

**ARD-028-N**  
**All-in-One Bar-Type**  
**Digital Signage Display**

**User's Manual**

Version 1.0  
(May 2017)



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## 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.

### FCC

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 VENTILATION 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 VENTILATION OPENINGS.
- Use this product in environments with ambient temperatures between -25°C and 40°C.
- 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:

- Sharp-pointed articles are prohibited to the panel.
- 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.
- **3<sup>rd</sup>-party parts:**

12-month (1-year) warranty from delivery for the 3<sup>rd</sup>-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](http://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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# Chapter 1

## General Information

The information provided in this chapter includes:

- Features
- Packing List
- Specifications
- Overview
- Dimensions

## 1.1 Introduction

ARD-028-N, a product code of IBASE Digital Signage Player series, is an all-in-one system for general applications. It is a fanless signage player with Intel® Atom™ E3825 DC processor and an Intel® I210IT Ethernet controller. The device outputs through VGA and supports peripherals such as RS-232/422/485 COM and USB. The device is able to be operated at the ambient operating temperature ranging from 0 ~ 40 °C, and even from -20 ~ 80 °C for storage.



## 1.2 Features

- 28" color TFT active matrix, wide LCD with optimum resolution 1920 x 360, and 700 nits brightness
- Intel® Atom™ E3825 DC processor at 1.33GHz with Intel® HD Graphics (Gen. 7-LP) 4EU integrated
- DDR3L-1333 SO-DIMM, expandable up to 4GB (Non-ECC)
- Ruggedized, fanless and compact design
- CE/FCC Class B, EN50155 (T1) /50121-3-2 (EMC) certified

### 1.3 Packing List

Your ARD-028-N 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.

- ARD-028-N x 1
- Female Terminal Block x 1
- Wall Mount Kit x 1
- Screws for Wall Mount Kit x 8

### 1.4 Optional Accessories

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

- LAN Port Cable (for M12 Connector) x 1

## 1.5 Specifications

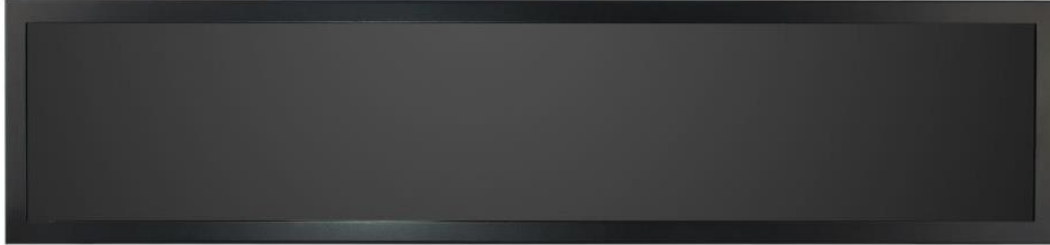
<b>Product Name</b>	<b>ARD-028-N</b>
<b>System</b>	
<b>Motherboard</b>	IB898
<b>Operating System</b>	No OS is pre-installed by default.  Options: <ul style="list-style-type: none"> <li>• Windows 7 / 8.1 (32-bit &amp; 64-bit)</li> <li>• Windows Embedded 8</li> <li>• Linux (Fedora)</li> </ul>
<b>CPU</b>	Intel® Atom™ DC Processor E3825 APU at 1.33 GHz, 1 MB cache FCBGA1170 (25 x 27 mm)
<b>Chipset</b>	Integrated
<b>Memory</b>	1 x DDR3L-1066 SO-DIMM 2 GB, expandable to 4 GB (Non-ECC)
<b>Graphics</b>	Intel® HD graphics Gen. 7-LP with 4EU
<b>Super I/O</b>	Nuvoton NCT5523D
<b>Storage</b>	1 x 64GB mSATA (default)
<b>Audio Codec</b>	Realtek ALC269QHD
<b>Power Requirement</b>	12V DC-in (Optional)
<b>BIOS</b>	AMI BIOS
<b>Watchdog</b>	Watchdog Timer 256 segments, 0, 1, 2...255 sec/min
<b>Chassis</b>	Aluminum & SGCC, black
<b>Mounting</b>	Side mount
<b>Dimensions (W x H x D)</b>	734.48 x 166.04 x 57.5 mm (28.92" x 6.54" x 2.26")
<b>Net Weight</b>	5.4 kg (11.9 lb)
<b>Certificate</b>	CE EMC EN50155 (T1) & EN50121-3-2 / FCC Class B / cULus / CCC
<b>I/O Ports</b>	
<b>DC Input</b>	Terminal block for 12V DC-In
<b>LAN</b>	2 x M12 GbE LAN
<b>USB</b>	2 x USB 2.0
<b>Serial</b>	1 x COM Port (RS-232/422/485, jumperless selection)

<b>Expansion</b>	<ul style="list-style-type: none"><li>• 2 x Mini PCIe slot (full-sized) for WiFi, BT, 4G/LTE, or TV tuner options</li><li>• 1 x Mini PCIe slot (half-sized) for mSATA</li></ul>
<b>Environment</b>	
<b>Temperature</b>	<ul style="list-style-type: none"><li>• <b>Operating:</b> -25 ~ 40 °C (-13 ~ 104 °F)</li><li>• <b>Storage:</b> -20 ~ 80 °C (-4 ~ 176 °F)</li></ul>
<b>Relative Humidity</b>	5 ~ 90% at 45 °C (non-condensing)
<b>Vibration Protection</b>	IEC 61373 (Vibration Class B)

All specifications are subject to change without prior notice.

## 1.6 Overview

### Front View



### Rear View



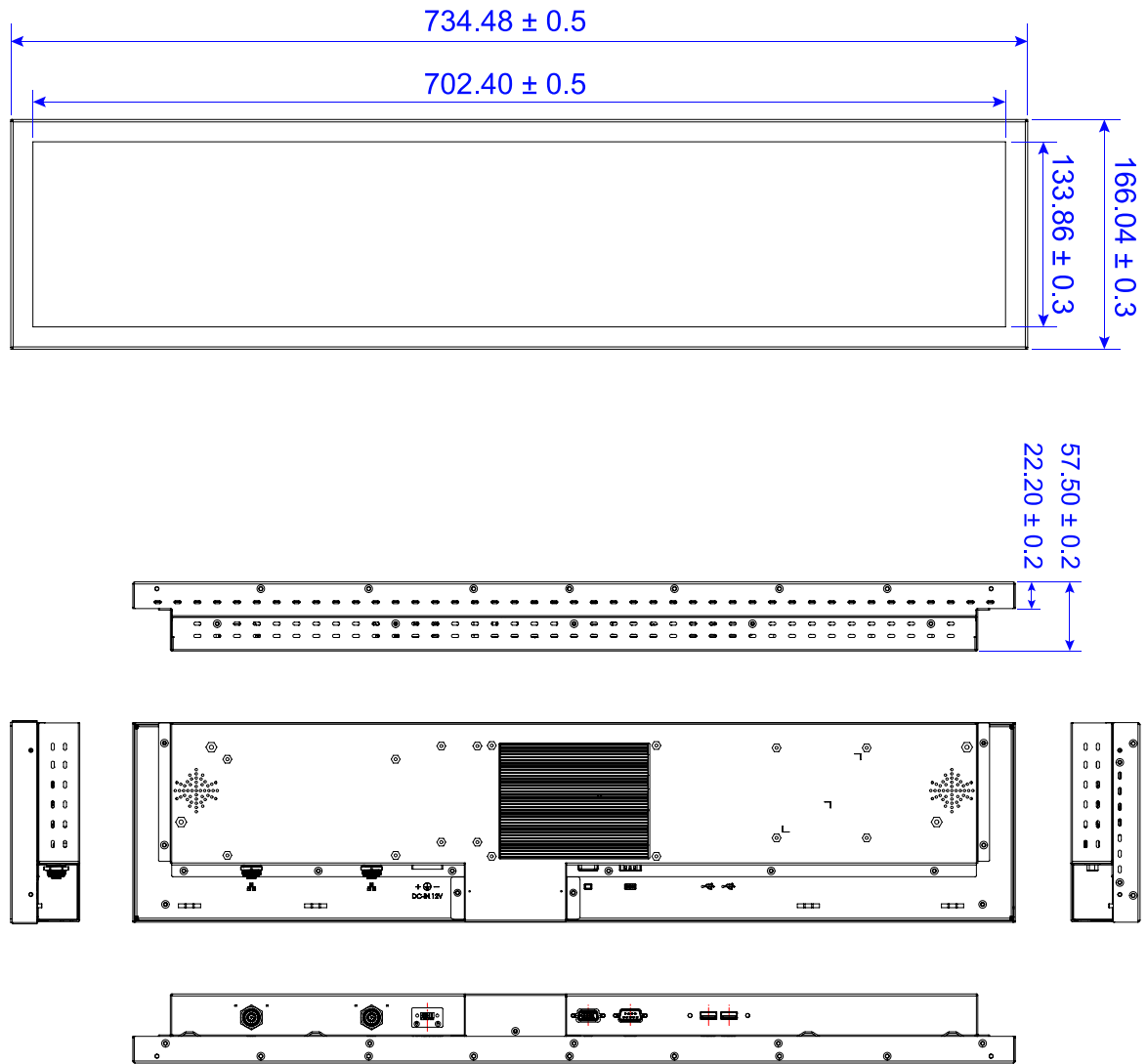
### I/O View



No.	Name	No.	Name
1	LAN Port (M12 Connector)	4	COM RS-232-422/485 Port
2	DC-In Power Connector	5	USB 2.0 Ports
3	VGA Port	6	

### 1.7 Dimensions

Unit: mm



## Chapter 2

# Hardware Configuration

The information provided in this chapter includes:

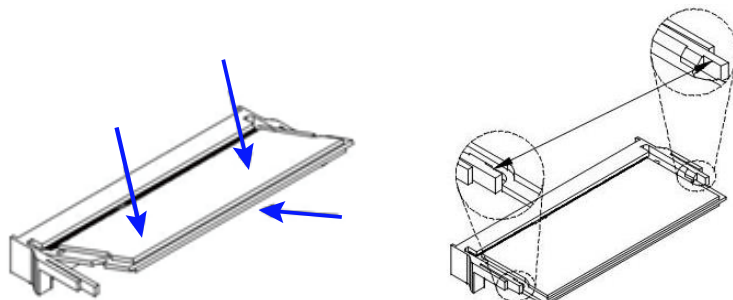
- Essential installations before you begin
- Information and locations of connectors



## 2.1 Essential Installations Before You Begin

### 2.1.1 Memory Installation

There is one SO-DIMM DDR3L memory slots inside ARD-028-N and the maximum memory is expandable up to 4 GB. If you need to install or replace a memory module, locate the memory slot inside the device and perform the following steps.



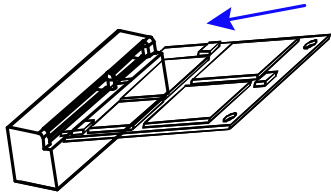
1. Align the key of your memory module with that on the memory slot and insert the module slantwise.
2. Gently push the module in an upright position until the clips of the slot click to hold the module in place when the module touches the bottom of the slot.

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

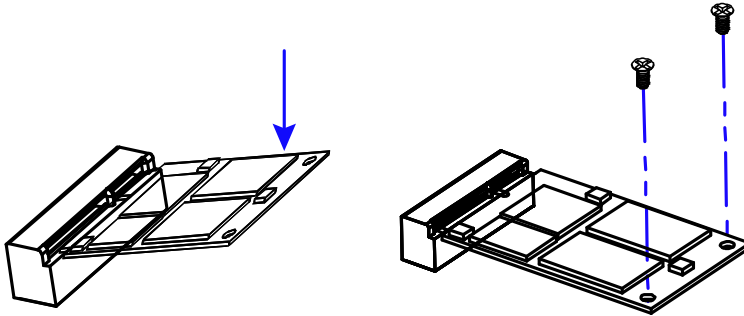
## 2.1.2 Mini-PCle & mSATA Cards Installation

If you need to replace or install the mini -PCle / mSATA card, locate the mini PCIe slot inside the device and perform the following steps.

1. Align the key of your mini-PCle card / mSATA card to the mini-PCle interface (the J14 connector shares mSATA signal), and insert the card slantwise.



2. Push the card down and fix it with 2 screws of M3 x 3.8 mm.



### 2.1.3 Mounting Brackets Installation

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

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#### 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 ARD-028-N 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").

