

MIO-5391

**7th Gen Intel® Core™ H-series
(i7/i5/i3/Xeon®*), 3.5" MIO-Compact
SBC, DDR4, Dual HDMI, 48-bit LVDS,
2 GbE, M.2 E Key, mSATA, Fanless,
MIOe**

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This manual is for the MIO-5391.

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CE

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Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

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.*



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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-5391 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)
- 1 x COM RS-232 Cable 30cm (p/n: 1700019414)
- 1 x Cooler (Heatsink) (p/n: 1960089060T001
(1960089142T001))
- 1 x Startup manual (p/n: 2006539100)
- 1 x Mini Jumper(10pcs package) (p/n: 9689000002)
- 1 x Screw Kit (4pcs screws for miniPCIe) (p/n: 9666525100E)
- 1 x RMM 3.2 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 with DSUB connector, 8-bit GPIO
MIOe-220-B3A1E ¹	3 x Intel® Gigabit Ethernet with PCIe Switch
MIOe-230-L0A1E	Displayport to 48-bit LVDS
MIOe-DB5000-01A1E	MI/O extension evaluation board
MIOe-3674-AE ²	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 No USB support on MIOe-230

² Support with customized BIOS

Optional Accessories

Part number	Description
1700002172	Internal 2 ports USB cable 17CM

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Chapter 1

General Information

This chapter gives background information on the MIO-5391.

Sections include:

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

1.1 Introduction

MIO-5391 is designed using MI/O Extension form factor (compact series, 146 x 102 mm) and powered by 7th generation of Intel® Core™ H series processors which have high performance computing and multimedia capabilities. Based on numerous demands from embedded applications, Advantech developed an optimized thermal solution for MIO-5391. This makes the possibility of fanless design on this kind of high performance platform. MIO-5391 also embedded SUSI 4.0 and WISE-PaaS/RMM created by Advantech to monitor and control system operation effectively and remotely. These tools offer greater system reliability and a smarter software framework for embedded customers and helps them speed up development times.

MIO-5391 adopts the latest 64-bit, multi-core processors built on 14nm process technology for improvements in CPU processing, graphics, security and I/O flexibility. Moreover, MIO-5391 is equipped with the latest generation graphics core (Intel® HD Graphics 520) with DirectX 11.3, OpenGL 4.4, OpenCL 2.1 and 4K encoding/decoding which increases more possibilities for multimedia application development. MIO-5391 supports not only triple independent displays including HDMI, VGA and 48-bit LVDS interfaces, but also low power dual 32G 2400MHz DDR4 memory and TPM, it's suitable to aim various high level embedded applications.

1.2 Specifications

1.2.1 Functional Specifications

- Processor: 7th Generation Intel® Core™ H-series
 - i7-7820EQ Quad Core 3.0GHz, burst frequency 3.7GHz
 - i5-7442EQ Quad Core 2.1GHz, burst frequency 2.9GHz
 - i3-7102E Dual Core 2.1GHz
 - E3-1505MV6 Quad Core 3.0GHz, burst frequency 4.0GHz
- L3 Cache:
 - i7-7820EQ: 8MB
 - i5-7442EQ: 6MB
 - i3-7102E: 3MB
 - E3-1505MV6: 8MB
- Advanced Technologies
 - * Intel® Turbo Boost Technology 2.0² (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**
 - Integrated Serial ATA Host Controller
 - * Data transfer rates up to 6.0 Gb/s (600 MB/s)
 - * Integrated AHCI controller

- USB
 - * xHCI Host Controller, supporting 4 SuperSpeed USB 3.0 ports
 - * One EHCI Host Controllers, supporting 4 HighSpeed USB 2.0 ports
 - * Supports wake-up from sleeping states S1, S3
 - * Supports legacy Keyboard/Mouse software
- Power Management
 - * Full support of ACPI C-states as implemented by the following processor C-states: — C0, C1, C1E, C3, C6, C7, C8, C9, C10
 - * Enhanced Intel SpeedStep® Technology
- **System Memory Support**
 - Non-ECC, DDR4 memory with dual SO-DIMM up to 32GB
 - DDR4 Voltage of 1.2V
 - * ECC support on Xeon SKU only up to 2400MHz
 - 64-bit wide channels
 - Intel® Fast Memory Access (Intel® FMA):
 - * Just-in-Time Command Scheduling
 - * Command Overlap
 - * Out-of-Order Scheduling
- **Integrated Graphics Controller**
 - Contains a generation 9 graphics core architecture (Intel® HD Graphics 520/510)
 - Intel® QuickSync & Clear Video Technology HD Supportt
 - Full Hardware Accelerated Video Decode: AVC/VC1/MPEG2/HEVC/VP8/JPEG.
 - OpenGL4.4 and OpenCL2.1 support
 - DirectX 12, DirectX 11.3, DirectX 11.2, DirectX 11.1, DirectX 10, DirectX 9 support
 - Multi-display interfaces: VGA, HDMI on rear I/O, Dual Channel 24-bit LVDS, DisplayPort¹ from MIOe
 - Support Extend, Clone and Collage mode with multi-display device
 - Dual Display:
 - * Any two combination between: LVDS, Dual HDMI
 - Triple Display:
 - * Dual HDMI + LVDS
 - Integrated Dual-channel LVDS support resolution up to 1920x1200 at 60 Hz
 - Analog RGB display (VGA) output up to resolution 1920 x 1200 with 60 Hz, or 2048 x 1152 @ 60Hz with reduced blanking.
 - HDMI interface supports the HDMI 1.4a specification with audio up to 4096x2160 at 24 Hz (Supporting 4K display required two DDR channels of same size).
- **Gigabit Ethernet**
 - Port1: Integrated Intel 100 Series Chipset (MAC) + i219 GbE (PHY)
 - * Integrated ASF Management Controller
 - * 10/100/1000 BASE-T IEEE 802.3 specification conformance
 - * Supports the Energy Efficient Ethernet (EEE) IEEE802.3az specification
 - * Supports up to 9 KB jumbo frames (full duplex)
 - * 802.1as/1588 conformance
 - Port2: i210 Gigabit Ethernet Controller
 - * Flow Control Support compliant with the 802.3X Specification
 - * Compliant with the 1 Gb/s IEEE 802.3 802.3u 802.3ab Specifications

- * Magic Packet* wake-up enable with unique MAC address
- * Supports IEEE 1588

- **Peripheral interface**

- MIOe Unified Expansion
 - * DisplayPort¹
 - * 4 PCIe x1
 - * USB 2.0
 - * LPC
 - * HD Audio: Line out
 - * SMBus
 - * Power: +5 Vsb/+12 Vsb, Power On, Reset
- 2 Serial-ATA port, up to 6.0 Gb/s (600 MB/s)
- 4 USB 3.0 compliant ports on rear I/O, 4 USB2.0 compliant ports for internal connection¹
- 2 RS-232/422/485 (ESD protection: Air gap ±15kV, Contact ±8kV)
- 16-bit Programmable General Purpose Input/ Output from iManager
- 1 SMBus / I²C channel from iManager
- Watchdog timer: Output System Reset, Programmable counter from 1 ~ 255 minutes/ seconds
- Mini PCIe / mSATA
 - * 1 Full-size mSATA/ Mini PCIe (default supports mSATA) (One Mini PCIe default supports mSATA, can be selected in BIOS)
 - * 1 Half-size Mini PCIe with SIM card holder
- M.2
 - E-Key
 - (PCIe x1, USB2.0)
 - 2230
- **High Definition Audio:**
 - Intel® High Definition Audio Interface
 - High Definition Audio Codec with Realtek proprietary loss-less content protection technology
 - Support 1 Line-input, 1 Line output, 1 Mic-input
- **BIOS**
 - AMI UEFI 128 Mbit
- **Security:**
 - TPM2.0, only support under UEFI mode

1.2.2 OS support

MIO-5391 supports Win10 64 bit

For further information about OS support of MIO-5391, 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: 16.5 mm, PCB: 2.0mm; Bottom Side: 7.8 mm
- **Weight:** 0.67 kg (reference weight of total package)

1.2.4 Electrical Specifications

- **Power Requirement:** Single +12V DC \pm 10% power input
- **Power Consumption:**
 - Max load
 - * i7-7820EQ: 67.64W
 - Idle mode
 - * i7-7820EQ: 8.26W
- **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

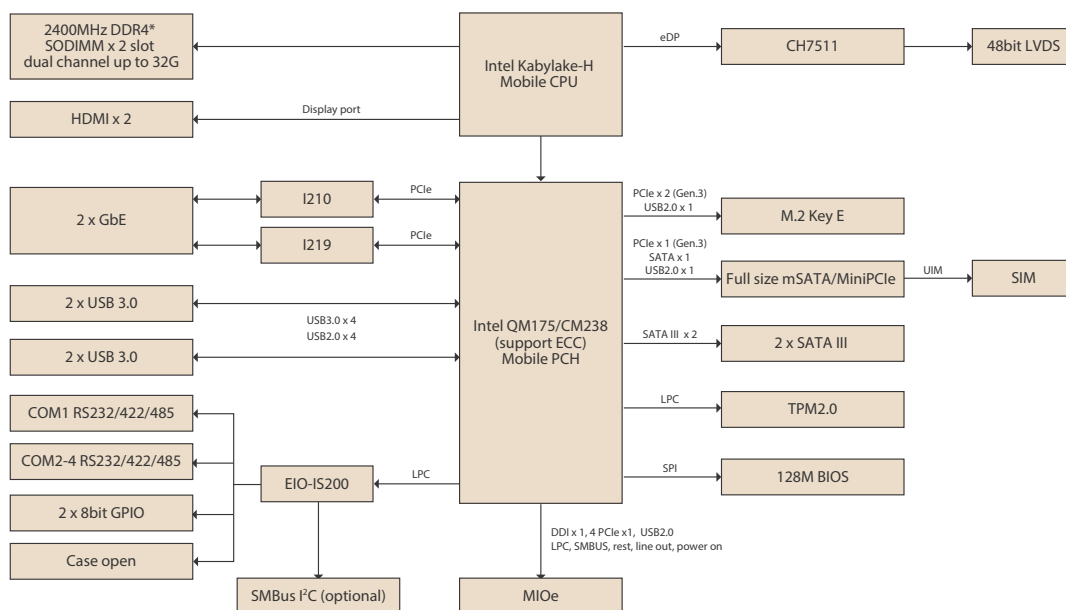
1.2.5 Environmental

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

¹ It will not be supported in default, please contact to Advantech if this function is needed.

² Thermal condition need to be considered when setting max frequency.

1.3 Block Diagram



1.4 Board layout: dimensions

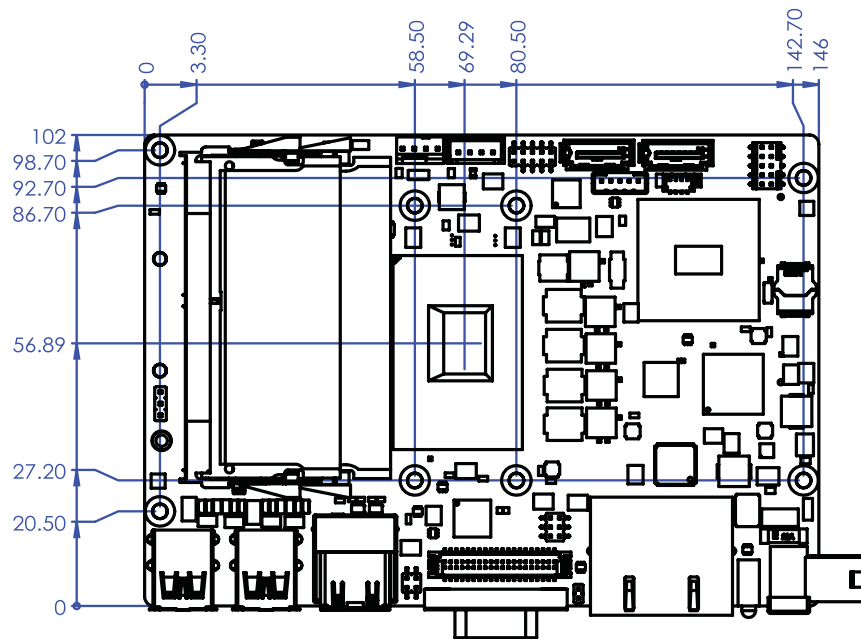


Figure 1.1 MIO-5391 Mechanical Drawing (Top Side)

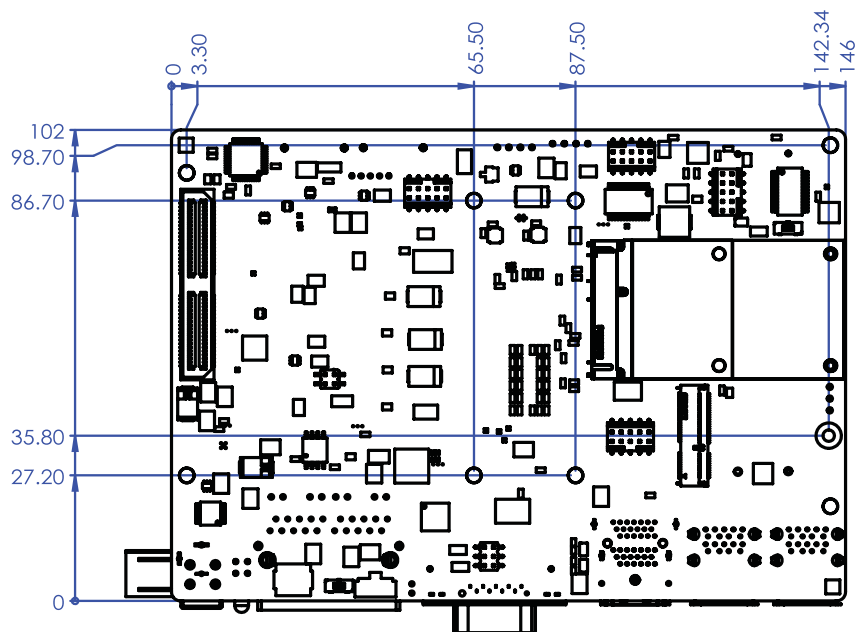


Figure 1.2 MIO-5391 Mechanical Drawing (Bottom Side)

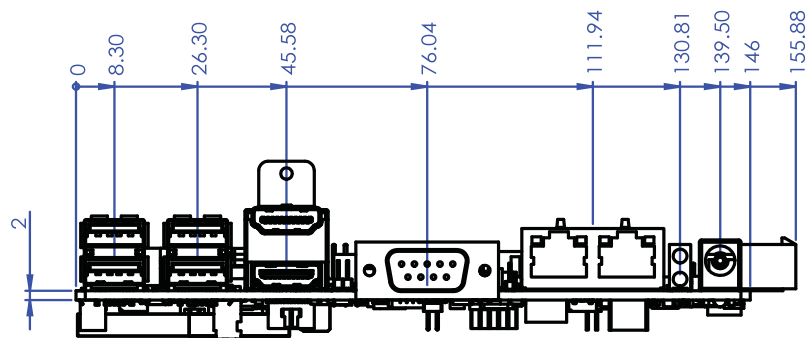


Figure 1.3 MIO-5391 Mechanical Drawing (Coastline)

