PCI Express Board User's Manual

Multiport Serial Board for PCI Express Bus

Eighth Edition, September 2013

www.moxa.com/product

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PCI Express Board User's Manual

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1

Introduction

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

The following topics are covered in this chapter:

- **Overview**
- **Applications**
- **Features**
- **Package Checklist**
- **Installation Flowchart**

Overview

Moxa's new PCI Express Multiport Serial Boards are designed for POS and ATM applications and for use by industrial automation system manufacturers and system integrators. The boards are compatible with all popular operating systems, and each of them supports data rates of up to 921.6 Kbps, and provides full modem control signals, ensuring compatibility with a wide range of serial peripherals. In addition, all models work with PCI Express ×1, allowing the boards to be installed in any available PCI Express slot (including ×1, ×2, ×4, ×8, ×16, ×32).

PCI Express Solution

The boards comply with PCI Express Spec. 1.1. The ports' transmission parameters are configured after the boards are installed. The PCI BIOS automatically assigns the IRQ and I/O addresses. For this reason, you must plug the boards into the computer before installing the drivers. For more PCI Express information, refer to the "Technical Reference" appendix.

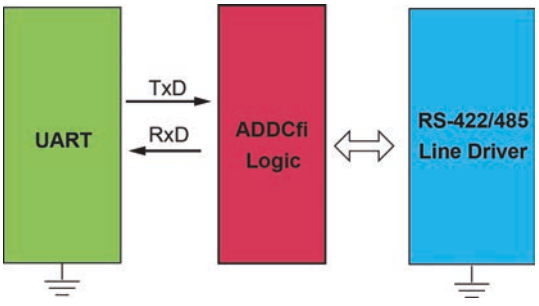
ESD Protection

The PCI Express boards come with built-in 15 KV ESD protection to prevent damage to the boards from lightning or high potential voltage. The surge protection feature makes the PCI Express boards suitable for industrial, factory-type applications, and for use with applications that are subject to severe weather conditions.

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, which means that transmission and reception share the same data channels. For this reason, 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 ADDC® (automatic data direction control). ADDC® is much easier to implement than the traditional "handshaking" method that uses the RTS signal.



Operating System Support

The PCI Express boards are compatible with all major industrial platforms, including Windows 2000/XP/2003/Vista/2008, Windows 7/8/2012, Windows CE, DOS, Linux, FreeBSD, QNX, and SCO. 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 NT/95/98/2000/XP/2003. Use this library to develop your own applications with Visual Basic, Visual C++, Borland Delphi, etc. Utilities, such as 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 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 PCI Express boards have the following outstanding features:

- PCI Express ×1 compliant
- Low profile board for compact-sized PCs
- Data flow LED display onboard
- 128-byte FIFO and on-chip H/W, S/W flow control
- 50 bps to 921.6 Kbps transmission speed
- Embedded 15 KV ESD surge protection
- Drivers for all major industrial platforms—Windows 2000, Windows XP/2003/Vista/2008 (32-bit/64-bit), Windows 7 (32-bit/64-bit), Windows 8 (32-bit/64-bit), Windows 2012 (64-bit), Windows CE, Windows XP Embedded, DOS, Linux (32-bit/64-bit), SCO, FreeBSD 4.x/5.x

Package Checklist

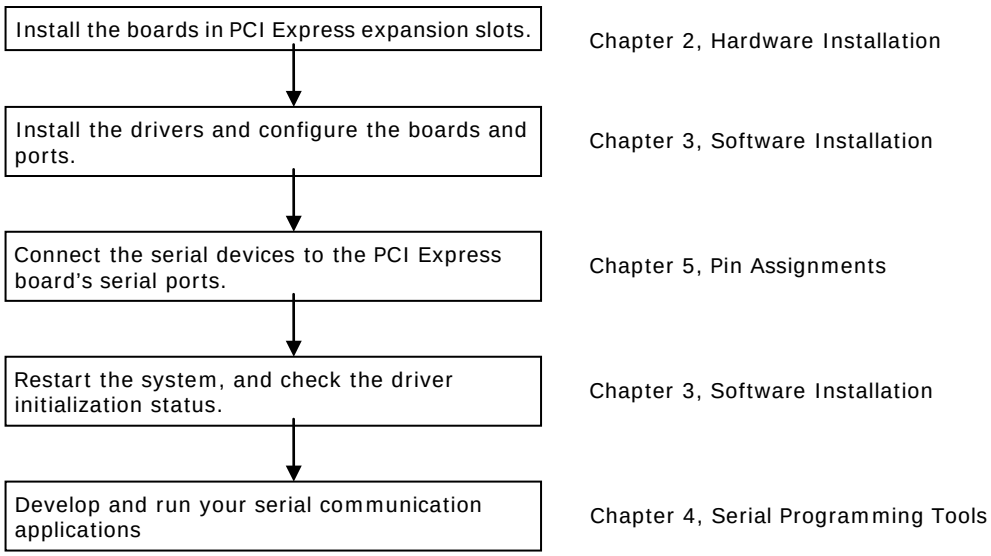
The following items are included in the PCI Express board package:

- PCI Express serial board
- Document and Software CD-ROM
- Quick Installation Guide
- Low profile bracket

NOTE NOTE: *Notify your sales representative if any of the above items are missing or damaged.*

Installation Flowchart

The following flowchart provides a brief summary of the procedure you should follow to install the PCI Express boards and also provides references to chapters with more detailed information:



2

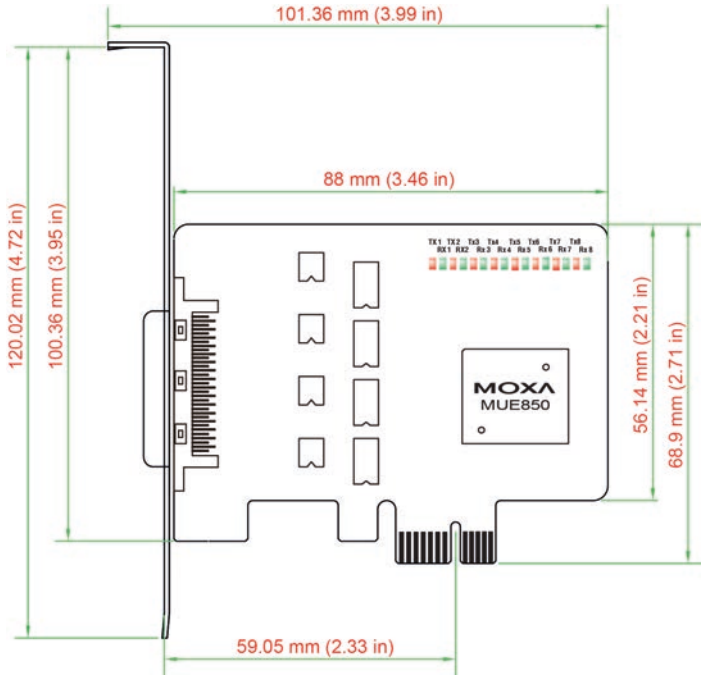
Hardware Installation

This chapter describes the PCI Express Series 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.

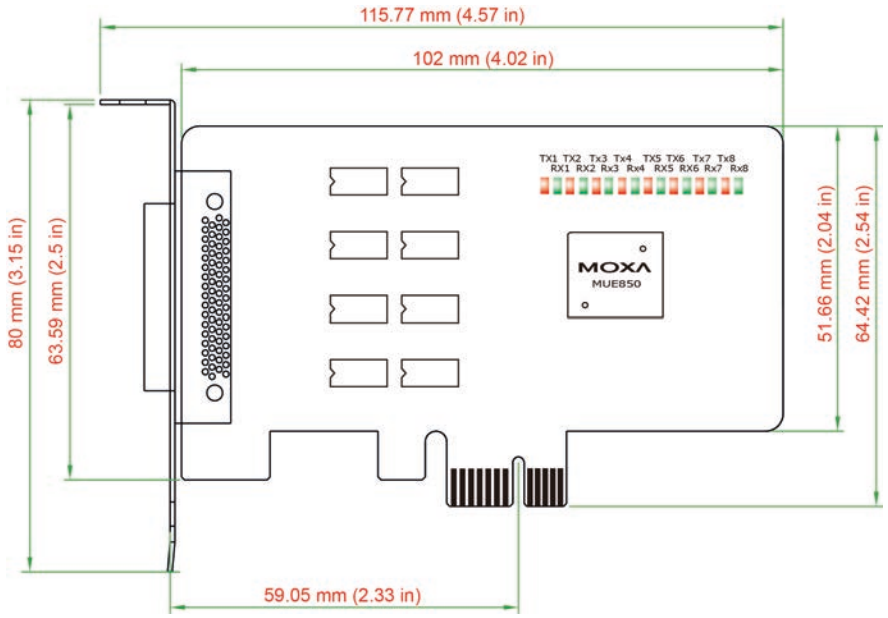
The following topics are covered in this chapter:

- **CP-118EL-A Dimensions**
- **CP-168EL-A Dimensions**
- **CP-104EL-A Dimensions**
- **CP-102E Dimensions**
- **CP-102EL Dimensions**
- **CP-132EL Dimensions**
- **CP-132EL-I Dimensions**
- **CP-114EL Dimensions**
- **CP-114EL-I Dimensions**
- **Plugging the Board into an Expansion Slot**

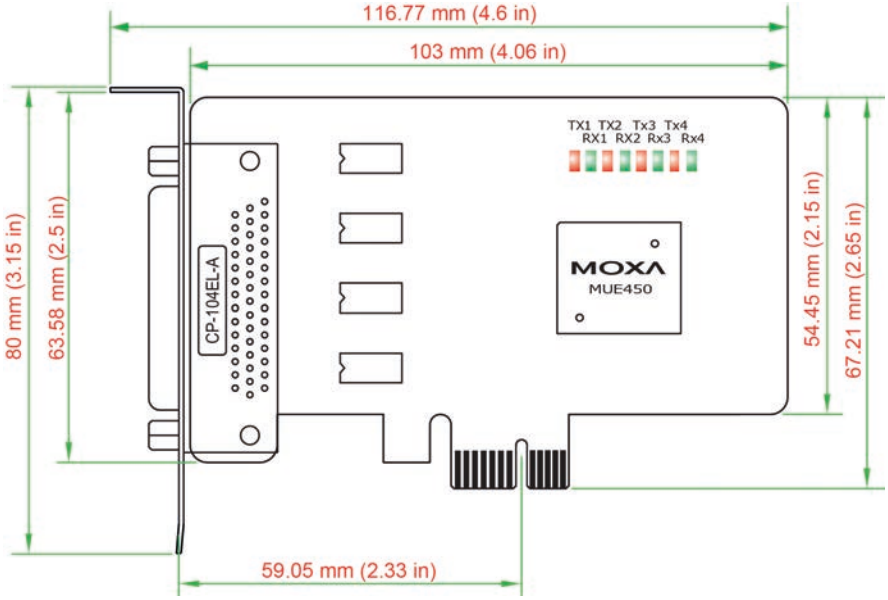
CP-118EL-A Dimensions



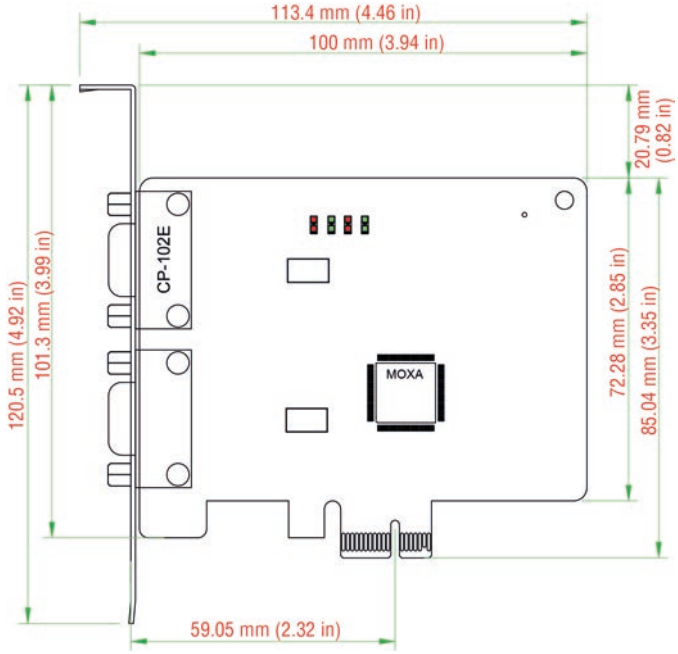
CP-168EL-A Dimensions



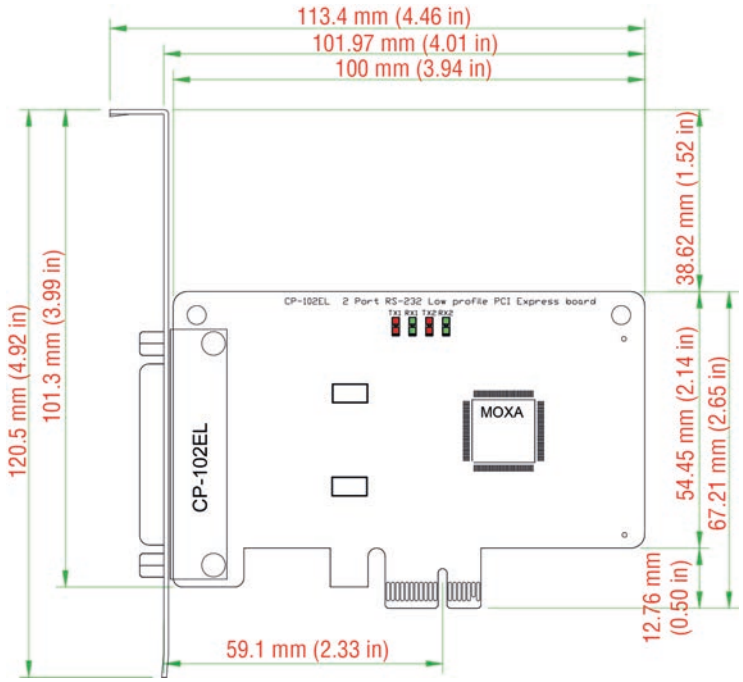
CP-104EL-A Dimensions



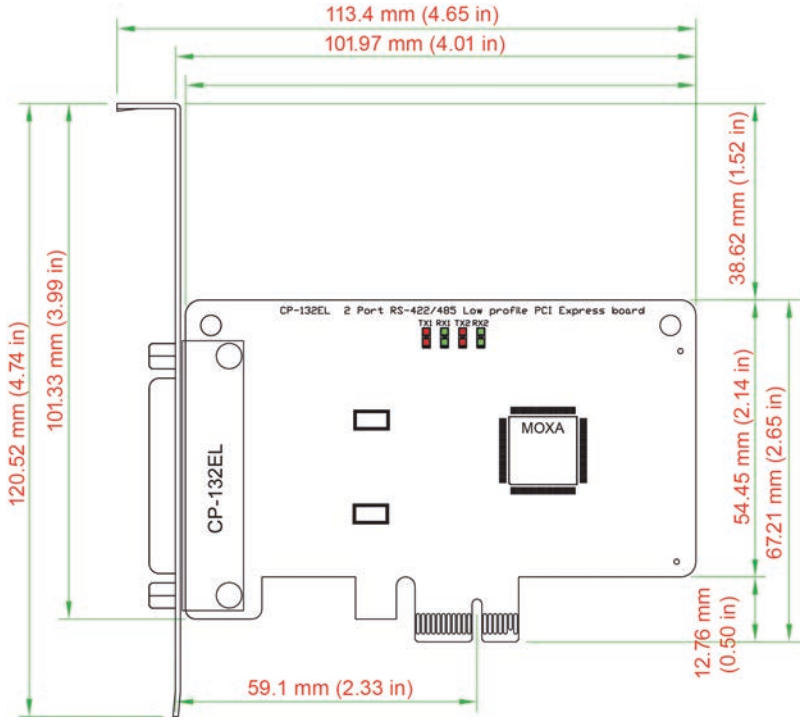
CP-102E Dimensions



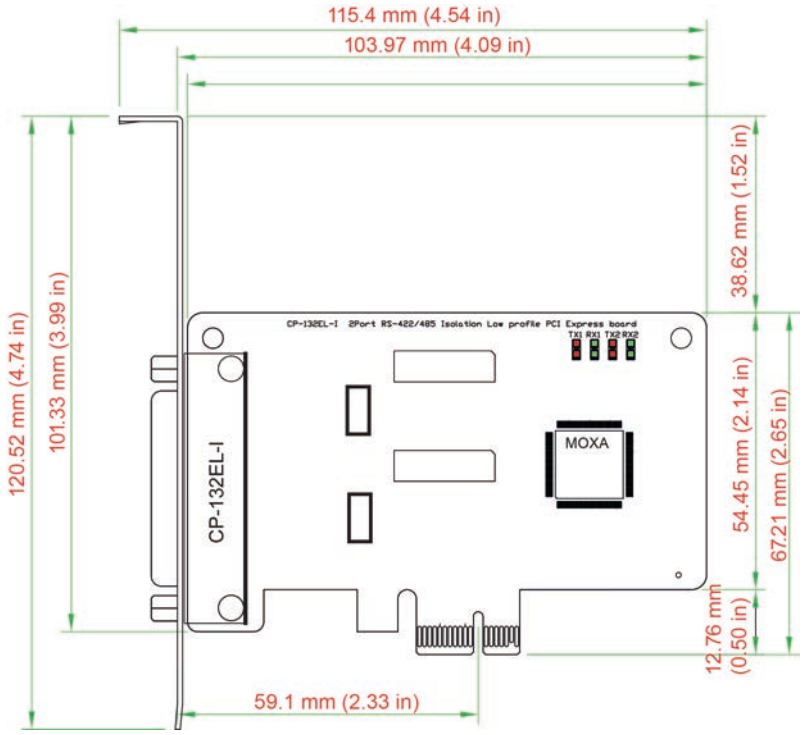
CP-102EL Dimensions



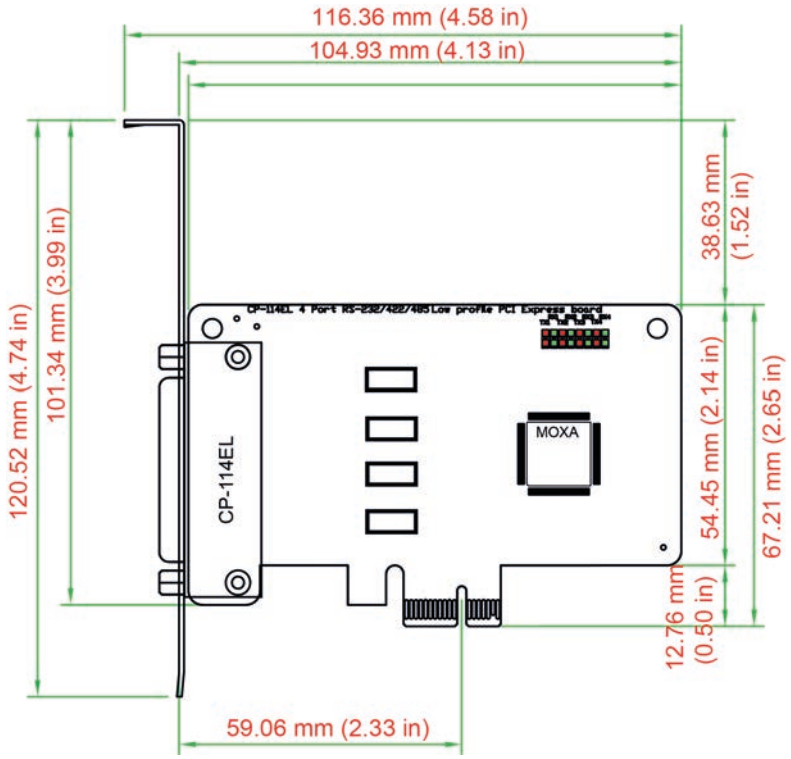
CP-132EL Dimensions



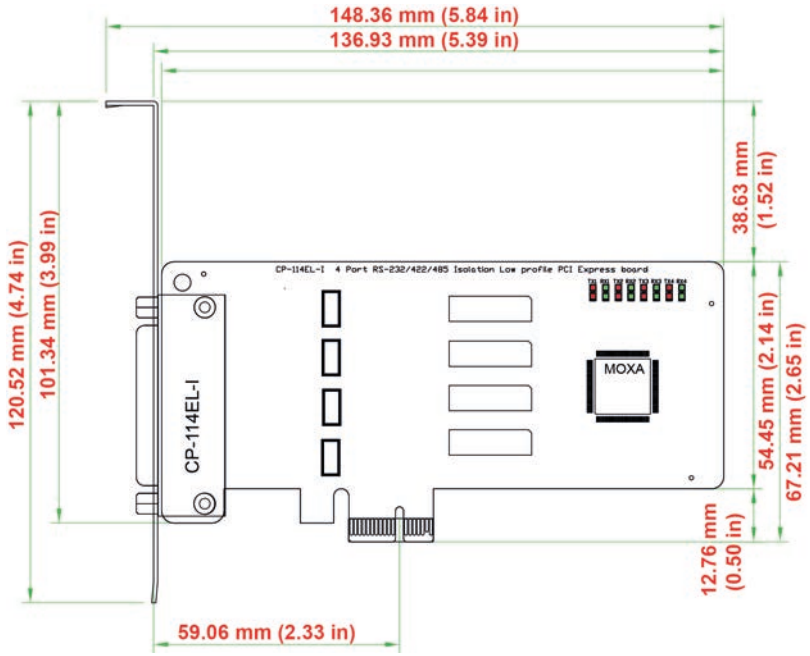
CP-132EL-I Dimensions



CP-114EL Dimensions



CP-114EL-I Dimensions



Plugging the Board into an Expansion Slot

Since the BIOS automatically assigns the PCI Express board's IRQ number and I/O addresses, you must plug the board into one of the computer's expansion slots before installing the driver.

Step 1: Power off the PC.

WARNING

To avoid damaging your system and board, make sure you turn off your computer before installing the board.

Step 2: Remove the PC's cover.

Step 3: Remove the slot cover bracket if there is one.

Step 4: Plug the PCI Express board firmly into a free PCI Express slot.

Step 5: Fasten the holding screw to fix the control board in place.

Step 6: Replace the PC's cover.

Step 7: Power on the PC. The BIOS will automatically set the IRQ and I/O address.

NOTE Each Moxa PCI Express board uses one unique IRQ and I/O address, both of which are assigned automatically by the PCI BIOS.

Step 8: Proceed with the software installation discussed in the next chapter, "Software Installation."

3

Software Installation

This chapter gives installation, configuration, and update/removal procedures for the driver for Windows 2000, Windows 2003/XP/Vista/2008 (32-bit/64-bit), Windows 7/8 (32-bit/64-bit), Windows 2012 (64-bit), DOS, Linux (32-bit/64-bit), and SCO, and WinCE 5.0. Before 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 that you can install up to 4 PCI Express boards in one system, provided sufficient I/O address and IRQ number resources are available.

You can download the drivers from the Moxa website.

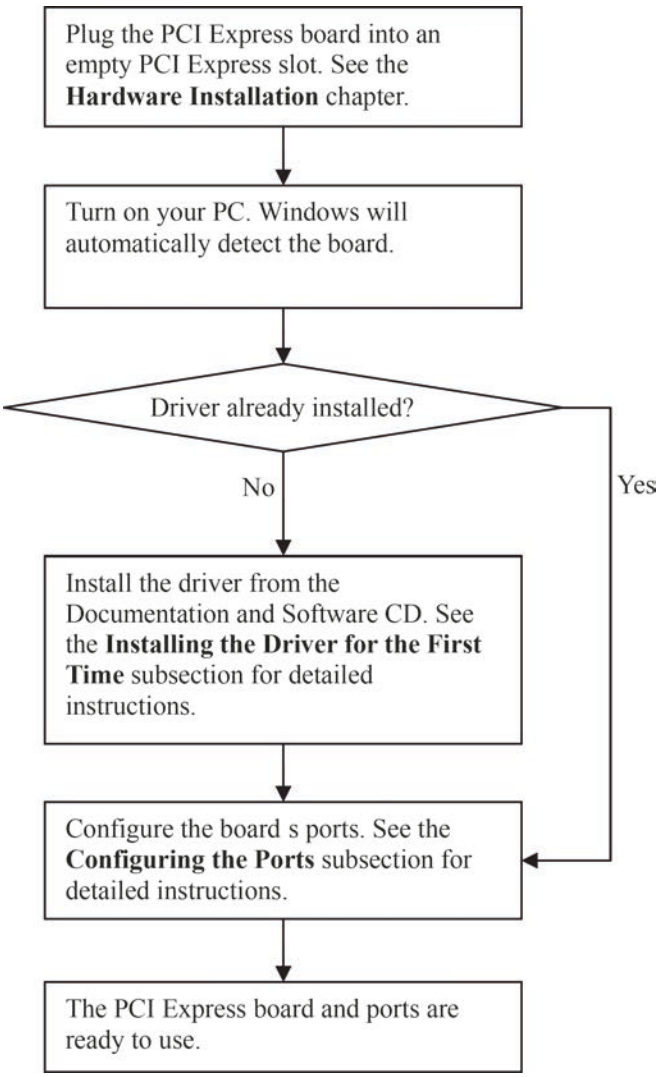
The following topics are covered in this chapter:

- **Windows Drivers**
  - Windows 7/8 (32-bit/64-bit)
  - Windows 2008/Vista (32-bit/64-bit)
  - Windows 2003/XP (32-bit/64-bit)
  - Windows 2000
- **Non-Windows Drivers**
  - DOS
  - Linux (32-bit/64-bit)
  - SCO

Windows Drivers

Moxa provides drivers that allow you to use the following serial board products under Windows 7/8, Windows 2008/Vista/2003/XP/2000.

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



Windows 7/8 (32-bit/64-bit)

The Windows 8 installation procedures and popup windows are almost the same as Windows 7. Thus, in this section, we describe the installation procedure for Windows 7 as an example.

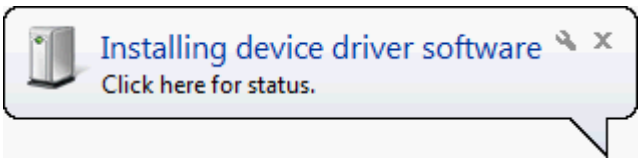
Installing the Driver

The following procedure describes how to install the CP-104EL-A driver for the first time with Windows 7. First, make sure that you have already plugged the board or boards into the system's PCI Express slot(s).

