ASRock Industrial

iEP-5020G-Series

User Manual

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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.

CALIFORNIA, USA ONLY

The Lithium battery adopted on this motherboard contains Perchlorate, a toxic substance controlled in Perchlorate Best Management Practices (BMP) regulations passed by the California Legislature. When you discard the Lithium battery in California, USA, please follow the related regulations in advance.
"Perchlorate Material-special handling may apply, see www.dtsc.ca.gov/hazardouswaste/perchlorate"

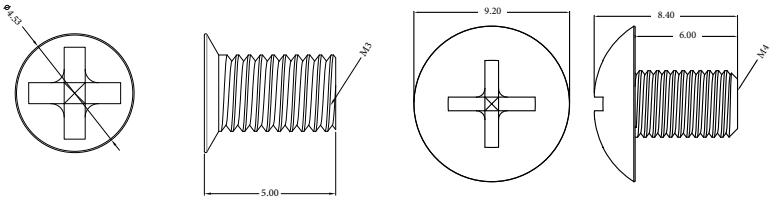
ASRock Industrial's Website: www.asrockind.com

Important Safety Instructions

For user safety, please read and follow all instructions, Warnings, Cautions, and Notes marked in this manual and on the associated device before handling/operating the device, to avoid injury or damage.

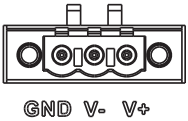
1. Read these safety instructions carefully.
2. Retain this user manual for future reference.
3. Read the Specifications section of this manual for detailed information on the recommended operating environment.
4. Disconnect the equipment from all AC outlets before cleaning. Use only a damp cloth for cleaning. Do not use liquid or sprayed detergent.
5. Place the equipment on a reliable surface during installation. Dropping or letting the equipment fall may cause damage.
6. Do not leave the equipment in an environment with a storage temperature of below -40°C (-40°F) or above 85°C (185°F) as this may cause damage. The equipment should be stored in a controlled environment.
7. Ensure that the voltage of the power source is correct before connecting the equipment to a power outlet.
8. Position the power cord away from high-traffic areas. Do not place anything over the power cord.
9. If the equipment is not used for a long time, disconnect the equipment from the power source to avoid damage from transient over-voltage.
10. All cautions and warnings on the equipment should be noted.
11. To avoid electrical shock and/or damage to device:
    - Keep device away from water or liquid sources.
    - Keep device away from high heat or humidity.
    - Keep device properly ventilated (do not block or cover ventilation openings).
    - Always use recommended voltage and power source settings.
    - Always install and operate device near an easily accessible electrical outlet.
    - Secure the power cord (do not place any object on/over the power cord).
    - Only install/attach and operate device on stable surfaces and/or recommended mountings.
    - The power cord must be connected to a socket or outlet with a ground connection.
12. If one of the following occurs, have the equipment checked by service personnel:
    - The power cord or plug is damaged.
    - Liquid has penetrated into the equipment.
    - The equipment has been exposed to moisture.
    - The equipment is malfunctioning or does not operate according to the user manual.
    - The equipment has been dropped and damaged.
    - The equipment shows obvious signs of breakage.
13. Never attempt to repair the device, which should only be serviced by qualified technical personnel using suitable tools.
14. Any unverified component may cause unexpected damage. To ensure correct installation, always use the components (e.g., screws) provided in the accessory box.

15. This equipment is not suitable for use in locations where children are likely to be present.
16. The equipment should only be installed in a restricted access area.
17. Restricted Access Location : It is recommended that the device be installed only in a server room or computer room where access is:
    - Restricted to qualified service personnel or users familiar with restrictions applied to the location, reasons therefor, and any precautions required.
    - Only afforded by the use of a tool or lock and key, or other means of security, and controlled by the authority responsible for the location.
    - Be sure to turn off the power and then disconnect the power cords from your system before performing any installation or servicing. A sudden surge of power could damage sensitive electronic components.
    - All interior servicing is to be performed by qualified skilled personnel only, which requires the use of a tool for open the metal enclosure.



DIN Rail/Wall Mount: M3x5mm Screws *(for securing the mounting bracket(s) to the chassis)*
VESA Mount: M4x6mm Screws *(for securing the VESA bracket to the monitor)*

18. This product is intended to be supplied by a Listed Power Adapter or DC power source, rated 6-36Vdc, 15.44-2.57A minimum or 19-36Vdc, 6.05-3.19A minimum, Tma = 40°C or 50°C (For input 19-36Vdc) or 70°C (For input 6-36Vdc) minimum. If further assistance is needed, please contact ASRock Industrial for further information.
19. The terminal block is suitable for V+& V- for 14~28AWG. The torque value is 0.19Nm. Use copper conductors only. Kindly note that this must be installed by a skilled person.



Replaceable batteries

CAUTION: RISK OF EXPLOSION IF BATTERY IS REPLACED BY AN INCORRECT TYPE. DISPOSE OF USED BATTERIES ACCORDING TO THE INSTRUCTIONS

BURN HAZARD

Hot surface! Do not touch! Touching this surface could result in bodily injury. To reduce risk, allow the surface to cool before touching.

CAUTION

The equipment is equipped with a battery-powered real-time clock circuit. There is a risk of explosion if a battery is incorrectly replaced. Replace only with same or equivalent type as recommended by the manufacturer. Discard all used batteries according to the manufacturer's instructions.

WARNING

All interconnection to the EUT is for indoor location and therefore PoE network interconnected to the EUT is considered as ES1/SELV for connected only to PoE network without routing to the outside plant.

WARNING

Input voltage rated 19-36V, 6.32-3.34A
Packing: The unit should be carried with both hands and handled with care.
Maintenance: Use only approved products or a dry applicator to clean and maintain the surfaces.

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Contact Information

If you need to contact ASRock Industrial or want to know more about ASRock Industrial, you're welcome to visit ASRock Industrial's website at www.asrockind.com; or you may contact your dealer for further information.

ASRock Industrial Incorporation

email: Info_ipc@asrockind.com

Contents

Chapter 1 Introduction

Because the hardware specifications might be updated, the content of this documentation will be subject to change without notice.

1.1 Package Contents

iEP-5020G-020

- 1 x iEP-5020G-020
- 3 x M2*2 Screw Package
- 2 x 3-pin phoenix connector
- 1 x System QIG

iEP-5020G-021

- 1 x iEP-5020G-021
- 3 x M2*2 Screw Package
- 2 x 3-pin phoenix connector
- 1 x System QIG

iEP-5020G-022

- 1 x iEP-5020G-022
- 3 x M2*2 Screw Package
- 2 x 3-pin phoenix connector
- 1 x System QIG

iEP-5020G-023

- 1 x iEP-5020G-023
- 3 x M2*2 Screw Package
- 2 x 3-pin phoenix connector
- 1 x System QIG

iEP-5020G-024

- 1 x iEP-5020G-024
- 3 x M2*2 Screw Package
- 2 x 3-pin phoenix connector
- 1 x System QIG

If any items are missing or appear damaged, contact your authorized dealer.

1.2 Order Information

Model Name	PN	Description
iEP-5020G-020	90PXGCC0-00000000	Basic SKU W/O RAM, SSD, ADAPTER
iEP-5020G-021	90PXGCC0-10000000	POE SKU W/O RAM, SSD, ADAPTER
iEP-5020G-022	90PXGCC0-20000000	5LANWIFI W/O RAM, SSD, ADAPTER
iEP-5020G-023	90PXGCC0-30000000	5LAN5G W/O RAM, SSD, ADAPTER
iEP-5020G-024	90PXGCC0-40000000	8DIO W/O RAM, SSD, ADAPTER

1.3 Optional Items

Model Name	PN	Description
Wall Mount Kits	13G020760000AI	Attach the wall mounting brackets
Din Rail Kits	13G020761000AI	Attach the din-rail brackets and can place to the din rail.
4G LTE Kits	14G15A004000AI 14G000035310AI	ANTENNA SUB 6G x 4pcs SMA CABLE, L=300mm x 4pcs
5G Module Kits	14G15A004000AI 14G000035310AI	ANTENNA SUB 6G x 4pcs SMA CABLE, L=300mm x 4pcs
Wi-Fi Module Kits	14G15A005000AI 14G000032200AI	ANTENNA 2dBi WSS002 2.4/5/6G x 2pcs WIFI SMA CABLE, L=185mm x 2pcs
Adapter 120W	04G266001001AI	ADAPTER 120W 19V W/O CONN (PHX)

1.4 Product Specifications

1.4.1 System : iEP-5020G-020

Processor	CPU	Intel Atom® x7433RE
	Frequency	1.5GHz
	TDP	9W
	BIOS	AMI SPI 256 Mbit
Memory	Technology	DDR5 4800 MHz (Support In-Band ECC)
	Max Capacity	16GB
	Socket	1 x 262-pin SO-DIMM
Graphics	Chipset	MCP
	Display Port	DisplayPort 1.4a , DP++
	VGA	Max resolution up to 1920x1200@60Hz
Expansion Slots	RF&Antenna	6 x Antenna Hole
	M.2	1 x M.2 Key B (3042/3052) with PCIe Gen3/USB 3.2 for LTE/5G 1 x M.2 Key E (2230/2260) with PCIe Gen3/USB 2 for Wireless/BT
	SIM Slot	1 x Nano SIM Card
	SD Slot	1 x Micro SD Card (SD Card specification version 3.01)
Audio	Interface	Realtek ALC897 HD codec, High Defintion Audio, Mic-In, Line-Out
Ethernet	LAN1	Intel I226IT with 10/100/1000/2500 Mbps, supports TSN/TCC
	LAN2	Intel I210IT with 10/100/1000 Mbps
	LAN3	Intel I210IT with 10/100/1000 Mbps
	LAN4/PoE1	NA
	LAN5/PoE2	NA
Storage	M.2	1 x M.2 2280 Key M (PCIe Gen3/SATA3 mode)
I/O Interface	Serial Port	2 x COM 232/422/485
	USB	2 x USB 3.2 Gen2, 1 x USB 2, 1 x Type-C USB 3.2 Gen2
	Digital I/O	NA
	Function	1 x Power on Button with LED
Security	Watch Dog	255-level timer interval, set up through software
	TPM	TPM 2.0
Power Requirement	DC Input	2 x pluggable 3-pin Phoenix type for 6 to 36 V DC input
Environment	Operating Temp.	-40°C ~ 70°C (-40°F~158°F), w/ airflow 0.5~0.8m/s
	Storage Temp.	-40°C ~ 85°C (-40°F~185°F)
	Humidity	~95% @ 40°C (non-condensing)
	Shock	Operating with SSD: 100 G, half sine 11 ms duration
	Vibration	Operating with SSD: 5 Grms, 5-500 Hz, 3 axes
	ESD	Contact +/-8 KV, Air +/-15 KV
	EMC	CE and FCC Class A (EN61000-6-4/-2)
	Safety	LVD

Mechanical	Mounting	Din-Rail, Wall Mount (Optional)
	Dimensions	58mm (W) x 125mm (D) x 157mm (H)
	Net Weight	1.208 kg
Support	OS	Windows & Linux
	Real-Time Enablement	TSN, TCC support under Linux

