UNO-2041

486 Universal Network Controller with PC/104, 2 x RS-232, 2 x RS-232/485

User's Manual

Acknowledgements

Part No. 2003204120

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Product warranty

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

This warranty does not apply to any products that 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 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 on-screen 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.

Technical support and sales assistance

If you have any technical questions about the UNO-2041 or any other Advantech products, please visit our support website at:

http://www.advantech.com/support

For more information about Advantech's products and sales information, please visit:

http://www.advantech.com

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CHAPTER 1

UNO-2041 Overview

This chapter gives background information on the UNO-2041. It shows you the UNO-2041 overview and specifications.

Sections include:

- Introduction
- Hardware Specifications
- Safety Precautions
- UNO-2041 Series
- Chassis Dimension

1.1 Introduction

Are you looking forward to a suitable embedded Application Ready Platform (ARP) that could shorten your development time and offer rich networking interfaces to fulfill your extensive needs in different kind of projects? Advantech Universal Network Controller (UNO-2000 series) is your ANSWER concentrating the services on Network-enabled Application Ready Platform total solution.

Leveraging field-approved and worldwide-awareness real-time OS technology, Advantech UNO-2000 series provides Windows CE .NET ready solution and support several standard networking interfaces, such as Ethernet, Wireless LAN, RS-232/422/485 and so on. Because of its openness, great expansion capability and reliable design – fanless and diskless, Advantech UNO-2000 series becomes an ideal embedded platform to implement custom applications in diversified applications.

1.2 Hardware Specifications

1.2.1 General

- **CPU**: 486-66 MHz
- **Memory**: 32 MB DRAM
- **10/100 Base T Ethernet interface:**

  -Chipset: RTL-8139 PCI local bus Ethernet controller

  -Ethernet interface: IEEE 802.3 compatible 100/10Base T interface
- **Serial ports**: Two RS-232, Two RS-232/485.

  -Two DB9 RS-232 interface (COM 1,2)

  -Two DB-9 RS-232/485 interface (COM 3,4)
- **VGA with 64 bit Windows accelerator:**

  -Display memory: 4MB share memory architecture (UMA structure)

  -Display resolution: 1024*768@16M colors

- **One PC/104 interface**
- **PS/2 KB/Mouse:** supports standard PC/AT keyboard and PS/2 mouse
- **Reset button**
- **Solid state disk**: supports one internal CompactFlash™ socket and one external CompactFlash™ socket as an emulated HDD
- **LED**: one power LED, one external HDD LED

1.2.2 Internal Interfaces

- **Enhanced IDE hard disk drive interface**: Supports up to two hard disk drives.

1.2.3 Mechanical and environmental

- **Power supply voltage**: 24 V DC (input range 10 ~ 30 V_{DC})
- **Max. power requirements**: +24 V @ 0.5 A
- **Operating temperature**: 0 ~ 55° C
- **Chassis size**: 164.8 x 106.5 x 35.5 mm
- **Weight**: 0.7kg

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. All of the connector pin assignments are shown in Appendix A.

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-2041. 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 UNO-2041 Series

There are four products in UNO-2041 series listed as below:

- **UNO-2041:** UNO-2041 hardware platform
- **UNO-2041CE:** UNO-2041 hardware platform with Windows CE OS (built in 32MB CompactFlash™ card)

Packing list

Before installing your board, make sure that the following materials have been received:

Common parts:

- Warranty certificate
- Software Supporting CD-ROM
- 6P-6P-6P 20cm KB and PS/2 Mouse Y cable (P/N: 1652002202)
- Phoenix power connector (P/N 1652002202)
- 6P-15P 10cm VGA cable (P/N: 1703150101)
- DIN-rail mounting accessory (1997001110, 1997001120, 1997001130, 1997001140)
- PC/104 extension accessory (1962009830x1, 1962009840x1, 1962009850x2)

For UNO-2041CE only:

- Built in 32MB CompactFlash™ card with Microsoft Windows CE OS
- End User License Agreement for Windows CE

If any of these items are missing or damaged, contact your distributor or sales representative immediately.

