FPC-5211 Series

Intel® 12th / 13th /14th Gen. Core Fanless Edge AI Computer supporting Nvidia® RTX-A2000

User's Manual

Version 1.2

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Revision History

Version	Release Time	Description
1.0	2023.10	Initial release
1.1	2024.07	Add Installing Thermal Pad for RAM & NVMe SSD, PoE Management Utility instruction and appendix for CAN BUS testing procedure
1.2	2024.12	Add FPC-5211-E1 SKU product images and information

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Copyright Notice

The information in this document is subject to change without prior notice in order to improve the reliability, design and function. It does not represent a commitment on the part of the manufacturer.

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.

Declaration of Conformity

CE

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

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

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

FCC Class A

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

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

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

NOTE:

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

RoHS

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

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

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

SVHC / REACH

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

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

Important Safety Instructions

Read these safety instructions carefully

1. Read all cautions and warnings on the equipment.
2. Place this equipment on a reliable surface when installing. Dropping it or letting it fall may cause damage
3. Make sure the correct voltage is connected to the equipment.
4. For pluggable equipment, the socket outlet should be near the equipment and should be easily accessible.
5. Keep this equipment away from humidity.
6. The openings on the enclosure are for air convection and protect the equipment from overheating. DO NOT COVER THE OPENINGS.
7. Position the power cord so that people cannot step on it. Do not place anything over the power cord.
8. Never pour any liquid into opening. This may cause fire or electrical shock.
9. Never open the equipment. For safety reasons, the equipment should be opened only by qualified service personnel.
10. If one of the following situations arises, get the equipment checked by service personnel:
    a. The power cord or plug is damaged.
    b. Liquid has penetrated into the equipment.
    c. The equipment has been exposed to moisture.
    d. The equipment does not work well, or you cannot get it to work according to the user's manual.
    e. The equipment has been dropped or damaged.
    f. The equipment has obvious signs of breakage.
11. Keep this User's Manual for later reference.

Warning

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

1. Disconnect your Box PC from the power source when you want to work on the inside.
2. Use a grounded wrist strap when handling computer components.
3. Place components on a grounded antistatic pad or on the bag that came with the Box PC, whenever components are separated from the system.

Replacing Lithium Battery

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

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

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

Technical Support

If you have any technical difficulties, please consult the user's manual first at:

http://www.arbor-technology.com

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

E-mail: info@arbor.com.tw

Warranty

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

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

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

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

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Chapter 1

Introduction

1.1. The Computer

FPC-5211-M4

- Fanless design (Embedded heat pipes cooling solution)
- 14th / 13th / 12th Gen Core™ i9/i7/i5/i3 Processor (Raptor Lake-Refresh-S/ Raptor Lake-S/Alder Lake-S)
- Up to 60W GPU MXM module expansion
- 4 x 802.3af (15.4W) Gigabit PoE ports
- DP x 2 + HDMI x 1 and DVI x 1 (support 4 independent displays)
- Power on/off delay control / configurable ignition power control
- Supports TPM 2.0 and Time-Sensitive Networking (TSN)
- Two-mPCIe for optional WiFi/3G/4G/GPS or I/O expansion supported
- Front-accessible I/O support
- 1 x M.2 B-Key for storage or 5G / LTE +1 x M.2 E-Key for WiFi / BT
- 1 x M.2 M-Key for NVMe SSD

FPC-5211-P6

- Fanless design (Embedded heat pipes cooling solution)
- 14th/13th/12th Gen. Core™ i9/i7/i5/i3 Processor (Raptor Lake-Refresh-S/ Raptor Lake-S/Alder Lake-S)
- Up to 60W GPU MXM module expansion
- 6x 802.3af (15.4W) Gigabit PoE ports
- DP x2 + HDMI x 1 and DVI x 1 (support 4 independent displays)
- Power on/off delay control / configurable ignition power control
- Supports TPM 2.0 and Time-Sensitive Networking (TSN)
- Two-mPCIe for optional WiFi/3G/4G/GPS or I/O expansion supported
- Front-accessible I/O support
- 1 x M.2 B-Key for storage or 5G / LTE +1 x M.2 E-Key for WiFi / BT
- 1 x M.2 M-Key for NVMe SSD

FPC-5211-2M4(2P4)

- Fanless design (Embedded heat pipes cooling solution)
- 14th / 13th / 12th Gen Core™ i9/i7/i5/i3 Processor (Raptor Lake-Refresh-S/ Raptor Lake-S/Alder Lake-S)
- Up to 60W GPU MXM module expansion

- 802.3af (15.4W)/802.3at(25.5W) Gigabit PoE ports
- DP x2 + HDMI x 1 and DVI x 1 (support 4 independent displays)
- Power on/off delay control / configurable ignition power control
- Supports TPM 2.0 and Time-Sensitive Networking (TSN)
- Two-mPCIe for optional WiFi/3G/4G/GPS or I/O expansion supported
- Front-accessible I/O support
- 1 x M.2 B-Key for storage or 5G / LTE +1 x M.2 E-Key for WiFi / BT
- 1 x M.2 M-Key for NVMe SSD

FPC-5211-E1

- Fanless design (Embedded heat pipes cooling solution)
- 14th/13th/12th Gen. Core™ i9/i7/i5/i3 Processor (Raptor Lake-Refresh-S/ Raptor Lake-S/Alder Lake-S)
- Up to 60W GPU MXM module expansion
- 1 x PCIe expansion
- DP x2 + HDMI x 1 and DVI x 1 (support 4 independent displays)
- Power on/off delay control / configurable ignition power control
- Supports TPM 2.0 and Time-Sensitive Networking (TSN)
- Two-mPCIe for optional WiFi/3G/4G/GPS or I/O expansion supported
- Front-accessible I/O support
- 1 x M.2 B-Key for storage or 5G / LTE +1 x M.2 E-Key for WiFi / BT
- 1 x M.2 M-Key for NVMe SSD

1.2. About this Manual

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

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

1.3. Specifications

FPC-5211-M4

System	
CPU	Intel® 14th / 13th / 12th generation Core™ i9/i7/i5/i3 processor in LGA1700 socket (Max 35W CPU)
Memory	2 x 262-pin DDR5 SO-DIMM sockets, supporting 4800 MHz SDRAM up to 64GB (ECC/ Non-ECC)
Chipset	Intel® R680E
Graphics	Integrated Intel® HD Graphics 770
ATA	2 x Serial ATA ports with 600MB/s HDD transfer rate
LAN Chipset	1 x Intel® WGI219LM GbE controller w/ iAMT 16.0 3 x Intel® I226 2.5G GbE controllers 2 x Intel® I210 GbE controllers for PoE 2 x Intel® I226 2.5G GbE controllers for PoE
Watchdog Timer	1~255 levels reset
TPM	Onboard TPM 2.0
I/O	
Serial Port	2 x RS-232/422/485 configurable ports via DB-9 connectors (Default RS232,Switch via BIOS) 2 x RS-232 via DB-9 connectors
USB Port	8 x USB 3.2/ 2.0 ports
LAN	4 x RJ-45 connectors for GbE 4 x M12 X-coded connectors by 2 x Intel® I210(1GbE) + 2 x Intel® I225(2.5GbE) supports 802.3af POE
Video Port	2 x DP 1.4a from MXM module or Intel Graphics (Default Intel graphics switch via BIOS)
	1 x HDMI 2.0b female conn. for Digital Video output
	1 x DVI-I female conn. for Digital / Analog video output
	*Support 4 independent displays
Digital I/O Port	1 x DB15 conn.for 8 x digital input (Dry / Wet contact) with 2KV isolation
	1 x DB15 connector for 8 x digital output with 2KV isolation
Audio	Mic-in/Line-out

Expansion Bus	1 x MXM3.1 TYPE A/B GPU Slot (PCIe Gen5 x16) MXM A2000 support
	2 x mPCIe Slots interconnected with SIM card sockets for optional WiFi/BT/3G/LTE/ GPS (PCIex1+USB2.0, Full Size)
	1 x M.2 B key (2242/3052/2280) w/ (PCIex2+USB3.0+SATA) interconnected with SIM for 5G / LTE or for storage (either one)
	1 x M.2 E key (2230) with PCIex1+USB2.0+CNVi) for Wireless
Environmental	
Operating Temp.	-20 ~ 50°C (-4 ~ 122°F), ambient w/ air flow -20 ~ 65°C (-4 ~ 149°F), ambient w/ air flow (w/ External SMART FAN kit) *A2000 GPU 100% loading without throttling
Storage Temp.	-40 ~ 85°C (-40 ~ 185°F)
Operating Humidity	10 ~ 95% @ 65°C (non-condensing)
Vibration	5~500Hz 3G rms X,Y,Z axis w/SSD, according to IEC 60068-2-64
Shock	50 Grms, Half-sine 11 m sec. duration w/ SSD, according IEC60068-2-27
Qualification	
Certification	CE, FCC Class A, E mark
Power Requirement	
Main Power Input	DC 9~36V input (w/ 4-pin DC input terminal block) (V+ ,V+, V-, V-)
Ignition Switch	2-pin teminal block: IGN, GND
Power Consumption	Max. 180W
Storage	
Type	2 x 2.5” outside accessible drive bays
	1 x M.2 B key (2242/2280) w/ (PCIex2+USB+ SATA) for storage or LTE expansion (either one)
	1 x M.2 2280 M key supports 2242, 2280 devices (PCIe x4 & SATA signal, support boot up function)
Mechanical	
Construction	Aluminum alloy
Mounting	Wall-mount
Weight	5.83 Kg (12.85lb)
Dimensions (W x D x H)	285x230x 90mm (11.22” x9.05” x 3.54”), Fanless 285x230x110mm (11.22” x9.05” x 4.33”), w/ FAN

OS Support	
Windows 10 IoT Enterprise 64-bit / Windows 11 IoT Enterprise 64-bit Linux (Ubuntu 20.04)	
Ordering Information	
FPC-5211-M4	Edge AI GPU Computer Bare BOM, w/4x M12 PoEs

FPC-5211-P6

System	
CPU	Intel® 14th / 13th / 12th generation Core™ i9/i7/i5/i3 processor in LGA1700 socket (Max 35W CPU)
Memory	2 x 262-pin DDR5 SO-DIMM sockets, supporting 4800 MHz SDRAM up to 64GB (ECC/ Non-ECC)
Chipset	Intel® R680E
Graphics	Integrated Intel® HD Graphics 770
ATA	2 x Serial ATA ports with 600MB/s HDD transfer rate
LAN Chipset	1 x Intel® WGI219LM GbE controller w/ iAMT 16.0 3 x Intel® I226 2.5G GbE controllers 6 x Intel® I210 GbE controllers for PoE
Watchdog Timer	1~255 levels reset
TPM	Onboard TPM 2.0
I/O	
Serial Port	2 x RS-232/422/485 configurable ports via DB-9 connectors (Default RS232,Switch via BIOS)
USB Port	8 x USB 3.2/ 2.0 ports
LAN	4 x RJ-45 connectors for GbE 6 x RJ-45 connectors by Intel® I210(1GbE) max 60W supports 802.3af POE
Video Port	2 x DP 1.4a from MXM module or Intel Graphics
	1 x HDMI 2.0b female conn. for Digital Video output (Default Intel graphics switch via BIOS)
	1 x DVI-I female conn. for Digital / Analog video output
	*Support 4 independent displays
Digital I/O Port	1 x DB15 conn.for 8 x digital input (Dry / Wet contact) with 2KV isolation
	1 x DB15 connector for 8 x digital output with 2KV isolation
Audio	Mic-in/Line-out

Expansion Bus	1 x MXM3.1 TYPE A/B GPU Slot (PCIe Gen5 x16) MXM A2000 support
	2 x mPCIe Slots interconnected with SIM card sockets for optional WiFi/BT/3G/LTE/ GPS (PCIex1+USB2.0, Full Size)
	1 x M.2 B key (2242/3052/2280) w/ (PCIex2+USB3.0+SATA) interconnected with SIM for 5G / LTE or for storage (either one)
	1 x M.2 E key (2230) with PCIex1+USB2.0+CNVi) for Wireless
Environmental	
Operating Temp.	-20 ~ 50°C (-4 ~ 122°F), ambient w/ air flow -20 ~ 65°C (-4 ~ 149°F), ambient w/ air flow (w/ External SMART FAN kit) *A2000 GPU 100% loading without throttling
Storage Temp.	-40 ~ 85°C (-40 ~ 185°F)
Operating Humidity	10 ~ 95% @ 65°C (non-condensing)
Vibration	5~500Hz 3G rms X,Y,Z axis w/SSD, according to IEC 60068-2-64
Shock	50 Grms, Half-sine 11 m sec. duration w/ SSD, according IEC60068-2-27
Qualification	
Certification	CE, FCC Class A, E mark
Power Requirement	
Main Power Input	DC 9~36V input (w/ 4-pin DC input terminal block) (V+ ,V+, V-, V-)
Ignition Switch	2-pin teminal block: IGN, GND
Power Consumption	Max. 180W
Storage	
Type	2 x 2.5” outside accessible drive bays
	1 x M.2 B key (2242/2280) w/ (PCIex2+USB+ SATA) for storage or LTE expansion (either one)
	1 x M.2 2280 M key supports 2242, 2280 devices (PCIe x4 & SATA signal, support boot up function)
Mechanical	
Construction	Aluminum alloy
Mounting	Wall-mount
Weight	5.83 Kg (12.85lb)
Dimensions (W x D x H)	285x230x 90mm (11.22” x9.05” x 3.54”), Fanless 285x230x110mm (11.22” x9.05” x 4.33”), w/ FAN
OS Support	

Windows 10 IoT Enterprise 64-bit / Windows 11 IoT Enterprise 64-bit Linux (Ubuntu 20.04)	
Ordering Information	
FPC-5211-P6	Edge AI GPU Computer Bare BOM, w/6x POEs

FPC-5211-2M4(FPC-5211-2P4)

System	
CPU	Intel® 14th/13th/12th Gen Core™ i9/i7/i5/i3 processor in LGA1700 socket (Max 35W CPU)
Memory	2 x 262-pin DDR5 SO-DIMM sockets, supporting 4800 MHz SDRAM up to 64GB (ECC/ Non-ECC)
Chipset	Intel® R680E
Graphics	Integrated Intel® HD Graphics 770
ATA	2 x Serial ATA ports with 600MB/s HDD transfer rate
LAN Chipset	1 x Intel® WGI219LM GbE controller w/ iAMT 16.0 3 x Intel® I226 2.5GbE controllers 2 x Intel® I226 2.5GbE controllers for PoE 2 x Marvell® 10GbE controllers for PoE
Watchdog Timer	1~255 levels reset
TPM	Onboard TPM 2.0
I/O	
Serial Port	2 x RS-232/422/485 configurable ports via DB-9 connectors (Default RS232,Switch via BIOS) 2 x RS-232 via DB-9 connectors
USB Port	8 x USB 3.2(10Gbps) / 2.0 ports
LAN	4 x RJ-45 conn. for GbE 4 x M12 X-coded conn. by 2 x Intel® I226(2.5GbE) + 2 x Marvell® 10GbE, max 60W supports 802.3at POE+ (For -2M4) 4 x RJ45 conn.by 2 x Intel® I226(2.5GbE) + 2 x Marvell® 10GbE, max 60W supports 802.3at POE+ (For -2P4)
Video Port	2 x DP 1.4a from MXM module or Intel Graphics (Default Intel Graphics switch via BIOS)
	1 x HDMI 2.0b female connector
	1 x DVI-I female connector for digital / analog video output
	*Support 4 independent displays

Digital I/O Port	1 x DB15 conn.for 8 x digital input (Dry / Wet contact) with 2KV isolation
	1 x DB15 connector for 8 x digital output with 2KV isolation
Audio	Mic-in/Line-out
CAN Bus	2x DB9 connector for isolated CANbus 2.0B(CN1/CN2)
Expansion Bus	1 x MXM3.1 TYPE A/B GPU Slot (PCIe Gen5 x16) MXM A2000 support
	2 x mPCIe Slots interconnected with SIM card sockets for optional WiFi/BT/3G/LTE/ GPS (PCIex1+USB2.0, Full Size)
	1 x M.2 B key (2242/3052/2280) w/(PCIex2+USB3.0) interconnected with SIM for 5G / LTE expansion or for storage (either one)
	1 x M.2 E key (2230) with PCIex1+USB2.0+CNVi) for Wireless
Environmental	
Operating Temp.	-20 ~ 50°C (-4 ~122°F), ambient w/ air flow -20 ~ 60°C (-4 ~140°F), ambient w/ air flow (w / External SMART FAN kit) *A2000 GPU 100% loading without throttling
Storage Temp.	-40 ~ 85°C (-40 ~ 185°F)
Operating Humidity	10 ~ 95% @ 60°C (non-condensing)
Vibration	5~500Hz 3G rms X,Y,Z axis w/SSD, according to IEC 60068-2-64
Shock	50 Grms, Half-sine 11 m sec. duration w/ SSD, according IEC60068-2-27
Qualification	
Certification	CE, FCC Class A, E mark
Power Requirement	
Main Power Input	DC 9~36V input (w/ 4-pin DC input terminal block) (V+ ,V+, V-, V-)
Ignition Switch	2-pin teminal block: IGN, GND
Power Consumption	Max. 180W
Storage	
Type	2 x 2.5” outside accessible drive bays
	1 x M.2 B key (2242/2280) w/ (PCIex2+USB) for storage or LTE expansion (either one)
	1 x M.2 2280 M key supports 2242, 2280 devices (PCIe x4 signal, support boot up function)
Mechanical	
Construction	Aluminum alloy
Mounting	Wall-mount

