



®

***AXIOMTEK***

## **tBOX100-838-FL Series**

**Embedded System**

**User's Manual**



## **Disclaimers**

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## Safety Precautions

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

1. User should not modify any unmentioned jumper settings without Axiomtek FAE's instruction. Any modifications without instruction might cause system damaged.
2. Operating system follows the configuration you had in tBOX100-838-FL.
3. Be sure to ground yourself to prevent static charge when installing internal components. Using a grounding wrist strap and place all electronic components in any static-shielded devices. Most electronic components are sensitive to static electrical charge.
4. Disconnect the power input with tBOX100-838-FL before making any installation. Be sure both the system and the external devices are TURNED OFF. Sudden surge of power could damage sensitive components. Make sure the tBOX100-838-FL is properly grounded.
5. Make sure the voltage of the power source is correct before connecting the equipment to the power outlet.
6. TURN OFF the system power before cleaning.
7. Do not leave this equipment in an uncontrolled environment where the storage temperature is below -40°C or above 60°C or It may damage the equipment.
8. Do not open the system's bottom 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 protection 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 equipments need 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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# Table of Contents

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Disclaimers.....	ii
Safety Precautions.....	iii
Classification.....	iv
<b>CHAPTER 1 INTRODUCTION .....</b>	<b>1</b>
1.1    General Description .....	1
1.2    System Specifications .....	2
1.2.1    CPU .....	2
1.2.2    System I/O .....	2
1.2.3    System Specification.....	2
1.2.4    Driver CD Content.....	3
1.3    Dimensions .....	4
1.4    I/O Outlets .....	4
1.5    Packing List.....	6
<b>CHAPTER 2 HARDWARE INSTALLATION .....</b>	<b>7</b>
2.1    HDD/SSD Installation .....	7
2.2    PCI Express mini card and SIM card Installation.....	8
2.3    Wall mount kit Installation.....	9
<b>CHAPTER 3 CONNECTOR .....</b>	<b>11</b>
3.1    Connectors .....	11
3.1.1    VGA Connector .....	11
3.1.2    Remote switch Connector .....	11
3.1.3    Serial Port Connector .....	12
3.1.4    USB2.0 Stack Ports .....	12
3.1.5    LED Indicators.....	13
3.1.6    DC Power Input connector.....	13
3.1.7    LAN Connector (LAN#1, LAN#2) .....	14
3.1.8    SIM Card Connector .....	15
3.1.9    PCI Express mini card Connector.....	16
<b>CHAPTER 4 AMI BIOS SETUP UTILITY .....</b>	<b>17</b>
4.1    Starting .....	17
4.2    Navigation Keys .....	18
4.3    Main Menu .....	19
4.4    Advanced Menu .....	20
4.5    Chipset Menu .....	27
4.6    Security Menu .....	29
4.7    Boot Menu .....	30
4.8    Save & Exit Menu .....	31
<b>APPENDIX A WATCHDOG TIMER .....</b>	<b>33</b>

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## CHAPTER 1 INTRODUCTION

This chapter contains general information and detailed specifications of the tBOX100-838-FL. The Chapter 1 includes the following sections:

- General Description
- System Specifications
- Dimensions
- I/O Outlets
- Package List

### 1.1 General Description

The tBOX100-838-FL is an embedded system that supports onboard Intel® Atom™ E3845 (1.91 GHz), to provide Windows® 7, Windows® 8, Windows® 10 IoT, Windows® embedded ,Linux and VxWorks7, suitable for the most endurable operation. It features fanless design with full feature I/O, supports onboard 4GB DDR3L memory, and enhanced system dependability by built-in Watchdog Timer.

- **Features**

- CE (Class A), E-Mark, ISO 7637, certified;
- Intel® Bay Trail-I Atom™ E3845 (10W) 4C@1.91GHz processor onboard
- DDR3 4GB system memory onboard comes with high performance and reliability
- Fanless with operating temperature range of -40°C ~ +60°C
- Intelligent power management solution
- Compact size with rich multiple I/O ports, DIN rail and wall mount supported
- 1x full size PCI Express mini card slot, 1x SIM card socket for various applications

- **Reliable and Stable Design**

- The tBOX100-838-FL is designed for fanless and wide operating temperature range system, also we enhance vibration endurance such as: lockable I/O outlets, onboard processor, onboard system memory and follow IEC60068 regulation, make sure filed embedded system reliability and stability, best for mobility control unit, passenger information system, onboard video surveillance and many more applications.

- **Embedded O.S. Supported**

- The tBOX100-838-FL is not only support Windows® 7/8/10, but also supports embedded OS, such as Windows® 7/8 embedded, WinCE, Linux and VxWorks7. For storage device, the tBOX100-838-FL supports one 2.5" 9.5mm SATA HDD drive bay.

## 1.2 System Specifications

### 1.2.1 CPU

- **CPU**
  - Intel® Atom™ E3845 processor (Quad Core, 2M Cache, 1.91 GHz) onboard.
- **BIOS**
  - American Megatrends Inc. BIOS.
  - “Load Optimized Default” to backup customized Setting in the BIOS flash chip to prevent from CMOS battery fail.
- **System Memory**
  - 4GB DDR3L-1333 system memory onboard.
- **Graphics**
  - Integrated in the Intel® HD Graphics for VGA.

### 1.2.2 System I/O

- **Rear Side**
  - 2x RJ-45 GbE LAN (M12 A-coded is optional)
  - 1x Phoenix DC power input (M12 DC power input is optional)
  - 4x antenna opening
- **Front Side**
  - 1x RS-232/422/485
  - 1x VGA
  - 2x USB 2.0
  - 1x Reset button
  - 1x Remote power switch
  - 4x video-in/1x audio-in BNC

### 1.2.3 System Specification

- **Watchdog Timer**
  - Reset supported; 255 levels, 0~255 secs/mins
- **Power Supply**
  - 9~36 VDC-in power supply (Typical as +12/24V)
  - Power Rate:9-36Vdc, 1.8A@12/24Vdc
- **Operation Temperature**
  - -40°C - +60°C (- 40°F - +140°F)
- **Storage Temperature**
  - -40°C - +85°C (- 40°F - +176°F)
- **Humidity**
  - 5% - 95% (non-condensation)
- **Vibration Endurance**
  - 2Grms w/ SSD, (5 - 500Hz, X, Y, Z direction; Random)
  - 1Grms w/ HDD, (5 – 500Hz, X, Y, Z direction; Random)

- **Weight**
  - 0.77 kg (1.69 lb) without package
  - 1.40 kg (2.78 lb) with package
- **Dimensions**
  - 163.8mm(6.44")(W) x 108mm(4.25")(D) x 44mm(1.73")(H)



