BoxPC Series
User Manual

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Edited by Anna Huang

Warranty

All products manufactured by ICP DAS are under warranty regarding defective materials for a period of one year, beginning from the date of delivery to the original purchaser.

Warning

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Contact US

If you have any problem, please feel free to contact us.

You can count on us for quick response.

Email: service@icpdas.com

Precautions

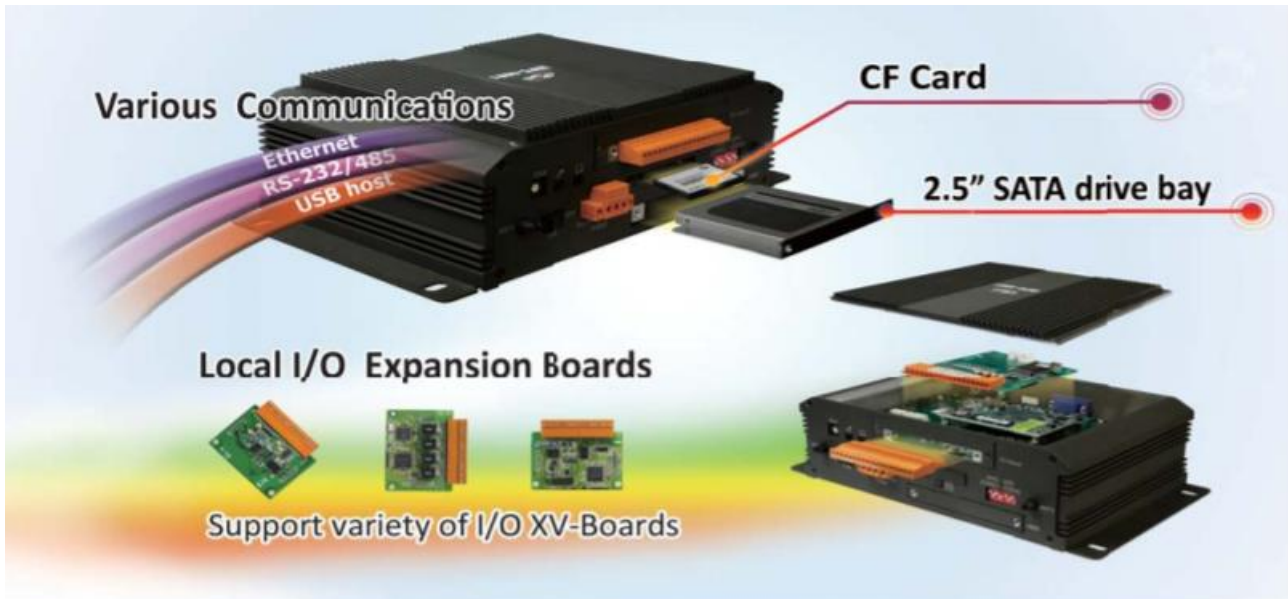Please read the following important instructions before getting started.

1. The iBPC Series isn't equipped with any storage devices (HDD/SSD/SD card etcs). Purchase a storage device that meets power consumption, temperature, and vibration requirements.

2. The iBPC Series isn't equipped with an operating system. An operating system must be installed on a storage device first before installing any software into the BoxPC.

2. Disconnect the power cord from the BoxPC before making any installation. Be sure both the system and the external devices are turned OFF. Sudden surge of power could ruin sensitive components. Make sure the BoxPC is properly grounded.

3. Make sure the power source matches the power rating of the BoxPC.

4. Turn OFF the system power before cleaning. Use a damp cloth instead of liquid or spray detergents for cleaning.

5. Do not leave this equipment in an uncontrolled environment where the storage temperature is below -40℃ or above 75℃. It may damage the equipment.

6. Never open the equipment. For maintenance reasons or mounting the components, only a trained technician is allowed to do so. Most integrated circuits are sensitive to static electrical charge. To avoid damaging chips from electrostatic discharge, observe the following precautions:

- Before handling a board or integrated circuit, touch an unpainted portion of the system unit chassis for a few seconds. This will help to discharge any static electricity on your body.

- When handling boards and components, wear a wrist-grounding strap, available from most electronic component stores.

7. If any of the following situations arises, please the contact our service personnel: The power cord or plug is damaged.

- Liquid has penetrated into the device.
- The device has been exposed to moisture.
- The device is not working as expected or in a manner as described in this manual.
- The device has been dropped and damaged.
- Any obvious signs of damage displayed on the device.

Contents

1. Introduction

iBPC series is a fanless embedded box PC, wide operating temperature and wide range voltage capability, allow it run in the harsh environments.

iBPC series comes with the same interfaces: four RS-232/422/485 ports, VGA, HMDI, Audio, dual Gigabit Ethernet LAN ports and four high-speed USB 2.0. And there are various CPU options: iBPC-4081 is with one Intel® ATOM Quad Core 1.91Ghz Processor E3845 (with 4GB on-board memory).

Two SMA type connector opening for antenna, optional I/O expansion board (XV-board), provides high protection I/O, +10 ~ 30 VDC power input connector, and one power switch. One 2.5" SATA HDD drive bay is also set up in the embedded computer to possess sufficient storage.

1.1. Features

The BoxPC offers the most comprehensive configuration and remote system upgrade solutions to meet specific application requirements. The following list shows the hardware and software features designed to simplify installation, configuration and application.

Powerful Hardware Design

- iBPC-4081: Intel® Atom E3845 CPU (with 4 GB on-board memory)
- 2 × 10/100/1000M Ethernet and 4 × USB 2.0 port
- One 2.5" SATA drive bay and 1 CF socket
- Ultra-Rugged Construction and Reliable Design
- Supports VGA and HDMI dual display
- RS-232/422/485 port
- I/O Expansion Bus for XV-board
- One Mini PCI Express Card slot
- Operating Temperature: -25 ~ +70°C

Local I/O Expansion Board

iBPC series equips with an I/O expansion card, which allow youimplement various I/O functions.

Remote I/O Module and Expansion Unit

With the built-in RS-485 and Ethernet ports, iBPC series can connect RS-485/Ethernet remote I/O units (RU-87Pn/ET-87Pn) or modules (I-7000/M-7000/ET-7000).

Multiple Communication Interfaces

iBPC series provides different communication interfaces, easy to expand various I/O modules or connect to external devices.

- Ethernet
- RS-232/485 /422
- USB host
- CAN Bus
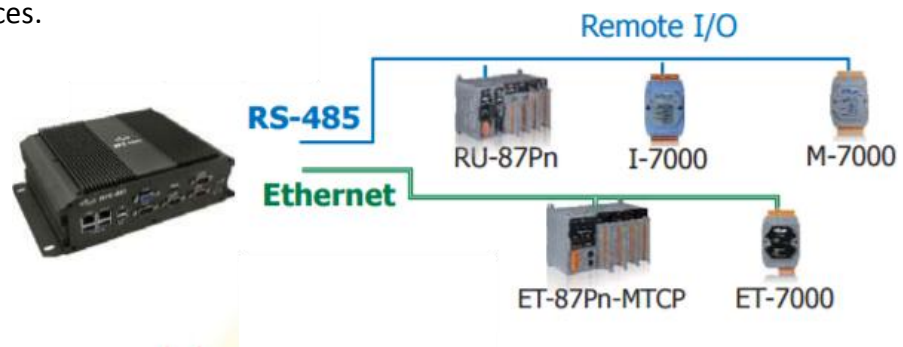
Various Memory Storage Options

iBPC series provides various memory storage options.

- CF card: Portable data logging applications.
- 2.5" SATA drive bay or Flash DOM (mini-PCIe): Rugged storage and shock absorption.

Highly Reliable Under Harsh Environment

iBPC series operates in a wide range of temperature and humidity.

- Operating Temperature: -25 ~ +70 °C
- Storage Temperature: -40 ~ +75 °C
- Humidity 10 ~ 90 % RH (non-condensing)

1.2. Specifications

The table below summarizes the specifications of BoxPC.

Models	iBPC-4081
System Software	
OS	Win7/Win8/Win10/WES7
SDK Provided	DLL for VC, DLL for Visual Studio.Net
CPU Module	
CPU	Intel® ATOM Quad Core 1.91Ghz Processor E3845
BIOS	AMI
SDRAM	4 GB DDR3
MRAM	128 KB
HDD	One 2.5" SATA drive bay with active LED
EEPROM	16 KB
Memory Expansion	One CF socket
RTC (Real Time Clock)	Provide second, minute, hour, date, day of week, month, year
64-bit Hardware Serial Number	Yes, for software copy protection
Dual Watchdog Timers	Yes
Programmable LED Indicator	2 (L1, L2)
Rotary Switch	Yes (0 ~ 9)
I/O Expansion Slots	
I/O Expansion Bus	Yes, one optional XV-board
PCI Express Mini Card	1
VGA &Communication Ports	
VGA Resolution HDMI	1280 x 1024 to 1920 x 1080 for 16:9 display; 640 x 480 to 1024 x 768 for 4:3 display
Ethernet Port	RJ-45, 10/100/1000M Base-TX (Auto-negotiating, Auto MDI/MDI-X, LED indicators)
USB 2.0	4
COM1	Internal communication for XV-board series
COM2	RS-232/485 (RxD, TxD and GND for RS-232; Data+, Data- for RS-485); 3000 V_{DC} isolated
COM3	RS-232 (RxD, TxD, CTS, RTS, DSR, DTR, CD, RI and GND); 3000 V_{DC} isolated
COM4	RS-232/485/422 (RxD, TxD, CTS, RTS and GND for RS-232; Data+, Data- for RS-485, TX+/TX-/RX+/RX- for RS-422);3000 V_{DC} isolated

COM5	RS-232/485/422 (RxD, TxD, CTS, RTS and GND for RS-232; Data+, Data- for RS-485, TX+/TX-/RX+/RX- for RS-422);3000 V_{DC} isolated
Audio	Mic-in and Earphone-out
Mechanical	
Dimensions (W x H x D)	254 mm x164 mm x74 mm
Installation	Wall or DIN-rail mounting
Ingress Protection	IP30 (Aluminum)
Environmental	
Operating Temperature	-25 °C to +70 °C
Storage Temperature	-40 °C to +75 °C
Ambient Relative Humidity	10 % to 90 % RH (non-condensing)
Power	
Input Range	+10 $V_{DC}$to +30 $V_{DC}$with 3-pin terminal block
Isolation	1 kV
Power Switch	Yes
Consumption	18 W (0.75 A @ 24 V_{DC})

1.3. Overview

The iBPC Series modules are equipped with several interfaces and peripherals that can be integrated with external systems. Here is an overview of the components and its descriptions.

BoxPC
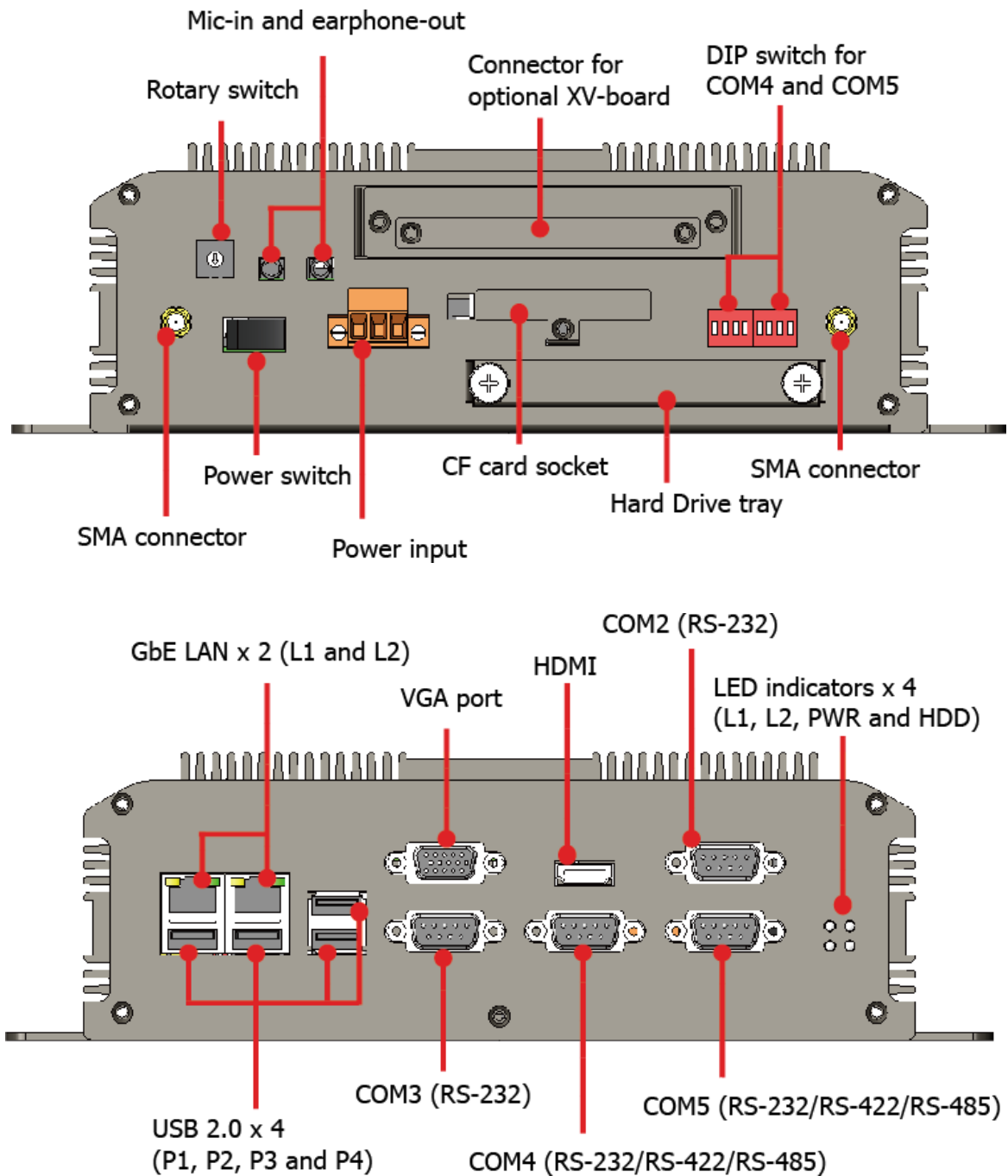
The details of these items are as follows:

SMA Connector

The BoxPC has 2 SMA connectors that are usually used for GPS and WiFi antenna systems.

Rotary Switch

Rotary Switch is an operating mode selector that provides functions to configure with the selection of operating mode and authorization control.

Power Switch

The power switch enables or disables power to electric circuits and loads in the BoxPC.

Microphone-in and Earphone-out

The microphone-in and an earphone-out can be used to process the input and the output of sound.

Power Input

The Box has a 3-wire terminal block; there has 2-wire for the power input and a wire for the frame ground.

Connector for optional XV-board

The XV-board slot can be used to communicate with one XV-board. The XV-board can be used to implement various I/O functions such as DI, DO, A/D, D/A, Timer/Counter.
For more information about these available expansion boards, please refer tohttp://www.icpdas.com/root/product/solutions/hmi_touch_monitor/touchpad/xv-board_selection.html service to expand the function.

CF Card Socket

The BoxPC comes with a CF card inside the CF socket. The CF card can be used to restore the BoxPC system or expand the memory up to 32 GB. (Shipped without any CF card)

Hard Drive Tray
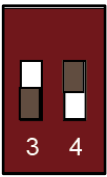
BoxPC has a HDD tray that supports 2.5-inch disk drives and 2.5-inch flash drives.

DIP Switch for COM4 and COM5

The BoxPC has 2 COM ports that provide versatile communication types: RS-232, RS-422 and RS-485. The two DIP switches are used for assigning the communication types.

DIP2 (COM5)   DIP1 (COM4)
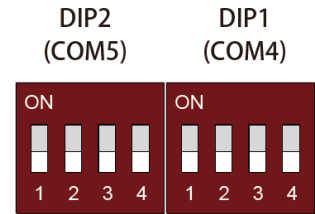
- **Selecting communication interface (S3, S4)**

Switch Setting		RS-232 (Default)	RS-422	RS-485
Switch Setting	S3	ON	ON	OFF
	S4	OFF	ON	On
Status				

- **Enable/Disable Pull-high/Pull-low resistors for RS-422/RS-485 (S1)**

	Enable (Default)	Disable
Switch Setting	S1: ON	S1: OFF
Status		

- **Enable/Disable 120Ω termination resistors for RS-422/RS-485 (S2)**

	Enable	Disable (Default)
Switch Setting	S2: ON	S2: OFF
Status		

GbE LAN (L1 and L2)

The BoxPC has 2 Ethernet ports that can be used to connect the router to the Internet or to other devices.

USB 2.0 (P1, P2, P3 and P4)

The BoxPC has 4 USB 2.0 ports that can be used to connect the USB devices such as mouse, keyboard or an external USB hard drive.

VGA Port

The BoxPC has a VGA port that can be used with a variety of supported VGA resolutions, and the output resolution covers, 1280 x 1024 to 1920 x 1080 for 16:9 display; 640 x 480 to 1024 x 768 for 4:3 display.

HDMI

The HDMI port can be used to connect BoxPCto TV or projector.

COM2 (RS-232/RS-485)

The COM2 port is a 9-pins RS-232/RS-485 connector. Thedetails of the COM2 port specifications are shown to the side.

Note:16C550 compatible

Port Type: Male

Baud Rate: 115200, 57600, 38400, 19200, 9600, 4800, 2400, 1200 bps

Data Bits: 5, 6, 7, 8

Parity: None, Even, Odd, Mark (Always 1), Space (Always 0)

Stop Bits: 1, 2

FIFO:64 bytes
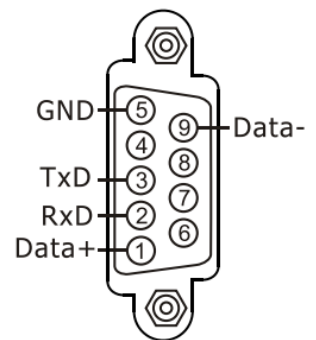
COM3 (RS-232)

The COM3 port is a 9-pins RS-232 connector. Thedetails of the COM3 port specifications are shown to the side.

Note:16C550 compatible

Port Type: Male

Baud Rate: 115200, 57600, 38400, 19200, 9600, 4800, 2400, 1200 bps

Data Bits: 5, 6, 7, 8

Parity: None, Even, Odd, Mark (Always 1), Space (Always 0)

Stop Bits: 1, 2

FIFO:128 bytes
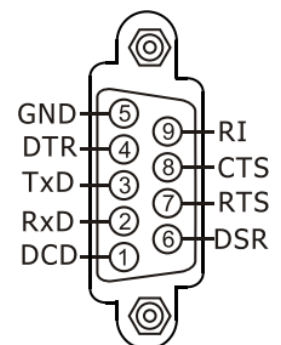
COM4/COM5 (RS-232/RS-422/RS-485)

The BoxPC has 2 COM ports that provide versatile communication types:RS-232, RS-422 and RS-485. The pin assignments of these two COM port are shown as below. (Refer to page 13 and 14 for more hardware configuration information)

	COM4/COM5		
	RS-232 (Default)	**RS-422**	**RS-485**
Pins			
1	DCD	TxD-	Data-
2	RxD	TxD+	Data+
3	TxD	RxD+	-
4	DTR	RxD-	-
5	GND	GND	GND
6	DSR	-	-
7	RTS	-	-
8	CTS	-	-
9	-	-	-

LED Indicators

The BoxPC has 4 LED indicators. The details of these LED indicators are as follows:

LED Indicator	Color	Description
L1/L2	Red	LED indicators controlled by userprogram.
PWR	Green	System has power applied to it.
HDD	Green	HDD is accessed.

1.4. Dimensions

The diagrams below provide the dimensions of the BoxPC to use in defining your enclosure specifications. Remember to leave room for potential expansion if you are using other components in your system. All dimensions are in millimeters.
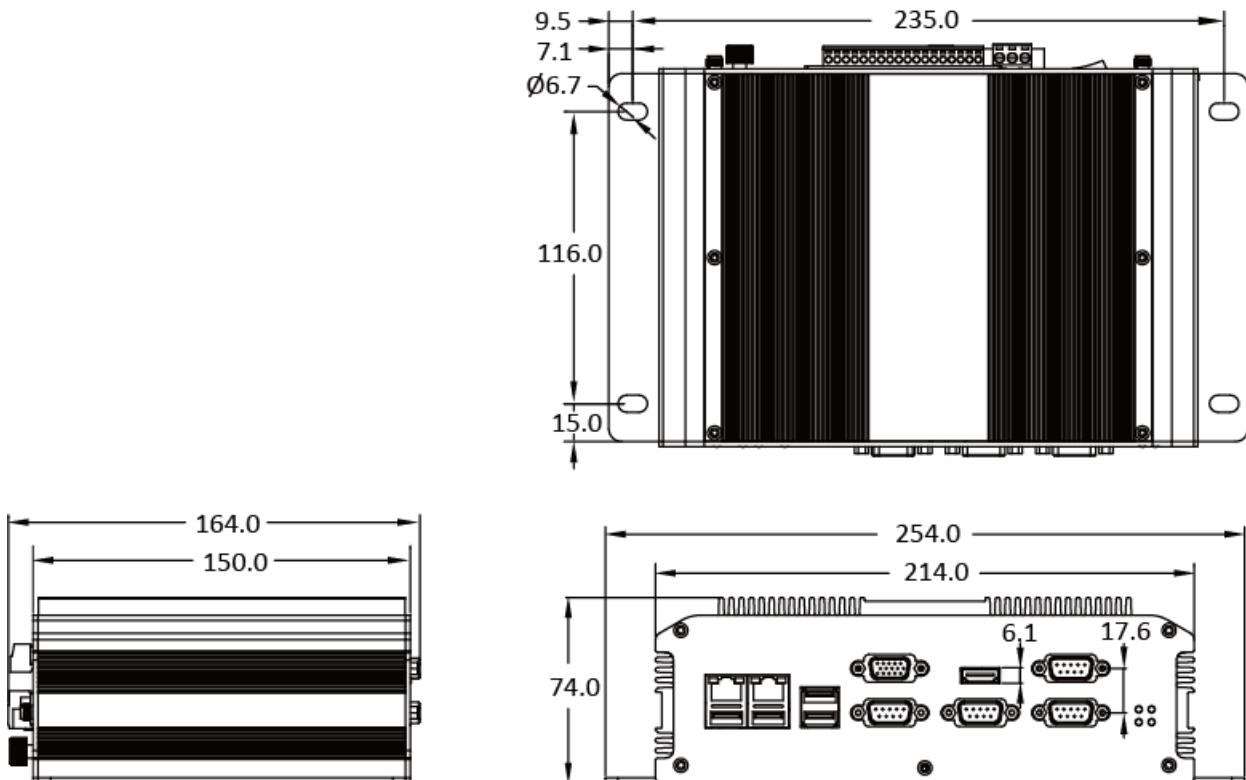
1.5. Companion CD

This package comes with a CD that provides a collection of the software utility, documentation, drivers, demo program and application. The CD contains several subdirectories. All of them are listed below.

CD:\BoxPC

Demo
The demo programs for examples of use in the application.

Document
The technical support documents for installation, operation, maintenance, development and application.

Driver
The device driver for start up BoxPC to enable feature.

SDK
The sources for development and application in your application.

