CAN Interface Board User Manual

Version 3.0, May 2026

www.moxa.com/products

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CAN Interface Board User Manual

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1. Introduction

Overview

Moxa's CAN (Controller Area Network) interface board solutions include boards that support the Universal PCI interface, PCI Express interface, and PC/104-Plus interface. Because Moxa develops CAN FPGA (SJA 1000 compatible), the CP-602U-I, CP-602E-I, and CB-602I boards are cost-effective solutions. Each active CAN interface board has two CAN ports. These CAN interface boards use the transceiver TCAN1044, which provides bus arbitration and error detection. In addition, all series support wide temperature solutions 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 2.0 A/B and CAN FD Interface Board Universal PCI board with isolation protection.

CP-602U-I-T: 2-port CAN 2.0 A/B and CAN FD interface board Universal PCI board with isolation protection, -40 to 85°C operating temperature.

CP-602E-I: 2-port CAN 2.0 A/B and CAN FD Interface Board PCI Express board with isolation protection.

CP-602E-I-T: 2-port CAN 2.0 A/B and CAN FD interface board PCI Express board, with isolation protection, -40 to 85°C operating temperature.

CB-602I: 2-port CAN 2.0 A/B and CAN FD interface board PC/104-Plus module with isolation protection.

CB-602I-T: 2-port CAN 2.0 A/B and CAN FD interface board PC/104-Plus module with isolation protection, -40 to 85°C operating temperature.

Package Checklist

Your CAN Interface Board package includes the following items:

- 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
- Quick Installation Guide
- Warranty card



NOTE

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

Product Features

The CAN interface board has the following features:

- Supports CAN 2.0 A/B and CAN FD.
- Two independent CAN ports.
- CAN 2.0 A/B transfer rate up to 1 Mbps.
- CAN FD transfer rate up to 5 Mbps.
- 2 kV electrical 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 and Linux drivers provided.

Product Specifications

NOTE

The latest specifications for Moxa's products can be found at https://www.moxa.com.

2. Hardware Installation

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

Hardware Installation Procedure

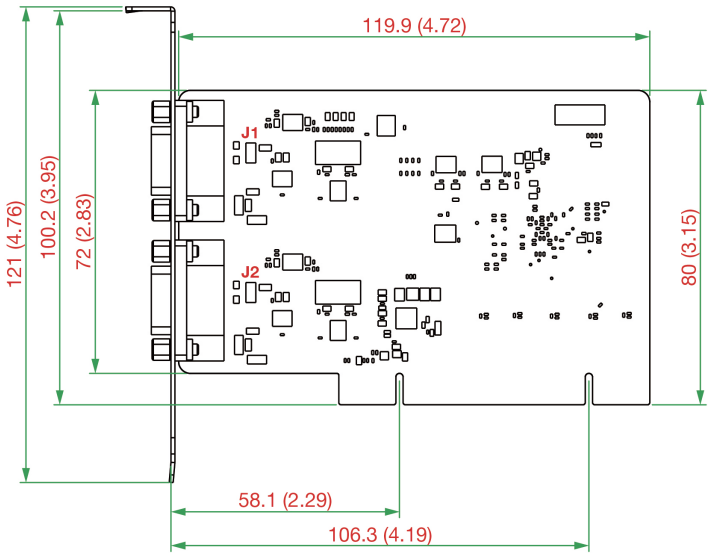
Use the following simple procedure to install the Moxa CAN interface board in your computer.

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

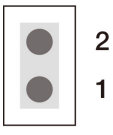
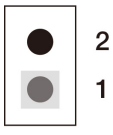
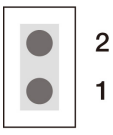
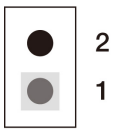
CP-602U-I

Unit: mm (inch)



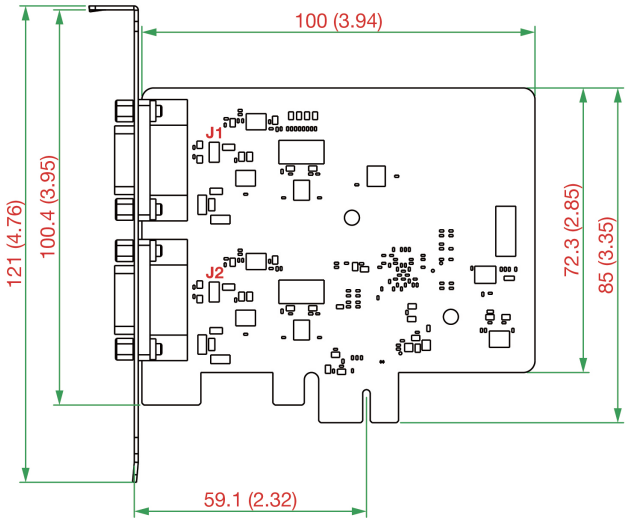
Terminal Resistor

A jumper allows you to activate onboard termination resistors individually for each CAN controller.