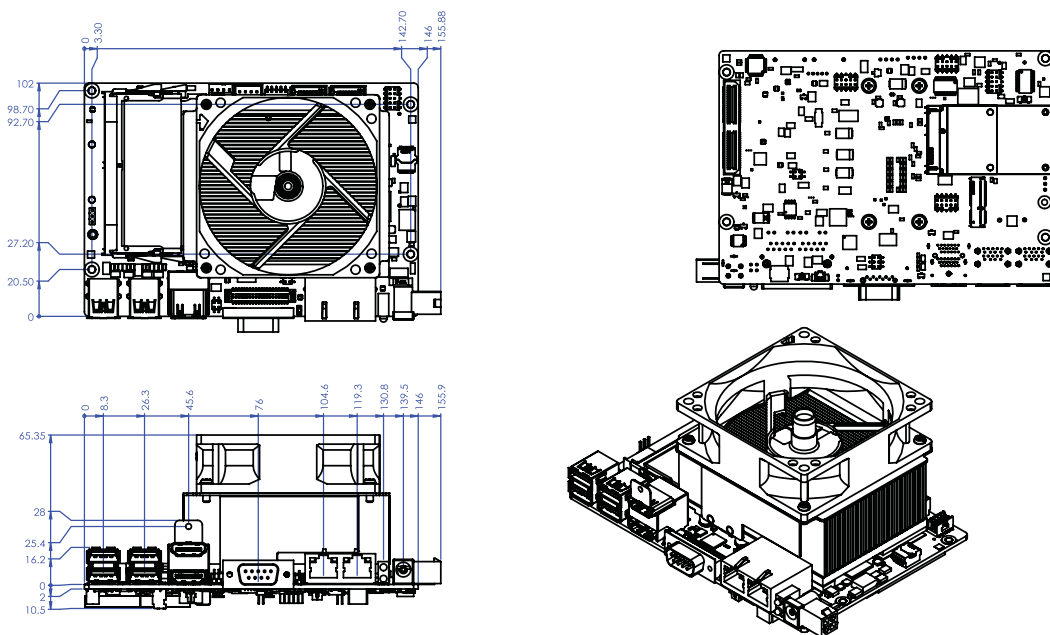


Figure 1.4 MIO-5391 Mechanical Drawing (with Cooler)

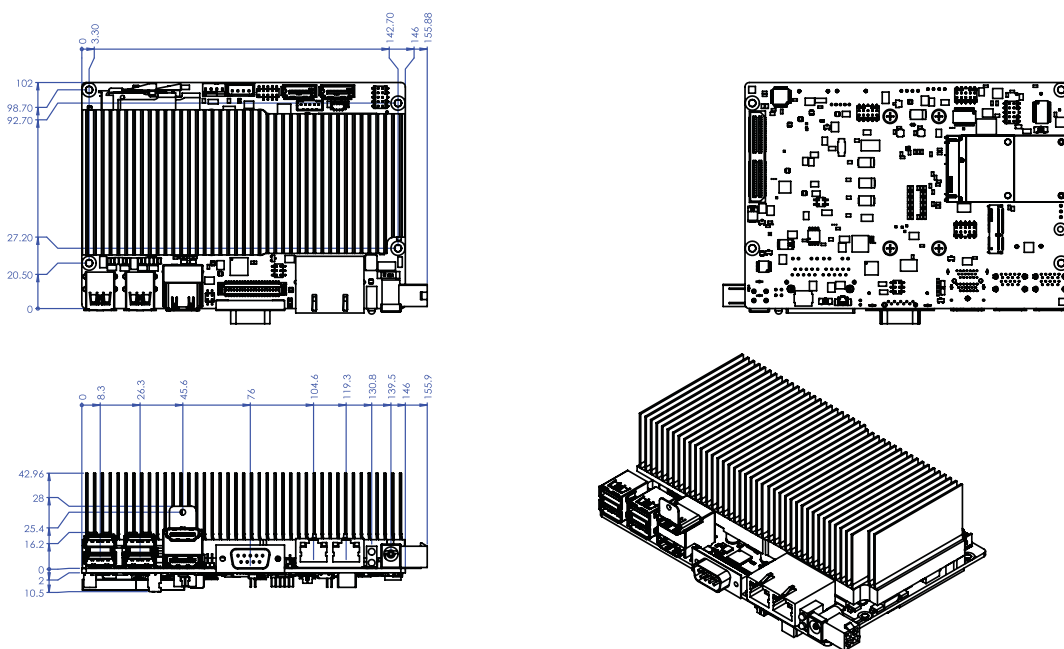


Figure 1.5 MIO-5391 Mechanical Drawing (with Heatsink)

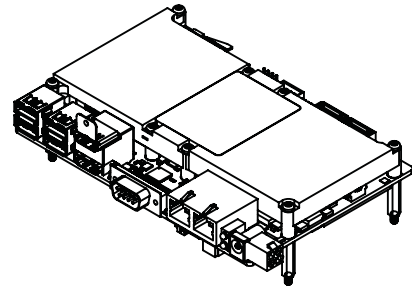
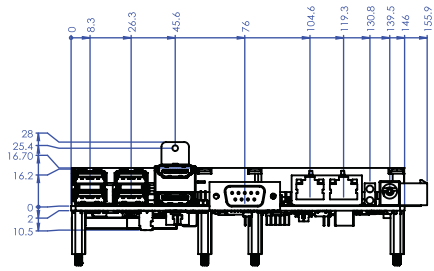
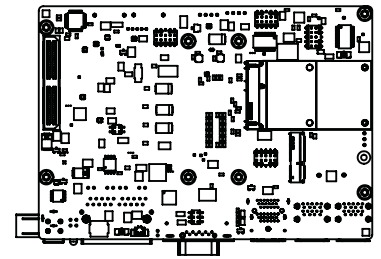
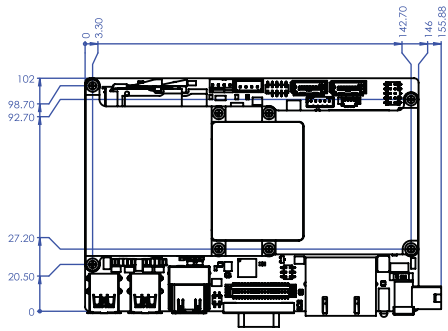


Figure 1.6 MIO-5391 Mechanical Drawing (with Heat Spreader)

Chapter 2

Installation

This chapter explains the setup procedures of the MIO-5391 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-5391 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 Setting
J3	LCD Power
J4	LVDS VCON Setting
J6	Serial Port Voltage Select
SW1	Clear CMOS
SW2	NL/CJS-1201TA1

2.2 Connectors

Onboard connectors link the MIO-5391 to external devices such as hard disk drives, a keyboard. The table below lists the function of each of the board's connectors.

Table 2.2: Connectors

Label	Function
CN1	12V Power Input
CN2	DC JACK
CN4	Battery
CN5	COM1
CN6	SODIMMDDR4_260
CN7	SODIMMDDR4_260
CN18	LAN
CN20	Audio
CN21	External USB3.0
CN22	External USB3.0
CN23	Internal USB
CN24	SATA Power
CN25	SATA
CN27	SATA
CN30	MIOe
CN31	SMBus
CN32	Smart FAN
CN33	Inverter Power Output
CN34	48-bit LVDS Panel
CN36	HDMI
CN37	M.2 E Key
CN38	COM2
CN45	Front Panel
CN47	Mini PCIE
CN48	GPIO
CN49	SIM Card
CN50	GPIO

2.3 Locating connectors & block diagram

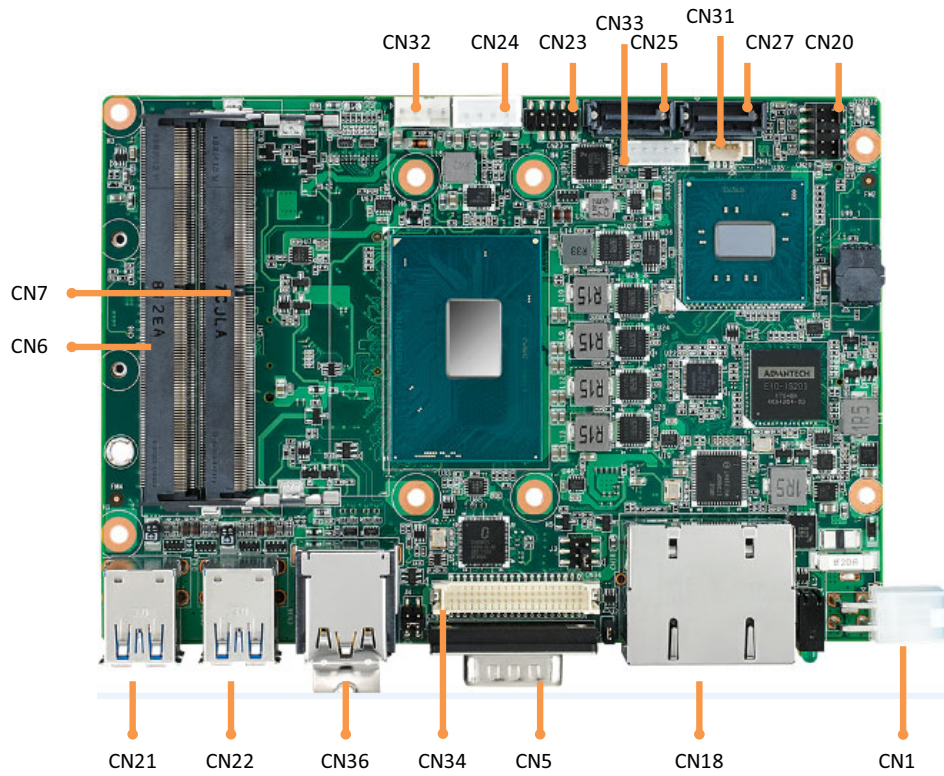


Figure 2.1 MIO-5391 Connector Locations (Top Side)

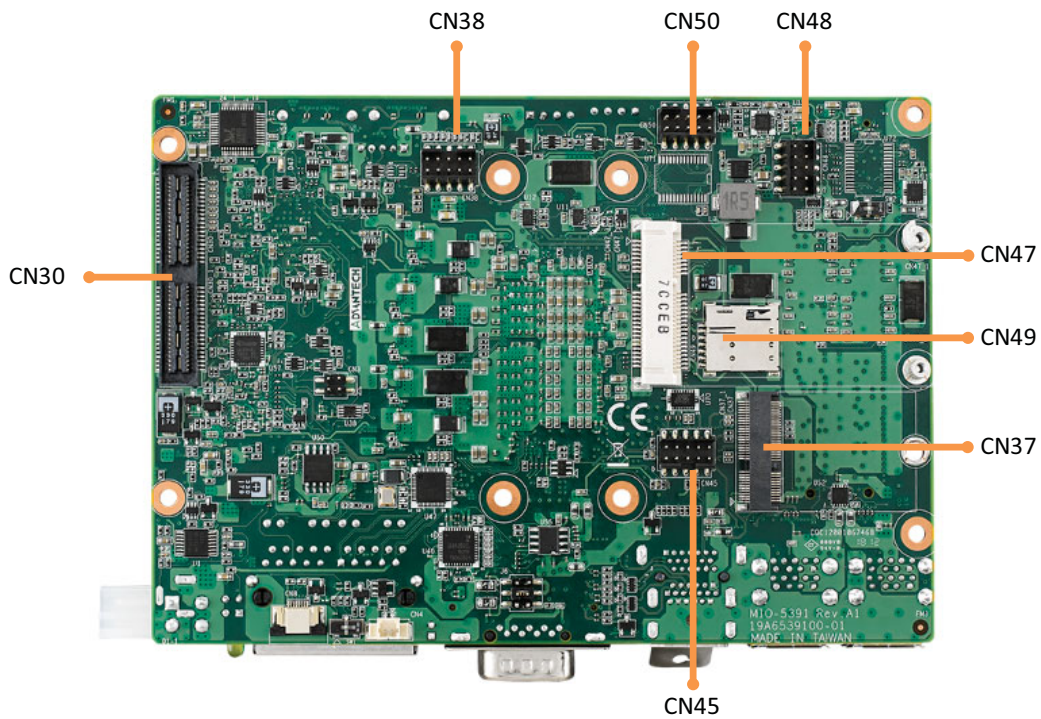


Figure 2.2 MIO-5391 Connector Locations (Bottom Side)

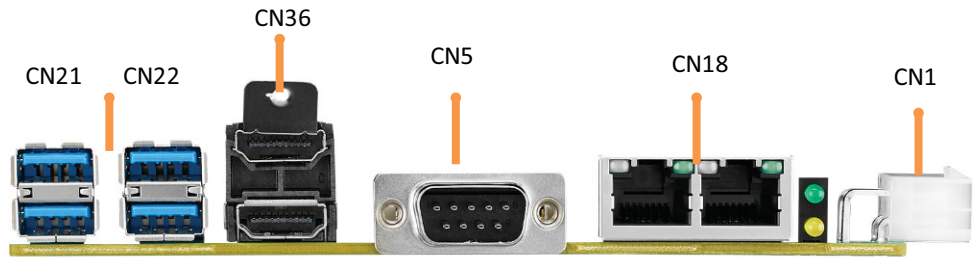
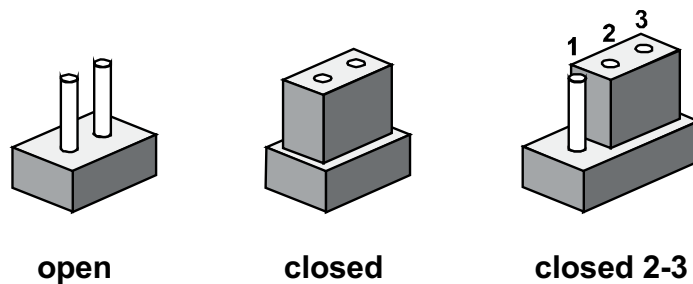


Figure 2.3 MIO-5391 Connector Locations (Coastline)

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, 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)

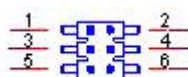
Part Number	1653002101-02
Footprint	HD_2x1P_79_D
Description	PIN HEADER 2x1P 2.0mm 180D(M) DIP 21N12050
Setting	Function
NC	Power Button for Power On
(1-2)*	Auto Power On



2.4.2 LCD Power (J3)

Table 2.4: LCD Power (J3)

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



2.4.3 LVDS VCON Setting (J4)

Table 2.5: LVDS VCON Setting (J4)

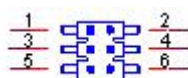
Part Number	1653000014
Footprint	HD_2x2P_79
Description	PIN HEADER 2x2P 2.00mm 180D(M) SMD 21N22050
Setting	Function
(1-2)*	3.3V High for VCON on LVDS
(1-3)	Low for VCON on LVDS



2.4.4 Serial Port Voltage Select (J6)

Table 2.6: Serial Port Voltage Select (J6)

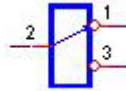
Part Number	1653003260
Footprint	HD_3x2P_79
Description	PIN HEADER 3x2P 2.0mm 180D(M) SMD 21N22050
Setting	Function
(1-2)	+5V
(3-4) *	COM3_RI#
(5-6)	+12V



2.4.5 Clear CMOS (SW1)

Table 2.7: Clear CMOS (SW1)

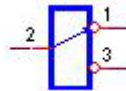
Part Number	1600000071
Footprint	SW_3P_CJS-1201TA1
Description	SLIDE SW CJS-1201TA1 SMD 3P SPDT P=6.0mm W=2.5mm
Setting	Function
(2->1)*	Normal
(2->3)	Clear COMS



2.4.6 m-SATA/mPCI-E SEL (SW2)

Table 2.8: m-SATA/mPCI-E SEL (SW2)

