UNO-2052

GX1-300 UNO with 2xCAN, LAN, USB, RS-232, 8 x Isolated DI/O, 2 x AI

User Manual

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Part No. 2003205200 1st Edition

Printed in Taiwan May 2004

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. Test conditions for passing included the equipment being operated within an industrial enclosure. In order to protect the product from being damaged by ESD (Electrostatic Discharge) and EMI leakage, we strongly recommend the use of CE-compliant industrial enclosure products.

FCC Class A

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

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.

The IPPC-9170 Series industrial panel PCs include the following models:

- Plug-in 2P female screw terminal for power
- Plug-in 10P female screw terminal for DI/O
- Plug-in 5P female screw terminal for AI
- AD509 temperature transducer
- Mini jumper 2.0mm * 10 pcs
- Y-type KB/MS cable
- Null-modem cable (UNO-2052CE only)
- DIN rail mounting kit * 2 pcs
- UNO-2000 Driver & Utility CD-ROM
- Advantech Warranty

Contents

CHAPTER 1

UNO-2052 Overview

This chapter gives background information on the UNO-2052. It shows you the UNO-2052 overview and specifications.

Sections include:

- Introduction
- Hardware Specifications
- Safety Precautions
- Chassis Dimensions

Chapter 1 UNO-2052 Overview

1.1 Introduction

UNO-2052 is an embedded Application Ready Platform (ARP) that can shorten your development time and offer rich networking interfaces to fulfill extensive needs in different kind of projects. The Advantech Universal Network Controller (UNO-2000 series) is designed for providing services on a network enabled Application Ready Platform.

Leveraging field-approved and worldwide-accepted OS technology, Advantech UNO-2000 series provides a Windows CE .NET ready solution, and supports several standard networking interfaces, such as Ethernet, Wireless LAN, RS-232/422/485 and more. Because of its openness, great expansion capability and reliable design (fanless and diskless), the Advantech UNO-2000 series are ideal embedded platforms to implement custom applications for diversified applications.

1.2 Hardware Specifications

- **CPU:** NS Geode GX1-300 MHz, 64/128 MB SDRAM on board
- **VGA/Keyboard/Mouse:** DB-15 VGA Connector, PS/2 keyboard & mouse
- **Serial Port:** 1 × standard RS-232
  - Speed: RS-232: 50 ~ 115.2 Kbps
- **USB Interface:** One USB port, USB OpenHCI, Rev. 1.0 compliant
- **LAN:** One 10/100 Base-R RJ-45 Ports
- **CAN:** Dual isolated CAN 2.0B interfaces.
  - CAN controller: SJA-1000
  - CAN transceiver: 82C250
  - Signal support: CAN-L, CAN-H
  - CAN isolation: 1000 VDC
- **4-ch isolated digital input:**
  - 2,000 VDC isolation, 2,000 VDC ESD protection and 70 VDC overvoltage protection
  - 0 ~ 50 VDC input range
  - Digital input level

- **Dry Contact:**
  Logic level 0: Close to GND
  Logic level 1: Open
- **Wet Contact:**
  Logic level 0: +2V max
  Logic level 1: +4V~+50V
- **4-ch isolated Digital Output:**
  - 2,000 VDC isolation and 200 mA max / channel sink current
  - Keep output status after system hot reset
  - 5 ~ 30 VDC output range
  Open collector to 30 V
  30 mA max. load
  Power dissipation: 300 mW
- **2-ch Analog Input:**
  -Input type: Thermocouple: J/K/T/E-type.
  -Input range: +-15 mV, +-50 mV, +-100 mV, +- 500 mV, +-1 V, +-2.5 V, +-20 mA
  -T/C type and temperature range:
  J 0 ~ 760° C
  K 0 ~ 1370° C
  T -100 ~ 400° C
  E 0 ~ 1000° C
- **SSD:** One internal Type I / Type II CompactFlash card slot
- **HDD:** HDD extension kit offered for installation of one standard 2.5" HDD.
- **Watchdog Timer:** Programmable.
- **LED:** Power LED, IDE LED and one programmable diagnostic LED and buzzer.
- **Power Supply:** 9~36 VDC
- **Anti-Shock:** 20G@DIN IEC 68 section 2-27, half sine, 11ms
  50G@Wall/Panel IEC 68 section 2-27, half sine, 11ms.
- **Anti-Vibration:** 2G w/ CF@IEC 68 section 2-6, sine, 5~500Hz, 1 Oct./min, 1hr/axis.
  1G w/ HDD@IEC 68 section 2-6, sine, 12~300Hz, 1 Oct./min, 1hr/axis.
- **Operating Temperature:** -10~55° C @ 5~85% related humidity.
- **Related Humidity:** 95% @ 40° C.

- **Power Consumption:** 0.6 A max under +24 V power input or 1.2 A max under +12 V power input
- **Power Requirement:** 1 A typical under +24 V power input or 1.5 A typical under +12 V power input
- **Operating Temperature:** -10 ~55° C (14 ~ 131° F)
- **Chassis Size:** (WxLxH) 188.8 x 106.5 x 35.5 mm (7.5" × 4.2" × 1.4")
- **Weight:** 0.8 kg

1.3 Safety Precautions

The following sections tell how to make each connection. In most cases, you will simply need to connect a standard cable.

Warning! *Always disconnect the power cord from your chassis whenever you are working on it. Do not connect while the power is on. A sudden rush of power can damage sensitive electronic components. Only experienced electronics personnel should open the chassis.*

Caution! *Always ground yourself to remove any static electric charge before touching UNO-2052. Modern electronic devices are very sensitive to static electric charges. Use a grounding wrist strap at all times. Place all electronic components on a static-dissipative surface or in a static-shielded bag.*

1.4 Chassis Dimensions

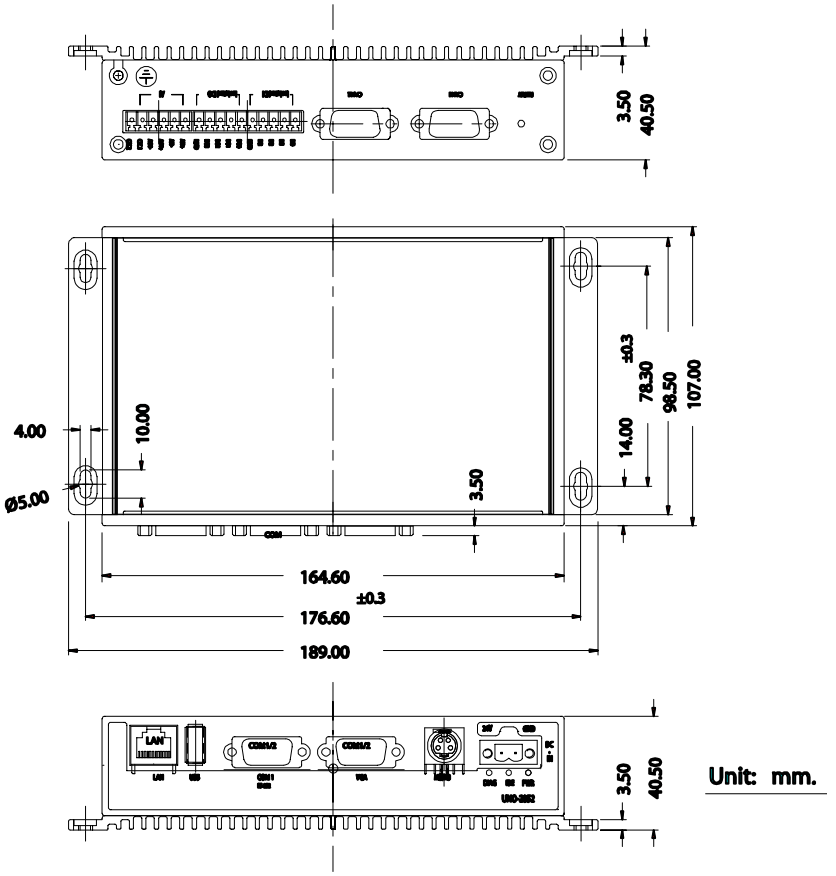


Figure 1.1: Chassis Dimensions

CHAPTER 2

Hardware Functionality

This chapter shows how to set up the UNO-2052's hardware functions, including connecting peripherals, switches and indicators.

