

VCM-2000 USER

Intel® Core™ 200S Series and 14/13/12th Gen Intel® Core™ Processor
Compact Embedded Computing System

Manual

Record of Revision

Version	Date	Page	Description	Remark
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1.30	2026/03/10	v, 11	Update	
1.40	2026/04/29	All	Update	

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FCC 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 it is not installed and used in accordance with the instruction manual, it 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.

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Order Information

Part Number	Description
VCM-2000/2000F	1 GigE LAN, 3 2.5G LAN, 4 COM, 4 USB, 2 SIM , 12V
VCM-2000A/2000AF	1 GigE LAN, 3 2.5G LAN, 4 COM, 4 USB, 2 SIM , 9V to 36V

CPU List

Series	CPU	Cores	GHz	TDP (W)
Intel® Core™	9 273PE	12	5.7	65
	7 253PE	10	5.5	
	5 223PE	8	5.4	
	7-251E	24	5.6	
	5 221E	14	5.2	
	3 201E	4	4.8	60
	i9-14900	24	5.8	65
	i7-14700	20	5.4	
	i5-14500	14	5	
	i3-14100	4	4.7	
	i9-13900E	24	5.2	
	i7-13700E	16	5.1	
	i5-13500E	14	4.6	
	i3-13100E	4	4.4	
	i9-12900E	16	5	
	i7-12700E	12	4.8	
	i5-12500E	6	4.5	
	i3-12100E	4	4.2	
	9 273PTE	12	5.5	45
	7 253PTE	10	5.4	
	5 223PTE	8	5.4	
	7 251TE	24	5.4	
	5 221TE	14	5.0	
	3 201TE	4	4.6	
	i9-14900T	24	5.5	35
	i7-14700T	20	5.2	
	i5-14500T	14	4.8	
	i3-14100T	4	4.4	
	i9-13900TE	24	5	
	i7-13700TE	16	4.8	
	i5-13500TE	14	4.5	
	i3-13100TE	4	4.1	
	i9-12900TE	16	4.8	
	i7-12700TE	12	4.7	
	i5-12500TE	6	4.3	
	i3-12100TE	4	4	

* 14th Gen support PC Client use condition only.

* Turbo Mode not support

Optional Accessories

Part Number	Description
DDR5 48G	Certified DDR5 48GB 5600MHz RAM
DDR5 32G	Certified DDR5 32GB 5600/4800MHz RAM
DDR5 24G	Certified DDR5 24GB 5600MHz RAM
DDR5 16G	Certified DDR5 16GB 5600/4800MHz RAM
DDR5 8G	Certified DDR5 8GB 5600/4800MHz RAM
PWA-100W-12V	100W, 12V, 85V AC to 264V AC Power Adapter with 3-pin Terminal Block, Wide Temperature -30°C to +70°C
PWA-135W-WT-12V	120W, 24V, 90V AC to 264V AC Power Adapter with 3-pin Terminal Block
PWA-120W1	135W, 12V, 85V AC to 264V AC Power Adapter with 3-pin Terminal Block,
PWA-160W-WT	160W, 24V, 85V AC to 264V AC Power Adapter with 3-pin Terminal Block, Wide Temperature -30°C to +70°C
PWA-180W	180W, 24V, AC 90V-132V/180V-264V Power Adapter
PWA-330W	330W, 24V, AC 90V-264V Power Adapter *Recommended when enable turbo mode
DIN Rail	DIN Rail Kit
VESA Mount	VESA Mounting Kit
M.2 Storage Module	M.2 Key M Storage Module
5G Module	5G Module with Antenna
4G Module	4G/GPS Module with Antenna
WiFi & Bluetooth	WiFi & Bluetooth Module with Antenna

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1

GENERAL INTRODUCTION

1.1 Overview

The Vecow VCM-2000 is a compact, fanless embedded system powered by Intel® Core™ 200S Series and 14/13/12th Gen Intel® Core™ Processor (codename: Bartlett Lake-S/Raptor Lake-S Refresh/Raptor Lake-S/Alder Lake-S). With high-speed memory, versatile I/O, and robust connectivity, the VCM-2000 empowers real-time data processing and ensures reliable performance in the most challenging environments.

Equipped with up to 96GB of DDR5 5600MHz memory, the VCM-2000 delivers outstanding performance for AI, machine vision, and automation workloads. It features 2 USB 3.2, 2 USB 2.0, and 4 COM ports to support diverse peripheral connections, while 4 independent Intel® GigE LAN ports, including 3 2.5GbE, provide high-speed, stable networking for data-intensive applications.

The VCM-2000 integrates dual external SIM card slots, supporting WiFi/4G/5G/LTE/GPRS/UMTS for internet access and mobile connectivity. Expansion flexibility is built-in with Key E, Key B, and dual Mini PCIe slots, enabling easy integration of PCIe, USB, and SIM card modules. Supporting a 12V DC input and optional 9V to 36V wide-range power input with software ignition control, the VCM-2000 is ideally suited for automotive and in-vehicle applications.

With industrial-grade reliability and wide temperature operation from -25°C to 60°C, the VCM-2000 is engineered to thrive in harsh edge environments, making it the perfect platform for next-generation intelligent edge deployments.

1.2 Features

- Intel® Core™ 200S Series and 14/13/12th Gen Intel® Core™ Processor (codename: Bartlett Lake-S/Raptor Lake-S Refresh/Raptor Lake-S/Alder Lake-S) running with Intel® H610E PCH supports max 65W TDP CPU
- Supports 2 DIMM up to 96GB DDR5 5600MHz memory
- USB 3.2, 2 USB 2.0, 4 COM RS-232/422/485
- Independent Intel® GigE LAN ports, including 3 2.5GbE
- 2 External SIM Card Socket support WiFi/4G/5G/LTE/GPRS/UMTS
- Key E, Key B, 2 Mini PCIe for PCIe/USB/SIM Card expansions
- 12V DC Power Input, optional supports 9V to 36V wide range DC power input, Software Ignition Control
- Supports operating temperatures from -40°C to 60°C

1.3 Product Specification

1.3.1 Specifications of VCM-2000

System	
Processor	• 24-core Intel® Core™ 200S Series Processor (Bartlett Lake-S) • 24-core 14th Gen Intel® Core™ i9/i7/i5/i3 Processor (Raptor Lake-S Refresh) • 24-core 13th Gen Intel® Core™ i9/i7/i5/i3 Processor (Raptor Lake-S) • 16-core 12th Gen Intel® Core™ i9/i7/i5/i3 Processor (Alder Lake-S)
Chipset	Intel® H610E
BIOS	AMI
SIO	IT8786E
Memory	2 DDR5 5600MHz SO-DIMM, up to 96GB
OS	Windows 11, Window 10, Linux
I/O Interface	
Serial	4 COM RS-232/422/485
USB	• 2 USB 3.2 Type-A • 2 USB 2.0 Type-A
LED	Power, HDD
SIM Card	2 External SIM Card Sockets
Expansion	
M.2	• 1 M.2 Key E Socket(2230, PCIe2/USB2) • 1 M.2 Key B Socket(2280/3042/3052, default PCIe1 USB3.2/USB2.0) with SIM
Mini PCIe	• 1 Full-size Mini PCIe (PCIe1, SATA, USB2) • 1 Full-size Mini PCIe (PCIe1, SATA, USB2) with SIM
Graphics	
Graphics Processor	Intel® Xe™ LPG Graphics architecture, up to 4Xe™ Graphics Engines
Interface	• 1 HDMI 2.0: Up to 3840 x 2160 @60Hz • 1 DVI-I: Up to 1920 x 1080 @60Hz
Storage	
SATA	2 SATAIII (6Gbps) for SSD/HDD
M.2	• 1 M.2 Key M Socket (2242/2280, PCIe4) • 1 M.2 Key B Socket (2280, PCIe x2, share with expansion)
mSATA	2 SATA III (Mini PCIe Type, 6Gbps, share with expansion)
Ethernet	
LAN 1	Intel® I219LM GigE LAN
LAN 2	Intel® I226 2.5 GigE LAN
LAN 3	Intel® I226 2.5 GigE LAN
LAN 4	Intel® I226 2.5 GigE LAN

Power	
Power Input	12V DC-in
Power Interface	3-pin Terminal Block: V+, V-, Frame Ground
Ignition Control	16-mode Software Ignition Control
Remote Switch	3-pin Terminal Block
Others	
TPM	Infineon SLB9670 supports TPM 2.0, SPI Interface
Watchdog Timer	Reset : 1 to 255 sec./min. per step
Smart Mgmt.	Wake on LAN, PXE supported
HW Monitor	Monitoring temperature, voltages. Auto throttling control when CPU overheats.
Mechanical	
Dimension (W x L x H)	209.0mm x 150.5mm x 75.0mm (8.23" x 5.93" x 2.95")
Weight	2.31kg (5.09lb)
Mounting	• Wallmount by mounting bracket • VESA Mount (Optional) • DIN Rail Mounting (Optional)
Environment	
Operating Temperature (with air flow)	35W TDP CPU with heat sink: -40°C to 60°C (-40°F to 140°F) with air flow
Storage Temperature	-40°C to 85°C (-40°F to 185°F)
Humidity	5% to 95% Humidity, non-condensing
Relative Humidity	95% @60°C
Shock	• IEC 60068-2-27 • SSD : 50G @ wallmount, Half-sine, 11ms
Vibration	• IEC 60068-2-64 • SSD : 5Grms, 5Hz to 500Hz, 3 Axis
EMC	CE, FCC, ICES, EN50155, EN50121-3-2

1.3.2 Specifications of VCM-2000F

System	
Processor	• 24-core Intel® Core™ 200S Series Processor (Bartlett Lake-S) • 24-core 14th Gen Intel® Core™ i9/i7/i5/i3 Processor (Raptor Lake-S Refresh) • 24-core 13th Gen Intel® Core™ i9/i7/i5/i3 Processor (Raptor Lake-S) • 16-core 12th Gen Intel® Core™ i9/i7/i5/i3 Processor (Alder Lake-S)
Chipset	Intel® H610E
BIOS	AMI
SIO	IT8786E
Memory	2 DDR5 5600MHz SO-DIMM, up to 96GB
OS	Windows 11, Window 10, Linux
I/O Interface	
Serial	4 COM RS-232/422/485
USB	• 2 USB 3.2 Type-A • 2 USB 2.0 Type-A
LED	Power, HDD
SIM Card	2 External SIM Card Sockets
Expansion	
M.2	• 1 M.2 Key E Socket(2230, PCIe2/USB2) • 1 M.2 Key B Socket(2280/3042/3052, default PCIe1 USB3.2/USB2.0) with SIM
Mini PCIe	• 1 Full-size Mini PCIe (PCIe1, SATA, USB2) • 1 Full-size Mini PCIe (PCIe1, SATA, USB2) with SIM
Graphics	
Graphics Processor	Intel® X ^e LPG Graphics architecture, up to 4X ^e Graphics Engines
Interface	• 1 HDMI 2.0: Up to 3840 x 2160 @60Hz • 1 DVI-I: Up to 1920 x 1080 @60Hz
Storage	
SATA	2 SATAIII (6Gbps) for SSD/HDD
M.2	• 1 M.2 Key M Socket (2242/2280, PCIe4) • 1 M.2 Key B Socket (2280, PCIe x2, share with expansion)
mSATA	2 SATA III (Mini PCIe Type, 6Gbps, share with expansion)
Ethernet	
LAN 1	Intel® I219LM GigE LAN
LAN 2	Intel® I226 2.5 GigE LAN
LAN 3	Intel® I226 2.5 GigE LAN
LAN 4	Intel® I226 2.5 GigE LAN

Power	
Power Input	12V DC-in
Power Interface	3-pin Terminal Block: V+, V-, Frame Ground
Ignition Control	16-mode Software Ignition Control
Remote Switch	3-pin Terminal Block
Others	
TPM	Infineon SLB9670 supports TPM 2.0, SPI Interface
Watchdog Timer	Reset : 1 to 255 sec./min. per step
Smart Mgmt.	Wake on LAN, PXE supported
HW Monitor	Monitoring temperature, voltages. Auto throttling control when CPU overheats.
Mechanical	
Dimension (W x L x H)	209.0mm x 150.5mm x 75.0mm (8.23" x 5.93" x 2.95")
Weight	2.31kg (5.09lb)
Mounting	• Wallmount by mounting bracket • VESA Mount (Optional) • DIN Rail Mounting (Optional)
Environment	
Operating Temperature (with air flow)	65W TDP CPU with fan sink : -40°C to 60°C (-40°F to 140°F)
Storage Temperature	-40°C to 85°C (-40°F to 185°F)
Humidity	5% to 95% Humidity, non-condensing
Relative Humidity	95% @60°C
Shock	• IEC 60068-2-27 • SSD : 50G @ wallmount, Half-sine, 11ms
Vibration	• IEC 60068-2-64 • SSD : 5Grms, 5Hz to 500Hz, 3 Axis
EMC	CE, FCC, ICES, EN50155, EN50121-3-2

1.3.3 Specifications of VCM-2000A

System	
Processor	• 24-core Intel® Core™ 200S Series Processor (Bartlett Lake-S) • 24-core 14th Gen Intel® Core™ i9/i7/i5/i3 Processor (Raptor Lake-S Refresh) • 24-core 13th Gen Intel® Core™ i9/i7/i5/i3 Processor (Raptor Lake-S) • 16-core 12th Gen Intel® Core™ i9/i7/i5/i3 Processor (Alder Lake-S)
Chipset	Intel® H610E
BIOS	AMI
SIO	IT8786E
Memory	2 DDR5 5600MHz SO-DIMM, up to 96GB
OS	Windows 11, Window 10, Linux
I/O Interface	
Serial	4 COM RS-232/422/485
USB	• 2 USB 3.2 Type-A • 2 USB 2.0 Type-A
LED	Power, HDD
SIM Card	2 External SIM Card Sockets
Expansion	
M.2	• 1 M.2 Key E Socket(2230, PCIe2/USB2) • 1 M.2 Key B Socket(2280/3042/3052, default PCIe1 USB3.2/USB2.0) with SIM
Mini PCIe	• 1 Full-size Mini PCIe (PCIe1, SATA, USB2) • 1 Full-size Mini PCIe (PCIe1, SATA, USB2) with SIM
Graphics	
Graphics Processor	Intel® X ^e LPG Graphics architecture, up to 4X ^e Graphics Engines
Interface	• 1 HDMI 2.0: Up to 3840 x 2160 @60Hz • 1 DVI-I: Up to 1920 x 1080 @60Hz
Storage	
SATA	2 SATAIII (6Gbps) for SSD/HDD
M.2	• 1 M.2 Key M Socket (2242/2280, PCIe4) • 1 M.2 Key B Socket (2280, PCIe x2, share with expansion)
mSATA	2 SATA III (Mini PCIe Type, 6Gbps, share with expansion)
Ethernet	
LAN 1	Intel® I219LM GigE LAN
LAN 2	Intel® I226 2.5 GigE LAN
LAN 3	Intel® I226 2.5 GigE LAN
LAN 4	Intel® I226 2.5 GigE LAN

Power	
Power Input	9V to 36V wide range DC-in
Power Interface	3-pin Terminal Block: V+, V-, Frame Ground
Ignition Control	16-mode Software Ignition Control
Remote Switch	3-pin Terminal Block
Others	
TPM	Infineon SLB9670 supports TPM 2.0, SPI Interface
Watchdog Timer	Reset : 1 to 255 sec./min. per step
Smart Mgmt.	Wake on LAN, PXE supported
HW Monitor	Monitoring temperature, voltages. Auto throttling control when CPU overheats.
Mechanical	
Dimension (W x L x H)	209.0mm x 150.5mm x 75.0mm (8.23" x 5.93" x 2.95")
Weight	2.31kg (5.09lb)
Mounting	• Wallmount by mounting bracket • VESA Mount (Optional) • DIN Rail Mounting (Optional)
Environment	
Operating Temperature (with air flow)	35W TDP CPU with heat sink: -40°C to 60°C (-40°F to 140°F) with air flow
Storage Temperature	-40°C to 85°C (-40°F to 185°F)
Humidity	5% to 95% Humidity, non-condensing
Relative Humidity	95% @60°C
Shock	• IEC 60068-2-27 • SSD : 50G @ wallmount, Half-sine, 11ms
Vibration	• IEC 60068-2-64 • SSD : 5Grms, 5Hz to 500Hz, 3 Axis
EMC	CE, FCC, ICES, EN50155, EN50121-3-2

1.3.4 Specifications of VCM-2000AF

System	
Processor	• 24-core Intel® Core™ 200S Series Processor (Bartlett Lake-S) • 24-core 14th Gen Intel® Core™ i9/i7/i5/i3 Processor (Raptor Lake-S Refresh) • 24-core 13th Gen Intel® Core™ i9/i7/i5/i3 Processor (Raptor Lake-S) • 16-core 12th Gen Intel® Core™ i9/i7/i5/i3 Processor (Alder Lake-S)
Chipset	Intel® H610E
BIOS	AMI
SIO	IT8786E
Memory	2 DDR5 5600MHz SO-DIMM, up to 96GB
OS	Windows 11, Window 10, Linux
I/O Interface	
Serial	4 COM RS-232/422/485
USB	• 2 USB 3.2 Type-A • 2 USB 2.0 Type-A
LED	Power, HDD
SIM Card	2 External SIM Card Sockets
Expansion	
M.2	• 1 M.2 Key E Socket(2230, PCIe2/USB2) • 1 M.2 Key B Socket(2280/3042/3052, default PCIe1 USB3.2/USB2.0) with SIM
Mini PCIe	• 1 Full-size Mini PCIe (PCIe1, SATA, USB2) • 1 Full-size Mini PCIe (PCIe1, SATA, USB2) with SIM
Graphics	
Graphics Processor	Intel® X ^e LPG Graphics architecture, up to 4X ^e Graphics Engines
Interface	• 1 HDMI 2.0: Up to 3840 x 2160 @60Hz • 1 DVI-I: Up to 1920 x 1080 @60Hz
Storage	
SATA	2 SATAIII (6Gbps) for SSD/HDD
M.2	• 1 M.2 Key M Socket (2242/2280, PCIe4) • 1 M.2 Key B Socket (2280, PCIe x2, share with expansion)
mSATA	2 SATA III (Mini PCIe Type, 6Gbps, share with expansion)
Ethernet	
LAN 1	Intel® I219LM GigE LAN
LAN 2	Intel® I226 2.5 GigE LAN
LAN 3	Intel® I226 2.5 GigE LAN
LAN 4	Intel® I226 2.5 GigE LAN

Power	
Power Input	9V to 36V wide range DC-in
Power Interface	3-pin Terminal Block: V+, V-, Frame Ground
Ignition Control	16-mode Software Ignition Control
Remote Switch	3-pin Terminal Block
Others	
TPM	Infineon SLB9670 supports TPM 2.0, SPI Interface
Watchdog Timer	Reset : 1 to 255 sec./min. per step
Smart Mgmt.	Wake on LAN, PXE supported
HW Monitor	Monitoring temperature, voltages. Auto throttling control when CPU overheats.
Mechanical	
Dimension (W x L x H)	209.0mm x 150.5mm x 75.0mm (8.23" x 5.93" x 2.95")
Weight	2.31kg (5.09lb)
Mounting	• Wallmount by mounting bracket • VESA Mount (Optional) • DIN Rail Mounting (Optional)
Environment	
Operating Temperature (with air flow)	65W TDP CPU with fan sink: -40°C to 60°C (-40°F to 140°F) with air flow
Storage Temperature	-40°C to 85°C (-40°F to 185°F)
Humidity	5% to 95% Humidity, non-condensing
Relative Humidity	95% @60°C
Shock	• IEC 60068-2-27 • SSD : 50G @ wallmount, Half-sine, 11ms
Vibration	• IEC 60068-2-64 • SSD : 5Grms, 5Hz to 500Hz, 3 Axis
EMC	CE, FCC, ICES, EN50155, EN50121-3-2

1.4 Supported CPU List

Series	CPU	Cores	GHz	TDP (W)
Intel® Core™	9 273PE	12	5.7	65
	7 253PE	10	5.5	
	5 223PE	8	5.4	
	7-251E	24	5.6	
	5 221E	14	5.2	
	3 201E	4	4.8	60
	i9-14900	24	5.8	65
	i7-14700	20	5.4	
	i5-14500	14	5	
	i3-14100	4	4.7	
	i9-13900E	24	5.2	
	i7-13700E	16	5.1	
	i5-13500E	14	4.6	
	i3-13100E	4	4.4	
	i9-12900E	16	5	
	i7-12700E	12	4.8	
	i5-12500E	6	4.5	
	i3-12100E	4	4.2	
	9 273PTE	12	5.5	45
	7 253PTE	10	5.4	
	5 223PTE	8	5.4	
	7 251TE	24	5.4	
	5 221TE	14	5.0	
	3 201TE	4	4.6	
	i9-14900T	24	5.5	35
	i7-14700T	20	5.2	
	i5-14500T	14	4.8	
	i3-14100T	4	4.4	
	i9-13900TE	24	5	
	i7-13700TE	16	4.8	
	i5-13500TE	14	4.5	
	i3-13100TE	4	4.1	
	i9-12900TE	16	4.8	
	i7-12700TE	12	4.7	
	i5-12500TE	6	4.3	
	i3-12100TE	4	4	

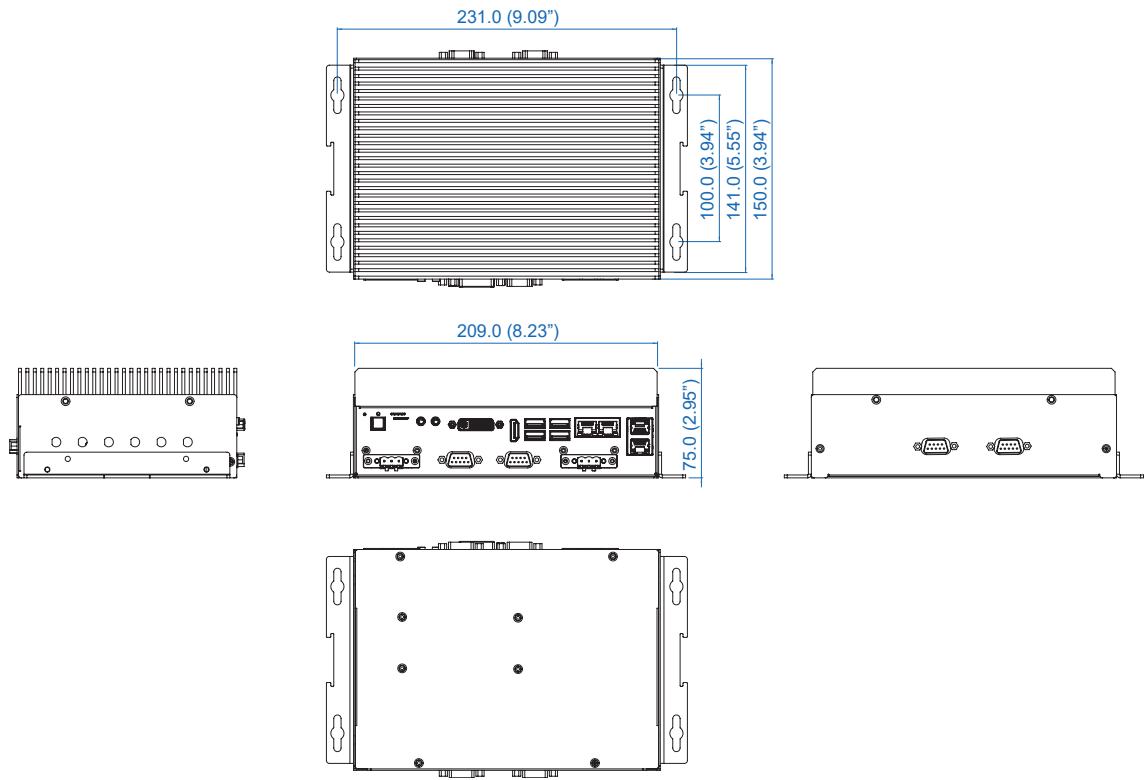
* 14th Gen support PC Client use condition only.