Tools
The tools and utilities for operation on PC.

Update
The installation packages related to BoxPC.

2. Getting Started

This chapter provides a guided tour of the BoxPC installation and configuration that describes the steps needed to download, install, configure, and run the basic procedures for user working with the BoxPC for the first time.

Before starting any task, please check the package contents. If any of the following package contents are missing or damaged, contact your dealer, distributor.
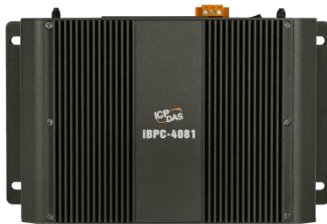
iBPC-4081

Quick Start Guide

Software Utility CD

44 mm DIN-Rail Clip

Screw Driver (1C016) 2.4 mm

M3 x 6 Screw x 12

M2.6 x 4L Screw x 2

2.1. Mounting the BoxPC

The BoxPC can be mounted either directly to a wall/panel, or onto a stainless 35mm DIN rail.

Wall/Panel mounting

Step 1: Install the four mounting screws into the 4 keyhole mounting holes

Step 2: Fasten the screws securely
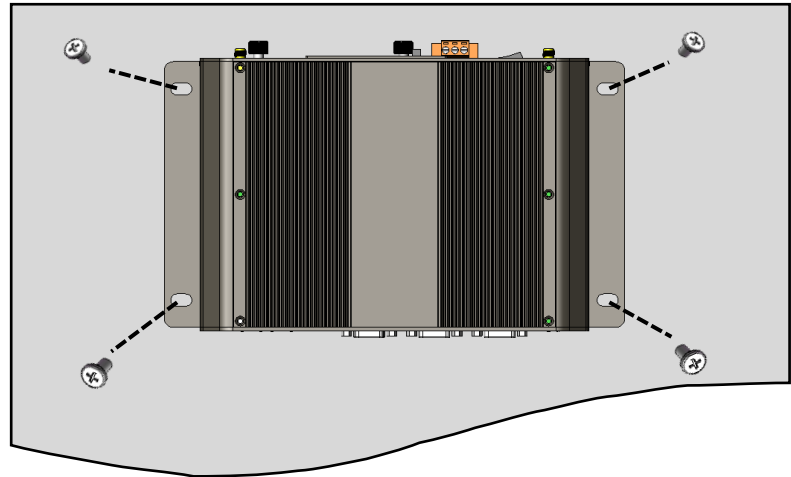
DIN Rail mounting

Step 1: Fasten the DIN rail clip to the BoxPC with the screws (M3x 6L)
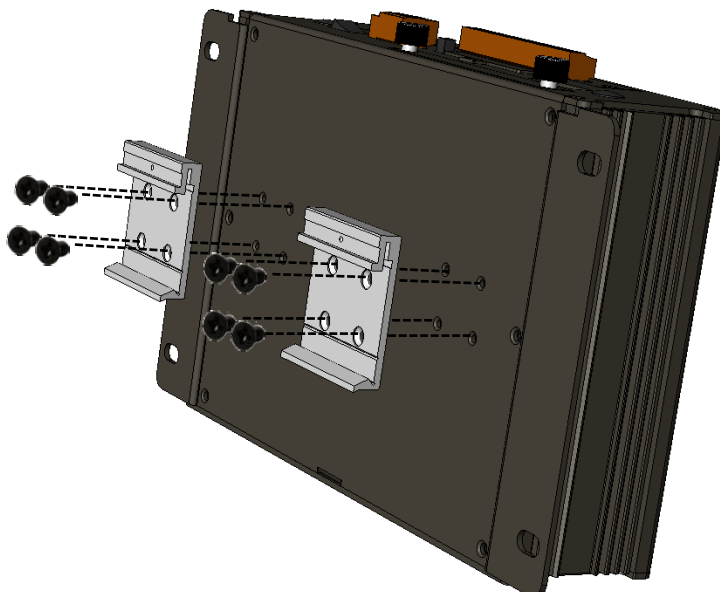
Step 2: Clip the device onto a stainless DIN rail

35 mm
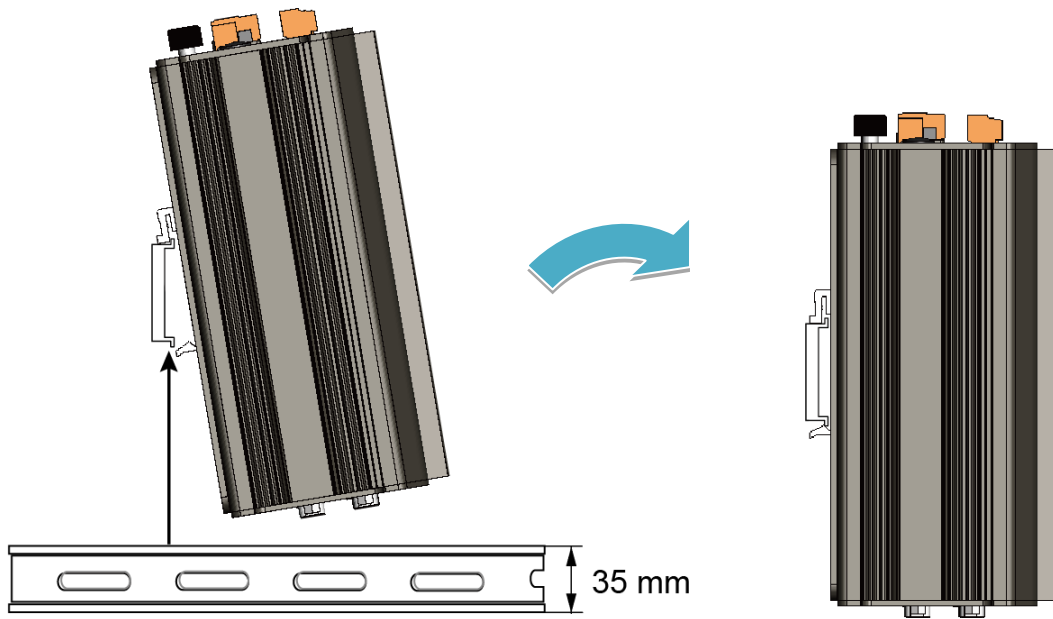
A stainless steel DIN rail is recommended.

Tips & Warnings

⚠ For DIN rail mounting, it is strongly recommended that only a stainless steel DIN rail be used to support the weight of BoxPC system, providing stability and preventing BoxPC from leaning
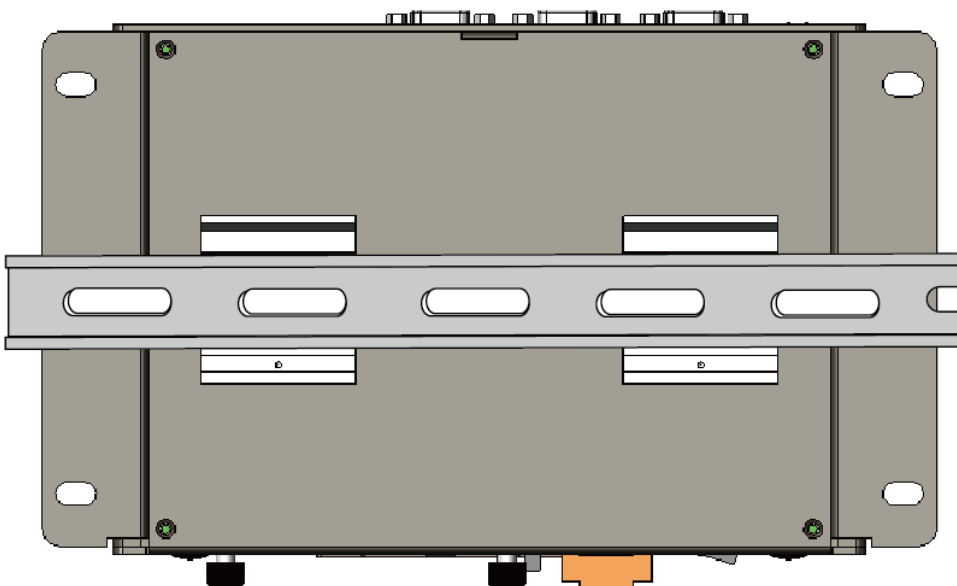
2.2. Deploying a Basic BOX-PC System

The BOXPC provides a variety of communication interface to suit a range of application. Here is a simple application for using the BoxPC.

Step 1: Connect the positive terminal (+) of the power supply to the terminal <u>PWR1/2</u> and the negative terminal (-) of the power supply to the <u>P.GND</u>

Step 2: Connect the USB mouse or the USB keyboard to the USB port

Step 3: Connect the monitor to the VGA port

Step 4: Connect to PC or the laptop to the LAN port via an Ethernet switch
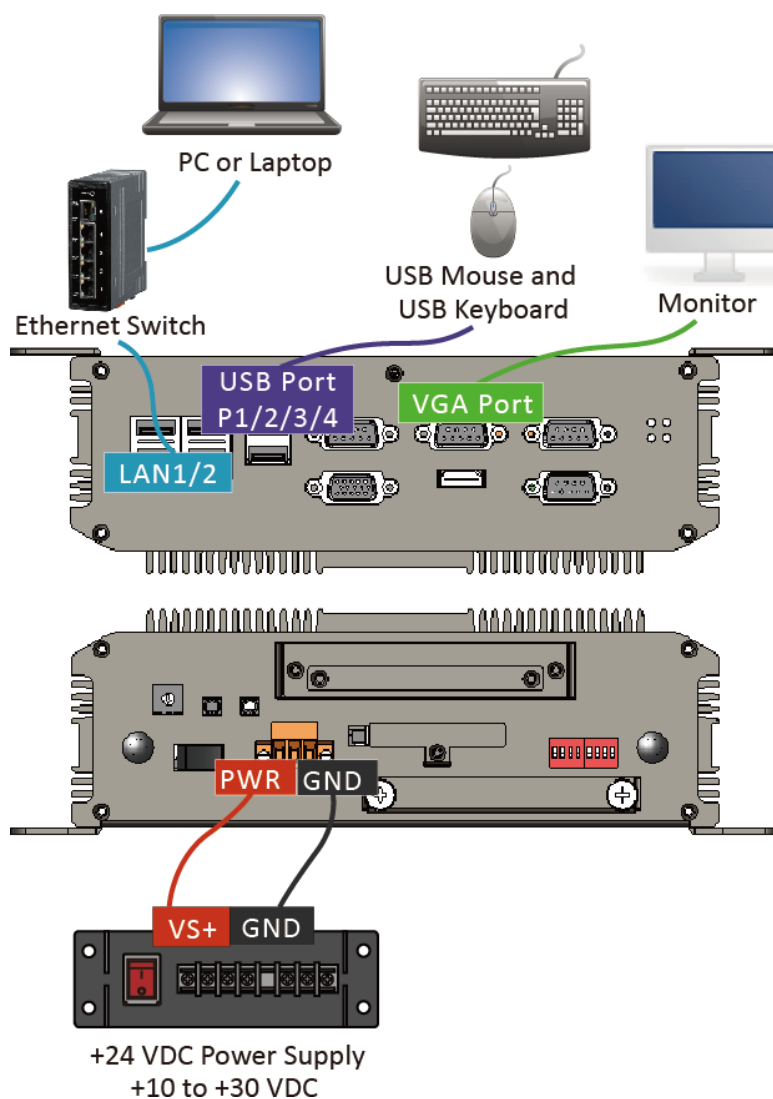
2.3. Mounting a HDD

BoxPC has a HDD tray that supports 2.5-inch disk drives and 2.5-inch flash drives.

Step 1: Remove the 2drive screws to take out the HDD tray
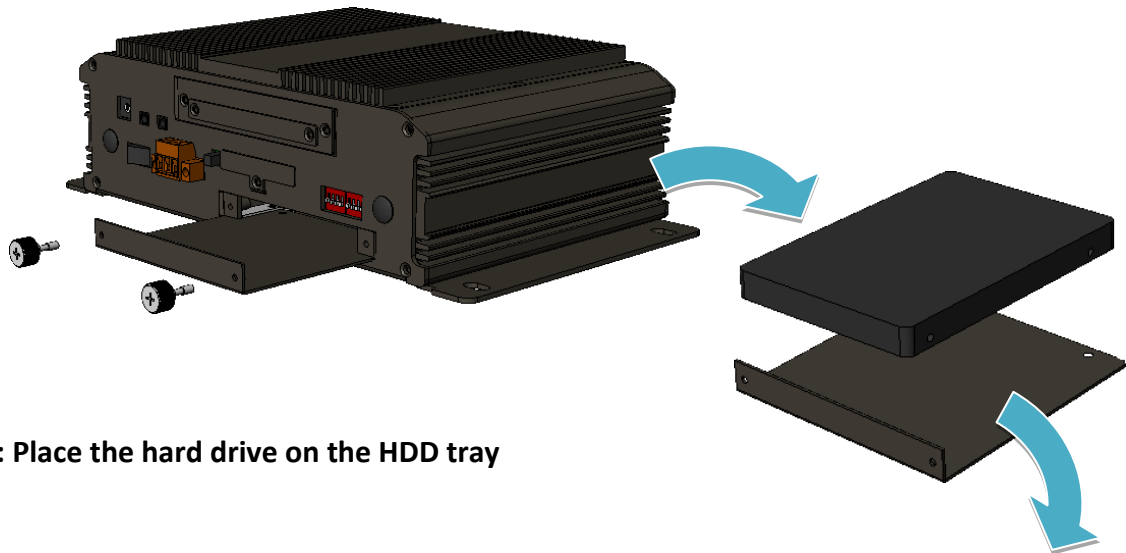
Step 2: Place the hard drive on the HDD tray

Step 3: Make sure the hard drive and HDD tray screw holes align, and then attach the 4 screws (M3x 6L)

Step 4: Slide the HDD tray into its slot

Step 5: Reattach the 2 drive screws
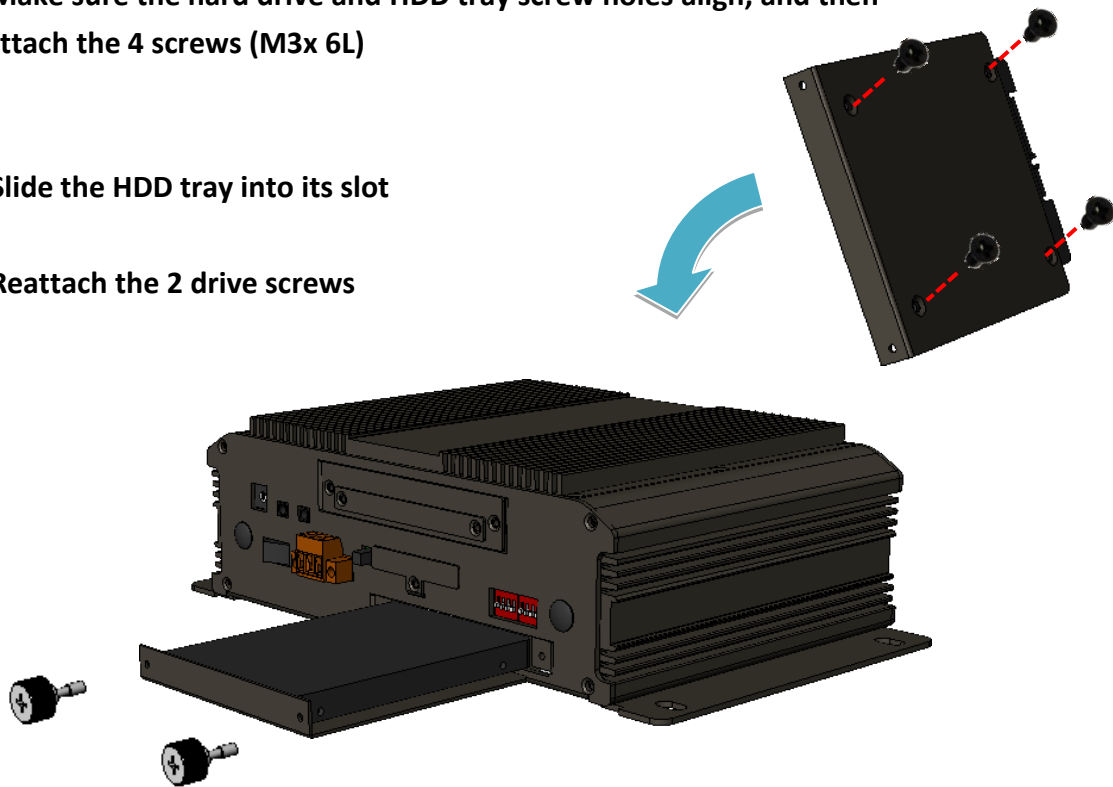
2.4. Mountinga XV-board

BoxPC has one expansion I/O slots to expand the functions. For more detailed information about the XV-board specifications, please refer to Appendix B. XV-Board Modules.

Step 1: Remove cover screws to remove the cover
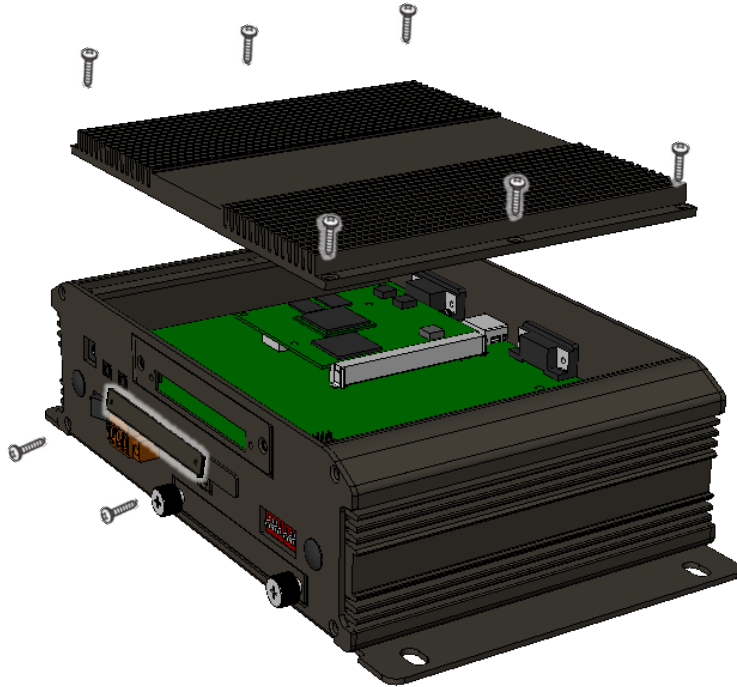
Step 2: Hold the XV-board vertically and align the socket, and then carefully press the XV-board onto the socket
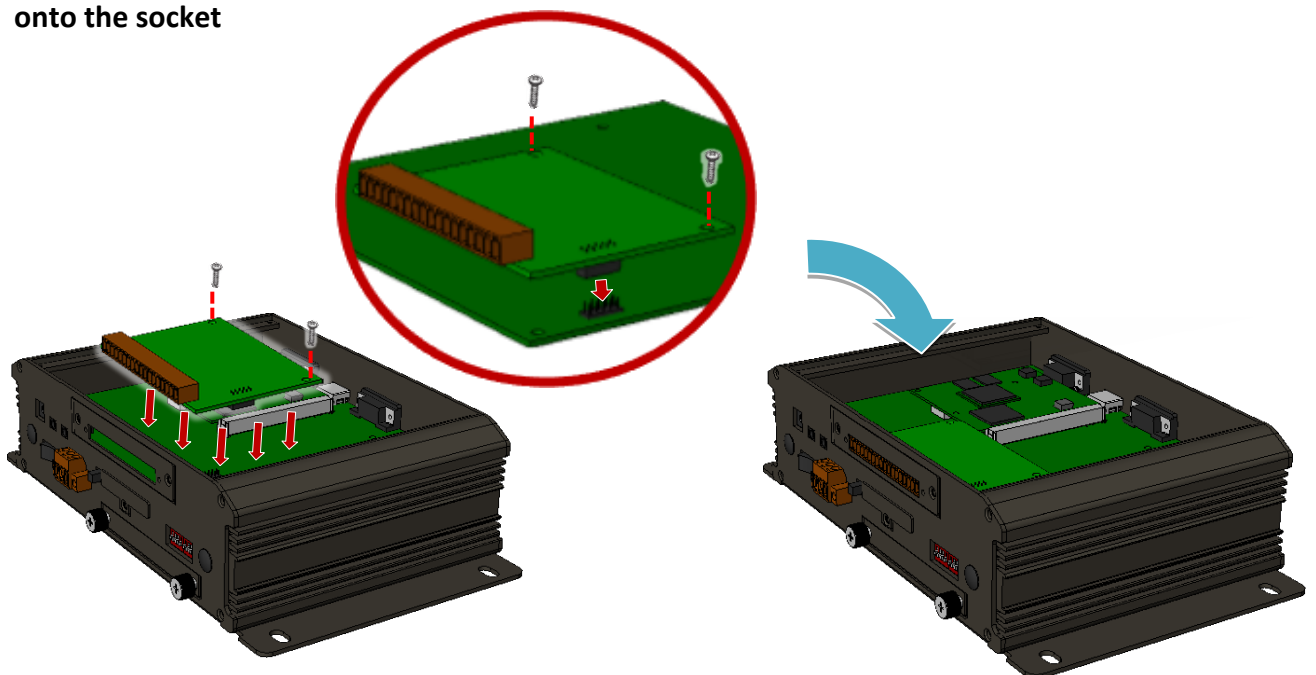
Step 3: Close the cover and then fasten the screws
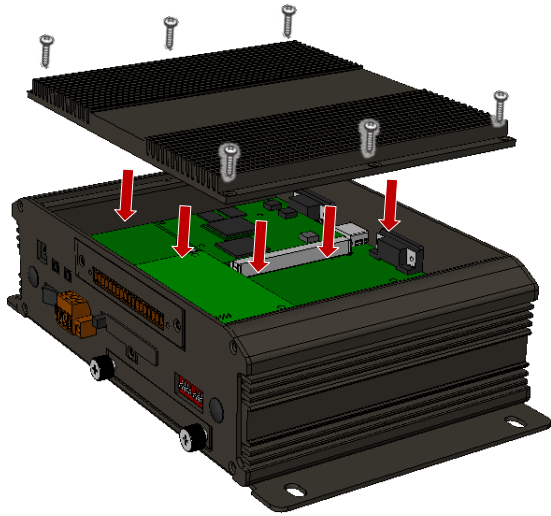
Step 4: Insert the I/O terminal and then stick the I/O sticker
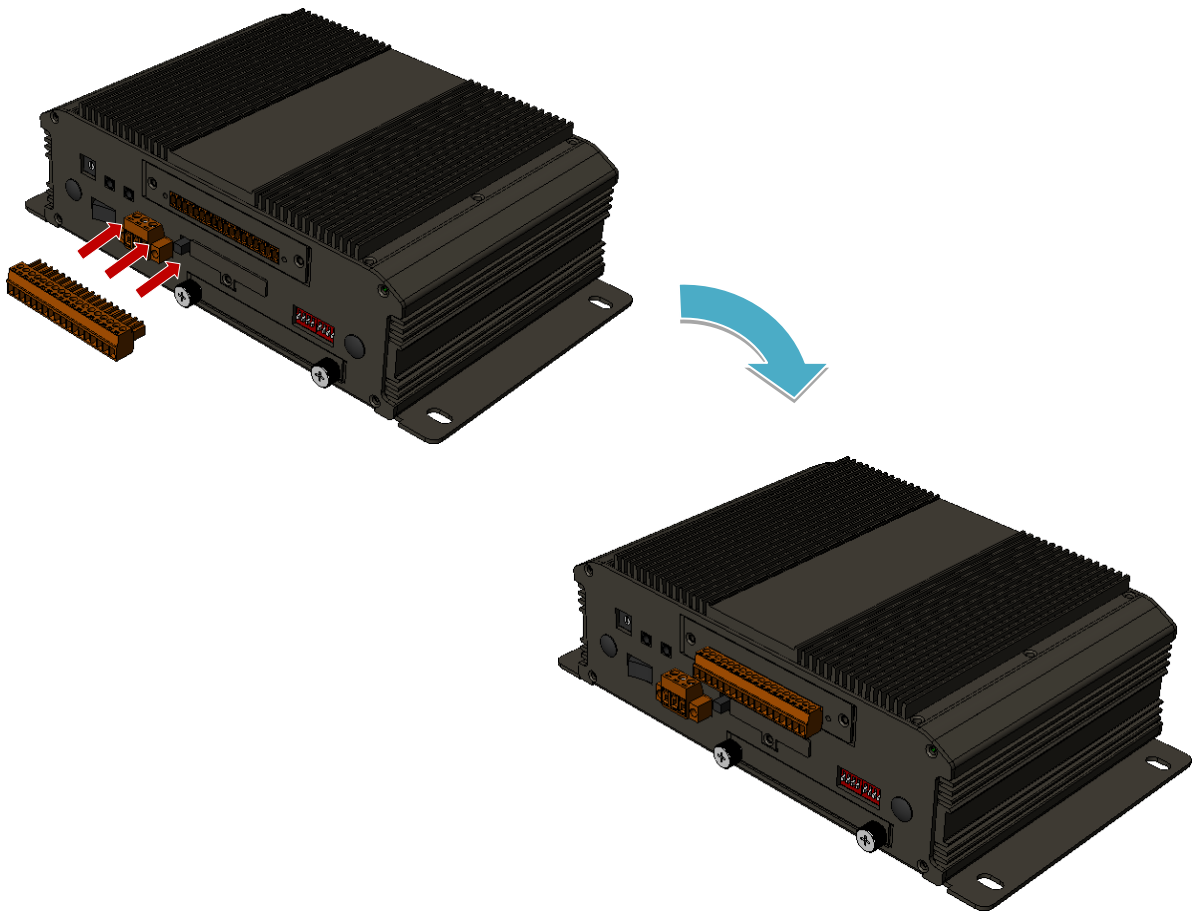
2.5. Inserting a Mini PCIe

iBPC series supports 1 Mini PCIe slot.