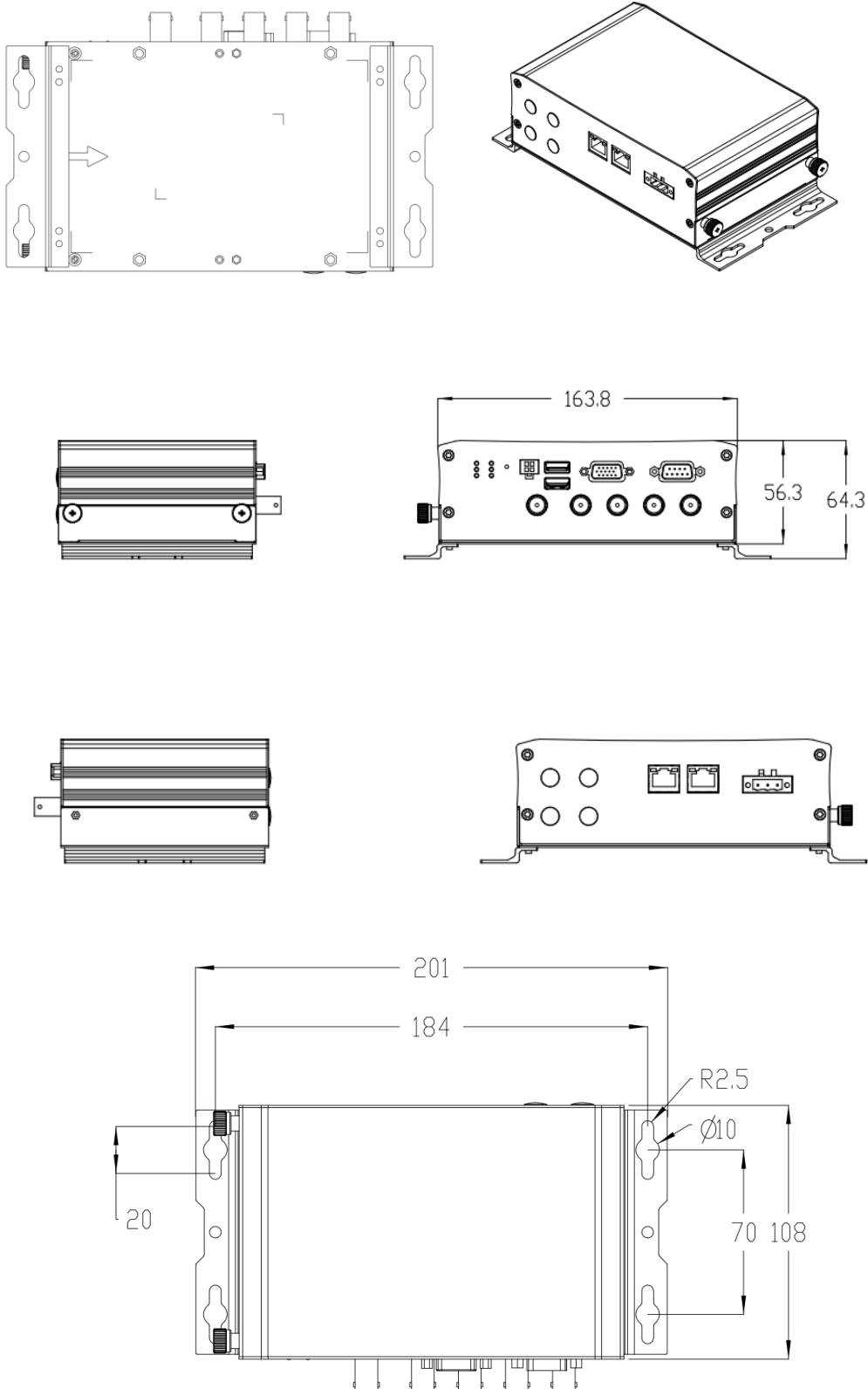
**NOTE:** All specifications and images are subject to change without notice.

#### 1.2.4 Driver CD Content

- **Chipset Driver**
- **Graphic Drivers**
- **Ethernet Driver**
- **Capture Card Driver**

### 1.3 Dimensions

The following diagrams show you dimensions and outlines of the tBOX100-838-FL.



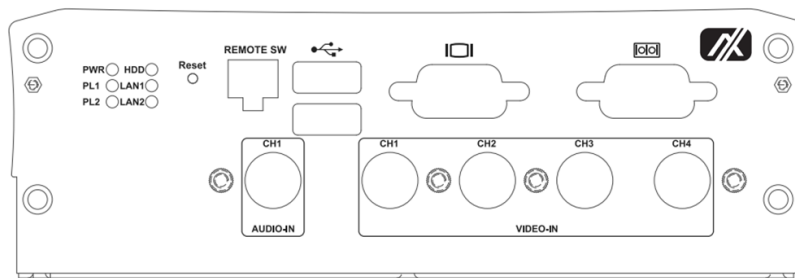
## 1.4 I/O Outlets

The following figures show you panoramic view of tBOX100-838-FL.

- **Front View**



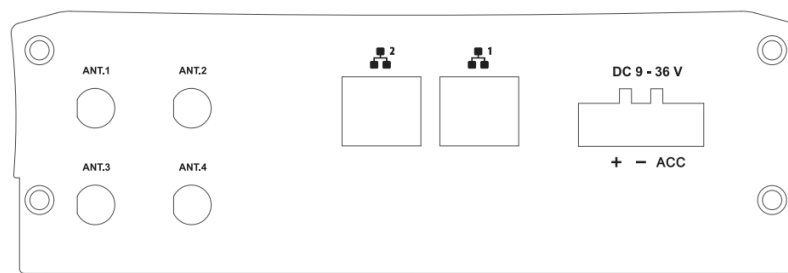
- **Front View drawing**



- **Rear View type #1**



- **Rear View drawing type #1**



## **1.5 Packing List**

The package bundled with your tBOX100-838-FL should contain the following items:

- **tBOX100-838-FL System Unit x 1**
- **Quick Installation Guide x 1**
- **DVD Driver x 1**
- **Din-rail & Bracket x 1**
- **Wall mount x 4**
- **Foot Pad Kit x 4**
- **Screws x 14 (SSD x4/Wall mount x4/Din rail x4/Mini card x2)**
- **Terminal block for power x1 (RJ-45 GbE LAN version only)**
- **HDD/SSD (optional)**
- **M12 LAN cable (optional)**
- **M12 power cable (optional)**
- **M12 power adapter (optional)**
- **Remote switch cable (optional)**
- **Mmini card module (optional)**

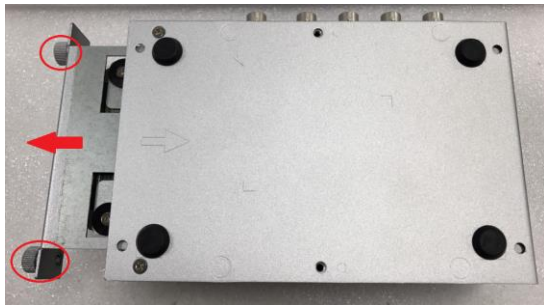
If you can not find this package or any items are missing, please contact Axiomtek distributors immediately.

## CHAPTER 2 HARDWARE INSTALLATION

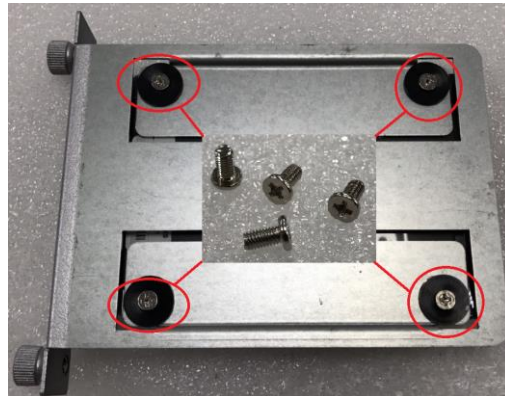
The tBOX100-838-FL is convenient for your various hardware configurations, such as HDD and PCI Express mini card. The chapter 2 will show you how to install the components.

### 2.1 HDD/SSD Installation

**Step 1** Turn off the system, and unplug the power cord. Loosen the screws and plug out HDD/SSD tray as shown.



**Step 2** Fasten 4x screw and rubber pad with HDD/SSD as shown.  
Note the direction of SATA connector.

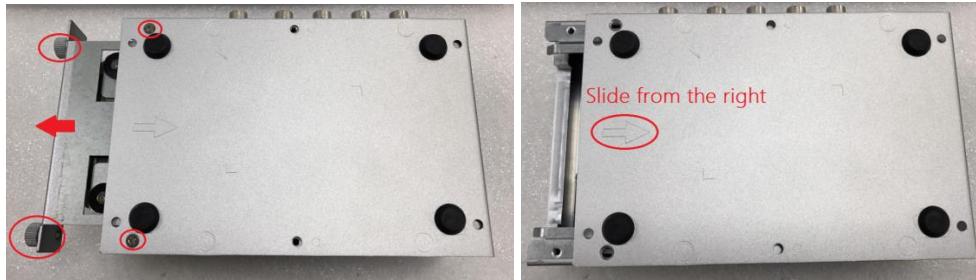


**Step 3** Plug in HDD-TRAY and Fasten 2x screw as shown.



## 2.2 PCI Express mini card and SIM card Installation

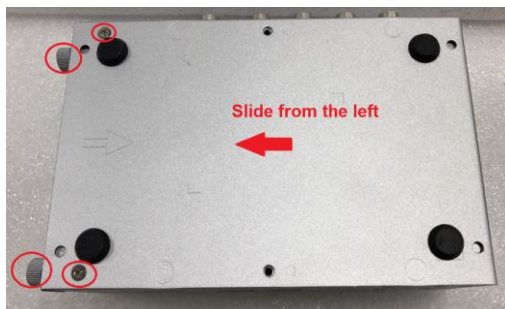
**Step 1** Turn off the system, and unplug the power cord. Loosen the screws as shown.



