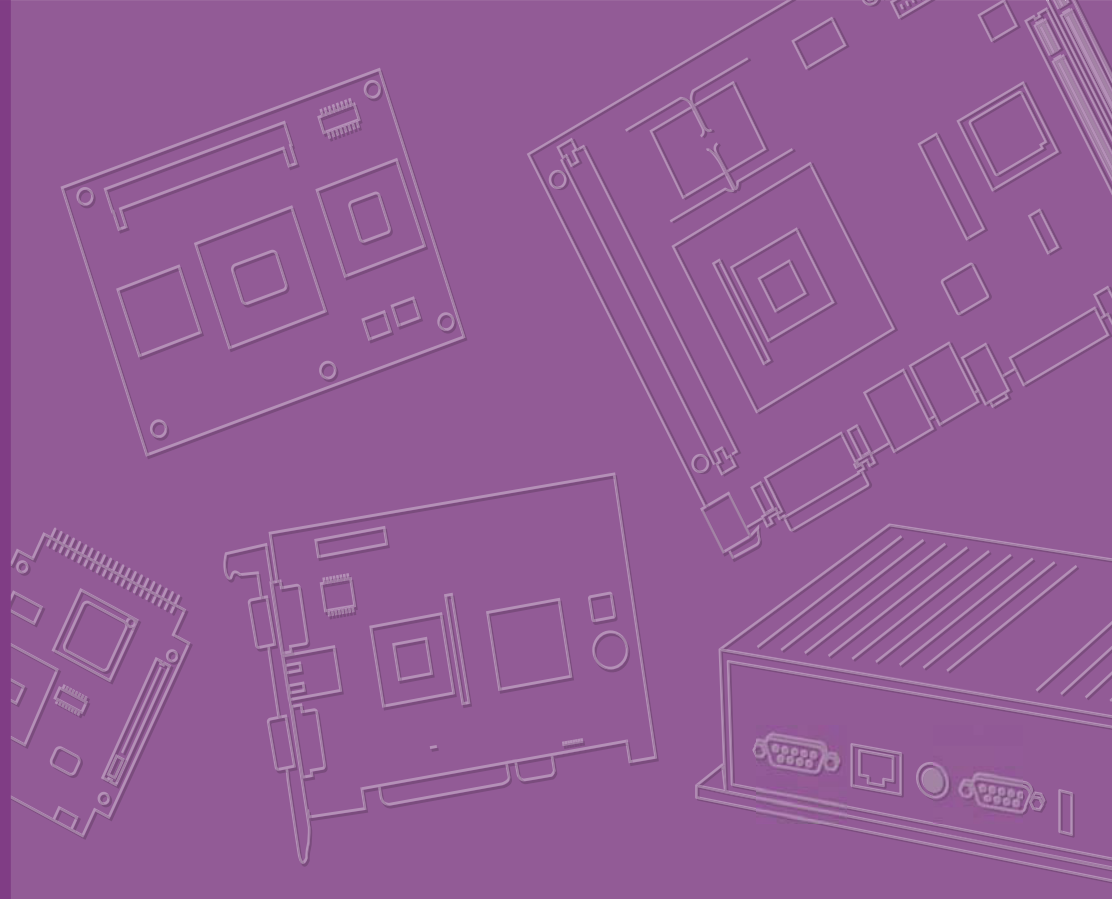


Manual

ADVANTECH

MIO-5272

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MIO-5251

Intel® Celeron® J1900 & Atom™ E3825,
3.5" MI/O-Compact SBC, DDR3L,
VGA, HDMI/DP, 48-bit LVDS/eDP,
2GbE, Mini PCIe, mSATA/SD card,
iManager, MIOe

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2. Call your dealer and describe the problem. Please have your manual, product, and any helpful information readily available.
3. If your product is diagnosed as defective, obtain an RMA (return merchandise authorization) number from your dealer. This allows us to process your return more quickly.
4. Carefully pack the defective product, a fully-completed Repair and Replacement Order Card and a photocopy proof of purchase date (such as your sales receipt) in a shippable container. A product returned without proof of the purchase date is not eligible for warranty service.
5. Write the RMA number visibly on the outside of the package and ship it prepaid to your dealer.

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CE

This product has passed the CE test for environmental specifications. Test conditions for passing included the equipment being operated within an industrial enclosure. In order to protect the product from being damaged by ESD (Electrostatic Discharge) and EMI leakage, we strongly recommend the use of CE-compliant industrial enclosure products.

FCC Class A

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Caution! *There is a danger of a new battery exploding if it is 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.*



Technical Support and Assistance

1. Visit the Advantech website at <http://support.advantech.com> where you can find the latest information about the product.
2. Contact your distributor, sales representative, or Advantech's customer service center for technical support if you need additional assistance. Please have the following information ready before you call:
 - Product name and serial number
 - Description of your peripheral attachments
 - Description of your software (operating system, version, application software, etc.)
 - A complete description of the problem
 - The exact wording of any error messages

Packing List

Before you begin installing your card, please make sure that the following materials have been shipped:

- 1 x MIO-5251 SBC
- 1 x SATA Cable 30cm (p/n: 1700006291)
- 1 x SATA Power Cable 35cm (p/n: 1700018785)
- 1 x Audio Cable 20cm (p/n: 1700019584)
- 2 x COM Cable 22cm (p/n: 1701200220)
- 1 x Heatsink (19mm) (p/n: 1960062791T001)
- 1 x Startup manual (p/n: 2006525100)
- 1 x Mini Jumper(10pcs package) (p/n: 9689000002)
- 1 x Screw Kit (4pcs screws for miniPCle) (p/n: 9666525100E)
- 1 x SUSIAccess Pro package (p/n: 968EMLSAP1)

If any of these items are missing or damaged, contact your distributor or sales representative immediately.

Optional MIOe Module

| Part Number | Description |
|-------------------|---|
| MIOe-210-D6A1E | 4 x RS232/422/485, 2x RS422/485, 8-bit GPIO |
| MIOe-220-B3A1E | 3 x Intel® Gigabit Ethernet with PCIe Switch |
| MIOe-230-L0A1E | DisplayPort or 48-bit LVDS, 2 x USB2.0 |
| MIOe-DB5000-01A1E | MI/O extension evaluation board |
| MIOe-3674-AE | 4-port PoE ports |
| MIOe-3680-AE | 2-Port CAN-Bus with Isolation Protection |
| MIOe-PWR1-00E | 12-24V wide range power module (by cable, not via MIOe) |
| MIOe-PWR2 | 9-36V wide range power module (by cable, not via MIOe) |

Optional Accessories

| Part number | Description |
|----------------|----------------------------------|
| 1960065073N001 | Heat spreader 16.7mm height |
| 1757003995 | AC-to-DC Adapter 12V/5A, 0-40°C |
| 1703100264 | Internal 1-Port USB cable 22.5cm |

Contents

| | | |
|-------------------|--|-----------|
| Chapter 1 | General Information | 1 |
| 1.1 | Introduction | 2 |
| 1.2 | Specifications | 2 |
| 1.2.1 | Functional Specifications | 2 |
| 1.2.2 | OS support..... | 4 |
| 1.2.3 | Mechanical Specifications..... | 4 |
| 1.2.4 | Electrical Specifications | 4 |
| 1.2.5 | Environmental | 4 |
| 1.3 | Block Diagram..... | 5 |
| 1.4 | Board layout: dimensions..... | 5 |
| | Figure 1.1 MIO-5251 Mechanical Drawing (Top Side) | 5 |
| | Figure 1.2 MIO-5251 Mechanical Drawing (Bottom Side) | 6 |
| | Figure 1.3 MIO-5251 Mechanical Drawing (Coastline)..... | 6 |
| | | |
| Chapter 2 | Installation..... | 7 |
| 2.1 | Jumpers & Switches..... | 8 |
| | Table 2.1: Jumpers & Switches | 8 |
| 2.2 | Connectors..... | 8 |
| | Table 2.2: Connectors | 8 |
| 2.3 | Locating Connectors | 9 |
| | Figure 2.1 MIO-5251 Connector Locations (Top Side)..... | 9 |
| | Figure 2.2 MIO-5251 Connector Locations (Bottom Side)..... | 9 |
| 2.4 | Setting Jumpers | 10 |
| 2.4.1 | Auto Power On Setting (J2) | 10 |
| | Table 2.3: Auto Power On Setting (J2)..... | 10 |
| 2.4.2 | LCD Power (J5) | 10 |
| | Table 2.4: LCD Power (J5) | 10 |
| 2.4.3 | Clear CMOS (SW2) | 11 |
| | Table 2.5: Clear CMOS (SW2) | 11 |
| | | |
| Chapter 3 | AMI BIOS Setup | 13 |
| 3.1 | Entering Setup | 15 |
| 3.1.1 | Main Setup..... | 15 |
| 3.1.2 | Advanced BIOS Features Setup..... | 16 |
| 3.1.3 | Chipset Configuration | 29 |
| 3.1.4 | Security | 36 |
| 3.1.5 | Boot..... | 37 |
| 3.1.6 | Save & Exit | 38 |
| | | |
| Chapter 4 | MIOe Installation | 39 |
| 4.1 | Quick Installation Guide: | 40 |
| | | |
| Appendix A | Pin Assignments | 41 |
| A.1 | Jumper List..... | 42 |
| A.2 | Connector Pin Definition | 43 |

| | | |
|-------------------|---|-----------|
| Appendix B | System Assignments..... | 63 |
| B.1 | System I/O Ports..... | 64 |
| | Table B.1: System I/O Ports | 64 |
| B.2 | 1st MB Memory Map..... | 64 |
| | Table B.2: 1st MB Memory Map | 64 |
| B.3 | Interrupt Assignments | 65 |
| | Table B.3: Interrupt assignments..... | 65 |
| | | |
| Appendix C | EC Watchdog Timer Sample Code .. | 67 |
| C.1 | EC Watchdog Timer sample code | 68 |

Chapter 1

General Information

This chapter gives background information on the MIO-5251.

Sections include:

- Introduction
- Specifications
- Block diagram
- Board layout and dimensions

1.1 Introduction

MIO-5251 is designed using MI/O Extension form factor (compact series, 146 x 102 mm) and powered by the latest generation of Intel® Celeron® J1900 and Atom™ E3825 processors which have low power features but also good performance computing, especially for multimedia capabilities compared to earlier generations. Meanwhile, MIO-5251 offers flexible expansion possibilities: two full-size mini PCIe, 2nd LVDS through MIOe-230, SD card, SIM holder, MIOe with PCIe1, SMBus, 3xUSB2.0, LPC, line out, DisplayPort, and power interface.

MIO-5251 supports various display interfaces including HDMI/DisplayPort, VGA, 48-bit LVDS/eDP, and rich I/O: 2 x GbE, SATA, mSATA/SD card, 4xSerial Ports, USB 3.0 and 4 x USB 2.0.

1.2 Specifications

1.2.1 Functional Specifications

- **Processor:**
 - Celeron® J1900 2.0GHz (burst frequency 2.42GHz), Quad Cores, Four Threads
 - Atom™ E3825 1.33GHz, Dual Cores, Two Threads
 - Cache Hierarchy
 - * 32 KB 8-way L1 instruction cache and 24 KB 6-way L1 data cache per core
 - * 1 MB, 16-way L2 cache, shared per two cores
 - Supported C-states: C0, C1, C6, C7
 - Advanced Technologies
 - * Intel® Virtualization Technology (VT-x)
 - * Intel® 64 Architecture
 - * Enhanced Intel SpeedStep Technology
 - * Intel® Trusted Execution Engine (TXE)
 - Power Management
 - * ACPI 5.0
 - * System sleep states: S0, S3, S4, S5
- **System Memory Support**
 - Non-ECC, DDR3L SODIMM up to 8GB
 - 64 bit data bus
 - x8 and x16 DDR3L SDRAM device data widths
 - DDR3L with 1066 MT/s data rates for E3825, total memory bandwidth 8.5GB/s
 - DDR3L with 1333 MT/s data rates for J1900, total memory bandwidth can be scalable to 21.3GB/s
 - Aggressive power management to reduce power consumption
- **Graphic and Media Engine**
 - Intel® 7th generation (Gen 7) graphics and media encode/decode engine
 - GFX: Normal 688 MHz / Burst 854 MHz for J1900, Normal 533 MHz for E3825
 - Graphic Features:
 - * 3D HW Acceleration: DirectX11, OpenGL3.2, OpenCL1.2
 - * HW Video Decode: H.264, MPEG2, MVC, VC-1, WMV9, MJPEG and VP8
 - * HW Video Encode: H.264, (MPEG2 and MVC only for J1900)
 - Multi-display interfaces: VGA, HDMI/DisplayPort (default HDMI), 48-bit LVDS/eDP (default LVDS). MIOe's DisplayPort interface is shared with DisplayPort on rear I/O.

- * Supports Extend/ Clone Mode with multi-display device
- * Dual display: any two combination between VGA, HDMI/DisplayPort/MIOe's DisplayPort, LVDS/eDP
- Specification and Resolution
 - * VGA: 2560 x 1600 at 60Hz
 - * HDMI/DisplayPort: HDMI 1.4a with audio, up to 1080P at 60Hz. DisplayPort is supported standard version 1.1a with audio, up to 2560x1600 at 60Hz
 - * LVDS/eDP: 48-bit dual channel LVDS up to WUXGA 1920x1200 at 60Hz via CH7511, eDP is supported standard version 1.3 with audio up to 2560 x1600 at 60Hz
 - * Inverter power: 1A @ 5V/12V
- 3D HW Acceleration: OGL4.0, DirectX 11.1
- HW Video Decode: H.264, MPEG2, VC-1, VP8
- HW Video Encode: H.264, MPEG2 (max at 1080p)
- **Gigabit Ethernet**
 - Controller: Intel® i210
 - * 10/100/1000 BASE-T
 - * IEEE 802.3az Energy Efficient Ethernet (EEE), which defines Low Power Idle (LPI) state
 - * IEEE 1588/802.1AS precision time synchronization
 - * 9.5 KB Jumbo frames supported (Full-duplex)
 - * Flow Control supported
 - * Magic packet wake-up enable with unique MAC address
- **Peripheral interface**
 - MIOe Expansion
 - * DisplayPort (Supported by T-P/N due to shared with the DisplayPort on rear I/O)
 - * 1 PCIe x1
 - * 3 USB 2.0
 - * LPC
 - * HD Audio: Line out
 - * SMBus
 - * Power: +5 Vsb/+12 Vsb, Power On, Reset
 - 1 Serial-ATA port, up to 3.0Gb/s transfer rate (300 MB/s), supports independent DMA operation
 - * SATA Power: 5V / 12V
 - 1 x USB 3.0 & 4 x USB2.0
 - * One USB3.0 and three USB2.0 on rear I/O, one internal USB2.0
 - * USB3.0 SuperSpeed (SS), implements xHCI software host controller interface
 - * Multiplexed with EHCI controller that are High-Speed/Full-Speed (HS/FS)
 - * USB source: USB3.0 and USB2.0's dual port on rear I/O's USB signal directly from CPU, USB2.0 dual port on rear I/O + internal USB + mini PCIe from USB hub1, mSATA + 3xUSB3.0 for MIOe from USB hub2
 - * Support wake-up from sleeping state S3
 - * Power supply: 0.5A @ 5V for USB2.0, 1A @ 5V for USB3.0
 - 2 RS-232 for COM1/2, 2 RS-232/422/485 for COM3/4 (ESD protection: air gap ±15kV, contact ±8kV)
 - 8-bit Programmable General Purpose Input/ Output from iManager (5V tolerance)
 - 1 SMBus / I²C channel from iManager
 - Watchdog timer: Output System Reset, Programmable counter from 1 ~ 255 minutes/ seconds
 - Mini PCIe / mSATA
 - * 1 Full-size Mini PCIe with SIM holder (with PCIe and USB interface)
 - * 1 Full-size mSATA (with SATA and USB interface)
 - * Power supply: 1.1 A @ 3.3 V, 0.375 A @ 1.5 V

- SD slot: supported by T-P/N, shared the location with mSATA

- **High Definition Audio:**

- Intel® High Definition Audio Interface
- High Definition Audio Codec with Realtek proprietary loss-less content protection technology
- Supports 1 Line-input, 1 Line output, 1 Mic-input

- **BIOS**

- AMI UEFI 64 Mbit, BIOS for 64 or 32bit is different, default version is for 64bit
- Default setting is Legacy boot, that can be manually changed to UEFI boot. If default setting to UEFI is needed, that can be done by T-P/N

1.2.2 OS support

MIO-5251 supports Win8, Win7, WES8, WES7, WEC7, Linux kernel 3.x, VxWorks 6.9.3.3, Android Kit Kat 4.4

Win7 only supports Legacy mode and Win8 for UEFI mode.

For further information about OS support of MIO-5251, please Advantech website: <http://support.advantech.com.tw/> or contact the technical support center.

