

ARK-1350

**GX1-300 with Four Serial Ports
PC Card, LAN, 2 x USB, Ultra
Compact, Fanless, Embedded
Box Computer**

User Manual

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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. 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

Note: 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.

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- 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

Document Feedback

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Safety Instructions

1. Read these safety instructions carefully.
2. Keep this User's Manual for later reference.
3. Disconnect this equipment from any AC outlet before cleaning. Use a damp cloth. Do not use liquid or spray detergents for cleaning.
4. For plug-in equipment, the power outlet socket must be located near the equipment and must be easily accessible.
5. Keep this equipment away from humidity.
6. Put this equipment on a reliable surface during installation. Dropping it or letting it fall may cause damage.
7. The openings on the enclosure are for air convection. Protect the equipment from overheating. **DO NOT COVER THE OPENINGS.**
8. Make sure the voltage of the power source is correct before connecting the equipment to the power outlet.
9. Position the power cord so that people cannot step on it. Do not place anything over the power cord.
10. All cautions and warnings on the equipment should be noted.
11. If the equipment is not used for a long time, disconnect it from the power source to avoid damage by transient overvoltage.
12. Never pour any liquid into an opening. This may cause fire or electrical shock.
13. Never open the equipment. For safety reasons, the equipment should be opened only by qualified service personnel.
14. If one of the following situations arises, get the equipment checked by service personnel:
 - a. The power cord or plug is damaged.
 - b. Liquid has penetrated into the equipment.
 - c. The equipment has been exposed to moisture.
 - d. The equipment does not work well, or you cannot get it to work according to the user's manual.
 - e. The equipment has been dropped and damaged.
 - f. The equipment has obvious signs of breakage.
15. **DO NOT LEAVE THIS EQUIPMENT IN AN ENVIRONMENT WHERE THE STORAGE TEMPERATURE MAY GO BELOW -**

20° C (-4° F) OR ABOVE 60° C (140° F). THIS COULD DAMAGE THE EQUIPMENT. THE EQUIPMENT SHOULD BE IN A CONTROLLED ENVIRONMENT.

16. CAUTION: DANGER OF EXPLOSION IF BATTERY IS INCORRECTLY REPLACED. REPLACE ONLY WITH THE SAME OR EQUIVALENT TYPE RECOMMENDED BY THE MANUFACTURER, DISCARD USED BATTERIES ACCORDING TO THE MANUFACTURER'S INSTRUCTIONS.

The sound pressure level at the operator's position according to IEC 704-1:1982 is no more than 70 dB (A).

DISCLAIMER: This set of instructions is given according to IEC 704-1. Advantech disclaims all responsibility for the accuracy of any statements contained herein.

Wichtige Sicherheitshinweise

1. Bitte lesen Sie sich diese Hinweise sorgfältig durch.
2. Heben Sie diese Anleitung für den späteren Gebrauch auf.
3. Vor jedem Reinigen ist das Gerät vom Stromnetz zu trennen. Verwenden Sie keine flüssigen- oder Aerosolreiniger. Am besten dient ein angefeuchtetes Tuch zur Reinigung.
4. Die Netzanschlusssteckdose soll nahe dem Gerät angebracht und leicht zugänglich sein.
5. Das Gerät ist vor Feuchtigkeit zu schützen.
6. Bei der Aufstellung des Gerätes ist auf sicheren Stand zu achten. Ein Kippen oder Fallen könnte Verletzungen hervorrufen.
7. Die Belüftungsöffnungen dienen zur Luftzirkulation, die das Gerät vor Überhitzung schützt. Sorgen Sie dafür, dass diese Öffnungen nicht abgedeckt werden.
8. Beachten Sie beim Anschluss an das Stromnetz die Anschlusswerte.
9. Verlegen Sie die Netzanschlussleitung so, dass niemand darüber fallen kann. Es sollte auch nichts auf der Leitung abgestellt werden.
10. Alle Hinweise und Warnungen, die sich an den Geräten befinden, sind zu beachten.
11. Wird das Gerät über einen längeren Zeitraum nicht benutzt, sollten Sie es vom Stromnetz trennen. Somit wird im Falle einer Überspannung eine Beschädigung vermieden.
12. Durch die Lüftungsöffnungen dürfen niemals Gegenstände oder Flüssigkeiten in das Gerät gelangen. Dies könnte einen Brand bzw. elektrischen Schlag auslösen.
13. Öffnen Sie niemals das Gerät. Das Gerät darf aus Gründen der elektrischen Sicherheit nur von autorisiertem Servicepersonal geöffnet werden.
14. Wenn folgende Situationen auftreten, ist das Gerät vom Stromnetz zu trennen und von einer qualifizierten Servicestelle zu überprüfen:
 - a - Netzkabel oder Netzstecker sind beschädigt.
 - b - Flüssigkeit ist in das Gerät eingedrungen.
 - c - Das Gerät war Feuchtigkeit ausgesetzt.

d - Wenn das Gerät nicht der Bedienungsanleitung entsprechend funktioniert oder Sie mit Hilfe dieser Anleitung keine Verbesserung erzielen.

e - Das Gerät ist gefallen und/oder das Gehäuse ist beschädigt.

f - Wenn das Gerät deutliche Anzeichen eines Defektes aufweist.

15. **VORSICHT:** Explosionsgefahr bei unsachgemäßen Austausch der Batterie. Ersatz nur durch denselben oder einem vom Hersteller empfohlene-mähnlichen Typ. Entsorgung gebrauchter Batterien nach Angaben des Herstellers.

