CSB200-898

Slim & Compact SBC System

User's Manual

Version 1.0
(Oct. 2016)

iBASE

Compliance

CE

This is a class B product. This product has passed CE tests for environmental specifications and limits. This product is in accordance with the directives of the Union European (EU). If users modify and/or install other devices in this equipment, the CE conformity declaration may no longer apply.

FC

This product has been tested and found to comply with the limits for a Class B device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with manufacturer's instructions, may cause harmful interference to radio communications.

WEEE

This product must not be disposed of as normal household waste, in accordance with the EU directive of for waste electrical and electronic equipment (WEEE - 2012/19/EU). Instead, it should be disposed of by returning it to a municipal recycling collection point. Check local regulations for disposal of electronic products.

Green IBASE

This product is compliant with the current RoHS restrictions and prohibits use of the following substances in concentrations exceeding 0.1% by weight (1000 ppm) except for cadmium, limited to 0.01% by weight (100 ppm).

- Lead (Pb)
- Mercury (Hg)
- Cadmium (Cd)
- Hexavalent chromium (Cr6+)
- Polybrominated biphenyls (PBB)
- Polybrominated diphenyl ether (PBDE)

Important Safety Information

Carefully read the precautions before using the device.

Environmental conditions:

- Lay the device horizontally on a stable and solid surface in case the device may fall, causing serious damage.
- Leave plenty of space around the device and do not block the openings for ventilation. NEVER DROP OR INSERT ANY OBJECTS OF ANY KIND INTO THE VENTIILATION OPENINGS.
- Slots and openings on the chassis are for ventilation. Do not block or cover these openings. Make sure you leave plenty of space around the device for ventilation. NEVER INSERT OBJECTS OF ANY KIND INTO THE VENTILATIN OPENINGS.
- Use this product in environments with ambient temperatures between -30˚C and 65˚C for SSD, and between -10˚C and 45˚C for HDD.
- DO NOT LEAVE THIS DEVICE IN AN ENVIRONMENT WHERE THE STORAGE TEMPERATURE MAY GO BELOW -20˚C OR ABOVE 80˚C. This could damage the device. The device must be used in a controlled environment.

Care for your IBASE products:

- Before cleaning the device, turn it off and unplug all cables such as power in case a small amount of electrical current may still flow.
- Use neutral cleaning agents or diluted alcohol to clean the device chassis with a cloth. Then wipe the chassis with a dry cloth.
- Vacuum the dust with a computer vacuum cleaner to prevent the air vent or slots from being clogged.

WARNING

Attention during use:

- Do not use this product near water.
- Do not spill water or any other liquids on your device.
- Do not place heavy objects on the top of the device.
- Operate this device from the type of power indicated on the marking label. If you are not sure of the type of power available, consult your distributor or local power company.
- Do not walk on the power cord or allow anything to rest on it.
- If you use an extension cord, make sure that the total ampere rating of the product plugged into the extension cord does not exceed its limits.

Avoid Disassembly

You are not suggested to disassemble, repair or make any modification to the device. Disassembly, modification, or any attempt at repair could generate hazards and cause damage to the device, even bodily injury or property damage, and will void any warranty.

CAUTION

Danger of explosion if internal lithium-ion battery is replaced by an incorrect type. Replace only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.

Warranty Policy

- **IBASE standard products:**

  24-month (2-year) warranty from the date of shipment. If the date of shipment cannot be ascertained, the product serial numbers can be used to determine the approximate shipping date.

- **3rd-party parts:**

  12-month (1-year) warranty from delivery for the 3rd-party parts that are not manufactured by IBASE, such as CPU, memory, HDD, power adapter, panel and touchscreen.

* PRODUCTS, HOWEVER, THAT FAILS DUE TO MISUSE, ACCIDENT, IMPROPER INSTALLATION OR UNAUTHORIZED REPAIR SHALL BE TREATED AS OUT OF WARRANTY AND CUSTOMERS SHALL BE BILLED FOR REPAIR AND SHIPPING CHARGES.

Technical Support & Services

1. Visit the IBASE website at www.ibase.com.tw to find the latest information about the product.
2. If you need any further assistance from your distributor or sales representative, prepare the following information of your product and elaborate upon the problem.
   - Product model name
   - Product serial number
   - Detailed description of the problem
   - The error messages in text or in screenshots if there is any
   - The arrangement of the peripherals
   - Software in use (such as OS and application software, including the version numbers)
3. If repair service is required, you can download the RMA form at http://www.ibase.com.tw/english/Supports/RMAService/. Fill out the form and contact your distributor or sales representative.

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Table of Contents

Chapter 1
General Information

The information provided in this chapter includes:

- Features
- Packing List
- Specifications
- Overview
- Dimensions

1.1 Introduction

The CSB200-898 is a product series of IBASE embedded computing system, applicable to thin clients, smart industrial automation or controller, and retail equipment. It is a compact and fanless design with an Intel®-Atom™ DC E3825 processor and an Intel® I210IT Ethernet controller. This product features iSMART that allows the device capable of auto-scheduling for general applications and gives energy savings on power. It is able to be operated at the ambient operating temperature ranging from -30 ~ 65 °C for SSD, -10 ~ 45 °C for HDD, and even from -20 ~ 80 °C for storage.

1.2 Features

- Slim and compact fanless design with IBASE 3.5” disk-sized SBC
- On board Intel® Atom™ DC E3825 SoC at 1.33 GHz
- iSMART for auto-scheduler and power resume
- 2.5” drive tray for SATA HDD or SSD
- 1 x USB 3.0, 3 x USB2.0, 3 x mini PCIe
- 12V DC power input

1.3 Packing List

Your CSB200-898 package should include the items listed below. If any of the items below is missing, contact the distributor or the dealer from whom you purchased the product.

- CSB200-898 x 1
- Female Terminal Block x 1
  (If the optional DC Jack is used, this terminal block will not be enclosed.)
- Wall Mount Kit x 1
- Screws for Wall Mount Kit x 4
- Disk (including drivers) x 1
- Motherboard IB898 User's Manual x 1
  (You can download CSB200-898 User's Manual from our website.)

1.4 Optional Accessories

IBASE provide optional accessories as follows. Please contact us or your dealer if you need any.

- Power Adapter x 1
- Power Cord x 1
- mSATA Installation Kit (if an mSATA card is used) x 1
  Including:

mSATA Plate	x 1
Thermal Pad	x 1
Screw	x 2
Nut	x 2

1.5 Specifications

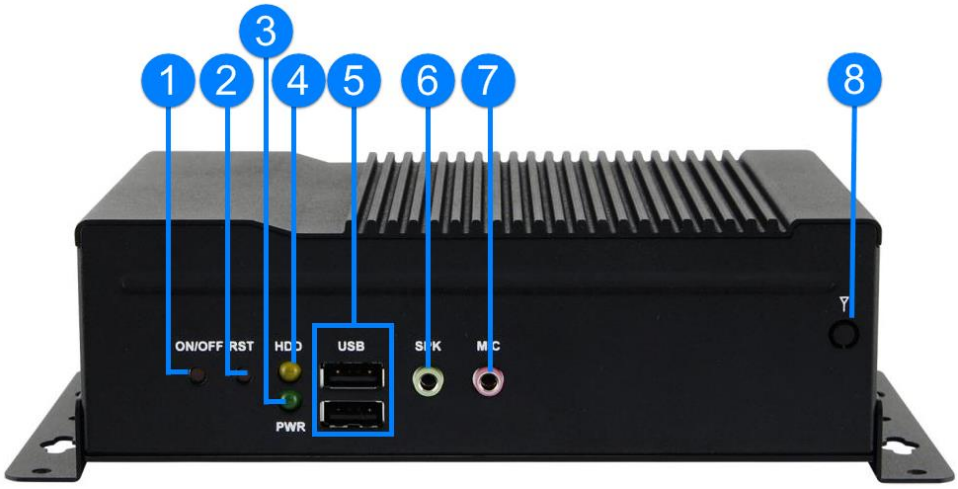
Product Name	CSB200-898
System	
Motherboard	IB898-I25-ASB
Operating System	• Windows 7 / 8.1 (32-bit & 64-bit) • Windows Embedded 8 • Linux (Fedora)
CPU	Intel® Atom™ DC Processor E3825 APU at 1.33 GHz
Chipset	Integrated
Memory	1 x DDR3L-1333 SO-DIMM 2GB, upgradable to 8 GB
Graphics	Intel® HD graphics Gen. 7 with 4EU Supports DX 11, OGL 3.0, OCL 1.1, OGLES 2.0
Super I/O	Nuvoton NCT5523D
Storage	2.5” drive bay for SSD / HDD
Audio Codec	Realtek ALC269QHD, two-way audio
Network	Intel® I210IT GbE LAN
Power Supply	60W power adaptor (Optional)
BIOS	AMI BIOS
Watchdog	Watchdog Timer 256 segments, 0, 1, 2…255 sec/min
Chassis	Aluminum & steel, black
Mounting	Desktop or wall mount
Dimensions (W x H x D)	172 x 52 x 111.6 mm (6.77” x 2.05” x 4.39”)
Net Weight	2.55 kg (5.62 lb)
Certificate	CE / LVD / FCC Class B
I/O Ports	
DC Input	Terminal block for 12V DC-In (DC Jack type is optional.)
LAN	1 x RJ45 GbE LAN
USB	• 1 x USB 3.0 • 3 x USB 2.0
Serial	• 1 x COM1 (RS-232/422/485) • 1 x COM2 (RS-232 only)
Display	• 1 x Display Port • 1 x VGA

Audio Jack	• 1 x Microphone input • 1 x Line-out
SATA	2 x SATA II connector
Expansion	• 2 x Mini PCIe slot (full-sized, a combo Mini PCIe / mSATA slot is included.) • 1 x Mini PCIe slot (half-sized)
Environment	
Temperature	• **Operating:** With SSD: -30 ~ 65 °C (22 ~ 149 °F) With HDD: -10 ~ 45 °C (14 ~ 113 °F) • **Storage:** -20~ 80 °C (-4 ~ 176 °F)
Relative Humidity	5 ~ 90% at 45 °C (non-condensing)
Vibration Protection	• **Operating:** 0.25 Grms / 5 ~ 500 Hz • **Non-operating:** 1 Grms / 5 ~ 500Hz
Shock Protection	• **Operating:** 20 g / 11 ms • **Non-operating:** 40 g / 11 ms

All specifications are subject to change without prior notice.

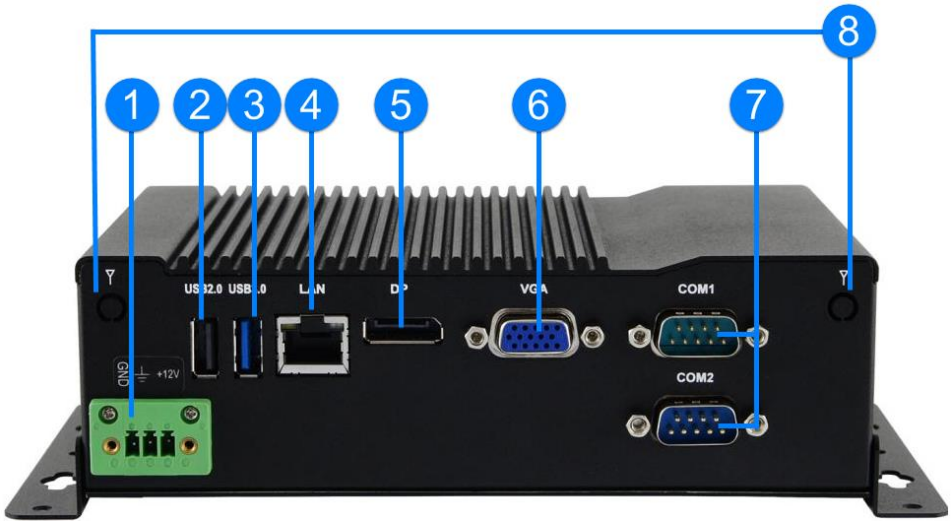
1.6 Overview

Front View



No.	Name	No.	Name
1	Power Button	5	USB 2.0 Ports
2	Reset Button	6	Audio Jack – Line-Out
3	Power LED Indicator	7	Audio Jack – Microphone Input
4	HDD LED Indicator	8	Antenna Hole

Rear View

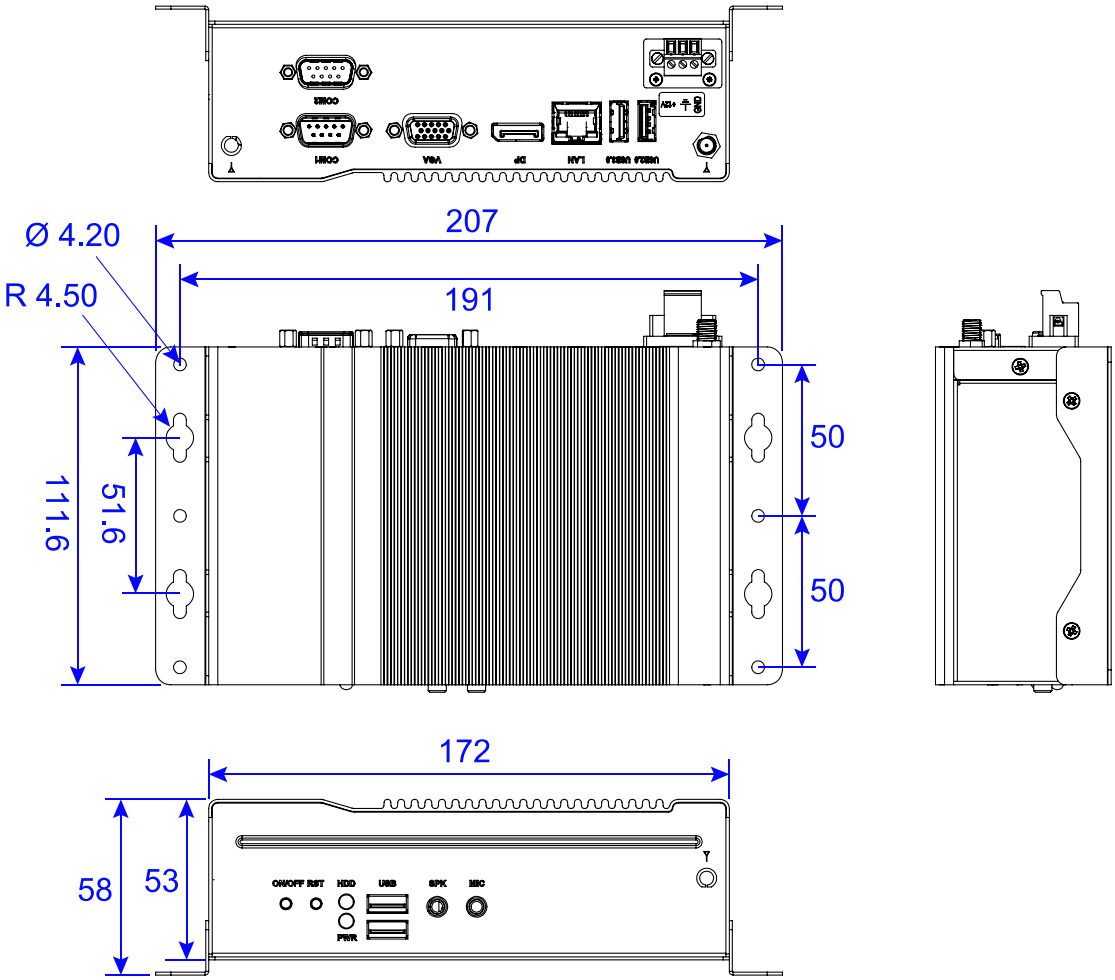


No.	Name	No.	Name
1	DC-In Power Connector	5	Display Port
2	USB 2.0 Port	6	VGA Port
3	USB 3.0 Port	7	COM Ports
4	LAN Port	8	Antenna Holes

Oblique View

1.7 Dimensions

Unit: mm



Chapter 2
Hardware Configuration

The information provided in this chapter includes:

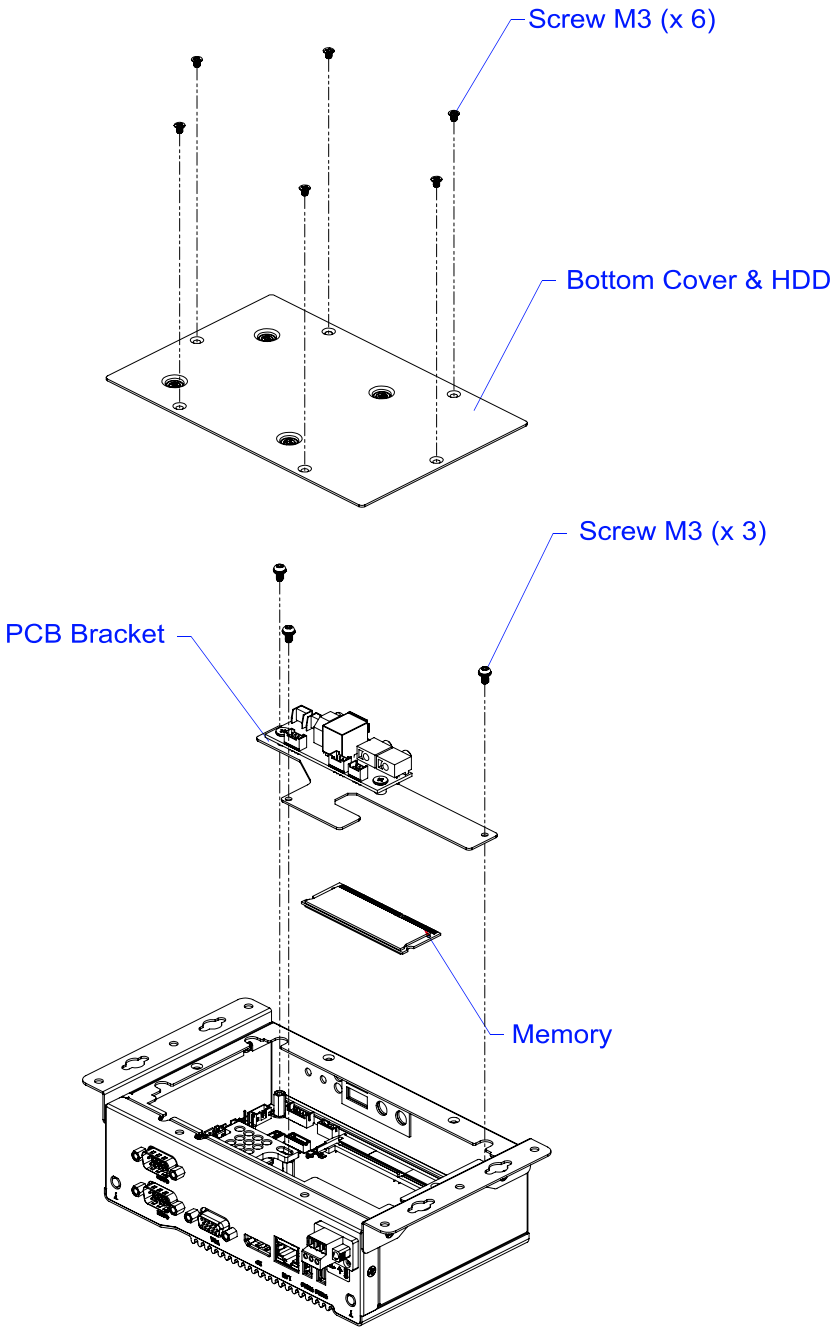
- Essential installations before you begin
- Information and locations of connectors

2.1 Essential Installations Before You Begin

2.1.1 Memory Installation

There is one SO-DIMM DDR3L memory slots inside CSB200-898 and the maximum memory is expandable up to 8 GB.

