MIC-3680/3680R

2-Port Isolated CAN Communication Card / Rear I/O support

User Manual

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Product Warranty (2 years)

Advantech warrants to you, the original purchaser, that each of its products will be free from defects in materials and workmanship for two years from the date of purchase.

This warranty does not apply to any products which have been repaired or altered by persons other than repair personnel authorized by Advantech, or which have been subject to misuse, abuse, accident or improper installation. Advantech assumes no liability under the terms of this warranty as a consequence of such events.

Because of Advantech's high quality-control standards and rigorous testing, most of our customers never need to use our repair service. If an Advantech product is defective, it will be repaired or replaced at no charge during the warranty period. For out-of-warranty repairs, you will be billed according to the cost of replacement materials, service time and freight. Please consult your dealer for more details.

If you think you have a defective product, follow these steps:

1. Collect all the information about the problem encountered. (For example, CPU speed, Advantech products used, other hardware and software used, etc.) Note anything abnormal and list any onscreen messages you get when the problem occurs.
2. Call your dealer and describe the problem. Please have your manual, product, and any helpful information readily available.
3. If your product is diagnosed as defective, obtain an RMA (return merchandize authorization) number from your dealer. This allows us to process your return more quickly.
4. Carefully pack the defective product, a fully-completed Repair and Replacement Order Card and a photocopy proof of purchase date (such as your sales receipt) in a shippable container. A product returned without proof of the purchase date is not eligible for warranty service.
5. Write the RMA number visibly on the outside of the package and ship it prepaid to your dealer.

CE

This product has passed the CE test for environmental specifications when shielded cables are used for external wiring. We recommend the use of shielded cables. This kind of cable is available from Advantech. Please contact your local supplier for ordering information.

Technical Support and Assistance

Step 1. Visit the Advantech web site at **www.advantech.com/support** where you can find the latest information about the product.

Step 2. Contact your distributor, sales representative, or Advantech's customer service center for technical support if you need additional assistance. Please have the following information ready before you call:
- Product name and serial number
- Description of your peripheral attachments
- Description of your software (operating system, version, application software, etc.)
- A complete description of the problem
- The exact wording of any error messages

Packing List

Before setting up the system, check that the items listed below are included and in good condition. If any item does not accord with the table, please contact your dealer immediately.

- CompactPCI communication interface card
- Rear I/O module (for MIC-3680/3680R only)
- Industrial Communication Driver, Utility and CompactPCI communication card user's manual in ICOM CD-ROM

Safety Precaution - Static Electricity

Follow these simple precautions to protect yourself from harm and the products from damage.

1. To avoid electrical shock, always disconnect the power from your PC chassis before you work on it. Don't touch any components on the CPU card or other cards while the PC is on.
2. Disconnect power before making any configuration changes. The sudden rush of power as you connect a jumper or install a card may damage sensitive electronic components.

Contents

CHAPTER 1

Introduction

This chapter provides a general description of MIC-3680/3680R.

Sections include:

- Description
- Features
- Specifications
- Ordering Information

Chapter 1 Introduction

1.1 Description

MIC-3680/3680R is special purpose communication card that offers connectivity to Controller Area Networks (CAN) on your PC. With its built-in CAN controllers, MIC-3680/3680R provides bus arbitration and error detection with an automatic transmission repetition function. This drastically reduces the chance of data loss and ensures system reliability. You can run both CAN controllers independently at the same time. MIC-3680/3680R operates at baud rates up to 1 Mbps and can be installed in a CompactPCI expansion slot.

1.1.1 Controller Area Network

CAN (Controller Area Network) is a serial bus system especially suited for networking "intelligent" I/O devices as well as sensors and actuators within a machine or plant. Characterized by its multi-master protocol, real-time capability, error correction, high noise immunity, and the existence of many different silicon components, the CAN serial bus system, originally developed by Bosch for use in automobiles, is increasingly being used in industrial automation.

1.1.2 Optical Isolation Protection

On-board optical isolators protect your PC and equipment against damage from ground loops, increasing system reliability in harsh environments.

1.2 Features

- CompactPCI specification PICMG V2.0, R3.0 compatible
- Operates two separate CAN networks at the same time
- High speed transmission up to 1 Mbps
- 16 MHz CAN controller frequency
- Optical isolation protection of 2500 VDC ensures system reliability
- I/O address automatically assigned by CompactPCI PnP
- LED indicates Transmit/Receive status on each port
- Windows DLL library and examples included
- Supports Windows 98/ME/2000/XP driver and utility
- Rear I/O module (for MIC-3680R only)

1.3 Specifications

- **Bus Interface:** PCI bus spec. 2.2 compliant
- **Ports:** 2
- **Protocol:** CAN 2.0 A/B
- **Communication Controller:** SJA-1000
- **CAN Transceiver:** 82C250
- **Signal Support:** CAN_H, CAN_L, GND
- **CAN Controller Frequency:** 16 MHz
- **Speed (bps):** Up to 1 Mbps programmable transfer rate
- **Isolation Protection:** 2,500 V DC
- **Connector:** Dual DB9 male connectors
- **Power Consumption:** 5 V @ 400 mA(Typical)
- **Dimensions:** 175 x 100 mm (6.9" x 3.9")
- **Operating Temperature:** 0 ~ 65° C
- **Storage Temperature:** -25 ~ 85° C
- **Operating Humidity:** 5 ~ 95% Relative Humidity, non-condensing

1.4 Ordering Information

MIC-3680/3-A:	3U CompactPCI 2-port isolated CAN communication card
MIC-3680/6-A:	6U CompactPCI 2-port isolated CAN communication card
MIC-3680R/3-A:	3U CompactPCI 2-port isolated CAN communication card with Rear I/O support

CHAPTER 2

Software Installation

This chapter shows how to install the driver and Advantech Device Manager.

