# FPC-9107 Series

**Robust Box PC with Intel® Comet Lake-S Xeon® Core™ i9/i7/i5/i3 Processor**

# User's Manual

## Version 1.1

C E

RoHS VERIFIED

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## Revision History

| Version | Release Time | Description |
|---------|--------------|-------------|
| 1.0 | 2021.07 | Initial release |
| 1.1 | 2023.11 | Add FPC-9107-L2U4 |

# Contents

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## Declaration of Conformity
### CE

The CE symbol on the computer indicates that it is in compliance with the directives of the Union European (EU). A Certificate of Compliance is available by contacting Technical Support.

This product has passed the CE test for environmental specifications when shielded cables are used for external wiring. We recommend the use of shielded cables. This kind of cable is available from ARBOR. Please contact your local supplier for ordering information.

> **Warning**
> This is a class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

### FCC Class A

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

(1) This device may not cause harmful interference, and

(2) This device must accept any interference received, including interference that may cause undesired operation.

NOTE:

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

## RoHS

ARBOR Technology Corp. certifies that all components in its products are in compliance and conform to the European Union's Restriction of Use of Hazardous Substances in Electrical and Electronic Equipment (RoHS) Directive 2002/95/EC.

The above mentioned directive was published on 2/13/2003. The main purpose of the directive is to prohibit the use of lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls (PBB), and polybrominated diphenyl ethers (PBDE) in electrical and electronic products. Member states of the EU are to enforce by 7/1/2006.

ARBOR Technology Corp. hereby states that the listed products do not contain unintentional additions of lead, mercury, hex chrome, PBB or PBDB that exceed a maximum concentration value of 0.1% by weight or for cadmium exceed 0.01% by weight, per homogenous material. Homogenous material is defined as a substance or mixture of substances with uniform composition (such as solders, resins, plating, etc.). Lead-free solder is used for all terminations (Sn(96-96.5%), Ag(3.0-3.5%) and Cu(0.5%)).

## SVHC / REACH

To minimize the environmental impact and take more responsibility to the earth we live, Arbor hereby confirms all products comply with the restriction of SVHC (Substances of Very High Concern) in (EC) 1907/2006 (REACH --Registration, Evaluation, Authorization, and Restriction of Chemicals) regulated by the European Union.

All substances listed in SVHC < 0.1 % by weight (1000 ppm)

## Important Safety Instructions

Read these safety instructions carefully

1.  Read all cautions and warnings on the equipment.

2.  Place this equipment on a reliable surface when installing. Dropping it or letting it fall may cause damage

3.  Make sure the correct voltage is connected to the equipment.

4.  For pluggable equipment, the socket outlet should be near the equipment and should be easily accessible.

5.  Keep this equipment away from humidity.

6.  The openings on the enclosure are for air convection and protect the equipment  from overheating. DO NOT COVER THE OPENINGS.

7.  Position the power cord so that people cannot step on it. Do not place anything over the power cord.

8.  Never pour any liquid into opening. This may cause fire or electrical shock.

9.  Never open the equipment. For safety reasons, the equipment should be opened only by qualified service personnel.

10. If one of the following situations arises, get the equipment checked by service personnel:

    a.  The power cord or plug is damaged.

    b.  Liquid has penetrated into the equipment.

    c.  The equipment has been exposed to moisture.

    d.  The equipment does not work well, or you cannot get it to work according to the user's manual.

    e.  The equipment has been dropped or damaged.

    f.  The equipment has obvious signs of breakage.

11. Keep this User's Manual for later reference.

## Warning

The Box PC and its components contain very delicately Integrated Circuits (IC). To protect the Box PC and its components against damage caused by static electricity, you should always follow the precautions below when handling it:

1.  Disconnect your Box PC from the power source when you want to work on the inside.

2.  Use a grounded wrist strap when handling computer components.

3.  Place components on a grounded antistatic pad or on the bag that came with the Box PC, whenever components are separated from the system.

## Replacing Lithium Battery

Incorrect replacement of the lithium battery may lead to a risk of explosion.

The lithium battery must be replaced with an identical battery or a battery type recommended by the manufacturer.

Do not throw lithium batteries into the trash can. It must be disposed of in accordance with local regulations concerning special waste.

## Technical Support

If you have any technical difficulties, please consult the user's manual first at:
http://www.arbor-technology.com

Please do not hesitate to e-mail our customer service when you still cannot find out the answer.

E-mail:info@arbor.com.tw

## Warranty

This product is warranted to be in good working order for a period of one year from the date of purchase. Should this product fail to be in good working order at any time during this period, we will, at our option, replace or repair it at no additional charge except as set forth in the following terms. This warranty does not apply to products damaged by misuse, modifications, accident or disaster.

Vendor assumes no liability for any damages, lost profits, lost savings or any other incidental or consequential damage resulting from the use, misuse of, or inability to use this product. Vendor will not be liable for any claim made by any other related party.

Vendors disclaim all other warranties, either expressed or implied, including but not limited to implied warranties of merchantability and fitness for a particular purpose, with respect to the hardware, the accompanying product's manual(s) and written materials, and any accompanying hardware. This limited warranty gives you specific legal rights.

Return authorization must be obtained from the vendor before returned merchandise will be accepted. Authorization can be obtained by calling or faxing the vendor and requesting a Return Merchandise Authorization (RMA) number. Returned goods should always be accompanied by a clear problem description.

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# Chapter 1

## Introduction

## 1.1. The Computer

## FPC-9107-P6-G2



- Intel 10<sup>th</sup> Gen (Comet Lake-S ) with W480E chipset
- Supports dual NVIDIA® Tesla T4 GPU or RTX-30 series up to 250W GPU
- Wide Range DC power input (12~36V)
- HDMI x 1 + VGA x1 ( 2 independent display )
- Power on/off delay control/ Configurable ignition power control
- TPM2.0 support
- 2 x outside accessible SATA SSD, supporting RAID 0,1
- 2 x USB3.2 supports up to 10Gbps data transfer
- Front-accessible I/O support
- SMART FAN control support
- 6 x 802.3af Gigabit PoE ports
- 1 x M.2 (NGFF) B-Key(2242/3052/2280) socket for storge or 5G / LTE
- 1 x M.2 (NGFF) E-Key(2230) socket for WiFi / BT

## FPC-9107-L2U4-G2



- Intel 10th Gen (Comet Lake-S ) with W480E chipset
- Supports dual NVIDIA® Tesla T4 GPU or 250W GPU
- Wide Range DC power input (12~36V)
- HDMI x 1 +VGA x1 ( 2 independent display )
- Power on/off delay control/ Configurable ignition power control
- TPM2.0 support
- 2 x outside accessible SATA SSD, supporting RAID 0,1
- 2 x USB3.2 supports up to 10Gbps data transfer
- Front-accessible I/O support
- SMART FAN control support
- 1 x M.2 (NGFF) B-Key(2242/3052/2280) socket for storge or 5G / LTE
- 1 x M.2 (NGFF) E-Key(2230) socket for WiFi / BT

## 1.2. About this Manual

This manual is meant for the experienced users and integrators with hardware knowledge of personal computers. If you are not sure about the description herein, consult your vendor before further handling.

We recommend that you keep one copy of this manual for the quick reference for any necessary maintenance in the future. Thank you for choosing ARBOR products.

## 1.3. Specifications

FPC-9107-P6-G2

| System | |
|---|---|
| **CPU** | 10th Generation Intel® Xeon®Core™ i9/i7/i5/i3 processor in LGA1200 socket |
| **Memory** | 2 x 260-pin DDR4 SO-DIMM sockets, supporting 2933 ( i9/ i7 CPU)/2666( i5/ i3 CPU)/2400 MHz (Pentium/ Celeron CPU) SDRAM up to 64GB (ECC / Non-ECC) |
| **Chipset** | Intel® W480E |
| **Graphics** | Integrated Intel® HD Graphics |
| **ATA** | 2 x Serial ATA ports with 600MB/s HDD transfer rate |
| **LAN Chipset** | 1 x Intel® WGI225LM 2.5GigE LAN<br>1 x Intel® WGI219LM PCIe controllers w/ iAMT14.0<br>6 x Intel® WGI211AT PCIe controllers for PoE |
| **Watchdog Timer** | 1~255 levels reset |
| I/O | |
| **Serial Port** | 2 x RS-232/422/485 configurable (default RS-232) |
| **USB Port** | 2 x USB 3.2 Gen2 (10Gbps) / 2.0 ports<br>Internal USB dongle |
| **LAN** | 2 x RJ-45 ports for GbE/2.5GbE<br>6 x RJ-45 ports for PoE (Power budget 60W) |
| **Video Port** | 1 x HDMI (Max resolution: 4096 x 2160 @24Hz) |
| | 1 x DB-15 female connector for Analog RGB |
| **Digital I/O Port** | 16 x DI, 16 x DO (1.5KV isolation protection / DO supports 24V 200mA) |
| **Audio** | Mic-in/Line-out |
| **Expansion Bus** | 1 x mini-PCI Express Slots interconnected with SIM card sockets for optional WiFi/BT/3G/LTE/ GPS (PCIex1+USB2.0, Full Size) |
| | 1 x M.2 E key (2230) with PCIex1+USB2.0, for Wireless |
| | 1 x M.2 B key (2242/3052/2280) w/ (PCIex2+USB3.0+SATA) interconnected with SIM for 5G / LTE expansion or for storage (either one) |
| | 2 x PCIe x16 slot (via x 8 lanes) or 1 x PCIe x16 slot (via x 16 lanes) Support dual Tesla or 250W GPU card |
| | 1 x PCIe x4 slot (power budget 25W) |

| Environmental | |
|---|---|
| Operating Temp. | 80W TDP CPU: -20 ~ 50°C (-4 ~ 122°F)<br>65W TDP CPU: -20 ~ 55°C (-4 ~ 131°F)<br>35W TDP CPU: -20 ~ 70°C (-4 ~ 158°F)<br>w/ NVIDIA® Tesla T4: -20 ~ 50°C (-4 ~ 122°F)<br>w/ NVIDIA® RTX-30700: -20 ~ 45°C (-4 ~112°F) |
| Storage Temp. | -40 ~ 85°C (-40 ~ 185°F) |
| Operating Humidity | 10 ~ 95% @ 50°C (non-condensing) |
| Vibration | Comply with MIL-STD-810G, Method 514.6, Category 4 w/ SSD |
| Shock | Comply with MIL-STD-810G, Method 516.6,Table 516.6-II 20G |
| **Qualification** | |
| Certification | CE, FCC Class A |
| **Power Requirement** | |
| Main Power Input | DC 12~36V input (w/ 2-pin DC input terminal block ) |
| Secondary Power Input | DC 12-36V input ( w/ 4-pin DC input terminal block<br>for graphic cards power support) (V+, V+, V-, V-) |
| Ignition Switch | 2-pin teminal block: IGN, GND |
| **Storage** | |
| Type | 2 x 2.5" drive bays (outside accessible) |
| | 1 x M.2 B key (2242/3052/2280) w/ (PCIex2+USB3.0+SATA) interconnected with SIM for 5G/ LTE expansion or storage (either one) |
| **Mechanical** | |
| Construction | Metal |
| Mounting | Wall-mount |
| Weight | 7.4 kg (16.31lb) |
| Dimensions (W x D x H) | 180 x 320 x 250 mm |
| **OS Support** | |
| Windows 10 IOT Enterprise 2019 Linux/Linux (Kernal 4.9) | |
| **Ordering Information** | |
| FPC-9107-P6-G2 | Ruggedized Edge AI Computing Platform supporting NVIDIA® RTX-3070 GPU Card or Dual Tesla T4 GPU Cards, Intel® 10th Gen Xeon® Core™ Processor with 6 x GbE PoE ( Up to 80W TDP CPU) |

FPC-9107-L2U4-G2

| System | |
|---|---|
| **CPU** | 10th Generation Intel® Xeon®Core™ i9/i7/i5/i3 processor in LGA1200 socket |
| **Memory** | 2 x 260-pin DDR4 SO-DIMM sockets, supporting 2933 ( i9/ i7 CPU)/2666( i5/ i3 CPU)/2400 MHz (Pentium/ Celeron CPU) SDRAM up to 64GB (ECC / Non-ECC) |
| **Chipset** | Intel® W480E |
| **Graphics** | Integrated Intel® HD Graphics |
| **ATA** | 2 x Serial ATA ports with 600MB/s HDD transfer rate |
| **LAN Chipset** | 1 x Intel® WGI225LM 2.5GigE LAN<br>1 x Intel® WGI219LM PCIe controllers w/ iAMT14.0<br>2 x Intel® WG82583V GbE controllers |
| **Watchdog Timer** | 1~255 levels reset |
| I/O | |
| **Serial Port** | 2 x RS-232/422/485 configurable (default RS-232)<br>2 x RS-232 |
| **USB Port** | 2 x USB 3.2 Gen2 (10Gbps) / 2.0 ports<br>4 x USB 3.2 Gen1 (5Gbps) / 2.0 ports<br>Internal USB dongle |
| **LAN** | 4 x RJ-45 ports for GbE/2.5GbE |
| **Video Port** | 1 x HDMI (Max resolution: 4096 x 2160 @24Hz) |
| | 1 x DB-15 female connector for Analog RGB |
| **Digital I/O Port** | 16 x DI, 16 x DO (1.5KV isolation protection / DO supports 24V 200mA) |
| **Audio** | Mic-in/Line-out |
| **Expansion Bus** | 1 x mini-PCI Express Slots interconnected with SIM card sockets for optional WiFi/BT/3G/LTE/ GPS (PCIex1+USB2.0, Full Size) |
| | 1 x M.2 E key (2230) with PCIex1+USB2.0, for Wireless |
| | 1 x M.2 B key (2242/3052/2280) w/ (PCIex2+USB3.0+SATA) interconnected with SIM for 5G / LTE expansion or for storage (either one) |
| | 2 x PCIe x16 slot (via x 8 lanes) or 1 x PCIe x16 slot (via x 16 lanes) Support dual Tesla or 250W GPU card |
| | 1 x PCIe x4 slot (power budget 25W) |

| Environmental | |
|---|---|
| **Operating Temp.** | 80W TDP CPU: -20 ~ 50°C (-4 ~ 122°F)<br>65W TDP CPU: -20 ~ 55°C (-4 ~ 131°F)<br>35W TDP CPU: -20 ~ 70°C (-4 ~ 158°F)<br>w/ NVIDIA® Tesla T4: -20 ~ 50°C (-4 ~ 122°F)<br>w/ NVIDIA® RTX-3070: -20 ~ 45°C (-4 ~112°F) |
| **Storage Temp.** | -40 ~ 85°C (-40 ~ 185°F) |
| **Operating Humidity** | 10 ~ 95% @ 50°C (non-condensing) |
| **Vibration** | Comply with MIL-STD-810G, Method 514.6, Category 4 w/ SSD |
| **Shock** | Comply with MIL-STD-810G, Method 516.6,Table 516.6-II 20G |
| **Qualification** | |
| **Certification** | CE, FCC Class A |
| **Power Requirement** | |
| **Main Power Input** | DC 12~36V input (w/ 2-pin DC input terminal block) |
| **Secondary Power Input** | DC 12-36V input ( w/ 4-pin DC input terminal block for graphic cards power support) (V+, V+, V-, V-) |
| **Ignition Switch** | 2-pin teminal block: IGN, GND |
| **Storage** | |
| **Type** | 2 x 2.5" drive bays (outside accessible) |
| | 1 x M.2 B key (2242/3052/2280) w/ (PCIex2+USB3.0+SATA) interconnected with SIM for 5G/ LTE expansion or storage (either one) |
| **Mechanical** | |
| **Construction** | Metal |
| **Mounting** | Wall-mount |
| **Weight** | 7.4 kg (16.31lb) |
| **Dimensions (W x D x H)** | 180 x 320 x 250 mm |
| **OS Support** | |
| Windows 10 IOT Enterprise 2019/Linux (Kernal 4.9) | |
| **Ordering Information** | |
| **FPC-9107-L2U4-G2** | Ruggedized Edge AI Computing Platform supporting 250W GPU or Dual Tesla T4 Nvidia® Graphics Cards, Intel® 10th Gen Xeon® Core™ Processor with 4x LAN,6 x USB3.1 ( Up to 80W TDP CPU) (BTO) |

## 1.4. Inside the Package

Upon opening the package, carefully inspect the contents. If any of the items is missing or appears damaged, contact your local dealer or distributor. The package should contain the following items:

1 x FPC-9107 Series Robust System

1 x User's Manual

### 1.5.1. Optional Accessories

The following items are normally optional, but some vendors may include them as a standard package, or some vendors may not carry all the items.

| | | |
|---|---|---|
| WMK-7000 | Wall-mount kit for FPC-7XXX Series | |
| PAC-180W6C-FSP | 180W AC/DC 24V adapter kit (For System ) | |
| PAC-280W6C-MW | 280W AC/DC 24V adapter kit ( For GPU Box ) | |
| PAC-480W6C-MW | 480W AC/DC 24V DIN Rail adapter kit (For System + GPU Box) | |

| FAN-9107T4-1 | Thermal kit for 1x Nvidia® Tesla T4 GPU Card |
|---|---|
| FAN-9107T4-2 | Thermal kit for 2x Nvidia® Tesla T4 GPU Card |

