ADLINK TECHNOLOGY INC.

EOS-2000

4-CH Compact Vision System

User's Manual

Manual Revision: 2.02

Revision Date: December 9, 2010

Part Number: 50-1Z065-1000

Advance Technologies; Automate the World.

Table of Contents

List of Tables

Preface

Copyright 2010 ADLINK TECHNOLOGY INC.

Disclaimer

The information in this document is subject to change without prior notice in order to improve reliability, design, and function and does not represent a commitment on the part of the manufacturer.

In no event will the manufacturer be liable for direct, indirect, special, incidental, or consequential damages arising out of the use or inability to use the product or documentation, even if advised of the possibility of such damages.

Trademarks

Borland® C/C++ and Delphi® are registered trademarks of the Borland Software Corporation. Intel® is a registered trademark of Intel Corporation. LabVIEW™ is a trademark of National Instruments Corporation. Linux® and the Linux® Logo are registered trademarks of Linus Torvalds. MATLAB® and the MATLAB Logo are registered trademarks of The MathWorks, Inc. Microsoft®, MS-DOS®, Windows® 95, Windows® 98, Windows NT®, Windows® 2000, Windows® 2003 Server®, Windows® XP, Windows Vista®, ActiveX®, Visual Studio®, Visual Basic®, Visual C#®, and Visual C++® are registered trademarks of Microsoft Corporation. PCI™, CompactPCI®, and PCI Express®, are registered trademarks of the Peripheral Component Interconnect Special Interest Group (PCI-SIG). PXI™ is a trademark of the PXI systems Alliance. VEE™ is a trademark of Agilent.

Product names mentioned herein are used for identification purposes only and may be trademarks and/or registered trademarks of their respective companies.

Getting Service

Contact us should you require any service or assistance.

ADLINK Technology Inc.
Address: 9F, No.166 Jian Yi Road, Chungho City,
Taipei County 235, Taiwan
台北縣中和市建一路 166 號 9 樓
Tel: +886-2-8226-5877
Fax: +886-2-8226-5717
Email: service@adlinktech.com

Ampro ADLINK Technology Inc.
Address: 5215 Hellyer Avenue, #110, San Jose, CA 95138, USA
Tel: +1-408-360-0200
Toll Free: +1-800-966-5200 (USA only)
Fax: +1-408-360-0222
Email: info@adlinktech.com

ADLINK Technology Beijing
Address: 北京市海淀区上地东路 1 号盈创动力大厦 E 座 801 室
(100085)
Rm. 801, Power Creative E, No. 1, B/D
Shang Di East Rd., Beijing 100085, China
Tel: +86-10-5885-8666
Fax: +86-10-5885-8625
Email: market@adlinktech.com

ADLINK Technology Shanghai
Address: 上海市漕河泾高科技开发区钦江路 333 号 39 幢 4 层
(200233)
Tel: +86-21-6495-5210
Fax: +86-21-5450-0414
Email: market@adlinktech.com

ADLINK Technology Shenzhen
Address: 深圳市南山区科技园南区高新南七道 数字技术园
A1 栋 2 楼 C 区 (518057)
2F, C Block, Bld. A1, Cyber-Tech Zone,
Gao Xin Ave. Sec 7, High-Tech Industrial Park S.,
Shenzhen, 518054 China
Tel: +86-755-2643-4858
Fax: +86-755-2664-6353
Email: market@adlinktech.com

ADLINK Technology (Europe) GmbH
Address: Nord Carree 3, 40477 Duesseldorf, Germany
Tel: +49-211-495-5552
Fax: +49-211-495-5557
Email: emea@adlinktech.com

ADLINK Technology, Inc. (French Liaison Office)
Address: 15 rue Emile Baudot, 91300 Massy CEDEX, France
Tel: +33 (0) 1 60 12 35 66
Fax: +33 (0) 1 60 12 35 66
Email: france@adlinktech.com

ADLINK Technology Japan Corporation
Address: 151-0072 東京都渋谷区幡ヶ谷
1-1-2 朝日生命幡ヶ谷ビル 8F
Asahiseimei Hatagaya Bldg. 8F
1-1-2 Hatagaya, Shibuya-ku, Tokyo 151-0072, Japan
Tel: +81-3-4455-3722
Fax: +81-3-5333-6040
Email: japan@adlinktech.com

ADLINK Technology, Inc. (Korean Liaison Office)
Address: 서울시 서초구 서초동 1506-25 한도 B/D 2 층
2F, Hando B/D, 1506-25, Seocho-Dong, Seocho-Gu,
Seoul 137-070, Korea
Tel: +82-2-2057-0565
Fax: +82-2-2057-0563
Email: korea@adlinktech.com

ADLINK Technology Singapore Pte. Ltd.
Address: 84 Genting Lane #07-02A, Cityneon Design Centre,
Singapore 349584
Tel: +65-6844-2261
Fax: +65-6844-2263
Email: singapore@adlinktech.com

ADLINK Technology Singapore Pte. Ltd. (Indian Liaison Office)
Address: No. 1357, "Anupama", Sri Aurobindo Marg, 9th Cross,
JP Nagar Phase I, Bangalore - 560078, India
Tel: +91-80-65605817
Fax: +91-80-22443548
Email: india@adlinktech.com

This page intentionally left blank.

1 Introduction

1.1 Product Overview

ADLINK's EOS-2000 is a rugged and embedded vision system that features an Intel® Multicore processor and four channel NTSC/PAL image acquisition. This system is ideal for high computing power and multi-camera imaging applications such as alignment, assembly inspection, and gauge.

By selecting long-life embedded components and incorporating system monitoring components to watch CPU temperature, fan speed, and system responsiveness, the EOS-2000 provides a very robust and reliable platform for mission critical applications.

1.1.1 Key Features

- Compact and rugged system design
- Embedded Intel® Core 2 Duo CPU
- Multi-camera support: up to four NTSC/PAL cameras
- Rich I/O support: RS-232/485, USB, and isolated digital I/Os
- Dual storage support: HDD and CompactFlash cards
- Hardware Monitoring: temperature, voltage, and watchdog

1.2 Specifications

EOS-2000

CPU	Intel® Core 2 Duo P8400, 2.26GHz
System Memory	Up to 4 GB DDR3
Camera Interface	4 Ch NTSC/PAL
Chipset	Intel® GM45 / ICH9 Chipset
VGA	Analog CRT support up to 1600 x 1200
USB	Four USB ports, USB 2.0 compliant
Audio	AC97, Mic In/Speaker Out
COM Ports	COM1/COM2: RS-232/RS-422/RS-485(BIOS Setting)
Digital I/O	16-CH Isolated Digital Input, and Output, 5.0 KV isolation protection
Keyboard/Mouse	Combed PS/2 type mini-DIN connectors
Power Supply	DC: 10~30 VDC, AT mode
AC: 100~240 VAC, AT mode	
Operating Temp.	0˚C to 55˚C
Humidity	0% to 90%
Dimensions	200(W) x 165(D) x 85(H) mm
Power Consumption	With 2 GB DDRAM, and 2GB CompactFlash, 50 W
Storage	One CompactFlash Type I; One 2.5' SATA HDD(Option)
Random Vibration	Operating: 5 to 100Hz, 0.00142 g2/Hz; 100 to 500Hz, -6 dB/Octave, 0.5 Grms, 3 axes, 30 minutes/axis
Safety Compliance	CE/FCC, RoHS

Table 1-1: EOS-2000 Specifications

Warning: Always disconnect the power cord from your chassis whenever you are working on it. Do not connect the power cord while the power switch is on. A sudden rush of power can damage sensitive electronic components. Only authorized and experienced electronics personnel should open the chassis.

Always ground yourself to remove any static electric charge before touching EOS-1000. Modern electronic devices are very sensitive to static electric charges. Use a grounding wrist strap at all times. Place all electronic components on a static-dissipative surface or in a static-shielded bag.

1.3 Unpacking Checklist

Before unpacking, check the shipping carton for any damage. If the shipping carton and/or contents are damaged, inform ADLINK immediately. Retain the shipping carton and packing materials for inspection. Obtain authorization from your dealer before returning any product to ADLINK, check if the following items are included in the package.

Product	Included Items
EOS-2000	▶ All-in-one support CD-ROM (software & manuals) ▶ Wall mounting kit: ▷ Wall mounting brackets (x2) ▷ M4 screws, 0.7 mm pitch, 5 mm length (x4) ▶ Power cord (L=1.8 M, country of use to be specified while ordering, for AC units only) ▶ PS/2 Y cable (x1) ▶ DSUB to BNC cable (x1)

Table 1-2: Unpacking Checklist

Note: The packaging for the OEM version with non-standard configuration, functionality, or package may vary according to different configuration requests.

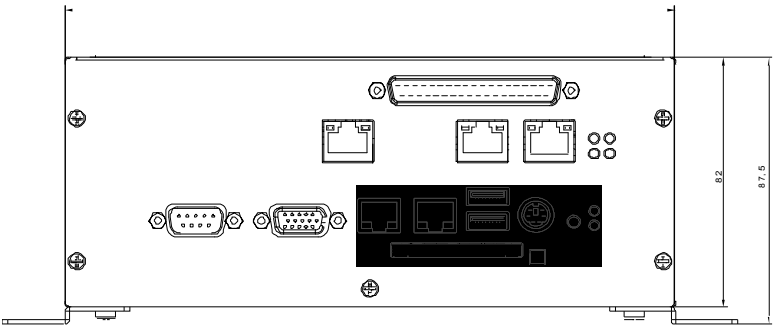
This page intentionally left blank.

2 System Description

This section describes the appearance and connectors of the EOS-2000, including chassis dimensions, front panel connectors, and internal IO connectors.

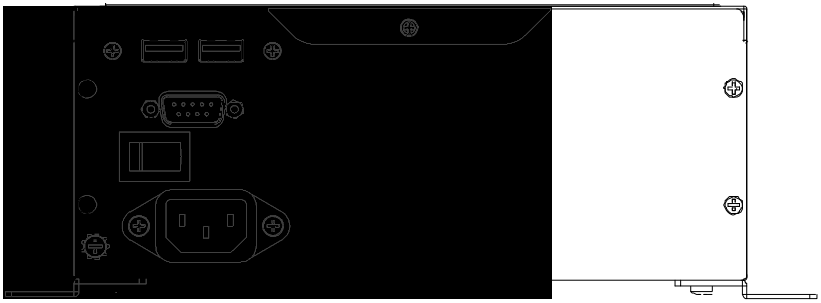
2.1 Mechanical Drawings

2.1.1 Front View

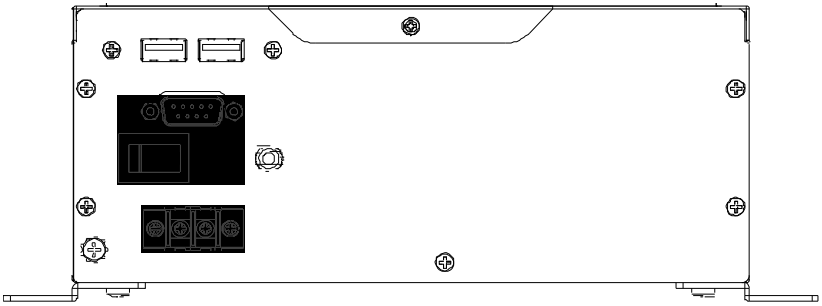


2.1.2 Rear View

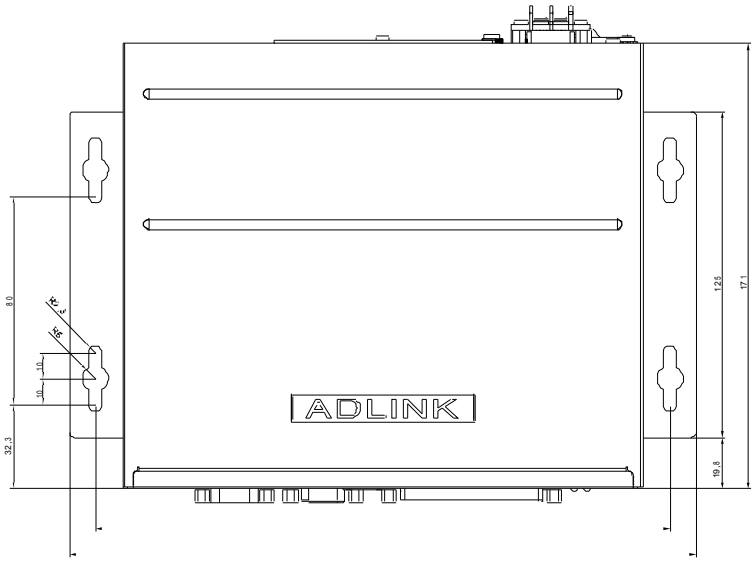
AC Power:



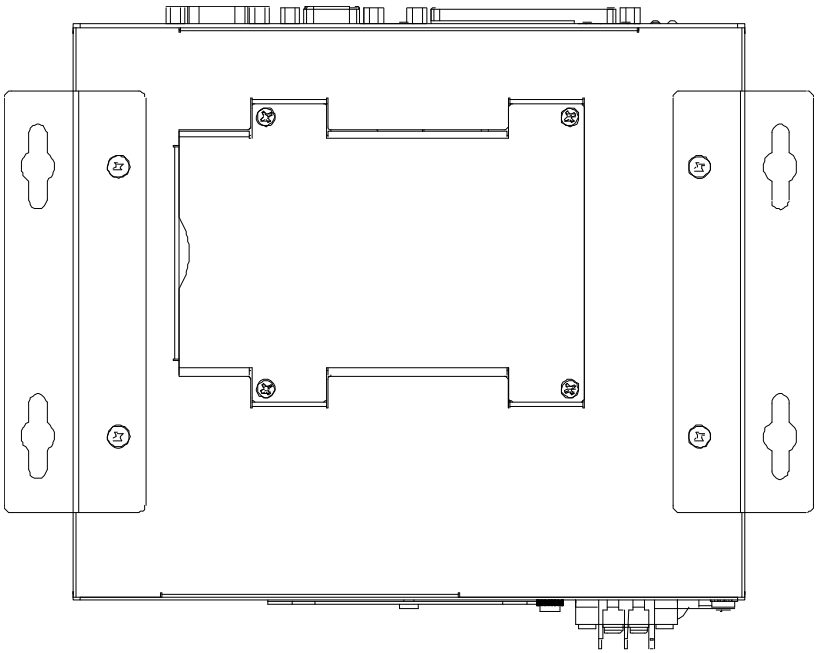
DC Power:



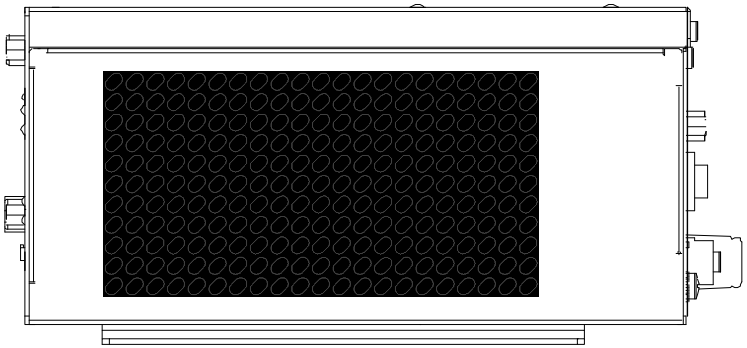
2.1.3 Top View



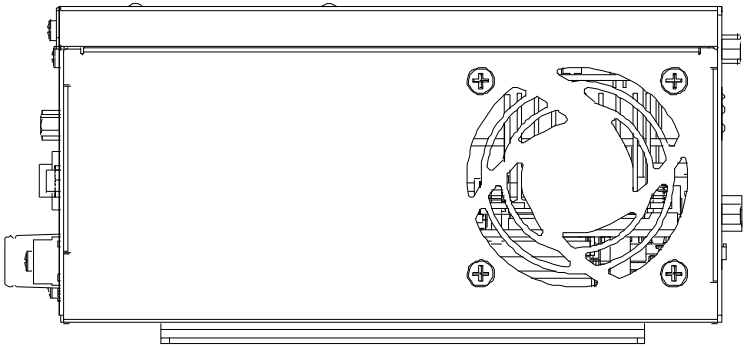
2.1.4 Bottom View



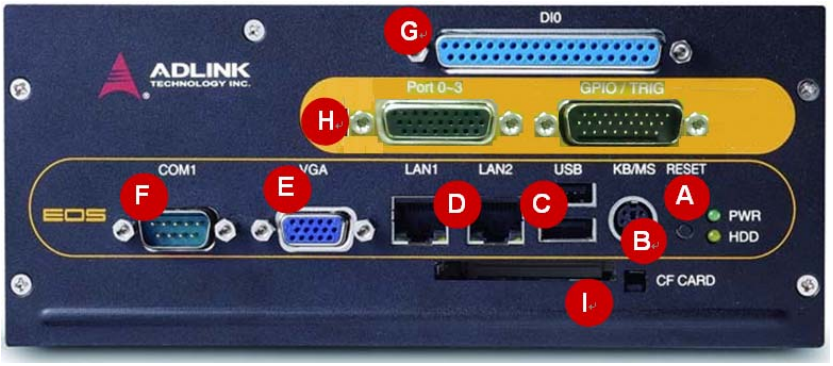
2.1.5 Side View (Right)



2.1.6 Side View (Left)



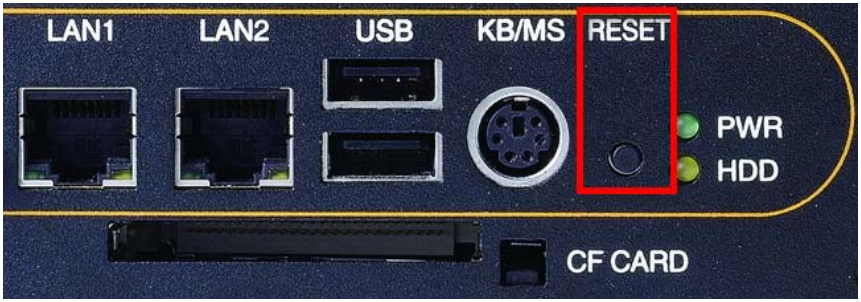
2.2 Front Panel I/O Connectors



Symbol	Function
A	Reset button
B	PS2 keyboard & mouse
C	USB2.0 ports
D	Dual Gigabit Ethernet ports
E	VGA connector
F	COM port
G	Digital I/O connector
H	4 channel Power over Ethernet Connectors
I	Compact Flash socket

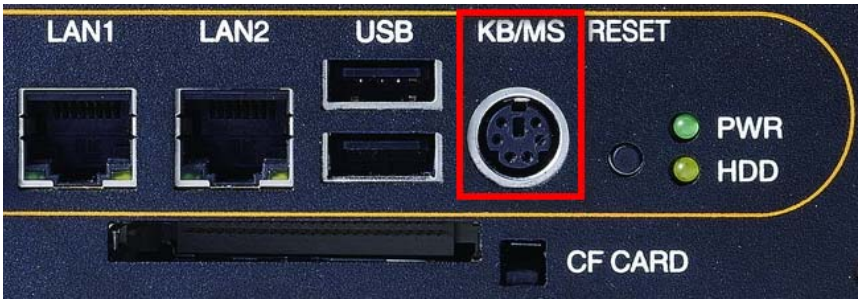
Figure 2-1: Front Panel I/O Connectors

2.2.1 Reset Button



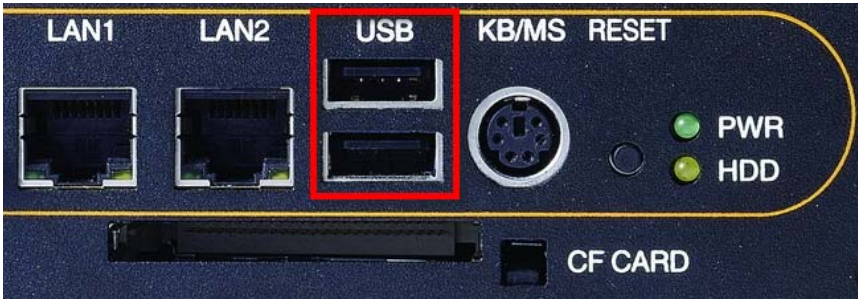
The reset button is used to perform a hard reset on the EOS-2000. A pin-like object can be used to push the reset button.

2.2.2 Keyboard and Mouse PS2 connectors



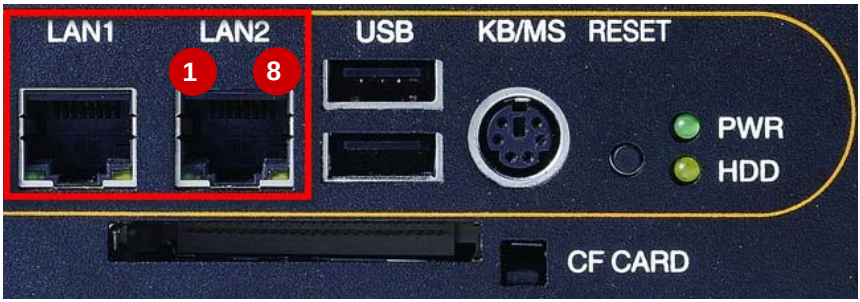
The EOS-2000 provides connectors for connecting PS2 keyboard and mouse. The green connector is for PS/2 mouse and the purple one is for PS/2 key-board.

2.2.3 USB 2.0 Connectors



The EOS-2000 provides two USB 2.0 ports via Type A USB connectors on the front panel. All USB ports are compatible with high-speed, full-speed and low-speed USB devices. The EOS-2000 supports multiple boot devices, including USB flash drives, USB external hard drive, USB floppy, USB CD-ROM, etc. The boot priority and boot device can be configured in the BIOS.

2.2.4 Gigabit Ethernet Ports



Pin	Signal	Pin	Signal
1	MDI0+	5	MDI2-
2	MDI0-	6	MDI1-
3	MDI1+	7	MDI3+
4	MDI2+	8	MDI3-

Table 2-1: Gigabit Ethernet Port Pinout

2.2.5 VGA Connector

The D-sub 15-pin VGA connector is used to connect the EOS-2000 to a monitor. The EOS-2000 supports only analog (VGA) monitors.

2.2.6 COM1 Port

The EOS-2000 provides one COM port in the form of D-Sub 9P connectors on the front panel. The COM1 port supports RS-232 only.

Pin	Signal Name	Pin	Signal Name
RS-232			
1	DCD#	6	DSR#
2	RXD#	7	RTS#
3	TXD#	8	CTS#
4	DTR#	9	RI#
5	GND		

Table 2-2: COM1 Port Pinout

2.2.7 Digital I/O (PCM-7230+)

The EOS-2000 features a 16 channels isolated digital I/O card (PCM-7230+). The onboard digital I/O card supports the following features:

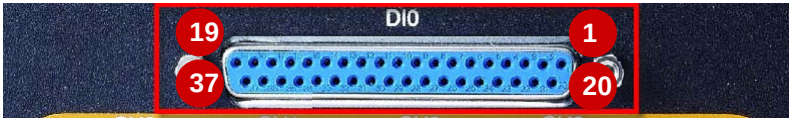
16-CH Isolated DI

- Logic high: 3 – 24 V
- Logic low: 0 – 1 V
- Input resistance: 1.2 k @ 0.5 W
- Isolation voltage: 1000 Vrms
- Interrupt source: DI channel 0 and 1

16-CH Isolated DO

- Output type: Darlington transistors
- Output voltage: open collector 5 V(min.), up to 35 VDC(max.)
- Sink current:
  - 500 mA max @ 100% duty, for one of the eight transistor devices ON
  - 370 mA @ duty 10% for all transistors devices ON
  - 140 mA @ duty 50% for all transistors devices ON

  Note: the pulse width is 25 ms for one duty cycle
- Isolated voltage: 1000 Vrms @ 10 seconds



Pin	Signal Name	Pin	Signal Name	Pin	Signal Name
1	IDI_0	14	IDO_6	27	IDI_15
2	IDI_2	15	IDO_8	28	EOGND
3	IDI_4	16	IDO_10	29	EOGND
4	IDI_6	1	IDO_12	30	IDO_1
5	IDI_8	18	IDO_14	31	IDO_3
6	IDI_10	19	VDD	32	IDO_5
7	IDI_12	20	IDI_1	33	IDO_7
8	IDI_14	21	IDI_3	34	IDO_9
9	EICOM	22	IDI_5	35	IDO_11
10	EOGND	23	IDI_7	36	IDO_13
11	IDO_0	24	IDI_9	37	IDO_15
12	IDO_2	25	IDI_11		
13	IDO_4	26	IDI_13		

Table 2-3: Digital I/O Pinout

Legend:

IDI_n: Isolated digital input channel #n.

IDO_n: Isolated digital output channel #n.

EOCOM: Common Ground or Common power of isolated input channels.

EOGND: Ground return path of isolated output channels.

VDD: Power input signal for fly-wheel diode of DO channels.

Note: The VDD must be supplied by an external power supply of 5 to 35 VDC

2.2.8 Analog Video Input Port (RTV24)

This port ccepts standard composite color (PAL, NTSC) or monochrome video formats (CCIR, EIA). The square-pixel and broadcast resolutions are programmable (640 x 480 or 768 x 576). Before images are transferred into the PC's memory, the resolution can be scaled down using selectable ratios. Arbitrary cropping to regions of interest is supported. The RTV series generates bitmaps in all popular color formats such as RGB.

Image Acquisition Speed

NTSC	1 Camera	2 Cameras	3 Cameras	4 Cameras
Fields	60	120	180	240
Frames	30	60	90	120
PAL	**1 Camera**	**2 Cameras**	**3 Cameras**	**4 Cameras**
Fields	50	100	150	200
Frames	25	50	75	100

Table 2-4: Image Acquisition Speed

Color Image

The color video format is compatible with the following composite video input formats: NTSC-M, NTSC-Japan, PCL-B, PAL-D, PAL-G, PAL-H, PAL-I, PAM-M, PAL-N, and SECAM

Monochrome Image

The monochrome video acquisition is compatible with CCIR and EIA (RS-170)

Optional Scaling

Optional scaling of acquired image or portions of an image.

- Acquisition of a programmable area of interest
- Scaling of the image (down to 1:16)
- Adjustment of hue (for NTSC signals), contrast (0 to 200%), brightness and saturation (0 to 200% for U and V signals)
- Automatic chrominance gain control

GPIO

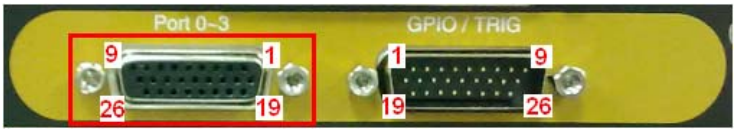
The RTV24 is also ideal for automation applications by providing four of each isolated digital inputs and outputs.

Power Output

Provides DC +12V, max. 1A output (GPIO connector pin 25)

Note: This power is not isolated with the system, but its ground is the reference GND pin.

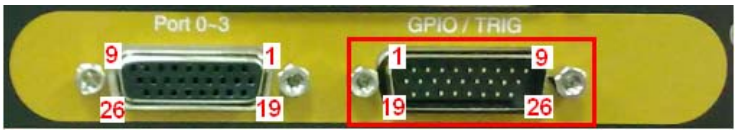
Video Prots 0-3



Pin	Signal Name	Pin	Signal Name	Pin	Signal Name
1	Port 0 video in	10	GND	19	Port 3 video in
2	--	11	GND	20	--
3	--	12	GND	21	--
4	Port 1 video in	13	GND	22	GND
5	--	14	GND	23	GND
6	--	15	GND	24	GND
7	Port 2 video in	16	GND	25	GND
8	--	17	GND	26	GND
9	--	18	GND		

Table 2-5: Video Ports 0 - 3 Pinout

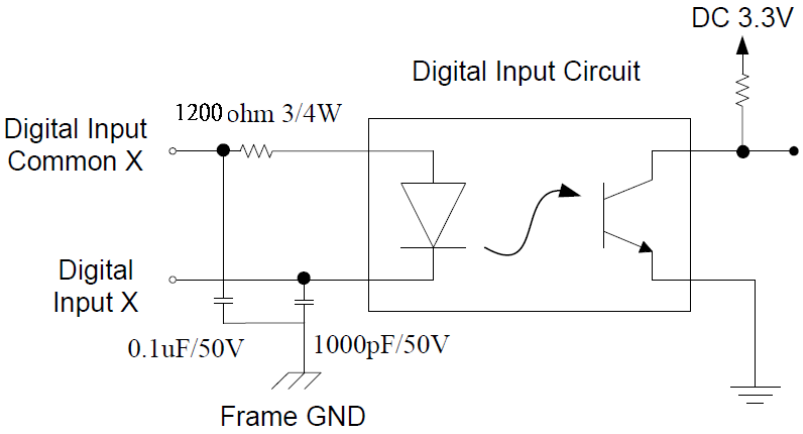
GPIO



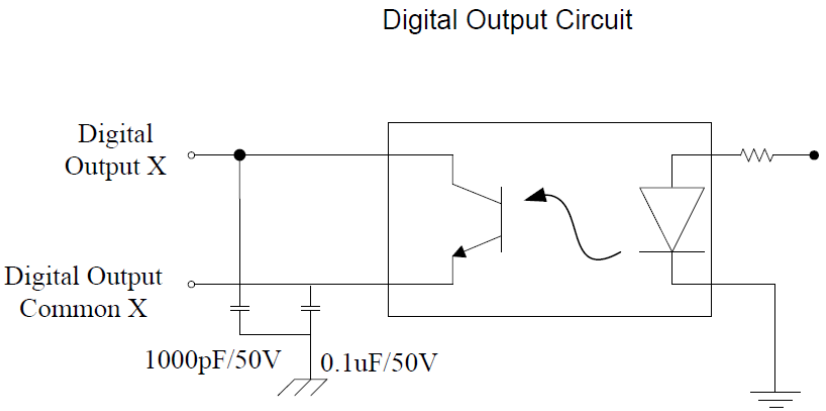
Pin	Signal Name	Pin	Signal Name	Pin	Signal Name
1	In0	10	Out0	19	--
2	ComI0	11	ComO0	20	--
3	In1	12	Out1	21	--
4	ComI1	13	ComO1	22	--
5	In2	14	Out2	23	--
6	ComI2	15	ComO2	24	--
7	In3	16	Out3	25	12V out,
8	ComI3	17	ComO3	26	GND
9	Frame GND	18	Frame GND		

Table 2-6: GPIO Pinout

Digital Input Circuit



Digital Output Circuit



GPIO Features

Function	Electronic Specification
Isolated Digital Input	Photo Coupled Input x 4 ch
Status	Normal is High
Input voltage range (Coml to In)	0 to 25 V
High Level (active off)	Coml to In < 0.5 V
Low Level (active on)	Coml to In > 2.2 V
Isolated Digital Output	Photo Coupled Output x 4 ch
Status	Normal is Close
Load voltage range	3 to 24V
Output sink current	80 mA (Max)
Output voltage drop	1.0 V (Max)
Leak current	0.1 mA (Max)
Reverse voltage	-6 V

Table 2-7: GPIO Hardware Features

2.2.9 CompactFlash Socket

The CompactFlash socket of EOS supports both DMA and PIO mode.

2.3 Back Panel I/O Connectors

Item	Function	Item	Function
J	USB2.0 ports	M	Mic in and speaker out
K	COM port	N	Power in (AC model shown)
L	Power switch	O	Chassis ground

Table 2-8: Back Panel I/O Connectors

2.3.1 USB 2.0 Connectors

The EOS-2000 provides two USB 2.0 ports as Type A USB connectors on the back panel. All USB ports are compatible with high-speed, full-speed and low-speed USB devices. The EOS-2000 supports multiple boot devices, including USB flash drive, USB external hard drive, USB floppy, USB CD-ROM and etc. The boot priority and boot device can be configured in BIOS.

2.3.2 COM2 Port

The EOS-2000 provides one COM port in the form of D-Sub 9P connectors on the front panel. COM2 port supports RS-232 only.

Pin	Signal Name	Pin	Signal Name
RS-232			
1	DCD#	6	DSR#
2	RXD#	7	RTS#
3	TXD#	8	CTS#
4	DTR#	9	RI#
5	GND		

Table 2-9: COM2 Port Pinout

2.3.3 Power Switch

O	Off
I	On

Table 2-10: Power Switch

2.3.4 AC Power Input Connector

The AC power input connector is a standard 100-240 VAC 50/60 Hz three-pin connector.

2.3.5 DC Power Input Connector

The DC power input connector of the EOS-2000 controller consists of two pins, V+ and V- from left to right respectively. V+ and V- pins are for DC power input. The DC power input of EOS-2000 allows a voltage input from 10 VDC to 30 VDC.