1.2.3 Mechanical Specifications

- **Dimensions:** 146 x 102 mm (5.7 x 4 inches)
- **Height:** top side 19mm, PCB 1.6mm, bottom side 6.8mm, total 27.4mm
- **Weight:** 0.5 kg (reference weight of total package)

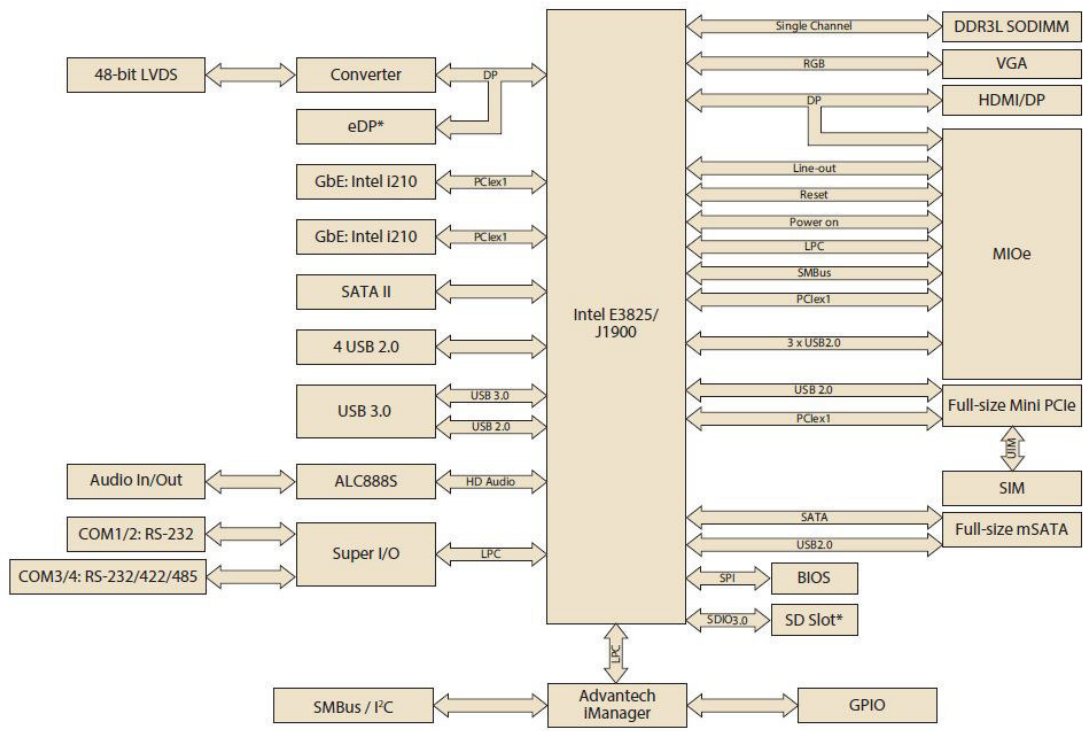
1.2.4 Electrical Specifications

- **Power Requirement:** Single +12V DC \pm 10% power input
- **Power Consumption:**
 - Max load
 - * MIO-5251J-U0A1E: 1.16A @ 12V (13.92W)
 - * MIO-5251E-S3A1E: 0.81A @ 12V (9.72W)
 - Idle mode
 - * MIO-5251J-U0A1E: 0.62A @ 12V (7.44W)
 - * MIO-5251E-S3A1E: 0.42A @ 12V (5.04W)
- **Power Consumption Conditions:**
 - Test software: 3DMark 2006
 - Max. load: Measure the maximum current value which system under maximum load (CPU: Top speed, RAM &Graphic: Full loading)
 - Idle mode: Measure the current value when system in windows mode and without running any program
- **RTC Battery:**
 - Typical Voltage: 3.0 V
 - Normal discharge capacity: 210 mAh

1.2.5 Environmental

- **Operating temperature:** 0 ~ 60°C (32 ~ 140°F)
- **Operating Humidity:** 40°C @ 85% RH Non-Condensing
- **Storage Temperature:** Storage temperature: -40~85°C
- **Storage Humidity:** Relative humidity: 95% @ 60°C

1.3 Block Diagram



1.4 Board layout: dimensions

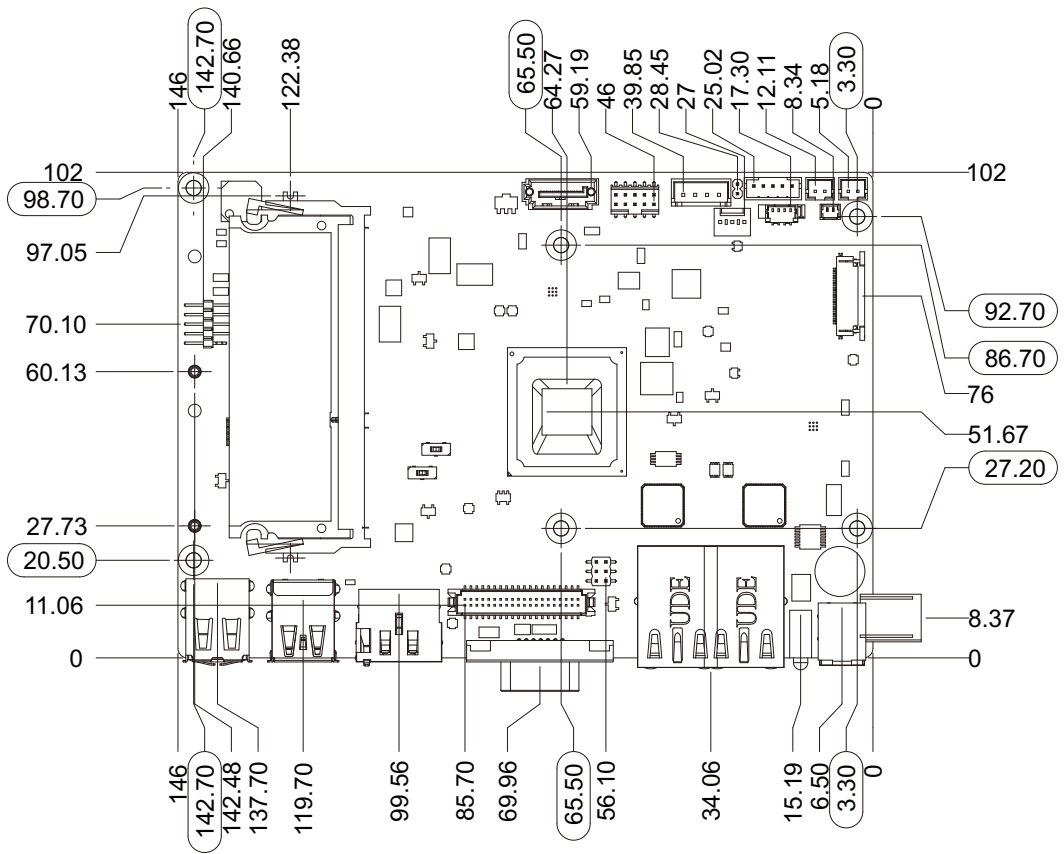


Figure 1.1 MIO-5251 Mechanical Drawing (Top Side)

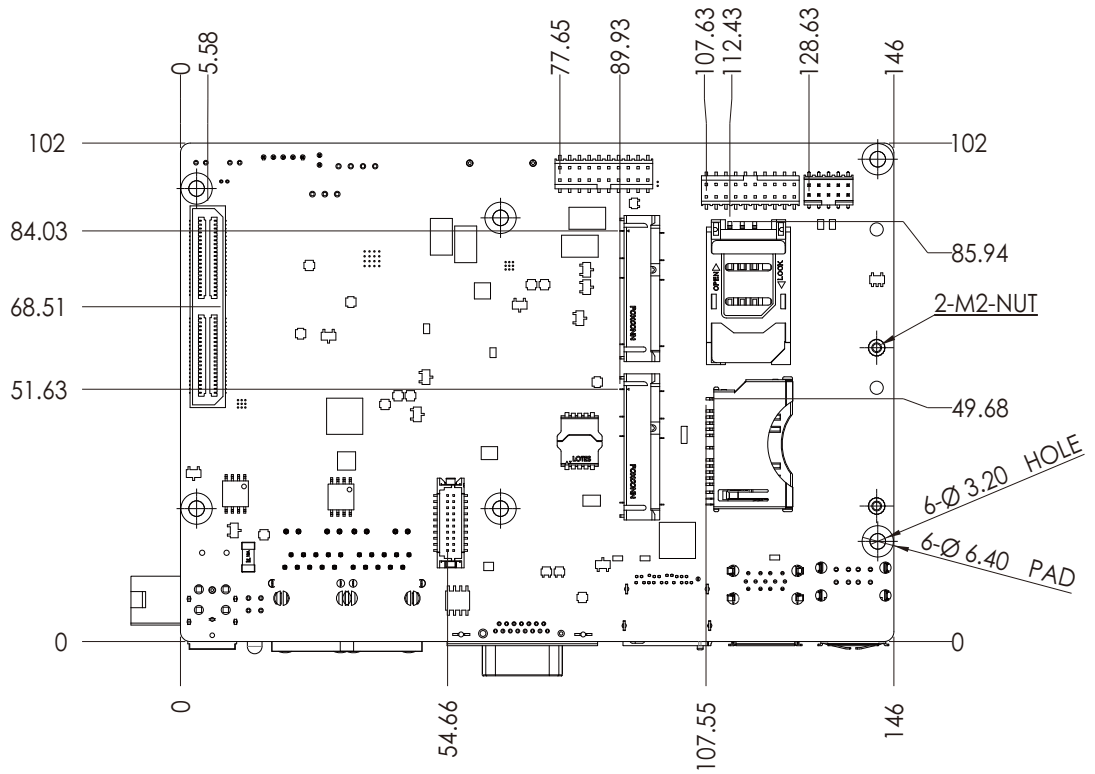


Figure 1.2 MIO-5251 Mechanical Drawing (Bottom Side)

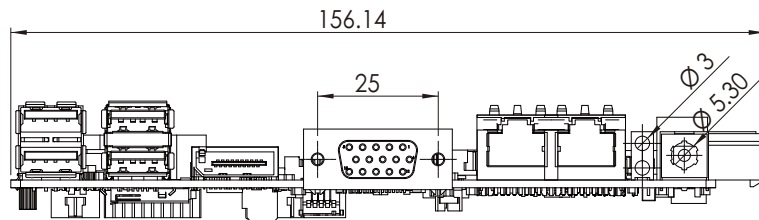


Figure 1.3 MIO-5251 Mechanical Drawing (Coastline)

Chapter 2

Installation

This chapter explains the setup procedures of the MIO-5251 hardware, including instructions on setting jumpers and connecting peripherals, switches and indicators. Be sure to read all safety precautions before you begin the installation procedure.

2.1 Jumpers & Switches

The MIO-5251 has a number of jumpers that allow you to configure your system to suit your application. The table below lists the functions of the various jumpers.

Table 2.1: Jumpers & Switches

| | |
|-----|---------------|
| J2 | Auto Power On |
| J5 | LCD Power |
| SW2 | Clear CMOS |

2.2 Connectors

Onboard connectors link the MIO-5251 to external devices such as hard disk drives, a keyboard, or floppy drives. The table below lists the function of each of the connectors.

Table 2.2: Connectors

| Label | Function |
|--------------|------------------------|
| CN1 | 12V Power Input |
| CN4 | SD Card |
| CN6 | SODIMM |
| CN7 | Power Switch |
| CN9 | Reset |
| CN10 | GPIO |
| CN11 | VGA |
| CN12 | HDMI (Optional DP) |
| CN13 | SATA Power |
| CN14 | SATA |
| CN15 | Mini PCIe |
| CN16 | mSATA |
| CN17 | SIM Holder |
| CN18 | External USB2.0 |
| CN19 | External USB3.0+USB2.0 |
| CN20 | COM1/2: RS-232 |
| CN21 | COM3/4: RS-232/422/485 |
| CN24 | GbE |
| CN27 | Audio |
| CN29 | MIOe |
| CN30 | Inverter Power |
| CN31 | LVDS |
| CN32 | eDP |
| CN33 | SMBus/I ² C |
| CN34 | Internal USB2.0 |
| FAN1 | System Fan |

2.3 Locating Connectors

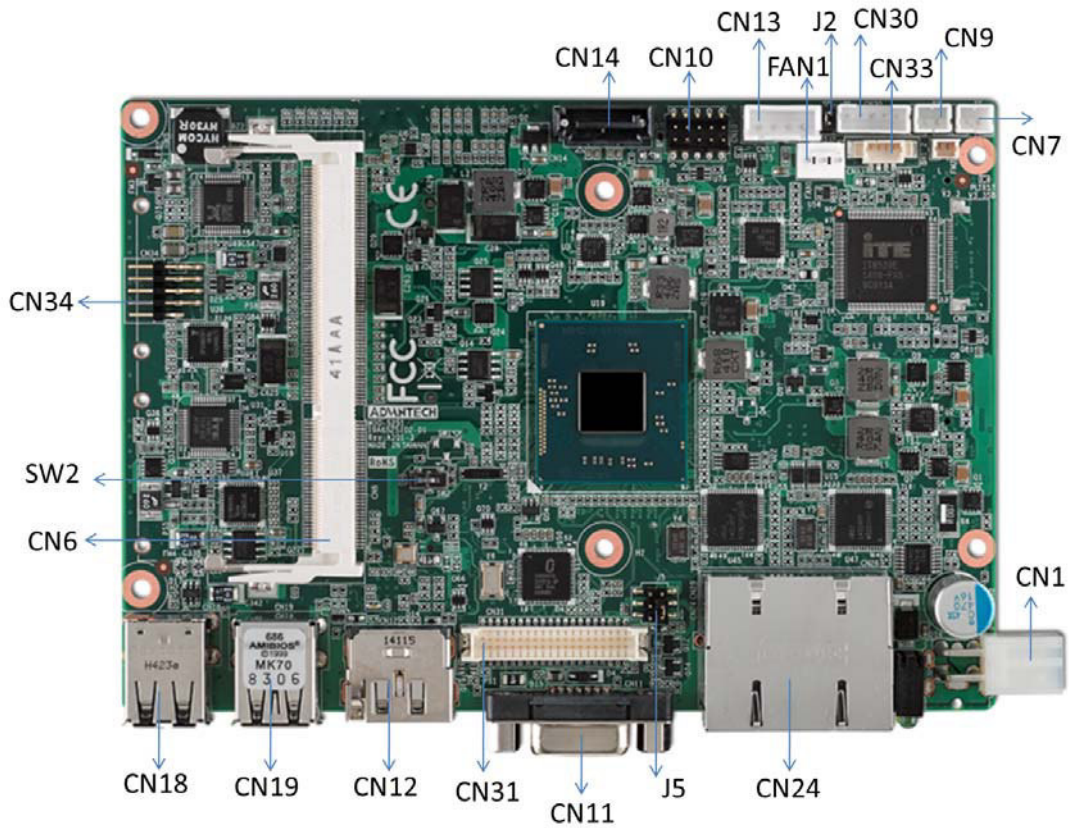


Figure 2.1 MIO-5251 Connector Locations (Top Side)

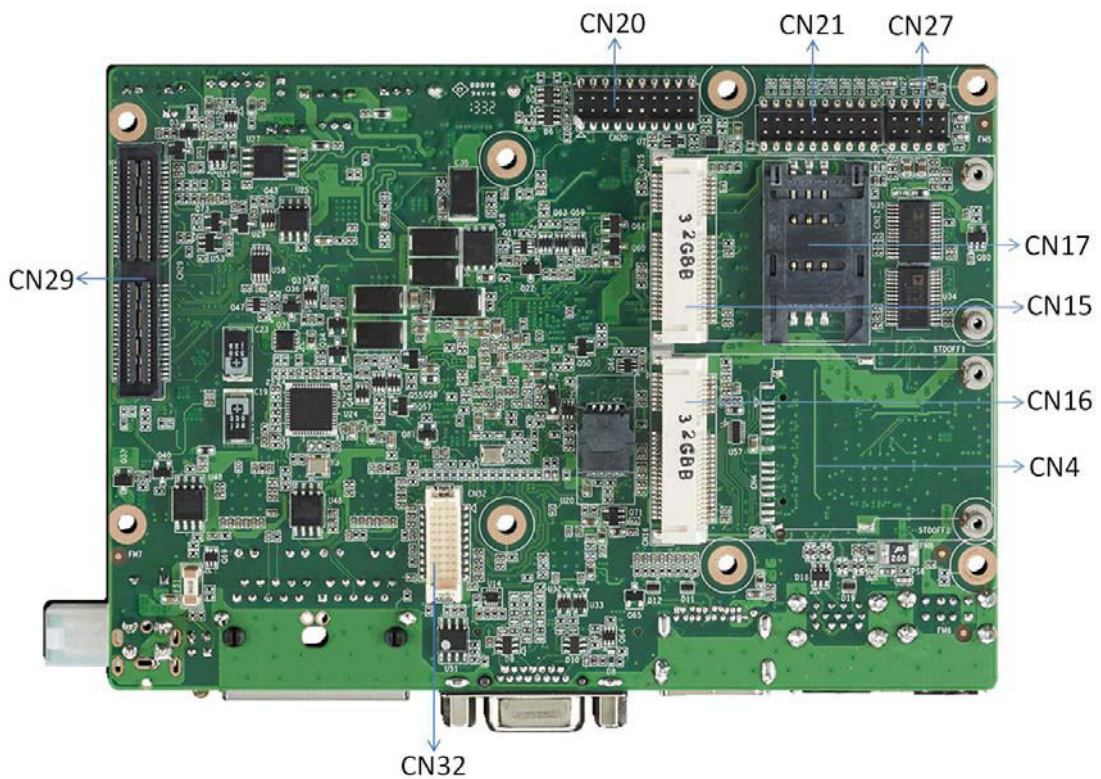
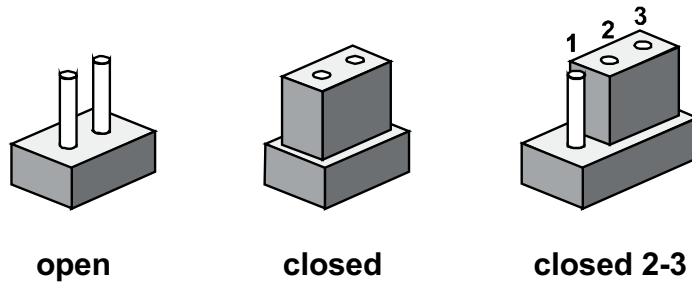


Figure 2.2 MIO-5251 Connector Locations (Bottom Side)

2.4 Setting Jumpers

You may configure your card to match the needs of your application by setting jumpers. A jumper is a metal bridge used to close an electric circuit. It consists 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” a jumper, you connect the pins with the clip. To “open” a jumper, you remove the clip. Sometimes a jumper will have three pins, labeled 1, 2 and 3. In this case you would connect either pins 1 and 2, or 2 and 3.