**Step 2** Install the module card and fasten screw as shown.



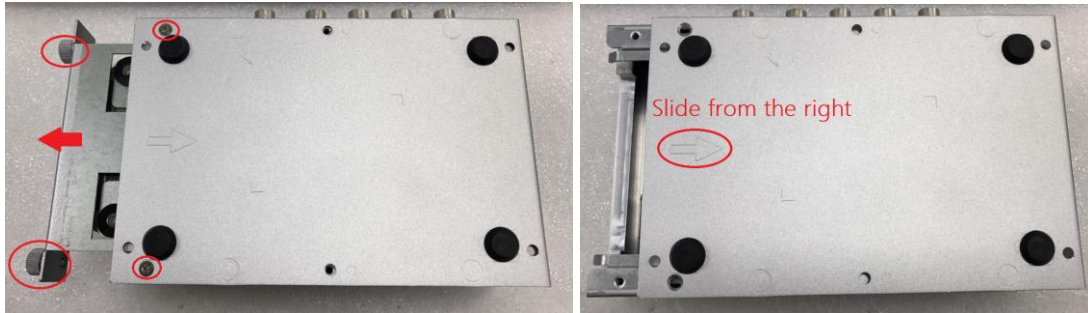
**Step 3** Fasten 4x screw on bottom cover as shown.



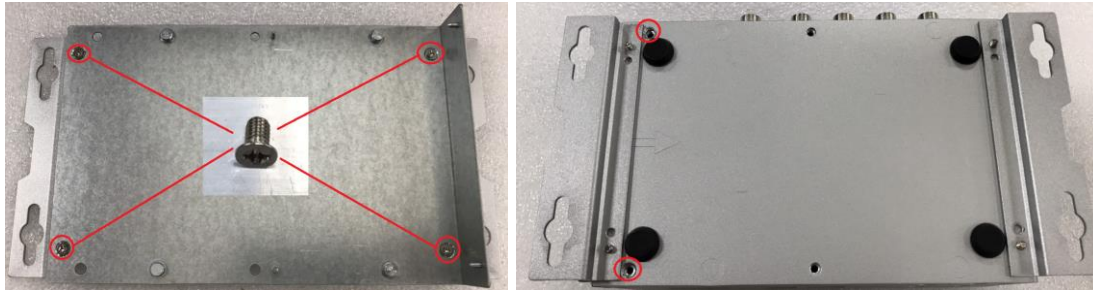


## 2.3 Wall mount kit Installation

**Step 1** Turn off the system, and unplug the power cord. Loosen the screws as shown.

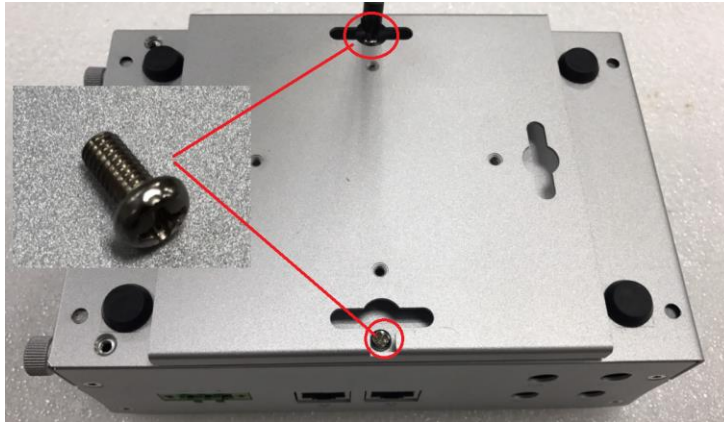


**Step 2** Fasten 4x screw and wall mount kit, last fasten 2x screw as shown.

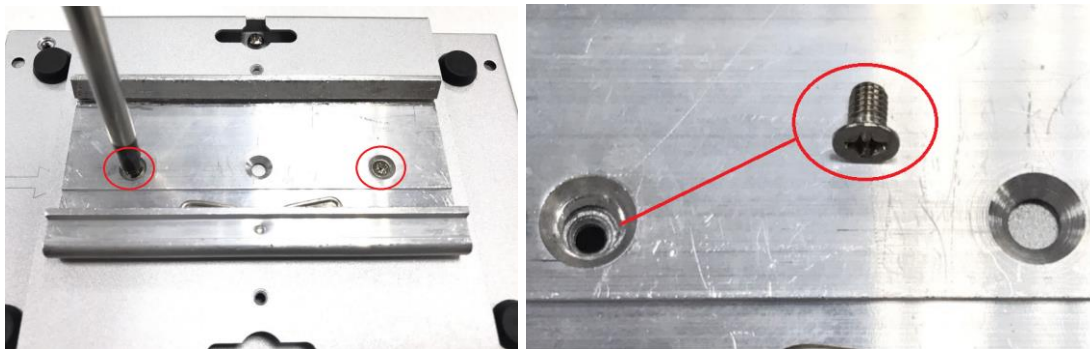


## **2.4 Din-rail kit Installation**

**Step 1** Turn off the system, and unplug the power cord. Fasten 2x screw and din-rail bracket.



**Step 2** Fasten 2x screw and din-rail kit.



## CHAPTER 3 CONNECTOR

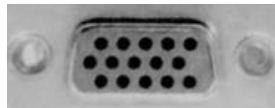
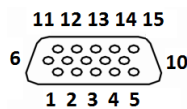
### 3.1 Connectors

Connectors connect the motherboard with other parts of the system. Loose or improper connection might cause problems. Make sure all connectors are properly and firmly connected.

#### 3.1.1 VGA Connector

DB15 connector is commonly used for the CRT monitor.

Pin	Signal	Pin	Signal	Pin	Signal
1	Red	2	Green	3	Blue
4	N.C.	5	GND	6	GND
7	GND	8	GND	9	VCC
10	GND	11	N.C.	12	DDC DATA
13	Horizontal Sync	14	Vertical Sync	15	DDC CLK



#### 3.1.2 Remote switch Connector

Remote switch is ideal for a remote button which can act as an ATX power on/off button.

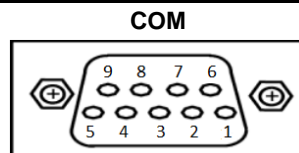
Pin	Signal	Description
1	NC	
2	Switch Signal	Low Active. Act as PC's ATX switch when external switch installed (Pin 3 Active) <b>**Internal pull up resister did not connect to any power source</b>
3	Ext. SW Sensor	Low Active. To detect external power swtich install or not. <b>** Internal pull up resister did not connect to any power source</b>
4	GND	



### 3.1.3 Serial Port Connector

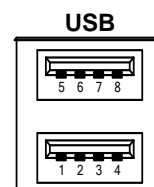
The pin definitions of RS-232/422/485 are listed as following matrix. You may select RS-232/422/485 function in BIOS settings.