1.4.2 System : iEP-5020G-021

Processor	CPU	Intel Atom® x7433RE
	Frequency	1.5GHz
	TDP	9W
	BIOS	AMI SPI 256 Mbit
Memory	Technology	DDR5 4800 MHz (Support In-Band ECC)
	Max Capacity	16GB
	Socket	1 x 262-pin SO-DIMM
Graphics	Chipset	MCP
	Display Port	DisplayPort 1.4a , DP++
	VGA	Max resolution up to 1920x1200@60Hz
Expansion Slots	RF&Antenna	6 x Antenna Hole
	M.2	1 x M.2 Key E (2230/2260) with PCIe Gen3/USB 2 for Wireless/BT
	SIM Slot	1 x Nano SIM Card
	SD Slot	1 x Micro SD Card (SD Card specification version 3.01)
Audio	Interface	Realtek ALC897 HD codec, High Defintion Audio, Mic-In, Line-Out
Ethernet	LAN1	Intel I226IT with 10/100/1000/2500 Mbps, supports TSN/TCC
	LAN2	Intel I210IT with 10/100/1000 Mbps
	LAN3	Intel I210IT with 10/100/1000 Mbps
	PoE1	Intel I210AT, supports IEEE 802.3AF
	PoE2	Intel I210AT, supports IEEE 802.3AF
Storage	M.2	1 x M.2 2280 Key M (PCIe Gen3/SATA3 mode)
I/O Interface	Serial Port	2 x COM 232/422/485
	USB	2 x USB 3.2 Gen2, 1 x USB 2, 1 x Type-C USB 3.2 Gen2
	Digital I/O	NA
	Function	1 x Power on Button with LED
Security	Watch Dog	255-level timer interval, set up through software
	TPM	TPM 2.0
Power Requirement	DC Input	2 x pluggable 3-pin Phoenix type for 19 to 36 V DC input
Environment	Operating Temp.	-40°C ~ 50°C (-40°F~122°F), w/ airflow 0.5~0.8m/s
	Storage Temp.	-40°C ~ 85°C (-40°F~185°F)
	Humidity	~95% @ 40°C (non-condensing)
	Shock	Operating with SSD: 100 G, half sine 11 ms duration
	Vibration	Operating with SSD: 5 Grms, 5-500 Hz, 3 axes
	ESD	Contact +/-8 KV, Air +/-15 KV
	EMC	CE and FCC Class A (EN61000-6-4/-2)
	Safety	LVD
Mechanical	Mounting	Din-Rail, Wall Mount (Optional)
	Dimensions	58mm (W) x 125mm (D) x 157mm (H)
	Net Weight	1.395 kg

Support	OS	Windows & Linux
	Real-Time Enablement	TSN, TCC support under Linux

1.4.3 System : iEP-5020G-022

Processor	CPU	Intel Atom® x7433RE
	Frequency	1.5GHz
	TDP	9W
	BIOS	AMI SPI 256 Mbit
Memory	Technology	DDR5 4800 MHz (Support In-Band ECC)
	Max Capacity	16GB
	Socket	1 x 262-pin SO-DIMM
Graphics	Chipset	MCP
	Display Port	DisplayPort 1.4a , DP++
	VGA	Max resolution up to 1920x1200@60Hz
Expansion Slots	RF&Antenna	6 x Antenna Hole
	M.2	1 x M.2 Key E (2230/2260) with PCIe Gen3/USB 2 for Wireless/BT
	SIM Slot	1 x Nano SIM Card
	SD Slot	1 x Micro SD Card (SD Card specification version 3.01)
Audio	Interface	Realtek ALC897 HD codec, High Defintion Audio, Mic-In, Line-Out
Ethernet	LAN1	Intel I226IT with 10/100/1000/2500 Mbps, supports TSN/TCC
	LAN2	Intel I210IT with 10/100/1000 Mbps
	LAN3	Intel I210IT with 10/100/1000 Mbps
	LAN4	NA
	LAN5	NA
Storage	M.2	1 x M.2 2280 Key M (PCIe Gen3/SATA3 mode)
I/O Interface	Serial Port	2 x COM 232/422/485
	USB	2 x USB 3.2 Gen2, 1 x USB 2, 1 x Type-C USB 3.2 Gen2
	Digital I/O	NA
	Function	1 x Power on Button with LED
Security	Watch Dog	255-level timer interval, set up through software
	TPM	TPM 2.0
Power Requirement	DC Input	2 x pluggable 3-pin Phoenix type for 6 to 36 V DC input
Environment	Operating Temp.	-40°C ~ 70°C (-40°F~158°F), w/ airflow 0.5~0.8m/s
	Storage Temp.	-40°C ~ 85°C (-40°F~185°F)
	Humidity	~95% @ 40°C (non-condensing)
	Shock	Operating with SSD: 100 G, half sine 11 ms duration
	Vibration	Operating with SSD: 5 Grms, 5-500 Hz, 3 axes
	ESD	Contact +/-8 KV, Air +/-15 KV
	EMC	CE and FCC Class A (EN61000-6-4/-2)
	Safety	LVD
Mechanical	Mounting	Din-Rail, Wall Mount (Optional)
	Dimensions	58mm (W) x 125mm (D) x 157mm (H)
	Net Weight	TBD

Support	OS	Windows & Linux
	Real-Time Enablement	TSN, TCC support under Linux

1.4.4 System : iEP-5020G-023

Processor	CPU	Intel Atom® x7433RE
	Frequency	1.5GHz
	TDP	9W
	BIOS	AMI SPI 256 Mbit
Memory	Technology	DDR5 4800 MHz (Support In-Band ECC)
	Max Capacity	16GB
	Socket	1 x 262-pin SO-DIMM
Graphics	Chipset	MCP
	Display Port	DisplayPort 1.4a , DP++
	VGA	Max resolution up to 1920x1200@60Hz
Expansion Slots	RF&Antenna	6 x Antenna Hole
	M.2	1 x M.2 Key B (3042/3052) with PCIe Gen3/USB 3.2 for LTE/5G
	SIM Slot	1 x Nano SIM Card
	SD Slot	1 x Micro SD Card (SD Card specification version 3.01)
Audio	Interface	Realtek ALC897 HD codec, High Defintion Audio, Mic-In, Line-Out
Ethernet	LAN1	Intel I226IT with 10/100/1000/2500 Mbps, supports TSN/TCC
	LAN2	Intel I210IT with 10/100/1000 Mbps
	LAN3	Intel I210IT with 10/100/1000 Mbps
	LAN4	NA
	LAN5	NA
Storage	M.2	1 x M.2 2280 Key M (PCIe Gen3/SATA3 mode)
I/O Interface	Serial Port	2 x COM 232/422/485
	USB	2 x USB 3.2 Gen2, 1 x USB 2, 1 x Type-C USB 3.2 Gen2
	Digital I/O	NA
	Function	1 x Power on Button with LED
Security	Watch Dog	255-level timer interval, set up through software
	TPM	TPM 2.0
Power Requirement	DC Input	2 x pluggable 3-pin Phoenix type for 6 to 36 V DC input
Environment	Operating Temp.	-40°C ~ 70°C (-40°F~158°F), w/ airflow 0.5~0.8m/s
	Storage Temp.	-40°C ~ 85°C (-40°F~185°F)
	Humidity	~95% @ 40°C (non-condensing)
	Shock	Operating with SSD: 100 G, half sine 11 ms duration
	Vibration	Operating with SSD: 5 Grms, 5-500 Hz, 3 axes
	ESD	Contact +/-8 KV, Air +/-15 KV
	EMC	CE and FCC Class A (EN61000-6-4/-2)
	Safety	LVD
Mechanical	Mounting	Din-Rail, Wall Mount (Optional)
	Dimensions	58mm (W) x 125mm (D) x 157mm (H)
	Net Weight	TBD

Support	OS	Windows & Linux
	Real-Time Enablement	TSN, TCC support under Linux

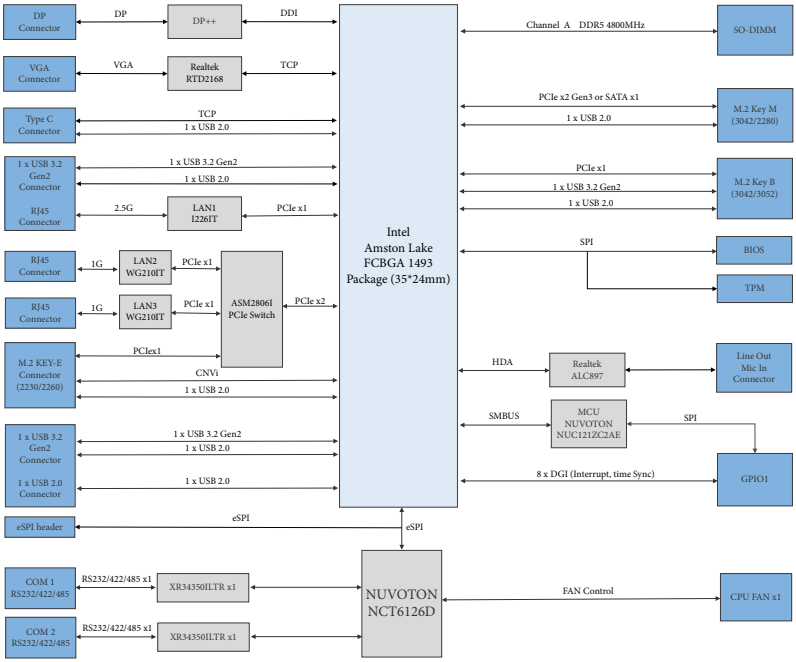
1.4.5 System : iEP-5020G-024

Processor	CPU	Intel Atom® x7433RE
	Frequency	1.5GHz
	TDP	9W
	BIOS	AMI SPI 256 Mbit
Memory	Technology	DDR5 4800 MHz (Support In-Band ECC)
	Max Capacity	16GB
	Socket	1 x 262-pin SO-DIMM
Graphics	Chipset	MCP
	Display Port	DisplayPort 1.4a , DP++
	VGA	Max resolution up to 1920x1200@60Hz
Expansion Slots	RF&Antenna	6 x Antenna Hole
	M.2	1 x M.2 Key E (2230/2260) with PCIe Gen3/USB 2 for Wireless/BT
	SIM Slot	1 x Nano SIM Card
	SD Slot	1 x Micro SD Card (SD Card specification version 3.01)
Audio	Interface	Realtek ALC897 HD codec, High Defintion Audio, Mic-In, Line-Out
Ethernet	LAN1	Intel I226IT with 10/100/1000/2500 Mbps, supports TSN/TCC
	LAN2	Intel I210IT with 10/100/1000 Mbps
	LAN3	Intel I210IT with 10/100/1000 Mbps
	LAN4	NA
	LAN5	NA
Storage	M.2	1 x M.2 2280 Key M (PCIe Gen3/SATA3 mode)
I/O Interface	Serial Port	2 x COM 232/422/485
	USB	2 x USB 3.2 Gen2, 1 x USB 2, 1 x Type-C USB 3.2 Gen2
	Digital I/O	8DIs/8DOs with sink/source isolation 36V
	Function	1 x Power on Button with LED
Security	Watch Dog	255-level timer interval, set up through software
	TPM	TPM 2.0
Power Requirement	DC Input	2 x pluggable 3-pin Phoenix type for 6 to 36 V DC input
Environment	Operating Temp.	-40°C ~ 70°C (-40°F~158°F), w/ airflow 0.5~0.8m/s
	Storage Temp.	-40°C ~ 85°C (-40°F~185°F)
	Humidity	~95% @ 40°C (non-condensing)
	Shock	Operating with SSD: 100 G, half sine 11 ms duration
	Vibration	Operating with SSD: 5 Grms, 5-500 Hz, 3 axes
	ESD	Contact +/-8 KV, Air +/-15 KV
	EMC	CE and FCC Class A (EN61000-6-4/-2)
	Safety	LVD
Mechanical	Mounting	Din-Rail, Wall Mount (Optional)
	Dimensions	58mm (W) x 125mm (D) x 157mm (H)
	Net Weight	TBD

Support	OS	Windows & Linux
	Real-Time Enablement	TSN, TCC support under Linux

1.5 Block Diagram

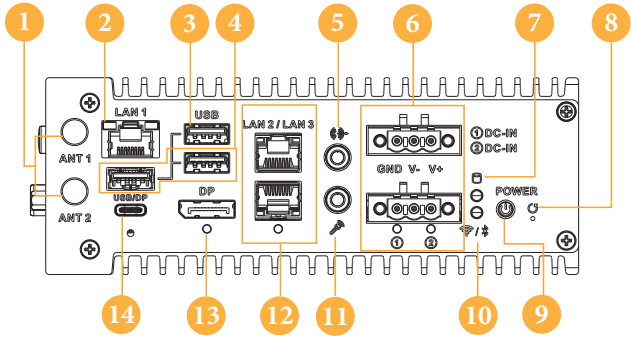
DSB-1020-WT

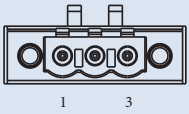


Chapter 2 Product Overview

This chapter provides diagrams showing the location of important components of the iEP-5020G Series.

