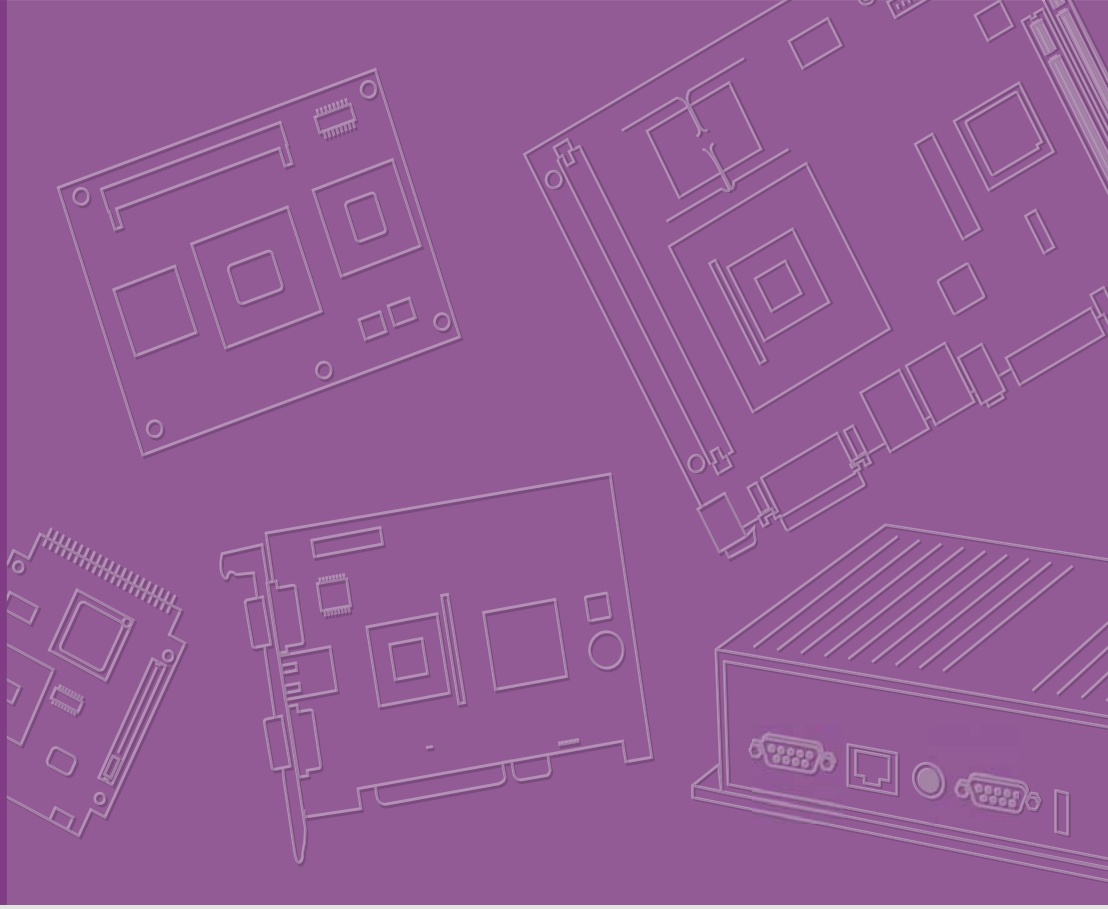

User Manual

MIO-5290

Intel® Core™ i7 / i3, 3.5" MI/O-Compact SBC, DDR3/DDR3L, VGA, HDMI, 48-bit LVDS, 2 x GbE, 2 x Mini PCIe, mSATA, iManager, MIOe

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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-5290.

Part No. 2006529010 Edition 1

Printed in China January 2013

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 A

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

Caution! *There is a danger of a new battery exploding if it is incorrectly installed. Do not attempt to recharge, force open, or heat the battery. Replace the battery only with the same or equivalent type recommended by the 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-5290 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 22cm (p/n: 1701200220)
- 1 x COM RS-422/485 Cable 25cm (p/n: 1700019435)
- 1 x Cooler (MIO-5290U series only) (p/n: 1960057432N001)
- 1 x Cooler (MIO-5290L series only) (p/n: 1960057431N001)
- 1 x Startup manual (p/n: 2006529000)
- 1 x Mini Jumper(10pcs package) (p/n: 9689000002)
- 1 x Screw Kit (3pcs screws for miniPCIe) (p/n: 9666529000E)

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-L3A1E	3 x GbE with RJ45 connector
MIOe-230-L0A1E	Displayport to 48-bit LVDS
MIOe-DB5000-01A1E	MI/O extension evaluation board

Optional Accessories

Part number	Description
1960054269T001	Heat spreader 137x84.2x16.7-mm MIO-5250
1703100260	Internal USB 5/6 cable
1935032000	Screw of Heatsink / Cooler R/S 5.5 2.0 +M M3*20L ST Ni
1930000058	The POST Stand off, F=M3*8L M=M3*4L D=5 H=19L Cu
1757003934	ADAPTER 100-240V 60W 12V 5A W/O PFC

Contents

Chapter 1

General Information

This chapter gives background information on the MIO-5290.

Sections include:

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

1.1 Introduction

Advantech created the stackable architecture MI/O Extension Single Board Computer as a SBC design with flexible and multiple I/O support (hence the name MI/O) and united extended interface connector. The new MI/O Extension Single Board Computer: MIO-5290, based on the 3rd generation Intel ® Core™ processors with QM77 chipset, supports either 1600MHz DDR3 or low power 1333MHz DDR3L, USB 3.0, SATA III (600 MB/s), AMT 8.0, and can drive three independent displays (two DP combine with any other device). MIO-5290 provide not only the powerful computing capability but also a great graphic capacity platform. It's suitable to aim various high level embedded applications.

MIO-5290 adapt the newest solution from Intel with 22nm process and leading innovation: Tri-Gate Transistor architecture (Higher performing transistors and lower leakage). It can have up to ~15% CPU performance increase with lower or the same power consumption. DDR3-1600 and DDR3L-1333 for speedier communication between components at lower power. The fastest I/O, such as USB 3.0 or SATA port up to 6Gb/s is also available on MIO-5290. It will be the best choice to construct next intelligent system.

MIO-5290 contains a latest generation graphics core (Intel® HD Graphics 4000) with DXVA (full AVC/VC1/MPEG2 Hardware Acceleration), OpenGL* 3.0 and DirectX 11 support. Up to ~50% 3D performance increase and 1.8X HD to HD transcode performance. It can help customer easily to implement high quality video or graphic application through MIO-5290 along with single and simple integrated solution.

MIO-5290 also can support Dual Display by any combination interface from board. 3 independent displays also can be available through two display ports (one from MIO extension) with VGA or LVDS.

1.2 Specifications

1.2.1 Functional Specifications

- **Processor:** Mobile 3rd Generation Intel® Core™ Processor
  - i7 3555LE 2.5 GHz / i7 3517UE 1.7 GHz / i3 3217UE 1.6GHz Dual-Core
  - Cache Hierarchy
    - A 32-KB instruction and 32-KB data first-level cache (L1) for each core
    - A 256-KB shared instruction/data second-level cache (L2) for each core
    - 4MB / 3 MB Intel® Smart Cache for i7 / i3 series, shared among all cores
  - Direct Media Interface (DMI)
    - DMI 2.0 support
    - Four lanes in each direction
    - 5 GT/s point-to-point DMI interface to PCH is supported
  - Advanced Technologies
    - Intel® Hyper-Threading Technology 2-threads per core
    - Intel® Active Management Technology 8.0 (Intel® AMT 8.0, i7 series only)
    - Intel® Trusted Execution Technology (Intel® TXT)
    - Intel® 64 Architecture
    - Thermal Monitoring Technologies
    - Enhanced Intel SpeedStep® Technology

- **Chipset: Intel® QM77 I/O Controller**
  - Direct Media Interface
    - Up to 20 Gb/s each direction, full duplex
    - Transparent to software
  - Integrated Serial ATA Host Controller
    - Data transfer rates up to 6.0 Gb/s (600 MB/s)
    - Integrated AHCI controller
  - USB
    - NEW: xHCI Host Controller, supporting SuperSpeed USB 3.0 ports
    - Two EHCI Host Controllers, supporting HighSpeed USB 2.0 ports
    - Supports wake-up from sleeping states S1–S4
    - Supports legacy Keyboard/Mouse software
  - Power Management Logic
    - Supports ACPI 4.0a
    - ACPI-defined power states (processor driven C states)
    - ACPI Power Management Timer
    - SMI# generation
- **System Memory Support**
  - Non-ECC, DDR3/DDR3L memory with one Unbuffered SODIMM up to 8GB
  - DDR3/DDR3L/DDR3L-RS at 1.5 V Data Transfer Rates
    - 1333 MT/s (PC3-10600), 1600 MT/s (PC3-12800)
  - DDR3L/DDR3L-RS at 1.35 V Data Transfer Rates:
    - 1333 MT/s (PC3-10600)
  - 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 refresh of the seventh generation graphics core (Intel® HD Graphics 4000), with 500MHz Graphics Base Frequency and 1GHz Graphics Max Dynamic Frequency
  - DirectX* Video Acceleration (DXVA) support for accelerating video processing
    - Full AVC/VC1/MPEG2 Hardware Acceleration
  - OpenGL* 3.0 support
  - DirectX* 11, DirectX* 10.1, DirectX* 10, DirectX* 9 support
  - Multi-display interfaces through Intel® FDI: VGA, HDMI/display port on rear I/O, Dual Channel 24-bit LVDS, display port from MIOe
  - Support Extend and Clone mode with multi-display device
  - Dual Independent Display
    - Any two combination between: VGA, LVDS, HDMI, display port (from Rear I/O), display port (from MIOe)
  - Triple Independent Display:
    - VGA+display port (from Rear I/O) + display port (from MIOe)
    - LVDS+display port (from Rear I/O) + display port (from MIOe)
  - Integrated Dual LVDS channel support resolution up to 2560x1600 at 60 Hz
  - Analog RGB display (VGA) output up to resolution 2048x1536 pixels with 32-bit color at 75 Hz.
  - Display Port interface supports the Display Port* 1.1a specification with audio up to 2560x1600 at 60 Hz

- HDMI interface supports the HDMI 1.4a specification with audio up to 1920x1200 at 60 Hz

- **Gigabit Ethernet**
  - Port1: QM77 (MAC) + 82579LM GbE (PHY)
    - Integrated ASF Management Controller
    - 10/100/1000 BASE-T IEEE 802.3 specification conformance
    - Energy Efficient Ethernet (EEE) IEEE802.3az support [Low Power Idle (LPI) mode]
    - Supports up to 9 KB jumbo frames (full duplex)
  - Port2: 82583V 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
- **Peripheral interface**
  - MIOe Unified Expansion
    - Display Port
    - 4 PCIe x1
    - USB 2.0/ 3.0
    - LPC
    - HD Audio: Line out
    - SMBus from QM77 I/O Controller
    - Power: +5/+12Vsb, ACPI Power On
  - 2 x Serial-ATA port, up to 6.0 Gb/s (600 MB/s)
  - 2 x USB 3.0 and 2 x USB2.0 compliant ports on rear I/O, 2 x USB2.0 compliant ports for internal connection
  - 1 RS-232 from COM1, 1 RS-232/422/485 from COM2 (ESD protection for RS-232: Air gap ±15kV, Contact ±8kV)
  - 8-bit Programmable General Purpose Input/ Output
  - Watchdog timer: Output System Reset, Programmable counter from 1 ~ 255 minutes/ seconds
  - Mini PCIe
    - 1 x Full-size Mini PCIe (Supports mSATA)
    - 1 x Half-size Mini PCIe
- **High Definition Audio:**
  - Intel® High Definition Audio Interface
  - High Definition Audio Codec with Realtek proprietary loss-less content protection technology
  - Support 1 x Line-input, 1 x Line output, 1 x Mic-input
- **BIOS**
  - AMI 64-Mbit SPI Flash BIOS

1.2.2 OS support

MIO-5290 supports Win 8, Win7, Win XP, WES7 and WES

For further information about OS support of MIO-5290, 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: 37 mm (MIO-5290U series), 47.7 mm (MIO-5290L series); Bottom Side: 9 mm
- **Weight:** 0.84 kg (reference weight of total package)

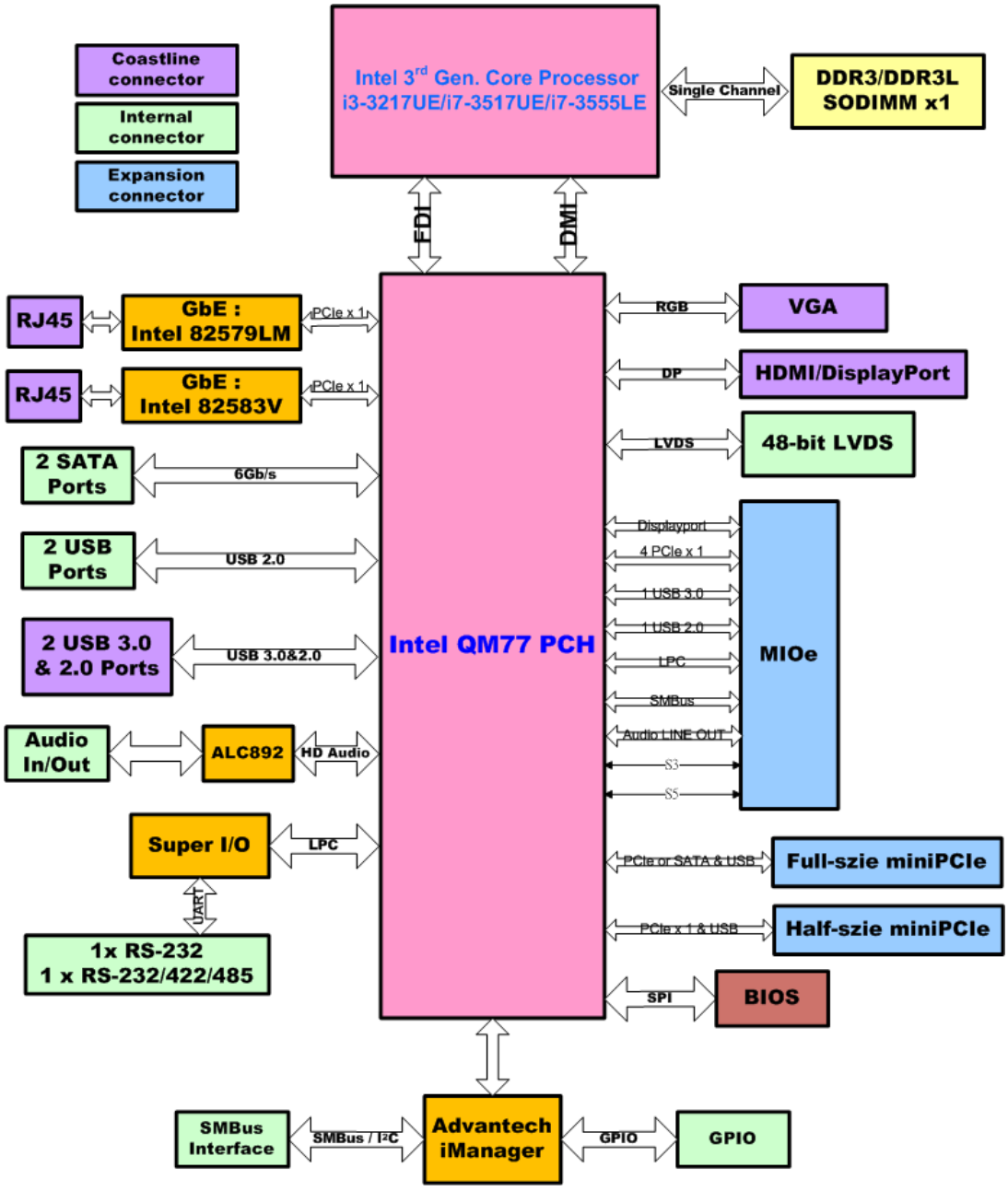
1.2.4 Electrical Specifications

- **Power Requirement:** Single +12V DC ± 10% power input
- **Power Consumption:**
  - Max load
    - MIO-5290U-S6A1E: w/DDR3: 2.024 A @ 12 V (24.29 W), w/DDR3L: 1.84 A @ 12 V (22.08 W)
    - MIO-5290U-S7A1E: w/DDR3: 2.412 A @ 12 V (28.94 W), w/DDR3L: 2.3 A @ 12 V (27.6 W)
    - MIO-5290L-U5A1E: w/DDR3: 2.896 A @ 12 V (34.75 W), w/DDR3L: 2.708 A @ 12 V (32.5 W)
  - Idle mode
    - MIO-5290U-S6A1E: w/DDR3: 1.615 A @ 12 V (19.38 W), w/DDR3L: 1.507 A @ 12 V (18.08 W)
    - MIO-5290U-S7A1E: w/DDR3: 2.023 A @ 12 V (24.28 W), w/DDR3L: 1.965 A @ 12 V (23.5 W)
    - MIO-5290L-U5A1E: w/DDR3: 2.356 A @ 12 V (28.27 W), w/DDR3L: 2.309 A @ 12 V (27.7 W)
- **Power Consumption Conditions:**
  - Test software: 3DMark 2006
  - Max. load: Measure the maximum current value which system under maximum load (CPU: Top speed, RAM &Graphic: Full loading)
  - Idle mode: Measure the current value when system in windows mode and without running any program
- **RTC Battery:**
  - Typical Voltage: 3.0 V
  - Normal discharge capacity: 210 mAh