If you need to install or replace a memory module, you will have to remove the metal plate (i.e. PCB bracket as shown below) with I/O module locating above the memory slot. Follow the instructions to remove the plate.



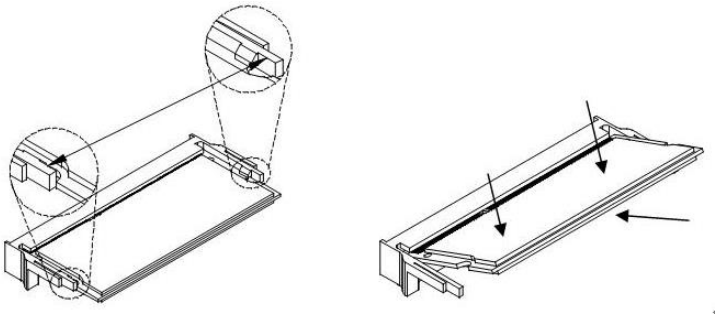
1. Loosen 6 screws from the bottom cover.

2. Loosen the 3 screws (M3) to free up the PCB bracket for removal.

3. Take out the PCB bracket with the I/O module carefully.

4. Align the key of your memory module with that on the memory slot and insert the module slantwise.

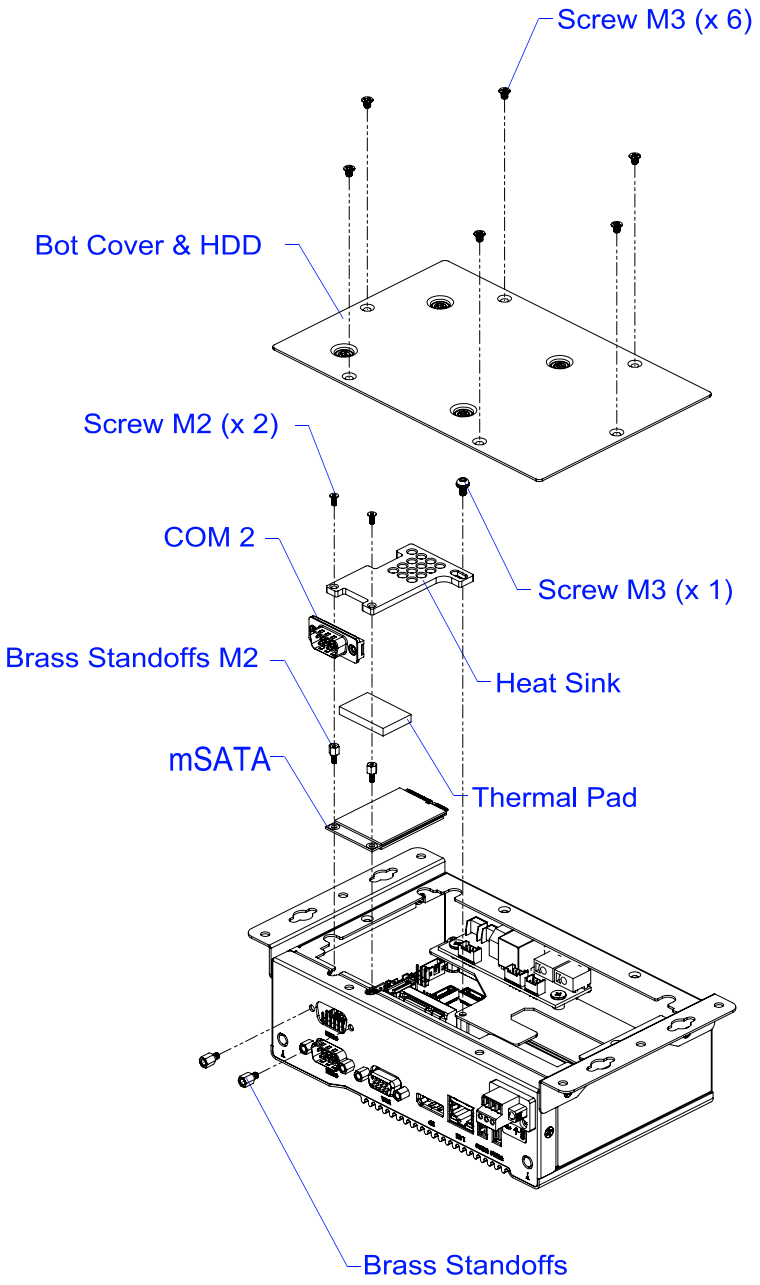
5. Gently push the module in an upright position until the clips of the slot click to hold the module in place when the module touches the bottom of the slot.



To remove the module, press the clips outwards with both hands.

2.1.2 Mini PCIe Card / mSATA Card Installation

If you are using a model type of CSB200-898 that doesn't include a mSATA card, you can follow the instructions below to install a mSATA card.

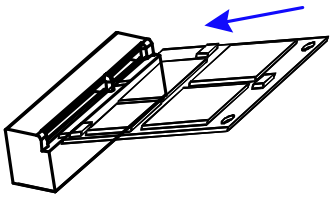


1. Loosen 6 screws from the bottom cover and remove it.

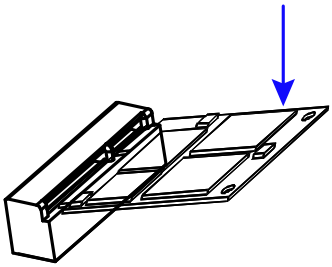
2. Loosen 2 brass standoffs to release COM2 Port.

3. Loosen 2 brass standoffs in front of the mini PCIe slot.

4. Align the key of your mini PCIe card / mSATA card to the Mini PCIe interface (the J14 connector shares mSATA signal), and insert the card slantwise.



5. Push the card down and fix it with the 2 brass standoffs mentioned in step 3.



6. Put the thermal pad and heatsink onto the mini PCIe / mSATA card, and fix the heatsink with 3 screws (M2 x 2, M3 x 1).

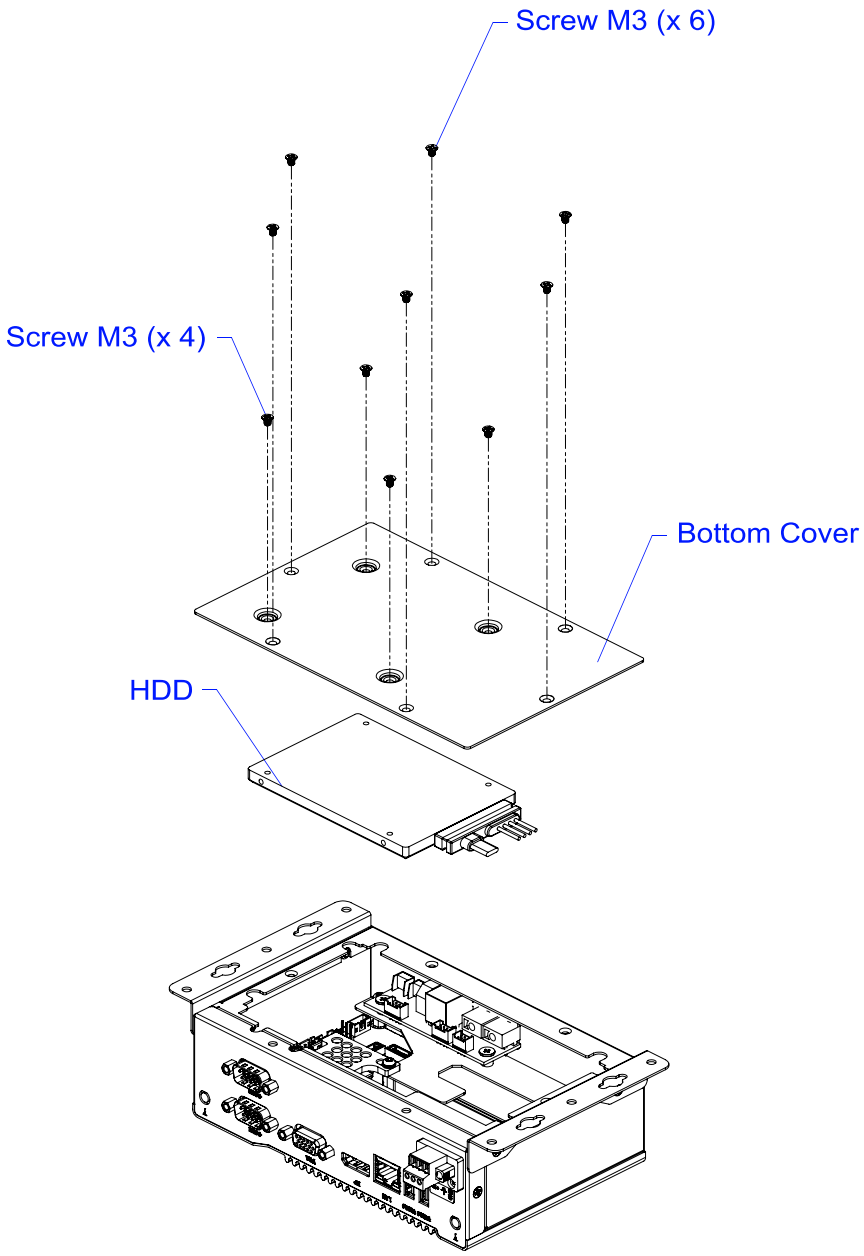
7. Fasten the COM2 port back in place.

2.1.3 HDD Installation

If you are using a model type of CSB200-898 that doesn't include a HDD card, you will need to install one. Follow the instructions below for installation.

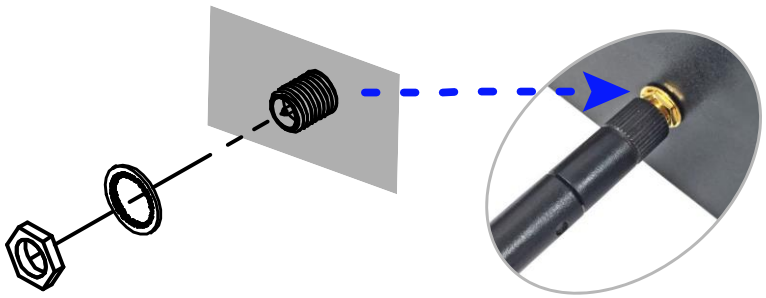
1. Loosen 6 screws from the bottome cover and remove it.

2. Loosen 4 screws to attach your HDD and then tighten these screws to fix the HDD.



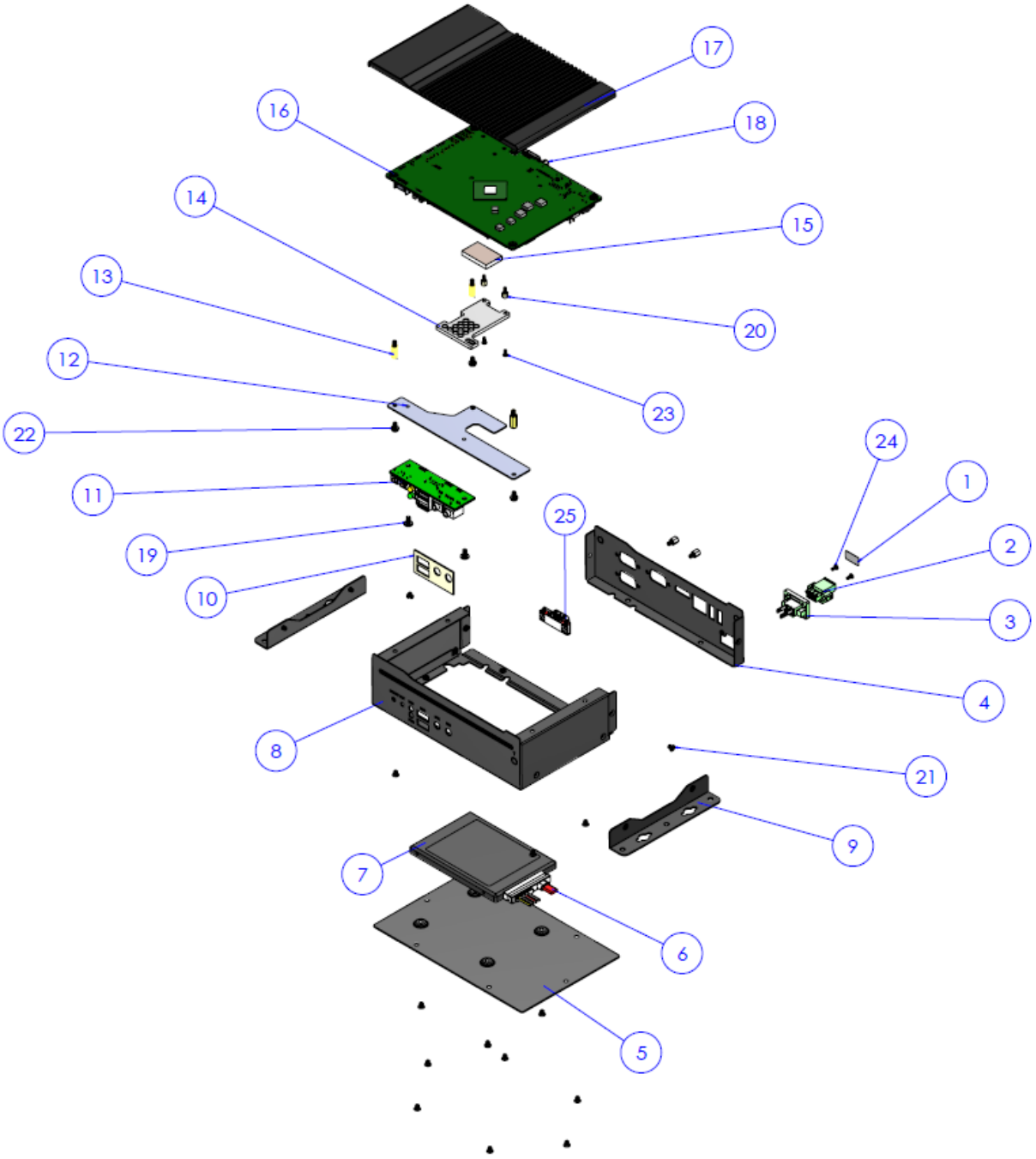
2.1.4 WiFi / 3G / 4G Antenna Installation

Thread the WiFi / 3G / 4G antenna cable through an antenna hole. Then fasten the antenna as shown below.



Info: The diameter of the nut is around 6.35 mm (0.25”-36UNC).

2.1.5 Device Exploded Diagram



Item	Name	Q'ty
1	Stickcer-12V Only	1
2	3.81 3 Pins Female	1
3	3.81 3 Pins Male	1
4	CSB200-898 Rear Plate Ver. B1A	1

Item	Name	Q'ty
5	CSB200-898 Bottom Cover Ver. A1	1
6	SATA Cable-12	1
7	2.5" SSD 370	1
8	CSB200-898 Base Ver. B1A	1
9	CSB200-897 Bracket-B1	2
10	EMI Gasket	1
11	ID737	1
12	CSB200-898 PCB Bracket Ver. B1A	1
13	Nut (M3 x 11.25L)	3
14	CSB200-898 mSATA Plate Ver. B1A	1
15	Thermal Pad RS-300 (18 x 28 mm, T = 4 mm)	1
16	IB898-A1	1
17	CSB200-898 Heatsink Ver. A1	1
18	#4-40 Hex Stud (Short)	6
19	Screw (M3 x 1.5L + 5L)	2
20	Nut (M2 x 4L)	2
21	Screw (M3 x 4L)	20
22	Screw (M3 x 6L)	5
23	Screw (M2 x 5L)	2
24	Screw (M2 x 4L)	2
25	VGA	1

2.1.6 Mounting Brackets Installation

Note: Before mounting the system on wall, ensure that you are following all applicable building and electric codes.

Requirements

When mounting, ensure that you have enough room for power and signal cable routing. And have good ventilation for power adapter. The method of mounting must be able to support weight of the CSB200-898 plus the suspend weight of all the cables to be attached to the system. Use the following methods for mounting your system:

Selecting the Location

Plan the mounting location thoroughly. Locations such as walkway areas, hallways, and crowded areas are not recommended. Mount the product to a flat, sturdy, structurally sound column or wall surface.

The best mounting surface is a standard countertop, cabinet, table, or other structure that is minimally the width and length of the product. This will reduce the risk that someone may accidentally wall into and damage the product. Local laws governing the safety of individuals might require this type of consideration.

Selecting the type of wall construction

1. Mounting on a hollow wall

   - **Wood surface**
     Use construction-grade wood and the recommended minimum thickness is 38 x 25.4 mm (1.5” x 10”).

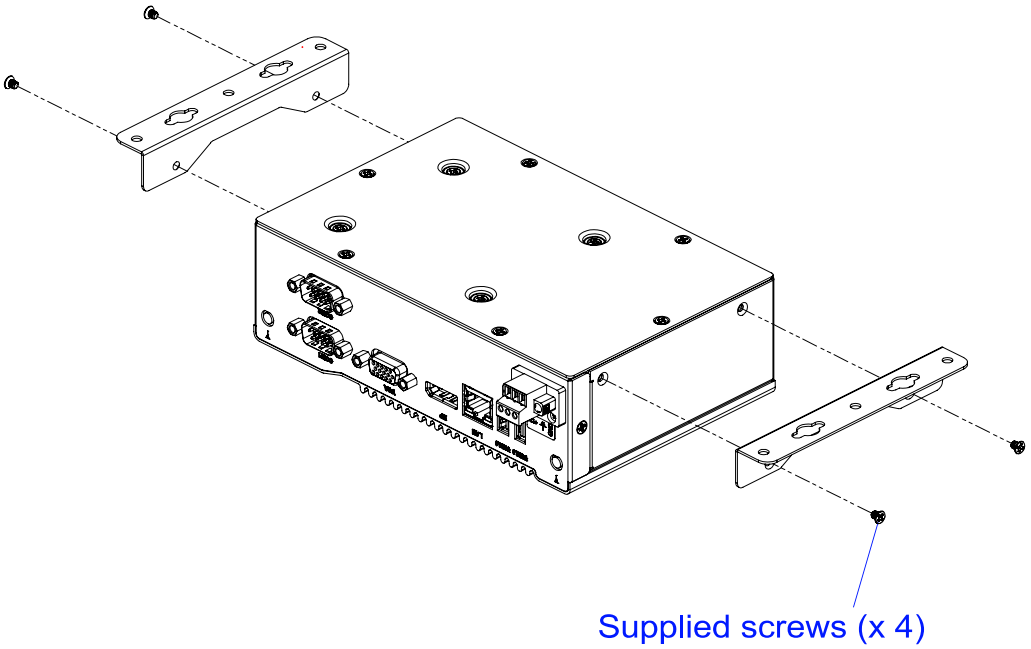
     Note: This method provides the most reliable attachment for the product with little risk that the product may come loose or require ongoing maintenance.