Sections include:

- Device Manager Installation
- Driver Installation

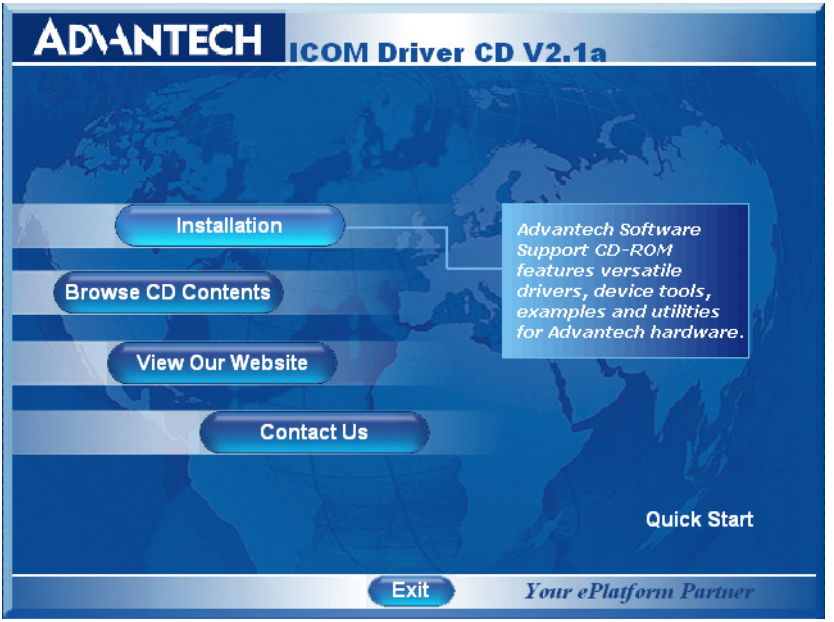
Chapter 2 Software Installation

2.1 Device Manager Installation

Advantech Device Manager is a software program that allows you to configure your hardware and store the settings in your Windows registry. You must install the Advantech Device Manager if you want to add and manage Advantech CAN cards.

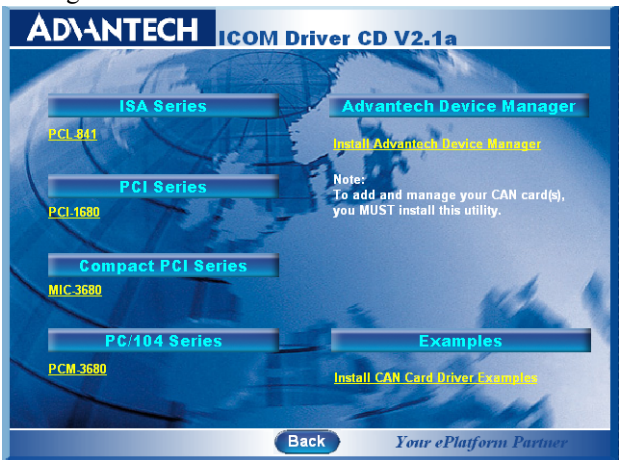
Please follow the steps below to install Advantech Device Manager.

1. Click **Installation** to start installation.

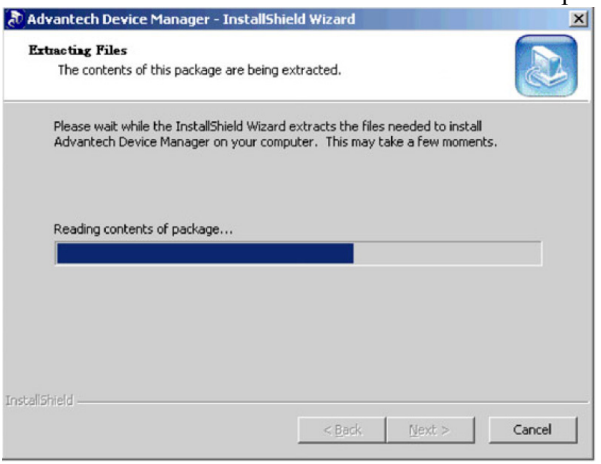


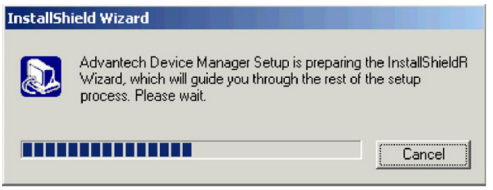
2. Click **CAN Card Drivers** to enter the CAN cards selection screen.