1.5 Chassis Dimensions

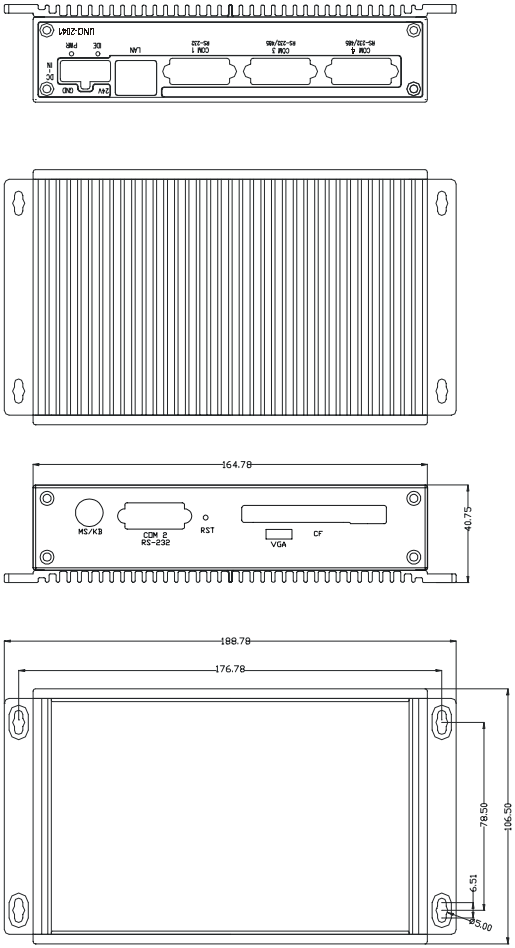


Figure 1-1: Chassis dimensions

CHAPTER 2

Hardware Functionality

This chapter shows how to set up the UNO-2041's hardware functions, including connecting peripherals, switches and indicators.

Sections include:

- UNO-2041 Peripherals
- COM1~COM4: RS-232/485 Interfaces
- LAN: Ethernet Connector
- Power Connector
- LED Indicators
- PS/2 Keyboard and Mouse Connector
- VGA: VGA Display Connector
- Compact Flash Card Slot
- RESET: Reset Button

2.1 UNO-2041 Peripherals

The following two figures show the connectors on UNO-2041. The following sections give you detail information about function of each peripheral.

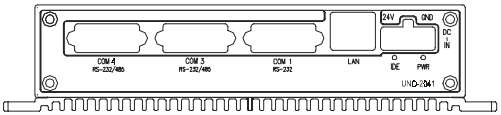


Figure 2-1: UNO-2041 front panel

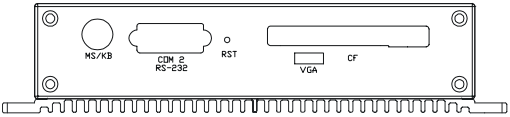


Figure 2-2: UNO-2041 rear panel

2.2 COM1~COM4: RS-232/485 Interfaces

The UNO-2041 offers four serial communication interface ports, and they are COM 1, COM 2, COM 3 and COM 4. COM1 and COM2 are standard RS-232 ports; COM3 and COM4 can be configured individually to either RS-232 or RS-485 using on-board jumpers (see Appendix A.2). Table 2-1 shows the default setting of serial ports.

Table 2-1: Serial ports default setting

COM Port	Default	Setting Address	Interrupt
COM1	RS-232	3F8	IRQ 4
COM2	RS-232	2F8	IRQ 3
COM3	RS-485	3E8	IRQ 10
COM4	RS-485	2E8	IRQ 5

Data Flow Control Function for RS-485

In RS-485 mode, UNO-2041 data flow control function has two modes: Auto Control mode and RTS Control mode by JP5/6 jumper setting. (Pls refer to Appendix A.2 for detail) RTS Control mode offers trandi-tional way to control RS-485 data flow by switching direction through RTS signal manually. Auto Control mode is advanced way to control data flow automatically to decrease progamming efforts a lot. UNO-2041 automatically senses the direction of incoming data and switches its transmission direction accordingly. Therefore no hand-shaking signal (e.g. RTS signal) is necessary. This feature lets you simply and quickly build an RS-485 network with just two wires. More importantly, application software previously written for half duplex RS-232 environments can be maintained without need for modification.

2.3 LAN: Ethernet Connector

The UNO-2041 is equipped with 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 board, and LED indicators on the front side to show its Link (Yellow LED) and Active (Green LED) status.

