User Manual

PCI Express 10 GigE Vision Frame Grabber Card

Industrial 10 GigE Vision Frame Grabber Card

ADVANTECH

Enabling an Intelligent Planet

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Product Warranty (2 years)

Advantech warrants to you, the original purchaser, that this product will be free from defects in materials and workmanship for five years from the date of purchase.

This warranty does not apply to products that have been repaired or altered by persons other than repair personnel authorized by Advantech, nor does it apply to products that have been subject to misuse, abuse, accident, or improper installation. Under the terms of this warranty, Advantech assumes no liability for consequences arising from such events.

Because of Advantech's high quality-control standards and rigorous testing, most of our customers never need to use our repair service. If an Advantech product is defective, it will be repaired or replaced at no charge during the warranty period. For out-of-warranty repairs, you will be billed according to the cost of replacement materials, service time, and freight. Please consult your dealer for more details.

If you believe that you have a defective product, follow these steps:

1. Collect all the information about the problem encountered (e.g., CPU speed, Advantech products used, other hardware and software used, etc.). Note anything abnormal and list any on-screen messages you get when the problem occurs.

2. Call your dealer and describe the problem. Please have your manual, product, and any helpful information readily available.

3. If your product is diagnosed as defective, obtain a return merchandise authorization (RMA) number from your dealer. This allows us to process your return more quickly.

4. Carefully pack the defective product, a fully completed Repair and Replacement Order Card, and photocopy proof of the purchase date (e.g., your sales receipt) in a shippable container. A product returned without proof of the purchase date will not be eligible for warranty service.

5. Write the RMA number visibly on the outside of the package and ship it prepaid to your dealer.

Declaration of Conformity

CE

This product has passed the CE test for environmental specifications when shielded cables are used for external wiring. We recommend using shielded cables. This type of cable is available from Advantech. Please contact your local supplier for ordering information.

FCC Class A

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio-frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his or her own expense.

Safety Precaution - Static Electricity

Follow these simple precautions to protect yourself from harm and the products from damage.

- ■ To avoid electrical shock, always disconnect the power from your PC chassis before you work on it. Do not touch any components on the CPU card or other cards while the PC is on.
- ■ Disconnect the power before making any configuration changes. The sudden rush of power as you connect a jumper or install a card may damage sensitive electronic components.

Technical Support and Assistance

1. Visit the Advantech website at www.advantech.com/support for the latest information about the product.
2. Contact your distributor, sales representative, or Advantech's customer service center for technical support should you requires additional assistance. Please have the following information ready before you call:
   - – Product name and serial number
   - – Description of your peripheral attachments
   - – Description of your software (OS, version, application software, etc.)
   - – A complete description of the problem
   - – The exact wording of any error messages

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Chapter   1

Introduction

1.1 Description

Advantech's PCIE-1181 and PCIE-1182 cards are PCI Express x4 cards with Power over Ethernet (PoE+) for independent 10 Gigabit Ethernet ports. Advantech 10 GbE PoE cards leverage the Plug and Play capability defined in the PCI Express bus specification. The board requires one PCI Express x4 slot in the personal computer it is to be installed in. The card provides independent 10 Gigabit Ethernet Ports via Intel X550 series 10 Gigabit Ethernet controllers. Multiple 10 Gigabit Ethernet Vision device connections are supported for standard 10 Gigabit Ethernet Vision data transfer rates of up to 10,000 Mb.

The PCIE-1181 and PCIE-1182 feature the 802.3at PoE+ standard combining a power supply and IEEE1588 (precise time protocol) to enable synchronization with multi-camera or powered device (PD) acquisition capabilities.

Each port of the PCIE-1181 and PCIE-1182 can deliver a maximum of 30W of power per port (external 12 V_{DC} is required) and 10,000-Mbps bandwidth over a Cat-6 cable up to 50 m and Cat-7 cable up to 100 m in length. It features link aggregation, which perform exceptionally for continuously receiving large amounts of image data.

PoE + technology significantly reduces installation and maintenance costs by eliminating the need for power wiring. Combining PoE+ and the 10 Gigabit bandwidth, the PCIE-1181 and PCIE-1182 are the perfect fit for your vision applications.

