Neousys Technology Inc.

PCIe-USB381F
Frame Grabber Card

User Manual
Rev. A1.0

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Safety Precautions

Read these instructions carefully before you install, operate, or transport the system.

- Install the system or DIN rail associated with, at a sturdy location
- Install the power socket outlet near the system where it is easily accessible
- Secure each system module(s) using its retaining screws
- Place power cords and other connection cables away from foot traffic.
- Do not place items over power cords and make sure they do not rest against data cables
- Shutdown, disconnect all cables from the system and ground yourself before touching internal modules
- Ensure that the correct power range is being used before powering the device
- Should a module fail, arrange for a replacement as soon as possible to minimize down-time
- If the system is not going to be used for a long time, disconnect it from mains (power socket) to avoid transient over-voltage

Service and Maintenance

- ONLY qualified personnel should service the system
- Shutdown the system, disconnect the power cord and all other connections before servicing the system
- When replacing/ installing additional components (expansion card, memory module, etc.), insert them as gently as possible while assuring proper connector engagement

ESD Precautions

- Handle add-on module, motherboard by their retention screws or the module’s frame/ heat sink.
- Avoid touching the PCB circuit board or add-on module connector pins
- Use a grounded wrist strap and an anti-static work pad to discharge static electricity when installing or maintaining the system
- Avoid dust, debris, carpets, plastic, vinyl and styrofoam in your work area.
- Do not remove any module or component from its anti-static bag before installation

About This Manual

This manual introduces and describes how to setup/ install Neousys Technology PCIe-USB381F frame grabber card. It offers connectivity expansion, stability and SuperSpeed USB3.1 Gen1 performance to your existing system.

Revision History

Version	**Date**	**Description**
1.0	Feb. 2021	Initial release

1 Introduction

Neousys PCIe-USB381F is an industrial-grade 8-port USB 3.1 Gen1 (formerly USB 3.0) host adapter card for machine vision applications. Featuring x4 PCI Express Gen2 interface and four Fresco FL1100SX xHCI controllers, PCIe-USB381F can provide up to 400MB/s sustained data transfer rate per port with four USB3 cameras operating simultaneously, or provide a total bandwidth of 1600MB/s when eight cameras are plugged in.

All eight USB ports of PCIe-USB381F are accessible on the faceplate for easy cabling. Each port can deliver standard 900mA regulated 5V output to power USB3.0 cameras or user-configurable 1800mA output via onboard jumpers for devices that require higher power consumption. It also supports software-programmable per-port power on/off control to reset cameras or other devices for fault recovery.

The steady 400 MB/s data throughput satisfies the bandwidth requirement of most off-the-shelf industrial USB3.0 cameras. Pairing reliable 5 VDC power output and per-port on/off control, PCIe-USB381F can benefit a variety of vision-related applications such as machine vision, factory automation and medical imaging.

1.1 Product Specification

Specifications

USB Ports	8x USB 3.1 Gen1 ports, compatible with USB 2.0/ 1.1/ 1.0
USB Connectors	8x panel-accessible Type-A USB3 connectors
Bus Interface	4-lanes, Gen2 PCI Express interface, compliant with PCI Express Base Specification Revision 2.0
USB3 Host Controller	4x Fresco FL1100SX host controllers, compliant with Intel® xHCI Specification Revision 1.0
Per-Port Current Limit	User-configurable 900mA/ 1800mA per-port current limit
Power Requirement	Maximal 2.0 A@3.3V from PCI Express bus Maximal 5.5 A@12V from PCI Express bus for all connected USB devices
Operating Temperature	0 ~ 60°C with ambient airflow
Dimension	117.7 mm (W) x 111.2 mm (H)
Compatible operating systems	Windows 7 Windows 10

2 Setting Up Your PCIe-USB Card

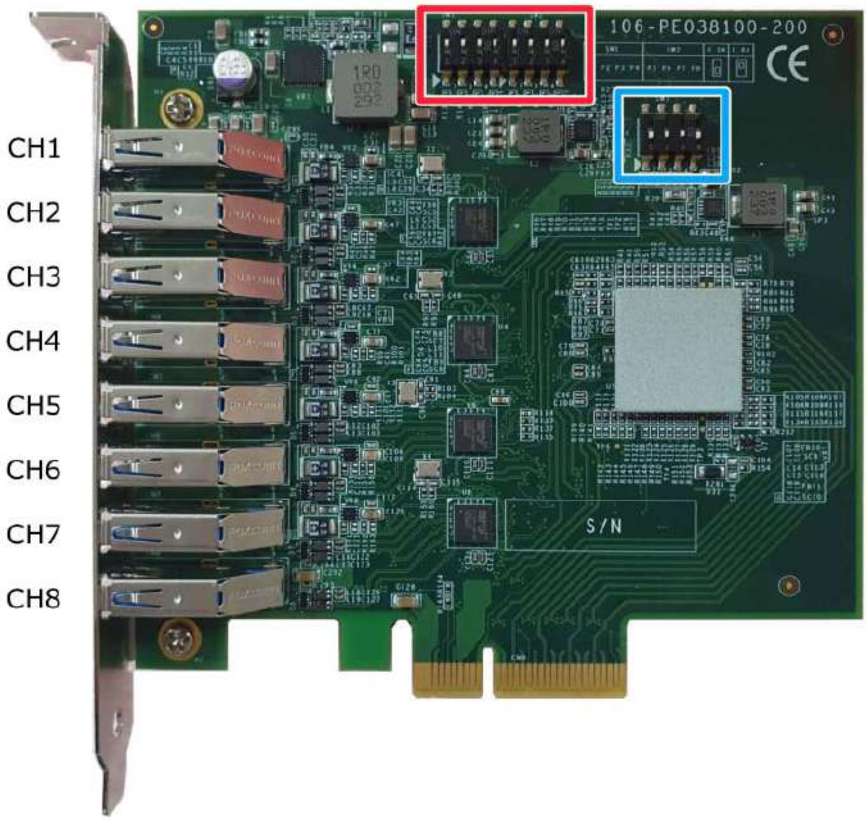
2.1 Unpacking Your PCIe-USB Card

Upon receiving the PCIe-USB card package, please check immediately if the package contains all the items listed in the following table. If any item is missing or damaged, please contact your local dealer or Neousys Technology Inc.