2.4 Power Connector

The UNO-2041 comes with a Phoenix connector that carries 10~30 V_{DC} external power input, and features reversed wiring protection. Therefore, it will not cause any damage to the system by reversed wiring of ground line and power line.

2.5 LED Indicators

There are two LEDs on the UNO-2041 front panel for indicating system status: PWR LED is for power status and IDE LED is for IDE bus status.

2.6 PS/2 Keyboard and Mouse Connector

The UNO-2041 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-2041. The UNO-2041 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 VGA: VGA Display Connector

The UNO-2041 provides a VGA controller for a high resolution VGA interface. It supports VGA, up to 1280 x 1024 @ 64 K colors and 1024 x 768 @ 16 M colors resolution and up to 4 MB share memory. The VGA interface is reserved for system testing and debugging. The UNO-2041's JP2 is a 6-pin mini connector for a VGA monitor. A VGA cable is attached to convert from a 6-pin mini connector to standard VGA connector. Pin assignments for VGA display are detailed in Appendix A.6.

2.8 Compact Flash Card Slot

UNO-2041 has two CompactFlash card slots, one is internal slot inside the chassis and the other is external slot for you to access Compact-Flash card easily. In normal situation, internal CompactFlash card is for OS (Operation System) and external CompactFlash card is for data storage and system backup. Internal CompactFlash slot uses primary IDE channel and acts as master device; external CompactFlash card slot uses secondary IDE channel which could be set as the master channel or slave device by changing the setting of JP3. (Pls see Appendix A.7 for detail)

2.9 RESET: Reset Button

Press "RESET" button will activate a reset function.

CHAPTER 3

Initial Setup

This chapter shows how to initial the UNO-2041, sections include:

Sections include:

- Insert Internal CompactFlash Card
- Install PC/104 Module
- Connect the Power
- BIOS Setup and System Assignments

3.1 Insert Internal CompactFlash Card

The procedure for installing a CompactFlash™ card into the UNO-2041 is as follows, please follows these steps carefully.

Step 1: Remove power cord.

Step 2: Unscrew four screws from the rear panel of the UNO-2041.

Step 3: Remove the rear panel.

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

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

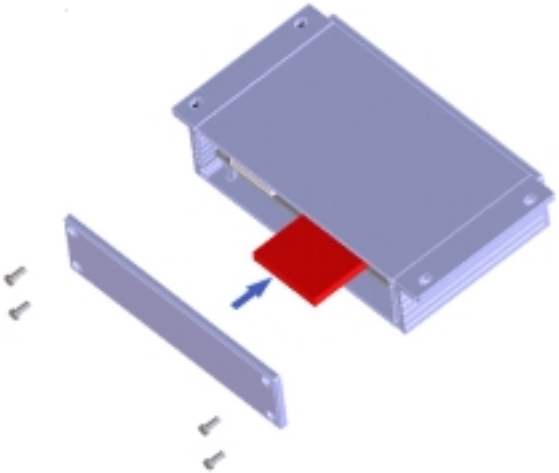


Figure 3-1: installation of on-board CompactFlash™ disk

3.2 Install PC/104 module

UNO-2041 has on-board PC/104 connector to add on external PC/104 for function extension, such as I/O, communicaton, fieldbus interface, motion control, video surveillance and so on.

The procedure for installing a PC/104 module into the UNO-2041 is as follows, please follows these steps carefully.

Step 1: Unscrew screws from the back cover of the UNO-2041.

Step 2: Remove the back cover.

Step 3: Plug a PC/104 module into the PC/104 connector.

Step 4: Screw the extension covers.

Step 5: Screw back the cover with screws.

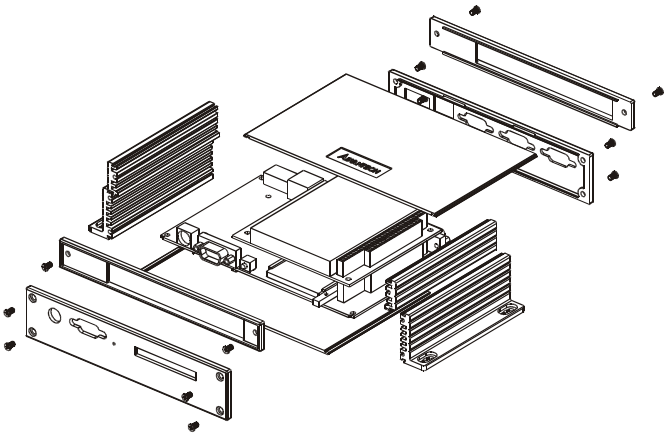


Figure 3-2: UNO-2041 PC/104 Module Installation

3.3 Connect the Power

Connect the UNO-2041 to a 10 ~ 30 V_{DC} power source. The power source can either be from a power adapter or an in-house power source.