1.2 Features

- IEEE802.3at-compliant,
- Support for 2 independent 10Gigabit ports
- PD auto-detection and classification
- Built-in ESD 8 kV and EFT 6 kV
- IEEE 1588-compliant
- PCI Express x4-compliant
- Supports link aggregation
- Inrush current, current limit, and short-circuit protection

1.3 Specifications

■ **Power Over Ethernet Port**
  – 1 or 2 10 Gigabit Ethernet MAC and physical layer ports
  – 48 VDC PoE power output, total max. 60 W with AT/ATX system power input(1 port 30W)
  – Standard IEEE 802.3 Ethernet interface provided for 10000BASE-T, 5000BASE-T(Linux only), 1000BASE-T, 100BASE-TX, and 10BASE-T applications (802.3, 802.3u, 802.3af, 802.3at and 802.3ab, 802.3x)

■ **VDC ouptput**
  – 12VDC up to 48Watt(2 ports)/24Watt(1 port)

■ **Bus Interface**
  – PCIe x4

■ **Power Requirements**
  – Input voltage: 12 V_{DC} direct from PCIe slot or AT/ATX system power input

■ **ESD/EFT**
  – 8 kV ESD and 6 kV EFT

■ **Physical**
  – Dimensions (W x D): 167 x 68.9 mm
  – Operating temperature: 0~60°C
  – Safety compliance: CE/FCC

1.4 Ordering Information

■ PCIE-1181: 1-port PCIe 10 GigE Vision Frame grabber card
■ PCIE-1182: 2-port PCIe 10 GigE Vision Frame grabber card

1.5 Unpacking Checklist

Ensure that the following items are included in the package.

■ PCIE-1181 or PCIE-1182 card

Chapter 2

Hardware
Configuration

2.1 Initial Inspection

We carefully inspect our PCIe 10GbE PoE cards mechanically and electrically before shipping them. Your PCIe card should be free from marks and scratches and in per- fect working order upon receipt.

As you unpack your card, check for signs of shipping damage (e.g., damaged box, scratches, or dents). If it has been damaged or if it fails to meet the specifications, notify our service department or your local sales representative immediately. Also notify the carrier and retain the shipping carton and packing material for inspection by the carrier. After inspection, we will make arrangements to repair or replace the card.

When you handle the card, remove it from its protective packaging by grasping the rear metal panel. Retain the anti-vibration package for storage should you ever need to remove the card from your PC.

Warning! *Discharge your body's static electric charge by touching the back of the grounded chassis of the system unit (metal) before handling the board. You should avoid contact with materials that hold a static charge, such as plastic, vinyl, and styrofoam. To avoid static damage to its integrated circuits, handle the board only by its edges. Avoid touching the exposed circuit connectors. We recommend that you use a grounded wrist strap and place the card on a static dissipative mat whenever handling it.*
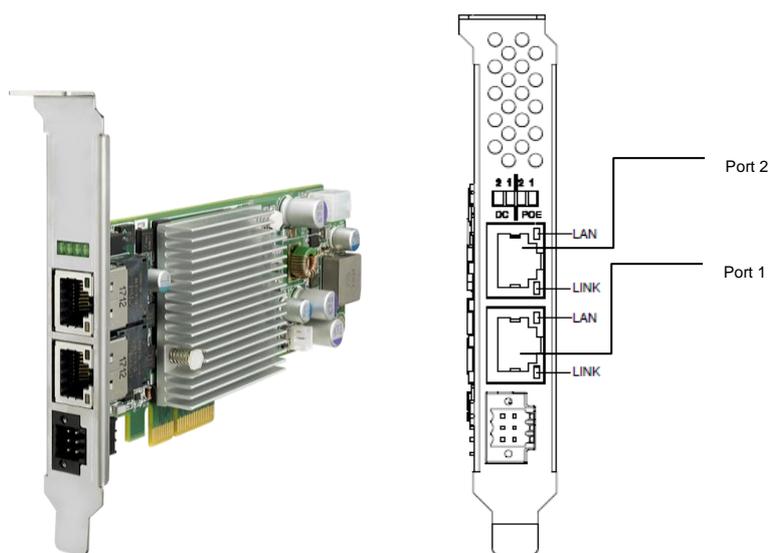
2.2   Hardware View

Figure 2.1 PCIE-1182 Board Layout

Figure 2.2 LED Status Indicators

LED indicators of RJ 45 (Lan) connector	
LEDs	Description
Lan LED (In the left of RJ45 connector)	Green: Ethernet connected
Link LED (In the right of RJ45 connector)	Yellow: 5G/2.5G/1G/100Mbps Green: 10G