Weight	5.83 Kg (12.85lb)
Dimensions (W x D x H)	285 x 230 x 90mm (11.22" x9.05" x 3.54"), Fanless 285 x 230 x110mm (11.22" x9.05" x 4.33"), w/ FAN
OS Support	
Windows 10 IoT Enterprise 64-bit / Windows 11 IoT Enterprise 64-bit Linux (Ubuntu 20.04)	
Ordering Information	
FPC-5211-2M4	Edge AI GPU Computer Bare Bone, w/2x 10GbE POEs, M12 type
FPC-5211-2P4	Edge AI GPU Computer Bare Bone, w/2x 10GbE POEs, RJ45 type (BTO)

FPC-5211-E1

System	
CPU	Intel® 14th/13th/12th Gen Core™ i9/i7/i5/i3 processor in LGA1700 socket (Max 35W CPU)
Memory	2 x 262-pin DDR5 SO-DIMM sockets, supporting 4800 MHz SDRAM up to 64GB (ECC/ Non-ECC)
Chipset	Intel® R680E
Graphics	Integrated Intel® HD Graphics 770
ATA	2 x Serial ATA ports with 600MB/s HDD transfer rate
LAN Chipset	1 x Intel® WGI219LM GbE controller w/ iAMT 16.0 3 x Intel® I226 2.5GbE controllers
Watchdog Timer	1~255 levels reset
TPM	Onboard TPM 2.0
I/O	
Serial Port	2 x RS-232/422/485 configurable ports via DB-9 connectors (Default RS232,Switch via BIOS)
USB Port	8 x USB 3.2(10Gbps) / 2.0 ports
LAN	4 x RJ-45 connectors for GbE
Video Port	2 x DP 1.4a from MXM module or Intel Graphics (Default Intel Graphics switch via BIOS)
	1 x HDMI 2.0b female connector for digital video output
	1 x DVI-I female connector for digital / analog video output
	*Support 4 independent displays

Digital I/O Port	1 x DB15 conn.for 8 x digital input (Dry / Wet contact) with 2KV isolation
	1 x DB15 connector for 8 x digital output with 2KV isolation
Audio	Mic-in/Line-out
Expansion Bus	1 x MXM3.1 TYPE A/B GPU Slot (PCIe Gen5 x16) MXM A2000 support
	2 x mPCIe Slots interconnected with SIM card sockets for optional WiFi/BT/3G/LTE/ GPS (PCIex1+USB2.0, Full Size)
	1 x M.2 B key (2242/3052/2280) w/(PCIex2+USB3.0+SATA) interconnected with SIM for 5G / LTE expansion or for storage (either one)
	1 x M.2 E key (2230) with PCIex1+USB2.0+CNVi) for Wireless
	1 x PCIe x 8 slot expansion (via x4 lanes)
Environmental	
Operating Temp.	-20 ~ 50°C (-4 ~122°F), ambient w/ air flow -20 ~ 65°C (-4 ~149°F), ambient w/ air flow (w / External SMART FAN kit) -20 ~ 70°C (-4 ~158°F), ambient w/ air flow (w / 35W TDP CPU Only) *A2000 GPU 100% loading without throttling
Storage Temp.	-40 ~ 85°C (-40 ~ 185°F)
Operating Humidity	10 ~ 95% @ 65°C (non-condensing)
Vibration	5~500Hz 3G rms X,Y,Z axis w/SSD, according to IEC 60068-2-64
Shock	50 Grms, Half-sine 11 m sec. duration w/ SSD, according IEC60068-2-27
Qualification	
Certification	CE, FCC Class A, E mark
Power Requirement	
Main Power Input	DC 9~36V input (w/ 4-pin DC input terminal block) (V+ ,V+, V-, V-)
Ignition Switch	2-pin teminal block: IGN, GND
Power Consumption	Max. 180W (w/ MXM-A2000 GPU)
Storage	
Type	2 x 2.5" outside accessible drive bays
	1 x M.2 B key (2242/2280) w/ (PCIex2+USB+SATA) for storage or LTE expansion (either one)
	1 x M.2 2280 M key supports 2242, 2280 devices (PCIe x4 & SATA signal, support boot up function)

Mechanical	
Construction	Aluminum alloy
Mounting	Wall-mount
Weight	5.83 Kg (12.85lb)
Dimensions (W x D x H)	285 x 230 x 90mm (11.22" x9.05" x 3.54"), Fanless 285 x 230 x110mm (11.22" x9.05" x 4.33"), w/ FAN
OS Support	
Windows 10 IoT Enterprise 64-bit / Windows 11 IoT Enterprise 64-bit Linux (Ubuntu 20.04)	
Ordering Information	
FPC-5211-E1	Edge AI GPU Computer Bare Bone, w/1 x PCIe expansion

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-5211 Series Robust System

1 x User's Manual

1.4.1. 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-5210	Wall-mount kit for FPC-521x Series	
PAC-280W6C-MW	280W AC/DC adapter kit w/ 2-pin/3-pin/4-pin block	

1.4.2. 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.

MXM-A2000-8G	MXM 3.1 Type A NVIDIA® Quadro® Embedded A2000_8GB GDDR6 60W TGP)	
MM-5C-8G/16G/32G	DDR5-4800 8GB/16GB/32G SDRAM DIMM module	
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	
Core™ i3-13100TE	Intel® 13th Gen. Core™ i3-13100TE processor, L3/12M, 2.4G	
Core™ i5-13500TE	Intel® 13th Gen. Core™ i5-13500TE processor, L3/24M, 1.3G	
Core™ i7-13700TE	Intel® 13th Gen. Core™ i7-13700TE processor, L3/30M, 1.1G	
Core™ i9-13900TE	Intel® 13th Gen. Core™ i9-13900TE processor, L3/36M, 1.0G	
Core™ i3-14100T	Intel® 14th Gen. Core™ i3-14100T processor, L3/12M, 2.7G	
Core™ i5-14500T	Intel® 14th Gen. Core™ i5-14500T processor, L3/24M, 1.7G	
Core™ i7-14700T	Intel® 14th Gen. Core™ i7-14700T processor, L3/33M, 1.3G	
Core™ i9-14900T	Intel® 14th Gen. Core™ i9-14900T processor, L3/36M, 1.1G	
EXFAN-8015	External SAMRT Fan kit (80 x 80 x 15mm, 4 pin Terminal Block Plug, Mounting Bracket, support Smart Fan Function)	

*CTOS means Configure-to-Order Service.

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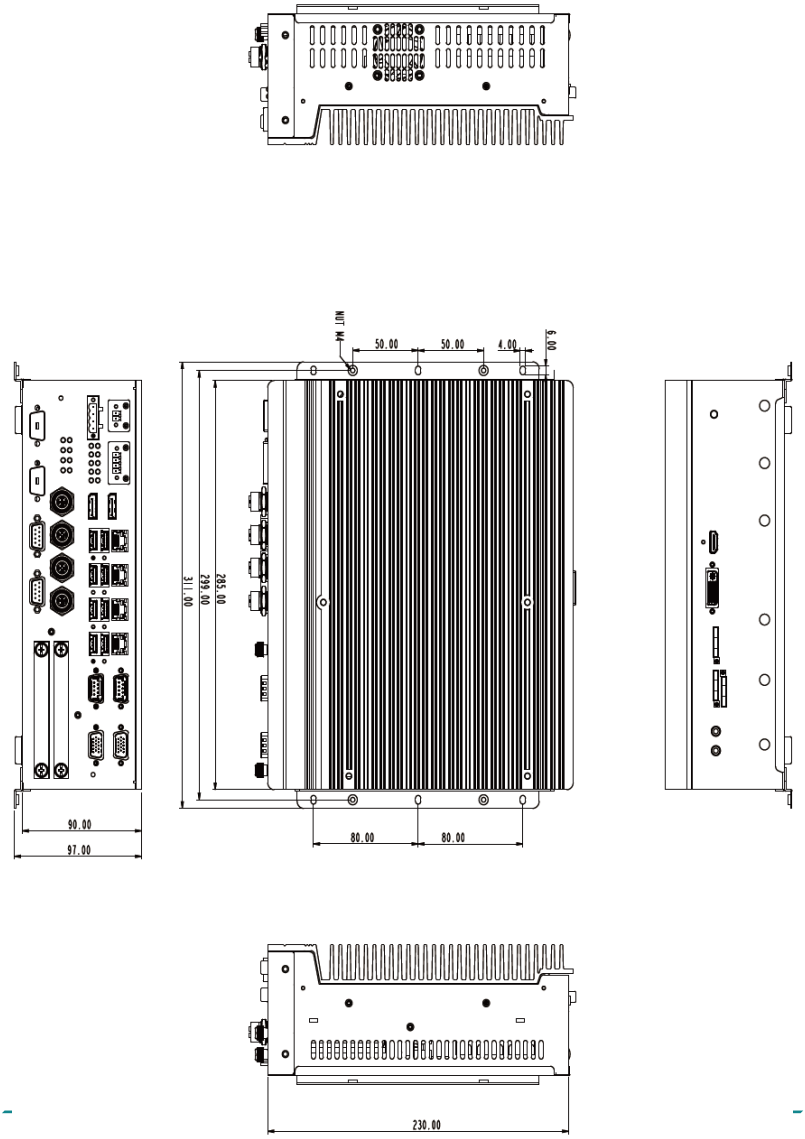
Chapter 2

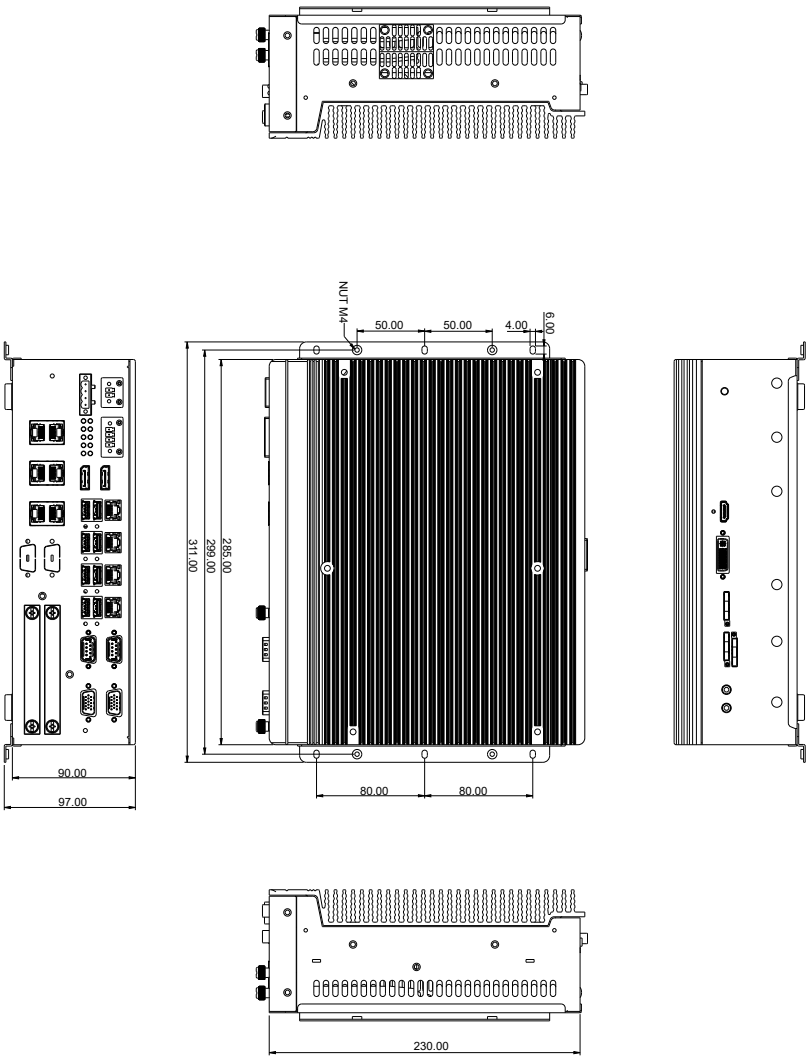
System Overview

2.1. Dimensions

FPC-5211-M4



FPC-5211-P6


NUT M4
50.00
50.00
4.00
6.00
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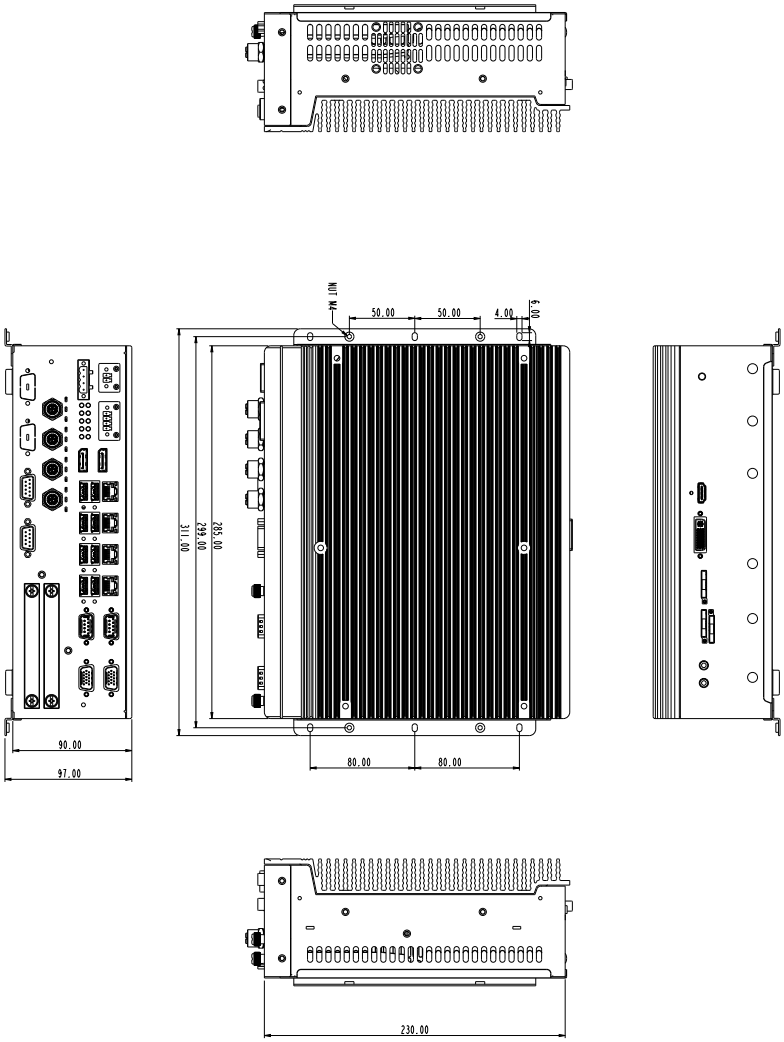
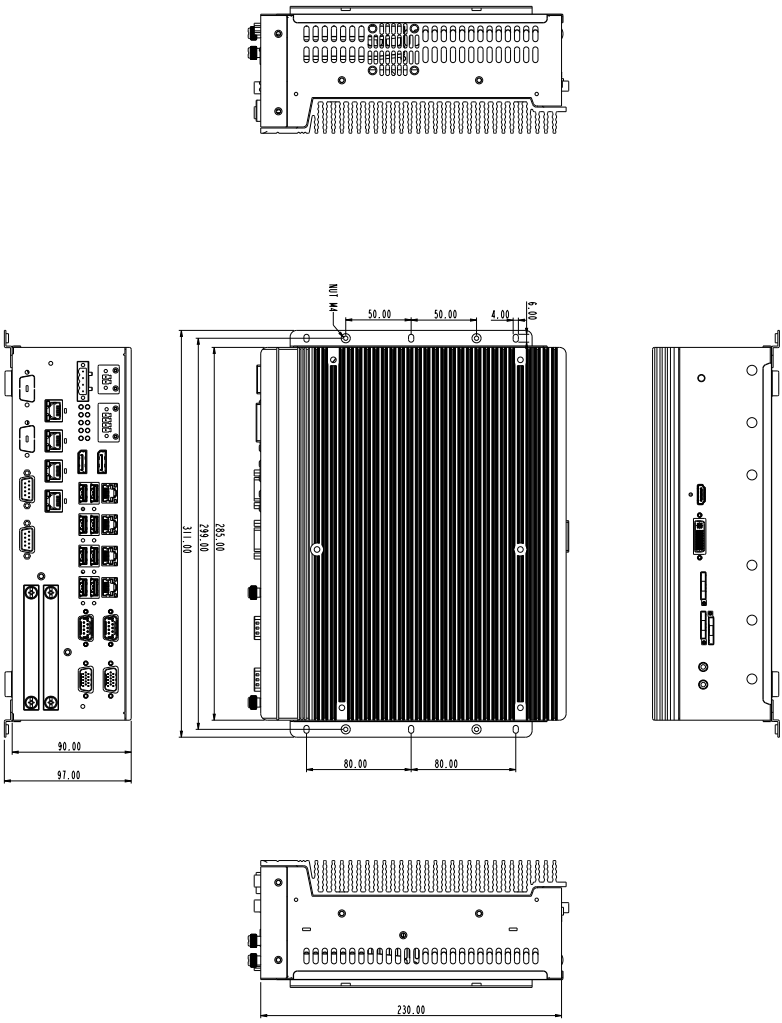
299.00
285.00
90.00
97.00
80.00
80.00
230.00

