



NexCOBOT Co., Ltd.

**Intelligent Platform & Services Business Unit**  
**Embedded Computing (Industrial Motherboard)**  
**NEX 916**  
User Manual

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# PREFACE

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## Acknowledgements

NEX 916 is a trademark of Nexcobot Co., Ltd. All other product names mentioned herein are registered trademarks of their respective owners.

## Regulatory Compliance Statements

This section provides the FCC compliance statement for Class A devices and describes how to keep the system CE compliant.

## Declaration of Conformity

### FCC

This equipment has been tested and verified to comply with the limits for a Class A digital device, pursuant to Part 15 of 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 instructions, may cause harmful interference to radio communications. Operation of this equipment in a residential area (domestic environment) is likely to cause harmful interference, in which case the user will be required to correct the interference (take adequate measures) at their own expense.

### CE

The product(s) described in this manual complies with all applicable European Union (CE) directives if it has a CE marking. For computer systems to remain CE compliant, only CE-compliant parts may be used. Maintaining CE compliance also requires proper cable and cabling techniques.

## RoHS Compliance



### NexCOBOT RoHS Environmental Policy and Status Update

NexCOBOT is a global citizen for building the digital infrastructure. We are committed to providing green products and services, which are compliant with European Union RoHS (Restriction on Use of Hazardous Substance in Electronic Equipment) directive 2011/65/EU, to be your trusted green partner and to protect our environment.

RoHS restricts the use of Lead (Pb) < 0.1% or 1,000ppm, Mercury (Hg) < 0.1% or 1,000ppm, Cadmium (Cd) < 0.01% or 100ppm, Hexavalent Chromium (Cr6+) < 0.1% or 1,000ppm, Polybrominated biphenyls (PBB) < 0.1% or 1,000ppm, and Polybrominated diphenyl Ethers (PBDE) < 0.1% or 1,000ppm.

In order to meet the RoHS compliant directives, NexCOBOT has established an engineering and manufacturing task force in to implement the introduction of green products. The task force will ensure that we follow the standard NexCOBOT development procedure and that all the new RoHS components and new manufacturing processes maintain the highest industry quality levels for which NexCOBOT are renowned.

The model selection criteria will be based on market demand. Vendors and suppliers will ensure that all designed components will be RoHS compliant.

### How to recognize NexCOBOT RoHS Products?

For existing products where there are non-RoHS and RoHS versions, the suffix “(LF)” will be added to the compliant product name.

All new product models launched after January 2013 will be RoHS compliant. They will use the usual NexCOBOT naming convention.

## Warranty and RMA

### NexCOBOT Warranty Period

NexCOBOT manufactures products that are new or equivalent to new in accordance with industry standard. NexCOBOT warrants that products will be free from defect in material and workmanship for 2 years, beginning on the date of invoice by NexCOBOT.

### NexCOBOT Return Merchandise Authorization (RMA)

- Customers shall enclose the “NexCOBOT RMA Service Form” with the returned packages.
- Customers must collect all the information about the problems encountered and note anything abnormal or, print out any on-screen messages, and describe the problems on the “NexCOBOT RMA Service Form” for the RMA number apply process.
- Customers can send back the faulty products with or without accessories (manuals, cable, etc.) and any components from the card, such as CPU and RAM. If the components were suspected as part of the problems, please note clearly which components are included. Otherwise, NexCOBOT is not responsible for the devices/parts.
- Customers are responsible for the safe packaging of defective products, making sure it is durable enough to be resistant against further damage and deterioration during transportation. In case of damages occurred during transportation, the repair is treated as “Out of Warranty.”
- Any products returned by NexCOBOT to other locations besides the customers’ site will bear an extra charge and will be billed to the customer.

### Repair Service Charges for Out-of-Warranty Products

NexCOBOT will charge for out-of-warranty products in two categories, one is basic diagnostic fee and another is component (product) fee.

#### System Level

- Component fee: NexCOBOT will only charge for main components such as SMD chip, BGA chip, etc. Passive components will be repaired for free, ex: resistor, capacitor.
- Items will be replaced with NexCOBOT products if the original one cannot be repaired. Ex: motherboard, power supply, etc.
- Replace with 3rd party products if needed.
- If RMA goods can not be repaired, NexCOBOT will return it to the customer without any charge.

#### Board Level

- Component fee: NexCOBOT will only charge for main components, such as SMD chip, BGA chip, etc. Passive components will be repaired for free, ex: resistors, capacitors.
- If RMA goods can not be repaired, NexCOBOT will return it to the customer without any charge.



## Warnings

Read and adhere to all warnings, cautions, and notices in this guide and the documentation supplied with the chassis, power supply, and accessory modules. If the instructions for the chassis and power supply are inconsistent with these instructions or the instructions for accessory modules, contact the supplier to find out how you can ensure that your computer meets safety and regulatory requirements.

## Cautions

Electrostatic discharge (ESD) can damage system components. Do the described procedures only at an ESD workstation. If no such station is available, you can provide some ESD protection by wearing an antistatic wrist strap and attaching it to a metal part of the computer chassis.

## Safety Information

Before installing and using the device, note the following precautions:

- Read all instructions carefully.
- Do not place the unit on an unstable surface, cart, or stand.
- Follow all warnings and cautions in this manual.
- When replacing parts, ensure that your service technician uses parts specified by the manufacturer.
- Avoid using the system near water, in direct sunlight, or near a heating device.
- The load of the system unit does not solely rely for support from the rackmounts located on the sides. Firm support from the bottom is highly necessary in order to provide balance stability.
- The computer is provided with a battery-powered real-time clock circuit. There is a danger of explosion if battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer. Discard used batteries according to the manufacturer's instructions.

## Installation Recommendations

Ensure you have a stable, clean working environment. Dust and dirt can get into components and cause a malfunction. Use containers to keep small components separated.

Adequate lighting and proper tools can prevent you from accidentally damaging the internal components. Most of the procedures that follow require only a few simple tools, including the following:

- A Philips screwdriver
- A flat-tipped screwdriver
- A grounding strap
- An anti-static pad

Using your fingers can disconnect most of the connections. It is recommended that you do not use needle-nose pliers to disconnect connections as these can damage the soft metal or plastic parts of the connectors.



## Safety Precautions

1. Read these safety instructions carefully.
2. Keep this User Manual for later reference.
3. Disconnect the equipment from any AC outlet before cleaning or installing a component inside the chassis. Use a damp cloth. Do not use liquid or spray detergents for cleaning.
4. To prevent electrostatic build-up, leave the board in its anti-static bag until you are ready to install it.
5. For plug-in equipment, the power outlet socket must be located near the equipment and must be easily accessible.
6. Keep the board away from humidity.
7. Put the board on a stable surface. Dropping it or letting it fall may cause damage.
8. Wear anti-static wrist strap.
9. Do all preparation work on a static-free surface.
10. Make sure the voltage of the power source is correct before connecting the equipment to the power outlet.
11. Hold the board only by its edges. Be careful not to touch any of the components, contacts or connections.
12. All cautions and warnings on the board should be noted.
13. Use the correct mounting screws and do not over tighten the screws.
14. Keep the original packaging and the anti-static bag; in case the board has to be returned for repair or replacement.

## Technical Support and Assistance

1. For the most updated information of NexCOBOT products, visit NexCOBOT's website at [www.nexcobot.com](http://www.nexcobot.com).
2. For technical issues that require contacting our technical support team or sales representative, please have the following information ready before calling:
  - Product name and serial number
  - Detailed information of the peripheral devices
  - Detailed information of the installed software (operating system, version, application software, etc.)
  - A complete description of the problem
  - The exact wordings of the error messages

### Warning!

1. Handling the unit: carry the unit with both hands and handle it with care.
2. Maintenance: to keep the unit clean, use only approved cleaning products or clean with a dry cloth.

## Conventions Used in this Manual



### Warning:

Information about certain situations, which if not observed, can cause personal injury. This will prevent injury to yourself when performing a task.



### Caution:

Information to avoid damaging components or losing data.



### Note:

Provides additional information to complete a task easily.