2.3.6 Chassis Ground

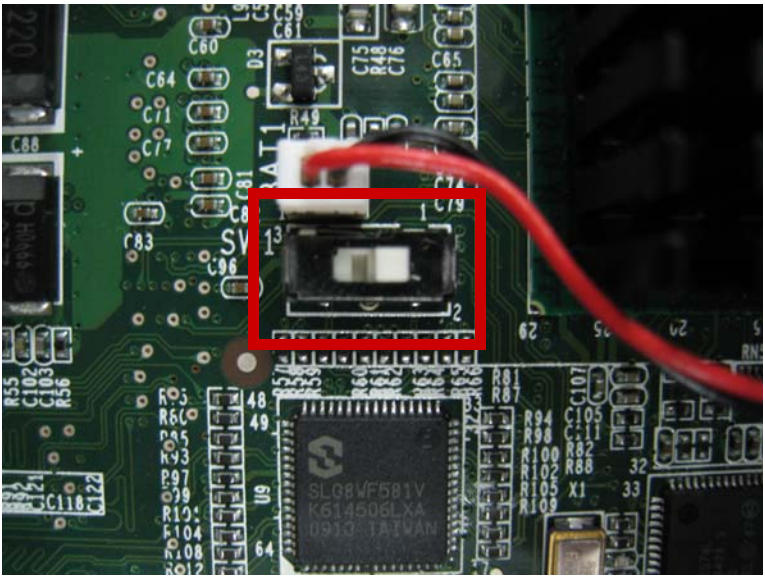
The chassis ground, isolated from power ground, is shorted to the internal signal ground.

2.4 Internal I/O Connectors

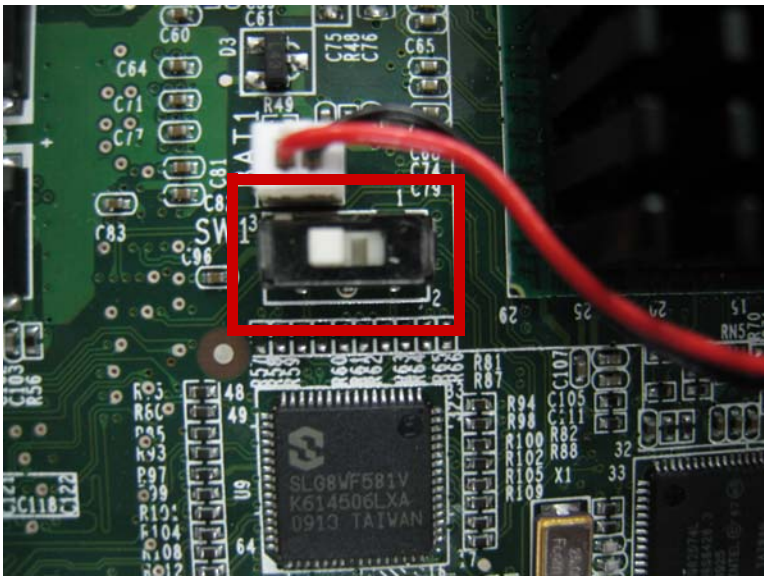
2.4.1Clear CMOS Switch

If abnormal condition that causes the EOS-2000 controller fail to boot are experienced, you can try to clear the BIOS content stored in the CMOS and restore to the default setting. To clear the CMOS, just press the button and hold for 1-2 seconds before release it. The CMOS will then be restored to its factory default setting.

Normal Mode:



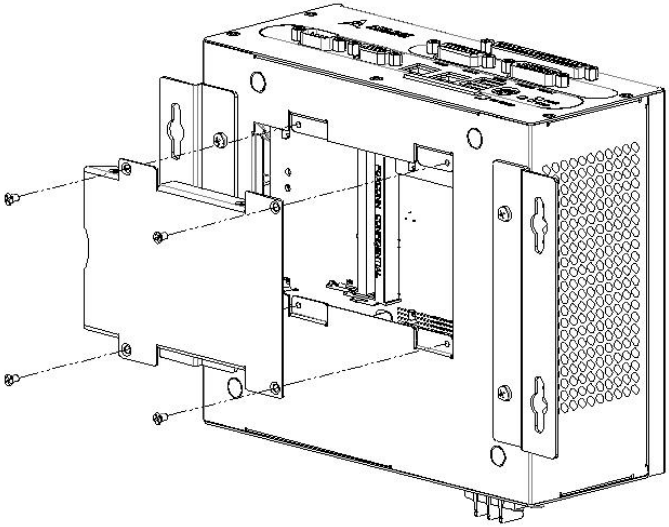
Clear CMOS Mode:



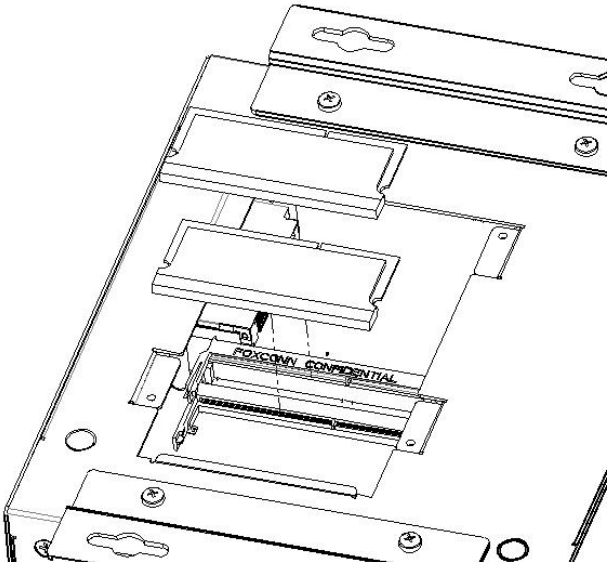
3 Basic Installation

3.1 Installing the Memory

1. Remove the four screws in the figure below.

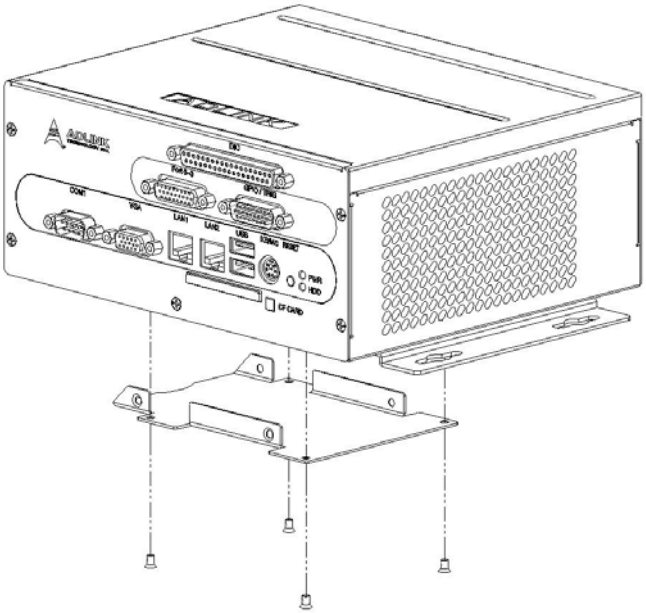


2. Insert the memory module into the DDR3 SO-DIMM at a 45 degree angle. Then put down until the memory module snaps into place.

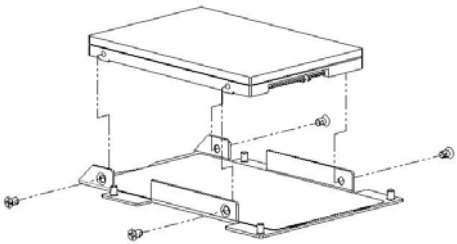


3.2 Installing the Hard Drive

1. Remove the four screws and unload the hard drive cover in the figure below.

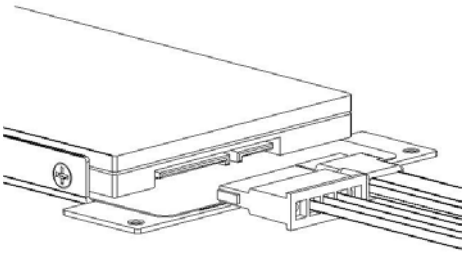


2. Secure the hard drive on the hard drive cover.

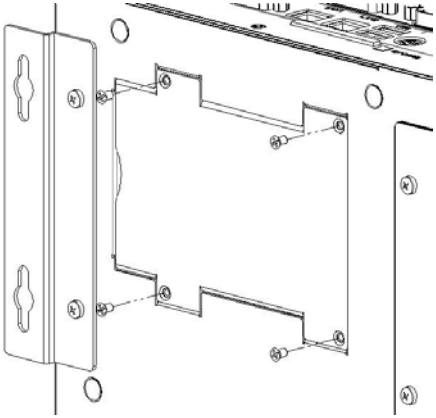


.

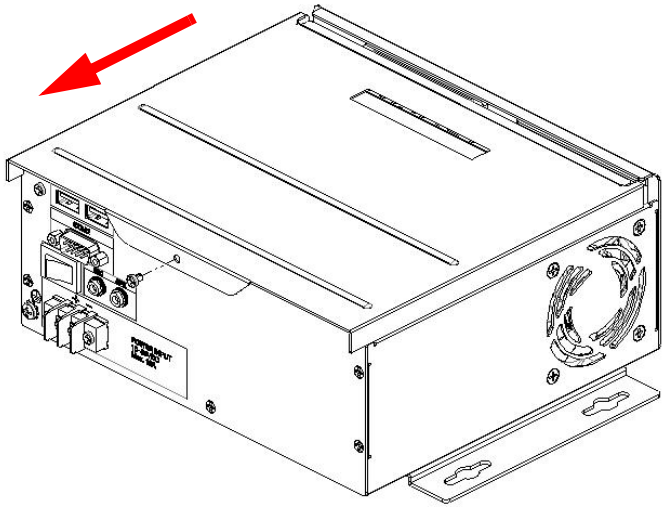
3. Insert the SATA power cable and data cable on the hard drive.

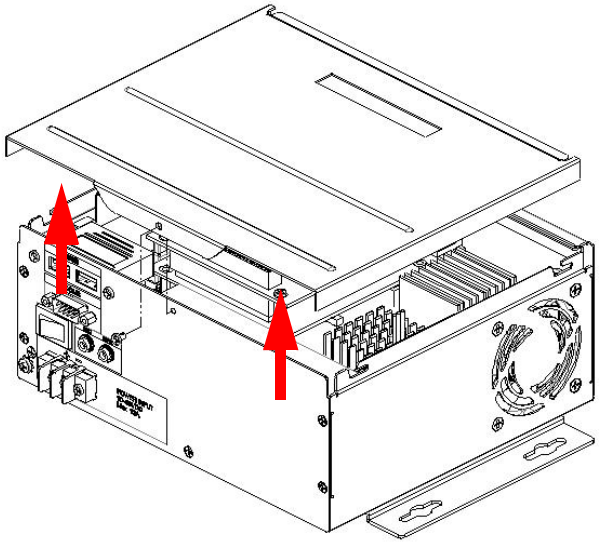


4. Secure the hard drive cover back.

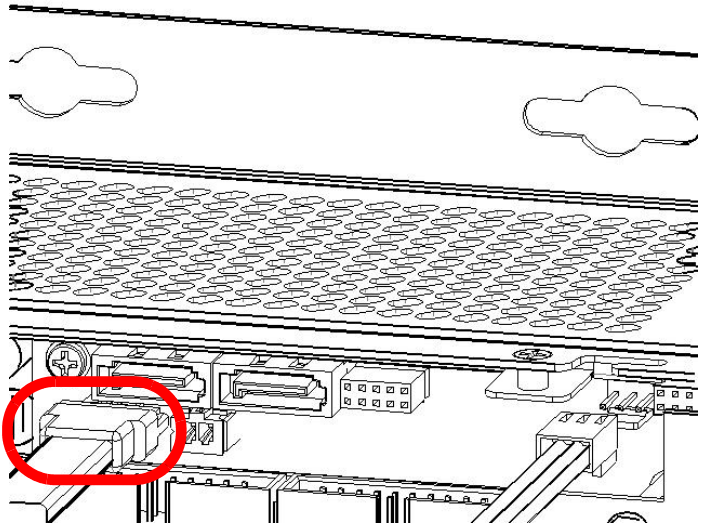


5. Remove the chassis top cover.



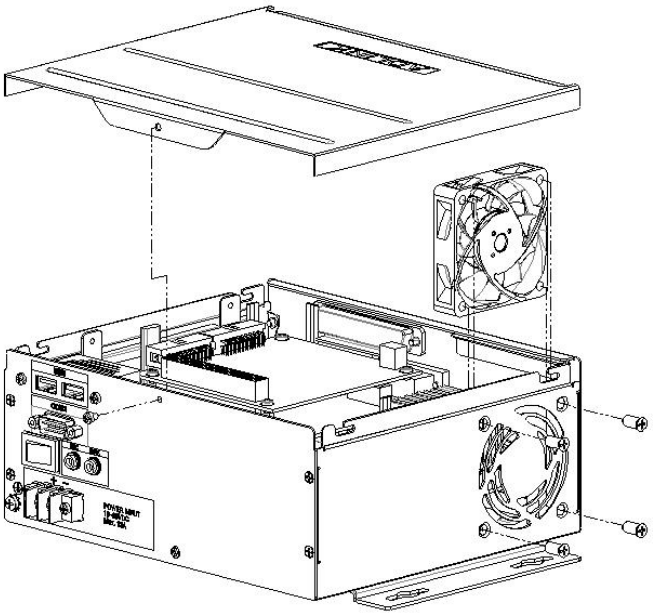


6. Insert the SATA data cable.

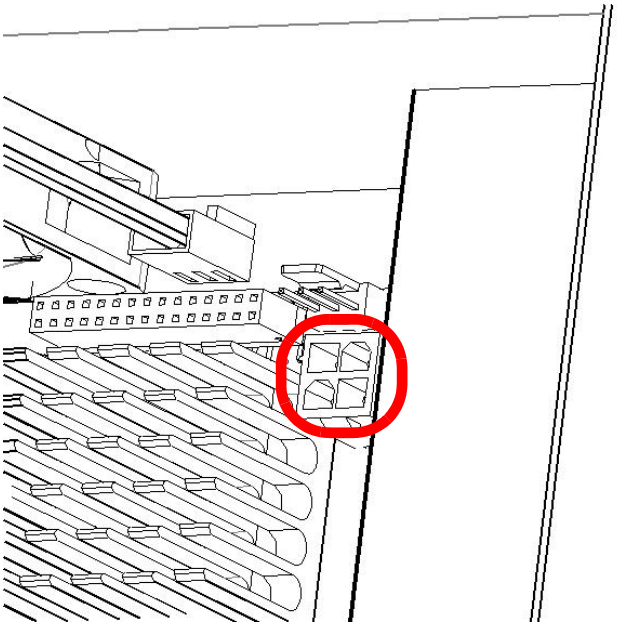


3.3 Installing the Fan

1. Remove the box cover and secure the fan on the side of box.

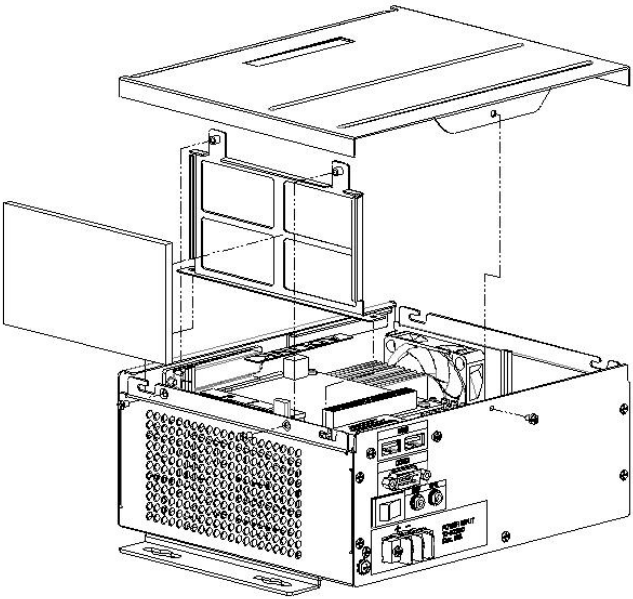


2. Insert the fan power cable on the power connector on the motherboard (RB-850).



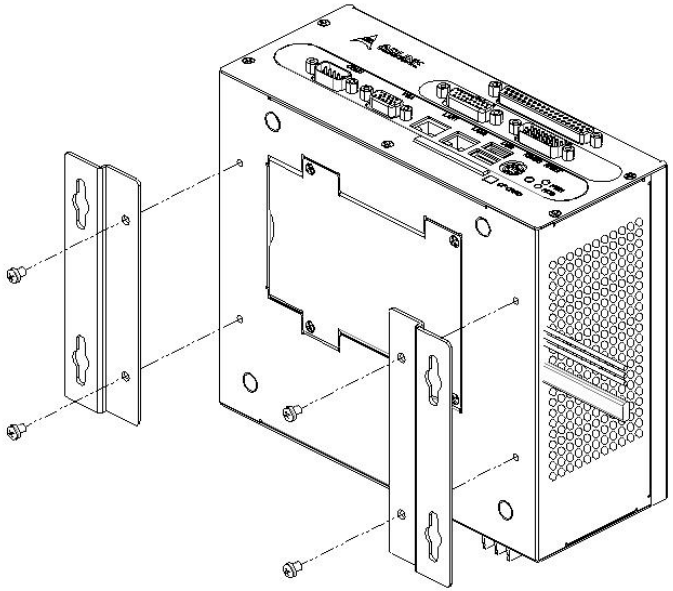
3.4 Installing the filter

1. Remove the box cover and stick the mesh on the filter, then secure the filter on the side of box.



3.5 Installing the Wallmount Brackets

1. Secure the wallmount brackets on the bottom of box.



4 Software Support

Selecting an operating system (OS) suitable for the application requirements is vital for system developers. The EOS-2000 is compatible with several operating systems for maximum flexibility.

4.1 Operation System Support

4.1.1 Windows XP

Windows XP supports the EOS-2000 chipset drivers, allowing simple installation of this OS. ADLINK also provides pre-installation services for Windows XP on the EOS-2000 (requires the Windows XP license to be pre-purchased from ADLINK).

4.1.2 Windows XP Embedded

Windows XP is a multitasking OS known for its stability. As a result of its overwhelming popularity, human-machine interfaces, and plentiful development tools, developing applications in Windows XP is comparatively simple. Microsoft carried over the advantages of Windows XP when releasing Embedded XP. The concept behind the design of Embedded XP is simply a modularized Windows XP. System developers only select the needed Windows XP components and functions and then organize them together to construct an XP Embedded OS.

By using this architectural modularization, system integrators can readily reduce the storage space requirements of XP Embedded. The only factor determining storage space requirements is the number of function modules needed. Because XP Embedded is completely compatible with Windows XP, developers can compile controller software in the Windows XP environment, and then transfer the code to Embedded XP for immediate use. System developers do not need to learn any new tools to use XP Embedded. Their experience on Windows XP can be directly transferred to XP Embedded, thus lowering software development costs. Another advantage is that the cost of licensing Embedded XP is much less than that of Windows XP.

ADLINK currently provides standard XP Embedded OS images for the EOS-2000 (XP Embedded license pre-purchase from ADLINK is required). The standard XP Embedded OS image provided by ADLINK is about 1.4 GB, and the key features included in the standard XP Embedded OS image are as follows

- XP Embedded OS Kernel
- Drivers for EOS H/W and peripheral cards
- TCP/IP Networking
- TCP/IP with file sharing and client for Microsoft network
- Internet Explorer
- File Manager
- Language Support

The standard XP Embedded OS image meets most application needs. If you have special functional requirements for XP Embedded, please contact ADLINK for more details about this OEM service.

4.2 Driver Installation

After installing the operating system, you need to install all related drivers to make your system work accordingly. This section describes the drivers needed for Windows operating systems and the procedures to install them. For other OS support, please contact ADLINK for further information.

To install Windows drivers, please follow the steps below:

1. Properly install Windows before installing any drivers. Most of the standard I/O device drivers have been included in Windows.
2. Install the chipset driver.
3. Install the graphics driver.
4. Install the PCMe-RTV23 driver.
5. Install the audio driver.
6. Install the PCM-7230+ driver.

4.2.1 Installing the Chipset Driver

The chipset driver outlines to the operating system how to configure the Intel® GM45 chipset components in order to ensure that the following features function properly:

- Core PCI and ISAPNP Services
- PCIe Support
- SATA Storage Support
- USB Support
- Identification of Intel® Chipset Components in the Device Manager

Please follow the following steps to install the chipset driver:

1. Close any running applications
2. Execute Chipset.exe and follow the on-screen instructions to complete the setup
3. Reboot your system

4.2.2 Installing the Graphics Driver

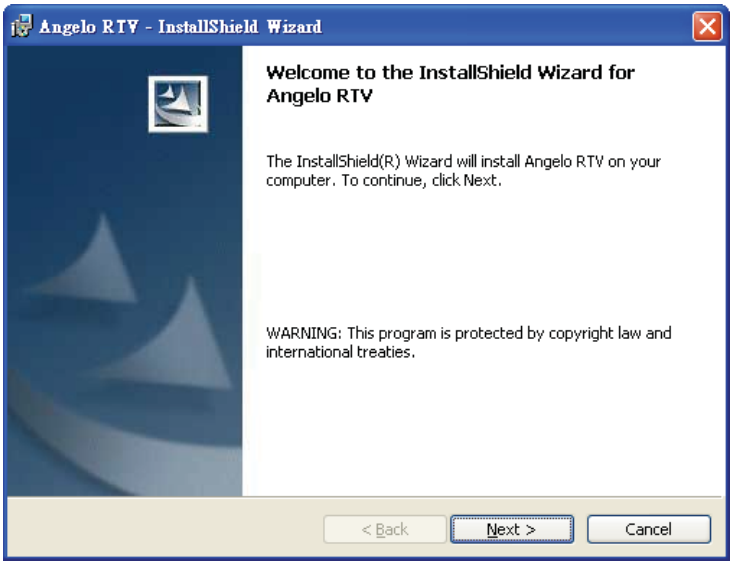
The EOS-2000 is equipped with the Intel® GMA4500 graphics media accelerator integrated in the Intel Mobile Intel® GM45 chip-set. Please follow the following steps to install graphics driver:

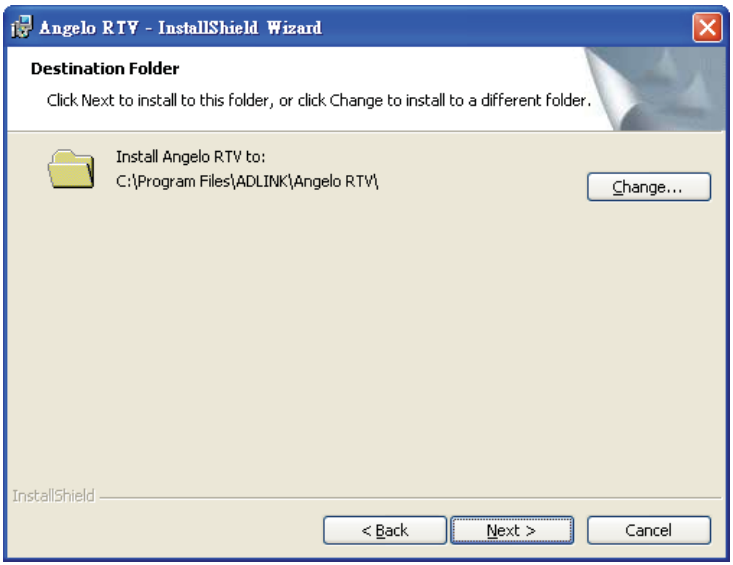
1. Close any running applications
2. Execute Video.exe and follow the on-screen instructions to complete the setup
3. Reboot your system

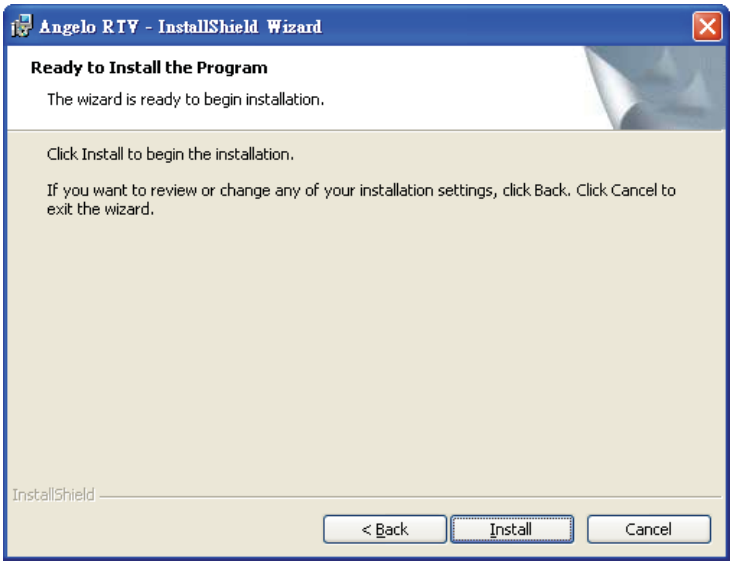
4.2.3 Installing the PCMe-RTV24 Driver

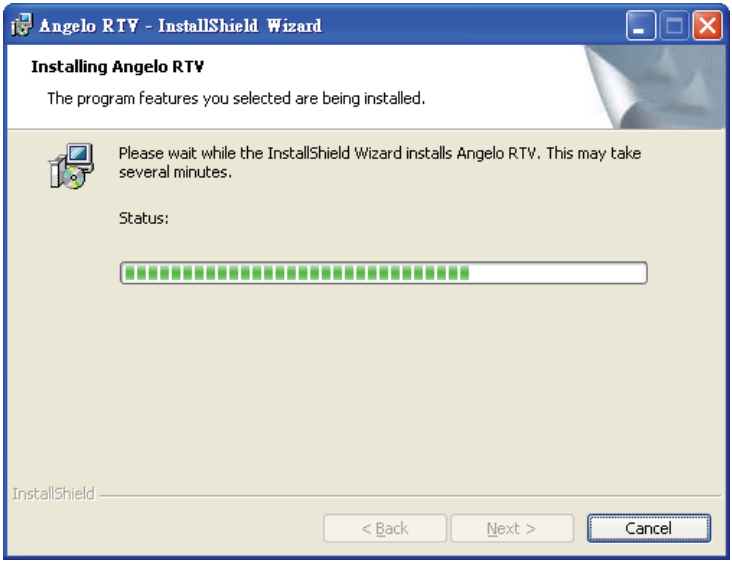
4.2.3.1 WDM Driver Installation

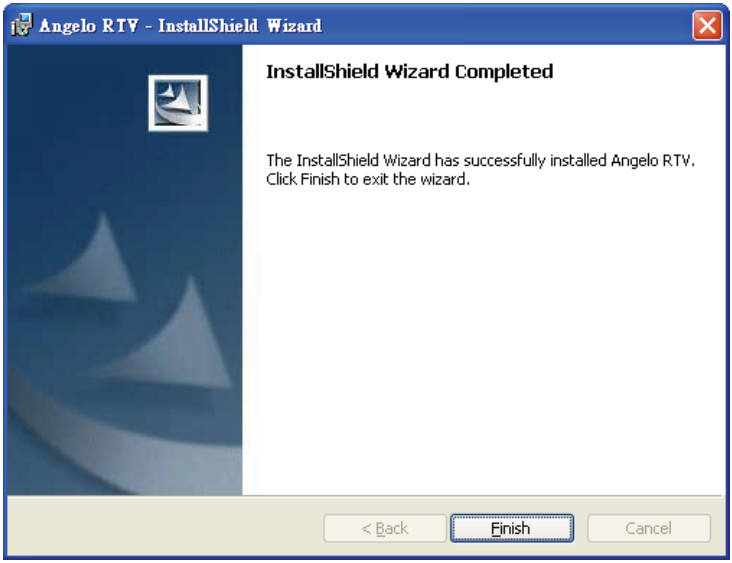
1. Run setup.
2. Click Next until the driver is completely installed.



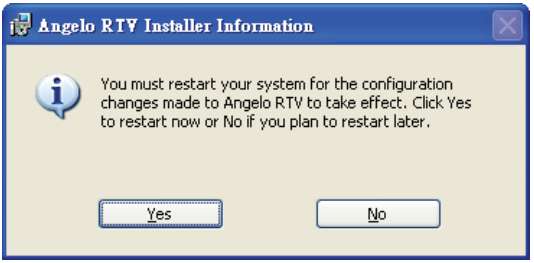

Angelo RTV - InstallShield Wizard
Destination Folder
Click Next to install to this folder, or click Change to install to a different folder.
Install Angelo RTV to:
C:\Program Files\ADLINK\Angelo RTV\
Change...
InstallShield
< Back
Next >
Cancel


Angelo RTV - InstallShield Wizard
Ready to Install the Program
The wizard is ready to begin installation.
Click Install to begin the installation.
If you want to review or change any of your installation settings, click Back. Click Cancel to exit the wizard.
InstallShield
< Back
Install
Cancel


Angelo RTV - InstallShield Wizard
Installing Angelo RTV
The program features you selected are being installed.
Please wait while the InstallShield Wizard installs Angelo RTV. This may take several minutes.
Status:
InstallShield
< Back
Next >
Cancel

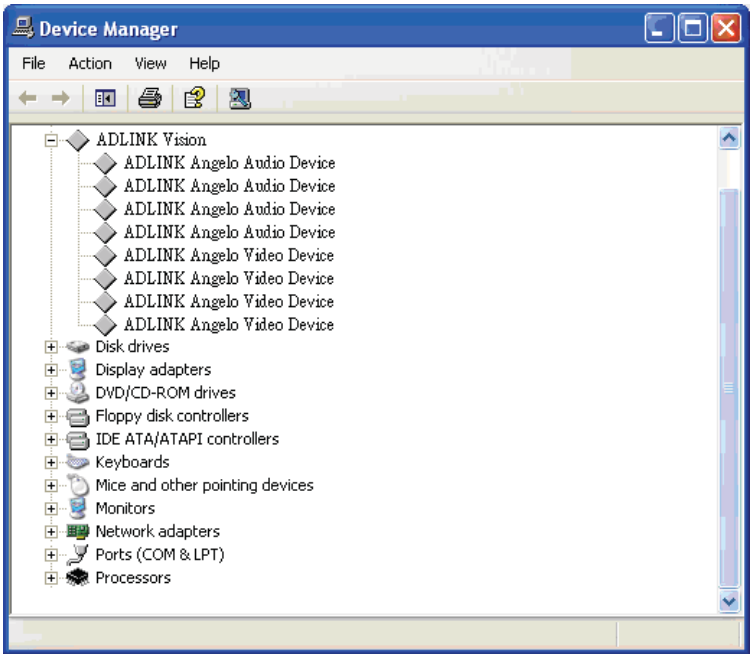

Angelo RTV - InstallShield Wizard
InstallShield Wizard Completed
The InstallShield Wizard has successfully installed Angelo RTV. Click Finish to exit the wizard.
< Back
Finish
Cancel

3. Click yes and restart system.



4. Open the Device Manager and check for the following 8 items:
   - ▷ ADLINK Angelo Audio Device (4 instances)
   - ▷ ADLINK Angelo Video Device (4 instances)

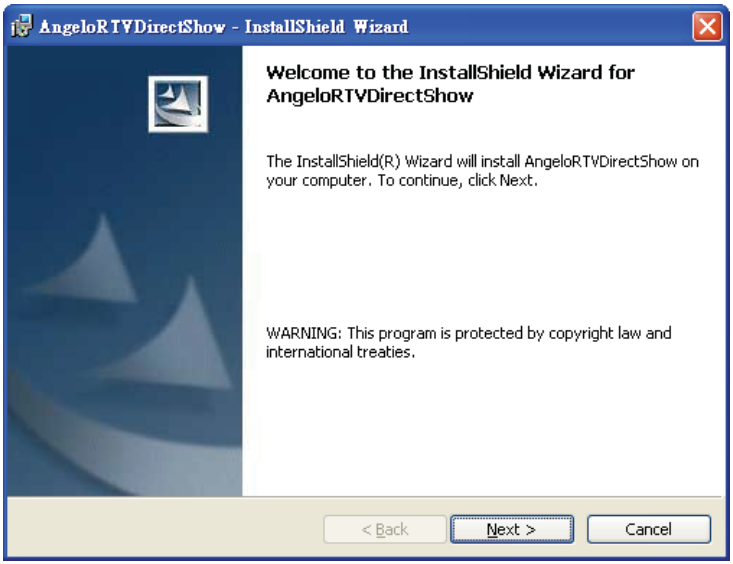
The Device Manager should be as follows:

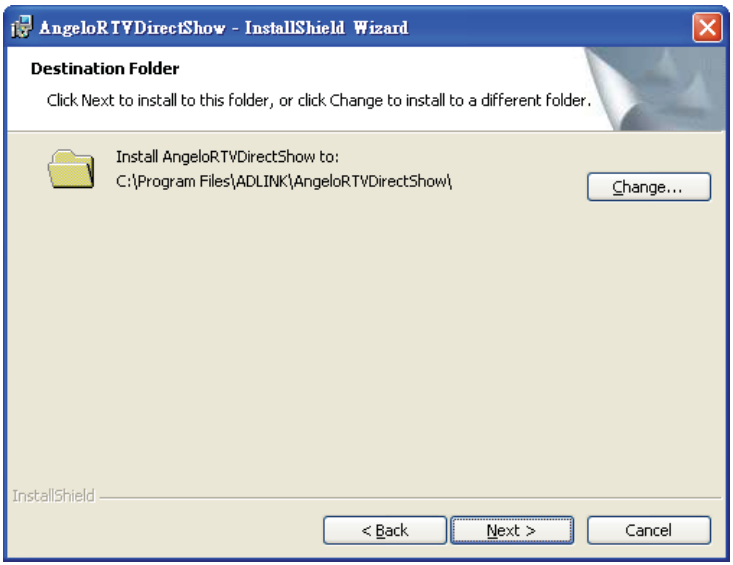


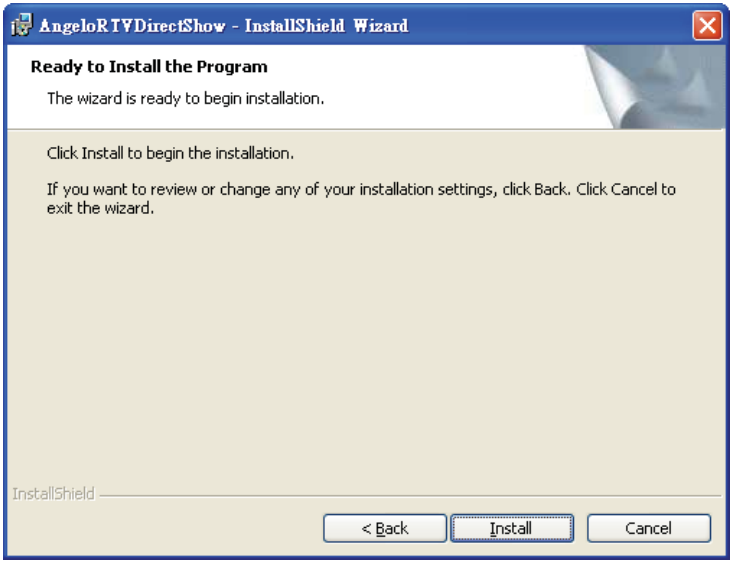
Note: If using Windows Vista, the User Account Control (UAC) needs to be turned off before using the device. To turn off the UAC, go to [Start] - [Settings] - [Control Panel] - [User Accounts] - [Turn User Account Control on or off]. Uncheck the UAC and restart the computer, then the device can work normally.