* Turbo Mode not support

1.5 Mechanical Dimension

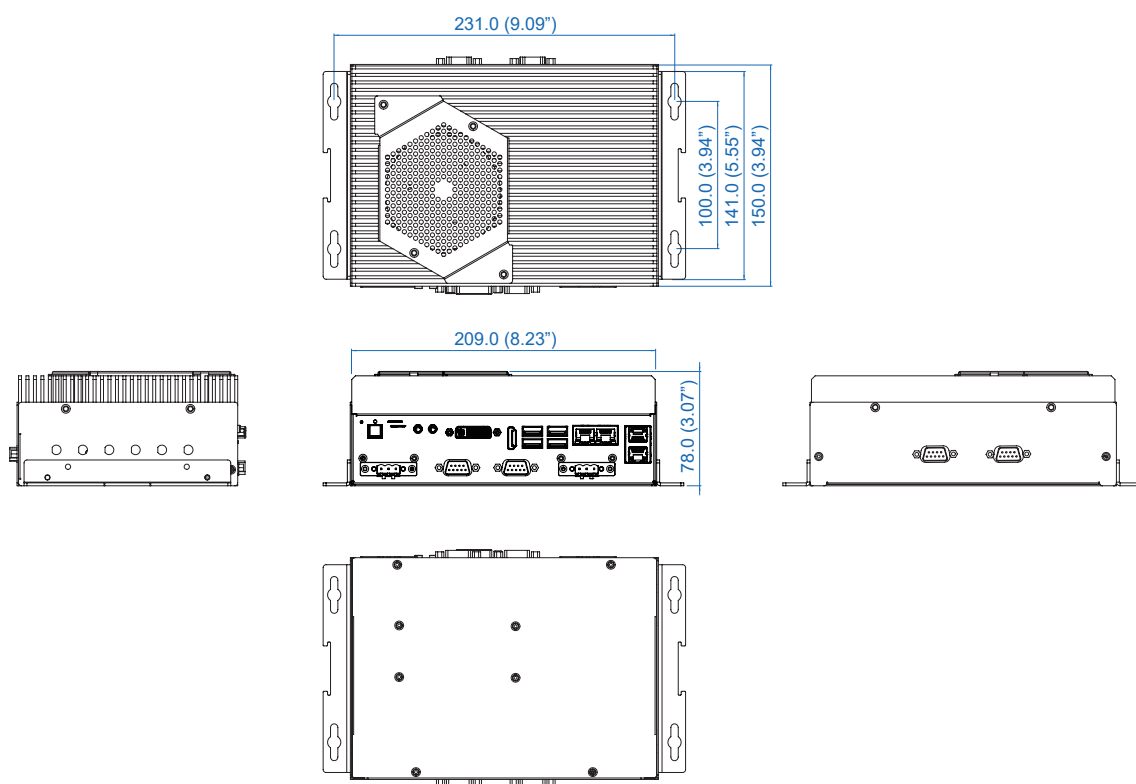
1.5.1 Dimensions of VCM-2000/VCM-2000A

Unit : mm (inch)



1.5.2 Dimensions of VCM-2000F/VCM-2000AF

Unit : mm (inch)



2

GETTING TO KNOW YOUR VCM-2000

2.1 Packing List

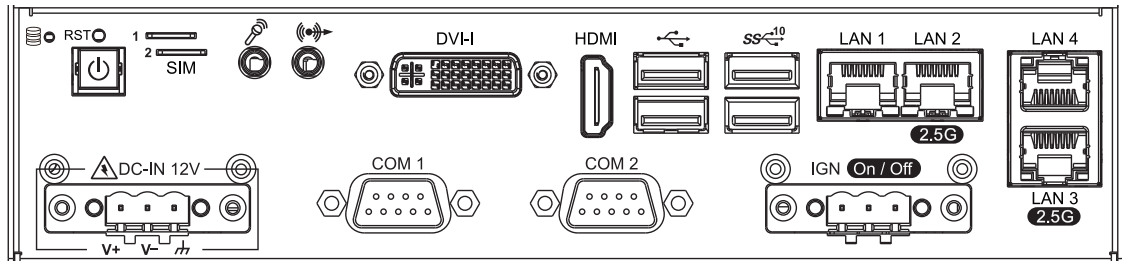
VCM-2000/VCM-2000F/VCM-2000A/VCM-2000AF

Item	Description	Qty
1	VCM-2000 Compact Embedded System (According to the configuration of you order, the VCM-2000 series may contain SSD/HDD and DDR5 SO-DIMM. Please verify these items if necessary.)	1
2	VCM-2000/VCM-2000F accessory box, which contains:	1

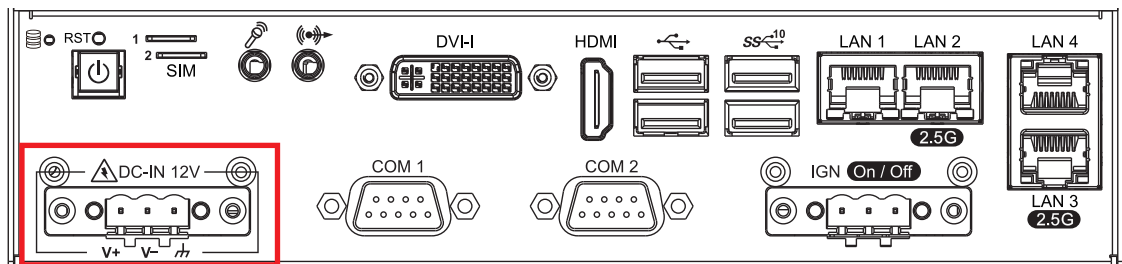
Item	Description	Outlook	Usage	P/N	Qty
1	Terminal block 3-pin (5.0mm)		DC-IN/IGN	51-2411R03-S1B	2
2	PHILLIPS M2.5x6L,Ni		Mini PCIe slot	53-2426906-30B	2
3	PHILLIPS M3x6L,Ni+Ny		WALL MOUNT	53-2426206-80B	4
4	M4x16L		WALL MOUNT	53-24D6416-30B	4
5	M3*5L		SSD	53-M004950-310	8
6	PHILLIPS M3x4L,Ni+Ny		M.2	53-2426204-80B	4
7	PAD			53-4000042-303	4
8	M.2 Extender Bracket(42/52 to 80)		M.2	62-03P0997-30A	1
9	Wall mount		Wall mount	62-6645WAL-014	2

2.2 Front Panel I/O Functions

In Vecow's VCM-2000 series family, all I/O connectors are located on the front panel. Most of the general connections to the computer device, such as DVI-I, HDMI, are placed on the front panel.

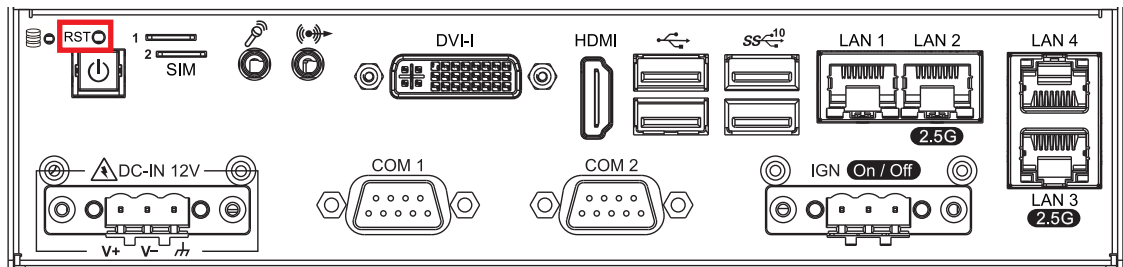


2.2.1 Power Input



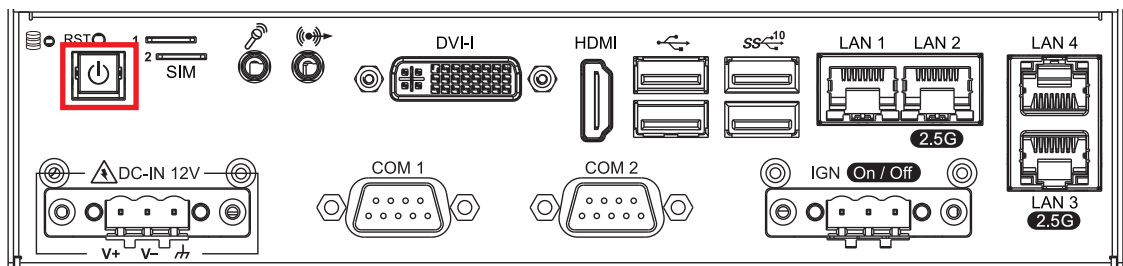
This system only supports 12V DC power input by terminal block in the Front side.

2.2.2 Reset Tact Switch



It is a hardware reset switch. Use this switch to reset the system without power off the system. Press the Reset Switch for a few seconds, then reset will be enabled.

2.2.3 Power Button



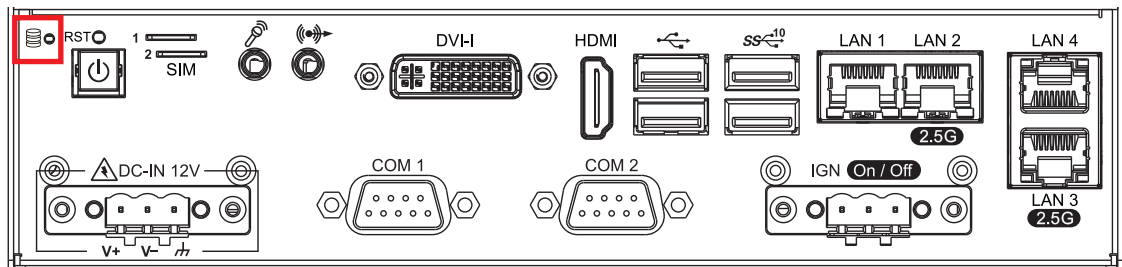
The Power Button is a non-latched switch with dual color LED indications. It indicates power status: S0, S3 and S5. More detail LED indications are listed as follows:

LED Color	Power Status	System Status
Solid Blue	S0	System working
Solid Orange	S3, S5	Suspend to RAM, System off with standby power

To power on VCM-2000, please press the power button and then the blue LED is lightened. To power off the system, you can either command shutdown by OS operation, or just simply press the power button.

If system error, you can just press the power button for 4-seconds to shut down the machine directly. Please do note that a 4-second interval between each 2 power-on/power-off operation is necessary in normal working status. (For example, once turning off the system, you have to wait for 4 seconds to initiate another power-on operation.)

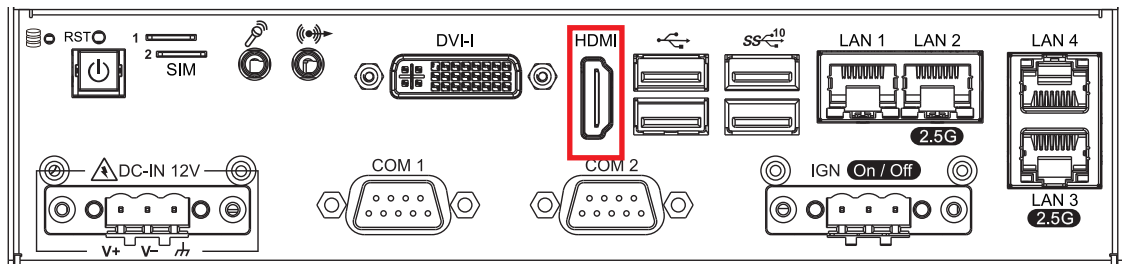
2.2.4 HDD LED Indicator



HDD LED/ Yellow : A hard disk/M.2 M key LED. If the LED is on, it indicates that VCM-2000 storage is functional. If it is off, it indicates that the system's storage is not functional. If it is flashing, it indicates data access activities.

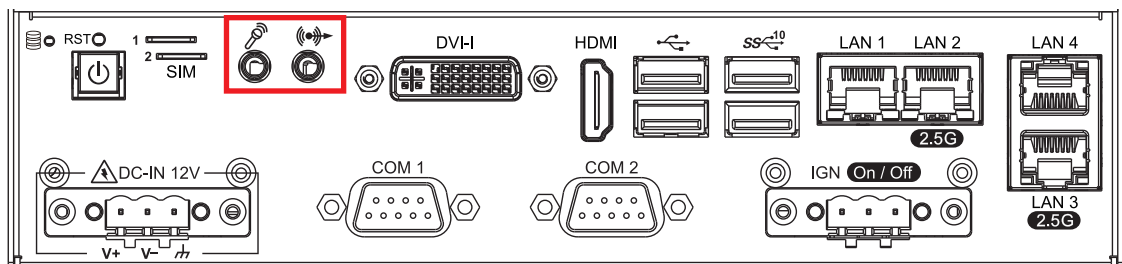
LED Color	Power Status	System Status
Yellow	HDD	- On/Off : Storage status, function or not - Twinkling : Data transferring

2.2.5 HDMI



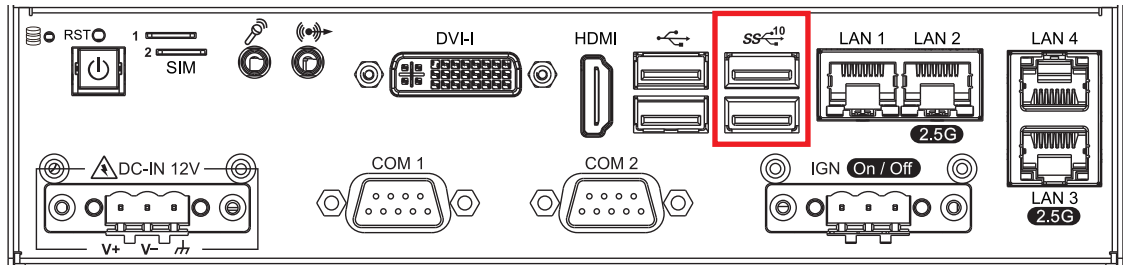
Onboard HDMI Port supports DDC channel mode. The connection supports up to 3840 x 2160 resolution at 60Hz

2.2.6 Audio Jack



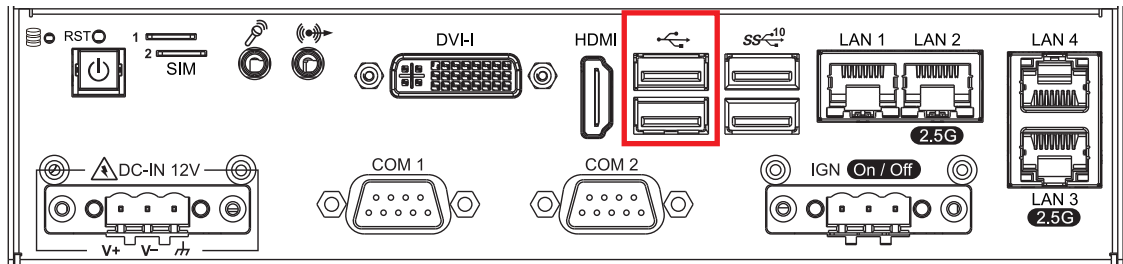
There are 2 audio connectors, Mic-in and Line-out, in the Front side of VCM-2000. Onboard Realtek ALC888 audio codec supports 5.1 channel HD audio and fully complies with Intel® High Definition Audio (Azalia) specifications. To utilize the audio function in Windows platform, you need to install corresponding drivers for Realtek ALC888 codec.

2.2.7 USB3.2 Gen2



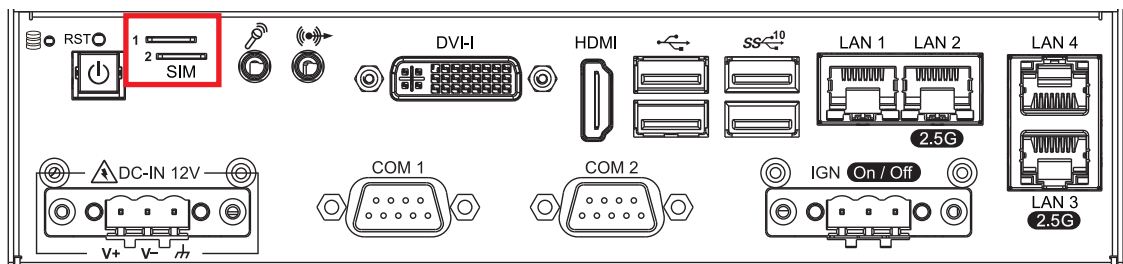
There are 2 USB 3.2 Gen2 ports connection available supporting up to 10GB per second data rate in the front side of VCM-2000. It also compliant with the requirements of Super Speed (SS), high speed (HS), full speed (FS) and low speed (LS).

2.2.8 USB2.0



There are 2 USB 2.0 connections available supporting up to 480MB per second data rate.

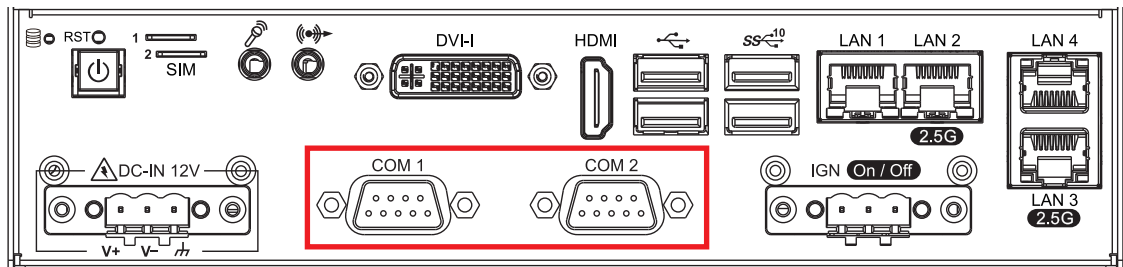
2.2.9 SIM Card



SIM Slot Mapping Table :

SIM	LED
MINIPCIE2	1
M.2 B KEY	2

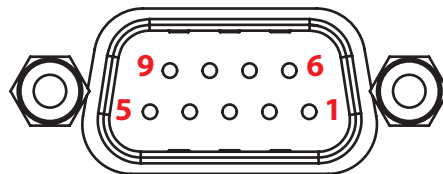
2.2.10 Serial Port



Serial port 1 to 2 (COM 1 to 2) can be configured for RS-232, RS-422, or RS-485 with auto flow control communication. The default definition is RS-232. If you want to change to RS-422 or RS-485, you can find the setting in BIOS.

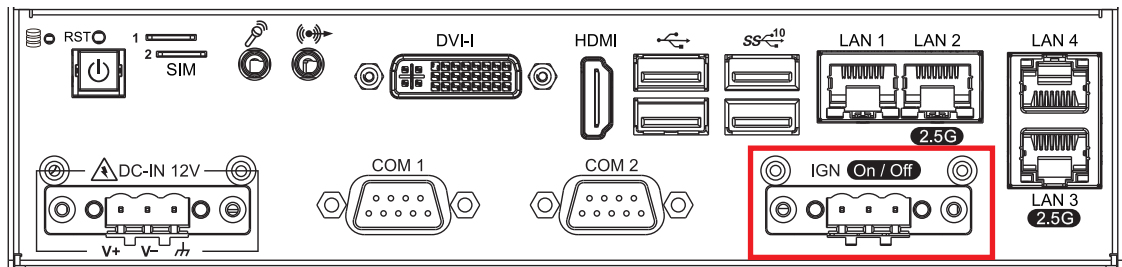
BIOS Setting	Function
COM 1 COM 2	RS-232
	RS-422 (5-wire)
	RS-485
	RS-485 w/z auto-flow control

The pin assignments are listed in the following table:



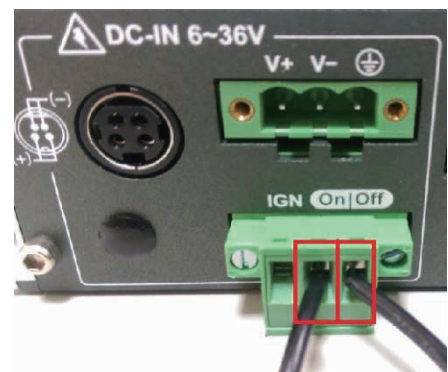
Serial Port	Pin No.	RS-232	RS-422(5-wire)	RS-485(3-wire)
1 to 2	1	DCD	TXD-	DATA-
	2	RXD	TXD+	DATA+
	3	TXD	RXD+	-----
	4	DTR	RXD-	-----
	5	GND	GND	GND
	6	DSR	-----	-----
	7	RTS	-----	-----
	8	CTS	-----	-----
	9	RI	-----	-----

2.2.11 Remote Power On/Off Switch & Ignition

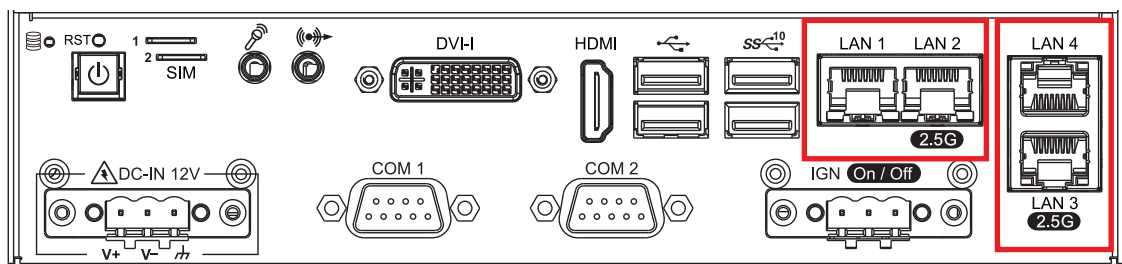


It is a 2-pin power-on or power-off switch through Phoenix Contact terminal block. You could turn on or off the system power by using this contact. This terminal block supports dual function of soft power-on/ power-off (instant off or delay 4 second), and suspending mode.

Pin No.	Definition
1	Ignition
2	SW+
3	SW-



2.2.12 Ethernet Port



There are three 8-pin RJ-45 jacks supporting 10/100/1000/2500 Mbps Ethernet connections on the front side of VCM-2000.

LAN 1 is powered by Intel® I219LM Ethernet engine

LAN Chip	Function	Connector
Intel I219	RJ45(10/100/1000Mbps)	LAN1

LAN2,LAN3 and LAN4 are powered by Intel I226 Ethernet engine.

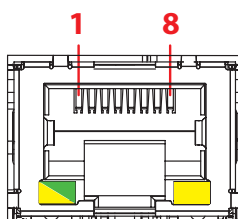
LAN Chip	Function	Connector
Intel I226	RJ45(10/100/1000/2500Mbps)	LAN2
Intel I226	RJ45(10/100/1000/2500Mbps)	LAN3
Intel I226	RJ45(10/100/1000/2500Mbps)	LAN4

Using suitable RJ-45 cable, you can connect the system to a computer or to any other devices with Ethernet connection; for example, a hub or a switch. Moreover, both LAN1, LAN2, LAN3 and LAN4 support Wake on LAN and Pre-boot functions. The pin-outs of LAN1, LAN2, LAN3 and LAN4 are listed as follows:

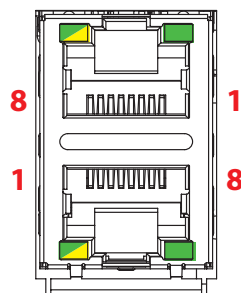
Pin No.	10/100 Mbps	1000/2500 Mbps
1	E_TX+	MDI0_P
2	E_TX-	MDI0_N
3	E_RX+	MDI1_P
4	----	MDI2_P
5	----	MDI2_N
6	E_RX-	MDI1_N
7	-----	MDI3_P
8	-----	MDI3_N

Each LAN port is supported by standard RJ-45 connector with LED indicators to present Active/Link/Speed status of the connection.

The LED indicator on the left bottom corner lightens in solid yellow when the cable is properly connected to a 1000 Mbps Ethernet network; The LED indicator on the left bottom corner lightens in solid green when the cable is properly connected to a 2500Mbps Ethernet network; The right LED will keep twinkling/off when Ethernet data packets are being transmitted/received.