Jumper	Description	Status	
		Enabled	Disabled
J1	Jumper settings for port 1 termination resistor (120 ohm)		
		Enabled	Disabled
J2	Jumper settings for port 2 termination resistor (120 ohm)		

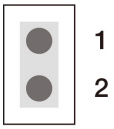
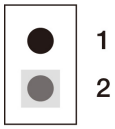
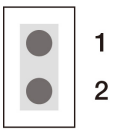
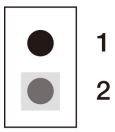
CP-602E-I

Unit: mm (inch)



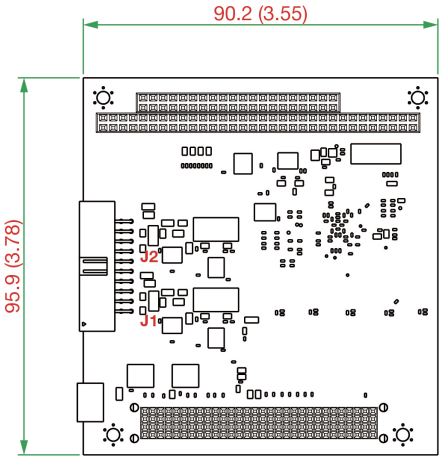
Terminal Resistor

A jumper allows you to activate onboard termination resistors individually for each CAN controller.

Jumper	Description	Status	
		Enabled	Disabled
J1	Jumper settings for port 1 termination resistor (120 ohm)		
		Enable	Disable
J2	Jumper settings for port 2 termination resistor (120 ohm)		

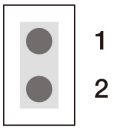
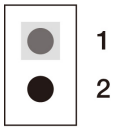
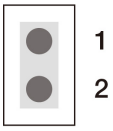
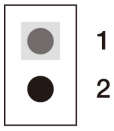
CB-602I

Unit: mm (inch)



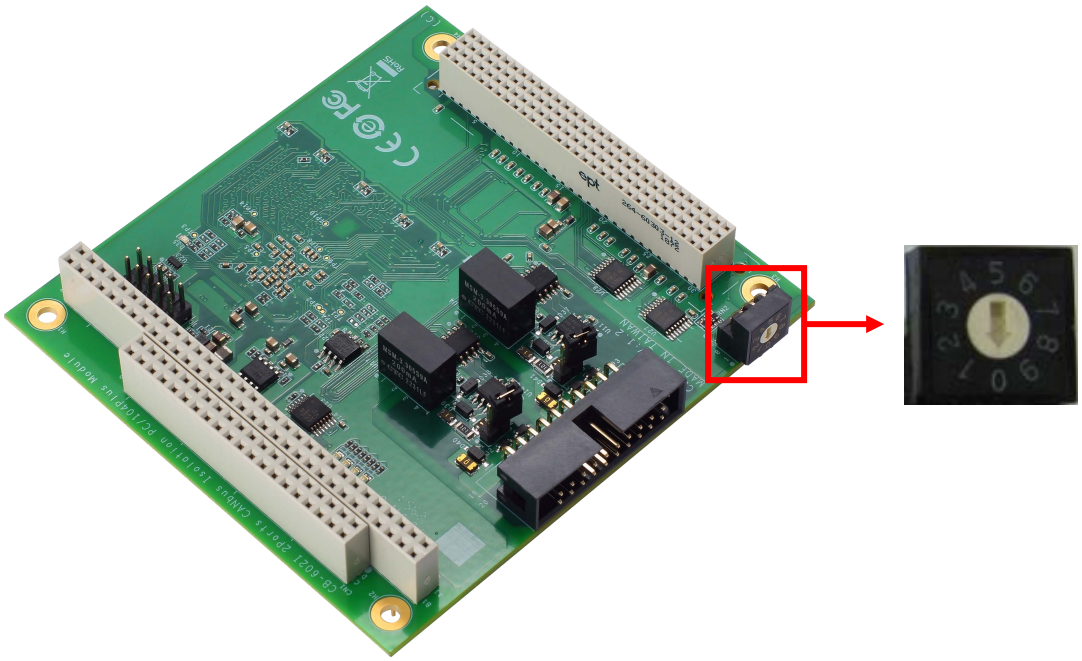
Terminal Resistor

A jumper allows you to individually activate onboard termination resistors for each CAN controller.