16. **ACHTUNG:** Es besteht die Explosionsgefahr, falls die Batterie auf nicht fach-männische Weise gewechselt wird. Verfangen Sie die Batterie nur gleicher oder entsprechender Type, wie vom Hersteller empfohlen. Entsorgen Sie Batterien nach Anweisung des Herstellers.

Der arbeitsplatzbezogene Schalldruckpegel nach DIN 45 635 Teil 1000 beträgt 70dB(A) oder weiger.

Haftungsausschluss: Die Bedienungsanleitungen wurden entsprechend der IEC-704-1 erstellt. Advantech lehnt jegliche Verantwortung für die Richtigkeit der in diesem Zusammenhang getätigten Aussagen ab.

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	Overview	2
1.1	Introduction	2
1.2	Features	2
1.2.1	Comprehensive Communication and Control Capacity	2
1.2.2	Ultra Compact Size with Fanless Operation	2
1.2.3	Optimized Integration in a Robust Casting Construction	2
1.3	Hardware Specifications	3
1.4	Safety Precautions	4
1.5	ARK-1350 Series Model	5
1.6	Chassis Dimensions	6
	Figure 1.1:Chassis dimensions	6
Chapter 2	ARK-1350 Peripherals.....	8
	Figure 2.1:ARK-1350 rear panel	8
	Figure 2.2:ARK-1350 front panel	8
2.1	COM1~COM2: RS-232/485 Interfaces	9
	Table 2.1:COM1 and COM2 ports default setting	9
2.2	COM3~COM4: RS-232/422/485 Interfaces	9
	Table 2.2:COM3 and COM4 ports default setting	9
2.2.1	- 16C954 UARTs with 128-byte standard	9
2.2.2	Jumpless for RS-422/485	9
2.2.3	Automatic Data Flow Control Function for RS-485	9
2.2.4	IRQ and Address Setting	10
2.3	LAN: Ethernet Connector	10
2.4	Power Connector	10
2.5	LED Indicators	10
2.6	PS/2 Keyboard and Mouse Connector	10
2.7	USB1 & USB2: Universal Serial Bus connectors.....	10
2.8	PCMCIA: PC Card Slot	11
2.9	VGA: VGA Display Connector	11
2.10	Programmable LED and Buzzer for System Diagnosis	11
	Table 2.3:LED and Buzzer control register bit map	12
	Table 2.4:Programmable LED control bit	12
	Table 2.5:Programmable buzzer control bit	12
2.11	RESET: Reset Button.....	12
Chapter 3	Initial Setup.....	14
3.1	Insert CompactFlash Card	14
3.2	Chassis Grounding	14
	Figure 3.1:Chassis Grounding connection	14
3.3	Connect the Power	15
3.4	BIOS Setup and System Assignments	15
Appendix A	Board Connectors and Jumpers	18
	Figure A.1:ARK-1350 Connector and jumper locations	

		(Top View) 18	
		Figure A.2:ARK-1350 connector and jumper locations	
		(Bottom View) 18	
		Table A.1:ARK-1350 connectors and jumpers	19
A.1	RS-232/485 Serial Port (CN14~CN15).....		20
		Table A.2:RS-232/485 serial port pin assignments	20
A.1.1	Terminator Resistors Setup for RS-485		20
		Figure A.3:COM ports terminator resistor locations	21
		Figure A.4:Terminator resistor installation	21
A.1.2	RS-485 Signal Wiring		21
		Figure A.5:RS-485 Wiring topology	22
A.1.3	RS-232/485 Selection		22
		Table A.3:Jumpers to select RS-232/485	22
		Figure A.6:RS-232 Jumper Setting	22
		Figure A.7:RS-485 Jumper Setting	22
A.2	RS-232/422/485 Serial Port (CN16~CN17)		23
		Table A.4:RS-232/422/485 serial port pin assignments ..	23
A.2.1	Terminator Resistors Setup for RS-422/485		23
		Figure A.8:COM 3 ~ COM4 ports terminator resistor lo-	
		cations 24	
		Table A.5:RS-422 terminal resistor setting (COM3/	
		COM4) 24	
		Table A.6:RS-485 terminal resistor setting (COM3/	
		COM4) 24	
		Figure A.9:Terminator installation	24
A.2.2	RS-232/422/485 Selection		25
		Table A.7: Jumpers RS-232/422/485 Serial Port	
		(COM3~COM4) 25	
		Figure A.10:RS-422/485 jumper setting	25
		Figure A.11:RS-232 jumper setting	25
A.2.3	RS-485 Auto Flow Control Mode and RS-422 Master/		
	Slave Mode Selection 25		
		Table A.8:RS-485 auto flow control mode and RS-422	
		master/slave mode selection 26	
A.3	Ethernet RJ-45 Connector (LAN1)		26
		Table A.9:Ethernet RJ-45 connector pin assignments ..	26
A.4	Phoenix Power Connector (CN4).....		27
		Table A.10:Phoenix power connector pin assignments ...	27
A.5	PS/2 Keyboard and Mouse Connector (CN9).....		27
		Table A.11:Keyboard and Mouse connector pin assign-	
		ments 27	
A.6	USB Connector (CN12, CN13).....		28
		Table A.12:USB connector pin assignments	28
A.7	VGA Display Connector (JP8).....		28
		Table A.13:VGA display connector pin assignments ..	28
		Table A.14:VGA adaptor cable pin assignments	29
A.8	CompactFlash Master/Slave Jumper Setting (JP1)		30
A.9	Enhanced IDE connector (CN2)		30

Overview

This chapter gives background information on the ARK-1350. It shows you the ARK-1350 overview and specifications.