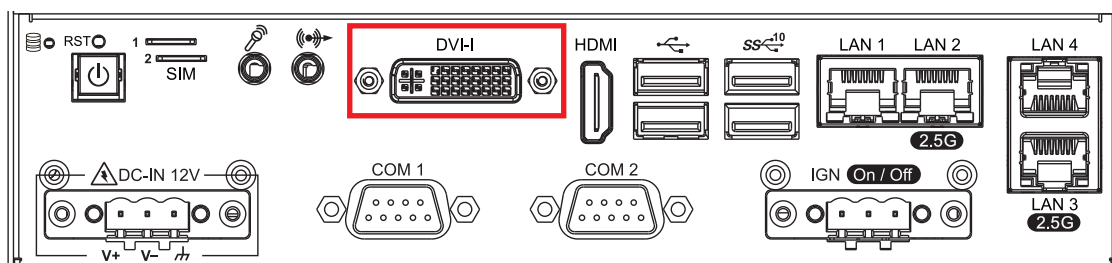


LAN	LED Location	LED Color	10 Mbps	100 Mbps	1000 Mbps	2500 Mbps
LAN1	Left	Green/ Yellow	Off	Solid Green	Solid Yellow	X
	Right	Yellow	Twinkling Yellow	Twinkling Yellow	Twinkling Yellow	X
LAN2	Left	Green/ Yellow	Off	Off	Solid Yellow	Solid Green
	Right	Yellow	Twinkling Yellow	Twinkling Yellow	Twinkling Yellow	Twinkling Yellow



LAN	LED Location	LED Color	10 Mbps	100 Mbps	1000 Mbps	2500 Mbps
LAN3	Left	Green/ Yellow	Off	Off	Solid Yellow	Solid Green
	Right	Green	Twinkling Green	Twinkling Green	Twinkling Green	Twinkling Green
LAN4	Left	Green/ Yellow	Off	Off	Solid Yellow	Solid Green
	Right	Green	Twinkling Yellow	Twinkling Green	Twinkling Green	Twinkling Green

2.2.13 DVI-I Connector

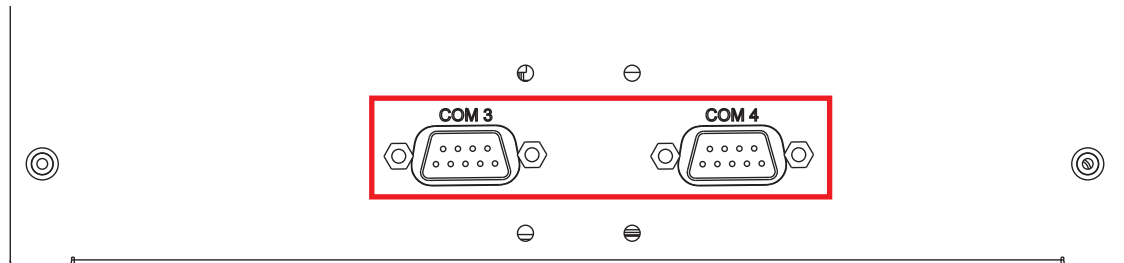


- The DVI-I connector on the front panel supports both DVI and VGA display modes.
- This connector can output DVI signals. The DVI output mode supports up to 1920x1200 resolution.
- The DVI mode is automatically selected according to the display device connected.
- You will need a DVI-I cable when connecting to a display device.
- The VGA output mode supports up to 1920x1200 resolution.
- If use VGA function will need a DVII to VGA module connecting to DVI-I device.
- Below is the DVII to VGA module picture



2.3 Rear Panel I/O & Functions

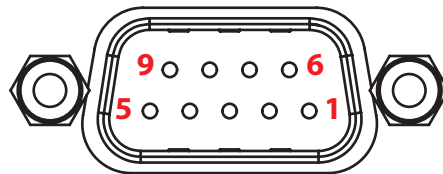
2.3.1 Serial Port



Serial port 3 to 4 (COM 3 to 4) can be configured for RS-232, RS-422, or RS-485 with auto flow control communication. The default definition is RS-232. If you want to change to RS-422 or RS-485, you can find the setting in BIOS.

BIOS Setting	Function
COM 3 to 4	RS-232
	RS-422 (5-wire)
	RS-485
	RS-485 w/z auto-flow control

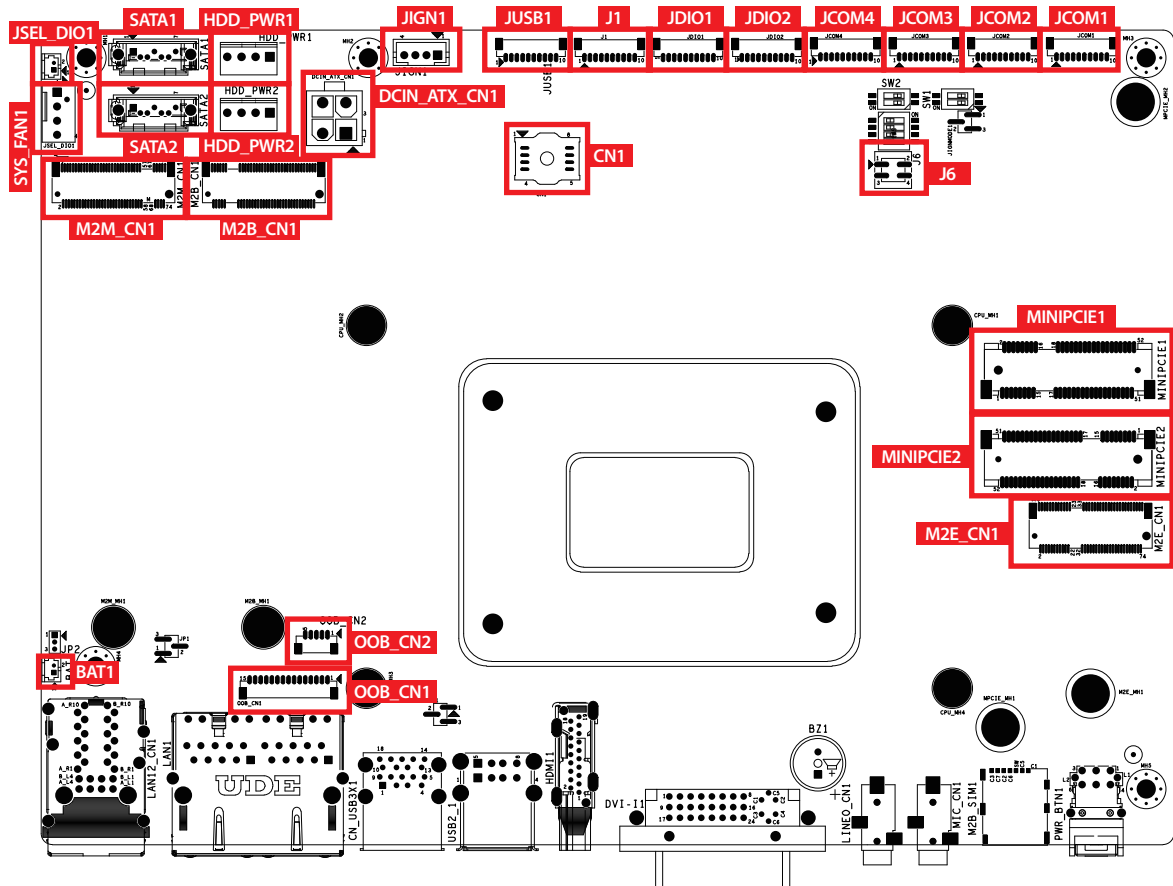
The pin assignments are listed in the following table :



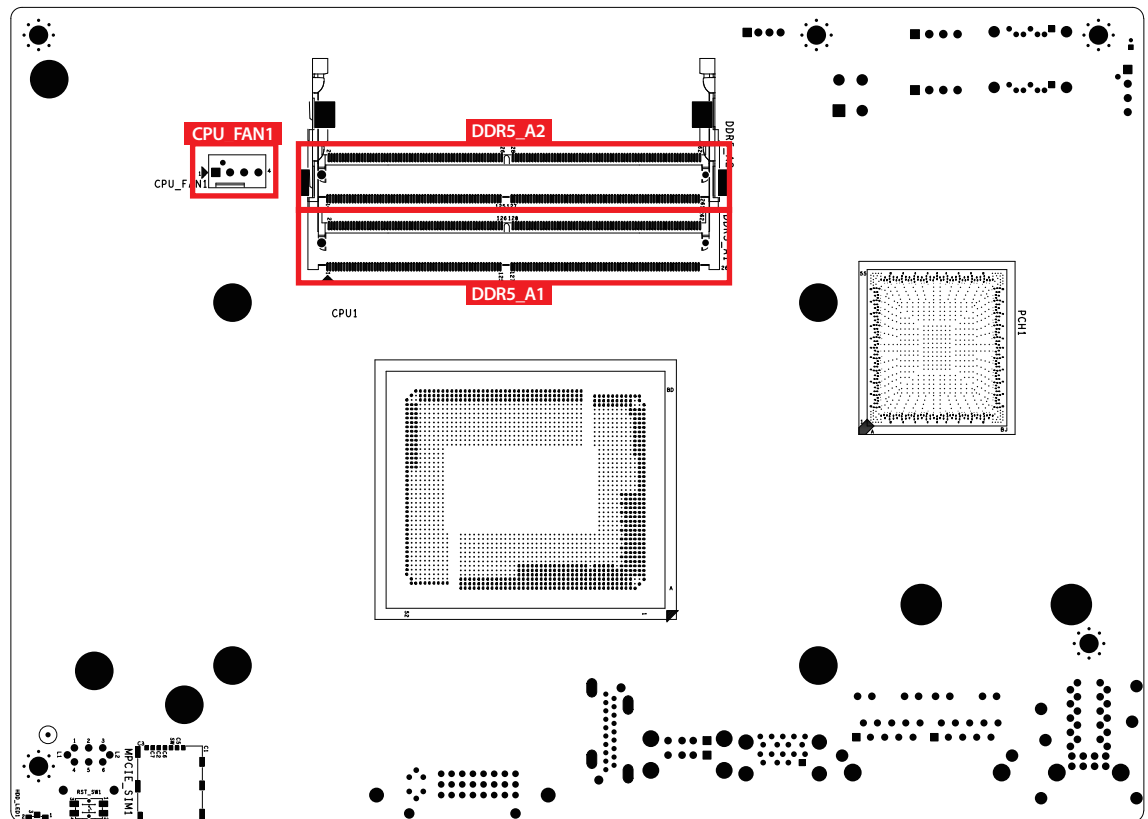
Serial Port	Pin No.	RS-232	RS-422 (5-wire)	RS-485 (3-wire)
3 to 4	1	DCD	TXD-	DATA-
	2	RXD	TXD+	DATA+
	3	TXD	RXD+	-----
	4	DTR	RXD-	-----
	5	GND	GND	GND
	6	DSR	-----	-----
	7	RTS	-----	-----
	8	CTS	-----	-----
	9	RI	-----	-----

2.4 Main Board Expansion Connectors

2.4.1 Top View (Component Side) of VCM-2000 Main Board With Connector Location



2.4.2 Bottom View (Solder Side) of VCM-2000 Main Board With Connector Location

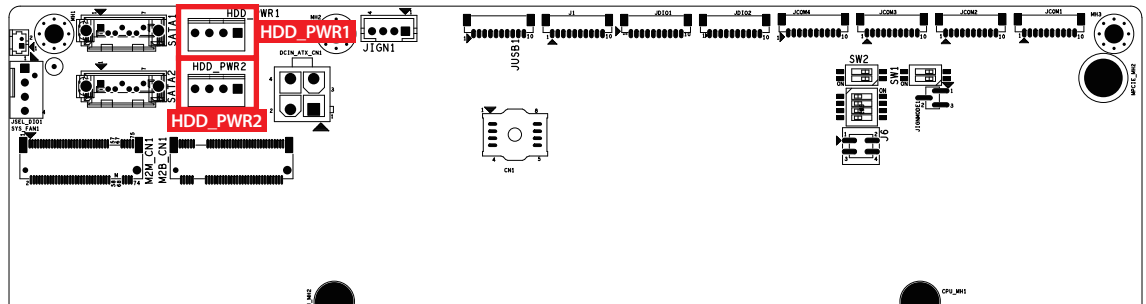


The diagram shows a 4-pin connector with a top handle and a bottom mounting tab. The pins are numbered 1 through 4. Pin 1 is the bottom-right pin (square symbol), Pin 2 is the bottom-left pin (circle symbol), Pin 3 is the top-right pin (circle symbol), and Pin 4 is the top-left pin (circle symbol). A triangle points to the bottom of the connector.

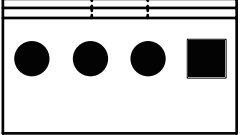
Pin Number	Definition
1	V-
2	V-
3	V+
4	V+

	Pin No.	Definition	Pin No.	Definition
	1	GND	2	TXP
	3	TXN	4	GND
	5	RXN	6	RXP
	7	GND		-

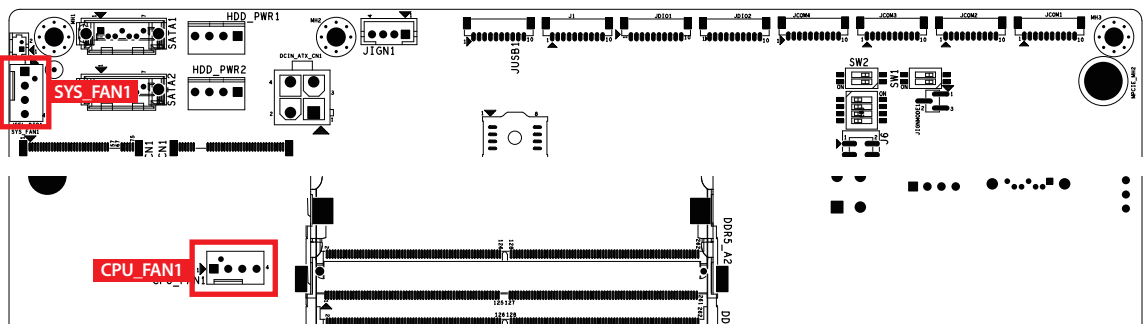
2.4.5 HDD_PWR1,HDD_PWR2 : SATA Power Connector



The VCM-2000 also equip with a SATA power connector. The one port supports 5V (Up to 2A) and 12V (Up to 1A) current to the hard drive or SSD. The pin assignments of HDD_PWR1, HDD_PWR2 are listed in the following table:

	Pin Number	Definition
	1	+12V (1A max)
	2	GND
	3	GND
	4	+5V (2A max)

2.4.6 CPU_FAN1, SYS_FAN1 : FAN Header



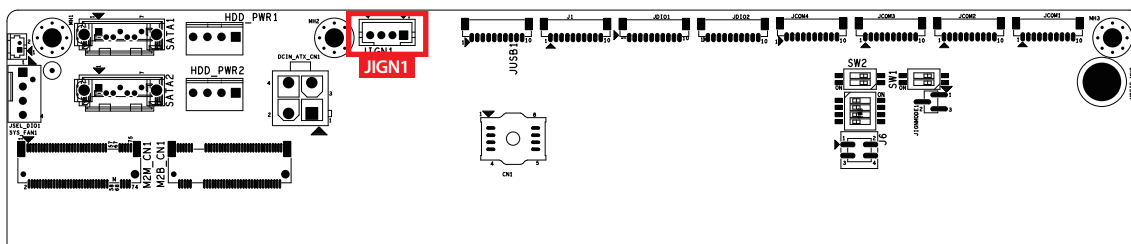
Fan power connector supports for additional thermal requirements. The pin assignments of CPU_FAN1, SYS_FAN1 are listed in the following table.

	Pin Number	Definition
	1	GND
	2	+12V (1.5A max)
	3	Fan speed sensor
	4	Fan PWM

The diagram shows a rectangular circuit board layout. It features a top horizontal row of components labeled 1 through 100. The components are arranged in a grid-like pattern. On the left side, there are two vertical columns of components labeled 1 and 2. On the right side, there are two vertical columns of components labeled 75 and 74. The components are represented by small rectangles and circles. The layout is symmetrical and organized into a structured grid.

Pin No.	Signal Name	Pin No.	Signal Name
75	Ground		
73	Ground	74	3.3V
71	Ground	72	3.3V
69	PEDET	70	3.3V
67	Ground	68	NC
Mechanical Key			
57	Ground	58	NC
55	REFCLKp	56	NC
53	REFCLKn	54	PEWAKE#
51	Ground	52	CLKREQ#
49	PETp0/SATA_A+	50	PERST#
47	PETn0/SATA_A-	48	NC
45	Ground	46	NC
43	PERp0/SATA_B-	44	NC
41	PERn0/SATA_B+	42	NC
39	Ground	40	NC
37	PETp1	38	DEVSLP
35	PETn1	36	NC
33	Ground	34	NC
31	PERp1	32	NC
29	PERn1	30	NC
27	Ground	28	NC
25	PETp2	26	NC
23	PETn2	24	NC
21	Ground	22	NC
19	PERp2	20	NC
17	PERn2	18	3.3V

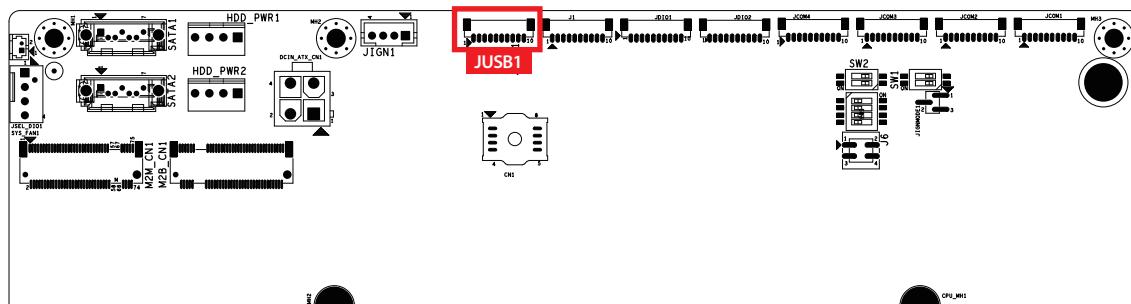
2.4.10 JIGN1 : IGNITION Control and Remote Power on switch



Pin assignment as the following table :

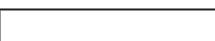
	Pin No.	Definition	Pin No.	Definition
	1	FP_PWR_BTN_P	2	GND
	3	IGNITION	4	GND

2.4.11 JUSB1 : Internal USB 2.0 Connector

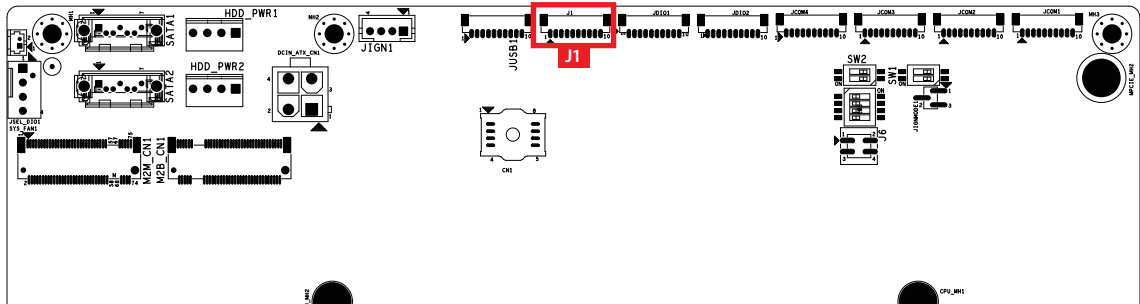


The VCM-2000 main board provides two expansion USB ports. The USB interface supports 480 Mbps transfer rate which comply with high speed USB specification Rev. 2.0.

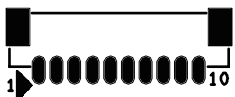
The USB interface is accessed through one 10-pin JST 1.0mm connector. You will need an adapter cable if you use a standard USB connector. The adapter cable has a 10-pin connector on one end and a USB connector on the other. The pin assignments of JUSB1 listed in the following table:

	Pin No.	Definition	Pin No.	Definition
	1	USB_VCC	2	USB_VCC
	3	USB_VCC	4	USB_D_4N
	5	USB_D_4P	6	USB_D_5N
	7	USB_D_5P	8	GND
	9	GND	10	GND

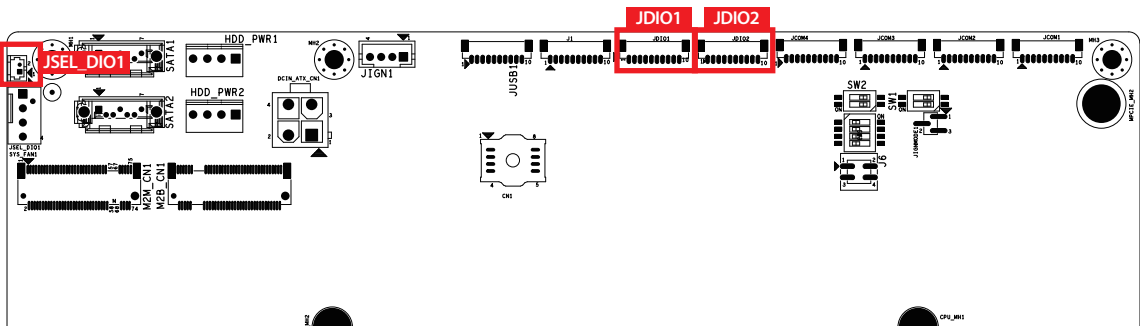
2.4.12 J1: ESPI Port 80 Header



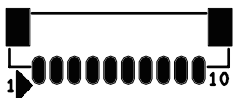
The system's provide a ESPI Port 80 Header for Debug Card.

	Pin No.	Definition	Pin No.	Definition
	1	+V3.3S	2	Port 80_ESPI_CS#
	3	Port 80_ESPI_IO0	4	Port 80_ESPI_IO1
	5	Port 80_ESPI_IO2	6	Port 80_ESPI_IO3
	7	GND	8	Port 80_ESPI_CLK
	9	RST 80_ESPI_RST#	10	GND

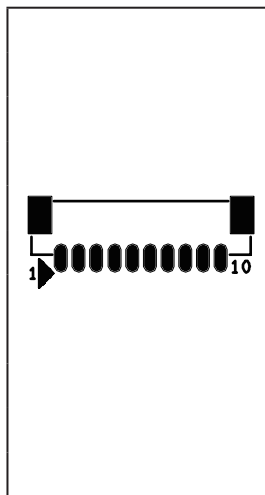
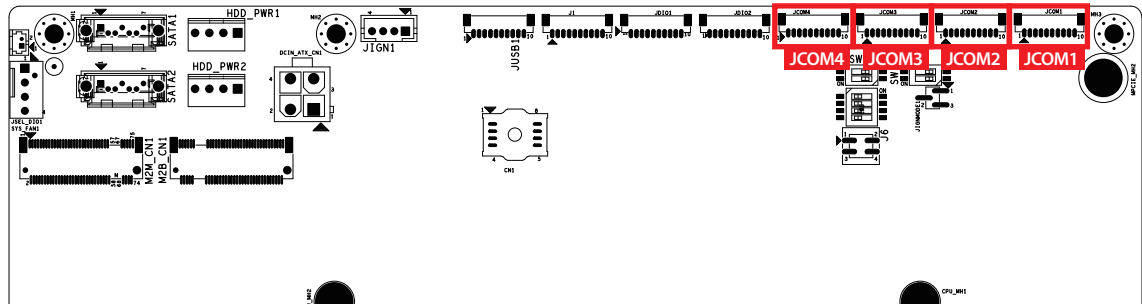
2.4.13 JDIO1, JDIO2 : GPIO from Super I/O



There is a 16-bit GPIO connector in the Top side. Each GPIO channel can be configuration GPI or GPO. JSEL_DIO1 header is for SINK/SOURCE mode selection on ISO_DIO board (DMX-100-E). JDIO1 and JDIO2 pins are defined in the following table:

	Pin No.	JDIO1 Definition	JDIO2 Definition
	1	SIO_GPI80	SIO_GPO70
	2	SIO_GPI81	SIO_GPO71
	3	SIO_GPI82	SIO_GPO72
	4	SIO_GPI83	SIO_GPO73
	5	SIO_GPI84	SIO_GPO74
	6	SIO_GPI85	SIO_GPO75
	7	SIO_GPI86	SIO_GPO76
	8	SIO_GPI87	SIO_GPO77
	9	+3.3V	+3.3V
	10	GND	GND

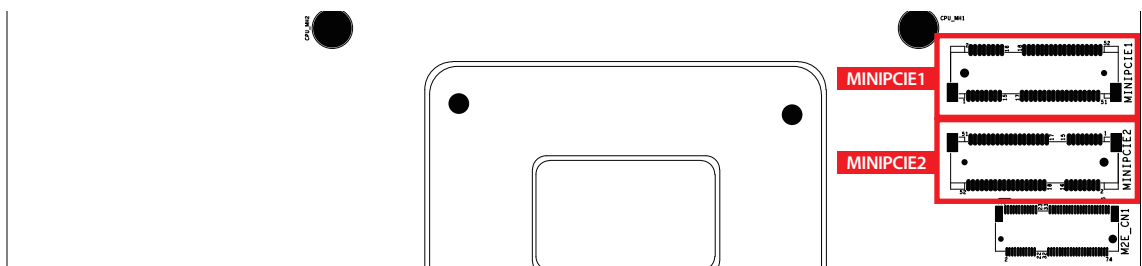
2.4.14 JCOM1 to JCOM4 : Serial Port cable Connector



Pin No.	JDIO1 Definition
1	NC
2	GND
3	RI
4	DTR
5	CTS
6	TXD
7	RTS
8	RXD
9	DSR
10	DCD

