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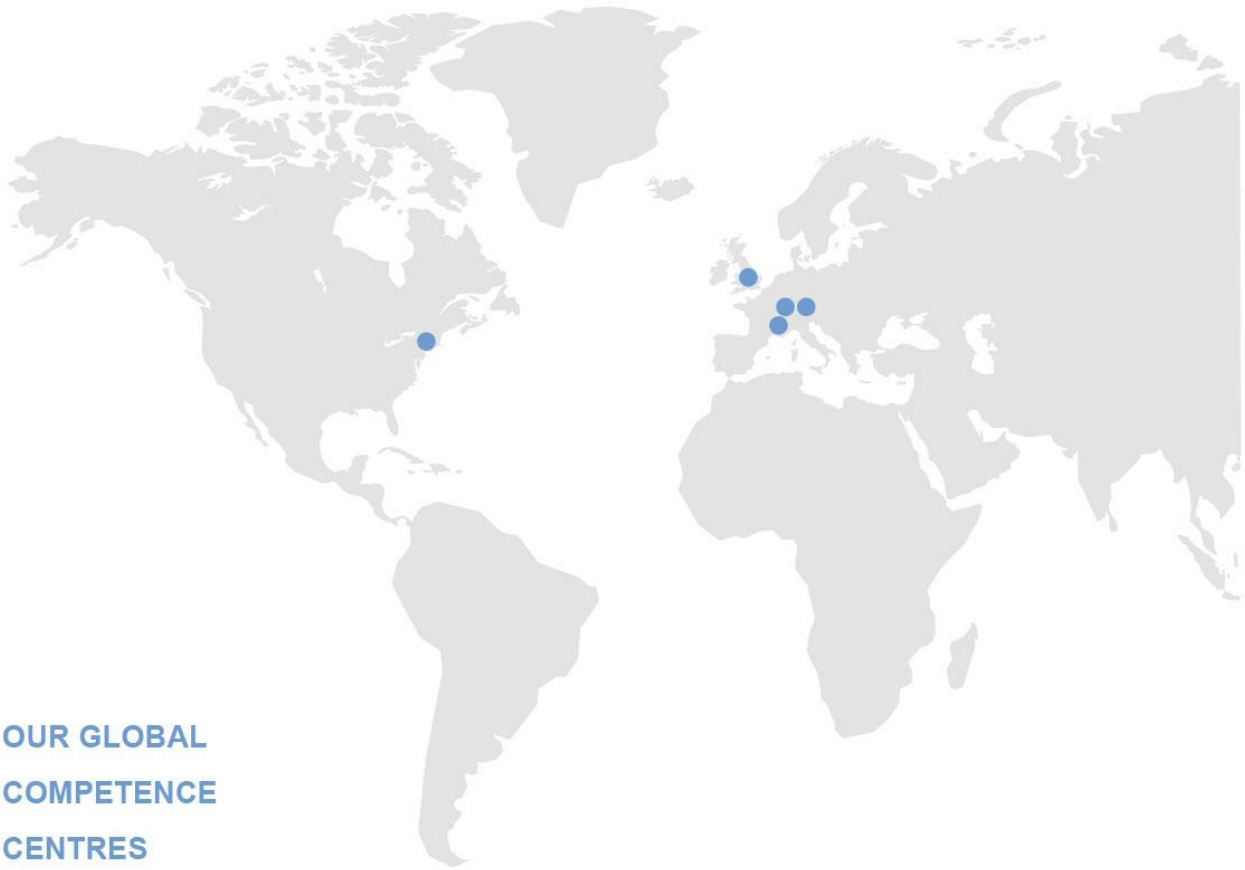

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Manual

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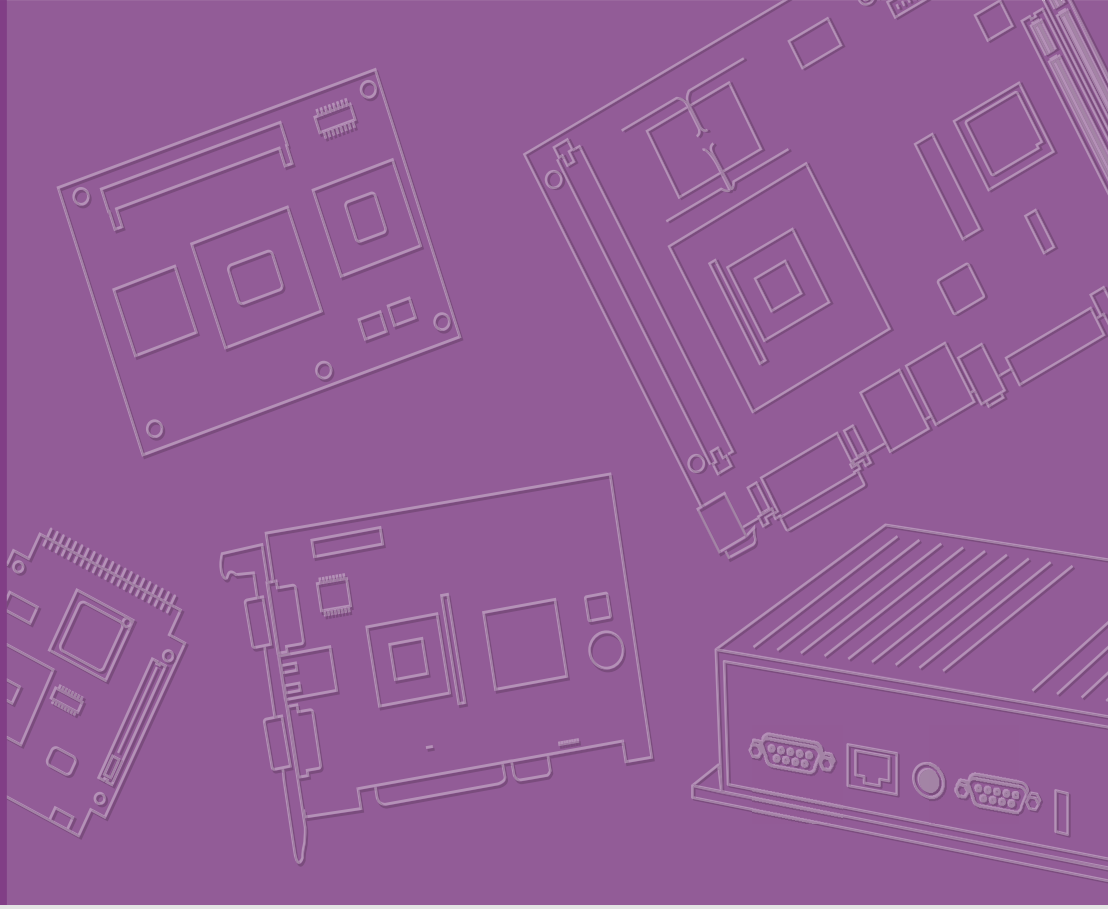
MIO-5393

3,5" Single-Board Computer with Intel® Coffee Lake 8th/9th Gen. Xeon® / Core™ i Processor and Intel® PCH CM246 or QM370



User Manual

MIO-5393

9th/8th Gen. Intel® Xeon®/ Core™ H-series Processor, 3.5" MI/O-Compact SBC, DDR4, DP, HDMI, 48-bit LVDS, 2 GbE, M.2 E Key, M.2 B Key, MIOe

ADVANTECH

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Acknowledgements

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http://www.advantech.com

http://www.advantech.com/eplatform

For technical support and service, please visit our support website at:

http://support.advantech.com/

This manual is for the MIO-5393

Part No. 2006539300 Edition 1

January 2020

Product Warranty (2 years)

Advantech 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 purchase.

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

Because of Advantech's high quality-control standards and rigorous testing, most of our customers never need to use our repair service. If an Advantech 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, Advantech 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 RMA (return merchandize authorization) number from your dealer. This allows us to process your return more quickly.
4. Carefully pack the defective product, a fully-completed Repair and Replacement Order Card and a photocopy proof of purchase date (such as your sales receipt) in a shippable container. A product returned without proof of the purchase date is not eligible for warranty service.
5. Write the RMA number visibly on the outside of the package and ship it prepaid to your dealer.

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 ESD (Electrostatic Discharge) and EMI leakage, we strongly recommend the use of CE-compliant industrial enclosure products.

FCC Class B

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

Technical Support and Assistance

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

Packing List

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

- 1 x MIO-5393 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 20cm (p/n: 1700030404-01)
- 1 x Cooler (Heatsink) (p/n: 1960094211T001 (1960094210N000))
- 1 x Startup manual (p/n: 2046539300)
- 1 x Mini Jumper (10pcs package)
- 1 x Screw Kit (2pcs screws for M.2 device)
- 1 x Screw Kit (4 sets of screw & stand-off)
- 1 x DeviceOn Package

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	3 x Intel® Gigabit Ethernet with PCIe Switch
MIOe-230-L0A1E[1]	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

[1] No USB support on MIOe-230

[2] Support with customized BIOS

Optional Accessories

Part number	Description
1700030406-01	Internal 2 ports USB cable 20CM

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Chapter 1

General Information

This chapter gives background information on the MIO-5393

Sections include:

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

1.1 Introduction

MIO-5393 is designed using MI/O Extension form factor (compact series, 146 x 102 mm) and powered by 9th/8th generation of Intel® Xeon®/Core™ H series processors. MIO-5393 offers embedded iManager 3.0, SUSI 4.0 and WISE-PaaS/DeviceOn created by Advantech to monitor and control system operation effectively and remotely.

MIO-5393 adopts the latest 64-bit, multi-core processors built on 14nm process technology for improvements in CPU processing, graphics, security and I/O flexibility. MIO-5393 is equipped with the latest generation graphics core (Intel® UHD Graphics P630/630) with DirectX 11.2, OpenGL 4.5, OpenCL 2.1 and 4K encoding/decoding. MIO-5393 supports triple independent displays including HDMI, DP and 48-bit LVDS interfaces, and dual 32G 2400MHz DDR4 memory and TPM.

1.2 Specifications

1.2.1 Functional Specifications

- Processor: 9th/8th Generation Intel® Xeon®/Core™ H-series
  - E-2276ME, 6 cores, Base Frequency 2.8GHz; Max Turbo Frequency 4.5GHz
  - i7-9850HE, 6 cores, Base Frequency 2.7GHz; Max Turbo Frequency 4.4GHz
  - i7-9850HL, 6 cores, Base Frequency 1.9GHz; Max Turbo Frequency 4.1GHz
  - i5-8400H, 4 cores, Base Frequency 2.5GHz; Max Turbo Frequency 4.2GHz
- L3 Cache:
  - E-2276ME: 12MB
  - i7-9850ME/i7-9850ML: 9MB
  - i5-8400H: 8MB
- Advanced Technologies
  - * Intel® vPro™ Platform Eligibility
  - * Intel® Turbo Boost Technology 2.0
  - * Intel® Speed Shift Technology
  - * Intel® Virtualization Technology (VT-x)
  - * Intel® Hyper-Threading Technology
  - * Intel® Active Management Technology
  - * Intel® Trusted Execution Technology (Intel® TXT)
  - * Intel® 64 Architecture
  - * Intel® Software Guard Extensions (Intel® SGX)
  - * 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 USB 3.1 Gen 2 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 low power graphics core architecture (Intel® UHD Graphics P630/630)
- Intel® QuickSync & Clear Video Technology HD Support
- Full Hardware Accelerated Video Decode: AVC/VC1/MPEG2/HEVC/VP8/ JPEG.
- OpenGL4.5 and OpenCL2.1 support
- DirectX 2015, DirectX 11.2, DirectX 11.1, DirectX 10, DirectX 9 support
- Multi-display interfaces: HDMI and DP on rear I/O, Dual Channel 24-bit LVDS, DisplayPort[1] from MIOe
- Support Extend, Clone and Collage mode with multi-display device
- Dual Display:
  - ∗ Any two combination between: LVDS, HDMI, DP
- Triple Display:
  - ∗ HDMI, DP + LVDS
- Integrated Dual-channel LVDS support resolution up to 1920x1200 at 60 Hz
- DP interface supports the DisplayPort 1.2 specification with up to 4096x2304 @ 60Hz
- HDMI interface supports the HDMI 1.4a specification with audio up to 4096x2160 at 30Hz (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
  - DisplayPort[1]
  - 4 PCIe x1
  - USB 3.0 x1, USB 2.0 x1
  - 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 3.1 Gen.2 compliant ports on rear I/O, 2 USB2.0 compliant ports for internal connection
- 2 RS-232/422/485 (ESD protection: Air gap ±15kV, Contact ±8kV)
- 16-bit Programmable General Purpose Input/ Output from iManager
- 1 SMBus / I^2C channel from iManager
- Watchdog timer: Output System Reset, Programmable counter from 1 ~ 255 minutes/ seconds
- M.2 Expansion Slot
  E Key (PCIe x1, USB 2.0) for M.2 2230 device
  B Key (PCIe Gen.3 x2, SATA Gen.3, USB 2.0) for M.2 2280 or 3042* device
  * 3042 device support with optional bracket

- **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 256 Mbit
- **Security:**
  - TPM2.0, only support under UEFI mode

1.2.2 OS Support

MIO-5393 supports Win10 64 bit

For further information about OS support of MIO-5393, 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: 25.3 mm, PCB: 2.0mm; Bottom Side: 10.96 mm
- **Weight:** 0.67 kg (reference weight of total package)

1.2.4 Electrical Specifications

- **Power Requirement:** Single +12V DC ± 10% power input
- **Power Consumption:**

- Max load
  E-2276ME: 102.75W
  i7-9850HE: 95.38W
  i7-9850HL: 44.55W
  i5-8400H: 74.44W
- Idle mode
  E-2276ME/i7-9850HE/i7-9850HL/i58400H: 11.55W

■ **Power Consumption Conditions:**

- Test software:
  1. Intel (R) Thermal Analysis Tool 6.5.1001 (CPU-All and Gfx with 100%).
  2. BrunIn Test V8.1 Pro (1025)(CPU, RAM, 2D&3D Graphics and Disk with 100%)
- 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

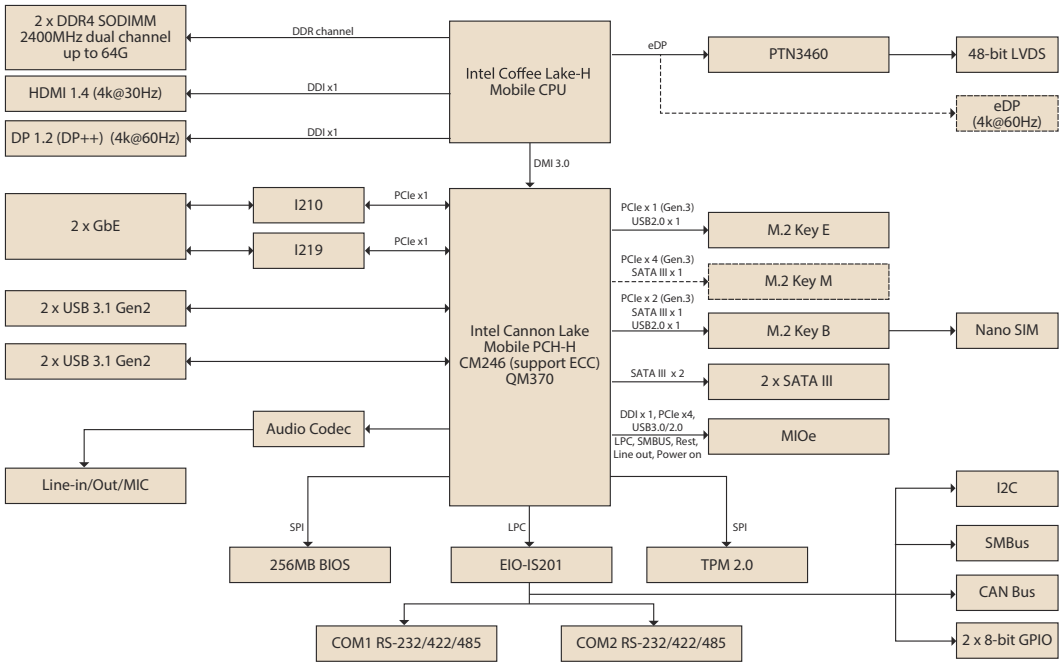
■ **RTC Battery:**

- 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

1.3 Block Diagram



*Function block with dotted line support by request

1.4 Board Layout: Dimensions

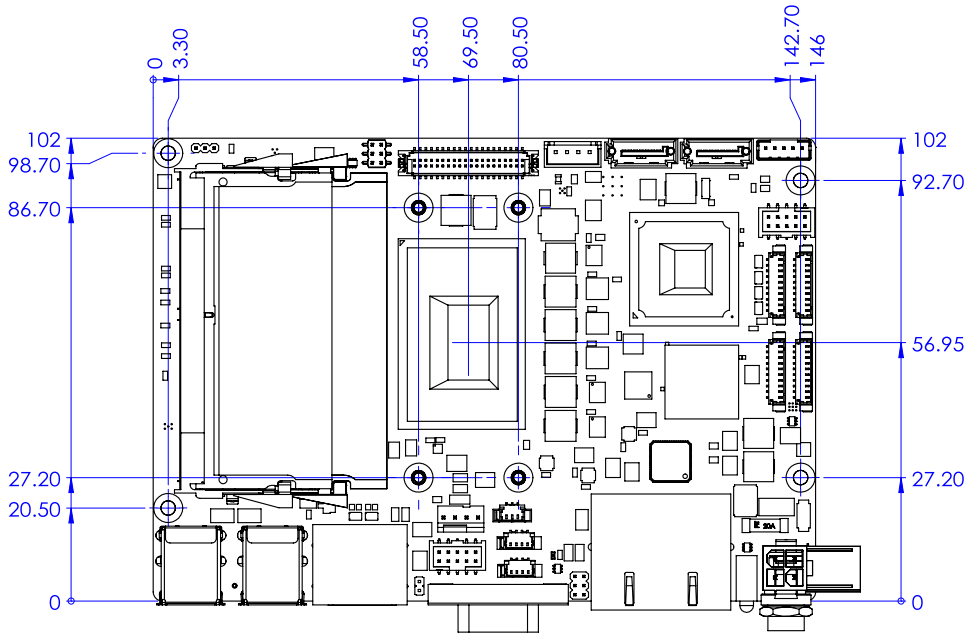


Figure 1.1 MIO-5393 Mechanical Drawing (Top Side)

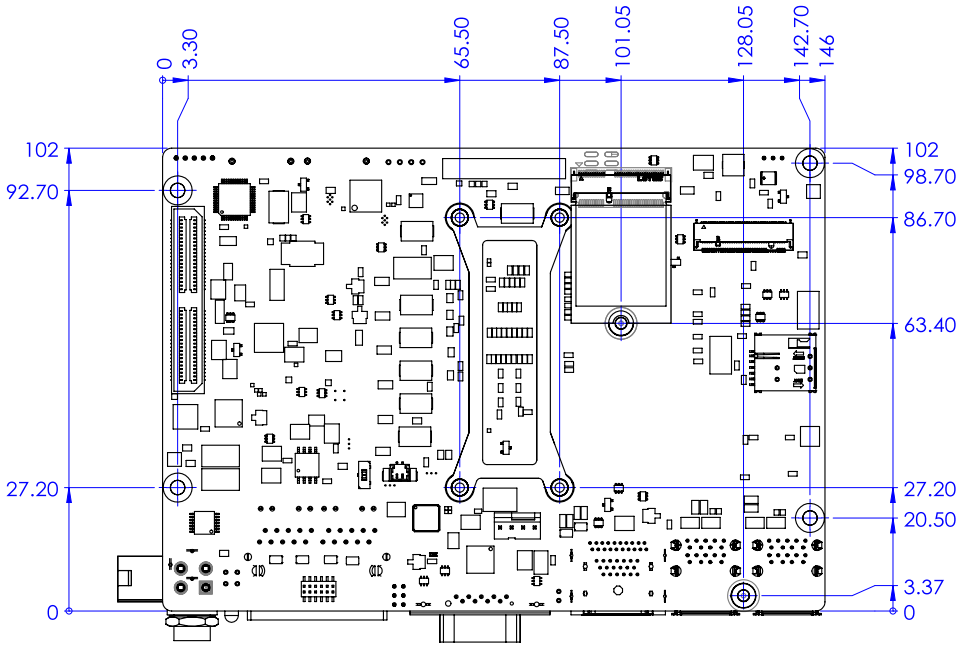


Figure 1.2 MIO-5393 Mechanical Drawing (Bottom Side)

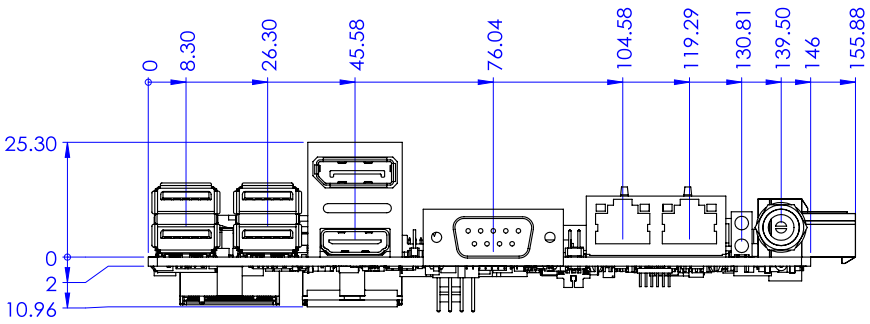


Figure 1.3 MIO-5393 Mechanical Drawing (Coastline)

