CAN Interface Board User's Manual

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www.moxa.com/product

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Introduction

The following topics are covered in this chapter:

- **Overview**
- **Package Checklist**
- **Connection Options for the CB-602I Series (can be purchased separately)**
- **Product Features**
- **Product Specifications**

Overview

Moxa's new CAN (Controller Area Network) interface board solutions include boards that support the Universal PCI interface, PCI Express interface, and PC/104-Plus interface. As stand-alone CAN controllers, the CP-602U-I, CP-602E-I, and CB-602I boards are cost-effective solutions. Each active CAN interface board has two independent CAN controllers with a DB9 connector. These CAN interface boards use the NXP SJA1000 and PCA82C251 transceiver, which provide bus arbitration and error detection. In addition, all models support wide temperature and have 2 KV of isolation protection built in, making the boards suitable for harsh industrial environments.

The CAN interface board series includes the following models:

CP-602U-I: 2-port CAN Interface Board Universal PCI board with isolation protection.

CP-602U-I-T: 2-port CAN Interface Board Universal PCI board with isolation protection, -40 to 85°C operating temperature.

CP-602E-I: 2-port CAN Interface Board PCI Express board with isolation protection.

CP-602E-I-T: 2-port CAN Interface Board PCI Express board, with isolation protection, -40 to 85°C operating temperature0.

CB-602I: 2-port CAN Interface Board PC/104-Plus module with isolation protection.

CB-602I-T: 2-port CAN Interface Board PC/104-Plus module with isolation protection, -40 to 85°C operating temperature.

Package Checklist

The following items are included in your CAN Interface Board package:

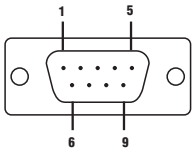
- CP-602U-I: Universal PCI Board with standard bracket, or
  CB-602I: PC/104-Plus Module, or
  CP-602E-I: PCI Express Board with standard bracket
- Document & Software CD-ROM
- Quick Installation Guide
- 5-year Warranty Statement

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

Connection Options for the CB-602I Series (can be purchased separately)

CBL-F20M9x2-50
20-pin box header to DB9 male x 2 connection cable, 50 cm

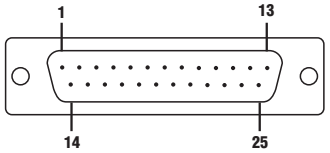
DB9 male



Pin	Signal
2	CAN_L
3	CAN_GND
5	Shield
7	CAN_H

CBL-F20M25x2-50
20-pin box header to DB9 male x 2 connection cable, 50 cm

DB25 male



Pin	Signal
2	CAN_GND
3	CAN_L
4	CAN_H
7	Shield

Product Features

The CAN interface board has the following features:

- Supports CAN 2.0A and CAN 2.0B.
- Two independent CAN controllers with DB9 connector.
- CAN transfer rate up to 1 Mbps.
- 2 KV optical isolation protection.
- LED indicator for transmit/receive status on each port.
- Optional 120 ohm terminal resistor for CAN Interface Board networks.
- DLL library and examples included.
- Universal PCI board supports a 3.3 V or 5 V PCI bus signal. (CP-602U-I only)
- Windows drivers provided.

Product Specifications

Hardware	
CAN Controller	NXP SJA1000
CAN Transceiver	PCA82C251
CAN Specification	CAN 2.0 A/B
Signal Support	CAN_H, CAN_L, GND
Card Interface	**CP-602U-I:** Universal PCI **CB-602I:** PC/104-Plus bus module **CP-602E-I:** PCI Express x 1
Connectors	**CP-602U-I/CP-602E-I:** DB9 Male **CB-602I:** 20-pin box header
Ports	2
Transfer Rate	1 Mbps
Terminator Resister	120 ohms (selected by jumper)
Max. Module Support	4 pcs
Driver Support	Windows 2000, XP/2003/Vista/2008 (x86 and x64), Windows 7
Library	C, C++, Visual Basic
Physical Characteristics	
Dimensions	**CP-602U-I:** 120 x 80 mm (4.72" x 3.15" in) **CB-602I:** 90 x 96 mm (3.54" x 3.78" in) **CP-602E-I:** 120 x 80 mm (4.72" x 3.15" in)
Protection	
Optical Isolation	2 KV
Environment Limits	
Humidity (Operating)	5 to 95% RH
Operating Temperature	Standard Models: 0 to 55° C (32 to 131° F) Wide Temp. Models: -40 to 85° C (-40 to 185° F)
Storage Temperature	-40 to 85° C (-40 to 185° F)
Regulatory Approvals	EN61000-3-3, IEC61000-4-2, IEC61000-4-3, IEC61000-4-4,

	IEC61000-4-5, IEC61000-4-6, IEC61000-4-8, IEC61000-4-11, FCC Part 15 Class B
Power Requirements	
Power Consumption	**CP-602U-I:** 365 mA @ 5VDC **CB-602I:** 380 mA @ 5VDC **CP-602E-I:** 780 mA @ 5VDC
Warranty	
	5 years Details: See www.moxa.com/warranty

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Hardware Installation

In this chapter, we describe the hardware installation procedure, and provide dimensions diagrams for all three boards.

The following topics are covered in this chapter:

- **Hardware Installation Procedure**
- **Configuring the Board and Dimensions**
  - CP-602U-I
  - CP-602E-I
  - CB-602I

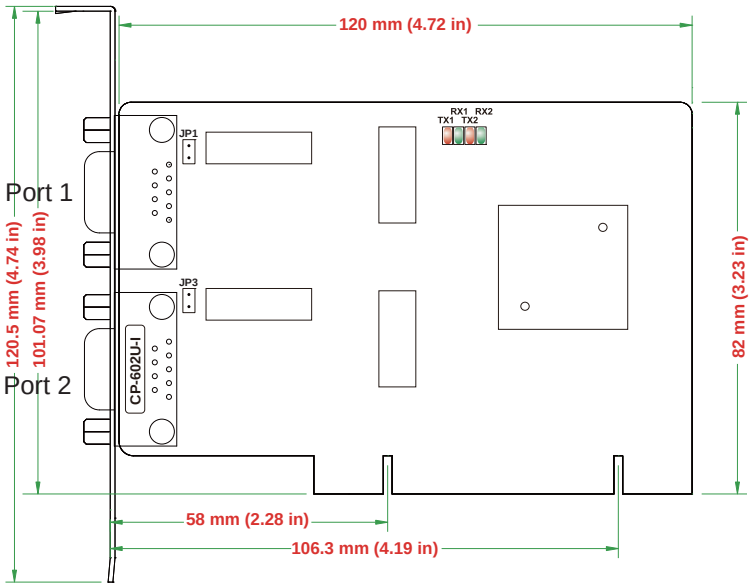
Hardware Installation Procedure

Use the following simple procedure to install the Moxa CAN interface board in your computer.

1. Shut down the computer and remove the computer's outer cover.
2. Insert your CP-602U-I, CP-602E-I, or CB-602I board into a suitable empty slot.
3. Replace the computer's outer cover and turn on the computer.

