
FPC-9107 Series

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

User's Manual

Version 1.0



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Revision History

Version	Release Time	Description
1.0	2021.07	Initial release

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Copyright Notice

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Under no circumstances will the manufacturer be liable for any direct, indirect, special, incidental, or consequential damages arising from the use or inability to use the product or documentation, even if advised of the possibility of such damages.

This document contains proprietary information protected by copyright. All rights are reserved. No part of this document may be reproduced by any mechanical, electronic, or other means in any form without prior written permission of the manufacturer.

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.

Preface

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



- Intel 10th 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 storage 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

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 1 x Intel® WGI219LM PCIe controllers w/ iAMT14.0 6 x Intel® WGI211AT PCIe controllers for PoE (FPC-9107-P6-G2) 2 x Intel® WG82583V GbE controllers (FPC-9107-L2U4-G2)
Watchdog Timer	1~255 levels reset
I/O	
Serial Port	2 x RS-232/422/485 configurable (default RS-232) 2 x RS-232(FPC-9107-L2U4-G2)
USB Port	2 x USB 3.2 Gen2 (10Gbps) / 2.0 ports Internal USB dongle (FPC-9107-L2U4-G2) 2 x USB 3.2 Gen2 (10Gbps) / 2.0 ports 4 x USB 3.2 Gen1 (5Gbps) / 2.0 ports Internal USB dongle
LAN	2 x RJ-45 ports for GbE 6 x RJ-45 ports for PoE (Power budget 60W) (FPC-9107-P6-G2)
Video Port	1 x HDMI (Max resolution: 4096 x 2160 @24Hz) 1 x DB-15 female connector for Analog RGB
Digital I/O Port	(FPC-9107-P6-G2) 16 x DI, 16 x DO (1.5KV isolation protection / DO supports 24V 200mA) (FPC-9107-L2U4-G2) 16 x DI, 16 x DO (1.5KV isolation protection / DO supports 24V 200mA)
Audio	Mic-in/Line-out

Introduction

Expansion Bus	1 x mini-PCI Express Slots interconnected with SIM card sockets for optional WiFi/BT/3G/LTE/ GPS (PClex1+USB2.0, Full Size)
	1 x M.2 E key (2230) with PClex1+USB2.0, for Wireless
	1 x M.2 B key (2242/3052/2280) w/ (PClex2+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) 65W TDP CPU : -20 ~ 55°C (-4 ~ 131°F) 35W TDP CPU : -20 ~ 70°C (-4 ~ 158°F) w/ NVIDIA® Tesla T4 : -20 ~ 50°C (-4 ~ 122°F) 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)
Ignition Switch	2-pin terminal block: IGN, GND
Storage	
Type	2 x 2.5" drive bays (outside accessible)
	1 x M.2 B key (2242/3052/2280) w/ (PClex2+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-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	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
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FAN-9107T4-2	Thermal kit for 2x Nvidia® Tesla T4 GPU Card
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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.

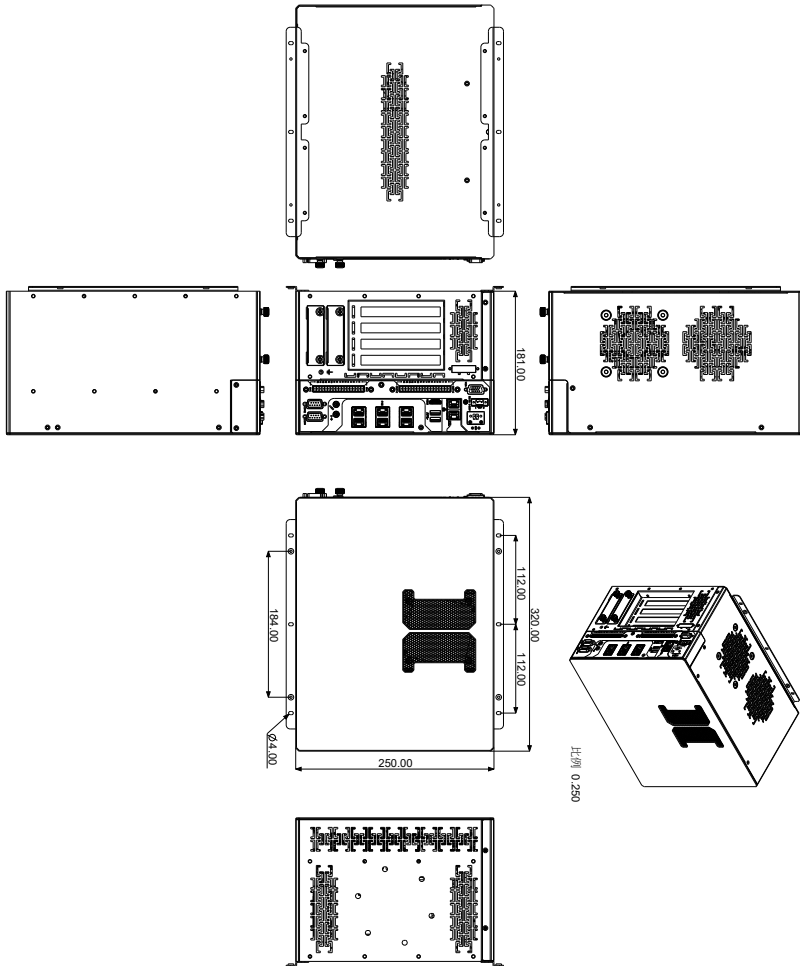
MK-4C-4G/8G/16G/32G	DDR4-2400 4GB/8GB/16GB/32G(DDR4-2933) SDRAM DIMM kit	
WIFI-IN2550	Intel AX200NGW M.2 Wi-Fi 6 module w/ 2 x 30cm internal wires	
ANT-H11	1 x 2dBi HSUPA antenna	
ANT-D11	1 x WiFi dual-band 2.4G/5G antenna	
Xeon® W-1250E	Intel® Xeon® W-1250E processor, L2/12M, 3.5G	
Core™ i9-10900E	Intel® 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	
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	

Chapter 2

System Overview

2.1. Dimensions

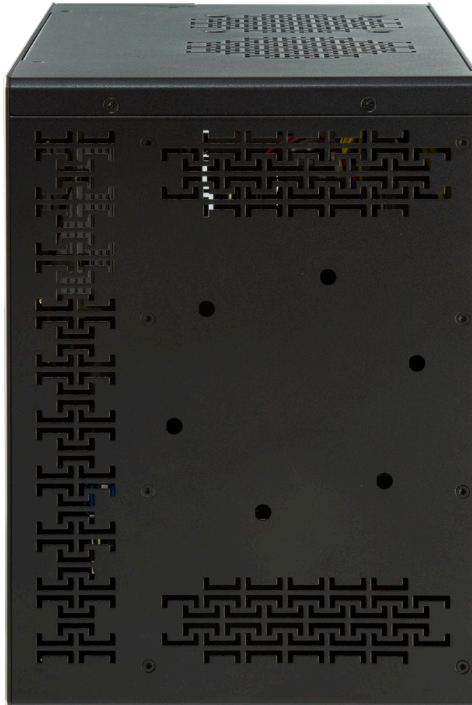
FPC-9107-P6-G2



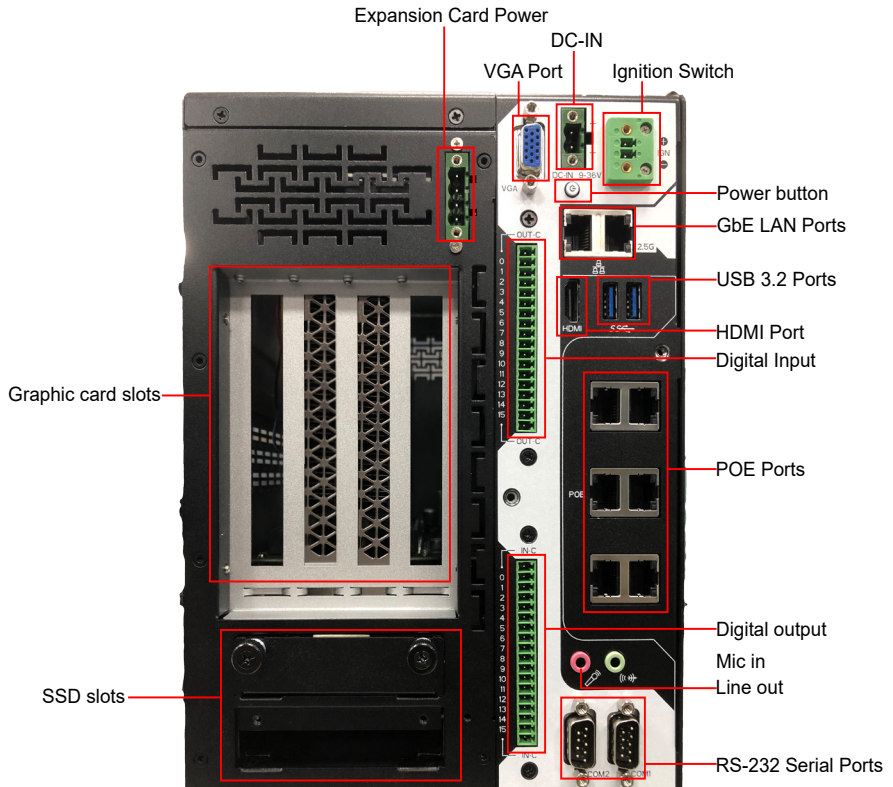
2.2. Take A Tour

2.2.1. FPC-9107-P6-G2

2.2.1.1 Front View



2.2.1.2 Rear View



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 downloaded file and follow the sequence below to install the drivers:

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

The driver path is listed as below:

Windows 10

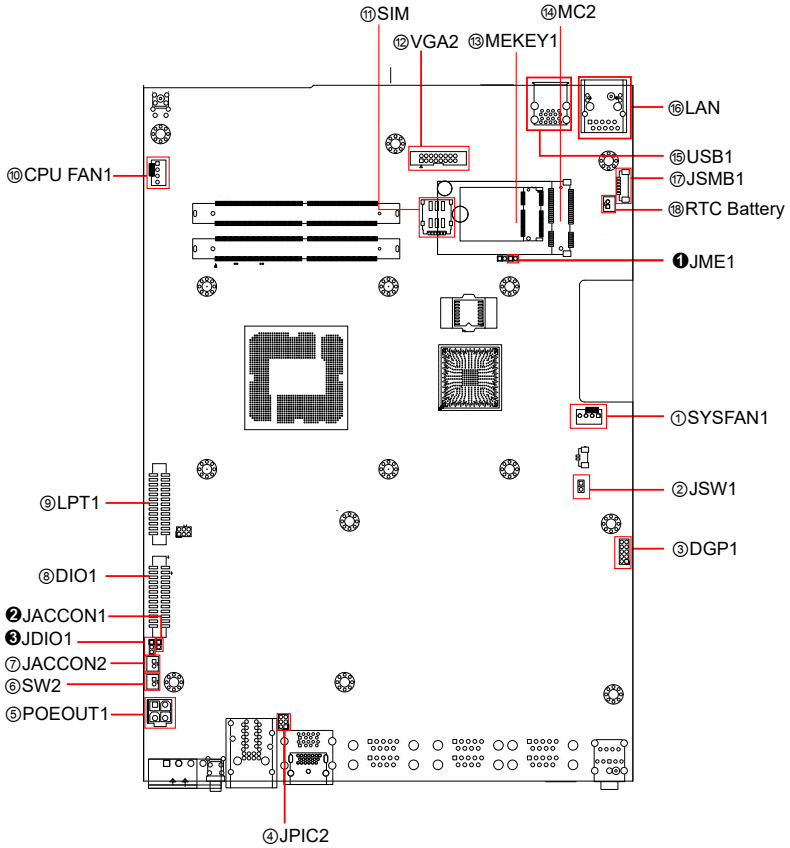
Driver	Path
Chipset	\\WIN10\Chipset\10.1.1.42\SetupChipset.exe
LAN	\\WIN10\Ethernet\PROWinx64.exe
VGA	\\WIN10\Graphics\Setup.exe
Audio	\\WIN10\AUDIO\0006-64bit_Win7_Win8_Win81_Win10_R279.exe
ME	\\WIN10\ME_11.6\SetupME.exe

Chapter 3

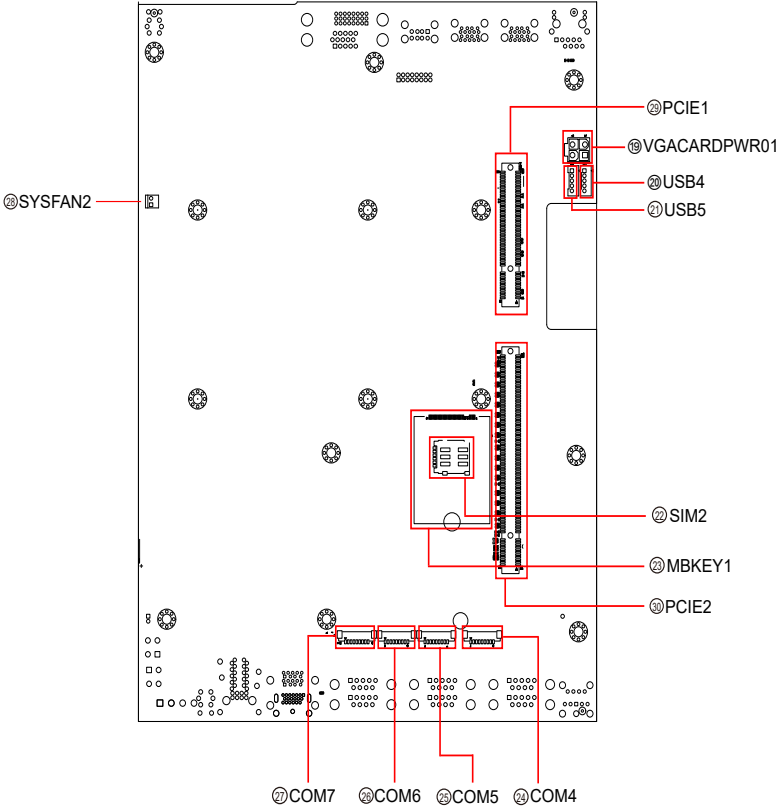
System Configuration

3.1. Board Layout

Board Top



Board Bottom



Engine of the Computer

Jumpers

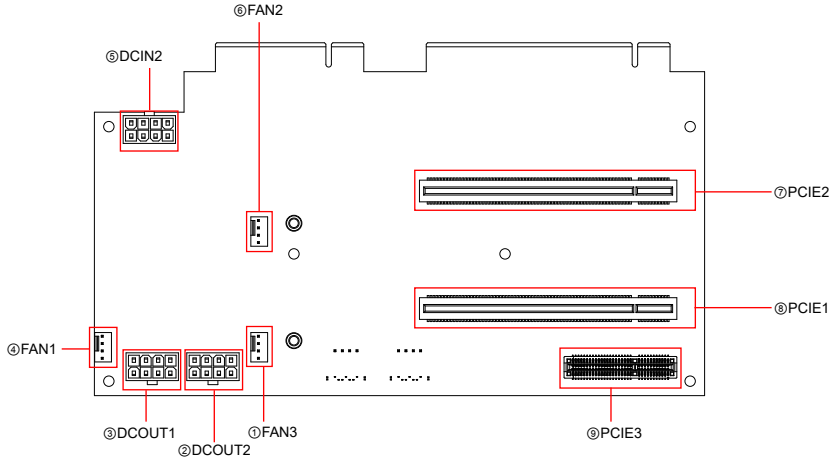
Label	Description
① JME1	Clear CMOS selection
② JACCON1	ACC ON Mode selection
③ JDIO1	Ignition power mode

Connectors

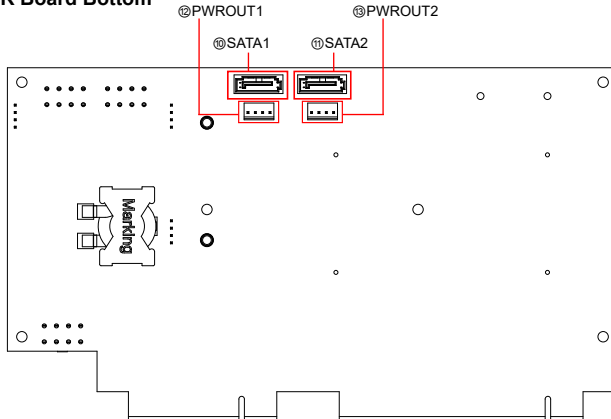
Label	Description
① SYSFAN1	Fan power connector
② JSW1	System reset pin header
③ DGP1	External 80 port pin header
④ JPIC2	Vcore IC debug pin header
⑤ POEOUT1	PoE power connector
⑥ SW2	System switch
⑦ JACCON2	Ignition Power connector
⑧ DIO1	Digital IO Connector
⑨ LPT1	On-board parallel port connector
⑩ CPUFAN1	Fan power connector
⑪ SIM	Nano SIM card socket
⑫ VGA2	Analog RGB
⑬ MEKEY1	M.2 E-Key socket
⑭ MC2	PCI Express Mini-card socket
⑮ USB1	USB Connector
⑯ LAN1	GbE RJ-45 Ethernet connector
⑰ JSMB1	SMbus wafer connector
⑱ RTC Battery	RTC Battery
⑲ VGACARDPWR1	Power output for VGA card
⑳ ㉑ USB4,5	USB wafer connector
㉒ SIM2	Nano SIM card socket
㉓ MC2	M.2 B-Key socket

②④ ②⑤	COM4, COM5	RS232 connector
②⑥ ②⑦	COM6, COM7	RS232/RS422/RS485 connector
②⑧	SYSFAN2	Fan power connector
②⑨	PCIE1	PCI Expansion Slot
③⑩	PCIE2	PCI Expansion Slot

SCDB-469R Board Top



SCDB-469R Board Bottom



Connectors



Label	Description
① FAN3	Fan power connector
② ③ DCOUT1, 2	System power output connector
④ FAN1	Fan power connector
⑤ DCIN2	System power input connector
⑥ FAN2	Fan power connector
⑦ PCIE2	PCI Expansion Slot
⑧ PCIE1	PCI Expansion Slot
⑨ PCIE3	PCI Expansion Slot
⑩ ⑪ SATA1, 2	Serial SATA connector
⑫ ⑬ PWROUT1, 2	SATA HDD power connector

3.2. Jumpers and Connectors

3.2.1. Jumpers



① JME1

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

Pin	Description	
Short	Clear CMOS	
Open	Keep CMOS (default)	



② 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	

③ 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: Onboard 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



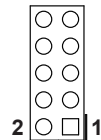
③ DGP1

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



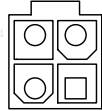
⑤ POEOUT1

Function: PoE Power Connector

Connector Type: 2.54mm-pitch 4-pin header

Pin Assignment:

Pin	Desc.
1	GND
2	GND
3	DCIN
4	DCIN



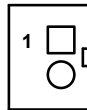
⑥ SW2

Function Power Button

Connector Type: Onboard 2x1-pin box connector

Pin Assignment:

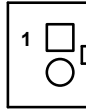
Pin	Description
1	PWR_IN_SW#
2	GND



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:

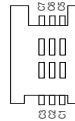
Pin	Desc.	Pin	Desc.
1	STB#	14	AFD#
2	PD0	15	ERR#
3	PD1	16	INIT#
4	PD2	17	SLIN#
5	PD3	18	GND
6	PD4	19	GND
7	PD5	20	GND
8	PD6	21	GND
9	PD7	22	GND
10	ACK#	23	GND
11	BUSY	24	GND
12	PE	25	GND
13	SLCT	26	N.C



⑩ 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

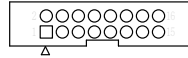


⑫ **VGA2**

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

Pin Assignment:

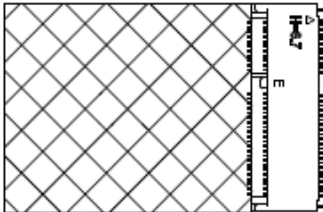
Pin	Desc.	Pin	Desc.
1	RED	9	+5V
2	GREEN	10	GND
3	BLUE	11	N/C
4	N/C	12	VDDAT
5	GND	13	HSYNC
6	GND	14	VSYNC
7	GND	15	VDCLK
8	GND		



⑬ **MEKEY1**

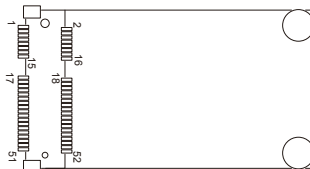
Function: M.2 E-Key socket (w/ PCIe + USB 2.0)
 for optional Wi-Fi/BT

Connector Type: M.2 E-Key 2230 Socket
Pin Assignment: The pin assignments conform to the industry standard.



