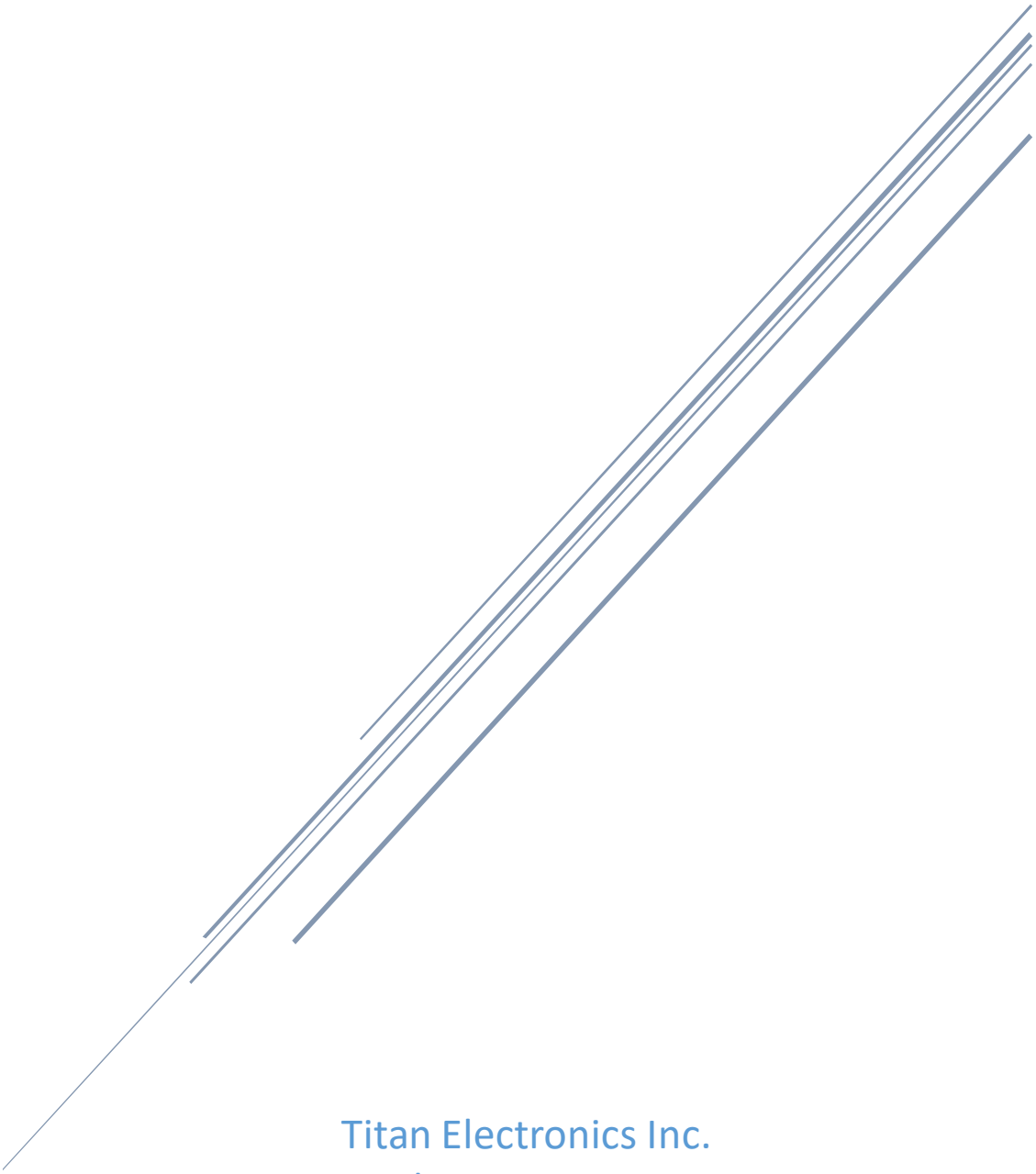
PCIe-200i/PCIe-200i-SI USER'S MANUAL

2017 July Edition



Titan Electronics Inc.
Web: www.titan.tw

The computer programs provided with the hardware are supplied under a license. The software provided should be used only with the NCOM series hardware designed and manufactured by TITAN Electronics Inc.

Trademarks

Copyright

Disclaimer

TITAN Electronics Inc. provides this document and computer programs “as is” without warranty of any kind, either expressed or implied, including, but not limited to, its particular purpose. TITAN Electronics Inc. reserves the right to make improvements and changes to this user manual, or to the products, or the computer programs described in this manual, at any time.

Information provided in this manual is intended to be accurate and reliable. However, TITAN Electronics Inc. assumes no responsibility for its use, or for any infringements on the rights of third parties that may result from its use.

This product might include unintentional technical or typographical errors. Changes are periodically made to the information herein to correct such errors, and these changes are incorporated into new editions of the publication.

Contents

INTRODUCTION

The PCIe-200i and PCIe-200i-SI PCI Express 2-port industrial serial I/O cards are plug and play high-speed serial I/O expansion cards for the PCI Express bus. Connecting to a PCI Express bus on your computer, the PCI Express 2-port industrial serial I/O card instantly adds two RS-232/422/485 serial I/O communication ports to your system. The PCI Express 2-port industrial serial I/O cards are designed to utilize the Exar XR17V352 PCI Express to UART chip. The PCIe-200i & PCIe-200i-SI support high-speed data rate up to 921.6kbps. Each serial port is fully compatible with 16C550 UART, with enhanced feature of 256 bytes TX and RX FIFO buffer for higher performance.

The PCI Express 2-port industrial serial I/O card is an advanced and high efficient solution for serial data communication and industrial automation applications.