Sections include:

- Introduction
- Hardware Specifications
- Safety Precautions
- ARK-1350 Series
- Chassis Dimension

Chapter 1 Overview

1.1 Introduction

The ARK-1350 is an ultra compact, fanless fully sealed robust embedded box computer designed for space critical application that require low power consumption. All electronics are protected in a ruggedized, sealed housing. No external cooling is needed. Featuring one LAN, two USB, and four Serial communication ports; as well as PC card interfaces, that bring comprehensive control and communication capability to fulfill diverse application requirements. Therefore, the ARK-1350 is an ideal solution for stand-alone and embedded gateway applications.

1.2 Features

1.2.1 Comprehensive Communication and Control Capacity

Rich communication interface: Ethernet, four Serial Ports, dual USB and a PC card slot make the ARK-1350 an ideal solution for diverse applications:

- Data communication gateway for navigation and transportation
- POI/Kiosk control, self-service of entrance control, ticketing, payment and information preview system

1.2.2 Ultra Compact Size with Fanless Operation

- Small dimensions: 188.8 x 106.5 x 35.5 mm (7.5" × 4.2" × 1.4")
- Fanless operation in an aluminum sealed construction
- Supports desktop/wall/Din-Rail mounting under space critical installation conditions

1.2.3 Optimized Integration in a Robust Casting Construction

- Few parts, zero cables, easy integration, easy maintenance, to reduce investment
- System is “Ready-to-Run” as supplied
- Accept wide range of DC power input from DC 9 V ~ DC 30 V

1.3 Hardware Specifications

CPU: AMD Geode GX1-300 MHz

Chipset: AMD CS5530A

BIOS: AWARD 256 KB FLASH BIOS RAM: 128 MB SDRAM on board

VGA: Supports VGA and VESA

- Display memory: 1 ~ 4 MB shared memory, set in BIOS
- CRT display mode: Non-interlaced CRT monitors resolutions up to 1280 x 1024 @ 256 colors or 1024 x 768 @ 16 bpp
- DB-15 and Mini 6-pin VGA connector

Serial Port: Two RS-232/485 ports (COM1 and COM2)

Two RS-232/422/485 ports (COM3 and COM4)

- Controller: Oxford OX16PCI954 UARTs with 128 bytes FIFOs
- IRQ: All ports use the same IRQ assigned by BIOS
- Space reserved for termination resistors
- Automatic RS-485 data flow control
- RS-422/485 surge protection up to 2,000 VDC
- Data bits: 5, 6, 7, 8
- Stop bits: 1, 1.5, 2
- Parity: none, even, odd
- RS-232 speed: 50 ~ 230.4 Kbps
- RS-422/485 speed: 50 ~ 921.6Kbps
- RS-232 data signals: TxD, RxD, RTS, CTS, DTR, DSR, DCD, RI, GND
- RS-422 data signals: TxD+, TxD-, RxD+, RxD-, GND
- RS-485 data signal: DATA+, DATA-, GND
- RS-232 max data distance: 50 feet (15.2 meters)
- RS-422/485 max data distance: 4000 feet (1220 meters)

USB interface: Two USB ports, USB OpenHCI, Rev. 1.0 compliant

Ethernet Port: One 10/100Base-T Ethernet

- LAN chip: Realtek 8139C chipset supports

- LED on the front side

PC Card: One PC Card slot

- Supports CardBus (Card-32) Card and 16-bit (PCMCIA 2.1/JEIDA4.2) Card

- Supports +5 V, +3.3 V and +12 V @ 120mA working power

SSD: One Type I / Type II CompactFlash TM card slot inside the chassis

LED: One power LED, one IDE LED, one programmable LED and one programmable buzzer

Keyboard/Mouse connector: Mini-DIN connector supports PS/2 keyboard and a PS/2 mouse

Power supply voltage: 9 ~ 36 V

DC , reversed wiring protection

Power Consumption: 0.6A max under +24V power input or 1.2A max. under +12V power input

Power Requirement: 1A 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: 164.8 mm (W) x 106.5 mm (L) x 35.5 mm (H) (6.5" x 4.2" x 1.4")

Weight: 0.8 kg

1.4 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 ARK-1350. 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.*

1.5 ARK-1350 Series Model

There are three sub-models in ARK-1350 series listed below:

Part Number	Description
ARK-1350-1G0A1	AMD GX1-300 MHz Embedded Box Computer with Card Bus slot, 1 x LAN, 2 x USB, 4 x COM and 128 MB SDRAM
ARK-1350-2G0A1	AMD GX1-300 MHz Embedded Box Computer with Card Bus slot, 1 x LAN, 2 x USB, 4 x COM, 128 MB SDRAM, and 128 MB Compact Flash Disk pre-installed with Windows CE.NET 5.0 Professional Plus

Packing List

- 1 x ARK-1350 Unit
- 1 x DIN-Rail Mounting Kit
- 1 x PS2 Keyboard/Mouse Cable
- 1 x 6-pin to D-Sub 15-Pin 10cm VGA Cable
- 1 x Driver Utility CD

For ARK-1350-2G0A1 only:

- Built in 128MB CompactFlash card with Microsoft Windows CE.NET 5.0 Professional Plus
- End User License Agreement for Windows CE .NET