3. Click **Advantech Device Manager** to install Advantech Device Manager.

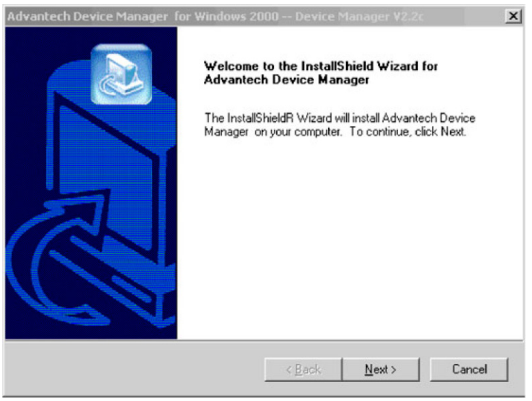


4. The InstallShield Wizard will initiate the installation process.

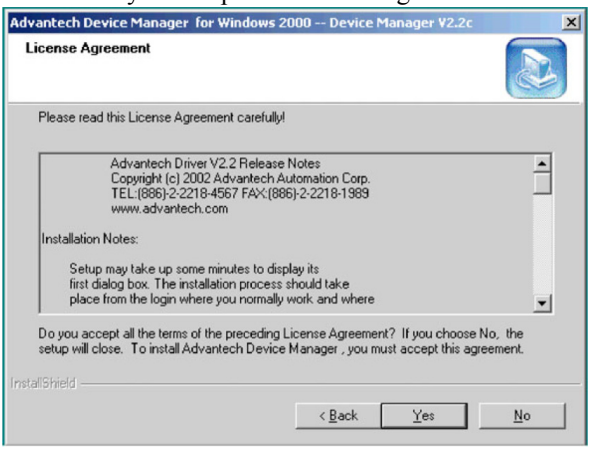




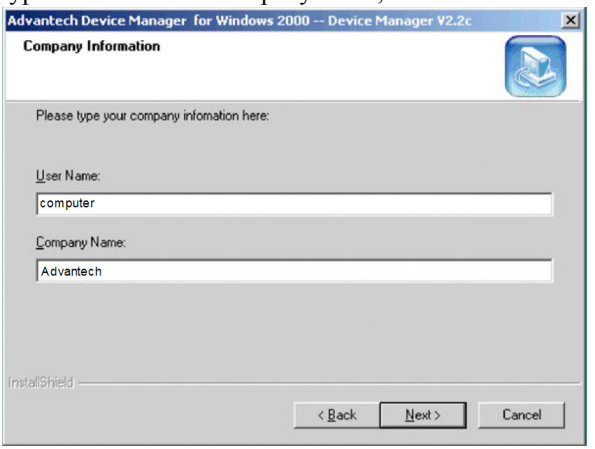
5. Click **Next** to start the installation process.



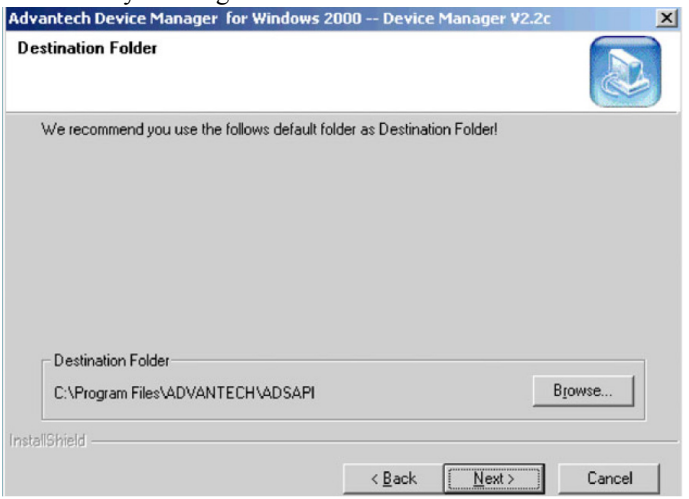
6. Click **Yes** if you accept the License Agreement.



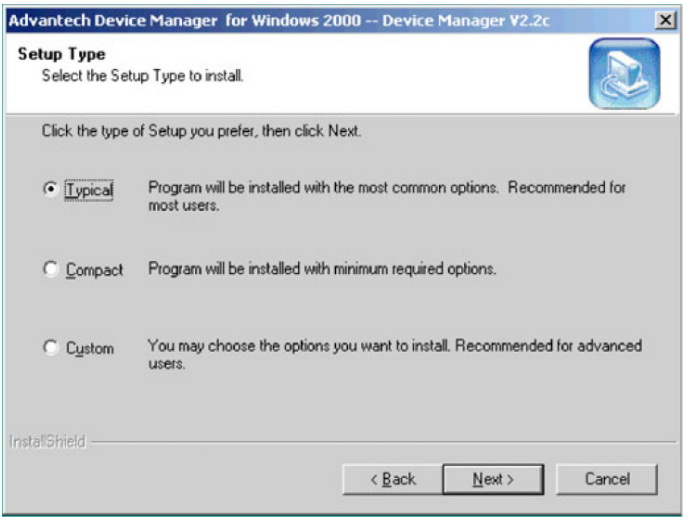
7. Type user name and company name, and then click **Next**.



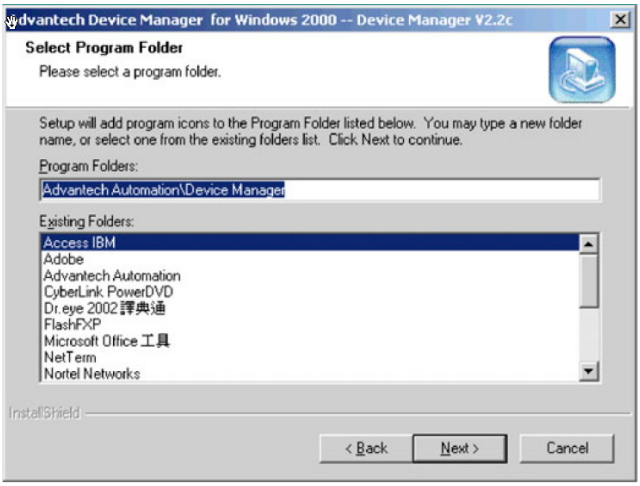
8. Click **Next** to accept the default installation folder, or specify a folder by clicking **Browse**.