FEATURES

- PCI Express 2.0 Gen 1 compliant
- PCI Express 1 Lane compliant
- 16C550 compatibility
- 256 bytes receive FIFO buffer
- 256 bytes transmit FIFO buffer
- Automatic RTS/CTS or DTR/DSR hardware flow control with programmable hysteresis
- Automatic Xon/Xoff software flow control
- Drivers provided for Windows and Linux OS
- Wide ambient temperature operation 0°C to 60°C (32°F to 140°F)
- CE, FCC approval
- Supports two high speed RS-232/422/485 serial ports with data transfer rate up to 921.6kbps
- Provides 15KV ESD protection and 600W surge protection for all serial signals
- Two DB9 male connectors for serial data communication
- PCIe-200i RS-232 data signals: DCD, RxD, TxD, DTR, GND, DSR, RTS, CTS, RI
- PCIe-200i-SI RS-232 data signals: RxD, TxD, GND, RTS, CTS
- RS-422 data signals: TxD-, TxD+, RxD+, RxD-, GND, RTS-, RTS+, CTS+, CTS-
- RS-485 data signals: TxD-, TxD+, RxD+, RxD- (4 wire), Data-, Data+ (2 wire)
- PCIe-200i-SI provides 3000V DC optical isolation for all serial signals

SPECIFICATIONS

General	
Bus	PCI Express; Single-Lane (×1)
Chipset	EXAR XR17V352
Interface	RS-232/422/485
Plug & Play	Supported
IRQ & IO Address	Assigned by system BIOS

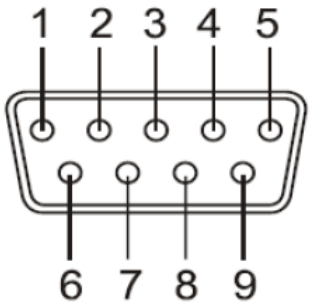
PCIe-200i	
No. of Ports	Two
RS-232 Signals	DCD, RxD, TxD, DTR, GND, DSR, RTS, CTS, RI
RS-422 Signals	TxD-, TxD+, RxD+, RxD-, GND, RTS-, RTS+, CTS+, CTS-
RS-485 Signals	TxD-, TxD+, RxD+, RxD- (4 wire), Data-, Data+ (2 wire)
Max. Bitrates	921.6kbps
Serial Configuration	Data bits: 5, 6, 7, 8 Parity: None, Odd, Even, Mark, Space Stop bits: 1, 1.5, 2
UART FIFO Buffer Size	Each port with 256 bytes FIFO for transmit & receive
Connectors	Two DB9 male connectors
Protection	15kV ESD protection and 600W surge protection for all serial signals
Mechanical	PCIe-200i with standard height bracket

PCIe-200i-SI	
No. of Ports	Two, with isolation
RS-232 Signals	RxD, TxD, GND, RTS, CTS
RS-422 Signals	TxD-, TxD+, RxD+, RxD-, GND, RTS-, RTS+, CTS+, CTS-
RS-485 Signals	TxD-, TxD+, RxD+, RxD- (4 wire), Data-, Data+ (2 wire)
Max. Bitrates	921.6kbps
Serial Configuration	Data bits: 5, 6, 7, 8 Parity: None, Odd, Even, Mark, Space Stop bits: 1, 1.5, 2
UART FIFO Buffer Size	Each port with 256 bytes FIFO for transmit & receive
Connectors	Two DB9 male connectors
Protection	15kV ESD protection and 600W surge protection for all serial signals 3000V DC optical isolation for all serial signals
Mechanical	PCIe-200i-SI with standard height bracket

Environment	
Operating Temperature	0°C to 60°C
Storage Temperature	-40°C to 85°C
Humidity	0 to 80% RH. Noncondensing
Safety Approvals	CE, FCC

PIN-OUT INFORMATION

The following are the connector pin-out for PCIe-200i & PCIe-200i-SI PCI Express serial I/O card.



DB9 Male connector pin numbers

RS-232 Pin-out for DB9 Connector

Pin Number	Pin Type	Description
1	*Input*	DCD: Data Carrier Detect
2	*Input*	RxD: Receive Data
3	*Output*	TxD: Transmit Data
4	*Output*	DTR: Data Terminal Ready
5	*Ground*	GND: Signal Ground
6	*Input*	DSR: Data Set Ready
7	*Output*	RTS: Request to Send
8	*Input*	CTS: Clear to Send
9	*Input*	RI: Ring Indicator

RS-422 Pin-out for DB9 Connector

Pin Number	Pin Type	Description
1	*Output*	TxD-: Transmit Data, negative polarity
2	*Output*	TxD+: Transmit Data, positive polarity
3	*Input*	RxD+: Receive Data, positive polarity
4	*Input*	RxD-: Receive Data, negative polarity
5	*Ground*	GND: Signal Ground
6	*Output*	RTS-: Request to Send, negative polarity
7	*Output*	RTS+: Request to Send, positive polarity
8	*Input*	CTS+: Clear to Send, positive polarity
9	*Input*	CTS-: Clear to Send, negative polarity

RS-485 Full Duplex (4 wire) Mode Pin-out for DB9 Connector

Pin Number	Pin Type	Description
1	*Output*	TxD-: Transmit Data, negative polarity
2	*Output*	TxD+: Transmit Data, positive polarity
3	*Input*	RxD+: Receive Data, positive polarity
4	*Input*	RxD-: Receive Data, negative polarity
5	*Ground*	GND: Signal Ground

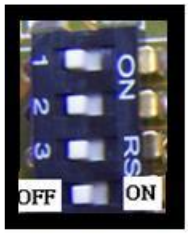
RS-485 Half Duplex (2 wire) Mode Pin-out for DB9 Connector

Pin Number	Pin Type	Description
1	*Output/ Input*	Data-: Transmit/Receive Data, negative polarity
2	*Output/ Input*	Data+: Transmit/Receive Data, positive polarity
5	*Ground*	GND: Signal Ground

HARDWARE AND SOFTWARE SETTINGS

Selecting the Operation Mode

There are two 4-pin DIP switches, SW1 and SW2, on PCIe-200i and PCIe-200i-SI cards. The DIP switches are used to select the mode of operation. You will need to set the switch settings to RS-232 mode, RS-422 mode or RS-485 mode as per the requirements of your application. The RS-232, RS-422 & RS-485 mode block configuration settings are listed as follows.



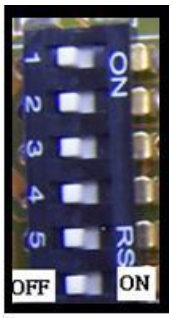
SW1, SW2 for Mode Setting

Operation Mode		1	2	3	4
RS-232	Standard RS-232 Mode	OFF	ON	ON	ON
RS-422	4 wire with Handshaking	ON	ON	ON	ON
RS-485	Full Duplex (4 wire)	ON	OFF	ON	ON
	Half Duplex (2 wire) – with Echo	ON	OFF	OFF	ON
	Half Duplex (2 wire) – without Echo	ON	OFF	OFF	OFF

Note: When PCIe-200i and PCIe-200i-SI are working in RS-485 operation mode, you need to enable the automatic direction control of the RS-485 transceiver buffer by setting the driver configuration (refer to page 11).