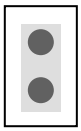
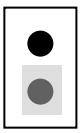
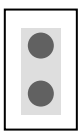
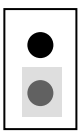
Configuring the Board and Dimensions

CP-602U-I

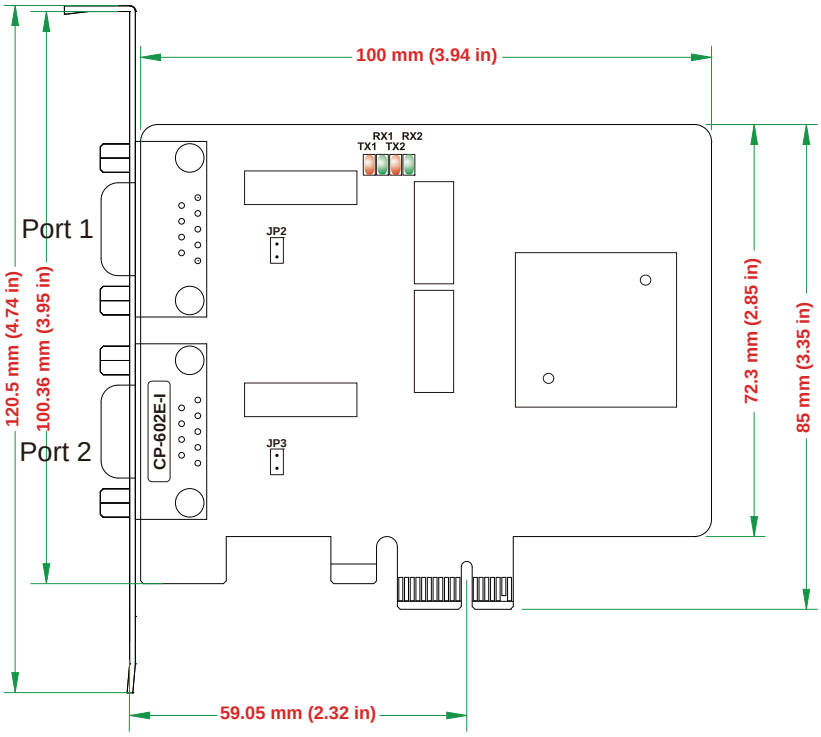


Terminal Resistor

Onboard termination resistors can be activated individually for each CAN controller using a jumper.

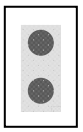
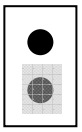
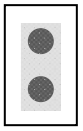
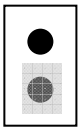
Jumper	Description	Status	
		Enabled	Disabled
JP1	Jumper settings for port 1 termination resistor (120 Ω)		
		Enabled	Disabled
JP3	Jumper settings for port 2 termination resistor (120 Ω)		

CP-602E-I

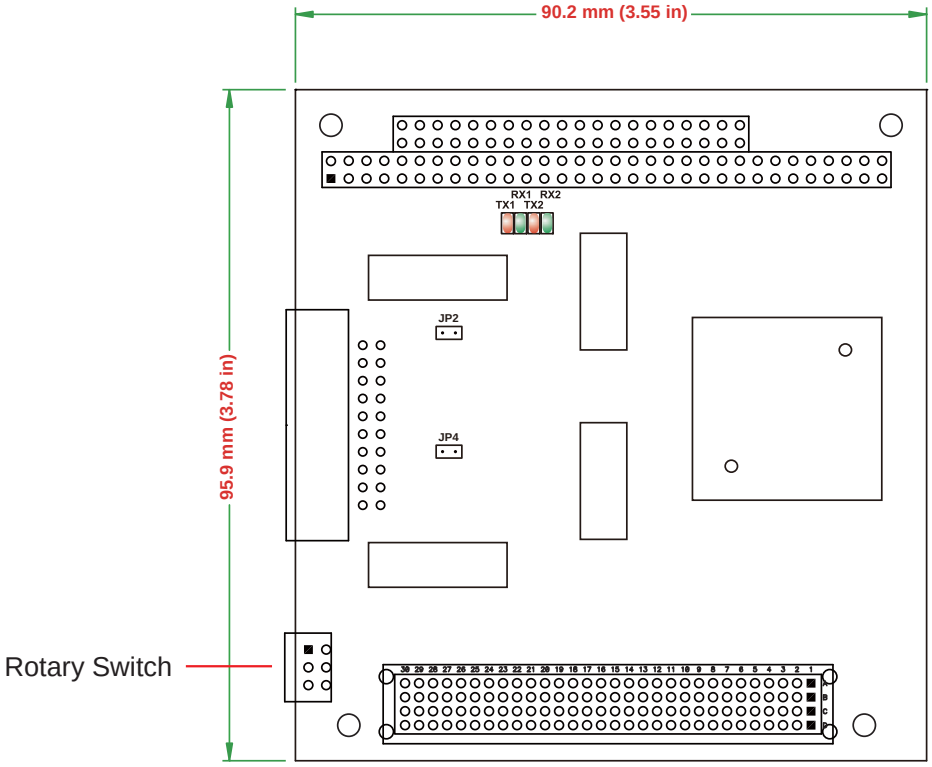


Terminal Resistor

Onboard termination resistors can be activated individually for each CAN controller using a jumper.

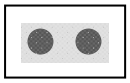
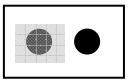
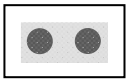
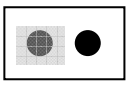
Jumper	Description	Status	
		Enabled	Disabled
JP2	Jumper settings for port 1 termination resistor (120 Ω)	 1 2	 1 2
		Enable	Disable
JP3	Jumper settings for port 2 termination resistor (120 Ω)	 1 2	 1 2

CB-602I



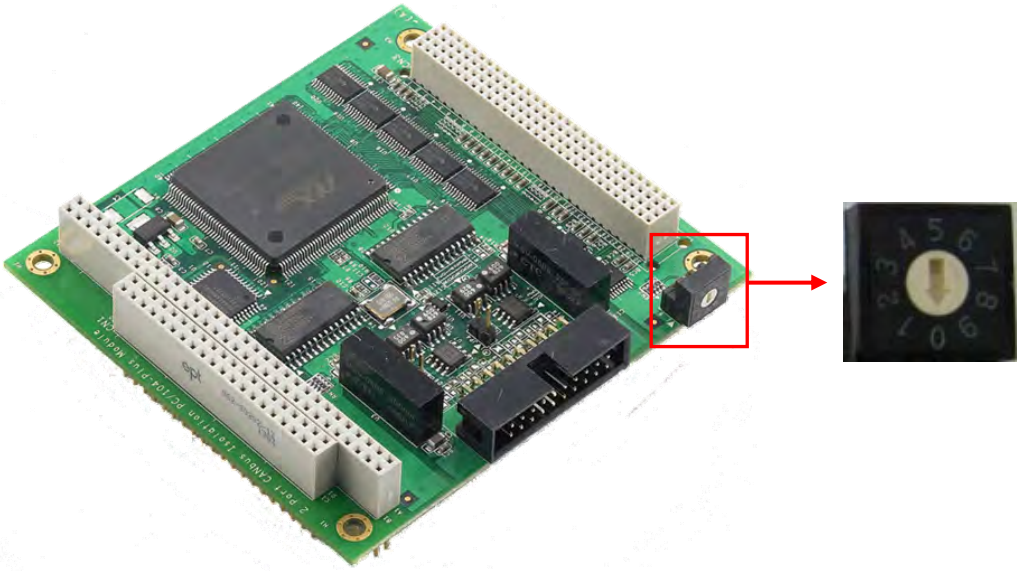
Terminal Resistor

Onboard termination resistors can be activated individually for each CAN controller using jumper.

Jumper	Description	Status	
		Enabled	Disabled
JP2	Jumper settings for port 1 termination resistor (120 Ω)	1 2 	1 2 
		Enabled	Disabled
JP4	Jumper settings for port 2 termination resistor (120 Ω)	1 2 	1 2 

Rotary Switch Configuration

A rotary switch on the CB-602I board makes it easy to set the appropriate signals, particularly when installing multiple PC/104-Plus modules in the same unit. The rotary switch, which looks like a clock, provides a bi-directional path with no signal propagation delay. The first module on the stack should be set to CLK0, the second to CLK1, etc., to eliminate clock skew between modules.



The module stack order is shown below.