   - **Drywall**
     Drywall over wood studs is acceptable.

2. Mounting on a solid concrete or brick wall with flat and smooth surface

Wall Mount Installation instructions:

1. Turn your CSB200-898 upside down, attach the mounting brackets to the device, and secure with the supplied four screws as below.



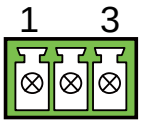
2. Then prepare at least four screws (M3, 6 mm) to mount the device on wall .

You can install CSB200-898 on plastic (LCD monitor), wood, drywall surface over studs, or a solid concrete or metal plane directly. The types of fasteners required are dependent on the type of wall construction.

Fasteners are not supplied in the product package. You will need to prepare the fasteners. Choose fasteners that are rated either **Medium Duty** or **Heavy Duty**. To assure proper fastener selection and installation, follow the fastener manufacturer's recommendations.

2.1.7 Pinout for DC Power Input Connector

- **DC Power Input (terminal block)**



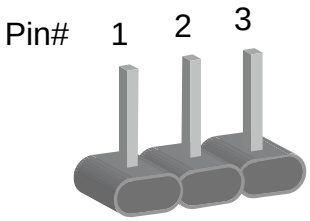
Pin	Assigment	Pin	Assigment
1	GND	3	+12V
2	Chassis GND		

2.2 Setting the Jumpers

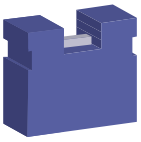
Set up and configure your CSB200-898 by using jumpers for various settings and features according to your needs and applications. Contact your supplier if you have doubts about the best configuration for your use.

2.2.1 How to Set Jumpers

Jumpers are short-length conductors consisting of several metal pins with a non-conductive base mounted on the circuit board. Jumper caps are used to have the functions and features enabled or disabled. If a jumper has 3 pins, you can connect either PIN1 to PIN2 or PIN2 to PIN3 by shorting.

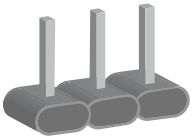
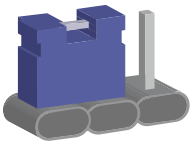
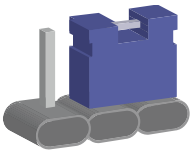
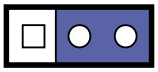


A 3-pin jumper



A jumper cap

Refer to the illustration below to set jumpers.

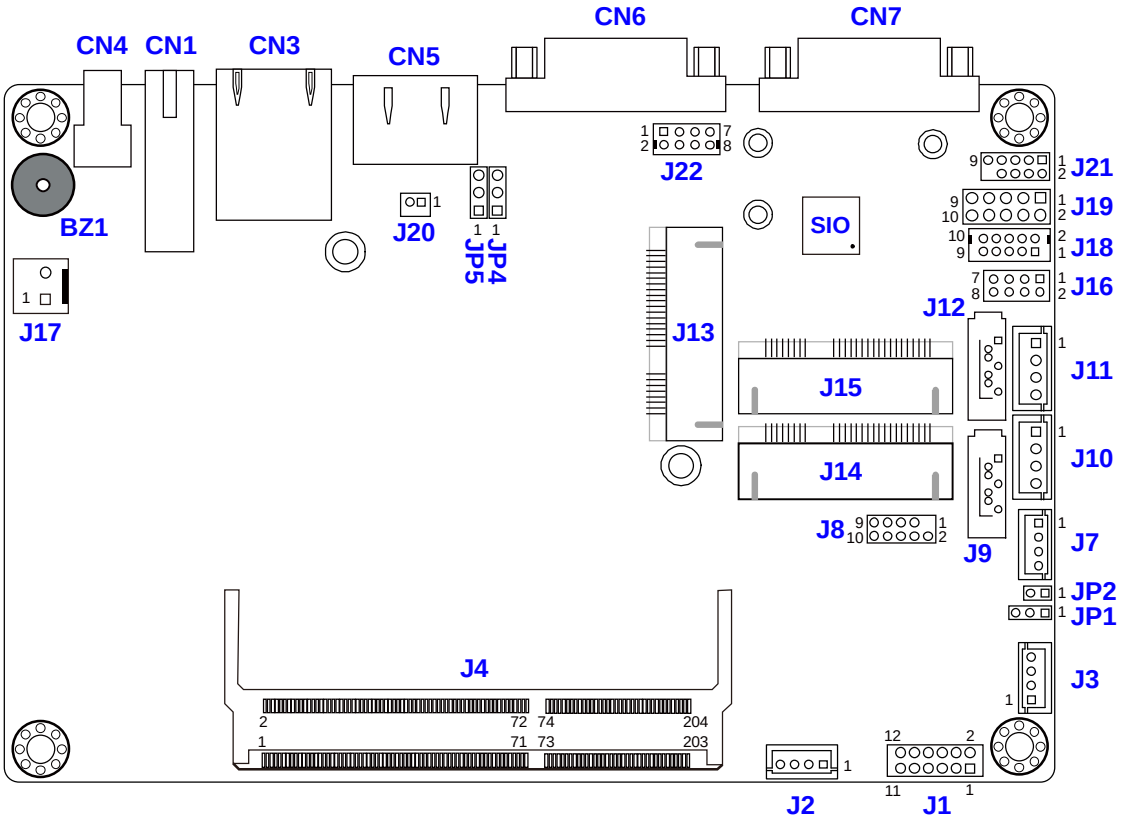
Pin closed	Oblique view	Schematic illustration in the manual
Open		
1-2		
2-3		

When two pins of a jumper are encased in a jumper cap, this jumper is **closed**, i.e. turned **On**.

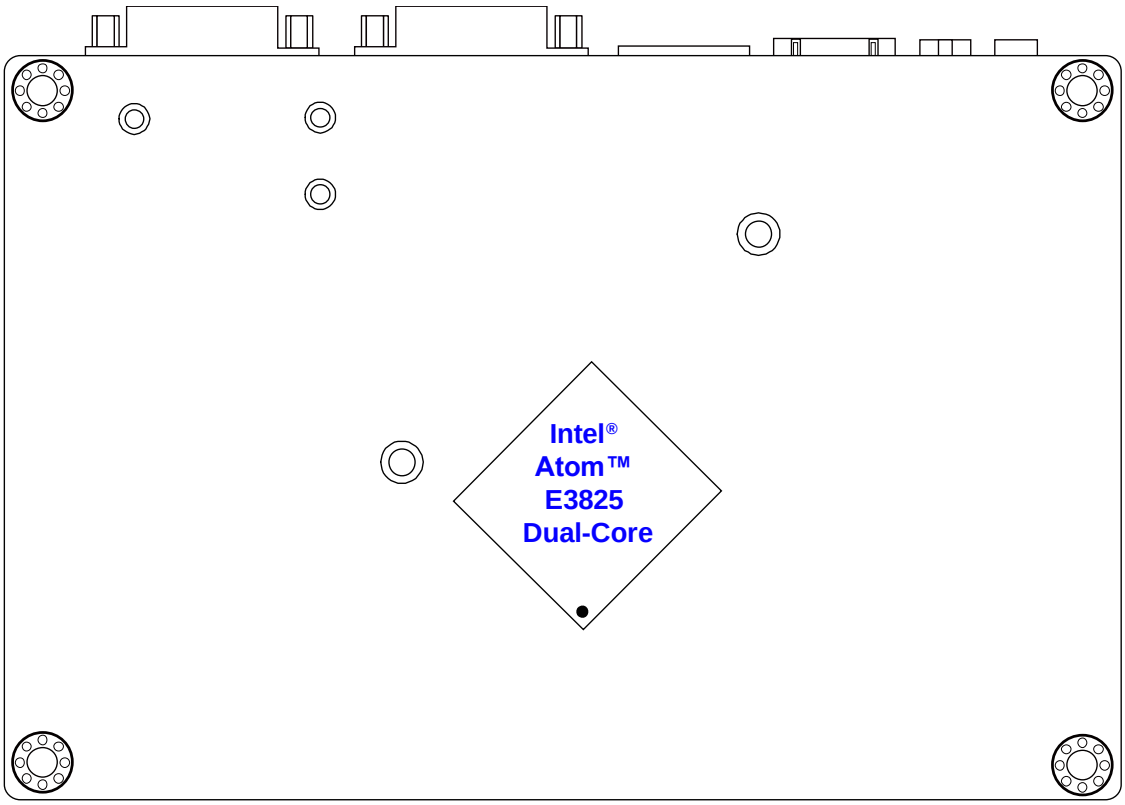
When a jumper cap is removed from two jumper pins, this jumper is **open**, i.e. turned **Off**.

2.3 Jumper & Connector Locations on Motherboard

Motherboard: IB898



IB898 - top

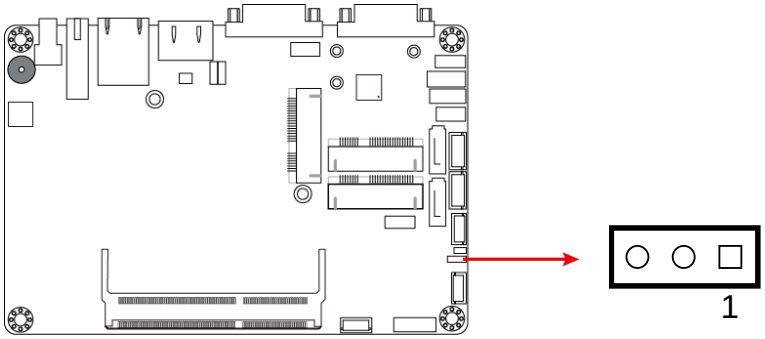


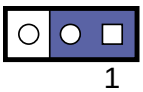
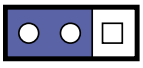
IB898 - bottom

2.4 Jumpers Quick Reference

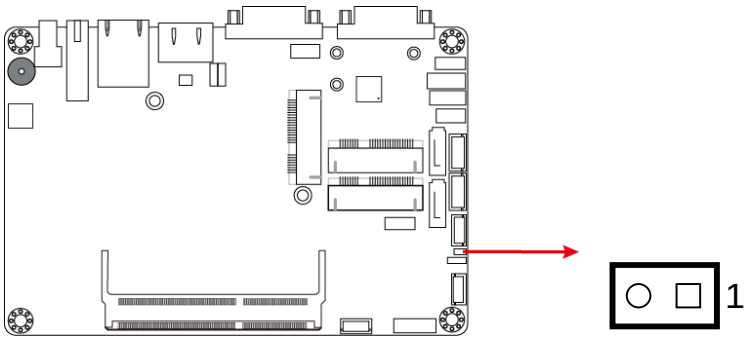
Function	Connector Name	Page
LVDS Panel Power Selection	JP1	24
LVDS Panel Brightness Control Selection	JP2	25
CMOS Data Clearance	JP4	25
ME Register Clearance	JP5	26

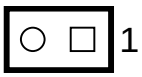
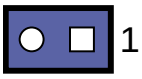
2.4.1 LVDS Panel Power Selection (JP1)



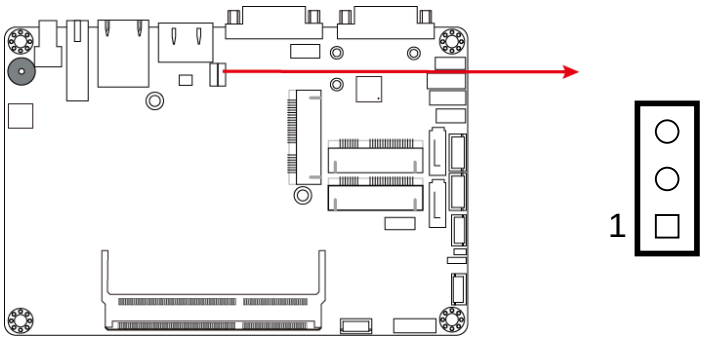
Function	Pin closed	Illustration
3.3V (default)	1-2	 1
5V	2-3	 1

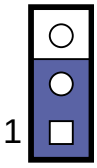
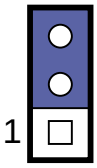
2.4.2 LVDS Panel Brightness Control Selection (JP2)



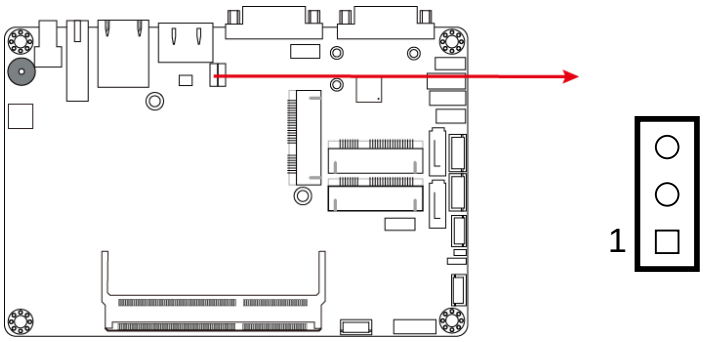
Function	Pin closed	Illustration
3.3V	Open	
5V (default)	Close	

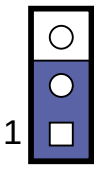
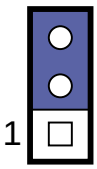
2.4.3 CMOS Data Clearance (JP4)



Function	Pin closed	Illustration
Normal (default)	1-2	
Clear CMOS	2-3	

2.4.4 ME Register Clearance (JP5)

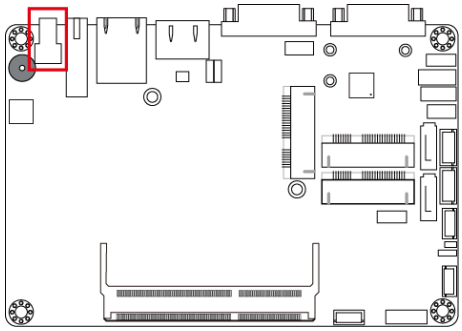


Function	Pin closed	Illustration
Normal (default)	1-2	
Clear ME Register	2-3	

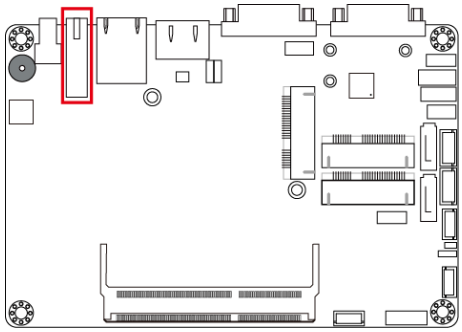
2.5 Connectors Quick Reference

Function	Connector Name	Page
USB 2.0 Port	CN4	28
USB 3.0 Port	CN1	28
LAN Port (GbE)	CN3	28
Display Port	CN5	29
VGA Port	CN6	29
COM1 Port	CN7	30
Audio Connector	J1	31
Amplifier Connector	J3	31
DDR3L SO-DIMM Socket	J4	32
LCD Backlight Connector	J7	32
SATA II / mSATA Port	J9	32
SATA II Port	J12	33
SATA HDD Power Connector	J10, J11	33
Full-Size Mini-PCIe Connector	J13	33
Full-Size Mini-PCIe / mSATA Connector	J14	34
Half-Size Mini-PCIe Connector	J15	34
Front Panel Setting Connector	J16	34
Motherboard Power Input Connector	J17	35
COM2 (RS-232) Port	J18	35
Digital I/O Connector	J19	36
USB 2.0 Connector	J22	36
Factory Use Only	J2, J8, J21	--

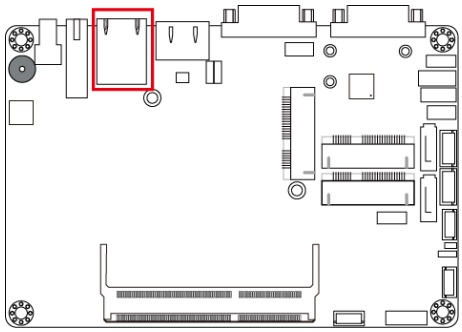
2.5.1 USB 2.0 Port (CN4)



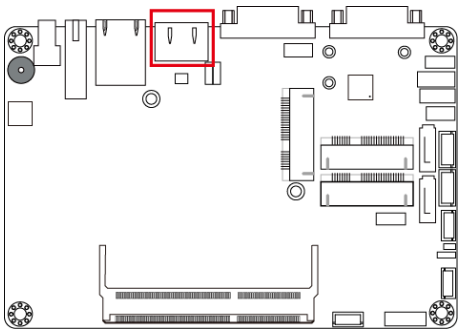
2.5.2 USB 3.0 Port (CN1)



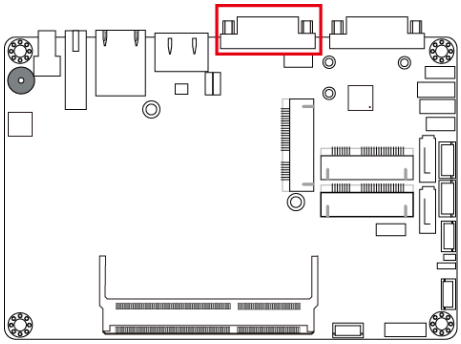
2.5.3 LAN Port (GbE) (CN3)



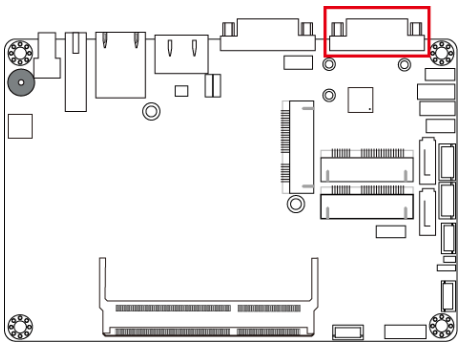
2.5.4 Display Port (CN5)

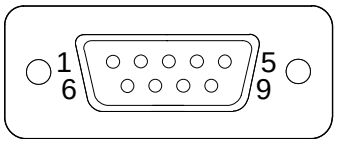


2.5.5 VGA Port (CN6)



2.5.6 COM1 RS-232/422/485 Port (CN7)



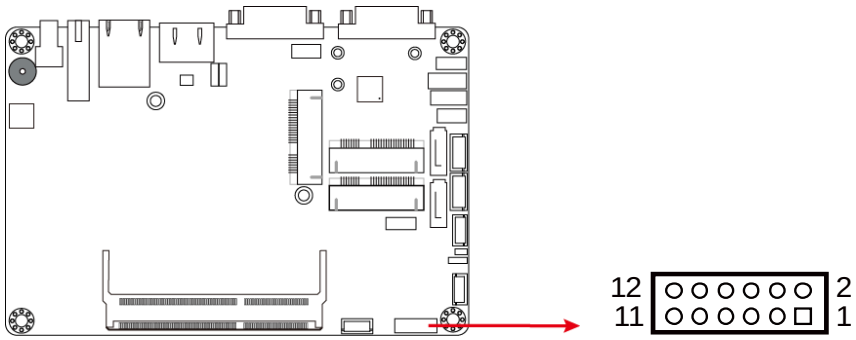


COM1 port is jumper-less and configurable in BIOS.