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

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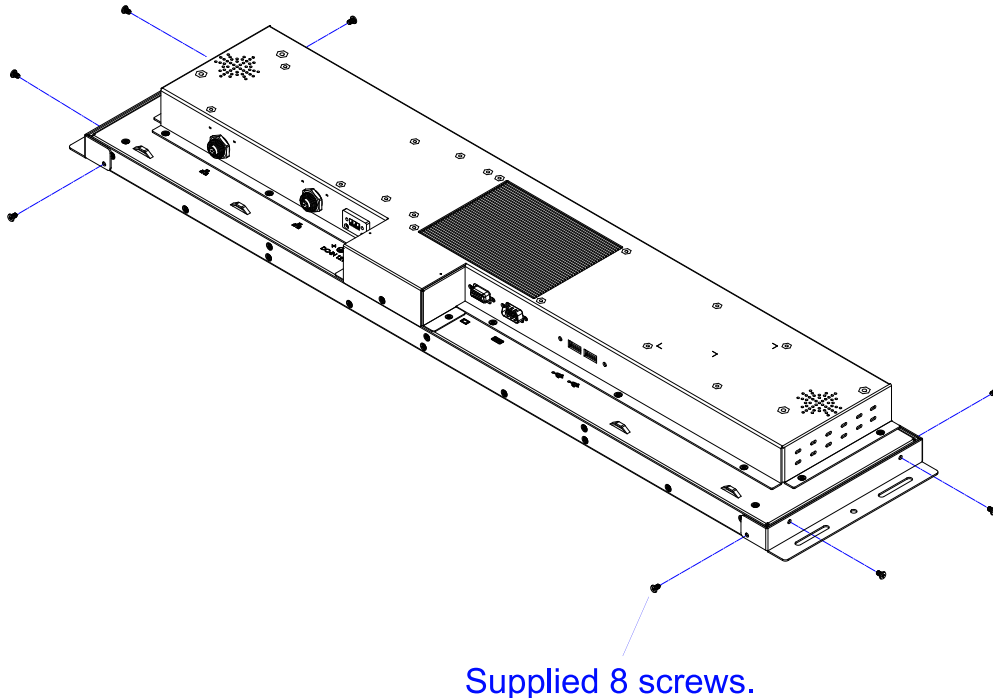
- **Drywall**

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 ARD-028-N upside down, attach the mounting brackets to the device, and secure with the supplied 8 screws as below.



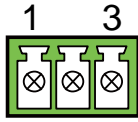
2. Then prepare at least four screws (M3, 6 mm) to mount the device on wall .

You can install ARD-028-N 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.

### 2.1.4 Pinout for DC Power Input Connector

- DC Power Input (terminal block)



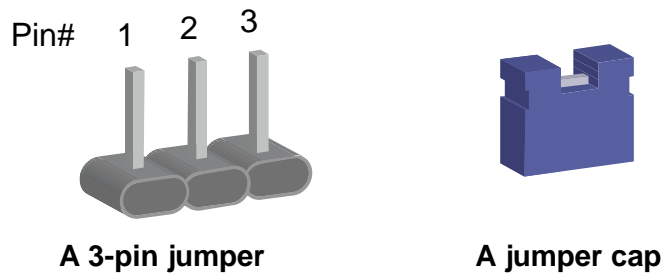
Pin	Assignment	Pin	Assignment
1	GND	3	+12V
2	Chassis GND		

## 2.2 Setting the Jumpers

Set up and configure your ARD-028-N 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.



Refer to the illustration below to set jumpers.

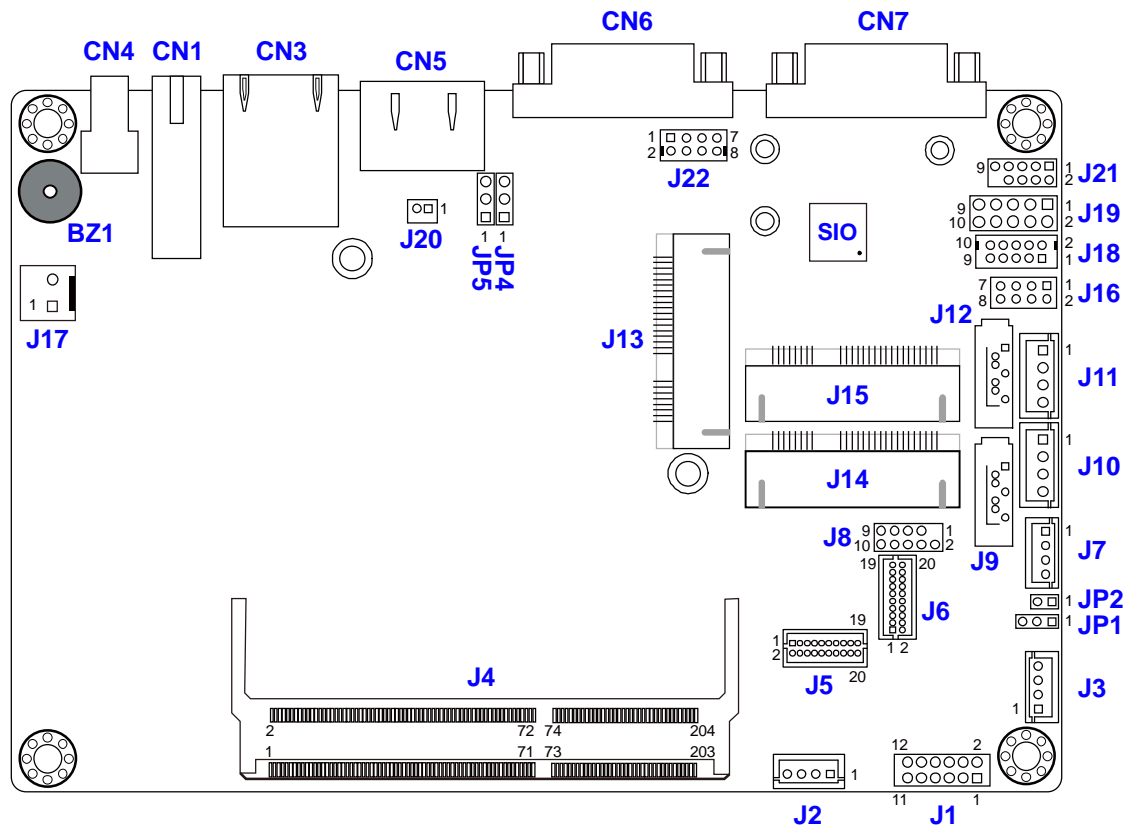
Pin closed	Oblique view	Schematic illustration in the manual
Open		
1-2		
2-3		

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

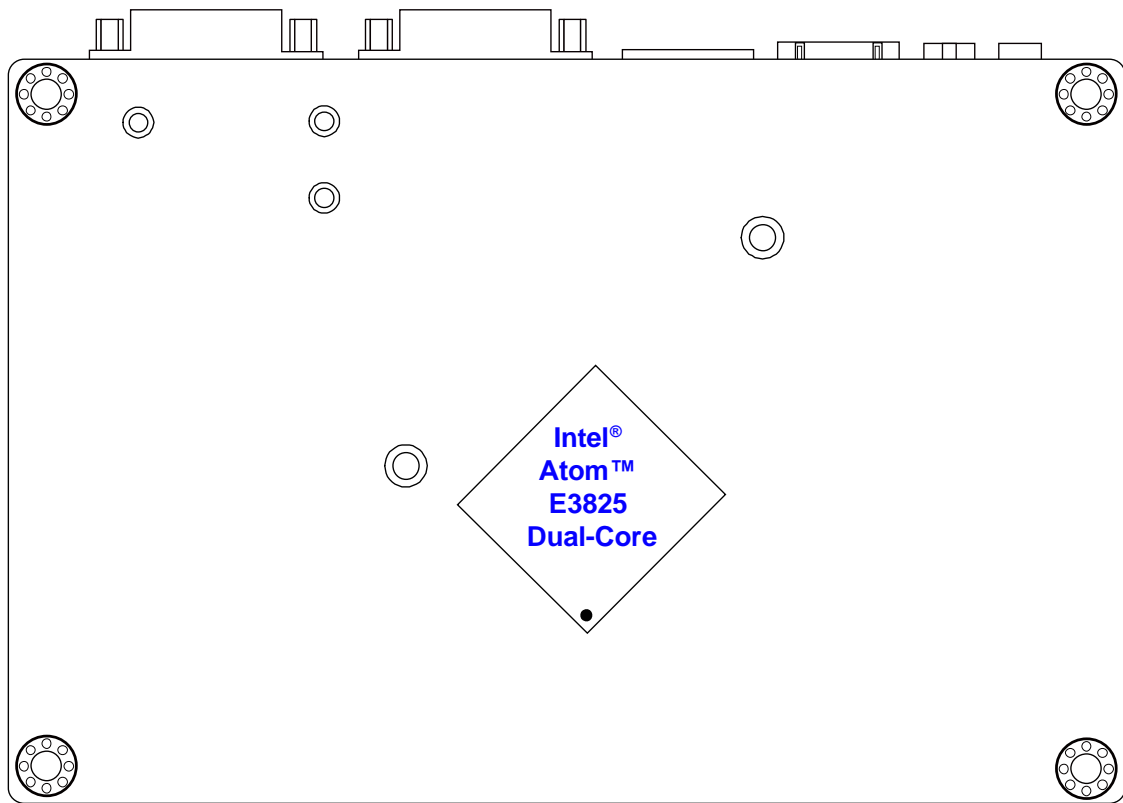
When a jumper cap is removed from two jumper pins, this jumper is **open**, i.e. turned **Off**.

### 2.3 Jumper & Connector Locations on Motherboard

Motherboard: IB898



IB898 - top



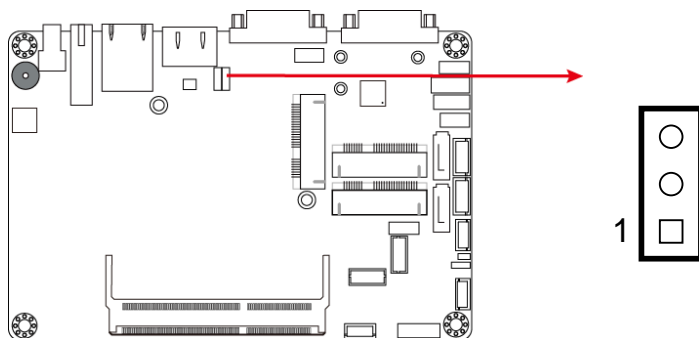
**IB898 - bottom**



## 2.4 Jumpers Quick Reference

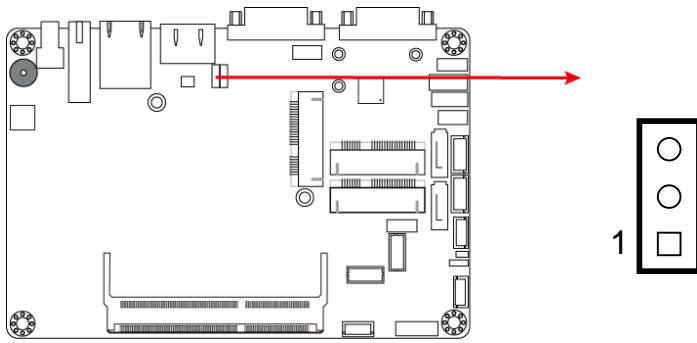
Function	Connector Name	Page
CMOS Data Clearance	JP4	17
ME Register Clearance	JP5	18

### 2.4.1 CMOS Data Clearance (JP4)



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

**2.4.2 ME Register Clearance (JP5)**

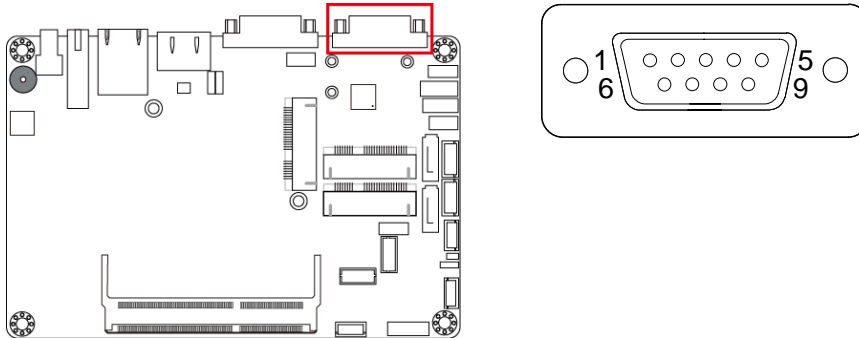


Function	Pin closed	Illustration
Normal (default)	1-2	
Clear ME Register	2-3	

## 2.5 Connectors Quick Reference

Function	Connector Name	Page
COM1 Port	CN7	19
Full-Size Mini-PCIe / mSATA Connector	J14	20

### 2.5.1 COM RS-232/422/485 Port (CN7)

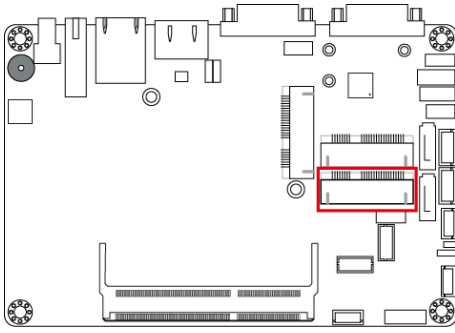


COM port is jumper-less and configurable in BIOS.