Jumper	Description	Status	
		Enabled	Disabled
J1	Jumper settings for port 1 termination resistor (120 ohm)		
		Enabled	Disabled
J2	Jumper settings for port 2 termination resistor (120 ohm)		

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 bidirectional 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.



See the module stack order 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. We explain the basic installation procedures in this chapter. The screenshots shown in this chapter are for Windows 11, although the procedures are essentially the same as for Windows 7/10 and later versions.

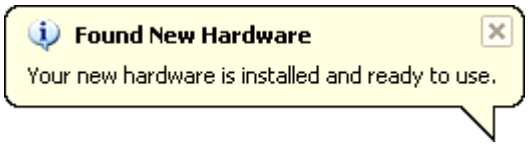
Software Installation Information

Get the latest driver at www.moxa.com. Based on the OS type, choose the corresponding driver.

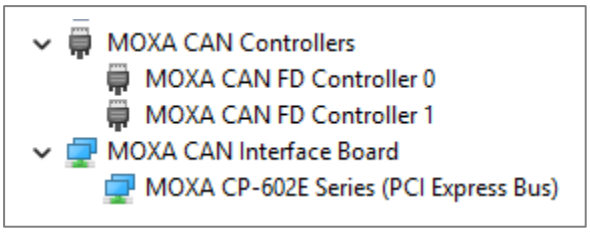
Installing Windows driver

Windows driver version	Supporting OS	Supporting Hardware Revision
v1.0	Windows XP, Vista, 7 Windows 2000, Server 2003, Server 2028	CP-602E-I models v1.0 CP-602U-I models v1.2 and before CB-602I models v1.1 and before
v3.0	Windows 10 Windows 2019, 2016	
v3.1	Windows 7	CP-602E-I models v1.1 and later CP-602U-I models v1.3 and later CB-602I models v1.2 and later
v4.0	Windows 10 and later Windows Server 2016 and later	

1. Unzip and execute the .exe file.
2. Follow the instructions to install the drivers.



3. Open the Windows Device Manager to check that the installation was successful. The MOXA CANbus Serial Board Series should appear under **MOXA CAN Interface Board,** and **CAN Controllers** should appear under **MOXA CAN Controllers**.



(Using CP-602E as reference)

Installing Linux driver

To simplify the processes, we provided a single step to build, install, and load the MOXA driver.

- Untar the file # tar -zxvf driv_linux_CAN_<version>_build_<build_ date>.tgz
- Execute the ./mxinstall in ./mxcan to use the product. # ./mxinstall