1.2.5 Environmental

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

1.3 Block Diagram



1.4 Board layout: dimensions

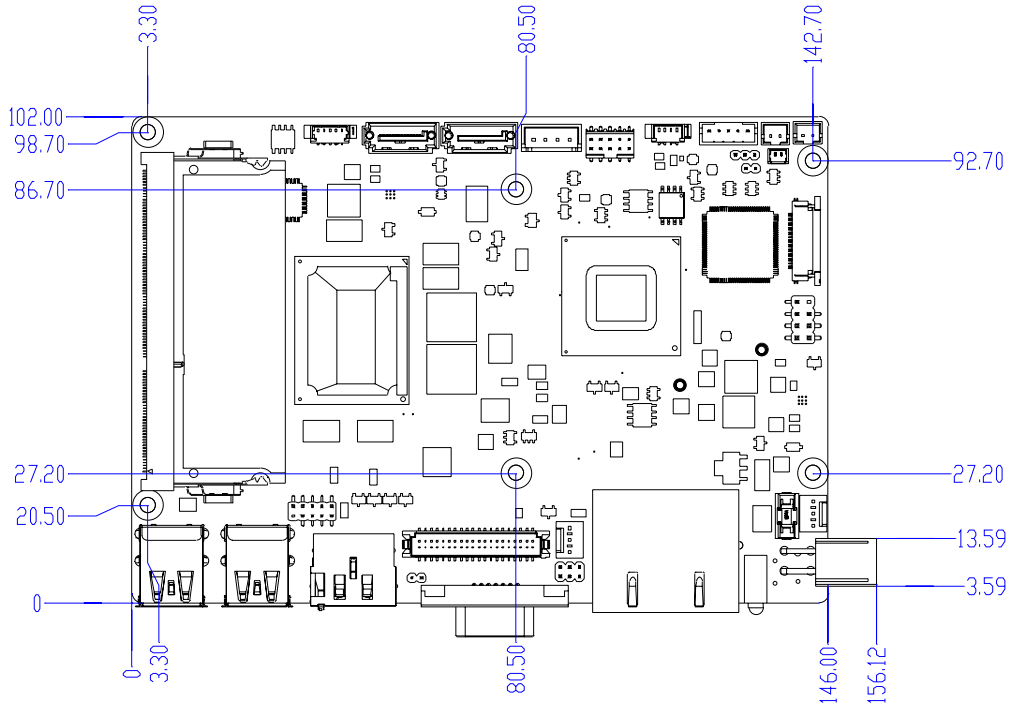


Figure 1.1 MIO-5290L Mechanical Drawing (Top Side)

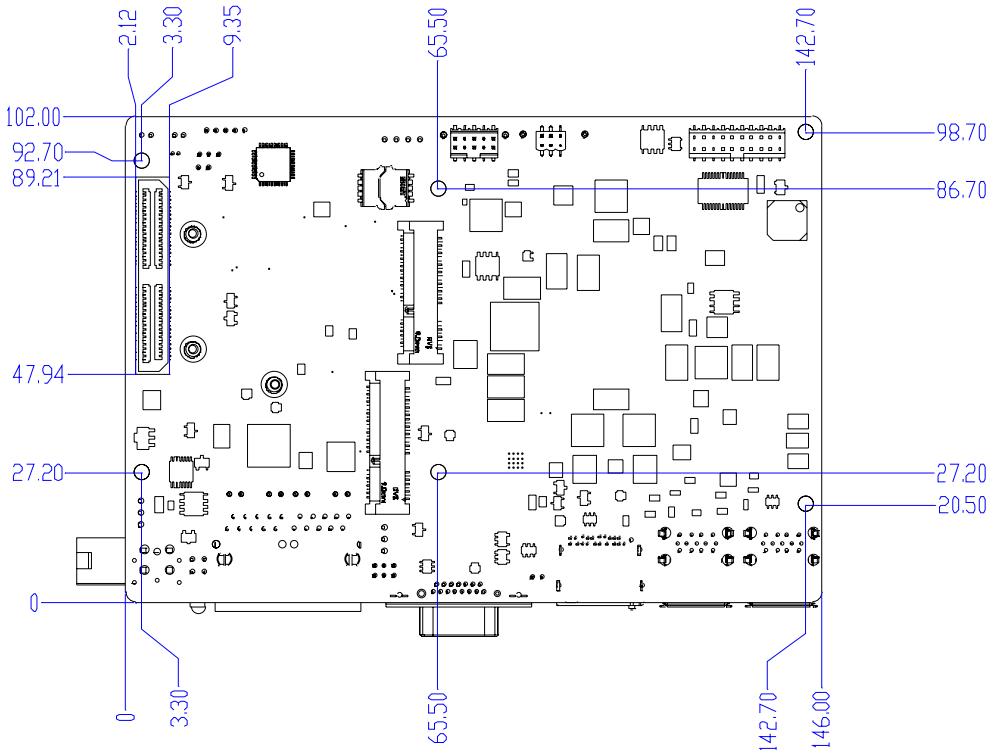


Figure 1.2 MIO-5290 Mechanical Drawing (Bottom Side)

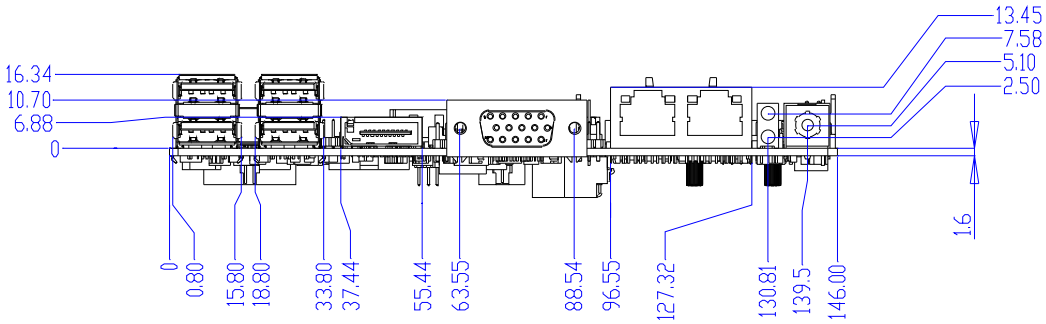


Figure 1.3 MIO-5290U Mechanical Drawing (Coastline)

Chapter 2

Installation

This chapter explains the setup procedures of the MIO-5290 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

The MIO-5290 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	
J1	Clear CMOS
J2	Auto Power On Setting
J3	LCD Power
J4	DDR3L Select
J5	COM2 Setting

2.2 Connectors

Onboard connectors link the MIO-5290 to external devices such as hard disk drives, a keyboard, or floppy drives. The table below lists the function of each of the board's connectors.

Table 2.2: Connectors	
Label	**Function**
CN1	Power Switch
CN2	Reset
CN3	Inverter Power Output
CN4	SMBus
CN5	RS422/485
CN6	SATA Power
CN7	SATA2
CN8	SATA1
CN9	Audio
CN12	SODIMM-DDR3
CN13	Internal USB
CN14	48 bits LVDS Panel
CN15	LAN
CN18	12V Power Input
CN19	External USB2.0+USB3.0
CN20	External USB2.0+USB3.0
CN21	HDMI+DISPLAY
CN22	DC Jack
CN23	VGA
CN24	COM1/COM2
CN25	GPIO
CN26	BIOS Socket
CN27	MIOe
CN28	Mini PCIE/mSATA
CN29	Mini PCIE
FAN1	CPU FAN
FAN2	System FAN

2.3 Locating connectors & block diagram

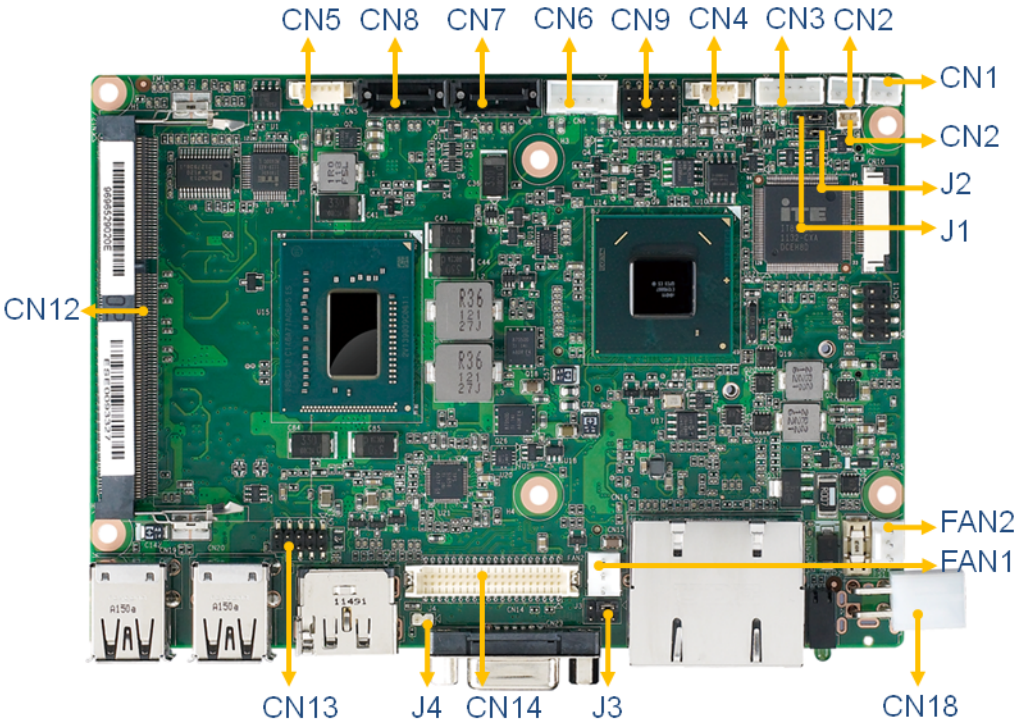


Figure 2.1 MIO-5290L Connector Locations (Top Side)

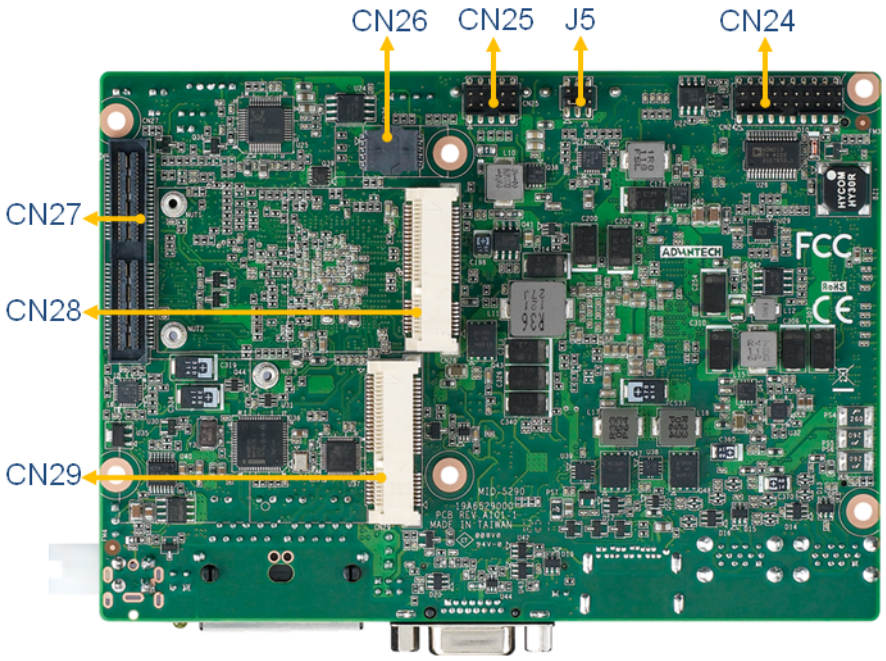


Figure 2.2 MIO-5290 Connector Locations (Bottom Side)

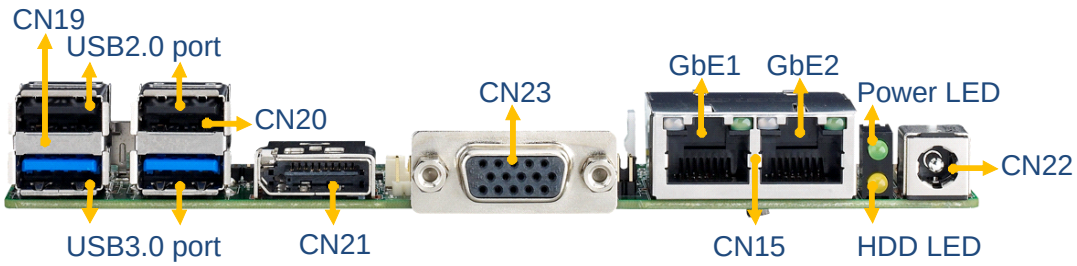
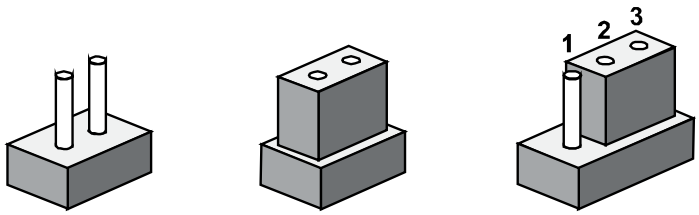


Figure 2.3 MIO-5290U Connector Locations (Coastline)

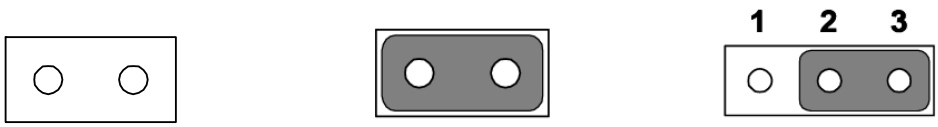
2.4 Setting Jumpers

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.



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

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 (JP1)	
Setting	**Function**
(1-2)*	Normal (default)
(2-3)	Clear CMOS

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 LCD Power (J3)

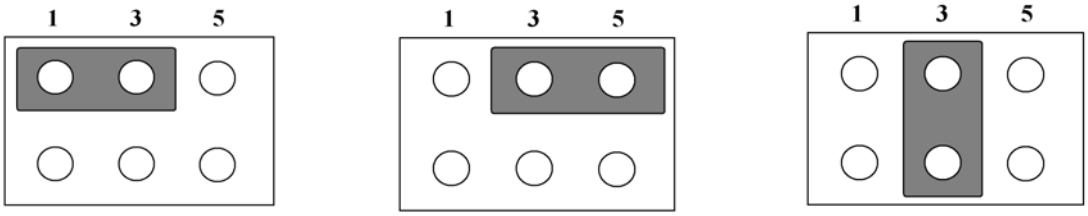
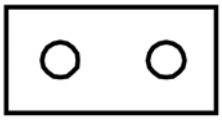


Table 2.5: LCD Power (J3)	
Setting	Function
(1-3)*	+3.3V (default)
(3-5)	+5V
(3-4)	+12V

2.4.4 LVDS Panel Power Select (J4)



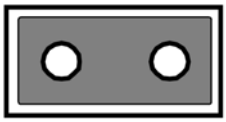
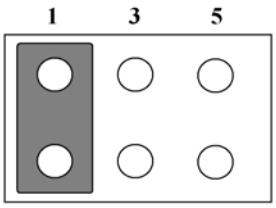
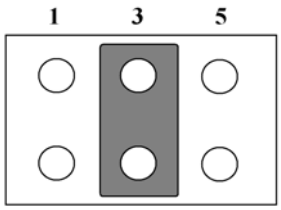


Table 2.6: LVDS Panel Power Select (J4)

Setting	Function
(Open)*	1.5V for Std. DDR3 (default)
Close	1.35V for DDR3L

2.4.5 COM2 Setting (J5)





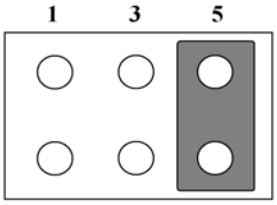


Table 2.7: COM2 Setting (J5)

Setting	Function
(1-2)*	RS232 (default)
(3-4)	RS485
(5-6)	RS422

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-5290 BIOS setup screens.