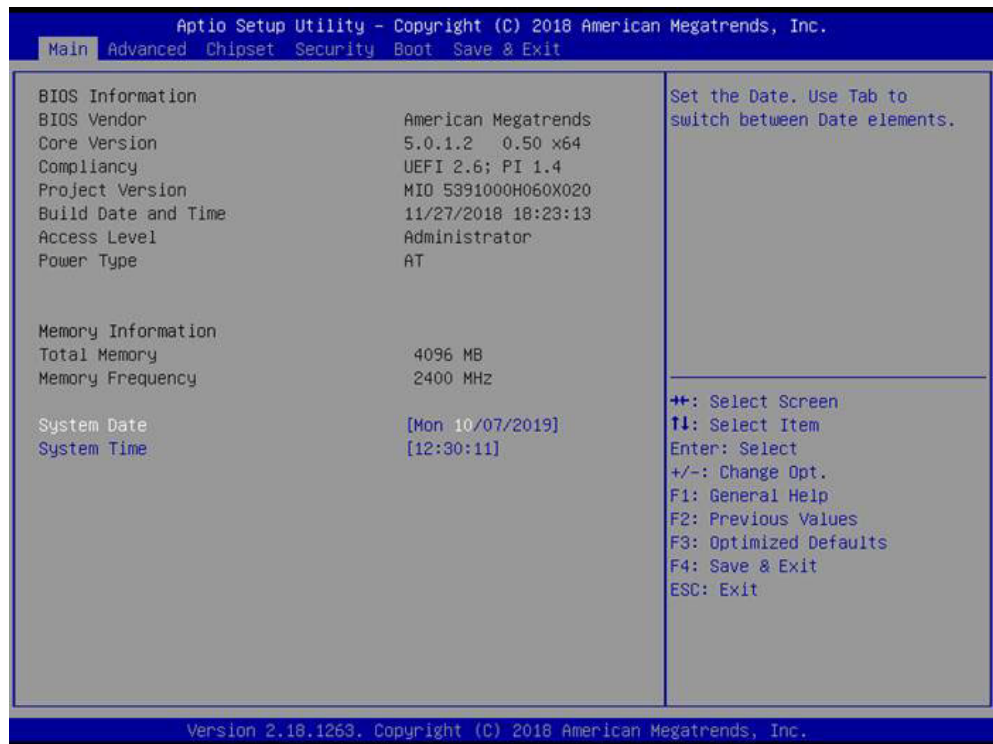
Part Number	1600000071
Footprint	SW_3P_CJS-1201TA1
Description	SLIDE SW CJS-1201TA1 SMD 3P SPDT P=6.0mm W=2.5mm
Setting	Function
(2->1)*	mPCI-E
(2->3)	m-SATA



Chapter 3

AMI BIOS Setup

AMIBIOS has been integrated into many motherboards for over a decade. 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-5391 BIOS setup screens.



AMI's 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.

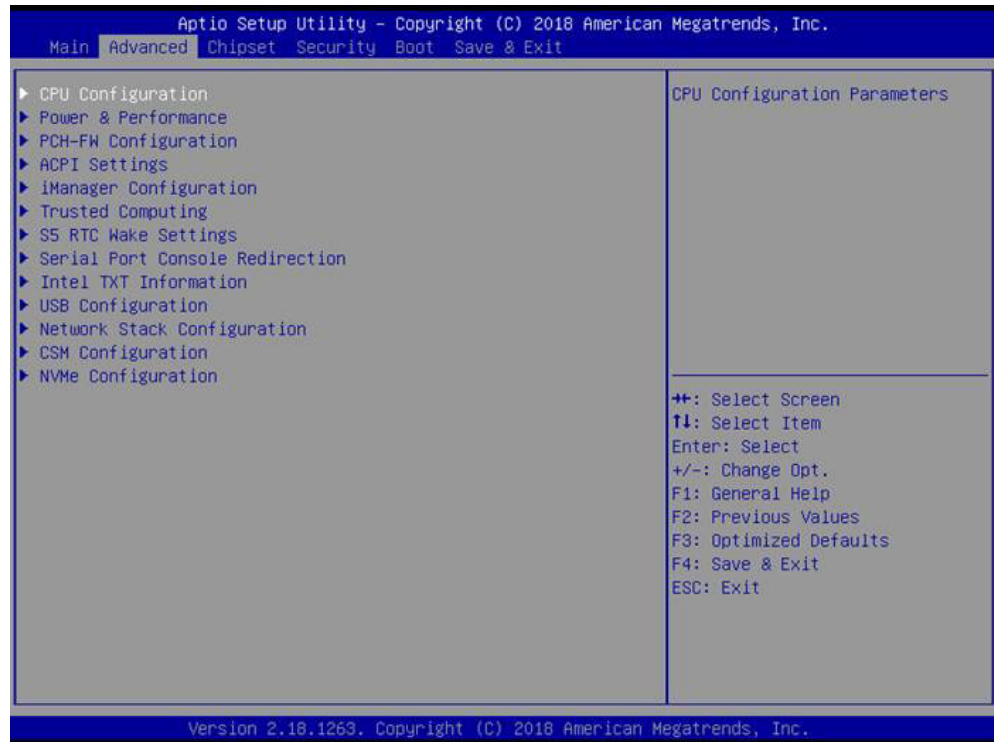
Above the key legend is an area reserved for a text message. When an option is selected in the left frame, it is highlighted in white. Often a text message will accompany it.

■ System time / System date

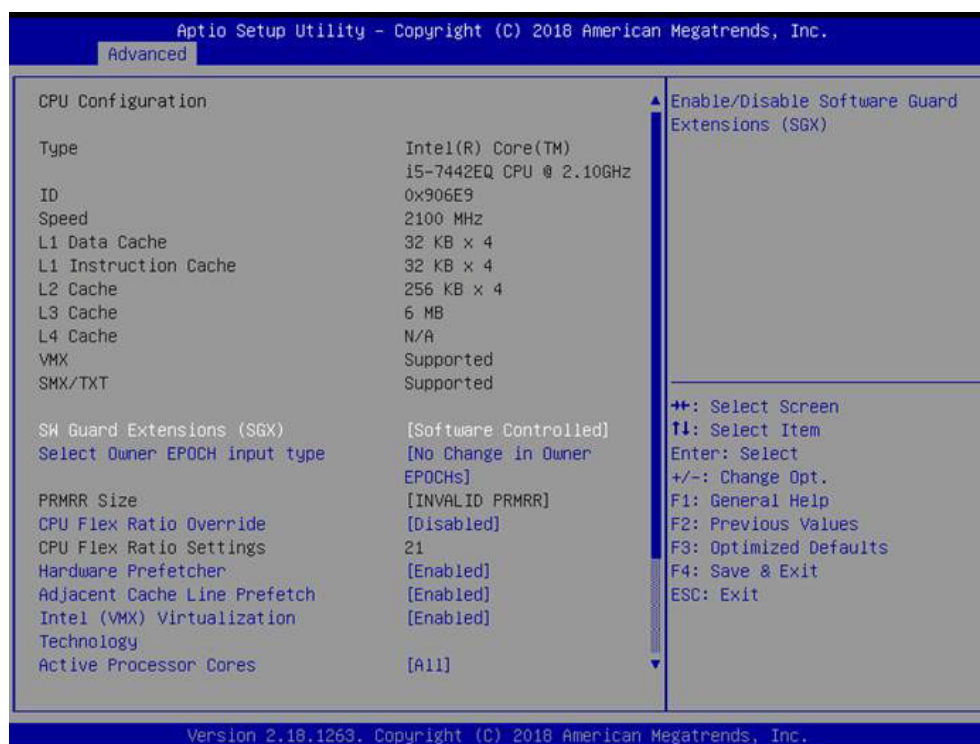
Use this option to change the system time and date. Highlight System Time or System Date using the <Arrow> keys. Enter new values through the keyboard. Press the <Tab> key or the <Arrow> keys to move between fields. The date must be entered in MM/DD/YY format. The time must be entered in HH:MM:SS format.

3.1.2 Advanced BIOS Features Setup

Select the Advanced tab from the MIO-5391 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 CPU Configuration



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



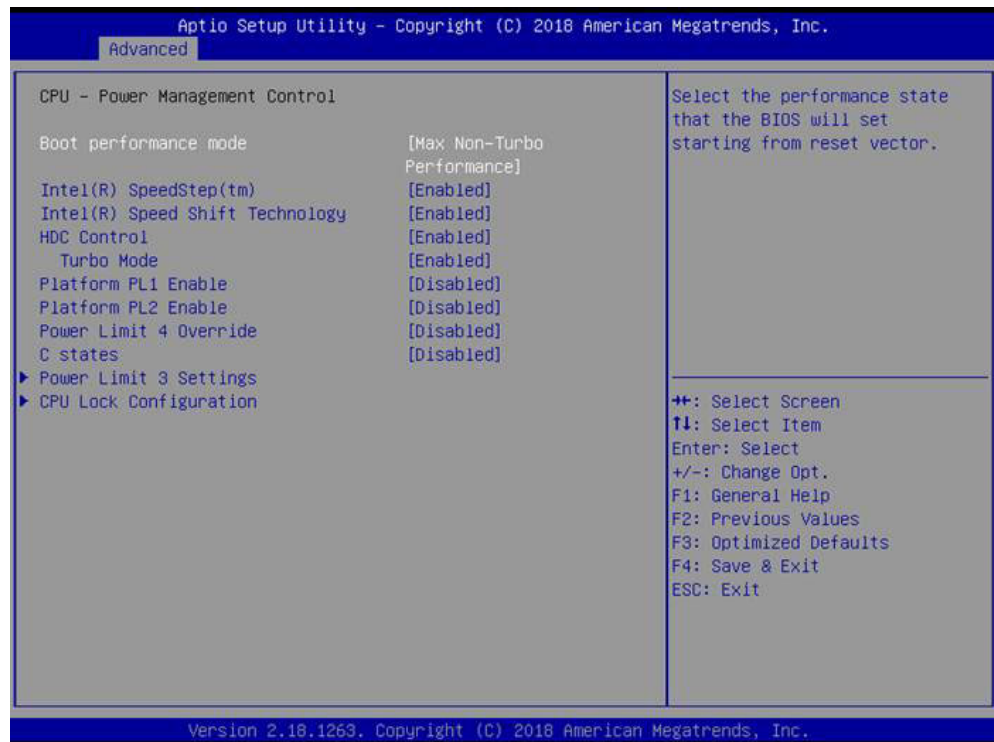
CPU – Power Management Control

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.

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.

Power Limit 3 Settings**Power Limit 3 Override**

Enable/Disable Power Limit 3 override.

CPU Lock Configuration



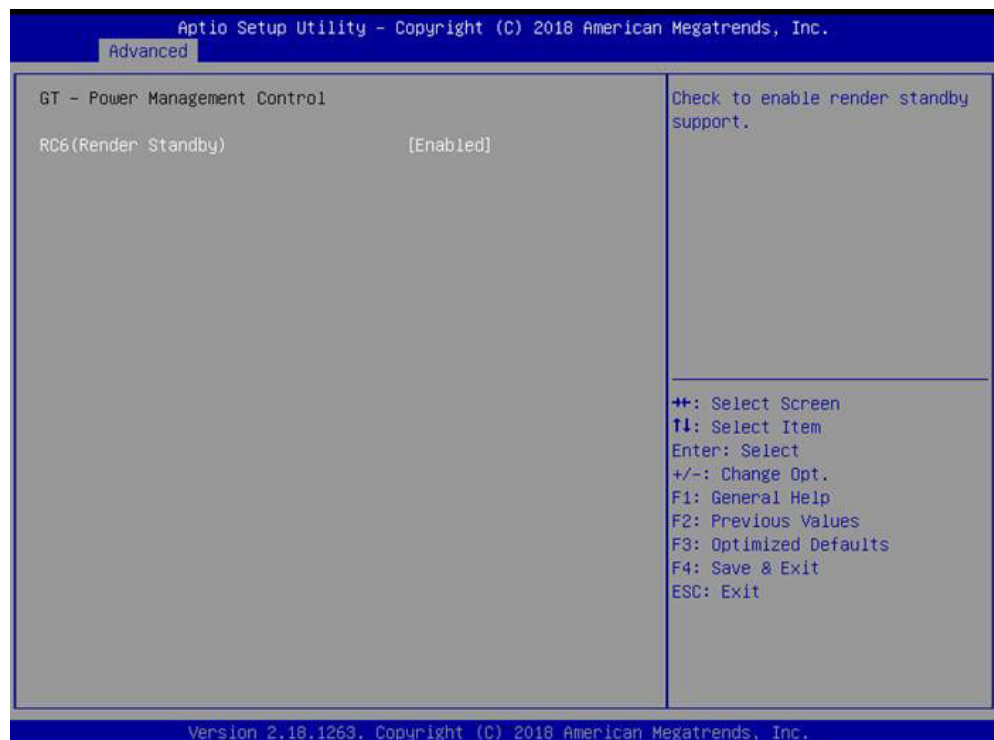
CFG Lock

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.

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.

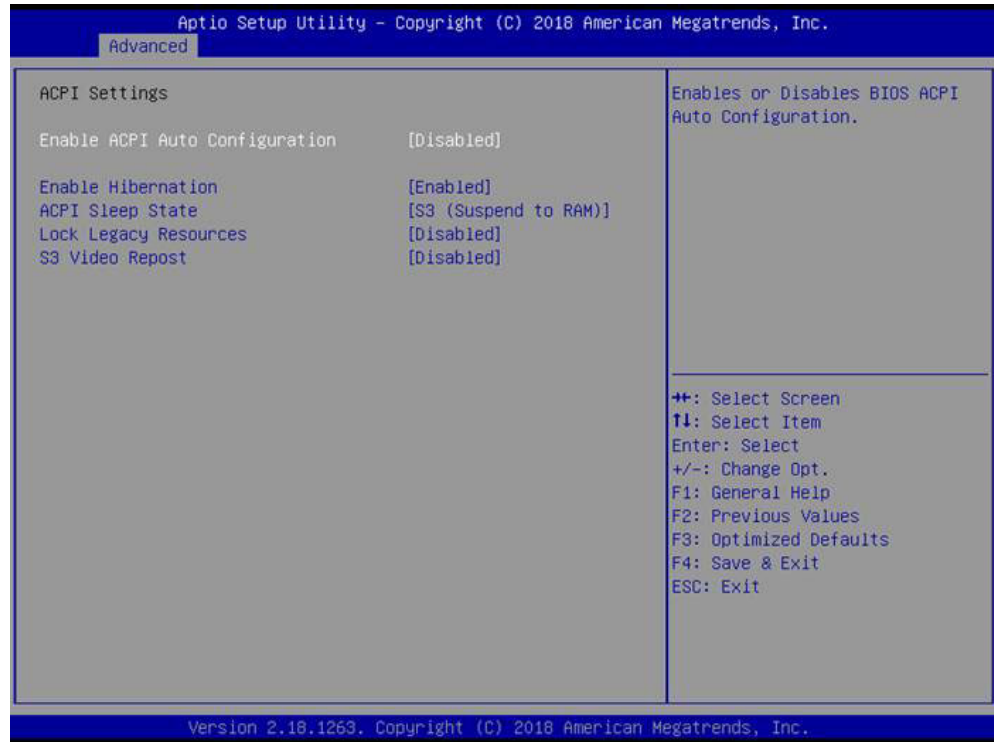
ME Unconfig on RTC Clear

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.