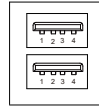
⑭ **MC2**

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

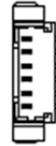
Function: Dual GbE RJ-45 Ethernet connectors
Connector Type: RJ-45 connector that supports 10/100/1000Mbps fast Ethernet
Pin Assignment: The Pin assignment conform to the industry standard.



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:

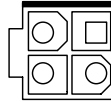
Pin	Desc.
1	BAT+
2	BAT-



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



⑳ ㉑ **USB4, 5**

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

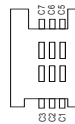
Pin	Description.
1	+5V
2	D-
3	D+
4	GND
5	GND



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.

②④ ②⑤ 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

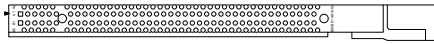
Pin Assignment: The pin assignments conform to the industry standard.



⑩ 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: Onboard 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: onboard 2.54mm pitch 8-pin wafer

Pin Assignment:

Pin Description

1	GND
---	-----

2	GND
---	-----

3	GND
---	-----

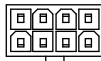
4	GND
---	-----

5	+V12S
---	-------

6	+V12S
---	-------

7	+V12S
---	-------

8	SENSE
---	-------



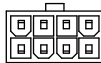
⑤ **DCIN (DCIN2)**

Function: DC in

Connector Type: onboard 2.54mm pitch 8-pin wafer

Pin Assignment:

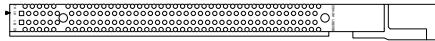
Pin	Pin Description
1	GND
2	GND
3	GND
4	GND
5	DCIN
6	DCIN
7	DCIN
8	DCIN



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.



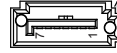
⑩ ⑪ SATA1, 2

Function: Serial ATA Connector

Connector Type: On-board Standard 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

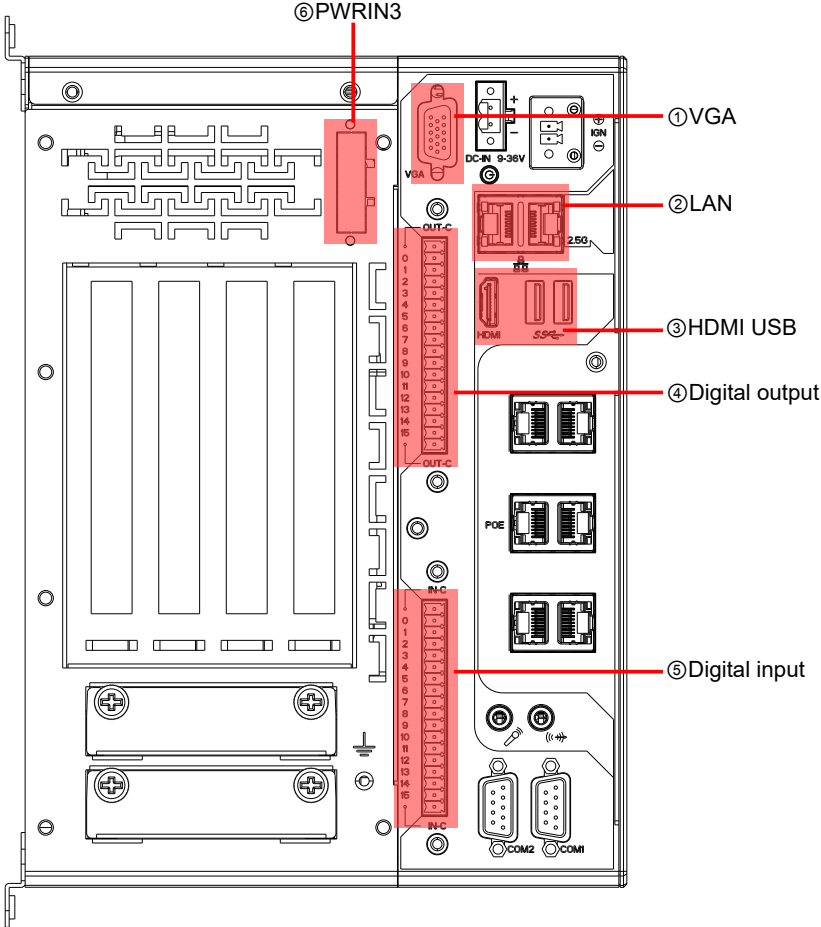
Function: SATA HDD Power Connector

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

Pin Assignment:

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



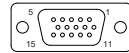


Engine of the Computer

① VGA1

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

Analog RGB



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.

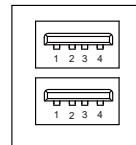


③ HDMIUSB1

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

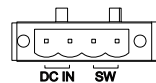
Function: Digital In Connector
Connector Type: 2.0mm pitch 2x13 pin box header

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

⑥ PWRIN3

Function: DC Adapter Power Input for expansion card
Connector Type: 4-Pin Terminal block
Pin Assignment:



Pin	Desc.
1	VIN+
2	VIN-
3	Switch-
4	Switch+

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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

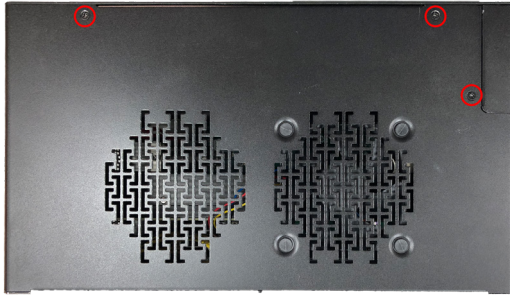
All jumpers, CPU socket, MiniCard socket, SDRAM SO-DIMM slots, DIO/LPT ports are built on the top side of the main board. To access these components, the computer's top cover has to be removed. Follow through the steps below to remove the top cover.

FPC-9107

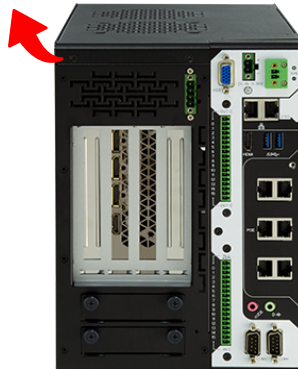
1. Loosen and remove the 4 screws as shown below.



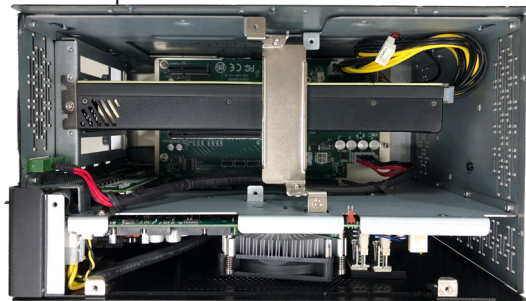
2. Loosen and remove the 3 screws on the top panels respectively as shown below.



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.

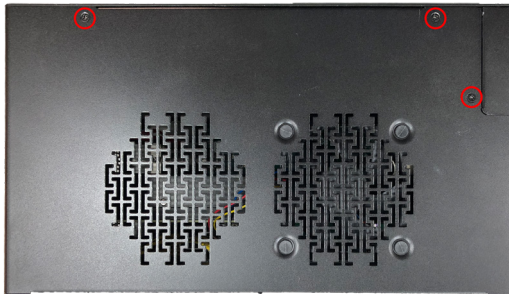


4.1.1.3. Remove Side Cover

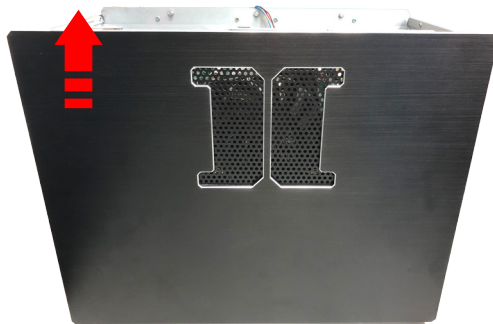
1. Loosen and remove the 2 screws at the bottom as shown below.



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.

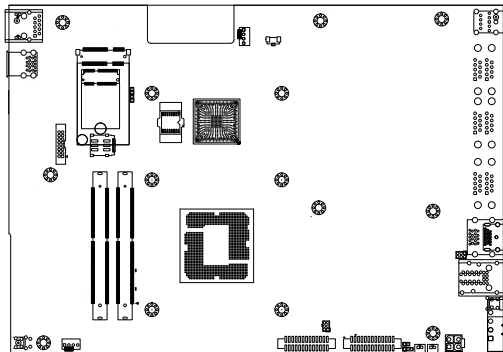


The inside of the computer comes to view.