Step 1: Remove cover screws to remove the cover
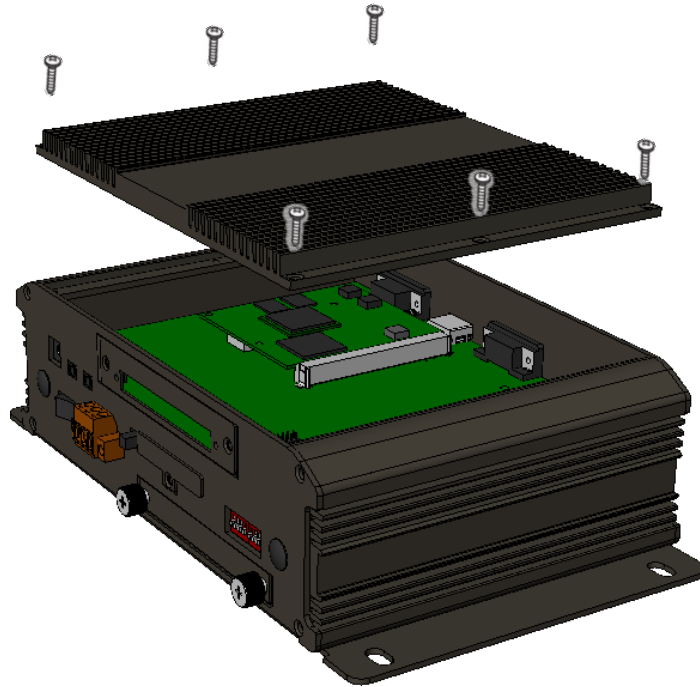
Step 2: Slide the Mini PCIe module into the mini PCIe slot
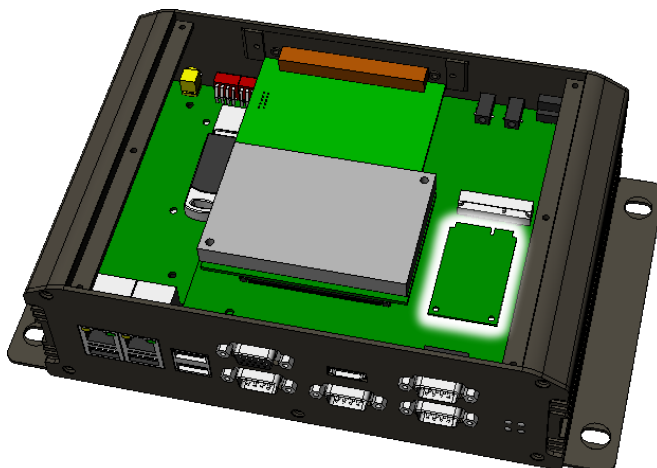
Step 3: Make sure the mini PCIe and slot screw holes align, and then attach the 2 screws (M2.6 x 4L)
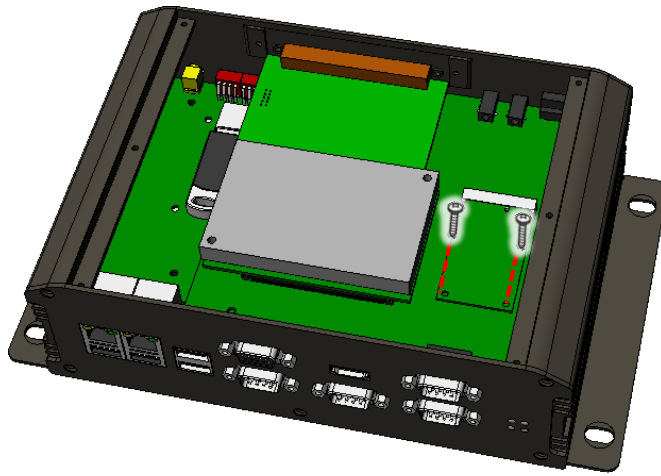
Step 4: Close the cover and then fasten the screws
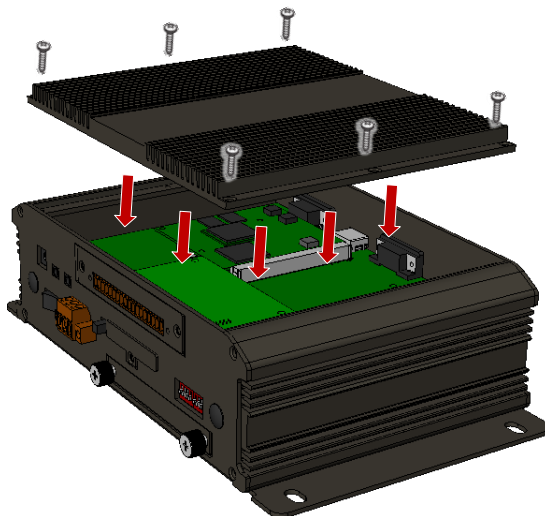
2.6. Adding an External Antenna

The BoxPC has two antenna connectors for the WIFI module of mini PCIe. Since the housing is locked. It is difficult for the user to mount the cable to the antenna by himself/herself so the preset has already been installed in the housing. On the installed cable, one side is the antenna and the other side is the connection hole for the cable to be placed.

The BoxPC has two cables which mount on the PCB of the BoxPC like below.
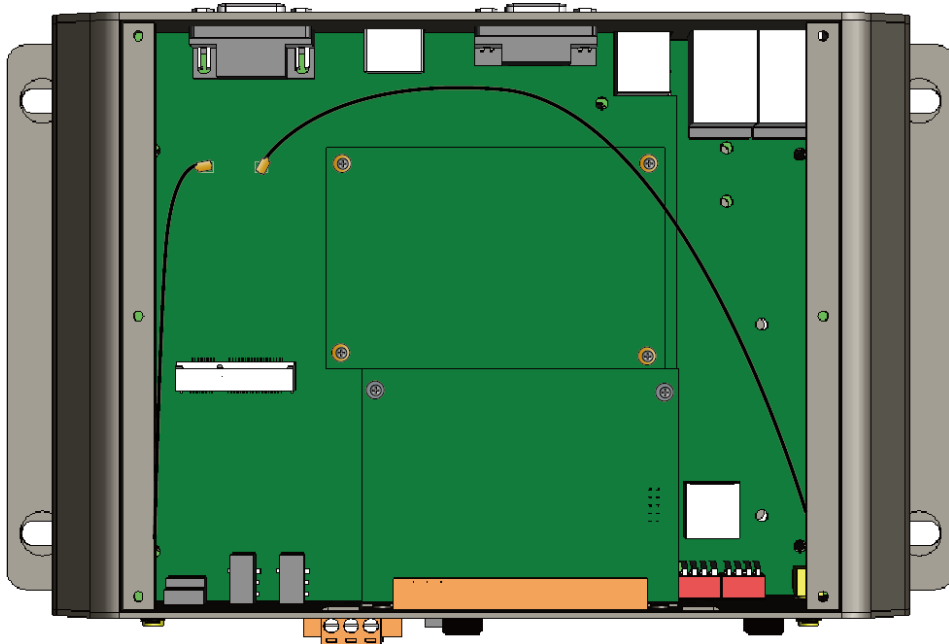
After you insert a WIFI module of mini PCIe (you can refer to the chapter 2.5 Inserting a Mini PCIe), you need attach the cable on the mini PCIe module like below, and mount wireless antenna, then you can use the WIFI module at BoxPC.
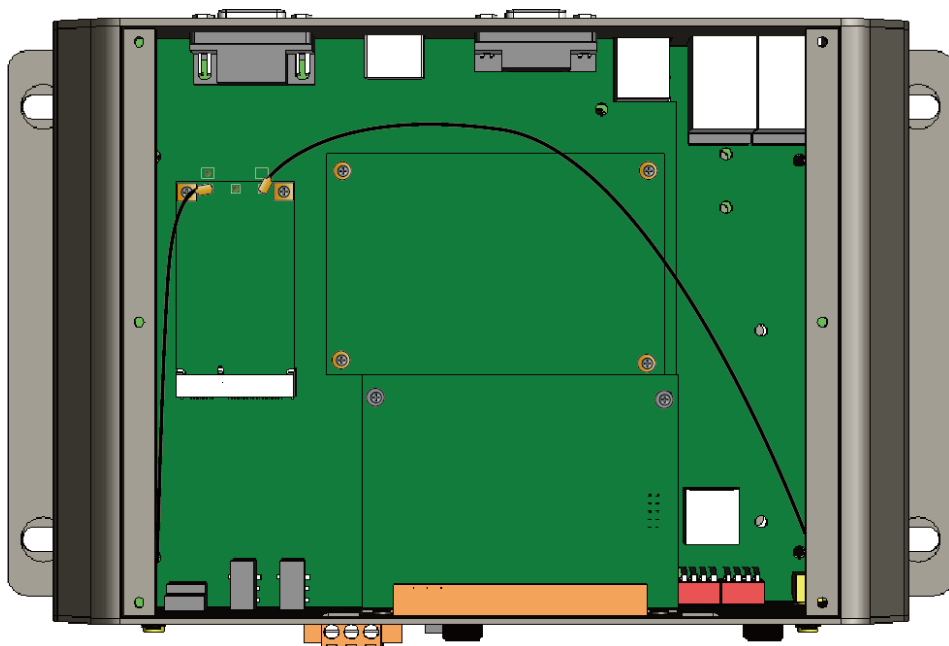
3. BIOS Setup

BoxPC is equipped with the AMI BIOS stored in Flash ROM. These BIOS has a built-in Setup program that allows users to modify the basic system configuration easily. This type of information is stored in CMOS RAM so that it is retained during power-off periods. When system is turned on, BoxPC communicates with peripheral devices and checks its hardware resources against the configuration information stored in the CMOS memory. If any error is detected, or the CMOS parameters need to be initially defined, the diagnostic program will prompt the user to enter the SETUP program. Some errors are significant enough to abort the start up.

Entering Setup -- Launch System Setup

Power on the computer and the system will start POST (Power On Self Test) process. When the message below appears on the screen, press <**Del**> key will enter BIOS setup screen.

Press <Del> to enter SETUP
If the message disappears before responding and still wish to enter Setup, please restart the system by turning it OFF and On. It can be also restarted by pressing <Ctrl>, <Alt>, and <Delete> keys on keyboard simultaneously.

Press <F1> to Run General Help or Resume
The BIOS setup program provides a General Help screen. The menu can be called up from any menu by pressing <F1>. The Help screen lists all the possible keys to use and the selections for the highlighted item. Press <Esc> to exit the Help screen.
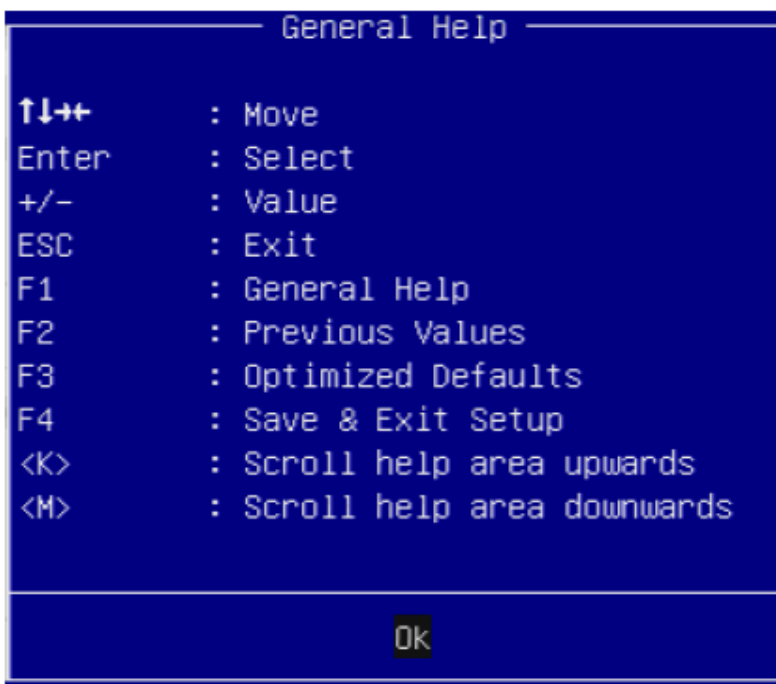
How to recovery the BIOS setting

If it isn't necessary, recommended that you should avoid changing the chipset's defaults. Changing the settings may cause some problems. If there is a situation where you cannot reboot, you want to recovery the BIOS setting to the original settings.

Recovery the BIOS settings, you need close the power of BoxPC and uninstall the battery from BoxPC, then want about 10~15 seconds and install the battery. After that, you will get an original BIOS setting.

About uninstalling/installing the battery, you can refer to the chapter Appendix D.

Main

Use this menu for basic system configurations, such as time, date etc.

```
              Aptio Setup Utility - Copyright (C) 2013 American Megatrends, Inc.
      Main  Configuration  Security  Boot  Save & Exit

      Project Name                      PCOM-BA00
      BIOS Version & Build Date         40814T00 (08/14/2014 09:32:23)
      EC Version & Build Date           40520T00 (05/20/2014)

      Processor information
      Brand String                      Intel(R) Atom(TM) CPU E3845 @ 1.91GHz

      Memory Information
      Total Memory                      2048 MB (LPDDR3)

      TXE Information
      TXE FW Version                    01.01.00.1113

      System Date                       [Tue 01/10/2012]
      System Time                       [03:02:00]

      Access Level                      Administrator




              Version 2.16.1242. Copyright (C) 2013 American Megatrends, Inc.
```

System Date

View or set system date.

The date format is <Day>, <Month><Date><Year>. Use [Tab] to select<Day>, <Month>,<Date> and <Year>. Use [＋] or [－] to configure system Date.

System Time

View or set system time.

The time format is <Hour><Minute><Second>. Use [Tab] to select <Hour >, <Minute > and <Second >. Use [＋] or [－] to configure system Time.

Configuration

```
            Aptio Setup Utility - Copyright (C) 2013 American Megatrends, Inc.
    Main   Configuration  Security  Boot  Save & Exit

 ▶ CPU Configuration                                     CPU Configuration Parameters
 ▶ Chipset Configuration
 ▶ LAN Configuration
 ▶ Graphics Configuration
 ▶ PCI/PCIE Configuration
 ▶ SATA Configuration
 ▶ USB Configuration
 ▶ Power Control Configuration
 ▶ TPM Configuration
 ▶ Super IO Configuration
 ▶ H/W Monitor
 ▶ Serial Port Console Redirection
                                                        →←: Select Screen
 ▶ SIO Configuration                                    ↑↓: Select Item
                                                        Enter: Select
                                                        +/-: Change Opt.
                                                        F1: General Help
                                                        F2: Previous Values
                                                        F3: Optimized Defaults
                                                        F4: Save & Exit
                                                        ESC: Exit



           Version 2.16.1242. Copyright (C) 2013 American Megatrends, Inc.
```

CPU Configuration

CPU Configuration Parameters.

```
                Aptio Setup Utility - Copyright (C) 2013 American Megatrends, Inc.
   Configuration

   CPU Configuration                                          Number of cores to enable in
                                                              each processor package.
   CPU Signature               30673
   Microcode Patch             31e
   Max CPU Speed               1910 MHz
   Min CPU Speed               500 MHz
   Processor Cores             4
   Intel HT Technology         Not Supported
   Intel VT-x Technology       Supported
   64-bit                      Supported
   L1 Data Cache               24 kB x 4
   L1 Code Cache               32 kB x 4
   L2 Cache                    1024 kB x 2

                                                              →←: Select Screen
   Active Processor Cores      [All]                          ↑↓: Select Item
   Intel Virtualization Technology  [Enabled]                 Enter: Select
   EIST                        [Enabled]                      +/-: Change Opt.
   CPU C6 report               [Disabled]                     F1: General Help
                                                              F2: Previous Values
                                                              F3: Optimized Defaults
                                                              F4: Save & Exit
                                                              ESC: Exit



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```

Active Processor Cores

Number of cores to enable in each processor package

Choices: All, 1.

Intel Virtualization Technology

When enabled, a VMM can utilize the additional hardware capabilities provided by Vanderpool Technology. You can't change this to Disabled, it's locked.

Choices: Disabled, Enabled.

EIST

Enable/Disable Intel Speed Step.

Choices: Disabled, Enabled.

CPU C6 report

Enable/Disable CPU C6 (ACPI C3) report to OS

Choices: Disabled, Enabled. BIOS Setup Information

Chipset Configuration

Configuration Chipset Feature

```
         Aptio Setup Utility - Copyright (C) 2013 American Megatrends, Inc.
  Configuration

  Chipset Configuration                                      Enable or Disable the High
                                                             Precision Event Timer.
  High Precision Timer              [Enabled]
  Audio Controller                  [Enabled]

  Memory Information

  Total Memory                      2048 MB (LPDDR3)
  Memory Slot0                      2048 MB (LPDDR3)
  Memory Slot1                      Not Present


                                                             ++: Select Screen
                                                             ↑↓: Select Item
                                                             Enter: Select
                                                             +/-: Change Opt.
                                                             F1: General Help
                                                             F2: Previous Values
                                                             F3: Optimized Defaults
                                                             F4: Save & Exit
                                                             ESC: Exit



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```

High Precision Timer

Enable or Disable the High Precision Event Timer.

Choices: Disabled, Enabled.

Audio Controller

Control Detection of the Azalia device. Disabled = Azalia will be unconditionally disabled.
Enabled = Azalia will be unconditionally enabled. Auto = Azalia will be enabled if present.
Disable otherwise.

Choices: Disabled, Enabled.

Max TOLUD

Select how much memory for OS.

Choices : Dynamic, 1 GB, 1.25 GB, 1.5 GB, 1.75 GB, 2 GB, 2.25 GB, 2.5 GB, 2.75 GB, 3 GB

Warning!!Please don't change this item, or you will get a major problem at BoxPC.

LAN Configuration

Configuration On Board LAN Device

```
          Aptio Setup Utility - Copyright (C) 2013 American Megatrends, Inc.
     Configuration

    LAN Configuration                                    Launch Legacy PXE Rom .
                                                         [Disable] Not launch Rom,
                                                         [Enable] Force Launch Rom,
    N/A                                                  [Auto] Auto detect LAN Cable
    LAN MAC Address                00-00-00-00-00-00     status to Enable/Disable Rom
    Launch Legacy PXE Rom          [Auto]                initial.

    N/A
    LAN MAC Address                00-00-00-00-00-00
    Launch Legacy PXE Rom          [Auto]

    Intel Ethernet Controller WGI210AT
    LAN MAC Address                00-00-00-00-00-00     ++: Select Screen
    Launch Legacy PXE Rom          [Auto]                ↑↓: Select Item
                                                         Enter: Select
                                                         +/-: Change Opt.
                                                         F1: General Help
                                                         F2: Previous Values
                                                         F3: Optimized Defaults
                                                         F4: Save & Exit
                                                         ESC: Exit

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```

Launch Legacy PXE Rom

Launch Legacy PXE Rom. [Disable] Not launch Rom, [Enable] Force Launch Rom, [Auto] Auto detect LAN Cable status to Enable/Disable Rom initial.

Choices: Disabled, Enabled, Auto.

Wake OnLan Controller

Enable or Disable the Wake-on-LAN.

Choices: Disabled, Enabled.

Graphics Configuration

Configuration Graphics Settings

```
                Aptio Setup Utility - Copyright (C) 2013 American Megatrends, Inc.
     Configuration

  Graphics Configuration                                          Enable GOP Driver will unload
                                                                  VBIOS; Disbale it will load
  GOP Configuration                                               VBIOS
  GOP Driver                      [Enabled]

  Intel IGD Configuration
  Integrated Graphics Device      [Enabled]
  IGD Turbo Enable                [Enabled]
  Primary Display                 [IGD]
  DVMT Pre-Allocated              [64M]
  DVMT Total Gfx Mem              [256MB]

  IGD Output Display control - GOP
  Force Lid Status                [On]               ↔: Select Screen
  BIA                             [Auto]             ↑↓: Select Item
  ALS Support                     [Disabled]         Enter: Select
  IGD Flat Panel                  [Auto]             +/-: Change Opt.
  Pannel Scaling                  [Auto]             F1: General Help
                                                     F2: Previous Values
  IGD Output Display control - CSM                   F3: Optimized Defaults
  Primary IGFX Boot Display       [VBIOS Default]    F4: Save & Exit
  LCD Panel Type                  [VBIOS Default]    ESC: Exit
  Panel Scaling                   [Auto]
  Backlight Control               [PWM Normal]
  Active LFP                      [eDP Port-A]

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```

GOP Configuration

GOP Driver

Enable GOP Driver will unload VBIOS; Disable it will load VBIOS.