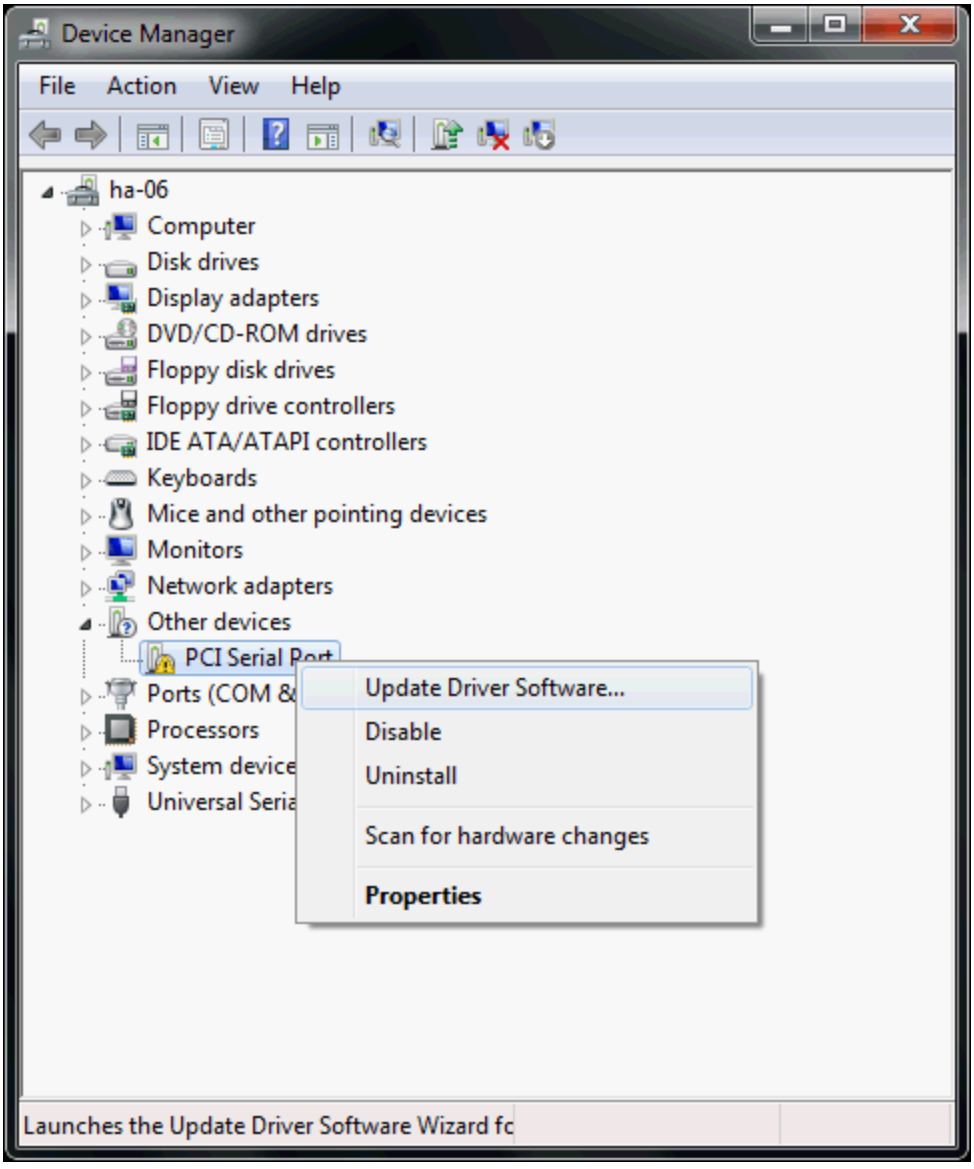
NOTE If you have already installed a CP-104EL-A or other Moxa PCI Express board in your computer, and you are installing additional boards, Windows 7 will automatically detect and install the new board(s) the next time you boot up the computer. In this case, proceed directly to the next section, "Configuring the Ports," to configure the ports' serial transmission parameters.

1. After plugging the board into an expansion slot and powering on your PC, Windows 7 will automatically detect the new board, and a popup window that states Device driver software was not successfully installed will appear in the lower right corner of your computer screen.

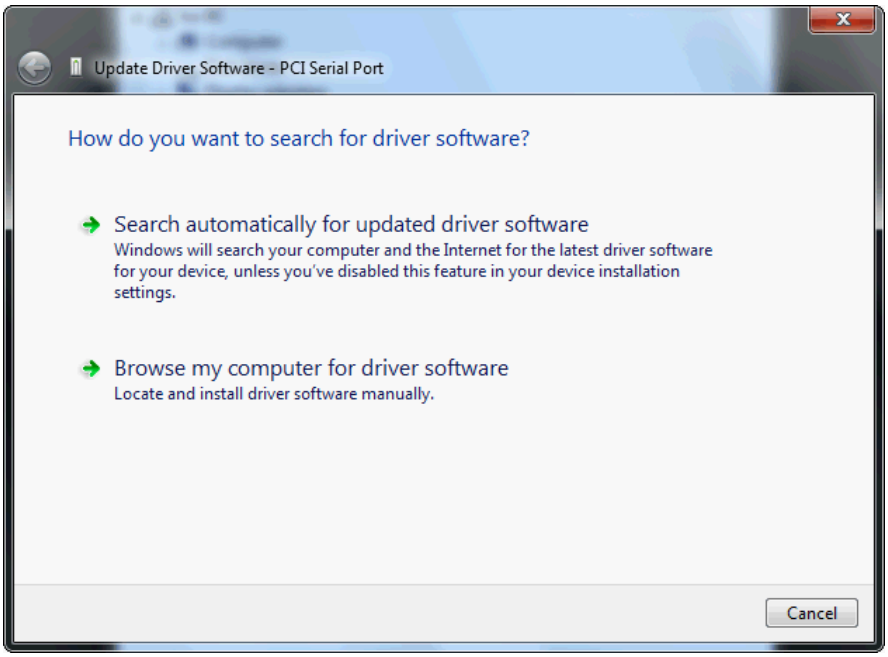
   *** (The popup message will not show in Windows 8.)**



2. Go to **Device Manager / Other devices** to install the **PCI Serial Port** driver. Right click on the PCI Serial port. Windows will offer to connect to the Windows update site to search for a driver. Select **Update Driver Software….**

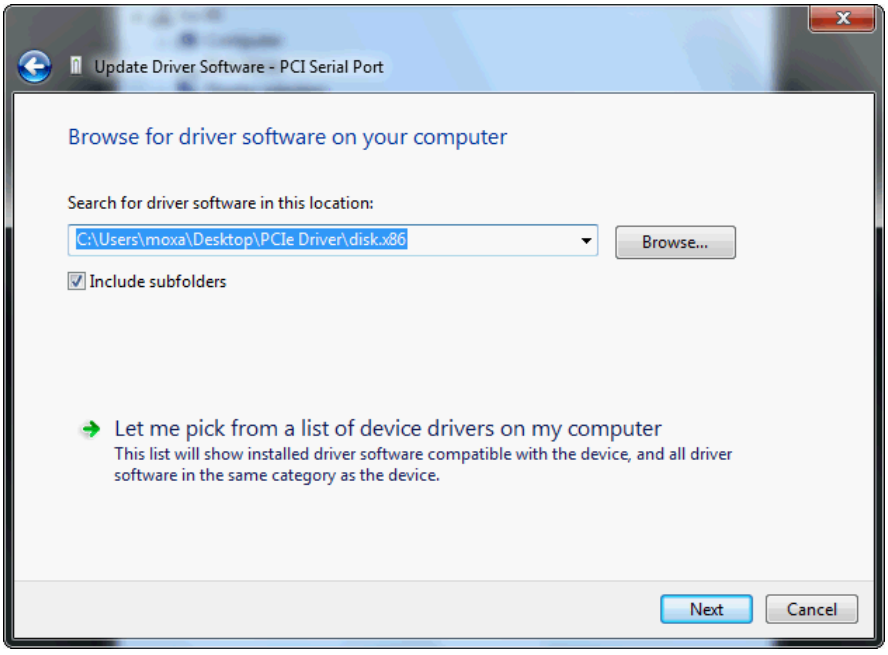


3. Select **Browse my computer for device software** to continue.

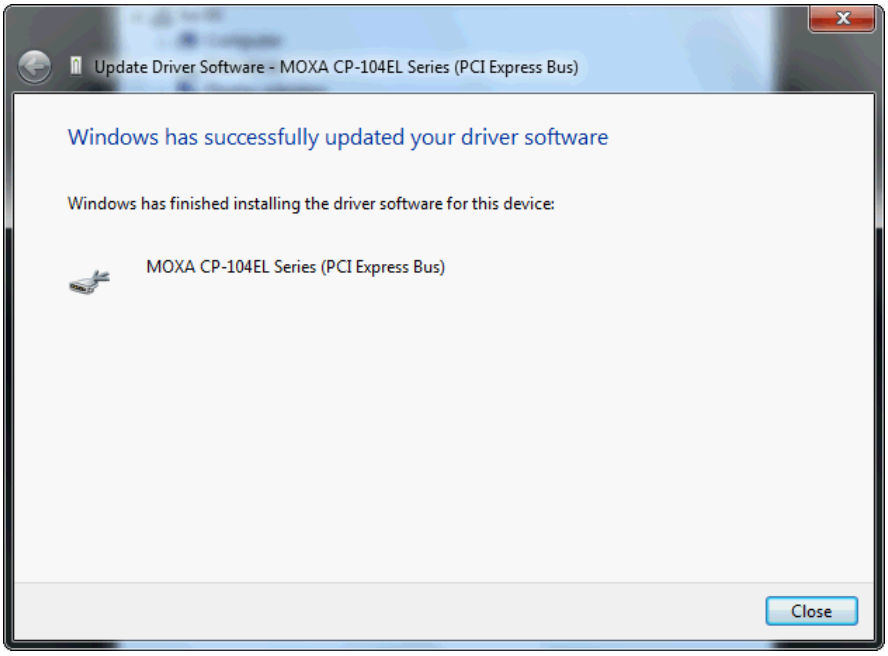


4. Select **Search for driver software in this location**, select **Include subfolders**, and then click **Browse**. If the system is a 32-bit (x86) platform, navigate to the **\CP-104EL-A Series\Software\Windows 7\x86** folder on the CD. If the system is a 64-bit (x64) platform, navigate to the **\CP-104EL-A Series\Software\Windows 7\x64** folder on the CD, and then click **Next** to continue.

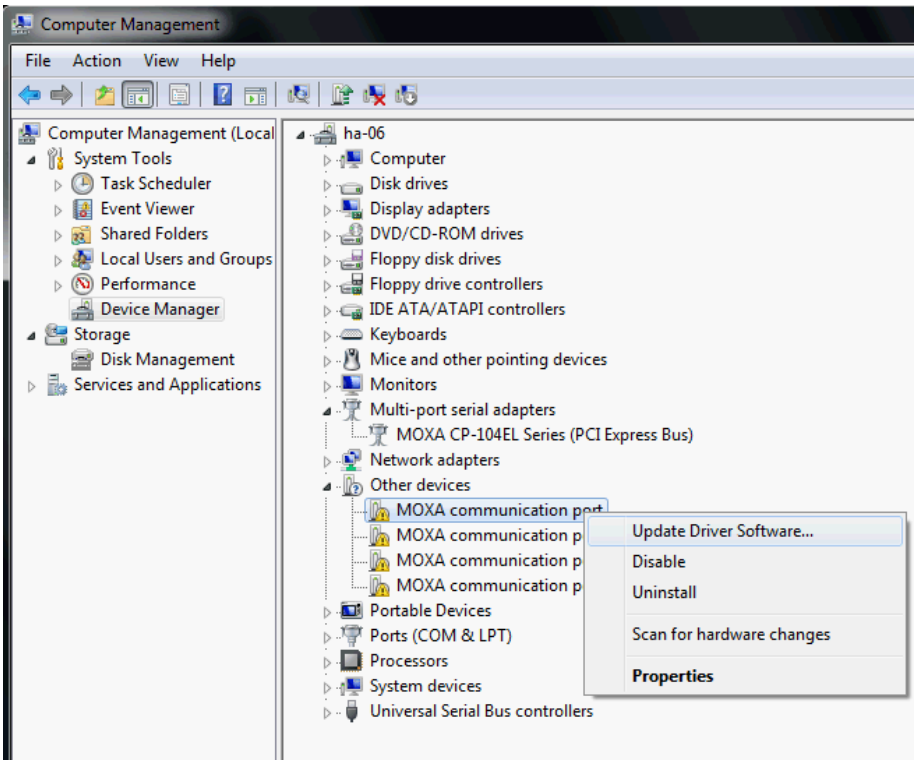
The following figure shows the path for x86.



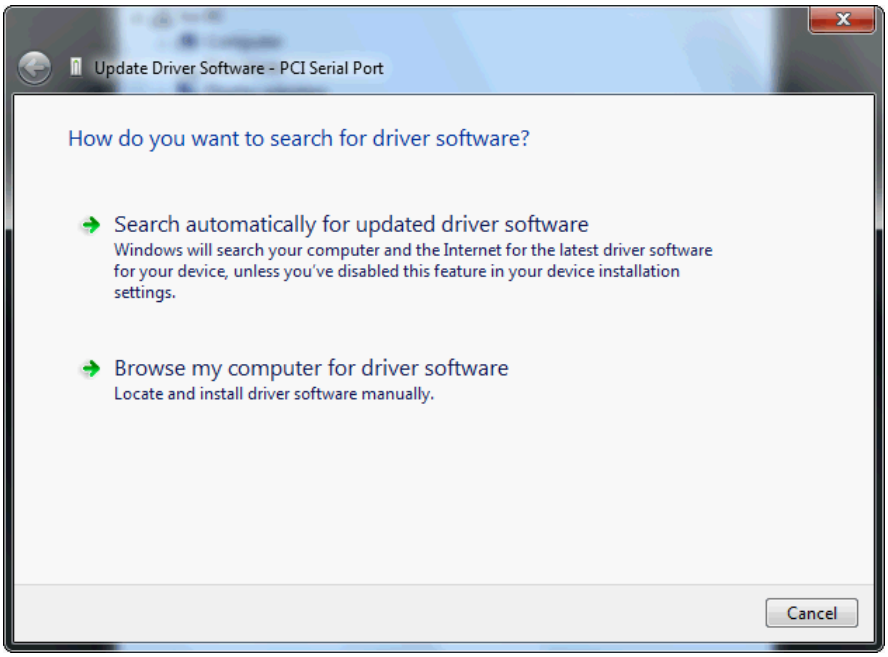
5. Wait while the driver software is installed. The next window shows the model name of the board, and indicates that Windows has completed the driver installation. Click **Close** to proceed with the rest of the installation procedure.



6. After installing the multiport serial adaptors driver, install the Moxa Port diver next. Right click on **MOXA communication port**. A popup window will open to help you install the driver for MOXA Port 0. Select **Update Driver Software…**

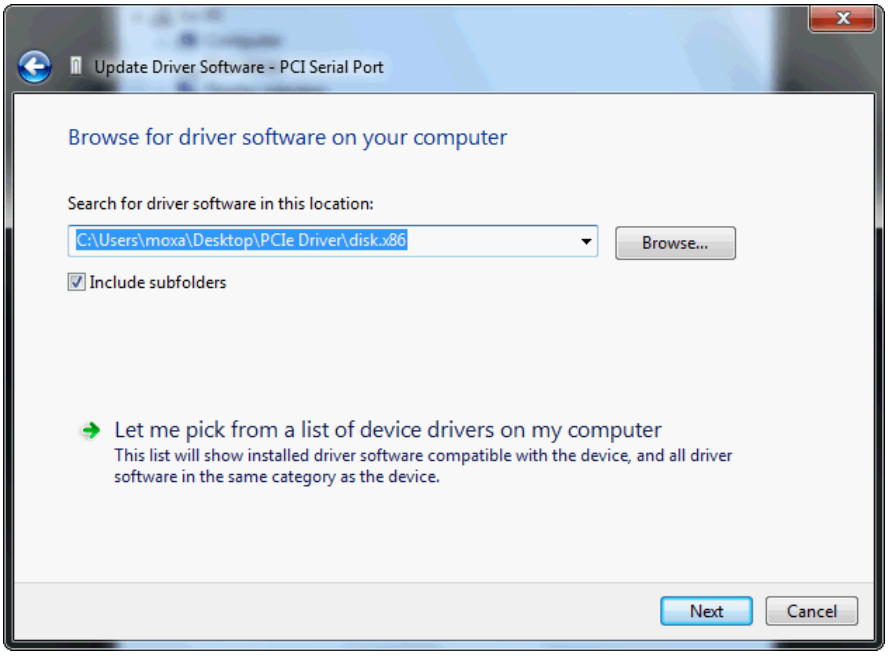


7. Select **Browse my computer for device software** to continue.

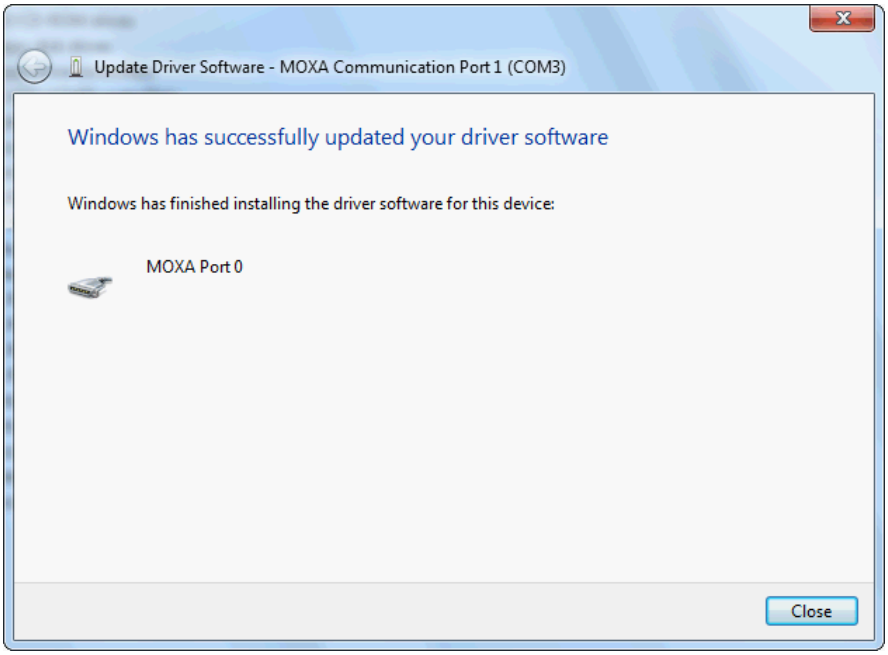


8. Select **Search for driver software in this location**, select **Include subfolders**, and then click **Browse**. If the system is a 32-bit (x86) platform, navigate to the **\CP-104EL-A Series\Software\Windows 7\x86** folder on the CD. If the system is a 64-bit (x64) platform, navigate to the **\CP-104EL-A Series\Software\Windows 7\x64** folder on the CD, and then click **Next** to continue.

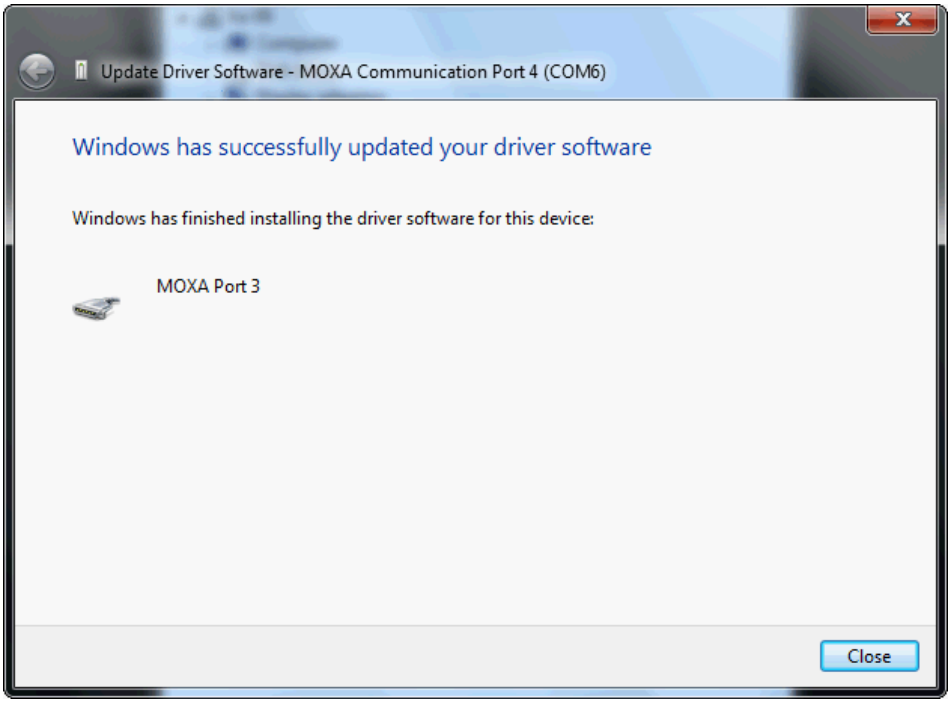
The following figure shows the path for x86.

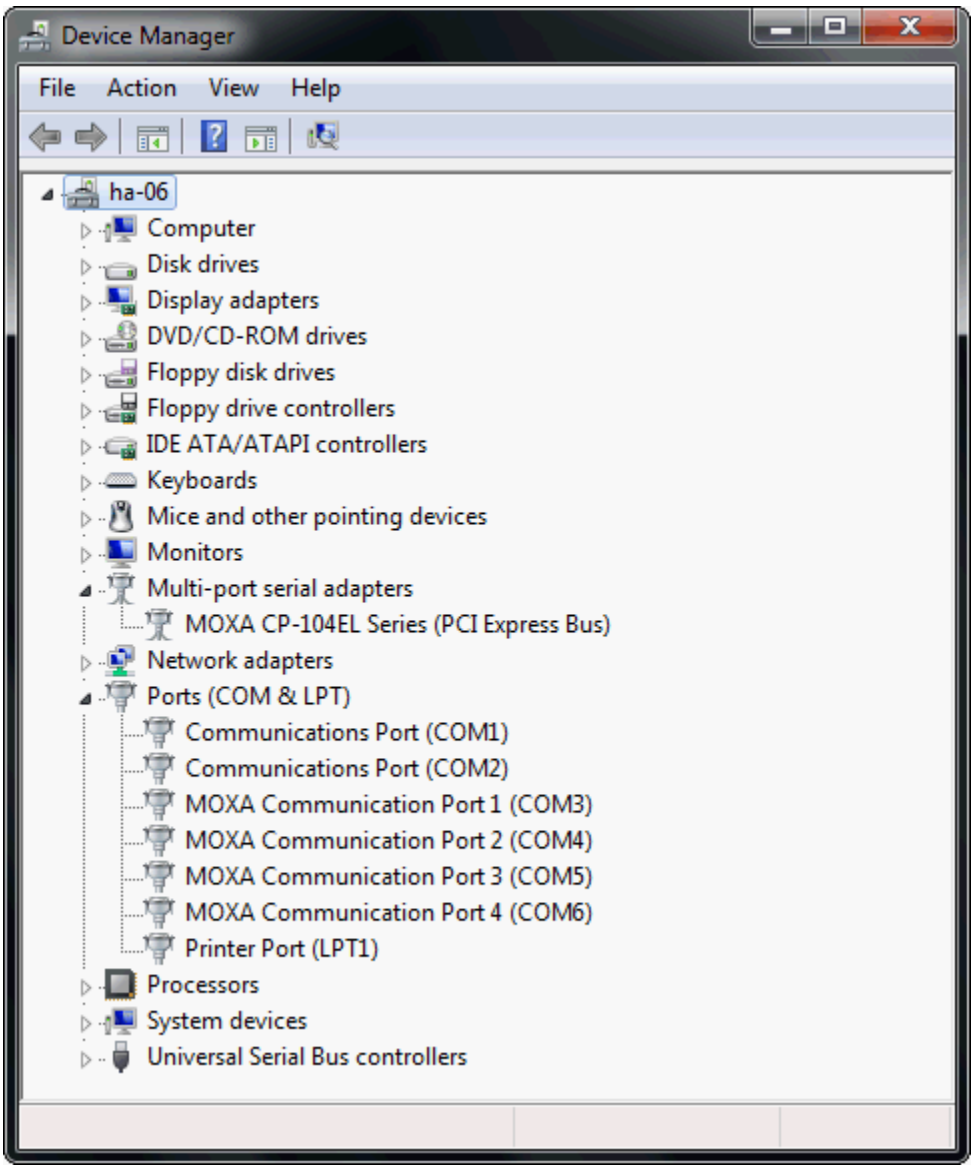


9. After all files have been copied to the system, window showing **Windows has successfully updated your driver software** will open to indicate that it has finished installing **MOXA Port 0**. The Port installation procedure is complete when Port 0 has been set up.



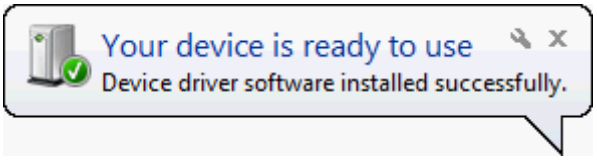
10. Repeat Step 7 through Step 11 for each of the remaining three ports. The last port to be installed will be Moxa Port 3, as shown in the following figure.





11. In Windows 7, you will see a message stating **Your device is ready to use** will appear to inform you that the hardware was installed successfully.

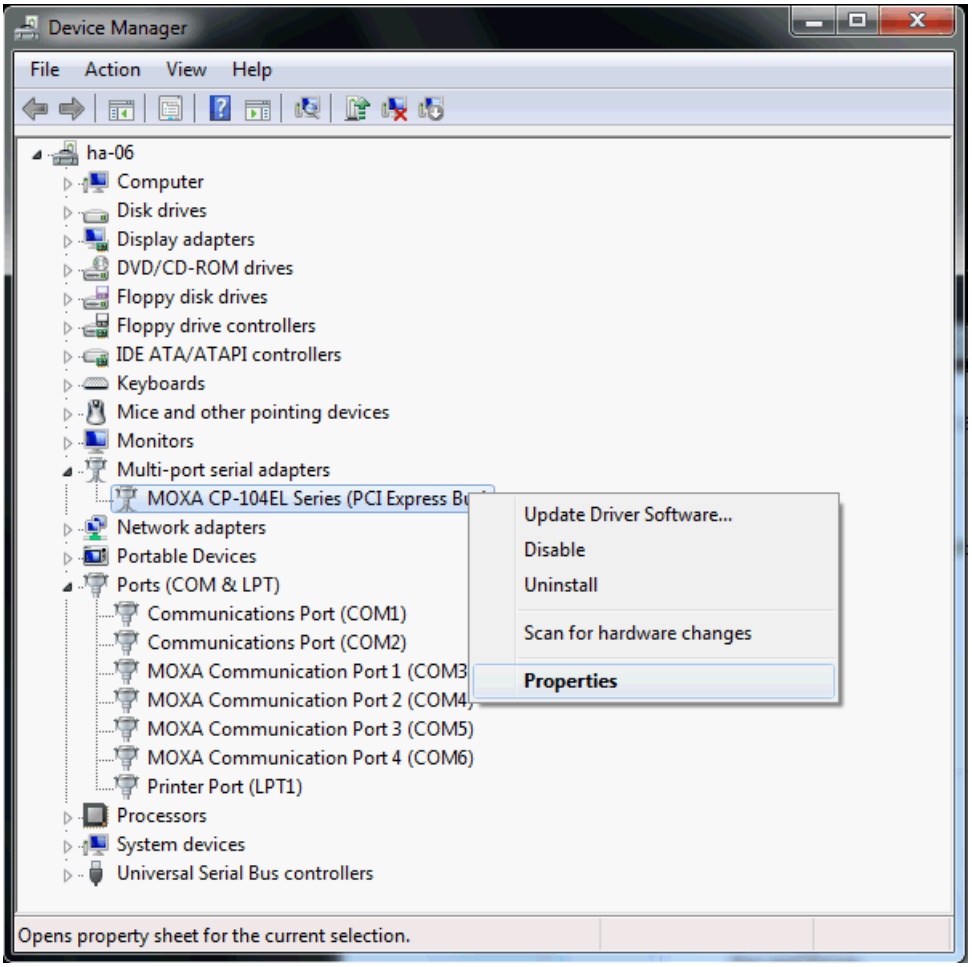
*** (The popup message will not show in Windows 8.)**



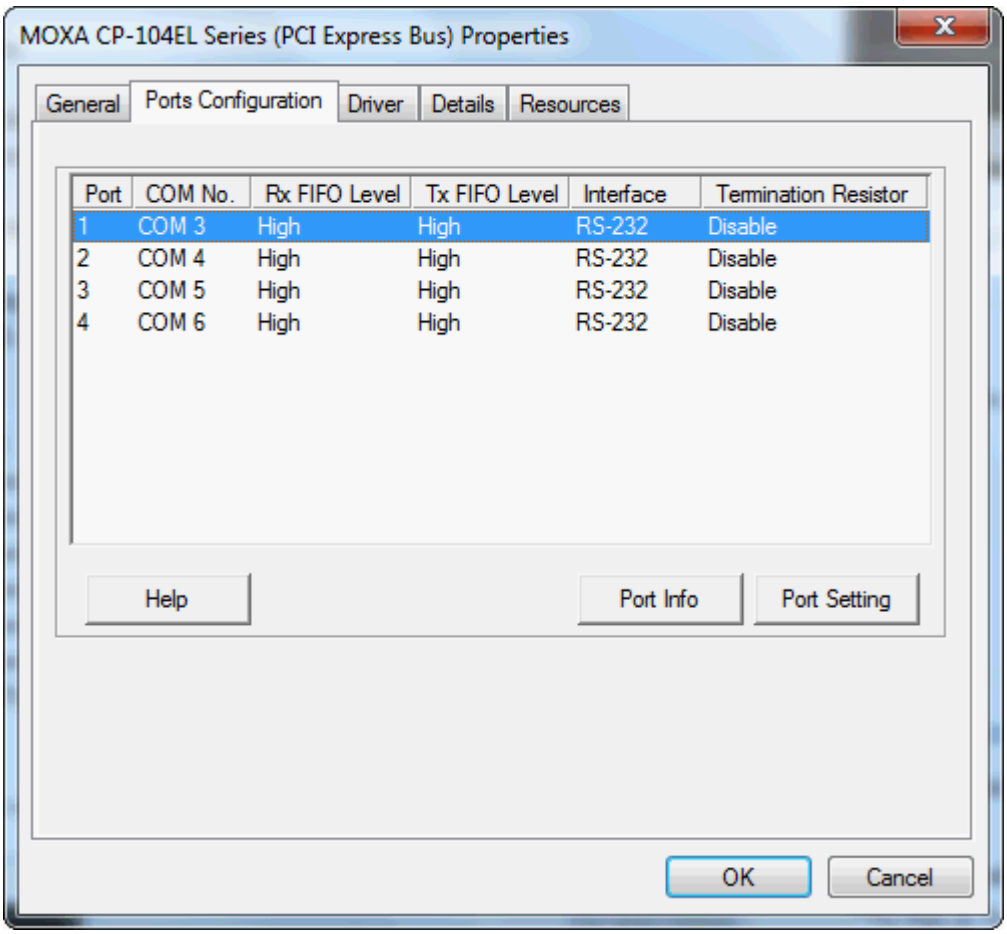
Configuring the Ports

After the driver has been installed, use Device Manager to configure the CP-104EL-A serial ports.

