

IVH-9000 USER

Manual

Quad Core Intel® Xeon® / Core™ i7/ i5/ i3 Fanless In-Vehicle System
High Performance, Rugged, Extended Temp, Power Protection

Record of Revision

Version	Date	Page	Description	Remark
0.1	07/13/2016	All	Preliminary Release	
1.0	07/28/2016	All	Official Release	
1.1	09/06/2016	All	Update	
1.2	04/21/2017	18	Update	
1.3	05/09/2017	83	Update	
1.4	03/22/2021	3, 5, 7, 24	Update	
1.5	06/07/2023	All	Update	

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Order Information

Part Number	Description
IVH-9016-PoER505M	IVH-9000, Quad Core Intel® Xeon® E3-1505M v5, 18 GbE LAN w/ 16 PoE+, 4 SSD Tray, 4 COM, 4 USB 3.0, 4 SIM, Isolated DIO, 16 GPIO
IVH-9016-PoER820Q	IVH-9000, Quad Core Intel® Core™ i7-6820EQ, 18 GbE LAN w/ 16 PoE+, 4 SSD Tray, 4 COM, 4 USB 3.0, 4 SIM, Isolated DIO, 16 GPIO
IVH-9016-PoER440Q	IVH-9000, Quad Core Intel® Core™ i5-6440EQ, 18 GbE LAN w/ 16 PoE+, 4 SSD Tray, 4 COM, 4 USB 3.0, 4 SIM, Isolated DIO, 16 GPIO
IVH-9008-PoER505M	IVH-9000, Quad Core Intel® Xeon® E3-1505M v5, 10 GbE LAN w/ 8 PoE+, 4 SSD Tray, 4 COM, 4 USB 3.0, 4 SIM, Isolated DIO, 16 GPIO
IVH-9008-PoER820Q	IVH-9000, Quad Core Intel® Core™ i7-6820EQ, 10 GbE LAN w/ 8 PoE+, 4 SSD Tray, 4 COM, 4 USB 3.0, 4 SIM, Isolated DIO, 16 GPIO
IVH-9008-PoER440Q	IVH-9000, Quad Core Intel® Core™ i5-6440EQ, 10 GbE LAN w/ 8 PoE+, 4 SSD Tray, 4 COM, 4 USB 3.0, 4 SIM, Isolated DIO, 16 GPIO
IVH-9000-2R505M	IVH-9000, Quad Core Intel® Xeon® E3-1505M v5, 2 GbE LAN, 4 SSD Tray, 4 COM, 4 USB 3.0, 4 SIM, Isolated DIO, 16 GPIO
IVH-9000-2R820Q	IVH-9000, Quad Core Intel® Core™ i7-6820EQ, 2 GbE LAN, 4 SSD Tray, 4 COM, 4 USB 3.0, 4 SIM, Isolated DIO, 16 GPIO
IVH-9000-2R440Q	IVH-9000, Quad Core Intel® Core™ i5-6440EQ, 2 GbE LAN, 4 SSD Tray, 4 COM, 4 USB 3.0, 4 SIM, Isolated DIO, 16 GPIO

Order Accessories

Part Number	Description
DDR4 16G	Certified DDR4 16GB 2133MHz RAM
DDR4 8G	Certified DDR4 8GB 2133MHz RAM
DDR4 4G	Certified DDR4 4GB 2133MHz RAM
PWA-280WB-WT	280W, 24V, 85V AC to 264V AC Power Adaptor with 3-pin Terminal Block (7.62mm pitch), Wide Temperature -30°C to +70°C
PWA-160WB-WT	160W, 24V, 85V AC to 264V AC Power Adaptor with 3-pin Terminal Block (7.62mm pitch), Wide Temperature -30°C to +70°C
VESA Mount	VESA Mounting Kit
DIN-RAIL	DIN Rail Kit
Rack Mount	2U Rackmount Kit
TMBK-20P-100	Terminal Block 20-pin to SCSI Cable, 100cm
TMBK-20P-500	Terminal Block 20-pin to SCSI Cable, 500cm
TMB-SCSI-20P	Terminal Board with One 20-pin SCSI Connector and DIN-Rail Mounting
3G Module	Mini PCIe 3G/GPS Module with Antenna
4G Module	Mini PCIe 4G/GPS Module with Antenna
WiFi & Bluetooth Module	Intel® Mini PCIe WiFi & Bluetooth Module with Antenna