## 1.5.2. Optional Configuration (CTOS* Kit)

Make the computer more tailored to your needs by selecting one or more components from the list below to be fabricated to the computer.

| MK-4C-4G/8G/16G/32G | DDR4-2400 4GB/8GB/16GB/32G(DDR4-2933) SDRAM DIMM kit | |
|---|---|---|
| WIFI-IN2550 | Intel AX200NGW M.2 Wi-Fi 6 module w/ 2 x 30cm internal wires | |
| ANT-H11 | 1 x 2dBi HSUPA antenna | |
| ANT-D11 | 1 x WiFi dual-band 2.4G/5G antenna | |
| Xeon® W-1250E | Intel® Xeon® W-1250E processor, L2/12M, 3.5G | |
| Core™ i9-10900E | Intel® 10th Gen. Core™ i9-10900E processor, L2/20M, 2.8G | |
| Core™ i9-10900TE | Intel® 10th Gen. Core™ i9-10900TE processor, L2/20M, 1.8G | |
| Core™ i7-10700E | Intel® 10th Gen. Core™ i7-10700E processor, L2/16M, 2.9G | |
| Core™ i7-10700TE | Intel® 10th Gen. Core™ i7-10700TE processor, L2/16M, 2.0G | (intel) |
| Core™ i5-10500E | Intel® 10th Gen. Core™ i5-10500E processor, L2/12M, 3.1G | |
| Core™ i5-10500TE | Intel® 10th Gen. Core™ i5-10500TE processor, L2/12M, 2.3G | |
| Core™ i3-10100E | Intel® 10th Gen. Core™ i3-10100E processor, L2/6M, 3.2G | |
| Core™ i3-10100TE | Intel® 10th Gen. Core™ i3-10100TE processor, L2/6M, 2.3G | |

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# Chapter 2

## System Overview

## 2.1. Dimensions

FPC-9107-P6-G2

FPC-9107-L2U4-G2



181.00

184.00

112.00

320.00

112.00

250.00
262.00

比例 0.250
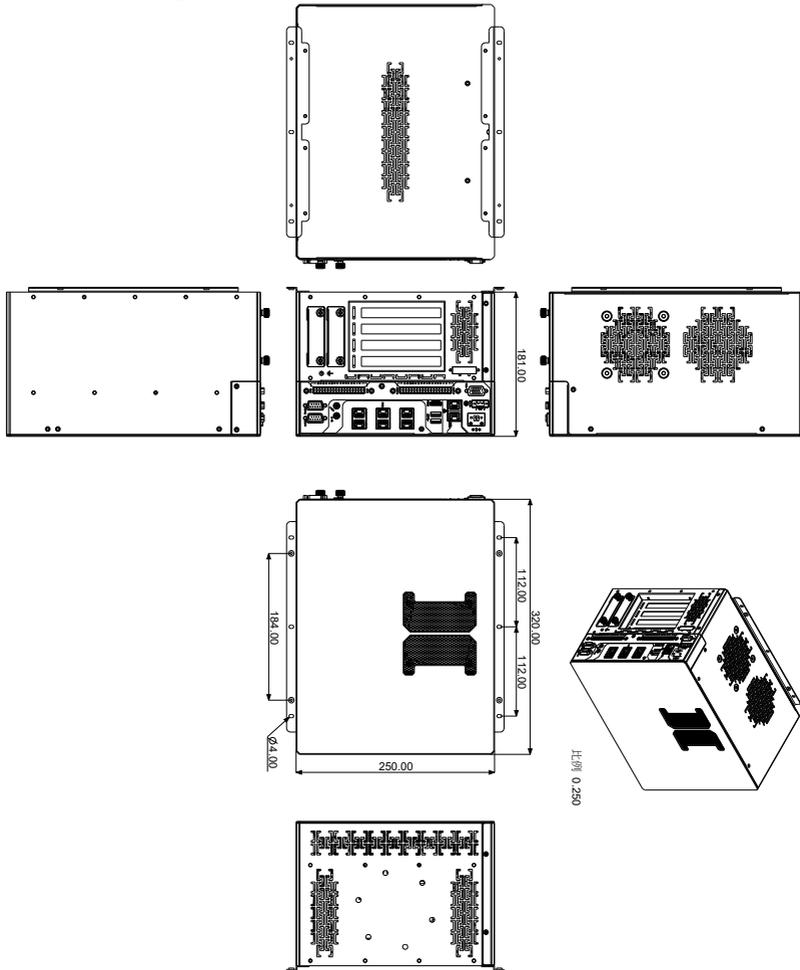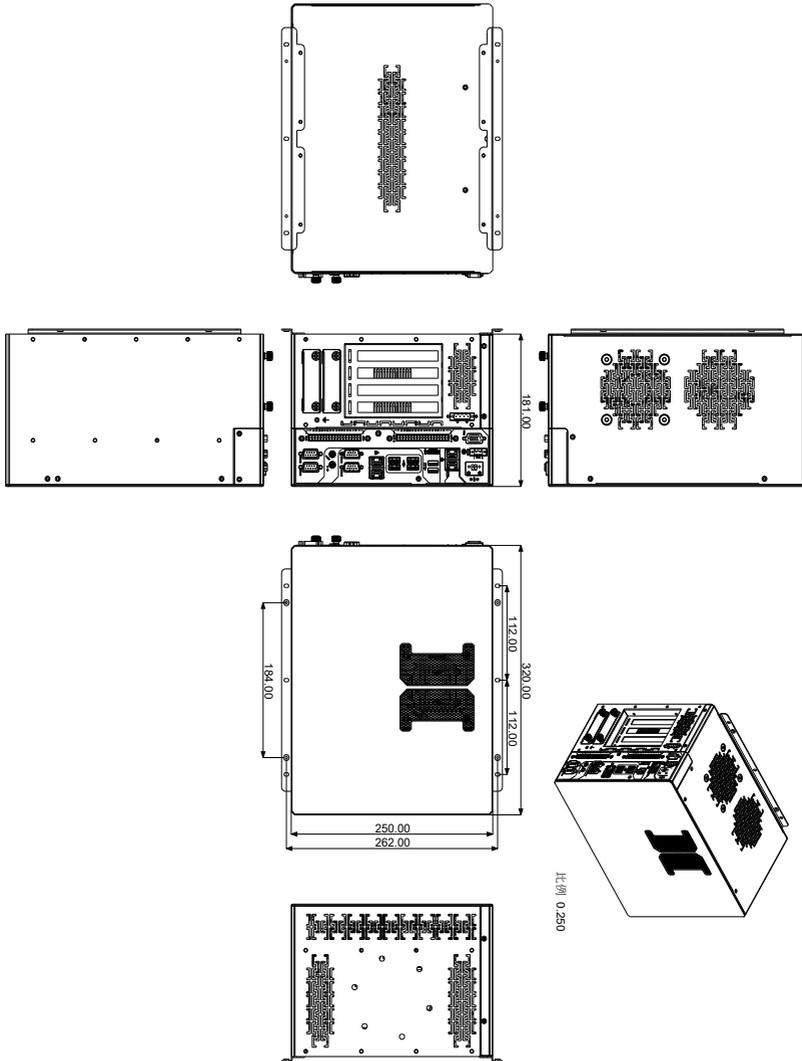
## 2.2. Take A Tour

### 2.2.1. FPC-9107-P6-G2

### 2.2.1.1 Front View

**2.2.1.2 Rear View**



Expansion Card Power
(DC 12~36V)

DC-IN
(12~36V)

VGA Port

Ignition Switch

Power button

GbE LAN Ports

USB 3.2 Ports

HDMI Port

Digital Input

Graphic card slots

POE Ports

Digital output

Line out

Mic in

SSD slots

RS-232/422/485
Serial Ports
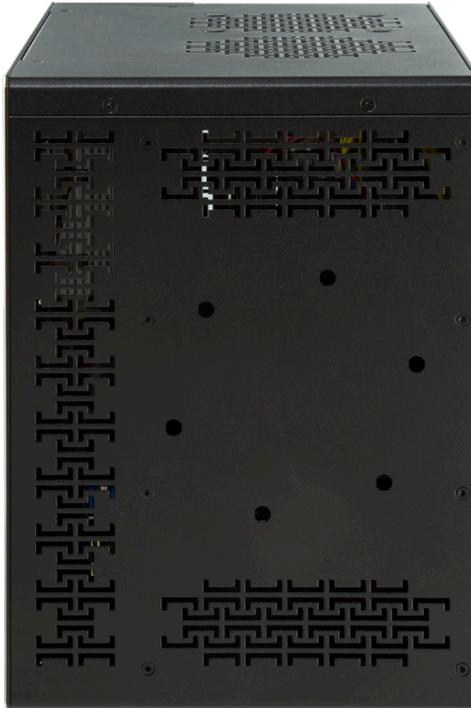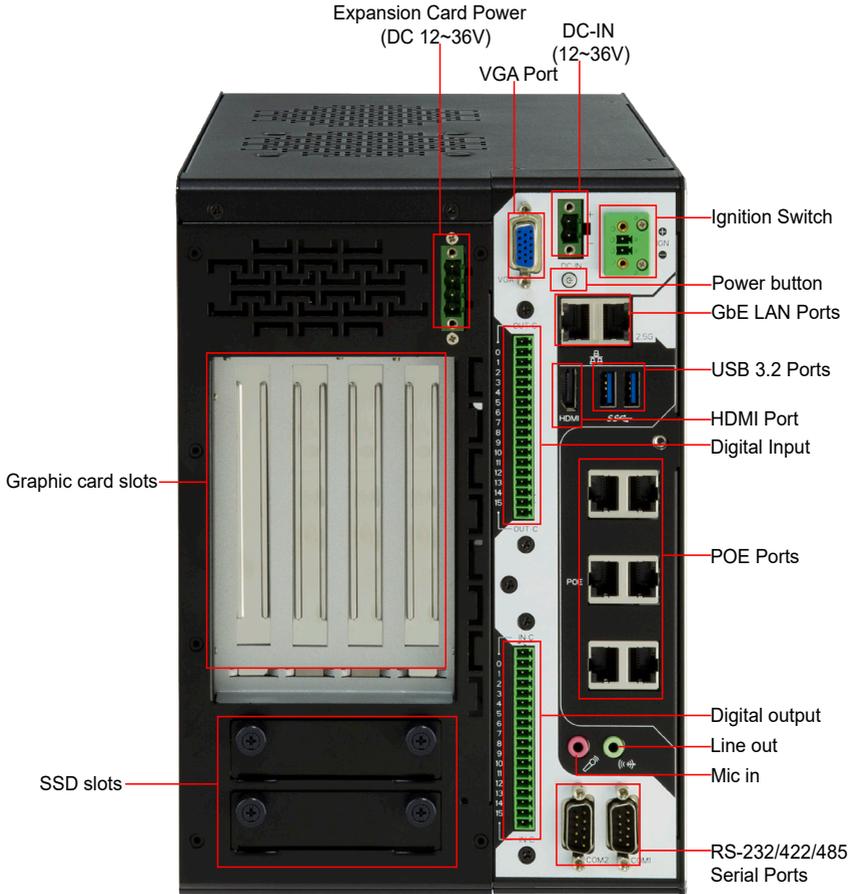
**2.2.2. FPC-9107-L2U4-G2**

**2.2.2.1 Front View**

**2.2.2.2 Rear View**

Expansion Card Power
(DC 12~36V)

DC-IN
(12~36V)

VGA Port

Ignition Switch

Power button

GbE LAN Ports

USB 3.2 Ports

HDMI Port

Digital Input

USB 3.2 Ports

Graphic card slots

LAN Ports

RS-232 Serial Ports

Line out

Mic in

SSD slots

RS-232/422/485
Serial Ports

Digital Output

- 17 -
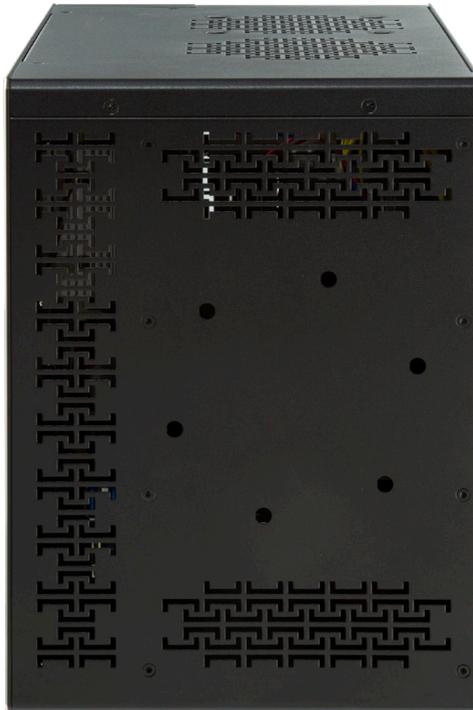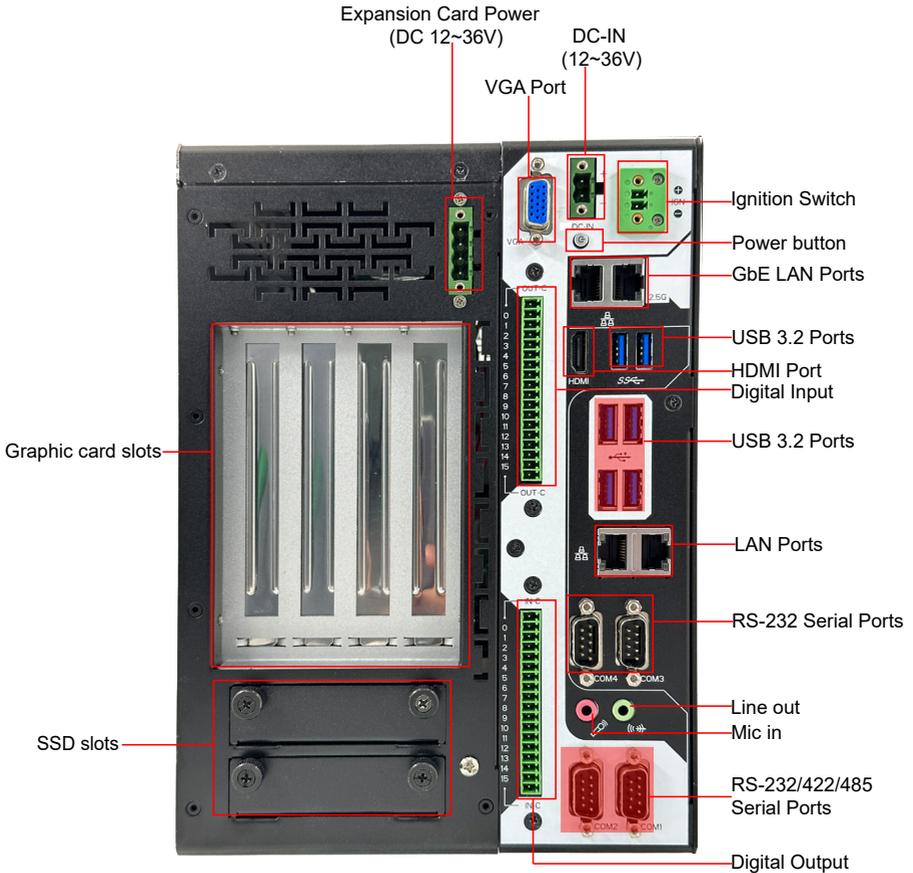
## 2.3. Driver Installation Notes

The CPU module supports Windows 10 64-bit and Linux. To install the drivers, please go to our website at **www.arbor-technology.com** and download the driver pack from the product page. Then extract the down-loaded file and follow the sequence below to install the drivers:

**Chipset → Graphic → Audio → Other drivers**

The driver path is listed as below:

**Windows 10**

| Driver | Path |
|---|---|
| Chipset | \WIN10\Chipset\10.1.1.42\SetupChipset.exe |
| LAN | \WIN10\Ethernet\PROWinx64.exe |
| VGA | \WIN10\Graphics\Setup.exe |
| Audio | \WIN10\AUDIO\0006-64bit_Win7_Win8_Win81_Win10_R279.exe |
| ME | \WIN10\ME_11.6\SetupME.exe |