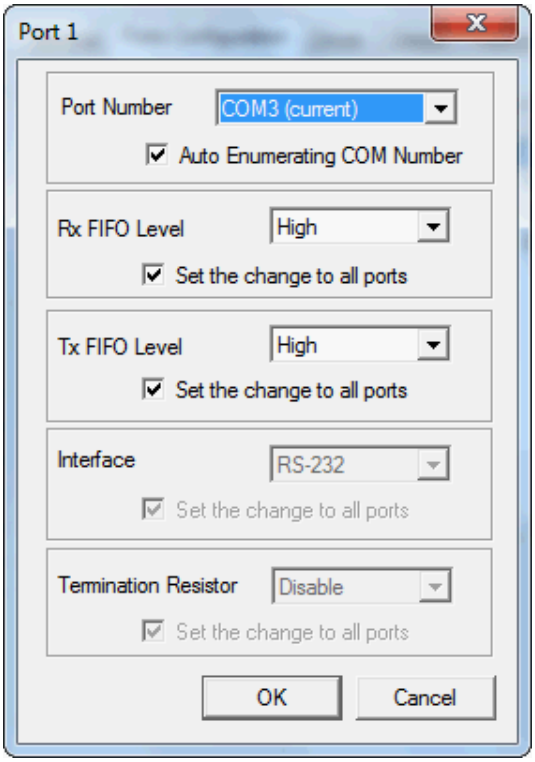
1. Expand the **Multi-port serial adapters** tab, right click **MOXA CP-104EL Series (PCI Express Bus)**, and then click **Properties** to open the board's configuration panel.



2. Click the port you would like to configure to highlight it, and then click **Port Setting**.



3. Select a COM number for the port from the **Port Number** pull-down list. Select the **Auto Enumerating COM Number** option to map subsequent ports automatically. The port numbers will be assigned in sequence. For example, if COM 3 is assigned to Port 1, then COM 4 (if not already occupied) will be assigned to Port 2, etc.

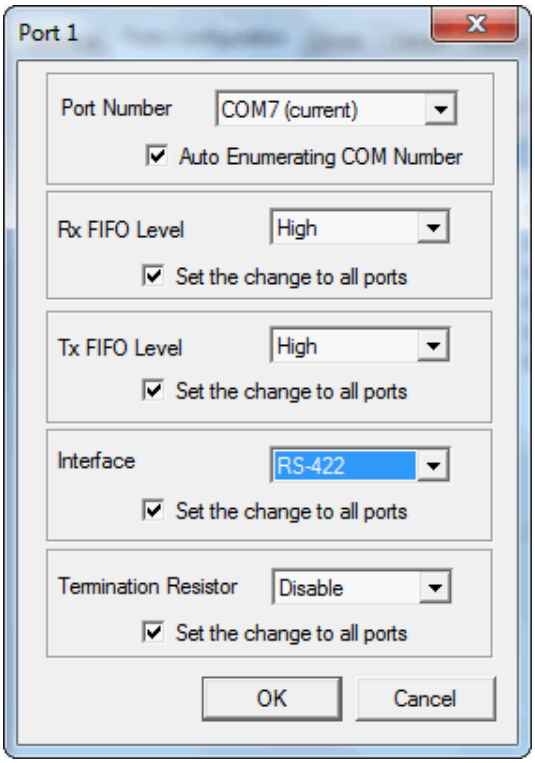


4. Select an **Rx FIFO** Trigger from the **Rx FIFO Level** pull-down list. Rx FIFO trigger levels of **High, Middle**, and **Low** are available, with the default set to High (120 bytes). Select **Set the change to all ports** option to apply this Rx FIFO Trigger to all ports.
5. Select a **Tx FIFO Level** from the **Tx FIFO Level** pull-down list. Tx FIFO Levels of **High, Middle**, and **Low** are available, with the default set to High (128 bytes). Select **Set the change to all ports** option to apply the just defined Tx FIFO Size to all ports.

	Tx FIFO	Rx FIFO
High	128	120
Middle	64	60
Low	1	1

Unit: Bytes

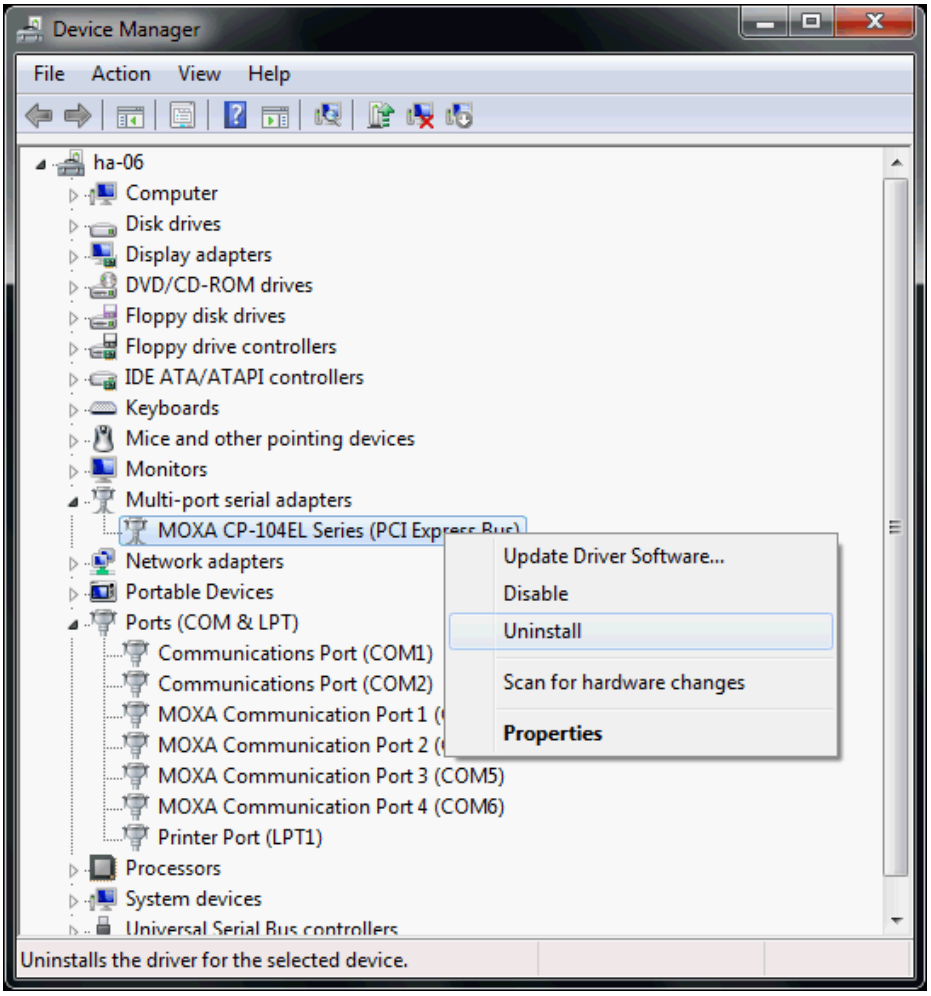
6. If you are using CP-118EL-A, CP-114EL, CP-114EL-I, CP-132EL, or CP-132EL-I, select **Interface** (RS-232, RS-422, 2-wire RS-485, 4-wire RS-485) and **Termination Resistor** (120Ω, Enable or Disable) to configure. We use the CP-118EL-A to illustrate. The following figures show the settings for configuring the port for RS-422 and no Termination Resistor (select Disable).



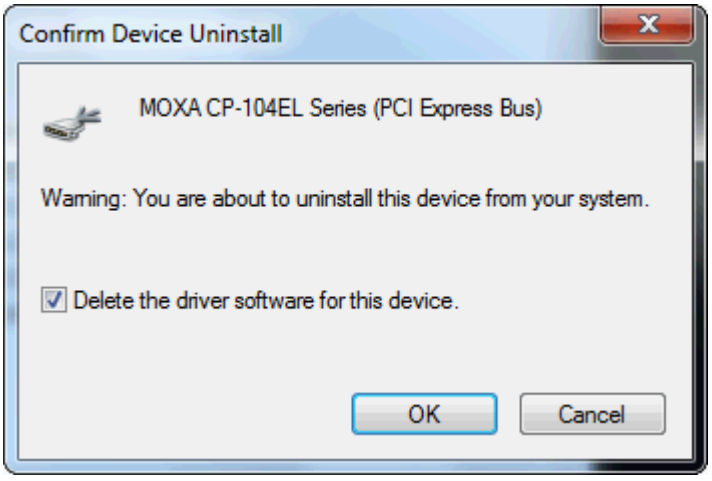
7. Click **OK** to save the port settings, and then click **OK** in the **Property** window to finish the port settings procedure.

Removing the Driver

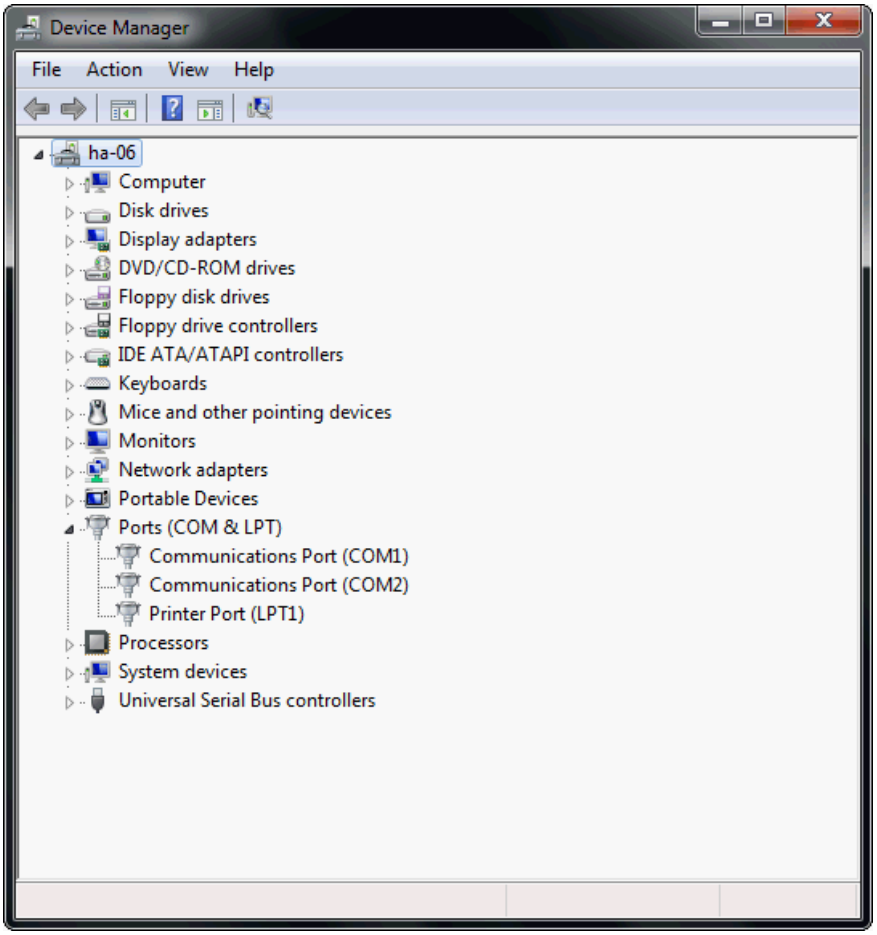
1. Go to **Device Manager**. Use the mouse to place the cursor over the CP-104EL-A Series board under **Multi-port serial adapters**, and then click the right mouse button. Select the **Uninstall** option.



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



3. The **Device Manager** window refreshes automatically, showing that the driver and ports for the CP-104EL-A Series board have been removed.



Windows 2008/Vista (32-bit/64-bit)

In this section, we describe the installation procedure for Windows Vista. The installation procedure for Windows 2008 is similar.

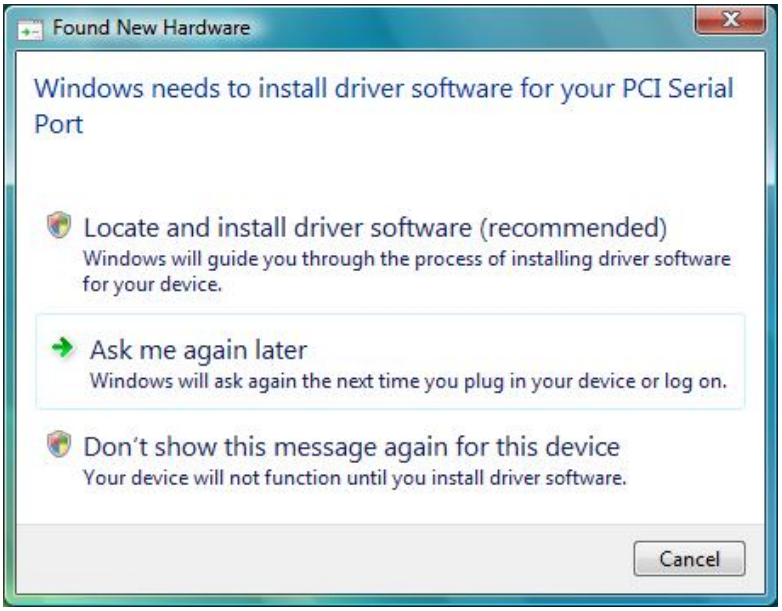
Windows 2008 and Windows Vista support up to 256 serial ports from COM1 to COM256. In order to make the best use of Windows 2008/Vista's multi-process/multi-thread advanced features, 32-bit and 64-bit Windows 2008/Vista device drivers were developed for Moxa multiport boards. The drivers conform to the Win32 COMM API standard.

Installing the Driver

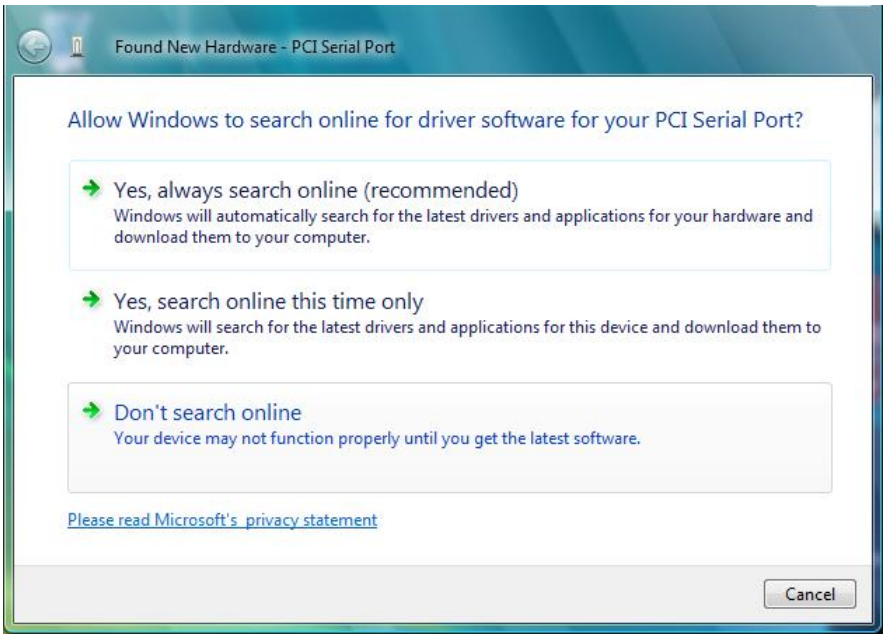
The following procedure describes how to install the CP-114EL driver for the first time with Windows Vista. First, make sure that you have already plugged the board or boards into the system's PCI Express slot(s).

NOTE If you have already installed a CP-114EL or other Moxa PCI Express board in your computer, and you are installing additional boards, Windows 2008/Vista will automatically detect and install the new board(s) the next time you boot up the computer. In this case, proceed directly to the next section, "Configuring the Ports," to configure the ports' serial transmission parameters.

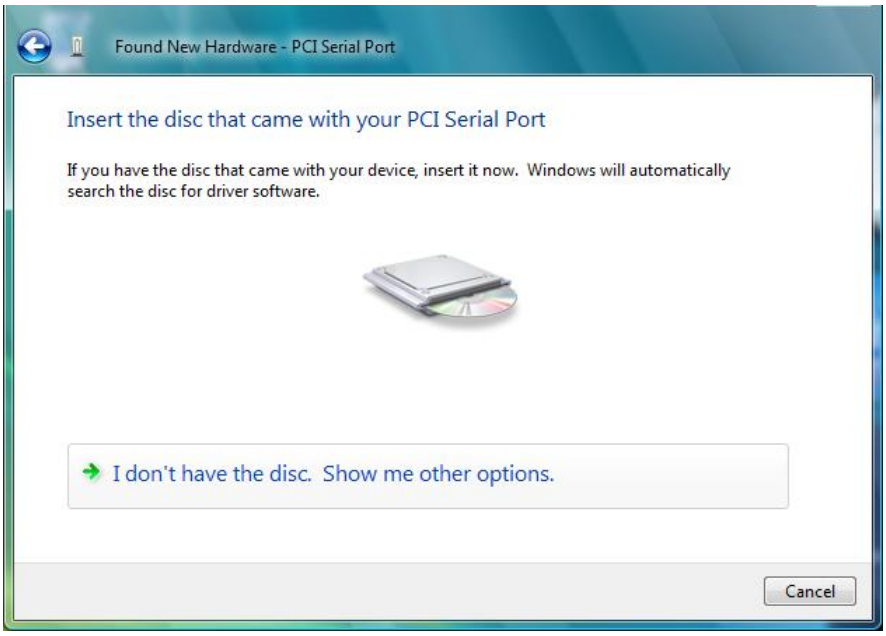
1. After plugging the board into an expansion slot and powering on your PC, Windows Vista will automatically detect the new board, and the **Found New Hardware** window will open.

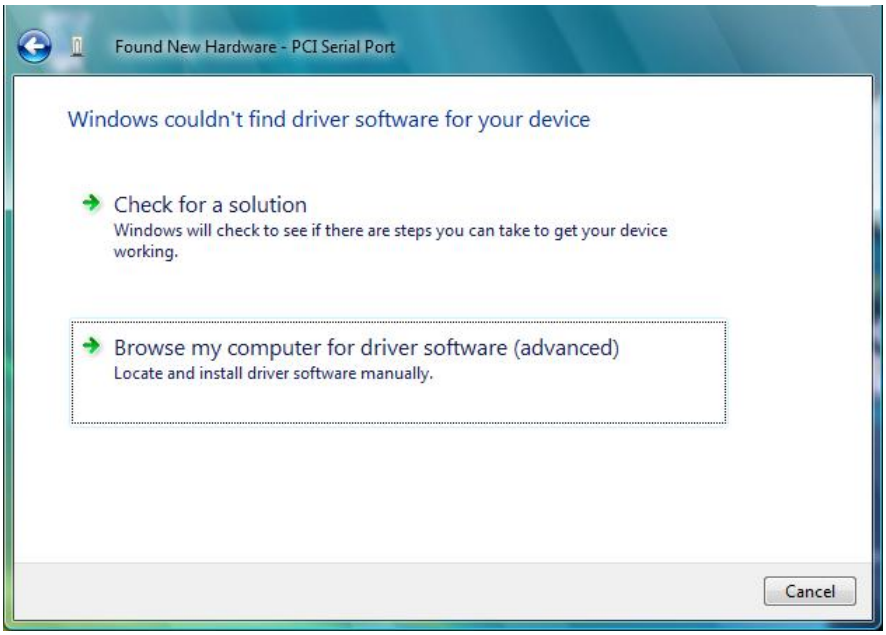


2. The **Found New Hardware – PCI Serial Port** window will open automatically. This window will offer to connect to the Windows update site to search for a driver. Select **Don't search online**.



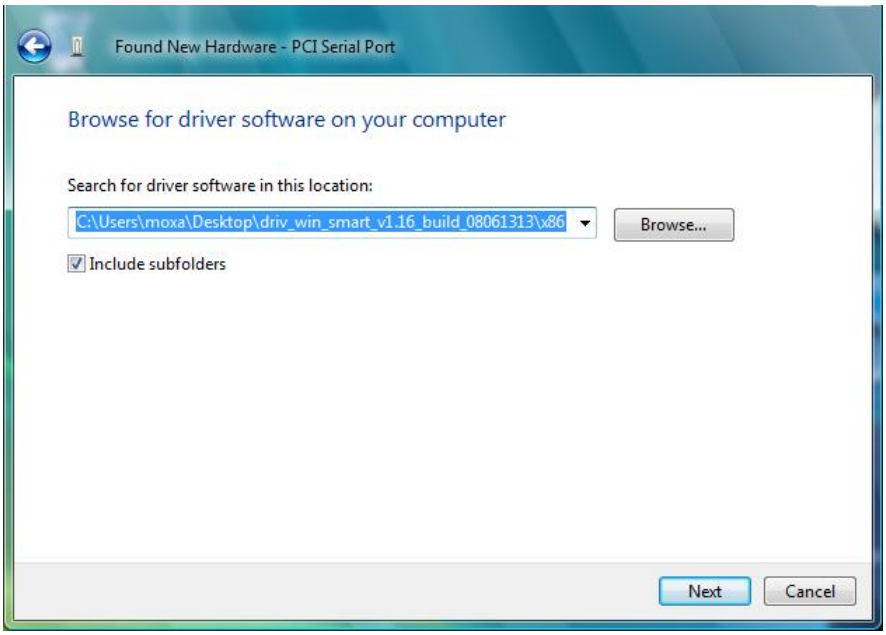
3. Select **I don't have the disc. Show me other options**, and then click **Browse my computer for device software (advanced)** to continue.



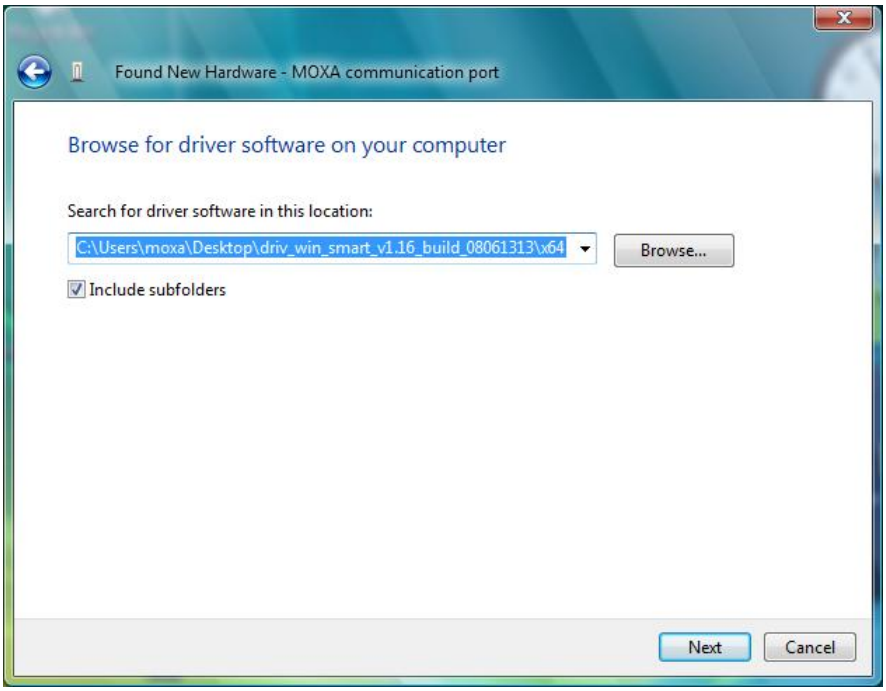


4. Select **Search for driver software in this location**, select **Include subfolders**, and then click **Browse**. If the system is a 32-bit (x86) platform, navigate to the **\CP-114EL Series\Software\Windows 2008_Vista\x86** folder on the CD. If the system is a 64-bit (x64) platform, navigate to the **\CP-114EL Series\Software\Windows 2008_Vista\x64** folder on the CD, and then click **Next** to continue.

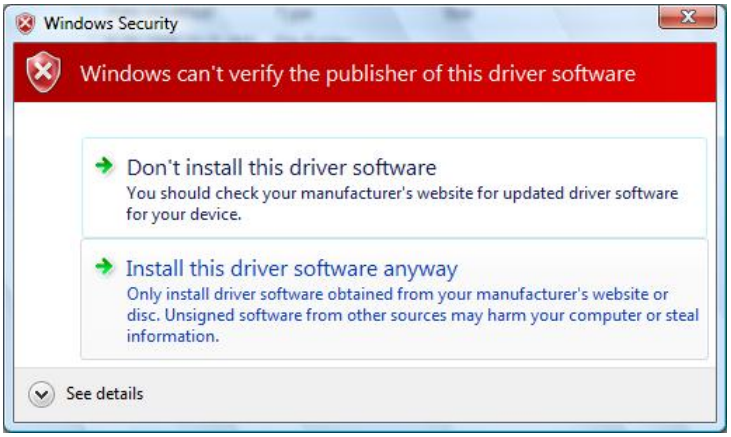
   The following figure shows the path for x86.



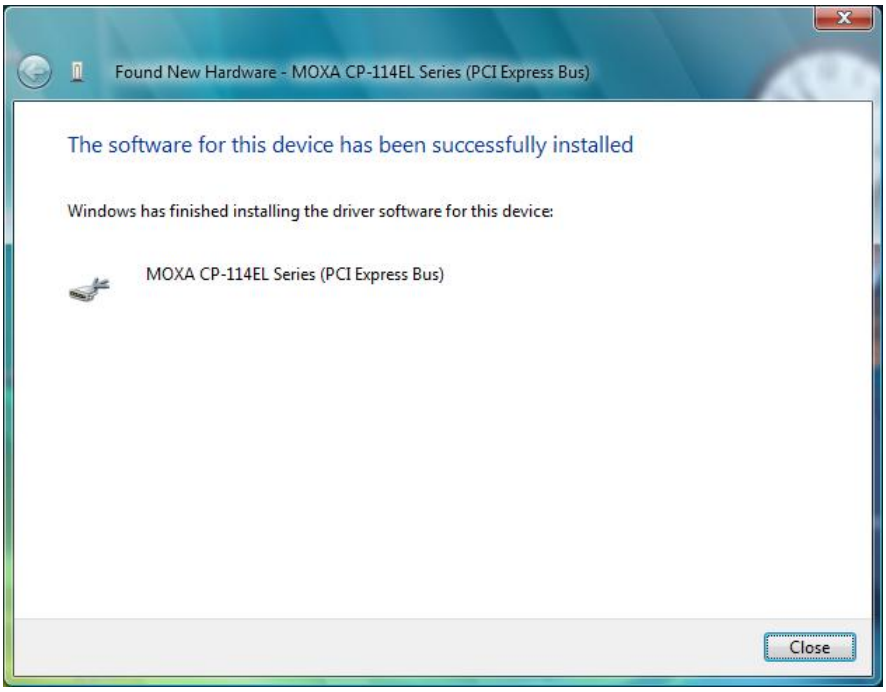
   The following figure shows the path for x64.