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

1.6 Chassis Dimensions

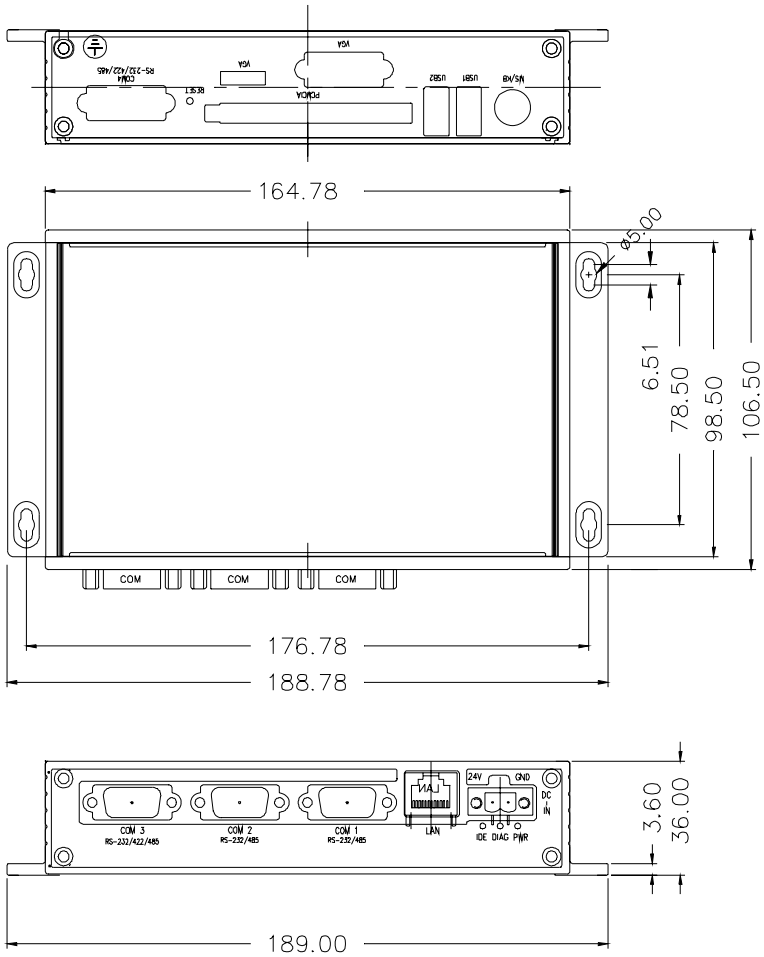


Figure 1.1: Chassis dimensions

Hardware Functionality

This chapter shows how to set up the ARK-1350's hardware functions, including connecting peripherals, switches and indicators.

Sections include:

- ARK-1350 Peripherals
- COM1~COM2: RS-232/485 Interfaces
- COM3~COM4: RS-232/422/485 Interfaces
- LAN: Ethernet Connector
- Power Connector
- LED Indicators
- PS/2 Keyboard and Mouse Connector
- USB1 & USB2: Universal Serial Bus connectors
- PCMCIA: PC Card Slot
- VGA: VGA Display Connector
- Programmable LED and Buzzer for
- System Diagnosis
- RESET: Reset Button

Chapter 2 ARK-1350 Peripherals

The following two figures show the connectors on ARK-1350. The following sections give you detailed information about functions of each peripheral.

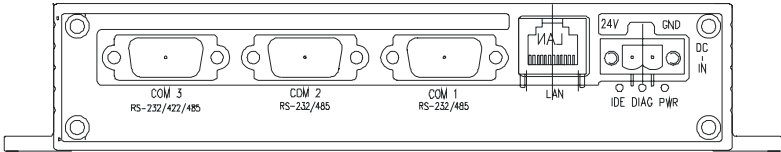


Figure 2.1: ARK-1350 rear panel

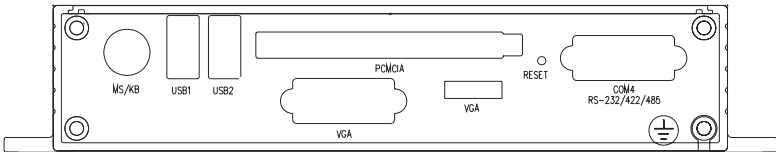


Figure 2.2: ARK-1350 front panel

2.1 COM1~COM2: RS-232/485 Interfaces

The ARK-1350 offers two RS-232/485 serial communication interface ports, they are COM1 and COM2. Each port can be configured individually to either RS-232 or RS-485 using onboard jumpers (see Appendix A.2), and Table 2-1 lists the default setting of serial ports.

Table 2.1: COM1 and COM2 ports default setting

COM Port	Default Setting
COM1	RS-232
COM2	RS-232

2.2 COM3~COM4: RS-232/422/485 Interfaces

The ARK-1350 offers two RS-232/422/485 serial communication interface port, they are COM3 and COM4. Each port can be configured individually to either RS-232, RS422/485 by using onboard jumpers. (See Appendix A.3) and Table 2-2 lists the default setting of each port.

Table 2.2: COM3 and COM4 ports default setting

COM Port	Default Setting
COM3	RS-422/485
COM4	RS-422/485

2.2.1 - 16C954 UARTs with 128-byte standard

Advantech ARK-1350 comes standard with Oxford OX16PCI964 UARTs containing 128 bytes FIFOs. These upgraded FIFOs greatly reduce CPU overhead and are an ideal choice for heavy multitasking environments.

2.2.2 Jumpless for RS-422/485

In RS-422/485 mode, ARK-1350 automatically senses signals to match RS-422 or RS-485 networks.

2.2.3 Automatic Data Flow Control Function for RS-485

In RS-485 mode, ARK-1350 automatically senses the direction of incoming data and switches its transmission direction accordingly. Therefore no handshaking 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.