Switch Position	Module Slot	IDSEL	CLK	INT#
0, 4, 8	1	IDSEL0	CLK0	INTA#
1, 5, 9	2	IDSEL1	CLK1	INTB#
2, 6	3	IDSEL2	CLK2	INTC#
3, 7	4	IDSEL3	CLK3	INTD#

3

Software Installation

Installing the CAN interface board in your computer is simple. After installing the hardware (see Chap. 2 for details) and restarting your computer the Windows operating system will load the correct drivers for the board and the CAN controller. In this chapter, basic installation procedures are explained. The screenshots shown in this chapter are for Windows XP, although the procedures are essentially the same as for Windows 2000/2003/Vista/2008 and later versions.

The following topics are covered in this chapter:

- **Initial Driver Installation**
- **Connecting the Hardware**
  - Windows XP, Windows 2003, and Windows Vista (32-bit and 64-bit)
  - Installing the Driver for the CAN Controller
- **Removing the MOXA CAN Interface Board Windows Driver**

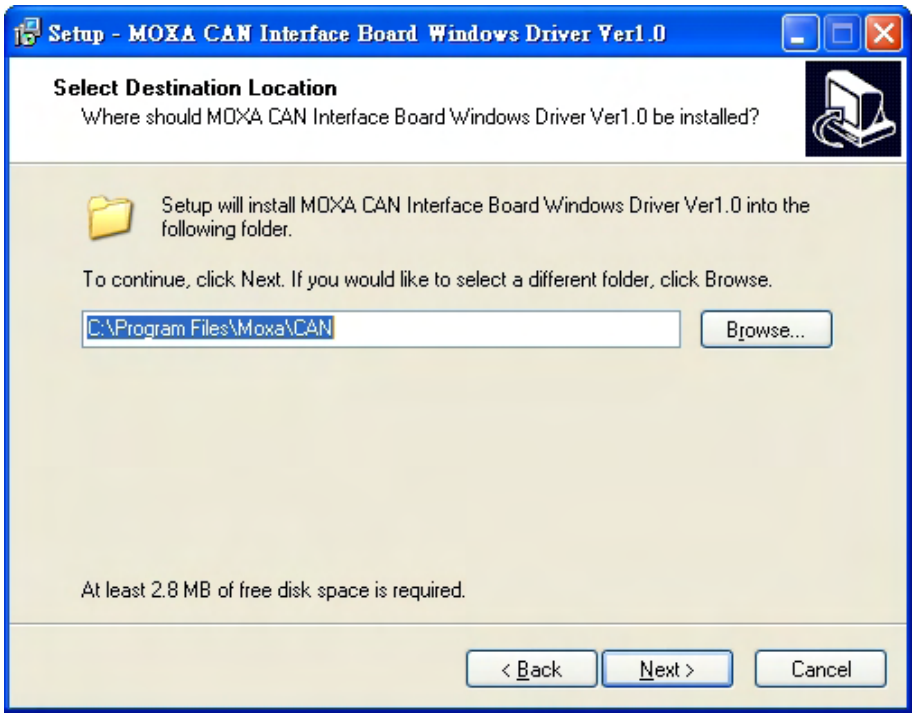
Initial Driver Installation

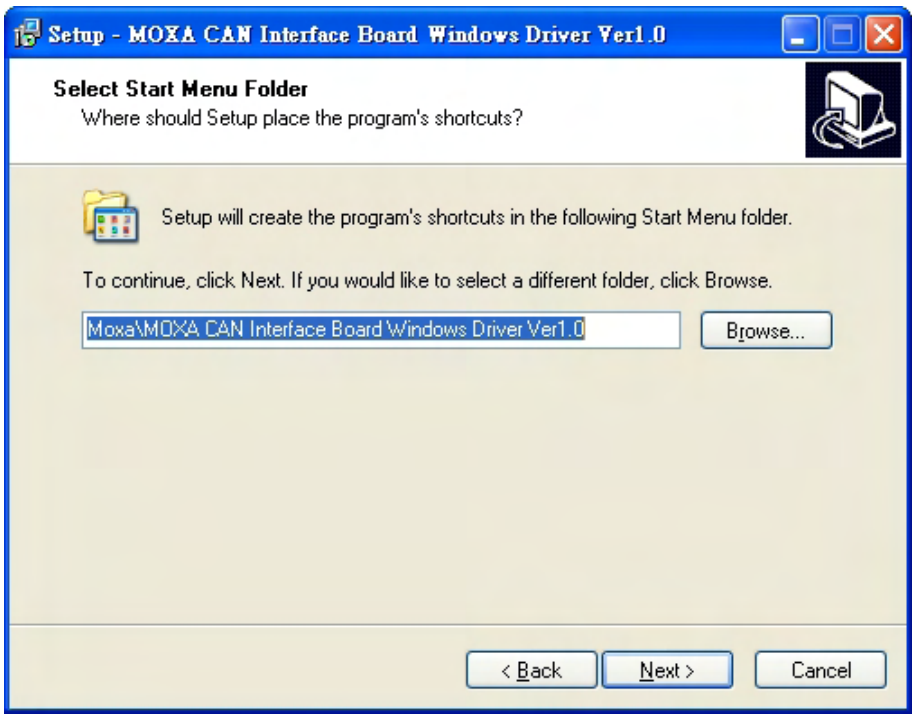
The Documentation and Software CD contain the drivers for the CAN interface board. You may also download the drivers from Moxa's website at http://www.moxa.com. After inserting the Documentation and Software CD in your computer, locate the **CAN Interface Board/Software** folder and then double-click the **Setup** or **Install** file.

Step 1: Run **driv_win2k_can_x.x_build_ yymmddhh.exe**, located on the Documentation and Software CD-ROM. Click **Next** to begin installing the driver.

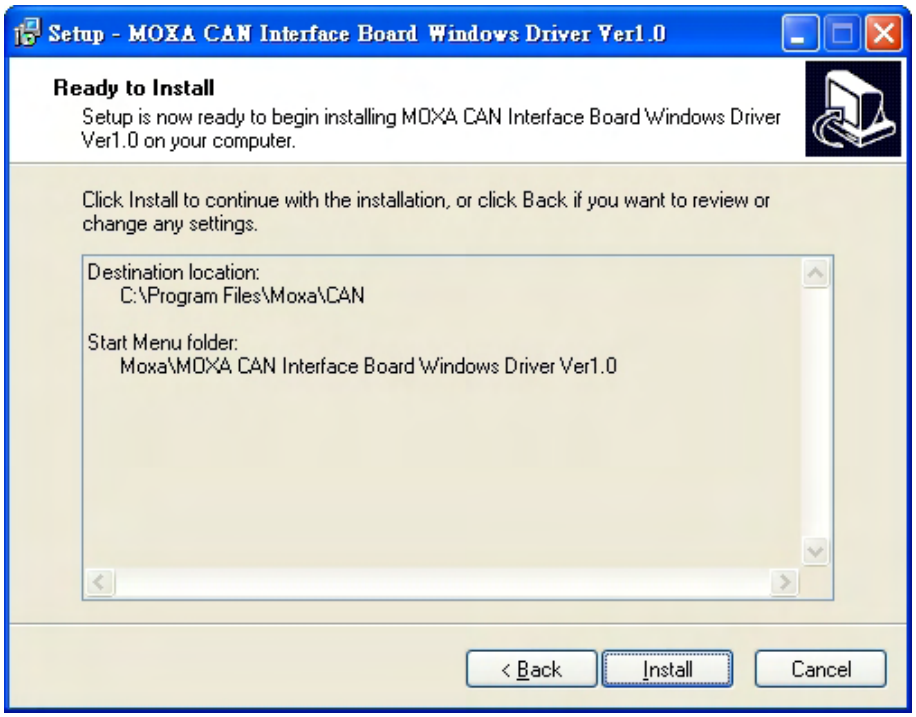
(*Note: x.x = version, yy = year, mm = month, dd = day, hh = hour)

Step 2: Click **Next** to install the driver in the indicated folder.