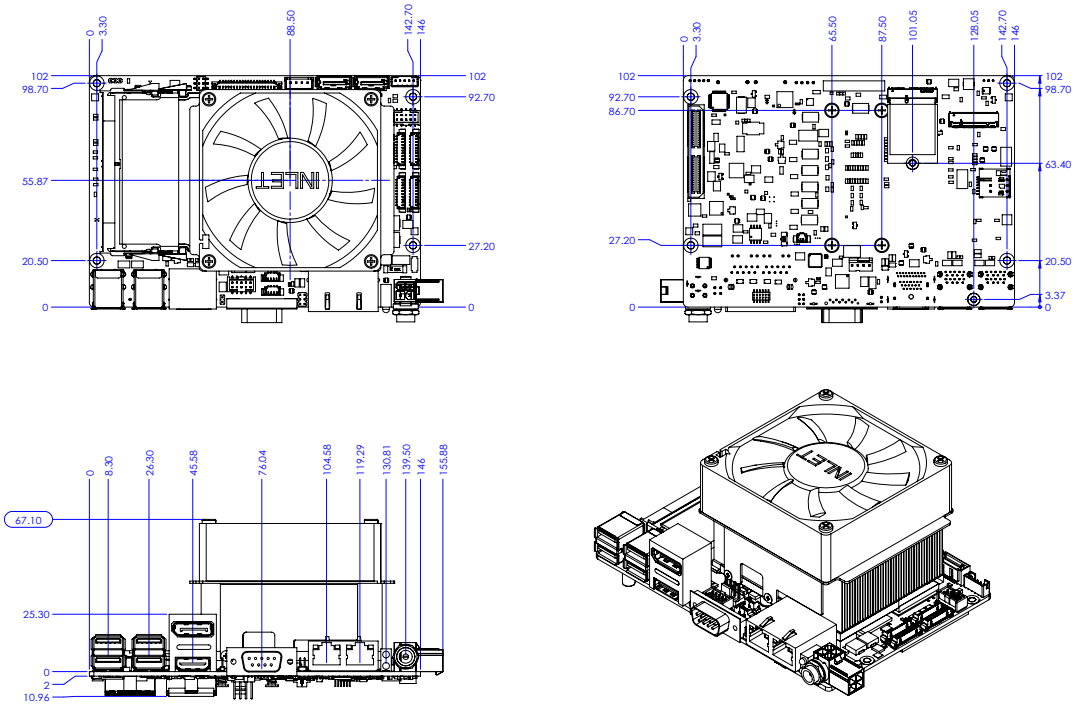


Figure 1.4 MIO-5393 Mechanical Drawing (with Cooler)

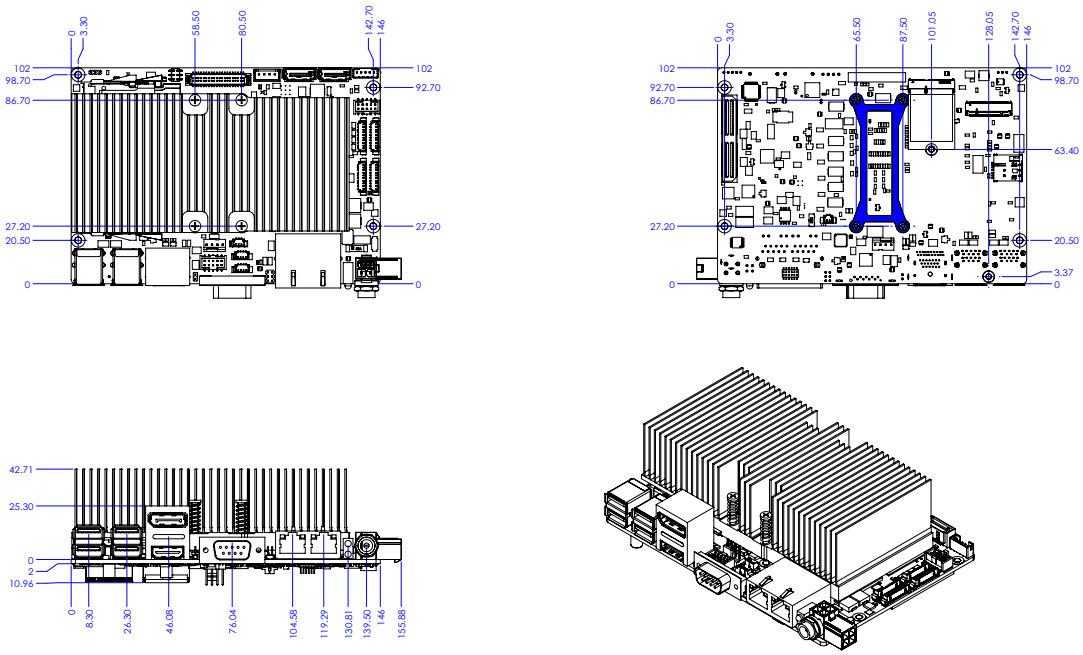


Figure 1.5 MIO-5393 Mechanical Drawing (with Heatsink)

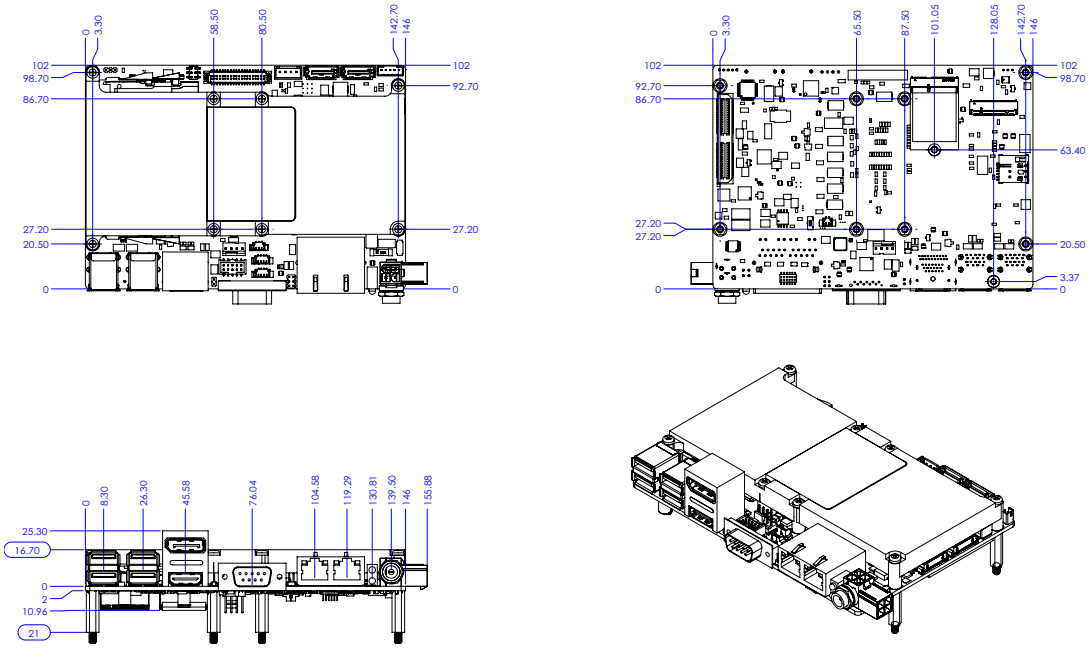


Figure 1.6 MIO-5393 Mechanical Drawing (with Heat Spreader)

Chapter 2

Installation

This chapter explains the setup procedures of the MIO-5393 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-5393 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	Clean CMOS
J2	Auto Power on Setting
J3	COM1 Power Setting
J4	LCD Power
J5	LVDS VCON Setting

2.2 Connectors

Onboard connectors link the MIO-5393 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	Power Input
CN3	SO-DIMM 9.2mm
CN4	SO-DIMM 5.2mm
CN5	RTC Battery
CN7	CAN BUS
CN8	Front Panel
CN9	Audio
CN10	SM BUS
CN11	I2C
CN12	COM1
CN13	COM2
CN14	GPIO_P0
CN15	GPIO_P1
CN16	RJ45
CN17	Inverter Power output
CN18	48 bit LVDS
CN19	eDP
CN20	HDMI & DP
CN21	M.2 E-key
CN22	M.2 B-key
CN24	NAMO SIM
CN25	USB2.0+3.0_13H
CN26	USB2.0+3.0_13H
CN27	Internal USB
CN28	SATA Power
CN29	SATA_7V
CN30	SATA_7V
CN31	FAN
CN33	MIO

2.3 Locating Connectors & Block Diagram

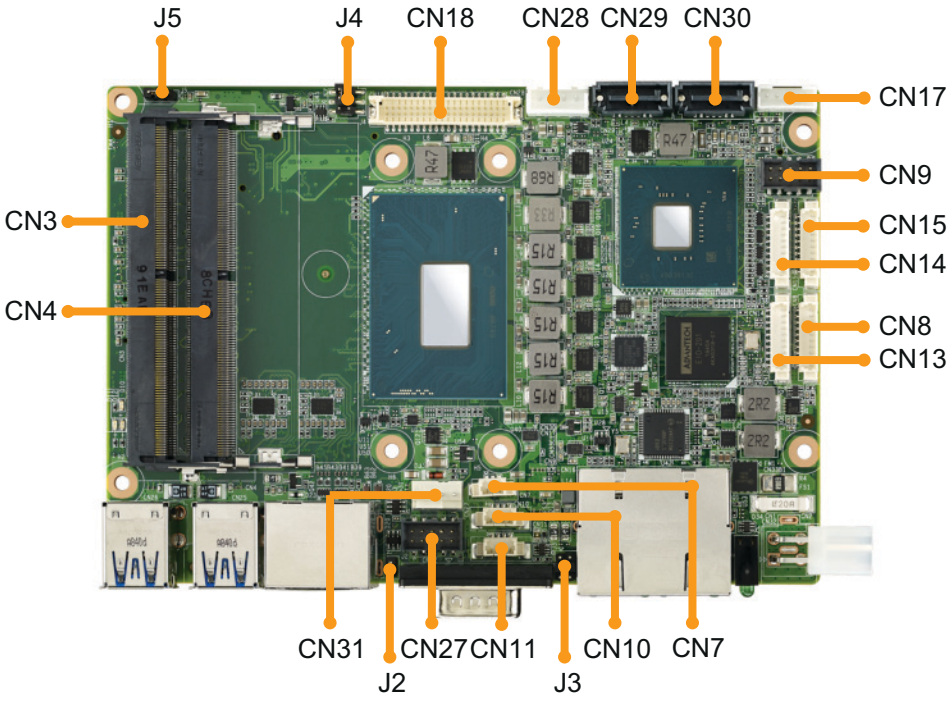


Figure 2.1 MIO-5393 Connector Locations (Top Side)

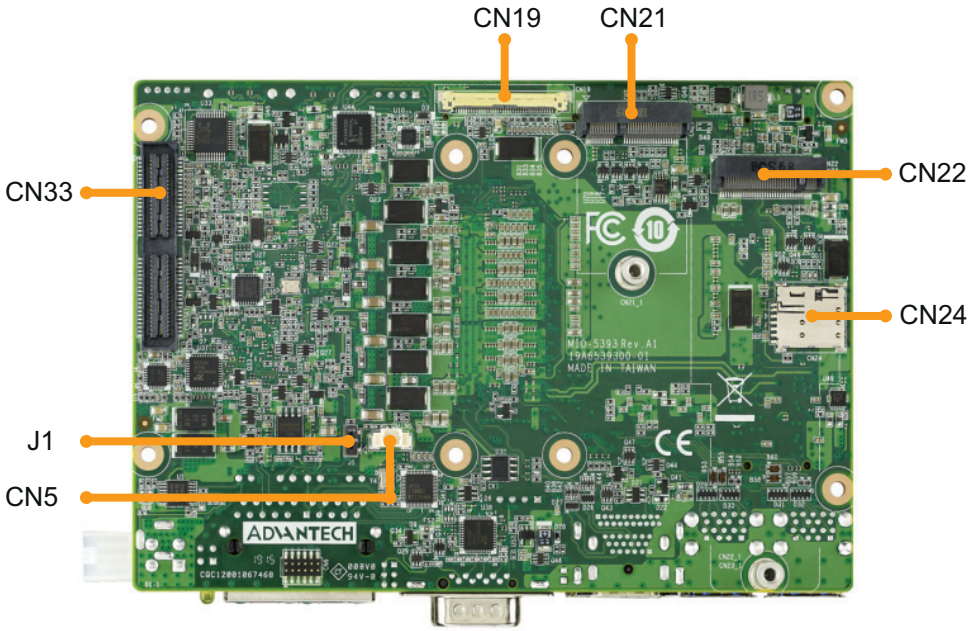


Figure 2.2 MIO-5393 Connector Locations (Bottom Side)

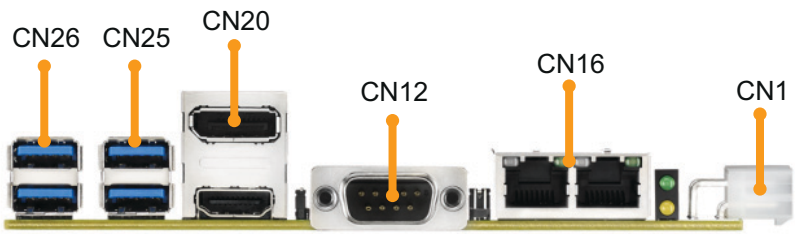
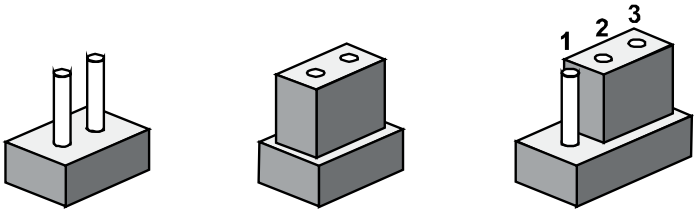


Figure 2.3 MIO-5393 Connector Locations (Coastline)

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:



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 simply need a standard cable to make most connections.

2.4.1 Clear CMOS (J1)

Table 2.3: Clear CMOS (J1)

Setting	Function
(1-2)*	Normal (*Default)
(2-3)	Clear COMS

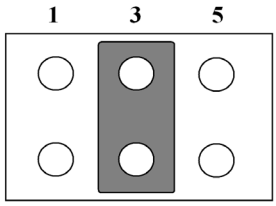
2.4.2 Auto Power On Setting (J2)

Table 2.4: Auto Power On Setting (J2)

Setting	Function
NC	Power Button for Power On
(1-2)*	Auto Power On (*Default)

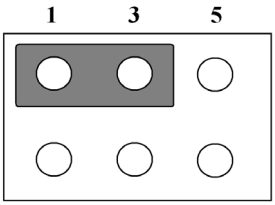
2.4.3 COM1 Power Setting (J3)

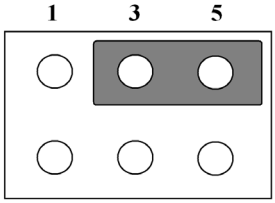
Table 2.5: COM1 Power Setting (J3)	
Setting	**Function**
(1-2)	+5V
(3-4)*	Wake on Ring (*Default)
5-6	+12V

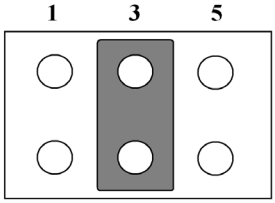


2.4.4 LCD Power (J4)

Table 2.6: LVDS VCON Setting (J4)	
Setting	**Function**
(1-3)*	+3.3V (*Default)
(3-5)	+5V
(3-4)	+12V

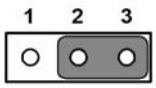






2.4.5 LVDS VCON Setting (J5)

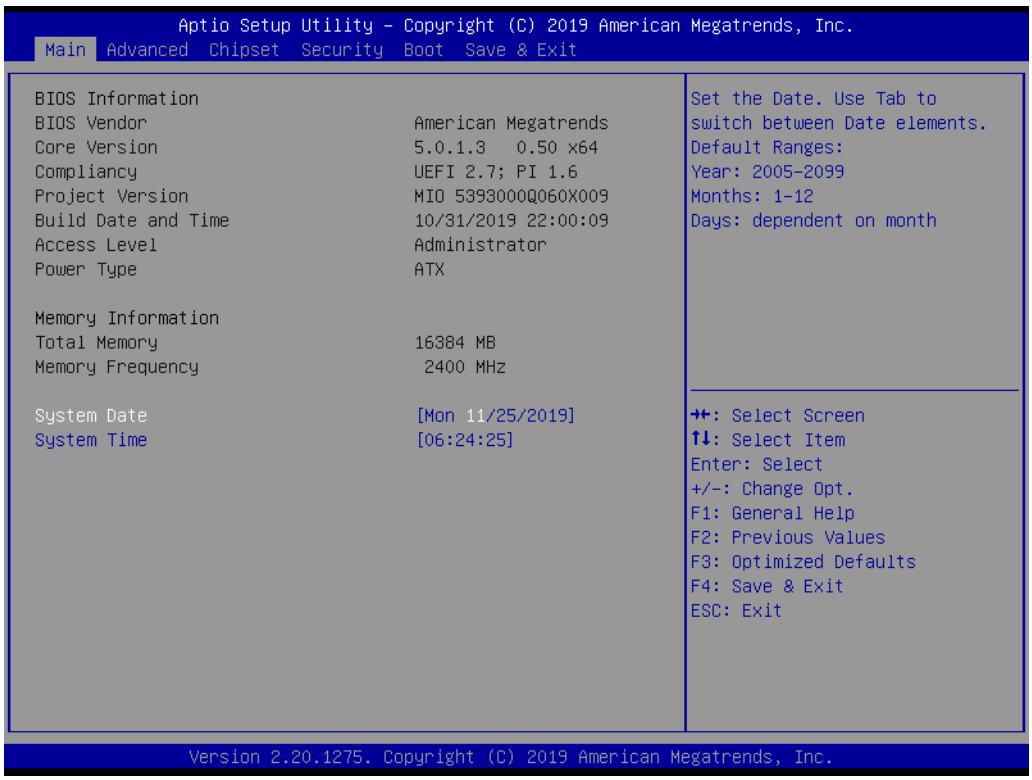
Table 2.7: LVDS VCON Setting (J5)	
Setting	**Function**
(1-2)	3.3V High for VCON on LVDS
(2-3) *	Low for VCON on LVDS (*Default)



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-5393 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 <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.

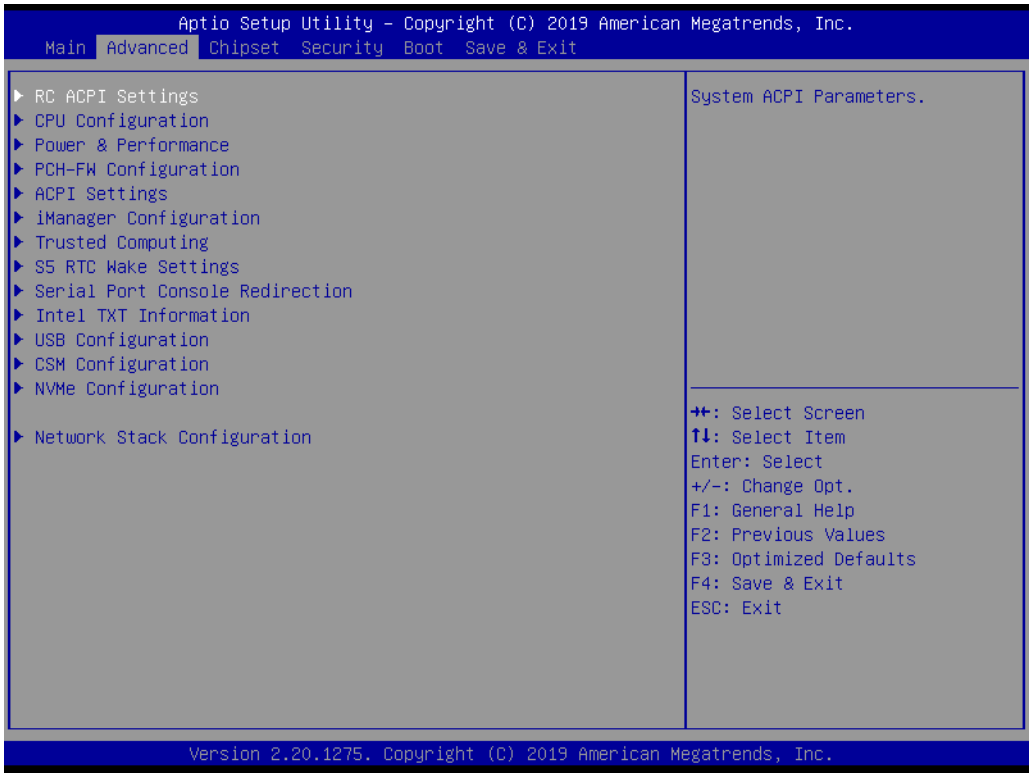
Above the key legend is an area reserved for a text message. When an option is selected in the left frame, it is highlighted in white. Often a text message will accompany it.

- **System Time / System Date**

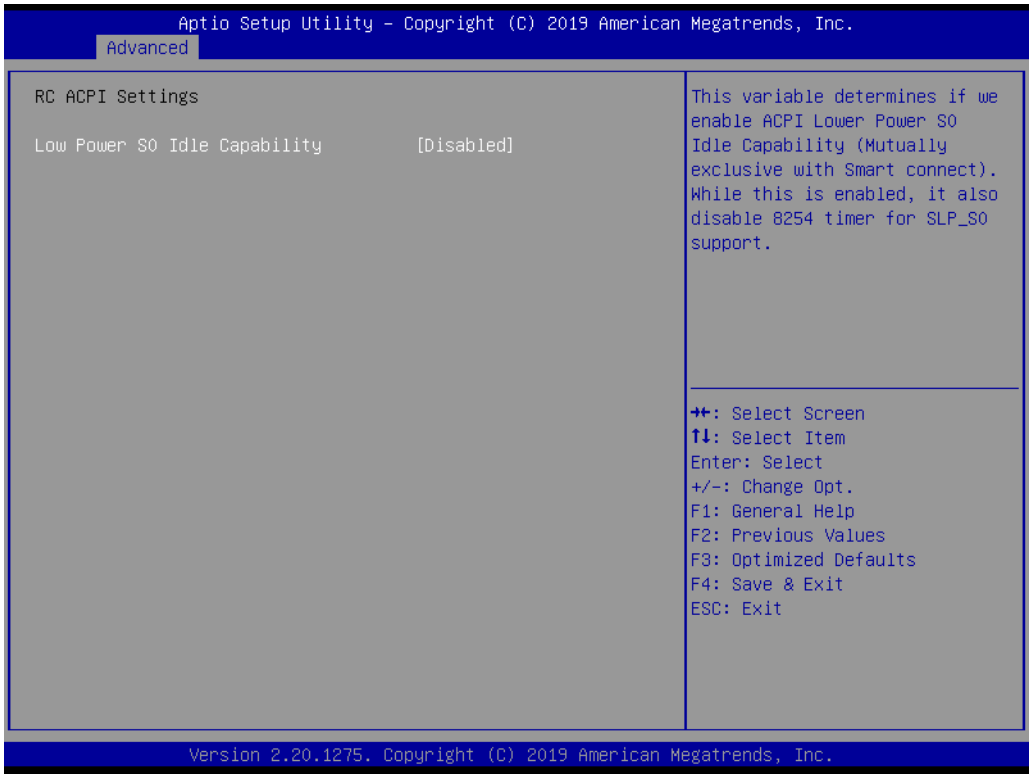
Use this option to change the system time and date. Highlight System Time or System Date using the <Arrow> keys. Enter new values through the keyboard. Press the <Tab> key or the <Arrow> keys to move between fields. The date must be entered in MM/DD/YY format. The time must be entered in HH:MM:SS format.