The jumper settings are schematically depicted in this manual as follows:



A pair of needle-nose pliers may be helpful when working with jumpers. If you have any doubts about the best hardware configuration for your application, contact your local distributor or sales representative before you make any changes. Generally, you simply need a standard cable to make most connections.

2.4.1 Auto Power On Setting (J2)



Table 2.3: Auto Power On Setting (J2)

| Setting | Function |
|----------|---------------------------|
| (Open) | Power Button for Power On |
| (Close)* | Auto Power On |

* Default

2.4.2 LCD Power (J5)

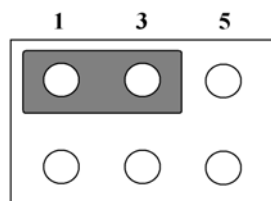


Table 2.4: LCD Power (J5)

| Setting | Function |
|---------|----------|
| (1-3)* | +3.3V |
| (3-5) | +5V |
| (3-4) | +12V |

2.4.3 Clear CMOS (SW2)

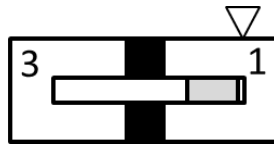


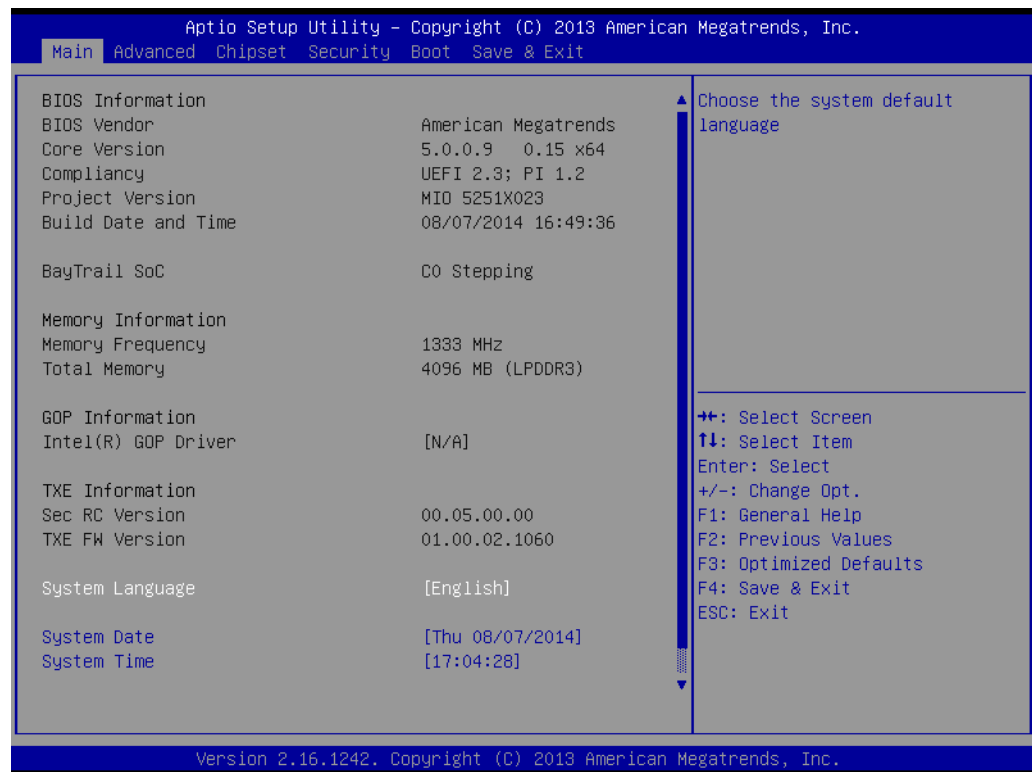
Table 2.5: Clear CMOS (SW2)

| Setting | Function |
|---------|------------|
| (1)* | Normal |
| (3) | Clear CMOS |

Chapter 3

AMI BIOS Setup

AMIBIOS has been integrated into a plethora of motherboards for decades. With the AMIBIOS Setup program, you can modify BIOS settings and control the various system features. This chapter describes the basic navigation of the MIO-5251 BIOS setup screens.



AMI BIOS ROM has a built-in Setup program that allows users to modify the basic system configuration. This information is stored in battery-backed CMOS so it retains the Setup information when the power is turned off.

3.1 Entering Setup

Turn on the computer and check for the patch code. If there is a number assigned to the patch code, it means that the BIOS supports your CPU. If there is no number assigned to the patch code, please contact an Advantech application engineer to obtain an up-to-date patch code file. This will ensure that your CPU's system status is valid. After ensuring that you have a number assigned to the patch code, press and you will immediately be allowed to enter Setup.

3.1.1 Main Setup

When you first enter the BIOS Setup Utility, you will encounter the Main setup screen. You can always return to the Main setup screen by selecting the Main tab. There are two Main Setup options. They are described in this section. The Main BIOS Setup screen is shown below.



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.

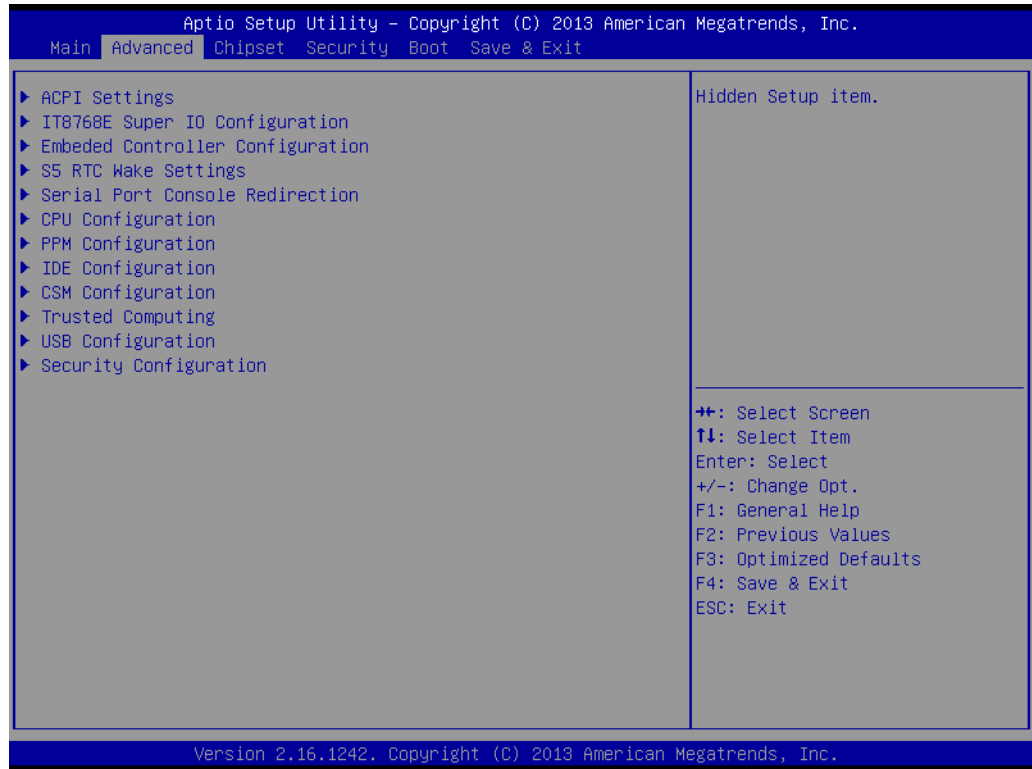
Above the key legend is an area reserved for a text message. When an option is selected in the left frame, it is highlighted in white. Often a text message will accompany it.

- #### System time / System date

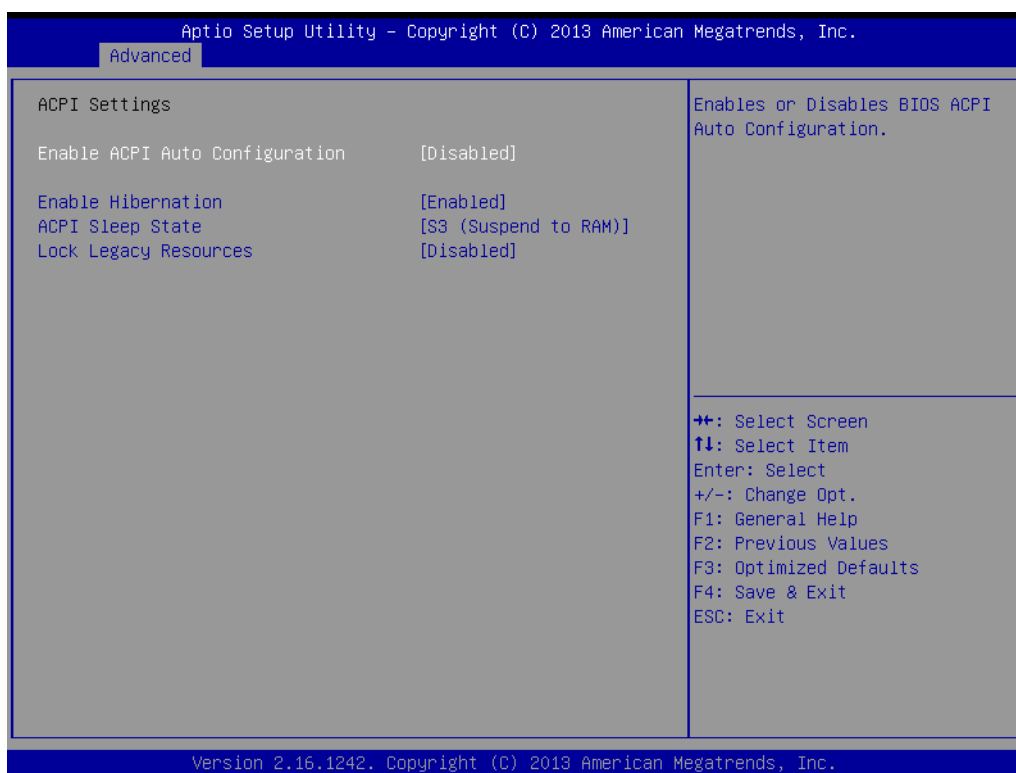
Use this option to change the system time and date. Highlight System Time or System Date using the <Arrow> keys. Enter new values through the keyboard. Press the <Tab> key or the <Arrow> keys to move between fields. The date must be entered in MM/DD/YY format. The time must be entered in HH:MM:SS format.

3.1.2 Advanced BIOS Features Setup

Select the Advanced tab from the MIO-5251 setup screen to enter the Advanced BIOS Setup screen. You can select any of the items in the left frame of the screen, such as CPU Configuration, to go to the sub menu for that item. You can display an Advanced BIOS Setup option by highlighting it using the <Arrow> keys. All Advanced BIOS Setup options are described in this section. The Advanced BIOS Setup screens is shown below. The sub menus are described on the following pages.

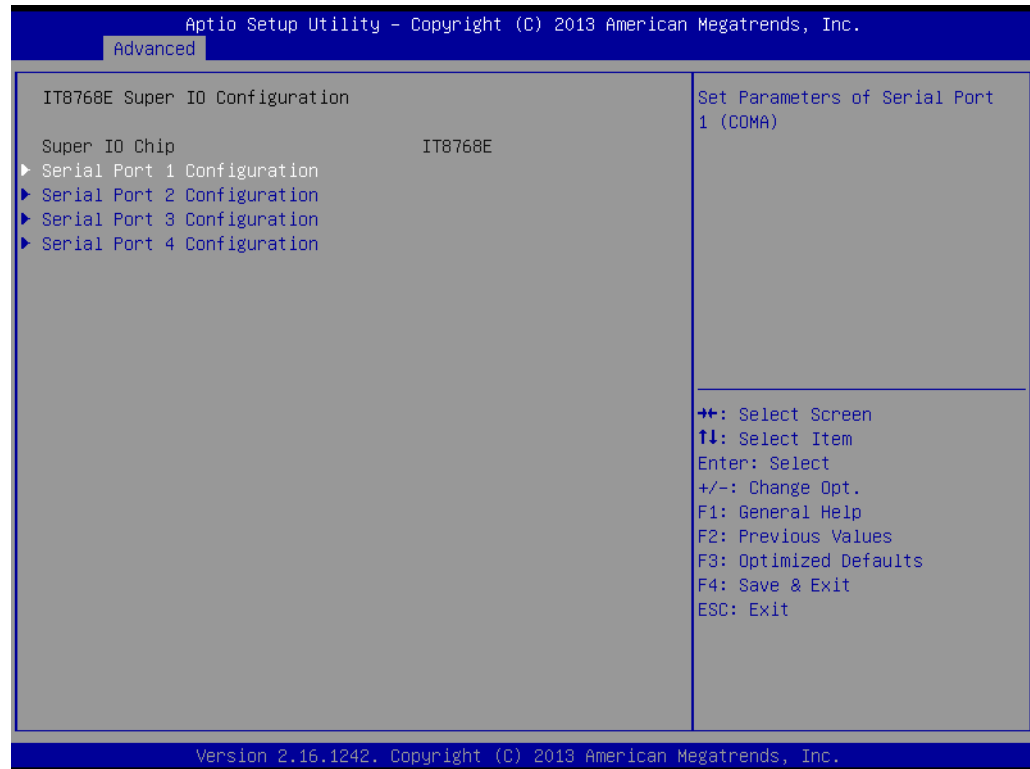


3.1.2.1 ACPI Settings



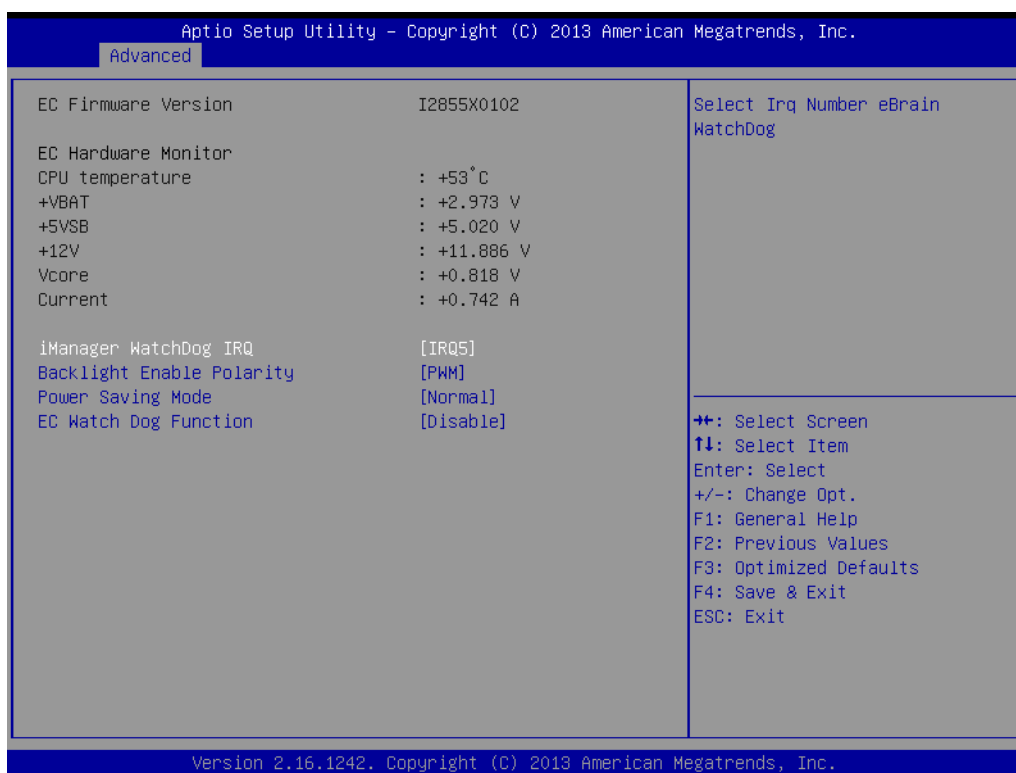
- **Enable ACPI Auto Configuration**
Enable or disable BIOS ACPI auto configuration.
- **Enable Hibernation**
Enables or Disables System ability to Hibernate (OS/S4 Sleep State). This option may be not effective with some OS.
- **ACPI Sleep State**
Select the highest ACPI sleep state the system will enter when the SUSPEND button is pressed.
- **Lock Legacy Resources**
Enables or Disables Lock of Legacy Resources