Item	Description	Qty
1	PCIe-USB381F frame grabber card	1
2	Drivers & Utilities Disc	1

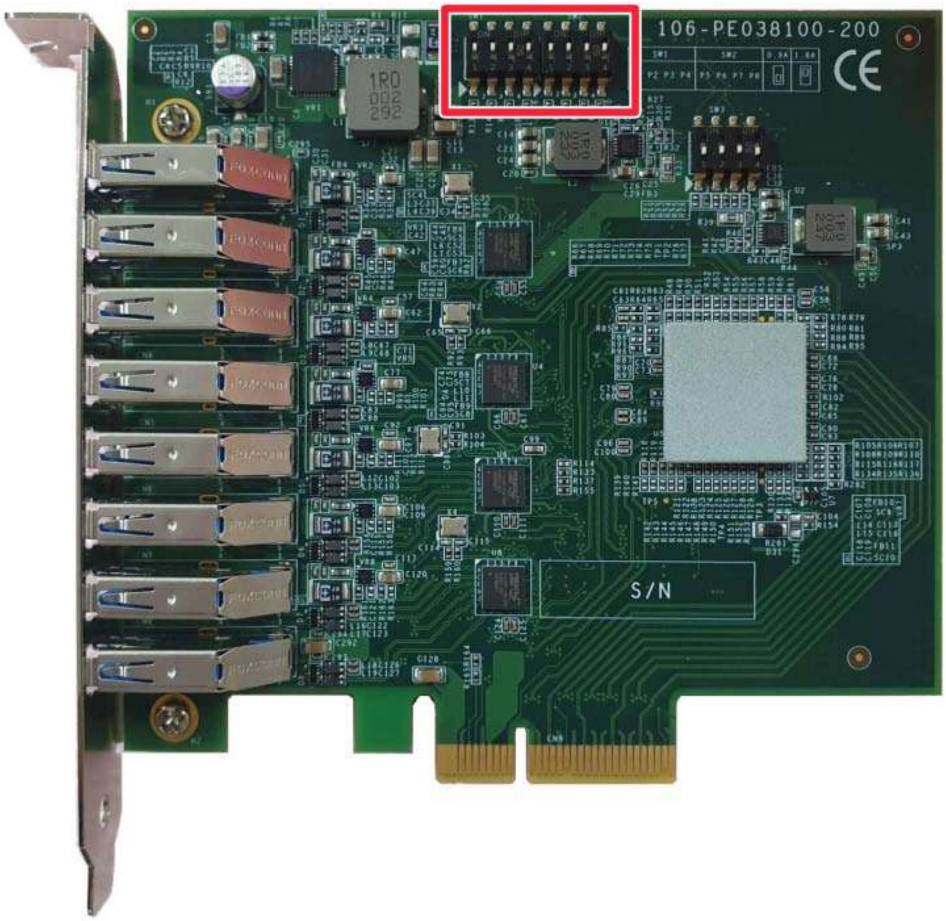
2.2 Superior View

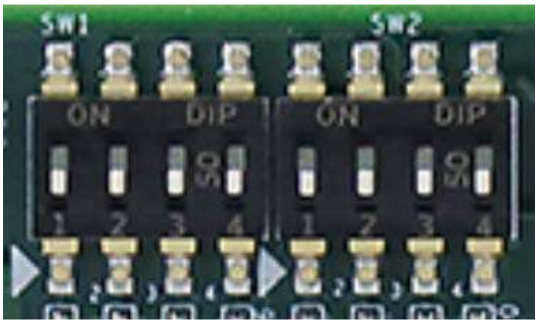
Shown below is a PCIe-USB381F frame grabber card, from top to bottom, they are channels 0-7. On the top, DIP switches 1 and 2 are indicated in **red**, they offer per-port current configurable settings of 900mA or 1800mA. Please refer to the DIP switch 1 and 2 settings for details. To the right of DIP switches 1 and 2, you can find DIP switch 3 (indicated in **blue**), it offers PCIe-USB card ID settings for when you install multiple cards in your system to identify each PCIe-USB card.



2.3 DIP Switch 1 and 2 Settings

The DIP switch 1 and 2 locations are indicated below in **red**.