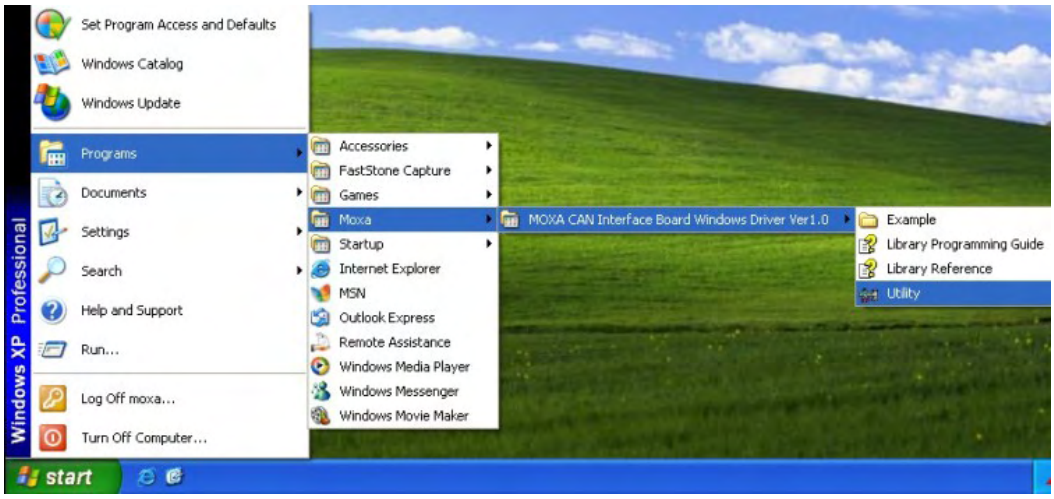


Step 3: Click **Install** to proceed with the installation.



Step 4: Moxa has thoroughly tested the driver for safe Windows operation. Click **Finish** to complete the driver installation.

After the driver installation has been completed, the **MOXA CAN interface board windows driver** folder will located in the Start menu as shown below. The driver folder includes Example, Library programming guide, Library Reference, and utility. This content is provided to make it easier for users to develop their own program.



Connecting the Hardware

After installing the driver, power off the PC and plug the Moxa CAN interface board into any empty slot, and then power it back on. Windows will automatically detect the card and begin installing the driver. When Windows finishes installing the driver for the board, it will detect the new CAN controller, and then install the CAN controller driver. The following screenshots use CP-602U-I as an example.

ATTENTION

For best results, we recommend that you install the driver before plugging the board into the slot and power off the PC when plugging in the board. Please refer to the previous section on Initial Driver Installation for instructions.

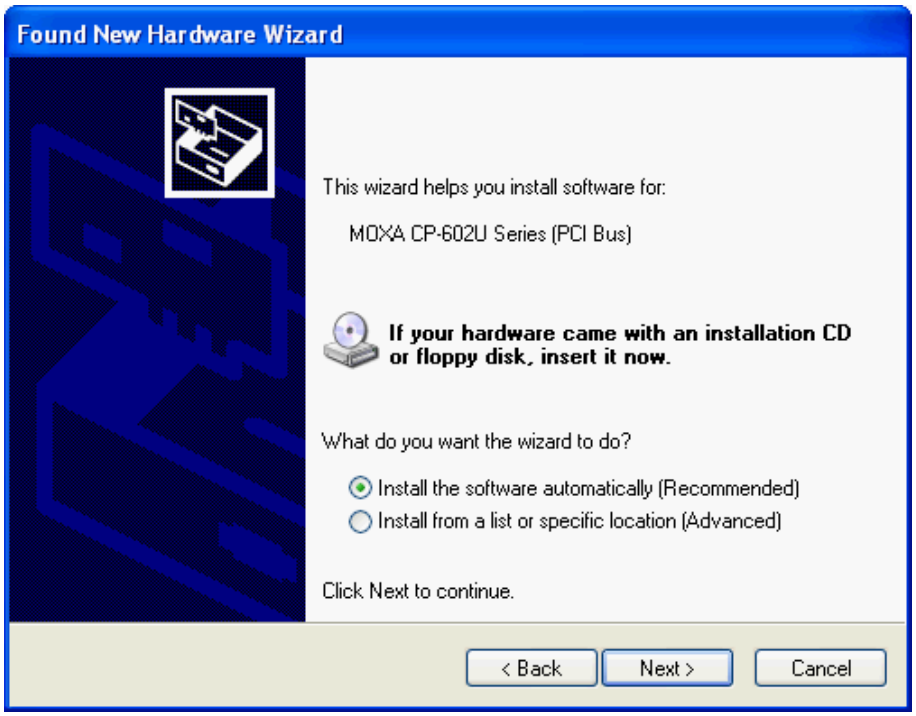
Windows XP, Windows 2003, and Windows Vista (32-bit and 64-bit)

The following instructions are for Windows XP, Windows 2003, and Windows Vista systems.

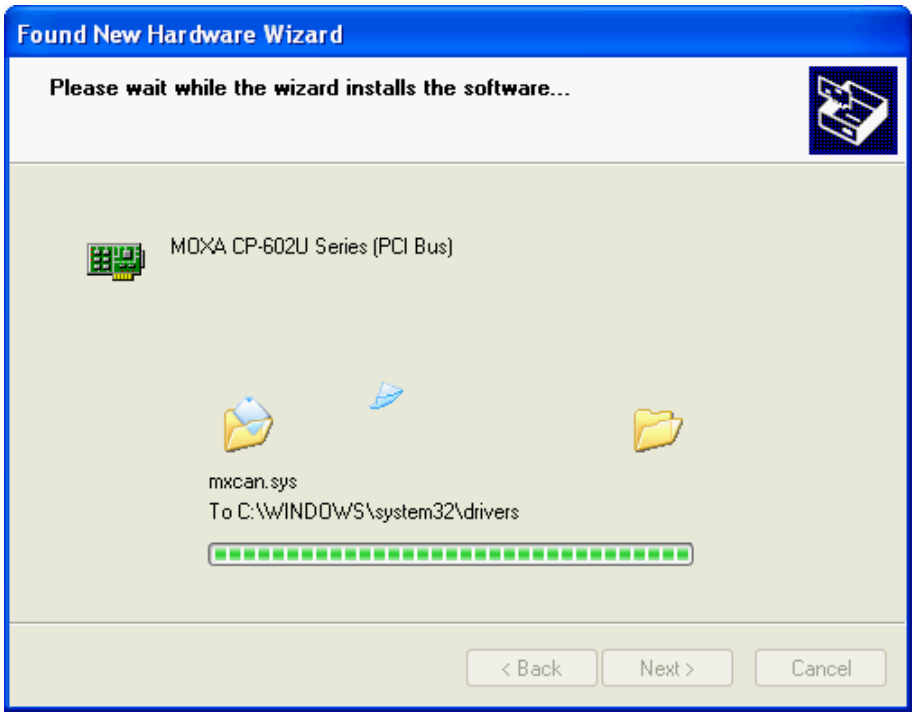
Step 1: After plugging the CAN interface board into a slot, Windows will automatically detect the new device. The **Found New Hardware** balloon will appear in the bottom right corner of the Windows desktop. No action is required yet. We use the CP-602U series to illustrate.

Step 2: After a moment, the Found New Hardware Wizard will open. If you see the following screen, select **No, not this time**, and then click **Next.**

Step 3: On the next window that appears, select **Install the software automatically (Recommended)**, and then click **Next**.



Step 4: Windows will spend a few moments installing the CAN interface board driver.



Step 5: The next window indicates that Windows has completed the installation. Click **Finish** to continue with the installation procedure.

