AXIOMTEK

eBOX671-885-FL Series

Embedded System

User's Manual

RoHS

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Safety Precautions

Before getting started, please read the following important safety precautions.

1. The eBOX671-885-FL does not come equipped with an operating system. An operating system must be loaded first before installing any software into the computer.

2. Be sure to ground yourself to prevent static charge when installing the internal components. Use a grounding wrist strap and place all electronic components in any static-shielded devices. Most electronic components are sensitive to static electrical charge.

3. Disconnect the power cord from the eBOX671-885-FL 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 eBOX671-885-FL is properly grounded.

4. Make sure the voltage of the power source is correct before connecting the equipment to the power outlet.

5. Turn OFF the system power before cleaning. Clean the system using a cloth only. Do not spray any liquid cleaner directly onto the screen.

6. Do not leave this equipment in an uncontrolled environment where the storage temperature is below -40℃ or above 80℃. It may damage the equipment.

7. Do not open the system's back cover. If opening the cover for maintenance is a must, only a trained technician is allowed to do so. Integrated circuits on computer boards are sensitive to static electricity. 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.

Classification

1. Degree of production against electric shock : not classified
2. Degree of protection against the ingress of water : IP40
3. Equipment not suitable for use in the presence of a flammable anesthetic mixture with air or with oxygen or nitrous oxide.
4. Mode of operation : Continuous

General Cleaning Tips

You may need the following precautions before you begin to clean the computer. When you clean any single part or component for the computer, please read and understand the details below fully.

When you need to clean the device, please rub it with a piece of dry cloth.

1. Be cautious of the tiny removable components when you use a vacuum cleaner to absorb the dirt on the floor.
2. Turn the system off before you start to clean up the component or computer.
3. Never drop the components inside the computer or get circuit board damp or wet.
4. Be cautious of all kinds of cleaning solvents or chemicals when you use it for the sake of cleaning. Some individuals may be allergic to the ingredients.
5. Try not to put any food, drink or cigarette around the computer.

Cleaning Tools:

Although many companies have created products to help improve the process of cleaning your computer and peripherals users can also use household items to clean their computers and peripherals. Below is a listing of items you may need or want to use while cleaning your computer or computer peripherals.

Keep in mind that some components in your computer may only be able to be cleaned using a product designed for cleaning that component, if this is the case it will be mentioned in the cleaning.

- Cloth: A piece of cloth is the best tool to use when rubbing up a component. Although paper towels or tissues can be used on most hardware as well, we still recommend you to rub it with a piece of cloth.

- Water or rubbing alcohol: You may moisten a piece of cloth a bit with some water or rubbing alcohol and rub it on the computer. Unknown solvents may be harmful to the plastics parts.

- Vacuum cleaner: Absorb the dust, dirt, hair, cigarette particles, and other particles out of a computer can be one of the best methods of cleaning a computer. Over time these items can restrict the airflow in a computer and cause circuitry to corrode.

- Cotton swabs: Cotton swaps moistened with rubbing alcohol or water are excellent tools for wiping hard to reach areas in your keyboard, mouse, and other locations.

- Foam swabs: Whenever possible it is better to use lint free swabs such as foam swabs.

 **Note:** _We strongly recommended that you should shut down the system before you start to clean any single components._

Please follow the steps below:

1. Close all application programs
2. Close operating software
3. Turn off power switch
4. Remove all device
5. Pull out power cable

Scrap Computer Recycling

If the computer equipment's needs the maintenance or are beyond repair, we strongly recommended that you should inform your Axiomtek distributor as soon as possible for the suitable solution. For the computers that are no longer useful or no longer working well, please contact your Axiomtek distributor for recycling and we will make the proper arrangement.

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CHAPTER 1
INTRODUCTION

This chapter contains general information and detailed specifications of the eBOX671-885-FL. The Chapter 1 includes the following sections:

- General Description
- System Specifications
- Dimensions
- I/O Outlets
- Packing List
- Model List

1.1   General Description

The eBOX671-885-FL is an embedded system that supports LGA1150 Socket 4th generation Intel® Core™ i7/i5/i3/Celeron processor to support Windows 7, Windows 7 Embedded, Windows 8.1, Windows 8 Embedded or Linux, suitable for the most endurable operation.

It features fan-less design with full feature I/O, self-contained PoE controller features performance computing with Power over Ethernet, extended product longevity and enhanced system dependability by built-in Watchdog Timer.

- **Features**
    1. 4th generation Intel® Core™ i7/i5/i3/Celeron processors by LGA1150 socket
    2. Intel® Q87 PCH
    3. Supports dual channel DDR3 1333/1600 SO-DIMM, max. up to 16 GB
    4. 4-CH GbE PoE (Power over Ethernet), IEEE 802.3at compliant
    5. Supports 6 USB 3.0 & 2 USB 2.0 ports
    6. Supports 2 x RS-232/422/485 & 2 x RS-232
    7. Supports 2 x 10/100/1000Mbps Ethernet
    8. 8-CH Digital I/O (4IN & 4OUT), Programmable
    9. 8-CH Isolated Digital I/O (4IN & 4OUT) (Option)
    10. Two PCI Express Mini Card Slots w/ mSATA supported
    11. Watchdog timer
    12. One SIM slot w/ three antenna openings

● **Reliable and Stable Design**
The eBOX671-885-FL adopts the advanced cooling system and supporting the CFast™, & mSATA which makes it especially suitable for vibration environments, eBOX671-885-FL also supports wall mount kit, it's best for industrial automation, digital signage and gaming application.

● **Flexible Connectivity**
eBOX671-885-FL features four Power-over-Ethernet (PoE) Gigabit Ethernet ports for connecting to GigE Vision® cameras and four USB 3.0 ports for connecting to USB3 Vision™ cameras. Additionally, two more Gigabit Ethernet ports allow for networks communication. eBOX671-885-FL also supports two RS232/RS485 & 2 RS-232 serial interfaces and 8 channel digital I/O.

● **Embedded O.S. Supported**
The eBOX671-885-FL not only supports Windows 7, Windows 8.1, but also supports embedded OS, such as Windows 7 Embedded, Windows 8 Embedded and Linux.

● **Various Storage Supported**
For storage device, the eBOX671-885-FL supports two 2.5" SATA storage drive bay, one CFast™ slot and mSATA devices.

1.2   System Specifications

1.2.1 CPU

- **CPU**
  - ■ LGA1150 Socket Intel® Core™ i7/i5/i3/Celeron processor
- **Chipset**
  - ● Intel® Haswell/ Haswell-refresh Q87 chipset
- **BIOS**
  - ■ American Megatrends Inc. UEFI (Unified Extensible Firmware Interface) BIOS.
- **System Memory**
  - ■ Two 204-pin unbuffered DDR3 1333/1600 MHz SO-DIMM socket, max. up to 16GB

1.2.2 I/O System

- **Display:**
  - ■ Intel® HD Graphics by CPU, max. up to triple independent display
  - ■ One HDMI (Supports HDMI 1.4a, max. resolution up to 4096 × **2160**@24Hz)
  - ■ One DVI-I connector (Supports max. resolution up to 1920x1200@60Hz)
  - ■ One DisplayPort (Supports max. resolution up to 3840x2160@60Hz)
- **Audio:**
  - ■ One Audio connector (Mic-in, Line-out)
- **Ethernet:**
  - ■ 2 x RJ-45 connectors for 10/100/1000 Base-T Ethernet ports (Intel® i211-AT)
- **PoE (Power over Ethernet):**
  - ■ Controller: Intel® i211AT x 4
  - ■ Compliant:
    - - 4ports full-load, IEEE802.3af Class 2 (7Watt)
    - - 2ports full-load, IEEE802.3af Class 3 (15.4Watt)
    - - 1ports full-load, IEEE802.3at Class 4 (30Watt)
  - ■ Power Output: Total maximum 30 watt for 4 ports
- **USB Ports:**
  - ■ 6 x USB 3.0 & 2 x USB 2.0 ports
- **Serial Ports**
  - ■ 2 x RS-232/422/485 and 2 x RS-232 by 9-pin D-Sub male connectors, jumper-less
- **DIO:**
  - ■ 8 CH programmable digital I/O by 9-pin D-Sub female connectors
  - ■ 8 CH Isolated digital I/O (4in & 4out) by phoenix type connectors (Option)
- **Mini PCIe Interface:**
  - ■ 2 x PCI Express Mini Card Slots w/ mSATA supported
- **Storage:**
  - ■ 2 x 2.5" SATA HDD/SSD drive bay
  - ■ 1 x CFast™
  - ■ 2 x mSATA
- **Indicator:**
  - ■ 1 x Orange LED for HDD active
  - ■ 1 x Blue LED for system power

- **Switch:**
  - 1 x Power switch
  - 1 x Reset switch
  - 1 x AT/ATX switch
  - 1 x Remote PWR switch connector
- **SIM Slot x 1**

1.2.3 System Specification

- **Watchdog Timer**
  - 1~255 seconds or minutes; up to 255 levels.
- **Power Supply**
  - 24V DC input
- **Operation Temperature**
  - -20℃ ~ 50℃ (-4 ⁰F ~ 122⁰F), with W.T. SSD & Memory ;CPU TDP 35W)
- **Storage Temperature**
  - -40℃ ~ 80℃ (-40 ⁰F ~ 176⁰F)
- **Humidity**
  - 10% ~ 90% (non-condensation)
- **Vibration Endurance**
  - 3Grm w/ CFast (5-500Hz, X, Y, Z directions)
- **Weight**
  - 4.31 kg (9.5 lb) without package
  - 5.1 kg (11.24 lb) with package
- **Dimensions**
  - 280mm(11.02") (W) x210mm(8.27") (D) x 76mm(2.99") (H)

1.2.4 Driver CD Content

- **Driver**
  - Audio
  - Chipset
  - Ethernet
  - Graphic
  - Intel Rapid Storage Technology
  - USB 3.0
  - ME 9.0
- **Manual**
  - User Manual
  - Quick Manual

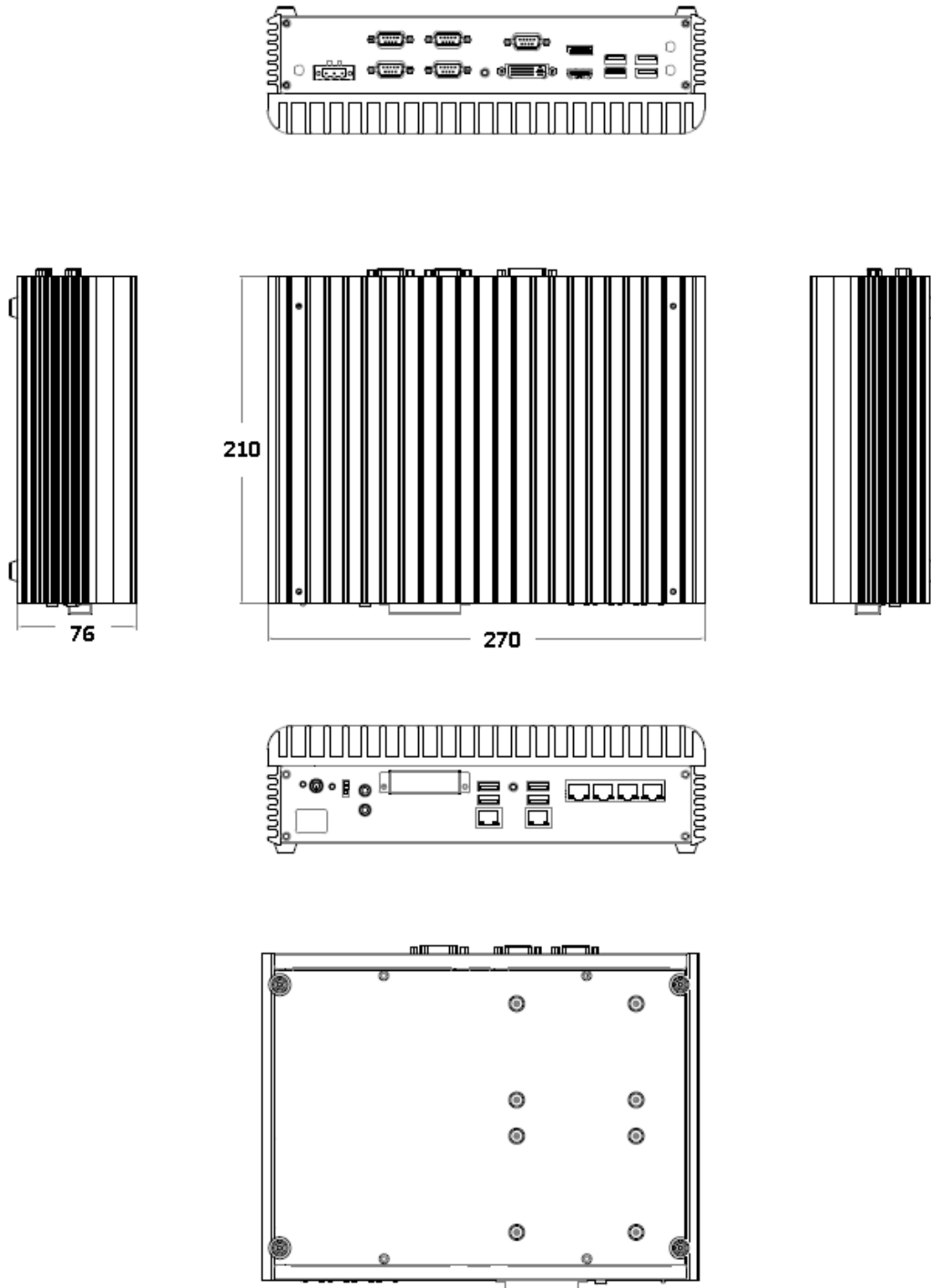*Note:* ***All specifications and images are subject to change without notice.***

1.3   Dimensions

The following diagrams show you dimensions and outlines of the eBOX671-885-FL.

1.3.1 System Dimension

1.3.2 Wall mount Bracket Dimension

35

60

60

35

290.6
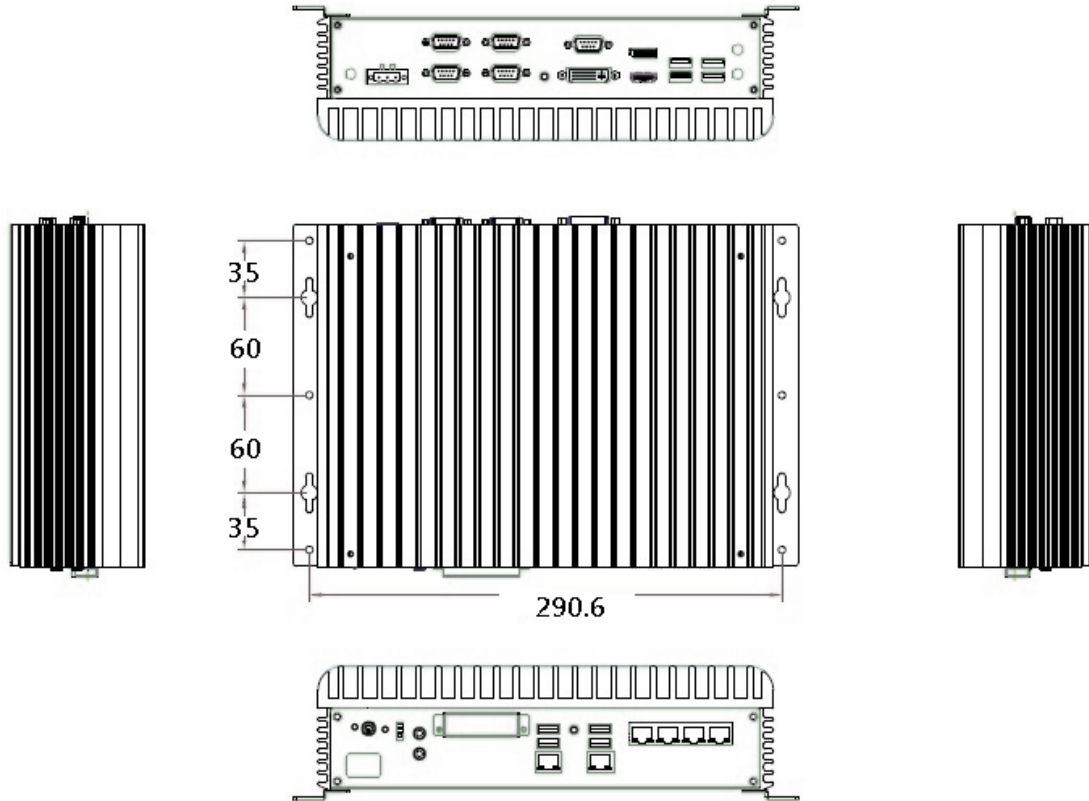
1.4 I/O Outlets

The following figures show you I/O outlets on front view of the eBOX671-885-FL.