Pin	RS-232	RS-422	RS-485
1	DCD, Data carrier detect	TX-	Data-
2	RXD, Receive data	TX+	Data+
3	TXD, Transmit data	RX+	NC
4	DTR, Data terminal ready	RX-	NC
5	GND, ground	GND, ground	GND, ground
6	DSR, Data set ready	NC	NC
7	RTS, Request to send	NC	NC
8	CTS, Clear to send	NC	NC
9	RI, Ring indicator	NC	NC



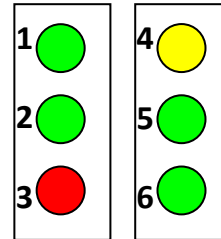
### 3.1.4 USB2.0 Stack Ports

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



### 3.1.5 LED Indicators

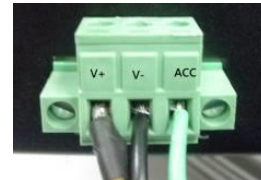
Number	LED Indicator	Function
1	Green	Power on
2	Green	REC
3	Red	Alert
4	Yellow	HDD active
5	Green	LAN #1 active
6	Green	LAN #2 active



### 3.1.6 DC Power Input connector

There are three pins of the DC-in connector as below.

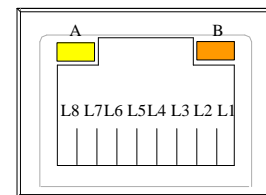
Pin	Description	Definination
1	V+	For DC power in V+.
2	V-	For DC power in V-
3	ACC	For ACC (Ignition)



### 3.1.7 LAN Connector (LAN#1, LAN#2)

The RJ-45 LAN connector is able to support 10/100/1000Mbps.

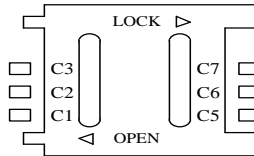
Pin	Description	10/100Base-T	1000Base-T
1	Transmit Data+ or Bidirectional	TX+	BI_DA+
2	Transmit Data- or Bidirectional	TX-	BI_DA-
3	Receive Dtata+ or Bidirectional	RX+	BI_DB+
4	Not Connected or Bidirectional	N.C.	BI_DC+
5	Not Connected or Bidirectional	N.C.	BI_DC-
6	Receive Dtata- or Bidirectional	RX-	BI_DB-
7	Not Connected or Bidirectional	N.C.	BI_DD+
8	Not Connected or Bidirectional	N.C.	BI_DD-
A	Activity Link LED(Yellow)	OFF: No Link Blinking: Data acitivity detected	
B	Speed LED	OFF/Green	Orange



### 3.1.8 SIM Card Connector

The SIM Card slot is a ISO 7816 standard 6-pin connector for PCI Express Mini Card used.

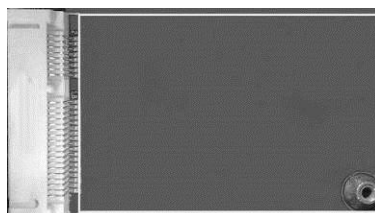
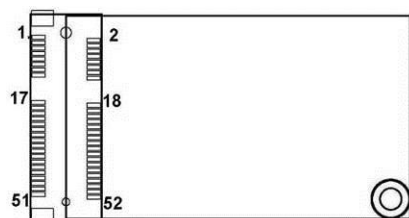
Pin	Signal
C1	SIM_PWR
C2	SIM_RESET
C3	SIM_CLK
C5	GND
C6	SIM_VPP
C7	SIM_DATA



### 3.1.9 PCI Express mini card Connector

The PCI Express mini card connector is able to support a PCI Express x1 link and a USB 2.0 link.

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	+3.3VSB
21	GND	22	PERST#
23	PE_RXN4	24	+3.3VSB
25	PE_RXP4	26	GND
27	GND	28	+1.5V
29	GND	30	SMB_CLK
31	PE_TXN4	32	SMB_DATA
33	PE_TXP4	34	GND
35	GND	36	USB_D3-
37	GND	38	USB_D3+
39	+3.3VSB	40	GND
41	+3.3VSB	42	LED_WWAN#
43	GND	44	LED_WLAN#
45	No use	46	LED_WPAN#
47	No use	48	+1.5V
49	No use	50	GND
51	No use	52	+3.3VSB



A mini PCIe card can be applied to either PCIe or USB 2.0. The USB 2.0 function will be helpful during the transition to PCIe, because peripheral vendors will need time to design their chipsets to have the PCIe function. During the transition, Mini PCIe cards can be quickly implemented by using USB 2.0.



## CHAPTER 4

### AMI BIOS SETUP UTILITY

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

#### 4.1 Starting

To enter the setup screens, follow the steps below:

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



## 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>, <F10>, <Enter>, <ESC>, <Arrow> keys, and so on.



**NOTE:** Some of 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.
F10	The <F10> key allows you to save any changes you have made and exit Setup. Press the <F10> 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

Aptio Setup Utility - Copyright (C) 2013 American Megatrends, Inc.		
Main Advanced Chipset Security Boot Save & Exit		
Project Version	87838 B1.01	Set the Date. Use Tab to switch between Date elements.
Build Date and Time	08/16/2017	
Memory Information		
Total Memory	4096 MB (LPDDR3)	
System Date	[Wed 08/16/2017]	
System Time	[17:07:37]	
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 2.16.1242. Copyright (C) 2013 American Megatrends, Inc.		

#### System Time/Date

You may change the system time and date by this option. 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.

## 4.4 Advanced Menu

The Advanced menu 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:

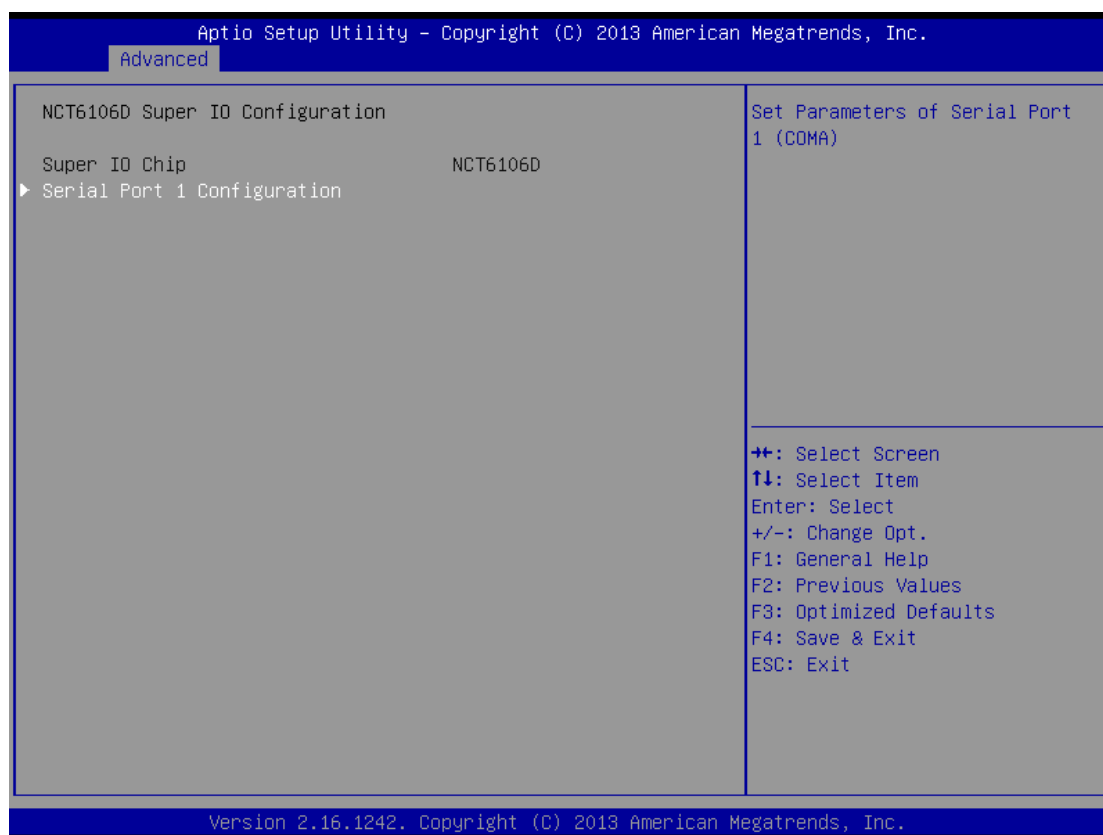
- ▶ NCT6106D Super IO Configuration
- ▶ NCT6106D H/W Monitor
- ▶ Serial Port Console Redirection
- ▶ CPU Configuration
- ▶ IDE Configuration
- ▶ Utility Configuration

For items marked with “▶”, please press <Enter> for more options.