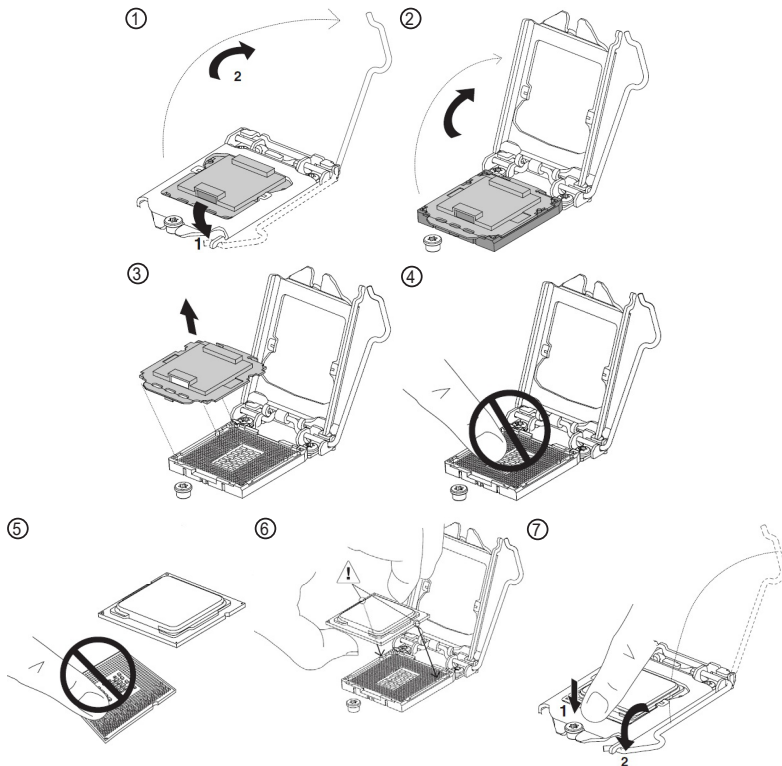
4.1.2. Install CPU

1. Remove the top and side cover from the computer as described in [4.1.1.3. Remove Side Cover](#) on page [40](#).
2. Locate the CPU socket on the main board



Installation & Maintenance

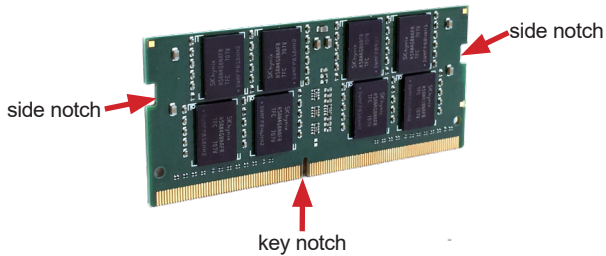
The processor socket comes with a lever to secure the processor. Please refer to the pictures step by step as below and note that the cover of the socket must always be be installed during transportation to avoid damage to the socket.



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.

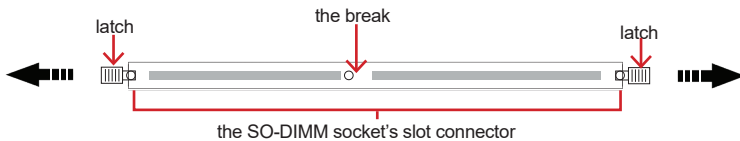


To install a DDR4 memory module:

1. Remove the side cover from the computer as described in [4.1.1.3. Remove Side Cover](#) on page 40.
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.

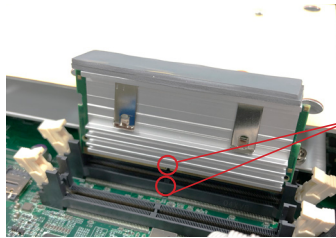
3. Pull back both latches from the socket.



vertical-type SO-DIMM socket (overview)

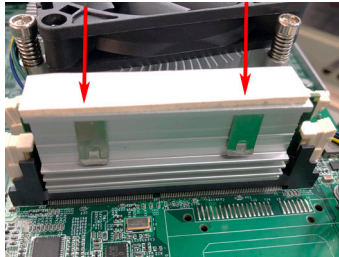
4. Confront the memory module's edge connector side at the SO-DIMM socket. Position the memory module at the SO-DIMM socket, with the memory module's key notch aligned at the break of the SO-DIMM's slot connector.

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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.

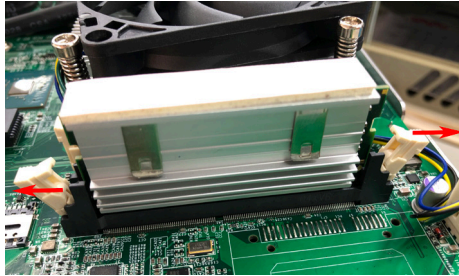


6. Restore the top and side cover to the computer.

To uninstall a DDR4 memory module:

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

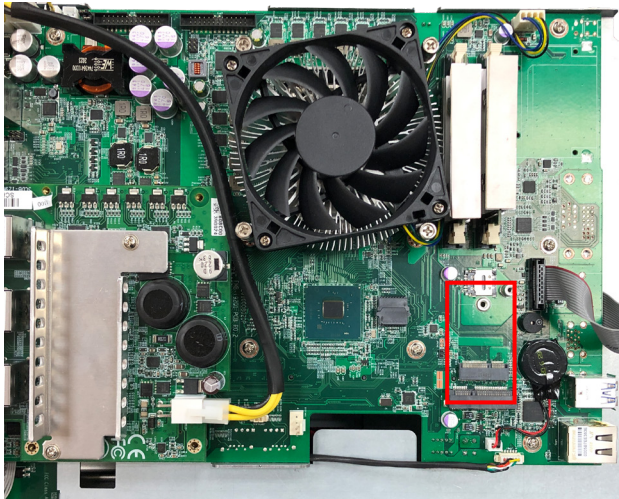
The DDR4 memory module will be auto-released from the socket.



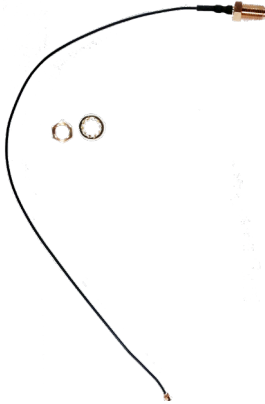
2. Remove the memory module.
3. Restore the top cover to the computer.

4.1.4. Install Wi-Fi Module

1. Remove the side cover from the computer as described in [Section 4.1.1.3. Remove Side Cover on page 40.](#)
2. Locate the **M.2 E-Key** socket for wireless module.



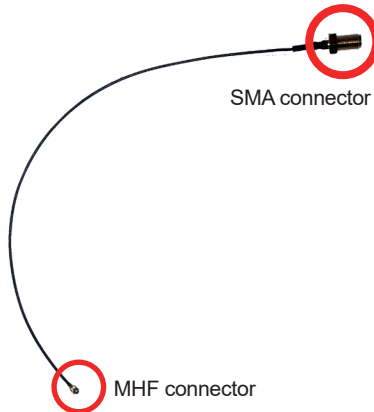
3. Prepare the Wi-Fi module kit. The module is a **M.2 E-Key** socket form factor, with two U.FL connectors, one is "MAIN", and the other is "AUX".



Two U.FL connectors, one is “MAIN” (marked 2), the other is “AUX” (marked 1).



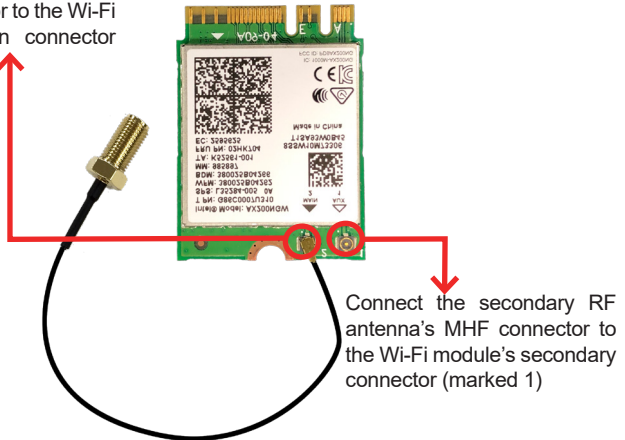
4. Have the RF antenna. The antenna has an SMA connector on one end and an MHF connector on the other.



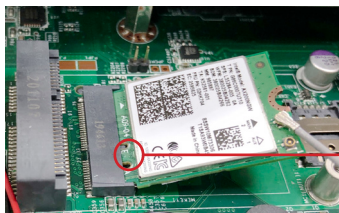
5. Connect the RF antenna's MHF connector to the Wi-Fi module's main connector marked 0. If you are going to connect a secondary antenna, connect it to the connector marked 1.

Installation & Maintenance

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



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.

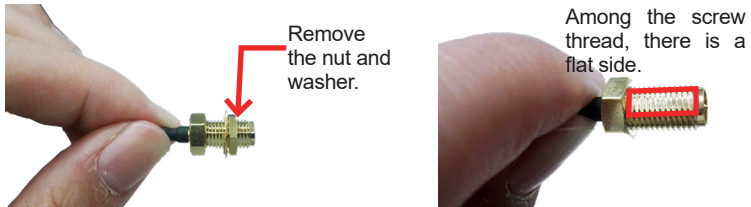
7. Press the module down and fix the module in place using one screw.