Location	Description
JCOM1	COM1
JCOM2	COM2
JCOM3	COM3
JCOM4	COM4

2.4.15 MINI PCIE Connector(MINIPCE1/MINIPCE2)



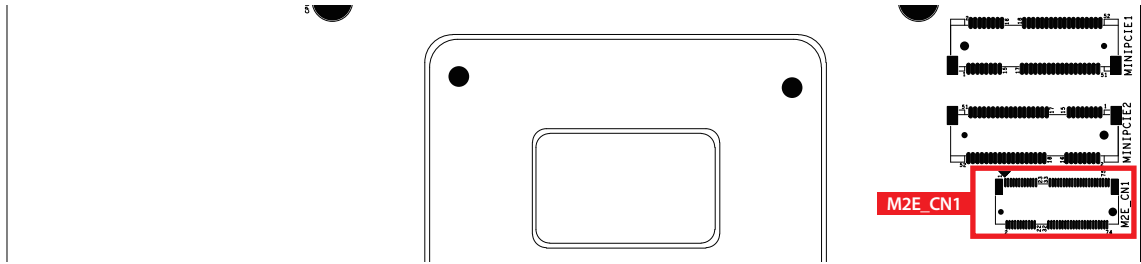
Standard full length Mini PCIe slot:

Pin Out :

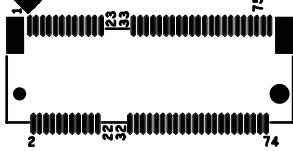
Pin No.	Description	Pin No.	Description
51	Reserved	52	+3.3Vaux
49	Reserved	50	GND

Pin No.	Description	Pin No.	Description
47	Reserved	48	+1.5V
45	Reserved	46	Reserved
43	GND	44	Reserved
41	+3.3Vaux	42	Reserved
39	+3.3Vaux	40	GND
37	GND	38	USB_D+
35	GND	36	USB_D-
33	PETp0	34	GND
31	PETn0	32	SMB_DATA
29	GND	30	SMB_CLK
27	GND	28	+1.5V
25	PERn0	26	GND
23	PERp0	24	+3.3Vaux
21	GND	22	PERST#
19	Reserved	20	reserved
17	Reserved	18	GND
Mechanical Key			
15	GND	16	UIM_VPP
13	REFCLK+	14	UIM_RESET
11	REFCLK-	12	UIM_CLK
9	GND	10	UIM_DATA
7	CLKREQ#	8	UIM_PWR
5	Reserved	6	1.5V
3	Reserved	4	GND
1	WAKE#	2	3.3Vaux

2.4.16 M2E_CN1 : M.2 key E Slot for USB2.0, PCIe Gen3x2 support

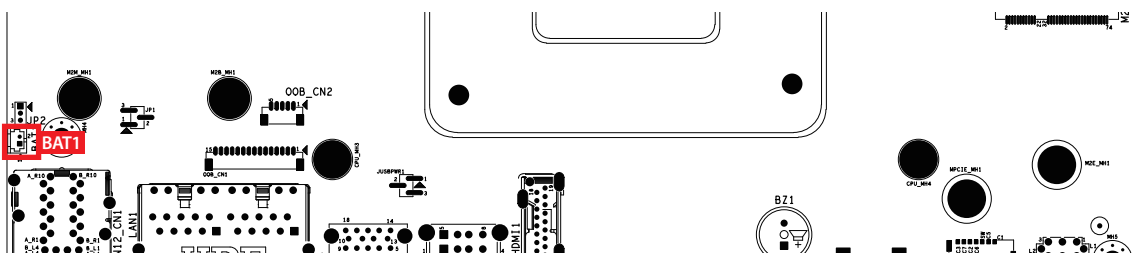


M.2 key E connector is suitable for applications that use wireless connectivity including Wi-Fi, Bluetooth, NFC or GNSS. Module card types include 2230. The pin assignments of M2E_CN1 are listed in the following table:

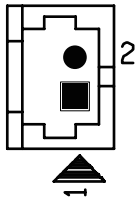
			
Pin No.	Signal Name	Pin No.	Signal Name
75	Ground		
73	NC	74	3.3V
71	NC	72	3.3V
69	Ground	70	PEWAKE1#
67	NC	68	NC
65	NC	66	NC
63	Ground	64	NC
61	NC	62	ALERT
59	NC	60	I2C_CLK
57	Ground	58	I2C_DATA
55	PEWAKE0#	56	NC
53	CLKREQ0#	54	NC
51	Ground	52	PERST0#
49	REFCLKn0	50	NC
47	REFCLKp0	48	NC
45	Ground	46	NC
43	PERn0	44	NC
41	PERp0	42	NC
39	Ground	40	NC
37	PETn0	38	DEVSLP
35	PETp0	36	NC
33	Ground	34	NC
		32	NC
Mechanical Key			
23	NC		
21	NC	22	NC

19	Ground	20	NC
17	NC	18	Ground
15	NC	16	NC
13	Ground	14	NC
11	NC	12	NC
9	NC	10	NC
7	Ground	8	NC
5	USB-	6	LED1#
3	USB+	4	3.3V
1	Ground	2	3.3V

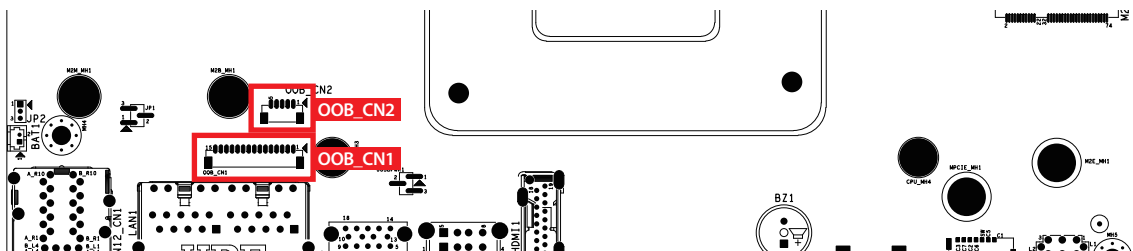
2.4.17 BAT1: RTC Battery



The VCM-2000's real-time clock is powered by a lithium battery. It is equipped with Panasonic BR2032 190mAh lithium battery. It is recommended that you not replace the lithium battery on your own, but if the battery needs to be changed, please contact the Vecow RMA service team.

	Pin Number	Definition
	1	+3V_BAT
	2	GND

2.4.18 OOB_CN1,OOB_CN2 : For OOB Module

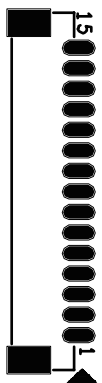


The LED indicator can instantly judge the power status(P) of OOB Enabler and the connection status(A) of OOB Enabler and Allxon Portal.

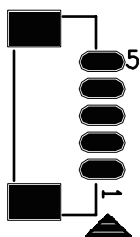
If both LEDs are on, it means OOB Enabler is running and the connection to Allxon Cloud is stable. The OOB network port is used for OOB out-of-band control.

The SIM card holder is used for OOB 4G network cards. This function is optional. For detailed instructions, please refer to the OOB chapter.

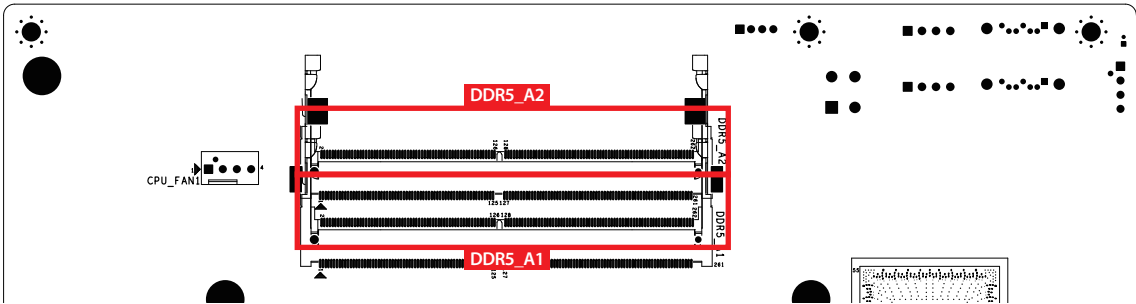
OOB_CN1:

	Pin No.	Definition	Pin No.	Definition
	1	5V	9	GND
	2	5V	10	NC
	3	GND	11	NC
	4	NC	12	GND
	5	NC	13	PSW_NU
	6	GND	14	OOB_RSTBTN#
	7	UART_RX	15	PWR_ONOFF_DET
	8	UART_TX		

OOB_CN2:

	Pin Number	Definition
	1	NC
	2	NC
	3	GND
	4	BIOS_UART0_TXD_R
	5	BIOS_UART0_RXD_R

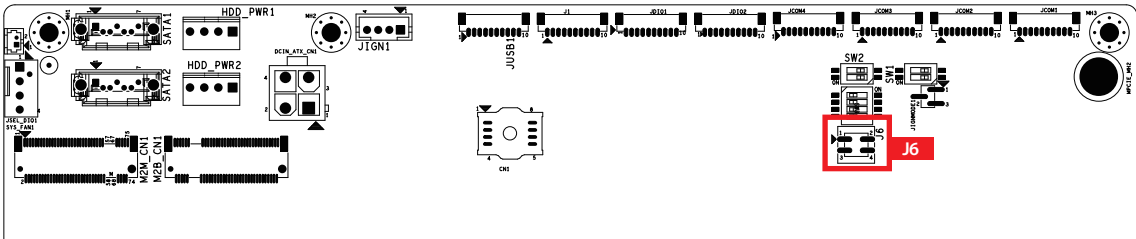
2.4.19 DDR5_A1, DDR5_A2: DDR5 Slot

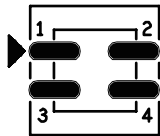


There are 2 DDR5 channel onboard, support DDR5 5600, max 96GB, each channel 48GB

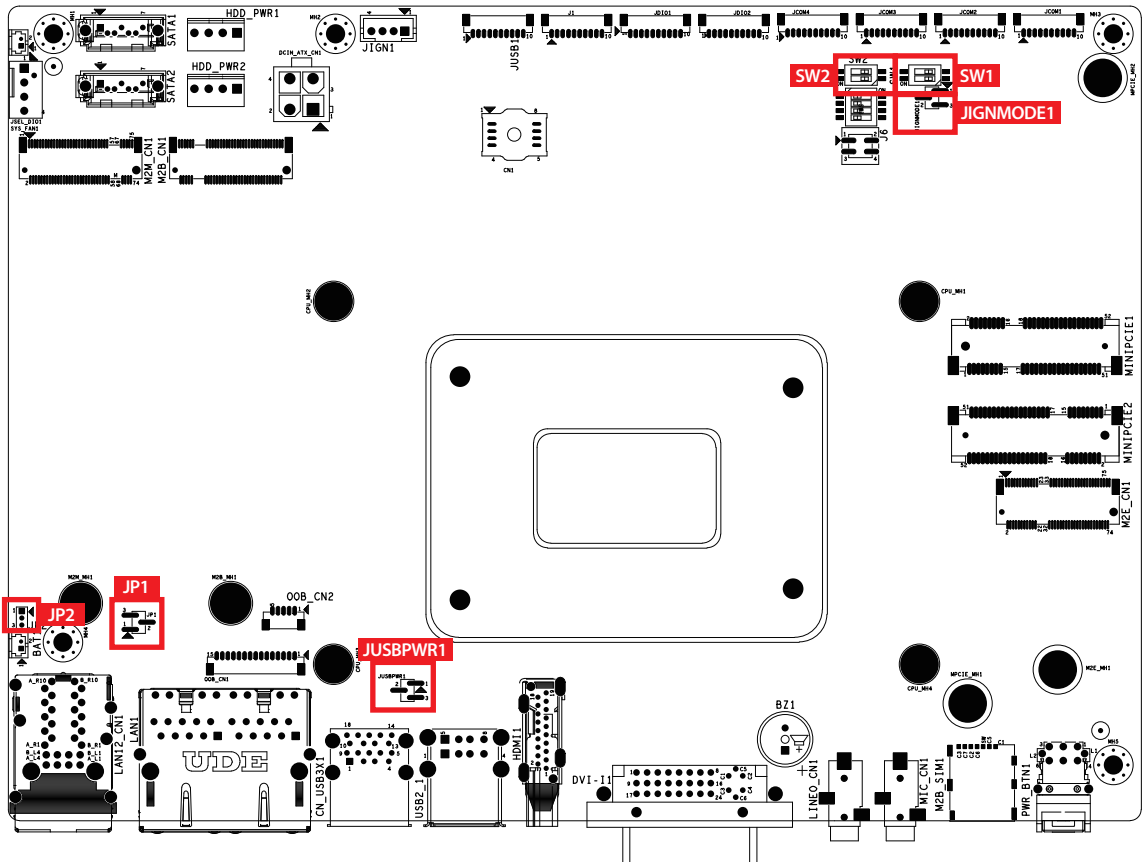
Slot	Description
DDR5_A2	DDR5 Channel B
DDR5_A1	DDR5 Channel A

2.4.20 J6: IGNITION FW Programming Header



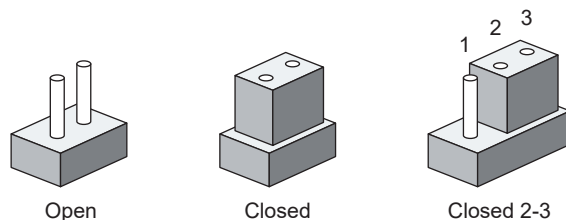
	Pin Number	Definition
	1	GND
	2	MCU_RST#
	3	+V3.3_MCU
	4	MCU_PRG

2.5 Main Board Jumper Settings

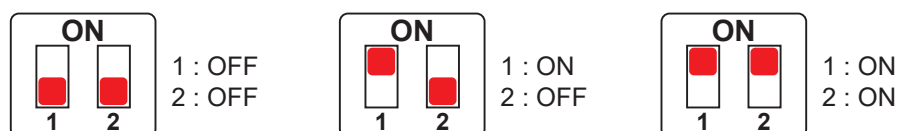


The figure below is the top view of the system main board which is the main board. It shows the location of the jumpers and the switches.

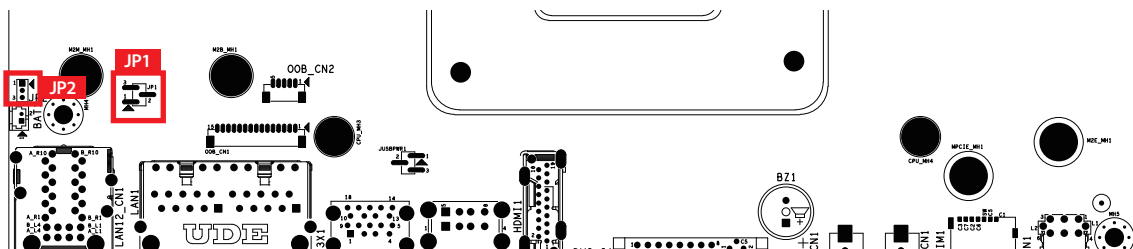
You may configure your card to match the needs of your application by setting jumpers. A jumper is a metal bridge used to close an electric circuit. It consists of two metal pins and a small metal clip (often protected by a plastic cover) that slides over the pins to connect them. To “close” a jumper, you connect the pins with the clip. To “open” a jumper, you remove the clip. Sometimes a jumper will have three pins, labeled 1, 2 and 3. In this case you would connect either pins 1 and 2, or 2 and 3.



You may configure your card to match the needs of your application by DIP switch. As below show the DIP switch on and off.

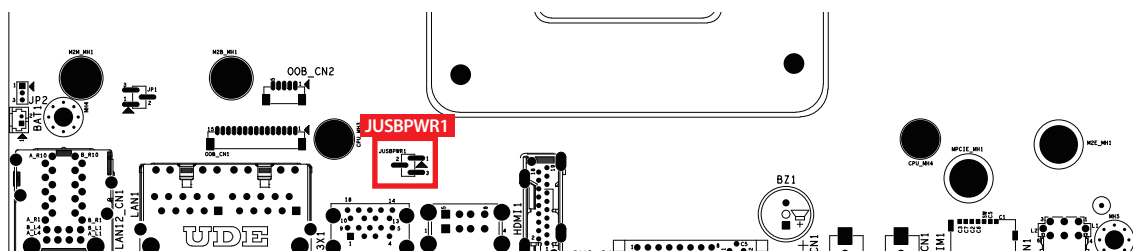


2.5.1 JP1,JP2 : CMOS & ME Flash



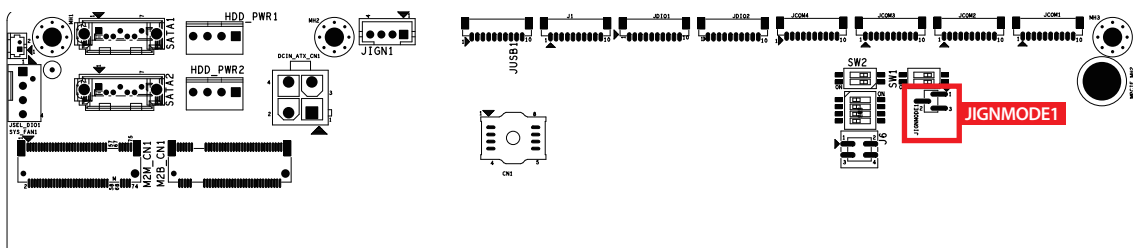
Location	Description	Function	Layout
JP2	1-2	*Normal (Default)	
	2-3	Clear CMOS	
JP1	1-2	Enable security measures defined in the Flash Descriptor. (Default)	
	2-3	Disable Flash Descriptor Security (Flash ME)	

2.5.2 JUSBPWR1 : USB Wake Up



Location	Description	Function	Layout
JUSBPWR1	2 - 3	Non Wake Up support	
	1 - 2	Supported Wake Up(Default)	

2.5.4 JIGNMODE1 : IGNITION mode

41

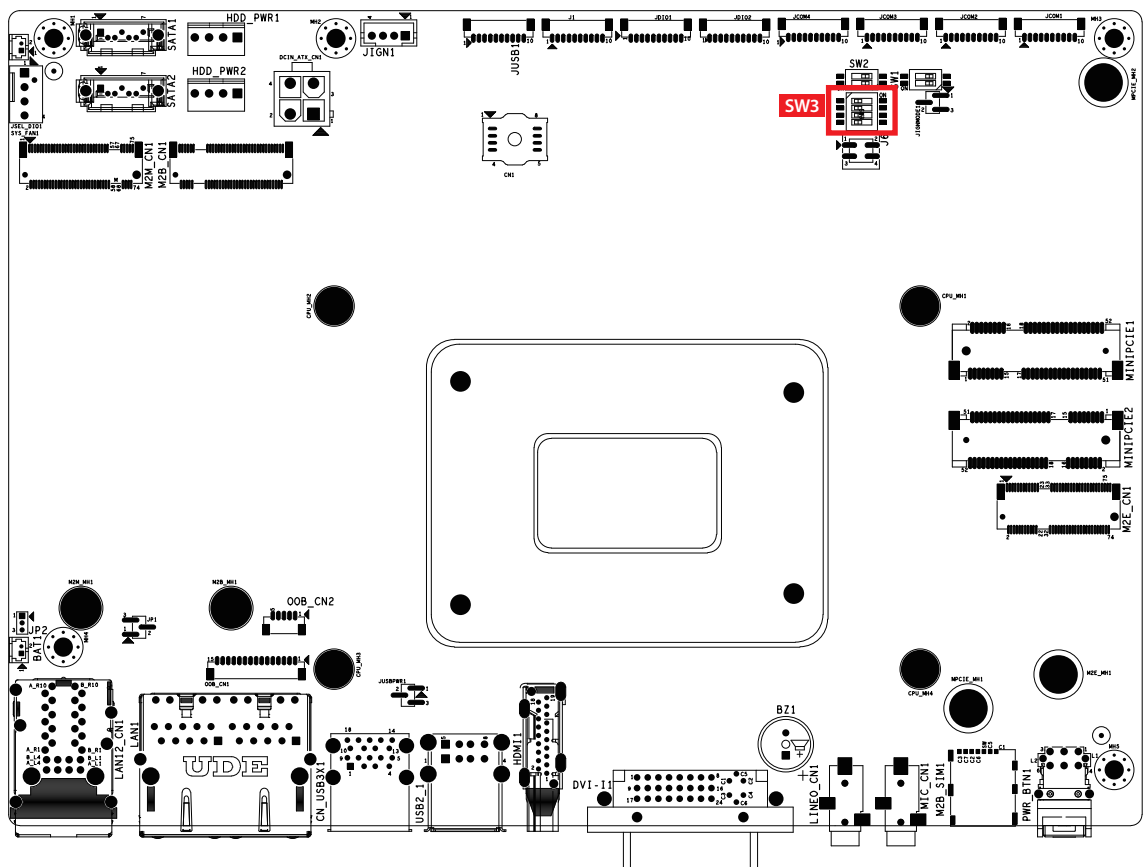
2.6 Ignition Control

VCM-2000 series provides ignition power control feature for in-vehicle applications. The built-in MCU monitors the ignition signal and turns on/off the system according to pre-defined on/off delay period.

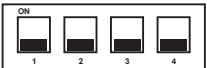
2.6.1 Adjust Ignition Control Modes

VCM-2000 series provides 16 modes of different power on/off delay periods adjustable via SW3 switch. The default rotary switch is set to 0 in ATX/AT power mode.

SW3: Ignition Control



The modes are listed in below table :

DIP Switch Position	Power on delay	Power off delay	Switch Position
0	ATX/AT mode (Default)		
1	No delay	No delay	
2	No delay	5 seconds	
3	No delay	10 seconds	
4	No delay	30 seconds	
5	No delay	60 seconds	
6	5 seconds	10 seconds	
7	5 seconds	30 seconds	
8	5 seconds	60 seconds	
9	5 seconds	90 seconds	
A	5 seconds	120 seconds	
B	10 seconds	10 seconds	
C	10 seconds	30 seconds	
D	10 seconds	60 seconds	
E	10 seconds	90 seconds	
F	10 seconds	120 seconds	

2.6.2 Adjust Ignition Control Modes

To activate ignition control, you need to provide IGN signal via the 3-pin pluggable terminal block locates in the back panel. Please find below the general wiring configuration.

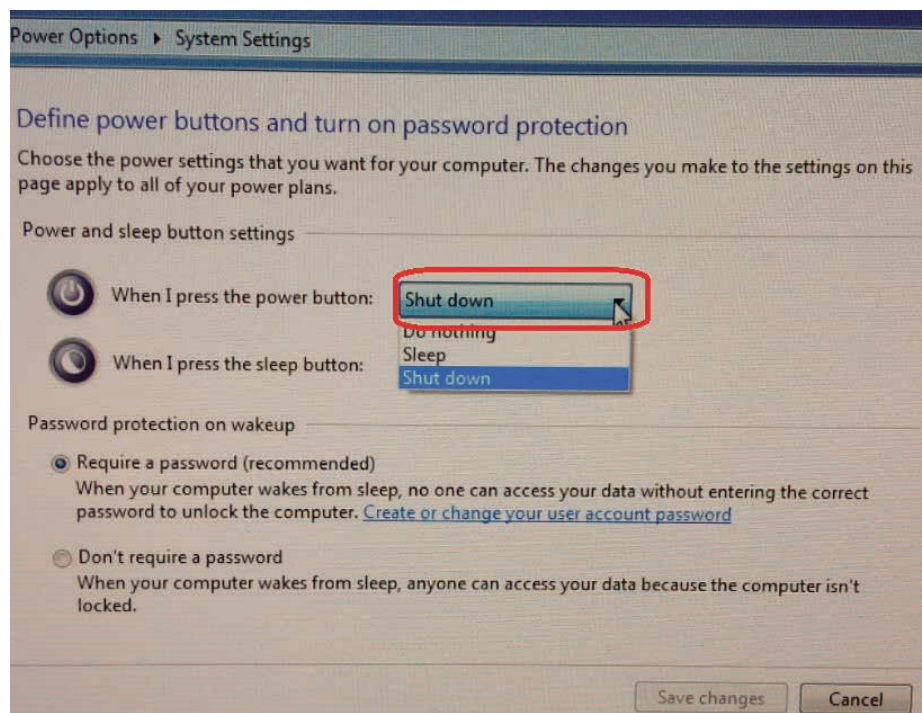
Pin No.	Definition
1	Ignition (IGN)
2	SW+
3	SW-



For testing purpose, you can refer to the picture blow to simulate ignition signal input controlled by a latching switch.

Note :

1. DC power source and IGN share the same ground.
2. VCM-2000 only supports 12V DC power input in ATX/AT mode. In Ignition mode, the input voltage is fixed to 12V for car battery scenario.
3. For proper ignition control, the power button setting should be "Power Down" mode. In Windows for example, you need to set "When I press the power button" to Shut down.