Bracket LED indicators	
LEDs	Description
DC 1~2(PCIE-1182) DC 1 (PCIE-1181)	12V DC output
POE 1~2(PCIE-1182) POE 1 (PCIE-1181)	Power over Ethernet

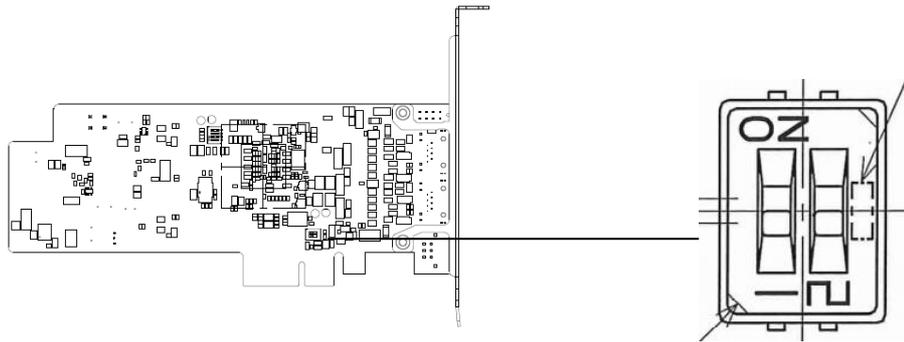**Figure 2.3 AT/ATX 12V DC input 4-pin Power Connector**

AT/ATX 12V DC input 4-pin power connector	
Pin	**Function**
Pin 1	GND
Pin 2	GND
Pin 3	+12V
Pin 4	+12V

Figure 2.4 12V DC Output Connector

12V DC Output Connector Pin-out Assignment		
Port	**Pin**	**Function**
DC1	Pin 1	+12V
	Pin 2	GND
	Pin 3	N.C
DC2	Pin 4	N.C
	Pin 5	+12V
	Pin 6	GND

Figure 2.5 12V DC Output Switch

12V DC Output Switch	
Port	**Function**
1	DC power On/Off
2	DC power On/off
Default is power on and API can't control after power off.	
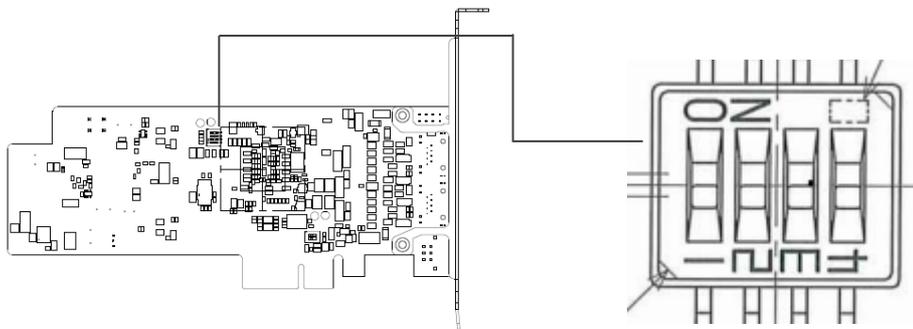
Figure 2.6 Board ID Switch

12V DC Output Switch	
Port	**Function**
1	Configure different on/off position to setup the board ID in multi-card scenario
2	
3	
4	

2.3 Card Installation

> **Note!** *We strongly recommend that you install the software driver before you install the hardware in your system. This will guarantee a smooth and trouble-free installation process.*
>
> *Turn off your PC's power supply whenever you install or remove the card or its cables. Static electricity can easily damage computer equipment. Ground yourself by touching the chassis of the computer (metal) before you touch any boards. See the static warning at the start of this chapter.*

1. Turn off the computer and all peripheral devices (such as printers and monitors)
2. Disconnect the power cord and any other cables from the back of the computer
3. Remove the PC's cover (refer to your user guide if necessary)
4. Install the card in your PCIe bus
5. Replace the PC's cover and reconnect any cables you removed at Step 3 and then connect the power connector and power supply with the power cable in the package
6. Turn on the computer
7. Test your Ethernet port and verify that it works normally (see Chapter 4)

Chapter 3

## Driver Setup and Installation

3.1 Introduction

This chapter describes the driver installation of Advantech PoE power control, configuration and removal procedures for Windows 10 (64-bit).