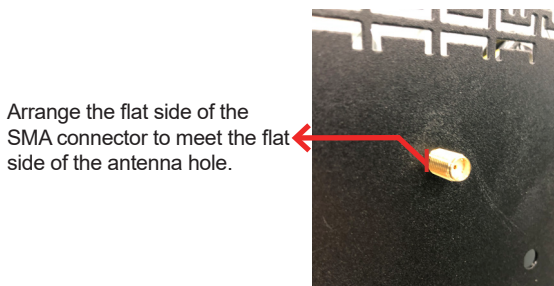
8. Locate the SMA antenna holes on front panel. Remove the plastic plug to
-

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

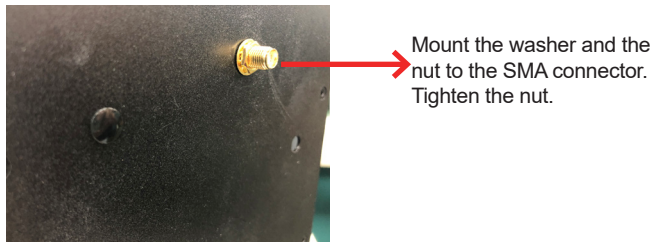
- From the other end of the RF antenna, which is an SMA connector, remove the washer and the nut. Note the SMA connector has the form of a threaded bolt, with one flat side.



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



- Mount the washer first and then the nut to the SMA connector. Make sure the nut is tightened.



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

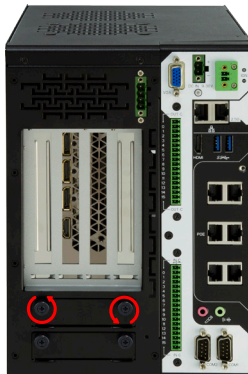


4.1.5. Install SATA Storage Devices

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.

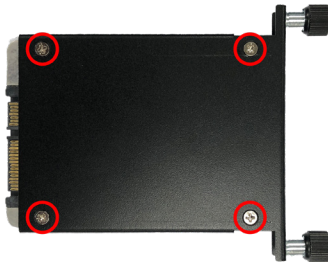
1. Find the HDD/SSD brackets. Loosen the screws as marked in the illustration below and take the bracket out. Then dismount the bracket from the computer.



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:

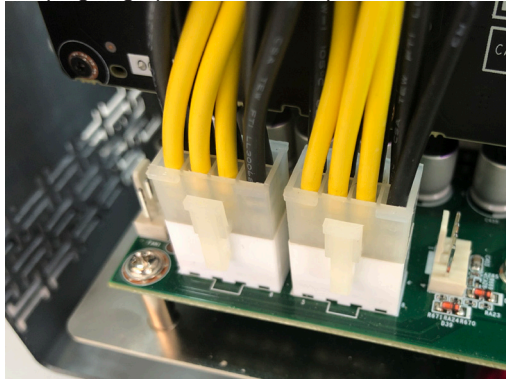
1. Remove the top and side cover from the computer.
2. Install a graphic card into the computer.



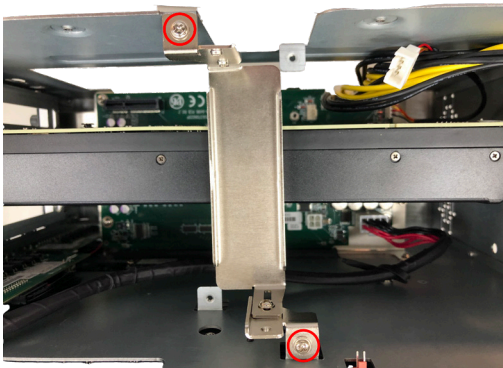
3. Use a cross head screwdriver to tighten the screws to secure the graphic card.



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.

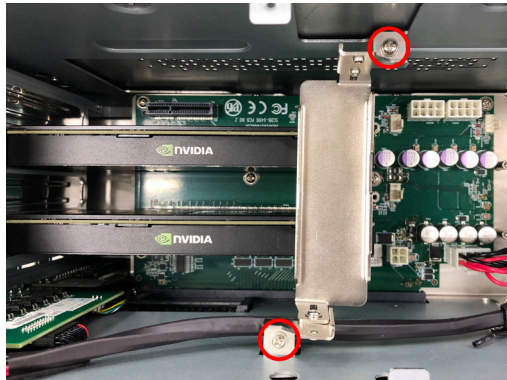
1. Remove the top and side cover from the computer.

Installation & Maintenance

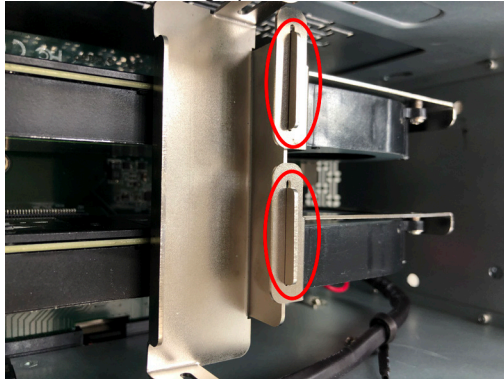
2. Install graphics card into the computer and use a cross head screwdriver to tighten the screws to secure the graphic cards.



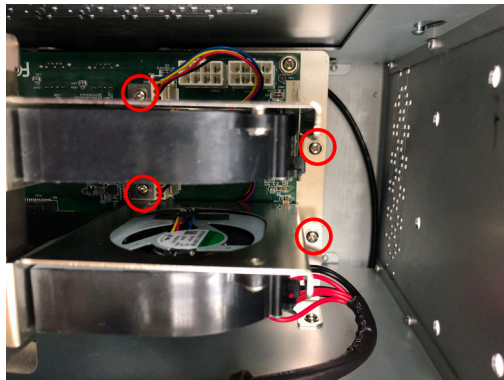
3. Use a cross-head screwdriver to tighten the screws to secure the graphic card holder.



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.



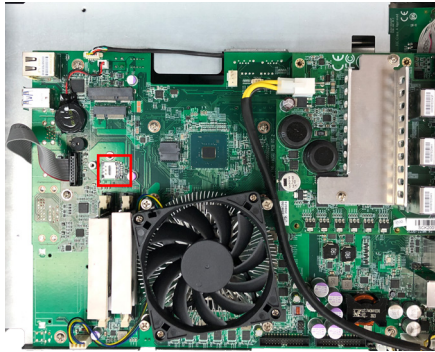
4.1.7. Install/Uninstall SIM Card

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

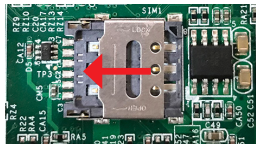
1. Remove the side cover from the computer as described in [4.1.1.3. Remove Side Cover](#) on page [40](#).

Installation & Maintenance

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



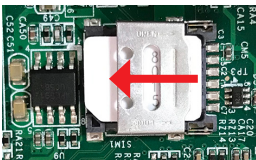
3. Slide the SIM card holder cover towards the OPEN edge and then lift the cover to open it.



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.

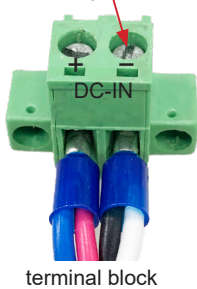


Warning Only trained and qualified personnel are allowed to install or replace this equipment.

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.

Installation & Maintenance

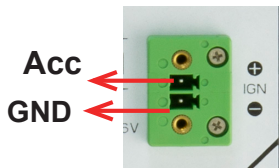
6. Use a slotted screwdriver to tighten the captive screws. Plug the terminal block firmly, which wired, into the receptacle on the rear panel.



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 20](#)).
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.



The featured settings are:

Menu	Description
Main	See 5.1. Main on page 62
Advanced	See 5.2. Advanced on page 63
Chipset	See 5.3. Chipset on page 78
Security	See 5.4. Security on page 84
Boot	See 5.5. Boot on page 86
Save & Exit	See 5.6. Save & Exit on page 88

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	<ul style="list-style-type: none"> ▶ On the top menus: 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. ▶ On the submenus: 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.)

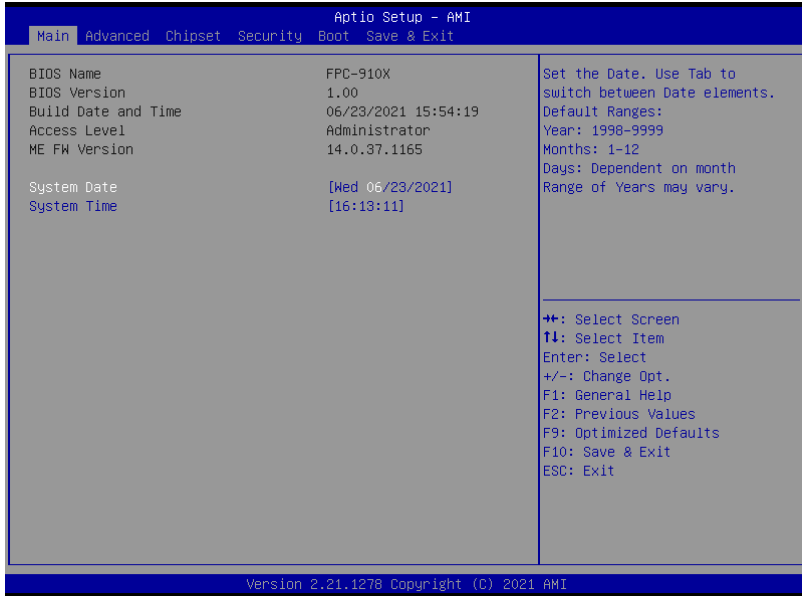
Note: Pay attention to the "WARNING" that shows at the left pane onscreen when making any change to the BIOS settings.

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.