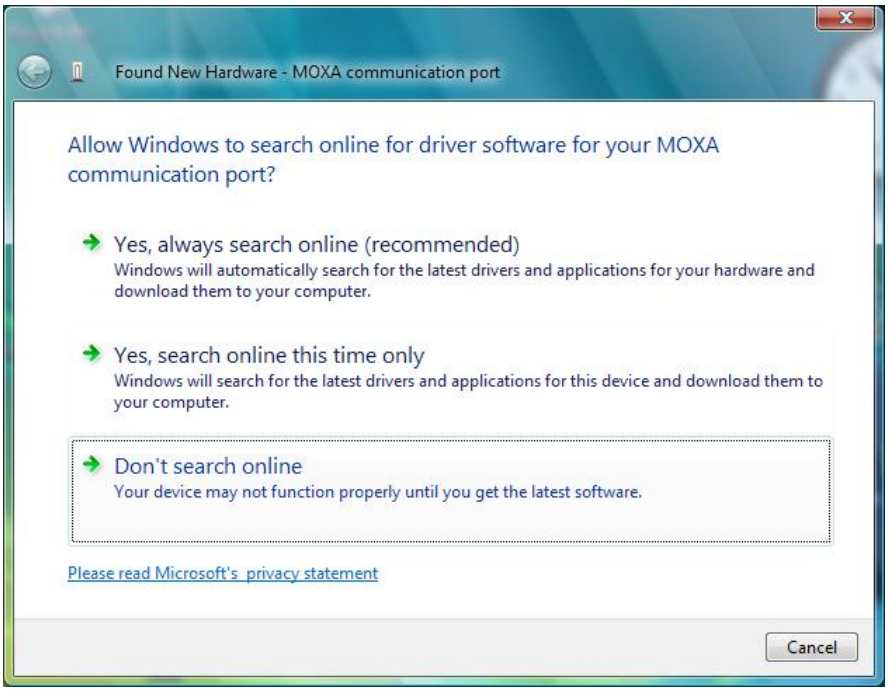
5. Wait while the installation wizard searches for the correct drivers. The next window that opens cautions you that although this software has not passed Windows Logo testing, the driver has been tested and shown that it can support the Windows OS. Click **Install this driver software anyway** to proceed.



6. Wait while the driver software is installed. The next window shows the model name of the board, and indicates that Windows has completed the driver installation. Click **Close** to proceed with the rest of the installation procedure.



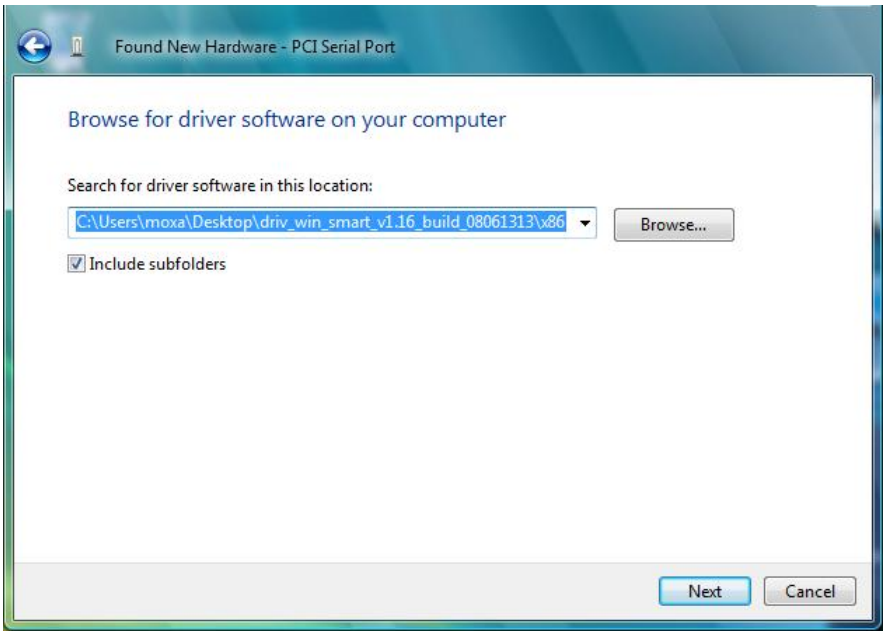
7. The Found New Hardware window will open to help you install the driver for MOXA Port 0. Select **Don't search online**.



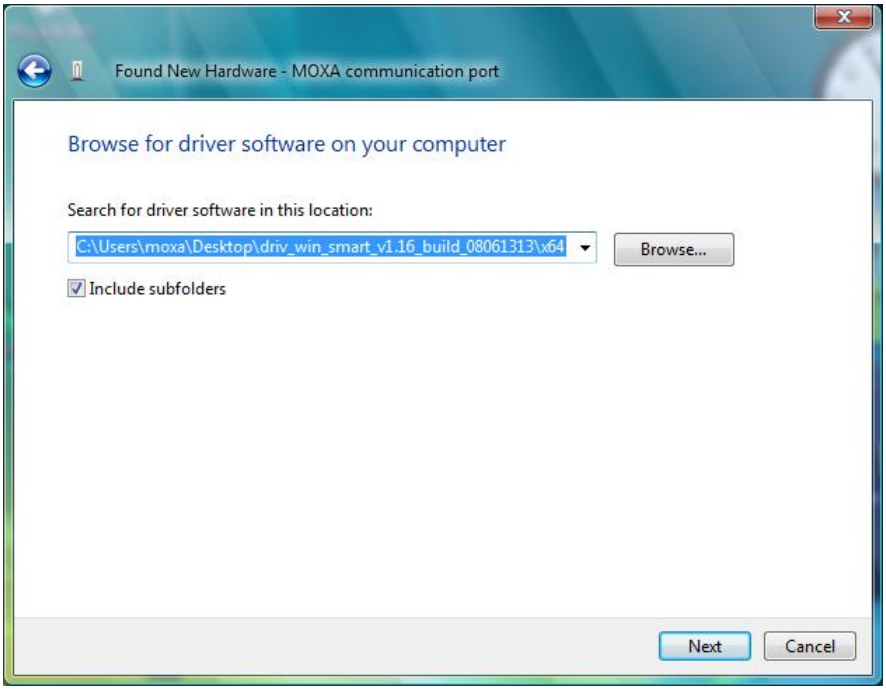
8. Select **Browse my computer for driver software (advanced)**.

9. Select **Search for driver software in this location**, select **Include subfolders**, and then click **Browse**. If the system is a 32-bit (x86) platform, navigate to the **\CP-114EL Series\Software\Windows 2008_Vista\x86** folder on the CD. If the system is a 64-bit (x64) platform, navigate to the **\CP-114EL Series\Software\Windows 2008_Vista\x64** folder on the CD, and then click **Next** to continue.

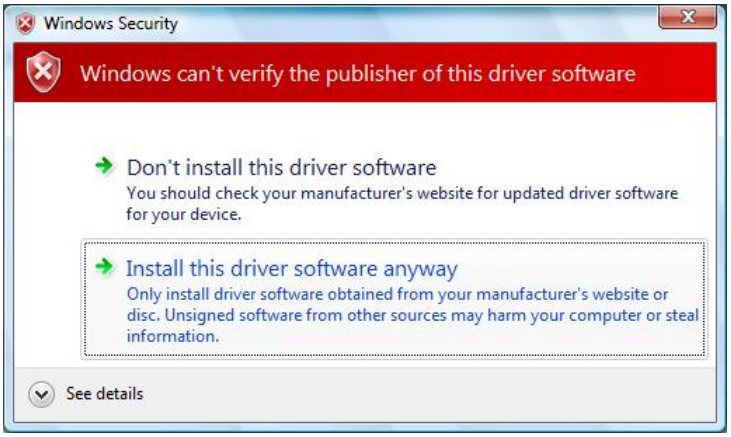
   The following figure shows the path for x86.



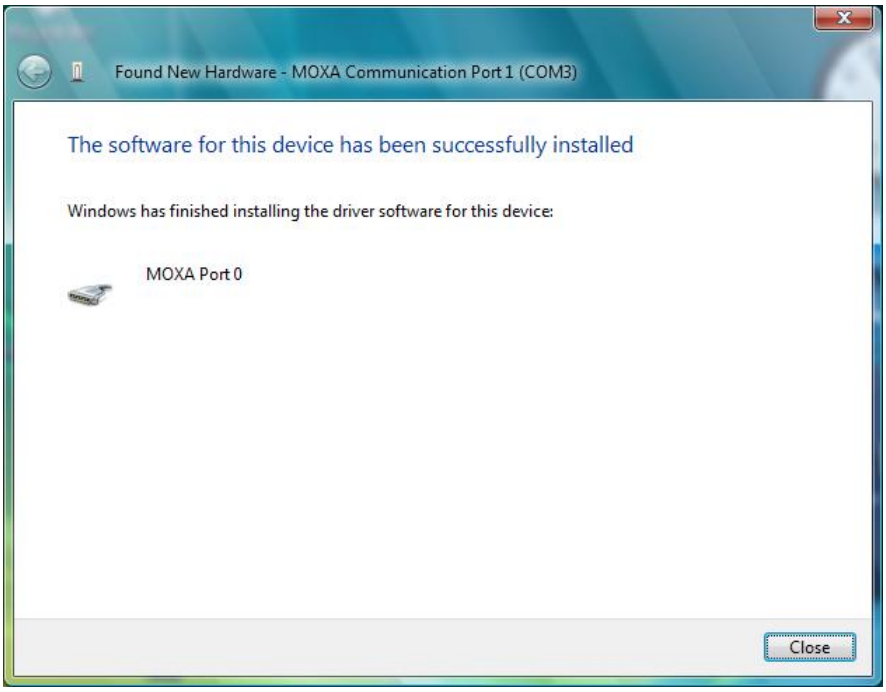
   The following figure shows the path for x64.



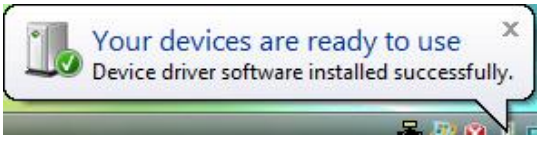
10. Wait while the installation wizard searches. The next window that opens cautions you that although this software has not passed Windows Logo testing, the driver has been tested and shown that it can support the Windows OS. Click **Install this driver software anyway** to proceed.



11. After all files have been copied to the system, the **software for this device has been successfully installed** window will open to indicate that it has finished installing **Port 0**. Port installation procedure is complete when Port 0 has been set up.



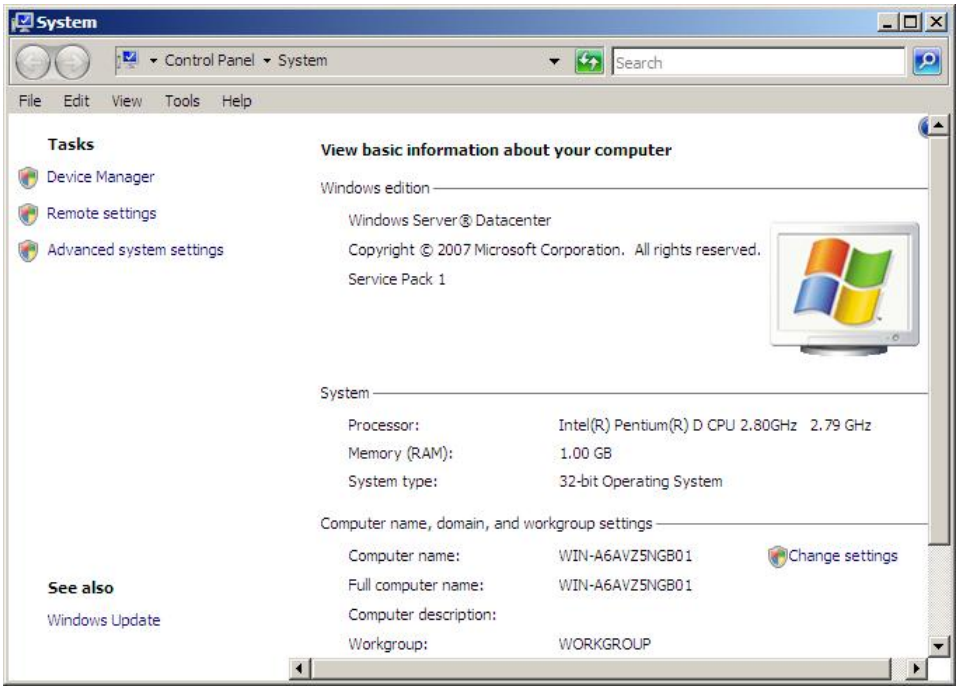
12. The “Your devices are ready to use” will reappear to inform you that the hardware was installed successfully.



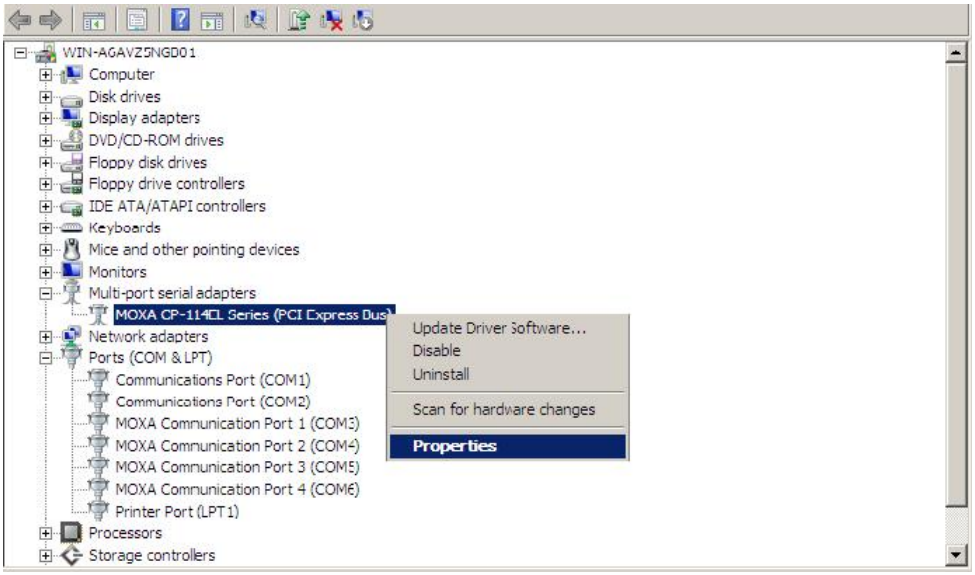
Configuring the Ports

After the driver has been installed, use Device Manager to configure the CP-114EL serial ports.

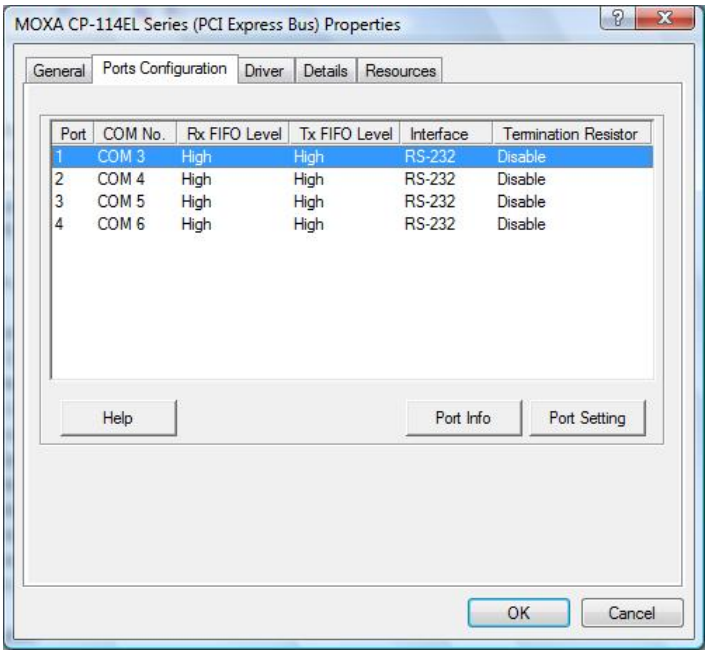
1. Click **Start → Settings → Control Panel → System**, select the **Hardware** tab, and then click **Device Manager**.



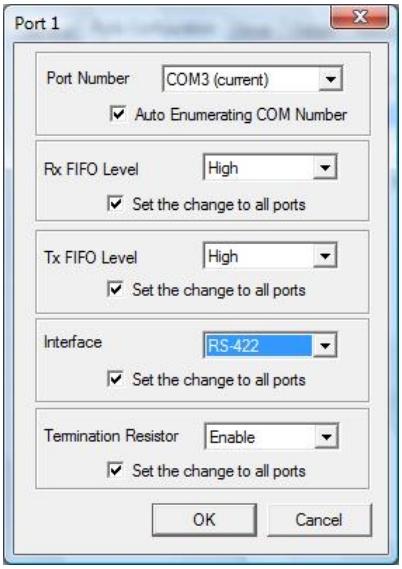
2. Expand the **Multi-port serial adapters** tab, right click **MOXA CP-114EL Series (PCI Express Bus)**, and then click **Properties** to open the board's configuration panel.



3. Click the port you would like to configure to highlight it, and then click **Port Setting**.



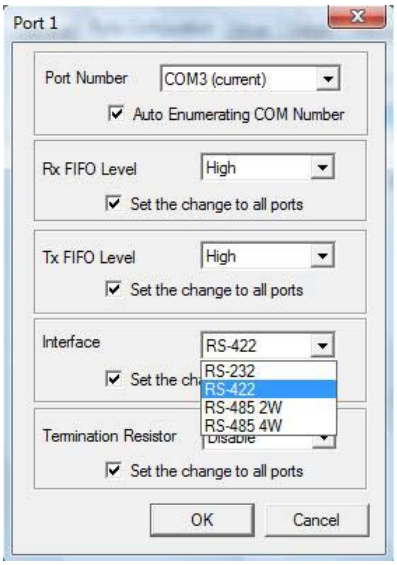
4. Select a COM number for the port from the **Port Numbe**r pull-down list.
5. Select the **Auto Enumerating COM Number** option to map subsequent ports automatically. The port numbers will be assigned in sequence. For example, if COM 3 is assigned to Port 1, then COM 4 (if not already occupied) will be assigned to Port 2, etc.
6. Select an **Rx FIFO** Trigger from the **Rx FIFO Level** pull-down list. Rx FIFO trigger levels of **High, Middle**, and **Low** are available, with the default set to High (120 bytes). Select **Set the change to all ports** option to apply this Rx FIFO Trigger to all ports.
7. Select a **Tx FIFO Level** from the **Tx FIFO Level** pull-down list. Tx FIFO Levels of **High, Middle**, and **Low** are available, with the default set to High (128 bytes). Select **Set the change to all ports** option to apply the just defined Tx FIFO Size to all ports.

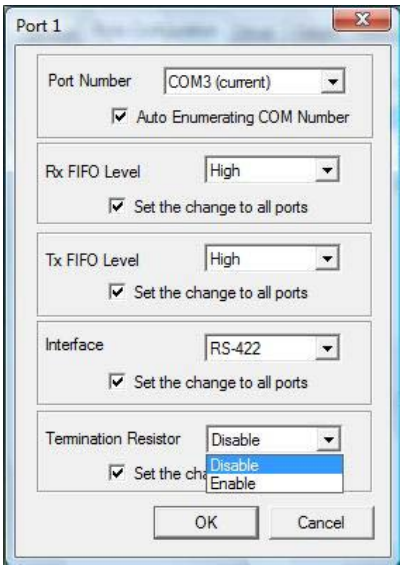


	Tx FIFO	Rx FIFO
High	128	120
Middle	64	60
Low	1	1

Unit: Bytes

8. If you use the CP-114EL, CP-114EL-I, CP-132EL, CP-132EL-I, CP-118EL-A, select **Interface** (RS-232, RS-422, 2-wire RS-485, 4-wire RS-485) and **Termination Resistor** (120Ω, Enable or Disable) to configure. Take CP-114EL for example. If you would like to configure as RS-422 and no Termination Resistor, please see figures below.





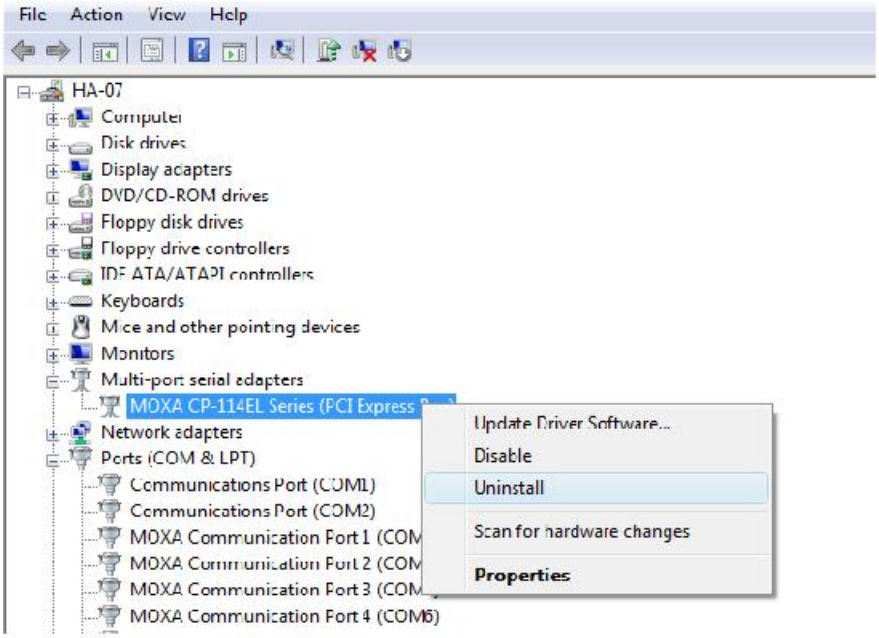
9. Click **OK** to save the port settings, and then click **OK** in the **Property** window to finish the

Using Event Log

To use the **Event Log** to check the installation of your MOXA boards, click **Start → Settings → Control Panel → Administrative Tools → Event Viewer** to enter the Event Viewer utility. Look under the System category to find the latest information relevant to Moxa's drivers.

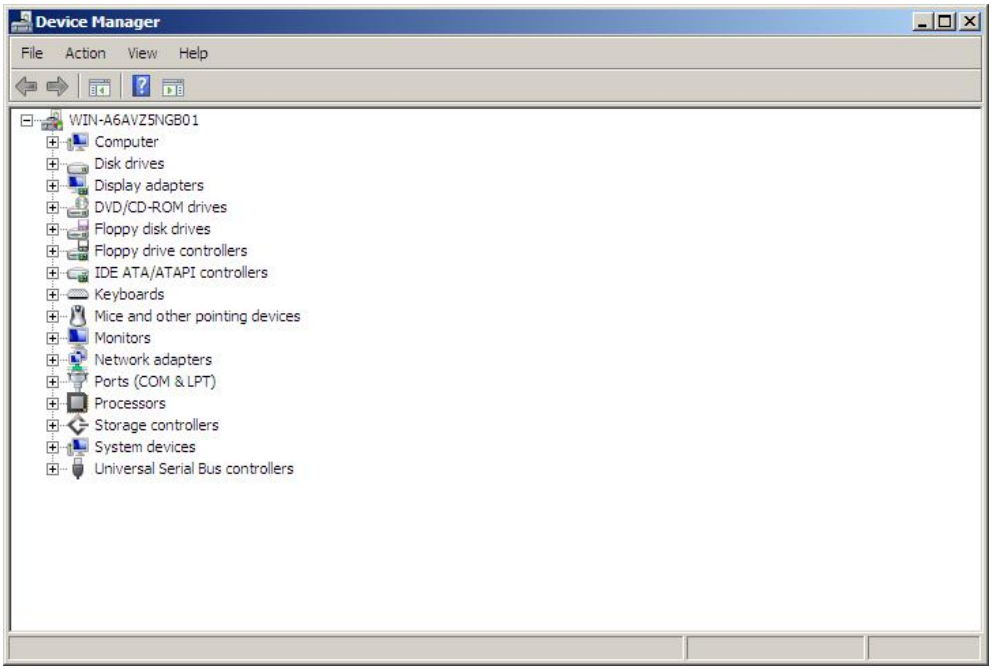
Removing the Driver

1. To uninstall the driver, click **Start → Settings → Control Panel → System**, select the **Hardware** tab, and then click **Device Manager**. Use the mouse to place the cursor over the CP-114EL Series board under **Multi-port serial adapters**, and then click the right mouse button. Select the **Uninstall** option.



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

3. The **Device Manager** window refreshes automatically, showing that the driver and ports for the CP-114EL Series board have been removed.



Windows 2003/XP (32-bit/64-bit)

In this section, we describe the installation procedure for Windows XP. The installation procedure for Windows 2003 is similar.

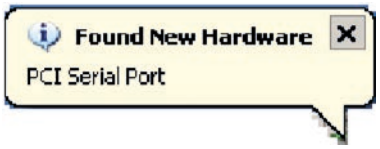
Windows 2003/XP support up to 256 serial ports, from COM1 to COM256. In order to make the best use of Windows 2003/XP's multi-process/multi-thread advanced features, 32-bit and 64-bit Windows 2003/XP device drivers were developed for Moxa multiport boards. The drivers conform to the Win32 COMM API standard.

Installing the Driver

The following procedure shows how to install the CP-118EL-A driver for the first time under Windows XP. First, make sure that you have already plugged the board or boards into the system's PCI Express slot(s).

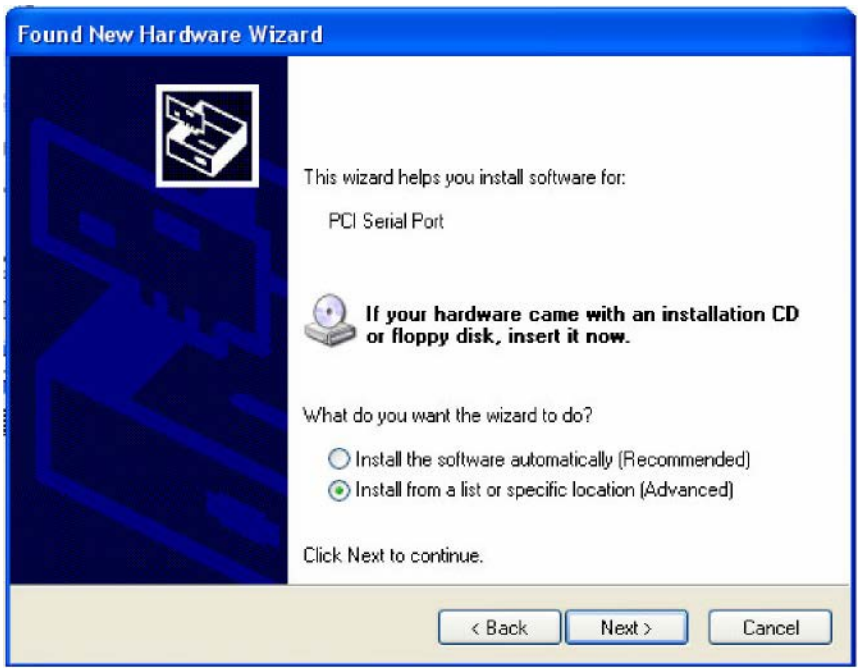
NOTE If you have already installed a CP-118EL-A or other Moxa PCI Express board in your computer, and you are installing additional boards, Windows 2003/XP will automatically detect and install the new board(s) the next time you boot up the computer. In this case, proceed directly to the next section, "Configuring the Ports," to configure the ports' serial transmission parameters.

