Mini PCI Express Multiport Serial Board Series User Manual

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www.moxa.com/products

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1. Introduction

Moxa's Mini PCI Express serial boards meet the new slot standard for expansion boards and work with any Mini PCI Express slots. The boards have multiple RS-232/422/485 serial ports to connect data acquisition equipment and other serial devices to a PC.

Overview

Moxa's new Mini PCI Express Multiport Serial Boards family fulfills a customized expansion need and provides a faster response to market. It includes isolated and non-isolated RS-232/422/485 communication cards for a variety of applications and users, such as industrial automation system manufacturers, system integrators, and industrial PC makers.

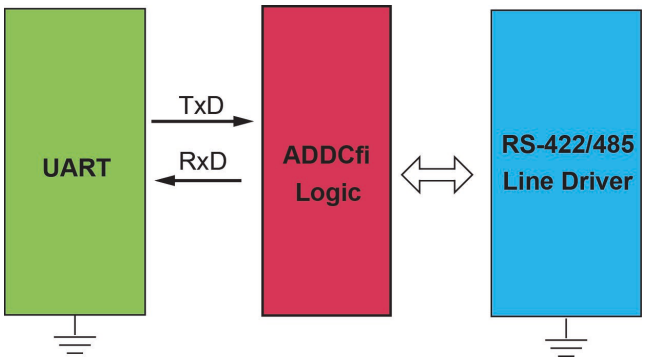
Mini PCI Express Solution

All mini PCIe Serial Boards feature high performance 16C950 compatible UARTs. Available in 4-port and 2-port versions, they are compatible with all popular operating systems, supports data rates of up to 921.6 kbps, and have 128-byte transmit and receive FIFOs. All mini PCIe serial cards operate in wide temperatures, ranging from -40 to 85°C. In addition, the packaging of all mini PCIe serial cards include door brackets, allowing the board to be installed in Moxa IPC Expansion slots.

ADDC™ (Automatic Data Direction Control) for RS-485

RS-485 uses differential data transmission over two wires to transmit data from one station to another and allows multiple transmitters and receivers to be used on the same data line. RS-485 uses half-duplex transmission, meaning transmission and reception share the same data channels. Hence, only one transmitter can be active at any given time.

Moxa's serial boards have a built-in circuitry to switch transmitters on and off automatically. We call this form of switching Automatic Data Direction Control (ADDC®). ADDC® is much easier to implement than the traditional handshaking method that uses the RTS signal.



Operating System Support

The Mini PCI Express boards are compatible with all major industrial platforms, including Windows and Linux. Moxa device drivers are provided for smoother installation, configuration, and performance.

Visit Moxa's website at www.moxa.com to download the latest drivers and user's manuals for all of Moxa's products.

Moxa Serial Comm Tool

For application development, Moxa provides an easy-to-use serial communication library called PComm that runs under Windows operation system. Use this library to develop your own applications with Visual Basic, Visual C++, Borland Delphi, to name a few. Utilities such as View Com, Data Scope, Monitor, Terminal Emulator, and Diagnostics are included to make it easier to debug, monitor communication status, provide terminal emulation, and transfer files.

Applications

The Mini PCI Express boards are suitable for many different applications, including:

- Internet/Intranet Connections
- Remote Access
- Multi-user Applications
- Industrial Automation
- Office Automation
- Telecommunications
- PC-based Vending Machines and Kiosks
- POS (Point-of-Sale) Systems

Features

The Mini PCI Express boards have the following outstanding features:

- Supports Mini PCI Express interface
- Small size for compact-sized or Din-rail PCs
- 128-byte FIFO and on-chip H/W, S/W flow control
- 50 bps to 921.6 kbps transmission speed
- Drivers are provided for Windows and Linux

Package Checklist

- 1 Moxa Mini PCI Express multi serial board (CP-104N-I-T, CP-134N-I-T, CP-114N-T models have the main board and I/O boards)
- 1 Moxa DB bracket
- Internal connection cable (25 cm)
- Documentation
- Quick installation guide (printed)
- Warranty card

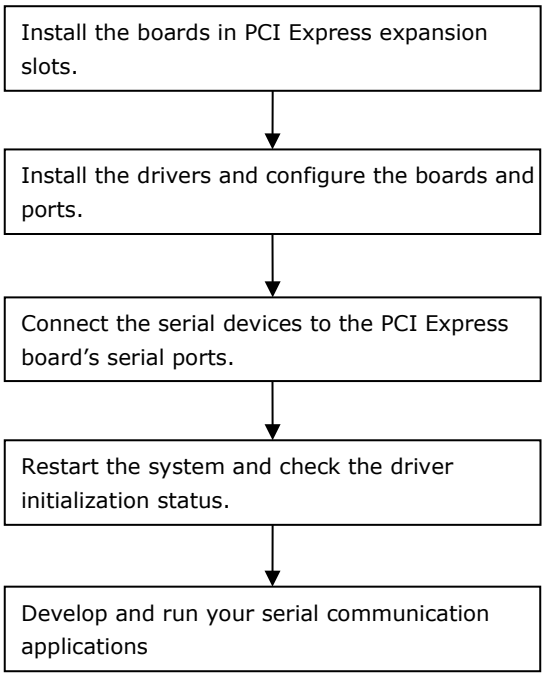
NOTE

The cable type and number of DB brackets might differ different product models.

Notify your sales representative if any of the above items are missing or damaged

Installation Flowchart

The following flowchart summarizes the procedure you should follow to install the Mini PCI Express boards, and it provides references to chapters with more detailed information:



Chapter 2, Hardware Installation

Chapter 3, Software Installation

Chapter 6, Pin Assignments

Chapter 3, Software Installation

Chapter 5, Serial Programming Tools

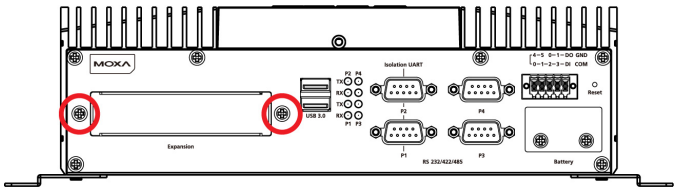
2. Hardware Installation

In this chapter, we show the dimensions diagrams for all the boards in the Mini PCI Express Series and describe the hardware installation procedure. Since the BIOS automatically assigns the PCI Express board's IRQ number and I/O addresses, you must plug in the board before installing the driver (driver installation is discussed in Chapter 3).

Hardware Installation Procedure

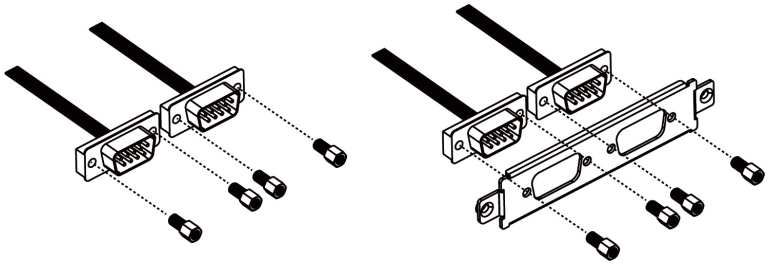
The Mini PCI Express board must be plugged into the PC before installing the driver. The following steps show how to install the Moxa Mini PCI express cards.

1. Find the Mini PCIe slot in your computer.
2. Insert the Mini PCIe multiport serial board and lock the screws.
3. Unscrew to remove the blank expansion plate. (We use Moxa V2406C as an example.)

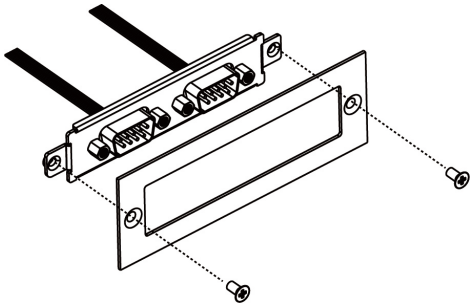


For the models (CP-102N-T, CP-102N-I-T, CP-112N-T, CP-132N-T, CP-132N-I-T, CP-104N-T) without I/O boards.

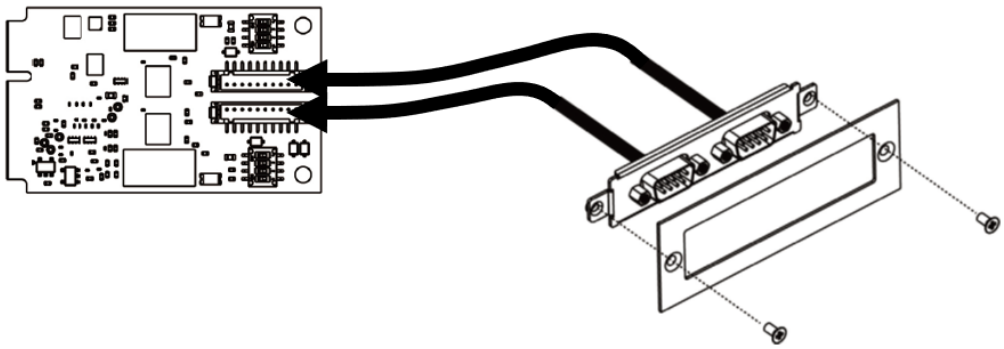
4. Unscrew the hexagonal copper pillars on the cable (DB9 Connector) and use them to connect the provided cables with the bracket.



5. Insert the plate through the blank expansion slot and lock the screws.

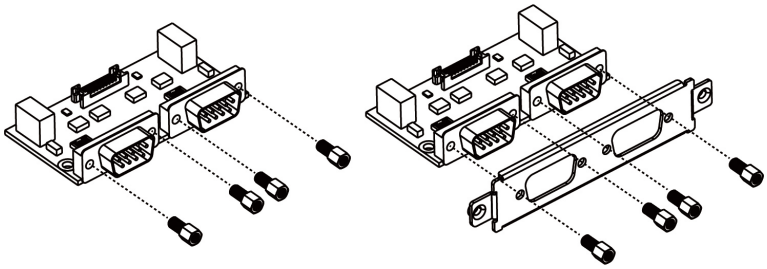


6. Connect the Mini PCIe multiport serial board with the cables.

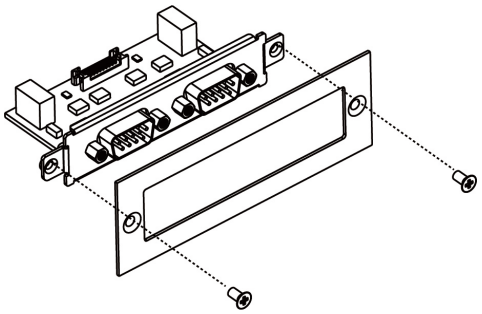


For the models (CP-104N-I-T, CP-134N-I-T, CP-114N-T) with I/O boards.

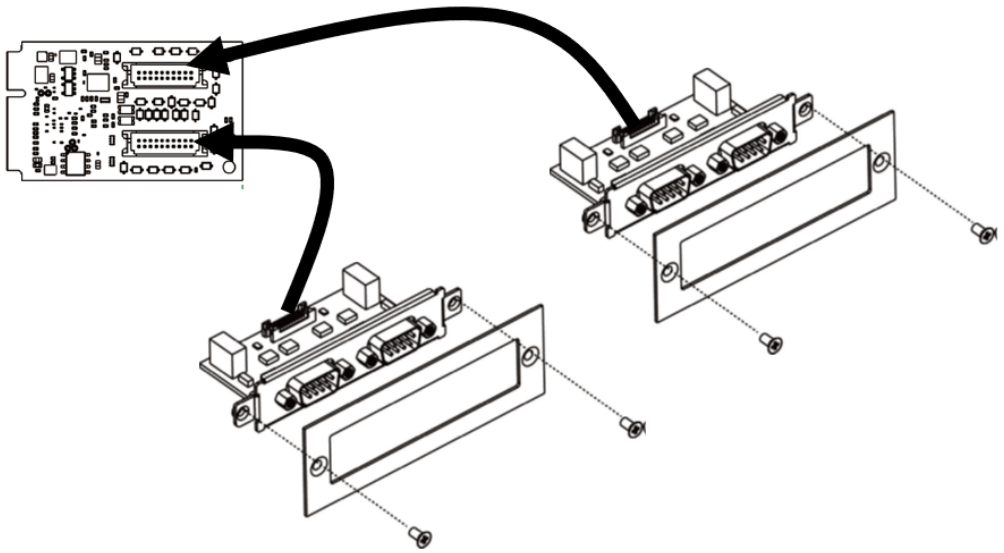
4. Unscrew the hexagonal copper pillars on the I/O board and lock the I/O board with the bracket.



5. Insert the I/O board with the bracket through the blank plate hole and lock the screws.



6. Connect the I/O board to the Mini PCIe multiport serial board with the serial cables.



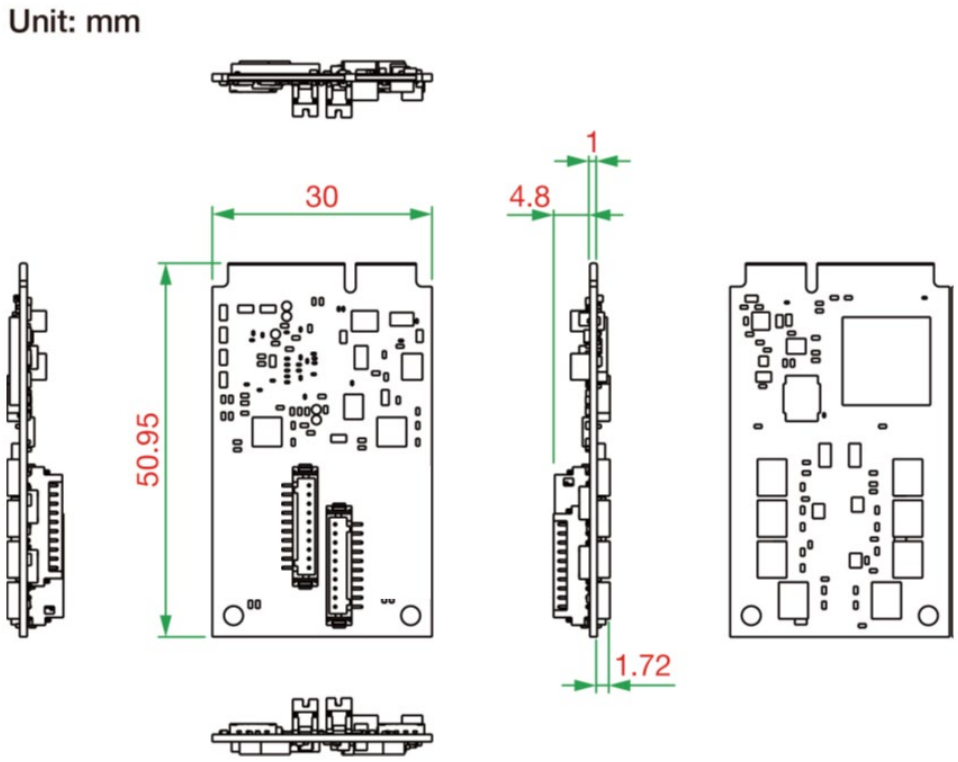
Mini PCIe Boards Dimension

Mini PCI express serial boards series is included in the following models.

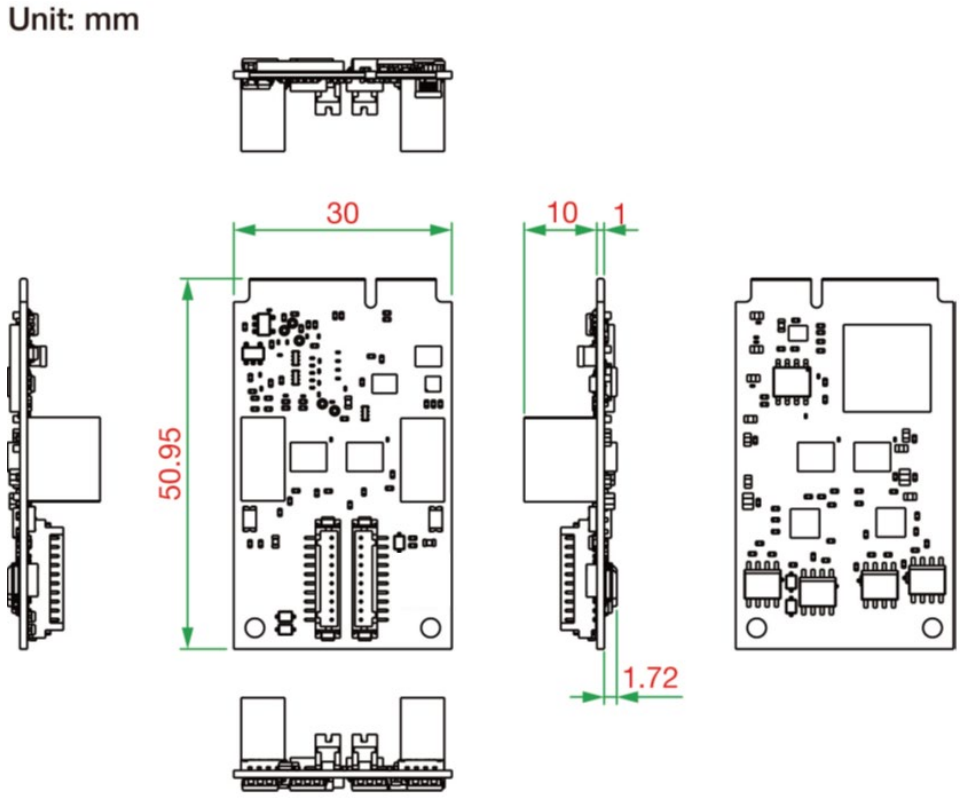
Model	Ports	Bus	Chip
CP-102N-T	2	PCIe	MUE850
CP-102N-I-T	2	PCIe	MUE850
CP-132N-T	2	PCIe	MUE850
CP-132N-I-T	2	PCIe	MUE850
CP-112N-T	2	PCIe	MUE850
CP-104N-T	4	PCIe	MUE850
CP-104N-I-T	4	PCIe	MUE850
CP-134N-I-T	4	PCIe	MUE850
CP-114N-T	4	PCIe	MUE850

The following content is showing the models' dimension.