2.2.4 IRQ and Address Setting

The IRQ and I/O address range are both assigned by BIOS, and four serial ports use the same IRQ.

2.3 LAN: Ethernet Connector

The ARK-1350 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 ARK-1350 comes with a Phoenix connector that carries 9~36 VDC 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 three LEDs on the ARK-1350 rear panel for indicating system status: PWR LED is for power status, DIAG LED is programmable by users and IDE LED is for IDE bus status.

2.6 PS/2 Keyboard and Mouse Connector

The ARK-1350 provides a PS/2 keyboard and PS/2 mouse connector. A 6-pin mini-DIN connector is located on the front panel of the ARK-1350. The ARK-1350 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.6 for its pin assignments.

2.7 USB1 & USB2: Universal Serial Bus connectors

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 ARK-1350 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 specification OpenHCI, Rev. 1.0. The USB interface can be disabled in the system BIOS setup. Please refer to Appendix A.7 for its pin assignments.

2.8 PCMCIA: PC Card Slot

The ARK-1350 provides one PC Card slot that supports CardBus (Card-32) Card and 16-bit (PCMCIA 2.1/JEIDA 4.2) Card standard. It supports +3.3 V, +5 V and +12 V @ 120 mA working voltage. PC Card is a 85.6 mm long by 54 mm wide (3.37" x 2.126") sized, 68-pin connector used and removable module standardized by PCMCIA that is known as "PCMCIA card." PCMCIA interrupt assignment is IRQ 9.

2.9 VGA: VGA Display Connector

The ARK-1350 provides a VGA controller 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 4 MB shared memory. The VGA interface is reserved for system testing and debugging. The ARK-1350'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 standard VGA connector. You can choose one of the VGA interfaces for system testing and debugging. Pin assignments for VGA display are detailed in Appendix A.8.

2.10 Programmable LED and Buzzer for System Diagnosis

In headless applications (an application without monitor display), it is always a big problem to know the system status. Another PC may be needed to monitor headless device status via RS-232 or Ethernet. In order to solve this problem, ARK-1350 offers a programmable LED indicator and buzzer. Hence, they can be programmed to show a system's status by LED indicator flickering and buzzer alarm.

Table 2.3: LED and Buzzer control register bit map

LED Control Register				
Base+62H	R/W	LEDS1	LEDS0	LEDEn
Buzzer Control Register				
Base+63H	R/W	SPKS1	SPKS0	SPKEn

LED and Buzzer Control Register

LEDEn: Enable LED flickering

LEDS0 and LEDS1: LED flickering speed setting bit

SPKEn: Enable buzzer alarming

SPKS0 & SPKS1: Buzzer alarming setting bit

Table 2.4: Programmable LED control bit

LED flickering status	LEDS1	LEDS0
Light on	0	0
Fast flicker	0	1
Normal flicker	1	0
Short flicker	1	1

Table 2.5: Programmable buzzer control bit

Buzzer alarming	SPKS1	SPKS0
Beep on	0	0
Short beep	0	1
Normal beep	1	0
Long beep	1	1

2.11 RESET: Reset Button

Press “RESET” button will activate a reset function.

Initial Setup

This chapter shows how to initial the ARK-1350

Sections include:

- Insert CompactFlash Card
- Chassis grounding
- Connect the Power
- BIOS Setup and System Assignments

Chapter 3 Initial Setup

3.1 Insert CompactFlash Card

The procedure for installing a CompactFlash card into the ARK-1350 is as follows, please follow these steps carefully.

Step 1: Remove power cord.

Step 2: Unscrew four screws from the front panel of the ARK-1350.

Step 3: Remove the front panel.

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

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

3.2 Chassis Grounding

The ARK-1350 housing is aluminum material that provides good EMI protection and a stable system grounding base. There is an easy-to-connect chassis grounding point for you to connect to the "Earth." Users can select if connecting power grounding with chassis grounding through onboard jumper selection.

Please connect chassis ground of ARK-1350 with "EARTH" as GROUND.

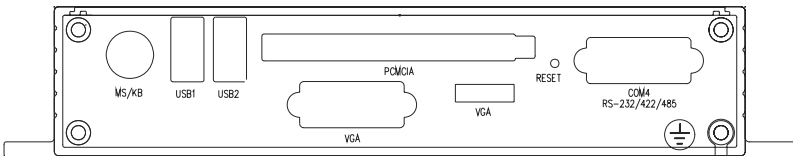
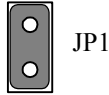


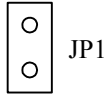
Figure 3.1: Chassis Grounding connection

ARK-1350 has an onboard jumper JP1 to select if connecting chassis ground with system's power ground.

Connecting chassis ground with system power ground: (Default)



Not connecting chassis ground with system power ground:



3.3 Connect the Power

Connect the ARK-1350 to a 9~36 VDC 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

ARK-1350 adopts Advantech SOM-2353 CPU module. For ARK-1350 BIOS setup and system assignments, you can refer to SOM-2353 Chapter 4 “Award BIOS Setup” and Appendix A “System Assignments” for detailed information. The SOM-2353 user manual is located in the “Manual” folder on the CD-ROM.”

Please note that you can try to “LOAD BIOS DEFAULTS” from BIOS Setup manual if the ARK-1350 does not work properly.

Pin Assignments

This appendix gives the ARK-1350 pin assignments.