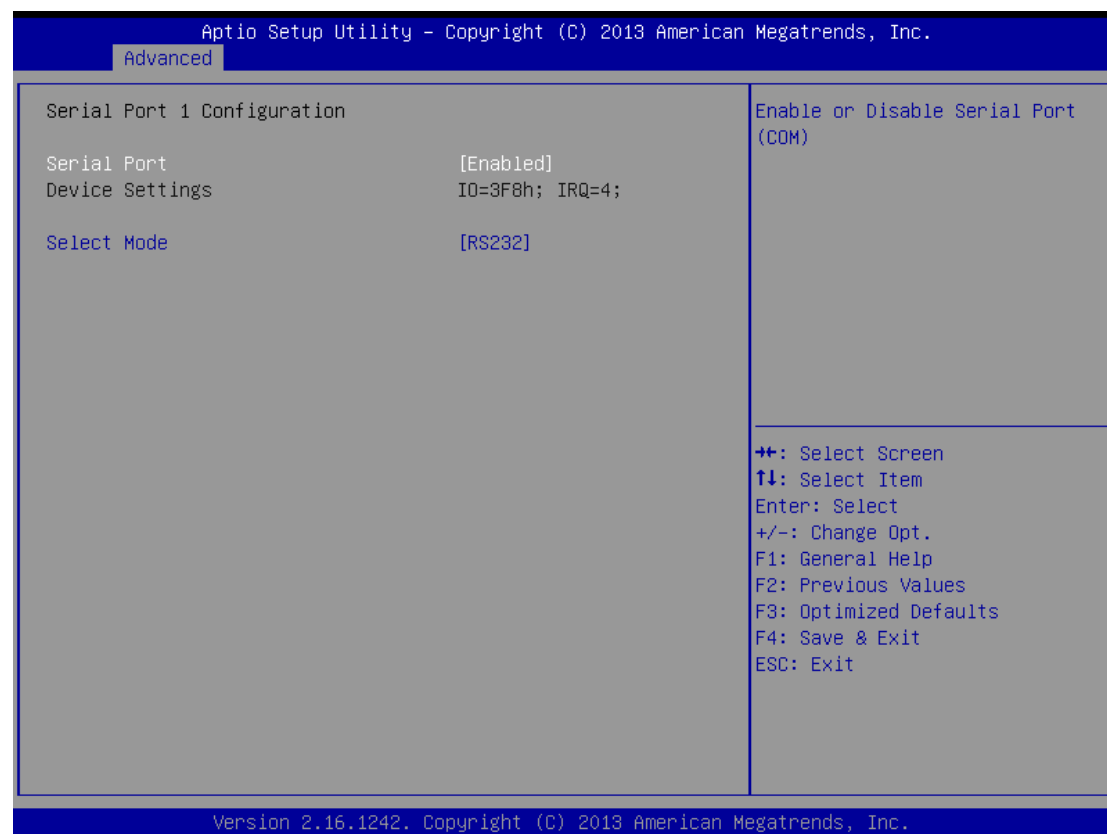
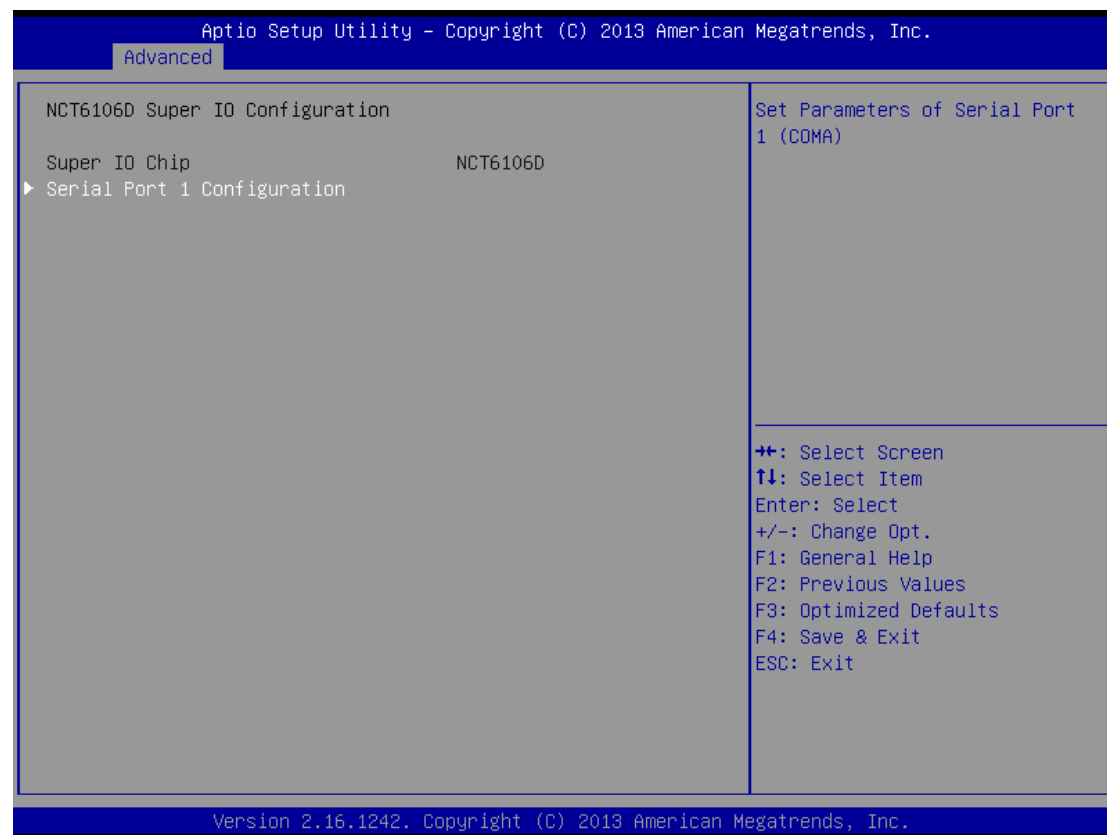
**NCT6106D Super IO Configuration**

You may set settings for Super IO configuration by this option, and change the value of the selected option



**Serial Port 1 configuration**

You may enable or disable serial port by this setting.