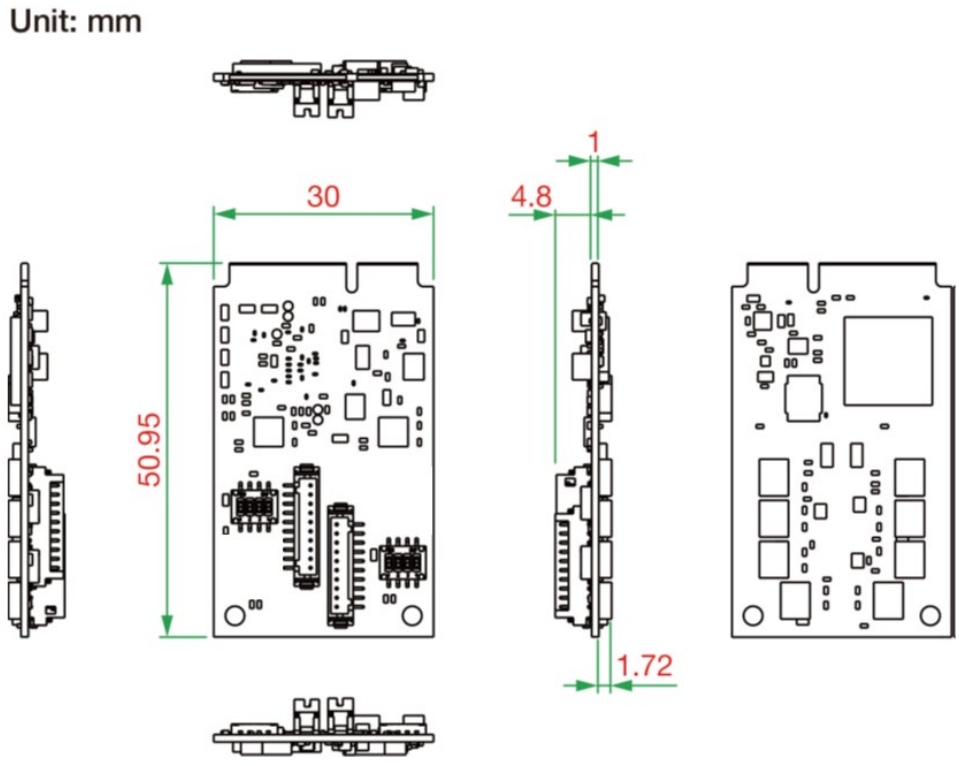
CP-102N-T Dimensions



CP-102N-I-T Dimensions

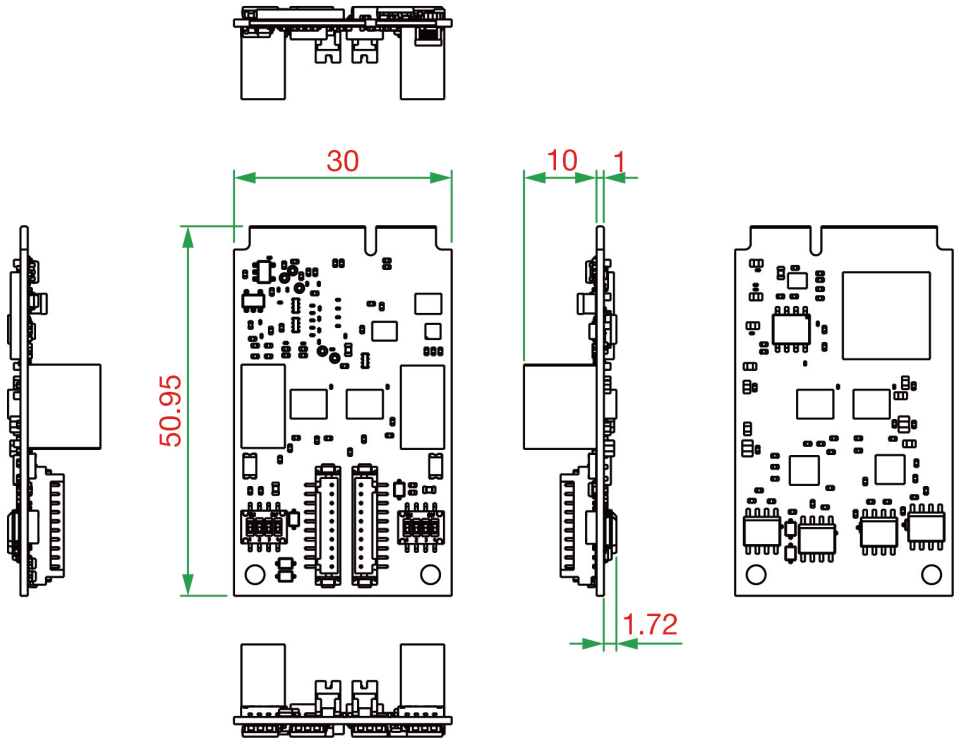


CP-132N-T Dimensions



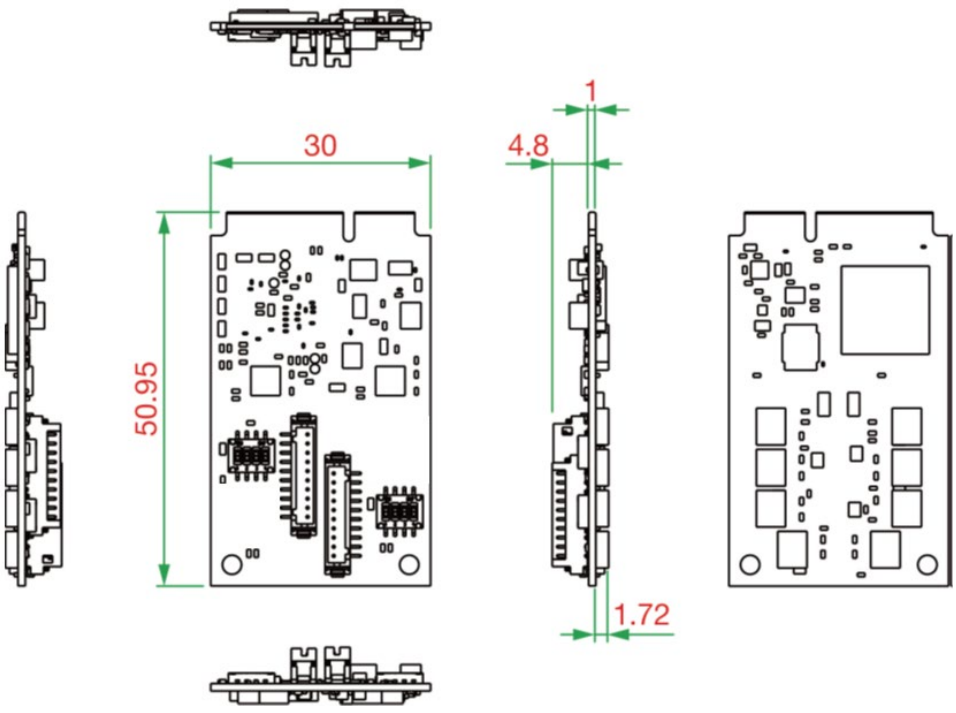
CP-132N-I-T Dimensions

Unit: mm



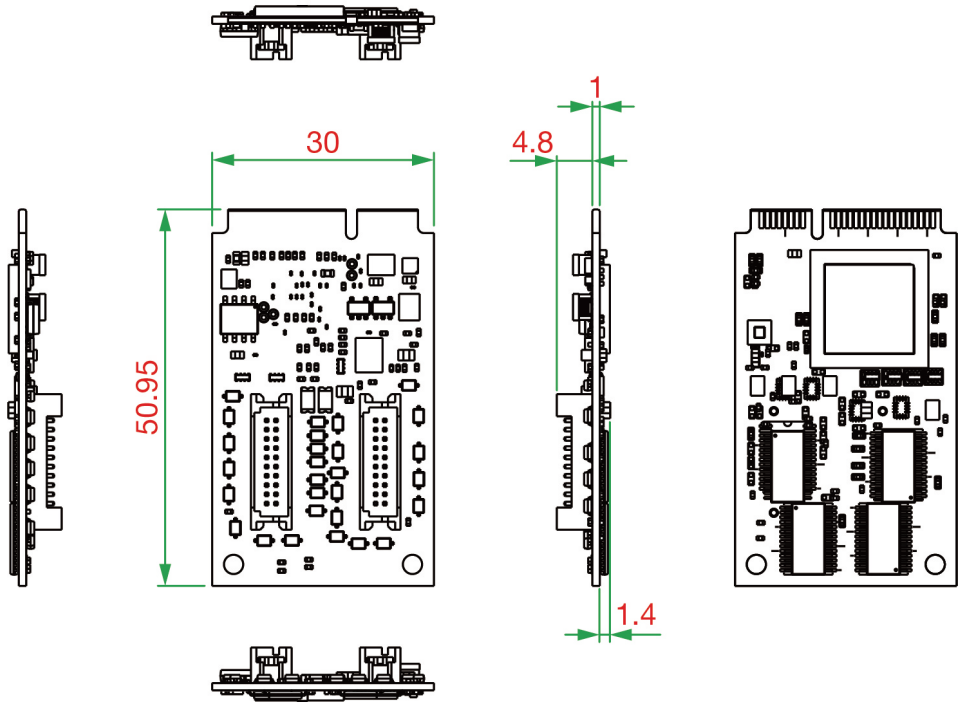
CP-112N-T Dimensions

Unit: mm



CP-104N-T Dimensions

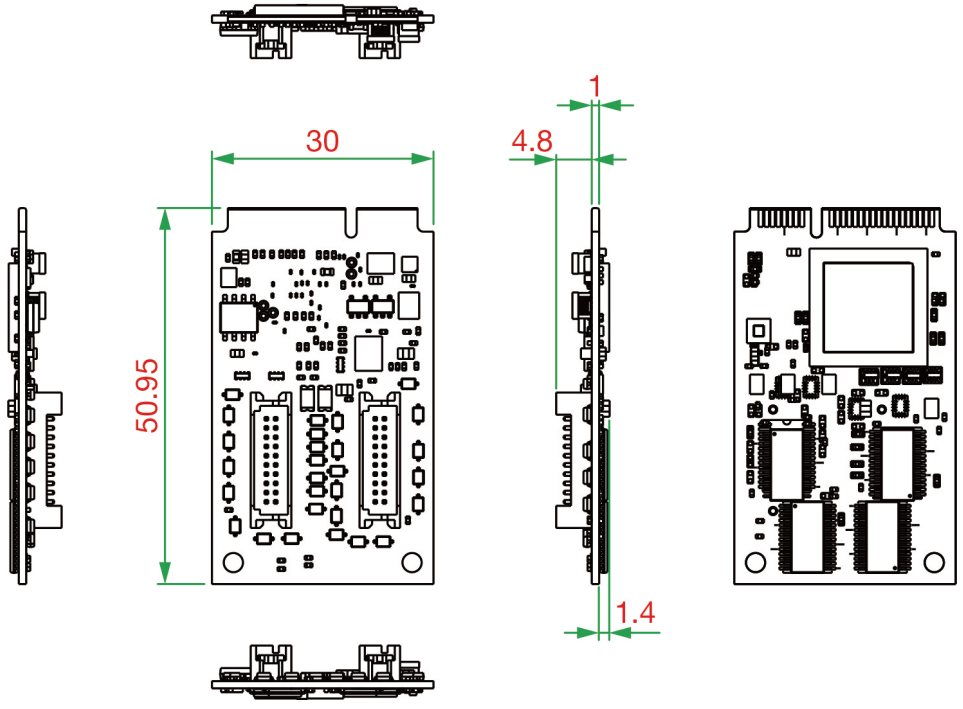
Unit: mm



CP-104N-I-T Dimensions

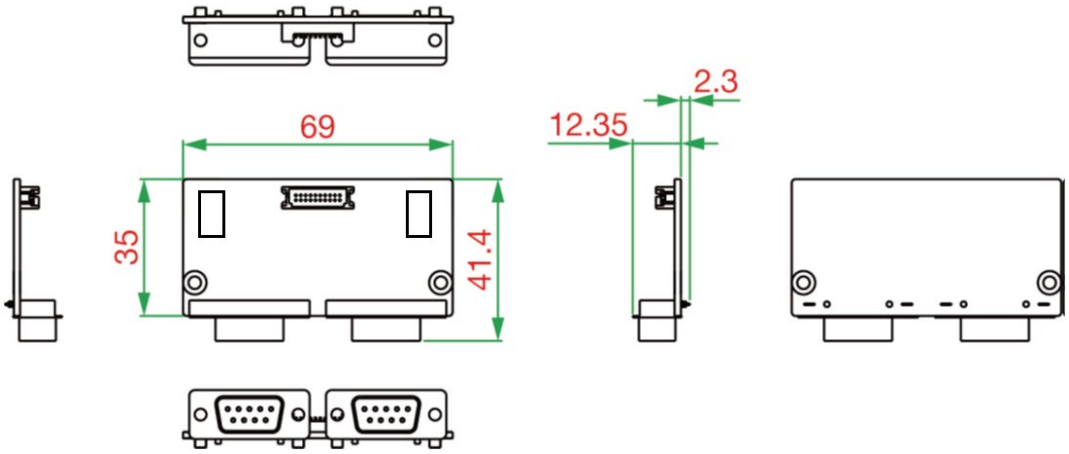
Mainboard Dimensions (Mini PCIe)

Unit: mm



I/O Board Dimensions

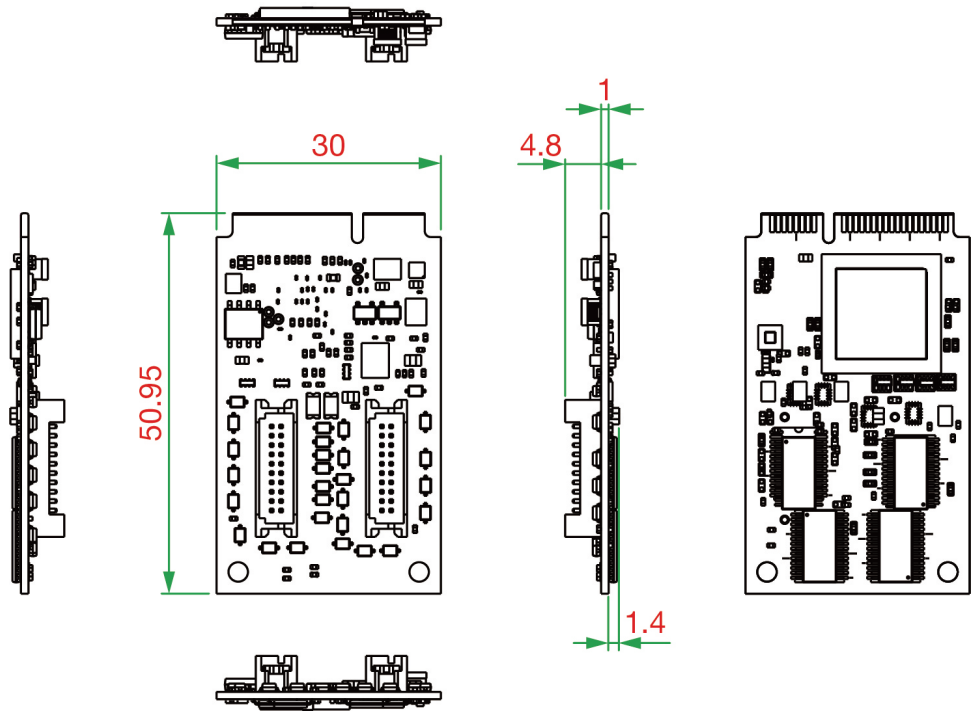
Unit: mm



CP-134N-I-T Dimensions

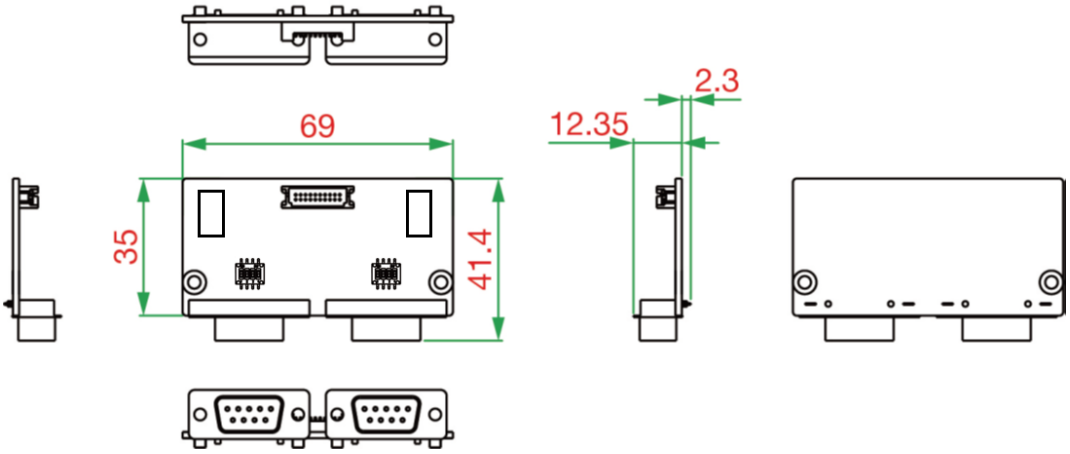
Mainboard Dimensions (Mini PCIe)