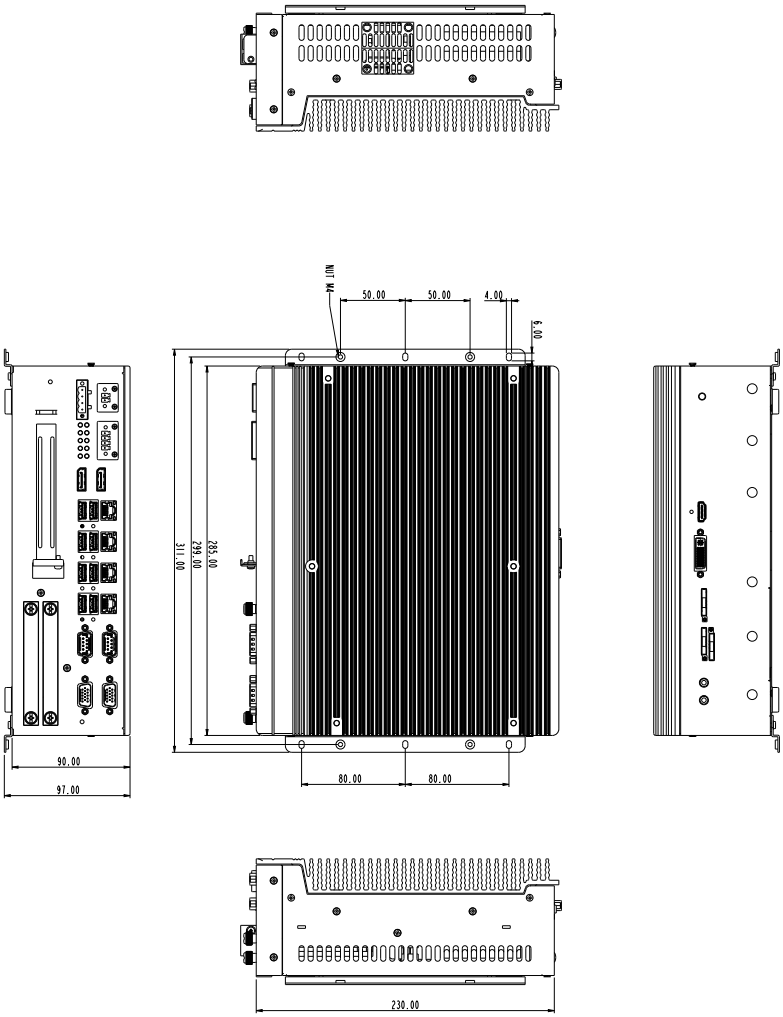
FPC-5211-2M4


NOT M4
50.00
50.00
4.00
6.00
311.00
285.00
249.00
90.00
97.00
80.00
80.00
230.00

FPC-5211-2P4


50.00
50.00
4.00
6.00
311.00
299.00
285.00
90.00
97.00
80.00
80.00
230.00

FPC-5211-E1

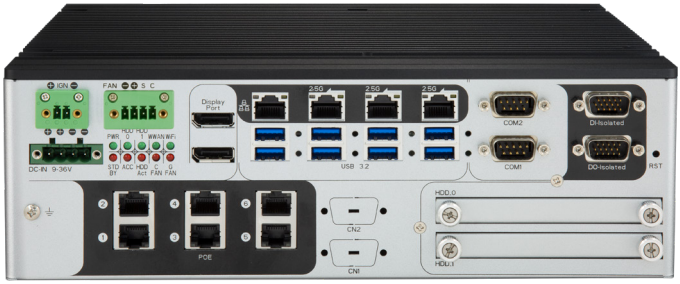

M4 DIN
50.00
50.00
4.00
6.00
111.00
294.00
285.00
90.00
97.00
80.00
80.00
230.00

2.2. Take A Tour

2.2.1. FPC-5211-M4(FPC-5211-P6/2P4/2M4/E1) Front View

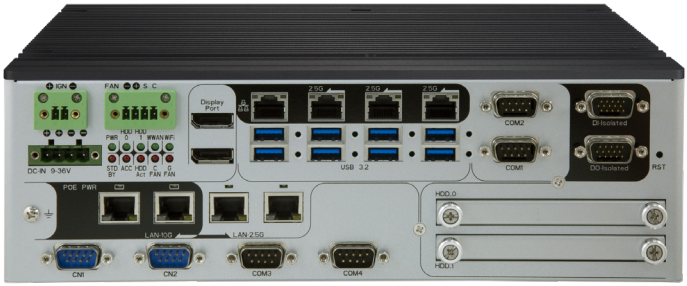
2.2.2. FPC-5211-M4 Rear View

2.2.3. FPC-5211-P6 Rear View



2.2.4. FPC-5211-2M4 Rear View

2.2.5. FPC-5211-2P4 Rear View



2.2.6. FPC-5211-E1 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

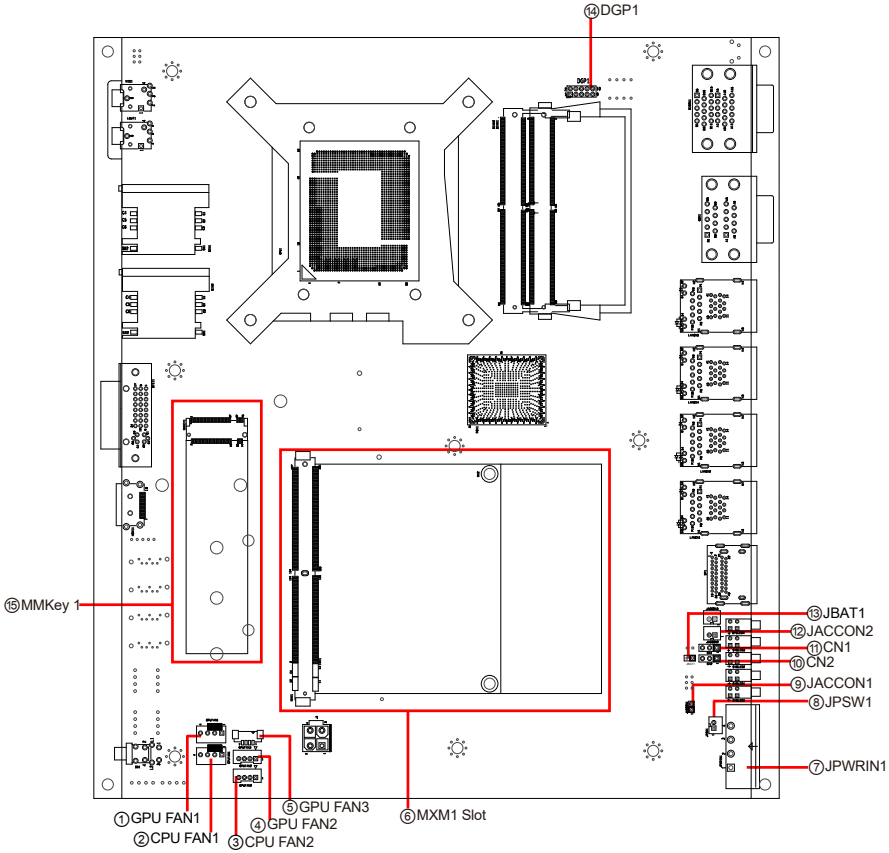
Driver	Path
Chipset	\\Chipset\chipset\SetupChipset.exe
LAN	\\LAN\Intel\Autorun.exe \\LAN\10G\Windows\Installer\Marvell_FastLinQ_Edge_x64_ver3.1.3.0.msi
VGA	\\Graphics\gfx_win_101.4575.exe
Audio	\\AUDIO\0006-64bit_Win7_Win8_Win81_Win10_R279.exe
ME	\\ME\SetipME.exe
MXM	\\Win10_11x64_(527.27).exe
VMD	\\VMD\VTUD\f6umdflpy_x64
Serial IO	\\30.100.2131.26_PV_ADL_PCH-S_Win11\SetupSerialIO.exe

Chapter 3

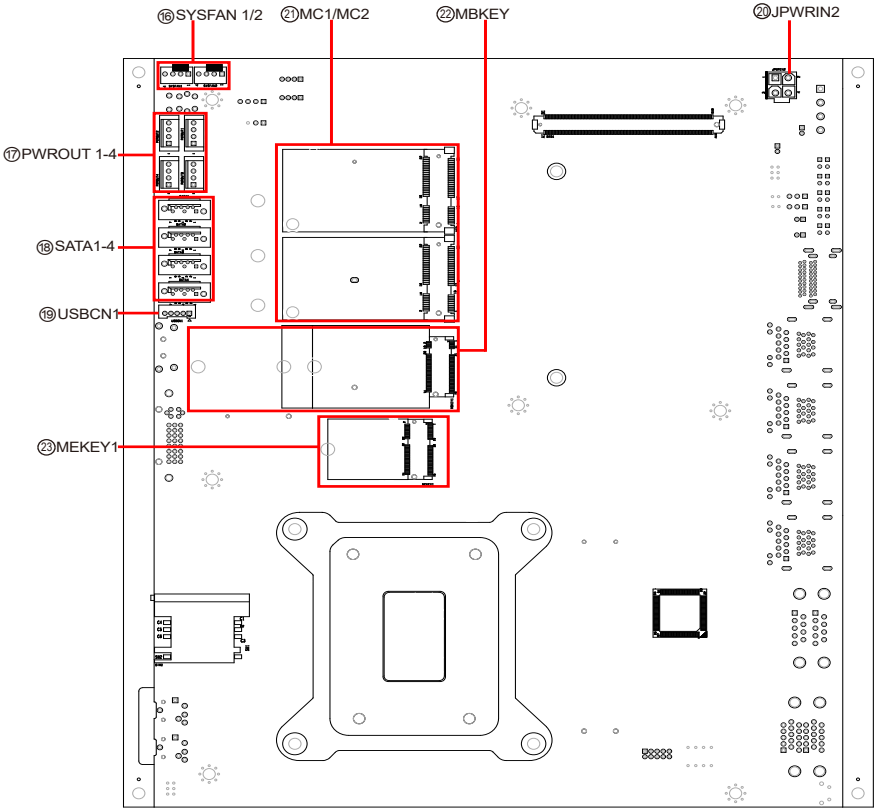
System Configuration

3.1. Board Layout

Board Top



Board Bottom



Jumpers & Connectors

Label	Description
①④GPU FAN1~2	Fan power connector
⑤GPU FAN3	Fan power connector
②③CPU FAN1	Fan power connector
⑥MXM1 Slot	MXM Expansion Slot
⑦JPWRIN1	Power Input
⑧JPSW1	Power Button
⑩⑪CN1, 2	DP source select
⑨⑫JACCON1, 2	ACC ON Signal
⑬JBAT1	Clear CMOS settings
⑭DGP1	Debug Port
⑮MMKey 1	M.2 M-Key socket
⑯SYSFAN1/SYSFAN2	System FAN connector
⑰PWROUT	SATA HDD Power Connector
⑱SATA	Serial ATA Connector
⑲USBCN1	USB2.0 wafer connector
⑳JPWRIN2	Power Input
㉑MC1/MC2	PCI Express Mini-card Full socket
㉒MBKEY	M.2 B-Key socket
㉓MEKEY1	M.2 E-Key socket

3.2. Pin Headers and Connectors

3.2.1 Main board

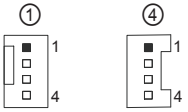
①④ GPU FAN1~2

Function: Fan Power Connector

Connector Type: Onboard 4-pin header/① pitch 2.54mm/ ④ pitch 2.00mm

Pin Assignment:

Pin	Description
1	GND
2	+12V
3	PWM
4	Control



⑤ GPU FAN3

Function: Fan Power Connector

Connector Type: Onboard 4-pin header / pitch 1.25mm

Pin Assignment:

Pin	Description
4	Control
3	PWM
2	+12V
1	GND

Please note that all GPU FAN connector1-3 are only initiated single device at a time simultaneously.

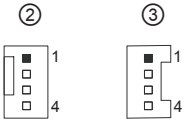
②③ CPU FAN1/CPU FAN2

Function: CPUFAN1/CPUFAN2

Connector Type: Onboard 4-pin header/ ②pitch 2.54mm/ ③2.00mm

Pin Assignment:

Pin	Description
1	GND
2	+12V
3	PWM
4	Control



Please note that all CPU FAN connectors are only initiated single device at a time simultaneously.

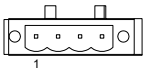
⑥ MXM Expansion slot

Function: External MXM slot
Connector Type: MXM3.1 TYPE A/B GPU Slot
Pin Assignment: The pin assignments conform to the industry standard

⑦ JPWRIN1

Function Power Input
Connector Type: Onboard 4-Pin Terminal block
Pin Assignment:

Pin	Description
1	DCIN
2	DCIN
3	GND
4	GND



⑧ JPSW1

Function: Power Button
Connector Type: 2-pin wafer
Pin Assignment:

Pin	Desc.
1	PWR_IN_SW#
2	GND

⑩⑪ CN1/CN2

Function DP source select
Connector Type: Onboard 3-pin header
Pin Assignment:

Pin	Description
1-2	GPU
2-3	CPU(default)

⑨ JACCON1

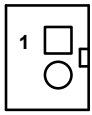
Function Vehicle Acc Mode Selection
Connector Type: Onboard 2-pin header
Pin Assignment:

Description	
Enable: 1-2 short (default)	
Disable: 1-2 open	

⑫ JACCON2

Function ACC ON Signal
Connector Type: Onboard 2-pin header
Pin Assignment:

Pin	Description
1	ACC_ON
2	GND



⑬ JBAT1

Function: Clear CMOS settings
Connector Type: Onboard 2x1-pin box connector
Pin Assignment:

Pin	Desc.
1	RTCRST#
2	GND

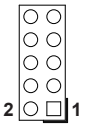
⑭ DGP1

Function: Debug Port

Connector Type: Onboard 10-pin header

Pin Assignment:

Pin	Desc.	Pin	Desc.
1	ESPI_CLK	2	GND
3	ESPI_CS0#	4	ESPI_IO0
5	ESPI_RST#	6	V3.3A
7	ESPI_IO3	8	ESPI_IO2
9	V3.3S	10	ESPI_IO1



⑮ MMKEY1

Function: M.2 M-Key Connector

Connector Type: M.2 75-pin M-Key connector for PCIe x4/SATA-III SSD storage, supporting 22x42 / 22x80 modules

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

⑯ SYSFAN 1/2

Function: Fan Power Connector

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

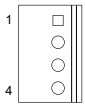
Pin Assignment:

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

⑰ PWROUT1~4

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

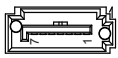
Pin	Description
1	+5V
2	GND
3	GND
4	+12V



⑱ SATA1~4

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

Pin	Description
1	GND
2	TX+
3	TX-
4	GND
5	RX-
6	RX+
7	GND



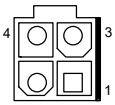
⑲ USBCN1

Function: USB2.0 Wafer
Connector Type: On-board onboard Type 5pin wafer connector
Pin Assignment:

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

⑳ JPWRIN2

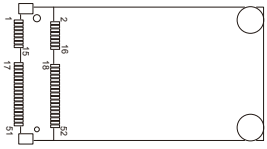
Function: VGA card power
Connector Type: oboard 2.54mm pitch 4-pin wafer
Pin Assignment:



Pin	Desc.
1	GND
2	GND
3	DCIN
4	DCIN

㉑ MC1/MC2

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



㉒ MBKEY1

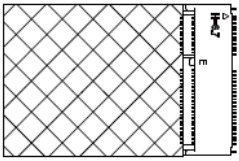
Function: M.2 B-Key socket
Connector Type: M.2 B-Key
Pin Assignment: The pin assignments conform to the industry standard.

㉓ MEKEY1

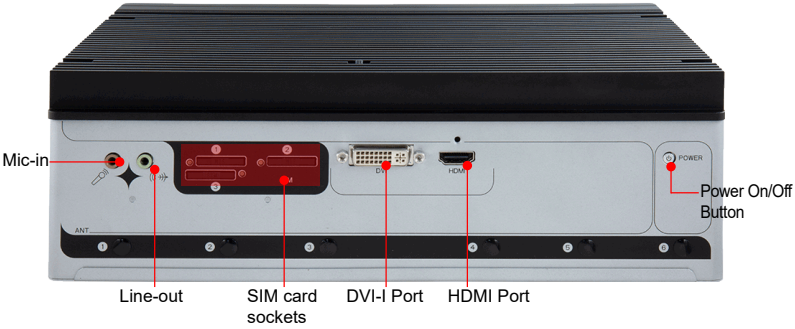
Function: M.2 E-Key socket (w/ PCIex1+ CNVi+USB2.0) for optional Wi-Fi/BT

Connector Type: M.2 E-Key 2230 Socket

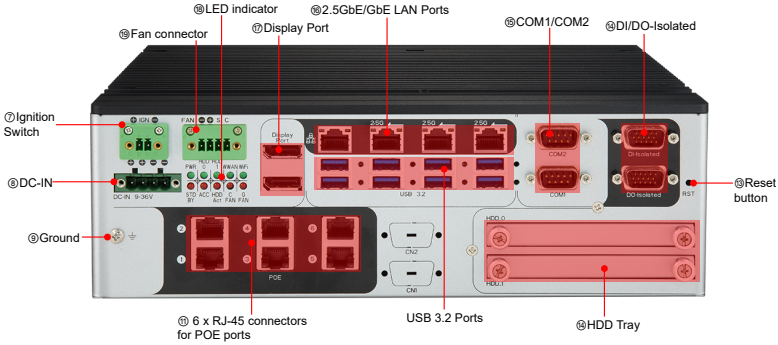
Pin Assignment: The pin assignments conform to the industry standard.