DIP switch 1 and 2

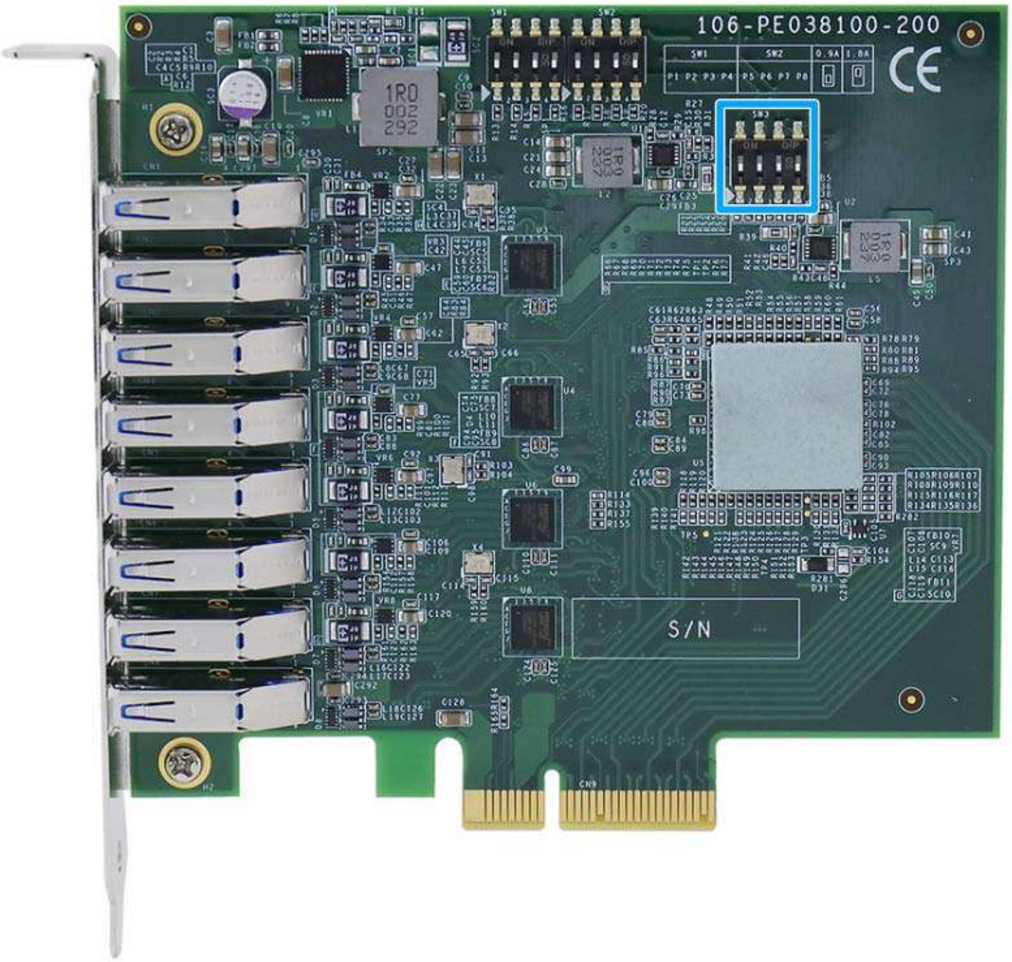
SW1	SW2	0.9A	1.8A
P1 P2 P3 P4	P5 P6 P7 P8	▄	▀

DIP switch settings

The current output setting can be configured for each individual USB port. The current output can be set at 900mA (▄ position) or 1800mA (▀ position). By default the If the DIP switches are set to output 900mA. You may also set all channels to output 1800mA without any issue.

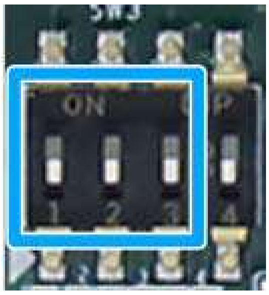
2.4 DIP Switch 3 Settings

PCIe-USB cards feature per-port power on/off control via Neousys' API so you may manually cut off or resume the power delivery to the connected device. This feature is designed for failure recovery in the field to rest connected devices. To support per-port on/off control for multiple cards, the PCIe-USB381F card has DIP switch 3 (indicated in **blue**) to configure user-defined board ID. The board ID can be used as a parameter in API to specify the card.



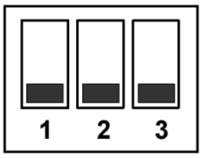
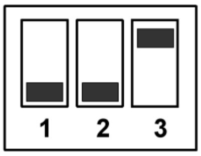
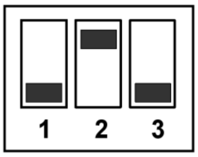
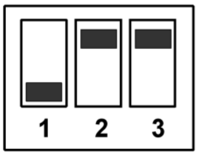
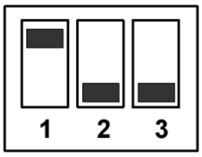
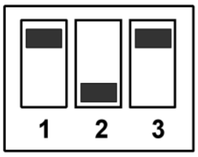
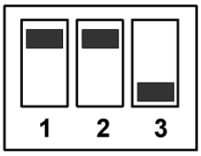
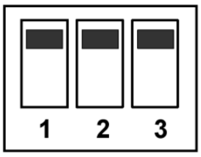
2.4.1 DIP Switch 3

There are four DIP switches but to configure the board ID, you only need to configure the DIP switches 1~3.



2.4.2 Board ID Settings Via DIP Switch 3

To set board IDs, please refer to the following table.

Board ID	DIP Switch 3 Position (P1 ~ P3)
0	
1	
2	
3	
4	
5	
6	
7	

3 PCIe-USB Card Installation

Once you have set up your PCIe-USB card, current output for each port or if you are installing multiple PCIe-USB cards, setting up the board ID, then you are ready to install the PCIe-USB card into the system. To install the PCIe-USB card, please refer to the following procedure.