1. After plugging the board into an expansion slot and powering on your PC, Windows XP will automatically detect the new board, and the **Found New Hardware** balloon will open in the bottom right corner of the Windows desktop.



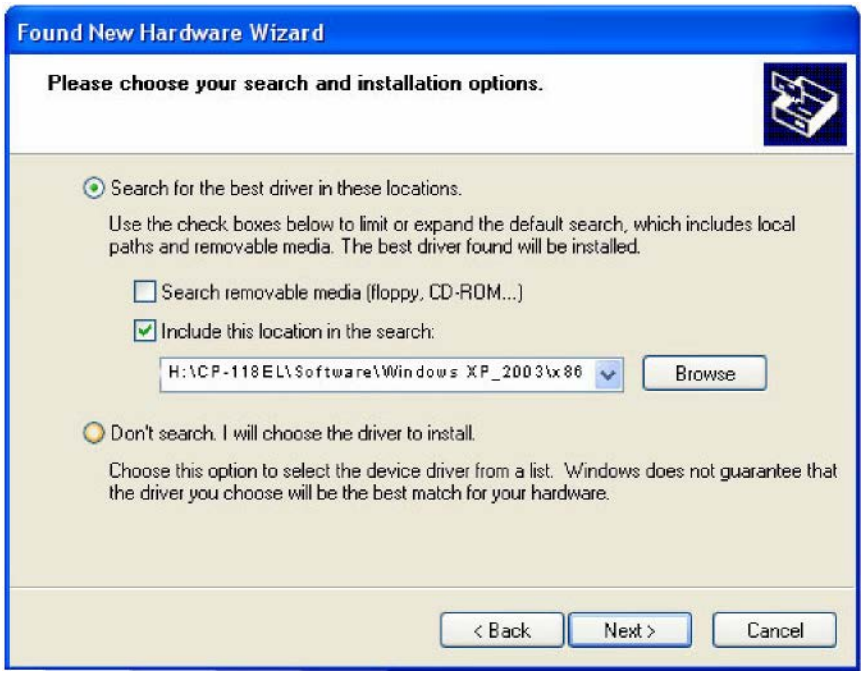
2. The **Welcome to the Found New Hardware Wizard** window will open automatically. This window will offer to connect to the Windows update site to search for a driver. Select **No, not at this time** and click **Next** to continue.

3. Select **Install from a list or specific location (Advanced)**, and then click **Next** to continue

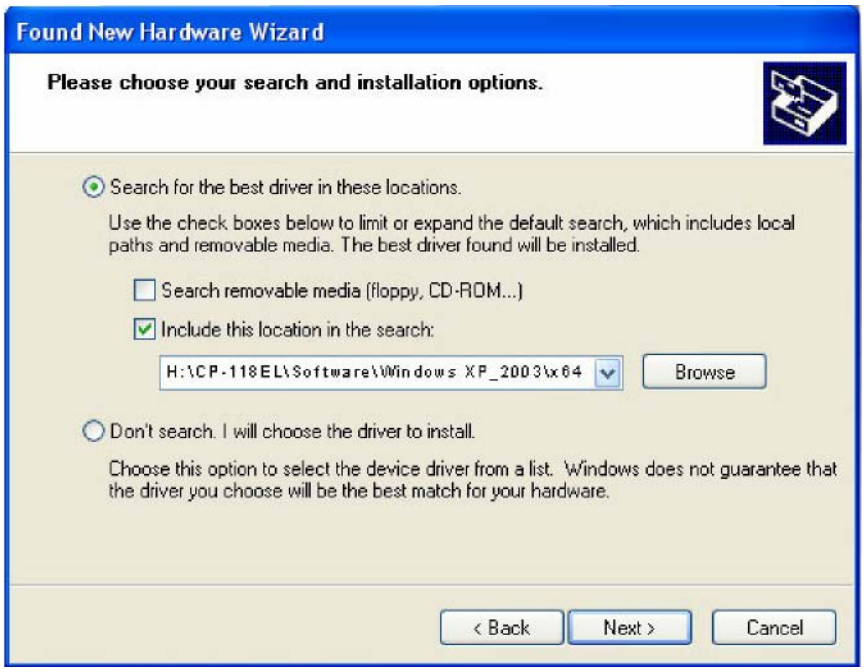


4. Select Search **for the best driver in these locations**, select **Include this location in the search**, and then click **Browse**. If the system is a 32-bit (x86) platform, navigate to the **\CP-118EL Series\Software\Windows XP_2003\x86** folder on the CD. If the system is a 64-bit (x64) platform, navigate to the **\CP-118EL Series\Software\Windows XP_2003\x64** folder on the CD, and then click **Next** to continue.

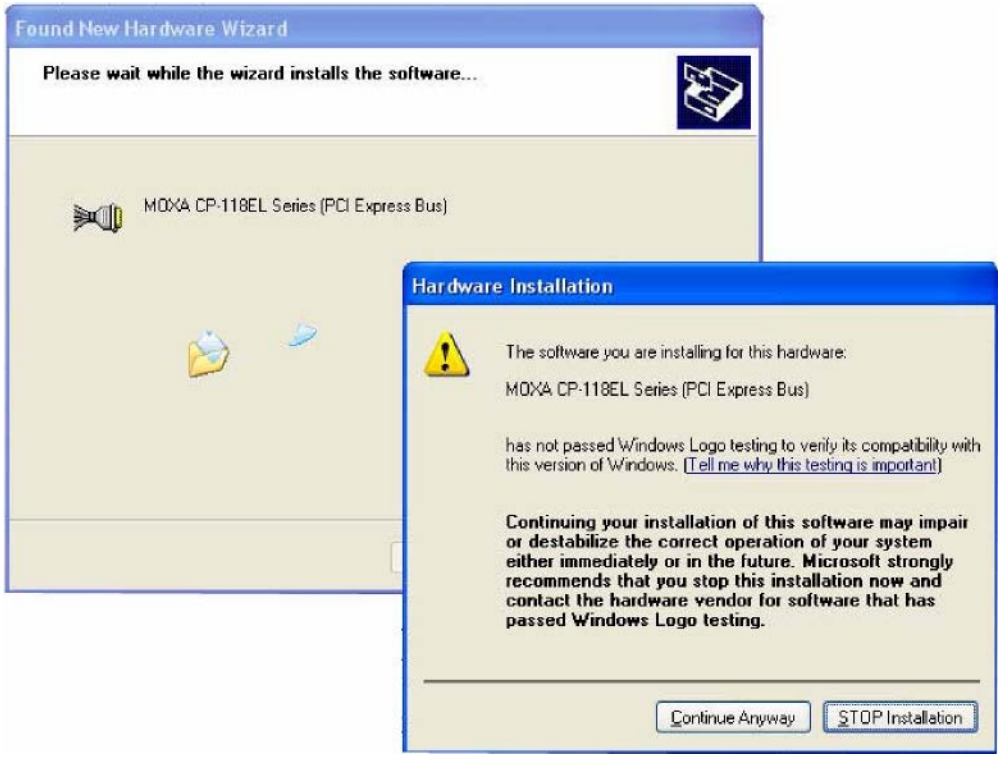
The following figure shows the path for x86.



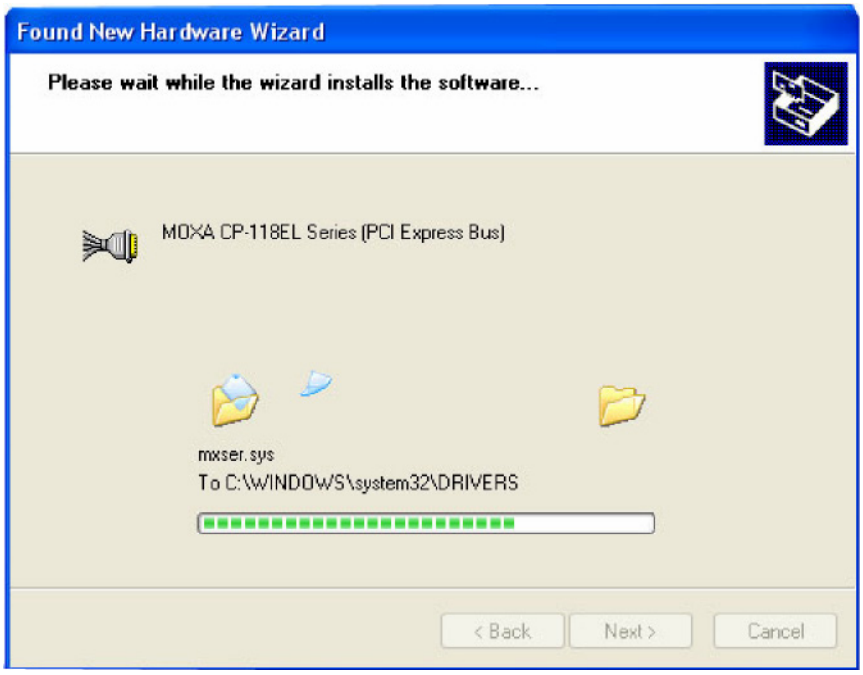
The following figure shows the path for x64.



5. Wait while the installation wizard searches for the correct drivers. The next window that opens cautions you that although this software has not passed Windows Logo testing, the driver has been tested and shown that it can support the Windows OS. Click **Continue Anyway** to proceed.



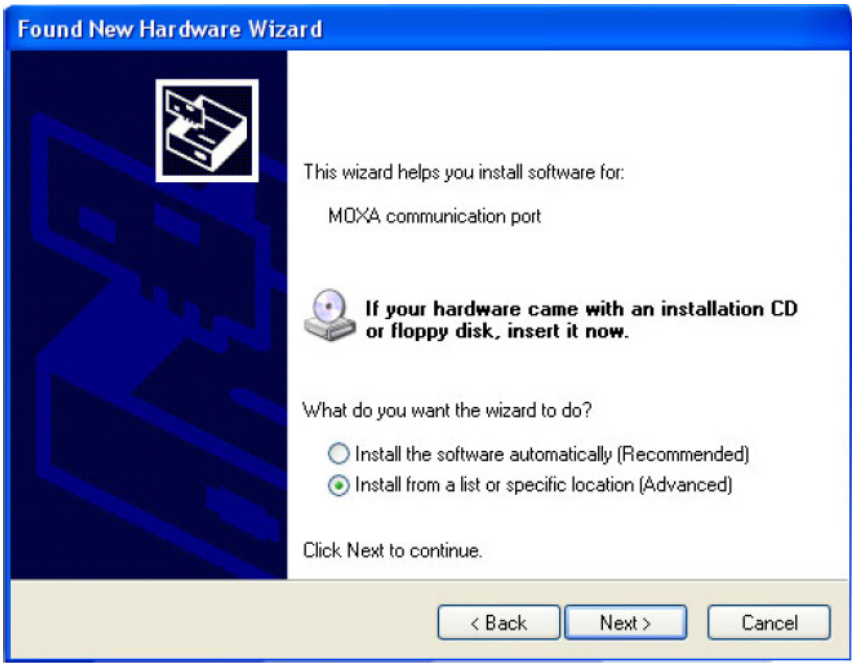
6. Wait while the driver software is installed.



7. The next window shows the model name of the board, and indicates that Windows has completed the driver installation. Click **Finish** to proceed with the rest of the installation procedure.

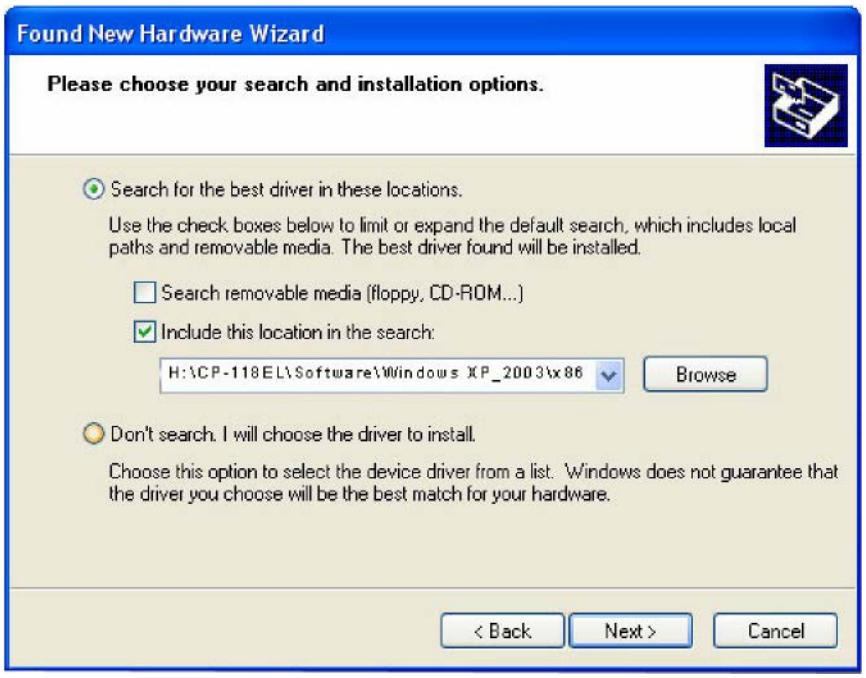
8. The **Found New Hardware Wizard** window will open to help you install the driver for Moxa Port 0. This window will offer to connect to the Windows update site to search for a driver. Select **No, not at this time** and then click **Next** to continue.

9. Select Install **from a list or specific location (Advanced)**, and then click **Next** to proceed.

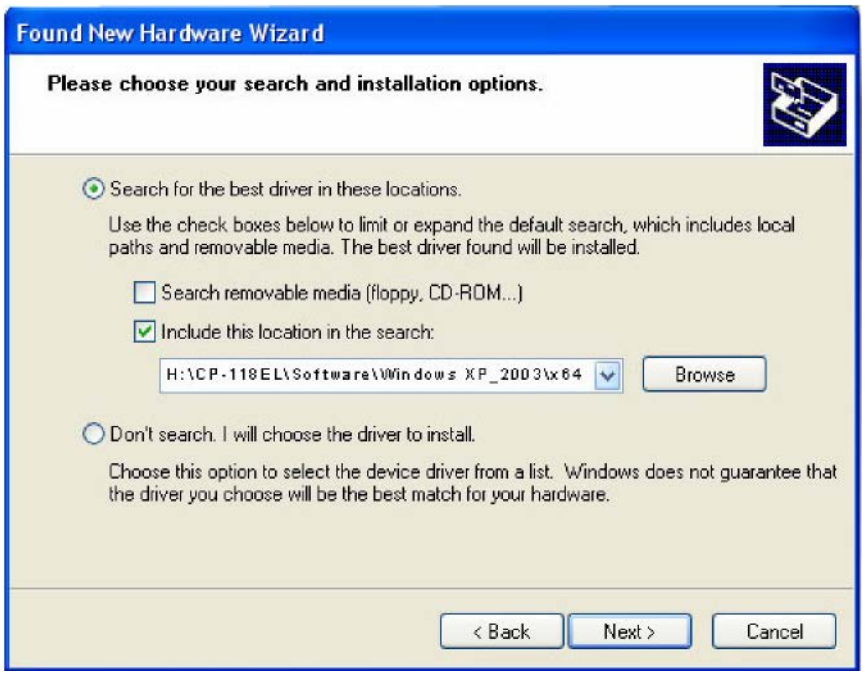


10. Select Search **for the best driver in these locations**, select **Include this location in the search**, and then click **Browse**. If necessary, use the **Browse** button to navigate to the **\CP-118EL Series\Software\Windows XP_2003\x86** folder (32 bit platform) or **\CP-118EL Series\Software\Windows XP_2003\x64** folder (64 bit platform), and then click **Next** to proceed.

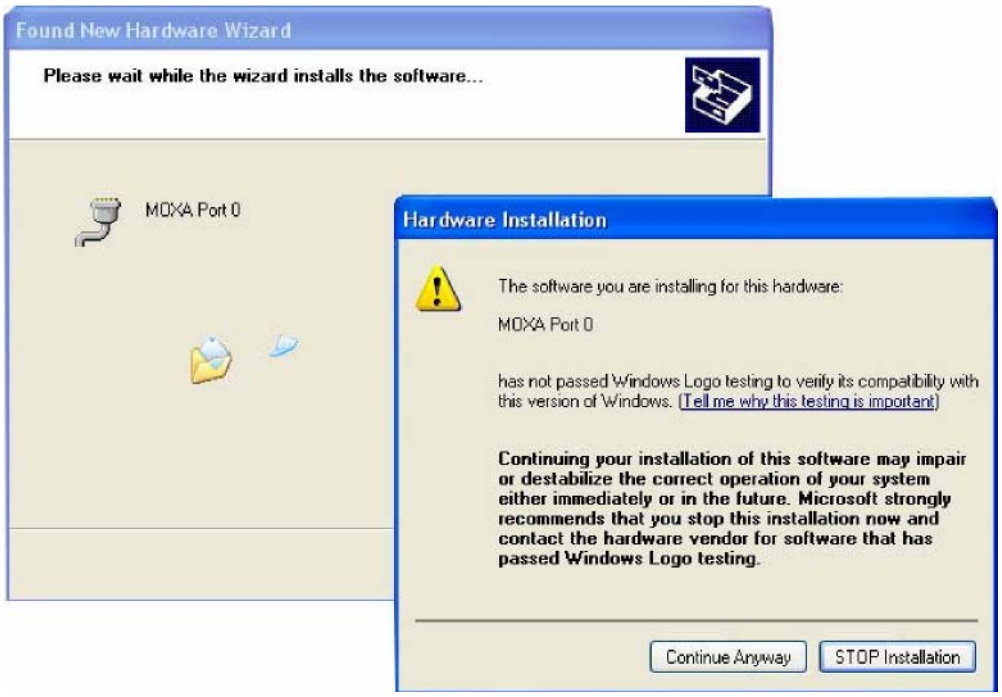
The following figure shows the path for x86.



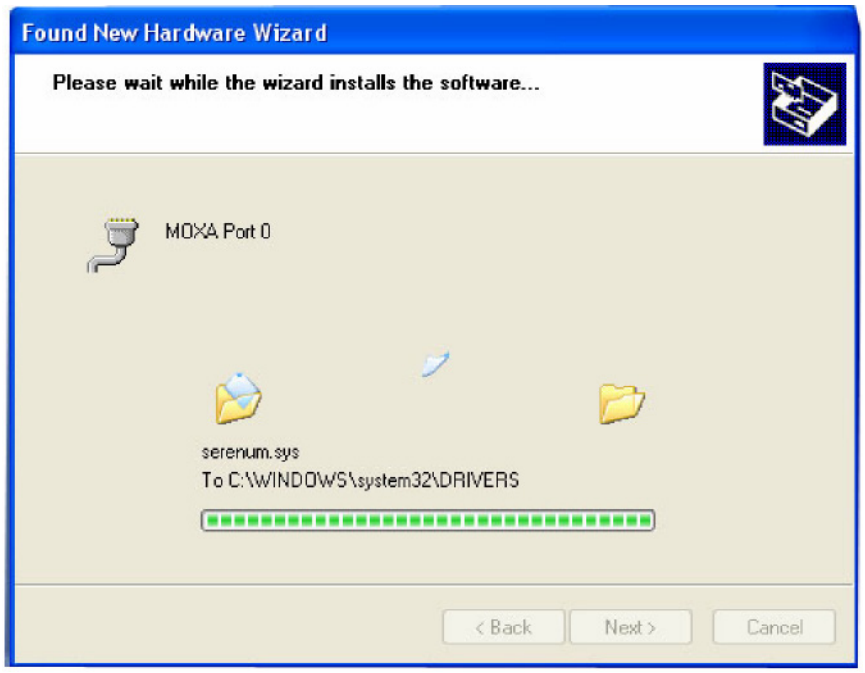
The following figure shows the path for x64.



11. Wait while the installation wizard searches. The next window that opens cautions you that although this software has not passed Windows Logo testing, the driver has been tested and shown that it can support the Windows OS. Click **Continue Anyway** to proceed.



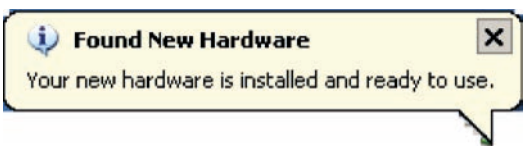
12. Wait while the wizard installs the software.



13. After all files have been copied to the system, the **Completing the Found New Hardware Wizard** window will open to indicate that it has finished installing **Port 0**. Click **Finish** to proceed with the rest of the installation.

14. Repeat Step 7 through Step 11 for each of the remaining seven ports. The last port to be installed will be Moxa Port 7, as shown in the following figure.

15. The **Found New Hardware** balloon will reappear to inform you that the hardware was installed successfully.

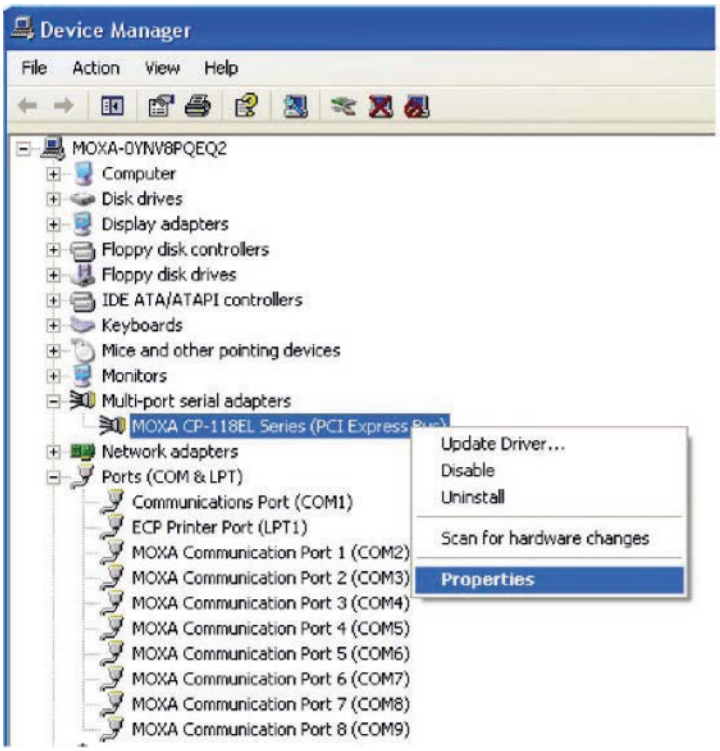


Configuring the Ports

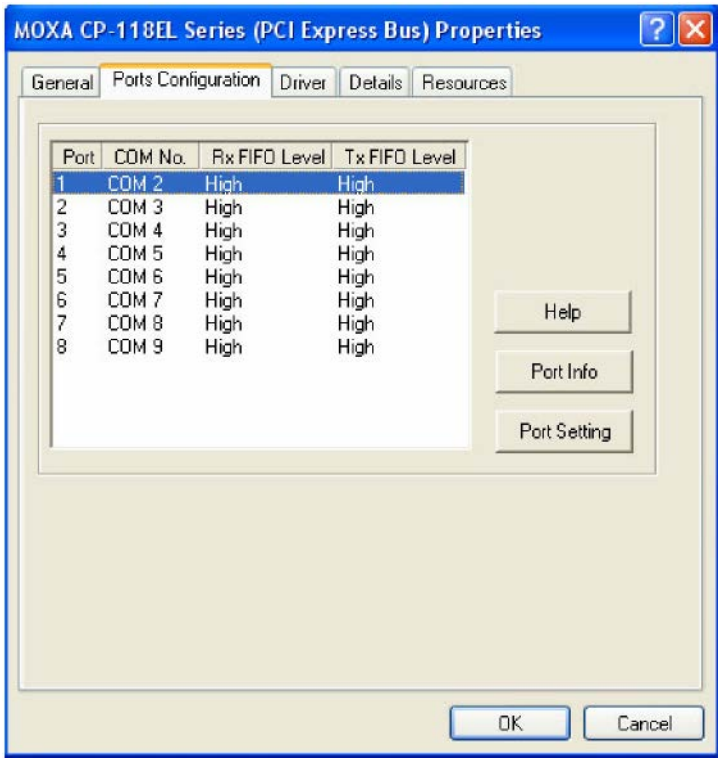
After the driver has been installed, use Device Manager to configure the CP-118EL serial ports.

1. Click **Start → Settings → Control Panel → System**, select the **Hardware** tab, and then click **Device Manager**.

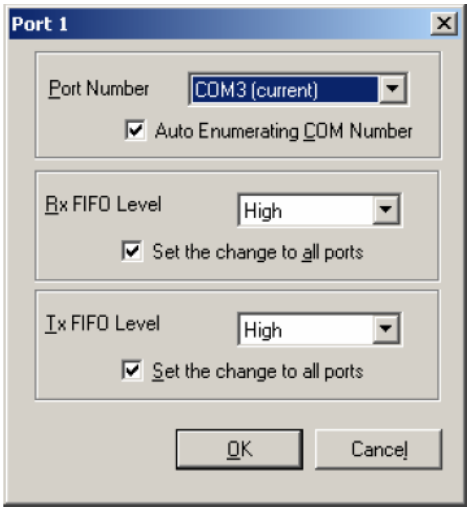
2. Expand the **Multi-port serial adapters** tab, right click **Moxa CP-118EL Series (PCI Express Bus)**, and then click **Properties** to open the board's configuration panel.



3. Click the port you would like to configure to highlight it, and then click **Port Setting**.



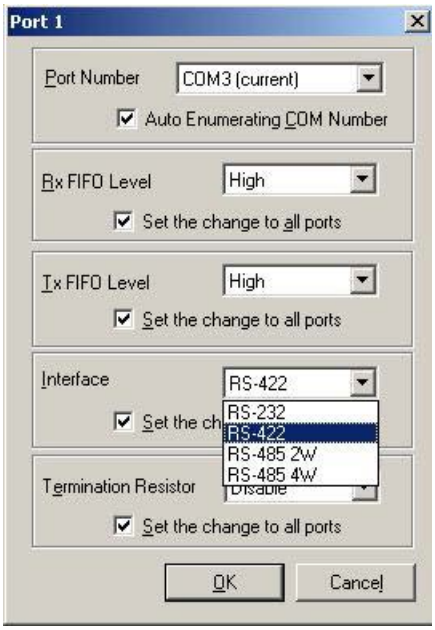
4. Select a COM number for the port from the **Port Number** pull-down list.
5. Select the **Auto Enumerating COM Number** option to map subsequent ports automatically. The port numbers will be assigned in sequence. For example, if COM 3 is assigned to Port 1, then COM 4 (if not already occupied) will be assigned to Port 2, etc.
6. Select an **Rx FIFO** Trigger from the **Rx FIFO Level** pull-down list. Rx FIFO trigger levels of **High**, **Middle**, and **Low** are available, with the default set to High (120 bytes). Select **Set the change to all ports** option to apply this Rx FIFO Trigger to all ports.
7. Select a **Tx FIFO Level** from the **Tx FIFO Level** pull-down list. Tx FIFO Levels of **High**, **Middle**, and **Low** are available, with the default set to High (128 bytes). Select **Set the change to all ports** option to apply the just defined Tx FIFO Size to all ports.