3.1.2.2 Super I/O Configuration



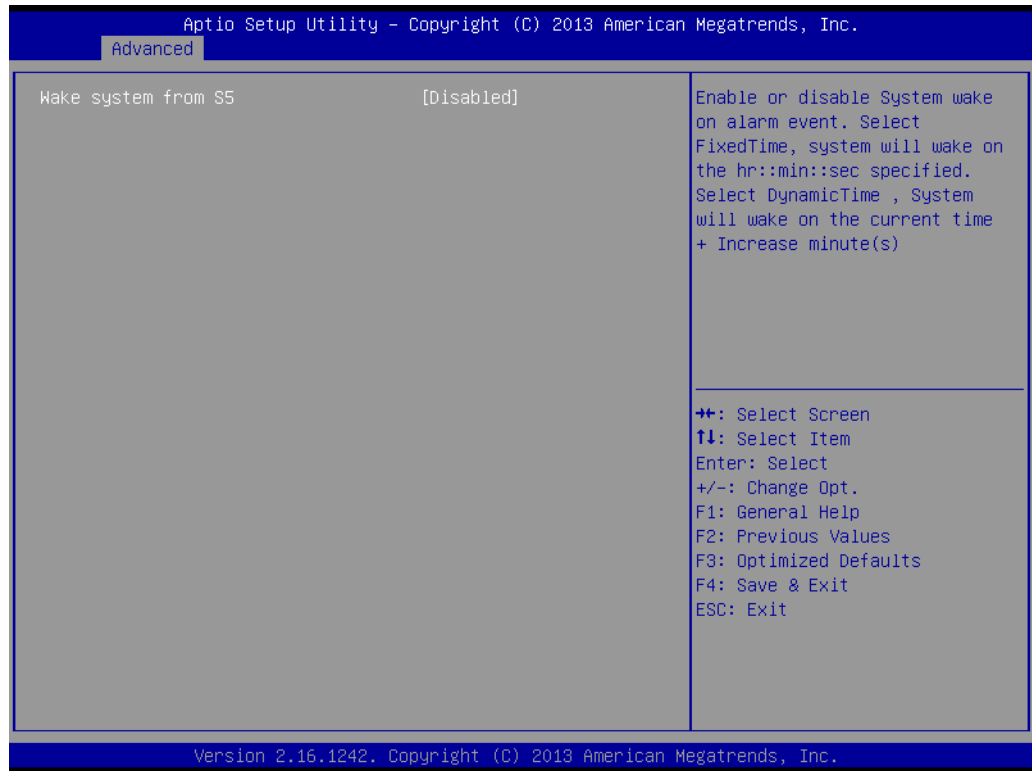
- **Serial Port 1 Configuration**
Set Parameters of Serial Port 1 (COMA).
- **Serial Port 2 Configuration**
Set Parameters of Serial Port 2 (COMB).
- **Serial Port 3 Configuration**
Set Parameters of Serial Port 3 (COMC).
- **Serial Port 4 Configuration**
Set Parameters of Serial Port 4 (COMD).

3.1.2.3 Embedded Controller Configuration



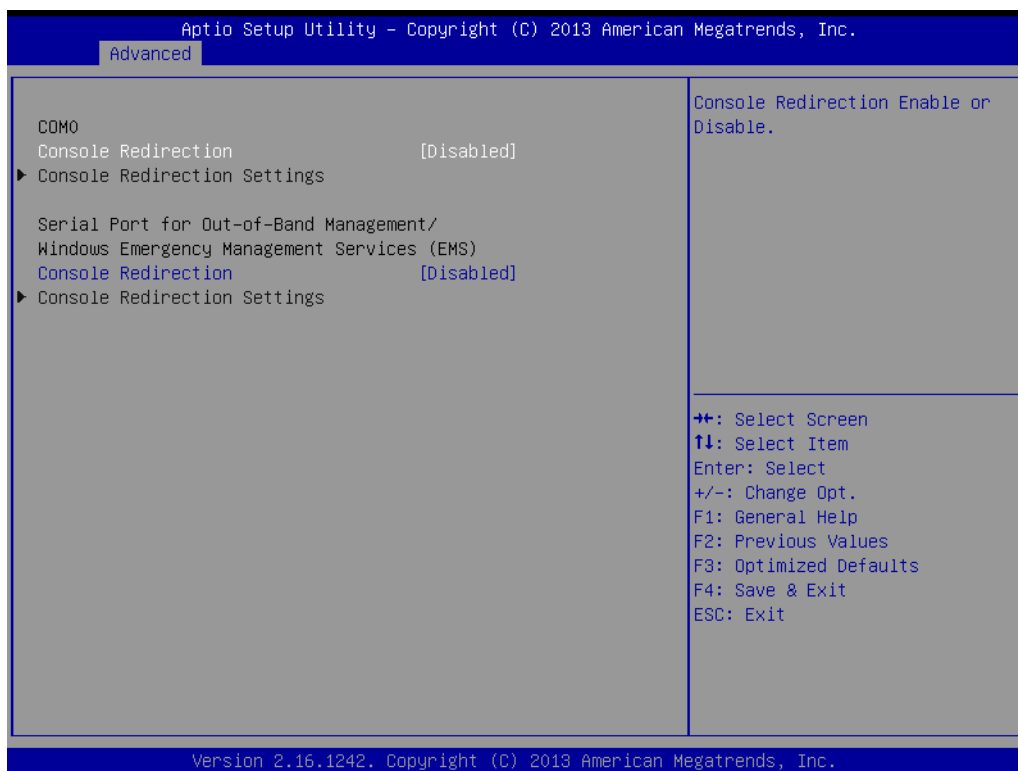
- **EC Hardware Monitor**
This page display all information about system Temperature/Voltage/Current.
- **iManager WatchDog IRQ**
This item allows users to set the IRQ number of EC watchdog.
- **Backlight Enable Polarity**
This item allows users to set backlight mode.
- **EC Power Saving Mode**
This item allows users to set board's power saving mode when off.
- **EC Watch Dog Function**
This item allows users to select EC watchdog timer.

3.1.2.4 S5 RTC Wake Settings



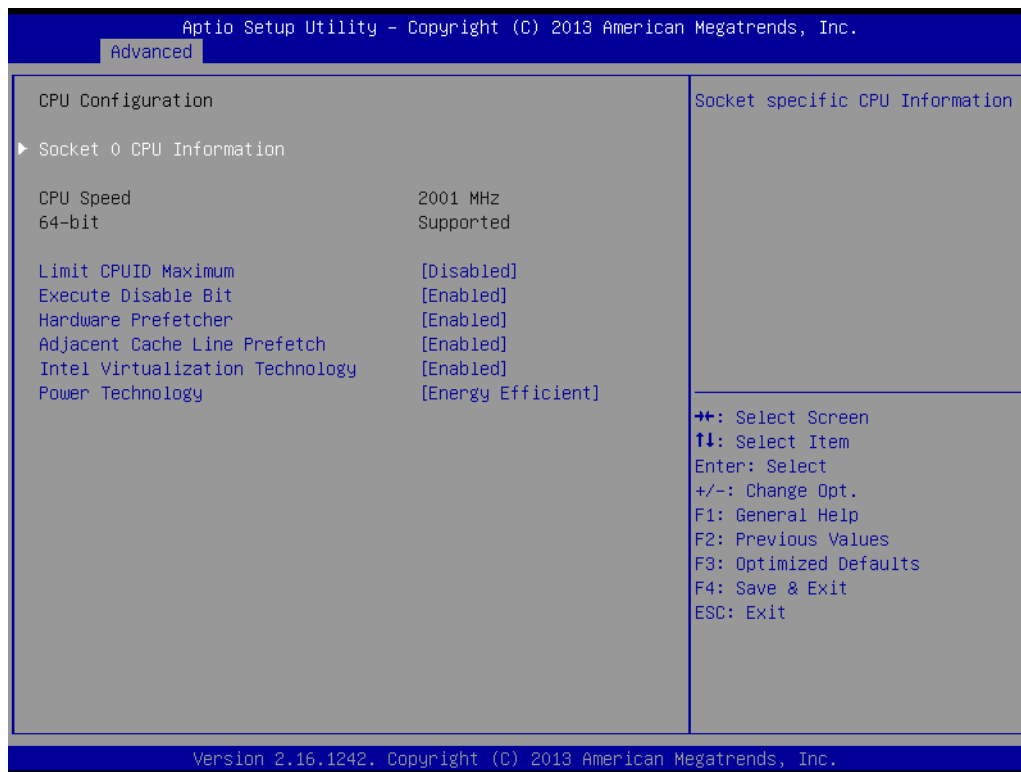
- **Wake system from S5**
Enable or disable System wake on alarm event. Select FixedTime, system will wake on the hr::min::sec specified.

3.1.2.5 Serial Port Console Redirection



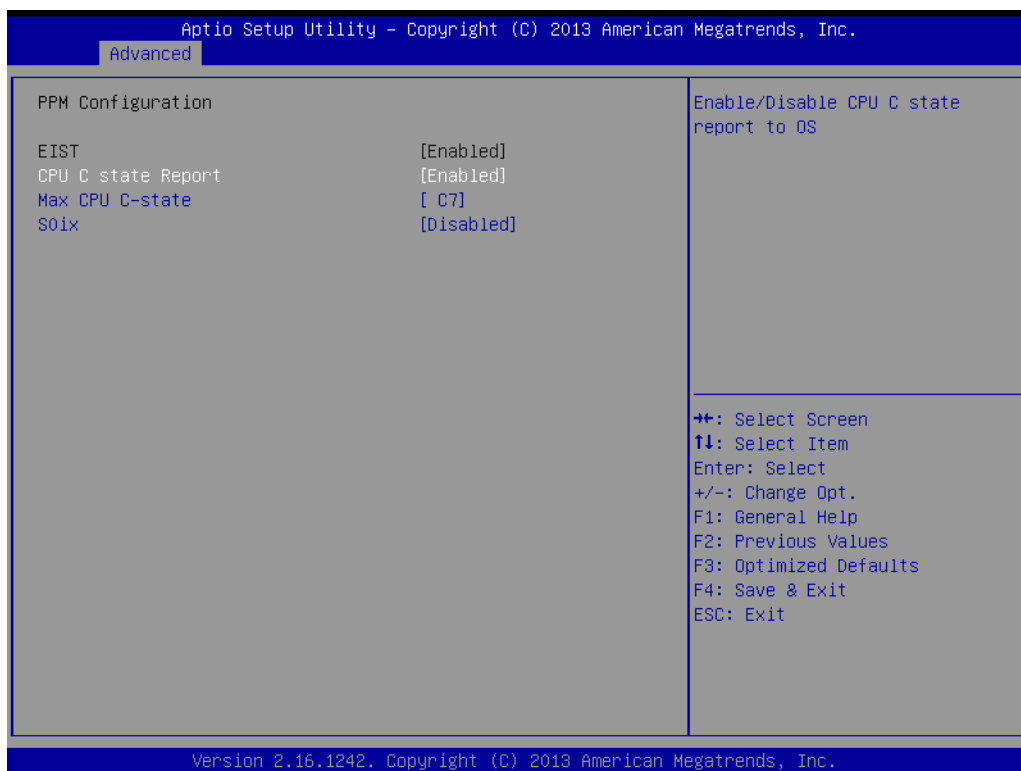
- **Console Redirection**
This item allows users to enable or disable console redirection for Microsoft Windows Emergency Management Services (EMS).
- **Console Redirection**
This item allows users to configuration console redirection detail settings.

3.1.2.6 CPU Configuration



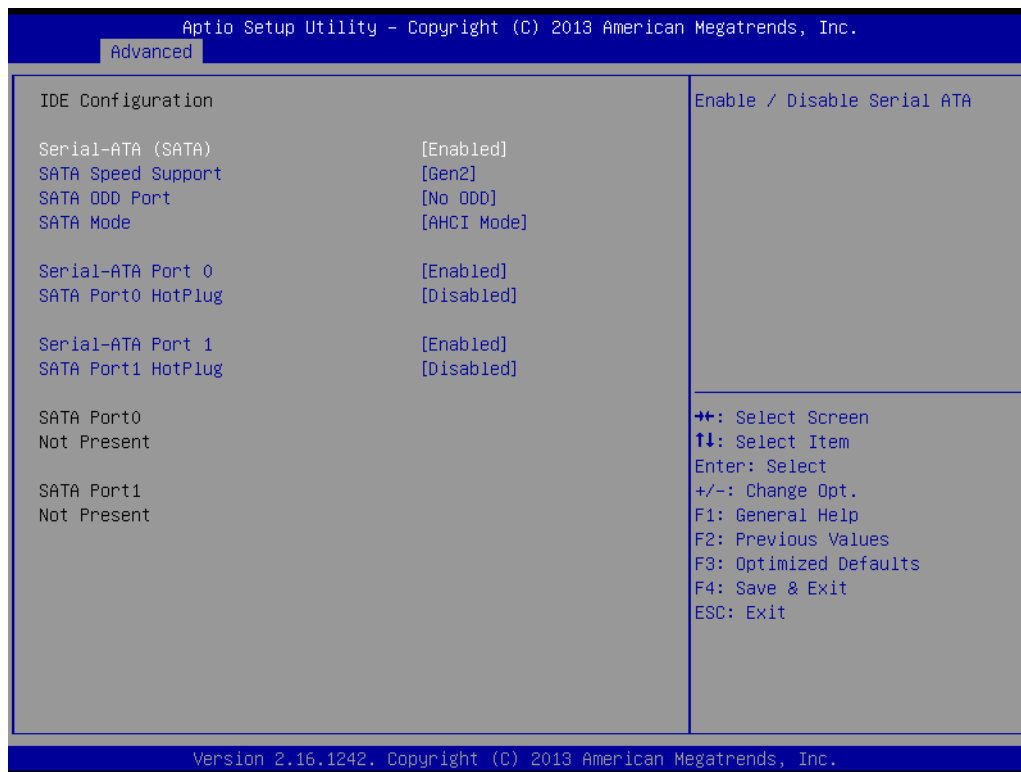
- **Limit CPUID Maximum**
Disabled for Windows XP.
- **Execute Disable Bit**
XD can prevent certain classes of malicious buffer overflow attacks when combined with a supporting OS (Windows Server 2003 SP1, Windows XP SP2, SuSE Linux 9.2, RedHat Enterprise 3 Update 3.)
- **Hardware Prefetcher**
Enable the mid level cache(L2) streamer prefetcher.
- **Adjacent Cache Line Prefetch**
Enable the mid level cache(L2) prefetching of adjacent cache lines.
- **Intel Virtualization Technology**
When enabled, a VMM can utilize the additional hardware capabilities provided by Vanderpool Technology.
- **Power Technology**
Enable the power management features.

3.1.2.7 PPM Configuration



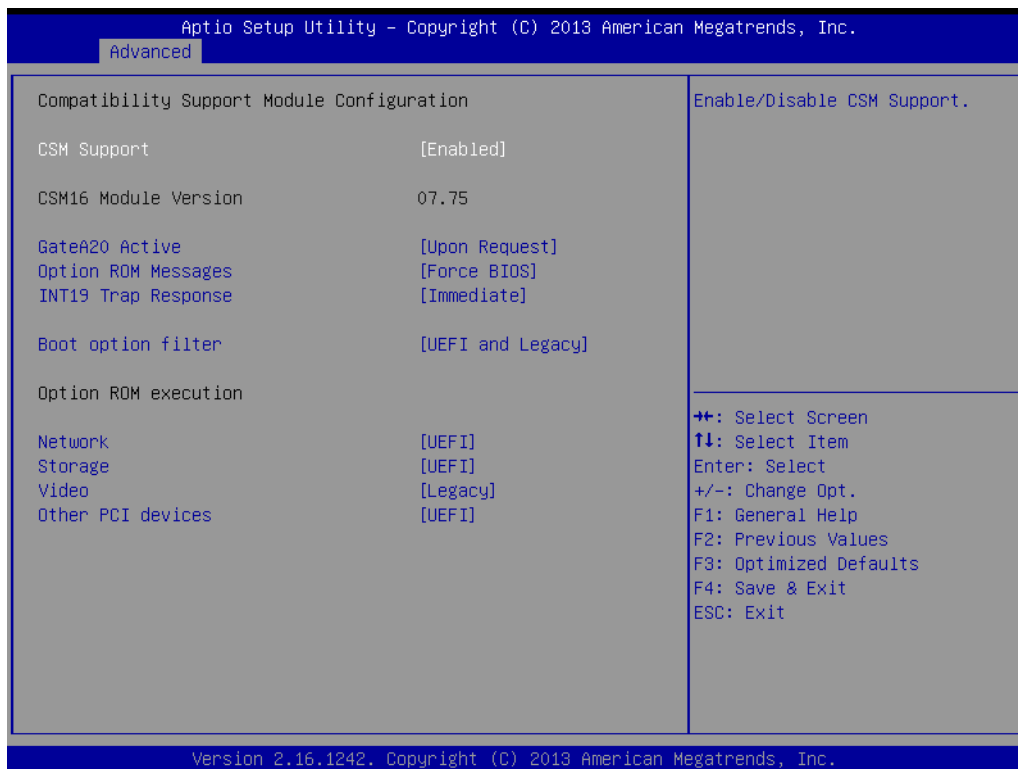
- **CPU C state Report**
Enable/Disable CPU C state report to OS.
- **Max CPU C-state**
This option controls Max C state that the processor will support.
- **S0ix**
Enable/Disable CPU S0ix state.