Sections include:

- UNO-2052 Peripherals
- COM1 RS-232 Interface
- CAN1~CAN2: CAN Interface
- LAN: Ethernet Connector
- Power Connector
- PS/2 Mouse and Keyboard Connector
- USB Connector
- VGA Display Connector
- Reset Button
- On-Board Isolated Digital Input
- On-Board Isolated Digital Output
- On-Board Analog Input

Chapter 2 Hardware Functionality

2.1 UNO-2052 Peripherals

The following two figures show the connectors on UNO-2052. The following sections give you detail information about function of each peripheral.

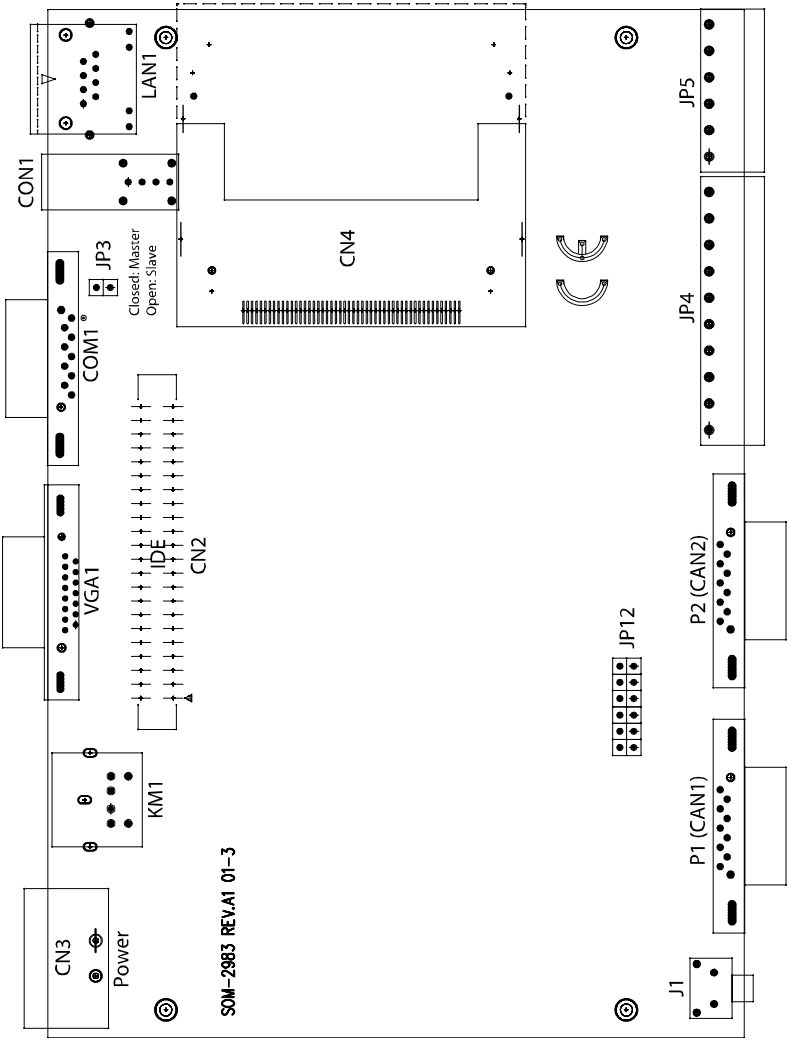


Figure 2.1: Front Panel of UNO-2052

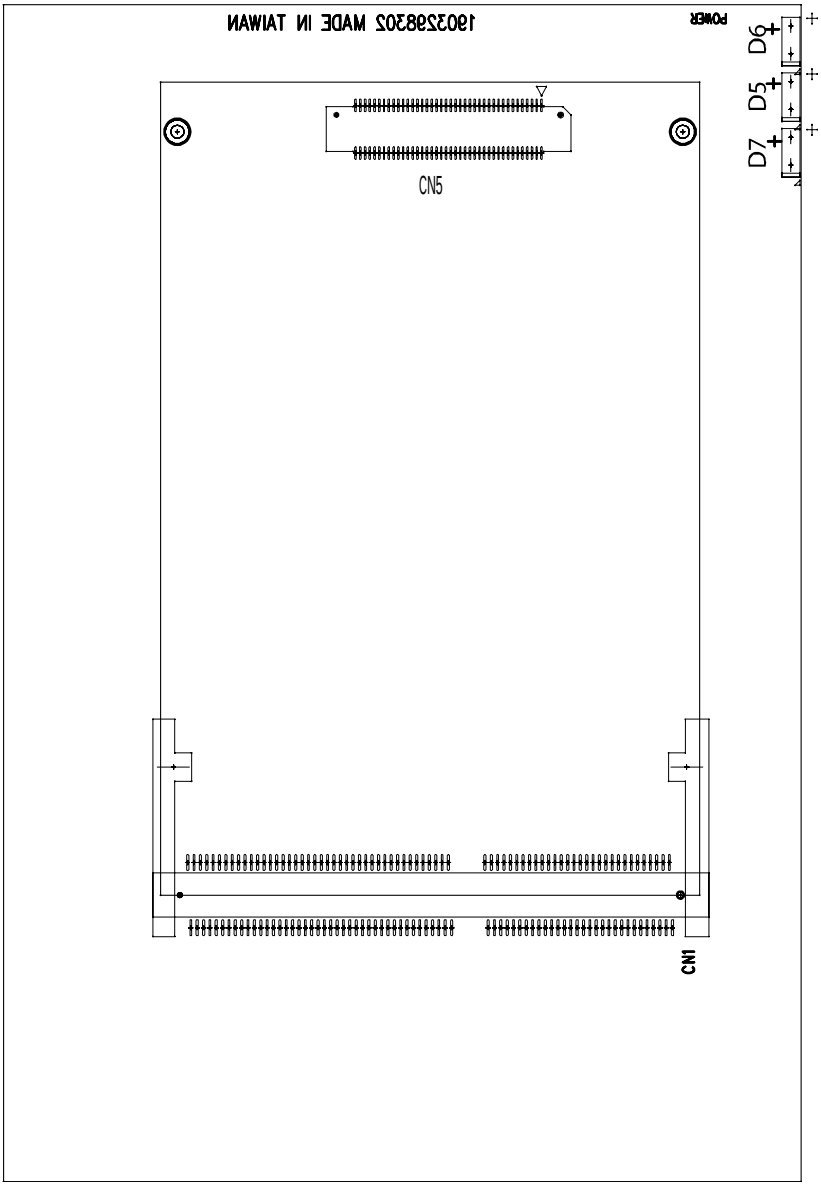


Figure 2.2: Rear Panel of UNO-2052

2.2 COM1: RS-232 Interface

The UNO-2052 offers one standard RS-232 serial communication interface port (COM1). Please refer to A.2 for the pin assignments.