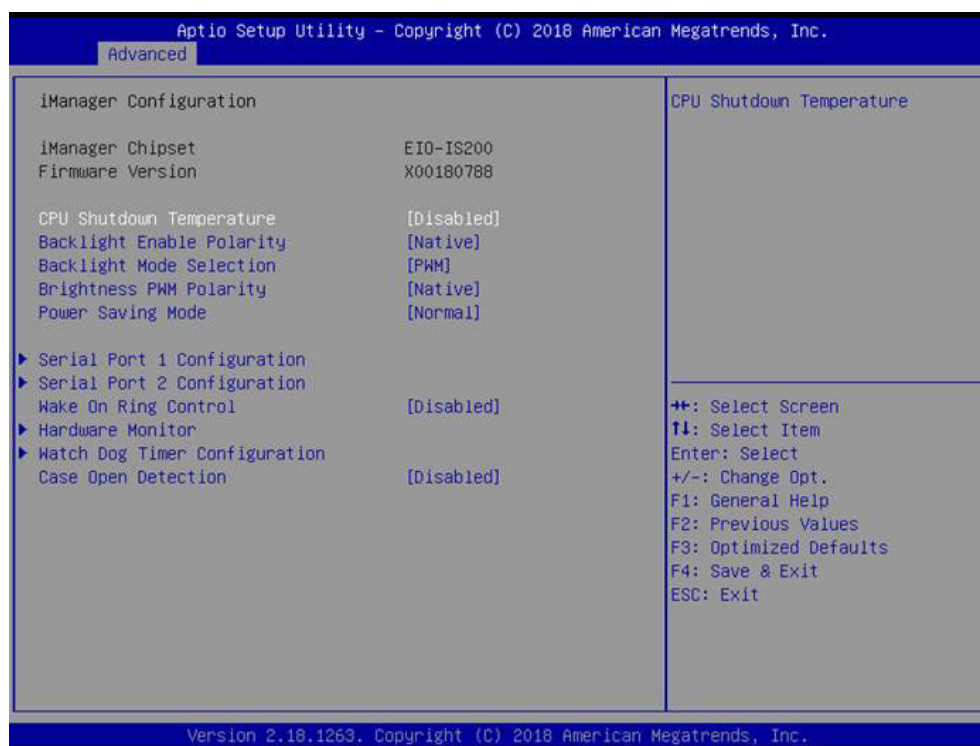
Lock Legacy Resources

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.

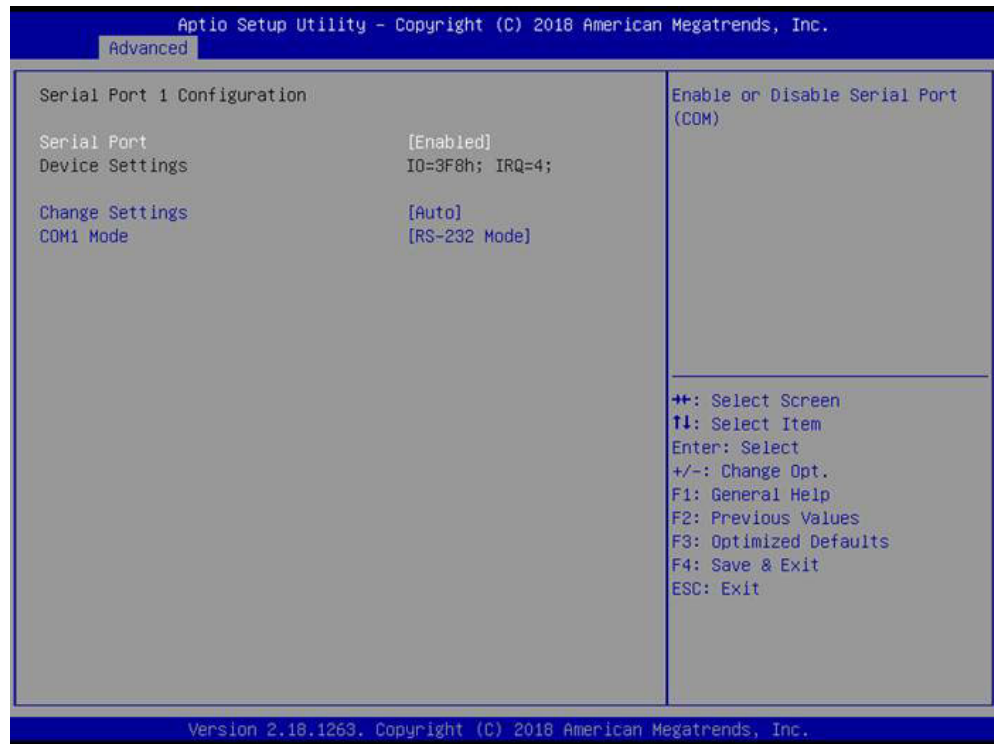
Watch Dog Timer Configuration

Watch Dog Timer Configuration Page.

Case Open Detection

Enable or Disable Case Open Detect Function.

Serial Port 1 Configuration



Serial Port

Enable or Disable Serial Port (COM).

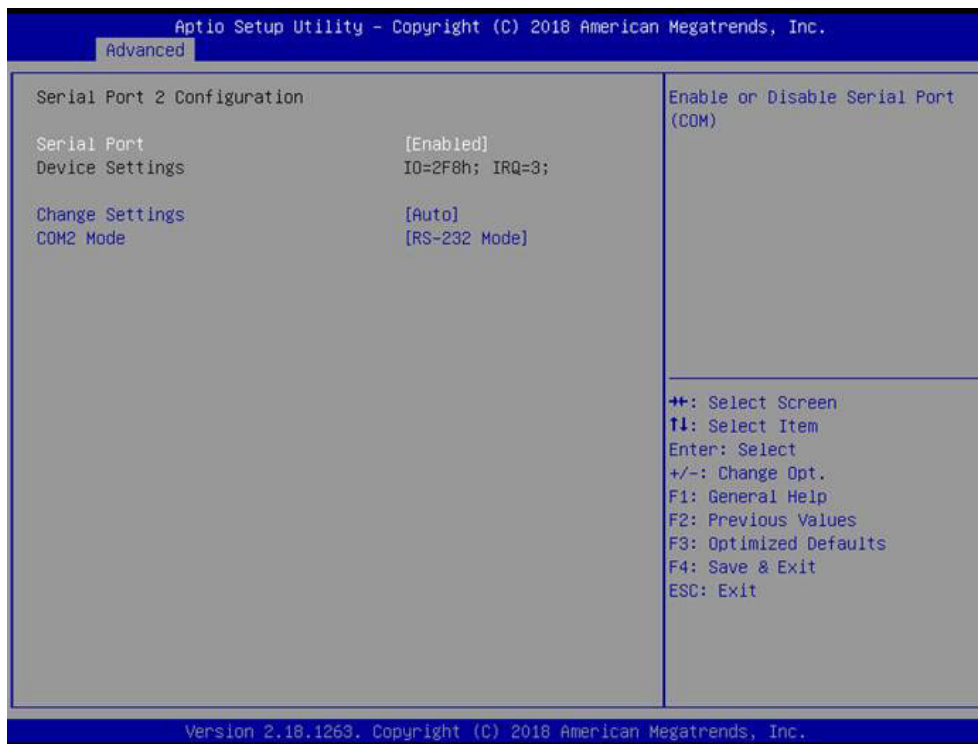
Change Settings

Select an optimal settings for Super IO device.

COM1 Mode

COM1 Mode Select.

Serial Port 2 Configuration



Serial Port

Enable or Disable Serial Port (COM).

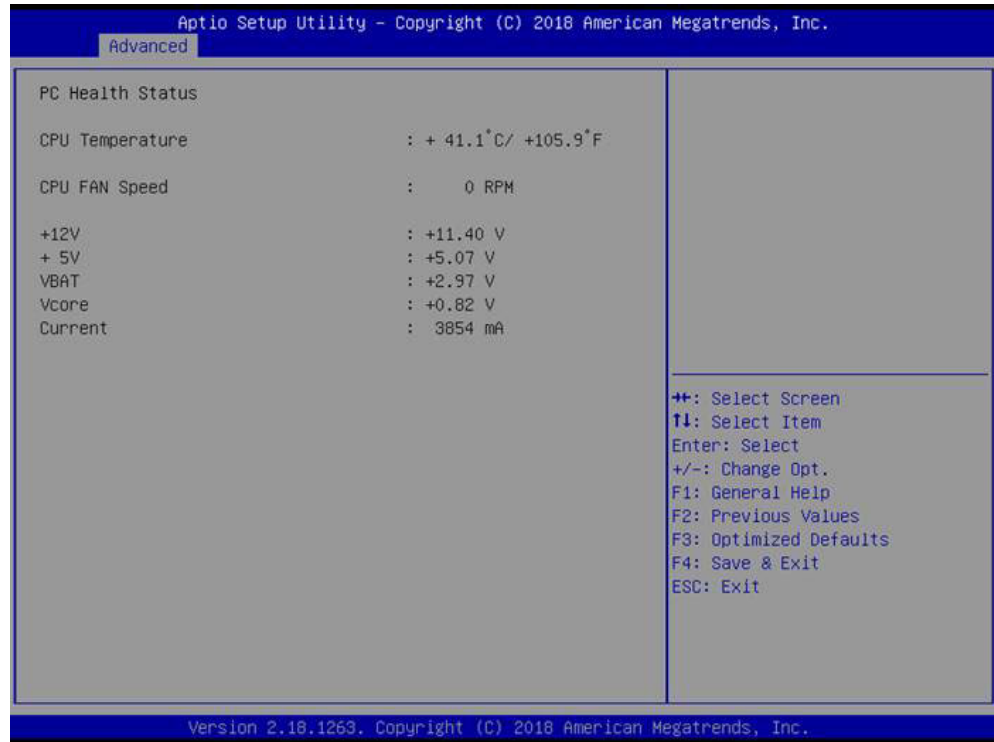
Change Settings

Select an optimal settings for Super IO device.

COM2 Mode

COM2 Mode Select.

Hardware Monitor



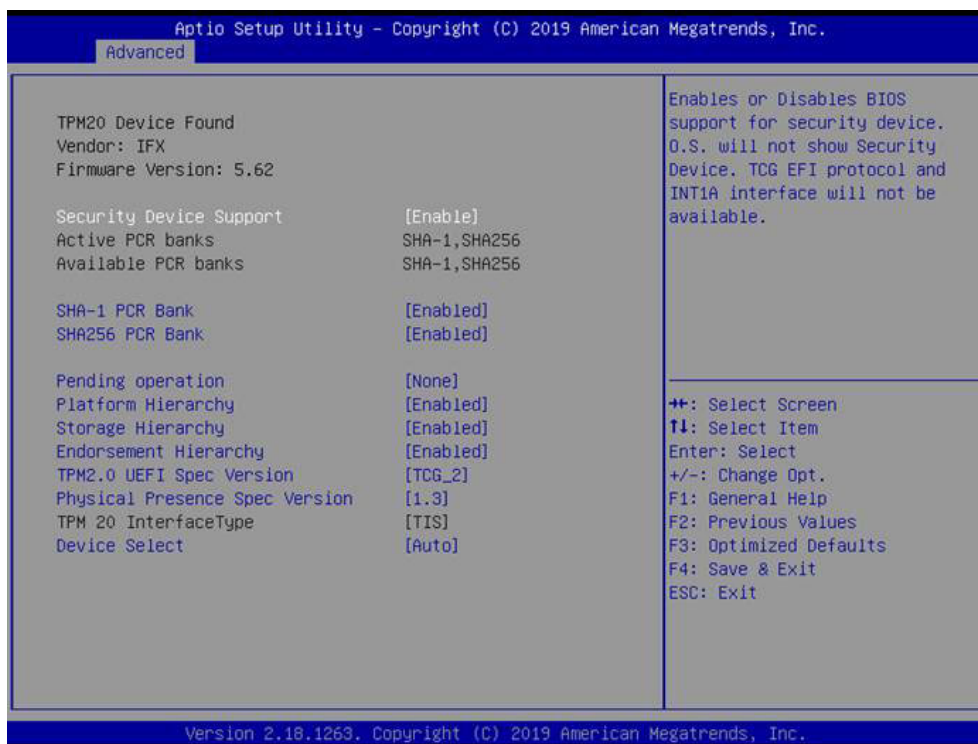
Watch Dog Timer Configuration



Watch Dog Timer

Enable or Disable Watch Dog Timer Function.

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.

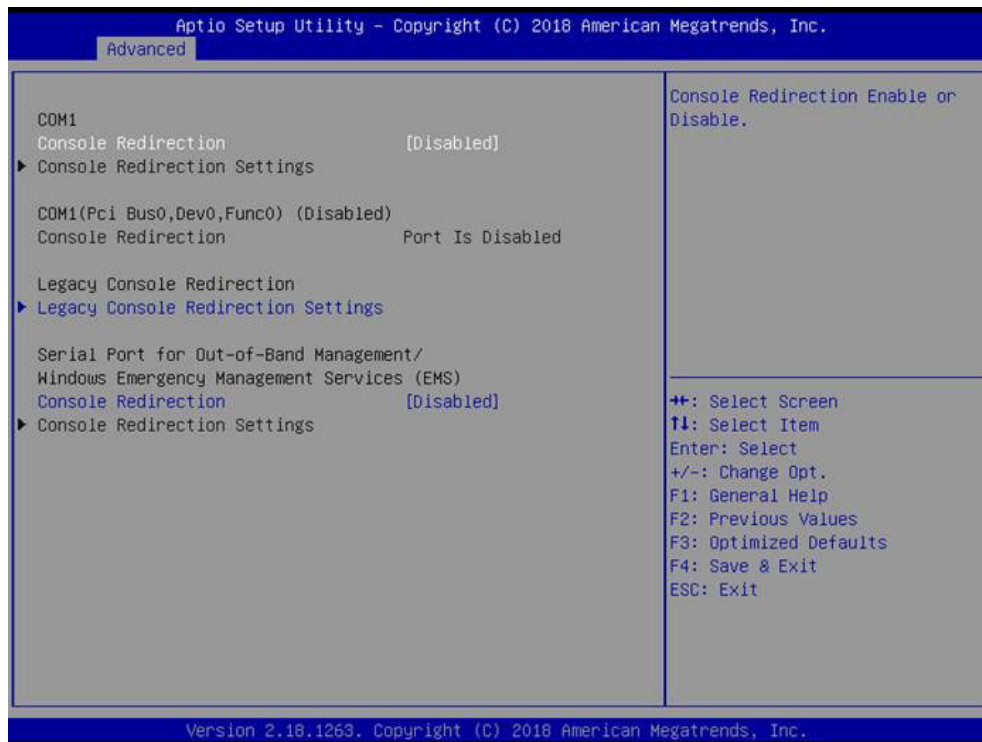
3.1.2.7 S5 RTC Wake Settings



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



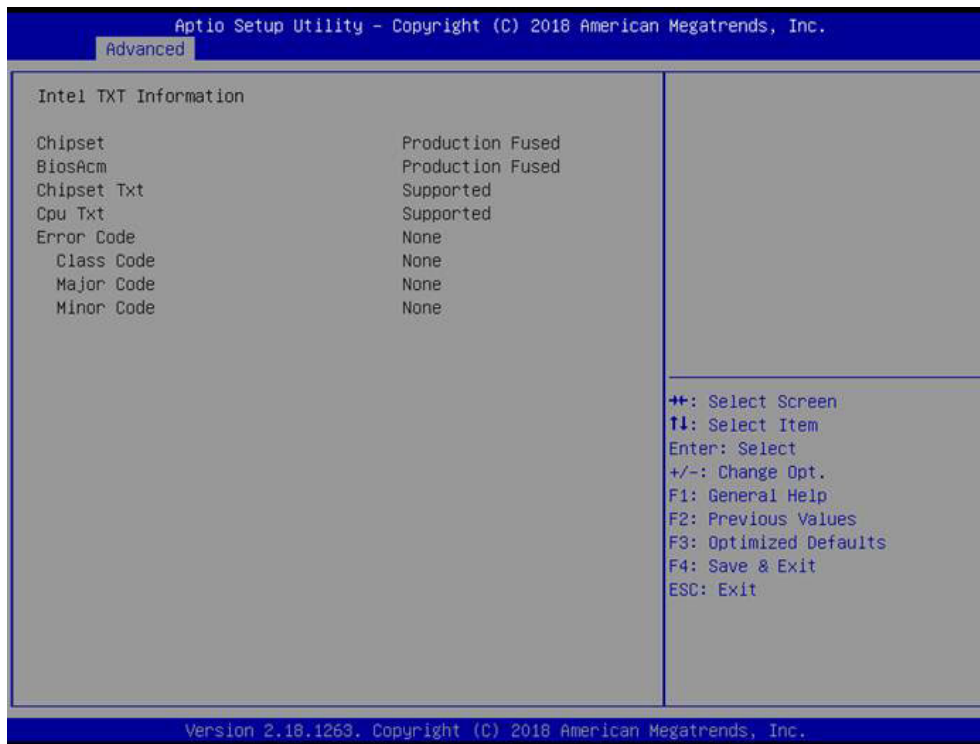
Console Redirection

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.