3.1.2.8 IDE Configuration



- **Serial-ATA (SATA)**
Enable / Disable Serial ATA.
- **SATA Speed Support**
SATA Speed Support Gen1 or Gen2.
- **SATA ODD Port**
SATA ODD is Port0 or Port1.
- **SATA Mode**
Select IDE / AHCI.
- **Serial-ATA Port 0 / Port1**
Enable / Disable Serial ATA Port0 / Port1.
- **SATA Port 0 / Port1 HotPlug**
Enable / Disable SATA Port0 / Port1 hotplug function.

3.1.2.9 CSM Configuration



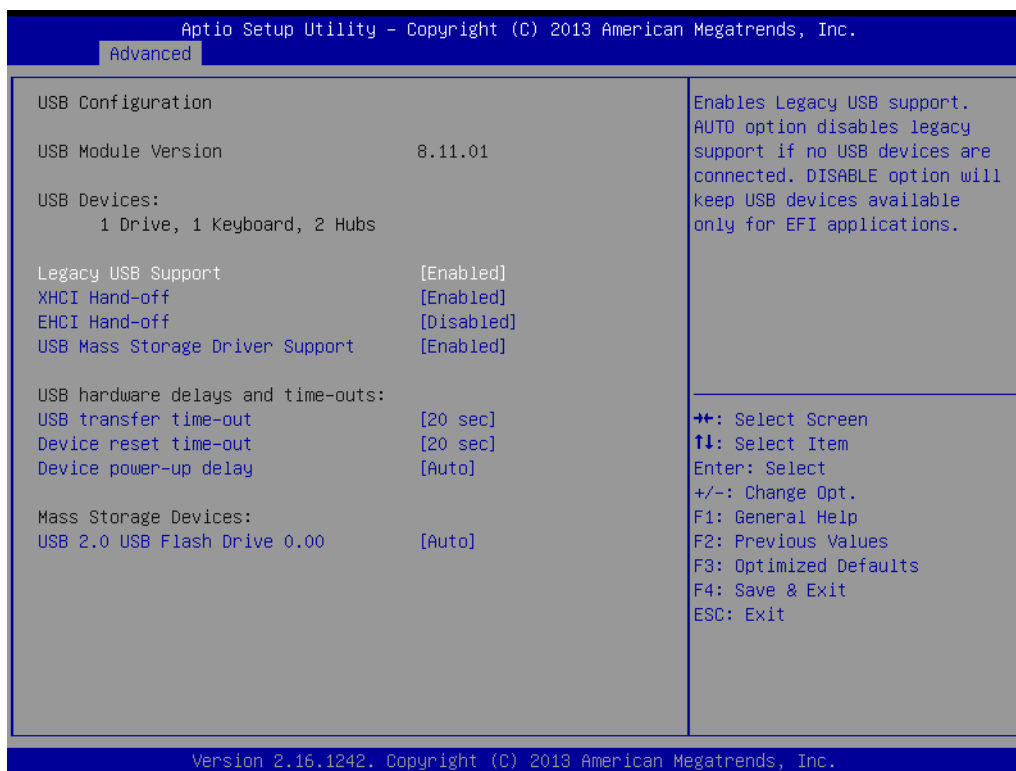
- **CSM Support**
Enable/Disable CSM Support.
- **GateA20 Active**
UPON REQUEST - GA20 can be disabled using BIOS services. ALWAYS - do not allow disabling GA20; this option is useful when any RT code is executed above 1MB.
- **Option ROM Messages**
Set display mode for Option ROM.
- **INT19 Trap Response**
BIOS reaction on INT19 trapping by Option ROM: IMMEDIATE - execute the trap right away; POSTPONED - execute the trap during legacy boot.
- **Boot option filter**
This option controls Legacy/UEFI ROMs priority.
- **Network**
Controls the execution of UEFI and Legacy PXE OpROM.
- **Storage**
Controls the execution of UEFI and Legacy Storage OpROM.
- **Video**
Controls the execution of UEFI and Legacy Video OpROM.
- **Other PCI devices**
Determines OpROM execution policy for devices other than Network, Storage, or Video.

3.1.2.10 Trusted Computing



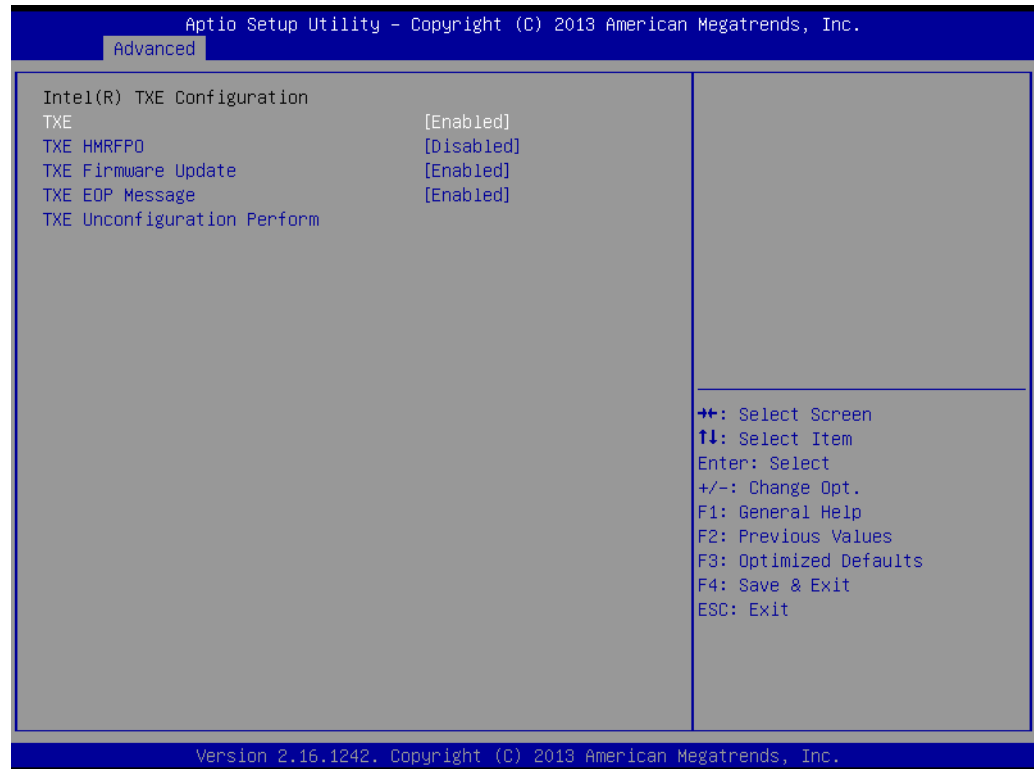
- **Trusted Computing**
Enables or Disables BIOS support for security device. O.S. will not show Security Device. TCG EFI protocol and INT1A interface will not be available.

3.1.2.11 USB Configuration



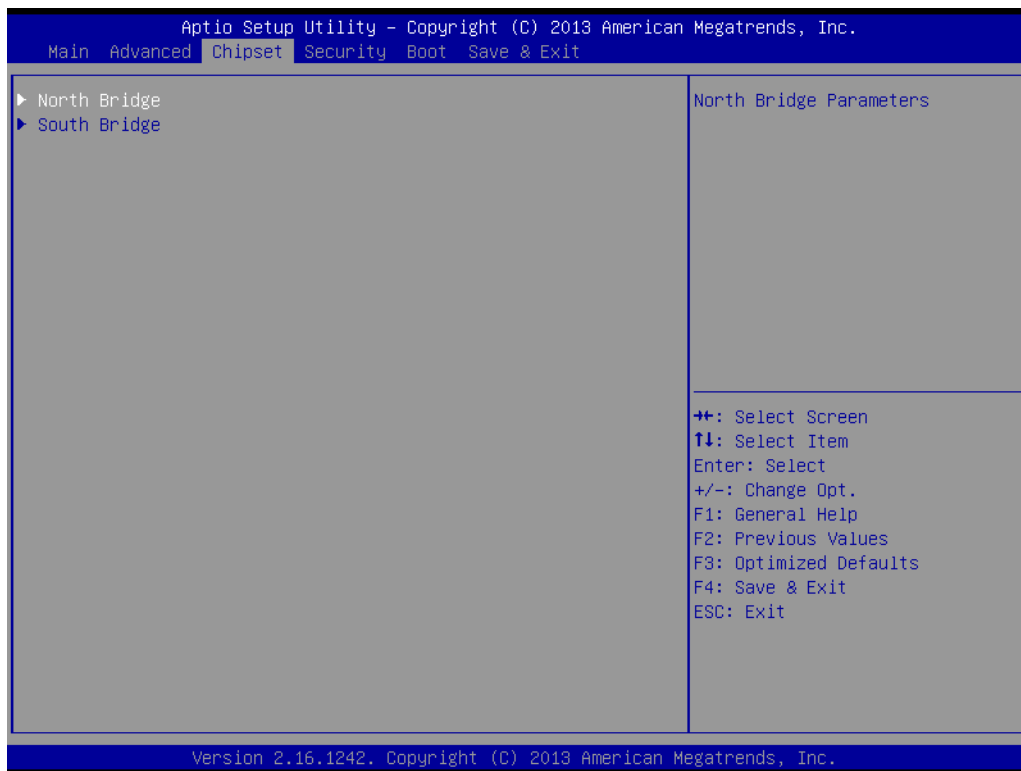
- **Legacy USB Support**
Enables Legacy USB support. AUTO option disables legacy support if no USB devices are connected. DISABLE option will keep USB devices available only for EFI applications.
- **XHCI Hand-off**
This is a workaround for OSES without XHCI hand-off support. The XHCI ownership change should be claimed by XHCI driver.
- **EHCI Hand-Off**
This is a workaround for OSES without EHCI hand-off support. The EHCI ownership change should claim by EHCI driver.
- **USB Mass Storage Driver Support**
Enable/Disable USB Mass Storage Driver Support.
- **USB transfer time-out**
Time-out value for control, Bulk, and interrupt transfers.
- **Device reset time-out**
USB mass storage device start unit command time-out.
- **Device power-up delay**
Maximum time the device will take before it properly reports itself to the Host Controller. 'Auto' uses default value: for a Root port it is 100 ms, for a Hub port the delay is taken from Hub descriptor.

3.1.2.12 Security Configuration



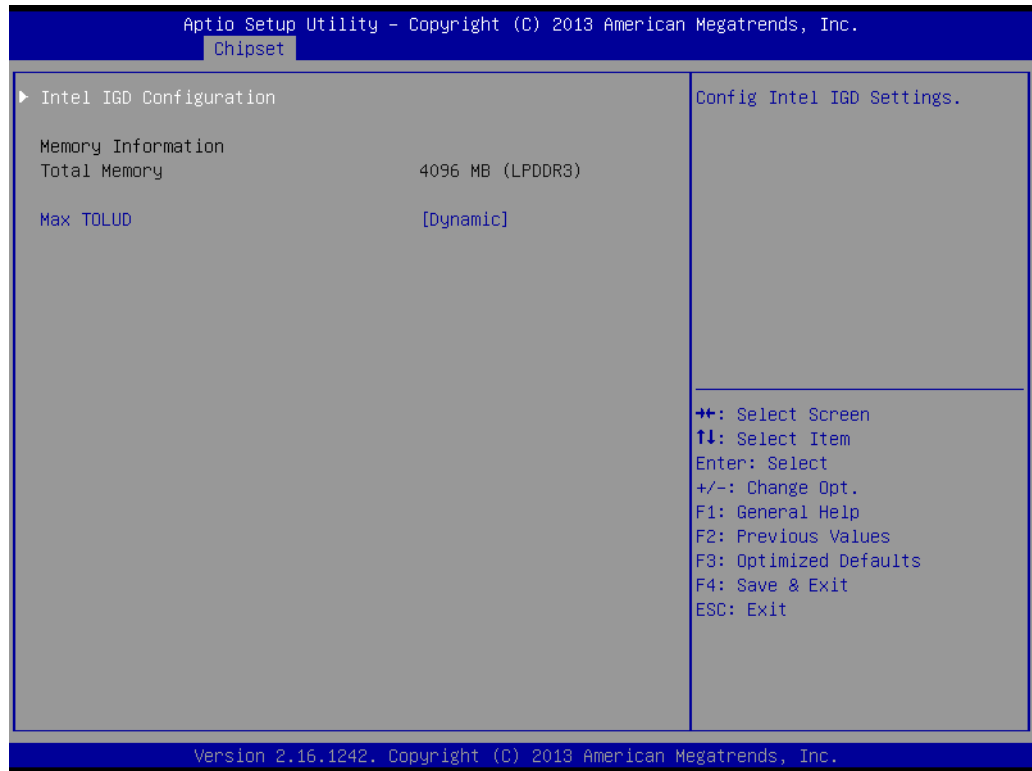
- **TXE**
- **TXE HMRFPD Disable**
- **TXE Firmware Update**
- **TXE EOP Message**
Send EOP Message Before Enter OS
- **TXE Unconfiguration Perform**
Revert TXE settings to factory defaults

3.1.3 Chipset Configuration



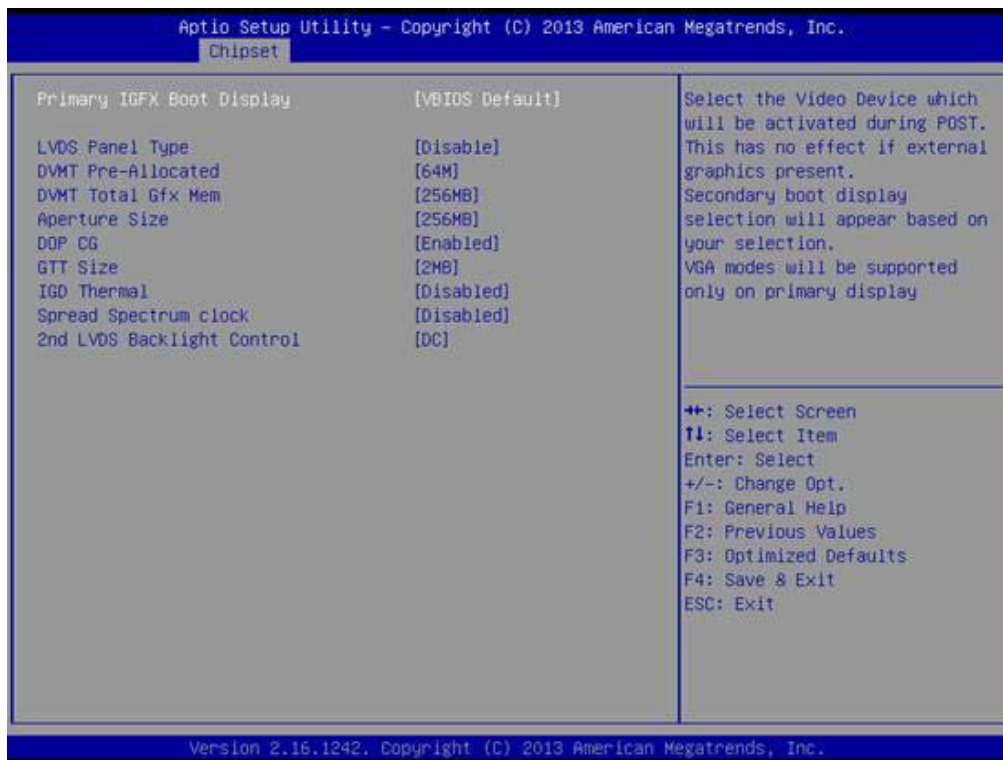
- **North Bridge**
Details for North Bridge items.
- **South Bridge**
Details for South Bridge items.

3.1.3.1 North Bridge



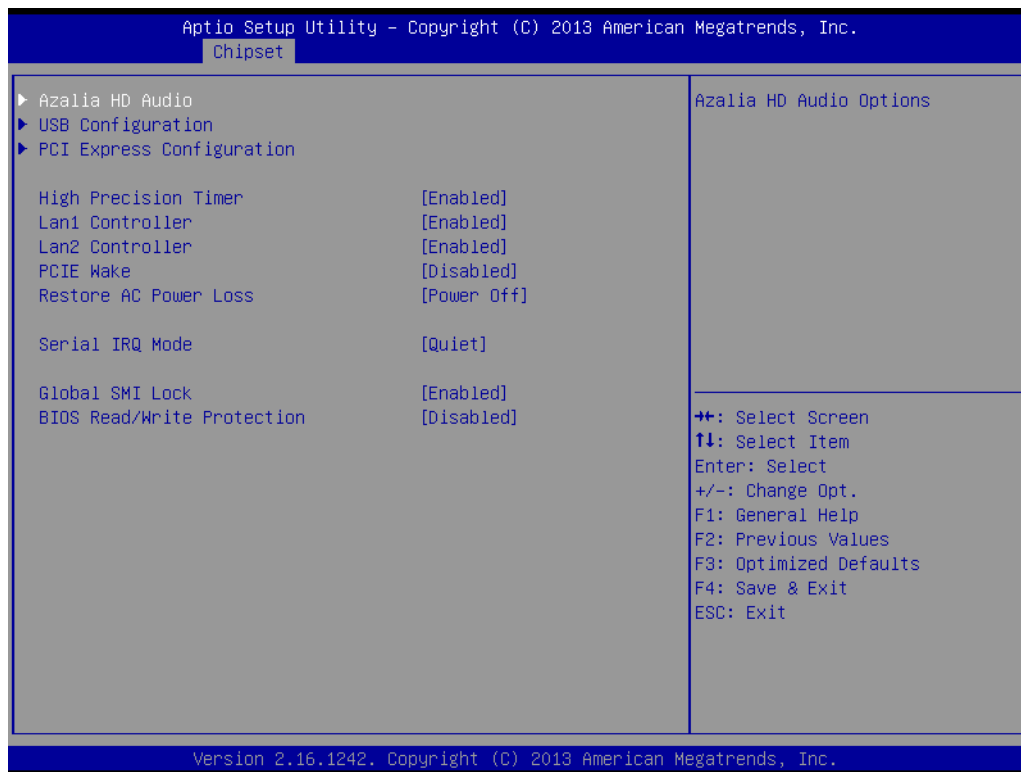
- **Intel IGD Configuration**
Config Intel IGD Settings.
- **Max TOLUD**
Maximum Value of TOLUD.