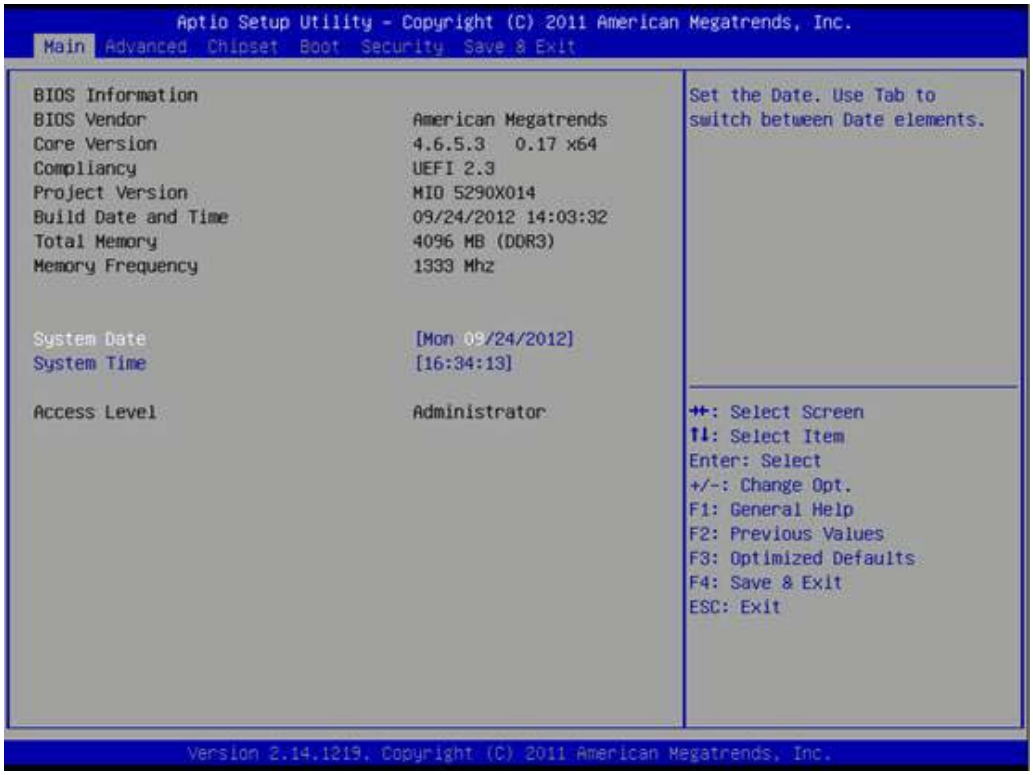


Figure 3.1 Setup program initial screen

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 then press <F2> or <DEL> to enter Setup menu.

3.2 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.

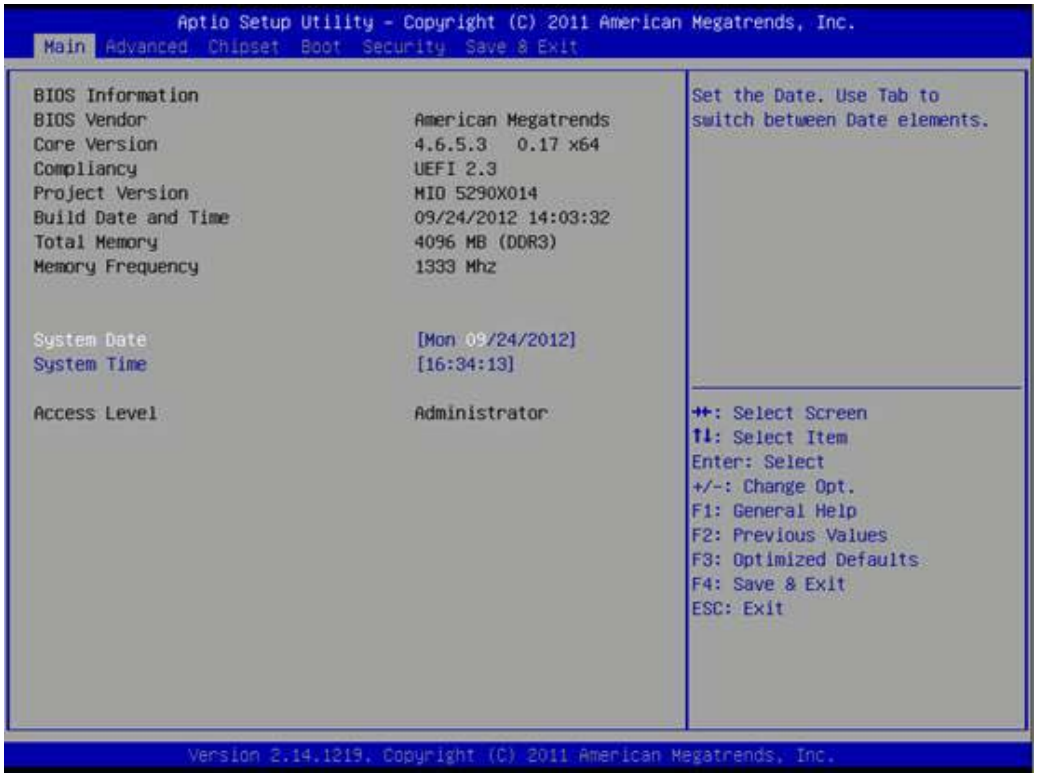


Figure 3.2 Main setup screen

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.

3.2.1 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.

3.3 Advanced BIOS Features Setup

Select the Advanced tab from the MIO-5290 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.

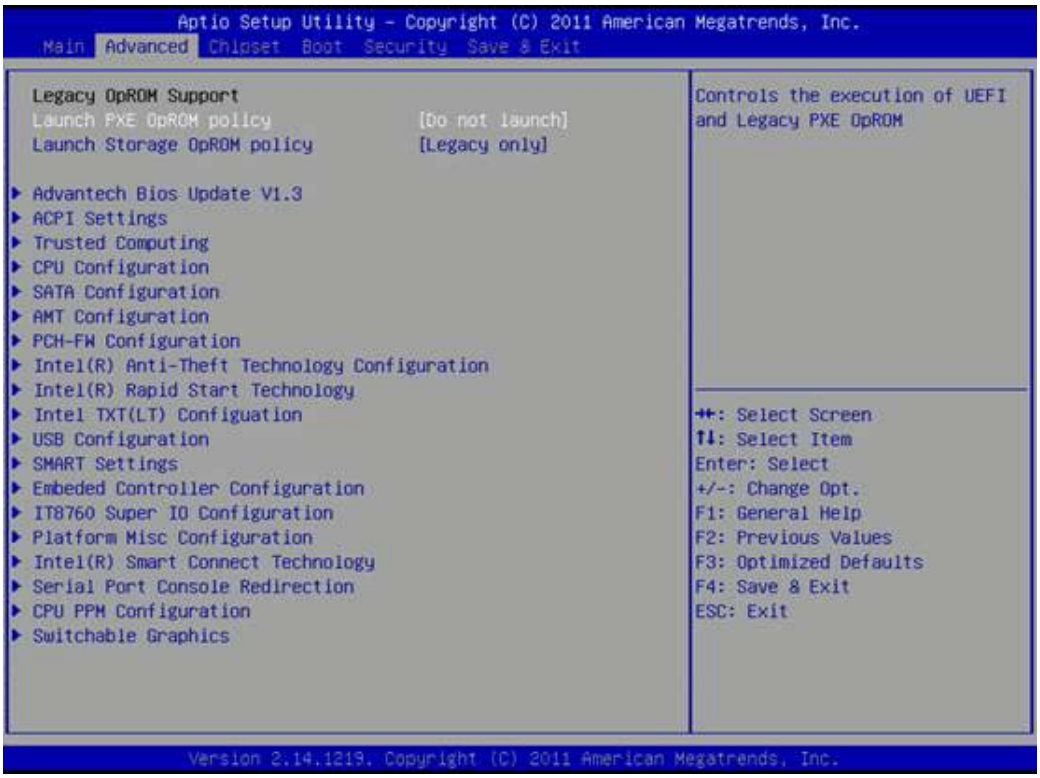


Figure 3.3 Advanced BIOS features setup screen

3.3.1 Advantech BIOS Update V1.3

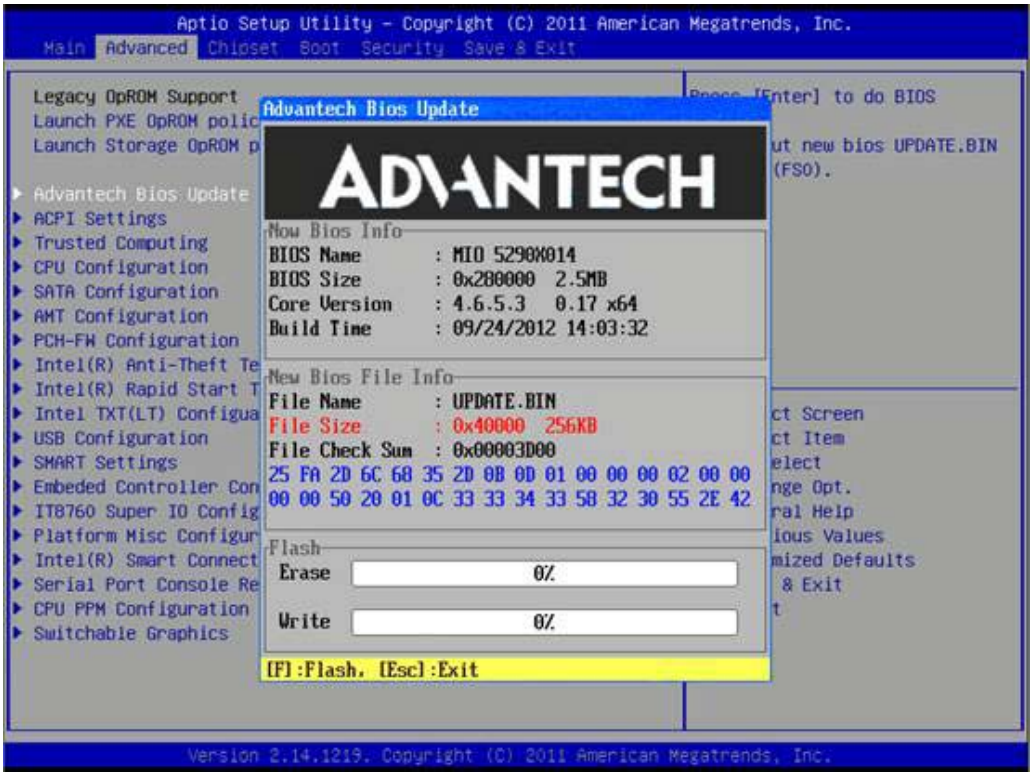


Figure 3.4 Advanced BIOS Update screen

Advantech BIOS Update V1.3

This item allows users to update BIOS flash rom.

3.3.2 ACPI Settings

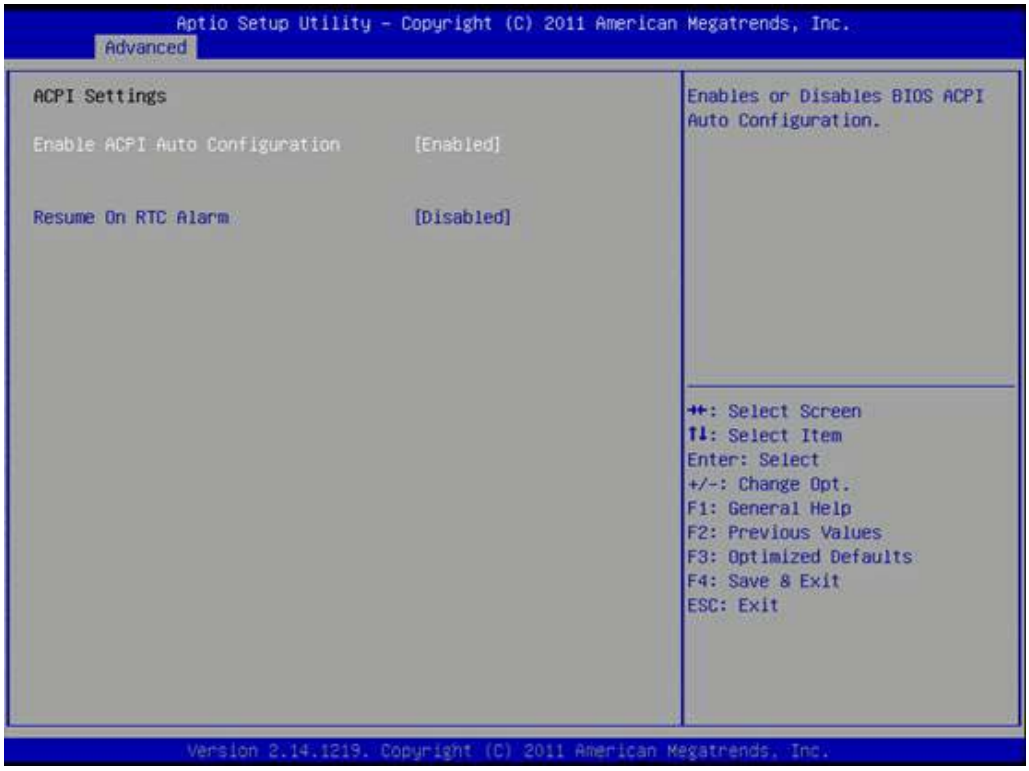


Figure 3.5 ACPI Setting

Enable ACPI Auto Configuration

This item allows users to enable or disable BIOS ACPI auto configuration.

Enable Hibernation

This item allows users to enable or disable hibernation.

ACPI Sleep State

This item allows users to set the ACPI sleep state.

Lock Legacy Resources

This item allows users to lock legacy devices' resources.

S3 Video Repost

This item allows users to enable or disable VBIOS run after S3 resume.

Resume On RTC Alarm

This item allows users to enable or disable system wake on alarm event by Items setting.

3.3.3 TPM Configuration

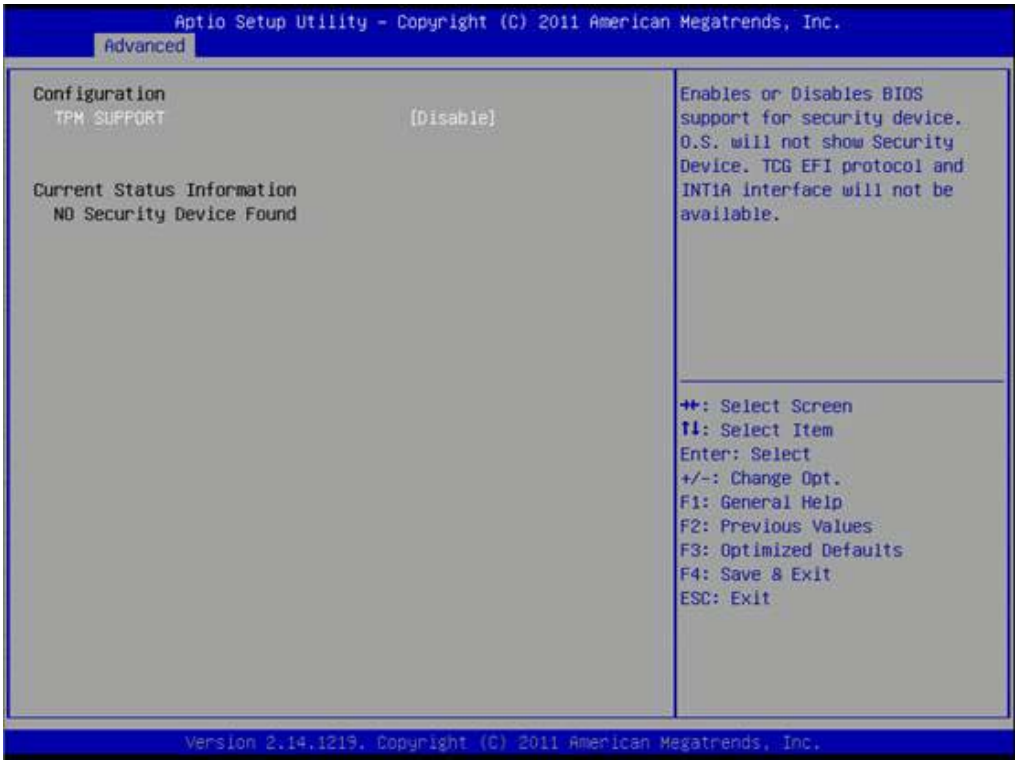


Figure 3.6 TPM Configuration

TPM Support

Disable/Enable TPM if available.

3.3.4 CPU Configuration

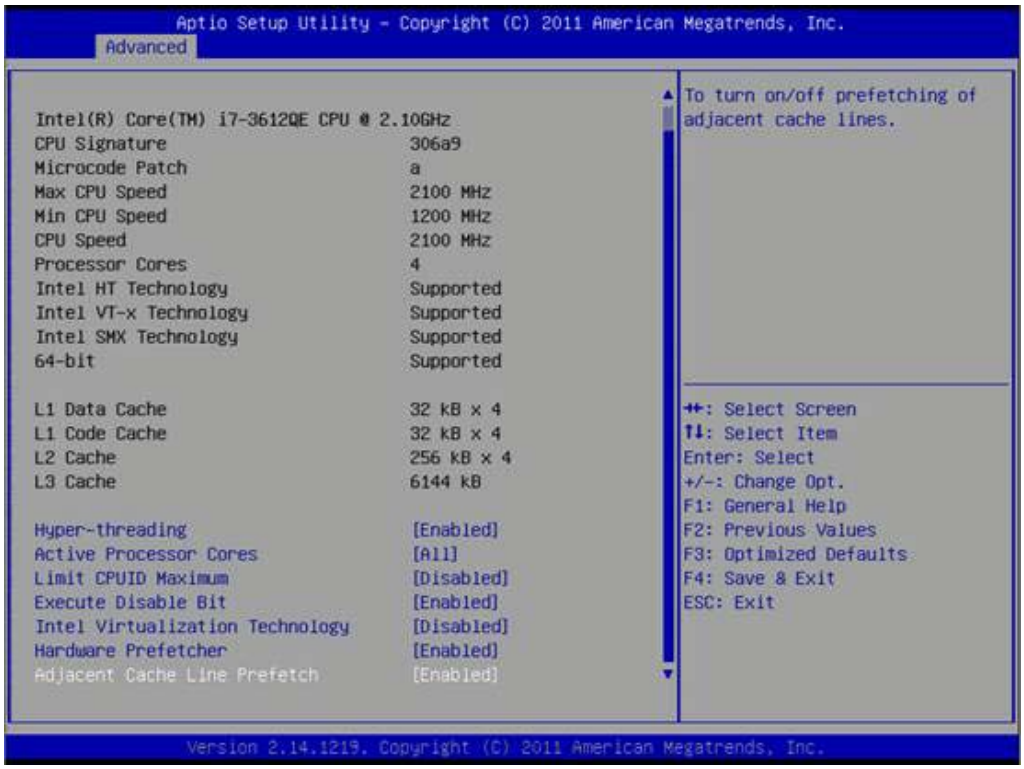


Figure 3.7 CPU Configuration Setting

Hyper Threading Technology

This item allows users to enable or disable Intel? Hyper Threading technology.