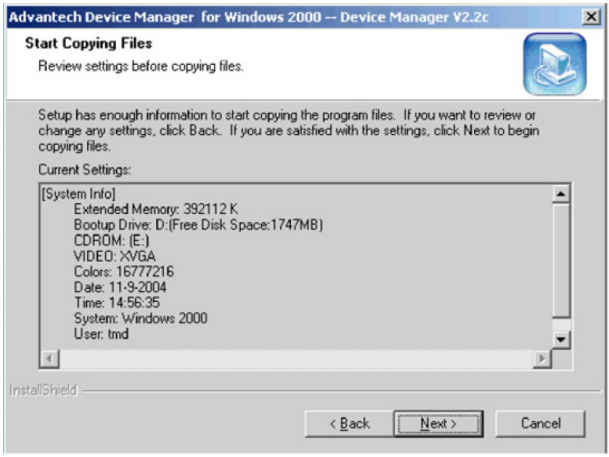
9. Choose the type of setup you prefer, and then click **Next**.

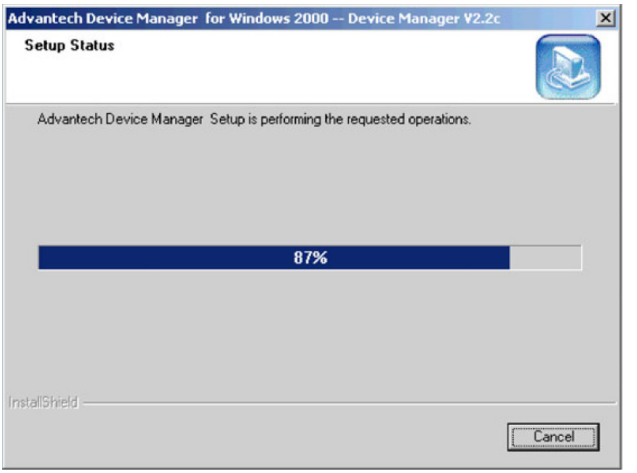


10. Setup will add program icons to the default program folder. You may type a new folder name, or select one from the existing folder list. Click **Next** to continue.

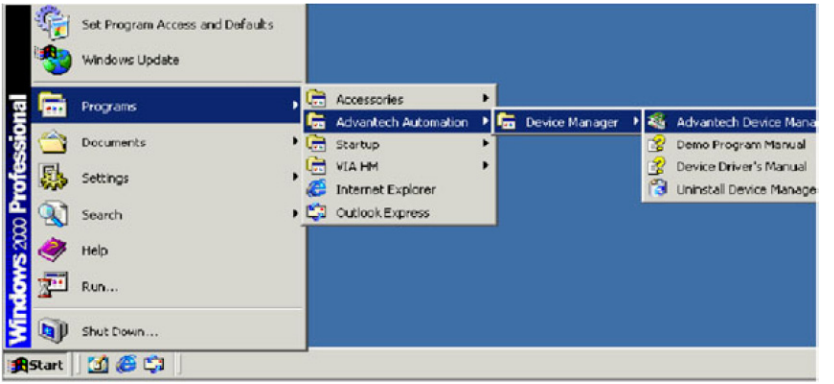


11. Click **Back** to review or change your settings. Click **Next**, and the installation program will copy the files to your computer to finish the installation process.

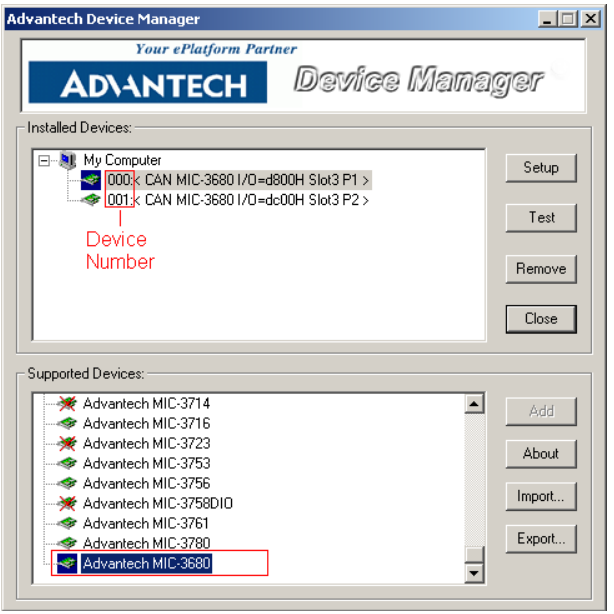




12. You can see that shortcuts were added to your Windows Start Menu.



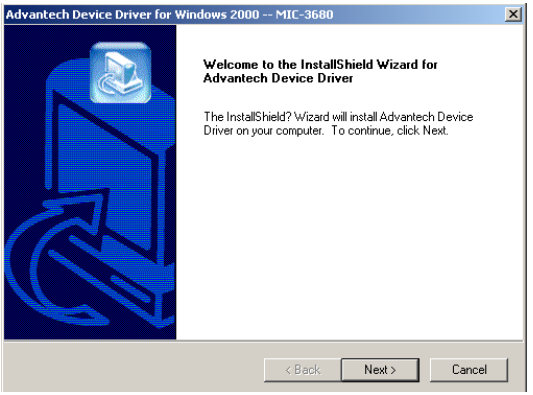
13. After the physical hardware has been installed, execute Advantech Device Manager to see MIC-3680/3680R in both Installed Devices & Supported Devices windows. You can get the device number for AdsCAN.dll compiler. Click **Setup** for each port setting.