Choices: Enabled, Disabled.

Intel IGD Configuration

Integrated Graphics Device

Enable: Enable Integrated Graphics Device (IGD) when selected as the Primary Video Adapter.

Disable: Always disable IGD.

Choices: Enabled, Disabled.

IGD Turbo Enable

Enable: Enable IGD Turbo Enable. Disable: IGD Turbo Disable.

Choices: Enabled, Disabled.

Primary Display

Select which of IGD/PCI Graphics device should be Primary Display.

Choices: Auto, IGD, PCI, SG.

DVMT Pre-Allocated

Select DVMT 5.0 Pre-Allocated (Fixed) Graphics Memory sized used by the Internal Graphic Device.

Choices: 64M, 96M, 128M, 160M, 192M, 224M, 256M, 288M, 320M, 352M, 384M, 416M, 448M, 480M, 512M.

DVMT Total GfxMem

Select DVMT 5.0 Total Graphic Memory size used by the Internal Graphics Device.

Choices: 128MB, 256MN, Max.

IGD Output Display Control - CSM

Primary UGFX Boot Display

Select the video device which will be activated during POST. This has no effect if external graphics present. Secondary boot display selection will appear based on your election. VGA modes will be supported only on primary display.

Choices: VBIOS Default, CRT, EFP, LFP, EEP3, EEP2, LFP2.

Warning!!The choices EFP,LFP, EEP3, EEP2 and LFP2 will make BoxPC can't start, so please don't select these choices.

LCD Panel Type

Select LCD panel used by Internal Graphics Device by selecting the appropriate setup item.

Choices: VBIOS Default, 640x480 LVDS, 800x600 LVDS, 1024x768 LVDS, 1280x1024 LVDS, 1400x1050 (RB) LVDS, 1400x1050 LVDS, 1600x1200 LVDS, 1366x768 LVDS, 1680x1050 LVDS, 1920x1200 LVDS, 1440x900 LVDS, 1600x900 LVDS, etc.

Panel Scaling

Select the LCD Panel scaling option used by Internal Graphic device.

Choices: Auto, Off, Force Scaling.

Backlight Control

Back Light Control Setting

Choices: PWM Inverted, PWM Normal, GMBus Inverted, GMBus Normal.

Active LFP

Select the Active LFP configuration.

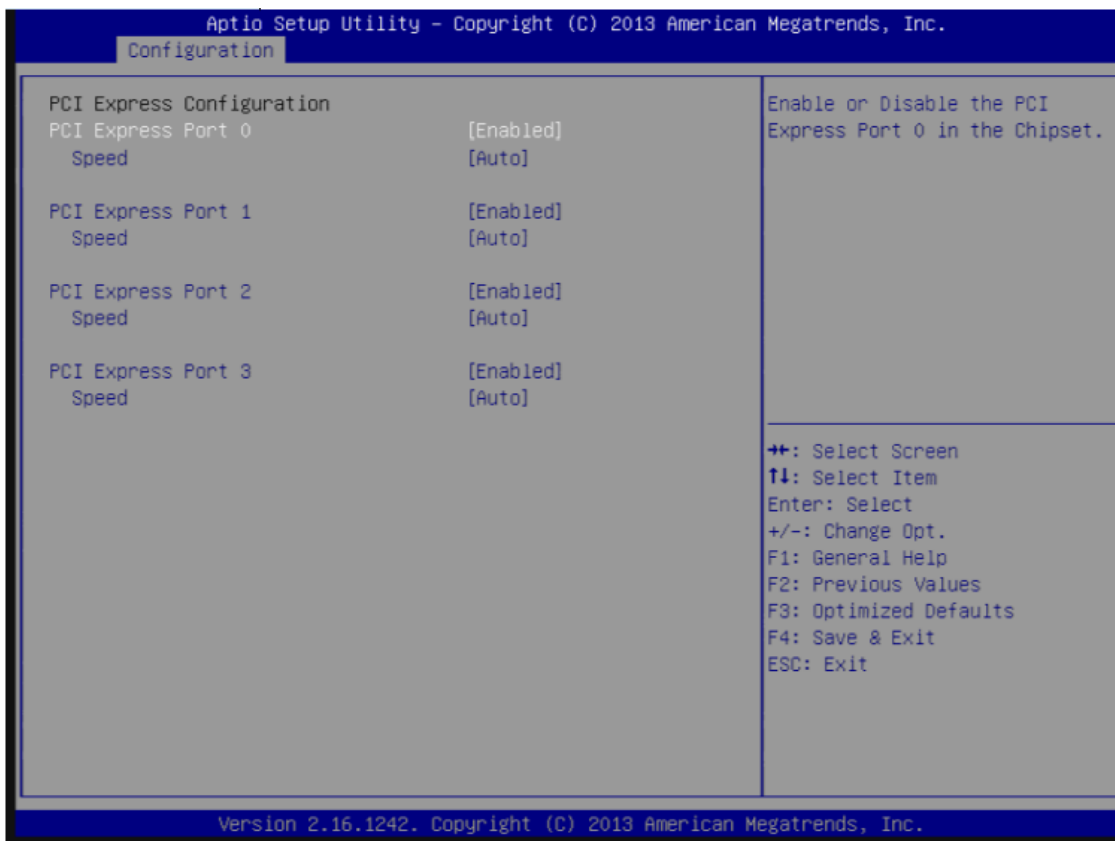Choices: No LVDS, Int-LVDS, SDVDLVDS, eDP Port-A, eDP Port-D.

PCI/PCIE Configuration

PCI, PCI-X and PCI Express Settings.

```
          Aptio Setup Utility - Copyright (C) 2013 American Megatrends, Inc.
   Configuration

   PCI/PCIE Configuration                                    PCI Express Configuration
                                                             settings

 ▶ PCI Express Configuration




                                                             ↔: Select Screen
                                                             ↑↓: Select Item
                                                             Enter: Select
                                                             +/-: Change Opt.
                                                             F1: General Help
                                                             F2: Previous Values
                                                             F3: Optimized Defaults
                                                             F4: Save & Exit
                                                             ESC: Exit



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```

PCI Express Configuration

PCI Express Settings

```
          Aptio Setup Utility - Copyright (C) 2013 American Megatrends, Inc.
   Configuration

   PCI Express Configuration                                 Enable or Disable the PCI
   PCI Express Port 0          [Enabled]                     Express Port 0 in the Chipset.
     Speed                     [Auto]

   PCI Express Port 1          [Enabled]
     Speed                     [Auto]

   PCI Express Port 2          [Enabled]
     Speed                     [Auto]

   PCI Express Port 3          [Enabled]
     Speed                     [Auto]

                                                             ↔: Select Screen
                                                             ↑↓: Select Item
                                                             Enter: Select
                                                             +/-: Change Opt.
                                                             F1: General Help
                                                             F2: Previous Values
                                                             F3: Optimized Defaults
                                                             F4: Save & Exit
                                                             ESC: Exit



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```

PCI Express Root Port 0-3

Enable or Disable the PCI Express Port 0 in the Chipset.

Choices: Enabled, Disabled.

Speed

Configuration PCIe Port Speed

Choices: Auto, Gen2, Gen1.

SATA configuration

SATA Device Option Settings

Serial-ATA (SATA)

Enable/Disable Serial ATA.

Choices: Enabled, Disabled.

Warning!!The BoxPC can't read the disk if you select disabled. You can back to BIOS to select enabled for fix the problem.

SATA Mode

Select IDE/AHCI.

Choices: IDE Mode, AHCI Mode.

Warning!!You will get a problem for select AHCI Mode. You can back to BIOS to select enabled for fix the problem.

SATA-ATA Port 0-1

Enable/Disable Serial ATA Port 0-1.

Choices: Enabled, Disabled.

Warning!!The BoxPC can't read the disk if you select disabled. You can back to BIOS to select enabled for fix the problem.

SATA Port 0-1 HotPlug

Enable/Disable Serial ATA Port 0-1 HotPlug.

Choices: Enabled, Disabled.

Warning!!You will get a problem for select Disabled. You can back to BIOS to select enabled for fix the problem.

USB Configuration

USB Configuration Parameters

```
                Aptio Setup Utility - Copyright (C) 2013 American Megatrends, Inc.
     Configuration

   USB Configuration                                              Enables Legacy USB support.
                                                                  AUTO option disables legacy
   USB Devices:                                                   support if no USB devices are
         1 Hub                                                    connected. DISABLE option will
                                                                  keep USB devices available
   Legacy USB Support               [Enabled]                     only for EFI applications.
   XHCI Legacy Support              [Enabled]
   XHCI Hand-off                    [Enabled]
   EHCI Hand-off                    [Disabled]
   USB Mass Storage Driver Support  [Enabled]
 ▶ USB Configuration
                                                                  ++: Select Screen
                                                                  ↑↓: Select Item
                                                                  Enter: Select
                                                                  +/-: Change Opt.
                                                                  F1: General Help
                                                                  F2: Previous Values
                                                                  F3: Optimized Defaults
                                                                  F4: Save & Exit
                                                                  ESC: Exit


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```

Legacy USB Support

Enables Legacy USB support. AUTO option disables legacy support if no USB devices are connected.
DISABLE option will keep USB devices available only for EFI application.

Choices: Enabled, Disabled, Auto.

xHCI Legacy Support

Enable/Disable XHCI Controller Legacy support

Choices: Enabled, Disabled.

xHCI Hand-off

This is a workaround for OSes without XHCI hand-off support. The XHCI ownership change should
be claimed by XHCI driver.

Choices: Enabled, Disabled.

EHCI Hand-off

This is a workaround for OSes without EHCI hand-off support. The EHCI ownership change should
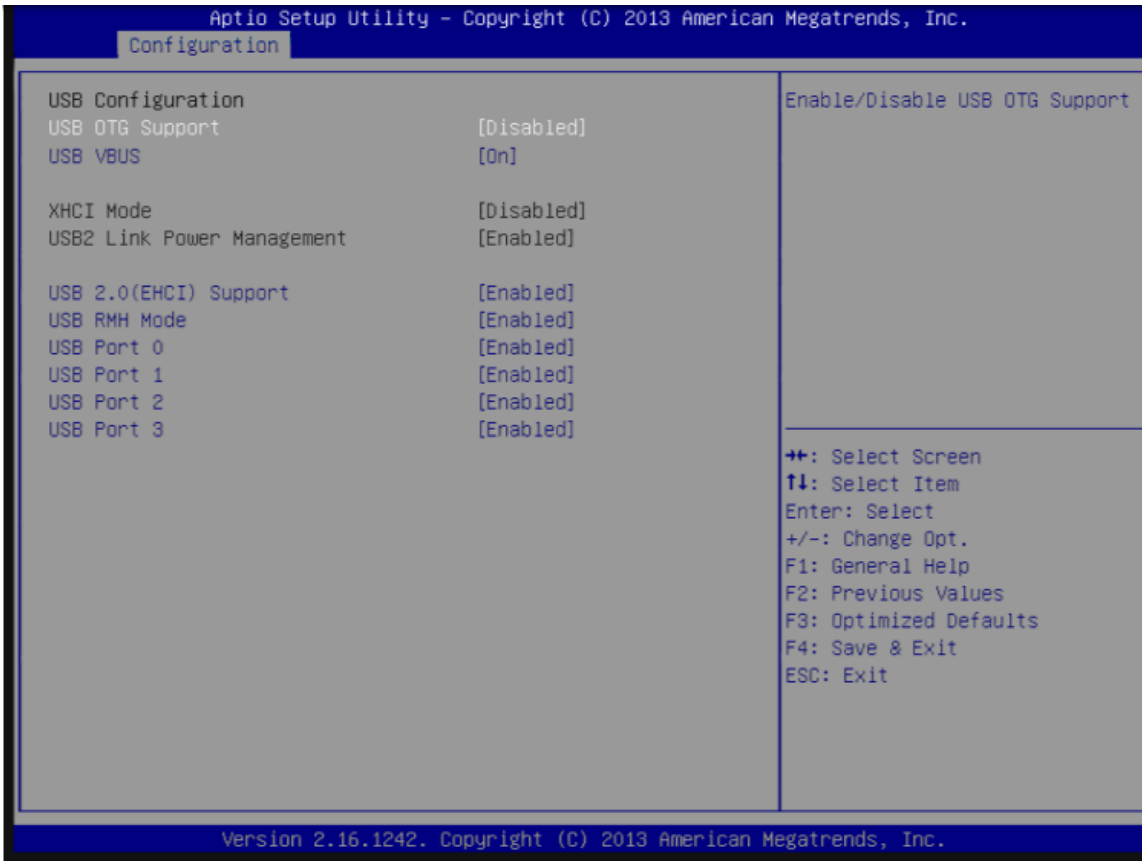be claimed by EHCI driver.

Choices: Enabled, Disabled.

USB Mass Storage Driver Support

Enable/Disable USB Mass Storage Driver Support

Choices: Enabled, Disabled.

 USB Configuration

USB Configuration Settings

USB 2.0 (EHCI) Support

Control the USB EHCI (USB 2.0) function. One EHCI controller must always be enabled.

Choices: Disabled, Enabled.

USB RMH Mode

Disable/Enable the USB RMH Mode.

Choices: Disabled, Enabled.

USB Port #0~#3

Enable/Disable USB port #0~#3

Choices: Disabled, Enabled.

Power Control Configuration

System Power Control Configuration Parameters

```
           Aptio Setup Utility - Copyright (C) 2013 American Megatrends, Inc.
     Configuration

  Power Control Configuration                                     Enables or Disables System
                                                                  ability to Hibernate (OS/S4
  Enable Hibernation                  [Enabled]                   Sleep State). This option may
  ACPI Sleep State                    [S3 (Suspend to RAM)]       be not effective with some OS.
  Restore AC Power Loss               [Last State]




                                                                  ++: Select Screen
                                                                  ↑↓: Select Item
                                                                  Enter: Select
                                                                  +/-: Change Opt.
                                                                  F1: General Help
                                                                  F2: Previous Values
                                                                  F3: Optimized Defaults
                                                                  F4: Save & Exit
                                                                  ESC: Exit




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```

Enable Hibernation

Enable or Disable system ability to Hibernate (OS/S4 Sleep State). This option may be not effective with some OS.

Choices: Disabled, Enabled.

ACPI Sleep state

Select the highest ACPI sleep state the system will enter when the SUSPEND button is pressed.

Choices: Suspend Disable, S3 (Suspend to RAM).

Restore AC Power Loss

Select AC power state when power is re-applied after a power failure.

Choices: Power off, Power On, Last State.

TPM Configuration

Trusted Computing Settings

Security Device Support

Enable or disable BIOS support for security device. OS will not show security device. TCGEFI protocol and INT1A interface will not be available.

Choices: Disabled, Enabled.

Super IO Configuration

Super I/O configuration
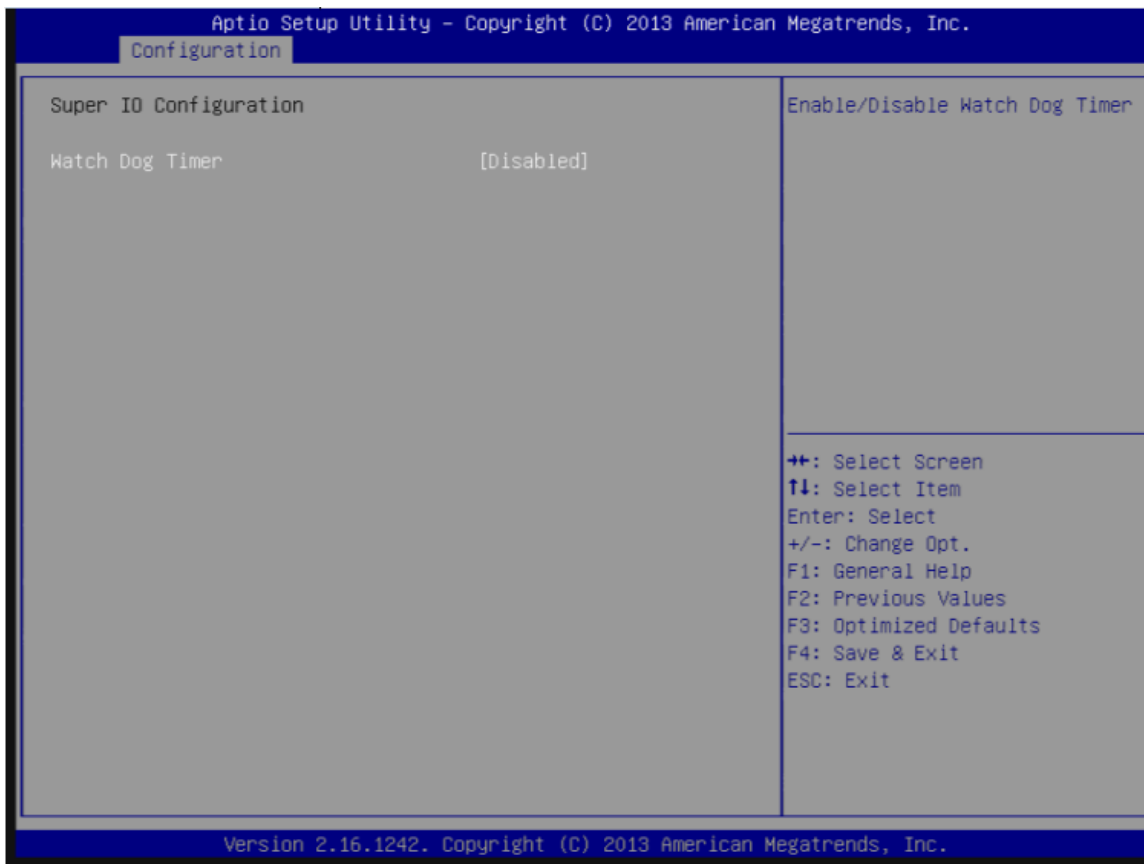
Serial Port

Enable/Disable Serial Port.

Choices: Disabled, Enabled.

Watch Dog Timer

Enable/Disable Watch Dog Timer.

Choices: Disabled, Enabled.

H/W Monitor

Monitor Hardware Status.

```
           Aptio Setup Utility - Copyright (C) 2013 American Megatrends, Inc.
    Configuration

    CPU temperature              : +39 C
    Fan Speed                    : N/A
    Vcore                        : +0.936 V
    +3.3V                        : +3.420 V
    +5V                          : +5.270 V
    +12V                         : +12.454 V
    +1.35V                       : +1.383 V





                                                    ++: Select Screen
                                                    ↑↓: Select Item
                                                    Enter: Select
                                                    +/-: Change Opt.
                                                    F1: General Help
                                                    F2: Previous Values
                                                    F3: Optimized Defaults
                                                    F4: Save & Exit
                                                    ESC: Exit




           Version 2.16.1242. Copyright (C) 2013 American Megatrends, Inc.
```

Serial Port Console Redirection

```
           Aptio Setup Utility - Copyright (C) 2013 American Megatrends, Inc.
    Configuration

    Serial Port Console Redirection                 Console Redirection Enable or
                                                    Disable.


    COM0
    Console Redirection          [Disabled]
  ▶ Console Redirection Settings





                                                    ++: Select Screen
                                                    ↑↓: Select Item
                                                    Enter: Select
                                                    +/-: Change Opt.
                                                    F1: General Help
                                                    F2: Previous Values
                                                    F3: Optimized Defaults
                                                    F4: Save & Exit
                                                    ESC: Exit




           Version 2.16.1242. Copyright (C) 2013 American Megatrends, Inc.
```

Console Redirection

Console Redirection Enable or Disable.

Choices: Disable, Enable.

Security

```
          Aptio Setup Utility - Copyright (C) 2013 American Megatrends, Inc.
  Main  Configuration  Security  Boot  Save & Exit

  Password Description                                Set Administrator Password

  If ONLY the Administrator's password is set,
  then this only limits access to Setup and is
  only asked for when entering Setup.
  If ONLY the User's password is set, then this
  is a power on password and must be entered to
  boot or enter Setup. In Setup the User will
  have Administrator rights.
  The password length must be
  in the following range:
  Minimum length                  3
  Maximum length                  20
                                                     →←: Select Screen
                                                     ↑↓: Select Item
  Administrator Password                             Enter: Select
  User Password                                      +/-: Change Opt.
                                                     F1: General Help
                                                     F2: Previous Values
                                                     F3: Optimized Defaults
                                                     F4: Save & Exit
                                                     ESC: Exit



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```

Administrator Password

Set Administrator Password

User Password

Set User Password

HDD Security Configuration:

HDD 0~N: (device name)

Security information of device

Boot

Boot configuration

```
                Aptio Setup Utility - Copyright (C) 2013 American Megatrends, Inc.
     Main   Configuration  Security  Boot  Save & Exit

     Boot Configuration                                    Number of seconds to wait for
     Setup Prompt Timeout              1                   setup activation key.
     Bootup NumLock State              [On]                65535(0xFFFF) means indefinite
     Post Report                       [Disabled]          waiting.
     Summary Screen                    [Disabled]
     CSM Support                       [Enabled]
     GateA20 Active                    [Upon Request]
     Option ROM Messages               [Force BIOS]
     INT19 Trap Response               [Immediate]

     Storage                           [Do not launch]

     Full Screen Logo                  [Disabled]
     OS Selection                      [Windows 8.X]       →←: Select Screen
     Fast Boot                         [Disabled]          ↑↓: Select Item
                                                           Enter: Select
                                                           +/-: Change Opt.
     Boot Option Priorities                                F1: General Help
     Boot Option #1                    [UEFI: Built-in EFI ...]  F2: Previous Values
                                                           F3: Optimized Defaults
                                                           F4: Save & Exit
                                                           ESC: Exit




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```

Setup Prompt Timeout

Number of seconds to wait for setup activation key.65535 (0xFFFF) means indefinite waiting.

Choices: 0, 1, etc.

BootupNumLock State

Select the keyboard Numlock state.

Choices: On, off.

Post Report

Post report support enable/disable.

Choices: Disabled, Enabled.

Summary Screen

Summary Screen support Enable/Disable.

Choices: Disabled, Enabled.

CSM Support

Enable/Disable CSM support.

Choices: Disabled, Enabled.

GateA20 Active

UPON REQUEST – GA20 can be disabled using BIOS services.

ALWAYS – do not allow disabling GA20; this option is useful when any RT code is excused above 1MB.

Choices: Upon Request, Always.

Option ROM Messages

Set display mode for option ROM

Choices: Force BIOS, Keep Current.

INI19 Trap Response

BIOS reaction on INT19 trapping by option ROM: IMMEDIATE – execute the trap right away; POSTPONED – execute the trap during legacy boot.

Choices: Immediate, Postponed.

Storage

Controls the execution of UEFI and Legacy Storage OpROM.

Choices: Do not launch, UEFI only, Legacy only.

Fill Screen Logo

Enable or Disable quiet boot option and full screen logo.

Choices: Disabled, Enabled.

OS Selection

Choices: Windows 8.X, windows 7.

Fast Boot

Enable or disable boot with initialization of a minimal set of devices required to launch active for BBS boot options.

Choices: Disabled, Enabled.

Boot option priorities

Boot Option #1~N

Sets the system boot order.

Choices: UEFI: Built-in EFI Shell, Disable.

