Arpex-1610

Arpex Embedded Computing
(1U Advanced Box PC)

User's Manual

Version 1.1

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Copyright Notice

Declaration of Conformity

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 ARBOR. Please contact your local supplier for ordering information.

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

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.

About User's Manual

This User's Manual is intended for experienced users and integrators with hardware knowledge of personal computers. If you are not sure about any description in this User's Manual, please consult your vendor before further handling.

Warning

The Box PC and their components contain very delicate Integrated Circuits (IC). To protect Box PC and its components against damage from static electricity, you should always follow the following precautions when handling it :

1. Disconnect your Box PC from the power source when you want to work on the inside.
2. Use a grounded wrist strap when handling computer components.
3. Place components on a grounded antistatic pad or on the bag that came with Box PC, whenever components are separated from the system.

Replacing the Lithium Battery

Incorrect replacement of the lithium battery may lead to a risk of explosion. The lithium battery must be replaced with an identical battery or a battery type recommended by the manufacturer.
Do not throw lithium batteries into the trashcan. It must be disposed of in accordance with local regulations concerning special waste.

Technical Support

If you have any technical difficulties, please consult the user's manual first at:

ftp://ftp.arbor.com.tw/pub/manual

Please do not hesitate to call or e-mail our customer service when you still can not find out the answer.

http://www.arbor.com.tw
E-mail:info@arbor.com.tw

Warranty

This product is warranted to be in good working order for a period of two years from the date of purchase. Should this product fail to be in good working order at any time during this period, we will, at our option, replace or repair it at no additional charge except as set forth in the following terms. This warranty does not apply to products damaged by misuse, modifications, accident or disaster.

Vendor assumes no liability for any damages, lost profits, lost savings or any other incidental or consequential damage resulting from the use, misuse of, or inability to use this product. Vendor will not be liable for any claim made by any other related party.

Vendors disclaim all other warranties, either expressed or implied, including but not limited to implied warranties of merchantibility and fitness for a particular purpose, with respect to the hardware, the accompanying product's manual(s) and written materials, and any accompanying hardware. This limited warranty gives you specific legal rights.

Return authorization must be obtained from the vendor before returned merchandise will be accepted. Authorization can be obtained by calling or faxing the vendor and requesting a Return Merchandise Authorization (RMA) number. Returned goods should always be accompanied by a clear problem description.

Packing List

- 1 x Arpex-1610 advanced Box PC
- 2 x EPE FOAM
- 1 x Accessory Bag (CD/ Manual/ Screws/ Spacer supports/ Fuse/ Cable)
- 1 x Gift Box

If any of the above items is damaged or missing, please contact your vendor immediately.

Ordering Information

Arpex-1610	1U Box PC with Intel ATOM N270 1.6GHz, LCM, Isolation COM, FRAM, 1GB SDRAM
Arpex-1610-E4	1U Box PC with Intel ATOM N270 1.6GHz, w/o LCM, Isolation COM, FRAM and SDRAM

Chapter 1

General Information

1.1 Introduction

The Arpex-1610 is a state-of-the-art rugged box PC. This Box PC is a x86-based platform with these key features:

- All-In-One Platform
  The CPU, DRAM and even software are integrated to provide a plug-and-play machine.
- LCM Display
  Build-in LCM Module, Alphanumeric LCM.
- Fanless and Modular CPU Board
  By using a low power processor, the system does not have to rely on fans, which are often unreliable and may cause dust to circulate inside the equipment. The modular design facilitates maintenance or possible upgrades on the CPU board.
- Powerful Communication Capability
  The Arpex-1610 provides RS-232/422/485 serial ports, Gigabit Ethernet, USB, AI/DI/DO, and VGA/DVI dual display interfaces.
- S.D.R. (System Data Recovery)
  Memory back-up for data saving after power loss
- System Fast Boot
  Smart boot loader for system fast boot
- Isolated I/O
  3.75KV optical isolation for all serial ports
- Windows OS Support:
  ARBOR offers platform support for Windows CE 5.0, Windows CE 6.0, Windows XP, Windows XPe, Linux, DOS. The optional Windows CE operating system specifically for the Arpex-1610 is available for Windows CE application program builders.