ATTENTION

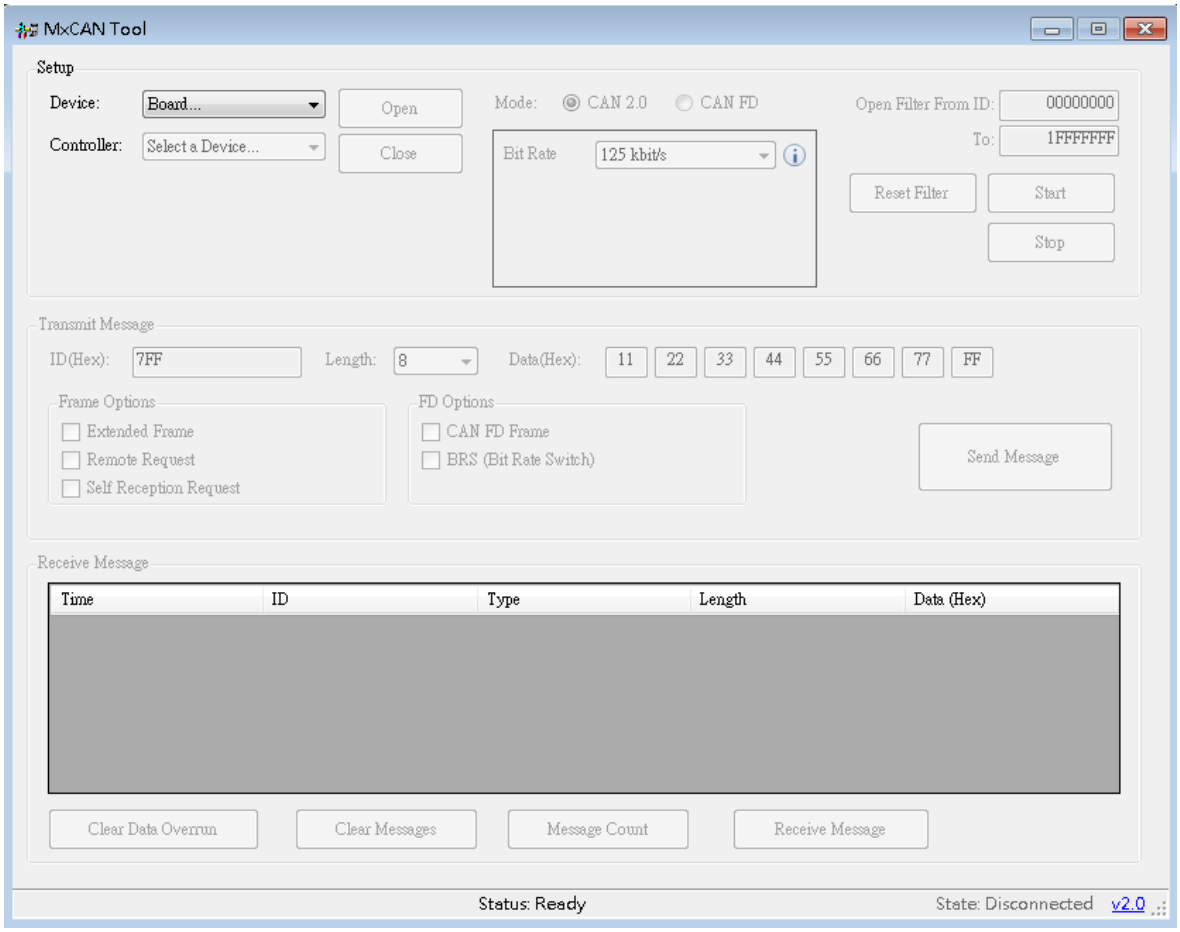
For best results, we recommend that you install the driver before plugging the board into the slot and power off the PC when plugging in the board. Refer to the previous section on Initial Driver Installation for instructions.

Connecting the Hardware

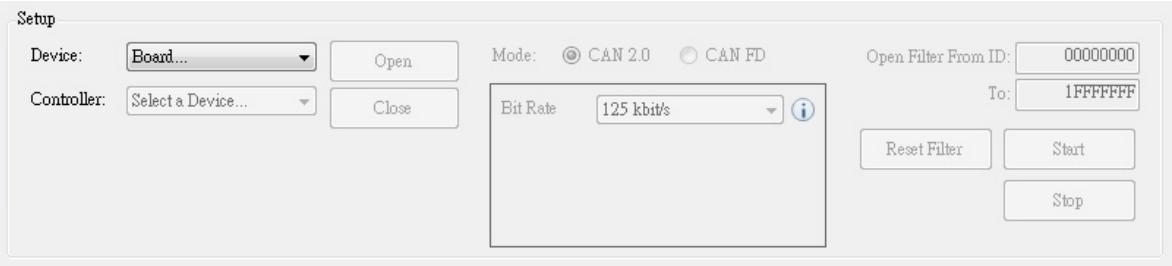
After installing the driver, power off the PC and plug the Moxa CAN interface board into any empty slot, and then power it back on. Windows will automatically detect the card and begin installing the driver. When Windows finishes installing the driver for the board, it will detect the new CAN controller and then install the CAN controller driver.

4. CAN Interface Board Utility

In this chapter, we introduce Moxa's **MxCANTool** utility to show the CAN Interface Board's functions. You will see the following default panel. This panel includes three sessions: Setup, Transmit Message, and Receive Message. Configure the bit rate, 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 select Send Message, the message will appear in the Receive Message box.