# Chapter 3

## System Configuration

## 3.1. Board Layout

**Board Top**

**Board Bottom**



㉙PCIE1

⑲VGACARDPWR01

⑳USB4

㉑USB5

㉘SYSFAN2

㉒SIM2

㉓MBKEY1

㉚PCIE2

㉗COM7    ㉖COM6    ㉕COM5    ㉔COM4
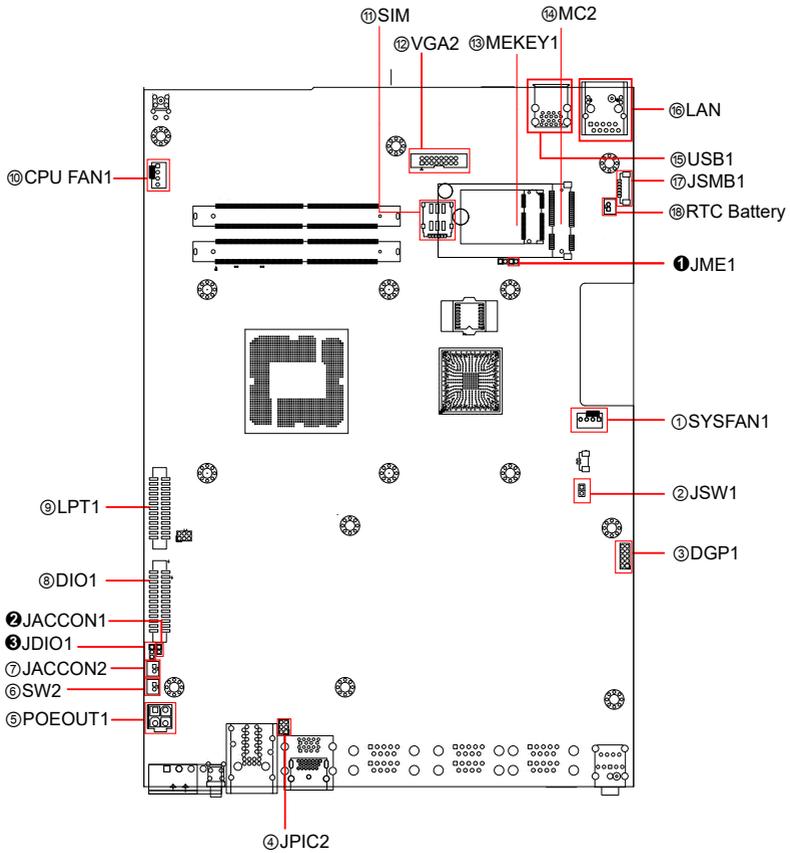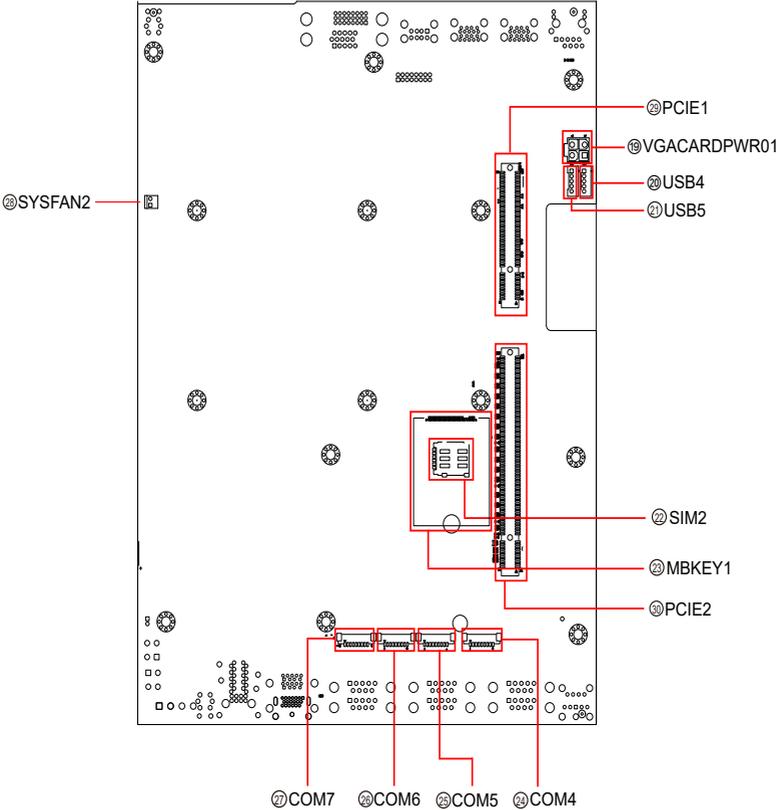
# Engine of the Computer

## Jumpers

| Label | Description |
|-------|-------------|
| ❶JME1 | Clear CMOS selection |
| ❷JACCON1 | ACC ON Mode selection |
| ❸JDIO1 | Ignition power mode |

## Connectors

| Label | Description |
|-------|-------------|
| ①SYSFAN1 | Fan power connector |
| ②JSW1 | System reset pin header |
| ③DGP1 | External 80 port pin header |
| ④JPIC2 | Vcore IC debug pin header |
| ⑤POEOUT1 | PoE power connector |
| ⑥SW2 | System switch |
| ⑦JACCON2 | Ignition Power connector |
| ⑧DIO1 | Digital IO Connector |
| ⑨LPT1 | On-board parallel port connector |
| ⑩CPUFAN1 | Fan power connector |
| ⑪SIM | Nano SIM card socket |
| ⑫VGA2 | Analog RGB |
| ⑬MEKEY1 | M.2 E-Key socket |
| ⑭MC2 | PCI Express Mini-card socket |
| ⑮USB1 | USB Connector |
| ⑯LAN1 | GbE RJ-45 Ethernet connector |
| ⑰JSMB1 | SMbus wafer connector |
| ⑱RTC Battery | RTC Battery |
| ⑲VGACARDPWR1 | Power output for VGA card |
| ⑳㉑USB4,5 | USB wafer connector |
| ㉒SIM2 | Nano SIM card socket |
| ㉓MC2 | M.2 B-Key socket |

| | |
|---|---|
| ㉔㉕COM4, COM5 | RS232 connector |
| ㉖㉗COM6, COM7 | RS232/RS422/RS485 connector |
| ㉘SYSFAN2 | Fan power connector |
| ㉙PCIE1 | PCI Expansion Slot |
| ㉚PCIE2 | PCI Expansion Slot |

**SCDB-469R Board Top**
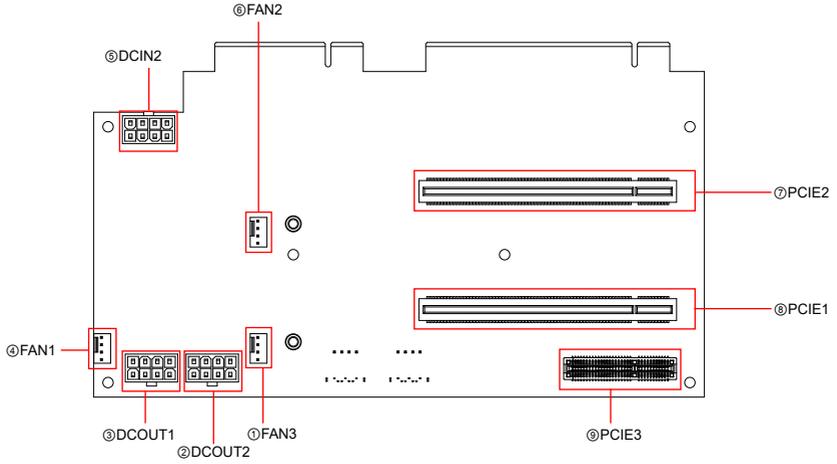


**SCDB-469R Board Bottom**
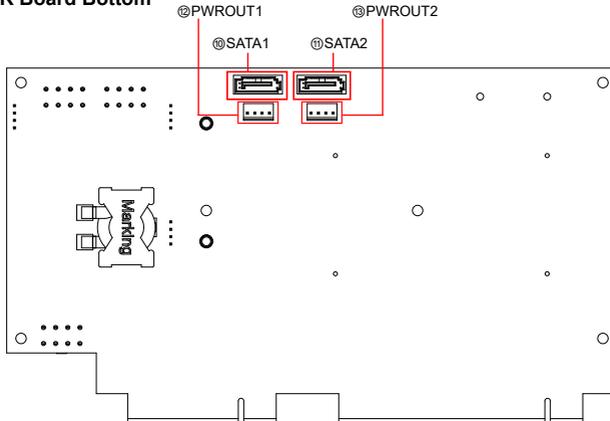
Connectors

| Label | Description |
| --- | --- |
| ①FAN3 | Fan power connector |
| ②③DCOUT1, 2 | System power output connector |
| ④FAN1 | Fan power connector |
| ⑤DCIN2 | System power input connector |
| ⑥FAN2 | Fan power connector |
| ⑦PCIE2 | PCI Expansion Slot |
| ⑧PCIE1 | PCI Expansion Slot |
| ⑨PCIE3 | PCI Expansion Slot |
| ⑩⑪SATA1, 2 | Serial SATA connector |
| ⑫⑬PWROUT1, 2 | SATA HDD power connector |

## 3.2. Jumpers and Connectors

### 3.2.1. Jumpers

#### ❶ JME1

**Function:** Clear CMOS Selection
**Jumper Type:** 2.00mm pitch, 1x2-pin header
**Setting:**

| Pin | Description | |
|---|---|---|
| **Short** | Clear CMOS | 1 ▭ 2 |
| **Open** | Keep CMOS (default) | 1 ▢○ 2 |

#### ❷ JACCON1

**Function:** ACC ON Mode selection(for debug)
**Jumper Type:** 2.00mm pitch, 1x2-pin header
**Setting:**

| Pin | Description | |
|---|---|---|
| **Short** | ACC ON Mode | |
| **Open** | Car mode | |

#### ❸ JDIO

**Function:** Digital I/O VCC out put voltage
**Jumper Type:** Onboard 2.00mm-pitch 1x3-pin header
**Setting:**

| Pin | Description | |
|---|---|---|
| **Short 1-2** | 12V | |
| **Short 2-3** | 5V (default) | |

## 3.2.2. Connectors
## 3.2.2.1 Main board

### ①⑩ FAN Connector (SYSFAN1/CPUFAN1)

**Function:**          Fan Power Connector

**Connector Type:**   Onbard 2.54mm pitch 1x4-pin one-wall wafer connector

**Pin Assignment:**

| Pin | Description |
| --- | --- |
| 1 | GND |
| 2 | +12V |
| 3 | RPM |
| 4 | Control |

### ② System reset pin header (JSW1): Reserved for Reset button

**Function:**           Reserved for Reset button

**Connector Type:**   onboard 2.0mm pitch 2-pin header

**Pin Assignment:**

| Pin | Description |
| --- | --- |
| 1 | FR_RST# |
| 2 | GND |

### ③ DGP1

**Function:**          External 80 port
**Connector Type:**   2.00mm-pitch 2x5-pin header
**Pin Assignment:**

| Pin | Description | Pin | Description |
| --- | --- | --- | --- |
| 1 | CLK | 2 | GND |
| 3 | FRAME# | 4 | LAD0 |
| 5 | PLTRST# | 6 | N.C |
| 7 | LAD3 | 8 | LAD2 |
| 9 | VCC3 | 10 | LAD1 |
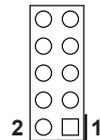
### ④ **Vcore IC debug pin header (JPIC2)**

**Function**          Reserved For Vcore IC debug
**Connector Type:**   Onboard 2.0mm pitch 6-pin header
**Pin Assignment:**

| Pin | Description | Pin | Description |
|-----|-------------|-----|-------------|
| 1 | NC | 2 | NC |
| 3 | GND | 4 | PMSCL |
| 5 | nPMALERT | 6 | PMSDA |

### ⑤ **POEOUT1**

**Function:**         PoE Power Connector
**Connector Type:**   2.54mm-pitch 4-pin header
**Pin Assignment:**

| Pin | Desc. |
|-----|-------|
| 1 | GND |
| 2 | GND |
| 3 | DCIN |
| 4 | DCIN |
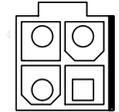
### ⑥ **SW2**

**Function**          Power Button
**Connector Type:**   Onboard 2x1-pin box connector
**Pin Assignment:**

| Pin | Description |
|-----|-------------|
| 1 | PWR_IN_SW# |
| 2 | GND |
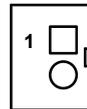
⑦ **JACCON2**

**Function**            Ignition Power Connector
**Connector Type:**     Onboard 2x1-pin box connector
**Pin Assignment:**

| Pin | Description |
| --- | --- |
| 1 | Acc_ON |
| 2 | GND |
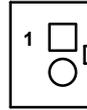
⑧ **DIO1**

**Function:**           Digital IO Connector
**Connector Type:**     2.0mm pitch 2x13 pin box header
**Pin Assignment:**

| Pin | Desc. | Pin | Desc |
| --- | --- | --- | --- |
| 1 | DIO0 | 14 | DIO8 |
| 2 | DIO1 | 15 | DIO9 |
| 3 | DIO2 | 16 | DIO10 |
| 4 | DIO3 | 17 | DIO11 |
| 5 | DIO4 | 18 | DIO12 |
| 6 | DIO5 | 19 | DIO13 |
| 7 | DIO6 | 20 | DIO14 |
| 8 | DIO7 | 21 | DIO15 |
| 9 | +5V | 22 | GND |
| 10 | +5V | 23 | GND |
| 11 | N.C | 24 | N.C |
| 12 | N.C | 25 | N.C |
| 13 | N.C | 26 | N.C |

⑨ **LPT1**

**Function:**         On-board Parallel Port Connector
**Connector Type:**   2.00mm pitch 2 x13-pin box header
**Pin Assignment:**

| Pin | Desc. | Pin | Desc. |
|-----|-------|-----|-------|
| 1 | STB# | 14 | AFD# |
| 2 | PD0 | 15 | ERR# |
| 3 | PD1 | 16 | INIT# |
| 4 | PD2 | 17 | SLIN# |
| 5 | PD3 | 18 | GND |
| 6 | PD4 | 19 | GND |
| 7 | PD5 | 20 | GND |
| 8 | PD6 | 21 | GND |
| 9 | PD7 | 22 | GND |
| 10 | ACK# | 23 | GND |
| 11 | BUSY | 24 | GND |
| 12 | PE | 25 | GND |
| 13 | SLCT | 26 | N.C |

⑪ **SIM**

**Function:**         SIM Card Socket
**Connector Type:**   6-pin SIM card socket
**Pin Assignment:**

| Pin | Desc. | Pin | Desc |
|-----|-------|-----|------|
| C1 | VCC | C2 | RST |
| C3 | CLK | C5 | GND |
| C6 | VPP | C7 | I/O |
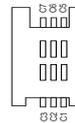
## ⑫ VGA2

**Function:**          Analog RGB
**Connector Type:**    Analog RGB(D-Sub 15-pin female type)
**Pin Assignment:**

| Pin | Desc. | Pin | Desc. |
|-----|-------|-----|-------|
| 1 | RED | 9 | +5V |
| 2 | GREEN | 10 | GND |
| 3 | BLUE | 11 | N/C |
| 4 | N/C | 12 | VDDAT |
| 5 | GND | 13 | HSYNC |
| 6 | GND | 14 | VSYNC |
| 7 | GND | 15 | VDCLK |
| 8 | GND | | |
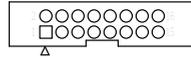
## ⑬ MEKEY1

**Function:**          M.2 E-Key socket (w/ PCIe + USB 2.0)
                       for optional Wi-Fi/BT
**Connector Type:**    M.2 E-Key 2230 Socket
**Pin Assignment:**    The pin assignments conform to the
                       industry standard.
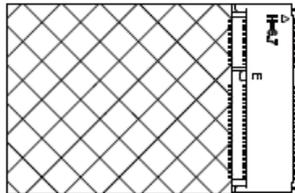
## ⑭ MC2

**Function:**          PCI Express Mini-card Full socked
**Connector Type:**    Onboard 0.8mm pitch 52-pin edge card connector.
**Pin Assignment:**
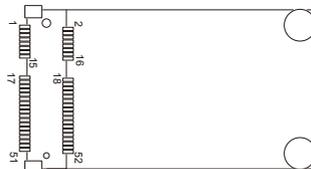
## ⑮ USB1

| | |
|---|---|
| **Function:** | USB 2.0/3.0 connectors |
| **Connector Type:** | USB2.0/3.0 Type-A connectors |
| **Pin Assignment:** | The Pin assignment conform to the industry standard. |
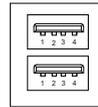
## ⑯ LAN2

| | |
|---|---|
| **Function:** | Dual GbE RJ-45 Ethernet connectors |
| **Connector Type:** | RJ-45 connector that supports 10/100/1000Mbps fast Ethernet |
| **Pin Assignment:** | The Pin assignment conform to the industry standard. |

## ⑰ SMBUS Connector(JSMB1)

| | |
|---|---|
| **Function:** | SMbus Wafer connector for DIO |
| **Connector Type:** | 1.25mm pitch 1x6 wafer connector |

**Pin Assignment:**

| Pin | Desc. |
|-----|-------|
| 1 | +V3.3S |
| 2 | GND |
| 3 | CLK |
| 4 | GND |
| 5 | DATA |
| 6 | +V12S |

## ⑱ BAT1

| | |
|---|---|
| **Function:** | RTC Battery |
| **Connector Type:** | Onboard 2x1-pin box connector |

**Pin Assignment:**

| Pin | Desc. |
|-----|-------|
| 1 | BAT+ |
| 2 | BAT- |

## ⑲ VGACARDPWR01

**Function:** VGA card power
**Connector Type:** oboard 2.54mm pitch 4-pin wafer
**Pin Assignment:**

| Pin | Desc. |
|-----|-------|
| 1 | GND |
| 2 | GND |
| 3 | +V12S |
| 4 | +V12S |
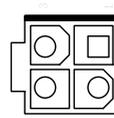
## ⑳㉑ USB4, 5

**Function:** USB 3.0/2.0 Connectors
**Connector Type:** On-board 1.25mm pitch 1x5 pin wafer connector
**Pin Assignment:**

| Pin | Description. |
|-----|--------------|
| 1 | +5V |
| 2 | D- |
| 3 | D+ |
| 4 | GND |
| 5 | GND |

## ㉒ SIM

**Function:** SIM Card Socket
**Connector Type:** 6-pin SIM card socket
**Pin Assignment:**

| Pin | Desc. | Pin | Desc |
|-----|-------|-----|------|
| C1 | VCC | C2 | RST |
| C3 | CLK | C5 | GND |
| C6 | VPP | C7 | I/O |
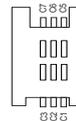
㉓ **MBKEY1**

**Function:** M.2 B-Key socket (w/ PCIe + USB 3.0 or
SATA + USB 3.0)(either one)
**Connector Type:** M.2 E-Key
**Pin Assignment:** The pin assignments conform to the
industry standard.