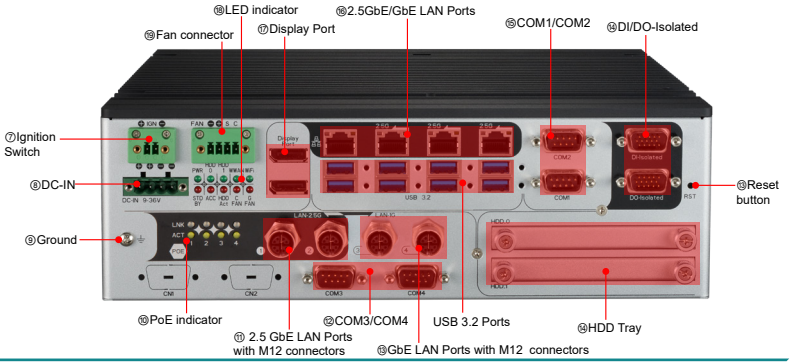
FPC-5211-M4(FPC-5211-P6) Front side



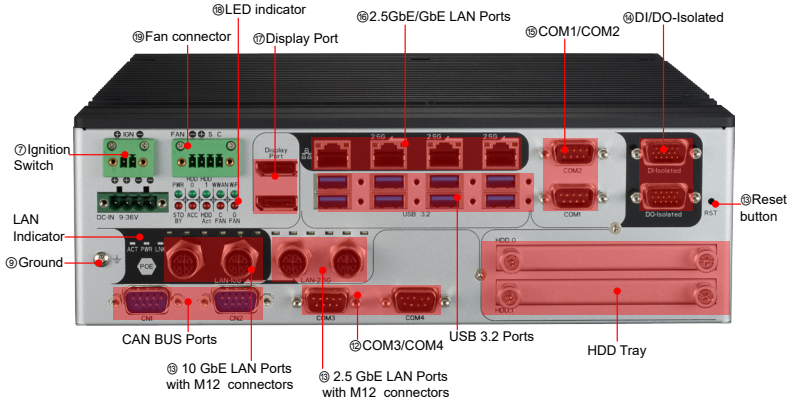
FPC-5211-P6 Rear side



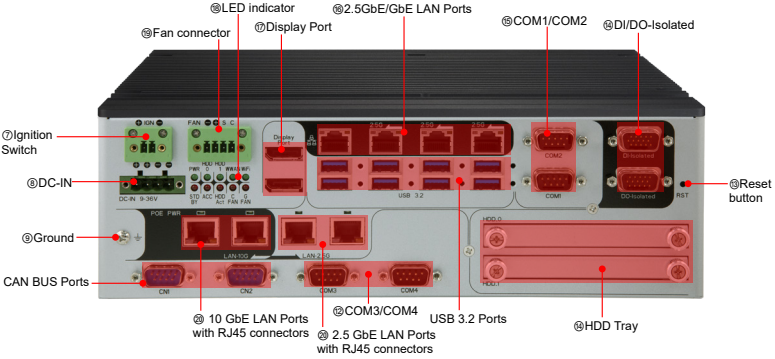
FPC-5211-M4 Rear side



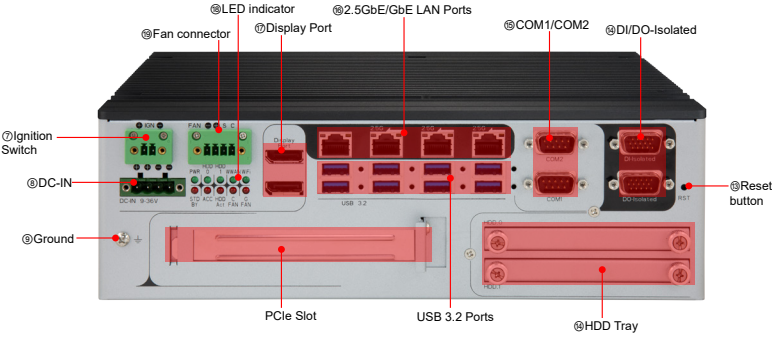
FPC-5211-2M4 Rear side



FPC-5211-2P4 Rear side



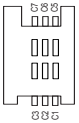
FPC-5211-E1 Rear side



③ SIM Card socket

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



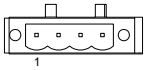
⑦ Ignition Switch

Function: For vehicle application
Connector Type: 2-Pin Terminal block
Pin Assignment:

Pin	Desc.
1	V+
2	V-

⑧ PWRIN3

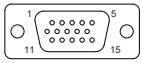
Function: DC Adapter Power Input for expansion card
Connector Type: 4-Pin Terminal block
Pin Assignment:



Pin	Desc.
1	V+
2	V+
3	V-
4	V-

⑭ DIOCN1

Function: Isolated DIO
Connector Type: 15-pin D-sub male connector
Pin Assignment:



DIOCN1 (DOWN)		DIOCN1 (UP)	
NO.	Desc.	NO.	Desc
A1	DOUT_00	B1	DI_00
A2	DOUT_01	B2	DI_01
A3	DOUT_02	B3	DI_02
A4	DOUT_03	B4	DI_03
A5	DOUT_04	B5	DI_04
A6	DOUT_05	B6	DI_05
A7	DOUT_06	B7	DI_06
A8	DOUT_07	B8	DI_07
A9	NC	B9	NC
A10	NC	B10	NC
A11	NC	B11	NC
A12	NC	B12	NC
A13	NC	B13	24V_ISO
A14	GND_ISO	B14	COM1
A15	GND_ISO	B15	GND_24V_ISO

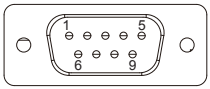
⑮ COM1, COM2

Function: RS-232/422/485 Selectable Serial Port

Connector Type: 9-pin D-sub male connector

Pin Assignment:

	Pin	Desc.	Pin	Desc
RS-232	1	DCD	6	DSR
	2	RXD	7	RTS
	3	TXD	8	CTS
	4	DTR	9	RI
	5	GND	10	N.C
RS-422	1	COM_422 TX-		
	2	COM_422 TX+		
	3	COM_422 RX+		
	4	COM_422 RX-		
	5	GND		
RS-485	1	COM_485 D-		
	2	COM_485 D+		
	5	GND		



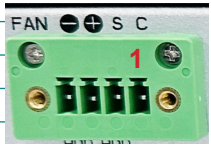
⑲ FAN connector

Function: Fan Connector

Connector Type: 1x4-pin connector

Pin Assignment:

Pin	Description
1	Control
2	PWM
3	+12V
4	GND



⑱ LED Indicator Statement

Function: LED Indicator

Pin Assignment:

Function	LED Color	Desc.
STANDBY	Red	This LED lights Red when in standyby mode
Power Status (PWR)	Green	This LED lights Red when power is on
ACC	Red	This LED lights Red when ACC power is on
HDD_0	Green	This LED lights when the HDD/SSD was detected in HDD0
HDD_ACT	Red	This LED lights when HDD_0/ HDD_1 SATA is accessed
HDD_1	Green	This LED lights when the HDD/SSD was detected in HDD1
CPU FAN	Red	This LED lights when CPU SMART FAN was activated
	Flashing	This LED light when CPU SMART FAN is abnormal
WWAN	Green	This LED lights when the system detect WWAN device
GPU FAN	Red	This LED lights wh GPU SMART FAN was activated
	Flashing	This LED light when GPU SMART FAN is abnormal
WIFI	Green	This LED lights when the system detect WIFI device

Please note that the LED indicators of "WWAN" and "WIFI" LED status may be various by different wifi devices.

⑩ PoE Indicator Statement (FPC-5211-M4)

Function: PoE LED Indicator

Pin Assignment:

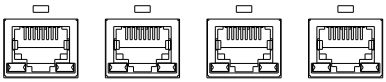
Location	Silk	Function	LED Color
Upper LED	LINK	10/100M	Steady Green
		1G	Steady Orange
Down LED	ACT	Active	Flashing Yellow

⑳ PoE Indicator Statement(FPC-5211-2P4)

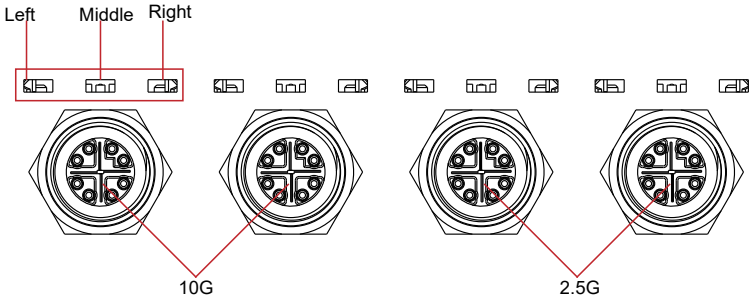
Function: PoE LED Indicator

Pin Assignment:

LED Indicator	10G	2.5G
Left LED	Steady Orange (10GbE)	Steady Orange (2.5GbE)
	Steady Green (2.5GbE or below)	Steady Green (1GbE or below)
Middle LED	Steady Blue (PoE power)	Steady Blue (PoE power)
Right LED	Flash Yellow (Active)	Flash Yellow (Active)

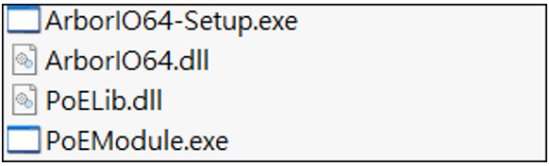


⑬ PoE Indicator Statement(FPC-5211-2M4)



3.3. **PoE Management Utility** (Only for FPC-5211-2M4/2P4 SKU)

Installing PoE Management Utility



Step 1: Install ArborIO64-Setup.exe

Step 2: Copy ArborIO64.dll file to C:\Program Files (x86)\ArborIO64\ArborIO64.dll

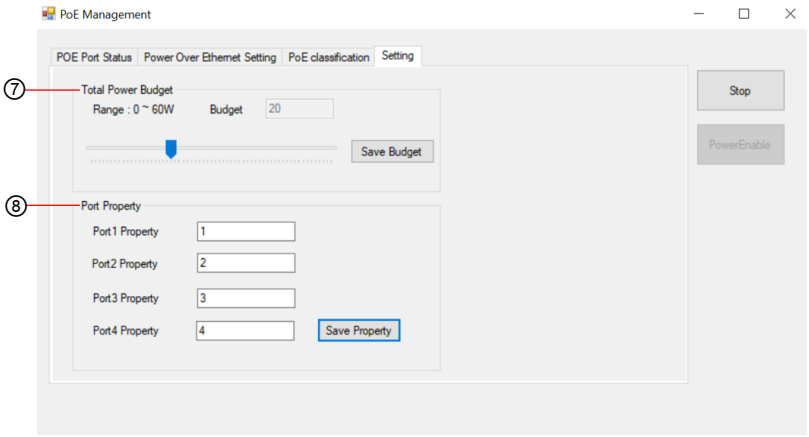
Step 3: Run PoEModule.exe application

Note: Users are available to download PoE Management utility on our website at http://www.arbor-technology.com to monitor the PoE status.

POE Port Status

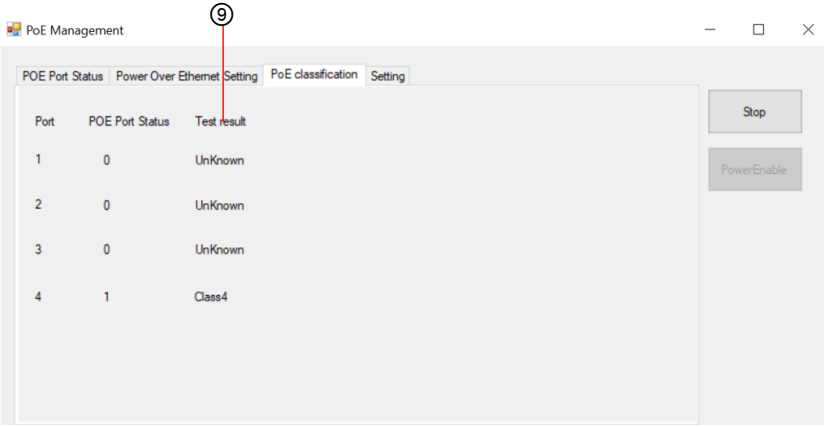
No.	Item	Description
①	Start/Stop	Connect/Disconnect the PoE device from the PoE Management.
②	Total Power Budget	Maximum power value: If the power value is exceeded, the PoE port will be closed through the port priority setting.
③	Reserved Power	Display the remaining power value.
④	PoE Active	If the status is 0, then PoE power off, and 1 is active.
⑤	PoE IC Real Temperature	The Value shows the temperature(°C) of PoE controller IC.
⑥	Power Enable	Users can switch PoE port power on or off without system restart if the power budget is exceeded.

Setting



No.	Item	Description
⑦	Total Power Budget	The maximum power budget is 60 watts, and users have the flexibility to set the value anywhere from 0 to 60 watts.
⑧	Port Priority	If the power budget is exceeded, the PoE port will be closed based on the port priority setting, from low (Category 4) to high (Category 1). Category 4 represents the lowest priority.

PoE classification



No.	Item	Description
⑨	Test result	Present the PoE Classification Result

Class	PSE Output
Class0	15.4W
Class1	4W
Class2	7W
Class3	15.4W
Class4	30W

3.4. FPC-5211 2M4/2P4 CAN BUS daughter board settings

FPC-5211-2M4/2P4 CAN BUS

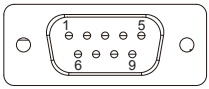
CAN BUS Termination Pin Definition

Function: CAN BUS Serial Port

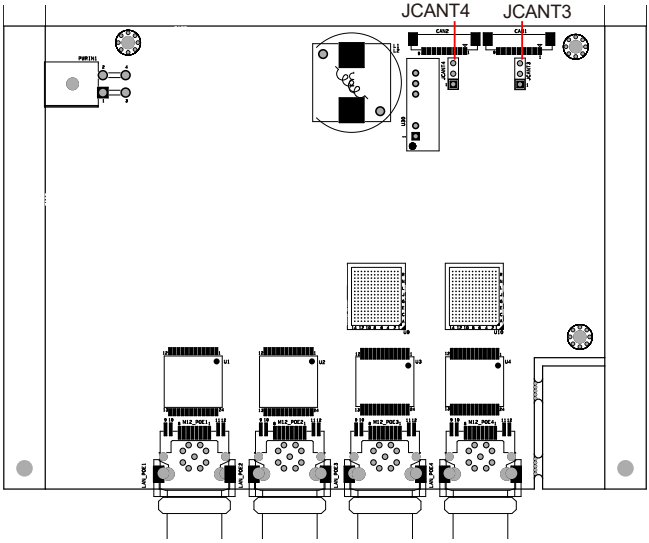
Connector Type: 9-pin D-sub male connector

Pin Assignment:

	Pin	Desc.	Pin	Desc
CAN BUS	1	NC	6	NC
	2	CAN-L	7	CAN-H
	3	GND	8	NC
	4	NC	9	NC
	5	NC		



CAN BUS daughter board jumper settings



JCANT3/JCANT4

Function	CAN BUS Termination Mode Selection
Connector Type:	Onboard 3-pin header
Pin Assignment:	

Description	
Disable: 1-2	
Enable (120ohms): 2-3 short	

Chapter 4

Installation and Maintenance

4.1. Install Hardware

The FPC-5211 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.

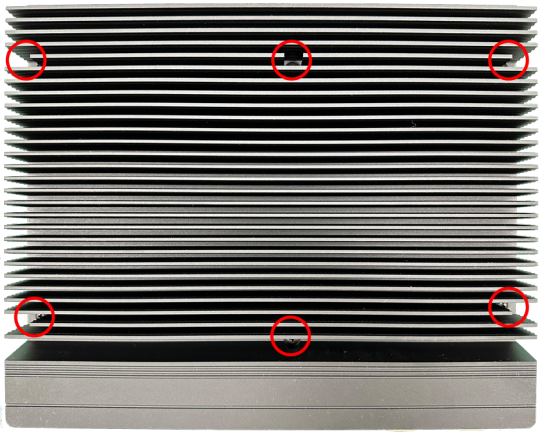
4.1.1.2. Remove Top Cover

All jumpers, CPU socket, MiniCard socket, SDRAM SO-DIMM slots, and DIO 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-5211-M4

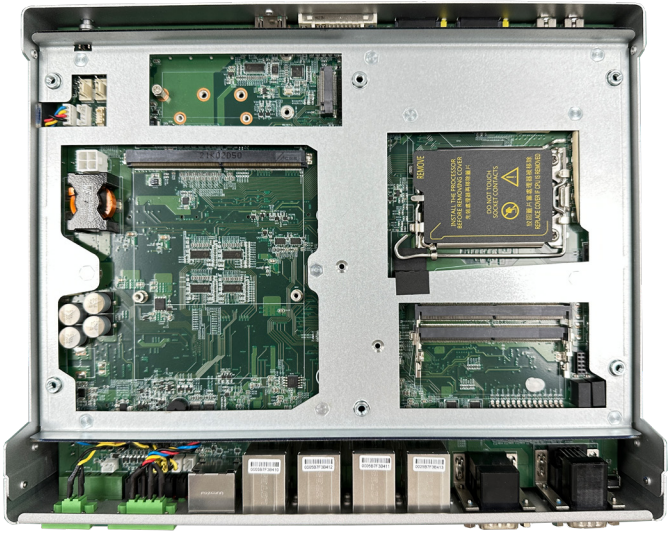
This section will use FPC-5211-M4 as the installation example.

1. Loosen and remove the 6 screws of the top case from both side as shown below.



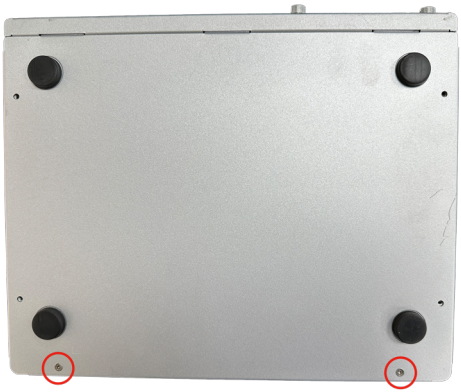
2. Carefully lift the top cover and then completely part the top and slide the side cover from the computer.