Enabling Termination and Biasing Resistors

There are two 6-pin DIP switches, S1 and S2, on PCIe-200i and PCIe-200i-SI cards. The DIP switches are used to enable TxD, RxD 120Ω termination resistors and TxD, RxD 750Ω biasing resistors. You will need to set the DIP switches for termination and biasing resistors when using RS-422 mode or RS-485 mode as per the requirements of your application. Settings are listed as follows:

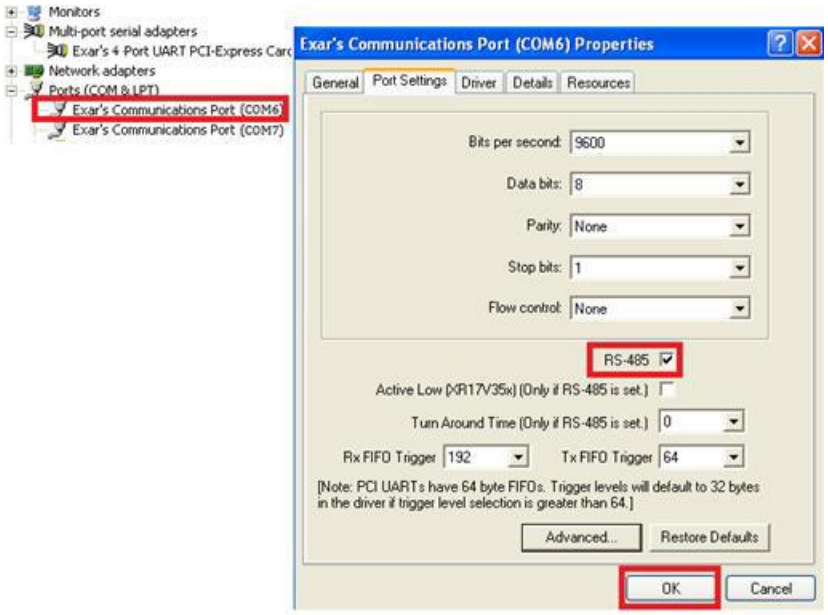


DIP Switch	Function	Remark
S1/S2 Pin 1 ON	Enable TxD+ biasing resistor	Pull-up TxD+ with 750Ω resistor
S1/S2 Pin 2 ON	Enable TxD+/TxD- termination resistor	120Ω termination resistor
S1/S2 Pin 3 ON	Enable TxD- biasing resistor	Pull-down TxD- with 750Ω resistor
S1/S2 Pin 4 ON	Enable RxD+ biasing resistor	Pull-up RxD+ with 750Ω resistor
S1/S2 Pin 5 ON	Enable RxD+/RxD- termination resistor	120Ω termination resistor
S1/S2 Pin 6 ON	Enable RxD- biasing resistor	Pull-down RxD- with 750Ω resistor

Enabling Automatic Direction Control in RS-485 Mode

When PCIe-200i or PCIe-200i-SI is working in RS-485 operation mode, you need to enable the automatic direction control of the RS-485 transceiver buffer by setting the driver configuration.

1. Double click on “Exar’s Communications Port (COMx)” under Device Manager to enter “Exar’s Communications Port (COMx) Properties”. Check “RS-485” and click “OK” to enable the automatic direction control of the transceiver buffer in RS-485 operation mode.



2. Repeat the steps above for other COM ports to enable automatic direction control for all ports.

WIRING INFORMATION FOR RS-422/485

This section will provide proper wiring information about RS-422 and RS-485 data communication. It is necessary to have the basic knowledge to avoid or find errors in data transmission. Failures in cabling are responsible for the vast majority of transmission problems.

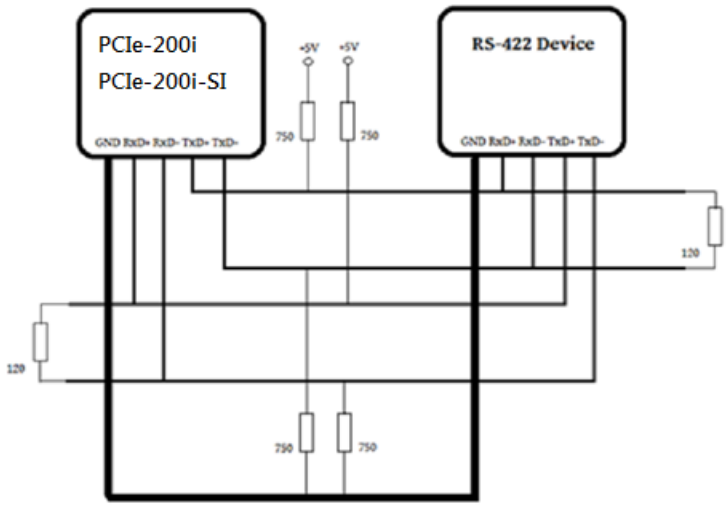
RS-422 and RS-485 Transmission Technique

RS-422 and RS-485 use the same balanced transmission method. Signals are not transmitted as voltage on a single wire like in RS-232. Instead, two wires are used; when one carries high voltage, the other one carries low voltage. The signal is defined by the difference in voltage between those two wires. This hardens the transmission against noise. Usually, twisted pair cables are used, which further reduces the sensitivity to noise.

To make sure the signals meet the common voltage range, the GND of sender and receiver must be connected. To ensure the signals are in the valid voltage range so that the differential voltage can be correctly sensed by the receiver, the GND lines of the transmitter and receiver must be connected.