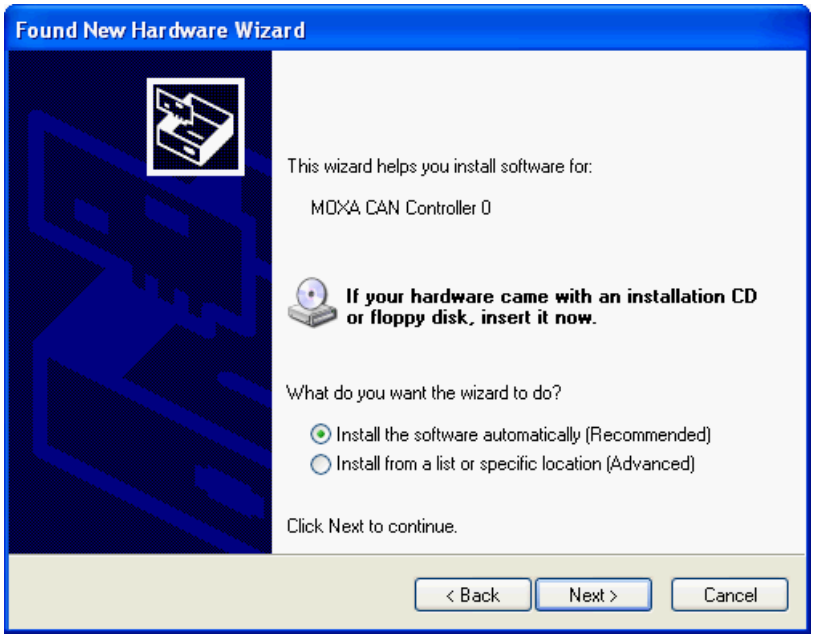
Step 6: After Windows has completed installing the MOXA CAN interface board, it will automatically detect the new CAN controller.

Installing the Driver for the CAN Controller

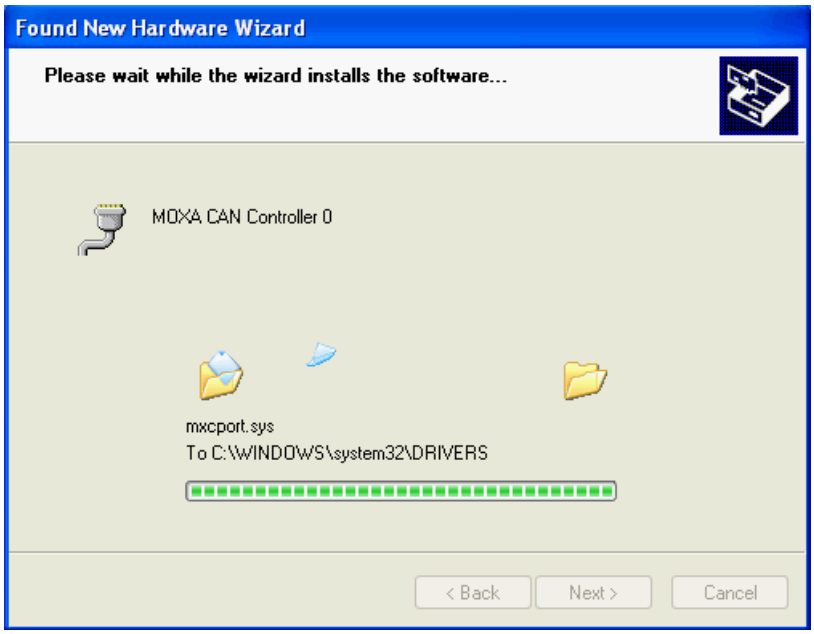
After the driver for the CAN interface board have been installed, Windows will automatically detect the new CAN controller.

Step 1: The **Found New Hardware Wizard** window will open to help you install the driver. This window will offer to connect to the Windows update site to search for a driver. Select **No, not this time** and then click **Next** to continue.

Step 2: Select **Install the software automatically (Recommended)**, and then click **Next** to continue.



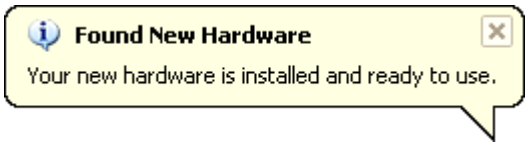
Step 3: Windows will spend a few moments installing the CAN controller driver.



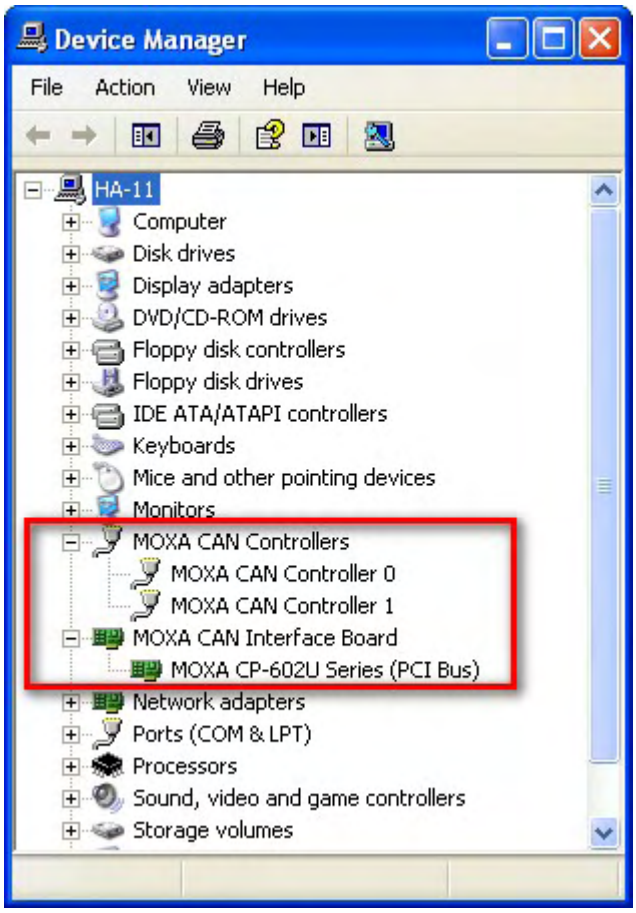
Step 4: After all files have been copied to the system, the **Completing the Found New Hardware Wizard** window will open to indicate that it has finished installing the driver. Click **Finish** to proceed with the rest of the installation.

Step 5: Repeat Step 1 through Step 4 for each of the remaining controllers (note that there are 2 controllers for a 2-port board).

Step 6: The **Found New Hardware** balloon will reappear to inform you that the hardware was installed successfully.

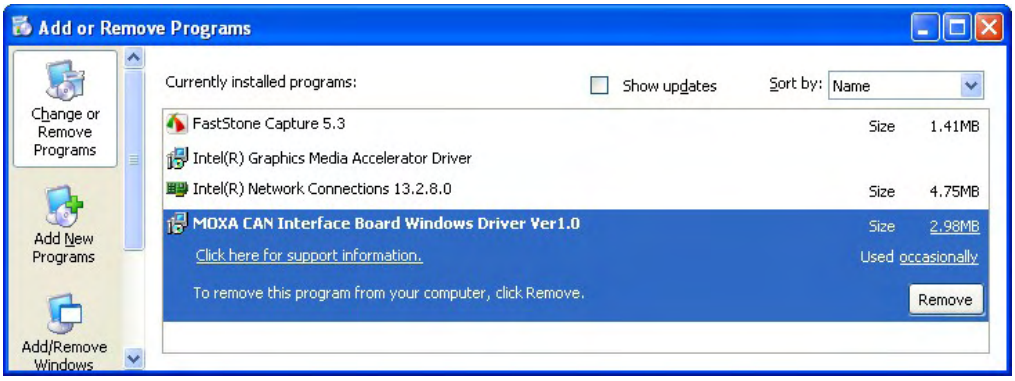


Open the Windows Device Manager to check that the installation was successful. The MOXA CP-602U Series should appear under **MOXA CAN Interface Board** and **CAN Controllers** appear under **MOXA CAN Controllers**.

