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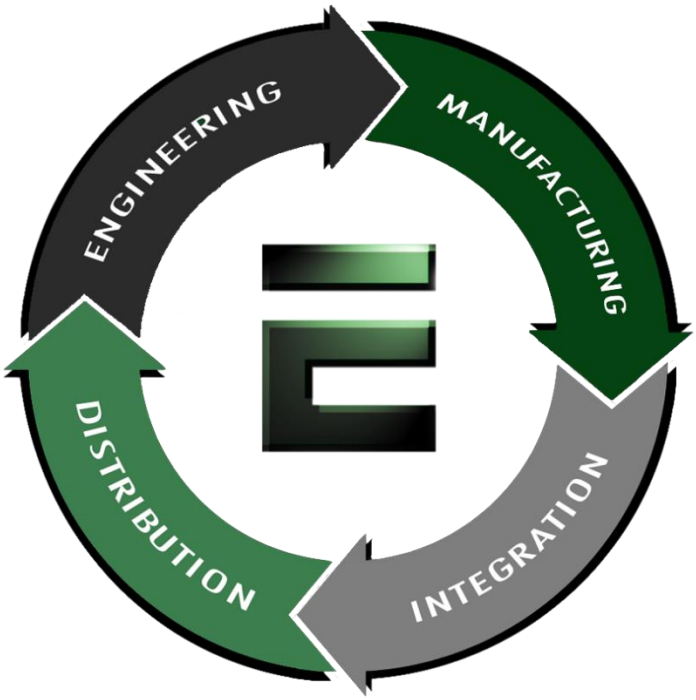

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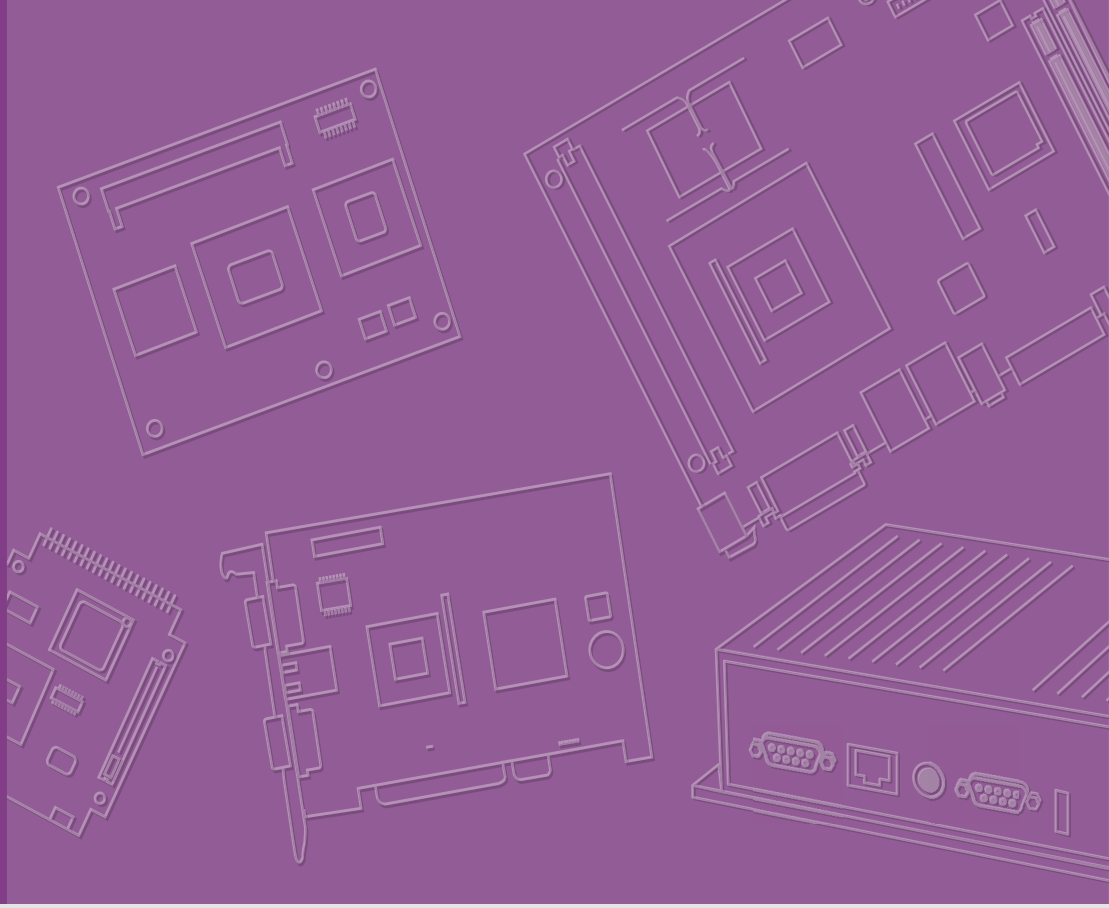

User Manual

MIO-5373

MIO-5373 3.5" MI/O-Compact SBC, 8th Gen. Intel® Core™ U-Series (i7/i5/i3/Celeron®), DDR4, eMMC, HDMI, DP, 48-bit LVDS, 2x GbE, M.2 B Key 2280, DC-in 12-24V, and iManager

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This manual is for MIO-5373.

Part No. 2006537301 Edition 2

Printed in China November 2020

Product Warranty (2 years)

The Manufacturer warrants to you, the original purchaser, that each of its products will be free from defects in materials and workmanship for two years from the date of pur-chase.

This warranty does not apply to any products which have been repaired or altered by persons other than authorized repair personnel, or which have been subject to misuse, abuse, accident or improper installation. We assumes no liability under the terms of this warranty as a consequence of such events.

Because of our high quality-control standards and rigorous testing, most of our customers never need to use our repair service. If a product is defective, it will be repaired or replaced at no charge during the warranty period. For out-of-warranty repairs, you will be billed according to the cost of replacement materials, service time and freight. Please consult your dealer for more details.

If you think you have a defective product, follow these steps:

1. Collect all the information about the problem encountered. (For example, CPU speed, other products used, other hardware and software used, etc.) Note anything abnormal and list any onscreen messages you get when the problem occurs.
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 return merchandise authori-zation (RMA) 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.

Declaration of Conformity

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 electrostatic discharge (ESD) and electromagnetic interference (EMI) leakage, we strongly recommend the use of CE-compliant industrial enclosure products.

FCC Class B

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/her 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 manflatterer. Discard used batteries according to the manufacturer's instructions.*

Technical Support and Assistance

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 installing the card, ensure that the following materials have been shipped:

- 1x MIO-5373 SBC
- 1x SATA Cable 30 cm (11.8 in) (P/N: 1700006291)
- 1x SATA Power Cable 35cm (13.77 in) (P/N: 1700018785)
- 1x Audio JACK*3 Cable 20 cm (7.87 in) (P/N: 1700019584)
- 1x COM RS-232 Cable 20 cm (7.87 in) (P/N: 1700030404-01)
- 1x MIO-5373 Heatsink for 0 ~ 60 °C (32 ~ 140 °F) (P/N: 1960091427N001)
- 1x MIO-5373 Heatsink for -40 ~ 85 °C (-40 ~ 185 °F) (P/N: 1960091427N011)
- 1x Screw Kit (4 sets of screw & stand-off)
- 1x Mini Jumper (P/N: 9689000002)

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	4x RS232/422/485, 2 x RS422/485, 8-bit GPIO
MIOe-220-B3A1E	3x Intel® Gigabit Ethernet with PCIe Switch
MIOE-260L-00A1	Dual Intel GbE with M.2 B-key & F/S miniPCIe
MIOe-3674-AE[1]	4-port PoE ports MIOe Module
MIOe-3680-AE	2-Port CAN-Bus MIOe Module with Isolation Protection
MIOE-PWR1-00A1E	12-24V Power Module
MIOE-PWR2-00A1E	9-36V Power Module

[1] Supported with customized BIOS

Optional Accessories

Part Number	Description
1970004423N000	Heat spreader for single layer display HDMI connector (optional)
1970004423N010	Heat spreader for dual layer display HDMI + DP connector
1960090264N000	Bracket for M.2 2280 to M.2 3042

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Chapter 1

General Information

This chapter details background information regarding MIO-5373.

- Introduction
- Specifications
- Block Diagram
- Board Layout and Dimensions

1.1 Introduction

Advantech's MIO-5373 3.5" SBC w/ MIOe is powered by 8th Gen. Intel® Core i7/i5/i3/Celeron processors. It offers low power features, high performance computing, and multimedia capabilities. MIO-5373 supports Advantech's iManager, SW APIs, and WISE-PaaS/DeviceOn to remotely monitor and control system operation effectively.

MIO-5373 adopts the latest 64-bit, Quad-core processors built on 14nm process technology for improvements in CPU processing, graphics, security and I/O flexibility.

MIO-5373 is equipped with Intel® latest generation graphics core with DX12, OGL4.4, HW Encode:H.264 & MPEG2, HW Decode:H.264 & MPEG2 encoding/decoding and supports triple simultaneous displays by 48-bit LVDS/eDP+HDMI+DP, dual-channel 2400MHz DDR4 memory (Max. 32GB), M.2 B-Key 2280 (supports NVMe), and DC-in 12~24V.

1.2 Specifications

1.2.1 Functional Specifications

- **Processor: 8th Gen. Intel® Core™ U-series**
  - Intel® Core™ i7-8665UE (Quad-Core, 1.70GHz)
  - Intel® Core™ i5-8365UE (Quad-Core, 1.60GHz)
  - Intel® Core™ i3-8145UE (Dual-Core, 2.20GHz)
- **LLC**
  - Intel® Core™ i7-8665UE: 2MB
  - Intel® Core™ i5-8365UE: 2MB
  - Intel® Core™ i3-8145UE: 2MB
- **Advanced Technologies**

  * Intel® Turbo Boost Technology 2.0[2] (i5/i7 series only)
  * Intel® Advanced Vector Extensions 2.0 (Intel® AVX2)
  * Intel® Hyper-Threading Technology
  * Intel® Active Management Technology 11.0 (Intel® AMT 11.0, i5/i7 series only)
  * Intel® Trusted Execution Technology (Intel® TXT)
  * Intel® 64 Architecture
  * Intel® Virtualization Technology (Intel® VT)
  * Intel® Advanced Encryption Standard New Instructions (Intel® AES-NI)
  * Enhanced Intel SpeedStep® Technology

- **I/O Interface of Platform Controller Hub**
  - SATA
    2x SATA 3.0:
    *Integrated Serial ATA Host Controller
    *Data transfer rates up to 6.0 Gb/s (600MB/s)
    *Integrated AHCI controller
  - USB
    4x rear I/O USB 3.1 ports at coastline
    2x internal USB 2.0 ports
  - Power Management

- Full ACPI (Advanced Configuration and Power Interface) with ATX mode: C0-C7 support; C8, C9, C10 no support
- Support S0, S3, S4, S5
- Support Wake on LAN
- Enhanced Intel® SpeedStep® Technology

■ **System Memory Support**

- Technology: DDR4-2400MT/s
- Max. Capacity: 32GB
- Channel/Socket:
  *Dual Channel/Dual Socket DDR4 (5.2 mm)
  *Dual Channel/Dual Socket DDR4 (9.2 mm)
- ECC Support: N/A

■ **Integrated Graphics Controller**

- Controller: Intel® WHL-U SoC integrated
- Max. Frequency: i7-8665UE (400 MHz)
- Base Frequency: i7-8665UE (550 MHz)
- 3D/HW Acceleration:
  DX12, OGL4.4
  HW Encode: H.264, MPEG2
  HW Decode: H.264, MPEG2
- Multiple Display: Triple simultaneous displays by 48-bit LVDS/ eDP+HDMI+DP
- LCD:
  LVDS Dual Channel 48-bit up to 1920 x 1200
  Option eDP1.4 up to 4096x2304@60Hz
- HDMI/DP:
  1x Port HDMI1.4 up to 4096x2160@30/24Hz
  1x Port DP1.2 up to 4096x2306@60Hz

■ **Gigabit Ethernet**

- Controller:
  LAN1: Intel® i219
  LAN2: Intel® i210-IT
- Compliant with IEEE 802.3, IEEE 802.3u, IEEE 802.3z, IEEE 802.ab
- Speed: 10/100/1000 Mbps
- LAN LED:
  Link: Green (100Mbps)/Orange (1000Mbps)
  Active: Green (flash)
- Support wake on LAN

■ **Peripheral Interface**

- MIOe Unified Expansion: 4 PCIex1, 1 PCIex4, USB2.0, LPC, SMBus, Line-out, 12V/5V Power supply
- COM Port:
  2x RS-232/422/485
  2x GPIO 8b (default) or 2 x RS-232 (*by request)
- 16-bit GPIO
- 1 SMBus / I^2C channel from iManager
- Watchdog timer: 65536 level, 0~65535 sec
- 1x M.2 E-key 2230
- 1x M.2 B-key 2280 (SATA or NVMe PCIex2), 3042 LTE module (support USB 2.0 only), optional M-key 2280 NVMe PCIex4

- **High Definition Audio**
  - Intel® High Definition Audio Interface
  - High Definition Audio Codec with Realtek proprietary loss-less content protection technology
  - Supports 1x Line-input, 1x Line output, 1x Mic-input
- **BIOS: AMI EFI 256Mbit**
- **Security: TPM2.0, supported by UEFI mode only**

1.2.2 OS Support

MIO-5373 supports Win10 64-bit (UEFI mode only).
For further information regarding OS support for MIO-5373, please visit Advantech's website or contact our technical support center.

1.2.3 Mechanical Specifications

- **Dimensions:** 146 x 102 mm (5.7 x 4 in)
- **Height:** Top: 25.3 mm (.996 in), PCB: 2.0 mm (.07 in); bottom: 10.51 mm (10.51 in)
- **Weight:** 0.67 kg/1.47 lb (reference weight of total package)

1.2.4 Electrical Specifications

- **Power Requirement**
  - Supply Voltage: Vin: 12V-24V +/- 10%
  - Connector: ATX 2x2-pin, optional: DC-Jack*
  - Power Management: AT, ATX
- **Power Consumption**
  - Max.:
    i7-8665UE: 65.59W (12V)/74.06W (24V)
    i5-8365UE: 71.28W (12V)/74.04W (24V)
    i3-8145UE: 35.70W (12V)/38.68W (24V)
  - Typical: Idle mode in Windows 10
    i7-8665UE: 6.68W (12V)/8.71W (24V)
    i5-8365UE: 7.55W (12V)/7.55W (24V)
    i3-8145UE: 7.03W (12V)/8.18W (24V)
- **Power Consumption Conditions**
  - Max. load: Measures the maximum current value the system is under during maximum loading (CPU: Top speed, RAM, and Graphic: Full loading)
  - Idle mode: Measures the current value when the system is in windows mode without running any programs
- **RTC Battery**
  - Typical Voltage: 3.0 V
  - Normal discharge capacity: 210 mAh

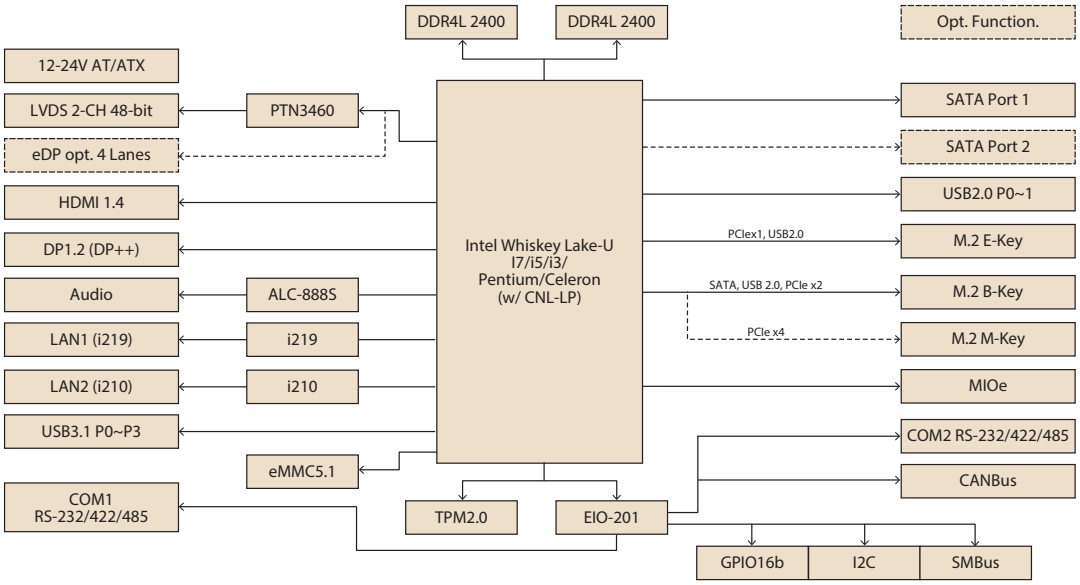
1.2.5 Environmental

- **Temperature**
  - Operating:
    Standard: 0 ~ 60 °C (32 ~ 140 °F)
    Extend: -40 ~ 85 °C (-40 ~ 185 °F)
  - Storage: -40 ~ 85 °C (-40 ~ 185 °F)

- **Humidity**
  - Operating: 40 °C (104 °F) @ 95% relative humidity, non-condensing
  - Storage: 60 °C (140 °F) @ 95% relative humidity, non-condensing
- **Vibration Resistance:** 3.5Grms

[1] Not supported by default. Please contact us if this function is needed. [2] Thermal conditions need to be considered when setting maximum frequency.

1.3 Block Diagram



1.4 Board Dimensions

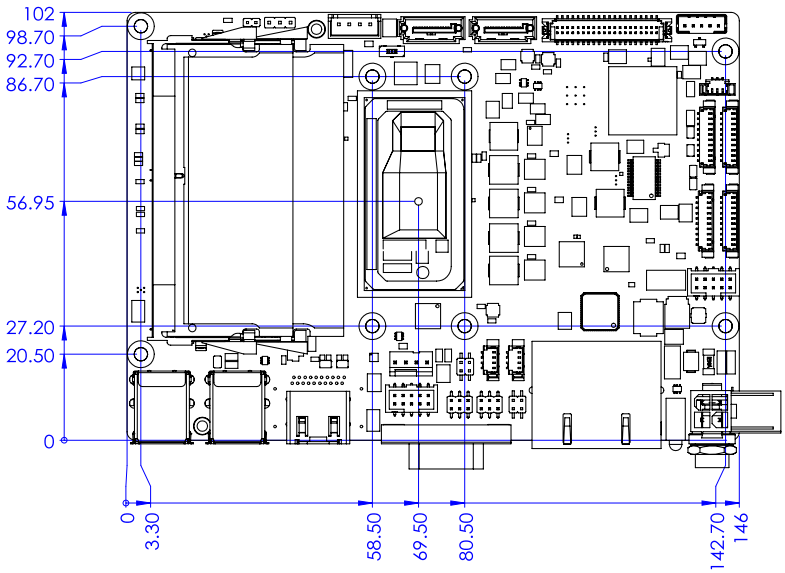


Figure 1.1 MIO-5373 Mechanical Diagram (Top Side)

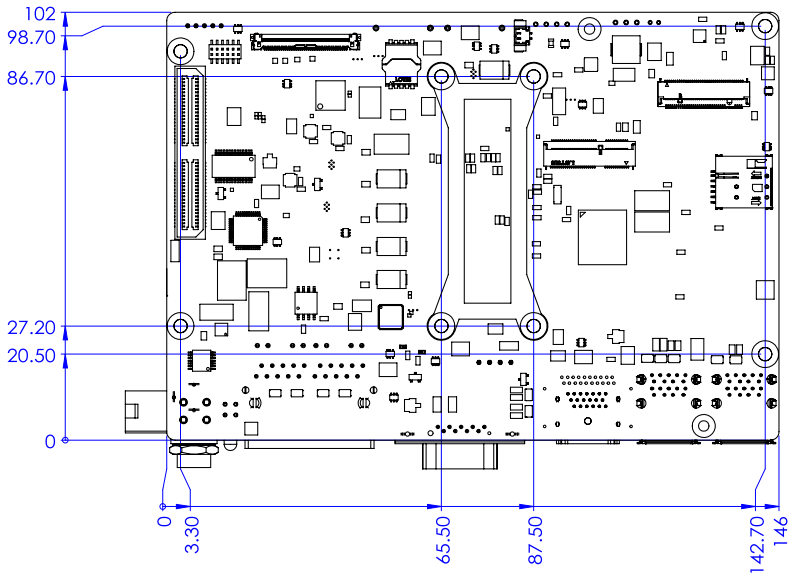


Figure 1.2 MIO-5373 Mechanical Diagram (Bottom Side)

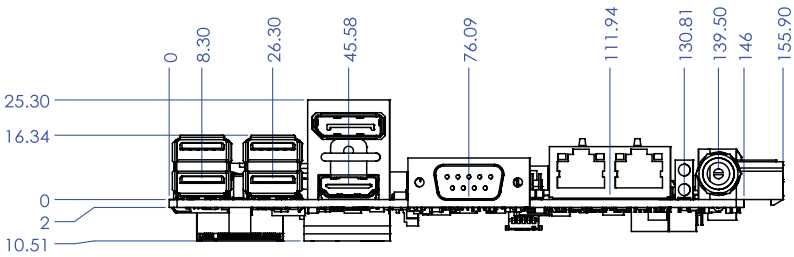


Figure 1.3 MIO-5373 Mechanical Diagram (Coastline)

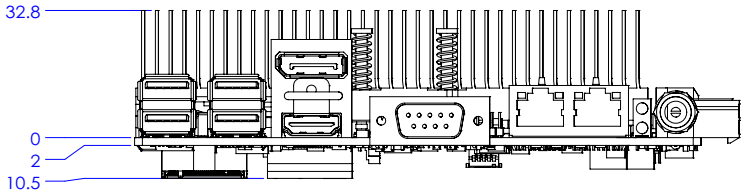


Figure 1.4 MIO-5373 Mechanical Diagram (with Heatsink)

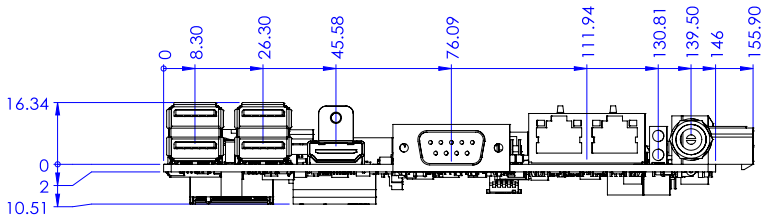


Figure 1.5 MIO-5373 Mechanical Drawing for Single Layer Display HDMI Connector (Coastline)

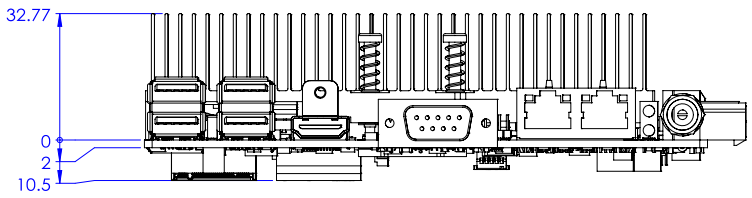


Figure 1.6 MIO-5373 Mechanical Drawing for Single Layer Display HDMI Connector (with Heatsink)

Chapter 2

Installation

This chapter explains the setup procedures of the MIO-5373 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

MIO-5373 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	
J1	AT/ATX mode selection
J2	RI# 5V/12V selection pin for CN9
J3	Panel voltage selection
J4	LVDS JEIDA and VESA mode selection
SW1	Clear CMOS

2.2 Connectors

Onboard connectors link the MIO-5373 to external devices such as hard disk drives, a keyboard, or floppy drives. The table below lists the function of each of the board's connectors.