## Global Service Contact Information

### Headquarters

#### NEXCOM International Co., Ltd.

9F, No. 920, Zhongzheng Rd.,  
Zhonghe District, New Taipei City, 23586,  
Taiwan, R.O.C.  
Tel: +886-2-8226-7786  
Fax: +886-2-8226-7782  
www.nexcom.com

### Asia

#### Taiwan

#### NexAIoT Headquarters

#### Industry 4.0 and Cloud Services

13F, No.922, Zhongzheng Rd.,  
Zhonghe District, New Taipei City,  
23586, Taiwan, R.O.C.  
Tel: +886-2-8226-7796  
Fax: +886-2-8226-7926  
Email: jacobhuang@nexaiot.com  
www.nexaiot.com

#### NexAIoT Co., Ltd.

#### Taichung Office

16F, No.250, Sec.2, Chongde Rd.,  
Beitun District,  
Taichung City, 406, Taiwan, R.O.C.  
Tel: +886-4-2249-1179  
Fax: +886-4-2249-1172  
Email: jacobhuang@nexaiot.com  
www.nexaiot.com

#### NexCOBOT Taiwan Co., Ltd.

13F, No.916, Zhongzheng Rd.,  
Zhonghe District,  
New Taipei City, 23586, Taiwan, R.O.C.  
Tel: +886-2-8226-7786  
Fax: +886-2-8226-7926  
Email: jennyshern@nexcobot.com  
www.nexcobot.com

#### GreenBase Technology Corp.

13F, No.922, Zhongzheng Rd.,  
Zhonghe District,  
New Taipei City, 23586, Taiwan, R.O.C.  
Tel: +886-2-8226-7786  
Fax: +886-2-8226-7900  
Email: vivianlin@nexcom.com.tw  
www.nexcom.com.tw

#### DivioTec Inc.

19F-1A, No.97, Sec.4, ChongXin Rd.,  
Sanchong District,  
New Taipei City, 24161, Taiwan, R.O.C.  
Tel: +886-2-8976-3077  
Email: sales@diviotec.com  
www.diviotec.com

#### AIoT Cloud Corp.

13F, No.922, Zhongzheng Rd.,  
Zhonghe District,  
New Taipei City, 23586, Taiwan, R.O.C.  
Tel: +886-2-8226-7786  
Fax: +886-2-8226-7782  
Email: alantsai@aiotcloud.net  
www.aiotcloud.dev

#### EMBUX TECHNOLOGY CO., LTD.

13F, No.916, Zhongzheng Rd.,  
Zhonghe District,  
New Taipei City, 23586, Taiwan, R.O.C.  
Tel: +886-2-8226-7786  
Fax: +886-2-8226-7782  
Email: info@embux.com  
www.embux.com

#### TMR TECHNOLOGIES CO., LTD.

13F, No.916, Zhongzheng Rd.,  
Zhonghe District,  
New Taipei City, 23586, Taiwan, R.O.C.  
Tel: +886-2-8226-7786  
Fax: +886-2-8226-7782  
Email: services@tmrtek.com  
www.tmrtek.com

## **China NEXSEC Incorporated**

201, Floor 2, Unit 2, Building 15, Yard 3,  
Gaolizhang Road, Haidian District,  
Beijing, 100094, China  
Tel: +86-10-5704-2680  
Fax: +86-10-5704-2681  
Email: marketing@nexsec.cn  
www.nexsec.cn

## **NEXCOM Shanghai**

Room 406-407, Building C, No 154, Lane 953,  
Jianchuan Road, Minhang District,  
Shanghai, 201108, China  
Tel: +86-21-5278-5868  
Fax: +86-21-3251-6358  
Email: sales@nexcom.cn  
www.nexcom.cn

## **NEXCOM Surveillance Technology Corp.**

Floor 8, Building B3, Xiufeng Industrial Zone,  
GanKeng Community, Buji Street,  
LongGang District,  
ShenZhen, 518112, China  
Tel: +86-755-8364-7768  
Fax: +86-755-8364-7738  
Email: steveyang@nexcom.com.tw  
www.nexcom.cn

## **NEXGOL Chongqing**

1st Building No.999,  
Star Boulevard, Yongchuan Dist,  
Chongqing City, 402160, China  
Tel: +86-23-4960-9080  
Fax: +86-23-4966-5855  
Email: sales@nexgol.com.cn  
www.nexcom.cn

## **Beijing NexGemo Technology Co.,Ltd.**

Room 205, No.1, Fazhan Rd.,  
Beijing International Information Industry Base,  
Changping District,  
Beijing, 102206, China  
Tel: +86-10-8072-2025  
Fax: +86-10-8072-2022  
Email: sales@nexgemo.cn  
www.nexgemo.com

## **Japan**

### **NEXCOM Japan**

9F, Tamachi Hara Bldg.,  
4-11-5, Shiba Minato-ku,  
Tokyo, 108-0014, Japan  
Tel: +81-3-5419-7830  
Fax: +81-3-5419-7832  
Email: sales@nexcom-jp.com  
www.nexcom-jp.com

## **America**

### **USA NEXCOM USA**

46665 Fremont Blvd.,  
Fremont CA 94538, USA  
Tel: +1-510-656-2248  
Fax: +1-510-656-2158  
Email: sales@nexcom.com  
www.nexcomusa.com

## Package Contents

Before continuing, verify that the NEX 916 package that you received is complete. Your package should have all the items listed in the following table.

Item	Name	Qty
1	NEX 916 Motherboard	1
2	COM Port Cable	1
3	SATA Cable	2



### Heat Spreader:

The heatspreader acts as a thermal coupling device to the module and is thermally coupled to the CPU via a thermal gap filler. On some modules, it may also be thermally coupled to other heat generating components with the use of additional thermal gap fillers. Although the heatspreader is the thermal interface where most of the heat generated by the module is dissipated, it is not to be considered as a heatsink. It has been designed as a thermal interface between the module and the application specific thermal solution.



## Ordering Information

The following information below provides ordering information for NEX 916.

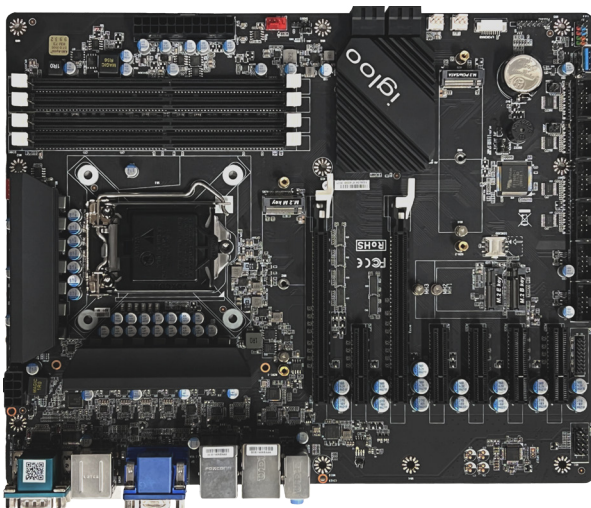
### **NEX 916 (P/N: 6879G0009160F)**

Intel® Comet Lake-S Q470E, supports LGA1200 CPU (Max 125W),  
DDR4 up to 128GB.



# CHAPTER 1: PRODUCT INTRODUCTION

## Overview



## Key Features

- Intel® LGA1200 Socket supports 10/11th Gen. Core Processor (Max 125W)
- Intel® Comet Lake-S Q470E chipset
- 4 x DDR4 3200/2933MHz up to 128GB
- 1 x Intel® i225-V 2.5GbE, 1 x Intel® i219-LM GbE
- 2 x M.2 Key M (NVMe), 1 x M.2 Key E (CNVi), and 1 x M.2 Key B
- 4 x SATA III (6Gb/s), supports Raid 0/1/5/10
- 1 x VGA, 1 x HDMI, and 1 x DP
- 2 x RS232/422/485, 4 x RS232, 4 x USB3.2 (Gen.2),
- 1 x USB3.2 (Gen.1), 6 x USB2.0
- 2 x PCI-E x16, 5 x PCI-E x4 Slots
- 2 x CPU FAN, 2 x System FAN
- 24 + 8 Pin ATX Power Input
- ATX Form Factor (305 x 244mm)

# Hardware Specifications

## CPU Support

- Intel® LGA1200 Socket supports 10th/11th Gen Core Processor Max 125W
- Intel® Q470E chipset
- AMI 256M Flash ROM

## Memory

- 4 x DDR4 3200/2933 MHz Long DIMM up to 128GB

## Storage

- 4 x SATAIII (6.0Gb/s, Support Raid 0/1/5/10)
- 2 x M.2 M-key 2242/2280, support NVMe (M2M is via PCH, M2M1 supports only with 11th CPU)

## Expansion Slots

- 1 x M.2 key B (3042/3052, USB3.2 + PCIe x1 interface, supports 4G/5G module)
- 1 x M.2 key E (2230, CNVi + USB2.0 interface, supports WIFI/BT module)
- 2 x PCIe x16 slots (by CPU)
- 5 x PCIe x4 slots (If PCIe2 is in use, PCIe4 will be operated at a PCIe x1 interface)