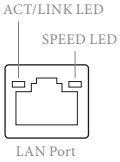
2.1 System Front Panel



No.	Description
1	**Antenna Hole:** The antenna hole allows you to connect a wireless antenna to enhance wireless signal reception.
2	**LAN port***: The RJ-45 LAN1 port supports a standard Ethernet cable for 10/100/1000/2500 Mbps connection to local network.
3	**USB 2.0:** The USB port is compatible with USB 2.0 or USB 1.1 devices.
4	**USB 3.2 Gen2 port:** The USB 3.2 port provides a transfer rate up to 10 Gbit/s.
5	**Audio (Line-Out) :** The port connects speakers to the Line-out connector for better sound quality.
6	**DC-IN Connector:** The V+ and V- pins provide DC power input and the chassis ground pin allows connection of the chassis to ground for better EMC compatibility. The DC power input for the iEP-5020G Series supports a voltage input range from 6V to 36V DC. Pin / Signal name: 1 GND; 2 V-; 3 V+  1 3
7	**Storage LED:** Storage LED indicator behaviors vary depending on the storage module you use.

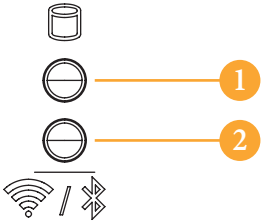
8	**Reset Button:** Use this button on a computer that allows you to turn it off and on again when a program does not work correctly.
9	**Power Button :** The power button allows you to turn on or off the system. You can use the power button to put your system into sleep mode, or press it for four seconds to shut down you system.
10	**Wi-Fi/Bluetooth LED** :** Wi-Fi/Bluetooth LED indicator behaviors vary depending on the 4G LTE/5G module you use.
11	**Audio (Mic-In):** The Mic-in audio connector on the I/O panel supports 5.1 channel HD audio and fully complies with Intel® High Definition Audio specifications.
12	**LAN port*****: The RJ-45 LAN2 and LAN3 ports support a standard Ethernet cable for 10/100/100 Mbps connection to local network.
13	**Debug LED****:** These LEDs indicate the debug status of the motherboard. Please refer to the table below to get more information about the Debug LED.
14	**USB 3.2 Gen2/DisplayPort (Type-C):** The USB 3.2 Gen2 ports provide a transfer rate up to 10 Gbit/s.

** There are two LEDs on the LAN1 port. Please refer to the table below for the LAN1 port LED indications.*



Activity / Link LED		Speed LED	
Status	**Description**	**Status**	**Description**
Off	No Link	Off	10Mbps connection
Blinking	Data Activity	Orange	100/1000Mbps connection
On	Link	Green	2.5Gbps connection

*** HDD Status LED & Wi-Fi/Bluetooth LED*



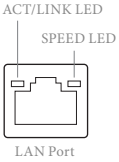
No.	Description
1	HDD Status LED
2	Wi-Fi/Bluetooth LED

Status LED Definitions

HDD Status LED	
Status	**Description**
Solid Green	HDD active
Blinking Green	HDD accessing or reading
Off	No HDD

Wi-Fi /Bluetooth LED	
Status	**Description**
Solid Green	LED indicator behaviors vary depending on the 4G LTE / 5G module you use.

**** There are two LEDs on the LAN2 and LAN3 ports. Please refer to the table below for the LAN2 and LAN3 ports LED indications.*



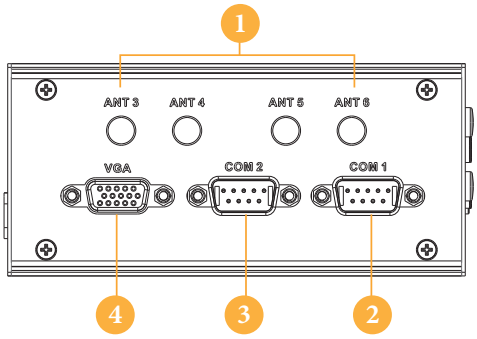
Activity / Link LED		Speed LED	
Status	**Description**	**Status**	**Description**
Off	No Link	Off	10Mbps connection
Blinking	Data Activity	Orange	100Mbps connection
On	Link	Green	1Gbps connection

***** Please refer to the table below for the Debug LED indications.*

Item	LED1	LED2	BIOS Status Code	Description
CPU	White	White	0x15	PEI_CAR_NB_INIT
	White	Blue	0x32	PEI_CPU_INIT
	White	Yellow	0x68	DXE_NB_HB_INIT
	White	Red	0x19	PEI_CAR_SB_INIT
DRAM	Blue	White	0x4F	PEI_DXE_IPL_STARTED
	Blue	Blue	0x51	PEI_MEMORY_SPD_FAIL
	Blue	Yellow	0x53	PEI_MEMORY_NOT_DETECT
	Blue	Red	0x54	PEI_MEMORY_ERROR
	Blue	Green	0x55	PEI_MEMORY_NOT_ INSTALLED
I/O PORT	Yellow	White	0x70	DXE_SB_INIT
	Yellow	Blue	0x97	DXE_CON_OUT_CONNECT
	Yellow	Yellow	0x99	DXE_SIO_INIT
	Yellow	Red	0xD6	DXE_NO_CON_OUT
BOOT	Green	White	0x91	DXE_BDS_CONNECT_ DRIVERS
	Green	Blue	0x94	DXE_PCI_BUS_ENUM
	Green	Yellow	0x9A	DXE_USB_BEGIN
	Green	Red	0xDA	DXE_BOOT_OPTION_FAILED
	Green	Green	0xA2	DXE_IDE_DETECT
	Red	Red	0xAB	ENTER BIOS SETUP
	None	None	0xAD	BOOT OS OR SHELL

2.2 System Top Panel

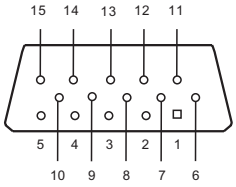
2.2.1 System : iEP-5020G-020



No.	Description
1	**Antenna Hole:** The antenna hole allows you to connect 5G wireless antenna to enhance wireless signal reception.
2, 3	**Serial (COM) Port:** The 9-pin RS232/422/485 serial connector allows you to connect devices that have serial ports. * This motherboard supports RS232/422/485 on COM1, 2 ports. Please refer to table below for the pin definition. In addition, COM1, 2 ports (RS232/422/485) can be adjusted in BIOS setup utility > Advanced Screen > Super IO Configuration. You may refer to our user manual for details.
4	**VGA:** Use a VGA cable to connect between the system and your monitor.

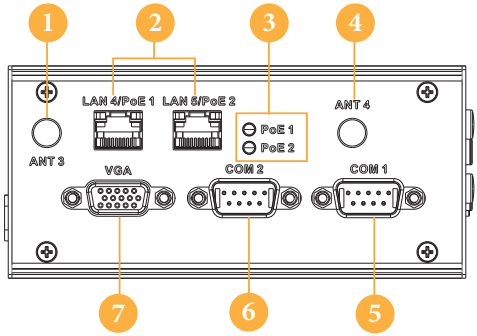
COM1, 2 Ports Pin Definition

Pin	RS232	RS422	RS485
1	DCD, Data Carrier Detect	TX-	RTX-
2	RXD, Receive Data	TX+	RTX+
3	TXD, Transmit Data	RX+	NA
4	DTR, Data Terminal Ready	RX-	NA
5	GND	GND	GND
6	DSR, Data Set Ready	NA	NA
7	RTS, Request To Send	NA	NA
8	CTS, Clear To Send	NA	NA
9	NA	NA	NA



Pin	Signal	Signal	Pin
1	RED_VGA	NA	9
2	GRN_VGA	GND	10
3	BLU_VGA	NA	11
4	NA	VGA_SDA	12
5	GND	HS_5V	13
6	GND	VS_5V	14
7	GND	VGA_SCL	15
8	GND		

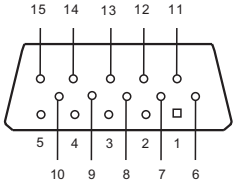
2.2.2 System : iEP-5020G-021/022/023



No.	Description
1, 4	**Antenna Hole:** The antenna hole allows you to connect 5G wireless antenna to enhance wireless signal reception.
2	**LAN4/PoE1 & LAN5/PoE2:** The RJ-45 LAN ports support a standard Ethernet cable for connection to local network, and support PoE.
3	**PoE1/PoE2 LED:** This indicator lights up when your iEP-5020G is connected to PoE1/PoE2.
5, 6	**Serial (COM) Port:** The 9-pin RS232/422/485 serial connector allows you to connect devices that have serial ports. * This motherboard supports RS232/422/485 on COM1, 2 ports. Please refer to table below for the pin definition. In addition, COM1, 2 ports (RS232/422/485) can be adjusted in BIOS setup utility > Advanced Screen > Super IO Configuration. You may refer to our user manual for details.
7	**VGA:** Use a VGA cable to connect between the system and your monitor.

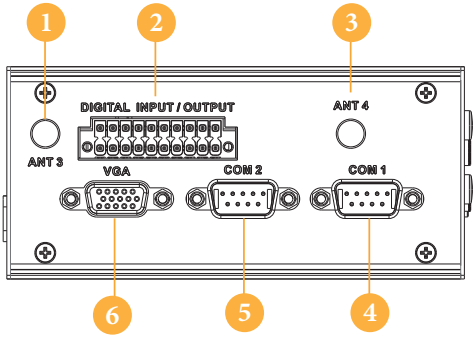
COM1, 2 Ports Pin Definition

Pin	RS232	RS422	RS485
1	DCD, Data Carrier Detect	TX-	RTX-
2	RXD, Receive Data	TX+	RTX+
3	TXD, Transmit Data	RX+	NA
4	DTR, Data Terminal Ready	RX-	NA
5	GND	GND	GND
6	DSR, Data Set Ready	NA	NA
7	RTS, Request To Send	NA	NA
8	CTS, Clear To Send	NA	NA
9	NA	NA	NA

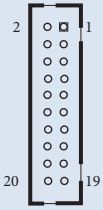


Pin	Signal	Signal	Pin
1	RED_VGA	NA	9
2	GRN_VGA	GND	10
3	BLU_VGA	NA	11
4	NA	VGA_SDA	12
5	GND	HS_5V	13
6	GND	VS_5V	14
7	GND	VGA_SCL	15
8	GND		

2.2.3 System : iEP-5020G-024



No.	Description
1, 3	**Antenna Hole:** The antenna hole allows you to connect 5G wireless antenna to enhance wireless signal reception.
2	**Digital Input/Output Connector (JGPIO1):** This system provides sink/source isolation 36V circuits for the customer's device.
4, 5	**Serial (COM) Port:** The 9-pin RS232/422/485 serial connector allows you to connect devices that have serial ports.



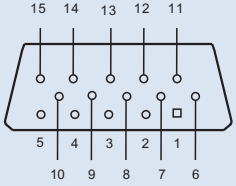
Pin	Signal	Signal	Pin
1	GND	GND	2
3	MCU_SPI0_MOSI	GPP_E16	4
5	MCU_SPI0_MISO	GPP_E7	6
7	MCU_SPI0_CLK	GPP_E3	8
9	MCU_SPI0_SS	GPP_D3	10
11	GPP_A15	GPP_E13	12
13	GPP_A14	GPP_E2	14
15	ICE_CLK	GPP_E1	16
17	ICE_DAT	GPP_B15	18
19	+3V	+3V	20

* This motherboard supports RS232/422/485 on COM1, 2 ports. Please refer to table below for the pin definition. In addition, COM1, 2 ports (RS232/422/485) can be adjusted in BIOS setup utility > Advanced Screen > Super IO Configuration. You may refer to our user manual for details.