Unit: mm



I/O Board Dimensions

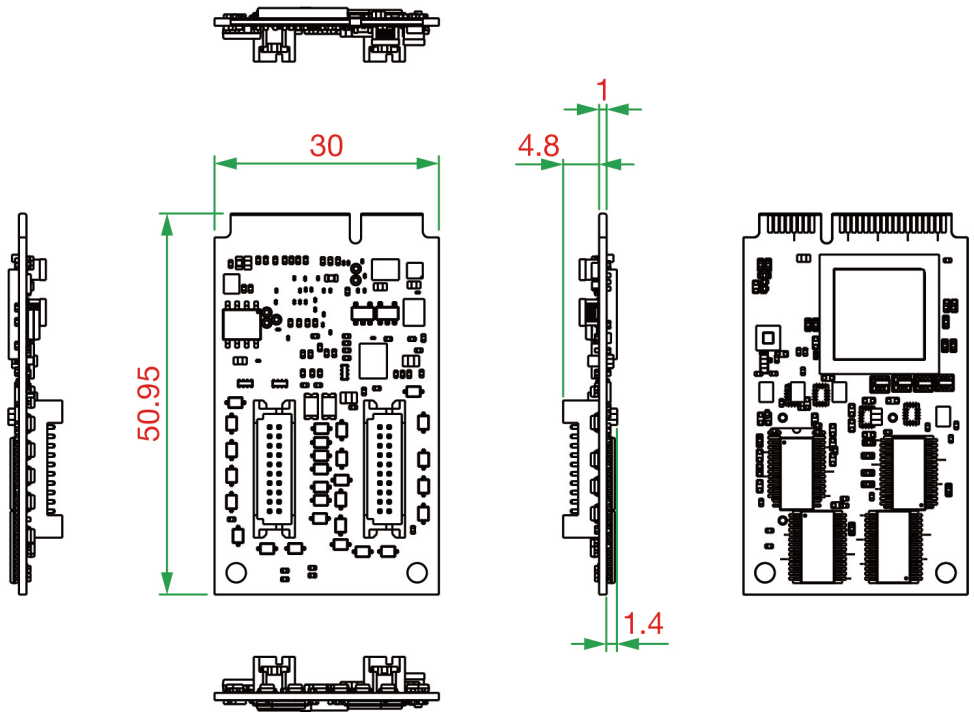
Unit: mm



CP-114N-T Dimensions

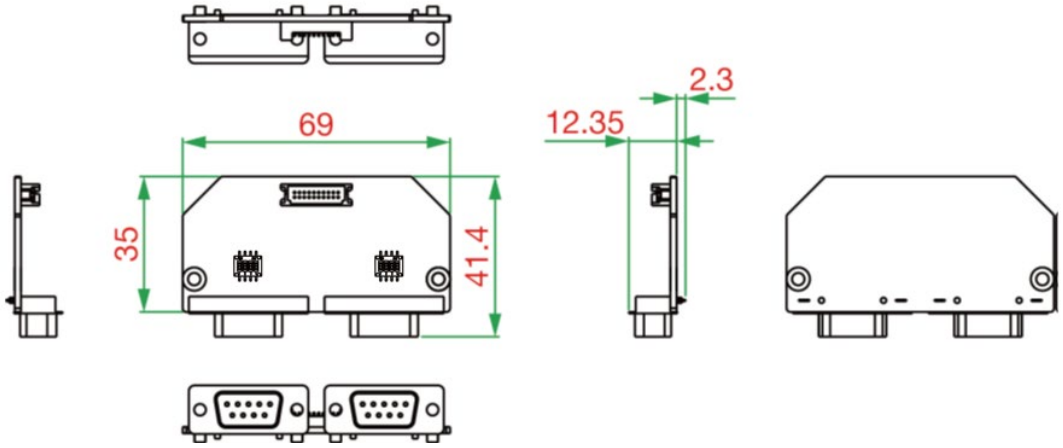
Mainboard Dimensions (Mini PCIe)

Unit: mm



I/O Board Dimensions

Unit: mm



3. Software Installation

In this chapter, we give installation, configuration, and update/removal procedures for the driver for Windows and Linux, proceeding with the software installation. Complete the hardware installation discussed in the previous chapter, "Hardware Installation."

Refer to the next chapter, "Serial Programming Tools," for information about developing your own serial programming applications.

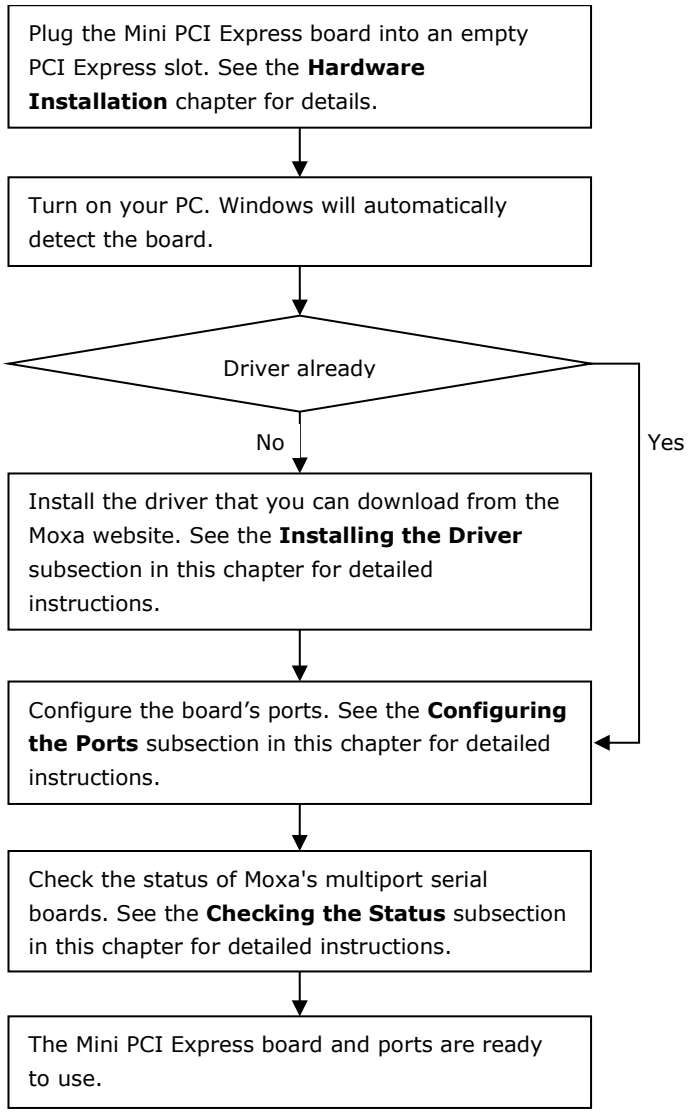
NOTE

You can download the drivers from the Moxa website.

Windows Driver

Moxa provides drivers that allow you to use the Mini PCI Express Series serial boards for various Windows platforms, such as Windows 7/8/8.1/10/11.

The overall procedure for installing the Windows drivers for the PCI Express boards is summarized in the flowchart on the right.



Windows 7/8 /8.1/10/11, Server 2008 R2/2012/2012 R2/ 2016 (x64)/2019/2022

This section includes the following topics:

- Installing the Driver
- Configuring the Ports
- Checking the Status
- Removing the Driver
- Uninstalling the Driver

We will take Window 10 as an example. Its procedure is similar to the other Windows platforms regarding installing, configuring, checking the port status, removing, or uninstalling the Mini PCI Express cards.

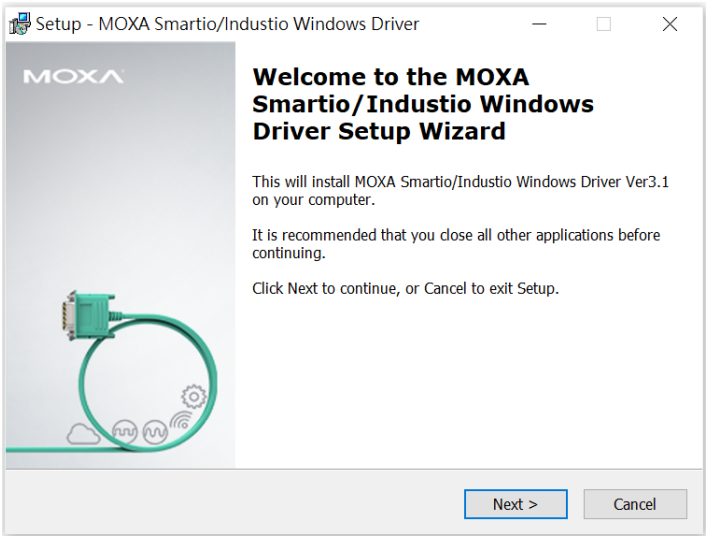
Installing the Driver

In this section, we describe how to install the Mini PCI Express cards for the first time with Windows 10. First, make sure that you have already plugged the board or boards into the system's Mini PCI Express slot(s).

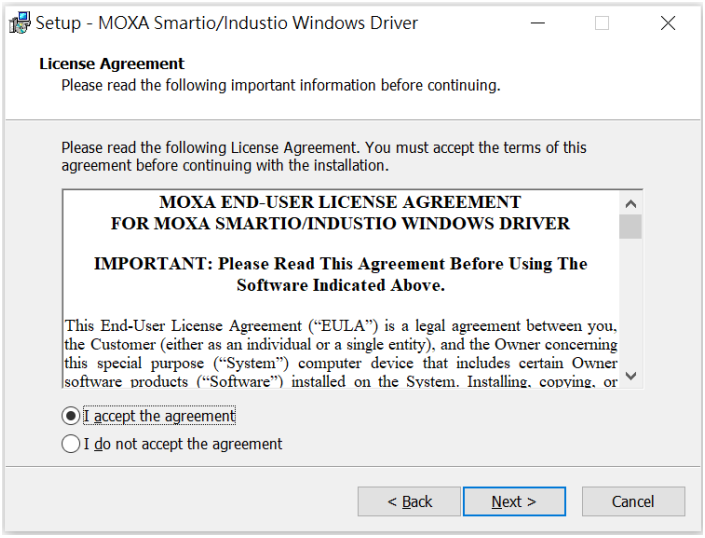
Second, you may download the drivers at www.moxa.com. Based on the OS type, choose the corresponding driver.

Follow the following procedures to install the driver.

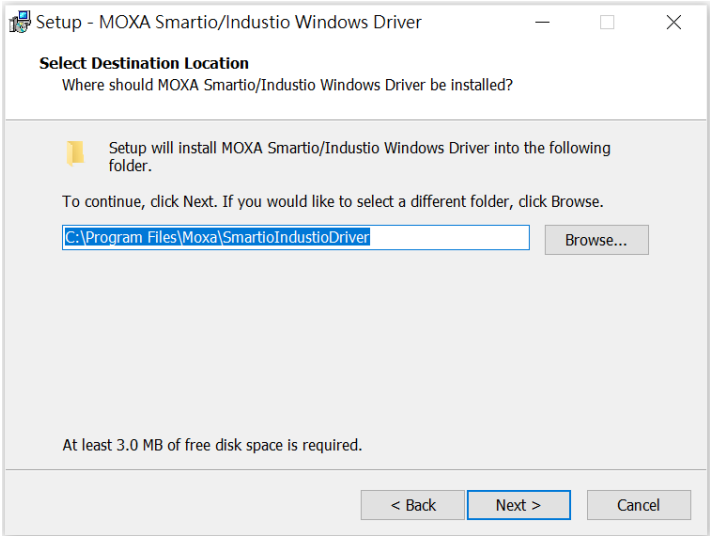
1. Double-click the installation file that you download from the Moxa website.
2. The Setup Wizard will open. Click **Next** to install the driver.



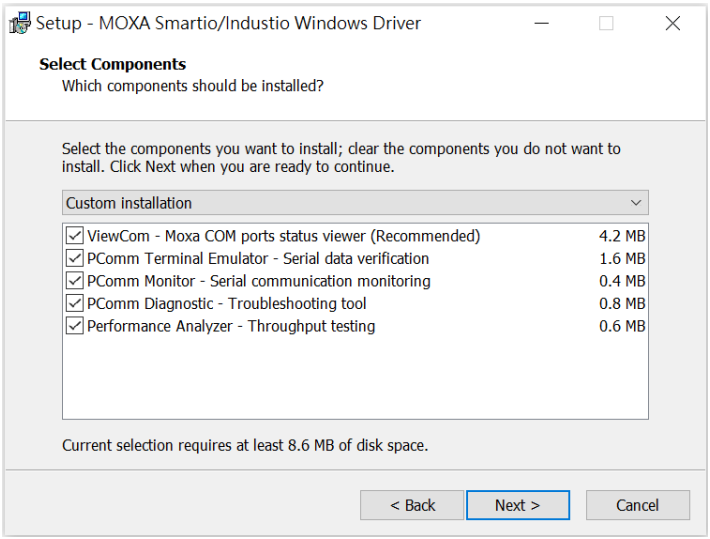
3. Please read the license agreement. If you agree, please click **Next** to move on.



4. Click **Next** to install the driver in the indicated folder or click the **Browse...** button to locate a different folder.



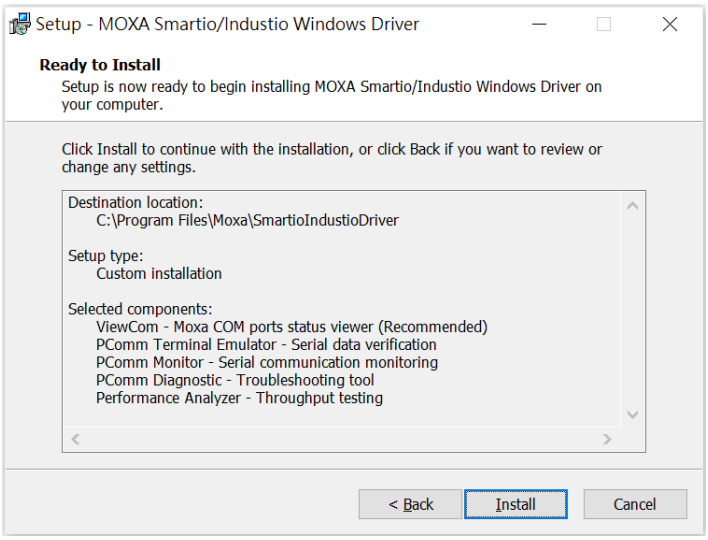
5. Select the component (tools) you want to install. These tools are useful for configuration, monitoring, and troubleshooting. We would recommend you install it (choose the full installation). However, if you would like to install it later, please untick the box in front of the tools. Click **Next** when you are ready to continue.



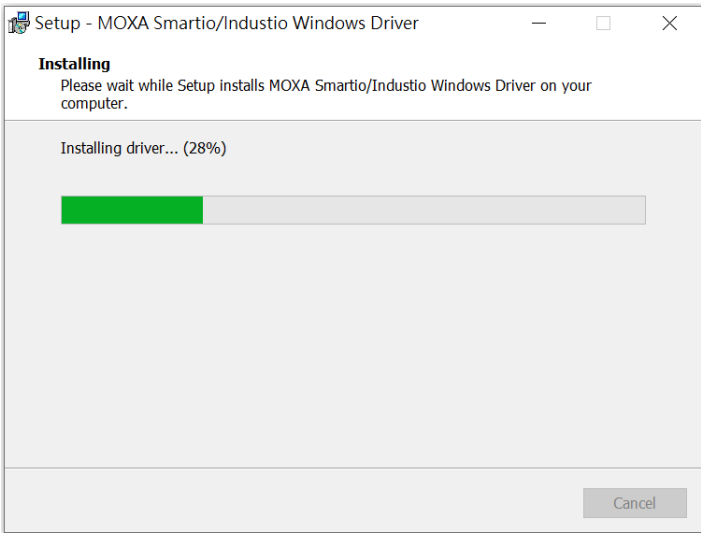
NOTE

The following process is based on all tools that have been selected.

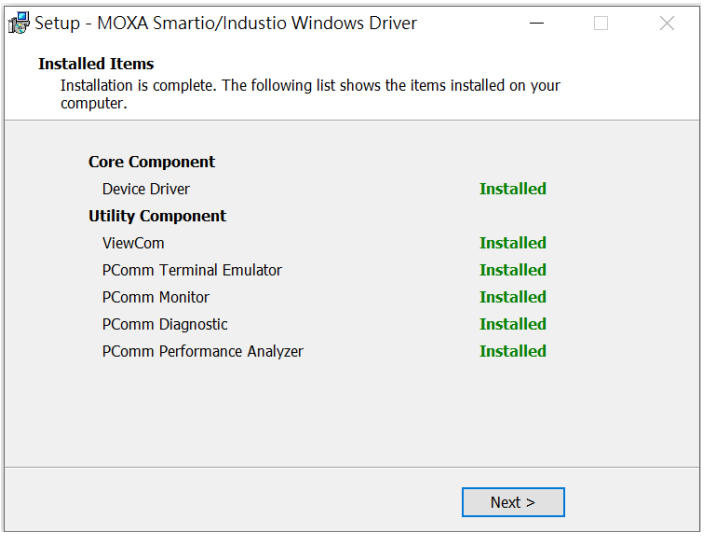
6. This page shows the tools that will be installed on your computer. Click **Install** and continue the installation process.



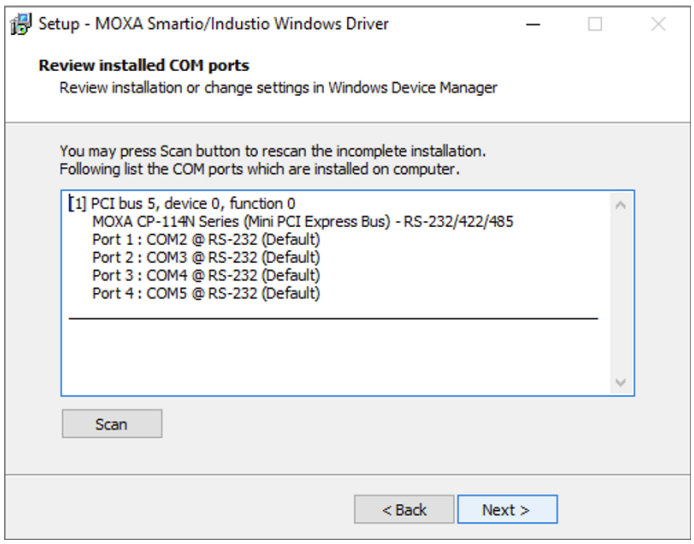
7. Please wait until the installation is completed.