● **Front View drawing**

● **Rear View drawing**

USB 3.0 **USB2.0** **HDMI** **DVI-I** **RS-232** **RS-232/422/485**

DisplayPort

8-CH Digital I/O

24VDC Power input

Isolated DIO

Option 8-CH isolated DIO

eBOX671-885-FL-DC

eBOX671-885-FL-DC-I

1.5   Packing List

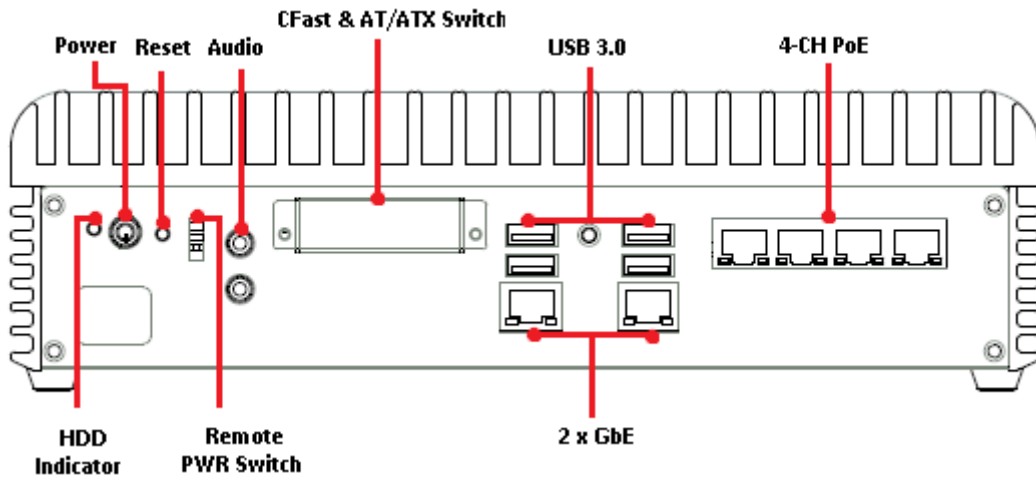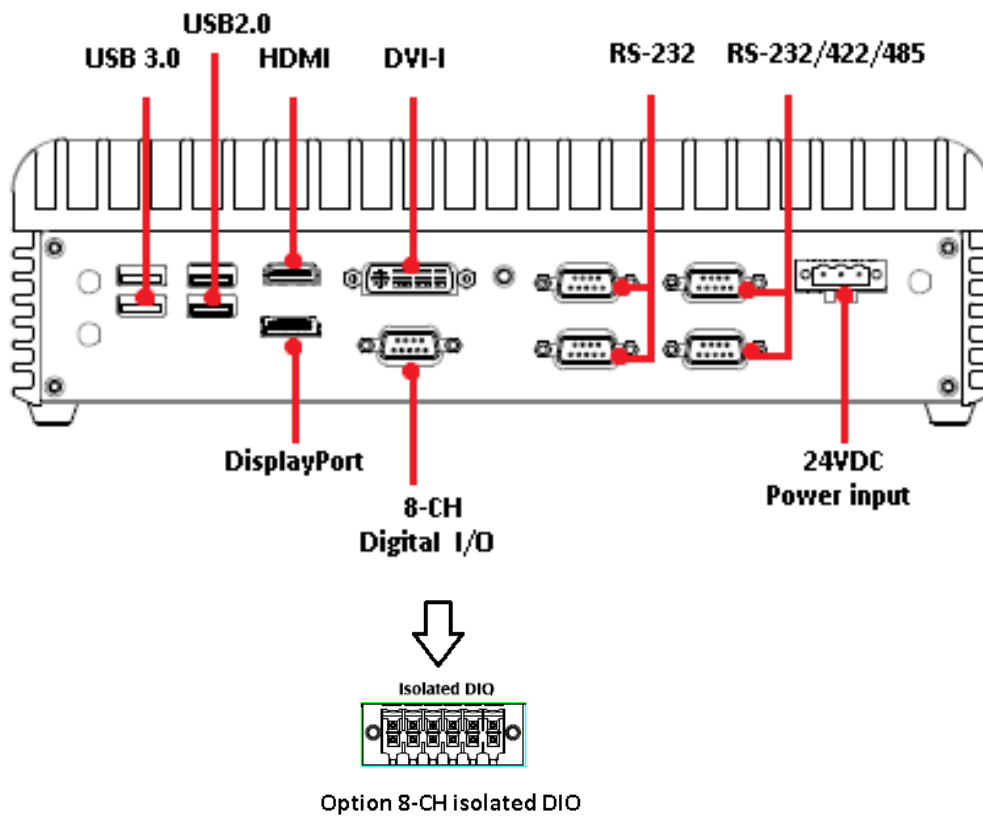The package bundled with your eBOX671-885-FL should contain the following items:

- eBOX671-885-FL System Unit x 1
- eBOX671-885-FL Quick Installation Guide x 1
- DVD x 1 (For Driver and Manual)
- Screws Pack x1
- Pre-installed Foot pad x4
- Processor Thermal Pad x1
- 3 Pin Phoenix Power Connector x1
- Remote Power Switch Cable x1
- Optional Wall-mount Kit
- Optional Antenna

1.6   Model List

eBOX671-885-FL-DC	Fanless Embedded System with Intel Core i7/i5/i3 & Celeron Processor, Q87 PCH, DVI-I/HDMI/DisplayPort, Dual HDD, PoE*4, GbE LAN*2, USB*8, Audio, COM*4 and 8-CH TTL digital I/O, 24VDC
eBOX671-885-FL-DC-I	Fanless Embedded System with Intel Core i7/i5/i3 & Celeron Processor, Q87 PCH, DVI-I/HDMI/DisplayPort, Dual HDD, PoE*4, GbE LAN*2, USB*8, Audio, COM*4 and 8-CH isolated digital I/O, 24VDC

If you cannot find this package or any items are missing, please contact Axiomtek distributors immediately.

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CHAPTER 2
HARDWARE INSTALLATION

The eBOX671-885-FL is convenient for your various hardware configurations, such as Processor, DRAM, HDD (Hard Disk Drive), SSD (Solid State Drive), CFast™ card or PCI Express Mini Card modules. The chapter 2 will show you how to install the hardware.

2.1   Installing the CPU Processor

Step 1 Turn off the system, and unplug the power cord.
Step 2 There are four screws on the top heatsink are used to fasten the heatsink to the chassis.
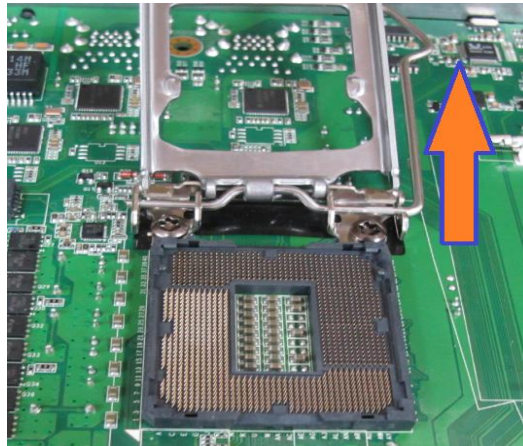
Step 3 Loosen these screws to remove the top heatsink.

Step 4   Remove the warning label and disengage load lever.

● Disengage load lever by releasing down and out on the hook.

● Rotate load lever to open position at approximately 135°.

● Rotate load plate to open position at approximately 150°.


Note	***Apply pressure to corner with right-hand thumb when opening or closing load lever - otherwise lever will bounce back (as a mouse trap) causing bent contacts.***

Step 5   Processor installation.

● Lift processor package from shipping media by grasping the substrate edges.

● Scan the processor package gold pads for any presence of foreign material.

● Locate connection 1 indicator on the processor which aligns with connection 1 indicator chamfer on the socket, and notice processor keying features that line up with posts along socket walls.

● Grasp the processor with thumb and index finger along the top and bottom edges. The socket will have cutouts for your fingers to fit into.

● Carefully place the processor into the socket body vertically.
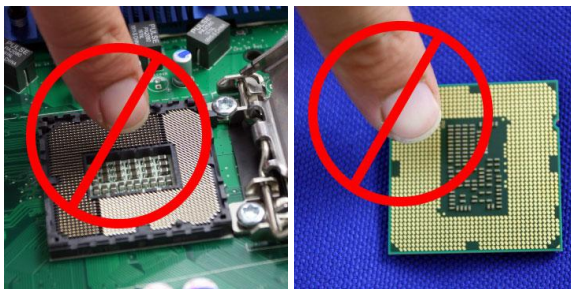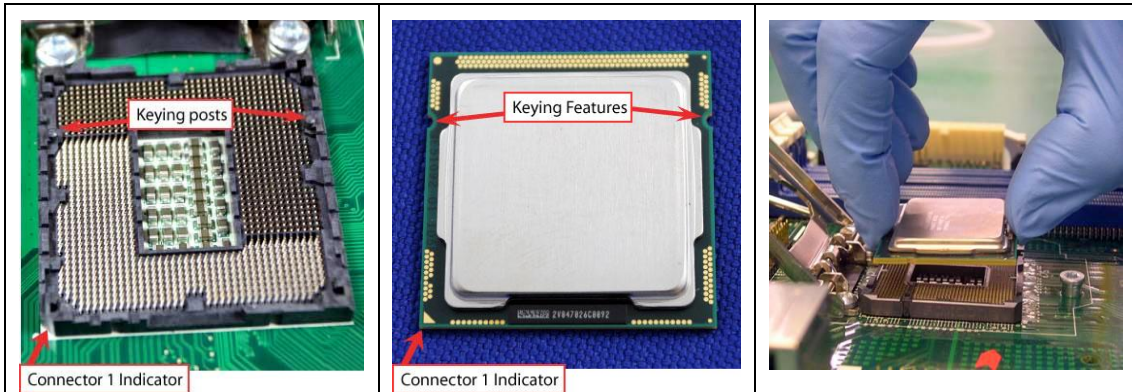
⚠️ **Caution**	***Never touch fragile socket contacts to avoid damage and do not touch processor sensitive contacts at any time during installation.***

Step 6   Thermal pad installation.

●   Please confirm the processor has placed into CPU socket properly.

●   Take one of processor thermal pad from accessory package.

●   Paste the thermal pad on the processor with caution then remove protection film.

●   Lock load lever to fix processor.
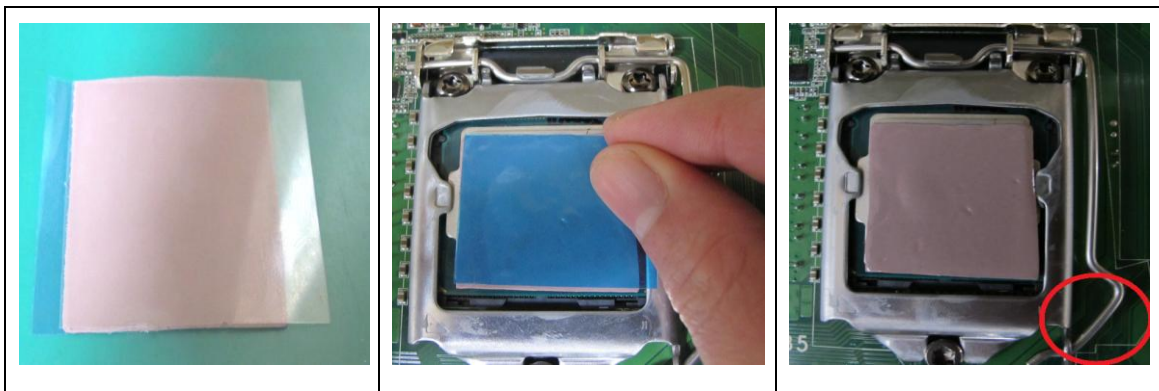
Step 7 Fasten four screws to assemble top heatsink with main chassis .

2.2   Installing the SO-DIMM

Step 1   **Turn off the system, and unplug the power cord.**
Step 2   **There are four screws on the top heatsink are used to fasten the heatsink to the chassis.**

Step 3   **Loosen these screws to remove the top heatsink then you can find dual SO-DIMM sockets on main board.**
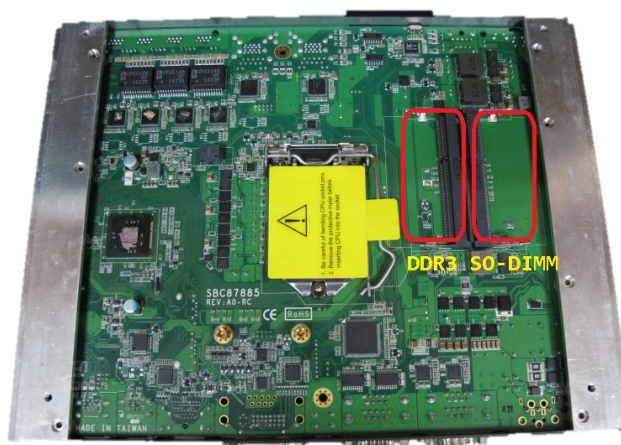
Step 4   **Locate the memory module, insert the gold colored contact into the socket, and push the module down, until it is firmly seated by locking two latches on the sides.**

Step 5 **Assemble top heatsink with chassis through four screws carefully to complete SO-DIMM installation.**

2.3   Installing the 2.5" SATA Device

Step 1   Turn off the system, and unplug the power cord.

Step 2   Turn the system upside down to locate screws at the bottom, loosen screws.

Step 3   Remove the bottom cover.

Step 4   You can get the SATA data cable and the SATA power cable, please refer to the following photos to place the SATA hard drive on bottom cover.

      Please notice the direction of connector for HDD.
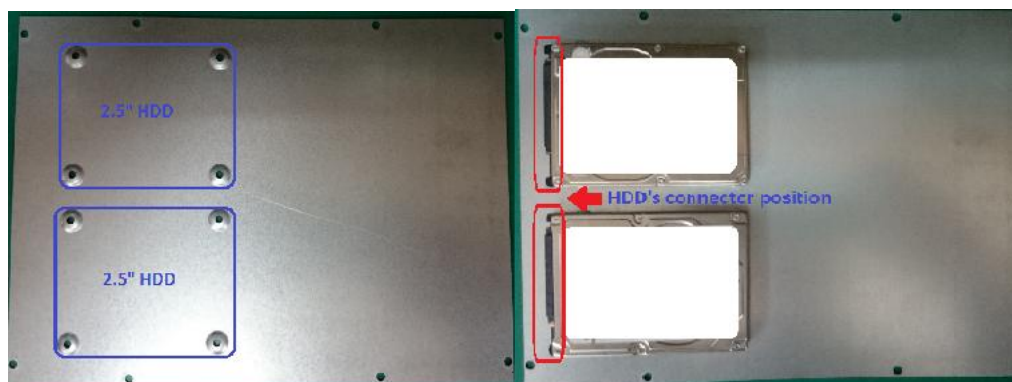
Step 5   Fasten screws to fix HDD with bottom cover.