3.1.2 Advanced BIOS Features Setup

Select the Advanced tab from the MIO-5393 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.



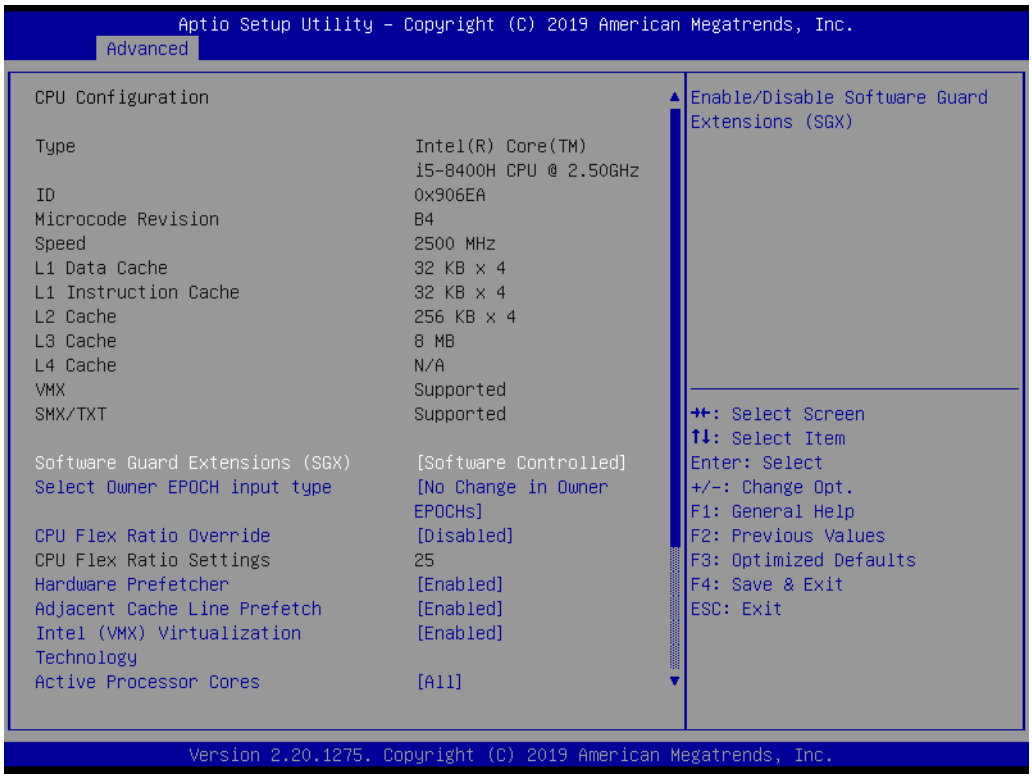
3.1.2.1 RC ACPI Settings



Low Power S0 Idle Capability

Determine if Enable ACPI Low Power S0 Idle Capability.

3.1.2.2 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.

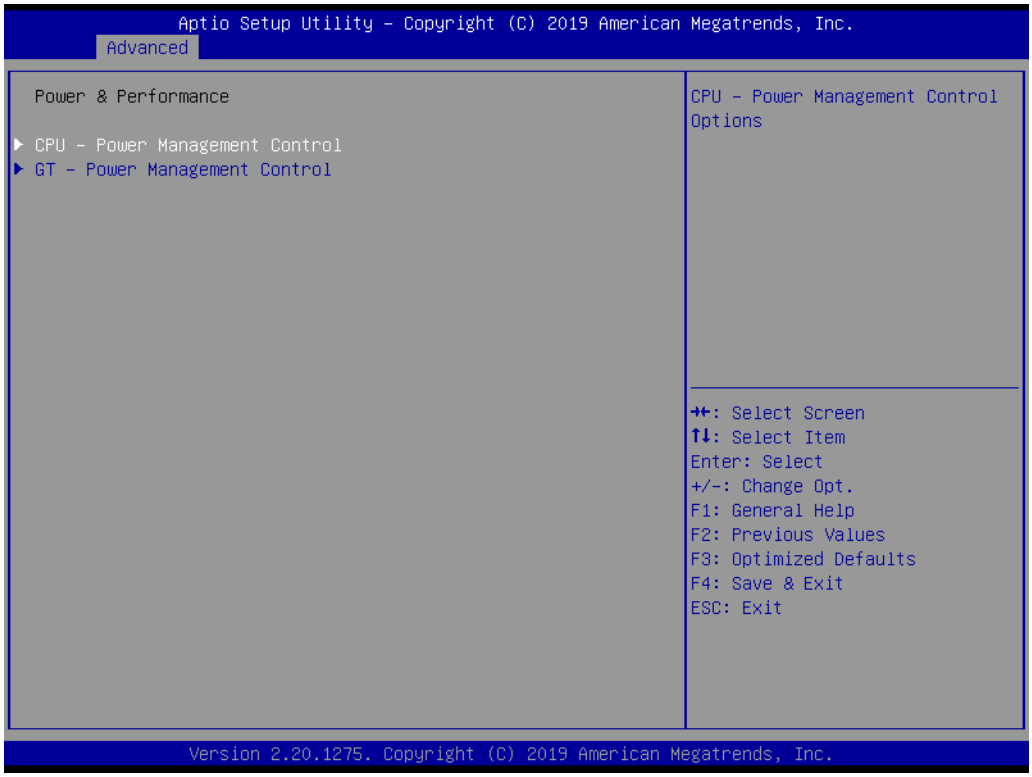
MonitorMWait

Enable/Disable MonitorMWait.

Intel Trusted Execution Technology

Enables utilization of additional hardware capability provided by Intel® Trusted Execution Technology.

3.1.2.3 Power & Performance



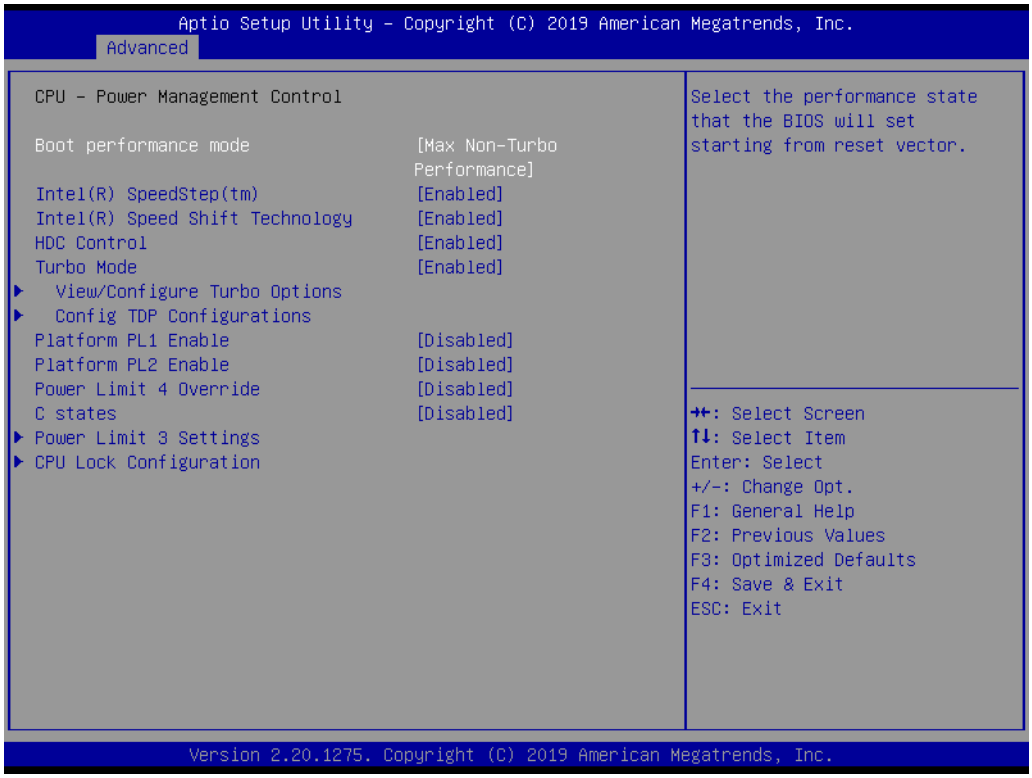
CPU – Power Management Control

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 Configuraitons.

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.

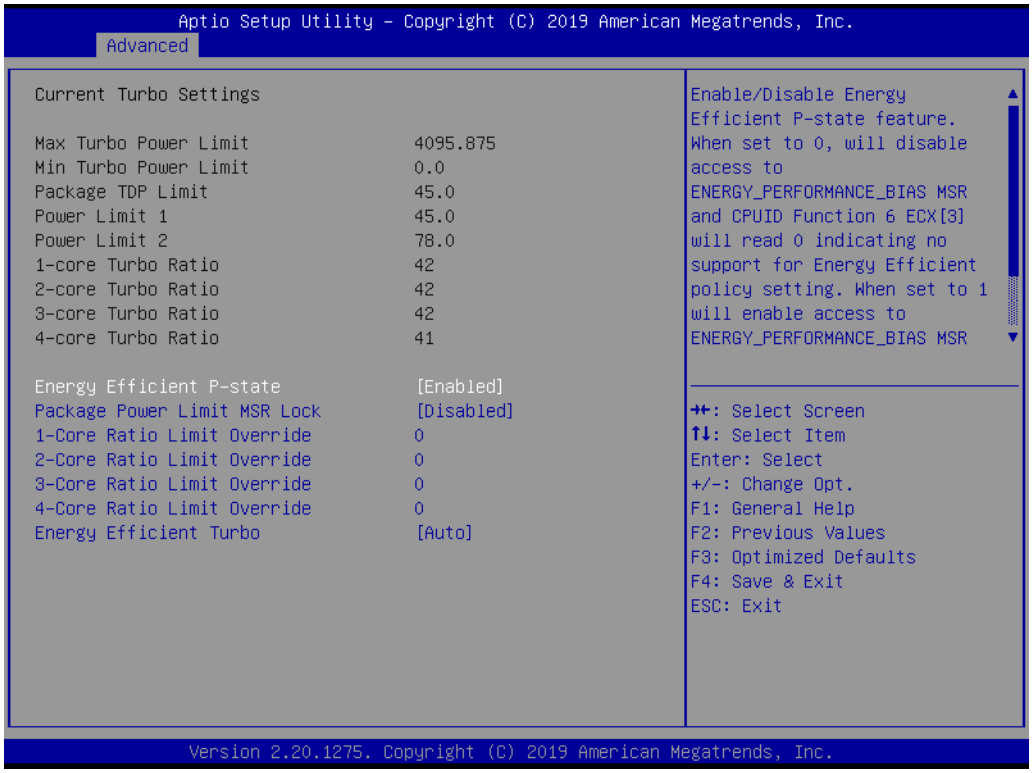
PowerLimit 3 Settings

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.

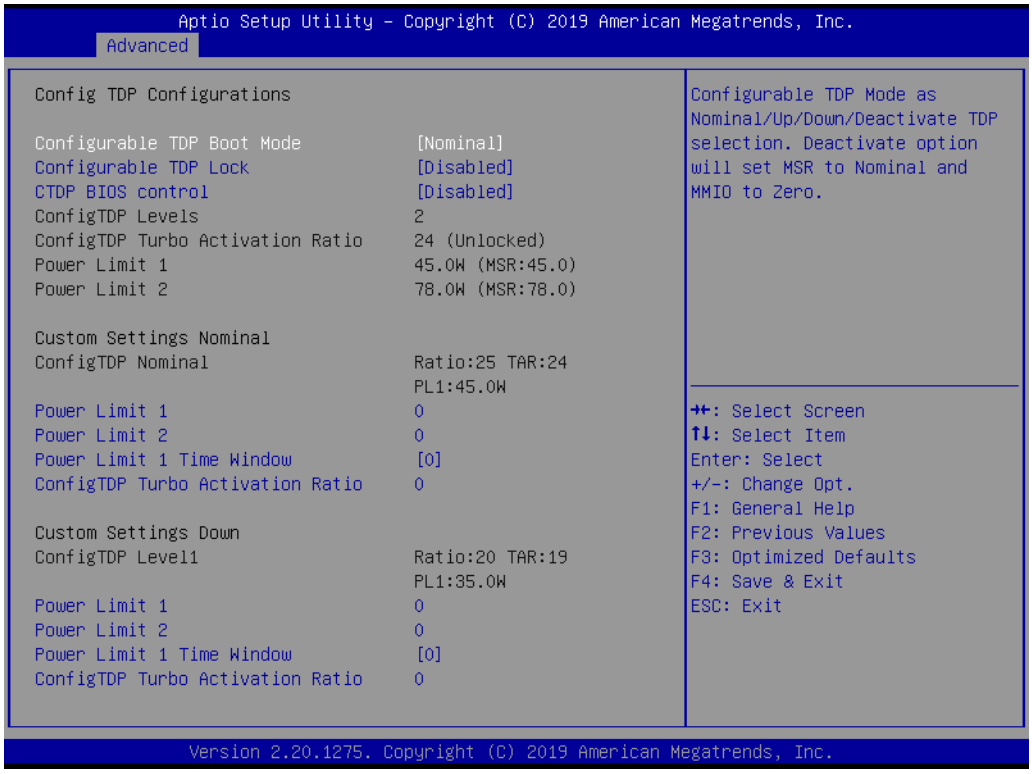
Package Power Limit MSR Lock

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.

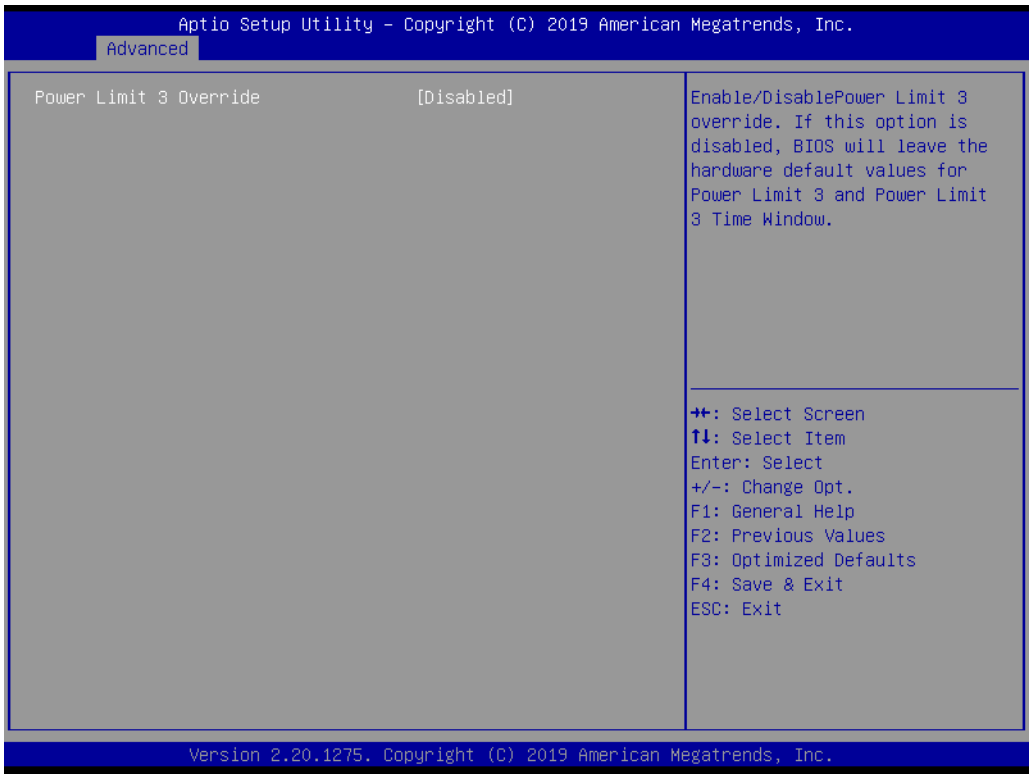
Configurable TDP Lock

Configurable TDP Mode Lock sets the Lock bit.

CTDP BIOS Control

Enables CTDP control via runtime ACPI BIOS method.

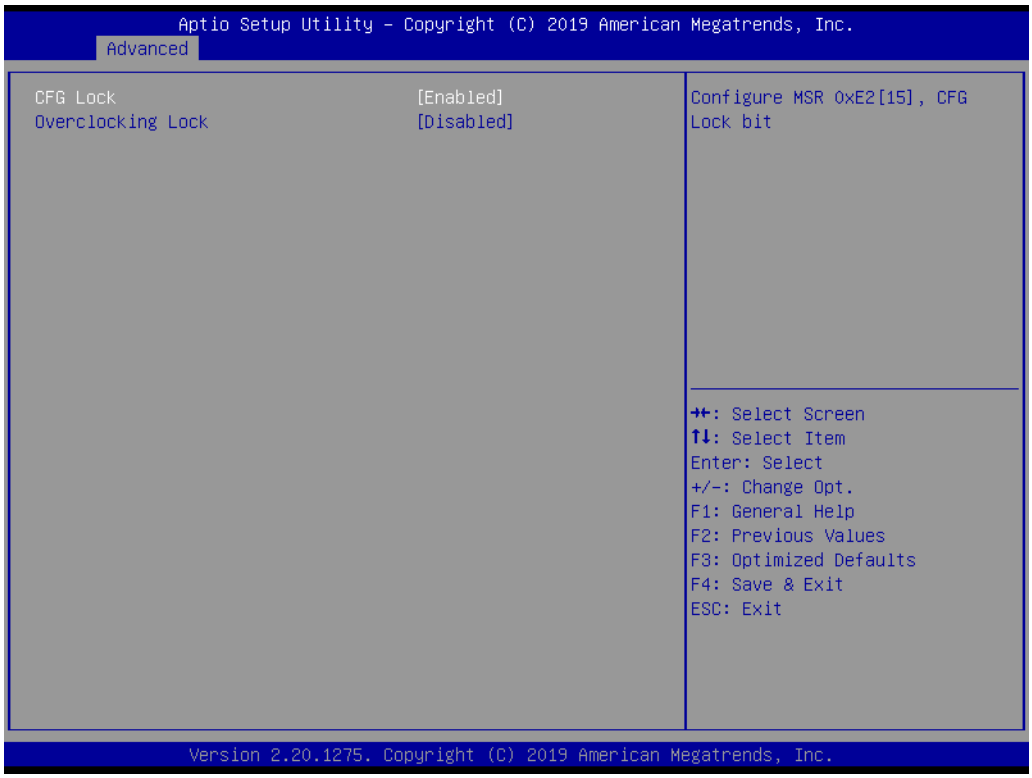
Power Limit 3 Settings



Power Limit 3 Override

Enable/Disable Power Limit 3 override.

CPU Lock Configuration



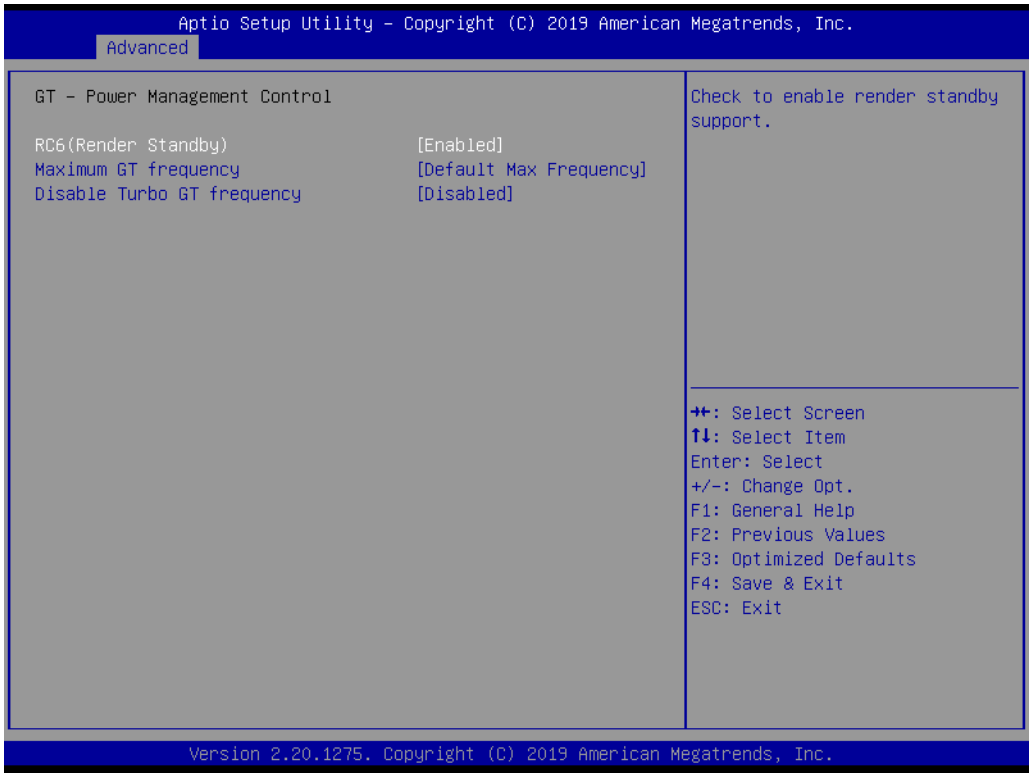
CFG Lock

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.