Table 2.2: Connector

Label	Function
CN1	DDR4 SODIMM 260P/H5.2mm
CN2	DDR4 SODIMM 260P/H9.2mm
CN3	DC Input Connector
CN5	RTC Battery Connector
CN8	Power/LED/Case Open/Buzzer Connector
CN9	COM port Connector (RS232+RS422+RS485)
CN10	COM port Connector (RS232+RS422+RS485)
CN11	RJ45 Connector (2 port)
CN12	Inverter Connector
CN13	LVDS Connector
CN14	eDP Connector
CN15	HDMI and DP++ Connector
CN16	Key E Connector
CN17	Key M and Key B (option) Connector
CN20	SIM Card Connector
CN22	USB 3.1 Connector (2 ports)
CN23	USB 3.1 Connector (2 ports)
CN24	Internal USB Connector
CN25	HDD Power Connector
CN26	HDD Connector
CN27	HDD Connector
CN28	GPIO/RS232 Connector
CN29	Audio Connector
CN30	GPIO/RS232 Connector
CN30A1	MIOe Connector
CN31	I2C Bus Connector
CN32	System FAN Connector
CN35	CANBus Connector
CN36	SMBus Connector
CN37	DC input Connector (Adapter)

2.3 Connector Locations

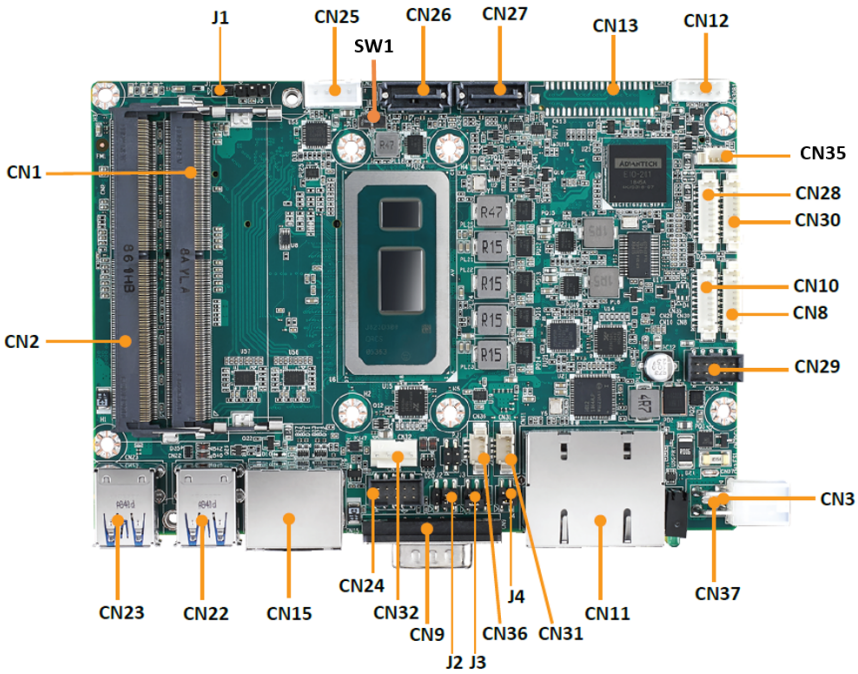


Figure 2.1 MIO-5373 Connector Locations Diagram (Top Side)

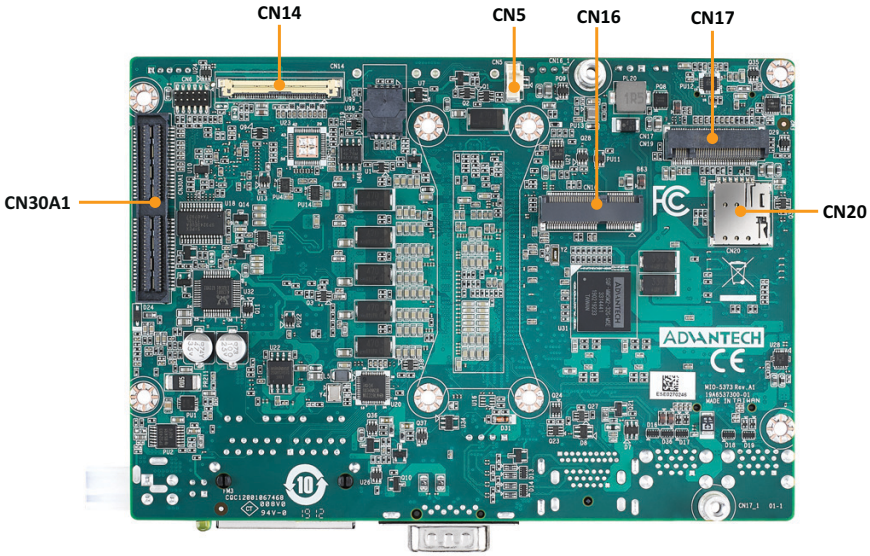


Figure 2.2 MIO-5373 Connector Locations Diagram (Bottom Side)

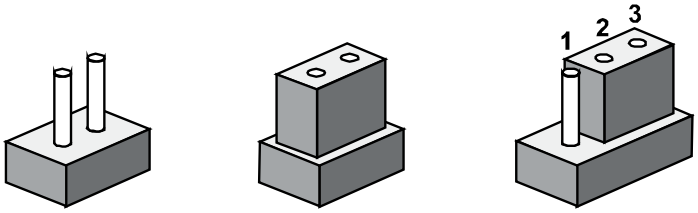
Figure 2.3 MIO-5373 Connector Locations Diagram (Coastline)

Figure 2.4 MIO-5373 Connector Locations with Single Layer HDMI (Coastline)

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, connect the pins with the clip. To “open” a jumper, remove the clip. Sometimes a jumper will have three pins, labeled 1, 2 and 3. In this case, connect either pins 1 and 2, or 2 and 3.

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

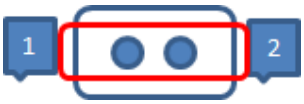


open **closed** **closed 2-3**

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 only need a standard cable to make most connections.

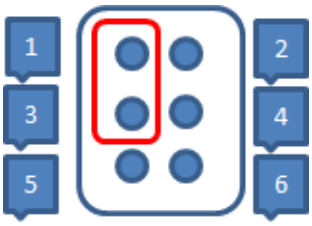
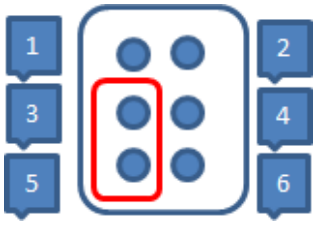
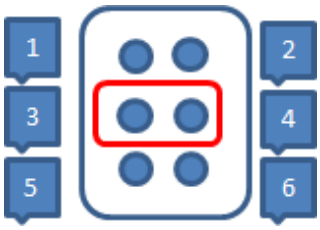
2.5 Jumper Settings

2.5.1 J1: ATX/AT Mode Selection

Function	Jumper Setting
AT Mode (Default)	
ATX Mode	

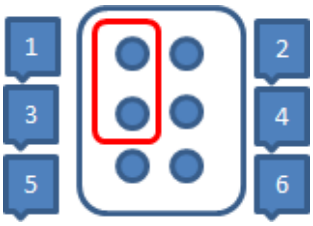
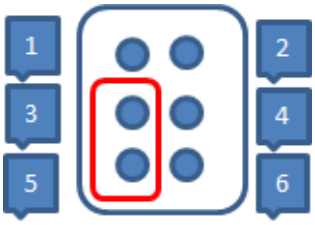
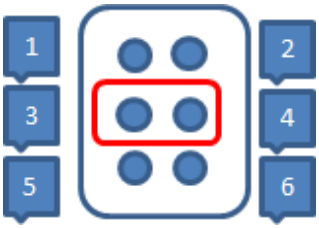
Pin	Signal Pin Definition
1	AT_DET#
2	GND

2.5.2 J2: RI# 5V/12V Selection Pin for CN9

Function	Jumper Setting
RI# Voltage Setting: +V5	
RI# Voltage Setting: +V12	
RI# Voltage Setting: RI# (Default)	

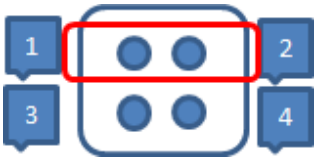
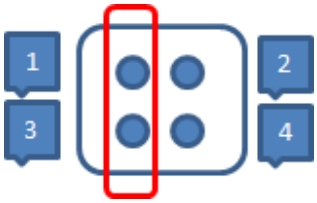
Pin	Signal Pin Definition
1	+V5
2	CN9_RI#
3	COM_RI#
4	CN9_RI#
5	+V12
6	CN9_RI#

2.5.3 J3: Panel Voltage Selection

Function	Jumper Setting
Panel Voltage Setting: +V3.3(Default)	
Panel Voltage Setting: +V5	
Panel Voltage Setting: +V12	

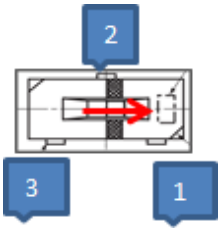
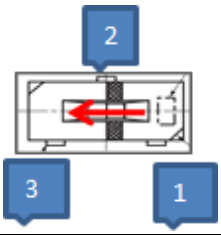
Pin	Signal Pin Definition
1	+V3.3
2	NC
3	+V_CH7511B_LCD
4	+V12
5	+V5
6	NC

2.5.4 J4: JEIDA and VESA Mode Selection

Function	Jumper Setting
JEIDA mode Setting: +V3.3	
VESA mode Setting: GND (Default)	

Pin	Signal Pin Definition
1	LVDS1_VCON
2	LVDS1_VCC
3	GND
4	NC

2.5.5 SW1: Clear CMOS

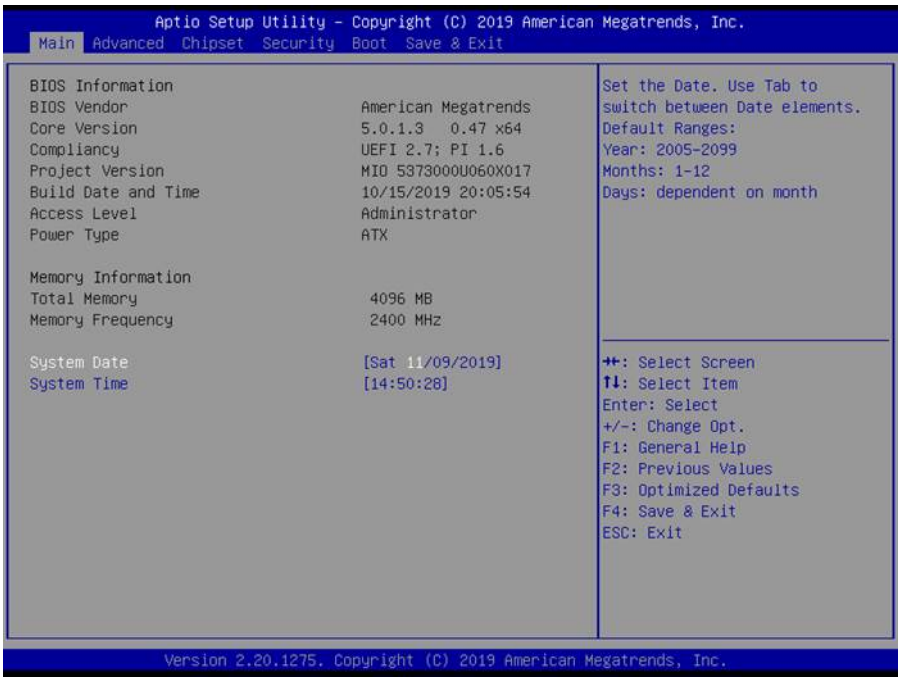
Function	Jumper Setting
Keep COMS Data (Default)	
Clear CMOS Date	

Pin	Signal Pin Definition
1	RTC_a_RST#
2	RTC_RST#
3	GND

Chapter 3

AMI BIOS Setup

AMI BIOS has been integrated into numerous of motherboards for decades. With the AMI BIOS Setup program, you can modify BIOS settings and control the various system features. This chapter describes the basic navigation of the MIO-5373 BIOS setup screens.



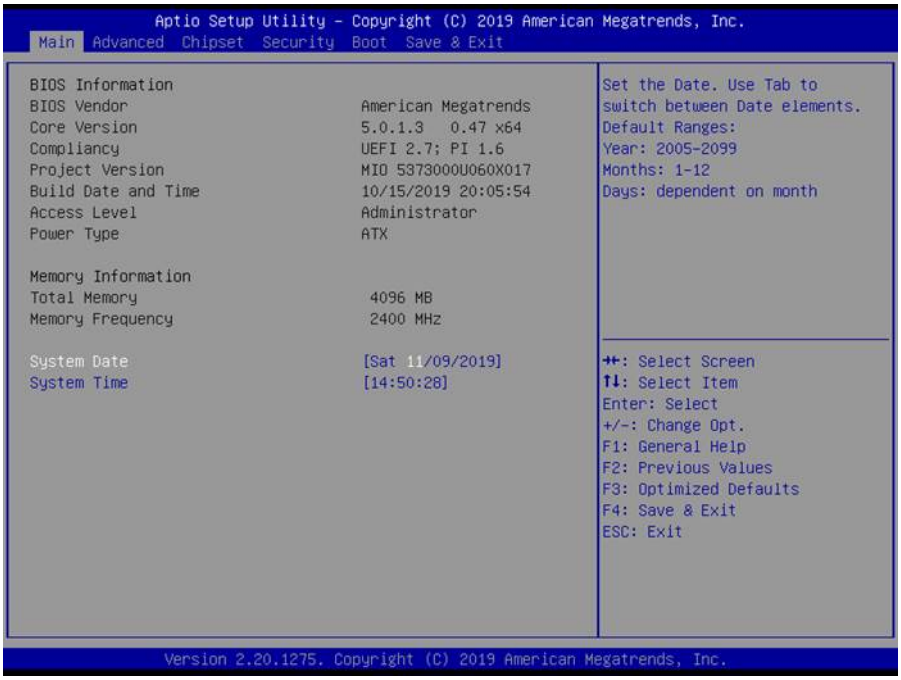
AMI BIOS ROM has a built-in Setup program that allows users to modify the basic system configurations. This information is stored in battery-backed CMOS so it retains the setup information when the power is turned off.

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 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 <DEL> 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.



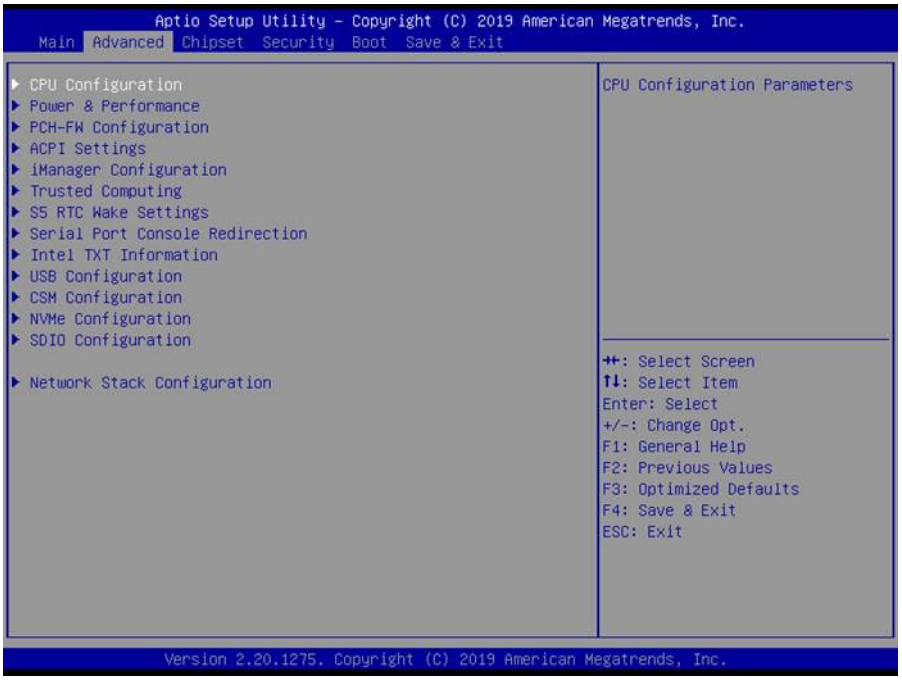
The Main BIOS setup screen has two main frames. The left frame displays all the options that can be configured. Grayed-out options cannot be configured; options in blue can. The right frame displays the key legend.

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.

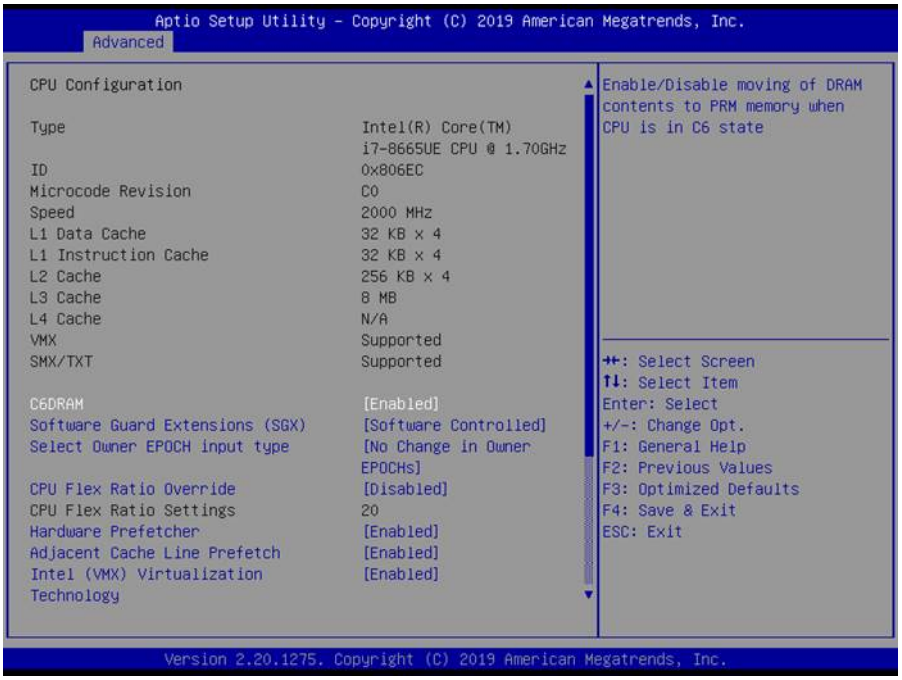
- **System Time / System Date**
  Use this option to change the system time and date. Highlight System Time or System Date using the <Arrow> keys. Enter new values through the keyboard. Press the <Tab> key or the <Arrow> keys to move between fields. The date must be entered in MM/DD/YY format. The time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

3.1.2 Advanced BIOS Features Setup

Select the Advanced tab from the MIO-5373 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 are shown below. The sub menus are described on the following pages.



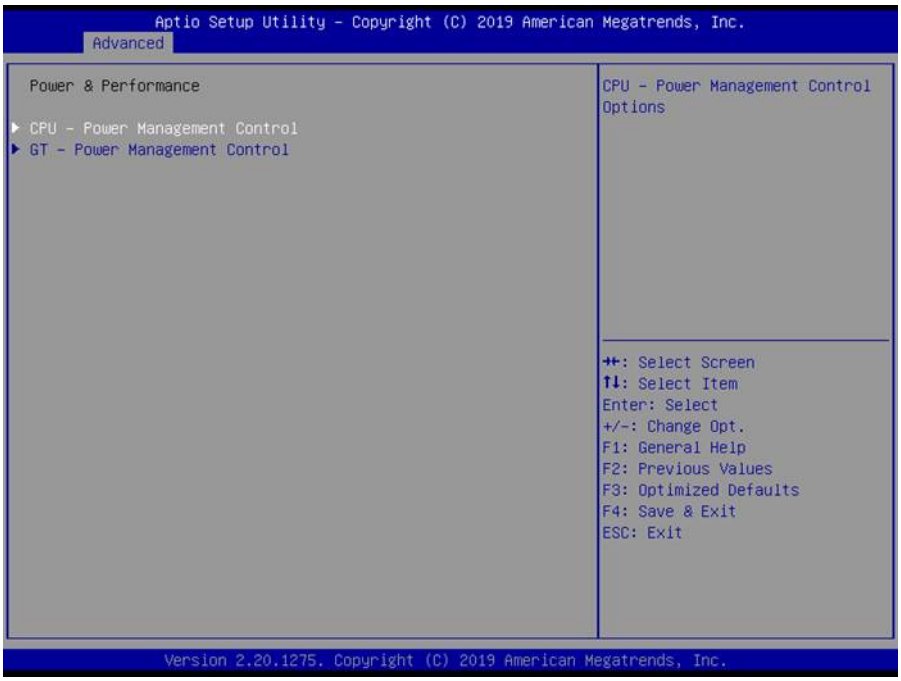
3.1.2.1 CPU Configuration



- **C6DRAM**
  Enable/Disable moving of dram contents to PRM memory when CPU is in C6 state.

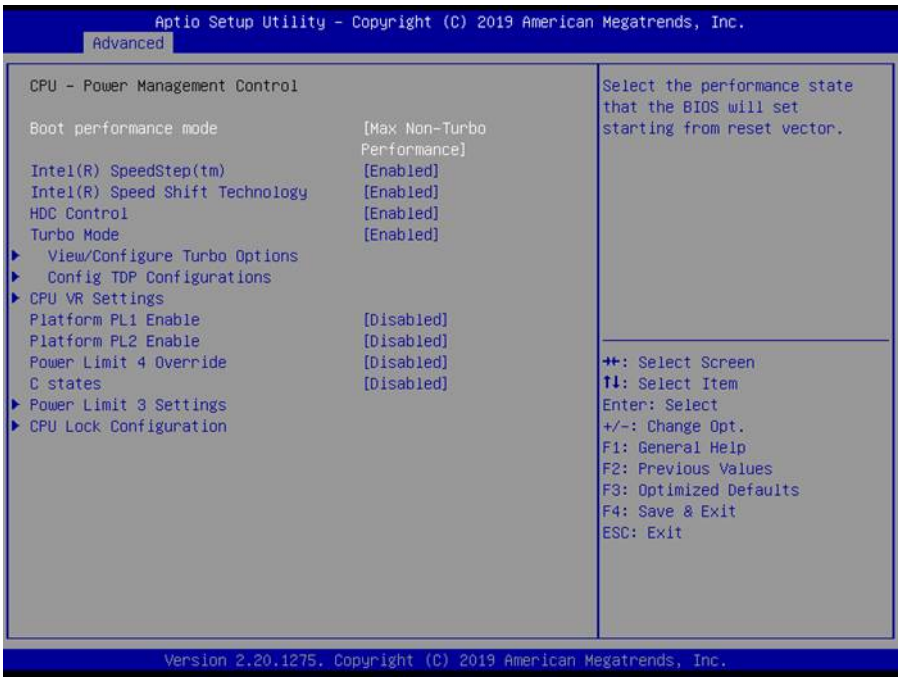
- **SW Guard Extension (SGX)**
  Enable/Disable Software Guard Extensions (SGX).
- **Select Owner EPOCH Input Type**
  Choose Owner EPOCH modes.
- **CPU Flex Ratio Override**
  Enable/Disable CPU Flex Ratio Programming.
- **Hardware Prefetcher**
  This item allows users to enable or disable the hardware prefetcher feature.
- **Adjacent Cache Line Prefetch**
  This item allows users to enable or disable the adjacent cache line prefetch feature.
- **Intel (VMX) Virtualization Technology**
  When Enabled, a VMM can utilize the additional hardware capability provided by Vanderpool Technology.
- **Active Processor Cores**
  This item allows users to set how many processor cores should be active.
- **AES**
  Enable/Disable AES (Advanced Encryption Standard).
- **MachineCheck**
  Enable/Disable Machine Check.
- **MonitorMWait**
  Enable/Disable MonitorMWait.
- **Intel Trusted Execution Technology**
  Enables utilization of additional hardware capability provided by Intel® Trusted Execution Technology.