Step 6   Connect the SATA data cable and SATA power cable to the connectors on the SATA drive.
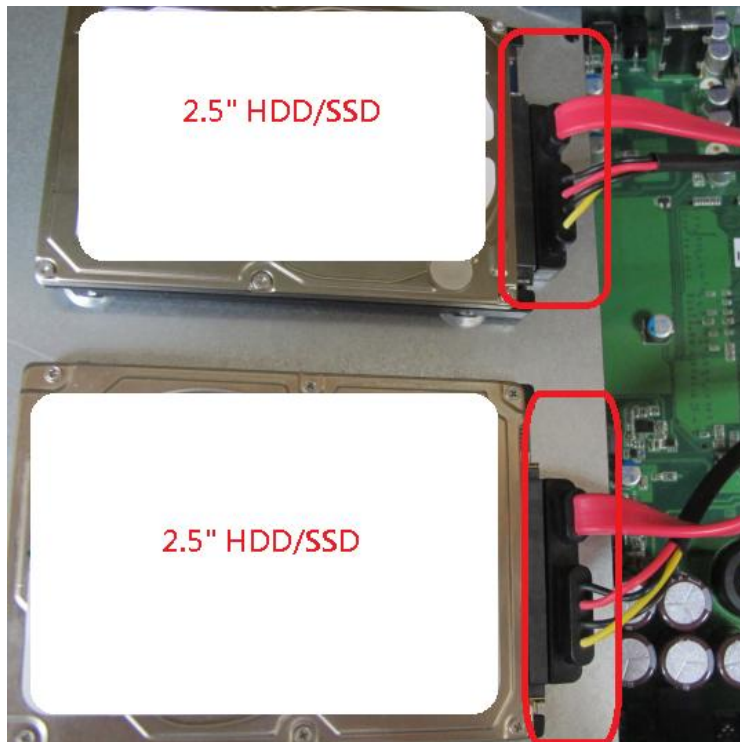
Step 7   Please fasten screws and foot pad to complete installation.
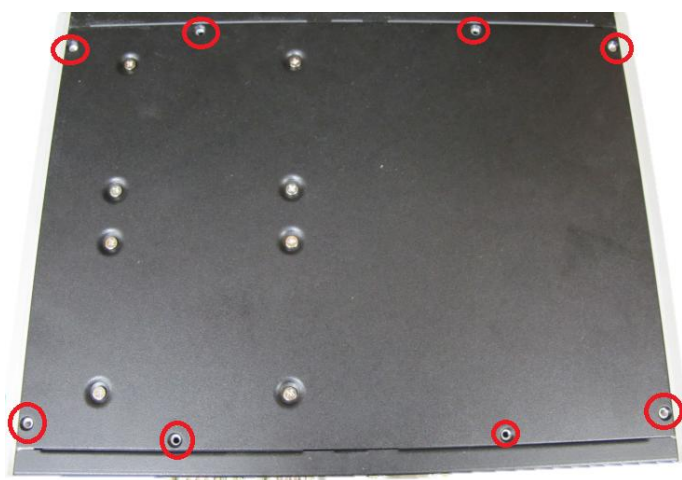
2.4   Installing the Express Mini Card

Step 1 **Turn off the system, and unplug the power cord.**
Step 2 **Turn the system upside down to locate screws at the bottom, loosen screws.**

Step 3 **Remove the bottom cover then find Mini Card location.**

eBOX671-885-FL supports two full-size Mini PCI Express slots, both all support mSATA device. Besides, SCN3 also supports one onboard SIM slot.
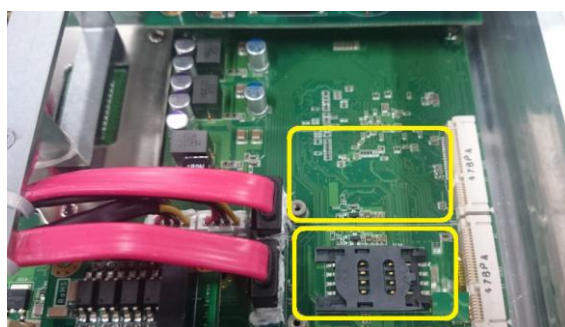
Step 4 **Insert the Mini PCI Express module into the slot at a 45 degrees angle until the gold-plated connector on the edge of the module completely disappears inside the slot.**

Step 5 **Push the module down and then secure it with mounting screws.**

Step 6 **Assembly the bottom Cover back and fasten all screws.**

2.5   Installing the CFast Card

Step 1   Turn off the system, and unplug the power cord.

Step 2   Remove the mounting screws of the CompactFlash socket's cover.

Step 3   Slide CompactFlash card into CompactFlash socket's slot with caution.

Step 4   Close the cover to the chassis and fasten two screws to complete installation.

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CHAPTER 3
JUMPER SETTING & CONNECTOR

Proper jumper settings configure the **eBOX671-885-FL** to meet your application purpose. We are herewith listing a summary table of all jumpers and default settings for onboard devices, respectively.

3.1　Jumper & Connector Location

SBC87885 Top Side
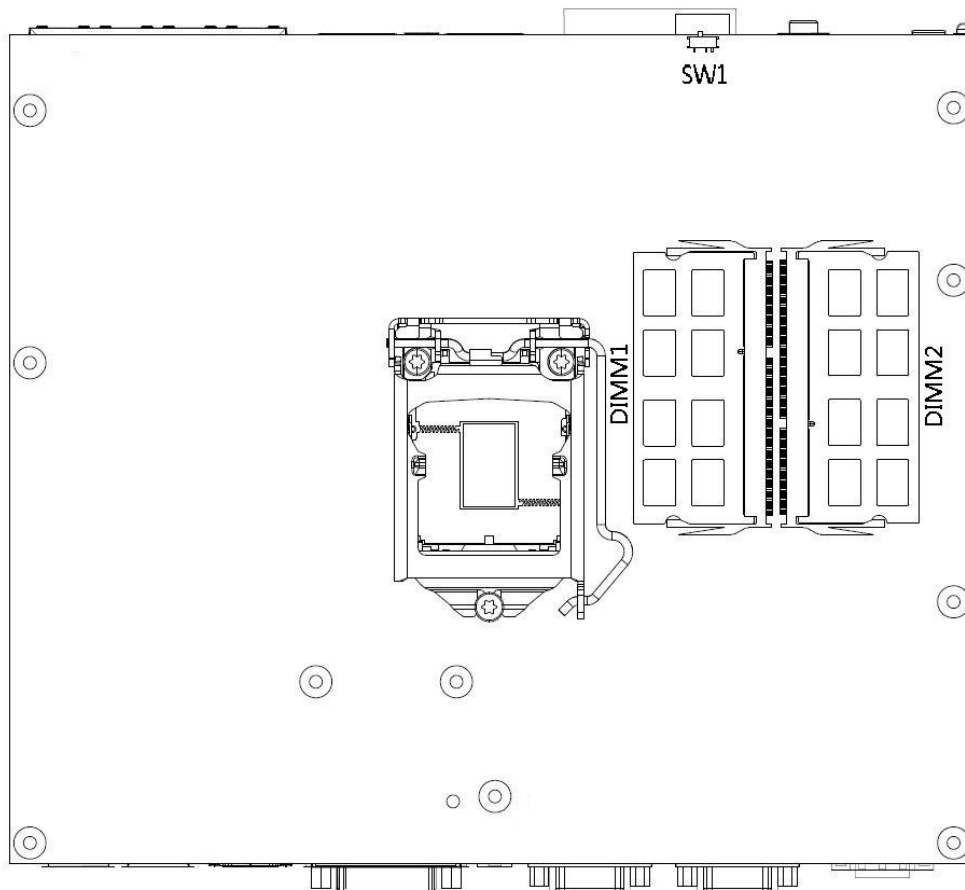
SBC87885 Bottom Side

Note: **We strongly recommended that you should not modify any unmentioned jumper setting without Axiomtek FAE's instruction. Any modification without instruction might cause system to become damage.**
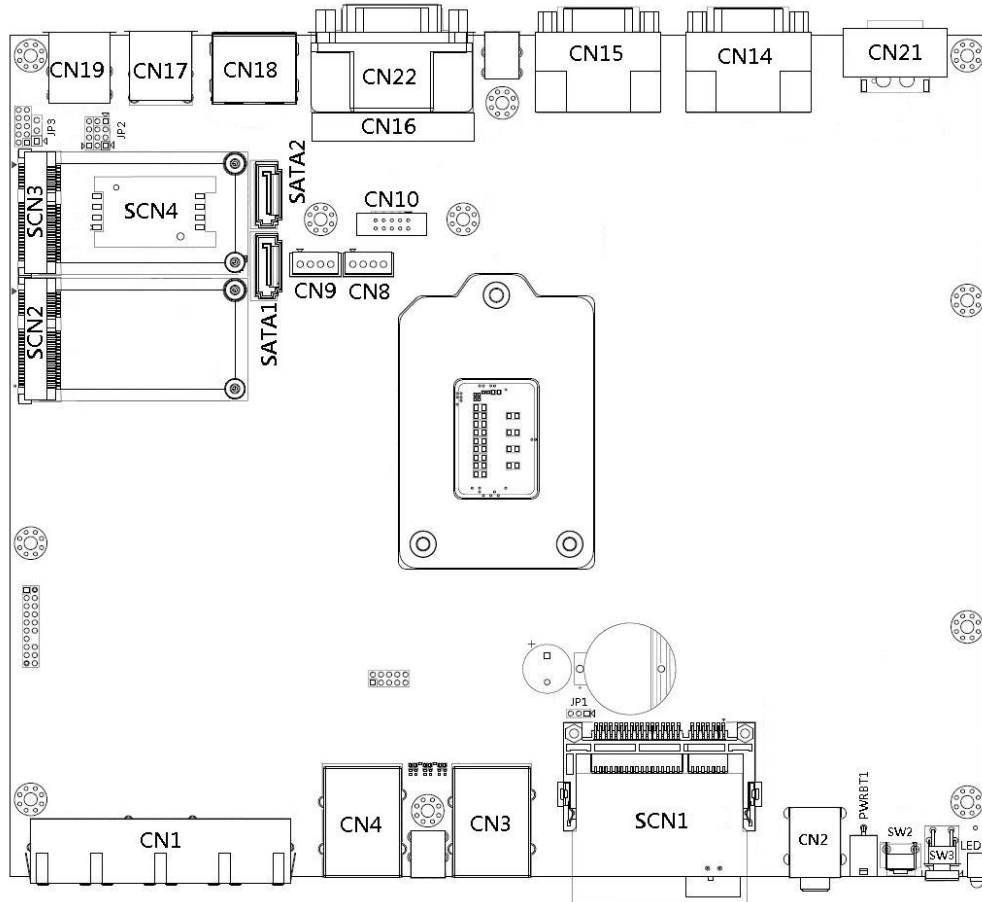
3.2   Jumper Setting Summary

Proper jumper settings configure the eBOX671-885-FL to meet your application purpose. We are herewith listing a summary table of all jumpers and default settings for onboard devices, respectively.

Jumper	Function/Default Setting	Jumper Setting
JP2	mSATA / PCIe Selection	SCN2: 3-5 Short SCN3: 4-6 Short
JP3	Restore BIOS Optimal Defaults Default: Normal Operation	Short 1-2

Note: How to setup Jumpers

The illustration shows how to set up jumpers. When the jumper cap is placed on pins, the jumper is "close", if not, that means the jumper is "open".

[Open]   [Closed]   [Pin1-2 Closed]

3.2.1 Mini Card Selection (JP2)

Select mSATA or PCI-Express x1 function on both two PCI-Express Mini Card sockets.

Function	SCN2	SCN3
mSATA	1-3 Short	2-4 Short
PCI-E/USB	3-5 Short	4-6 Short
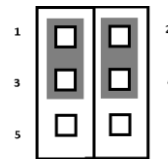
3.2.2 Restore BIOS Optimal Defaults (JP3)

Put jumper clip to pin 2-3 for a few seconds then move it back to pin 1-2. Doing this procedure can restore BIOS optimal defaults.

Function	Setting
Normal (Default)	1-2
Clear RTC	2-3
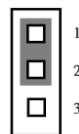
3.3 Connectors

Connectors connect the board with other parts of the system. Loose or improper connection might cause problems. Make sure all connectors are properly and firmly connected. Here is a summary table shows you all connectors and button on the **eBOX671-885-FL** Series.

External Connectors	Section
DC-in Phoenix Power Connector	3.3.1
HDMI Connector	3.3.2
DisplayPort Connector	3.3.3
DVI-I	3.3.4
Serial Port Connector	3.3.5
USB 3.0 Connector	3.3.6
Ethernet Connector	3.3.7
USB 2.0 Connector	3.3.8
Audio Connector	3.3.9
Digital I/O Connector	3.3.10
Isolated Digital I/O connector (Option)	3.3.11
ATX Power On/Off Button	3.3.12
Rest Button	3.3.13
Remote Power Switch Connector	3.3.14
AT/ATX Switch	3.3.15
CFast Socket	3.3.16
Internal Connectors	**Section**
Serial ATA (SATA) Connector	3.3.17
SATA Power Connector	3.3.18
SIM Card Slot (SCN4)	3.3.19
Full-Size Express Mini Card slot (SCN2 & SCN3)	3.3.20

3.3.1 DC-in Phoenix Power Connector

The system supports 24V Phoenix DC-in connector for system power input.

Pin	Signal
1	DC+
2	GND
3	DC-
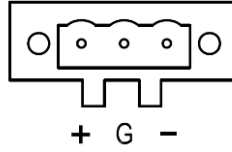
3.3.2 HDMI Connector

The HDMI (High-Definition Multimedia Interface) is a compact digital interface which is capable of transmitting high-definition video and high-resolution audio over a single cable.

Pin	Signal	Pin	Signal
1	HDMI OUT_DATA2+	11	GND
2	GND	12	HDMI OUT Clock-
3	HDMI OUT_DATA2-	13	N.C.
4	HDMI OUT_DATA1+	14	N.C.
5	GND	15	HDMI OUT_SCL
6	HDMI OUT_DATA1-	16	HDMI OUT_SDA
7	HDMI OUT_DATA0+	17	GND
8	GND	18	+5V
9	HDMI OUT_DATA0-	19	HDMI_HTPLG
10	HDMI OUT Clock+		
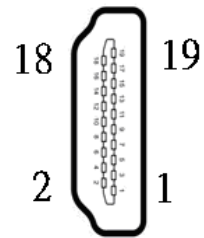
3.3.3   DisplayPort Connector

DisplayPort interface is also called DP port.
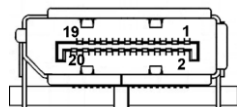
Pin	Signal	Pin	Signal
1	DPB_LANE0	11	GND
2	GND	12	DPB_LANE3#
3	DPB_LANE0#	13	Detect Pin
4	DPB_LANE1	14	GND
5	GND	15	DPB_AUX
6	DPB_LANE1#	16	GND
7	DPB_LANE2	17	DPB_AUX#
8	GND	18	DPB_HPDE
9	DPB_LANE2#	19	GND
10	DPB_LANE3	20	+3.3V

3.3.4   DVI-I Connector

DVI-I (integrated, combines digital and analog in the same connector; digital may be single or dual link) provides transmission of fast and high quality digital video between source device (graphic card) and display device.