Pin	Assignment	Pin	Assignment
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

**2.5.2 Full-Size Mini-PCIe / mSATA Connector (J14)**



## 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
- Intel® USB 3.0 Driver Installation
- LAN Driver Installation

## 3.1 Introduction

This section describes the installation procedures for software drivers. The software drivers are available on IBASE website [www.ibase.com.tw](http://www.ibase.com.tw). Register as a member of our website to download all the necessary drivers and extract for installation.

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

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## 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.

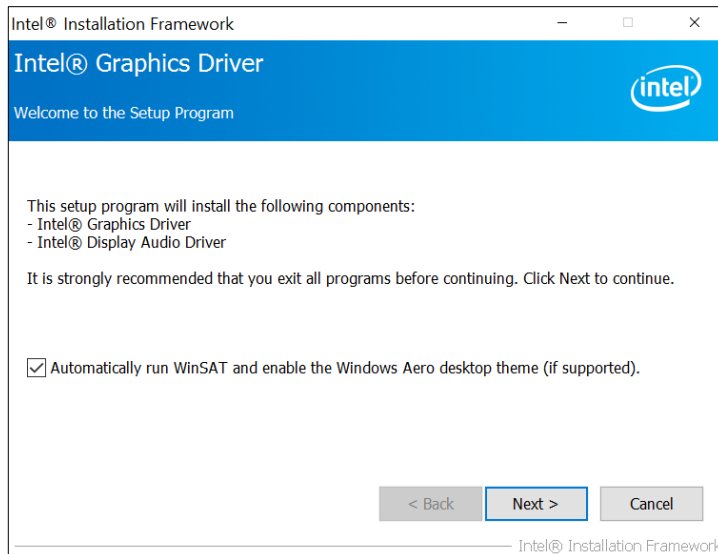
1. Run the **Setup.exe** file.
2. When the *Welcome* screen to the Intel® Chipset Device Software appears, click **Next** to continue.



3. Accept the license agreement and proceed with the installation process.
4. The driver has been completely installed. You are suggested to restart the computer for changes to take effect.

### 3.3 Intel® Graphics Driver Installation

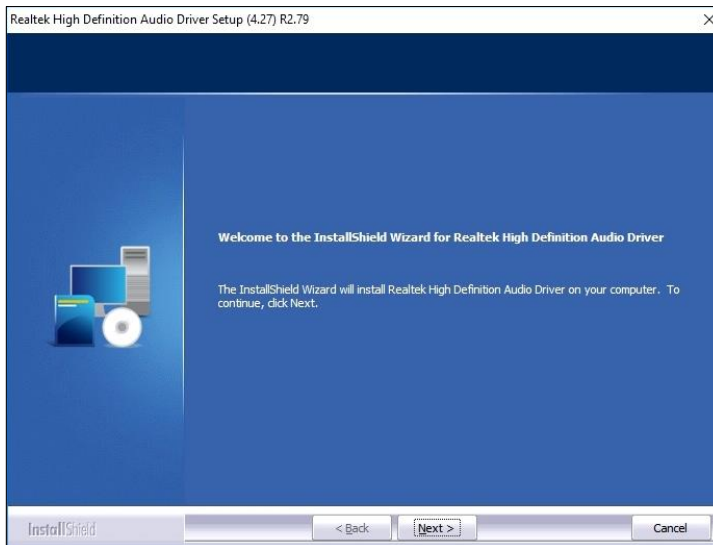
1. Run the **Setup.exe** file.
2. When the *Welcome* screen appears, click **Next** to continue.



3. Click **Yes** to agree with the license agreement and continue the installation.
4. On the *Readme File Information* screen, click **Next** for installation.
5. The driver has been completely installed. You are suggested to restart the computer for changes to take effect.

## 3.4 HD Audio Driver Installation

1. Run the **Setup.exe** file.
2. On the *Welcome* screen of the InstallShield Wizard, click **Next** for installation.

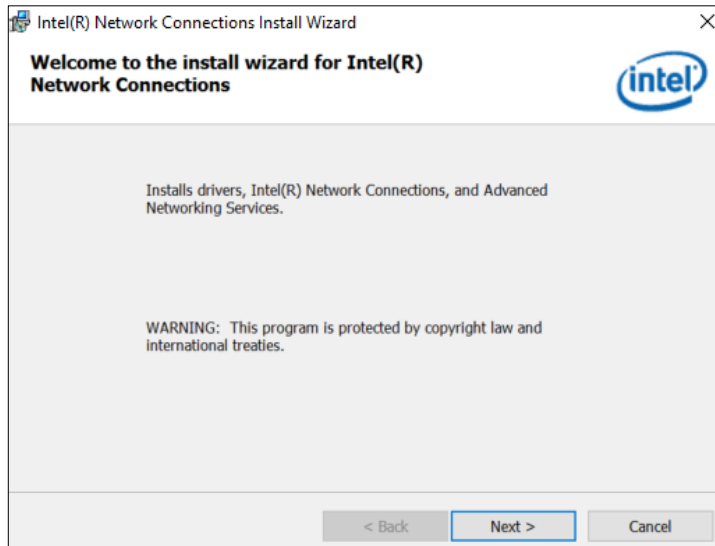


3. The driver has been completely installed. You are suggested to restart the computer for changes to take effect.



### 3.5 LAN Driver Installation

1. Run the **Setup.exe** file.
2. On the *Welcome* screen of the InstallShield Wizard, click **Next**.



3. Accept the license agreement and click **Next** to continue.
4. When the wizard is ready for installation, click **Install**.
5. The driver has been completely installed. You are suggested to restart the computer and for changes to take effect.

### 3.6 Intel® Trusted Execution Engine Installation

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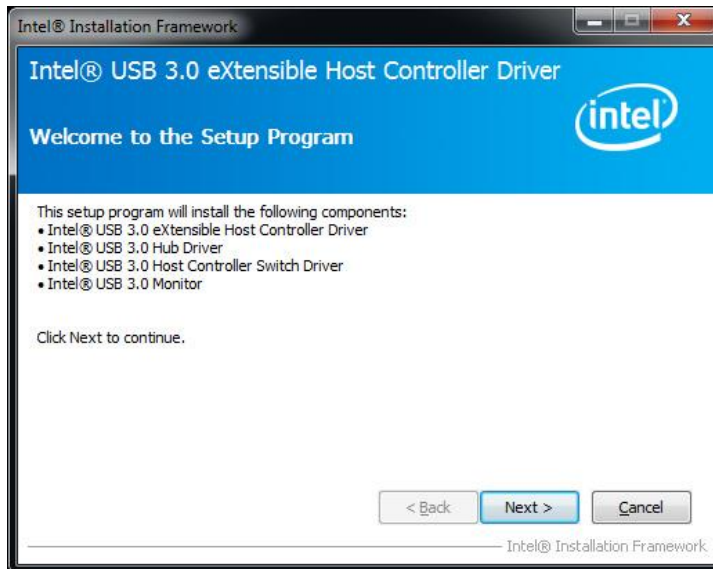
**Note:** The driver is for Windows 7 only.

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1. Run the **Setup.exe** file.
2. When the *Welcome* screen appears, click **Next**.
3. Accept the license agreement and click **Next** to continue.
4. The driver has been completely installed. Click **Finish** to restart the computer and for changes to take effect.

## 3.7 Intel® USB 3.0 Driver Installation

1. Run the **Setup.exe** file.
2. On the *Welcome* screen of the InstallShield Wizard, click **Next**.



3. Click **Yes** to agree with the license agreement.
4. On the *Readme File Information* screen, click **Next** for installation.
5. The driver has been completely installed. You are suggested 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
- Boot 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.