3.2 Driver Installation

3.2.1 Driver Installation

Please follow these steps for driver installation:

1. Visit the Advantech website, search for "PCIE-1182," click the **Manual/Driver/ BIOS/ FAQ** icon, and download the PoE power control driver installation file.

2. Before installing, please check whether the PCIE-1182 device ports exist in the Network adapters of Windows Device Manager.
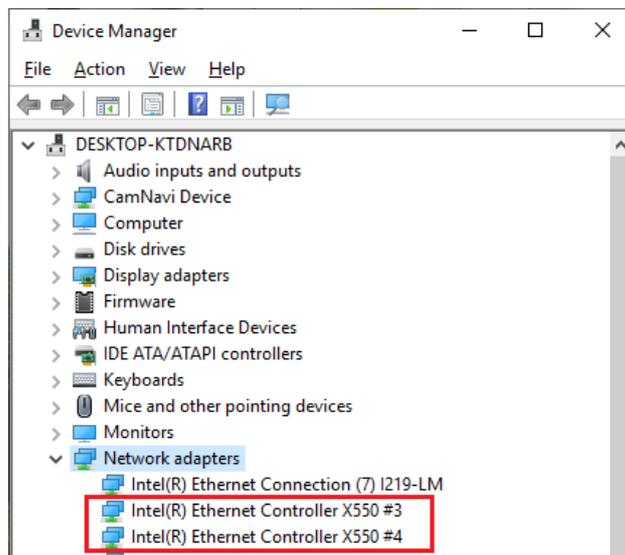
3. Execute the PoE power control installation file that you just downloaded. Follow the installation wizard to complete the driver installation.

4. After installation, the network device will appear in Device Manager.
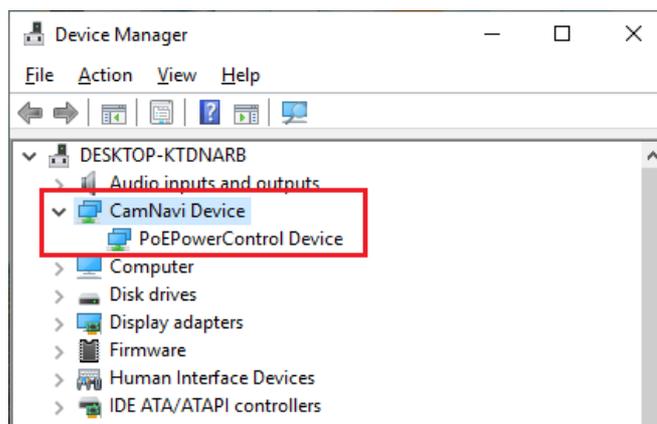
3.3 PoE & DCOUT Power Control Function

3.3.1 Introduction

The Advantech GigE vision frame grabber cards support the unique feature of power on/off control for each PoE port & DCOUT port. With the provided function APIs, you can turn the power of each PoE or DCOUT port on or off manually for fault recovery or device power reset purposes.

3.3.2 File Location

After installing the program, you can see the PoEPowerControl directory under the path of "C:\Advantech\"
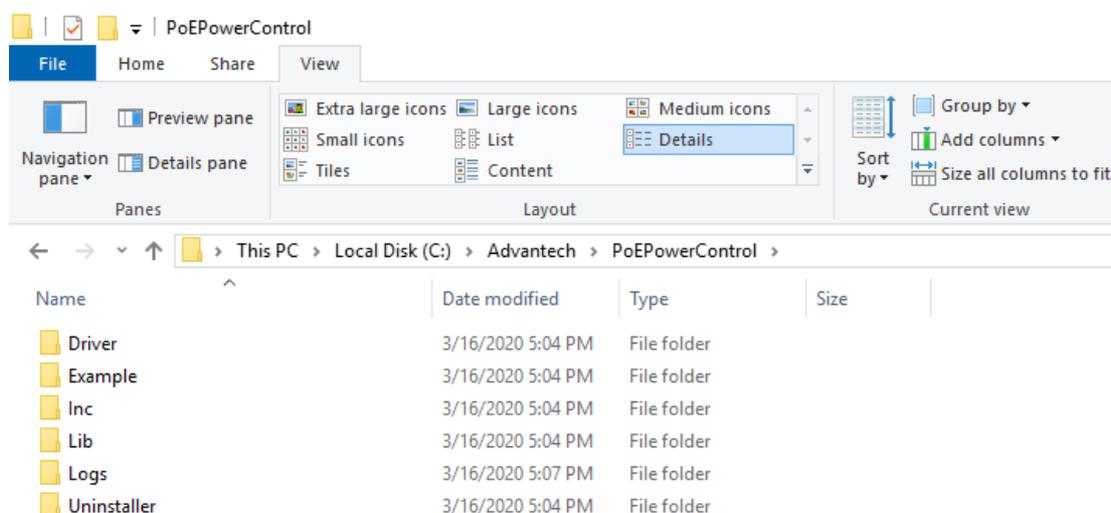
These directories are described as follows:

- Driver: The PoE power control driver installation file.
- Example: Examples of API usage for PoE power control (C++).
- Inc: The header file defines the PoE power control APIs and return codes.
- Lib: Provides method for the upper APP to use the power control driver.
- Logs: If the logging feature is enabled, the message will be stored here.

3.3.3 Software Architecture
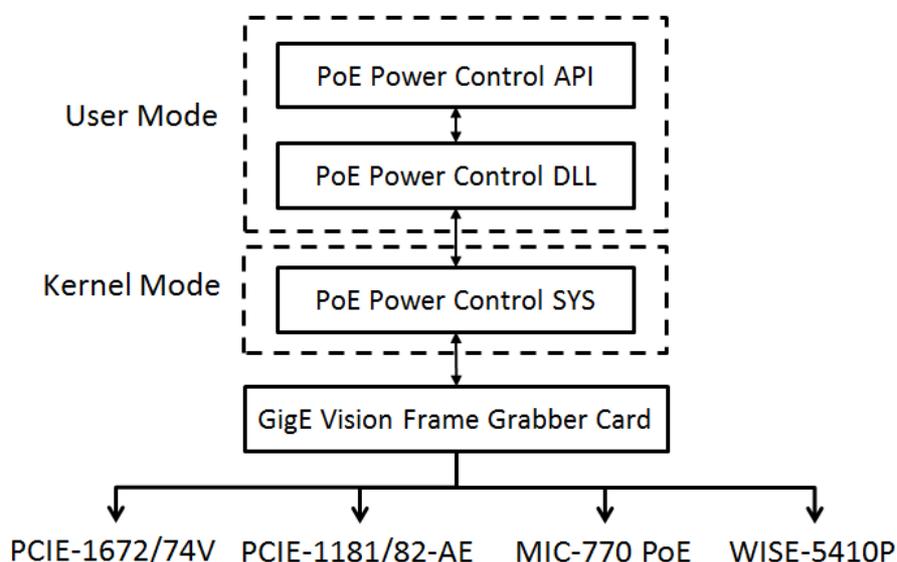
3.3.4 DLL Export Function

Device Support Function List:

	PCIE-1181-AE PCIE-1182-AE
PPCGetNumPorts	●
PPCSetPowerState	●
PPCGetPowerState	●
PPCGetPowerConsumption	●
PPCSetDCPowerState	●
PPCGetDCPowerState	●
PPCGetBoardID	●
PPCResetPSE	●
PPCSaveDevicePowerState	●

3.3.5 Unit32_tPPCGetNumPorts(void)

Description	Queries the Number of PoE Power Controllable Ports.
Param[IN]	No.
Return[OUT]	The number of PoE Power Controllable Ports.
	If no any PoE Power Controllable Ports, the return value is 0.
	If the return value is greater than (0xF000), please refer to the error code definition.

Since the bus order assigned by the operating system may be inconsistent with the order of the PCIE slots on the actual motherboard, the software will reorder the ports according to the board ID on the card from small to large.

If the boards ID are the same, the port order is sorted from small to large according to the bus number assigned by the operating system.

3.3.6 Unit32_t PPCSetPowerState(uint32_t PortIndex, PPC_POWER_STATE PowerState

Description	Set the Power State of PoE Power Controllable Port.
Param[IN]	PortIndex, start form 0.
Param[IN]	PowerState, defined in PPC_POWER_STATE_LIST.
Return[OUT]	Return value 1 means the operation completed successfully
	Others, please refer to the error code definition.

After call the API, the power state setting of the port will be stored in the EEPROM on GigE vision frame grabber card. At next time you restart your computer, the Advantech PoE Driver on system can automatically restore the power state to all ports from EEPROM of GigE vision frame grabber card.

*[Note] On Windows10, Only PCIE-1181/82-AE supports this feature.