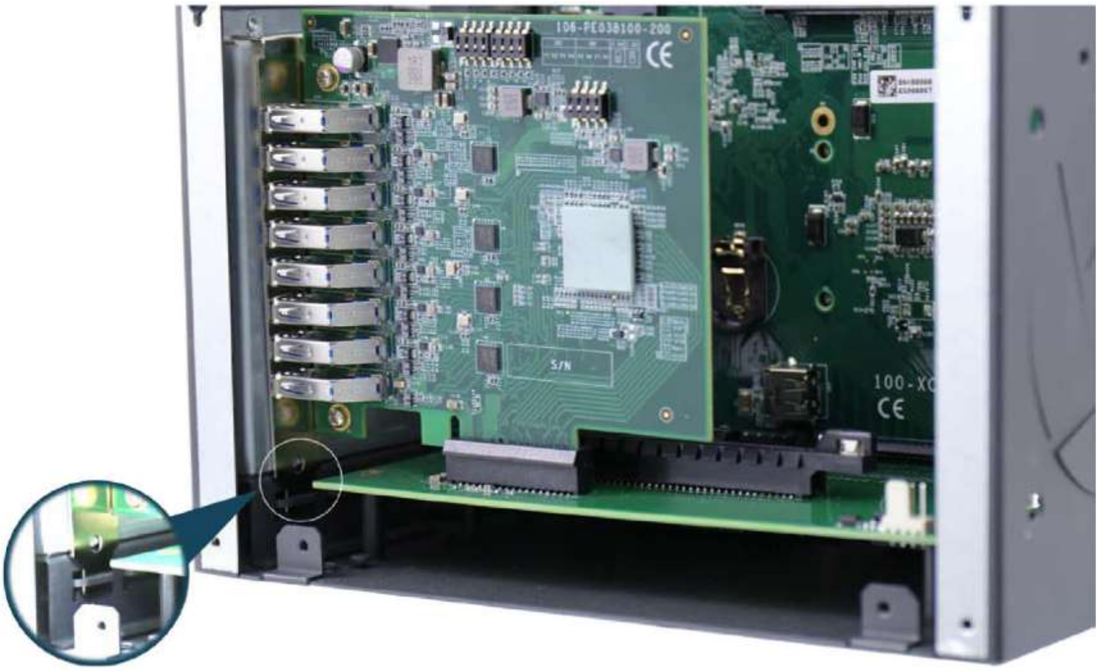
3.1 Hardware Installation

1. Save and close all work in progress.
2. Power off and unplug the power cable from the system you wish to install to.
3. Open the chassis (side panel) of the computer you wish to install the PCIe-USB card into.
4. Locate a x4 PCIe or spare x16 PCIe slot, remove the corresponding connector panel and gently lower the gold finger of PCIe-USB381F into the PCIe slot.