Pin	Assigment	Pin	Assigment
1	DCD, Data carrier detect	6	DSR, Data set ready
2	RXD, Receive data	7	RTS, Request to send
3	TXD, Transmit data	8	CTS, Clear to send
4	DTR, Data terminal ready	9	RI, Ring indicator
5	GND, ground		

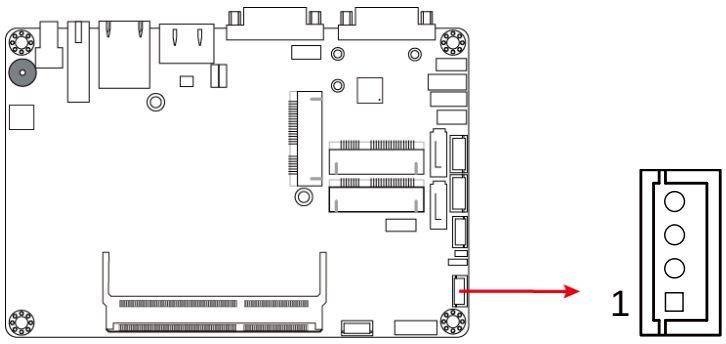
Pin	Assignment		
	RS-232	RS-422	RS-485
1	DCD	TX-	DATA-
2	RX	TX+	DATA+
3	TX	RX+	NC
4	DTR	RX-	NC
5	Ground	Ground	Ground
6	DSR	NC	NC
7	RTS	NC	NC
8	CTS	NC	NC
9	RI	NC	NC

2.5.7 Audio Connector (J1)



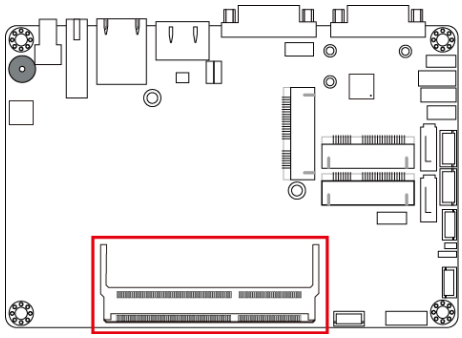
Pin	Assigment	Pin	Assigment
1	Lineout_L	7	JD_Linein
2	Lineout_R	8	GNd
3	JD_Front	9	MIC_L
4	GND	10	MIC-R
5	Linein_L	11	JD_MIC1
6	Linein_R	12	GND

2.5.8 Amplifier Connector (J3)

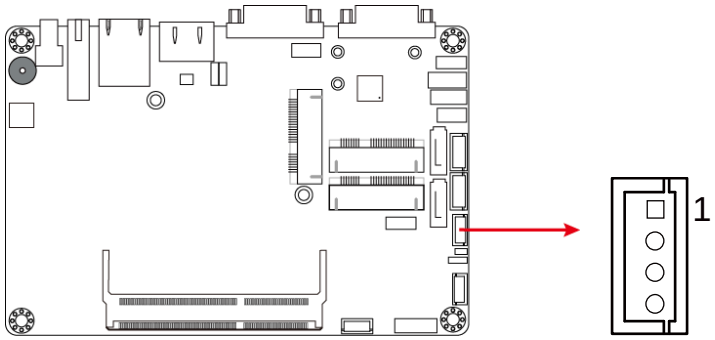


Pin	Assigment	Pin	Assigment
1	OUTL+	3	OUTR-
2	OUTL-	4	OUTR+

2.5.9 DDR3L SO-DIMM Socket (J4)

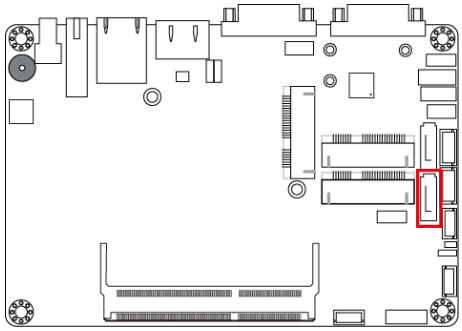


2.5.10 LCD Backlight Connector (J7)

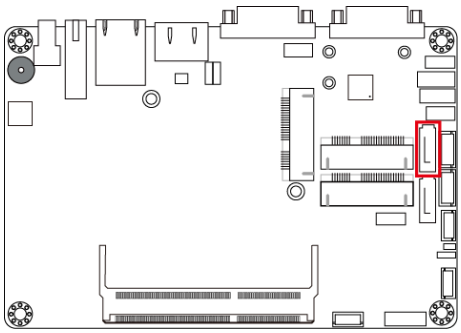


Pin	Assigment	Pin	Assigment
1	+12V(1A)	3	Brightness Control
2	Backlight Enable	4	Ground

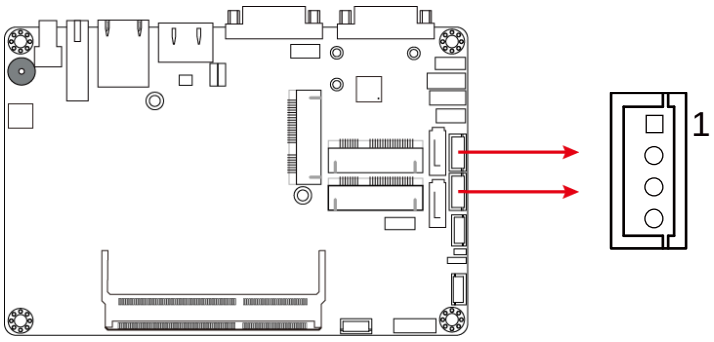
2.5.11 SATA II / mSATA Port (J9)



2.5.12 SATA II Port (J12)

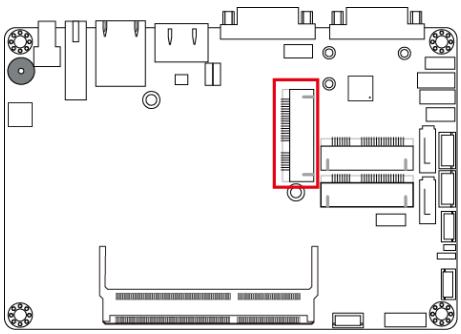


2.5.13 SATA HDD Power Connector (J10, J11)

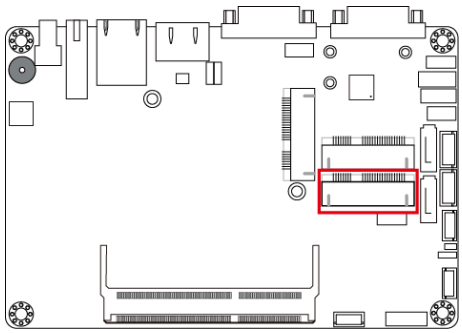


Pin	Assigment	Pin	Assigment
1	+5V (1A)	3	Ground
2	Ground	4	+12V (1A)

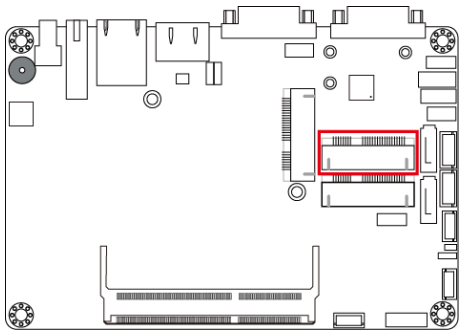
2.5.14 Full-Size Mini-PCIe Connector (J13)



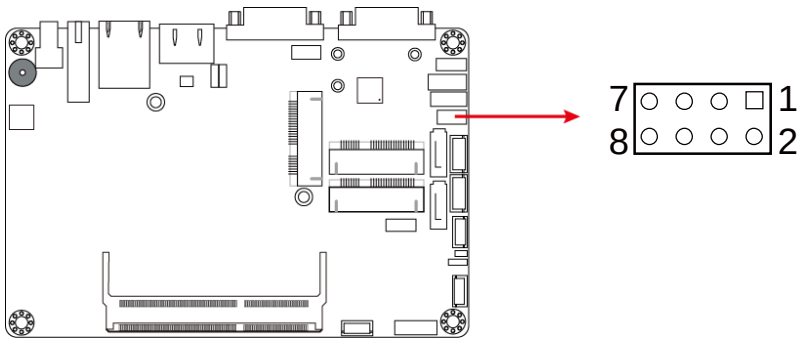
2.5.15 Full-Size Mini-PCIe / mSATA Connector (J14)



2.5.16 Half-Size Mini-PCIe Connector (J15)

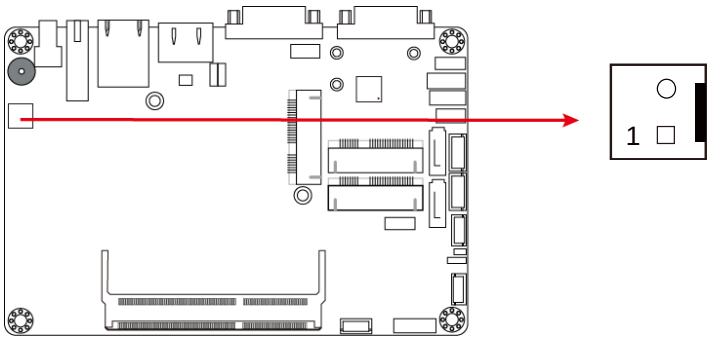


2.5.17 Front Panel Setting Connector (J16)



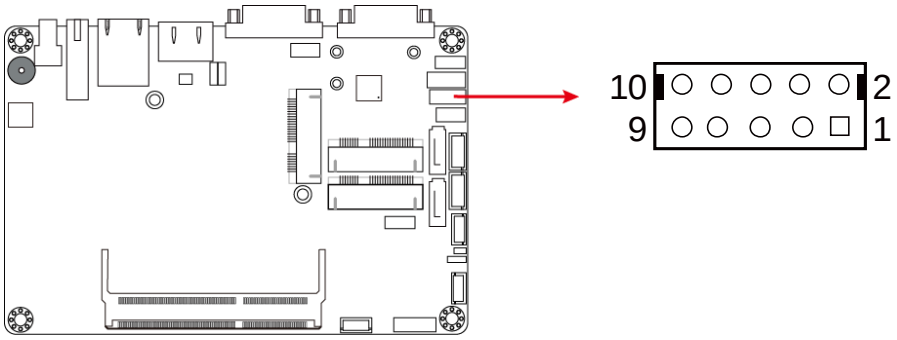
Pin	Assigment	Pin	Assigment
1	Power BTN	5	Reset BTN
2	Power BTN	6	Reset BTN
3	HDD LED+	7	Power LED+
4	HDD LED-	8	Power LED-

2.5.18 Motherboard Power Input Connector (J17)



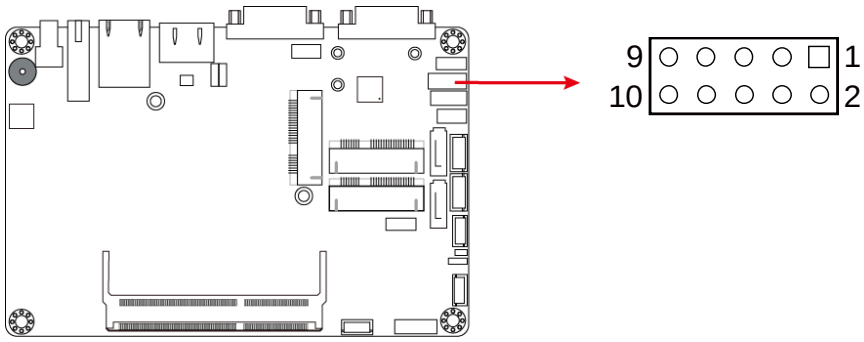
Pin	Assigment
1	VCC12
2	GND

2.5.19 COM2 RS-232 Port (J18)



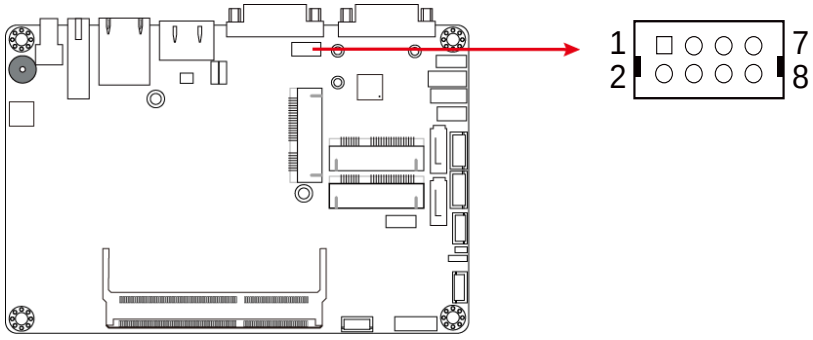
Pin	Assigment	Pin	Assigment
1	DCD, Data carrier detect	6	DSR, Data set ready
2	RXD, Receive data	7	RTS, Request to send
3	TXD, Transmit data	8	CTS, Clear to send
4	Data terminal ready	9	RI, Ring indicator
5	GND, ground	10	Not Used

2.5.20 Digital I/O Connector (J19)



Pin	Assigment	Pin	Assigment
1	GND	6	OUT0
2	VCC(500mA)	7	IN3
3	OUT3	8	IN1
4	OUT1	9	IN2
5	OUT2	10	IN0

2.5.21 USB 2.0 Connector (J22)



Pin	Assigment	Pin	Assigment
1	VCC	5	D0+
2	GND	6	D1-
3	D0-	7	GND
4	D1+	8	VCC

Chapter 3
Driver Installation

The information provided in this chapter includes:

- Intel® Chipset Software Installation Utility
- Intel® Graphics Driver Installation
- HD Audio Driver Installation
- Intel® Trusted Execution Engine Installation
- USB 3.0 Driver Installaion
- LAN Driver Installation

3.1 Introduction

This section describes the installation procedures for software drivers. The software drivers are in a disk enclosed with the product package. If you find anything missing, please contact the distributor where you made the purchase.

Note: After installing your Windows operating system, you must install the Intel® Chipset Software Installation Utility first before proceeding with the drivers installation.

3.2 Intel® Chipset Software Installation Utility

The Intel® Chipset drivers should be installed first before the software drivers to install INF files for Plug & Play function for the chipset components. Follow the instructions below to complete the installation.

1. Insert the disk enclosed in the package. Click **Intel** and then **Intel(R) Baytrail Chipset Drivers**.

2. Click **Intel(R) Chipset Software Installation Utility**.

3. When the *Welcome* screen to the Intel® Chipset Device Software appears, click **Next** to continue.

4. Click **Yes** to accept the software license agreement and proceed with the installation process.

5. The driver has been completely installed. Click **Finish** to restart the computer and for changes to take effect.

3.3 Intel® Graphics Driver Installation

1. Insert the disk enclosed in the package. Click **Intel** and then **Intel(R) Baytrail Chipset Drivers**.

2. Click **Intel(R) Baytrail Graphics Driver**.

3. When the *Welcome* screen appears, click **Next** to continue.

4. Click **Yes** to agree with the license agreement and continue the installation.

5. The driver has been completely installed. Click **Finish** to restart the computer and for changes to take effect.

3.4 HD Audio Driver Installation

1. Insert the disk enclosed in the package with the board. Click **Intel** and then **Intel(R) Baytrail Chipset Drivers**.

2. Click **Realtek High Definition Audio Driver**.

3. On the *Welcome* screen of the InstallShield Wizard, click **Next** for installation.

4. The driver has been completely installed. Click **Finish** to restart the computer and for changes to take effect.

3.5 Intel® Trusted Execution Engine Installation

Note: The driver is for Windows 7 only.

1. Insert the disk enclosed in the package with the board. Click **Intel** and then **Intel(R) Baytrail Chipset Drivers**.

2. Click **Intel(R) TXE Drivers**.

3. When the *Weocome* screen appears, click **Next**.

4. Click **Next** to agree with the license agreement and continue the installation.

5. The driver has been completely installed. Click **Finish** to restart the computer and for changes to take effect.

3.6 USB 3.0 Driver Installation

1. Insert the disk enclosed in the package with the board. Click **Intel** and then **Intel(R) Baytrail Chipset Drivers**.

2. Click **Intel(R) USB 3.0 Drivers**.

3. On the *Welcome* screen of the InstallShield Wizard, click **Next**.

4. Click **Yes** to agree with the license agreement.

5. On the *Readme File Information* screen, click **Next** for installation.

6. The driver has been completely installed. Click **Finish** to restart the computer and for changes to take effect.

3.7 LAN Driver Installation

1. Insert the disk enclosed in the package with the board. Click **LAN Card** on the left pane. Then click **Intel(R) LAN Controller Drivers,** and **Intel(R) I21x Gigabit Network Drivers**.

2. On the *Welcome* screen of the InstallShield Wizard, click **Next**.

3. Click **Next** to agree with the license agreement.

4. When the wizard is ready for installation, click **Install**.

5. The driver has been completely installed. Click **Finish** to restart the computer and for changes to take effect.

Chapter 4
BIOS Setup

This chapter describes the different settings available in the AMI BIOS that comes with the board. The topics covered in this chapter are as follows:

- Main Settings
- Advanced Settings
- Chipset Settings
- Security Settings
- Book Settings
- Save & Exit

4.1 Introduction

The BIOS (Basic Input/Output System) installed in the ROM of your computer system supports Intel® processors. The BIOS provides critical low-level support for standard devices such as disk drives, serial ports and parallel ports. It also provides password protection as well as special support for detailed fine-tuning of the chipset controlling the entire system.