3.1.2.2 Power & Performance



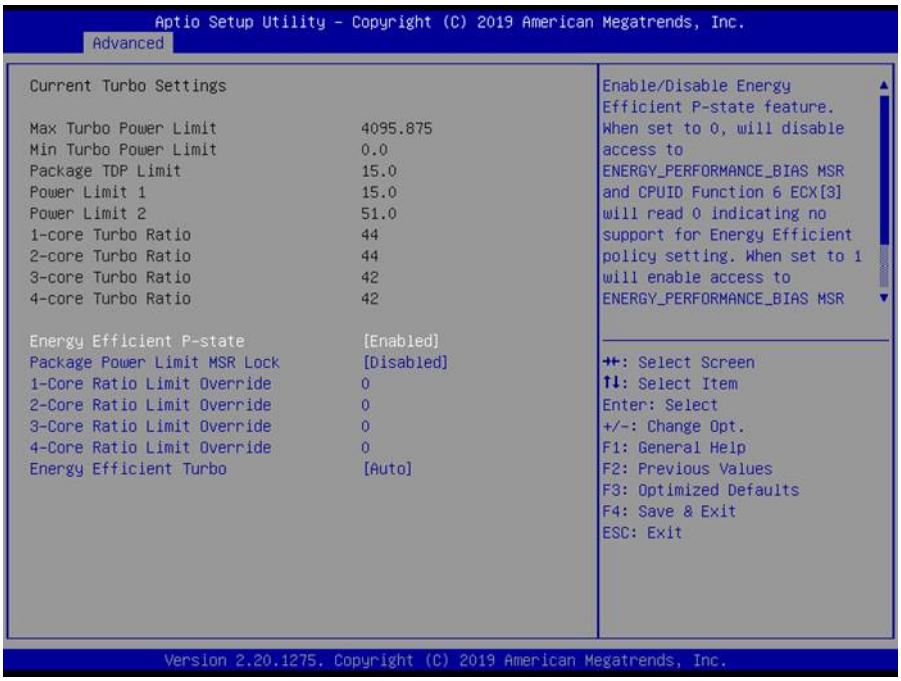
- **CPU - Power Management Control**
  CPU - Power Management Control Options.
- **GT - Power Management Control**
  GT - Power Management Control Options.

CPU - Power Management Control



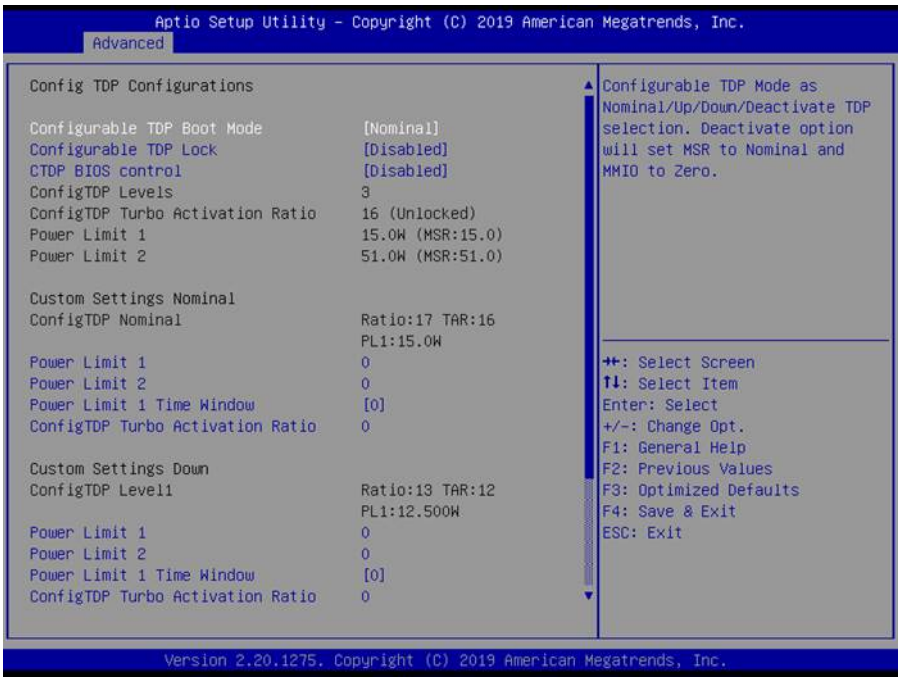
- **Boot Performance mode**
  Select the performance state that the BIOS will set before OS handoff.
- **Intel® SpeedStep™**
  Allows more than two frequency ranges to be supported.
- **Intel® Speed Shift Technology**
  Enable/Disable Intel® Speed Shift Technology support.
- **HDC Control**
  Enable/Disable Intel HDC.
- **Turbo Mode**
  Enable/Disable processor turbo mode.
- **View/Configure Turbo Options**
  View and Configure Turbo Options.
- **Config TDP Configuration**
  Config TDP Configurations.
- **CPU VR Setting**
  CPU CR Settings.
- **Platform PL1 Enable**
  Enable/Disable Platform Power Limit 1 programming.
- **Platform PL2 Enable**
  Enable/Disable Platform Power Limit 1 programming.
- **Power Limit 4 Override**
  Enable/Disable Power Limit 4 override.
- **C states**
  Enable/Disable CPU Power Management.
- **PowerLimit 3 Settings**
  Power Limit 3 Settings.
- **CPU Lock Configuration**
  CPU Lock Configuration.

View/Configure Turbo Options



- **Energy Efficient P-state**
  Enable/Disable Energy Efficient P-state feature.
- **Package Power Limit MSR Lock**
  Enable/Disable locking of Package Power Limit settings.
- **Energy Efficient Turbo**
  Enable/Disable Energy Efficient Turbo feature.

Config TDP Configurations



- **Configurable TDP Boot Mode**
  Configurable TDP Mode as Nominal/Up/Down/Deactivate TDP selection.
- **Configurable TDP Lock**
  Configurable TDP Mode Lock sets the Lock bit.
- **CTDP BIOS control**
  Enables CTDP control via runtime ACPI BIOS method.

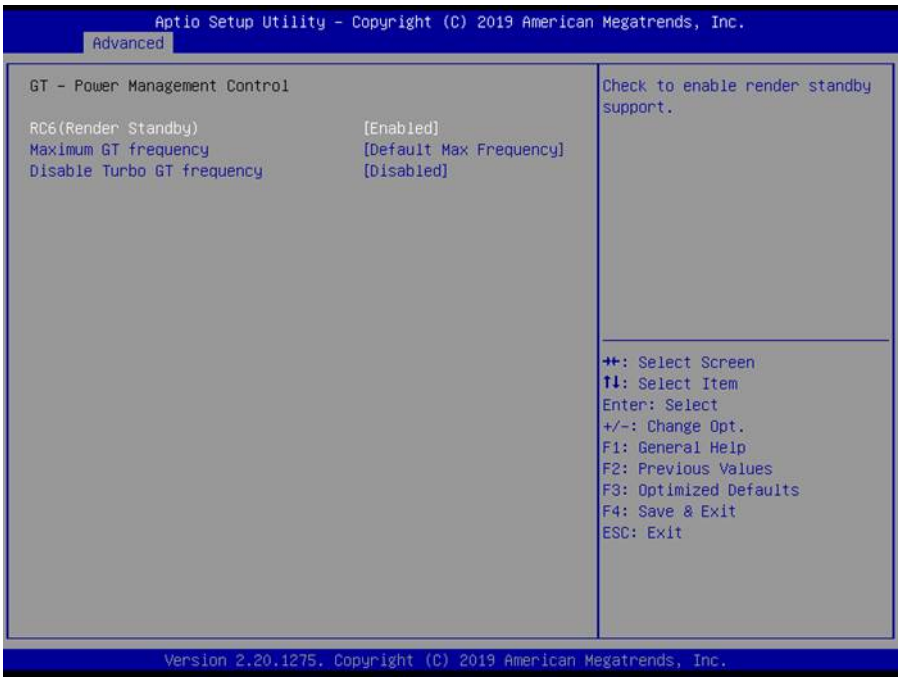
Power Limit 3 Settings

- **Power Limit 3 Override**
  Enable/Disable Power Limit 3 override.

CPU Lock Configuration

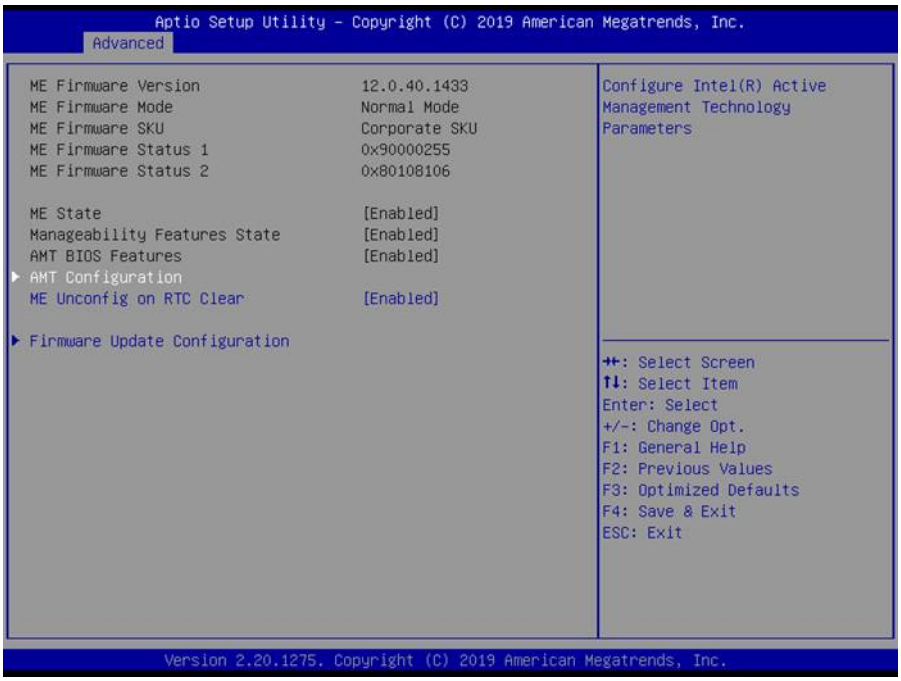
- **CFG Lock**
  Configure MSR 0xE2[15], CFG Lock bit.
- **Overclocking Lock**
  Enable/Disable Overclocking Lock (BIT 20) in FLEX_RATIO(194) MSR.

GT - Power Management Control



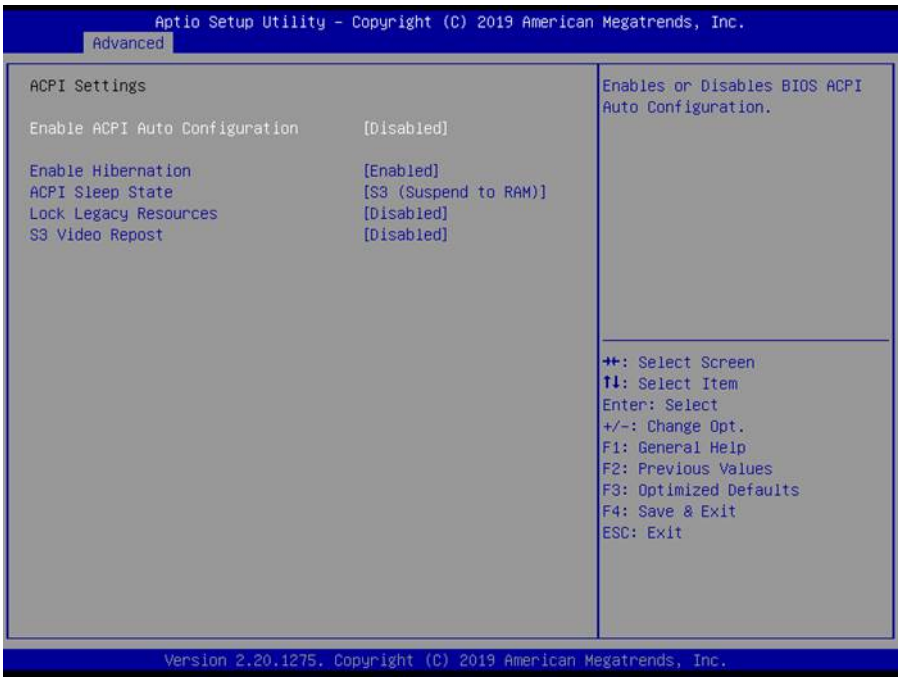
- **RC6(Render Standby)**
  Check to enable render standby support.
- **Maximum GT Frequency**
  Maximum GT frequency limited by user.
- **Disable Turbo GT Frequency**
  Enabled/Disabled Turbo GT frequency.

3.1.2.3 PCH-FW Configuration



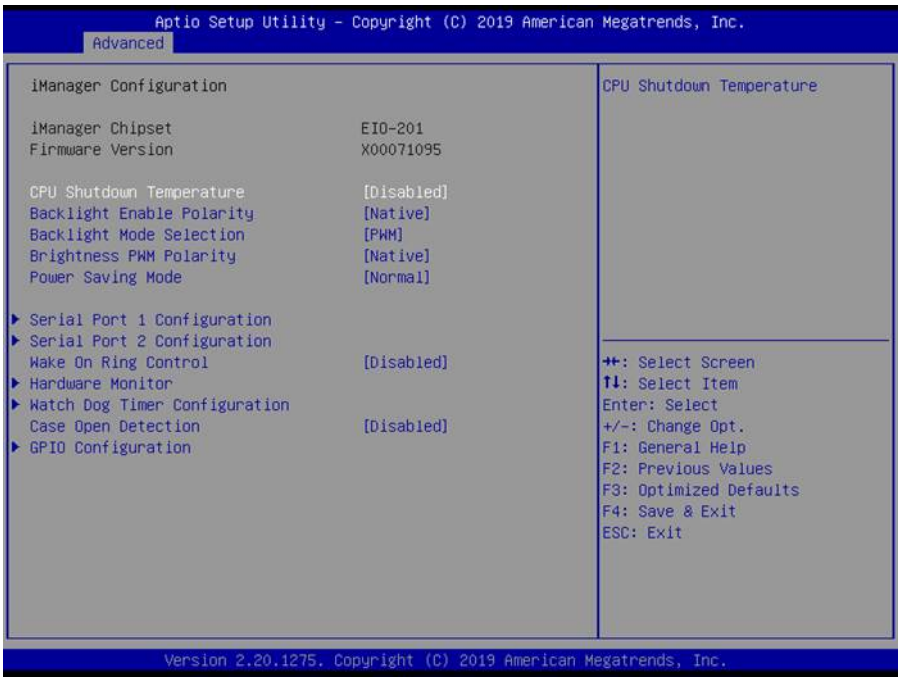
- **ME State**
  When Disabled ME will be put ME into Temporarily Disabled Mode.
- **Manageability Features State**
  Enable/Disable Intel® Manageability features.
- **AMT BIOS Features**
  When disabled, AMT BIOS Features are no longer supported and user is no longer able to access MEBx setup.
- **AMT Configuration**
  Configure Intel® Active Management Technology Parameters.
- **ME Unconfig on RTC Clear**
  When Disabled, ME will not be unconfigured on RTC Clear.
- **Firmware Update Configuration**
  Configure Management Engine Technology Parameters.

3.1.2.4 ACPI Settings



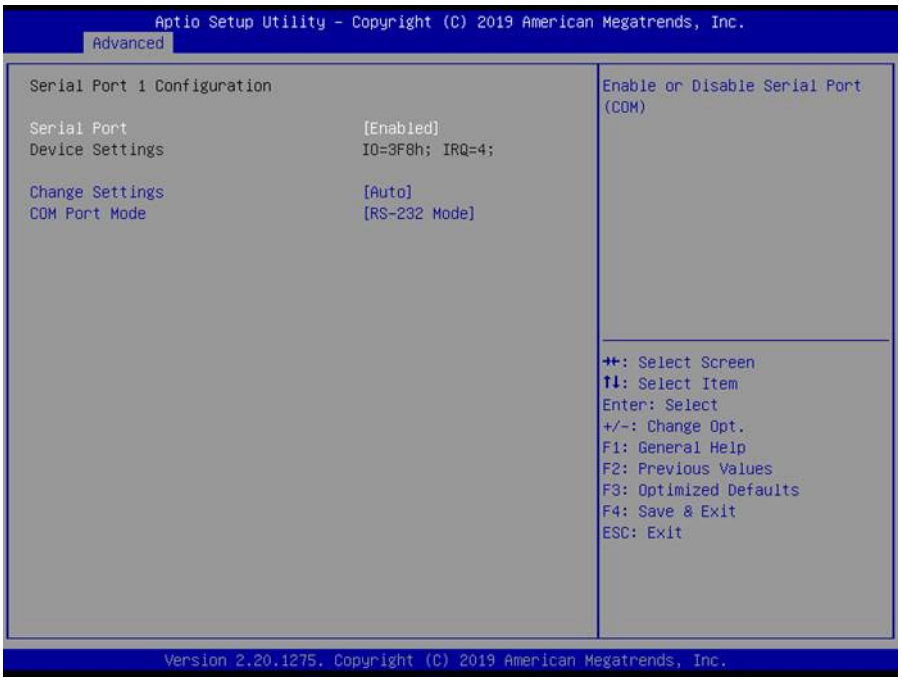
- **Enable ACPI Auto Configuration**
  Enable or disable BIOS ACPI auto configuration.
- **Enable Hibernation**
  Enables or Disables System ability to Hibernate (OS/S4 Sleep State). This option may be not effective with some OS.
- **ACPI Sleep State**
  Select the highest ACPI sleep state the system will enter when the SUSPEND-button is pressed.
- **Lock Legacy Resources**
  Enables or Disables Lock of Legacy Resources.
- **S3 Video Repost**
  Enable or Disable S3 Video Repost.

3.1.2.5 iManager Configuration



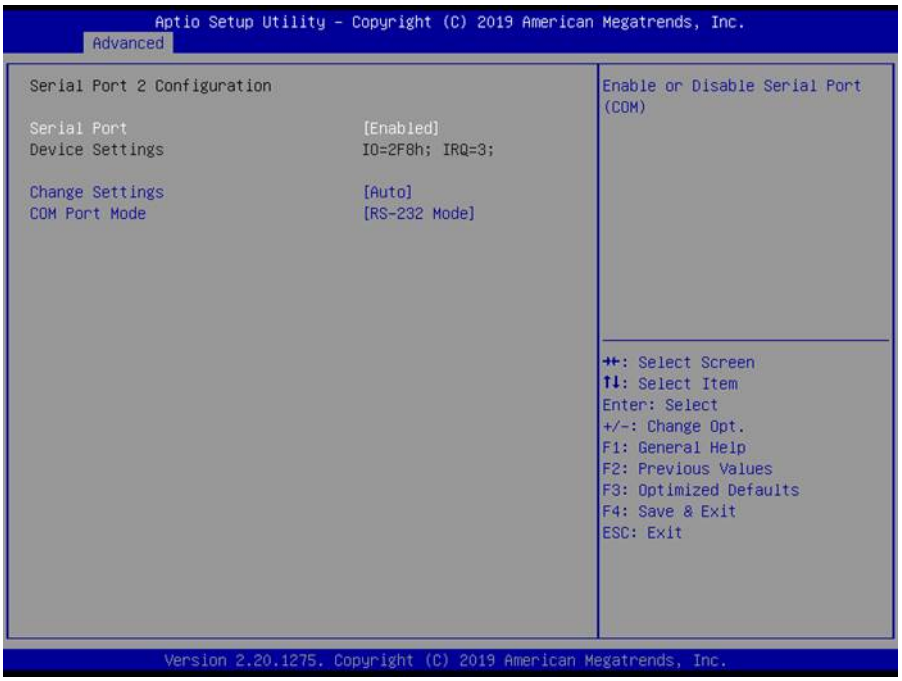
- **CPU Shutdown Temperature**
  Enable/Disable CPU Shutdown Temperature.
- **Backlight Enable Polarity**
  Switch Backlight Enable Polarity for Native or Invert.
- **Backlight Mode Selection**
  Switch Backlight Control to PWM or DC mode.
- **Brightness PWM Polarity**
  Switch Brightness PWM Polarity for Native or Invert.
- **Power Saving Mode**
  Enable/Disable power saving mode.
- **Serial Port 1 Configuration**
  Set Parameters of Serial Port 1.
- **Serial Port 2 Configuration**
  Set Parameters of Serial Port 2.
- **Wake On Ring Control**
  Enable/Disable Wake on Ring Function.
- **Hardware Monitor**
  Monitor hardware Status.
- **Watch Dog Timer Configuration**
  Watch Dog Timer Configuration Page.
- **Case Open Detection**
  Enable or Disable Case Open Detect Function.
- **GPIO Configuration**
  GPIO Configuration Settings.

Serial Port 1 Configuration



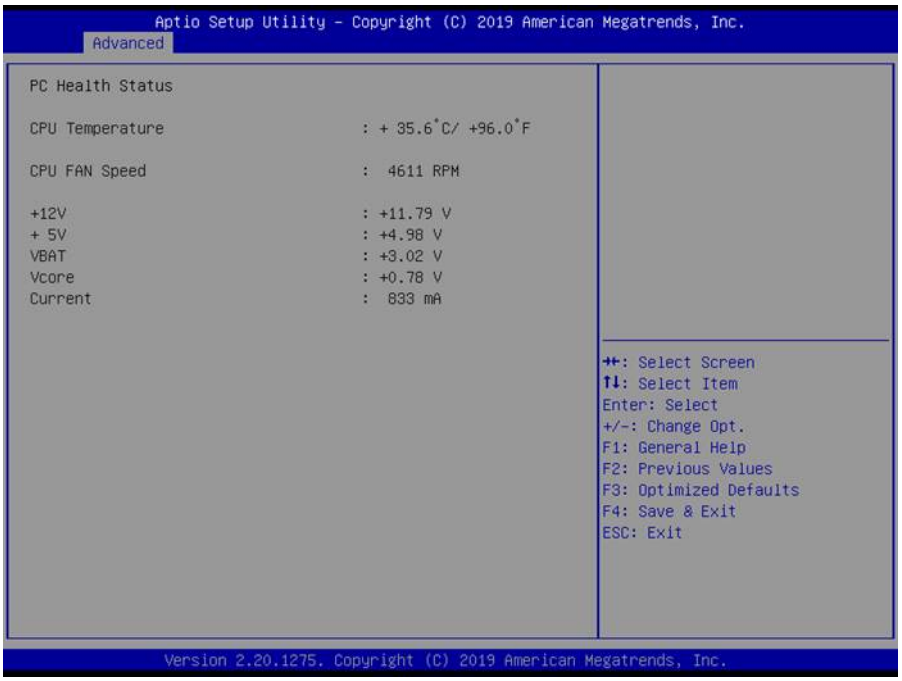
- **Serial Port**
  Enable or Disable Serial Port (COM).
- **Change Settings**
  Select an optimal settings for Super I/O device.
- **COM Port Mode**
  COM Port Mode Select.