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1

GENERAL INTRODUCTION

1.1 Overview

Powered by server-grade Quad Core Intel® Xeon®/ Core™ i7 processor (Skylake-H), ECC/ non-ECC DDR4 dual channel up to 32GB memory; Intel® HD P530/ 530 graphics supports DVI-D and dual DisplayPort interface, up to 4K display, fanless -25°C to 70°C operating temperature, all-in-one integrated features, multiple I/O connection, user-friendly, smart manageability, excellent mobile availability, 6V to 78V power input with 200V surge protection, configurable ignition power control, intelligent circus protection and rugged reliability in harsh environments, Vecow IVH-9000 Series Fanless Vehicle Computing System is your perfect choices for Rolling Stock System, Machine Vision, Intelligent Transportation System (ITS), Mobile DVR/NVR, Intelligent Surveillance, Fleet Management, Industry 4.0, Internet of Things (IoT) and any performance driven real-time vehicle computing applications.

1.2 Features

- Quad Core Intel® Xeon®/ Core™ i7/ i5/ i3 Processor (Skylake-H) with CM236 Chipset supports up to 4K display
- 2 DDR4 2133MHz Memory, up to 32GB (ECC/ Non-ECC)
- Fanless, -25°C to 70°C Operating Temperature
- 18 Gigabit LAN with 16 IEEE 802.3at PoE+ compliant, iAMT 11.0 supported
- 4 Mini PCIe Slot
- 4 SIM Card Socket (3 External)
- 4 Front-access 2.5" HDD/ SSD Tray, 5 USB
- Supports 3G/ 4G/ LTE/ WiFi/ GPRS/ UMTS
- 16 Isolated DIO, 16 GPIO
- Configurable Ignition Power Control
- 6V to 78V DC Power Input with 200V Surge Protection
- UPS supported (Optional)

1.3 Product Specification

1.3.1 Specifications of IVH-9016-PoER

System	
Processor	Quad Core Intel® Xeon® E3-1505M v5/ Core™ i7-6820EQ/ i5-6440EQ Processor (Skylake-H)
Chipset	Intel® CM236
BIOS	AMI
SIO	IT8786E
Memory	<ul style="list-style-type: none"> • DDR4 2133MHz • Up to 32GB • 2 260-pin SO-DIMM Socket (ECC Function enable depends on processor support)
I/O Interface	
Serial	4 COM RS-232/ 422/ 485 w/ auto flow control
USB	<ul style="list-style-type: none"> • 4 USB 3.0 (Front) • 1 USB 2.0 (Internal)
Isolated DIO	16 Isolated DIO (8 DI, 8 DO)
GPIO	16 GPIO
LED	Power, HDD, Wireless, PoE
SIM Card	4 SIM Card Socket (3 External, 1 Internal)
Expansion	
Mini PCIe	4 Mini PCIe Socket : <ul style="list-style-type: none"> • 1 Mini PCIe Socket for PCIe/ USB/ Internal SIM Card/ Optional mSATA • 3 Mini PCIe Socket for PCIe/ USB/ External SIM Card
SUMIT A, B	2 SUMIT Slot (Optional)
Graphics	
Graphics Processor	Intel® HD Graphics P530/ 530
Display Memory	Shared Memory, up to 1.7GB
Interface	<ul style="list-style-type: none"> • DVI-D : Up to 1920 x 1200 @ 60Hz • DisplayPort 1 : Up to 4096 x 2304 @ 60Hz • DisplayPort 2 : Up to 4096 x 2304 @ 60Hz
Storage	
SATA	6 SATA III (6Gbps) support software RAID 0, 1, 5, 10
mSATA	1 SATA III (Mini PCIe Type, 6Gbps)
Storage Device	<ul style="list-style-type: none"> • 1 CFast Socket, Push-in/ Push-out Ejector • 4 Front-access 2.5" SSD/ HDD Tray