4.2 BIOS Setup

The BIOS provides a Setup utility program for specifying the system configurations and settings. The BIOS ROM of the system stores the Setup utility. When you turn on the computer, the BIOS is immediately activated. Press the <Del> key immediately allows you to enter the Setup utility. If you are a little bit late pressing the <Del> key, POST (Power On Self Test) will continue with its test routines, thus preventing you from invoking the Setup.

If you still need to enter Setup, restart the system by pressing the ”Reset” button or simultaneously pressing the <Ctrl>, <Alt> and <Delete> keys. You can also restart by turning the system Off and back On again.

The following message will appear on the screen:

```
Press <DEL> to Enter Setup
```

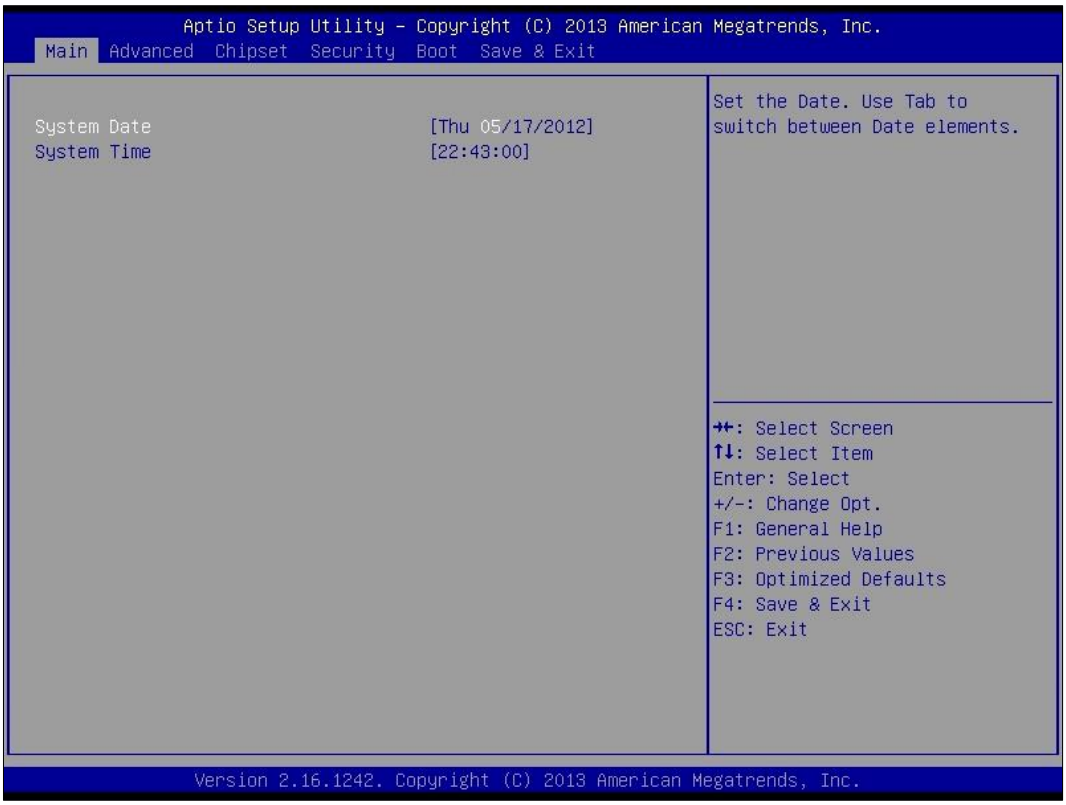
In general, press the arrow keys to highlight items, <Enter> to select, the <PgUp> and <PgDn> keys to change entries, <F1> for help, and <Esc> to quit.

When you enter the BIOS Setup utility, the *Main Menu* screen will appear on the screen. The Main Menu allows you to select from various setup functions and exit choices.

Warning: It is strongly recommended that you avoid making any changes to the chipset defaults.

These defaults have been carefully chosen by both AMI and your system manufacturer to provide the absolute maximum performance and reliability. Changing the defaults could make the system unstable and crash in some cases.

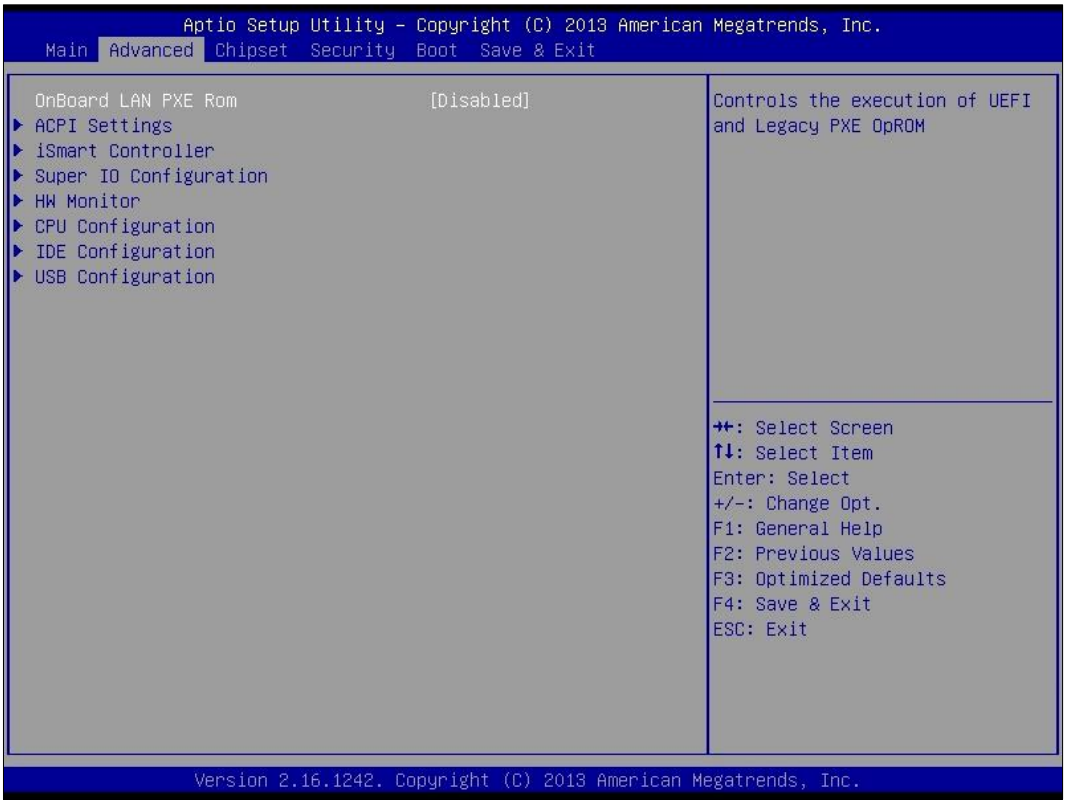
4.3 Main Settings



BIOS Setting	Description
System Date	Sets the date. Use the <Tab> key to switch between the data elements.
System Time	Set the time. Use the <Tab> key to switch between the data elements.

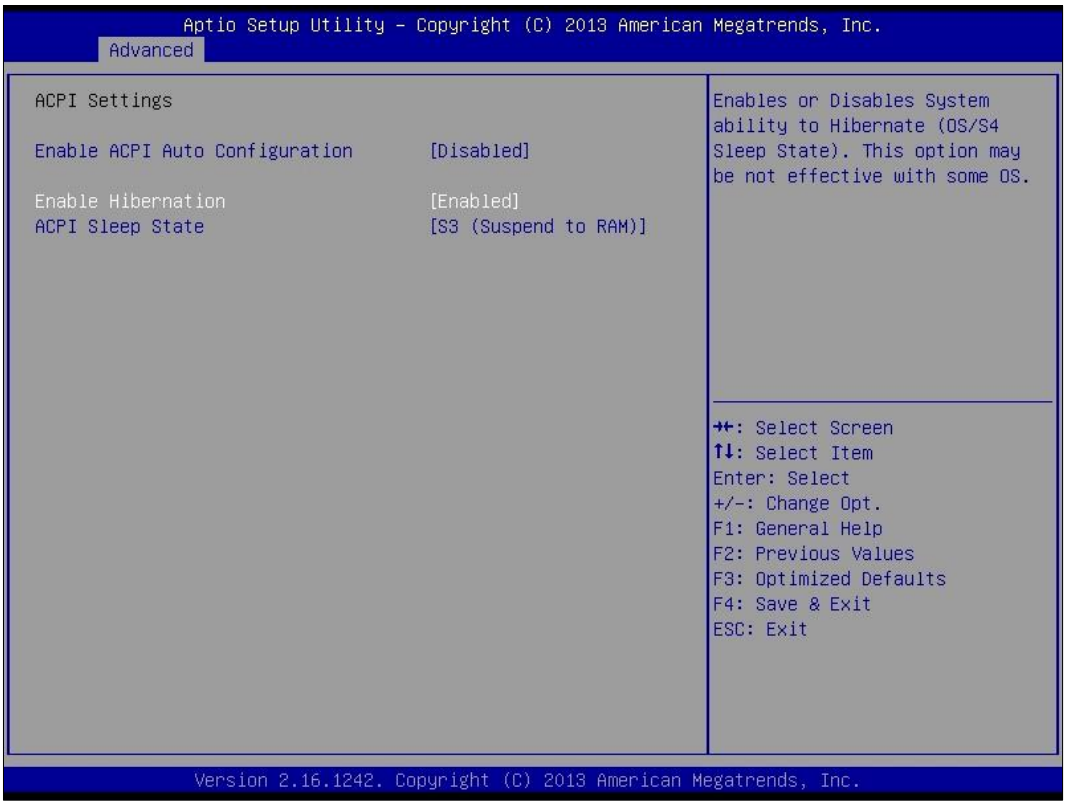
4.4 Advanced Settings

This section allows you to configure, improve your system and allows you to set up some system features according to your preference.



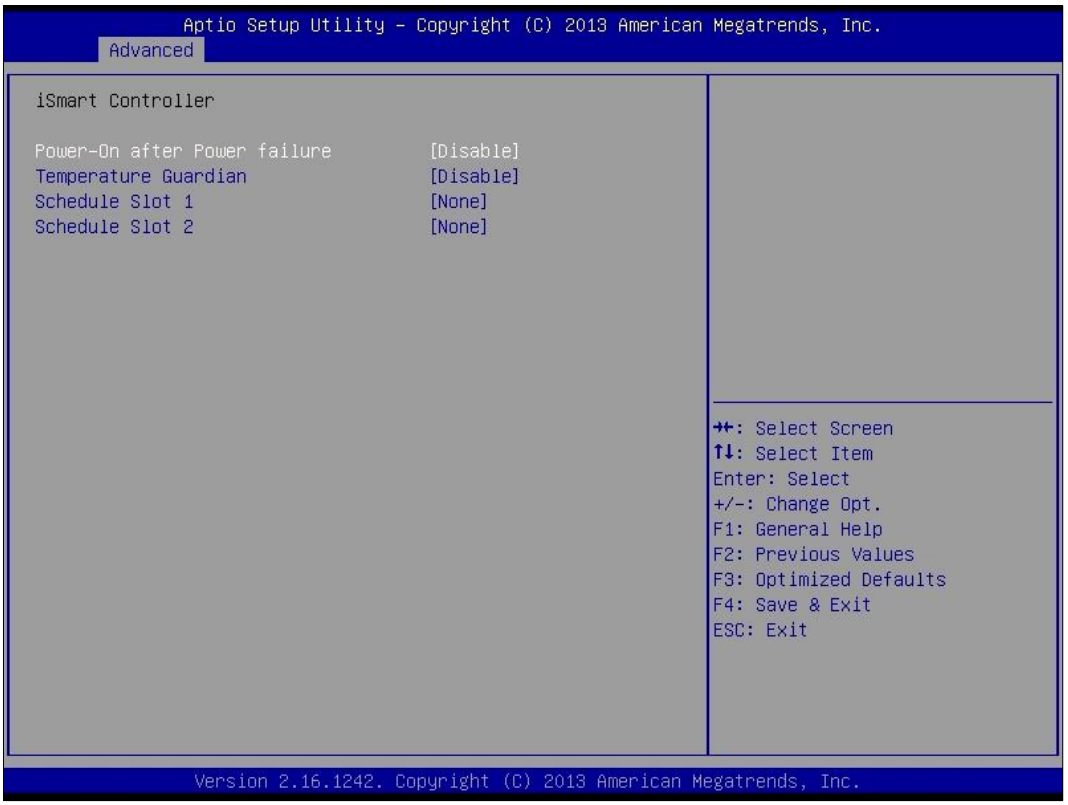
BIOS Setting	Description
OnBoard LAN PXE Rom	Enables or disables the execution of UEFI and Legacy PXE OpROM.

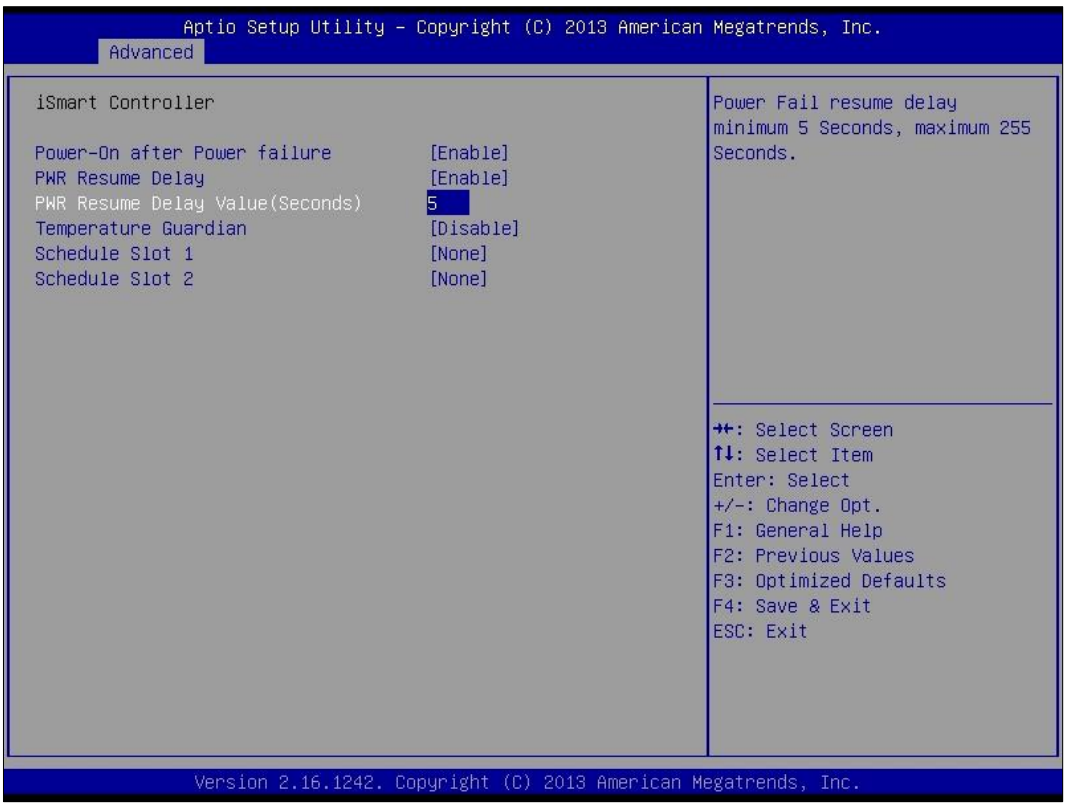
4.4.1 ACPI Settings

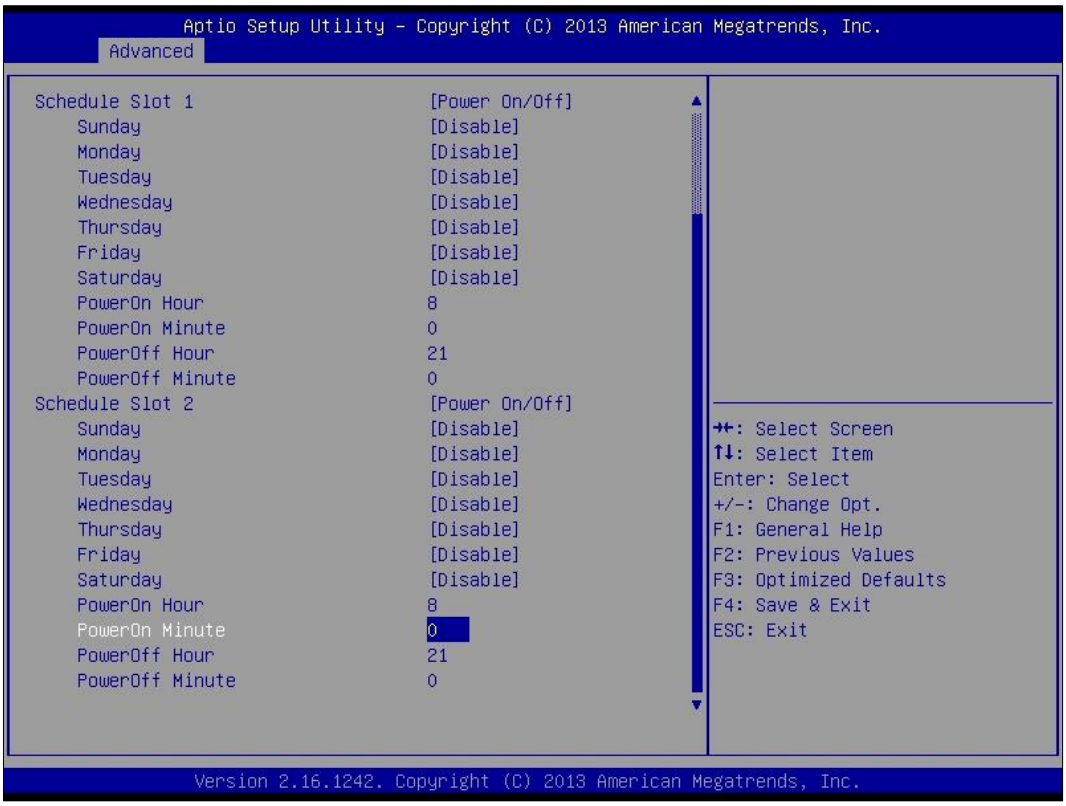


BIOS Setting	Description
Enable ACPI Auto Configuration	Enables / Disables the ACPI Auto configuration.
Enable Hibernation	Enables / Disables the system ability to hibernate (OS/S4 Sleep State). This option may not be effective with some OS.
ACPI Sleep State	Selects a ACPI sleep state for the system to enter. Options: • Suspend Disabled • S3 (Suspend to RAM)