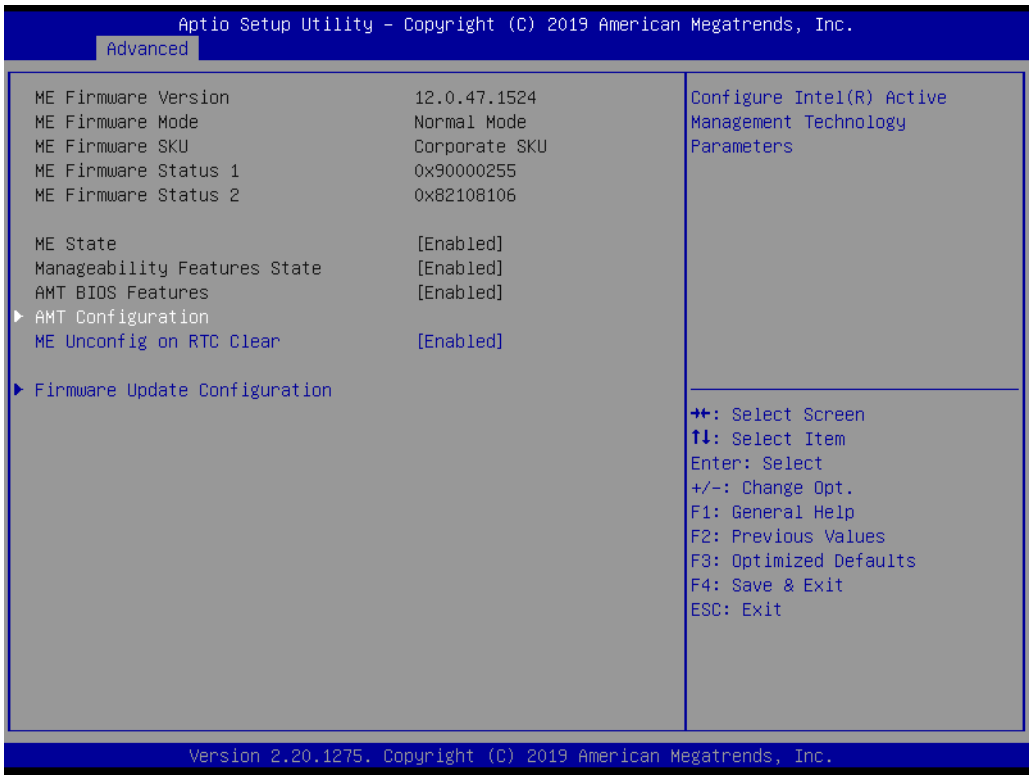
Maximum GT Frequency

Maximum GT frequency limited by user.

Disable Turbo GT Frequency

Enabled/Disabled Turbo GT frequency.

3.1.2.4 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.

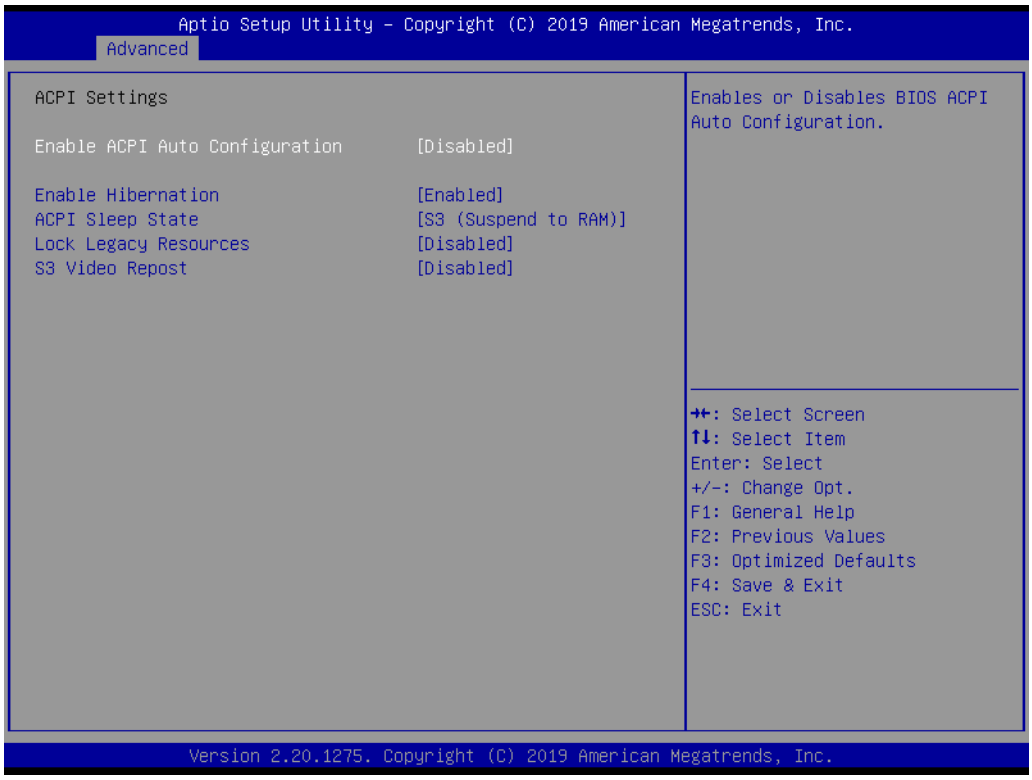
ME Unconfig on RTC Clear

When Disabled, ME will not be unconfigured on RTC Clear.

Firmware Update Configuration

Configure Management Engine Technology Parameters.

3.1.2.5 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.

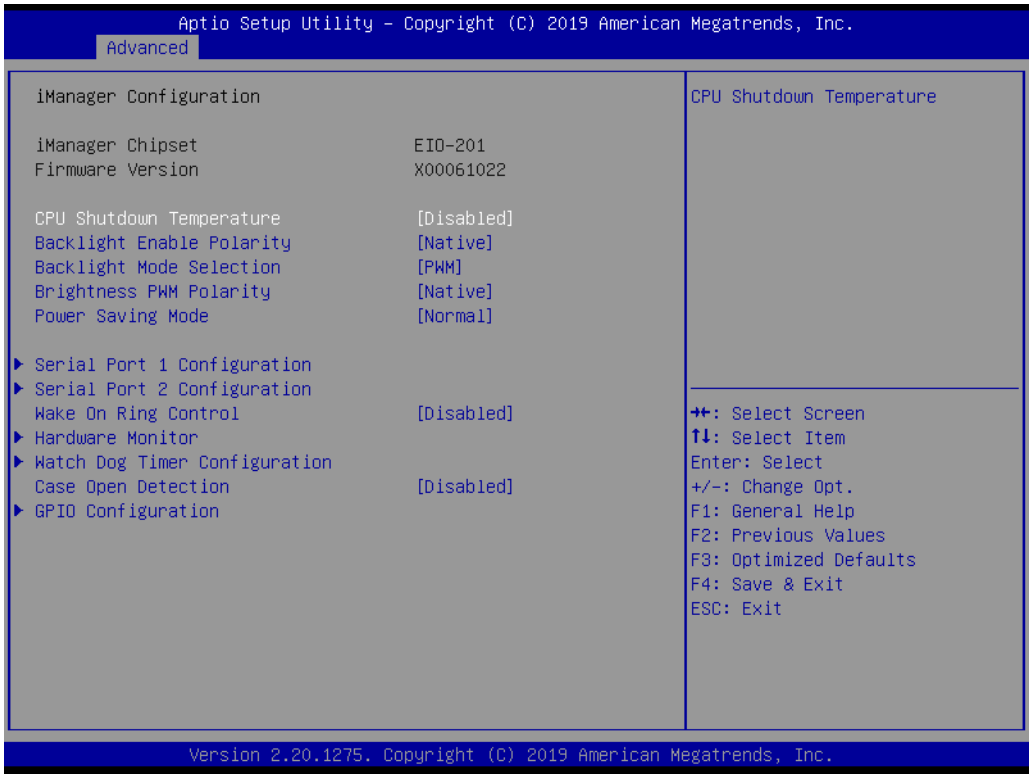
Lock Legacy Resources

Enables or Disables Lock of Legacy Resources.

S3 Video Repost

Enable or Disable S3 Video Repost.

3.1.2.6 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.

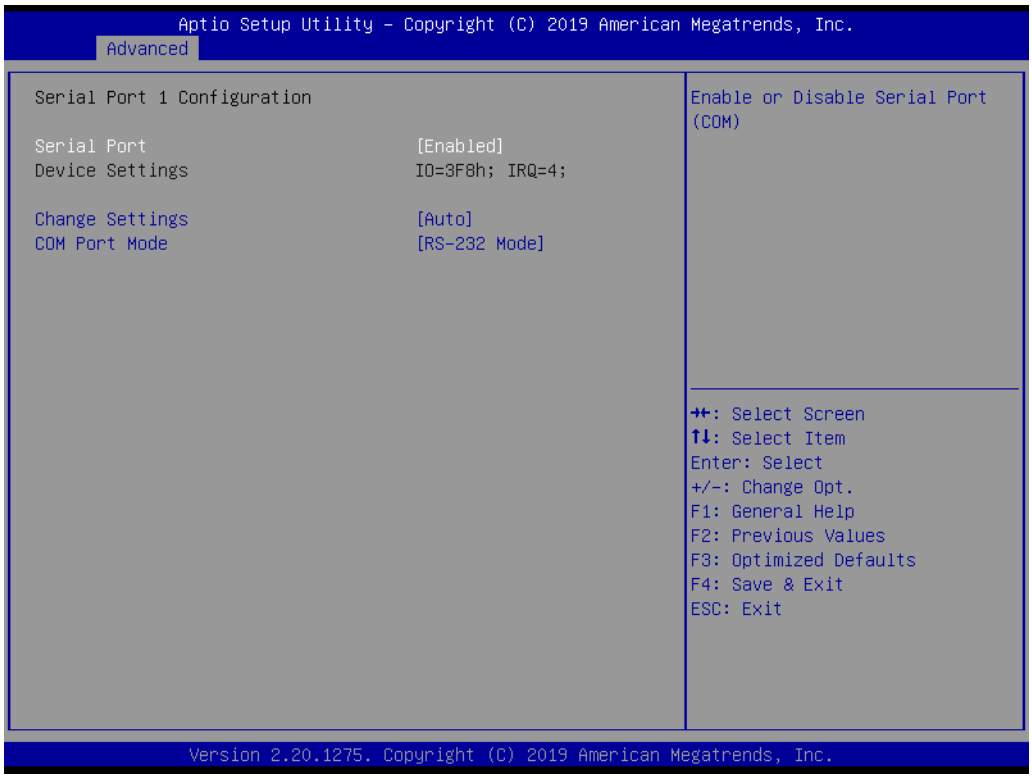
Case Open Detection

Enable or Disable Case Open Detect Function.

GPIO Configuration

GPIO Configuration Settings.

Serial Port 1 Configuration



Serial Port

Enable or Disable Serial Port (COM).

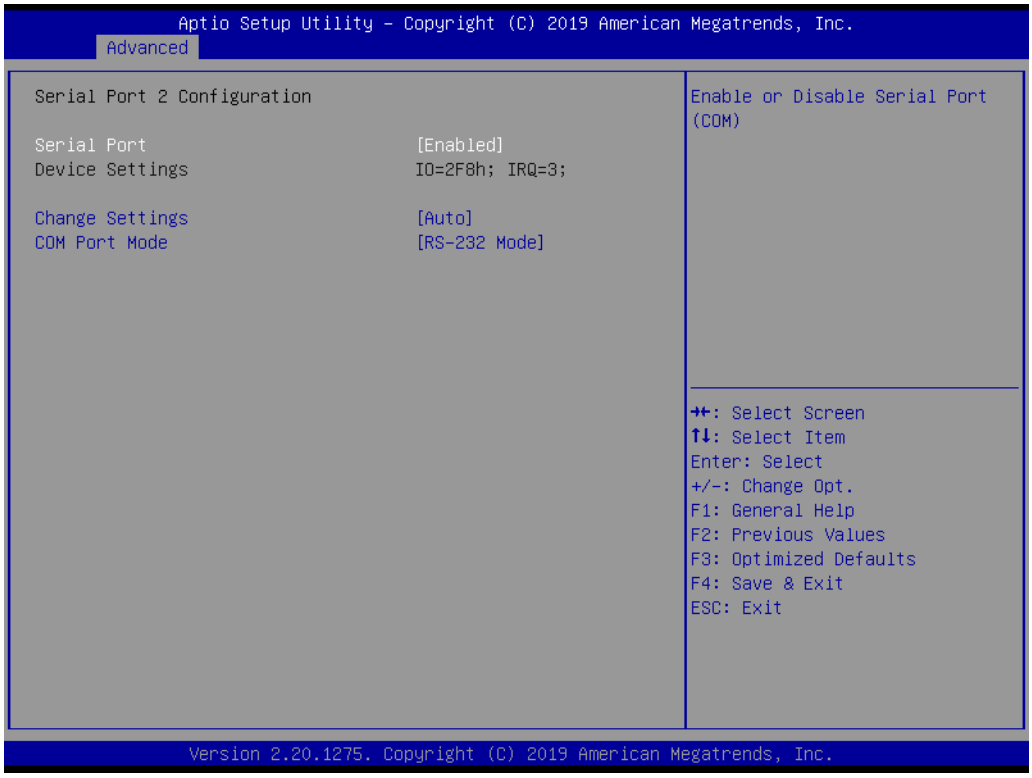
Change Settings

Select an optimal settings for Super I/O device.

COM Port Mode

COM1 Port Mode Select.

Serial Port 2 Configuration



Serial Port

Enable or Disable Serial Port (COM).

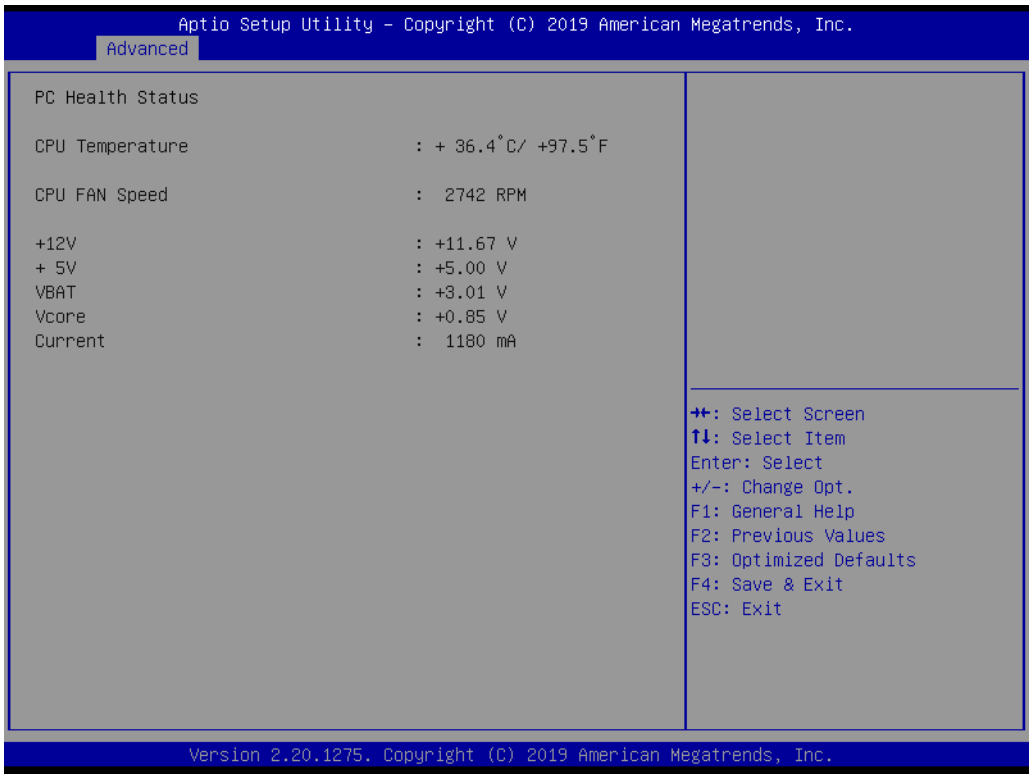
Change Settings

Select an optimal settings for Super IO device.

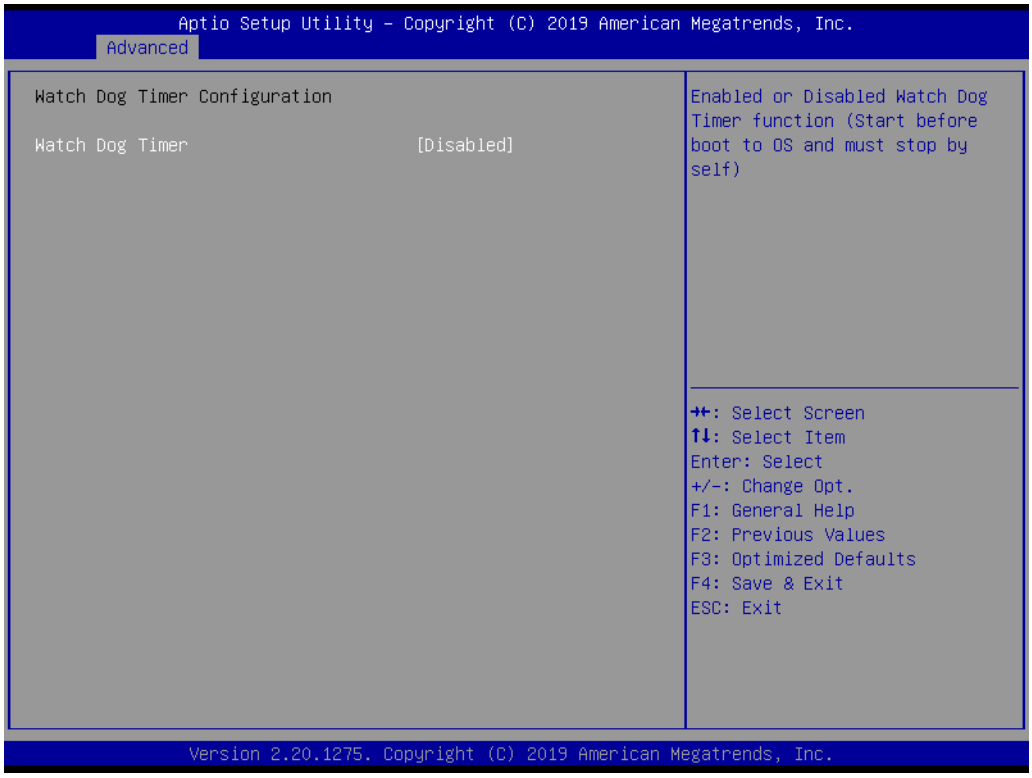
COM Port Mode

COM2 Port Mode Select.

Hardware Monitor



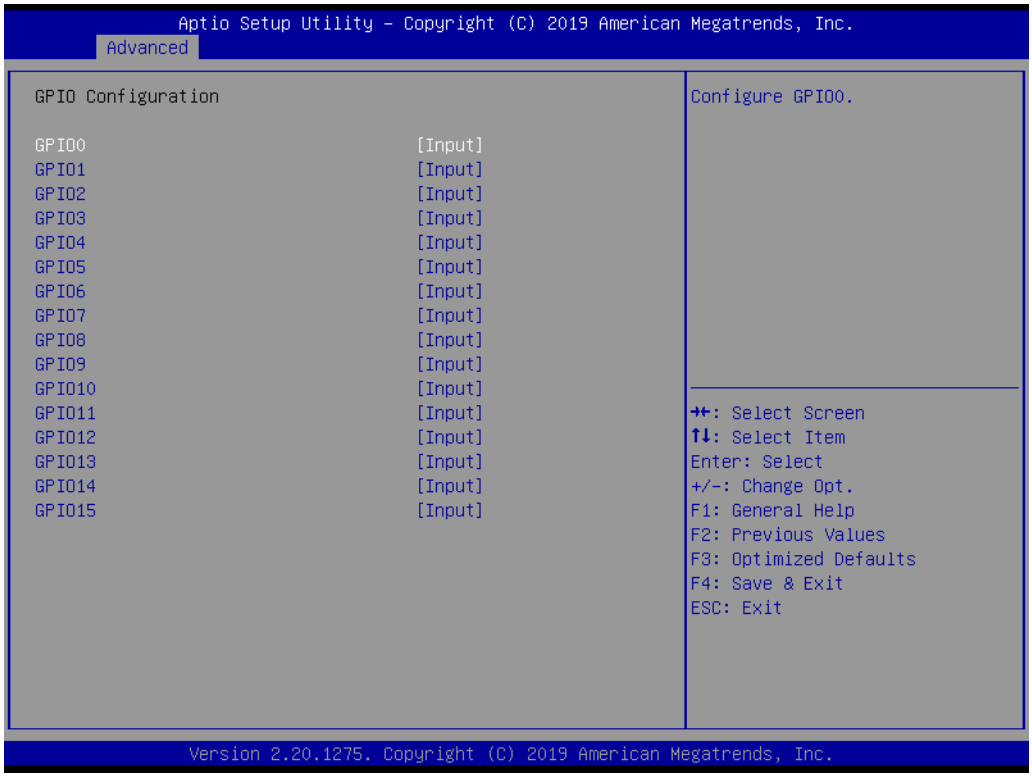
Watch Dog Timer Configuration



Watch Dog Timer

Enable or Disable Watch Dog Timer Function.