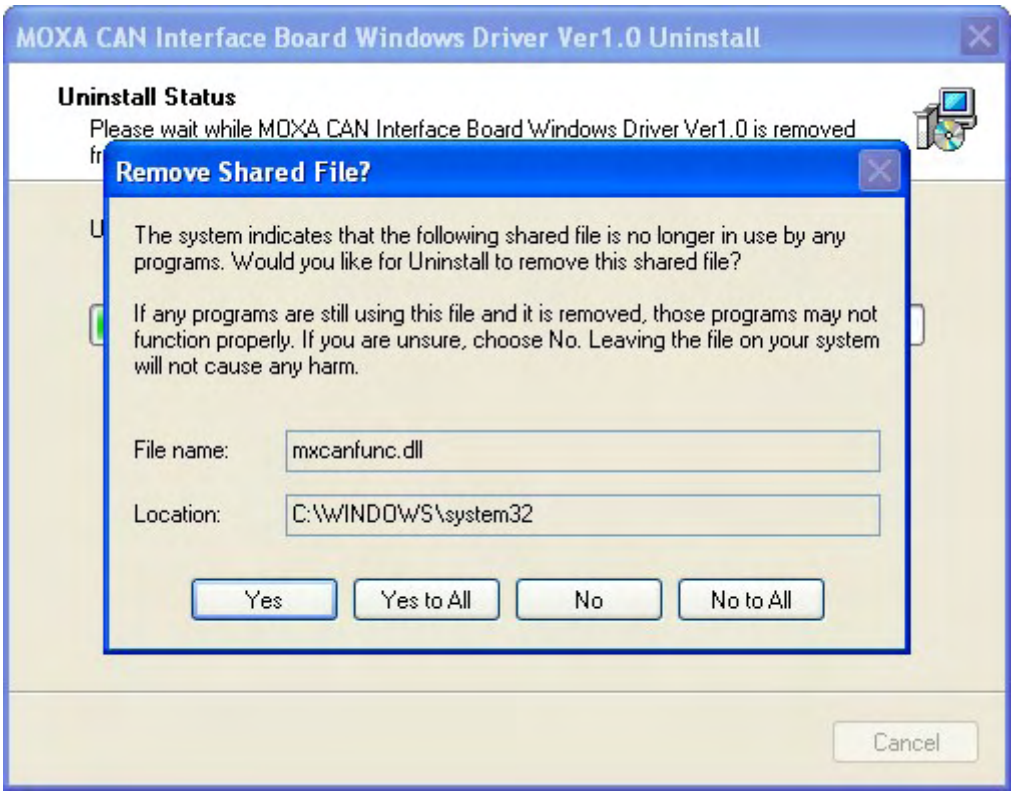


Removing the MOXA CAN Interface Board Windows Driver

1. If the MOXA CAN interface board driver is no longer in use, you may click the **Remove** button in Windows' **Add or Remove Programs** tool to remove the MOXA CAN Interface Board driver.



2. If you want to remove the driver, then click **YES** to continue.

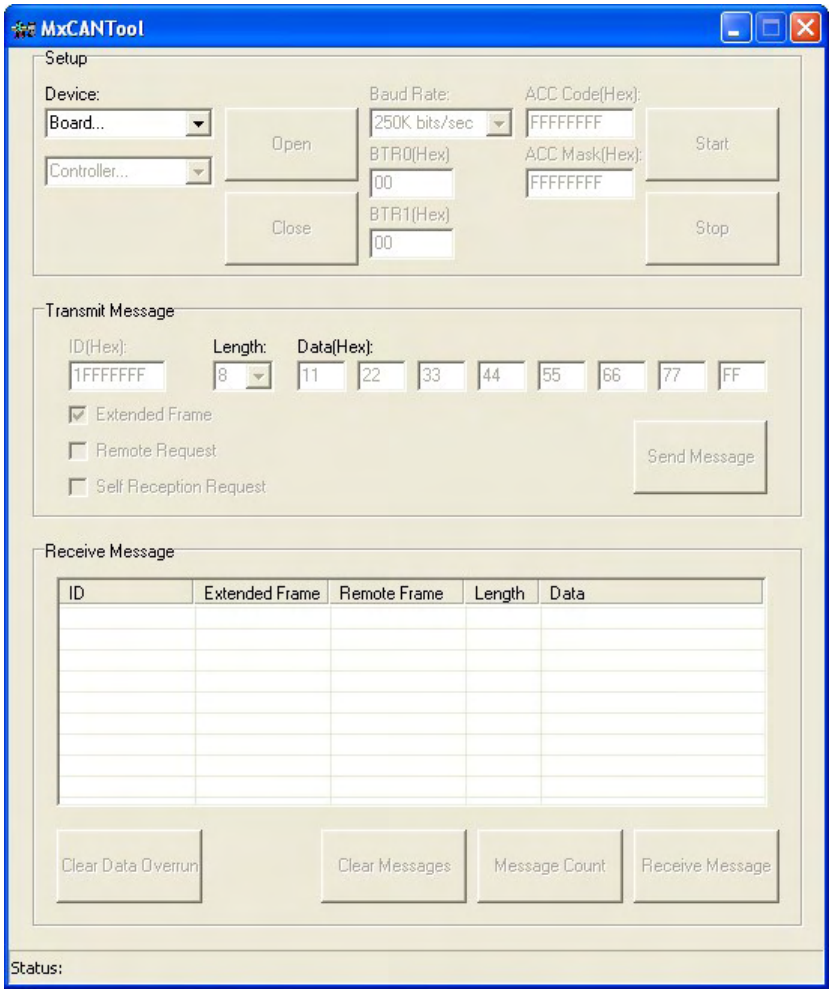


3. Click **OK** to proceed with the un-installation procedure.

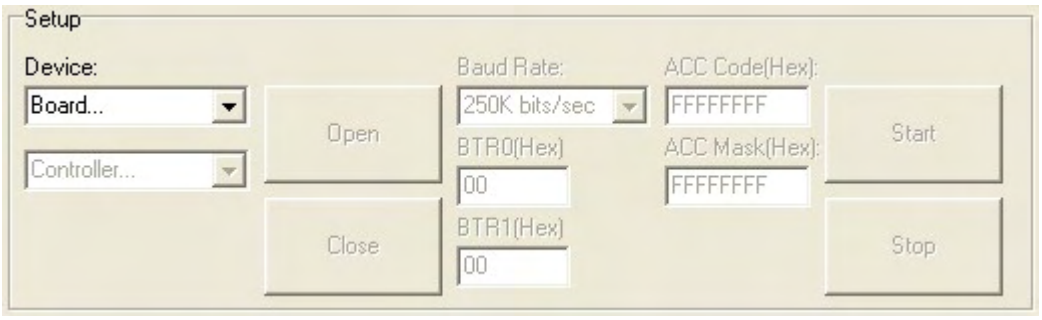
4

CAN Interface Board Utility

In this chapter we introduce Moxa's **MxCANTool** utility to demonstrate the CAN Interface Board's functions. After installing the Moxa CAN Interface Board Driver package, the utility will be located in **Start/Programs/Moxa/MOXA CAN Interface Board Windows Driver Ver 1.0/Utility**. You will see the following default panel. This panel includes three sessions: Setup, Transmit Message, and Receive Message. Users can configure the Baudrate, ACC Code, and ACC mask parameters for the CAN controllers of each board in the Setup session. When you enter the Transmit Message information and then click Send Message, the message will appear in the Receive Message box.