3.4 BIOS Setup and System Assignments

UNO-2041 adopts Advantech CPC-2245 CPU module. For UNO-2041 BIOS setup and system assignments, you can refer to CPC-2245 Chapter 3 “Award BIOS Setup” and Appendix A “System Assignments” for detailed information. The CPC-2245 user’s manual is located under “Manual” folder on the CD-ROM.”

Please note that you can try to “LOAD BIOS DEFAULTS” from BIOS Setup manual if the UNO-2041 does not work properly.

APPENDIX A

Pin Assignments

This appendix gives the UNO-2041 pin assignments

- Board Connectors and Jumpers
- RS-232/485 Serial Port
- Ethernet RJ-45 Connector
- Phoenix Power Connector
- PS/2 Keyboard and Mouse Connector
- USB Connector
- VGA Display Connector
- CompactFlash™ Master/Slave Jumper Setting
- Enhanced IDE connctor (CN5)

A.1 Board Connectors and Jumpers

There are connectors and jumpers on the UNO-2041 board. The following sections tell you how to configure the UNO-2041 hardware setting. Figure A-1 and figure A-2 show the locations of UNO-2041 connectors and jumpers.

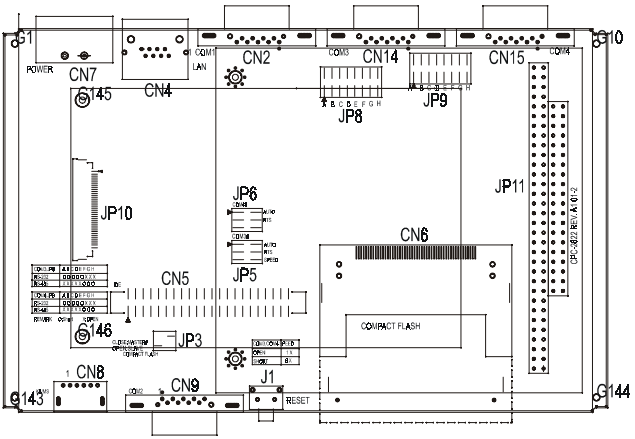


Figure A-1: UNO-2041 connector and jumper locations (Top View)

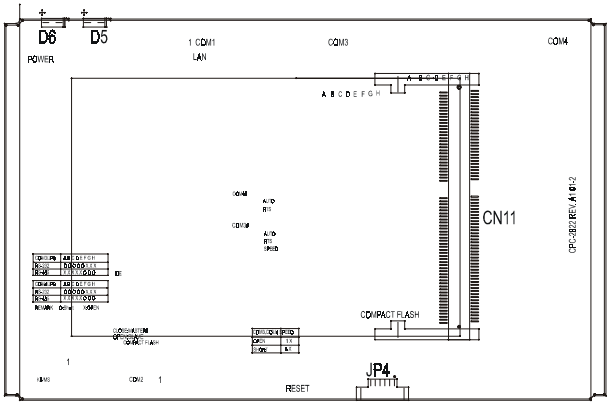


Figure A-2: UNO-2041 connector and jumper locations (Bottom View)

Table A-1: UNO-2041 connectors and jumpers

Number	Function
CN2	COM1 RS-232 serial port
CN4	Ethernet RJ-45 connector
CN5	Internal IDE connector (reserved)
CN6	External CompactFlash card slot
CN7	Phoenix power connector
CN8	PS/2 Keyboard and Mouse connector
CN9	COM2 RS-232 serial port
CN11	CPU module connector
CN14	COM3 RS-232/485 serial port
CN15	COM4 RS-232/485 serial port
J1	Reset Button
JP3	External CompactFlash IDE Secondary Master/ Slave Jumper
JP4	VGA display connector
JP5	COM3 flow control jumper
JP6	COM4 flow control jumper
JP8	COM3 RS-232/485 selection jumper
JP9	COM4 RS-232/485 selection jumper
D5	IDE LED
D6	Power LED