1.2 Specifications

System Kernel	FMB-i270G
Processor	Intel Atom N270 1.6GHz
VGA	Integrated Intel 945GSE
BIOS	AMI BIOS onboard 8Mb flash ROM, support onboard re-flash
North Bridge	Intel 945GSE
South Bridge	Intel ICH7M
System Memory	1 x 512KB FRAM soldered onboard 1 x 200pin DDR2-SDRAM SODIMM socket with 1GB memory module installed, up to 2GB
Storage Memory	1 x CompactFlash socket 1 x 2.5" SATA HDD bay
Watchdog Timer	Super I/O watchdog timer; 1 ~ 255 seconds timeout period
I/O Ports	
Serial Port	2 x isolated RS-232 (COM1/2) 2 x isolated RS-232/422/485 (COM3/4)
Keyboard/ Mouse	1 x 6-pin Mini-DIN port for standard PS/2 keyboard and mouse via Y cable
Ethernet Port	2 x 10/100/1000Base-T (Realtek RTL8111B/ RTL8111C-GR x2 [Co-layout for flexibility]) RJ-45 type connector
USB Port	2 x USB 2.0 compliant
DVI Port	1 x DVI-I connector supports DVI & analog RGB dual output (through external Y cable)
Digital I/O	4-channel/4-channel
Analog Input	2-ch. analog input; voltage 0 ~ 5V
LED Display	Power LED & HDD LED
Battery	Alarm for RTC battery
Safety	
FCC	Class A certificated
CE	Certificated

Environment	
Operating Temp.	0ºC ~ 50ºC (14 ~ 122°F)
Storage Temp.	-20ºC ~ 80ºC (-4 ~ 176°F)
Humidity	10 ~ 95% @ 40ºC relative humidity (non-condensing)
Vibration	1Grms

1.3 LCM Specifications

Module Size	73.5 (W)x35.5 (H)x11.5max (D)
View Area	52.0 (W)x14.0(H)
Dot Size	0.47 (W)mmx0.58 (H)mm
Dot Pitch	0.52 (W)mmx0.63 (H)mm
Display Format	16 characters (W)x2 lines (H)
Duty Ratio	1/16 Duty
Controller	NT 7651

1.4 Power

Input Voltage	9 ~ 33 VDC
Maximum Current	3A
Power Consumption	20W

1.5 I/O Ports

The Arpex-1610 has 4 isolated serial ports (2 x RS232, 2 x RS-232/422/485), 2 USB (Host) ports, 2 RJ-45 LAN ports, 2-channel AI, 4-channel DI, 4-channel DO, 1 KB/MS port with Y cable, and 1 DVI-I port with Y cable supporting DVI and VGA dual output. Figure 1.1 shows the arrangement of these ports.

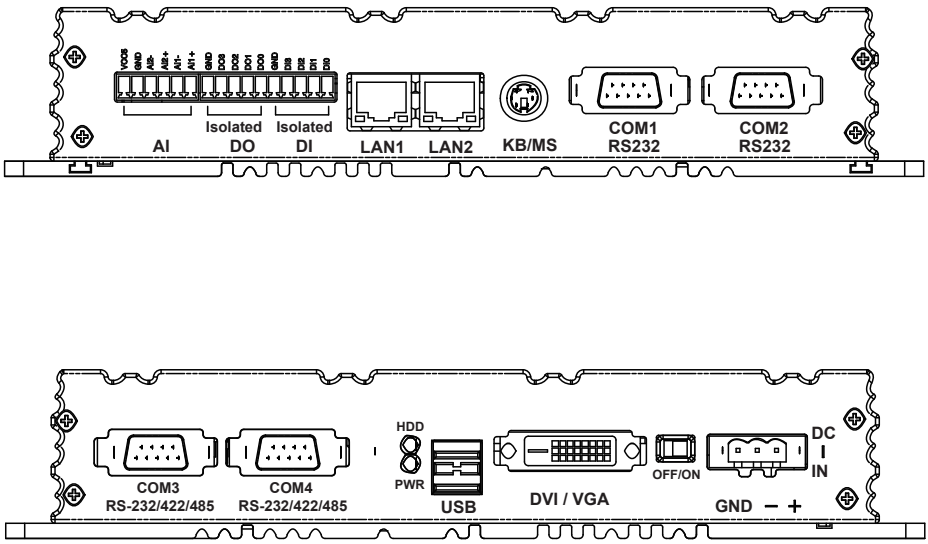


Figure 1.1: I/O Ports

1.6 Dimensions

- Weight: 1.9kg (without HDD)
- Dimension: 242.5 x 138.0 x 44.5 mm (WxHxD)