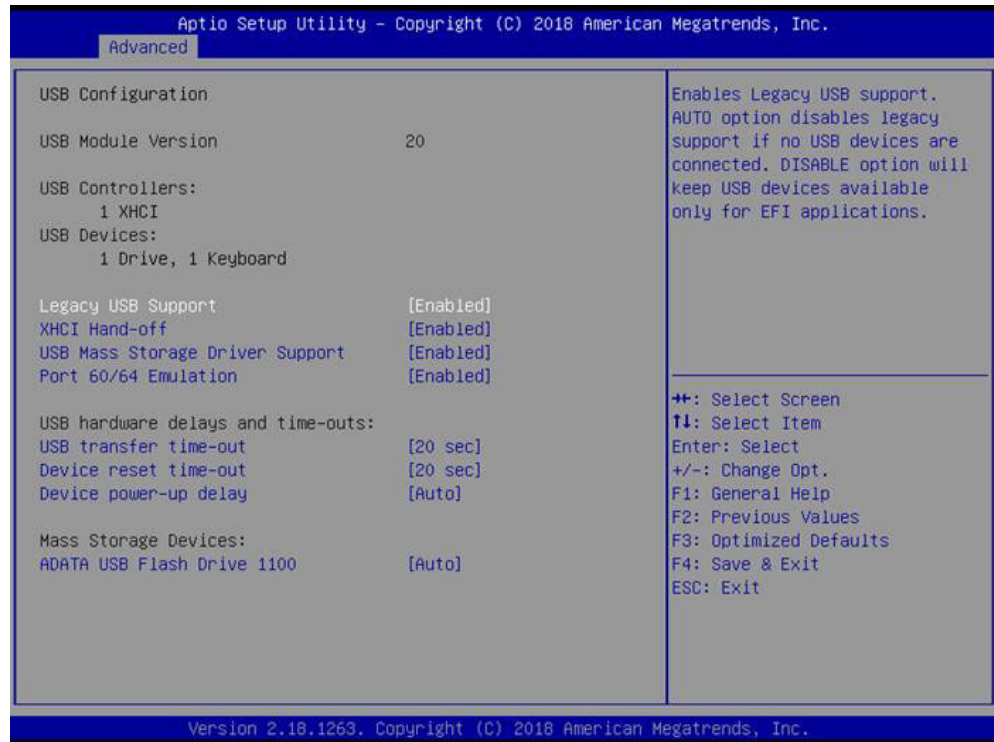
3.1.2.9 Intel TXT Information



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 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.

USB Mass Storage Driver Support

Enable/Disable USB Mass Storage Driver Support.

Port 60/64 Emulation

Enables I/O port 60h/64h emulation support. This should be enabled for the complete USB keyboard legacy support for non-USB aware OSEs.

USB transfer time-out

Time-out value for control, Bulk, and interrupt transfers.

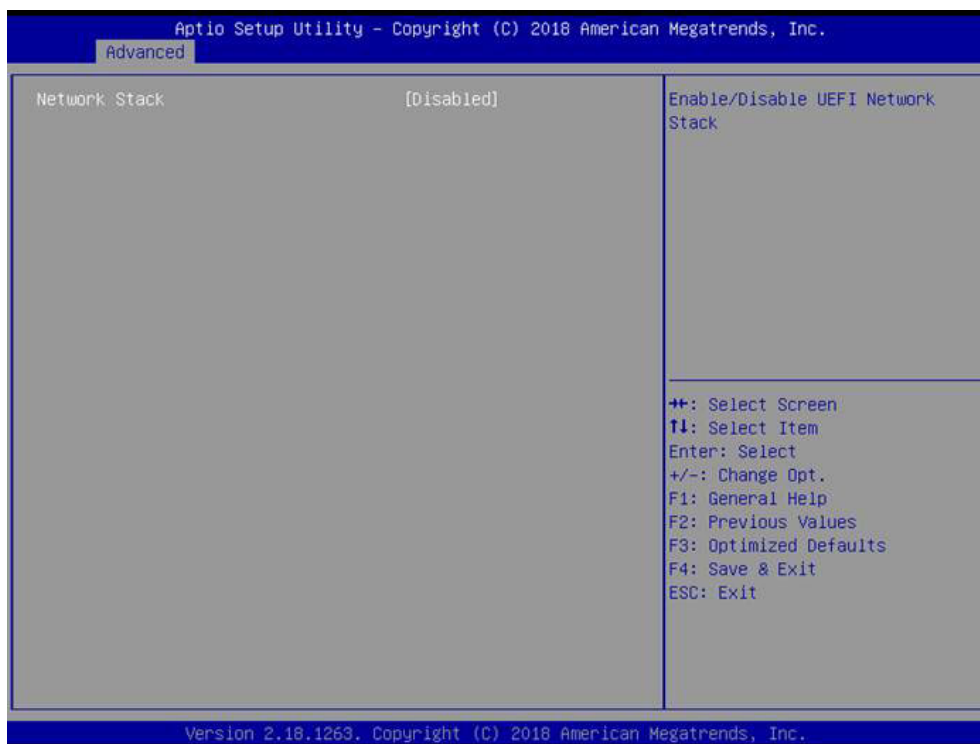
Device reset time-out

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.

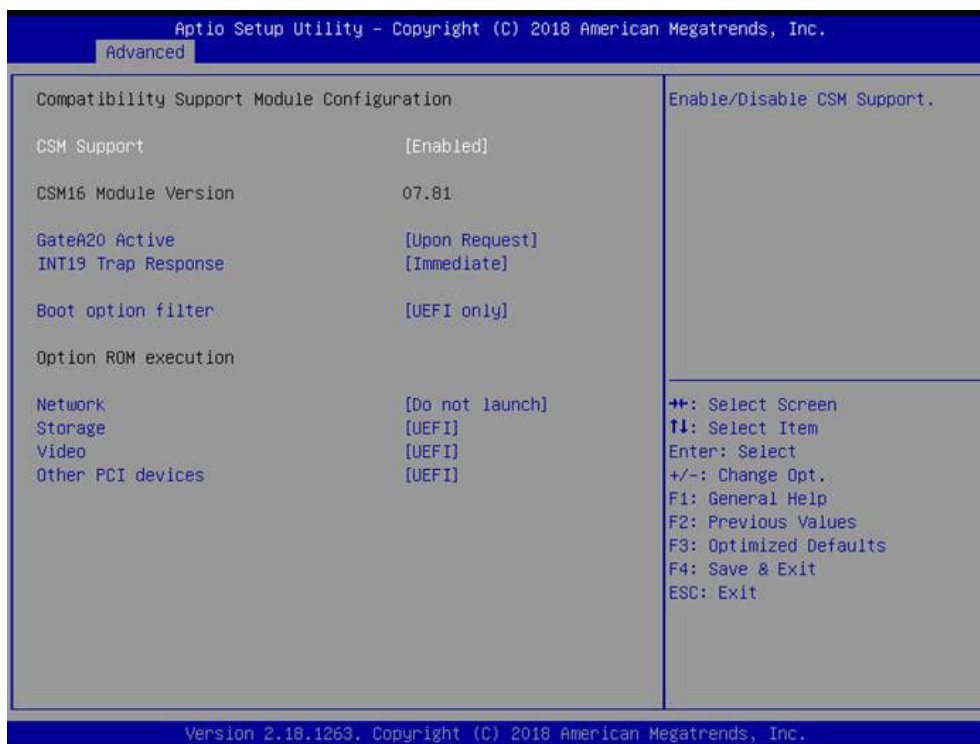
3.1.2.11 Network Stack Configuration



Network Stack

Enable/Disable UEFI Network Stack.

3.1.2.12 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

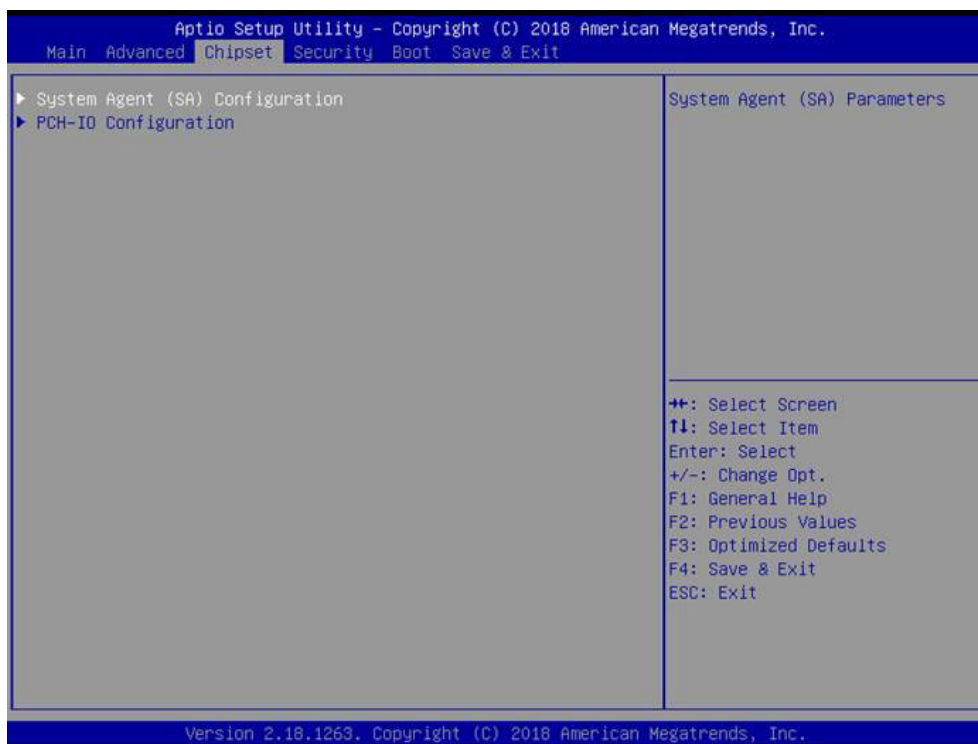
Determines OpROM execution policy for devices other than Network, Storage, or Video.

3.1.2.13 NVMe Configuration

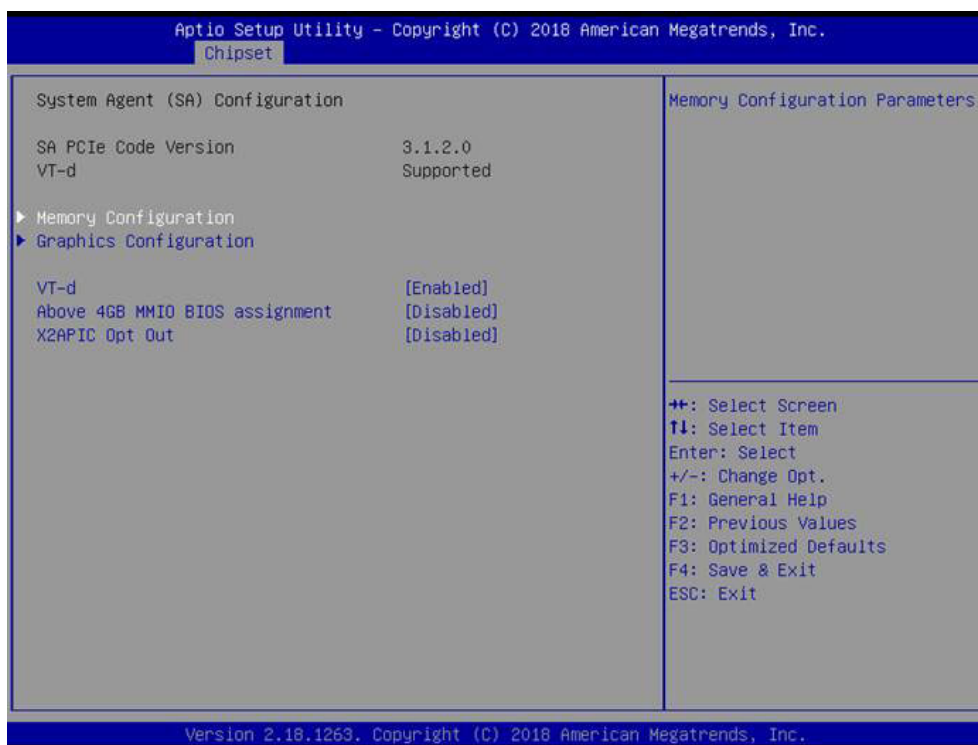


3.1.3 Chipset Configuration

Select the Chipset tab from the MIO-5391 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 Configuraiton

Graphics Configuration Parameters.

VT-d

VT-D capability.

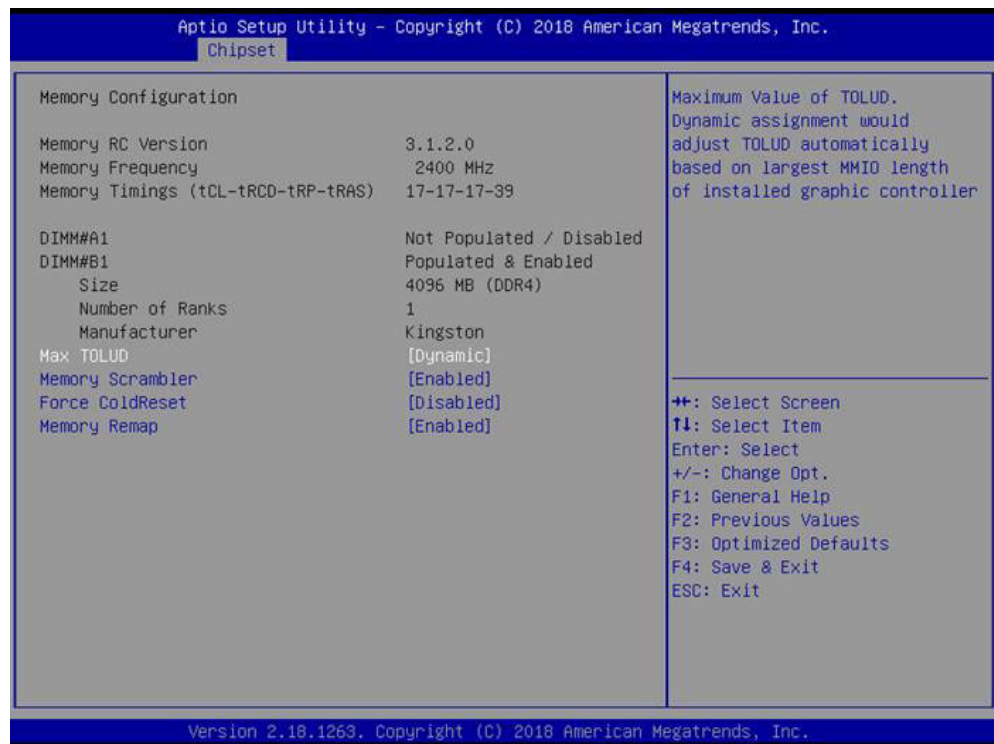
Above 4GB MMIO BIOS assignment

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.