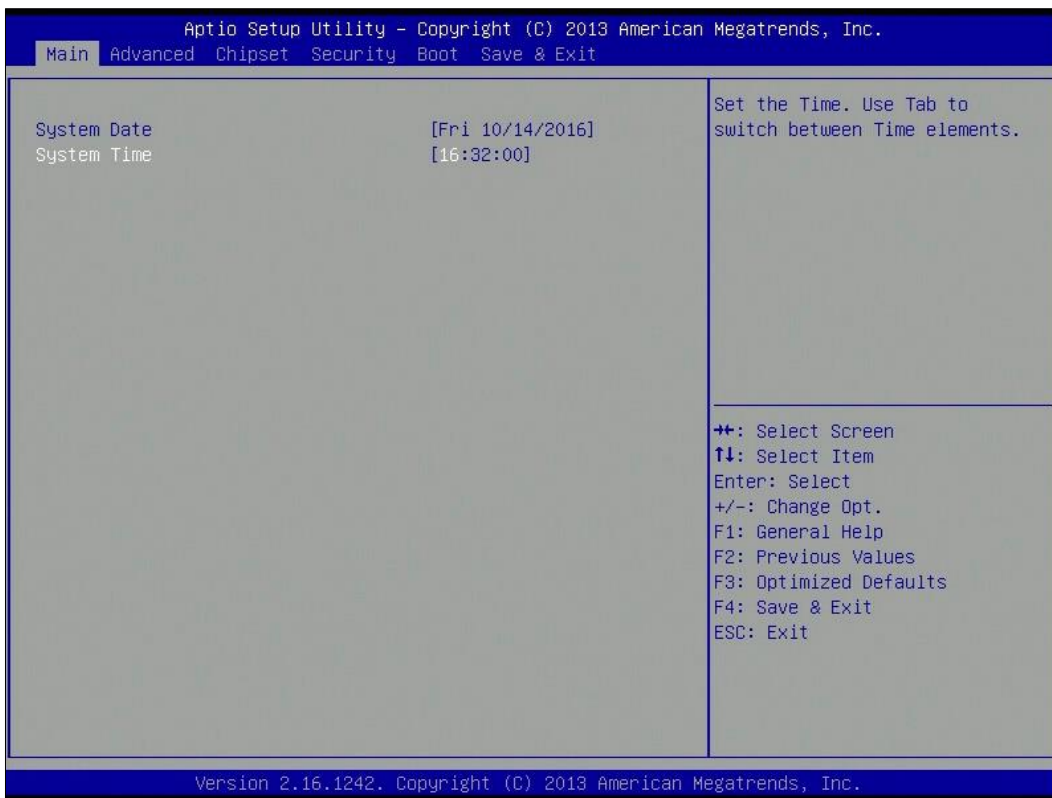
---

**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.

---

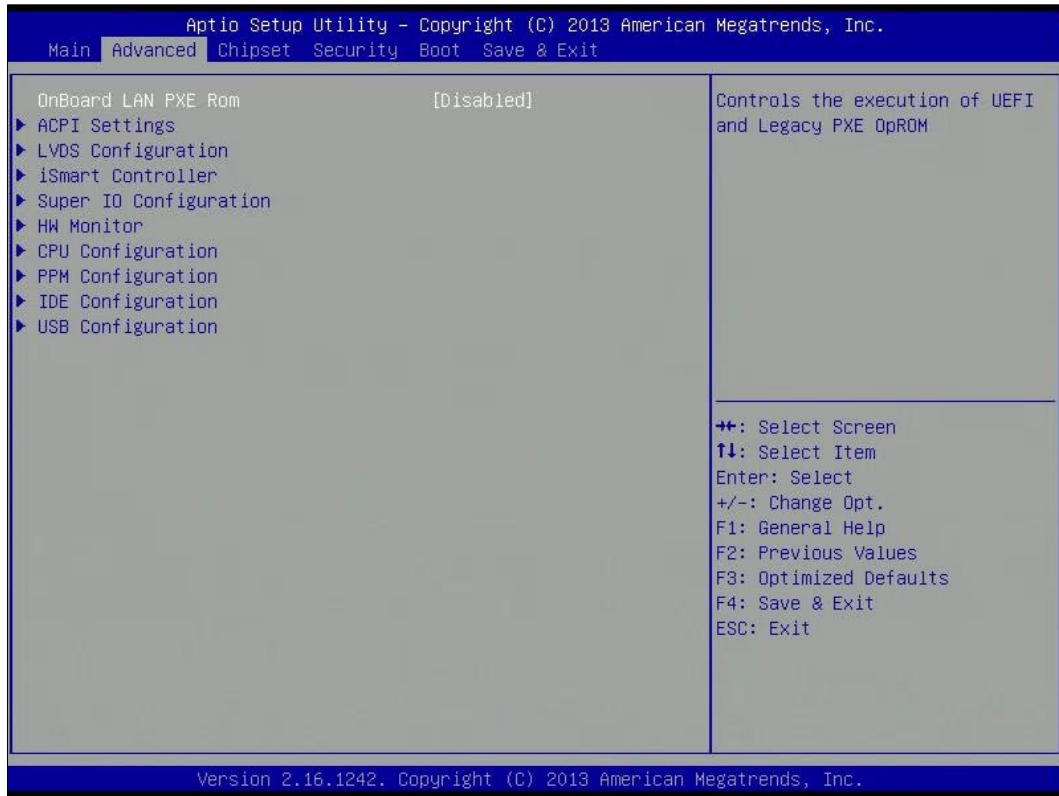
### 4.3 Main Settings



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.

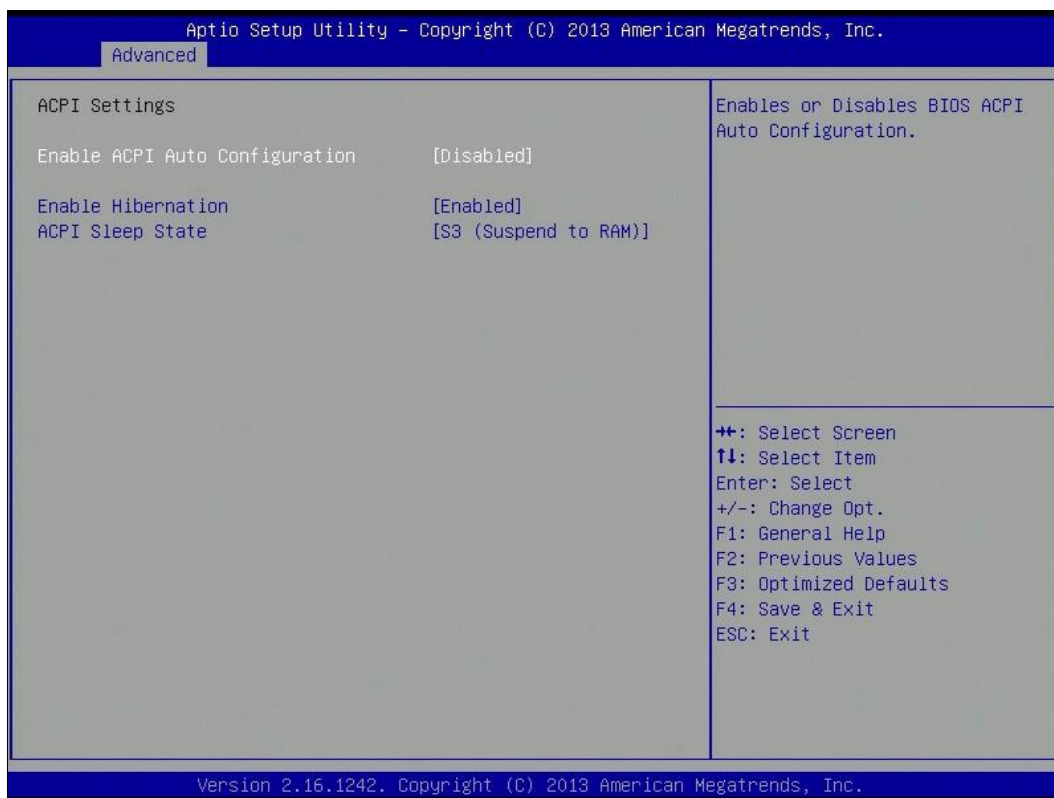
## 4.4 Advanced Settings

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



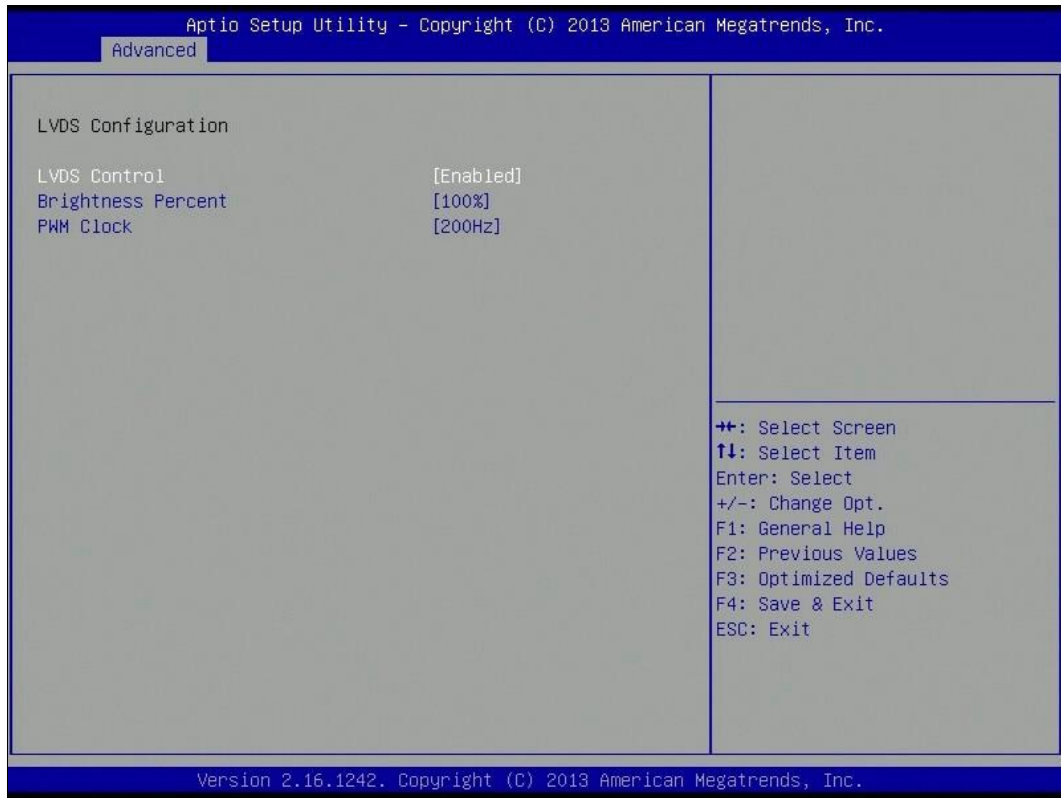
BIOS Setting	Description
OnBoard LAN PXE Rom	Enables or disables the execution of UEFI and Legacy PXE OpROM.

### 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: <ul style="list-style-type: none"> <li>• Suspend Disabled</li> <li>• S3 (Suspend to RAM)</li> </ul>

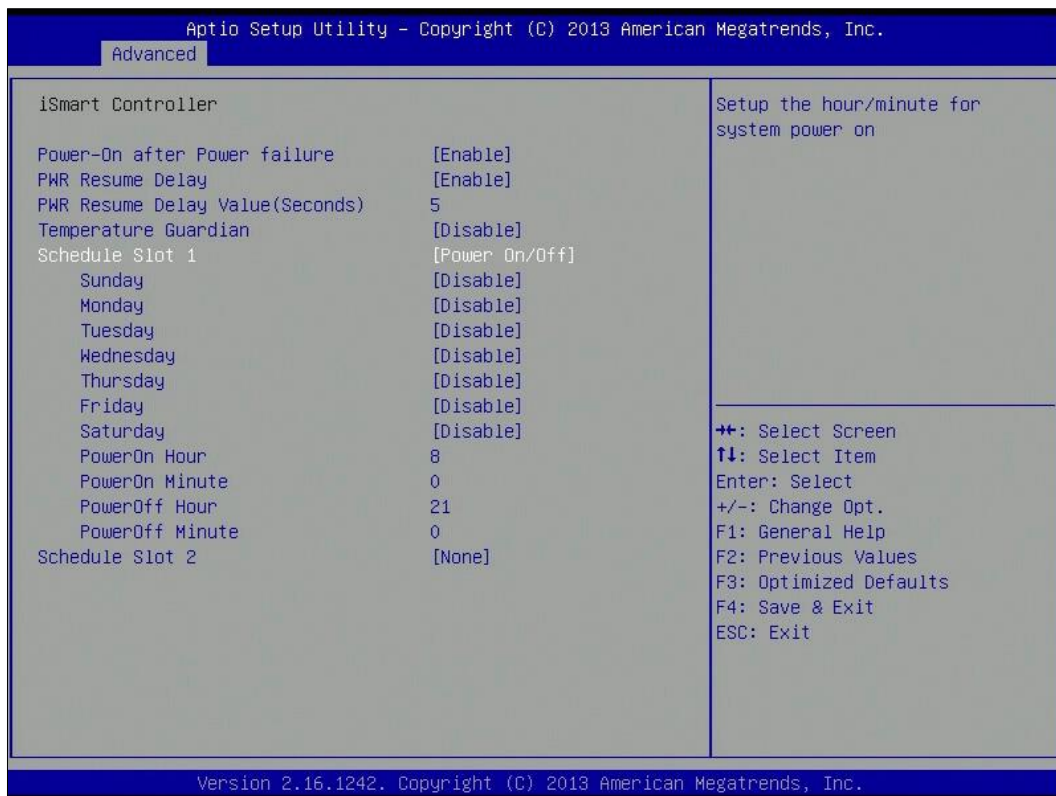
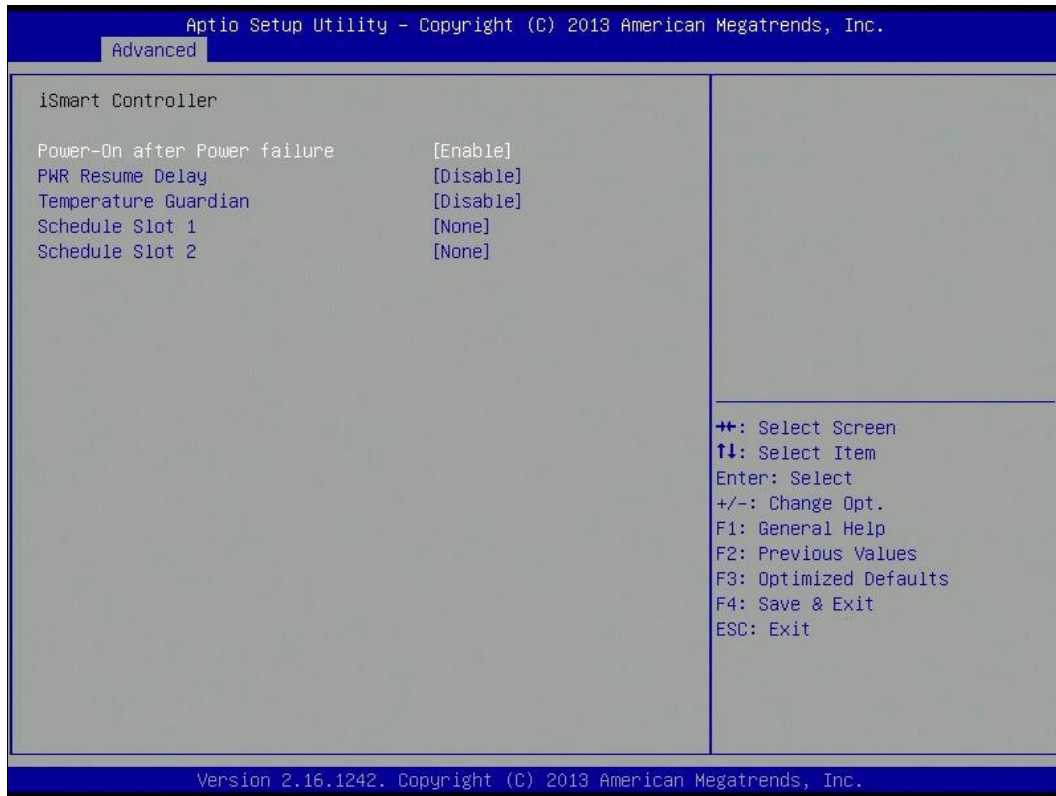
**4.4.2 LVDS Configuration**



BIOS Setting	Description
LVDS Control	Enables / Disables LVDS control.
Brightness Percent	Sets the brightness percentage as 100 / 75 / 50%.
PWM Clock	Sets the frequency of the PWM clock as 200, 1K, 5K Hz.