COM1, 2 Ports Pin Definition

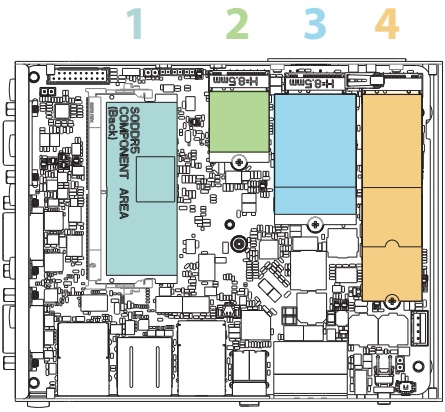
Pin	RS232	RS422	RS485
1	DCD, Data Carrier Detect	TX-	RTX-
2	RXD, Receive Data	TX+	RTX+
3	TXD, Transmit Data	RX+	NA
4	DTR, Data Terminal Ready	RX-	NA
5	GND	GND	GND
6	DSR, Data Set Ready	NA	NA
7	RTS, Request To Send	NA	NA
8	CTS, Clear To Send	NA	NA
9	NA	NA	NA

6	**VGA:** Use a VGA cable to connect between the system and your monitor.



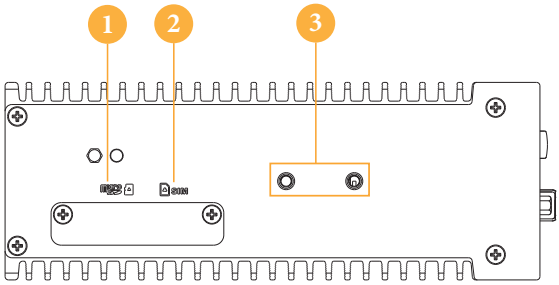
Pin	Signal	Signal	Pin
1	RED_VGA	NA	9
2	GRN_VGA	GND	10
3	BLU_VGA	NA	11
4	NA	VGA_SDA	12
5	GND	HS_5V	13
6	GND	VS_5V	14
7	GND	VGA_SCL	15
8	GND		

2.3 Inside View



No.	Description
1	**Memory:** Single Small Outline Single Inline Memory module slot designed for DDR5 memory module.
2	**M.2 Slot (E Key):** The M.2 slot allows you to install 2230/2260 Wi-Fi/BT module.
3	**M.2 Slot (B Key):** The M.2 slot allows you to install 3042/3052 4G LTE/5G module.
4	**M.2 Slot (M Key):** The M.2 slot allows you to install 2280 M.2 devices.

2.4 Rear View

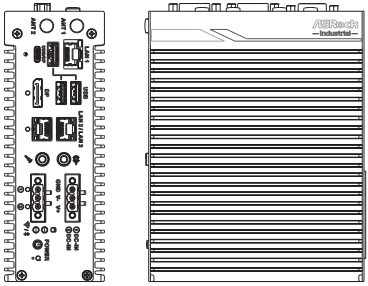


No.	Description
1	**Micro SD Slot:** The slot supports Micro SD card.
2	**SIM Card Slot:** The SIM Card slot allows you to install a Nano type SIM card.
3	**Mounting Hole:** The holes support Wall Mount and DIN Rail brackets for system in vertical position.

SO-DIMM memory, hard drive and M.2 SSD are not included with this system.

2.5 Position

The iEP-5020G Series should be placed in vertical position only.

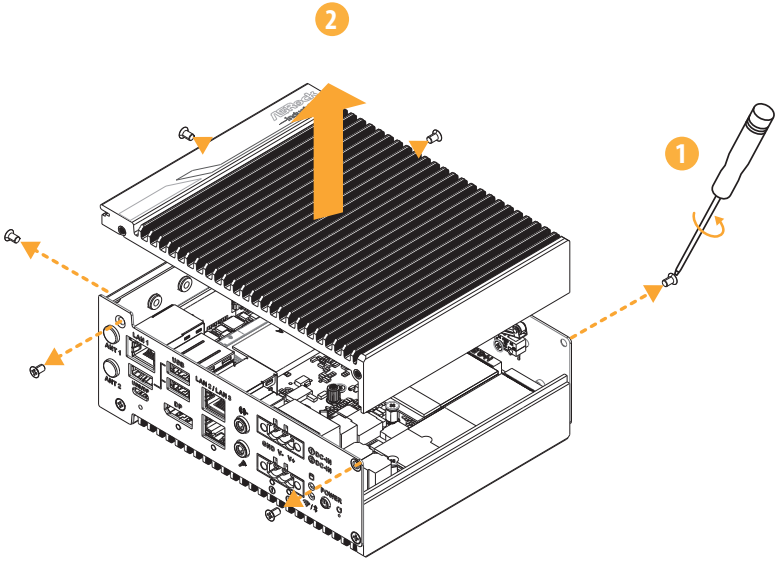


Chapter 3 Hardware Installation

This chapter helps you install or remove important components.

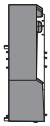
3.1 How to Remove the Front Cover

1. Remove the screws on the case.
2. Then lift up and remove the front cover.

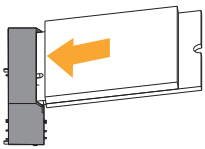


3.2 How to Install the Wi-Fi Module (2230/2260) to the M.2 E Key Slot (Optional)

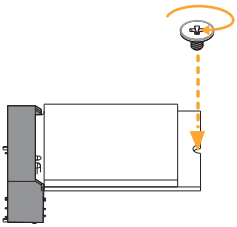
1. Locate the WiFi Module slot on the motherboard.



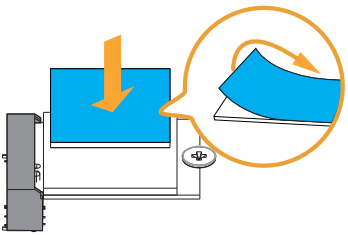
2. Carefully insert the WiFi Module into the slot at a 30-degree angle.



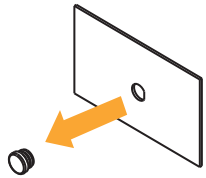
3. Tighten the screw to secure the WiFi Module to the motherboard.



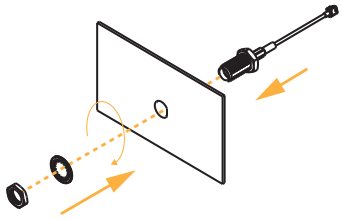
4. Paste the thermal pad onto the WiFi Module. Then remove the membrane.



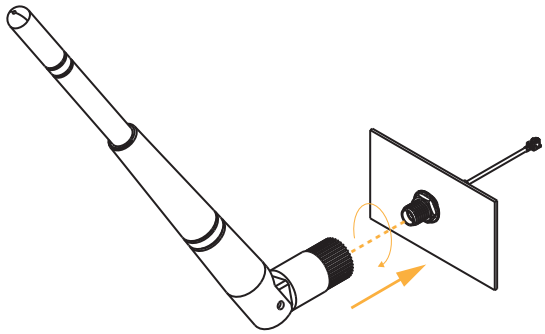
5. Remove the antenna rubber on the box cover.



6. Attach the SMA cable and washer to both sides of the cover, and secure them with the nut.



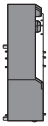
7. Install the Wifi antenna onto the SMA cable.



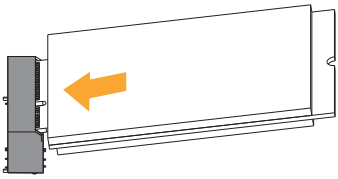
The Wi-Fi antenna and SMA cable are not provided by default. Please purchase them separately if needed.

3.3 How to Install the 4G LTE/5G Module (3042/3052) to the M.2 B Key Slot (Optional)

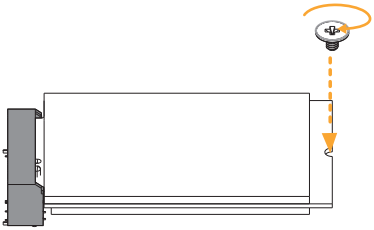
1. Locate the 4G LTE/5G Module slot on the motherboard.



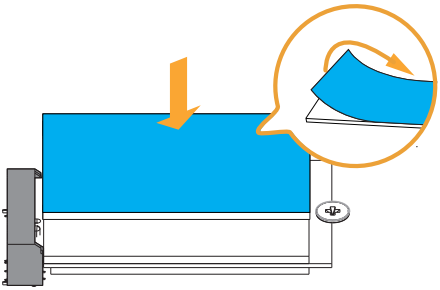
2. Carefully insert the 4G LTE/5G Module into the slot at a 30-degree angle.



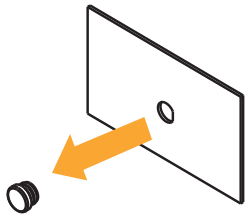
3. Tighten the screw to secure the 4G LTE/5G Module to the motherboard.



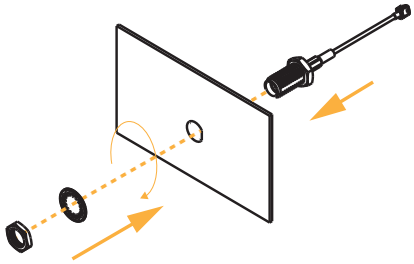
4. Paste the thermal pad onto the 4G LTE/5G Module. Then remove the membrane.



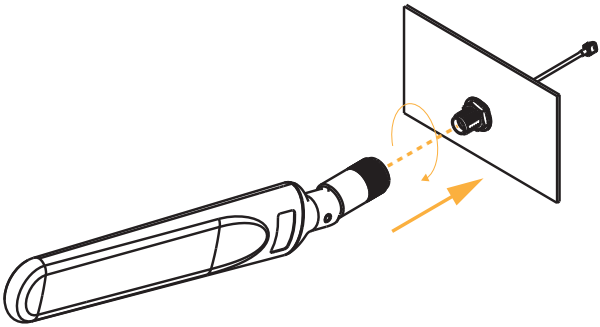
5. Remove the antenna rubber on the box cover.



6. Attach the SMA cable and washer to both sides of the cover, and secure them with the nut.



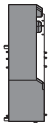
7. Install the 4G LTE/5G antenna onto the SMA cable.



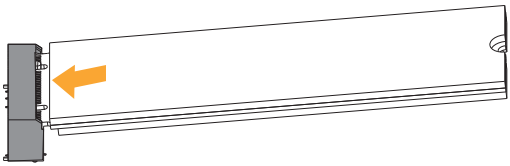
The 4G LTE/5G antenna and SMA calbe are not provided by default. Please purchase them separately if needed.

3.4 How to Install the M.2 SSD Device (2280) to the M.2 M Key Slot

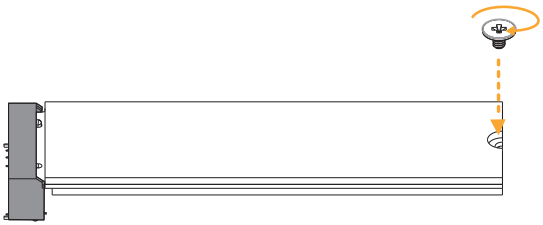
1. Locate the M.2 slot on the motherboard.



2. Carefully insert the M.2 SSD (Type 2280) into the slot at a 30-degree angle.



3. Tighten the screw to secure the M.2 SSD (Type 2280) to the motherboard.

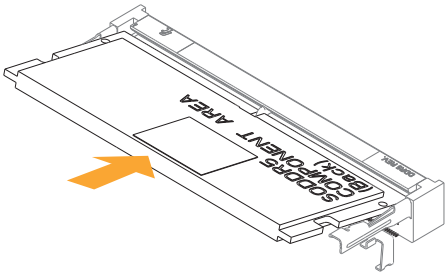


3.5 How to Install the Memory Modules and the Heatsinks

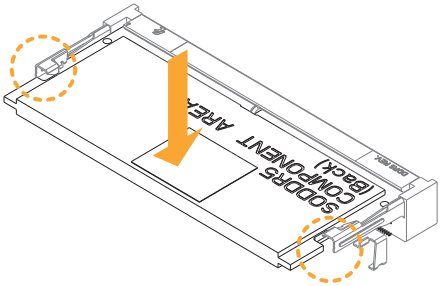
The iEP-5020G Series requires DDR5 SO-DIMM (1.2V).

The SO-DIMM only fits in one correct orientation. It will cause permanent damage to the motherboard and the DIMM if you force the DIMM into the slot at incorrect orientation.