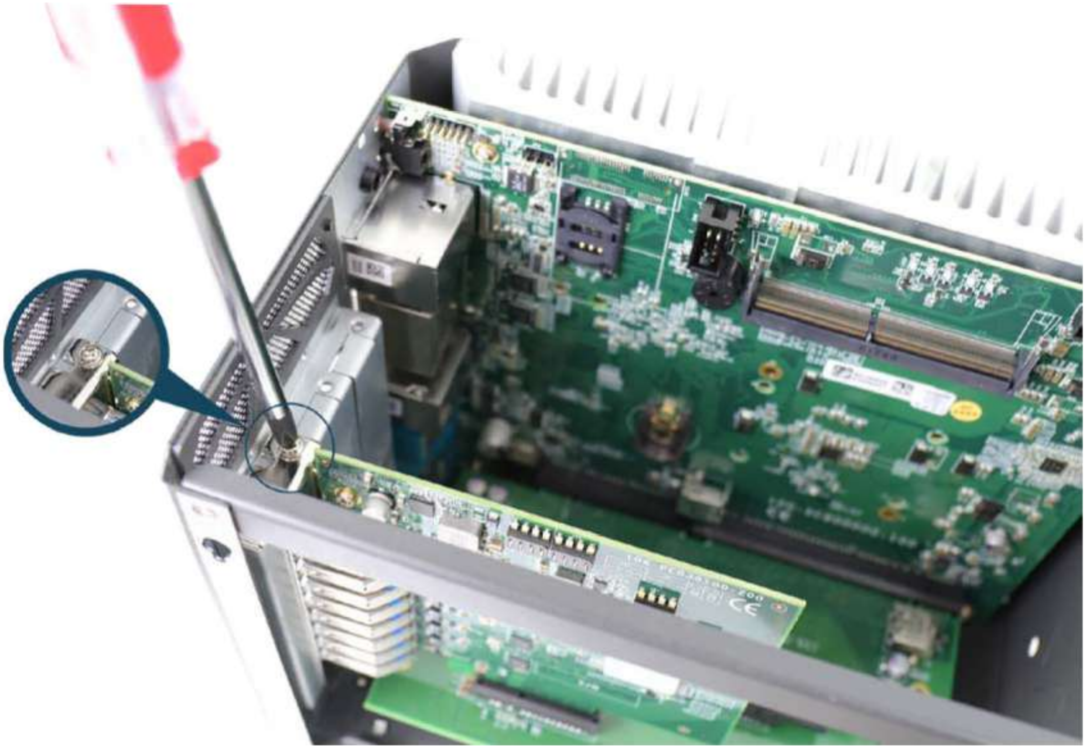
Lower PCIe-USB381F into the case

Insert gold finger into PCIe slot

5. Make sure the bottom of the PCIe card's connector panel is properly inserted.



6. Secure the PCIe-USB card to the chassis with a screw



7. Reinstall the system's chassis (panel) to complete the hardware installation process.

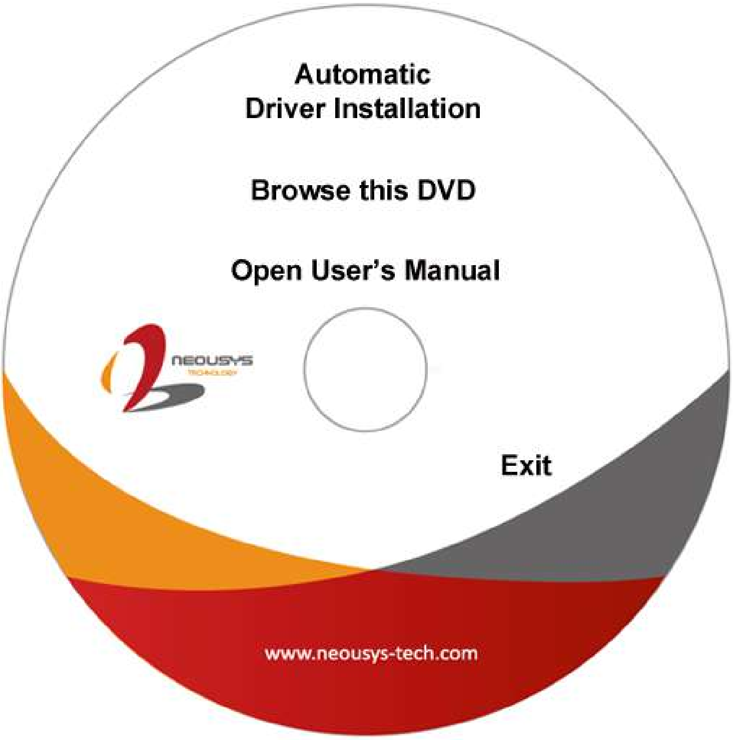
3.2 Software Installation

NOTE

Microsoft Windows 10 operating system comes with built-in USB3.0 drivers and therefore does not require driver installation. If your Windows 10 operating system does not recognize PCIe-USB381F, please make sure you have installed the relevant Windows update(s).

Some operating system may have built-in drivers and automatically complete the installation upon entering the system. If you are using earlier versions of Windows operating systems, please refer to the following installation procedure to take advantage of all the functions offered.

1. Plug in the power cable and power up the system.
2. Once you are in the system, insert the driver disc included in the package into the DVD-ROM.



3. Execute the file FLUSB3.0-3.8.35514.0.exe, it may be located in the directory x:\Driver_Pool\USB3_Fresco\Win7_ALL
4. For "PCIe-USB381F library", please go to the following directory and execute the EXE file x:\Driver_Pool\USB3_PerPort_Ctrl\PCIeUSB381_Setup_v1.0(x64).exe
5. If your system does not have a DVD-ROM, please go here to download the latest driver for PCIe-USB381F.
6. Simply follow instructions to complete the software installation process.
7. You may begin using your PCIe-USB card after hardware/ software components have been installed.

Appendix A: PCIe-USB381F Function Library

Neousys PCIe-USB381F function library provides a set of function APIs that control the 5V power supply for each USB port. This allows users to enable or disable remote USB devices using the application software, rather than manually plugging the cable.

In this document, we'll illustrate how to use the function library provided by Neousys to program the USB ports on PCIe-USB381F. Currently, PCIe-USB381F library supports the following operating systems:

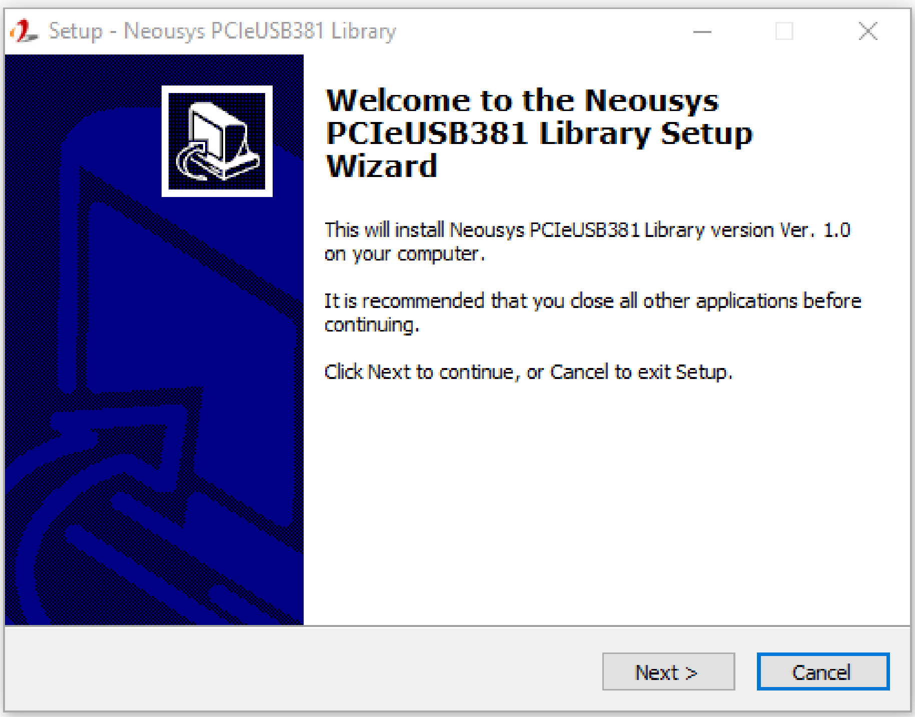
- Windows 7 (32-bit & 64-bit)
- Windows 10 (32-bit & 64-bit)

For other OS support, please contact Neousys Technology for further information.

