

AIMB-U117

**AIMB-U117 Intel® Atom™ E3950/
E3930 Quad 1.6/Dual Core 1.3
GHz UTX Industrial Motherboard
with HDMI/eDP (LVDS)/DP++, 2
COMs, eMMC, Dual LAN, 4 USB,
1 MiniPCle and 1 M.2 E Key**

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Caution! *There is a risk of a new battery exploding if incorrectly installed. Do not attempt to recharge, force open, or heat the battery. Replace the battery only with the same or equivalent type recommended by the manufacturer. Discard used batteries according to the manufacturer's instructions.*



Memory Compatibility

| Category | Speed | Capacity | Advantech P/N | Operating Temperature | Result |
|----------|-------|----------|--------------------|-----------------------|--------|
| DDR3L | 1866 | 8GB | SQR-SD3I-8G1K8SNLB | -40 to 85 | Pass |
| DDR3L | 1866 | 8GB | SQR-SD3M-8G1K8SNLB | -25 to 85 | Pass |
| DDR3L | 1866 | 4GB | SQR-SD3M-4G1K8SNLB | -20 to 85 | Pass |
| DDR3L | 1600 | 8GB | AQD-SD3L8GN16-SG1 | 0 to 85 | Pass |
| DDR3L | 1600 | 4GB | SQR-SD3N-4G1K6HNEC | 0 to 85 | Pass |
| DDR3L | 1600 | 4GB | AQD-SD3L4GN16-SG1 | 0 to 85 | Pass |
| DDR3L | 1600 | 2GB | SQR-SD3N-2G1K6HNXC | 0 to 85 | Pass |

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1. Collect all information about the problem encountered (for example, CPU speed, Advantech products used, other hardware and software used, etc.). Note anything abnormal and list any onscreen messages encountered when the problem occurs.
2. Call your dealer and describe the problem. Please have your manual, product, and any relevant information readily available.
3. If your product is diagnosed as defective, obtain a return merchandise authorization (RMA) number from your dealer. This allows us to process your return more quickly.
4. Carefully pack the defective product, a completed Repair and Replacement Order Card, and proof of the purchase date (such as a photocopy of your sales receipt) in a shippable container. Products returned without a proof of purchase date are not eligible for our warranty service.
5. Write the RMA number clearly on the outside of the package and ship the product prepaid to your dealer.

Initial Inspection

Before installing the motherboard, please ensure that the following items are included in your shipment:

- 1x AIMB-U117 Intel® Atom x7-E3950/ x5-3930 UTX Motherboard
- 1 x SATA HDD Cable
- 1 x SATA Power Cable
- 1 x Serial Port Cable
- 1 x Startup Manual
- 1 x MiniPCle Screw
- 1 x M.2 Screw
- 1 x Warranty Card
- 1 x On-Board CPU Cooler (AIMB-U117Z)/ CPU Heatsink (AIMB-U117I)

If any of these items are missing or damaged, contact your distributor or sales representative immediately. All AIMB-U117 devices are mechanically and electrically inspected before shipment. Thus, your product should be free of marks and scratches and in perfect working order upon receipt. While unpacking AIMB-U117, check the product for signs of shipping damage (for example, a damaged box, scratches, dents, etc.). If the device is damaged or fails to meet the specifications, notify our service department or your local sales representative immediately. Please also notify the carrier. Retain the shipping carton and packing material for inspection by the carrier. After this inspection, we will make arrangements to repair or replace the unit.

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Chapter 1

General Information

1.1 Introduction

AIMB-U117 is the newest UTX small form factor motherboard equipped with Intel® Atom® Quad Core 1.6 GHz x7-E3950/ Dual Core 1.3 GHz x5-E3930 processors and DDR3L 1866 MHz up to 8GB. The palm-sized industrial motherboard measures 116.8x 111.8mm and offers fast graphics and media performance to support triple display by HDMI1.4b, DP++1.2, eDP1.3 (or LVDS), Dual Realtek 10/100/1000 Mbps Ethernet port provides high-speed networking, and flexibility on storage eMMC is supported.

AIMB-U117 offers high speed, multiple I/O connectivity and expansion, including four USB3.0, optional 1 CANBus, 2 COMs (1 RS-232, 1 RS422 or RS485) or vending application standard protocol CCTalk and MDB, 1 SATAIII 6 GB/s connector, 1 M.2 (E-Key for 2230 module type) expansion slots for easy integration, and 1 Full-Sized MiniPCle (with mSATA supported) expansion and an optional TPM2.0 or TPM1.2 security feature.

Moreover, AIMB-U117 supports the wide range 12-24V DC power input, extended operating temperatures of -20 to 70° C with compliant and flexible thermal solution design. The thermal design power rating for the Intel E3930 dual-core architecture is only 6 W, and for Atom x7-E3950 quad-core is 12 W, allowing additional power reductions, system compressions.

All the features described above are incorporated into a space-saving, power-efficient, and cost-effective UTX small form factor.

1.2 Features

- Supports Intel® Atom x7-E3950/ x5-E3930 processors
- One 204-pin SODIMM, up to 8 GB DDR3L 1866 MHz SDRAM
- HDMI, DP++, eDP (or LVDS) Triple display or 3 independent display
- 1 CANBus, 2 serial ports (or CCTalk or MDB), 4 USB 3.0 and 1 SATA III ports
- 1 MiniPCle & 1 M.2 (E key) expansion ports
- eMMC5.0 onboard flash storage (optional)
- Onboard TPM 1.2/2.0 support (optional)
- Wide DC input 12V ~24V & Low power consumption design
- Fanless and wide temperature -20 ~70 board design
- Pale size 112mmx117mm

1.3 Specifications

1.3.1 System

- **CPU:** Intel® Atom x7-E3950 Quad core 1.6 GH/z & x5- E3930 Duo core 1.3 GH/z
- **BIOS:** AMI 128M-bit SPI
- **SATA hard disk drive interface:** One onboard SATA connectors with a data transmission rate of up to 6 Gb/s

1.3.2 Memory

- **RAM:** 1 x SO-DIMM DDR3L 1866 MHz up to 8 GB

Note! AIMB-U117 supports 1.35 V memory only. Users must install the memory module on the DIMM1 socket first.



1.3.3 Input/Output

- **PCIe bus:** One full size MiniPCIe and one M.2 2230 (E sky) socket.
- **Serial ports:** Two serial ports; COM1 RS-232 or MDB (BOM optional), COM2 RS-422/RS485 (Default RS-422) or CCTalk (BOM optional).
- **USB port:** Supports four USB 3.0 port with a transmission rate of up to 5Gbps.
- **CANBus:** One CANBus connector supported by BOM optional.
- **GPIO connector:** One 8-bit general purpose input/output.

1.3.4 Graphics

- **Controller:** Intel Gen 9 graphics engine
- **HDMI:** Supports up to 3840 x 2160 @ 30Hz
- **LVDS:** Supports 24-bit dual channel and up to 1920 x 1200, colay eDP (LVDS is BOM optional)
- **DP++:** Supports up to 4096 x 2160 @ 60 Hz
- **eDP:** Supports up to 3840 x 2160@60 Hz, colay with LVDS
- **Triple display:** DP + HDMI + eDP (or LVDS)

1.3.5 Ethernet LAN

- Supports dual 10/100/1000 Mbps Ethernet port (s) via PCI Express x1 bus, which provides a data transmission rate of 500 MB/s
- **Controller:** LAN1: Realtek 8111G; LAN2: Realtek 8111G

1.3.6 Industrial Features

- **Watchdog timer:** Can generate a system reset. The watchdog timer is programmable, with each unit equal to one second or one minute (255 levels)

1.3.7 Mechanical and Environmental Specifications

- **Operating temperature:**
 - AIMB-U117Z SKU: 0 ~ 60 °C (32 ~ 140 °F) with air flow 0.7m/s
 - AIMB-U117I SKU: -20 ~ 70 °C (-4 ~ 158 °F) with air flow 0.7m/s
- **Storage temperature:** -40 ~ 85 °C (-40 ~ 185 °F)
- **Humidity:** 5 ~ 95% non-condensing
- **Power supply voltage:** +12V to +24V (± 10%)
- **Power consumption:** +12V, Windows Idle mode: 3.554W (Intel E3950 1.6GHz/DDR3L 1866MHz 8GB) 24V, Windows Idle mode: 7.296W (Intel E3950 1.6GHz/DDR3L 1866MHz 8GB)
- **Board size:** 112 x 117 mm (4.4" x 4.6")
- **Board weight:** 0.3 kg

1.4 Jumpers and Connectors

The AIMB-U117 motherboard is equipped with connectors for linking the board to external devices such as hard disk drives. The board also features several jumpers for configuring the system according to specific applications.

The function of each board jumper and connector is listed in the table below. The procedure for setting jumpers is explained in subsequent sections of this chapter. Instructions for connecting external devices to the motherboard are provided in Chapter 2.

Table 1.1: Connector / Header List

| | Description | Part Reference |
|----|---|-----------------------|
| 1 | DC Input Connector | DCIN1 |
| 2 | High Definition Multimedia Interface | HDMI1 |
| 3 | DisplayPort | DP1 |
| 4 | HD Analog Audio Interface | AUDIO1 |
| 5 | Single Port RJ45 Connector | LAN1 |
| 6 | Dual Ports RJ45 Connector | LAN12 |
| 7 | USB 3.0 Connector | USB12 |
| 8 | USB 3.0 Connector | USB34 |
| 9 | LVDS Backlight Inverter Power Header | INV1 |
| 10 | LVDS Panel Voltage Selection Header | JLVDS1 |
| 11 | LVDS Panel Header | LVDS_EDP1 |
| 12 | MCU Programming Header | JCAN2 |
| 13 | CAN BUS Header | CAN1 |
| 14 | Low Pin Count Header | LPC1 |
| 15 | SPI Programming Pin Header | SPI_CN1 |
| 16 | CMOS Battery Connector | BAT1 |
| 17 | General Purpose I/O Pin Header | GPIO1 |
| 18 | COMS Mode Selection | JCMOS1 |
| 19 | AT/ATX Mode Selection | PSON1 |
| 20 | Serial Bus Header | JFP2 |
| 21 | PWRBTN#/ RESET#/HDD LED/ Power LED Header | JFP1 |
| 22 | SATA Power Header | SATA_PWR1 |
| 23 | SATA Signal Connector | SATA1 |
| 24 | COM Port Header | COM1 |
| 25 | COM Port Header | COM2 |
| 26 | MINIPCIE and mSATA Connector | MINI-PCIE1 |
| 27 | Next Generation Form Factor | M.2_1 |
| 28 | CPU FAN Connector | CPUFAN1 |
| 29 | DDR3L SO-DIMM Socket | DIMMA1 |
| 30 | CPU-System on Chip | SOC1 |
| 31 | BIOS Flash | SPI1 |

1.5 Board Layout: Jumper and Connector Locations

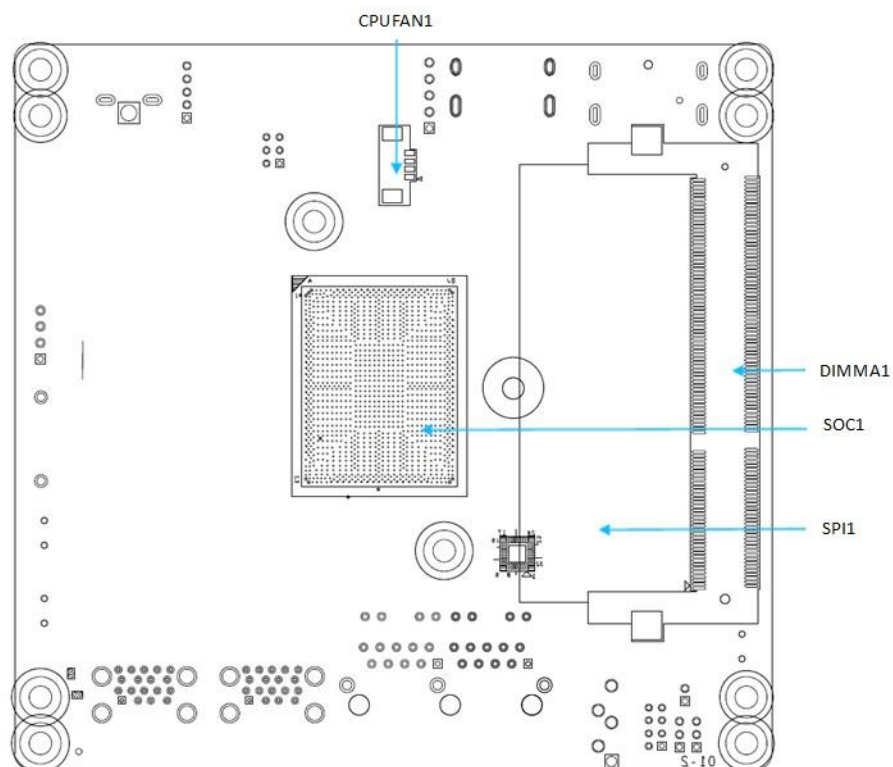


Figure 1.1 Jumper and Connector Locations

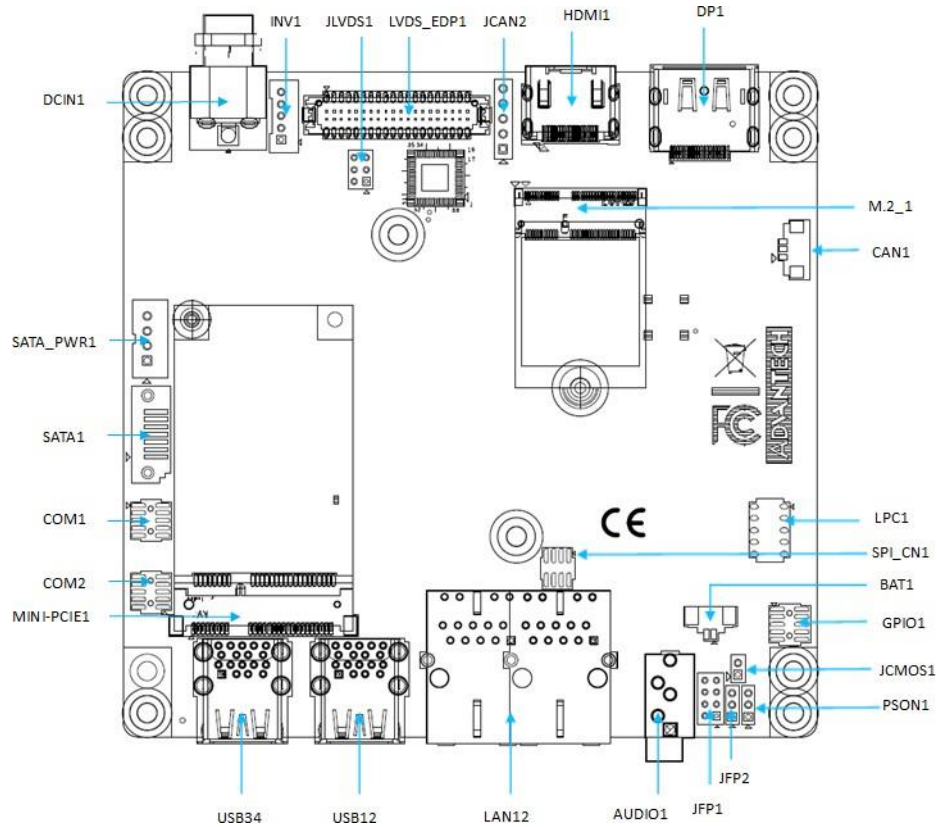


Figure 1.2 I/O Connectors

1.6 AIMB-U117 Board Diagram

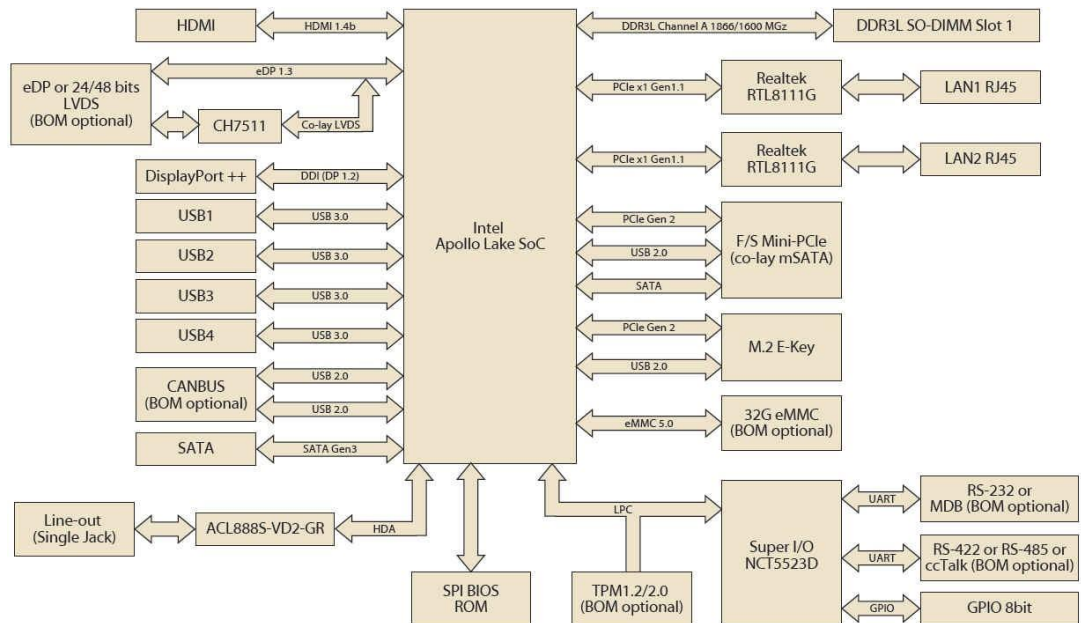


Figure 1.3 AIMB-U117 Board Diagram

1.7 Safety Precautions

Warning! Always completely disconnect the power cord from the chassis when working with the hardware. Do not connect devices while the power is on. Sensitive electronic components can be damaged by sudden power surges. Only experienced electronics personnel should open the PC chassis.



Caution! Always ground yourself to remove any static charge before touching the motherboard. Modern electronic devices are very sensitive to electro-static discharges. As a safety precaution, use a grounding wrist strap at all times. Place all electronic components on a static-dissipative surface or in a static-shielded bag when not in the chassis.



Caution! The computer is provided with a battery-powered real-time clock circuit. There is a danger of explosion if the battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer. Discard used batteries according to the manufacturer's instructions.



Caution! There is a danger of a new battery exploding if incorrectly installed. Do not attempt to recharge, force open, or heat the battery. Replace the battery only with the same or equivalent type recommended by the manufacturer. Discard used batteries according to the manufacturer's instructions.



1.8 Jumper Options

This section provides instructions on how to configure the motherboard by setting jumpers, and also outlines the default motherboard settings and options for each jumper.

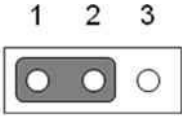
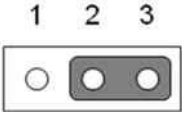
1.8.1 Setting Jumpers

The motherboard can be configured according to the application requirements with the setting of jumpers. A jumper is a metal bridge used to close an electrical circuit. Jumpers typically consist of two metal pins and a small metal clip (often protected by a plastic cover) that slides over the pins to connect them. To “close” (or turn ON) a jumper, connect the pins with the clip. To “open” (or turn OFF) a jumper, simply remove the clip. Some jumpers comprise a set of three pins, labeled 1, 2, and 3. With these jumpers, simply connect either Pins 1 and 2, or Pins 2 and 3. A pair of needle-nose pliers may be necessary for setting jumpers.

1.8.2 CMOS Mode Selection (JCMOS1)

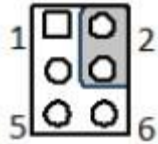
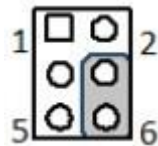
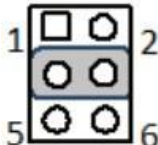
The AIMB-U117 motherboard contains a jumper that can erase CMOS data and reset the system BIOS information. To reset the CMOS data, put jumper to Pins 1 & 2 as closed for a few seconds. This procedure resets the CMOS to its default settings.

Table 1.2: CMOS Mode Selection (JCMOS1)

| Function | Setting |
|------------------------|--|
| Normal (1-2) (Default) |  |
| Clear CMOS Data (2-3) |  |

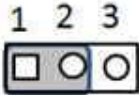
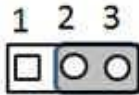
1.8.3 LVDS Panel Voltage Selection Header (JLVDS1)

Table 1.3: LVDS/eDP Panel Voltage Selection (JLVDS1/JLVDS2)

| Function | Setting |
|---|--|
| Set LVDS Panel as +5V (2-4) |  |
| Set LVDS Panel as +3.3V (Default) (4-6) |  |
| Set LVDS Panel as +12V (3-4) |  |

1.8.4 ATX/AT Mode Selection (PSON1)

Table 1.4: PSON1: ATX and AT Mode Selector

| Function | Jumper Setting |
|-------------------------|---|
| AT Mode(1-2) |  |
| ATX Mode (2-3)(Default) |  |

Chapter 2

Connecting Peripherals

2.1 Introduction

Most of the device connectors can be accessed from the top of the board during installation in the chassis. If the system is installed with several cards or the chassis is packed, partial removal of the card may be necessary to make all connections.

2.2 LAN and USB Ports (LAN12, USB12/USB34)

AIMB-U117 provides up to four USB 3.0 which located on the rear side. The USB interface complies with the USB specification revision 2.0 that supports transmission rates of up to 480 Mbps, revision 3.0 that supports transmission rates of up to 5 Gbps. The AIMB-U117 system is equipped with two high-performance 1000 Mbps Ethernet LAN adapters, both of which are supported by all major network operating systems. The RJ-45 jacks on the rear panel facilitate convenient LAN connection.

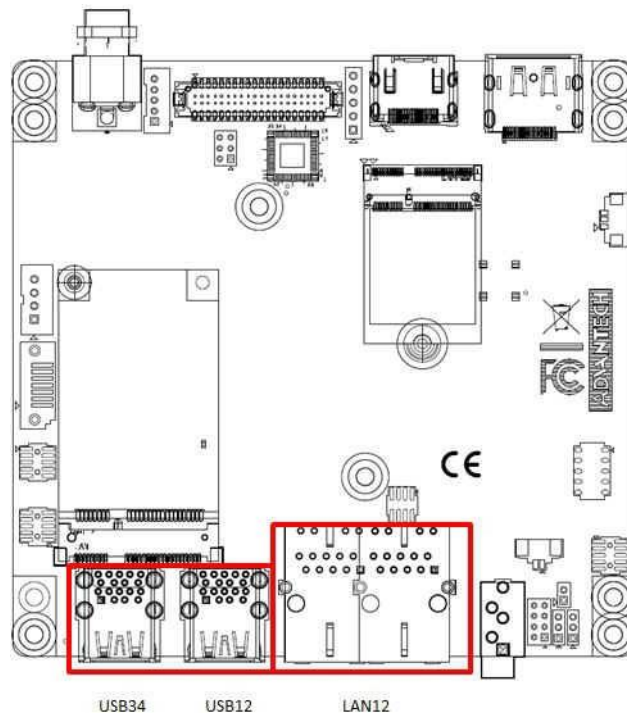
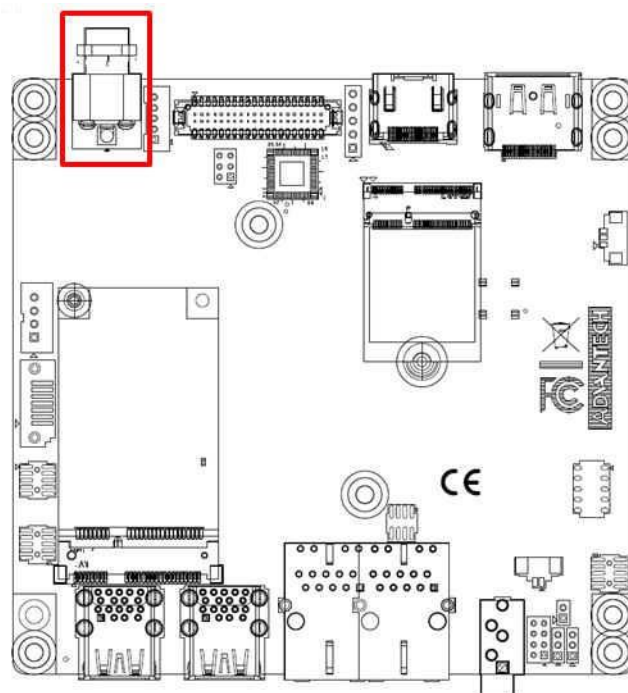


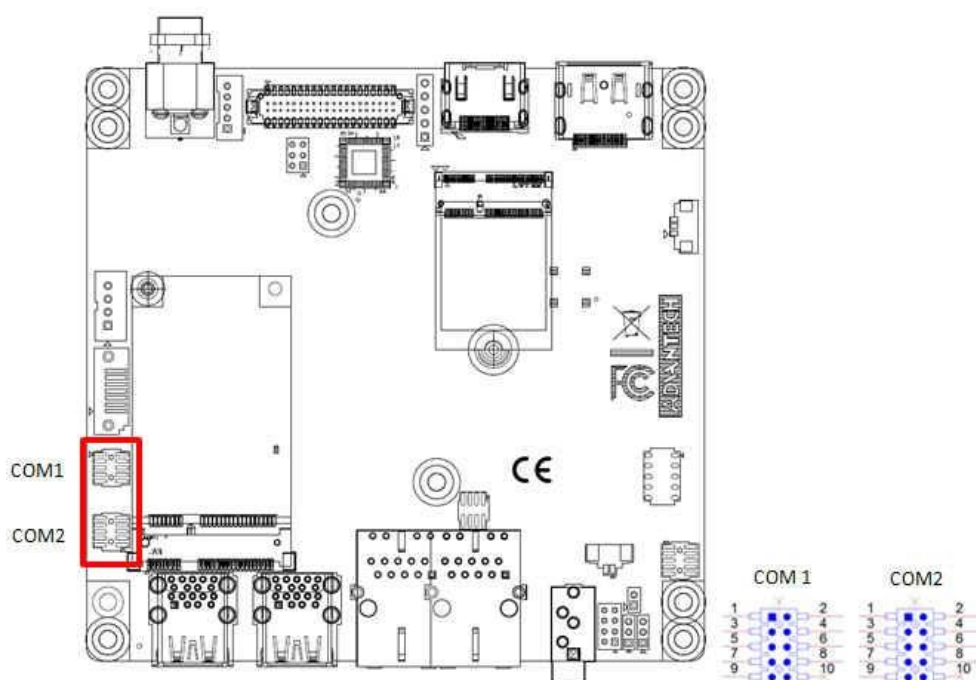
Table 2.1: LAN LED Indicators

| LAN Mode | LAN Indicator |
|------------------|---------------------|
| 1 Gbps link on | LED1 Green on |
| 100 Mbps link on | LED1 Orange on |
| Active | LED2 Green flashing |

2.3 DC Input Connector (DCIN1)

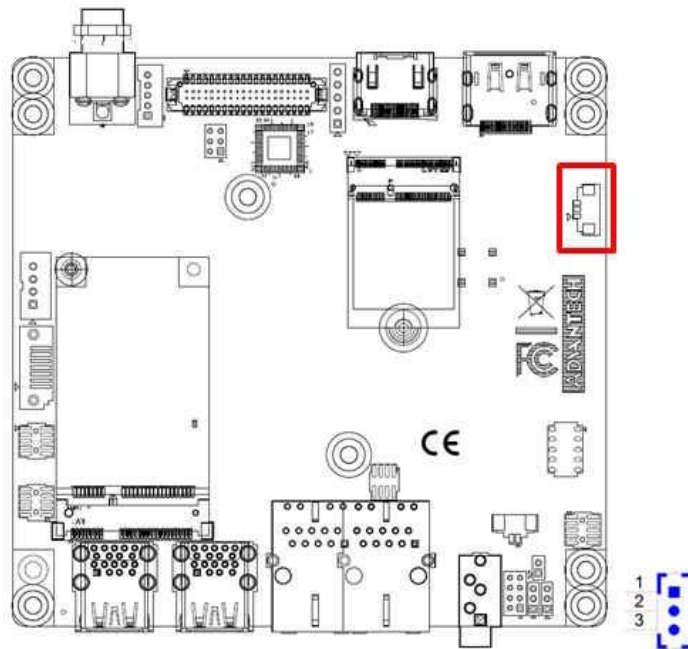


2.4 Serial Ports (COM1, COM2)

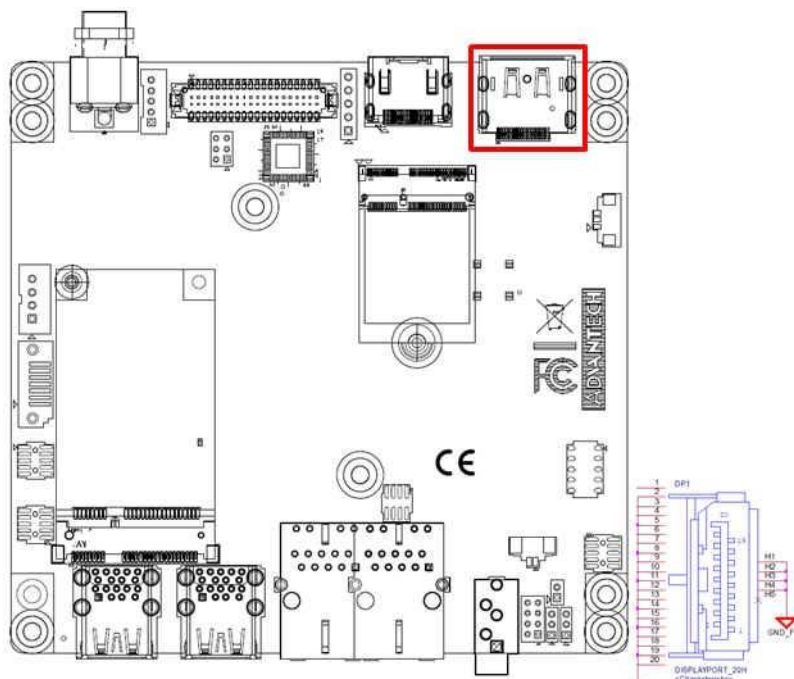


AIMB-U117 supports two serial ports. COM1 is RS-232 colay with MDB (BOM optional), COM2 is RS-422/RS-485 (default is RS-422) colay with CCTalk by BOM optional. The IRQ and address ranges for both ports are fixed. However, users can disable the port or change the parameters via the system BIOS setup. Users who experience problems with a serial device are advised check the connector pin assignments.