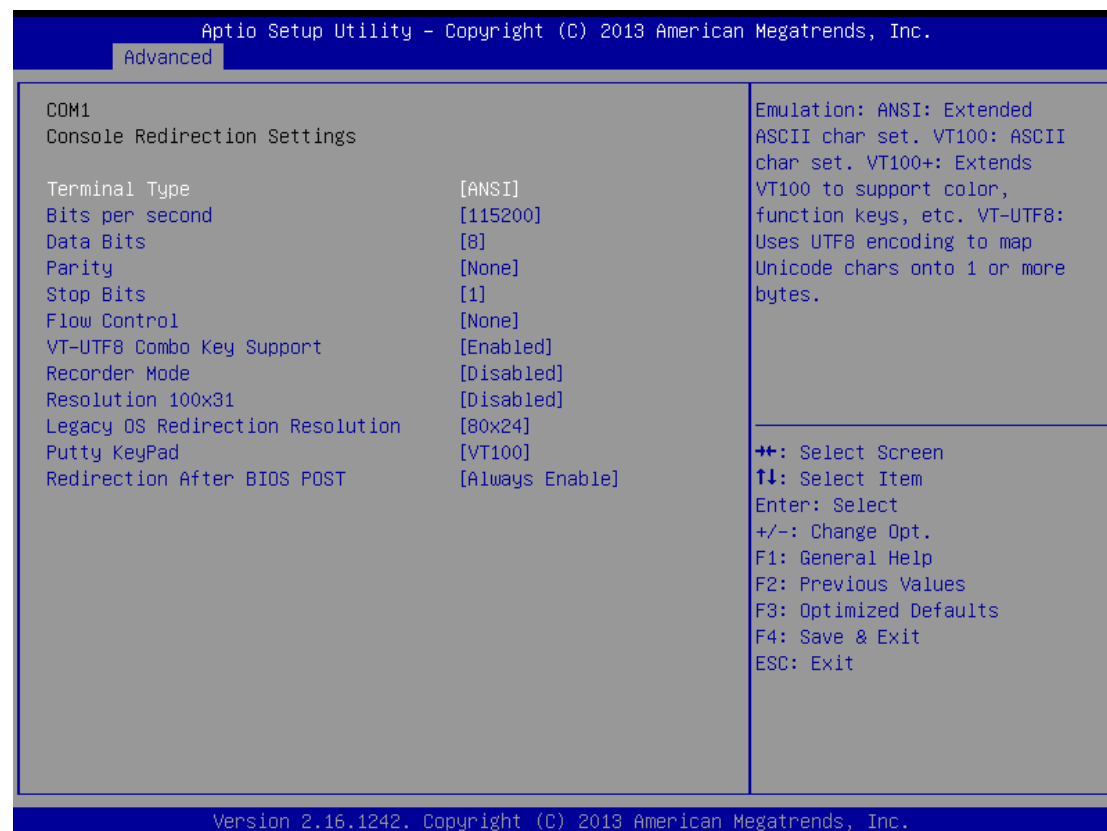
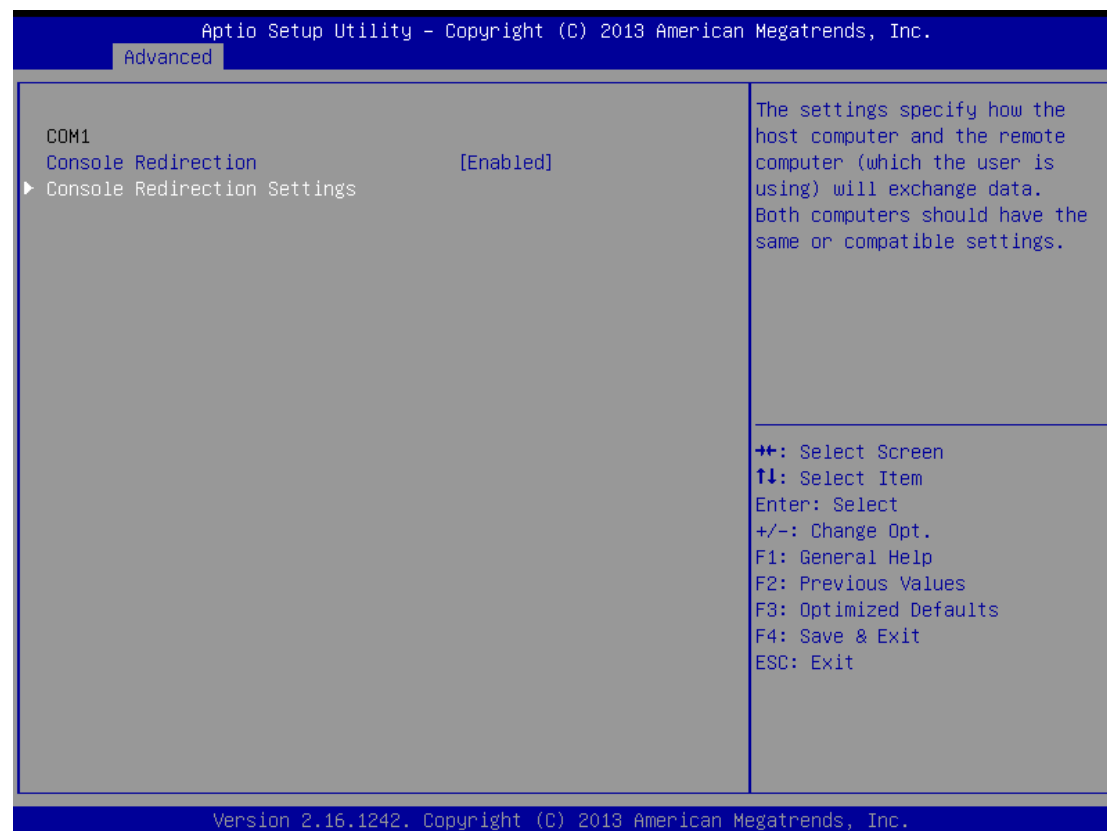
**NCT6106D H/W Monitor**

This screen shows the Hardware Health Configuration.

Aptio Setup Utility - Copyright (C) 2013 American Megatrends, Inc.	
Advanced	
Pc Health Status	
System temperature	: +29 C
CPU DTS temperature	: +29 C
+5VSB	: +5.120 V
VBAT	: +3.024 V
+5V	: +5.120 V
+3.3VSB	: +3.344 V
+3.3V	: +3.360 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.	

**Console Redirectino Settings:**

You may apply different serial port options in this item..





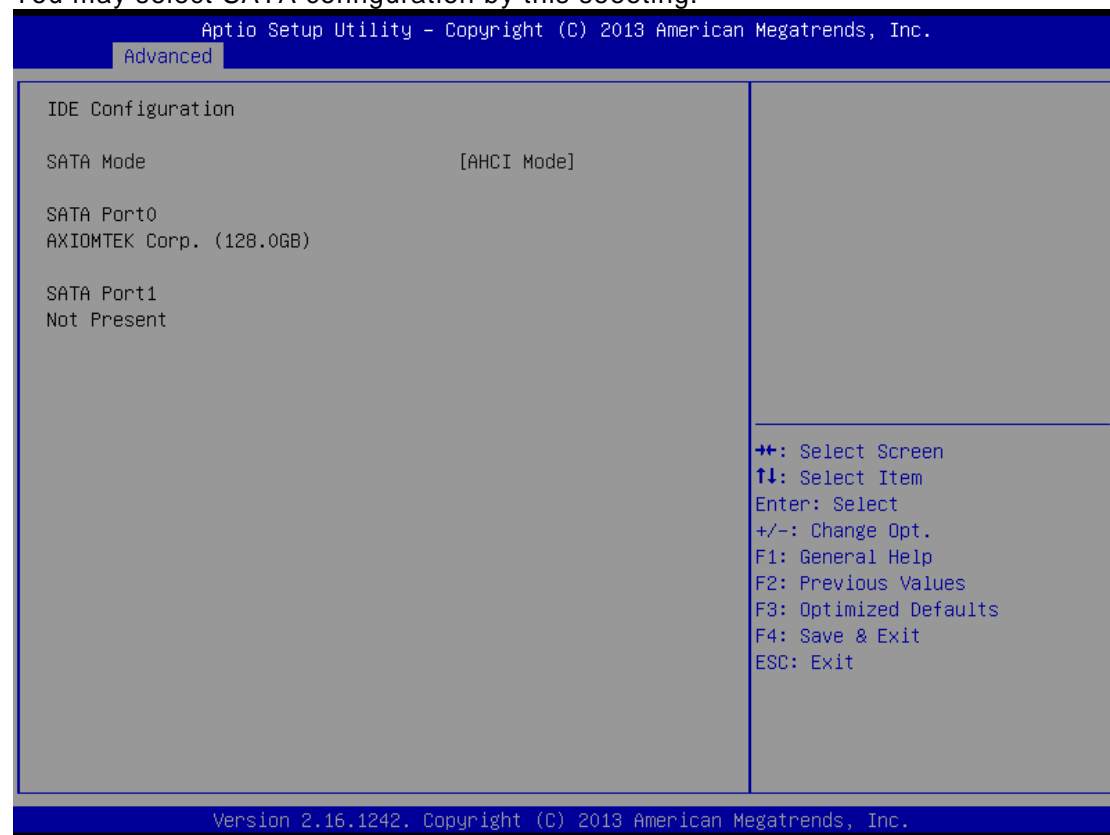
## CPU Configuration

This screen shows the CPU Configuration.