2.2 Driver Installation

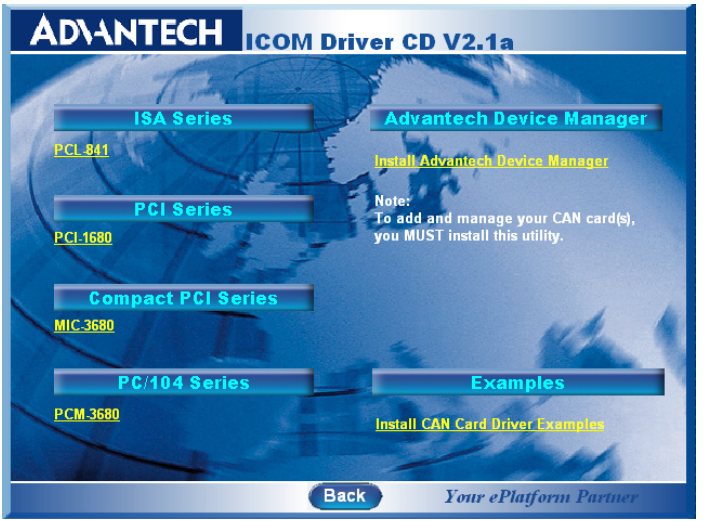
Please follow the steps below for the MIC-3680/3680R driver installation.

1. Insert your companion CD-ROM disc into your CD-ROM drive.
2. The driver setup program will be launched automatically. If the auto-play function is not enabled on your system, use Windows Explorer or the Windows Run command to execute **autorun.exe** on the companion CD-ROM.
3. Click **Installation** to start installation.

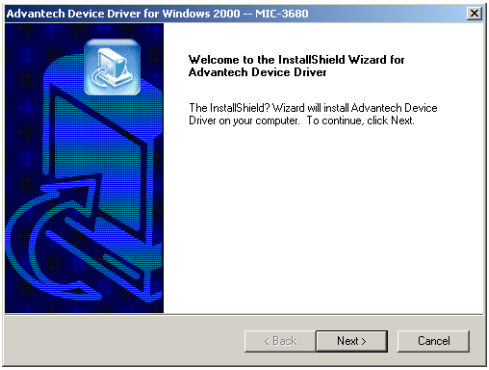


4. Click **CAN Card Drivers** to enter the **CAN** cards selection screen.

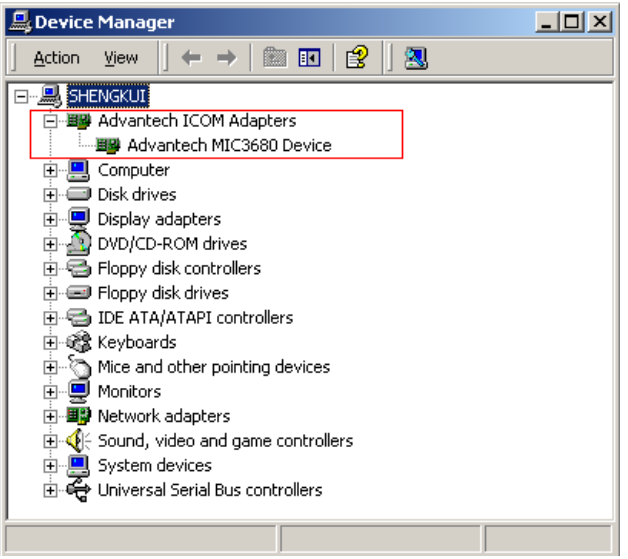
5. Choose the card you want to install (MIC-3680/3680R), and then click the hyperlink.



6. Click **Next**, and the Advantech Device Driver will be automatically installed on your computer.



7. After the physical hardware has been installed, the card will be automatically detected.



CHAPTER 3

Hardware Installation

This chapter covers inspection and installation of hardware and drivers.

Sections include:

- Initial inspection
- Jumper locations & setting
- Card installation

Chapter 3 Hardware Installation

3.1 Initial Inspection

You should find the following items inside the shipping package:

- CompactPCI communication interface card
- Rear I/O module (for MIC-3680R only)
- Industrial Communication Driver, Utility and Compact PCI communication card user's manual in ICOM CD-ROM

MIC-3680/3680R was carefully inspected mechanically and electrically before it was shipped. It should be free of marks and scratches and in perfect working order when received.

As you unpack MIC-3680/3680R, check for signs of shipping damage (damaged box, scratches, dents, etc.). If it is damaged or it fails to meet specifications, notify our service department or your local sales representative immediately. Also notify the carrier. Retain the shipping carton and packing material for inspection by the carrier. After inspection we will make arrangements to repair or replace the unit.

When you handle MIC-3680/3680R, remove it from its protective packaging by grasping the rear metal panel. Keep the anti-vibration packing. Whenever you remove the card from the PC, store it in this package for protection.