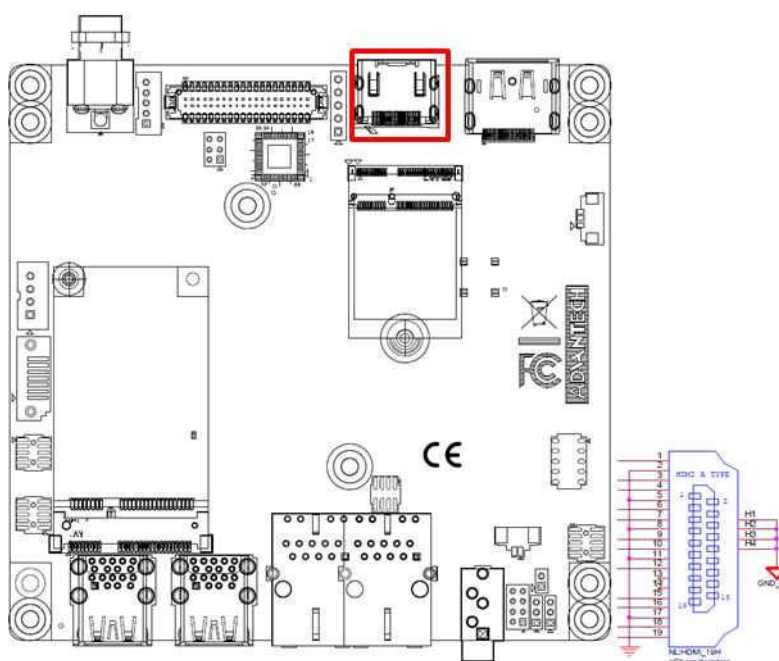
2.5 CAN BUS Header (CAN1)



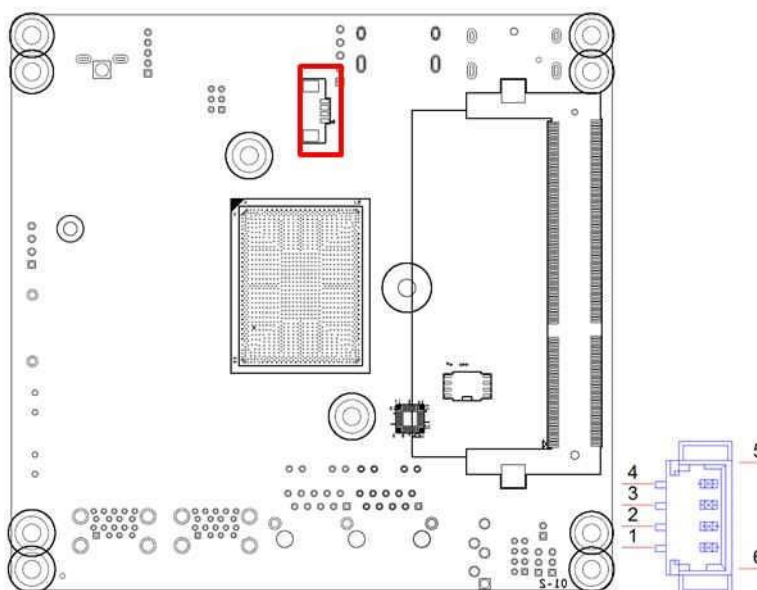
2.6 Display Port Connector (DP1)



2.7 HDMI Connector (HDMI1)

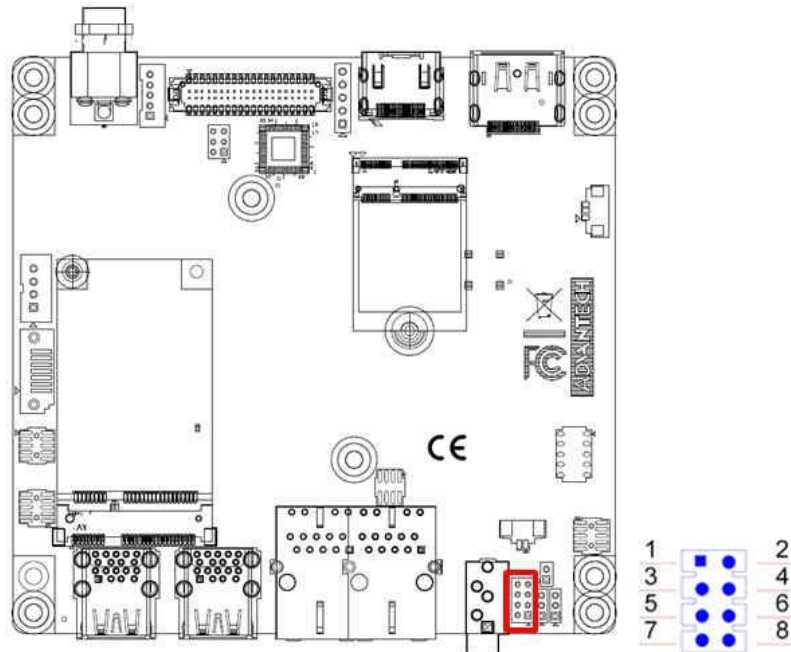


2.8 CPU FAN Connector (CPUFAN1)



2.9 Front Panel Connectors (JFP1)

Several external switches are provided for monitoring and controlling the AIMB-U117.



2.9.1 ATX Soft Power Switch (JFP1/RESET)

For computer cases equipped with ATX power supply, users should connect the Power On/Off button on the computer case for convenient Power On/Off functionality.

2.9.2 Reset (JFP1/RESET)

Many computer cases offer the convenience of a specific reset button. Connect the wire for the reset button.

2.9.3 HDD LED (JFP1/HDDLED)

An LED can be linked to the connector to indicate when the HDD is active.

2.9.4 Power LED Header (JFP1/PWR_LED)

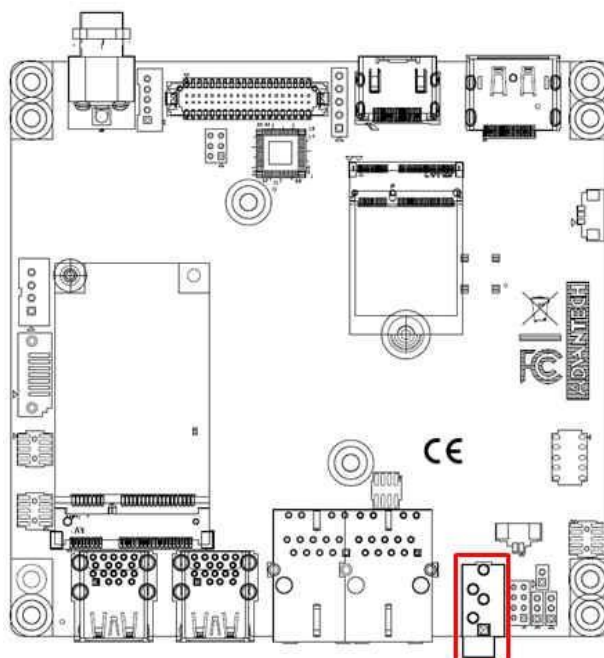
Refer to Appendix A for detailed information regarding the pin assignments. The Power LED cable should be connected to Pins 5-7.

Two power supply connection modes exist. The first is the ATX power mode, where the system is powered on/off by momentarily pressing the power button. The second is the AT power mode, where the system is powered on/off using the power supply switch. The status differences indicated by the power LED are listed in the following table:

Table 2.2: ATX Power Supply LED Status

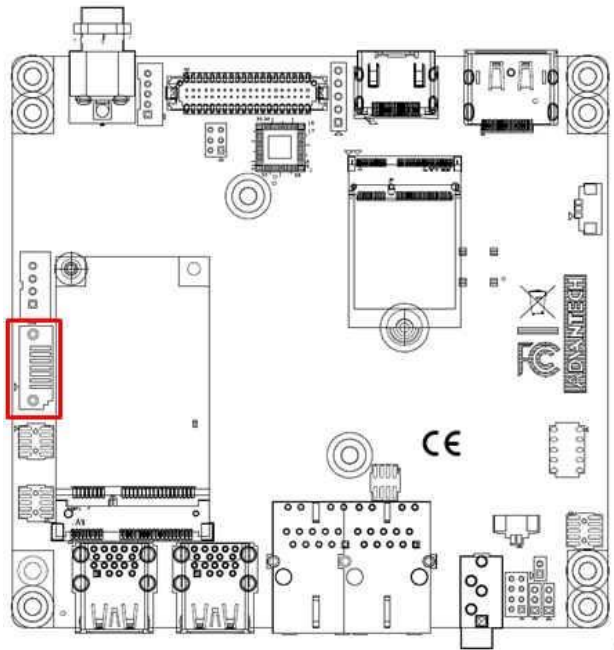
| Power Mode | LED (ATX power mode) (On/off by momentarily pressing the power button) | LED (AT power mode) (Powered on/off using the power supply switch) |
|-------------------------|--|---|
| PSON1 jumper setting | Pins 2-3 closed | Pins 1-2 closed |
| System On | On | On |
| S3 | Off | Off |
| S4 | Off | Off |
| System Off | Off | Off |

2.10 HD Analog Audio Connectors (AUDIO1)



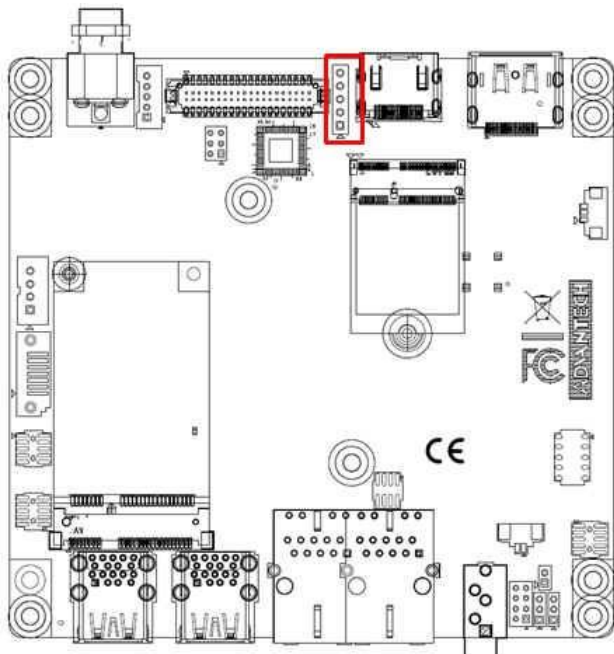
AIMB-U117 supports line-out as the default setting and can convert to Mic-in or Line-in.

2.11 Serial ATA Interface (SATA1)



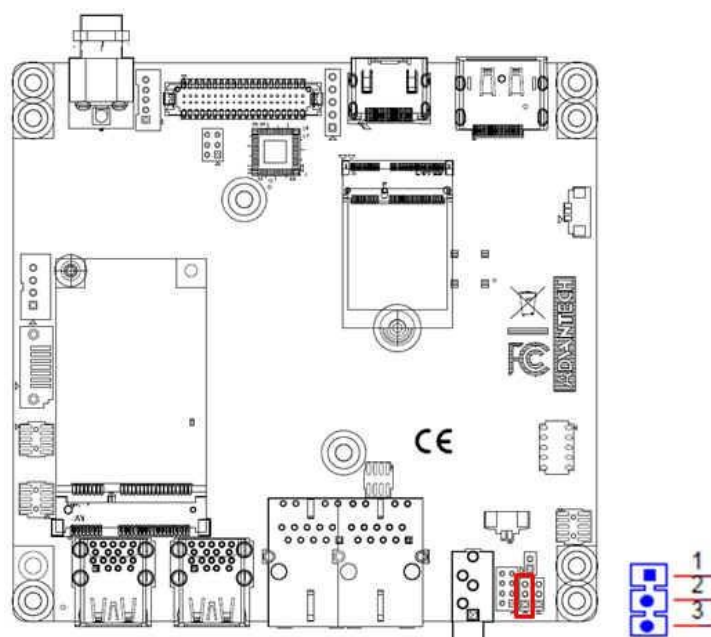
AIMB-U117 features a high-performance Serial ATA interface (up to 600 MB/s).

2.12 MCU Programming Header (JCAN2)



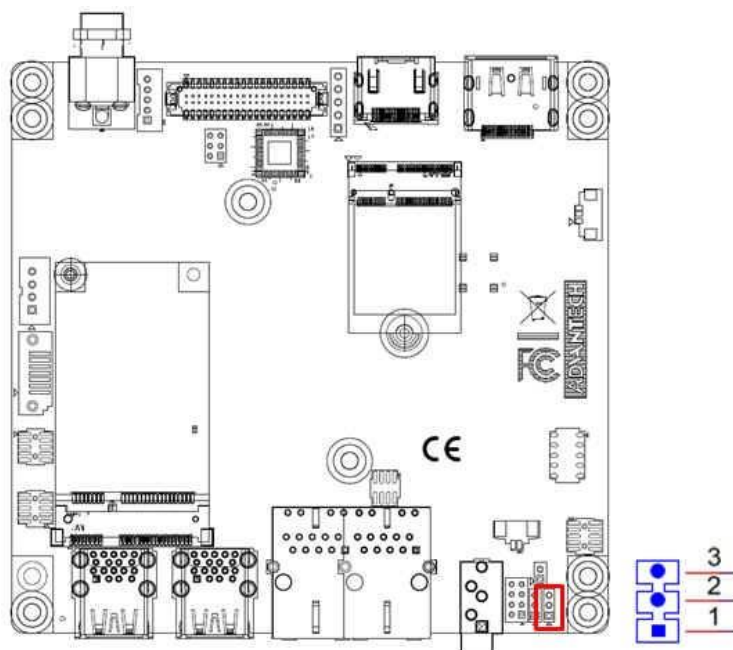
The connect supports programming the MCU for CANBus optional function.

2.13 Serial Bus Header (JFP2)



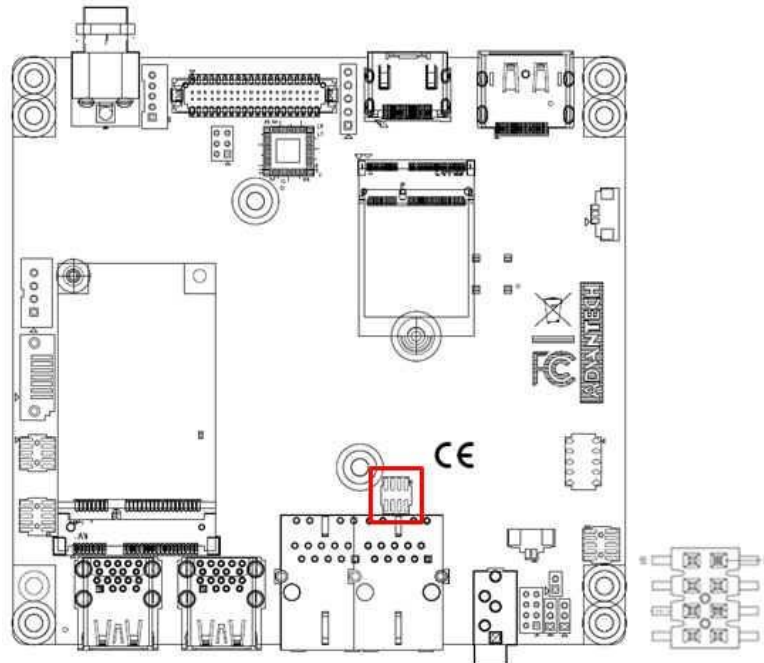
2.14 AT/ATX Mode Selection Connector (PSON1)

AIMB-U117 supports ATX/AT mode selection by jumper, the default setting is pin 2-3 ATX mode.

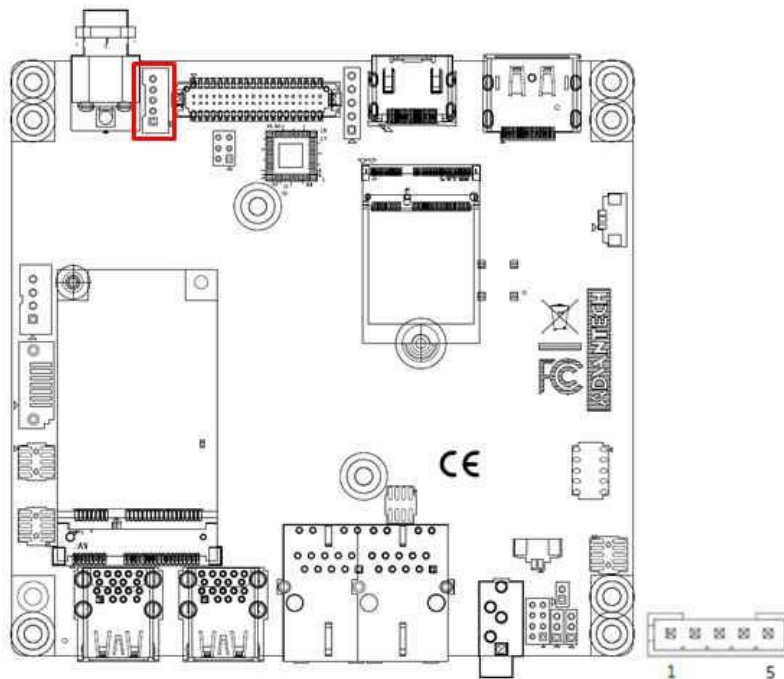


2.15 SPI Flash Connector (SPI_CN1)

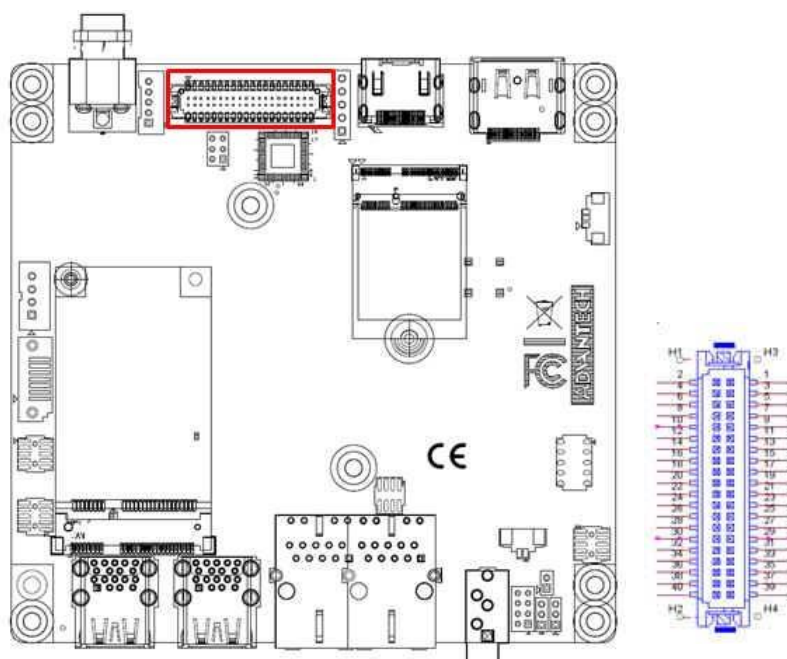
The SPI flash card pin header may be used to flash the BIOS if the AIMB-U117 cannot be powered on.



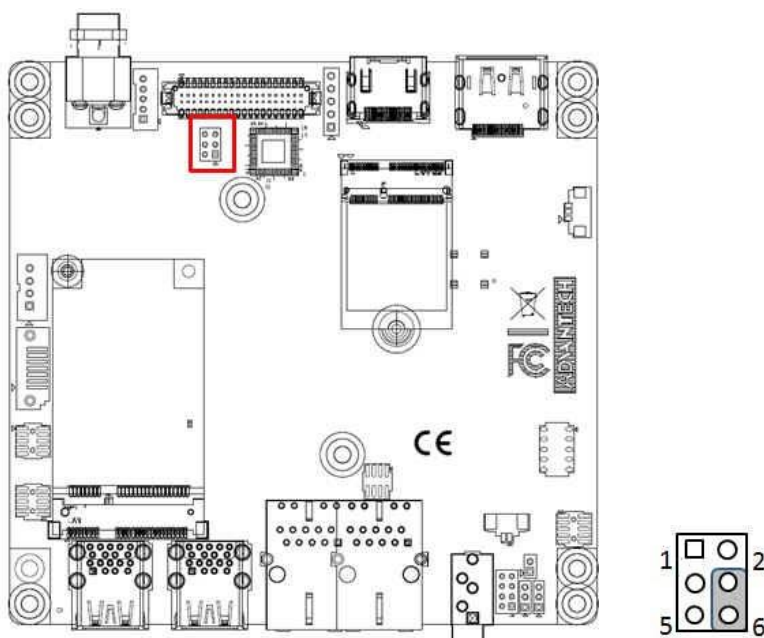
2.16 LVDS Backlight Inverter Power Connector (INV1)



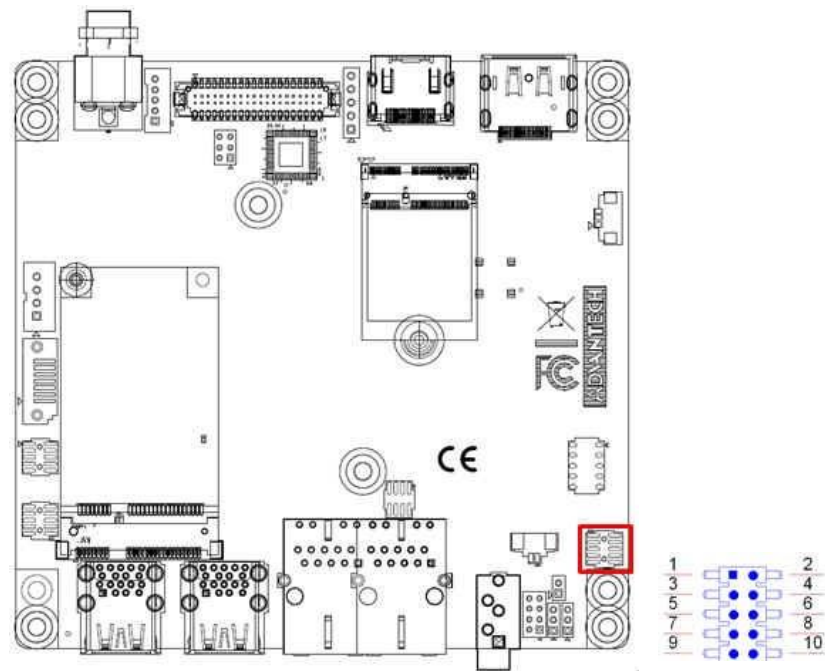
2.17 LVDS Panel Header (LVDS_EDP1), BOM Optional



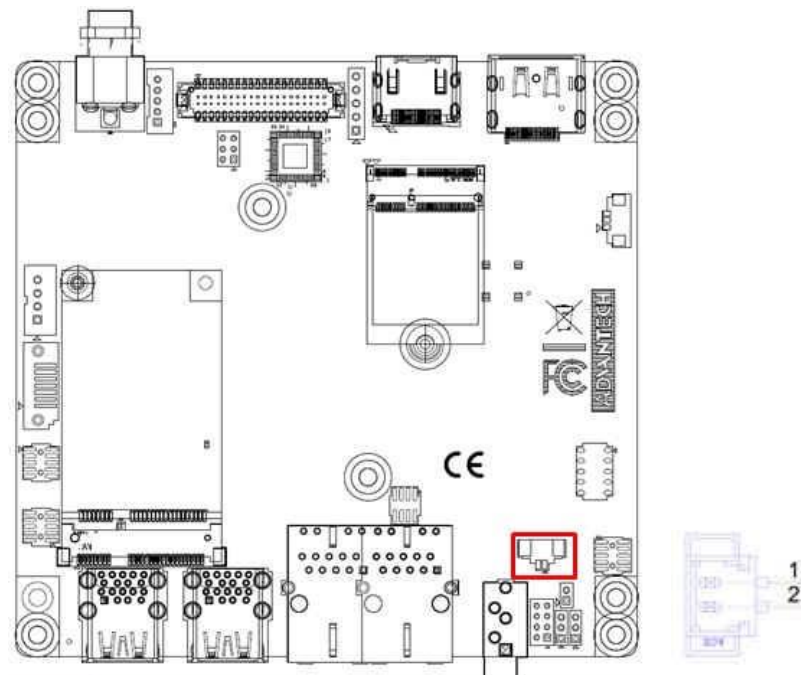
2.18 LVDS Panel Voltage Selection Header (JLVDS1)



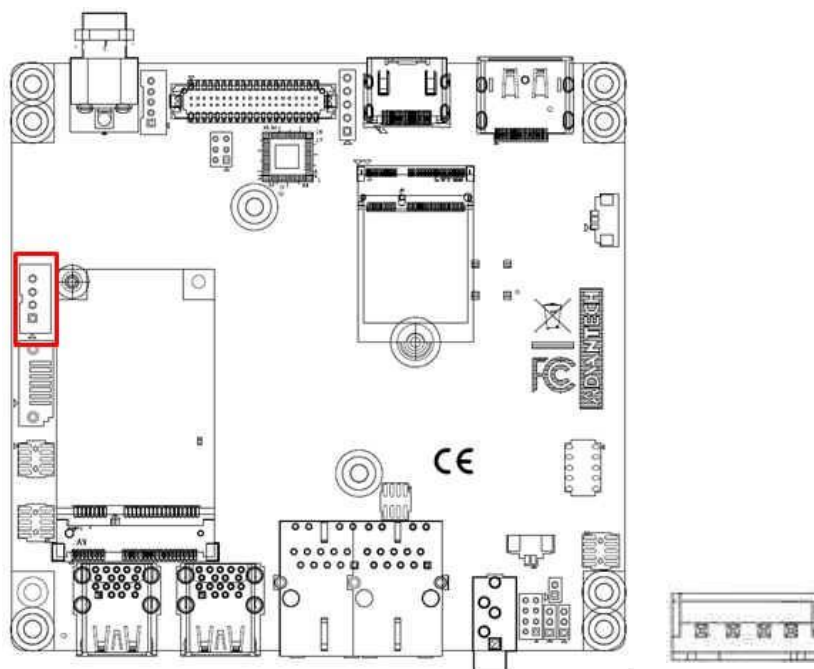
2.19 General Purpose I/O Connector (GPIO1)