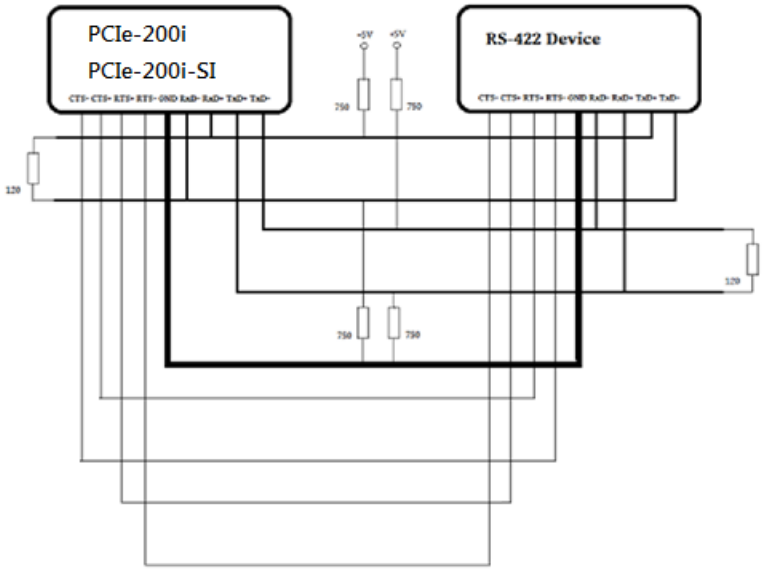
RS-422 without Handshaking Signals Connected

The following diagram shows RS-422 without handshaking signals connected.



RS-422 with Handshaking Signals Connected

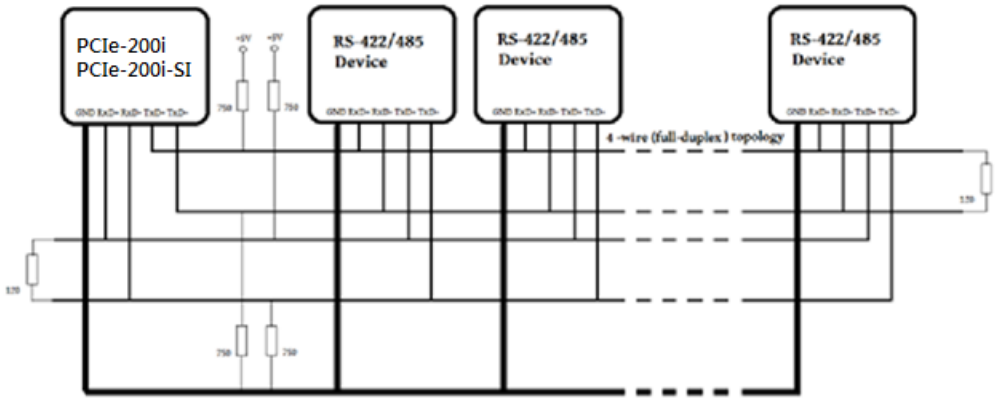
The following diagram shows RS-422 with handshaking signals connected.



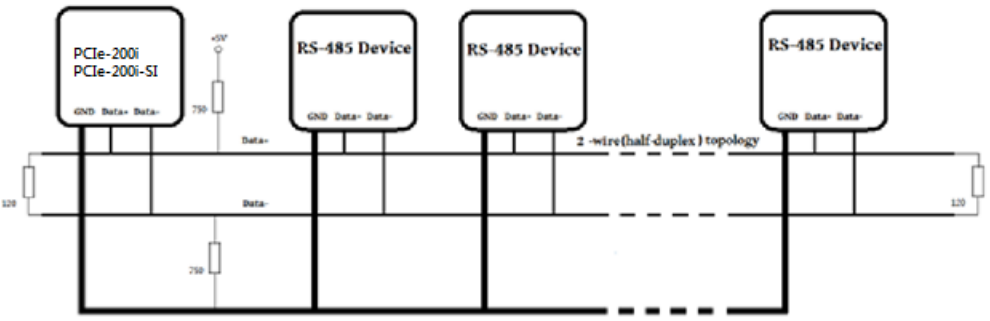
RS-422 and RS-485 4 Wire Scheme

RS-422 requires dedicated wire pairs for transmit and receive. The transmit wires are used to send data to as many as 10 receivers, as stated in the specifications of RS-422. Since the PCIe-200i and PCIe-200i-SI use RS-485 Line Driver technology, up to 32 receivers are possible.

The following diagram shows RS-422 and RS-485 4 wire scheme:



The following diagram shows RS-485 2 wire scheme:

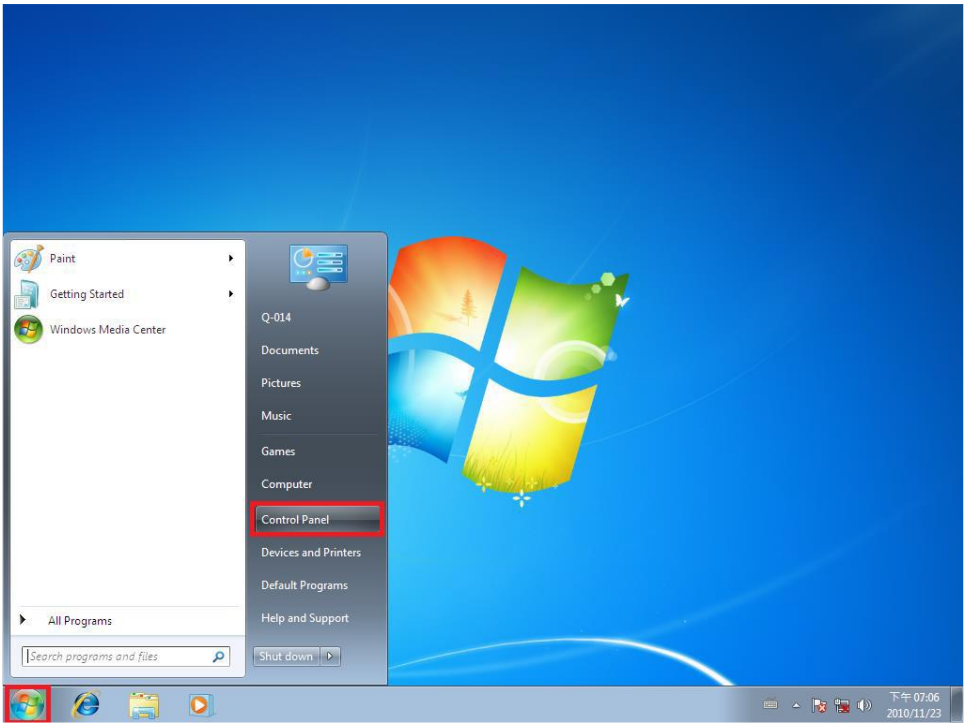


INSTALLATION

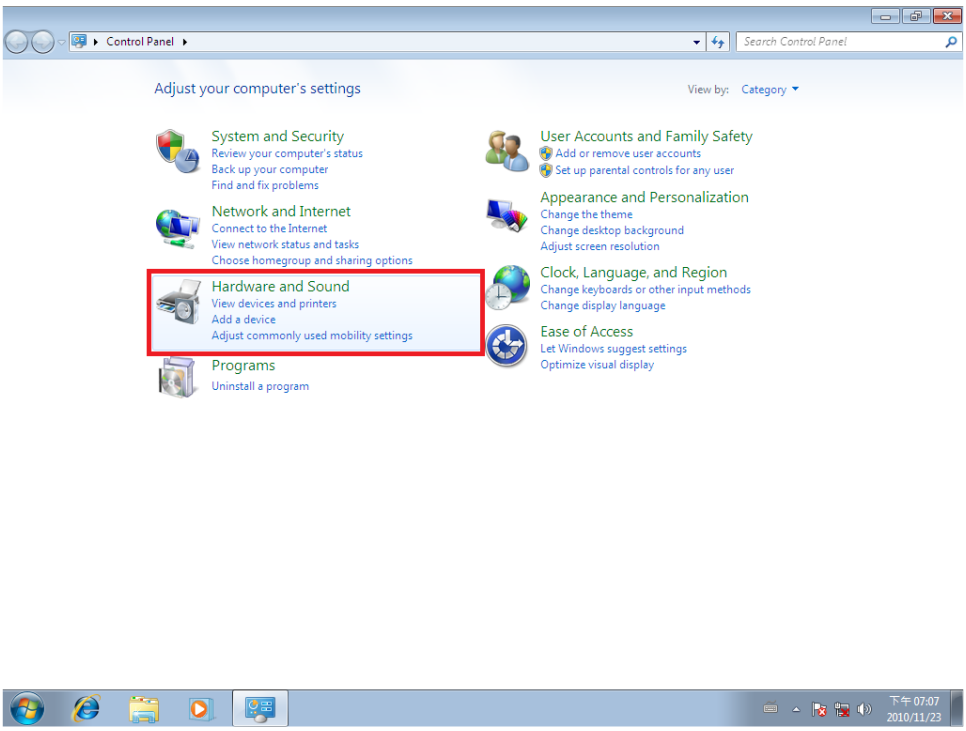
Windows 8.1/8/7 32-bit & 64-bit Drivers Installation

To install the Windows driver from Device Manager for PCI Express 2-port industrial serial I/O card, please follow the steps below:

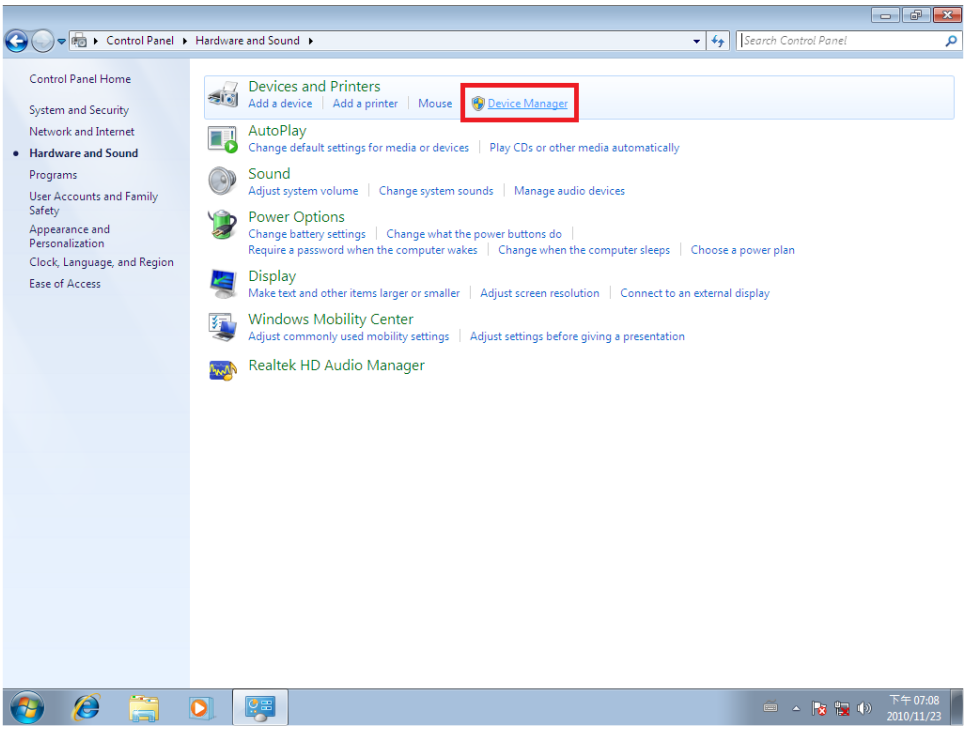
1. Switch off the computer.
2. Insert PCI Express industrial serial I/O card into a free PCI Express Bus slot.
3. Switch on the computer and start Windows OS.
4. Windows OS will automatically detect the PCI Express I/O Card.
5. Press “START” button and select “Control Panel”.