Warning! Discharge your body's static electric charge by touching the back of the grounded chassis of the system unit (metal) before handling the board. You should avoid contact with materials that hold a static charge such as plastic, vinyl and Styrofoam. Handle the board only by its edges to avoid static damage to its integrated circuits. Avoid touching the exposed circuit connectors. We also recommend that you use a grounded wrist strap and place the card on a static dissipative mat whenever you work with it.

3.2 Jumper Locations & Settings

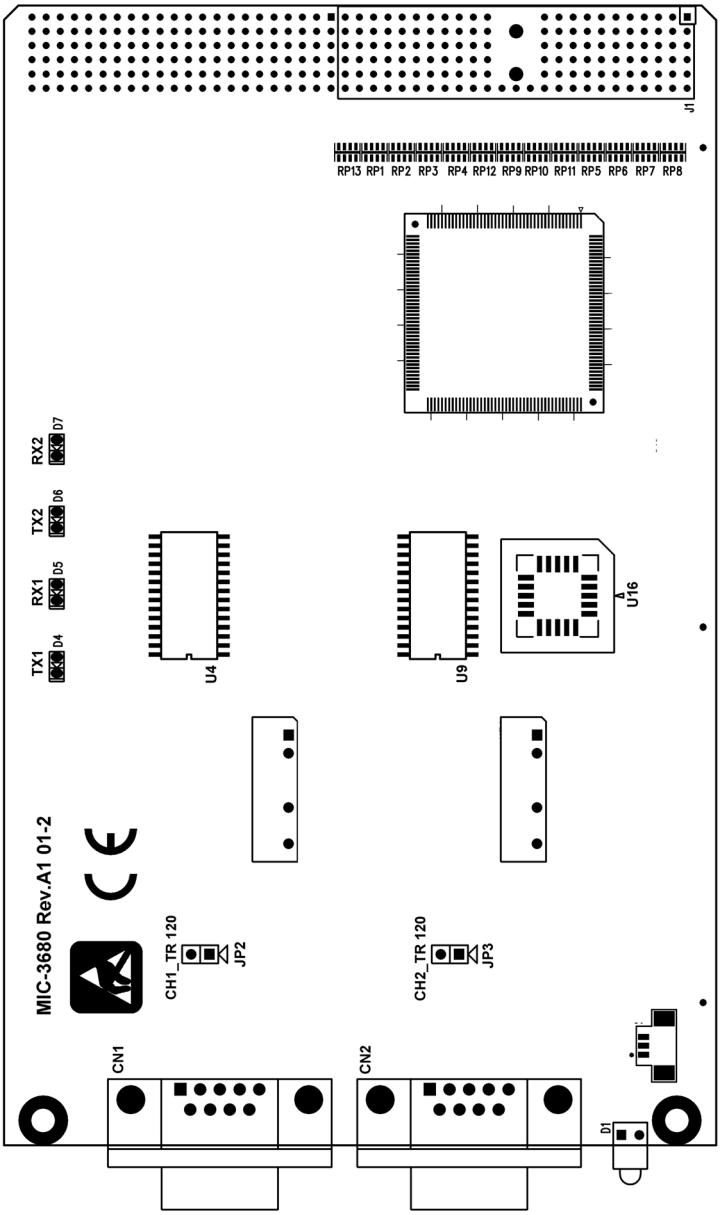


Figure 3.1: MIC-3680 Silk Screen

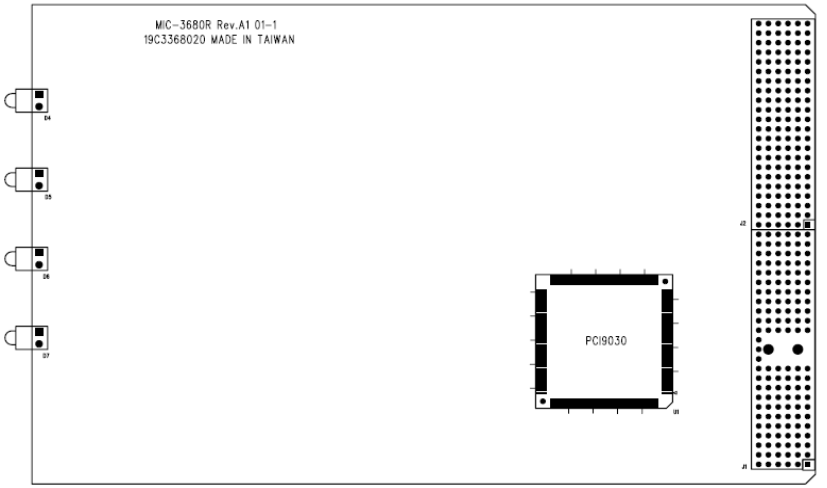


Figure 3.2: MIC-3680R Silk Screen

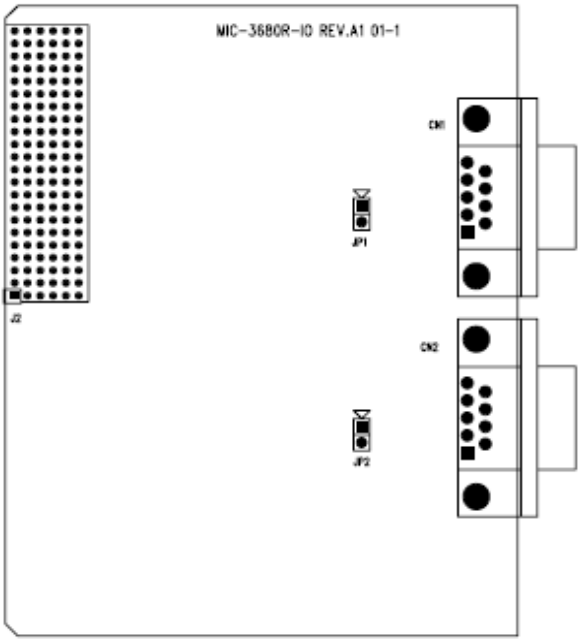


Figure 3.3: Rear I/O module Silk Screen

3.2.1 How to Set Jumpers

You configure your card to match the needs of your application by setting jumpers. A jumper is the simplest kind of electric switch. It consists of two metal pins and a small metal clip (often protected by a plastic cover) that slides over the pins to connect them. To close a jumper you connect the pins with the clip. To open a jumper you remove the clip.

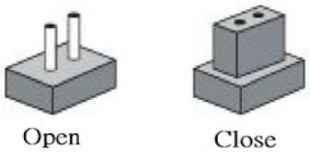


Figure 3.4: How to Set Jumpers

3.2.2 Terminator Resistor Setup

You can set the terminator resistor if necessary to match impedance. Each port has a separate resistor.

Table 3.1: MIC-3680 / Rear I/O Module Resistors

Status	**Value of Terminator Resistor (W)**
Open mode (Default)	No Terminator Resistor present
Close mode	120

3.3 Card Installation

Note: Make sure you first install the driver before installing the card. We strongly recommend that you install the software driver before installing the hardware into your system, since this will guarantee a smooth and trouble-free installation process. For more information about the driver installation, configuration and removal procedures for Windows 98, Windows 2K and Windows XP, please see the Device Driver Manual.

When installing the MIC-3680/3680R card, please make sure the DLL driver of MIC-3680/3680R installation is completed, you can now go on to install the MIC-3680/3680R card in your CompactPCI system. If you have any doubts, please consult the user manual or related documentation. Please follow the following steps to install the card on your system.

3.3.1 Installing a Card

Step 1: Remove one cover on the unused slot of your CompactPCI computer slot.

Step 2: Hold the card vertically. Be sure that the card is pointing in the correct direction. The components of the card should be pointing to the right-hand side and the black handle of the card should be pointing to the lower edge of the backplane.

Step 3: Hold the lower handle and pull the handle down to unlock it.

Step 4: Insert the MIC-3680/3680R card into the CompactPCI chassis carefully by sliding the lower edges of the card into the card guides.

Step 5: Push the card into the slot gently by sliding the card along the card guide until J1 meets the long needle on the backplane, then the Blue LED on the front panel of the card will light.