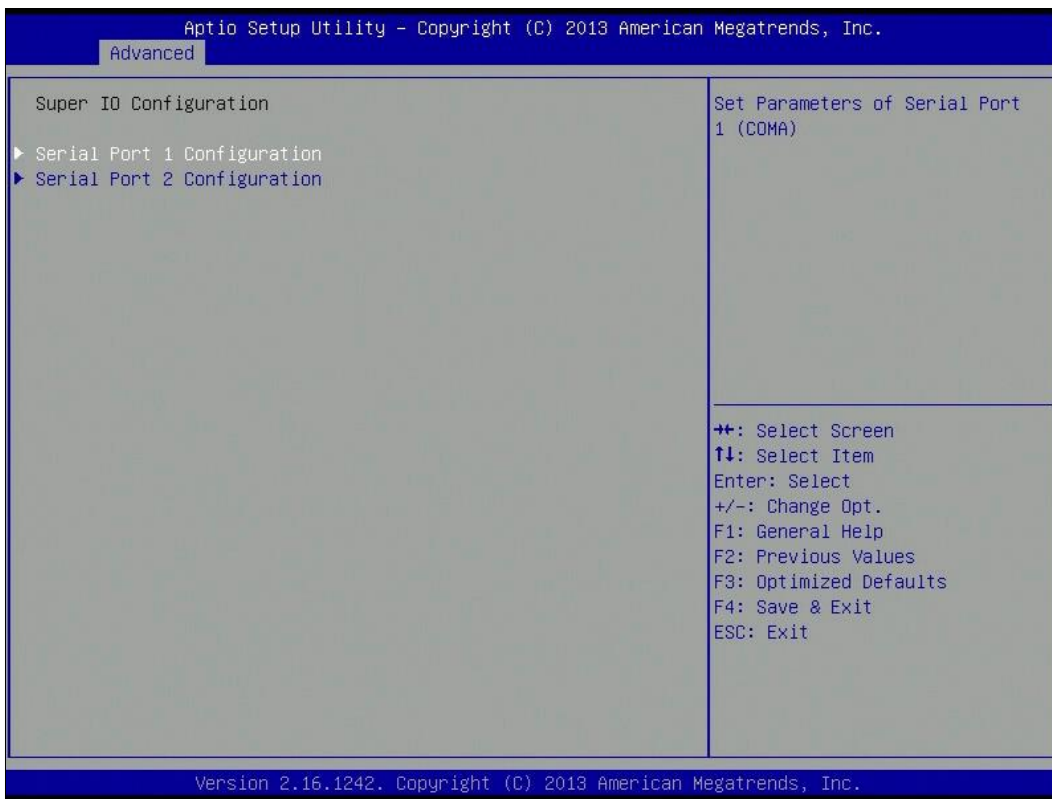


### 4.4.3 iSMART Controller



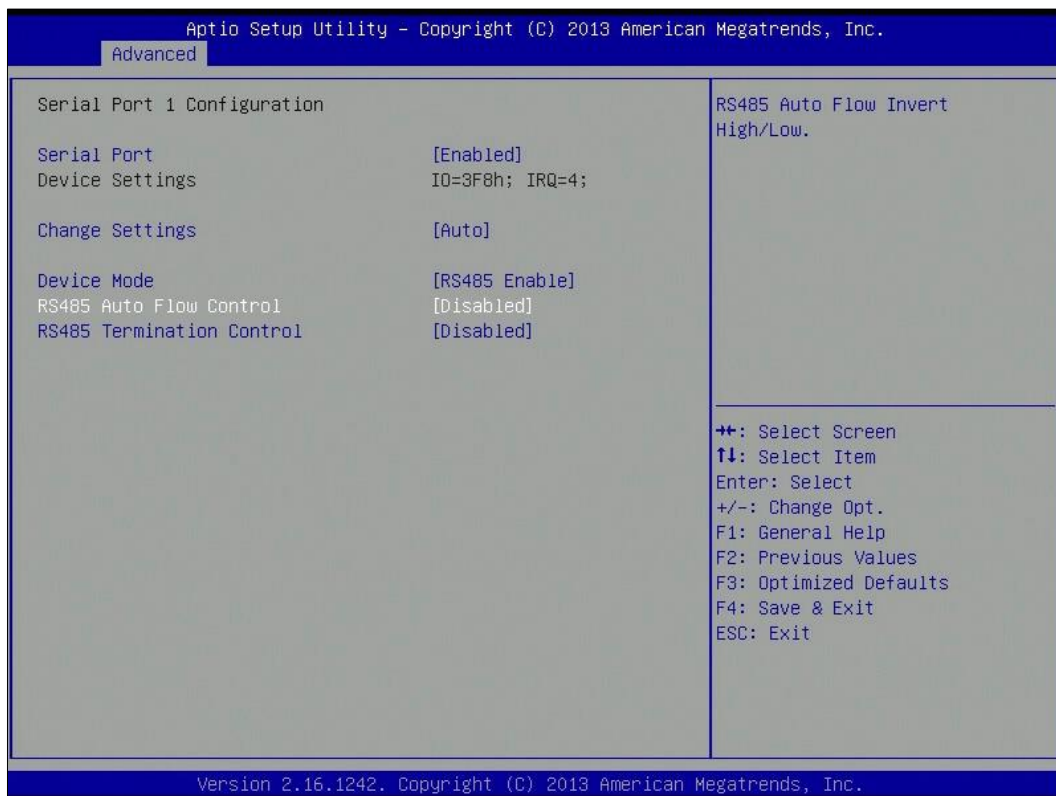
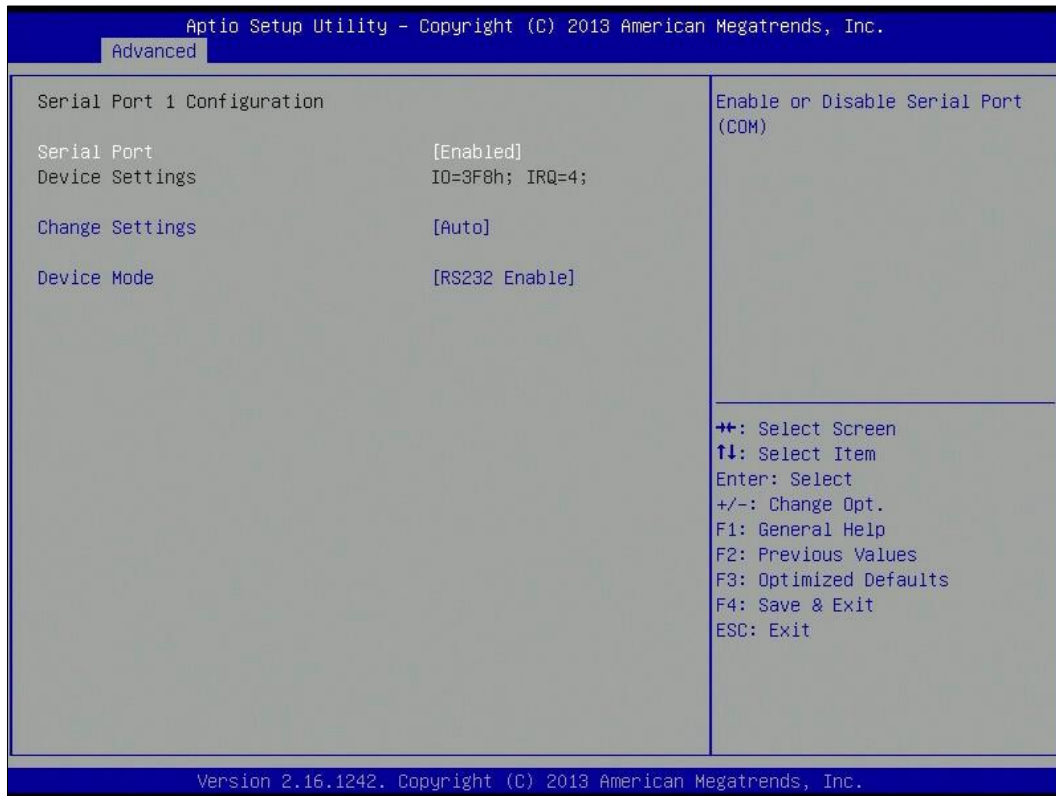
BIOS Setting	Description
Power-On after Power failure	Enables / Disables the system to be turned on automatically after a power failure.
Power Resume Delay	Enables / Disables to delay the time for system to turn on.
Power Resume Delay Value (Seconds)	Sets the delay timer for the system to resume power 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	<p>Sets up the hour / minute / day for the power-on schedule for the system.</p> <p>Options:</p> <ul style="list-style-type: none"> <li>• None</li> <li>• Power On</li> <li>• Power On / Off</li> </ul> <p><b>Important:</b> If you would like to set up a schedule between adjacent days, configure two schedule slots.</p> <p>For example, if setting up a schedule from Wednesday 5 p.m. to Thursday 2 a.m., configure two schedule slots. But if setting up a schedule from 3 p.m to 5 p.m. on Wednesday, configure only a schedule slot.</p>

### 4.4.4 Super IO Configuration



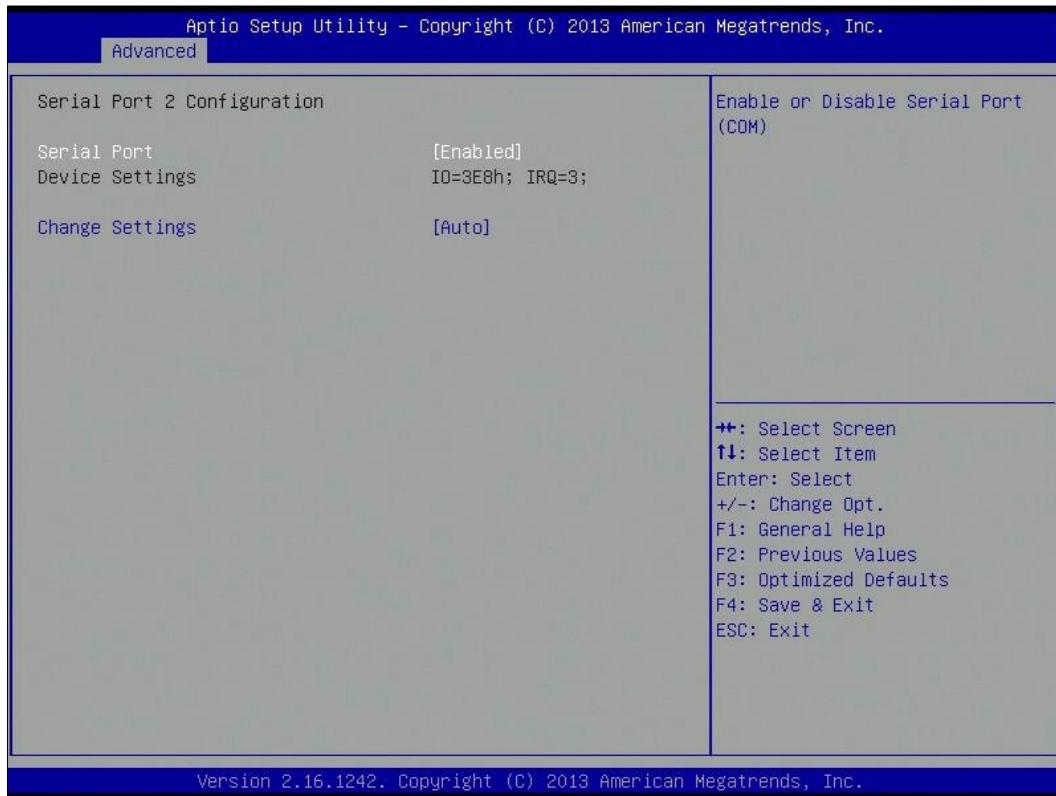
BIOS Setting	Description
Serial Port Configuration	Sets Parameters of Serial Ports. You can enable / disable the serial port and select an optimal settings for the Super IO device.