Active Processor Cores

This item allows users to set how many processor cores should be active.

Limit CPUID Maximum

This item allows users to limit the maximum value of CPUID.

Execute Disable Bit

This item allows users to enable or disable the No-Execution page protection technology.

Intel Virtualization Technology

This item allows users to enable or disable the intel virtualization technology.

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.

3.3.5 SATA Configuration

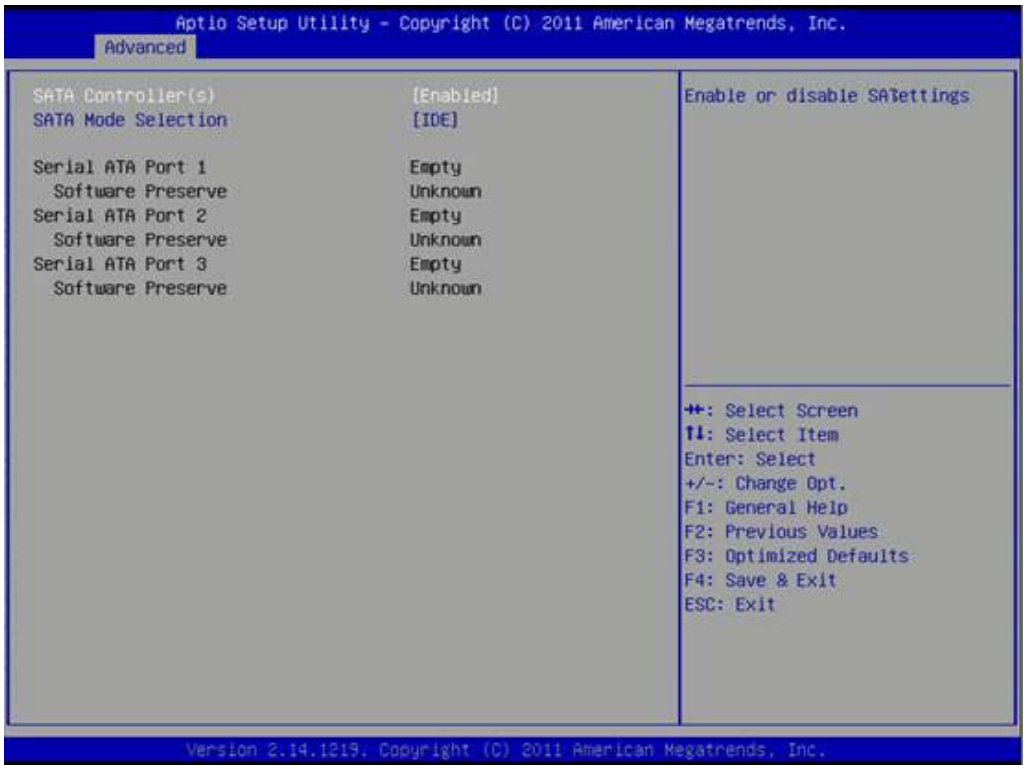


Figure 3.8 SATA Configuration

SATA Controller(s)

This item allows users to enable or disable the SATA controller(s).

SATA Mode Selection

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

3.3.6 AMT Configuration

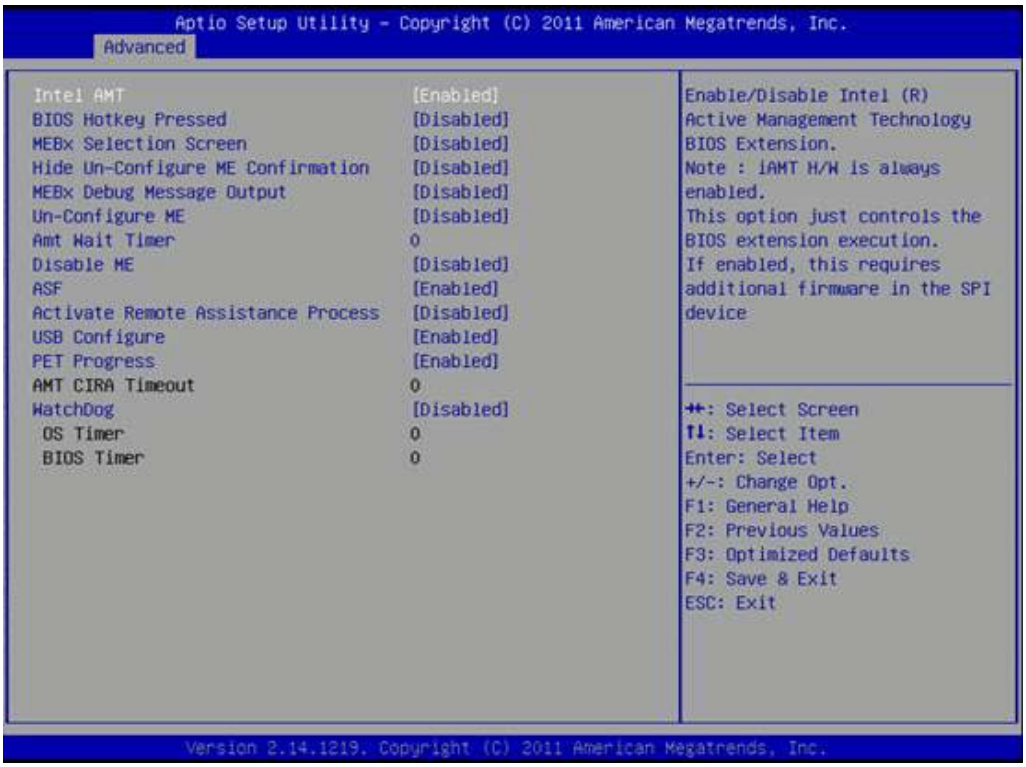


Figure 3.9 AMT Configuration

Intel AMT

This item allows users to enable or disable Intel AMT BIOS extension.

BIOS Hotkey Pressed

This item allows users to enable or disable BIOS hotkey press.

MEBx Selection Screen

This item allows users to enable or disable MEBx selection screen.

Hide Un-Configuration ME Confirmation

This item allows users to hide un-configure ME without password confirmation prompt.

MEBx Debug Message Output

This item allows users to enable or disable MEBx debug message.

Un-Configure ME

This item allows users to un-configure ME without password.

Amt Wait Timer

Set timer to wait before sending ASF_GET_BOOT_OPTIONS.

Disable ME

This item allows users to enable or disable Intel ME.

ASF

This item allows users to enable or disable Alert Specification Format.

Activate Remote Assistance Process

This item allows users to enable or disable trigger CIRA boot.

USB Configure

This item allows users to enable or disable USB configure function.

PET Progress

This item allows users to enable or disable PET events progress to receive PET events or not.

AMT CIRA Timeout

OEM defined timeout for MPS connection to be established.

WatchDog

This item allows users to enable or disable WatchDog Timer.

OS Timer

Set OS watchdog timer.

BIOS Timer

Set BIOS watchdog timer.

3.3.7 PCH-FW Configuration

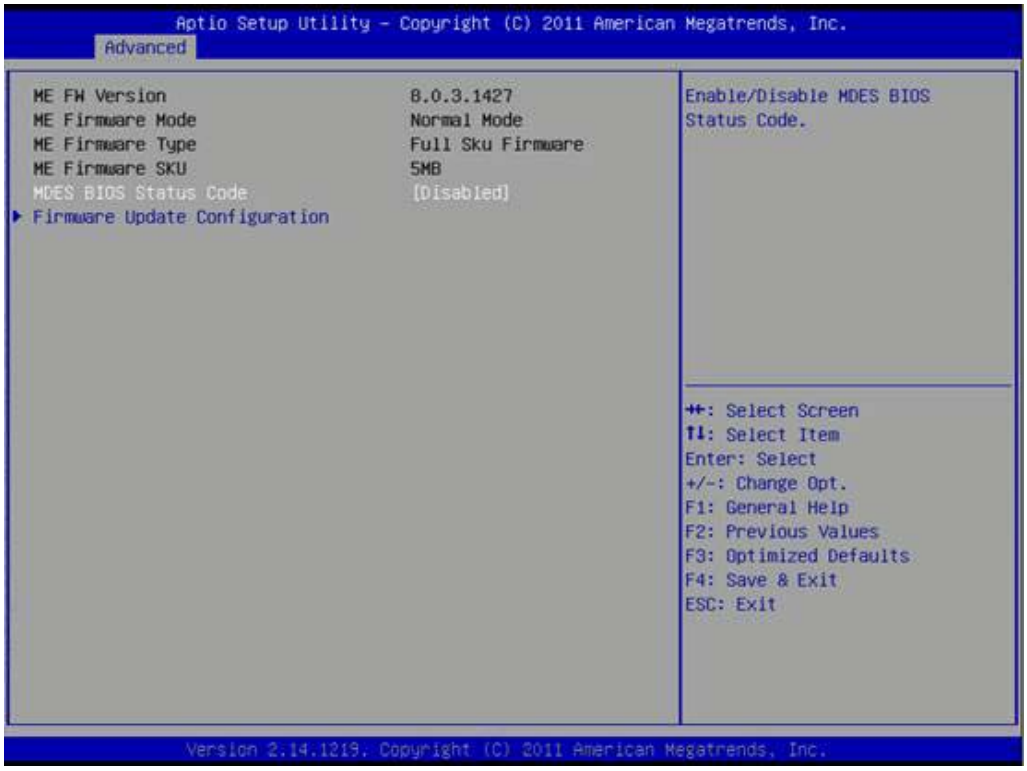


Figure 3.10 PCH-FW Configuration

MDES BIOS Status Code

This item allows users to enable or disable MDES BIOS Status Code function.

Firmware Update Configuration

This item allows users to enable or disable ME FW image re-flash function.

3.3.8 Intel® Anti-Theft Technology Configuration

Figure 3.11 Intel® Anti-Theft Technology Configuration

Intel® Anti-Theft Technology

This item allows users to enable or disable Intel® Anti-Theft Technology function.

Intel® Anti-Theft Technology Rec

This item allows users to set number of times recovery.

3.3.9 Intel® Rapid Start Technology

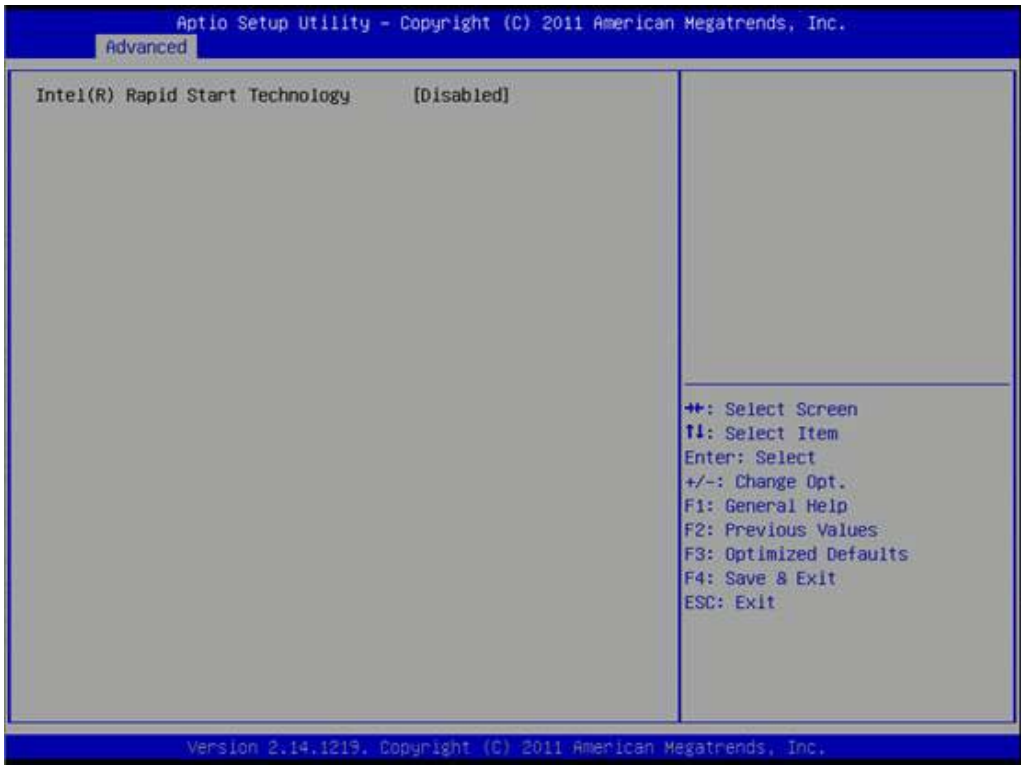


Figure 3.12 Intel® Rapid Technology

Intel® Rapid Start Technology

This item allows users to enable or disable Rapid Start Technology, if supported.

3.3.10 Intel TXT(LT) Configuration

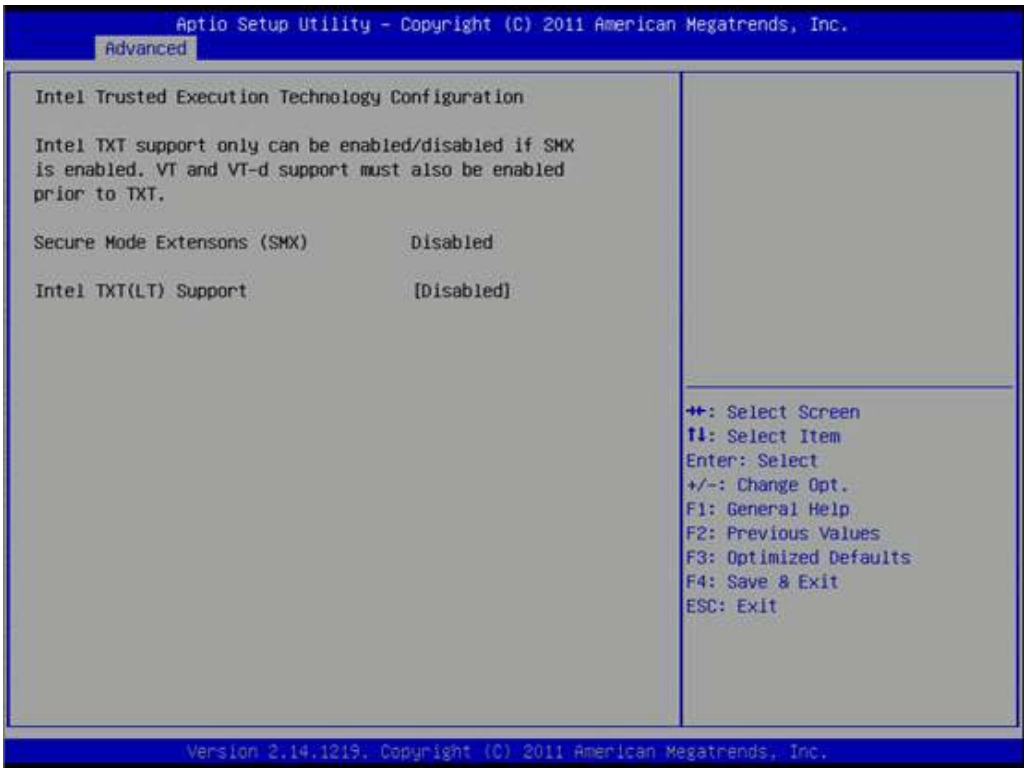


Figure 3.13 Intel TXT(LT) Configuration

Secure Mode Extensions (SMX)

This item allows users to enable or disable SMX.

Intel TXT(LT) Support

This item allows users to enable or disable Intel TXT.