## Ethernet

- 1 x Intel® i219-LM GbE
- 1 x Intel® i225-V 2.5GbE

## Graphics

- Intel® HD Graphics, shared memory
- 1 x VGA (Max Resolution: 1920x1080@60Hz)
- 1 x DP1.2 (Max Resolution: 4096x2304@60Hz)
- 1 x HDMI 1.4 (Max Resolution: 4096x2160@30Hz)

## Watchdog Timer

- From Super I/O to drag RESETCON#
- 256 segments (10sec ~ 255min)

## Audio

- Line-in, Line-out, and MIC

## Internal I/O

- 4 x USB2.0
- 1 x USB3.2 (Gen1, Type A)
- 4 x RS232 (COM3/4 support 5/12V TTL)
- 4 x M.2 (2 x Key M, 1 x Key B, 1 x Key E)
- 2 x PCIe x16 slots (by CPU)
- 5 x PCIe x4 slots (If PCIe2 is in use, PCIe4 will be operated at a PCIe x1 interface)
- 1 x GPIO (16 bit, 5V)
- 1 x PS/2
- 1 x SIM card slot
- 2 x CPU FAN (Support Smart FAN)
- 2 x System FAN
- 1 x Chassis intrusion
- 1 x SMBUS / I2C
- 1 x AT mode





## External I/O

- 2 x RS232/422/485 (Support 5V/12V TTL)
- 4 x USB3.2 (Gen 2)
- 2 x USB2.0
- 1 x VGA
- 1 x HDMI
- 1 x DP
- 2 x RJ45
- Line-in, Line-out, and MIC

## Power

- ATX Power
  - AT: Directly PWR on as Power input ready
  - ATX: Press Button to PWR on after Power input ready

## Certifications

- CE, FCC, RoHS, REACH

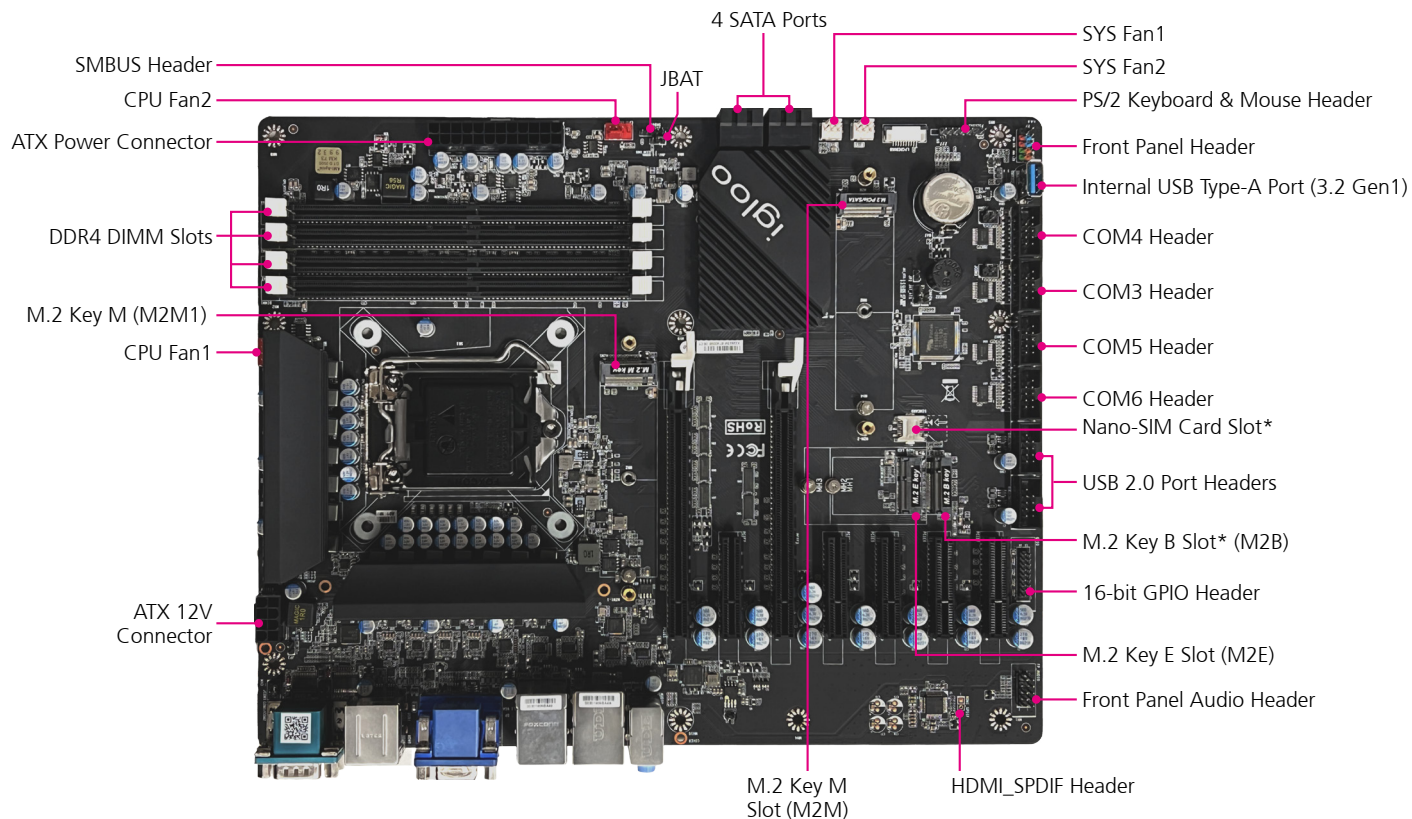
## Temperature

- Operating Temperature: 0 ~ 60° C
- Storage Temperature: -20 ~ 70° C
- Humidity: 10% ~ 90% RH @40°C (non-condensing)

## OS Support

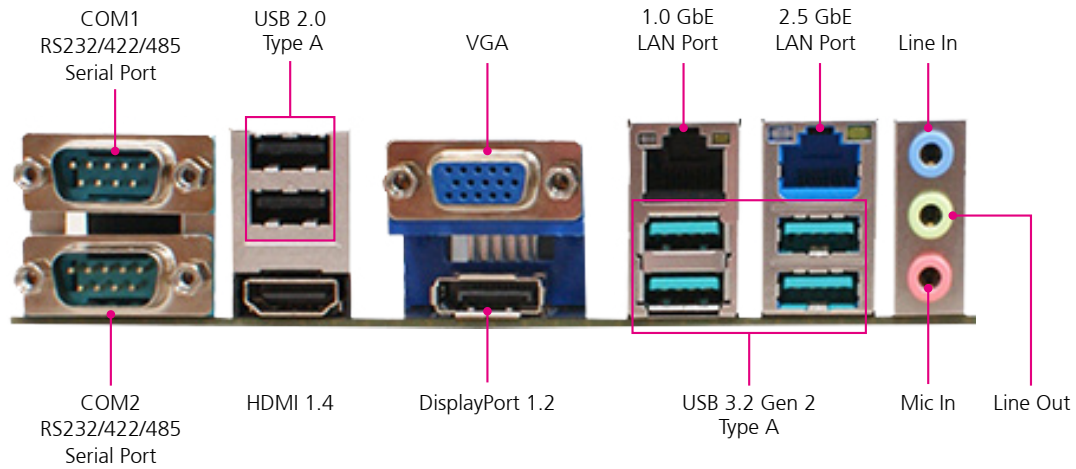
- Windows 10, 11, or Linux

## Knowing Your NEX 916



**Note \*:** SIM card slot will only work if a compatible nano-SIM card is inserted and a 4G/5G LAN card is plugged into the M2B slot.

## Edge I/O View



## CHAPTER 2: JUMPERS AND CONNECTORS

This chapter describes how to set the jumpers and connectors on the NEX 916 motherboard.

### Before You Begin

- Ensure you have a stable, clean working environment. Dust and dirt can get into components and cause a malfunction. Use containers to keep small components separated.
- Adequate lighting and proper tools can prevent you from accidentally damaging the internal components. Most of the procedures that follow require only a few simple tools, including the following:
  - A Philips screwdriver
  - A flat-tipped screwdriver
  - A set of jewelers screwdrivers
  - A grounding strap
  - An anti-static pad
- Using your fingers can disconnect most of the connections. It is recommended that you do not use needle-nosed pliers to disconnect connections as these can damage the soft metal or plastic parts of the connectors.
- Before working on internal components, make sure that the power is off. Ground yourself before touching any internal components, by touching a metal object. Static electricity can damage many of the electronic components. Humid environments tend to have less static electricity than

dry environments. A grounding strap is warranted whenever danger of static electricity exists.