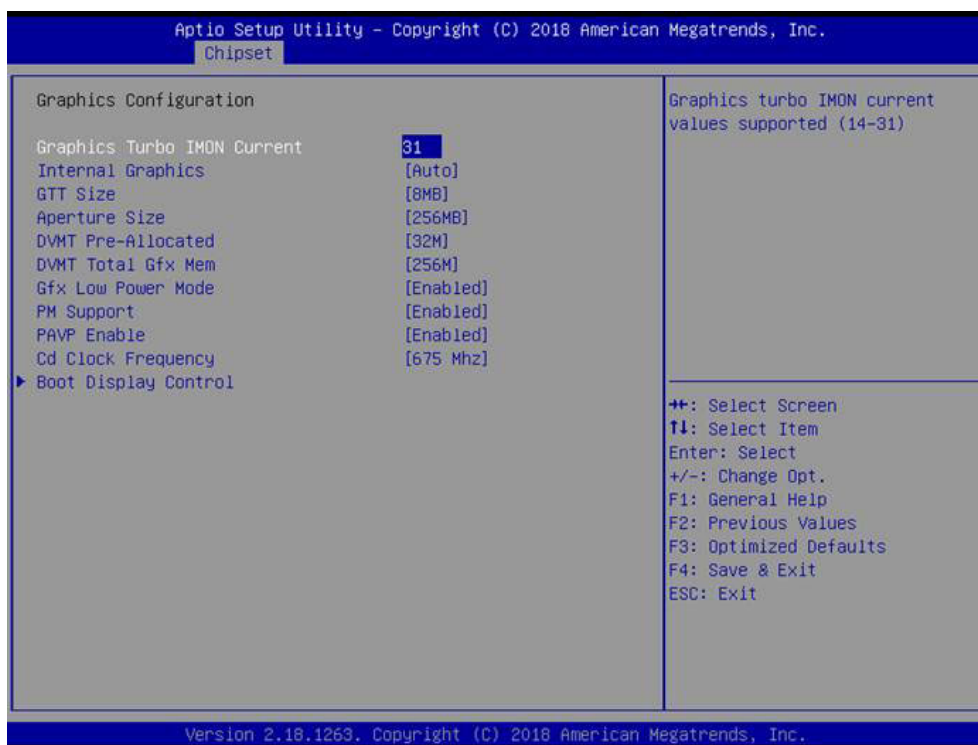
Force ColdReset

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 Support.

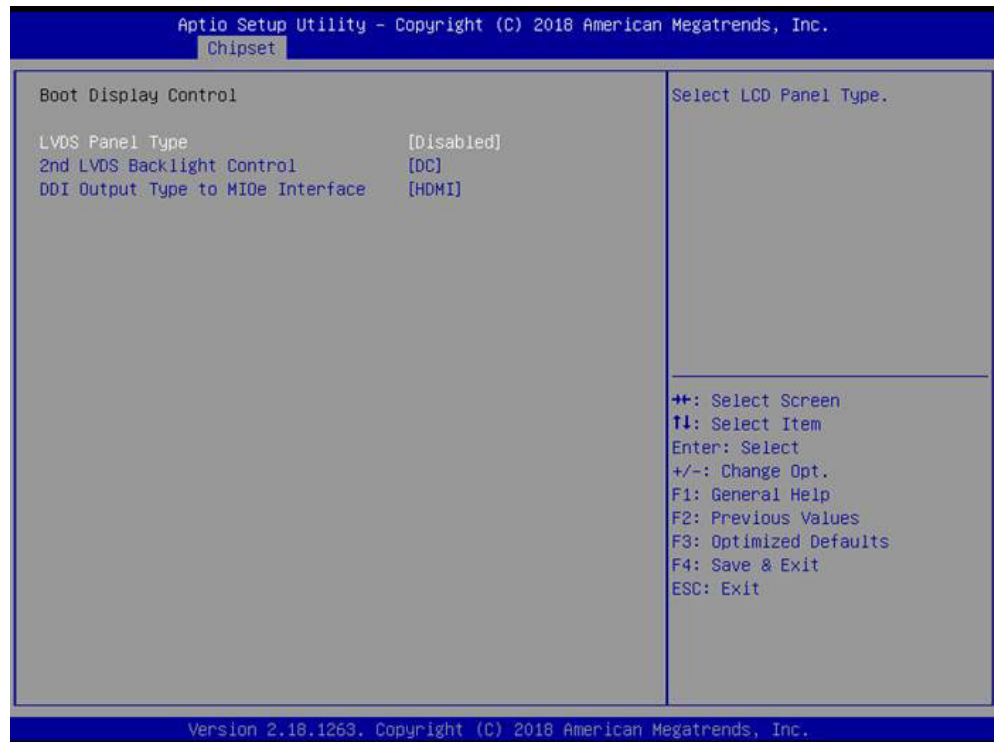
PAVP Enable

Enable/Disable PAVP.

CD Clock Frequency

Select the highest Cd clock frequency supported by this platform.

Boot Display Control



LVDS Panel Type

This item allow user to select LVDS panel type.

2nd LVDS Backlight Control

Switch Backlight Control for PWM or DC mode.

DDI Output Type to MIOe Interface

Select DDI Output Type (HDMI/DP) connect to MIOe Connector.

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.

PCH LAN Controller

Enable or Disable onboard NIC.

LAN Option 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.

LAN Option ROM

Enable or Disable onboard LAN's PXE option ROM.

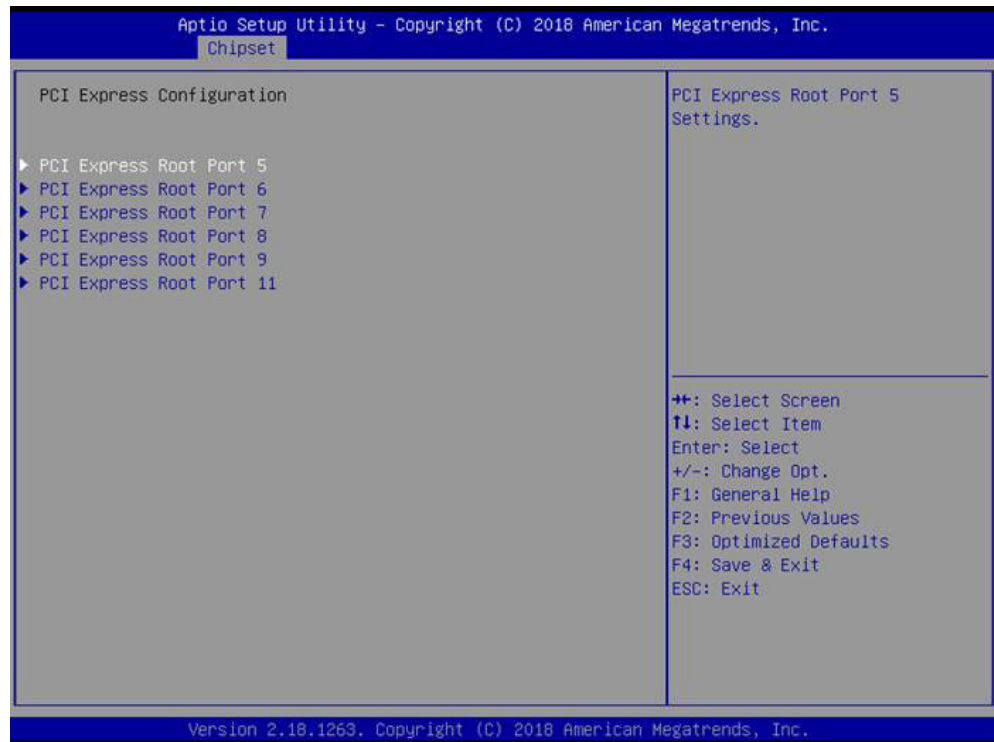
PCIE Wake

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).

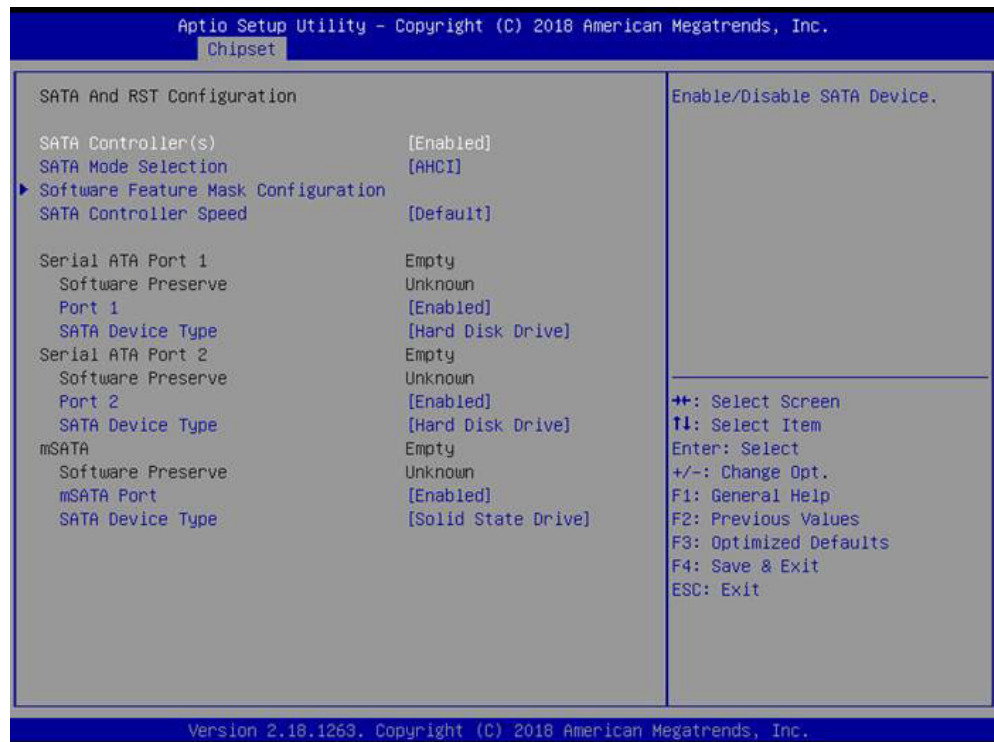
PCI Express Configuration



PCI Express Root Port 5/6/7/8/9/11

PCI Express Port 5/6/7/8/9/11 Settings.

SATA and RST Configuration



SATA Controller(s)

Enable/Disable SATA Device.

SATA Mode Selection

Determine how SATA controller operate.

Software Feature Mask Configuration

RST Legacy ROM/RST UEFI Driver will refer to the SWFM configuration to enable/disable the storage feature.

SATA Controller Speed

Indicates the maximum speed the SATA controller can support.

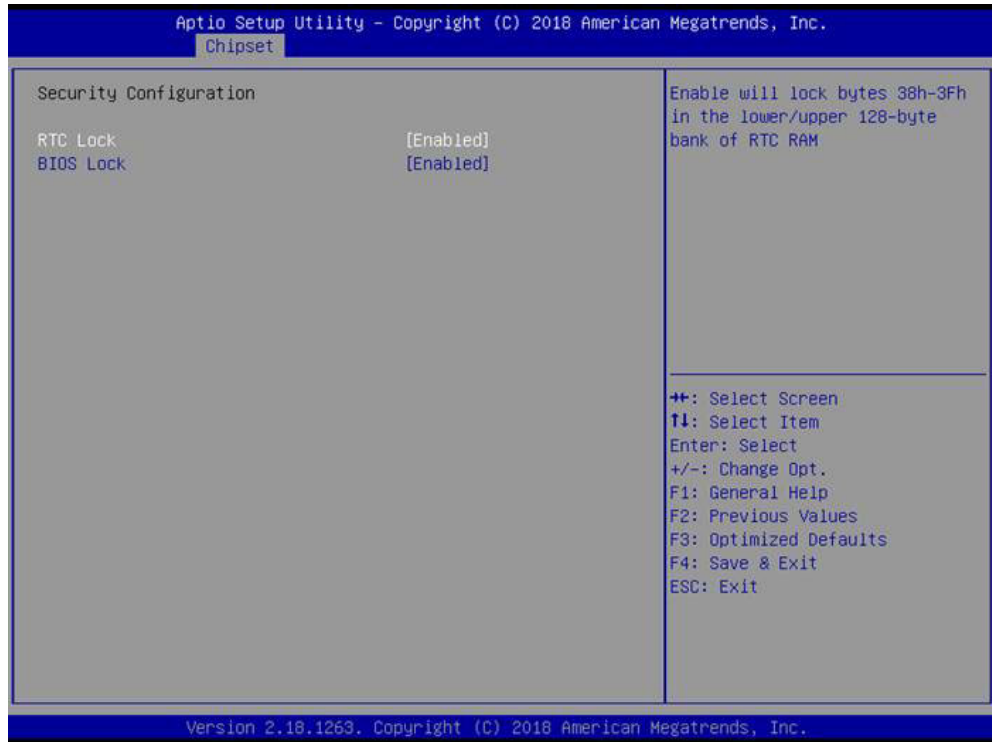
USB Configuration**XHCI Disable Compliance mode**

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.

3.1.4 Security

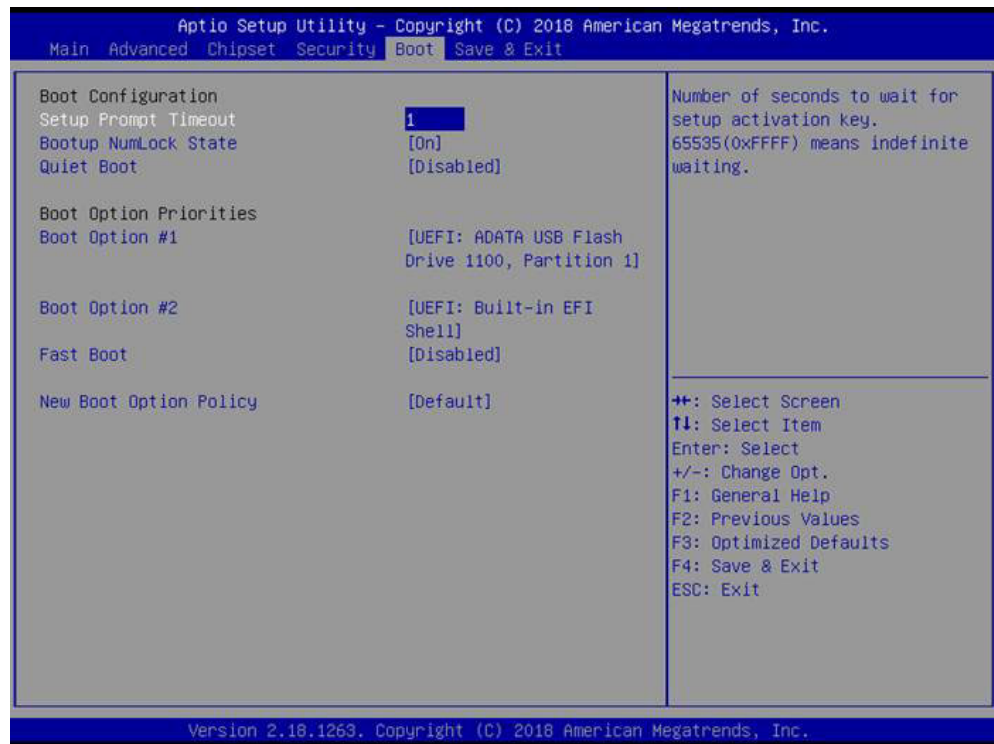


Select Security Setup from the MIO-5391 Setup main BIOS setup menu. All Security Setup options, such as password protection and virus protection are described in this section. To access the sub menu for the following items, select the item and press <Enter>:

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.