Pin	Signal	Pin	Signal
1	DVI_DATA2-	2	DVI_DATA2+
3	GND	4	N.C.
5	N.C.	6	DVI_SPC
7	DVI_SPD	8	N.C.
9	DVI_DATA1-	10	DVI_DATA1+
11	GND	12	N.C.
13	N.C.	14	+5V
15	GND	16	DVI_HTPLG
17	DVI_DATA0-	18	DVI_DATA0+
19	GND	20	N.C.
21	N.C.	22	GND
23	DVI_CLK+	24	DVI_CLK-
C1	Analog red	C2	Analog green
C3	Analog blue	C4	Analog horizontal sync
C5	Analog ground		

3.3.5 COM1~COM4 Serial Port Connector

The system has four serial ports. COM1~COM2 are RS-232/422/485 ports. Please refer to Chapter 4 for the detail of BIOS setting. COM3~COM4 are RS-232 ports.

※**COM1,COM2**
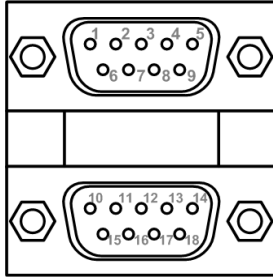
Pin	Pin	RS-232	RS-422	RS-485
1	10	DCD, Data Carrier Detect	TX-	Data-
2	11	RXD, Receive Data	TX+	Data+
3	12	TXD, Transmit Data	RX+	No use
4	13	DTR, Data Terminal Ready	RX-	No use
5	14	GND, Ground	No use	No use
6	15	DSR, Data Set Ready	No use	No use
7	16	RTS, Request To Send	No use	No use
8	17	CTS, Clear To Send	No use	No use
9	18	RI, Ring Indicator	No use	No use

※**COM3 & COM4**
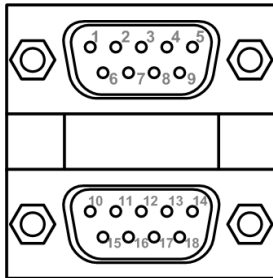
Pin	Pin	RS-232
1	10	DCD, Data Carrier Detect
2	11	RXD, Receive Data
3	12	TXD, Transmit Data
4	13	DTR, Data Terminal Ready
5	14	GND, Ground
6	15	DSR, Data Set Ready
7	16	RTS, Request To Send
8	17	CTS, Clear To Send
9	18	RI, Ring Indicator

3.3.6 USB 3.0 Connector

The Universal Serial Bus connectors are compliant with USB 3.0 (5Gb/s), and ideally for installing USB peripherals such as scanner, camera and USB devices, etc.

Pin	Signal USB Port 0	Pin	Signal USB Port 1
1	USB_VCC (+5V level standby power)	10	USB_VCC (+5V level standby power)
2	USB_Data2-	11	USB_Data3-
3	USB_Data2+	12	USB_Data3+
4	GND	13	GND
5	SSRX2-	14	SSRX3-
6	SSRX2+	15	SSRX3+
7	GND	16	GND
8	SSTX2-	17	SSTX3-
9	SSTX2+	18	SSTX3+
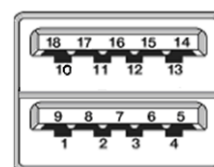
3.3.7 Ethernet Connector (LAN1~LAN6)

The RJ-45 connector is for Ethernet-**(Intel i211-AT)**. To connect the board to a 1000/100/10 Base-T hub, just plug one end of the cable into connector and connect the other end (phone jack) to a 1000/100/10-Base-T hub. LAN 3 to LAN 6 all are PoE ports for standard of eBOX671-885-FL, total watt maxmum up to 30 watt.

4-CH PoE Compliant:

-4ports full-load, IEEE802.3af Class 2 (7Watt)

-2ports full-load, IEEE802.3af Class 3 (15.4Watt)

-1ports full-load, IEEE802.3at Class 4 (30Watt)

Pin	LAN Signal	Pin	LAN Signal
L1	**MDI0+**	**L5**	**MDI2+**
L2	**MDI0-**	**L6**	**MDI2-**
L3	**MDI1+**	**L7**	**MDI3+**
L4	**MDI1-**	**L8**	**MDI3-**
A	**Activity link LED(Yellow)** **OFF: No link** **Blinking: Link established; data activity detected**		
B	**Speed LED** **OFF: 10Mbps data rate** **Green: 100Mbps data rate** **Orange: 1GMbps data rate**		
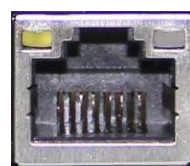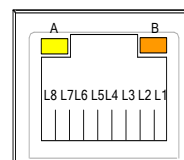
3.3.8 USB 2.0 Connector

The Universal Serial Bus connectors are compliant with USB 2.0 (480Mbps), and ideally for installing USB peripherals such as keyboard, mouse, scanner, etc.

Pin	Signal USB Port 0	Pin	Signal USB Port 1
1	USB VCC (+5V level)	5	USB VCC (+5V level)
2	USB #0_D-	6	USB #1_D-
3	USB #0_D+	7	USB #1_D+
4	Ground (GND)	8	Ground (GND)
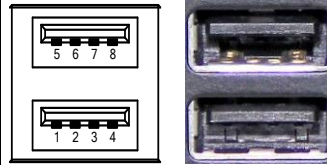
3.3.9 Audio Connector

These two audio jacks ideal are for Audio Mic-In and Audio Line-out.

Pin	Signal
1	Line Out
2	Microphone In
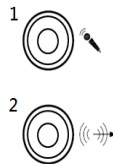
3.3.10 Digital I/O Connector

eBOX671-885-FL supports 8 channel TTL digital I/O, programmable (4in & 4out as default) for standard version, you can get the pin define from below table.

Pin	I/O
1	DIO1
2	DIO2
3	DIO3
4	DIO4
5	DIO5
6	DIO6
7	DIO7
8	DIO8
9	GND
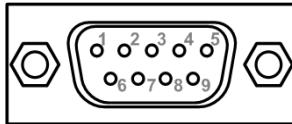
3.3.11 Isolated Digital I/O Connector (Option)

eBOX671-885-FL also equipped one version that supports isolated COM 8 channel digital I/O to instead of 8 channel programmable digital I/O. Therefore, please refer to the following information if your system belongs to isolated digital I/O version of eBOX671-885-FL.

The digital I/O can be configured to control cash drawers and sense warning signals from an Uninterrupted Power System (UPS), or perform store security control. You may use software programming to control these digital signals.

Pin	I/O
1	External power
2	DI1
3	DI2
4	DI3
5	DI4
6	Isolation GND
7	Common PWR +
8	DO1
9	DO2
10	DO3
11	DO4
12	Common PWR -

Dry Contact Wiring	Wet Contact Wiring

DO Contact Wiring
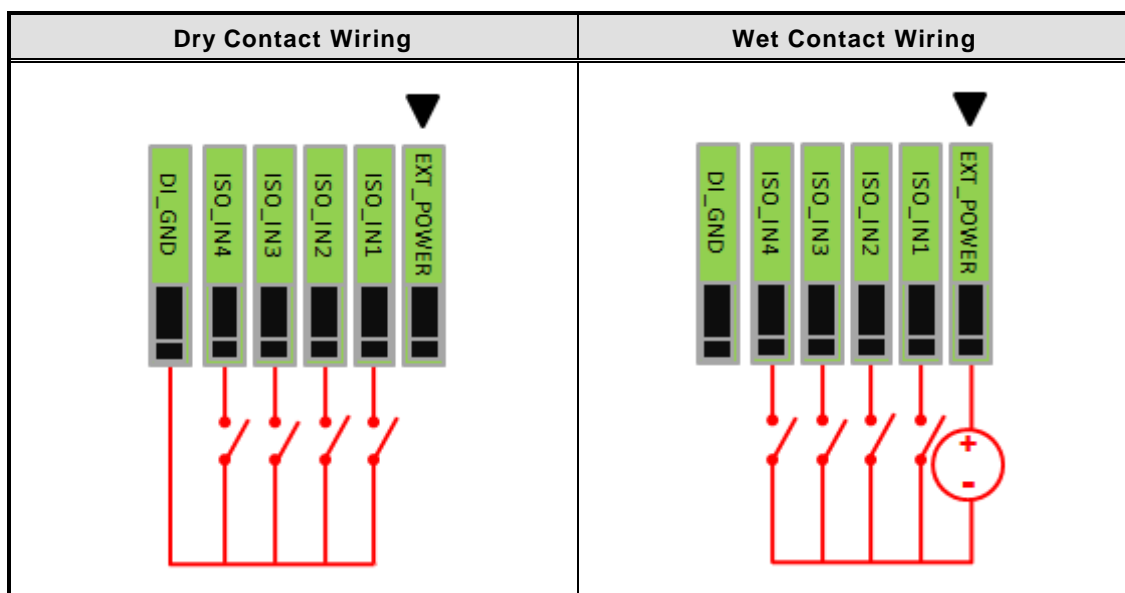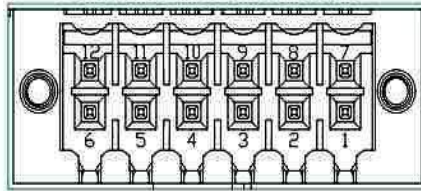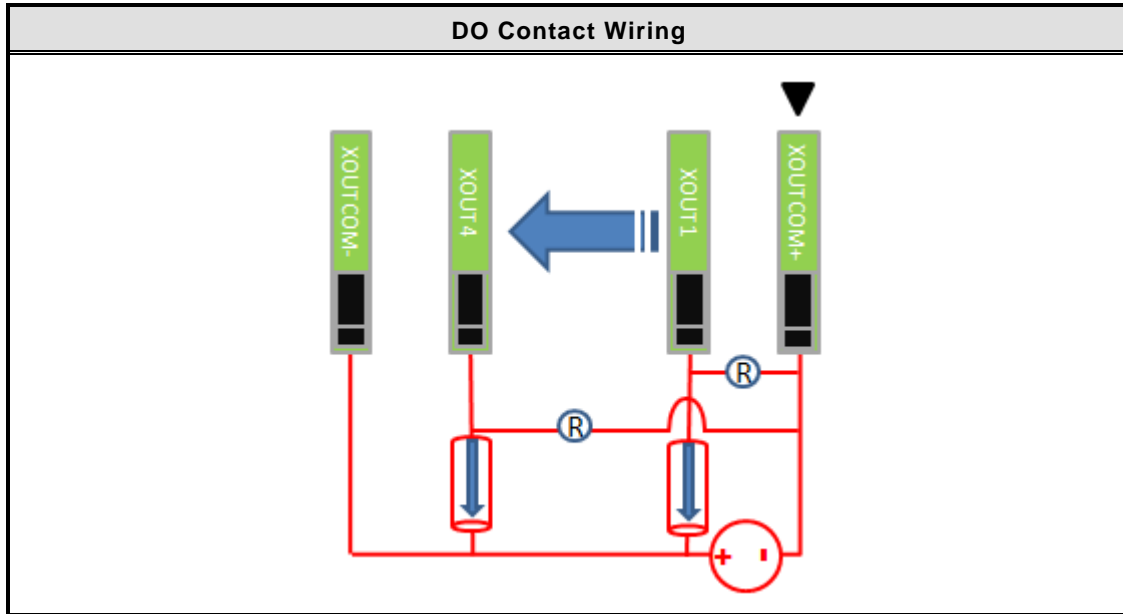
3.3.12 ATX Power On/OFF Button

The ATX power button is on the I/O side. It can allow users to control eBOX671-885-FL power on/off.

Function	Description
On	Turn on/off system
Off	Keep system status

3.3.13 Reset Button

The Reset button can allow users to reset eBOX671-885-FL.

Function	Description
On	Reset system
Off	Keep system status

3.3.14 Remote Power Switch Connector (SPWRBT1)

One 2-pin connector output for remote power on/off switch.

Function	Description
Short(1-2)	Turn on/off system
Open	Keep system status
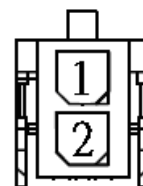
3.3.15 AT/ATX Switch

You can adjust this switch once you remove CFast cover.

If you set AT/ATX switch to AT mode, the system will be automatically power on without pressing soft power button during power input; we can use this switch to achieve auto power on demand.

AT ⟷ ATX
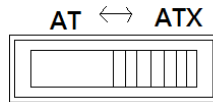
3.3.16 CFast™ Socket

The system is equipped with a CFast™ socket on the bottom side to support a CFast™ card which is based on the Serial ATA bus. The socket is specially designed to avoid incorrect installation of the CFast™ card. When installing or removing the CFast™ card, please make sure the system power is off. The CFast™ card by default identifies itself as C: or D: drive in your PC system.

Pin	Signal	Pin	Signal
S1	GND	PC1	NC
S2	TX+	PC2	GND
S3	TX-	PC3	NC
S4	GND	PC4	NC
S5	RX-	PC5	NC
S6	RX+	PC6	NC
S7	GND	PC7	GND
		PC8	NC
		PC9	NC
		PC10	NC
		PC11	NC
		PC12	NC
		PC13	3.3V
		PC14	3.3V
		PC15	GND
		PC16	GND
		PC17	NC
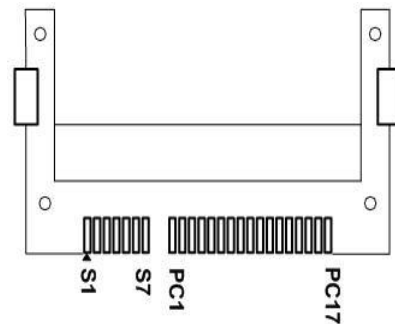
3.3.17 SATA Connector (SATA 1 & 2)

These Serial Advanced Technology Attachment (Serial ATA or SATA) connectors are for high-speed SATA interfaces. They are computer bus interfaces for connecting to devices such as hard disk drives. This board has two SATA 3.0 ports with 6Gb/s performance.

Pin	Signal
1	GND
2	SATA_TX+
3	SATA_TX-
4	GND
5	SATA_RX-
6	SATA_RX+
7	GND

3.3.18 SATA Power Connector

Use CN8、CN9 for interfacing to SATA 2.5" HDD power supply.

Pin	Signal
1	+12V level
2	GND
3	GND
4	+5V level
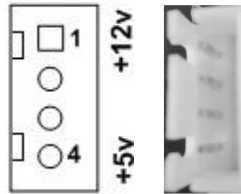
3.3.19 SIM Card Slots

eBOX671-885-FL includes one SIM slots (SCN4) on the bottom side of the system for inserting SIM Card. It is mainly used in 3G/LTE wireless network application on SCN3.

Pin	Signal
1	PWR
2	RST
3	CLK
4	NC
5	GND
6	VPP
7	I/O
8	NC
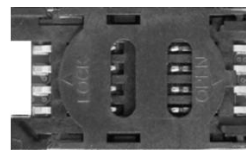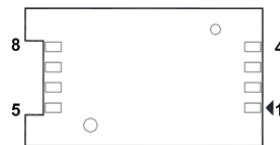
3.3.20 Full-Size PCI Express Mini Card Slot (SCN2 & SCN3)

There are two PCI-Express Mini Card connectors on the bottom side applying to either PCI-Express or USB 2.0 or **SATA (mSATA)**. It complies with PCI-Express Mini Card Spec. V1.2. It can also support mSATA cards.