Serial Port 2 Configuration

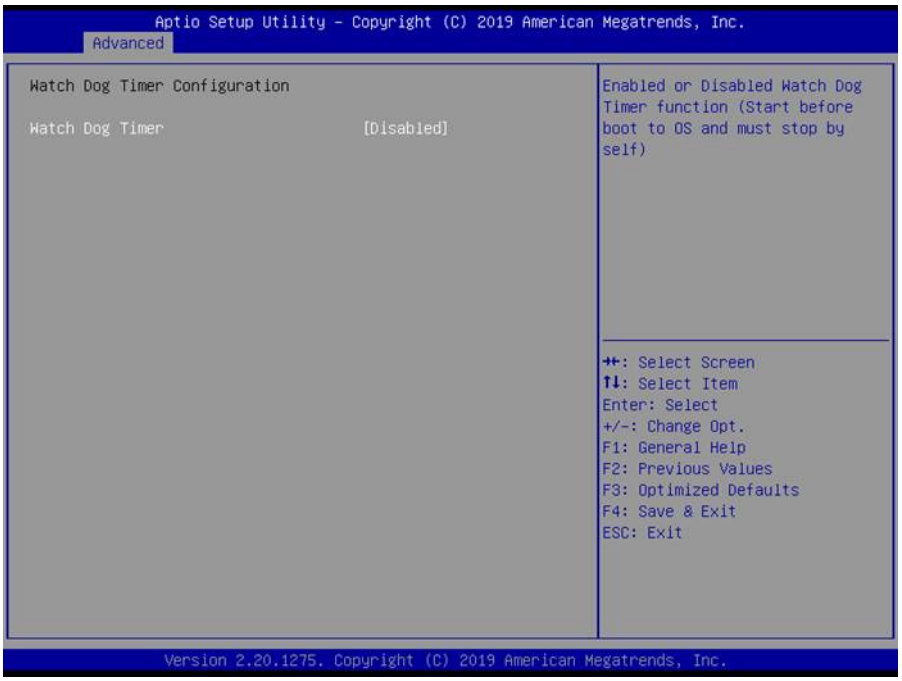


- **Serial Port**
  Enable or Disable Serial Port (COM).
- **Change Settings**
  Select an optimal settings for Super I/O device.
- **COM Port Mode**
  COM Port Mode Select.

Hardware Monitor

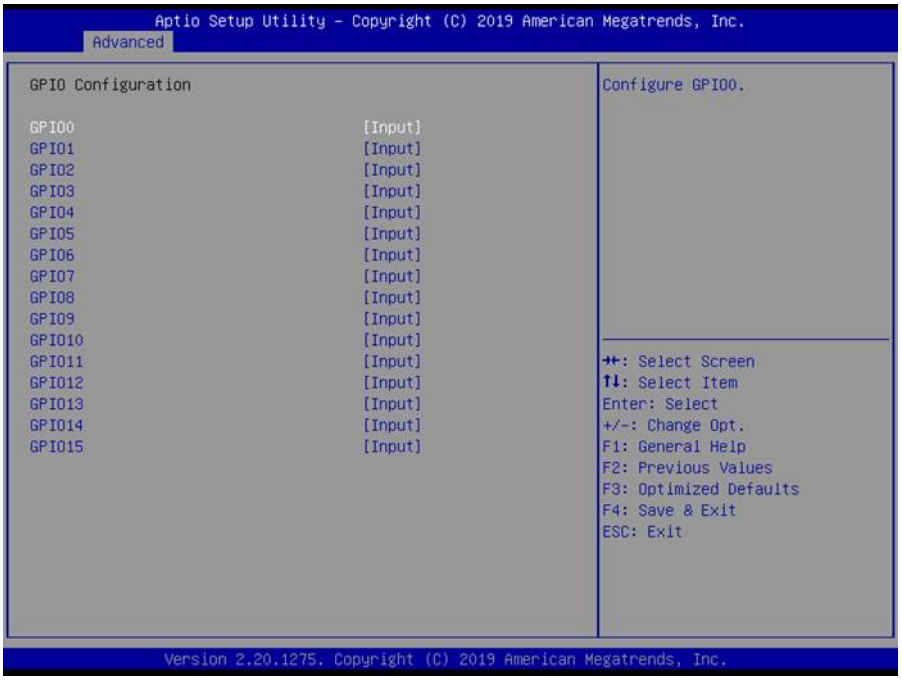


Watchdog Timer Configuration



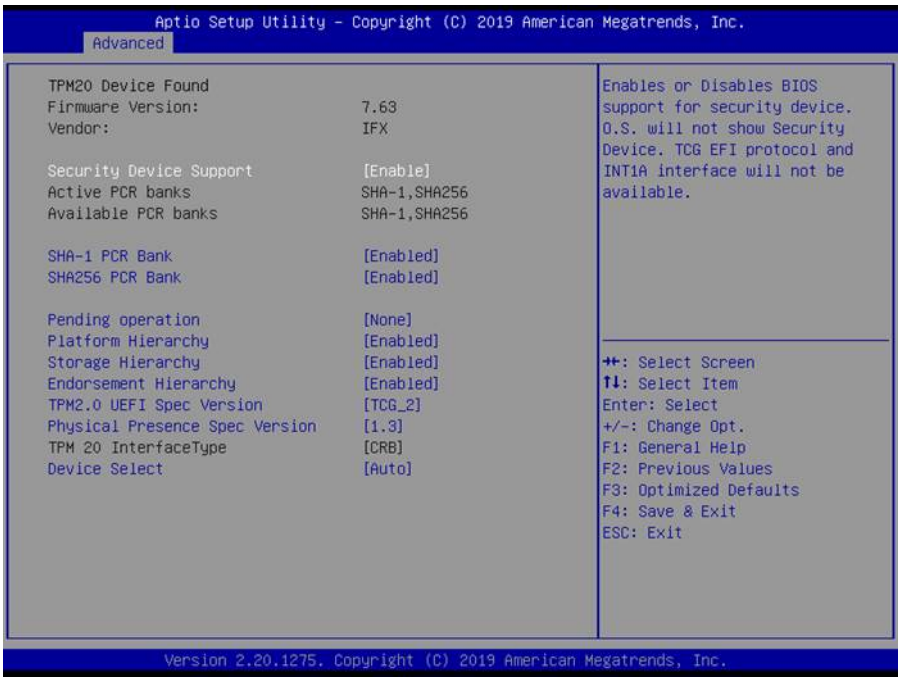
- **Watchdog Timer**
  Enable or Disable Watchdog Timer Function.

GPIO Configuration



- **GPIO0/1/2/3/4/5/6/7/8/9/10/11/12/13/14/15**
  Configure GPIO 0/1/2/3/4/5/6/7/8/9/10/11/12/13/14/15.

3.1.2.6 Trusted Computing

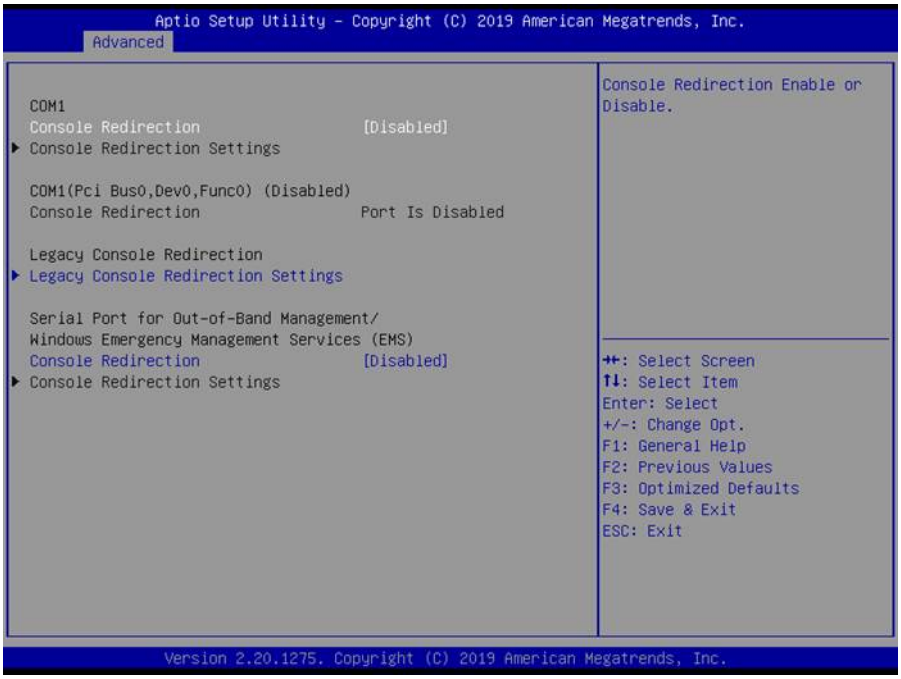


- **Security Device Support**
  Enable or disable BIOS support for security device.
- **SHA-1 PCR Bank**
  Enable or Disable SHA-1 PCR Bank.
- **SHA256 PCR Bank**
  Enable or Disable SHA256 PCR Bank.
- **Pending Operation**
  Schedule an Operation for the Security Device.
- **Platform Hierarchy**
  Enable or Disable Platform Hierarchy.
- **Storage Hierarchy**
  Enable or Disable Storage Hierarchy.
- **Endorsement Hierarchy**
  Enable or Disable Endorsement Hierarchy.
- **TPM 2.0 UEFI Spec Version**
  Select the TCG2 Spec Version Support.
- **Physical Presence Spec Version**
  Select to Tell O.S. to support PPI Spec Version 1.2 or 1.3.
- **Device Select**
  TPM 1.2 will restrict support to TPM 1.2 devices, TPM 2.0 will restrict support to TPM 2.0 devices.

3.1.2.7 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.

3.1.2.8 Serial Port Console Redirection

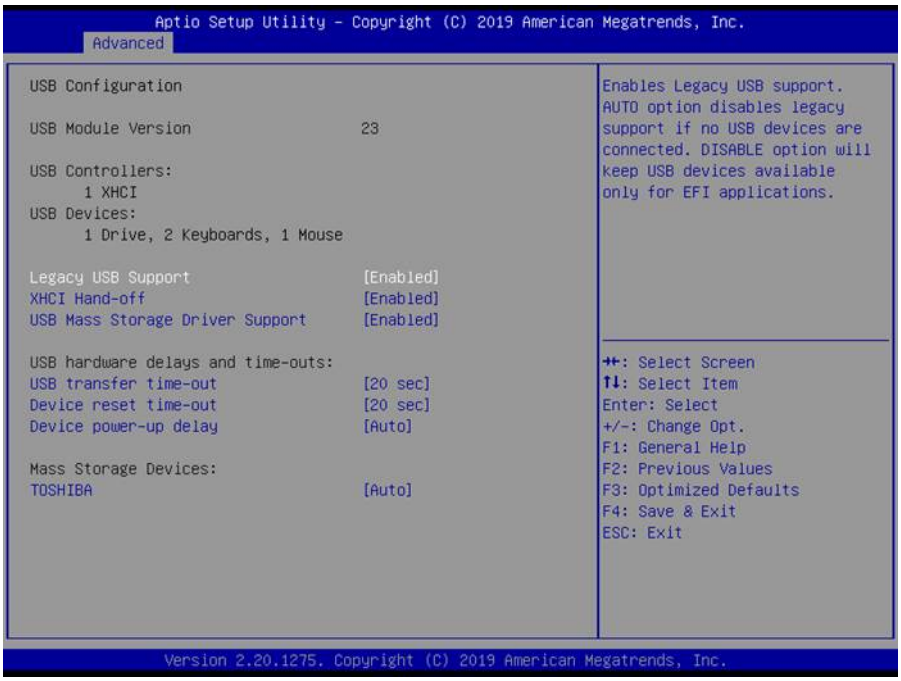


- **Console Redirection**
  This item allows users to enable or disable console redirection for Microsoft Windows Emergency Management Services (EMS).
- **Console Redirection**
  This item allows users to configuration console redirection detail settings.

3.1.2.9 Intel TXT Information

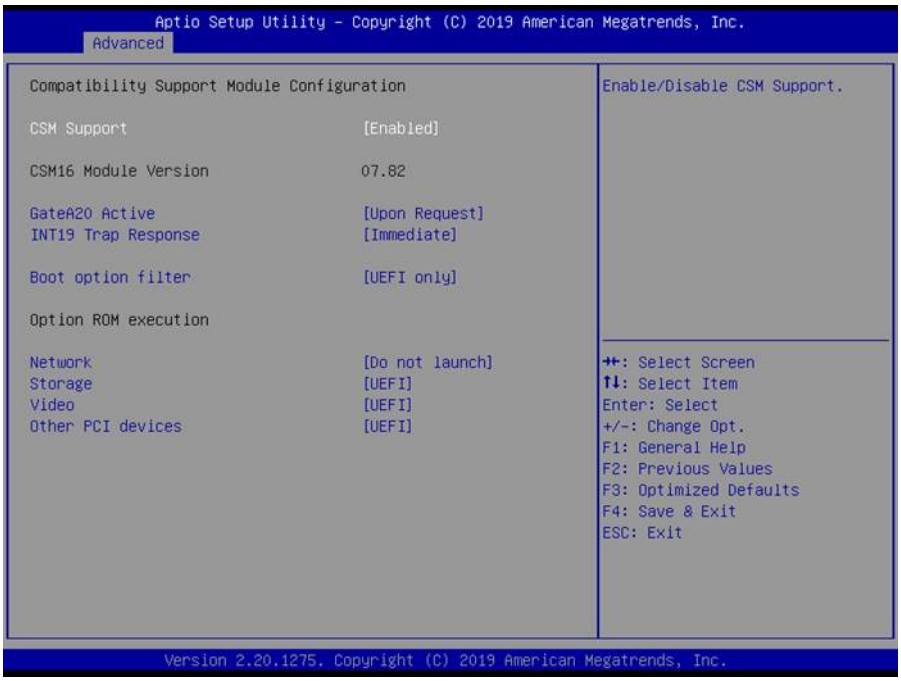
- **Intel TXT Information**
  Display Intel TXT information.

3.1.2.10 USB Configuration



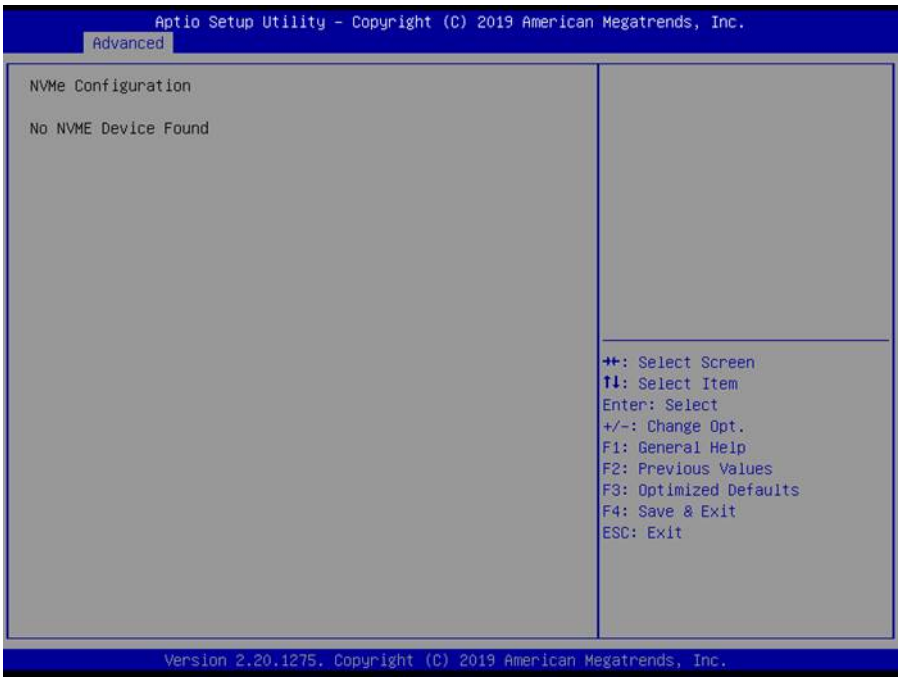
- **Legacy USB Support**
  Enables Legacy USB support. AUTO option disables legacy support if no US devices are connected. DISABLE option will keep USB devices available only for EFI applications.
- **XHCI Hand-Off**
  This is a workaround for OSes without XHCI hand-off support. The XHCI ownership change should be claimed by XHCI driver.
- **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.

3.1.2.11 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 Message**
  BIOS 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.

3.1.2.12 NVMe Configuration



3.1.2.13 SDIO Configuration

- **SDIO Access Mode**
  Select access SD device in DMA mode or PIO mode.

3.1.2.14 Network Stack Configuration

- **Network Stack**
  Enable/Disable UEFI Network Stack.

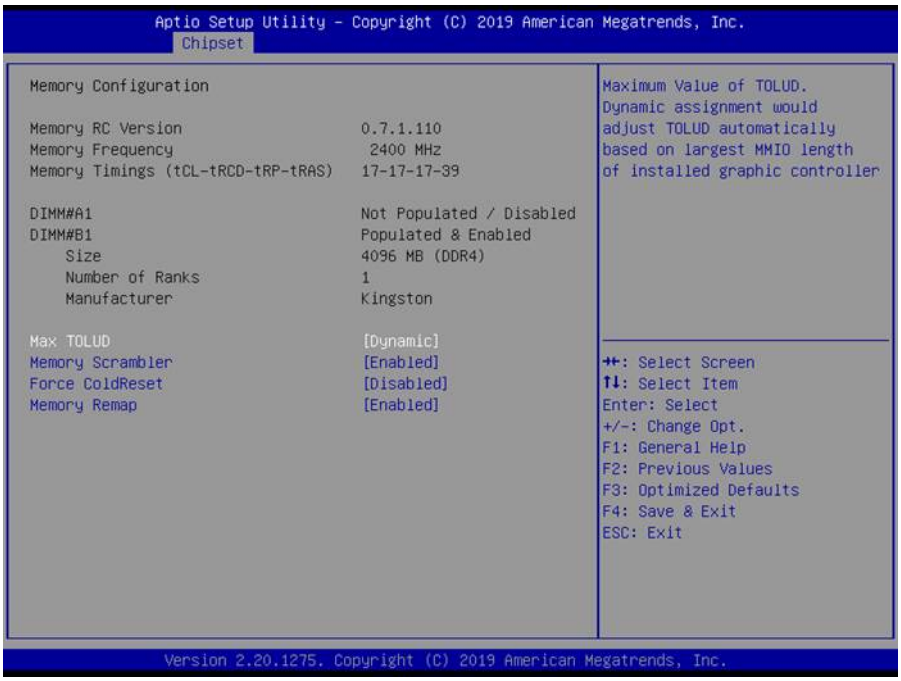
3.1.3 Chipset Configuration

Select the Chipset tab from the MIO-5373 setup screen to enter the Chipset BIOS Setup screen. You can display a Chipset BIOS Setup option by highlighting it using the <Arrow> keys. All Plug and Play BIOS Setup options are described in this section. The Plug and Play BIOS Setup screen is shown below.

3.1.3.1 System Agent (SA) Configuration

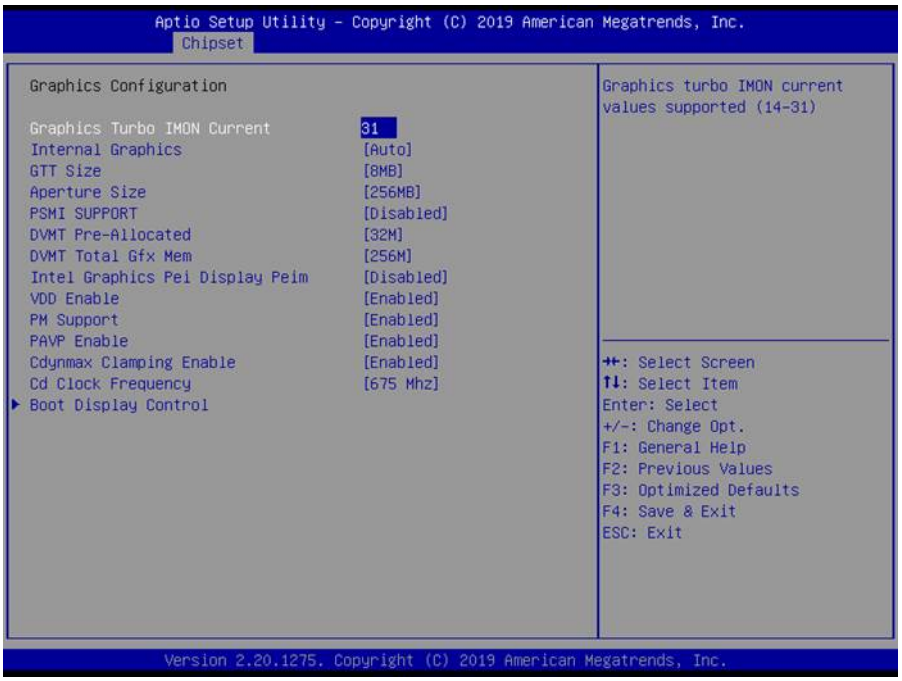
- **Memory Configuration**
  Memory Configuration Parameters.
- **Graphics Configuration**
  Graphics Configuration Parameters.
- **VT-d**
  VT-D capability.
- **Above 4GB MMIO BIOS Assignment**
  Enable/Disable above 4GB Memory Mapped IO BIOS assignment.
- **X2APIC Opt Out**
  Enable/Disable X2APIC Opt Out Bit.

Memory Configuration



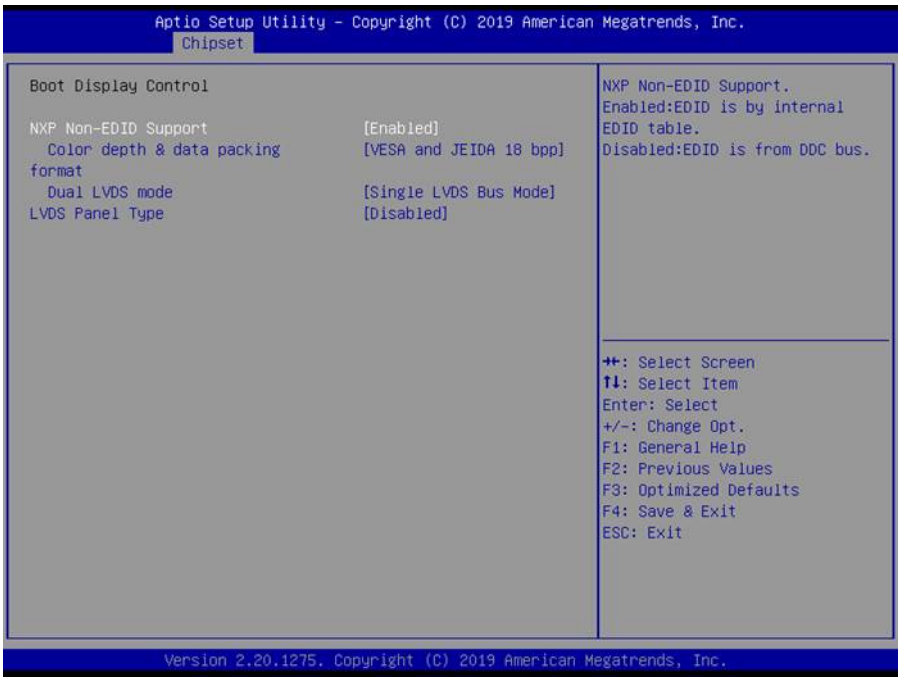
- **Max TOLUD**
  Maximum Value of TOLUD.
- **Memory Scrambler**
  Enable/Disable Memory Scrambler support.
- **Force ColdReset**
  Force ColdReset OR Choose MrcColdBoot mode.
- **Memory Remap**
  Enable/Disable Memory Remap above 4GB.