Audio	
Audio Codec	Realtek ALC888S-VD, 7.1 Channel HD Audio
Audio Interface	1 Mic-in, 1 Line-out
Ethernet	
LAN 1	Intel® I219 Gigabit LAN supports iAMT 11.0
LAN 2	Intel® I210 Gigabit LAN
PoE	
LAN 3 to LAN 18	Gigabit IEEE 802.3at (25.5W/48V) PoE ⁺ by Intel® I350
Power	
Power Input	6V to 78V, DC-in
Power Interface	3-pin Terminal Block : V+, V-, Frame Ground
Ignition Control	16 Mode (Internal)
Remote Switch	5-pin Terminal Block : On, Off, IGN, LED+, LED-
Surge Protection	Up to 200V/1ms Transient Power
UPS	Supported (Optional)
Others	
TPM	Optional Infineon SLB9665 supports TPM 2.0, LPC interface
Watchdog Timer	Reset : 1 to 255 sec./min. per step
Smart Management	Wake on LAN, PXE supported
HW Monitor	Monitoring temperature, voltages. Auto throttling control when CPU overheats.
GPS	Onboard GPS Module supports Accelerometer, Gyroscope and Odometer (Optional)
Software Support	
OS	Windows 10, Windows 8.1, Windows 7, Linux
Mechanical	
Dimensions (WxLxH)	260mm x 215mm x 79mm (10.2" x 8.5" x 3.1")
Weight	4.2 kg (9.26 lb)
Mounting	<ul style="list-style-type: none"> • Wallmount by mounting bracket • DIN Rail Mount (Optional) • 2U Rackmount (Optional)
Environment	
Operating Temperature	-25°C to 70°C (-13°F to 158°F)
Storage Temperature	-40°C to 85°C (-40°F to 185°F)
Humidity	5% to 95% Humidity, non-condensing

Relative Humidity	95% at 70°C
Shock	<ul style="list-style-type: none"> • IEC 60068-2-27 • SSD : 50G @ Wallmount, Half-sine, 11ms
Vibration	<ul style="list-style-type: none"> • IEC 60068-2-64 • SSD : 5Grms, 5Hz to 500Hz, 3 Axis
EMC	CE, FCC, EN 50155, EN 50121-3-2

1.3.2 Specifications of IVH-9008-PoER

System	
Processor	Quad Core Intel® Xeon® E3-1505M v5/ Core™ i7-6820EQ/ i5-6440EQ Processor (Skylake-H)
Chipset	Intel® CM236
BIOS	AMI
SIO	IT8786E
Memory	<ul style="list-style-type: none"> • DDR4 2133MHz • Up to 32GB • 2 260-pin SO-DIMM Socket (ECC Function enable depends on processor support)
I/O Interface	
Serial	4 COM RS-232/ 422/ 485 w/ auto flow control
USB	<ul style="list-style-type: none"> • 4 USB 3.0 (Front) • 1 USB 2.0 (Internal)
Isolated DIO	16 Isolated DIO (8 DI, 8 DO)
GPIO	16 GPIO
LED	Power, HDD, Wireless, PoE
SIM Card	4 SIM Card Socket (3 External, 1 Internal)
Expansion	
Mini PCIe	4 Mini PCIe Socket : <ul style="list-style-type: none"> • 1 Mini PCIe Socket for PCIe/ USB/ Internal SIM Card/ Optional mSATA • 3 Mini PCIe Socket for PCIe/ USB/ External SIM Card
SUMIT A, B	2 SUMIT Slot (Optional)
Graphics	
Graphics Processor	Intel® HD Graphics P530/ 530
Display Memory	Shared Memory, up to 1.7GB
Interface	<ul style="list-style-type: none"> • DVI-D : Up to 1920 x 1200 @ 60Hz • DisplayPort 1 : Up to 4096 x 2304 @ 60Hz • DisplayPort 2 : Up to 4096 x 2304 @ 60Hz