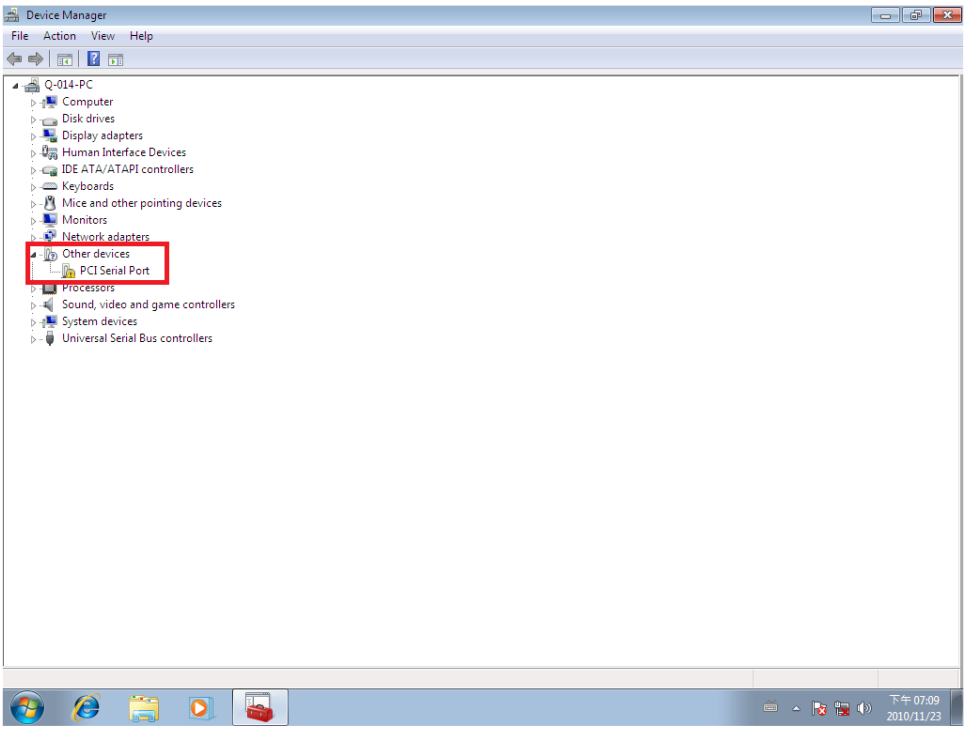
6. Select “Hardware and Sound”.



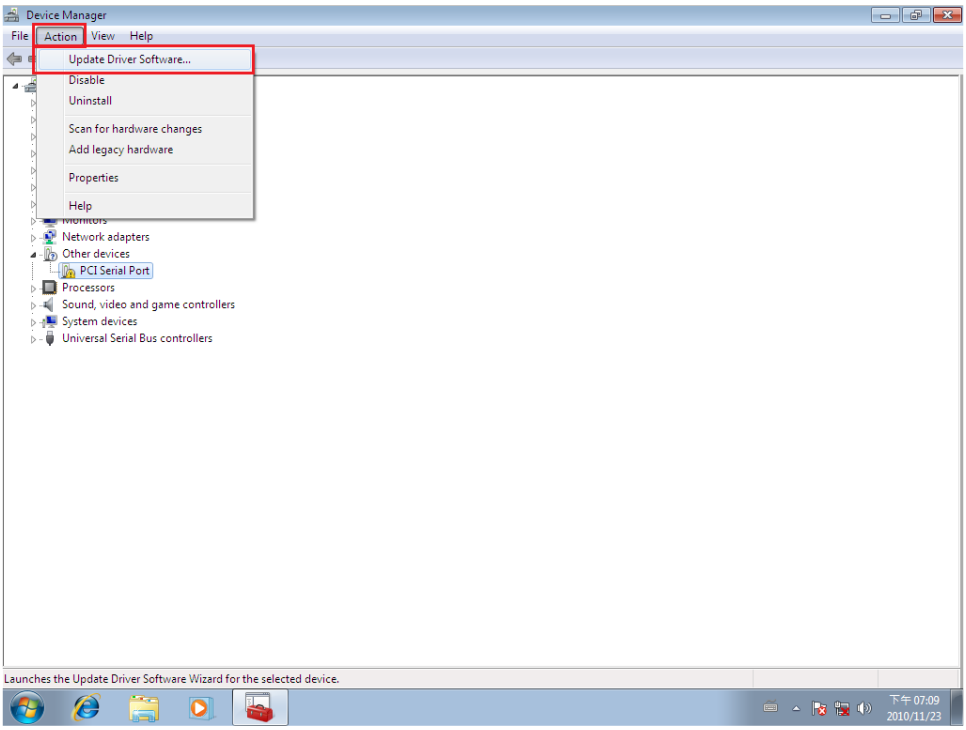
7. Select “Device Manager”.



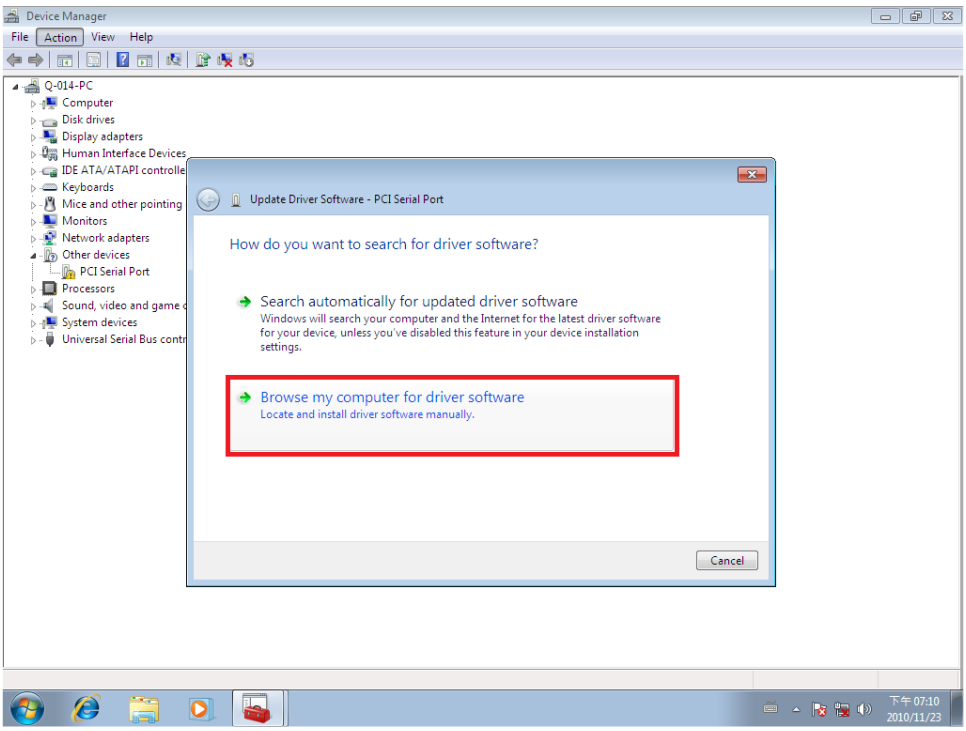
8. Under “Device Manager” of the system properties, you can find “PCI Serial Port” attached to “Other devices”. Select “PCI Serial Port”.