3.1.3.2 Intel IGD Configuration



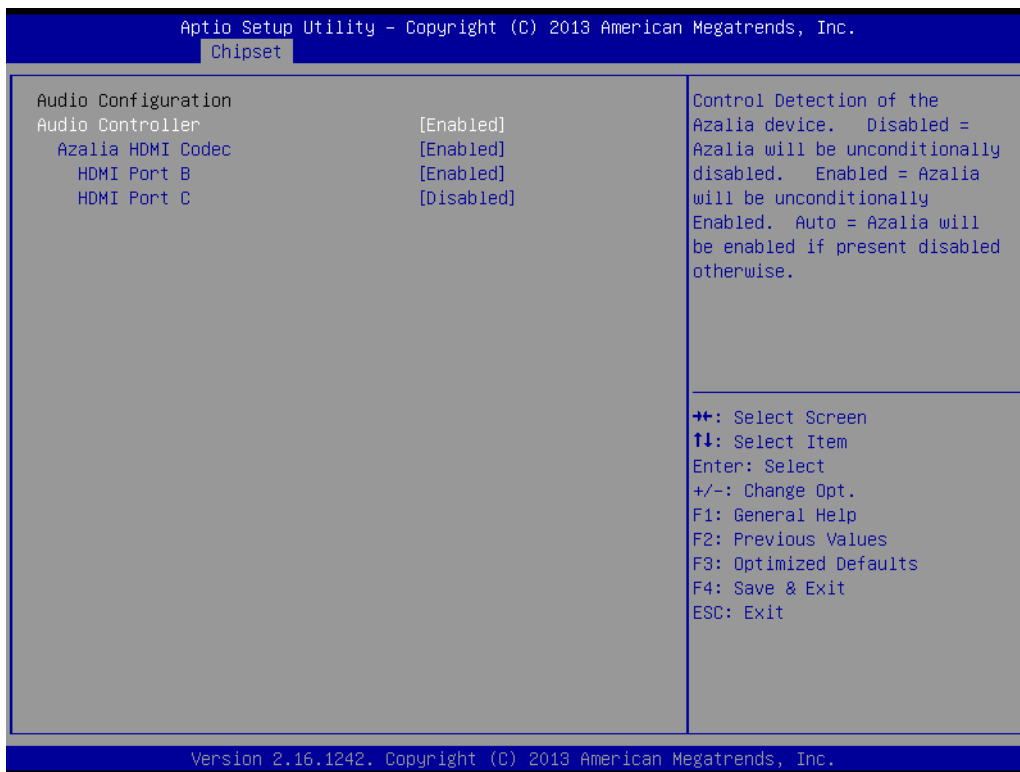
- **Primary IGFX Boot Display**
Select the Video Device which will be activated during POST. This has no effect if an external graphics present. Secondary boot display selection will appear based on your selection. VGA modes will be supported only on primary display.
- **LVDS Panel Type**
This item allow user to select LVDS panel type.
- **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.
- **Aperture Size**
Select the Aperture Size.
- **DOP CG**
Enable/Disable DOP clock gating.
- **GTT Size**
Select the GTT Size
- **IGD Thermal**
Enable/Disable IGD Thermal.
- **Spread Spectrum clock**
Enable/Disable Spread Spectrum clock.

3.1.3.3 South Bridge



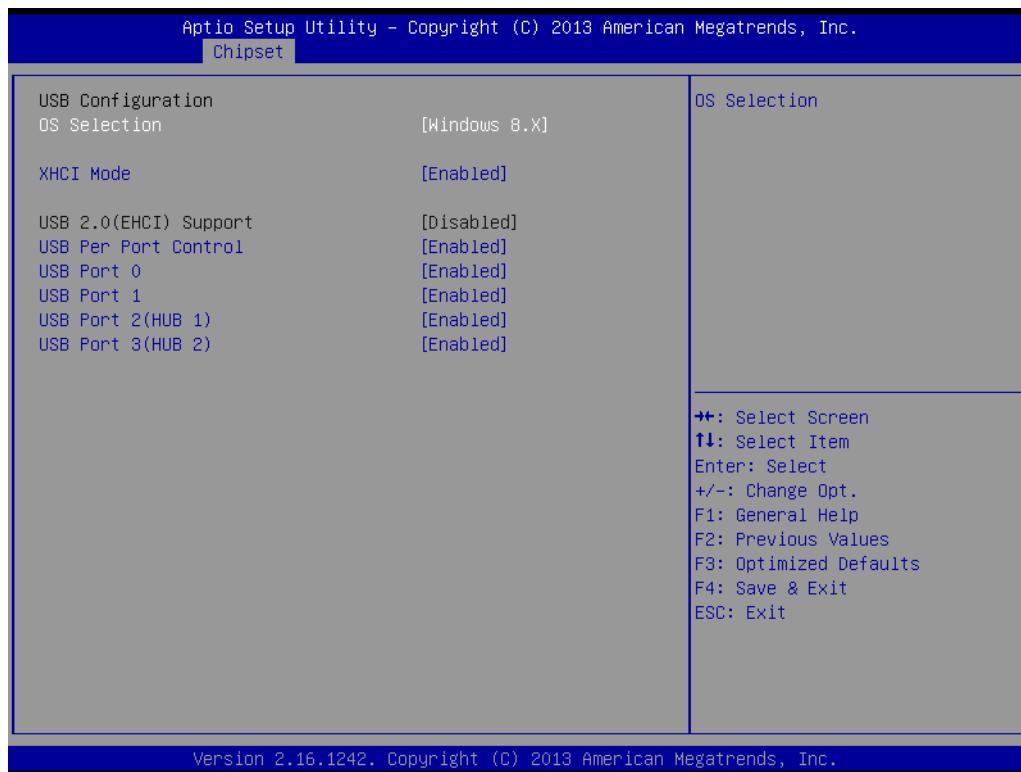
- **Azalia HD Audio**
Azalia HD Audio Options.
- **USB Configuration**
USB Configuration Settings.
- **PCI Express Configuration**
PCI Express Configuration settings.
- **High Precision Timer**
Enables or disables the high precision timer.
- **LAN1 Controller**
Enable or Disable the LAN1.
- **LAN2 Controller**
Enable or Disable the LAN2.
- **PCIE Wake**
Enable or Disable PCIE to wake the system from S5.
- **Restore AC Power Loss**
Select AC power state when power is re-applied after a power failure.
- **Serial IRQ Mode**
Configure Serial IRQ Mode.
- **Global SMI Lock**
Enable or Disable SMI lock.
- **BIOS Read/Write Protection**
Enable or Disable BIOS SPI region read/write protect.

3.1.3.4 Azalia HD Audio



- **Audio Controller**
Control Detection of the Azalia device. Disabled = Azalia will be unconditionally disabled. Enabled = Azalia will be unconditionally Enabled. Auto = Azalia will be enabled if present disabled otherwise.
- **Azalia HDMI Codec**
Enable/Disable internal HDMI codec for Azalia
- **HDMI Port B**
Enable/Disable HDMI Port B
- **HDMI Port C**
Enable/Disable HDMI Port C

3.1.3.5 USB Configuration



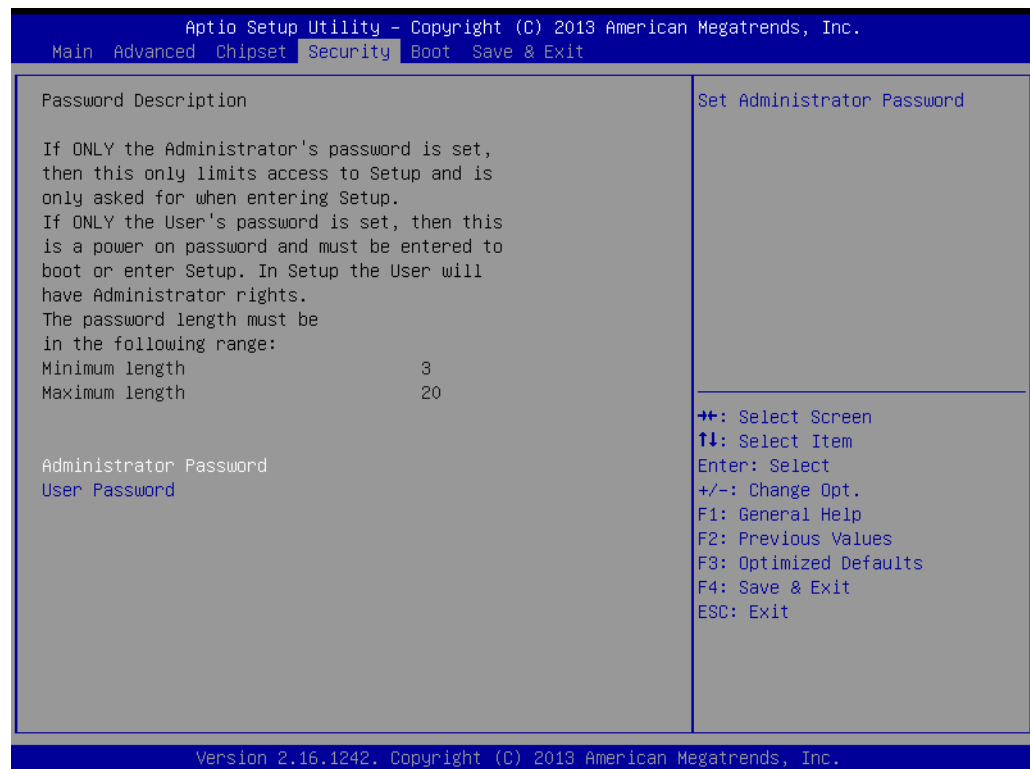
- **OS Selection**
OS Selection to choose Windows 8.X / Windows 7.
- **XHCI Mode**
Mode of operation of xHCI controller.
- **USB 2.0(EHCI) Support**
Control the USB EHCI (USB 2.0) functions. One EHCI controller must always be enabled.
- **USB Per Port Control**
Control each of the USB ports (0~3). Enable: Enable USB per port; Disable: Use USB port X settings.

3.1.3.6 PCI Express Configuration



- **PCI Express Port0 / Port2**
Enable or Disable the PCI Express Port0 / Port 2 in the Chipset.
- **Speed**
Configure PCIe Port Speed.

3.1.4 Security



Select Security Setup from the MIO-5251 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**

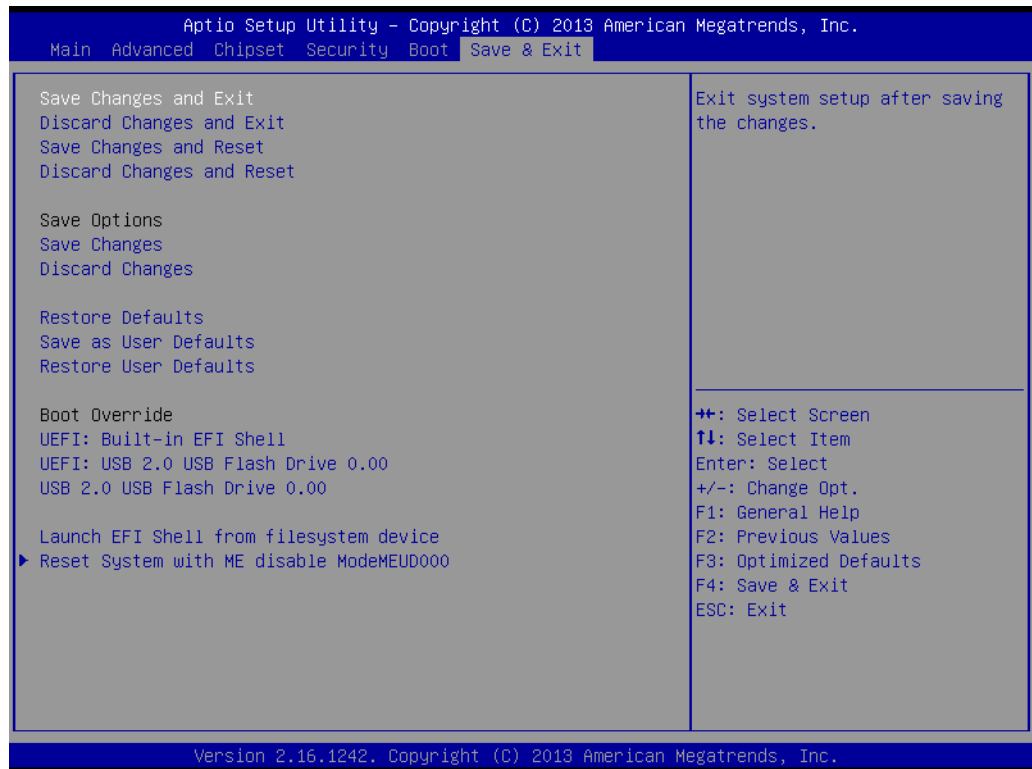
Select this option and press <ENTER> to access the sub menu, and then type in the password.

3.1.5 Boot



- **Setup Prompt Timeout**
Number of seconds that the firmware will wait before initiating the original default boot selection. A value of 0 indicates that the default boot selection is to be initiated immediately on boot. A value of 65535(0xFFFF) indicates that firmware will wait for user input before booting. This means the default boot selection is not automatically started by the firmware.
- **Bootup NumLock State**
Select the keyboard NumLock state.
- **Quiet Boot**
Enables or disables Quiet Boot option.
- **Boot Option #1**
Sets the system boot order.

3.1.6 Save & Exit



- **Save Changes and Exit**
This item allows you to exit system setup after saving the changes.
- **Discard Changes and Exit**
This item allows you to exit system setup without saving any changes.
- **Save Changes and Reset**
This item allows you to reset the system after saving the changes.
- **Discard Changes and Reset**
This item allows you to rest system setup without saving any changes.
- **Save Changes**
This item allows you to save changes done so far to any of the options.
- **Discard Changes**
This item allows you to discard changes done so far to any of the options.
- **Restore Defaults**
This item allows you to restore/load default values for all the options.
- **Save as User Defaults**
This item allows you to save the changes done so far as user defaults.
- **Restore User Defaults**
This item allows you to restore the user defaults to all the options.
- **Boot Override**
Boot device select can override your boot priority.