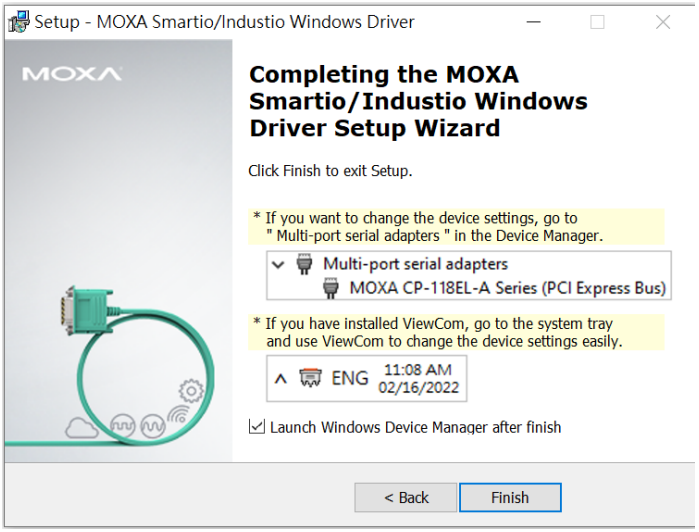
8. This page will show all the applications that you have installed. Click **Next** to continue the installation process.



9. On this page, you can check the serial card default port basic configuration here. You can also click the **Scan** button to refresh this page. Click **Next** to continue the install process.



10. This is the final page for the installation process. It shows two ways to do further device configuration. One directs to the multiport serial adapters on the device manager page; the other use the ViewCom tool that you have installed. Click **Finish** to complete the installation process.

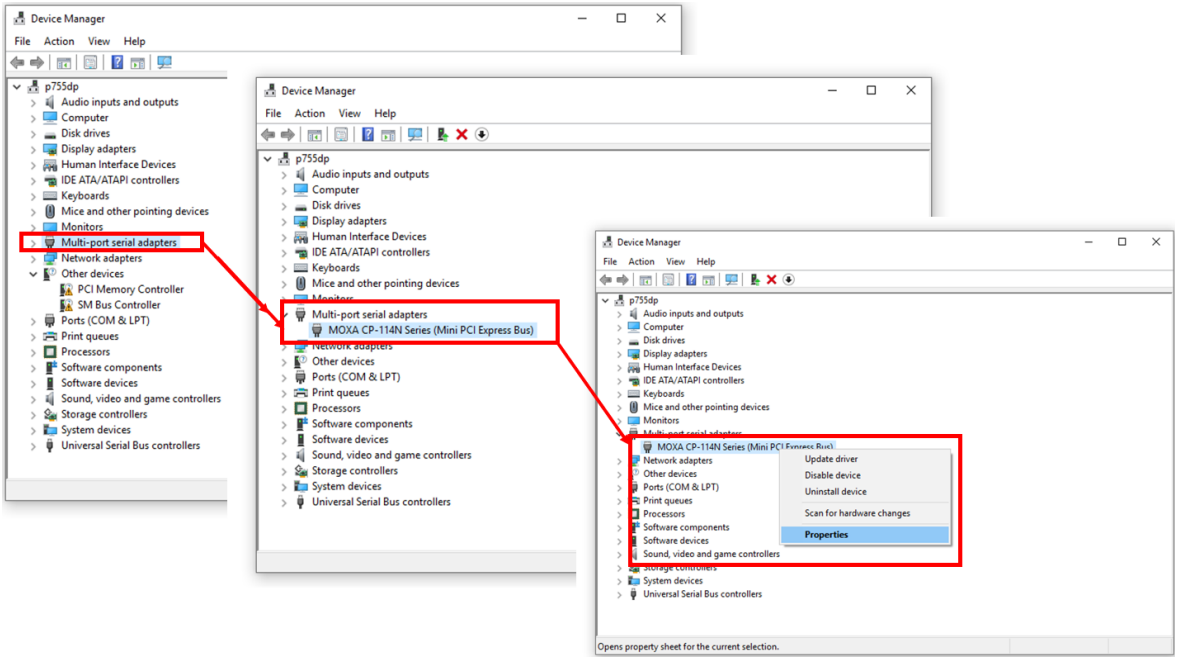


Configuring the Ports

After the driver has been installed, use the Device Manager to configure the serial port of your Mini PCI Express cards (the CP-114N-T will be used as an example). In this section, we describe how to access MOXA Smartio/Industio Window Driver and guide through the configuration of serial ports.

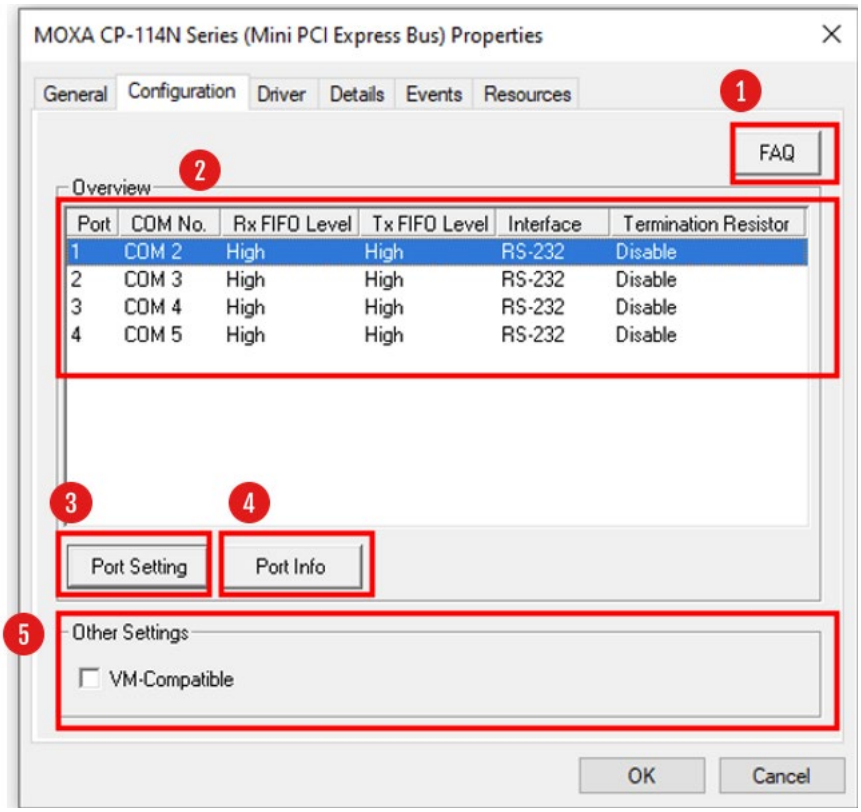
Accessing MOXA Smartio/Industio Window Driver

Expand the **Multi-port serial adapters tab**, right click **Moxa CP-114N Series**, and then click **Properties** to open the board's configuration panel. Please see the following section for more detailed information for the configuration of the Mini PCIe port.



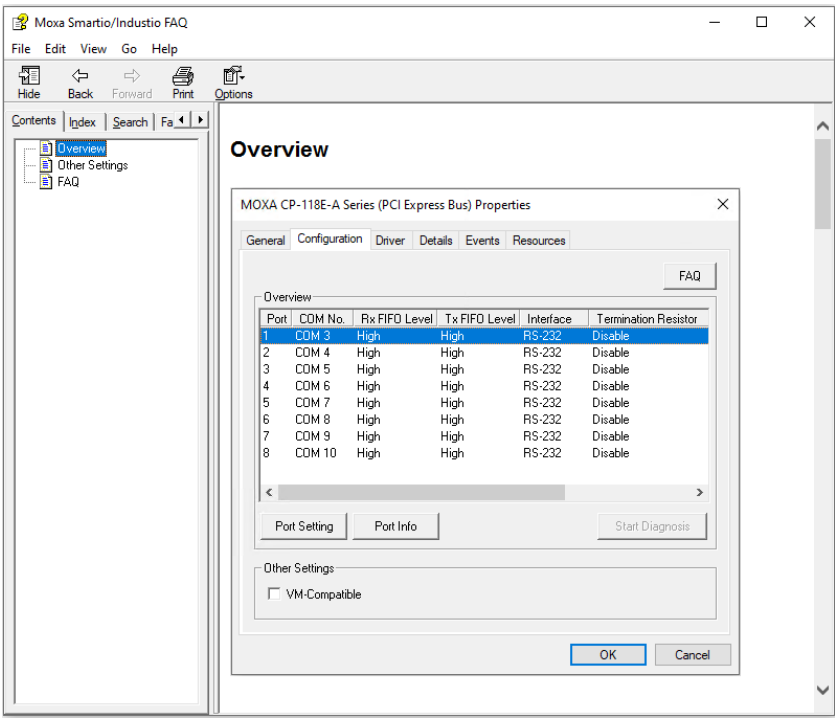
Configuring Serial Port

You can set all parameters in the driver properties page's configuration sheet. Here is an introduction to this page.



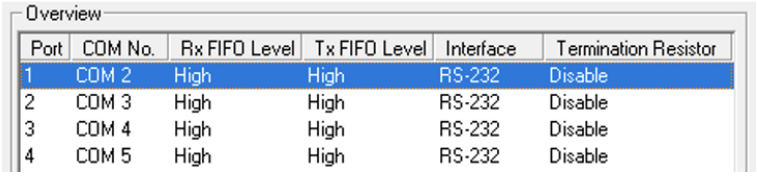
1. FAQ:

Click the FAQ button, which will open the FAQ document. If you encounter problems, please check this document before you reached out technical support.



2. Overview:

In this section, it shows the port parameters such as COM Number, TX and RX FIFO level, and Termination Resistor. The following are the description of this parameters.



- **Port Number and COM No.**

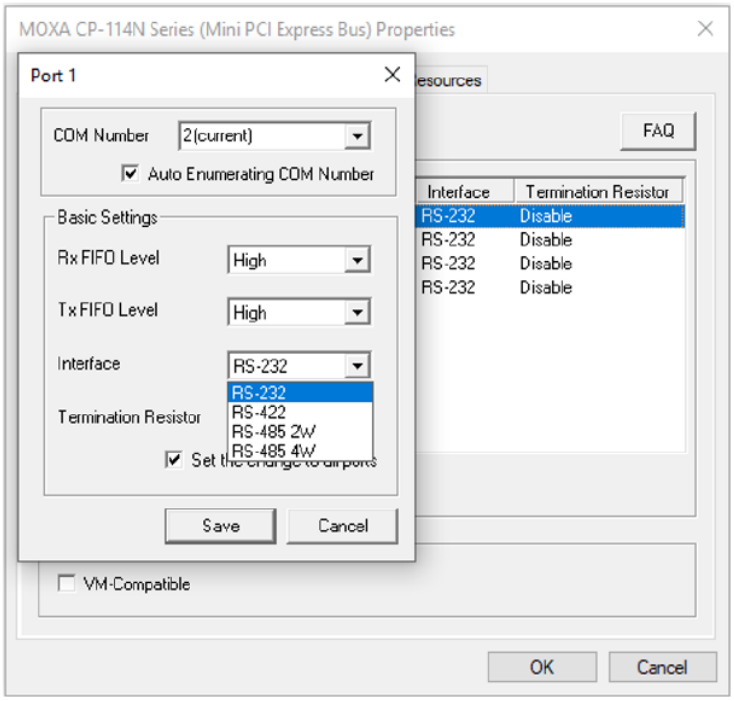
  You will need to set up all the ports of the board with the desired "COM number", which should not conflict with other COM numbers in use.

- **RX and TX FIFO**
  - Rx FIFO Level
    - Low - Disables FIFO, resulting in decreased latency, and low throughput.
    - High - Results in high throughput, but with increased latency. ***(Default)***
  - Tx FIFO Level
    - Low - Disables FIFO (recommended when the attached serial device has a small buffer, or slow transmission speed).
    - High - Results in high throughput. ***(Default)***
- **Interface**
- This column shows the interface of serial ports. You can change the interface by clicking the Port Setting button and making the changes in "Port Setting" dialog box. For the RS-232/422/485 serial boards, the interface default setting is RS-232. For the RS-422/485 serial boards, the interface default setting is RS-485 2W
- **Termination Resistor**

  You may need to enable the termination resistor in the long communication distance.
  - Enable (120 ohm)
  - Disable (Default)

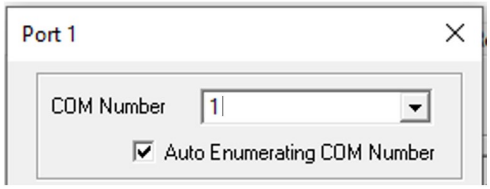
3. Port Setting:

Click this button, which will open the port setting window for you to configure the serial ports.



Port Number/Auto Enumerating COM Number

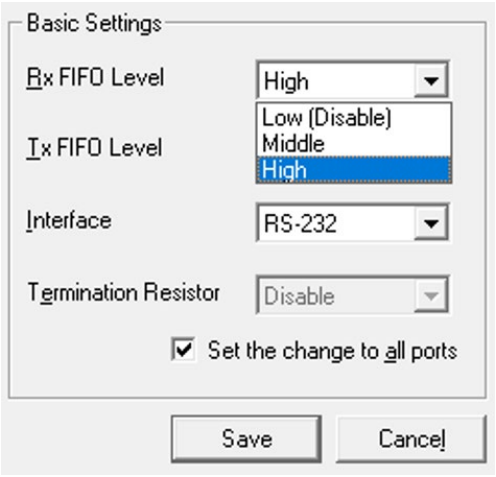
Select a COM number for the port from the Port Number drop-down list. You could also type the port number in the text column to quickly get the target port.



Select the **Auto Enumerating COM Number** option to map subsequent ports automatically. The port numbers will be assigned in sequence. For example, if COM 1 is assigned to Port 1, then COM 2 (if not already occupied) will be assigned to Port 2, etc.

Basic Settings (Rx, TX FIFO, Interface)

RX and TX FIFO

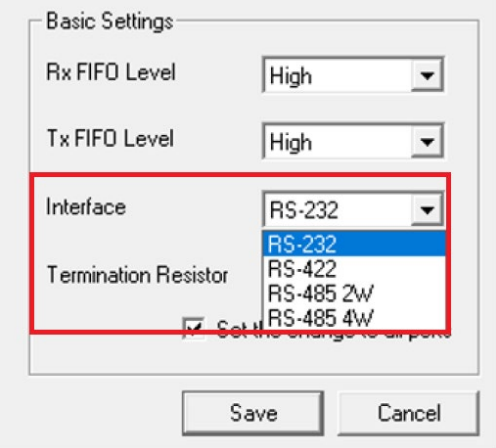


1. Select an Rx FIFO Trigger from the Rx FIFO Level drop-down list. Rx FIFO trigger levels of High, Middle, and Low are available, with the default set at High (120 bytes).
   - Low - Disables FIFO, resulting in decreased latency and low throughput.
   - High - Results in high throughput but with increased latency. ***(Default)***
2. Select a Tx FIFO Level from the Tx FIFO Level drop-down list. Tx FIFO Levels of High, Middle, and Low are available, with the default set at High (128 bytes).
   - Low - Disables FIFO (recommended when the attached serial device has a small buffer, or slow transmission speed).
   - High - Results in high throughput. ***(Default)***

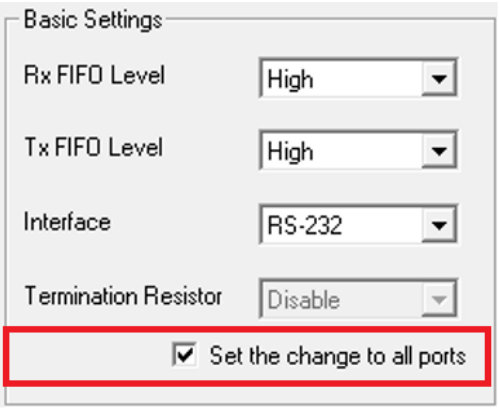
TX/RX FIFO Size

	TX FIFO (Byte)	RX FIFO (Byte)
High (Default)	128	120
Middle	64	60
Low	1	1

Serial Interface



If you are using CP-132N-T, CP-132N-I-T, CP-134N-I-T, or CP-114N-T, **select Interface from the drop-down list** (RS-232, RS-422, RS-485-2W, or RS-485-4W).

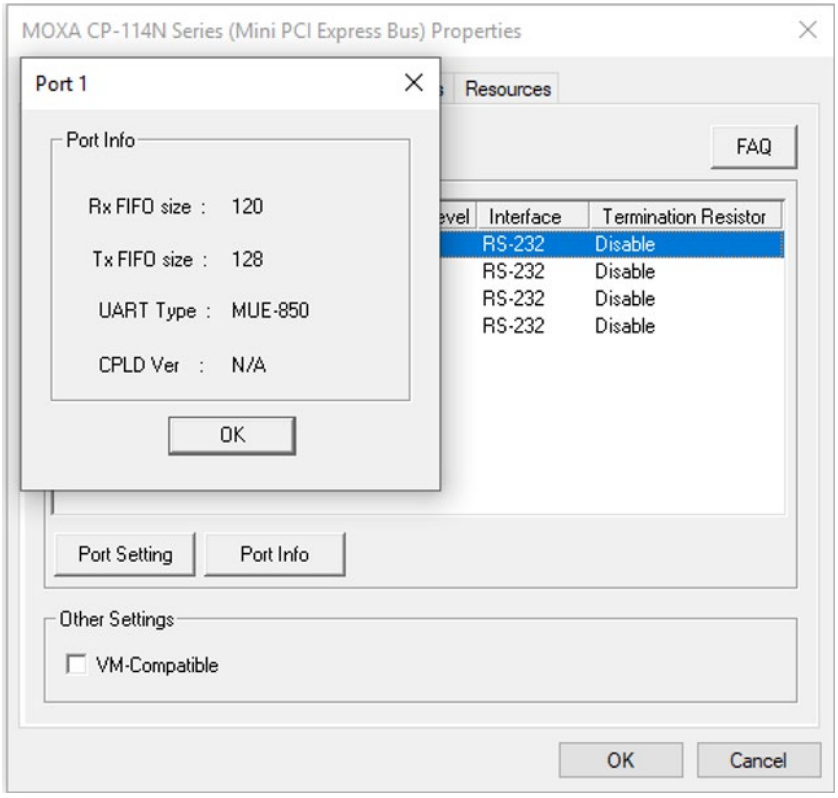


Check the **Set the change to all ports** option to apply the just define configuration (Interface and Bias Settings).