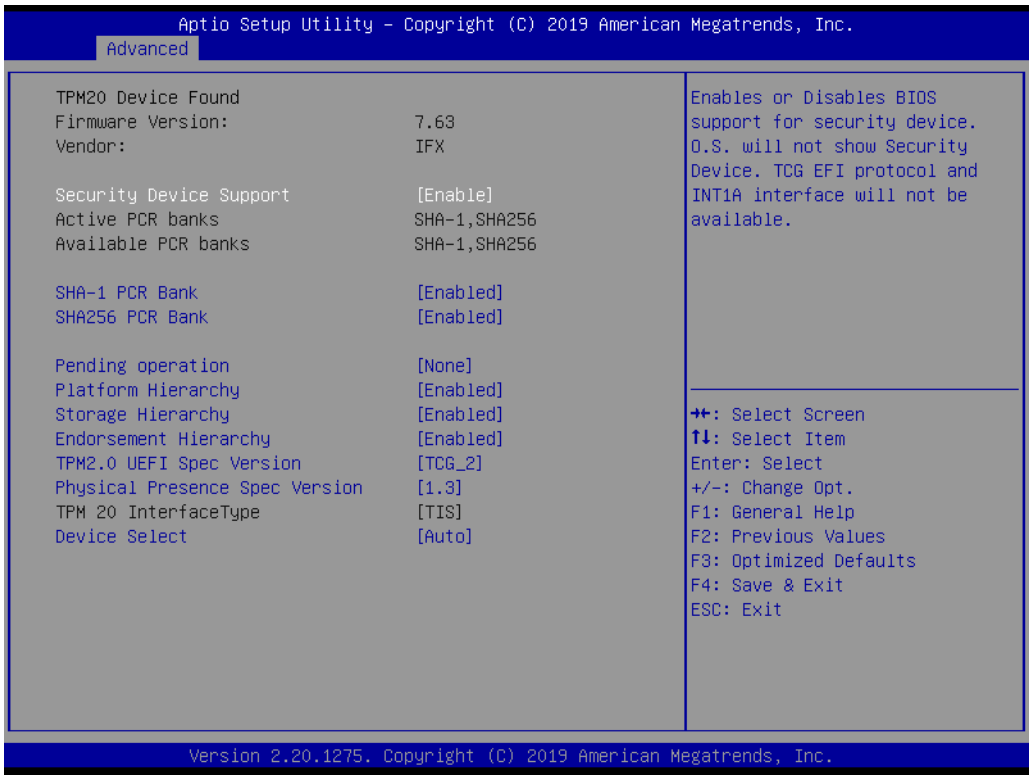
GPIO Configuration



GPIO0/1/2/3/4/5/6/7/8/9/10/11/12/13/14/15

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

3.1.2.7 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.

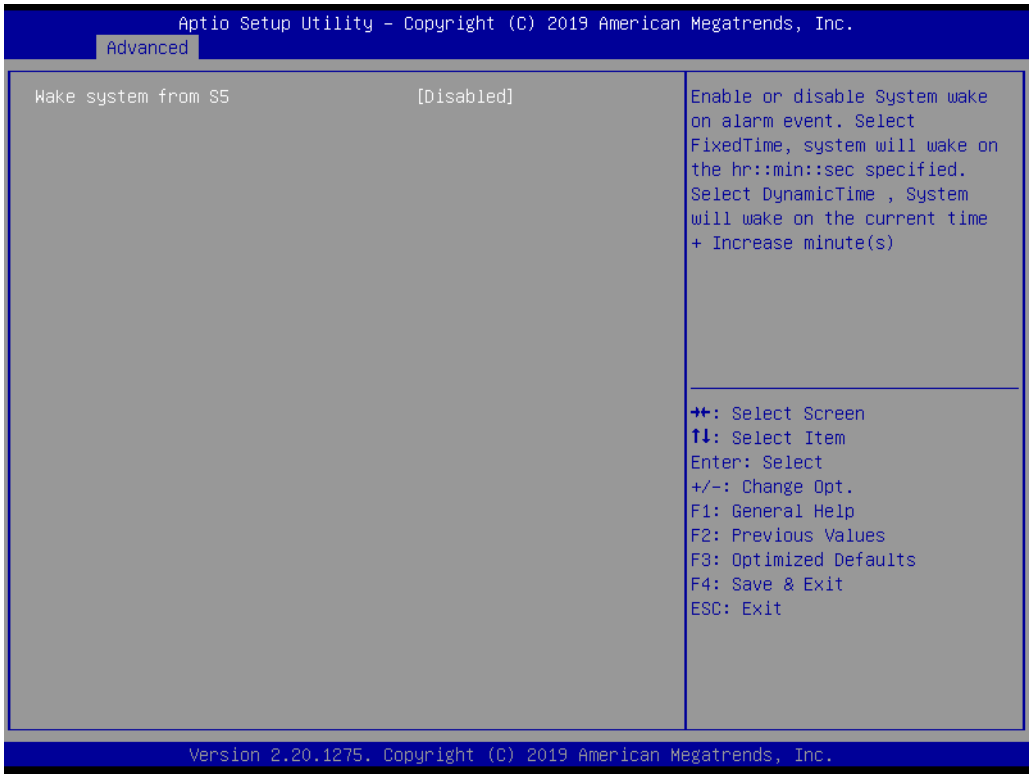
Physical Presence Spec Version

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.

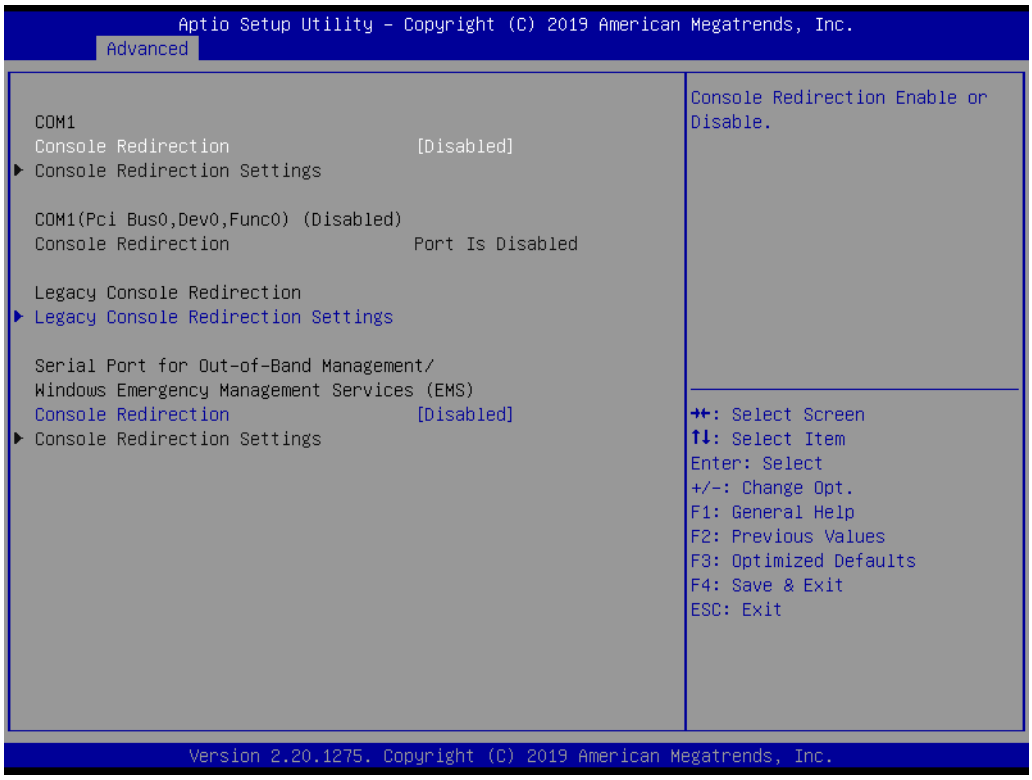
3.1.2.8 S5 RTC Wake Settings



Wake System from S5

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

3.1.2.9 Serial Port Console Redirection



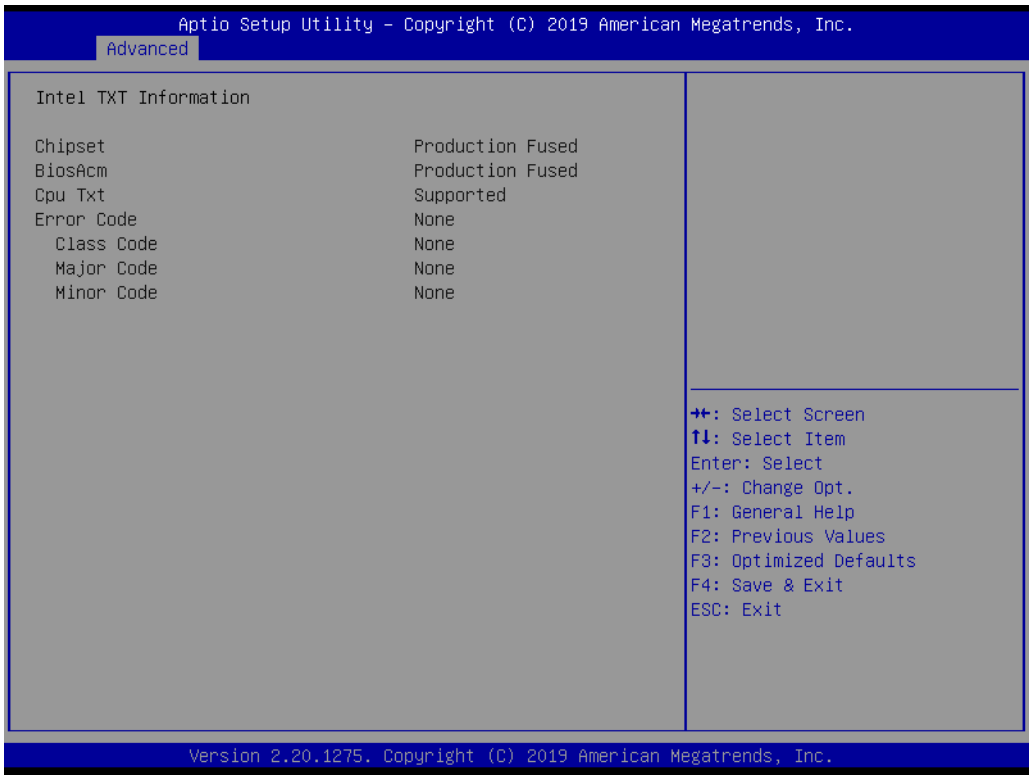
Console Redirection

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.

3.1.2.10 Intel TXT Information



Intel TXT Information

Display Intel TXT information.

3.1.2.11 USB Configuration

Legacy USB Support

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

XHCI Hand-off

This is a workaround for OSes without XHCI hand-off support. The XHCI ownership change should be claimed by XHCI driver.

USB Mass Storage Driver Support

Enable/Disable USB Mass Storage Driver Support.

USB Transfer Time-Out

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

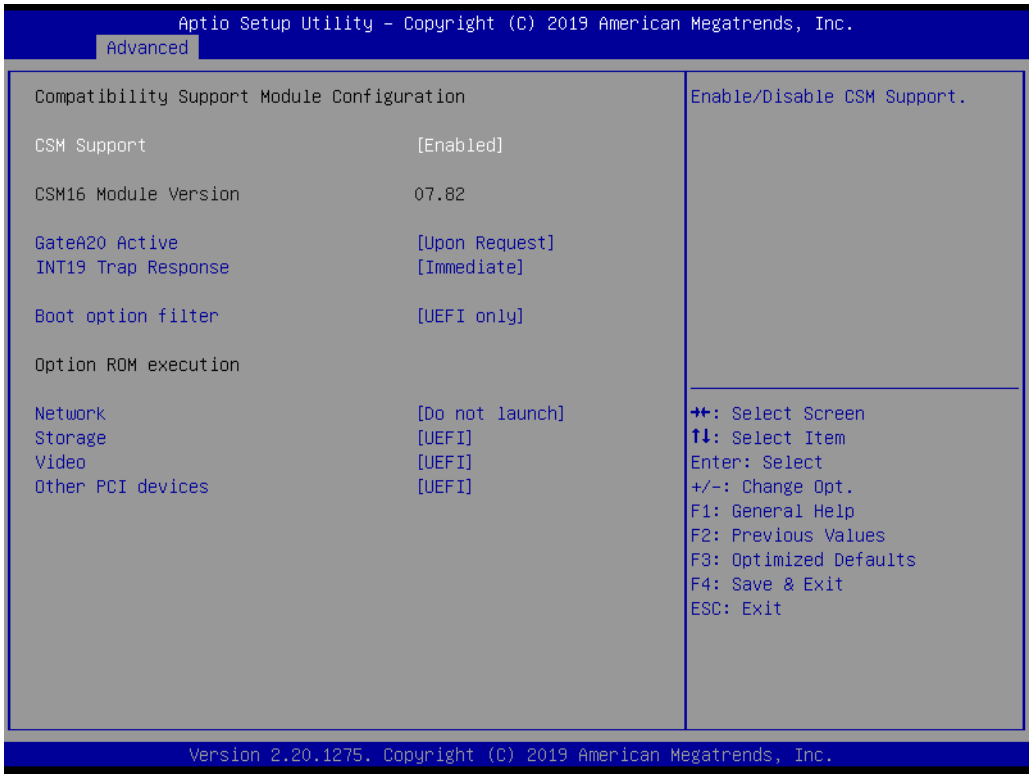
Device Reset Time-Out

USB mass storage device start unit command time-out.

Device Power-Up Delay

Maximum time the device will take before it properly reports itself to the Host Controller. 'Auto' uses default value: for a Root port it is 100 ms, for a Hub port the delay is taken from Hub descriptor.

3.1.2.12 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.

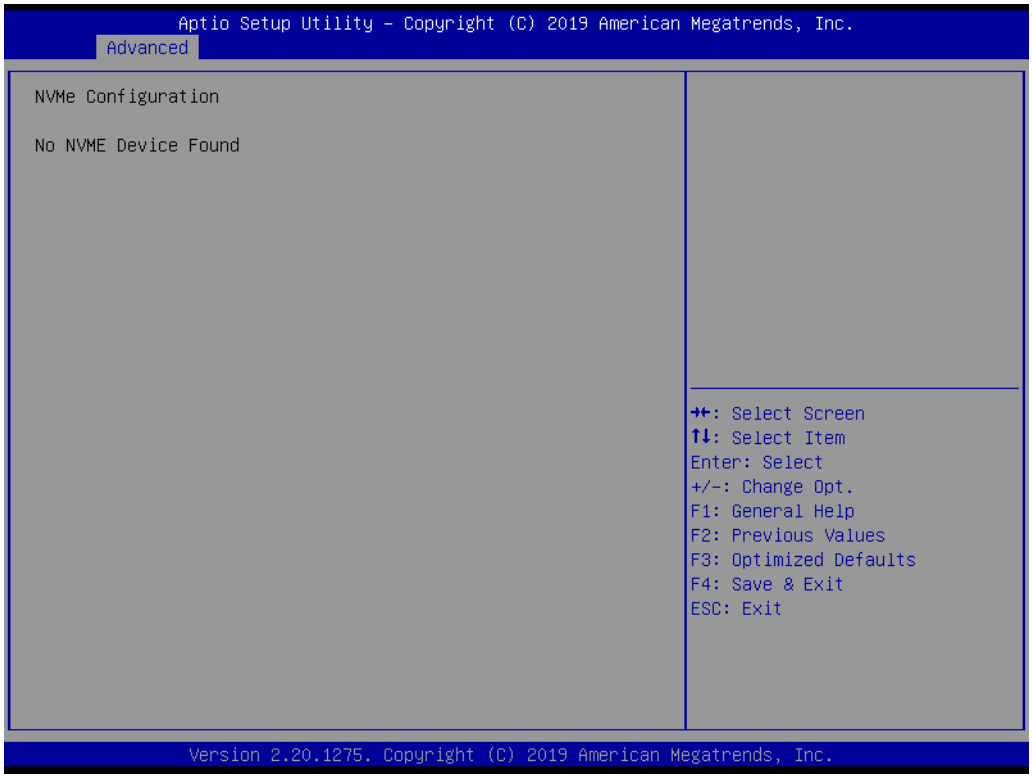
Video

Controls the execution of UEFI and Legacy Video OpROM.

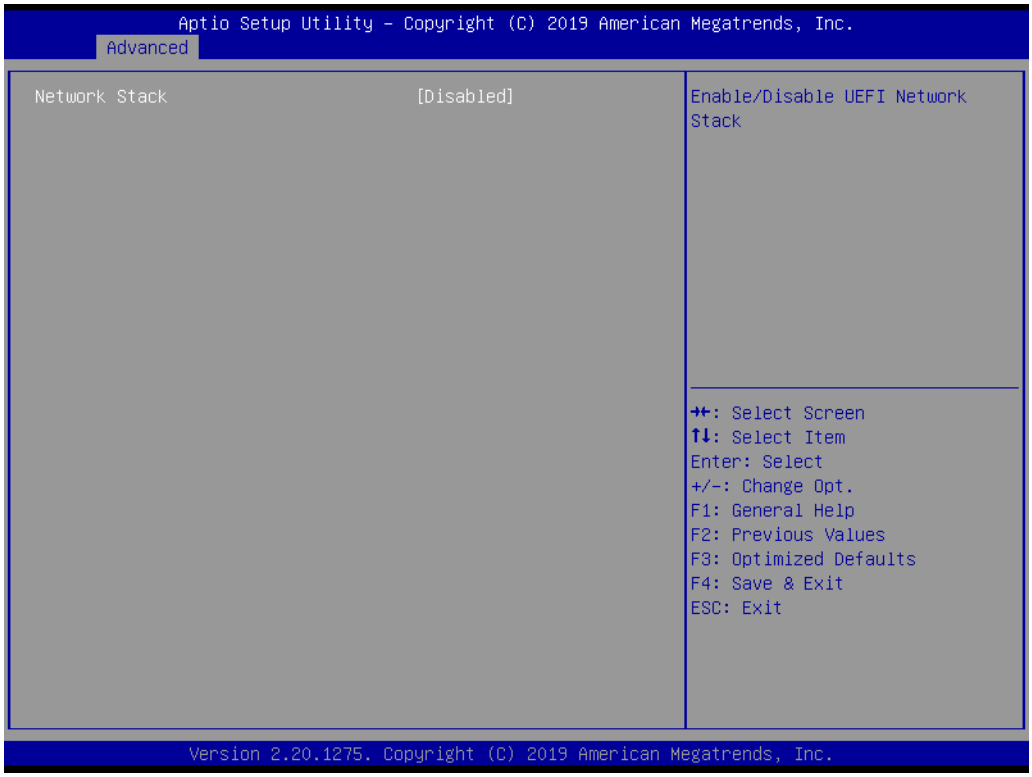
Other PCI Devices

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

3.1.2.13 NVMe Configuration



3.1.2.14 Network Stack Configuration

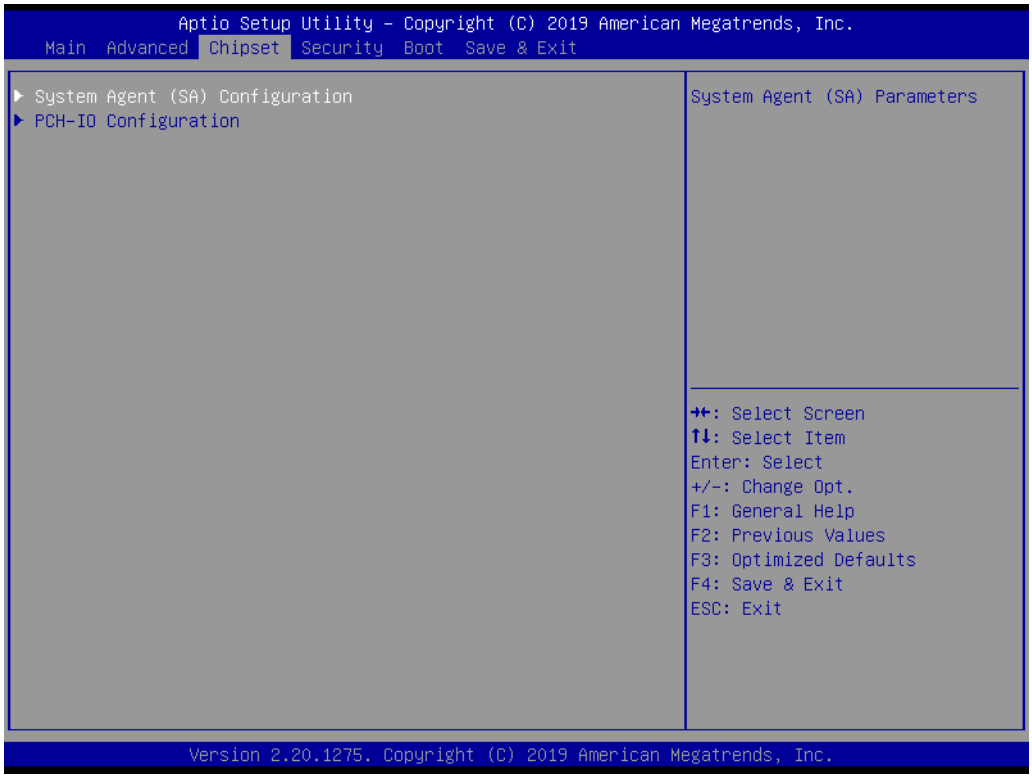


Network Stack

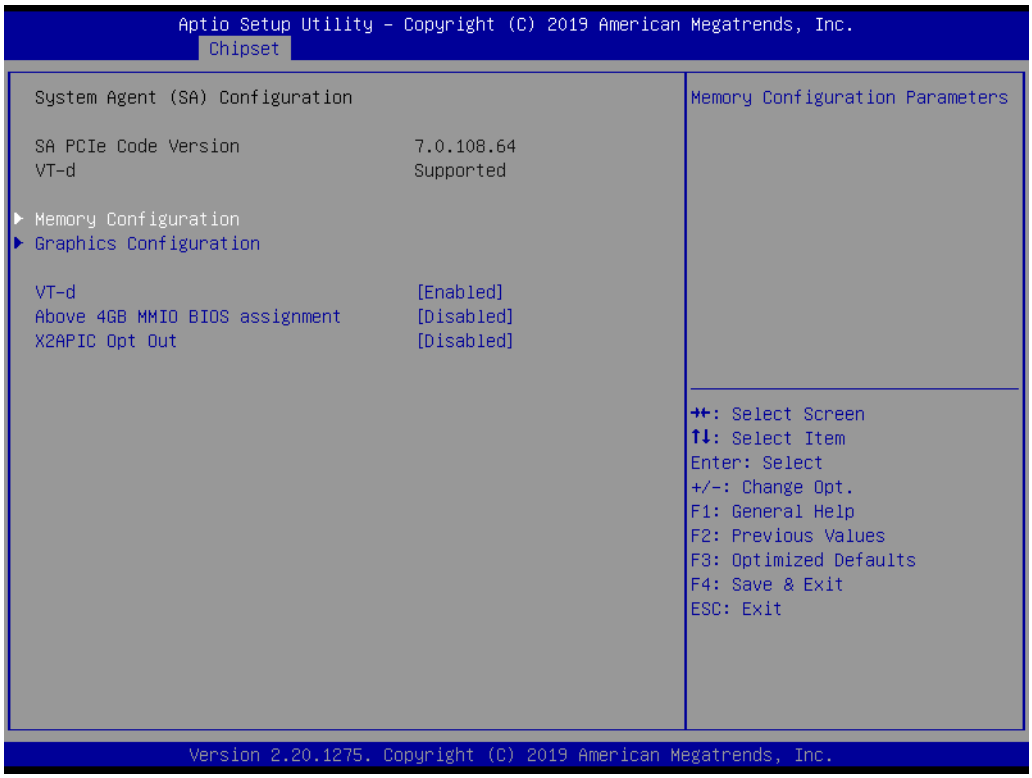
Enable/Disable UEFI Network Stack.