BIOS

5.1. Main

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



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. ▶ The date format is: Day: Sun to Sat Month: 1 to 12 Date: 1 to 31 Year: 1998 to 2099
System Time	Set the system time. Use Tab to switch between Time elements. ▶ The time format is: Hour: 00 to 23 Minute: 00 to 59 Second: 00 to 59

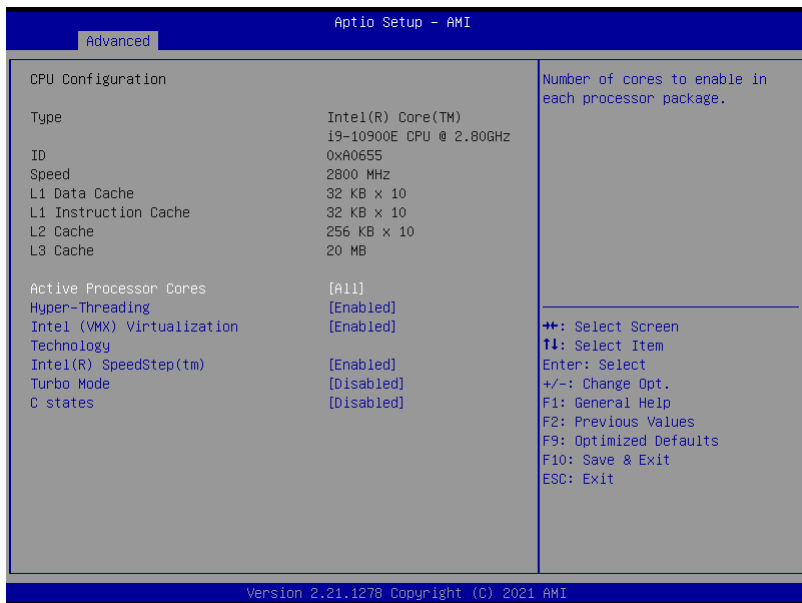
5.2. Advanced



The featured settings and submenus are:

Setting	Description
CPU Configuration	See 5.2.1. CPU Configuration on page 64
Trusted Computing	See 5.2.2. Trusted Computing on page 66
ACPI Settings	See 5.2.3. ACPI Settings on page 67
Super IO Configuration	See 5.2.4. Super IO Configuration on page 68
Hardware Monitor	See 5.2.5. Hardware Monitor on page 70
SS RTC Wake Settings	See 5.2.6. S5 RTC Wake Settings on page 71
AMI Graphic Outut protocol policy	See 5.2.7. AMI Graphic Outut protocol policy on page 72
PCI Subsystem Settings	See 5.2.8. PCI Sybssystem Settings on page 73
USB Configuration	See 5.2.9. USB Configuration on page 74
CSM Configuration	See 5.2.10. CSM Configuration on page 76
NVMe Configuration	See 5.2.11. NVMe Configuration on page 77

5.2.1. CPU Configuration



The features settings are:

Setting	Description
Active Processor Cores	Number of cores to enable in each processor package. ▶ 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. ▶ 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 . Enable /Disable (default) Turbo Mode (requires EMTTM enabled, unless max turbo ratio is bigger than 16 - SKLAO W/A.

C States

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

BIOS

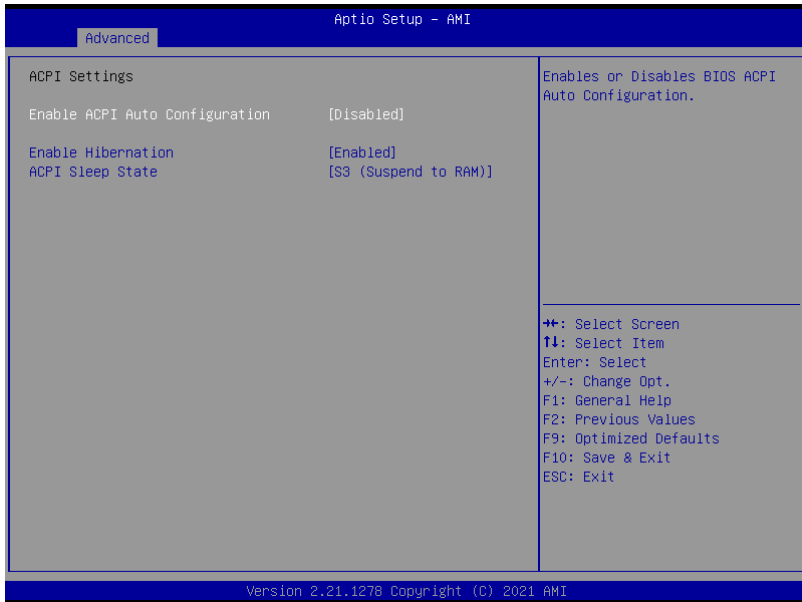
5.2.2. Trusted Computing



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. ▶ Options: None (default) and TPM Clear

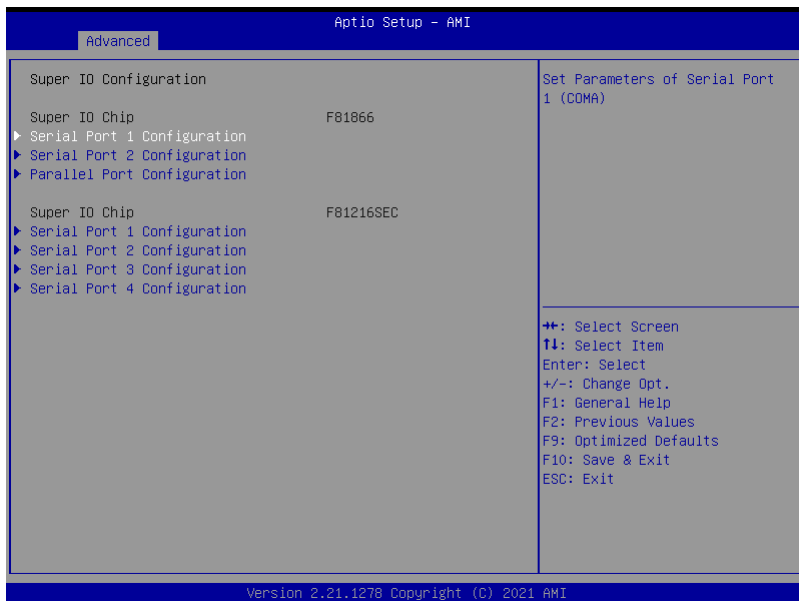
5.2.3. ACPI Settings



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. ► Options: Suspend Disabled and S3 (Suspend to RAM) (default)

5.2.4. Super IO Configuration



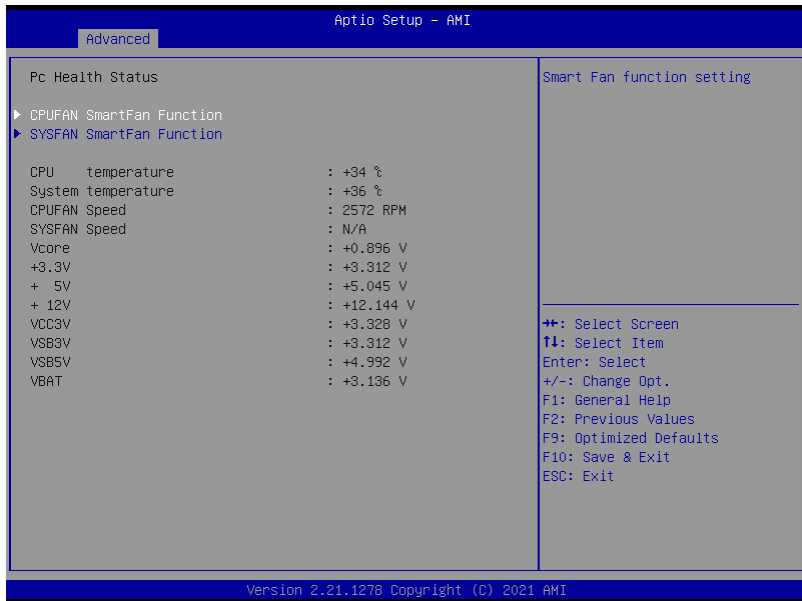
Super IO Chip F81866 Settings

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: <ul style="list-style-type: none"> Options: STD Printer Mode (default) ; SPP Mode; EPP-1.9 and SPP Mode; EPP-1.7 and SPP Mode; ECP Mode; ECP and EPP 1.9 Mode; 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



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 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.

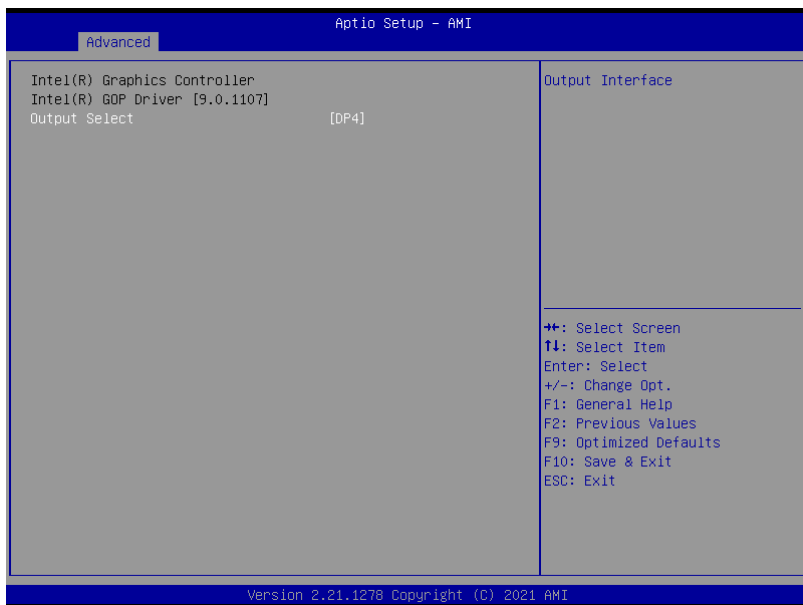
5.2.6. S5 RTC Wake Settings



The features settings are:

Setting	Description
Wake System from S5	<p>Enable or Disable (default) system wake on alarm event.</p> <ul style="list-style-type: none"> ▶ Options available are: Disabled (default): Fixed Time: System will wake on the hr::min::sec specified. DynamicTime: If selected, you need to set Wake up minute increase from 1 - 5. System will wake on the current time + increase minute(s).