3.3.7 uint32_t PPCGetPowerState(uint32_t PortIndex

Description	Get the Power State of PoE Power Controllable Port.
Param[IN]	PortIndex, start form 0.
Return[OUT]	Return value 0 means Power ON, 1 means Power OFF.
	Others, please refer to the error code definition.

3.3.8 uint32_t PPCGetPowerConsumption(uint32_t PortIndex)

Description	Get the Power Consumption of PoE Power Controllable Port.
Param[IN]	PortIndex, start form 0.
Return[OUT]	Return the Port real Power Consumption of PoE Power Controllable Port. (Max value is less than 30W)
	Others, please refer to the error code definition.

3.3.9 uint32_t PPCSetDCPowerState(uint32_t PortIndex, PPC_POWER_STATE PowerState)

Description	Set the Power State of DCOUT Power Controllable Port.
Param[IN]	PortIndex, start form 0.
Param[IN]	PowerState, defined in PPC_POWER_STATE_LIST.
Return[OUT]	Return value 1 means the operation completed successfully
	Others, please refer to the error code definition.

* If you want to restore the previous power state when the system reboot, please call API PPCSaveDevicePowerState to save the power state on the device. Please refer to section 3.3.13 for detailed usage.

3.3.10 uint32_t PPCGetDCPowerState(uint32_t PortIndex)

Description	Get the Power State of DCOUT Power Controllable Port.
Param[IN]	PortIndex, start form 0.
Return[OUT]	Return value 0x0 means Power ON, 0x1 means Power OFF
	Others, please refer to the error code definition.

3.3.11 uint32_t PPCGetBoardID(uint32_t PortIndex)

Description	Queries the Board ID by Port Index.
Param[IN]	PortIndex, start form 0.
Return[OUT]	Return value is 0x0 ~ 0xF
	Others, please refer to the error code definition.

3.3.12 uint32_t PPCResetPSE(uint32_t BoardID)

Description	Reset the PSE Controller on the Device by Board ID.
Param[IN]	Board ID, Start from 0x0~0xF
Return[OUT]	Return value 0x1 means the operation completed successfully
	Others, please refer to the error code definition.

3.3.13 uint32_t PPCSaveDevicePowerState (void)

Description	Save all current power states to each Advantech PoE device.
Param[IN]	No
Return[OUT]	Return value 1 means the operation completed successfully
	Others, please refer to the error code definition.

After call the API, the current power states will be stored in the EEPROM. At next time you restart your computer, the Advantech PoE Driver on system can automatically restore the power state to all ports from EEPROM

3.4　How does the API uses the DLL Export Function

The following steps show how to call the DLL export function to control the power of the PoE and DCOUT Port on the PCIE-1182. Please refer to the sample program for more details. (path: "C:\Advantech\PoEPowerControl\Example\")

3.4.1　Load DLL library

```
HMODULE hDLL = LoadLibrary(TEXT("PoEPowerControl.dll"));
```

3.4.2　Get DLL function

P_PPCGetNumPorts fpPPCGetNumPorts = NULL; fpPPCGetNumPorts = (P_PPCGetNumPorts)**GetProcAddress**(hDLL, "**PPCGetNumPorts**");
P_PPCSetPowerState fpPPCSetPowerState = NULL; fpPPCSetPowerState = (P_PPCSetPowerState)**GetProcAddress**(hDLL, "**PPCSetPowerState**");
P_PPCGetPowerState fpPPCGetPowerState = NULL; fpPPCGetPowerState = (P_PPCGetPowerState)**GetProcAddress**(hDLL, "**PPCGetPowerState**");
P_PPCSetDCPowerState fpPPCSetDCPowerState = NULL; fpPPCDCSetPowerState = (P_PPCSetDCPowerState)**GetProcAddress**(hDLL, "**PPCSetDCPowerState**");
P_PPCGetDCPowerState fpPPCGetDCPowerState = NULL; fpPPCGetDCPowerState = (P_PPCGetDCPowerState)**GetProcAddress**(hDLL, "**PPCGetDCPowerState**");
P_ PPCSaveDevicePowerState fpPPCSaveDevicePowerStates= NULL; fpPPCSaveDevicePowerStates = (P_PPCSaveDevicePowerState)**GetProcAddress**(hDLL, "**PPCSaveDevicePowerState**");