2.3 CAN 1~CAN 2: CAN Interface

The UNO-2052 offers two CAN serial communication interface ports. COM3 and COM4. Please refer to Appendix A.3 for the pin assignments.

Control Area Network

The CAN (Control Area Network) is a serial bus system specially 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.

For further information about CAN controllers, please refer to the data sheet of JIA-1000.

2.4 LAN: Ethernet Connector

The UNO-2052 is equipped with a Realtek RTL8139C Ethernet LAN controller that is fully compliant with IEEE 802.3u 10/100Base-T CSMA/CD standards. The Ethernet port provides a standard RJ-45 jack on the board, and LED indicators on the front side shows its link (Green LED) and active (Yellow LED) status.

2.5 Power Connector

The UNO-2052 comes with a Phoenix connector to provide a 9~36 VDC external power input, and features reversed wiring protection. Therefore, it will not cause any damage to the system in the case of reversed wiring of ground line and power line.

2.6 PS/2 Keyboard and Mouse Connector

The UNO-2052 provides a PS/2 keyboard and PS/2 mouse connector. A 6-pin mini-DIN connector is located on the rear panel of the UNO-2052. The UNO-2052 comes with an adapter to convert from the 6-pin mini-DIN connector to two 6-pin mini-DIN connectors for PS/2 keyboard and PS/2 mouse connection. Please refer to Appendix A.5 for its pin assignments.

2.7 USB Connector

The USB connector is used for connecting any device that conforms to the USB interface. Many recent digital devices conform to this standard. The USB interface supports Plug and Play, which enables you to connect or disconnect a device whenever you want, without turning off the computer.

The UNO-2052 provides two connectors for USB interfaces, which gives complete Plug & Play, and hot swapping for up to 127 external devices. The USB interface complies with USB UHCI, Rev. 1.1. The USB interface can be disabled in the system BIOS setup. Please refer to Appendix A.6 for its pin assignments.

2.8 VGA Display Connector

The UNO-2052 provides a VGA controller (Chipset: VIA Twister chip with Integrated S3 Savage4 2D/3D/Video accelerator) for a high resolution VGA interface. It supports VGA and VESA, up to 1280 x 1024 @ 8 bpp and 1024 x 768 @ 16bpp resolution, and up to 32 MB shared memory. The VGA interface is reserved for system testing and debugging. The UNO-2052's JP8 is a 6-pin mini connector and CN7 is a 15-pin connector for a VGA monitor. A VGA cable is attached to convert from a 6-pin mini connector to a standard VGA connector. You can choose one of the VGA interfaces for system testing and debugging. Pin assignments for VGA display are described in Appendix A.7.

2.9 RESET: Reset Button

Press the "Reset" button to activate a reset function.

2.10 On-Board Isolated Digital Input

The UNO-2052 has four isolated digital input channels designated DI0~DI3.

Pin Assignment

The connector type of UNO-2052 is a plug-in screw terminal block that enables you to connect to field I/O devices directly without additional accessories. Figure 2-3 and Table 2-1 shows its pin assignment as well as signal descriptions.

Figure 2.3: Pin Assignment of Digital Input Connector

Table 2.1: Digital Input Connector Signal Descriptions

Signal Name	Reference	Direction	Description
DI <0…3>	COM	Input	Isolated digital input signals
COM	-	Input	Common ground

Isolated Inputs

Each of the isolated digital input channels accepts 10 ~ 50 VDC inputs, and bi-directional inputs. It means that you can apply positive or negative voltage to an isolated input pin (Vin). All four channels share one common pin (COM). Figure 2.4 shows how to connect an external input source to one of the UNO-2052's isolated input channels.

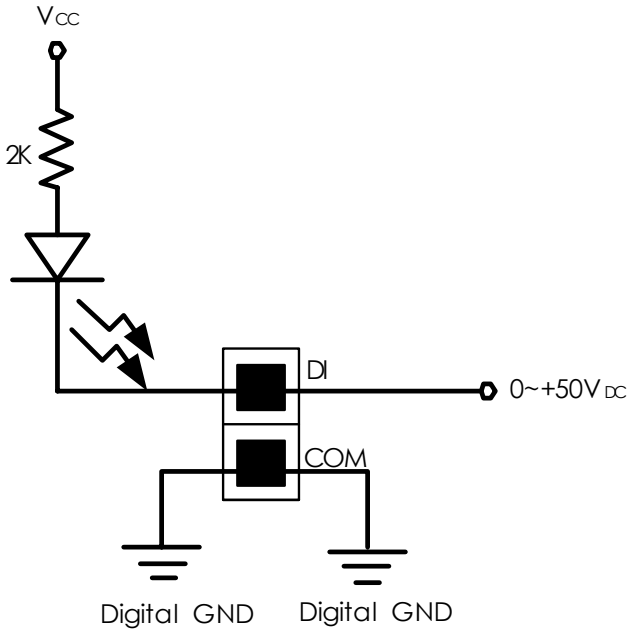


Figure 2.4: Isolated Digital Input Connection- Wet Contact

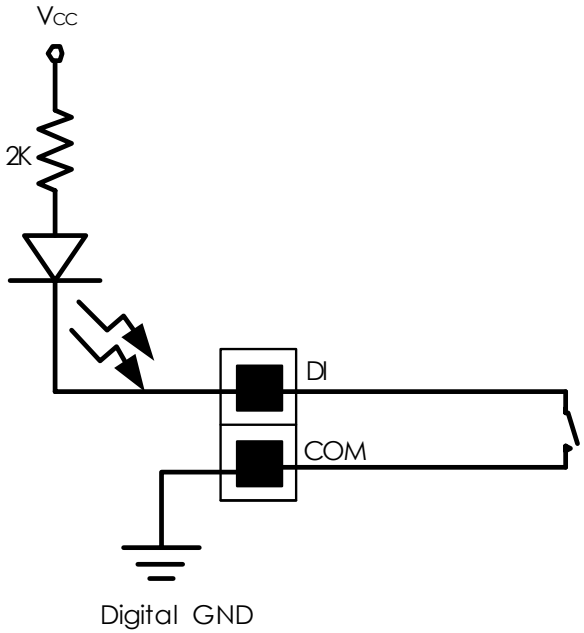


Figure 2.5: Isolated Digital Input Connection- Dry Contact

2.11 On-Board Isolated Digital Output

The UNO-2052 has four isolated digital output channels designated DO0~DO3.

Pin Assignment

The connector type of UNO-2052 is a plug-in screw terminal block that enables you to connect to field I/O devices directly without additional accessories. Figure 2-6 and Table 2-2 shows its pin assignment as well as signal description.