Hard Drive BBS Priorities

choose which store device will boot first

Save & Exit

```
                Aptio Setup Utility - Copyright (C) 2013 American Megatrends, Inc.
      Main  Configuration  Security  Boot  Save & Exit

     Save Changes and Reset                                Reset the system after saving
     Discard Changes and Reset                             the changes.

     Restore Defaults
     Boot Override
     UEFI: Built-in EFI Shell

     Launch EFI Shell from filesystem device

                                                           ↔: Select Screen
                                                           ↑↓: Select Item
                                                           Enter: Select
                                                           +/-: Change Opt.
                                                           F1: General Help
                                                           F2: Previous Values
                                                           F3: Optimized Defaults
                                                           F4: Save & Exit
                                                           ESC: Exit

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```

Save Changes and Reset

Reset the system after saving the changes.

Disable Changes and Reset

Reset system setup without saving any changes.

Restore Defaults

Restore/Load Default values for all the setup options.

Launch EFI Shell from file system device

Boot to EFI Shell

4. Driver & Software installation

This chapter provides a brief introduction of drivers and utility tools installation for the BoxPC.

There are several tools and drivers designed for BoxPC. All of these are installed on BoxPC after OS installation and can work directly on BoxPC.

Tools for working with PC can be found separately on the CD that was provided with the package or by downloading the latest version from the ICP DAS web site.

CD:\BoxPC\