PCIe-USB381F Library Installation

The PCIe-USB381F function library is delivered in the form of a setup package named **PCIeUSB381_Setup_v1.0.exe**. In prior to program PCIe-USB381F, you should execute the setup program and install the PCIe-USB381F library.

1. Right click and "Run as administrator" to execute **PCIeUSB381_Setup_v1.0.exe**. The following dialog appears.



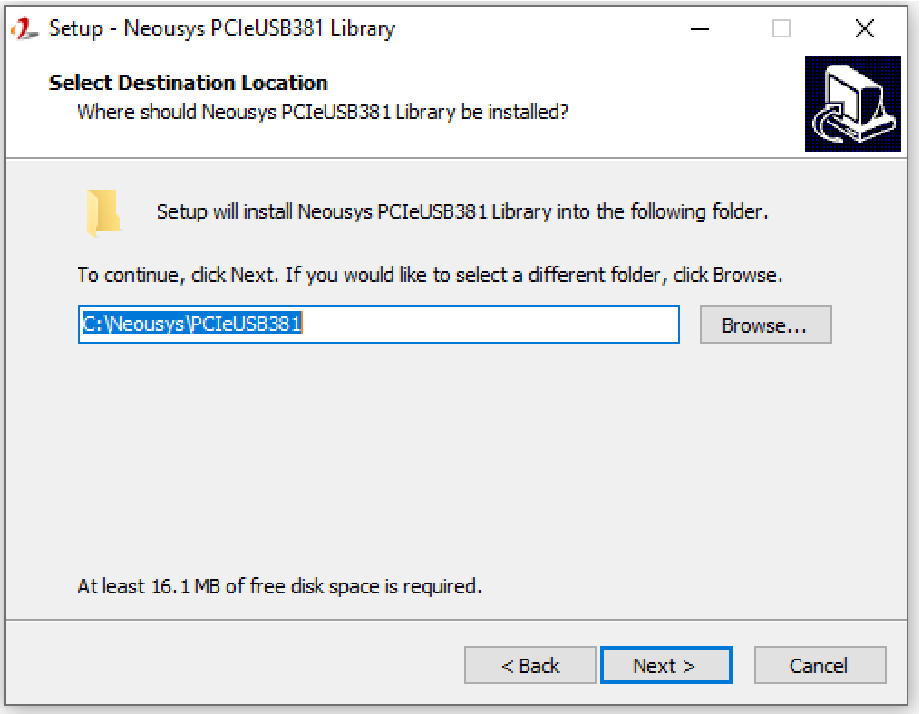
Welcome to the Neousys PCIeUSB381 Library Setup Wizard

This will install Neousys PCIeUSB381 Library version Ver. 1.0 on your computer.

It is recommended that you close all other applications before continuing.

Click Next to continue, or Cancel to exit Setup.

2. Click “Next >” and specify the directory of installing related files. The default directory is C:\Neousys\PCIeUSB381.



Setup - Neousys PCIeUSB381 Library

Select Destination Location

Where should Neousys PCIeUSB381 Library be installed?

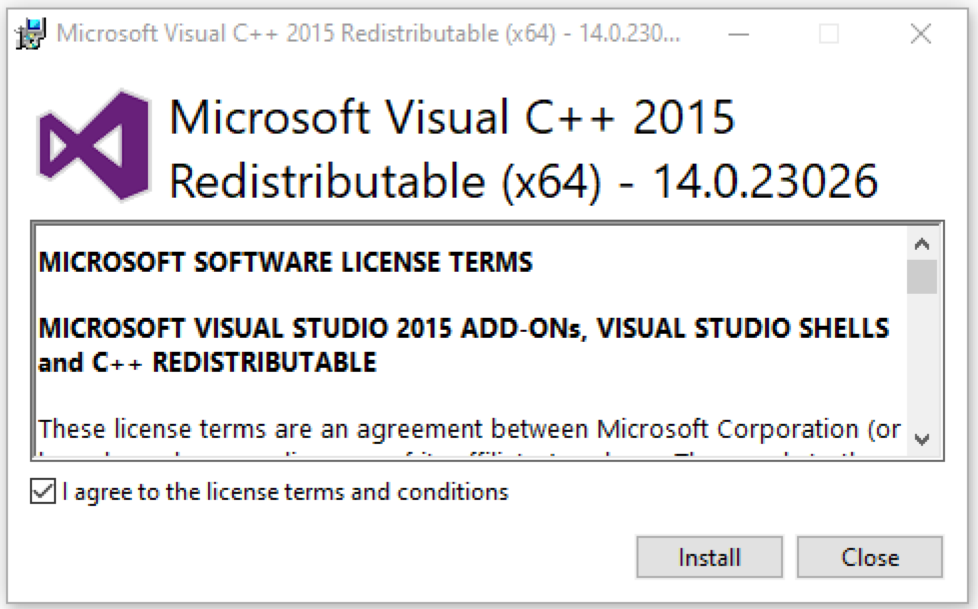
Setup will install Neousys PCIeUSB381 Library into the following folder.

To continue, click Next. If you would like to select a different folder, click Browse.

C:\Neousys\PCIeUSB381

At least 16.1 MB of free disk space is required.

3. During the process, the installation file may detect and prompt you to install other Microsoft components. Please click on the “I agree to the license terms and conditions” and click on “Install” to continue.