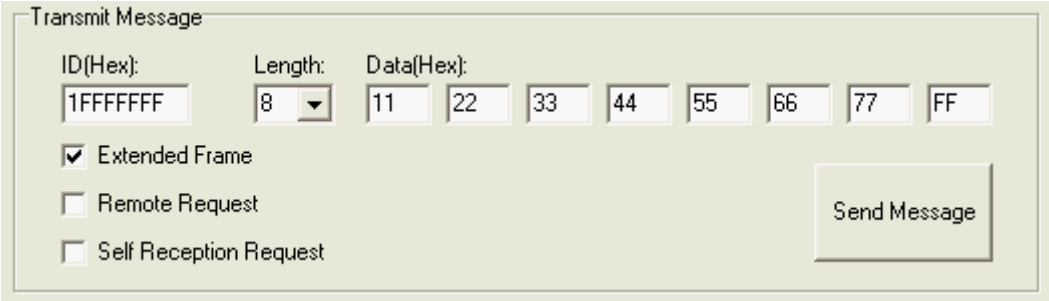
The MxCANTool parameters for each CAN controller can be configured during an MxCANTool Setup session.



Parameter	Options	Description
Device [Board...]	Board 0… Board 3	Displays boards in the system. Select the CAN interface board to configure
Device [Controller…]	Controller 0 Controller 1	Displays controllers in the board. Select the controller to configure.
Baud Rate	10K bits/sec… 1000K bits/sec…	Select a regular Baud Rate.
	User Defined	If User defined is selected need to configure the BTR0/BTR1 parameters.
BTR0/BTR1(Hex)	0x00-0xFF	To set a user-defined Baudrate, refer to the datasheet of NXP SJA1000 in section 6.5.
Open/Close		Open/Close CAN controller.
ACC Code (Acceptance Code)	0-FFFFFFFF	Set the parameter to allow the specified ID frame to be received. Refer to the *cnio_set_filter_ex* function from Library reference for detail.
ACC Mask (Acceptance Mask)	0-FFFFFFFF	Set the parameter to mask the specified bit in frame to be received. Refer to *cnio_set_filter_ex* function from Library reference for detail.
Start/Stop		Set to Operation mode/Reset mode.

Transmit Message

The function sends a CAN message with or without the block operation. The default setting is **Extended Frame**.



Parameter	Options	Description
ID (Hex)	Standard Frame: 0-0x7FF Extended Frame: 0-0x1FFFFFFF	Set the specified ID of frame to be transmitted.
Length	0-8	Data length code of a frame.
Data (Hex)	0-0xFF	Data byte.

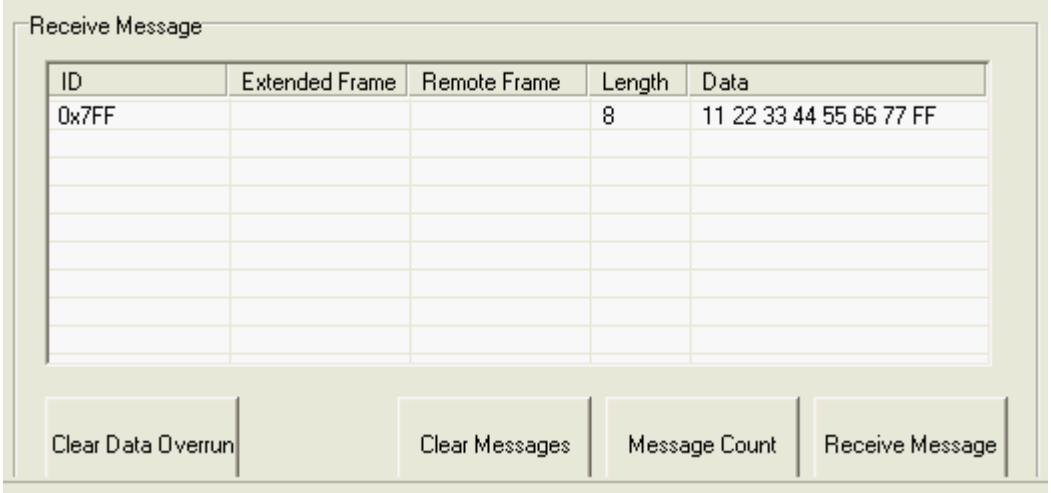
Parameter	Check	Description
Standard Frame	Empty	11-bit ID CAN frame
Extended Frame	Checked	29-bit ID CAN frame(Default setting)
Remote Request	Checked	Set the frame as remote request frame to be transmitted. Select this option to ignore the data field.
Self Reception Request	Checked	Select this option to allow the frame to be received by the controller who transmits the frame.

ATTENTION

The Standard Frame parameter does not display on the panel. If you need to select Standard Frame, remove the checkmarks from the other three check boxes.

Receive Message

The function gets a CAN message from the received buffer with or without the block operation.



Parameter	Description
Clear Data Overrun	Clear data overrun status
Clear Messages	Clear messages on the message list
Message Count	Displays the number of messages received
Receive Message	The CAN message will be displayed

The following screenshots illustrate the **MxCANTool** functions. We use the cable that follows the ISO11898 pin assignments to connect controller 0 and controller 1. The CAN message will be transmitted from controller 0 to controller 1 in a standard frame.

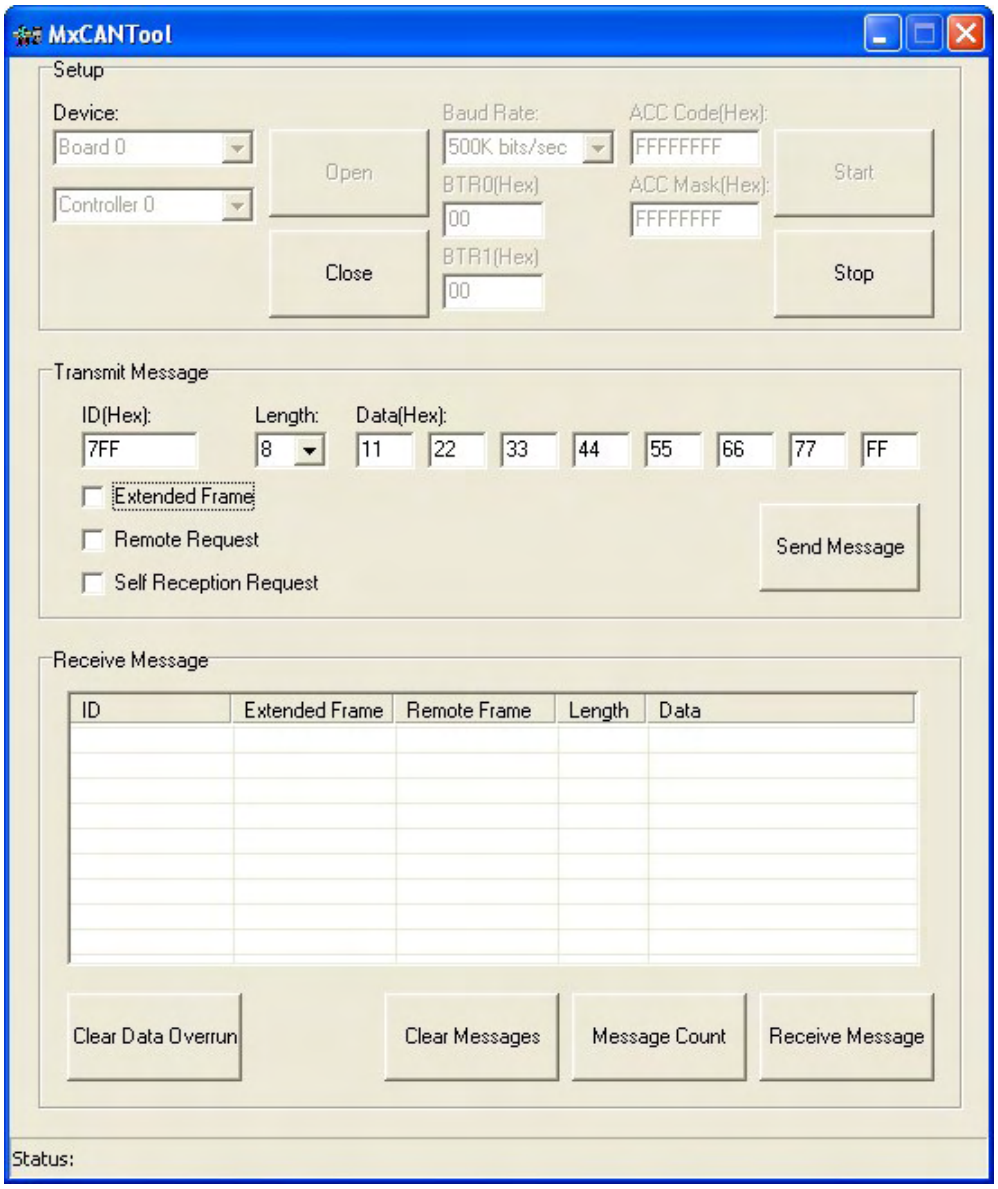
Step 1: Open the **MxCANTool** utility and select **controller 0**; configure all parameters.