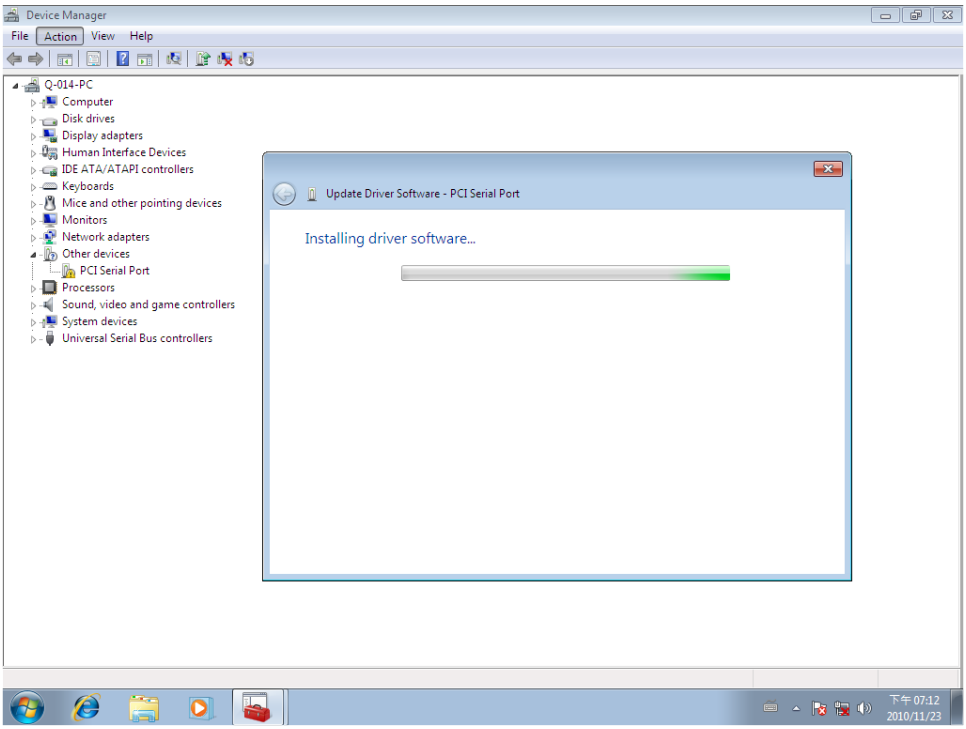
9. Select “Action” and execute “Update Driver Software”.



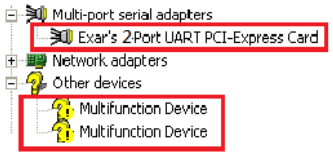
10. Click “Browse my computer for driver software”.



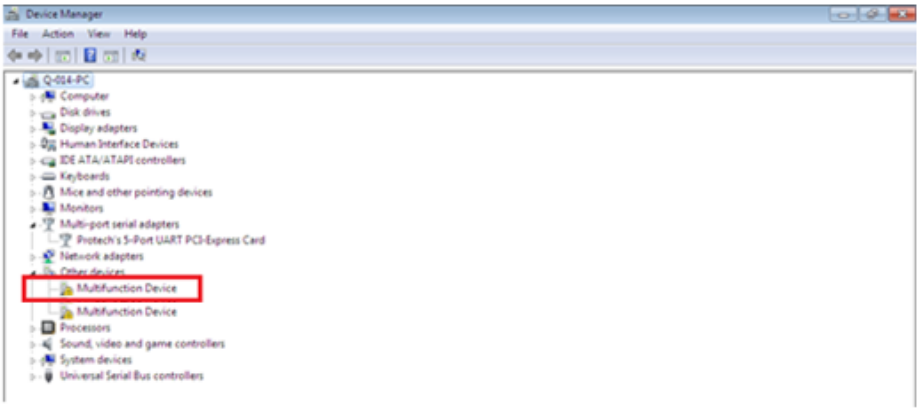
11. Insert the driver CD into the CD-ROM or DVD-ROM drive.
12. Select the directory "\PCIe Drivers\x86” for 32 bits Windows OS (“\PCIe Drivers\x64 for 64 bits Windows OS”) as the target. Click on "OK", and on “Next” to install driver.



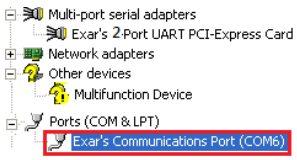
13. After driver installation is done successfully, you will find “Exar’s 2-Port UART PCI-Express Card” and two instances of “Multifunction Device” under Device Manager.



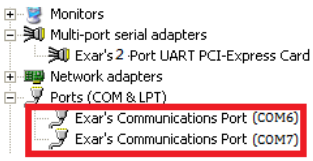
14. Select the first “Multifunction Device”.



15. Select “Action” and execute “Update Driver Software”.
16. Click “Browse my computer for driver software” again.
17. Select the directory "\PCIe Drivers\x86” for 32 bits Windows OS (“\PCIe Drivers\x64 for 64 bits Windows OS”) as the target. Click on "OK", and on “Next” to install COM port driver.
18. After COM port driver installation is done successfully, you can find the first “Exar’s Communications Port (COMx)” under “Ports (COM & LPT)” in Device Manager.



19. Select the next “Multifunction Device” and repeat steps 15~17 to install all of the COM port drivers.
20. After all COM port driver installations are done successfully, you will find two “Exar’s Communications Port (COMx)” under “Ports (COM & LPT)” in Device Manager.