Microsoft Visual C++ 2015 Redistributable (x64) - 14.0.230...

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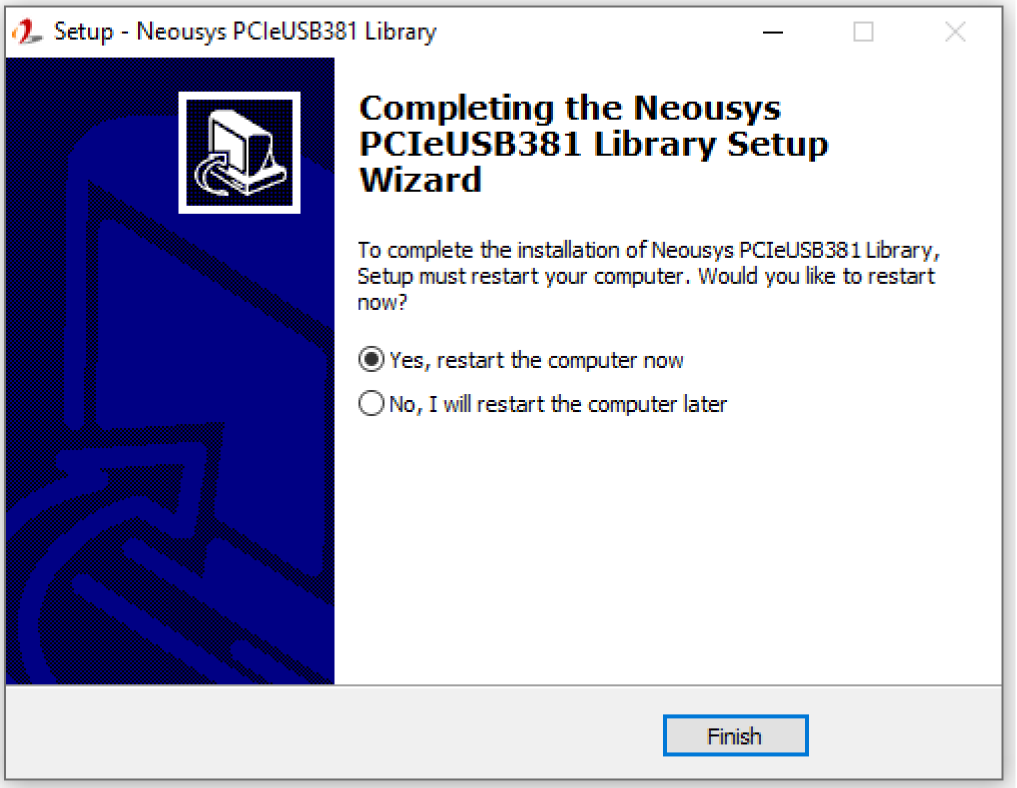
4. Once the installation process is finished, a dialog appears to prompt you to reboot the system. The PCIe-USB381F library will take effect after the system reboots.



Setup - Neousys PCIeUSB381 Library

Completing the Neousys PCIeUSB381 Library Setup Wizard

To complete the installation of Neousys PCIeUSB381 Library, Setup must restart your computer. Would you like to restart now?

● Yes, restart the computer now

○ No, I will restart the computer later

5. When you program your PCIe-USB381F, the related files are located in

Header file:	\Include
Lib file:	\Lib
Function Reference:	\Manual
Sample Code:	\Sample

Using PCIe-USB381F Function

PCIe-USB381F Function Reference

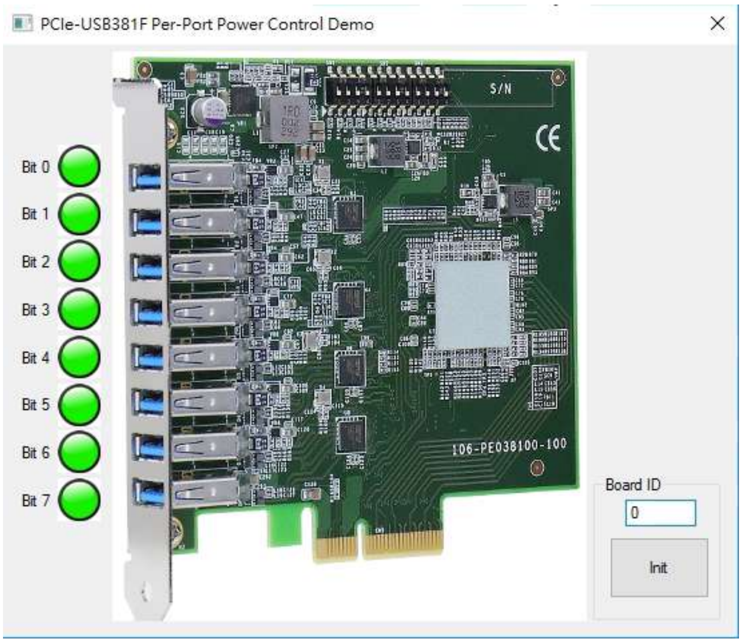
UsbPort_Open

Syntax	int __stdcall UsbPort_Open(BYTE smtSwitch);
Description	Initialize the PCIe-USB381F device. You should always invoke UsbPort_Open() before control procedures.
Parameter	[in] *smtSwitch* BYTE value that specifies the SMT switch of PCIe-USB381F. For current revision of PCIe-USB381F, please always specify 0 for default value.
Return Value	Returns a negative integer value if function failed, otherwise if function successes.
Usage	if (0 > UsbPort_Open(0)) { return false; }