1. Carefully insert the SO-DIMM memory module into the slot at a 30-degree angle.

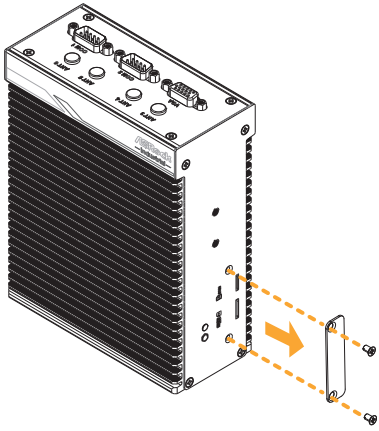


2. Push down until the modules snap into place.

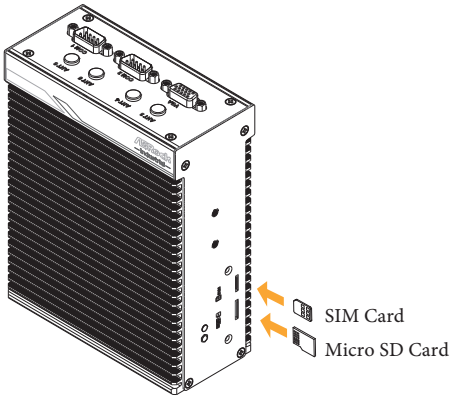


3.6 How to Install a Nano SIM Card and Micro SD Card

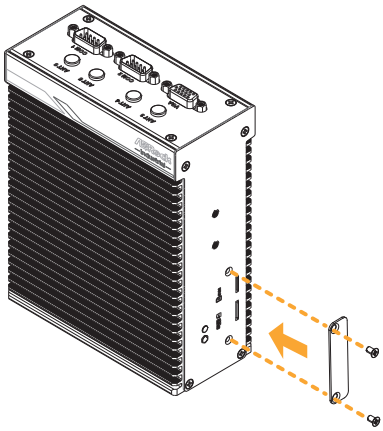
1. Release the screws on the iEP-5020G Series and remove the SIM/Micro SD Card slot cover..



2. With the gold contacts facing front, carefully insert the SIM Card or the SD Card into the designated slot until it clicks.

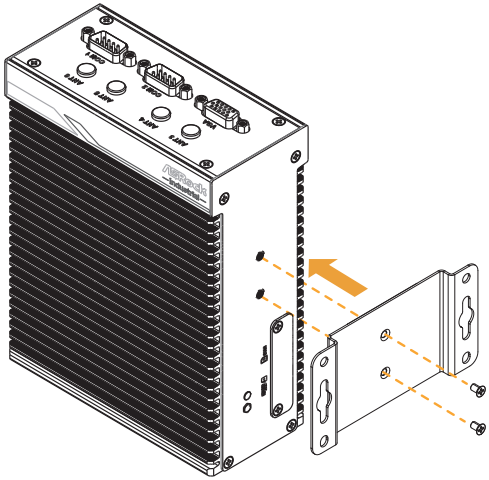


3. Place the cover back and secure it to the iEP-5020G Series with screws.

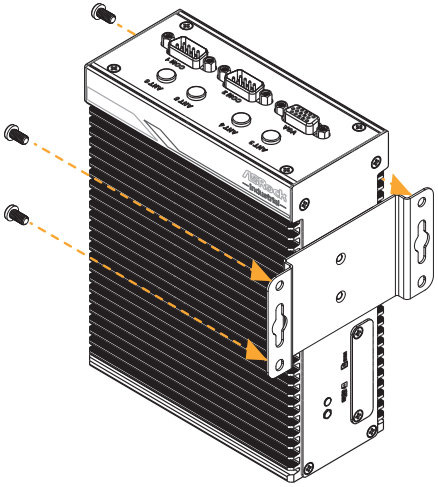


3.7 How to Install the Wall Mounting Bracket (Optional)

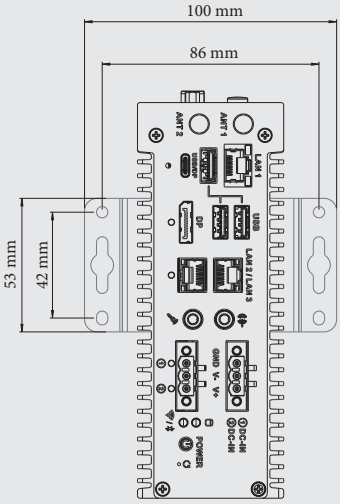
1. Attach the wall mounting brackets to the iEP-5020G Series and secure it with screws.



2. Then you can attach the iEP-5020G Series to the wall with screws.



Dimension of the iEP-5020G Series with Wall Mounting Bracket Installed

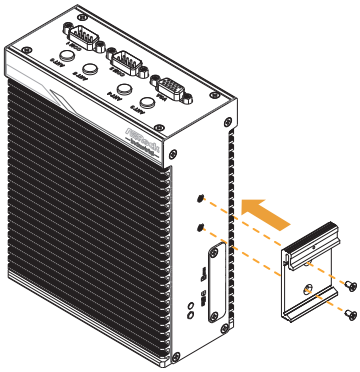


The Wall Mounting Bracket is not provided by default. Please purchase it separately if needed.

3.8 How to Install the Din Rail Mounting Bracket (Optional)

1. Attach the Din Rail Bracket to the iEP-5020G Series and secure it with screws.
2. Then you can place the iEP-5020G Series to the Din Rail.

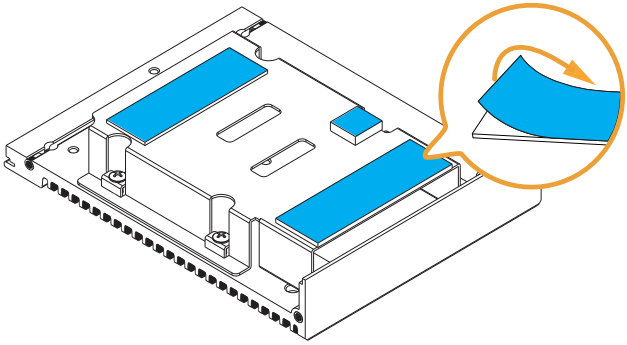
Admissible DIN rail : TS35/7.5 or TS35/15



The DIN Rail kit is not provided by default. Please purchase it separately if needed.

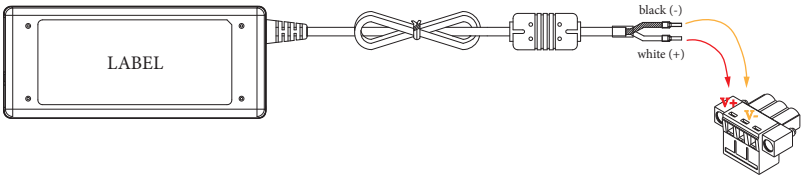
3.9 How to Remove the Membranes

Please note to remove the membranes from the heatsinks before reinstall the bottom case.

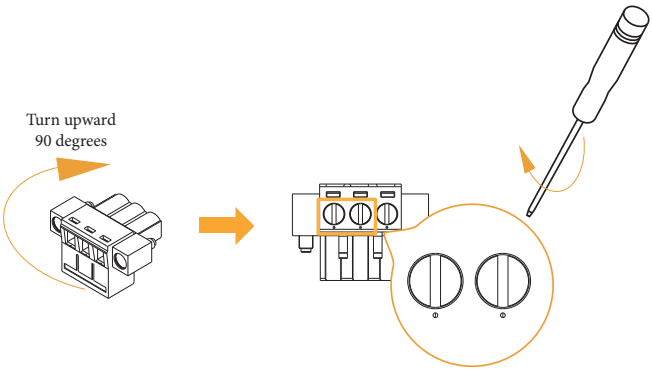


3.10 How to Install Phoenix Connector and the Adapter (Optional)

1. Insert white (+) cable of the adapter into the left port of the phoenix connector, and insert the black (-) cable into the middle port. Ensure the cables are inserted to the end.



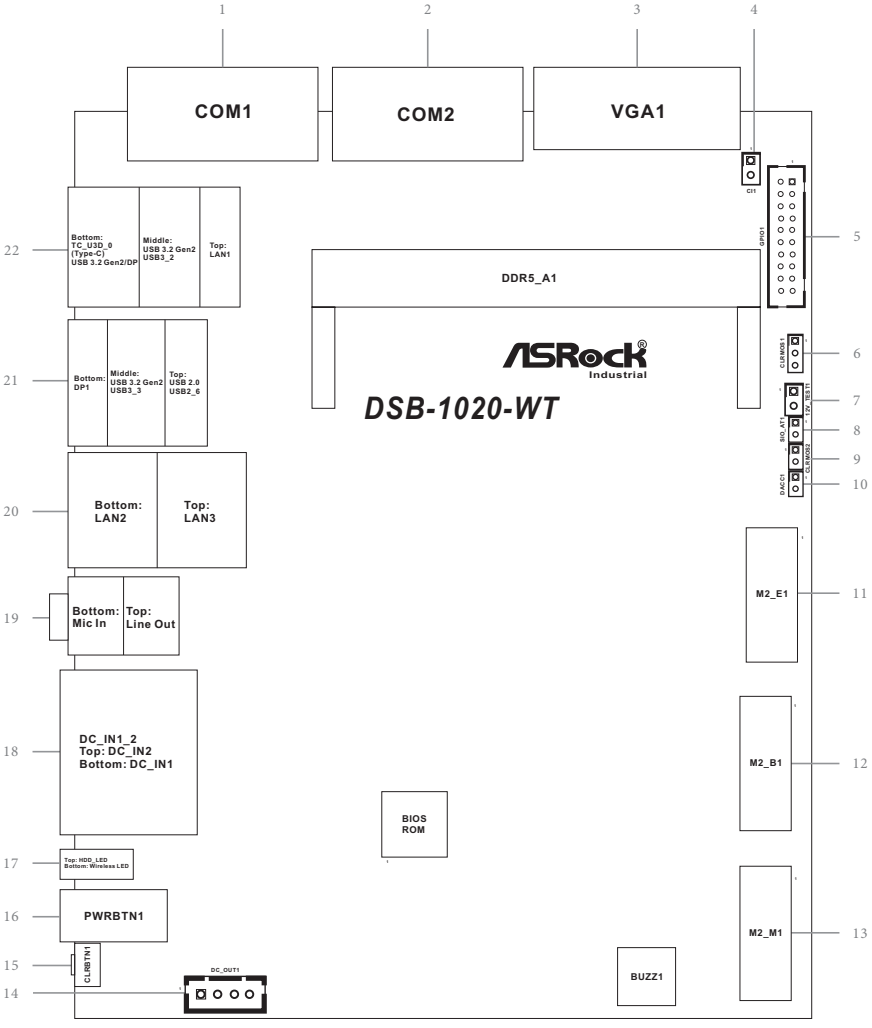
2. Tighten the left two screws from the top of the phoenix connector with a flathead screwdriver. Ensure the cables are inserted to the end and cannot be unplugged.