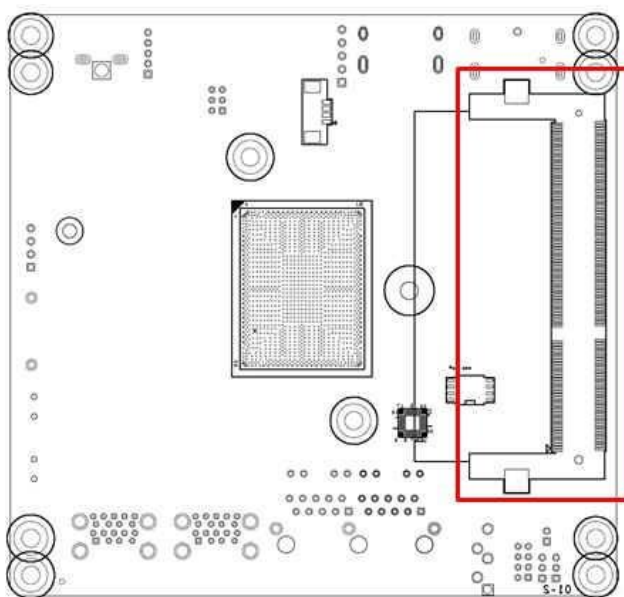
2.20 CMOS Battery Connector (BAT1)



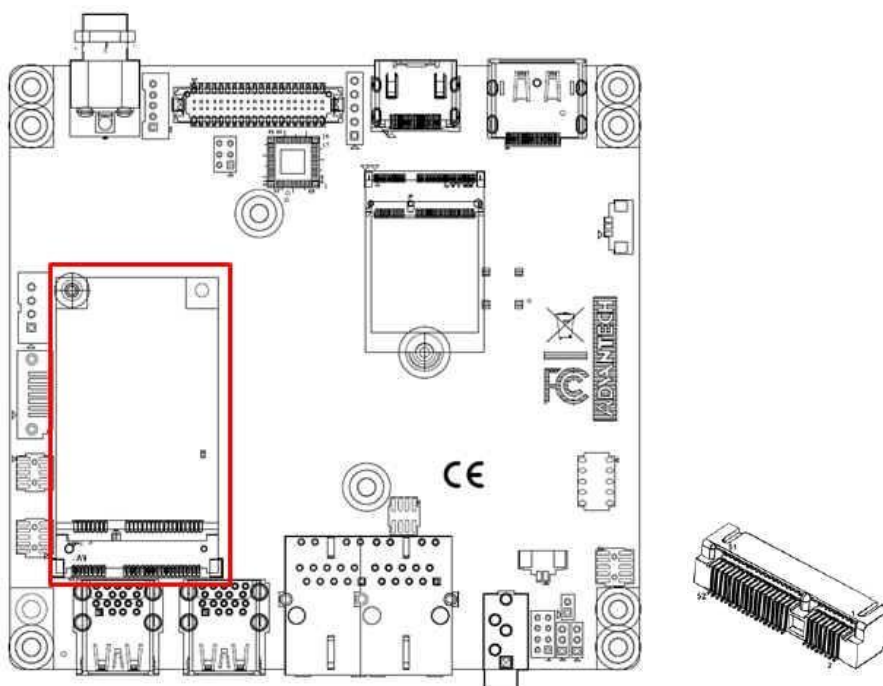
2.21 SATA Power Connector (SATA_PWR1)



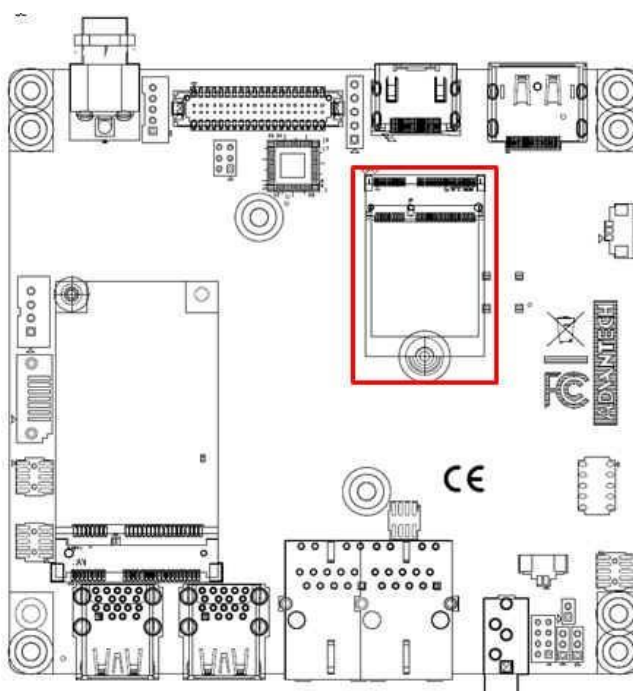
2.22 DDR3L SODIMM Socket (DIMMA1)



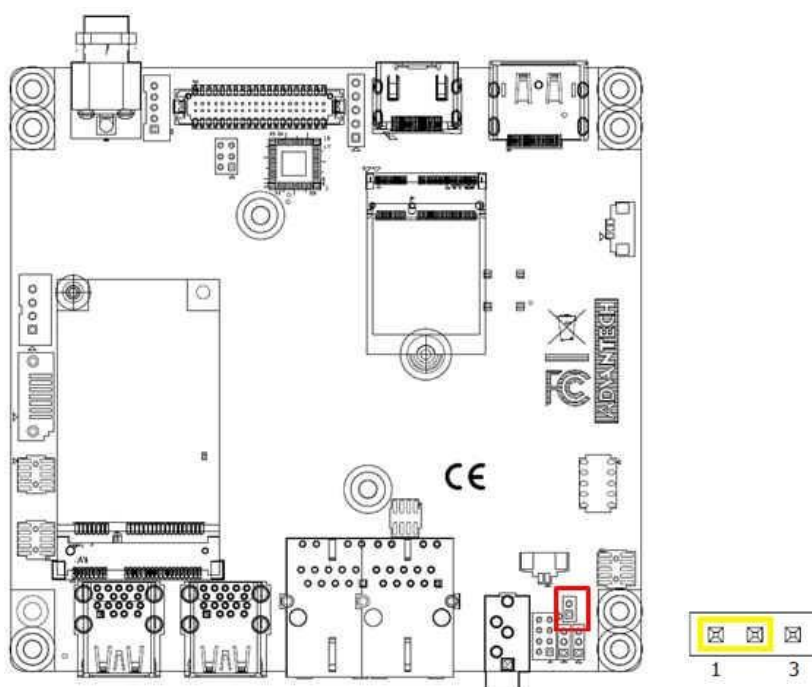
223 Mini-PCle Connector (MINI-PCIE1)



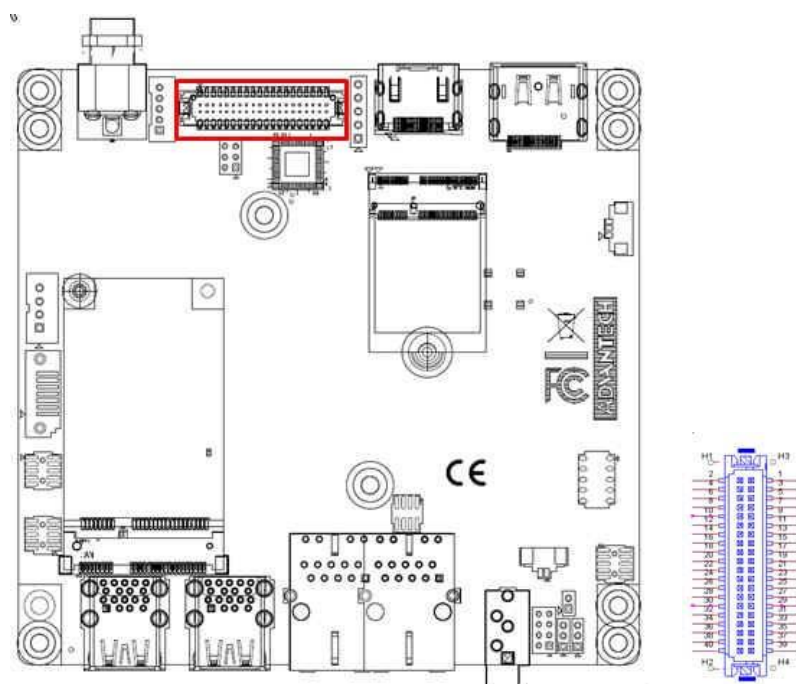
224 M.2 E key Connector (M.2_1)



2.25 CMOS Clear Jumper (JCMOS1)

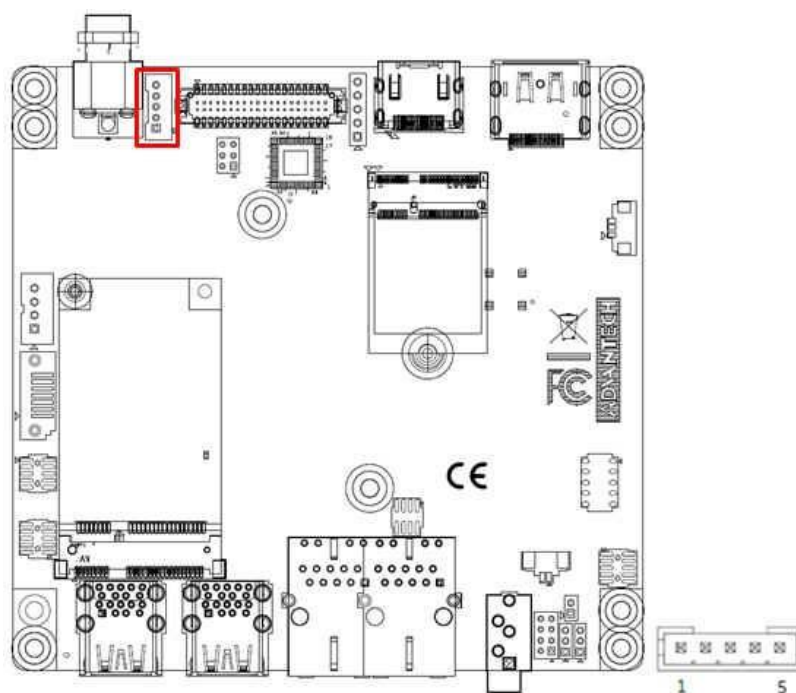


2.26 eDP Connector (LVDS_EDP1)

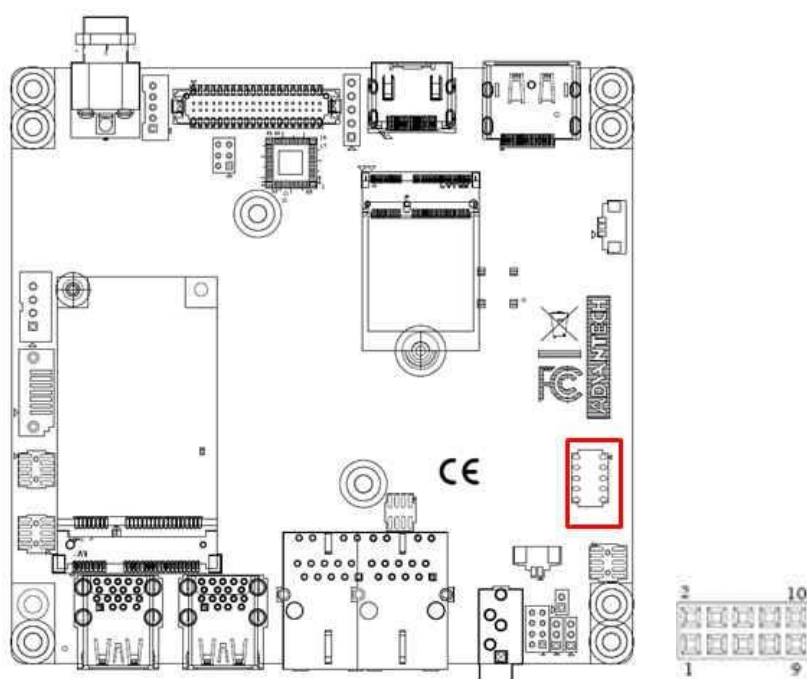


AIMB-U217 supports Non-ECC single channel SODIMM SDRAM, maximum capacity up to 8GB.

227 eDP Backlight Inverter Power Connector (INV1)



228 Low Pin Count Header (LPC1)



Chapter 3

BIOS Operation

3.1 Introduction

With the AMI BIOS Setup program, users can modify the BIOS settings and control the special system features. The Setup program comprises several menus with options for adjusting or turning special features on or off. This chapter describes the basic navigation of the AIMB-U117 BIOS setup menu pages.

3.2 BIOS Setup

The AIMB-U117 Series is equipped with built-in AMI BIOS and a CMOS Setup Utility that allows users to configure specific settings or activate certain system features.

The CMOS Setup Utility saves the configuration in the CMOS RAM of the motherboard. When the system power is turned off, the battery on the board supplies the necessary power to preserve the CMOS RAM.

When the power is turned on, press the button during the BIOS power-on self-test (POST) to access the CMOS Setup Utility screen.

| Control Keys | |
|----------------------|---|
| < ↑ >< ↓ >< ← >< → > | Move select item |
| <Enter> | Select item |
| <Esc> | Main Menu - Quit without saving changes to the CMOS Sub Menu - Exit current page and return to the Main Menu |
| <Page Up/+> | Increase the numeric value or make changes |
| <Page Down/-> | Decrease the numeric value or make changes |
| <F1> | General help, for Setup Sub Menu |
| <F2> | Item help |
| <F5> | Load previous values |
| <F7> | Load setup defaults |
| <F10> | Save all CMOS changes |

3.2.1 Main Menu

Press to enter the AMI BIOS CMOS Setup Utility, the Main Menu will appear on the screen. Use the arrow keys to select items and press <Enter> to access the submenu.



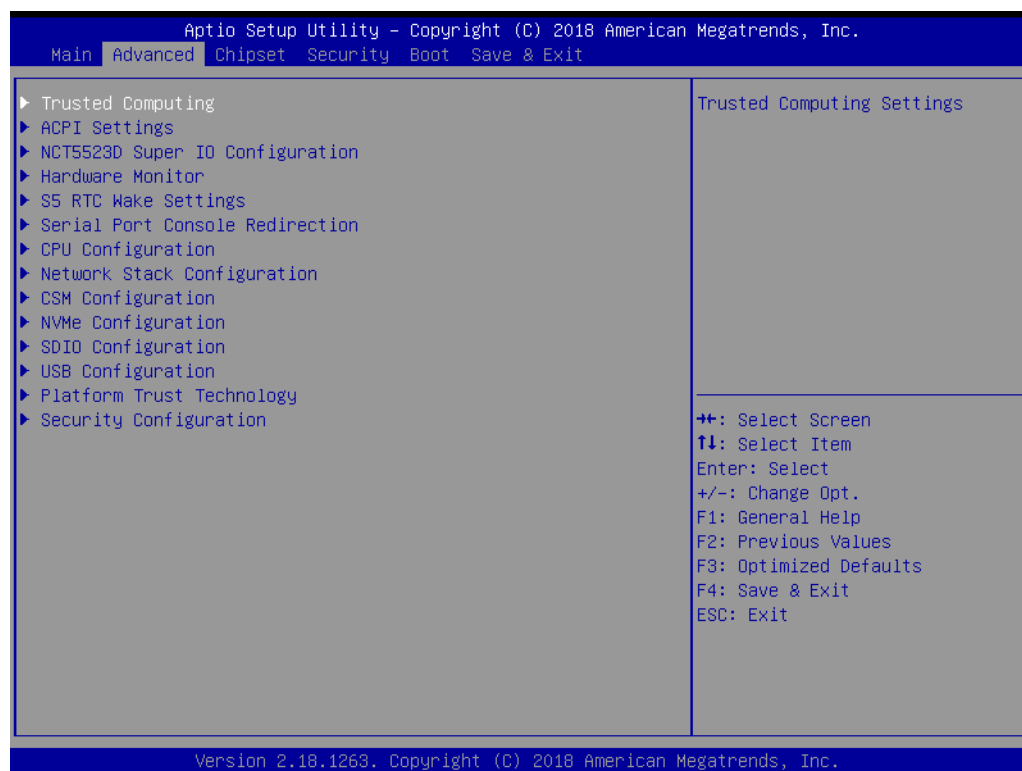
The Main BIOS setup screen has two main frames. The left frame displays all the options that can be configured. Grayed-out options cannot be configured; options in blue can. The right frame displays the key legend.

Above the key legend is an area reserved for a text message. When an option is selected in the left frame, it is highlighted in white. Often a text message will accompany it.

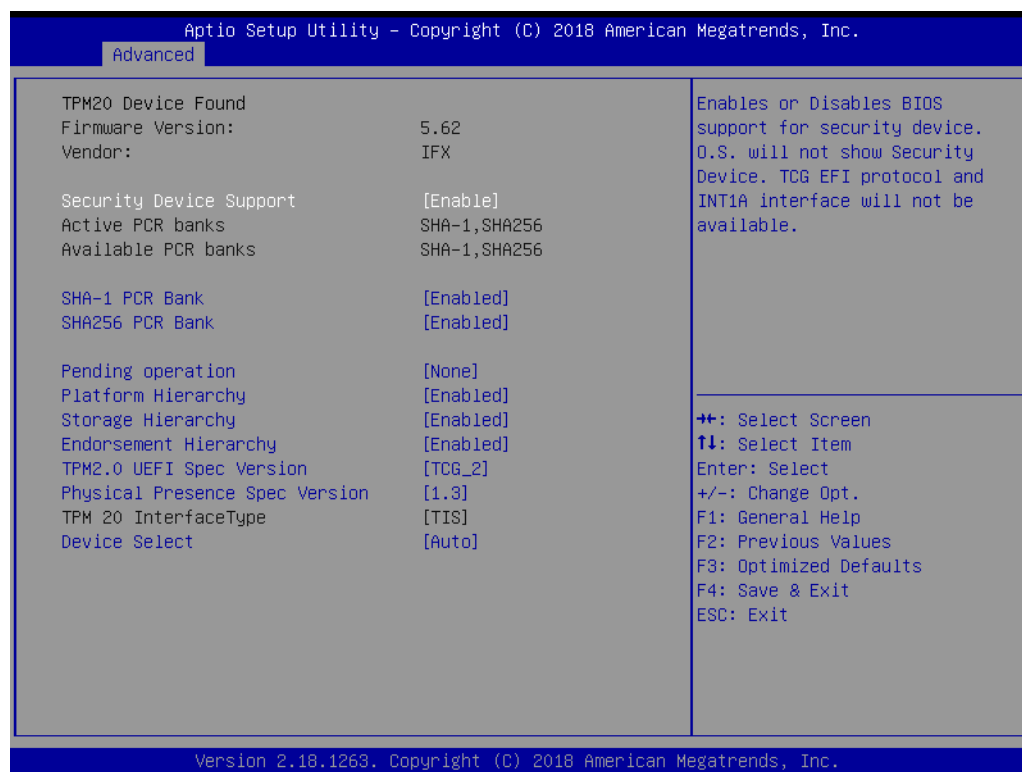
■ System Time/System Date

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

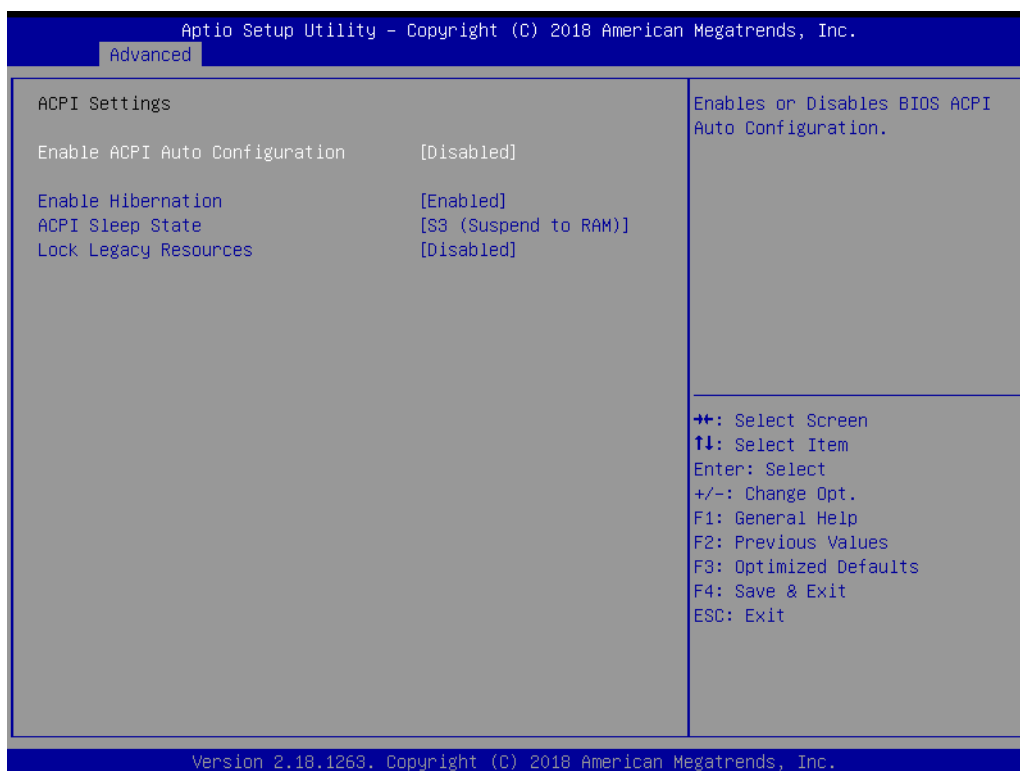
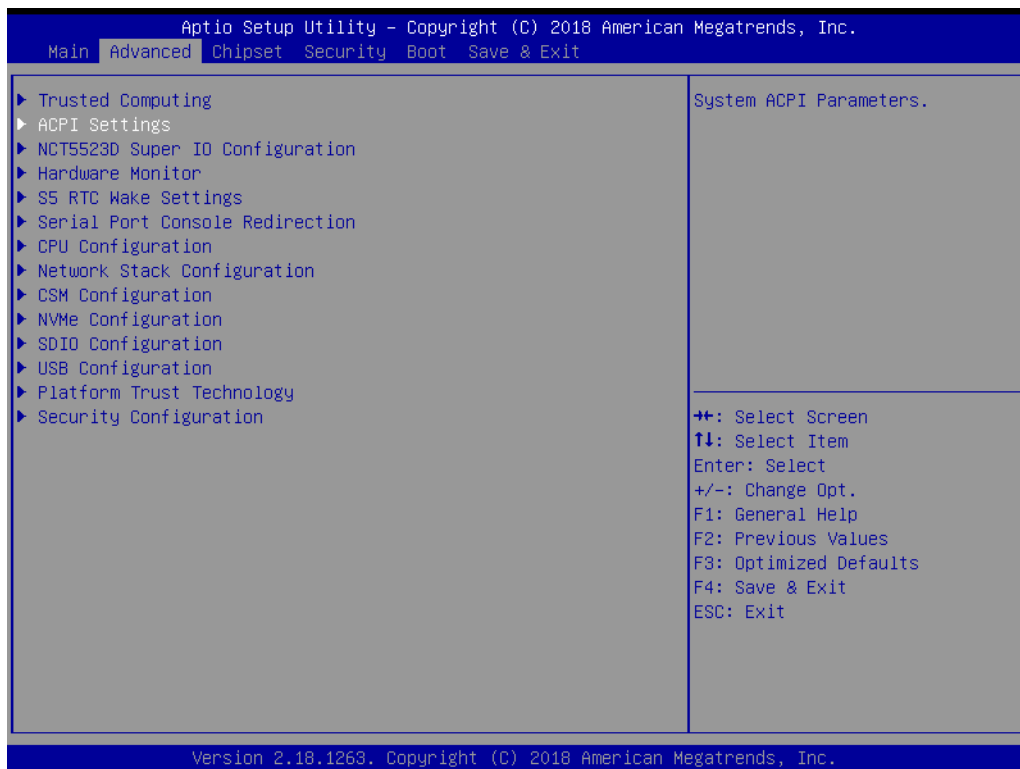
3.2.1.1 Trusted Computing



- **Security Device Support**
Enable or disable BIOS support for security device.