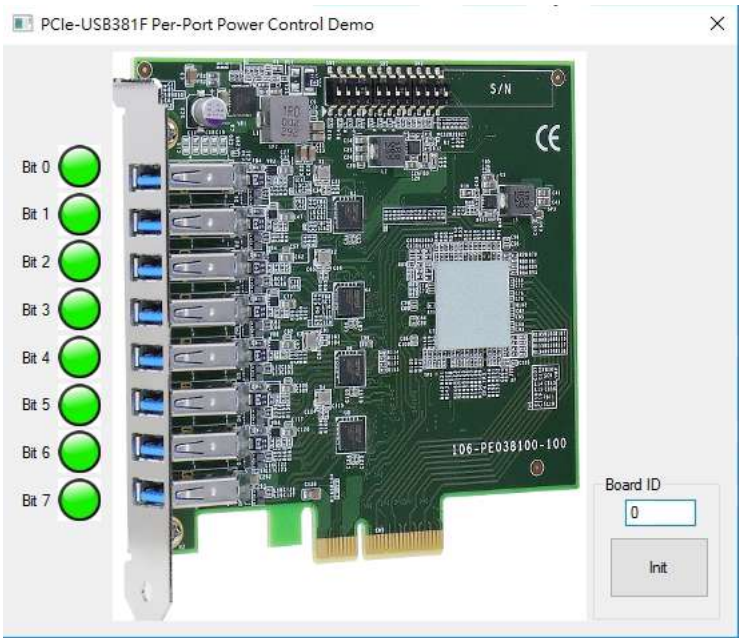
UsbPort_Close

Syntax	int __stdcall UsbPort_Close(BYTE smtSwitch);
Description	This function is used to release and cleanup the inner resources used by PCIe-USB381F library.
Parameter	[in] *smtSwitch* BYTE value that specifies the SMT switch of PCIe-USB381F. For current revision of PCIe-USB381F, please always specify 0 for default value.
Return Value	Returns a negative integer value if function failed, otherwise if function successes.
Usage	if (0 > UsbPort_Close(0)) { return false; }

UsbPort_PowerControl

Syntax	int __stdcall UsbPort_PowerControl(BYTE smtSwitch, BYTE portCtrl);
Description	Enable/ disable USB 5V power supply for each port in bit order.
Parameter	[in] *smtSwitch* BYTE value that specifies the SMT switch of PCIe-USB381F. For current revision of PCIe-USB381F, please always specify 0 for default value. [in] portCtrl BYTE value that specifies a bit mask for power control of corresponding USB port. A bit value of 0 indicates disabling the power for corresponding port and a bit value of 1 indicated enabling the power for corresponding port.  PCIe-USB381F Per-Port Power Control Demo Bit 0 Bit 1 Bit 2 Bit 3 Bit 4 Bit 5 Bit 6 Bit 7 S/N 106-PE038100-100 Init Board ID: 0
Return Value	Returns a negative integer value if function failed, otherwise if function successes.
Usage	if (0 > UsbPort_PowerControl(0, 0xAA) { return false; } // 10101010b, disable port 0/2/4/6 and enable port 1/3/5/7

UsbPort_PowerStatus

Syntax	int __stdcall UsbPort_PowerStatus(BYTE smtSwitch, BYTE* pPortStatus);
Description	Get the power status of all USB ports on PCIe-USB381F.
Parameter	[in] *smtSwitch* BYTE value that specifies the SMT switch of PCIe-USB381F. For current revision of PCIe-USB381F, please always specify 0 for default value. [out] *pPortStatus* Pointer to BYTE value that contains the bit mask of power status. Each bit in *pPortStatus* indicates the on/off status of corresponding USB port. A bit value of 0 indicated power is disabled, and a bit value of 1 indifcated power is enabled.  PCIe-USB381F Per-Port Power Control Demo Board ID: 0
Return Value	Returns a negative integer value if function failed, otherwise if function successes.

Usage	BYTE portStatus = 0;
	if (0 > UsbPort_PowerStatus(0, &portStatus)) { return false; }

UsbPort Example

```
#include <stdio.h>
#include <stdlib.h>
#include <windows.h>
#include "PCIeUSB380.h"

int main(int argc, char* argv[])
{
    int  result;
    BYTE  portStatus;

    //Step 1, initialize UsbPort library by invoking UsbPort_Open()
    result = UsbPort_Open(0);
    if ( 0 > result )
    {
        printf("UsbPort_Open --> FAILED, %d\n", result);
        return -1
    }
    printf("UsbPort_Open --> PASSED\n");

    //Step2, get the power status
    result = UsbPort_PowerStatus(0, &portStatus);
    if ( 0 > result )
    {
        printf("UsbPort_PowerStatus --> FAILED, %d\n", result);
        return -2;
    }
    printf("UsbPort_PowerStatus --> PASSED\n");

    //Step3, control the power, disable port 0/2/4/6
    portStatus = 0xAA; //10101010b
    result = UsbPort_PowerControl(0, portStatus);
    if ( 0 > result )
    {
        printf("UsbPort_PowerControl --> FAILED, %d\n", result);
        return -3;
    }
    printf("UsbPort_PowerControl --> PASSED\n");

    //Step4, close and release library resource
    result = UsbPort_Close(0);
    if ( 0 > result )
    {
        printf("UsbPort_Close --> FAILED, %d\n", result);
        return -4;
    }
    printf("UsbPort_Close --> PASSED\n");

    printf("\npress any key to exit...\n");
    system("pause >nul");
    return 0;
}
```