Graphics Configuration



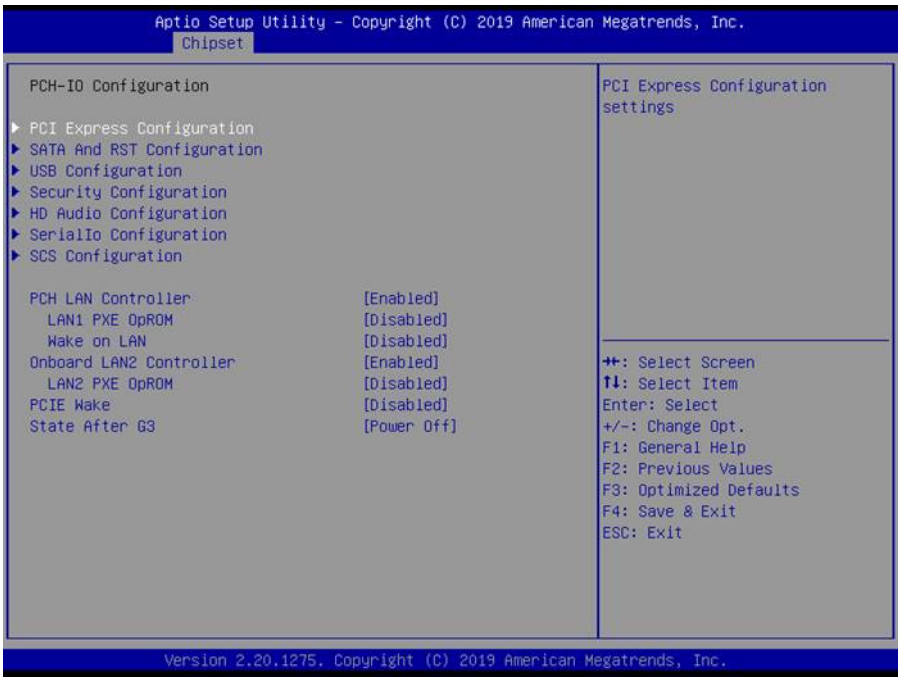
- **Graphics Turbo IMON Current**
  Graphics turbo IMON current values supported.
- **Internal Graphics**
  Keep IGFX enabled based on the setup options.
- **GTT Size**
  Select the GTT Size.
- **Aperture Size**
  Select the Aperture Size.
- **DVMT Pre-Allocated**
  Select DVMT 5.0 Pre-Allocated (Fixed) 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.
- **Gfx Low Power Mode**
  This option is applicable for SFF only.
- **PM Support**
  Enable/Disable PM Spport.
- **PAVP Enable**
  Enable/Disable PAVP.
- **CD Clock Frequency**
  Select the highest Cd clock frequency supported by this platform.

Boot Display Control



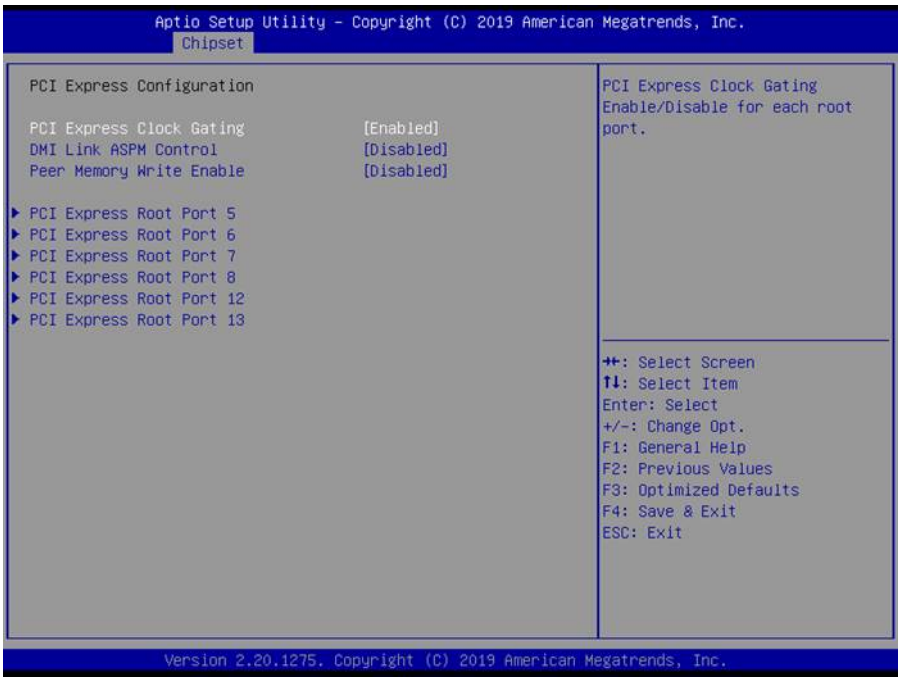
- **NXP Non-EDID Support**
  NXP Non-EDID Support.
- **Color Depth & Data Packing**
  Color depth and data packing format for Non-EDID Support.
- **Dual LVDS Mode**
  Select LVDS bus to Single bus mode or Dual bus mode.
- **LVDS Panel Type**
  This item allow user to select LVDS panel type.

3.1.3.2 PCH-IO Configuration



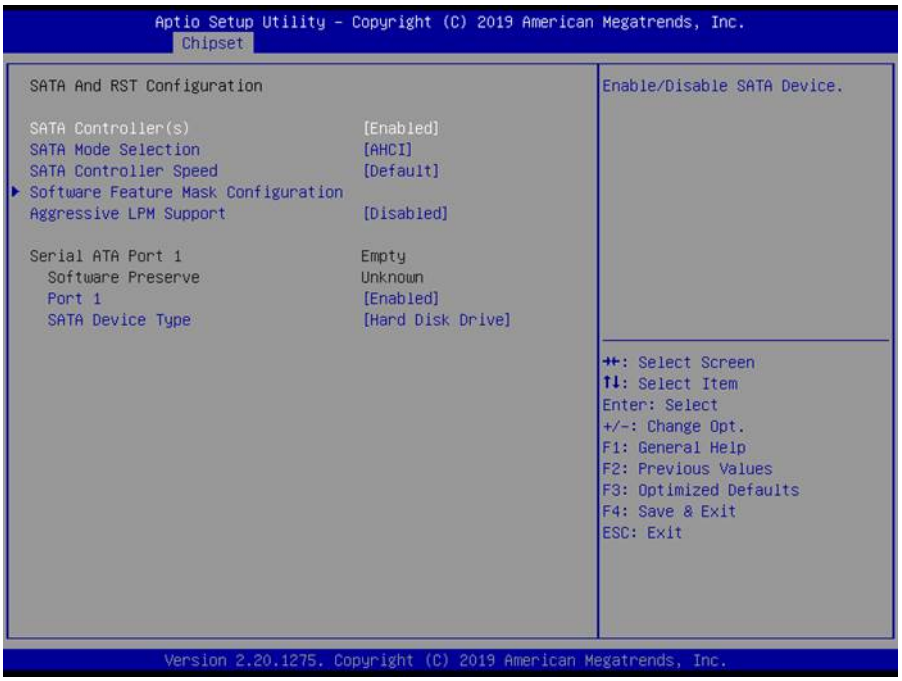
- **PCI Express Configuration**
  PCI Express Configuration Settings.
- **SATA And RST Configuration**
  SATA Device Options Settings.
- **USB Configuration**
  USB Configuration Settings.
- **Security Configuration**
  Security Configuration Settings.
- **HD Audio Configuration**
  HD Audio Subsystem Configuration Settings.
- **SerialIO Configuration**
  SerialIO Configuration Settings.
- **SCS Configuration**
  Storage and Communication Subsystem Configuration.
- **PCH LAN Controller**
  Enable or Disable onboard NIC.
- **LAN1 PXE ROM**
  Enable or Disable onboard LAN's PXE option ROM.
- **Wake on LAN**
  Enable or Disable Integrated LAN to wake the system from S5.
- **Onboard LAN2 Controller**
  Enable or Disable onboard NIC.
- **LAN2 PXE ROM**
  Enable or Disable onboard LAN's PXE option ROM.
- **PCIE Wake**
  Enable or Disable PCIE to wake the system from S5.
- **State After S3**
  Specify what state to go to when power is re-applied after a power failure (G3 state).

PCI Express Configuration



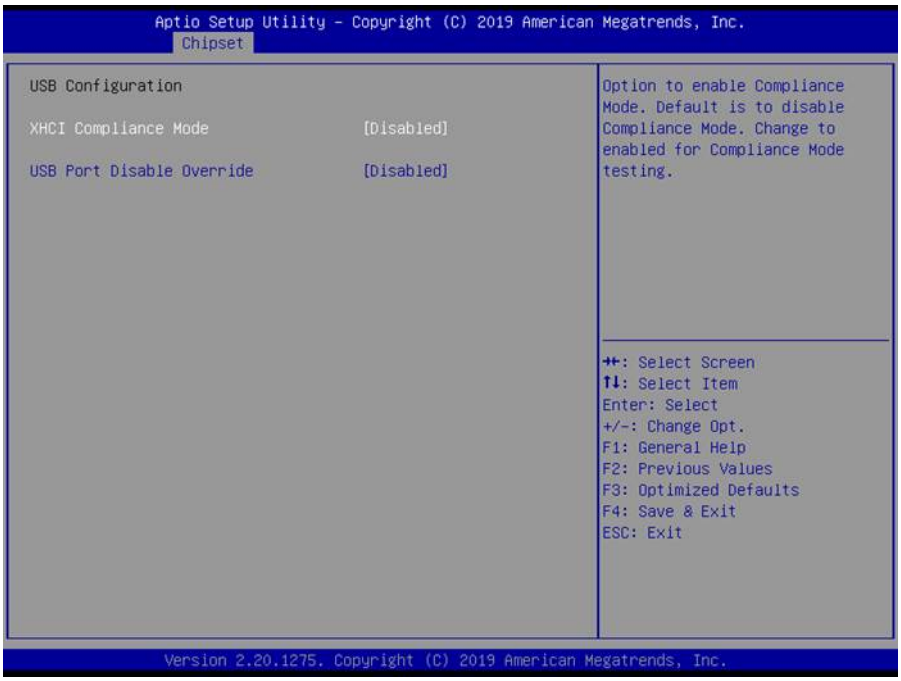
- **PCI Express Root Port 5/6/7/8/12/13**
  PCI Express Port 5/6/7/8/12/13 Settings.

SATA and RST Configuration



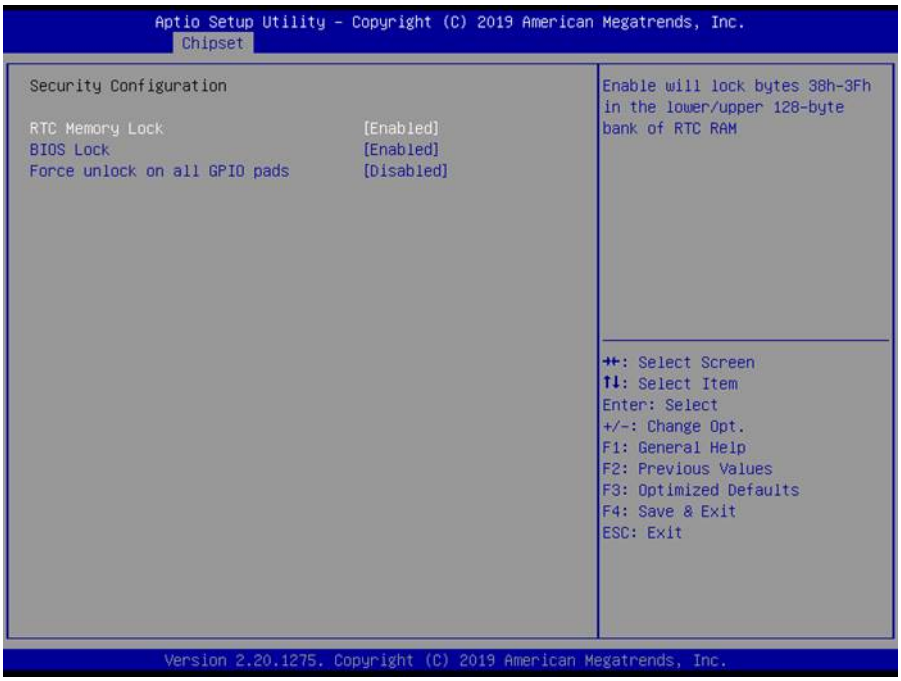
- **SATA Controller(s)**
  Enable/Disable SATA Device.
- **SATA Mode Selection**
  Determine how SATA controller operates.
- **SATA Controller Speed**
  Indicates the maximum speed the SATA controller can support.
- **Software Feature Mask Configuration**
  RST Legacy ROM/RST UEFI Driver will refer to the SWFM configuration to enable/disable the storage feature.
- **Aggressive LPM Support**
  Enabled PCH to aggressively enter link power state.

USB Configuration



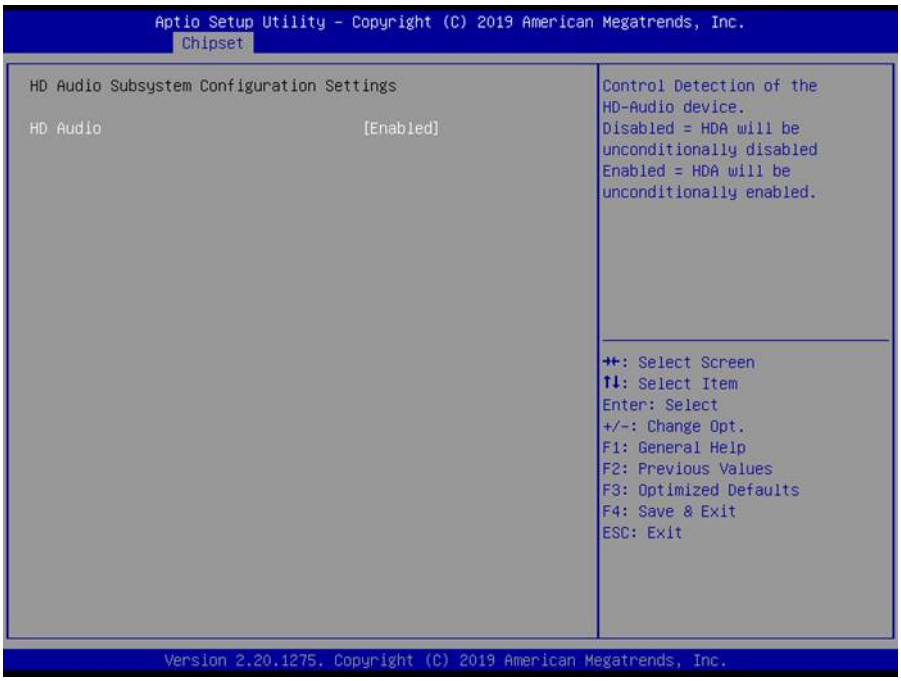
- **XHCI Disable Compliance Mode**
  Option to disable Compliance Mode.
- **USB Port Disable Override**
  Selectively Enable/Disable the corresponding USB Port from reporting a Device Connection to the Controller.

Security Configuration



- **RTC Lock**
  Enable will lock bytes 38h-3Fh in the lower/upper 128-byte bank of RTC RAM.
- **BIOS Lock**
  Enable or Disable the PCH BIOS Lock Enable feature.

HD Audio Configuration

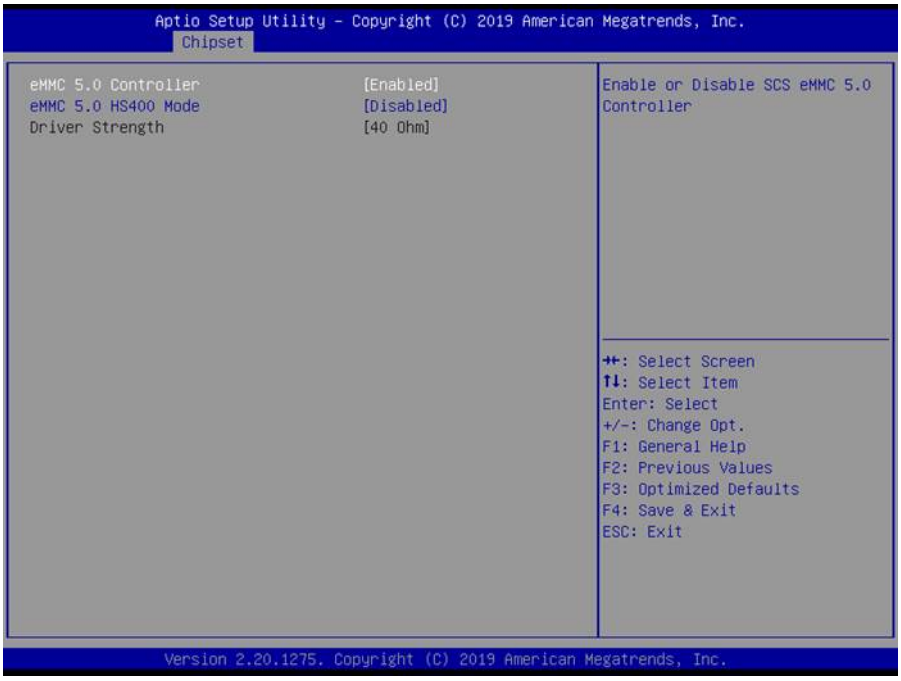


- **HD Audio**
  Control Detection of the HD-Audio device. Disabled = HDA will be unconditionally disabled. Enabled = HDA will be unconditionally Enabled.

Serial I/O Configuration

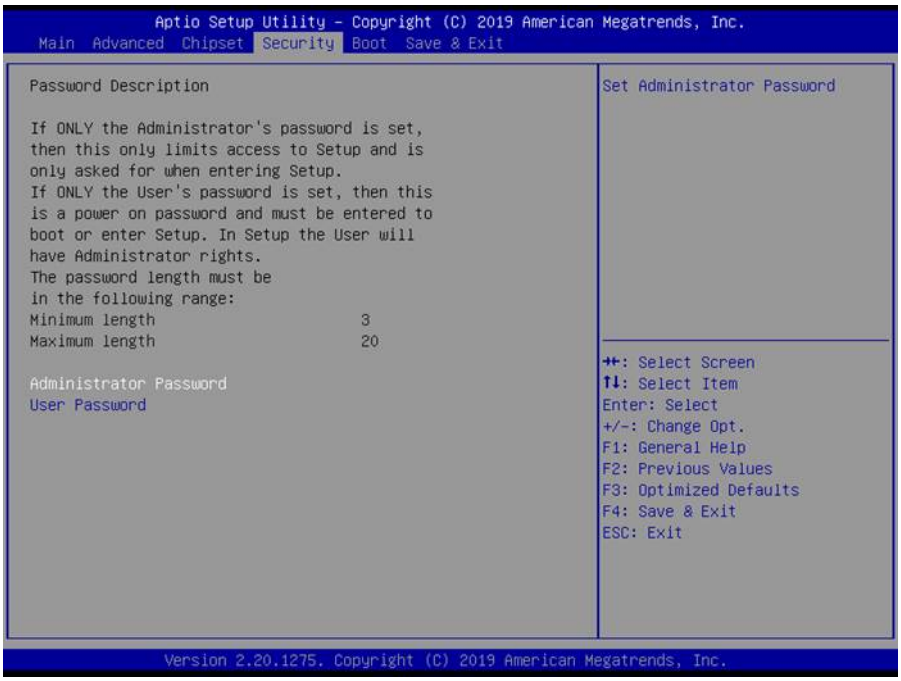
- **I2C0 Controller**
  Enable/Disables Serial I/O Controller.

SCS Configuration



- **eMMC 5.0 Controller**
  Enable or Disable SCS eMMC 5.0 Controller.

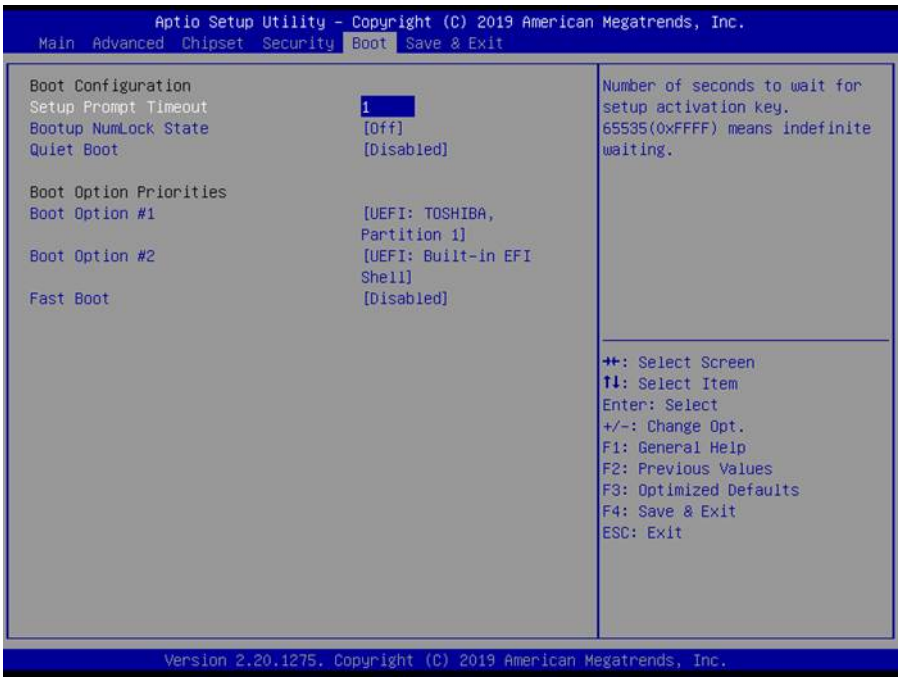
3.1.4 Security



Select Security Setup from the MIO-5373 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>:

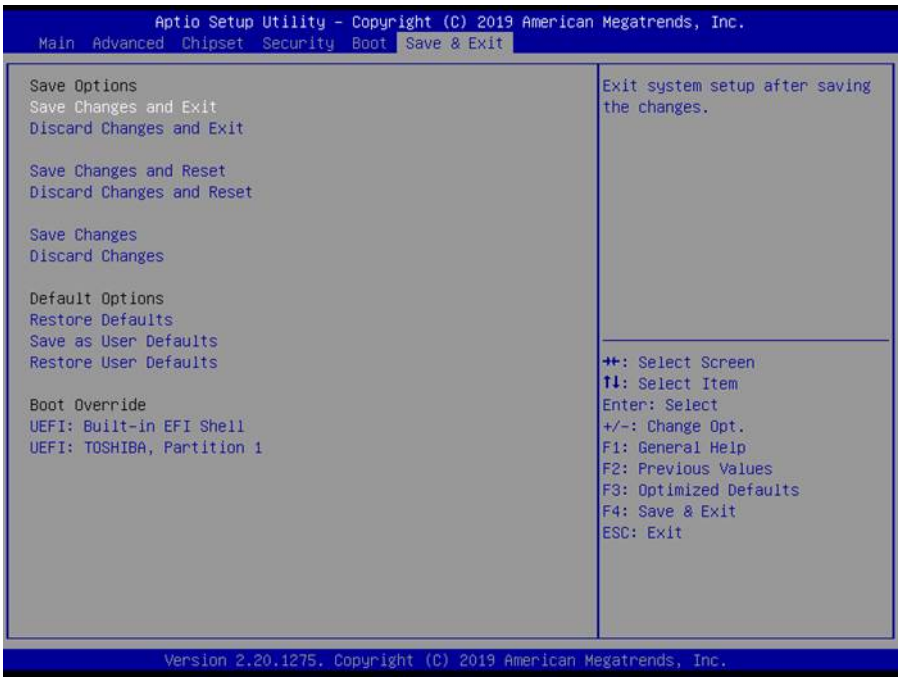
- **Change Administrator / User Password**
  Select this option and press <ENTER> to access the sub menu, and then type in the password.