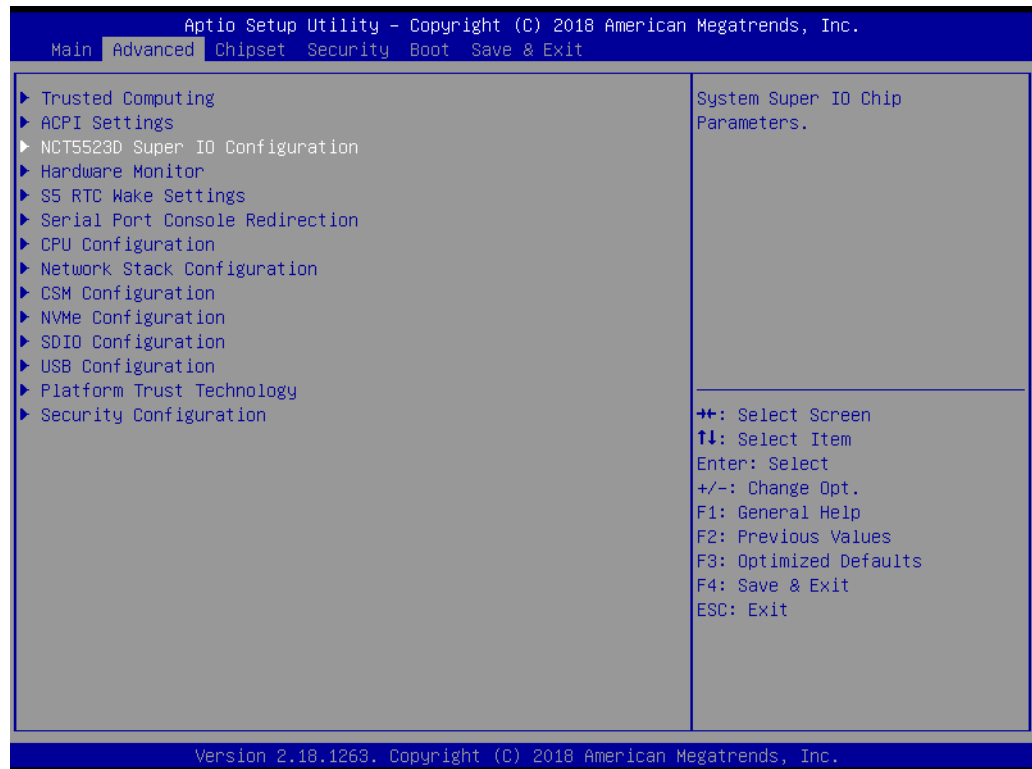
3.2.1.2 ACPI Settings

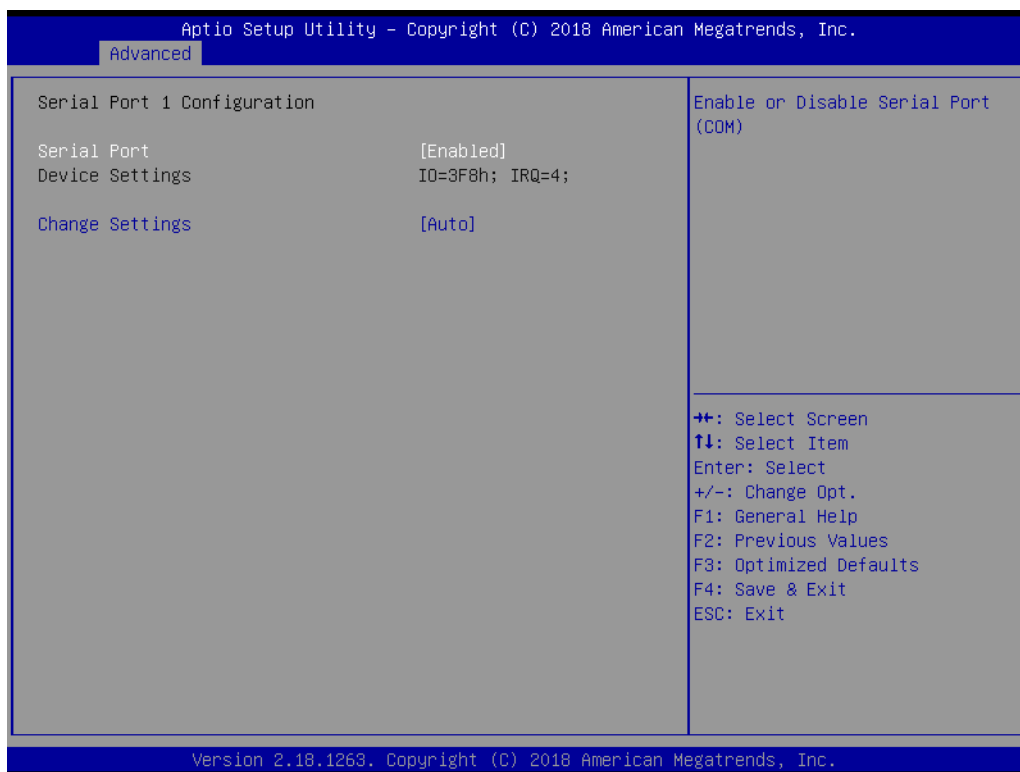


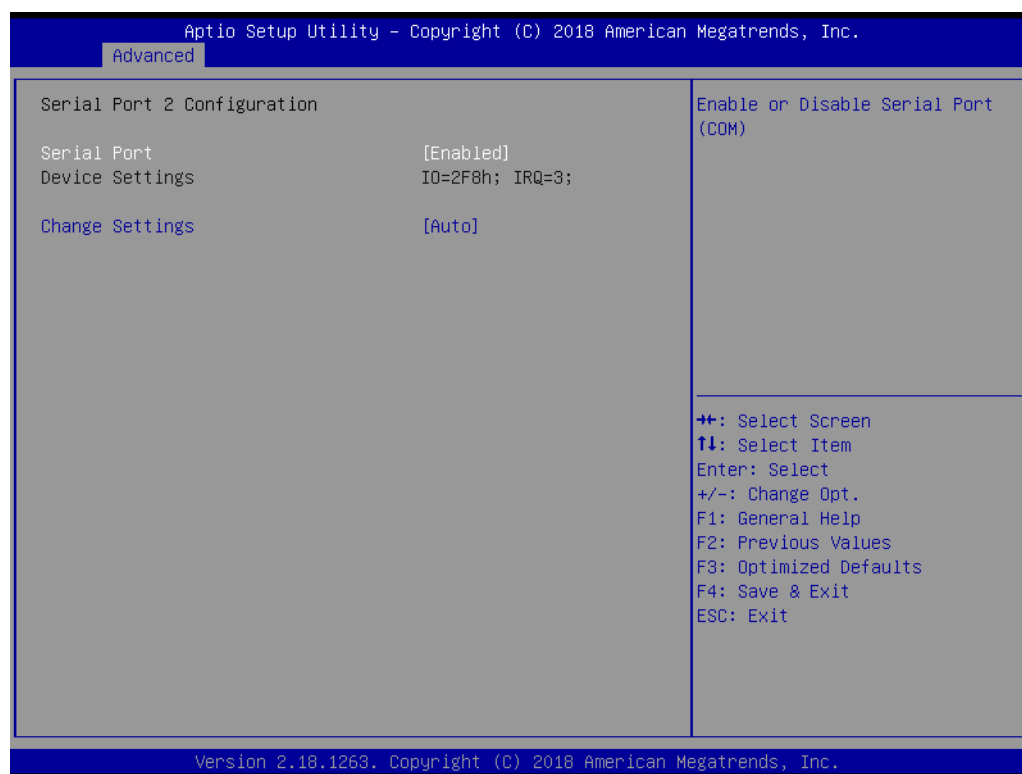
- **Enable ACPI Auto Configuration**
Enable or Disable ACPI Auto Configuration.
- **Enable Hibernation**
This item allows users to enable or disable hibernation.

- **ACPI Sleep State**
This item allows users to set the ACPI sleep state.
- **Lock Legacy Resources**
This item allows users to lock legacy device resources.

3.2.1.3 Super I/O Configuration



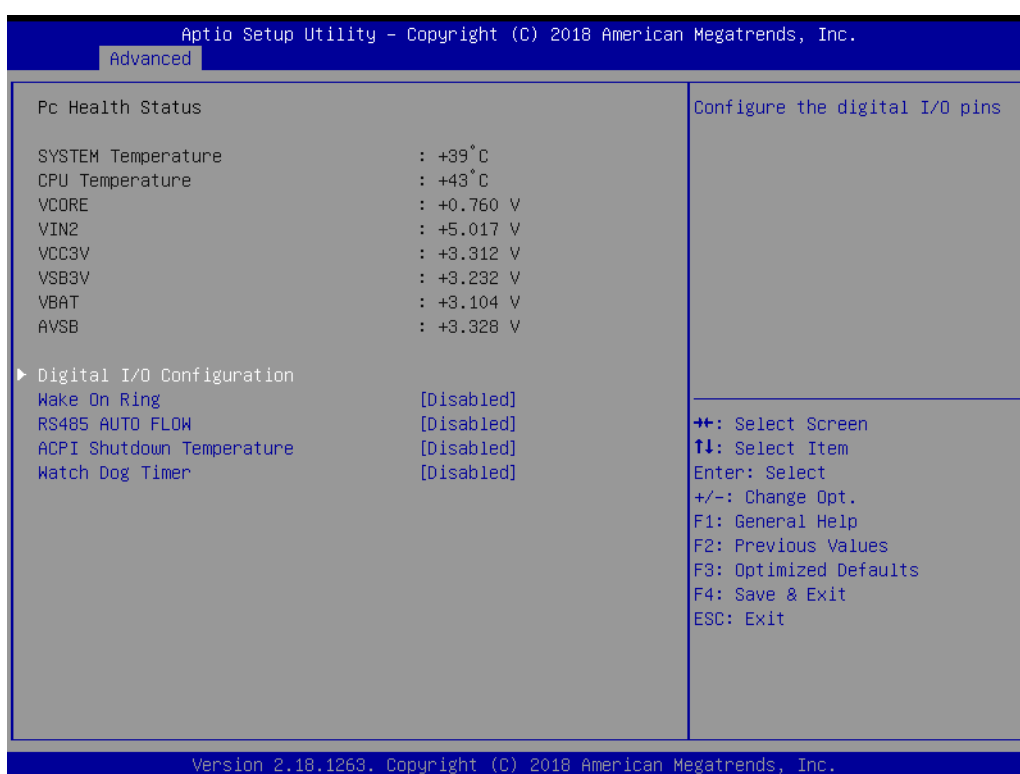
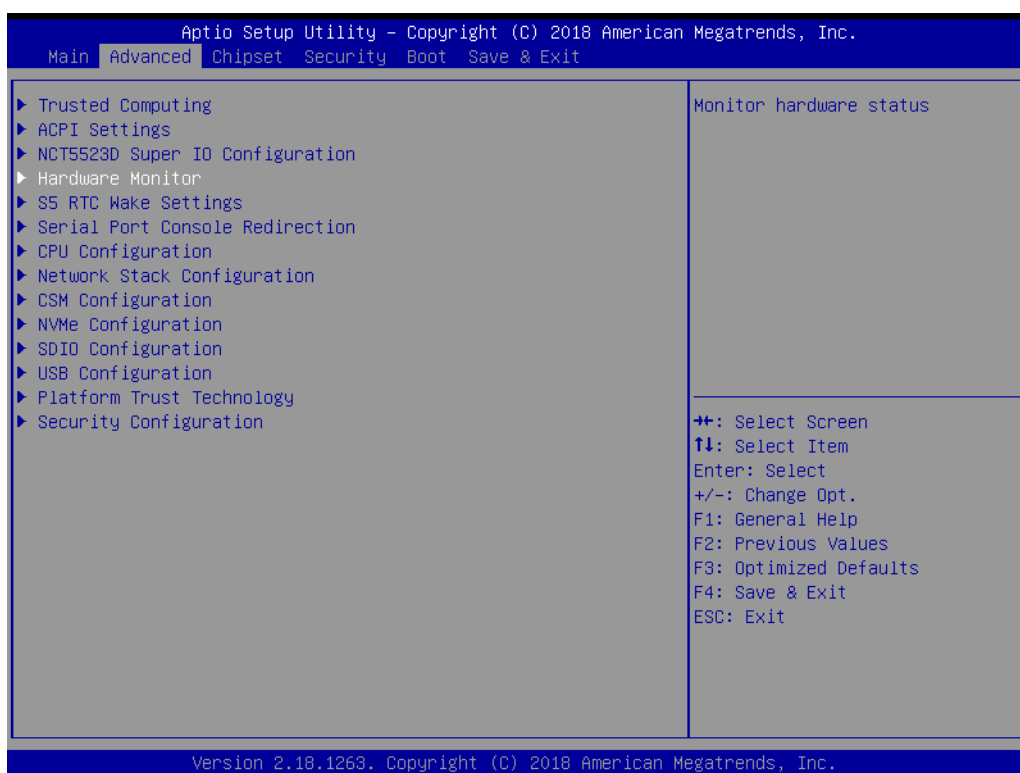




- **Serial Ports 1/2**
This item allows users to enable or disable serial ports 1/2.
- **Change Settings**
This item allows users to change the serial port 1/2 setting.

3.2.1.4 Hardware Monitor

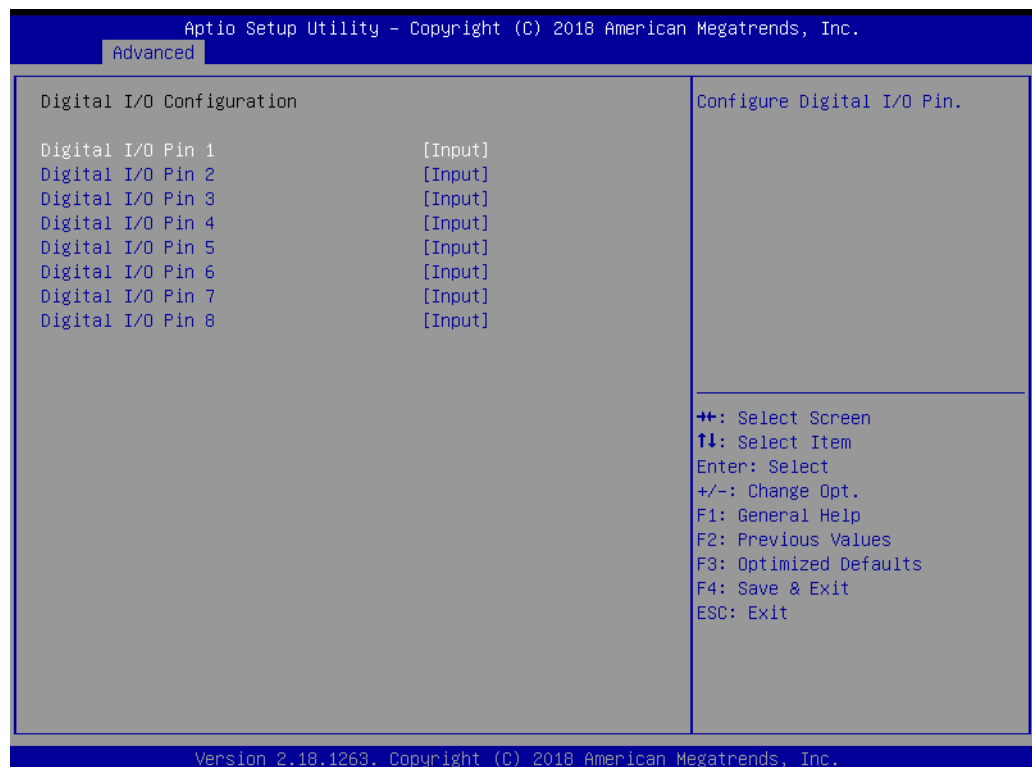
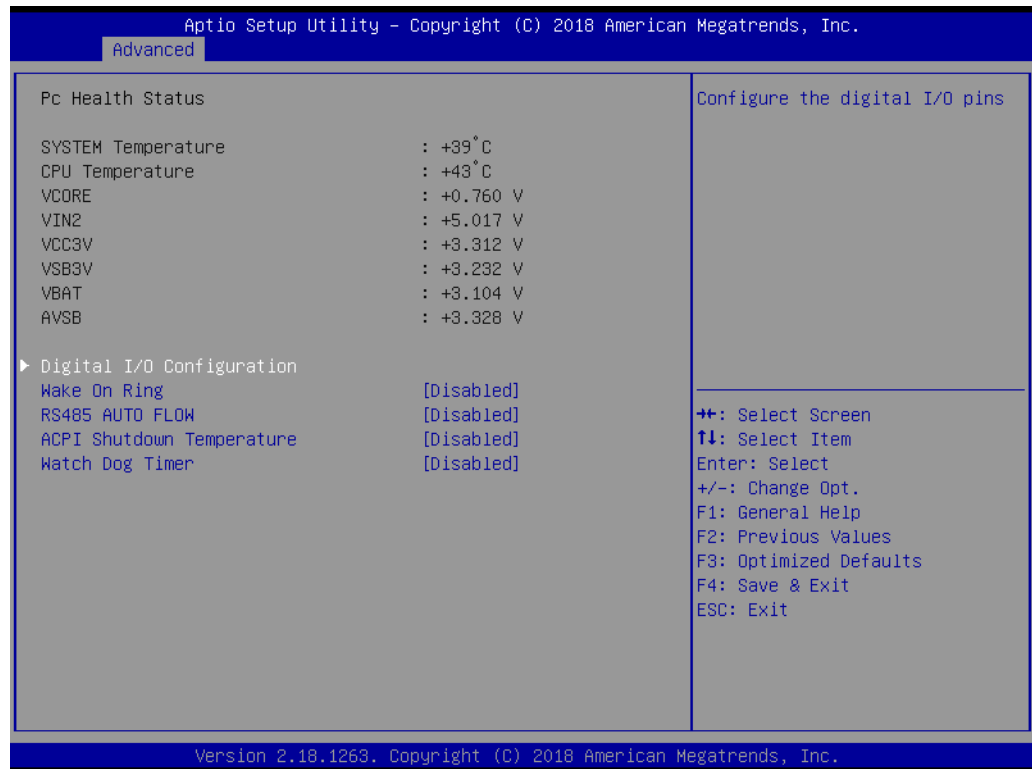
This page shows the AIMB-U117 PC health status.



- **Wake On Ring**
This item allows users to enable or disable Wake On Ring functionality.
- **RS-485 AUTO FLOW**
This item allows users to enable or disable the RS-485 AUTO FLOW function.

- **ACPI Shutdown Temperature**
This item allows users to set the CPU temperature threshold at which the system automatically shuts down to prevent the CPU from overheating.
- **Watchdog Timer**
This item allows users to enable or disable the Watchdog timer.

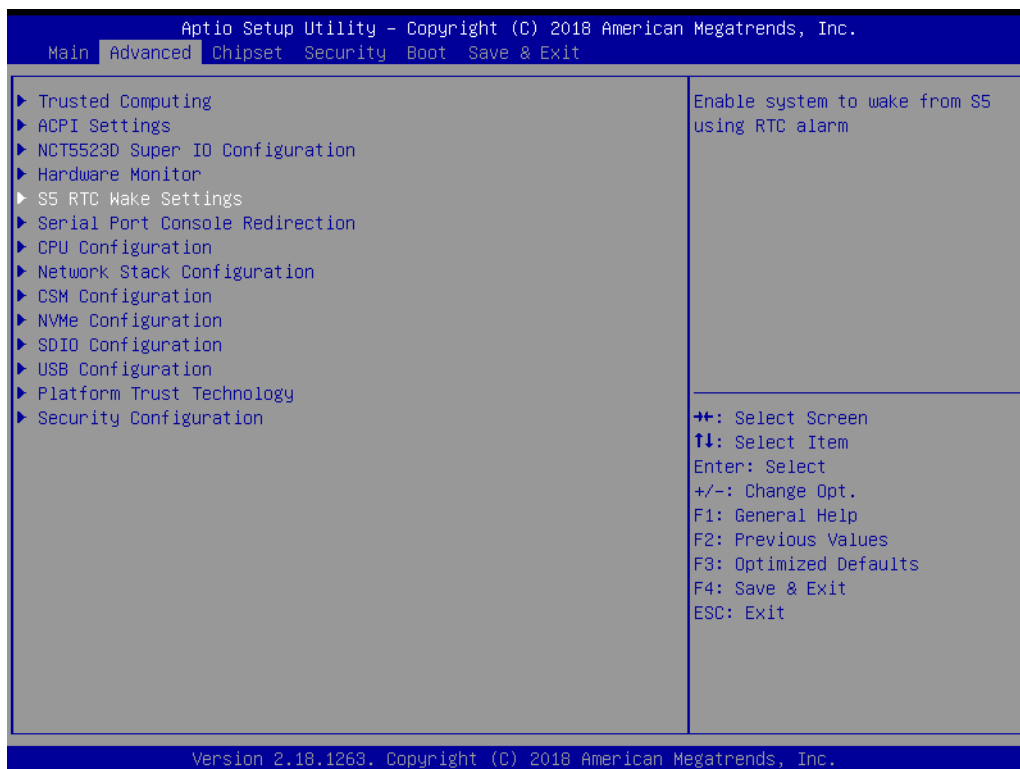
3.2.1.5 Digital I/O Configuration



■ Digital I/O Configuration

This item will allow users to set up Digital I/O 1~8 to "input" or "output".

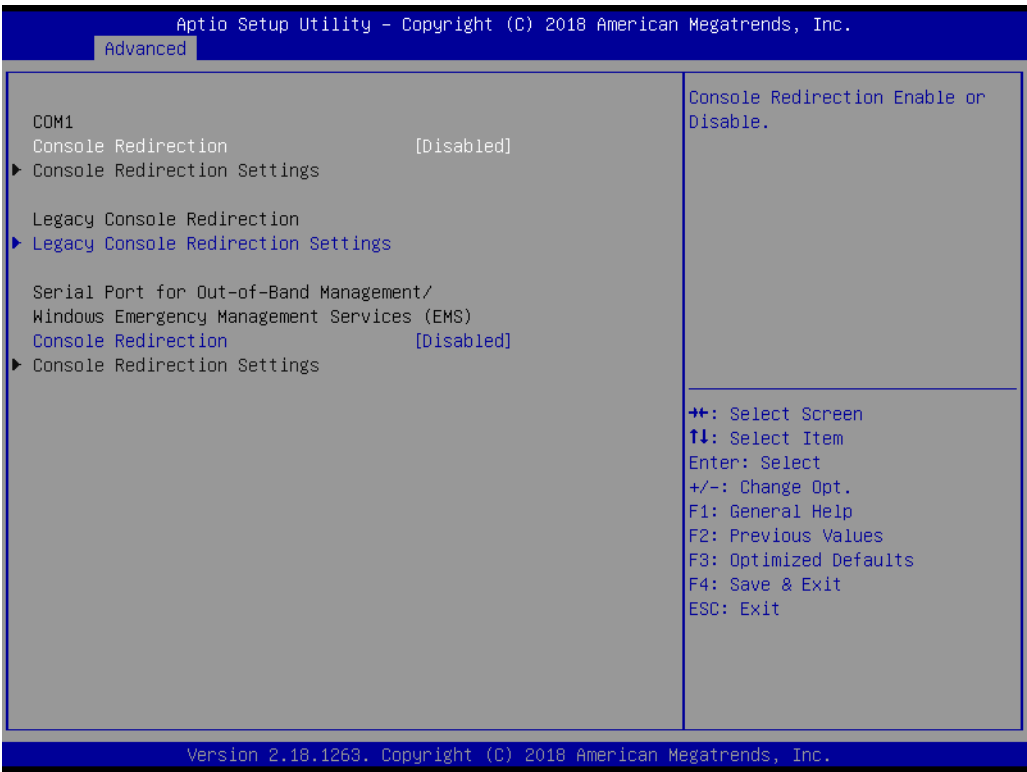
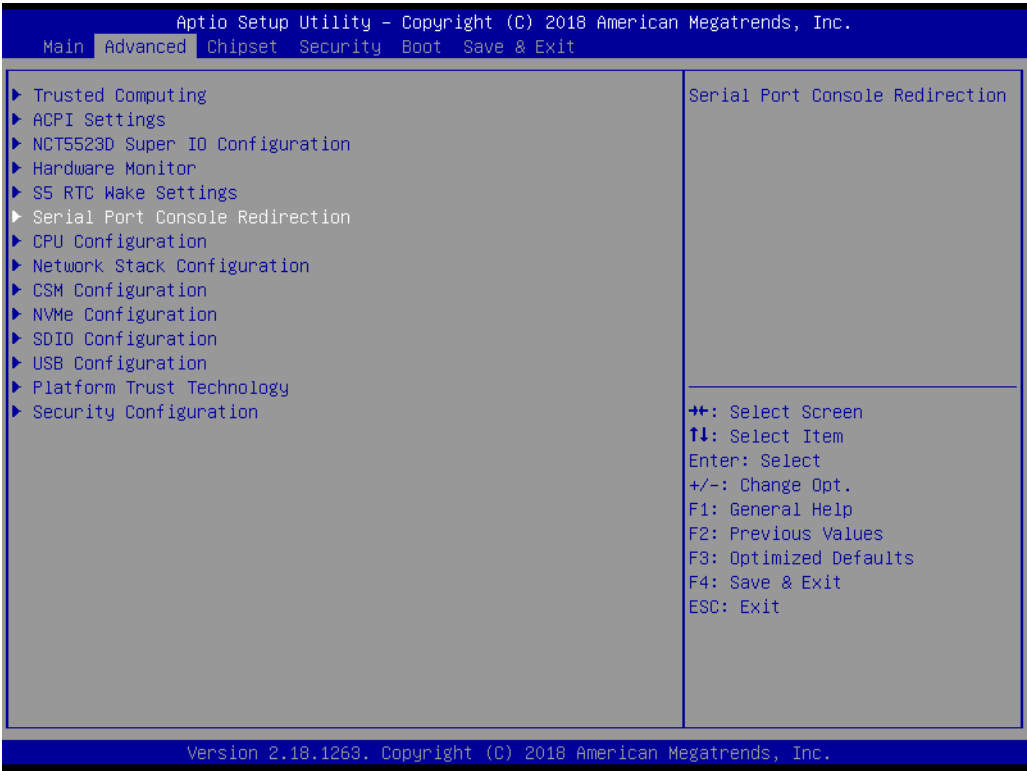
3.2.1.6 S5 RTC Wake Settings



■ Wake System From S5

Enable or disable system wake on alarm event.

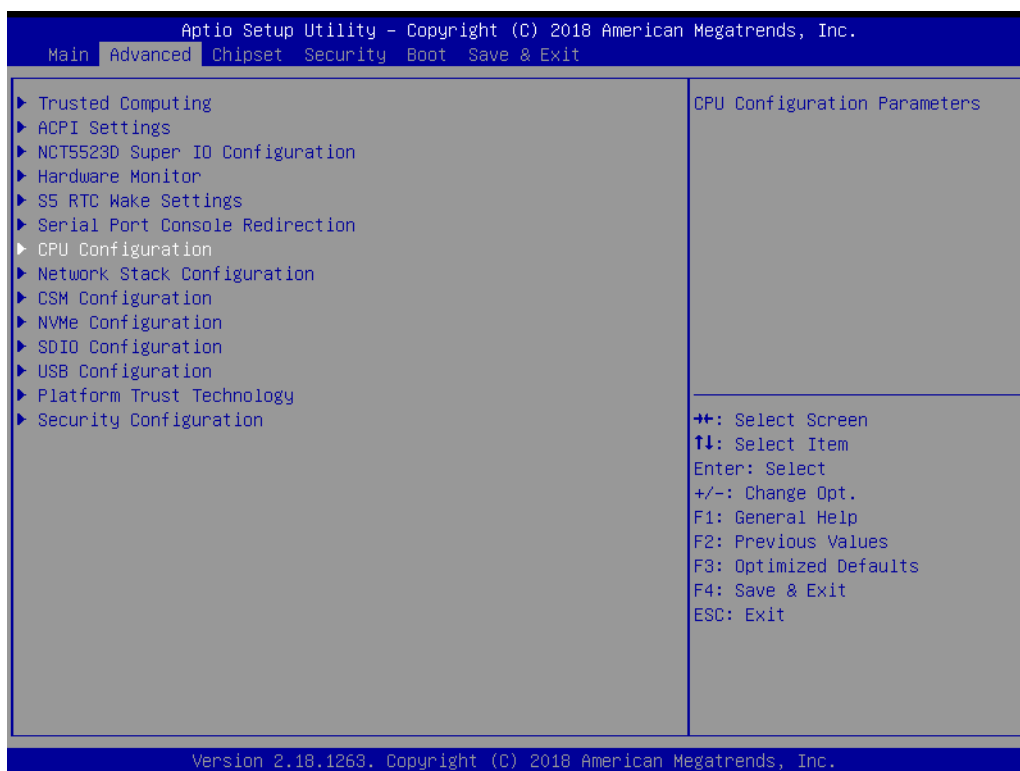
3.2.1.7 Serial Port Console Redirection



- **Console Redirection**
This item allows users to enable or disable console redirection.

3.2.1.8 CPU Configuration

This page shows CPU Information.



- **Active Power Cores**
Number of cores to enable in each processor package
- **Intel Virtualization Technology**

When enabled, a VMM can utilize the additional hardware capabilities provided by Vanderpool Technology.

- **VT-d**

Enable or disable VT-d

- **Bi-Directional PROCHOT**

When a processor thermal sensor trips (either core), the PROCHOT# will be driven. If bi-direction is enabled, external agents can drive PROCHOT# to throttle the processor.

- **Thermal Monitor**

Enable or disable Thermal Monitor

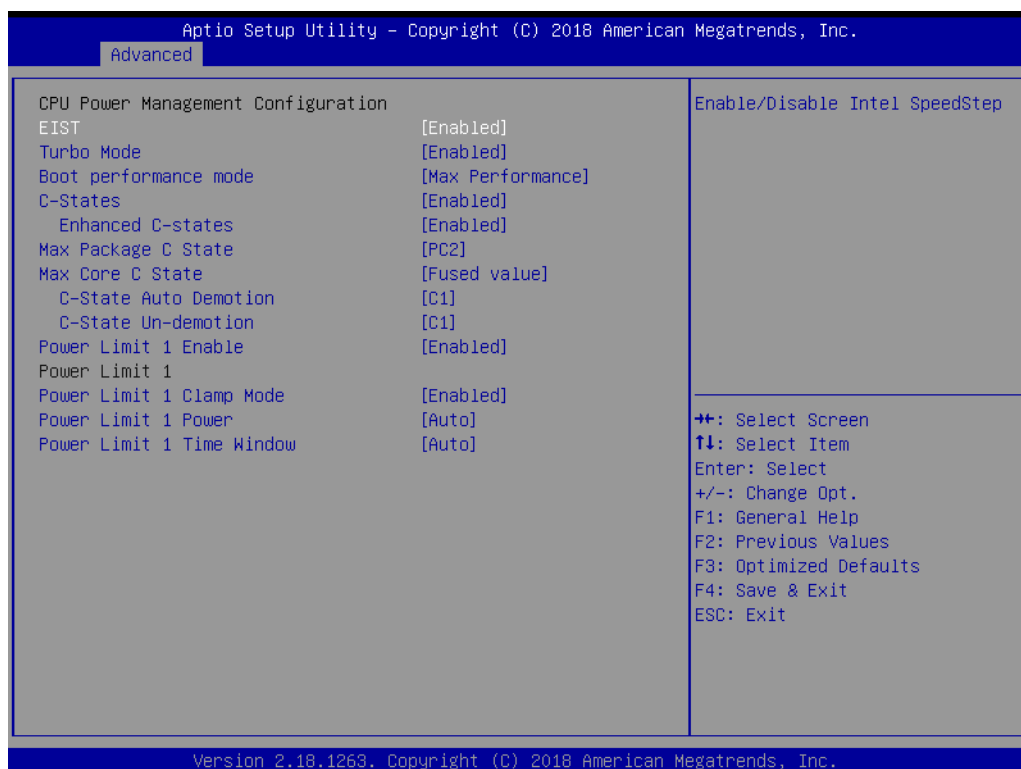
- **Monitor Mwait**

Enable/disable Monitor Mwait.