㉔㉕ **COM4, 5**

**Function:** RS232 Connector(COM4~COM5)
**Connector Type:** Onboard 1.25mm pitch 9-pin Connector
**Pin Assignment:**

| Pin | Description |
|-----|-------------|
| 1 | XDCD# |
| 2 | XDSR# |
| 3 | XRXD |
| 4 | XRTS# |
| 5 | XTXD |
| 6 | XCTS# |
| 7 | XDTR# |
| 8 | XRI# |
| 9 | GND |

㉖ ㉗ **COM6, 7**

**Function:**  RS232/RS422/RS485 connector(COM6~COM7)
**Connector Type:**  Onboard 1.25mm pitch 9-pin Connector
**Pin Assignment:**

| Pin | Description |
|-----|-------------|
| 1 | XDCD# |
| 2 | XDSR# |
| 3 | XRXD |
| 4 | XRTS# |
| 5 | XTXD |
| 6 | XCTS# |
| 7 | XDTR# |
| 8 | XRI# |
| 9 | GND |

㉘ **SYSFAN2**

**Function:**  System Fan power out
**Connector Type:**  2.0mm-pitch 2-pin header
**Pin Assignment:**

| Pin | Description |
|-----|-------------|
| 1 | +12V |
| 2 | GND |

㉙ **PCIE1**

**Function:**  PCIe x 8 slot

**Pin Assignment:**  The pin assignments conform to the industry standard.

㉚ **PCIE2**

**Function:**           PCIe x16 slot

**Pin Assignment:**    The pin assignments conform to the industry standard.
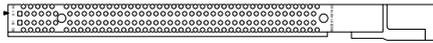


### 3.2.2.2 Riser board SCDB-469R

①④⑥ **FAN Connector (FAN1/FAN2/FAN3)**

**Function:**           Fan Power Connector

**Connector Type:**    Onbard 2.54mm pitch 1x4-pin one-wall wafer connector

**Pin Assignment:**

| Pin | Description |
|-----|-------------|
| 1 | GND |
| 2 | +12V |
| 3 | FANIN |
| 4 | FANCTL |

②③ **DCOUT (DCOUT/DCOUT2)**

**Function:**           DC Out

**Connector Type:**    oboard 2.54mm pitch 8-pin wafer

**Pin Assignment:**

| Pin | Description |
|-----|-------------|
| 1 | GND |
| 2 | GND |
| 3 | GND |
| 4 | GND |
| 5 | +V12S |
| 6 | +V12S |
| 7 | +V12S |
| 8 | SENSE |

⑤ **DCIN (DCIN2)**

**Function:**          DC in

**Connector Type:**   oboard 2.54mm pitch 8-pin wafer

**Pin Assignment:**

| Pin | Description |
| --- | --- |
| 1 | GND |
| 2 | GND |
| 3 | GND |
| 4 | GND |
| 5 | DCIN |
| 6 | DCIN |
| 7 | DCIN |
| 8 | DCIN |
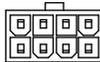
⑦⑧ **PCIE1/PCIE2**

**Function:**          PCIe x16 slot (PCIE2 with PCIe x 8 signal)

**Pin Assignment:**   The pin assignments conform to the industry standard.

⑨ **PCIE3**

**Function:**          PCIe x 4

**Pin Assignment:**   The pin assignments conform to the industry standard.

⑩ ⑪ **SATA1, 2**

**Function:**          Serial ATA Connector
**Connector Type:**   On-board Stabdard 7-pin Serial ATA Connector
**Pin Assignment:**

| Pin | Description |
|-----|-------------|
| 1   | GND         |
| 2   | TX+         |
| 3   | TX-         |
| 4   | GND         |
| 5   | RX-         |
| 6   | RX+         |
| 7   | GND         |
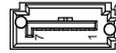
⑫ ⑬ **PWROUT1, 2**

**Function:**          SATA HDD Power Connector
**Connector Type:**   2.54mm pitch 1x4-pin one-wall connector
**Pin Assignment:**

| Pin | Description |
|-----|-------------|
| 1   | +5V         |
| 2   | GND         |
| 3   | GND         |
| 4   | +12V        |

⑦PWRIN3

①VGA

②LAN

③HDMI USB

④Digital output

⑤Digital input

⑥COM1, 2
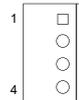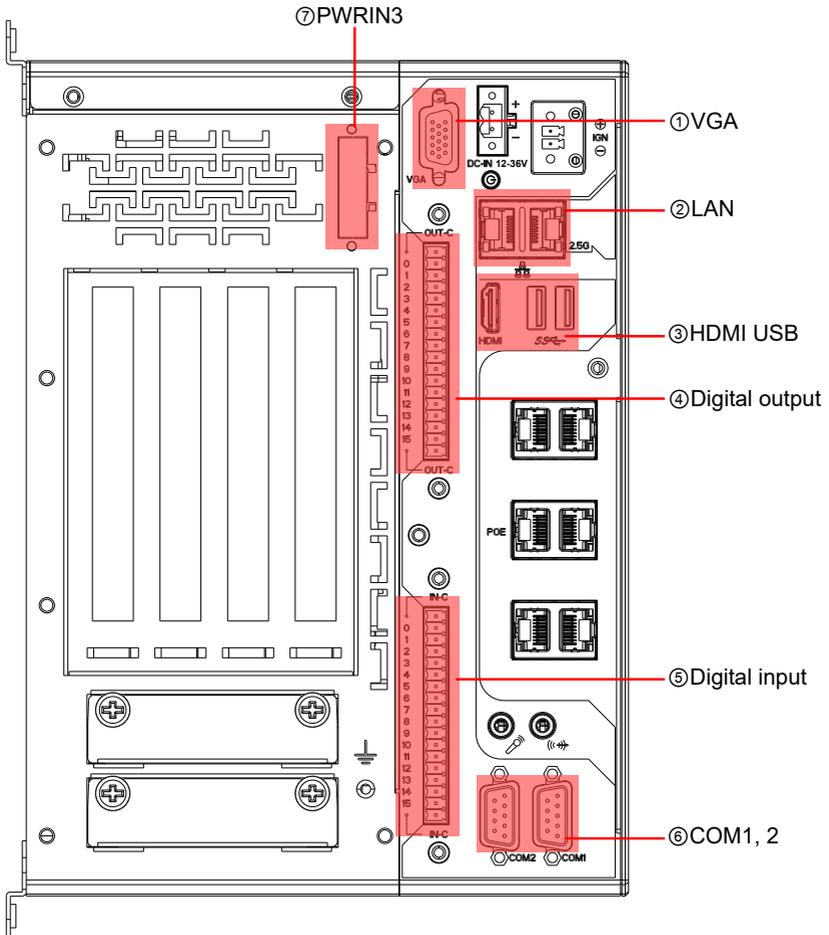
## ① **VGA**

| | | |
|---|---|---|
| **Function:** | Analog RGB & DVI-D Connector | Analog RGB |
| **Connector Type:** | Analog RGB (D-Sub 15-pin female type) | |
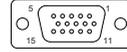


**Pin Assignment:**

**Analog RGB Connector**

| Pin | Desc. | Pin | Desc. | Pin | Desc. |
|---|---|---|---|---|---|
| 1 | RED | 6 | GND | 11 | N/C |
| 2 | GREEN | 7 | GND | 12 | VDDAT |
| 3 | BLUE | 8 | GND | 13 | HSYNC |
| 4 | N/C | 9 | +5V | 14 | VSYNC |
| 5 | GND | 10 | GND | 15 | VDCLK |

## ② **LAN**

| | |
|---|---|
| **Function:** | Dual GbE RJ-45 Ethernet connectors |
| **Connector Type:** | RJ-45 connector that supports 10/100/1000Mbps fast Ethernet |
| **Pin Assignment:** | The Pin assignment conform to the industry standard. |



## ③ **HDMIUSB1**

| | |
|---|---|
| **Function:** | HDMI Connectors (includes USB Connectors) |
| **Connector Type:** | HDMI + double stacked USB type A connector |
| **Pin Assignment:** | The Pin assignment conform to the industry standard. |
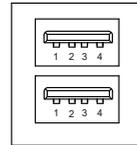
④ **DOUT**

**Function:** Digital Out Connector
**Connector Type:** 2.0mm pitch 2x13 pin box header

**Pin Assignment:**

| | Pin | Desc. | Pin | Desc. |
|---|---|---|---|---|
| **DOUT1** | 1 | DIO_GND | 10 | DOUT_09 |
| | 2 | DOUT_01 | 11 | DOUT_10 |
| | 3 | DOUT_02 | 12 | DOUT_11 |
| | 4 | DOUT_03 | 13 | DOUT_12 |
| | 5 | DOUT_04 | 14 | DOUT_13 |
| | 6 | DOUT_05 | 15 | DOUT_14 |
| | 7 | DOUT_06 | 16 | DOUT_15 |
| | 8 | DOUT_07 | 17 | DOUT_16 |
| | 9 | DOUT_08 | 18 | DIO_GND |

⑤ **DIN**

**Function:** Digital In Connector
**Connector Type:** 2.0mm pitch 2x13 pin box header

**Pin Assignment:**

| | Pin | Desc. | Pin | Desc. |
|---|---|---|---|---|
| **DIN1** | 1 | DI_VDD | 10 | DI_09 |
| | 2 | DI_01 | 11 | DI_10 |
| | 3 | DI_02 | 12 | DI_11 |
| | 4 | DI_03 | 13 | DI_12 |
| | 5 | DI_04 | 14 | DI_13 |
| | 6 | DI_05 | 15 | DI_14 |
| | 7 | DI_06 | 16 | DI_15 |
| | 8 | DI_07 | 17 | DI_16 |
| | 9 | DI_08 | 18 | DI_VDD |

⑦ **PWRIN3**

**Function:** DC Adapter Power Input for expansion card
**Connector Type:** 4-Pin Terminal block
**Pin Assignment:**
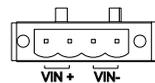
| Pin | Desc. |
|---|---|
| 1 | VIN+ |
| 2 | VIN+ |
| 3 | VIN- |
| 4 | VIN- |

## ⑥ COM1, COM2

**Function:**  RS-232/422/485 Selectable Serial Port
**Connector Type:**  External 9-pin D-sub male connector
**Pin Assignment:**

| | Pin | Desc. | Pin | Desc |
|---|---|---|---|---|
| **RS-232** | 1 | DCD | 6 | DSR |
| | 2 | RXD | 7 | RTS |
| | 3 | TXD | 8 | CTS |
| | 4 | DTR | 9 | RI |
| | 5 | GND | | |
| **RS-422** | 1 | COM_422 TX- | | |
| | 2 | COM_422 TX+ | | |
| | 3 | COM_422 RX+ | | |
| | 4 | COM_422 RX- | | |
| | 5 | GND | | |
| **RS-485** | 1 | COM_485 D- | | |
| | 2 | COM_485 D+ | | |
| | 5 | GND | | |
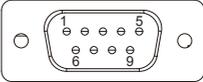
# Chapter 4

## Installation and Maintenance

## 4.1. Install Hardware

The FPC-9107 Series is constructed based on modular design to make it easy for users to add hardware or to maintain the computer. The following sections will guide you to the simple hardware installations for the computer.

### 4.1.1. Open the Computer

For the computer, removing the top and bottom covers is essential to open the computer and access the inside. Follow through the steps below to remove the top cover and bottom cover from the computer.

### 4.1.1.2. Remove Top Cover

All jumpers, CPU socket, MiniCard socket, SDRAM SO-DIMM slots, DIO/ LPT ports are built on the top side of the main board. To access these components, the computer's top cover has to be removed. Follow through the steps below to remove the top cover.

**FPC-9107**

1. Loosen and remove the 4 screws as shown below.

2. Loosen and remove the 3 screws on the top panels respectively as shown below.
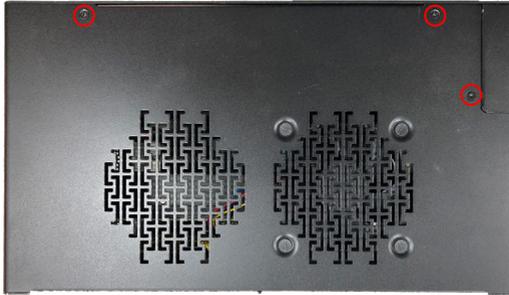


3. Carefully lift the top cover and then completely part the top and slide the side cover from the computer.



The inside of the computer comes to view.
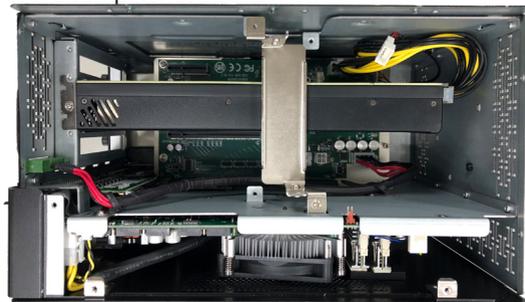
### 4.1.1.3. Remove Side Cover

1. Loosen and remove the 2 screws at the bottom as shown below.



2. Loosen and remove the 3 screws on the top panels respectively as shown below.
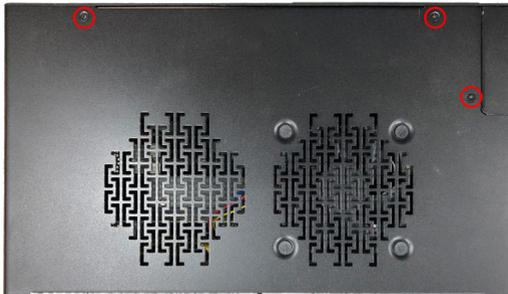


3. Carefully slide the side over and then completely part the side cover from the computer.
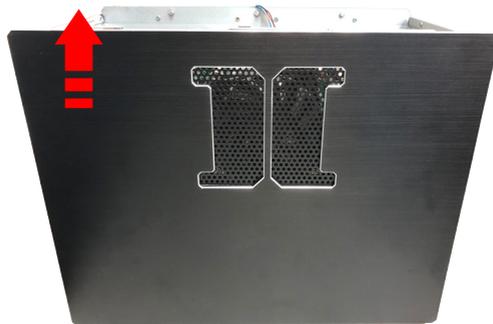
The inside of the computer comes to view.



## 4.1.2. Install CPU

1. Remove the top and side cover from the computer as described in 4.1.1.3. Remove Side Cover on page 46.

2. Locate the CPU socket on the main board
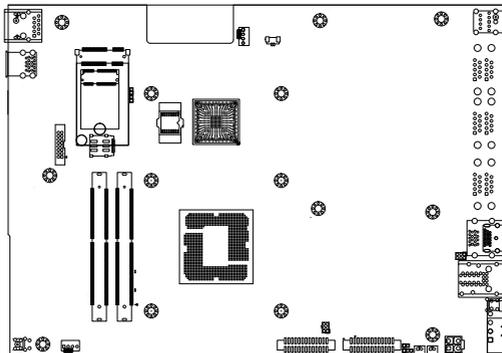
The processor socket comes with a lever to secure the processor. Please refer to the pictures step by step as below and note that the cover of the socket must always be installed during transportation to avoid damage to the socket.
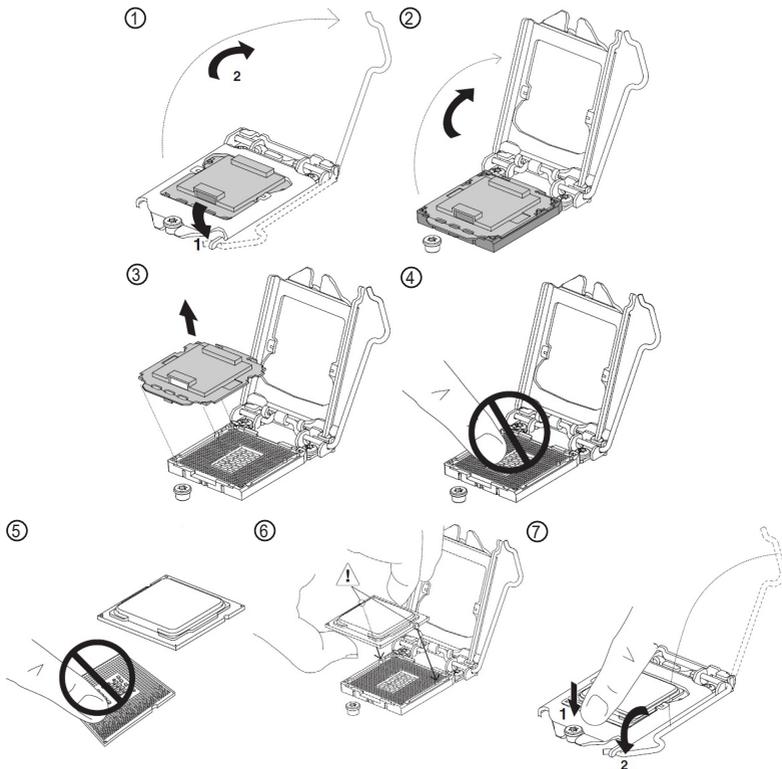


3.　Restore the top and side cover to the computer by fastening the all screws.

### 4.1.3. Install/Uninstall Memory Modules

The main board has two memory module (DIMM) sockets. Increase memory capacity to make programs run faster on the system. The memory module for the FPC-9107 Series' SO-DIMM sockets should be a 260-pin DDR4 with a "key notch" off the centre among the pins, which enables the memory module for particular applications. There are another two notches at each left and right side of the memory module to help fix the module in the socket.
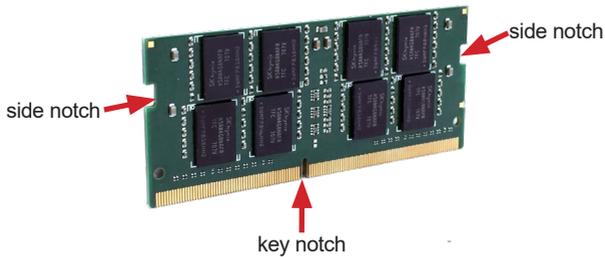
**To install a DDR4 memory module:**

1.  Remove the side cover from the computer as described in

2.  Locate the SO-DIMM sockets on the main board.

    The SO-DIMM sockets are vertical type, and each socket has two latches for fixing the memory modules. The memory module can only be installed by one direction due to the notch.