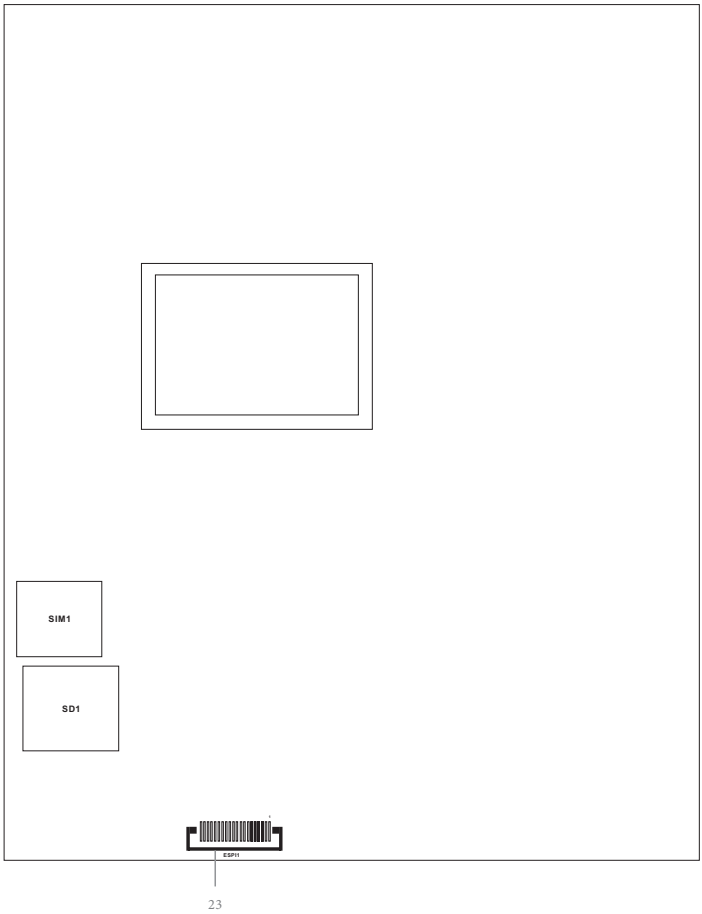
Chapter 4 Motherboard

4.1 Motherboard Layout

Top Side :



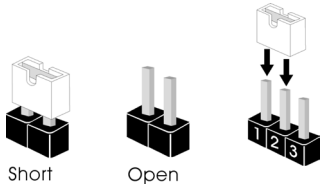
Rear Side :



1 : COM Port (COM1) (RS232/422/485)
2 : COM Port (COM1) (RS232/422/485)
3 : Top : D-Sub Port (VGA1)
4 : Chassis Intrusion Header (CI1)
5 : Digital Input/Output Connector (JGPIO1)
6 : Clear CMOS Header (CLRMOS1)
7 : 12V_TEST1
8 : ATX/AT Mode Jumper (SIO_AT1)
9 : Clear CMOS Header (CLRMOS2)
10 : DACC Jumper (DACC1)
11 : M.2 Key-E Socket (M2_E1)
12 : M.2 Key-B Socket (M2_B1)
13 : M.2 Key-M Socket (M2_M1)
14 : Power Connector (DC_OUT1) (12V/GND)
15 : Clear CMOS Button (CLRBTN1)
16 : Power Button (PWRBTN1)
17 : Top : HDD LED
Bottom : Wireless LED
18 : DC Input Connectors (DC_IN1_2)
Top : DC_IN2
Bottom : DC_IN1
19 : Audio Jacks
Top : Green - Line Out
Bottom : Pink - Mic In
20 : RJ45 LAN Ports
Top : LAN3
Bottom : LAN2
21 : Top : USB 2.0 Port (USB2_6)
Middle : USB 3.2 Gen2 Port (USB3_3)
Bottom : DislpayPort (DP1)
22 : Top : RJ45 LAN Port (LAN1)
Middle : USB 3.2 Gen2 Port (USB3_2)
Bottom : USB 3.2 Gen2/DP Type-C Port (TC_U3D_0)
23 : ESPI Header (ESPI1)

4.2 Jumpers Setup

The illustration shows how jumpers are setup. When the jumper cap is placed on pins, the jumper is "Short." If no jumper cap is placed on pins, the jumper is "Open." The illustration shows a 3-pin jumper whose pin1 and pin2 are "Short" when a jumper cap is placed on these 2 pins.



Chassis Intrusion Header

(2-pin CI1)

(see 38, No. 4)

Setting	Description
Open	Normal
Short	Active Case Open

This motherboard supports CASE OPEN detection feature that detects if the chassis cover has been removed. This feature requires a chassis with chassis intrusion detection design.

Clear CMOS Headers

(3-pin CLRMOS1)

(see p. 38, No. 6)

Setting	Description
1-2	Normal (Default)
2-3	Clear CMOS

NOTE: CLRMOS1 allows you to clear the data in CMOS. To clear and reset the system parameters to default setup, please turn off the computer and unplug the power cord from the power supply. After waiting for 15 seconds, use a jumper cap to short pin2 and pin3 on CLRMOS1 for 5 seconds. However, please do not clear the CMOS right after you update the BIOS. If you need to clear the CMOS when you just finish updating the BIOS, you must boot up the system first, and then shut it down before you do the clear-CMOS action. Please be noted that the password, date, and time will be cleared only if the CMOS battery is removed.

(2-pin CLRMOS2)

(see p. 38, No. 9)

Setting	Description
Open	Normal (Default)
Short	Auto Clear CMOS (Power Off)

Note:

CLRMOS2 allows you to clear the data in CMOS automatically when AC power on. The data in CMOS includes system setup information such as system password, date, time, and system setup parameters. To clear and reset the system parameters to default setup, please turn off the computer and unplug the power cord, and then use a jumper cap to short the pins on CLRMOS2.

ATX/AT Mode Jumper

(2-pin SIO_AT1)

(see p. 38, No. 8)

Setting	Description
Open	ATX Mode (Default)
Short	AT Mode

The header provides auto boot function when AC power on. If you need the function, short SIO_AT1 pin 1 and pin 2.

DACC Jumper

(2-pin DACC1)

(see p. 38, No. 10)

Setting	Description
Open	No ACC
Short	ACC (Default)

Auto clear CMOS when system boot improperly.

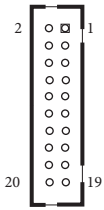
4.3 Onboard Headers and Connectors

Onboard headers and connectors are NOT jumpers. Do NOT place jumper caps over these headers and connectors. Placing jumper caps over the headers and connectors will cause permanent damage to the motherboard!

Digital Input/Output Connector

(20-pin JGPIO1)

(see p. 38, No. 5)



Pin	Signal Name	Signal Name	Pin
1	GND	GND	2
3	MCU_SPI0_ MOSI	GPP_E16	4
5	MCU_SPI0_ MISO	GPP_E7	6
7	MCU_SPI0_CLK	GPP_E3	8
9	MCU_SPI0_SS	GPP_D3	10
11	GPP_A15	GPP_E13	12
13	GPP_A14	GPP_E2	14
15	ICE_CLK	GPP_E1	16
17	ICE_DAT	GPP_B15	18
19	+3V	+3V	20

12V_TEST1

(2-pin 12V_TEST1)

(see p. 38, No. 7)

Pin	Signal name
1	+12V_TEST
2	GND

Power Connector (12N/GND)

(4-pin DC_OUT1)

(see p. 38, No. 14)

Pin	Signal name
1	+12VSB
2	GND
3	GND
4	+12VSB

Backside:

ESPI Header

(20-pin ESPI1)

(see p. 39, No. 12)

Pin	Signal Name
1	GND
2	C_ESPI_CLK
3	GND
4	C_ESPI_CS#
5	DEBUG_RESET
6	GND
7	+3V
8	GND
9	SMB_CLK_MAIN
10	SMB_DATA_MAIN
11	C_ESPI_IO0
12	C_ESPI_IO1
13	C_ESPI_IO2
14	C_ESPI_IO3
15	GND
16	+3VSB
17	NA
18	NA
19	C_ESPI_ALERT#
20	GND

4.4 Expansion Slots (M.2 Sockets)

There are three M.2 sockets on the motherboard.

M.2 Key-E Socket (M2_E1):

(see p. 38, No.11)

M.2 2230/2260 Key E (PCIe Gen3 x1 and USB 2.0 mode) supports Wifi/BT module.

Pin	Signal Name	Signal Name	Pin
1	GND	+3.3V	2
3	USB_D+	+3.3V	4
5	USB_D-	NA	6
7	GND	NA	8
9	CNV_WGR_D1-	CNV_RF_RESET	10
11	CNV_WGR_D1+	NA	12
13	GND	MODEM_ CLKREQ	14
15	CNV_WGR_D0-	NA	16
17	CNV_WGR_D0+	GND	18
19	GND	NA	20
21	CNV_WGR_ CLK-	CNV_BRI_RSP	22
23	CNV_WGR_ CLK+		
		CNV_BGI_DT	32
33	GND	CNV_RGI_RSP	34
35	PETp	CNV_BRI_DT	36
37	PETn	NA	38
39	GND	NA	40
41	PERp	NA	42
43	PERn	NA	44
45	GND	NA	46
47	PEFCLKp	NA	48
49	PEFCLKn	SUSCLK	50
51	GND	PERST0#	52
53	CLKREQ#	W_DISABLE1#	54
55	NA	W_DISABLE2#	56
57	GND	SMB_DATA	58
59	CNV_WT_D1-	SMB_CLK	60
61	CNV_WT_D1+	NA	62
63	GND	NA	64
65	CNV_WT_D0-	NA	66
67	CNV_WT_D0+	NA	68
69	GND	NA	70
71	CNV_WT_CLK-	+3.3V	72
73	CNV_WT_CLK+	+3.3V	74
75	GND		

M.2 Key-B Socket (M2_B1)

(see p. 38, No. 12)

M.2 3042/3052 Key-B (PCIe Gen3x1and USB 3.2 Gen1 x1 mode) supports 4G LTE/5G module.

Pin	Signal Name	Signal Name	Pin
1	NA	+3.3V	2
3	GND	+3.3V	4
5	GND	Full_Card_ Power_off	6
7	USB_D+	W_DISABLE	8
9	USB_D-	WWAN_LED#	10
11	GND		
		NA	20
21	GND	NA	22
23	NA	NA	24
25	NA	NA	26
27	GND	NA	28
29	USB3_RX-	UIM_RESET	30
31	USB3_RX+	UIM_CLK	32
33	GND	UIM_DATA	34
35	USB3_TX-	UIM_PWR	36
37	USB3_TX+	NA	38
39	GND	NA	40
41	PERn0	NA	42
43	PERp0	NA	44
45	GND	NA	46
47	PETn0	NA	48
49	PETP0	PERST#	50
51	GND	CLKREQ#	52
53	PEFCLKn	NA	54
55	PEFCLKp	NA	56
57	GND	NA	58
59	NA	NA	60
61	NA	NA	62
63	NA	NA	64
65	NA	NA	66
67	NA	NA	68
69	PEDET	+3.3V	70
71	GND	+3.3V	72
73	GND	+3.3V	74
75	NA		

M.2 Key-M Socket (M2_M1)

(see p. 38, No. 13)

M.2 2280 Key-M socket suppots PCIe Gen3 x2.

Pin	Signal Name	Signal Name	Pin
1	GND	+3.3V	2
3	GND	+3.3V	4
5	NA	NA	6
7	NA	NA	8
9	GND	SATA_LED	10
11	NA	+3.3V	12
13	NA	+3.3V	14
15	GND	+3.3V	16
17	NA	+3.3V	18
19	NA	NA	20
21	GND	NA	22
23	NA	NA	24
25	NA	NA	26
27	GND	NA	28
29	PERn1	NA	30
31	PERp1	NA	32
33	GND	NA	34
35	PETn1	NA	36
37	PETp1	NA	38
39	GND	SMB_CLK	40
41	PERn0 / SATA-B+	SMB_DATA	42
43	PERp0 / SATA-B-	NA	44
45	GND	NA	46
47	PETn0 / SATA-A-	NA	48
49	PETP0/ SATA-A+	PERST#	50
51	GND	CLKREQ#	52
53	PEFCLKn	NA	54
55	PEFCLKp	NA	56
57	GND	NA	58
67	NA	NA	68
69	PEDET	+3.3V	70
71	GND	+3.3V	72
73	GND	+3.3V	74
75	GND		

Chapter 5 UEFI Setup Utility

5.1 Introduction

ASRock Industrial UEFI (Unified Extensible Firmware Interface) is a BIOS utility which offers tweak-friendly options in an advanced viewing interface. The UEFI system works with a USB mouse and offers users a faster, sleeker experience.

This BIOS utility can perform the Power-On Self-Test (POST) during system startup, record hardware parameters of the system, load operating system, and so on. The battery on the motherboard supplies the power needed to the CMOS when the system power is turned off, and the values configured in the UEFI utility are kept in the CMOS.

Please note that inadequate BIOS settings may cause system instability, mulfunction or boot failure. We strongly recommend that you do not alter the UEFI default configurations or change the settings only with the assistance of a trained service person.

If the system becomes unstable or fails to boot after you change the setting, try to clear the CMOS values and reset the board to default values. See your motherboard manual for instructions.

5.1.1 Entering BIOS Setup

You may run the UEFI SETUP UTILITY by pressing <F2> or <Delete> right after you power on the computer; otherwise, the Power-On-Self-Test (POST) will continue with its test routines. If you wish to enter the UEFI SETUP UTILITY after POST, restart the system by pressing <Ctl> + <Alt> + <Delete>, or by pressing the reset button on the system chassis. You may also restart by turning the system off and then back on.