3.1.3 Chipset Configuration

Select the Chipset tab from the MIO-5393 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.

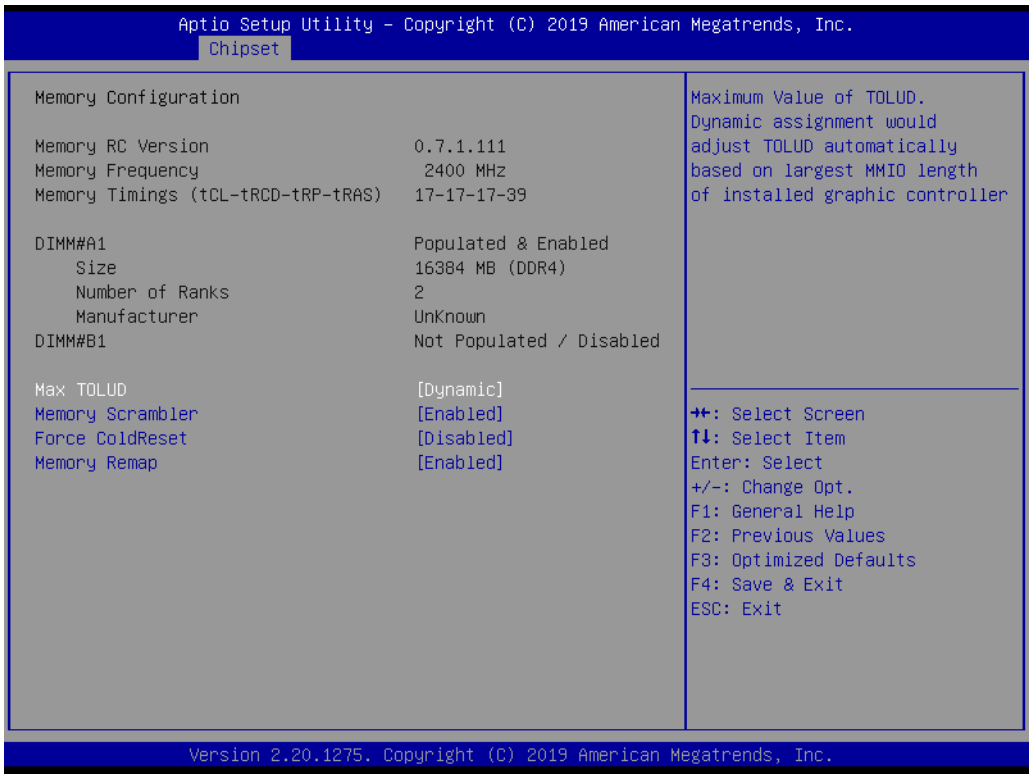
Above 4GB MMIO BIOS Assignment

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.

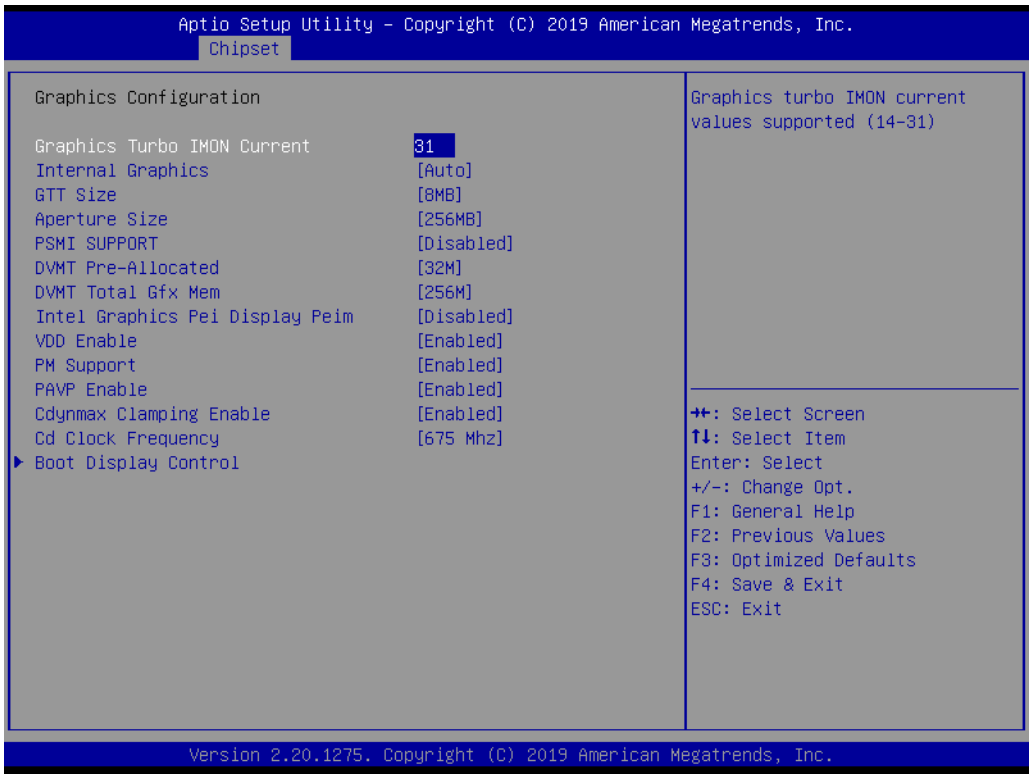
Force ColdReset

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.

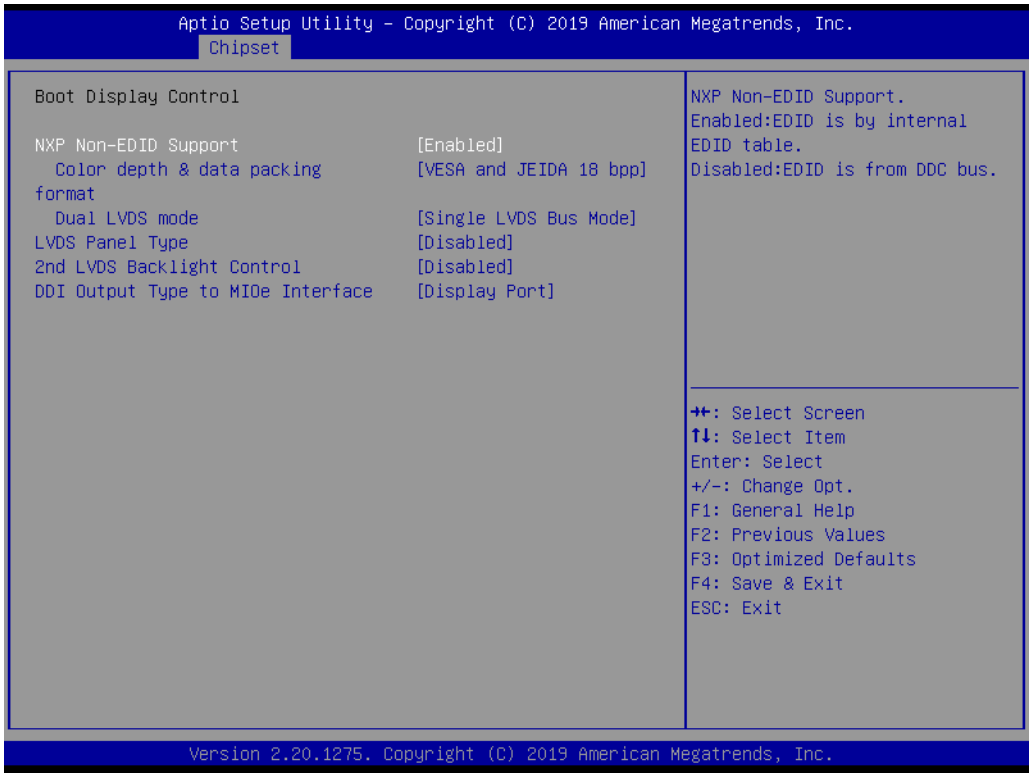
PAVP Enable

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.

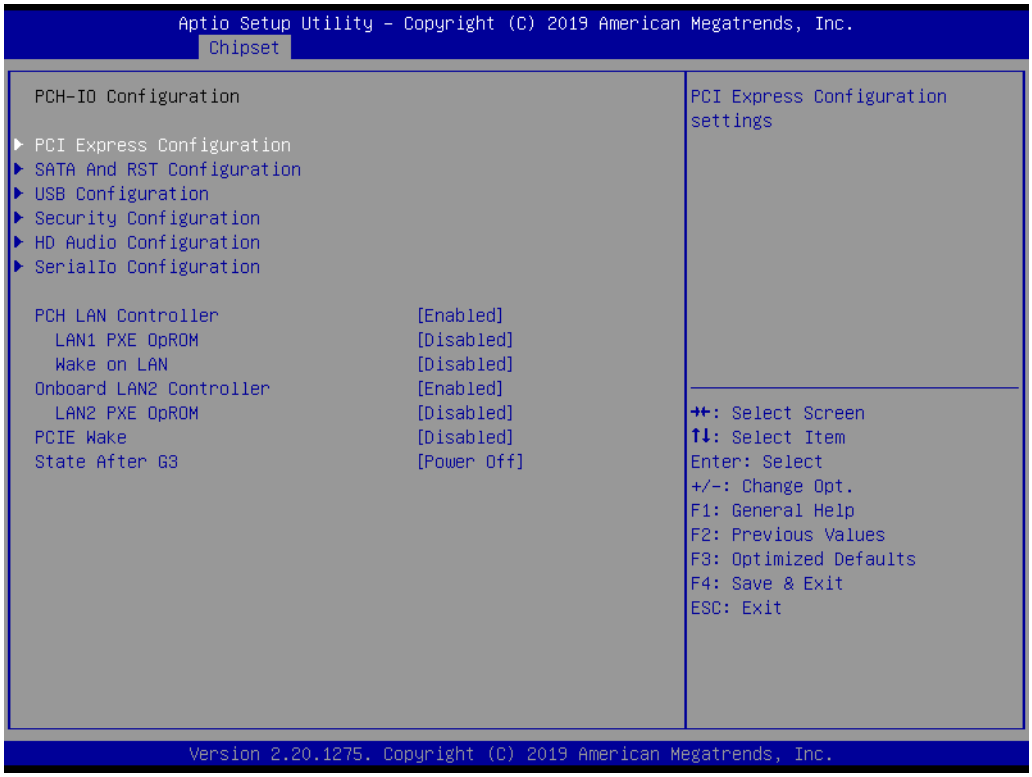
Dual LVDS Mode

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 Susbsystem Configuration Settings.

SerialIO Configuration

SerialIO Configuration Settings.

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.

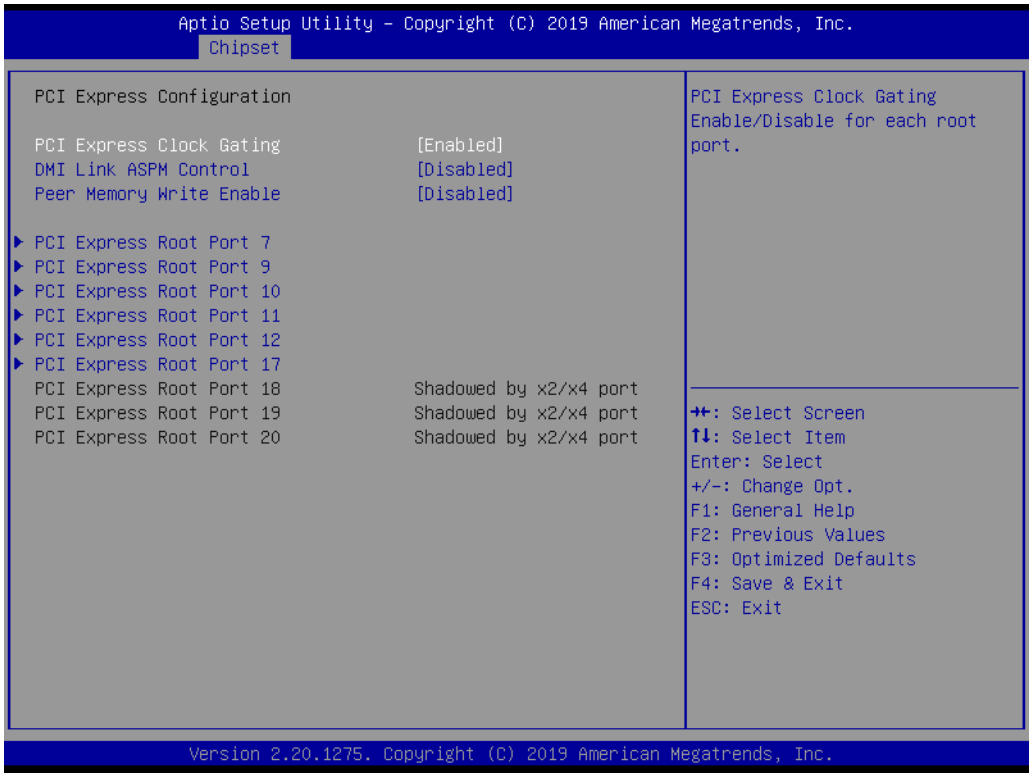
PCIE Wake

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).

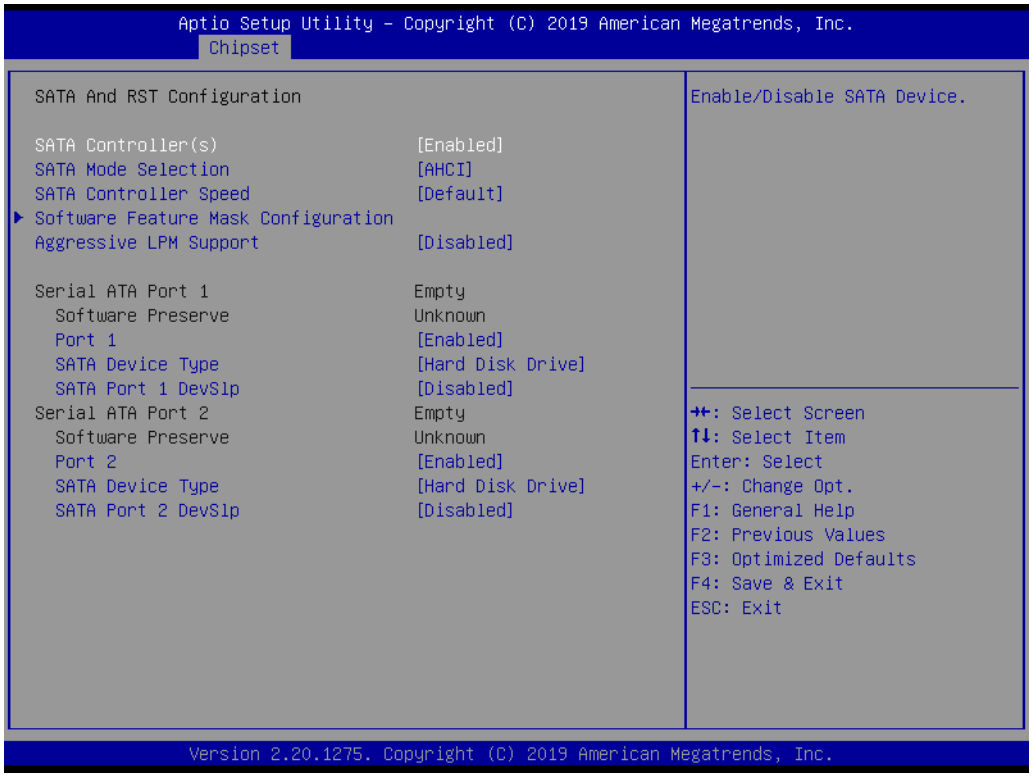
PCI Express Configuration



PCI Express Root Port 7/9/10/11/12/17

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 operate.

SATA Controller Speed

Indicates the maximum speed the SATA controller can support.

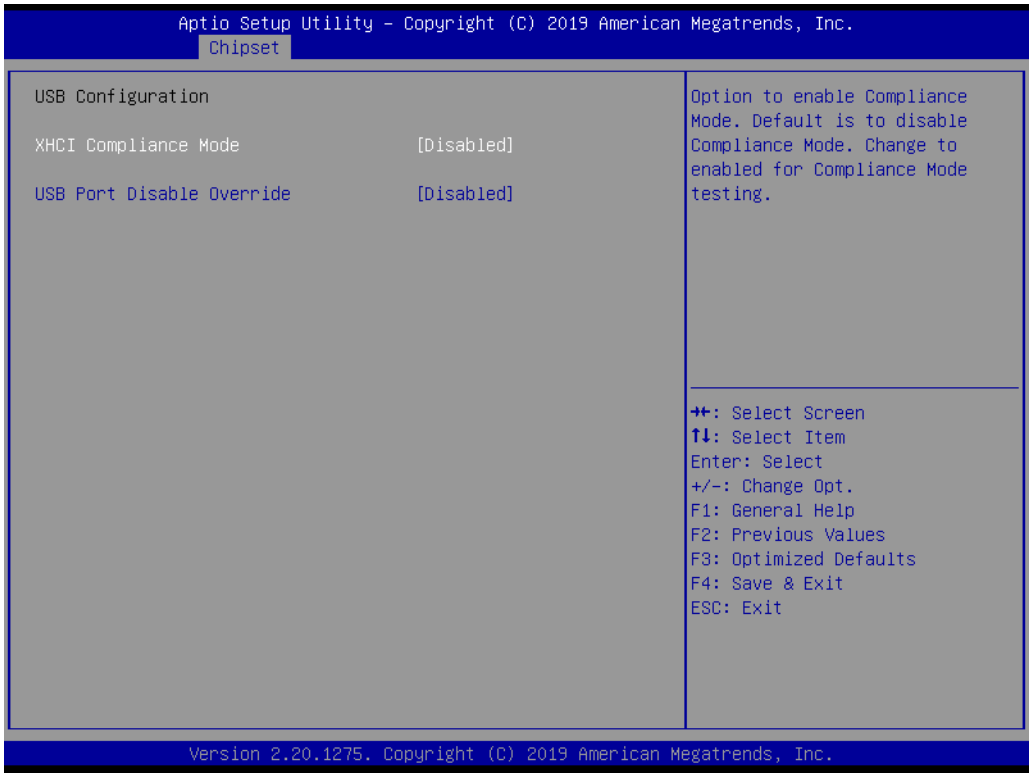
Software Feature Mask Configuration

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



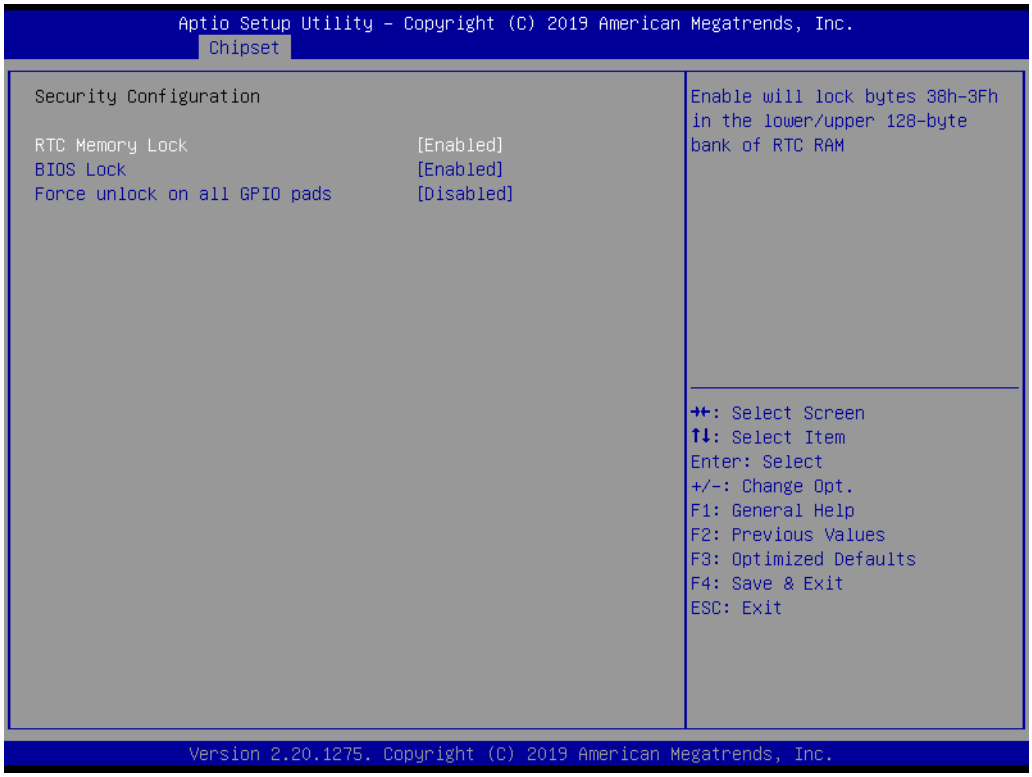
XHCI Disable Compliance Mode

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



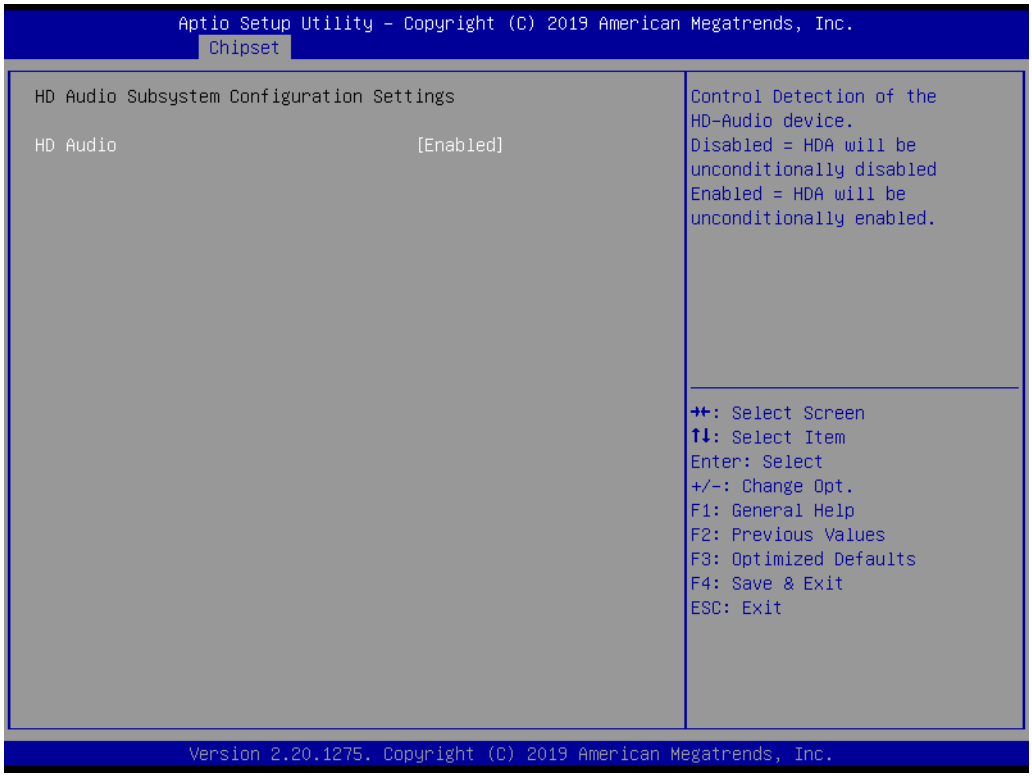
RTC Lock

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.