### Precautions

Computer components and electronic circuit boards can be damaged by discharges of static electricity. Working on computers that are still connected to a power supply can be extremely dangerous.

Follow the guidelines below to avoid damage to your computer or yourself:

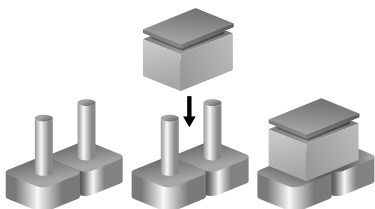
- Always disconnect the unit from the power outlet whenever you are working inside the case.
- If possible, wear a grounded wrist strap when you are working inside the computer case. Alternatively, discharge any static electricity by touching the bare metal chassis of the unit case, or the bare metal body of any other grounded appliance.
- Hold electronic circuit boards by the edges only. Do not touch the components on the board unless it is necessary to do so. Don't flex or stress the circuit board.
- Leave all components inside the static-proof packaging that they shipped with until they are ready for installation.
- Use correct screws and do not over tighten screws.

## Jumper Settings

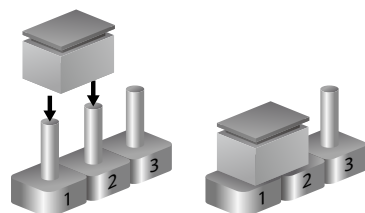
A jumper is the simplest kind of electric switch. It consists of two metal pins and a cap. When setting the jumpers, ensure that the jumper caps are placed on the correct pins. When the jumper cap is placed on both pins, the jumper is short. If you remove the jumper cap, or place the jumper cap on just one pin, the jumper is open.

Refer to the illustrations below for examples of what the 2-pin and 3-pin jumpers look like when they are short (on) and open (off).

Two-Pin Jumpers: Open (Left) and Short (Right)

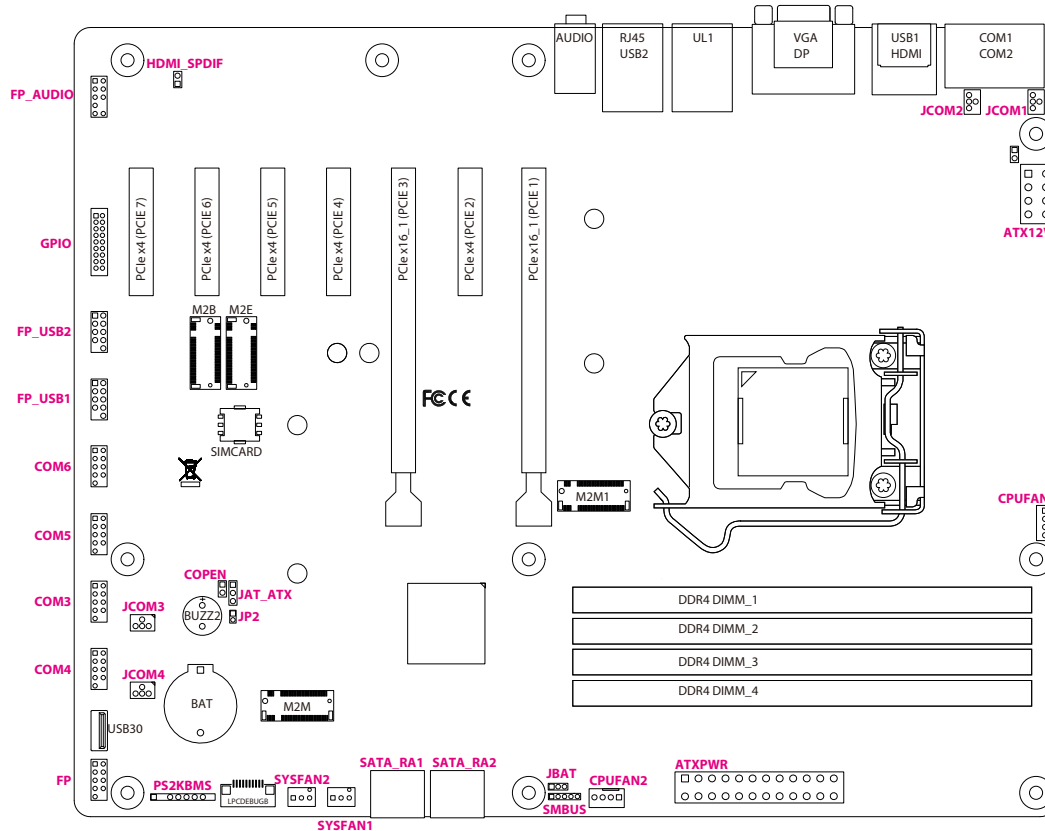


Three-Pin Jumpers: Pins 1 and 2 are Short



## Locations of the Jumpers and Connectors

The figure below shows the location of the jumpers and connectors.



# Jumpers

## Chassis Intrusion

Connector type: 2-pin header  
Connector location: COPEN



Pin	Settings
1-2 On	Enable



**Note:**  
To enable open chassis detection, short-circuit the COPEN pins and configure the [Case Open Detect](#) in the BIOS.

## AT/ATX Mode Selection

Connector type: 3-pin header  
Connector location: JAX\_ATX



Pin	Settings
1-2 On	ATX mode (default)
2-3 On	AT mode



**ATX Mode:** Press the power button to switch on when power is available.  
**AT Mode:** Direct power on when power is available.

RTC RAM Clear

Connector type: 3-pin header  
Connector location: JBAT



Pin	Settings
1-2 On	Normal (default)
2-3 On	Clear RTC

Erase the RTC RAM

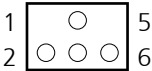
1. Unplug the power cord when the computer is switched off.
2. Move the jumper cap from pins 1-2 (default) to pins 2-3 and stay for 5–10 seconds, then move the cap back to pins 1-2.
3. Power on the computer and enable the BIOS for configuration.



**CAUTION:**  
**DO NOT** remove the cap from the default position of the JBAT jumper, except when cleaning the RTC RAM. The system boot may fail if doing so. Moreover, if you fail to clean the CMOS data by removing the jumper cap, please remove the onboard battery first and then remove the jumper again to clean the CMOS data. Reinstall the battery when the cleaning process is done.

COM Ports RS232/5V/12V Selection

Connector location: JCOM1, JCOM2, JCOM3, and JCOM4



Pin	Settings
2-4 On	RS232
3-4 On	5V
4-6 On	12V



Intel® ME (Management Engine) Selection

Connector type: 2-pin header  
Connector location: JP2



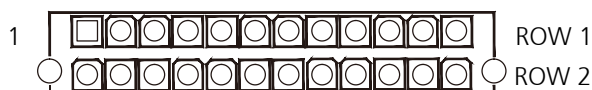
Pin	Settings
1-2 Off	Enabled ME flash security (default)
2-3 On	Disabled ME flash security

## Internal Connector Pin Definitions

### 24-pin ATX Power Connector

Connector type: 24-pin boxed header

Connector location: ATXPWR



Pin	ROW 1 Definition	ROW 2 Definition
1	+3.3V	+3.3V
2	+3.3V	-12V
3	GND	GND
4	+5V	Soft Power on
5	GND	GND
6	+5V	GND
7	GND	GND
8	Power OK	-5V
9	+5V Standby	+5V
10	+12V	+5V
11	+12V	+5V
12	+3.3V	GND



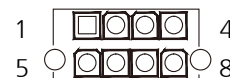
#### Note:

- For a fully configured system, we recommend that you use a power supply unit (PSU) that complies with ATX 12V Specification 2.0 (or later) and provides a min. power of 350W.

### 8-pin ATX Power Connector

Connector type: 8-pin boxed header

Connector location: ATX12V



Pin	Definition	Pin	Definition
1	GND	5	+12V
2	GND	6	+12V
3	GND	7	+12V
4	GND	8	+12V

- We recommend that you use a PSU with higher power output when configuring a system with more power-consuming devices. The system may become unstable or may not boot up if the power is inadequate.

CPU Fan Headers

Connector type: 4-pin header  
Connector location: CPUFAN1 and CPUFAN2



Pin	Definition	Pin	Definition
1	GND	2	+12V Fan Power
3	Fan Speed	4	Control



**CAUTION:**  
DO NOT forget to connect the fan cables to the fan headers. Insufficient air flow inside the system may damage the motherboard components. These are not jumpers! **DO NOT** place jumper caps on the fan connectors!