**4.4.3.1. Serial Port 1 Configuration**



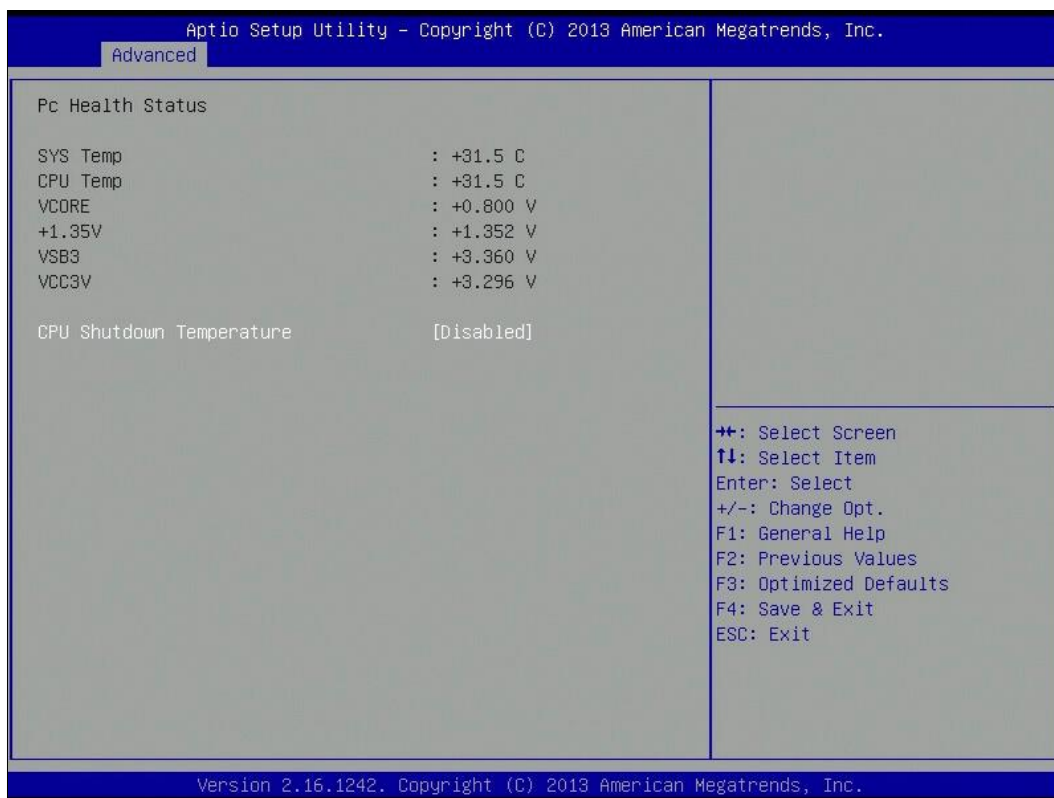
BIOS Setting	Description
Change Settings	<p>Selects an optimal settings for the Super I/O device.</p> <p>Options:</p> <ul style="list-style-type: none"> <li>• Auto</li> <li>• IO=3F8h ; IRQ=4</li> <li>• IO=3F8h ; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12</li> <li>• IO=2F8h ; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12</li> <li>• IO=3E8h ; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12</li> <li>• IO=2E8h ; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12</li> </ul>
Device Mode	<p>Changes the mode of serial port.</p> <p>Options:</p> <ul style="list-style-type: none"> <li>• RS232 Enable</li> <li>• RS485 Enable</li> <li>• RS422 Enable</li> </ul>
RS485 Auto Flow Control	Enables / Disables the RS485 auto flow invert.
RS485 Termination Control	Enables / Disables the RS485 termination control.

**4.4.3.2. Serial Port 2 Configuration**



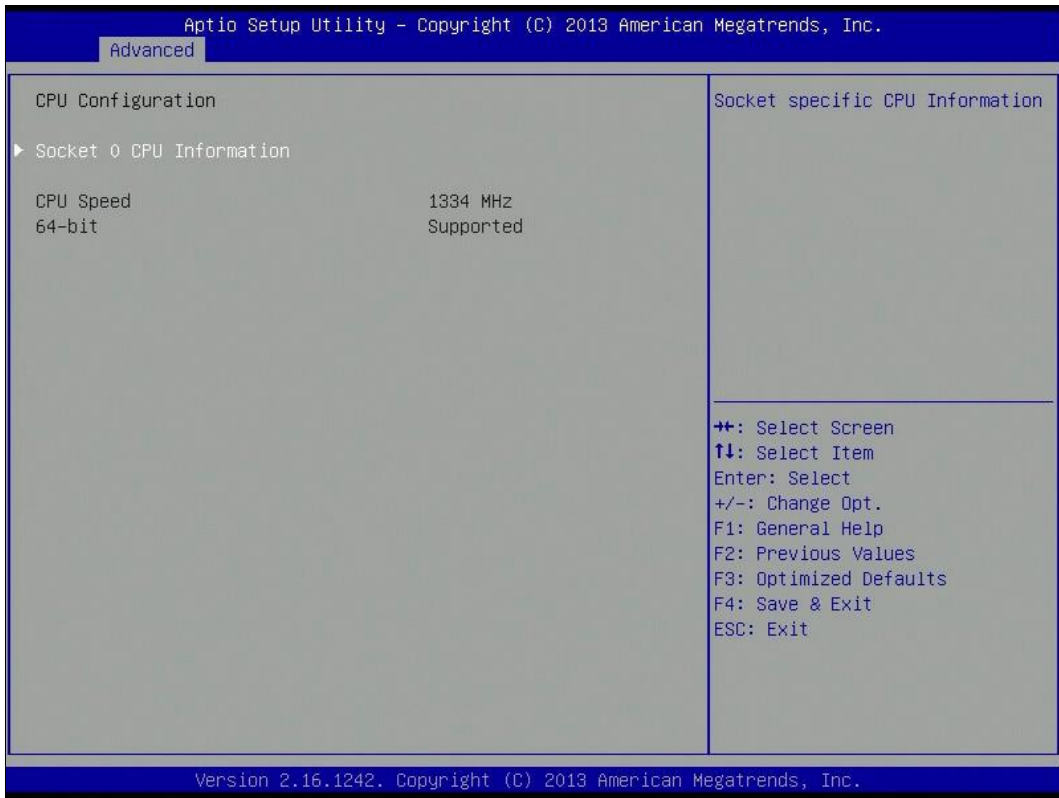
BIOS Setting	Description
Change Settings	<p>Selects an optimal settings for the Super I/O device.</p> <p>Options:</p> <ul style="list-style-type: none"> <li>• Auto</li> <li>• IO=3E8h ; IRQ=3</li> <li>• IO=3E8h ; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12</li> <li>• IO=2E8h ; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12</li> <li>• IO=2F0h ; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12</li> <li>• IO=2E0h ; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12</li> </ul>

## 4.4.5 Hardware Monitor



BIOS Setting	Description
CPU Shutdown Temperature	<p>This field enables or disables the Shutdown Temperature</p> <p>Options:</p> <ul style="list-style-type: none"> <li>• Disabled</li> <li>• 70 °C</li> <li>• 75 °C</li> <li>• 80 °C</li> <li>• 85 °C</li> <li>• 90 °C</li> <li>• 95 °C</li> </ul>