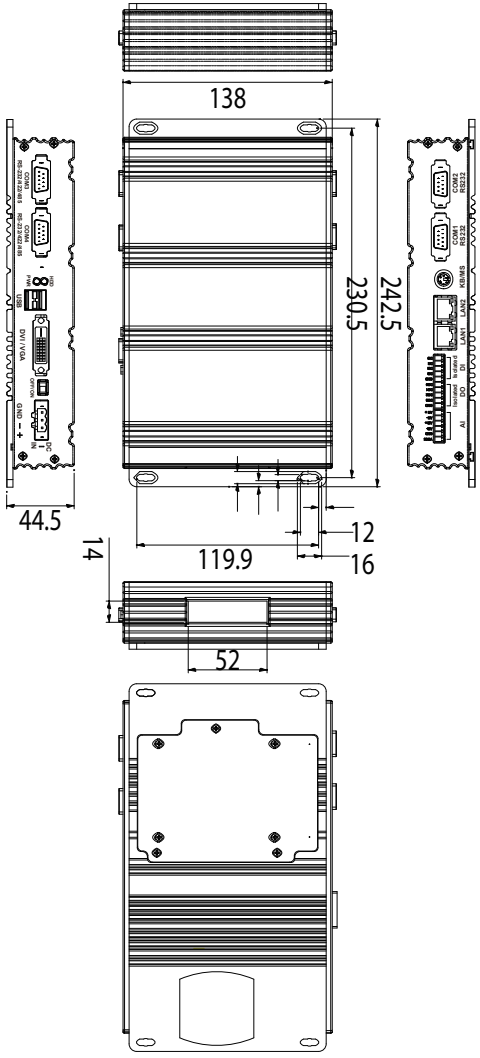


Figure 1.2: Dimensions and Cutout

Chapter 2

System Quick Start

2.1 Assembly & Mounting

2.1.1 HDD Installation

Step 1: Unscrew the three screws which fix the HDD Holder bracket to the main unit. Keep the screws safely for later use.
Step 2: Note that the SATA cable and power cable are attached to the connectors of the HDD Holder bracket. To take the bracket off the unit, pull the SATA cable off the connector by pressing the latch securing the SATA cable.
Step 3: Stick the accompanying thermal pad to the HDD properly.
Step 4: Insert the HDD into the connector of the bracket and then fix the HDD to the bracket by the accompanying four screws for the most effective heat dissipation.
Step 5: Remember to connect the SATA cable back into the connector of the HDD Holder bracket.
Step 6: Use the three screws removed before to fix the HDD Holder bracket to the main unit.