3.3.11 USB Configuration

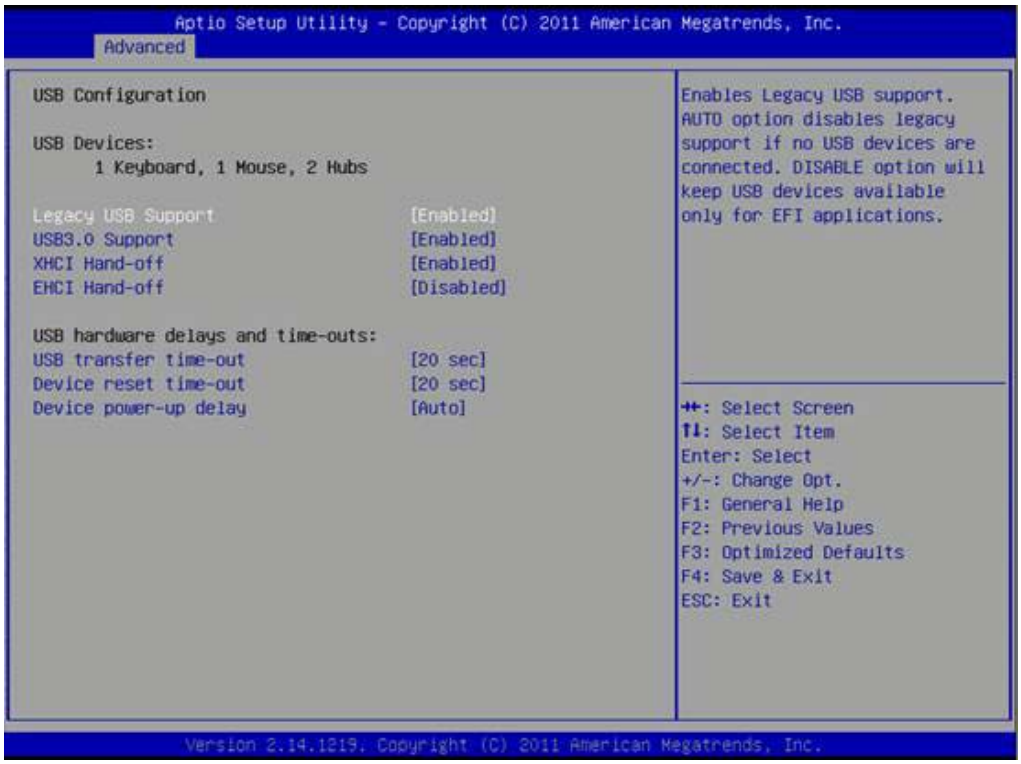


Figure 3.14 USB Configuration

Legacy USB Support

Enable the support for legacy USB. Auto option disables legacy support if no USB devices are connected.

USB3.0 Support

This item allows users to enable or disable USB3.0 support.

XHCI Hand-Off

This is a workaround for the OS without XHCI hand-off support. The XHCI ownership change should claim by XHCI driver.

EHCI Hand-Off

This is a workaround for the OS without EHCI hand-off support. The EHCI ownership change should claim by EHCI driver.

USB transfer time-out

Set the time-out value for Control, Bulk, and Interrupt transfers.

Device reset time-out

Set USB mass storage device Start Unit command time-out value.

Device power-up delay

Set the maximum time of 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.

3.3.12 SMART Settings

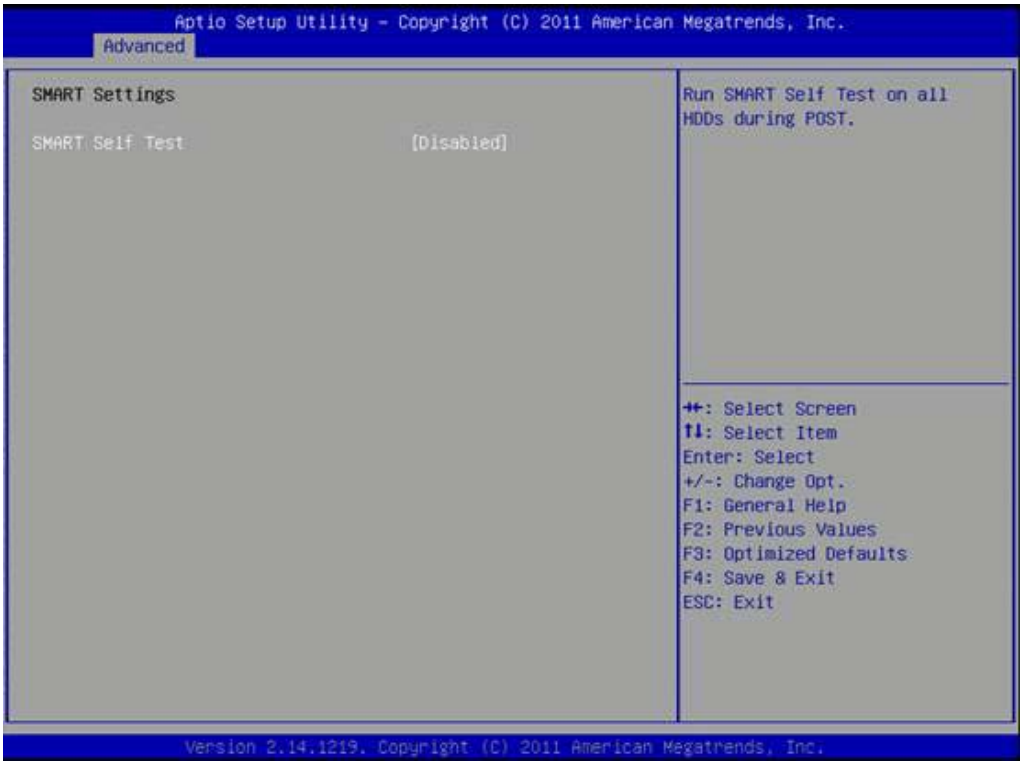


Figure 3.15 SMART Settings

SMART Self Test

This item allows users to enable or disable SMART Self Test.

3.3.13 Embedded Controller Configuration

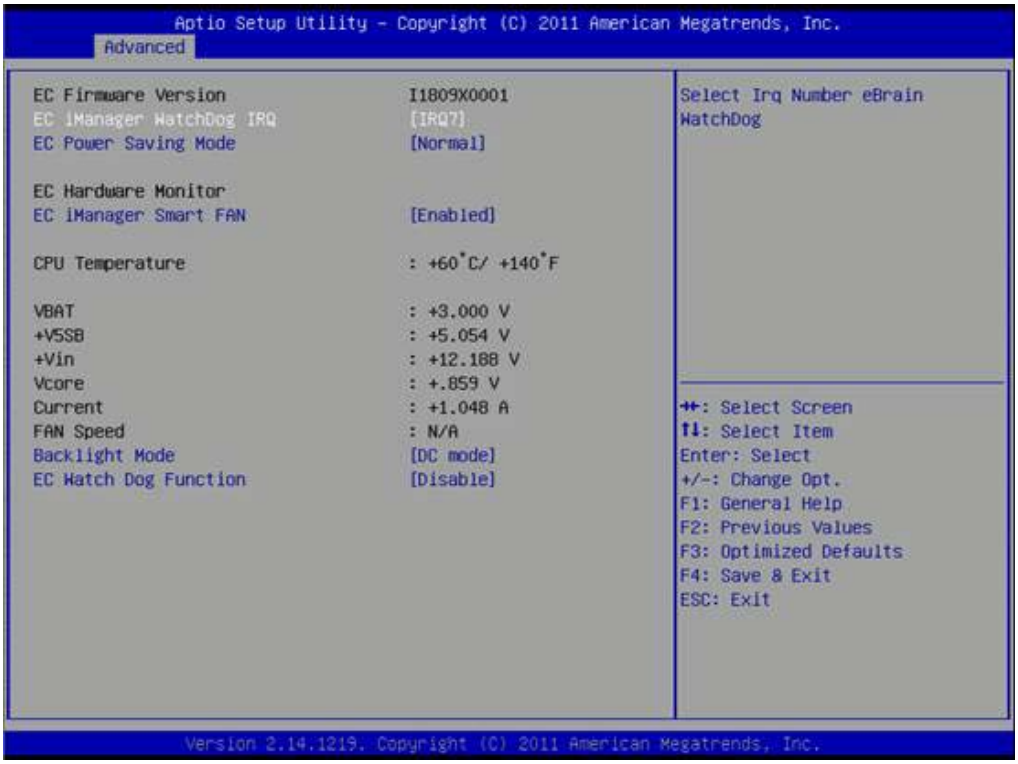


Figure 3.16 Embedded Controller Configuration

EC iManager WatchDog IRQ

This item allows users to set the IRQ number of EC watchdog.

EC Power Saving Mode

This item allows users to set board's power saving mode when off.

EC iManager Smart FAN

This item allows users to enable or disable EC iManager smart FAN feature.

This item allows users to enable or disable EC serial port B.

Backlight Mode

This item allows users to set backlight Function.

EC Watch Dog Function

This item allows users to select EC watchdog timer.

3.3.14 Super IO Configuration

Figure 3.17 Super IO Configuration

Serial Port 0 Configuration

This item allows users to configure serial port 0.

Serial Port 1 Configuration

This item allows users to configure serial port 1.

3.3.15 Platform Misc Configuration

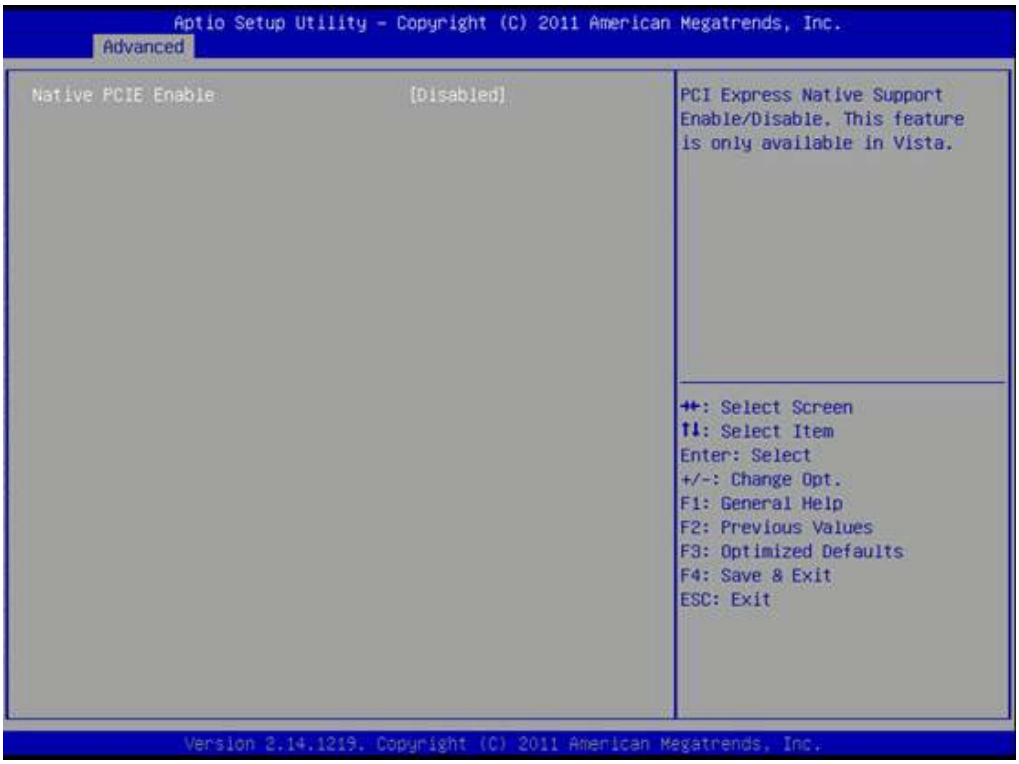


Figure 3.18 Platform Misc Configuration

Native PCIE Enable

This item allows users to enable or disable native PCIE support feature.

3.3.16 Intel® Smart Connect Technology

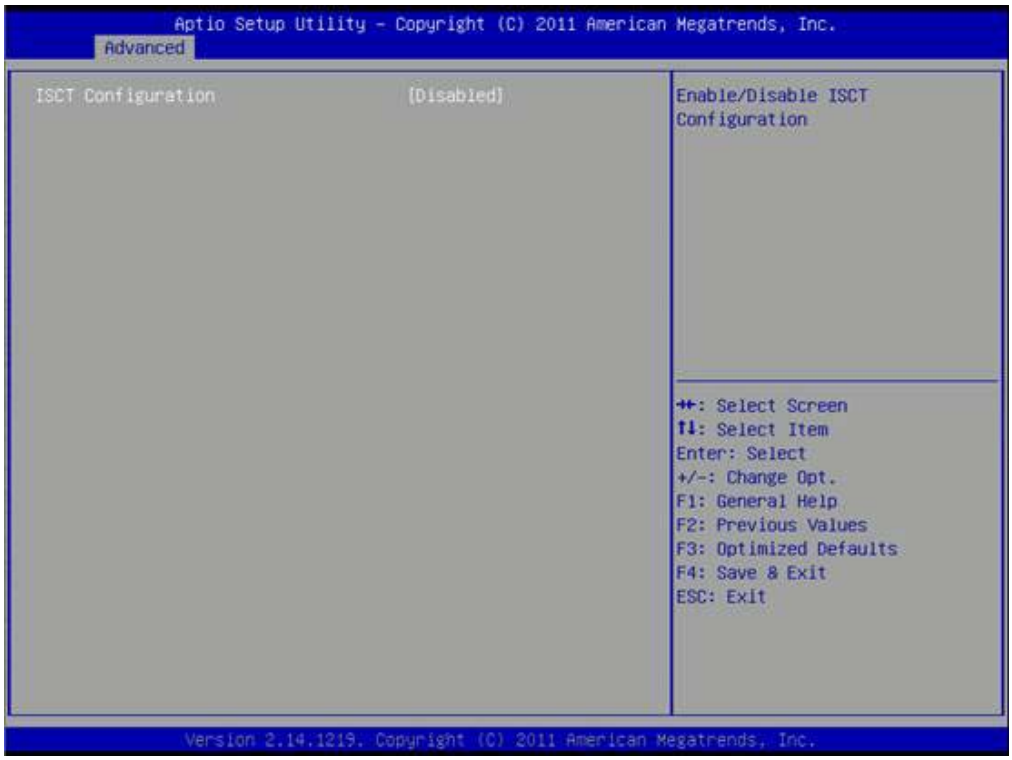


Figure 3.19 Intel® Smart Connect Technology

ISCT Configuration

This item allows users to enable or disable ISCT Configuration.

3.3.17 Serial Port Console Redirection

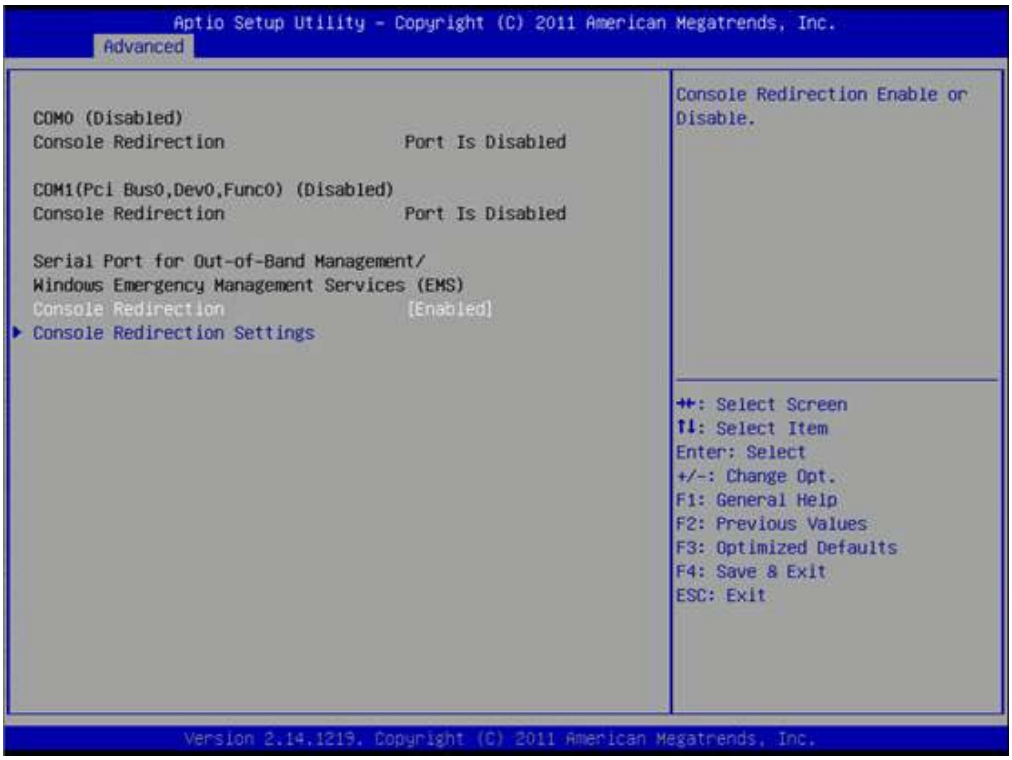


Figure 3.20 Serial Port Console Redirection

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.