Click **Save** to apply the port settings and click **OK** in the Property window to finish the port settings procedure.

4. VM-compatible:

Click this button to get the information summary of this port. Click **OK** to close this window.

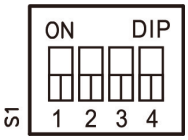


5. Port info:

Tick this setting to ignore PCI capability if this board has an transmission issue on the virtual machine.

Bias Resistor Setting

The termination resistor (120Ω, Enable, or Disable) and pull high/low resistor will be set by the DIP switch on the main board (CP-132N-T, CP-132-I-T). For the models CP-114N-T and CP-134N-I-T, you can find the DIP switch on the I/O boards. The default setting of the resistors is disable termination resistor and use 150 kohm. If you connect serial cables with a long range, we recommend you enable the 120-ohm termination resistor and set the pull high/low at 1 kohm. Otherwise, please keep it in the default setting so that the serial device continues to work as normal.

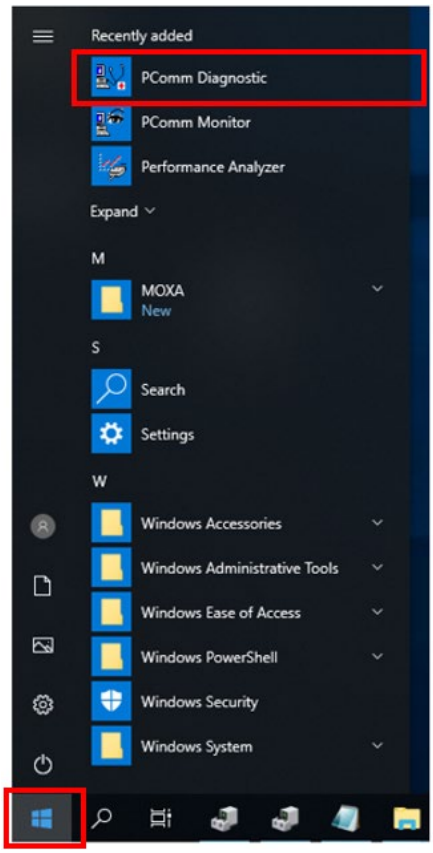


	On	OFF (Default)
SW1	Enable 120-ohm termination resistor	Disable termination resistor
SW2	1K-ohm pull-high/low resistors	150K-ohm Pull-high/low resistors
SW3	Reserved for future feature	
SW4	Reserved for future feature	

Checking the Status

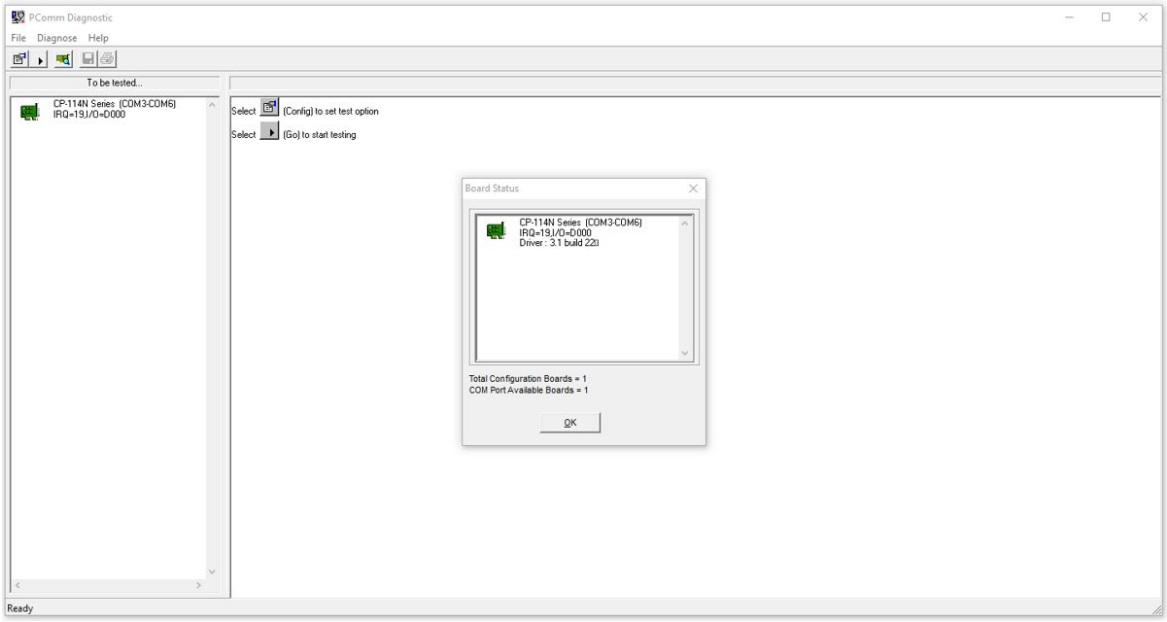
The PComm Diagnostic program is a useful tool for checking the status of Moxa's multiport serial boards. The program can be used to test internal and external IRQ, TxD/RxD, UART, CTS/RTS, DTR/DSR, etc. Use this program to ensure that your Moxa boards and ports are working properly.

Go to start the program, click **The Windows icon** and find **the PComm Diagnostic Program**. If you just install it, the program will be shown on the recently added group. The program Default installation location will be C:\ProgramData\Microsoft\Windows\Start Menu\Programs\Moxa. You could also go to the location and launch the program directly.



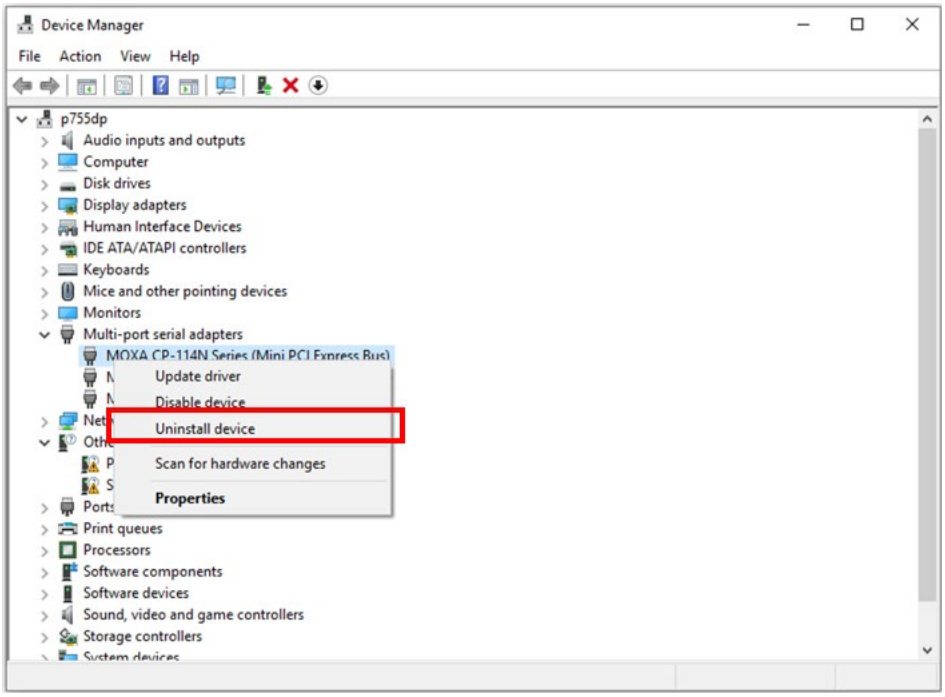
Or, you can click the search icon and search the **PComm Diagnostic** program, and then launch this program.

If the serial board is installed successfully, you will see the installed serial device shown on the Board Status window.

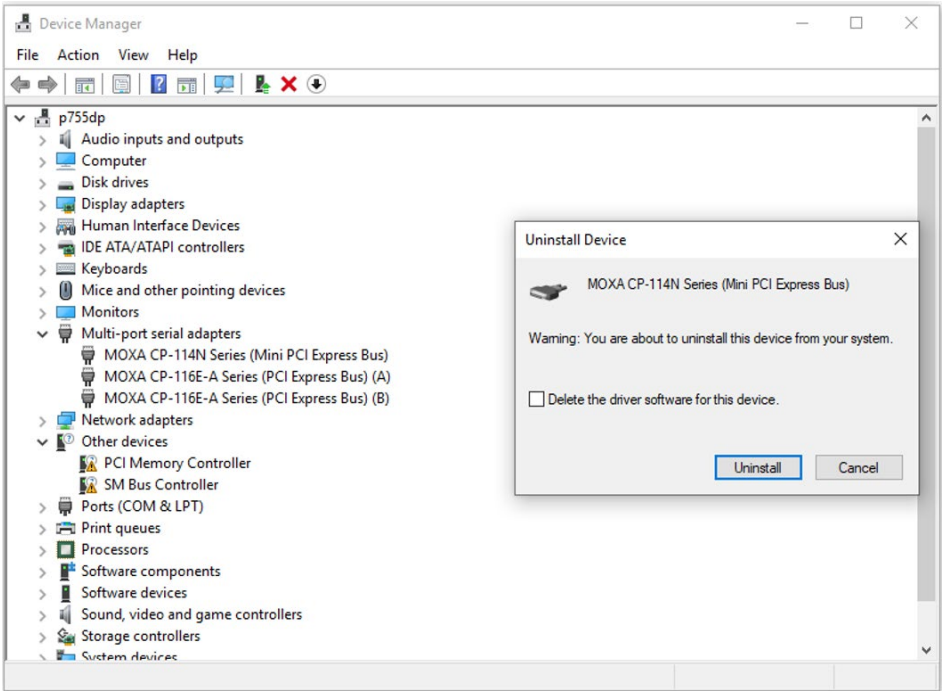


Removing the Driver

1. Open the Device Manager and put the cursor over MOXA CP-114N Series (Mini PCI Express Bus) under Multi-port serial adapters. Right-click and select the **Uninstall** option.

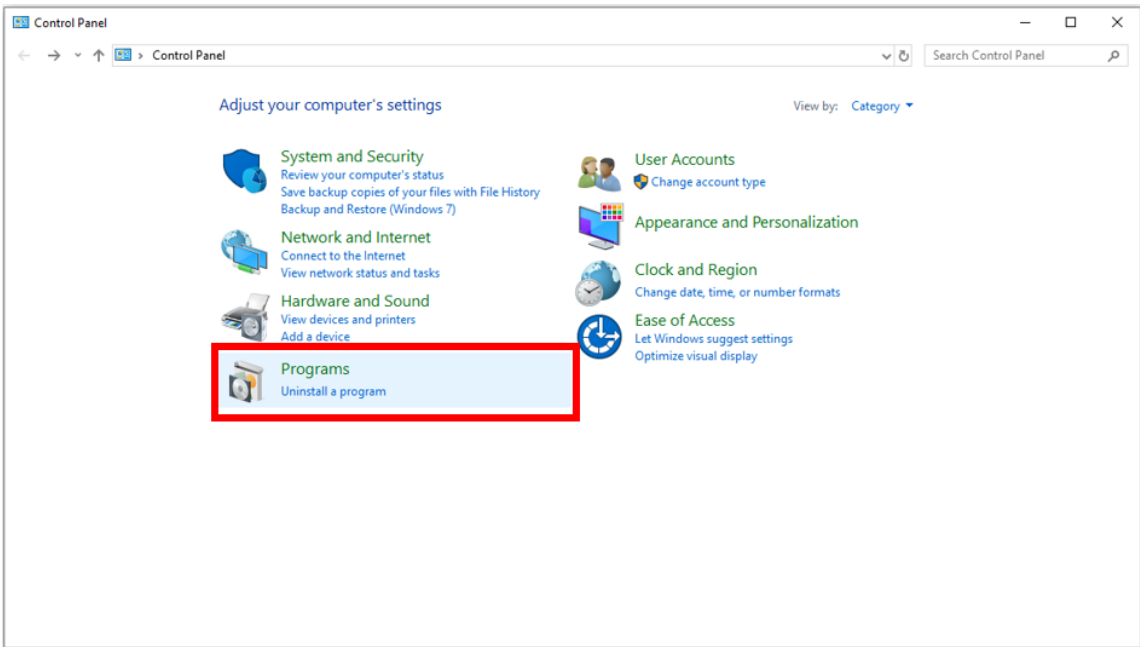


2. Select **Delete the driver software for this device** and click **OK** to proceed with uninstalling the board.

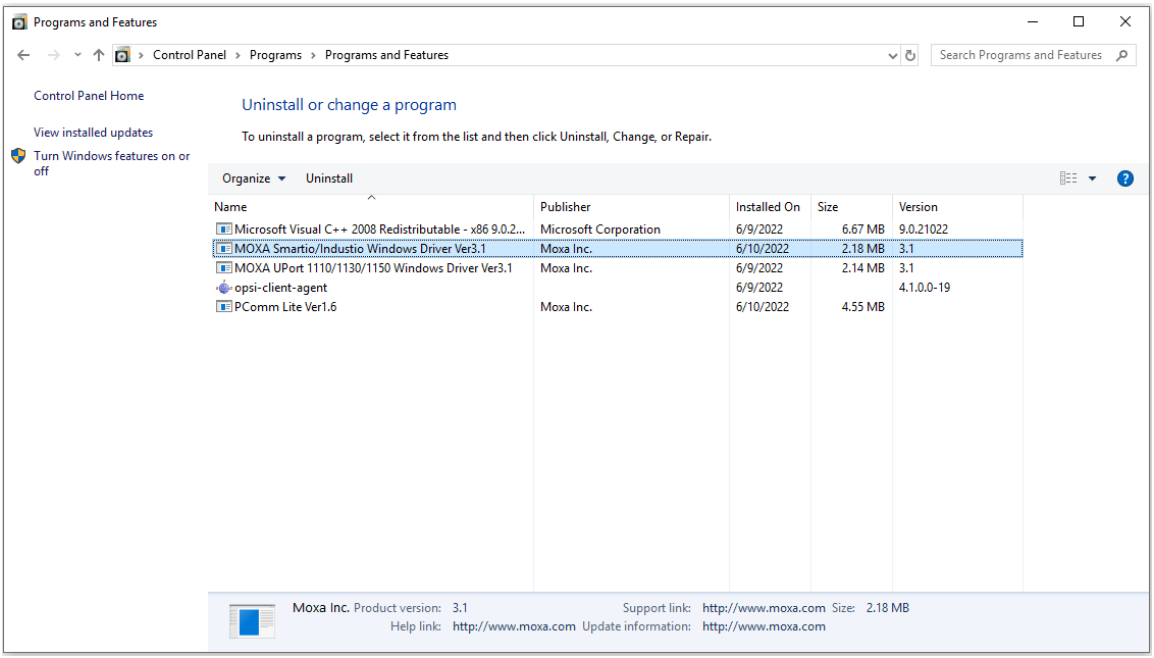


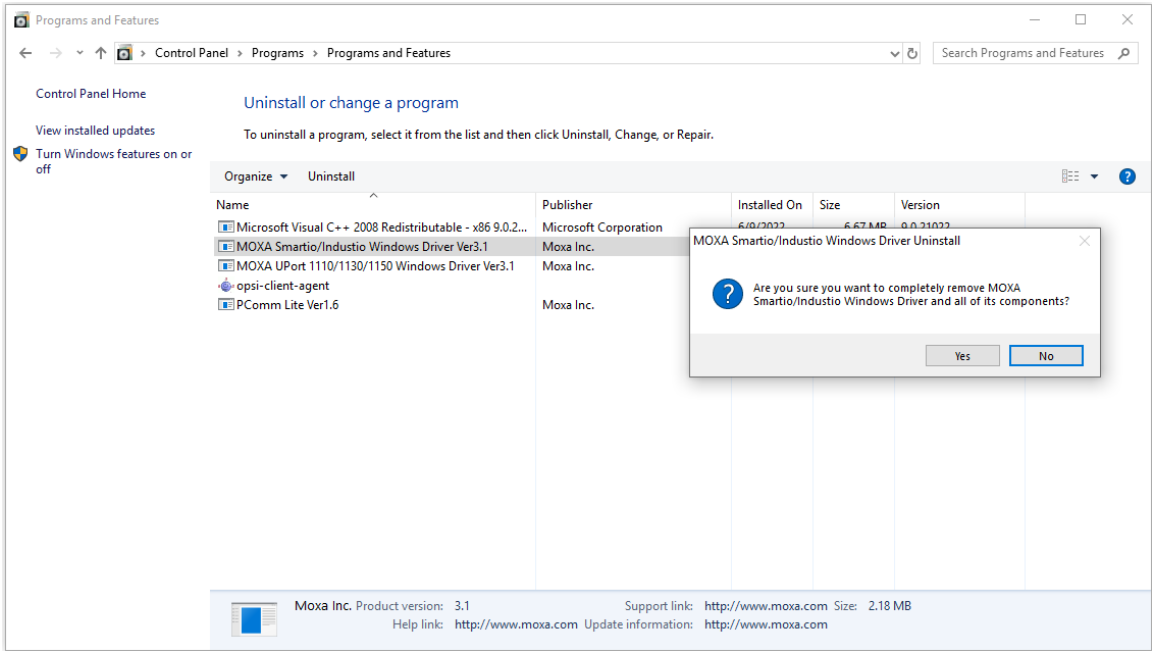
Uninstalling the Driver

The MSB driver may be removed through Add/Remove Programs in the Windows Control Panel. Open the Control Panel and click **Uninstall a program**.