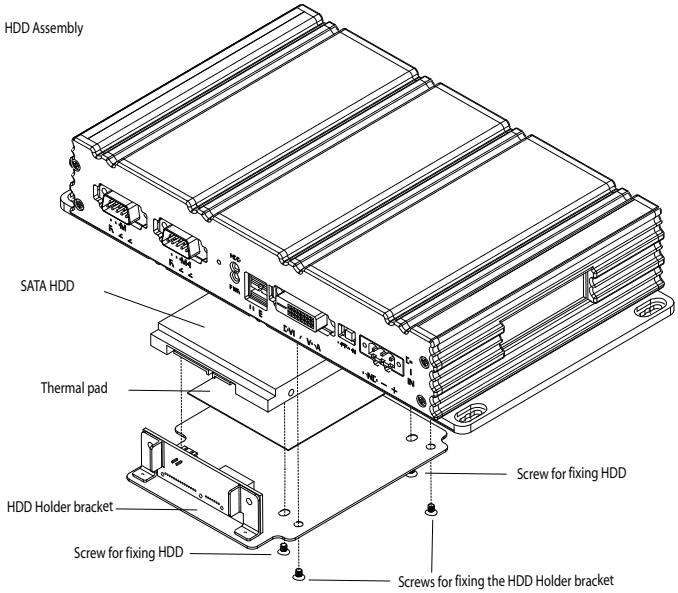


Figure 2.1: HDD with BOTTOM Assembly

2.1.2 CF Card Installation

Before installing the CF card, as the drawing illustrated below, users have to remove the top and side covers.

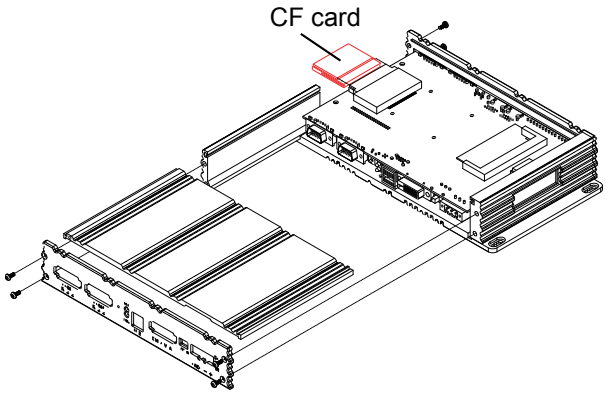


Figure 2.2: CF Card Assembly

2.1.3 Mounting

Please use four screws to mount the unit on the wall, bracket or other machine. See the figure shown below.

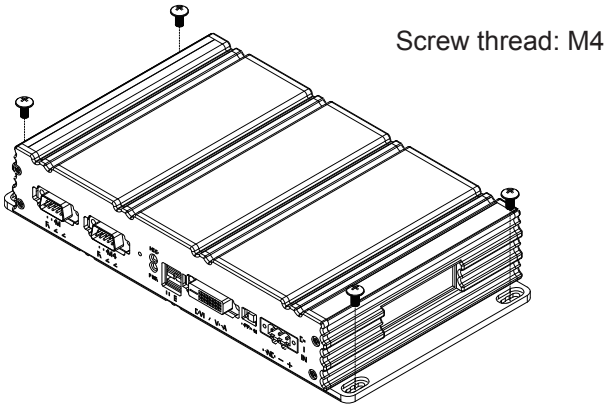


Figure 2.3: Unit Mounting

2.2 Power Wiring

1. Connect the power connector to 9 ~ 33VDC power lines. The power lines can either be from a power adapter or an in-house power source.

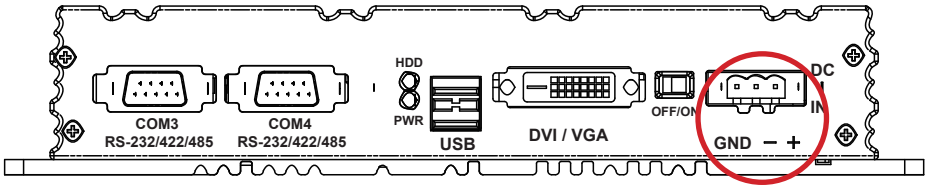
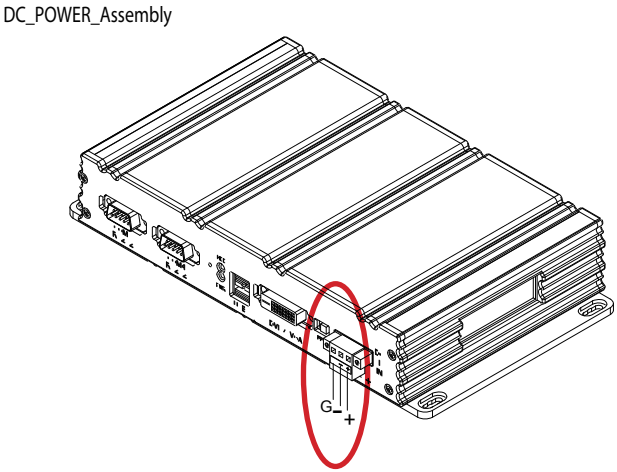


Figure 2.4: Power Connector Pin Assignment

2. Plug the power lines into the system power receptor.



Caution: If the power lines are not connected to the correct pins, the system may be damaged when power is turned on.