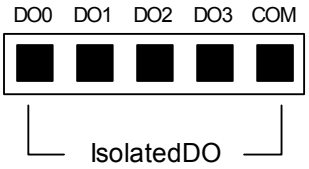


Figure 2.6: Pin Assignment of Isolated Digital Output Connector

Table 2.2: Signal Descriptions for Digital Output Connectors

Signal Name	Reference	Direction	Description
DO <0…3>	COM	Output	Isolated digital output signals
COM	-	Input	Common ground

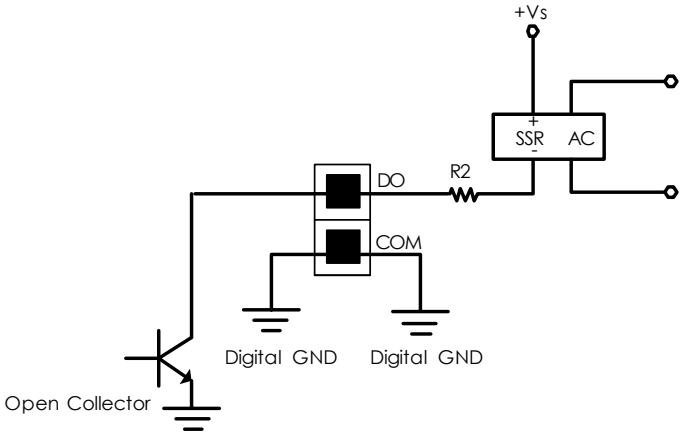


Figure 2.7: Isolated Digital Output Connection

2.12 On-Board Analog Input

The UNO-2052 has two analog input channels designated AI0, AI1.

Pin Assignment

The connector type of UNO-2052 is plug-in screw terminal block that enables you to connect to field I/O devices directly without additional accessories. Figure 2-8 and Table 2-3 shows its pin assignment as well as signal description.

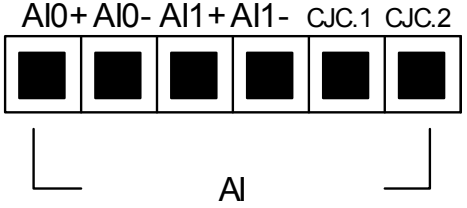


Figure 2.8: Analog Input Connector Pin Assignment

Table 2.3: Analog Input Connector Signal Descriptions		
Signal Name	**Direction**	**Description**
AI <0,1>	Input	Analog input signals
CJC <1,2>		CJC sensor for calibration

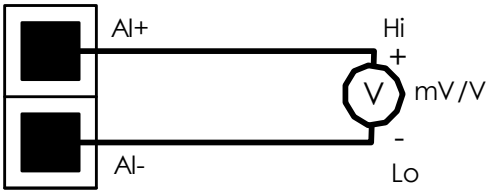


Figure 2.9: Milli Volt and Volt Input

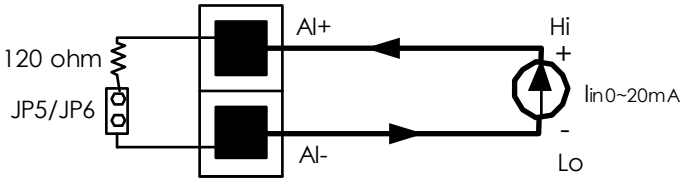


Figure 2.10: Thermocouple Input

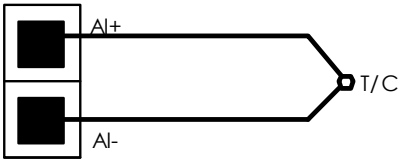


Figure 2.11: Process Current Input

Jumper		**Description**
JP5		Closed, process current input for AI0
		Open, volt or thermocouple input for AI0
JP6		Closed, process current input for AI1
		Open, volt or thermocouple input for AI1

CHAPTER 3

Initial Setup

This chapter provides information on how to setup UNO-2052.

Sections include:

- Inserting a CompactFlash Card
- Connecting the Power
- Connecting to a Hard Disk
- BIOS Setup and System Assignments

Chapter 3 Initial Setup

3.1 Inserting a CompactFlash Card

The procedure for installing a CompactFlash card into the UNO-2052 is as follows, please follows these steps carefully.

Step 1: Remove the power cord.

Step 2: Unscrew the four screws from the rear panel of the UNO-2052.

Step 3: Remove the rear panel.

Step 4: Plug a CompactFlash card with the user's OS and application program into a CompactFlash card slot on the board.

Step 5: Screw back the rear panel with the four screws.

3.2 Connecting the Power

Connect the UNO-2052 to a 9~36 VDC power source. The power source can either be from a power adapter or an in-house power source.

3.3 Connecting to a Hard Disk

The procedure for installing a hard disk into the UNO-2052 is as follows, please follows these steps carefully.

Step 1: Remove the power cord.

Step 2: Unscrew the four screws from the rear panel of the UNO-2052.

Step 3: Remove the rear panel.

Step 4: Connect an IDE flat cable to the **primary** (recommended) or secondary IDE connector, then connect the other side of the connector to the hard disk.

Step 5: Screw back the rear panel with the four screws.

3.4 BIOS Setup and System Assignments

UNO-2052 uses the Advantech SOM-2353 CPU module. Further information about the SOM-2353 CPU module can be found in the SOM-2353 user manual.

Please note that you can try to “LOAD BIOS DEFAULTS” from the BIOS Setup manual if the UNO-2052 does not work properly.

CHAPTER 4

I/O Command Set

This chapter introduces the command sets used for digital input, digital output and analog input with UNO-2052.

Chapter 4 I/O Command Set

4.1 Introduction

To avoid communication conflicts when several devices try to send data at the same time, all actions are instigated by the UNO-2052. The basic form is a command/response protocol with the UNO-2052 initiating the sequence. When UNO-2052 is not transmitting, other devices are in listening mode. All of UNO-2052's command sets follow the Advantech ADAM command set format.

4.2 Syntax

The syntax of the Advantech ADAM command set is listed as below:

[delimiter character] [address*] [command] [data] [checksum**] [carriage return]

Every command begins with a delimiting character, which are defined below:

$: dollar sign #: pound sign

%: percentage sign @: at sign

The delimiter character is followed by a two-character address (hexadecimal) that specifies the UNO-2052. The I/O address of UNO-2052 is defined as (0x01)H. The actual two character command follows the address. Depending on the command, an optional data segment follows the command string. An optional two character checksum may be appended to the total string; but the checksum is disabled in UNO-2052. Every command is terminated by a carriage return (cr).

* The I/O address of UNO-2052 is defined as (0x01)H.

** The checksum is disabled in UNO-2052

UNO-2052 provides an internal serial communication port (COM2). You can configure the digital input, digital output and analog input function of UNO-2052 by COM2. The baud rate of COM2 can support 115200 bps, 57600 bps, 38400 bps, 19200 bps and 9600 bps.

Table 4.1: UNO-2052 Command Set Table		
Command Syntax	**Command Name**	**Description**
%AANNTTCCFF	Configuration	Sets input range, integration time for a specified analog input module
$AA2	Configuration Status	Returns the configuration parameters for the specified analog input module
$AAF	Read Firmware Version	Returns the firmware version source code from the specified analog input module
$AAM	Read Module Name	Returns the module name from the specified analog input module
#AA	Analog Data In	Returns the input value from a specified analog input module in the currently configured data format
#AAN	Read Analog Input from Channel N	Returns the input value from channel number n of the specified analog input module
$AA0	Span Calibration	Calibrate the analog input module to correct for gain errors
$AA1	Offset Calibration	Calibrate the analog input module to correct for offset errors
$AAB	Open Thermocouple Detection	Ask the module to respond whether the thermocouple is open or closed.
$AA3	CJC Status	Returns the value of the CJC sensor for a specified analog input module
$AA9	CJC Offset Calibration	Calibrates the CJC sensor for offset errors
$AA6	Digital Data In	Returns the values of digital I/O channels of the addressed module
#AABB(data)	Digital Data Out	Write specified values to either a single channel or all channels simultaneously

4.2.1 %AANNTTCCFF

Name: Configuration

Description: Sets address, input range, baud rate, data format, checksum status, and/or integration time for an analog input module.