3.4.3　Set PoE Port 0 Power OFF

```
fpPPCSetPowerState (0, PPC_POWER_OFF);
```

3.4.4　Set PoE Port 0 Power ON

```
fpPPCSetPowerState (0, PPC_POWER_AUTO);
```

3.4.5　Get PoE Port 0 Power Status

```
State = fpPPCGetPowerState (0);
if(State == PPC_POWER_AUTO)
     printf("PoE Port[0] State: Power ON\n");
else if(State == PPC_POWER_OFF)
     printf("PoE Port[0] State: Power OFF\n");
```

3.4.6　Set Port 0 DCOUT Power OFF

```
fpPPCDCSetPowerState (0, PPC_POWER_OFF);
```

3.4.7　Set Port 0 DCOUT Power ON

```
fpPPCDCSetPowerState (0, PPC_POWER_AUTO);
```

3.4.8　Get Port 0 DCOUT Power Status

```
State = fpPPCGetDCPowerState (0);
if(State == PPC_POWER_AUTO)
     printf("DCOUT Port[0] State: Power ON\n");
else if(State == PPC_POWER_OFF)
     printf("DCOUT Port[0] State: Power OFF\n");
```

3.4.9 If you want to automatically restore the power state when the system restarts

```
ErrCode = fpPPCSaveDevicePowerStates();
if(ErrCode > ERR_CODE_BASE)
    printf("[ERR] Please check the ErrCode 0x%X\r\n", ErrCode);
```

Example program execution results:

3.5 Troubleshooting

This section will give a detailed explanation about the error code definitions and troubleshooting.

3.5.1 0xF001: ERR_NOT_INITIALIZED

Cause	error occurs because all Advantech GigE vision frame grabber cards were not enumerated before.
Solution	**PPCGetNumPorts** to enumerate all Advantech GigE vision frame grabber cards before calling other APIs.

3.5.2 0xF002: ERR_DEVICE_PORT_NOT_FOUND

Cause	Advantech GigE vision frame grabber cards found.
Solution	1) Please check the Advantech GigE vision frame grabber cards on your system. 2) Open Windows Device Manager. Check whether the Network Adapters of Advantech GigE vision frame grabber cards are present.

3.5.3 0xF003: ERR_DEVICE_NOT_SUPPORT

Cause	This device does not support this feature.
Solution	Please check the "Device Support Function List" on section 2.4

3.5.4 0xF004: ERR_INPUT_DATA_INVALID

Cause	The parameter entered by the user is invalid. 1) Input PortIndex exceeds the number of all power controllable ports. 2) The set PowerState is not in the definition. 3) When accessing the **PPCResetPSE**, enter the wrong board ID value.
Solution	Please correct the input value.

3.5.5 0xF005: ERR_BOID_RUNTIME_CHANGE

Cause	Call **PPCGetBoardID** but get the error. Due to user changed the Board ID after calling **PPCGetNumPorts** to enumerate all Advantech GigE vision frame grabber cards.
Solution	Call **PPCGetNumPorts** again to re-establish all Advantech GigE vision frame grabber cards information.

3.5.6 0xF006: ERR_DRIVER_NOT_FOUND

Cause	Advantech PoE power control driver is not installed.
Solution	1) Visit Advantech's website to download the PoE power control driver installation file. 2) Open Windows Device Manager. Check whether the PoE Power Control Device exists.

3.5.7 0xF007: ERR_IOCTL_FAILED

Cause	Operate Advantech PoE power control driver failed.
Solution	1) Open Windows Device Manager. Check whether the PoE Power Control Device exists. 2) Please reinstall the PoE power control driver then restart your computer.

3.5.8 0xF008~0xF00A: Internal Factory Test Used

3.5.9 0xF00B: ERR_PSE_FAILED

Cause	The PSE power controller on the Device is abnormal
Solution	Please Reset the PSE Controller on the Device by Board ID.

When you are operating the PSE controller related APIs, such as:
PPCSetPowerState, PPCGetPowerState…etc. An error code of F00B was received.
It indicates the PSE power controller on the device is abnormal, please call the
PPCResetPSE API to reset the PSE Controller on the Device by Board ID.
You may refer to section 3.13 "enable the LOG" to view more device information.

3.5.10 0xF00C: ERR_DEVICE_FAILED

Cause	Device operation is abnormal
Solution	Please Power-cycle the system to recovery the device.

If error code of F00C was received, it indicates the device operation is abnormal.
Please "Power-cycle (cold reboot)" the system to recovery the device.
You may refer to section 3.13 "enable the LOG" to view more device information.