New Boot Option Policy

Controls the placement of newly detected UEFI 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

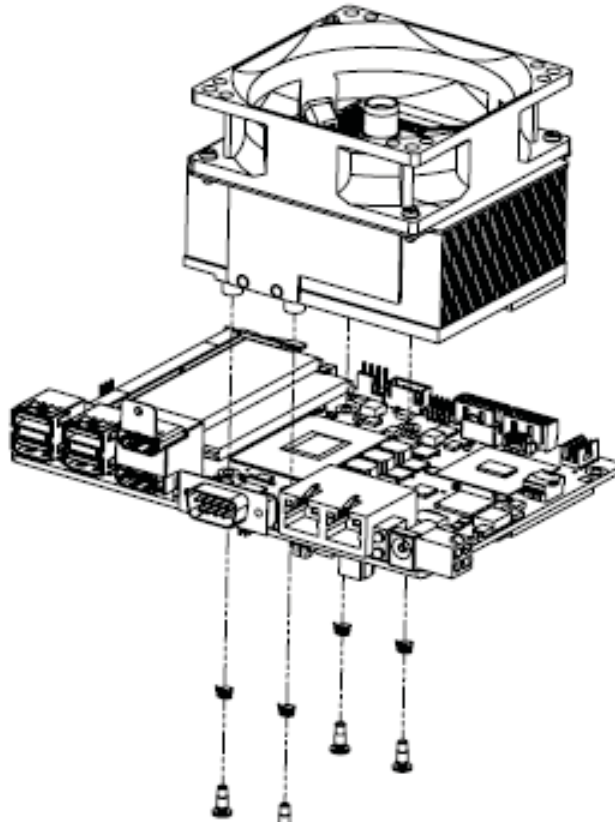
MIOe Installation

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

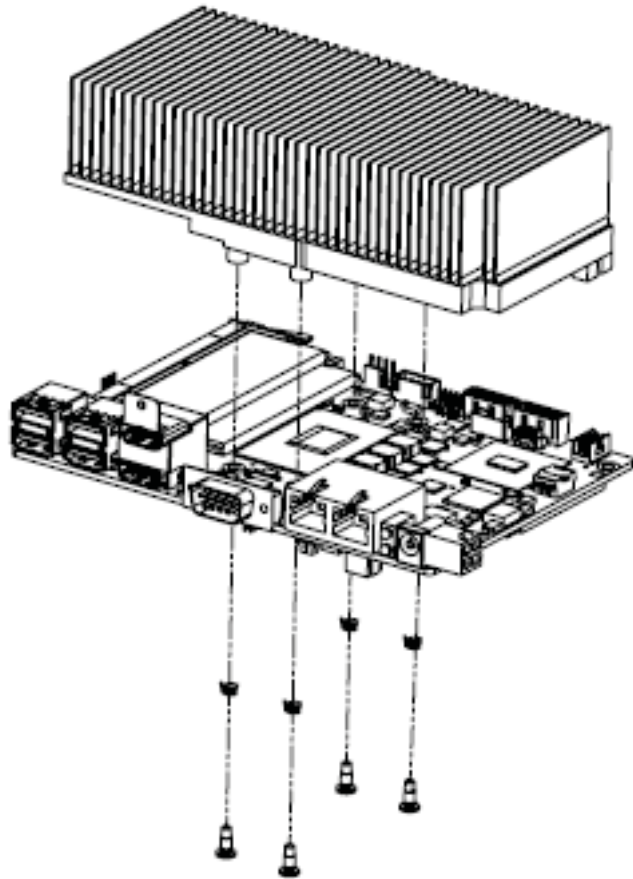
4.1 Quick Installation Guide

There is a Heatsink/Cooler (or optional heatspreader) in the white box inside the package, and please assembly it by following explosion drawing.

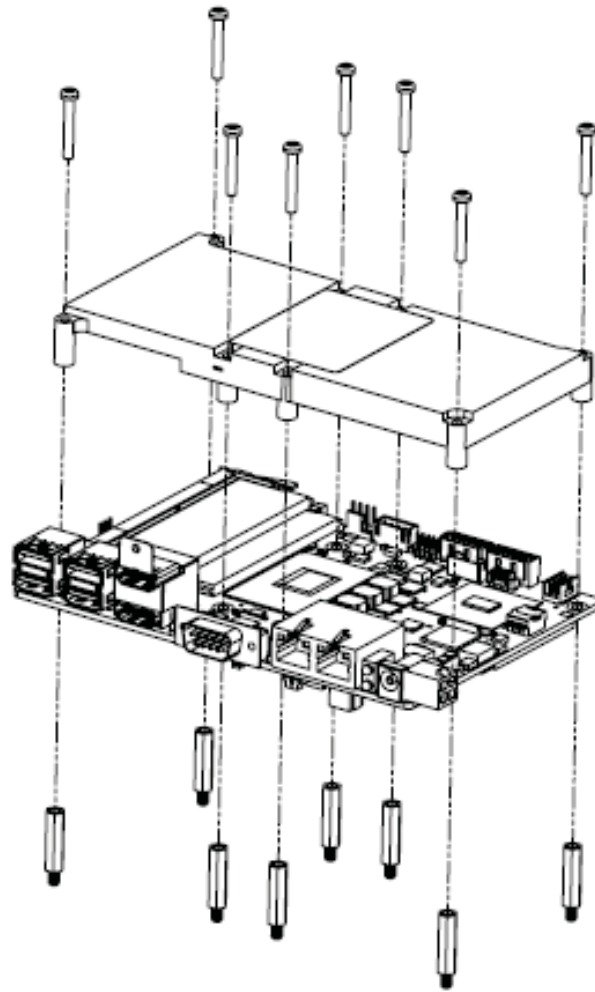
4.1.1 Cooler



4.1.2 Heatsink



4.1.3 Heatspreader



Appendix **A**

Pin Assignments

This appendix contains information of a detailed or specialized nature.

Sections include:

- Jumper and Connector Tables

A.1 Jumper and Connector Setting

Table A.1: Jumper Setting

J2	Auto Power On Setting
J3	LCD Power
J4	LVDS VCON Setting
J6	Serial Port Voltage Select
SW1	Clear CMOS
SW2	NL/CJS-1201TA1

Table A.2: Connector Table

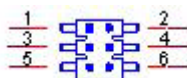
CN1	12V Power Input
CN2	DC JACK
CN4	Battery
CN5	COM1
CN6	SODIMMDDR4_260
CN7	SODIMMDDR4_260
CN18	LAN
CN20	Audio
CN21	External USB3.0
CN22	External USB3.0
CN23	Internal USB
CN24	SATA Power
CN25	SATA
CN27	SATA
CN30	MIOe
CN31	SMBus
CN32	Smart FAN
CN33	Inverter Power Output
CN34	48-bit LVDS Panel
CN36	HDMI
CN37	M.2 E Key
CN38	COM2
CN45	Front Panel
CN47	Mini PCIE
CN48	GPIO
CN49	SIM Card
CN50	GPIO

Table A.3: J2 Auto Power On Setting

Part Number	1653002101-02
Footprint	HD_2x1P_79_D
Description	PIN HEADER 2x1P 2.0mm 180D(M) DIP 21N12050
Setting	Function
NC	Power Button for Power On
(1-2)*	Auto Power On

**Table A.4: J3 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

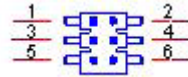
**Table A.5: J4 LVDS VCON Setting**

Part Number	1653000014
Footprint	HD_2x2P_79
Description	PIN HEADER 2x2P 2.00mm 180D(M) SMD 21N22050
Setting	Function
(1-2)*	3.3V High for VCON on LVDS
(1-3)	Low for VCON on LVDS

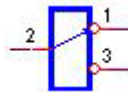


Table A.6: J6 Serial Port Voltage Select

Part Number	1653003260
Footprint	HD_3x2P_79
Description	PIN HEADER 3x2P 2.0mm 180D(M) SMD 21N22050
Setting	Function
(1-2)	+5V
(3-4) *	COM3_RI#
(5-6)	+12V

**Table A.7: SW Clear CMOS**

Part Number	1600000071
Footprint	SW_3P_CJS-1201TA1
Description	SLIDE SW CJS-1201TA1 SMD 3P SPDT P=6.0mm W=2.5mm
Setting	Function
(2->1)*	Normal
(2->3)	Clear COMS

**Table A.8: SW2 m-SATA/mPCI-E SEL**

Part Number	1600000071
Footprint	SW_3P_CJS-1201TA1
Description	SLIDE SW CJS-1201TA1 SMD 3P SPDT P=6.0mm W=2.5mm
Setting	Function
(2->1)*	mPCI-E
(2->3)	m-SATA

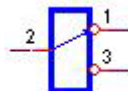
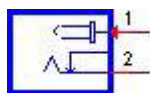


Table A.9: CN1 12V Power Input

Part Number	1655003861
Footprint	WF_2x2P_165_BOX_RA_D_740-77
Description	ATX PWR Conn. 2x2P 4.2mm 90D(M) DIP 740-77-04TS0
Pin	Pin Name
1	GND
2	GND
3	+12V or DC IN
4	+12V or DC IN

**Table A.10: CN2 DC JACK**

Part Number	1652005278
Footprint	PJ_3P_2DC-0005
Description	POWER JACK 3P 2.5mm 90D(M) DIP 2DC-0005B100
Pin	Pin Name
1	+VIN
2	GND

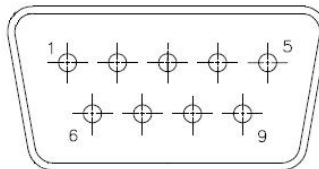
**Table A.11: CN4 Battery**

Part Number	1655005427-01
Footprint	WF_2P_49_53398-0271
Description	WAFER 2P 1.25mm 180D(M) SMD 53398-0271
Pin	Pin Name
1	GND
2	+3.3V



Table A.12: CN5 COM1

Part Number	1654011262-01
Footprint	DBCOM-VM5MS
Description	D-SUB 9P 2.77mm 90D(M) DIP G/F DSB5-09M1-KNR0-90
Pin	Pin Name
1	DCD#
2	RXD
3	TXD
4	DTR#
5	GND
6	DSR#
7	RTS#
8	CTS#
9	RI#

**Table A.13: CN6 SODIMMDDR4_260**

Part Number	1651002909-02
Footprint	SODIMMDDR4_260P_AS0A826-HARB
Description	DDR4 SODIMM 260P/0.5mm/LCP/RA/G10u/S/BK/H9.2/RVS
Pin	Pin Name

Table A.14: CN7 SODIMMDDR4_260

Part Number	1651002908-01
Footprint	SODIMMDDR4_260P_AS0A826-H2RB
Description	DDR4 SODIMM H=5.2mm 260P SMD REV. AS0A826-H2RB-7
Pin	Pin Name

Table A.15: CN18 LAN CONN

Part Number	1652003274
Footprint	RJ45_28P_RTB-19GB9J1A
Description	PHONE JACK RJ45 28P DIP RTB-19GB9J1A
Pin	Pin Name
A1	LAN1_MDI0+
A2	LAN1_MDI0-
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	+3.3V_LAN1
A13	LAN1_LINK100#
A14	LAN1_LINK1000#
B1	LAN2_MDI0+
B2	LAN2_MDI0-
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	+3.3V_LAN2
B13	LAN2_LINK100#
B14	LAN2_LINK1000#

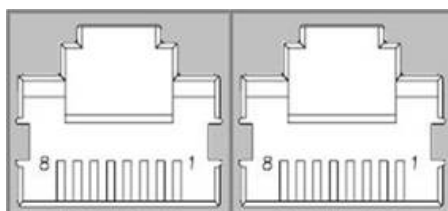
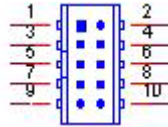


Table A.16: CN20 Audio

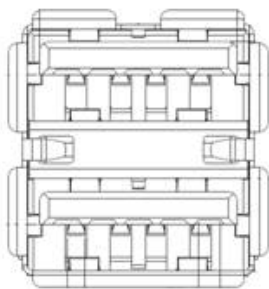
Part Number	1653004099
Footprint	HD_5x2P_79_23N685B-10M10
Description	BOX HEADER 5x2P 2.00mm 180D(M) SMD 23N685B-10M10
Pin	Pin Name
1	LOUTR
2	LINR
3	GND
4	GND
5	LOUTL
6	LINL
7	GND
8	GND
9	MIC1R
10	MIC1L



Matching Cable: 1703100152

Table A.17: CN21 External USB3.0

Part Number	1654011725-01
Footprint	USB_9x2P_WDU3R-18F3B4PBUW3
Description	Double USB 3.0 CONN. 18P 90D(F) DIP WDU3R-18F6B4
Pin	Pin Name
1	+5V
2	USB1_D-
3	USB1_D+
4	GND
5	USB1_SSRX-
6	USB1_SSRX+
7	GND
8	USB1_SSTX-
9	USB1_SSTX+
10	+5V
11	USB2_D-
12	USB2_D+
13	GND
14	USB2_SSRX-
15	USB2_SSRX+
16	GND
17	USB2_SSTX-
18	USB2_SSTX+


Table A.18: CN22 External USB3.0

Part Number	1654011725-01
Footprint	USB_9x2P_WDU3R-18F3B4PBUW3
Description	Double USB 3.0 CONN. 18P 90D(F) DIP WDU3R-18F6B4
Pin	Pin Name
1	+5V
2	USB3_D-
3	USB3_D+
4	GND
5	USB3_SSRX-
6	USB3_SSRX+
7	GND
8	USB3_SSTX-
9	USB3_SSTX+
10	+5V
11	USB4_D-
12	USB4_D+
13	GND
14	USB4_SSRX-
15	USB4_SSRX+
16	GND
17	USB4_SSTX-
18	USB4_SSTX+

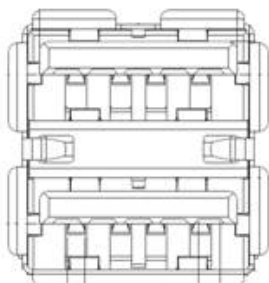


Table A.19: CN23 Internal USB

Part Number	1653005260
Footprint	HD_5x2P_79_N10
Description	PIN HEADER 2x5P 2.0mm 180D(M) SMD 21N22050
Pin	Pin Name
1	+5V
2	+5V
3	USB7_D-
4	USB8_D-
5	USB7_D+
6	USB8_D+
7	GND
8	GND
9	GND

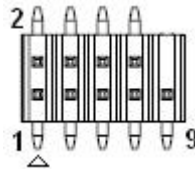


Table A.20: CN24 SATA Power

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

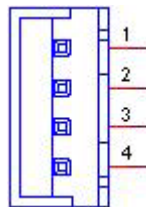
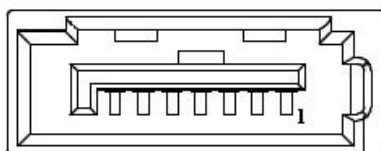