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.
- **Fast Boot**
  Enables or disables boot with initialization of a minimal set of devices required to launch active boot option. Has no effect for BBS boot options.

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.

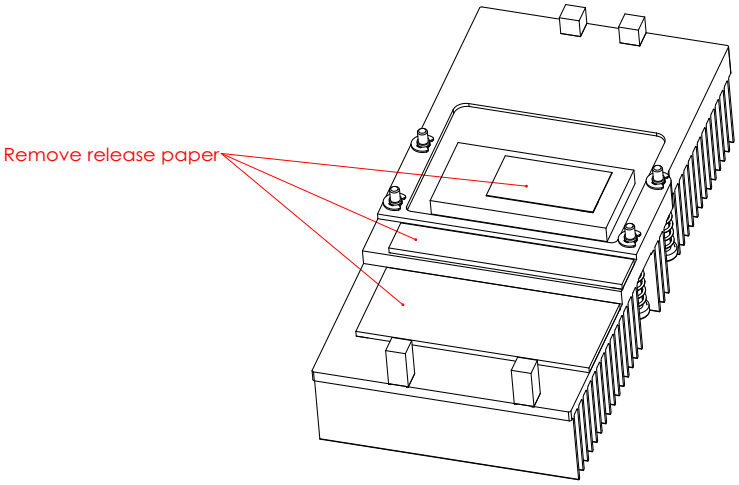
Chapter 4

MIOe Installation

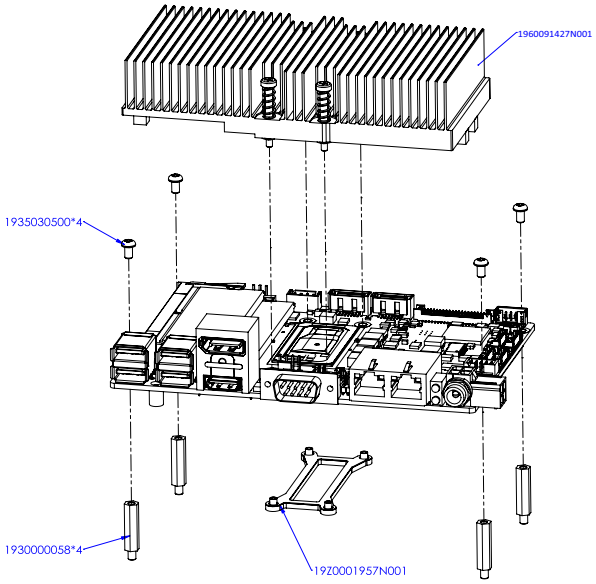
The MI/O compact form factor SBC is a next-generation SBC with a variety of mechanical improvements. The following is a quick installation guide for our thermal design and MIOe module.

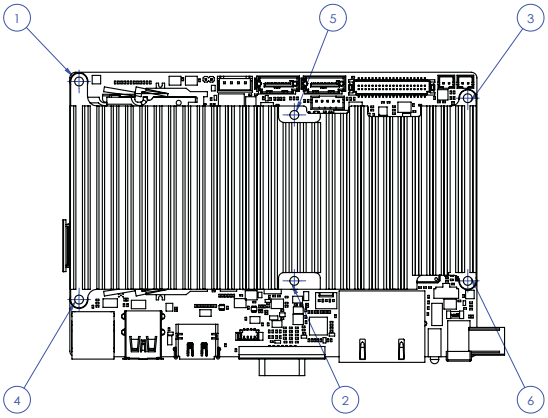
4.1 Quick Installation Guide

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 four screws inside the white box, please install the heatsink into place and follow assembly sequence below:




1
5
3
4
2
6

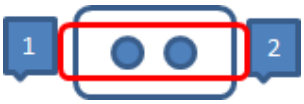
Appendix A

Pin Assignments

This appendix contains detailed/ specialized information.

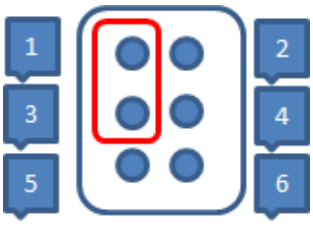
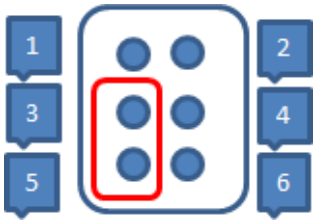
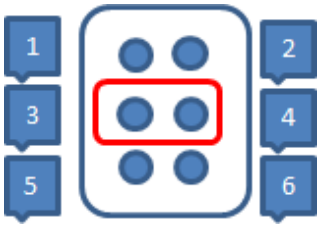
A.1 Jumper Settings

A.1.1 J1: ATX/AT Mode Selection

Function	Jumper Setting
AT Mode (Default)	
ATX Mode	

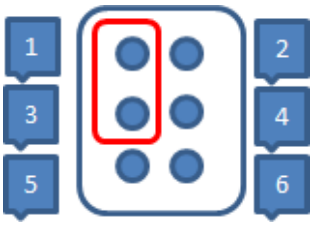
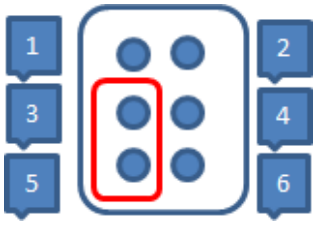
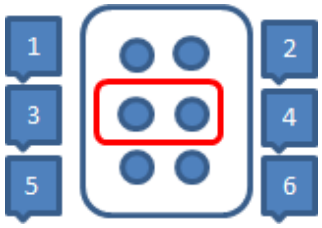
Pin	Signal Pin Definition
1	AT_DET#
2	GND

A.1.2 J2: RI# 5V/12V Selection Pin for CN9

Function	Jumper Setting
RI# Voltage Setting: +V5	
RI# Voltage Setting: +V12	
RI# Voltage Setting: RI# (Default)	

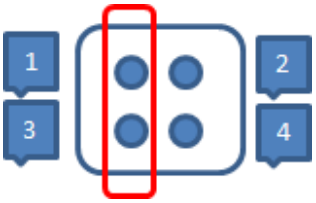
Pin	Signal Pin Definition
1	+V5
2	CN9_RI#
3	COM_RI#
4	CN9_RI#
5	+V12
6	CN9_RI#

A.1.3 J3: Panel Voltage Selection

Function	Jumper Setting
Panel Voltage Setting: +V3.3(Default)	
Panel Voltage Setting: +V5	
Panel Voltage Setting: +V12	

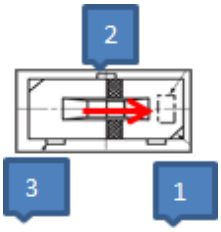
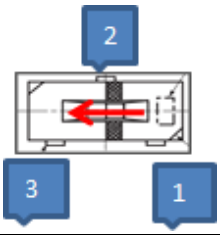
Pin	Signal Pin Definition
1	+V3.3
2	NC
3	+V_CH7511B_LCD
4	+V12
5	+V5
6	NC

A.1.4 J4: JEIDA and VESA Mode Selection

Function	Jumper Setting
JEIDA Mode Setting: +V3.3	
VESA Mode Setting: GND (Default)	

Pin	Signal Pin Definition
1	LVDS1_VCON
2	LVDS1_VCC
3	GND
4	NC

A.1.5 SW1: Clear CMOS

Function	Jumper Setting
Keep COMS Data (Default)	
Clear CMOS Date	

Pin	Signal Pin Definition
1	RTC_a_RST#
2	RTC_RST#
3	GND

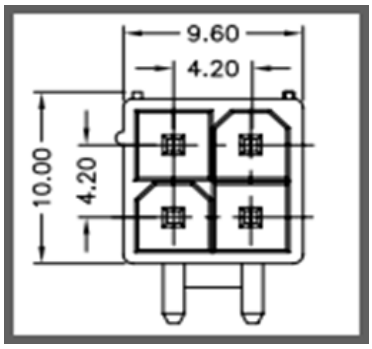
A.2 Connector and Header List

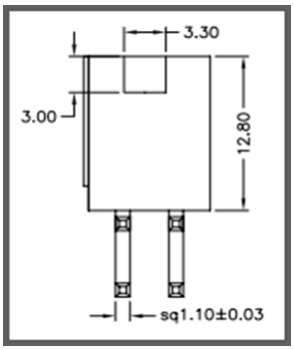
Table A.1: Connector and Header List:

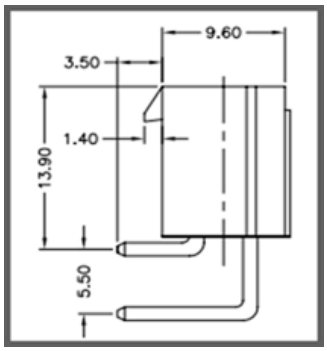
	Description	Location Name
1	DDR4 SODIMM 260P/H5.2mm	CN1
2	DDR4 SODIMM 260P/H9.2mm	CN2
3	DC Input Connector	CN3
4	RTC Battery Connector	CN5
5	Power/LED/Case Open/Buzzer Connector	CN8
6	COM Port Connector (RS232+RS422+RS485)	CN9
7	COM Port Connector (RS232+RS422+RS485)	CN10
8	RJ45 Connector (2 port)	CN11
9	Inverter Connector	CN12
10	LVDS Connector	CN13
11	eDP Connector	CN14
12	HDMI and DP++ Connector	CN15
13	Key E Connector	CN16
14	Key B and Key M (option) Connector	CN17
15	SIM Card Connector	CN20
16	USB 3.1 Connector (2 ports)	CN22
17	USB 3.1 Connector (2 ports)	CN23
18	Internal USB Connector	CN24
19	HDD Power Connector	CN25
20	HDD Connector	CN26
21	HDD Connector	CN27
22	GPIO/RS232 Connector	CN28
23	Audio Connector	CN29
24	GPIO/RS232 Connector	CN30
25	MIOe Connector	CN30A1
26	I2C Bus Connector	CN31
27	System FAN Connector	CN32
28	CANBus Connector	CN35
29	SMBus Connector	CN36
30	DC input Connector (Adapter)	CN37

A.3 Connector and Header List Description

A.3.1 DC Input Connector

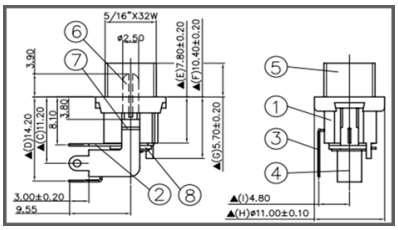


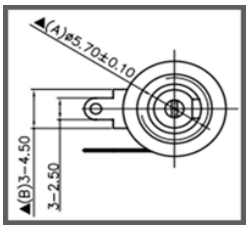


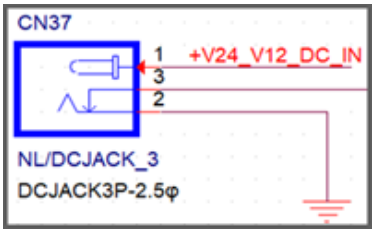


Pin	Signal Pin Definition
1	GND
2	GND
3	+V24_V12_DC_IN
4	+V24_V12_DC_IN

A.3.2 DC Input Connector (Adapter)

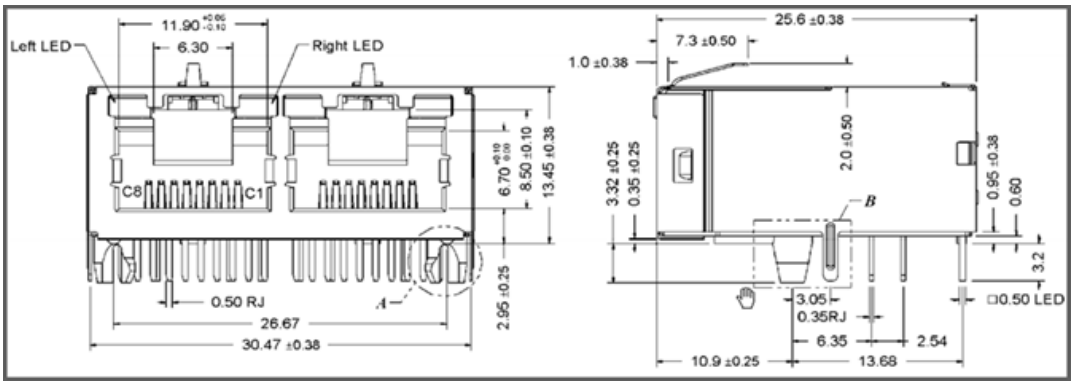


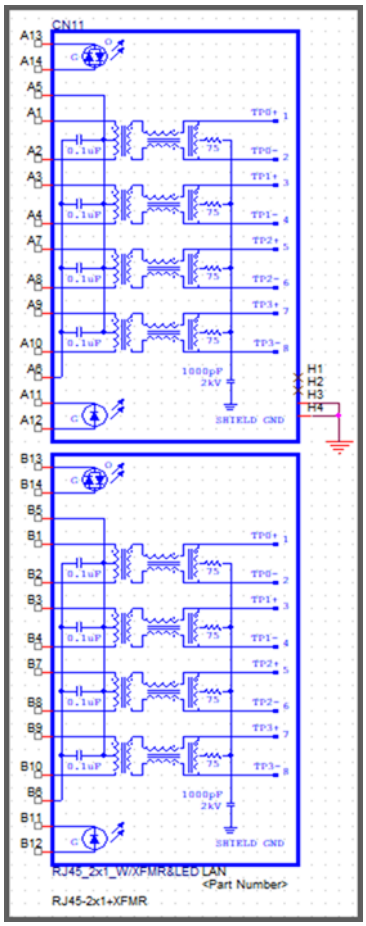




Pin	Signal Pin Definition
1	+V24_V12_DC_IN
2	NC
3	GND

A.3.3 RJ45 (2 Ports)

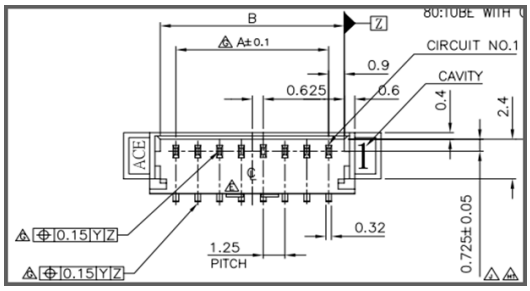


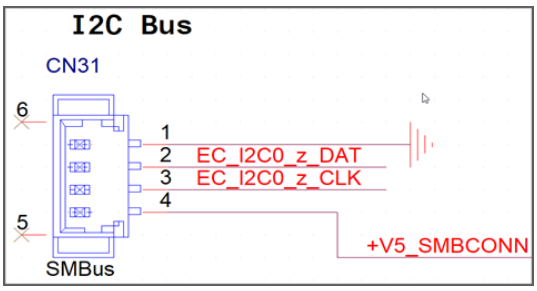


Pin	Signal Pin Definition
A1	LAN1_MDIO+
A2	LAN1_MDIO-
A3	LAN1_MDI1+
A4	LAN1_MDI1-
A5	LAN1CONN
A6	LAN1_GND
A7	LAN1_MDI2+
A8	LAN1_MDI2-
A9	LAN1 MDI3+

A10	LAN1_MDI3-
A11	LAN1_ACT#
A12	LAN1_A_ACT#
A13	LAN1_A_LINK100#
A14	LAN1_A_LINK1000#
B1	LAN2_MDIO+
B2	LAN2_MDIO-
B3	LAN2_MDI1+
B4	LAN2_MDI1-
B5	LAN2CONN
B6	LAN2_GND
B7	LAN2_MDI2+
B8	LAN2_MDI2-
B9	LAN2_MDI3+
B10	LAN2_MDI3-
B11	LAN2_ACT#
B12	LAN2_A_ACT#
B13	LAN2_A_LINK100#
B14	LAN2_A_LINK1000#

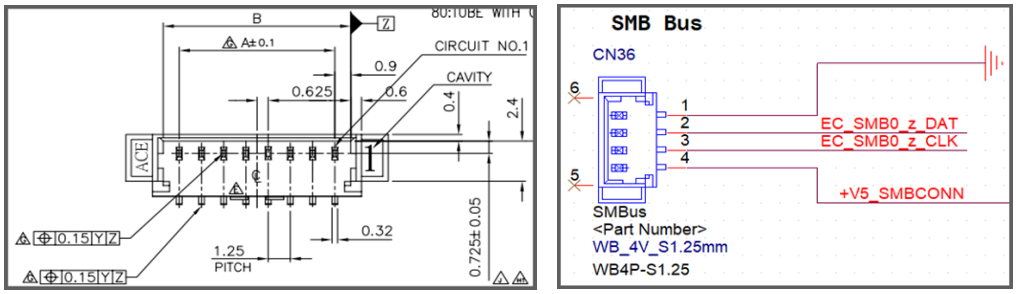
A.3.4 I2C Bus Connector





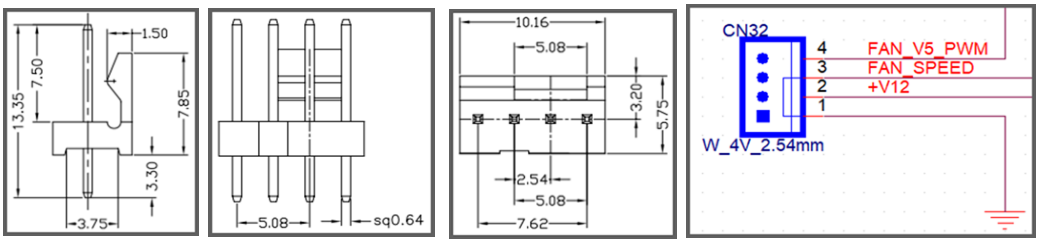
Pin	Signal Pin Definition
1	GND
2	I2C_DAT
3	I2C_CLK
4	+V5

A.3.5 SMBus Connector



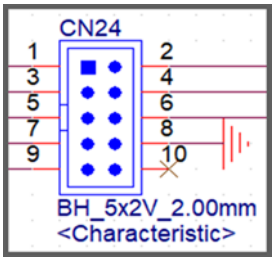
Pin	Signal Pin Definition
1	GND
2	SMBus_DAT
3	SMBus_CLK
4	+V5

A.3.6 System FAN Connector



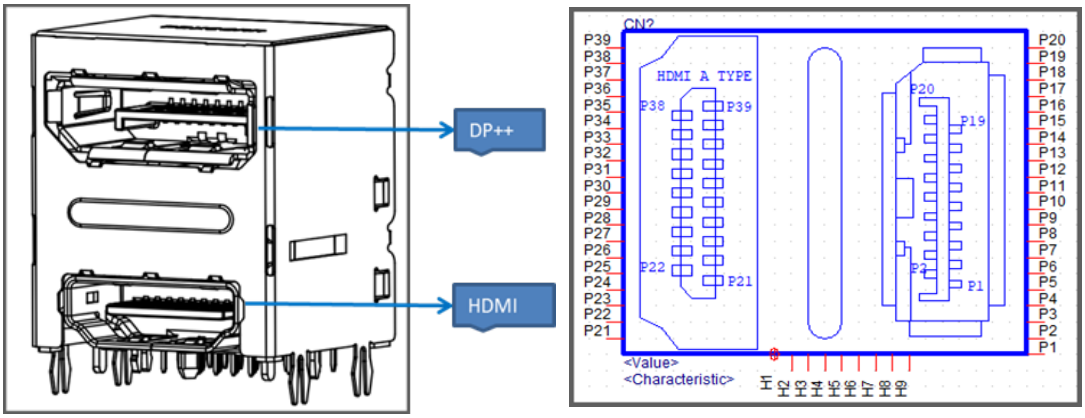
Pin	Signal Pin Definition
1	GND
2	+12V
3	FAN_SPEED
4	FAN_PWM

A.3.7 Internal USB Connector



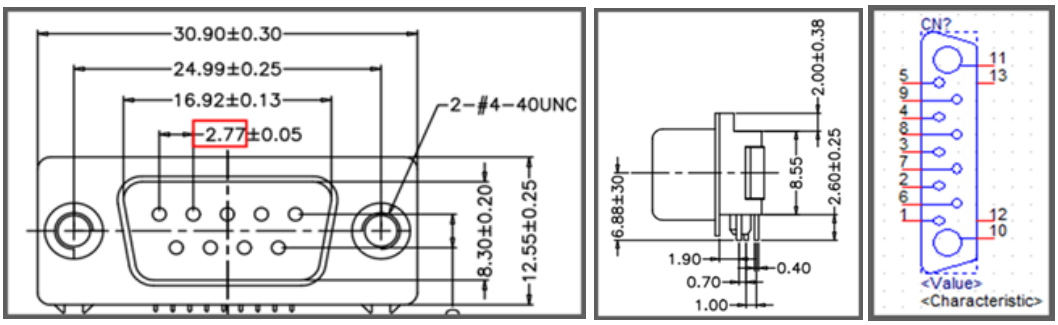
Pin	Signal Pin Definition
1	+V5SB
2	+V5SB
3	USB8_P-
4	USB9_P-
5	USB8_P+
6	USB9_P+
7	GND
8	GND
9	GND
10	NC

A.3.8 HDMI and DP++ Connector



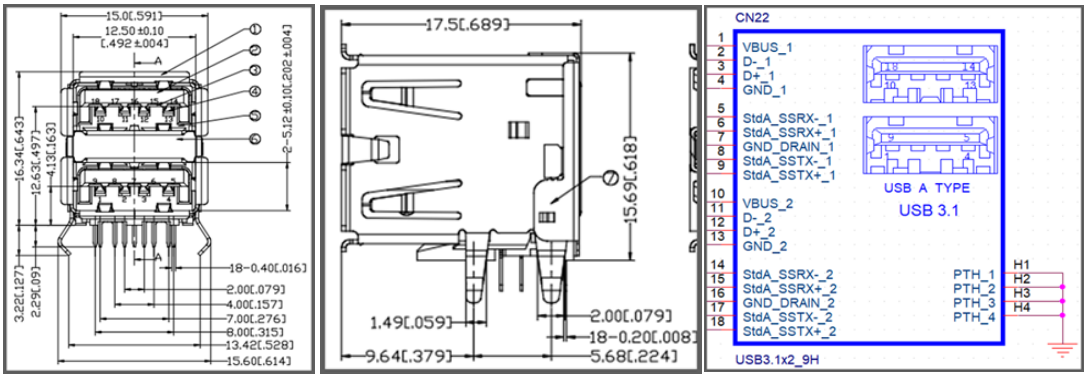
Pin	Signal Pin Definition	Pin	Signal Pin Definition
P21	HDMI1_Z_TX2+	P1	DP_TX0+
P22	GND	P2	GND
P23	HDMI1_Z_TX2-	P3	DP_TX0-
P24	HDMI1_Z_TX1+	P4	DP_TX1+
P25	GND	P5	GND
P26	HDMI1_Z_TX1-	P6	DP_TX1-
P27	HDMI1_Z_TX0+	P7	DP_TX2+
P28	GND	P8	GND
P29	HDMI1_Z_TX0-	P9	DP_TX2-
P30	HDMI1_Z_DCLK+	P10	DP_TX3+
P31	GND	P11	GND
P32	HDMI1_Z_DCLK-	P12	DP_TX3-
P33	NC	P13	DP_AUX_EN#
P34	NC	P14	GND
P35	HDMI1_SCL	P15	DP_AUX+
P36	HDMI1_SDA	P16	GND
P37	GND	P17	DP1_AUX-
P38	+V5_HDMI1	P18	DDP2_DP_HPD
P39	DDP1_HDMI_HPD	P19	GND
		P20	+V3.3_DP