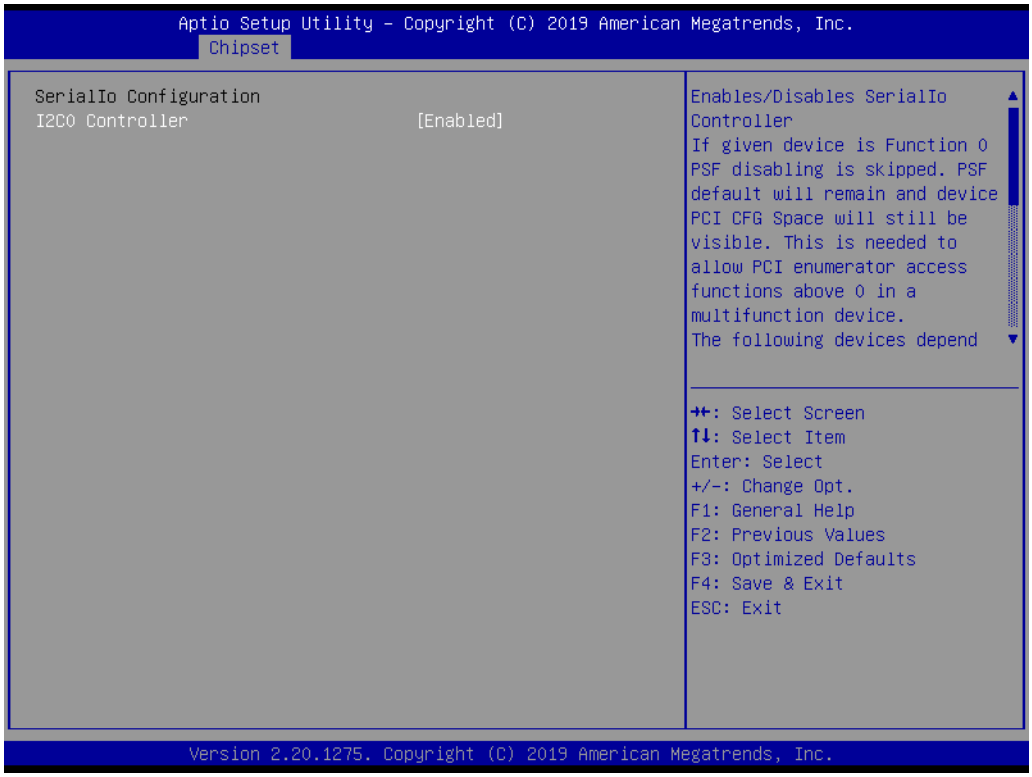
HD Audio Configuration



HD Audio

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

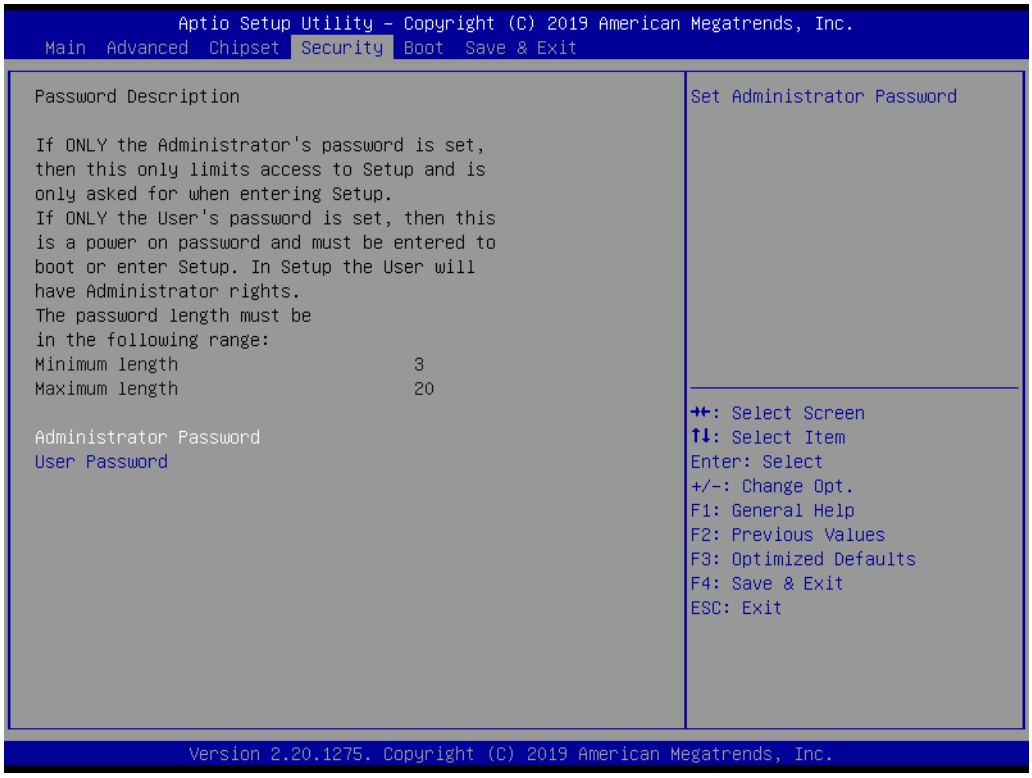
SerialIO Configuration



I2C0 Controller

Enable/Disables SerialIO Controller.

3.1.4 Security

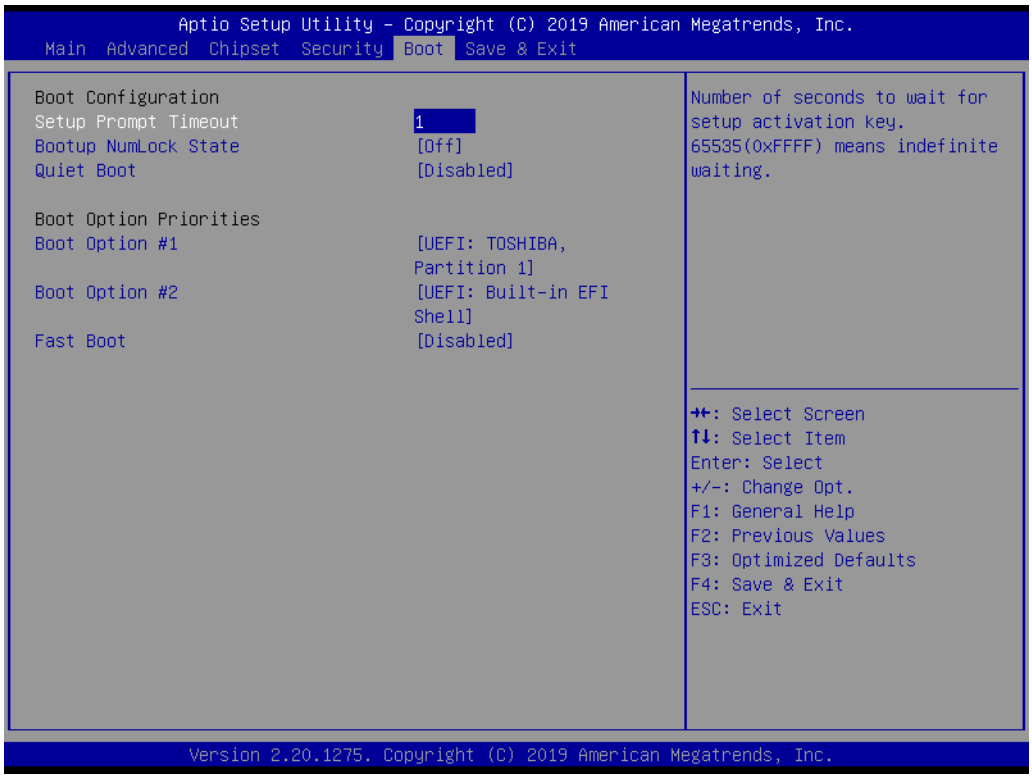


Select Security Setup from the MIO-5393 Setup main BIOS setup menu. All Security Setup options, such as password protection and virus protection are described in this section. To access the sub menu for the following items, select the item and press <Enter>:

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.

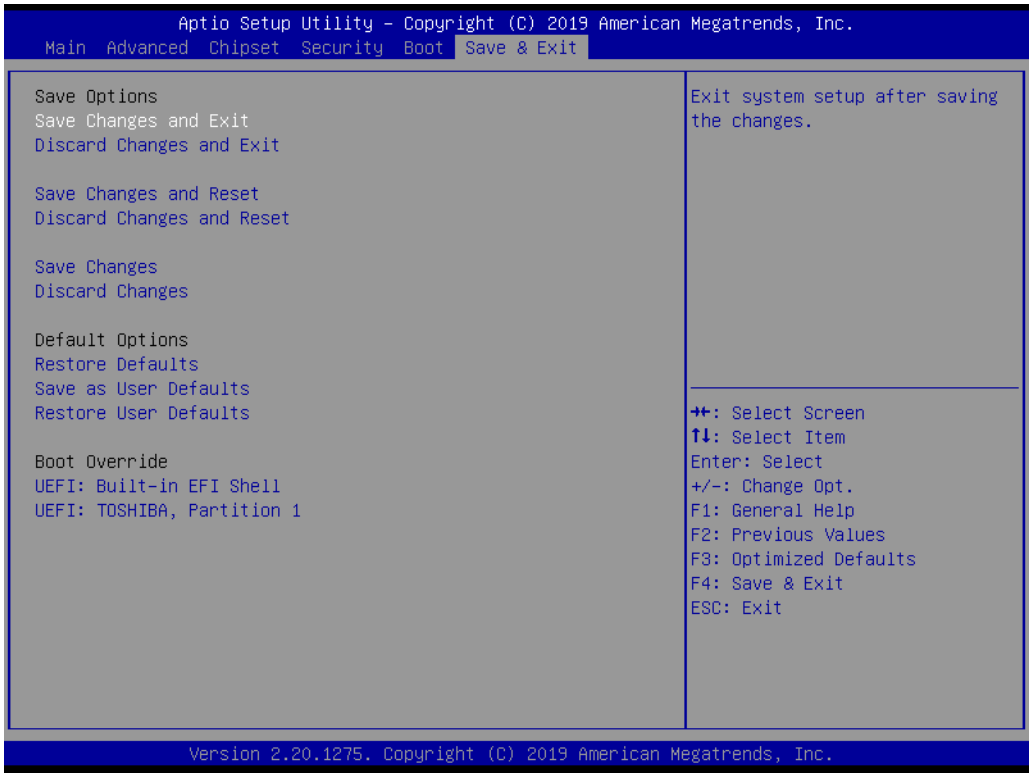
Fast Boot

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

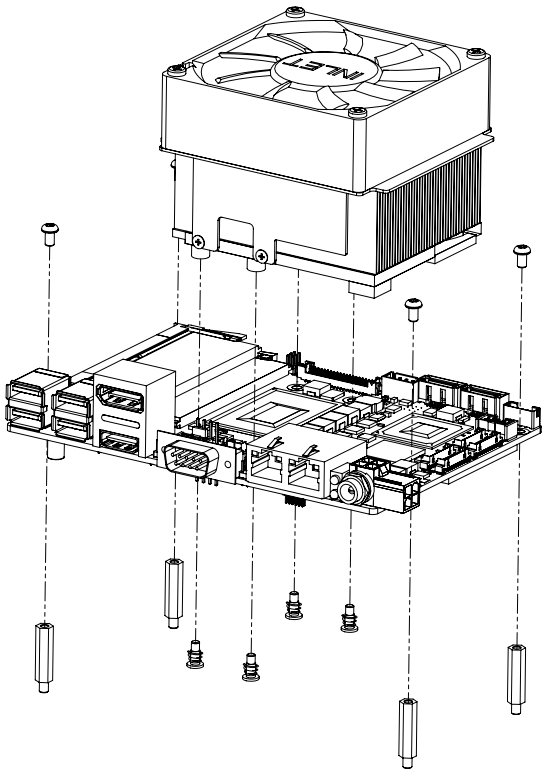
MIOe Installation

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.

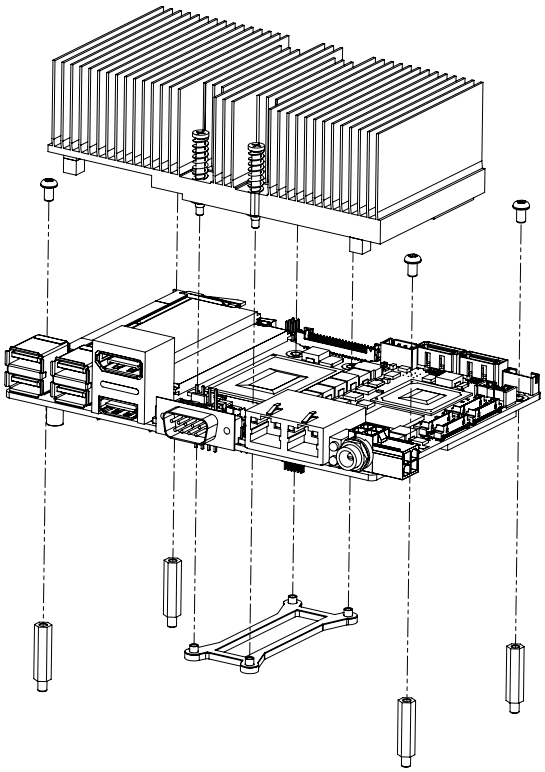
4.1 Quick Installation Guide

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

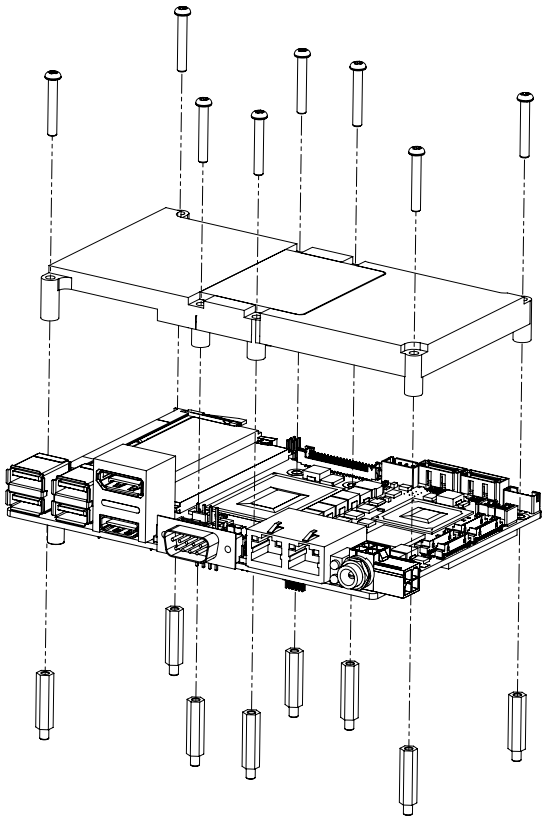
4.1.1 Cooler



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 Settings

Table A.1: Jumper Settings	
J1	Clear CMOS
J2	Auto Power on Setting
J3	COM1 power Setting
J4	LCD power
J5	LVDS VCON Setting

Table A.2: Connectors	
Label	**Function**
CN1	Power Input
CN3	SO-DIMM 9.2mm
CN4	SO-DIMM 5.2mm
CN5	RTC Battery
CN7	CAN BUS
CN8	Front Panel
CN9	Audio
CN10	SM BUS
CN11	I2C
CN12	COM1
CN13	COM2
CN14	GPIO_P0
CN15	GPIO_P1
CN16	RJ45_2x1_W/XFMR&LED
CN17	Inverter Power output
CN18	48 bit LVDS
CN19	eDP
CN20	HDMI & DP++
CN21	M.2 E-key
CN22	M.2 B/M-key
CN24	NAMO SIM
CN25	USB2.0+3.0_13H
CN26	USB2.0+3.0_13H
CN27	Internal USB
CN28	SATA Power
CN29	SATA_7V
CN30	SATA_7V
CN31	FAN
CN33	MIO

Table A.3: J1 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
(1-2)*	Normal
(2-3)	Clear COMS

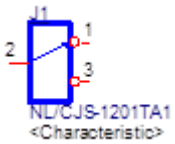


Table A.4: J2 Auto Power On Settings	
Part Number	1653002101-02
Footprint	HD_2x1P_79_D
Description	PIN HEADER 2x1P 2.0mm 180D(M) DIP 21N12050
Setting	Function
NC	Power Button for Power On
(1-2)*	Auto Power On

Table A.5: J3 COM1 Power Settings	
Part Number	1653003201
Footprint	HD_3x2P_79_D
Description	PIN HEADER 3x2P 2.0mm 180D(M) SMD 21N22050
Setting	Function
(1-2)	+5V
(3-4) *	Wake on Ring
(5-6)	+12V

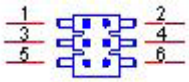


Table A.6: J4 LCD Power	
Part Number	1653003260
Footprint	HD_3x2P_79
Description	PIN HEADER 3x2P 2.0mm 180D(M) SMD 21N22050
Setting	Function
(1-3)*	+3.3V
(3-5)	+5V
(3-4)	+12V

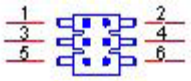


Table A.7: J5 LVDS VCON Setting	
Part Number	1653003101
Footprint	HD_3x1P_79_D
Description	PIN HEADER 3x1P 2.0mm 180D(M) DIP 2000-13 WS
Setting	Function
(1-2)	3.3V High for VCON on LVDS
(2-3) *	Low for VCON on LVDS

Table A.8: CN1 12V Power Input	
Part Number	1655003865
Footprint	WF_2x2P_165_BOX_RA_D_740SP
Description	ATX PWRCONN 2x2P 4.2mm 90D(M) DIP 740-77-04TS50
Pin	Pin Name
1	GND
2	GND
3	+12V
4	+12V

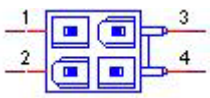


Table A.9: CN3 SODIMMDDR4_260 9.2mm	
Part Number	1651002909-02
Footprint	SODIMMDDR4_260P_AS0A826-HARB
Description	DDR4 SODIMM 260P/0.5mm/LCP/RA/G10u/S/BK/H9.2/RVS
Pin	Pin Name

Table A.10: CN4 SODIMMDDR4_260 5.2mm	
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.11: CN5 RTC 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	VBAT

Table A.12: CN7 CAN BUS	
Part Number	1654903500
Footprint	WHL3VS-125M
Description	WAFER 3P 1.25mm 90D(M) SMD 85205-03001
Pin	Pin Name
1	CAN1_D+
2	CAN1_D-
3	GND

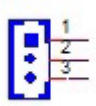


Table A.13: CN8 Front Panel	
Part Number	1653007728-01
Footprint	WF_10P_49_BOX_53398-1071
Description	Wafer 1x10P/1.25mm/PA/M/VA/WH/Sn/H4.7mm/WO
Pin	Pin Name
1	GND
2	BUZZER-
3	BUZZER+
4	RDC_CASEOPEN
5	SATA_EXT_LED#
6	PSIN#
7	RST#
8	HD LED +3.3V
9	NC
10	Power LED +5V

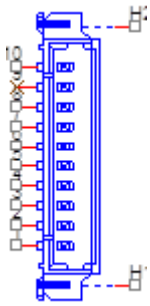


Table A.14: CN9 Audio	
Part Number	1653007480-01
Footprint	HD_5X2P_79_BOX_H245
Description	BOXH 2x5P/2.0mm/LCP/M/VA/G10u/S/BK/H4.83/W CAP
Pin	Pin Name
1	LOUTR
2	LINR
3	GND
4	GND
5	LOUTL
6	LINL
7	GND
8	GND
9	MIC1R
10	MIC1L

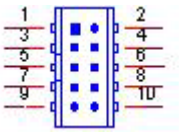


Table A.15: CN10 SM BUS	
Part Number	1655904020
Footprint	FPC4V-125M
Description	WAFER 4P 1.25mm 180D(M) SMD 85205-04001
Pin	Pin Name
1	GND
2	SMB0_DAT
3	SMB0_CLK
4	+V5_SMB

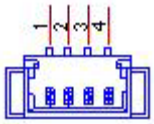


Table A.16: CN11 I^2C	
Part Number	1655904020
Footprint	FPC4V-125M
Description	WAFER 4P 1.25mm 180D(M) SMD 85205-04001
Pin	Pin Name
1	GND
2	I^2C_DAT
3	I^2C_CLK
4	+V5_I^2C