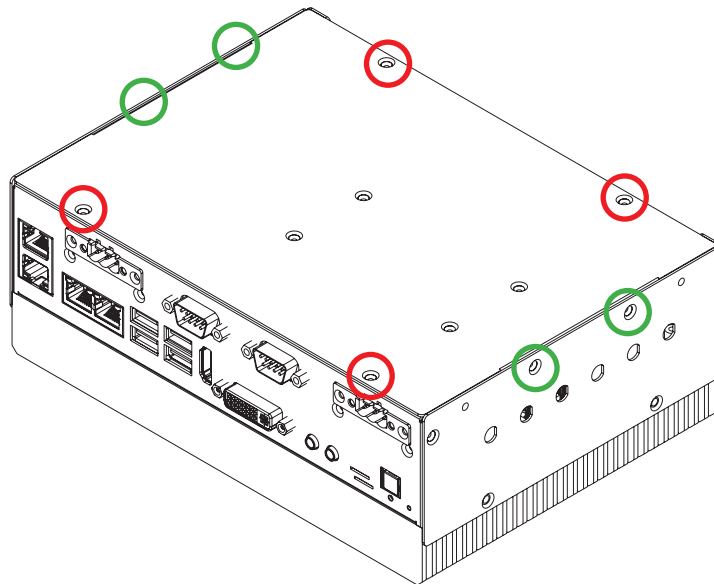


3

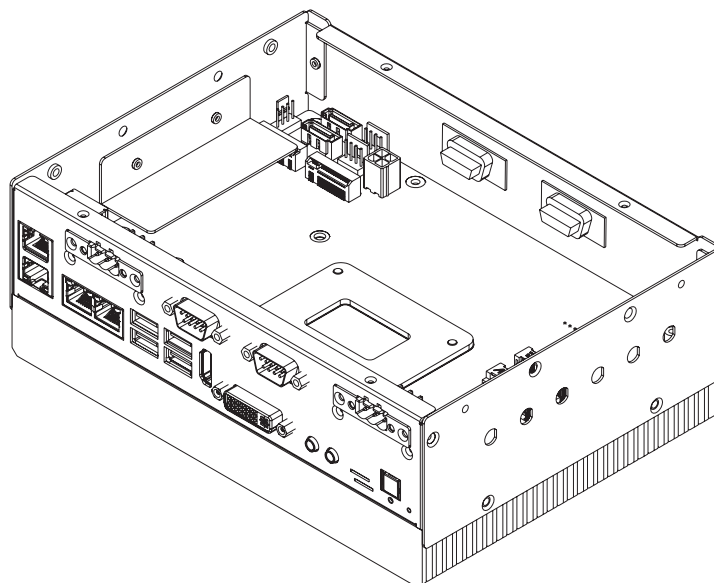
SYSTEM SETUP

3.1 How to Open Your VCM-2000 / VCM-2000F

Step 1 Remove **bottom side four flat head #6-32 screws** and **both side four flat head #6-32 screws**, and take out bottom cover.

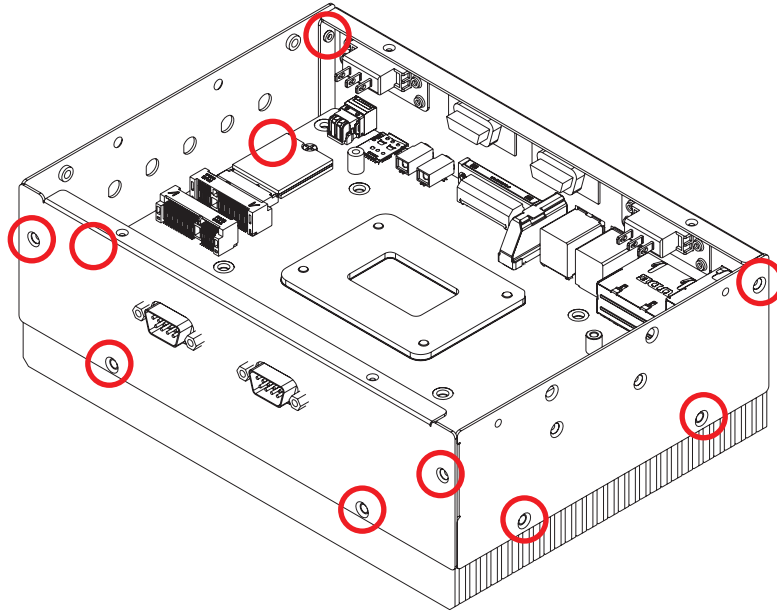


Step 2 After take out bottom cover.

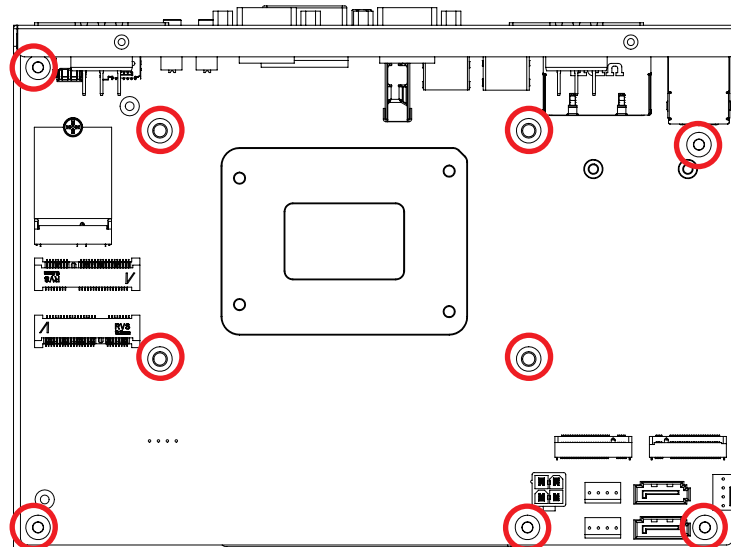


3.2 Installing CPU

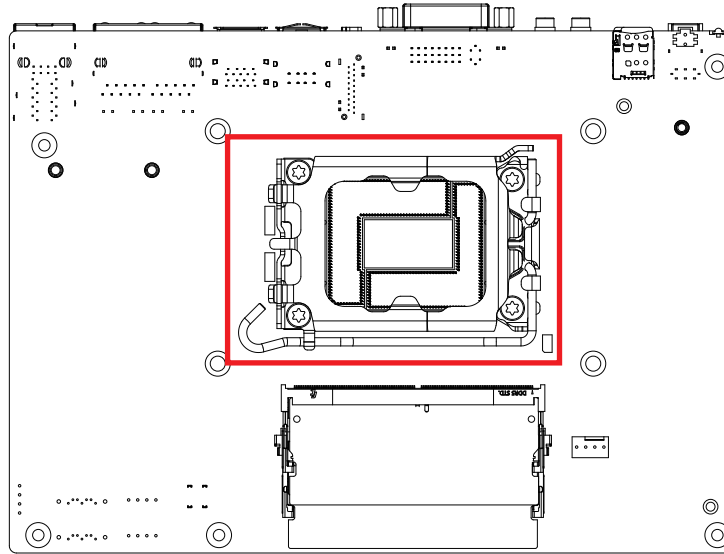
Step 1 Remove the chassis screws as indicated by the red circles.



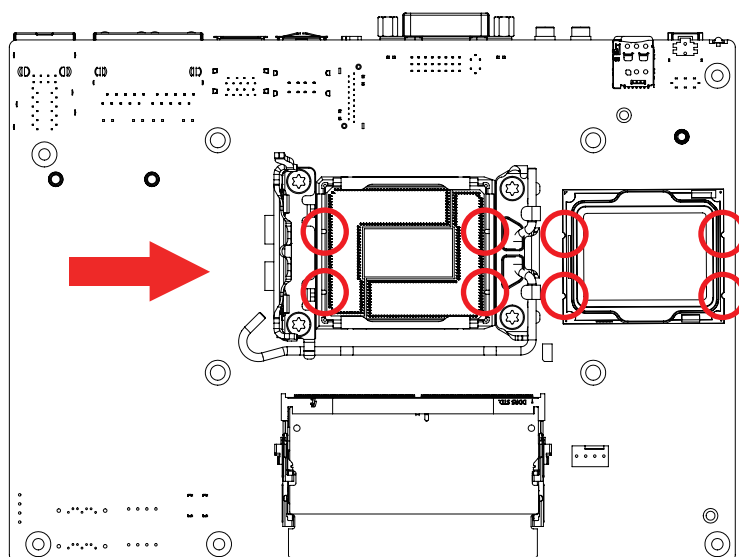
Step 2 Remove the screws on the PCBA as indicated by the red circles.



Step 3 Check the CPU socket location

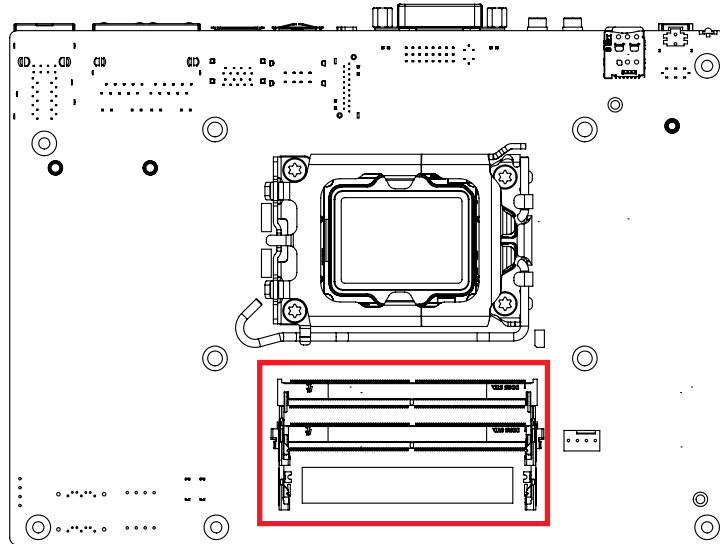


Step 4 Open the CPU socket cover following the arrow's direction. Install the CPU by aligning it with the notch as indicated by the red circle.

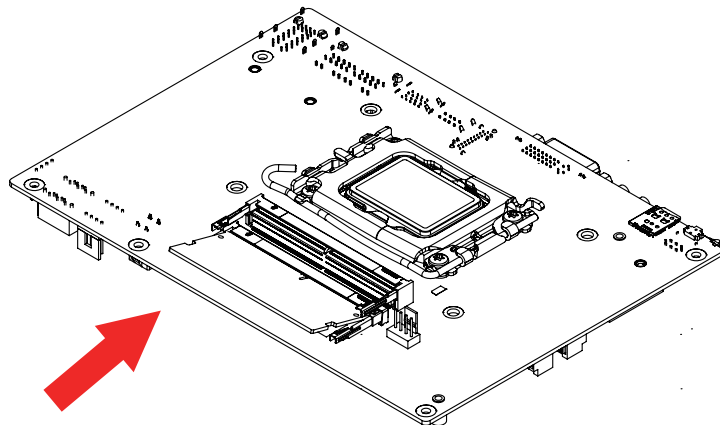


3.3 Installing DDR5 SO-DIMM Modules

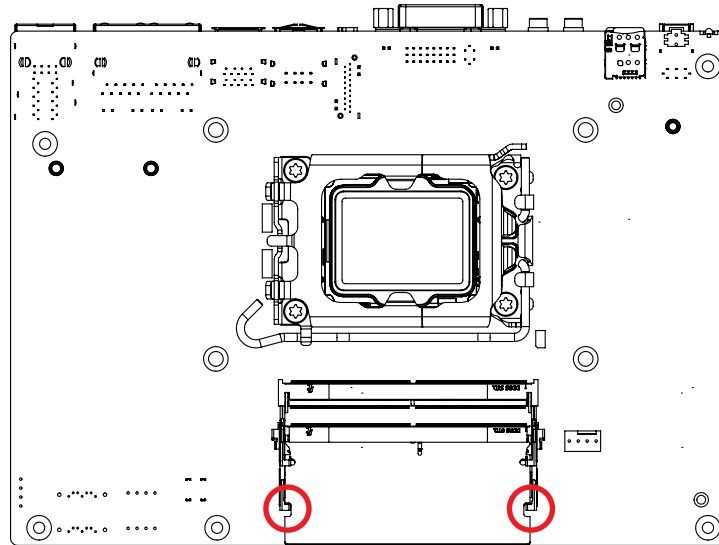
Step 1 DDR5 SO-DIMM slot.



Step 2 Install DDR5 RAM module into SO-DIMM socket.

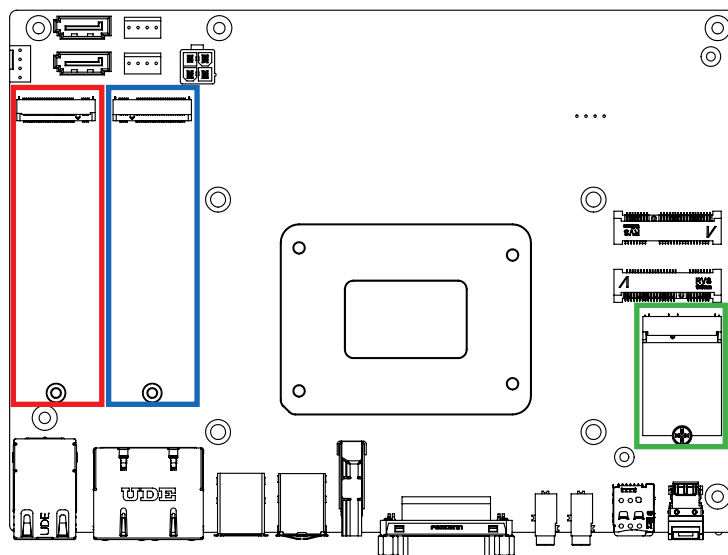


Step 3 Make sure RAM module is locked by the memory slot

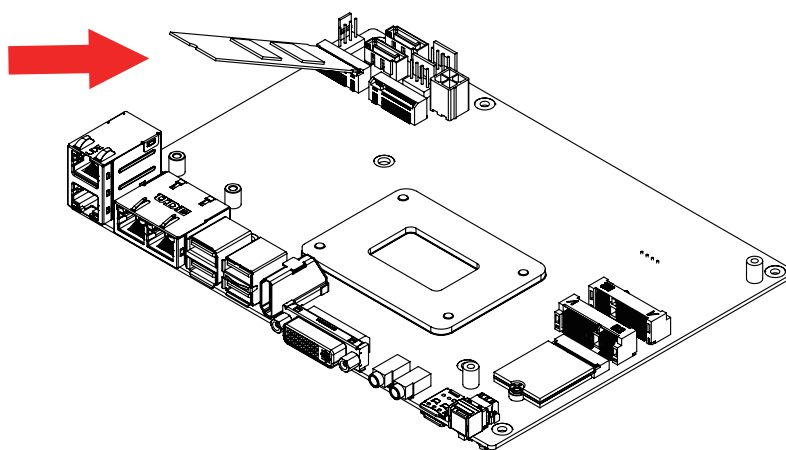


3.4 Installing M.2 (Key B/E/M)

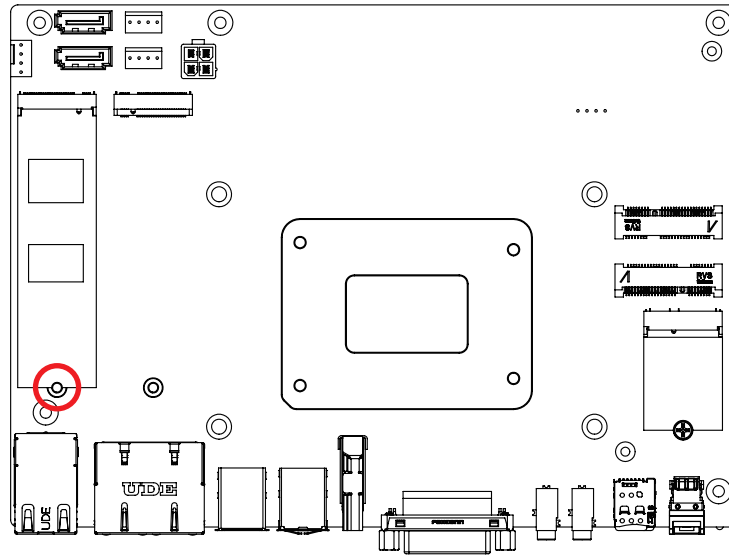
- Step 1** Confirm the M.2 slot position
(For M.2 slot types (Keying): Red: M Key Blue: B Key Green: E Key)



- Step 2** Install the M.2 module

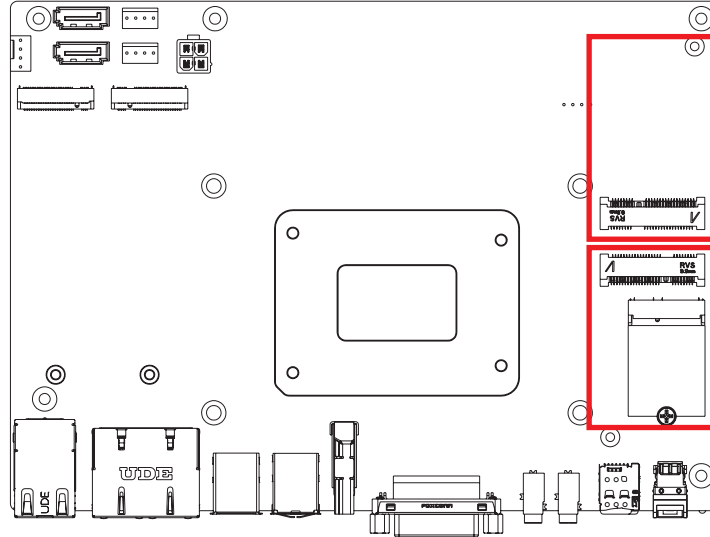


Step 3 Secure it with M3 screws.

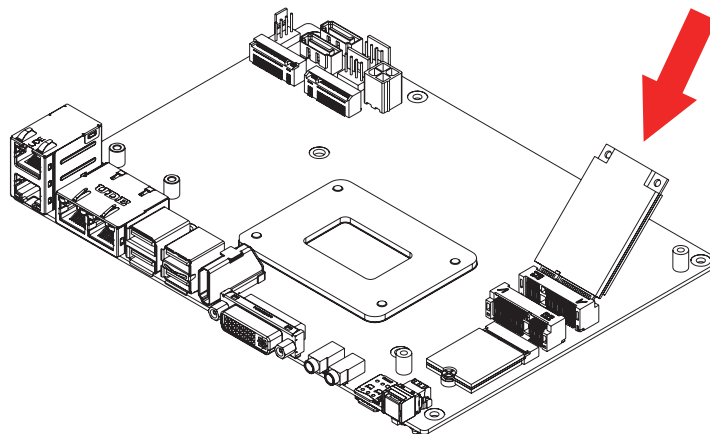


3.5 Installing mini PCIe

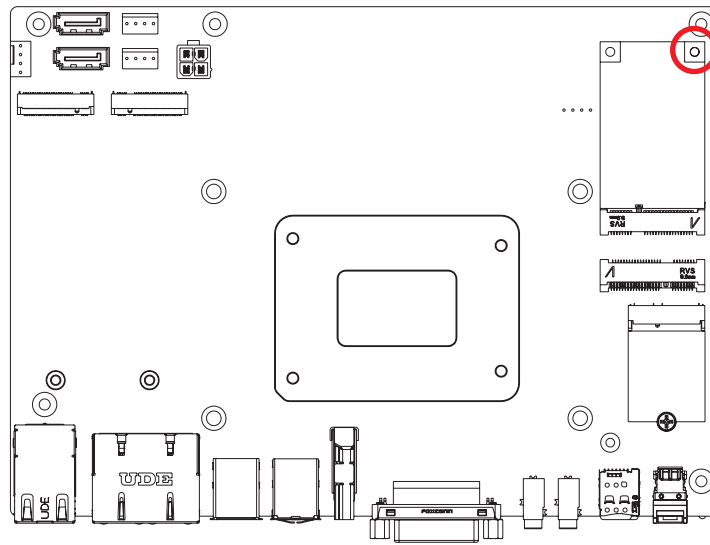
Step 1 Confirm the Mini PCIe location



Step 2 Insert the Mini PCIe module.

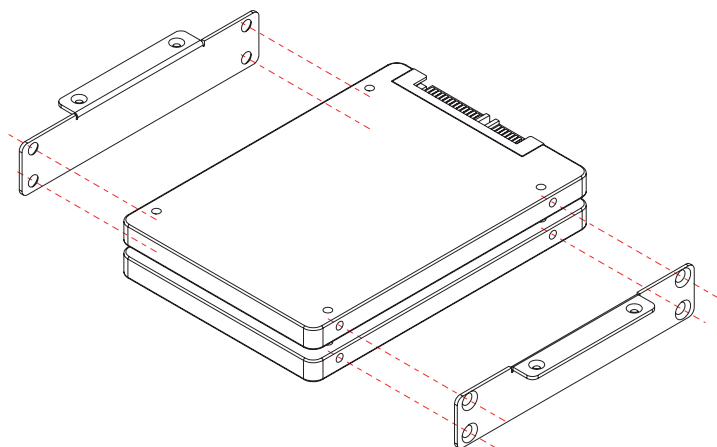


Step 3 Fasten one M2.5 screw.

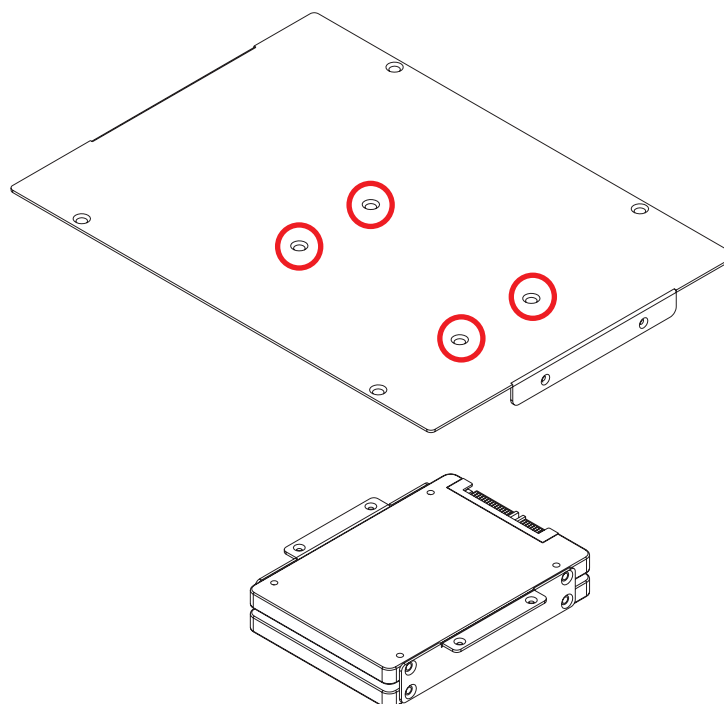


3.6 Installing M.2

Step 1 Screw the SSD to the SSD bracket.

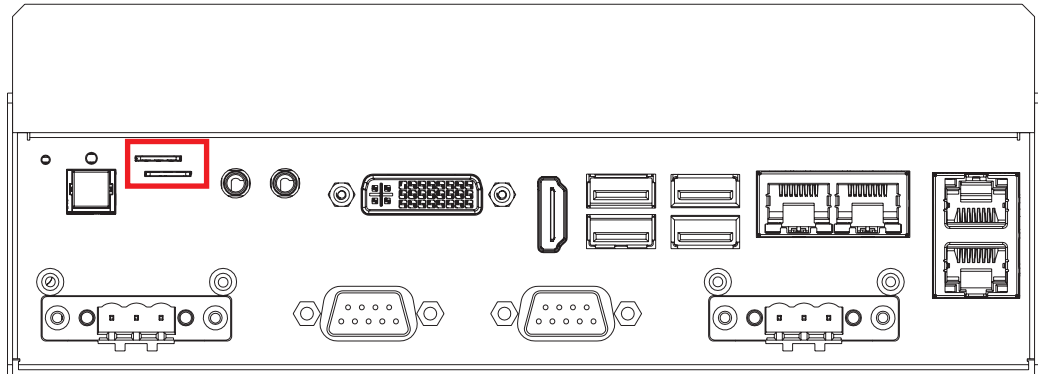


Step 2 Secure the SSD module to the bottom plate.