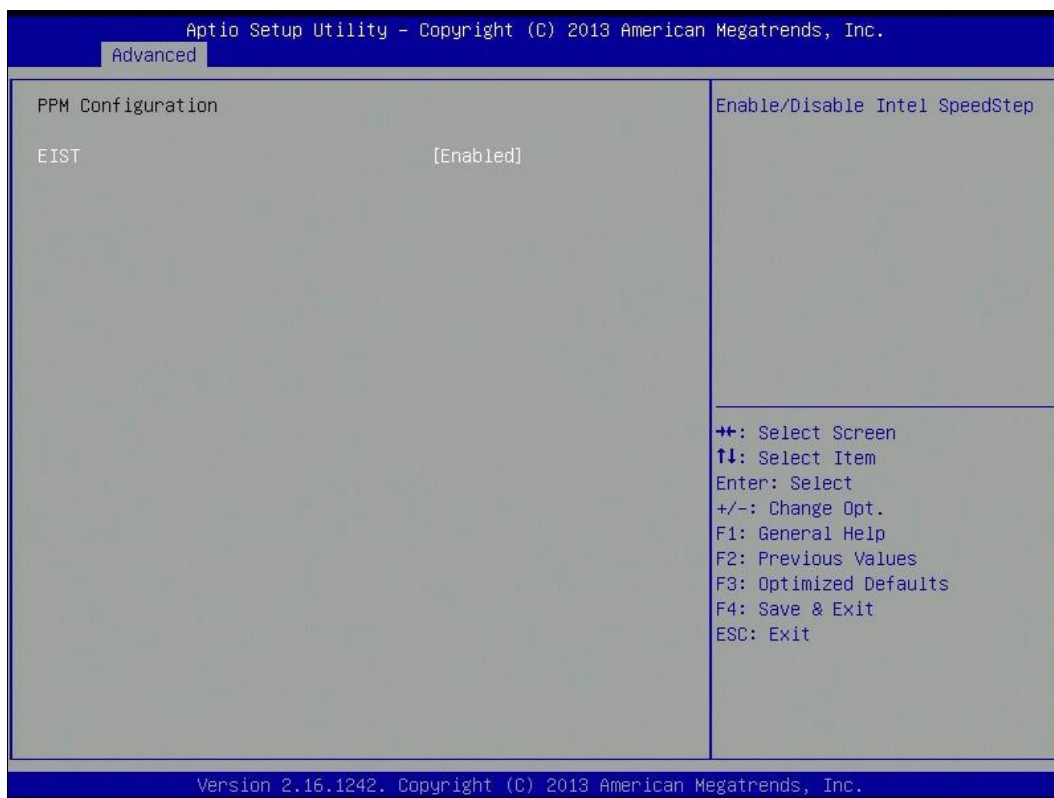
### 4.4.6 CPU Configuration



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

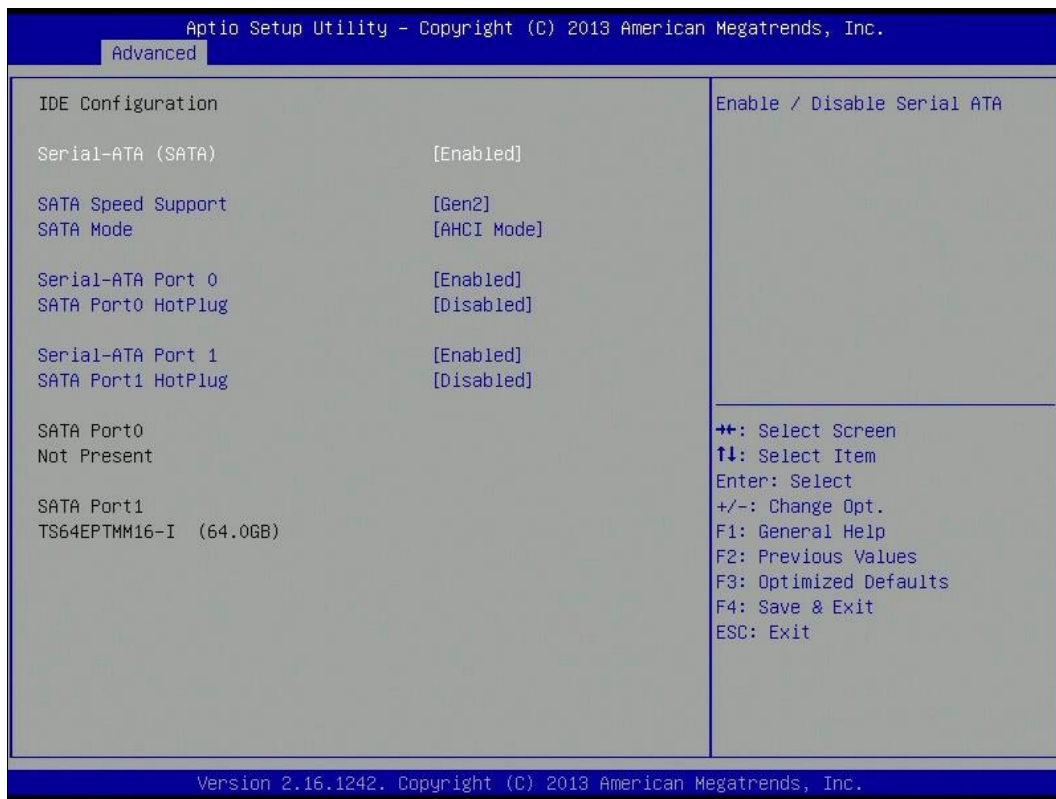


### 4.4.7 PPM Configuration



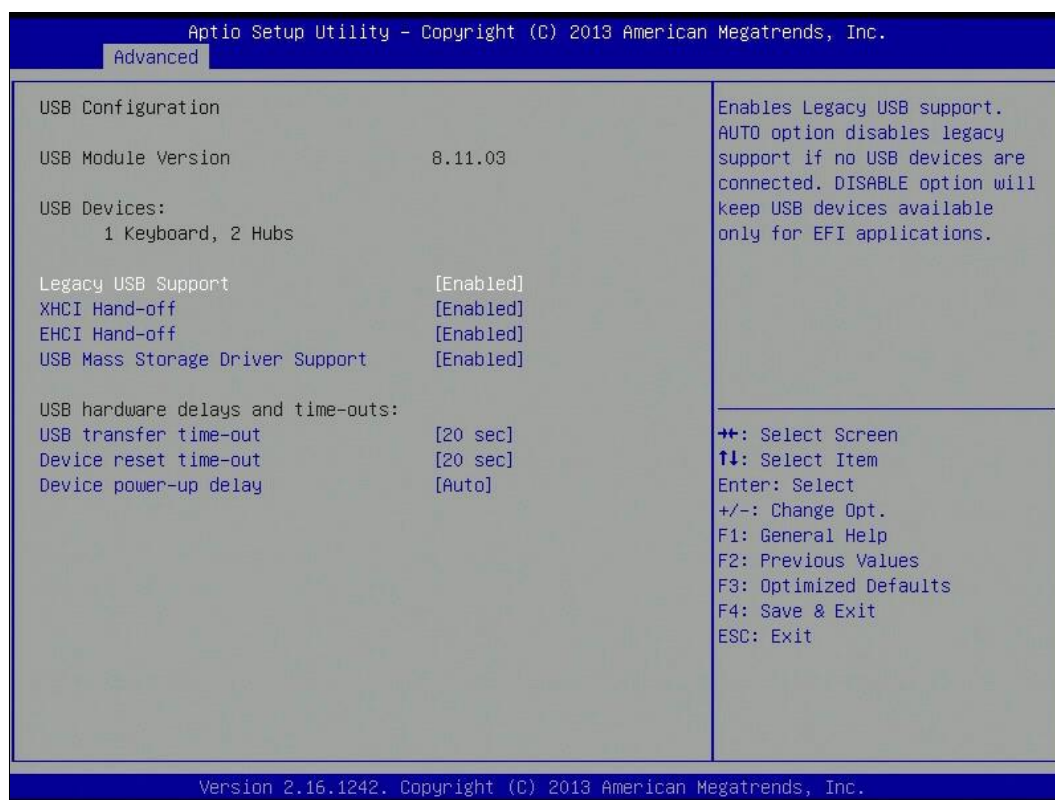
BIOS Setting	Description
EIST	Enables / Disables Intel SpeedStep.

### 4.4.8 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.

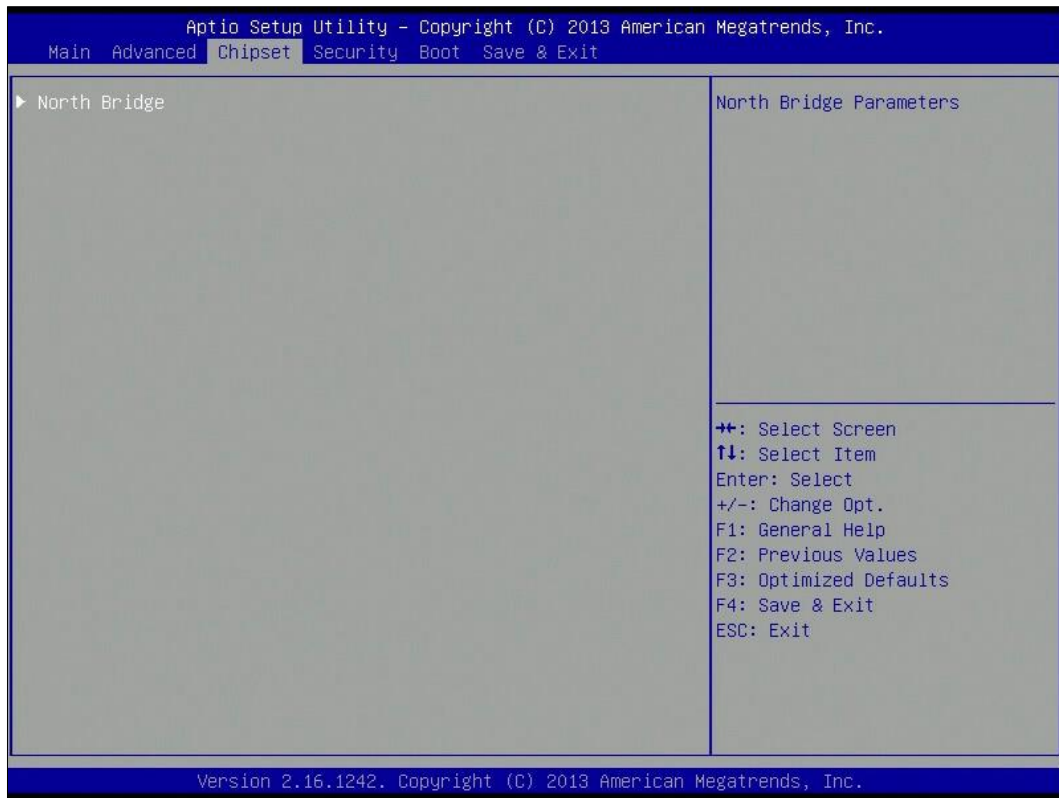
## 4.4.9 USB Configuration



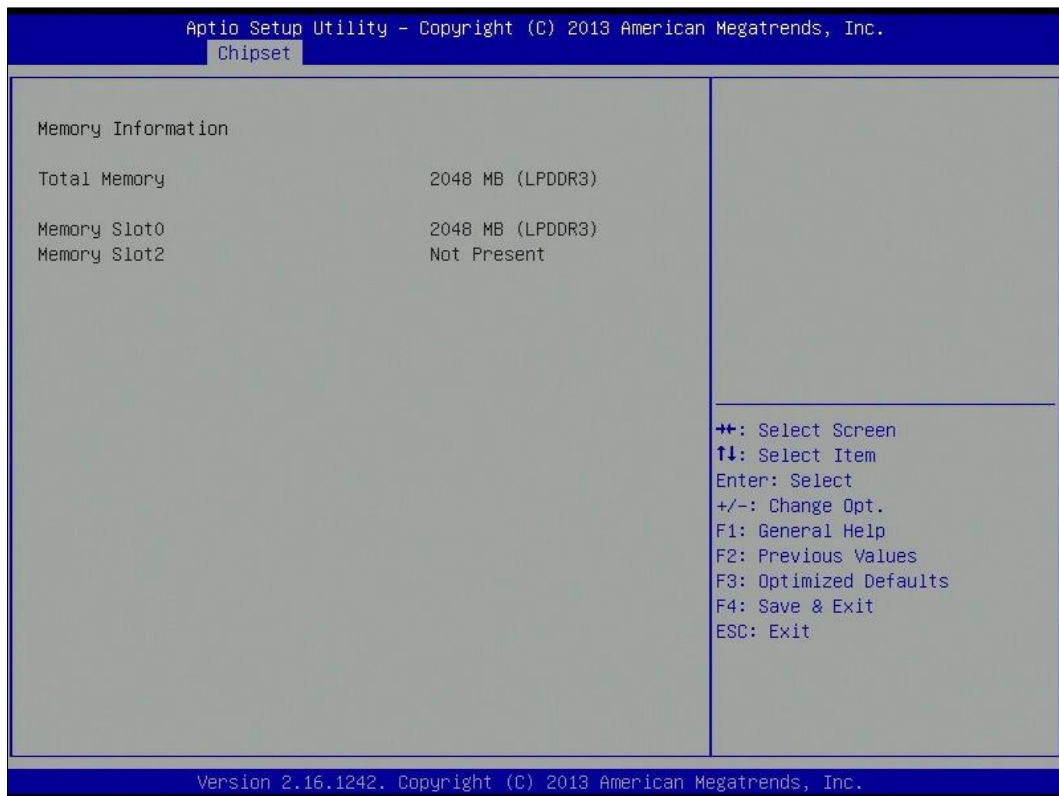
BIOS Setting	Description
Legacy USB Support	Enables / Disables Legacy USB support. <ul style="list-style-type: none"> <li>“Auto” disables legacy support if there is no USB device connected.</li> <li>“Disable” keeps USB devices available only for EFI applications.</li> </ul>
XHCI Hand-off	This is a workaround for OSeS without XHCI hand-off support. The XHCI ownership change should be claimed by XHCI driver.
EHCI Hand-off	This is a workaround for OSeS without EHCI hand-off support. The EHCI ownership change should be claimed by EHCI 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)

<b>BIOS Setting</b>	<b>Description</b>
Device reset time-out	Seconds of delaying execution of start unit command to USB mass storage device.  Options: 10, 20, 30, 40 secs
Device power-up delay	Automatically or manually sets the maximum time the device will take before it properly reports itself to the Host Controller. “Auto” uses the default value. For a Root port, it is 100 ms, but for a Hub port, the delay is taken from Hub descriptor.
Device power-up delay in seconds	Sets the desired time in seconds manually for the delay of device power-up.

## 4.5 Chipset Settings



### 4.5.1 North Bridge



## 4.6 Security Settings

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

Main Advanced Chipset **Security** Boot Save & Exit

<p>Password Description</p> <p>If ONLY the Administrator's password is set, then this only limits access to Setup and is only asked for when entering Setup.          If ONLY the User's password is set, then this is a power on password and must be entered to boot or enter Setup. In Setup the User will have Administrator rights.          The password length must be in the following range:</p> <table style="width: 100%; border: none;"> <tr> <td style="padding-right: 20px;">Minimum length</td> <td style="text-align: right;">3</td> </tr> <tr> <td>Maximum length</td> <td style="text-align: right;">20</td> </tr> </table> <p>Administrator Password          User Password</p> <p>HDD Security Configuration:          P1:TS64EPTMM16-</p>	Minimum length	3	Maximum length	20	<p>Set Administrator Password</p> <hr/> <p>             ++: Select Screen              ↑↓: Select Item              Enter: Select              +/-: Change Opt.              F1: General Help              F2: Previous Values              F3: Optimized Defaults              F4: Save &amp; Exit              ESC: Exit         </p>
Minimum length	3				
Maximum length	20				