Sections include:

- Board Connectors and Jumpers
- RS-232/422/485 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 connector (CN1)

Appendix A Board Connectors and Jumpers

There are connectors and jumpers on the ARK-1350 board. The following sections tell you how to configure the ARK-1350 hardware setting. Figure A-1 and figure A-2 show the locations of ARK-1350 connectors and jumpers.

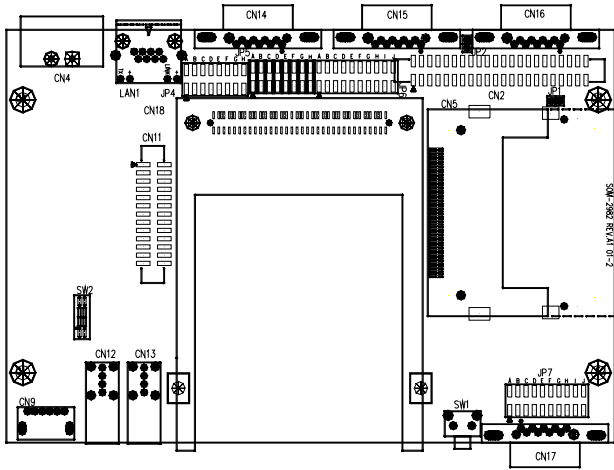


Figure A.1: ARK-1350 Connector and jumper locations (Top View)

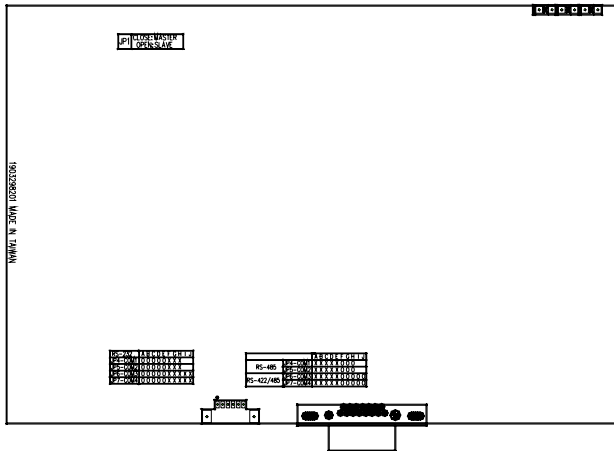


Figure A.2: ARK-1350 connector and jumper locations (Bottom View)

Table A.1: ARK-1350 connectors and jumpers

C N 2	Internal IDE connector
C N 4	Phoenix power connector
C N 5	Internal CompactFlash card slot
C N 7	VGA DB15 display connector
C N 9	PS/2 keyboard and mouse connector
CN11	Parallel port (reserved)
CN12	USB1 connector
CN13	USB2 connector
CN14	COM1 RS-232/485 serial port
CN15	COM2 RS-232/485 serial port
CN16	COM3 RS-232/422/485 serial port
CN17	COM4 RS-232/422/485 serial port
CN18	PC Card slot
D6	IDE LED
D7	Power LED
D 1 6	Programmable LED
SW1	Reset button
JP1	CompactFlash IDE Primary Master/Slave jumper
JP2	System grounding jumper
JP4	COM1 RS-232/485 selection
JP5	COM2 RS-232/485 selection
JP6	COM3 RS-232/422/485 selection
JP7	COM4 RS-232/422/485 selection
JP8	6-pin mini VGA display connector

A.1 RS-232/485 Serial Port (CN14~CN15)

Pin Assignments

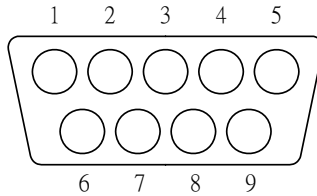


Table A.2: RS-232/485 serial port pin assignments

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."

A.1.1 Terminator Resistors Setup for RS-485

The terminal resistors for impedance matching on the ARK-1350 are not installed at the factory.

The user can install the resistors with the appropriate resistances according to the ARK-1350 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 Ω or 300 Ω). The TR1 and TR2 shown on Figure A-3 are prepared for COM1 and COM2 termination resistors respectively.

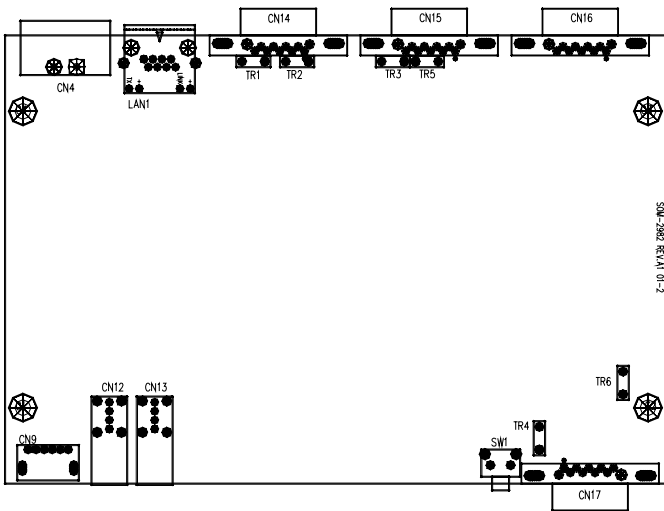


Figure A.3: COM ports terminator resistor locations

An example of the installation of COM1 is as follows:

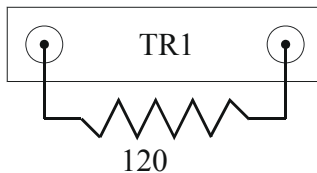


Figure A.4: Terminator resistor installation

A.1.2 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 ARK-1350 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.