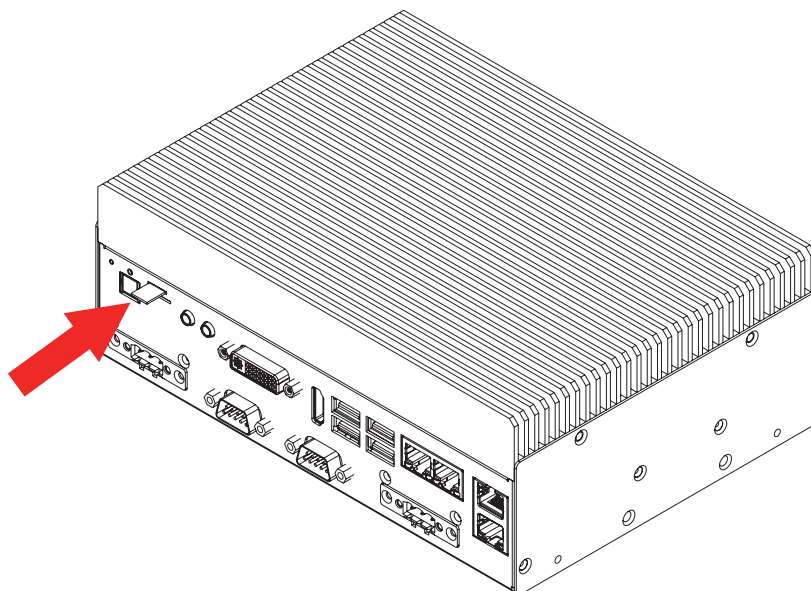


3.7 Installing Nano SIM Card

Step 1 Confirm the SIM card slot location.

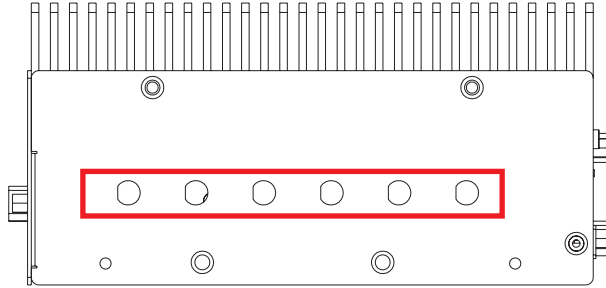


Step 2 Push SIM card slot cover open and install SIM card.

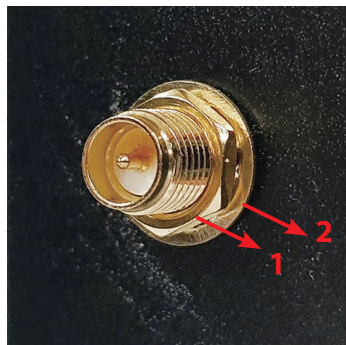
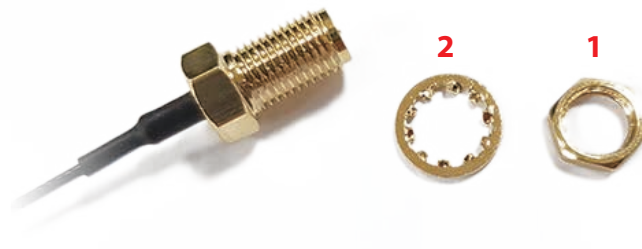


3.8 Installing Antenna Cable

Step 1 Verify the antenna port location.

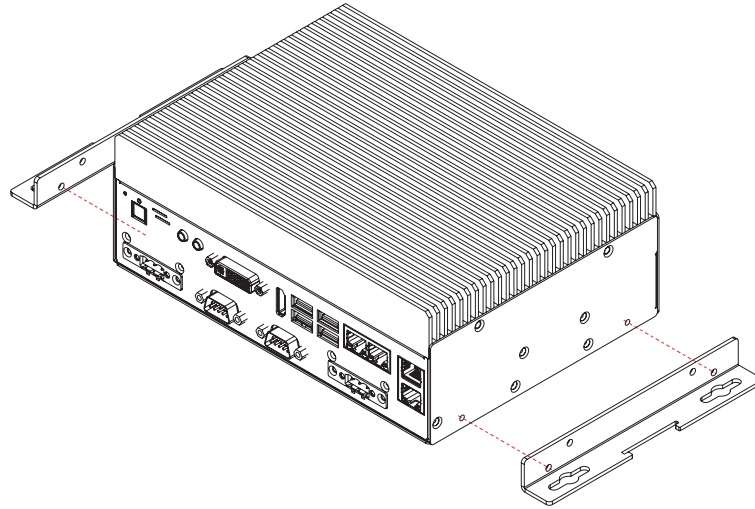


Step 2 Check antenna parts (cable and washers).

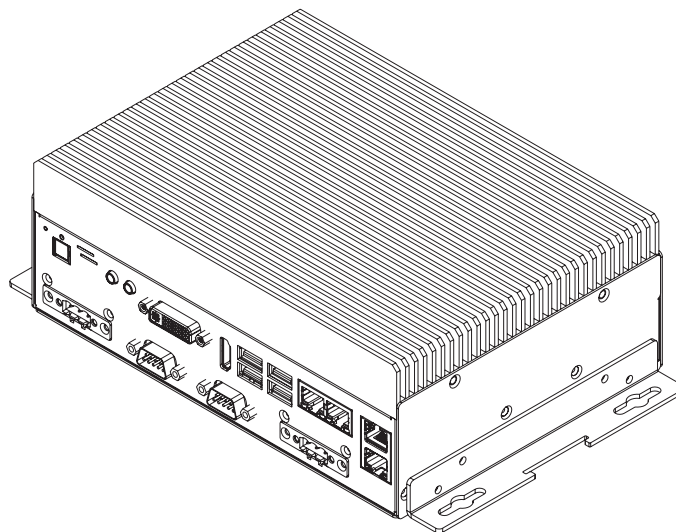


3.9 Mount Your VCM-2000

Step 1 Secure the wall mount to the chassis



Step 2 Finish.



4

BIOS SETUP

4.1 BIOS Setup

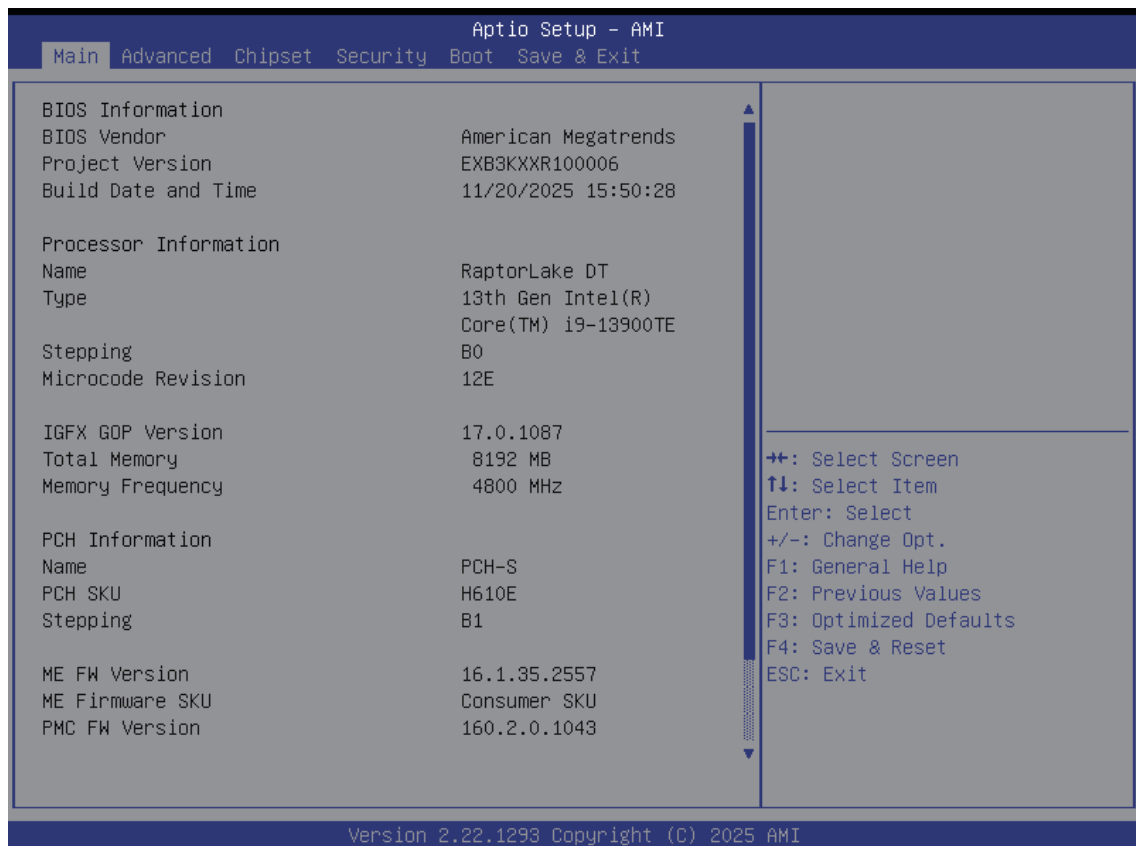


Figure 4-1 : Entering Setup Screen

BIOS provides an interface for users to check and change system configuration. The BIOS setup program is accessed by pressing the <Del> key when POST display output is shown.

4.2 Main Menu

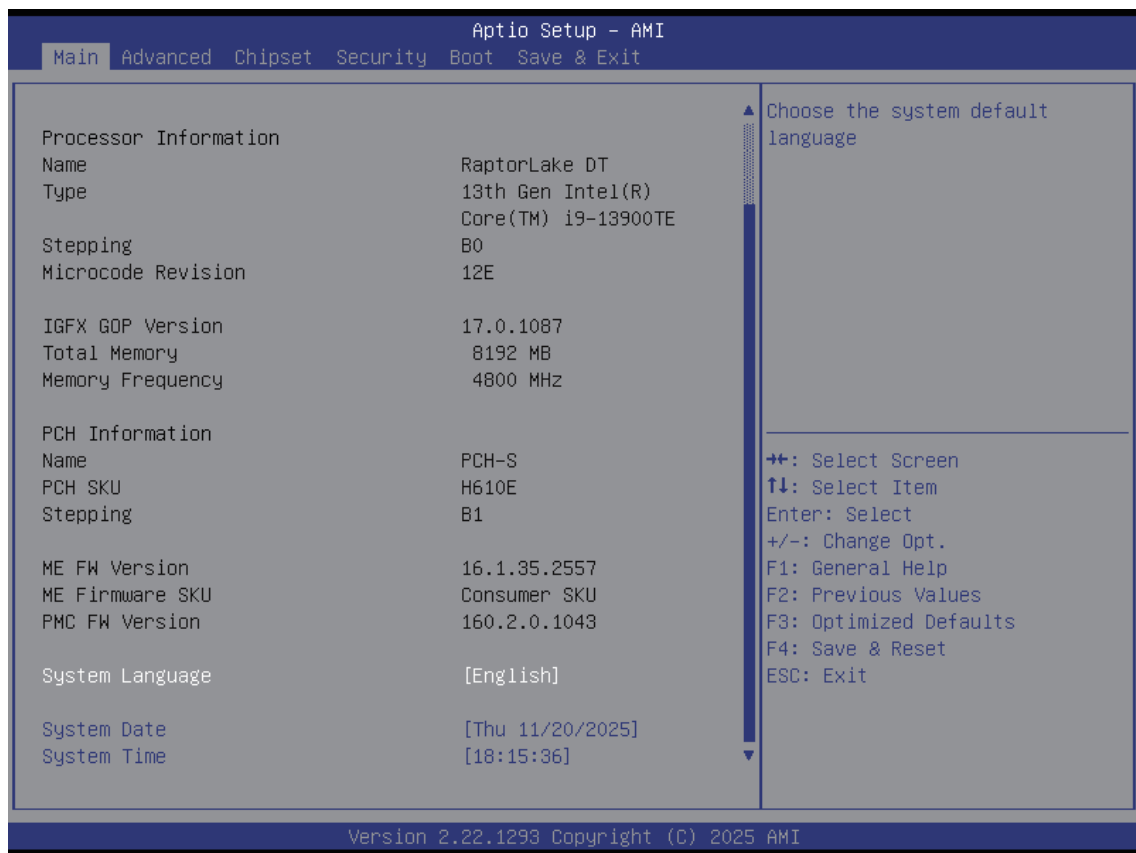


Figure 4-2 : BIOS Main Menu

The main menu displays BIOS version and system information. There are two options on Main menu.

System Date

Set the Date. Use Tab to switch between Date elements.

Default Ranges:

Year: 1998-9999

Months: 1-12

Days: Dependent on month

Range of Years may vary.

System Time

Set the Time. Use Tab to switch between Time elements.

4.3 Advanced Functions

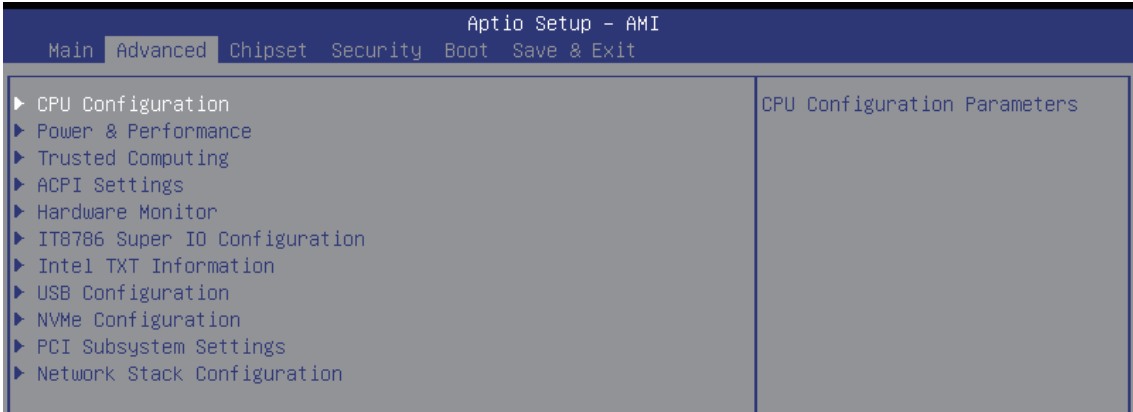


Figure 4-3 : BIOS Advanced Menu

Select advanced tab to enter advanced BIOS setup options, such as CPU configuration, ACPI settings, and Super IO configuration.

4.3.1 CPU Configuration

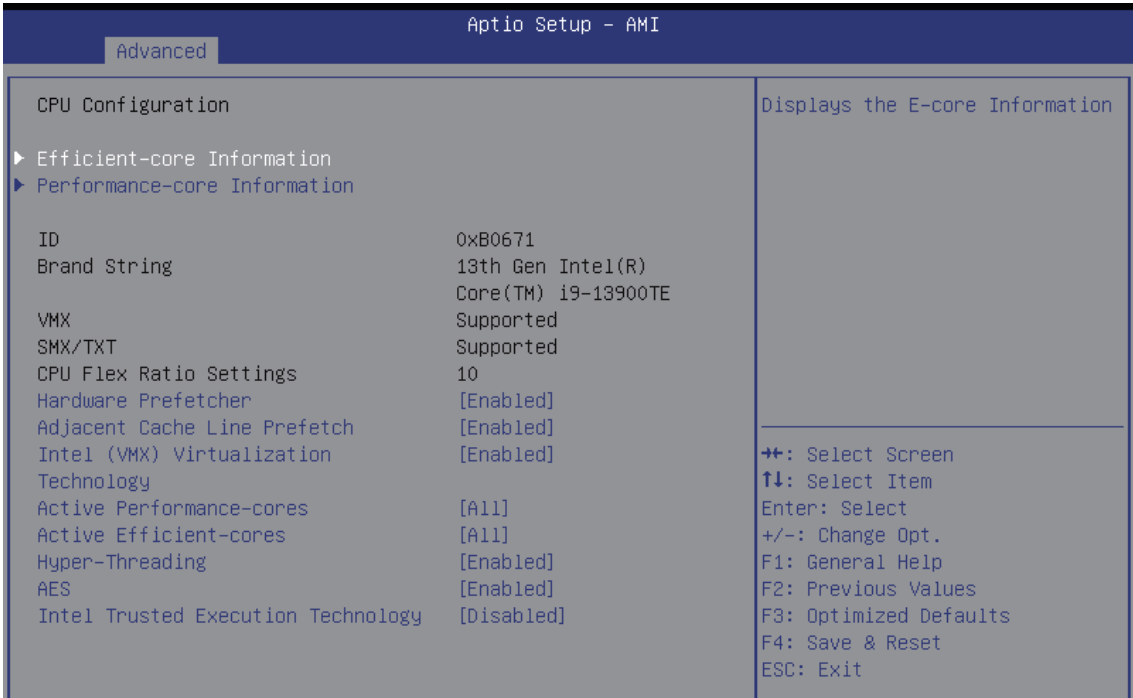


Figure 4-3-1 : CPU Configuration

Efficient-core Information

Displays the E-core Information.

Performance-core Information

Displays the P-core Information.

Hardware Prefetcher

To turn on/off the MLC streamer prefetcher.

Adjacent Cache Line Prefetch

To turn on/off prefetching of adjacent cache lines.

Intel (VMX) Virtualization Technology

When enabled, a VMM can utilize the additional hardware capabilities provided by Vanderpool Technology.

Active Performance-cores

Number of P-cores to enable in each processor package. Note: Number of Cores and E-cores are looked at together. When both are {0,0}, Pcode will enable all cores.

Active Efficient-cores

Number of E-cores to enable in each processor package. Note: Number of Cores and E-cores are looked at together. When both are {0,0}, Pcode will enable all cores.

Hyper-Threading

Enable or Disable Hyper-Threading Technology.

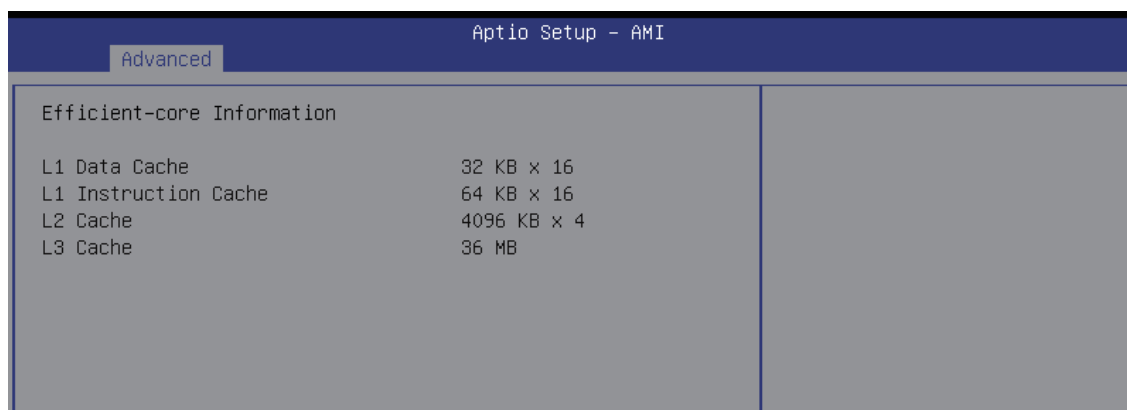
AES

Enable/Disable AES (Advanced Encryption Standard).

Intel Trusted Execution Technology

Enables utilization of additional hardware capabilities provided by Intel (R) Trusted Execution Technology Changes require a full power cycle to take effect.

4.3.1.1 Efficient-core Information

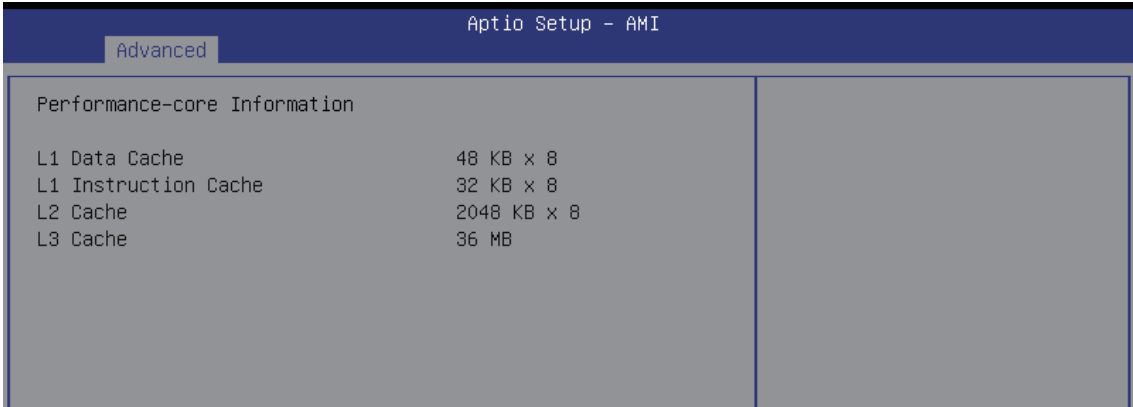


Aptio Setup - AMI	
Advanced	
Efficient-core Information	
L1 Data Cache	32 KB x 16
L1 Instruction Cache	64 KB x 16
L2 Cache	4096 KB x 4
L3 Cache	36 MB

Figure 4 3-1-1: Efficient-core Information

Display Efficient-core Information.

4.3.1.2 Performance-core Information



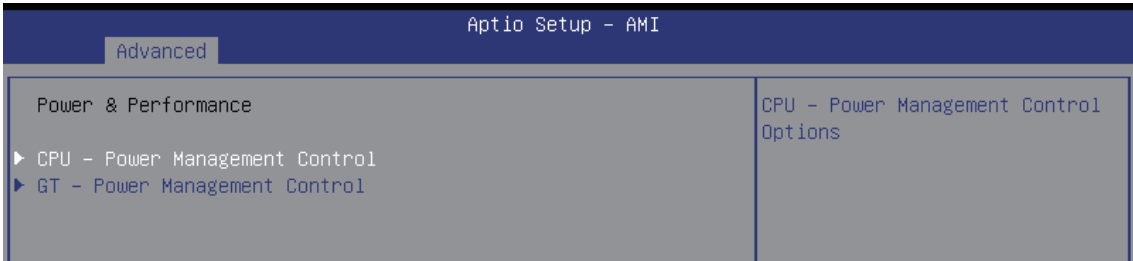
The screenshot shows the 'Aptio Setup - AMI' interface with the 'Advanced' tab selected. The 'Performance-core Information' section displays the following cache details:

Cache Type	Size
L1 Data Cache	48 KB x 8
L1 Instruction Cache	32 KB x 8
L2 Cache	2048 KB x 8
L3 Cache	36 MB

Figure 4 3-1-2: Performance-core Information

Display Performance-core Information.

4.3.2 Power & Performance



The screenshot shows the 'Aptio Setup - AMI' interface with the 'Advanced' tab selected. The 'Power & Performance' section lists the following options:

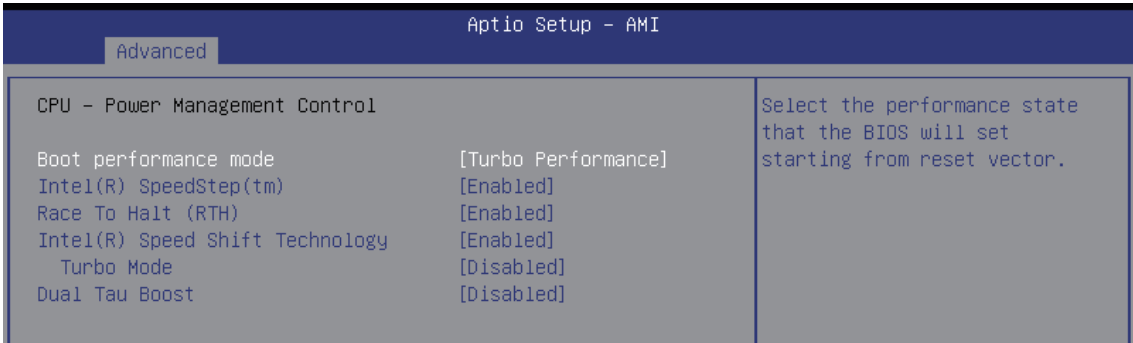
- ▶ CPU - Power Management Control
- ▶ GT - Power Management Control

The right-hand pane shows 'CPU - Power Management Control Options'.

Figure 4 3-2: Power & Performance

Display CPU - Power Management Control & GT - Power Management Control item.

4.3.2.1 CPU - Power Management Control



The screenshot shows the 'Aptio Setup - AMI' interface with the 'Advanced' tab selected. The 'CPU - Power Management Control' section displays the following settings:

Setting	Value
Boot performance mode	[Turbo Performance]
Intel(R) SpeedStep(tm)	[Enabled]
Race To Halt (RTH)	[Enabled]
Intel(R) Speed Shift Technology	[Enabled]
Turbo Mode	[Disabled]
Dual Tau Boost	[Disabled]

The right-hand pane provides a description: 'Select the performance state that the BIOS will set starting from reset vector.'