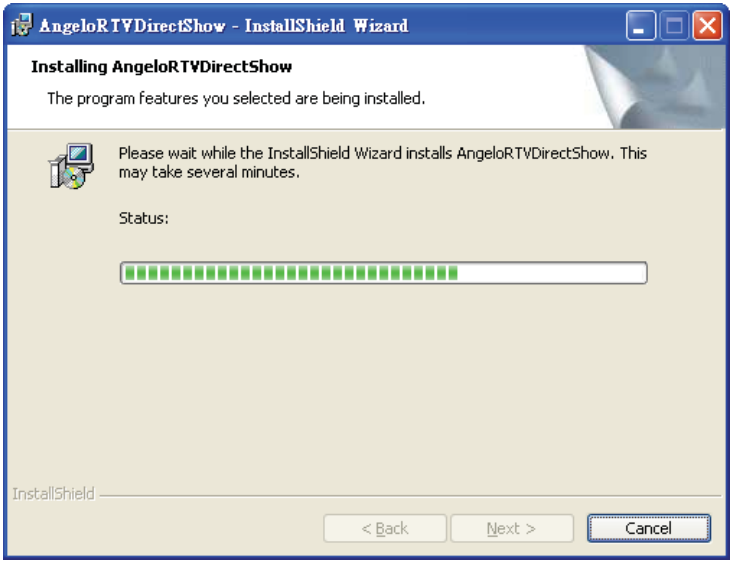
4.2.3.2 DirectShow Driver Installation

1. Run setup.
2. Click Next until the driver is completely installed.

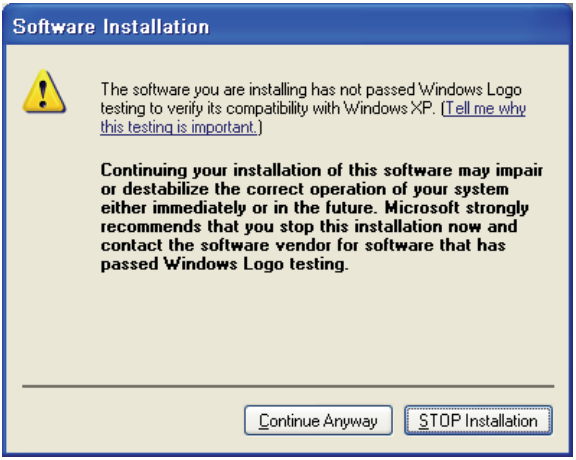


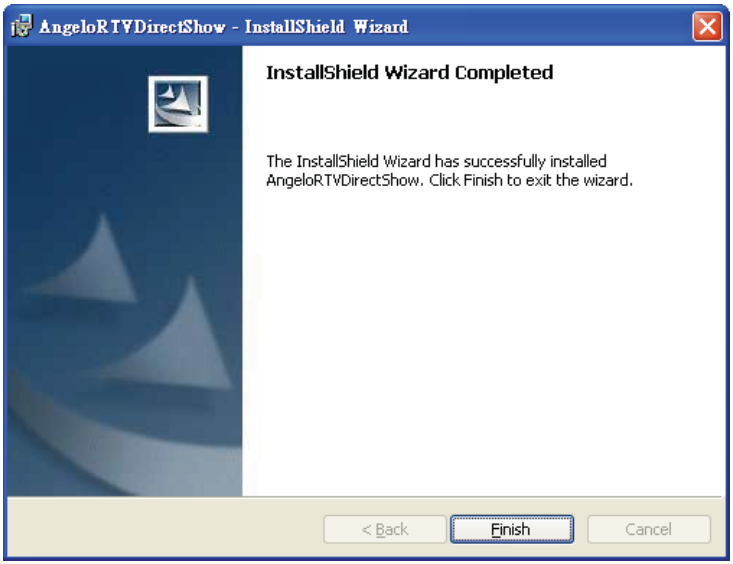



AngeloRTVDirectShow - InstallShield Wizard
Ready to Install the Program
The wizard is ready to begin installation.
Click Install to begin the installation.
If you want to review or change any of your installation settings, click Back. Click Cancel to exit the wizard.
InstallShield
< Back
Install
Cancel


AngeloRTVDirectShow - InstallShield Wizard
Installing AngeloRTVDirectShow
The program features you selected are being installed.
Please wait while the InstallShield Wizard installs AngeloRTVDirectShow. This may take several minutes.
Status:
InstallShield
< Back
Next >
Cancel

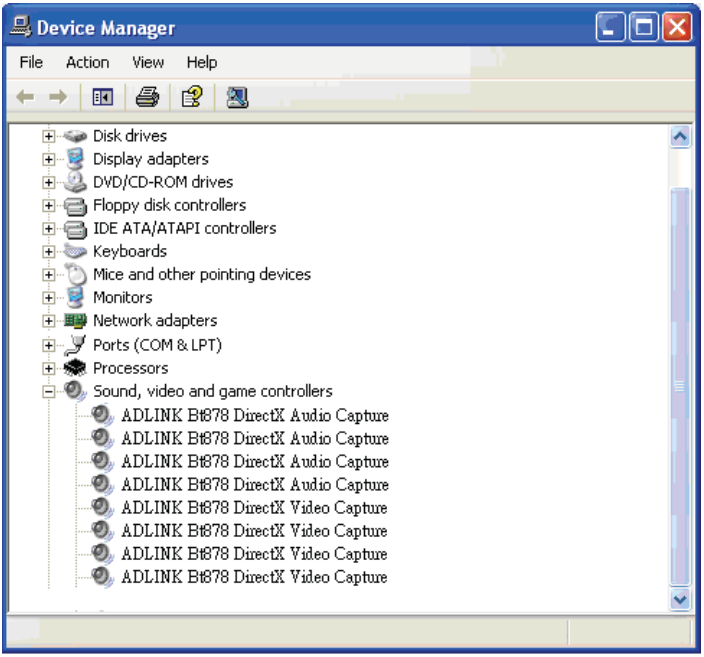
3. When the following window appears, please click "Continue Anyway".





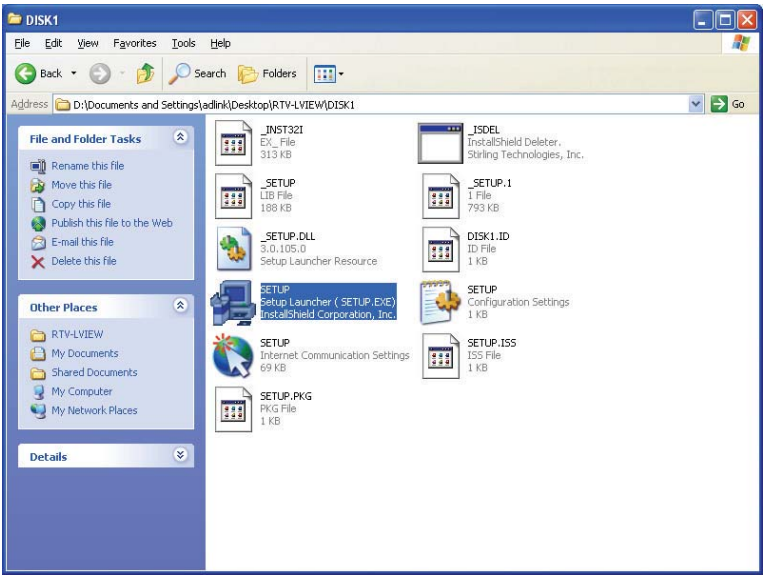
4. Open the Device Manager and check for the following 8 items:
   - ▷ ADLINK Bt878 DirectX Audio Capture (4 instances)
   - ▷ ADLINK Bt878 DirectX Video Capture (4 instances)

The Device Manager should be as follows:

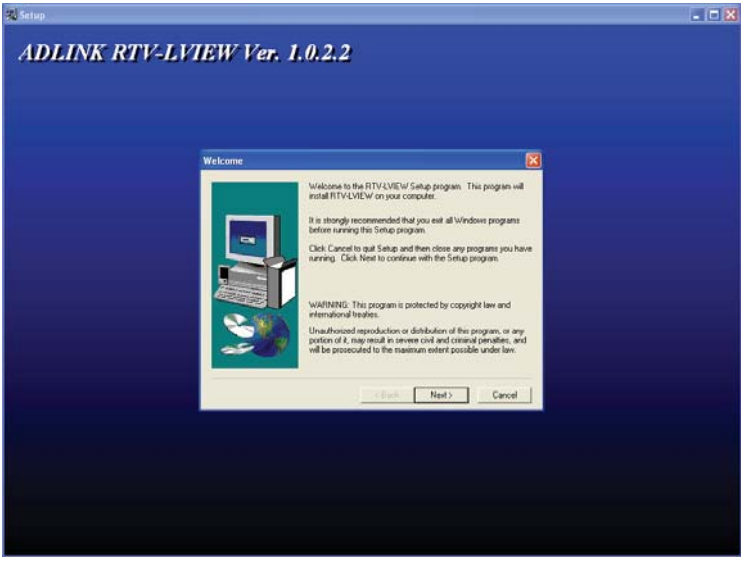


4.2.3.3 RTV-LVIEW Installation

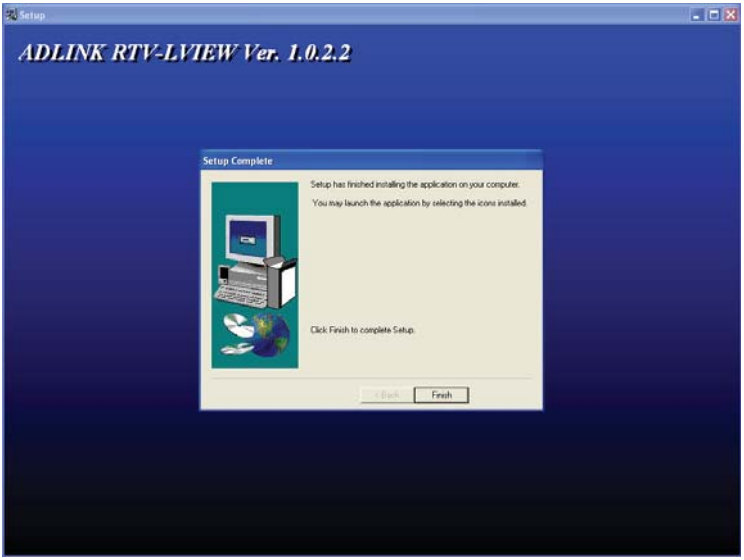
1. Double-click the setup.exe file to start RTV-LVIEW installation.



2. Continuously click the Next button to install RTV-LVIEW.

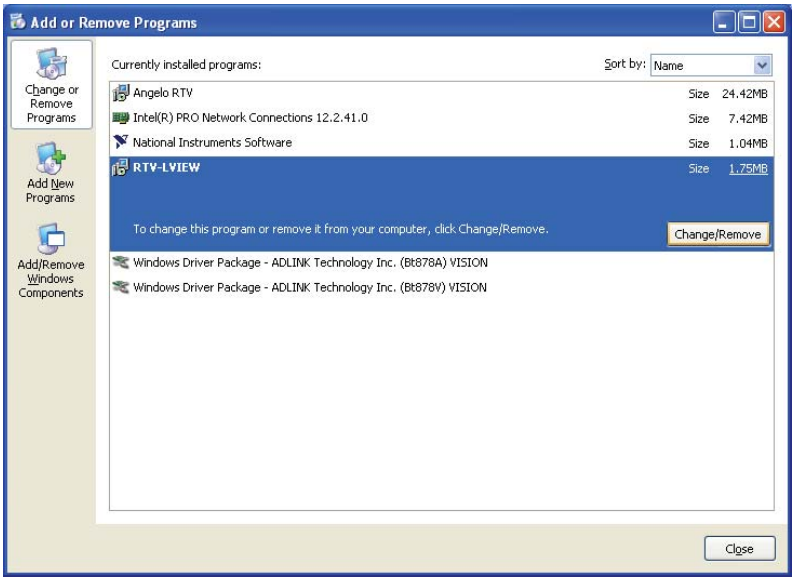


3. Click the Finish button to finish the installation.



4.2.3.4 Uninstall RTV-LVIEW

Open the **Control Panel** and double-click **Add/Remove Programs**. Select RTV-LVIEW and click the **Change/Remove** button to uninstall it.



After un-installation, all files in the directory of RTV-LVIEW will be removed, except the **ADLINK_Vision** palette. If you do not want to use it any more, you can remove the **Angelo.llb** in the **user.lib** folder and the **menus\ADLINK_Vision** folder.

4.2.4 Installing the Audio Driver

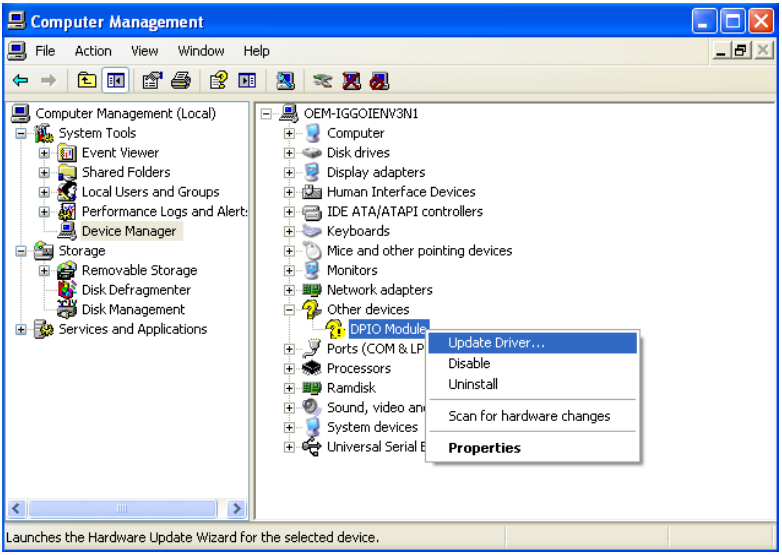
The EOS-2000 controller supports Intel High Definition audio using the Realtek ALC888 chip. Please follow the following steps to install the audio driver for the EOS-2000:

1. Close any running applications
2. Execute Audio.exe and follow the on-screen instructions to complete the setup
3. Reboot your system

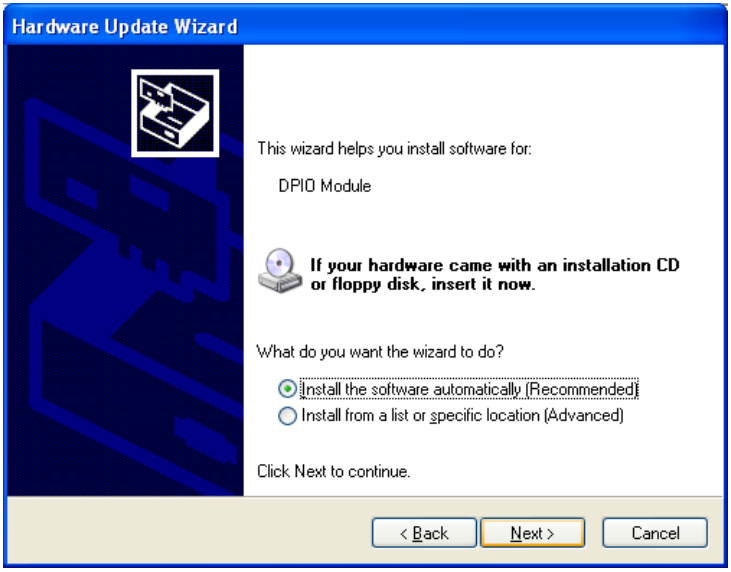
4.2.5 Installing the PCM-7230+ Driver

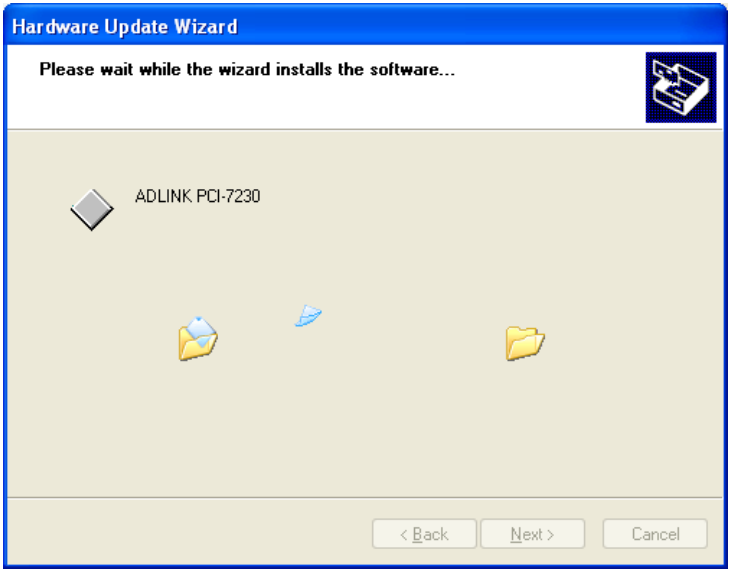
Please follow the following steps to install the driver for ADLINK's PCM-7230+:

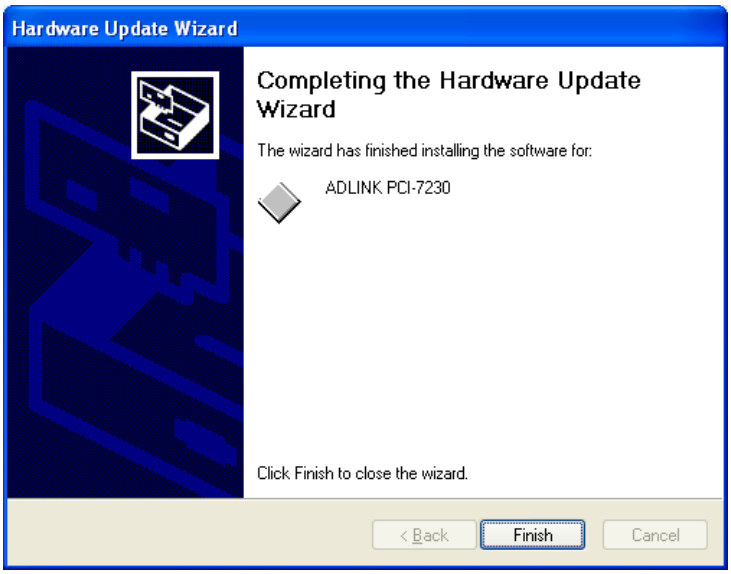
1. Close any running applications
2. Execute 7230.exe and follow the on-screen instructions to complete the setup
3. Reboot your system
4. Go to Device Manager and install the driver manually as follows:

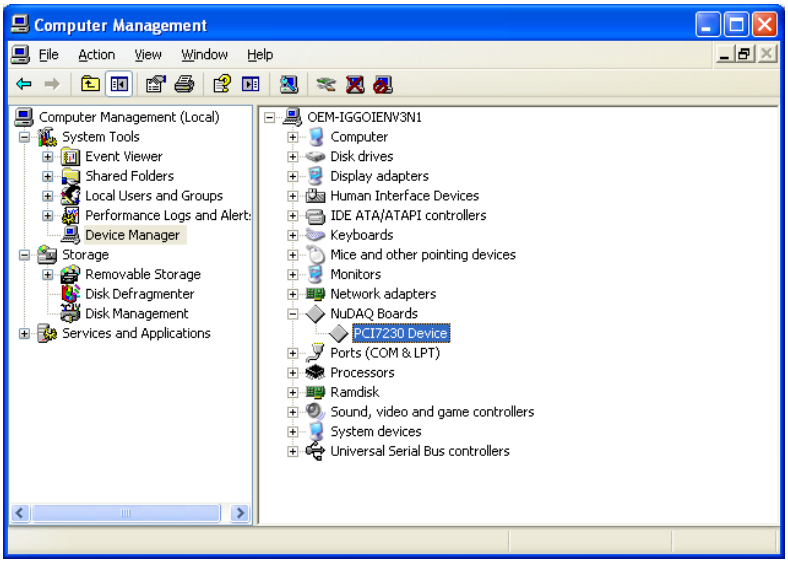

Computer Management
File Action View Window Help
Computer Management (Local)
System Tools
Event Viewer
Shared Folders
Local Users and Groups
Performance Logs and Alert
Device Manager
Storage
Removable Storage
Disk Defragmenter
Disk Management
Services and Applications
OEM-IGGOIENV3N1
Computer
Disk drives
Display adapters
Human Interface Devices
IDE ATA/ATAPI controllers
Keyboards
Mice and other pointing devices
Monitors
Network adapters
Other devices
DPIO Module
Ports (COM & LP
Processors
Ramdisk
Sound, video an
System devices
Universal Serial B
Update Driver...
Disable
Uninstall
Scan for hardware changes
Properties
Launches the Hardware Update Wizard for the selected device.


Hardware Update Wizard
Welcome to the Hardware Update Wizard
Windows will search for current and updated software by looking on your computer, on the hardware installation CD, or on the Windows Update Web site (with your permission).
Read our privacy policy
Can Windows connect to Windows Update to search for software?
Yes, this time only
Yes, now and every time I connect a device
No, not this time
Click Next to continue.
< Back
Next >
Cancel


Hardware Update Wizard
This wizard helps you install software for:
DPIO Module
If your hardware came with an installation CD or floppy disk, insert it now.
What do you want the wizard to do?
Install the software automatically (Recommended)
Install from a list or specific location (Advanced)
Click Next to continue.
< Back
Next >
Cancel

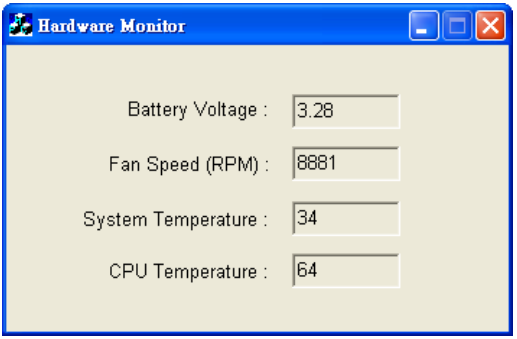

Hardware Update Wizard
Please wait while the wizard installs the software...
ADLINK PCI-7230
< Back
Next >
Cancel


Hardware Update Wizard
Completing the Hardware Update Wizard
The wizard has finished installing the software for:
ADLINK PCI-7230
Click Finish to close the wizard.
< Back
Finish
Cancel


Computer Management
File Action View Window Help
Computer Management (Local)
System Tools
Event Viewer
Shared Folders
Local Users and Groups
Performance Logs and Alert
Device Manager
Storage
Removable Storage
Disk Defragmenter
Disk Management
Services and Applications
OEM-IGGOIENV3N1
Computer
Disk drives
Display adapters
Human Interface Devices
IDE ATA/ATAPI controllers
Keyboards
Mice and other pointing devices
Monitors
Network adapters
NuDAQ Boards
PCI7230 Device
Ports (COM & LPT)
Processors
Ramdisk
Sound, video and game controllers
System devices
Universal Serial Bus controllers

4.3 Hardware Monitor Application

The Hardware Monitor application provides an easy way to obtain system information from the Winbond W83627HG, including battery voltage, fan speed, system temperature, and CPU temperature. The Hardware Monitor application is as follows:



The Hardware Monitor application updates every 500 ms and provides a quick and easy way to obtain system status information.

4.3.1 Programming Guide

This program is based on the driver (WBHWDOCT.sys) and library (Wbcdflsh.dll) provided by Winbond Electronics Corporation. Before programming, be sure to copy these two files in the proper directories:

WBHWDOCT.sys in C:\WINDOWS\system32\drivers

Wbcdflsh.dll in C:\WINDOWS\system32

In order to obtain system information from Winbond W83627HG, you must

1. Load the driver first by calling LoadWBCDFlshVxD()
2. Initial the bus by calling GetBaseAddressForLPC() and InitialBus()
3. Check for the existence of the chip by calling GetVenderID()

Now you can obtain system information by calling GetVBAT(), GetFanSpeed(), GetSystemTemperature(), and GetCPUTemperature as the sample program does. Source code of the Hardware Monitor sample program reside at C:\Program Files\ADLINK\HwMon

4.4 ViewCreatorPro Utility

Once hardware installation is complete, ensure that they are configured correctly before running the ViewCreatorPro utility. This chapter outlines how to establish a vision system and hot to manually controlling Angelo series cards to verify correct operation. ViewCreatorPro provides a simple yet powerful means to setup, configure, test, and debug the vision system.

Note: ViewCreatorPro is only available for Windows /XP/Vista with a recommended screen resolution higher than 800x600.

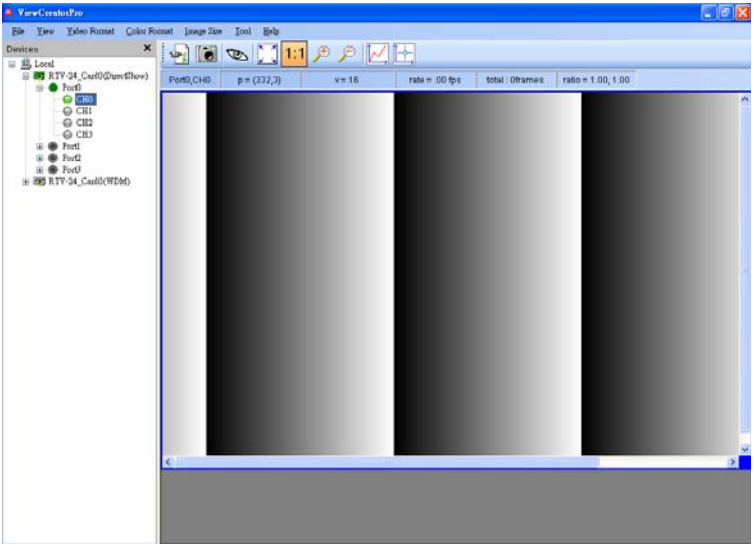
4.4.1 Overview

ViewCreatorPro offers the following features:

- 32-bit.64-bit operation under Windows XP/Vista WDM or DirectShow driver
- Angelo series cards access and configuration
- Video picture adjustments
- Image file saving (BMP or JPG)
- Direct access to general purpose I/Os
- FULL, CIF, or QCIF Image size, 2x2 or 4x4 display
- Software triggering

4.4.2 Component Description

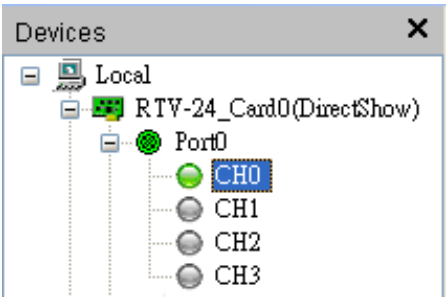
Start the utility and the view should like below:



4.4.3 Operation Theory

ViewCreatorPro provides many functions for the Angelo RTV series cards as described below:

4.4.3.1 Devices Panel



Local

Current active Device

All operations will apply to this device.

Inactive Device

Click the port after this icon to activate this device.

Current active port

All operations will apply to this port.

Inactive port

Click the port after this icon to activate this port.

Current active channel

All operations will apply to this channel.

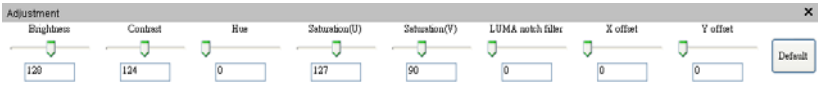
Inactive channel

Click the port after this icon to activate this channel.

Close this panel

4.4.3.2 Adjustment Panel

A panel allows user adjusting video images. Click and hold the left mouse button on the slider of the Adjustment Panel and drag the cursor to change its value. Or type value into the edit tool to change its value directly.



Default Button

Press Default Button resetting all values to default value.

Close this panel

4.4.3.3 Toolbar

Continue Grab

Start to grab images and display the images on display panel. Click it again to stop the grab. This is a toggle button.

Stop Grab

Stop grabbing.

Snap Shot

Capture an image and display the image on display panel.

Hind Image

Hide or unhide displaying image. This is a toggle button.

Fit Size

Fit the images which are selected to whole display panel. The images which are selected will have a blue frame.

Original Size

Restore the images which are selected to original size. The images which are selected will have a blue frame.

Zoom In

Zoom in the images which are selected. The images which are selected will have a blue frame.

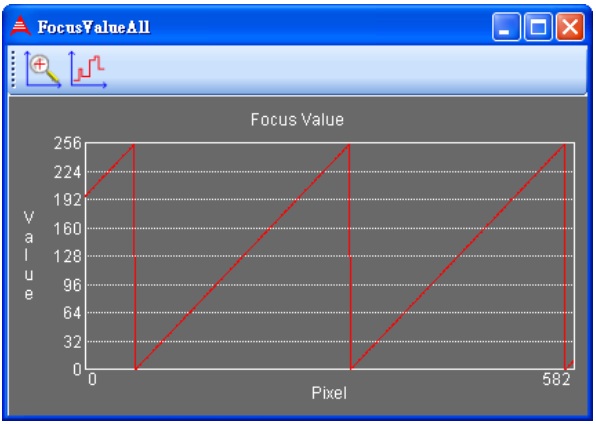
Zoom Out

Zoom in the images which are selected. The images which are selected will have a blue frame.