This setup guide explains how to use the UEFI SETUP UTILITY to configure all the supported system. The screenshots in this manual are for reference only. UEFI Settings and options may vary owing to different BIOS release versions or CPU installed. Please refer to the actual BIOS version of the motherboard you purchased for detailed screens, settings and options.

5.1.2 UEFI Menu Bar

The top of the screen has a menu bar with the following selections:

Main	For setting system time/date information
Advanced	For advanced system configurations
H/W Monitor	Displays current hardware status
Security	For security settings
Boot	For configuring boot settings and boot priority
Exit	Exit the current screen or the UEFI Setup Utility

Because the UEFI software is constantly being updated, the following UEFI setup screens and descriptions for reference purpose only, and may vary from the latest BIOS and do not exactly match what you see on your screen.

5.1.3 Navigation Keys

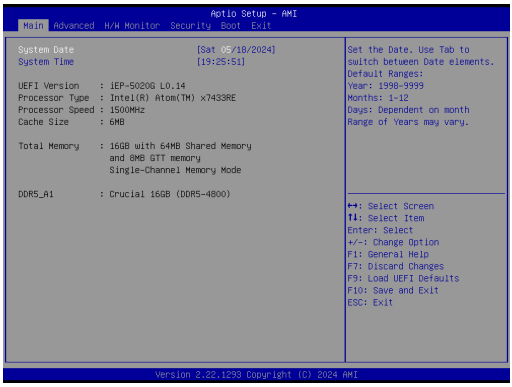
Use < ← > key or < → > key to choose among the selections on the menu bar, and use < ↑ > key or < ↓ > key to move the cursor up or down to select items, then press <Enter> to get into the sub screen. You can also use the mouse to click your required item.

Please check the following table for the descriptions of each navigation key.

Navigation Key(s)	Description
+ / -	To change option for the selected items
<Tab>	Switch to next function
<PGUP>	Go to the previous page
<PGDN>	Go to the next page
<HOME>	Go to the top of the screen
<END>	Go to the bottom of the screen
<F1>	To display the General Help Screen
<F7>	Discard changes and exit the SETUP UTILITY
<F9>	Load optimal default values for all the settings
<F10>	Save changes and exit the SETUP UTILITY
<F12>	Print screen
<ESC>	Jump to the Exit Screen or exit the current screen

5.2 Main Screen

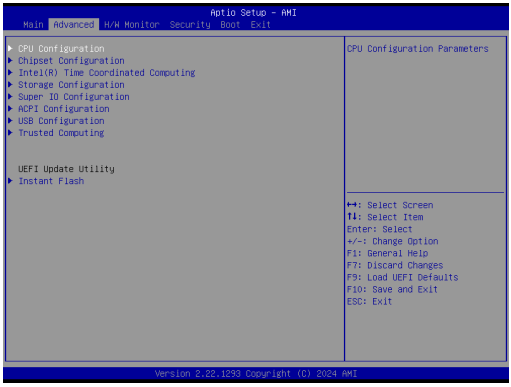
When you enter the UEFI SETUP UTILITY, the Main screen will appear and display the system overview.



Because the UEFI software is constantly being updated, the following UEFI setup screens and descriptions are for reference purpose only, and they may not exactly match what you see on your screen. Options may also vary depending on the features of your motherboard.

5.3 Advanced Screen

In this section, you may set the configurations for the following items: CPU Configuration, Chipset Configuration, Intel(R) Time Coordinated Computing, Storage Configuration, Super IO Configuration, ACPI Configuration, USB Configuration, and Trusted Computing.

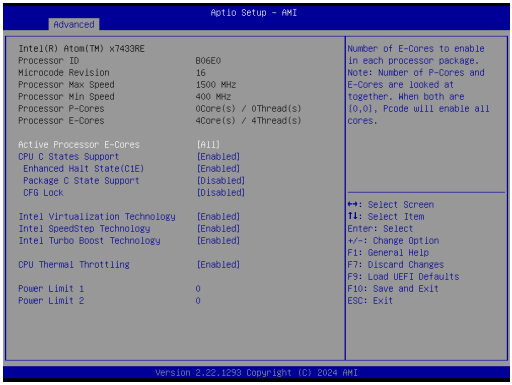


Setting wrong values in this section may cause the system to malfunction.

Instant Flash

Instant Flash is a UEFI flash utility embedded in Flash ROM. This convenient UEFI update tool allows you to update system UEFI without entering operating systems first like MS-DOS or Windows®. Just launch this tool and save the new UEFI file to your USB flash drive, floppy disk or hard drive, and then you can update your UEFI in only a few clicks without preparing an additional floppy diskette or other complicated flash utility. Please be noted that the USB flash drive or hard drive must use FAT32/16/12 file system. If you execute Instant Flash utility, the utility will show the UEFI files and their respective information. Select the proper UEFI file to update your UEFI, and reboot your system after UEFI update process completes.

5.3.1 CPU Configuration



Active Processor E-Cores

This allows you to select the number of cores to enable in each processor package.

CPU C States Support

This allows you to enable CPU C States Support for power saving. It is recommended to keep C3, C6 and C7 all enabled for better power saving.

Configuration options: [Enabled] [Disabled]

Enhanced Halt State (C1E)

The option allows you to enable Enhanced Halt State (C1E) for lower power consumption.

Configuration options: [Enabled] [Disabled]

Package C State Support

The option allows you to enable CPU, PCIe, Memory, Graphics C State Support for power saving.

Configuration options: [Auto] [Enabled] [Disabled]

CFG Lock

The option allows you to enable or disable the CFG Lock.

Configuration options: [Enabled] [Disabled]

Intel Virtualization Technology

When this option is set to [Enabled], a VMM (Virtual Machine Architecture) can utilize the additional hardware capabilities provided by Vanderpool Technology. This option will be hidden if the installed CPU does not support Intel Virtualization Technology.

Configuration options: [Enabled] [Disabled]

Intel SpeedStep Technology

Intel SpeedStep technology allows processors to switch between multiple frequencies and voltage points for better power saving and heat dissipation. CPU turbo ratio can be fixed when Intel SpeedStep Technology is set to [Disabled] and Intel Turbo Boost Technology is set to [Enabled].

If you install Windows® 10 and want to enable this function, please set this item to [Enabled]. This item will be hidden if the current CPU does not support Intel SpeedStep technology.

Configuration options: [Enabled] [Disabled].

Please note that enabling this function may reduce CPU voltage and lead to system stability or compatibility issues with some power supplies. Please set this item to [Disabled] if above issues occur.

Intel Turbo Boost Technology

Intel Turbo Boost Technology enables the processor to run above its base operating frequency when the operating system requests the highest performance state. The default

value is [Enabled].

Configuration options: [Enabled] [Disabled]

CPU Thermal Throttling

CPU Thermal Throttling allows you to enable CPU internal thermal control mechanisms to keep the CPU from overheating.

Configuration options: [Enabled] [Disabled]

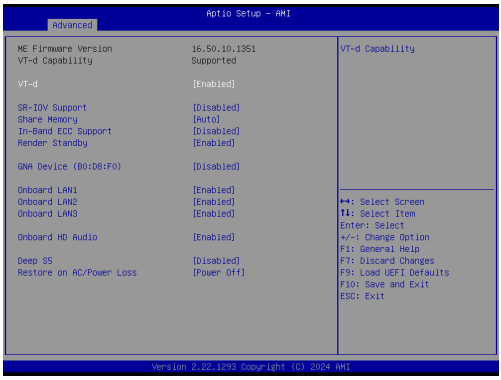
Power Limit 1

Power Limit 1 in Milli Watts. BIOS will round to the nearest 1/8W when programming. 0 = no custom override. For 12.50W, enter 12500. Overclocking SKU: Value must be between Max and Min Power Limits (specified by PACKAGE_POWER_SKU_MSR). Other SKUs: This value must be between Min Power Limit and Processor Base Power (TDP) Limit.

Power Limit 2

Power Limit 2 value in Milli Watts. BIOS will round to the nearest 1/8W when programming. 0 = no custom override. For 12.50W, enter 12500. Processor applies control policies such that the package power does not exceed this limit.

5.3.2 Chipset Configuration



VT-d

Intel® Virtualization Technology for Directed I/O helps your virtual machine monitor better utilize hardware by improving application compatibility and reliability, and providing additional levels of manageability, security, isolation, and I/O performance.

Configuration options: [Enabled] [Disabled]

SR-IOV Support

If system has SR-IOV capable PCIe Devices, this option Enables or Disables Single Root IO Virtualization Support.

Configuration options: [Enabled] [Disabled]

Share Memory

Share memory allows you to configure the size of memory that is allocated to the integrated graphics processor when the system boots up.

Configuration options: [Auto] [32M] [64M] [128M] [256M] [512M] Options vary depending on the memory you use on your motherboard.

In-Band ECC

This allows you to enable or disable In-Band ECC.

Configuration options: [Enabled] [Disabled]

Render Standby

Power down the render unit when the GPU is idle for lower power consumption.

GNA Device (BO:D8:FO)

This allows you to enable or disable GNA Device.

Configuration options: [Enabled] [Disabled]

Onboard LAN1

This allows you to enable or disable the Onboard LAN1 feature.

Onboard LAN2

This allows you to enable or disable the Onboard LAN2 feature.

Onboard LAN3

This allows you to enable or disable the Onboard LAN3 feature.

Onboard HD Audio

Select [Auto], [Enabled] or [Disabled] for the onboard HD Audio feature. If you select [Auto], the onboard HD Audio will be disabled when PCI Sound Card is plugged.

Deep S5

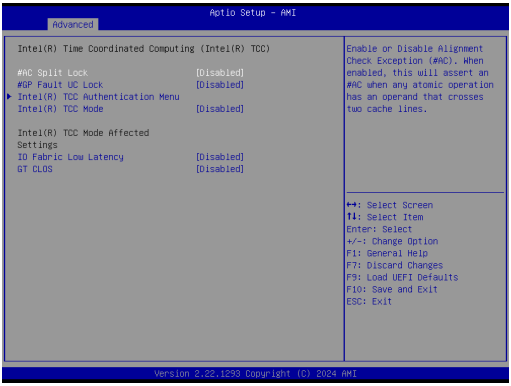
Mobile platforms support Deep S5 in DC only and desktop platforms support Deep S5 in AC only. The default value is [Disabled].

Configuration options: [Auto] [Disabled]

Restore on AC/Power Loss

Select the power state after a power failure. If [Power Off] is selected, the power will remain off when the power recovers. If [Power On] is selected, the system will start to boot up when the power recovers.

5.3.3 Intel(R) Time Coordinated Computing



#AC Split Lock

Enable or Disable Alignment Check Exception (#AC). When enabled, this will assert an #AC when any atomic operation has an operand that crisses two cache lines.

#GP Fault UC Lock

Enable or Disable GP Fault Exception (GP#). When enabled, this will assert an GP# when encountering a Lock to un-cacheable memory before the bus is locked.

Interl (R) TCC Authenticatiion Menu

Press Enter to configure Intel(R) TCC Authentication Menu options.

Interl (R) TCC Mode

The item enables or disables Intel(R) TCC Mode. When enabled, this will modify system settings to improve real-time performance. The full list of settings and their current state are displayed below when Intel(R) TCC mode is enabled.

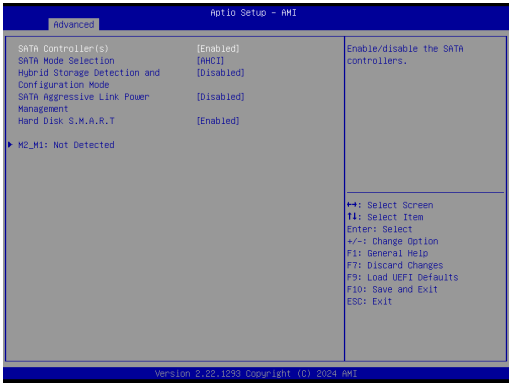
IO Fabric Low Latency

The item enables or disables IO Fabric Low Latency. This will turn off some power management in the PCH IO fabrics. This option provides the most aggressive IO Fabric performance setting. S3 state is NOT supported.