Storage	
SATA	6 SATA III (6Gbps) support software RAID 0, 1, 5, 10
mSATA	1 SATA III (Mini PCIe Type, 6Gbps)
Storage Device	<ul style="list-style-type: none"> • 1 CFast Socket, Push-in/ Push-out Ejector • 4 Front-access 2.5" SSD/ HDD Tray
Audio	
Audio Codec	Realtek ALC888S-VD, 7.1 Channel HD Audio
Audio Interface	1 Mic-in, 1 Line-out
Ethernet	
LAN 1	Intel® I219 Gigabit LAN supports iAMT 11.0
LAN 2	Intel® I210 Gigabit LAN
PoE	
LAN 3 to LAN 10	Gigabit IEEE 802.3at (25.5W/48V) PoE ⁺ by Intel® I350
Power	
Power Input	6V to 78V, DC-in
Power Interface	3-pin Terminal Block : V+, V-, Frame Ground
Ignition Control	16 Mode (Internal)
Remote Switch	5-pin Terminal Block : On, Off, IGN, LED+, LED-
Surge Protection	Up to 200V/1ms Transient Power
UPS	Supported (Optional)
Others	
TPM	Optional Infineon SLB9665 supports TPM 2.0, LPC interface
Watchdog Timer	Reset : 1 to 255 sec./min. per step
Smart Management	Wake on LAN, PXE supported
HW Monitor	Monitoring temperature, voltages. Auto throttling control when CPU overheats.
GPS	Onboard GPS Module supports Accelerometer, Gyroscope and Odometer (Optional)
Software Support	
OS	Windows 10, Windows 8.1, Windows 7, Linux
Mechanical	
Dimensions (WxLxH)	260mm x 215mm x 79mm (10.2" x 8.5" x 3.1")
Weight	4.2 kg (9.26 lb)
Mounting	<ul style="list-style-type: none"> • Wallmount by mounting bracket • DIN Rail Mount (Optional) • 2U Rackmount (Optional)

Environment	
Operating Temperature	-25°C to 70°C (-13°F to 158°F)
Storage Temperature	-40°C to 85°C (-40°F to 185°F)
Humidity	5% to 95% Humidity, non-condensing
Relative Humidity	95% at 70°C
Shock	<ul style="list-style-type: none"> • IEC 60068-2-27 • SSD : 50G @ Wallmount, Half-sine, 11ms
Vibration	<ul style="list-style-type: none"> • IEC 60068-2-64 • SSD : 5Grms, 5Hz to 500Hz, 3 Axis
EMC	CE, FCC, EN 50155, EN 50121-3-2

1.3.3 Specifications of IVH-9000-2R

System	
Processor	Quad Core Intel® Xeon® E3-1505M v5/ Core™ i7-6820EQ/ i5-6440EQ Processor (Skylake-H)
Chipset	Intel® CM236
BIOS	AMI
SIO	IT8786E
Memory	<ul style="list-style-type: none"> • DDR4 2133MHz • Up to 32GB • 2 260-pin SO-DIMM Socket (ECC Function enable depends on processor support)
I/O Interface	
Serial	4 COM RS-232/ 422/ 485 w/ auto flow control
USB	<ul style="list-style-type: none"> • 4 USB 3.0 (Front) • 1 USB 2.0 (Internal)
Isolated DIO	16 Isolated DIO (8 DI, 8 DO)
GPIO	16 GPIO
LED	Power, HDD, Wireless
SIM Card	4 SIM Card Socket (3 External, 1 Internal)
Expansion	
Mini PCIe	4 Mini PCIe Socket : <ul style="list-style-type: none"> • 1 Mini PCIe Socket for PCIe/ USB/ Internal SIM Card/ Optional mSATA • 3 Mini PCIe Socket for PCIe/ USB/ External SIM Card
SUMIT A, B	2 SUMIT Slot (Optional)