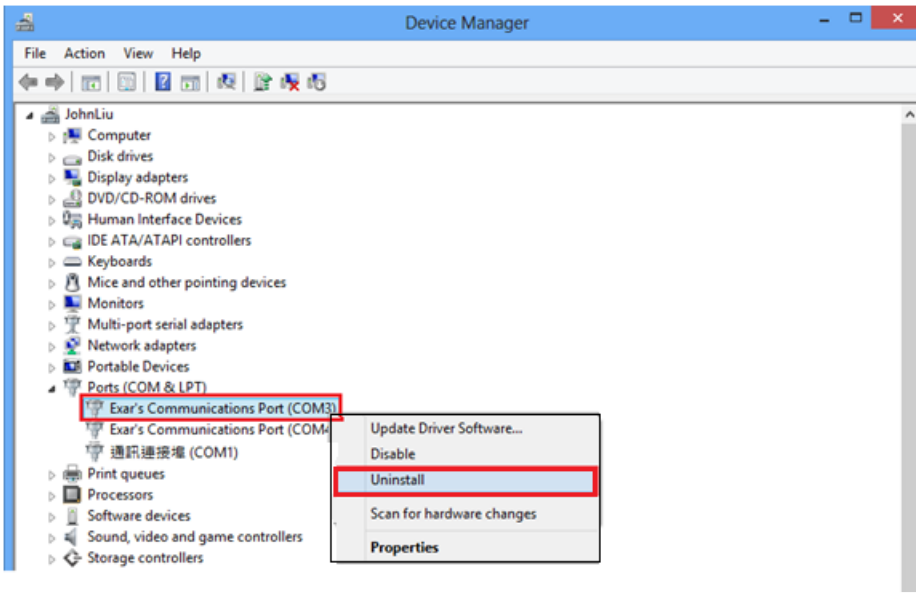


21. Restart computer to complete installation.

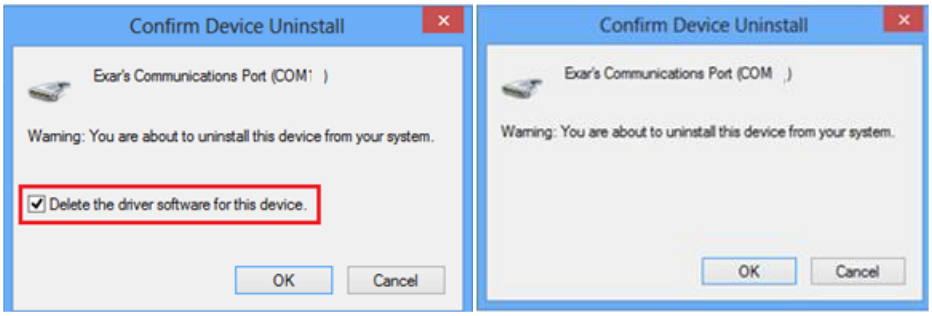
UNINSTALLING WINDOWS DRIVERS

To uninstall the Windows driver from Device Manager for PCI Express 2-port serial I/O card, please follow the steps below:

1. Right click on “Exar’s Communications Port (COMx)” under Device Manager and select “Uninstall” to start Exar’s Communications Port (COMx) driver uninstall.

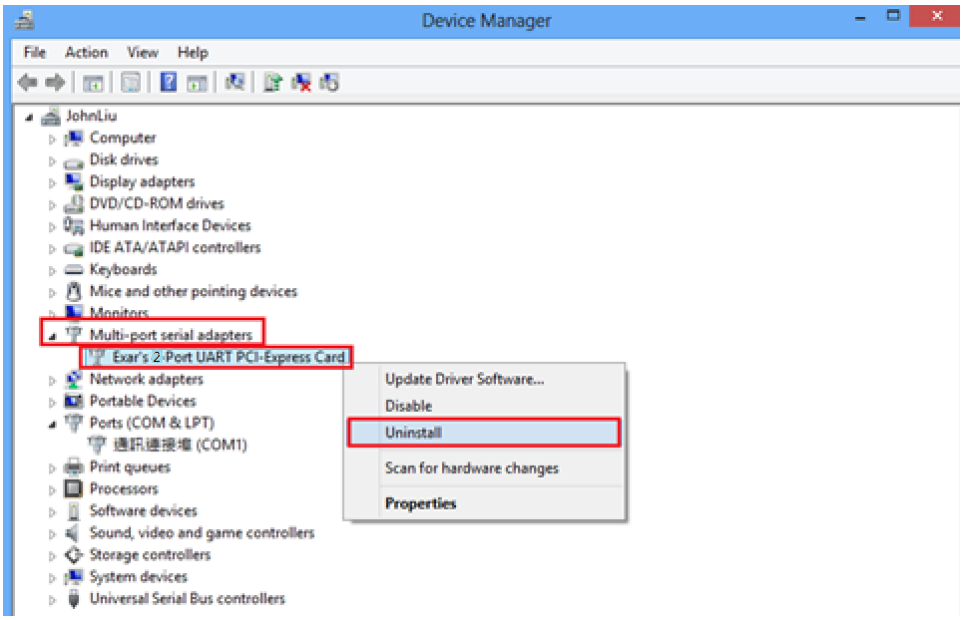


2. Under the “Confirm Device Uninstall” window, check “Delete the driver software for this device.” Click “OK” to uninstall the software driver. If there is no “Delete the driver software for this device” checkbox, just click “OK” to uninstall the software driver.

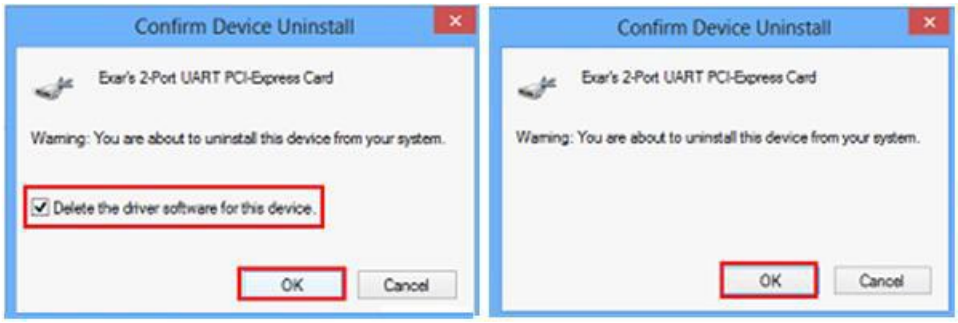


3. Right click on the remaining “Exar’s Communications Port (COMx)” drivers and repeat steps 1 and 2 to uninstall all Exar’s Communications Port drivers.

4. Right click on “Exar’s 2-Port UART PCI-Express Card” under Device Manager and select “Uninstall” to start uninstalling “Exar’s 2-Port UART PCI-Express Card” software driver.



5. Under the “Confirm Device Uninstall” window, check “Delete the driver software for this device.” Click “OK” to uninstall the software driver. If there is no “Delete the driver software for this device.” message, just click “OK” to uninstall the software driver.



6. If you installed more than one PCI Express 2-port serial I/O cards in your system, please right click on the other “Exar’s 2-Port UART PCI-Express Card” drivers and repeat steps 4~5 to uninstall all PCI Express 2-port serial I/O cards software drivers.