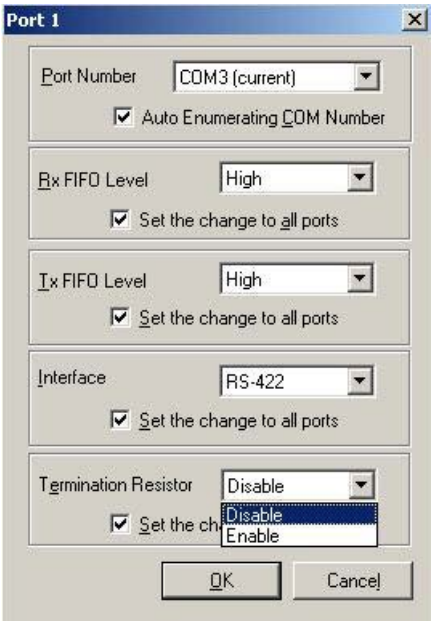


	Tx FIFO	Rx FIFO
High	128	120
Middle	64	60
Low	1	1

Unit: Bytes

8. If you use the CP-118EL-A, CP-114EL, CP-114EL-I, CP-132EL, CP-132EL-I, select **Interface** (RS-232, RS-422, 2-wire RS-485, 4-wire RS-485) and **Termination Resistor** (120Ω, Enable or Disable) to configure. Take the CP-114EL for example. If you would like to configure as RS-422 and no Termination Resistor, please see figures below.



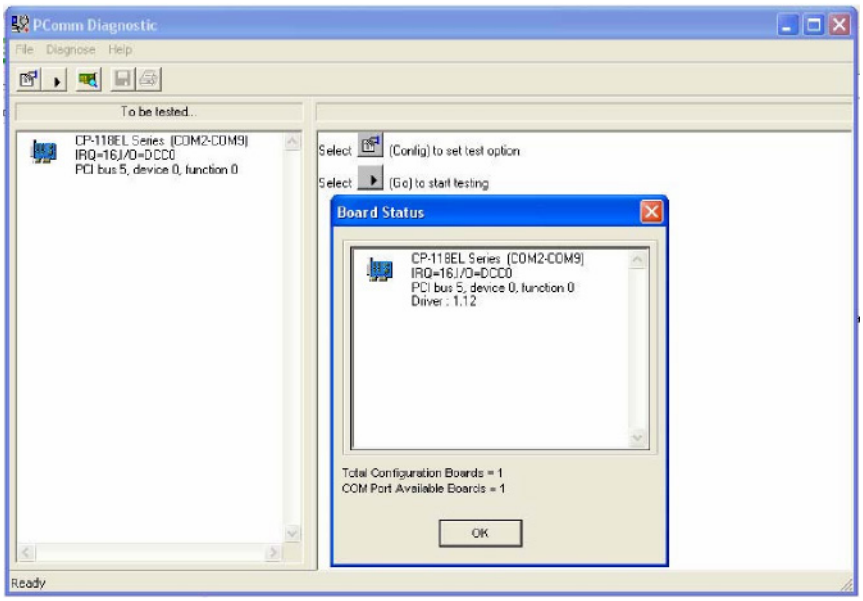


9. Click **OK** to save the port settings, and then click **OK** in the **Property** window to finish the port settings procedure.

Using Moxa PComm Utility

The PComm Diagnostic program is a useful tool for checking the status of Moxa's multiport 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.

To start the program, click **Start → Programs → PComm Lite 2000 → PComm Diagnostic**.



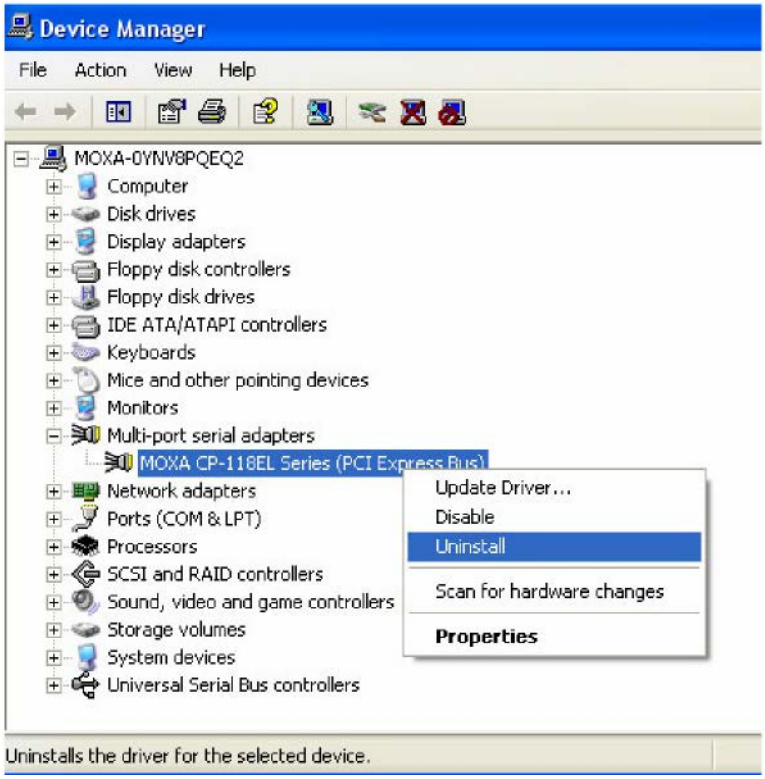
NOTE You can download the PComm Lite software for free from Moxa's website at www.moxa.com/support/free_downloads.htm.

Using Event Log

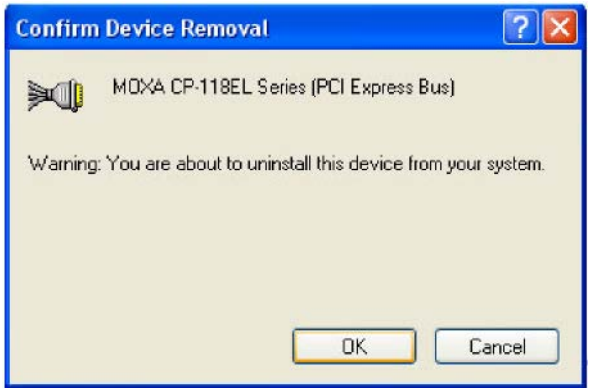
To use the **Event Log** to check the installation of your Moxa boards, click **Start → Settings → Control Panel → Administrative Tools → Event Viewer** to enter the Event Viewer utility. Look under the **System** category to find the latest information relevant to Moxa's drivers.

Removing the Driver

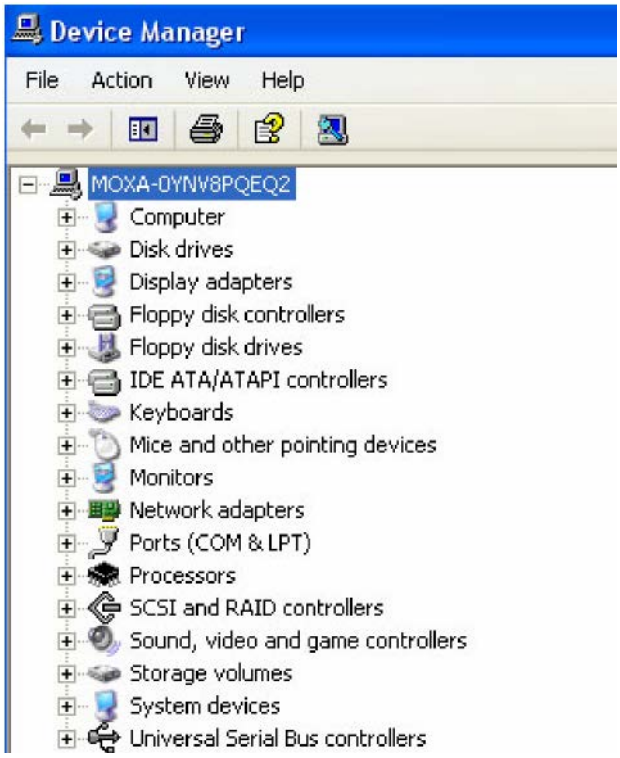
1. To uninstall the driver, click **Start → Settings → Control Panel → System**, select the **Hardware** tab, and then click **Device Manager**. Use the mouse to place the cursor over the CP-118EL Series board under **Multi-port serial adapters**, and then click the right mouse button. Select the **Uninstall...** option.



2. Click **OK** to proceed with uninstalling the board.



3. The **Device Manager** window refreshes automatically, showing that the driver and ports for the CP-118EL Series board have been removed.



Windows 2000

In this section, we describe the installation procedure for Windows 2000.

Windows 2000 supports up to 256 serial ports, from COM1 to COM256. In order to utilize fully Windows 2000's multi-process and multi-thread advanced features, pure 32-bit Windows 2000 device drivers were developed for Moxa multiport boards. The drivers conform to the Win32 COMM API standard.

Installing the Driver for the First Time

The following procedure shows how to install the CP-118EL-A driver for the first time under Windows 2000. First, make sure you have already plugged the board or boards into the system's PCI Express slot(s).

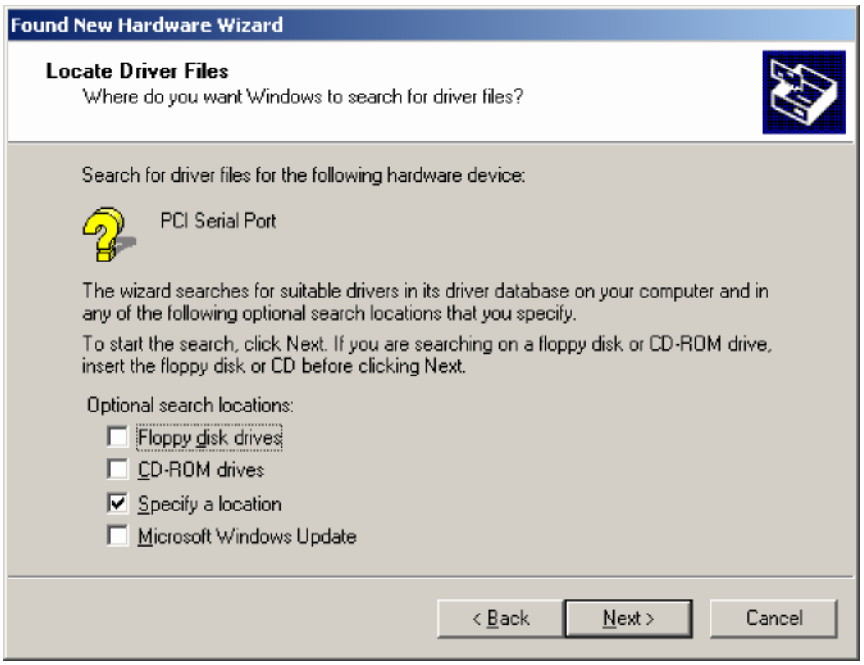
NOTE If you have already installed a CP-118EL-A or other Moxa PCI Express board in your computer, and you are installing additional boards, Windows 2000 will automatically detect and install the new board(s) the next time you boot up the computer. In this case, proceed directly to the next section, "Configuring the Ports," to configure the ports' serial transmission parameters.

1. After plugging the board into an expansion slot and powering on your PC, Windows 2000 will automatically detect the new board, and the **Found New Hardware** window will be displayed for a moment or two.

2. When the **Welcome to the Found New Hardware Wizard** window opens, click **Next** to continue.

3. Select Search **for a suitable driver for my device (recommended)**, and then click **Next** to continue.

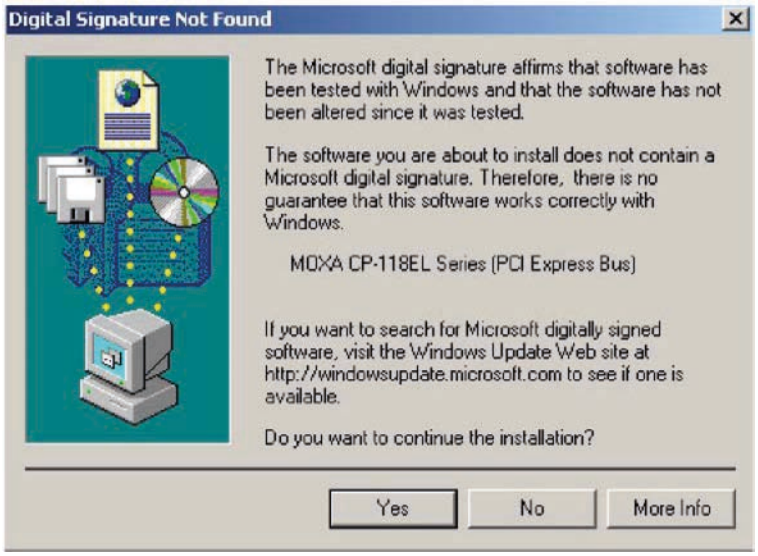
4. Select **Specify a location** and then click **Next** to continue.



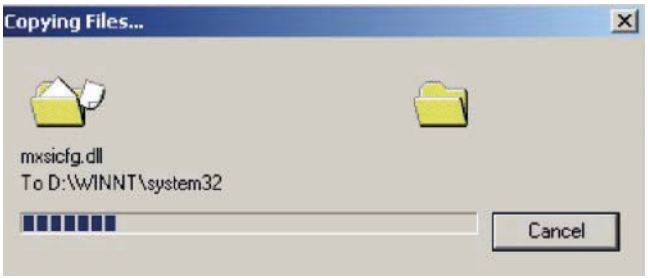
5. Navigate to the **\CP-118EL Series\Software\Windows 2K** folder on the software CD, and then click **OK** to continue.

6. Click **Next** to copy the driver files to your system.

7. The next window that opens cautions you that although this software has not passed Windows Logo testing, the driver has been tested and shown that it can support the Windows OS. Click **Yes** to proceed.



8. Wait while the files are copied to your hard drive.

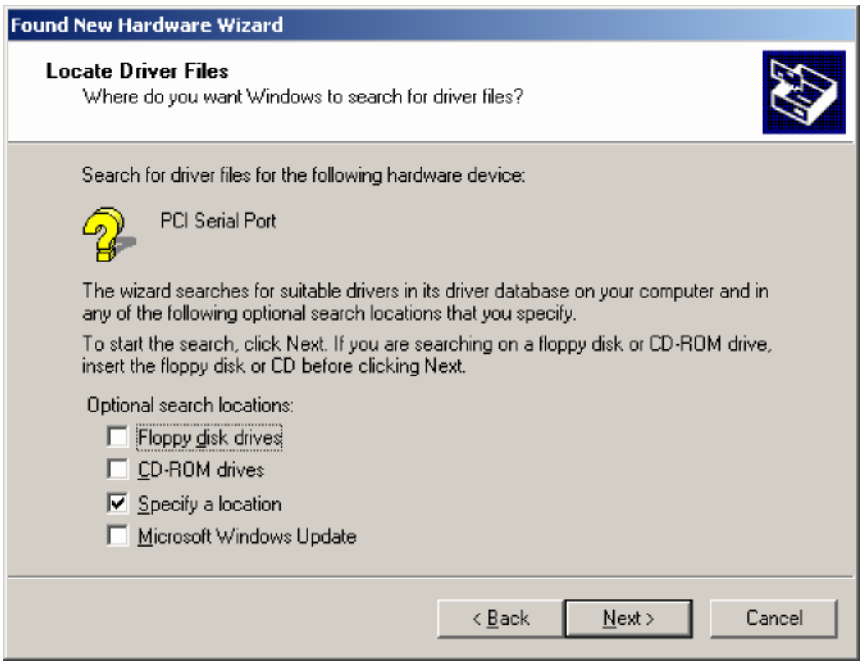


9. The next window shows the model number of the board, and indicates that Windows has completed the driver installation. Click **Finish** to continue with the rest of the installation procedure.

10. The **Found New Hardware** Wizard window will open to help you install the driver for Moxa Port 0. Click **Next** to continue.

11. Select **Search for a suitable driver for my device (recommended)**, and then click **Next** to continue.

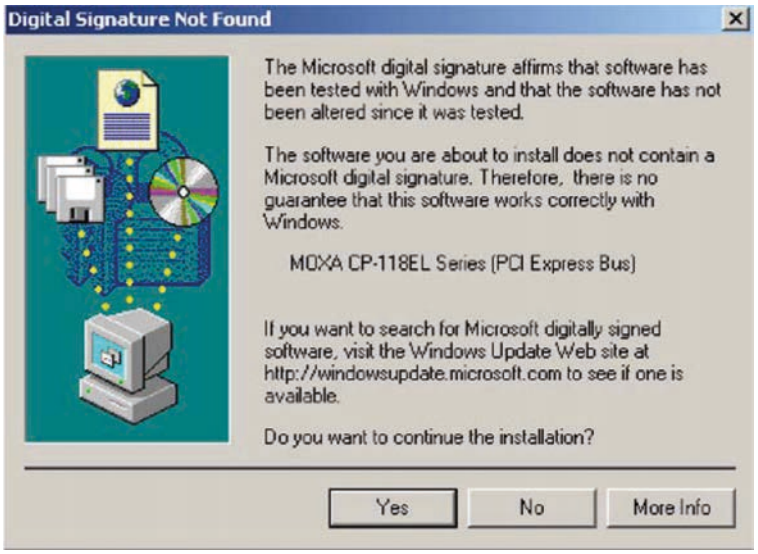
12. Select **Specify a location** and then click **Next** to continue.



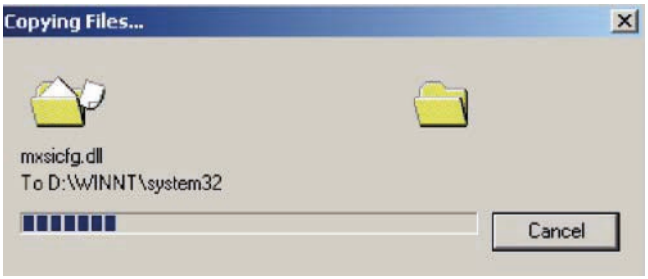
13. Navigate to the **\CP-118EL Series\Software\Windows 2K** folder on the software CD, and then click **OK** to continue.

14. Wait while the installation wizard searches.

15. The next window that opens cautions you that although this software has not passed Windows Logo testing, the driver has been tested and shown that it can support the Windows OS. Click **Yes** to proceed.



16. Wait while the files are copied to your hard drive.

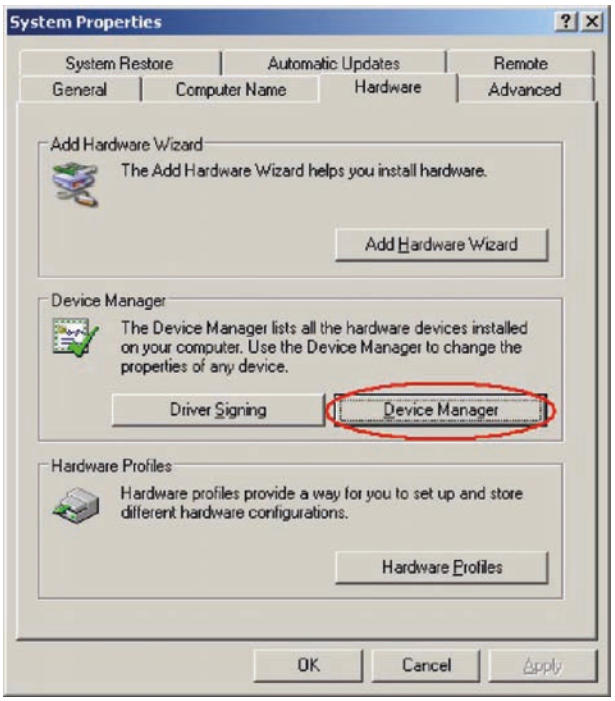


17. After all files have been copied to the system, the **Completing the Found New Hardware Wizard** window will open to indicate that it has finished installing **Port 0**. Click **Finish** to proceed with the rest of the installation.

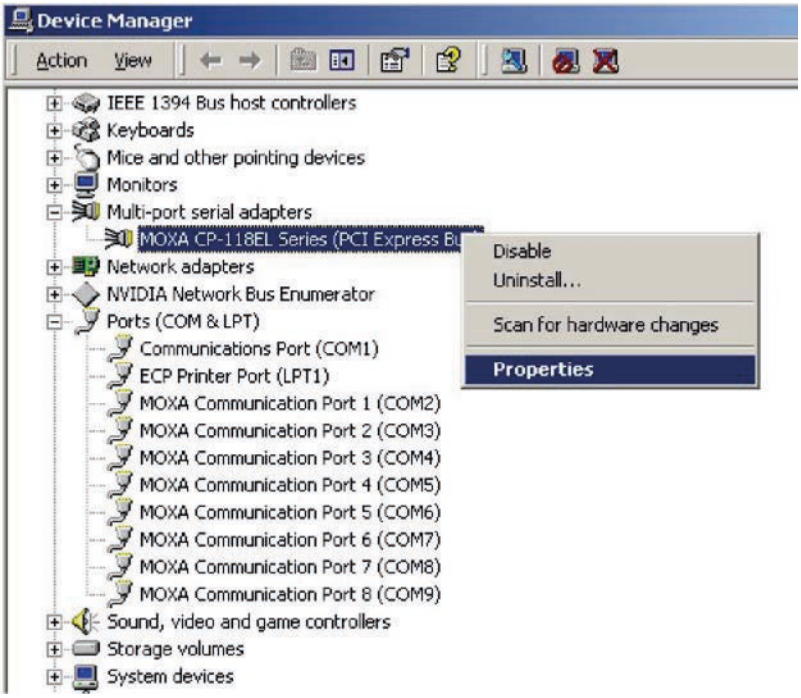
Configuring the Ports

After the driver has been installed, use Device Manager to configure the CP-118EL serial ports.

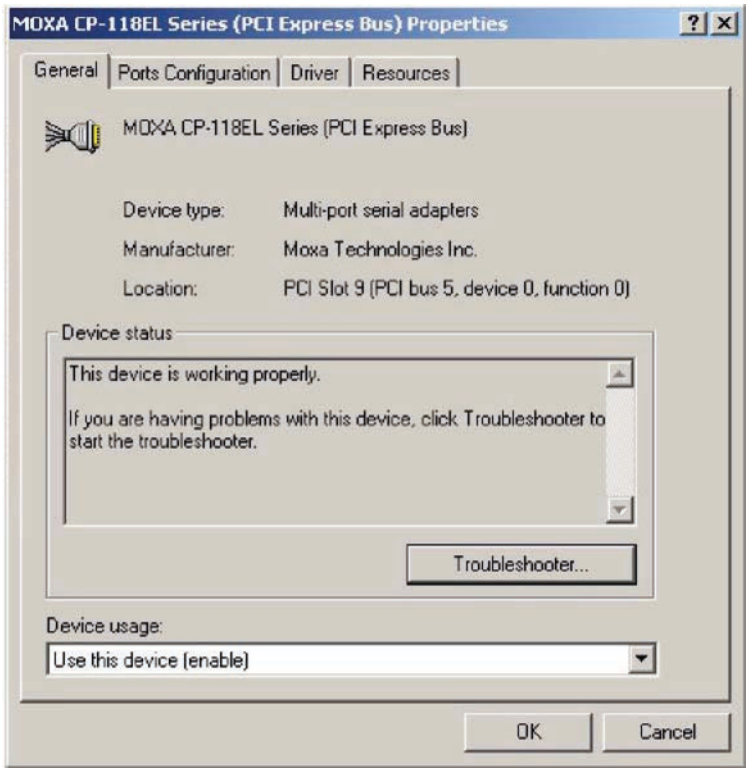
1. Click **Start → Settings → Control Panel → System**, select the **Hardware** tab, and then click **Device Manager**.



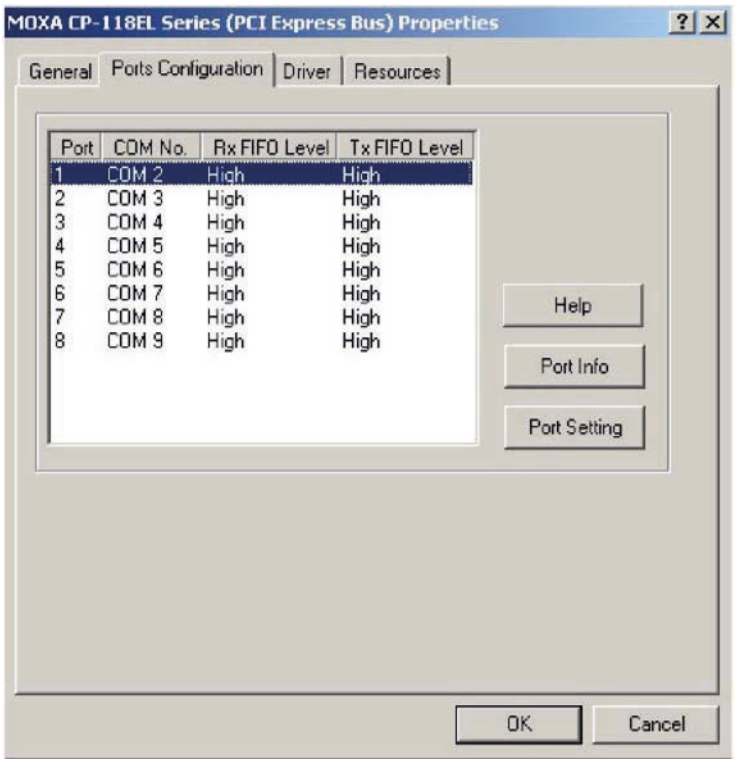
2. Expand the **Multi-port serial adapters** tab, right click **Moxa CP-118EL Series (PCI Express Bus)**, and then click **Properties** to open the board's configuration panel.



3. Basic information about the board is displayed on the **General** page. Click the **Ports Configuration** tab to configure the board's serial ports.

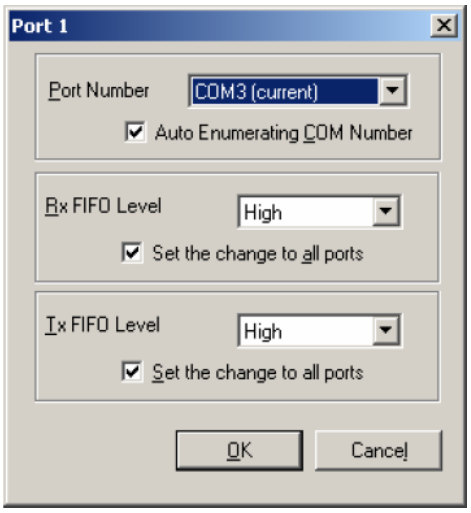


4. Click the port you would like to configure to highlight it, and then click **Port Setting**.



5. Select a COM number for the port from the **Port Number** pull-down list.
6. Select the **Auto Enumerating COM Number** option to map subsequent ports automatically. The port numbers will be assigned in sequence. For example, if COM 3 is assigned to Port 1, then COM 4 (if not already occupied) will be assigned to Port 2, etc.

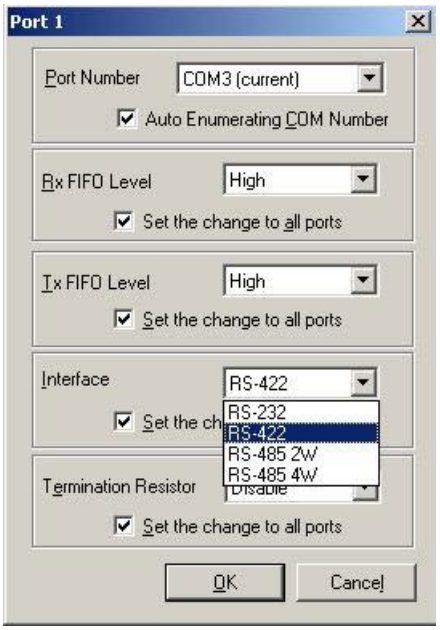
7. Select an **Rx FIFO Trigger** from the **Rx FIFO Level** pull-down list. Rx FIFO trigger levels of **High, Middle,** and **Low** are available, with the default set to High (120 bytes). Select Set **the change to all ports** option to apply this Rx FIFO Trigger to all ports.
8. Select a **Tx FIFO Level** from the **Tx FIFO Level** pull-down list. Tx FIFO Levels of **High**, **Middle**, and **Low** are available, with the default set to High (128 bytes). Select **Set the change to all ports** option to apply the just defined Tx FIFO Size to all ports.