Graphics	
Graphics Processor	Intel® HD Graphics P530/ 530
Display Memory	Shared Memory, up to 1.7GB
Interface	<ul style="list-style-type: none"> • DVI-D : Up to 1920 x 1200 @ 60Hz • DisplayPort 1 : Up to 4096 x 2304 @ 60Hz • DisplayPort 2 : Up to 4096 x 2304 @ 60Hz
Storage	
SATA	6 SATA III (6Gbps) support software RAID 0, 1, 5, 10
mSATA	1 SATA III (Mini PCIe Type, 6Gbps)
Storage Device	<ul style="list-style-type: none"> • 1 CFast Socket, Push-in/ Push-out Ejector • 4 Front-access 2.5" SSD/ HDD Tray
Audio	
Audio Codec	Realtek ALC888S-VD, 7.1 Channel HD Audio
Audio Interface	1 Mic-in, 1 Line-out
Ethernet	
LAN 1	Intel® I219 Gigabit LAN supports iAMT 11.0
LAN 2	Intel® I210 Gigabit LAN
Power	
Power Input	6V to 78V, DC-in
Power Interface	3-pin Terminal Block : V+, V-, Frame Ground
Ignition Control	16 Mode (Internal)
Remote Switch	5-pin Terminal Block : On, Off, IGN, LED+, LED-
Surge Protection	Up to 200V/1ms Transient Power
UPS	Supported (Optional)
Others	
TPM	Optional Infineon SLB9665 supports TPM 2.0, LPC interface
Watchdog Timer	Reset : 1 to 255 sec./min. per step
Smart Management	Wake on LAN, PXE supported
HW Monitor	Monitoring temperature, voltages. Auto throttling control when CPU overheats.
GPS	Onboard GPS Module supports Accelerometer, Gyroscope and Odometer (Optional)
Software Support	
OS	Windows 10, Windows 8.1, Windows 7, Linux
Mechanical	
Dimensions (WxLxH)	260mm x 215mm x 79mm (10.2" x 8.5" x 3.1")

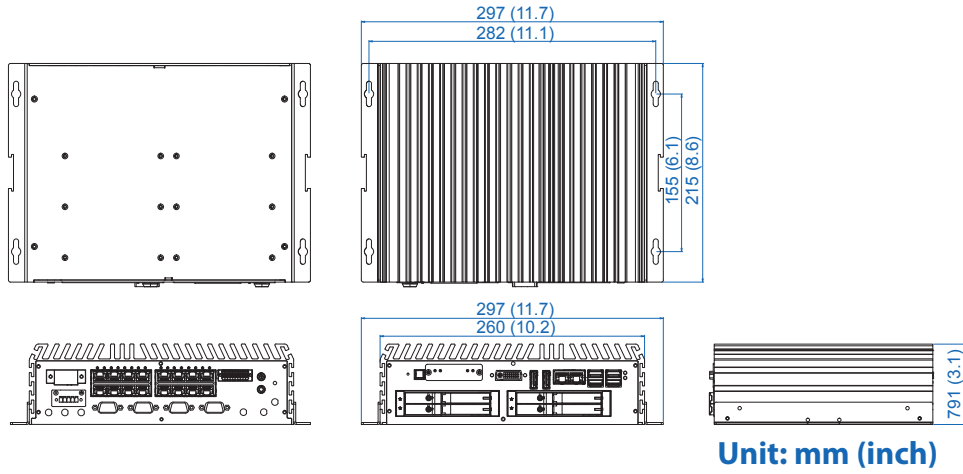
Weight	4.2 kg (9.26 lb)
Mounting	<ul style="list-style-type: none"> • Wallmount by mounting bracket • DIN Rail Mount (Optional) • 2U Rackmount (Optional)
Environment	
Operating Temperature	-25°C to 70°C (-13°F to 158°F)
Storage Temperature	-40°C to 85°C (-40°F to 185°F)
Humidity	5% to 95% Humidity, non-condensing
Relative Humidity	95% at 70°C
Shock	<ul style="list-style-type: none"> • IEC 60068-2-27 • SSD : 50G @ Wallmount, Half-sine, 11ms
Vibration	<ul style="list-style-type: none"> • IEC 60068-2-64 • SSD : 5Grms, 5Hz to 500Hz, 3 Axis
EMC	CE, FCC, EN 50155, EN 50121-3-2