Pin	Signal	Pin	Signal
1	WAKE#	2	+3.3VSB
3	No use	4	GND
5	No use	6	+1.5V
7	CLKREQ#	8	No use
9	GND	10	No use
11	REFCLK-	12	No use
13	REFCLK+	14	No use
15	GND	16	No use
17	No use	18	GND
19	No use	20	W_DISABLE#
21	GND	22	PERST#
23	PE_RXN3/	24	+3.3VSB
25	PE_RXP3/	26	GND
27	GND	28	+1.5V
29	GND	30	SMB_CLK
31	PE_TXN3/	32	SMB_DATA
33	PE_TXP3/	34	GND
35	GND	36	USB_D8-
37	GND	38	USB_D8+
39	+3.3VSB	40	GND
41	+3.3VSB	42	No use
43	GND	44	No use
45	No use	46	No use
47	No use	48	+1.5V
49	No use	50	GND
51	No use	52	+3.3VSB
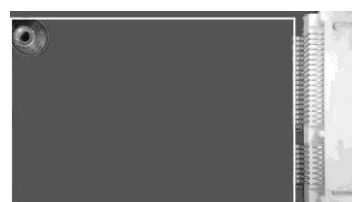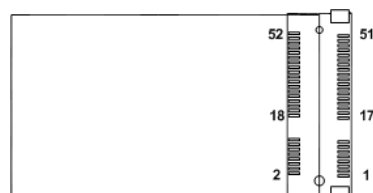
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CHAPTER 4
BIOS SETUP UTILITY

This chapter provides users with detailed description how to set up basic system configuration through the BIOS setup utility.

1.3 Starting

To enter the setup screens, follow the steps below:

1. Turn on the computer and press the <Del> key immediately.
2. After you press the <Del> key, the main BIOS setup menu displays. You can access the other setup screens from the main BIOS setup menu, such as the Advanced and Chipset menus.

It is strongly recommended that you should avoid changing the chipset's defaults. Both AMI and your system manufacturer have carefully set up these defaults that provide the best performance and reliability.

4.2   Navigation Keys

The BIOS setup/utility uses a key-based navigation system called hot keys. Most of the BIOS setup utility hot keys can be used at any time during the setup navigation process. These keys include <F1>, <F2>, <Enter>, <ESC>, <Arrow> keys, and so on.

Note: Some of the navigation keys differ from one screen to another.

Hot Keys	Description
➔⬅ **Left/Right**	The Left and Right <Arrow> keys allow you to select a setup screen.
↑↓ **Up/Down**	The Up and Down <Arrow> keys allow you to select a setup screen or sub-screen.
+− Plus/Minus	The Plus and Minus <Arrow> keys allow you to change the field value of a particular setup item.
Tab	The <Tab> key allows you to select setup fields.
F1	The <F1> key allows you to display the General Help screen.
F2	The <F2> key allows you to Load Previous Values.
F3	The <F3> key allows you to Load Optimized Defaults.
F4	The <F4> key allows you to save any changes you have made and exit Setup. Press the <F4> key to save your changes.
Esc	The <Esc> key allows you to discard any changes you have made and exit the Setup. Press the <Esc> key to exit the setup without saving your changes.
Enter	The <Enter> key allows you to display or change the setup option listed for a particular setup item. The <Enter> key can also allow you to display the setup sub- screens.

4.3   Main Menu

The first time you enter the setup utility, you will enter the Main setup screen. You can always return to the Main setup screen by selecting the Main tab. System Time/Date can be set up as described below. The Main BIOS setup screen is shown below.

```
            Aptio Setup Utility - Copyright (C) 2011 American Megatrends, Inc.
    Main  Advanced  Chipset  Boot  Security  Save & Exit

    BIOS Version                    SBC87885  X002          Set the Date. Use Tab to
    Build Date                      07/11/2013              switch between Date elements.

    System Date                     [Wed 07/17/2013]
    System Time                     [10:55:51]

    Access Level                    Administrator

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

            Version 2.14.1219. Copyright (C) 2011 American Megatrends, Inc.
```

BIOS Information

Display the auto-detected BIOS information.

System Date/Time

Use this option to change the system time and date. Highlight System Time or System Date using the <Arrow> keys. Enter new values through the keyboard. Press the <Tab> key or the <Arrow> keys to move between fields. The date must be entered in MM/DD/YY format. The time is entered in HH:MM:SS format.


Access Level

Display the access level of current user.

4.2   Advanced Menu

The Advanced menu also allows users to set configuration of the CPU and other system devices. You can select any of the items in the left frame of the screen to go to the sub menus:

- ► ACPI Settings
- ► CPU Configuration
- ► SATA Configuration
- ► USB Configuration
- ► NCT6106D Super IO Configuration
- ► NCT6106D HW Monitor
- ► Intel I211 Gigabit Network Connections

For items marked with "►", please press <Enter> for more options.
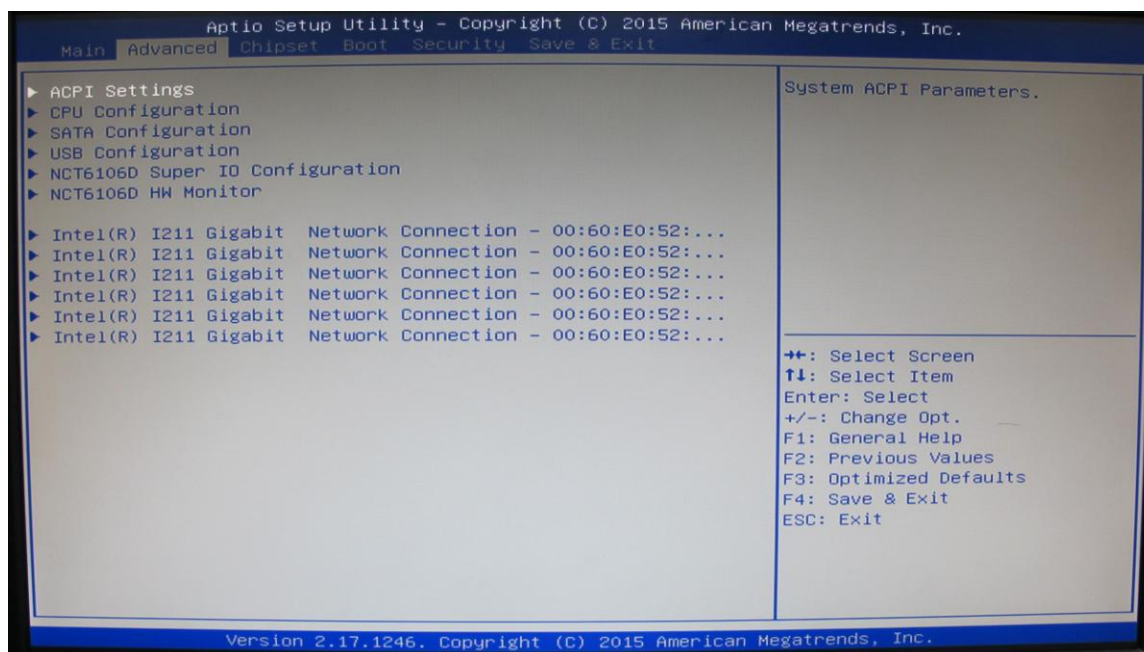
● **ACPI Settings**

You can use this screen to select options for the ACPI configuration, and change the value of the selected option. A description of the selected item appears on the right side of the screen.
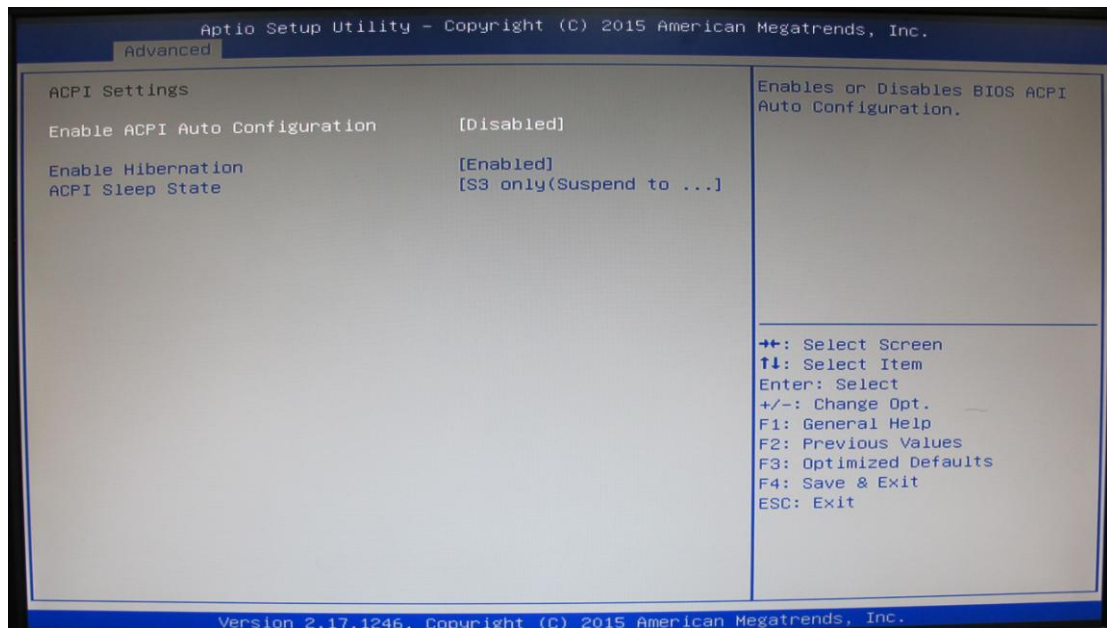
Enable ACPI Auto Configuration

Values: Enabled, Disabled

Enables or disables BIOS ACPI Auto Configurations. When enabled, the following two parameters are hidden.

Enable Hibernation

Values: Enabled, Disabled

Enables or disables the system's ability to hibernate (S4 Sleep State). The setting of this option may have no effect with some operating systems.
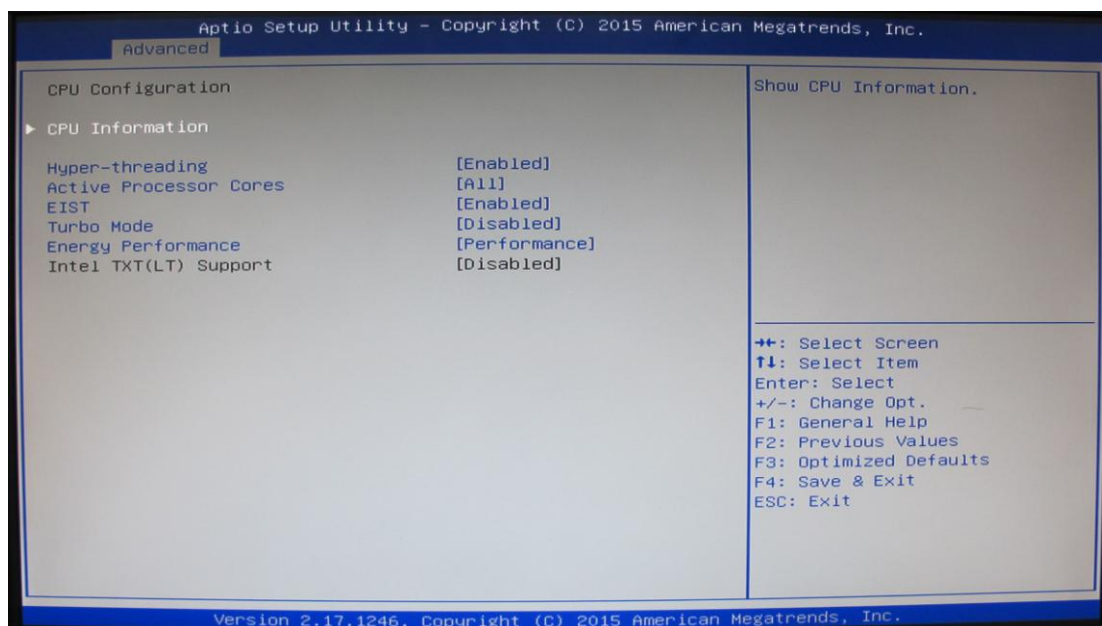
ACPI Sleep State

Allow you to select the Advanced Configuration and Power Interface (ACPI) sleep state. Here are the options for your selection: Suspend Dissabled and S3 (Suspend to RAM).

The S3 (Suspend to RAM) option selects the highest ACPI sleep state the system will enter when SUSPEND button is pressed.

● **CPU Configuration**

This screen shows the CPU information.

Hyper-threading
To enable hyperthreading you must first enable it in your system's BIOS settings, the default is enabled.

Active Processor Cores
Active the cores of processors , default sets to "All".

EIST
Enhanced Intel SpeedStep Technology (EIST) is a power and thermal management technology developed by Intel. eBOX671-885-FL sets to Enabled for default setting.

Turbo Mode
In order to keep system in stable operating condition, we suggest users set disable by default.

CPU Information
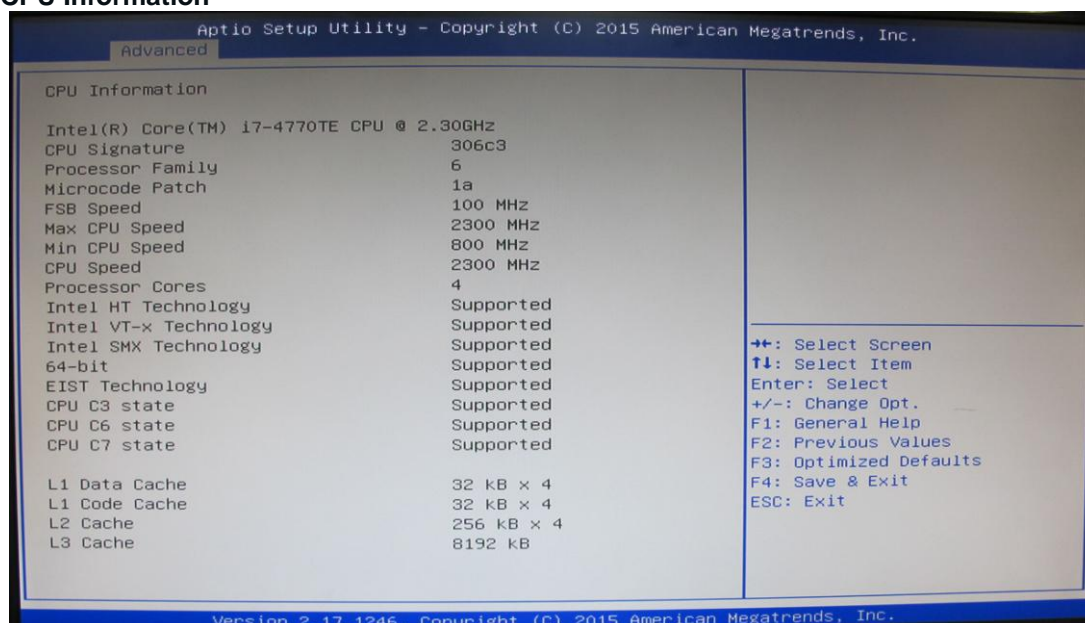
● **SATA Configuration**