Aptio Setup Utility - Copyright (C) 2013 American Megatrends, Inc.	
Advanced	
CPU Configuration	
Intel(R) Atom(TM) CPU E3845 @ 1.91GHz	
CPU Signature	30679
Microcode Patch	901
Max CPU Speed	1910 MHz
Min CPU Speed	500 MHz
Processor Cores	4
Intel HT Technology	Not Supported
Intel VT-x Technology	Supported
↔: 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.	

## IDE Configuration

You may select SATA configuration by this seeeting.



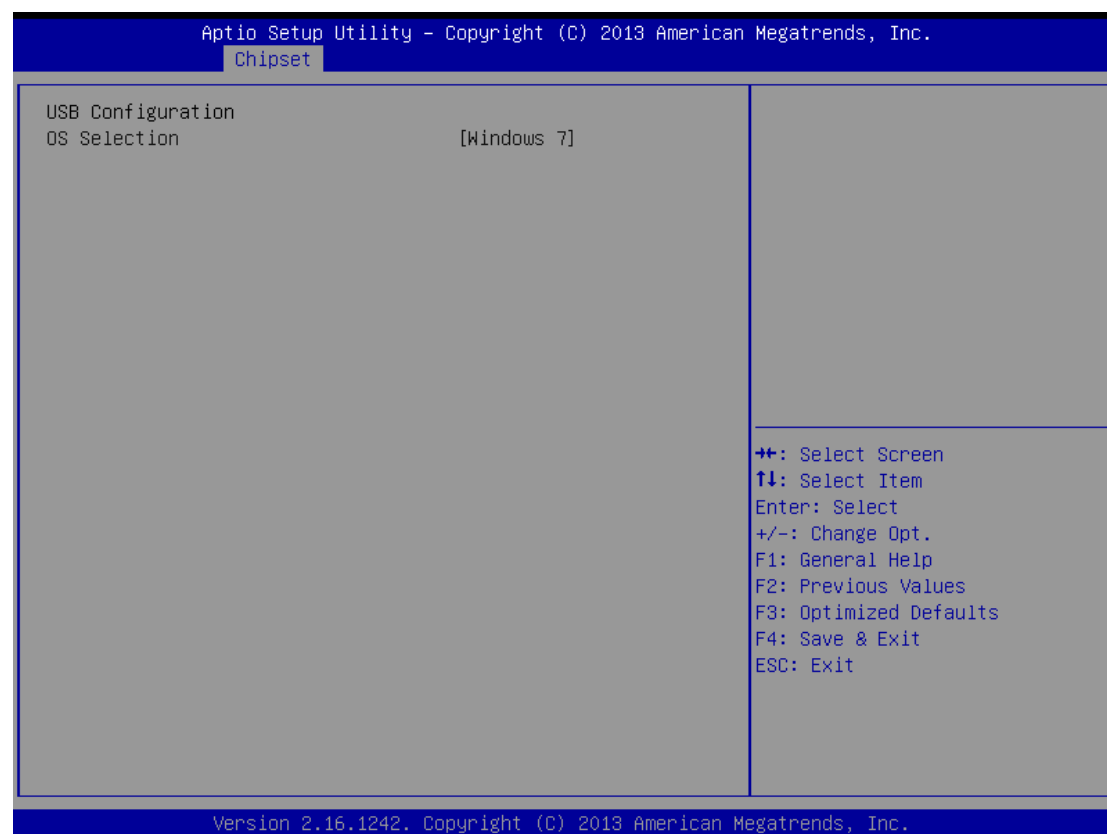
## 4.5 Chipset Menu

The Chipset menu allows users to change the advanced chipset settings.