System Fan Headers

Connector type: 3-pin header  
Connector location: SYSFAN1 and SYSFAN2



SYSFAN1

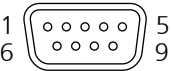
Pin	Definition
1	GND
2	+12V Fan Power
3	Fan Speed

SYSFAN2

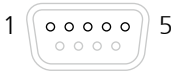
Pin	Definition
1	GND
2	+12V Fan Power
3	GND

COM Ports

Connector type: DB-9 port, 9-pin D-Sub  
Connector location: COM1 and COM2

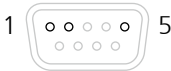


Pin	Definition	Pin	Definition
1	RS232 DCD#	6	RS232 DSR#
2	RS232 SIN	7	RS232 RTS#
3	RS232 SOUT	8	RS232 CTS#
4	RS232 DTR#	9	RS232 RI#
5	GND		



RS422

Pin	Definition
1	RS422 TX(B)
2	RS422 TX(A)
3	RS422 RX(A)
4	RS422 RX(B)
5	GND



RS485

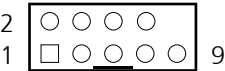
Pin	Definition
1	RS485 D-(B)
2	RS485 D+(A)
5	GND



**Note:**  
By default, both COM ports are RS232. You can change to RS422 or RS485 using a compatible COM cable and the [Transmission Mode Select](#) settings in the BIOS.

Front Panel Header

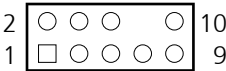
Connector type: 9-pin header  
Connector location: FP



Pin	Definition	Pin	Definition
1	HDDLED+	2	PWRLED+
3	HDDLED-	4	PWRLED-
5	GND	6	PWRBT
7	RSTSW	8	GND
9	VCC		

Line-Out and MIC-In Header

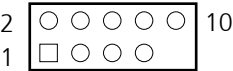
Connector type: 9-pin header  
Connector location: FP\_AUDIO



Pin	Definition	Pin	Definition
1	MIC2_L	2	GND
3	MIC2_R	4	AUDIO_JD
5	LINE_OUT2_R	6	MIC2_JD
7	SENSE		
9	LINE_OUT2_L	10	LINE_OUT2_JD

USB 2.0 Connectors

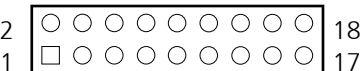
Connector type: 9-pin header  
Connector location: FP\_USB1 and FP\_USB2



Pin	Definition	Pin	Definition
1	VCC	2	VCC
3	-DATA	4	-DATA
5	+DATA	6	+DATA
7	GND	8	GND
		10	NC

16-Bit GPIO Header

Connector type: 18-pin header  
Connector location: GPIO



Pin	Definition	Pin	Definition
1	GPIO70	2	GPIO71
3	GPIO72	4	GPIO73
5	GPIO74	6	GPIO75
7	GPIO76	8	GPIO77
9	GPIO80	10	GPIO81
11	GPIO82	12	GPIO83
13	GPIO84	14	GPIO85
15	GPIO86	16	GPIO87
17	GND	18	VCC

HDMI SPDIF Out Header

Connector type: 2-pin header  
Connector location: HDMI\_SPDIF



Pin	Definition
1	HDMI_SPDIF_OUT
2	GND

PS/2 Keyboard and Mouse Header

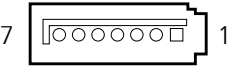
Connector type: 6-pin header  
Connector location: PS2KBMS



Pin	Definition
1	PS2VCC
2	
3	KB_DAT
4	KB_CLK
5	GND
6	MS_CLK
7	MS_DATA

Serial ATA 6.0Gb/s Connectors

Connector type: Standard Serial ATA 7-pin  
Connector location: SATA\_RA1 and SATA\_RA2



Pin	Definition
1	GND
2	TXP
3	TXN
4	GND
5	RXN
6	RXP
7	GND

SMBUS Header

Connector type: 5-pin header  
Connector location: SMBUS



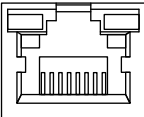
Pin	Definition
1	SMBUS_CLK
2	SMBUS_DAT
3	SMBUS_ALERT-
4	GND
5	VCC3



# LED Indicators

## 1.0 Gbps LAN Port LED

Speed      Activity/Link

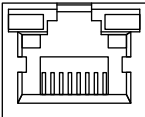


Speed Status	Description
Off	10Mbps Link
Green	100Mbps Link
Orange	1Gbps Link

Activity/Link Status	Description
Off	No Link
Blinking	Data Activity
On	Link

## 2.5 Gbps LAN Port LED

Speed      Activity/Link



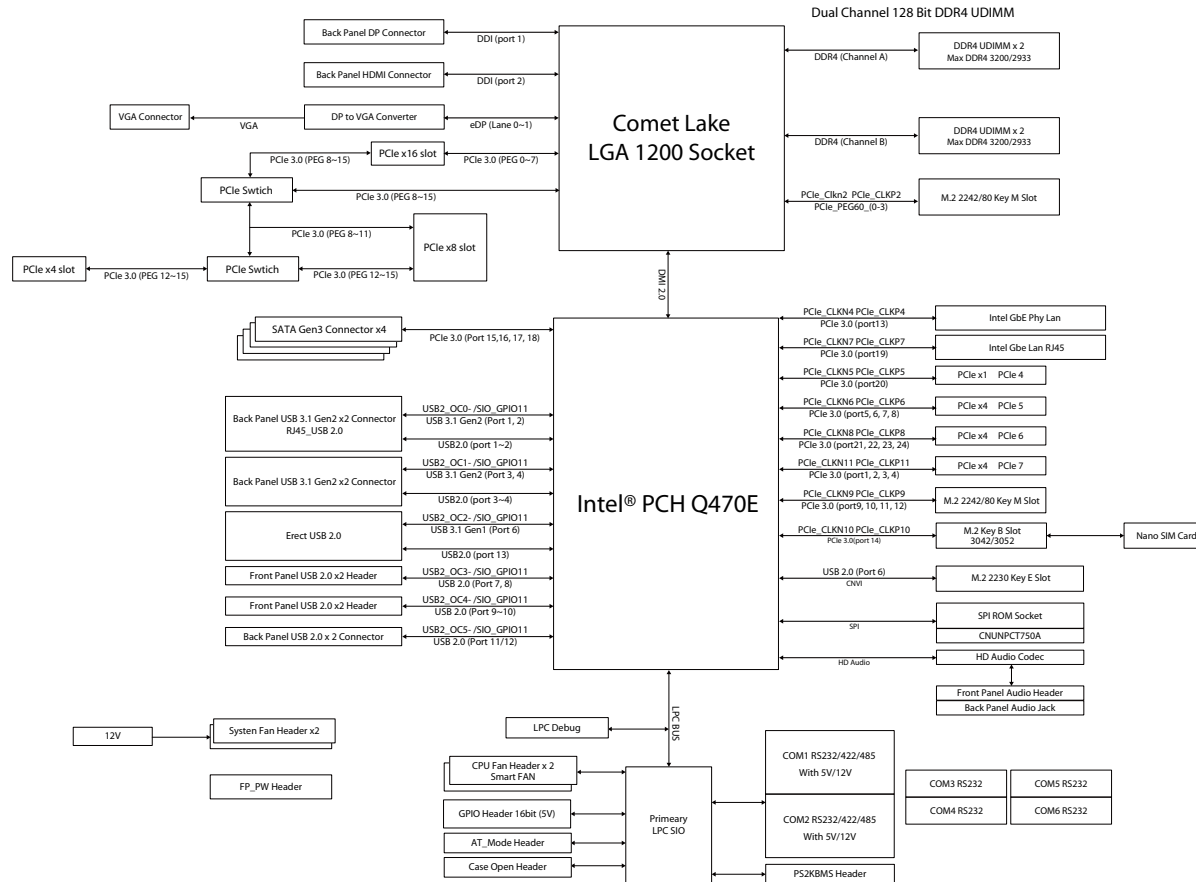
Speed Status	Description
Off	10/100Mbps Link
Red	1Gbps Link
Green	2.5Gbps Link

Activity/Link Status	Description
Off	No Link
Blinking	Data Activity
On	Link



**Note:**  
In order to achieve the high speed transfer rate of up to 2.5 Gbps, it is necessary to use the CAT 5e UTP cable.

## Block Diagram



# CHAPTER 3: BIOS SETUP

This chapter describes how to use the BIOS setup program for NEX 916. The BIOS screens provided in this chapter are for reference only and may change if the BIOS is updated in the future.

To check for the latest updates and revisions, visit the NexCOBOT website at [www.nexcobot.com](http://www.nexcobot.com).

## About BIOS Setup

The BIOS (Basic Input and Output System) Setup program is a menu driven utility that enables you to make changes to the system configuration and tailor your system to suit your individual work needs. It is a ROM-based configuration utility that displays the system's configuration status and provides you with a tool to set system parameters.