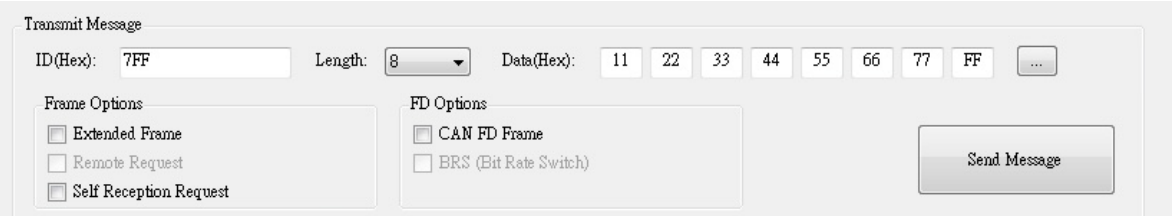
The MxCANTool parameters for each CAN controller can be configured during a MxCANTool setup session.



Parameter	Options	Description
Device	Board 0 to-3	Displays boards in the system. Select the CAN interface board to configure.
Controller	Controller 0 Controller 1	Displays controllers on the board. Select the controller to configure.
Open/Close		Open/close CAN controller.
Mode	CAN 2.0	Select CAN protocol mode.
	CAN FD	
Bit Rate	CAN 2.0	Configure the arbitration bit rate for CAN 2.0. 10, 20, 50 ,100, 125, 250, 500, 800, 1000 Kbps, User defined.
	CAN FD	**[Nominal]** Configure arbitration phase bit rate. 125, 250, 500, 800, 1000 Kbps, User-defined. **[Data]** Configure the data phase bit rate. 500K, 1M, 2M, 5M, User-defined. **NOTE:** ISO CAN FD supports an arbitration rate of 125 kbps or above, with a recommended arbitration-to-data rate ratio between 1:1 and 1:8.
	User defined	If selected, you must configure Prop Seg, Seg1, Seg2, and Prescaler.
Open filter from ID	00000000	For the data phase, Prescaler is shared with the nominal phase.
To	1FFFFFFF	Set the lower bound of the ID filter range. Only frames within the specified range will be received. Refer to *cnio_set_filters_by_range* for details.
Start/Stop		Set to Operation mode/Reset mode.

Transmit Message

The function sends a CAN message with or without the block operation.



Parameter	Options and Description	
ID (Hex)	11-bit/29-bit	Set the frame identifier in hexadecimal format. The range depends on the standard or extended frame.
Length	0-8 (CAN 2.0) 0-64 (CAN FD)	Set the data length (DLC). CAN FD supports up to 64 bytes.
Data (Hex)	Byte array input	Input data payload in hexadecimal format.
Data (Hex) [...]	Expand	Expand input field to allow configuration of more than 8 bytes (up to 64 bytes in CAN FD mode).
Send Message	Button	Transmit the configured CAN/CAN FD frame.
Frame Option	Configure the type of frame to be transmitted.	
	Extended	Use the extended (29-bit) ID.

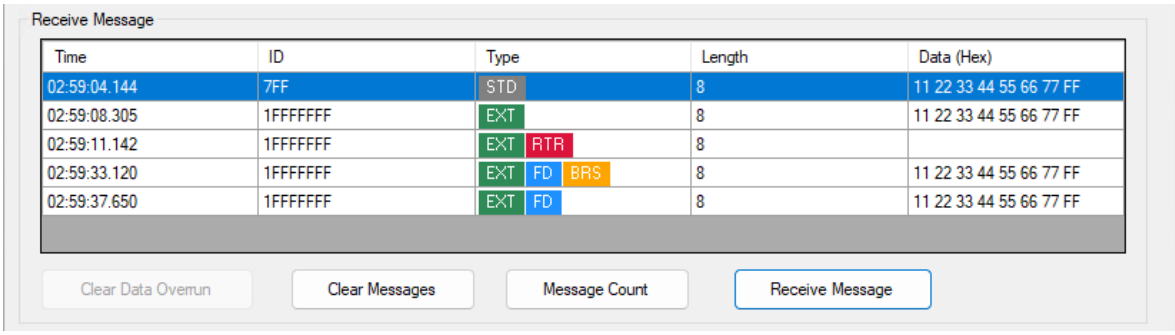
Parameter	Options and Description	
	Remote Request	Send a remote request frame.
	Self-reception Request	Self-reception Request: Receive the transmitted frame locally.
FD Option	Configure CAN FD transmission behavior.	
	CAN FD Frame	Enable CAN FD format transmission.
	BRS (Bit Rate Switch)	Enable bit rate switching during the data phase (effective only in CAN FD mode).
Standard Frame	11-bit ID CAN frame (default setting).	
Extended Frame	29-bit ID CAN frame.	
Remote Request	Set the frame as a remote request frame to be transmitted. Select this option to ignore the data field.	
Self-reception Request	Select this option to allow the frame to be received by the controller that transmitted the frame.	