Syntax:

%AANNTTCCFF(cr)

% is a delimiter character.

AA(01) represents the 2-character hexadecimal address of the analog input module you want to configure.

NN represents the new hexadecimal address of the analog input module. The address of UNO-2052 must be 01h.

TT represents the type (input range) code.

CC represents the baud rate code.

FF is a hexadecimal number that equals the 8-bit parameter representing the data format, checksum status and integration time. The layout of the 8-bit parameter is shown in figure 4-1. Bits 2 through 5 are not used and are set to 0.

(cr) is the terminating character, carriage return (0Dh)

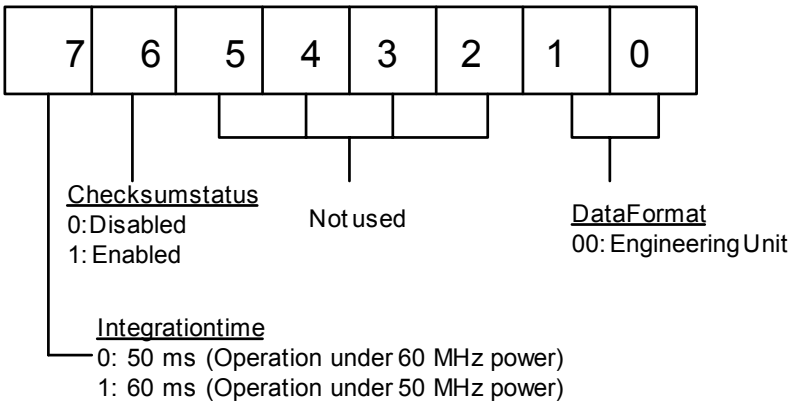


Figure 4.1: Data Format for 8-bit Parameter

4.2.2 %AANNTTCCFF

Response: !AA(cr) if the command is valid.

?AA(cr) if an invalid parameter was entered or if the INIT* terminal was not grounded when attempting to change baud rate or checksum settings.

There is no response if the module detects a syntax error or communication error or if the specified address does not exist.

! delimiter character indicates a valid command was received.

? delimiter character indicates the command was invalid

AA (01) represents the 2-character hexadecimal address of an analog input module.

(cr) is the terminating character, carriage return (0Dh)

Example:

command: %0101050600(cr)

response: !01(cr)

The UNO-2052 module with address 01h is configured to: input range ±2.5 V, baud rate 9600, integration time 50 ms (60 Hz), engineering units data format and no checksum checking or generation.

The response indicates that the command was received.

Wait 1 second to let the new configuration settings take effect before issuing a new command to the module.

NOTICE: An analog input module requires a maximum of 1 second to perform auto calibration and ranging after it is reconfigured. During this time span, the module cannot be addressed to perform any other actions.

Table 4.2: Input Range Codes (Type Code)	
Input Range Code (Hex)	**Input Range for 4011,4011D,4018,4018+,4018M**
00	± 15 mV
01	± 50 mV
02	± 100 mV
03	± 500 mV
04	± 1 V
05	± 2.5 V
06	± 20 mA
0E	Type J Thermocouple 0 to 760° C
0F	Type K Thermocouple 0 to 1370° C
10	Type T Thermocouple -100 to 400° C
11	Type E Thermocouple 0 to 1370° C

Table 4.3: Baud Rate Codes	
Baud Rate Code (hex)	**Baud Rate**
06	9600 bps
07	19.2 kbps
08	38.4 kbps
09	57.6 kbps
0A	115.2Kbps

4.2.3 $AA2

Name: Configuration Status

Description: The command requests the return of the configuration data from the analog input module at address AA.

Syntax: $AA2(cr)

$ is a delimiter character.

AA (01) represents the 2-character hexadecimal address of the analog input module that you want to
interrogate.

2 is the Configuration Status command.

(cr) is the terminating character, carriage return (0Dh).

Response: !AATTCCFF(cr) if the command is valid.

?AA(cr) if an invalid operation was entered.

There is no response if the module detects a syntax error or communication error or if the specified address does not exist.

! delimiter character indicates a valid command was received.

? delimiter character indicates the command was invalid.

AA (01) represents the 2-character hexadecimal address of an analog input module.

TT represents the type code. Type code determines the input range.

CC represents the baud rate code.

FF is a hexadecimal number that equals the 8-bit parameter that represents the data format, checksum status and integration time . The layout of the 8-bit parameter is shown in figure 4-1. Bits 2 to 5 are not used, and are set to 0.

(cr) is the terminating character, carriage return (0Dh).

(Also see the %AANNTTCCFF configuration command)

4.2.4 $AA2

Example:

command: $012(cr)
response: !01050600(cr)

The command asks the analog input module at address (01)H to send its configuration data.

The analog input module at address (01)H responds with an input range of 2.5 volts, a baud rate of 9600 bps, an integration time of 50 ms (60 Hz), engineering units are the currently configured data format, and no checksum function or checksum generation.

4.2.5 $AAF

Name: Read Firmware Version

Description: The command requests the analog input module at address AA to return the version code of its firmware

Syntax: $AAF (cr)

$ is a delimiter character.

AA (01) represents the 2-character hexadecimal address of the analog input module that you want to
interrogate.

F identifies the version command.

(cr) is the terminating character, carriage return (ODh)

Response: !AA(Version)(cr) if the command is valid.

There is no response if the module detects a syntax error or communication error, or if the specified address does not exist.

! is a delimiter character indicating a valid command was received.

AA (01) represents the 2-character hexadecimal address of an analog input module.

(Version) is the version code of the module's firmware at address AA.

(cr) is the terminating character, carriage return (ODh).

4.2.6 $AAM

Name Read Module Name

Description: The command requests the analog input module at address AA to return its name

Syntax: $AAM (cr)

$ is a delimiter character.

AA (01) represents the 2-character hexadecimal address of the analog input module that you want to
interrogate.

M is the Read Module Name command.

(cr) is the terminating character, carriage return (ODh)

Response: !AA(Module Name)(cr) if the command is valid.

There is no response if the module detects a syntax error or communication error, or if the specified address does not exist.

! is a delimiter character indicating a valid command was received.

AA (01) represents the 2-character hexadecimal address of an analog input module.

(Module Name) is the name of the module at address AA.

(cr) is the terminating character, carriage return (ODh).

4.2.7 #AA

NameAnalog Data In

Description: The command will return the input value from a specified (AA) module in the currently configured data format.

Syntax: #AA(cr)

is a delimiter character.

AA (01) represents the 2-character hexadecimal address of an analog input module.

(cr) is the terminating character, carriage return (0Dh).

Response: >(data)(cr)

There is no response if the module detects a syntax error or communication error or if the specified address does not exist.

> is a delimiter character.

(data) is the input value in the configured data format of the interrogated module. (For data formats, see Appendix B).

(cr) is the terminating character, carriage return (0Dh).

Example: command:#01(cr)

response:+1.8222+1.8220(cr)

The command interrogates the analog input module at address 01h for its input values of all channels.

The analog input module responds with channels from 0 to 1 with +1.8222 volts and +1.8220 volts.

4.2.8 #AA

NOTICE: When modules measure Thermocouple or RTD input values that are outside their configured range, they will send data that implies input out of bounds. The next table shows the values that the modules will return, depending on the configured data format and if the input value falls under or exceeds the configured range.