These parameters are stored in non-volatile battery-backed-up CMOS RAM that saves this information even when the power is turned off. When the system is turned back on, the system is configured with the values found in CMOS.

With easy-to-use pull down menus, you can configure such items as:

- Hard drives, diskette drives, and peripherals
- Video display type and display options
- Password protection from unauthorized use
- Power management features

The settings made in the setup program affect how the computer performs. It is important, therefore, first to try to understand all the setup options, and second, to make settings appropriate for the way you use the computer.

## When to Configure the BIOS

This program should be executed under the following conditions:

- When changing the system configuration
- When a configuration error is detected by the system and you are prompted to make changes to the setup program
- When resetting the system clock
- When redefining the communication ports to prevent any conflicts
- When making changes to the Power Management configuration
- When changing the password or making other changes to the security setup

Normally, CMOS setup is needed when the system hardware is not consistent with the information contained in the CMOS RAM, whenever the CMOS RAM has lost power, or the system features need to be changed.

## Default Configuration


Most of the configuration settings are either predefined according to the Load Optimal Defaults settings which are stored in the BIOS or are automatically detected and configured without requiring any actions. There are a few settings that you may need to change depending on your system configuration.

## Entering Setup






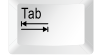




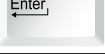
When the system is powered on, the BIOS will enter the Power-On Self Test (POST) routines. These routines perform various diagnostic checks; if an error is encountered, the error will be reported in one of two different ways:

- If the error occurs before the display device is initialized, a series of beeps will be transmitted.
- If the error occurs after the display device is initialized, the screen will display the error message.

Powering on the computer and immediately pressing <Del> allows you to enter Setup.

Press the  key to enter Setup:

## Legends


Key	Function
	Moves the highlight left or right to select a menu.
	Moves the highlight up or down between sub-menu or fields.
	Exits the BIOS Setup Utility.
	Scrolls forward through the values or options of the highlighted field.
	Scrolls backward through the values or options of the highlighted field.
	Selects a field.
	Displays General Help.
	Load previous values.
	Load optimized default values.
	Saves and exits the Setup program.
	Press <Enter> to enter the highlighted sub-menu




## Scroll Bar

When a scroll bar appears to the right of the setup screen, it indicates that there are more available fields not shown on the screen. Use the up and down arrow keys to scroll through all the available fields.

## Submenu

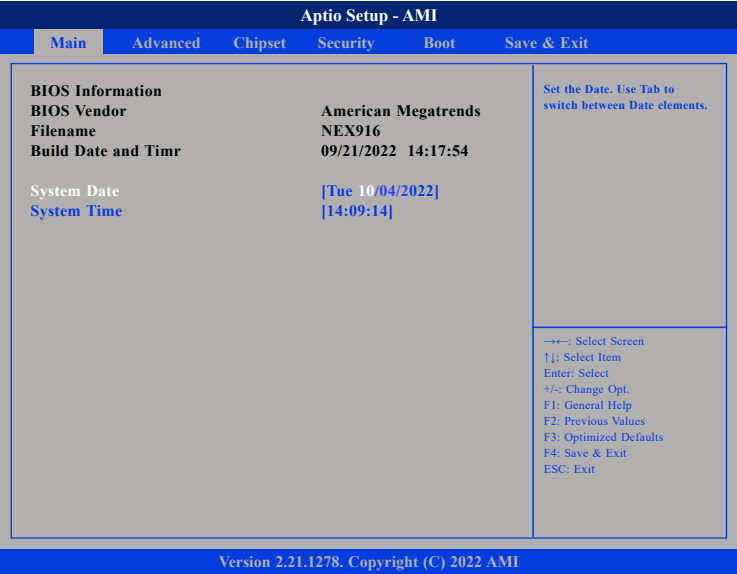
When “▶” appears on the left of a particular field, it indicates that a submenu which contains additional options are available for that field. To display the submenu, move the highlight to that field and press  .

# BIOS Setup Utility

Once you enter the AMI BIOS Setup Utility, the Main Menu will appear on the screen. The main menu allows you to select from several setup functions and one exit. Use arrow keys to select among the items and press  to accept or enter the submenu.

## Main

The Main menu is the first screen that you will see when you enter the BIOS Setup Utility.



## System Date


The date format is <day>, <month>, <date>, <year>. Day displays a day, from Monday to Sunday. Month displays the month, from January to December. Date displays the date, from 1 to 31. Year displays the year, from 2005 to 2099.

## System Time

The time format is <hour>, <minute>, <second>. The time is based on the 24-hour military-time clock. For example, 1 p.m. is 13:00:00. Hour displays hours from 00 to 23. Minute displays minutes from 00 to 59. Second displays seconds from 00 to 59.

## Advanced

The Advanced menu allows you to configure your system for basic operation. Some entries are defaults required by the system board, while others, if enabled, will improve the performance of your system or let you set some features according to your preference.



Setting incorrect field values may cause the system to malfunction.



## Connectivity Configuration

This section is used to configure a CNVi device. The configurations are available only when a CNVi device is plugged in.

- > **CNVi present**
- > **CNVi Configuration**
- > **CNVi Configuration > CNVi Mode**

Use this item to configure the connectivity options. Note that the GPIO pins used for the radio interface cannot be assigned to the other native function when CNVi is present.

**Auto Detection:** If discrete solution is discovered, it will be enabled by default. Otherwise integrated solution (CNVi) will be enabled.

**Disable Integrated:** This option disables the integrated solution.

## CPU Configuration

This section is used to display the current CPU information and configure the installed CPU.

### > Hyper-threading

Enable or disable hyper-threading technology.

### > Intel(R) (VMX) Virtualization Technology

When set to Enabled, the VMM can use the additional hardware capabilities provided by Vanderpool Technology.

### > Intel(R) SpeedStep(tm)

Enable or disable Intel SpeedStep.

### > C States

Enable or disable CPU C States support.

### > Turbo Mode

Enable or disable the process turbo mode. Ensure that Intel Speed Step and/or Intel Speed Shift is enabled.

## SATA Configuration

This section is used to display and configure the SATA connection of the device.

### > SATA Controller(s)

Enable or disable the SATA controller.

### > SATA Mode Selection

Configures the SATA mode.

**AHCI:** This option configures the Serial ATA drives to use AHCI (Advanced Host Controller Interface). AHCI allows the storage driver to enable the advanced Serial ATA features which will increase storage performance.

**RAID:** This option allows you to create RAID or Intel Matrix Storage configuration on Serial ATA devices.

### > M.2

#### > M.2 > Port

Enable or disable the SATA Port.

### > SATA1/2/3/4

#### > SATA1/2/3/4 > Port

Enable or disable each SATA Port.

### > SATA1/2/3/4 > Hot Plug

Enable or disable hot plugging feature on each SATA port.



## PCH-FW Configuration

This section is used to configure the options for updating the firmware.

### > TPM Device Selection

Use to select a TPM device. The options are dTPM and PTT.

**Warning!** PTT/dTPM will be disabled and all data saved on it will be lost.

### > Firmware Update Configuration

Press Enter to configure the following submenu.

#### > Firmware Update Configuration > ME FW Image Re-Flash

Enable or disable ME FW Image Re-Flash. If the option is set to Enabled, the system will turn off and reboot after 4 seconds.

## Trusted Computing

This section is used to configure the settings for the TPM (Trusted Platform Module).

### > TPM 2.0 Device Found

#### > TPM 2.0 Security Device Support

Enable or disable BIOS support for security device. Note that the O.S will not show Security Device. TCG EFI protocol and INT1A interface will not be available. More options will be available if the option is configured to Enabled.

#### > Pending operation

Schedule an operation for the security device. Note that your computer will reboot during restart in order to change state of security device.

## ACPI Settings

This section is used for the configuration of the ACPI (Advanced Configuration and Power Interface) settings.

### > ACPI Settings

#### > ACPI Sleep State

Select ACPI sleep state the system will enter when the suspend button is pressed. The options are Suspend Disabled and S3 (Suspend to RAM).

## Wake-up function Settings

This section is used to configure the settings related to waking up the system.

### > Wake System with Fixed Time

Enables or disables system wake on alarm event. When enabled, the system will wake on the hr::min::sec specified.

### > ACPI Sleep State

Enable or disable system wake on alarm event. This option is available when the **Wake System with Fixed Time** is set to Disabled. More options will be available if this option is configured to Enabled.

## Super I/O Configuration

This section is used to configure the input/output of the serial ports.

### > Super IO Configuration

#### > ERP Support

Set this option to Disabled to activate all wake-up functions. The available options are Auto and Disabled.