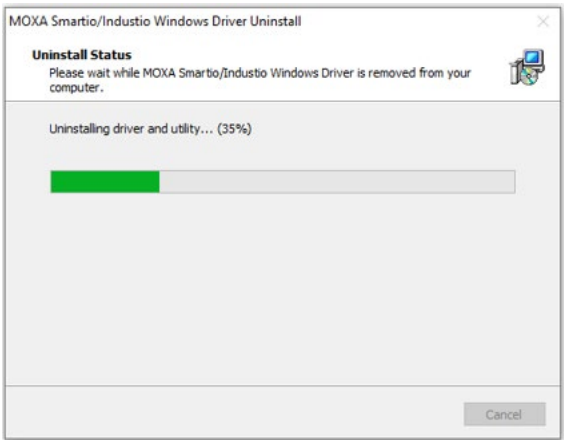


Click **Uninstall** next to MOXA Smartio/Industio Windows Driver Verx.xx





Wait until the driver has been uninstalled.



Linux Driver(32-bit/64-bit)

Moxa provides drivers that allow you to use the following serial boards for Linux.

Mini PCI Express Boards: CP-102N-T, CP-102N-I-T, CP-132N-T, CP-132N-I-T, CP-104N-T, CP-104N-I-T, CP-134N-I-T, CP-114N-T

> **NOTE**
>
> The following procedure shows how to install the CP-114N-T driver for Linux.

Execute the following commands from the Linux prompt:

1. **#cd /**
   #mkdir moxa
   #cd moxa
   #cp /<driver directory>/driv_linux_smart_<version>_build_<build_date>.tgz .
   #tar -zxvf driv_linux_smart_<version>_build_<build_date>.tgz
2. **#cd mxser**
   #make clean; make install
3. **#cd /moxa/mxser/driver**
   #./msmknod
4. **#modprobe mxupcie**
5. Use the Moxa Port Configuration Tool to set CP-100N Series Interface for the MUE series.
   Usage: muestty <operation> device
   Device: The MUE series device node

Operation:	-h	Help
	-g	Get interface and terminator type
	-i intf	Set interface type with options below
intf	RS232	RS-232 mode
	RS422	RS-422 mode
	RS4852W	RS-485 2-wire mode
	RS4854W	RS-485 4-wire mode

For example

To set the CP-100N Series interface

muestty –i RS422 /dev/ttyMUE2

6. Use the Moxa diagnostics utility to verify the driver status:

   #cd /moxa/mxser/utility/diag

   #./msdiag

7. Use the Moxa terminal utility to test the tty ports:

   #cd /moxa/mxser/utility/term

   #./msterm

4. Serial Programming Tools

Moxa provides an easy-to-use yet powerful serial programming library and utilities for communication troubleshooting for Windows platforms. The following sections provide details about the installation, the library, and the utilities for various platforms.

Moxa PComm

PComm, a professional serial communication tool for PCs, is a software package that runs under Windows NT95/98/2000/XP/2003/Vista/2008/7(x86 and x64)/8/8.1/10/11. PComm provides:

- A powerful serial communication library that simplifies serial programming tasks for the most popular programming languages. The serial communication library is useful for developing applications for data communications, remote access, data acquisition, and industrial control for Windows NT95/98/2000/XP/2003/Vista/2008/7(x86 and x64) and is a simpler programming solution compared to the more complex Windows Win32 COMM API.
- Useful utilities such as diagnostics, monitor, and terminal emulator.
- Illustrative sample programs.
- Comprehensive online documentation.

Installing PComm

To install PComm, you could download the installation file on the Moxa website or review Chapter 3, "Software Installation", to install it while you are installing the mini PCIe Serial Card driver. Note that the PComm diagnostics and monitor utilities are for Moxa boards only. To use these utilities, you must have a Moxa board and the appropriate Windows (NT/95/98/2000/XP/2003/Vista/2008/7(x86 and x64)/8/8.1/10/11 device driver installed in your system. See Chapter 3, "Software Installation", for instructions on how to install the drivers.

After installing PComm, click the search icon and search the PComm program and then the **PComm Lite group** to select from the list of utilities and documents.

PComm Programming Library

The serial communication library helps you develop serial communication programs for any COM port that complies with the Microsoft Win32 API. This library facilitates the implementation of multiprocesses, multithread serial communication programs, and greatly reduces the time required to develop applications.

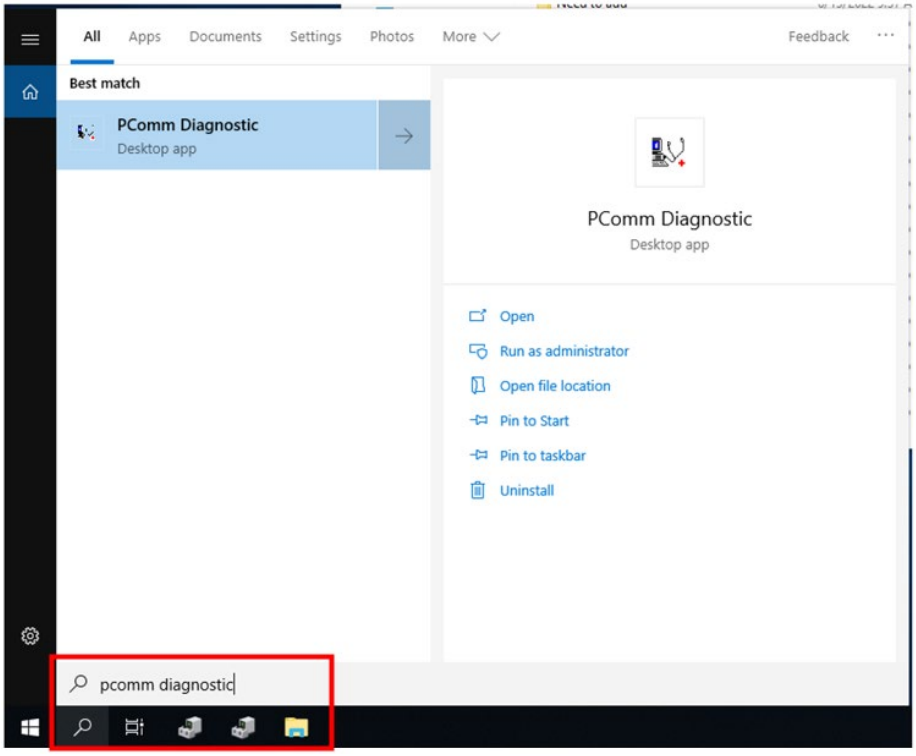
For a complete description of the library functions and sample programs for Visual C++, Visual Basic, and Delphi, check the help file and the sample programs in the PComm directory.

Utilities

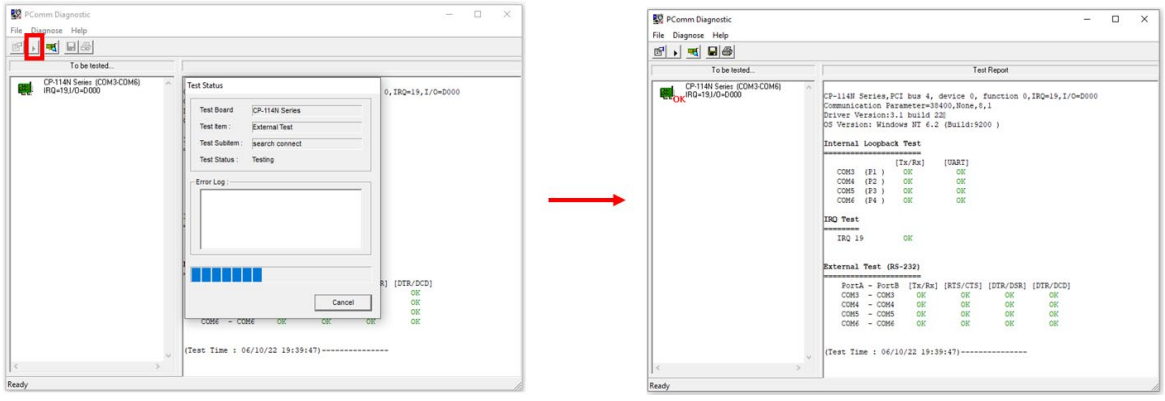
In this section, we provide brief descriptions of each utility. For more information about these utilities, refer to the Documentation online.

Diagnostics (for Moxa boards only)

This convenient diagnostics program, which only works with Moxa boards and ports, provides internal and external testing of IRQ, TxD/RxD, UART, CTS/RTS, DTR/DSR, DTR/DCD, etc. The diagnostics program allows the user to check both the hardware and software functions. To run the diagnostics program, click the search icon and search the **PComm Diagnostic** program and then launch this program.



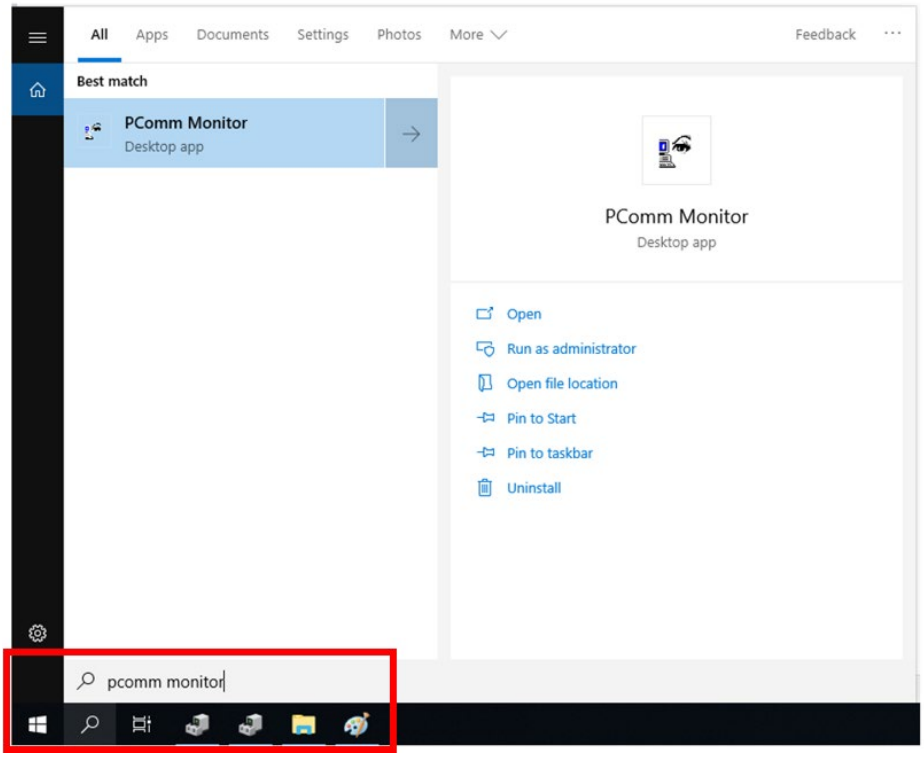
A typical test report for a Moxa board is as follows:



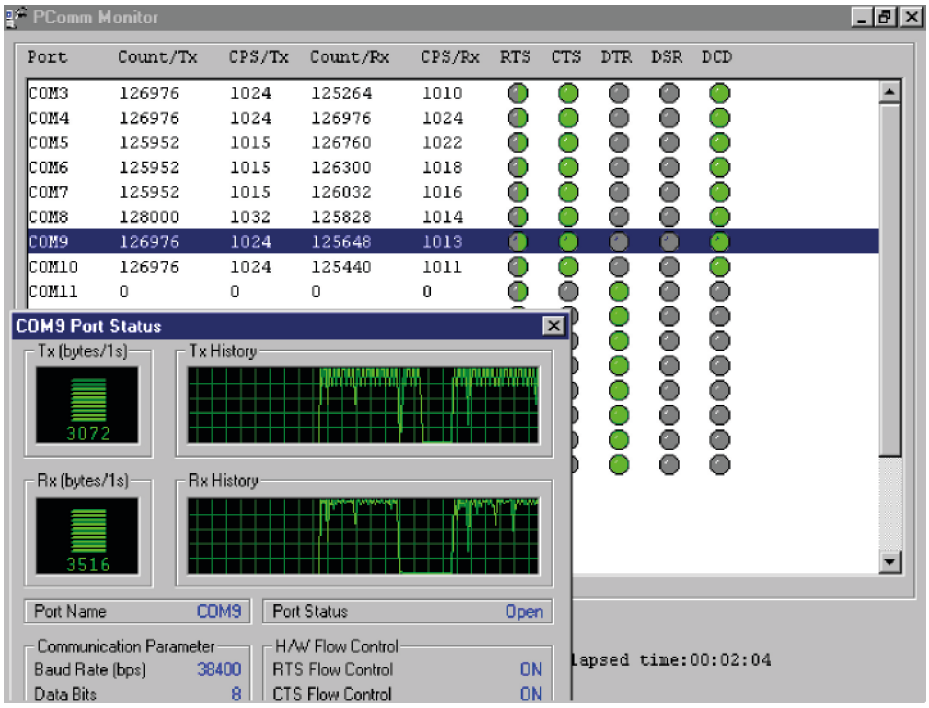
Monitor

This useful port status monitoring program allows you to monitor data transmission of selected Moxa COM ports.

To run the Monitor program, click the search icon and search the **PComm Monitor** program and then launch this program.



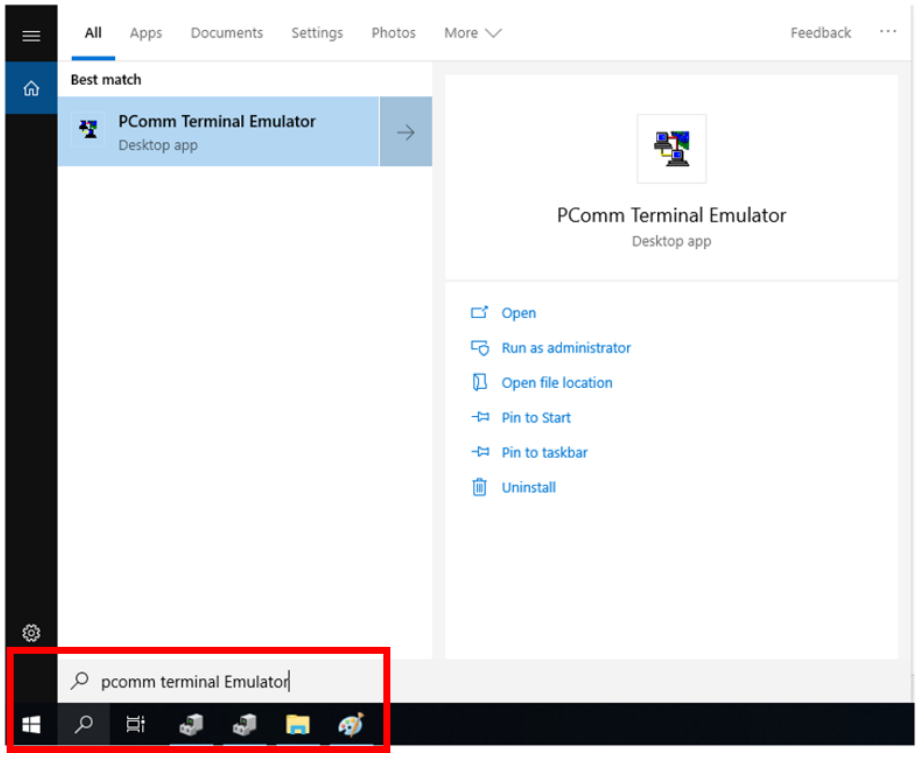
The program monitors data transmission/reception throughput and communication line status, with data updated and displayed on the screen at regular time intervals. Click a specific port to see a graph of the current communication parameters and status of that port.



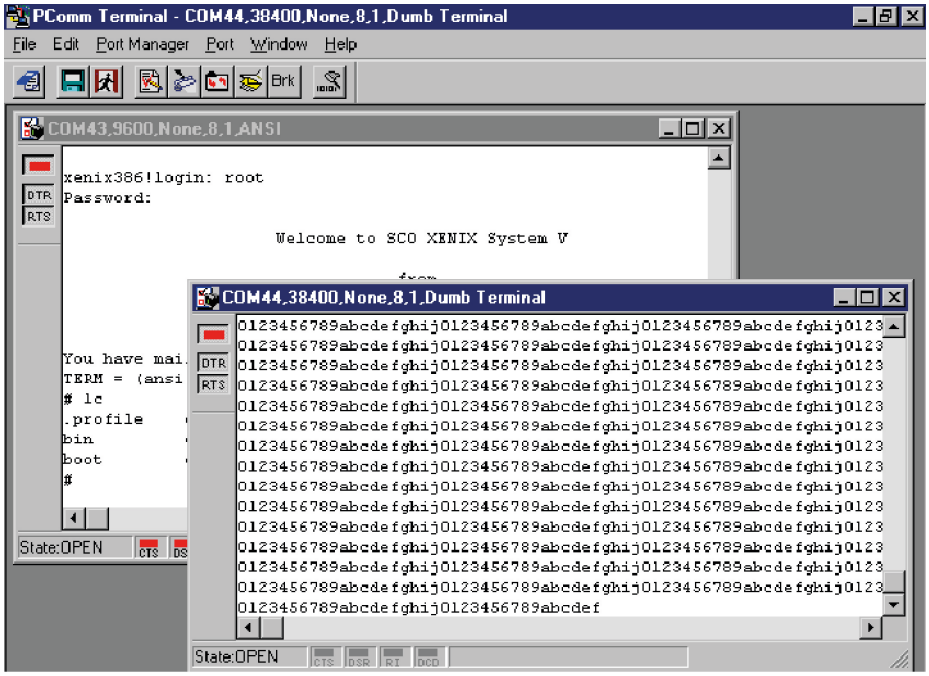
Terminal Emulator

Use Terminal Emulator to connect to your PC's serial ports to check if the data is transmitted correctly.