Only when modules are configured for Thermocouple will this "input out of bounds" warning occur. When analog input modules measure voltage or current that falls outside the configured range, they will return the actual measured input!

In the next example the target module is configured for an input range of T/C type J (Input range: 0 - 760° C) and for a data format in engineering units. The module measures an input value of 820° C.

Example: command: #01(cr)
response: >+9999(cr)

By returning a high value, +9999, the module at address 01h indicates that the measured input value exceeds the configured range.

4.2.9 #AAN

Name: Read Analog Input from Channel N

Description: The command will return the input value from one of the eight channels of a specified (AA) module in the currently configured data format.

Syntax: #AAN(cr)

is a delimiter character.

AA (01) represents the 2-character hexadecimal address of the analog input module.

N identifies the channel you want to read. The value can range from 0 to 1 for UNO-2052.

(cr) is the terminating character, carriage return (0Dh).

Response: >(data)(cr)

There is no response if the module detects a syntax error or communication error or if the specified address does not exist.

> is a delimiter character.

(data) is the input value of the channel number N. Data consists of a + or - sign followed by five decimal digits with a fixed decimal point.

(cr) is the terminating character, carriage return (0Dh).

Example: command: #010(cr)

response: >+1.4567(cr)

The command requests the analog input module at address 01h to return the input value of channel 0.

The analog input module responds that the input value of channel 0 is equal to +1.4567 volts.

4.2.10 $AA0

Name: Span Calibration

Description: Calibrates an analog input module to correct for gain errors.

Syntax: $AA0(cr)

$ is a delimiter character.

AA (01) represents the 2-character hexadecimal address of the analog input module which is to be calibrated.

0 represents the span calibration command.

(cr) is the terminating character, carriage return (0Dh).

Response: !AA(cr) if the command was valid.

?AA(cr) if an invalid operation was entered.

There is no response if the module detects a syntax error or communication error or if the specified address does not exist.

! delimiter character indicates a valid command was received.

? delimiter character indicates the command was invalid.

AA (01) represents the 2-character hexadecimal address of the analog input module.

(cr) represents terminating character, carriage return (0Dh).

In order to successfully calibrate an analog input module's input range, a proper calibration input signal should be connected to the analog input module (channel 0 and 1) before and during the calibration.

NOTICE: An analog input module requires a maximum of 1 second to perform auto calibration and ranging after it received a Span Calibration command. During this interval, the module cannot be addressed to perform any other actions.

4.2.11 $AA1

Name: Offset Calibration.

Description: Calibrates an analog input module to correct for offset errors.

Syntax: $AA1(cr)

$ is a delimiter character.

AA (01) represents the 2-character hexadecimal address of the analog input module you want to calibrate.

1 represents the offset calibration command.

(cr) is the terminating character, carriage return (0Dh).

Response: !AA(cr) if the command is valid.

?AA(cr) if an invalid operation was entered.

There is no response if the module detects a syntax error or communication error or if the specified address does not exist.

! delimiter character indicates a valid command was received.

? delimiter character indicates the command was invalid.

AA (01) represents the 2-character hexadecimal address of the analog input module.

(cr) represents terminating character, carriage return (0Dh).

In order to successfully calibrate an analog input module's input range, a proper calibration input signal should be connected to the analog input module (channel 0 and 1) before and during the calibration.

NOTICE: An analog input module requires a maximum of 1 second to perform auto calibration and ranging after it received an Offset Calibration command . During this interval, the module can not be addressed to perform any other actions.

4.2.12 $AAB

Name: Open Thermocouple Detection

Description: Asks the module to respond whether the thermocouple is open or not.

Syntax: $AAB(cr)

$ is a delimiter character

AA (01) represents the 2-character hexadecimal address of the analog input module to be detected.

B is the channel diagnose command.

(cr) is the terminating character, carriage return (0Dh)

Response:

!AANN(cr) if the command is valid.

?AA(cr) if an invalid command was issued.

There is no response if the module detects a syntax error or communication error of if the specified address does not exist.

! delimiter character indicates a valid command was received.

? delimiter character indicates the command was invalid.

AA (01) represents the 2-character hexadecimal address of the analog input module.

NN (range 00-03) is a hexadecimal number that equals the 8-bit parameter, representing the status of analog input channels. Bit value 0 means normal status; and bit value 1 means channel open wiring.

(cr) is the terminating character, carriage return (0Dh)

4.2.13 $AA3

Name: CJC Status command

Description: Instructs the addressed analog input module to read its CJC (Cold Junction Compensation) sensors and return the acquired data.

Syntax: $AA3(cr)

$ is a delimiter character.

AA (01) represents the 2-character hexadecimal address of the analog input module which contains the CJC Status you wish to retrieve.

3 is CJC Status command.

(cr) is the terminating character, carriage return (0Dh).

Response: >data(cr) if the command is valid.

?AA(cr) if an invalid command was issued.

There is no response if the module detects a syntax error or communication error or if the specified address does not exist.

! delimiter character indicates a valid command was received.

? delimiter character indicates the command was invalid

AA (01) represents the 2-character hexadecimal address of an analog input module.

(data) is the value that is retrieved by the module by reading its CJC sensor. The data format, in degrees Celsius, consists an "+" or "-" sign followed by five decimal digits and a fixed decimal point. The resolution of the data is 0.1° C.

(cr) is the terminating character, carriage return (0Dh).

Example: command: $013(cr)
response: >+0036.8(cr)

The command request the analog input module at address 01h to read its CJC sensor and return the data. The analog input module at address 01h responds with: 36.8° C.

4.2.14 $AA9

Name: CJC Offset Calibration

Description: Calibrates an analog input module to adjust for offset errors of its CJC (Cold Junction Compensation) sensors.

Syntax: $AA9S(number of counts)(cr).

$ is a delimiter character.

AA (01) represents the 2-character hexadecimal address of the analog input module which contains the CJC Status you wish to retrieve.

9 is CJC Status command.

S sign, + or -, indicates whether to increase or decrease the CJC offset value.

(number of counts) a four character hexadecimal "count" value. Each count equals approximately 0.009° C. The value can range from 0000 to FFFF.

(cr) is the terminating character, carriage return (0Dh).

Response: !AA(cr) if the command is valid.

?AA(cr) if an invalid command was issued.

There is no response if the module detects a syntax error or communication error or if the specified address does not exist.

! delimiter character indicates a valid command was received.

? delimiter character indicates the command was invalid.

AA (01) represents the 2-character hexadecimal address of an analog input module.

(cr) is the terminating character, carriage return (0Dh).

Example: command: $019+0042(cr)
response: !01(cr)

The command increases the CJC offset value of the analog input module at address 01h with 66 counts (42 hex) which equals about 0.6° C.

NOTICE: *An analog input module requires a maximum of 2 seconds to perform auto calibration and ranging after it received an CJC Calibration command . During this interval, the module can not be addressed to perform any other actions.*

4.2.15 $AA6

Name: Digital Data In

Description: This command requests that the specified (AA) module returns the status of its digital input channels and returns a readback value of its digital output channels.

Syntax: $AA6(cr)

$ is a delimiter character.

AA (01) represents the 2-character hexadecimal address of the digital I/O module.

6 is the Digital Data In command.

(cr) is the terminating character, carriage return (0Dh).

Response: !(dataOutput)(dataInput)00(cr)
if the command was valid.

?AA(cr) if an invalid command has been issued.

There is no response if the module detects a syntax error or communication error or if the specified address does not exists.