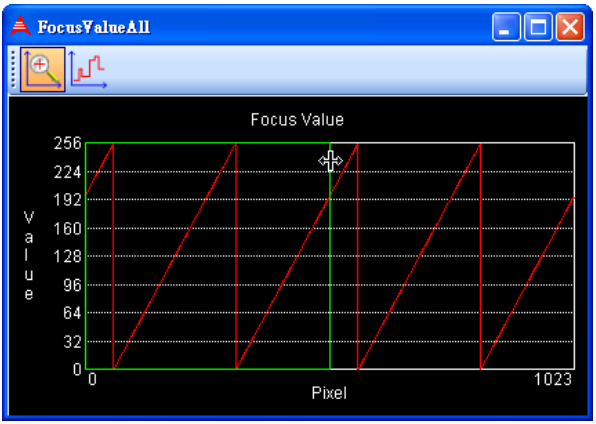
Focus Value

Open a chart to see pixel values of the selected horizontal line of the image which is selected first. The display image shows a red horizontal line on it. Click mouse on the display image to move the selected line.

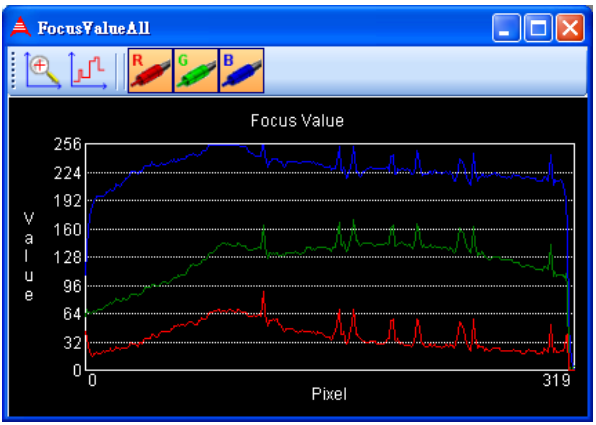
If it is grabbing image, the background color of focus value window is gray. The chart will update immediately by acquired image and the x-axis region depends on which horizontal pixels shown in display panel. The window is shown below:



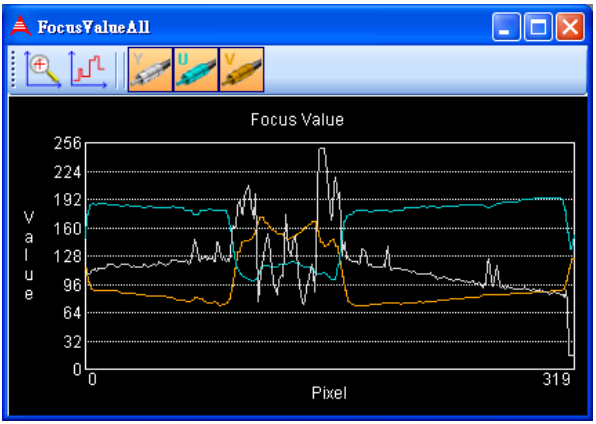
After stopping grabbing, the background color of focus value window is black. The x-axis size is the width of the whole image. The window is shown below:



If the image is chromatic and is RGB type, there are three curves represented red, green, and blue individual in the chart. The window is shown below:



If the image is chromatic and is YUV type, there are three curves represented y, u, and v individual in the chart. The window is shown below:



Zoom In

Open a window to zoom in the green rectangle region.

Differential

Open a window to show the slop of the line for the green rectangle region.

Drag the vertical green line to resize the green rectangle.

Show/Hide Red Values

Show or hide the red value of the pixels.

Show/Hide Green Values

Show or hide the green value of the pixels.

Show/Hide Blue Values

Show or hide the blue value of the pixels.

Show/Hide Y Values

Show or hide the y value of the pixels.

Show/Hide U Values

Show or hide the u value of the pixels.

Show/Hide V Values

Show or hide the v value of the pixels.

Focus Cross

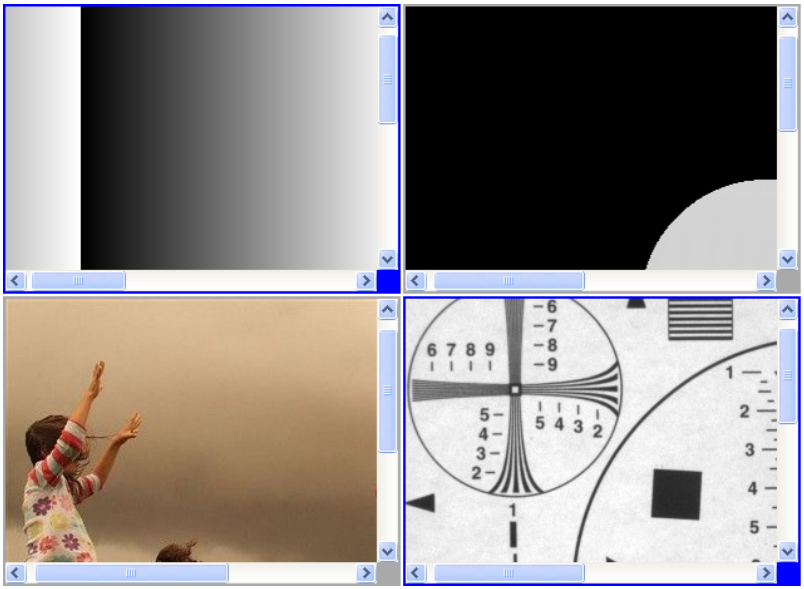
See pixel values of the selected point of the image on toolbar. The display image shows a blue cross line on it. Click mouse on the display image to move the selected point.

4.4.3.4 Status Bar

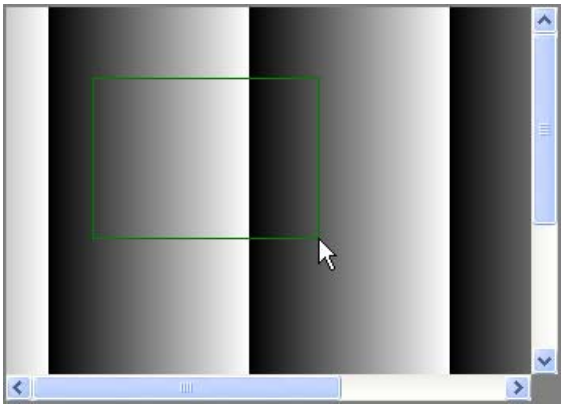
From left to right, the panel items are status host, cursor position, pixel value, frame rate, total captured frames, and magnification (horizontal ratio, vertical ratio).

4.4.3.5 Display Panel

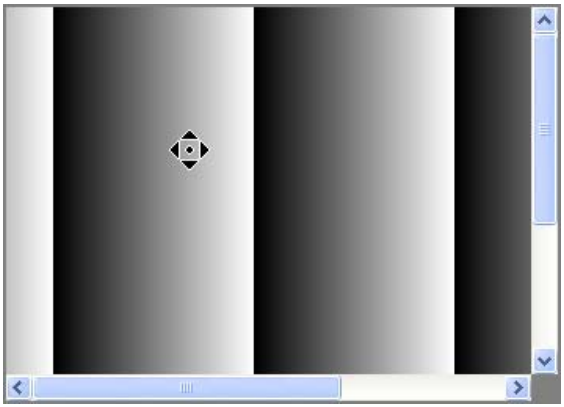
Press left mouse button on the image and then there will be a blue frame around the image. It means the image is selected. If user wants select more images, please keep pressing Ctrl and click the other images. Like the picture below, the up-left channel and down-right channel are selected. Then user can adjust these images' size by "Fit Size", "Original Size", "Zoom In", and "Zoom out" button.



Press left mouse button and then drag it, display panel will appear a green rectangle region which will be zoomed in. Keep pressing Shift during dragging, the image will be zoomed in at the same proportion of width and height. Shown below:



Press right mouse button, the cursor will become a move2D icon. Then user can drag the image. Shown below:



4.4.3.6 Main Menu

File menu

- **Open Image**
  Open an image from a file and display it to the display panel.
- **Save Image**
  Save current displaying image to a bitmap file.
- **Exit**
  Terminate ViewCreatorPro.

View menu

- **Devices**
  Hide or unhide Devices panel.
- **Adjustment**
  Hide or unhide Adjustment panel.
- **ChannelExtensionEnable**
  Determine if let user select channel node.

Video Format menu

- **NTSC**
  Set the channels showed on display panel to NTSC format.
- **PAL**
  Set the channels showed on display panel to PAL format.

Color Format menu

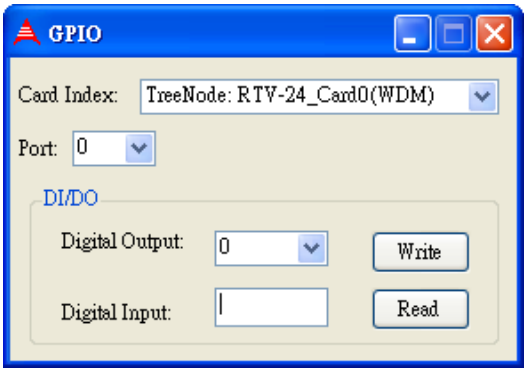
- **Gray**
  Set the channels showed on display panel to gray format.
- **RGB32**
  Set the channels showed on display panel to rgb32 format.
- **RGB24**
  Set the channels showed on display panel to rgb24 format.
- **RGB16**
  Set the channels showed on display panel to rgb16 format.
- **RGB15**
  Set the channels showed on display panel to rgb15 format.
- **YUV**
  Set the channels showed on display panel to yuv format.

Image Size menu

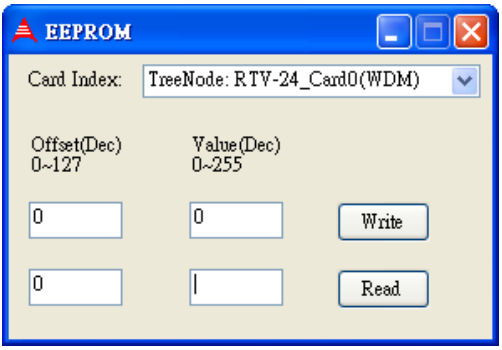
- **Full Image**
  Set buffer sizes of the channels showed on display panel to full image size.
- **Cif Image**
  Set buffer sizes the channels showed on display panel to cif image size.
- **Qcif Image**
  Set buffer sizes the channels showed on display panel to qcif image size.

Tool menu

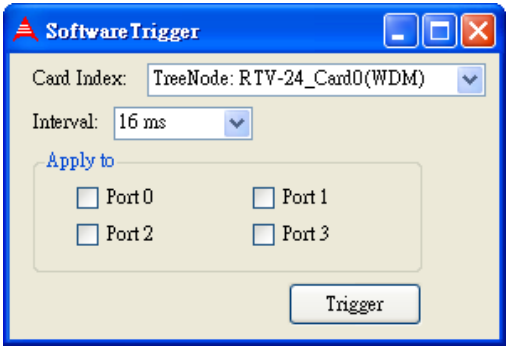
- **GPIO**
  Click Tool in the menu bar and select GPIO item to bring up the GPIO dialog box. Select the card and port to access and select the digital output value. Click the write or read button to write/read to/from the digital I/O ports.



- **EEPROM**
  Click Tool in the menu bar and select EEPROM to bring up the EEPROM dialog box. Select the card you wish to access, enter the offset and output values, and then click the Write button to write the value into the EEPROM. Enter the offset value and click the Read button to read the value from the EEPROM. Valid offset values are between 0-127. Valid output values are 0-255. The value in the EEPROM will not be erased when the system is powered off.



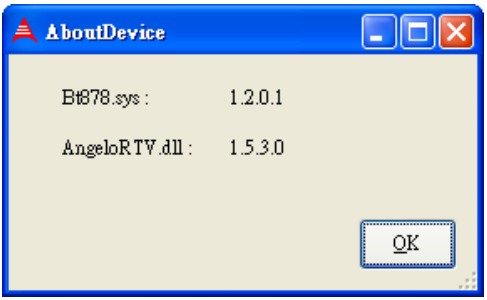
- **Software Trigger**
  Click Tool in the menu bar and select Software Trigger to bring up the Trigger dialog box. Select the card to access and set the interval of the trigger pulse output. Check the ports you want to trigger simultaneously, and click the Trigger button. The one shot pulse output voltage goes high (from 0V to 5V).



Help menu

- **About**
  Click Help in the menu bar and select About ViewCreator-Pro to bring up the About ViewCreatorPro box. This window will show ViewCreatorPro version.

- **AboutDevice**
  Click Help in the menu bar and select About Device to bring up the About Device box. This window will show the driver version and dll version.



4.5 Function Library

This chapter describes the API for Angelo RTV series cards. Users can use these functions to develop application programs under Visual C++, Visual Basic, C++ Builder, C#, Visual Basic .Net, and Delphi.

4.5.1 List of Functions

Category	Section	Function
System	4.5.3	AngeloRTV_Initial(PortNo)
		AngeloRTV_Close(PortNo)
		AngeloRTV_Software_Reset(PortNo)
		AngeloRTV_Read_Serial(CardNo, HighByte, LowByte)
		AngeloRTV_Get_Version(DriverVersion, DLLVersion, Reserved)
Configuration	4.5.4	AngeloRTV_Set_Image_Config(PortNo, ConfigIndex,Value)
		AngeloRTV_Get_Image_Config(PortNo, ConfigIndex, Value)
		AngeloRTV_Set_Color_Format(PortNo, ColorFormat)
		AngeloRTV_Get_Color_Format(PortNo, ColorFormat)
		AngeloRTV_Set_Video_Format(PortNo, Value)
		AngeloRTV_Get_Video_Format(PortNo, Value)
		AngeloRTV_Set_Image_Geometric(PortNo, X_Offset, Y_Offset, X_Active, Y_Active, X_Scale, Y_Scale)
		AngeloRTV_Detect_Video_Format(PortNo, FormatValue)
Image Grabbing	4.5.5	AngeloRTV_Capture_Start(PortNo, CaptureNo)
		AngeloRTV_Select_Channel(PortNo, Multiplex)
		AngeloRTV_Capture_Stop (PortNo)
		AngeloRTV_Capture_Config(PortNo, Start_Field)
		AngeloRTV_Sync_Grab(PortNo, Start_Address, Width, Height, Size_Byte)
GPIO & EPROM	4.5.6	AngeloRTV_Set_GPIO_Sts(PortNo, Status)
		AngeloRTV_Get_GPIO_Sts(PortNo, Status)
		AngeloRTV_Set_GPIO_Int_Logic (PortNo, Logic)
		AngeloRTV_Write_EEPROM(PortNo, Offset, Value)
		AngeloRTV_Read_EEPROM(PortNo, Offset, Value)
		AngeloRTV_Set_LED_Sts (PortNo, LEDStatus)
Callback & Thread	4.5.7	AngeloRTV_Set_Int_Event(PortNo,hEvent)
		AngeloRTV_Set_Callback(PortNo, CallBackProc)
		AngeloRTV_Get_Int_Status(PortNo,IntStatus)
Software Trigger	4.5.8	AngeloRTV_Trigger_Config(PortNo, Interval)
		AngeloRTV_Trigger_Start(CardNo, Multiplex)
Frame Buffer	4.5.9	AngeloRTV_Get_frame(PortNo, Start_Address, Width, Height, Size_Byte)
		AngeloRTV_Save_File(PortNo, FileName, FileFormat, nQuality)
		AngeloRTV_Copy_frame(PortNo, Dest_Address, Size_Byte)

Table 4-1: List of Functions

4.5.2 C/C++ Programming Library

Function prototypes and common data types are defined in Angelo.h. The Angelo series library uses these data types. We suggest that these data types be used in your application programs. The following table shows the data types and their range:

Type Name	Description	Range
U8	8-bit ASCII character	0 to 255
I16	16-bit integer	-32768 to 32767
U16	16-bit unsigned integer	0 to 65535
I32	32-bit long integer	-2147483648 to 2147483647
U32	32-bit unsigned long integer	0 to 4294967295
F32	32-bit float	-3.402823E38 to 3.402823E38
F64	64-bit double float	-1.797683134862315E308 to 1.797683134862315E309
Boolean	Boolean logic	TRUE, FALSE

Table 4-2: C/C++ Data Types

4.5.3 System Functions

@ **Name**

AngeloRTV_Initial(PortNo)
Initialize the port in Angelo series card.

AngeloRTV_Close(PortNo)
Close the port in Angelo series card.

AngeloRTV_Software_Reset(PortNo)
Reset the port in Angelo series card.

AngeloRTV_Read_Serial(CardNo, HighByte, LowByte)
Read the unique 48-Bit Serial Number of Angelo Series Card (Only for RTV-24 Rev.B1 above, PCI-2100 Rev.A2 above)

AngeloRTV_Get_Version(DriverVersion, DLLVersion, Reserved)
Get the version of driver of AngeloRTV card and AngeloRTV.dll.

@ **Description**

AngeloRTV_Initial:
This function initializes the ports of the Angelo Series card. Each application program must call this function before any other functions can be used. If the initialization is executed successfully, it returns a value of 0.

Note: There are four ports on the RTV-24, cRTV-24, and cRTV-44 series cards, and one port on the PMC- RTV21.

AngeloRTV_Close:
Releases all resources from the ports.

AngeloRTV_Software_Reset:
Resets the port to its initial state.

AngeloRTV_Read_Serial:
This function can read a 48-bit unique ID and store in 2 Long interger.

AngeloRTV_Get_Version:
Used to get the current version of AngeloRTV card driver and AngeloRTV.dll file.

@ **Syntax**

C/C++ (Windows/CE.NET)

```
I16 AngeloRTV_Initial(U16 PortNo)
I16 AngeloRTV_Close(U16 PortNo)
I16 AngeloRTV_Software_Reset(U16 PortNo)
U16 AngeloRTV_Read_Serial(U16 CardNo, U32*
     HighByte, U32* LowByte);
I16 AngeloRTV_Get_Version(U32 *DriverVersion, U32
     *DLLVersion, U32 *Reserved)
```

Visual Basic (Windows/CE.NET)

```
AngeloRTV_Initial (ByVal PortNo As Integer) As
     Integer
AngeloRTV_Close(ByVal PortNo As Integer) As
     Integer
AngeloRTV_Software_Reset (ByVal PortNo As
     Integer) As Integer
AngeloRTV_Read_Serial(Byval CardNo as Integer,
     ByRef HighByte As Long, ByRef LowByte As
     Long) As Integer
AngeloRTV_Get_Version (ByRef DriverVersion As
     Long, ByRef DLLVersion As Long, ByRef
     Reserved As Long) As Integer
```

Delphi (Windows)

```
AngeloRTV_Initial(PortNo:Smallint):Smallint
AngeloRTV_ Close (PortNo:Smallint):Smallint
AngeloRTV_Software_Reset
     (PortNo:Smallint):Smallint
AngeloRTV_Read_Serial(CardNo:Smallnt; Var
     HighByte: Longint; Var
     LowBytet:Longint):Smallint;
AngeloRTV_Get_Version (var DriverVersion:Longint;
     var DLLVersion:Longint; var
     Reserved:Longint):Smallint
```

@ **Arguments**

PortNo:

Port number is the zero index of the Angelo series card. For example, if there are two RTV-24 Angelo cards (card 0, card 1) in the system, and each RTV-24 has four ports, the first port of card 0 is "0", and the first port of card 1 is "4."

HighByte:

HighByte stores the upper 16Bit of Serial No..

LowByte:

LowByte stores the lower 32Bit of Serial No.

DriverVersion:

Indicate the current version of AngeloRTV driver. This parameter is a pointer to an integer array with length 4.

DLLVersion:

Indicate the current version of AngeloRTV.dll file. This parameter is a pointer to an integer array with length 4.

@ **Return Codes**

- 0: ERROR_NoError
- -2: ERROR_Card_Not_Exist – make sure the Angelo series card is plugged into the system, check the device manager to make sure the device is loaded, and the "PortNo" parameter is valid.
- -3: ERROR_Card_Not_Accessible – make sure the Angelo series card is plugged into the system, check the device manager to make sure the device is loaded, and the "PortNo" parameter is valid.
- -12: ERROR_CPLD_Check_Failed – Power off the computer and power on again.

@ **Examples**

<VC/BCB >

AngeloRTV_Initial –

```
I16 Result;
for(int PortNo= 0 ; PortNo <4;PortNo++)
Result = AngeloRTV_Initial (PortNo);
```

AngeloRTV_Cose –

```
I16 Result;
for(int PortNo= 0 ; PortNo <4;PortNo++)
Result = AngeloRTV_Cose (PortNo);
```

AngeloRTV_Software_Reset–

```
I16 Result;
for(int PortNo= 0 ; PortNo <4;PortNo++)
Result = AngeloRTV_Software_Reset (PortNo);
```

AngeloRTV_Read_Serial–

```
int Result;
int CardNo = 0;
unsigned long HighByte = 0, LowByte = 0;
Result = AngeloRTV_Read_Serial(CardNo, &HighByte,
     &LowByte);
```

AngeloRTV_Get_Version –

```
   I16 Result;
   U32 DriverVersion[4] = {0}, DLLVersion[4] = {0},
        Reserved[4] = {0};
   char strDriverVersion[20], strDLLVersion[20];
   Result = AngeloRTV_Get_Version (DriverVersion,
        DLLVersion, Reserved);
   sprintf(strDriverVersion, "%d.%d.%d.%d",
        DriverVersion[0], DriverVersion[1],
        DriverVersion[2], DriverVersion[3]);
   sprintf(strDLLVersion, "%d.%d.%d.%d",
        DLLVersion[0], DLLVersion[1],
        DLLVersion[2], DLLVersion[3]);
```

< Visual Basic >

AngeloRTV_Initial –

```
   Dim Result As Integer
   Dim PortNo As Integer
   For PortNo= 0 To 3
   Result = AngeloRTV_Initial (ByVal PortNo)
```

AngeloRTV_Cose –

```
   Dim Result As Integer
   Dim PortNo As Integer
   For PortNo= 0 To 3
   Result = AngeloRTV_Close (ByVal PortNo)
```

AngeloRTV_Read_Serial–

```
   Dim Result As Integer
   Dim CardNo As Integer
   Dim HighByte As Long, LowByte As Long
   CardNo=0
   HighByte=0
   LowByte=0
   Result = AngeloRTV_Read_Serial(CardNo, HighByte,
        LowByte)
```

AngeloRTV_Software_Reset–

```
   Dim Result As Integer
   Dim PortNo As Integer
   For PortNo= 0 To 3
   Result = AngeloRTV_Software_Reset (ByVal PortNo)
```

AngeloRTV_Get_Version –

```
   Dim Result As Integer
   Dim DriverVersion(3) As Long, DLLVersion(3) As
        Long, Reserved(3) As Long
   Dim strDriverVersion, strDLLVersion As String
```

```
Result = AngeloRTV_Get_Version (DriverVersion(0),
     DLLVersion(0), Reserved(0))
strDriverVersion = CStr(DriverVersion(0)) + "." +
     CStr(DriverVersion(1)) + "." +
     CStr(DriverVersion(2)) + "." +
     CStr(DriverVersion(3))
strDLLVersion = CStr(DLLVersion(0)) + "." +
     CStr(DLLVersion(1)) + "." +
     CStr(DLLVersion(2)) + "." +
     CStr(DLLVersion(3))
```

<Delphi >

AngeloRTV_Initial –

```
var PortNo,Result:SmallInt;
for i:= 0 to 3 do
begin
Result := AngeloRTV_Initial (PortNo);
End;
```

AngeloRTV_Cose –

```
var PortNo,Result:SmallInt;
for i:= 0 to 3 do
begin
Result := AngeloRTV_Close (PortNo);
End;
```

AngeloRTV_Software_Reset–

```
var PortNo,Result:SmallInt;
for i:= 0 to 3 do
begin
Result := AngeloRTV_Software_Reset (PortNo);
End;
```

AngeloRTV_Read_Serial–

```
var
CardNo,Result:SmallInt;
HighByte, LowByte:SmallInt;
Result := AngeloRTV_Read_Serial(CardNo, HighByte,
LowByte)
```

AngeloRTV_Get_Version –

```
var
Result: Smallint;
DriverVersion: array[1..4] of Longint;
DLLVersion: array[1..4] of Longint;
Reserved: array[1..4] of Longint;
strDriverVersion, strDLLVersion: String;
```

```
Result := AngeloRTV_Get_Version
     (DriverVersion[1], DLLVersion[1],
     Reserved[1]);
strDriverVersion := IntToStr(DriverVersion[1]);
strDriverVersion := strDriverVersion + '.' +
     IntToStr(DriverVersion[2]);
strDriverVersion := strDriverVersion + '.' +
     IntToStr(DriverVersion[3]);
strDriverVersion := strDriverVersion + '.' +
     IntToStr(DriverVersion[4]);
strDLLVersion := IntToStr(DLLVersion[1]);
strDLLVersion := strDLLVersion + '.' +
     IntToStr(DLLVersion[2]);
strDLLVersion := strDLLVersion + '.' +
     IntToStr(DLLVersion[3]);
strDLLVersion := strDLLVersion + '.' +
     IntToStr(DLLVersion[4]);
```

4.5.4 Configuration Functions

@ **Name**

AngeloRTV_Set_Image_Config(PortNo, ConfigIndex ,Value)
Set the video adjustments.

AngeloRTV_Get_Image_Config(PortNo, ConfigIndex, Value)
Get the video adjustments.

AngeloRTV_Set_Color_Format(PortNo, ColorFormat)
Set the color format.

AngeloRTV_Get_Color_Format(PortNo, ColorFormat)
Get the color format.

AngeloRTV_Set_Video_Format(PortNo, Value)
Set the video format.

AngeloRTV_Get_Video_Format(PortNo, Value)
Set the video format.

AngeloRTV_Set_Image_Geometric(PortNo, X_Offset, Y_Offset, X_Active, Y_Active, X_Scale, Y_Scale)
Advanced image processing.

AngeloRTV_Detect_Video_Format(PortNo, FormatValue)
Detect the video format and if there is signal input.

@ **Descriptions**

AngeloRTV_Set_Image_Config:
Adjusts the hue, contrast, Saturation and brightness of the port for the Angelo series card.

AngeloRTV_Get_Image_Config:
Retrieves the current hue, contrast, Saturation and brightness setting of the port for the Angelo series card.

AngeloRTV_Set_ Color _Format:
Sets the color format of the port for the Angelo series card. Valid color formats are: gray scale, RGB.

AngeloRTV_Get_ Color _Format:
Retrieves the color format of the port for the Angelo series card.

AngeloRTV_Set_ Video_Format:
Sets the Video format of the port for the Angelo series card. Valid color formats are: NTSC, EIA, PAL, CCIR.

AngeloRTV_Get_ Video _Format:
Retrieves the video format of the port for the Angelo series card.

AngeloRTV_Set_Image_Geometric:
This function is used for image cropping and scaling.

AngeloRTV_Detect_Video_Format:
Use the function to retrieve the video format. And if the return value of the 2nd parameter is 0 that means there is no signal input.

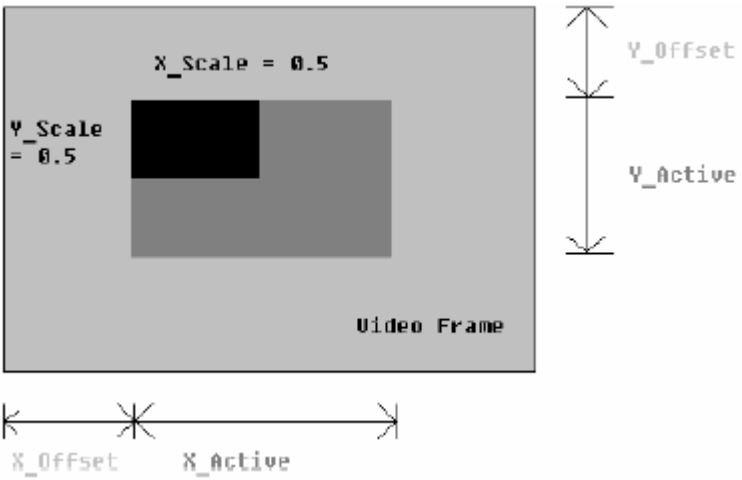


Figure 4-1: Video Frame

@ Syntax

C/C++ (Windows/CE.NET)

```
I16 AngeloRTV_Set_Image_Config(U16 PortNo,U8
     ConfigIndex , U8 Value);
I16 AngeloRTV_Get_Image_Config(U16 PortNo,U8
     ConfigIndex , U8* Value);
```

```
I16 AngeloRTV_Set_ Color _Format (U16 PortNo, U8
     ColorFormat);
I16 AngeloRTV_Get_ Color _Format (U16 PortNo, U8*
     ColorFormat);
I16 AngeloRTV_Set_Video _Format (U16 PortNo, U8
     VideoFormat);
I16 AngeloRTV_Set_Video _Format (U16 PortNo, U8*
     VideoFormat);
I16 AngeloRTV_Set_Image_Geometric(U16 PortNo, U32
     X_Offset, U32 Y_Offset, U32 X_Active, U32
     Y_Active,double X_Scale,double Y_Scale);
I16 AngeloRTV_Detect_Video_Format (U16 PortNo, U8
     *FormatValue);
```

Visual Basic (Windows/CE.NET)

```
AngeloRTV_Set_Image_Config(ByVal PortNo As
     Integer, ByVal ConfigIndex As Byte,ByVal
     Value As Byte) As Integer
AngeloRTV_Get_Image_Config(ByVal PortNo As
     Integer, ByVal ConfigIndex As Byte, ByRef
     Value As Byte) As Integer
AngeloRTV_Set_ Color _Format (ByVal PortNo As
     Integer, ByVal ColorFormat As Byte) As
     Integer
AngeloRTV_Get_ Color _Format (ByVal PortNo As
     Integer, ByRef ColorFormat As Byte) As
     Integer
AngeloRTV_Set_Video _Format (ByVal PortNo As
     Integer, ByVal VideoFormat As Byte) As
     Integer
AngeloRTV_Set_Video _Format (ByVal PortNo As
     Integer, ByRef VideoFormat As Byte) As
     Integer
AngeloRTV_Set_Image_Geometric(ByVal PortNo As
     Integer, ByVal X_Offset As Long, ByVal
     Y_Offset As Long, ByVal X_Active As Long,
     ByVal Y_Active As Long, ByVal X_Scale As
     Double, ByVal Y_Scale As Double)  As Integer
AngeloRTV_Detect_Video_Format (ByVal PortNo,
     ByRef FormatValue As Byte) As Integer
```

Delphi (Windows)

```
AngeloRTV_Set_Image_Config(PortNo:Smallint;Confi
     gIndex:Byte;Value:Byte): Smallint;
```

```
      AngeloRTV_Get_Image_Config(PortNo:Smallint;
      ConfigIndex:Byte;var Value:Byte):Smallint;
AngeloRTV_Set_Color_Format(PortNo:Smallint;Color
      Format:Byte):Smallint;
AngeloRTV_Get_Color_Format(PortNo:Smallint;var
      ColorFormat:Byte):Smallint;
AngeloRTV_Set_Video_Format(PortNo:Smallint;Video
      Format:Byte):Smallin;
AngeloRTV_Get_Video_Format(PortNo:Smallint;var
      VideoFormat:Byte):Smallint;
AngeloRTV_Set_Image_Geometric (PortNo:Smallint;
      X_Offset:LongInt; Y_Offset:LongInt;
      X_Active:LongInt; Y_Active:LongInt;
      X_Scale:Double; Y_Scale:Double):Smallint;
AngeloRTV_Detect_Video_Format(PortNo:Smallint;
      var FormatValue:Byte):Smallint;
```

@ **Arguments**

PortNo:

Port number is the zero index of the Angelo series card. For example, if there are two PCI-RTV-24 Angelo cards (card 0, card 1) in the system, and each PCI-RTV-24 has four ports, the first port of card 0 is "0", and the first port of card 1 is "4."

ConfigIndex:

- ▷ 0 for BRIGHTNESS
- ▷ 1 for HUE
- ▷ 2 for SATURATION (U)
- ▷ 3 for SATURATION (V)
- ▷ 4 for CONTRAST (LUMA)
- ▷ 5 for luma notch filter (for monochrome video, the notch filter should not be used)

Value: (0-255)

- ▷ Range Default value
- ▷ BRIGHTNESS 0 ---- 255 128
- ▷ HUE 0 ---- 255 0
- ▷ CHROMA (U) 0 ---- 255 127
- ▷ CHROMA (V) 0 ---- 255 90
- ▷ LUMA 0 ---- 255 124
- ▷ LUMA notch filter 0(Enable) or 1(Disable)

Color Format:

- ▷ RGB16 = 0,
- ▷ GRAY = 1,
- ▷ RGB15 = 2,
- ▷ RGB24 = 3,
- ▷ RGB32 = 4,
- ▷ RGB8 = 5,
- ▷ RAW8X = 6,
- ▷ YUY24:2:2= 7,

Video Format:

- ▷ Full NTSC (640*480) = 0,
- ▷ Full PAL (768*576) = 1,
- ▷ CIF NTSC (320*240) = 2,
- ▷ CIF PAL (384*288) = 3,
- ▷ QCIF NTSC (160*120) = 4,
- ▷ QCIF PAL (192*144) = 5,

Note: Please do not use Full NTSC and Full PAL format to acquire dynamic object image, because the interlaced scanning may not be able to present clear image for it.