A.3.9 COM Port Connector (RS232+RS422+RS485)



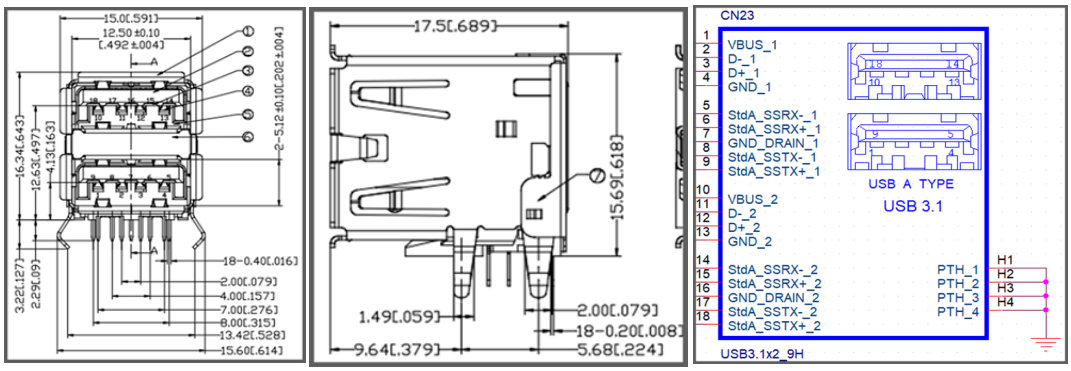
Pin	Signal Pin Definition
1	422TX-/485D-/DCD#
2	422TX+/485D+/RXD
3	422RX+/TXD
4	422RX-/DTR#
5	GND
6	DSR#
7	RTS#
8	CTS#
9	RI#

A.3.10 USB 3.1 Connector (2 Ports)



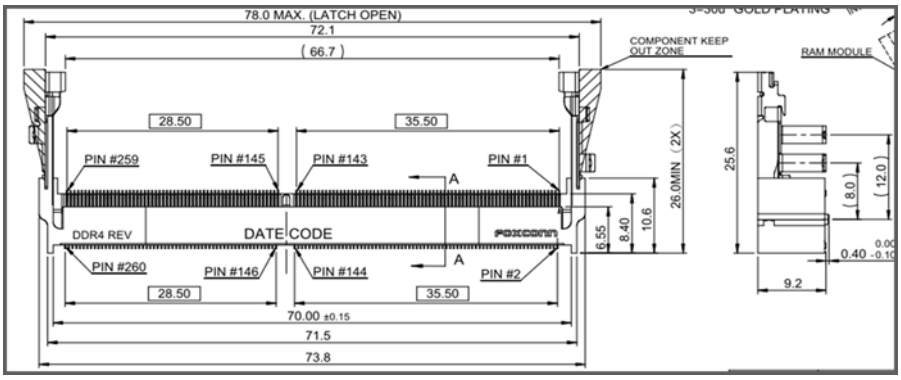
Pin	Signal Pin Definition
1	+V5
2	USB1_P-
3	USB1_P+
4	GND
5	USB1_SSRX-
6	USB1_SSRX+
7	GND
8	USB1_SSTX-
9	USB1_SSTX+
10	+V5
11	USB2_P-
12	USB2_P+
13	GND
14	USB2_SSRX-
15	USB2_SSRX+
16	GND
17	USB2_SSTX-
18	USB2_SSTX+
H1	GND
H2	GND
H3	GND
H4	GND

A.3.11 USB3.1 Connector (2 Ports)



Pin	Signal Pin Definition
1	+V5
2	USB3_P-
3	USB3_P+
4	GND
5	USB3_SSRX-
6	USB3_SSRX+
7	GND
8	USB3_SSTX-
9	USB3_SSTX+
10	+V5
11	USB4_P-
12	USB4_P+
13	GND
14	USB4_SSRX-
15	USB4_SSRX+
16	GND
17	USB4_SSTX-
18	USB4_SSTX+
H1	GND
H2	GND
H3	GND
H4	GND

A.3.12 DDR4 SODIMM 260P/H9.2mm



Pin	Signal Pin Definition
1	GND
2	GND
3	MB_MD8
4	MB_MD11
5	GND
6	GND
7	MB_MD15
8	MB_MD14
9	GND
10	GND
11	MB_DQS1-
12	+V1.2DDR
13	MB_DQS1+
14	GND
15	GND
16	MB_MD12
17	MB_MD13
18	GND
19	GND
20	MB_MD9
21	MB_MD10
22	GND
23	GND
24	MB_MD2
25	MB MD3
26	GND
27	GND
28	MB_MD7
29	MB_MD0
30	GND
31	GND
32	MB_DQS0-
33	+V1.2DDR
34	MB_DQS0+

35	GND
36	GND
37	MB_MD1
38	MB_MD4
39	GND
40	GND
41	MB_MD6
42	MB_MD5
43	GND
44	GND
45	MB_MD21
46	MB_MD17
47	GND
48	GND
49	MB_MD20
50	MB_MD16
51	GND
52	GND
53	MB_DQS2-
54	+V1.2DDR
55	MB_DQS2+
56	GND
57	GND
58	MB_MD23
59	MB_MD18
60	GND
61	GND
62	MB_MD22
63	MB_MD19
64	GND
65	GND
66	MB_MD28
67	MB_MD29
68	GND
69	GND
70	MB_MD25
71	MB_MD24
72	GND
73	GND
74	MB_DQS3-
75	+V1.2DDR
76	MB_DQS3+
77	GND
78	GND
79	MB_MD30
80	MB_MD26
81	GND
82	GND

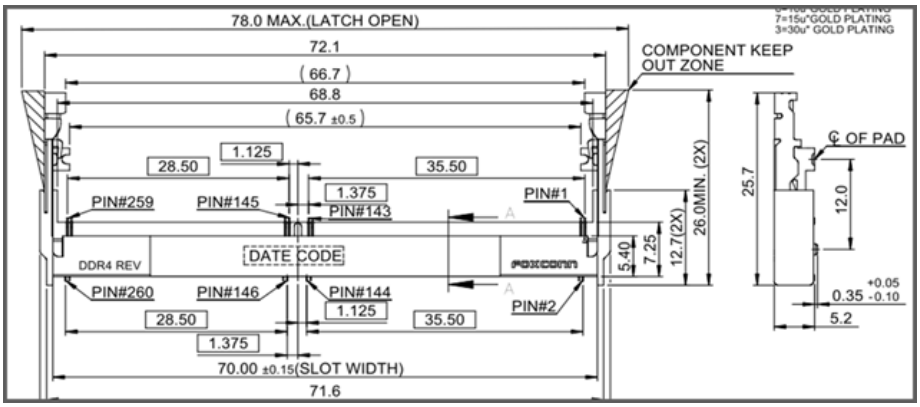
83	MB_MD31
84	MB_MD27
85	GND
86	GND
87	MB_CB5
88	MB_CB4
89	GND
90	GND
91	MB_CB1
92	MB_CB0
93	GND
94	GND
95	MB_DQS8-
96	+V1.2DDR
97	MB_DQS8+
98	GND
99	GND
100	MB_CB6
101	MB_CB2
102	GND
103	GND
104	MB_CB7
105	MB_CB3
106	GND
107	GND
108	DDR4_DRAMRST#
109	MB_CKE0
110	MB_CKE1
111	+V1.2DDR
112	+V1.2DDR
113	MB_BG1
114	MB_ACT#
115	MB_BG0
116	DDR1_B_ALERT#
117	+V1.2DDR
118	+V1.2DDR
119	MB_MA12
120	MB_MA11
121	MB_MA9
122	MB_MA7
123	+V1.2DDR
124	+V1.2DDR
125	MB_MA8
126	MB_MA5
127	MB_MA6
128	MB_MA4
129	+V1.2DDR
130	+V1.2DDR

131	MB_MA3
132	MB_MA2
133	MB_MA1
134	DDR1_B_EVENT#
135	+V1.2DDR
136	+V1.2DDR
137	MB_CLK_DDRB0+
138	MB_CLK_DDRB1+
139	MB_CLK_DDRB0-
140	MB_CLK_DDRB1-
141	+V1.2DDR
142	+V1.2DDR
143	DDR1_B_PARITY
144	MB_MA0
145	MB_BA1
146	MB_MA10
147	+V1.2DDR
148	+V1.2DDR
149	MB_SCS#0
150	MB_BA0
151	MB_SWE#
152	MB_SRAS#
153	+V1.2DDR
154	+V1.2DDR
155	MB_ODT0
156	MB_SCAS#
157	MB_SCS#1
158	MB_MA13
159	+V1.2DDR
160	+V1.2DDR
161	MB_ODT1
162	
163	+V1.2DDR
164	DDR1_VREF_Z_DQ
165	
166	DIMMB_SA2
167	GND
168	GND
169	MB_MD38
170	MB_MD34
171	GND
172	GND
173	MB_MD35
174	MB_MD39
175	GND
176	GND
177	MB_DQS4-
178	+V1.2DDR

179	MB_DQS4+
180	GND
181	GND
182	MB_MD36
183	MB_MD33
184	GND
185	GND
186	MB_MD37
187	MB_MD32
188	GND
189	GND
190	MB_MD44
191	MB_MD40
192	GND
193	GND
194	MB_MD45
195	MB_MD41
196	GND
197	GND
198	MB_DQS5-
199	+V1.2DDR
200	MB_DQS5+
201	GND
202	GND
203	MB_MD42
204	MB_MD47
205	GND
206	GND
207	MB_MD46
208	MB_MD43
209	GND
210	GND
211	MB_MD52
212	MB_MD49
213	GND
214	GND
215	MB_MD48
216	MB_MD53
217	GND
218	GND
219	MB_DQS6-
220	+V1.2DDR
221	MB_DQS6+
222	GND
223	GND
224	MB_MD55
225	MB_MD50
226	GND

227	GND
228	MB_MD54
229	MB_MD51
230	GND
231	GND
232	MB_MD60
233	MB_MD57
234	GND
235	GND
236	MB_MD56
237	MB_MD61
238	GND
239	GND
240	MB_DQS7-
241	+V1.2DDR
242	MB_DQS7+
243	GND
244	GND
245	MB_MD62
246	MB_MD63
247	GND
248	GND
249	MB_MD59
250	MB_MD58
251	GND
252	GND
253	SMB_CLK
254	SMB_DAT
255	+V3.3
256	DIMMB_SAO
257	+V2.5_VPP
258	+V0.6 VTT
259	+V2.5_VPP
260	DIMMB_SA1
H1	NC
H2	NC
H3	GND
H4	GND

A.3.13 DDR4 SODIMM 260P/H9.2mm



Pin	Signal Pin Definition
1	GND
2	GND
3	MA_MD4
4	MA_MD1
5	GND
6	GND
7	MA_MDO
8	MA_MD5
9	GND
10	GND
11	MA_DQSO-
12	+V1.2DDR
13	MA_DQSO+
14	GND
15	GND
16	MA_MD6
17	MA_MD7
18	GND
19	GND
20	MA_MD2
21	MA_MD3
22	GND
23	GND
24	MA_MD9
25	MA_MD13
26	GND
27	GND
28	MA_MD8
29	MA_MD12
30	GND
31	GND
32	MA_DQS1-
33	+V1.2DDR

34	MA_DQS1+
35	GND
36	GND
37	MA_MD15
38	MA_MD10
39	GND
40	GND
41	MA_MD14
42	MA_MD11
43	GND
44	GND
45	MA_MD21
46	MA_MD16
47	GND
48	GND
49	MA_MD20
50	MA_MD17
51	GND
52	GND
53	MA_DQS2-
54	+V1.2DDR
55	MA_DQS2+
56	GND
57	GND
58	MA_MD19
59	MA_MD22
60	GND
61	GND
62	MA_MD23
63	MA_MD18
64	GND
65	GND
66	MA_MD24
67	MA_MD29
68	GND
69	GND
70	MA_MD25
71	MA_MD28
72	GND
73	GND
74	MA_DQS3-
75	+V1.2DDR
76	MA_DQS3+
77	GND
78	GND
79	MA_MD27
80	MA_MD26
81	GND

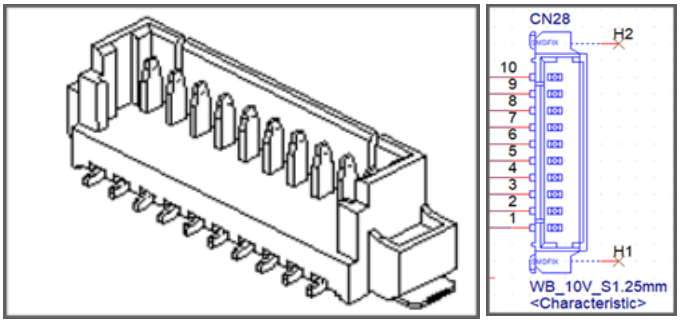
82	GND
83	MA_MD30
84	MA_MD31
85	GND
86	GND
87	MA_CB5
88	MA_CB4
89	GND
90	GND
91	MA_CB1
92	MA_CB0
93	GND
94	GND
95	MA_DQS8-
96	+V1.2DDR
97	MA_DQS8+
98	GND
99	GND
100	MA_CB6
101	MA_CB2
102	GND
103	GND
104	MA_CB7
105	MA_CB3
106	GND
107	GND
108	DDR4_DRAMRST#
109	MA_CKE0
110	MA_CKE1
111	+V1.2DDR
112	+V1.2DDR
113	MA_BG1
114	MA_ACT#
115	MA_BG0
116	DDR0_A_ALERT#
117	+V1.2DDR
118	+V1.2DDR
119	MA_MA12
120	MA_MA11
121	MA_MA9
122	MA_MA7
123	+V1.2DDR
124	+V1.2DDR
125	MA_MA8
126	MA_MA5
127	MA_MA6
128	MA_MA4
129	+V1.2DDR

130	+V1.2DDR
131	MA_MA3
132	MA_MA2
133	MA_MA1
134	DDR0_A_EVENT#
135	+V1.2DDR
136	+V1.2DDR
137	MA_CLK_DDRA0+
138	MA_CLK_DDRA1+
139	MA_CLK_DDRA0-
140	MA_CLK_DDRA1-
141	+V1.2DDR
142	+V1.2DDR
143	DDR0_A_PARITY
144	MA_MA0
145	MA_BA1
146	MA_MA10
147	+V1.2DDR
148	+V1.2DDR
149	MA_SCS#0
150	MA_BA0
151	MA_SWE#
152	MA_SRAS#
153	+V1.2DDR
154	+V1.2DDR
155	MA_ODT0
156	MA_SCAS#
157	MA_SCS#1
158	MA_MA13
159	+V1.2DDR
160	+V1.2DDR
161	MA_ODT1
162	
163	+V1.2DDR
164	DDR0_VREF_Z_CA
165	
166	DIMMA_SA2
167	GND
168	GND
169	MA_MD33
170	MA_MD36
171	GND
172	GND
173	MA_MD37
174	MA_MD32
175	GND
176	GND
177	MA_DQS4-

178	+V1.2DDR
179	MA_DQS4+
180	GND
181	GND
182	MA_MD35
183	MA_MD38
184	GND
185	GND
186	MA_MD34
187	MA_MD39
188	GND
189	GND
190	MA_MD40
191	MA_MD44
192	GND
193	GND
194	MA_MD45
195	MA_MD41
196	GND
197	GND
198	MA_DQS5-
199	+V1.2DDR
200	MA_DQS5+
201	GND
202	GND
203	MA_MD43
204	MA_MD47
205	GND
206	GND
207	MA_MD46
208	MA_MD42
209	GND
210	GND
211	MA_MD50
212	MA_MD48
213	GND
214	GND
215	MA_MD52
216	MA_MD49
217	GND
218	GND
219	MA_DQS6-
220	+V1.2DDR
221	MA_DQS6+
222	GND
223	GND
224	MA_MD53
225	MA_MD54

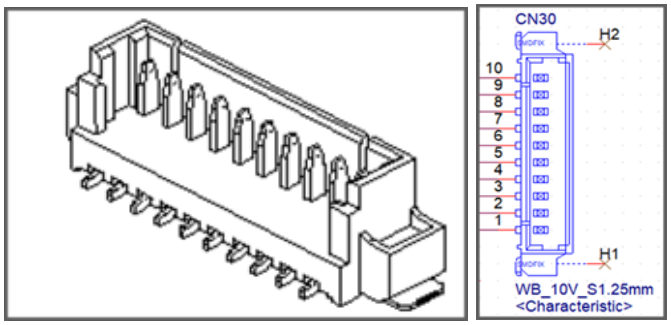
226	GND
227	GND
228	MA_MD55
229	MA_MD51
230	GND
231	GND
232	MA_MD56
233	MA_MD57
234	GND
235	GND
236	MA_MD60
237	MA_MD61
238	GND
239	GND
240	MA_DQS7-
241	+V1.2DDR
242	MA_DQS7+
243	GND
244	GND
245	MA MD62
246	MA MD59
247	GND
248	GND
249	MA MD58
250	MA MD63
251	GND
252	GND
253	SMB_CLK
254	SMB OAT
255	+V3.3
256	DIMMA_SAO
257	+V2.5_VPP
258	+V0.6 VTT
259	+V2.5 VPP
260	DIMMA_SA1
H1	NC
H2	NC
H3	GND
H4	GND

A.3.14 GPIO/RS232 Connector



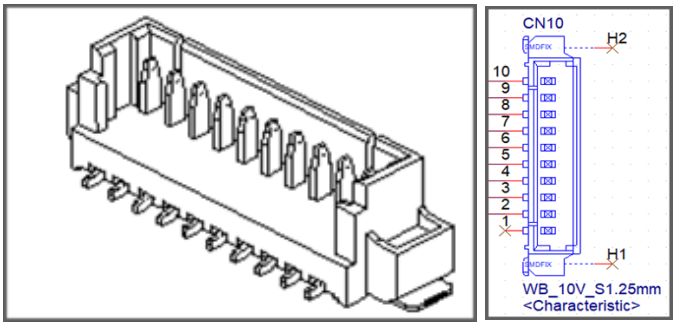
Pin	Signal Pin Definition
1	GND
2	GPIO7/COM_RI#
3	GPIO2/COM_DTR#
4	GPIO6/COM_CTS#
5	GPIO1/COM_TXD
6	GPIO5/COM_RTS#
7	GPIO0/COM_RXD
8	GPIO4/COM_DSR#
9	+V5_GPIO/COM_DCD#
10	GPIO3/COM_GND

A.3.15 GPIO/RS232 Connector



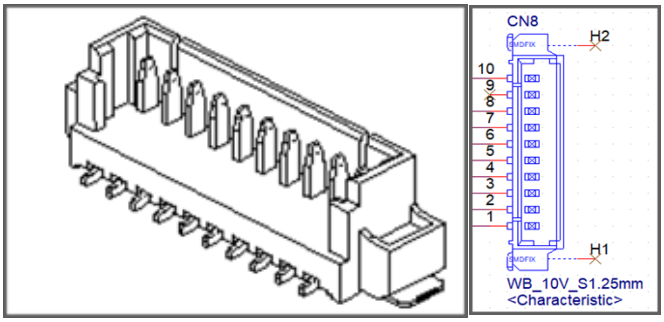
Pin	Signal Pin Definition
1	GND
2	GPIO7/COM_RI#
3	GPIO2_COM_DTR#
4	GPIO6/COM_CTS#
5	GPIO1/COM_TXD
6	GPIO5/COM_RTS#
7	GPIO0/COM_RXD
8	GPIO4/COM_DSR#
9	+V5_GPIO/COM_DCD#
10	GPIO3/COM_GND

A.3.16 COM Port Connector (RS232+RS422+RS485)



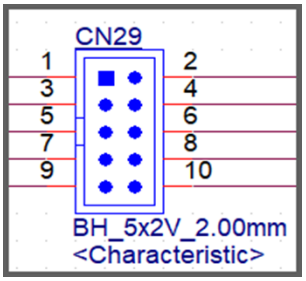
Pin	Signal Pin Definition
1	NC
2	RI#
3	422RX-/DTR#
4	CTS#
5	422RX+/TXD
6	RTS#
7	422TX+/485D+/RXD
8	DSR#
9	422TX-/485D-/DCD#
10	GND

A.3.17 Power/LED/Case Open/Buzzer Connector



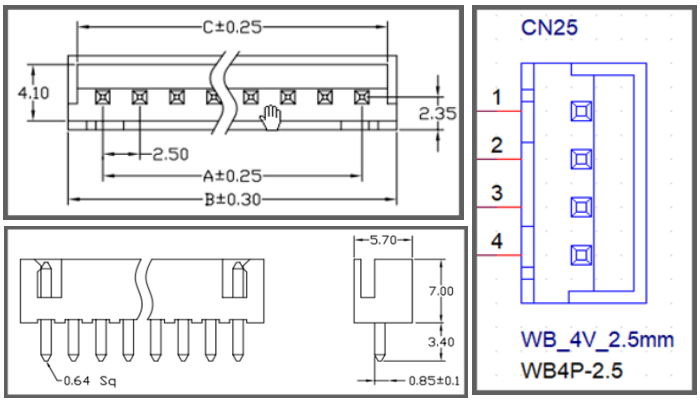
Pin	Signal Pin Definition
1	GND
2	BUZZER-
3	BUZZER+
4	CASEOPEN
5	SATA_LED#
6	PSIN#
7	RST#
8	+3.3V
9	NC
10	+5V

A.3.18 Audio Connector



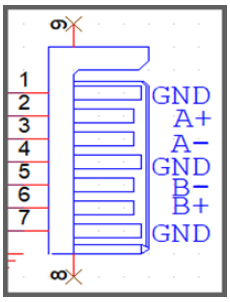
Pin	Signal Pin Definition
1	LOUTR
2	LINR
3	GND
4	GND
5	LOUTL
6	LINL
7	GND
8	GND
9	MIC1R
10	MIC1L

A.3.19 HDD Power Connector



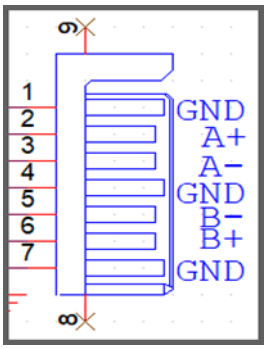
Pin	Signal Pin Definition
1	5V
2	GND
3	GND
4	12V