The inside of the computer comes to view.

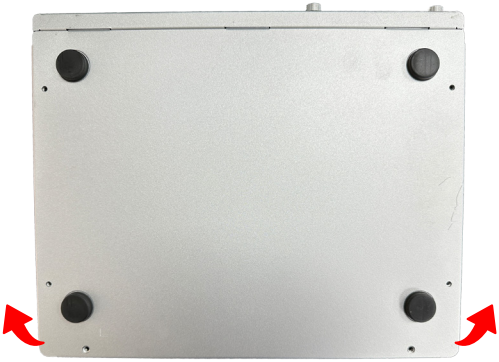


4.1.1.3. Remove Bottom Cover

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



2. Carefully lift the bottom cover and then completely part the side cover from the computer.



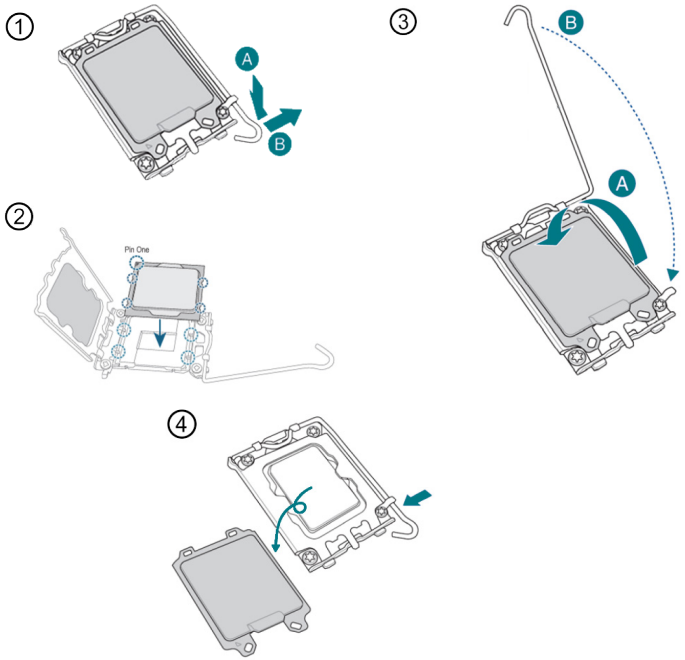
The inside of the computer comes to view.

4.1.2. Install CPU

1. Remove the top and side cover from the computer as described in 4.1.1.3. Remove Bottom Cover on page 52.

2. Locate the CPU socket on the main board

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

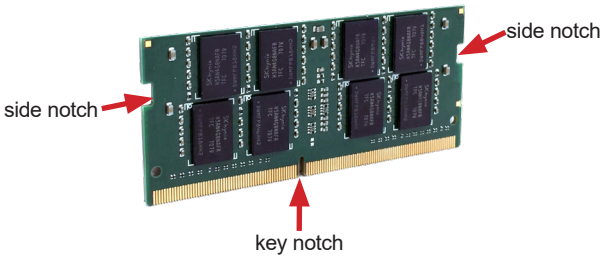


Note: Please note that, when pushing the lever down to unclip, the lever may rebound.

3. Restore the top and back 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-5211 Series' SO-DIMM sockets should be a 262-pin DDR5 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.

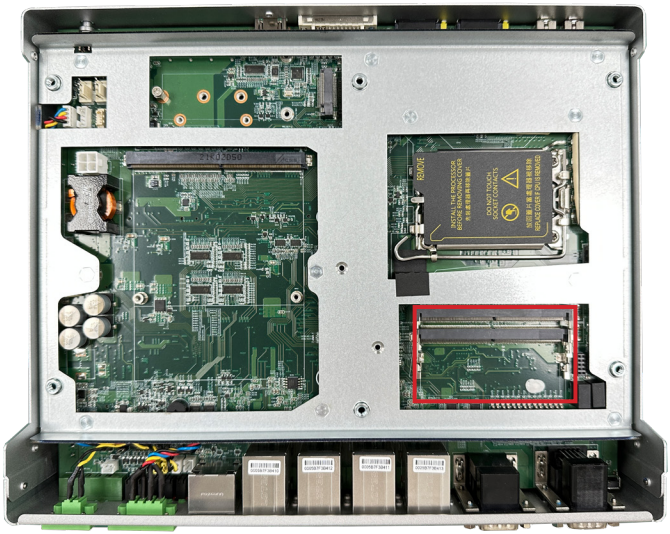


The computer has two 262-pin DDR5 SO-DIMM sockets that each socket support up to 64 GB maximum system memory. To install a memory module:

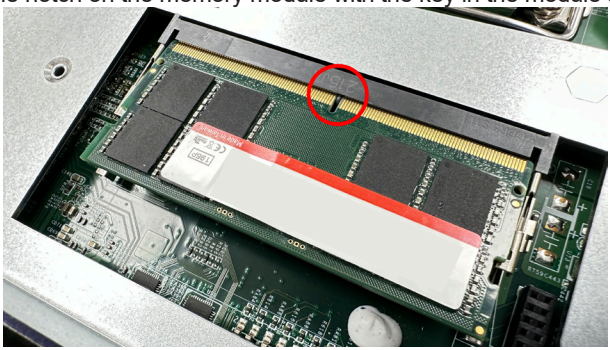
To install a DDR5 memory module:

1. Remove the top cover from the computer as described in 4.1.1.2. Remove Top Cover on page 50

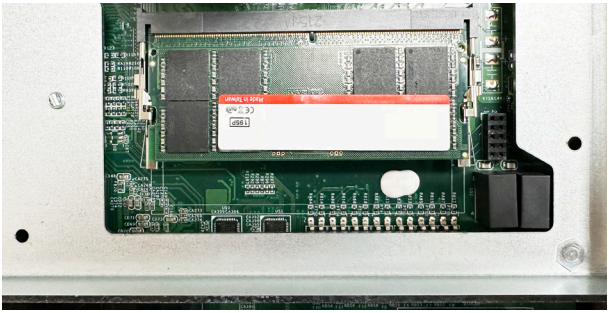
2. Locate the SO-DIMM sockets on the main board.



3. Align the notch on the memory module with the key in the module socket.



4. Plug the module into place. Once the memory module is fully inserted into the socket, press down on the top edge of the device to latch it into place.



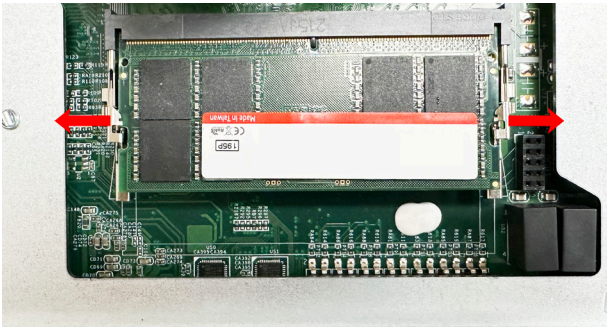
5. This way it's flat to the laptop's bottom. The carrier should snap into place with latches.

6. Restore the top cover to the computer.

To uninstall a DDR5 memory module:

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

   The DDR5 memory module will be auto-released from the socket.



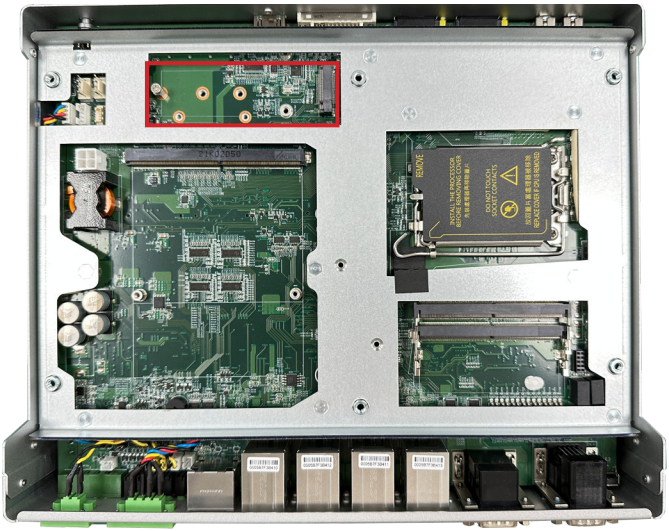
2. Remove the memory module.

3. Restore the top cover to the computer.

4.1.4. Installing M.2 Storage Module

The computer has a M.2 M-Key socket for NvME SSD storage. This section will use a 22 x 80 form factor as the installation example.

1. Remove the top cover from the computer as described in 4.1.1.2. Remove Top Cover on page 50 Locate the M.2 on-board connector.



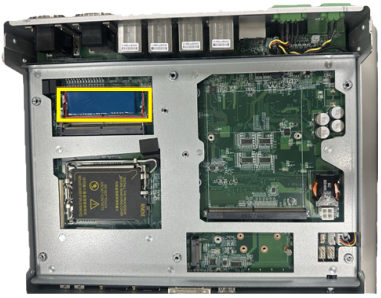
2. Insert the M.2 module into the socket by aligning the notch on the module with the small slot on the M.2 socket.

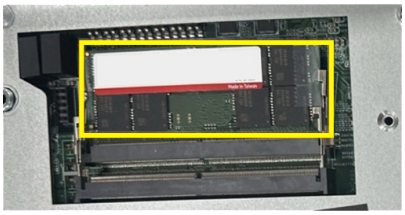
3. Insert and fasten the screw into the standoff.

4.1.5. Installing Thermal Pad for RAM & NVMe SSD

1. There are two SO-DIMM RAM slots on this device. The first slot is near the PCBA side, and the second slot is near the Top case.

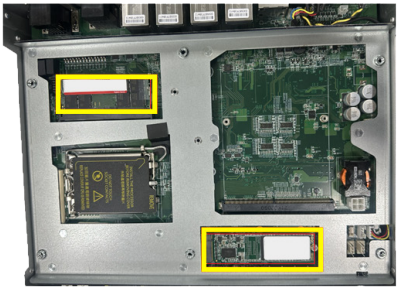
2. For the SO-DIMM slot which is near to PCBA, please place the thermal pad on the main board PCBA. After that, remove the thermal pad protection films and then install the memory.

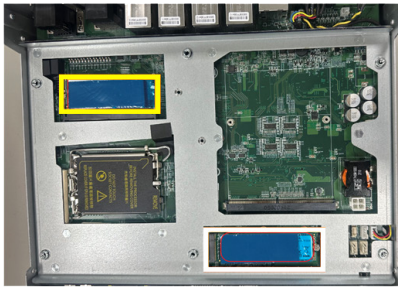




3. Install the NVMe SSD & SO-DIMM, which are close to the top case, then add the thermal pad and remove the thermal pad protection films.

Note: When installing the NVMe SSD, make sure to place the thermal pad near the M.2 socket or SSD controller IC.

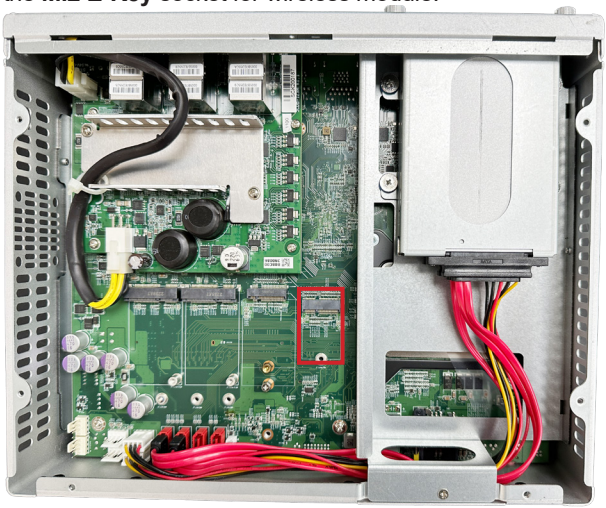




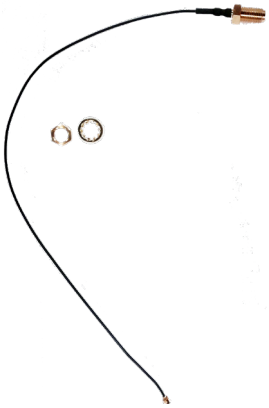
4.1.6. Install Wi-Fi Module

1. Remove the back cover from the computer as described in Section 4.1.1.3. Remove Bottom Cover on page 52.

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

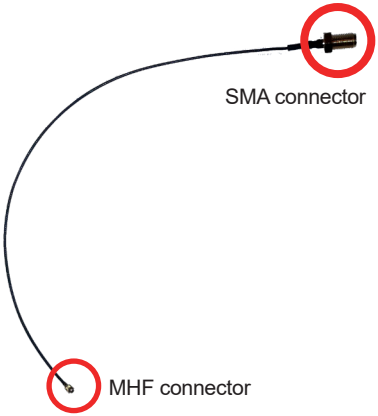


3. Prepare the Wi-Fi module kit. The module is a **M.2 E-Key** socket form factor, with two MHF connectors, one is “MAIN“, and the other is “AUX“.

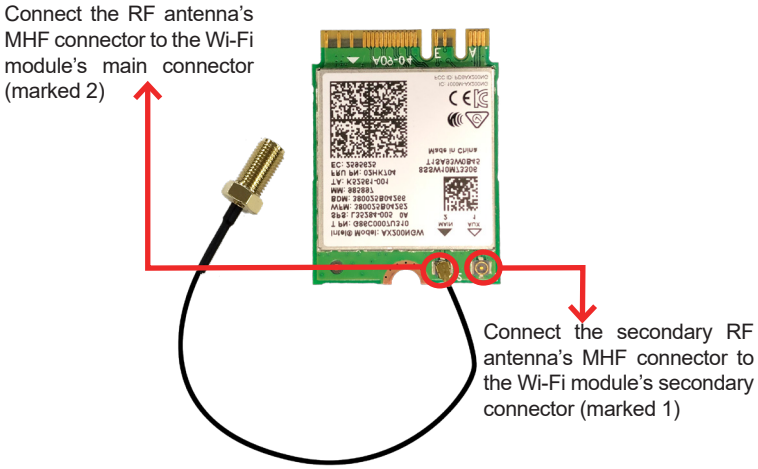


Two MHF connectors, one is “MAIN” (marked 2), the other is “AUX” (marked 1).

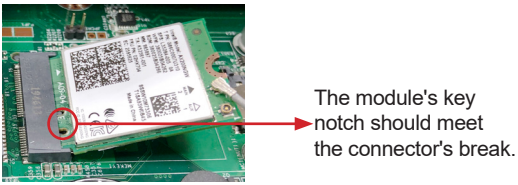
4. Have the RF antenna. The antenna has an SMA connector on one end and an MHF connector on the other.



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.



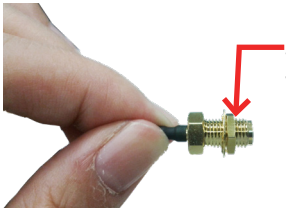
6. Plug the Wi-Fi module to the socket's connector by a slanted angle. Fully plug the module, and note the notch on the wireless module should meet the break of the connector.

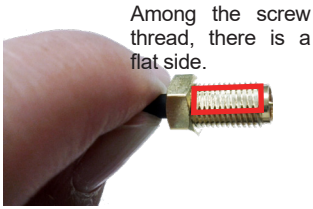


7. Press the module down and fix the module in place using one screw.

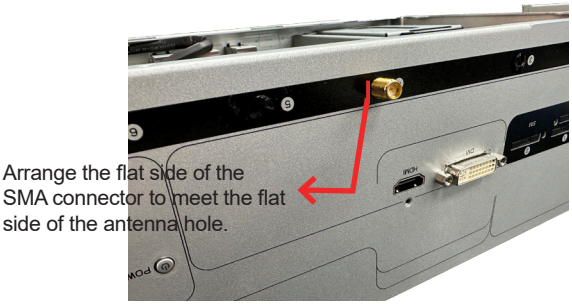
8. Locate the SMA antenna holes on front panel. Remove the plastic plug to make an antenna hole. Keep the plastic plug for any possible restoration in the future.

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





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



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

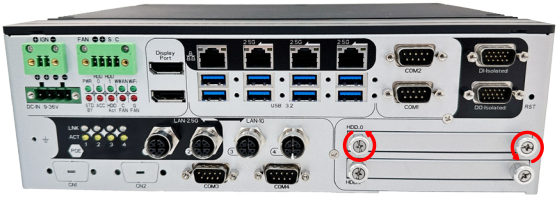
12. Have the external antenna(s). Screw and tightly fasten the antenna(s) to the SMA connector.

13. After completing the required hardware installation, assemble the computer by performing the proceeding steps in reverse order.

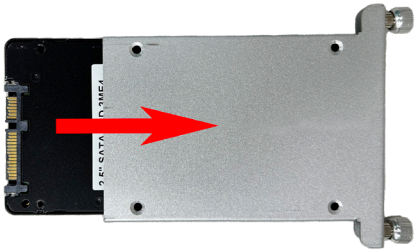
4.1.7. Install Internal SATA Storage Device

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.

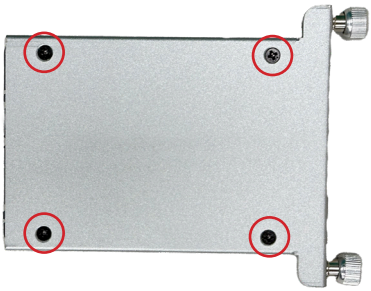
1. Find the HDD/SSD brackets. Loosen the screws as marked in the illustration below and take the bracket out. Then dismount the bracket from the computer.



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 HDD/SSD bracket to the computer.