3.5.11 Why the Power of PoE Port remain ON until driver is loaded?

During BIOS and OS loading stage, PoE power would still remain ON until driver is loaded. This is the limitation because we do not have controls in these stages in current hardware design architecture.

### 3.5.12 Why the Power of DCOUT Port cannot control by SW? (PCIE-1181/82-AE)

Please check the DIP Switch on PCIE-1182 card, as shown below, the value of DIP switch must be turned ON to be controlled by software.
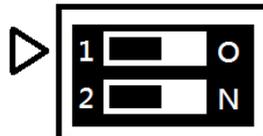
If the value is OFF, there will be no power output from DCOUT port and software cannot be controlled.
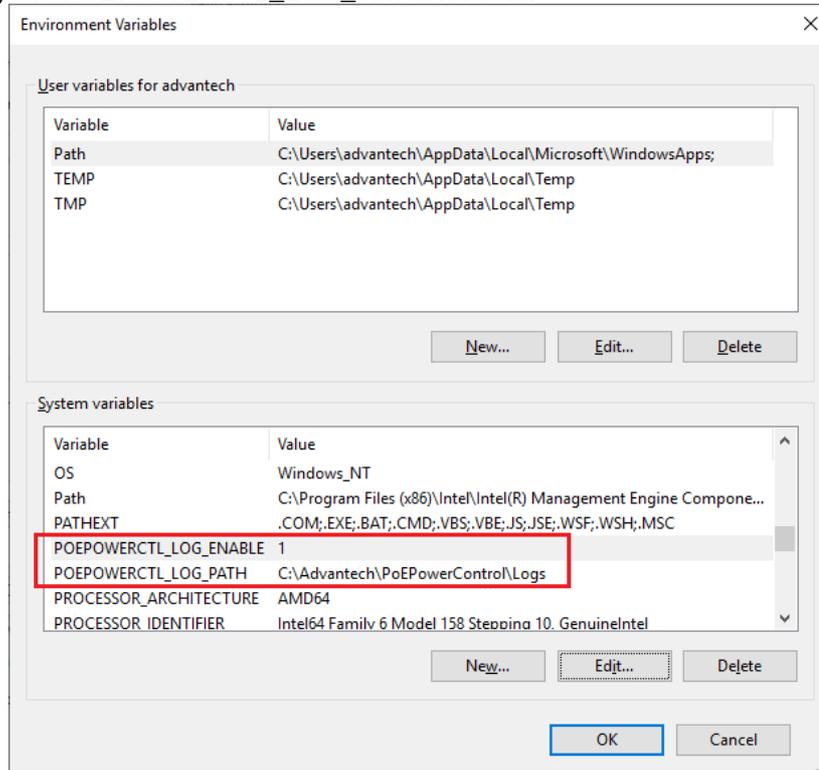
3.5.13 How to enable the LOG

Please open Windows System Properties and click Environment Variables.
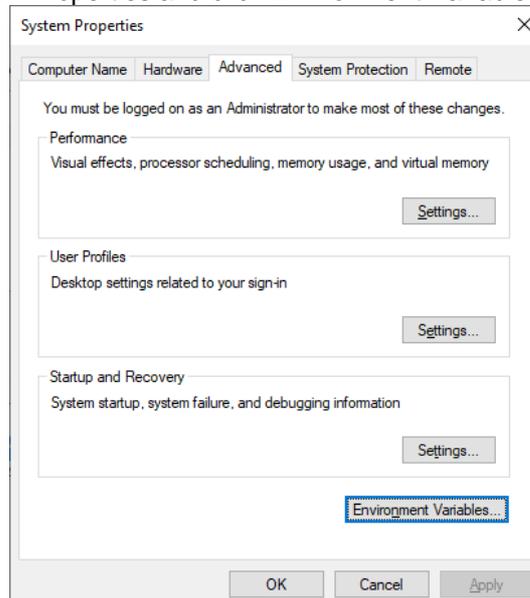
Find the POEPOWERCTL_LOG_ENABLE variable and set it to 1. The log will be stored under the path

specified by the POEPOWERCTL_LOG_PATH variable.

The log function can be turned off by setting the POEPOWERCTL_LOG_ENABLE variable to 0.
:

3.5.14 Why the Power State cannot restore on PCIE-1182 in Win10 after Computer Restart?

Please follow the steps to turn off the fast startup option on Win10.