- **P-STATE Coordination**

Change P-STATE Coordination type.

CPU Power Management Configuration

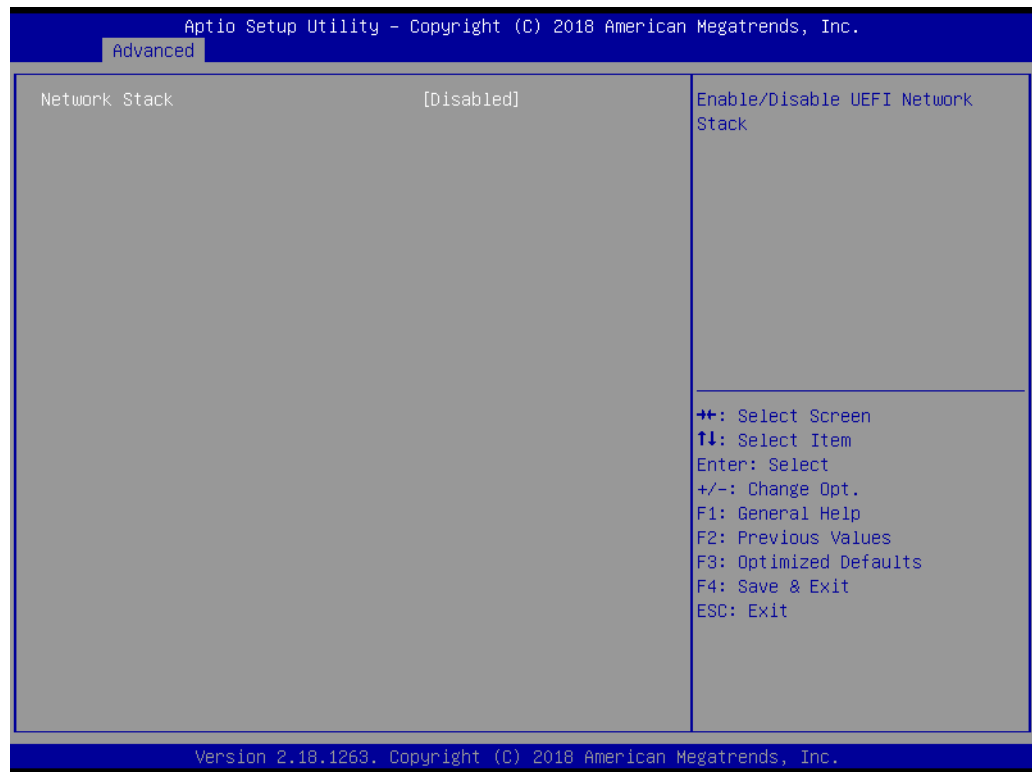


- **EIST**
Enabled or disabled Intel Speed Step function.
- **Turbo Mode**
Enabled or disabled Turbo Mode
- **Boot Performance Mode**
Select the performance state that the BIOS will set before OS handoff.
- **C-States**
Enabled or disabled C-States
- **Enhanced C-States**
Enabled or disabled C1E. When enabled, CPU will switch to minimum speed when all cores enter C-State.
- **Max Package C State**
Controls the max package C state that the processor will support.
- **Max Core C State**
This option controls the Max Core C State that cores will support.
- **C-State Auto Demotion**
Configure C-State Auto Demotion.
- **C-State Un-Demotion**
Configure C-State Un-demotion.
- **Power Limit 1 Enable**
Enable/Disable Power Limit 1.
- **Power Limit 1 Clamp Mode**
Enable/Disable Power Limit 1 Clamp Mode.
- **Power Limit 1 Power**
Power Limit 1 in Watts. Auto will program Power Limit 1 based on silicon default support value.

- **Power Limit 1 Time Window**

Power Limit 1 Time Window Value in seconds. Auto will program Power Limit 1 Time Window based on silicon default support value.

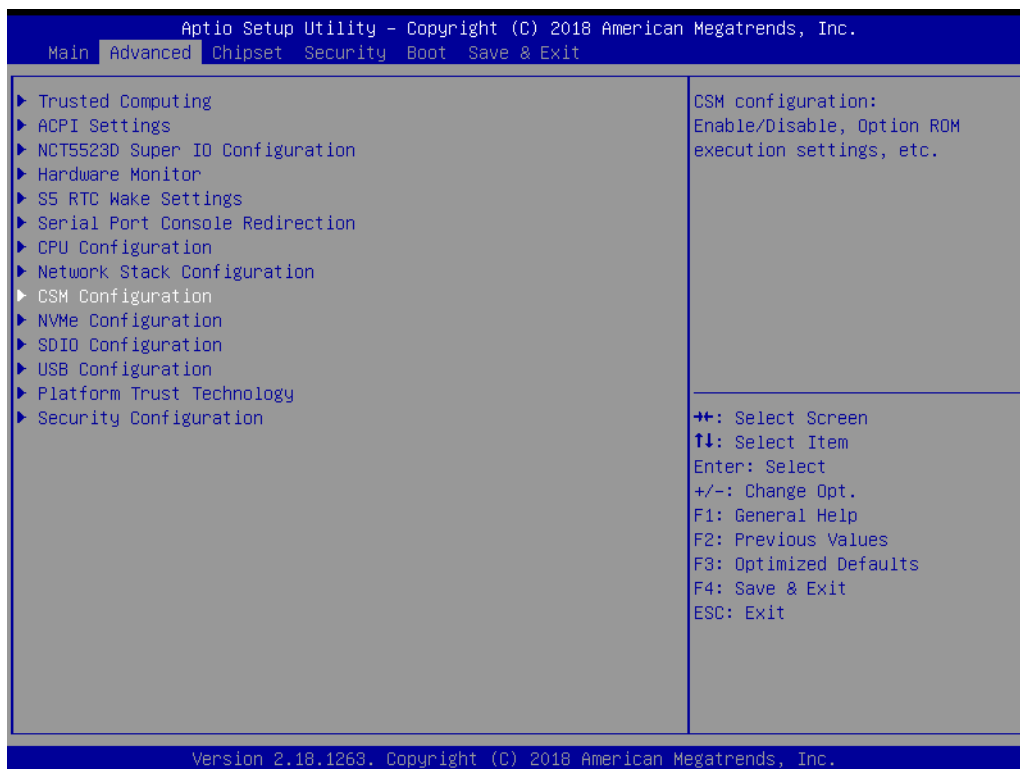
3.2.1.9 Network Stack Configuration



- **Network Stack**

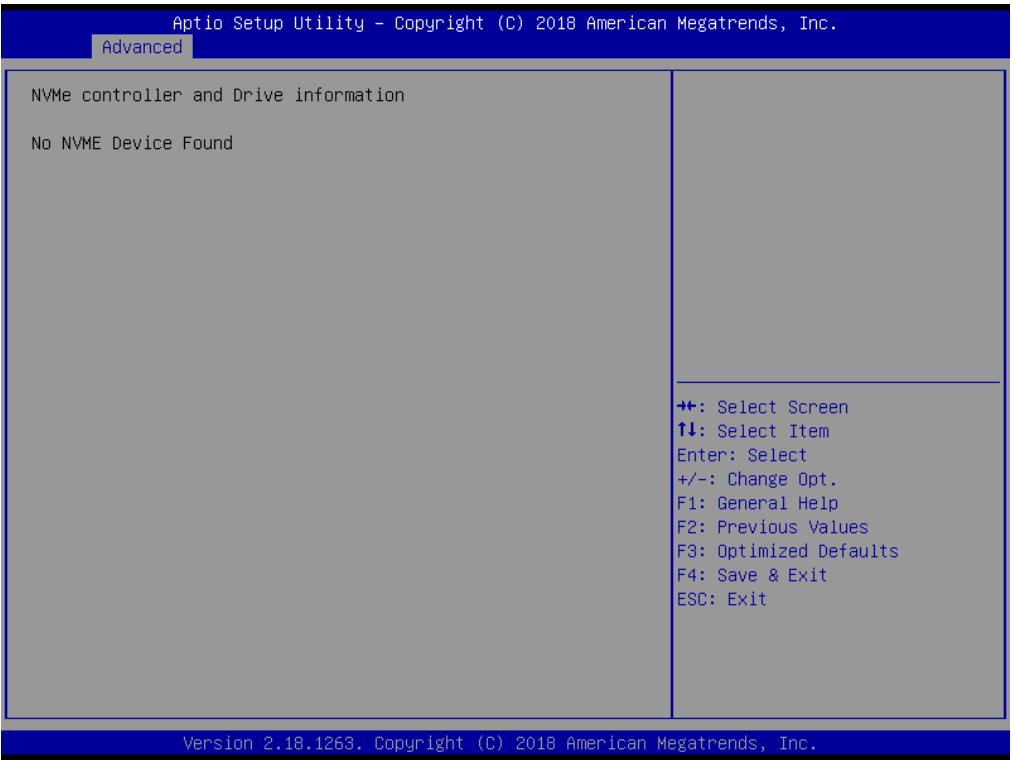
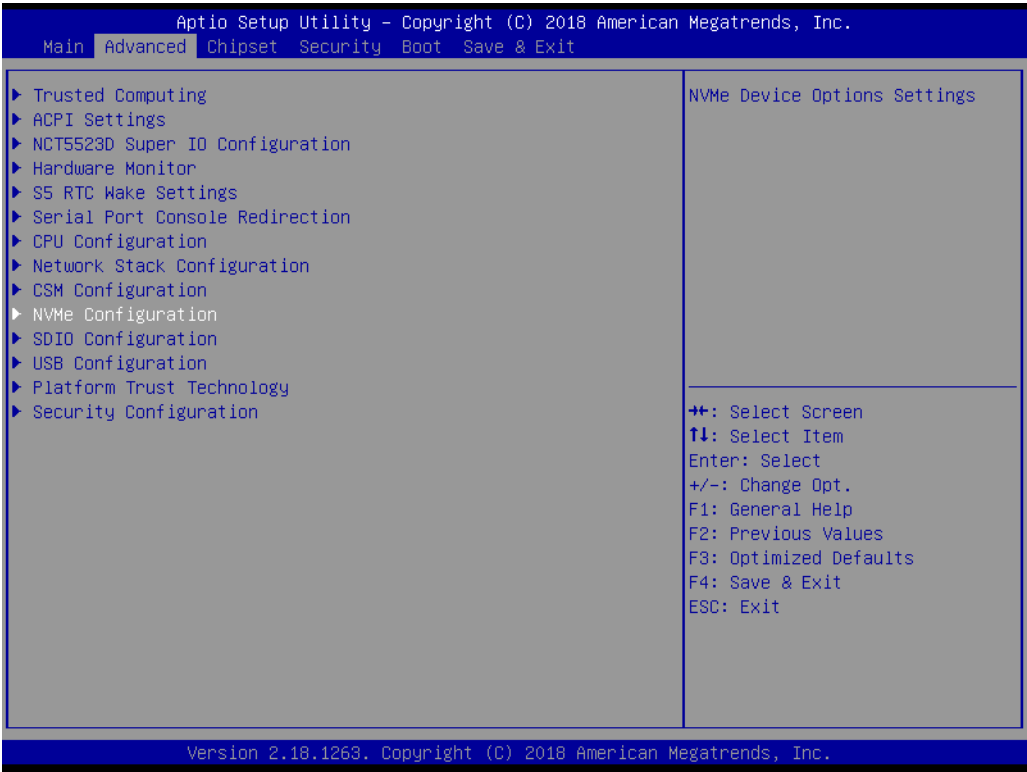
Enable or disable UEFI Network Stack.

3.2.1.10 CSM Configuration

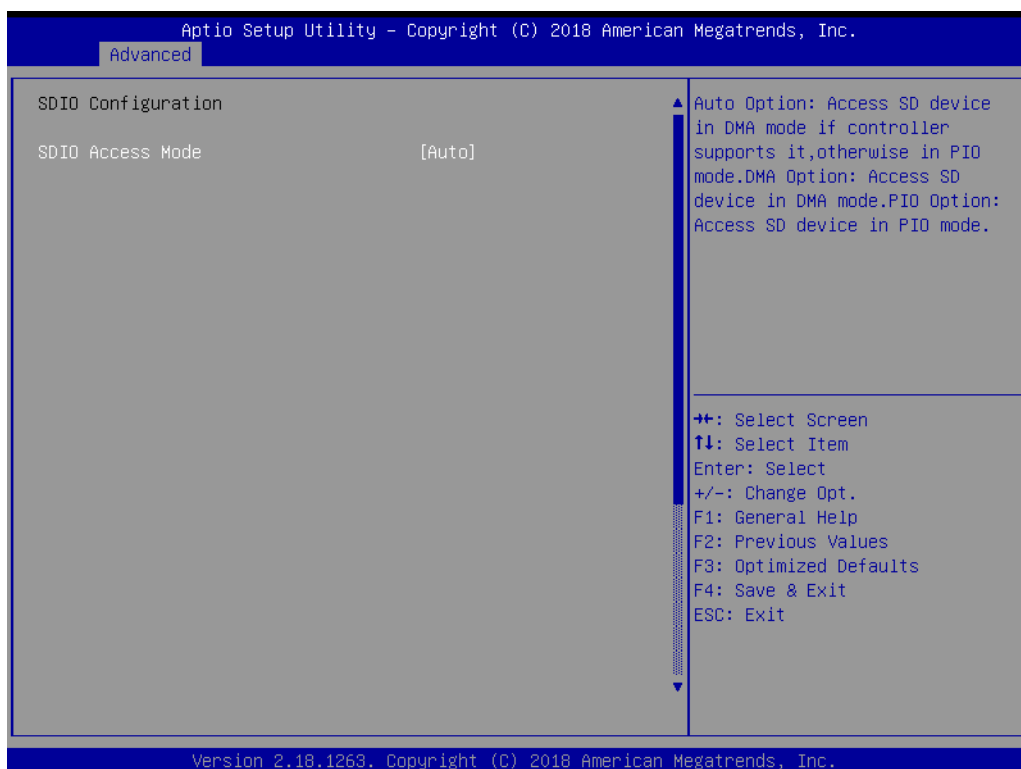
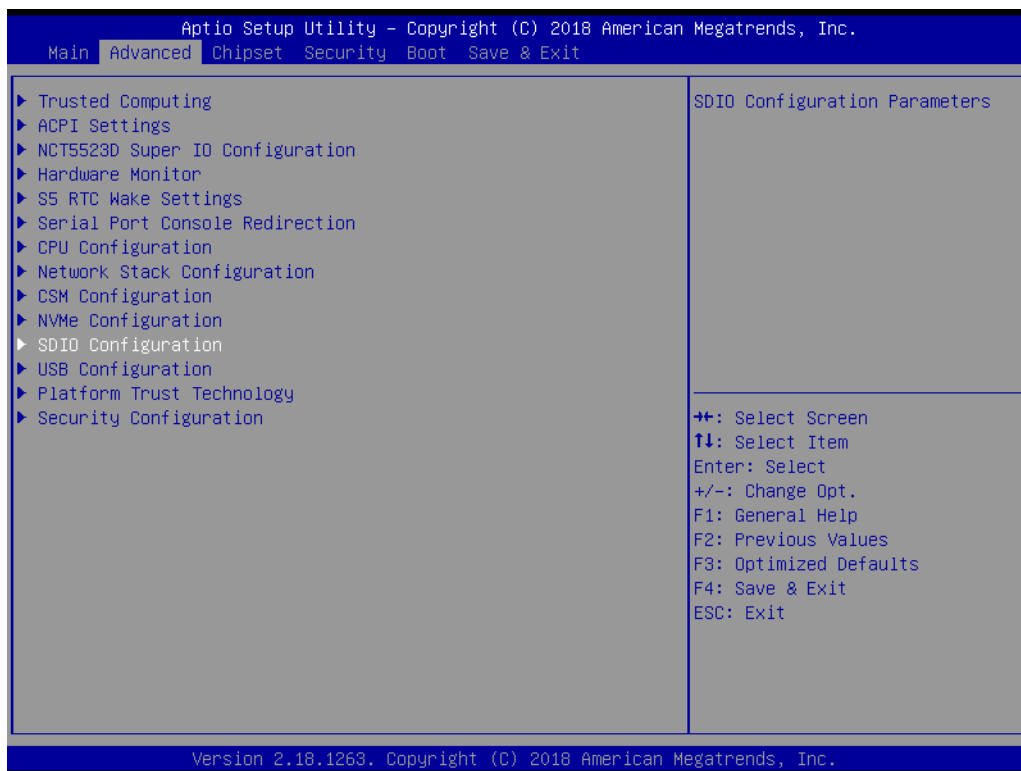


- **CSM Support**
Enable or disable CSM Support..

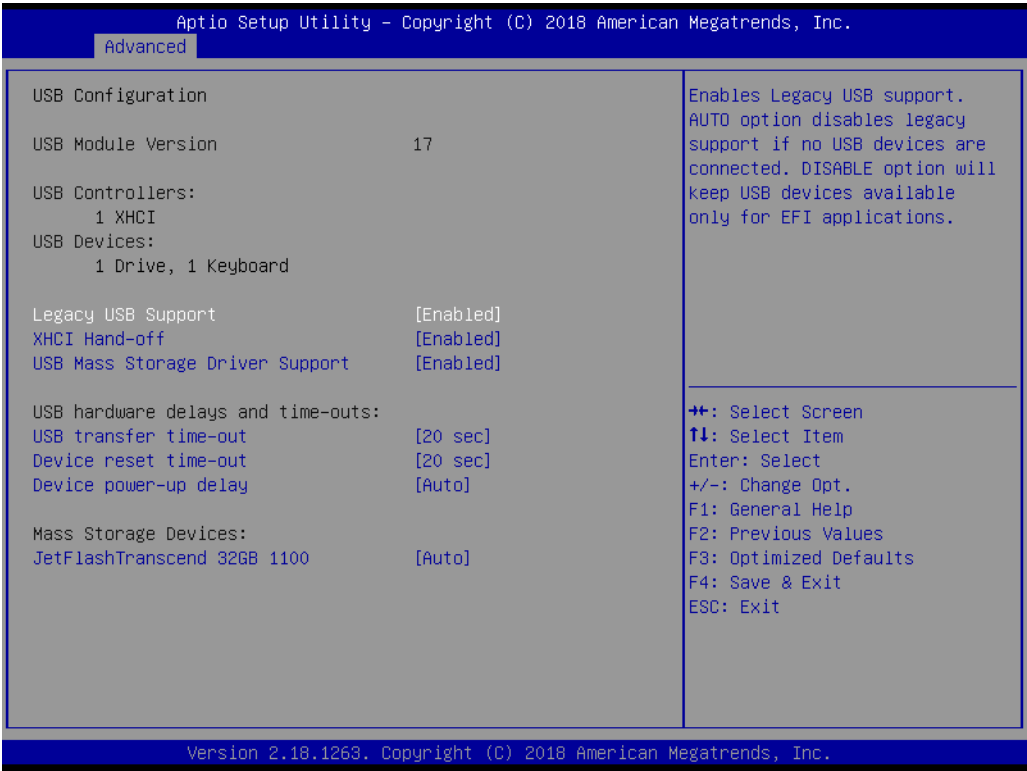
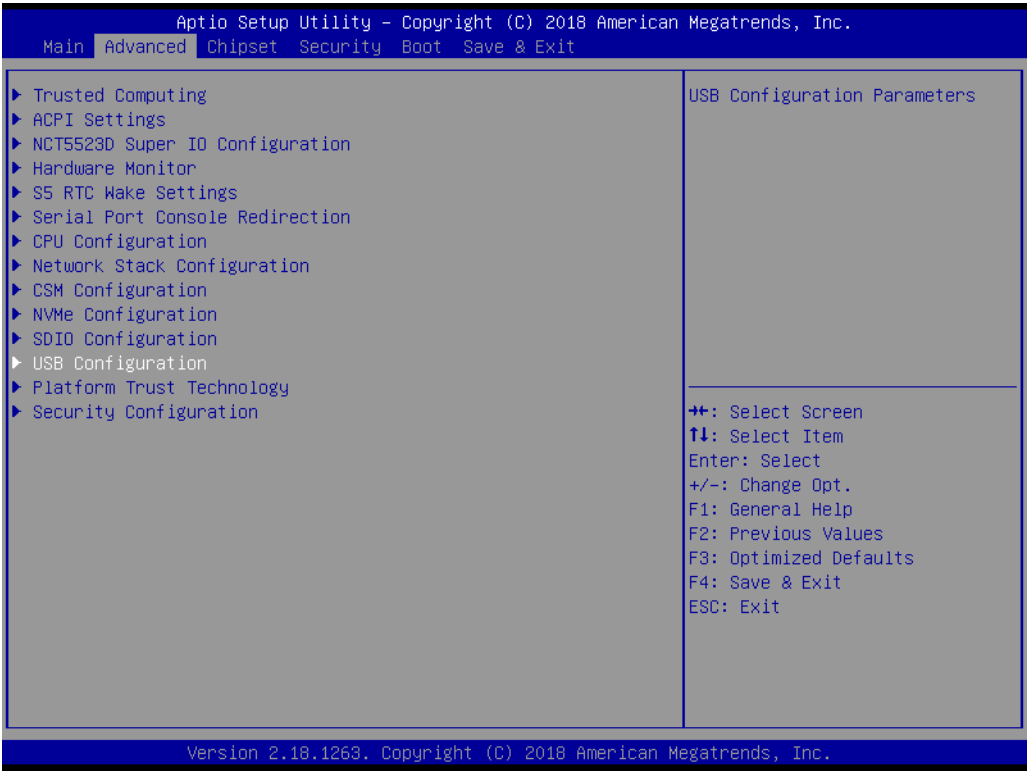
3.2.1.11 NVMe Configuration



3.2.1.12 SDIO Configuration



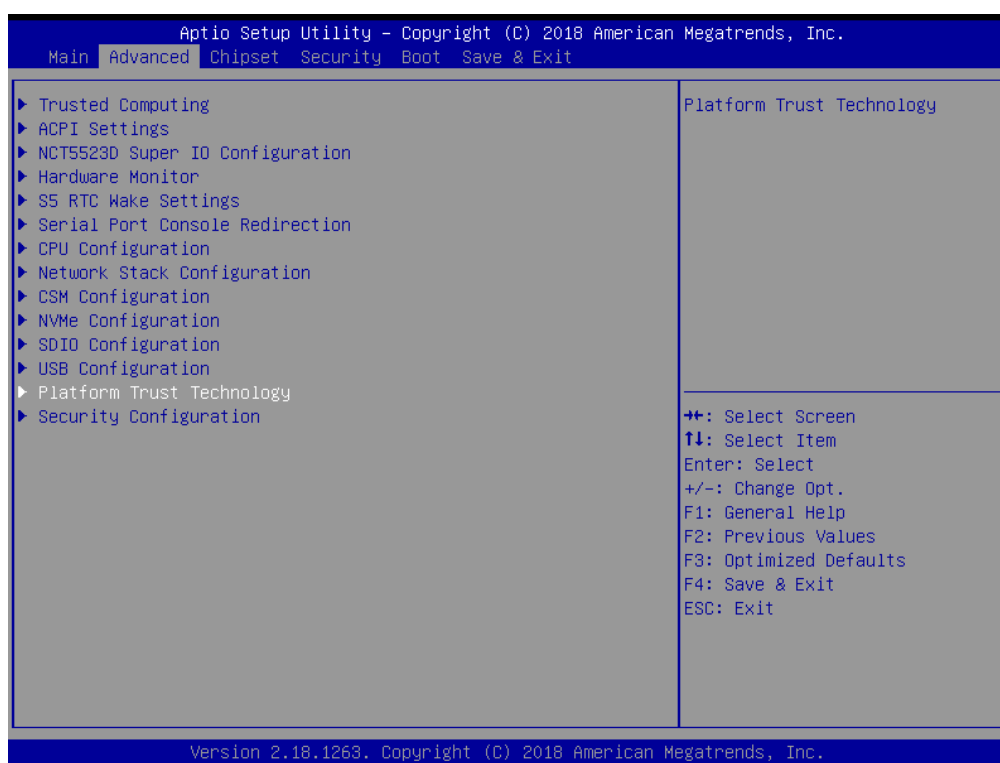
3.2.1.13 USB Configuration

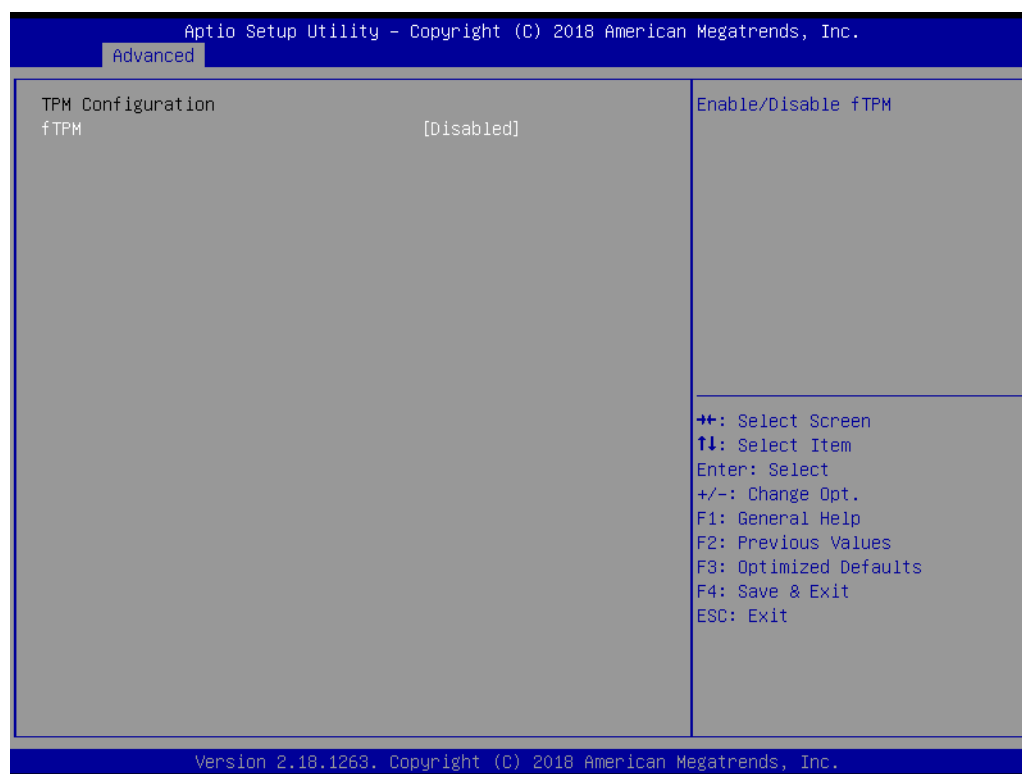


- **Legacy USB Support**
Enables support for legacy USB. Auto option disables legacy support if no USB devices are connected. DISABLE option will keep USB devices available only for EFI applications.