3.  Pull back both latches from the socket.
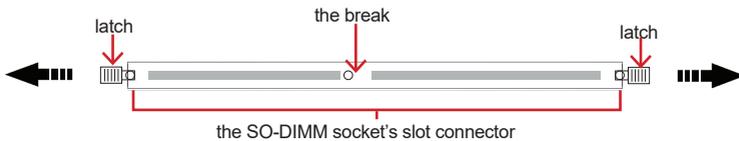


vertical-type SO-DIMM socket (overview)

4.  Confront the memory module's edge connector side at the SO-DIMM socket. Position the memory module at the SO-DIMM socket, with the memory module's key notch aligned at the break of the SO-DIMM's slot connector.
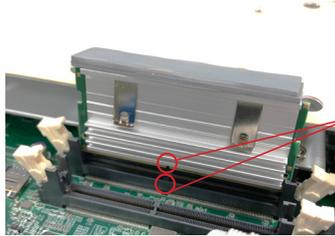
Align the notch on the memory module with the notch in the memory socket.

5.  Vertically plug the memory module to the DIMM socket. "Fully" plug the memory module until both latches auto-lock the memory module in place.
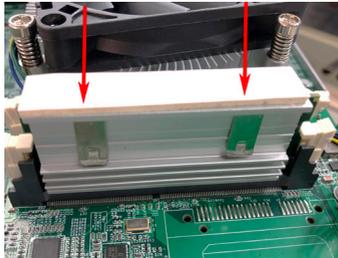


6.  Restore the top and side cover to the computer.

**To uninstall a DDR4 memory module:**

1.  Pull back both latches from the SO-DIMM socket.

    The DDR4 memory module will be auto-released from the socket.



2.  Remove the memory module.

3.  Restore the top cover to the computer.

**4.1.4. Install Wi-Fi Module**

1.  Remove the side cover from the computer as described in <u>Section 4.1.1.3.</u> <u>Remove Side Cover on page 46</u>.

2.  Locate the **M.2 E-Key** socket for wireless module.
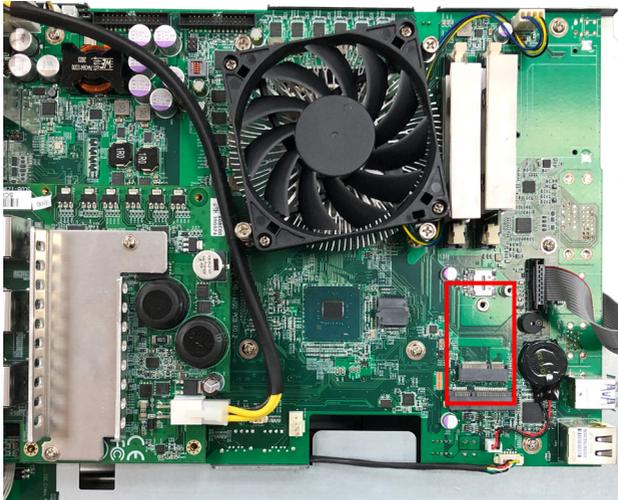


3.  Prepare the Wi-Fi module kit. The module is a **M.2 E-Key** socket form factor, with two U.FL connectors, one is "MAIN", and the other is "AUX".
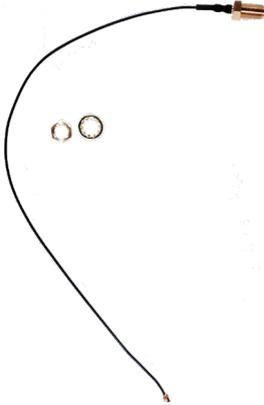
Two U.FL connectors, one is "MAIN" (marked 2), the other is "AUX" (marked 1).

4. Have the RF antenna. The antenna has an SMA connector on one end and an MHF connector on the other.



SMA connector
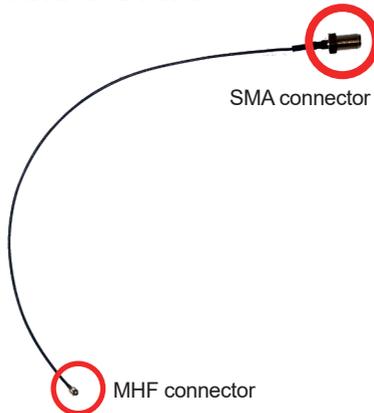
MHF connector

5. Connect the RF antenna's MHF connector to the Wi-Fi module's main connector marked 0. If you are going to connect a secondary antenna, connect it to the connector marked 1.

Connect the RF antenna's MHF connector to the Wi-Fi module's main connector (marked 2)

Connect the secondary RF antenna's MHF connector to the Wi-Fi module's secondary connector (marked 1)
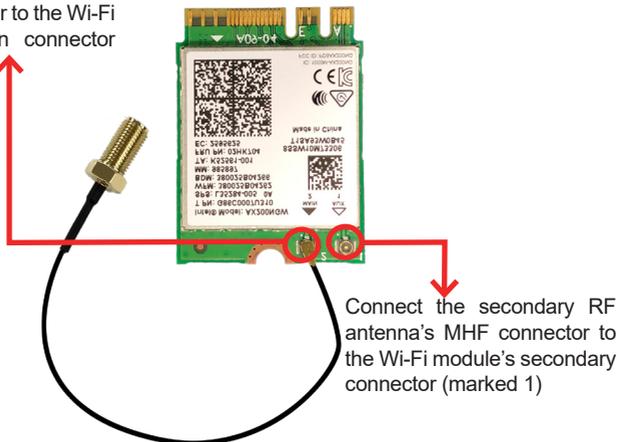
6. Plug the Wi-Fi module to the socket's connector by a slanted angle. Fully plug the module, and note the notch on the wireless module should meet the break of the connector.

The module's key notch should meet the connector's break.

7. Press the module down and fix the module in place using one screw.

8. Locate the SMA antenna holes on front panel. Remove the plastic plug to

make an antenna hole. Keep the plastic plug for any possible restoration in the future.

9.  From the other end of the RF antenna, which is an SMA connector, remove the washer and the nut. Note the SMA connector has the form of a threaded bolt, with one flat side.

Remove the nut and washer.

Among the screw thread, there is a flat side.

10. Pull the SMA connector through the above mentioned antenna hole. Note to meet the aforesaid flattened side with the antenna hole's flat side.

Arrange the flat side of the SMA connector to meet the flat side of the antenna hole.
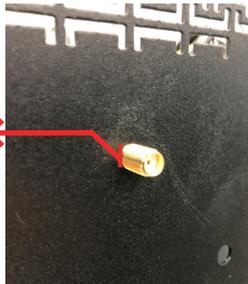
11. Mount the washer first and then the nut to the SMA connector. Make sure the nut is tightened.

Mount the washer and the nut to the SMA connector. Tighten the nut.
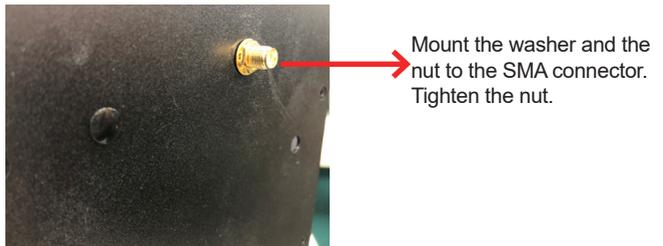
12. Have the external antenna(s). Screw and tightly fasten the antenna(s) to the SMA connector.



### 4.1.5. Install SATA Storage Devices

### 4.1.5.1. Install Internal SATA Storage Device

The computer supports two 2.5" SATA storage devices to work inside the computer for RAID. The following will guide you to install two SATA HDD/SSD.

1. Find the HDD/SSD brackets. Loosen the screws as marked in the illustration below and take the bracket out. Then dismount the bracket from the computer.
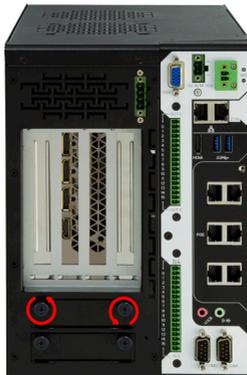
2.    For the 1st storage bracket, slide the HDD/SSD storage device into the bracket.



3.    Fix the storage device in place by fastening the four screws of the bracket.
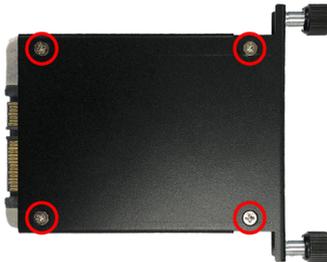


4.    If you are going to install the 2nd HDD/SSD storage device, slide the storage device into the bracket and fix it in place in the same way.

5.    Restore the cover to the computer.

**4.1.6. Install graphic cards**

To install a graphic cards:

1.  Remove the top and side cover from the computer.

2.  Install a graphic card into the computer.



3.  Use a cross head screwdriver to tighten the screws to secure the graphic card.

4.   Plug the power plug of graphic card to computer
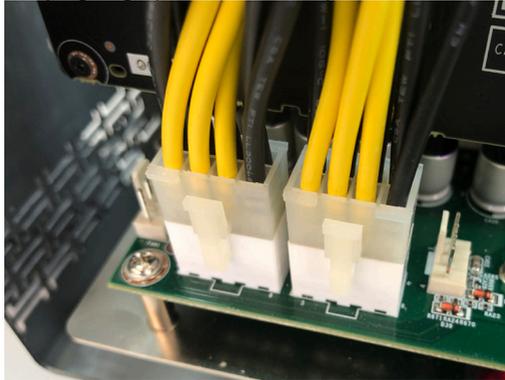


5.   Use a cross-head screwdriver to tighten the screws to secure the graphic card holder.
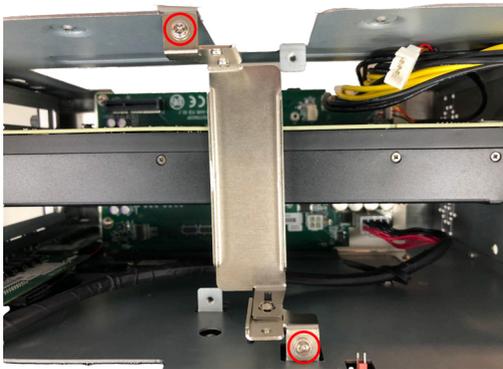


6.   Restore the top and side cover to the computer.

If two NVIDIA® Tesla T4 graphic cards was installed in the computer, please follow steps as below.

1.   Remove the top and side cover from the computer.

2.  Install graphics card into the computer and use a cross head screwdriver to tighten the screws to secure the graphic cards.



3.  Use a cross-head screwdriver to tighten the screws to secure the graphic card holder.
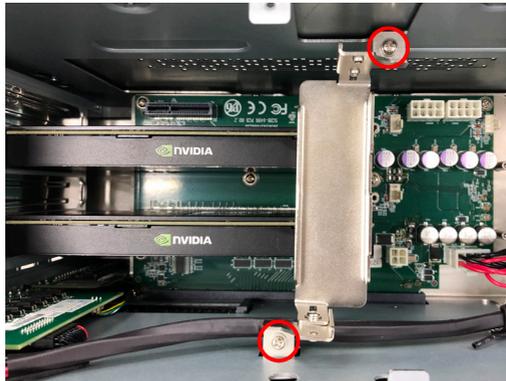
4.  Align the graphic card bracket with the graphic card holder, and insert the graphic card bracket into the graphic holder.



5.  Use a cross-head screwdriver to tighten screws on the graphic card bracket.



### 4.1.7. Install/Uninstall SIM Card

This section will use FPC-9107-P6-G2 as the example to guide you through the SIM card installation steps:

1.  Remove the side cover from the computer as described in

2. Locate the SIM card slot on the main board.
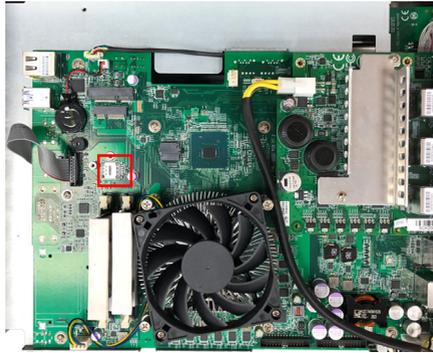


3. Slide the SIM card holder cover towards the OPEN edge and then lift the cover to open it.



4. Insert the SIM card into the card holder as shown below.



5. Close the SIM card holder door and slide the door to the LOCK edge to lock into place.

**To uninstall the SIM card:**

1. Loosen and remove the card door screw and open the card door.

2. Push-eject the SIM card.

3. Remove the SIM card.

4. Refasten the screw to close the card door.

Note: Make sure to refasten the screw to close the card door each time the SIM card is installed or uninstalled.

## 4.2. Wire DC-in Power Source

### 4.2.1 Automation Mode

Follow the instructions below for connecting the computer to a DC-input power source.

> ⚠ **Warning** Only trained and qualified personnel are allowed to install or replace this equipment.

1. Before wiring, make sure the power source is disconnected.
2. Find the terminal block in the accessory box.
3. Use the wire-stripping tool to strip a short insulation segment from the output wires of the DC power source.
4. Identify the positive and negative feed positions for the terminal block connection. See the symbols printed on the rear panel indicating the polarities and DC-input power range in voltage.
5. Insert the exposed wires into the terminal block plugs. Only wires with insulation should extend from the terminal block plugs. Note that the polarities between the wires and the terminal block plugs must be positive to positive and negative to negative.

6.   Use a slotted screwdriver to tighten the captive screws. Plug the terminal block firmly, which wired, into the receptacle on the rear panel.

captive screw



terminal block

**4.2.2 Vehicle Application Mode**

Follow the instructions below for connecting the computer to a vehicle power source.

1.   Make sure JACCON2 jumper is open for vehicle power mode. (Refer to Section 3.2.1. Jumpers on page 26).

2.   For vehicle application, DC power Input wiring pin configuration is as below. Please connect the Acc pin with your car Acc, and the device will be activated when you turn your ignition key to Acc.
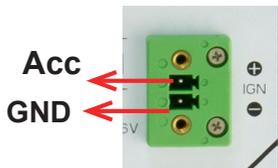
# Chapter 5

## BIOS

# BIOS

The BIOS Setup utility for the FPC-9107 Series is featured by American Megatrends Inc to configure the system settings stored in the system's BIOS ROM. The BIOS is activated once the computer powers on. When the computer is off, the battery on the main board supplies power to BIOS RAM.

To enter the BIOS Setup utility, keep hitting the "Delete" key upon powering on the computer.