X_Scale:

This parameter is the scaling factor applied to the Angelo sampled line to obtain pixels according to the resolution.

X_Active

This parameter value is the length of the active video line

X_Offset

This parameter value is the number of scaled pixels to skip before the start of the active video line.

Y_Scale:
This parameter is the scaling factor applied to the Angelo sampled data lines in the vertical direction.

Y_Active
This parameter value is the height (in lines) of the active video image.

Y_Offset
This parameter value is the number of lines to skip before the first line of the active video image.

FormatValue:
If the return value of this parameter is 0 that means there is no video signal input. And if the value is 1 or 2, the video format of the port is NTSC. Otherwise, if the value is 3, 4 or 5, the video format of the port is PAL.

@ **Example**

<VC/BCB >

AngeloRTV_Set_Image_Config –
AngeloRTV_Get_Image_Config –

```
I16 Result;
I16 PortNo = 0;
U8 ConfigIndex = 0;
U8 Value = 128;
Result = AngeloRTV_Set_Image_Config (PortNo,
ConfigIndex, Value);
Result = AngeloRTV_Get_Image_Config (PortNo,
ConfigIndex, &Value);
```

AngeloRTV_Set_Color_Format –
AngeloRTV_Get_Color_Format –
AngeloRTV_Set_Video_Format –
AngeloRTV_Get_Video_Format –

```
I16 Result;
I16 PortNo = 0;
U8 VideoFormat = 0;
U8 ColorFormat = 3;
Result = AngeloRTV_Set_Color_Format(PortNo,
     ColorFormat);
```

```
   Result = AngeloRTV_Get_Color_Format(PortNo,
        &ColorFormat);
   Result = AngeloRTV_Set_Video_Format(PortNo,
        VideoFormat);
   Result = AngeloRTV_Get_Video_Format(PortNo,
        &VideoFormat);
```

AngeloRTV_Set_Image_Geometric –

```
   I16 Result;
   I16 PortNo = 0;
   U32 X_Active = 600;
   U32 Y_Active = 400;
   U32 X_Offset = 40;
   U32 Y_Offset = 80;
   Double X_Scale = 1.0;
   Double Y_Scale = 1.0;
   Result = AngeloRTV_Set_Image_Geometric (PortNo,
        X_Offset, Y_Offset, X_Active, Y_Active,
        X_Scale, Y_Scale);
```

AngeloRTV_Detect_Video_Format –

```
   I16 Result;
   U16 PortNo;
   U8   FormatValue;
   PortNo = 0;
   Result = AngeloRTV_Detect_Video_Format (PortNo,
        &FormatValue);
```

< Visual Basic >

AngeloRTV_Set_Image_Config –
AngeloRTV_Get_Image_Config –

```
   Dim Result As Integer
   Dim PortNo As Integer
   Dim ConfigIndex As Byte
   Dim Value As Byte
   PortNo = 0
   ConfigIndex =0
   Value = 128
   Result = AngeloRTV_Set_Image_Config (ByVal
        PortNo, ByVal ConfigIndex, ByVal Value)
   Result = AngeloRTV_Get_Image_Config (ByVal
        PortNo, ByVal ConfigIndex, ByRef Value)
```

AngeloRTV_Set_Color_Format –
AngeloRTV_Get_Color_Format –
AngeloRTV_Set_Video_Format –
AngeloRTV_Get_Video_Format –

```
Dim Result As Integer
Dim PortNo As Integer
Dim ColorFormat As Byte
Dim VideoFormat As Byte
PortNo = 0
ColorFormat =3
VideoFormat = 0
Result = AngeloRTV_Set_Color_Format(ByVal PortNo,
     ByVal ColorFormat)
Result = AngeloRTV_Get_Color_Format(ByVal PortNo,
     ByRef ColorFormat)
Result = AngeloRTV_Set_Video_Format(ByVal PortNo,
     ByVal VideoFormat)
Result = AngeloRTV_Get_Video_Format(ByVal PortNo,
     ByRef VideoFormat)
```

AngeloRTV_Set_Image_Geometric –

```
Dim Result As Integer
Dim PortNo As Integer
Dim X_Active As Long
Dim Y_Active As Long
Dim X_Offset As Long
Dim Y_Offset As Long
Dim X_Scale As Double
Dim Y_Scale As Double
PortNo = 0
X_Active = 600
Y_Active = 400
X_Offset = 40
Y_Offset = 80
X_Scale = 1.0
Y_Scale = 1.0
Result = AngeloRTV_Set_Image_Geometric (PortNo,
     X_Offset, Y_Offset, X_Active, Y_Active,
     X_Scale, Y_Scale)
```

AngeloRTV_Detect_Video_Format –

```
Dim Result As Integer
Dim PortNo As Integer
Dim FormatValue As Byte
PortNo = 0
Result = AngeloRTV_Detect_Video_Format (ByVal
     PortNo, ByRef FormatValue)
```

<Delphi >

AngeloRTV_Set_Image_Config –

AngeloRTV_Get_Image_Config –

```
Var
Result : SmallInt;
PortNo : SmallInt;
ConfigIndex: Byte;
Value: Byte;
PortNo:=0;
ConfigIndex:=0;
Value:=0;
Result := AngeloRTV_Set_Image_Config
     (PortNo,ConfigIndex, Value);
Result := AngeloRTV_Get_Image_Config (PortNo,
     ConfigIndex, Value);
```

AngeloRTV_Set_Color_Format –

AngeloRTV_Get_Color_Format –

AngeloRTV_Set_Video_Format –

AngeloRTV_Get_Video_Format –

```
Var
Result : SmallInt;
PortNo : SmallInt;
VideoFormat: Byte;
ColorFormat: Byte;
PortNo:=0;
VideoFormat:=0;
ColorFormat:=3;
Result :=
     AngeloRTV_Set_Color_Format(PortNo,ColorForm
     at);
Result :=
     AngeloRTV_Get_Color_Format(PortNo,ColorForm
     at);
Result :=
     AngeloRTV_Set_Video_Format(PortNo,VideoForm
     at);
Result := AngeloRTV_Get_Video_Format(PortNo,
     VideoFormat);
```

AngeloRTV_Set_Image_Geometric –

```
Var
Result : SmallInt;
PortNo : SmallInt;
X_Active : LongInt;
Y_Active : LongInt;
X_Offset : LongInt;
```

```
   Y_Offset : LongInt;
   X_Scale : Double;
   Y_Scale : Double;
   PortNo := 0;
   X_Active := 600;
   Y_Active := 400;
   X_Offset := 40;
   Y_Offset := 80;
   X_Scale := 1.0;
   Y_Scale := 1.0;
   Result := AngeloRTV_Set_Image_Geometric(PortNo,
        X_Offset, Y_Offset, X_Active, Y_Active,
        X_Scale, Y_Scale);
```

AngeloRTV_Detect_Video_Format –

```
   var
   Result : SmallInt;
   PortNo : SmallInt;
   FormatValue : Byte;
   PortNo := 0;
   Result := AngeloRTV_Detect_Video_Format (PortNo,
        FormatValue);
```

4.5.5 Image Grabbing

@ **Name**

AngeloRTV_Capture_Start(PortNo, CaptureNo)
Start to grab the video image

AngeloRTV_Select_Channel(PortNo, Multiplex)
Channel extension of video signal, for advanced only

AngeloRTV_Capture_Stop(PortNo)
Stop to grab the video image

AngeloRTV_Capture_Config(PortNo, Start_Field)
Set the starting field of image

AngeloRTV_Sync_Grab(PortNo, Start_Address, Width, Height, Size_Byte)
Get an image frame with start address of memory

@ **Description**

AngeloRTV_Capture_Start:
Continuously captures video frames and stops when the total frame number equals the "CaptureNo" parameter. The frame update rate is 30 frames/sec. If the "CaptureNo" is 0xFFFFFFFF, the frame grabbing will not stop until the "AngeloRTV_Capture_Stop" function is called.

AngeloRTV_Capture_Stop:
Stop grabbing video frames.

AngeloRTV_Select_Channel:
Angelo series cards are capable of channel extension. This function is used to multiplex video signals for the ports. In most cases using this function should not be required because the default setting is one port is dedicated to one channel.

Note: Do not call this function if there is no channel extension board in the system.

AngeloRTV_Capture_Config:
Chooses the starting field of image.

AngeloRTV_Sync_Grab:
This is a synchronous image grabbing function to get an image frame. Retrieve the memory start address from the frame data, width, height, and size in bytes of the image.

@ Syntax

C/C++ (Windows/CE.NET)

```
I16 AngeloRTV_Capture_Start (U16 PortNo, U32
      CaptureNo)
I16 AngeloRTV_Select_Channel (U16 PortNo, U16
      Multiplex)
I16 AngeloRTV_Capture_Stop (U16 PortNo)
I16 AngeloRTV_Capture_Config (U16 PortNo, U32
      Start_Field)
I16 AngeloRTV_Sync_Grab(U16 PortNo, U32*
      Start_Address, U32* Width, U32* Height, U32*
      Size_Byte)
```

Visual Basic (Windows/CE.NET)

```
AngeloRTV_Capture_Start (ByVal PortNo As Integer,
      ByVal CaptureNo As Long) As Integer
AngeloRTV_Select_Channel (ByVal PortNo As
      Integer, ByVal Multiplex As Integer) As
      Integer
AngeloRTV_Capture_Stop (ByVak PortNo As Integer)
      As Integer
AngeloRTV_Capture_Config (ByVal PortNo As
      Integer, ByVal Start_Field As Long) As
      Integer
AngeloRTV_Sync_Grab(ByVal PortNo As Integer,
      ByRef Start_Address As Long, ByRef Width as
      Long, ByRef Height As Long, ByRef Size_byte
      As Long) As Integer
```

Delphi (Windows)

```
AngeloRTV_Capture_Start (PortNo:Smallint;
      CaptureNo:LongInt):Smallint
AngeloRTV_Select_Channel (PortNo:Smallint;
      Multiplex:SmallInt):Smallint
AngeloRTV_Capture_Stop
      (PortNo:Smallint):Smallint
AngeloRTV_Capture_Config (PortNo:Smallint;
      Start_Field:LongInt):Smallint
AngeloRTV_Sync_Grab(PortNo:Smallint; var
      Start_Address:Pointer; var Width:Longint;
      var Height:Longint; var
      Size_byte:Longint):Smallint
```

@ **Arguments**

PortNo:

Port number is the zero index of the Angelo series card. For example, if there are two PCI-RTV-24 Angelo cards (card 0, card 1) in the system, and each PCI-RTV-24 has four ports, the first port of card 0 is "0", and the first port of card 1 is "4."

CaptureNo:

Total number of frames to capture. If the "CaptureNo" is 0xFFFFFFFF, the frame grabbing will not stop until the "AngeloRTV_Capture_Stop" function is called.

Multiplex:

Indicates the multiplex channels.

- ▷ Bit 0 : Channel 0, 0 for disable ; 1 for enable.
- ▷ Bit 1 : Channel 1, 0 for disable ; 1 for enable.
- ▷ Bit 2 : Channel 2, 0 for disable ; 1 for enable.
- ▷ Bit 3 : Channel 3, 0 for disable ; 1 for enable.

For example:

- ▷ Multiplex = 1, only channel 0 is enable
- ▷ Multiplex = 2, only channel 1 is enable
- ▷ Multiplex = 15, four channels are enable

Start_Filed:

Indicates the first field of image.

- ▷ 0: first field is Odd, so the image will be Odd field + Even field.
- ▷ 1: first field is Even, so the image will be Even field + Odd field.
- ▷ 2: first field depends on the current field, so the image will be Even field + Odd field, or Odd field + Even field.

Start_Address:

Memory start address of the video frame.

Width:

Image width.

Height:
Image height.

Size_Byte:
Memory size in bytes.

@ **Return Codes**

- 0: ERROR_NoError
- -7: ERROR_Not_Initialized – Make sure the port has been initialized by "AngeloRTV_Initial".
- -9: ERROR_Invalid_PortNo – Please input the correct "PortNo" parameter.

@ **Examples**

<VC/BCB >

AngeloRTV_Capture_Config –
AngeloRTV_Capture_Start –
AngeloRTV_Sync_Grab –
AngeloRTV_Capture_Stop –

```
I16 Result;
U16 PortNo = 0;
U32 CaptureNo = 0xFFFFFFFF;
U32 Start_Field = 0;
U32 StrAddr;
U32 Width, Height, Size_Byte;
Result = AngeloRTV_Capture_Config (PortNo,
     Start_Field);
Result = AngeloRTV_Capture_Start (PortNo,
     CaptureNo);
Result = AngeloRTV_Sync_Grab (PortNo, &StrAddr,
     &Width, &Height, &Size_Byte);
Result = AngeloRTV_Capture_Stop (PortNo);
```

< Visual Basic >

AngeloRTV_Capture_Config –
AngeloRTV_Capture_Start –
AngeloRTV_Sync_Grab –

```
AngeloRTV_Capture_Stop –
Dim Result As Integer
Dim PortNo As Integer
Dim CaptureNo As Long
Dim Start_Field As Long
Dim StrAddr As Long
```

```
Dim Width as Long, Height As Long, Size_Byte As
     Long
PortNo = 0
CaptureNo = &HFFFFFFFF
Start_Field = 0
Result = AngeloRTV_Capture_Config (ByVal PortNo,
     ByVal Start_Field)
Result = AngeloRTV_Capture_Start (ByVal PortNo,
     ByVal CaptureNo)
Result = AngeloRTV_Sync_Grab (ByVal PortNo,
     StrAddr, Width, Height, Size_Byte)
Result = AngeloRTV_Capture_Stop (ByVal PortNo)
```

<Delphi >

AngeloRTV_Capture_Config –
AngeloRTV_Capture_Start –
AngeloRTV_Sync_Grab –
AngeloRTV_Capture_Stop –

```
Var
Result : SmallInt;
PortNo: SmallInt;
CaptureNo: LontInt;
Start_Field: LontInt;
StrAddr: Pointer;
Width, Height, Size_Byte: LongInt;
begin
PortNo:=0;
Start_Field :=0;
CaptureNo:= INFINITE;
Result := AngeloRTV_Capture_Config (PortNo,
     Start_Field);
Result := AngeloRTV_Capture_Start (PortNo,
     CaptureNo);
Result := AngeloRTV_Sync_Grab (PortNo, StrAddr,
     Width, Height, Size_Byte);
Result: = AngeloRTV_Capture_Stop (PortNo);
end;
```

4.5.6 GPIO & EEPROM Functions

@ Name

AngeloRTV_Set_GPIO_Sts (PortNo, Status)
Set Digital Output status.

AngeloRTV_Get_GPIO_Sts (PortNo, Status)
Get Digital Input status.

AngeloRTV_Set_GPIO_Int_Logic (PortNo, Logic)
Configure the Digital Input Interrupt condition

AngeloRTV_Write_EEPROM (PortNo, Offset, Value)
Write data into EEPROM

AngeloRTV_Read_EEPROM (PortNo, Offset, Value)
Read data from EEPROM

AngeloRTV_Set_LED_Sts (PortNo, LEDStatus)
Set LED status for cPci RTV24 card.

@ Description

AngeloRTV_Set_GPIO_Sts:
There is one digital output channel in each port of the Angelo series card, use this function to set the digital output status.

AngeloRTV_Get_GPIO_Sts:
There is one digital input channel in each port of Angelo series card, use this function to get the digital input status.

AngeloRTV_Set_GPIO_Int_Logic:
This function used to configure the Digital Input Interrupt condition.

AngeloRTV_Write_EEPROM:
Writes data into the EEPROM. Data in EEPROM will not be lost even when powered off.

AngeloRTV_Read_EEPROM:
Reads data from the EEPROM. Data in EEPROM will not be lost even when powered off.

AngeloRTV_Set_LED_Sts:
Use the function to set LED status. The function is for cPci RTV24 card only.

@ **Syntax**

C/C++ (Windows/CE.NET)

```
I16 AngeloRTV_Set_GPIO_Sts(U16 PortNo,U8 Status);
I16 AngeloRTV_Get_GPIO_Sts(U16 PortNo,U8*
    Status);
I16 AngeloRTV_Set_GPIO_Int_Logic(U16 PortNo, U16
    Logic);
I16 AngeloRTV_Write_EEPROM(U16 CardNo, U8 Offset,
    U8 Value);
I16 AngeloRTV_Read_EEPROM(U16 CardNo, U8 Offset,
    U8* Value);
I16 AngeloRTV_Set_LED_Sts (U16 PortNo, U8
    LEDStatus);
```

Visual Basic (Windows/CE.NET)

```
AngeloRTV_Set_GPIO_Sts (ByVal PortNo As Integer,
    ByVal Status As Byte) As Integer
AngeloRTV_Get_GPIO_Sts (ByVal PortNo As Integer,
    ByRef Status As Byte) As Integer
AngeloRTV_Set_GPIO_Int_Logic(ByVal PortNo As
    Integer, ByVal Logic As Integer) As Integer
AngeloRTV_Write_EEPROM (ByVal PortNo As Integer,
    ByVal Offset As Byte, ByVal Value As Byte)
    As Integer
AngeloRTV_Read_EEPROM (ByVal PortNo As Integer,
    ByVal Offset As Byte, ByRef Value As Byte)
    As Integer
AngeloRTV_Set_LED_Sts (ByVal PortNo As Integer,
    ByVal LEDStatus As Byte) As Integer
```

Delphi (Windows)

```
AngeloRTV_Set_GPIO_Sts
    (PortNo:Smallint;status:Byte):Smallint;
AngeloRTV_Get_GPIO_Sts (PortNo:Smallint;var
    status:Byte):Smallint;
AngeloRTV_Set_GPIO_Int_Logic(PortNo:Smallint;
    Logic:Smallint):Smallint;
AngeloRTV_Write_EEPROM (
    PortNo:Smallint;Offset:Byte;Value:Byte):Sma
    llint;
AngeloRTV_Read_EEPROM ( PortNo:Smallint;
    Offset:Byte;var Value:Byte):Smallint;
AngeloRTV_Set_LED_Sts (PortNo:Smallint;
    LEDStatus:Byte):Smallint;
```

@ **Arguments**

PortNo:

Port number is the zero index of the Angelo series card. For example, if there are two PCI-RTV-24 Angelo cards (card 0, card 1) in the system, and each PCI-RTV-24 has four ports, the first port of card 0 is "0", and the first port of card 1 is "4."

Status:

The digital input or digital output status

- ▷ 0 Low
- ▷ 1 High

Logic:

The digital input interrupt condition

- ▷ 0: Active Low
- ▷ 1: Active High

Offset:

The offset address of the EEPROM. This parameter is valid between 0 and 127

Value:

The value in Byte data type, this parameter is valid between 0 and 255.

LEDStatus:

Use the parameter to set the LED status.

- ▷ LEDStatus = 1: High
- ▷ LEDStatus = 0: Low

@ **Return Code**

- ▶ 0: ERROR_NoError
- ▶ -7: ERROR_Not_Initialized – Make sure the port has been initialized by "AngeloRTV_Initial".
- ▶ -9: ERROR_Invalid_PortNo – Please input the correct "PortNo" parameter.
- ▶ -15: ERROR_Invalid_Address – a valid offset address is between 0 and 127

@ **Example**

<VC/BCB >

AngeloRTV_Set_GPIO_Sts –
AngeloRTV_Get_GPIO_Sts –

```
I16 Result;
I16 PortNo = 0;
U8   Status = 1;
Result = AngeloRTV_Set_GPIO_Sts (PortNo, Status);
Result = AngeloRTV_Get_GPIO_Sts (PortNo, &
     Status);
```

AngeloRTV_Set_GPIO_Int_Logic –

```
I16 Result;
U16 PortNo = 0;
U16 Logic = 0;
Result = AngeloRTV_Set_GPIO_Int_Logic (PortNo,
     Logic);
```

AngeloRTV_Write_EEPROM
AngeloRTV_Read_EEPROM

```
I16 Result;
I16 PortNo = 0;
U8   Offset = 0;
U8   Value = 128;
Result = AngeloRTV_Write_EEPROM (PortNo, Offset,
     Value);
Result = AngeloRTV_Read_EEPROM (PortNo, Offset,
     &Value);
```

AngeloRTV_Set_LED_Sts –

```
I16 Result;
U16 PortNo;
U8  LEDStatus;
PortNo = 0;
LEDStatus = 1;
Result = AngeloRTV_Set_LED_Sts (PortNo,
     LEDStatus);
```

< Visual Basic >

AngeloRTV_Set_GPIO_Sts –
AngeloRTV_Get_GPIO_Sts –

```
Dim Result As Integer
Dim PortNo As Integer
Dim Status As Byte
PortNo = 0
Status = 1
Result = AngeloRTV_Set_GPIO_Sts (ByVal PortNo,
     ByVal Status)
```

```
   Result = AngeloRTV_Get_GPIO_Sts (ByVal PortNo,
        ByRef Status)
```

AngeloRTV_Set_GPIO_Int_Logic –

```
   Dim Result As Integer
   Dim PortNo As Integer
   Dim  Logic As Integer
   PortNo = 0
   Logic = 0
   Result = AngeloRTV_Set_GPIO_Int_Logic (ByVal
        PortNo, ByVal Logic)
```

AngeloRTV_Write_EEPROM
AngeloRTV_Read_EEPROM

```
   Dim Result As Integer
   Dim PortNo As Integer
   Dim Offset As Byte
   Dim Value As Byte
   PortNo = 0
   Offset =0
   Value = 128
   Result = AngeloRTV_Write_EEPROM(ByVal PortNo,
        ByVal Offset, ByVal Value)
   Result = AngeloRTV_Read_EEPROM(ByVal PortNo,
        ByVal Offset, ByRef Value)
```

AngeloRTV_Set_LED_Sts –

```
   Dim Result As Integer
   Dim PortNo As Integer
   Dim LEDStatus As Byte
   PortNo = 0
   LEDStatus = 1
   Result = AngeloRTV_Set_LED_Sts (ByVal PortNo,
        ByVal LEDStatus)
```

<Delphi >

AngeloRTV_Set_GPIO_Sts –
AngeloRTV_Get_GPIO_Sts –

```
   Var
   Result : SmallInt;
   PortNo : SmallInt;
   Status: Byte;
   PortNo:=0;
   Status:=1;
   Result := AngeloRTV_Set_GPIO_Sts (PortNo,
        Status);
```

```
Result := AngeloRTV_Get_GPIO_Sts (PortNo,
     Status);
```

AngeloRTV_Set_GPIO_Int_Logic –

```
var
Result: SmallInt;
PortNo: SmallInt;
Logic: SmallInt;
PortNo := 0;
Logic := 0;
Result := AngeloRTV_Set_GPIO_Int_Logic (PortNo,
     Logic);
```

AngeloRTV_Write_EEPROM

AngeloRTV_Read_EEPROM

```
Var
Result : SmallInt;
PortNo : SmallInt;
Offset: Byte;
Value: Byte;
PortNo:=0;
Offset:=0;
Value:=128;
Result := AngeloRTV_Write_EEPROM (PortNo, Offset,
     Value);
Result := AngeloRTV_Read_EEPROM (PortNo, Offset,
     Value);
```

AngeloRTV_Set_LED_Sts –

```
var
Result: Smallint;
PortNo: Smallint;
LEDStatus: Byte;
PortNo := 0;
LEDStatus := 1;
Result := AngeloRTV_Set_LED_Sts (PortNo,
     LEDStatus);
```

4.5.7 Callback & Thread Functions

@ **Name**

AngeloRTV_Get_Int_Status (PortNo, IntStatus)
Gets the current interrupt status

AngeloRTV_Set_Int_Event (PortNo,hEvent)
Assigns the windows interrupt event

AngeloRTV_Set_Callback(PortNo, CallBackProc)
Sets the callback function when an interrupt is generated

@ **Description**

AngeloRTV_Get_Int_Status:
Allows users to identify what caused an interrupt signal.

- ▷ Bit 0: GPIO interrupt, when Digital input channel is changed.
- ▷ Bit 1: Channel 0 Image ready
- ▷ Bit 2: Channel 1 Image ready
- ▷ Bit 3: Channel 2 Image ready
- ▷ Bit 4: Channel 3 Image ready

Note: There are four channels in each port, the default channel is channel 0.

AngeloRTV_Set_Int_Event:
Links interrupt events. Users only have to declare the "hEvent" variable and call this function to DLL, the DLL will link the event and interrupt automatically.

AngeloRTV_Set_Callback:
Links the callback function when an interrupt is generated to host pc.

Note: There are two ways to use the synchronization mechanism, one is the callback function, and the other is the thread function.

@ **Syntax**

C/C++ (Windows/CE.NET)

```
I16 AngeloRTV_Get_Int_Status(U16 PortNo,U32
     *IntStatus);
I16 AngeloRTV_Set_Int_Event(U16 PortNo,HANDLE*
     hEvent);
```

```
I16 AngeloRTV_Set_Callback (U16 PortNo, void (
     __stdcall *CallBackProc)(U32
     VideoBufferaddress ,U16 PortNo));
```

Visual Basic (Windows/CE.NET)

```
AngeloRTV_Set_Int_Event (ByVal PortNo As Integer,
     ByRef hEvent As Long) As Integer
AngeloRTV_Get_Int_Status(ByVal PortNo As Integer,
     ByRef IntStatus As Long) As Integer
AngeloRTV_Set_Callback(ByVal PortNo As Integer,
     ByVal CallBack As Long) As Integer
```

Delphi (Windows)

```
AngeloRTV_Set_Int_Event(PortNo:Smallint;var
     hEvent:Integer):Smallint;
AngeloRTV_Get_Int_Status(PortNo:Smallint;var
     IntStatus:Longint):Smallint;
AngeloRTV_Set_Callback(PortNo:Smallint;lpCallBac
     kProc:CallbackFunc):Smallint;
```

@ **Arguments**

PortNo:

Port number is the zero index of the Angelo series card. For example, if there are two PCI-RTV-24 Angelo cards (card 0, card 1) in the system, and each PCI-RTV-24 has four ports, the first port of card 0 is "0", and the first port of card 1 is "4."

IntStatus:

Interrupt status

- ▷ Bit 0:GPIO interrupt, when Digital input channel is changed.
- ▷ Bit 1:Channel 0 Image ready
- ▷ Bit 2:Channel 1 Image ready
- ▷ Bit 3:Channel 2 Image ready
- ▷ Bit 4:Channel 3 Image ready

hEvent:

- ▷ Interrupt event handle.

@ Return Codes

- 0: ERROR_NoError
- -7: ERROR_Not_Initialized – Make sure the port has been initialized by "AngeloRTV_Initial".
- -9: ERROR_Invalid_PortNo – Please input the correct "PortNo" parameter.

@ Examples

< VC/BCB >

Use Thread:

```
HANDLE hEvent=NULL;
void *pThread=NULL;
U32 threadID;
U16 PortNo = 0;

DWORD nObj;
U32 Size_Byte;
U32  Status =0;
I16 ISR_ON=0;
DWORD WINAPI IntThreadProc( LPVOID lpParam )
{
      while( ISR_ON )
      {
      nObj = WaitForSingleObject(hEvent,
      INFINITE);
      AngeloRTV_Get_Int_Status(PortNo,&Status);
      if((Status&0x01)==1)//GPIO
      {
      }
      if((Status>>1&0x01)==1)//Channel 0 of the
      nPort
      {
      }
      else if((Status>>2&0x01)==1)//Channel 1 of
      the nPort
      {
      }
      else if((Status>>3&0x01)==1)//Channel 2 of
      the nPort
      {
      }
      else if((Status>>4&0x01)==1)//Channel 3 of
      the nPort
```

```
        {
        }
        ResetEvent(hEvent);
        }
        Return TRUE;
    }
    AngeloRTV_Set_Int_Event(PortNo,&hEvent);
    pThread =CreateThread(NULL, 0, IntThreadProc, 0,
        0, &threadID);
```

Use Callback Function:

```
    U16 PortNo = 0;
    void __stdcall MediaStreamProc( U32
        VideoBufferaddress ,U16 PortNo)
    {
        U32 Status;
        AngeloRTV_Get_Int_Status(PortNo,&Status);
        if((Status&0x01)==1)//GPIO
        {
        }
        if((Status>>1&0x01)==1)//Channel 0 of the
        nPort
        {
        }
        else if((Status>>2&0x01)==1)//Channel 1 of
        the nPort
        {
        }
        else if((Status>>3&0x01)==1)//Channel 2 of
        the nPort
        {
        }
        else if((Status>>4&0x01)==1)//Channel 3 of
        the nPort
        {
        }
     }
    AngeloRTV_Set_Callback(PortNo,MediaStreamProc);
```

< Visual Basic >

Use Callback Function

```
    Dim Result As Integer
    Dim PortNo As Integer
    Public Sub lpcallback(ByVal VideoBufferaddress As
        Long, ByVal PortNo As Integer)
```

```
Dim Status As Long
Result  = AngeloRTV_Get_Int_Status(PortNo,
     Status)
End Sub
PortNo = 0
Result = AngeloRTV_Set_Callback(PortNo, AddressOf
     lpcallback)
```

<Delphi >

Use Thread

```
Var
ISR_ON : SmallInt;
Event_Angelo:Integer;
ThreadId : LongInt;
PortNo: SmallInt;
PortNo:=0;
     function ThreadFunc(Parameter: Pointer):
     Integer ;
          var
        Str_Add :Pointer;
        Size_Byte :Longint;
        intstatus : LongInt;
begin
        while(ISR_ON=1) do
        begin

     WaitForSingleObject(Event_Angelo,INFINITE);
               ResetEvent(Event_Angelo);

     AngeloRTV_Get_Int_Status(PortNo,intstatus);
               if intstatus = 2 then //image
     ready for channel 0 of port
               begin

               end;
        end;
end;

     AngeloRTV_Set_Int_Event(PortNo,Event_Angelo
     );
     ISR_ON :=1;
       Mythread :=
     BeginThread(nil,0,ThreadFunc,nil,0,ThreadId
     );
```

Use Callback function

```
var
PortNo: SmallInt;
PortNo:=0;
procedure MyCallback(VideoBufferAddress :
     LongInt;PortNo : SmallInt);stdcall
var
     Str_Add :Pointer;
     Result :Smallint;
     Size_Byte :LongInt;
     intstatus :LongInt;
begin
     AngeloRTV_Get_Int_Status(PortNo,intstatus);
        if intstatus = 2 then
        begin
        end;
     end;
AngeloRTV_Set_Callback(Cur_Port,MyCallback);
```

4.5.8 Watchdog Timer

Note: This function is only available for RTV-24.

@ Name

AngeloRTV_Set_WDT(CardNo, Enable, Interval)

Sets the watch dog status (only for PCI-RTV24)

@ Description

AngeloRTV_Set_WDT:

Enables or disables the watch dog timer in the Angelo series cards, and set the interval of timer. When users have enabled the watch dog timer and selected a 16 seconds interval, a system reset signal will be triggered if this function is not called after 16 seconds.

@ Syntax

C/C++ (Windows/CE.NET)

```
I16 AngeloRTV_Set_WDT (U16 CardNo,U16 Enable,U16
      Interval)
```

Visual Basic (Windows/CE.NET)

```
AngeloRTV_Set_WDT (ByVal PortNo As Integer, ByVal
      Enable As Integer, ByVal Interval As
      Integer) As Integer
```

Delphi (Windows)

```
AngeloRTV_Set_WDT(CardNo:Smallint;enable:Smallin
      t;interval:Smallint):Smallint;
```

@ Arguments

CardNo:

Card number is the zero index in Angelo series card. For example, if there are two Pci-RTV-24 Angelo cards (card 0, card 1) in the system, "CardNo" of card 0 is 0, and 1 for card 1.

Enable:

Enables or disables the watch dog timer. 0 for disable, 1 for enable.

Interval:

Indicates the watch dog timer interval.

- ▷ 1: 8 seconds
- ▷ 2: 16 seconds
- ▷ 3: 32 seconds

@ **Return Codes**

- 0 : ERROR_NoError
- -7: ERROR_Not_Initialized – Make sure the port has been initialized by "AngeloRTV_Initial".
- -9 : ERROR_Invalid_PortNo – Please input the correct "PortNo" parameter.