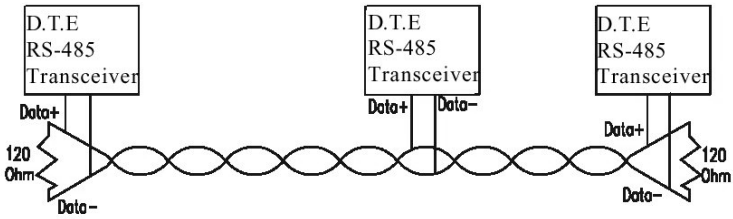


Figure A.5: RS-485 Wiring topology

A.1.3 RS-232/485 Selection

COM1 and COM2 all support 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
COM1	JP4
COM2	JP5

Jumper Setting for RS-232 interface: (Default setting)

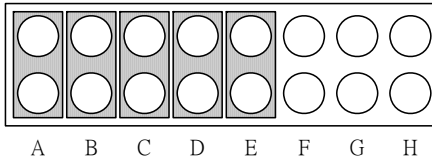


Figure A.6: RS-232 Jumper Setting

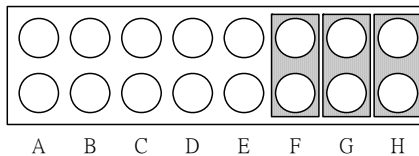


Figure A.7: RS-485 Jumper Setting

A.2 RS-232/422/485 Serial Port (CN16~CN17)

Pin assignments

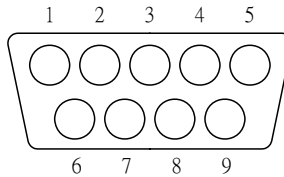


Table A.4: RS-232/422/485 serial port pin assignments

Pin	RS-232	RS-422	RS-485
1	DCD	Tx-	DATA-
2	RxD	Tx+	DATA+
3	TxD	Rx+	NC
4	DTR	Rx-	NC
5	GND	GND	GND
6	D S R	NC	NC
7	RTS	NC	NC
8	CTS	NC	NC
9	RI	NC	NC

Note: NC represents "No Connection"

A.2.1 Terminator Resistors Setup for RS-422/485

The terminal resistors for impedance matching on the ARK-1350 are not installed at the factory.

The user can install the resistors with the appropriate resistances according to the ARK-1350 application. Each terminal resistor corresponds to different channels for RS-422/485 signal 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 or 300).

The TR3, TR4, TR5 and TR6 shown on Figure A- are prepared for COM3 and COM4 termination resistors respectively.

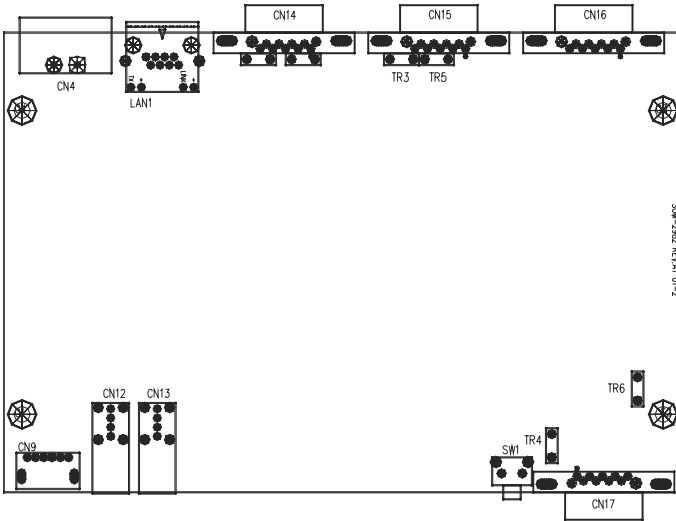


Figure A.8: COM 3 ~ COM4 ports terminator resistor locations

Table A.5: RS-422 terminal resistor setting (COM3/COM4)

Serial Port	Terminal resistor
COM3	TR3 (Tx+, Tx-)
COM3	TR5 (Rx+, Rx-)
COM4	TR4 (Tx+, Tx-)
COM4	TR6 (Rx+, Rx-)

Table A.6: RS-485 terminal resistor setting (COM3/COM4)

Serial Port	Terminal resistor
COM3	TR3 (Data+, Data-)
COM4	TR4 (Data+, Data-)

An example of the installation of COM3 is as follows:

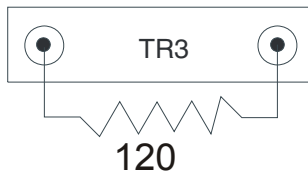


Figure A.9: Terminator installation

A.2.2 RS-232/422/485 Selection

COM3 and COM4 support 9-wire RS-232, RS-422 or RS-485 interfaces, and you can set corresponding jumpers to select serial ports as RS-232 or RS-422/485 interfaces shown in Table A-7. The system detects RS-422 or RS-485 signals automatically in RS-422/

485 mode.

