CAN Interface Board User's Manual

Second Edition, August 2009

www.moxa.com/product



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CAN Interface Board User's Manual

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1 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
- **D** 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

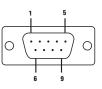
NOTE: Please notify your sales representative if any of the above items are missing or damaged.

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



Signal

CAN_L



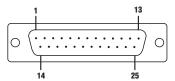
3CAN_GND5Shield7CAN_H

Pin

2

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





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	8
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,

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

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

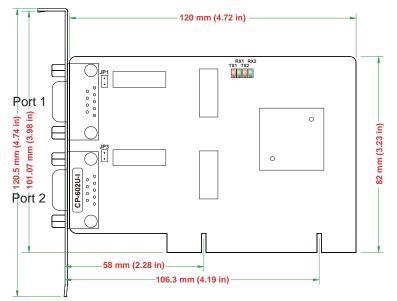
Hardware Installation Procedure

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

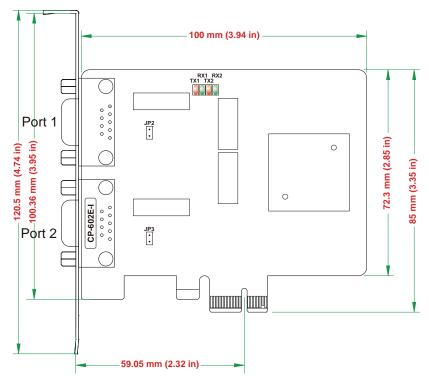


Terminal Resistor

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)	2 1	2 1
		Enabled	Disabled
JP3	Jumper settings for port 2 termination resistor (120 Ω)	2 1	• 2 • 1

CP-602E-I

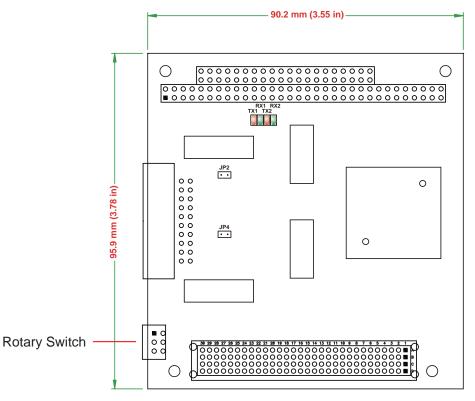


Terminal Resistor

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

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

CB-602I



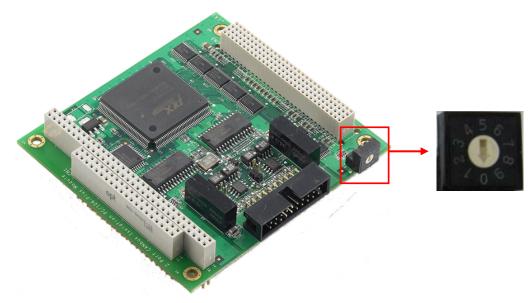
Terminal Resistor

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

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

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
- **Generative Constitution of the Active Testimeter Constitution of 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 <u>http://www.moxa.com</u>. 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.

🕼 Setup - MOXA CAN Interface Board Windows Driver Ver1.0
Select Destination Location Where should MDXA CAN Interface Board Windows Driver Ver1.0 be installed?
Setup will install MOXA CAN Interface Board Windows Driver Ver1.0 into the following folder.
To continue, click Next. If you would like to select a different folder, click Browse.
C:\Program Files\Moxa\CAN Browse
At least 2.8 MB of free disk space is required.
< <u>B</u> ack <u>N</u> ext > Cancel

🕞 Setup - MOXA CAN Interface Board Windows Driver Verl.0
Select Start Menu Folder Where should Setup place the program's shortcuts?
Setup will create the program's shortcuts in the following Start Menu folder.
To continue, click Next. If you would like to select a different folder, click Browse.
Moxa\M0XA CAN Interface Board Windows Driver Ver1.0 Browse
< <u>B</u> ack <u>N</u> ext > Cancel

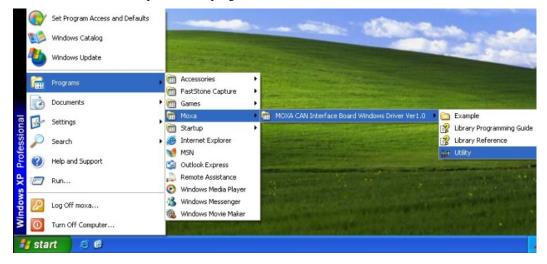
Step 3: Click Install	to proceed with	the installation.
-----------------------	-----------------	-------------------

🔂 Setup - MOXA CAN Interface Board Windows Driver Ver1.0	
Ready to Install Setup is now ready to begin installing MOXA CAN Interface Board Windows Driver Ver1.0 on your computer.	
Click Install to continue with the installation, or click Back if you want to review or change any settings.	
Destination location: C:\Program Files\Moxa\CAN	
Start Menu folder: Moxa\M0XA CAN Interface Board Windows Driver Ver1.0	
< <u>B</u> ack Install	Cancel

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.