@ **Examples**

<VC/BCB >

AngeloRTV_Set_WDT

```
I16 Result;
U16 CardNo = 0;
U16 Enable = 1;
U16 Interval = 1;
Result =
     AngeloRTV_Set_WDT(CardNo,Enable,Interval);
```

< Visual Basic >

AngeloRTV_Set_WDT

```
Dim Result As Integer
Dim CardNo As Integer
Dim Enable As Integer
Dim Interval As Integer
CardNo = 0
Enable = 1
Interval = 1
Result =
     AngeloRTV_Set_WDT(CardNo,Enable,Interval)
```

<Delphi >

AngeloRTV_Set_WDT

```
Var
Result : SmallInt;
CardNo: SmallInt;
Enable: SmallInt;
Interval: SmallInt;
CardNo :=0;
Enable:=1;
Interval:=1;
Result :=
     AngeloRTV_Set_WDT(CardNo,Enable,Interval);
```

4.5.9 Software Trigger

@ **Name**

AngeloRTV_Trigger_Config (PortNo,Interval)

Sets software trigger configuration(Only for PCI-RTV24, cPCI-RTV-24, cPCI-RTV44)

AngeloRTV_Trigger_Start (CardNo, Multiplex)

Generates single or multiple trigger output simultaneously(Only for PCI-RTV24, cPCI-RTV-24, cPCI-RTV44)

@ **Description**

AngeloRTV_Trigger_Config:

Configures the pulse output interval.

AngeloRTV_Trigger_Start:

Generates a one shot pulse output for single or multiple ports.

@ **Syntax**

C/C++ (Windows/CE.NET)

```
I16 AngeloRTV_Trigger_Config(U16 PortNo,U16
      Interval);
I16 AngeloRTV_Trigger_Start(U16 CardNo,U16
      Multiplex);
```

Visual Basic (Windows/CE.NET)

```
AngeloRTV_Trigger_Config (ByVal PortNo As
      Integer, ByVal Interval As Integer) As
      Integer
AngeloRTV_Trigger_Start (ByVal CardNo As Integer,
      ByVal Multiplex As Integer) As Integer
```

Delphi (Windows)

```
AngeloRTV_Trigger_Config (PortNo:Smallint;
      Interval:Smallint):Smallint;
AngeloRTV_Trigger_Start (CardNo:Smallint;
      Multiplex:Smallint):Smallint;
```

@ **Arguments**

CardNo:

Card number is the zero index in Angelo series card. For example, if there are two Pci-RTV-24 Angelo cards (card 0, card 1) in the system, "CardNo" of card 0 is 0, and 1 for card 1.

PortNo:

Port number is the zero index of the Angelo series card. For example, if there are two PCI-RTV-24 Angelo cards (card 0,

card 1) in the system, and each PCI-RTV-24 has four ports, the first port of card 0 is "0", and the first port of card 1 is "4."

Interval:
Indicates the trigger output interval, the valid range is from 0 to 253, the definition is as following

- ▷ 0: 16ms
- ▷ 32: 12ms
- ▷ 128: 8ms
- ▷ 253: 60μs

Multiplex:
Indicates the trigger output ports in Angelo series cards.

- ▷ Bit 0: Port 0 on each card. 0 for disable, 1 for enable.
- ▷ Bit 1: Port 1 on each card. 0 for disable, 1 for enable.
- ▷ Bit 2: Port 2 on each card. 0 for disable, 1 for enable.
- ▷ Bit 3: Port 3 on each card. 0 for disable, 1 for enable.

For example:

- ▷ Multiplex = 1, only port 0 in each Angelo series card generates a trigger output.
- ▷ Multiplex = 2, only port 1 in each Angelo series card generates a trigger output.
- ▷ Multiplex = 15, four ports in each Angelo series card generates a trigger output.

@ **Return Codes**

- ▶ 0: ERROR_NoError
- ▶ -7: ERROR_Not_Initialized – Make sure the port has been initialized by "AngeloRTV_Initial".
- ▶ -9: ERROR_Invalid_PortNo – Please input the correct "PortNo" parameter.

@ **Examples**

<VC/BCB >

AngeloRTV_Trigger_Config
AngeloRTV_Trigger_Start

```
I16 Result;
U16 CardNo = 0;
U16 PortNo = 0;
```

```
U16 Multiplex = 1;
U16 Interval = 32;
Result =
     AngeloRTV_Trigger_Config(PortNo,Interval);
Result = AngeloRTV_Trigger_Start(CardNo,
     Multiplex);
```

< Visual Basic >

AngeloRTV_Trigger_Config

AngeloRTV_Trigger_Start

```
Dim Result As Integer
Dim CardNo As Integer
Dim PortNo As Integer
Dim Multiplex As Integer
Dim Interval As Integer
CardNo = 0
PortNo = 0
Multiplex = 1
Interval = 32
Result = AngeloRTV_Trigger_Config
     (PortNo,Interval)
Result = AngeloRTV_Trigger_Start (CardNo,
     Multiplex)
```

<Delphi >

AngeloRTV_Trigger_Config

AngeloRTV_Trigger_Start

```
Var
Result : SmallInt;
CardNo: SmallInt;
PortNo: SmallInt;
Multiplex: SmallInt;
Interval: SmallInt;
CardNo :=0;
PortNo:=0;
Multiplex:=1;
Interval:=32;
Result := AngeloRTV_Trigger_Config
     (PortNo,Interval);
Result := AngeloRTV_Trigger_Start (CardNo,
     Multiplex);
```

4.5.10 Frame Buffer

@ **Name**

AngeloRTV_Copy_frame (PortNo, Dest_Address, Size_Byte)
Copies the frame date to the user allocated destination memory (bytes).

AngeloRTV_Get_frame(PortNo, Start_Address,Width, Height, Size_Byte)
Gets the frame memory start address and size of frame (bytes).

AngeloRTV_Save_File(PortNo, FileName, FileFormat, nQuality)
Save the video frame into an image file.

@ **Description**

AngeloRTV_Copy_frame:
Copies frame data to memory or an array that the user has allocated. Before using this function, remember to allocate enough memory address space or array elements.

AngeloRTV_Save_File:
Saves the current video frame into an image file (TIF, BMP, or JPEG). nQuality is only used JPEGs.

AngeloRTV_Get_frame:
Retrieves the memory start address from the frame data, width, height, and size in bytes of the image. For example a FULL NTSC RGB24 video frame will occupy 900K Byte (640*480*3) memory address space.

Format	DWORD(32Bit)	Pixel Data			
		Byte 3 Bit [31:24]	Byte 2 Bit[23:16]	Byte 1 Bit[15:8]	Byte 0 Bit[7:0]
RGB32	Dw0	Appha	R	G	B
RGB24	Dw0	B1	R0	G0	B0
	Dw1	G2	B2	R1	G1
	Dw2	R3	G3	B3	R2

Table 4-3: Pixel Data

Format	DWORD(32Bit)	Pixel Data			
RGB16	Dw0	{R0[31:27], G0[26:21], B0[20:16]}	{R0[15:11], G0[10:5], B0[4:0]}		
RGB15	Dw0	{0,R0[30:26], G0[25:21], B0[20:16]}	{0,R0[14:10], G0[9:5], B0[4:0]}		
Gray Scale(Y8)	Dw0	Y3	Y2	Y1	Y0

Table 4-3: Pixel Data

@ Syntax

C/C++ (Windows/CE.NET)

```
I16 AngeloRTV_Copy_Frame(U16 PortNo,U8
     *Dest_Address,U32 Size_Byte);
I16 AngeloRTV_Get_Frame(U16 PortNo,U32*
     Start_Address, U32* Width, U32* Height, U32*
     Size_Byte);
16 AngeloRTV_Save_File(U16 PortNo, char*
     FileName,U8 FileFormat,U32 nQuality);
```

Visual Basic (Windows/CE.NET)

```
AngeloRTV_Copy_Frame (ByVal PortNo As Integer,
     Dest_Address As Byte, ByVal Size_byte As
     Long) As Integer
AngeloRTV_Get_Frame (ByVal PortNo As Integer,
     ByRef Start_Address As Long, ByRef Width as
     Long, ByRef Height As Long, ByRef Size_byte
     As Long) As Integer
AngeloRTV_Save_File (ByVal PortNo As Integer,
     ByVal FileName As String, ByVal FileFormat
     As Byte, ByVal nQuality As Long) As Integer
```

Delphi (Windows)

```
AngeloRTV_Copy_Frame(PortNo:Smallint;var
     Dest_Address:Byte;Size_byte:Longint):Smalli
     nt;
AngeloRTV_Get_Frame(PortNo:Smallint;var
     Start_Address:Pointer; var Width:Longint ,
     var Height:Longint ,var
     Size_byte:Longint):Smallint;
AngeloRTV_Save_File(PortNo:Smallint;FileName:Str
     ing;FileFormat:Byte;nQuality
     :LongIng):Smallint;
```

@ **Arguments**

PortNo:

Port number is the zero index of the Angelo series card. For example, if there are two PCI-RTV-24 Angelo cards (card 0, card 1) in the system, and each PCI-RTV-24 has four ports, the first port of card 0 is "0", and the first port of card 1 is "4."

Dest_Address:

User allocated destination memory address or array.

Start_Address:

Memory start address of the video frame.

Width:

Image width.

Height:

Image height.

Size_Byte:

Memory size in bytes.

FileName:

File name to save to. Remember to add the file extension name.

FileFormat:

File format to save to.

- ▷ 0: TIF
- ▷ 1: BMP
- ▷ 2: JPEG

nQuality:

This parameter in used only for the JPEG file format.

@ **Return Code**

- ► 0: ERROR_NoError
- ► -7: ERROR_Not_Initialized – Make sure the port has been initialized by "AngeloRTV_Initial".
- ► -9: ERROR_Invalid_PortNo – Please input a correct "PortNo" parameter.

@ **Examples**

<VC/BCB >

AngeloRTV_Copy_Frame

```
I16 Result;
U16 PortNo = 0;
U32 Size_Byte = 640*480*3;
U8* Dest_Address =NULL;
Dest_Address = (U8*)malloc(Size_Byte );
Result = AngeloRTV_Copy_Frame (PortNo,
     Dest_Address, Size_Byte);
```

AngeloRTV_Get_Frame

```
I16 Result;
U16 PortNo = 0;
U32 Size_Byte,Width,Height ;
U32 StrAddr ;
Result = AngeloRTV_Get_Frame(PortNo,&StrAddr,
     &Width, &Height,&Size_Byte);
```

AngeloRTV_Save_File

```
I16 Result;
U16 PortNo = 0;
U8 File_Format = 2;
U32 nQuality = 25;
Result = AngeloRTV_Save_File(PortNo,"Image.jpg",
     File_Format, nQuality);
```

< Visual Basic >

AngeloRTV_Copy_Frame

```
Dim Result As Integer
Dim PortNo As Integer
Dim Size_Byte As Long
Dest_Address( ) As Byte
PortNo = 0
Size_Byte =640*480*3
ReDim Dest_Address(0 To Size_Byte - 1) As Byte
Result = AngeloRTV_Copy_Frame (PortNo,
     Dest_Address(0), Size_Byte);
```

AngeloRTV_Get_Frame

```
Dim Result As Integer
Dim PortNo As Integer
Dim Size_Byte As Long
Dim StrAddr As Long
Dim Width as Long,Height As Long
PortNo = 0
Result = AngeloRTV_Get_Frame( ByVal PortNo,
     Str_Add, Width, Height, Size_Byte)
```

AngeloRTV_Save_File

```
   Dim Result As Integer
   Dim File_Format as Byte
   Dim nQuality as Long
   PortNo = 0
   File_Format = 2
   NQuality = 25
   Result = AngeloRTV_Save_File (PortNo,
        "Image.jpg", File_Format, NQuality)
```

<Delphi >

AngeloRTV_Copy_Frame

```
   Var
   Result : SmallInt;
   PortNo: SmallInt;
   Size_Byte :Longint;
   Dest_Add : array of Byte;
   PortNo := 0;
   Size_Byte := 640*480*3;
   SetLength(Dest_Add, Size_Byte);
   Result := AngeloRTV_Copy_Frame (PortNo,
        Dest_Add[0], Size_Byte);
```

AngeloRTV_Get_Frame

```
   Var
   Result : SmallInt;
   PortNo: SmallInt;
   Size_Byte : LongIng;
   Width :LongIng;
   Height :LongIng;
   Str_Add :Pointer;
   PortNo:=0;
   Result :=AngeloRTV_Get_Frame(PortNo,
        Str_Add,Width, Height, Size_Byte);
```

AngeloRTV_Save_File

```
   Var
   Result : SmallInt;
   PortNo: SmallInt;
   File_Format : Byte;
   NQuality :LongInt;
   PortNo:=0;
   File_Format:=2;
   Nquality := 25;
   Result := AngeloRTV_Save_File (PortNo,
        'Image.jpg', File_Format, Nquality)
```

4.5.11 Angel RTV LabVIEW Function Library

AngeloRTV_Init.vi

This VI initializes the port of RTV card. Set video format and color format for the port of RTV card. Call this VI before AngeloRTV_Snap.vi.

Video Format

- 0: Full NTSC (640*480)
- 1: Full PAL (768*576)
- 2: CIF NTSC (320*240)
- 3: CIF PAL (384*288)
- 4: QCIF NTSC (160*120)
- 5: QCIF PAL (192*144)

Color Format

- 0: RGB16
- 1: GRAY
- 2: RGB15
- 3: RGB24
- 4: RGB32
- 5: RGB8
- 6: RAW8X
- 7: YUY2 4:2:2
- 8: BtYUV 4:1:1

AngeloRTV_Snap.vi

Obtain an image and output the image data for picture control.

AngeloRTV_Close.vi

Release resources of all ports.

AngeloRTV_Software_Reset.vi

Reset the port to its initial state.

AngeloRTV_Hardware_Initial.vi
This VI initializes the port of RTV card. Each application program must call this function before any other function. If the initialization succeeds, it returns a value 0.

AngeloRTV_Hardware_Close.vi
Release resources of all ports.

AngeloRTV_Int_Enable.vi
This VI links the event and the interrupt automatically.

AngeloRTV_Wait_Int.vi
Wait for interrupt events. You can get a complete image data from the image buffer after this VI returns correctly.

AngeloRTV_Set_Video_Format.vi
Set the Video format for the port of RTV card. Valid color formats are: NTSC, EIA, PAL, CCIR.

AngeloRTV_Get_Video_Format.vi
Retrieve the video format of the port.

AngeloRTV_Set_Color_Format.vi
Set the color format for the port of RTV card. Valid color format are: gray scale, RGB, YUV.

Color Format:

- ▷ RGB16 = 0
- ▷ GRAY = 1
- ▷ RGB15 = 2
- ▷ RGB24 = 3
- ▷ RGB32 = 4
- ▷ RGB8 = 5

AngeloRTV_Get_Color_Format.vi
Retrieve the color format of the port

AngeloRTV_Set_Image_Config.vi
Adjust hue, contrast, saturation and brightness for the port of RTV card.

ConfigIndex:

- ▷ 0 for BRIGHTNESS
- ▷ 1 for HUE
- ▷ 2 for SATURATION (U)
- ▷ 3 for SATURATION (V)
- ▷ 4 for CONTRAST (LUMA)
- ▷ 5 for luma notch filter (for monochrome video, the notch filter should not be used)
- ▷ 6 for Gamma Correction Removal

	Range	Default Value
BRIGHTNESS	0 to 255	128
HUE	0 to 255	0
CHROMA (U)	0 to 255	127
CHROMA (V)	0 to 255	127
LUMA	0 to 255	112
LUMA notch filter	0(Enable) or 1(Disable)	

AngeloRTV_Get_Image_Config.vi
Retrieve current hue, contrast, saturation and brightness of the port.

AngeloRTV_Set_Image_Geometric.vi
This VI is used for image cropping and scaling.

X_Scale

This parameter is the scaling factor applied to the RTV sampled line to obtain pixels according to the resolution.

X_Active

This parameter is the length of the active video line.

X_Offset

This parameter is the number of scaled pixels to skip before the start of the active video line.

Y_Scale

This parameter is the scaling factor applied to the RTV sampled data lines in the vertical direction. It must be the following values: 1.0, 0.5, 0.25.

Y_Active

This parameter is the height (in lines) of the active video image.

Y_Offset

This parameter is the number of lines to skip before the first line of the active video image.

AngeloRTV_Select_Channel.vi

RTV card is capable of channel extension. This VI is used to multiplex video signals for ports. In most cases, this VI is not required because the default setting is one port dedicated to one channel.

Note: Do not call this VI if there is no channel extension board in the system.

AngeloRTV_Capture_Config.vi

Set the starting field of image, only for Full size image (Video format = 0 or 1)

Start_Filed

Indicate the first field of image.

- ▷ 0: First field is odd, so the image will be odd field + even field.
- ▷ 1: First field is even, so the image will be even field + odd field.
- ▷ 2: First field depends on the current field, so the image will be even field + odd field or odd field + even field.
- ▷ 3: Single field frame, used for moving object inspection.

AngeloRTV_Capture_Start.vi

Start to grab video images. If the "CaptureNumber" is 0xFFFFFFFF, the frame grabbing will not stop until the "AngeloRTV_Capture_Stop.vi" is called.

AngeloRTV_Capture_Stop.vi

Stop grabbing video images.

AngeloRTV_Trigger_Start.vi

Generate a one shot pulse output for single or multiple ports.

Multiplex

Indicate the trigger output ports on the RTV card.

- ▷ Bit 0: Port 0 on each card. 0 for disable, 1 for enable.
- ▷ Bit 1: Port 1 on each card. 0 for disable, 1 for enable.
- ▷ Bit 2: Port 2 on each card. 0 for disable, 1 for enable.
- ▷ Bit 3: Port 3 on each card. 0 for disable, 1 for enable.

AngeloRTV_Trigger_Config.vi

Configure the pulse output interval.

Interval

Indicates the trigger output interval. The valid range is from 0 to 253. The definition is as follows:

- ▷ 0: 16 ms
- ▷ 32: 12 ms
- ▷ 128: 8 ms
- ▷ 253: 60μs

AngeloRTV_Sync_Grab.vi

Use this VI to obtain an image frame. Retrieve the memory start address from the frame data, width, height, and size in bytes of the image.

AngeloRTV_Get_Frame.vi

Retrieve the memory start address from the frame data, width, height, and size in bytes of the image.

AngeloRTV_Copy_Frame.vi

Copy frame data to memory or an array that the user allocates. Before using this VI, remember to allocate enough memory space or array elements.

AngeloRTV_Set_GPIO_Sts.vi

There is one digital output channel in each port of RTV card. Use this VI to set digital output status.

1.

AngeloRTV_Get_GPIO_Sts.vi

There is one digital input channel in each port of RTV card. Use this VI to get the digital input status.

AngeloRTV_Write_EEPROM.vi

Write data into EEPROM. Data in EEPROM will not be lost when power off.

Offset

This parameter is valid between 0 and 127

Value

Value in byte. This parameter is valid between 0 and 255.

AngeloRTV_Read_EEPROM.vi

Read data from EEPROM. Data in EEPROM will not be lost when power off.

Offset:

This parameter is valid between 0 and 127

Value:

Value in byte. This parameter is valid between 0 and 255.

AngeloRTV_Read_Serial.vi

This VI can read a 48-bit unique ID and store in 2 long integers.

HighByte

HighByte stores the upper 16-bit of Serial No.

LowByte

LowByte stores the lower 32-bit of Serial No.

AngeloRTV_Save_File.vi

Save the current video frame into an image file (TIF, BMP, or JPEG). Quality is used only for JPEGs.

FileFormat

- ▷ 0: TIF
- ▷ 1: BMP
- ▷ 2: JPEG

4.6 Programming Guide

4.6.1 DirectShow Programming Guide

Introduction

A complete documentation on DirectShow application programming can be found at:

http://msdn.microsoft.com/library/default.asp?url=/library/en-us/directx9_c/directX/htm/introductiontodirectshow.asp.

If a DirectX 9.0 is installed, this documentation is also available from DirectX SDK Help.

The main goal of writing a DirectShow Application is to build a filter graph by connecting several filters together to perform a given task such as previewing video/audio, capturing video/audio and multiplexing them to write into a file. Each filter performs a single operation and pass data from its output pin to the input pin of the next filter in the graph.

To build a capture graph using a program, the first thing is to obtain the interface pointer of the capture filter. The ADLink Bt878 Video Capture filter can be obtained through **system device enumerator**. After holding an interface pointer to the capture filter object, use method **IGraphBuilder::AddSourceFilter** to add the source filter object to the filter graph. Use **IFilterGraph::AddFilter** to add other downstream filters to the filter graph. After filters are added, call **IFilterGraph::ConnectDirect** or **IGraphBuilder::Connect** methods to connect output pins from upstream filters to the input pins of the downstream filters. Calling methods **IMediaControl::Run, IMediaControl::Pause** or **IMediaControl::Stop** will change filter state to running, paused or stopped.

The filters that are needed for capturing video streams are listed in next section, with detailed information for each filter and its pins. Example filter graphs for previewing/capturing video streams are also illustrated in this chapter and gives examples of two ways of controlling device driver.

Descriptions of Filters

This section lists filters needed to build a filter graph for capturing video stream and previewing video stream.

Source Filter

ADLink Bt878 Video Capture

ADLink Bt878 Video Capture Filter belongs to the category of WDM Streaming Capture Devices. It is actually a kernel-mode KsProxy plug-in. An application can treat it simply as a filter. Use System Device Enumerator to add this filter to a filter graph.

Filter Name	ADLink Bt878 Video Capture
Filter CLSID	Not applicable.
Filter Category Name	WDM Streaming Capture Devices
Filter Category	AM_KSCATEGORY_CAPTURE
Video Capture Pin Supported Media Types	MEDIATYPE_Video Subtypes: ▶ MEDIASUBTYPE_YUY2 ▶ MEDIASUBTYPE_YVU9 ▶ MEDIASUBTYPE_UYVY ▶ MEDIASUBTYPE_YV12 ▶ MEDIASUBTYPE_I420 ▶ MEDIASUBTYPE_Y41P ▶ MEDIASUBTYPE_RGB24 ▶ MEDIASUBTYPE_RBG32 ▶ MEDIASUBTYPE_RBG565 ▶ MEDIASUBTYPE_RBG555
Video Preview Pin Supported Media Types	MEDIATYPE_Video Subtypes: ▶ MEDIASUBTYPE_YUY2 ▶ MEDIASUBTYPE_YVU9 ▶ MEDIASUBTYPE_UYVY ▶ MEDIASUBTYPE_YV12 ▶ MEDIASUBTYPE_I420 ▶ MEDIASUBTYPE_Y41P ▶ MEDIASUBTYPE_RGB24 ▶ MEDIASUBTYPE_RBG32 ▶ MEDIASUBTYPE_RBG565 ▶ MEDIASUBTYPE_RBG555
Merit	MERIT_DO_NOT_USE

CrossBar Filter

If the device is a capture board, a CrossBar filter is needed for switching video source. In hardware design, crossbar can switch channel input of same port.

Filter Name	ADLink Bt878 CrossBar
Filter Category Name	WDM_Streaming Crossbar Devices

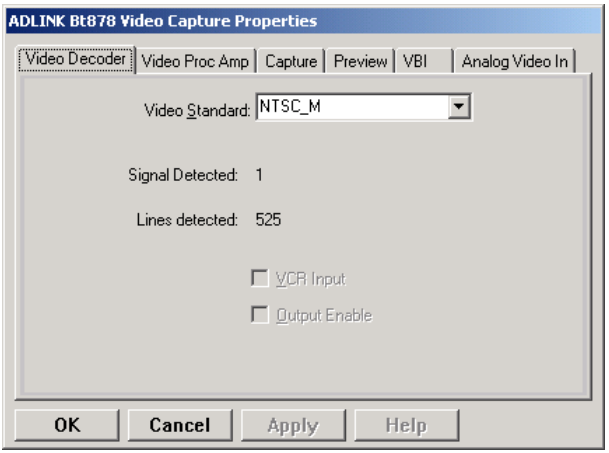
Example Graphs

The Microsoft DirectX SDK provides a very useful debugging utility called GraphEdit, which can be used to simulate graph building. From the **Graph** menu of the GraphEdit application, click **Insert Filters**… and choose the desired filters. Filters are organized by categories. Click **Insert Filter** button to add the filters to a graph. Then connect two filters' pins by dragging mouse from one filter's output pin to another filter's input pin. An arrow will be drawn if these two pins agree on the connection.

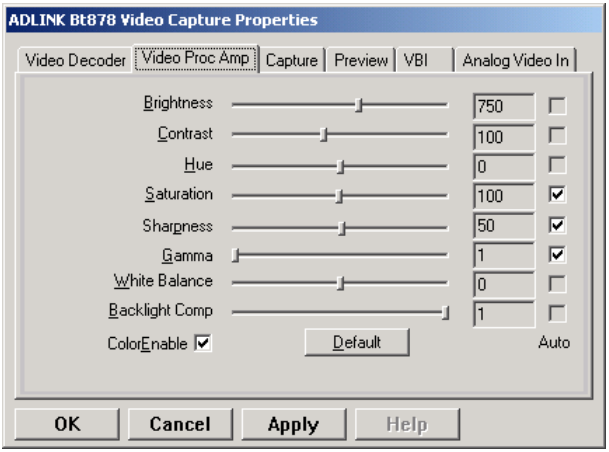
After inserting ADLink Bt878 Video Capture filter and ADLink Bt878 Crossbar filter, right click on the rectangle and click Filter Properties…. The **filter properties** dialogue will appear. Use the property pages to set video settings before connecting video pins to other filters. The property pages are shown below:

ADLink Bt878 Video Capture filter:

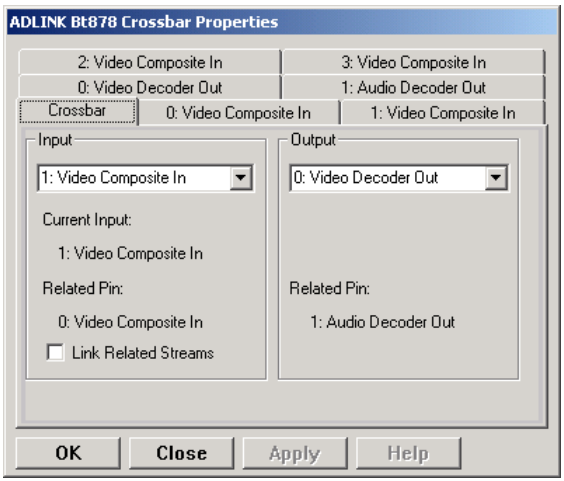
Video Decoder:



Video Proc Amp:

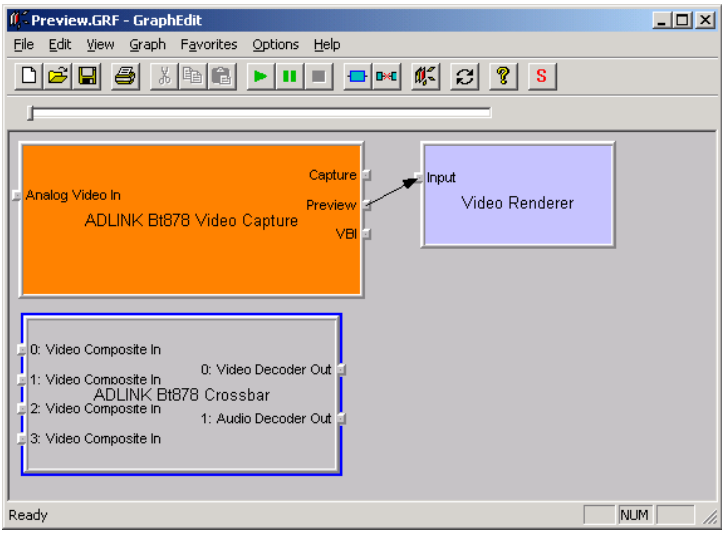


ADLink Bt878 Crossbar filter:



Select video input before or during video previewing.

Example Graph



Controlling Driver

The ADLink Bt878 Video Capture Filter provides property pages and exposes COM interfaces to control video. So an application can have two ways to control video configurations: using the property pages and using the COM interfaces.

Use Property Pages

There are two embedded property pages in the driver. To show these property pages, use Windows API: **OleCreateProperty-Frame**.

Documentation about Displaying a Filter's Property Page can be found on Microsoft MSDN homepage.

Below is the example code for adding property pages:

```
// pFilter points to the capture filter
ISpecifyPropertyPages *pSpecify;
HRESULT hr;
hr = pFilter-
     >QueryInterface(IID_ISpecifyPropertyPages,
     (void **)&pSpecify);
if (SUCCEEDED(hr))
{
     FILTER_INFO FilterInfo;
     pFilter->QueryFilterInfo(&FilterInfo);
     FilterInfo.pGraph->Release();
     CAUUID caGUID;
     pSpecify->GetPages(&caGUID);
     pSpecify->Release();
     OleCreatePropertyFrame(
          NULL,// Parent window
          0,   // x (Reserved)
          0,   // y (Reserved)
          FilterInfo.achName,// Caption for the
          dialog box
          1,   // Number of filters
          (IUnknown **)&m_pFilter,// Pointer to
          the filter
          caGUID.cElems,// Number of property
          pages
          caGUID.pElems,// Pointer to property
          page CLSIDs
          0,   // Locale identifier
          0,   // Reserved
          NULL // Reserved
          );
     CoTaskMemFree(caGUID.pElems);
}
```

Use COM interfaces

Use the methods of **IAMVideoProvAmp** interface of standard DirectShow Interface to get or set the qualities of an incoming video signal.

ADLink Bt878 Crossbar

The ADLink Bt878 Crossbar filter implements an **IAMCrossbar** interface. It routes signals from an analog or digital source to a video capture filter.

Proprietary Interface

GPIO Access

The GPIO provides a method to read board information, select input channel, and control digital inputs/digital outputs.

Sample:

#define INSTANCE_DATA_OF_PROPERTY_PTR(x)
((PKSPROPERTY((x))) + 1)

#define INSTANCE_DATA_OF_PROPERTY_SIZE(x)
(sizeof((x)) - sizeof(KSPROPERTY))

```
void GPIOWrite(IBaseFilter* pFilter, DWORD value)
/*
Purpose:
     Set the electronic level of the gpio pin.
Parameters:
     pFilter: Interface of BT878 filter
     value: 1 for high level, and 0 for low level
*/
{
     IKsPropertySet *pKs = NULL;
     DWORD TypeSupport = 0;
     KSPROPERTY_CUSTOMBT848_GPIO_S rc;
     HRESULT hr;
     ULONG ret=0;
     DWORD bit = 6;// Offset of GPIO pin
     if (pFilter == NULL)
          return;
value = value ? 0 : 1; // its phase is inverse
```

```
      if (pFilter-
      >QueryInterface(IID_IKsPropertySet, (void
      **)&pKs) == S_OK)
      {
            hr = pKs-
      >QuerySupported(PROPSETID_CUSTOMBT848,
KSPROPERTY_CUSTOMBT848_GPIO,
&TypeSupport);
      if(TypeSupport & KSPROPERTY_SUPPORT_GET)
            {
            ZeroMemory(&rc,sizeof(rc));

      rc.dwOperation=BT848_CUSTPROP_GPIO_SETGPDAT
      ABITS;
            rc.dwFromBit = bit;
            rc.dwToBit = bit;
            rc.dwValue = value;
            rc.dwOffset =0;
            hr = pKs->Get(
                  PROPSETID_CUSTOMBT848,
                  KSPROPERTY_CUSTOMBT848_GPIO,
            INSTANCE_DATA_OF_PROPERTY_PTR(&rc),
            INSTANCE_DATA_OF_PROPERTY_SIZE(rc),
            &rc,
            sizeof(rc),
            &ret);
      }
pKs->Release();
      }
}
DWORD GPIORead(IBaseFilter* pFilter)
/*
Purpose:
      Get the electronic level of the gpio pin.
Parameters:
      pFilter: Interface of BT878 filter
*/
{
      IKsPropertySet *pKs = NULL;
      DWORD TypeSupport = 0;
      KSPROPERTY_CUSTOMBT848_GPIO_S rc;
      HRESULT hr;
      ULONG ret=0;
```

```
        DWORD ReturnValue=0;
    DWORD bit = 6;// Offset of GPIO pin
        if (pFilter == NULL)
            return 0;
        if (pFilter-
        >QueryInterface(IID_IKsPropertySet, (void
        **)&pKs) == S_OK)
        {
            hr = pKs-
        >QuerySupported(PROPSETID_CUSTOMBT848,
    KSPROPERTY_CUSTOMBT848_GPIO,
    &TypeSupport);
            if(TypeSupport &
        KSPROPERTY_SUPPORT_GET)
            {
                ZeroMemory(&rc,sizeof(rc));
                rc.dwOperation =
        BT848_CUSTPROP_GPIO_GETGPDATABITS;
            rc.dwFromBit = bit;
            rc.dwToBit = bit;
            rc.dwOffset =0;
            hr = pKs->Get(
                PROPSETID_CUSTOMBT848,
                SPROPERTY_CUSTOMBT848_GPIO,
            INSTANCE_DATA_OF_PROPERTY_PTR(&rc),
            INSTANCE_DATA_OF_PROPERTY_SIZE(rc),
            &rc,
            sizeof(rc),
            &ret);
        ReturnValue = rc.dwValue;
        }
    pKs->Release();
    }
    return ReturnValue;
    }
```

EEPROM Access

ADLink Bt878 Video Capture provides a method for accessing I2C register. The interface can store a few data, for example, board identification.