Figure 2.5: Connecting Power Lines

2.3 Board Layout

The engine of Arpex-1610 is constructed by the combination of one PCBA board. Such a combination makes system customization feasible.

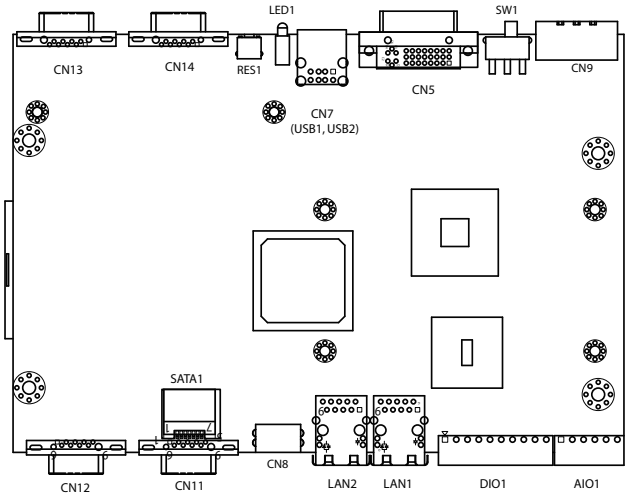


Figure 2.6: Arpex-1610 Main Board Top View

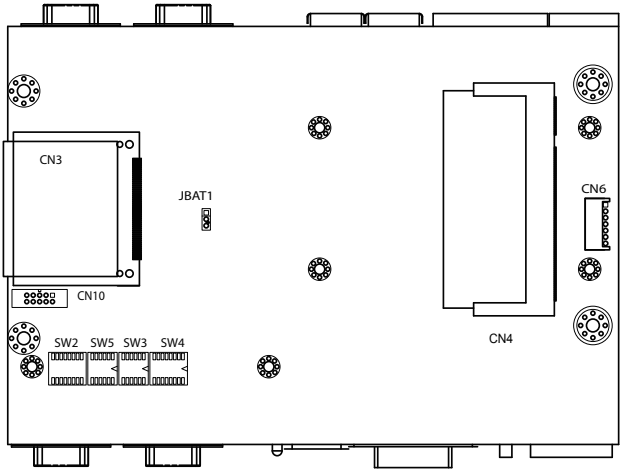


Figure 2.7: Arpex-1610 Main Board Bottom View

Arpex-1610 Main Board Connector/Jumper List

Label	Function
CN3	CF Socket
CN4	DDR2 SODIM Socket
CN5	DVI-I connector (Ratio 4:3) (DVI & Analog RGB Signals)
CN6	LCM connector (SMBUS)
CN7	USB1/USB2 connector (USB2.0)
CN8	PS/2 KB/MS
CN9	8~36V DC-IN
CN11	COM1 (RS232)
CN12	COM2 (RS232)
CN13	COM3 (RS232/422/485)
CN14	COM4 (RS232/422/485)
LAN1	LAN connector (Giga bit Ethernet)
LAN2	LAN connector (Giga bit Ethernet)
LED1	HDD/POWER LED
AIO1	Analog Input I/O
DIO1	Digital Input & Output I/O
SATA1	2.5” SATA HDD connector
SW1	Power on/off Switch
SW2	RS232/422/485 setting (COM3)
SW3	RS232/422/485 setting (COM3/4)
SW4	RS232/422/485 setting (COM4)
SW5	RS232/422/485 setting (COM3/4)
JBAT1	Clear CMOS
RES1	Reset