- **XHCI Hands Off**
This is a workaround for OSes without XHCI hand-off support. The XHCI ownership change should claim by XHCI driver.
- **USB Mass Storage Driver Support**
This item allows users to enable or disable USB Mass Storage Driver.
- **USB Transfer Time-Out**
Time-out value for control, bulk, and interrupt transfers.
- **Device Reset Time-Out**
USB mass storage device starts unit command time-out.
- **Device Power-Up Delay**
Maximum time the device will take before it properly report 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.
- **Mass Storage Device**
Mass storage device emulation type. 'AUTO' enumerates devices according to their media format. Optical drives are emulated as 'CDROM', drives with no media will be emulated according to a drive type.

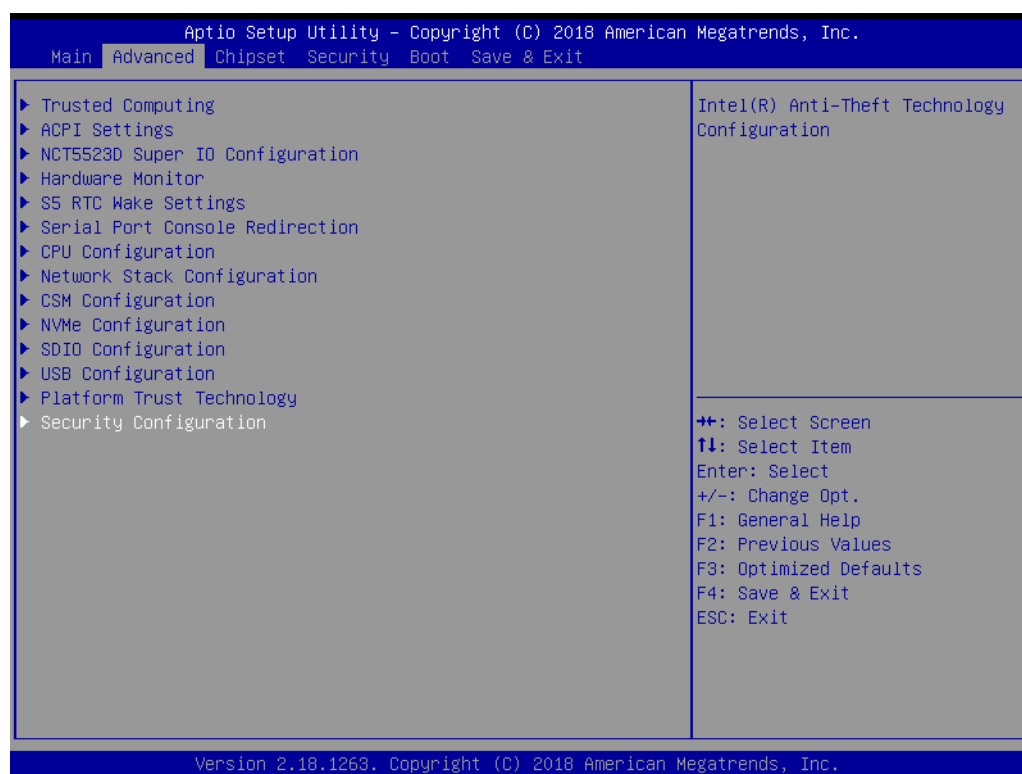
3.2.1.14 Platform Trust Technology

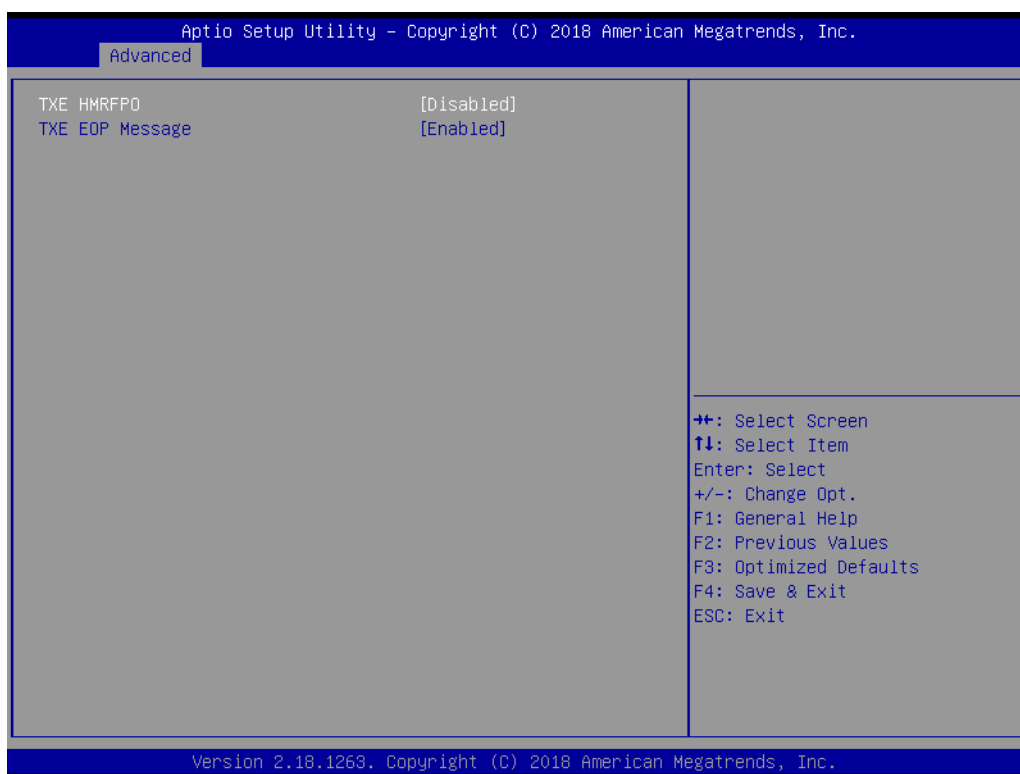




- **fTPM**
Enabled or disabled fTPM

3.2.1.15 Security Configuration



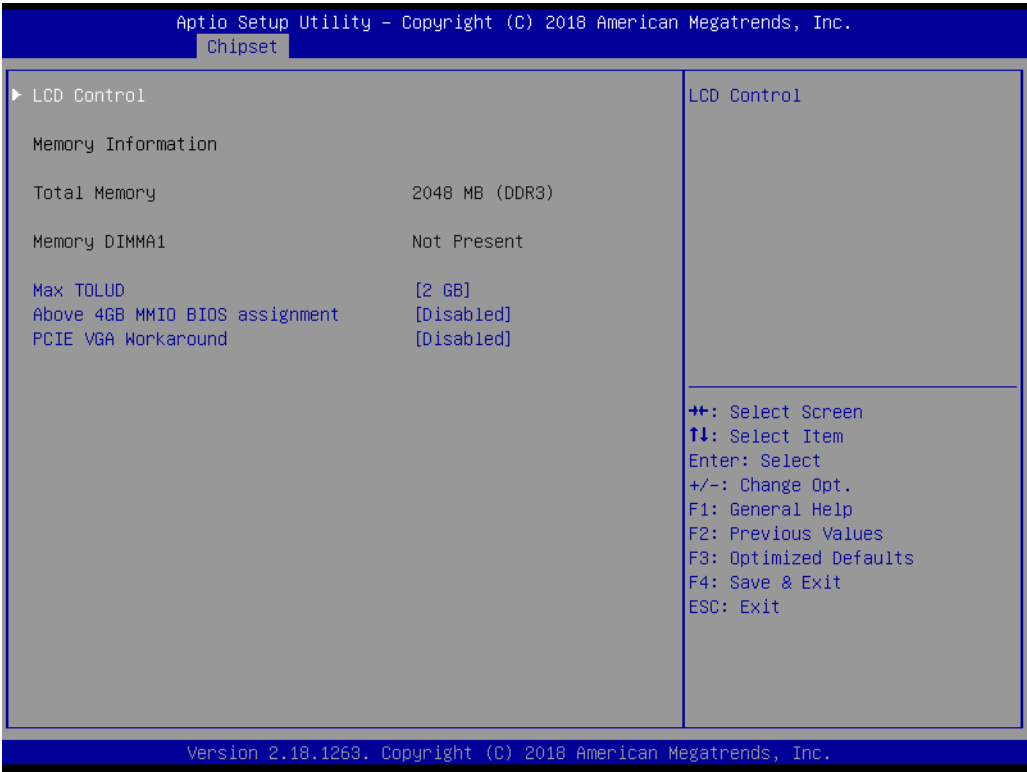
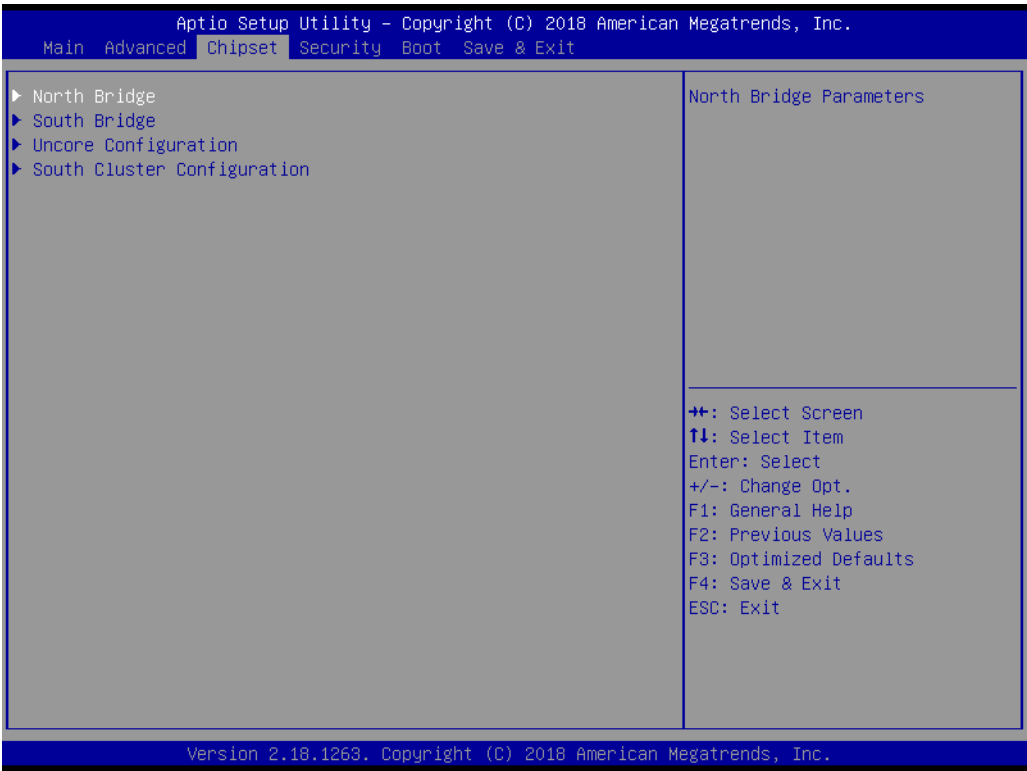


- **TXE HMRFP0**
This item allows users to enable or disable TXE HMRFP0.
- **TXE EOP Message**
Send EOP Message before Enter OS.

3.2.2 Chipset

This page provides information of the chipset on AIMB-U117.

3.2.2.1 North Bridge

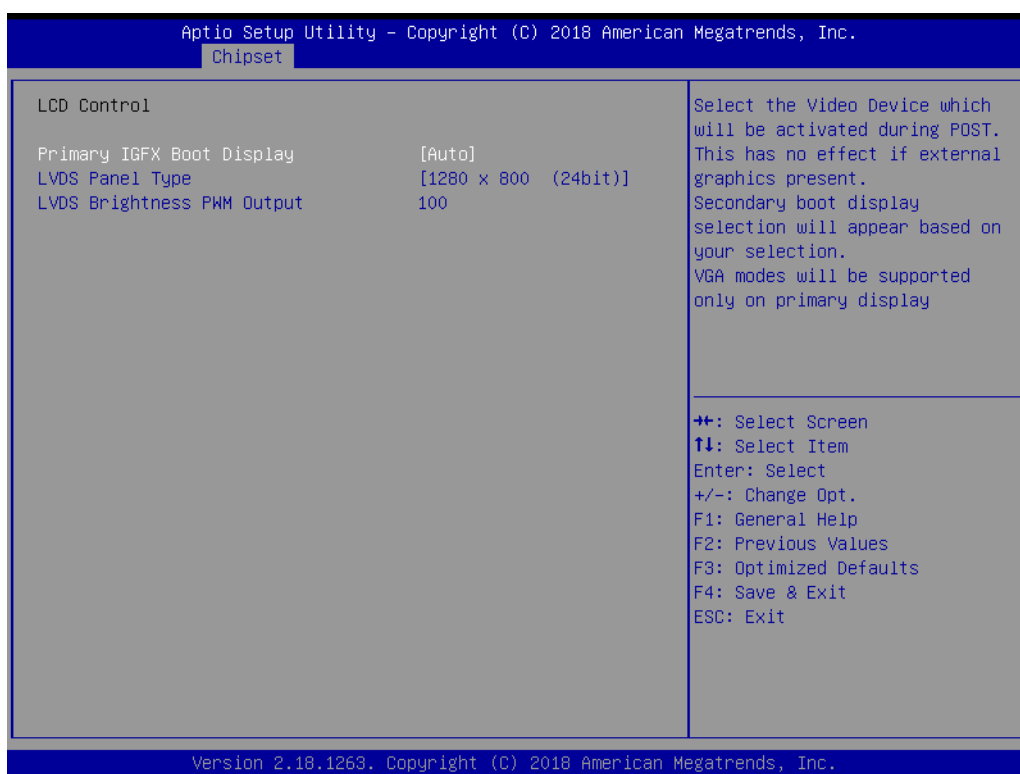


■ **Max TOLUD**

This item allows users to select the maximum value of TOLUD.

■ PCIE VGA Workaround

Enable it if your PCIe card cannot boot to DOS. This is for Test only.



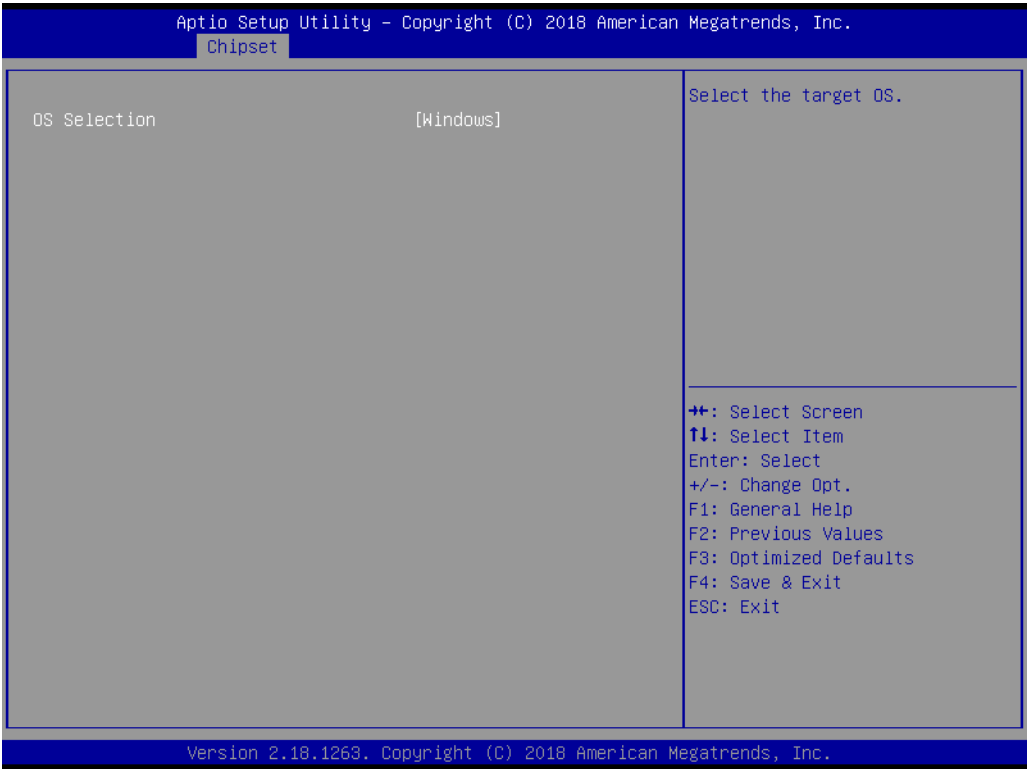
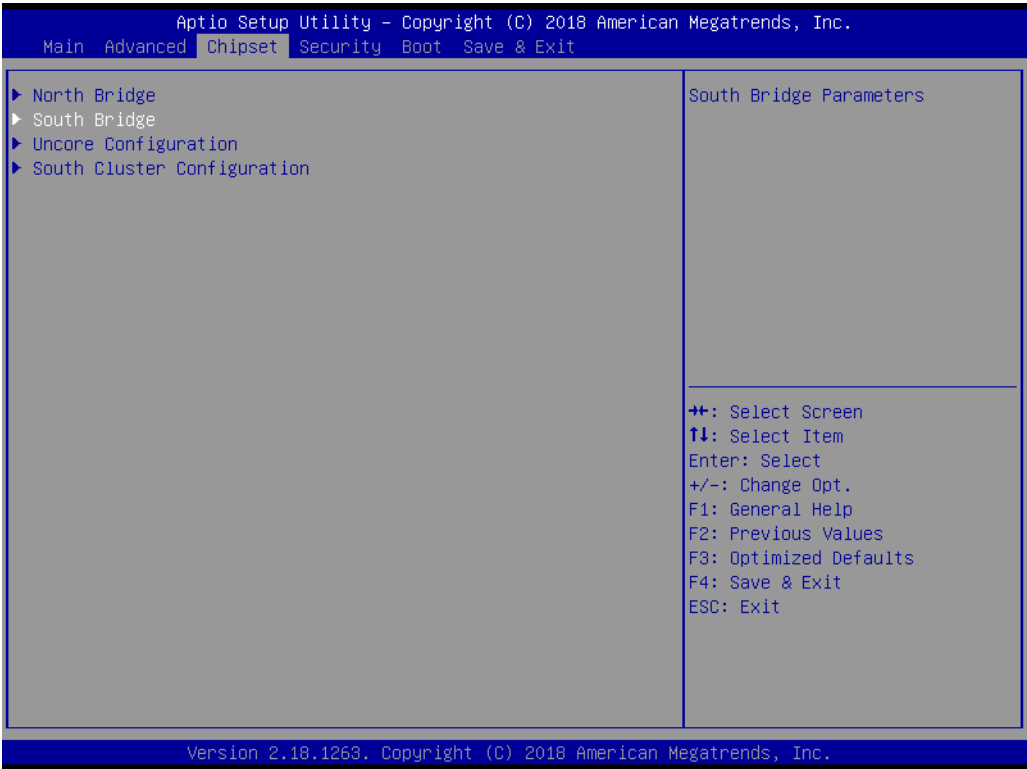
■ Primary IGFX Boot Display

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

■ LVDS Panel Type

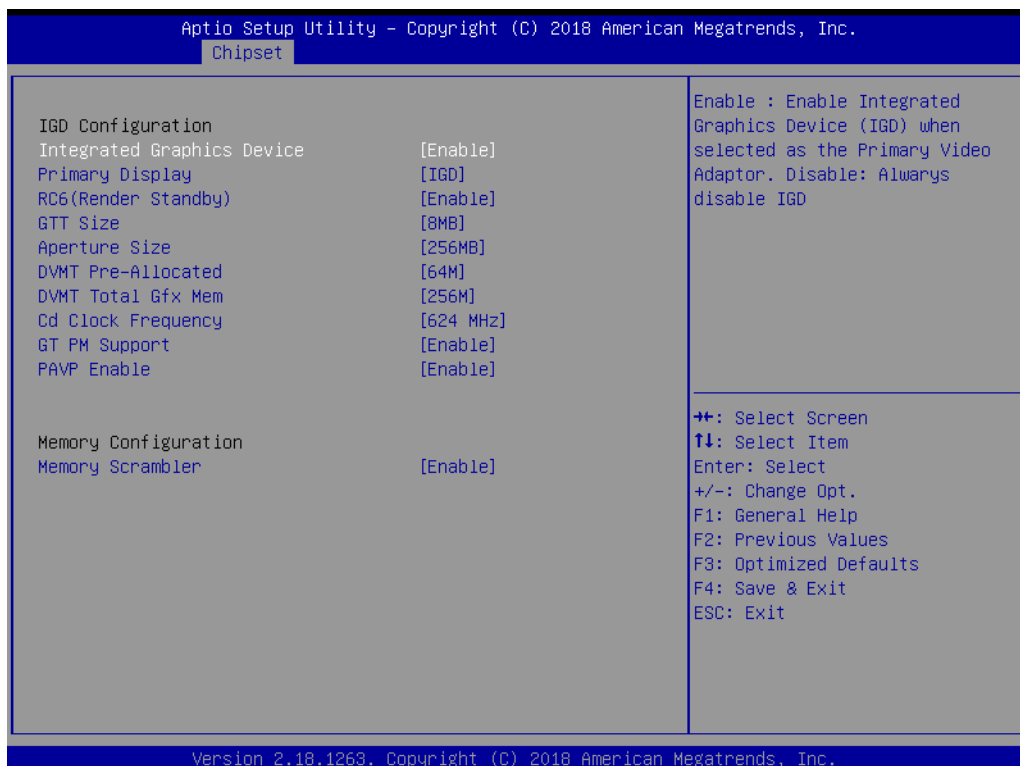
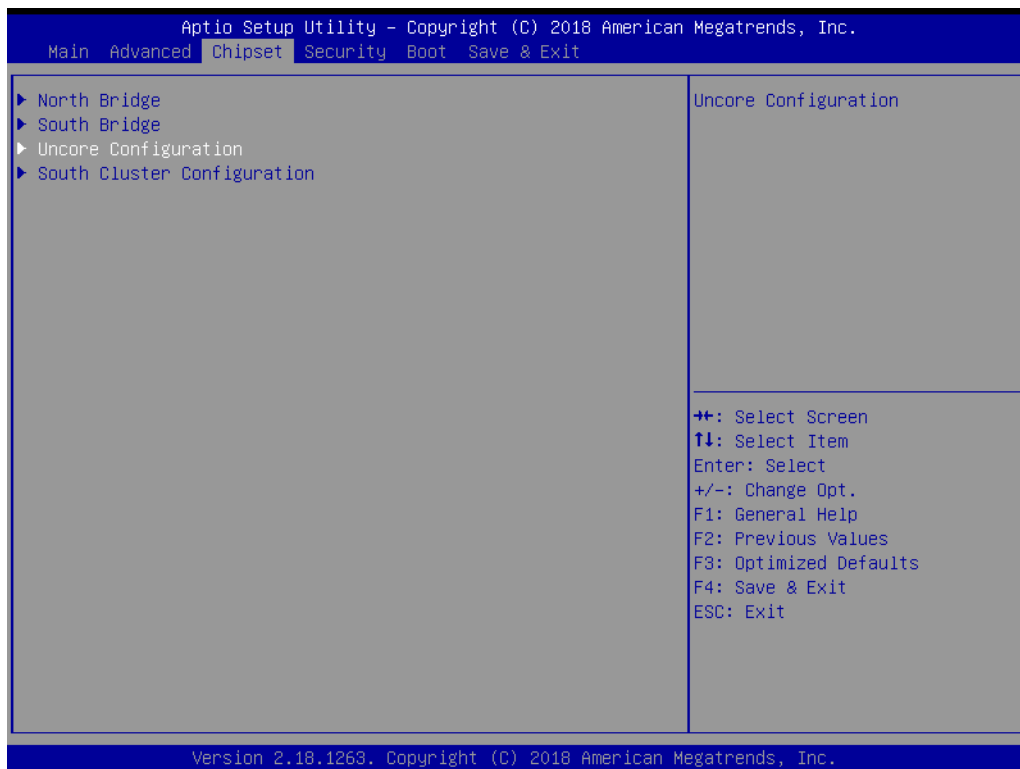
LVDS Panel Type selection.

3.2.2.2 South Bridge



- **OS Selection**
Select the target OS.

3.2.2.3 Uncore Configuration



- **Integrated Graphics Device**
Enable: Enable Integrated Graphics Device (IGD) when selected as the primary video adaptor.
Disable: Always disable IGD.
- **Primary Display**

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

■ **RC6 (Render Standby)**

Check to enable render standby support, RC6 should be enabled if S0ix is enabled. This item will be read only if S0ix is enabled.

■ **GTT Size**

Select the GTT Size.

■ **Aperture Size**

Select the Aperture Size.

■ **DVMT Pre-Allocated**

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

■ **DVMT Total Gfx Mem**

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

■ **Cd Clock Frequency**

Select the highest Cd Clock frequency supported by the platform.

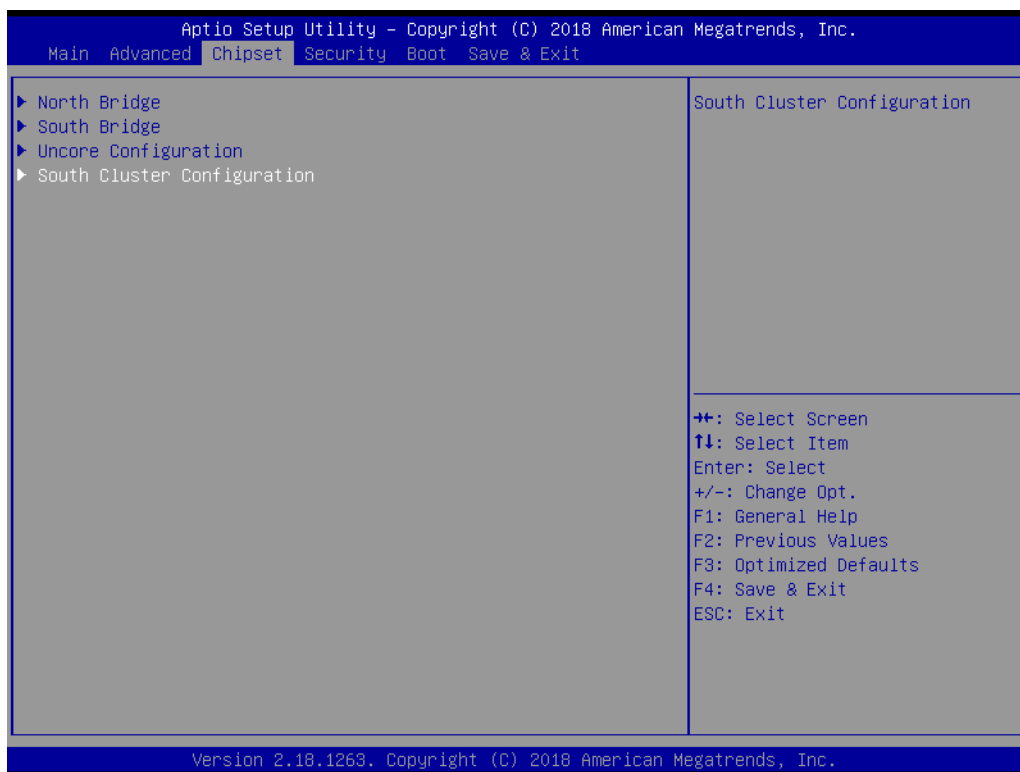
■ **GT PM Support**

Enable/Disable GT PM Support.