! delimiter character indicating a valid command was received.

? delimiter character indicating the command was invalid.

AA (01) represents the 2-character hexadecimal address of the digital I/O module that is responding.

(dataOutput) two-character hexadecimal value which either is the readback of a digital output channel or a relay.

(dataInput) two-character hexadecimal value representing the input values of the digital I/O module.

(cr) is the terminating character, carriage return (0Dh).

Example: command: $016(cr)
response: !090300(cr)

The first two characters of the response, value 09h (00001001), indicate that digital output channels 0 and 3 are ON, channels 1, 2, are OFF. The second two characters of the response, value 03h (00000010), indicate that digital input channels 0 and 1 are HIGH, channels 2, 3 are LOW.

4.2.16 #AABB

Name: Digital Data Out

Description: The command either sets a single digital output channel or sets all digital output channels simultaneously.

Syntax: #AABB(data)(cr)

is a delimiter character.

AA (01) represents the 2-character hexadecimal address of the digital I/O module you want to set its output value.

BB is used to indicate whether all channels will be set or a single channel will be set. In the last case BB also indicates which channel. Writing to all channels (write a byte): both characters should be equal to zero (BB=00). Writing to a single channel (write a bit): First character is 1, second character indicates channel number which can range from 0 to 3.

(data) is the hexadecimal representation of the digital output value(s).

When writing to a single channel (bit) the first character is always 0. The value of the second character is either 0 or 1.

When writing to all channels (byte), both characters are significant (range 00h-0Fh). The digital equivalent of these two hexadecimal characters represent the channels values.

4.2.17 #AABB

Response: >(cr) if the command was valid.

?AA(cr) if an invalid command has been issued.

There is no response if the module detects a syntax error or communication error or if the specified address does not exists.

> delimiter character indicating valid command was received.

? delimiter character indicating the command was invalid.

AA (01) represents the 2-character hexadecimal address of the digital I/O module that is responding.

(cr) is the terminating character, carriage return (0Dh)**.**

Examples: command: #010005(cr)
response: >(cr)

An output byte with value 05h (00000101) is sent to the digital I/O module at address (01)H. Its channels 0 and 2 will be set to ON. Other channels are set to OFF.

command: #011201(cr)

response: >(cr)

An output bit with value 1 is sent to channel 2 of a digital I/O module at address 01h.

Channel two of the digital I/O module is set to ON.

APPENDIX A

System Settings

This chapter provides information on the system settings of UNO-2052.

Sections include:

- Board Connectors and Jumpers
- RS-232 Standard Serial Port
- CAN Serial Port
- Ethernet RJ-45 Connector
- Phoenix Power Connector (PWR)
- PS/2 Keyboard and Mouse Connector
- USB Connector
- VGA Display Connector
- CompactFlash Master/Slave Jumper Setting

Appendix A

A.1 Board Connectors and Jumpers

There are connectors and jumpers on the UNO-2052 board. The following sections tell you how to configure the UNO-2052 hardware setting. Figure A-1 and figure A-2 show the locations of UNO-2052 connectors and jumpers.

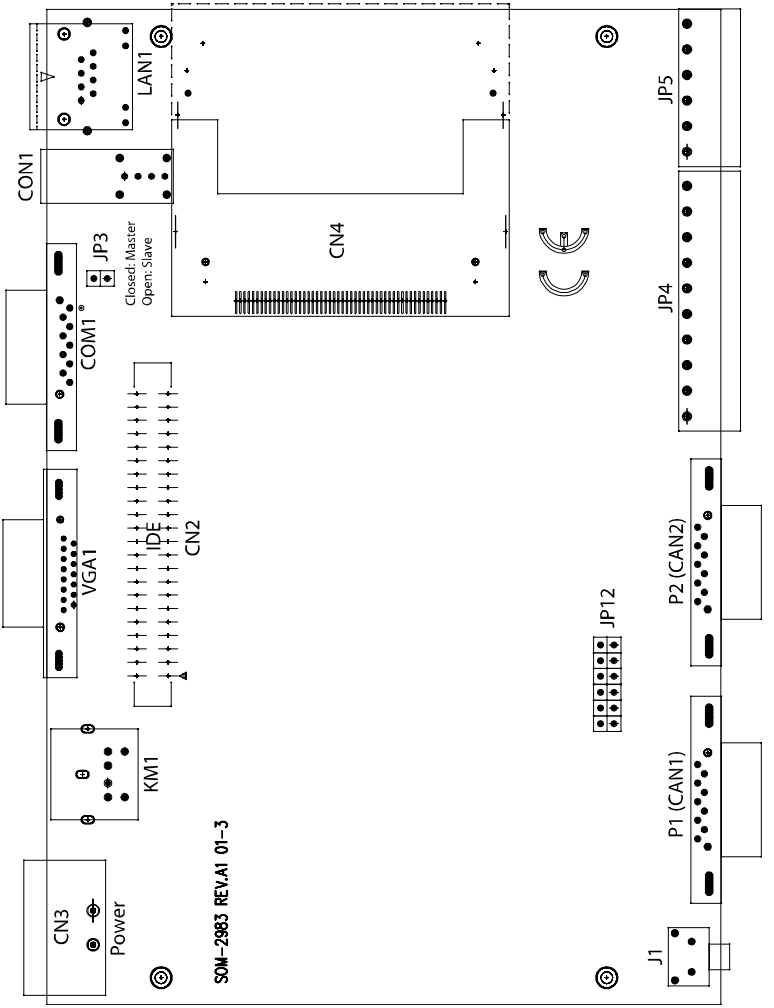


Figure A.1: UNO-2052 Connector and Jumper Location (Top View)