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

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

**Security**

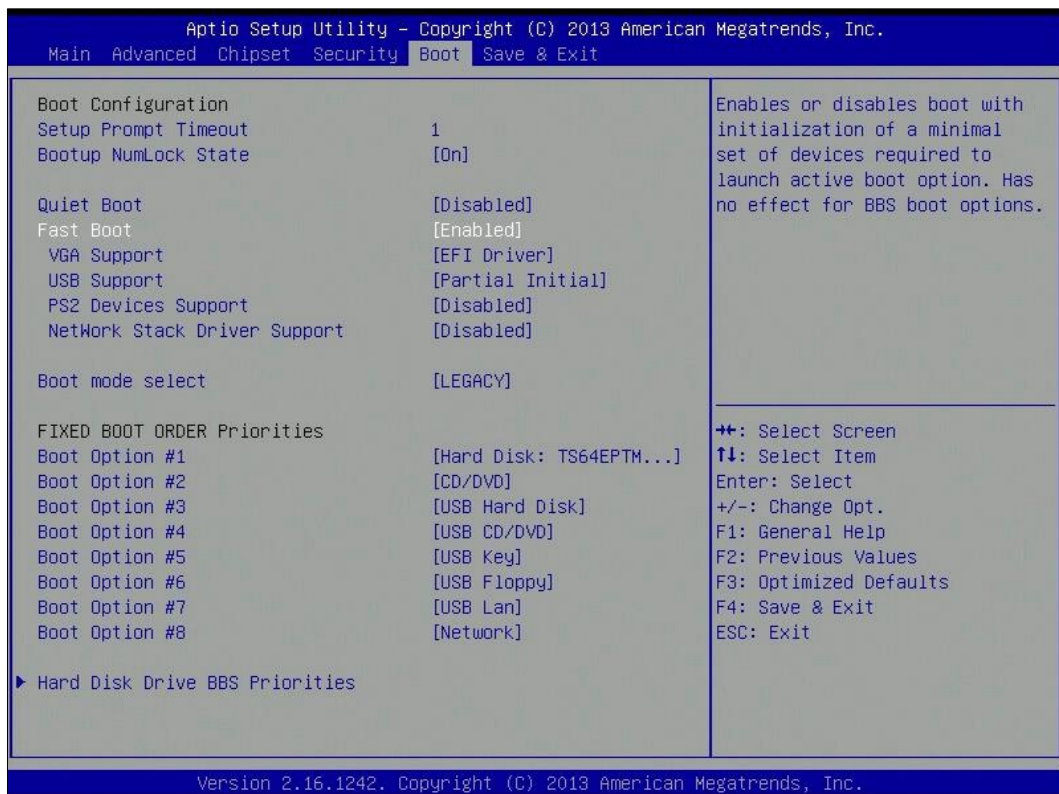
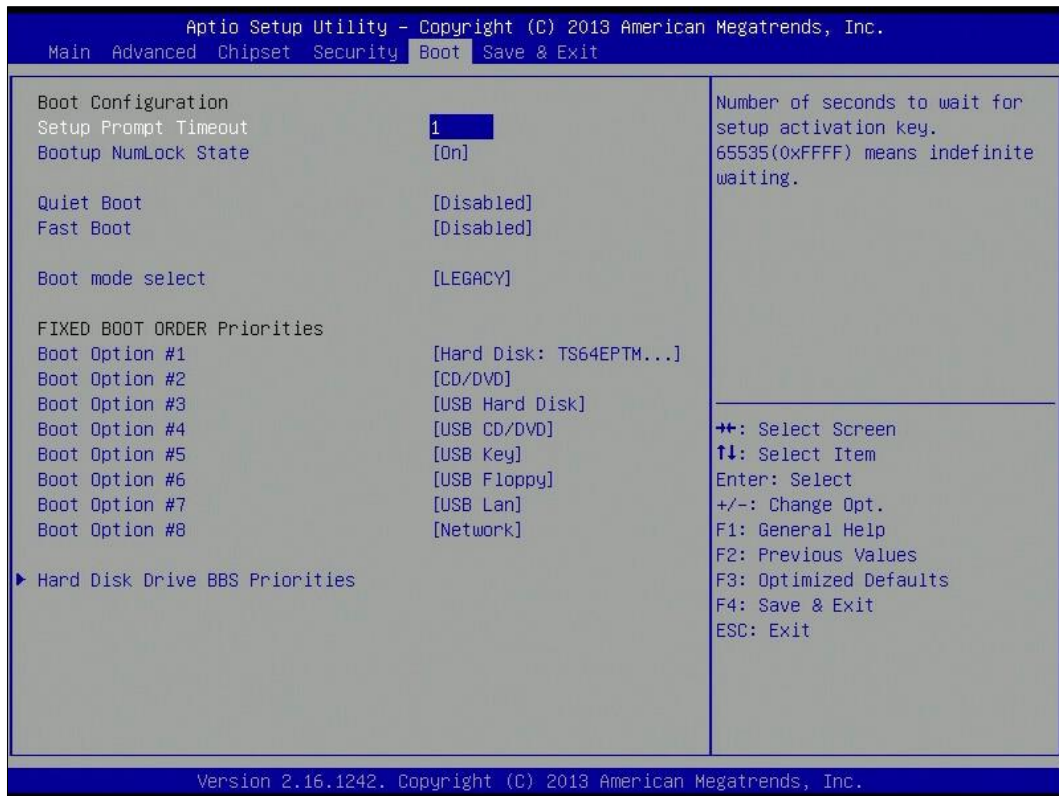
<p>HDD Password Description :</p> <p>Allows Access to Set, Modify and Clear HardDisk User and Master Passwords. User Password need to be installed for Enabling Security. Master Password can be Modified only when successfully unlocked with Master Password in POST.</p> <p>HDD PASSWORD CONFIGURATION:</p> <table style="width: 100%; border: none;"> <tr> <td style="padding-right: 20px;">Security Supported</td> <td style="padding-right: 20px;">:</td> <td style="text-align: right;">Yes</td> </tr> <tr> <td>Security Enabled</td> <td>:</td> <td style="text-align: right;">No</td> </tr> <tr> <td>Security Locked</td> <td>:</td> <td style="text-align: right;">No</td> </tr> <tr> <td>Security Frozen</td> <td>:</td> <td style="text-align: right;">No</td> </tr> <tr> <td>HDD User Pwd Status</td> <td>:</td> <td style="text-align: right;">NOT INSTALLED</td> </tr> <tr> <td>HDD Master Pwd Status</td> <td>:</td> <td style="text-align: right;">INSTALLED</td> </tr> </table> <p>Set User Password</p>	Security Supported	:	Yes	Security Enabled	:	No	Security Locked	:	No	Security Frozen	:	No	HDD User Pwd Status	:	NOT INSTALLED	HDD Master Pwd Status	:	INSTALLED	<p>Set HDD User Password.              *** Advisable to Power Cycle System after Setting Hard Disk Passwords ***.              Discard or Save changes option in setup does not have any impact on HDD when password is set or removed.</p> <hr/> <p>             ++: Select Screen              ↑↓: Select Item              Enter: Select              +/-: Change Opt.              F1: General Help              F2: Previous Values              F3: Optimized Defaults              F4: Save &amp; Exit              ESC: Exit         </p>
Security Supported	:	Yes																	
Security Enabled	:	No																	
Security Locked	:	No																	
Security Frozen	:	No																	
HDD User Pwd Status	:	NOT INSTALLED																	
HDD Master Pwd Status	:	INSTALLED																	

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BIOS Setting	Description
Administrator Password	Sets an administrator password for the setup utility.
User Password	Sets a user password.
HDD Security Configuration	Sets a password for your HDD. Advisable to the Power Cycle System after setting the HDD password. Discard or save changes option in setup does not have any impact on HDD when password is set or removed.



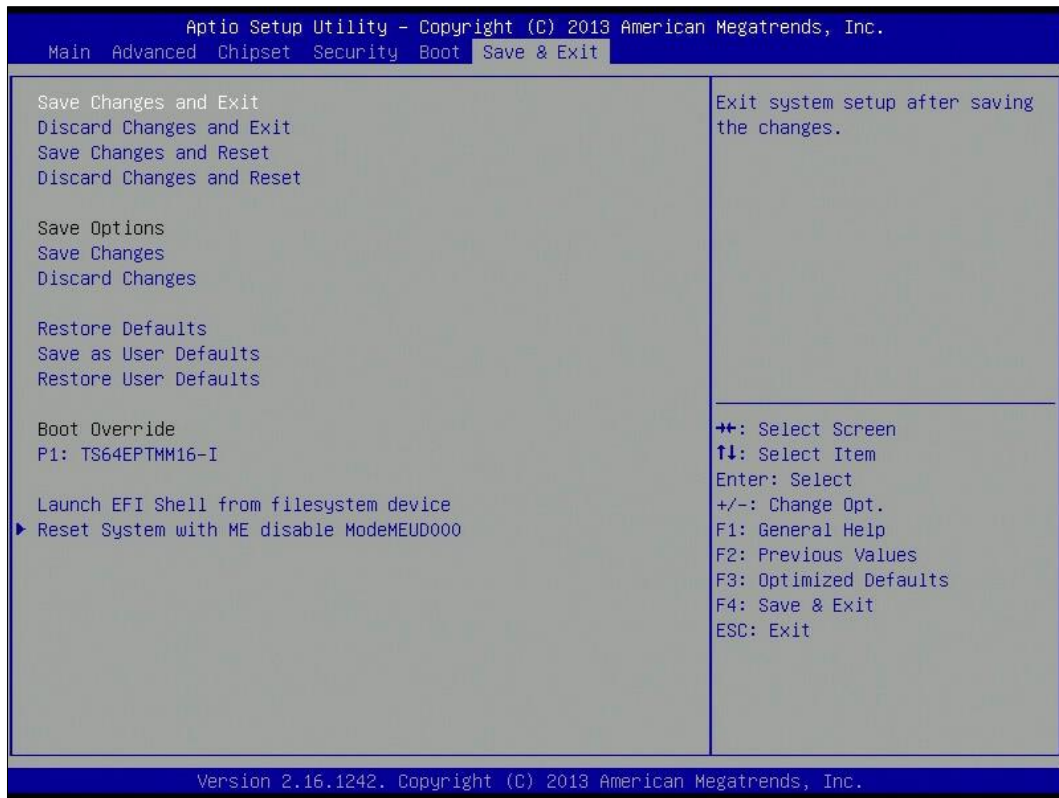
## 4.7 Boot Settings





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 mode select	Sets the boot mode as Legacy or UEFI.
Boot Option Priorities	Sets the system boot order.  Options: <ul style="list-style-type: none"> <li>• Hard Disk</li> <li>• CD/DVD</li> <li>• USB - Hard Disk, CD/DVD, Key, Floppy, Lan</li> <li>• Network</li> <li>• Disabled</li> </ul>
Hard Disk Drive BBS Priorities	Specifies the priority sequence of the boot 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.
Launch EFI Shell from filesystem device	Attempts to launch EFI Shell application (Shell.efi) from one of the available filesystem devices.

BIOS Setting	Description
Reset System with ME disable ModeMEUD000	ME will run into the temporary disable mode. Ignore if ME Ignition is FWMEUD001.

## 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)
- 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
0x0000002E-0x0000002F	Motherboard resources
0x0000004E-0x0000004F	Motherboard resources
0x00000061-0x00000061	Motherboard resources
0x00000063-0x00000063	Motherboard resources
0x00000065-0x00000065	Motherboard resources
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
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

Address	Device Description
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
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
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
0x000000B4-0x000000B5	Programmable interrupt controller
0x000000B8-0x000000B9	Programmable interrupt controller
0x000000BC-0x000000BD	Programmable interrupt controller
0x000004D0-0x000004D1	Programmable interrupt controller
0x0000D000-0x0000DFFF	Intel(R) Pentium(R) processor N- and J-series / Intel(R) Celeron(R) processor N- and J-series PCI Express - Root Port 1 - 0F48
0x00000040-0x00000043	System timer

Address	Device Description
0x00000050-0x00000053	System timer
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
0x000003F8-0x000003FF	Serial Port (COM1)
0x000003E8-0x000003EF	Serial Port (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 (COM2)
IRQ 4	Serial Port (COM1)
IRQ 8	High precision event timer
IRQ 11	Intel(R) Pentium(R) processor N- and J-series / Intel(R) Celeron(R) processor N- and J-series Platform Control Unit - SMBus Port - 0F12
IRQ 16	Intel(R) Pentium(R) processor N- 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- 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- and J-series / Intel(R) Celeron(R) processor N- and J-series PCI Express - Root Port 3 - 0F4C
IRQ 19	Intel(R) Pentium(R) processor N- and J-series / Intel(R) Celeron(R) processor N- and J-series PCI Express - Root Port 4 - 0F4E
IRQ 19	Intel(R) Pentium(R) processor N- and J-series / Intel(R) Celeron(R) processor N- and J-series AHCI - 0F23
IRQ 22	High Definition Audio Controller
IRQ 81 ~ 190	Microsoft ACPI-Compliant System
IRQ 4294967286 ~ 4294967291	Intel(R) I210 Gigabit Network Connection
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. 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;
}
//-----
```