Sample:

```
#define INSTANCE_DATA_OF_PROPERTY_PTR(x)
     ( (PKSPROPERTY((x)) ) + 1 )
#define INSTANCE_DATA_OF_PROPERTY_SIZE(x)
     ( sizeof((x)) - sizeof(KSPROPERTY) )
BYTE EEPROMRead(IBaseFilter *pFilter, BYTE
     offset)
/*
Purpose:
     Read.the value stored in EEPROM
Parameters:
     pFilter: Interface of BT878 filter
     offset: the offset (0~127) based on starting
     address of EEPROM
*/
{
     IKsPropertySet *pKs = NULL;
     DWORD TypeSupport = 0;
     KSPROPERTY_CUSTOMBT848_I2C_S I2C;
     BYTE uAddress;
     HRESULT hr;
     ULONG ret=0;

     if(pFilter == NULL)
          return 0;

     if((hr=pFilter-
     >QueryInterface(IID_IKsPropertySet, (void
     **)&pKs)) == S_OK)
     {
          hr = pKs-
     >QuerySupported(PROPSETID_CUSTOMBT848,

     KSPROPERTY_CUSTOMBT848_I2C,

     &TypeSupport);
          if(TypeSupport &
     KSPROPERTY_SUPPORT_GET)
```

```
            {
                  uAddress = 0xa0; // address for
      the EEPROM device
                  // Set frequency first
                  ZeroMemory(&I2C,sizeof(I2C));
                  I2C.bDontWaitACK = true;
                  I2C.dwOperation =
      BT848_CUSTPROP_I2C_SETFREQ;
                  I2C.dwFreq = 100000;
                  hr = pKs->Get(
                        PROPSETID_CUSTOMBT848,
                        KSPROPERTY_CUSTOMBT848_I2C,

      INSTANCE_DATA_OF_PROPERTY_PTR(&I2C),

      INSTANCE_DATA_OF_PROPERTY_SIZE(I2C),
                        &I2C,
                        sizeof(I2C),
                        &ret);
                  // Read value then

      I2C.dwOperation=BT848_CUSTPROP_I2C_R3;
                  I2C.ucAddress= uAddress;
                  I2C.ucInBuf[0] = offset;
                  I2C.dwOutLen = 0;
                  I2C.dwInLen  =  1;
                  I2C.bDontWaitACK = TRUE;
                  hr = pKs->Get(
                        PROPSETID_CUSTOMBT848,
                        KSPROPERTY_CUSTOMBT848_I2C,

      INSTANCE_DATA_OF_PROPERTY_PTR(&I2C),

      INSTANCE_DATA_OF_PROPERTY_SIZE(I2C),
                        &I2C,
                        sizeof(I2C),
                        &ret);
            }
            pKs->Release();
      }
      return I2C.ucInBuf[1];
}
```

```
void EEPROMWrite(IBaseFilter *pFilter, BYTE
     offset, BYTE value)
/*
Purpose:
     Write.the value to EEPROM
Parameters:
     pFilter: Interface of BT878 filter
     offset: the offset (0~127) based on starting
     address of EEPROM
     value: the data to EEPROM
*/
{
     IKsPropertySet *pKs = NULL;
     DWORD TypeSupport = 0;
     KSPROPERTY_CUSTOMBT848_I2C_S I2C;
     BYTE uAddress;
     HRESULT hr;
     ULONG ret=0;

     if(pFilter == NULL)
          return;

     if((hr=pFilter-
     >QueryInterface(IID_IKsPropertySet, (void
     **)&pKs)) == S_OK)
     {
          hr = pKs-
     >QuerySupported(PROPSETID_CUSTOMBT848,

     KSPROPERTY_CUSTOMBT848_I2C,

     &TypeSupport);
          if(TypeSupport &
     KSPROPERTY_SUPPORT_GET)
          {
               uAddress = 0xa0;// address for
               the EEPROM device
               // Set frequency first
               ZeroMemory(&I2C,sizeof(I2C));
               I2C.bDontWaitACK = true;
               I2C.dwOperation =
               BT848_CUSTPROP_I2C_SETFREQ;
               I2C.dwFreq = 100000;
```

```
                    hr = pKs->Get(
                         PROPSETID_CUSTOMBT848,
                         KSPROPERTY_CUSTOMBT848_I2C,

               INSTANCE_DATA_OF_PROPERTY_PTR(&I2C),

               INSTANCE_DATA_OF_PROPERTY_SIZE(I2C),
                         &I2C,
                         sizeof(I2C),
                         &ret);
                    // Write value then

               I2C.dwOperation=BT848_CUSTPROP_I2C_WR;
                    I2C.ucAddress= uAddress;
                    I2C.ucOutBuf[0] = offset;
                    I2C.ucOutBuf[1] = value;
                    I2C.dwOutLen = 2;
                    I2C.dwInLen  =  0;
                    I2C.bDontWaitACK = TRUE;
                    hr = pKs->Get(
                         PROPSETID_CUSTOMBT848,
                         KSPROPERTY_CUSTOMBT848_I2C,

               INSTANCE_DATA_OF_PROPERTY_PTR(&I2C),

               INSTANCE_DATA_OF_PROPERTY_SIZE(I2C),
                         &I2C,
                         sizeof(I2C),
                         &ret);
               }
               pKs->Release();
          }
     }
```

Build Environment Settings

Include Files

All applications need include the file shown in the following table.

Include File	Description
DShow.h	The header file is required for all C++ applications.
Custprop.h	The header file is required for all C++ applications.
Bt848guid.h	The header file is required for all C++ applications which need access BT878 proprietary interfaces, for instance, EEPROM and GPIO.
Bt878.cs	The class definition is required for all C# applications.

Library File

All applications need the library file shown in the following table.

Library File	Description
Strmiids.lib	Exports class identifiers (CLSIDs) and interface identifiers (IIDs). All C++ applications require this library.
Quartz.lib	Exports the AMGetErrorText function. If you do not call this function, this library is not required.
DirectShowLib-2005.dll	The class library is required for all Microsoft .Net applications.

Microsoft Visual C++ Users

VC++ users need to setup the builder environment prior to start to build your program. There are few steps you need to follow as below:

1. Open the solution file (baseclasses.sln) or the project file (baseclasses.dsw) under %DXSDK%\Samples\C++\DirectShow\BaseClasses and build it.

In above, %DXSDK% is the path of DirectX SDK.

2. Add the paths to the include directory in the settings of your project:

%DXSDK%\include

%DXSDK%\Samples\C++\DirectShow\BaseClasses

3. Add the paths to the additional library directory in the settings of your project:

%DXSDK%\Lib

%DXSDK%\Samples\C++\DirectShow\BaseClasses\Release

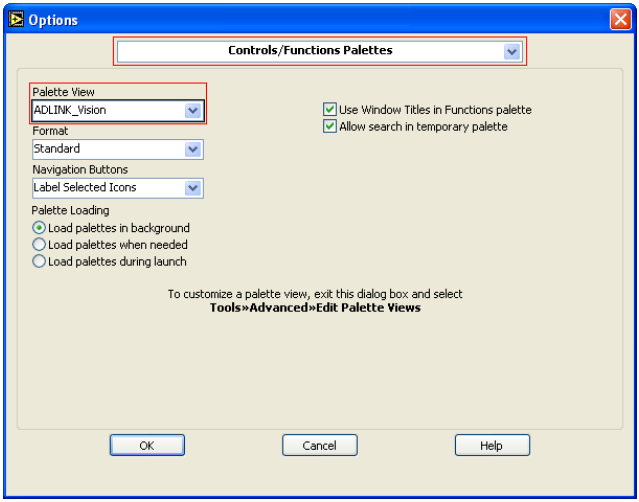
.Net Programming Users

Microsoft DirectShow only provides C++ programming. As for .net users, they need convert DirectShow COM objects to .net class. Fortunately, the work had been done as a sourceforge project. Download the source codes and samples from http://sourceforge.net/projects/directshownet/. It is a good start to program your DirectShow codes by .net languages. We also provided samples dedicated to RTV cards in the installation directory.

4.6.2 LabVIEW Programming Guide

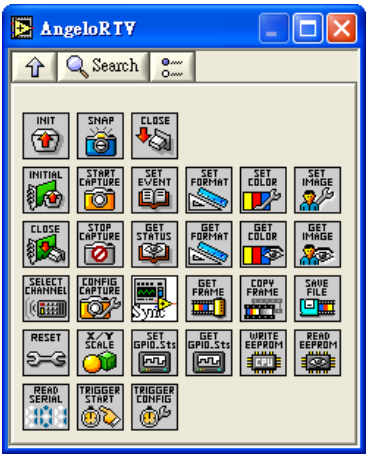
ADLINK_Vision Controls/Functions Palettes

To use RTV-LVIEW VIs, you have to switch the **Controls/Functions palettes** to the **ADLINK_Vision** palette view first. In LabVIEW 7.0, select **Tools>>Options** to display the **Options** dialog box. Select **Controls/Functions Palettes** from the top pull-down menu in the **Options** dialog box, and select **ADLINK_Vision** from the **Palette View** pull-down menu.

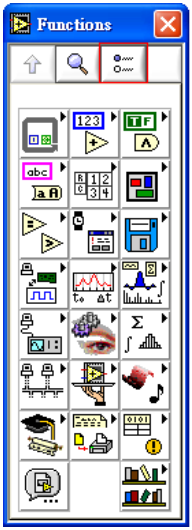


Click OK button. Then **ADLINK Vision** icon is shown in the **Functions** palette.

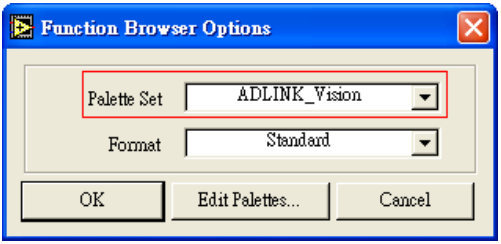
Click **ADLINK Vision** icon to display the **ADLINK_Vision** palette view. Then click the **AngeloRTV** icon, you can find RTV-LVIEW VIs.



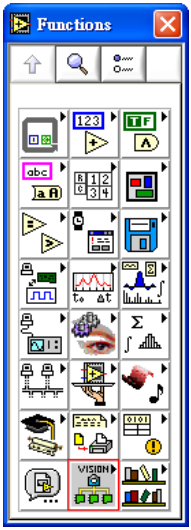
In LabVIEW 6, click the **Options** button on the **Functions** palette toolbar to display the **Function Browser Options** dialog box.



Select **ADLINK_Vision** from the **Palette Set** pull-down menu and click OK button.



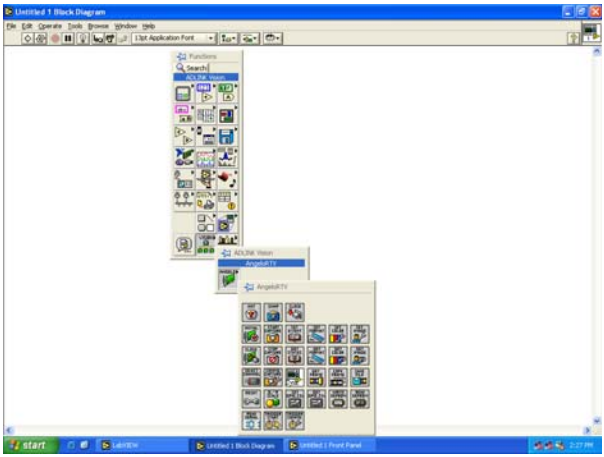
Then you can see the **ADLINK_Vision** Functions Palette as below.

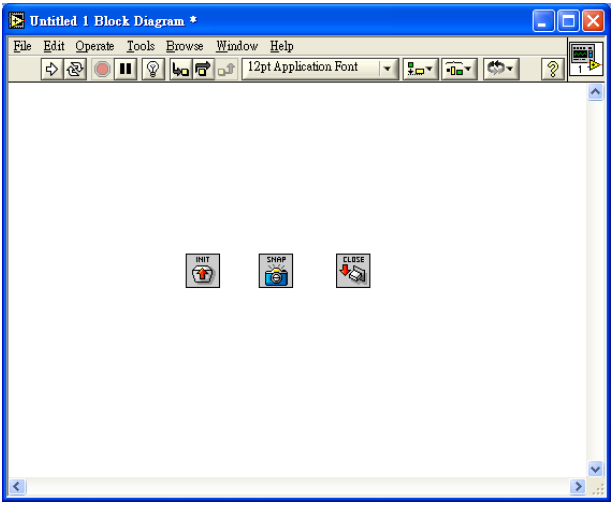


How-to Program with RTV-LVIEW

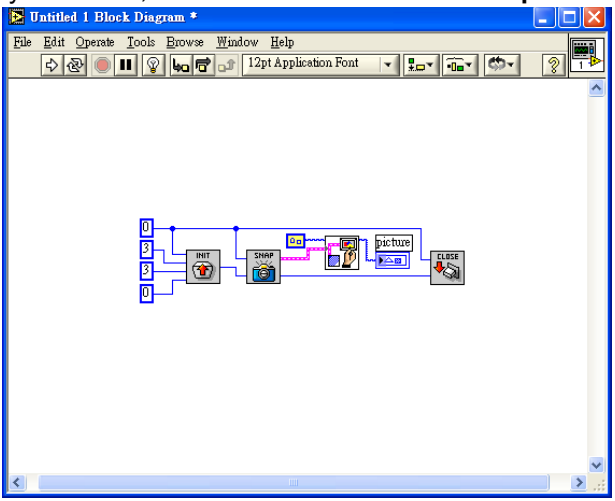
Here we provide a simplest sample showing how to capture a frame with RTV-LVIEW VI. For more complicated samples with RTV-LVIEW, you can reference those located in the **C:\Program Files\ADLINK\RTV-LVIEW\Samples** folder.

1. Open a blank VI and switch to the block diagram. Drag and drop **AngeloRTV_Init.vi**, **AngeloRTV_Snap.vi**, and **AngeloRTV_Close.vi** on the block diagram.

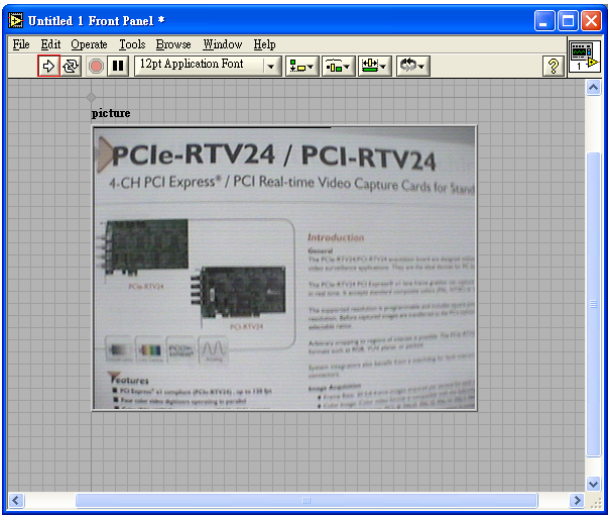




2. Create **Constant** or **Control** to each input and connect these VIs. In order to show the captured frame on the front panel, we also drag and drop another VI provided by LabVIEW, named **Draw Flattened Pixmap.vi**.

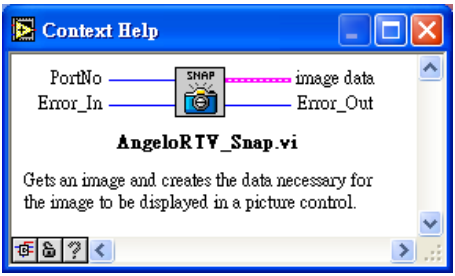


3. Push the upper left **Run** button and you can see a captured frame on the front panel.



Get Help for RTV-LVIEW

You can display the **Context Help** window by selecting **Help>>Show Context Help**. LabVIEW will show the information of the RTV-LVIEW VI when you move the cursor over it.



5 BIOS Setup

5.1 Starting the BIOS

To enter the setup screen, follow these steps:

1. Power on the motherboard
2. Press the < Delete > key on your keyboard when you see the following text prompt:
   < Press DEL or Delete to run Setup >
3. After you press the < Delete > key, the main BIOS setup menu displays. You can access the other setup screens from the main BIOS setup menu, such as Chipset and Power menus.

5.1.1 Setup Menu

The main BIOS setup menu is the first screen that you can navigate. Each main BIOS setup menu option is described in this user's guide.

The Main BIOS setup menu screen has two main frames. The left frame displays all the options that can be configured. "Grayed" options cannot be configured, "Blue" options can be.

The right frame displays the key legend. Above the key legend is an area reserved for a text message. When an option is selected in the left frame, it is highlighted in white. Often a text message will accompany it.

5.1.2 Navigation

The BIOS setup/utility uses a key-based navigation system called hot keys. Most of the BIOS setup utility hot keys can be used at any time during the setup navigation process. These keys include < F1 >, < F10 >, < Enter >, < ESC >, < Arrow > keys, and so on.

Hot Key	Description
→←	Left/Right The Left and Right < Arrow > keys allow you to select a setup screen. For example: Main screen, Advanced screen, Chipset screen, and so on.
↑↓	Up/Down The Up and Down < Arrow > keys allow you to select a setup item or sub-screen.
+-	Plus/Minus The Plus and Minus < Arrow > keys allow you to change the field value of a particular setup item. For example: Date and Time.
Tab	The < Tab > key allows you to select setup fields.
F1	The < F1 > key allows you to display the General Help screen. Press the < F1 > key to open the General Help screen.

General Help

↔	Select Screen	↓↑	Select Item
+ -	Change Screen	Enter	Go to Sub Screen
PGDN	Next Page	PGUP	Previous Page
Home	Go to Top of the Screen	End	Go to Bottom of Screen
F2/F3	Change Colors	F7	Discard Changes
F8	Load Failsafe Defaults	F9	Load Optimal Defaults
F10	Save and Exit	ESC	Exit

[Ok]

Table 5-1: BIOS Navigation

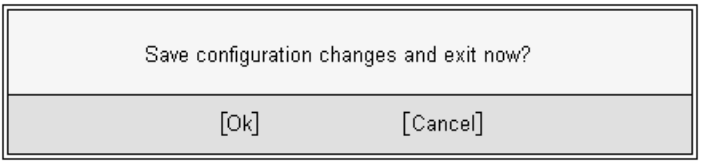
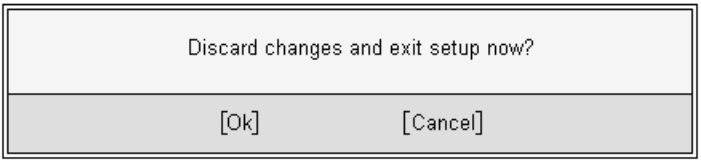
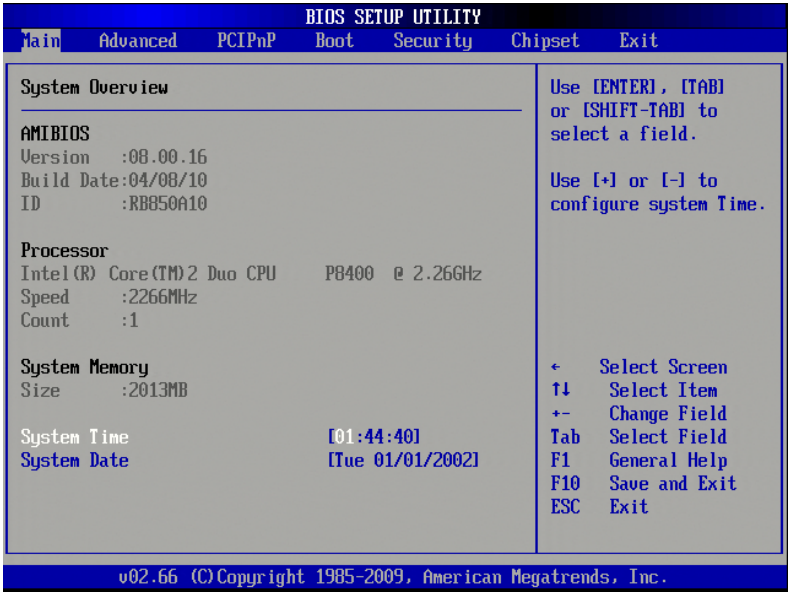
Hot Key	Description
F10	The < F10 > key allows you to save any changes you have made and exit Setup. Press the < F10 > key to save your changes. The following screen will appear:  Press the < Enter > key to save the configuration and exit. You can also use the < Arrow > key to select Cancel and then press the < Enter > key to abort this function and return to the previous screen.
Esc	The < Esc > key allows you to discard any changes you have made and exit the Setup. Press the < Esc > key to exit the setup without saving your changes. The following screen will appear:  Press the < Enter > key to discard changes and exit. You can also use the < Arrow > key to select Cancel and then press the < Enter > key to abort this function and return to the previous screen.
Enter	The < Enter > key allows you to display or change the setup option listed for a particular setup item. The < Enter > key can also allow you to display the setup sub-screens.

Table 5-1: BIOS Navigation

5.2 Main Setup

When you first enter the Setup Utility, you will enter the Main setup screen. You can always return to the Main setup screen by selecting the Main tab. There are two Main Setup options. They are described in this section. The Main BIOS Setup screen is shown below.



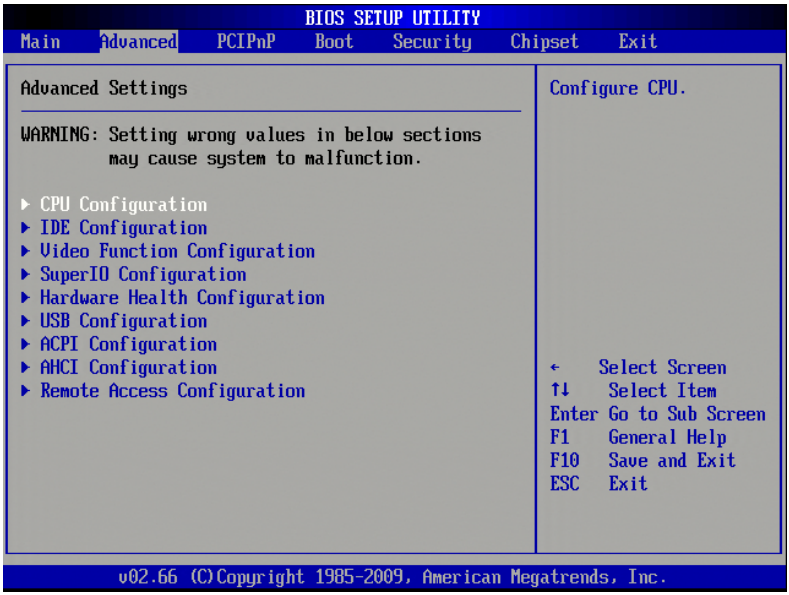
5.2.1 System Time/System Date

Use this option to change the system time and date. Highlight System Time or System Date using the < Arrow > keys. Enter new values using the keyboard. Press the < Tab > key or the < Arrow > keys to move between fields. The date must be entered in MM/DD/YY format. The time is entered in HH:MM:SS format.

5.3 Advanced BIOS Setup

Select the Advanced tab from the setup screen to enter the Advanced BIOS Setup screen. You can select any of the items in the left frame of the screen, such as SuperIO Configuration, to go to the sub menu for that item. You can display an Advanced BIOS Setup option by highlighting it using the < Arrow > keys. The Advanced BIOS Setup screen is shown below.

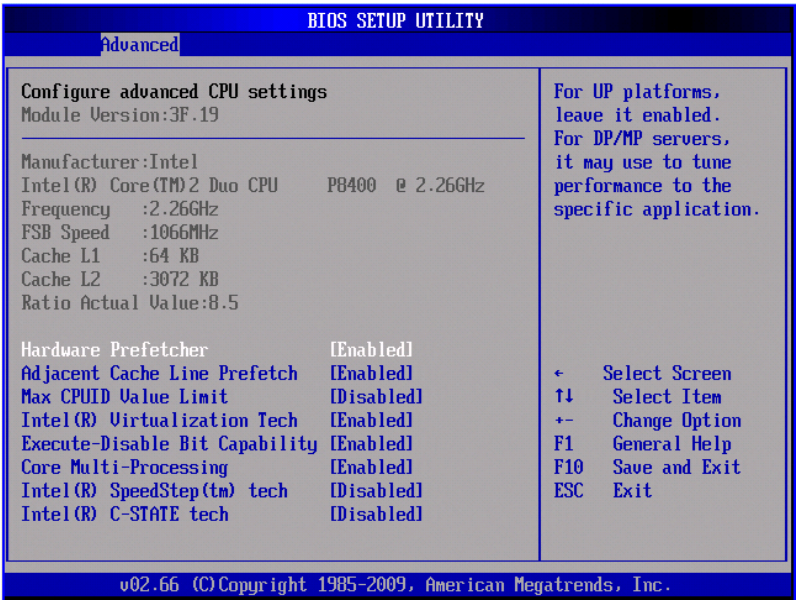
The sub menus are described on the following pages.



Warning: Setting incorrect or conflicting values in Advanced BIOS Setup may cause system malfunctions.

5.3.1 CPU Configuration

You can use this screen to select options for the CPU Configuration Settings. Use the up and down < Arrow > keys to select an item. Use the < + > and < - > keys to change the value of the selected option. A description of the selected item appears on the right side of the screen. An example of the CPU Configuration screen is shown below.



5.3.1.1 Execute-Disable Bit Capability

This item allows you to Enable/Disable the "Execute-Disable Bit" function. Intel's Execute Disable Bit functionality can help prevent certain classes of malicious buffer overflow attacks when combined with a supporting operating system. Execute Disable Bit allows the processor to classify areas in memory by where application code can execute and where it cannot. When a malicious worm attempts to insert code in the buffer, the process disables code execution, preventing damage and worm propagation. To use Execute Disable bit you must have a PC or server with a processor with Execute Disable Bit capability and a supporting operating system.

5.3.1.2 Core Multi-Processing

This item is visible depending on the CPU being used on the board. Multi-core capability of the CPU is enabled/disabled by this setting if the CPU supports this feature.

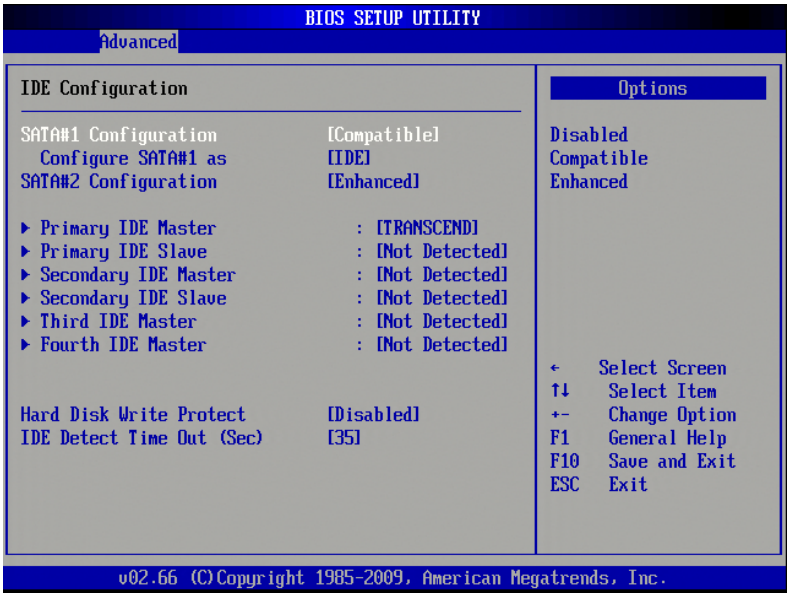
5.3.1.3 Intel® SpeedStep™ tech

This item allows you to Enable/Disable Intel® SpeedStep™ Technology. This function switches both voltage and frequency in tandem between high and low levels in response to processor load.

5.3.2 IDE Configuration

5.3.2.1 IDE Configuration Settings

You can use this screen to select options for the IDE Configuration Settings. Use the up and down < Arrow > keys to select an item. Use the < + > and < - > keys to change the value of the selected option. A description of the selected item appears on the right side of the screen. An example of the IDE Configuration screen is shown below.



5.3.2.2 SATA#1 Configuration

This item specifies whether the IDE channels should be initialized in Compatible or Enhanced mode of operation. The settings are Disabled, Compatible and Enhanced.

5.3.2.3 Configuration STAT#1 as

When running in compatible mode, the SATA#1 channel can be configured as a legacy IDE channel or AHCI. The settings are IDEA and AHCI.

If you use Compact flash function , you should setting IDE

5.3.2.4 SATA#2 Configuration

This item specifies whether the IDE channels should be initialized in Compatible or Enhanced mode of operation. The settings are Disabled, Compatible and Enhanced.

5.3.2.5 Primary, Secondary, ... IDE Master/Slave

Select one of the hard disk drives to configure it. Press < Enter > to access its sub menu.

5.3.2.6 Hard Disk Write Protect

Set this value to Enabled to prevent the hard disk drive from being overwritten.

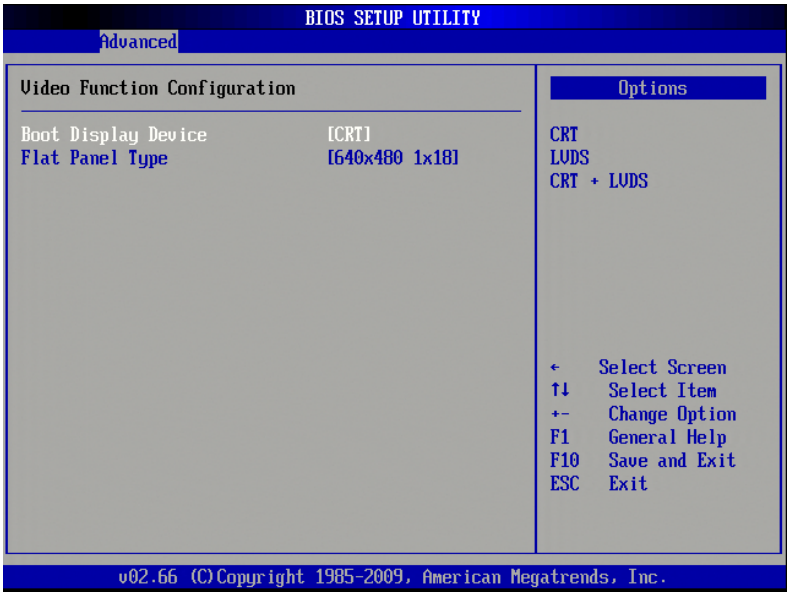
5.3.2.7 IDE Detect Time Out

This field allows you to set the time to stop searching for IDE devices within the specified number of seconds.

5.3.3 Video Function Configuration

5.3.3.1 Video Function Configuration Settings

You can use this screen to select options for Video Function configuration settings. Use the up and down < Arrow > keys to select an item. Use the < + > and < - > keys to change the value of the selected option. A description of the selected item appears on the right side of the screen. The video function BIOS Setup screen is shown below.



5.3.3.2 Boot Display Device

This item allows the user to configure the type of external display used.