2.4 COM3 RS-232/422/485 Jumper Settings

SW2	RS-232	RS-422/485
1-16	ON	OFF
2-15	ON	OFF
3-14	ON	OFF
4-13	ON	OFF
5-12	ON	OFF
6-11	ON	OFF
7-10	ON	OFF
8-9	ON	OFF

Arpex-1610-E Series

SW3	RS-232	RS-422	RS-485
1-12	ON	OFF	OFF
2-11	OFF	ON	OFF
3-10	OFF	OFF	ON

Arpex-1610 Series

SW3	RS-232	RS-422	RS-485
1-12	ON	ON	ON
2-11	OFF	ON	OFF
3-10	OFF	OFF	ON

SW5	RS-232	RS-422	RS-485
1-16	OFF	ON	ON
2-15	OFF	ON	ON
3-14	OFF	ON	ON
4-13	OFF	ON	ON

2.5 COM4 RS-232/422/485 Jumper Settings

Arpex-1610-E Series

SW3	RS-232	RS-422	RS-485
4-9	ON	OFF	OFF
5-8	OFF	ON	OFF
6-7	OFF	OFF	ON

Arpex-1610 Series

SW3	RS-232	RS-422	RS-485
4-9	ON	ON	ON
5-8	OFF	ON	OFF
6-7	OFF	OFF	ON

SW4	RS-232	RS-422/485
1-16	ON	OFF
2-15	ON	OFF
3-14	ON	OFF
4-13	ON	OFF
5-12	ON	OFF
6-11	ON	OFF
7-10	ON	OFF
8-9	ON	OFF

SW5	RS-232	RS-422	RS-485
5-12	OFF	ON	ON
6-11	OFF	ON	ON
7-10	OFF	ON	ON
8-9	OFF	ON	ON

2.6 Connector Pin Assignments

DIO1			
Pin	Description	Pin	Description
1	PDI0	6	PDO0
2	PDI1	7	PDO1
3	PDI2	8	PDO2
4	PDI3	9	PDO3
5	GND	10	GND

CN11~14 (UART1~4)			
Pin	Description	Pin	Description
1	DCD	2	RXD
3	TXD	4	DTR
5	GND	6	DSR
7	RTS	8	CTS
9	RI		

JBAT1	
Pin	Description
1-2	Clear CMOS
2-3	NOMO

AIO1	
Pin	Description
1	INA0+
2	INA0
3	INA1+
4	INA1-
5	GND
6	VCC5

LCM1	
Pin	Description
1	GND
2	VCC3
3	NC
4	SDA
5	SCL
6	VREF
7	RST

CN5 (DVO)			
Pin	Description	Pin	Description
1	DATA2-	2	DATA2+
3	GND	4	NC
5	NC	6	DDC_CLK
7	DDC_DATA	8	CRT_VS
9	DATA1-	10	DATA1+
11	GND	12	NC
13	NC	14	VCC5
15	GND	16	DVI_HTPLG
17	DATA0-	18	DATA0+
19	GND	20	NC (CRT_DC)
21	NC (CRT_DA)	22	GND
23	DVI_CLK+	24	DVI_CLK-
C1	RED	C4	CRT-HS
C2	GREEN	C5	AGND
C3	BLUE	C6	PGND

CFD1			
Pin	Description	Pin	Description
1	GND	26	GND
2	DATA3	27	DATA11
3	DATA4	28	DATA12
4	DATA5	29	DATA13
5	DATA6	30	DATA14
6	DATA7	31	DATA15
7	CS#1	32	CS#3
8	GND	33	GND
9	GND	34	IO READ
10	GND	35	IO WRITE
11	GND	36	+5V
12	GND	37	IRQ15
13	+5V	38	+5V
14	GND	39	CSEL
15	GND	40	N/C
16	GND	41	IDE RESET
17	GND	42	IO READY
18	ADDR2	43	REQ
19	ADDR1	44	DACK
20	ADDR0	45	DASP (HD_LED)
21	DATA0	46	DIAG
22	DATA1	47	DATA8
23	DATA2	48	DATA9
24	N/C (-IOCS16)	49	DATA10
25	GND	50	GND

SATA1			
Pin	Description	Pin	Description
1	GND	2	TXP0
3	TXN0	4	GND
5	RXN0	6	RXP0
7	GND		

USB1/USB2	
Pin	Description
1	+5V
2	USB-
3	USB+
4	GND