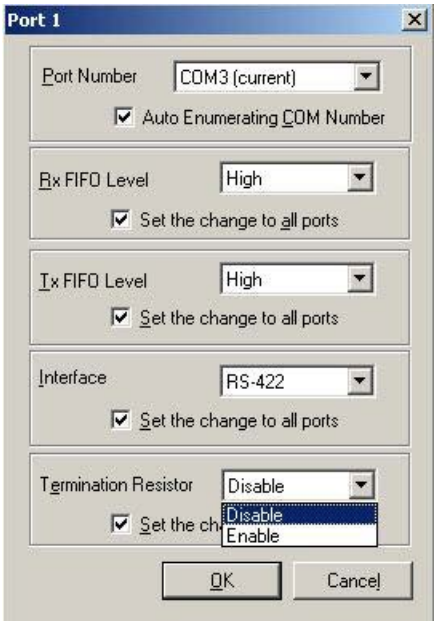


	Tx FIFO	Rx FIFO
High	128	120
Middle	64	60
Low	1	1

Unit: Bytes

9. If you use the CP-118EL-A, CP-114EL, CP-114EL-I, CP-132EL, CP-132EL-I, select **Interface** (RS-232, RS-422, 2-wire RS-485, 4-wire RS-485) and **Termination Resistor** (120Ω, Enable or Disable) to configure. Take the CP-114EL for example. If you would like to configure as RS-422 and no Termination Resistor, please see figures below.



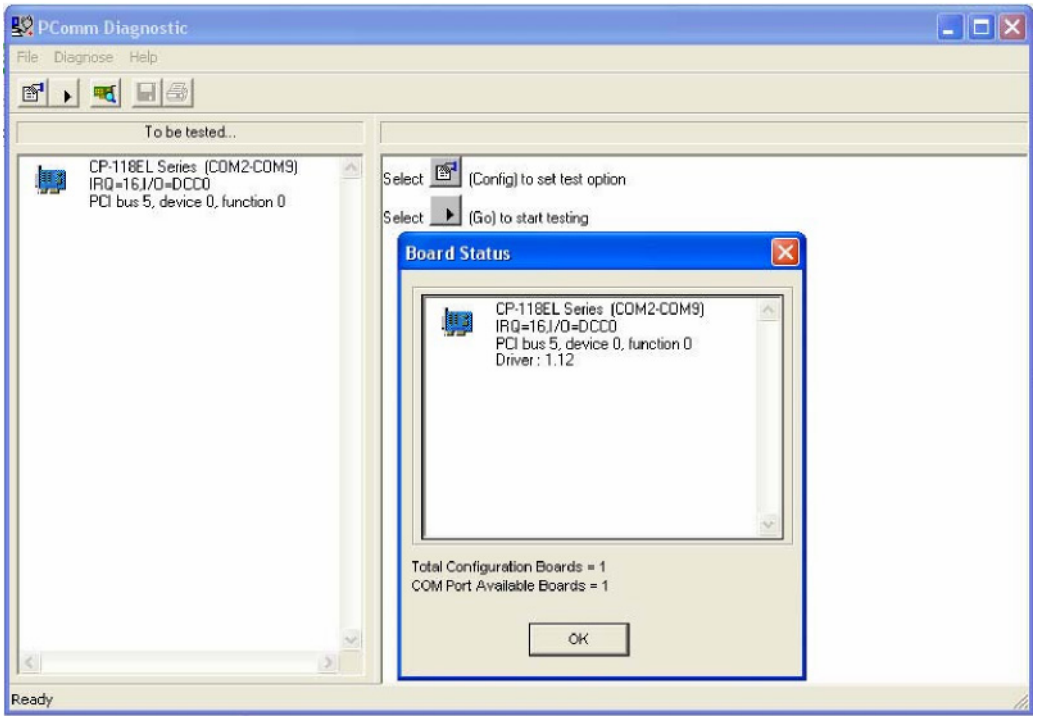


10. Click **OK** to save the port settings, and then click **OK** in the **Property** window to finish the port settings procedure.

Using Moxa PComm Utility

The PComm Diagnostic program is a useful tool for checking the status of Moxa's multiport 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.

To start the program, click **Start → Programs → PComm Lite 2000 → PComm Diagnostic**.



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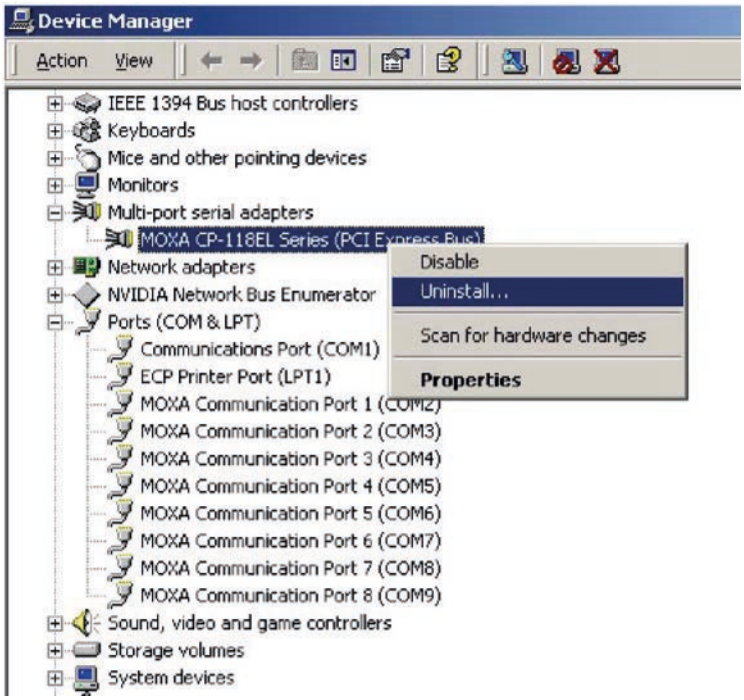
To use the **Event Log** to check the installation of your Moxa boards, click **Start → Settings → Control Panel → Administrative Tools → Event Viewer** to enter the Event Viewer utility. Look under the **System** category to find the latest information relevant to Moxa's drivers.

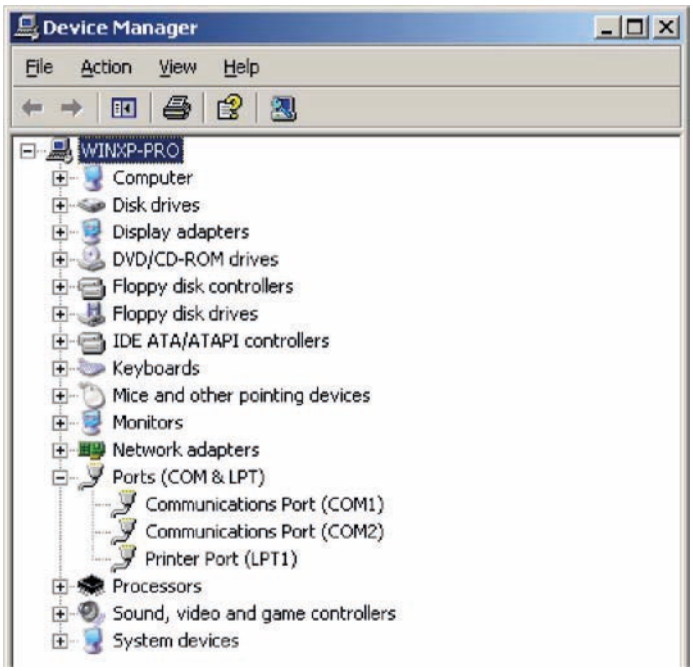
Removing the Driver

1. To uninstall the driver, click **Start → Settings → Control Panel → System**, select the **Hardware** tab, and then click **Device Manager**. Use the mouse to place the cursor over the CP-118EL Series board under **Multi-port serial adapters**, and then click the right mouse button. Select the **Uninstall...** option.



2. Click **OK** to proceed with uninstalling the board.

3. The **Device Manager** window refreshes automatically, showing that the driver and ports for the CP-118EL Series board have been removed.



Non-Windows Drivers

Drivers are provided for DOS, Linux, and SCO.

DOS

Moxa DOS API-232 is a software package that assists users in developing new programs, or debugging existing programs for serial communications. This section explains how to install the package, how to set up the driver, and how to load or unload the driver.

Moxa provides drivers that allow you to use the following serial board products under DOS:

- **PCI Express Boards:** CP-102E, CP-102EL, CP-132EL, CP-132EL-I CP-104EL-A, CP-114EL, CP-114EL-I, CP-118EL-A, CP-168EL-A

WARNING

If you are using a Serial ATA HDD under DOS, the installation process will also hang. In this case, change your HDD to IDE drive.

NOTE The following procedure shows how to install the CP-168EL driver under DOS.

Installing the Driver

1. Run the installation program, **DOSINST.EXE** from the **\Software\DOS** folder on the Documentation and Software CD. Specify the target API-232 directory (e.g. C:\Moxa) to which the driver will be copied. Press F2 to start the installation.

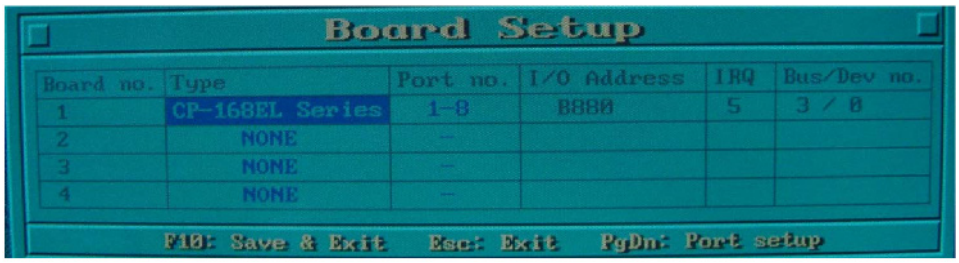
2. After the installation is complete, a window will open to ask if you want to run **SETUP.EXE**. Press **Y** to run the program.

Setting up the Driver

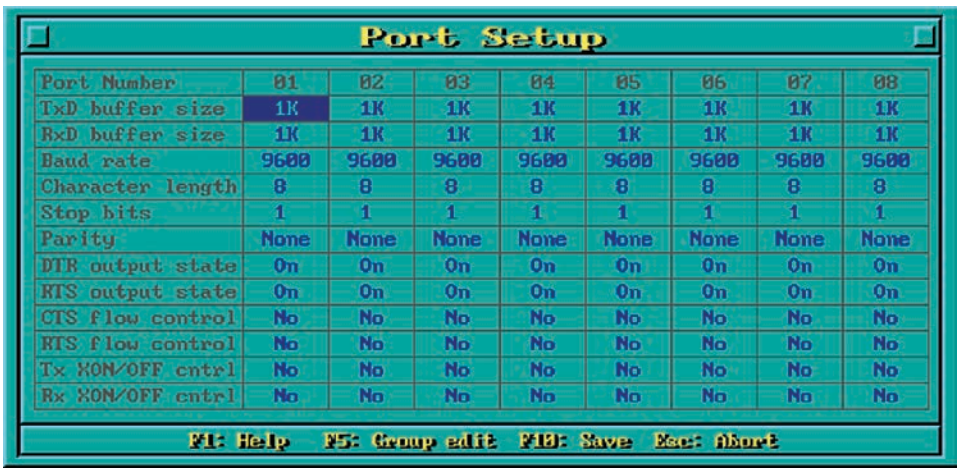
This section covers some of the setup program's most frequently used functions. For complete details, press F1 to open the on-line help file.

1. Run **BIN\SETUP.EXE**.
2. Press **Enter** to select the model name of the Moxa board you are installing.

3. A window will open displaying basic configuration information for all boards of this type currently installed in the system. Press **PgDn** to configure the port settings.



4. You may enter or modify the settings of each port at this stage. The values displayed first are the port's initial values that were set up when the driver was installed.



5. Press **F10** to save the changes and exit the SETUP program.

Legends

In this section, we explain the meaning of some of the fields and functions.

Port number

This is the ID of the port. Application software uses port number (ID) when referring to a port. You can set the port numbers to any number between 0 and 255 (inclusive). However, you must ensure that you assign each port a unique port number. If you are developing your own application software, then you may want to select port numbers that take into consideration the structure of the program.

TxD buffer size

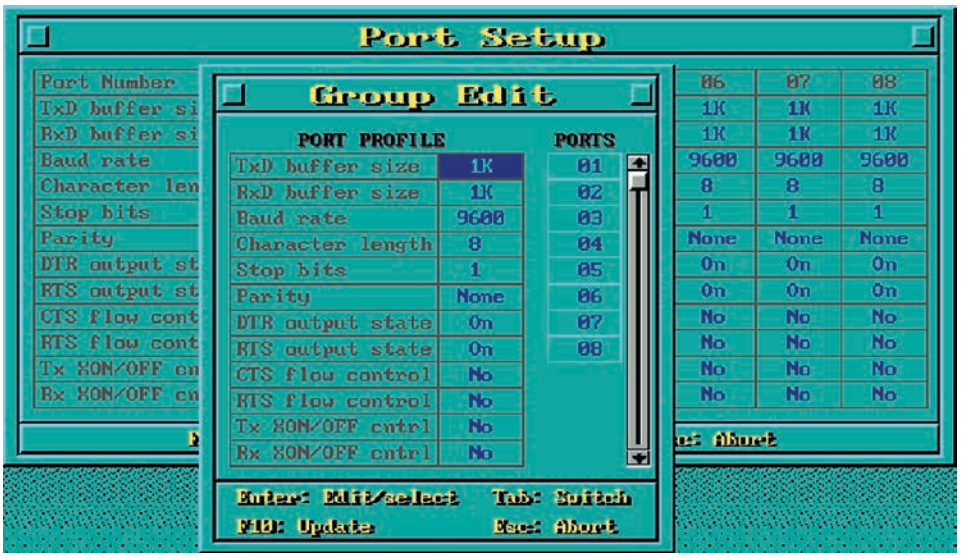
The TxD buffer is the transmission (output) buffer allocated by the system for each port.

RxD buffer size

The RxD buffer is the receiving (input) buffer allocated by the system for each port.

F5 Group Edit

This convenient function allows you to edit the configuration of several ports at one time as a group.



Loading the Driver

After completing the setup procedure, run **BIN\DP-DRV.EXE** from the DOS prompt to load the driver. The driver will automatically detect the boards that have already been installed. If one or more boards are detected, you will see a message similar to the following:

Smartio/Industio Family DOS driver Version 1.7

Setup driver ...

CP-168EL series (Bus= x ,Dev=y) : OK!

Device driver setup O.K.

This indicates that the CP-168EL Series driver has been installed properly. At this point, you may execute applications that support API-232 functions, or start developing applications using the API-232 library.

Unloading the Driver

To unload (release) the driver from memory, type **DP-DRV/Q** at the DOS prompt and then press **Enter**.

Linux (32-bit/64-bit)

Moxa provides drivers that allow you to use the following serial board products under Linux.

- **PCI Express Boards:** CP-118EL, CP-168EL, CP-104EL, CP-102E, CP-102EL, CP-132EL, CP-132EL-I, CP-114EL, CP-114EL-I

NOTE The following procedure shows how to install the CP-114EL driver under Linux.

Execute the following commands from the Linux prompt:

1. #mount /dev/cdrom /mnt/cdrom
   #cd /
   #mkdir moxa
   #cd moxa
   #cp /mnt/cdrom/<driver directory>/driv_linux_smart_vx.x_build_yymmddhh.tgz.
   #tar –xzvf driv_linux_smart_vx.x_build_yymmddhh.tgz.
2. #cd mxser
   #make clean; make install
3. #cd /moxa/mxser/driver
   #./msmknod
4. #modprobe mxupcie
5. For CP-132EL, CP-132EL-I, CP-114EL, CP-114EL-I, use the Moxa Port Configuration Tool to set Interface and Termination Resistor for the MUE series. The MUE series includes CP-102E, CP-102EL, CP-132EL, CP-132EL-I, CP-114EL and CP-114EL-I.

   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
	-t value	Set termination resistor with options below
intf	RS232	RS-232 mode
	RS422	RS-422 mode
	RS4852W	RS-485 2-wire mode
	RS4854W	RS-485 4-wire mode
value	NONTERM	Non termination resistor
	120TERM	120ohm termination resistor

   For example:
   To set the MUE interface
   # muestty –i RS422 /dev/ttyMUE2
   To set the MUE termination resistor
   # muestty –t 120TERM /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

SCO

- **SCO OpenServer 5**
- **SCO OpenServer 6**
- **SCO UnixWare 7**

Follow the steps given in this section to install the SCO OpenServer 5/6 & SCO UnixWare 7 driver. The installation procedures for SCO UnixWare 7 and SCO OpenServer 5/6 are similar.

1. Copy the driver file **.tar** to your host.
2. #tar xvf <driver tar file>
   #/tmp/moxa/mxinstall
3. The window shown below will open next. Press RETURN to continue.

```
================================================================

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Moxa Smartio/Industio Family Device Driver Installation (Ver. 1.11)

================================================================

For SCO UnixWare 7


Tar files, please wait.....O.K.

Press RETURN to continue
```

NOTE If your environment is SCO OpenServer 5/6, you could skip step 4 & 5

4. When you see the screen below, select “Esc” to exit and reboot your computer.

MOXA Smartio/Industio Family Installation Utility (Ver 1.11)

Smartio/Industio Family Basic Configuration				
Board No.	Board Type	I/O Address	Interrupt	Bus/Dev No.
1	None	----------	----------	----------
2	None	----------	----------	----------
3	None	----------	----------	----------
4	None	----------	----------	----------
PgDn: getty Setting Esc: Exit Enter: Confirm Input Value Tab: Change Item				

5. After rebooting computer, key in “moxaadm”, you will see MAIN MENU, select **Basic Configuration.**

MAIN MENU
Basic Configuration
Advanced Configuration
Interface Configuration
Port Monitoring
Terminal Emulation
Driver Removal
Exit

6. You will see the following screen. Press Enter to select the MOXA Multiport Serial Board you installed by port and by model. For example, if you installed the CP-104EL, select 4 ports and then CP-104EL.

MOXA Smartio/Industio Family Installation Utility (Ver 1.11)

Smartio/Industio Family Basic Configuration				
Board No.	Board Type	I/O Address	Interrupt	Bus/Dev No.
1	None	----------	----------	----------
2	None	----------	----------	----------
3	None	----------	----------	----------
4	None	----------	----------	----------
PgDn: getty Setting Esc: Exit Enter: Confirm Input Value Tab: Change Item				

7. The board's basic information, such as I/O address, Bus No., and Device No., will be shown. The SCO system will assign the resources automatically to the PCI Express board you selected.
8. Next, press "Esc" to exit and reboot your computer.

NOTE Steps 9 & 10 are only for CP-132EL Series and CP-114EL Series

9. After rebooting, key in "moxaadm". When you see MAIN MENU, select **Interface Configuration** to set your Resister and Interface. For example, if you want to set one of the CP-114EL ports as RS-422 and 120Ω, you have to select RS-422 and 120Ω.
10. Save your Interface Configuration and then reboot computer again.
11. Note that whenever you change a MAIN MENU item, you have to reboot your computer.

4

Serial Programming Tools

Moxa provides an easy to use yet powerful serial programming library, and communication troubleshooting utilities under Windows 2000/XP/2003, Windows 95/98, and Windows NT. The following sections provide details about the installation, the library, and the utilities for various platforms.

The following topics are covered in this chapter:

- **Moxa PComm**
  - Installing PComm
  - PComm Programming Library
- **Utilities**
  - Diagnostics (for Moxa boards only)
  - Monitor (for Moxa boards under Windows 2000/XP/2003)
  - Terminal Emulator
- **RS-485 Programming**
  - ADDC™

Moxa PComm

PComm, a professional serial communication tool for PCs, is a software package that runs under Windows NT95/98/2000/XP/2003. PComm provides:

- A powerful serial communication library that simplifies serial programming tasks for most popular programming languages. The serial communication library is useful for developing applications for data communications, remote access, data acquisition, and industrial control under Windows NT95/98/2000/XP/2003, 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 on-line documentation.

Installing PComm

To install PComm, run **\Setup.exe** from the Documentation and Software CD. 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) device driver installed in your system. See the "Software Installation" chapter for instructions on how to install the drivers.

After installing PComm, click **Start**, select **Program Files**, 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 communications programs for any COM port that complies with the Microsoft Win32 API. This library facilitates the implementation of multi-process, multi-thread 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.

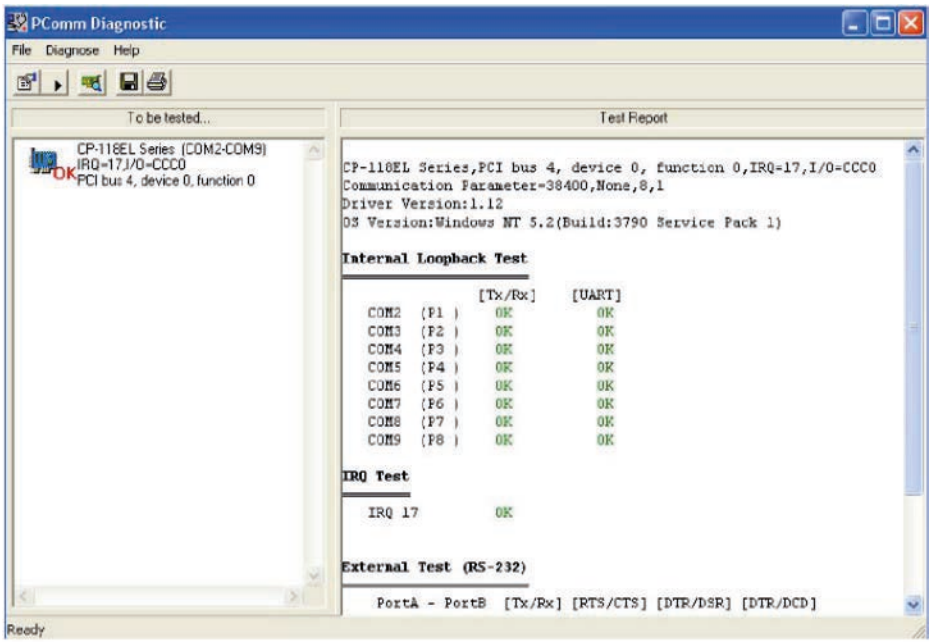
Utilities

In this section, we provide brief descriptions of each utility. For more information about these utilities, read the on-line help from the Documentation and Software CD.

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.

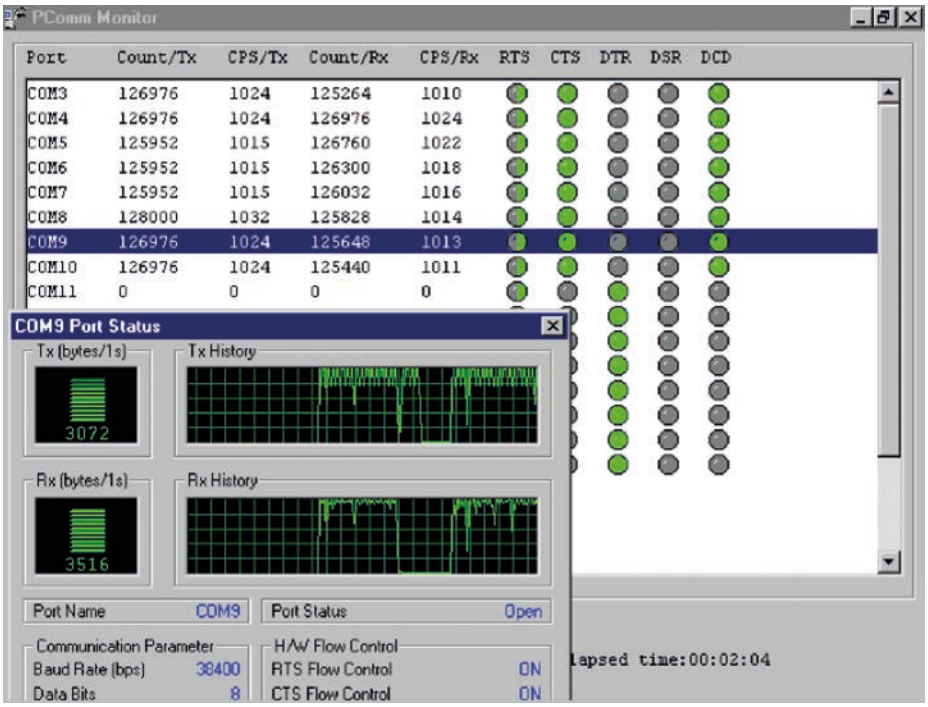
To run the diagnostics program, click **Start → Program → PComm Lite → Diagnostic**. A typical test report for a Moxa board is as follows:



Monitor (for Moxa boards under Windows 2000/XP/2003)

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

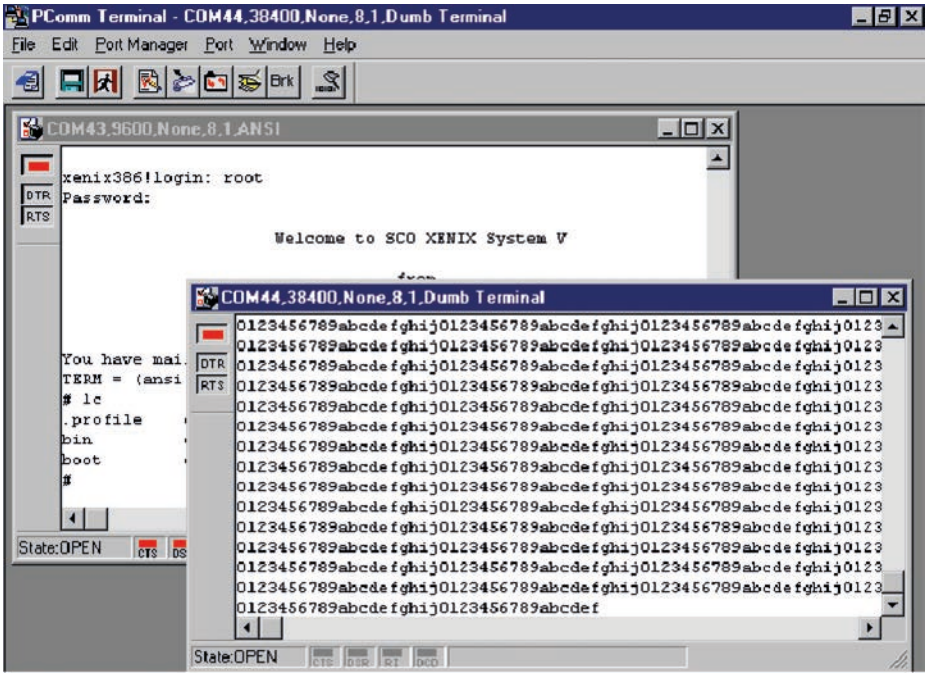
To run the Monitor program, click **Start →Program → PComm Lite → Monitor**.



Terminal Emulator

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

To run Terminal Emulator, click Start → **Program** → **PComm Lite** → **Terminal Emulator**.



RS-485 Programming

If you are using your CP-118EL Series board for RS-485 applications, in addition to reading this section, you should also refer to the "Connection Cables and Cable Wiring" chapter for more details about using RS-485.

The CP-118EL Series supports 2-wire half-duplex RS-485 and 4-wire full duplex RS-485 communication. Ports configured for 2-wire RS-485 use the Data+ and Data- pins for both transmitting and receiving data. Moxa's own ADDC™ (Automatic Data Direction Control) technology is used to switch between transmission and reception.

ADDC™

ADDC™ is the best method for switching between transmission and reception when using 2-wire RS-485.

When using ADDC™, additional code is not required to switch between data transmission and reception, since the board's built-in intelligent hardware mechanism automatically manages the switching mechanism. RS-485 programming using ADDC™ mode is just as simple and straightforward as RS-232 or RS-422 programming.