Note: *If your card is correctly positioned and has slid all the way into the chassis, the handle should match the rectangular holes. If not, remove the card from the card guide and repeat step 3 again. Do not try to install a card by forcing it into the chassis.*

Step 6: Now push the card into the right place, and the Blue LED will turn off.

Step 7: After the Blue LED is off, push the handle to secure the card and lock it into place.

Step 8: Because the CompactPCI system can "Hot-Swap", if your CompactPCI computer power is on the system can configure the card automatically. Once the system finished configuration, you can find the card information in the Device Manager.

Note: *If your card is properly installed, you should see the device name of your card listed on the Device Manager tab.*

3.3.2 Removing a Card:

Step 1: Push the handle down to unlock the card, and the CompactPCI system will automatically uninstall the card configuration.

Step 2: Once the system completes the configuration, the Blue LED will be lit. Now you can slide the card out.

CHAPTER 4

Software Requirements

This chapter has information on the software of MIC-3680/3680R.

Sections include:

- Introduction
- Overall Description
- Specific Requirements

Chapter 4 Software Requirements

4.1 Introduction

MIC-3680/3680R and PCI-1680U are isolated dual-port CAN communication cards. Each provides two isolated CAN ports for communication applications in difficult environments. The chip on the CAN cards is SJA1000. SJA1000 is a single chip solution for PC-based CAN port and parallel expansion add-in cards.

This chapter outlines the CAN card's Windows DLL driver software requirement specifications, including functionality, performance, and user interface requirements. It applies to programming of the CAN cards with a Windows unified DLL driver, including the driver for PCI-1680U and MIC-3680/3680R.

4.1.1 Definitions, Acronyms, and Abbreviations

SRS = Software Requirements Specification

PPI = Programmable Peripheral Interface

GUI = Graphics User Interface

4.1.2 Reference

Please see **SJA1000.pdf** on your CD-ROM for further information on the SJA1000 chip.

4.2 Overall Description

In order to unify the driver interface of Advantech's CAN series of products, a new DLL file named **AdsCAN.dll** has been defined. This makes it possible to change the CAN card from PCI-1680 to MIC-3680/3680R without recompiling applications.

AdsCAN.dll should decide which driver to call depending on the different CAN cards.

4.3 Specific Requirements

4.3.1 Device Driver Functionality

The **AdsCAN.dll** driver needs to decide which driver should be called depending on different hardware.

The **AdsCAN.dll** driver should properly translate the function parameters to a lower layer driver.

4.3.2 The CAN Driver Framework

All user-mode functionality is implemented through Win32 communication API Functions.