3.3.18 CPU PPM Configuration

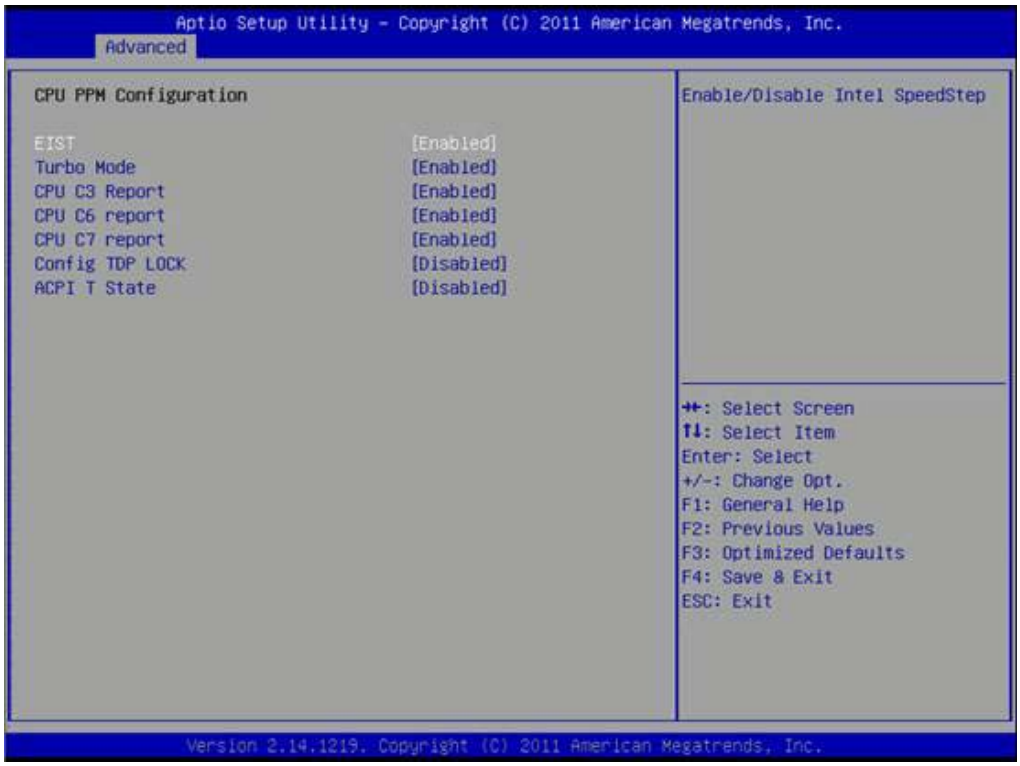


Figure 3.21 CPU PPM Configuration

EIST

CPU runs at its default speed if disabled; CPU speed is controlled by the operating system if enabled.

Turbo Mode

This item allows users to enable or disable turbo mode.

CPU C3/C6/C7 Report

This item allows users to enable or disable CPU C-state support.

Configurable TDP

This item allows users to select TDP levels.

Config TDP LOCK

This item allows users to enable or disable Config TDP LOCK.

ACPI T State

This item allows users to enable or disable ACPI T State.

3.3.19 Switchable Graphics

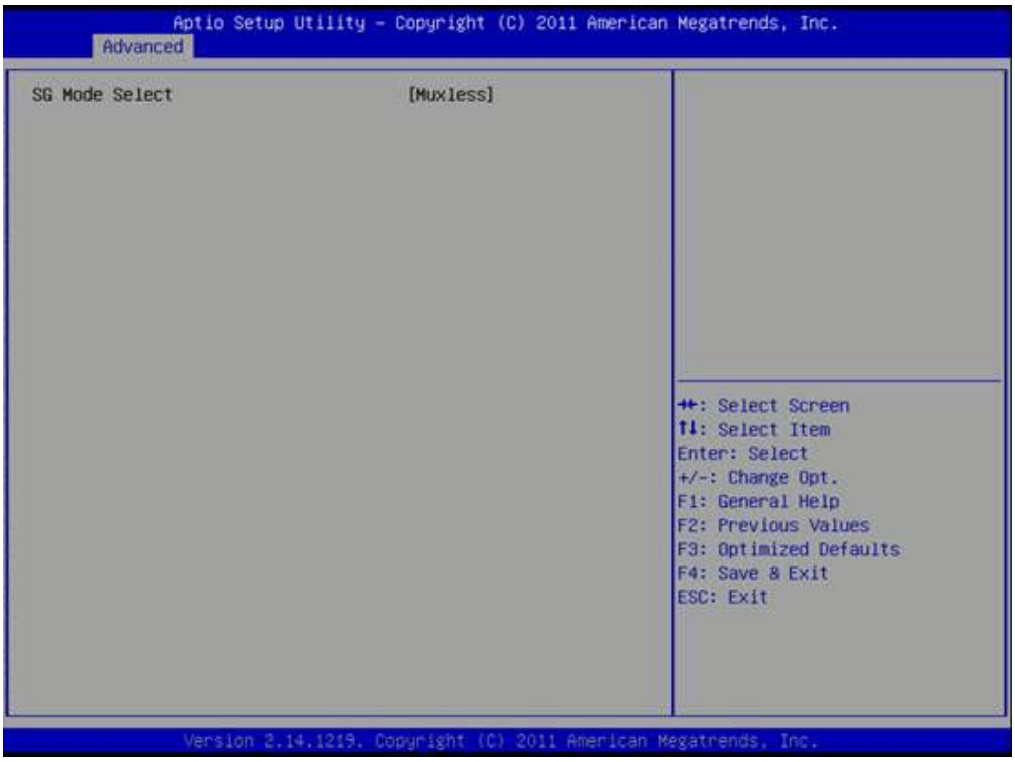


Figure 3.22 Switchable Graphics

SG Mode Select

This item allows users to select switchable graphics mode.

3.4 Chipset

Select the Chipset tab from the MIO-5290 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.

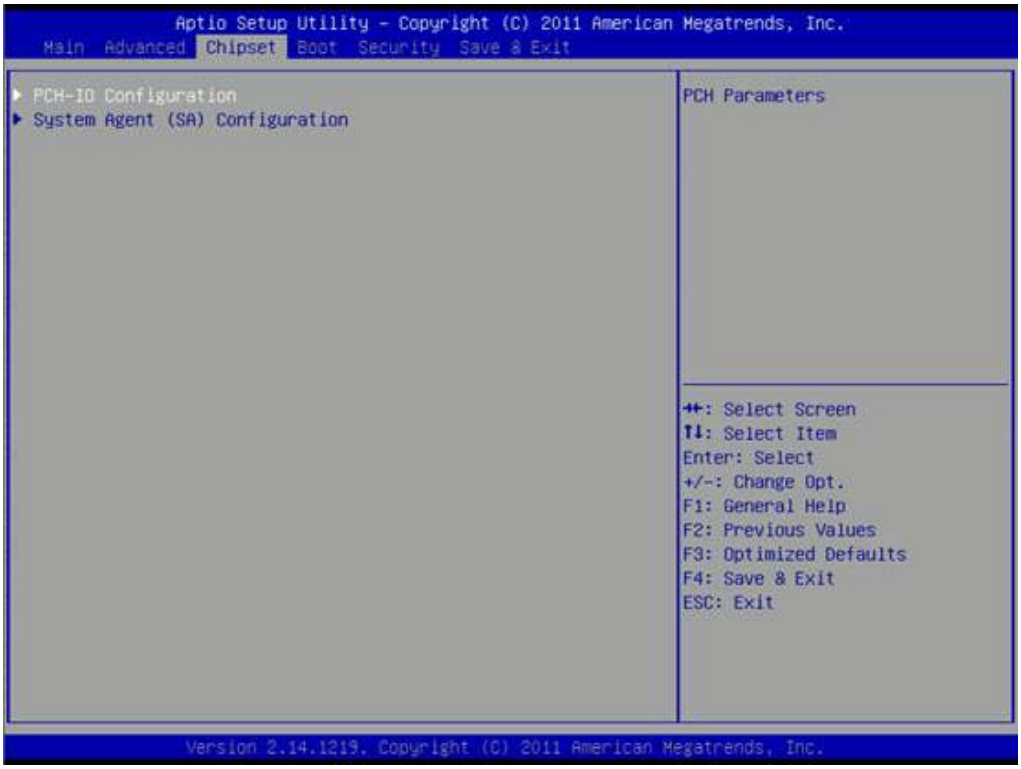


Figure 3.23 Chipset Setup

3.4.1 System Agent (SA) Configuration

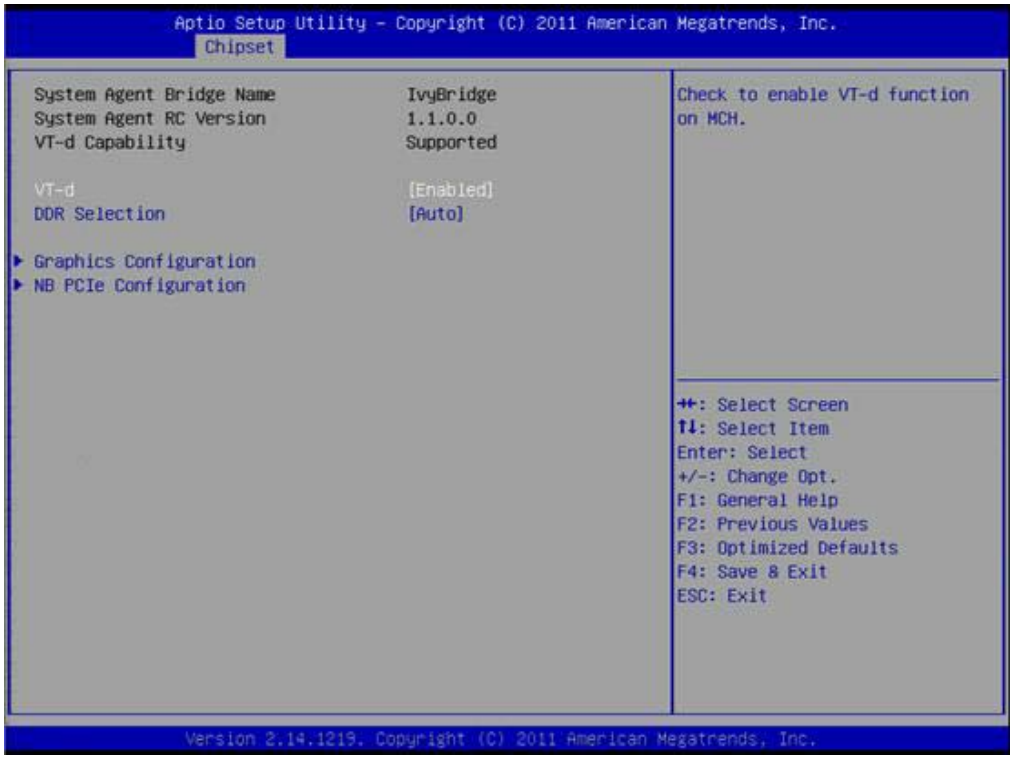


Figure 3.24 System Agent (SA) Configuration

VT-d

This item allows users to enable or disable VT-d.

DDR Selection

This item allows users to select which DDR or DDRL voltage.

3.4.1.1 Intel IGFX Configuration

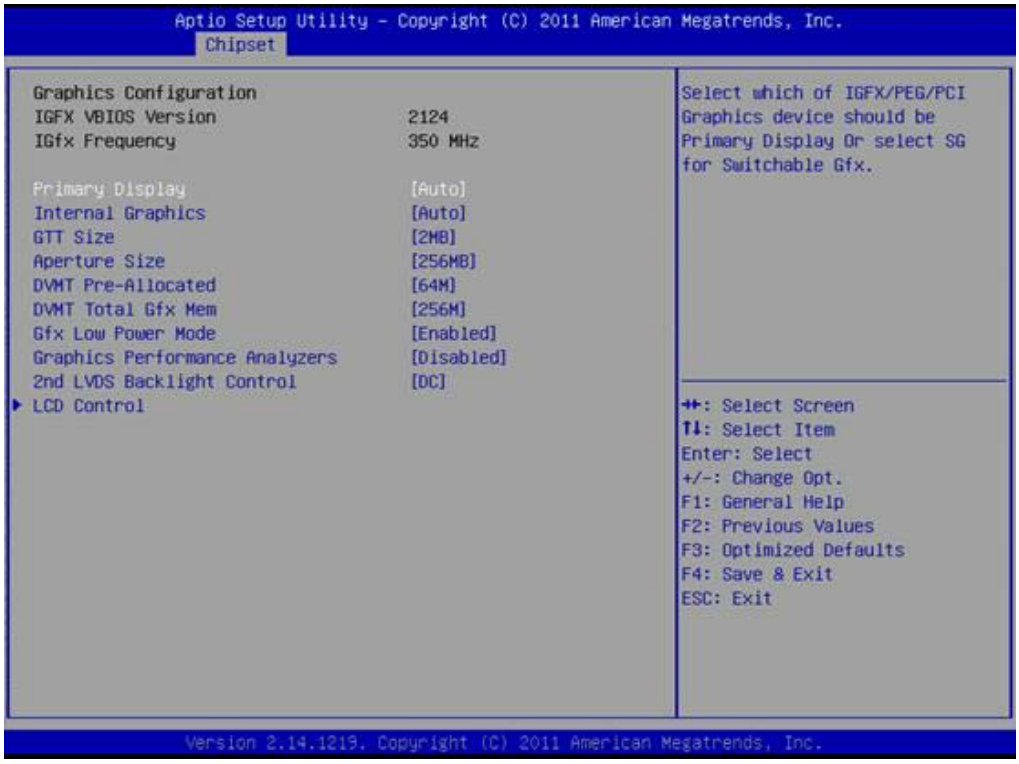


Figure 3.25 Intel IGFX Configuration

Primary Display

This item allows users to select Primary Display.

Internal Graphics

This item allows users to enable or disable IGD.

GTT Size

This item allows users to select GTT size.

Aperture Size

This item allows users to select aperture size.

DVMT Pre-Allocated

This item allows users to select DVMT pre-allocated memory size.

DVMT Total Gfx Mem

This item allows users to select DVMT total memory size.

Gfx Low Power Mode

This item allows users to enable or disable IGD low power mode.

Graphics Performance Analyzers

This item allows users to enable or disable Graphics Performance Analyzers

2nd LVDS Backlight Control

This item allows users to select 2nd backlight control mode.

LCD Control

Figure 3.26 LCD Control

Primary IGFX Boot Display

Select boot display device at post stage.

LCD Panel Type

This item allows users to select panel resolution.

Panel Scaling

This item allows users to enable or disable panel scaling.

Active LFP

This item allows users to select LFP configuration.

3.4.1.2 NB PCIe Configuration

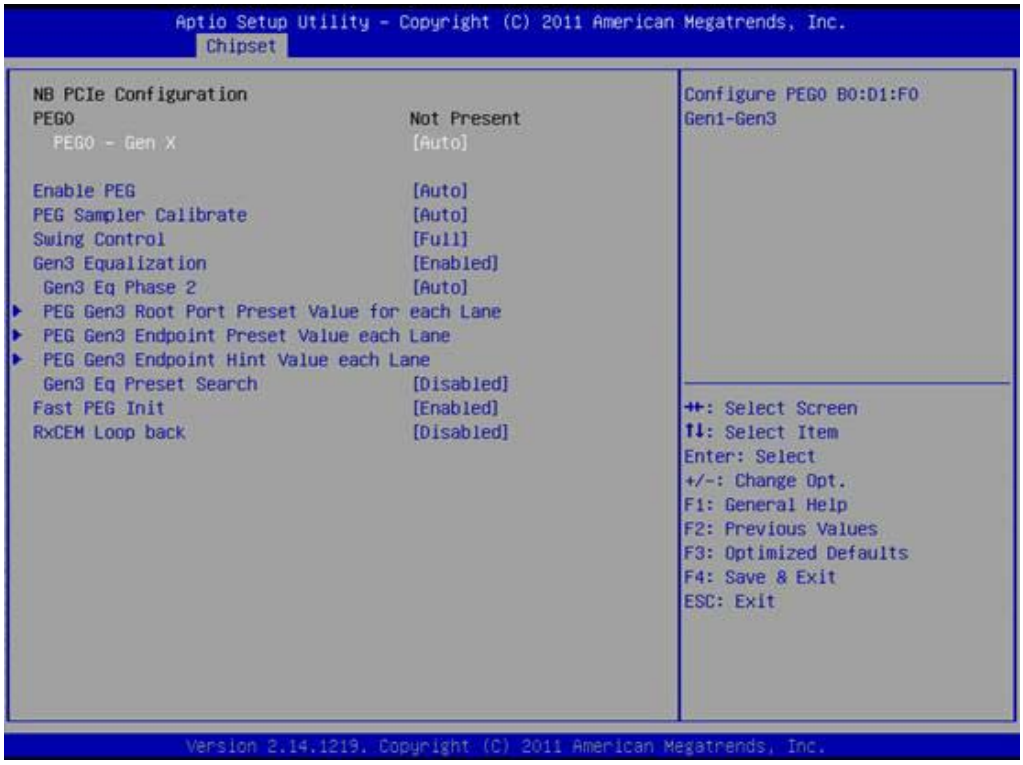


Figure 3.27 NB PCIe Configuration

PEG0 – Gen x

Select PEG0 Gen speed.

Enable PEG

This item allows users to enable or disable PEG always.

PEG Sampler Calibrate

This item allows users to enable or disable PEG sampler calibrate.

Swing Control

This item allows users to perform PEG swing control.

Gen3 Equalization

This item allows users to perform PEG Gen3 equalization steps.

Gen3 Eq Phase 2

This item allows users to perform PEG Gen3 equalization phase 2.

PEG Gen3 Root Port Preset Value for each Lane

This item allows users to select root port preset value per lane for Gen3.

PEG Gen3 Endpoint Preset Value for each Lane

This item allows users to select endpoint preset value per lane for Gen3.

PEG Gen3 Endpoint Hint Value for each Lane

This item allows users to select endpoint hint value per lane for Gen3.

Gen3 Eq Preset Search

This item allows users to enable or disable PEG Gen3 preset search algorithm.

Fast PEG Init

This item allows users to enable or disable fast PEG init.

RxCEM Loop back

This item allows users to enable or disable RxCEM loop back.

3.4.2 PCH-IO Configuration

Figure 3.28 PCH-IO Configuration

PCI Express Configuration

This item allows users to configuration PCIE1~PCIE8 root port detail settings.

USB Configuration

This item allows users to configuration detail of USB functions.

PCH Azalia Configuration

This item allows users to configuration detail of azalia functions.

PCH LAN controller

Enables or disables the PCH LAN controller.