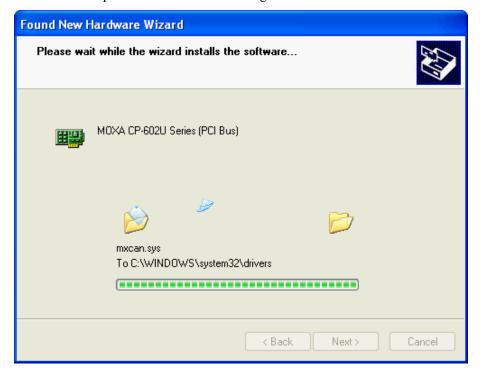
Found New Hardware Wizard		
	Welcome to the Found New Hardware Wizard Windows will search for current and updated software by looking on your computer, on the hardware installation CD, or on the Windows Update Web site (with your permission). Read our privacy policy	
	Can Windows connect to Windows Update to search for software? Yes, this time only Yes, now and every time I connect a device No, not this time Click Next to continue.	
	< Back Next > Cancel	

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

Found New Hardware Wizard		
Image: Note of the i		
< Back Next > Cancel		

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



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- Found New Hardware Wizard

 Completing the Found New Hardware Wizard

 The wizard has finished installing the software for:

 MOXA CP-602U Series (PCI Bus)

 Click Finish to close the wizard.
- **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.

Found New Hardware Wizard		
	Welcome to the Found New Hardware Wizard	
	Windows will search for current and updated software by looking on your computer, on the hardware installation CD, or on the Windows Update Web site (with your permission). <u>Read our privacy policy</u>	
	Can Windows connect to Windows Update to search for software?	
	◯ Yes, this time only	
	Yes, now and every time I connect a device	
	No, not this time ■	
	Click Next to continue.	
	< Back Next > Cancel	

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.

Found New Hardware Wizard	
Please wait while the wizard installs the software	
MOXA CAN Controller 0	
mxcport.sys To C:\WINDOWS\system32\DRIVERS	
< Back	Next > Cancel

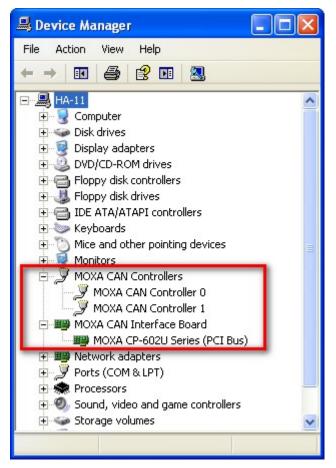
Step 4: After all files have been copied to the system, the **Completing the Found New Hardware Wizard** window will open to indicate that it has finished installing the driver. Click **Finish** to proceed with the rest of the installation.

Found New Hardware Wizard		
	Completing the Found New Hardware Wizard The wizard has finished installing the software for: MOXA CAN Controller 0	
	K Back Finish Cancel	

- **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.

🐻 Add or Rem	ove Programs			
	Currently installed programs:	ow up <u>d</u> ates <u>S</u> ort by:	Name	~
C <u>h</u> ange or Remove	FastStone Capture 5.3		Size	1.41MB
Programs	👸 Intel(R) Graphics Media Accelerator Driver			
	Intel(R) Network Connections 13.2.8.0		Size	4.75MB
Add New	👘 MOXA CAN Interface Board Windows Driver Ver1.0		Size	2.98MB
Programs	Click here for support information.		Used <u>oc</u>	<u>casionally</u>
1	To remove this program from your computer, click Remove.		1	Remove
Add/Remove Windows				

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

моха са	N Interface Board Windows Driver Ver1.0 Uninstall
?	Are you sure you want to completely remove MOXA CAN Interface Board Windows Driver Ver1.0 and all of its components?
MOXA	CAN Interface Board Windows Driver Ver1.0 Uninstall 🛛 🛛 🗙
	nstall Status lease wait while MOXA CAN Interface Board Windows Driver Ver1.0 is removed Remove Shared File?
ι (The system indicates that the following shared file is no longer in use by any programs. Would you like for Uninstall to remove this shared file? If any programs are still using this file and it is removed, those programs may not function properly. If you are unsure, choose No. Leaving the file on your system will not cause any harm.
	File name: mxcanfunc.dll Location: C:\WINDOWS\system32 Yes Yes to All No No to All
	Cancel

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



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.