GT CLOS

The item enables or disables Graphics Technology(GT) Class of Service. Enable will reduce Gfx LLC allocation to minimize impact of Gfx workload on LLC.

5.3.4 Storage Configuration



SATA Controller(s)

The option allows you to enable or disable the SATA controllers.

Configuration options: [Enabled] [Disabled]

SATA Mode Selection

AHCI supports new features that improve performance.

Configuration option: [AHCI]

AHCI (Advanced Host Controller Interface) supports NCQ and other new features that will improve SATA disk performance but IDE mode does not have these advantages.

Hybrid Storage Detection and Configuration Mode

The option allows you to select Hybrid Storage Detection and Configuration Mode.

Configuration options: [Dynamic Configuration for Hybrid Storage Enable]

[Disabled]

SATA Aggressive Link Power Management

SATA Aggressive Link Power Management allows SATA devices to enter a low power state during periods of inactivity to save power. It is supported only by AHCI mode.

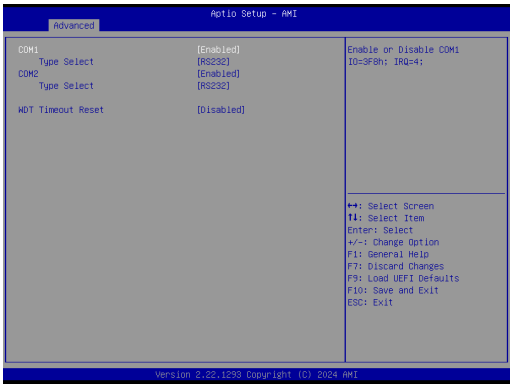
Configuration options: [Enabled] [Disabled]

Hard Disk S.M.A.R.T.

S.M.A.R.T stands for Self-Monitoring, Analysis, and Reporting Technology. It is a monitoring system for computer hard disk drives to detect and report on various indicators of reliability.

Configuration options: [Enabled] [Disabled]

5.3.5 Super IO Configuration



COM1

Use this to set parameters of COM1.

Type Select

Use this to select COM1 port type: [RS232], [RS422] or [RS485].

COM2

Use this to set parameters of COM2.

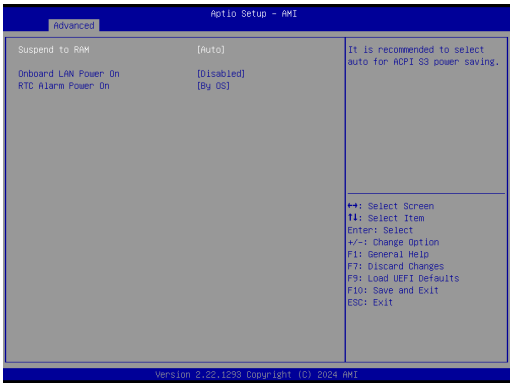
Type Select

Use this to select COM2 port type: [RS232], [RS422] or [RS485].

WDT Timeout Reset

Use this to set the Watch Dog Timer.

5.3.6 ACPI Configuration



Suspend to RAM

Suspend to RAM allows you to select [Disabled] for ACPI suspend type S1. It is recommended to select [Auto] for ACPI S3 power saving.

Configuration options: [Auto] [Disabled]

Onboard LAN Power On

Use this item to enable or disable onboard LAN to turn on the system from the power-softoff mode.

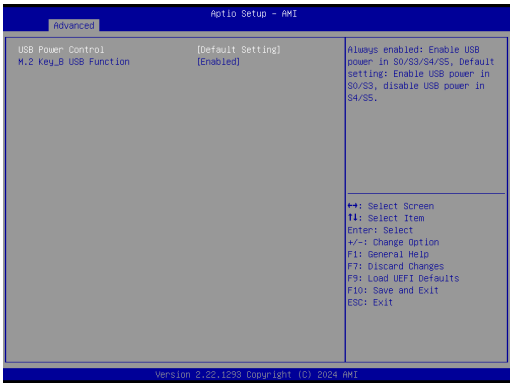
Configuration options: [Enabled] [Disabled]

RTC Alarm Power On

RTC Alarm Power On allows the system to be waked up by the real time clock alarm. Set it to By OS to let it be handled by your operating system.

Configuration options: [Enabled] [Disabled] [By OS]

5.3.7 USB Configuration



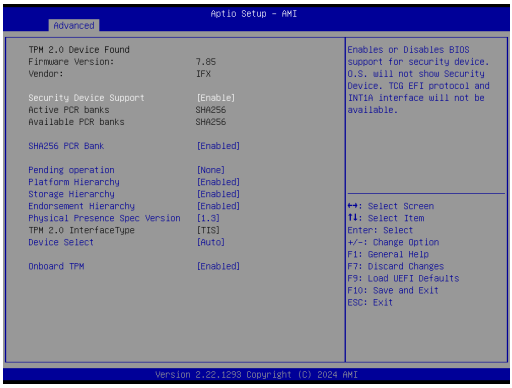
USB Power Control

Use this option to control USB power.

M.2 Key_B USB Function

The item enables or disables M.2 Key_B USB function.

5.3.8 Trusted Computing



Security Device Support

Security Device Support allows you to enable or disable BIOS support for security device. O.S. will not show Security Device. TCG EFI protocol and INT1A interface will not be available.

Configuration options: [Enabled] [Disabled]

Active PCR banks

This item displays active PCR Banks.

Available PCR Banks

This item displays available PCR Banks.

SHA256 PCR Bank

SHA256 PCR Bank allows you to enable or disable SHA256 PCR Bank.

Configuration options: [Enabled] [Disabled]

Pending Operation

Pending Operation allows you to schedule an Operation for the Security Device.

NOTE: Your computer will reboot during restart in order to change State of the Device.

Configuration options: [None] [TPM Clear]

Platform Hierarchy

This item allows you to enable or disable Platform Hierarchy.

Configuration options: [Enabled] [Disabled]

Storage Hierarchy

This item allows you to enable or disable Storage Hierarchy.

Configuration options: [Enabled] [Disabled]

Endorsement Hierarchy

This item allows you to enable or disable Endorsement Hierarchy.

Configuration options: [Enabled] [Disabled]

Physical Presence Spec Version

Select this item to tell OS to support PPI spec version 1.2 or 1.3. Please note that some HCK tests might not support version 1.3.

Configuration options: [1.2] [1.3]

TPM 2.0 InterfaceType

This item allows you to view the Communication Interface to TPM 2.0 Device: CRB or ITS.

Device Select

This item allows you to select the TPM device to be supported.

[TPM 1.2] restricts support to TPM 1.2 devices.

[TPM 2.0] restricts support to TPM 2.0 devices.

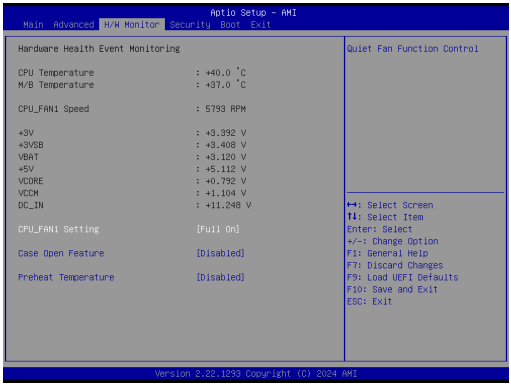
[Auto] supports both TPM 1.2 and TPM 2.0 devices with the default set to TPM 2.0 devices. If TPM 2.0 devices are not found, TPM 1.2 devices will be enumerated.

Onboard TPM

The option enables or disables Intel PTT in ME. Disable this option to use discrete TPM Module.

5.4 Hardware Health Event Monitoring Screen

In this section, it allows you to monitor the status of the hardware on your system, including the parameters of the CPU temperature, motherboard temperature, CPU fan speed, and the critical voltage.



NOTE: Options vary depending on the features of your motherboard.

CPU_Fan 1 Setting

This item allows you to select a fan mode for CPU Fan 1. The default value is [Full On].

Configuration options: [Full On] [Automatic Mode]

Case Open Feature

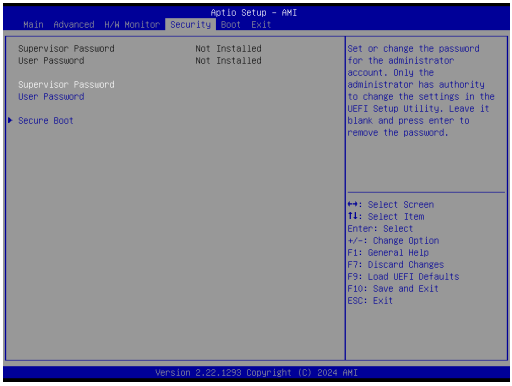
This item allows you to enable or disable case open detection feature. The default is value [Disabled].

Preheat Temperature

Use the item to enable AT/TX or disable Preheat Control.

5.5 Security Screen

In this section, you may set, change or clear the supervisor/user password for the system.



Supervisor Password

Set or change the password for the administrator account. Only the administrator has the authority to change the settings in the UEFI Setup Utility. Leave it blank and press enter to remove the password.

User Password

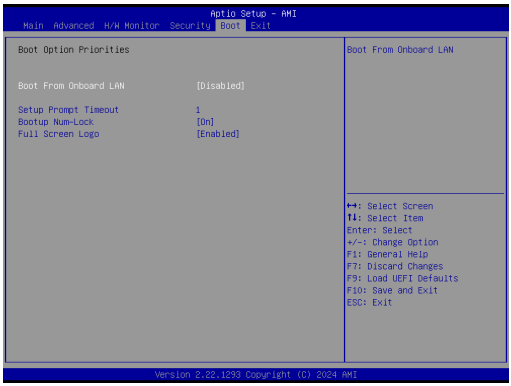
Set or change the password for the user account. Users are unable to change the settings in the UEFI Setup Utility. Leave it blank and press enter to remove the password.

Secure Boot

Press [Enter] to configure the Secure Boot Settings. The feature protects the system from unauthorized access and malwares during POST. Secure Boot is supported on Window 8 / Ubuntu 12.04 / Fedora 19 and later.

5.6 Boot Screen

In this section, it will display the available devices on your system for you to configure the boot settings and the boot priority.



Boot From Onboard LAN

The item allows the system to be woke up by the onboard LAN.

Configuration options: [Enabled] [Disabled]

Setup Prompt Timeout

The item allows you to configure the number of seconds to wait for the UEFI setup utility. 65535(0XFFFF) means indefinite waiting.

Configuration options: [1] - [65535]

Bootup Num-Lock

The item allows you to select whether Num Lock should be turned on or off when the system boots up.

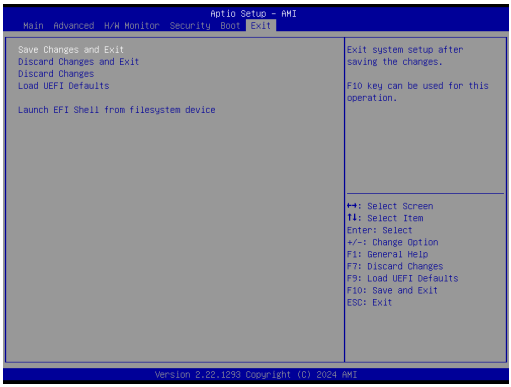
Configuration options: [On] [Off]

Full Screen Logo

[Enabled] Select this item to display the boot logo.

[Disabled] Select this item to show normal POST messages.

5.7 Exit Screen



Save Changes and Exit

When you select this option, the following message “Save configuration changes and exit setup?” will pop out. Select [Yes] to save the changes and exit the UEFI SETUP UTILITY.

Discard Changes and Exit

When you select this option, the following message “Discard changes and exit setup?” will pop out. Select [Yes] to exit the UEFI SETUP UTILITY without saving any changes.

Discard Changes

When you select this option, the following message “Discard changes?” will pop out. Select [Yes] to discard all the changes.

Load UEFI Defaults

The item allows you to load UEFI default values for all options. The F9 key can be used for this operation.

Launch EFI Shell from filesystem device

The item allows you to copy shellx64.efi to the root directory to launch EFI Shell.