To run Terminal Emulator, click the search icon and search the **PComm Terminal Emulator** program and then launch this program.



Terminal Emulator features multi-windows and supports VT100 and ANSI terminal types. You can transfer data interactively, send patterns periodically, and transfer files using ASCII, XMODEM, YMODEM, ZMODEM, and KERMIT protocols.

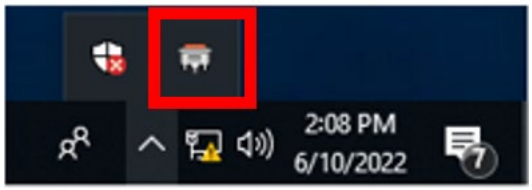


ViewCom

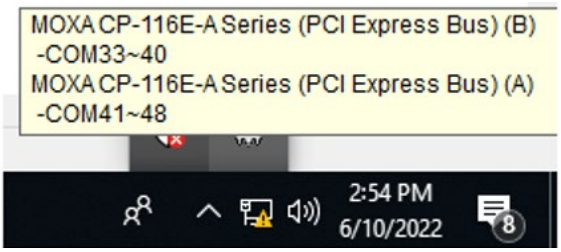
ViewCom is a useful tool to easily see your Moxa serial board status. ViewCom is also a shortcut to the serial boards parameter configuration page. You don't need to go to "device manager" and find the serial boards name, which is a complicated process.

ViewCom has many useful features.

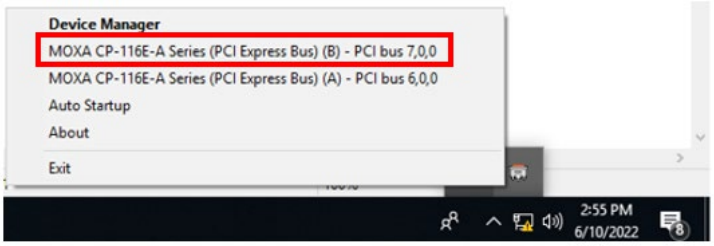
1. Clicking the ViewCom icon will lead you to the device manager page for monitoring and configuring your devices, including Moxa Serial Boards.



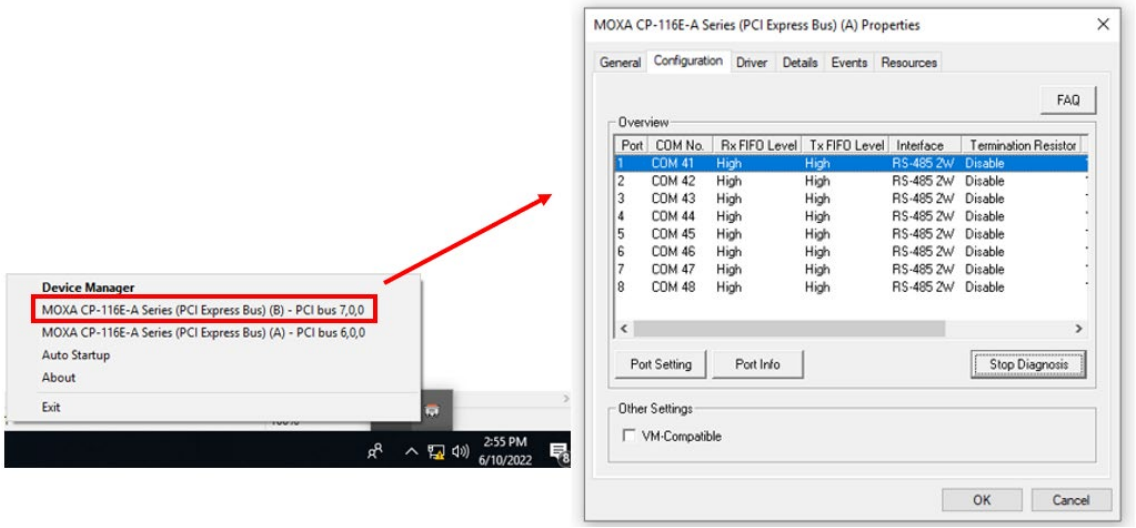
2. Hold your cursor on the ViewCom icon, and it will show the Moxa serial boards you have installed.



3. Right-click on the ViewCom icon.



You can choose a Moxa multi-port serial board and go to the serial boards parameter configuration page directly.



5. Programming Guide

If you want to develop your own driver, no matter whether on a Windows or Linux platform, the Moxa Smartio/Industio Programming Guide is a useful instruction. The following topics are covered in this chapter:

Relative Product List

IRQ * 1

I/O :

UART register: 64 bytes (8 bytes / port * 8port) for MU860
4096 bytes (512 bytes / port * 8port) for MUE250/450/850
IRQ Vector register: 16 bytes (only 1 byte used)

PCI Configuration for Moxa Board

A. MOXA Vendor ID = 0x1393

B. Device ID = (Please see Moxa Board PCI Device ID List section)

C. Hardware resource on Device Configuration Register of **PCI configuration space**

Resource Name	Chip	Address Offset		Size
IRQ	All	0x3C		
IRQ Vector Address	MU860	0x1C	BAR3	16 bytes
UART register (I/O Base Address)	MU860	0x18	BAR2	64 bytes
UART register (Memory Base Address)	MUE250, MUE450, MUE850	0x14	BAR1	4096 bytes
Vector Base Address	MUE250, MUE450, MUE850	0x18	BAR2	16 bytes

Byte Offset	0-7	8-15	16-23	24-31
00h	Vender ID		Device ID	
04h	Command		Status	
08h	…			
0Ch	…			
10h	BAR0			
14h	BAR1			
18h	BAR2			
1Ch	BAR3			
…	…			
3Ch	Interrupt Line	Interrupt Pin	Reserved	

NOTE

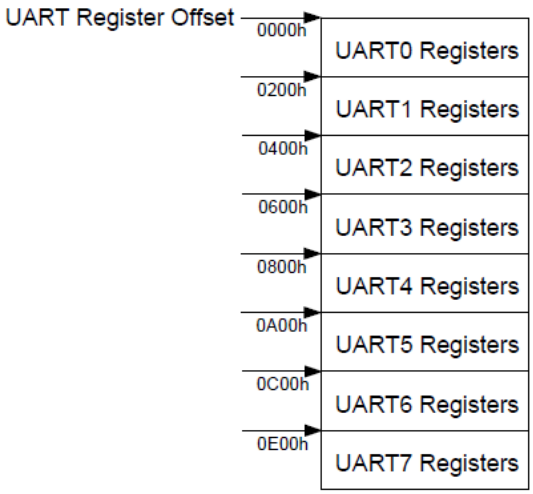
Mini PCIe multi-ports serial board use MUE850.

NOTE

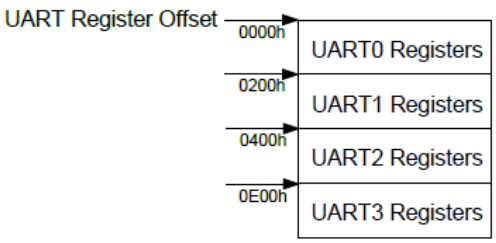
For MUE250, MUE450, and MUE850 Chips Only: Memory mode is recommended for these chips to access UART. To use memory mode, the driver must access the memory base address, which is located at BAR1.

UART Register Structure for MUE250, MUE450, and MUE850 Chips

There are 512 bytes for each UART register and 0x200 offset between each port. However, there is one exception: for the models that are 4-port boards, such as **CP-104EL-A, CP-114EL, CP-114EL-I,** and **CP-134EL-A,** the offset of the fourth UART register is 0xE00.



Registers for 8 ports



Registers for 4 ports

NOTE

For a detailed description of the UART register, please see the UART Datasheet section.

UART register address = I/O base address + (port-1) * 0x200

For example, if the base address is 0x200:

The first port's UART register's I/O address is 0x200 + (1-1) * 0x200 = 0x200
The first register's I/O address is 0x200,
The second register's I/O address is 0x201, …..

The second port's UART register's I/O address is 0x200 + (2-1) * 0x200 = 0x400
The first register's I/O register is 0x400,
The second register's I/O register is 0x401, …..

Control Serial Interface and Termination Resistor for MUE Chips

For Moxa boards that use MUE250, MUE450, and MUE850 chips, BAR2, which allocates 16 bytes, is the vector base address that can be used to control serial interfaces and termination resistors, according to the following table.

Offset	Bit	Port #	Parameters
0x4	[3..0]	1	0x0 : RS-232 0x1 : RS-422 0xF : RS-485 2W 0xB : RS-485 4W
	[7..4]	2	
0x5	[3..0]	3	
	[7..4]	4	
0x6	[3..0]	5	
	[7..4]	6	
0x7	[3..0]	7	
	[7..4]	8	
0x8	[7..0]	[8..1]	GPIO – Input
0x9	[7..0]	[8..1]	GPIO direction configuration 0 : Set GPIO direction to input 1 : Set GPIO direction to output
0xA	[7..0]	[8..1]	GPIO – Output (Termination Resistor) 0 : Low (0 Ohm) 1 : High (120 Ohm)

Especially, the interfaces of 4-port models, such as CP-114EL and CP-114EL-I, use the following offset to set the interface of port 4.

Offset	Bit	Port #	Parameters
0x4	[3..0]	1	0x0 : RS-232 0x1 : RS-422 0xF : RS-485 2W 0xB : RS-485 4W
	[7..4]	2	
0x5	[3..0]	3	
	[7..4]	–	
0x6	[3..0]	–	
	[7..4]	–	
0x7	[3..0]	4	

For Baudrate Settings

For General PC Com Port: CLK=1.8432MHz
Div = CLK/(Baud x 16)

But for Moxa Board: CLK=**14.7456**MHz
Div = **CLK**/(Baud x 16)

Moxa Board PCI Device ID List

Model	Ports	Bus	Chip	Max Baud	Vendor ID	Device ID
CP-102N-T	2	PCIe	MUE850	921.6k	0x1393	0x1027
CP-102N-I-T	2	PCIe	MUE850	921.6k	0x1393	0x1027
CP-132N-T	2	PCIe	MUE850	921.6k	0x1393	0x1323
CP-132N-I-T	2	PCIe	MUE850	921.6k	0x1393	0x1323
CP-112N-T	2	PCIe	MUE850	921.6k	0x1393	0x1121
CP-104N-T	4	PCIe	MUE850	921.6k	0x1393	0x1046
CP-104N-I-T	4	PCIe	MUE850	921.6k	0x1393	0x1046
CP-134N-I-T	4	PCIe	MUE850	921.6k	0x1393	0x1343
CP-114N-T	4	PCIe	MUE850	921.6k	0x1393	0x1145
CP-102U	2	UPCI	MU860	921.6k	0x1393	0x1022
CP-102UL	2	UPCI	MU860	921.6k	0x1393	0x1021
CP-132UL	2	UPCI	MU860	921.6k	0x1393	0x1321
CP-132UL-I	2	UPCI	MU860	921.6k	0x1393	0x1321
CP-102E	2	PCIe	MUE250	921.6k	0x1393	0x1024
CP-102EL	2	PCIe	MUE250	921.6k	0x1393	0x1025
CP-132EL	2	PCIe	MUE250	921.6k	0x1393	0x1322
CP-132EL-I	2	PCIe	MUE250	921.6k	0x1393	0x1322
CP-104UL	4	UPCI	MU860	921.6k	0x1393	0x1041
CP-104JU	4	UPCI	MU860	921.6k	0x1393	0x1042
CP-114UL	4	UPCI	MU860	921.6k	0x1393	0x1143
CP-114UL-I	4	UPCI	MU860	921.6k	0x1393	0x1143
CP-134U	4	UPCI	MU860	921.6k	0x1393	0x1340
CP-134U-I	4	UPCI	MU860	921.6k	0x1393	0x1340
CP-104EL-A	4	PCIe	MUE450	921.6k	0x1393	0x1045
CP-114EL	4	PCIe	MUE450	921.6k	0x1393	0x1144
CP-114EL-I	4	PCIe	MUE450	921.6k	0x1393	0x1144
CP-134EL-A	4	PCIe	MUE450	921.6k	0x1393	0x1342
CB-114	4	PC/104-Plus	MU860	921.6k	0x1393	0x1142
CB-134I	4	PC/104-Plus	MU860	921.6k	0x1393	0x1341
CP-118U	8	UPCI	MU860	921.6k	0x1393	0x1180
CP-118U-I	8	UPCI	MU860	921.6k	0x1393	0x1180
CP-138U	8	UPCI	MU860	921.6k	0x1393	0x1380
CP-138U-I	8	UPCI	MU860	921.6k	0x1393	0x1380
CP-168U	8	UPCI	MU860	921.6k	0x1393	0x1681
CP-116E-A(A)	8	PCIe	MUE850	921.6k	0x1393	0x1160
CP-116E-A(B)	8	PCIe	MUE850	921.6k	0x1393	0x1161
CP-118EL-A	8	PCIe	MUE850	921.6k	0x1393	0x1182
CP-118E-A-I	8	PCIe	MUE850	921.6k	0x1393	0x1183
CP-138E-A-I	8	PCIe	MUE850	921.6k	0x1393	0x1381
CP-168EL-A	8	PCIe	MUE850	921.6k	0x1393	0x1683
CB-108	8	PC/104-Plus	MU860	921.6k	0x1393	0x1080

UART Datasheet

Moxa's chips are compatible with the following chips. For more details about UART register description, please refer to the links below.

UART	Port	Datasheet
MU-860	2-8	TL16C550C
MUE-250	2	PI7C9X7952
MUE-450	4	PI7C9X7954
MUE-850	8	PI7C9X7958

Mini PCIe Board Accessories Table

Internal Connection Accessories

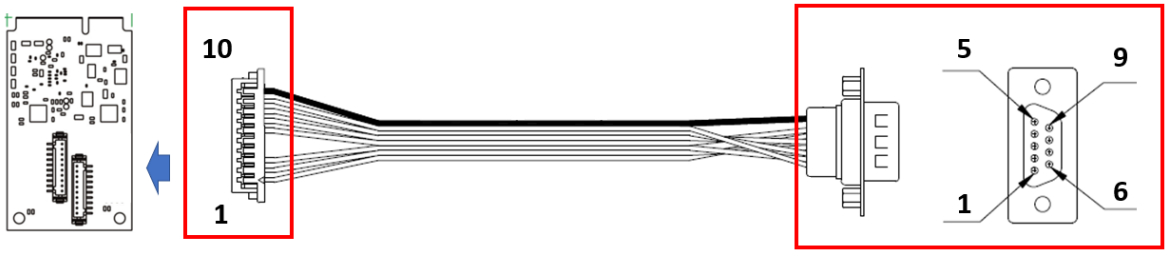
Model	Description	Suitable models
CBL-M9HSF1x10H-15-01	10-pin female wafer to 1 DB9 male serial cable, 15 cm	CP-102N-I-T CP-132N-I-T
CBL-M9HSF1x10H-15-02	10-pin female wafer to 1 DB9 male serial cable, 15 cm	CP-102N-T CP-132N-T CP-112N-T
CBL-M9x2HSF2x10H-15	20-pin female wafer to 2 DB9 male serial cables, 15 cm	CP-104N-T
CBL-HSF2x10-15	20-pin female wafer to 20-pin female serial cable, 15 cm	CP-104N-I-T CP-134N-I-T CP-114N-T

CP-102N-T

The CP-102N-T 2-port RS-232 Mini PCI Express serial board has two male wafer connectors on the board, with a 10-pin female wafer connector connected to the DB9 male connector via cables.

Female Wafer to DB9 Connector Pin Assignments

Female Wafer Connector **DB9 Male Connector**



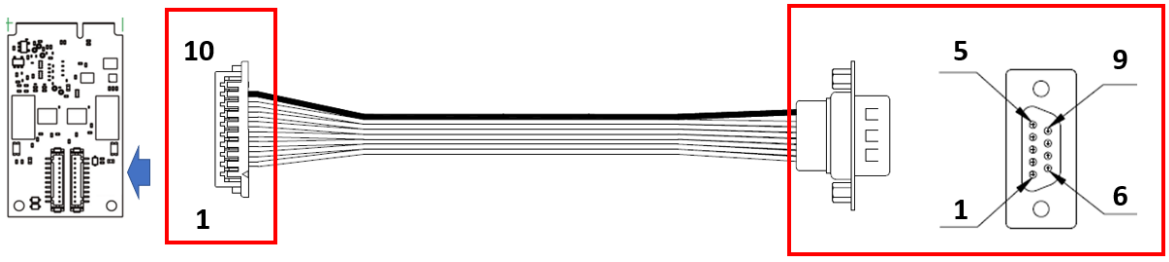
Female wafer Pin	DB9 Male Pin	RS-232
9	1	DCD
8	2	RxD
7	3	TxD
6	4	DTR
10	5	GND
3	6	DSR
2	7	RTS
1	8	CTS
–	9	–

CP-102N-I-T

The CP-102N-T 2-port RS-232 Mini PCI Express serial board has two male wafer connectors on the board, with 10-pin female wafer connector connected to the DB9 male connector via cables.

Female Wafer to DB9 Connector Pin Assignments

Female Wafer Connector **DB9 Male Connector**



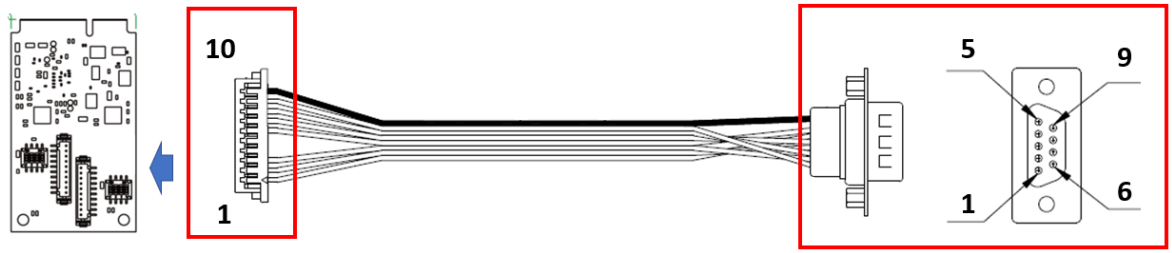
Female wafer Pin	DB9 Male Pin	RS-232
2	1	DCD
4	2	RxD
6	3	TxD
8	4	DTR
9	5	GND
3	6	DSR
5	7	RTS
7	8	CTS
–	9	–

CP-132N-T

The CP-132N-T 2-port RS-422/485 Mini PCI Express serial board supports RS-422, 4-wire RS-485, and 2-wire RS-485. It has two male wafer connectors on the board, with a 10-pin female wafer connector connected to the DB9 male connector via cables.