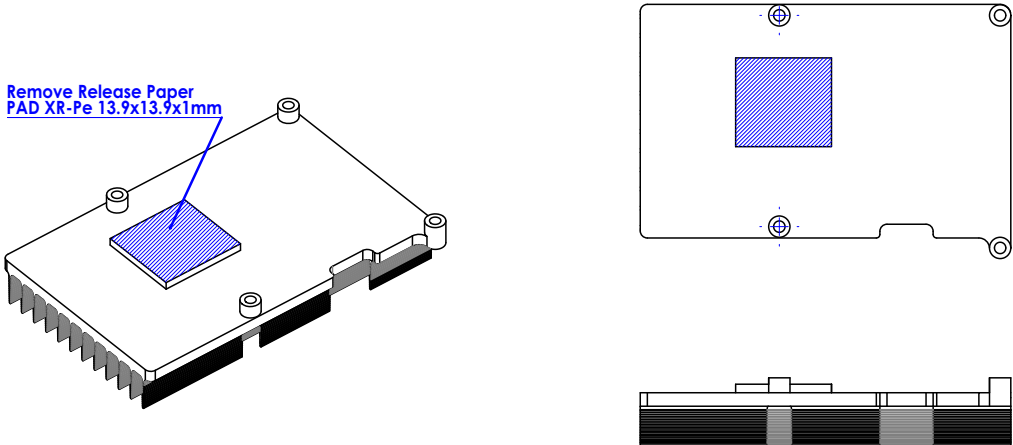
Chapter 4

MIOe Installation

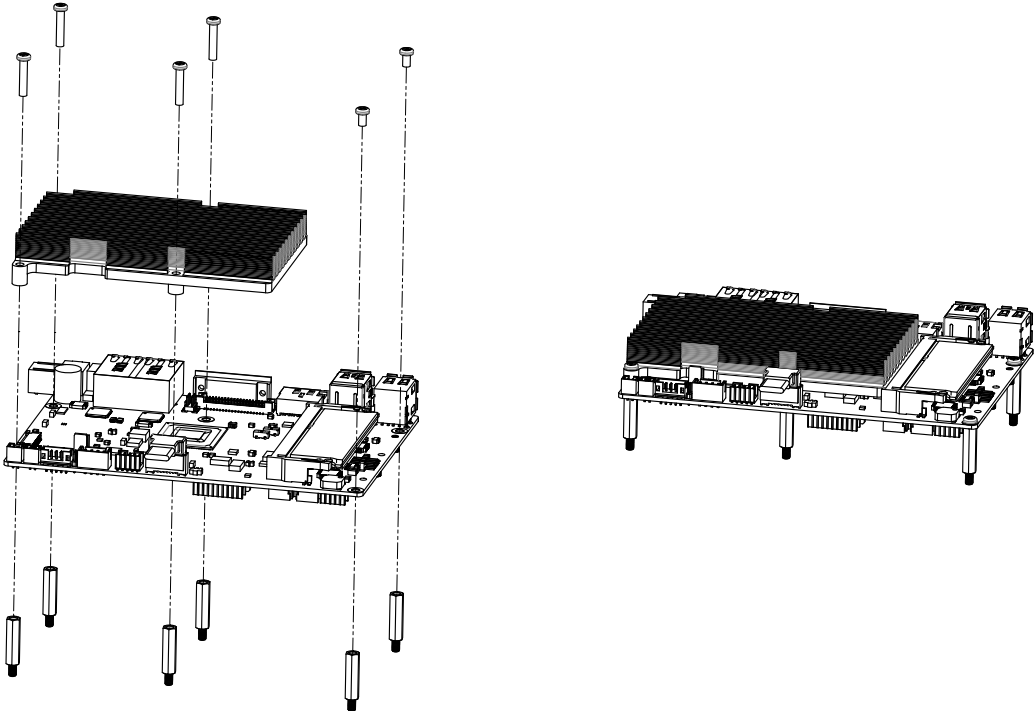
The MI/O compact form factor SBC is a new-generation SBC design with a variety of mechanical improvements. Here is the quick installation guide for our thermal design and MIOe module installation.

4.1 Quick Installation Guide:

1. There is a Heatsink / Cooler in the white box inside the package. Carefully remove the release paper from the thermal pad before installation.



2. There are six screws and six studs inside the white box, please install the heat sink into place as per illustration below:



Appendix **A**

Pin Assignments

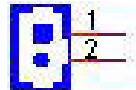
This appendix contains information of a detailed or specialized nature.

Sections include:

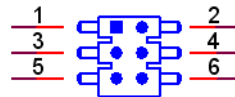
- Jumper and Connector Tables

A.1 Jumper List

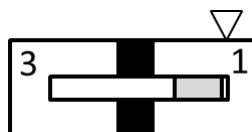
| | |
|--------------------|--|
| J2 | Auto Power On Setting |
| Part Number | 1653002101 |
| Footprint | HD_2x1P_79_D |
| Description | PIN HEADER 2*1P 180D(M)SQUARE 2.0mm DIP W/O Pb |
| Setting | Function |
| NC | Power Button for Power On |
| (1-2)* | Auto Power On |



| | |
|--------------------|--|
| J5 | LCD Power |
| Part Number | 1653003260 |
| Footprint | HD_3x2P_79 |
| Description | PIN HEADER 3x2P 2.0mm 180D(M) SMD 21N22050 |
| Setting | Function |
| (1-3)* | +3.3V |
| (3-5) | +5V |
| (3-4) | +12V |

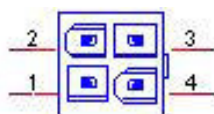


| | |
|--------------------|-------------------|
| SW2 | Clear CMOS |
| Part Number | 1600000071 |
| Footprint | SW_3P_CJS-1201TA1 |
| Description | CJS-1201TA1 |
| Pin | Pin Name |
| 1 | NC |
| 2 | RTC_TEST# |
| 3 | GND |

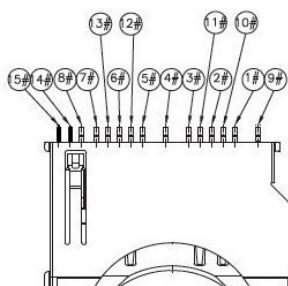


A.2 Connector Pin Definition

| | |
|--------------------|---|
| CN1 | 12V Power Input |
| Part Number | 1655003865 |
| Footprint | WF_2x2P_165_BOX_RA_D_740SP |
| Description | ATX PWRCONN 2x2P 4.2mm 90D(M) DIP 740-77-04TS50 |
| Pin | Pin Name |
| 1 | GND |
| 2 | GND |
| 3 | +12V |
| 4 | +12V |

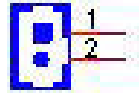


| | |
|--------------------|---------------------------------------|
| CN4 | SD Card |
| Part Number | 1654010952-01 |
| Footprint | SDCARD_15P_SDC5-15M1-KNM0-0 |
| Description | SD Card 15P SMD G/F SDC5-15M1-KNM0-01 |
| Pin | Pin Name |
| 1 | DAT3 |
| 2 | CMD |
| 3 | VSS1 |
| 4 | VDD |
| 5 | CLK |
| 6 | VSS2 |
| 7 | DAT0 |
| 8 | DAT1 |
| 9 | DAT2 |
| 10 | NC |
| 11 | NC |
| 12 | NC |
| 13 | NC |
| 14 | SD3_CD# |
| 15 | SD3_WP |

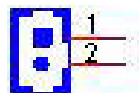


| | |
|--------------------|--|
| CN6 | SODIMMDDR3_204 |
| Part Number | 1651002088 |
| Footprint | SODIMMDDR3_204P_AS0A626-HA |
| Description | DDR3 SODIMM H=9.2mm 204P SMD AS0A626-HASN-7H |

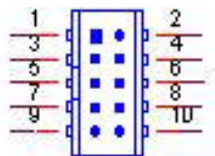
| | |
|--------------------|--|
| CN7 | Power Switch |
| Part Number | 1655302020 |
| Footprint | WF_2P_79_BOX_R1_D |
| Description | WAFER BOX 2P 2.0mm 180D(M) DIP A2001WV2-2P |
| Pin | Pin Name |
| 1 | PSIN |
| 2 | GND |



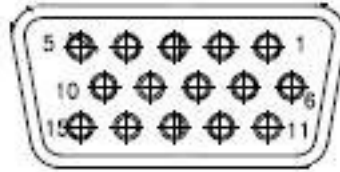
| | |
|--------------------|--|
| CN9 | Reset |
| Part Number | 1655302020 |
| Footprint | WF_2P_79_BOX_R1_D |
| Description | WAFER BOX 2P 2.0mm 180D(M) DIP A2001WV2-2P |
| Pin | Pin Name |
| 1 | RESET# |
| 2 | GND |



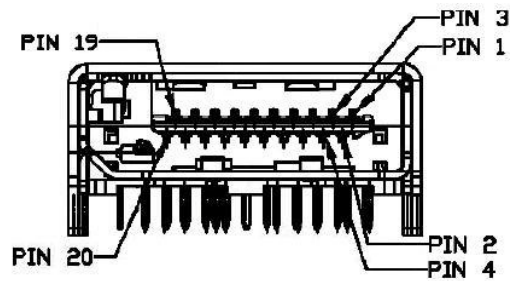
| CN10 | GPIO |
|--------------------|--|
| Part Number | 1653004099 |
| Footprint | HD_5x2P_79_23N685B-10M10 |
| Description | BOX HEADER 5x2P 2.00mm 180D(M) SMD 23N685B-10M10 |
| Pin | Pin Name |
| 1 | +5V |
| 2 | GPIO4 |
| 3 | GPIO0 |
| 4 | GPIO5 |
| 5 | GPIO1 |
| 6 | GPIO6 |
| 7 | GPIO2 |
| 8 | GPIO7 |
| 9 | GPIO3 |
| 10 | GND |



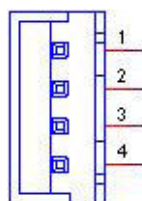
| CN11 | VGA |
|--------------------|--|
| Part Number | 1654000055 |
| Footprint | DBVGA-VF5MS |
| Description | D-SUB Conn. 15P 90D(F) DIP 070242FR015S200ZU |
| Pin | Pin Name |
| 1 | RED |
| 2 | GREEN |
| 3 | BLUE |
| 4 | NC |
| 5 | GND |
| 6 | GND |
| 7 | GND |
| 8 | GND |
| 9 | NC |
| 10 | GND |
| 11 | NC |
| 12 | DDAT |
| 13 | HSYNC |
| 14 | VSYNC |
| 15 | DCLK |



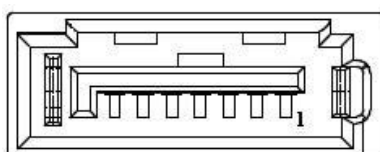
| | |
|--------------------|--|
| CN12 | HDMI/DP |
| Part Number | 1654010203 |
| Footprint | HDMICON_21P_845-002-217CRL |
| Description | HDMI+DISPLAY Conn. 20P 90D(M) DIP 845-002-217CRL |
| Pin | Pin Name |
| 1 | ML_Lane0(p)/TMDS Data2+ |
| 2 | GND/TMDS Data2 Shield |
| 3 | ML_Lane0(n)/TMDS Data2- |
| 4 | ML_Lane1(p)/TMDS Data1+ |
| 5 | GND/TMDS Data1 Shield |
| 6 | ML_Lane1(n)/TMDS Data1- |
| 7 | ML_Lane2(p)/TMDS Data0+ |
| 8 | GND/TMDS Data0 Shield |
| 9 | ML_Lane2(n)/TMDS Data0- |
| 10 | ML_Lane3(p)/TMDS Clock+ |
| 11 | GND/TMDS Clock Shield |
| 12 | ML_Lane3(n)/TMDS Clock- |
| 13 | CONFIG1/Reserved |
| 14 | CONFIG2/Reserved |
| 15 | AUX CH(p)/SCL |
| 16 | GND/SDA |
| 17 | AUX CH(n)/DDC Ground |
| 18 | Hot Plug Detect/+5V Power |
| 19 | GND/Hot Plug Detect |
| 20 | +3.3V |



| | |
|--------------------|--|
| CN13 | SATA Power |
| Part Number | 1655001154 |
| Footprint | WF_4P_98_BOX_R1_D |
| Description | WAFER BOX 4P 2.50mm 180D(M) DIP 24W1170-04S10-01 |
| Pin | Pin Name |
| 1 | +5V |
| 2 | GND |
| 3 | GND |
| 4 | +12V |

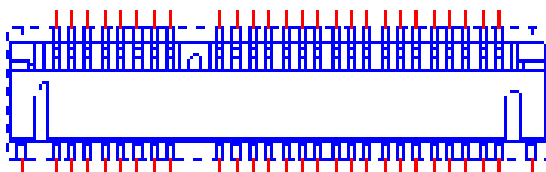


| | |
|--------------------|--|
| CN14 | SATA |
| Part Number | 1654007578 |
| Footprint | SATA_7P_WATF-07DBN6SB1U |
| Description | Serial ATA 7P 1.27mm 180D(M) SMD WATF-07DBN6SB1U |
| Pin | Pin Name |
| 1 | GND |
| 2 | TX+ |
| 3 | TX- |
| 4 | GND |
| 5 | RX- |
| 6 | RX+ |
| 7 | GND |



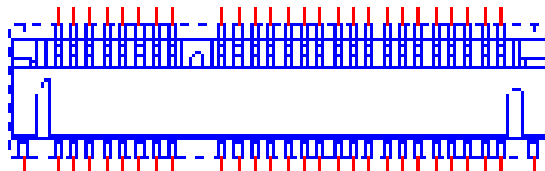
| | |
|--------------------|--|
| CN15 | Mini PCIE |
| Part Number | 1654002538 |
| Footprint | FOX_AS0B226-S68K7F |
| Description | MINI PCI E 52P 6.8mm 90D SMD AS0B226-S68Q-7H |
| Pin | Pin Name |
| 1 | WAKE# |
| 2 | +3.3VSB |
| 3 | NC |
| 4 | GND |
| 5 | NC |
| 6 | +1.5V |
| 7 | NC |
| 8 | UIM_PWR |
| 9 | GND |
| 10 | UIM_DATA |
| 11 | REFCLK- |
| 12 | UIM_CLK |
| 13 | REFCLK+ |
| 14 | UIM_RESET |
| 15 | GND |
| 16 | UIM_VPP |
| 17 | NC |
| 18 | GND |
| 19 | NC |
| 20 | W_DISABLE# |
| 21 | GND |
| 22 | PERST# |
| 23 | PERn0 |
| 24 | +3.3VSB |
| 25 | PERp0 |
| 26 | GND |
| 27 | GND |
| 28 | +1.5V |
| 29 | GND |
| 30 | SMB_CLK |
| 31 | PETn0 |
| 32 | SMB_DAT |
| 33 | PETp0 |
| 34 | GND |
| 35 | GND |
| 36 | USB D- |
| 37 | GND |
| 38 | USB D+ |
| 39 | +3.3VSB |
| 40 | GND |
| 41 | +3.3VSB |

| | |
|----|---------|
| 42 | NC |
| 43 | SEL |
| 44 | NC |
| 45 | NC |
| 46 | NC |
| 47 | NC |
| 48 | +1.5V |
| 49 | NC |
| 50 | GND |
| 51 | NC |
| 52 | +3.3VSB |

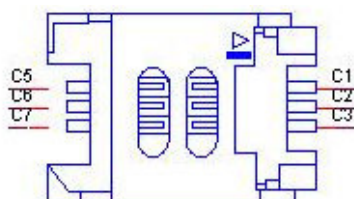


| | |
|--------------------|--|
| CN16 | mSATA |
| Part Number | 1654002538 |
| Footprint | FOX_AS0B226-S68K7F |
| Description | MINI PCI E 52P 6.8mm 90D SMD AS0B226-S68Q-7H |
| Pin | Pin Name |
| 1 | NC |
| 2 | +3.3V |
| 3 | NC |
| 4 | GND |
| 5 | NC |
| 6 | +1.5V |
| 7 | NC |
| 8 | NC |
| 9 | GND |
| 10 | NC |
| 11 | NC |
| 12 | NC |
| 13 | NC |
| 14 | NC |
| 15 | GND |
| 16 | NC |
| 17 | NC |
| 18 | GND |
| 19 | NC |
| 20 | NC |
| 21 | GND |
| 22 | NC |
| 23 | B+ |
| 24 | +3.3V |

| | |
|----|---------|
| 25 | B- |
| 26 | GND |
| 27 | GND |
| 28 | +1.5V |
| 29 | GND |
| 30 | SMB_CLK |
| 31 | A- |
| 32 | SMB_DAT |
| 33 | A+ |
| 34 | GND |
| 35 | GND |
| 36 | USB D- |
| 37 | GND |
| 38 | USB D+ |
| 39 | +3.3V |
| 40 | GND |
| 41 | +3.3V |
| 42 | NC |
| 43 | NC |
| 44 | NC |
| 45 | NC |
| 46 | NC |
| 47 | NC |
| 48 | +1.5V |
| 49 | NC |
| 50 | GND |
| 51 | NC |
| 52 | +3.3V |

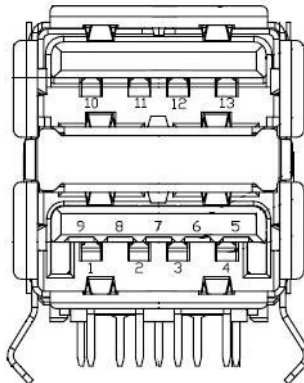


| | |
|--------------------|--|
| CN17 | SIM Holder |
| Part Number | 1654010809-01 |
| Footprint | SIM_6P_5210622-SINR03 |
| Description | SIM card conn. 6p 2.54mm 90D(F) SMD 5210622-SINR |
| Pin | Pin Name |
| C1 | UIM_PWR |
| C2 | UIM_RESET |
| C3 | UIM_CLK |
| C5 | GND |
| C6 | UIM_VPP |
| C7 | UIM_DATA |

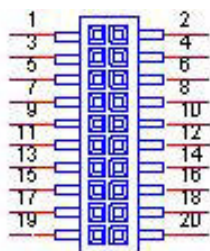


| | |
|--------------------|--|
| CN18 | External USB |
| Part Number | 1654009513 |
| Footprint | USB_8P_UB1112C-8FDE-4F |
| Description | USB CONN. 8P 2.0mm 90D DIP UB1112C-8FDE-4F |
| Pin | Pin Name |
| 1 | +5V |
| 2 | D- |
| 3 | D+ |
| 4 | GND |
| 5 | +5V |
| 6 | D- |
| 7 | D+ |
| 8 | GND |