Step 2: Open the **MxCANTool** utility and select **controller 1**; configure all parameters.

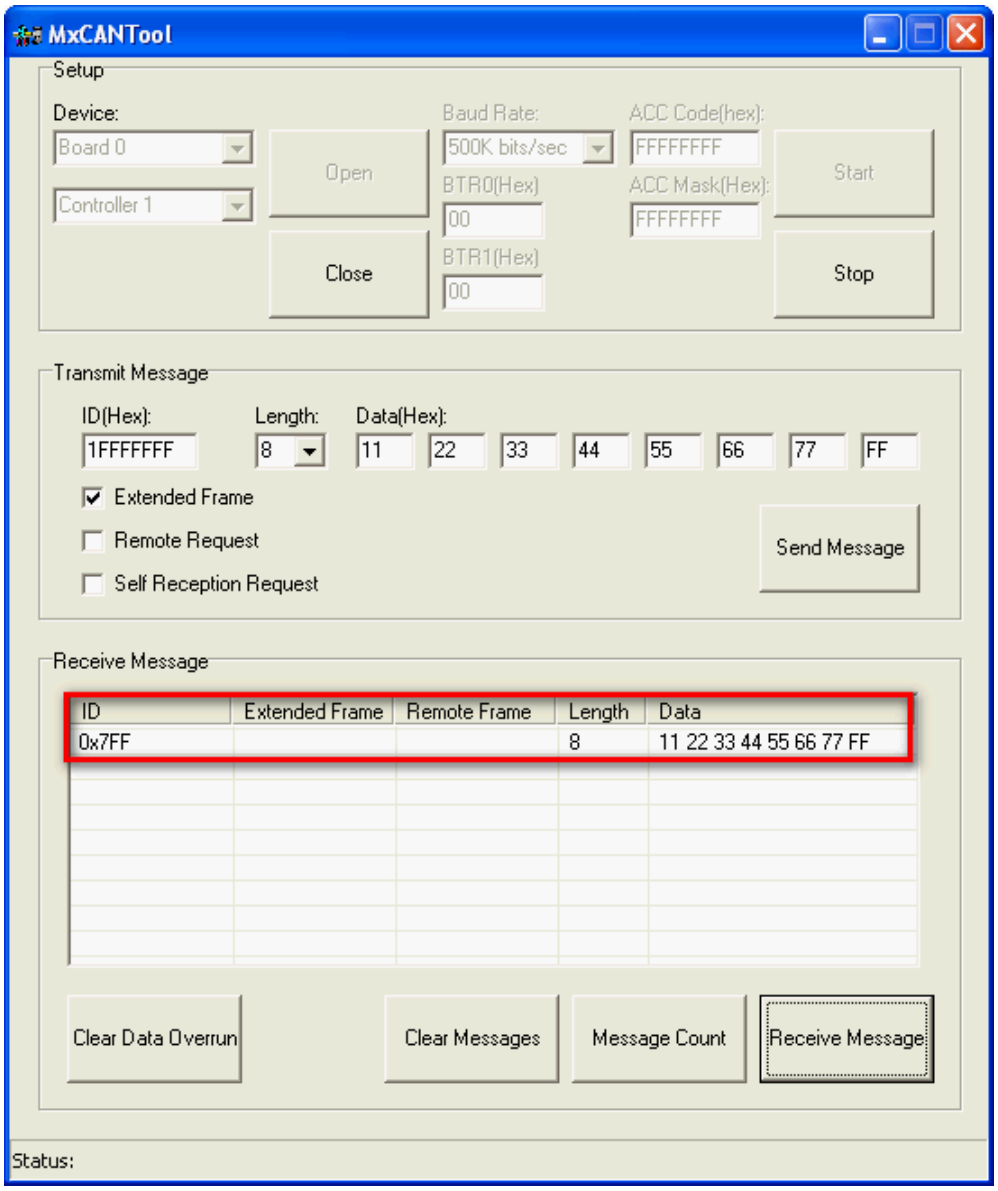
Step 3: In the **controller 0** panel, select options first and then set transmit the ID as "7FF", **Length** as "8", **Data** as "11, 22, 33, 44, 55, 66, 77, FF", and then click **Send Message**.

Step 4: In the **controller 1** panel, click the **Receive Message** so that the CAN message will be displayed on the receive message list.

<In Controller 0, Baudrate 500 Kbps, send standard frame >



<In Controller 1, Baudrate 500 Kbps, receive standard frame >



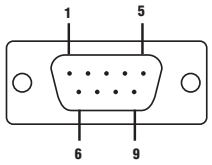
5

Pin Assignments

The CP-602U-I and CP-602E-I come with two DB9 connectors, and the CB-602I comes with a 20-pin right-angle header connector. Even though the CB-602I comes with a 20-pin right-angle header connector, Moxa also provides a 50-cm cable, called the CBL-F20M9x2-50 or CBL-F20M25x2-50, that converts a 20-pin female connector to a DB9 or DB25 connector.

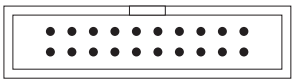
The connector's pin assignments are shown below:

DB9 Male



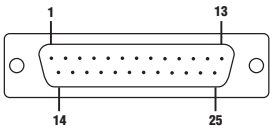
Pin	Signal
2	CAN_L
3	CAN_GND
5	Shield
7	CAN_H

20-pin right-angle header connectors



Pin	Signal	Pin	Signal
3	CAN0_L	13	CAN1_L
4	CAN0_H	14	CAN1_H
5	CAN_GND	15	CAN_GND
9	Shield	19	Shield

DB25 Male



Pin	Signal
2	CAN_GND
3	CAN_L
4	CAN_H
7	Shield

A

EMI Notices

EMI Notices (Class B)

Electromagnetic Compatibility Notices

FCC (U.S. Only)	**This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:** **(1) This device may not cause harmful interference, and** **(2) This device must accept any interference received, including interference that may cause undesired operation.**
IC (Canada Only)	**The Class B digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulation. Cet appareil numerique de la class [*] respecte toutes les exigences du Reglement sur le materiel brouilleur du Canada.**

GREEN Notices

WEEE Directive - 2002/96/EC
The symbol of the crossed-out wheeled bin indicates that at end-of-life of the equipment separate collection is required in the EU Member States. The black bar specifies that the appliance is put on the market after August 13, 2005.

Reference: Directive 2002/96/EC.