4.1.8. Install MXM3.1 TYPE A/B GPU Cards

To install a PCI or PCI Express card:

1. Remove the top cover from the computer as described in section 4.1.1.2. Remove Top Cover on page 50

2. Locate the MXM3.1 TYPE A/B GPU socket for GPU card.

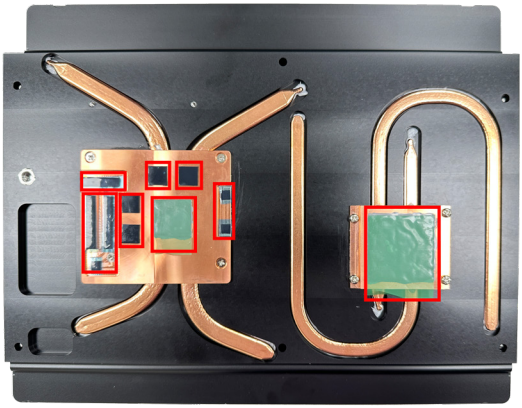
3. Install the graphic card into the computer correctly.

Note: Only specific component can be installed, please check the datasheet in advanced.

a. Align the graphics card notch with the slot on the board and push the graphics card into the slot until firmly inserted.

b. Then tighten the screws to secure GPU card.

4. Remove liner papers on the top cover.



5. Restore the top cover to the computer.

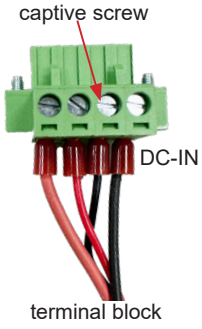
4.2. Wire DC-in Power Source

4.2.1 Automation Mode

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

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

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

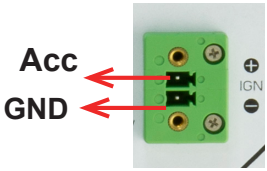


4.2.2 Vehicle Application Mode

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

1. Make sure JACCON1 jumper is open for vehicle power mode. (Refer to Section 3.2. Pin Headers and Connectors on page 29)

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.

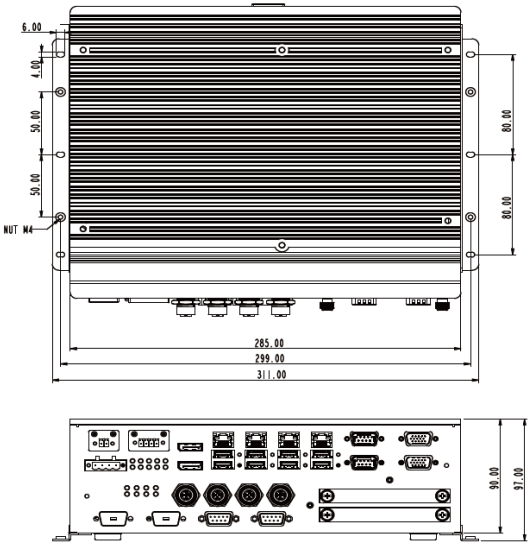


4.3 Wall Mounting

Prepare the wall mount kit and a screwdriver for wall mounting. Follow the instructions below:

1. Align the screw holes of the wall mount bracket with the ones of the main unit. Using the M3 screws included in the wall mount kit, fasten the wall mount bracket to the computer's case.

2. When the bracket is attached, the computer can be hanged on the wall as the way you want. The wall mount bracket dimension is shown as below:



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Chapter 5

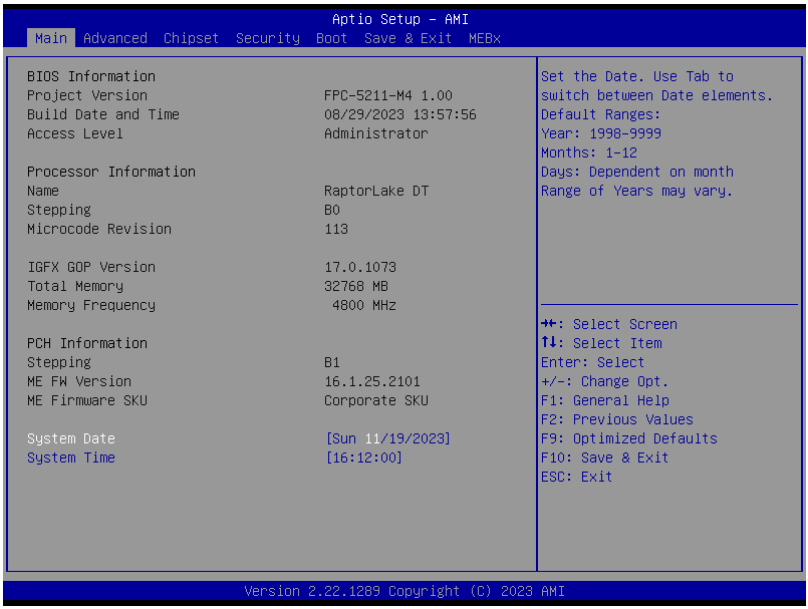
BIOS

The BIOS Setup utility for the FPC-5211 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 76
Advanced	See 5.2. Advanced on page 77
Chipset	See 5.3. Chipset on page 95
Security	See 5.4. Security on page 98
Boot	See 5.5. Boot on page 100
Save & Exit	See 5.6. Save & Exit on page 102
MEBx	See 5.7. MEBx on page 103



Key Commands

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

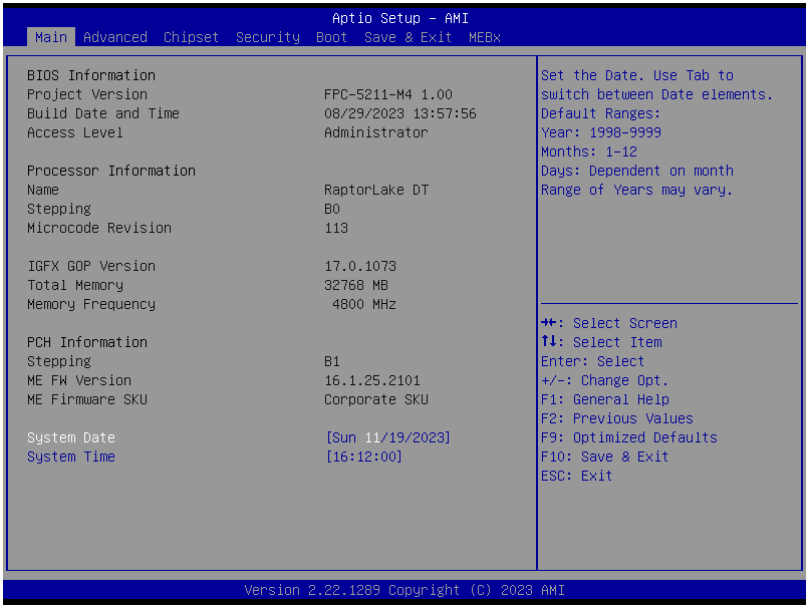
Keystroke	Function
← →	Moves left/right between the top menus.
↓ ↑	Moves up/down between highlight items.
Enter	Selects an highlighted item/field.
Esc	▸ On the top menus: Use **Esc** to quit the utility without saving changes to CMOS. (The screen will prompt a message asking you to select **OK** or **Cancel** 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.

5.1. Main

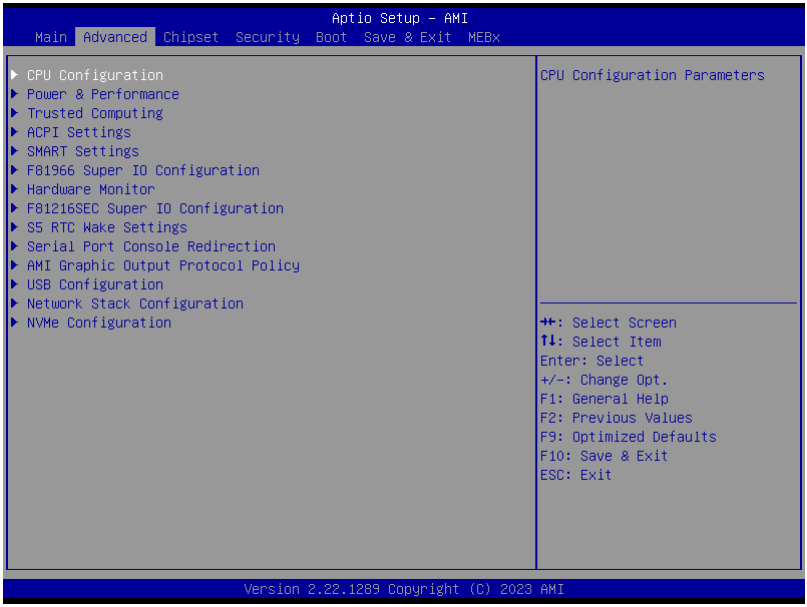
The **Main** menu features the settings of **System Date** and **System Time** and displays some BIOS info.



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

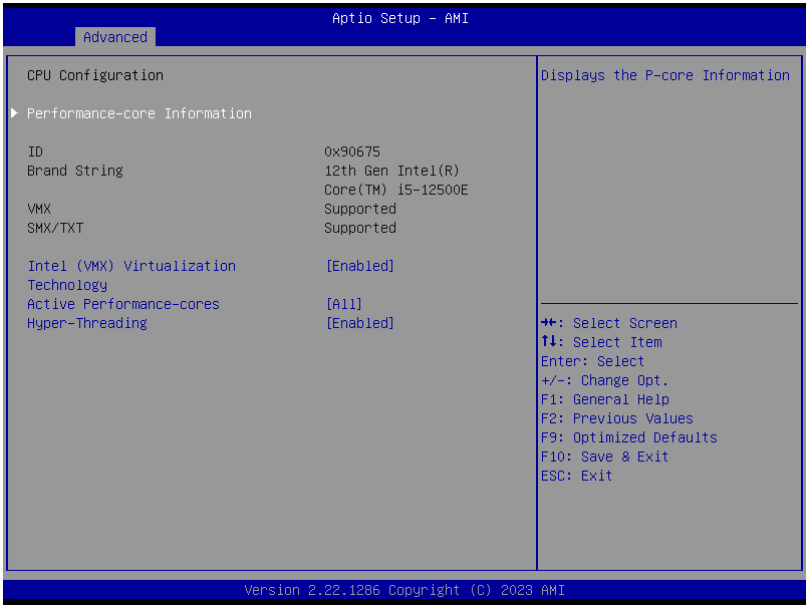


The featured settings and submenus are:

Setting	Description
CPU Configuration	See 5.2.1. CPU Configuration on page 79
Power & Performance	See 5.2.2. Power & Performance on page 80
Trusted Computing	See 5.2.3. Trusted Computing on page 82
ACPI Settings	See 5.2.4. ACPI Settings on page 83
SMART Settings	See 5.2.5. Smart Settings on page 84
FP81966 Super IO Configuration	See 5.2.6. F81966 Super IO Configuration on page 85
Hardware Monitor	See 5.2.7. Hardware Monitor on page 86
F81216SEC Super IO Configuration	See 5.2.8. F81216SEC Super IO Configuration on page 87
SS RTC Wake Settings	See 5.2.9. S5 RTC Wake Settings on page 88
Serial Port Console Redirection	See 5.2.10. Serial Port Console Redirection on page 89

AMI Graphic Outut protocol policy	See 5.2.11. AMI Graphic Output Protocol Policy on page 90
USB Configuration	See 5.2.12. USB Configuration on page 91
Network Stack Configuration	See 5.2.13. Network Stack Configuration on page 93
NVMe Configuration	See 5.2.14. NVME Configuration on page 94

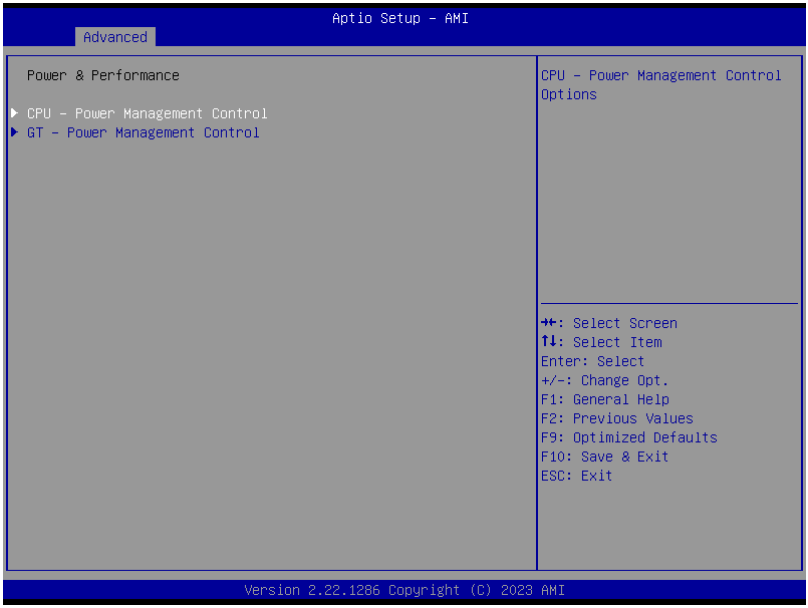
5.2.1. CPU Configuration



The features settings are:

Setting	Description
Performance-core Information	Display the P-core information
Intel (VMX) Virtualization Technology	When enabled, a VMM can utilize the additional hardware capabilities provided by Vanderpool Technology. ► Options: **Enabled** (default) or **Disabled**
Active Performance Cores	Number of cores to enable in each processor package. ► Options: **All** (default) and **1, 2, 3, 4, 5**
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.

5.2.2. Power & Performance



The features settings are:

Setting	Description
CPU - Power management Control	CPU - Power Management Control Options Control CPU Power Management: ► Options: Boot performance mode: **Max Battery, Max Non-Turbo performance, Turbo performance**(Default) Control CPU Power Management: Intel(R) SpeedStep(tm): ► Options: **Disable**(Default)**, Enabled** Turbo Mode: **Enable**/**Disable** peocessor Turbo Mode. ► Options: Turbo Mode: **Disable**(Default)**, Enabled** CPU - Power Management Control Options

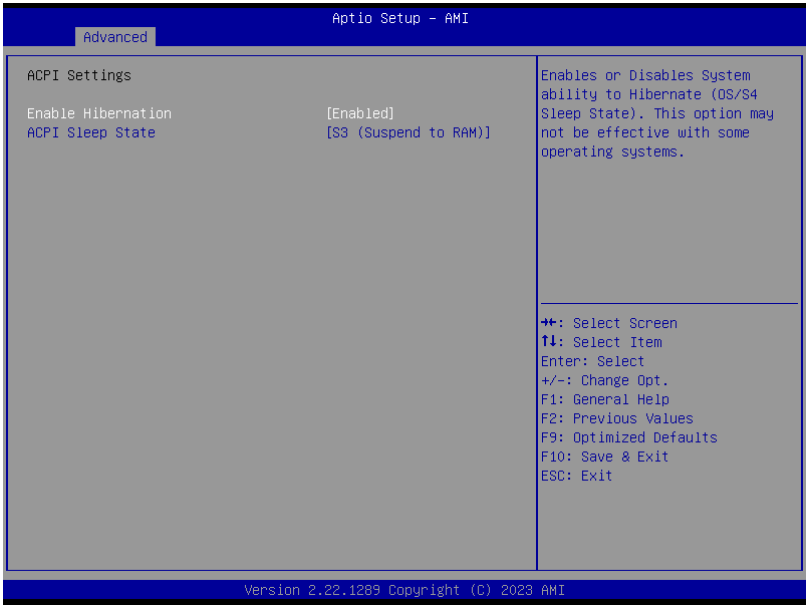
GT - Power Management Control	RC6(Render Standby): Check to enable render standby ► Options: **Disabled / Enabled**(Default) Maximum GT frequency: Maxium GT frequency limited by the user. Choose between 300MHz and 1450MHz. ► Options: **Default Max Frequency**(Default), **100Mhz~1200Mhz** Disable Turbo GT Frequency: Enabled/Disabled GT Frequency. Options: **Disabled**(Default) **/ Enabled**

5.2.3. 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**
SHA256 PCR Bank	**Enable** (default) or **Disable** SHA256 PCR Bank
SHA384 PCR Bank	**Enable** (default) or **Disable** SHA384 PCR Bank
Pending Operation	Use this item to schedule an operation for the security device. NOTE: Your computer will reboot during restart in order to change state of security device
Platform Hierarchy	**Enable** (default) or **Disable** Platform Hierarchy
Storage Hierarchy	**Enable** (default) or **Disable** Storage Hierarchy
Endorsement Hierarchy	**Enable** (default) or **Disable** Endorsement Hierarchy
Physical Peresence Spec Version	Select to tell O.S. to support PPI Spec Version. Options: **1.2 or 1.3**
Device Select	Select TPM devices Options: **TPM1.2**, **TPM2.0** and **Auto**

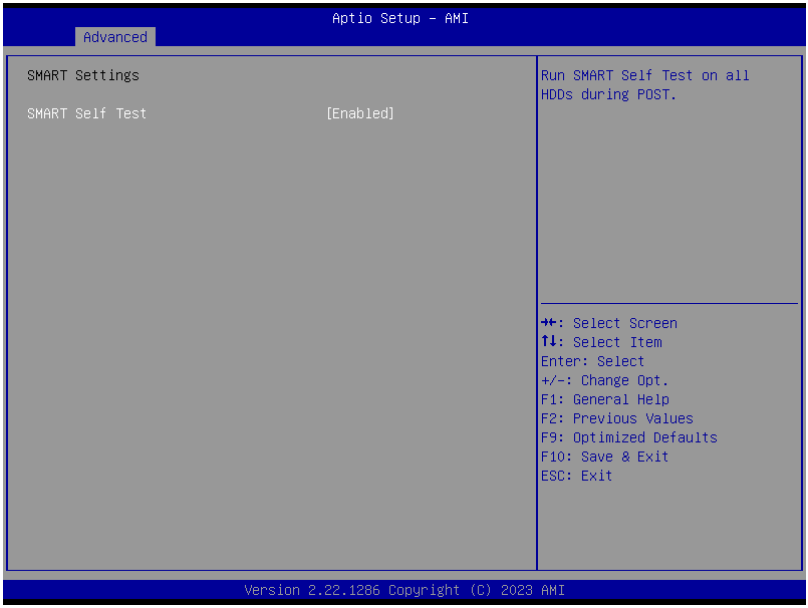
5.2.4. ACPI Settings



The features settings are:

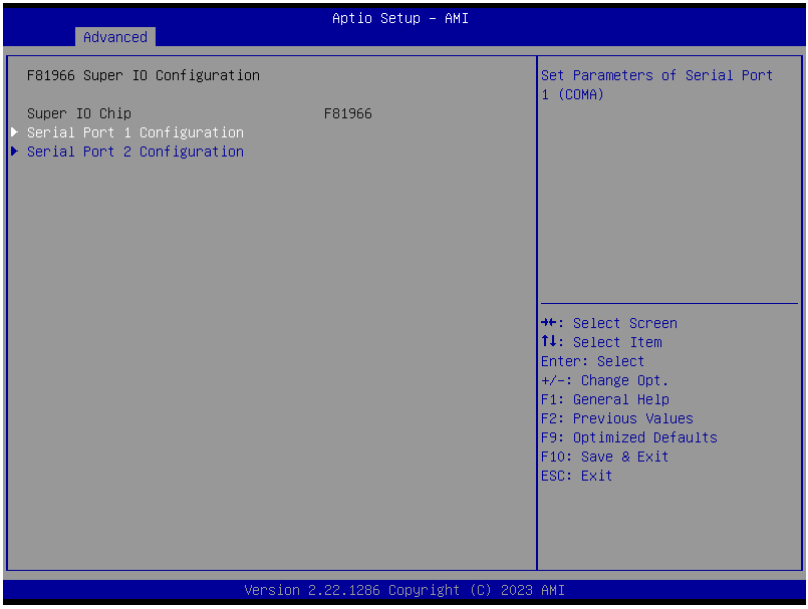
Setting	Description
Enable Hibernation	**Enables** (default) or **Disables** System ability to Hibernate (OS/S4 Sleep State). This option may be not effective with some OS.
ACPI Sleep State	Select ACPI sleep state the system will enter when the SUSPEND button is pressed. ► **Options: Suspend Disabled**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

5.2.5. Smart Settings



Setting	Description
Smart Settings	Run Smart Self Test on all HDDs during POST. Options: **Enabled**(default) or **Disabled**

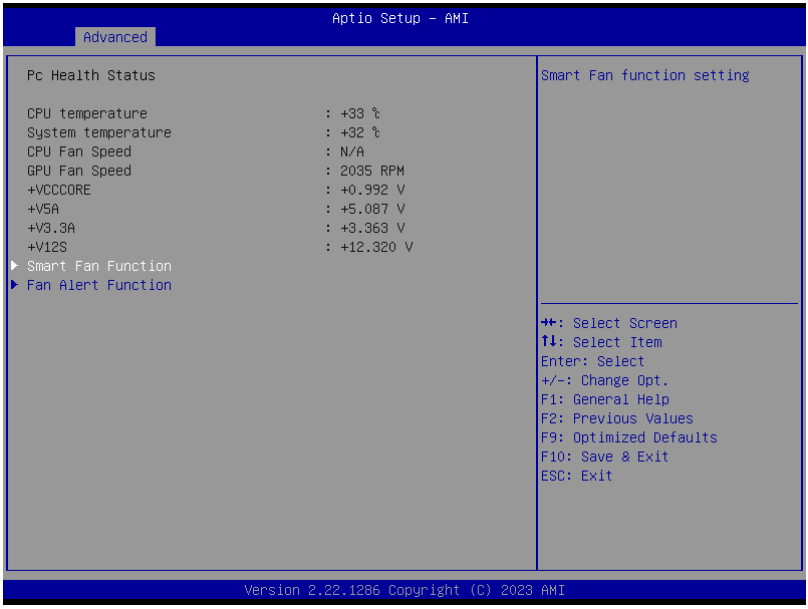
5.2.6. F81966 Super IO Configuration



Super IO Chip F81866 Settings

Setting	Description
Serial Port Configuration	
Serial Port 1-2 Configuration	**Enable** (default) or **Disable** Serial Port (COM). Select **RS-232** (default), **RS-422**, **RS-485**, or **RS-485 Termination Resistor**

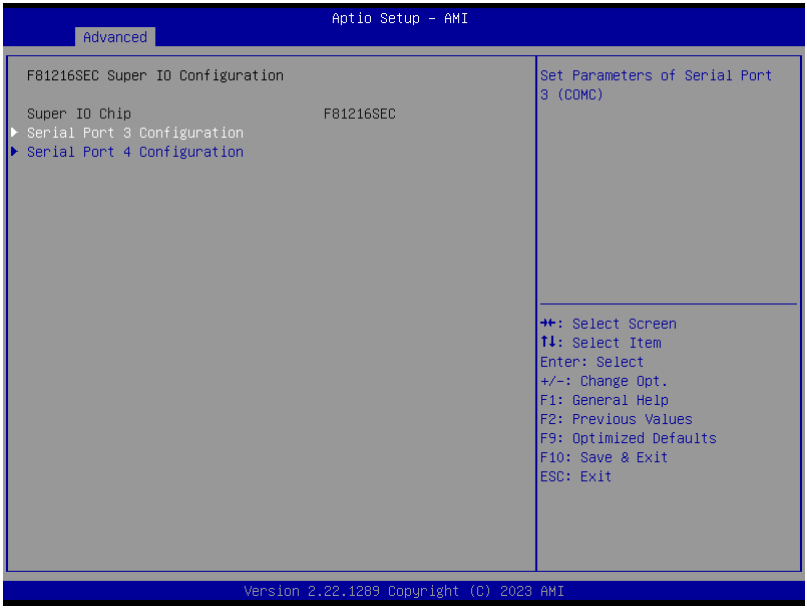
5.2.7. Hardware Monitor



The features settings are:

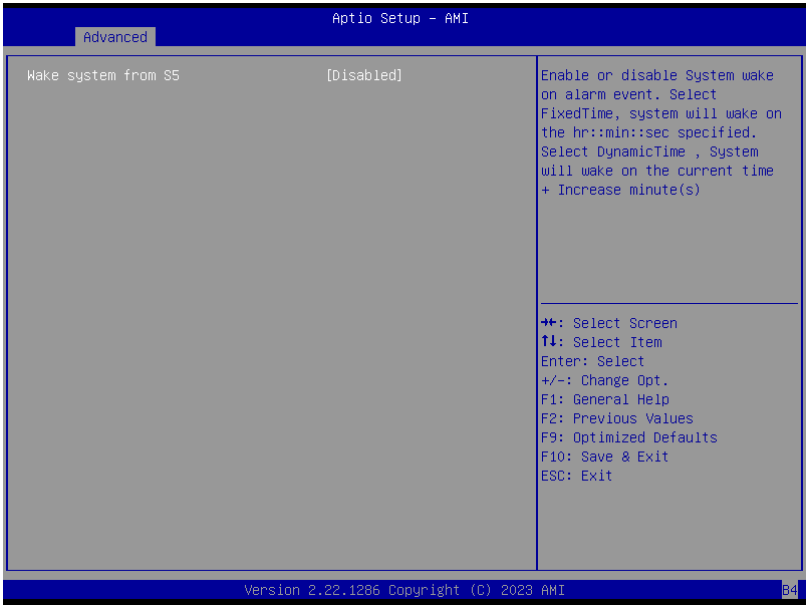
Setting	Description
SmartFan Function	CPU Smart Fan function settings. Fan mode selection: ► **Options: Auto - Dupty Cycle**(default) or **Manial - Dupty Cycle**
Fan Alert Function	GPU Smart Fan function settings. Update CPU fan speed while system reboot: ► **Options: Disabled**(default) or **Enabled** CPU fan speed. Update GPU fan speed while system reboot: ► **Options: Disabled**(default) or **Enabled** CPU fan speed.

5.2.8. F81216SEC Super IO Configuration



Setting	Description
Change Settings	Select an optimal setting for Super IO device. ▶ Options for Serial Port 3: Serial Port= **Disabled** or **Enabled**(default); Mode Select: **RS-232/ RS-422/ RS-485/ RS-422 Termination Resistor/ RS-485 Termination Resistor** ▶ Options for Serial Port 4: Serial Port= **Disabled** or **Enabled**(default); Mode Select: **RS-232/ RS-422/ RS-485/ RS-422 Termination Resistor/ RS-485 Termination Resistor**

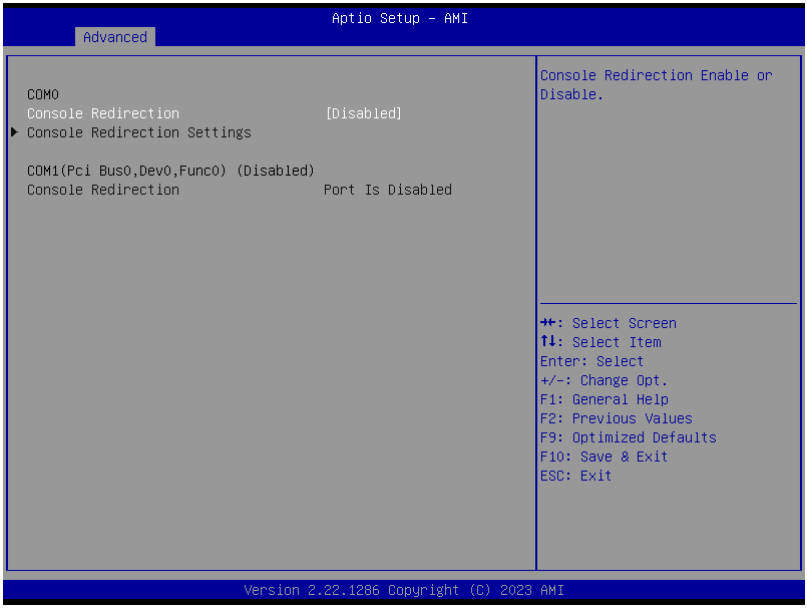
5.2.9. S5 RTC Wake Settings



The features settings are:

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

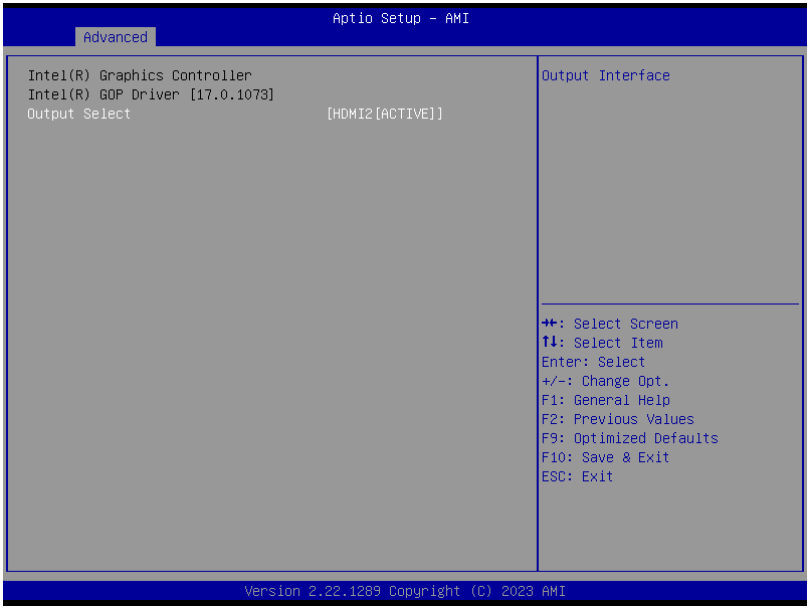
5.2.10. Serial Port Console Redirection



The features settings are:

Setting	Description
Console Redirection	Use this item to enable or disable Console Redirection. The optional settings: [**Disabled**]; [**Enabled**]. When set as [**Enabled**], user can make further settings in the following items:
Console Redirection EMS	**Out-of-Band Mgmt Port** The default setting is: [**COM1**]. ► Options: **Do not launch** (default) and **UEFI**

5.2.11. AMI Graphic Output Protocol Policy

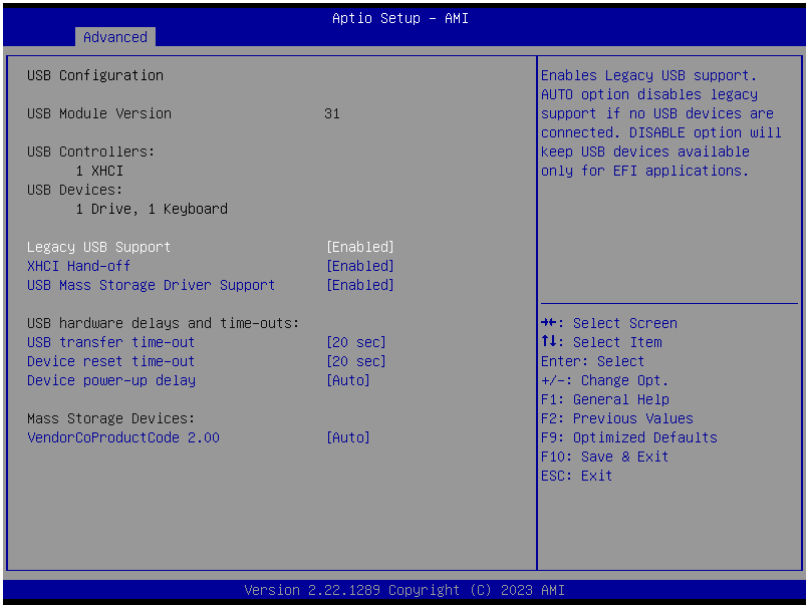


Access this submenu to select output interface.

The features settings are:

Setting	Description
Output select	**Select Output Interface**

5.2.12. USB Configuration

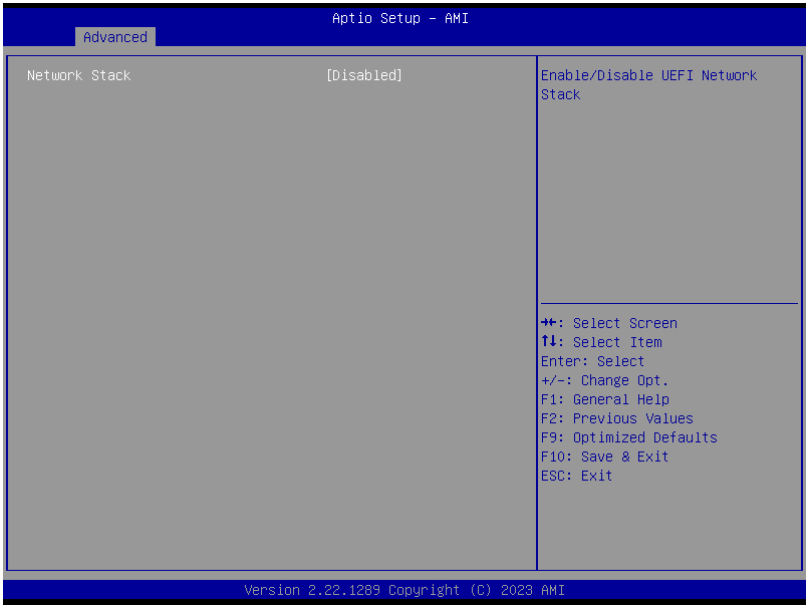


The features settings are:

Setting	Description
Legacy USB Support	Enables/disables legacy USB support. ► 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	This is a workaround for OSes without XHCI hand-off support. The XHCI ownership change should be claimed by XHCI driver. ► The optional settings are: **Enabled** (default) / **Disabled**.
USB Mass Storage Driver support	Enable / Disable USB Mass Storage Driver Support ► The optional settings are: **Enabled** (default) / **Disabled**.