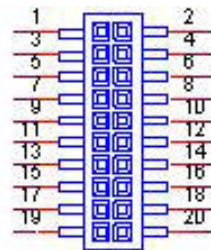
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|--------------------|--|
| CN19 | External USB2.0+USB3.0 |
| Part Number | 1654010199 |
| Footprint | USB_13P_UEA1112C-UHS6-4F |
| Description | USB Conn. 2.0+3.0 13P 90D(F) DIP UEA1112C-UHS6-4 |
| Pin | Pin Name |
| 1 | +5V |
| 2 | D- |
| 3 | D+ |
| 4 | GND |
| 5 | SSRX- |
| 6 | SSRX+ |
| 7 | GND |
| 8 | SSTX- |
| 9 | SSTX+ |
| 10 | +5V |
| 11 | D- |
| 12 | D+ |
| 13 | GND |



| CN20 | COM1/COM2 |
|--------------------|--|
| Part Number | 1653004793 |
| Footprint | HD_10x2P_79_23N685B-20M10 |
| Description | BOX HEADER 10x2P 2.0mm 180D(M)SMD 23N685B-20M10B |
| Pin | Pin Name |
| 1 | DCD1# |
| 2 | DSR1# |
| 3 | RXD1 |
| 4 | RTS1# |
| 5 | TXD1 |
| 6 | CTS1# |
| 7 | DTR1# |
| 8 | RI1# |
| 9 | GND |
| 10 | GND |
| 11 | DCD2# |
| 12 | DSR2# |
| 13 | RXD2 |
| 14 | RTS2# |
| 15 | TXD2 |
| 16 | CTS2# |
| 17 | DTR2# |
| 18 | RI2# |
| 19 | GND |
| 20 | GND |

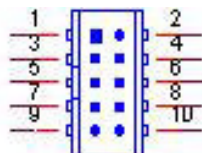


| | |
|--------------------|--|
| CN21 | COM3/COM4 |
| Part Number | 1653004793 |
| Footprint | HD_10x2P_79_23N685B-20M10 |
| Description | BOX HEADER 10x2P 2.0mm 180D(M)SMD 23N685B-20M10B |
| Pin | Pin Name |
| 1 | 422TX3-/485D3-/DCD3# |
| 2 | DSR3# |
| 3 | 422TX3+/485D3+/RXD3 |
| 4 | RTS3# |
| 5 | 422RX3+/TXD3 |
| 6 | CTS3# |
| 7 | 422RX3-/DTR3# |
| 8 | RI3# |
| 9 | GND |
| 10 | GND |
| 11 | 422TX4-/485D4-/DCD4# |
| 12 | DSR4# |
| 13 | 422TX4+/485D4+/RXD4 |
| 14 | RTS4# |
| 15 | 422RX4+/TXD4 |
| 16 | CTS4# |
| 17 | 422RX4-/DTR4# |
| 18 | RI4# |
| 19 | GND |
| 20 | GND |



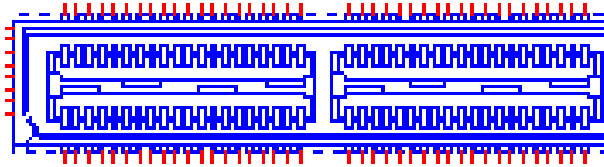
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|--------------------|--------------------------------------|
| CN24 | GbE |
| Part Number | 1652003274 |
| Footprint | RJ45_14P_RTA-195AAK1A |
| Description | PHONE JACK RJ45 28P DIP RTB-19GB9J1A |
| Pin | Pin Name |
| 1 | TX+(10/100),BI_DA+(GHz) |
| 2 | TX-(10/100),BI_DA-(GHz) |
| 3 | RX+(10/100),BI_DB+(GHz) |
| 4 | BI_DC+(GHz) |
| 5 | BI_DC-(GHz) |
| 6 | RX-(10/100),BI_DB-(GHz) |
| 7 | BI_DD+(GHz) |
| 8 | BI_DD-(GHz) |

| | |
|--------------------|--|
| CN27 | Audio |
| Part Number | 1653004099 |
| Footprint | HD_5x2P_79_23N685B-10M10 |
| Description | BOX HEADER 5x2P 2.00mm 180D(M) SMD 23N685B-10M10 |
| Pin | Pin Name |
| 1 | LOUTR |
| 2 | LINR |
| 3 | GND |
| 4 | GND |
| 5 | LOUTL |
| 6 | LINL |
| 7 | GND |
| 8 | GND |
| 9 | MIC1R |
| 10 | MIC1L |

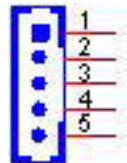


| | |
|--------------------|--|
| CN29 | MIOe |
| Part Number | 1654006235 |
| Footprint | MIOE_CPUSIDE |
| Description | B/B Conn. 40x2P 0.8mm 180D(F) SMD QSE-040-01-L-D |
| Pin | Pin Name |
| 1 | GND |
| 2 | GND |
| 3 | PCIE_RX0+ |
| 4 | PCIE_TX0+ |
| 5 | PCIE_RX0- |
| 6 | PCIE_TX0- |
| 7 | GND |
| 8 | GND |
| 9 | PCIE_RX1+ |
| 10 | PCIE_TX1+ |
| 11 | PCIE_RX1- |
| 12 | PCIE_TX1- |
| 13 | GND |
| 14 | GND |
| 15 | PCIE_RX2+ |
| 16 | PCIE_TX2+ |
| 17 | PCIE_RX2- |
| 18 | PCIE_TX2- |
| 19 | GND |
| 20 | GND |
| 21 | PCIE_RX3+ |
| 22 | PCIE_TX3+ |
| 23 | PCIE_RX3- |
| 24 | PCIE_TX3- |
| 25 | GND |
| 26 | GND |
| 27 | PCIE_CLK+ |
| 28 | LOUTL |
| 29 | PCIE_CLK- |
| 30 | LOUTR |
| 31 | GND |
| 32 | AGND |
| 33 | SMB_CLK |
| 34 | NC |
| 35 | SMB_DAT |
| 36 | NC |
| 37 | PCIE_WAKE# |
| 38 | NC |
| 39 | RESET# |
| 40 | NC |
| 41 | SLP_S3# |

| | |
|----|-------------------|
| 42 | CLK33M |
| 43 | NC |
| 44 | LPC_AD0 |
| 45 | DDP_HPDP |
| 46 | LPC_AD1 |
| 47 | GND |
| 48 | LPC_AD2 |
| 49 | DDP_AUX+ |
| 50 | LPC_AD3 |
| 51 | DDP_AUX- |
| 52 | LPC_DRQ#0 |
| 53 | GND |
| 54 | LPC_SERIRQ |
| 55 | DDP_D0+ |
| 56 | LPC_FRAME# |
| 57 | DDP_D0- |
| 58 | GND |
| 59 | GND |
| 60 | USB0_D+ |
| 61 | DDP_D1+ |
| 62 | USB0_D- |
| 63 | DDP_D1- |
| 64 | GND |
| 65 | GND |
| 66 | USB1_D+/USB_SSTX+ |
| 67 | DDP_D2+ |
| 68 | USB1_D-/USB_SSTX- |
| 69 | DDP_D2- |
| 70 | GND |
| 71 | GND |
| 72 | USB2_D+/USB_SSRX+ |
| 73 | DDP_D3+ |
| 74 | USB2_D-/USB_SSRX- |
| 75 | DDP_D3- |
| 76 | GND |
| 77 | GND |
| 78 | USB_OC# |
| 79 | +12VSB |
| 80 | +12VSB |
| 83 | GND |
| 84 | GND |
| 85 | GND |
| 86 | GND |
| 87 | +5VSB |
| 88 | +5VSB |
| 89 | +5VSB |
| 90 | +5VSB |



| | |
|--------------------|--|
| CN30 | Inverter Power |
| Part Number | 1655000453 |
| Footprint | WHL5V-2M-24W1140 |
| Description | WAFER BOX 2.0mm 5P 180D(M) DIP WO/Pb JIH VEI |
| Pin | Pin Name |
| 1 | +12V |
| 2 | GND |
| 3 | ENABKL |
| 4 | VBR |
| 5 | +5V |

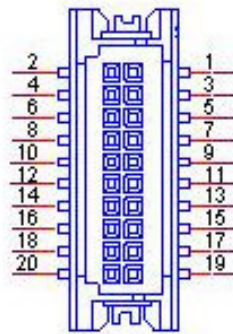


| | |
|--------------------|--|
| CN31 | LVDS |
| Part Number | 1653920200 |
| Footprint | SPH20X2 |
| Description | B/B Conn. 40P 1.25mm 90D SMD DF13-40DP-1.25V(91) |
| Pin | Pin Name |
| 1 | +5V or +3.3V |
| 2 | +5V or +3.3V |
| 3 | GND |
| 4 | GND |
| 5 | +5V or +3.3V |
| 6 | +5V or +3.3V |
| 7 | LVDS0_D0- |
| 8 | LVDS1_D0- |
| 9 | LVDS0_D0+ |
| 10 | LVDS1_D0+ |
| 11 | GND |
| 12 | GND |
| 13 | LVDS0_D1- |
| 14 | LVDS1_D1- |
| 15 | LVDS0_D1+ |
| 16 | LVDS1_D1+ |
| 17 | GND |

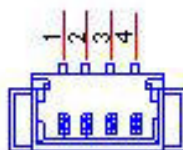
| | |
|----|------------|
| 18 | GND |
| 19 | LVDS0_D2- |
| 20 | LVDS1_D2- |
| 21 | LVDS0_D2+ |
| 22 | LVDS1_D2+ |
| 23 | GND |
| 24 | GND |
| 25 | LVDS0_CLK- |
| 26 | LVDS1_CLK- |
| 27 | LVDS0_CLK+ |
| 28 | LVDS1_CLK+ |
| 29 | GND |
| 30 | GND |
| 31 | NC |
| 32 | NC |
| 33 | GND |
| 34 | GND |
| 35 | LVDS0_D3- |
| 36 | LVDS1_D3- |
| 37 | LVDS0_D3+ |
| 38 | LVDS1_D3+ |
| 39 | NC |
| 40 | NC |



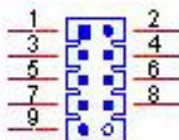
| | |
|--------------------|--|
| CN32 | eDP |
| Part Number | 1653910261 |
| Footprint | SPH10X2 |
| Description | B/B Conn 10x2P 1.25mm 180D(M)SMD DF13-20DP-1.25V |
| Pin | Pin Name |
| 1 | GND |
| 2 | GND |
| 3 | D0- |
| 4 | D3- |
| 5 | D0+ |
| 6 | D3+ |
| 7 | GND |
| 8 | NC |
| 9 | D1- |
| 10 | GND |
| 11 | D1+ |
| 12 | AUX- |
| 13 | GND |
| 14 | AUX+ |
| 15 | D2- |
| 16 | GND |
| 17 | D2+ |
| 18 | Hot Plug Detect |
| 19 | +5V or +3.3V |
| 20 | +5V or +3.3V |



| | |
|--------------------|---|
| CN33 | SMBus/I²C |
| Part Number | 1655904020 |
| Footprint | FPC4V-125M |
| Description | WAFER 4P 1.25mm 180D(M) SMD 85205-04001 |
| Pin | Pin Name |
| 1 | GND |
| 2 | SMB_DAT |
| 3 | SMB_CLK |
| 4 | +5V |



| | |
|--------------------|--|
| CN34 | Internal USB |
| Part Number | 1653003718 |
| Footprint | HD_5x2P_79_RA_N10_21N22050 |
| Description | PIN HEADER 5x2P 2.00mm 90D(M) SMD 21N22050 |
| Pin | Pin Name |
| 1 | +V5SB_USB_UTC |
| 2 | NC |
| 3 | USB6_HUB1_z_P- |
| 4 | NC |
| 5 | USB6_HUB1_z_P+ |
| 6 | NC |
| 7 | GND |
| 8 | NC |
| 9 | GND |



| | |
|--------------------|--|
| FAN1 | System Fan |
| Part Number | 1655003010 |
| Footprint | WHP3VA |
| Description | Wafer 2.54mm 3P 180D(M) DIP 22-27-2031 |
| Pin | Pin Name |
| 1 | GND |
| 2 | +V12 |
| 3 | N/A |



Appendix **B**

System Assignments

This appendix contains information of a detailed nature.

Sections include:

- System I/O Ports
- 1st MB Memory Map
- Interrupt Assignments

B.1 System I/O Ports

Table B.1: System I/O Ports

| Addr. Range (Hex) | Device |
|--------------------------|-------------------------------|
| 20–2D | Interrupt Controller |
| 2E – 2F | Motherboard resources |
| 30 – 3D | Interrupt Controller |
| 40 – 43 | System timer |
| 4E – 4F | Motherboard resources |
| 50 – 53 | System timer |
| 61 – 67 | Motherboard resources |
| 70 - 7F | System CMOS/real time clock |
| 80 - 92 | Motherboard resources |
| A0 – B1 | Interrupt Controller |
| B2 – B3 | Motherboard resources |
| B4 – BD | Interrupt Controller |
| 272 – 273 | Motherboard resources |
| 290 – 29F | Embedded Controller resources |
| 2E8 – 2EF | COM4 |
| 2F8 – 2FF | COM2 |
| 3B0 – 3DF | Intel® HD Graphics |
| 3E8 – 3EF | COM3 |
| 3F8 – 3FF | COM1 |
| 400 – 47F | Motherboard resources |
| 4D0 – 4D1 | Interrupt Controller |
| 500 – 57F | Motherboard resources |

B.2 1st MB Memory Map

Table B.2: 1st MB Memory Map

| Addr. Range (Hex) | Device |
|--------------------------|---|
| A0000h - BFFFFh | Intel® HD Graphics |
| A0000h - BFFFFh | PCI Bus |
| C0000h - DFFFFh | PCI Bus |
| E0000h - FFFFFh | PCI Bus |
| 90400000 – 905FFFFFF | Intel® Trusted Execution Engine Interface |
| E0000000 - FEFFFFFF | System resources |

B.3 Interrupt Assignments

Table B.3: Interrupt assignments

| Interrupt# | Interrupt source |
|-------------------|--|
| NMI | Parity error detected |
| IRQ0 | System timer |
| IRQ1 | Using SERIRQ, Keyboard Emulation |
| IRQ2 | Slave controller INTR output |
| IRQ3 | Communications Port (COM2) |
| IRQ4 | Communications Port (COM1) |
| IRQ5 | Communications Port (COM4) / iManager WatchDog IRQ |
| IRQ6 | Available |
| IRQ7 | Communications Port (COM3) |
| IRQ8 | Internal RTC or HPET |
| IRQ9 | Microsoft ACPI-Compliant System |
| IRQ10 | Available |
| IRQ11 | Available |
| IRQ12 | Available |
| IRQ13 | Numeric data processor |
| IRQ14 | SATA controller |
| IRQ15 | SATA controller |

Appendix **C**

EC Watchdog Timer
Sample Code

C.1 EC Watchdog Timer sample code

```
EC_Command_Port = 0x29Ah
EC_Data_Port = 0x299h
Write EC HW ram = 0x89
Watch dog event flag = 0x57
Watchdog reset delay time = 0x5E
Reset event = 0x04
Start WDT function = 0x28
=====
.model small
.486p
.stack 256
.data
.code
org 100h
.STARTup

mov dx, EC_Command_Port
mov al,89h      ; Write EC HW ram.
out dx,al

mov dx, EC_Data_Port
mov al, 5Fh    ; Watchdog reset delay time low byte (5Eh is high byte) index.
out dx,al

mov dx, EC_Data_Port
mov al, 30h    ;Set 3 seconds delay time.
out dx,al

mov dx, EC_Command_Port
mov al,89h    ; Write EC HW ram.
out dx,al

mov dx, EC_Data_Port
mov al, 57h   ; Watch dog event flag.
out dx,al

mov dx, EC_Data_Port
mov al, 04h   ; Reset event.
out dx,al

mov dx, EC_Command_Port
mov al,28h   ; start WDT function.
out dx,al

.exit
END
```


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Our company network supports you worldwide with offices in Germany, Austria, Switzerland, Great Britain and the USA. For more information please contact:

Germany



Distec GmbH

Augsburger Str. 2b
82110 Germering
Germany

Phone: +49 89 89 43 63-0
Fax: +49 89 89 43 63-131
E-Mail: info@datadisplay-group.de
Internet: www.datadisplay-group.de

FORTEC Elektronik AG

Lechwiesenstr. 9
86899 Landsberg am Lech
Germany

Phone: +49 8191 911 72-0
Fax: +49 8191 217 70
E-Mail: sales@fortecag.de
Internet: www.fortecag.de

FORTEC Elektronik AG

Office West

Hohenstaufenring 55
50674 Köln
Germany

Phone: +49 221 272 273-0
Fax: +49 221 272 273-10
E-Mail: west@fortecag.de

Austria



FORTEC Elektronik AG

Office Vienna

Nuschinggasse 12
1230 Wien
Austria

Phone: +43 1 8673492-0
Fax: +43 1 8673492-26
E-Mail: office@fortec.at

Switzerland



ALTRAC AG

Bahnhofstraße 3
5436 Würenlos
Switzerland

Phone: +41 44 7446111
Telefax: +41 44 7446161
E-Mail: info@altrac.ch
Internet: www.altrac.ch

United Kingdom



Display Technology Ltd.

5 The Oaks Business Village
Revenge Road, Lordswood
Chatham, Kent, ME5 8LF
United Kingdom

Phone: +44 1634 67 27 55
Fax: +44 1634 67 27 54
E-Mail: info@displaytechnology.co.uk
Internet: www.displaytechnology.co.uk

USA



Apollo Display Technologies, Corp.

87 Raynor Avenue,
Unit 1 Ronkonkoma,
NY 11779
United States of America

Phone: +1 631 580-43 60
Fax: +1 631 580-43 70
E-Mail: info@apolloDisplays.com
Internet: www.apolloDisplays.com