```
├── Driver
│       └── ibpc-4081
│               ├── X86
│               └── X64
└── Tools
        ├── PAC Utility
        └── DCON Utility
```
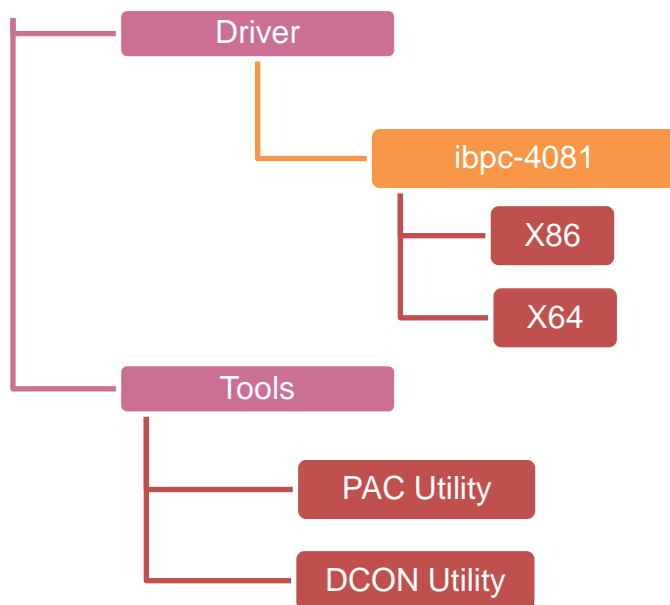
4.1. Driver installation

Before installation tools, you need to install the driver first to prepare device running.
All the drivers for BoxPC can be found on CD or downloaded the latest version from the ICP DAS web site.

CD:\BoxPC\drivers\ibpc-4081\X86\
  or
CD:\BoxPC\drivers\ibpc-4081\X64\

- Audio driver
- Chipset
- Graphics driver
- IO driver
- LAN
- MBI
- TXE
- USB3.0
- BP_Win_setup

x64
x86
→

- Audio Driver
- Chipset
- Graphics driver
- IO Drivers
- LAN
- TXE
- USB3.0
- BP_Win_setup_1.0.0_1000.exe
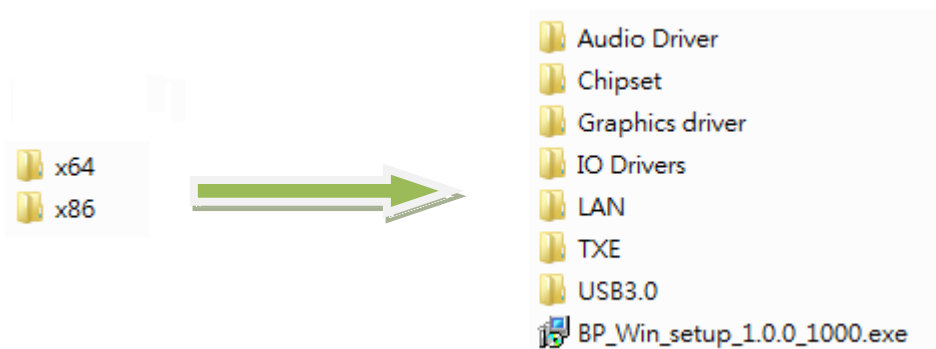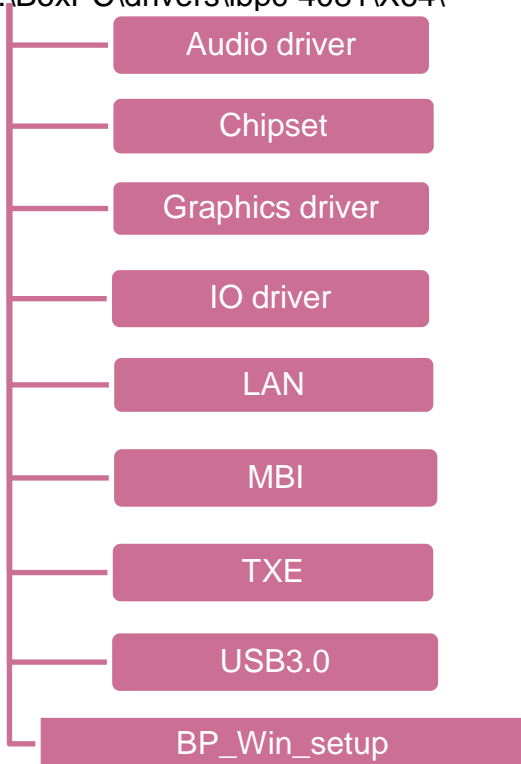
4.1.1. Installing Driver

Different versions of Windows require different drivers. Please install Windows OS, and then follow the sequence below to install the drivers.

Refer to the installation order and check what driver you need install for the Windows OS.

The applications will use administrator account by themselves, so you just need to open these applications.

Installation order	Name	Path	OS
1	Chipset Driver	CD:\BoxPC\driver\ibpc-4081\x86\Chipset\ChipSet Driver.zip	Windows 7/8/10 X86 (32bit)
		CD:\BoxPC\driver\ibpc-4081\x64\Chipset\ChipSet Driver.zip	Windows 7/8/10 X64 (64bit)
2	Graphics Driver	CD:\BoxPC\driver\ibpc-4081\x86\Graphics \WIN7\Graphics Driver.zip	Windows 7 X86 (32bit)
		CD:\BoxPC\driver\ibpc-4081\x64\Graphics \WIN7\Graphics Driver.zip	Windows 7 X64 (64bit)
		CD:\BoxPC\driver\ibpc-4081\x86\Graphics \WIN8WIN10\Graphics Driver.zip	Windows 8/10 X86 (32bit)
		CD:\BoxPC\driver\ibpc-4081\x64\Graphics \WIN8WIN10\Graphics Driver.zip	Windows 8/10 X64 (64bit)
3	LAN Driver	CD:\BoxPC\driver\ibpc-4081\x86\LAN\ LAN Driver.zip	Windows 7/8/10 X86 (32bit)
		CD:\BoxPC\driver\ibpc-4081\x64\LAN\ LAN Driver.zip	Windows 7/8/10 X64 (64bit)
4	Audio Driver	CD:\BoxPC\driver\ibpc-4081\x86\Audio\Audio Driver.zip	Windows 7/8/10 X86 (32bit)
		CD:\BoxPC\driver\ibpc-4081\x64\Audio\Audio Driver.zip	Windows 7/8/10 X64 (64bit)
5	IO Driver	CD:\BoxPC\driver\ibpc-4081\x86\IO\ WIN7\IO Driver.zip	Windows 7 X86 (32bit)

		CD:\BoxPC\driver\ibpc-4081\x64\IO\ WIN7\IO Driver.zip	Windows 7 X64 (64bit)
		CD:\BoxPC\driver\ibpc-4081\x86\IO\ WIN8\IO Driver.zip	Windows 8 X86 (32bit)
		CD:\BoxPC\driver\ibpc-4081\x64\IO\ WIN8\IO Driver.zip	Windows 8 X64 (64bit)
6	USB3.0 Driver	CD:\BoxPC\driver\ibpc-4081\x86\USB3.0\ LAN Driver.zip	Windows 7 X86 (32bit)
		CD:\BoxPC\driver\ibpc-4081\x64\USB3.0\ LAN Driver.zip	Windows 7 X64 (64bit)
7	TXE Driver	CD:\BoxPC\driver\ibpc-4081\x86\TXE\ TXE Driver.zip	Windows 8/10 X86 (32bit)
		CD:\BoxPC\driver\ibpc-4081\x64\TXE\ TXE Driver.zip	Windows 8/10 X64 (64bit)
8	ICPDAS Driver	CD:\BoxPC\driver\ibpc-4081\x86\ICPDAS\ BP_Win_setup_1.0.0_1000.exe	Windows 7/8/10 X86 (32bit)
		CD:\BoxPC\driver\ibpc-4081\x64\ICPDAS\ BP_Win_setup_1.0.0_1000.exe	Windows 7/8/10 X64 (64bit)

Double click the application from the specified path, then follow the instructions, you will finish the installation.

Please read 4.1.2 Installation ICPDAS Driver and follow the steps, when you install the ICPDAS Driver.

4.1.2. ICPDAS Driver Installation

If OS installed on BOXPC is Windows 7 64 bit, it's first to install the windows updates, KB3033929 and KB3035131.If you don't install two windows updates, you will get a bug while installing ICPDAS driver. Please install KB3035131 at first, then install KB3033929, you can find the path at the following table or download from Microsoft web site.

Name	Path	OS
KB3033929	CD:\BoxPC\update\Windows6.1-KB3033929-x64.msu	Windows 7 X64(64 bit)
KB3035131	CD:\BoxPC\update\Windows6.1-KB3035131-x64.msu	Windows 7 X64(64 bit)

It doesn't install two windows updates above in BOXPC with Window8/Windows 10.

Install ICPDAS driver

Double click the BP_Win_setup_1.0.0_1000.exe file, you will see the application's window like the following picture, press next to the next step.

Don't change the path of the installation software, or you will get a problem from it.
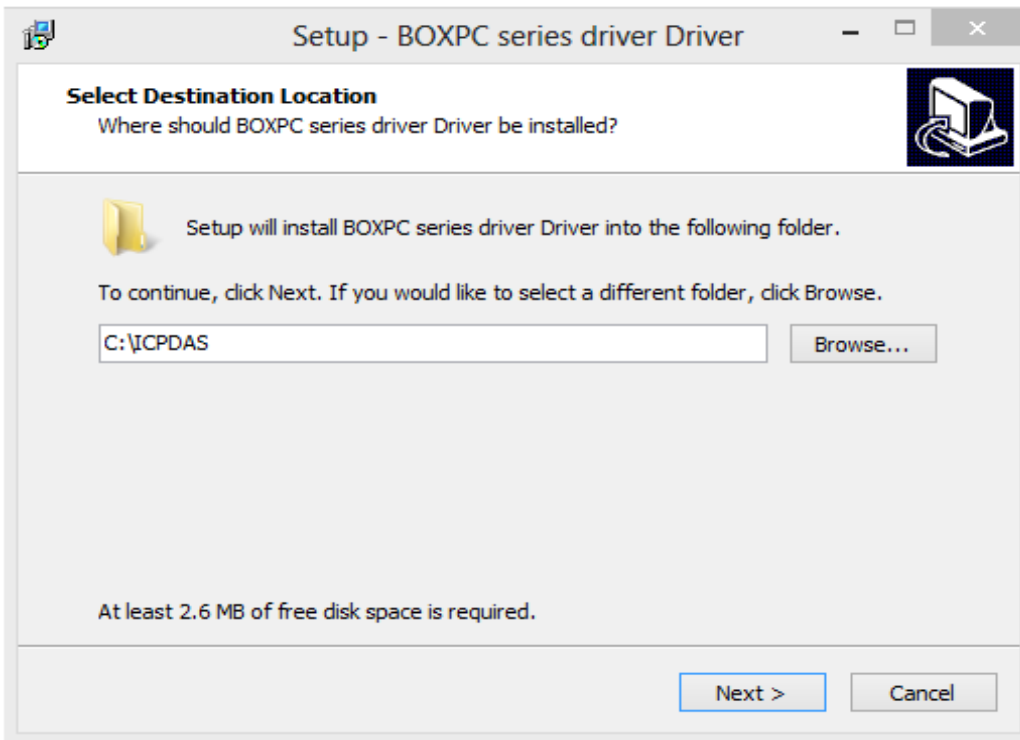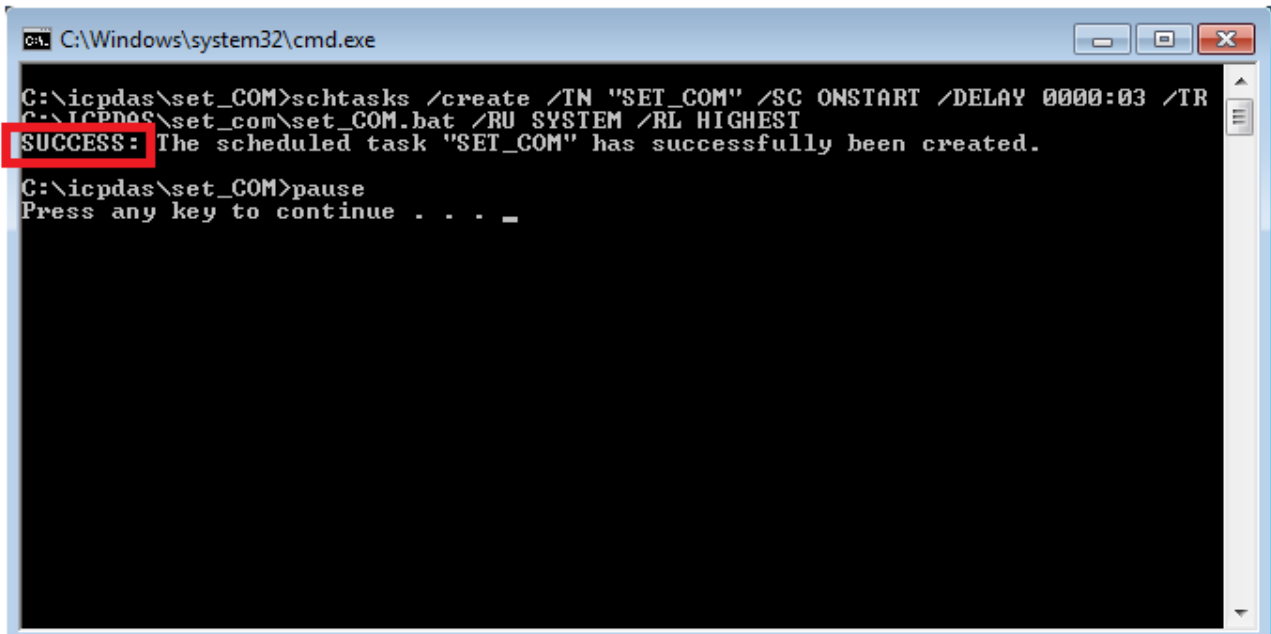
Check the path and press install to next step.
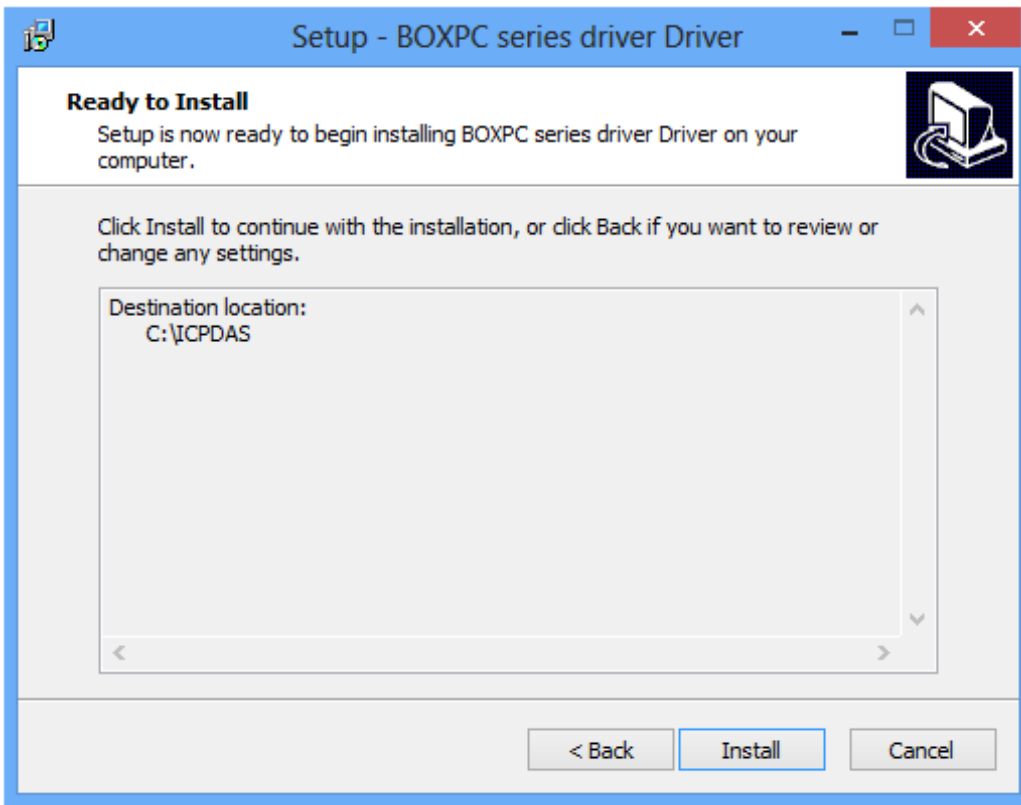
Start installing and wait.
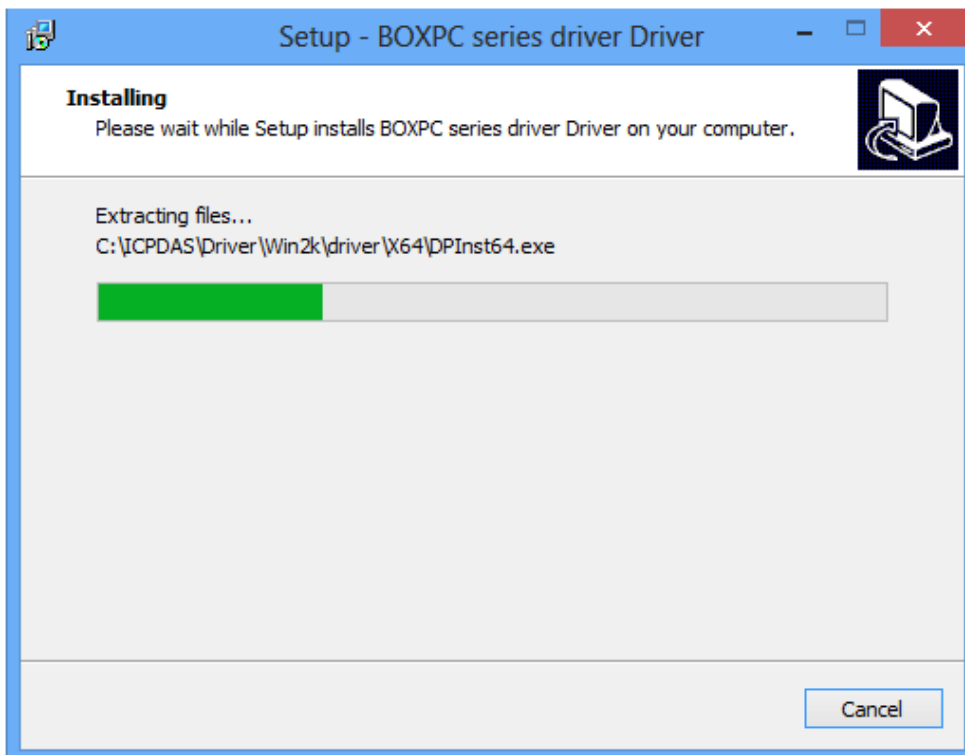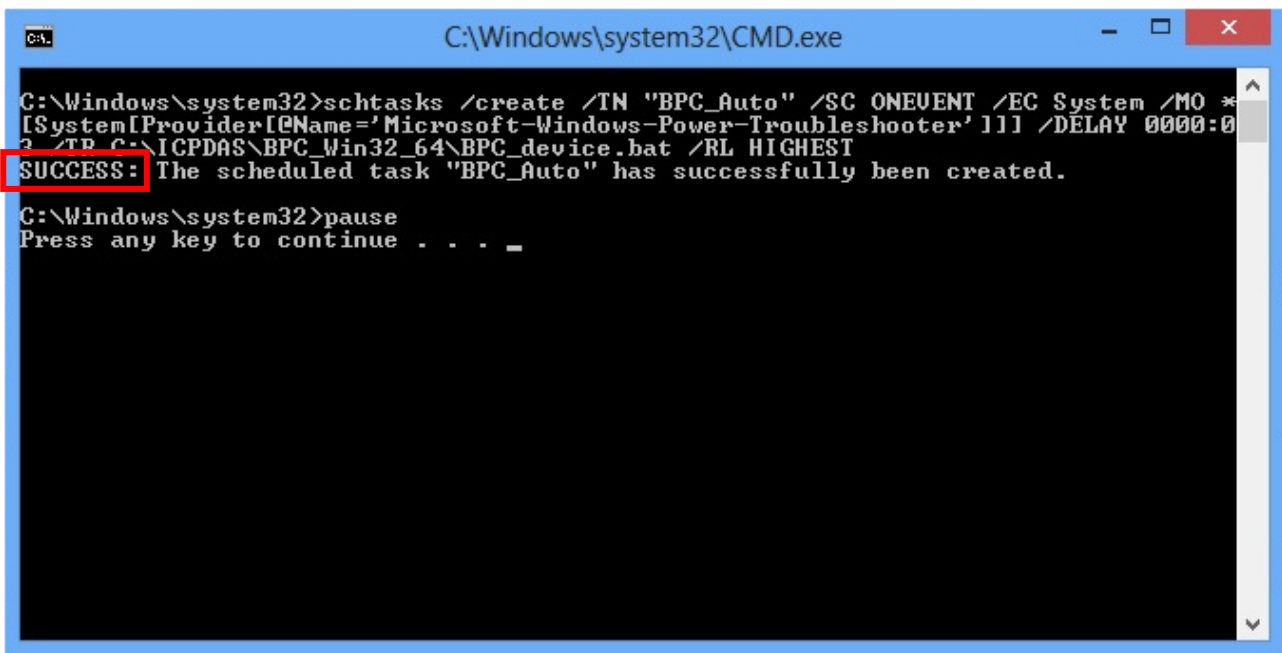
Check the creation success like red Box at following picture, then press any key to continue install. Because there have two commands need to work, so you would do it twice.

Start to install the Drivers, please checked "Always trust software from "ICP DAS Co., Ltd."" check box and press the Install button.

Finally, check Yes to restart the computer and press the Finish to finish installation.
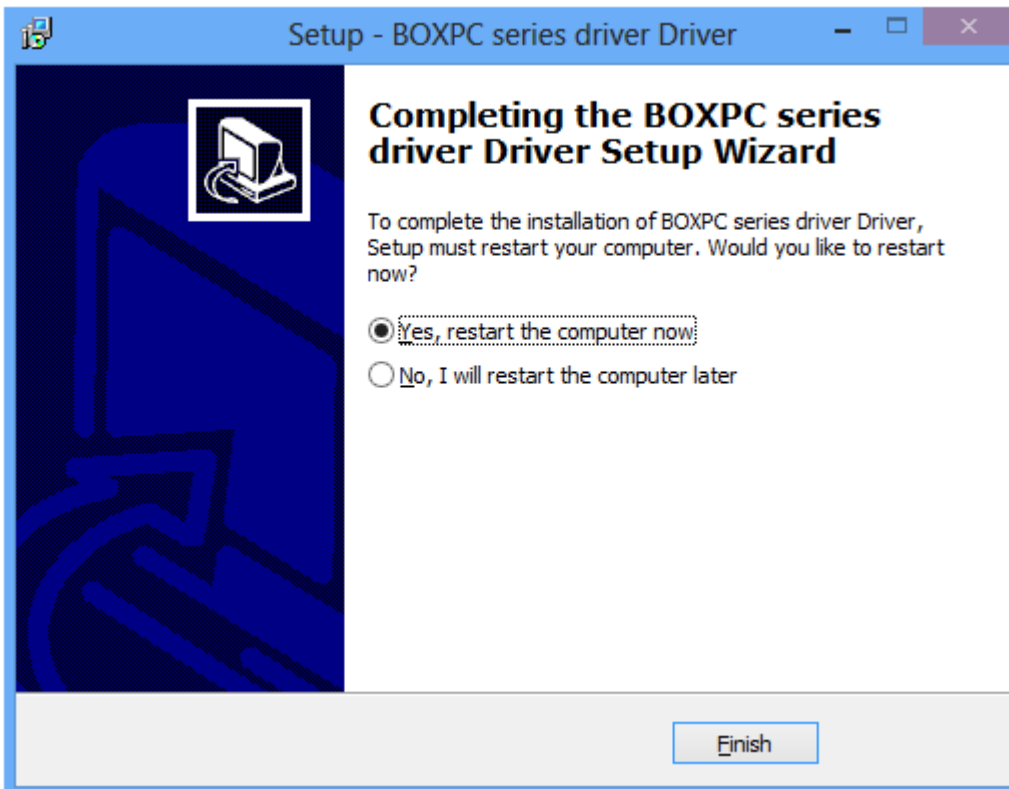
4.2. PAC Utility installation

PAC Utility is a collection of software applications that show information of BoxPC system. You must install this first when you want to use our applications or tools.

You find on CD or downloaded the latest version from the ICP DAS web site.

CD:\BoxPC\Tools\

└ PAC Utility

4.2.1. Installing PAC Utility

You can find the setup file at the following table, start the setup file, follow the instructions, and then it will show you system information.

Name	Path	OS
PAC Utility	CD:\BoxPC\tools\PACUtility\PAC_Utility setup.exe	Windows 7/8/10

Notice: please checked "create a desktop shortcut" , if you not checked, you need open the PAC Utility at the Path : C:\ICPDAS\Utility\PAC Utility\PAC_Utility.exe
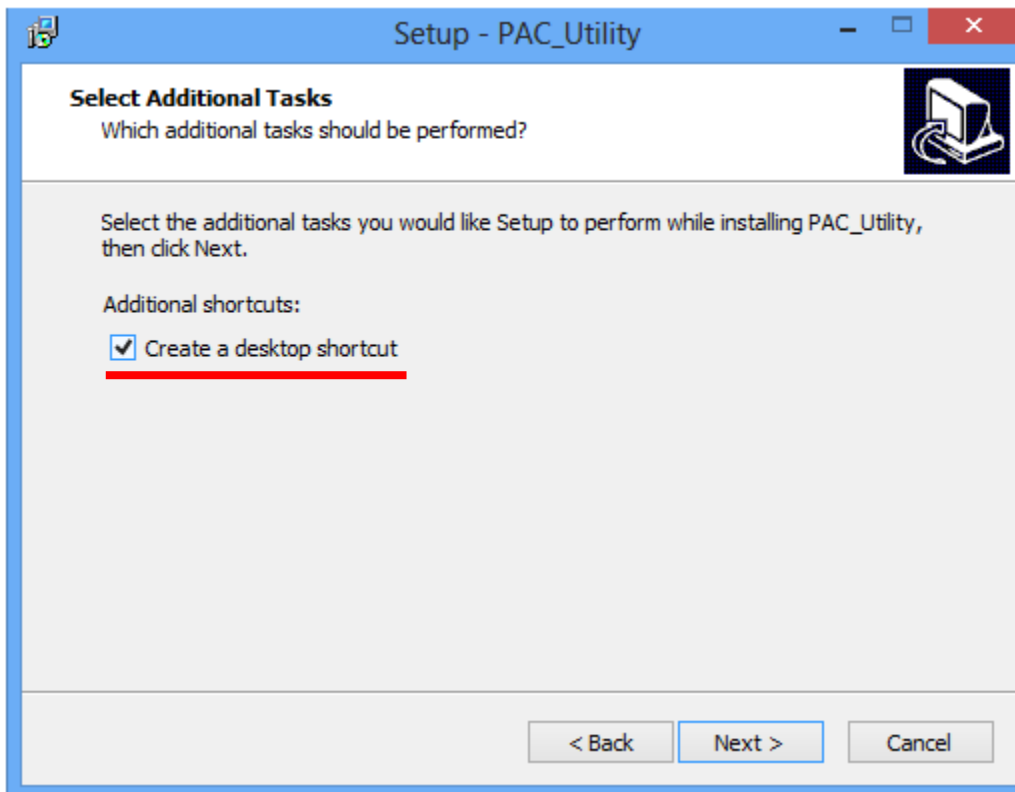
The System Information tab provides functions to monitor necessary device information of BoxPC.
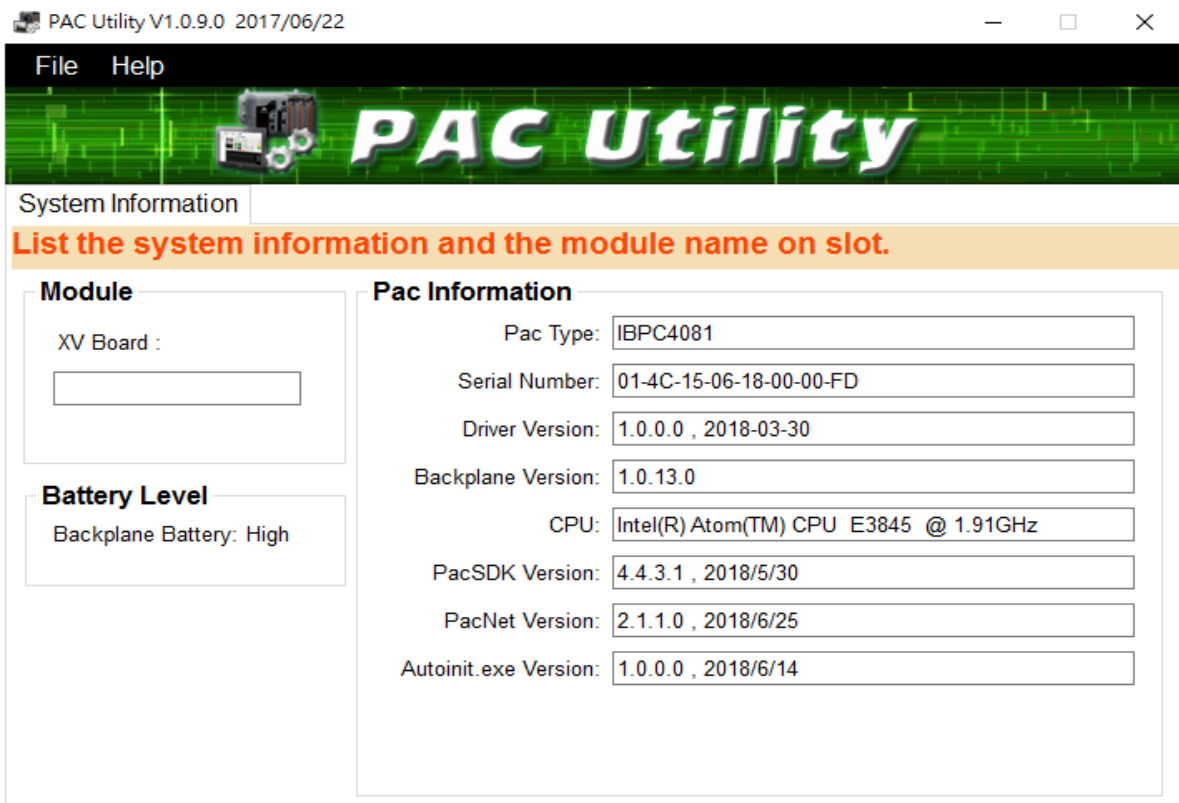
If your OS is WIN8 or WIN10, when you try to open the PAC Utility, you will see the picture below. You can refer to the Appendix E to update the .NET framework 3.5.
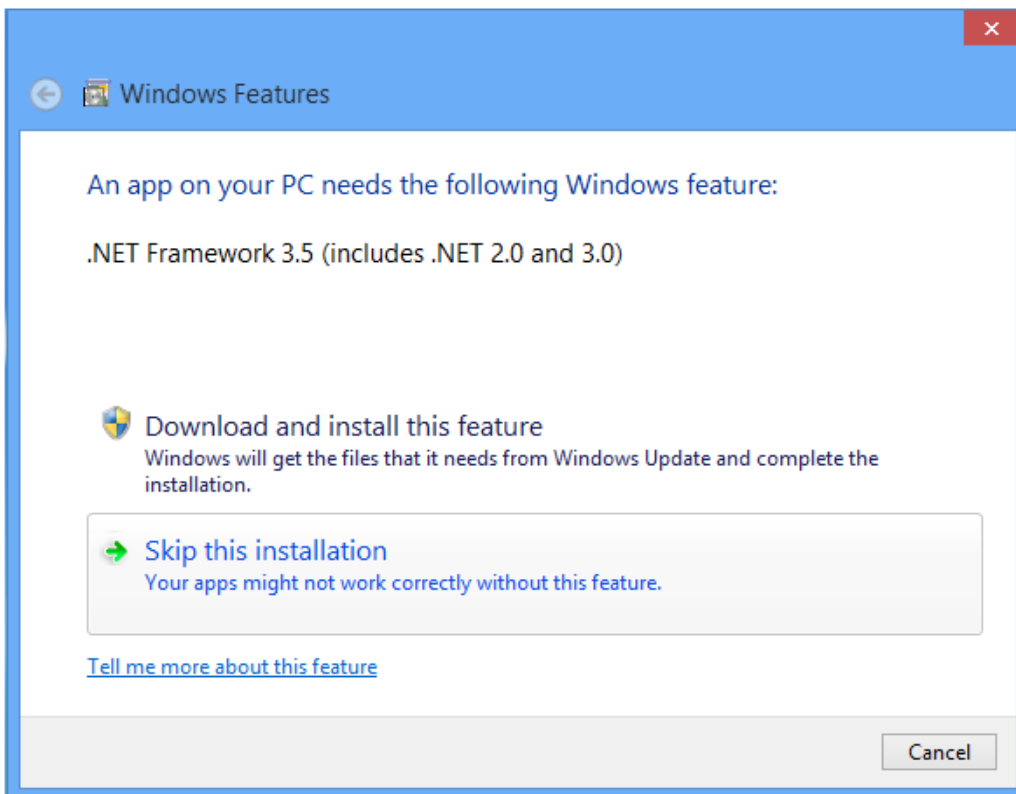
4.3. DCON Utility installation

You can find the DCON Utility at folder, the DCON_Utility_Pro_PC .zip folder, you can put it on the Desktop for using, or put it at C:\ICPDAS\Utility\ and create a shortcut on Desktop.

CD:\BoxPC\Tools\

L　　　　Dcon Utility

You can find the path of DCON Utility from the following table.

Name	Path	OS
DCON Utility	CD:\BoxPC\tools\DCONUtility \DCON_Utility_Pro_PC .zip	Windows 7/8/10

Unzip the folder and open the DCON_Utility_pro.exe at the DCON_Utility_Pro_PC file, you will see the application like the picture below.
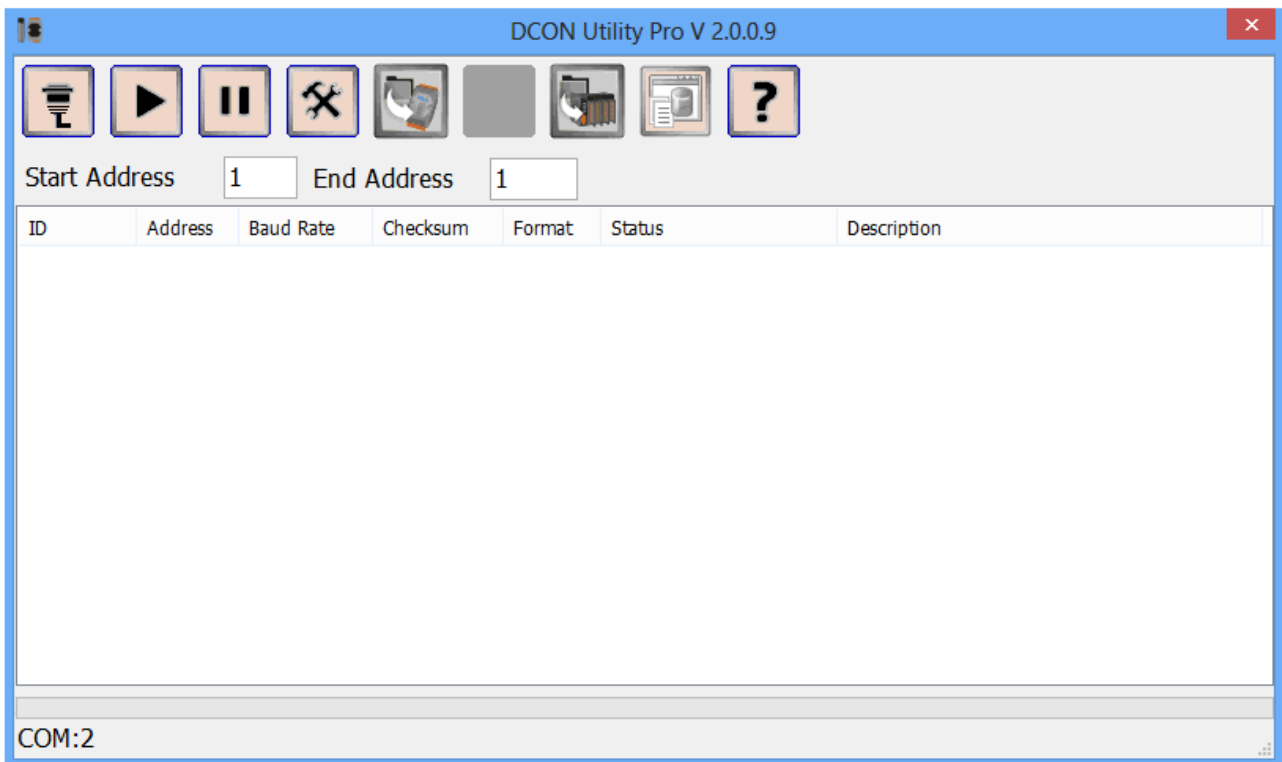
Tips & Warnings

⚠️ The DCON Utility is made for search our company's IO products for control products, you can't use this to search other company's product.

If you want to know how it works, please read the appendix C, Using DCON Utility Pro to Configure I/O Modules.

Support DCON and Modbus: DCON Utility Pro can support DCON and Modbus protocol for all ICPDAS and the others modules. It can select multi-options such as such as BaudRate, Checksum, Format and etc options for search module.
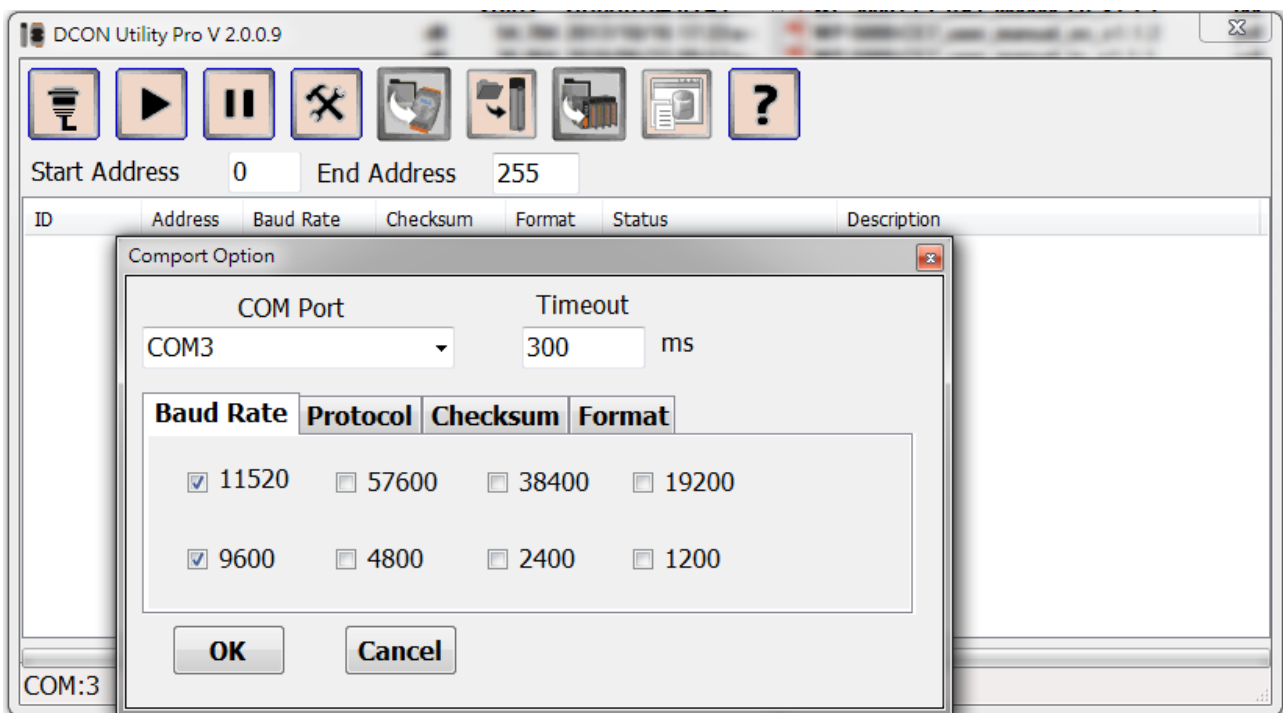
For more detailed information about DCON_Utility_Pro, please refer:http://ftp.icpdas.com/pub/cd/8000cd/napdos/driver/dcon_utility/manual/

5. APIs and Demos

This chapter provides a brief overview of PAC APIs and demos that have been designed for BoxPC.

ICP DAS provides a set of demos in different programming languages. You can examine the demo codes, which includes numerous comments, to familiarize yourself with the PAC APIs. This will allow developing your own applications quickly by modifying these demo programs.

For full usage information regarding the description, prototype and the arguments of the functions, please refer to the "PAC Standard API Manual"
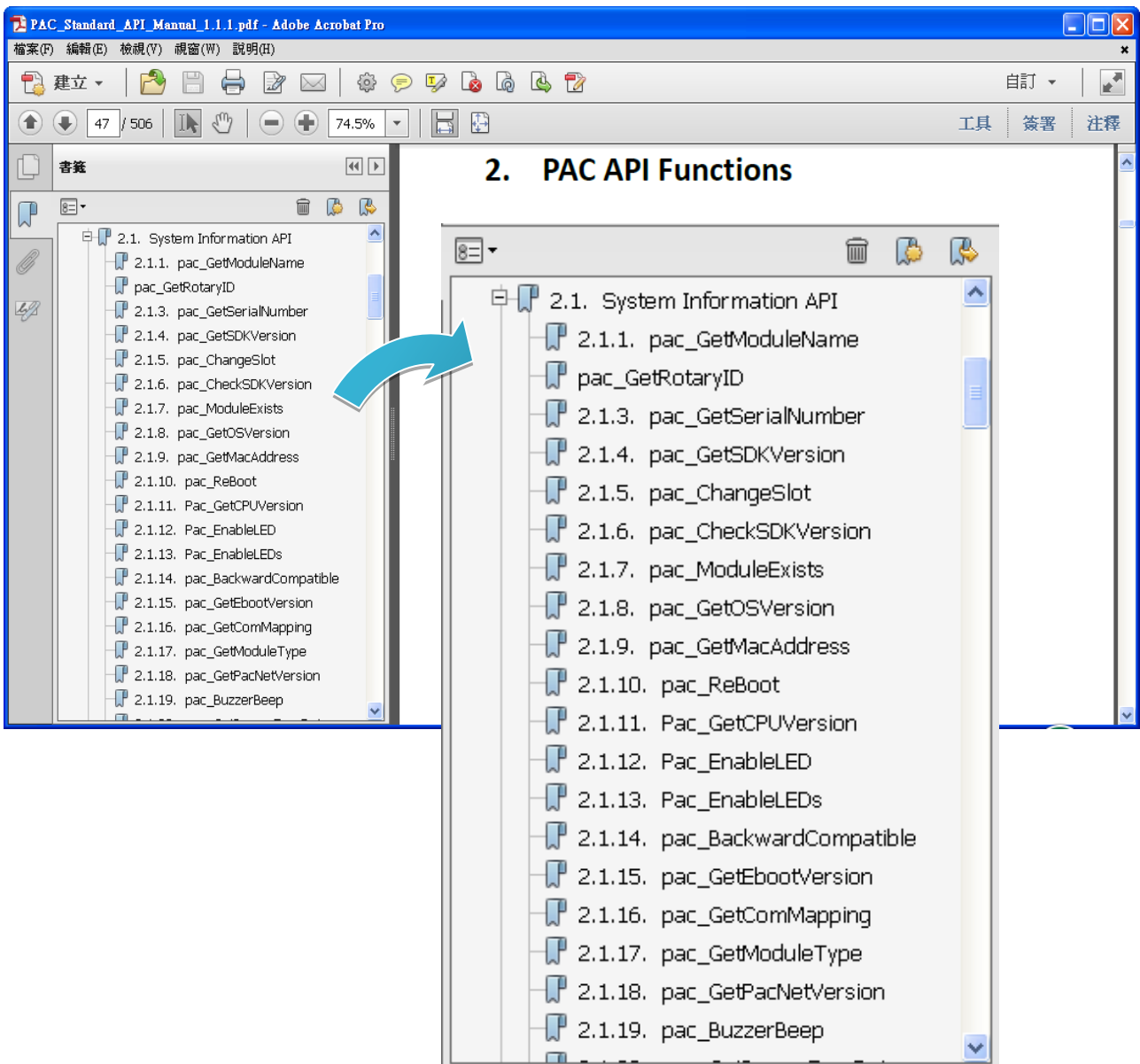
5.1. PAC Standard APIs

The diagram below shows the set of each system operation API provided in the PACSDK.

➤ System Information ➤ Watchdog

➤ Memory Access ➤ UART

➤ LED ➤ Registry