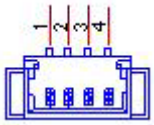


Table A.17: CN12 COM1	
Part Number	1654011262-01
Footprint	DBCOM-VM5MS
Description	D-SUB 9P 2.77mm 90D(M) DIP G/F DSB5-09M1-KNR0-90
Pin	Pin Name
1	COM_DCD#
2	COM_RXD
3	COM_TXD
4	COM_DTR#
5	GND
6	COM_DSR#
7	COM_RTS#
8	COM_CTS#
9	COM_RI# or 5/12V

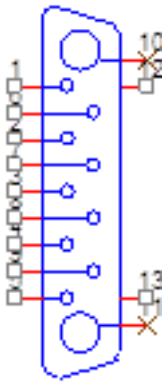


Table A.18: CN13 COM2	
Part Number	1653007728-01
Footprint	WF_10P_49_BOX_53398-1071
Description	Wafer 1x10P/1.25mm/PA/M/VA/WH/Sn/H4.7mm/WO CAP
Pin	Pin Name
1	NC
2	COM_RI#
3	COM_DTR#
4	COM_CTS#
5	COM_TXD
6	COM_RTS#
7	COM_RXD
8	COM_DSR#
9	COM_DCD#
10	GND

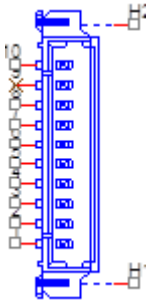


Table A.19: CN14 GPIO_P0	
Part Number	1653007728-01
Footprint	WF_10P_49_BOX_53398-1071
Description	Wafer 1x10P/1.25mm/PA/M/VA/WH/Sn/H4.7mm/WO CAP
Pin	Pin Name
1	GND
2	P0_GPIO7
3	P0_GPIO2
4	P0_GPIO6P
5	P0_GPIO1
6	P0_GPIO5
7	P0_GPIO0
8	P0_GPIO4
9	+5V
10	P0_GPIO3

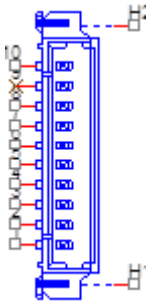


Table A.20: CN15 GPIO_P1	
Part Number	1653007728-01
Footprint	WF_10P_49_BOX_53398-1071
Description	Wafer 1x10P/1.25mm/PA/M/VA/WH/Sn/H4.7mm/WO CAP
Pin	Pin Name
1	GND
2	P1_GPIO7
3	P1_GPIO2
4	P1_GPIO6
5	P1_GPIO1
6	P1_GPIO5
7	P1_GPIO0
8	P1_GPIO4
9	+5V
10	P1_GPIO3

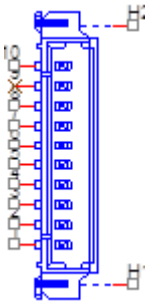


Table A.21: CN16 RJ45_2x1_W/XFMR&LED	
Part Number	1652003274
Footprint	RJ45_28P_RTB-19GB9J1A
Description	PHONE JACK RJ45 28P DIP RTB-19GB9J1A
Pin	Pin Name

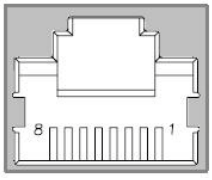


Table A.22: CN17 Inverter Power Output	
Part Number	1655305020
Footprint	WHL5V-2M
Description	WAFER BOX 5P 2.0mm 180D(M) DIP A2001WV2-5P
Pin	Pin Name
1	+12V
2	GND
3	ENABKL
4	VBR
5	+5V

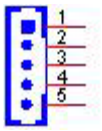


Table A.23: CN18 48-bit LVDS Panel	
Part Number	1653006918-01
Footprint	SPH20X2
Description	Wafer 2x20P/1.25mm/(M)/NY9T/VA/GFL/S/WH/W Post
Pin	Pin Name
1	+12V or +5V or +3.3V
2	+12V or +5V or +3.3V
3	GND
4	GND
5	+12V or +5V or +3.3V
6	+12V or +5V or +3.3V
7	LVDS0_D0-
8	LVDS1_D0-
9	LVDS0_D0+
10	LVDS1_D0+
11	GND
12	GND
13	LVDS0_D1-
14	LVDS1_D1-
15	LVDS0_D1+
16	LVDS1_D1+
17	GND
18	GND
19	LVDS0_D2-
20	LVDS1_D2-
21	LVDS0_D2+
22	LVDS1_D2+
23	GND
24	GND
25	LVDS0_CLK-

Table A.23: CN18 48-bit LVDS Panel	
26	LVDS1_CLK-
27	LVDS0_CLK+
28	LVDS1_CLK+
29	GND
30	GND
31	LVDS1_CLK
32	LVDS1_DAT
33	GND
34	GND
35	LVDS0_D3-
36	LVDS1_D3-
37	LVDS0_D3+
38	LVDS1_D3+
39	NC
40	VCON

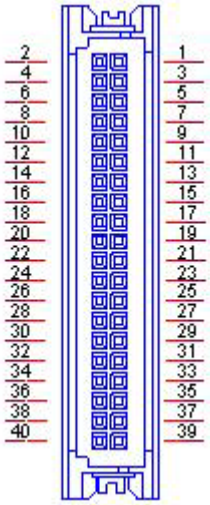


Table A.24: CN19 eDP	
Part Number	1655005384-01
Footprint	LVDS_40P_20_20455-040E_MIO-5373
Description	Conn. 40P 0.5mm 90D SMD 20455-040E-12
Pin	Pin Name
1	NC
2	GND
3	eDP_TX3-
4	eDP_TX3+
5	GND
6	eDP_TX2-
7	eDP_TX2+
8	GND
9	eDP_TX1-
10	eDP_TX1+
11	GND
12	eDP_TX0-
13	eDP_TX0+-
14	GND
15	eDP_AUX+
16	eDP_AUX-
17	GND
18	+12V or +5V or +3.3V
19	+12V or +5V or +3.3V
20	+12V or +5V or +3.3V
21	+12V or +5V or +3.3V
22	NC
23	GND
24	GND
25	GND
26	GND
27	eDP_HDP
28	GND
29	GND
30	GND
31	GND
32	ENABKL
33	PWM
34	NC
35	NC
36	eDP Inverter 12V or 5V
37	eDP Inverter 12V or 5V
38	eDP Inverter 12V or 5V
39	eDP Inverter 12V or 5V
40	NC

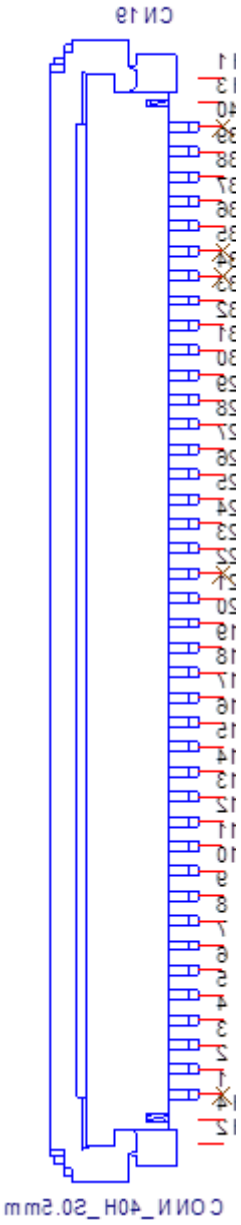


Table A.25: CN20 HDMI & DP++	
Part Number	1654012575-01
Footprint	HDMI_DP_39P_3VD11201-HHJ0-4
Description	HDMI+DP 39P/1.4+1.5mm/(F)/LCP/RA/G30u/D/BK
Pin	Pin Name

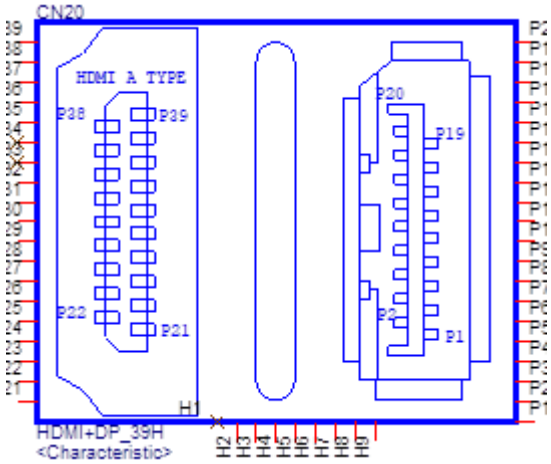


Table A.26: CN21 M.2 E Key			
Part Number	1654012663-01		
Footprint	NGFF_75P_APCI0163-P001A		
Description	NGFF 75P/0.5mm/(F)/LCP/RA/GFL/S/BK/H8.5mm/E-key		
Pin	Pin Name	Pin	Pin Name
1	GND	2	+3.3VSB
3	USB_D+	4	+3.3VSB
5	USB_D-	7	GND
8	BT_PCMCLK	10	BT_PCMSYNC
12	BT_PCMIN	14	BT_PCMOUT
18	GND	33	GND
35	PETp0	37	PETn0
39	GND	41	PERp0
43	PERn0	45	GND
47	REFCLK+	49	REFCLK-
50	SUSCLK	51	GND
52	PERESET#	53	CLKREQ#
54	BT_DISABLE#	55	PCIE_WAKE#
56	W_DISABLE#	57	GND
58	I2C DAT	60	I2C_CLK
63	GND	69	GND
72	+3.3VSB	74	+3.3VSB
75	GND		

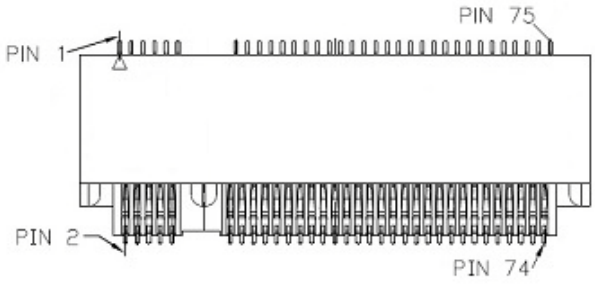


Table A.27: CN22 M.2 B key (Option for M.2 M key)		
Part Number	1654012087-02/(1654012187-02)	
Footprint	NGFF_75P_APCI0161-P001A	
Description	NGFF 75P/0.5mm/(F)/LCP/RA/GFL/S/BK/H8.50/B-key (NGFF 75P 0.5mm 90D(F) H=8.5 SMD 2E0BC21-S85BM-7H)	
Pin	B key Pin Nam	M key Pin Name
1	NC	GND
2	+3.3VSB	+3.3VSB
3	GND	GND
4	+3.3VSB	+3.3VSB
5	GND	PCIe_RX4-
6	POWER_OFF#	NC
7	USB7_P+	PCIe_RX4+
8	WWAN_DISABLE#	NC
9	USB7_P-	GND
10	NC	NC
11	GND	PCIe_TX4-
12	Key	+3.3VSB
13	Key	PCIe_TX4+
14	Key	+3.3VSB
15	Key	GND
16	Key	+3.3VSB
17	Key	PCIe_RX3-
18	Key	+3.3VSB
19	Key	PCIe_RX3+
20	NC	NC
21	GND	GND
22	NC	NC
23	NC	PCIe_TX3-
24	GNSS_DISABLE#	NC
25	NC	PCIe_TX3+
26	NC	NC
27	GND	GND
28	NC	NC
29	PCIe_RX1-	PCIe_RX2-
30	UIM_RESET	NC
31	PCIe_RX1+	PCIe_RX2+
32	UIM_CLK	NC

Table A.27: CN22 M.2 B key (Option for M.2 M key)		
33	GND	GND
34	UIM_DATA	NC
35	PCIe_TX1-	PCIe_TX2-
36	+VUIM_PWR	+VUIM_PWR
37	PCIe_TX1+	PCIe_TX2+
38	NC	NC
39	GND	GND
40	NC	NC
41	SATA_RX+	PCIe_RX1+
42	NC	NC
43	SATA_RX-	PCIe_RX1-
44	NC	NC
45	GND	GND
46	NC	NC
47	SATA_TX-	PCIe_TX1-
48	NC	NC
49	SATA_TX+	PCIe_TX1+
50	NC	PLTRST#
51	GND	GND
52	CLK _REQ#	CLK _REQ#
53	CLK _PCIE-	CLK _PCIE-
54	PCIE_WAKE#	PCIE_WAKE#
55	CLK _PCIE+	CLK _PCIE+
56	NC	NC
57	GND	GND
58	NC	NC
59	NC	Key
60	NC	Key
61	NC	Key
62	NC	Key
63	NC	Key
64	NC	Key
65	NC	Key
66	SIM_KEYB_DET	Key
67	PLTRST_BKEY #	NC
68	SUSCLK	SUSCLK
69	M2_SSD_PEDET	M2_SSD_PEDET
70	+3.3VSB	+3.3VSB
71	GND	GND
72	+3.3VSB	+3.3VSB
73	GND	GND
74	+3.3VSB	+3.3VSB
75	GND	GND

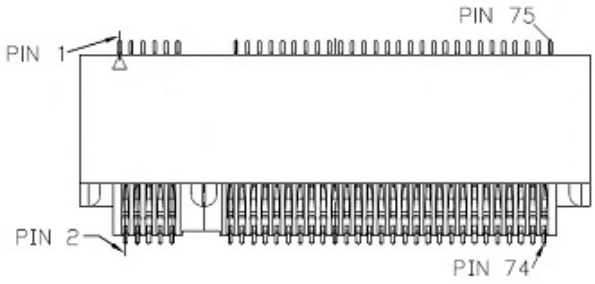


Table A.28: CN24 NANO SIM	
Part Number	1654013206-01
Footprint	SIM_6P_N080613-SICR10
Description	Nano SIM Card 6P/1.27/(F)/LCP/RA/GFL/S/BK/H1.37
Pin	Pin Name

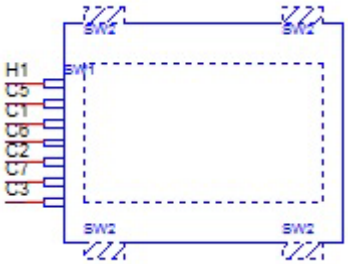


Table A.29: CN25 USB3.0_13H	
Part Number	1654013480-01
Footprint	USB_9X2P_USB5-18F5-BNR0-10
Description	USB 3.1 2x9P/2.0mm/PA66/(F)/RA/G30u/D/BU/H15.69
Pin	Pin Name

Table A.30: CN26 USB3.0_13H	
Part Number	1654013480-01
Footprint	USB_9X2P_USB5-18F5-BNR0-10
Description	USB 3.1 2x9P/2.0mm/PA66/(F)/RA/G30u/D/BU/H15.69
Pin	Pin Name

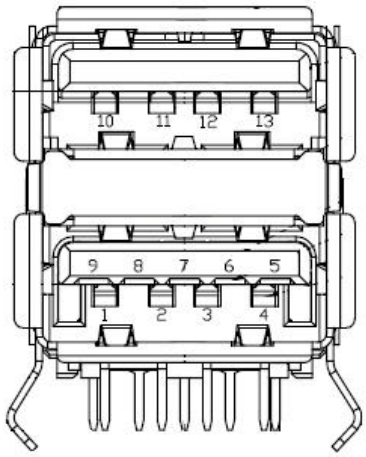


Table A.31: CN27 Internal USB	
Part Number	1653007480-01
Footprint	HD_5X2P_79_BOX_H245
Description	BOXH 2x5P/2.0mm/LCP/M/VA/G10u/S/BK/H4.83/W CAP
Pin	Pin Name
1	+5V
2	+5V
3	A_D-
4	B_D-
5	A_D+
6	B_D+
7	GND
8	GND
9	GND
10	NC

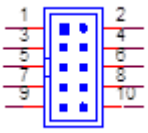


Table A.32: CN28 SATA Power	
Part Number	1655001154
Footprint	WF_4P_98_BOX_R1_D
Description	WAFER BOX 4P 2.50mm 180D(M) DIP 24W1170-04S10-01
Pin	Pin Name
1	+5V
2	GND
3	GND
4	+12V

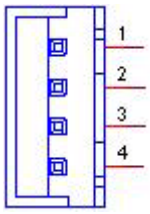


Table A.33: CN29 SATA_7V	
Part Number	1654013615-01
Footprint	SATA_7P_WATF-07DBN6SB1U
Description	SATA 7P/1.27mm/LCP/F/VA/G15u/S/BK/H8.41/W Post
Pin	Pin Name

Table A.34: CN30 SATA_7V	
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

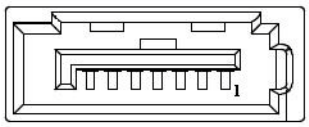


Table A.35: CN31 FAN	
Part Number	1655004347
Footprint	WF_4P_100_D_744-81-04TW30
Description	WAFER 2.54 1*4P 180D(M) DIP 744-81-04TW30
Pin	Pin Name
1	GND
2	+V12_FAN
3	FAN_SPEED
4	FAN_PWM

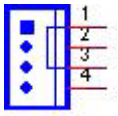
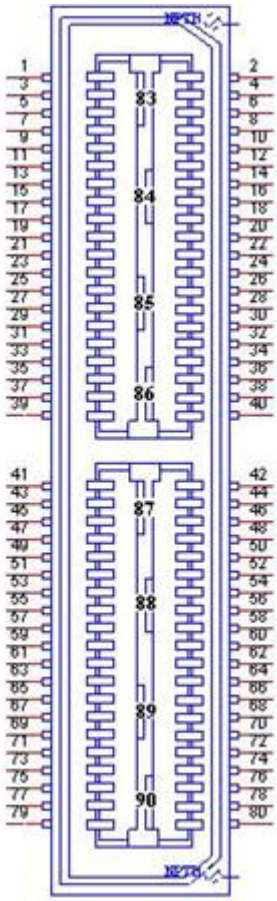


Table A.36: CN33 MIOe	
Part Number	1654006235
Footprint	BB_40x2P_32_1625x285_2HOLD
Description	B/B Conn. 40x2P 0.8mm 180D(F) SMD QSE-040-01-L-D
Pin	Pin Name
1	GND
2	GND
3	PCIE_RX0+
4	PCIE_TX0+
5	PCIE_RX0-
6	PCIE_TX0-
7	GND
8	GND
9	PCIE_RX1+
10	PCIE_TX1+
11	PCIE_RX1-
12	PCIE_TX1-
13	GND
14	GND
15	PCIE_RX2+
16	PCIE_TX2+
17	PCIE_RX2-
18	PCIE_TX2-
19	GND
20	GND
21	PCIE_RX3+
22	PCIE_TX3+
23	PCIE_RX3-
24	PCIE_TX3-
25	GND
26	GND

Table A.36: CN33 MIOe	
27	PCIE_CLK+
28	LOUTL
29	PCIE_CLK-
30	LOUTR
31	GND
32	AGND
33	SMB_CLK
34	NC
35	SMB_DAT
36	NC
37	PCIE_WAKE#
38	NC
39	RESET#
40	NC
41	SLP_S3#
42	CLK24M
43	NC
44	LPC_AD0
45	DDP_HPD
46	LPC_AD1
47	GND
48	LPC_AD2
49	DDP_AUX+
50	LPC_AD3
51	DDP_AUX-
52	NC
53	GND
54	LPC_SERIRQ
55	DDP_D0+
56	LPC_FRAME#
57	DDP_D0-
58	GND
59	GND
60	USB0_D+
61	DDP_D1+
62	USB0_D-
63	DDP_D1-
64	GND
65	GND
66	USB1_D+
67	DDP_D2+
68	USB1_D-
69	DDP_D2-
70	GND
71	GND
72	USB2_D+
73	DDP_D3+

Table A.36: CN33 MIOe	
74	USB2_D--
75	DDP_D3-
76	GND
77	GND
78	USB_OC#
79	+12VSB
80	+12VSB
83	GND
84	GND
85	GND
86	GND
87	+5VSB
88	+5VSB
89	+5VSB
90	+5VSB



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
200h-27Fh	CANBus Controller
280h-28Fh	I2C Controller
290h-29Fh	EC Index Port and Data Port
2A0h-2BFh	GPIO Controller
2C0h-2DFh	SMBus Controller
2F0h-2F7h	EC/PMC Controller
2F8h-2FFh	Communications Port (COM2)
380h-3AFh	Motherboard Resources
3C0h-3DFh	Motherboard Resources
3F8h-3FFh	Communications Port (COM1)
490h-4C7h	Motherboard Resources
4D0h-4D1h	Interrupt Controller
680h-69Fh	Motherboard Resources
A00h-AFFh	Motherboard Resources
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	CANBus Controller
IRQ7	Available
IRQ8	System CMOS/real time clock
IRQ9	Microsoft ACPI-Compliant System
IRQ10	Available
IRQ11	Display Controller
IRQ12	Available
IRQ13	Numeric data processor
IRQ14	GPIO Controller
IRQ15	Reserved

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

Headquarters

Germany

FORTEC Elektronik AG
Augsburger Str. 2b
82110 Germering

Phone: +49 89 894450-0
E-Mail: info@fortecag.de
Internet: www.fortecag.de

Fortec Group Members

Austria

Distec GmbH Office Vienna
Nuschinggasse 12
1230 Wien

Phone: +43 1 8673492-0
E-Mail: info@distec.de
Internet: www.distec.de

Germany

Distec GmbH
Augsburger Str. 2b
82110 Germering

Phone: +49 89 894363-0
E-Mail: info@distec.de
Internet: www.distec.de

Switzerland

ALTRAC AG
Bahnhofstraße 3
5436 Würenlos

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

United Kingdom

Display Technology Ltd.
Osprey House, 1 Osprey Court
Hichingbrooke Business Park
Huntingdon, Cambridgeshire, PE29 6FN

Phone: +44 1480 411600
E-Mail: info@displaytechnology.co.uk
Internet: www. displaytechnology.co.uk

USA

Apollo Display Technologies, Corp.
87 Raynor Avenue,
Unit 1Ronkonkoma,
NY 11779

Phone: +1 631 5804360
E-Mail: info@apollodisplays.com
Internet: www.apollodisplays.com