### > Serial Port 1/2/3/4 Configuration

Press Enter to configure the following submenu.

#### > Serial Port 1/2/3/4 Configuration > Serial Port

Enable or disable serial port. More options will be available if this option is configured to Enabled.

#### Serial Port 1/2/3/4 Configuration > Device Settings

#### Serial Port 1/2/3/4 Configuration > Change Settings

Select an optimal setting for super IO device. This option is available when the [Serial Port](#) is set to Enabled.

### > WatchDog Reset Timer

Enable or disable WatchDog Reset Timer reset function. When enabled, the following sub-menus will be available.

### > WatchDog Timer Value

Configure the watchdog timer value between 4~255.

### > WatchDog Timer Unit

Configure the metrics that will be used for the watchdog timer.

### > ATX Power Emulate AT Power

Display the power mode status. Refer to [AT/ATX Mode Selection](#) to select the power mode.

### > Case Open Detect

Enable or disable case open detection feature. The system will show the case open message during the computer POST (Power-On Self-Tests) if this feature is configured to Enabled. Refer to [Chassis Intrusion](#) to short the pins.

## PC Health Status

This section is used to monitor the hardware status such as temperature or fan speed.

### > SmartFan Configuration

Press Enter to configure the following submenu.

#### > SmartFan Configuration > CPUFAN1/2 Full-Speed Temperature

Set a temperature for CPUFAN. The fan will run at full speed above this temperature.

#### > SmartFan Configuration > CPUFAN1/2 Full-Speed Duty

Set CPUFAN to full speed duty. The fan will run at full speed above the pre-set duty.

#### > SmartFan Configuration > CPUFAN1/2 Idle-Speed Temperature

Set an idle temperature for CPUFAN. The fan will run at idle speed below the temperature.

#### > CPUFAN1/2 Idle-Speed Duty

Set CPUFAN to idle speed duty. The fan will run at idle speed below the pre-set duty.

## Serial Port Console Redirection

This section is used to configure the serial port that will be used for console redirection.

### > COM1

#### > Console Redirection

Enable or disable Console Redirection. When enabled, the following sub-menus will be available.

#### > Console Redirection Settings

Specify how the host and the remote computer (which the user is using) will exchange data. Both computers should have the same or compatible settings. Enable or disable the console redirection. When enabled, the following sub-menus will be available.

#### > Console Redirection Settings > Terminal Type

The options are: VT100, VT100+, VT-UTF8, and SNSI.

**VT100:** ASCII character set.

**VT100+:** Extends VT100 to support color, function keys, etc.

**VT-UTF8:** Uses UTF8 encoding to map Unicode characters onto 1 or more bytes.

**ANSI:** Extended ASCII character set.

#### > Console Redirection Settings > Bits per second

Selects the serial port transmission speed. The speed must match the other side. Long or noisy lines may require a lower speed.

#### > Console Redirection Settings > Data Bits

The options are 7 and 8.

**> Console Redirection Settings > Parity**

A parity bit can be sent with the data bits to detect some transmission errors. Even Parity bit is 0 if the number of 1's in the data bits is even. Odd Parity bit is 0 if number of 1's in the data bits is odd.

**> Console Redirection Settings > Stop Bits**

Stop bits indicate the end of a serial data packet. (A start bit indicates the beginning). The standard setting is 1 stop bit. Communication with slow devices may require more than 1 stop bit.

**> Console Redirection Settings > Flow Control**

Flow control can prevent data loss from buffer overflow. When sending data and the receiving buffers are full, a "stop" signal can be sent to stop the data flow.

**> Console Redirection Settings > VT-UTF8 Combo Key Support**

Enable or disable VT-UTF8 combination key support for ANSI/VT100 terminals.

**> Console Redirection Settings > Recorder Mode**

When enabled, only text will be sent. This is to capture the terminal data.

**> Console Redirection Settings > Resolution 100x31**

Enable or disable extended terminal resolution.

**> Console Redirection Settings > Putty KeyPad**

Selects the Putty keyboard emulation type.

**> Console Redirection Settings Serial Port for Out-of-Band Management / Windows Emergency Management Services (EMS)****> Console Redirection**

Specify how the host and the remote computer (which the user is using) will exchange data. Both computers should have the same or compatible settings. Enable or disable the console redirection. When enabled, the following submenus will be available.

**> Console Redirection Settings Serial Port for Out-of-Band Management / Windows Emergency Management Services (EMS) > Terminal Type EMS**

The options are: VT100, VT100+, VT-UTF8, and SNSI.

VT-UTF8 is the preferred terminal type for out-of-band management. Next choice is VT100+, then VT100.

**> Console Redirection Settings Serial Port for Out-of-Band Management / Windows Emergency Management Services (EMS) > Bits per second EMS**

Select the serial port transmission speed. The speed must match the other side. Long or noisy lines may require a lower speed.

**> Console Redirection Settings Serial Port for Out-of-Band Management / Windows Emergency Management Services (EMS) > Flow Control EMS**

Flow control can prevent data loss from buffer overflow. When sending data and the receiving buffers are full, a "stop" signal can be sent to stop the data flow.

## USB Configuration

This section is used to configure the USB functionality and related settings.

### > USB Configuration

#### > XHCI Hand-off

This is a workaround for OSs that does not support XHCI hand-off. The XHCI ownership change should be claimed by the XHCI driver.

### > USB Configuration

#### > USB Mass Storage Driver Support

Enable or disable USB mass storage driver support.

### > USB hardware delays and time-outs

#### > USB Transfer Timer-out

The time-out value for control, bulk, and, interrupt transfers

### > Device Reset Timer-out

Select the USB mass storage device's start unit command timeout.

### > Device Power-up Delay

Maximum time the value 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.

## Network Stack Configuration

This section is used to configure the network stack.

### > Network Stack

Enable or disable UEFI network stack.

### > Ipv4 PXE Support

Enable or disable Ipv4 PXE Boot Support.

### > Ipv6 PXE Support

Enable or disable Ipv6 PXE Boot Support.

### > PXE boot wait time

Configure the wait time in second to press the ESC key to abort the PXE boot.

### > Media detect count

Configure the number of times the media will be checked.

## CSM Configuration

This section is used to configure the CSM (Compatibility Support Module) features.

### > Compatibility Support Module Configuration

#### > Compatibility Support Module Configuration > CSM Support

Enable or disable CSM (Compatibility Support Module) support.

### > Option ROM execution

#### > Option ROM execution > Network

Enable or disable the boot option for legacy network devices.

#### > Option ROM execution > Storage

Enable or disable the boot option for legacy storage devices.

#### > Option ROM execution > Video

Enable or disable the boot option for legacy video devices.

#### > Option ROM execution > Other PCI Devices

Configures the OpROM execution policy for devices other than network, storage, or video devices.

## NVMe Configuration

This section is used to display the information about the NVMe devices that are installed on the system.

## Chipset Menu

This section gives you functions to configure the system based on the specific features of the chipset. The chipset manages bus speeds and access to system memory resources.



## System Agent (SA) Configuration

Press Enter to configure the following submenus.

### > Memory Configuration

Display the parameters of memory configuration.

### > Graphics Configuration

Press Enter to configure the following submenus.

#### > Graphics Configuration > Primary Display

Select which IGFX/PCIe graphics device should be primary display.

#### > Graphics Configuration > Internal Graphics

Keep IGFX enabled based on the setup options.

#### > Graphics Configuration > Aperture Size

Select the aperture size. The options are: 128MB, 256MB, 512MB, 1024MB, and 2048MB. Above 4GB MMIO BIOS assignment is automatically enabled when 2048MB aperture is selected. Please disable [CSM Support](#) to use this feature.

#### > Graphics Configuration > DVMT Pre-Allocated

Configure the DVMT 5.0 pre-allocated (fixed) graphics memory size used by the internal graphics device.

#### > Graphics Configuration > DVMT Total Gfx Mem

Configure the DVMT5.0 Total Graphic Memory size used by the internal graphics device.



### > PEG Slot Configuration

Press Enter to configure the following submenus.

#### > PEG Port Configuration > PEG Port Configuration

#### > PEG Port Configuration > PCIE1/ PCIE3/ PCIE2 Slot

#### > PEG Port Configuration > PCIE1/ PCIE3/ PCIE2 Slot > Enable Root Port

Enable or disable the root port.

#### > PEG Port Configuration > PCIE1/ PCIE3/ PCIE2 Slot > Max Link Speed

Configure the maximum link speed of the PEG device.

#### > PEG Port Configuration > Detect Non-Compliance Device

Detect Non-Compliance PCI Express Device in PEG.