4.4.2 iSMART Controller





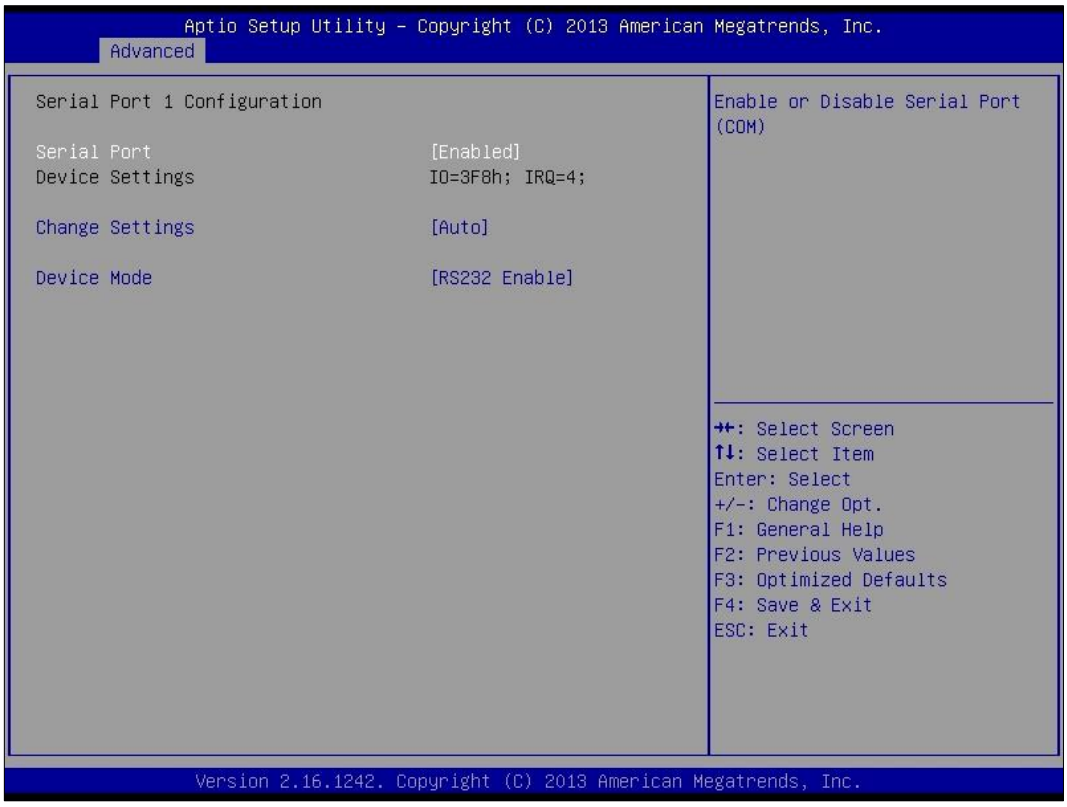


BIOS Setting	Description
Power-On after Power failure	Enables / Disables the system to be turned on automatically after a power failure.
Power Resume Delay	Enables / Disables to delay the time for system to turn on.
Power Resume Delay Value (Seconds)	Sets the delay timer for the system to resume power if power failure occurs. The minimum delay timer is 5 seconds, and the maximum is 255 seconds.
Temperature Guardian	Generate the reset signal when system hands up on POST.
Schedule Slot 1 / 2	Sets up the hour / minute / day for the power-on schedule for the system. Options: • None • Power On • Power On / Off

4.4.3 Super IO Configuration

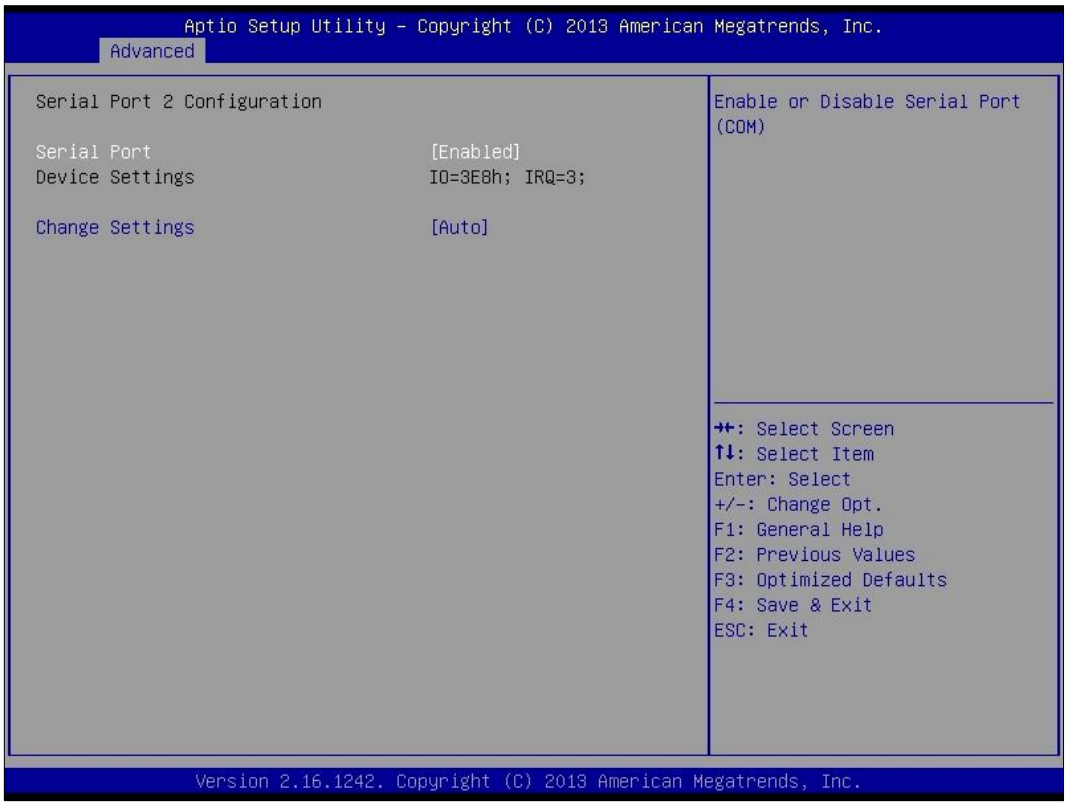
BIOS Setting	Description
Serial Port Configuration	Sets Parameters of Serial Ports. You can enable / disable the serial port and select an optimal settings for the Super IO device.

4.4.3.1. Serial Port 1 Configuration



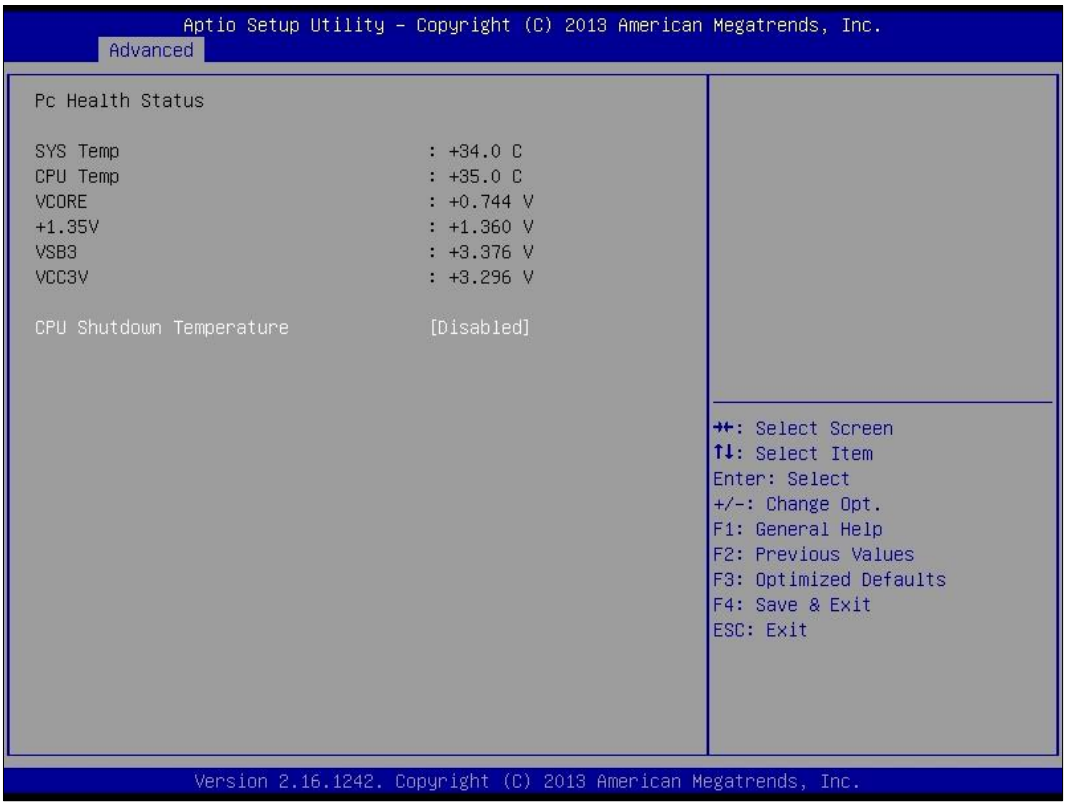
BIOS Setting	Description
Change Settings	Selects an optimal settings for the Super I/O device. Options: • Auto • IO=3F8h ; IRQ=4 • IO=3F8h ; IRQ=3, 4, 5, 6, 7, 9. 10, 11, 12 • IO=2F8h ; IRQ=3, 4, 5, 6, 7, 9. 10, 11, 12 • IO=3E8h ; IRQ=3, 4, 5, 6, 7, 9. 10, 11, 12 • IO=2E8h ; IRQ=3, 4, 5, 6, 7, 9. 10, 11, 12
Device Mode	Changes the mode of serial port. Options: • RS232 Enable • RS485 Enable • RS422 Enable

4.4.3.2. Serial Port 2 Configuration



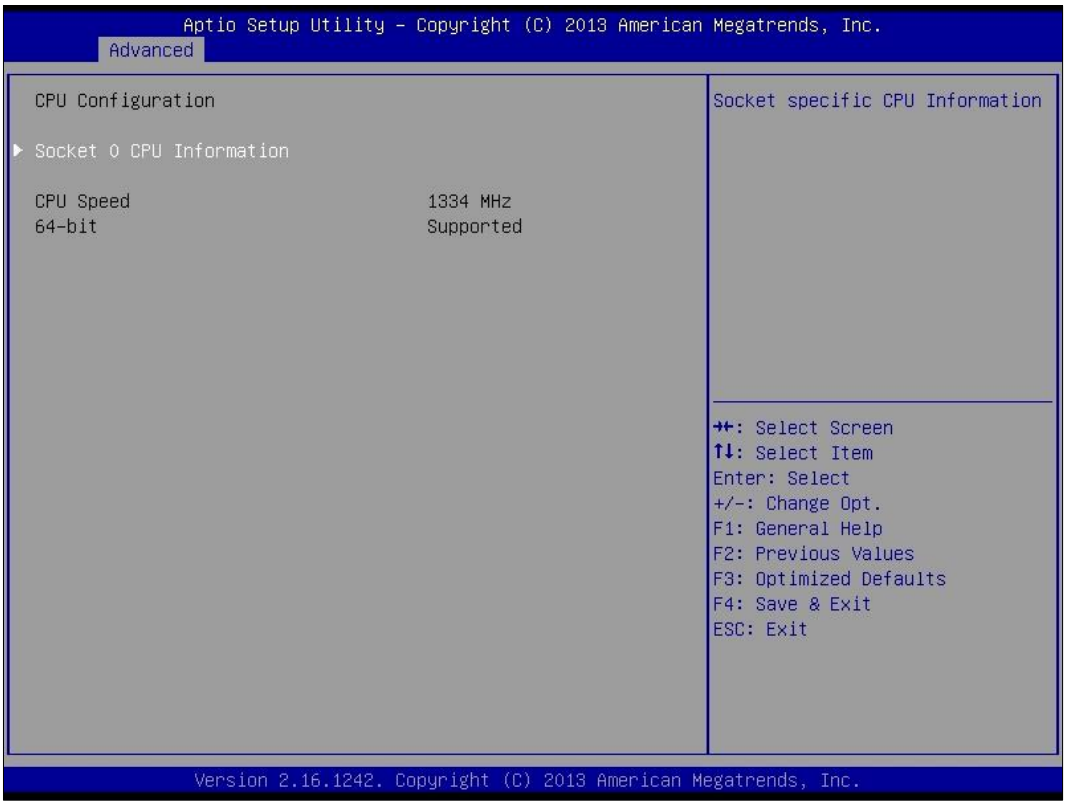
BIOS Setting	Description
Change Settings	Selects an optimal settings for the Super I/O device. Options: • Auto • IO=3E8h ; IRQ=3 • IO=3E8h ; IRQ=3, 4, 5, 6, 7, 9. 10, 11, 12 • IO=2E8h ; IRQ=3, 4, 5, 6, 7, 9. 10, 11, 12 • IO=2F0h ; IRQ=3, 4, 5, 6, 7, 9. 10, 11, 12 • IO=2E0h ; IRQ=3, 4, 5, 6, 7, 9. 10, 11, 12

4.4.4 Hardware Monitor



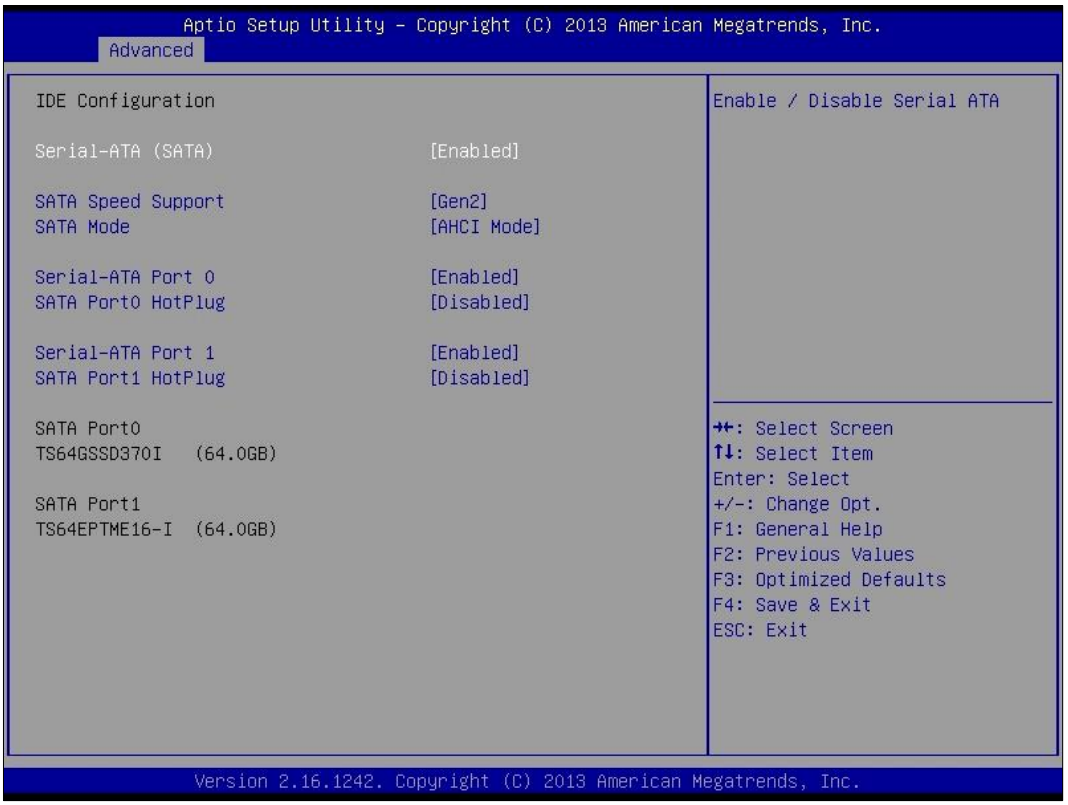
BIOS Setting	Description
CPU Shutdown Temperature	This field enables or disables the Shutdown Temperature Options: • Disabled • 70 ℃ • 75 ℃ • 80 ℃ • 85 ℃ • 90 ℃ • 95 ℃

4.4.5 CPU Configuration



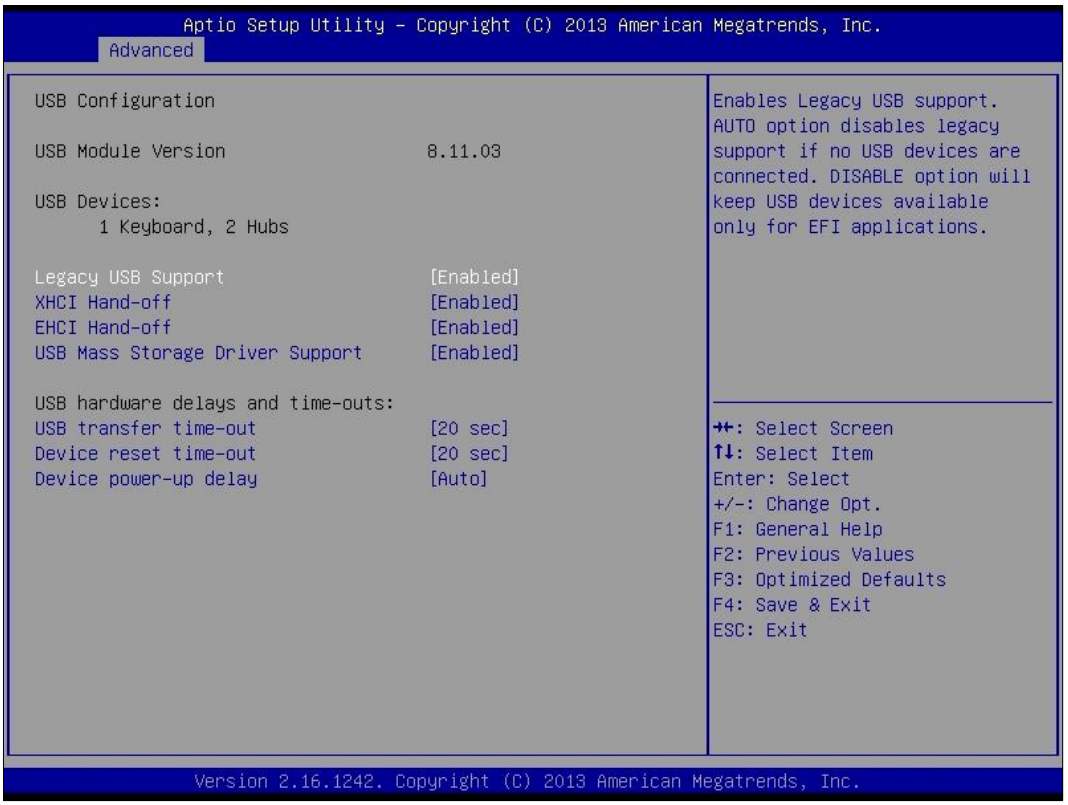
BIOS Setting	Description
Socket 0 CPU Information	Displays the specific socket CPU Information.