System Operation
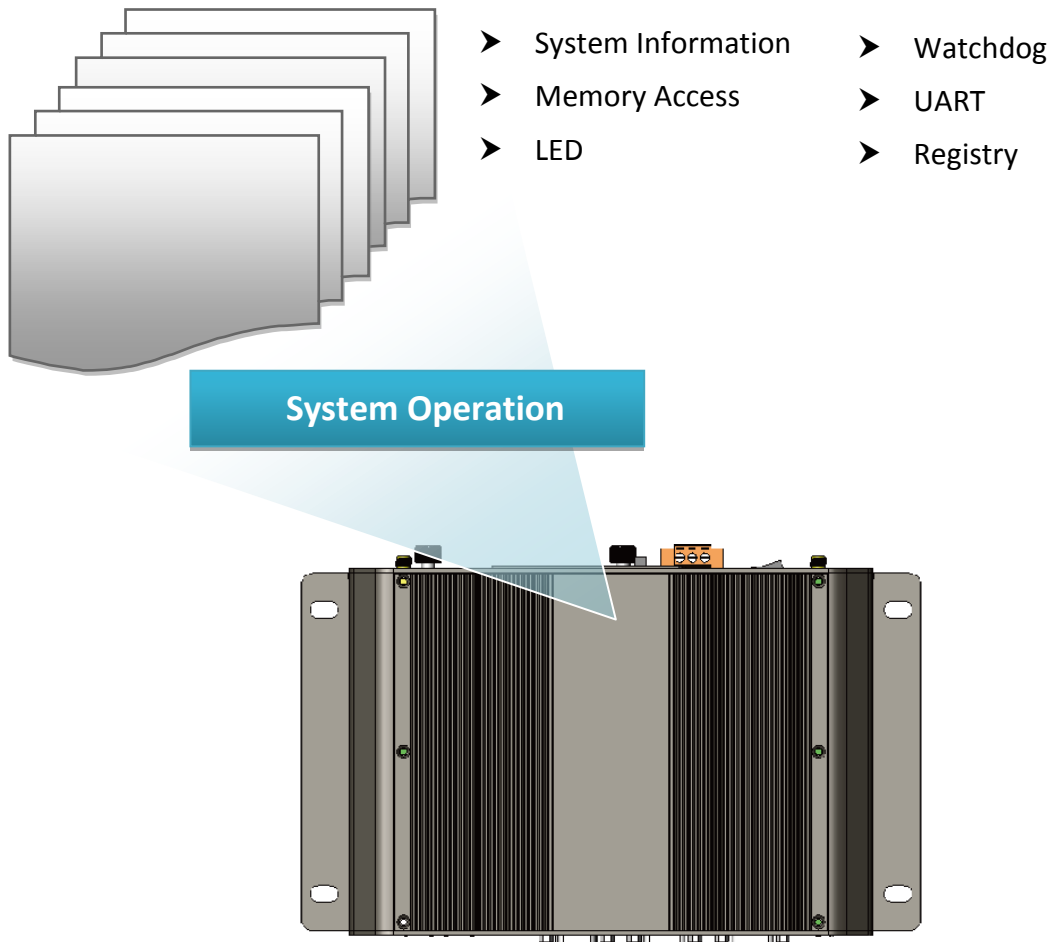
5.1.1. C# Demos for PAC Standard APIs

The PAC SDK includes the following demos that demonstrate the use of the PAC Standard APIs in a C# language environment. The following demos can be found on the CD that was provided with the package or by downloading the latest version from ICP DAS web site.

For C# applications, these demo programs can be obtained from:

CD:\BoxPC\demo\X86\iBPC\csharp.net\Standard\windows_forms\

CD:\BoxPC\demo\X64\iBPC\csharp.net\Standard\windows_forms\

http://ftp.icpdas.com/pub/cd/boxpc/demo/x86/ibpc/csharp.net/standard/windows_forms/

http://ftp.icpdas.com/pub/cd/boxpc/demo/x64/ibpc/csharp.net/standard/windows_forms/

Folder	Demo	Explanation
deviceinformation	DeviceInformation	Retrieves information about the Serial Number, SDK version, etc.
getrotaryid	GetRotaryID	Retrieves information about the status of the rotary switch
memory	Memory	Shows how to read/write data values from/to the EEPROM or the backplane of the MRAM
uart	UART	Shows how to read the name of a local I/O modules via a UART
watchdog	WatchDog	Displays information about how to operate the watchdog

5.1.2. Visual C++ Demos for PAC Standard APIs

The PAC SDK includes the following demos that demonstrate the use of the PAC Standard APIs ina Visual C++ language environment. The following demos can be found on the CD that was provided with the package or by downloading the latest version from ICP DAS web site.

For Visual C++ applications, these demo programs can be obtained from:

CD:\BoxPC\demo\X86\ibpc\vc\standard\

CD:\BoxPC\demo\X64\ibpc\vc\standard\

http://ftp.icpdas.com/pub/cd/boxpc/demo/x86/ibpc/vc/standard/

http://ftp.icpdas.com/pub/cd/boxpc/demo/x64/ibpc/vc/standard/

Folder	Demo	Explanation
deviceinformation	DeviceInformation	Retrieves information about the Serial Number, SDK version, etc.
getrotaryid	GetRotaryID	Retrieves information about the status of the rotary switch
memory	Memory	Shows how to read/write data values from/to the EEPROM or the backplane of the MRAM
uart	UART	Shows how to read the name of a local I/O modules via a UART
watchdog	WatchDog	Displays information about how to operate the watchdog

5.2. PAC IO APIs

The diagram below shows the types of the PAC IO APIs provided in the PACSDK or the specified SDK.

For more information about the APIs and demos provided by the expansion I/O modules, please refer to chapter 6. I/O Modules and SDK Selection.
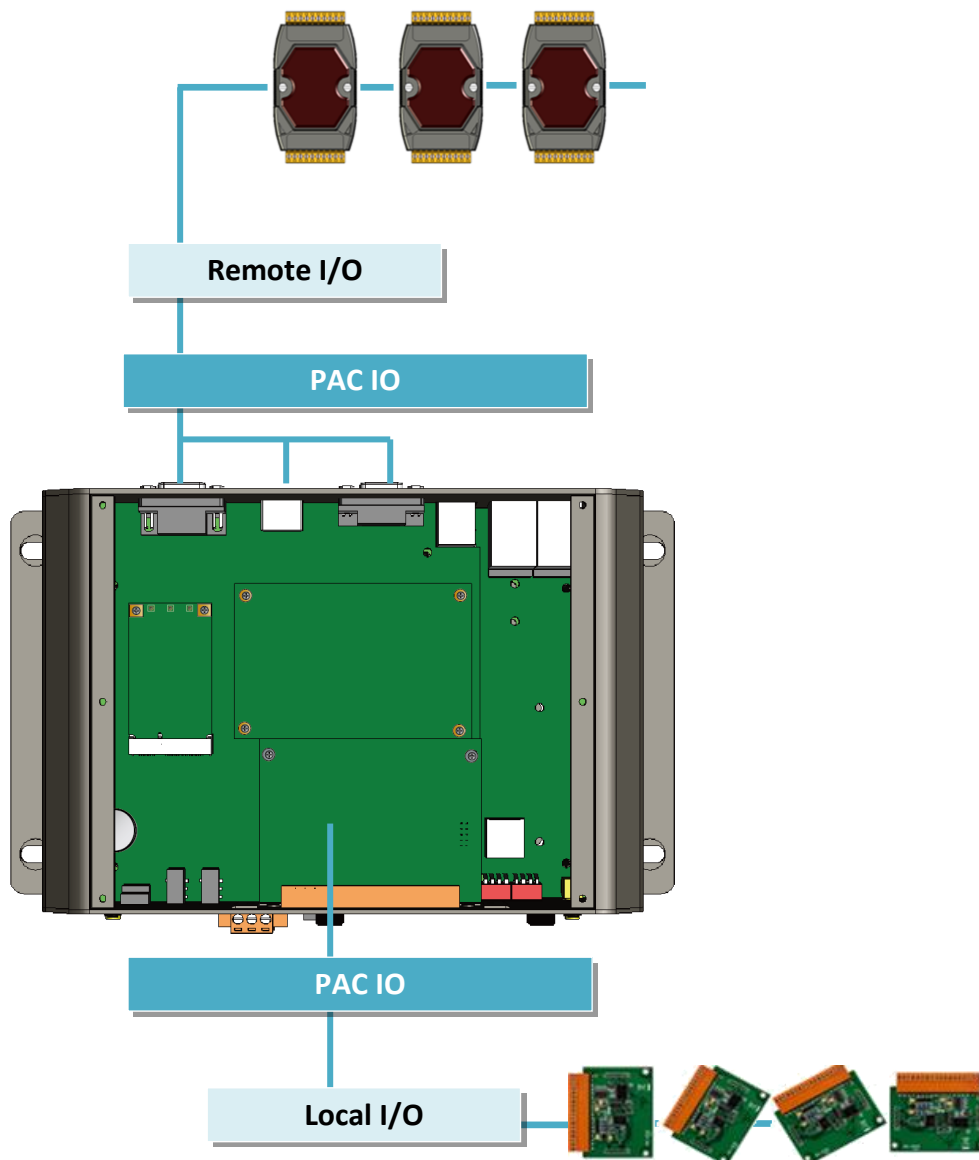
5.2.1. C# Demos for PAC Expansion I/O

The PAC SDK includes the following demos that demonstrate the use of the PAC IO APIs in a C# language environment.

The following demos can be found on the CD that was provided with the package or by downloading the latest version from ICP DAS web site.

For C# applications, these demo programs can be obtained from:

CD:\BoxPC\demo\X86\ibpc\csharp.net\io\

CD:\BoxPC\demo\X64\ibpc\csharp.net\io\

http://ftp.icpdas.com/pub/cd/boxpc/demo/x86/ibpc/csharp.net/io/

http://ftp.icpdas.com/pub/cd/boxpc/demo/x64/ibpc/csharp.net/io/

Floder	Demo	Explanation
Local	ModbusRTU_Master_Console	Shows how to use the XV107 module of the XV-board in console mode
	XV107_Modbus_RTU_Master_demo	Shows how to use the XV107 module of the XV-board
Remote	7K87K_ai	Shows how to read the AI values of AI module. This demo program is used by 7K or 87K series AI modules which connected through a COM port.
	7K87K_ao	Shows how to write the AO values to AO module. This demo program is used by 7K or 87K series AI modules which connected through a COM port.
	7K87K_ao_poweron_safe	Shows how to write/read three values of AO module, the AO values, the AO power on value and the AO safe value. Also shows how to enables/disables the WDT and sets WDT timeout value of module. This demo program is used by 7K or 87K series AO modules which connected through a COM port.
	7K87K_Basic	Shows how to send/receive a command/response application. This demo program is used by 7K or 87K series modules which connected through a COM port.
	7K87K_cnt	Shows how to reads the counter values of the counter/frequency modules. This demo program is used by 7K or 87K series modules which connected

|		through a COM port.
	7K87K_di(MF)	Shows how to read the DI values of DI module. This demo program is used by 7K or 87K series AI modules which connected through a COM port.
	7K87K_di_cnt(MF)	Shows how to read the DI values of DI module and reads the counts of the DI channels of the DI module. This demo program is used by 7K or 87K series AI modules which connected through a COM port.
	7K87K_dio(MF)	Shows how to read the DI and the DO values of the DIOmodule. This demo program is used by 7K or 87K series AI modules which connected through a COM port.
	7K87K_do(MF)	Shows how to write the DO values to DO module. This demo program is used by 7K or 87K series AI modules which connected through a COM port.
	7K87K_do_poweron_safe(MF)	Shows how to write/read three values of DO module, the DO values, the DO power on value and the DO safe value. Also shows how to enables/disables the WDT and sets WDT timeout value of module. This demo program is used by 7K or 87K series DO modules which connected through a COM port.
	7K87K_PWM	Shows how to set/read four things for a specific channel, the frequency values, the duty cycle values, the PWM step value and the continuous mode. Also shows how to save the PWM configuration, and reads the status of the PWM output port and the digital input port. This demo program is used by 7K or 87K series DO modules which connected through a COM port.

5.2.2. Visual C++ Demos for PAC Expansion I/O

The PAC SDK includes the following Demos that demonstrate the use of the PAC IO APIs in a Visual C++ language environment.

The following Demos can be found on the CD that was provided with the package or by downloading the latest version from ICP DAS web site.

For Visual C++ applications, these demo programs can be obtained from:

CD:\BoxPC\demo\ibpc\X86\vc\io\

CD:\BoxPC\demo\ibpc\X64\vc\io\

http://ftp.icpdas.com/pub/cd/boxpc/demo/x86/ibpc/vc/io/

http://ftp.icpdas.com/pub/cd/boxpc/demo/x86/ibpc/vc/io/

Floder	Demo	Explanation
Remote	7K87K_ai	Shows how to read the AI values of AI module. This demo program is used by 7K or 87K series AI modules which connected through a COM port.
	7K87K_ao	Shows how to write the AO values to AO module. This demo program is used by 7K or 87K series AI modules which connected through a COM port.
	7K87K_ao_poweron_safe	Shows how to write/read three values of AO module, the AO values, the AO power on value and the AO safe value. Also shows how to enables/disables the WDT and sets WDT timeout value of module. This demo program is used by 7K or 87K series AO modules which connected through a COM port.
	7K87K_Basic	Shows how to send/receive a command/response application. This demo program is used by 7K or 87K series modules which connected through a COM port.
	7K87K_cnt	Shows how to reads the counter values of the counter/frequency modules. This demo program is used by 7K or 87K series modules which connected through a COM port.
	7K87K_di(MF)	Shows how to read the DI values of DI module. This demo program is used by 7K or 87K series AI modules which connected through a COM port.

	7K87K_di_cnt(MF)	Shows how to read the DI values of DI module and reads the counts of the DI channels of the DI module. This demo program is used by 7K or 87K series AI modules which connected through a COM port.
	7K87K_dio(MF)	Shows how to read the DI and the DO values of the DIOmodule. This demo program is used by 7K or 87K series AI modules which connected through a COM port.
	7K87K_do(MF)	Shows how to write the DO values to DO module. This demo program is used by 7K or 87K series AI modules which connected through a COM port.