5.3.3.3 Flat Panel Type

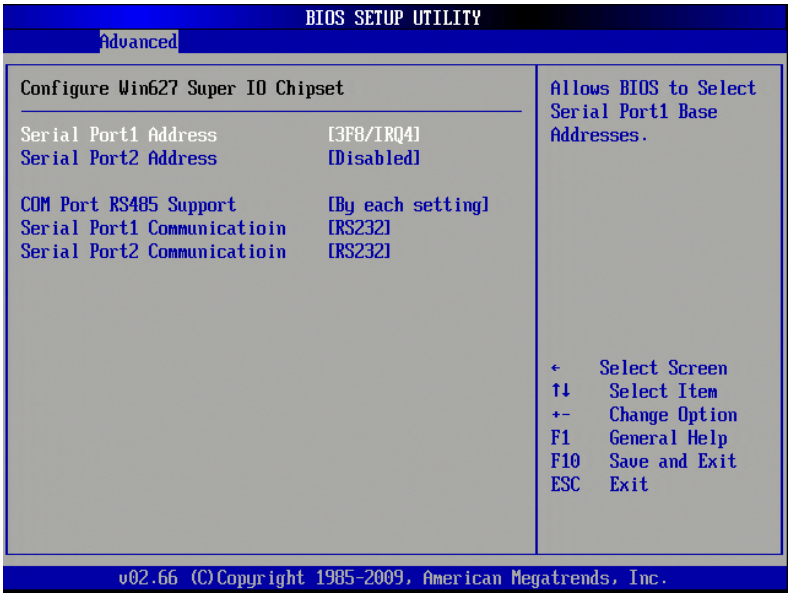
When LVDS is selected from Boot Display Device, this option allows you to set the resolution and timing settings for output to the LVDS interface.

Options: 640x480 18-bit, 800x600 18-bit, 1024x768 18-bit, 1024x768 24-bit

5.3.4 Super IO Configuration

5.3.4.1 Super IO Configuration Settings

You can use this screen to specify options for the onboard device configuration Settings. Use the up and down < Arrow > keys to select an item. Use the < + > and < - > keys to change the value of the selected option. The screen is shown below.



5.3.4.2 Serial Port1 Address

This option specifies the base I/O port address and Interrupt Request address of serial port 1.

Option	Description
Disabled	Set this value to prevent the serial port from accessing any system resources. When this option is set to Disabled, the serial port physically becomes unavailable.
3F8/IRQ4	Set this value to allow the serial port to use 3F8 as its I/O port address and IRQ 4 for the interrupt address.
3E8/IRQ4	Set this value to allow the serial port to use 3E8 as its I/O port address and IRQ 4 for the interrupt address.
2E8/IRQ3	Set this value to allow the serial port to use 2E8 as its I/O port address and IRQ 3 for the interrupt address.

Table 5-2: Serial Port1 Address

5.3.4.3 Serial Port2 Address

This option specifies the base I/O port address and Interrupt Request address of serial port 2.

Option	Description
Disabled	Set this value to prevent the serial port from accessing any system resources. When this option is set to Disabled, the serial port physically becomes unavailable.
2F8/IRQ3	Set this value to allow the serial port to use 2F8 as its I/O port address and IRQ 3 for the interrupt address.
3E8/IRQ4	Set this value to allow the serial port to use 3E8 as its I/O port address and IRQ 4 for the interrupt address.
2E8/IRQ3	Set this value to allow the serial port to use 2E8 as its I/O port address and IRQ 3 for the interrupt address.

Table 5-3: Serial Port2 Address

5.3.4.4 COM Port RS485 Support

This option specifies the COM port mode.

Option	Description
All ports Enable	Serial 1 & 2 are RS485 mode
By each setting	Set Serial 1 & 2 as RS232 or RS422 individually

Table 5-4: COM Port RS485 Support

5.3.4.5 Serial Port1 Communication

Configure Serial 1 to RS232 or RS422 mode.

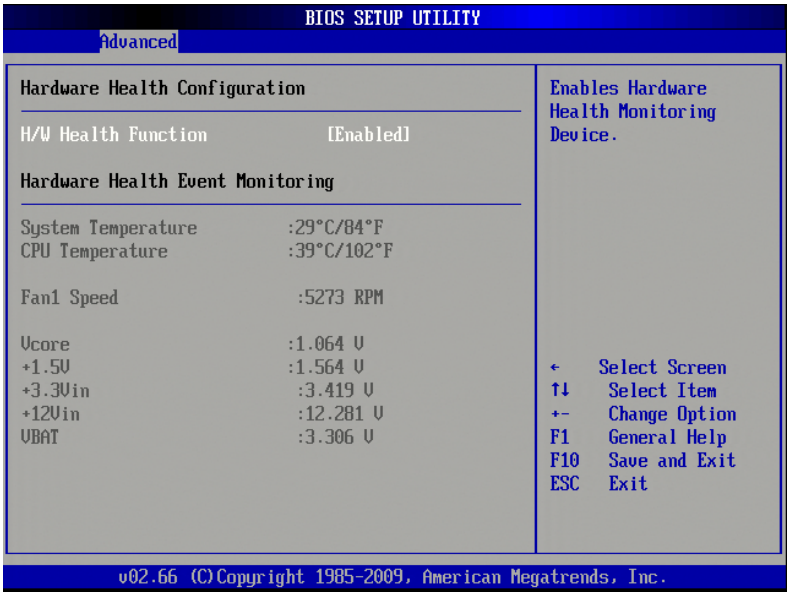
5.3.4.6 Serial Port2 Communication

Configure Serial 2 to RS232 or RS422 mode.

5.3.5 Hardware Health Configuration

5.3.5.1 Hardware Health Configuration Settings

This screen displays the current status of all of the monitored hardware devices/components such as voltages and temperatures. The options are Enabled and Disabled



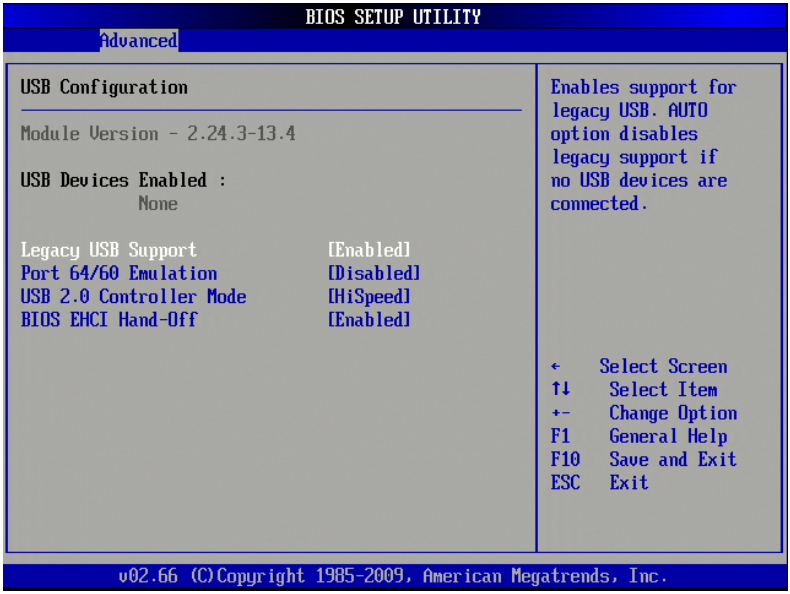
5.3.5.2 H/W Health Function

This screen displays the current status of all of the monitored hardware devices/components such as voltages and temperatures. The options are Enabled and Disabled.

5.3.6 USB Configuration

5.3.6.1 USB Configuration Settings

You can use this screen to specify options for the USB Configuration Settings. Use the up and down < Arrow > keys to select an item. Use the < + > and < - > keys to change the value of the selected option. The screen is shown below.



5.3.6.2 Legacy USB Support

Legacy USB Support refers to USB mouse and keyboard support. Normally if this option is not enabled, any attached USB mouse or keyboard will not become available until a USB compatible operating system is fully booted with all USB drivers loaded. When this option is enabled, any attached USB mouse or keyboard can control the system even when there are no USB drivers loaded on the system. Set this value to enable or disable the Legacy USB Support (see below).

Option	Description
Disabled	Set this value to prevent the use of any USB device in DOS or during system boot.
Enabled	Set this value to allow the use of USB devices during boot and while using DOS.
Auto	This option auto detects USB Keyboards or Mice and if found, allows them to be utilized during boot and while using DOS.

Table 5-5: Legacy USB Support

5.3.6.3 Port 64/60 Emulation

Enable I/O port 60h/64h emulation support. This should be enable for the complete USB keyboard legacy support for non-USB aware 0Sec.

5.3.6.4 USB 2.0 Controller Mode

The USB 2.0 Controller Mode configures the data rate of the USB port. The options are FullSpeed (12 Mbps) and HiSpeed (480 Mbps).

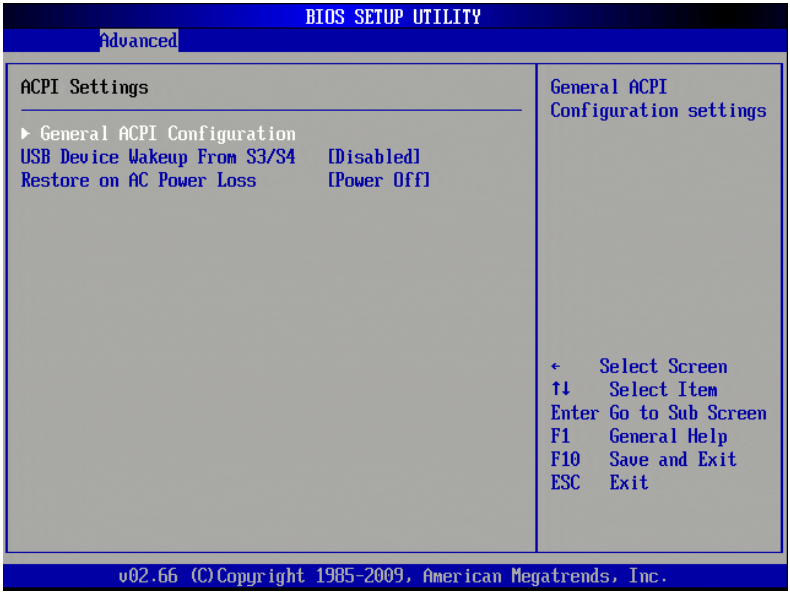
5.3.6.5 BIOS EHCI hand-off

Allows you to enable support for operating systems without EHCU hand-off feature.

5.3.7 ACPI Configuration

5.3.7.1 ACPI Configuration Settings

You can use this screen to select options for the ACPI Advanced Configuration Settings. Use the up and down < Arrow > keys to select an item. Use the < + > and < - > keys to change the value of the selected option. The screen is shown below.



5.3.7.2 USB Device Wakeup from S3/S4

This option allows a USB device to wake up the system from S3/S4.

5.3.7.3 Restore on AC Power Loss

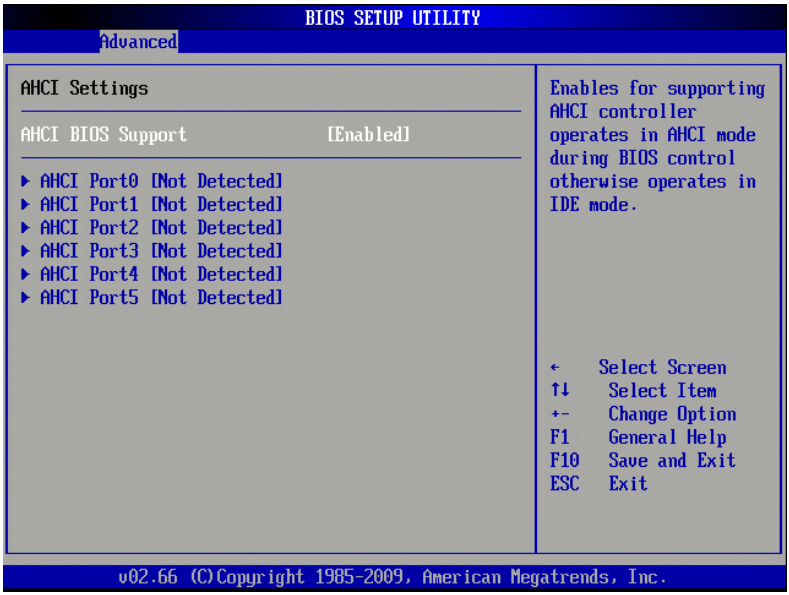
Determines what state the computer enters when AC power is restored after a power loss. The options for this value are Last State, Power On and Power Off.

Option	Description
Power Off	The system remains powered off when AC power is restored.
Power On	The system powers on after AC power is restored.
Last State	The system will power off/on depending on the last system power state when AC power is restored.

Table 5-6: Restore on AC Power Loss

5.3.8 AHCI Configuration

5.3.8.1 AHCI Configuration Settings



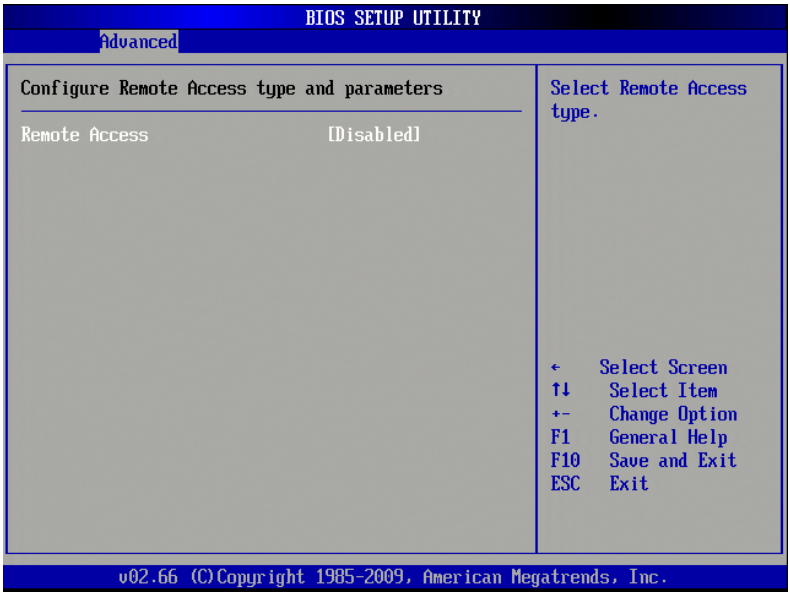
5.3.8.2 AHCI BIOS Support

Enables for supporting AHCI controller operates in AHCI mode during BIOS control otherwise operates in IDE mode.

5.3.9 Remote Access Configuration

5.3.9.1 Remote Access Configuration

Remote access configuration provides the settings to allow remote access by another computer to get POST messages and send commands through serial port access.



5.3.9.2 Remote Access

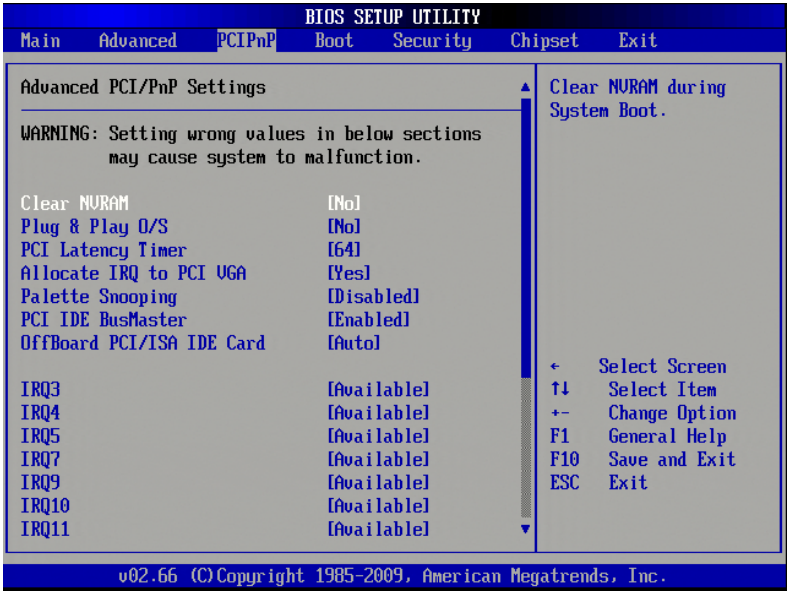
Select this option to Enable or Disable the BIOS remote access feature.

5.4 PCIPnP Setup

5.4.1 PCI PnP Configuration

5.4.1.1 PCIPnP Configuration Settings

You can display a Plug and Play BIOS Setup option by highlighting it using the < Arrow > keys to select an item. The Plug and Play BIOS Setup screen is shown below.



5.4.1.2 Clear NVRAM

This option clears ESCD (Extended System Configuration Data) information in NVRAM.

5.4.1.3 Plug & Play O/S

When set to "Yes" and a Plug and Play operating system is installed, the operating system configures the Plug and Play devices not required for boot.

5.4.1.4 PCI Latency Timer

Set this value to allow the PCI Latency Timer to be adjusted. This option sets the latency of all PCI devices on the PCI bus.

5.4.1.5 Allocate IRQ to PCI VGA

When set to "Yes", the BIOS will assign an IRQ for a PCI VGA card.

5.4.1.6 Palette Snoopling

When set to "enable" , informs the PCI devices that an ISA graphics device is install in the system so the card will function correctly.

5.4.1.7 PCI IDE Bus Master

When set to "enable" , BIOS uses PCI bus mastering for reading / writing to IDE device

5.4.1.8 OffBaord PCI/ISA IDE Card

Some PCI IDE cards may require this to be set to the PCI slot number that is holding the card.

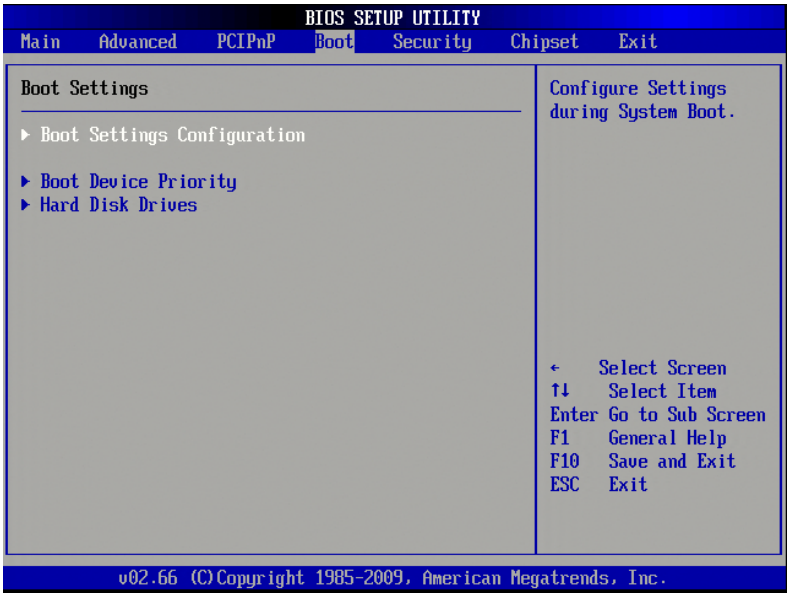
When set to "AUTO", it works for most PCI IDE cards

5.4.1.9 IRQ

Set this value to allow the IRQ settings to be modified. Available - This setting allows the specified IRQ to be used by a PCI/PnP device. Reserved - This setting allows the specified IRQ to be used by a legacy ISA device.

5.5 Boot Setup

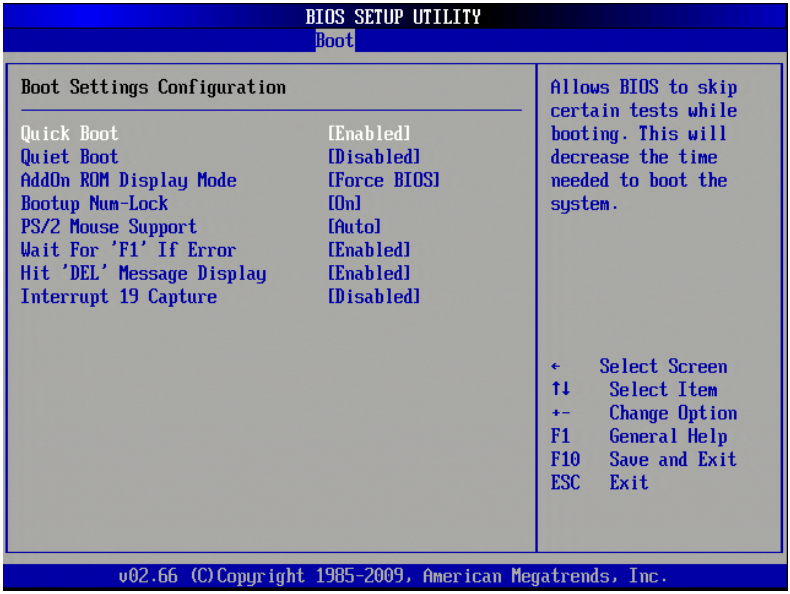
Select the Boot tab from the setup screen to enter the Boot BIOS Setup screen. You can select any of the items in the left frame of the screen, such as Boot Device Priority, to go to the sub menu for that item. You can display an Boot BIOS Setup option by highlighting it using the < Arrow > keys. The Boot Settings screen is shown below:



5.5.1 Boot Settings

5.5.1.1 Boot Settings Configuration

Use this screen to select options for the Boot Settings Configuration. Use the up and down <Arrow> keys to select an item. Use the <Plus> and <Minus> keys to change the value of the selected option. The screen is shown below.



5.5.1.2 Quick Boot

Disabled - Set this value to allow the BIOS to perform all POST tests. Enabled - Set this value to allow the BIOS to skip certain POST tests to boot faster.

5.5.1.3 Quiet Boot

Disabled - Set this value to allow the computer system to display the POST messages. Enabled - Set this value to allow the computer system to display the OEM logo.

5.5.1.4 AddOn ROM Display Mode

This feature controls the display of ROM messages from the BIOS of add-on devices like graphics cards or SATA controllers during the boot sequence.

When set to **Force BIOS**, AddOn ROM messages will be forced to display during the boot sequence.

When set to Keep Current, AddOn ROM messages will only be displayed if the third-party manufacturer had set the add-on device to do so.

5.5.1.5 Bootup Num-Lock

Set this value to allow the Number Lock setting to be modified during boot up. Off - This option does not enable the keyboard Number Lock automatically. To use the 10-keys on the keyboard, press the Number Lock key located on the upper left-hand corner of the 10-key pad. The Number Lock LED on the keyboard will light up when the Number Lock is engaged. On - Set this value to allow the Number Lock on the keyboard to be enabled automatically when the computer system is boot up. This allows the immediate use of 10-keys numeric keypad located on the right side of the keyboard. To confirm this, the Number Lock LED light on the keyboard will be lit.

5.5.1.6 PS/2 Mouse Support

Allows you to enable/disable PS/2 mouse support.

5.5.1.7 Wait for 'F1' If Error

If this option is set to Disabled, AMIBIOS does not wait for you to press the <F1> key after an error message.

5.5.1.8 Hit 'DEL' Message Display

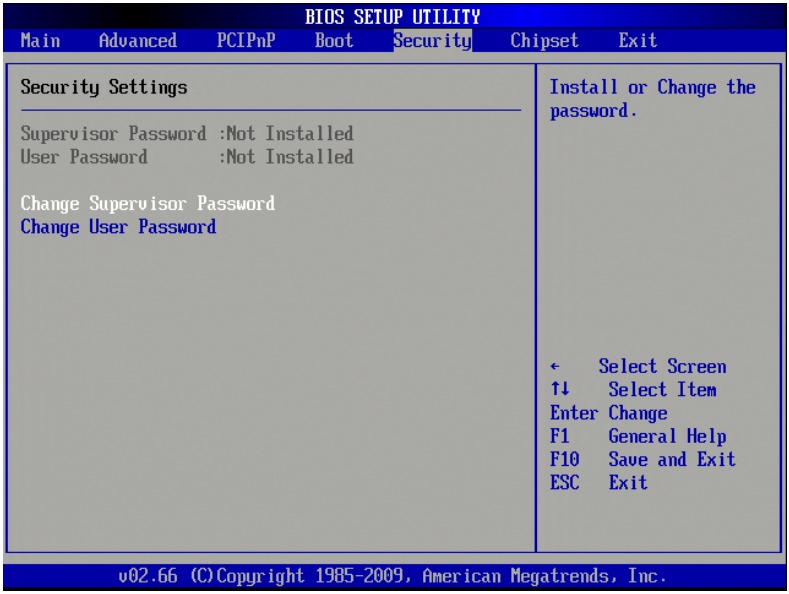
When set to Enabled, the system displays the message "Press DEL to run Setup during POST".

5.5.1.9 Interrupt 19 Capture

Interrupt 19 is the software interrupt that handles the boot disk function. When enabled, this feature allows the AddOn ROM of these host adaptors to "capture" Interrupt 19 during the boot process so that drives attached to these adaptors can function as bootable disks. In addition, it allows you to gain access to the host adaptor's AddOn ROM setup utility, if one is available.

When disabled, the AddOn ROM of these host adaptors will not be able to "capture" Interrupt 19. Therefore, you will not be able to boot operating systems from any bootable disks attached to these host adaptors. Nor will you be able to gain access to their AddOn ROM utilities.

5.6 Security Setup



5.6.1 Password Support

5.6.1.1 Two Levels of Password Protection

The BIOS provides both a Supervisor and a User password. If you use both passwords, the Supervisor password must be set first.

The system can be configured so that all users must enter a password every time the system boots or when Setup is executed, using either or either the Supervisor password or User password.

The Supervisor and User passwords activate two different levels of password security. If you select password support, you are prompted for a one to six character password. Type the password on the keyboard. The password does not appear on the screen when typed. Make sure you write it down. If you forget it, you must drain NVRAM and re-configure.

5.6.1.2 Remember the Password

Keep a record of the new password when the password is changed. If you forget the password, you must erase the system configuration information in NVRAM.

Select Security Setup from the Setup main BIOS setup menu. Security Setup options, such as password protection and virus protection, are described in this section. To access the sub menu for the following items, select the item and press < Enter >:

- Change Supervisor Password
- Change User Password
- Clear User Password

5.6.1.3 Supervisor Password

Indicates whether a supervisor password has been set.

5.6.1.4 User Password

Indicates whether a user password has been set.

5.6.1.5 Change Supervisor Password

Select this option and press < Enter > to access the sub menu. You can use the sub menu to change the supervisor password.

5.6.1.6 Change User Password

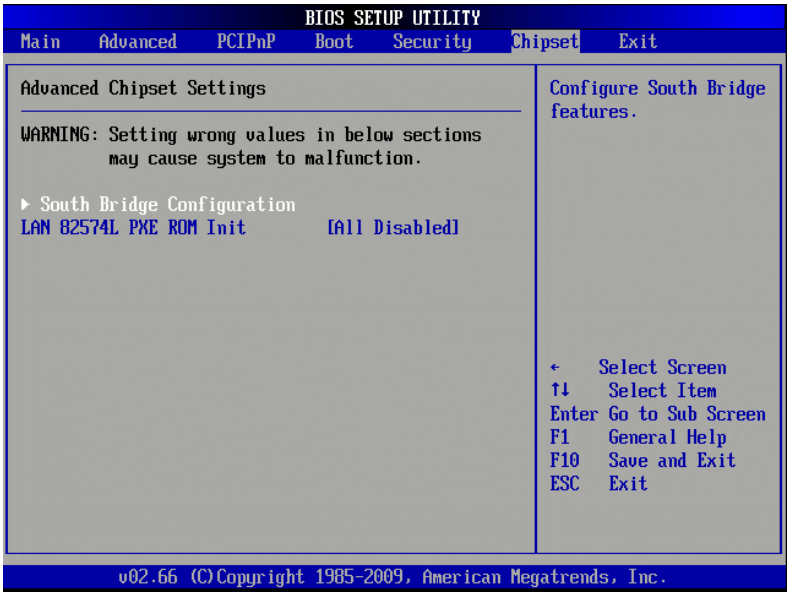
Select this option and press < Enter > to access the sub menu. You can use the sub menu to change the user password.

5.7 Chipset Configuration

5.7.1 Chipset Settings

5.7.1.1 Chipset Configuration Settings

Select the Chipset tab from the setup screen to enter the Chipset BIOS Setup screen. You can select any of Chipset BIOS Setup options by highlighting it using the < Arrow > keys. The Chipset BIOS Setup screen is shown below:



5.7.2 LAN 82574L PXE ROM Init

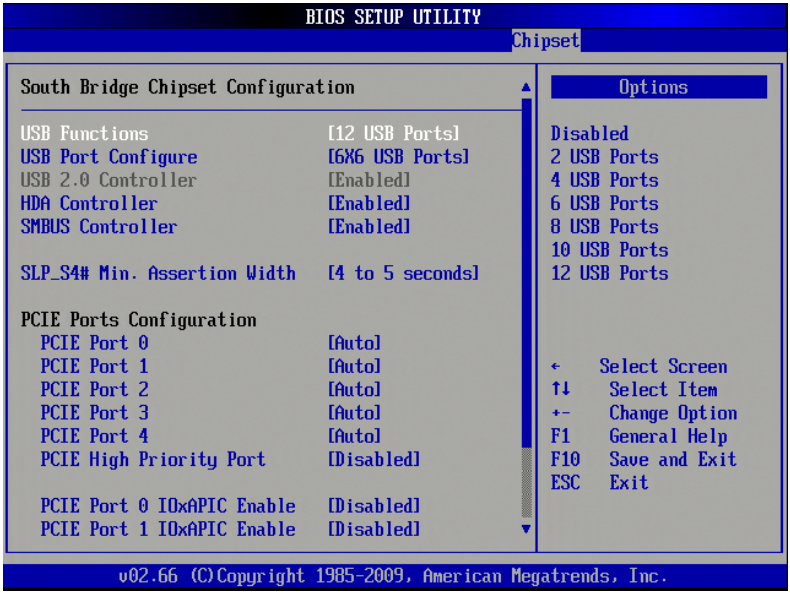
5.7.2.1 LAN 82574L PXE ROM Init Setting

Set this option to enable/disable the onboard LAN's PXE ROM to enable boot from LAN. Setting to Disabled can shorten the POST time by not initializing the LAN PXE ROM if boot from LAN is not needed. Enable if boot from LAN function is required.

5.7.3 South Bridge Chipset Configuration

5.7.3.1 South Bridge Chipset Configuration Settings

You can display a **South Bridge Chipset Configuration Setup** option by highlighting it using the < Arrow > keys to select an item. The **South Bridge Chipset Configuration Setup** screen is shown below.



5.7.3.2 USB Functions

The item determines the number of functional USB ports.

5.7.3.3 USB 2.0 Controller

The option allows you to enable/disable the EHCI (USB 2.0) controller.

5.7.3.4 HDA Controller

Set this value to enable or disable the HDA Controller.

5.7.3.5 SMBUS Controller

Set this value to enable or disable the SMBUS Controller.

5.7.3.6 SLP_S4# Min. Assertion width

Set this value of the SLP_S4# Min. Assertion width .

5.7.3.7 PCIE Ports 0-4 Configuration

Allows you to configure the PCIE0~PCIE4 of the South Bridge as five x1 slots or disable.

5.7.3.8 PCIE High Priority Port

This function is used to select a PCIE port as high priority port. Transactions on this port have higher priority than other ports.

5.7.3.9 PCIE Port (0-5) IOxAPIC Enable

This function is used to control the availability of the PCIE Port 0~5 IOxAPIC.

Important Safety Instructions

For user safety, please read and follow all **instructions**, **WARNINGS**, **CAUTIONS,** and **NOTES** marked in this manual and on the associated equipment before handling/operating the equipment.

- Read these safety instructions carefully.
- Keep this user's manual for future reference.
- Read the specifications section of this manual for detailed information on the operating environment of this equipment.
- When installing/mounting or uninstalling/removing equipment:
  - Turn off power and unplug any power cords/cables.
- To avoid electrical shock and/or damage to equipment:
  - Keep equipment away from water or liquid sources;
  - Keep equipment away from high heat or high humidity;
  - Keep equipment properly ventilated (do not block or cover ventilation openings);
  - Make sure to use recommended voltage and power source settings;
  - Always install and operate equipment near an easily accessible electrical socket-outlet;
  - Secure the power cord (do not place any object on/over the power cord);
  - Only install/attach and operate equipment on stable surfaces and/or recommended mountings; and,
  - If the equipment will not be used for long periods of time, turn off and unplug the equipment from its power source.

- Never attempt to fix the equipment. Equipment should only be serviced by qualified personnel.
- A Lithium-type battery may be provided for uninterrupted, backup or emergency power.

RISK OF EXPLOSION IF BATTERY IS REPLACED BY AN INCORECT TYPE. DISPOSE OF USED BATTERIES ACCORDING TO THEIR INSTRUCTIONS.

- Equipment must be serviced by authorized technicians when:
  - The power cord or plug is damaged;
  - Liquid has penetrated the equipment;
  - It has been exposed to high humidity/moisture;
  - It is not functioning or does not function according to the user's manual;
  - It has been dropped and/or damaged; and/or,
  - It has an obvious sign of breakage.