In this Configuration menu, you can see the currently installed hardware in the SATA ports. During system boot up, the BIOS automatically detects the presence of SATA devices.
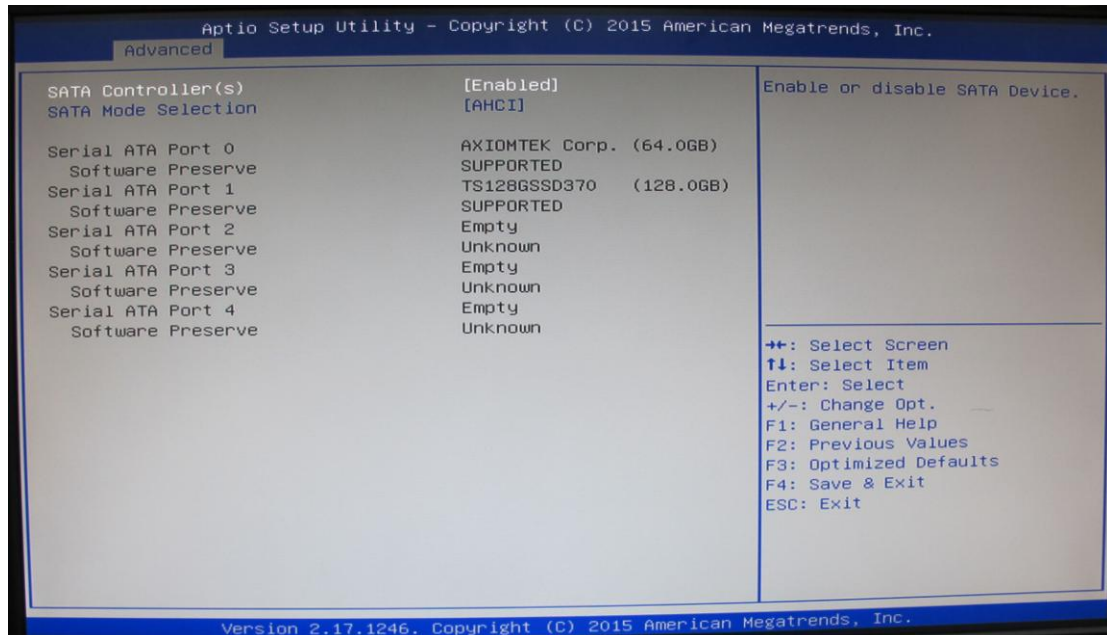
SATA Mode Selection

Determine how SATA controller(s) operate. Operation mode options are **RAID Mode, IDE Mode and AHCI Mode.**

● **USB Configuration**
This screen shows the USB version, and its detail information.
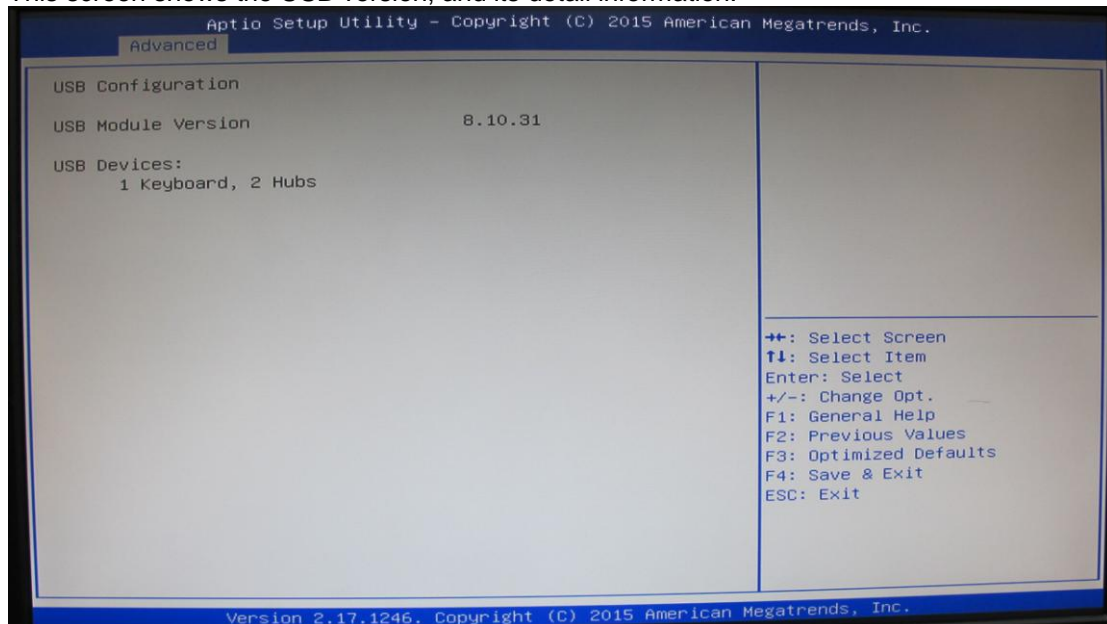
● **NCT6106D Super IO Configuration**

You can use this screen to select options for the Super IO Configuration, and change the value of the selected option.

A description of the selected item appears on the right side of the screen. For items marked with "►", please press <Enter> for more options.
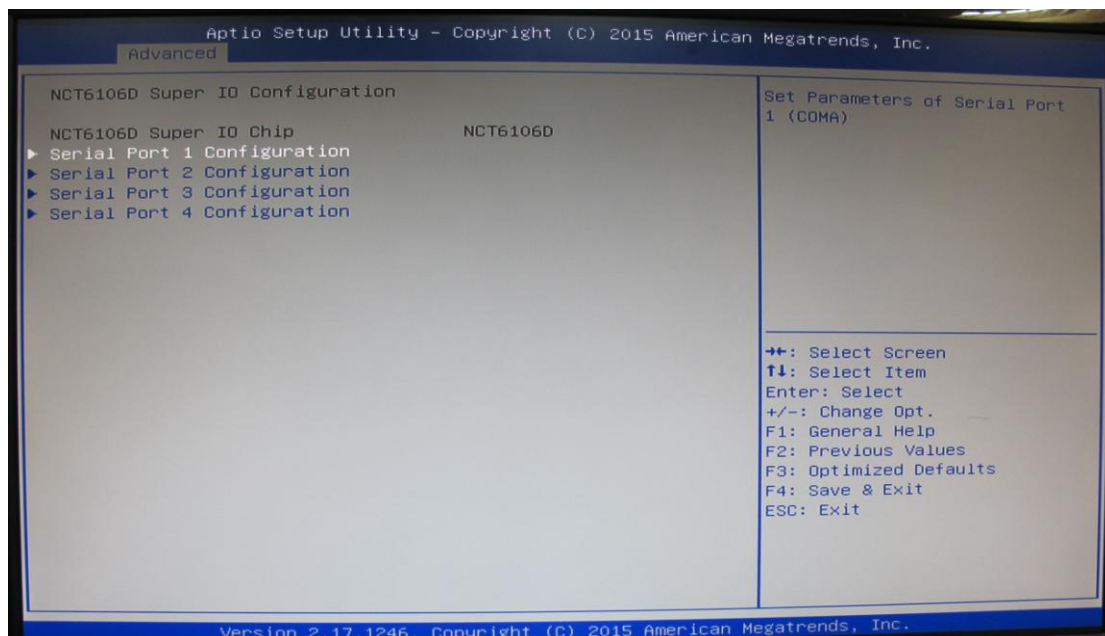
Serial Port 1~4Configuration

Use these items to set parameters of Serial Port 1~4.

● **Serial Port 1 Configuration**
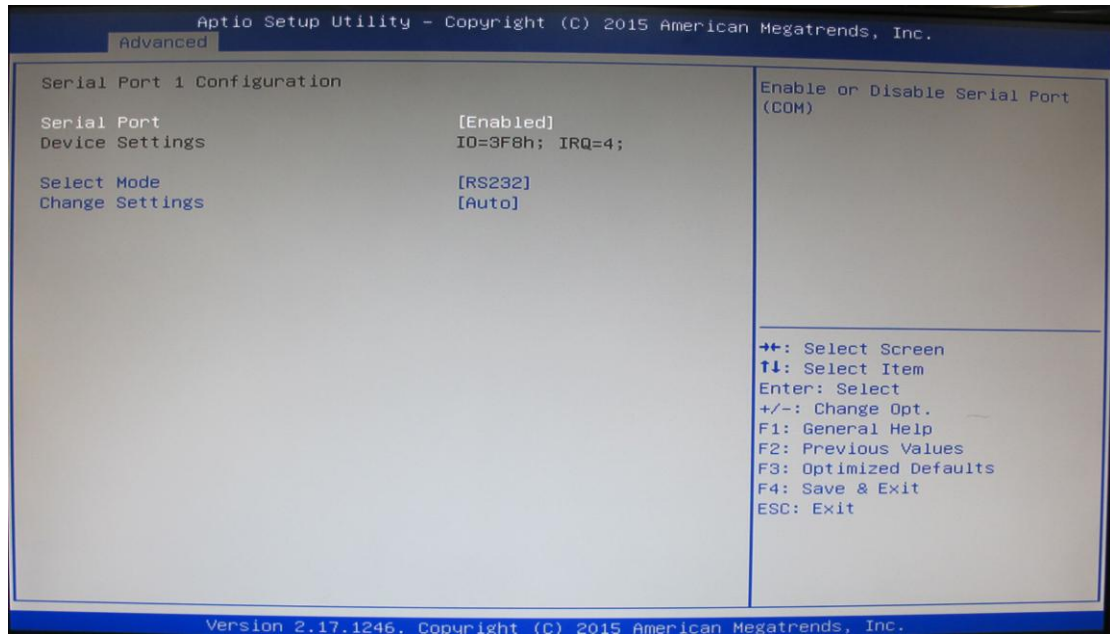
Serial Port

Use this item to enable or disable serial port 1. The optimal setting for base I/O address is 3F8h and for interrupt request line is IRQ4.

Select Mode

Use this item to configure serial port 1. Here are the options for your selection:

RS232

RS422

RS485.

● **Serial Port 2 Configuration**
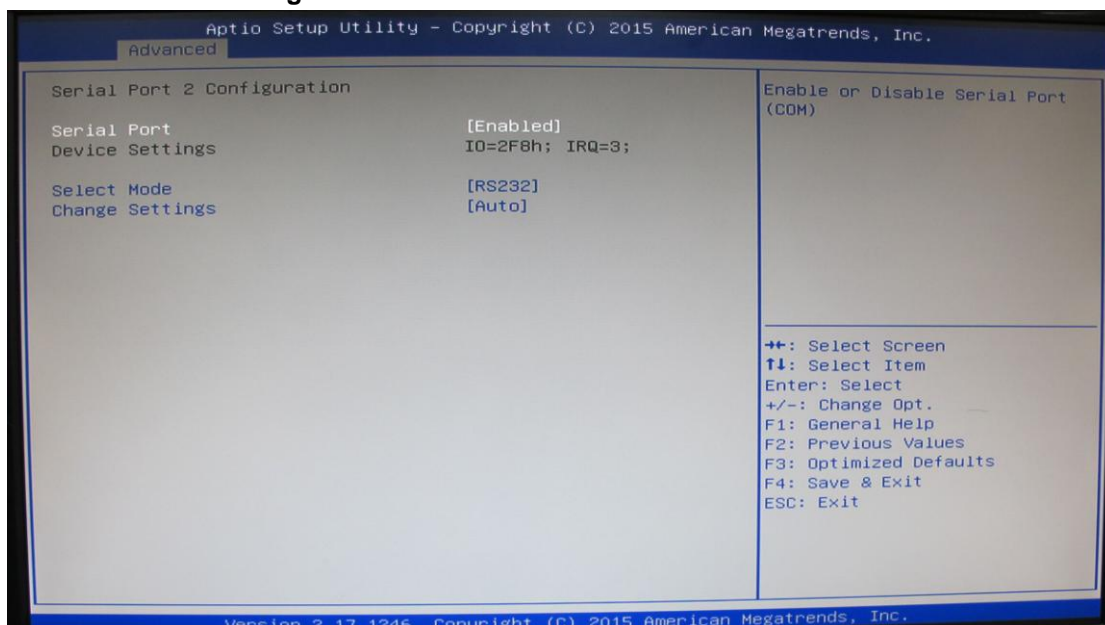
Serial Port

Use this item to enable or disable serial port 2. The optimal setting for base I/O address is 2F8h and for interrupt request line is IRQ3.

Select Mode

Use this item to configure serial port 2. Here are the options for your selection:

RS232

RS422

RS485.

● **Serial Port 3 Configuration**
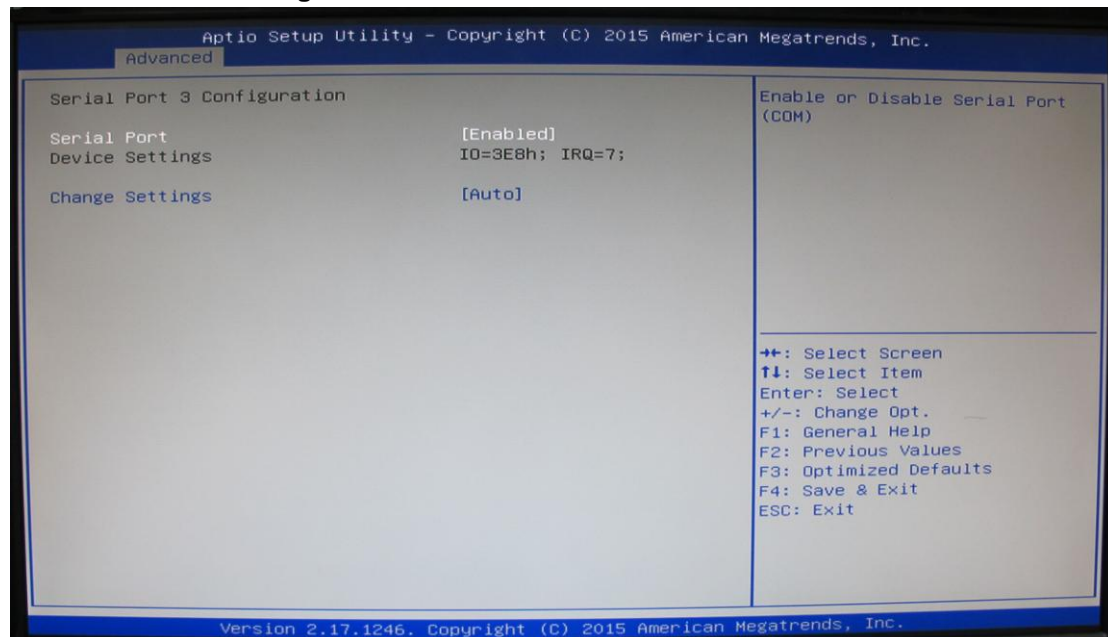
Serial Port

Use this item to enable or disable serial port 3. The optimal setting for base I/O address is 3E8h and for interrupt request line is IRQ7.