ATTENTION

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

Receive Message

The function gets a CAN message from the receiving buffer with or without a blocking operation.



Parameter	Description
Clear Data Overrun	Clear data overrun status
Clear Messages	Clear all messages from the message list
Message Count	Displays the total number of messages received
Receive Message	Displays received frames including time, ID, frame type, length, and data.

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.

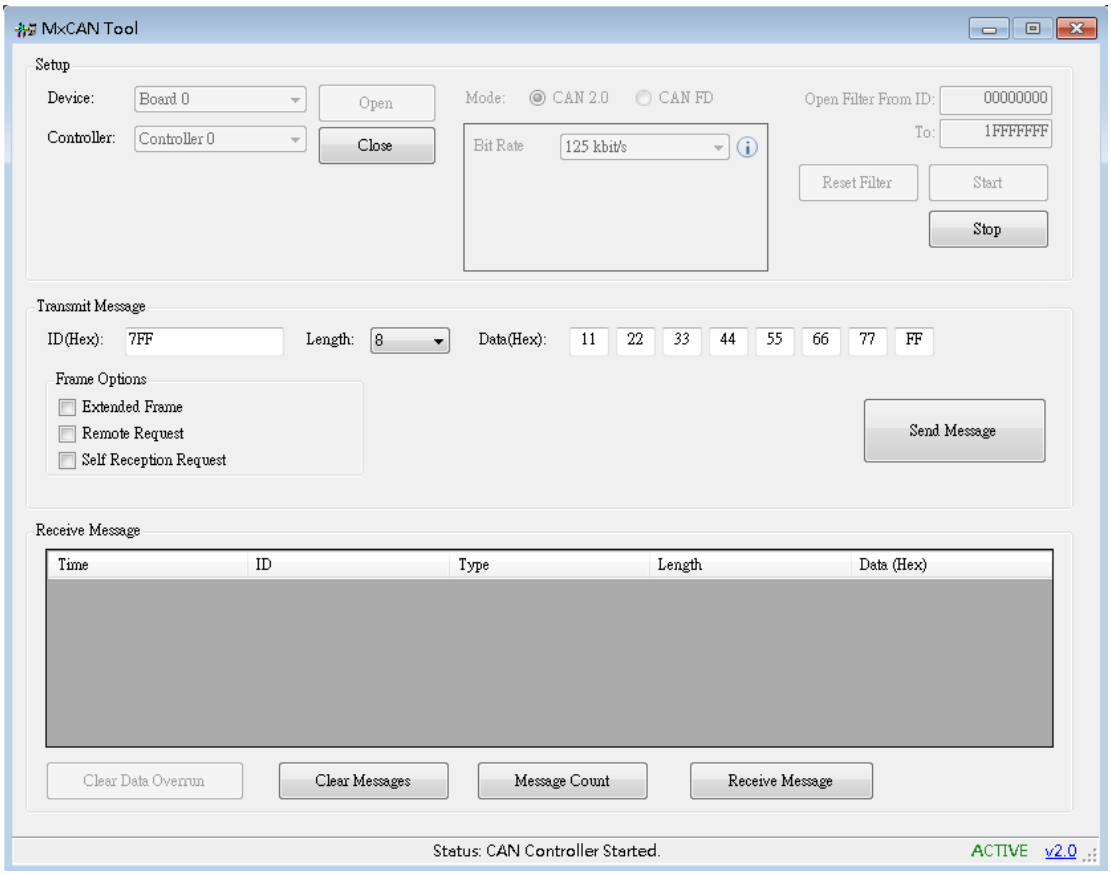
Step 1: Open the **MxCANTool** utility and select **controller 0**; configure all parameters.