Wake on LAN

Enables or disables PCH LAN wake up from sleep state.

MINI Card/M-SATA

This item allows users to select MINI card or M-SATA function.

WiFi Card1/WiFi Card 2

This item allows users to enables or disables the WiFi Card1/WiFi Card 2 if device exist.

High Precision Timer

Enables or disables the high precision timer.

SLP_S4 Assertion Width

This item allows users to set a delay of sorts.

Restore AC Power Loss

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

3.5 Boot Settings

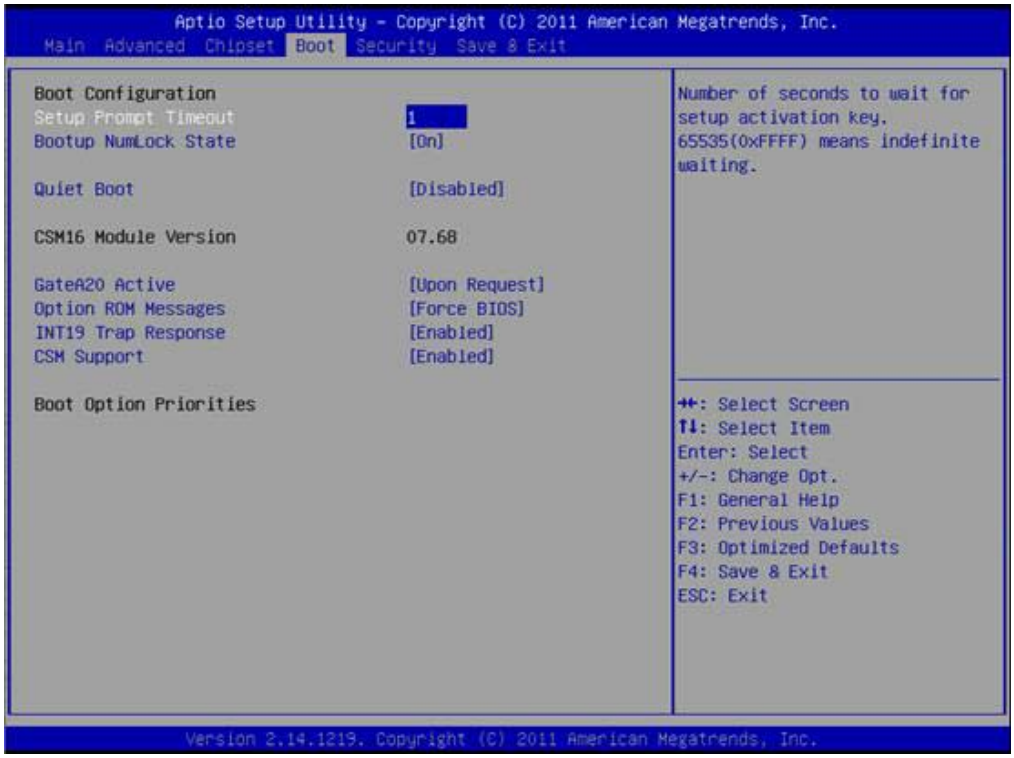


Figure 3.29 Boot Setup Utility

Setup Prompt Timeout

This item allows users to select the number of seconds to wait for setup activation key.

Bootup NumLock State

Select the Power-on state for Numlock.

Quiet Boot

If this option is set to Disabled, the BIOS displays normal POST messages. If Enabled, an OEM Logo is shown instead of POST messages.

GateA20 Active

This item allows to select upon request or always for GateA20.

Option ROM Message

Set display mode for option ROM.

INT19 Trap Response

This item allows option ROMs to trap interrupt 19.

CSM Support

This item allows users to enables or disables CSM support.

3.6 Security Setup

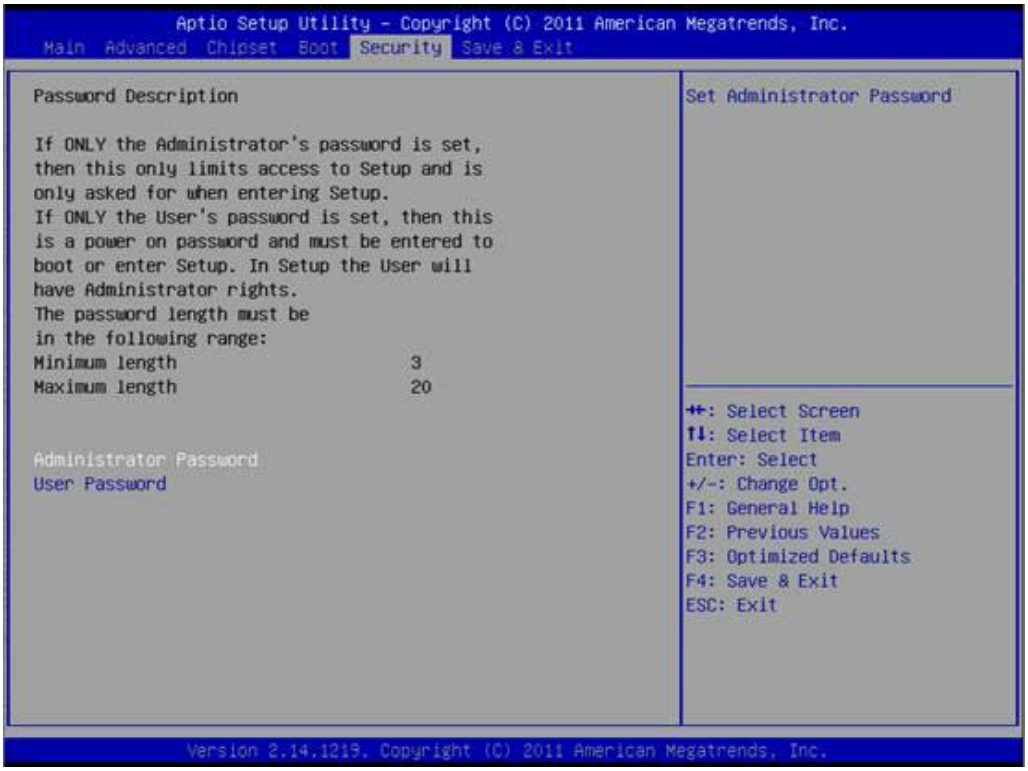


Figure 3.30 Password Configuration

Select Security Setup from the MIO-5290 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.

3.7 Save & Exit

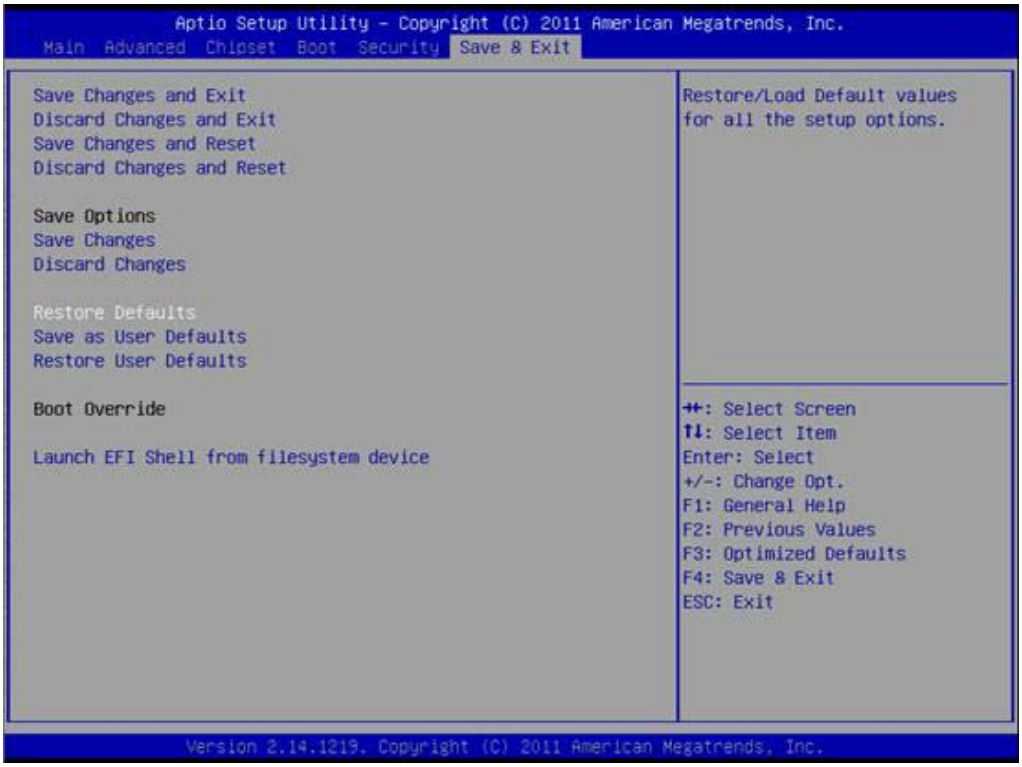


Figure 3.31 Save & Exit

3.7.1 Save Changes and Exit

When users have completed system configuration, select this option to save changes, exit BIOS setup menu and reboot the computer if necessary to take effect all system configuration parameters.

3.7.2 Discard Changes and Exit

Select this option to quit Setup without making any permanent changes to the system configuration.

3.7.2.1 Save Changes and Reset

When users have completed system configuration, select this option to save changes, exit BIOS setup menu and reboot the computer to take effect all system configuration parameters.

3.7.3 Discard Changes and Reset

Select this option to quit Setup without making any permanent changes to the system configuration and reboot the computer.

3.7.4 Save Changes

When users have completed system configuration, select this option to save changes without exit BIOS setup menu.

3.7.5 Discard Changes

Select this option to discard any current changes and load previous system configuration.

3.7.6 Restore Defaults

The MIO-5290 automatically configures all setup items to optimal settings when users select this option. Optimal Defaults are designed for maximum system performance, but may not work best for all computer applications. In particular, do not use the Optimal Defaults if the user's computer is experiencing system configuration problems.

3.7.7 Save User Defaults

When users have completed system configuration, select this option to save changes as user defaults without exit BIOS setup menu.

3.7.8 Restore User Defaults

The users can select this option to restore user defaults.

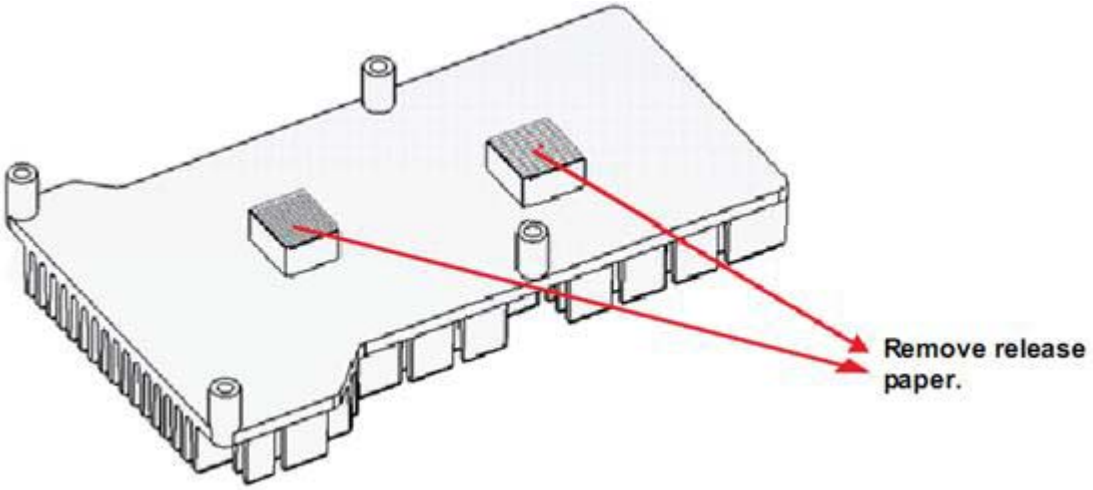
Chapter 4

MIOe Installation

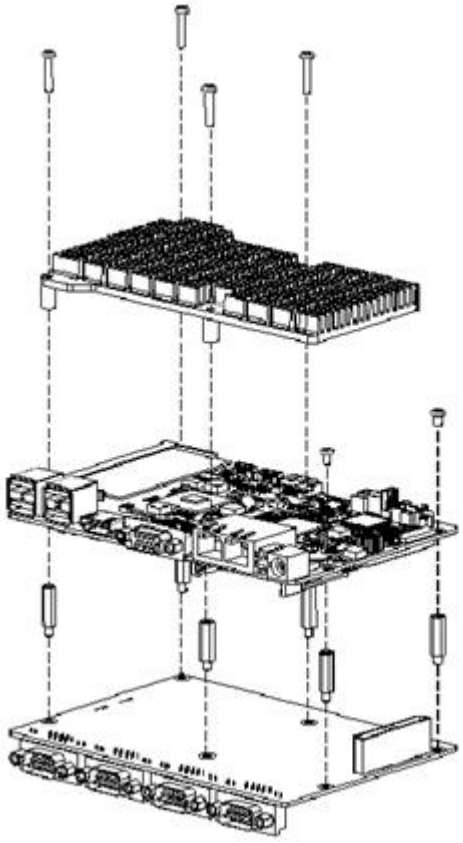
The MI/O compact form factor SBC is a new-generation SBC design with a variety of mechanical improvements. Here is the quick installation guide for our thermal design and MIOe module installation.

4.1 Quick Installation Guide:

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



2. There are six screws inside the white box; please install DRAM in the SODIMM socket first, then screw the heatsink as shown below. Four long screws are for the heatsink; two shorter screws are for the main board.
3. There are six standoff's on the MIOe module which can also can be installed with the screws and copper studs.



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 Tables

J1	Clear CMOS
Part Number	1653003101
Footprint	HD_3x1P_79_D
Description	PIN HEADER 3*1P 180D(M) 2.0mm DIP SQUARE W/O Pb
Setting	Function
(1-2)*	Normal
(2-3)	Clear COMS

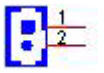
J2	Auto Power On Setting
Part Number	1653002101
Footprint	HD_2x1P_79_D
Description	PIN HEADER 2*1P 180D(M)SQUARE 2.0mm DIP W/O Pb
Setting	Function
NC	Power Button for Power On

J3	LCD Power
Part Number	1653003201
Footprint	HD_3x2P_79_D
Description	PIN HEADER 3*2P 180D(M) 2.0mm DIP SQUARE WO/Pb
Setting	Function
(1-3)*	+3.3V
(3-5)	+5V
(3-4)	+12V

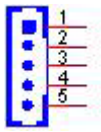
J4	DDR3L SEL
Part Number	1653000125
Footprint	HD_2x1P_79_H224_D
Description	
Setting	Function
(1-2)*	DDR3L

J5	COM2 Setting
Part Number	1653003260
Footprint	HD_3x2P_79
Description	PIN HEADER 3*2P 180D(M) 2.0mm SMD SOUARE PIN
Setting	Function
(1-2)*	RS232
(3-4)	RS485
(5-6)	RS422

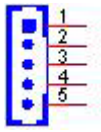
CN1	Power Switch
Part Number	1655302020
Footprint	WF_2P_79_BOX_R1_D
Description	WAFER BOX 2P 180D(M) 2.0mm W/Lock
Pin	Pin Name
1	PSIN
2	GND



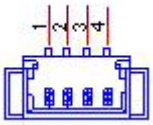
CN2	Reset
Part Number	1655302020
Footprint	WF_2P_79_BOX_R1_D
Description	WAFER BOX 2P 180D(M) 2.0mm W/Lock
Pin	Pin Name
1	RESET#
2	GND



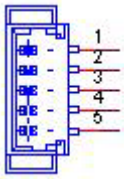
CN3	Inverter Power Output
Part Number	1655000453
Footprint	WHL5V-2M-24W1140
Description	WAFER BOX 2.0mm 5P 180D(M) DIP WO/Pb JIH VEI
Pin	Pin Name
1	+12V
2	GND
3	ENABKL
4	VBR
5	+5V



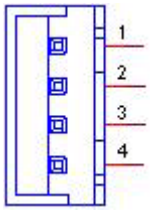
CN4	SMBus
Part Number	1655904020
Footprint	FPC4V-125M
Description	Wafer SMT 1.25mmS/T type 4P 180D(M) 85205-04001
Pin	Pin Name
1	GND
2	SMB_DAT
3	SMB_CLK
4	+5V



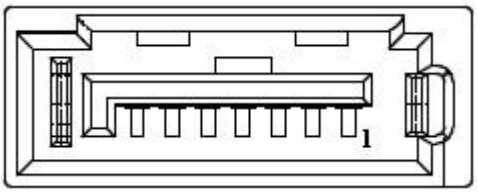
CN5	RS422/485
Part Number	1655004032
Footprint	WF_5P_49_BOX_85205
Description	
Pin	Pin Name
1	422RX-
2	422RX+
3	422/485TX+
4	422/485TX-
5	GND



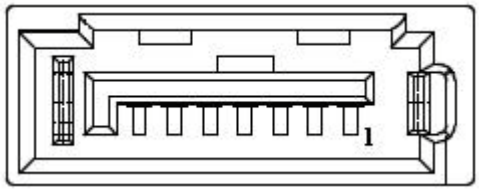
CN6	SATA Power
Part Number	1655001154
Footprint	WF_4P_98_BOX_R1_D
Description	
Pin	Pin Name
1	+5V
2	GND
3	GND
4	+12V