A.2 RS-232/485 Serial Port (CN2, CN9, CN14, CN15)

Pin Assignments

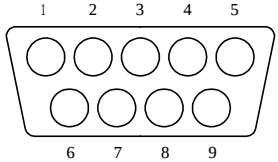


Table A-2: RS-232/485 serial port pin assignments

Pin	RS-232 Signal Name	RS-485 Signal Name
1	DCD	DATA-
2	RxD	DATA+
3	TxD	NC
4	DTR	NC
5	GND	GND
6	DSR	NC
7	RTS	NC
8	CTS	NC
9	RI	NC

Note: NC represents “No Connection.”

Terminator Resistors Setup for RS-485

The terminal resistors for impedance matching on the UNO-2041 are not installed at the factory.

The user can install the resistors with the appropriate resistances according to the UNO-2041 application. Each terminal resistor corresponds to a different channels for DATA+, DATA- lines. Usually, these resistors are needed for both ends of the communication wires and the value of the resistors should match the characteristic impedance of the wires used (approximately 120 Ohms or 300 Ohms). The TR2 and TR1 shown on Figure A-3 are prepared for COM3 and COM4 termination resistors respectively.

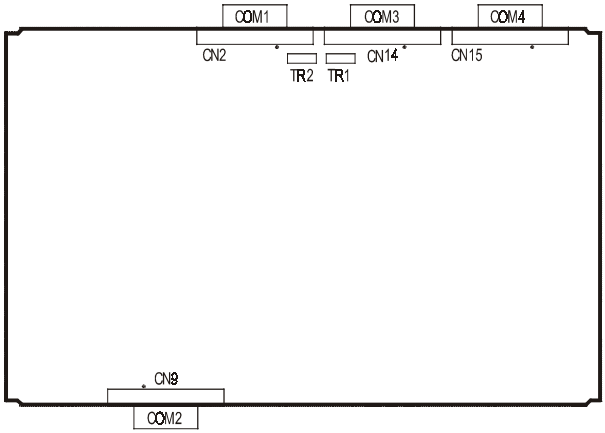


Figure A-3: COM ports terminator resistor locations

An example of the installation of COM4 is as follows:

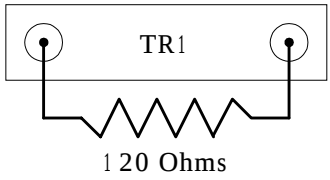


Figure A-4: Terminator resistor installation

RS-485 Signal Wiring

The RS-485 standard supports half-duplex communication. This means that just two wires are needed to both transmit and receive data. Handshaking signals (such as RTS, Request To Send) in RS-232 are normally used to control the direction of the data flow and to switch the transmission accordingly. In RS-485 mode, the UNO-2041 automatically senses the direction of the data flow and switches the transmission direction - no handshaking is necessary. This means a user can build an RS-485 network with just two wires. This RS-485 control is completely transparent to the user. The software written for half duplex RS-232 works without the need for any modification.

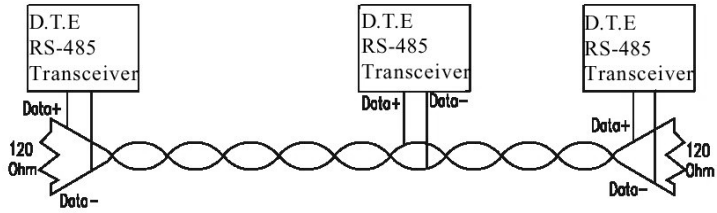


Figure A-5: RS-485 Wiring topology

RS-232/485 Selection

COM3 and COM4 support both RS-232 and RS-485 interfaces, and you can set corresponding jumpers to select serial ports as RS-232 or RS-485 interfaces shown in Table A-3.