This section will use FPC-9107-P6-G2 as the example.

```
                            Aptio Setup - AMI
    Main  Advanced  Chipset  Security  Boot  Save & Exit

  BIOS Name                      FPC-910X              Set the Date. Use Tab to
  BIOS Version                   1.00                  switch between Date elements.
  Build Date and Time            06/23/2021 15:54:19   Default Ranges:
  Access Level                   Administrator         Year: 1998-9999
  ME FW Version                  14.0.37.1165          Months: 1-12
                                                       Days: Dependent on month
  System Date                    [Wed 06/23/2021]      Range of Years may vary.
  System Time                    [16:13:11]



                                                       →←: Select Screen
                                                       ↑↓: Select Item
                                                       Enter: Select
                                                       +/-: Change Opt.
                                                       F1: General Help
                                                       F2: Previous Values
                                                       F9: Optimized Defaults
                                                       F10: Save & Exit
                                                       ESC: Exit




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```

The featured settings are:

| Menu | Description |
|------|-------------|
| **Main** | See 5.1. Main on page 68 |
| **Advanced** | See 5.2. Advanced on page 69 |
| **Chipset** | See 5.3. Chipset on page 84 |
| **Security** | See 5.4. Security on page 90 |
| **Boot** | See 5.5. Boot on page 92 |
| **Save & Exit** | See 5.6. Save & Exit on page 94 |

**Key Commands**

The BIOS Setup utility relies on a keyboard to receive user's instructions. Hit the following keys to navigate within the utility and use the utility.

| Keystroke | Function |
|---|---|
| ← → | Moves left/right between the top menus. |
| ↓ ↑ | Moves up/down between highlight items. |
| Enter | Selects an highlighted item/field. |
| Esc | ▶ On the top menus:<br>Use **Esc** to quit the utility without saving changes to CMOS. (The screen will prompt a message asking you to select **OK** or **Cancel** to exit discarding changes.<br>▶ On the submenus:<br>Use **Esc** to quit current screen and return to the top menu. |
| Page Up / + | Increases current value to the next higher value or switches between available options. |
| Page Down / - | Decreases current value to the next lower value or switches between available options. |
| F1 | Opens the **Help** of the BIOS Setup utility. |
| F2 | Previous values |
| F9 | Optimized defaults |
| F10 | Exits the utility saving the changes that have been made. (The screen then prompts a message asking you to select **OK** or **Cancel** to exit saving changes.) |

Note:    Pay attention to the "WARNING" that shows at the left pane onscreen when making any change to the BIOS settings.

This BIOS Setup utility is updated from time to time to improve system performance and hence the screenshots hereinafter may not fully comply with what you actually have onscreen.

**5.1. Main**

The **Main** menu features the settings of **System Date** and **System Time** and displays some BIOS info.

```
                          Aptio Setup - AMI
   Main  Advanced  Chipset  Security  Boot  Save & Exit

 BIOS Name                    FPC-910X            Set the Date. Use Tab to
 BIOS Version                 1.00                switch between Date elements.
 Build Date and Time          06/23/2021 15:54:19 Default Ranges:
 Access Level                 Administrator       Year: 1998-9999
 ME FW Version                14.0.37.1165        Months: 1-12
                                                  Days: Dependent on month
 System Date                  [Wed 06/23/2021]    Range of Years may vary.
 System Time                  [16:13:11]


                                                  →←: Select Screen
                                                  ↑↓: Select Item
                                                  Enter: Select
                                                  +/-: Change Opt.
                                                  F1: General Help
                                                  F2: Previous Values
                                                  F9: Optimized Defaults
                                                  F10: Save & Exit
                                                  ESC: Exit


                   Version 2.21.1278 Copyright (C) 2021 AMI
```

The featured settings are:

| Setting | Description |
|---|---|
| **System Date** | Set the system date. Use Tab to switch between Data elements. Note that the 'Day' automatically changes when you set the date. <br> ► The date format is: **Day:** Sun to Sat <br> **Month:** 1 to 12 <br> **Date:** 1 to 31 <br> **Year:** 1998 to 2099 |
| **System Time** | Set the system time. Use Tab to switch between Time elements. <br> ► The time format is: **Hour:** 00 to 23 <br> **Minute:** 00 to 59 <br> **Second:** 00 to 59 |

## 5.2. Advanced

```
                            Aptio Setup - AMI
        Main  Advanced  Chipset  Security  Boot  Save & Exit

 ▶ CPU Configuration                         CPU Configuration Parameters
 ▶ Trusted Computing
 ▶ ACPI Settings
 ▶ Super IO Configuration
 ▶ Hardware Monitor
 ▶ S5 RTC Wake Settings
 ▶ AMI Graphic Output Protocol Policy
 ▶ PCI Subsystem Settings
 ▶ USB Configuration
 ▶ CSM Configuration
 ▶ NVMe Configuration
                                             →←: Select Screen
                                             ↑↓: Select Item
                                             Enter: Select
                                             +/-: Change Opt.
                                             F1: General Help
                                             F2: Previous Values
                                             F9: Optimized Defaults
                                             F10: Save & Exit
                                             ESC: Exit


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```

The featured settings and submenus are:

| Setting | Description |
|---|---|
| CPU Configuration | See 5.2.1. CPU Configuration on page 70 |
| Trusted Computing | See 5.2.2. Trusted Computing on page 72 |
| ACPI Settings | See 5.2.3. ACPI Settings on page 73 |
| Super IO Configuration | See 5.2.4. Super IO Configuration on page 74 |
| Hardware Monitor | See 5.2.5. Hardware Monitor on page 76 |
| SS RTC Wake Settings | See 5.2.6. S5 RTC Wake Settings on page 77 |
| AMI Graphic Outut protocol policy | See 5.2.7. AMI Graphic Outut protocol policy on page 78 |
| PCI Subsystem Settings | See 5.2.8. PCI Sybsystem Settings on page 79 |
| USB Configuration | See 5.2.9. USB Configuration on page 80 |
| CSM Configuration | See 5.2.10. CSM Configuration on page 82 |
| NVMe Configuration | See 5.2.11. NVMe Configuration on page 83 |

### 5.2.1. CPU Configuration

```
                          Aptio Setup - AMI
        Advanced

 CPU Configuration                                  Number of cores to enable in
                                                    each processor package.
 Type                      Intel(R) Core(TM)
                           i9-10900E CPU @ 2.80GHz
 ID                        0xA0655
 Speed                     2800 MHz
 L1 Data Cache            32 KB x 10
 L1 Instruction Cache     32 KB x 10
 L2 Cache                  256 KB x 10
 L3 Cache                  20 MB

 Active Processor Cores    [All]
 Hyper-Threading           [Enabled]
 Intel (VMX) Virtualization [Enabled]
 Technology
 Intel(R) SpeedStep(tm)    [Enabled]           ++: Select Screen
 Turbo Mode                [Disabled]          ↑↓: Select Item
 C states                  [Disabled]          Enter: Select
                                               +/-: Change Opt.
                                               F1: General Help
                                               F2: Previous Values
                                               F9: Optimized Defaults
                                               F10: Save & Exit
                                               ESC: Exit



                Version 2.21.1278 Copyright (C) 2021 AMI
```

The features settings are:

| Setting | Description |
|---|---|
| **Active Processor Cores** | Number of cores to enable in each processor package.<br>► Options: **All** (default) and **1** |
| **Hyper-Threading** | **Enabled** (default) for Windows XP and Linux (OS optimized for Hyper-Threading Technology) and **Disabled** for other OS (OS not optimized or Hyper-Threading Technology). When disabled only one thread per enabled core is enabled. |
| **Intel (VMX) Virtualization Technology** | When enabled, a VMM can utilize the additional hardware capabilities provided by Vanderpool Technology.<br>► Options: **Enabled** (default) or **Disabled** |
| **Intel (R) Speed Step (tm)** | **Enable** (default)/**Disable** Intel SpeedStep. Allows more than two frequency ranges to be supported. |
| **Turbo Mode** | Only available when Intel Speed Step is **Enabled**.<br>**Enable** /**Disable** (default) Turbo Mode (requires EMTTM enabled, unless max turbo ratio is bigger than 16 - SKL AO W/A. |

| | |
|---|---|
| **C States** | **Enable** /**Disable** (default) CPU power management. Allows CPU to go to C state when it's not 100% utilized. |

## 5.2.2. Trusted Computing

```
                              Aptio Setup – AMI
        Advanced

   TPM 2.0 Device Found                              Enables or Disables BIOS
   Firmware Version:            5.62                 support for security device.
   Vendor:                      IFX                  O.S. will not show Security
                                                     Device. TCG EFI protocol and
   Security Device Support      [Enable]             INT1A interface will not be
   Pending operation            [None]               available.



                                                     →←: Select Screen
                                                     ↑↓: Select Item
                                                     Enter: Select
                                                     +/-: Change Opt.
                                                     F1: General Help
                                                     F2: Previous Values
                                                     F9: Optimized Defaults
                                                     F10: Save & Exit
                                                     ESC: Exit



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```

The features settings are:

| Setting | Description |
|---|---|
| **Security Device Support** | **Enable** (default) or **Disable** BIOS support for security device. |
| **Pending operation** | Schedule an Operation for the security Device. Your computer will reboot during restart in order to change State of Security Device. <br> ►     Options: **None** (default) and **TPM Clear** |

### 5.2.3. ACPI Settings

```
                          Aptio Setup - AMI
      Advanced

 ACPI Settings                                      Enables or Disables BIOS ACPI
                                                    Auto Configuration.
 Enable ACPI Auto Configuration    [Disabled]

 Enable Hibernation                [Enabled]
 ACPI Sleep State                  [S3 (Suspend to RAM)]




                                                    →←: Select Screen
                                                    ↑↓: Select Item
                                                    Enter: Select
                                                    +/-: Change Opt.
                                                    F1: General Help
                                                    F2: Previous Values
                                                    F9: Optimized Defaults
                                                    F10: Save & Exit
                                                    ESC: Exit




               Version 2.21.1278 Copyright (C) 2021 AMI
```
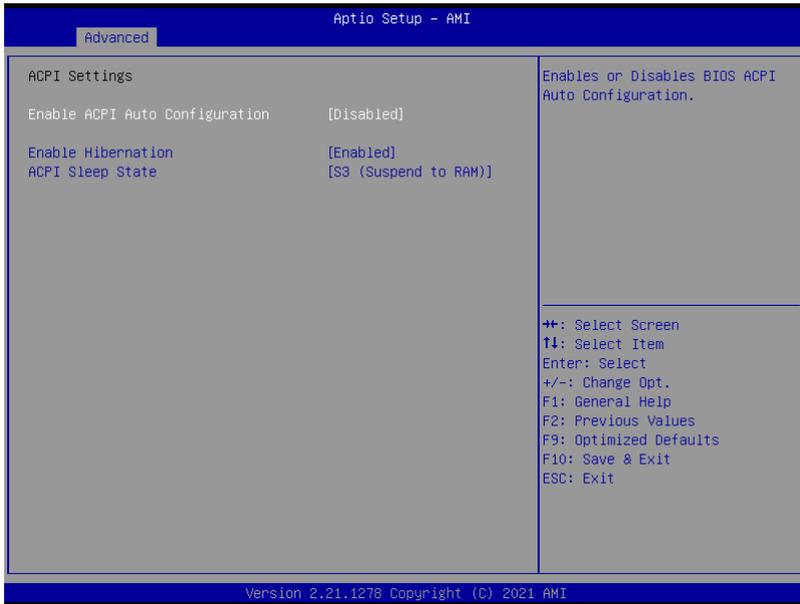
The features settings are:

| Setting | Description |
|---|---|
| **Enable ACPI Auto Configuration** | **Enables** or **Disables** (default) BIOS ACPI Auto Configuration |
| **Enable Hibernation** | **Enables** (default) or **Disables** System ability to Hibernate (OS/S4 Sleep State). This option may be not effective with some OS. |
| **ACPI Sleep State** | Select ACPI sleep state the system will enter when the SUSPEND button is pressed.<br>► **Options: Suspend Disabled** and **S3 (Suspend to RAM)** (default) |

### 5.2.4. Super IO Configuration

```
                              Aptio Setup - AMI
        Advanced

  Super IO Configuration                             Set Parameters of Serial Port
                                                     1 (COMA)
  Super IO Chip              F81866
▶ Serial Port 1 Configuration
▶ Serial Port 2 Configuration
▶ Parallel Port Configuration

  Super IO Chip              F81216SEC
▶ Serial Port 1 Configuration
▶ Serial Port 2 Configuration
▶ Serial Port 3 Configuration
▶ Serial Port 4 Configuration
                                                     ↔: Select Screen
                                                     ↑↓: Select Item
                                                     Enter: Select
                                                     +/-: Change Opt.
                                                     F1: General Help
                                                     F2: Previous Values
                                                     F9: Optimized Defaults
                                                     F10: Save & Exit
                                                     ESC: Exit



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```

**Super IO Chip F81866 Settings**

| Setting | Description |
|---|---|
| **Serial Port Configuration** | |
| **Serial Port** | **Enable** (default) or **Disable** Serial Port (COM). |
| **Mode Select** | Select **RS-232** (default), **RS-422**, **RS-485**, **RS-422 Termination Resistor** or **RS-485 Termination Resistor** |
| **Parallel Port Configuration** | |
| **Parallel Port** | **Enable** (default) or **Disable** Parallel Port (LPT/LPTE). |
| **Device Mode** | Change the printer port mode:<br>► Options:<br>　**STD Printer Mode** (default) ;<br>　**SPP Mode**;<br>　**EPP-1.9 and SPP Mode**;<br>　**EPP-1.7 and SPP Mode**;<br>　**ECP Mode**;<br>　**ECP and EPP 1.9 Mode**;<br>　**ECP and EPP 1.7 Mode** |

**Super IO Chip F81216SEC Settings**

| Serial Port Configuration | |
|---|---|
| **Serial Port** | **Enable** (default) or **Disable** Serial Port (COM). |

## 5.2.5. Hardware Monitor

```
                            Aptio Setup - AMI
         Advanced

  Pc Health Status                                    Smart Fan function setting

▶ CPUFAN SmartFan Function
▶ SYSFAN SmartFan Function

  CPU    temperature              : +34 %
  System temperature              : +36 %
  CPUFAN Speed                    : 2572 RPM
  SYSFAN Speed                    : N/A
  Vcore                           : +0.896 V
  +3.3V                           : +3.312 V
  + 5V                            : +5.045 V
  + 12V                           : +12.144 V
  VCC3V                           : +3.328 V      →←: Select Screen
  VSB3V                           : +3.312 V      ↑↓: Select Item
  VSB5V                           : +4.992 V      Enter: Select
  VBAT                            : +3.136 V      +/-: Change Opt.
                                                  F1: General Help
                                                  F2: Previous Values
                                                  F9: Optimized Defaults
                                                  F10: Save & Exit
                                                  ESC: Exit



                    Version 2.21.1278 Copyright (C) 2021 AMI
```
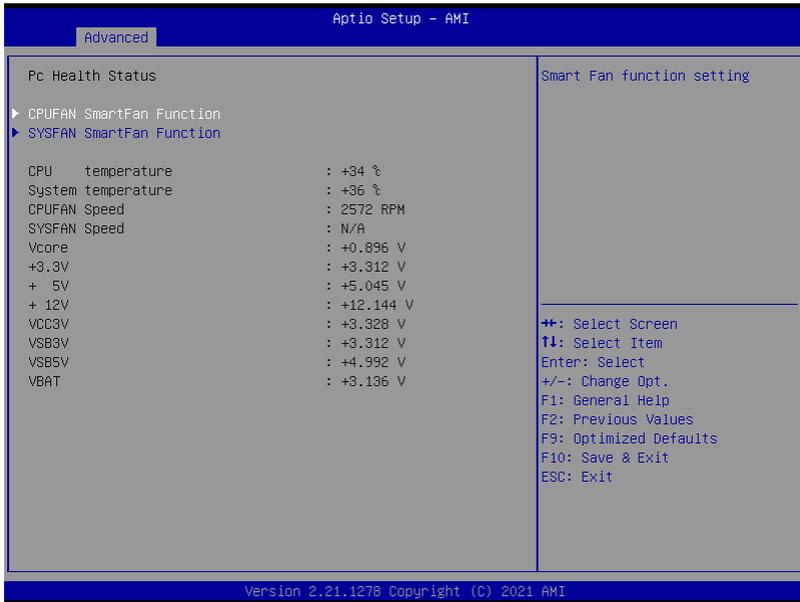
The features settings are:

| Setting | Description |
|---|---|
| **CPUFAN SmartFan Function** | **Enables** (default) or **Disables** Smart Fan |
| **SYSFAN SmartFan Function** | **Boundary 1~4 & Segment Speed 1~5**<br>Auto fan speed control. Fan speed will follow different temperature by different PRM 1-100. |

**Note:** CPUFAN & SYSFAN functions only apply to SKUs with smart fan. If your SKU doesn't come with smart fan, ignore these settings.