A.3.20 HDD Connector



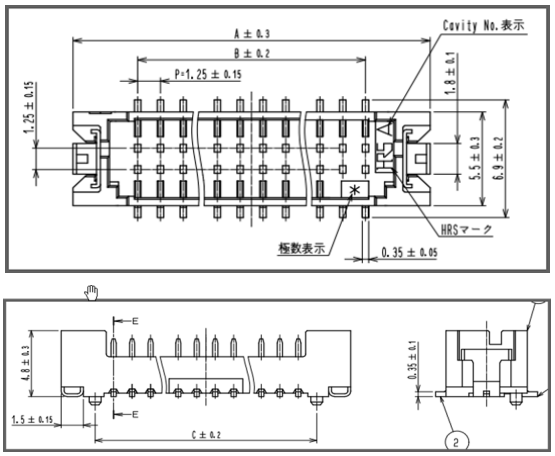
Pin	Signal Pin Definition
1	GND
2	SATA0_TX+
3	SATA0_TX-
4	GND
5	SATA0_RX-
6	SATA0_RX+
7	GND

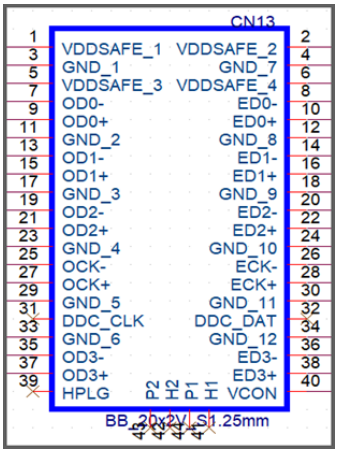
A.3.21 HDD Connector



Pin	Signal Pin Definition
1	GND
2	SATA1_TX+
3	SATA1_TX-
4	GND
5	SATA1_RX-
6	SATA1_RX+
7	GND

A.3.22 LVDS Connector

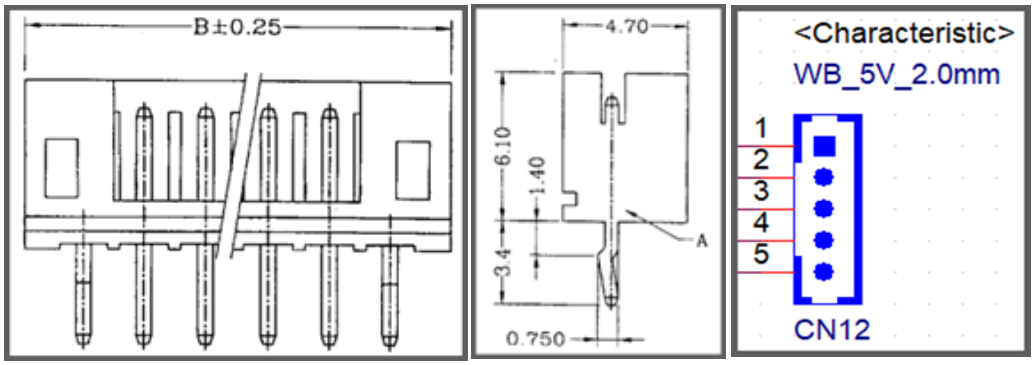




Pin	Signal Pin Definition
1	+V_LCD
2	+V_LCD
3	GND
4	GND
5	+V_LCD
6	+V_LCD
7	LVDS1_0_D0-
8	LVDS1_1_D0-
9	LVDS1_0_D0+
10	LVDS1_1_D0+

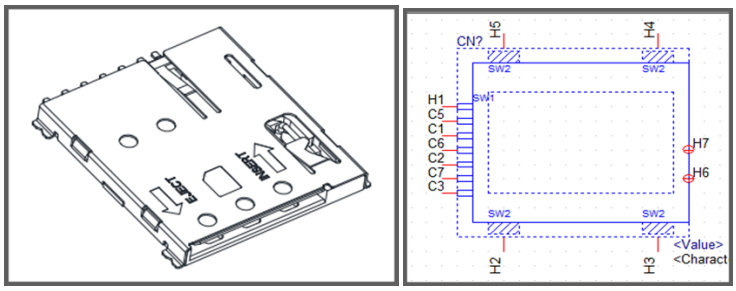
11	GND
12	GND
13	LVDS1_0_D1-
14	LVDS1_1_D1-
15	LVDS1_0_D1+
16	LVDS1_1_D1+
17	GND
18	GND
19	LVDS1_0_D2-
20	LVDS1_1_D2-
21	LVDS1_0_D2+
22	LVDS1_1_D2+
23	GND
24	GND
25	LVDS1_0_CLK-
26	LVDS1_1_CLK-
27	LVDS1_0_CLK+
28	LVDS1_1_CLK+
29	GND
30	GND
31	NC
32	NC
33	GND
34	GND
35	LVDS1_0_D3-
36	LVDS1_1_D3-
37	LVDS1_0_D3+
38	LVDS1_1_D3+
39	NC
40	LVDS1_VCON

A.3.23 Panel Inverter Connector



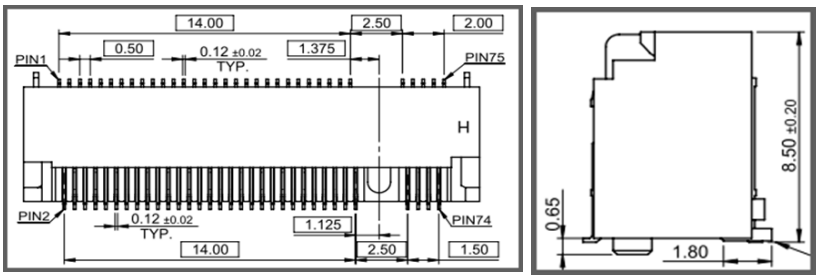
Pin	Signal Pin Definition
1	+V12
2	GND
3	LVDS1_ENABKL
4	LVDS1_PWM
5	+V5

A.3.24 SIM Card Connector



Pin	Signal Pin Definition
C1	+VUIM_PWR
C2	UIM RESET
C3	UIM_CLK
C5	GND
C6	+VUIM_VPP
C7	UIM DATA
H1	SIM_DET
H2	GND
H3	GND
H4	GND
H5	GND
H6	NC
H7	NC

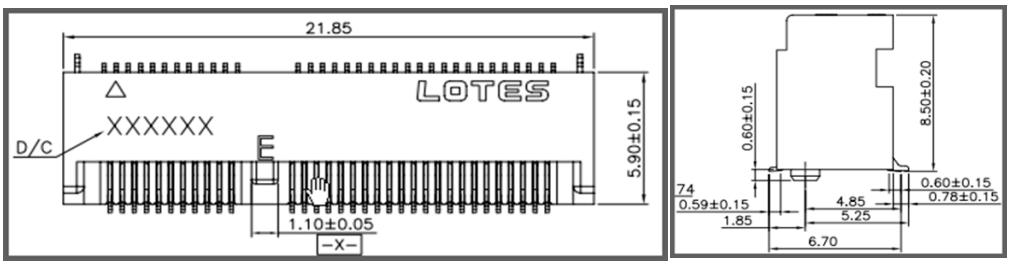
A.3.25 Key M and Key B Connector

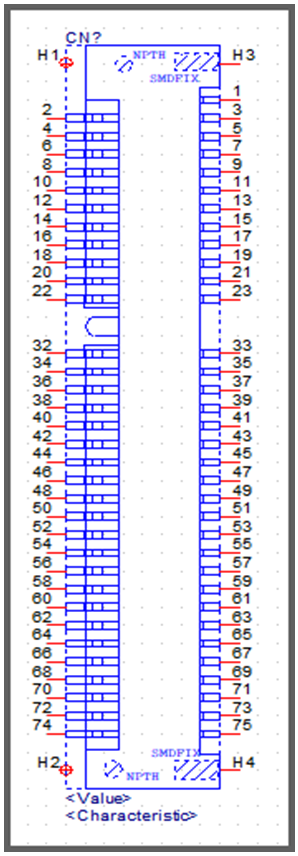


Pin	Signal Pin Definition (Key M)	Pin	Signal Pin Definition (Key B)
1	M.2_CONFIG_3 (GND)	1	M.2_CONFIG_3
2	+V3.3_M.2	2	+V3.3_M.2
3	GND	3	GND
4	+V3.3_M.2	4	+V3.3_M.2
5	PCIE_KEY-M_R_RX9-	5	GND
6	NC	6	NC
7	PCIE_KEY-M_R_RX9+	7	USB7_P+
8	WWAN_DISABLE#	8	WWAN_DISABLE#
9	GND	9	USB7_KEYB_P-
10	NC	10	NC
11	PCIE_A_PCH_TXN3	11	GND
12	+V3.3_M.2	12	B Key NC
13	PCIE_A_PCH_TXP3	13	
14	+V3.3_M.2	14	
15	GND	15	
16	+V3.3_M.2	16	
17	PCIE_KEY-M_RX8-	17	
18	+V3.3_M.2	18	
19	PCIE_KEY-M_RX8+	19	
20	NC	20	NC
21	M.2_CONFIG_0 (GND)	21	M.2_CONFIG_0
22	NC	22	NC
23	PCIE_A_PCH_TXN2	23	PCIE_A_PCH_TXN2
24	NC	24	NC
25	PCIE_A_PCH_TXP2	25	PCIE_A_PCH_TXP2
26	NC	26	NC
27	GND	27	GND
28	NC	28	NC
29	PCIE_KEY-M_RX7-	29	PCIE_KEY-M_RX7-
30	UIM_A_RESET	30	UIM_A_RESET
31	PCIE_KEY-M_RX7+	31	PCIE_KEY-M_RX7+
32	UIM_A_CLK	32	UIM_A_CLK
33	GND	33	GND
34	UIM_A_DATA	34	UIM_A_DATA
35	PCIE_A_PCH_TXN1	35	PCIE_A_PCH_TXN1
36	+VUIM_A_PWR	36	+VUIM_A_PWR

37	PCIE_A_PCH_TXP1	37	PCIE_A_PCH_TXP1
38	NC	38	NC
39	GND	39	GND
40	NC	40	NC
41	MPCIE_MSATA_RX+	41	MPCIE_MSATA_RX+
42	NC	42	NC
43	MPCIE_MSATA_RX-	43	MPCIE_MSATA_RX-
44	NC	44	NC
45	GND	45	GND
46	NC	46	NC
47	MPCIE_MSATA_TX-	47	MPCIE_MSATA_TX-
48	NC	48	NC
49	MPCIE_MSATA_TX+	49	MPCIE_MSATA_TX+
50	PLTRST_MKEY_BUFFER#	50	NC
51	GND	51	GND
52	CLK2_M2MB_A_PCIE_REQ#	52	CLK2_M2MB_A_PCIE_REQ#
53	CK_100M_A_MKEY_N	53	CK_100M_A_MKEY_N
54	M.2_PCIE_WAKE#	54	M.2_PCIE_WAKE#
55	CK_100M_A_MKEY_P	55	CK_100M_A_MKEY_P
56	NC	56	NC
57	GND	57	GND
58	NC	58	NC
59	M Key NC	59	NC
60		60	NC
61		61	NC
62		62	NC
63		63	NC
64		64	NC
65		65	NC
66		66	SIM_KEYB_DET
67	M.2_RESET#_R	67	M.2_RESET#_R
68	PCH_SUSCLK_R_MKEY	68	PCH_SUSCLK_R_MKEY
69	M2_SSD_PEDET	69	M2_SSD_PEDET
70	+V3.3_M.2	70	+V3.3_M.2
71	GND	71	GND
72	+V3.3_M.2	72	+V3.3_M.2
73	GND	73	GND
74	+V3.3_M.2	74	+V3.3_M.2
75	GND	75	GND

A.3.26 Key E Connector



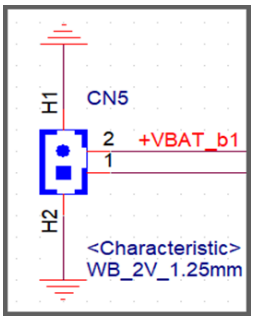


Pin	Signal Pin Definition (Key E)
1	GND
2	+V3.3SB_M.2_E
3	USB6 Z P+
4	+V3.3SB_M.2_E
5	USB6_Z_P-
6	NC
7	GND
8	NC
9	NC
10	NC
11	NC
12	NC
13	NC
14	NC

15	NC
16	NC
17	NC
18	GND
19	NC
20	NC
21	NC
22	NC
23	
24	
25	
26	
27	E Key NC
28	
29	
30	
31	
32	NC
33	GND
34	NC
35	PCIE_M2_Z_TX7+
36	NC
37	PCIE_M2_Z_TX7-
38	NC
39	GND
40	NC
41	PCIE_M2_RX7+
42	NC
43	PCIE_M2_RX7-
44	NC
45	GND
46	NC
47	CLK_M2E_Z_PCIE+
48	NC
49	CLK_M2E_Z_PCIE-
50	SUSCLK_Z_EKEY
51	GND
52	PLTRST_BUFFER#
53	PCIE_A_CLKREQ2#
54	BT_DISABLE#
55	PCIE_WAKE#
56	WIFI_DISABLE#
57	GND
58	I2C0_KEYE_DAT
59	NC
60	I2C0_KEYE_CLK
61	NC
62	NC

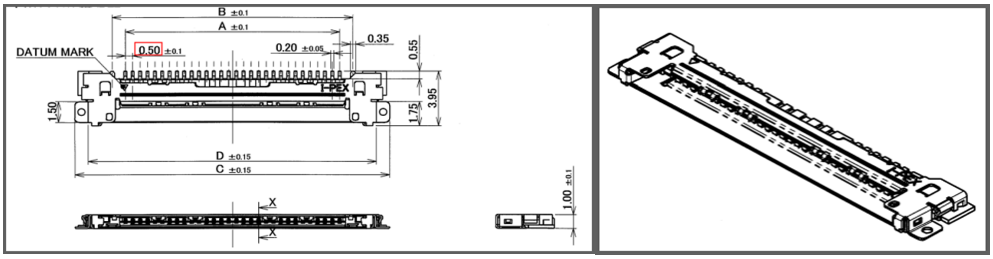
63	GND
64	NC
65	NC
66	NC
67	NC
68	NC
69	GND
70	NC
71	NC
72	+V3.3SB_M.2_E
73	NC
74	+V3.3SB_M.2_E
75	GND

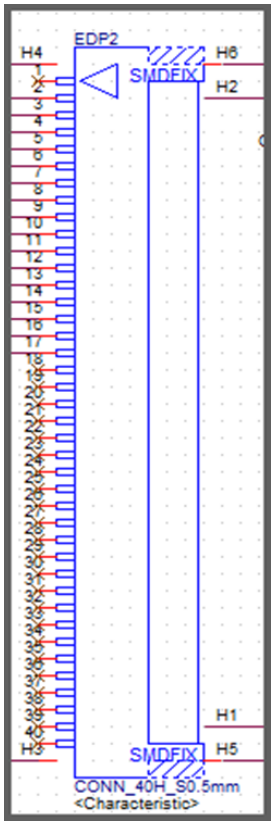
A.3.27 RTC Battery Connector



Pin	Signal Pin Definition (Key M)
1	+VBAT
2	GND

A.3.28 eDP Connector

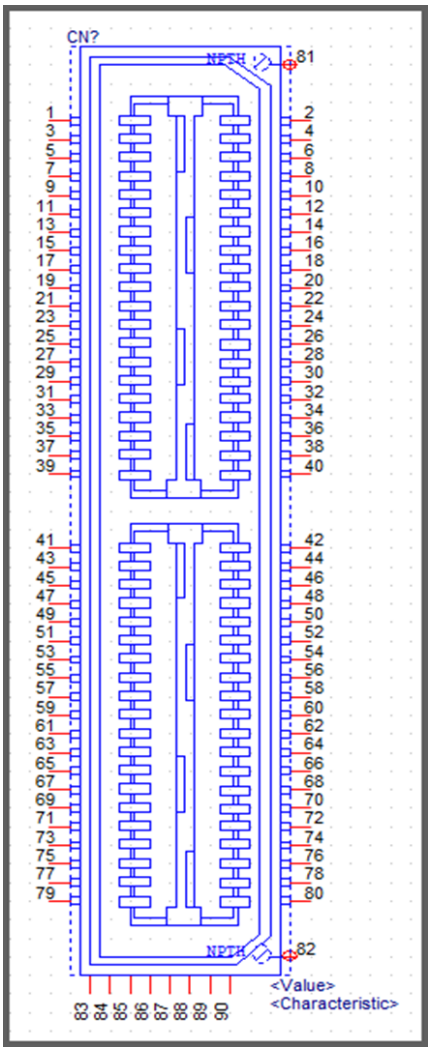




Pin	Signal Pin Definition
1	NC
2	GND
3	EDP_Z_TX3-
4	EDP_Z_TX3+
5	GND
6	EDP_Z_TX2-
7	EDP_Z_TX2+
8	GND
9	EDP_Z_TX1-
10	EDP_Z_TX1+
11	GND
12	EDP_Z_TXO-
13	EDP_Z_TXO+
14	GND
15	EDP_Z_AUX+
16	EDP_Z_AUX-
17	GND
18	+V_LCD
19	+V_LCD
20	+V_LCD
21	+V_LCD
22	NC
23	GND
24	GND

25	GND
26	GND
27	DDP3_EDP_Z_HPD
28	GND
29	GND
30	GND
31	GND
32	LVDS1_z_ENABKL
33	EC_LVDS1_z_PWM
34	NC
35	NC
36	+V12_+V5_EDP_INVERTER_O
37	+V12_+V5_EDP_INVERTER_O
38	+V12_+V5_EDP_INVERTER 0
39	+V12_+V5_EDP_INVERTER_O

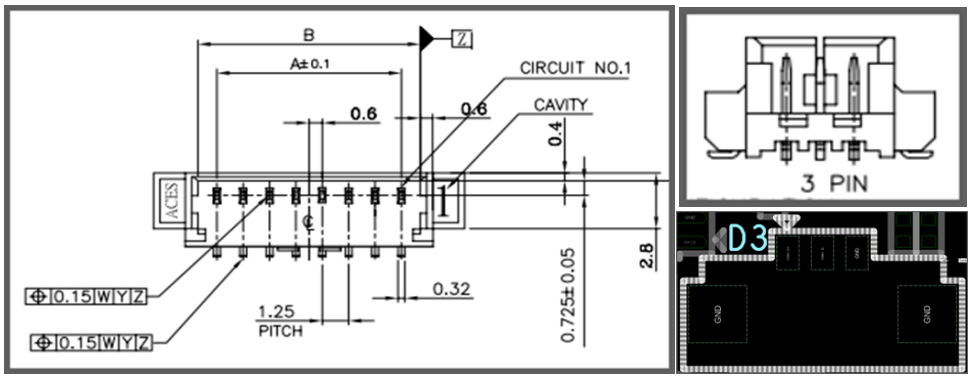
A.3.29 MIOe Connector



Pin	Signal Pin Definition (Key M)
1	GND
2	GND
3	PCIE_MIO_RX1+
4	PCIE_MIO_A_TX1+
5	PCIE_MIO_RX1-
6	PCIE_MIO_A_TX1-
7	GND
8	GND
9	PCIE_MIO_RX2+
10	PCIE_MIO_A_TX2+
11	PCIE_MIO_RX2-
12	PCIE_MIO_A_TX2-
13	GND
14	GND
15	PCIE_MIO_RX3+
16	PCIE_MIO_A_TX3+
17	PCIE_MIO_RX3-
18	PCIE_MIO_A_TX3-
19	GND
20	GND
21	PCIE_MIO_RX4+
22	PCIE_MIO_A_TX4+
23	PCIE_MIO_RX4-
24	PCIE_MIO_A_TX4-
25	GND
26	GND
27	CLK5_PCIE_MIO+
28	LOUTL_MIO
29	CLK5_PCIE_MIO-
30	LOUTR_MIO
31	GND
32	NC
33	SMB_STB_CLK
34	NC
35	SMB_STB_DAT
36	NC
37	PCIE_WAKE#
38	NC
39	PLTRST_BUFFER#
40	NC
41	PM_SLP_S3#
42	CLKOUT_MIO
43	NC
44	LPC_AD0
45	NC
46	LPC_AD1

47	GND
48	LPC_AD2
49	NC
50	LPC_AD3
51	NC
52	NC
53	GND
54	LPC_SERIRQ
55	NC
56	LPC_FRAME#
57	NC
58	GND
59	GND
60	USB5_P+
61	NC
62	USB5_P-
63	NC
64	GND
65	GND
66	NC
67	NC
68	NC
69	NC
70	GND
71	GND
72	NC
73	NC
74	NC
75	NC
76	GND
77	GND
78	USB5_OC#3
79	+V12SB_MIO
80	+V12SB_MIO
81	NC
82	NC
83	GND
84	GND
85	GND
86	GND
87	+V5SB
88	+V5SB
89	+V5SB
90	+V5SB

A.3.30 CANBus Connector



Name	Net Name
1	CAN1_D+
2	CAN1_D-
3	GND

Appendix B

System Assignments

- System I/O Ports
- DMA Channel Assignments
- First MB Memory Map
- Interrupt Assignments

B.1 System I/O Ports

Table B.1: System I/O Ports	
Addr. Range (Hex)	**Device**
00-1F	DMA Controller
20-2D	Interrupt Controller
2E - 2F	Motherboard Resources
4E - 4F	Motherboard Resources
50-52	Timer/Counter
60-6F	8042 (Keyboard Controller)
70-7F	Real-Time Clock, Non-Maskable Interrupt (NMI) Mask
80-9F	DMA Page Register
A0-BF	Motherboard Resources
C0-DF	DMA Controller
299-29A	EC HM Index Port and Data Port
29C-29D	EC Index Port and Data Port
2F8-2FF	Communications Port (COM2)
3C0-3DF	Motherboard Resources
3F8-3FF	Communications Port (COM1)
4D0-4D1	Motherboard Resources

B.2 DMA Channel Assignments

Table B.2: DMA Channel Assignments	
Channel	**Function**
0	Available
1	Available
2	Available
3	Available
4	Direct Memory Access Controller
5	Available
6	Available
7	Available

B.3 First MB Memory Map

Table B.3: First MB Memory Map	
Addr. Range (Hex)	**Device**
E0000h - FFFFFh	System Board
D0000h - DFFFFh	PCI Bus
C0000h - CFFFFh	System Board
A0000h - BFFFFh	PCI Bus
A0000h - BFFFFh	Intel® HD Graphic
00000h - 9FFFFh	System Board

B.4 Interrupt Assignments

Table B.4: Interrupt Assignments

Interrupt#	Interrupt Source
NMI	Parity Error Detected
IRQ0	System Timer
IRQ1	Using SERIRQ, Keyboard Emulation
IRQ2	Interrupt from Controller 2 (Cascade)
IRQ3	Communications Port (COM2)
IRQ4	Communications Port (COM1)
IRQ5	EC Watch DOG
IRQ6	Available
IRQ7	Available
IRQ8	System CMOS/Real Time Clock
IRQ9	Microsoft ACPI-Compliant System
IRQ10	Available
IRQ11	SATA Controller
IRQ12	Available
IRQ13	Numeric Data Processor
IRQ14	Reserved
IRQ15	Reserved

Appendix C

Watchdog Timer Sample Code

C.1 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
Stop WDT Function = 0x29
Reset WDT Function = 0x2A
=====================================================
.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, 5Eh          ; Watchdog reset delay time high byte index.
out dx,al

mov dx, EC_Data_Port
mov al, 00h          ;Set 0 seconds delay time.
out dx,al

mov dx, EC_Data_Port
mov al,5Fh          ; Watchdog reset delay time low 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. (stop: 0x29, reset: 0x2A)
out dx,al

.exit
END
```