Table A-3: Jumpers to select RS-232/485

Serial Port	Corresponding jumper to select RS-232/485
COM3	JP8
COM4	JP9

Jumper Setting for RS-232 Interface:

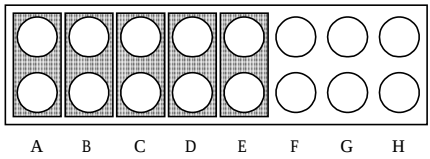


Figure A-6: RS-232 Jumper Setting

Jumper Setting for RS-485 Interface:

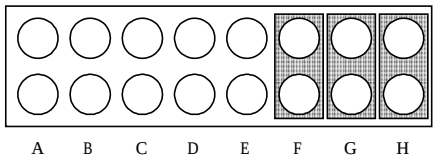
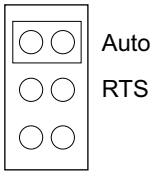


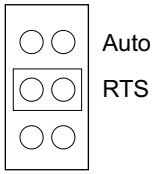
Figure A-7: RS-485 Jumper Setting

In flow control mode setting for RS-485 interface, pls follow the jumper setting below:

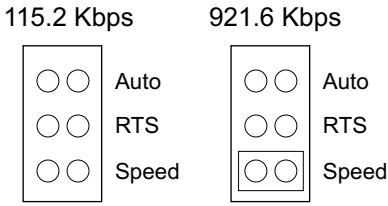
Auto Control mode (JP5/JP6):



RTS Control mode (JP5/JP6):



In JP5, you can select normal or high speed.In JP5, you can select normal or high speed.



A.3 Ethernet RJ-45 Connector (CN4)

Ethernet RJ-45 Connector Pin Assignments

Table A-4: 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.4 Phoenix Power Connector (CN7)

Phoenix Power Connector Pin Assignments

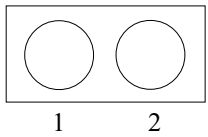


Table A-5: Phoenix power connector pin assignments

Pin	Signal Name
1	+10~30 V_{DC}
2	GND

A.5 PS/2 Keyboard and Mouse Connector (CN8)

PS/2 KB/MS Connector Pin Assignments

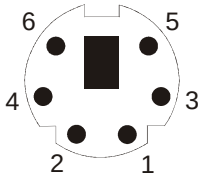


Table A-6: Keyboard and Mouse connector pin assignments

Pin	Signal Name
1	KB DATA
2	MS DATA
3	GND
4	VCC
5	KB CLOCK
6	MS CLOCK

A.6 VGA Display Connector (JP4)

VGA Display Connector Pin Assignments

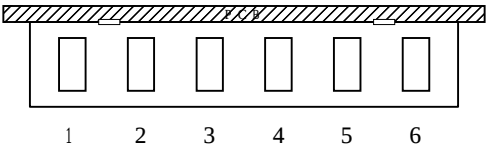


Table A-8: VGA display connector pin assignments

Pin	Signal Name
1	RED
2	H-SYNC
3	GREEN
4	V-SYNC
5	BLUE
6	GND

VGA Adaptor Cable Pin Assignments

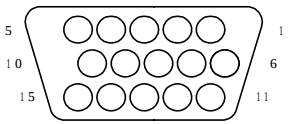


Table A-9: VGA adaptor cable pin assignments

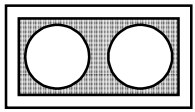
Pin	Signal Name	Pin	Signal Name
1	RED	9	NC
2	GREEN	10	GND
3	BLUE	11	NC
4	NC	12	NC
5	GND	13	H-SYNC
6	GND	14	V-SYNC
7	GND	15	NC
8	GND		

A.7 External CompactFlash™ Master/Slave Jumper Setting (JP3)

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

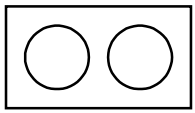
Master Device: (Default)

JP3



Slave Device:

JP3



UNO-2041 has one internal CompactFlash card slot and one external CompactFlash card slot. Internal CompactFlash card slot supports CompactFlash type I (3mm thick) ~~and~~ only and External CompactFlash card slot supports both Type I and type II (5mm thick) cards

A 32 MB CompactFlash card is equipped in the UNO-2041CE with Windows CE .NET OS. For UNO-2041, there is no CompactFlash card on the slot. UNO-2041 also supports IBM Microdrive storage device, which is an ultra-miniature hard disk from IBM that was introduced in 1998. The Microdrive is built into a Type II CompactFlash form factor.