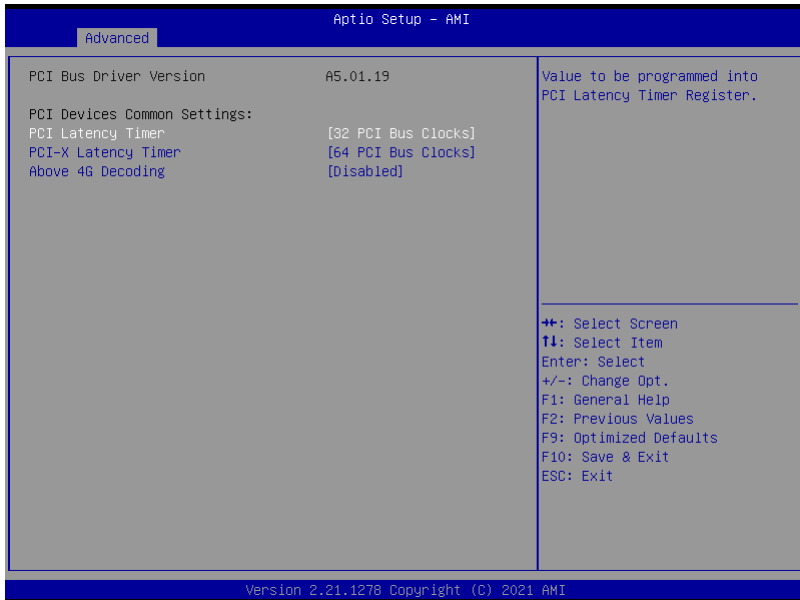
5.2.7. AMI Graphic Output protocol policy



The features settings are:

Setting	Description
Output select	Output Select

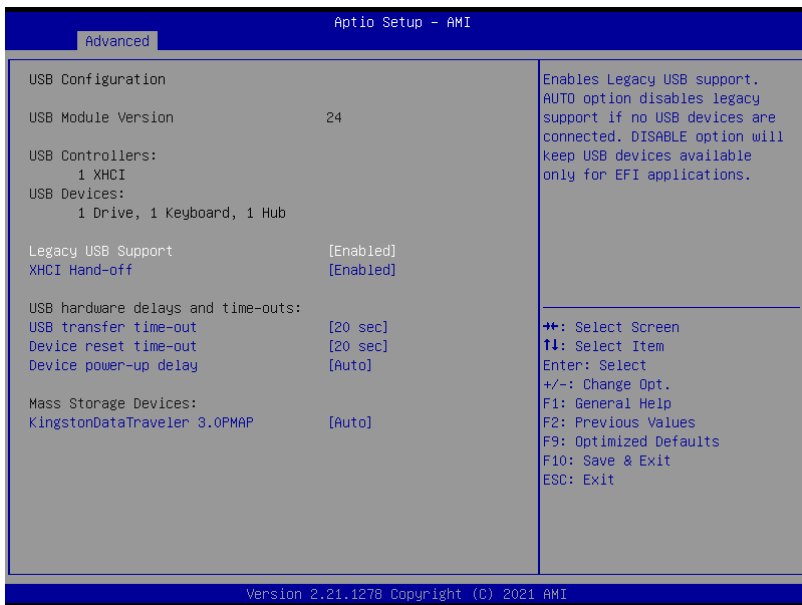
5.2.8. PCI Sybssystem Settings



The features settings are:

Setting	Description
PCI Latency Timer	Value to be programmed into PCI Latency Timer Register. ► 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. ► 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

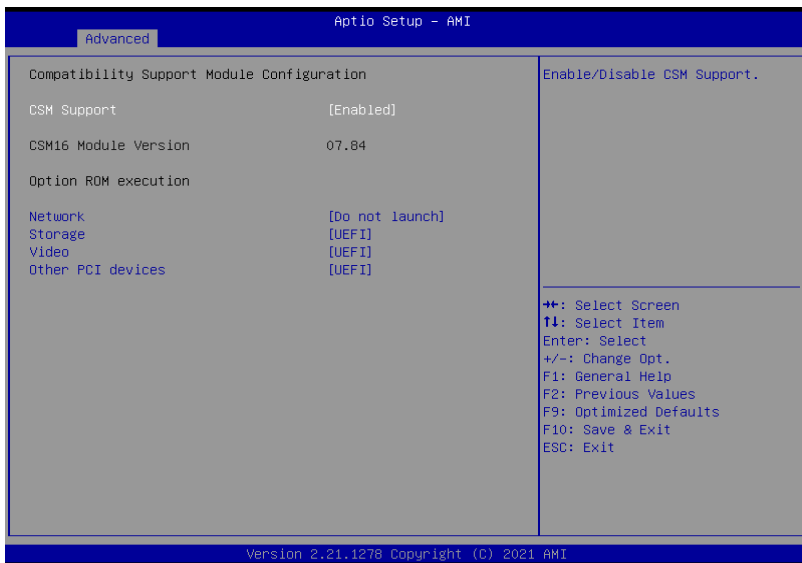


The features settings are:

Setting	Description
Legacy USB Support	<p>Enables/disables legacy USB support.</p> <ul style="list-style-type: none"> ▶ Options available are Enabled (default), Disabled and Auto. ▶ Select Auto to disable legacy support if no USB device are connected. ▶ Select Disabled to keep USB devices available only for EFI applications.
XHCI Hand-off	<p>This is a workaround for OSeS without XHCI hand-off support. The XHCI ownership change should be claimed by XHCI driver.</p> <ul style="list-style-type: none"> ▶ The optional settings are: Enabled (default) / Disabled.
USB Transfer time-out	<p>Use this item to set the time-out value for control, bulk, and interrupt transfers.</p> <ul style="list-style-type: none"> ▶ 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. ▶ 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. ▶ Options available are: Auto: Default 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

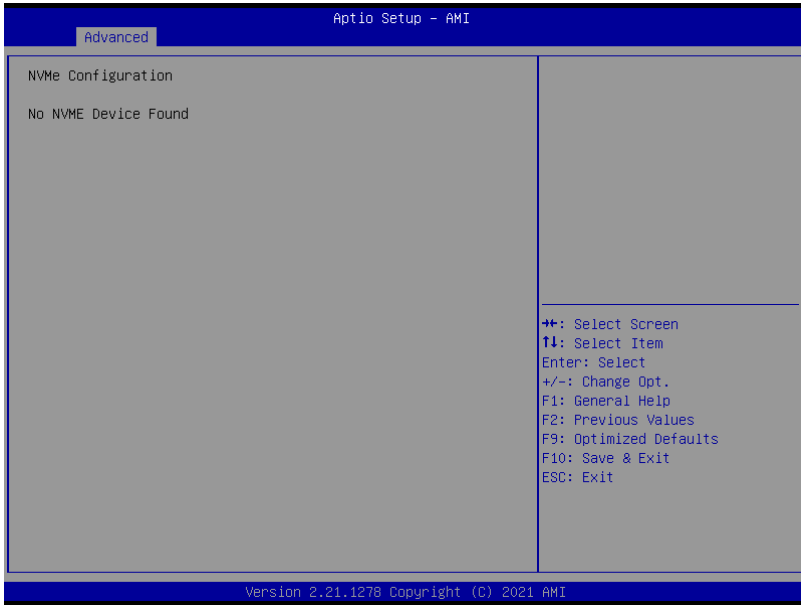


The features settings are:

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

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

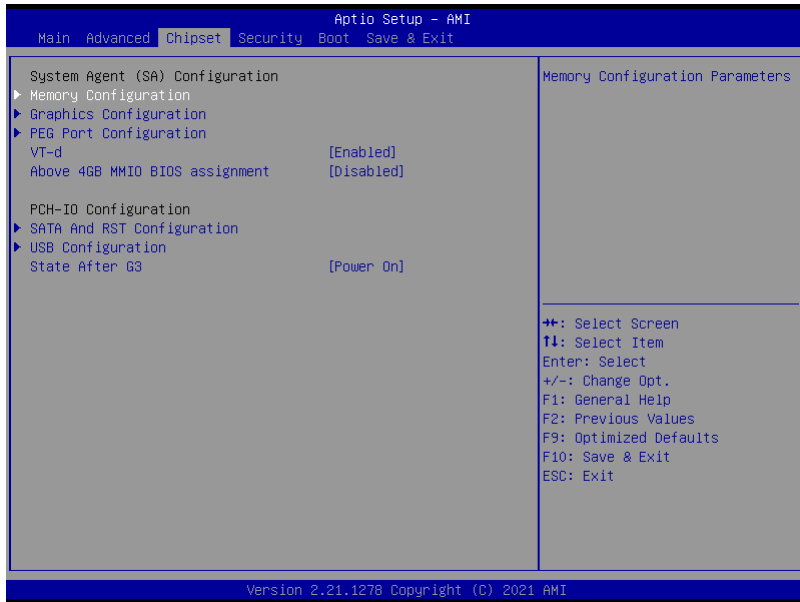
5.2.11. NVMe Configuration



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

5.3. Chipset

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

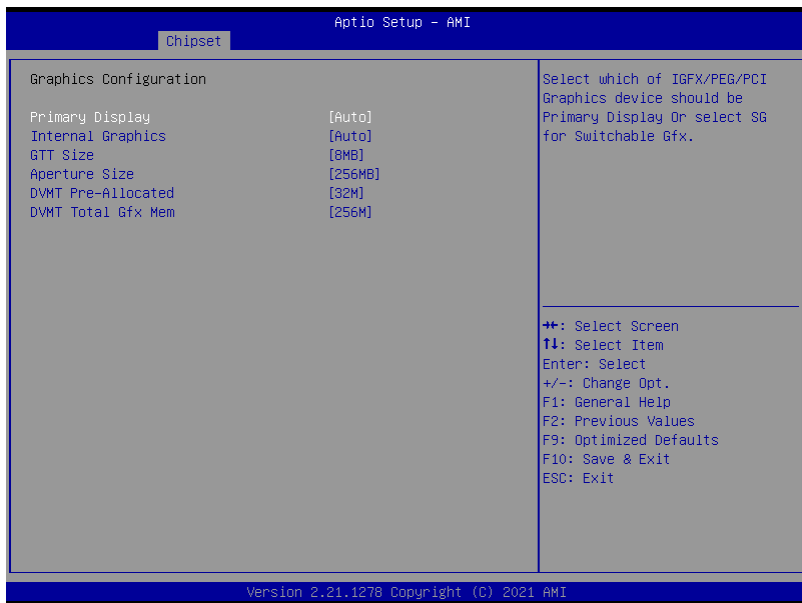


The features settings are:

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 80
PEG Port Configuration	PEG port options Enable Root Port: Enable or Disable the root port. ▶ Options: Auto (default), Enabled and Disabled . Max Link Speed: Configure PEG 0:1:0 Max Speed. ▶ 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 82
USB Configuration	See 5.3.1.3. USB Configuration on page 83
State After G3	Specify what state to go to when power is re-applied after a power failure (G3 state). ► Options available are Power On (default), Power Off and Last State .