● **Serial Port 4 Configuration**
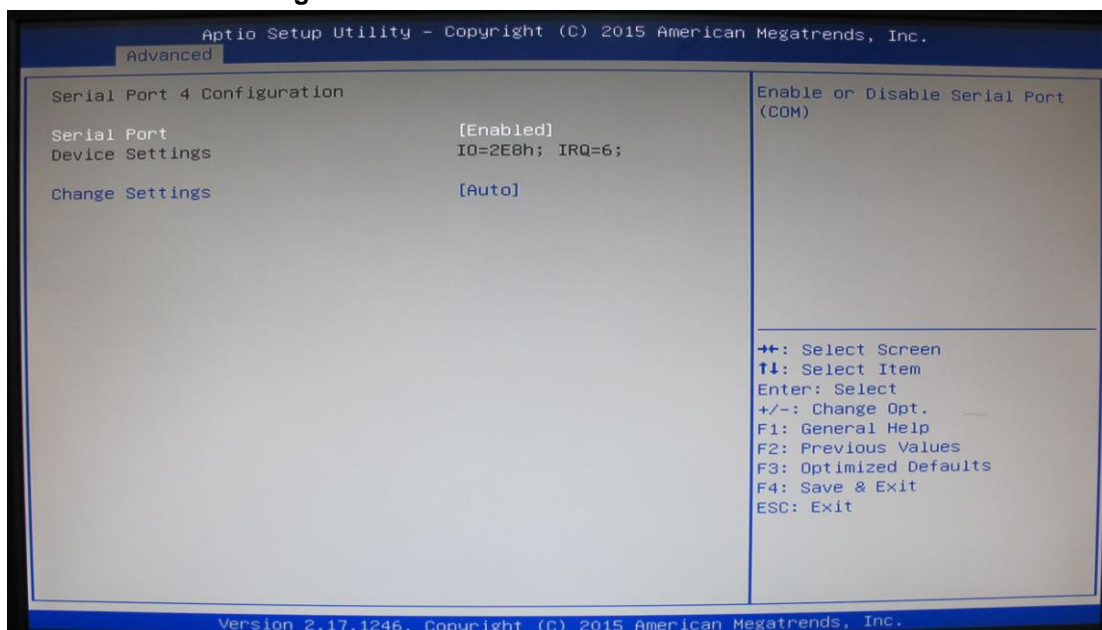
Serial Port

Use this item to enable or disable serial port 4. The optimal setting for base I/O address is 2E8h and for interrupt request line is IRQ6.

● **NCT6106D HW Monitor**

Users can base on this page to get detail hardware monitor information.
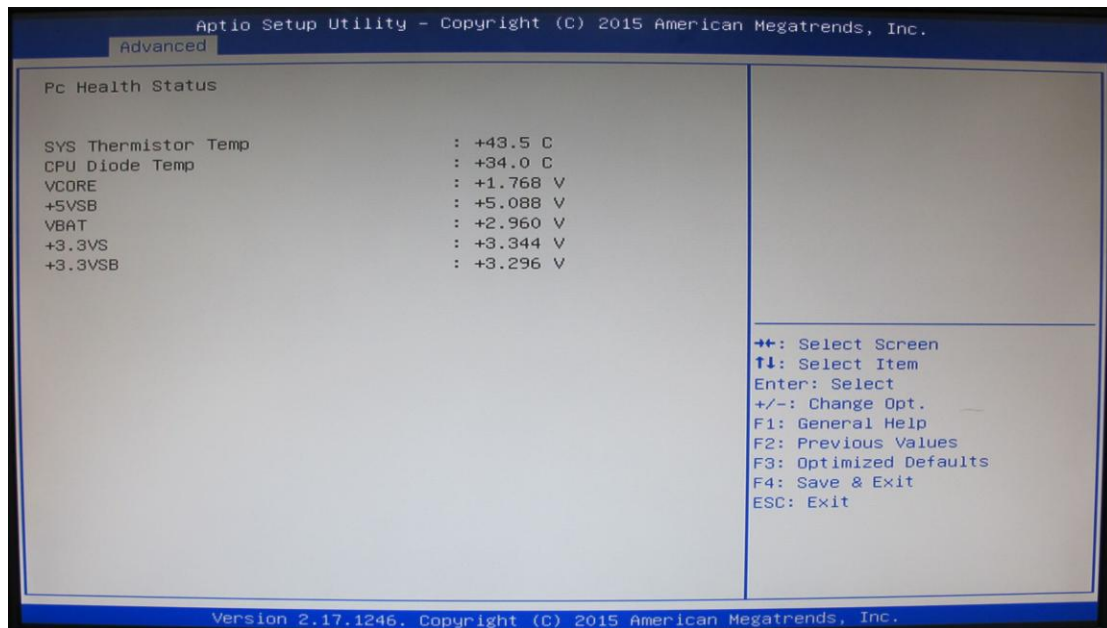
● **Intel I211 Gigabit Network Connection setting (Port1 to Port 6)**
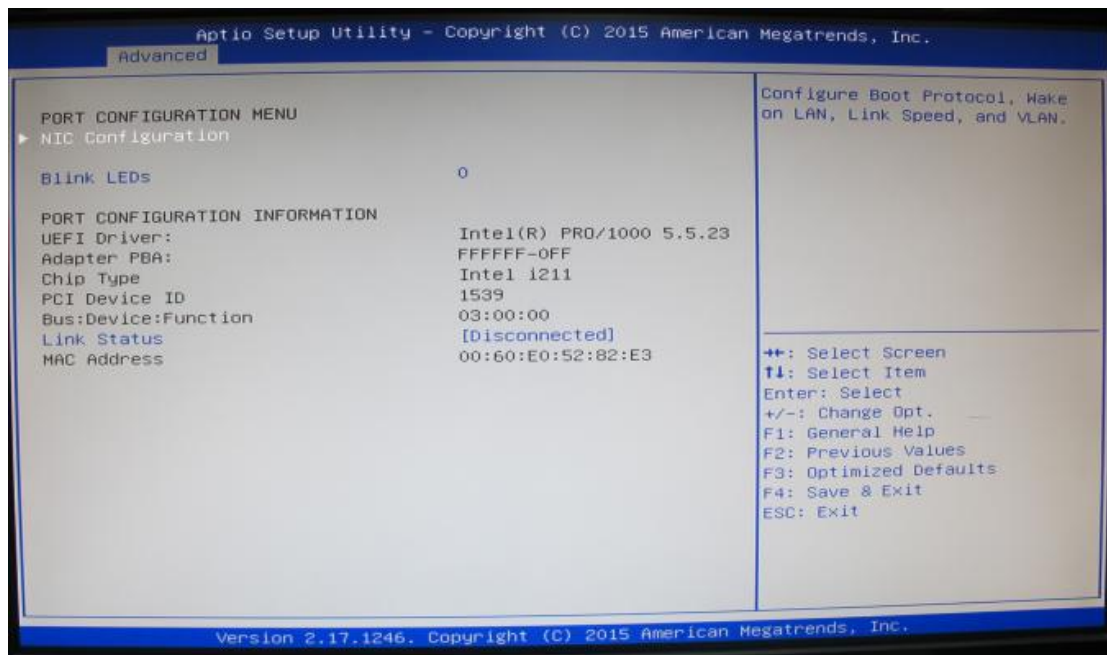
Port Configuration Menu

User's can get LAN detail connection information by this page.

NIC Configuration

Default is auto, but we also can adjust to 10 half/ full Mbps or 100 half/ full Mbps by different requirement.

BIOS Setup Utility

4.3   Chipset Menu

The Chipset menu allows users to change the advanced chipset settings. You can select any of the items in the left frame of the screen to go to the sub menus:

    ►   PCH-IO Configuration
    ►   System Agent (SA) Configuration

For items marked with "►", please press <Enter> for more options.
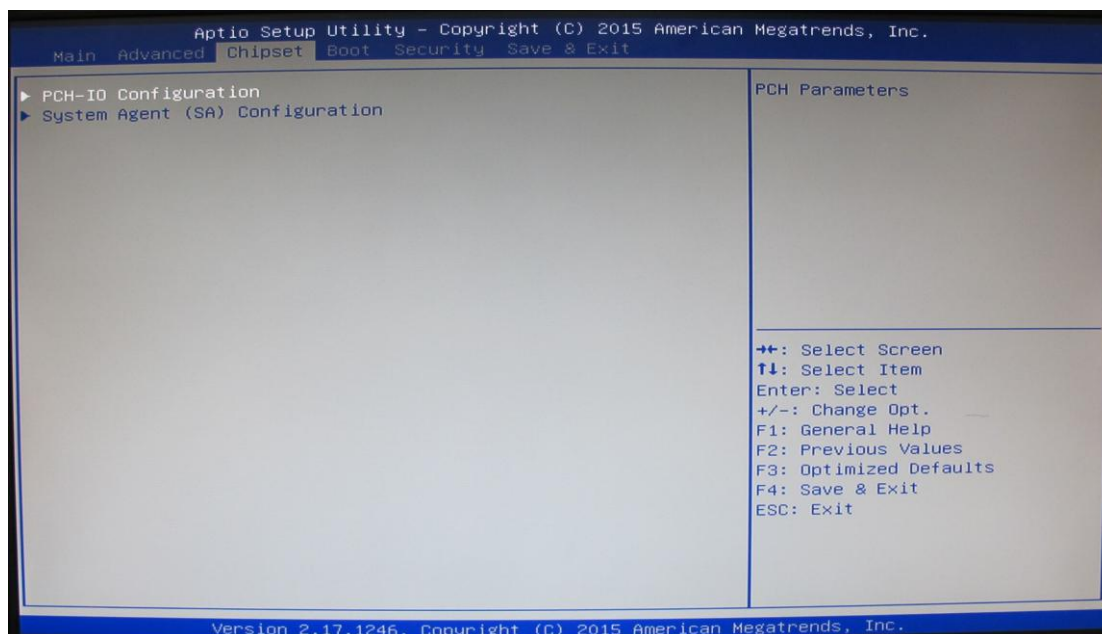
● **PCH-IO Configuration**

This screen shows memory information. For items marked with "►", please press <Enter> for more options.
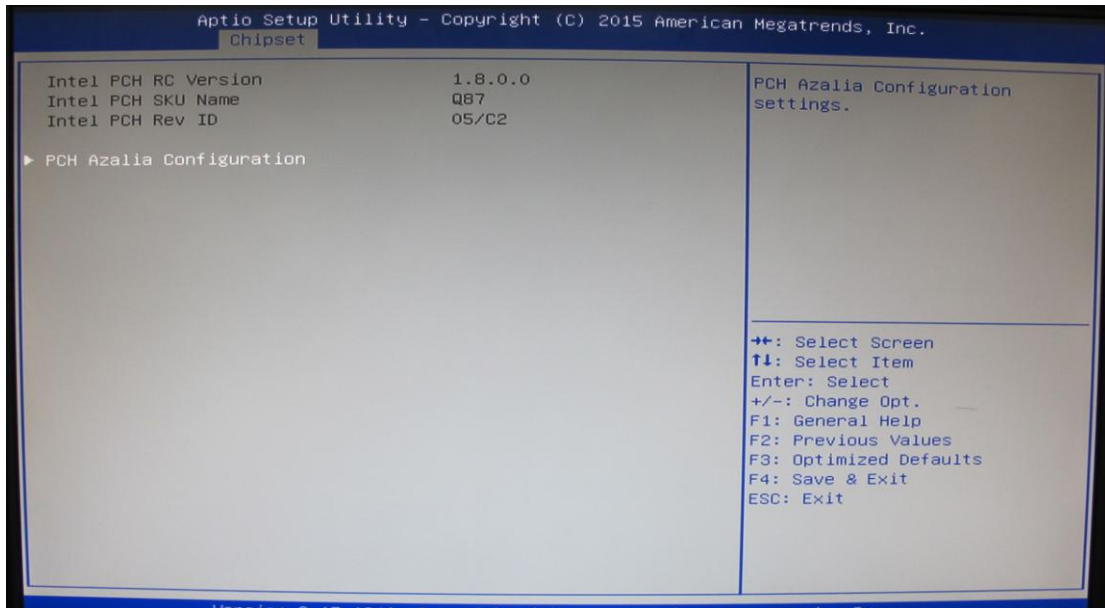
PCH Azalia Configuration

This item controls detection of the Azalia device.
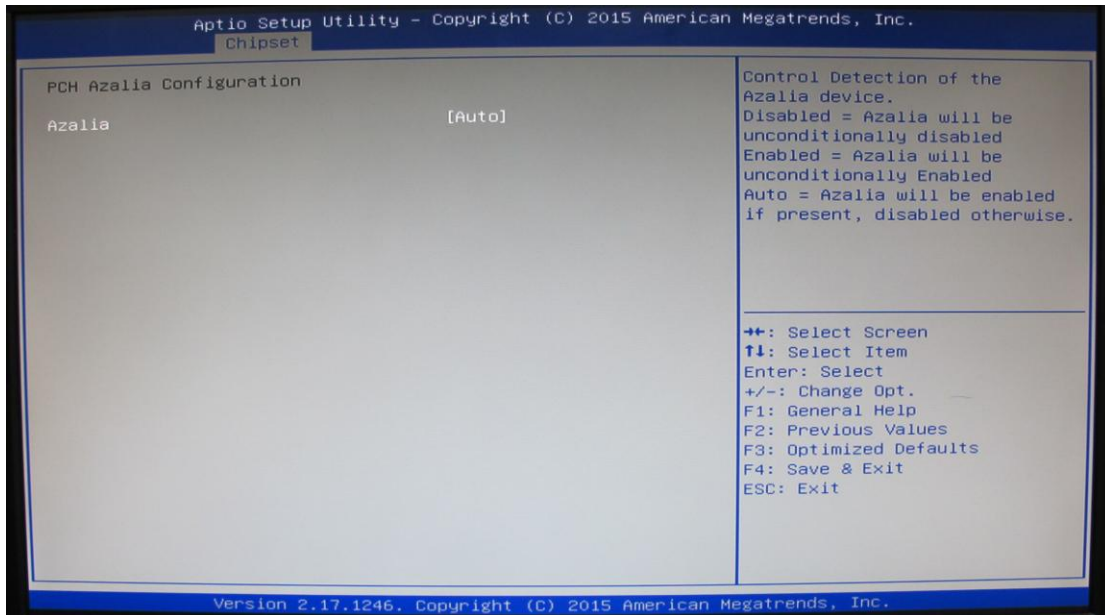
● **System Agent (SA) Configuration**