A.8 Enhanced IDE connctor (CN5)

Table A-10: IDE hard drive connector

Pin	Signal Name	Pin	Signal Name
1	IDE RESET	2	GND
3	DATA 7 (*2)	4	DATA 8 (*2)
5	DATA 6 (*2)	6	DATA 9 (*2)
7	DATA 5 (*2)	8	DATA 10 (*2)
9	DATA 4 (*2)	10	DATA 11 (*2)
11	DATA 3 (*2)	12	DATA 12 (*2)
13	DATA 2 (*2)	14	DATA 13 (*2)
15	DATA 1 (*2)	16	DATA 14 (*2)
17	DATA 0 (*2)	18	DATA 15 (*2)
19	SIGNAL GND	20	N/C
21	DMA REQUEST	22	GND
23	IO WRITE (*2)	24	GND
25	IO READ (*2)	26	GND
27	IO CHANNEL READY	28	GND (*1)
29	HDACK	30	GND
31	IRQ	32	N/C
33	ADDR 1	34	N/C
35	ADDR 0	36	ADDR 2
37	HARD DISK SELECT 0 (*2)	38	HARD DISK SELECT 1 (*2)
39	IDE ACTIVE	40	GND
41	VCC	42	VCC
43	GND	44	N/C

UNO-2041 external CompactFlash card slot and Enhanced IDE connector use Secondary IDE channel.

Users can attach two IDE devices to the IDE channel, one drive must be set as the master and another as the slave. You can set external CompactFlash card as master or slave by JP3 and set the device connected on Enhanced IDE connector by the jumper on it. Refer to the documentation that came with your drive for more information. For HDD drive, its jumper diagram usually appears on the top side of it.

APPENDIX B

System Assignments

This appendix contains information of a detailed or specialized nature. It includes:

- System I/O ports
- DMA channel assignments
- Interrupt assignments
- 1st MB memory map

B.1 System I/O ports

Table B-1: System I/O ports

Addr. range (Hex)	Device
000-01F	DMA controller
020-021	Interrupt controller 1, master
022-023	Chipset address
040-05F	8254 timer
060-06F	8042 (keyboard controller)
070-07F	Real-time clock, non-maskable interrupt (NMI) mask
080-09F	DMA page register,
0A0-0BF	Interrupt controller 2
0C0-0DF	DMA controller
0F0	Clear math co-processor
0F1	Reset math co-processor
0F8-0FF	Math co-processor
1F0-1F8	Fixed disk
200-207	Game I/O
278-27F	Parallel printer port 2 (LPT 3)
2E8-2FF	serial port4
2F8-2FF	Serial port 2
300-31F	Prototype card
360-36F	Reserved
378-37F	Parallel printer port 1 (LPT 2)
380-38F	SDLC, bisynchronous 2
3A0-3AF	Bisynchronous 1
3B0-3BF	Monochrome display and printer adapter (LPT1)
3C0-3CF	Reserved
3D0-3DF	Color/graphics monitor adapter
3E8-3FF	serial port3
3F0-3F7	Diskette controller
3F8-3FF	Serial port 1

B.2 DMA channel assignments

Table B-2: DMA channel assignments

Channel	Function
0	Available
1	Available
2	Floppy disk (8-bit transfer)
3	Available
4	Cascade for DMA controller 1
5	Available
6	Available
7	Available

B.3 Interrupt assignments

Table B-3: Interrupt assignments

Interrupt#	Interrupt source
IRQ 0	interval timer
IRQ 1	Keyboard
IRQ 2	Interrupt from controller 2 (cascade)
IRQ 8	Real-time clock
IRQ 12	PS/2 mouse (non-releasable)
IRQ 13	INT from co-processor
IRQ 14	Fixed disk controller (Primary)
IRQ 15	Fixed disk controller (Secondary)
IRQ 3	Serial communication port 2
IRQ 4	Serial communication port 1
IRQ 10	serial communication port 3
IRQ 5	serial communication port 4

Note: The Ethernet function is auto-sensing.

B.4 1st MB memory map

Table B-4: 1st MB memory map

Addr. range (Hex)	Device
F000h - FFFFh	System ROM
C800h - EFFFh	System ROM
C000h - C7FFh	Expansion ROM
B800h - BFFFh	CGA/EGA/VGA text
B000h - B7FFh	Unused
A000h - AFFFh	EGA/VGA graphics
0000h - 9FFFh	Base memory