Female Wafer to DB9 Connector Pin Assignments

Female Wafer Connector **DB9 Male Connector**

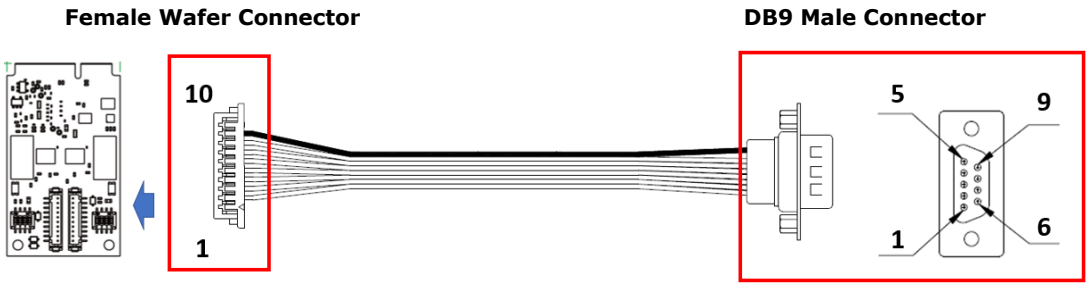


Female wafer Pin	DB9 Male Pin	RS-422/RS-485-4W	RS-485-2W
9	1	TxD-(A)	-
8	2	TxD+(B)	-
7	3	RxD+(B)	Data+(B)
6	4	RxD-(A)	Data-(A)
10	5	GND	GND
3	6	–	–
2	7	–	–
1	8	–	–
–	9	–	–

CP-132N-I-T

The CP-132N-I-T 2-port RS-422/485 Mini PCI Express serial board supports RS-422, 4-wire RS-485, and 2-wire RS-485. It has two male wafer connectors on the board, with a 10-pin female wafer connector connected to the DB9 male connector via cables.

Female Wafer to DB9 Connector Pin Assignments

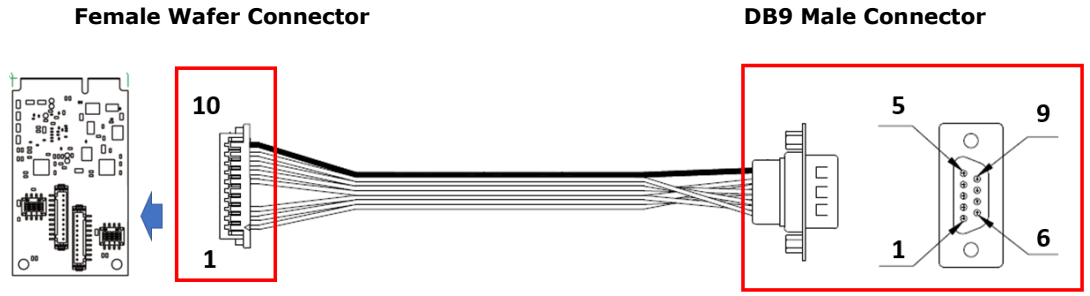


Female wafer Pin	DB9 Male Pin	RS-422/RS-485-4W	RS-485-2W
2	1	TxD-(A)	–
4	2	TxD+(B)	–
6	3	RxD+(B)	Data+(B)
8	4	RxD-(A)	Data-(A)
9	5	GND	GND
3	6	–	–
5	7	–	–
7	8	–	–
–	9	–	–

CP-112N-T

The CP-112N-T 2-port RS-232/422/485 Mini PCI Express serial board supports RS232, RS-422, 4-wire RS-485, and 2-wire RS-485. It has two male wafer connectors on the board, with a 10-pin female wafer connector connected to the DB9 male connector via cables.

Female Wafer to DB9 Connector Pin Assignments

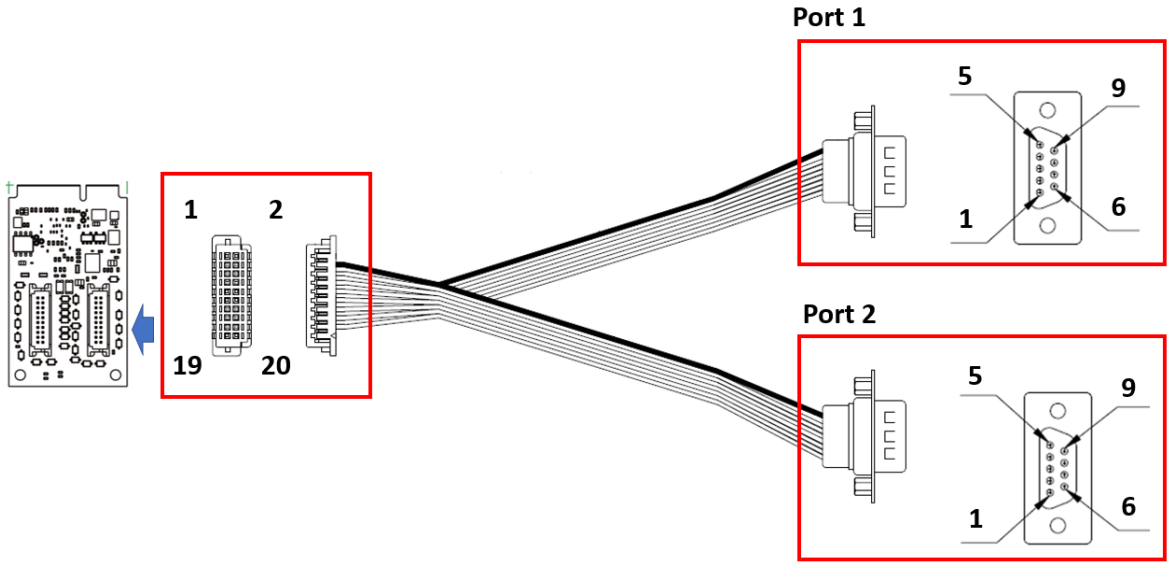


Female wafer Pin	DB9 Male Pin	RS-232	RS-422/RS-485-4W	RS-485-2W
9	1	DCD	TxD-(A)	-
8	2	RxD	TxD+(B)	-
7	3	TxD	RxD+(B)	Data+(B)
6	4	DTR	RxD-(A)	Data-(A)
10	5	GND	GND	GND
3	6	DSR	–	–
2	7	RTS	–	–
1	8	CTS	–	–
–	9	–	–	–

CP-104N-T

The CP-104N-T 4-port RS-232 Mini PCI Express serial board supports RS-232 interface. It has two male wafer connectors on the board, with a 20-pin female wafer connector connected to the DB9 male connector via cables.

Female Wafer to DB9 Connector Pin Assignments

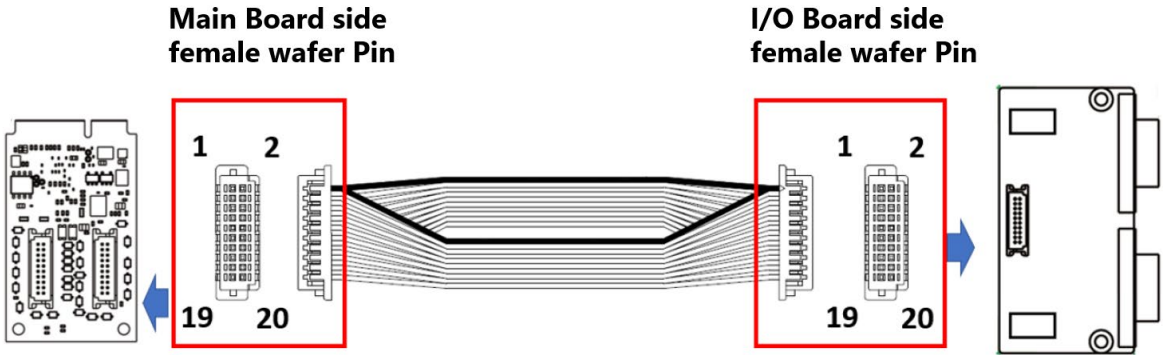


Female Wafer Pin	Port 1 DB9 Male Pin	RS-232	Female Wafer Pin	Port 2 DB9 Male Pin	RS-232
17	1	DCD1	18	1	DCD2
13	2	RxD1	14	2	RxD2
9	3	TxD1	10	3	TxD2
5	4	DTR1	6	4	DTR2
3	5	GND1	4	5	GND2
16	6	DSR1	16	6	DSR2
11	7	RTS1	12	7	RTS2
7	8	CTS1	8	8	CTS2
–	9	–	–	9	–

CP-104N-I-T

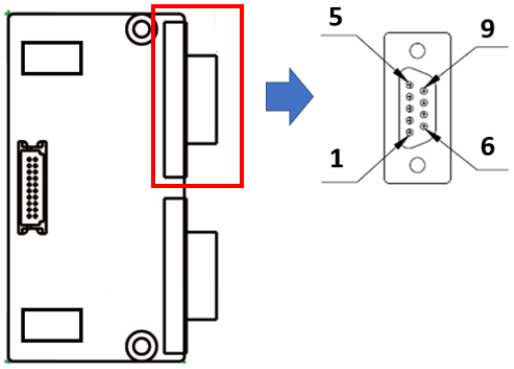
The CP-104N-I-T 4-port RS-232 Mini PCI Express serial board supports RS-232 interface. It has two male wafer connectors on the board, with a 20-pin female wafer connector connected to the I/O board via cables.

Board Side Pin Assignment



Main Board Side Female Wafer Pin	I/O Board Side Female Wafer Pin	Main Board Side Female Wafer Pin	I/O Board Side Female Wafer Pin
1	2	11	12
2	1	12	11
3	4	13	14
4	3	14	13
5	6	15	16
6	5	16	15
7	8	17	18
8	7	18	17
9	10	19	20
10	9	20	10

Device Side Pin Assignment

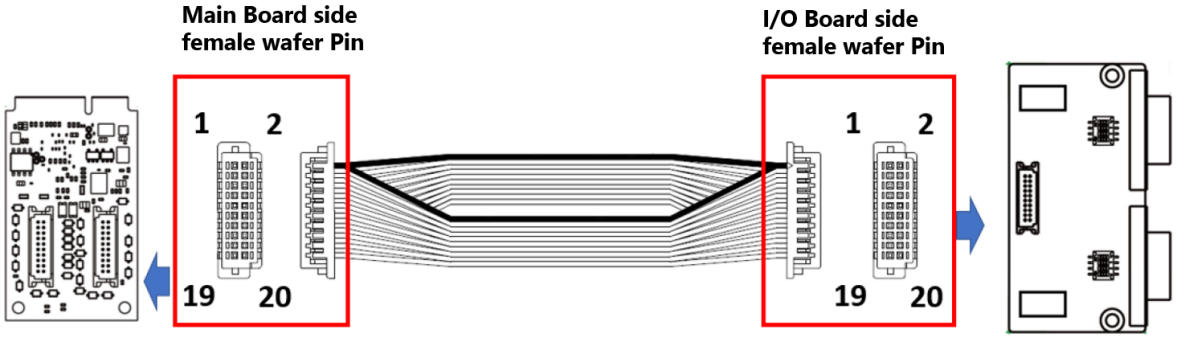


DB9 Male Pin	RS-232
1	DCD
2	RxD
3	TxD
4	DTR
5	GND
6	DSR
7	RTS
8	CTS
9	–

CP-134N-I-T

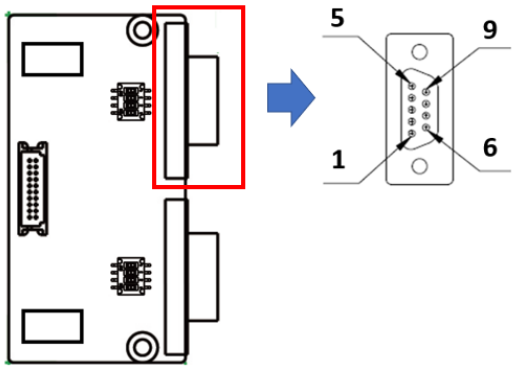
The CP-134N-I-T 4-port RS-422/485 Mini PCI Express serial board supports RS-422/485 interface. It has two male wafer connectors on the board, with a 20-pin female wafer connector connected to the I/O board via cables.

Board Side Pin Assignment



Main Board Side Female Wafer Pin	I/O Board Side Female Wafer Pin	Main Board Side Female Wafer Pin	I/O Board Side Female Wafer Pin
1	2	11	12
2	1	12	11
3	4	13	14
4	3	14	13
5	6	15	16
6	5	16	15
7	8	17	18
8	7	18	17
9	10	19	20
10	9	20	10

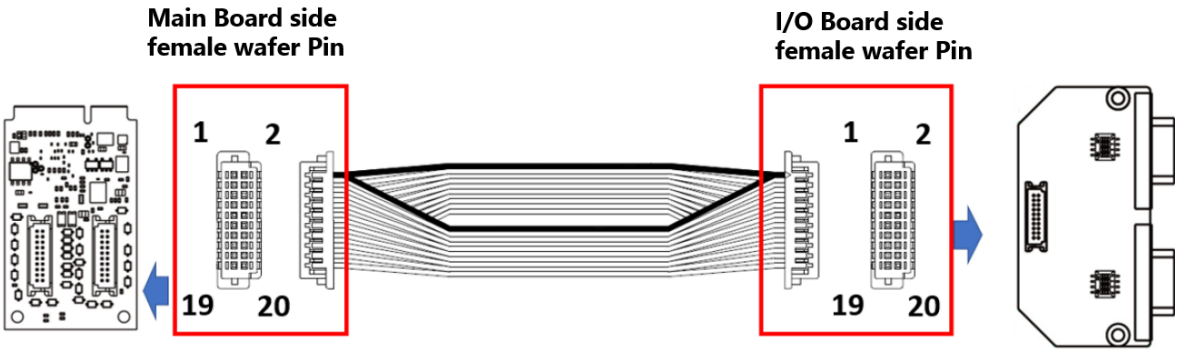
Device Side Pin Assignment



DB9 Male Pin	RS-422/RS-485-4W	RS-485-2W
1	TxD-(A)	–
2	TxD+(B)	–
3	RxD+(B)	Data+(B)
4	RxD-(A)	Data-(A)
5	GND	GND
6	–	–
7	–	–
8	–	–
9	–	–

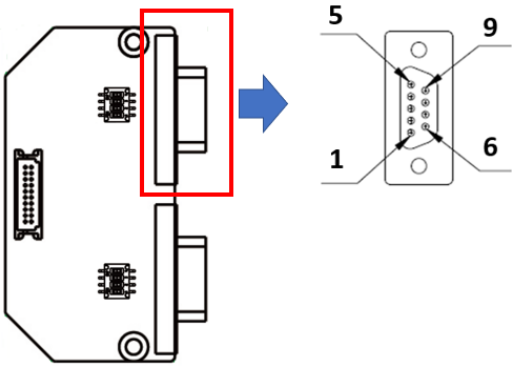
CP-114N-T

Board Side Pin Assignment



Main Board Side Female Wafer Pin	I/O Board Side female Wafer Pin	Main Board Side Female Wafer Pin	I/O Board Side Female Wafer Pin
1	2	11	12
2	1	12	11
3	4	13	14
4	3	14	13
5	6	15	16
6	5	16	15
7	8	17	18
8	7	18	17
9	10	19	20
10	9	20	10

Device Side Pin Assignment



DB9 Male Pin	RS-232	RS-422/RS-485-4W	RS-485-2W
1	DCD	TxD-(A)	–
2	RxD	TxD-(B)	–
3	TxD	RxD-(B)	Data+(B)
4	DTR	RxD-(A)	Data-(A)
5	GND	GND	GND
6	DSR	–	–
7	RTS	–	–
8	CTS	–	–
9	–	–	–

7. Troubleshooting

In this chapter, we discuss the common PCI Express Series problems and possible solutions. If you still have problems after reading this chapter, contact your dealer or Moxa for help, or use the Problem Report Form at the end of this manual to report problems to your dealer.

1. **The Moxa PCI Express board cannot be detected by the Moxa driver while installing the driver.**

   Hardware causes and solutions:

   a. Express slot. It is possible that a slot has malfunctioned. In this case, try other slots until you find one that works.

   b. The motherboard does not have an available IRQ for the PCI Express board. In this case, enter the BIOS and make sure there is an available IRQ under PCI/PnP settings.

2. **The Moxa PCI Express board and driver are activated but cannot transfer (transmit/receive) data.**

   Hardware Causes and Solutions:

   a. Make sure the cable wiring is connected correctly. Refer to Chapter 6, "Pin Assignments", for correct cable connections.

   b. The cable or the board could be defective. Try other ports, cables, or boards to verify this, or use the PComm Diagnostic utility to test the Moxa board and port conditions. If the Diagnostic program reports an error, replace the faulty components.

   Software Causes and Solutions:

   a. PCI Express Series boards will check the line status (CTS) before transmitting data if the RTS/CTS flow control feature is set to Enable in the configuration or application program. Refer to the "Connection Cables and Cable Wiring" chapter for proper wiring diagrams; then, check the line status of the suspected port, using the diagnostics LED indicators on the mini tester.

   b. The board control application may not be written correctly according to the corresponding API of the operating system. To check this problem, run another application that you know is correct, or use the utilities provided by Moxa (such as PComm Terminal emulatorl that runs under the Windows platform).