XCANTool					
ietup Device: Board	Close	Baud Rate: 250K bits/se BTR0(Hex) 00 BTR1(Hex) 00		CC Code(Hex FFFFFFF CC Mask(Hex FFFFFFF	Charl
ransmit Message	8 💌 11 me rest	a(Hex): 22 33 Remote Frame	44	55 66	77 FF Send Message

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

Setup Device:		Baud Rate:	ACC Code(Hex):	
Board		250K bits/sec 👻	FFFFFFF	
Controller	Open	BTRO(Hex)	ACC Mask(Hex):	Start
	Close	BTR1(Hex)		Stop

Parameter	Options	Description	
Device [Board]	Board 0	Displays boards in the system.	
	Board 3	Select the CAN interface board to configure	
Device [Controller]	Controller 0	Displays controllers in the board.	
	Controller 1	Select the controller to configure.	
Baud Rate	10K bits/sec	. Select a regular Baud Rate.	
	1000K bits/sec		
	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	0-FFFFFFFF	Set the parameter to allow the specified ID frame to be received.	
(Acceptance Code)		Refer to the <i>cnio_set_filter_ex</i> function from Library reference for detail.	
ACC Mask	0-FFFFFFFF	Set the parameter to mask the specified bit in frame to	
(Acceptance Mask)		be received.	
		Refer to <i>cnio_set_filter_ex</i> 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**.

-Transmit Message		
ID(Hex): 1FFFFFFF	Length: 8 💌	Data(Hex): 11 22 33 44 55 66 77 FF
🔽 Extended F	Frame	
🔲 Remote Re	equest	Send Message
🔲 Self Recep	otion Request	

Parameter	Options	Description
ID (Hex)	Standard Frame:	Set the specified ID of frame
	0-0x7FF	to be transmitted.
	Extended Frame: 0-0x1FFFFFFF	
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.

ID	Extended Frame	Remote Frame	Length	Data
Dx7FF			8	11 22 33 44 55 66 77 FF

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.

etup									
evice:			Bauc	l Rate:	1	ACC Code	(Hex):		
Board 0	• •	pen		< bits/sec 0(Hex)		FFFFFFF ACC Mask FFFFFFF	(Hex)	:	Start
	CI	lose		1(Hex)	1			:	Stop
ransmit Message									
ID(Hex):	Length:	Data 11	a(Hex):	33	44	55	66	77	FF
	ne								
🔲 Remote Requ	est							Send M	lessage
C Self Reception	n Request								
	n Request								
eceive Message				-					
	n Request Extended Fr	rame	Remote F	Frame	Length	Data			
eceive Message		rame	Remote F	Frame	Length	Data			
eceive Message		rame	Remote F	Frame	Length	Data			
eceive Message		rame	Remote F	rame	Length	Data			
eceive Message		rame	Remote F	rame	Length	Data			
eceive Message		rame	Remote P	- rame	Length	Data			
eceive Message		rame	Remote F	rame	Length	Data	_		
eceive Message	Extended Fi	rame	Remote F			Data	- nt		
eceive Message	Extended Fi	irame					- nt) Messag

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

AxCANTool					
Setup Device: Board 0	Open	Baud Rate: 500K bits/se BTR0(Hex)	IC I FFF	Code(hex): FFFFF Mask(Hex):	Start
	Close	00 BTR1(Hex) 00	FFF	FFFFF	Stop
Fransmit Message ID(Hex): 1FFFFFFF	Length: Data	a(Hex):	44 5	5 66	77 FF
 Extended France Remote Require Self Receptio Receive Message 	iest				Send Message
ID 0x7FF	Extended Frame	Remote Frame		Data 11 22 33 44	55 66 77 FF
Clear Data Overrur		Clear Messages	Message	e Count	Receive Message

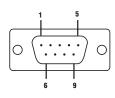
<In Controller 1, Baudrate 500 Kbps, receive standard frame >

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

_											
	-	-	-	-	-	-	-	-	-	-	
	•	•	•	۰	•	•	•	•	•	•	
				•							
		•	•	•	•	•	•	•	•	•	

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

1 13	Pin	
	2	
	3	
14 25	4	
	7	

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