USB Transfer time-out	Use this item to set the time-out value for control, bulk, and interrupt transfers. ► 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.
VendorCoproduct Code 2.00	Mass storage device emulation type. "AUTO" enumerates devices according to their media format. Optical drives are emulated as "CDROM", drives with no media will be emulated according to a drive type. ► Options available are: **Auto, Floppy, Forced FDD, Hard Disk, CD-ROM**

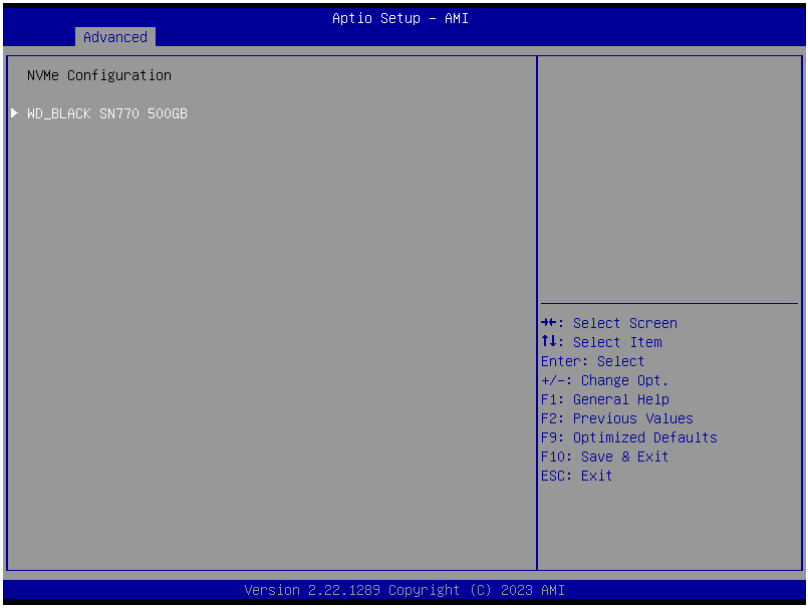
5.2.13. Network Stack Configuration



The features settings are:

Setting	Description
Network Stack	► Options are: [**Enable**] / [**Disable**] (default)

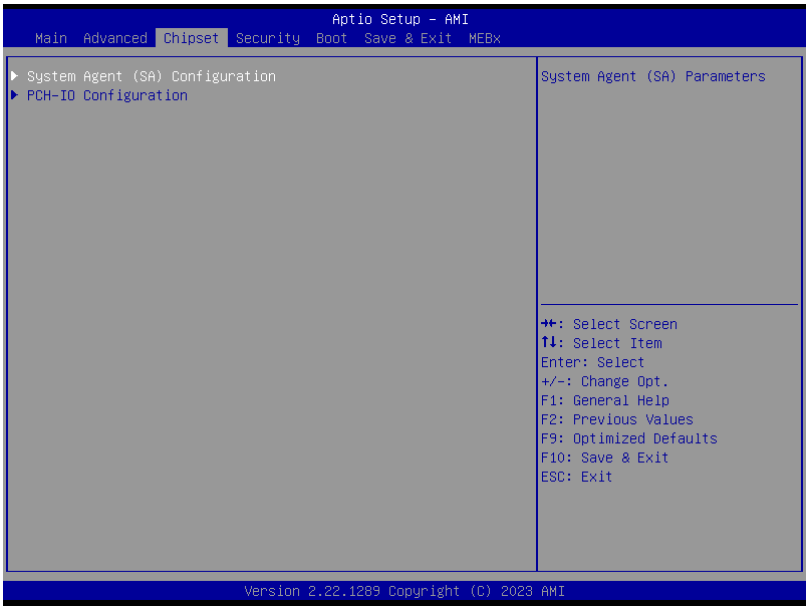
5.2.14. NVME Configuration



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

5.3. Chipset

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

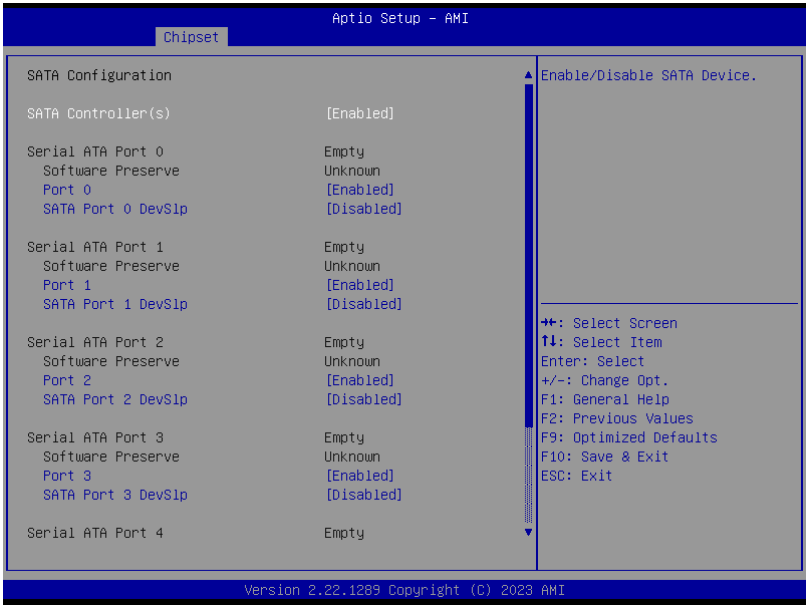


The features settings are:

Setting	Description
System Agent (SA) Configuration	
Memory Configuration	Access this submenu to view the memory configuration.

Graphics Configuration	**DP 1 Display**: Select IGFX or MXM grapghics device ► Options: **IGFX DP**(default) or **MXM DP**. **DP 2 Display**: Select IGFX or MXM grapghics device ► Options: **IGFX DP**(default) or **MXM DP**. **Primary Display**: Select which of IGFX/PEG/ PCI Graphics devics should be Primary Display or select HG for Hybrid Gfx. ► Options: **Auto, IGFX, PEG Slot, PCH PCI, HG**(default). **Apperture Size**: Select the Aperture Size ► Options: **128MB, 256MB, 512MB, 1024MB, 2048MB** **DVMT Pre-Allocated**: Select DVMT 5.0 Pre-Allocated (Fixed) Graphics Memory size ► Options: **64M, 96M, 128M, 160M, 82M/F7, 36M, 40M, 44M, 48M, 52M, 56M, 60M**
VMD Setup Menu	Enable / Disable to VMD controller ► Options: [**Enabled**] and [**Disabled**](default).
VT-d	VT-D capability ► Options: [**Enabled**] (default) or [**Disabled**] VT-d function
PCH-IO Configuration	
PCI Express Configuration	Press [**Enter**] to settings PCI Express Root Port Settings.
SATA Configuration	See Section 5.3.1. SATA Configuration on page 97
PCH-IO Configuration	[**Enabled**](default) / [**Disabled**] onboard NIC.
State After G3	Specify what state to go to when power is re-applied after a power failure (G3 state). ► The optional settings: [**S0 State**]; [**S5 State**]

5.3.1. SATA Configuration



The features settings are:

Setting	Description
SATA Controller(s)	**Enables** (default) **/ Disables** SATA device(s).
Serial ATA Port 0~6	SATA device information. **Enables** (default) / **Disables** the SATA port. *Available SATA ports depend on your model.
SATA Port 0~6 Devslp	**Enables / Disables**(default) SATA Port Device to sleep.

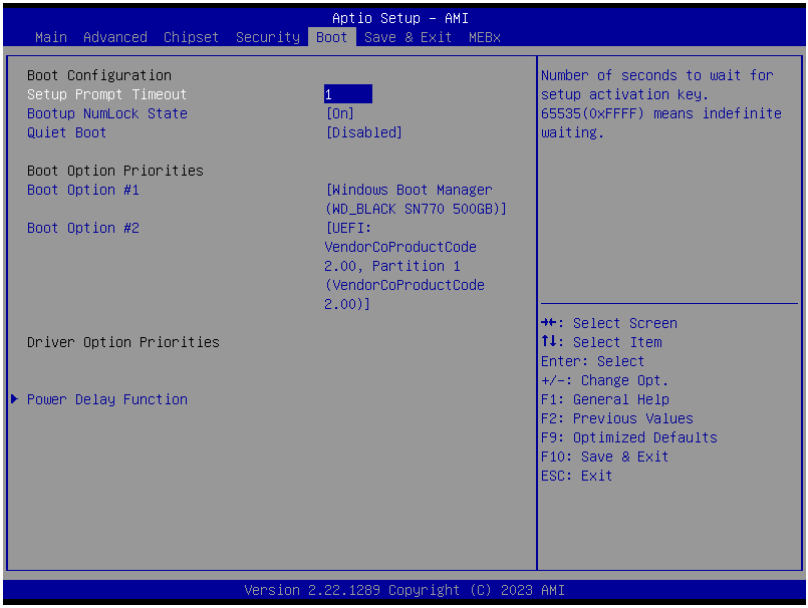
5.4. Security

The features settings are:

Setting	Description
Administrator/ User Password	If ONLY the Administrator's password is set, then this only limits access to Setup and is only asked for when entering Setup. If ONLY the User's password is set, then this is a power on password and must be entered to boot or enter Setup. In Setup the User will have Administrator rights. The password must be less than 3 characters and no more than 20 characters. To set up an administrator/user password: 1. Select Administrator/User 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.

Secure Boot menu	**Secure Boot** Press [**Enter**] to make customized secure settings: ► Options are: [**Disabled**] or [**Enabled**] **Secure Boot Mode** Secure Boot fearuew is Active if Secure Boot is Enabled: ► Options are: [**Custom**] or [**Standard**] **Key Management** ► This item enables expert users to modify Secure Boot Policy

5.5. Boot

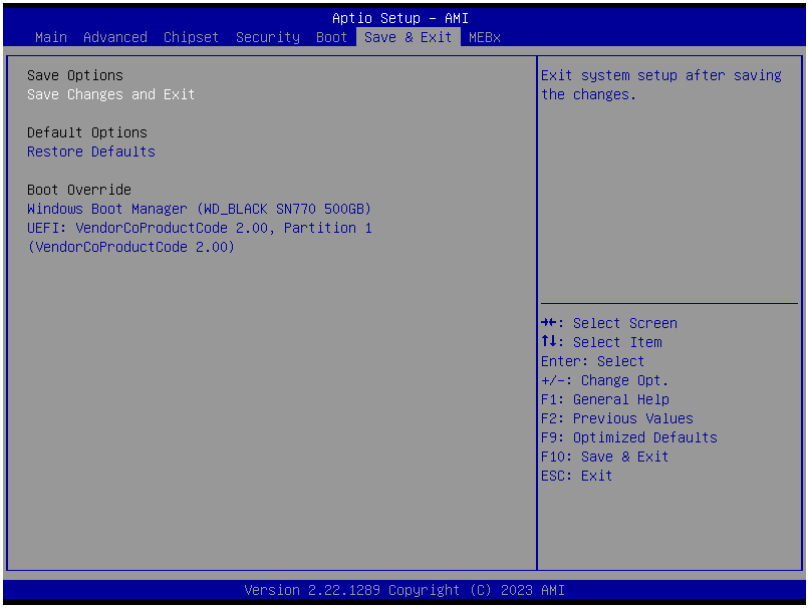


The features settings are:

Setting	Description
Setup Prompt Timeout	Set how long to wait for the prompt to show for entering BIOS Setup. ► 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. ► 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. ► Select **Disabled** to display the normal POST message, which is the default.
Boot Option Priority	Set the system boot priorities.

Power Delay Function	**Power Delay Function** Set the system support power delay function. ► Options: **Enable** (default)**:** Support power delay function. **Disable:** Power on/off manually operated. **Power on delay** Select the time which the system will power on. ► Options: **Manually Operator** (default), **04 Seconds**, **08 Seconds** and **16 Seconds**. **Power off delay** Select the time which the system will power on. ► Options: **Manually Operator** (default), **30 Seconds**, **60 Seconds** and **90 Seconds**.

5.6. Save & Exit



The features settings are:

Setting	Description
Save Changes and Exit	Saves the changes and quits the BIOS Setup utility.
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. ► **UEFI:** Attempts to launch EFI Shell Application (Shell.efi) from one of the available filesystem devices.

5.7. MEBx

The Intel MEBX provides the ability to change and/or collect the system hardware configuration.

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Appendix

Appendix A. CAN BUS Test Procedures

Users can test the CAN BUS in the Windows environment. Below is the procedure for your reference.

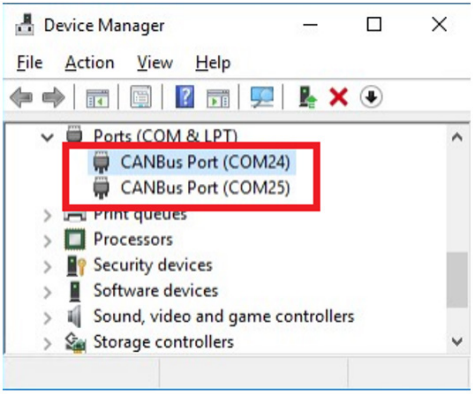
Step 1.
Users need to place the .exe file and .DLL file in the same folder for successful execution.

Step 2.
Open the command prompt in Windows and navigate to the appropriate location. You will need to open two windows, one for sending and one for receiving—the command as below.
FitCANBus.exe COM5 1000 12345678 29 0 0 0 0 0 0 << Receiving
FitCANBus.exe COM6 1000 12345678 29 0 1 10 0 0 << Transmitting

Note: The receive command should be placed first, and wait for the data to come in, in order to test normally, otherwise it will become timeout receive.

Step 3.
Execute the application program by command
Example.
Command line → FitCANBus.exe COM5 1000 12345678 29 0 0 0 0 0

FitCANBus.exe → Execute the application program file name
<COM Port Number> → It depends on the COM PORT of the computer, the examples are com5 & com6.
Example:



<CAN baudRate> →baud rate, 1000=1M OR 250=250K and so on.
<CAN ID> → format of CANID.
Example: 12345678 , CANID with hex format

<CAN Bits > → There are 29bit and 11bit can be used in the CAN BUS.
<CAN RTR> → RTR is only 0 or 1, make it enable/disable (default is 0).
<Flag> → CANBUS flag, one is for transmit, the other is for receive.
<Times> → Execution times, set execution times according to requirement
<Filter Mask> → Filter CANID pattern (default is 0)
<Filter Mask> → Filter mask (default is 0)

Note: If Filter and Mask set to 0 0, that means no filter, if you want to set specified CANID, you can give the CANID as FilterPattern, Mask set to ffffffff for 29 bit, set to fff fort 11bit, up to 15 filters.

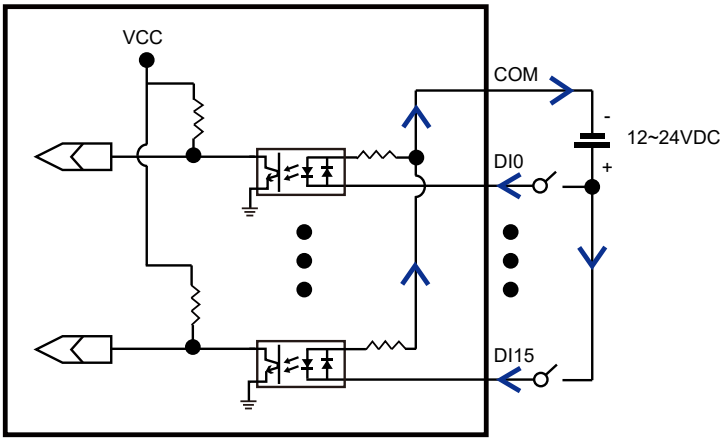
Step 4.
When the test is completed, a text file will be in the same folder for the record. This file will include the date, sampling rate, and time consumed.

Appendix B. 8-bit Opto-Isolated DI Signal Connections

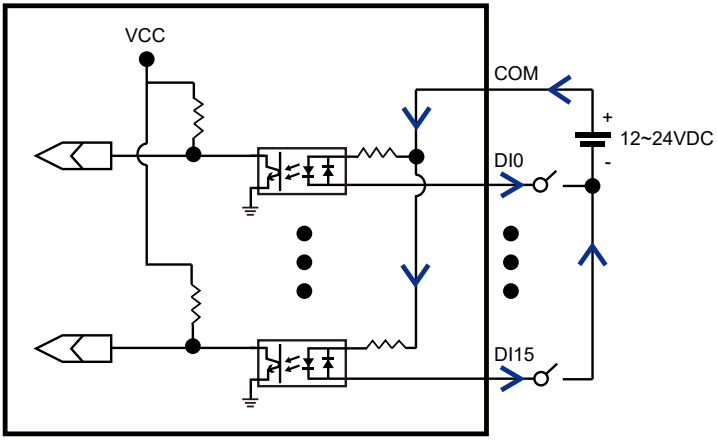
B.1. Wet Contact DI with NPN / PNP connection

Digital Input - Wet Contact	
V_{off}	V_{on}
Max. 3V	12~24V

PNP

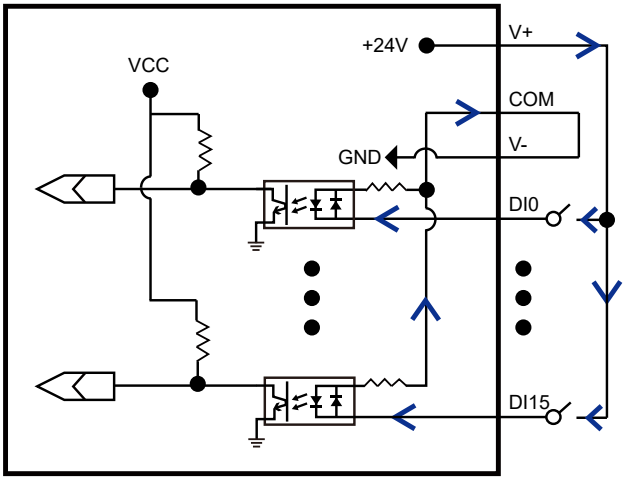


NPN

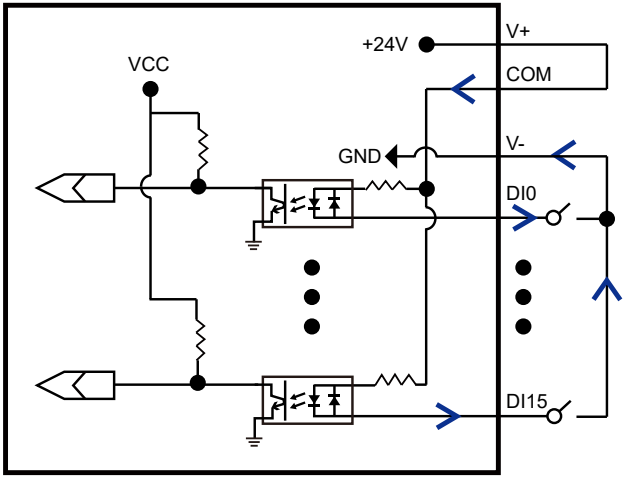


B.2. Dry Contact DI with NPN / PNP connection

PNP



NPN



Appendix C. 8-bit Opto-Isolated DO Signal Connections

C.1. DO Connection diagram

When an isolated output channel is being used as an output channel, if an external voltage (maximum 24V) is applied, the current will flow from the external voltage source to the system. Make sure that the current through each out pin does not exceed 100 mA.