	7K87K_do_poweron_safe(MF)	Shows how to write/read three values of DO module, the DO values, the DO power on value and the DO safe value. Also shows how to enable/disable the WDT and sets WDT timeout value of module. This demo program is used by 7K or 87K series DO modules which connected through a COM port.
	7K87K_PWM	Shows how to set/read four things for a specific channel, the frequency values, the duty cycle value ,the PWM step value and the continuous mode. Also shows how to save the PWM configuration, and read the status of the PWM output port and the digital input port. This demo program is used by 7K or 87K series DO modules which connected through a COM port.

6. I/O Modules and SDK Selection

This chapter describes how to select a suitable I/O expansion module and the corresponding SDK library to be used for developing programs on BoxPC series devices.

The following table shows the path ofPACNET.dll and PACSDK.dll.

File	Path
PACNET.dll	CD:\BoxPC\sdk\X86\PACNET\
	CD:\BoxPC\sdk\X64\PACNET\
PACSDK.dll	CD:\BoxPC\sdk\X86\PACSDK\
	CD:\BoxPC\sdk\X64\PACSDK\

Selecting a SDK Library for I/O Expansion
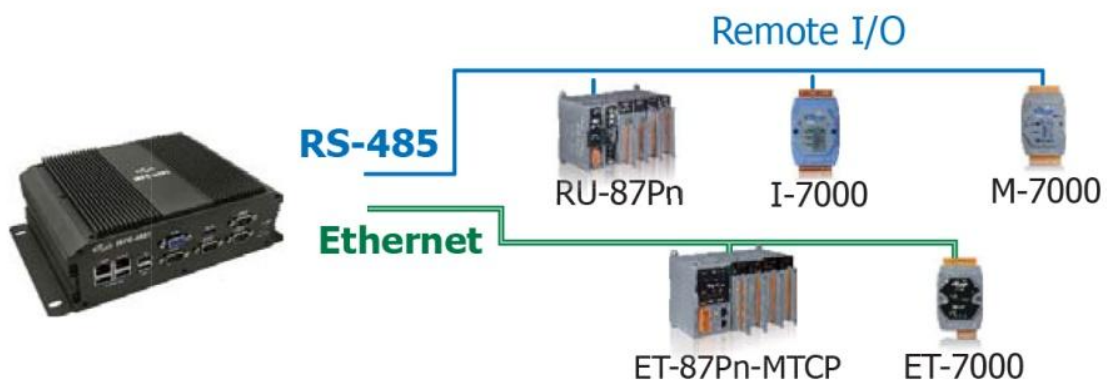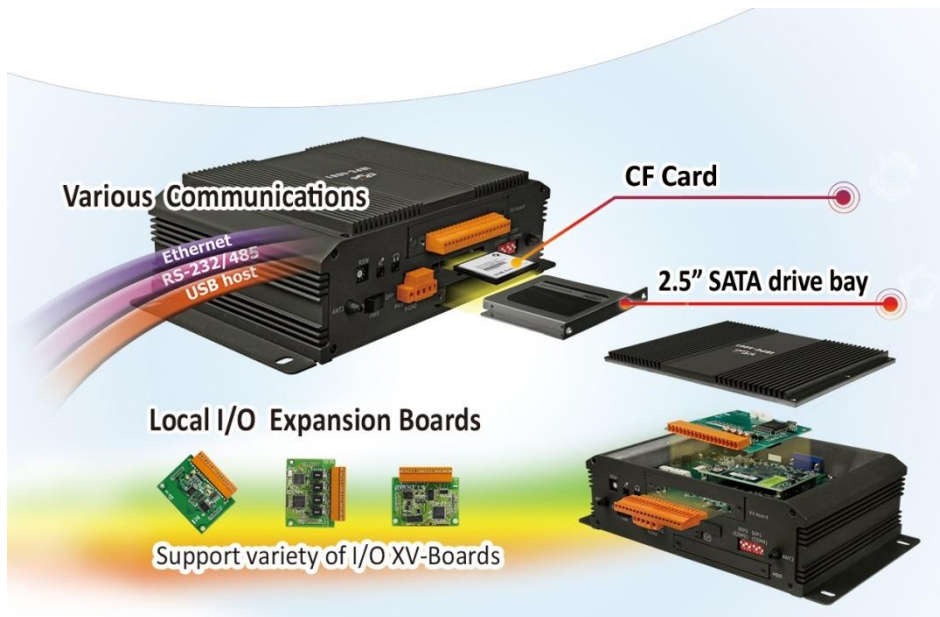
❶ Local I/O Module (XV-Board)

There are more than 8 XV-Board available for expanding the function of the BoxPC
The following table shows the appropriate SDK library to be used for I/O modules.

Module	Native SDK	.NET CF SDK
XV-Board	Modbus Demo	Modbus Demo

For more detailed information about these support modules, please refer to:
http://www.icpdas.com/root/product/solutions/hmi_touch_monitor/touchpad/xv-board_selection.html

❷ RS-485 (I-7000 series and M-7000 series)

I-7000, M-7000, RU-87Pn and high profile I-87K series modules connect to iBPC series devices via a twisted-pair, multi-drop, 2-wire RS-485 network.

➤ I-7000 series I/O modules

Module	Native SDK	.NET CF SDK
I-7000 series	PACSDK.dll	PACNET.dll

For full details regarding I-7000 series I/O modules and its demos, please refer to:
http://ftp.icpdas.com/pub/cd/boxpc/demo/x86/ibpc/applicabled_demo_for_7k_module.pdf

➤ M-7000 series I/O modules

Module	Native SDK	.NET CF SDK
M-7000 series	Modbus Demo	Modbus Demo

For more detailed information about M-7000 series modules using Modbus protocol and its demos, please refer to:
http://ftp.icpdas.com/pub/cd/boxpc/demo/x86/nmodbus/

➤ RU-87Pn + I-87K series I/O modules

Module	Native SDK	.NET CF SDK
RU-87Pn + I-87K	PACSDK.dll	PACNET.dll

Other specified I/O

Module	Native SDK	.NET CF SDK
I-7088W	PACSDK.dll	PACNET.dll

❸ **Ethernet (ET-7000 series and I-8KE4/8-MTCP)**

The Ethernet I/O devices available include ET-7000 and I-8KE4/8-MTCP, and support the Modbus/TCP communication protocol.

Module	Native SDK	.NET CF SDK
ET-7000	Modbus Demo	Modbus Demo
I-8KE4/8-MTCP	Modbus Demo	Modbus Demo

For more detailed information about ET-7000 and I-8KE4/8-MTCP series modules using Modbus protocol and its demos, please refer to:

http://ftp.icpdas.com/pub/cd/boxpc/demo/x86/nmodbus/

Notice!

If you try to build demos, please select same platform target and dll file, you can choose it at properties of Visual Studio 2008, and you can see the page like blow, select x86 or x64 at platform target, then start build it.

If you use tow demo of different platform target at x64 OS, which is very easy to make mistakes. So, you can use x86 demos at x86 OS, and use x86 or x64 demos at x64 OS, but recommended not to use x86 and x64 demos at x64 OS at the same time.
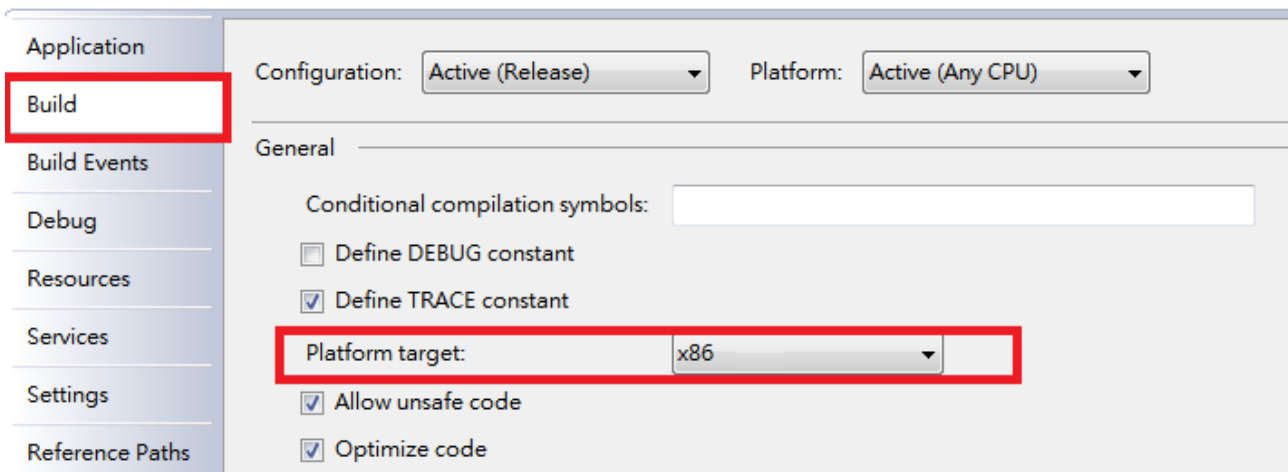
7. BoxPC Download Center

This chapter provides a brief introduction of the BoxPC download center.

BoxPC has a download center where you can access the latest version of the software, tools, demo programs, and related information.

The BoxPC Download Center can be found at:
http://www.icpdas.com/root/support/download/pac/ibpc/ibpc_download_pacsdk.html

Appendix

A. XV-Board Modules

The XV-board series are for iBPC-4081.

One PAC can only plug only one XV-board. The XV-board series have following common specification:

● DI channel is dry contact, sink type.
● DO channel is open collector, sink type.

DIO Expansion

Model	DI			DO	
	Channel	Type	Sink/Source	Channel	Sink/Source
XV107	8	Wet	Source	8	Sink
XV107A			Sink		Source
XV110	16	Dry/Wet	Sink/Source	-	-
XV111	-			16	Sink
XV111A					Source

Relay Output Expansion

Model	DI			Relay Output	
	Channel	Type	Sink/Source	Channel	Type
XV116	5	Wet	Sink/Source	2	Signal Relay
				4	Power Relay

Multi-Function Expansion

Model	AI	AO	DI				DO	
	Channel	Channel	Channel	Type	Sink/Source		Channel	Sink/Source
XV306	4	-	4	Wet	Sink/Source		4	Relay, FormA, 6A
XV307	-	2						
XV308	8	-	DI+DO=8	Dry/Wet	Source		DI+DO=8	Sink
XV310	4	2	4		Sink		4	Source

For more detailed information about these support modules, please refer to
http://www.icpdas.com/root/product/solutions/hmi_touch_monitor/touchpad/xv-board_selection.html

# B. Using DCON Utility Pro to Configure I/O Modules

DCON Utility Pro is a tool kit designed to quickly control and manage XV-Board series expansion I/O modules.

1. Click the DCON Utility Pro shortcut on the desktop

2. Click the Comport option button, and select setting, I want to search XV-board this time, so I select COM1.

3.check what you need to select or change, and press the "ok" button.
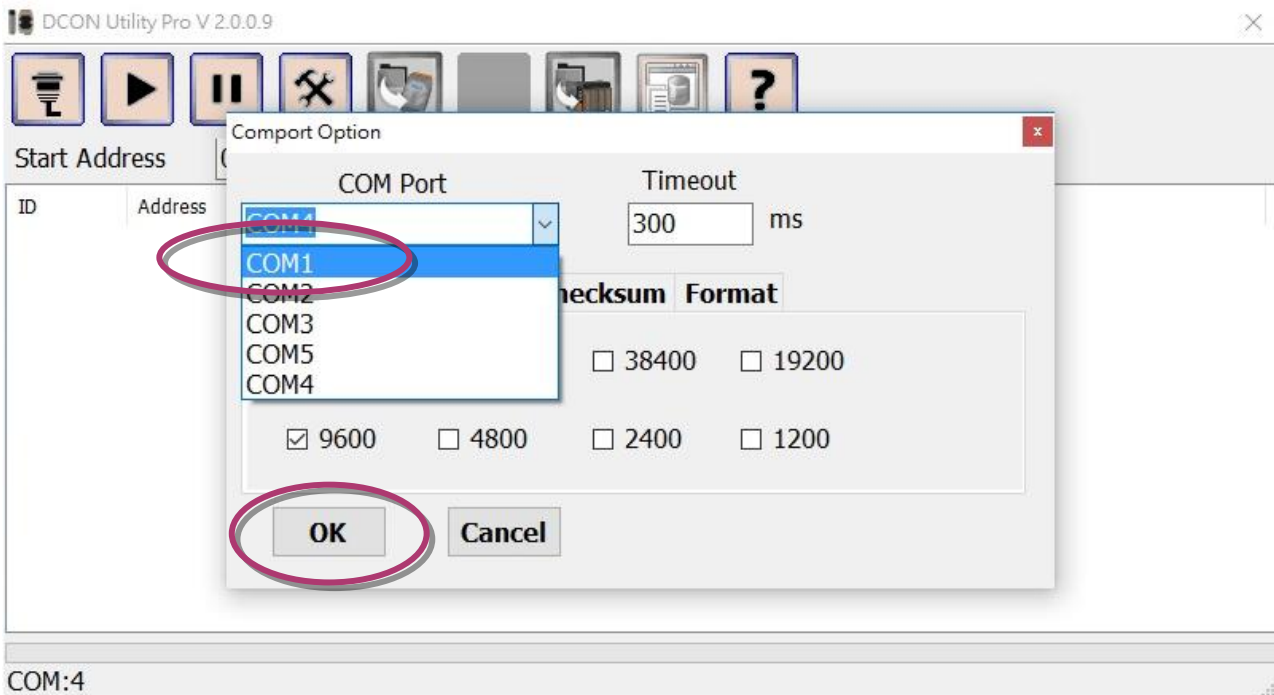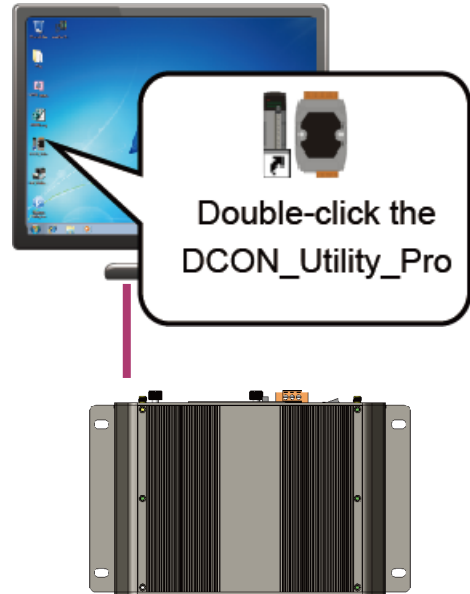
4. Click the Search button ▶

5. Click the module name to configure the XV-Board series module
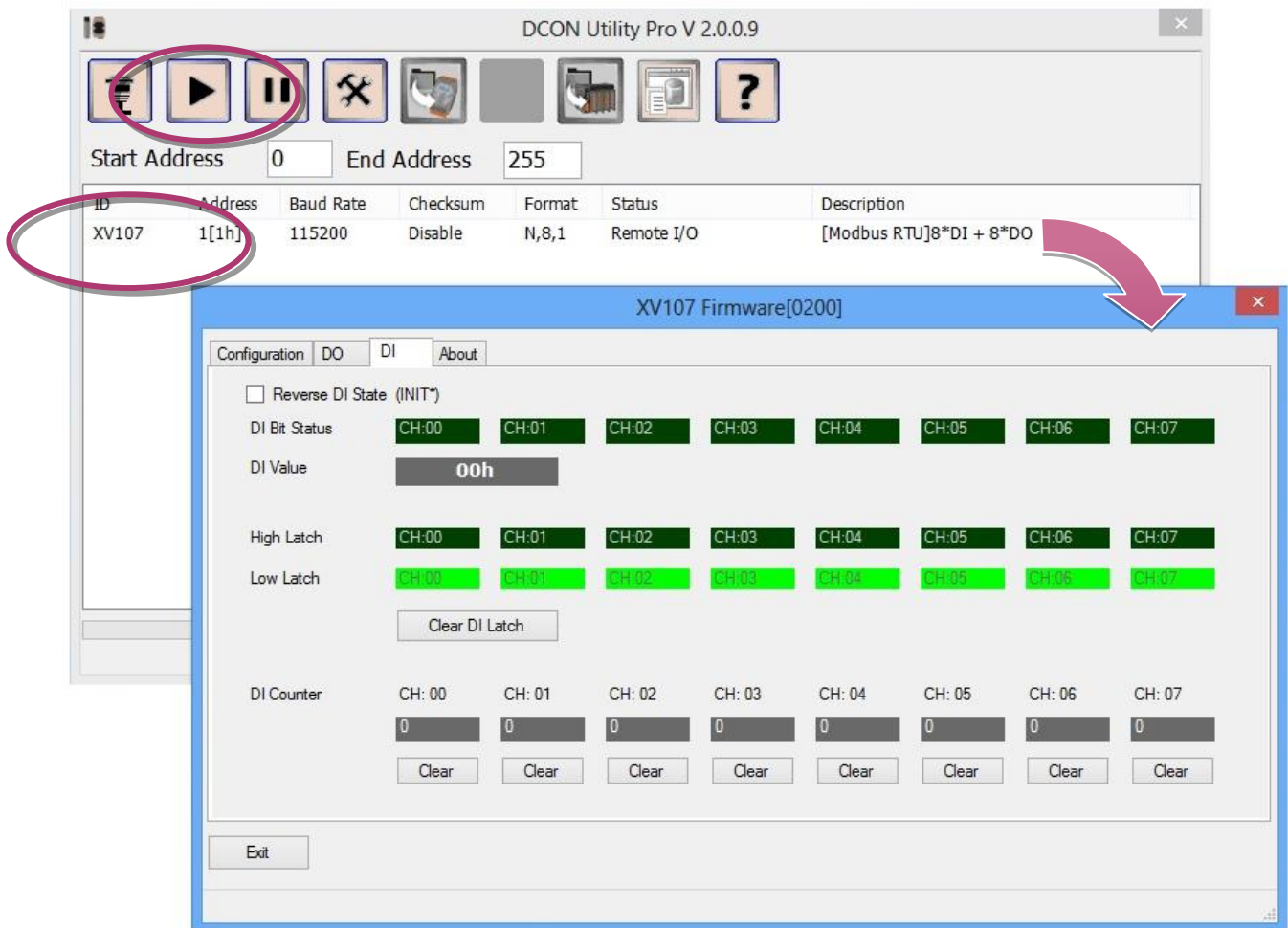
C. How to change the battery

The BoxPC device is equipped with a Li-ion battery to ensure that any data stored in the BIOS setting is retained if a power loss occurs. The batteries supply continuous power to the store chip enabling the data to be retained for up to 7 years. The BoxPC will lose data, when the battery is removed, if you don't want losing data, you need remember the setting which you changed, and recover the setting after you replace the battery. And please care when you replace the battery, it is dangerous at power up of the BoxPC.

The following figures show the location of the battery installed on the BoxPC device.
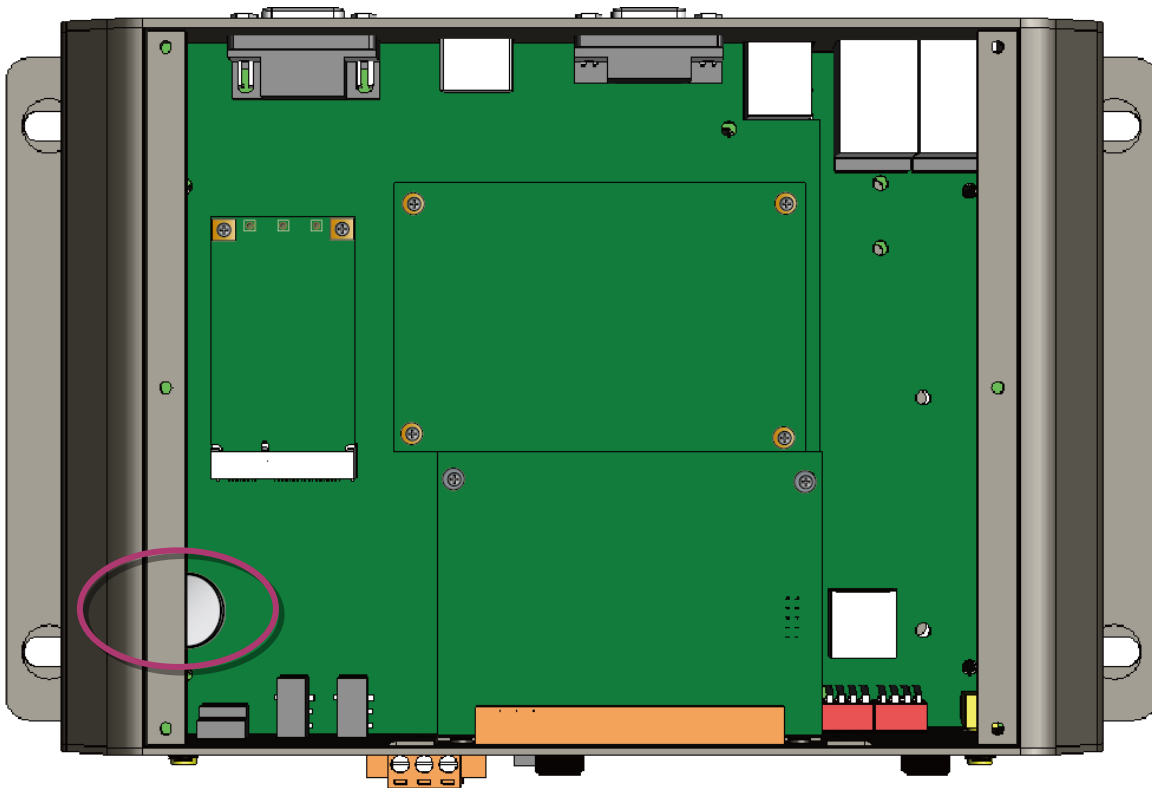
Checking the current battery power level:

1. Run the PAC Utility and check the battery in the System Information. These fields indicate the current status of battery. If the power level of the battery is shown as low, battery should be replaced.

2. When creating a custom application, call the pac_GetBatteryLevel() API function in the PACSDK.dll to check the power level of the batteries. If the power of the battery shown as low,it is recommended that battery is immediately replaced.

◆ **Replacing the batteries**

- Power off the BoxPC device.
- Remove the cover.
- Remove the battery with Screw Driver.
- Insert a new battery.
- Power on the BoxPC device.

Ordering information:

Battery type: BR2032 (the ICPDAS part number is 2LB004 for ICP DAS) For more detailed information, contact your local sales office or distributor

# D. How to update the .NET Framework 3.5

There have two ways to update the .NET Framework 3.5, on-line and off-line.

On-line update:

1. Open the Control Panel, and open the Program item, click the Turn Windows features on or off, you will see the picture below andcheck the .NET Framework 3.5 and press OK.
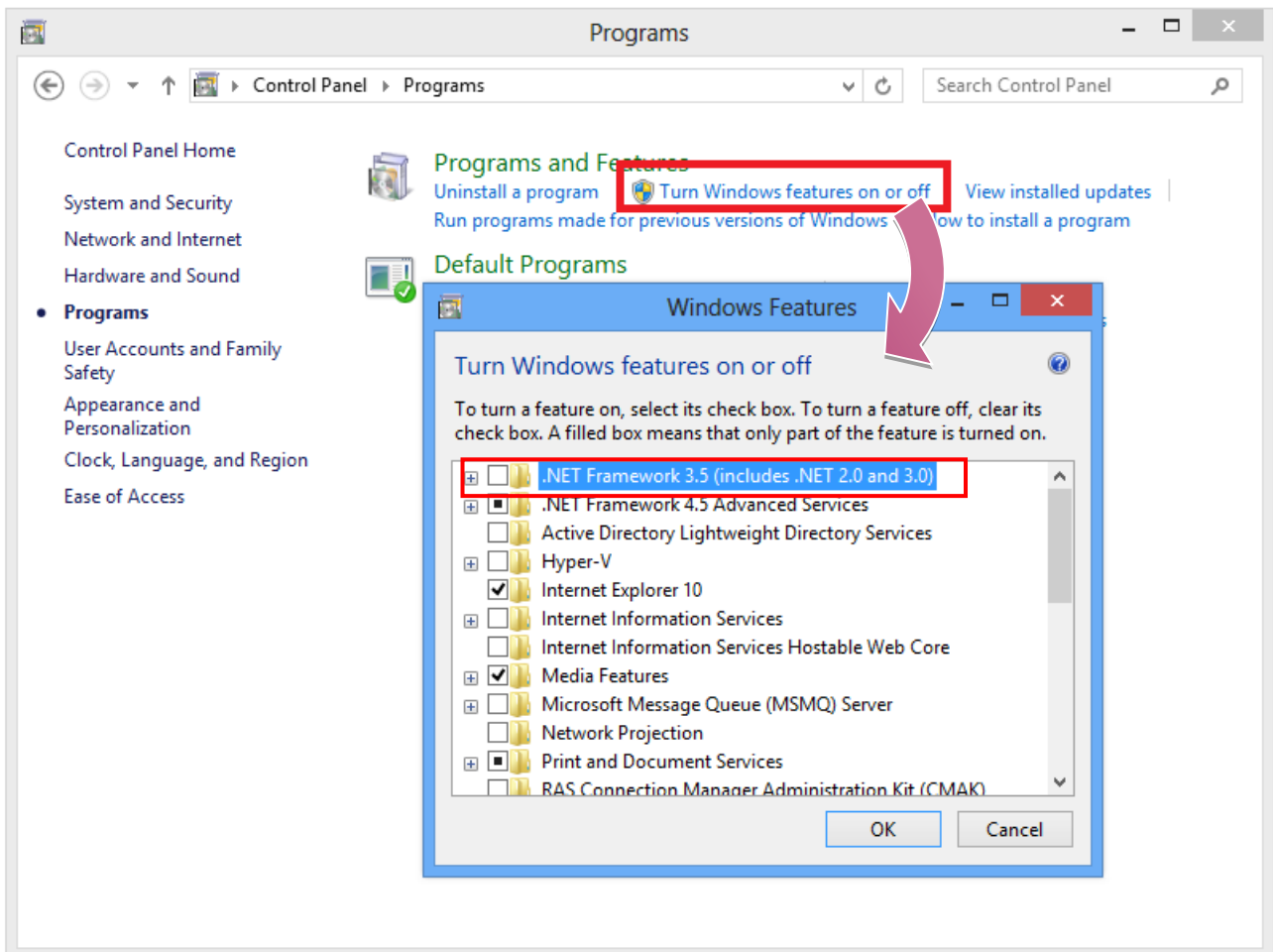
2. You will see the picture below, select the first option, and waitit to finish the update.
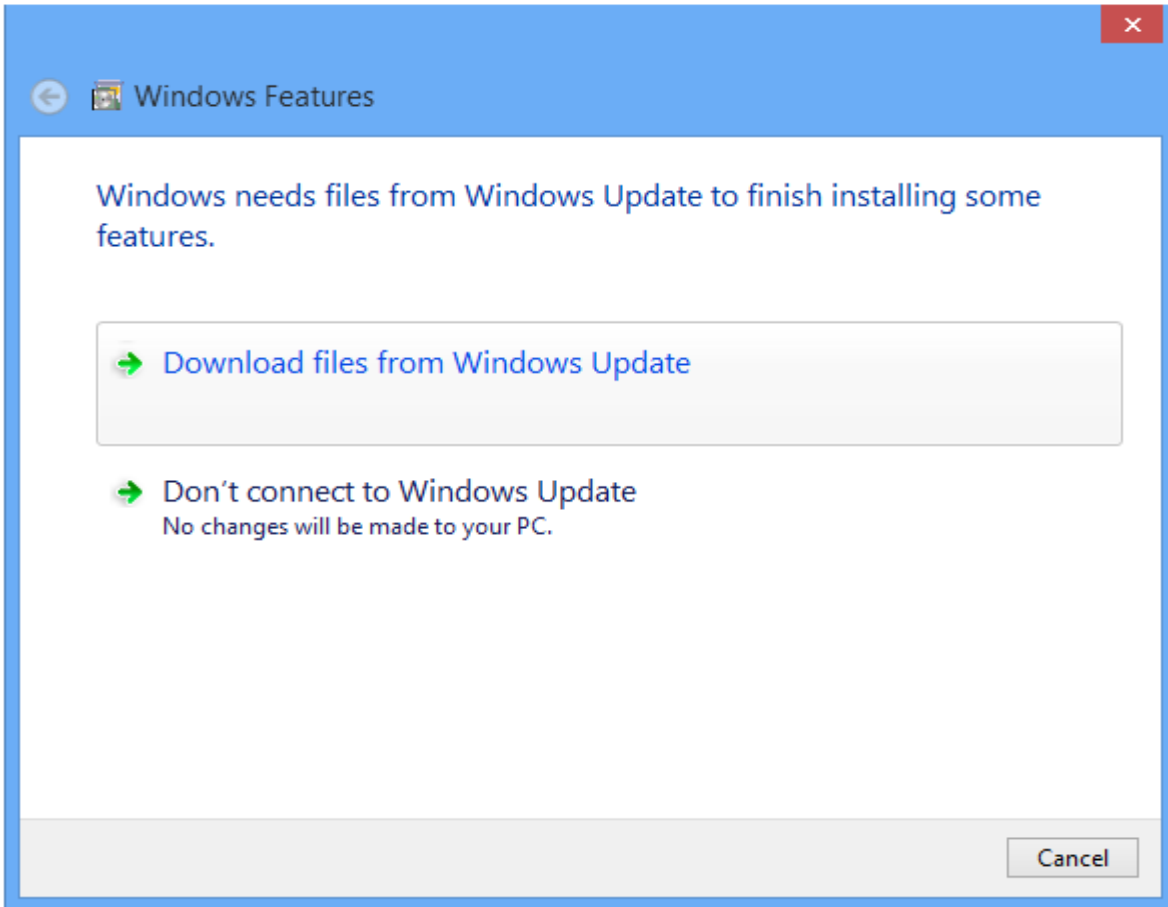
Off-line update:

You need to insert the device (CD or USB) of OS installation, check the disk number, and open the command with administrator account, type "dism.exe /online /enable-feature /featurename:netfx3 /Source:X:\sources\sxs", "X:\" is the disk number, wait it to finish the update, and you will see the picture of command below.
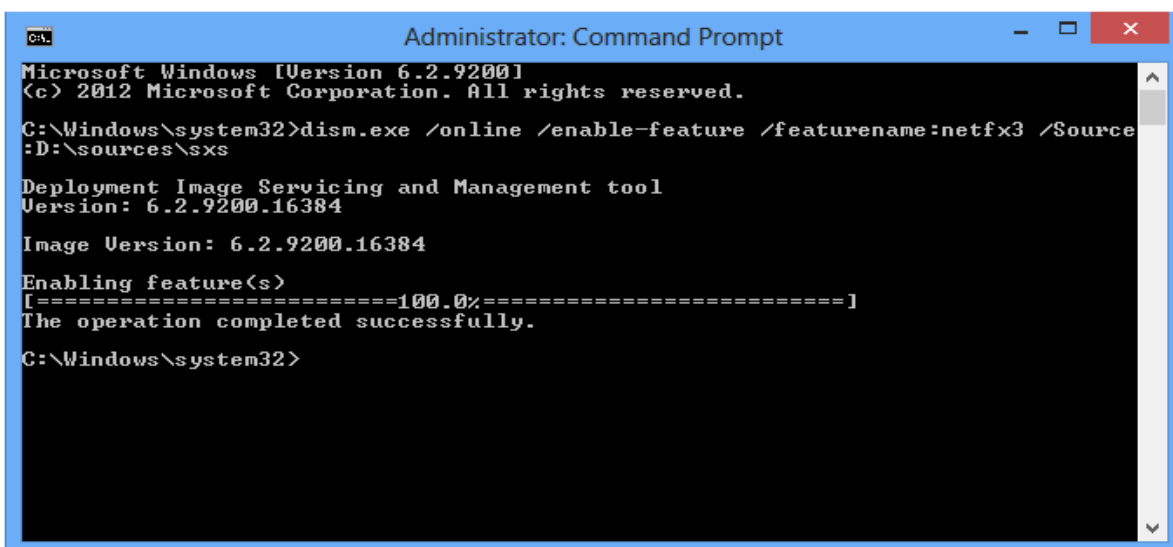
E. Revision History

This chapter provides revision history information to this document.

The table below shows the revision history.

Revision	Date	Description
V1.0.1	Aug. 2018	Initial issue