This screen provides function for specifying internal graphics controller and memory related parameters.
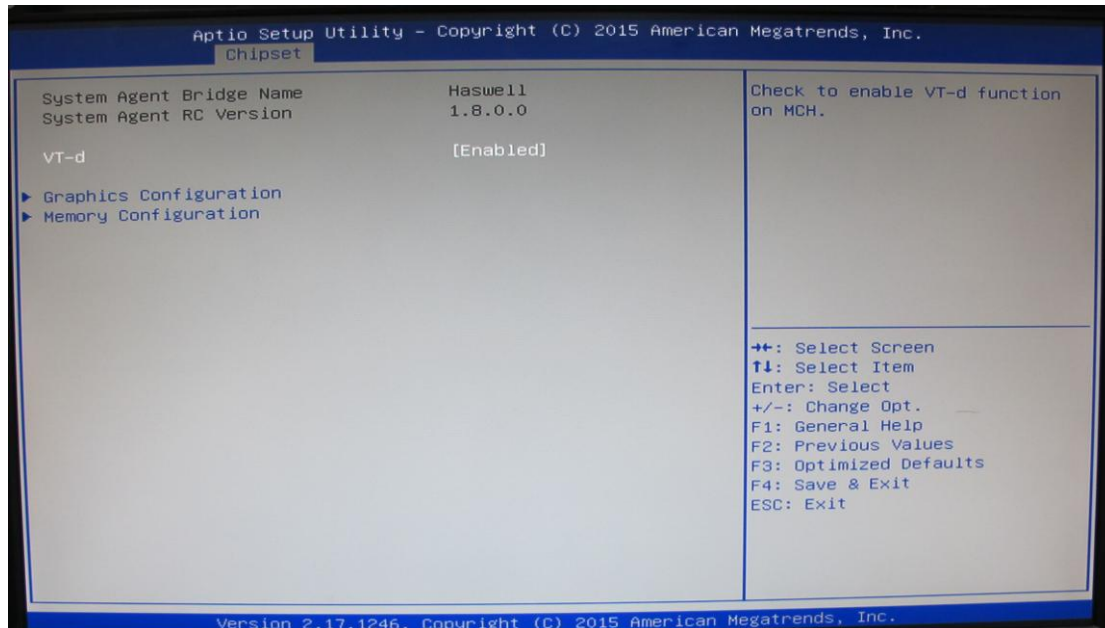
● **Graphics Configuration**
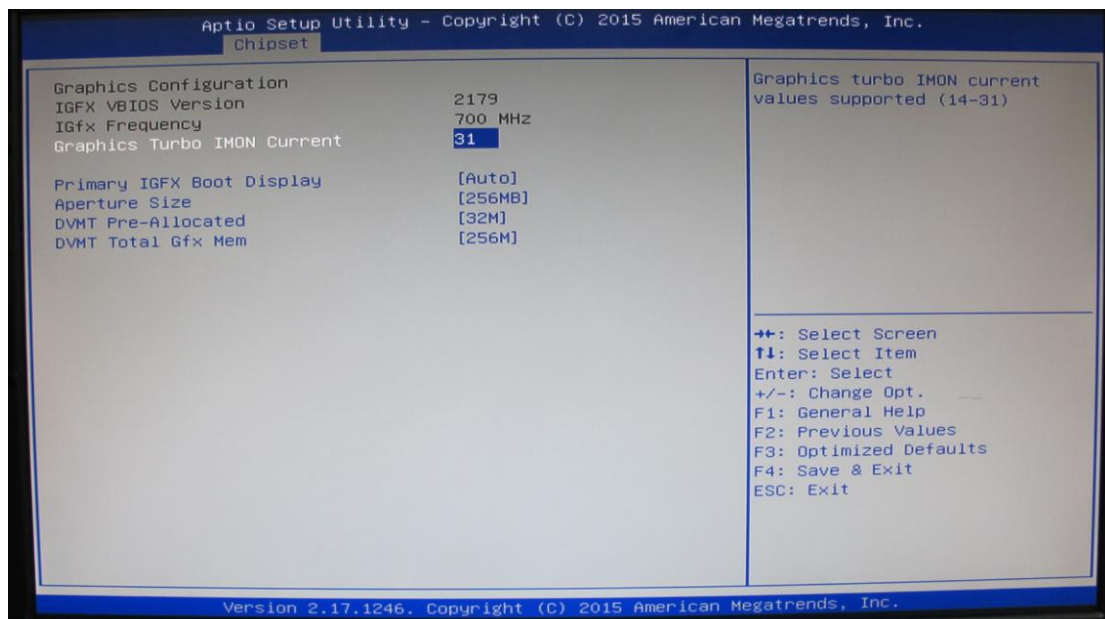
Primary IGFX Boot Display

Select the video device which will be activated during POST (Power-On Self Test).

This has no effect if external graphics present.

Aperture Size

Aperture Size is a video configuration option that determines the amount of system memory available for direct access by the graphics device

DVMT Pre-Allocated

Dynamic video memory technology (DVMT) allows dynamic allocation of system memory for use as video memory to ensure the most efficient use of available resources for maximum 2D/3D graphics performance.

DVMT Total Gfx Mem

Select DVMT 5.0 total graphics memory size used by the internal graphics device.

● **Memory Configuration**

Use this item for further setting of memory configuration, this screen displays memory information, and allows user to set memory configuration.
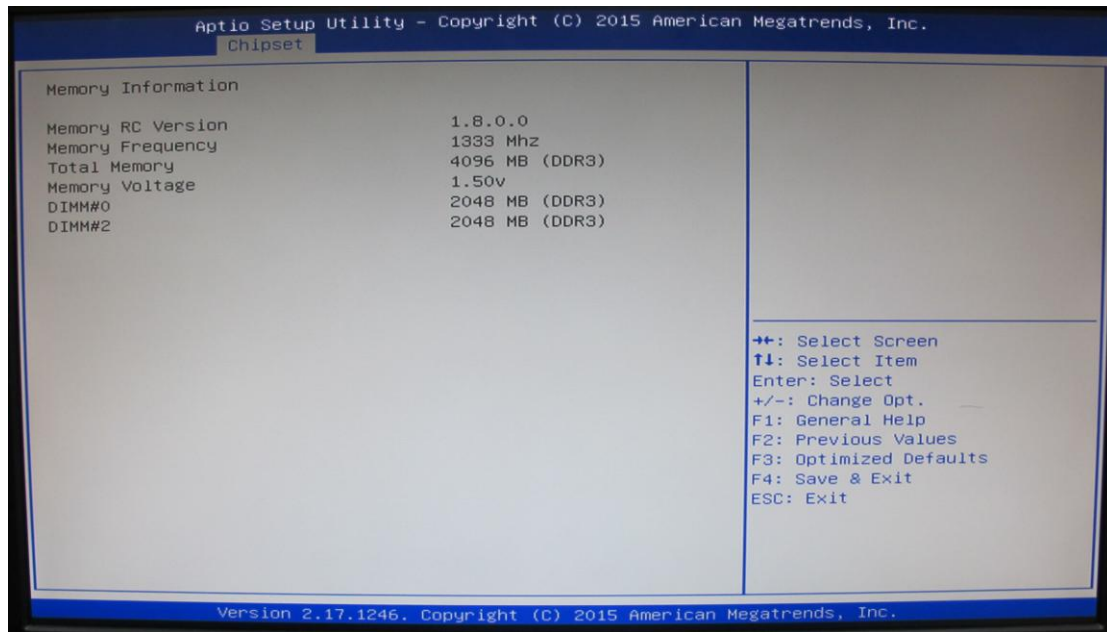
4.4   Boot Menu

The Boot menu allows users to change boot options of the system.
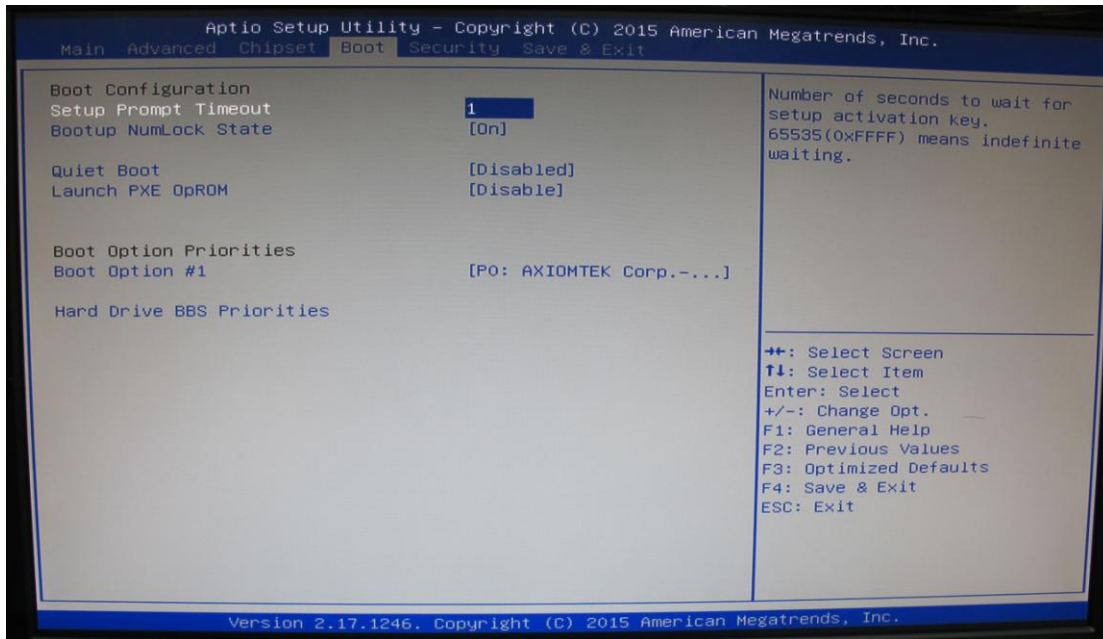
Setup Prompt Timeout
Number of seconds to wait for setup activation key. 65535(0xFFFF) means indefinite waiting.

Bootup NumLock State
Select the keyboard NumLock state.

Quiet Boot
Enables/Disables Quiet Boot option.

Launch PXE OpROM
Controls the execution of UEFI and Legacy PXE OpROM.

Boot Option Priorities

These are settings for boot priority. Specify the boot device priority sequence from the available devices.

Hard Drive BBS Priorities

This item is for configuring the boot order for a specific device class. Its option(s) is only visible if at least one device for this class is detected.

4.5   Security Menu

The Security menu allows users to change the security settings for the system.

```
            Aptio Setup Utility - Copyright (C) 2012 American Megatrends, Inc.
     Main    Advanced    Chipset    Boot    Security    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
   HDD Security Configuration:                      F2: Previous Values
   HDD0:ST3160316AS                                 F3: Optimized Defaults
                                                    F4: Save & Exit
                                                    ESC: Exit


            Version 2.15.1226. Copyright (C) 2012 American Megatrends, Inc.
```

Administrator Password

This item indicates whether an administrator password has been set (installed or uninstalled).

User Password

This item indicates whether an user password has been set (installed or uninstalled).

4.6   Save & Exit Menu

The Save & Exit menu allows users to load your system configuration with optimal or fail-safe default values.

```
             Aptio Setup Utility - Copyright (C) 2012 American Megatrends, Inc.
     Main   Advanced   Chipset   Boot   Security   Save & Exit

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

   Save Options
   Save Changes
   Discard Changes

   Restore Defaults
   Save as User Defaults
   Restore User Defaults

   Boot Override                                          →←: Select Screen
   SATA  PM: ST3160316AS                                  ↑↓: Select Item
                                                          Enter: Select
   Launch EFI Shell from filesystem device                +/-: Change Opt.
                                                          F1: General Help
                                                          F2: Previous Values
                                                          F3: Optimized Defaults
                                                          F4: Save & Exit
                                                          ESC: Exit


             Version 2.15.1226. Copyright (C) 2012 American Megatrends, Inc.
```
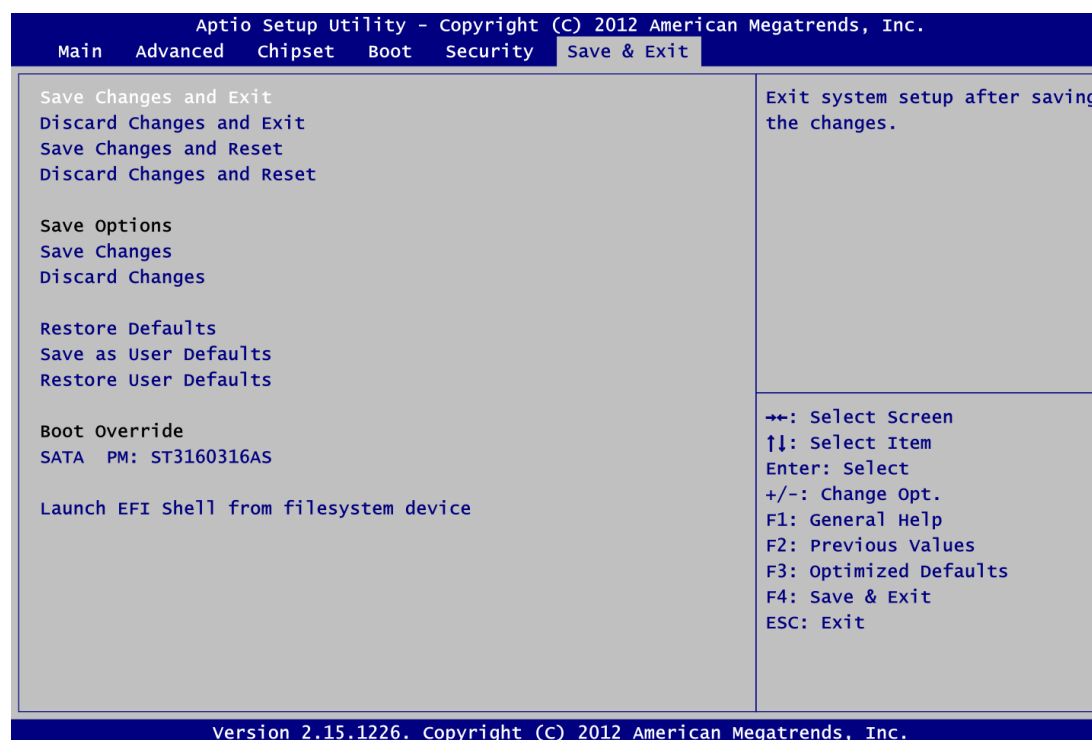
Save Changes and Exit

When you have completed the system configuration changes, select this option to leave Setup and return to Main Menu. Select Save Changes and Exit from the Save & Exit menu and press <Enter>. Select Yes to save changes and exit.

Discard Changes and Exit

Select this option to quit Setup without making any permanent changes to the system configuration and return to Main Menu. Select Discard Changes and Exit from the Save & Exit menu and press <Enter>. Select Yes to discard changes and exit.

Save Changes and Reset

When you have completed the system configuration changes, select this option to leave Setup and reboot the computer so the new system configuration parameters can take effect. Select Save Changes and Reset from the Save & Exit menu and press <Enter>. Select Yes to save changes and reset.

Discard Changes and Reset

Select this option to quit Setup without making any permanent changes to the system configuration and reboot the computer. Select Discard Changes and Reset from the Save & Exit menu and press <Enter>. Select Yes to discard changes and reset.

Save Changes

When you have completed the system configuration changes, select this option to save changes. Select Save Changes from the Save & Exit menu and press <Enter>. Select Yes to save changes.

Discard Changes

Select this option to quit Setup without making any permanent changes to the system configuration. Select Discard Changes from the Save & Exit menu and press <Enter>. Select Yes to discard changes.

Restore Defaults

It automatically sets all Setup options to a complete set of default settings when you select this option. Select Restore Defaults from the Save & Exit menu and press <Enter>.

Save as User Defaults

Select this option to save system configuration changes done so far as User Defaults. Select Save as User Defaults from the Save & Exit menu and press <Enter>.

Restore User Defaults

It automatically sets all Setup options to a complete set of User Defaults when you select this option. Select Restore User Defaults from the Save & Exit menu and press <Enter>.

Boot Override

Select a drive to immediately boot that device regardless of the current boot order.

Launch EFI Shell from filesystem device

Attempt to launch EFI Shell application (Shellx64.efi) from one of   the available filesystem devices.

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APPENDIX A
WATCHDOG TIMER

About Watchdog Timer

Software stability is major issue in most application. Some embedded systems are not watched by human for 24 hours. It is usually too slow to wait for someone to reboot when computer hangs. The systems need to be able to reset automatically when things go wrong. The watchdog timer gives us solution.

The watchdog timer is a counter that triggers a system reset when it counts down to zero from a preset value. The software starts counter with an initial value and must reset it periodically. If the counter ever reaches zero which means the software has crashed, the system will reboot.

Sample Program

The following example enables configuration using debug tool.

Enable WDT

↓

Enable configuration:

O 2E 87 ; Un-lock super I/O

O 2E 87

↓

Select logic device:

O 2E 07

O 2F 08

↓

WDT device enable:

O 2E 30

O 2F 01

↓

Set timer unit:

O 2E F0

O 2F 00 ; (00: Sec; 08:Minute)

↓

Set base timer:

O 2E F1

O 2F 0A ; Set reset time (where 0A (hex) = 10sec)

Disable WDT

↓

Enable configuration:

O 2E 87 ; Un-lock super I/O

O 2E 87

↓

Select logic device:

O 2E 07

O 2F 08

↓

WDT device disable:

O 2E 30

O 2F 00

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