Figure 4 3-2-1: CPU - Power Management Control

Boot performance mode

Select the performance state that the BIOS will set starting from reset vector.

Intel(R) SpeedStep(tm)

Allows more than two frequency ranges to be supported.

Race To Halt (RTH)

Enable or Disable Race To Halt feature.

Intel(R) Speed Shift Technology

Enable or Disable Intel(R) Speed Shift Technology support.

Turbo Mode

Enable or Disable processor Turbo Mode.

Dual Tau Boost

Enable Dual Tau Boost feature.

4.3.2.2 GT - Power Management Control

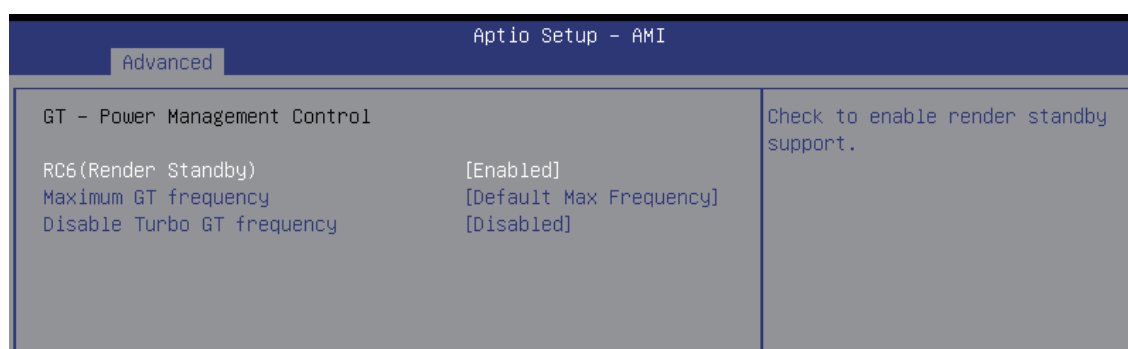


Figure 4 3-2-2: GT - Power Management Control

RC6(Render Standby)

Check to enable render standby support.

Maximum GT frequency

Setting maximum GT frequency.

Disable Turbo GT frequency

Enabled or Disables Turbo GT frequency.

4.3.3 Trusted Computing

Aptio Setup - AMI		
Advanced		
TPM 2.0 Device Found		Selects TPM device: PTT or dTPM. PTT - Enables PTT in SkuMgr dTPM 1.2 - Disables PTT in SkuMgr Warning ! PTT/dTPM will be disabled and all data saved on it will be lost.
Firmware Version:	7.85	
Vendor:	IFX	
TPM Device Selection	[dTPM]	
Security Device Support	[Enabled]	
Active PCR banks	SHA256	++: Select Screen ↑↓: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values
Available PCR banks	SHA256	
SHA256 PCR Bank	[Enabled]	
Pending operation	[None]	
Platform Hierarchy	[Enabled]	
Storage Hierarchy	[Enabled]	
Endorsement Hierarchy	[Enabled]	
Physical Presence Spec Version	[1.3]	
TPM 2.0 InterfaceType	[TIS]	
Device Select	[Auto]	

Figure 4 3-3: Trusted Computing

Control the TPM device status and display related information if TPM chip is present.

4.3.4 ACPI Settings

Aptio Setup - AMI		
Advanced		
ACPI Settings		Enables or Disables System ability to Hibernate (OS/S4 Sleep State). This option may not be effective with some operating systems.
Enable Hibernation	[Enabled]	
ACPI Sleep State	[S3 (Suspend to RAM)]	

Figure 4-3-4 : ACPI Settings

Enable Hibernation

Enables or Disables System ability to Hibernate (OS/S4 Sleep State). This option may not be effective with some operating systems.

ACPI Sleep State

Select the highest ACPI sleep state the system will enter when the SUSPEND button is pressed.

4.3.5 Hardware Monitor

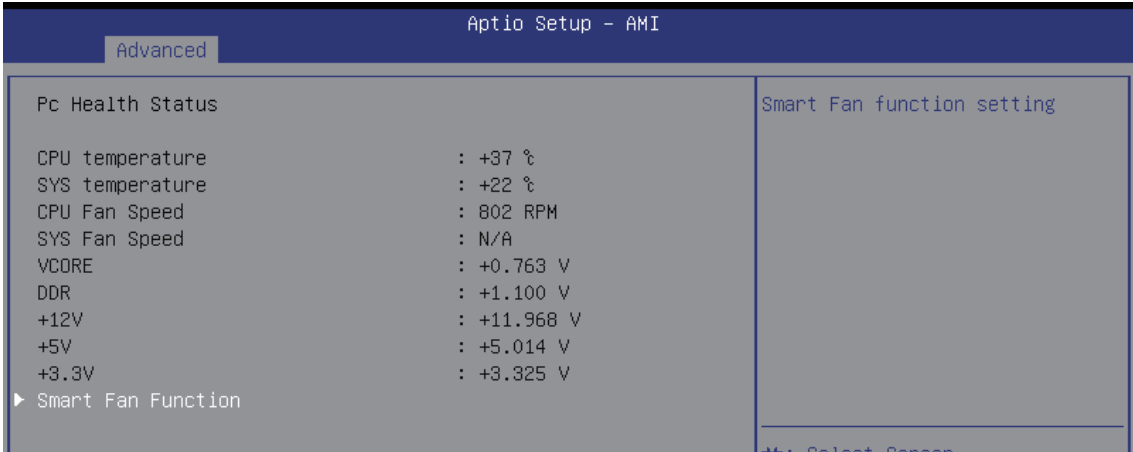


Figure 4 3-5: Hardware Monitor

The IT8786 SIO features an enhanced hardware monitor providing thermal, fan speed, and system voltages status monitoring.

4.3.5.1 Smart Fan Function

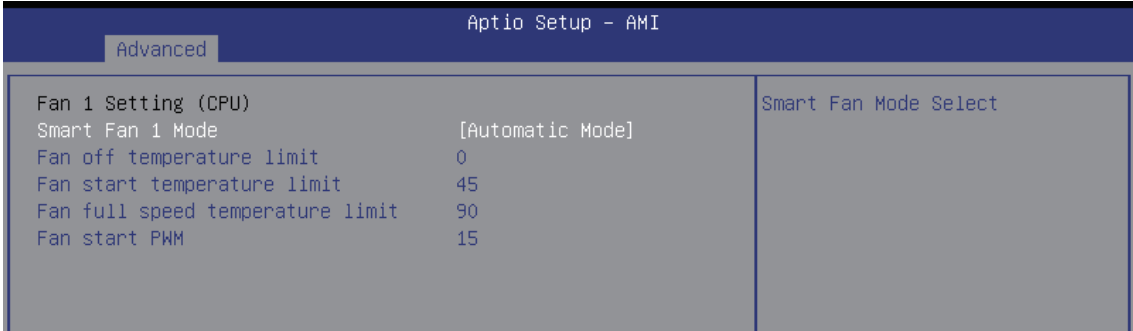


Figure 4-3-5-1: Smart Fan Function

Smart Fan X Mode

Smart Fan Mode Select

Fan off temperature limit

Fan will off when temperature lower than this limit

Fan start temperature limit

Fan will work when temperature higher than this limit

Fan full speed temperature limit

Fan will full speed when temperature higher than this limit

Fan start PWM

Fan will start with this PWM value.

4.3.6 IT8786 Super IO Configuration



Figure 4-3-6: IT8786 Super IO Configuration

4.3.6.1 Serial Port X Configuration

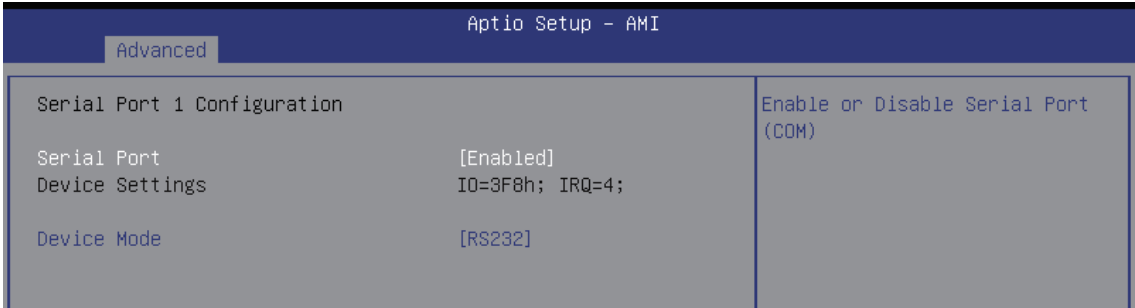


Figure 4-3-6-1: Serial Port X Configuration

Serial Port

Enable or Disable Serial Port (COM)

Device Mode

Select Device Mode.

4.3.7 Intel TXT Information

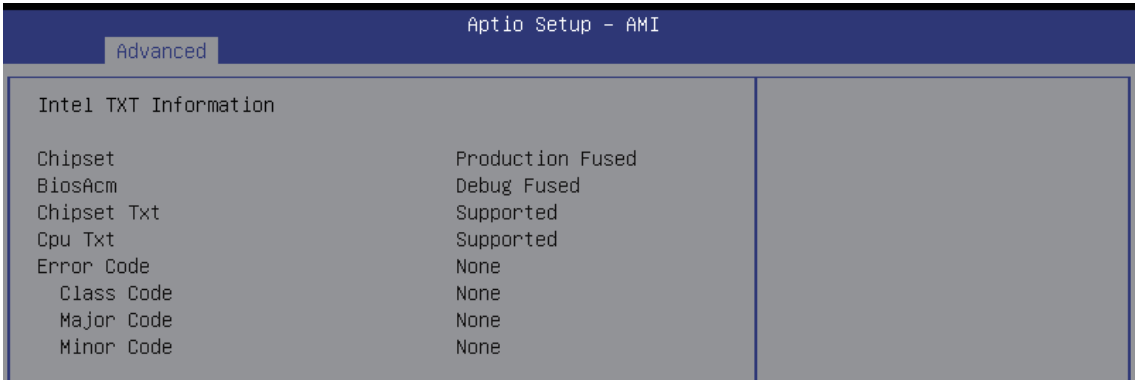


Figure 4-3-7: Intel TXT Information

Display Intel TXT Information.

4.3.8 USB Configuration

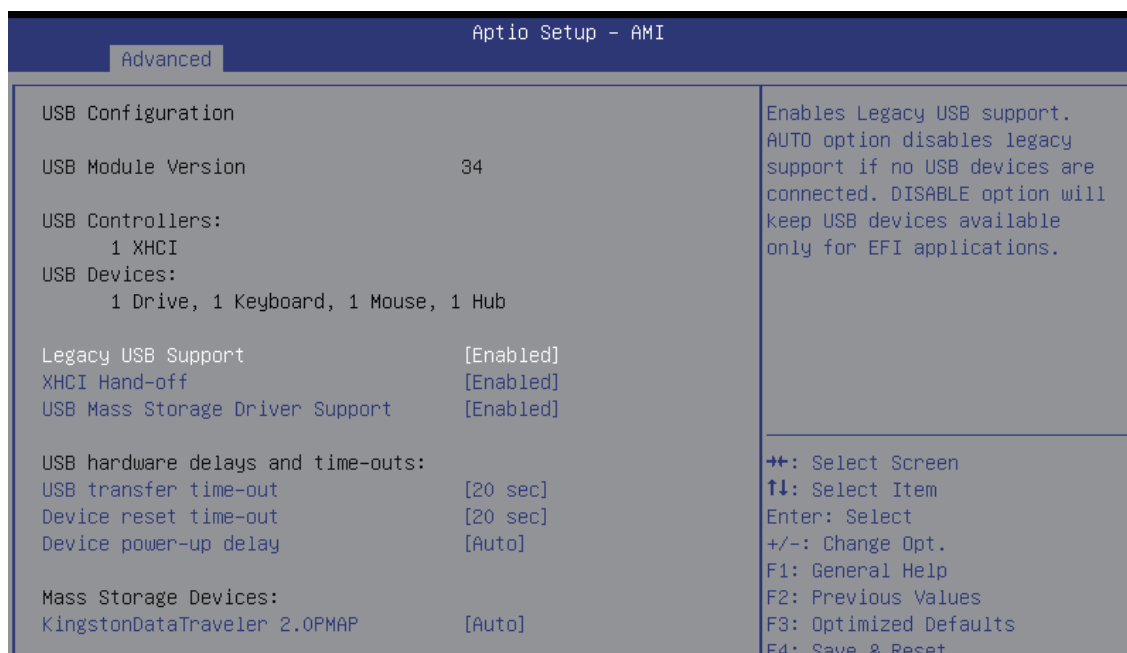


Figure 4-3-8: USB Configuration

Legacy USB Support

Enables Legacy USB support. AUTO option disables legacy support if no USB devices are connected. DISABLE option will 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.

USB Mass Storage Driver Support

Enable/Disable USB Mass Storage Driver Support.

USB transfer time-out

The time-out value for Control, Bulk, and Interrupt transfers.

Device reset time-out

USB mass storage device Start Unit command time-out.

Device power-up delay

Delay range is 1..40 seconds, in one second increments.

4.3.9 NVMe Configuration



Figure 4-3-9: NVMe Configuration

Display NVMe controller and Drive information.

4.3.10 PCI Subsystem Settings

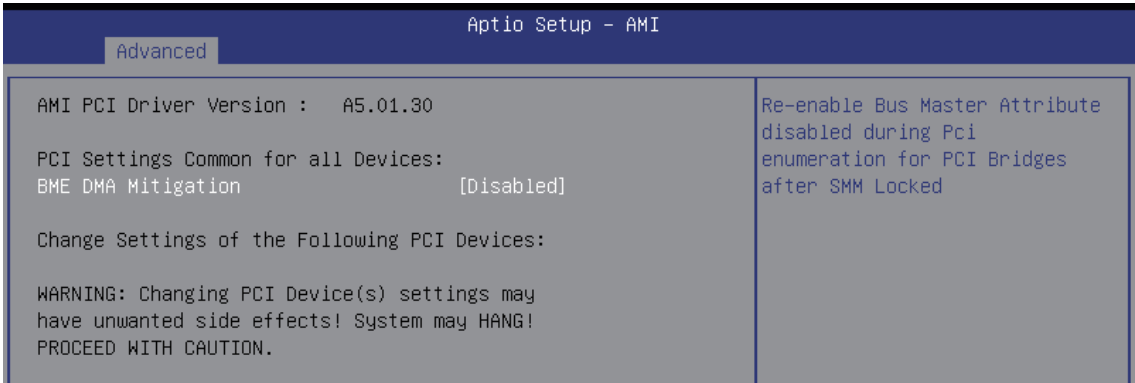


Figure 4-3-10: PCI Subsystem Settings

BME DMA Mitigation

Re-enable Bus Master Attribute disabled during Pci enumeration for PCI Bridges after SMM Locked.

4.3.11 Network Stack Configuration

Aptio Setup - AMI		
Advanced		
Network Stack	[Enabled]	Enable/Disable UEFI Network Stack
IPv4 PXE Support	[Disabled]	
IPv4 HTTP Support	[Disabled]	
IPv6 PXE Support	[Disabled]	
IPv6 HTTP Support	[Disabled]	
PXE boot wait time	0	
Media detect count	1	

Figure 4-3-11: Network Stack Configuration

Network Stack

Enable/Disable UEFI Network Stack

IPv4 PXE Support

Enable/Disable IPv4 PXE boot support. If disabled, IPv4 PXE boot support will not be available.

IPv4 HTTP Support

Enable/Disable IPv4 HTTP boot support. If disabled, IPv4 HTTP boot support will not be available

IPv6 PXE Support

Enable/Disable IPv6 PXE boot support. If disabled, IPv6 PXE boot support will not be available.

IPv6 HTTP Support

Enable/Disable IPv6 HTTP boot support. If disabled, IPv6 HTTP boot support will not be available.

PXE boot wait time

Wait time in seconds to press ESC key to abort the PXE boot. Use either +/- or numeric keys to set the value.

Media detect count

Number of times the presence of media will be checked. Use either +/- or numeric keys to set the value.

4.4 Chipset Menu



Figure 4-4: BIOS Chipset Menu

Select Chipset tab to enter chipset BIOS setup options, such as System Agent (SA) Configuration, PCH-IO Configuration, and SW Ignition Configuration.

4.4.1 System Agent (SA) Configuration

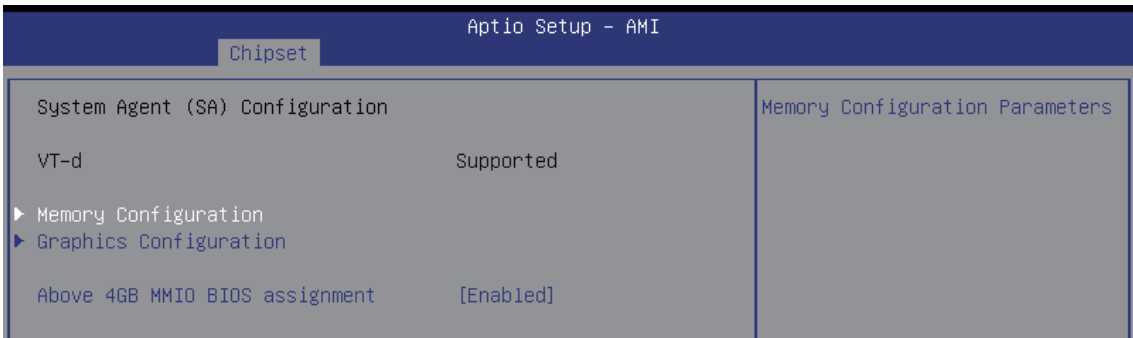


Figure 4-4-1: System Agent (SA) Configuration

Above 4GB MMIO BIOS assignment

Enable/Disable above 4GB MemoryMappedIO BIOS assignment

4.4.1.1 Memory Configuration

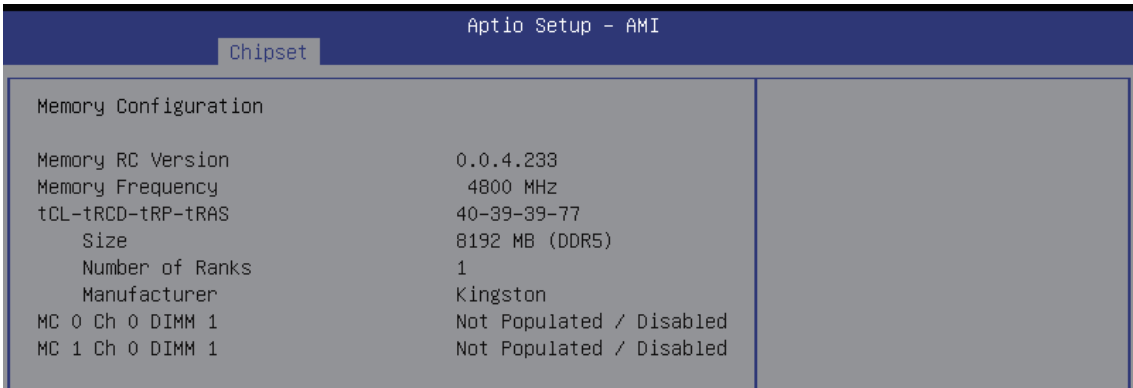


Figure 4-4-1-1: Memory Information

Display memory DIMM slot information.

4.4.1.2 Graphics Configuration

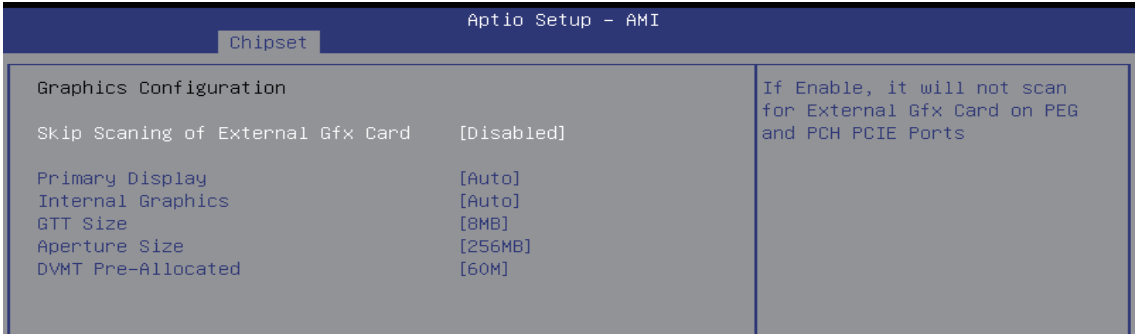


Figure 4-4-1-2 : Graphics Configuration

Skip Scanning of External Gfx Card

If Enable, it will not scan for External Gfx Card on PEG and PCH PCIE Ports.

Primary Display

Select which of IGFX/PEG/PCI Graphics device should be Primary Display Or select HG for Hybrid Gfx

Internal Graphics

Keep IGFX enabled based on the setup options.

GTT Size

Select the GTT Size.

Aperture Size

Select the Aperture Size.

DVMT Pre-Allocated

Select DVMT 5.0 Pre-Allocated (Fixed) Graphics Memory size used by the Internal Graphics Device.

4.4.2 PCH-IO Configuration

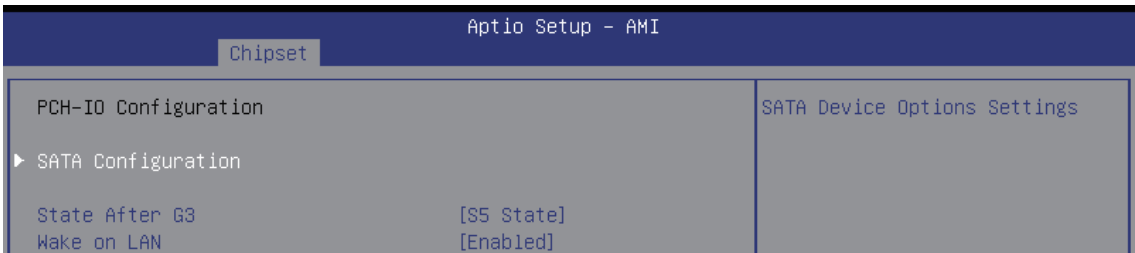


Figure 4-4-2 : PCH-IO Configuration

State After G3

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

Wake on LAN

Enable/Disable Wake On LAN Function.

4.4.2.1 SATA Configuration

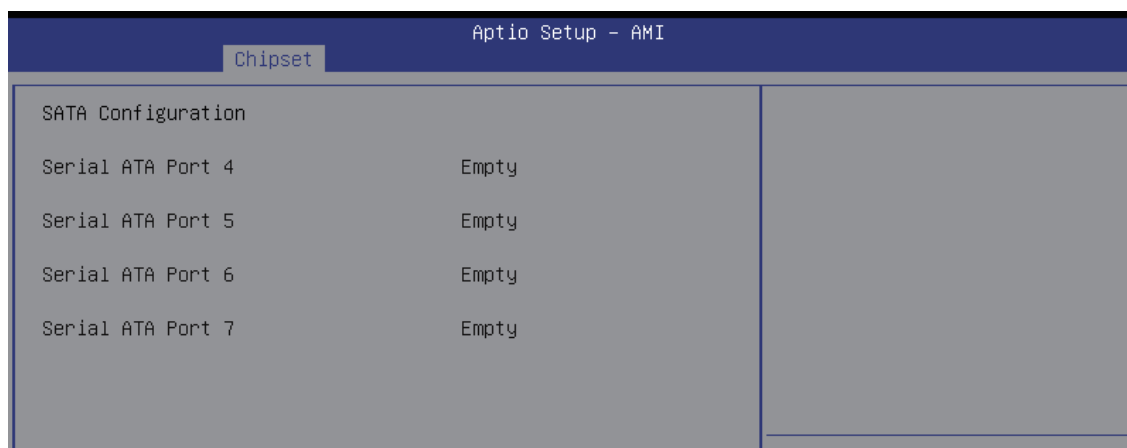


Figure 4-4-2-1: SATA Configuration

Display SATA port information.