The **AdsCan.dll** unified driver interface for all CAN cards is shown in figure 4.1.

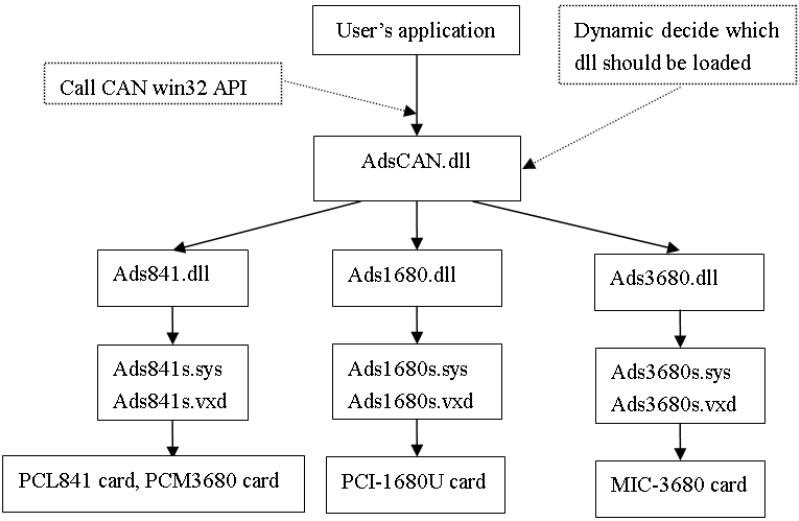


Figure 4.1: AdsCan.dll Architecture

With the new driver architecture, you don't need to recompile your CAN applications when you switch one CAN card with another.

4.3.3 Software Interfaces

AdsCAN.dll should follow the CAN software-programming interface, so that users can use Advantech‘s driver software in the same way.

You can access the CAN functionality via the **AdsCAN.dll** Library as shown in the following table. For detailed function library definitions and descriptions, please see the file **can.chm** on the CD-ROM.

Path in CD-ROM: *Documents\Software Manuals\CAN*

Table 4.1: Function Table of AdsCAN.dll

Function	Syntax (in C)	Description
1	CANCheckEvent()	Check event status from kernel-mode and clear event.
2	CANEnableEvent()	Enables or disables the event mech-anism
3	CANEnableMessaging()	Select the data transmit interrupt
4	CANEnableRxInt()	Enable the receive interrupt
5	CANGetArbitrationLost-CatchMsgEx()	Get arbitrate lost catch information
6	CANGetBaudRate()	Get the card current baud rate
7	CANGetControllerError-CodeEx()	Get Controller error code
8	CANGetErrorMessage()	Get error message
9	CANGetEventName()	Queries and gets CAN port's event name
10	CANGetProtocolType()	Get the card current protocol type
11	CANHwReset()	Reset the hardware
12	CANInit()	Controls CAN port settings
13	CANInpb()	Inputs a byte data from the specified address on CAN card

Table 4.1: Function Table of AdsCAN.dll		
14	CANOutpb()	Outputs a byte data to the specified address on CAN card
15	CANPortClose()	Releases settings, close port
16	CANPortOpen()	Open the CAN port
17	CANQueryID()	Query the message ID
18	CANQueryMsg ()	Reads data from the card
19	CANReadFile()	Reads data
20	CANReset()	Resets CAN port
21	CANSendMsg()	Sends message
22	CANSetAcp()	Set the card 2.0 A protocol accep-tance code
23	CANSetAcpEx()	Set 2.0B protocol accept code
24	CANSetBaud()	Set card baud rate
25	CANSetBufferPtr()	Set the data receive buffer
26	CANSetCountPtr()	Set the counter of receive buffer
27	CANSetIntrMaskEx()	Set 2.0B protocol interrupt mask
28	CANSetNormal()	Sets CAN card to normal mode
29	CANSetOutCtrl()	Set the card out control regis-ter
30	CANSetProtocolType()	Set the card current protocol type
31	CANWaitForFIFOEvent()	Wait for the FIFO buffer event.
32	CANWaitForID()	Wait For the message ID
33	CANWaitForMsg()	Queries and gets message from CAN bus.
34	CANWakeUpEx()	Set Can controller into sleep mode
35	CANWriteFile()	Send message

CHAPTER 5

Pin Assignments & Wiring

This chapter covers the pin assignment for the CAN connector, and the wiring of the two transmission wires.

Sections include:

- Pin Assignments
- Wiring

Chapter 5 Pin Assignments & Wiring

5.1 Pin Assignments

Figure 5.1 shows the pin assignment for the card‘s DB-9 connectors

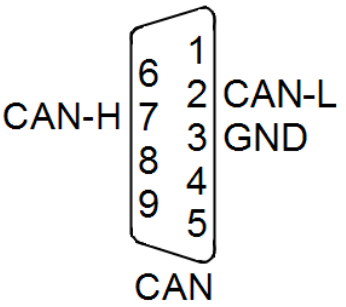


Figure 5.1: MIC-3680/3680R DB-9 pin assignment

5.2 Wiring

The CAN standard supports half-duplex communication. This means that just two wires are used to transmit and receive data.

Table 5.1: MIC-3680/3680R Pin Wiring

	MIC-3680/3680R DTE (male DB-9)	**Terminal DTE**
Pin	Signal	Signal
2	CAN_L	CAN_L
3	GND	GND
7	CAN_H	CAN_H