5

Pin Assignments

The following topics are covered in this chapter:

- **CP-118EL-A**
  - Board Side Pin Assignments—Female SCSI VHDCI68
  - Device Side Pin Assignments
- **CP-168EL-A**
  - Board Side Pin Assignments—Female SCSI VHDCI68
  - Device Side Pin Assignments
- **CP-104EL-A**
  - Board Side Pin Assignments—Female DB44
  - Device Side Pin Assignments
- **CP-102E**
  - Board Side Pin Assignments—Male DB9
- **CP-102EL**
  - Board Side Pin Assignments—Female DB25
  - Device Side Pin Assignments
- **CP-132EL/CP-132EL-I**
  - Board Side Pin Assignments—Female DB25
  - Device Side Pin Assignments
- **CP-114EL/CP-114EL-I**
  - Board Side Pin Assignments—Female DB44
  - Device Side Pin Assignments

To select a PCIe board accessories please refer to the following table:

PCIe Board	Model	Connector Type	Interface
CP-118EL-A	CBL-M68M9x8-100/ OPT8-M9+	Male DB9	RS-232 RS-422/4-wire RS-485 2-wire RS-485
	OPT8B+/ CBL-M68M25x8-100	Male DB25	
	OPT8A+/OPT8S+	Female DB25	
CP-168EL-A	CBL-M68M9x8-100/ OPT8-M9+	Male DB9	RS-232
	OPT8B+/OPT8C+	Male DB25	
	OPT8A+/OPT8S+	Female DB25	
	OPT8F+/OPT8Z+	Female DB25	RS-422
	OPT8K+	Female DB25	RS-422/RS-485
CP-104EL-A	CBL-M44M9x4-50	Male DB9	RS-232
	CBL-M44M25x4-50	Male DB25	
CP-102EL	CBL-M25M9x2-50	Male DB9	RS-232
CP-132EL/ CP-132EL-I	CBL-M25M9x2-50	Male DB9	RS-422/4-wire RS-485/2-wire RS-485
CP-114EL/ CP-114EL-I	CBL-M44M9x4-50	Male DB9	RS-232
	CBL-M44M25x4-50	Male DB25	RS-422/4-wire RS-485 2-wire RS-485

CP-118EL-A

The CP-118EL-A board has a female SCSI VHDCI68 connector on the board, with various connection options available for connecting from the board to your serial devices. In this chapter, we provide pin assignments for the board side connector, as well as pin assignments for device side connectors for the different connection options.

The CP-118EL-A board supports RS-232, RS-422, 4-wire RS-485, and 2-wire RS-485. Note that the RS-422 standard uses a balanced voltage digital interface to allow 9600 bps communication over cables of up to 4000 feet in length. You can connect ten receivers to one driver for broadcasting systems. The RS-485 standard is an enhanced version of the RS-422 balanced line standard. It allows multiple drivers and receivers to work on a multidrop network. A maximum of 32 drivers and 32 receivers can be set up on a multidrop network. The CP-118EL-A board supports both 2-wire half-duplex and 4-wire full-duplex RS-485 communications. In 2-wire RS-485, Data+/- pins are used for both data transmitting and receiving.

Board Side Pin Assignments—Female SCSI VHDCI68

RS-232

Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
1	RxD6	13	DCD4	25	TxD2	37	RI7	49	RI5	61	TxD1
2	CTS6	14	RTS4	26	GND	38	RTS7	50	CTS5	62	DSR1
3	RI6	15	RI4	27	TxD0	39	DCD7	51	RxD5	63	DTR1
4	RTS6	16	CTS4	28	DSR0	40	DTR7	52	RxD3	64	DCD1
5	DCD6	17	RxD4	29	DTR0	41	DSR7	53	CTS3	65	RTS1
6	DTR6	18	RxD2	30	DCD0	42	TxD7	54	RI3	66	RI1
7	DSR6	19	CTS2	31	RTS0	43	GND	55	RTS3	67	CTS1
8	TxD6	20	RI2	32	RI0	44	TxD5	56	DCD3	68	RxD1
9	GND	21	RTS2	33	CTS0	45	DSR5	57	DTR3		
10	TxD4	22	DCD2	34	RxD0	46	DTR5	58	DSR3		
11	DSR4	23	DTR2	35	RxD7	47	DCD5	59	TxD3		
12	DTR4	24	DSR2	36	CTS7	48	RTS5	60	GND		

RS-422 and 4-wire RS-485

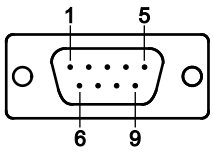
Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
1	TxD6+(B)	18	TxD2+(B)	35	TxD7+(B)	52	TxD3+(B)
5	TxD6-(A)	22	TxD2-(A)	39	TxD7-(A)	56	TxD3-(A)
6	RxD6-(A)	23	RxD2-(A)	40	RxD7-(A)	57	RxD3-(A)
8	RxD6+(B)	25	RxD2+(B)	42	RxD7+(B)	59	RxD3+(B)
9	GND	26	GND	43	GND	60	GND
10	RxD4+(B)	27	RxD0+(B)	44	RxD5+(B)	61	RxD1+(B)
12	RxD4-(A)	29	RxD0-(A)	46	RxD5-(A)	63	RxD1-(A)
13	TxD4-(A)	30	TxD0-(A)	47	TxD5-(A)	64	TxD1-(A)
17	TxD4+(B)	34	TxD0+(B)	51	TxD5+(B)	68	TxD1+(B)

2-wire RS-485

Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
6	D6-(A)	23	D2-(A)	40	D7-(A)	57	D3-(A)
8	D6+(B)	25	D2+(B)	42	D7+(B)	59	D3+(B)
9	GND	26	GND	43	GND	60	GND
10	D4+(B)	27	D0+(B)	44	D5+(B)	61	D1+(B)
12	D4-(A)	29	D0-(A)	46	D5-(A)	63	D1-(A)

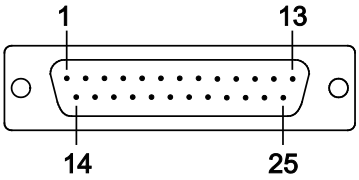
Device Side Pin Assignments

Male DB9 (CBL-M68M9x8-100/OPT8-M9+)



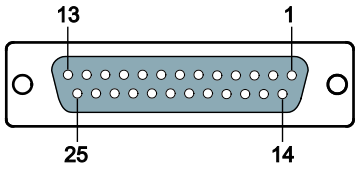
Pin	RS-232	RS-422 / 4-wire RS-485	2-wire RS-485
1	DCD	TxD-(A)	---
2	RxD	TxD+(B)	---
3	TxD	RxD+(B)	Data+(B)
4	DTR	RxD-(A)	Data-(A)
5	GND	GND	GND
6	DSR	---	---
7	RTS	---	---
8	CTS	---	---
9	---	---	---

Male DB25 (OPT8B+/ CBL-M68M25x8-100)



Pin	RS-232	RS-422 / 4-wire RS-485	2-wire RS-485
2	TxD	RxD+(B)	Data+(B)
3	RxD	TxD+(B)	---
4	RTS	---	---
5	CTS	---	---
6	DSR	---	---
7	GND	GND	GND
8	DCD	TxD-(A)	---
20	DTR	RxD-(A)	Data-(A)

Female DB25 (OPT8A+/S+)



Pin	RS-232	RS-422 / 4-wire RS-485	2-wire RS-485
2	RxD	TxD+(B)	---
3	TxD	RxD+(B)	Data+(B)
4	CTS	---	---
5	RTS	---	---
6	DTR	RxD-(A)	Data-(A)
7	GND	GND	GND
8	DCD	TxD-(A)	---
20	DSR	---	---

CP-168EL-A

The CP-168EL-A board has a female SCSI VHDCI68 connector on the board, with various connection options available for connecting from the board to your serial devices. In this chapter, we give pin assignments for the board side connector, as well as pin assignments for device side connectors for the different connection options. The CP-168EL-A board supports RS-232 interface on board.

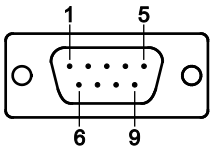
Board Side Pin Assignments—Female SCSI VHDCI68

RS-232

Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
1	RxD6	**13**	DCD4	**25**	TxD2	**37**	RI7	**49**	RI5	**61**	TxD1
2	CTS6	**14**	RTS4	**26**	GND	**38**	RTS7	**50**	CTS5	**62**	DSR1
3	RI6	**15**	RI4	**27**	TxD0	**39**	DCD7	**51**	RxD5	**63**	DTR1
4	RTS6	**16**	CTS4	**28**	DSR0	**40**	DTR7	**52**	RxD3	**64**	DCD1
5	DCD6	**17**	RxD4	**29**	DTR0	**41**	DSR7	**53**	CTS3	**65**	RTS1
6	DTR6	**18**	RxD2	**30**	DCD0	**42**	TxD7	**54**	RI3	**66**	RI1
7	DSR6	**19**	CTS2	**31**	RTS0	**43**	GND	**55**	RTS3	**67**	CTS1
8	TxD6	**20**	RI2	**32**	RI0	**44**	TxD5	**56**	DCD3	**68**	RxD1
9	GND	**21**	RTS2	**33**	CTS0	**45**	DSR5	**57**	DTR3		
10	TxD4	**22**	DCD2	**34**	RxD0	**46**	DTR5	**58**	DSR3		
11	DSR4	**23**	DTR2	**35**	RxD7	**47**	DCD5	**59**	TxD3		
12	DTR4	**24**	DSR2	**36**	CTS7	**48**	RTS5	**60**	GND		

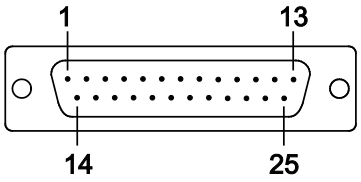
Device Side Pin Assignments

Male DB9 (CBL-M68M9x8-100/OPT8-M9+)



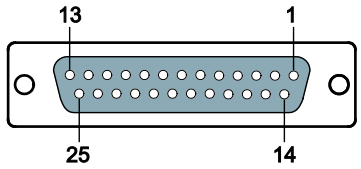
Pin	RS-232
1	DCD
2	RxD
3	TxD
4	DTR
5	GND
6	DSR
7	RTS
8	CTS
9	---

Male DB25 (OPT8B+ / CBL-M68M25x8-100)



Pin	RS-232
2	TxD
3	RxD
4	RTS
5	CTS
6	DSR
7	GND
8	DCD
20	DTR

Female DB25 (OPT8A+ /S+)



Pin	RS-232
2	RxD
3	TxD
4	CTS
5	RTS
6	DTR
7	GND
8	DCD
20	DSR

Female DB25 (OPT8F+ /Z+)

Pin	RS-422
2	RxD+(B)
3	TxD+(B)
7	GND
14	RxD-(A)
16	TxD-(A)

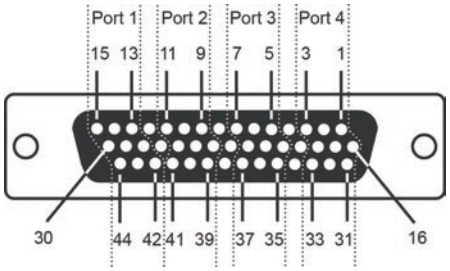
Female DB25 (OPT8K+)

Pin	RS-422 / 4-wire RS-485	2-wire RS-485
2	RxD+(B)	Data+(B)
3	TxD+(B)	---
7	GND	GND
14	RxD-(A)	Data-(A)
16	TxD-(A)	---

CP-104EL-A

Board Side Pin Assignments—Female DB44

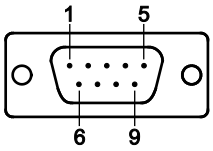
RS-232



Port 1		Port 2		Port 3		Port 4	
13	TxD	9	TxD	5	TxD	1	TxD
14	RxD	10	RxD	6	RxD	2	RxD
15	RTS	11	RTS	7	RTS	3	RTS
28	CTS	24	CTS	20	CTS	16	CTS
29	DTR	25	DTR	21	DTR	17	DTR
30	DSR	26	DSR	22	DSR	18	DSR
42	DCD	39	DCD	35	DCD	31	DCD
44	GND	41	GND	37	GND	33	GND

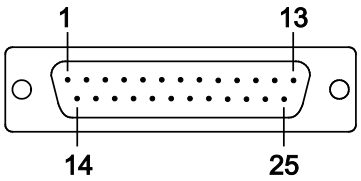
Device Side Pin Assignments

Male DB9 (CBL-M44M9x4-50)



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

Male DB25 (CBL-M44M25x4-50)



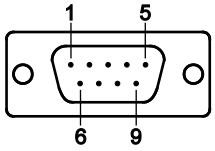
Pin	RS-232
2	TxD
3	RxD
4	RTS
5	CTS
6	DSR
7	GND
8	DCD
20	DTR

CP-102E

Board Side Pin Assignments—Male DB9

CP-102E has two Male DB9 connectors on board.

Male DB9

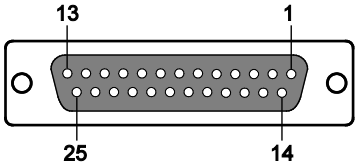


Pin	RS-232 Signals
1	DCD
2	RxD
3	TxD
4	DTR
5	GND
6	DSR
7	RTS
8	CTS
9	---

CP-102EL

Board Side Pin Assignments—Female DB25

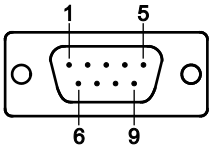
RS-232



Pin	RS-232	Pin	RS-232
1		13	
2	DCD1	14	
3	GND	15	DTR1
4	CTS1	16	DSR1
5	RxD1	17	RTS1
6		18	TxD1
7		19	
8		20	
9	DTR0	21	DCD0
10	DSR0	22	GND
11	RTS0	23	CTS0
12	TxD0	24	RxD0

Device Side Pin Assignments

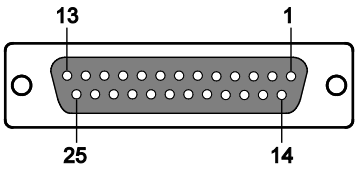
Male DB9 (CBL-M25M9x2-50)



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

CP-132EL/CP-132EL-I

Board Side Pin Assignments—Female DB25



RS-422 & 4-wire RS-485

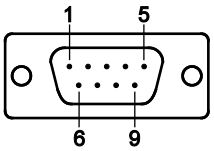
Pin	Signal	Pin	Signal
1	---	14	---
2	TxD1-(A)	15	RxD1-(A)
3	GND1	16	---
4	---	17	---
5	TxD1+(B)	18	RxD1+(B)
6	---	19	---
7	---	20	---
8	---	21	TxD0-(A)
9	RxD0-(A)	22	GND0
10	---	23	---
11	---	24	TxD0+(B)
12	RxD0+(B)	25	---
13	---		

2-wire RS-485

Pin	Signal	Pin	Signal
1	---	14	---
2	---	15	Data1-(A)
3	GND1	16	---
4	---	17	---
5	---	18	Data1+(B)
6	---	19	---
7	---	20	---
8	---	21	---
9	Data0-(A)	22	GND0
10	---	23	---
11	---	24	---
12	Data0+(B)	25	---
13	---		

Device Side Pin Assignments

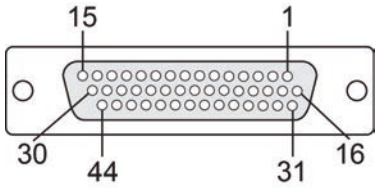
Male DB9 (CBL-M25M9x2-50)



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

CP-114EL/CP-114EL-I

Board Side Pin Assignments—Female DB44



RS-232

Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
1	TxD3	13	TxD0	25	DTR1	37	GND
2	RxD3	14	RxD0	26	DSR1	38	---
3	RTS3	15	RTS0	27	---	39	DCD1
4	---	16	CTS3	28	CTS0	40	---
5	TxD2	17	DTR3	29	DTR0	41	GND
6	RxD2	18	DSR3	30	DSR0	42	DCD0
7	RTS2	19	---	31	DCD3	43	---
8	---	20	CTS2	32	---	44	GND
9	TxD1	21	DTR2	33	GND		
10	RxD1	22	DSR2	34	---		
11	RTS1	23	---	35	DCD2		
12	---	24	CTS1	36	---		

RS-422 & 4-wire RS-485

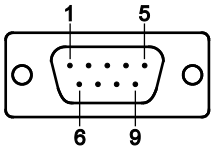
Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
1	RxD3(+)	13	RxD0(+)	25	RxD1(-)	37	GND
2	TxD3(+)	14	TxD0(+)	26	---	38	---
3	---	15	---	27	---	39	TxD1(-)
4	---	16	---	28	---	40	---
5	RxD2(+)	17	RxD3(-)	29	RxD0(-)	41	GND
6	TxD2(+)	18	---	30	---	42	TxD0(-)
7	---	19	---	31	TxD3(-)	43	---
8	---	20	---	32	---	44	GND
9	RxD1(+)	21	RxD2(-)	33	GND		
10	TxD1(+)	22	---	34	---		
11	---	23	---	35	TxD2(-)		
12	---	24	---	36	---		

2-wire RS-485

Pin	Signal	Pin	Signal	Pin	Signal
1	Data3+(B)	16	---	31	---
2	---	17	Data3-(A)	32	---
3	---	18	---	33	GND3
4	---	19	---	34	---
5	Data2+(B)	20	---	35	---
6	---	21	Data2-(A)	36	---
7	---	22	---	37	GND2
8	---	23	---	38	---
9	Data1+(B)	24	---	39	---
10	---	25	Data1-(A)	40	---
11	---	26	---	41	GND1
12	---	27	---	42	---
13	Data0+(B)	28	---	43	---
14	---	29	Data0-(A)	44	GND0
15	---	30	---		

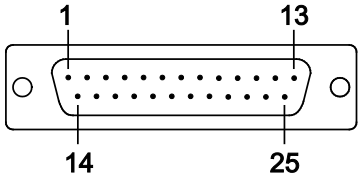
Device Side Pin Assignments

Male DB9 (CBL-M44M9x4-50)



Pin	RS-232	RS-422 & 4-wire RS-485	2-wire RS-485
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	---	---	---

Male DB25 (CBL-M44M25x4-50)



Pin	RS-232	RS-422 & 4-wire RS-485	2-wire RS-485
2	TxD	RxD+(B)	Data+(B)
3	RxD	TxD+(B)	---
4	RTS	---	---
5	CTS	---	---
6	DSR	---	---
7	GND	GND	GND
8	DCD	TxD-(A)	---
20	DTR	RxD-(A)	Data-(A)
22	---	---	---

6

Troubleshooting

Common PCI Express Series problems and possible solutions are as follows. 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.

The following topics are covered in this chapter:

- **General Troubleshooting**

General Troubleshooting

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 also 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 the “Pin Assignments” chapter 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, and 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 emulator or HyperTerminal under Windows platform).

A

Technical Reference

The following topics are covered in this appendix:

- **Product Specifications**
  - CP-118EL-A Specifications
  - CP-168EL-A Specifications
  - CP-104EL-A Specifications
  - CP-102E Specifications
  - CP-102EL Specifications
  - CP-132EL Series Specifications
  - CP-114EL Series Specifications

Product Specifications

CP-118EL-A Specifications

Hardware	
Connectors	SCSI VHDCI68
Comm. Controller	16C550C compatible
Interface	
Bus Interface	PCI Express × 1
Number of Ports	8
Max No. of Boards	4 (only one IRQ required)
Signals	
RS-232	TxD, RxD, RTS, CTS, DTR, DSR, DCD, GND
RS-422	TxD+(B), TxD-(A), RxD+(B), RxD-(A), GND
4-wire RS-485	TxD+(B), TxD-(A), RxD+(B), RxD-(A), GND
2-wire RS-485	Data+(B), Data-(A), GND
Performance	
Baudrate	50 bps to 921.6 Kbps
Configuration	
Data Bits	5, 6, 7, 8
Stop Bits	1, 1.5, 2
I/O address/IRQ	BIOS assigned
Parity	None, Even, Odd, Space, Mark
Flow Control	RTS/CTS, XON/XOFF
Power and Environment	
Power Requirement	1285 mA (3.3V)
Operating Temperature	0 to 55°C (32 to 132°F)
Operating Humidity	5 to 95% RH
Storage Temperature	-20 to 85°C (-4 to 185°F)
ESD Protection	Embedded 15 KV ESD Protection
Regulatory Approvals	EN55022, EN55024, EN61000-3-2, EN61000-3-3, IEC 61000-4-2, IEC 61000-4-3, IEC 61000-4-4, IEC 61000-4-5, IEC 61000-4-6, IEC 61000-4-8, IEC 61000-4-11 FCC Part 15 Class B
Warranty	5 years

CP-168EL-A Specifications

Hardware	
Connectors	SCSI VHDCI68
Comm. Controller	16C550C compatible
Interface	
Bus Interface	PCI Express × 1
Number of Ports	8
Max No. of Boards	4 (only one IRQ required)
Signals	
RS-232	TxD, RxD, RTS, CTS, DTR, DSR, DCD, GND
Performance	
Baudrate	50 bps to 921.6 Kbps
Configuration	
Data Bits	5, 6, 7, 8
Stop Bits	1, 1.5, 2
I/O address/IRQ	BIOS assigned
Parity	None, Even, Odd, Space, Mark
Flow Control	RTS/CTS, XON/XOFF
Power and Environment	
Power Requirement	1225 mA (3.3V)
Operating Temperature	0 to 55°C (32 to 132°F)
Operating Humidity	5 to 95% RH
Storage Temperature	-20 to 85°C (-4 to 185°F)
ESD Protection	Embedded 15 KV ESD Protection
Regulatory Approvals	EN55022, EN55024, EN61000-3-2, EN61000-3-3, IEC 61000-4-2, IEC 61000-4-3, IEC 61000-4-4, IEC 61000-4-5, IEC 61000-4-6, IEC 61000-4-8, IEC 61000-4-11 FCC Part 15 Class B
Warranty	5 years

CP-104EL-A Specifications

Hardware	
Connectors	Female DB44
Comm. Controller	16C550C compatible
Interface	
Bus Interface	PCI Express × 1
Number of Ports	4
Max No. of Boards	4 (only one IRQ required)
Signals	
RS-232	TxD, RxD, RTS, CTS, DTR, DSR, DCD, GND
Performance	
Baudrate	50 bps to 921.6 Kbps
Configuration	
Data Bits	5, 6, 7, 8
Stop Bits	1, 1.5, 2
I/O address/IRQ	BIOS assigned
Parity	None, Even, Odd, Space, Mark
Flow Control	RTS/CTS, XON/XOFF
Power and Environment	
Power Requirement	805 mA (3.3V)
Operating Temperature	0 to 55°C (32 to 132°F)
Operating Humidity	5 to 95% RH
Storage Temperature	-20 to 85°C (-4 to 185°F)
ESD Protection	Embedded 15 KV ESD Protection
Regulatory Approvals	EN55022, EN55024, EN61000-3-2, EN61000-3-3, IEC 61000-4-2, IEC 61000-4-3, IEC 61000-4-4, IEC 61000-4-5, IEC 61000-4-6, IEC 61000-4-8, IEC 61000-4-11 FCC Part 15 Class B
Warranty	5 years

CP-102E Specifications

Hardware	
Connectors	Male DB9 x 2
Comm. Controller	16C550C compatible
Interface	
Bus Interface	PCI Express × 1
Number of Ports	2
Max No. of Boards	4
Signal	
RS-232	TxD, RxD, RTS, CTS, DTR, DSR, DCD, GND
Performance	
Baudrate	50 bps to 921.6 Kbps
Configuration	
Data Bits	5, 6, 7, 8
Stop Bits	1, 1.5, 2
I/O address/IRQ	BIOS assigned
Parity	None, Even, Odd, Space, Mark
Flow Control	RTS/CTS, XON/XOFF
Environment	
Operating Temperature	0 to 55°C (32 to 132°F)
Operating Humidity	5 to 95% RH
Storage Temperature	-20 to 85°C (-4 to 185°F)
ESD Protection	Embedded 15 KV ESD Protection
Regulatory Approvals	EN55022, EN55024, EN61000-3-2, EN61000-3-3, EN61000-6-2, IEC-61000-4-2, IEC 61000-4-3, IEC 61000-4-4, IEC 61000-4-5, IEC 61000-4-6, IEC 61000-4-8, IEC 61000-4-11, FCC Part 15 Class B
Warranty	5 years

CP-102EL Specifications

Hardware	
Connectors	Female DB25
Comm. Controller	16C550C compatible
Interface	
Bus Interface	PCI Express × 1
Number of Ports	2
Max No. of Boards	4
Signal	
RS-232	TxD, RxD, RTS, CTS, DTR, DSR, DCD, GND
Performance	
Baudrate	50 bps to 921.6 Kbps
Configuration	
Data Bits	5, 6, 7, 8
Stop Bits	1, 1.5, 2
I/O address/IRQ	BIOS assigned
Parity	None, Even, Odd, Space, Mark
Flow Control	RTS/CTS, XON/XOFF
Environment	
Operating Temperature	0 to 55°C (32 to 132°F)
Operating Humidity	5 to 95% RH
Storage Temperature	-20 to 85°C (-4 to 185°F)
ESD Protection	Embedded 15 KV ESD Protection
Regulatory Approvals	EN55022, EN55024, EN61000-3-2, EN61000-3-3, EN61000-6-2, IEC-61000-4-2, IEC 61000-4-3, IEC 61000-4-4, IEC 61000-4-5, IEC 61000-4-6, IEC 61000-4-8, IEC 61000-4-11, FCC Part 15 Class B
Warranty	5 years

CP-132EL Series Specifications

Hardware	
Connectors	Female DB25
Comm. Controller	16C550C compatible
Interface	
Bus Interface	PCI Express × 1
Number of Ports	2
Max No. of Boards	4
Signal	
RS-422	TxD+(B), TxD-(A), RxD+(B), RxD-(A), GND
RS-485 4-Wire	TxD+(B), TxD-(A), RxD+(B), RxD-(A), GND
RS-485 2-Wire	Data+(B), Data-(A), GND
Performance	
Baudrate	50 bps to 921.6 Kbps
Configuration	
Data Bits	5, 6, 7, 8
Stop Bits	1, 1.5, 2
I/O address/IRQ	BIOS assigned
Parity	None, Even, Odd, Space, Mark
Flow Control	XON/XOFF
Environment	
Operating Temperature	0 to 55°C (32 to 132°F)
Operating Humidity	5 to 95% RH
Storage Temperature	-20 to 85°C (-4 to 185°F)
ESD Protection	Embedded 15 KV ESD Protection
Optical Isolation	2 KV (only for CP-132EL-I)
Regulatory Approvals	EN55022, EN55024, EN61000-3-2, EN61000-3-3, EN61000-6-2, IEC-61000-4-2, IEC 61000-4-3, IEC 61000-4-4, IEC 61000-4-5, IEC 61000-4-6, IEC 61000-4-8, IEC 61000-4-11, FCC Part 15 Class B
Warranty	5 years

CP-114EL Series Specifications

Hardware	
Connectors	Female DB44
Comm. Controller	16C550C compatible
Interface	
Bus Interface	PCI Express × 1
Number of Ports	4
Max No. of Boards	4
Signal	
RS-232	TxD, RxD, RTS, CTS, DTR, DSR, DCD, GND
RS-422	TxD+(B), TxD-(A), RxD+(B), RxD-(A), GND
RS-485 4-Wire	TxD+(B), TxD-(A), RxD+(B), RxD-(A), GND
RS-485 2-Wire	Data+(B), Data-(A), GND
Performance	
Baudrate	50 bps to 921.6 Kbps
Configuration	
Data Bits	5, 6, 7, 8
Stop Bits	1, 1.5, 2
I/O address/IRQ	BIOS assigned
Parity	None, Even, Odd, Space, Mark
Flow Control	RTS/CTS, XON/XOFF
Environment	
Operating Temperature	0 to 55°C (32 to 132°F)
Operating Humidity	5 to 95% RH
Storage Temperature	-20 to 85°C (-4 to 185°F)
ESD Protection	Embedded 15 KV ESD Protection
Optical Isolation	2 KV (only for CP-114EL-I)
Regulatory Approvals	EN55022, EN55024, EN61000-3-2, EN61000-3-3, EN61000-6-2, IEC-61000-4-2, IEC 61000-4-3, IEC 61000-4-4, IEC 61000-4-5, IEC 61000-4-6, IEC 61000-4-8, IEC 61000-4-11, FCC Part 15 Class B
Warranty	5 years