4.4.3 SW Ignition Configuration

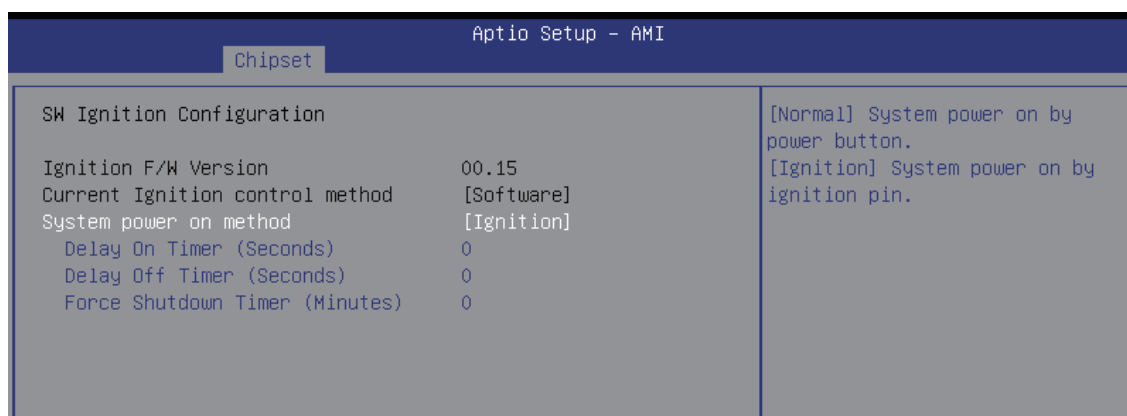


Figure 4-4-3: SW Ignition Configuration

System power on method

[Normal] System power on by power button.

[Ignition] System power on by ignition pin.

Delay On Timer (Seconds)

The delay time after user trigger ignition on signal (Seconds).

Delay Off Timer (Seconds)

The delay time after user trigger ignition off signal (Seconds).

Force Shutdown Timer (Minutes)

Used to force cut off system power when OS unable gracefully shutdown system successfully.

4.4.4 Onboard I/O Management

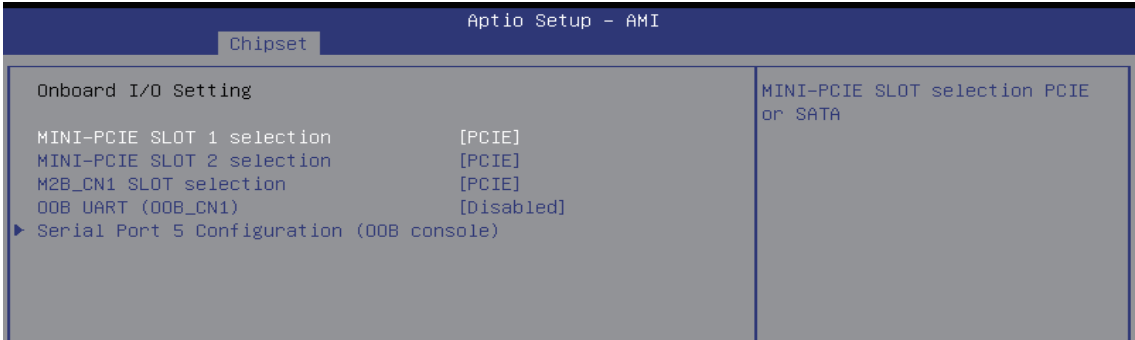


Figure 4-4-4: Onboard I/O Management

MINI-PCIE SLOT 1 selection

MINI-PCIE SLOT selection PCIE or SATA.

MINI-PCIE SLOT 2 selection

MINI-PCIE SLOT selection PCIE or SATA.

M2B_CN1 SLOT selection

M2B_CN1 SLOT selection PCIE or USB.

OOB UART (OOB_CN1)

Enable/Disable OOB UART function.

4.4.4.1 Serial Port 5 Configuration (OOB console)

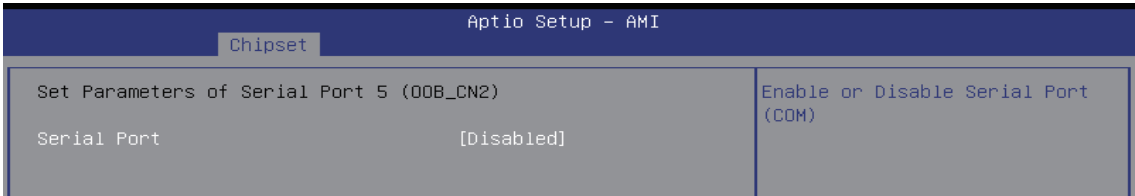


Figure 4-4-4-1: Serial Port 5 Configuration (OOB console)

Serial Port 5 Configuration (OOB console)

Enable/Disable OOB_CN2 console.

4.5 Security Function

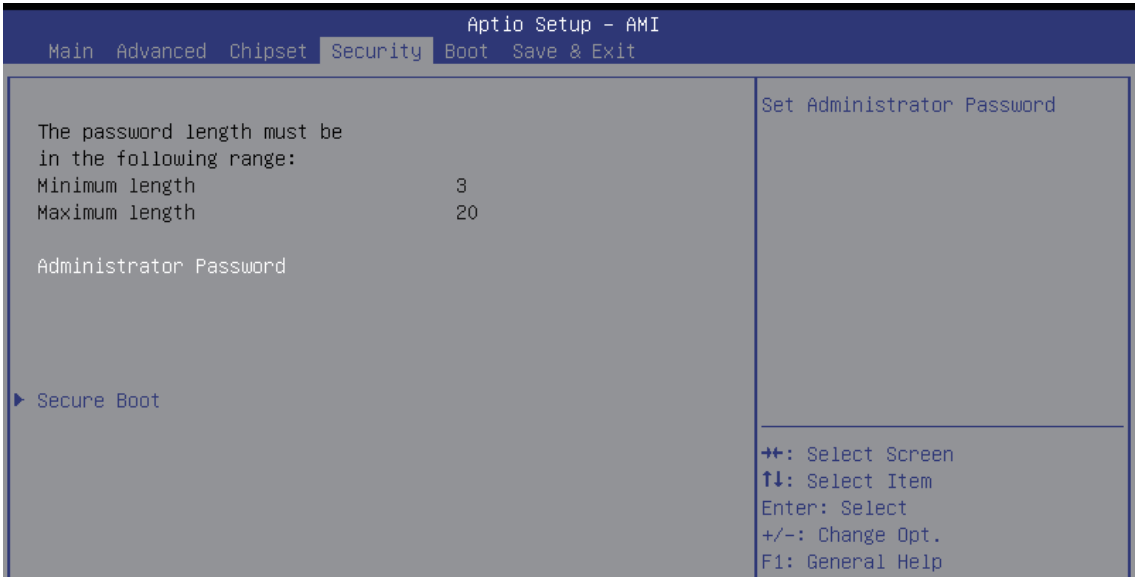


Figure 4-5 : BIOS Security Menu

Administrator Password
Set Administrator Password.

4.5.1 Security Boot

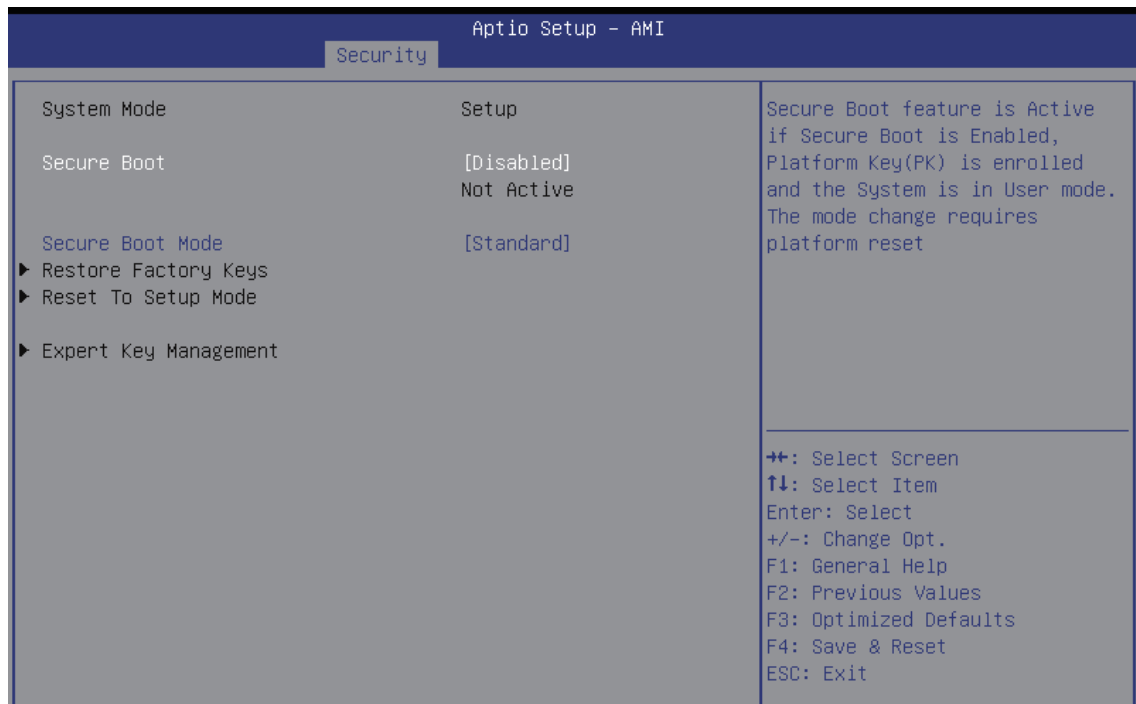


Figure 4-5-1: Security Boot

Secure Boot

Secure Boot feature is Active if Secure Boot is Enabled, Platform Key(PK) is enrolled and the System is in User mode. The mode change requires platform reset

Secure Boot Mode

Secure Boot mode options: Standard or Custom.

In Custom mode, Secure Boot Policy variables can be configured by a physically present user without full authentication

Restore Factory Keys

Force System to User Mode. Install factory default Secure Boot key databases

Reset To Setup Mode

Delete all Secure Boot key databases from NVRAM

Expert Key Management

Enables expert users to modify Secure Boot Policy variables without variable authentication

4.6 Boot Function

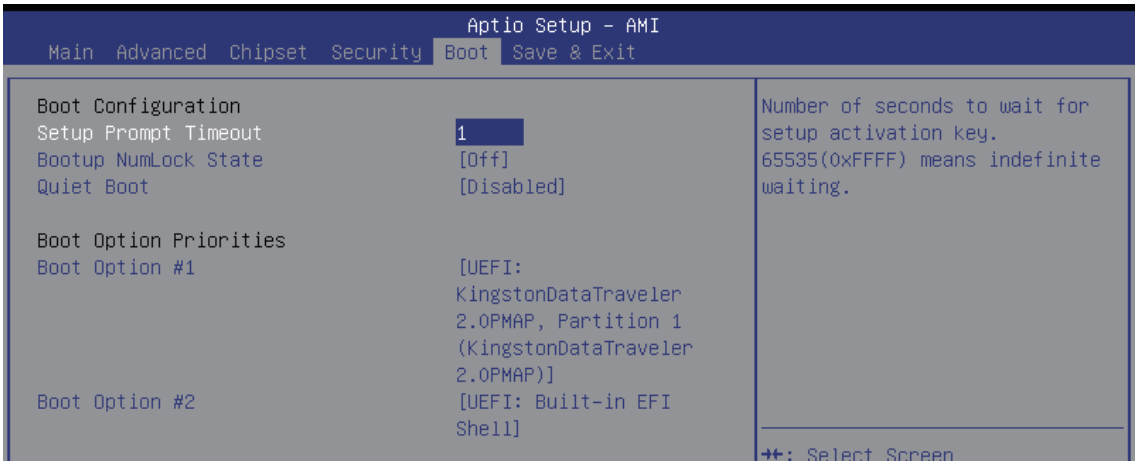


Figure 4-6: BIOS Boot Menu

Setup Prompt Timeout

Number of seconds to wait for setup activation key. 65535(0xFFFF) means indefinite waiting.

Bootup NumLock State

Select the keyboard NumLock state.

Quiet Boot

Enables or disables Quiet Boot option.

Boot Option Priorities

Sets the system boot order.

4.7 Save & Exit

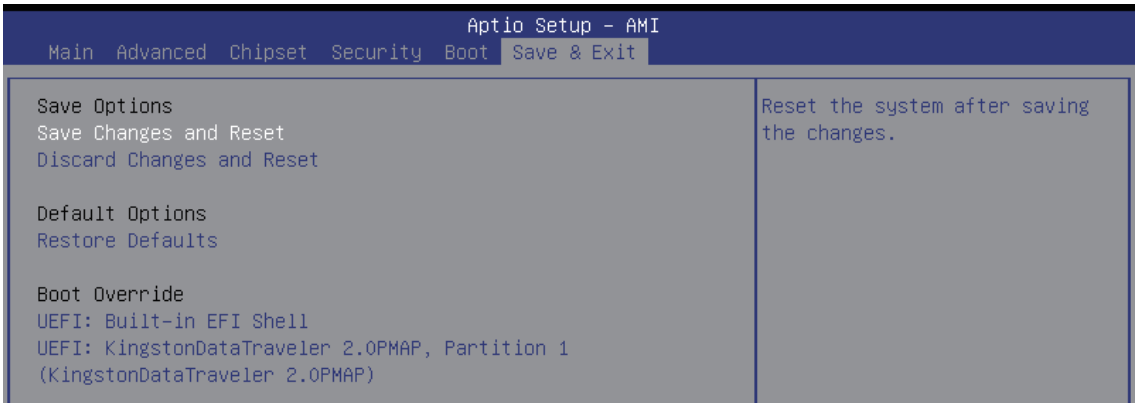


Figure 4-7: Bios Save and Exit Menu

Save Changes Reset

Reset the system after saving the changes.

Discard Changes and Reset

Reset system setup without saving any changes.

Restore Defaults

Restore/Load Default values for all the setup options.

A

APPENDIX A : Watchdog Function

A.1 Software Package Contain

Distribution folder include x32 and x64 versions, use batch file for installation.

There are included as followed :

Win10_32.bat, and Win10_64.bat :

Installation for driver, and

Uninstall_32.bat, and Uninstall_64.bat :

Uninstallation for driver

Run batch file as Administrator.

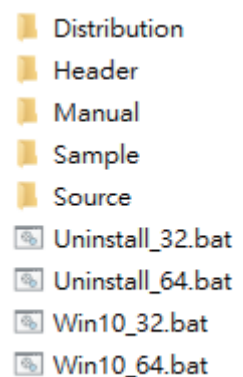
Make sure Windows version before installation.

Header folder include head file for software developer or System Integration.

Manual folder include API description.

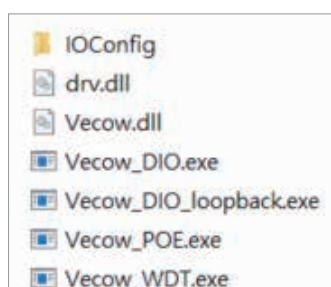
Sample folder include sample program, driver library, and API library for Windows/Linux

Source folder include sample program source code that compile on Visual Studio 2008/ubuntu16.04.

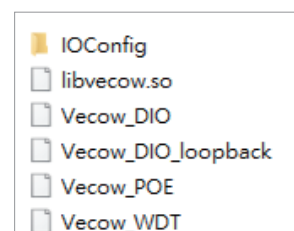


A.2 Sample

Execute demo tool.



Windows



Linux

```

DIO sample version : v1.0.0308.1108
Load Vecow.dll at least v1.0.1008.0812
Vecow.dll Version : v1.3.5008.1008
Config : IO port I - Isolated DIO
          IO port II - Non-Isolated DIO(GPIO)

Initial SIO success!
Choose IO : (1/2) 2
Get initial IO config success!
Select Non-Isolated/Isolated mode : (0/1) 0

GPIO access
Current GPIO config : 0xFF00
Set GPIO config In/Out(0/1) : 0x

```

Vecow_DIO

```

DIO loopback sample version : v1.0.1509.0608
Load Vecow.dll at least v1.8.1409.0608
Vecow.dll Version : v1.8.1409.0608
Config : IO port I - Isolated DIO
          IO port II - Non-Isolated DIO(GPIO)

How many IO temp_port : (1/2)

```

Vecow_DIO_loopback

```

WDT sample version : v1.0.0509.0608
Load Vecow.dll at least v1.8.1409.0608
Vecow.dll Version : v1.8.1409.0608
Config : IO port I - Isolated DIO
          IO port II - Non-Isolated DIO(GPIO)

Set WDT timer seconds (1~3932100) :

```

Vecow_WDT

B

APPENDIX B : Software Functions

B.1 Driver API Guide

In Header folder, Vecow.h and VecowLinux.h contain usable API for Windows/Linux.

BOOL initial_SIO(BYTE Isolate_Type, BYTE DIO_NPN)

Initial machine for IO and watch dogtimer.

Isolate_Type : DIO type.

1 : Isolated DIO;

0 : Non-Isolated DIO(GPIO).

DIO_NPN : DI/DO type.

1 : PNP (Source) mode for European rule;

0 : NPN (Sink) mode for Japanese rule.

Return :

TRUE (1) : Success.

FALSE (0) : Fail (Driver not exists, or version is too old, or machine not match).

BOOL get_IO1_configuration_other(BYTE *Iso, BYTE *DI_mode, BYTE *DO_mode, DWORD *Mask)

Get DIO configuration (by variable)

Isolate_Type : DIO type.

1 : Isolated DIO;

0: Non-Isolated DIO(GPIO).

DI_mode ([7:0]): DI type, pin setting by hexadecimal bitmask only for Isolated DIO.

0xFF: PNP (Source) mode for European rule;

0: NPN (Sink) mode for Japanese rule.

DO_mode: DO type only for Isolated DIO.

1: PNP (Source) mode for European rule;

0: NPN (Sink) mode for Japanese rule.

Mask ([15:0]): In / Out, pin setting by hexadecimal bitmask only for Non-Isolated DIO(GPIO).

1 : Output;

0 : Input

Return :

TRUE (1) : Success.

FALSE (0) : Fail (Initial error, or call by pointer error, or hardware problem).

BOOL set_IO1_configuration_other(BYTE Iso, BYTE DI_mode, BYTE DO_mode, DWORD Mask)

Set DIO configuration.

Isolate_Type : DIO type.

1 : Isolated DIO;

0 : Non-Isolated DIO(GPIO).

DI_mode ([7:0]): DI type, pin setting by hexadecimal bitmask only for Isolated DIO.

0xFF : PNP (Source) mode for European rule;

0 : NPN (Sink) mode for Japanese rule.

DO_mode: DO type only for Isolated DIO.

1 : PNP (Source) mode for European rule;

0 : NPN (Sink) mode for Japanese rule.

Mask ([15:0]): In / Out, pin setting by hexadecimal bitmask only for Non-Isolated DIO(GPIO).

1 : Output;

0 : Input

Return :

TRUE (1) : Success.

FALSE (0) : Fail (Initial error or hardware problem).

BOOL get_GPIO1(WORD *GPIO_data)

Get GPIO.

GPIO_data ([15:0]): GPIO state, pin setting by hexadecimal bitmask.

1 : High;

0 : Low.

Return :

TRUE (1) : Success.

FALSE (0) : Fail (Initial error or hardware problem).

BOOL set_GPIO1(WORD GPIO_data)

Set GPIO.

GPIO_data ([15:0]): GPIO state, pin setting by hexadecimal bitmask.

1 : High;

0 : Low.

Return :

TRUE (1) : Success.

FALSE (0) : Fail (Initial error or hardware problem).

BOOL get_WDT(DWORD *WDT)

Get watchdog timer setup.

WDT : watchdog timer setup.

Unit : second (Range : 0 ~ 65535 sec, 1093 ~ 65535 min (=65580 ~ 3932100 sec)).

Return :

TRUE (1) : Success.

FALSE (0) : Fail (Initial error, or call by pointer error, or hardware problem).

BOOL set_WDT(DWORD WDT)

Set watchdog timer setup.

WDT : watchdog timer setup.

Unit : second (Range : 0 ~ 65535 sec, 1093 ~ 65535 min (=65580 ~ 3932100 sec)).

Return :

TRUE (1) : Success.

FALSE (0) : Fail (Initial error, or setup 0, or hardware problem).

BOOL cancel_WDT()

Cancel watchdog timer.

Return :

TRUE (1) : Success.

FALSE (0) : Fail (Initial error or hardware problem).



APPENDIX C : Power Consumption

Testing Board	VCM-2000
RAM	48GB * 1
USB-1 : (USB 2.0)	USB Micsoft Wired Keyboard 600
USB-2 : (USB 2.0)	USB Mouse HP G1K28AA
M.2 PCIe SSD	INNODISK M.2(P80) 3TE6 512GB SSD
Graphics Output	HDMI
Power Plan	Balance (Windows11 Power plan)
Power Source	Chroma 62006P-100-25
Test Program -1	BurnInTest V10.2
Test Program -2	Furmark V2.8

C.1 Intel® Core i5-14500T 1.90 GHz (24M Cache, up to 4.80 GHz)

Power on and boot to Win 11 (64-bit)

CPU	Power Input	Standby Mode		Power on and boot to Win 11 (64-bit)			
				Sleep Mode		idle status CPU usage less 3%	
		Max Current	Max Consumption	Max Current	Max Consumption	Max Current	Max Consumption
Core™ i5-14500T	12V	0.359A	04.31W	04.22A	05.06W	01.305A	15.66W

CPU	Power Input	Power on and boot to Win11 (64-bit)			
		Run 100% CPU usage with 2D		Run 100% CPU usage with 3D	
		Max Current	Max Consumption	Max Current	Max Consumption
Core™ i5-14500T	12V	03.976A	47.71W	04.668A	56.02W

C.2 Intel® Core 7-251E 2.10 GHz (36M Cache, up to 5.60 GHz)

Power on and boot to Win 11 (64-bit)

CPU	Power Input	Standby Mode		Power on and boot to Win 11 (64-bit)			
				Sleep Mode		idle status CPU usage less 3%	
		Max Current	Max Consumption	Max Current	Max Consumption	Max Current	Max Consumption
Core™ 7-251E	12V	0.361A	04.33W	0.426A	05.11W	01.444A	17.33W

CPU	Power Input	Power on and boot to Win10 (64-bit)			
		Run 100% CPU usage with 2D		Run 100% CPU usage with 3D	
		Max Current	Max Consumption	Max Current	Max Consumption
Core™ 7-251E	12V	05.881A	70.57W	07.288A	87.46W

D

APPENDIX D : Supported Memory & Storage List

D.1 Supported Memory List

Testing Board :	VCM-2000
Memory Test	MemTest86 V11.0
BurnIn Test	BurnInTest Pro V10.2 (build 1006)

Test Item

Channel	Memory Test	Burn-in Test	Sleep	Hibernate	Reset
*1(DIMM 1)	PASS	PASS	PASS	PASS	PASS
*1(DIMM 2)	PASS	PASS	N/A	PASS	PASS

D.2 Supported Non-ECC Memory List

Brand	Info	Test Temp. (Celsius)
Samaung 8G DDR5-4800 SO-DIMM	M425R1GB4BB0-CQKOL	25°C
Transcend 8G DDR5-5600 SO-DIMM	TS1GSA64V6G	25°C
Samaung 16G DDR5-5600 SO-DIMM	M425RGA3PB0-CWM0D	25°C
Innodisk 32G DDR5-5600 SO-DIMM	M5S0-BG2OCZQ-H03	25°C
Kingston 48G DDR-5600 SO-DIMM	KVR56S46BD-48	25°C

D.3 Supported ECC Memory List

Brand	Info	Test Temp. (Celsius)
Kingston 16GB DDR5-4800 ECC SO-DIMM	KSM48T40BS8KM	25°C
Innodisk 16G DDR5-4800 ECC SO-DIMM	M5D0-AGS2PCVP-H03	25°C
Transcend 16G DDR5-4800 EC4 SO-DIMM	TS2GSA72V8E	25°C
Innodisk 16GB DDR5-5600 EC4 SO-DIMM	M5D0-AGS2PCZQ-H03	25°C
Transcend 32G DDR5-5600 EC4 SO-DIMM	TS4GSA72V6E	25°C
Innodisk 48GB DDR5-5600 ECC SO-DIMM	M5S0-GGMZO5ZQ	25°C

D.4 Supported Storage Device List

Type	Brand	Model	Capacity
M.2 SATA SSD	Innodisk	DEMSR-C12DK1KCAQF-H03	512GB
	Transcend	TS512GMSA460T	512GB
M.2 PCIe SSD	Innodisk	4TG2-P DGM28-C12DP1KCAEF-H03 G4X4	512GB
		3TE6 DEM28-C12DD1KCCQF-H03 G3X2	512GB
	Transcend	TS512GMTE720T G4X4	512GB
		TS512GMTE460T G3X2	512GB
SATA SSD	Innodisk	3ME4 DES25-A28M41BW1DC-H03	128GB
		3TE7 DES25-C12DK1KCCQL-H03	512GB
	Transcend	TS512GSSD460K	512GB

** If more help is needed, please contact Vecow Technical Support.**



For further support information, please visit www.vecow.com

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