4.4.6 IDE Configuration



BIOS Setting	Description
Serial-ATA (SATA)	Enables / Disables the Serial ATA.
SATA Speed Support	Supports SATA speed Gen.1 or Gen. 2.
SATA Mode	Selects IDE / AHCI Mode.
Serial –ATA Port 0	Enables / Disables Serial Port 0.
SATA Port0 HotPlug	Enables / Disables SATA Port 0 HotPlug.
Serial –ATA Port 1	Enables / Disables Serial Port 1.
SATA Port1 HotPlug	Enables / Disables SATA Port 1 HotPlug.

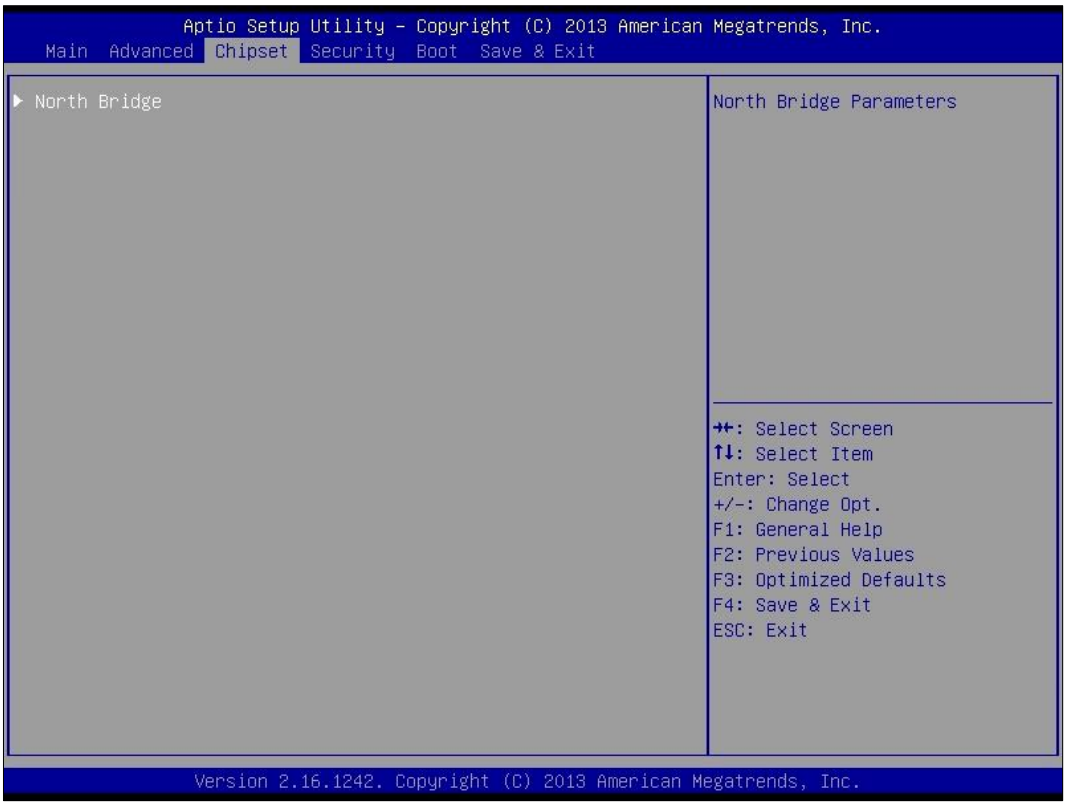
4.4.7 USB Configuration



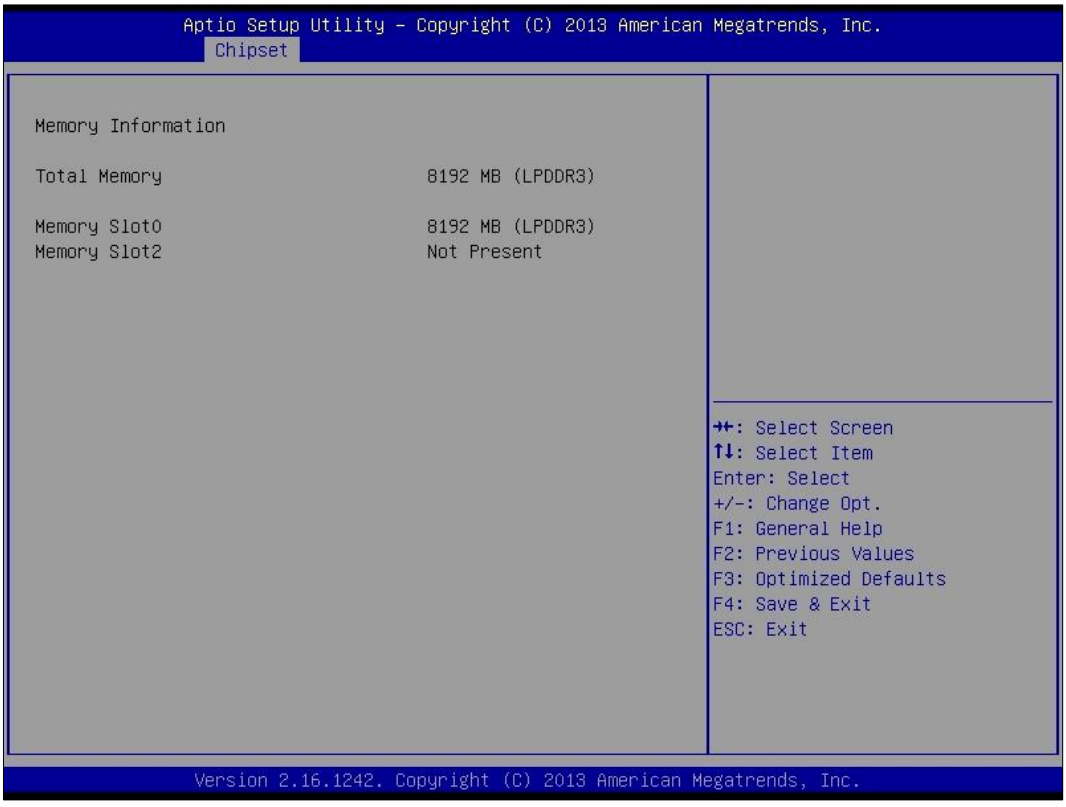
BIOS Setting	Description
Legacy USB Support	Enables / Disables Legacy USB support. • "Auto" disables legacy support if there is no USB device connected. • "Disable" keeps USB devices available only for EFI applications.
XHCI Hand-off	This is a workaround for OSes without XHCI hand-off support. The XHCI ownership change should be claimed by XHCI driver.
USB Mass Storage Driver Support	Enables / Disables the support for USB mass storage driver.
USB Transfer time-out	The time-out value for Control, Bulk, and Interrupt transfers. Options: 1, 5, 10, 20 sec(s)
Device reset time-out	Seconds of delaying execution of start unit command to USB mass storage device. Options: 10, 20, 30, 40 secs

BIOS Setting	Description
Device power-up delay	Maximum time it will take the device before the device properly reports itself to the Host Controller. “Auto” uses default value: for a Root port it is 100 ms; for a Hub port, the delay is taken from Hub descriptor.

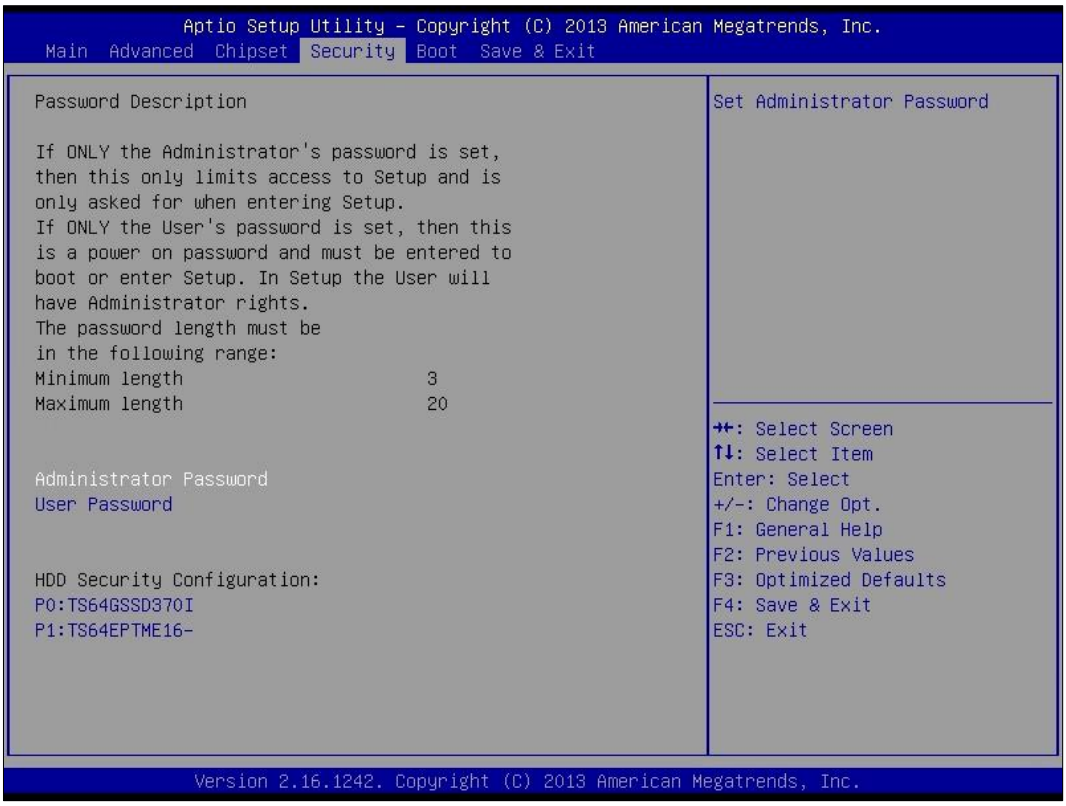
4.5 Chipset Settings



4.5.1 North Bridge

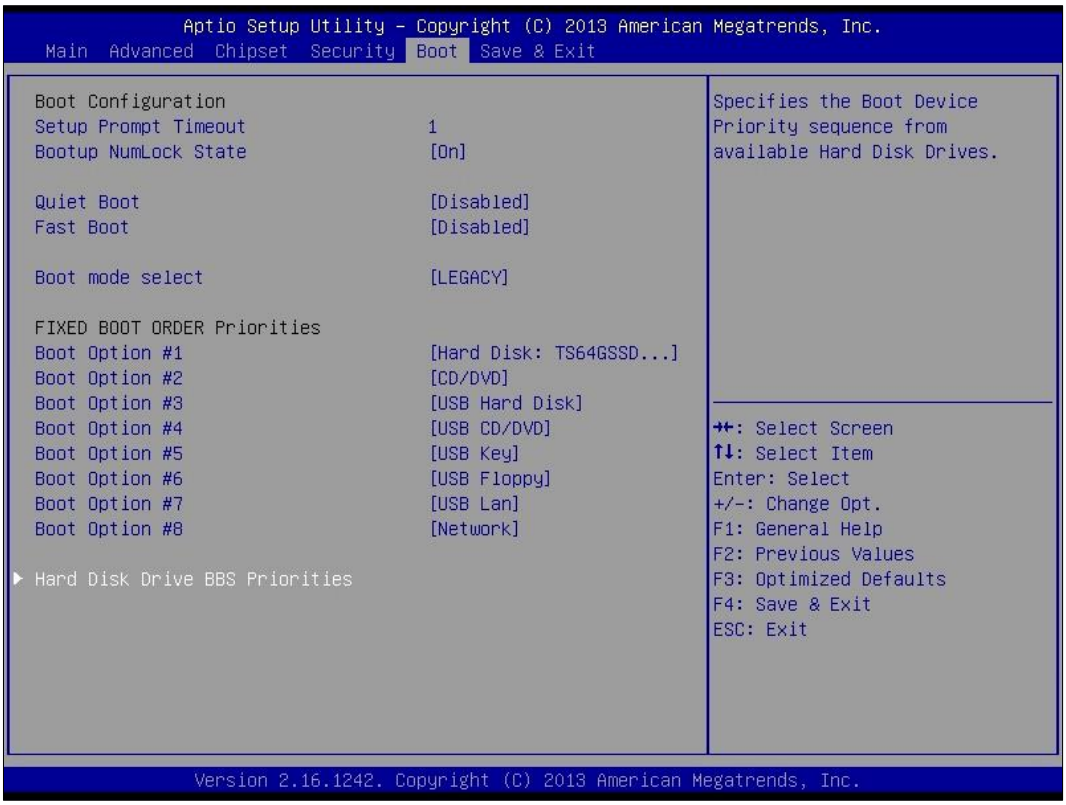


4.6 Security Settings



BIOS Setting	Description
Administrator Password	Sets an administrator password for the setup utility.
User Password	Sets a user password.

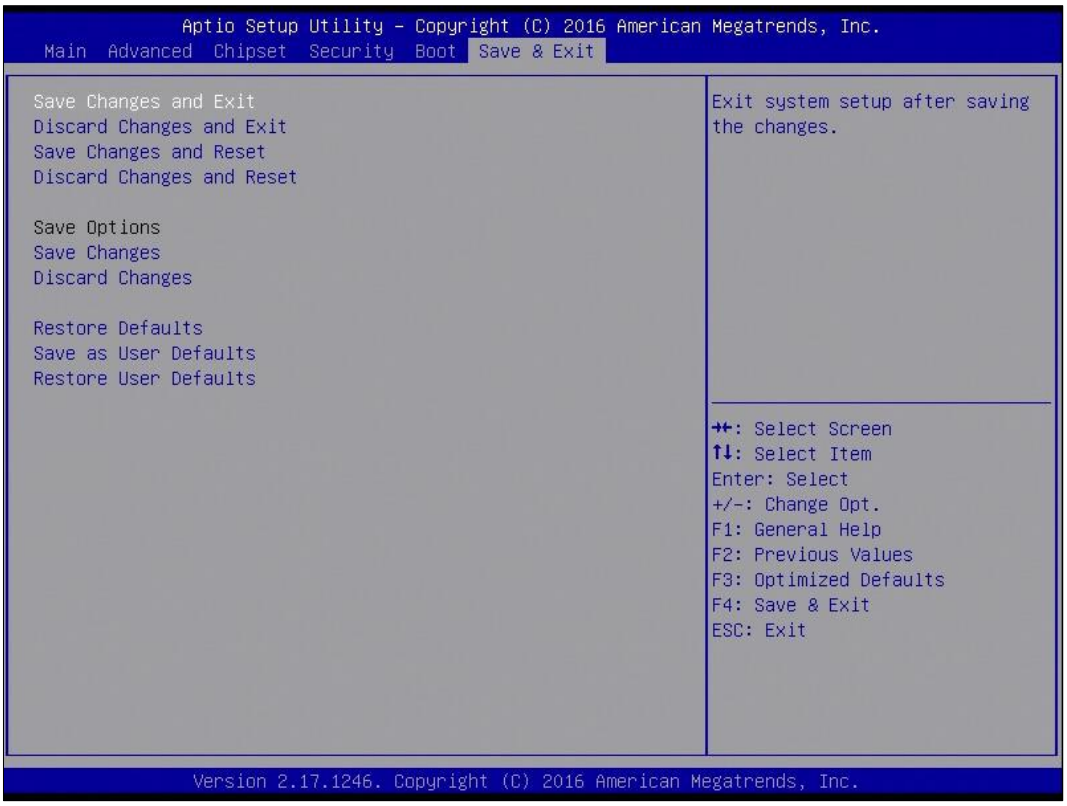
4.7 Boot Settings



BIOS Setting	Description
Setup Prompt Timeout	Number of seconds to wait for setup activation key. 65535 (0xFFFF) means indefinite waiting.
Bootup NumLock State	Selects the keyboard NumLock state as On or Off.
Quiet Boot	Enables / Disables Quiet Boot option.
Fast Boot	Enables / Disables boot with initialization of a minimal set of devices required to launch the active boot option. Has no effect for BBS boot options.
Boot Option Priorities	Sets the system boot order. Options: • Hard Disk • CD/DVD • USB - Hard Disk, CD/DVD, Key, Floppy, Lan • Network • Disabled

BIOS Setting	Description
Hard Disk Drive BBS Priorities	Specificies the priority sequence of the bood devices from available hard disk drives.

4.8 Save & Exit Settings



BIOS Setting	Description
Save Changes and Exit	Exits system setup after saving the changes.
Discard Changes and Exit	Exits system setup without saving any changes.
Save Changes and Reset	Resets the system after saving the changes.
Discard Changes and Reset	Resets system setup without saving any changes.
Save Changes	Saves changes done so far to any of the setup options.
Discard Changes	Discards changes done so far to any of the setup options.
Restore Defaults	Restores / Loads defaults values for all the setup options.
Save as User Defaults	Saves the changes done so far as user defaults.
Restore User Defaults	Restores the user defaults to all the setup options.

Appendix

This section provides the mapping addresses of peripheral devices and the sample code of watchdog timer configuration.

- I/O Port Address Map
- Interrupt Request Lines (IRQ)
- Digital I/O Sample Code
- Watchdog Timer Configuration

A. I/O Port Address Map

Each peripheral device in the system is assigned a set of I/O port addresses which also becomes the identity of the device. The following table lists the I/O port addresses used.