## 5.2.6. S5 RTC Wake Settings

```
                              Aptio Setup – AMI
     Advanced

 Wake system from S5          [Disabled]          Enable or disable System wake
                                                  on alarm event. Select
                                                  FixedTime, system will wake on
                                                  the hr::min::sec specified.
                                                  Select DynamicTime , System
                                                  will wake on the current time
                                                  + Increase minute(s)



                                                  ↔: Select Screen
                                                  ↑↓: Select Item
                                                  Enter: Select
                                                  +/-: Change Opt.
                                                  F1: General Help
                                                  F2: Previous Values
                                                  F9: Optimized Defaults
                                                  F10: Save & Exit
                                                  ESC: Exit



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```

The features settings are:

| Setting | Description |
|---|---|
| **Wake System from S5** | **Enable** or **Disable** (default) system wake on alarm event.<br>► Options available are:<br>**Disabled** (default):<br>**Fixed Time:** System will wake on the hr::min::sec specifiedc.<br>**DynamicTime:** If selected, you need to set **Wake up minute increase** from 1 - 5. System will wake on the current time + increase minute(s). |

## 5.2.7. AMI Graphic Outut protocol policy

```
                          Aptio Setup - AMI
    Advanced

   Intel(R) Graphics Controller                      Output Interface
   Intel(R) GOP Driver [9.0.1107]
   Output Select                   [DP4]




                                                      →←: Select Screen
                                                      ↑↓: Select Item
                                                      Enter: Select
                                                      +/-: Change Opt.
                                                      F1: General Help
                                                      F2: Previous Values
                                                      F9: Optimized Defaults
                                                      F10: Save & Exit
                                                      ESC: Exit



             Version 2.21.1278 Copyright (C) 2021 AMI
```
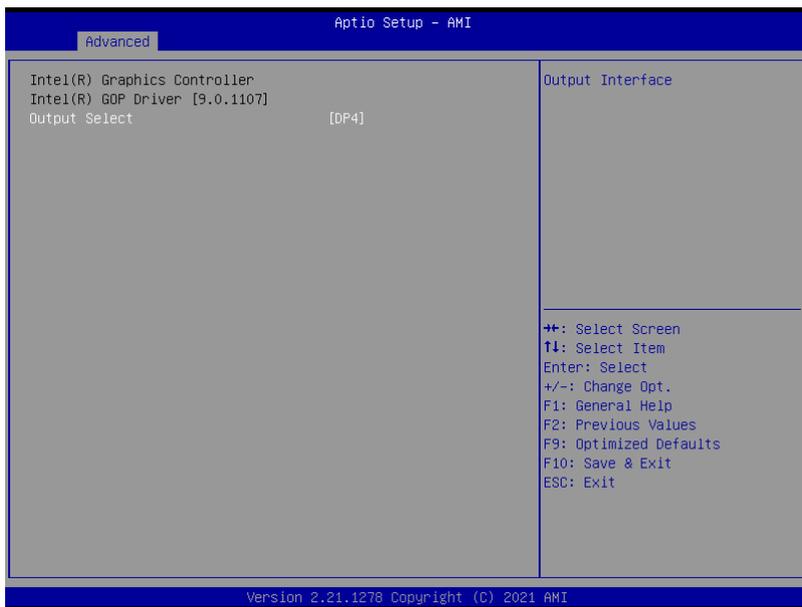
The features settings are:

| Setting | Description |
|---|---|
| Output select | **Output Select** |

### 5.2.8. PCI Sybsystem Settings

```
                              Aptio Setup - AMI
        Advanced

   PCI Bus Driver Version        A5.01.19              Value to be programmed into
                                                       PCI Latency Timer Register.
   PCI Devices Common Settings:
   PCI Latency Timer             [32 PCI Bus Clocks]
   PCI-X Latency Timer           [64 PCI Bus Clocks]
   Above 4G Decoding             [Disabled]




                                                       →←: Select Screen
                                                       ↑↓: Select Item
                                                       Enter: Select
                                                       +/-: Change Opt.
                                                       F1: General Help
                                                       F2: Previous Values
                                                       F9: Optimized Defaults
                                                       F10: Save & Exit
                                                       ESC: Exit



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```
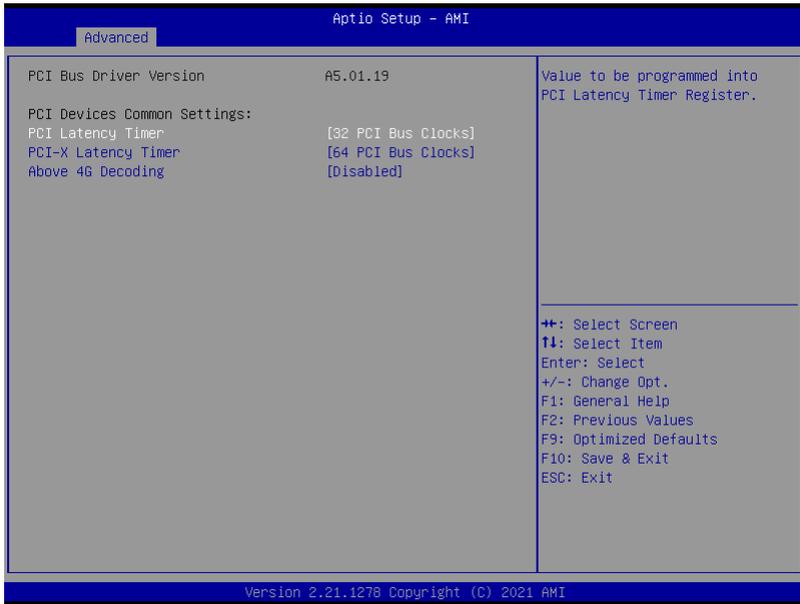
The features settings are:

| Setting | Description |
|---|---|
| **PCI Latency Timer** | Value to be programmed into PCI Latency Timer Register.<br>► **Options: 32** (default), **64**, **96**, **128**, **160**, **192**, **224** and **248 PCI Bus Clocks**. |
| **PCI-X Latency Timer** | Value to be programmed into PCI-X Latency Timer Register.<br>► **Options: 32**, **64** (default), **96**, **128**, **160**, **192**, **224** and **248 PCI Bus Clocks**. |
| **Above 4G Decoding** | **Enable/Disable** (default) 64bit capable Devices to be Decoded in Above 4G Address Space (Only if System Supports 64 bit PCI Decoding). |

### 5.2.9. USB Configuration

```
                              Aptio Setup - AMI
        Advanced

   USB Configuration                                  Enables Legacy USB support.
                                                      AUTO option disables legacy
   USB Module Version           24                    support if no USB devices are
                                                      connected. DISABLE option will
   USB Controllers:                                   keep USB devices available
      1 XHCI                                          only for EFI applications.
   USB Devices:
      1 Drive, 1 Keyboard, 1 Hub

   Legacy USB Support           [Enabled]
   XHCI Hand-off                [Enabled]

   USB hardware delays and time-outs:
   USB transfer time-out        [20 sec]              ++: Select Screen
   Device reset time-out        [20 sec]              ↑↓: Select Item
   Device power-up delay        [Auto]                Enter: Select
                                                      +/-: Change Opt.
   Mass Storage Devices:                              F1: General Help
   KingstonDataTraveler 3.0PMAP [Auto]                F2: Previous Values
                                                      F9: Optimized Defaults
                                                      F10: Save & Exit
                                                      ESC: Exit


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```

The features settings are:

| Setting | Description |
|---------|-------------|
| **Legacy USB Support** | Enables/disables legacy USB support.<br>► Options available are **Enabled** (default), **Disabled** and **Auto**.<br>► Select **Auto** to disable legacy support if no USB device are connected.<br>► Select **Disabled** to keep USB devices available only for EFI applications. |
| **XHCI Hand-off** | This is a workaround for OSes without XHCI hand-off support. The XHCI ownership change should be claimed by XHCI driver.<br>► The optional settings are: **Enabled** (default) **/ Disabled**. |
| **USB Transfer time-out** | Use this item to set the time-out value for control, bulk, and interrupt transfers.<br>► Options: **1 sec, 5 sec, 10 sec, 20 sec** (default). |

| | |
|---|---|
| **Device reset time-out** | Use this item to set USB mass storage device start unit command time-out.<br>► Options available are: **10 sec, 20 sec** (default).**, 30 sec, 40 sec** |
| **Device power-up delay** | Use this item to set maximum time the device will take before it properly reports itself to the host controller. 'Auto' uses default value: for a root port it is 100 ms, for a hub port the delay is taken from hub descriptor.<br>► Options available are:<br>**Auto**: Default<br>**Manual**: Select **Manual** you can set value for the following sub-item: 'Device Power-up delay in seconds', the delay range in from 1 to 40 seconds, in one second increments. |

**5.2.10. CSM Configuration**

```
                           Aptio Setup - AMI
      Advanced

 Compatibility Support Module Configuration              Enable/Disable CSM Support.

 CSM Support                    [Enabled]

 CSM16 Module Version           07.84

 Option ROM execution

 Network                        [Do not launch]
 Storage                        [UEFI]
 Video                          [UEFI]
 Other PCI devices              [UEFI]

                                                         →←: Select Screen
                                                         ↑↓: Select Item
                                                         Enter: Select
                                                         +/-: Change Opt.
                                                         F1: General Help
                                                         F2: Previous Values
                                                         F9: Optimized Defaults
                                                         F10: Save & Exit
                                                         ESC: Exit

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```

The features settings are:

| Setting | Description |
|---|---|
| **CSM Support** | **Enable** (default) or **Disable** CSM Support. |
| **Network** | Control the execution of UEFI PXE OpROM <br> ► Options: **Do not launch** (default) and **UEFI** |
| **Storage** | Control the execution of UEFI Storage OpROM <br> ► Options: **Do not launch** and **UEFI** (default) |
| **Video** | Control the execution of UEFI Video OpROM <br> ► Options: **Do not launch** and **UEFI**(default) |
| **Other PCI devices** | Determines OpROM execution policy for devices other than network, storage or video <br> ► Options: **Do not launch** and **UEFI**(default) |

Note: Legacy video can not be displayed in UEFI mode.

### 5.2.11. NVMe Configuration

```
                              Aptio Setup – AMI
        Advanced

 NVMe Configuration

 No NVME Device Found

                                                    →←: Select Screen
                                                    ↑↓: Select Item
                                                    Enter: Select
                                                    +/-: Change Opt.
                                                    F1: General Help
                                                    F2: Previous Values
                                                    F9: Optimized Defaults
                                                    F10: Save & Exit
                                                    ESC: Exit

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```
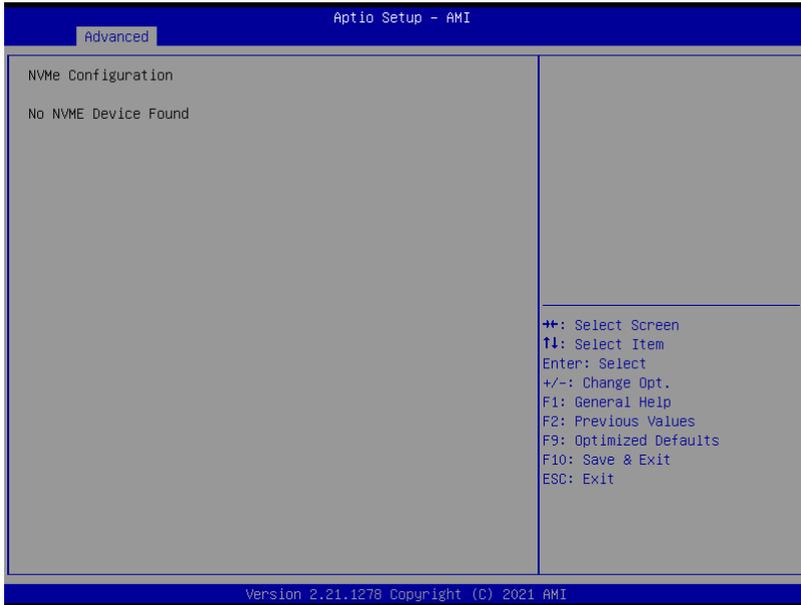
Access this submenu to view the NVMe controller and driver information.

## 5.3. Chipset

The **Chipset** menu controls the system's chipset.

```
                                Aptio Setup - AMI
        Main  Advanced  Chipset  Security  Boot  Save & Exit

    System Agent (SA) Configuration                      Memory Configuration Parameters
  ▶ Memory Configuration
  ▶ Graphics Configuration
  ▶ PEG Port Configuration
    VT-d                               [Enabled]
    Above 4GB MMIO BIOS assignment     [Disabled]

    PCH-IO Configuration
  ▶ SATA And RST Configuration
  ▶ USB Configuration
    State After G3                     [Power On]

                                                     ⇄: Select Screen
                                                     ⇅: Select Item
                                                     Enter: Select
                                                     +/-: Change Opt.
                                                     F1: General Help
                                                     F2: Previous Values
                                                     F9: Optimized Defaults
                                                     F10: Save & Exit
                                                     ESC: Exit

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```

The features settings are:

| Setting | Description |
|---|---|
| **System Agent (SA) Configuration** | |
| **Memory Configuration** | Access this submenu to view the memory configuration. |
| **Graphics Configuration** | See 5.3.1.1. Graphics Configuration on page 86 |
| **PEG Port Configuration** | PEG port options<br>**Enable Root Port:** Enable or Disable the root port.<br>► Options: **Auto** (default), **Enabled** and **Disabled**.<br>**Max Link Speed:** Configure PEG 0:1:0 Max Speed.<br>► Options: **Auto** (default), **Gen1**, **Gen 2** and **Gen3**. |
| **VT-d** | **Enable** (default) or **Disable** VT-d function |

| | |
|---|---|
| **Above 4GB MMIO BIOS assignment** | **Enable** or **Disable** (default) Above 4GB MMIO BIOS assignment. This is enabled automatically when aperture size is set to 2048MB. |
| **PCH-IO Configuration** | |
| **SATA And RST Configuration** | See 5.3.1.2. SATA And RST Configuration on page 88 |
| **USB Configuration** | See 5.3.1.3. USB Configuration on page 89 |
| **State After G3** | Specify what state to go to when power is re-applied after a power failure (G3 state).<br>► Options available are **Power On** (default), **Power Off** and **Last State**. |

### 5.3.1.1. Graphics Configuration

```
                            Aptio Setup - AMI
          Chipset

 Graphics Configuration                                  Select which of IGFX/PEG/PCI
                                                         Graphics device should be
 Primary Display               [Auto]                    Primary Display Or select SG
 Internal Graphics             [Auto]                    for Switchable Gfx.
 GTT Size                      [8MB]
 Aperture Size                 [256MB]
 DVMT Pre-Allocated            [32M]
 DVMT Total Gfx Mem            [256M]


                                                         ++: Select Screen
                                                         ↑↓: Select Item
                                                         Enter: Select
                                                         +/-: Change Opt.
                                                         F1: General Help
                                                         F2: Previous Values
                                                         F9: Optimized Defaults
                                                         F10: Save & Exit
                                                         ESC: Exit



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```

The features settings are:

| Setting | Description |
|---|---|
| **Primary Display** | Select the Graphics device which will be activated as Primary Display.<br>► Options available are **Auto** (default), **IGFX, PEG** and **PCI** |
| **Internal Graphics** | Enables/disables the IGD.<br>► Options available are **Auto** (default), **Disabled,** and **Enabled.** |
| **GTT Size** | Select the GTT Size.<br>► Options: **4MB, 2MB** and **8MB** (default)**.** |
| **Aperture Size** | Select the Aperture Size. Note that above 4GB MMIO BIOS assignment is automatically enabled when selecting 2048MB aperture. To use this feature, please disable CSM support.<br>► Options: **128MB**, **256MB** (default)**, 512MB**, **1024MB** and **2048MB** |

| DVMT Pre-Allocated | Select the DVMT 5.0 Pre-allocated (Fixed) Graphic Memory size used by the Internal Graphic Device.<br>► 32M is the default. |
|---|---|
| DVMT Total Gfx Mem | Select the DVMT 5.0 Total Graphic Memory size used by the Internal Graphic Device.<br>► Options: **128M, 256M** (default) and **Max.** |

### 5.3.1.2. SATA And RST Configuration

```
                              Aptio Setup - AMI
            Chipset

  SATA And RST Configuration                        ▲  Enable/Disable SATA Device.