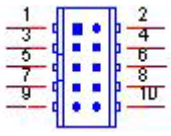
CN7	SATA2
Part Number	1654007578
Footprint	SATA_7P_WATF-07DBN6SB1U
Description	
Pin	Pin Name
1	GND
2	TX+
3	TX-
4	GND
5	RX-
6	RX+
7	GND



CN8	SATA1
Part Number	1654007578
Footprint	SATA_7P_WATF-07DBN6SB1U
Description	
Pin	Pin Name
1	GND
2	TX+
3	TX-
4	GND
5	RX-
6	RX+
7	GND



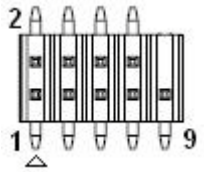
CN9	Audio
Part Number	1653004099
Footprint	HD_5x2P_79_23N685B-10M10
Description	
Pin	Pin Name
1	LOUTR
2	LINR
3	GND
4	GND
5	LOUTL
6	LINL
7	GND
8	GND
9	MIC1R
10	MIC1L



Matching Cable: 1703100152

CN12	SODIMMDDR3_204
Part Number	1651001649
Footprint	DDR3_204P_2-2013310-1
Description	
Pin	Pin Name

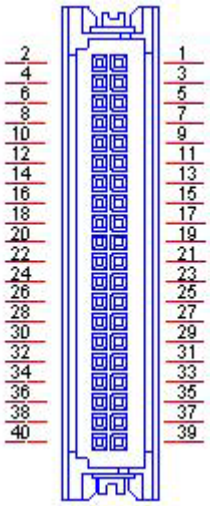
CN13	Internal USB
Part Number	1653005260
Footprint	HD_5x2P_79_N10
Description	PIN HEADER 2*5P 180D(M) 2.0mm SMD IDIOT-PROOF
Pin	Pin Name
1	+5V
2	+5V
3	A_D-
4	B_D-
5	A_D+
6	B_D+
7	GND
8	GND
9	GND



Matching Cable: 1703100260 1703100121

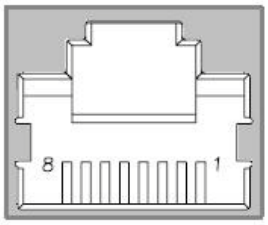
CN14	48 bits LVDS Panel
Part Number	1653920200
Footprint	SPH20X2
Description	*CONN. 40P 90D 1.25mm SMD WO/Pb DF13-40DP-1.25V
Pin	Pin Name
1	+5V or +3.3V
2	+5V or +3.3V
3	GND
4	GND
5	+5V or +3.3V
6	+5V or +3.3V
7	LVDS0_D0-
8	LVDS1_D0-
9	LVDS0_D0+
10	LVDS1_D0+
11	GND
12	GND

13	LVDS0_D1-
14	LVDS1_D1-
15	LVDS0_D1+
16	LVDS1_D1+
17	GND
18	GND
19	LVDS0_D2-
20	LVDS1_D2-
21	LVDS0_D2+
22	LVDS1_D2+
23	GND
24	GND
25	LVDS0_CLK-
26	LVDS1_CLK-
27	LVDS0_CLK+
28	LVDS1_CLK+
29	GND
30	GND
31	NC
32	NC
33	GND
34	GND
35	LVDS0_D3-
36	LVDS1_D3-
37	LVDS0_D3+
38	LVDS1_D3+
39	NC
40	NC

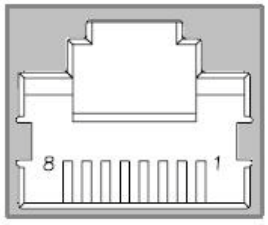


CN15	LAN1/LAN2
Part Number	1652003274
Footprint	RJ45_28P_RTB-19GB9J1A
Description	PHONE JACK RJ45 28P DIP Gold flash RTB-19GB9J1A
Pin	Pin Name
1	TX+(10/100),BI_DA+(GHz)
2	TX-(10/100),BI_DA-(GHz)
3	RX+(10/100),BI_DB+(GHz)
4	BI_DC+(GHz)
5	BI_DC-(GHz)
6	RX-(10/100),BI_DB-(GHz)
7	BI_DD+(GHz)
8	BI_DD-(GHz)

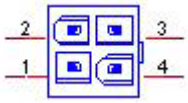
LAN1



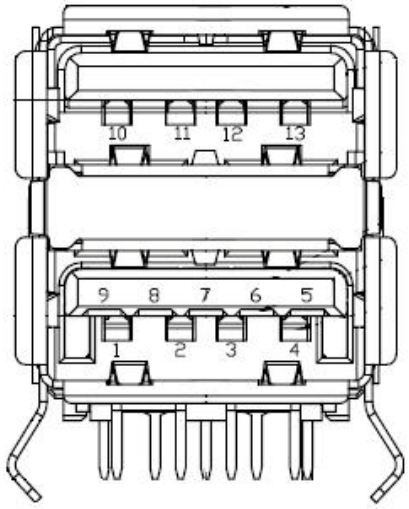
LAN2



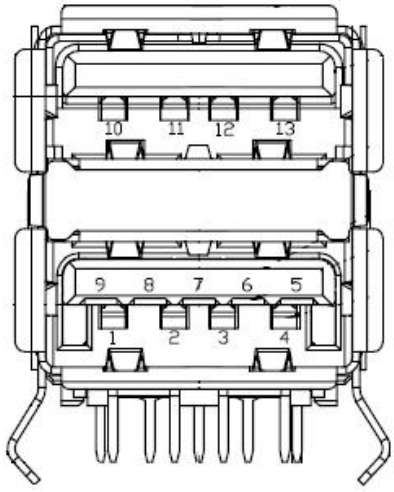
CN18	12V Power Input
Part Number	1655404090
Footprint	WF_2x2P_165_BOX_RA_D_740SP
Description	ATX PWR CONN. 2*2P 180D 4.2mm 24W4310-04S10-01T
Pin	Pin Name
1	GND
2	GND
3	+12V
4	+12V



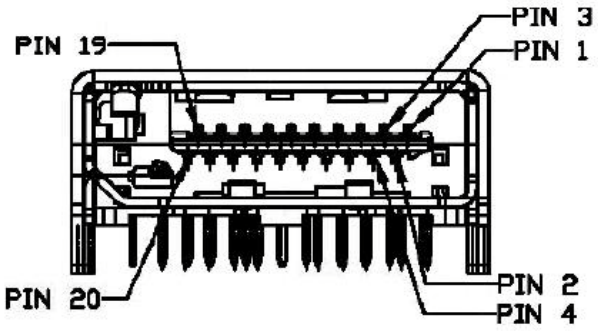
CN19	External USB2.0+USB3.0
Part Number	1654010199
Footprint	USB_13P_UEA1112C-UHS6-4F
Description	
Pin	Pin Name
1	+5V
2	D-
3	D+
4	GND
5	SSRX-
6	SSRX+
7	GND
8	SSTX-
9	SSTX+
10	+5V
11	D-
12	D+
13	GND



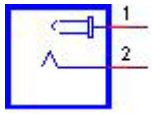
CN20	**External USB2.0+USB3.0**
Part Number	1654010199
Footprint	USB_13P_UEA1112C-UHS6-4F
Description	
Pin	Pin Name
1	+5V
2	D-
3	D+
4	GND
5	SSRX-
6	SSRX+
7	GND
8	SSTX-
9	SSTX+
10	+5V
11	D-
12	D+
13	GND



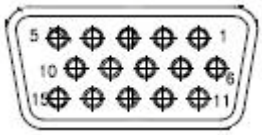
CN21	HDMI+DISPLAY_21H
Part Number	1654010203
Footprint	HDMICON_21P_845-002-217CRL
Description	
Pin	Pin Name



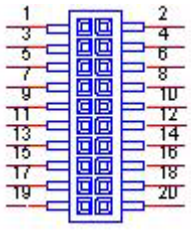
CN22	DC JACK
Part Number	1652005624
Footprint	PJ_2P_2DC-G213B200
Description	
Pin	Pin Name
1	+VIN
2	GND



CN23	**VGA**
Part Number	1654000055
Footprint	DBVGA-VF5MS
Description	D-SUB Conn. 15P 90D(F) DIP 070242FR015S200ZU
Pin	Pin Name
1	RED
2	GREEN
3	BLUE
4	NC
5	GND
6	GND
7	GND
8	GND
9	NC
10	GND
11	NC
12	DDAT
13	HSYNC
14	VSYNC
15	DCLK

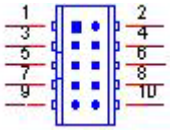


CN24	COM1/COM2
Part Number	1653004793
Footprint	HD_10x2P_79_23N685B-20M10
Description	
Pin	Pin Name
1	DCD1#
2	DSR1#
3	RXD1
4	RTS1#
5	TXD1
6	CTS1#
7	DTR1#
8	RI1#
9	GND
10	GND
11	DCD2#
12	DSR2#
13	RXD2
14	RTS2#
15	TXD2
16	CTS2#
17	DTR2#
18	RI2#
19	GND
20	GND

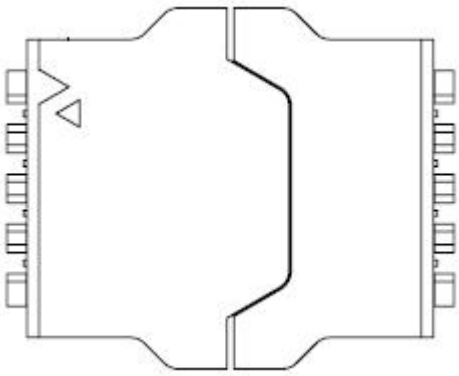


Matching Cable: 1701200220

CN25	GPIO
Part Number	1653004099
Footprint	HD_5x2P_79_23N685B-10M10
Description	
Pin	Pin Name
1	+5V
2	GPIO4
3	GPIO0
4	GPIO5
5	GPIO1
6	GPIO6
7	GPIO2
8	GPIO7
9	GPIO3
10	GND

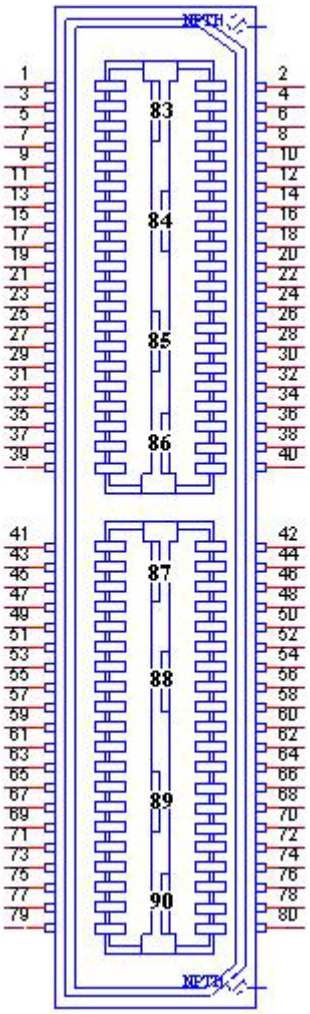


CN26	BIOS Socket
Part Number	1651000682
Footprint	SOCKET_8P_ACA-SPI-004-K01
Description	IC SKT 8P SMD WO/Pb C ACA-SPI-004-K01
Pin	Pin Name
1	CE#
2	SO
3	WP#
4	GND
5	SI
6	SCK
7	HOLD#
8	+3.3V



CN27	MIOe
Part Number	1654006235
Footprint	BB_40x2P_32_1625x285_2HOLD
Description	
Pin	Pin Name
1	GND
2	GND
3	PCIE_RX0+
4	PCIE_TX0+
5	PCIE_RX0-
6	PCIE_TX0-
7	GND
8	GND
9	PCIE_RX1+
10	PCIE_TX1+
11	PCIE_RX1-
12	PCIE_TX1-
13	GND
14	GND
15	PCIE_RX2+
16	PCIE_TX2+
17	PCIE_RX2-
18	PCIE_TX2-
19	GND
20	GND
21	PCIE_RX3+
22	PCIE_TX3+
23	PCIE_RX3-
24	PCIE_TX3-
25	GND
26	GND
27	PCIE_CLK+
28	LOUTL
29	PCIE_CLK-
30	LOUTR
31	GND
32	AGND
33	SMB_CLK
34	NC
35	SMB_DAT
36	NC
37	PCIE_WAKE#
38	NC
39	RESET#
40	NC
41	SLP_S3#
42	CLK33M

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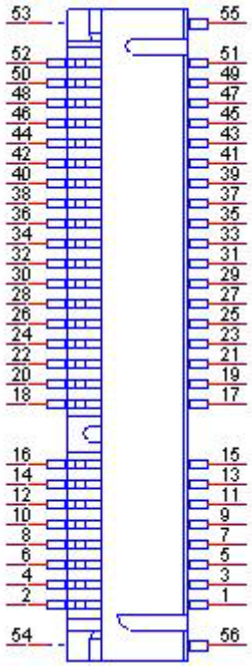
MPTH

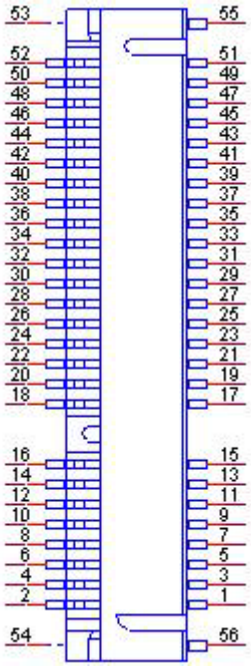
CN28	**Mini PCIE**
Part Number	1654006715
Footprint	MINIPCIE_FULL_HALF_STANDARD
Description	
Pin	Pin Name
1	WAKE#
2	+3.3VSB
3	NC
4	GND
5	NC
6	+1.5V
7	NC
8	UIM_PWR
9	GND
10	UIM_DATA
11	REFCLK-
12	UIM_CLK
13	REFCLK+
14	UIM_RESET
15	GND
16	UIM_VPP
17	NC
18	GND
19	NC
20	NC
21	GND
22	PERST#
23	PERn0
24	+3.3VSB
25	PERp0
26	GND
27	GND
28	+1.5V
29	GND
30	SMB_CLK
31	PETn0
32	SMB_DAT
33	PETp0
34	GND
35	GND
36	USB D-
37	GND
38	USB D+
39	+3.3VSB
40	GND
41	+3.3VSB
42	NC

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

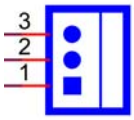


CN29	**Mini PCIE**
Part Number	1654006715
Footprint	MINIPCIE_FULL_HALF_STANDARD
Description	
Pin	Pin Name
1	WAKE#
2	+3.3VSB
3	NC
4	GND
5	NC
6	+1.5V
7	NC
8	UIM_PWR
9	GND
10	UIM_DATA
11	REFCLK-
12	UIM_CLK
13	REFCLK+
14	UIM_RESET
15	GND
16	UIM_VPP
17	NC
18	GND
19	NC
20	NC
21	GND
22	PERST#
23	PERn0
24	+3.3VSB
25	PERp0
26	GND
27	GND
28	+1.5V
29	GND
30	SMB_CLK
31	PETn0
32	SMB_DAT
33	PETp0
34	GND
35	GND
36	USB D-
37	GND
38	USB D+
39	+3.3VSB
40	GND
41	+3.3VSB
42	NC

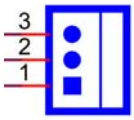
43	GND
44	NC
45	NC
46	NC
47	NC
48	+1.5V
49	NC
50	GND
51	NC
52	+3.3VSB



FAN1	CPU FAN
Part Number	1655003010
Footprint	WHP3VA
Description	
Pin	Pin Name
1	GND
2	+V12
3	FANTACH



FAN2	System FAN
Part Number	1655003010
Footprint	WHP3VA
Description	
Pin	Pin Name
1	GND
2	+V12
3	N/C



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
00-1F	DMA Controller
20-2D	Interrupt Controller
50-52	Timer/Counter
60-6F	8042 (keyboard controller)
70-7F	Real-time clock, non-maskable interrupt (NMI) mask
80-9F	DMA page register
A0-BF	0A0-0BF
C0-DF	DMA controller
200-20F	Motherboard resources
299-29A	EC HM Index port and Data port
29C-29D	EC Index port and Data port
2F8-2FF	Communications Port (COM2)
3C0-3DF	Motherboard resources
3F8-3FF	Communications Port (COM1)
400-4FF	Motherboard resources
500-57F	Motherboard resources

B.2 DMA Channel Assignments

Table B.2: DMA Channel Assignments

Channel	Function
0	Available
1	Available
2	Available
3	Available
4	Direct memory access controller
5	Available
6	Available
7	Available

B.3 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	Standard 101/102-Key or Microsoft Natural PS/2 Keyboard
IRQ2	Interrupt from controller 2 (cascade)
IRQ3	Communications Port (COM2)
IRQ4	Communications Port (COM1)
IRQ5	Available
IRQ6	Available
IRQ7	EC Watch DOG
IRQ8	System CMOS/real time clock
IRQ9	Microsoft ACPI-Compliant System
IRQ10	Available
IRQ11	Available
IRQ12	PS/2 Compatible Mouse
IRQ13	Numeric data processor
IRQ14	Primary IDE
IRQ15	Secondary IDE

Appendix C

Watchdog Timer Sample Code

C.1 Watchdog Timer Sample Code

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

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

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

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

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

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

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

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

.exit
```

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