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

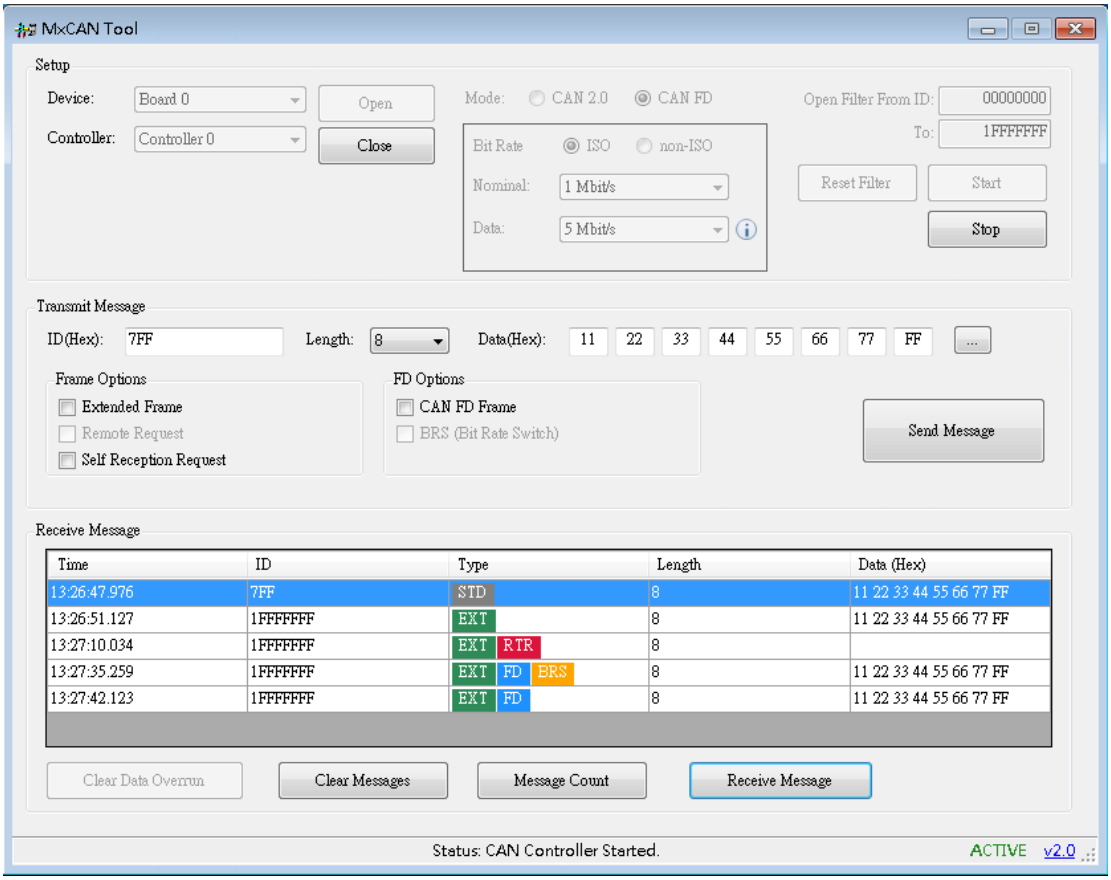
Step 3: In the **controller 0** panel, select options first and then set transmit the ID as "7FF", **Length** as "8", **Data** as "11, 22, 33, 44, 55, 66, 77, FF", and then select **Send Message**.

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

<In Controller 0, send standard frame >



<In Controller 1, receive standard frame >



CAN Bit Timing Adjustment

In most applications, the default CAN bit timing configuration is sufficient, and no manual adjustment is required.

However, manual tuning of CAN bit timing parameters may be considered under the following conditions:

- Long CAN bus cable length
- Many CAN nodes connected on the same network
- High communication bit rates
- Use of CAN devices from different vendors
- Operation in environments with high electromagnetic interference (EMI)
- Unstable communication, intermittent frame errors, or frequent bus-off conditions
- Use of nonstandard bit rates
- CAN FD applications using high-speed data phase bit rates

In such cases, adjusting parameters such as sample points or propagation timing may improve communication stability and interoperability.

For most standard CAN networks with short cable lengths and commonly used bit rates, the default timing configuration is recommended.

Select the Information icon next to the Bit Rate drop-down menu for more details.

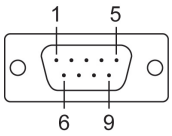


5. Pin Assignments

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.

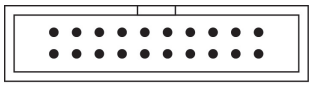
The connector's pin assignments are shown below:

DB9 Male



Pin	Signal
2	CAN_L
3	CAN_GND
5	Shield
6	CAN_GND
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