Table A.7: Jumpers RS-232/422/485 Serial Port (COM3~COM4)

Serial Port	Corresponding jumper to select RS-232/422/485
COM3	JP6
COM4	JP7

Jumper setting for RS-422/485 interface: (Default setting)

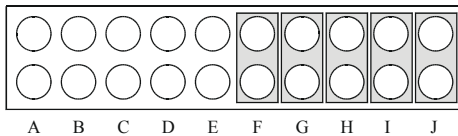


Figure A.10: RS-422/485 jumper setting

Jumper setting for RS-232 interfaces:

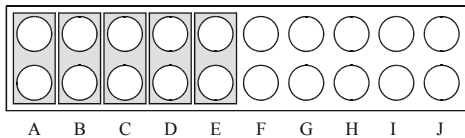
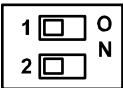
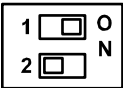
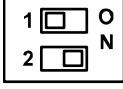
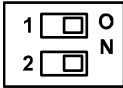
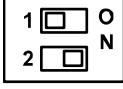
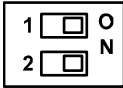
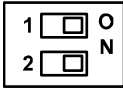


Figure A.11: RS-232 jumper setting

A.2.3 RS-485 Auto Flow Control Mode and RS-422 Master/Slave Mode Selection

You set the “Auto Flow Control” mode of RS-485 or “Master/Slave” mode of RS-422 by using SW2 DIP switches for each RS-422/485 port. In RS-485, if the switch is set to “Auto”, the driver automatically senses the direction of the data flow and switches the direction of transmission. No handshaking is necessary. In RS-422, if DIP switch is set to “On,” the driver is always enabled, and always in high or low status.

Table A.8: RS-485 auto flow control mode and RS-422 master/slave mode selection

SW2 DIP switch setting	Description
	COM3 RS-485: Auto flow control; RS-422: Slave mode
	COM4 RS-485: Auto flow control; RS-422: Slave mode
	COM3 RS-485: N/A; RS-422: Master mode
	COM4 RS-485: Auto flow control; RS-422: Slave mode
	COM4 RS-485: N/A; RS-422: Master mode
	COM3 RS-485: N/A; RS-422: Master mode
	COM4 RS-485: N/A; RS-422: Master mode

A.3 Ethernet RJ-45 Connector (LAN1)

Ethernet RJ-45 Connector Pin Assignments

Table A.9: 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 (CN4)

Phoenix Power Connector Pin Assignments

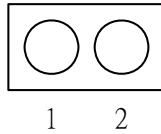


Table A.10: Phoenix power connector pin assignments

Pin	Signal Name
1	9 ~ 36 VDC
2	GND

A.5 PS/2 Keyboard and Mouse Connector (CN9)

PS/2 KB/MS Connector Pin Assignments

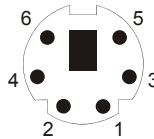


Table A.11: Keyboard and Mouse connector pin assignments

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

A.6 USB Connector (CN12, CN13)

USB Connector Pin Assignments

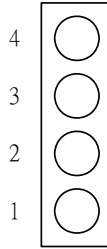


Table A.12: USB connector pin assignments

Pin	Signal Name	Cable Color
1	VCC	Red
2	DATA-	White
3	DATA+	Green
5	GND	Black

A.7 VGA Display Connector (JP8)

VGA Display Connector Pin Assignments

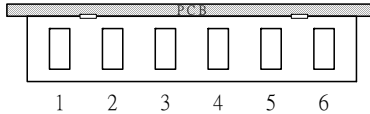


Table A.13: VGA display connector pin assignments

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

VGA Adaptor Cable Pin Assignments

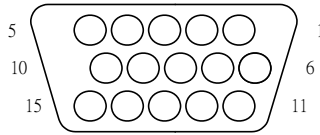


Table A.14: VGA adaptor cable pin assignments

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		

Chipset

The ARK-3150 uses an AMD CS5530A chipset for its SVGA controller. It supports interlaced and non-interlaced analog monitors (color and monochrome VGA) in high-resolution modes while maintaining complete IBM VGA compatibility. Digital monitors (i.e. MDA, CGA and EGA) are NOT supported. Multiple frequency (multisync) monitors are handled as if they were analog monitors.

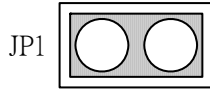
Display memory

With 1 ~ 4 MB shared memory, the VGA controller can drive CRT displays or color panel displays with resolutions up to 1024 x 768 at 64 K colors. For 1024 x 768 color resolution, the display is expanded to 4 MB in BIOS.

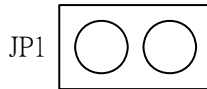
A.8 CompactFlash Master/Slave Jumper Setting (JP1)

The CompactFlash interface uses a primary IDE channel, which could be set as the master or slave device by changing the setting of JP1.

Master Device: (Default)



Slave Device:



ARK-3150 has one CompactFlash card slot in the chassis. It supports CompactFlash type I (3mm thick) and type II (5mm thick) cards. A 128 MB CompactFlash card is equipped in the ARK-3150. For ARK-1350-1G0A1, there is no CompactFlash card on the slot. ARK-3150 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.9 Enhanced IDE connector (CN2)

You can attach two IDE (Integrated Device Electronics) drives to the ARK-3150 for software installation or system testing. The ARK-3150 has an EIDE connector, designated CN1. Wire number 1 on the cable is red or blue, and the other wires are gray. Connect one end to connector CN1 on the board. Make sure that the red (or blue) wire corresponds to pin 1 on the connector (on the right side). See “A.1 Board Connectors and Jumpers” earlier in this chapter for help in finding the connector. Unlike floppy drives, IDE hard drives can connect in either position on the cable. If you install two drives, you will need to set one as the master and one as the slave. You do this by setting the jumpers on the drives. If you use just one drive, you should set it as the master. See the documentation that came with your drive for more information. Connect the first hard drive to the other end of the cable. Wire 1 on the cable should also connect to pin 1 on the hard drive connector, which is labeled on the drive circuit board. Check the documentation that came with the drive for more information.