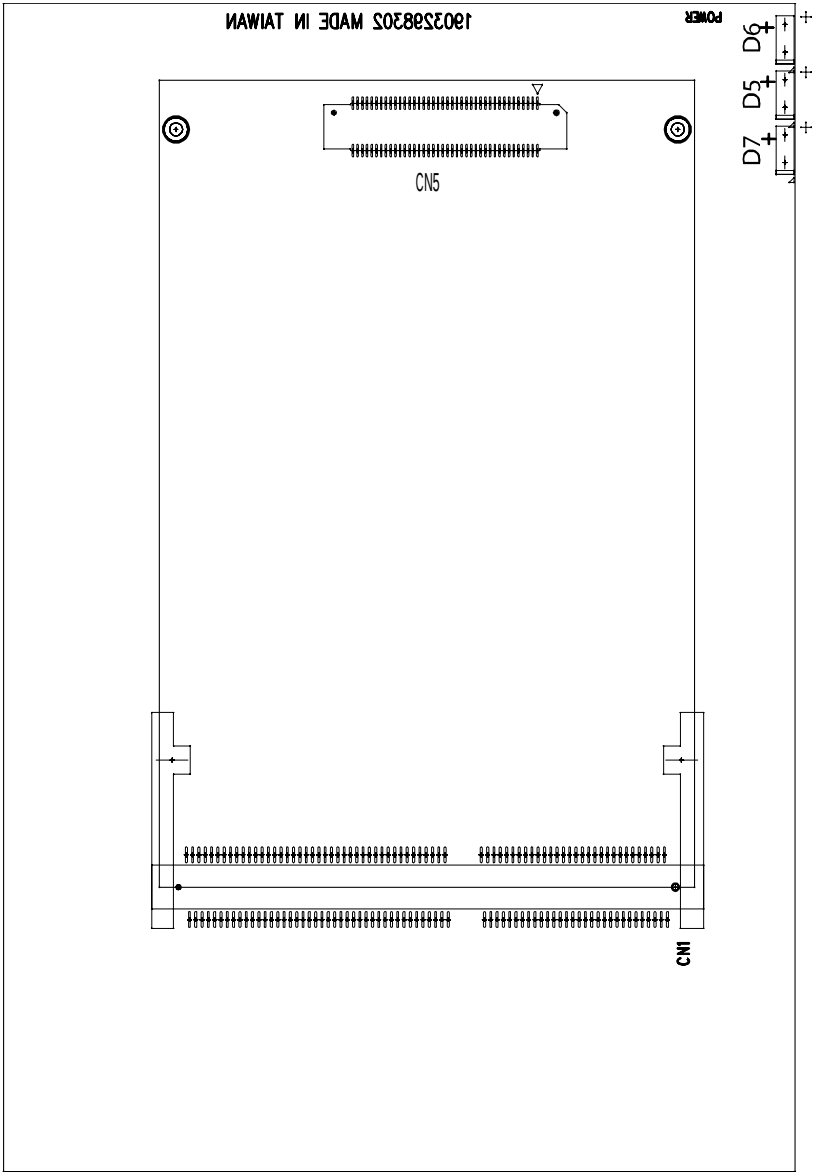


Figure A.2: UNO-2052 Connector and Jumper Location (Bottom View)

Table A.1: UNO-2052 Connectors and Jumpers	
CON1	COM1 standard RS-232 port
P1	CAN 1 DB-9 connector
P2	CAN 2 DB-9 connector
JP3	CompactFlash IDE Primary Master/Slave jumper
JP4	Isolated digital input and digital output connector
JP5	Analog input connector
JP12	Termination resistor for CAN 1 and CAN 2
Power	Phoenix power connector
CN4	Internal CompactFlash card slot
DB5	Power IDE LED
DB6	Power LED
DB7	Diagnostic LED
KM1	PS2 keyboard and mouse connector
CON1	USB connector
LAN1	Ethernet RJ-45 connector
VGA1	VGA DB-15 connector
J1	Reset button

A.2 RS-232 Standard Serial Port (COM1)

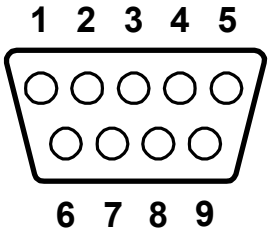
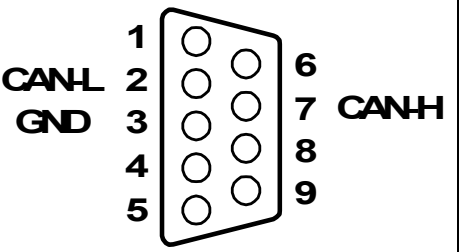


Table A.2: RS-232 Standard Serial Port Pin Assignments	
Pin	**RS-232 Signal Name**
1	DCD
2	RxD
3	TxD
4	DTR
5	GND
6	DSR
7	RTS
8	CTS
9	RI

A.3 CAN Serial Port Pin Assignment

Table A.3: CAN Port Pin Assignments (CAN1~CAN2)

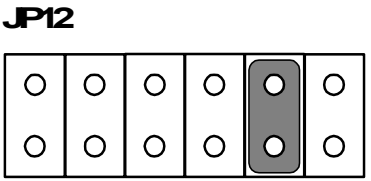
Pin	CAN Signal Name
1	N/A
2	CAN-L
3	GND
4	N/A
5	N/A
6	N/A
7	CAN-H
8	N/A
9	N/A



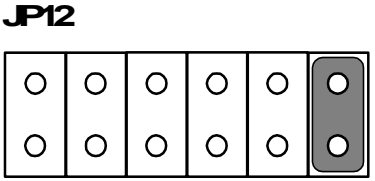
A.3.1 Termination Resistor Setup

Terminal resistors are factory installed to allow for impedance matching. These resistors can be enabled by utilizing **JP12** (shown below). The value of the resistor should equal the characteristic impedance of the signal wires (approximately 120 ohms). The following figure shows resistor placements.

Enable Termination Resistor for CAN1 Port

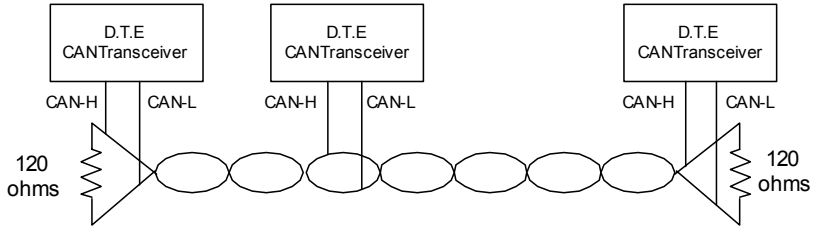


Enable Termination Resistor for CAN2 Port



A.3.2 CAN Signal Wiring

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



Wiring connections are as follows:

Table A.4: UNO-2052 DTE (male=DB-9) Terminal DTE		
Pin	**Signal**	**Signal**
7	CAN-H	CAN-H
3	GND	GND
2	CAN-L	CAN-L

A.4 Ethernet RJ-45 Connector (LAN1)

Table A.5: Ethernet RJ-45 Connector Pin Assignments	
Pin	**10/100Base-T Signal Name**
1	XMT+
2	XMT-
3	RCV+
4	NC
5	NC
6	RCV-
7	NC
8	NC

A.5 Phoenix Power Connector (PWR)

Table A.6: Phoenix Power Connector Pin Assignments	
Pin	**Signal Name**
1	+9~36 VDC
2	GND

A.6 PS/2 Keyboard and Mouse Connector

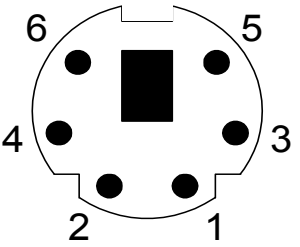


Table A.7: Keyboard and Mouse Connector Pin Assignments	
Pin	**Signal Name**
1	KB DATA
2	MS DATA
3	GND
4	VCC
5	KB Clock
6	MS Clock

A.7 USB Connector (USB1)

Table A.8: USB Connector Pin Assignments		
Pin	**Signal Name**	**Cable Color**
1	VCC	Red
2	DATA+	White
3	DATA-	Green
4	GND	Black

A.8 VGA Display Connector

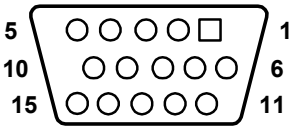
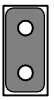
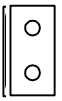


Table A.9: VGA Adaptor Cable Pin Assignment			
Pin	**Signal Name**	**Pin**	**Signal Name**
1	Red	9	NC
2	Green	10	GND
3	Blue	11	NC
4	NC	12	NC
5	GND	13	H-SYNC
6	GND	14	V-SYNC
7	GND	15	NC
8	GND		

A.9 CompactFlash Master/Slave Jumper Setting (JP3)

The CompactFlash interface uses a primary IDE channel, which could be set as the master or slave device by changing the setting of JP3.

Master Device (Default): JP3 Closed 
Slave Device: JP3 Open 

UNO-2052 has one internal CompactFlash card slot and one external CompactFlash card slot. Internal CompactFlash card slot supports CompactFlash type I (3mm thick) only and External CompactFlash card slot supports both Type I and type II (5mm thick) cards.