  SATA Controller(s)              [Enabled]
  SATA Mode Selection             [AHCI]
  Aggressive LPM Support          [Disabled]

  Serial ATA Port 0               Empty
    Port 0                        [Enabled]

  Serial ATA Port 1               2.5" SATA SSD  (31.0GB)
    Port 1                        [Enabled]

  Serial ATA Port 2               Empty
    Port 2                        [Enabled]                ++: Select Screen
                                                           ↑↓: Select Item
  Serial ATA Port 3               Empty                    Enter: Select
    Port 3                        [Enabled]                +/-: Change Opt.
                                                           F1: General Help
  Serial ATA Port 4               Empty                    F2: Previous Values
    Port 4                        [Enabled]                F9: Optimized Defaults
                                                           F10: Save & Exit
  Serial ATA Port 5               Empty                    ESC: Exit
    Port 5                        [Enabled]

  Serial ATA Port 6               Empty                 ▼

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```

The features settings are:

| Setting | Description |
|---|---|
| **SATA Controller(s)** | **Enables** (default) **/ Disables** SATA device(s). |
| **SATA Mode selection** | Determines how SATA controller operate. **AHCI** (default) **/ Intel RST Premium With Intel Optane System Acceleration** |
| **Aggressive LPM Support** | **Enables** / **Disables**(default) PCH to aggressively enter link power state. |
| **Serial ATA Port 0~6** | SATA device information. **Enables** (default) / **Disables** the SATA port. *Available SATA ports depend on your model. |

## 5.3.1.3. USB Configuration

```
                              Aptio Setup - AMI
        Chipset

 USB Configuration                                    Option to enable Compliance
                                                      Mode. Default is to disable
 XHCI Compliance Mode              [Disabled]         Compliance Mode. Change to
 xDCI Support                      [Disabled]         enabled for Compliance Mode
                                                      testing.




                                                      →←: Select Screen
                                                      ↑↓: Select Item
                                                      Enter: Select
                                                      +/-: Change Opt.
                                                      F1: General Help
                                                      F2: Previous Values
                                                      F9: Optimized Defaults
                                                      F10: Save & Exit
                                                      ESC: Exit




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```

The features settings are:

| Setting | Description |
| --- | --- |
| **XHCI Disable Compliance Mode** | Options to disable Compliance Mode. Default is **FALSE** (default) to not disable Compliance Mode. Set **TRUE** to disable Compliance Mode. |
| **xDCI Support** | **Enable** / **Disable** (default) xDCI (USB OTG Device). |

## 5.4. Security

```
                          Aptio Setup - AMI
    Main  Advanced  Chipset  Security  Boot  Save & Exit

   Password Description                              Set Administrator Password

   Minimum length                3
   Maximum length                20

   Administrator Password

 ▶ Secure Boot

                                                    ↔: Select Screen
                                                    ↑↓: Select Item
                                                    Enter: Select
                                                    +/-: Change Opt.
                                                    F1: General Help
                                                    F2: Previous Values
                                                    F9: Optimized Defaults
                                                    F10: Save & Exit
                                                    ESC: Exit


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```
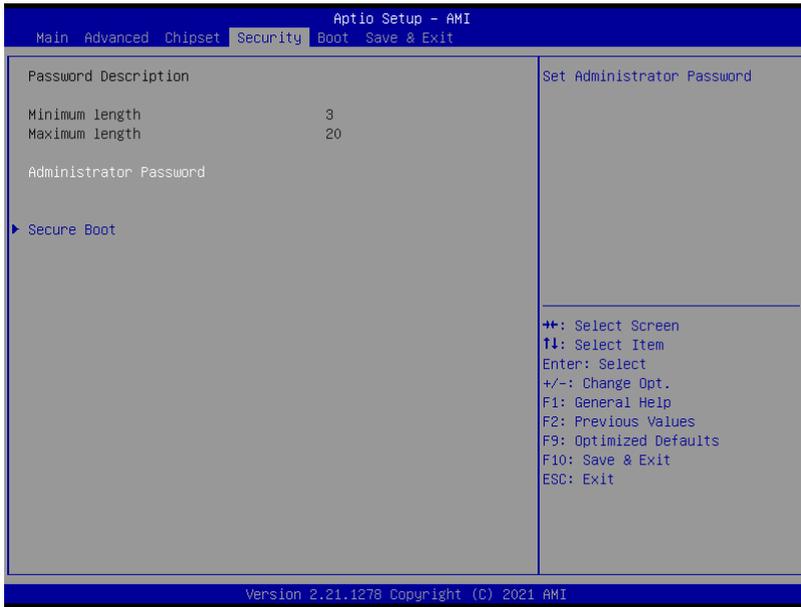
The features settings are:

| Setting | Description |
|---------|-------------|
| **Administrator Password** | To set up an administrator password:<br>1. Select **Administrator Password**.<br>2. An **Create New Password** dialog then pops up onscreen.<br>3. Enter your desired password that is no less than 3 characters and no more than 20 characters.<br>4. Hit [Enter] key to submit. |
| **Security Boot** | See <u>5.4.1. Security Boot on page 91</u>. |

## 5.4.1. Security Boot

```
                        Aptio Setup – AMI
            Security

 System Mode                Setup                    Secure Boot feature is Active
                                                     if Secure Boot is Enabled,
 Secure Boot                [Disabled]               Platform Key(PK) is enrolled
                            Not Active               and the System is in User mode.
                                                     The mode change requires
 Secure Boot Mode           [Custom]                 platform reset
 ▶ Restore Factory Keys
 ▶ Reset To Setup Mode

 ▶ Key Management
                                                     �: Select Screen
                                                     ↑↓: Select Item
                                                     Enter: Select
                                                     +/-: Change Opt.
                                                     F1: General Help
                                                     F2: Previous Values
                                                     F9: Optimized Defaults
                                                     F10: Save & Exit
                                                     ESC: Exit

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```

The features settings are:

| Setting | Description |
|---|---|
| **Secure Boot** | **Enable**/**Disable** (default) secure boot. |
| **Secure Boot Mode** | Allow users to set the secure boot selector. **Standard**/**Custome** (default) mode. |
| **Restore Factory Keys** | Force system to restore default secure boot key database. |
| **Reset to Setup Mode** | Delete all secure boot key databases. |
| **Key Management** | Allow users to modify secure variables and set key management page. |

## 5.5. Boot

```
                          Aptio Setup – AMI
      Main  Advanced  Chipset  Security  Boot  Save & Exit
┌──────────────────────────────────────────┬─────────────────────────────┐
│ Boot Configuration                        │ Number of seconds to wait for│
│ Setup Prompt Timeout         1            │ setup activation key.        │
│ Bootup NumLock State         [On]         │ 65535(0xFFFF) means indefinite│
│ Quiet Boot                   [Disabled]   │ waiting.                     │
│                                           │                             │
│ Boot Option Priorities                    │                             │
│ Boot Option #1               [Windows Boot Manager                      │
│                              (P1: 2.5'' SATA SSD                         │
│                              3MG2-P)]     │                             │
│ Boot Option #2               [Windows Boot Manager                      │
│                              (M.2 (P42) 3TE6)]                           │
│ Boot Option #3               [UEFI:       │                             │
│                              KingstonDataTraveler                       │
│                              3.0PMAP, Partition 1] │                    │
│                                           │ ↔: Select Screen            │
│                                           │ ↑↓: Select Item             │
│ ▶ Power Delay Function                    │ Enter: Select               │
│                                           │ +/-: Change Opt.            │
│                                           │ F1: General Help            │
│                                           │ F2: Previous Values         │
│                                           │ F9: Optimized Defaults      │
│                                           │ F10: Save & Exit            │
│                                           │ ESC: Exit                   │
│                                           │                             │
└──────────────────────────────────────────┴─────────────────────────────┘
              Version 2.21.1278 Copyright (C) 2021 AMI
```
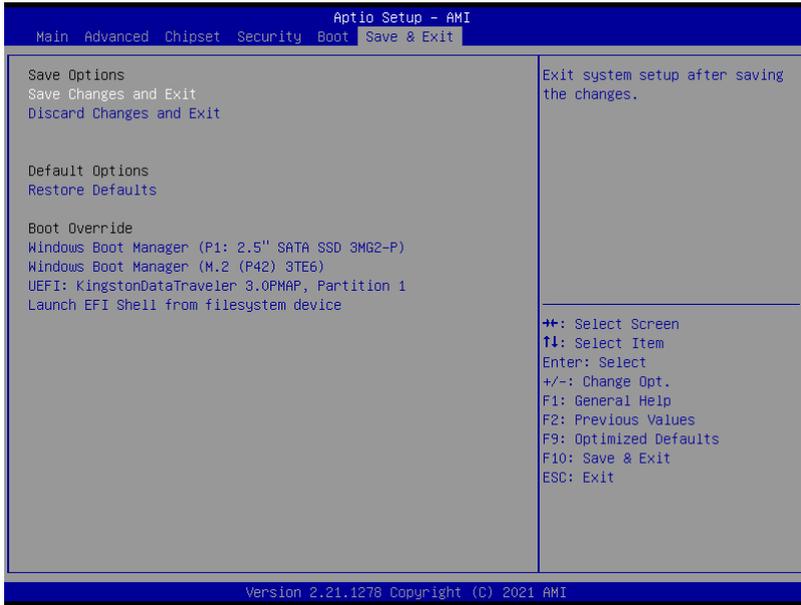
The features settings are:

| Setting | Description |
|---|---|
| **Setup Prompt Timeout** | Set how long to wait for the prompt to show for entering BIOS Setup.<br>► The default setting is **1** (sec).<br>► Set it to **65535** to wait indefinitely. |
| **Bootup NumLock State** | Sets whether to enable or disable the keyboard's NumLock state when the system starts up.<br>► Options available are **On** (default) and **Off**. |
| **Quiet Boot** | Sets whether to display the POST (Power-on Self Tests) messages or the system manufacturer's full screen logo during booting.<br>► Select **Disabled** to display the normal POST message, which is the default. |
| **Boot Option Priority** | Set the system boot priorities. |

| Hard Drive BBS Priorities | Sets the order of the legacy devices in this group. BBS means "BIOS Boot Specification". |
|---|---|
| **Power Delay Function** | **Power Delay Function**<br>Set the system support power delay function.<br>► Options:<br> **Enable** (default)**:** Support power delay function.<br> **Disable:** Power on/off manually operated.<br><br>**Power on delay**<br>Select the time which the system will power on.<br>► Options: **Manually Operator** (default), **04 Seconds**, **08 Seconds** and **16 Seconds**.<br><br>**Power off delay**<br>Select the time which the system will shutdown.<br>► Options: **Manually Operator** (default), **30 Seconds**, **60 Seconds** and **90 Seconds**. |

## 5.6. Save & Exit

```
                        Aptio Setup - AMI
    Main   Advanced   Chipset   Security   Boot   Save & Exit

 ┌─────────────────────────────────────────┐ ┌────────────────────────────┐
 │ Save Options                             │ │ Exit system setup after saving │
 │ Save Changes and Exit                    │ │ the changes.                │
 │ Discard Changes and Exit                 │ │                             │
 │                                          │ │                             │
 │                                          │ │                             │
 │ Default Options                          │ │                             │
 │ Restore Defaults                         │ │                             │
 │                                          │ │                             │
 │ Boot Override                            │ │                             │
 │ Windows Boot Manager (P1: 2.5" SATA SSD 3MG2-P) │ │                       │
 │ Windows Boot Manager (M.2 (P42) 3TE6)    │ │                             │
 │ UEFI: KingstonDataTraveler 3.0PMAP, Partition 1 │ │                       │
 │ Launch EFI Shell from filesystem device  │ │                             │
 │                                          │ │ →←: Select Screen           │
 │                                          │ │ ↑↓: Select Item             │
 │                                          │ │ Enter: Select               │
 │                                          │ │ +/-: Change Opt.            │
 │                                          │ │ F1: General Help            │
 │                                          │ │ F2: Previous Values         │
 │                                          │ │ F9: Optimized Defaults      │
 │                                          │ │ F10: Save & Exit            │
 │                                          │ │ ESC: Exit                   │
 └─────────────────────────────────────────┘ └────────────────────────────┘

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```

The features settings are:

| Setting | Description |
|---------|-------------|
| **Save Changes and Reset** | Saves the changes and quits the BIOS Setup utility. |
| **Discard Changes and Exit** | Quits the BIOS Setup utility without saving the change(s). |
| **Restore Defaults** | Restores all settings to defaults.<br>► This is a command to launch an action from the BIOS Setup utility. |
| **Boot Override** | **Boot Override** presents a list in context with the boot devices in the system.<br>► **P0:** Select the device to boot up the system regardless of the currently configured boot priority.<br>► **Launch EFI Shell from filesystem device:** Attempts to launch EFI Shell Application (Shell.efi) from one of the available filesystem devices. |

# Appendices

## A: Digital I/O Setting

Digital I/O can read from or write to a line or an entire digital port, which is a collection of lines. This mechanism helps users achieve various applications such as industrial automation, customized circuit, and laboratory testing. Take the source code below that is written in C for the digital I/O application example.

**Sample Codes:**

```
/*----------------------------------------------------------------------
----*/
#include <math.h>
#include <stdio.h>
#include <dos.h>

int sioIndex  = 0x2E;
int sioData   = 0x2F;

int main(void)
{
        int iData;

        SioGPIOMode(0xFF00);
        delay(2000);

        SioGPIOData(0x5500);
        delay(2000);

    iData = SioGPIOStatus();
    printf(" Input : %2x \n",iData);
    delay(2000);

        SioGPIOData(0xAA00);
        delay(2000);

    iData = SioGPIOStatus();
    printf(" Input : %2x \n",iData);
    delay(2000);

        return 0;
}

void SioGPIOMode(int iMode)
{
        int iTemp;

    outportb(sioIndex,0x87);                          /*    Enable
Super I/O */
    outportb(sioIndex,0x87);

    outportb(sioIndex,0x07);                          /*    Select
```

```
logic device – GPIO */
    outportb(sioData, 0x06);

    outportb(sioIndex,0x30);                              /*    Enable
GPIO */
    outportb(sioData, 0x01);

        iTemp = iMode & 0x00FF;
    outportb(sioIndex,0xA0);                              /*      GPIO
50~57 - Output Enable */
    outportb(sioData,iTemp);

        iTemp = (iMode & 0xFF00) >> 8;
    outportb(sioIndex,0xF0);                              /*      GPIO
00~07 - Output Enable */
    outportb(sioData,iTemp);


        outportb(sioIndex,0xAA);                          /*    Disable
Super I/O */
}

void SioGPIOData(int iData)
{
        int iTemp;

    outportb(sioIndex,0x87);                              /*    Enable
Super I/O */
    outportb(sioIndex,0x87);

    outportb(sioIndex,0x07);                              /*    Select
logic device – GPIO */
    outportb(sioData, 0x06);

        iTemp = iData & 0x00FF;
    outportb(sioIndex,0xA1);                              /*      GPIO
50~57 - Output Data */
    outportb(sioData,iTemp);

        iTemp = (iData & 0xFF00) >> 8;
    outportb(sioIndex,0xF1);                              /*      GPIO
00~07 - Output Data */
    outportb(sioData,iTemp);

        outportb(sioIndex,0xAA);                          /*    Disable
Super I/O */
}

int SioGPIOStatus()
{
        int iStatus;
        int iTemp;
```

```
    outportb(sioIndex,0x87);                              /*   Enable
Super I/O */
    outportb(sioIndex,0x87);

    outportb(sioIndex,0x07);                              /*   Select
logic device – GPIO */
    outportb(sioData, 0x06);

        outportb(sioIndex,0xA2);                          /*    GPIO
50~57 - Status */
    iTemp = inportb(sioData);

        outportb(sioIndex,0xF2);                          /*    GPIO
00~07 - Status */
    iStatus = inportb(sioData);

        outportb(sioIndex,0xAA);                          /*   Disable
Super I/O */

        iStatus = (iStatus<<8) + iTemp;

        return iStatus;
}
```

## B: Watchdog Timer (WDT) Setting

WDT is widely used for industry application to monitor the activity of CPU. Application software depends on its requirement to trigger WDT with adequate timer setting. Before WDT time out, the functional normal system will reload the WDT. The WDT never time out for a normal system. The WDT will not be reloaded by an abnormal system, then WDT will time out and auto-reset the system to avoid abnormal operation.

This computer supports 255 levels watchdog timer by software programming I/O ports.

Below is an assembly program example to disable and load WDT.

**Sample Codes:**

```
/*----------------------------------------------------------------------
----*/
#include <math.h>
#include <stdio.h>
#include <dos.h>

int sioIndex  = 0x4E;              /* or 0x2E */
int sioData   = 0x4F;              /* or 0x2F */

int main(void)
{
        int     iCount;
        printf("WDT Times ( 1 ~ 255 ) : \0");
        scanf("%d",&iCount);
        printf("\n");

        SioWDTStart(iCount);

        while(1)
        {
                iCount = SioWDTCount();
                printf("\r Counts : %d ",iCount);
                sleep(1);
        }

        return 0;
}

void SioWDTStart(int iCount)
{
        outportb(sioIndex, 0x87);                          /*    Enable
Super I/O */
```

```
        outportb(sioIndex, 0x87);

    outportb(sioIndex, 0x07);                                /*    Select
logic device - WDT */
    outportb(sioData,  0x07);

    outportb(sioIndex, 0x30);                                /*    Enable
WDT */
    outportb(sioData,  0x01);

        outportb(sioIndex, 0xFA);                            /*    Enable
WDTRST# Output */
        outportb(sioData,  0x01);

    outportb(sioIndex, 0xF6);                                /* Set  WDT
Timeout value */
    outportb(sioData,  iCount);

    outportb(sioIndex, 0xF5);                                /*        Set
Configure and Enable WDT timer, Start countdown */
    outportb(sioData,  0x32);

        outportb(sioIndex, 0xAA);                            /*    Disable
Super I/O */

}

void SioWDTStop(void)
{
        outportb(sioIndex, 0x87);                            /*    Enable
Super I/O */
        outportb(sioIndex, 0x87);

    outportb(sioIndex, 0x07);                                /*    Select
logic device - WDT */
    outportb(sioData,  0x07);

        outportb(sioIndex, 0xF5);                            /*    Disable
WDT timer, stop countdown */
        outportb(sioData,  0x12);

        outportb(sioIndex, 0xAA);                            /*    Disable
Super I/O */
}

void SioWDTClear(int iCount)
{
        outportb(sioIndex, 0x87);                            /*    Enable
Super I/O */
        outportb(sioIndex, 0x87);

    outportb(sioIndex, 0x07);                                /*    Select
```

```
logic device – WDT */
    outportb(sioData,  0x07);

        outportb(sioIndex, 0xF6);                        /* Reset WDT
Timeout Value */
        outportb(sioData,  iCount);

        outportb(sioIndex, 0xAA);                        /*  Disable
Super I/O */
}

int SioWDTCount(void)
{
    int iData;

        outportb(sioIndex, 0x87);                        /*    Enable
Super I/O  */
        outportb(sioIndex, 0x87);

    outportb(sioIndex, 0x07);                            /*    Select
logic device – WDT */
    outportb(sioData,  0x07);

    outportb(sioIndex, 0xF6);                            /* Get count
of timer */
    iData = inportb(sioData);

    outportb(sioIndex, 0xAA);                            /*  Disable
Super I/O */

    return iData;
}
```