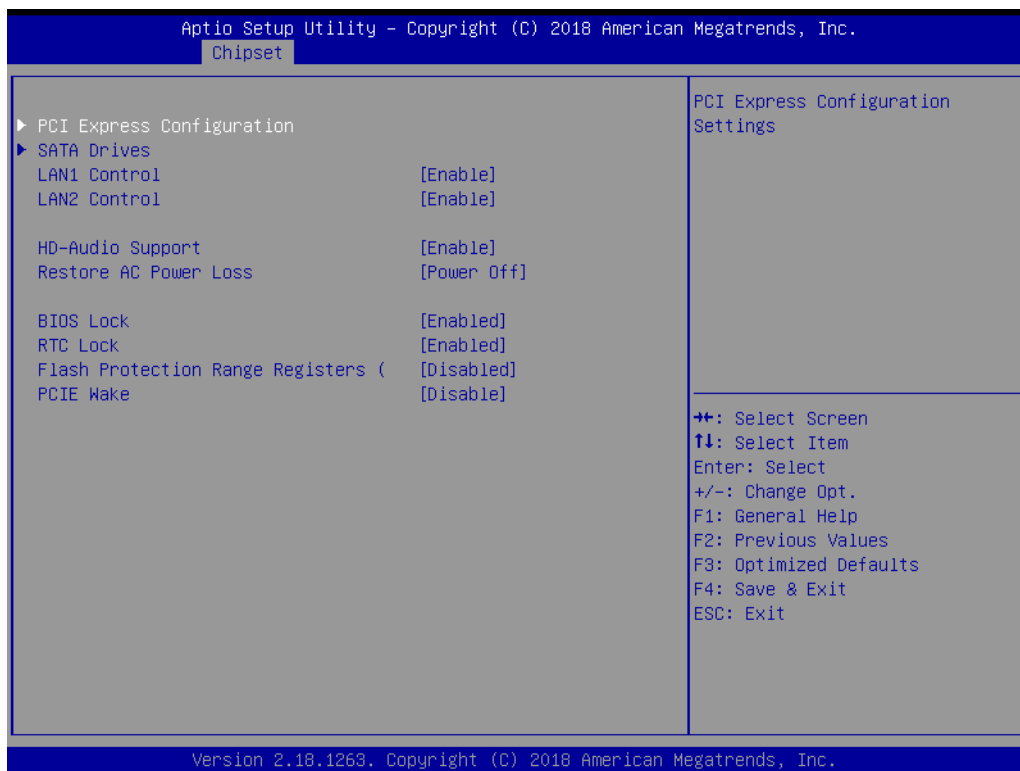
■ **PAVP Enable**

Enable/Disable PAVP.

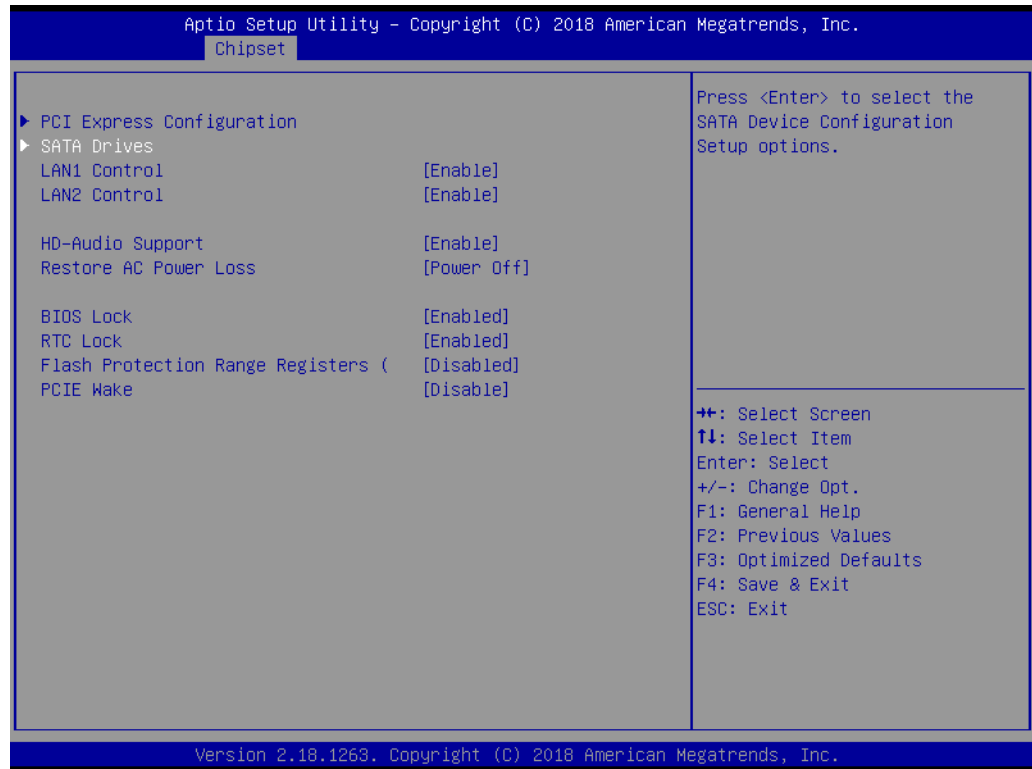
3.2.2.4 South Cluster Configuration



■ PCI Express Configuration



■ SATA Drives



– **Chipset SATA**

Enables or disables the chipset SATA controller. The chipset SATA controller supports the 1 blank internal SATA ports (up to 3Gb/s supported).

– **LAN1 Control**

Enable or disable the LAN 1 control.

– **LAN2 Control**

Enable or disable the LAN 2 control.

– **HD-Audio Support**

Enable or disable HD-Audio Support.

– **Restore AC Power Loss**

This item allows users to select off, on and last state.

– **BIOS Lock**

Enable/Disable the BIOS Lock Enable feature.

– **RTC Lock**

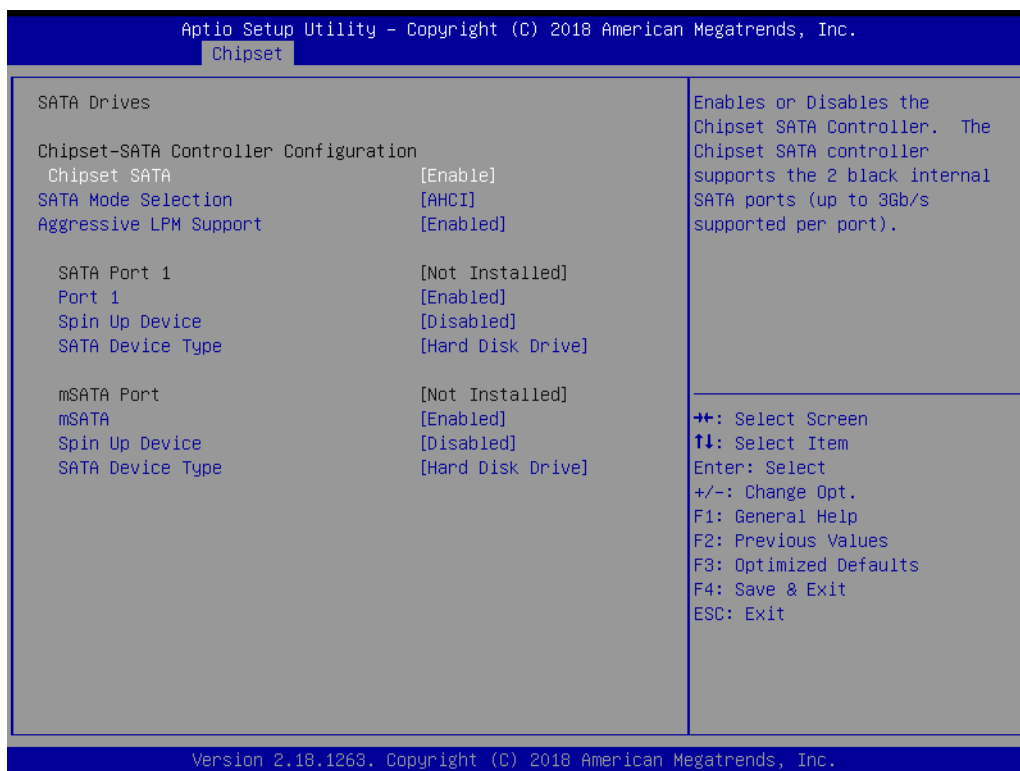
Enable or disable bytes 38h-3Fh in the upper and lower 128-byte bank of RTC RAM lockdown.

– **Flash Protection Range Registers**

Enable or disable Flash Protection Range Registers.

– **PCIE Wake**

Enable or disable PCIE to wake the system from S5.



- **SATA Mode Selection**

This item allows users to select mode of SATA controller(s).

- **Aggressive LPM Support**

This item allows users to enable or disable Aggressive LPM Support.

- **Port 1**

This item allows users to enable or disable the Serial-ATA Port 1 device.

- **Spin Up Device**

This item allows users to enable or disable the Spin Up Device.

- **SATA Device Type**

Identify the SATA port is connected to Solid State Drive or Hard Disk Drive.

- **Port 2**

This item allows users to enable or disable the Serial-ATA Port 2 device.

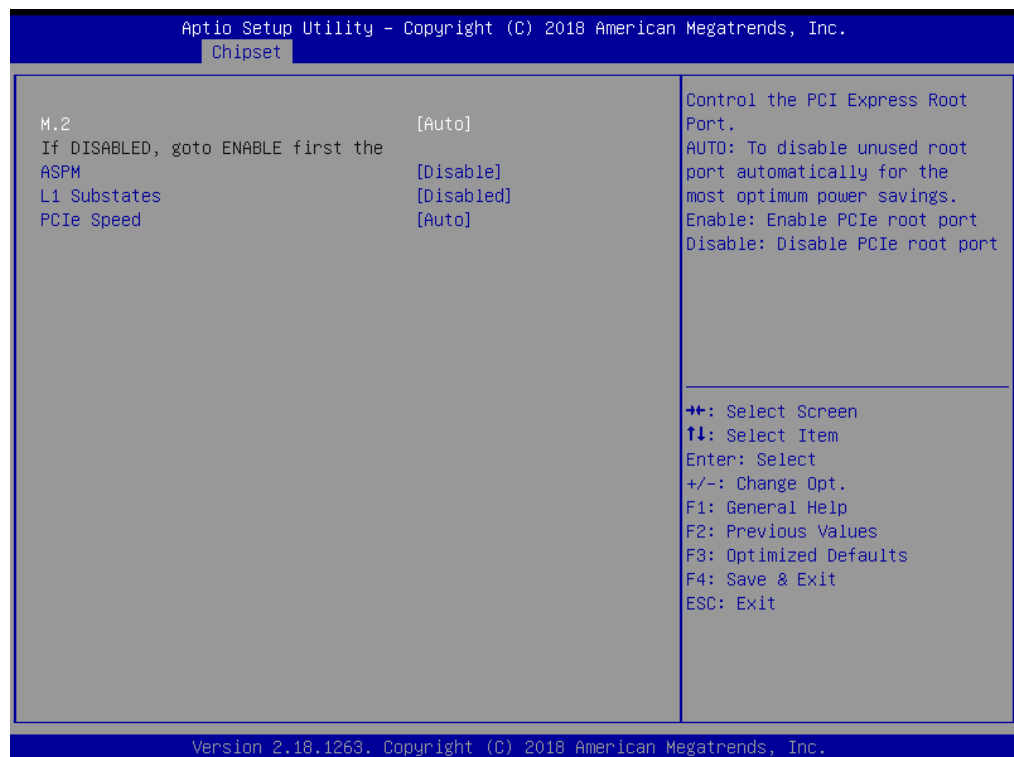
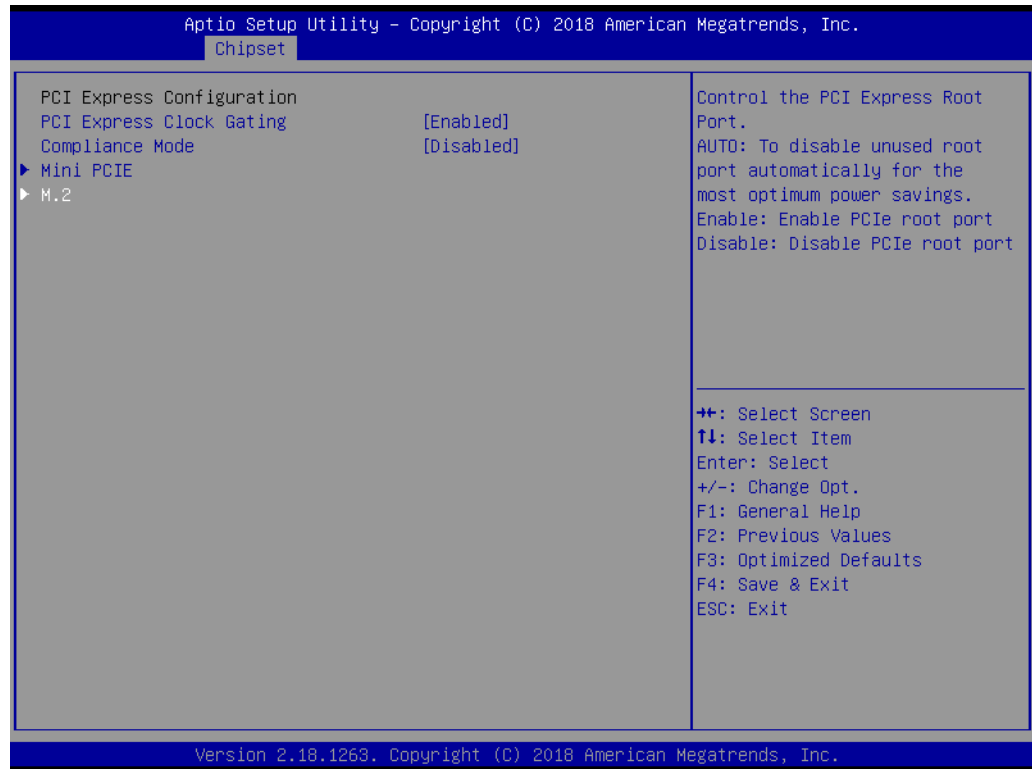
- **Spin Up Device**

This item allows users to enable or disable the Spin Up Device.

- **SATA Device Type**

Identify the SATA port is connected to Solid State Drive or Hard Disk Drive.

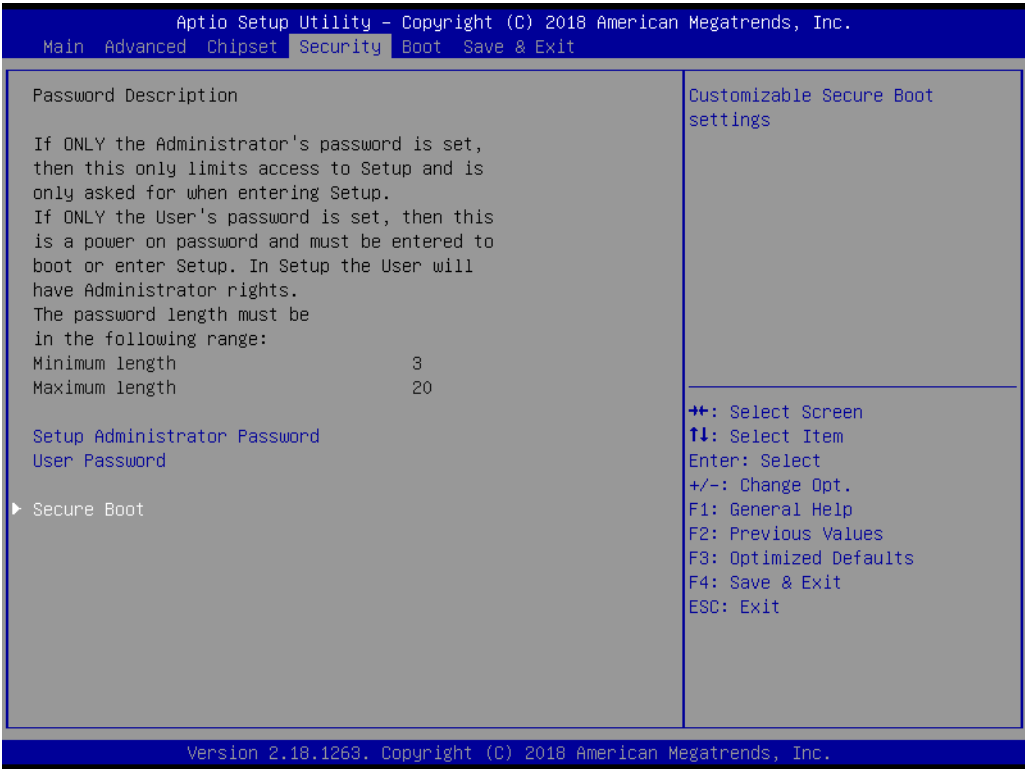
■ M.2 Configuration



■ Mini PCIE Configuration

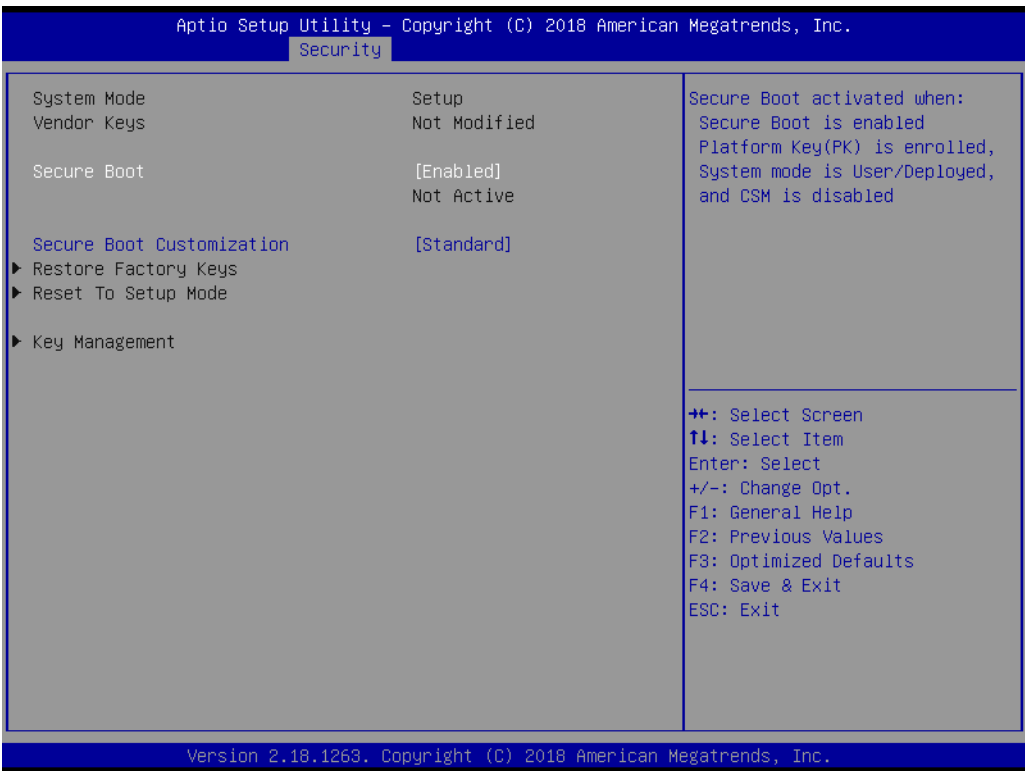


3.2.3 Security



Select Security Setup from the AIMB-U117 Setup main BIOS setup menu. All Security Setup options, such as password protection and virus protection are described in this section. To access the sub menu for the following items, select the item and press <Enter>: Change Administrator / User Password.

3.2.3.1 Secure Boot



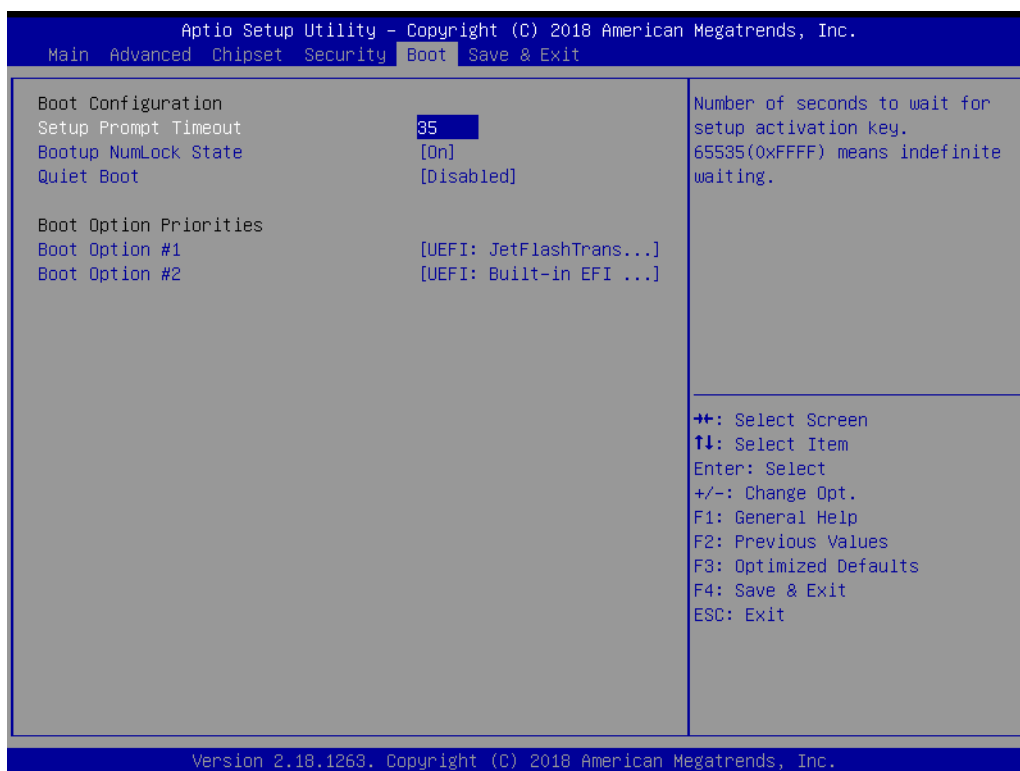
- **Secure Boot**

Secure Boot activated when platform key (PK) is enrolled, system mode is user/deployed, and CSM function is disabled.

- **Secure Boot Customization**

Secure Boot mode - Custom & Standard, Set UEFI Secure Boot Mode to STANDARD mode or CUSTOM mode, this change is effect after save. And after reset, the mode will return to STANDARD mode.

3.2.4 Boot



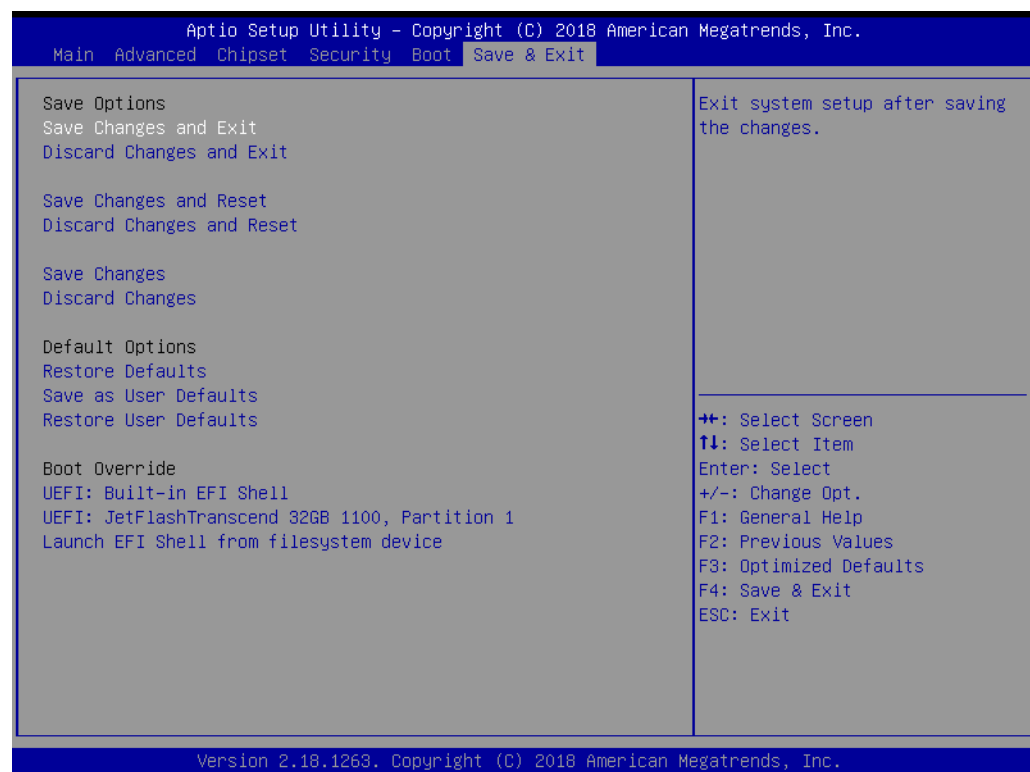
- **Bootup NumLock State**

Select the keyboard Numlock state.

- **Quiet Boot**

Enables or disableds Quiet Boot option.

3.2.5 Save and Exit



- **Save Changes and Exit**
This item allows users to exit system setup after saving changes.
- **Discard Changes and Exit**
This item allows users to exit the system setup without saving changes.
- **Save Changes and Reset**
This item allows users to reset the system setup after saving changes.
- **Discard Changes and Reset**
This item allows users to reset the system setup without saving changes.
- **Save Changes**
This item allows users to save changes done so far to any of the setup options.
- **Discard Changes**
This item allows users to discard changes done so far to any of the setup options.
- **Restore Defaults**
This item allows users to restore/load the default values for all options.
- **Save as User Defaults**
This item allows users to save changes done so far as user defaults.
- **Restore User Defaults**
This item allows users to restore the user defaults for all options.
- **Launch EFI Shell From a File system Device**
Attempts to Launch EFI Shell application (Shell.efi) from one of the available filesystem devices.

Chapter 4

Software and Service Introduction

4.1 Introduction

The mission of Advantech Embedded Software Services is to “enhance users quality of life with Advantech platforms and Microsoft® Windows® embedded technology.” We equip Advantech platforms with Windows® embedded software products to more effectively support the embedded computing community. This eliminates the hassle of dealing with multiple vendors (hardware suppliers, system integrators, and embedded OS distributors) for specific projects. Our aim is to make Windows® embedded software solutions widely available to the embedded computing community.

4.2 Value-Added Software Services

Software API: An interface that defines the ways in which an application program may request services from libraries and/or operating systems. This software provides not only the underlying drivers required, but also a rich set of user-friendly, intelligent, and integrated interfaces that speed development, enhance security, and offer add-on value for Advantech platforms. Furthermore, this software serves as a catalyst between developers and solutions, making Advantech embedded platforms easier and simpler to adopt and operate with customer applications.

4.2.1 Software API

4.2.1.1 Control

GPIO



General purpose input/output is a flexible parallel interface that allows various custom connections. This interface also enables users to monitor the level of signal input or set the output status to switch the device on or off. Our API also provides programmable GPIO, enabling developers to dynamically set the GPIO input or output status.

SMBus



SMBus is a system management bus defined by Intel Corporation in 1995. This interface is used in personal computers and servers for low-speed system management communications. The SMBus API allows developers to interface with an embedded system environment and transfer serial messages using SMBus protocols, facilitating multiple simultaneous device control.

4.2.1.2 Display

Brightness Control



The Brightness Control API allows developers to access embedded devices and easily control brightness.

Backlight



The Backlight API allows developers to control the backlight (screen) in embedded devices.

4.2.1.3 Monitor

Watchdog



A watchdog timer is a device that performs a specific operation after a specified period of time when a malfunction occurs and the system cannot recover on its own. A watchdog timer can be programmed to perform a warm booting (system restart) after a certain number of seconds.

Hardware Monitor



The Hardware Monitor API is a system health supervision API that inspects certain condition indices, such as fan speed, temperature, and voltage.

4.2.1.4 Power Saving

CPU Speed



This feature uses Intel SpeedStep® Technology to reduce the system power consumption. The system automatically adjusts the CPU speed according to the system load.

System Throttling



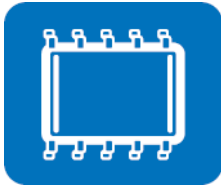
This refers to a series of methods for reducing system power consumption by lowering the clock frequency. This API allows users to adjust the clock frequency from 87.5% to 12.5%.

65

AIMB-
U117 User
Manual

4.2.2 Software Utility

BIOS Flash



The BIOS Flash utility allows customers to update the flash ROM BIOS version, or backup the current BIOS by copying the configuration from the flash chip to a file on the users' disk. The BIOS Flash utility also features a command line version and API for rapid implementation in customized applications.