### PCH-IO Configuration

Press Enter to configure the following submenus.

#### > PCH-IO Configuration > HD Audio

Control detection of the HD audio device.

**Disabled:** HD audio will be unconditionally disabled.

**Enabled:** HD audio will be unconditionally enabled.

#### > PCH-IO Configuration > Onboard Lan1 Controller

Enable or disable onboard NIC. The **Wake on LAN Enable** option is available for configuration when 'Enabled' is selected.

#### > PCH-IO Configuration > Onboard Lan2 Controller

Enable or disable the PCI Express Root port.

#### > PCH-IO Configuration > PCIE4/PCIE5/PCIE6/PCIE7/M2M Slot

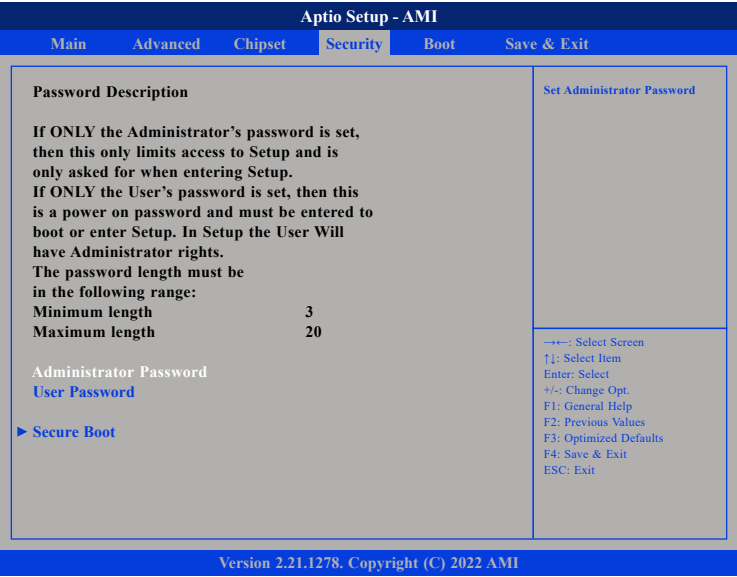
Enable or disable the PCI Express Root port.

#### > PCH-IO Configuration > System State After Power Failure

Specify what state to go to when power is re-applied after a power failure (G3 state).

Security

This section is used to configure the security related options for BIOS protection.



Administrator Password

Select this to configure the administrator's password.

User Password

Select this to configure the user's password.

Secure Boot

Press Enter to configure the following submenus.

> Secure Boot

Enable or disable the secure boot. The platform key (PK) enrolled and the system is in user mode when secure boot is enabled. A platform reset is required to change modes.

> Secure Boot Mode

Select a secure boot mode for the system. The options are standard and custom. When in custom mode, secure boot policy variables can be configured by a physically present user without full authentication. More options are available if the option is set to **Custom**.

Secure Boot > Restore Factory Keys

Force system into user mode.

Secure Boot > Reset To Setup Mode

Delete all Secure Boot Key databases from NVRAM.

Secure Boot > Key Management

Enable experienced users to modify Secure Boot variables, which includes the following items.

Secure Boot > Key Management > Vendor Keys

Secure Boot > Key Management > Factory Key Provision

Install the factory default secure boot keys after the platform has been has been reset and while the system is in the setup mode.

**Secure Boot > Key Management > Restore Factory Keys**

Force system into User Mode. Install factory default Secure Boot Key databases.

**Secure Boot > Key Management > Reset To Setup Mode**

Delete all Secure Boot key databases from NVRAM.

**Secure Boot > Key Management > Export Secure Boot Variables**

Copy NVRAM content of Secure Boot variables to files in a root folder on a file system device.

**Secure Boot > Key Management > Enroll Efi Image**

Run the image in Secure Boot Mode.

**Secure Boot > Key Management > Device Guard Ready****Secure Boot > Key Management > Remove 'URFI CA' from DB**

Device Guard ready system must not list 'Microsoft EFI CA' Certificate in Authorized Signature database (db).

**Secure Boot > Key Management > Restore DB defaults**

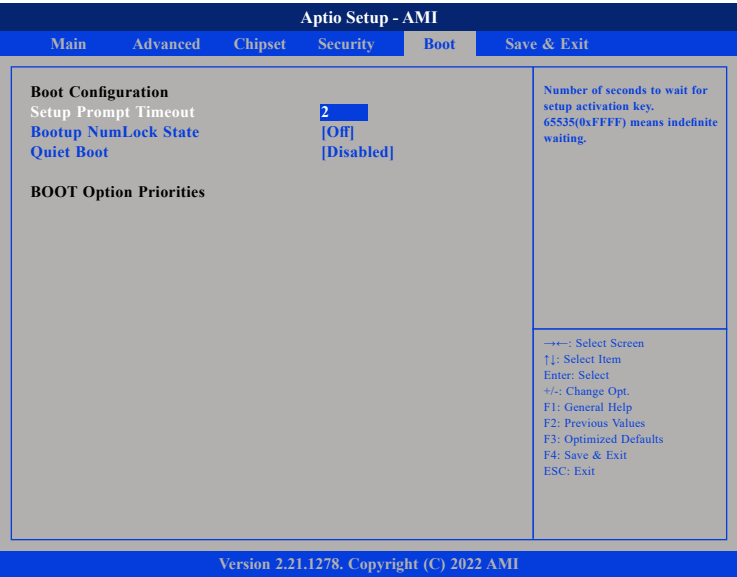
Restore DB variable to factory defaults.

**Secure Boot > Key Management > Secure Boot variable****Secure Boot > Key Management > Platform Key (PK)/Key Exchange Keys/Authorized Signature/Forbidden Signature/ Authorized TimeStamps/OsRecovery Signatures**

Enroll factory defaults or load the keys from a file.

Boot

This section is used to configure the boot features.



Boot Configuration

Setup Prompt Timeout

Select the number of seconds to wait for the setup activation key. 65535(0xFFFF) denotes indefinite waiting.

Bootup NumLock State

This allows you to determine the default state of the numeric keypad. By default, the system boots up with NumLock on wherein the function of the numeric keypad is the number keys. When set to Off, the function of the numeric keypad is the arrow keys.

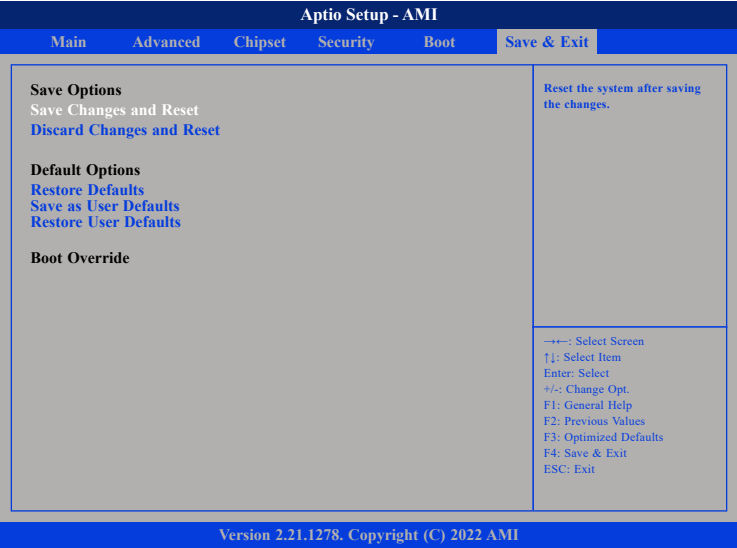
Quiet Boot

Enable or disable Quiet Boot option.  
**Enabled:** Displays OEM logo instead of the POST messages.  
**Disabled:** Displays normal POST messages.

Boot Option Priorities

Adjust the boot sequence of the system. Boot Option #1 is the first boot device that the system will boot from, next will be Boot Option #2 and so forth.

Save & Exit



Save Options

Save Changes and Reset

Press Enter to save the changes and reset. Confirm by selecting Yes when a dialogue box appears.

Discard Changes and Reset

Press Enter to exit the BIOS without saving the changes. You may be prompted to confirm again before exiting.

Default Options

Restore Defaults

Press Enter to restore the BIOS to the default settings. Confirm by selecting Yes when a dialogue box appears.

Save as User Defaults

Press Enter to use the current configurations as user default settings for the BIOS. Confirm by selecting Yes when a dialogue box appears.

Restore User Defaults

Press Enter to restore the BIOS to the user default settings. Confirm by selecting Yes when a dialogue box appears.

Boot Override

Select the desired device and press <Enter> to bypass the boot sequence from the boot option list and boot from a specific device.