Address	Device Description
0x00000070-0x00000077	System CMOS/real time clock
0x00000070-0x00000077	Motherboard resources
0x00000A00-0x00000A0F	Motherboard resources
0x00000290-0x0000029F	Motherboard resources
0x00000A20-0x00000A2F	Motherboard resources
0x00000A30-0x00000A3F	Motherboard resources
0x0000E070-0x0000E077	Intel(R) Pentium(R) processor N- and J-series / Intel(R) Celeron(R) processor N- and J-series AHCI - 0F23
0x0000E060-0x0000E063	Intel(R) Pentium(R) processor N- and J-series / Intel(R) Celeron(R) processor N- and J-series AHCI - 0F23
0x0000E050-0x0000E057	Intel(R) Pentium(R) processor N- and J-series / Intel(R) Celeron(R) processor N- and J-series AHCI - 0F23
0x0000E040-0x0000E043	Intel(R) Pentium(R) processor N- and J-series / Intel(R) Celeron(R) processor N- and J-series AHCI - 0F23
0x0000E020-0x0000E03F	Intel(R) Pentium(R) processor N- and J-series / Intel(R) Celeron(R) processor N- and J-series AHCI - 0F23
0x0000D000-0x0000D01F	Ethernet Controller
0x0000D000-0x0000D01F	Intel(R) Pentium(R) processor N- and J-series / Intel(R) Celeron(R) processor N- and J-series PCI Express - Root Port 1 - 0F48
0x0000002E-0x0000002F	Motherboard resources
0x0000004E-0x0000004F	Motherboard resources
0x00000061-0x00000061	Motherboard resources
0x00000063-0x00000063	Motherboard resources
0x00000065-0x00000065	Motherboard resources

Address	Device Description
0x00000067-0x00000067	Motherboard resources
0x00000080-0x0000008F	Motherboard resources
0x00000092-0x00000092	Motherboard resources
0x000000B2-0x000000B3	Motherboard resources
0x00000680-0x0000069F	Motherboard resources
0x00000400-0x0000047F	Motherboard resources
0x00000500-0x000005FE	Motherboard resources
0x00000600-0x0000061F	Motherboard resources
0x0000E080-0x0000E087	Intel(R) Atom(TM) Processor E3800 Series/Intel(R) Celeron(R) Processor N2920/J1900
0x000003B0-0x000003BB	Intel(R) Atom(TM) Processor E3800 Series/Intel(R) Celeron(R) Processor N2920/J1900
0x000003C0-0x000003DF	Intel(R) Atom(TM) Processor E3800 Series/Intel(R) Celeron(R) Processor N2920/J1900
0x0000E000-0x0000E01F	Intel(R) Pentium(R) processor N- and J-series / Intel(R) Celeron(R) processor N- and J-series Platform Control Unit - SMBus Port - 0F12
0x00000020-0x00000021	Programmable interrupt controller
0x00000024-0x00000025	Programmable interrupt controller
0x00000028-0x00000029	Programmable interrupt controller
0x0000002C-0x0000002D	Programmable interrupt controller
0x00000030-0x00000031	Programmable interrupt controller
0x00000034-0x00000035	Programmable interrupt controller
0x00000038-0x00000039	Programmable interrupt controller
0x0000003C-0x0000003D	Programmable interrupt controller
0x000000A0-0x000000A1	Programmable interrupt controller
0x000000A4-0x000000A5	Programmable interrupt controller
0x000000A8-0x000000A9	Programmable interrupt controller
0x000000AC-0x000000AD	Programmable interrupt controller
0x000000B0-0x000000B1	Programmable interrupt controller

Address	Device Description
0x000000B4-0x000000B5	Programmable interrupt controller
0x000000B8-0x000000B9	Programmable interrupt controller
0x000000BC-0x000000BD	Programmable interrupt controller
0x000004D0-0x000004D1	Programmable interrupt controller
0x00000040-0x00000043	System timer
0x00000050-0x00000053	System timer
0x000003F8-0x000003FF	Serial port #1 (COM1)
0x000003E8-0x000003EF	Serial port #2 (COM2)
0x00000000-0x0000006F	PCI bus
0x00000078-0x00000CF7	PCI bus
0x00000D00-0x0000FFFF	PCI bus

B. Interrupt Request Lines (IRQ)

Peripheral devices use interrupt request lines to notify CPU for the service required. The following table shows the IRQ used by the devices on board.

Level	Function
IRQ 0	System Timer
IRQ 3	Serial Port #2 (COM2)
IRQ 4	Serial Port #1 (COM1)
IRQ 8	High precision event timer
IRQ 11	Ethernet Controller
IRQ 11	Intel(R) Pentium(R) processor N-series and J-series / Intel(R) Celeron(R) processor N- and J-series Platform Control Unit - SMBus Port - 0F12
IRQ 19	Intel(R) Pentium(R) processor N-series and J-series / Intel(R) Celeron(R) processor N-series and J-series AHCI - 0F23
IRQ 19	Intel(R) Pentium(R) processor N-series and J-series / Intel(R) Celeron(R) processor N-series and J-series PCI Express - Root Port 4 - 0F4E
IRQ 16	Intel(R) Pentium(R) processor N-series and J-series / Intel(R) Celeron(R) processor N- and J-series PCI Express - Root Port 1 - 0F48
IRQ 17	Intel(R) Pentium(R) processor N-series and J-series / Intel(R) Celeron(R) processor N- and J-series PCI Express - Root Port 2 - 0F4A
IRQ 18	Intel(R) Pentium(R) processor N-series and J-series / Intel(R) Celeron(R) processor N-series and J-series PCI Express - Root Port 3 - 0F4C
IRQ 22	High Definition Audio Controller
IRQ 81 - IRQ 190	Microsoft ACPI-Compliant System
IRQ 4294967292	Intel(R) Trusted Execution Engine Interface
IRQ 4294967293	Intel(R) USB 3.0 Extensible Host Controller
IRQ 4294967294	Intel(R) Atom(TM) Processor E3800 Series/Intel(R) Celeron(R) Processor N2920/J1900

C. Digital I/O Sample Code

1. The file NCT5523D.H

```
//---------------------------------------------------------------------------
// THIS CODE AND INFORMATION IS PROVIDED "AS IS" WITHOUT WARRANTY OF ANY
// KIND, EITHER EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE
// IMPLIED WARRANTIES OF MERCHANTABILITY AND/OR FITNESS FOR A
PARTICULAR
// PURPOSE.
//---------------------------------------------------------------------------
#ifndef __NCT5523D_H
#define __NCT5523D_H                    1
//---------------------------------------------------------------------------
#define     NCT5523D_INDEX_PORT         (NCT5523D_BASE)
#define     NCT5523D_DATA_PORT          (NCT5523D_BASE+1)
//---------------------------------------------------------------------------
#define     NCT5523D_REG_LD             0x07
//---------------------------------------------------------------------------
#define NCT5523D_UNLOCK                 0x87
#define     NCT5523D_LOCK               0xAA
//---------------------------------------------------------------------------
unsigned int Init_NCT5523D(void);
void Set_NCT5523D_LD( unsigned char);
void Set_NCT5523D_Reg( unsigned char, unsigned char);
unsigned char Get_NCT5523D_Reg( unsigned char);
//---------------------------------------------------------------------------
#endif      //__NCT5523D_H
```

2. The file MAIN.CPP

```
//---------------------------------------------------------------------------
// THIS CODE AND INFORMATION IS PROVIDED "AS IS" WITHOUT WARRANTY OF ANY
// KIND, EITHER EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE
// IMPLIED WARRANTIES OF MERCHANTABILITY AND/OR FITNESS FOR A
PARTICULAR
// PURPOSE.
//---------------------------------------------------------------------------
#include <dos.h>
#include <conio.h>
#include <stdio.h>
#include <stdlib.h>
#include "NCT5523D.H"
//---------------------------------------------------------------------------
int main (void);

void Dio5Initial(void);
void Dio5SetOutput(unsigned char);
unsigned char Dio5GetInput(void);
void Dio5SetDirection(unsigned char);
unsigned char Dio5GetDirection(void);
//---------------------------------------------------------------------------
int main (void)
{
	char SIO;

	SIO = Init_NCT5523D();
	if (SIO == 0)
	{
		printf("Can not detect Nuvoton NCT5523D, program abort.\n");
		return(1);
	}

	Dio5Initial();

	//for GPIO20..27
	Dio5SetDirection(0x0F);	//GP20..23 = input, GP24..27=output
	printf("Current DIO direction = 0x%X\n", Dio5GetDirection());

	printf("Current DIO status = 0x%X\n", Dio5GetInput());

	printf("Set DIO output to high\n");
	Dio5SetOutput(0x0F);

	printf("Set DIO output to low\n");
	Dio5SetOutput(0x00);

	return 0;
}
//---------------------------------------------------------------------------
```

```
void Dio5Initial(void)
{
        unsigned char ucBuf;

       ucBuf = Get_NCT5523D_Reg(0x1C);
       ucBuf &= ~0x02;
       Set_NCT5523D_Reg(0x1C, ucBuf);

        Set_NCT5523D_LD(0x07);                          //switch to logic device 7
        //enable the GP2 group
        ucBuf = Get_NCT5523D_Reg(0x30);
        ucBuf |= 0x04;
        Set_NCT5523D_Reg(0x30, ucBuf);
}
//---------------------------------------------------------------------------
void Dio5SetOutput(unsigned char NewData)
{
        Set_NCT5523D_LD(0x07);                          //switch to logic device 7
        Set_NCT5523D_Reg(0xE1, NewData);
}
//---------------------------------------------------------------------------
unsigned char Dio5GetInput(void)
{
        unsigned char result;

        Set_NCT5523D_LD(0x07);                          //switch to logic device 7
        result = Get_NCT5523D_Reg(0xE1);
        return (result);
}
//---------------------------------------------------------------------------
void Dio5SetDirection(unsigned char NewData)
{
        //NewData : 1 for input, 0 for output
        Set_NCT5523D_LD(0x07);                          //switch to logic device 7
        Set_NCT5523D_Reg(0xE8, NewData);
}
//---------------------------------------------------------------------------
unsigned char Dio5GetDirection(void)
{
        unsigned char result;

        Set_NCT5523D_LD(0x07);                          //switch to logic device 7
        result = Get_NCT5523D_Reg(0xE8);
        return (result);
}
//---------------------------------------------------------------------------
```

3. The file NCT5523D.CPP

```
//---------------------------------------------------------------------------
// THIS CODE AND INFORMATION IS PROVIDED "AS IS" WITHOUT WARRANTY OF ANY
// KIND, EITHER EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE
// IMPLIED WARRANTIES OF MERCHANTABILITY AND/OR FITNESS FOR A
PARTICULAR
// PURPOSE.
//---------------------------------------------------------------------------
#include "NCT5523D.H"
#include <dos.h>
//---------------------------------------------------------------------------
unsigned int NCT5523D_BASE;
void Unlock_NCT5523D (void);
void Lock_NCT5523D (void);
//---------------------------------------------------------------------------
unsigned int Init_NCT5523D(void)
{
	unsigned int result;
	unsigned char ucDid;

	NCT5523D_BASE = 0x4E;
	result = NCT5523D_BASE;

	ucDid = Get_NCT5523D_Reg(0x20);
	if (ucDid == 0xC4)				//NCT5523D??
	{	goto Init_Finish;}

	NCT5523D_BASE = 0x2E;
	result = NCT5523D_BASE;

	ucDid = Get_NCT5523D_Reg(0x20);
	if (ucDid == 0xC4)				//NCT5523D??
	{	goto Init_Finish;}

	NCT5523D_BASE = 0x00;
	result = NCT5523D_BASE;

Init_Finish:
	return (result);
}
//---------------------------------------------------------------------------
void Unlock_NCT5523D (void)
{
	outportb(NCT5523D_INDEX_PORT, NCT5523D_UNLOCK);
	outportb(NCT5523D_INDEX_PORT, NCT5523D_UNLOCK);
}
//---------------------------------------------------------------------------
void Lock_NCT5523D (void)
{
	outportb(NCT5523D_INDEX_PORT, NCT5523D_LOCK);
}
//---------------------------------------------------------------------------
```

```
void Set_NCT5523D_LD( unsigned char LD)
{
	Unlock_NCT5523D();
	outportb(NCT5523D_INDEX_PORT, NCT5523D_REG_LD);
	outportb(NCT5523D_DATA_PORT, LD);
	Lock_NCT5523D();
}
//----------------------------------------------------------------------------
void Set_NCT5523D_Reg( unsigned char REG, unsigned char DATA)
{
	Unlock_NCT5523D();
	outportb(NCT5523D_INDEX_PORT, REG);
	outportb(NCT5523D_DATA_PORT, DATA);
	Lock_NCT5523D();
}
//----------------------------------------------------------------------------
unsigned char Get_NCT5523D_Reg(unsigned char REG)
{
	unsigned char Result;
	Unlock_NCT5523D();
	outportb(NCT5523D_INDEX_PORT, REG);
	Result = inportb(NCT5523D_DATA_PORT);
	Lock_NCT5523D();
	return Result;
}
//----------------------------------------------------------------------------
```

D. Watchdog Timer Configuration

The Watchdog Timer (WDT) is used to generate a variety of output signals after a user programmable count. The WDT is suitable for the use in the prevention of system lock-up, such as when software becomes trapped in a deadlock. Under these sorts of circumstances, the timer will count to zero and the selected outputs will be driven.

Under normal circumstance, you will need to restart the WDT at regular intervals before the timer counts to zero.

1. Sample Code: The file NCT5523D.H

```
//-----------------------------------------------------------------------------
//
// THIS CODE AND INFORMATION IS PROVIDED "AS IS" WITHOUT WARRANTY OF ANY
// KIND, EITHER EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE
// IMPLIED WARRANTIES OF MERCHANTABILITY AND/OR FITNESS FOR A
PARTICULAR
// PURPOSE.
//
//-----------------------------------------------------------------------------
#ifndef __NCT5523D_H
#define __NCT5523D_H                    1
//-----------------------------------------------------------------------------
#define     NCT5523D_INDEX_PORT     (NCT5523D_BASE)
#define     NCT5523D_DATA_PORT      (NCT5523D_BASE+1)
//-----------------------------------------------------------------------------
#define     NCT5523D_REG_LD         0x07
//-----------------------------------------------------------------------------
#define NCT5523D_UNLOCK             0x87
#define     NCT5523D_LOCK           0xAA
//-----------------------------------------------------------------------------
unsigned int Init_NCT5523D(void);
void Set_NCT5523D_LD( unsigned char);
void Set_NCT5523D_Reg( unsigned char, unsigned char);
unsigned char Get_NCT5523D_Reg( unsigned char);
//-----------------------------------------------------------------------------
#endif      //__NCT5523D_H
```

2. Sample Code: The file MAIN.CPP

```
//---------------------------------------------------------------------------
//
// THIS CODE AND INFORMATION IS PROVIDED "AS IS" WITHOUT WARRANTY OF ANY
// KIND, EITHER EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE
// IMPLIED WARRANTIES OF MERCHANTABILITY AND/OR FITNESS FOR A
PARTICULAR
// PURPOSE.
//
//---------------------------------------------------------------------------
#include <dos.h>
#include <conio.h>
#include <stdio.h>
#include <stdlib.h>
#include "NCT5523D.H"
//---------------------------------------------------------------------------
int main (void);

void WDTInitial(void);
void WDTEnable(unsigned char);
void WDTDisable(void);

//---------------------------------------------------------------------------
int main (void)
{
	char SIO;

	SIO = Init_NCT5523D();
	if (SIO == 0)
	{
		printf("Can not detect Nuvoton NCT5523D, program abort.\n");
		return(1);
	}

	WDTInitial();

	WDTEnable(10);

	WDTDisable();

	return 0;
}
//---------------------------------------------------------------------------
void WDTInitial(void)
{
	unsigned char bBuf;
	Set_NCT5523D_LD(0x08);				//switch to logic device 8
	bBuf = Get_NCT5523D_Reg(0x30);
	bBuf &= (~0x01);
	Set_NCT5523D_Reg(0x30, bBuf);			//Enable WDTO
}
//---------------------------------------------------------------------------
```

```
void WDTEnable(unsigned char NewInterval)
{
	unsigned char bBuf;

	Set_NCT5523D_LD(0x08);				//switch to logic device 8
	Set_NCT5523D_Reg(0x30, 0x01);			//enable timer

	bBuf = Get_NCT5523D_Reg(0xF0);
	bBuf &= (~0x08);
	Set_NCT5523D_Reg(0xF0, bBuf);			//count mode is second

	Set_NCT5523D_Reg(0xF1, NewInterval);		//set timer
}
//-------------------------------------------------------------------------
void WDTDisable(void)
{
	Set_NCT5523D_LD(0x08);				//switch to logic device 8
	Set_NCT5523D_Reg(0xF1, 0x00);			//clear watchdog timer
	Set_NCT5523D_Reg(0x30, 0x00);			//watchdog disabled
}
//-------------------------------------------------------------------------
```

3. Sample Code: The file NCT5523D.CPP

```
//---------------------------------------------------------------------------
//
// THIS CODE AND INFORMATION IS PROVIDED "AS IS" WITHOUT WARRANTY OF ANY
// KIND, EITHER EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE
// IMPLIED WARRANTIES OF MERCHANTABILITY AND/OR FITNESS FOR A
PARTICULAR
// PURPOSE.
//
//---------------------------------------------------------------------------
#include "NCT5523D.H"
#include <dos.h>
//---------------------------------------------------------------------------
unsigned int NCT5523D_BASE;
void Unlock_NCT5523D (void);
void Lock_NCT5523D (void);
//---------------------------------------------------------------------------
unsigned int Init_NCT5523D(void)
{
        unsigned int result;
        unsigned char ucDid;

        NCT5523D_BASE = 0x4E;
        result = NCT5523D_BASE;

        ucDid = Get_NCT5523D_Reg(0x20);
        if (ucDid == 0xC4)                              //NCT5523D??
        {       goto Init_Finish;}

        NCT5523D_BASE = 0x2E;
        result = NCT5523D_BASE;

        ucDid = Get_NCT5523D_Reg(0x20);
        if (ucDid == 0xC4)                              //NCT5523D??
        {       goto Init_Finish;}

        NCT5523D_BASE = 0x00;
        result = NCT5523D_BASE;

Init_Finish:
        return (result);
}
//---------------------------------------------------------------------------
void Unlock_NCT5523D (void)
{
        outportb(NCT5523D_INDEX_PORT, NCT5523D_UNLOCK);
        outportb(NCT5523D_INDEX_PORT, NCT5523D_UNLOCK);
}
//---------------------------------------------------------------------------
```

```
void Lock_NCT5523D (void)
{
	outportb(NCT5523D_INDEX_PORT, NCT5523D_LOCK);
}
//----------------------------------------------------------------------------
void Set_NCT5523D_LD( unsigned char LD)
{
	Unlock_NCT5523D();
	outportb(NCT5523D_INDEX_PORT, NCT5523D_REG_LD);
	outportb(NCT5523D_DATA_PORT, LD);
	Lock_NCT5523D();
}
//----------------------------------------------------------------------------
void Set_NCT5523D_Reg( unsigned char REG, unsigned char DATA)
{
	Unlock_NCT5523D();
	outportb(NCT5523D_INDEX_PORT, REG);
	outportb(NCT5523D_DATA_PORT, DATA);
	Lock_NCT5523D();
}
//----------------------------------------------------------------------------
unsigned char Get_NCT5523D_Reg(unsigned char REG)
{
	unsigned char Result;
	Unlock_NCT5523D();
	outportb(NCT5523D_INDEX_PORT, REG);
	Result = inportb(NCT5523D_DATA_PORT);
	Lock_NCT5523D();
	return Result;
}
//----------------------------------------------------------------------------
```