Table A.21: CN25 SATA

Part Number	1654013615-01
Footprint	SATA_7P_WATF-07DBN6SB1U
Description	SATA 7P/1.27mm/LCP/F/VA/G15u/S/BK/H8.41/W Post
Pin	Pin Name
1	GND
2	TX+
3	TX-
4	GND
5	RX-
6	RX+
7	GND

**Table A.22: CN27 SATA**

Part Number	1654013615-01
Footprint	sata_7p_watf-07dbn6sb1u
Description	SATA 7P/1.27mm/LCP/F/VA/G15u/S/BK/H8.41/W Post
Pin	Pin Name
1	GND
2	TX+
3	TX-
4	GND
5	RX-
6	RX+
7	GND

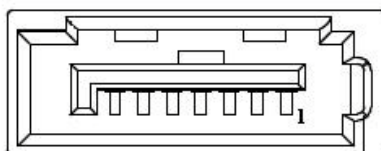


Table A.23: CN30 MIOe

Part Number	1654006235		
Footprint	BB_40x2P_32_1625x285_2HOLD		
Description	B/B Conn. 40x2P 0.8mm 180D(F) SMD QSE-040-01-L-D		
Pin	Pin Name	Pin	Pin Name
1	GND	2	GND
3	PCIE_RX1+	4	PCIE_TX1+
5	PCIE_RX1-	6	PCIE_TX1-
7	GND	8	GND
9	PCIE_RX2+	10	PCIE_TX2+
11	PCIE_RX2-	12	PCIE_TX2-
13	GND	14	GND
15	PCIE_RX3+	16	PCIE_TX3+
17	PCIE_RX3-	18	PCIE_TX3-
19	GND	20	GND
21	PCIE_RX4+	22	PCIE_TX4+
23	PCIE_RX4-	24	PCIE_TX4-
25	GND	26	GND
27	PCIE_CLK11+	28	LOUTL
29	PCIE_CLK11-	30	LOUTR
31	GND	32	GND_AGND
33	SMB_STB_CLK	34	NC
35	SMB_STB_DAT	36	NC
37	PCIE_WAKE#	38	NC
39	RESET#	40	NC
41	SLP_S3#	42	CLK
43	NC	44	LPC_AD0
45	DDP_HPD	46	LPC_AD1
47	GND	48	LPC_AD2
49	DDP_AUX+/DDC_CLK	50	LPC_AD3
51	DDP_AUX-/DDC_DAT	52	NC
53	GND	54	LPC_SERIRQ
55	DDP3_TX0+	56	LPC_FRAME#
57	DDP3_TX0-	58	GND
59	GND	60	USB5_D+
61	DDP3_TX1+	62	USB5_D-
63	DDP3_TX1-	64	GND
65	GND	66	USB5_SSTX+
67	DDP3_TX2+	68	USB5_SSTX-
69	DDP3_TX2-	70	GND
71	GND	72	USB5_SSRX+
73	DDP3_TX3+	74	USB5_SSRX-
75	DDP3_TX3-	76	GND
77	GND	78	USB5_OC#
79	+12VSB	80	+12VSB
83	GND	84	GND
85	GND	86	GND

Table A.23: CN30 MIOe

87	+5VSB	88	+5VSB
89	+5VSB	90	+5VSB

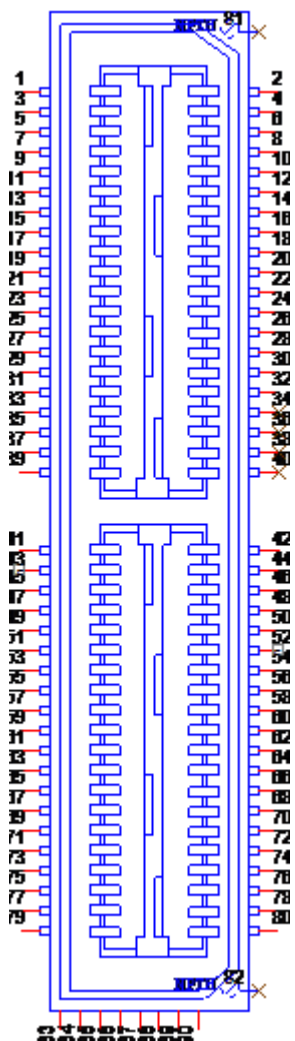


Table A.24: CN31 SMBus

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

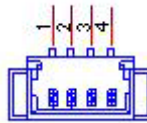


Table A.25: CN32 Smart FAN

Part Number	1655004347
Footprint	WF_4P_100_D_744-81-04TW30
Description	WAFER 2.54 1*4P 180D(M) DIP 744-81-04TW30
Pin	Pin Name
1	GND
2	+12V
3	SPEED
4	PWM

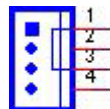
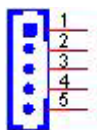


Table A.26: CN33 Inverter Power Output

Part Number	1655305020
Footprint	WHL5V-2M
Description	WAFER BOX 5P 2.0mm 180D(M) DIP A2001WV2-5P
Pin	Pin Name
1	+12V
2	GND
3	ENABKL
4	VBR
5	+5V

**Table A.27: CN34 48-bit LVDS CONN**

Part Number	1653920200		
Footprint	SPH20X2		
Description	Wafer 2x20P/1.25mm/(M)/NY9T/VA/GFL/S/WH/W Post		
Pin	Pin Name	Pin	Pin Name
1	+3.3V(Def) or +5V or +12V	2	+3.3V(Def) or +5V or +12V
3	GND	4	GND
5	+3.3V(Def) or +5V or +12V	6	+3.3V (Def)or +5V or +12V
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	VCON

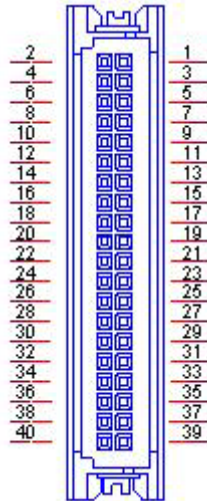


Table A.28: CN36 HDMI

Part Number	1654013546-01		
Footprint	HDMI_38P_QJ11191-DEB1-4F		
Description	HDMI 2x19P/1.5mm/F/PA9T/RA/GFL/D/BK/H18.05/W SC		
Pin	Pin Name	Pin	Pin Name
A1	HDMI_TX2+	A2	GND
A3	HDMI_TX2-	A4	HDMI_TX1+
A5	GND	A6	HDMI_TX1-
A7	HDMI_TX0+	A8	GND
A9	HDMI_TX0-	A10	HDMI_CLK+
A11	GND`	A12	HDMI_CLK-
A13	NA	A14	NA
A15	SCL	A16	SDA
A17	GND	A18	+5V Power
A19	Hot Plug Detect		

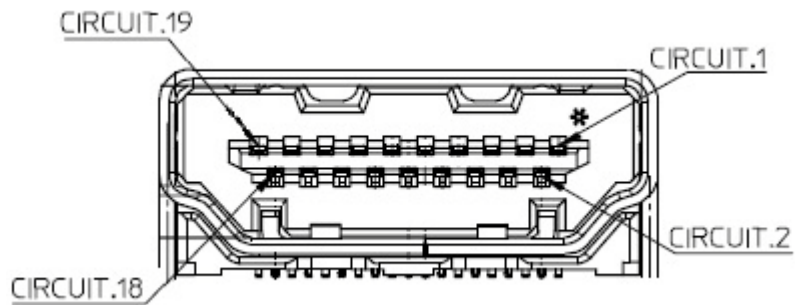


Table A.29: CN37 M.2 E Key

Part Number	1654012663-01		
Footprint	NGFF_75P_APCI0163-P001A		
Description	NGFF 75P/0.5mm/(F)/LCP/RA/GFL/S/BK/H8.5mm/E-key		
Pin	Pin Name	Pin	Pin Name
1	GND	2	+3.3VSB
3	USB6_D+	4	+3.3VSB
5	USB6_D-	6	NC
7	GND	8	NC
9	NC/SDIO_CLK	10	NC
11	NC/SDIO_CMD	12	NC
13	NC/SDIO_DATA0	14	NC
15	NC/SDIO_DATA1	16	NC
17	NC/SDIO_DATA2	18	GND
19	NC/SDIO_DATA3	20	NC
21	NC/SDIO_WAKE#	22	NC
23	NC/SDIO_RESET#	32	NC
33	GND	34	NC
35	PCIE_TX7+	36	NC
37	PCIE_TX7-	38	NC
39	GND	40	NC
41	PCIE_RX7+	42	NC
43	PCIE_RX7-	44	NC
45	GND	46	NC
47	PCIE_CLK_M2E+	48	NC
49	PCIE_CLK_M2E-	50	PCIE_SUSCLK
51	GND	52	PCIE_PERESET#
53	PCIE_CLKREQ2#	54	BT_DISABLE#
55	PCIE_WAKE#	56	WIFI_DISABLE#
57	GND	58	NC
59	PCIE_TX8+	60	NC
61	PCIE_TX8-	62	NC
63	GND	64	NC
65	PCIE_RX8+	66	NC
67	PCIE_RX8-	68	NC
69	GND	70	NC
71	NC/REFCLKp1	72	+3.3VSB
73	NC/REFCLKn1	74	+3.3VSB
75	GND		

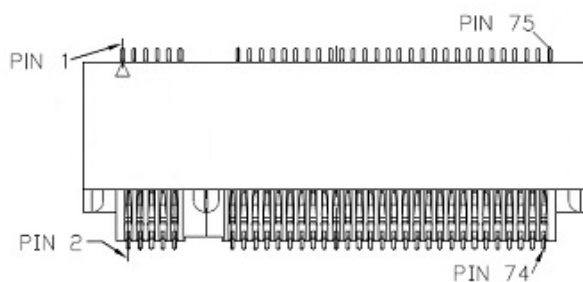
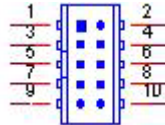


Table A.30: CN38 COM2

Part Number	1653004099
Footprint	HD_5x2P_79_23N685B-10M10
Description	BOX HEADER 5x2P 2.00mm 180D(M) SMD 23N685B-10M10
Pin	Pin Name
1	DCD4#
2	DSR4#
3	RXD4
4	RTS4#
5	TXD4
6	CTS4#
7	DTR4#
8	RI4#
9	GND
10	GND

**Table A.31: CN45 Front Panel**

Part Number	1653004099
Footprint	HD_5x2P_79_23N685B-10M10
Description	BOX HEADER 5x2P 2.00mm 180D(M) SMD 23N685B-10M10
Pin	Pin Name
1	POWER_BUTTON
2	RESET
3	GND
4	GND
5	+5V
6	CASE_OPEN
7	+3.3V
8	SATA_LED#
9	BUZZER+
10	BUZZER-

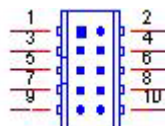


Table A.32: CN47 MiNi PCIE

Part Number	1654002538		
Footprint	FOX_AS0B226-S68K7F		
Description	MINI PCI E 52P 6.8mm 90D SMD AS0B226-S68Q-7H		
Pin	Pin Name	Pin	Pin Name
1	PCIE_WAKE#	2	+3.3VSB
3	NC	4	GND
5	NC	6	+1.5V
7	PCIE_MINI_CLK5_CLKREQ#	8	+VUIM_PWR
9	GND	10	UIM_DATA
11	PCIE_MINI_CLK5-	12	UIM_CLK
13	PCIE_MINI_CLK5+	14	UIM_RESET
15	GND	16	+VUIM_VPP
17	NC	18	GND
19	NC	20	WIFI_DISABLE#
21	GND	22	PERST#
23	mSTAT_mPCIE_RX-	24	+3.3VSB
25	mSTAT_mPCIE_RX+	26	GND
27	GND	28	+1.5V
29	GND	30	SMB_CLK
31	mSTAT_mPCIE_TX-	32	SMB_DAT
33	mSTAT_mPCIE_TX+	34	GND
35	GND	36	USB9_D-
37	GND	38	USB9_D+
39	+3.3VSB	40	GND
41	+3.3VSB	42	NC
43	mPCIE(GND)/mSATA(NC)	44	NC
45	NC	46	NC
47	NC	48	+1.5V
49	NC	50	GND
51	NC	52	+3.3VSB

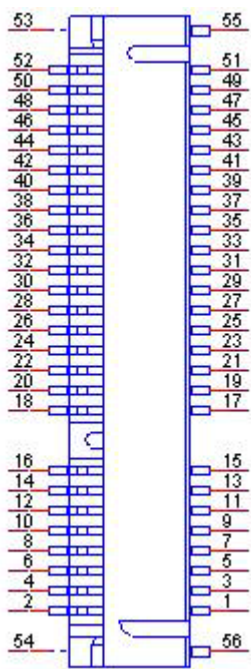


Table A.33: CN48 GPIO

Part Number	1653004099
Footprint	HD_5x2P_79_23N685B-10M10
Description	BOX HEADER 5x2P 2.00mm 180D(M) SMD 23N685B-10M10
Pin	Pin Name
1	DCD2#
2	DSR2#
3	RXD2
4	RTS2#
5	TXD2
6	CTS2#
7	DTR2#
8	RI2#
9	GND
10	GND

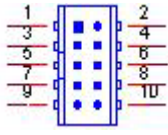
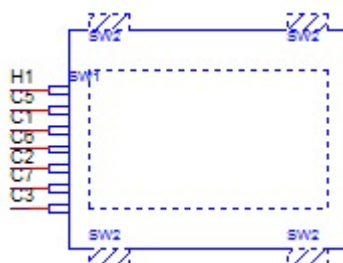
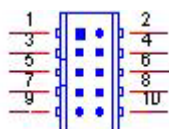


Table A.34: CN49 SIM Card

Part Number	1654013206-01
Footprint	SIM_6P_N080613-SICR10
Description	Nano SIM Card 6P/1.27/(F)/LCP/RA/GFL/S/BK/H1.37
Pin	Pin Name
C1	+VUIM_PWR
C2	UIM_RESET
C3	UIM_CLK
C5	GND
C6	UIM_VPP
C7	UIM_DATA
H1	NC

**Table A.35: CN50 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	DCD1#
2	DSR1#
3	RXD1
4	RTS1#
5	TXD1
6	CTS1#
7	DTR1#
8	RI1#
9	GND
10	GND



Appendix **B**

System Assignments

This appendix contains information of a detailed nature.

Sections include:

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

B.1 System I/O Ports

Table B.1: System I/O Ports

Addr. Range (Hex)	Device
00h-1Fh	DMA Controller
20h-2Dh	Interrupt Controller
2Eh-2Fh	Motherboard resources
30h-3Dh	Interrupt Controller
40h-43h	Timer/Counter
4Eh-4Fh	Motherboard resources
50h-53h	Timer/Counter
60h-6Fh	8042 (keyboard controller)/NMI Controller/Microcontroller
70h-7Fh	Real-time Controller
80h-8Fh	Debug Port/Reserved
90h-9Fh	Debug Port/Reset Generator
A0h-ADh	Interrupt Controller
B0h-B1h	Interrupt Controller
B4h-BDh	Power Management
290h-29Fh	EC Index port and Data port
2F8h-2FFh	Communications Port (COM2)
3C0h-3DFh	Motherboard resources
3F8h-3FFh	Communications Port (COM1)
4D0h-4D1h	Interrupt Controller
164Eh-164Fh	Motherboard resources
1800h-18FFh	Motherboard resources
CF9h-CF9h	Reset Generator

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 1st MB memory map

Table B.3: 1st 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

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