5.3.1.1. Graphics Configuration

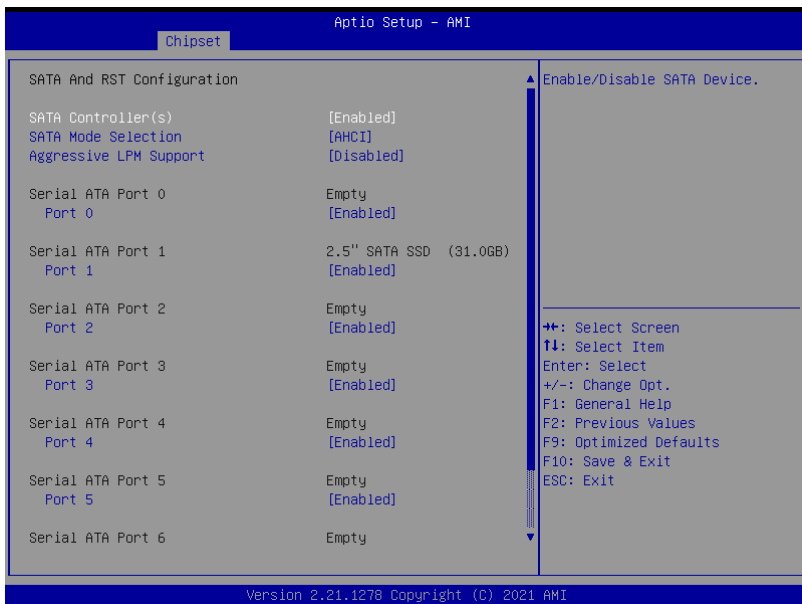


The features settings are:

Setting	Description
Primary Display	Select the Graphics device which will be activated as Primary Display. ▶ Options available are Auto (default), IGFX , PEG and PCI
Internal Graphics	Enables/disables the IGD. ▶ Options available are Auto (default), Disabled , and Enabled .
GTT Size	Select the GTT Size. ▶ 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. ▶ 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. ▶ 32M is the default.
DVMT Total Gfx Mem	Select the DVMT 5.0 Total Graphic Memory size used by the Internal Graphic Device. ▶ Options: 128M , 256M (default) and Max .

5.3.1.2. SATA And RST Configuration



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.

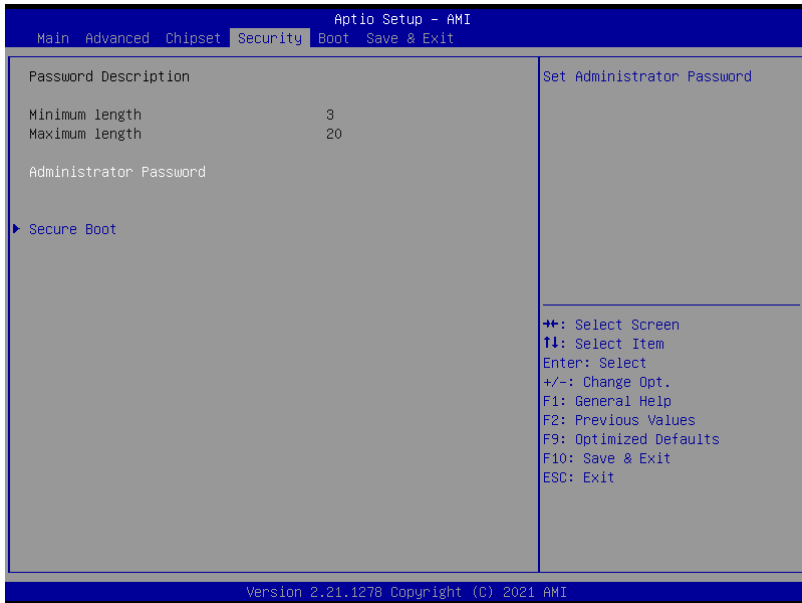
5.3.1.3. USB Configuration



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



The features settings are:

Setting	Description
Administrator Password	To set up an administrator password: 1. Select Administrator Password . 2. An Create New Password dialog then pops up onscreen. 3. Enter your desired password that is no less than 3 characters and no more than 20 characters. 4. Hit [Enter] key to submit.
Security Boot	See 5.4.1. Security Boot on page 85 .

5.4.1. Security Boot

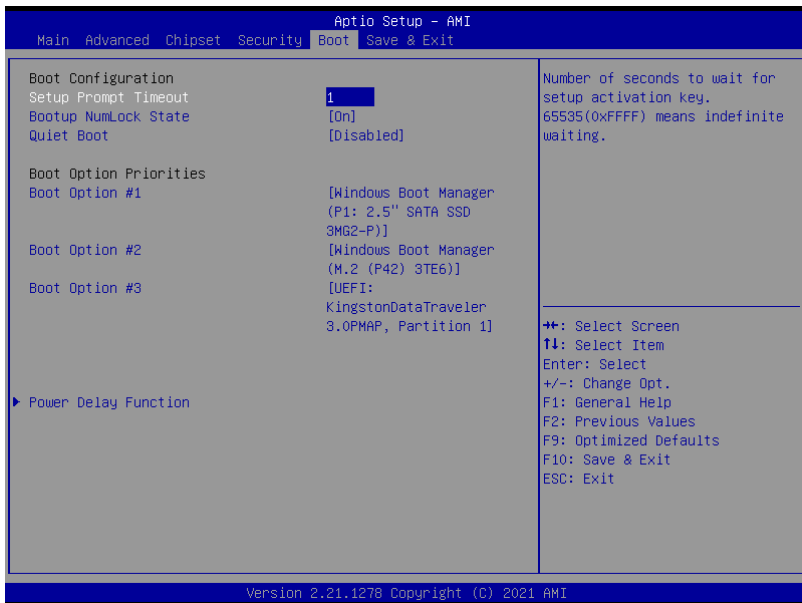


The features settings are:

Setting	Description
Secure Boot	Enable/Disable (default) secure boot.
Secure Boot Mode	Allow users to set the secure boot selector. Standard/Custom (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.

BIOS

5.5. Boot

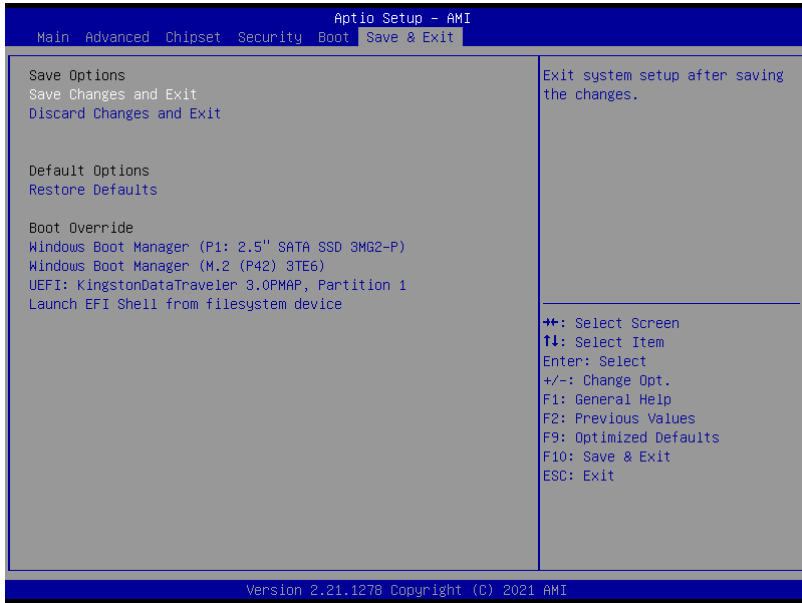


The features settings are:

Setting	Description
Setup Prompt Timeout	Set how long to wait for the prompt to show for entering BIOS Setup. <ul style="list-style-type: none"> ▶ The default setting is 1 (sec). ▶ 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. <ul style="list-style-type: none"> ▶ 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. <ul style="list-style-type: none"> ▶ 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	<p>Power Delay Function Set the system support power delay function.</p> <ul style="list-style-type: none">▶ Options:<ul style="list-style-type: none">Enable (default): Support power delay function.Disable: Power on/off manually operated. <p>Power on delay Select the time which the system will power on.</p> <ul style="list-style-type: none">▶ Options: Manually Operator (default), 04 Seconds, 08 Seconds and 16 Seconds. <p>Power off delay Select the time which the system will shutdown.</p> <ul style="list-style-type: none">▶ Options: Manually Operator (default), 30 Seconds, 60 Seconds and 90 Seconds.

5.6. Save & Exit



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. ▶ 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. ▶ P0: Select the device to boot up the system regardless of the currently configured boot priority. ▶ 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;

```

Appendices

```
        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 */

```

Appendices

```
        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
WDRST# 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;
}
```