Embedded Security ID



Embedded applications are the most important responsibilities for system integrators because they contain valuable intellectual property, design knowledge, and innovations, and are easily copied. This Embedded Security ID utility offers reliable security functions that allow users to secure application data within embedded BIOS.

Monitoring



The Monitoring API is a utility that allows users to monitor the system health indicators, such as voltage, CPU and system temperature, and fan speed. These system values are crucial. If critical errors occur and are not solved immediately, permanent damage to the device may result.

Chapter 5

Chipset Software
Install Utility

5.1 Before Installation

Before installing the enhanced display drivers and utility software, please read the instructions provided in this chapter carefully. The drivers for AIMB-U117 are provided on the Advantech support website: <http://support.advantech.com/Support/>. This driver will guide and link users to the utilities and drivers required for Microsoft Windows-based systems. Software updates can be accessed from Microsoft* software service packs.

Note! *The files on the website are compressed. Do not attempt to install the drivers by copying the files manually. The Setup program provided must be used to install the drivers.*



Please note, for most display drivers, the relevant software application must be installed on the system before enhanced display drivers can be installed. In addition, for many of the installation procedures, user familiarity with both the relevant software applications and operating system commands is assumed. Thus, users are advised to review relevant operating system commands and pertinent sections of the application software user manual before attempting installation.

5.2 Introduction

The Intel® Chipset Software Installation (CSI) utility installs the Microsoft Windows INF files that specify the chipset component configuration on the OS. This is essential to enable the following features and functionality:

- Core PCI PnP services
- Serial ATA interface support
- USB support
- Identification of Intel® chipset components in the device manager

Note! *This utility is used for the following versions of Windows, and it has to be installed before installing all the other drivers:*



- Windows 10 (64 bit)

Chapter 6

Graphics Setup

6.1 Introduction

To benefit from the Intel® Atom x7-E3950/ x5-E3930 integrated graphics controller, users must install the graphics driver.

6.2 Windows 10

Note! Before installing this driver, ensure the CSI utility is installed on the system. See Chapter 5 for information regarding installing the CSI utility.



Download the driver from website on your computer. Navigate to the "Graphics" folder and click "setup.exe" to complete the installation of the drivers for Windows 10.

Win 10(64bit) Driver for AIMB-U117

Solution : Win 10(64bit) Driver for AIMB-U117

| Download File | Released Date | Download Site | |
|--|---------------|---------------|-----------|
| AIMB-U117_Audio_Win10(64bit).zip | 2019-03-18 | Primary | Secondary |
| AIMB-U117_Chipset_Win10(64bit).zip | 2019-03-18 | Primary | Secondary |
| AIMB-U117_Graphic_Win10(64bit).zip | 2019-03-18 | Primary | Secondary |
| AIMB-U117_Intel TXE_Win10(64bit).zip | 2019-03-18 | Primary | Secondary |
| AIMB-U117_Others_Win10(64bit).zip | 2019-03-18 | Primary | Secondary |
| AIMB-U117_Realtek LAN_Win10(64bit).zip | 2019-03-18 | Primary | Secondary |

Chapter 7

LAN Configuration

7.1 Introduction

The AIMB-U117 system features dual Gigabit Ethernet LANs via dedicated PCI Express x1 lanes (Realtek RTL8111G (LAN1) and Realtek RTL8111G (LAN2)) that offer a bandwidth of up to 500 MB/sec, eliminating bottlenecks in the flow of network data by incorporating Gigabit Ethernet at 1000 Mbps.

7.2 Features

- Integrated 10/100/1000 Mbps transceiver
- 10/100/1000 Mbps triple-speed MAC
- High-speed RISC core with 24-KB cache
- On-chip voltage regulation
- Wake-on-LAN (WOL) support
- PCI Express X1 host interface

7.3 Installation

Note! Before installing LAN drivers, ensure the CSI utility is installed on the system. See Chapter 5 for information regarding installing the CSI utility.



The Realtek 8111G (LAN1) and Realtek 8111G (LAN2) Gigabit integrated controllers support all major network operating systems. However, the installation procedure varies between systems. Please follow the driver setup procedure instructions specific to the operating system installed.

7.4 Windows 10 Driver Setup (Realtek 8111G)

Download the driver from website on your computer. Navigate to the "AIMB-U117 Realtek LAN" folder and click "setup.exe" to complete the installation of the drivers.

Win 10(64bit) Driver for AIMB-U117

Solution : Win 10(64bit) Driver for AIMB-U117

| Download File | Released Date | Download Site | |
|--|---------------|---------------|-----------|
| AIMB-U117_Audio_Win10(64bit).zip | 2019-03-18 | Primary | Secondary |
| AIMB-U117_Chipset_Win10(64bit).zip | 2019-03-18 | Primary | Secondary |
| AIMB-U117_Graphic_Win10(64bit).zip | 2019-03-18 | Primary | Secondary |
| AIMB-U117_Intel TXE_Win10(64bit).zip | 2019-03-18 | Primary | Secondary |
| AIMB-U117_Others_Win10(64bit).zip | 2019-03-18 | Primary | Secondary |
| AIMB-U117_Realtek LAN_Win10(64bit).zip | 2019-03-18 | Primary | Secondary |

Appendix **A**

Pin Assignments

A.1 Pin Assignments

Table A.1: DC Input Connector (DCIN1)

| Pin | Signal |
|-----|-------------|
| 1 | Power input |
| 2 | GND |
| 3 | GND |

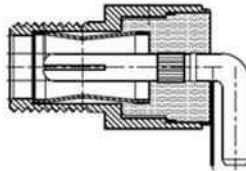


Table A.2: High Definition Multimedia Interface (HDMI1)

| Pin | Signal | Pin | Signal |
|-----|--------------|-----|--------------|
| 1 | HDMI1_Z_D2+ | 11 | GND |
| 2 | GND | 12 | HDMI1_Z_CLK- |
| 3 | HDMI1_Z_D2- | 13 | NC |
| 4 | HDMI1_Z_D1+ | 14 | NC |
| 5 | GND | 15 | HDMI1_SCL |
| 6 | HDMI1_Z_D1- | 16 | HDMI1_SDA |
| 7 | HDMI1_Z_D0+ | 17 | GND |
| 8 | GND | 18 | +V5_HDMI |
| 9 | HDMI1_Z_D0- | 19 | HDMI1_HPD |
| 10 | HDMI1_Z_CLK+ | | |

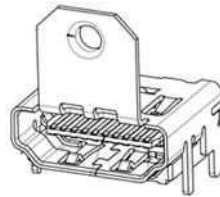
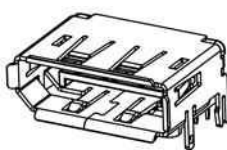


Table A.3: DisplayPort (DP1)

| Pin | Signal | Pin | Signal |
|-----|--------|-----|-------------|
| 1 | DP1_0+ | 11 | GND |
| 2 | GND | 12 | DP1_3- |
| 3 | DP1_0- | 13 | DP1_AUX_EN# |
| 4 | DP1_1+ | 14 | GND |
| 5 | GND | 15 | DP1_AUX+ |
| 6 | DP1_1- | 16 | GND |
| 7 | DP1_2+ | 17 | DP1_AUX- |
| 8 | GND | 18 | DP1_DP_HPD |
| 9 | DP1_2- | 19 | GND |
| 10 | DP1_3+ | 20 | +V3.3_DP1 |

**Table A.4: HD Analog Audio Interface (AUDIO1)**

| Pin | Signal |
|-----|--------|
| 1 | GND |
| 2 | Line_L |
| 3 | Detect |
| 4 | Line_R |
| 5 | GND |

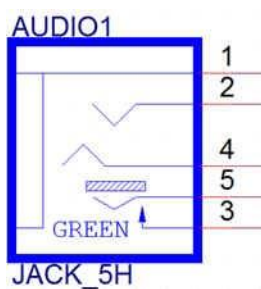
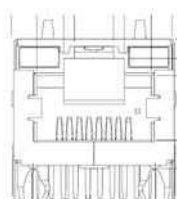


Table A.5: Single Port RJ45 Connector (LAN1)

| Pin | Signal | Pin | Signal |
|-----|------------|-----|-------------------|
| 1 | LAN1_MDI0+ | 8 | LAN1_MDI2- |
| 2 | LAN1_MDI0- | 9 | LAN1_MDI3+ |
| 3 | LAN1_MDI1+ | 10 | LAN1_MDI3- |
| 4 | LAN1_MDI1- | 11 | LAN1_LED1_z_ACT# |
| 5 | LAN1_TCT_A | 12 | +V3.3_DUAL |
| 6 | LAN1_TCTG | 13 | LAN1_LED2_z_1G# |
| 7 | LAN1_MDI2+ | 14 | LAN1_LED0_z_100M# |

**Table A.6: Dual Ports RJ45 Connector (LAN12)**

| Pin | Signal | Pin | Signal |
|-----|-------------------|-----|-------------------|
| A1 | LAN2_MDI0+ | B1 | LAN1_MDI0+ |
| A2 | LAN2_MDI0- | B2 | LAN1_MDI0- |
| A3 | LAN2_MDI1+ | B3 | LAN1_MDI1+ |
| A4 | LAN2_MDI1- | B4 | LAN1_MDI1- |
| A5 | LAN2_TCT_A | B5 | LAN1_TCT_A |
| A6 | LAN2_TCTG | B6 | LAN1_TCTG |
| A7 | LAN2_MDI2+ | B7 | LAN1_MDI2+ |
| A8 | LAN2_MDI2- | B8 | LAN1_MDI2- |
| A9 | LAN2_MDI3+ | B9 | LAN1_MDI3+ |
| A10 | LAN2_MDI3- | B10 | LAN1_MDI3- |
| A11 | LAN2_LED1_z_ACT# | B11 | LAN1_LED1_z_ACT# |
| A12 | +V3.3_DUAL | B12 | +V3.3_DUAL |
| A13 | LAN2_LED2_z_1G# | B13 | LAN1_LED2_z_1G# |
| A14 | LAN2_LED0_z_100M# | B14 | LAN1_LED0_z_100M# |

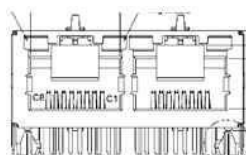
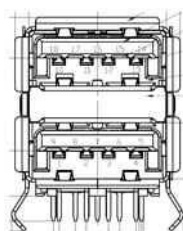


Table A.7: USB 3.0 Connector (USB12)

| Pin | Signal | Pin | Signal |
|-----|--------------|-----|--------------|
| 1 | +USBV1 | 10 | +USBV1 |
| 2 | USB_D0- | 11 | USB_D1- |
| 3 | USB_D0+ | 12 | USB_D1+ |
| 4 | GND | 13 | GND |
| 5 | USB3X0_z_RX- | 14 | USB3X1_z_RX- |
| 6 | USB3X0_z_RX+ | 15 | USB3X1_z_RX+ |
| 7 | GND | 16 | GND |
| 8 | USB3X0_z_TX- | 17 | USB3X1_z_TX- |
| 9 | USB3X0_z_TX+ | 18 | USB3X1_z_TX+ |

**Table A.8: USB 3.0 Connector (USB34)**

| Pin | Signal | Pin | Signal |
|-----|--------------|-----|--------------|
| 1 | +USBV2 | 10 | +USBV2 |
| 2 | USB_D2- | 11 | USB_D3- |
| 3 | USB_D2+ | 12 | USB_D3+ |
| 4 | GND | 13 | GND |
| 5 | USB3X2_z_RX- | 14 | USB3X3_z_RX- |
| 6 | USB3X2_z_RX+ | 15 | USB3X3_z_RX+ |
| 7 | GND | 16 | GND |
| 8 | USB3X2_z_TX- | 17 | USB3X3_z_TX- |
| 9 | USB3X2_z_TX+ | 18 | USB3X3_z_TX+ |

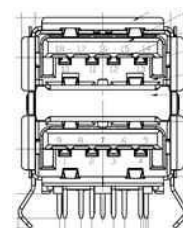


Table A.9: LVDS Backlight Inverter Power Header (INV1)

| Pin | Signal |
|-----|----------|
| 1 | +12V |
| 2 | GND |
| 3 | BKL EN |
| 4 | BKL CTRL |
| 5 | +5V |

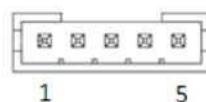


Table A.10: LVDS Panel Voltage Selection Header (JLVDS1)

| Pin | Signal | Pin | Signal |
|-----|--------|-----|----------|
| 1 | NC | 2 | +5V |
| 3 | +12V | 4 | EDP1 VDD |
| 5 | NC | 6 | +3.3V |

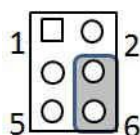


Table A.11: LVDS Panel Header (LVDS_EDP1)

| Pin | Signal | Pin | Signal |
|-----|-------------|-----|-------------|
| 1 | +VDD_LVDS1 | 2 | +VDD_LVDS1 |
| 3 | LVDS_DET# | 4 | GND |
| 5 | +VDD_LVDS1 | 6 | +VDD_LVDS1 |
| 7 | LVDS1_A0N | 8 | LVDS1_A4N |
| 9 | LVDS1_A0P | 10 | LVDS1_A4P |
| 11 | GND | 12 | GND |
| 13 | LVDS1_A1N | 14 | LVDS1_A5N |
| 15 | LVDS1_A1P | 16 | LVDS1_A5P |
| 17 | GND | 18 | GND |
| 19 | LVDS1_A2N | 20 | LVDS1_A6N |
| 21 | LVDS1_A2P | 22 | LVDS1_A6P |
| 23 | GND | 24 | GND |
| 25 | LVDS1_CLK1N | 26 | LVDS1_CLK2N |
| 27 | LVDS1_CLK1P | 28 | LVDS1_CLK2P |
| 29 | GND | 30 | GND |
| 31 | LVDS1_SCD | 32 | LVDS1_SDD |
| 33 | GND | 34 | LVDS1_PIN34 |
| 35 | LVDS1_A3N | 36 | LVDS1_A7N |
| 37 | LVDS1_A3P | 38 | LVDS1_A7P |
| 39 | LVDS1_ENBKL | 40 | LVDS1_VCON |

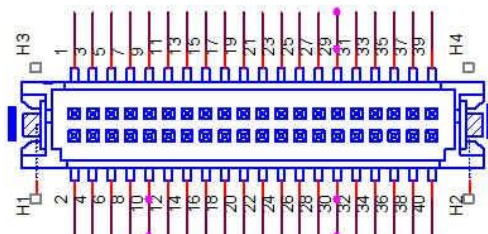
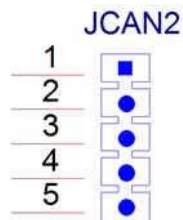


Table A.12: MCU Programming Header (JCAN2)

| Pin | Signal |
|-----|---------|
| 1 | MCLR# |
| 2 | +V5_CAN |
| 3 | GND |
| 4 | PG_DAT |
| 5 | PG_CLK |

**Table A.13: CAN BUS Header (CAN1)**

| Pin | Signal |
|-----|--------|
| 1 | CAN_H1 |
| 2 | CAN_L1 |
| 3 | GND |

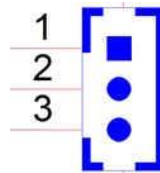
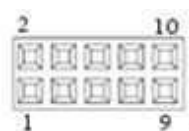
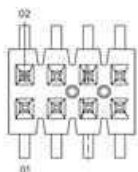


Table A.14: Low Pin Count Header (LPC1)

| Pin | Signal | Pin | Signal |
|-----|-------------|-----|----------------|
| 1 | SOC_LPC_AD1 | 2 | CLKOUT_25M_LPC |
| 3 | SOC_LPC_AD0 | 4 | PM_PLTRST# |
| 5 | +V3.3 | 6 | SOC_LPC_FRAME# |
| 7 | GND | 8 | SOC_LPC_AD3 |
| 9 | NC | 10 | SOC_LPC_AD2 |

**Table A.15: SPI Programming Pin Header (SPI_CN1)**

| Pin | Signal | Pin | Signal |
|-----|--------|-----|--------|
| 1 | CS# | 2 | +3.3V |
| 3 | MISO | 4 | NC |
| 5 | NC | 6 | SCK |
| 7 | GND | 8 | MOSI |

**Table A.16: CMOS Battery Connector (BAT1)**

| Pin | Signal |
|-----|--------|
| 1 | VBAT |
| 2 | GND |

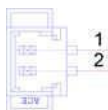
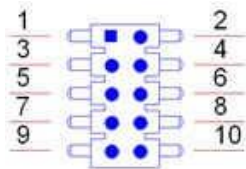
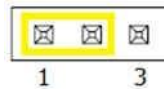


Table A.17: General Purpose I/O Pin Header (GPIO1)

| Pin | Signal | Pin | Signal |
|-----|--------|-----|--------|
| 1 | GPIO0 | 2 | GPIO4 |
| 3 | GPIO1 | 4 | GPIO5 |
| 5 | GPIO2 | 6 | GPIO6 |
| 7 | GPIO3 | 8 | GPIO7 |
| 9 | +3.3V | 10 | GND |

**Table A.18: COMS Mode Selection (JCMOS1)**

| Pin | Signal |
|-----|------------|
| 1 | VBAT |
| 2 | RTC RESET# |
| 3 | GND |

**Table A.19: AT/ATX Mode Selection (PSON1)**

| Pin | Signal |
|-----|--------|
| 1 | AT |
| 2 | +3.3V |
| 3 | ATX |

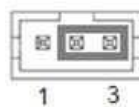
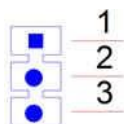
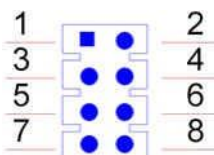


Table A.20: Serial Bus Header (JFP2)

| Pin | Signal |
|-----|----------|
| 1 | SMB_DATA |
| 2 | SMB_CLK |
| 3 | GND |

**Table A.21: PWRBTN#/ RESET#/HDD LED/ Power LED Header (JFP1)**

| Pin | Signal | Pin | Signal |
|-----|----------|-----|----------|
| 1 | HDD LED+ | 2 | PWR_BTN+ |
| 3 | HDD LED- | 4 | PWR_BTN- |
| 5 | PWR LED+ | 6 | RST_BTN+ |
| 7 | PWR LED- | 8 | RST_BTN- |

**Table A.22: SATA Power Header (SATA_PWR1)**

| Pin | Signal | Pin | Signal |
|-----|--------|-----|--------|
| 1 | +V5 | 3 | GND |
| 2 | GND | 4 | +12V |



Table A.23: SATA Signal Connector (SATA1)

| Pin | Signal |
|-----|--------|
| 1 | GND |
| 2 | TX+ |
| 3 | TX- |
| 4 | GND |
| 5 | RX- |
| 6 | RX+ |
| 7 | GND |

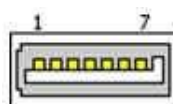


Table A.24: COM Port Header (COM1)

For RS232:

| Pin | Signal | Pin | Signal |
|-----|--------|-----|--------|
| 1 | DCD# | 2 | DSR# |
| 3 | RXD | 4 | RTS# |
| 5 | TXD | 6 | CTS# |
| 7 | DTR# | 8 | RI# |
| 9 | GND | 10 | NC |

For MDB (option):

| Pin | Signal | Pin | Signal |
|-----|--------|-----|--------|
| 1 | NC | 2 | NC |
| 3 | RXD | 4 | NC |
| 5 | TXD | 6 | NC |
| 7 | NC | 8 | NC |
| 9 | GND | 10 | NC |

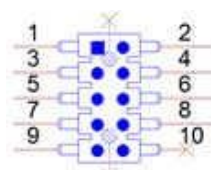


Table A.25: COM Port Header (COM2)**For RS-422/485:**

| Pin | Signal | Pin | Signal |
|-----|------------------|-----|--------|
| 1 | COM2_422_485_TX- | 2 | NC |
| 3 | COM2_422_485_TX+ | 4 | NC |
| 5 | COM2_422_RX+ | 6 | NC |
| 7 | COM2_422_RX- | 8 | NC |
| 9 | GND | 10 | NC |

For ccTlak (option):

| Pin | Signal | Pin | Signal |
|-----|--------|-----|--------|
| 1 | NC | 2 | NC |
| 3 | NC | 4 | NC |
| 5 | Data | 6 | NC |
| 7 | NC | 8 | NC |
| 9 | GND | 10 | NC |

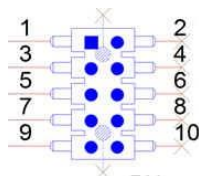


Table A.26: MINIPCIE and mSATA Connector (MINI-PCIE1)**MINIPCIE**

| Pin | Signal | Pin | Signal |
|-----|---------------|-----|-----------|
| 1 | WAKE# | 2 | +3.3Vaux |
| 3 | Reserved | 4 | GND |
| 5 | Reserved | 6 | +1.5V |
| 7 | CLKREQ# | 8 | Reserved |
| 9 | GND | 10 | Reserved |
| 11 | REFCLK- | 12 | Reserved |
| 13 | REFCLK+ | 14 | Reserved |
| 15 | GND | 16 | Reserved |
| 17 | Reserved | 18 | GND |
| 19 | Reserved | 20 | DISABLE# |
| 21 | DETECT# | 22 | RESET# |
| 23 | PCIE_RX+ | 24 | +3.3Vaux |
| 25 | PCIE_RX- | 26 | GND |
| 27 | GND | 28 | +1.5V |
| 29 | GND | 30 | SMB_CLK |
| 31 | PCIE_TX- | 32 | SMB_DATA |
| 33 | PCIE_TX+ | 34 | GND |
| 35 | GND | 36 | USB_D- |
| 37 | GND | 38 | USB_D+ |
| 39 | +3.3Vaux | 40 | GND |
| 41 | +3.3Vaux | 42 | Reserved |
| 43 | V1.2_DETECT# | 44 | LED_WLAN# |
| 45 | Reserved | 46 | Reserved |
| 47 | Reserved | 48 | +1.5V |
| 49 | Reserved | 50 | GND |
| 51 | MSATA_DETECT# | 52 | +3.3Vaux |

mSATA

| Pin | Signal | Pin | Signal |
|-----|----------|-----|----------|
| 1 | Reserved | 2 | +3.3V |
| 3 | Reserved | 4 | GND |
| 5 | Reserved | 6 | +1.5V |
| 7 | Reserved | 8 | Reserved |
| 9 | GND | 10 | Reserved |
| 11 | Reserved | 12 | Reserved |
| 13 | Reserved | 14 | Reserved |
| 15 | GND | 16 | Reserved |
| 17 | Reserved | 18 | GND |
| 19 | Reserved | 20 | Reserved |
| 21 | DETECT# | 22 | Reserved |
| 23 | RX+ | 24 | +3.3V |
| 25 | RX- | 26 | GND |
| 27 | GND | 28 | +1.5V |
| 29 | GND | 30 | SMB_CLK |

Table A.26: MINIPCIE and mSATA Connector (MINI-PCIE1)

| | | | |
|----|---------------|----|----------|
| 31 | TX- | 32 | SMB_DATA |
| 33 | TX+ | 34 | GND |
| 35 | GND | 36 | Reserved |
| 37 | GND | 38 | Reserved |
| 39 | +3.3V | 40 | GND |
| 41 | +3.3V | 42 | Reserved |
| 43 | Reserved | 44 | Reserved |
| 45 | Reserved | 46 | Reserved |
| 47 | Reserved | 48 | +1.5V |
| 49 | Reserved | 50 | GND |
| 51 | MSATA_DETECT# | 52 | +3.3V |

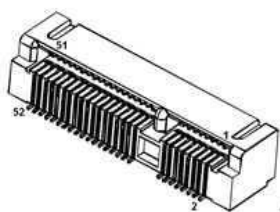


Table A.27: Next Generation Form Factor (M.2_1)

| Pin | Signal | Pin | Signal |
|-----|----------------------|-----|--------------------|
| 1 | GND | 43 | PCIE_RX- |
| 2 | +V3.3SB_M.2 | 44 | NC |
| 3 | USB_D+ | 45 | GND |
| 4 | +V3.3SB_M.2 | 46 | NC |
| 5 | USB_D- | 47 | CK100M_NGFF+ |
| 6 | NC | 48 | NC |
| 7 | GND | 49 | CK100M_NGFF- |
| 8 | NGFF_I2S3_Z_BCLK | 50 | NGFF_PMU_SUSCLK |
| 9 | SDIO_WIFI_CLK | 51 | GND |
| 10 | NGFF_I2S3_Z_SYNC | 52 | NGFF_PLTRST# |
| 11 | SDIO_WIFI_CMD | 53 | PCIE_REQ2_NGFF# |
| 12 | NGFF_I2S3_Z_SDI | 54 | NGFF_BT_DISABLE# |
| 13 | SDIO_WIFI_D0 | 55 | PCIE_NGFF_WAKE2# |
| 14 | NGFF_I2S3_Z_SDO | 56 | NGFF_WIFI_DISABLE# |
| 15 | SDIO_WIFI_D1 | 57 | GND |
| 16 | NC | 58 | NC |
| 17 | SDIO_WIFI_D2 | 59 | NC |
| 18 | GND | 60 | NC |
| 19 | SDIO_WIFI_D3 | 61 | NC |
| 20 | NGFF_CONN_UART_WAKE# | 62 | NC |
| 21 | SDIO_WIFI_WAKE# | 63 | GND |
| 22 | NGFF_UART0_Z_RXD | 64 | NC |
| 23 | SDIO_WIFI_RST | 65 | NC |
| 32 | NGFF_UART0_Z_TXD | 66 | NC |
| 33 | GND | 67 | NC |
| 34 | NGFF_UART0_Z_CTS# | 68 | NC |
| 35 | PCIE_TX+ | 69 | GND |
| 36 | NGFF_UART0_Z_RTS# | 70 | NC |
| 37 | PCIE_TX- | 71 | NC |
| 38 | NC | 72 | +V3.3SB_M.2 |
| 39 | GND | 73 | NC |
| 40 | NC | 74 | +V3.3SB_M.2 |
| 41 | PCIE_RX+ | 75 | GND |
| 42 | NC | | |

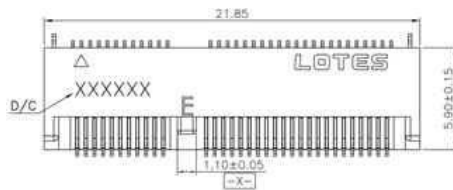
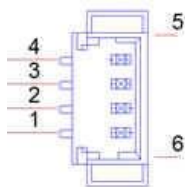
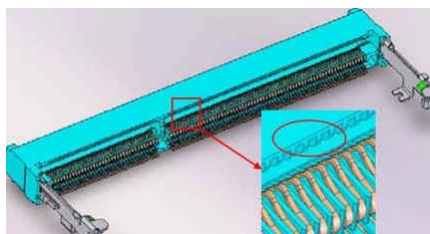
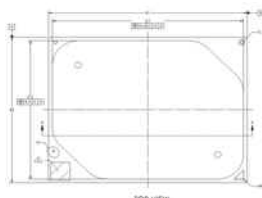
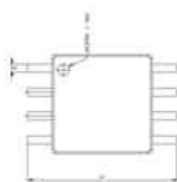


Table A.28: CPU FAN Connector (CPUFAN1)

| Pin | Signal |
|-----|------------|
| 1 | GND |
| 2 | VCC |
| 3 | CPU FANOUT |
| 4 | CPU FANIN |

**DDR3L SO-DIMM Socket (DIMMA1)****CPU-System on Chip(SOC1)****Table A.29: BIOS Flash (SPI1)**

| Pin | Signal | Pin | Signal |
|-----|------------|-----|-------------|
| 1 | SPI_Z_CS0 | 5 | SPI_Z_MOSI |
| 2 | SPI_Z_MISO | 6 | SPI_Z_CLK |
| 3 | SPI_Z_IO2 | 7 | SPI_Z_IO3 |
| 4 | GND | 8 | +V1.8SB_SPI |





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