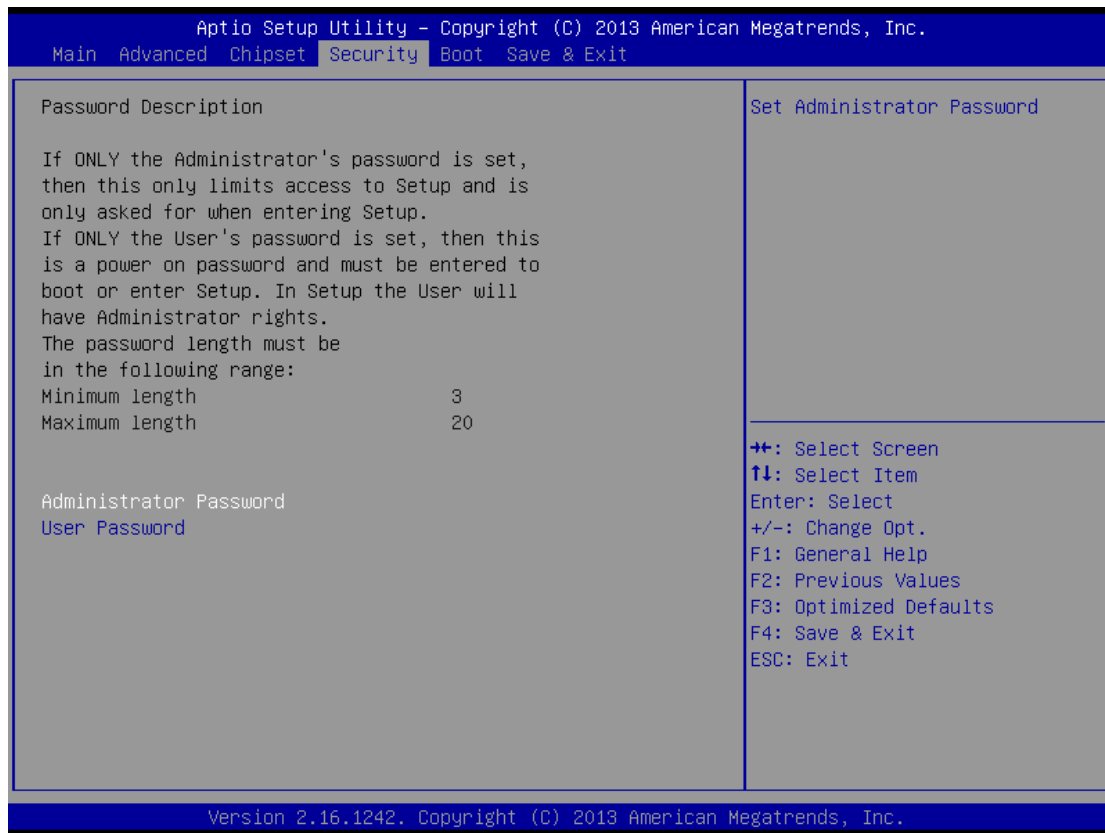
## USB Configuration

This screen shows O/S configuration support



## 4.6 Security Menu

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



### Administrator Password

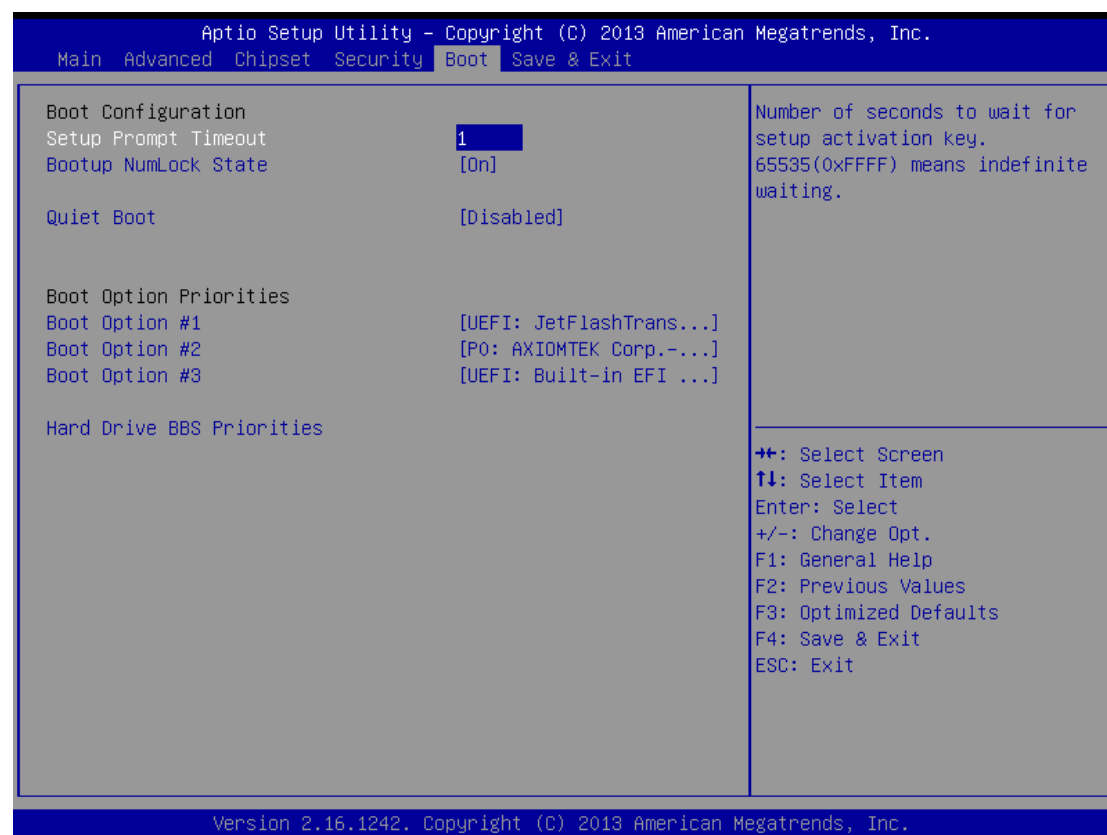
This item indicates whether a supervisor password has been set. If the password has been installed, 『 Installed 』 displays. If not, 『 Not Installed 』 displays.

### User Password

This item indicates whether a user password has been set. If the password has been installed, 『 Installed 』 displays. If not, 『 Not Installed 』 displays.

## 4.7 Boot Menu

The Boot menu allows users to change boot options of the system. You can select any of the items in the left frame of the screen to go to the sub menus:



### Setup Prompt Timeout

Set the Timeout for wait press key to enter Setup Menu

### Bootup NumLock State

You may set NumLock on/off while power on, default setting is on.

### Quiet Boot

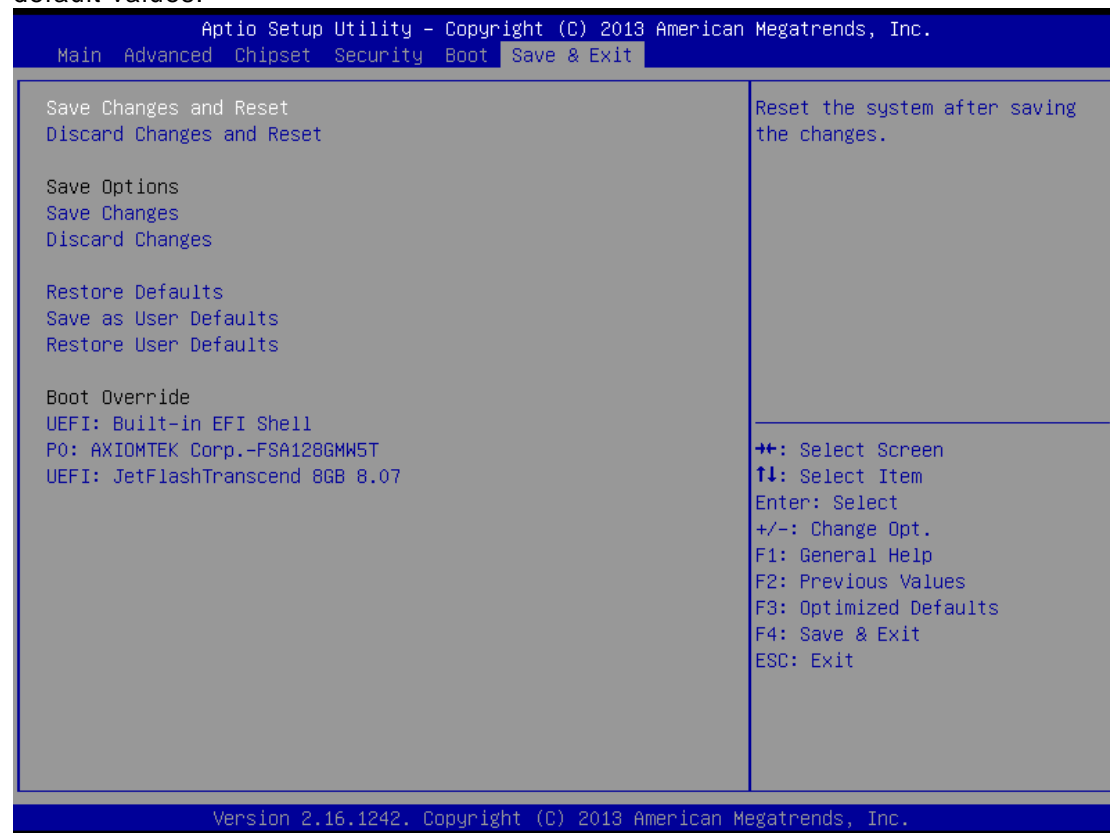
You may set Quiet Boot state is enable or disable, default setting is off.

### Boot Option Priorities

Specifies the overall boot order from the available devices.

## 4.8 Save & Exit Menu

The Exit menu allows users to load the system configuration with optimal or failsafe default values.



### 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 Exit* from the Exit menu and press <Enter>. Select Ok to save changes and exit.

### Discard Changes and Reset

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

### Discard Changes

Use this item to abandon all changes.

### Restore Defaults

It automatically sets all Setup options to a complete set of default settings when you select this option. The Optimal settings are designed for maximum system performance, but may not work best for all computer applications. In particular, do not use the Optimal Setup options if your computer is experiencing system configuration problems. Select Load Optimal Defaults from the Exit menu and press <Enter>.

### **Restore user Defaults**

It automatically sets all Setup options to a complete set of default settings when you select this option. The Fail-Safe settings are designed for maximum system stability, but not maximum performance. Select the Fail-Safe Setup options if your computer is experiencing system configuration problems.

Select Load Fail-Safe Defaults from the Exit menu and press <Enter>. Select Ok to load Fail-Safe defaults.



## APPENDIX A WATCHDOG TIMER

### What is Watchdog Timer

The integrated Watchdog Timer can be set up by programming. There are 0~255 levels available. As long as the value of timer is set, after enabling, the countdown of the value is starting. It needs to reset or disable watchdog, otherwise auto-reset will be running when the value is counted to 0.

### How to Use the Watchdog Timer

(Following is example to enable configuration by using debug tool)

#### Enable WDT

1.Enable configuration

-O 2E 87

-O 2E 87

2. Select Logic device:

-O 2E 07

-O 2F 08

3. WDT Device Enable

-O 2E 30

-O 2F 01

4. Set timer unit

-O 2E F0

-O 2F 00 → (00: Sec; 08: Minute)

5. Set base timer:

-O 2E F1

-O 2F 0A → Set Reset Time (Ex.0A:10 Sec)

Disable WDT

1.Enable configuration

-O 2E 87

-O 2E 87

2. Select Logic device:

-O 2E 07

-O 2F 08

3. WDT Device Disable

-O 2E 30

-O 2F 00

### Sample of Watchdog application

Assume there is program A which needs to maintain running in a system. The value of Watchdog Timer must be set bigger than the running time of program A. Then, after the running time of program A is finished, either to disable or to reset watchdog timer.

When program A has problems to make system shut down, the system can be rebooted by Watchdog timer when the value of watchdog timer is countdowned to 0.

The below flowchart can be referred to edit program A