1.4 Supported CPU List

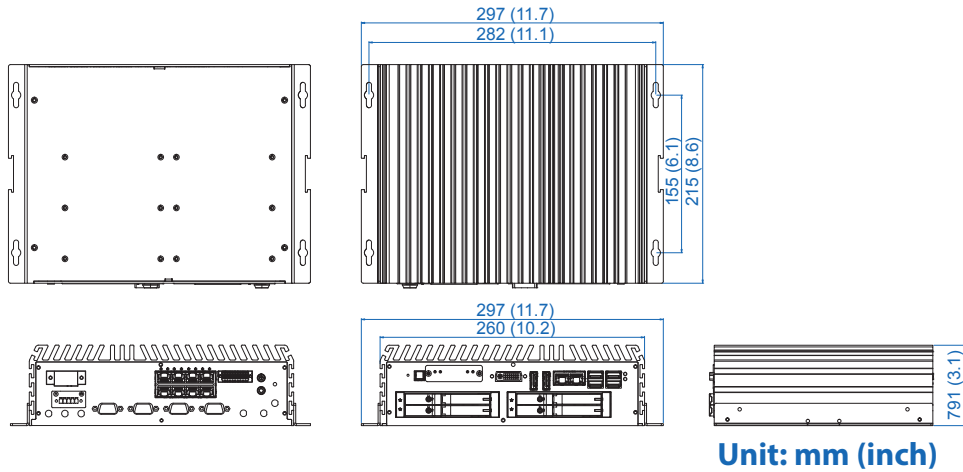
Processor No.	TDP	Cache	Max. Frequency	Embedded
Xeon® E3-1575M v5	45W	8M	Up to 3.00 GHz	
Xeon® E3-1545M v5	45W	8M	Up to 2.90 GHz	
Xeon® E3-1535M v5	45W	8M	Up to 2.80 GHz	
Xeon® E3-1515M v5	45W	8M	Up to 2.80 GHz	
Xeon® E3-1505M v5	45W	8M	Up to 2.80 GHz	Yes
Xeon® E3-1505L v5	25W	8M	Up to 2.00 GHz	
Core i7-6970HQ	45W	8M	Up to 3.70 GHz	
Core i7-6920HQ	45W	8M	Up to 3.80 GHz	
Core i7-6870HQ	45W	8M	Up to 3.60 GHz	
Core i7-6820HQ	45W	8M	Up to 3.60 GHz	
Core i7-6770HQ	45W	6M	Up to 3.50 GHz	
Core i7-6700HQ	45W	6M	Up to 3.50 GHz	
Core i7-6820EQ	45W	8M	Up to 3.50 GHz	Yes
Core i7-6822EQ	25W	8M	Up to 2.80 GHz	
Core i5-6440HQ	45W	6M	Up to 3.50 GHz	
Core i5-6350HQ	45W	6M	Up to 3.20 GHz	
Core i5-6300HQ	45W	6M	Up to 3.20 GHz	
Core i5-6440EQ	45W	6M	Up to 3.40 GHz	Yes
Core i5-6442EQ	45W	6M	Up to 2.70 GHz	

1.5 Mechanical Dimension

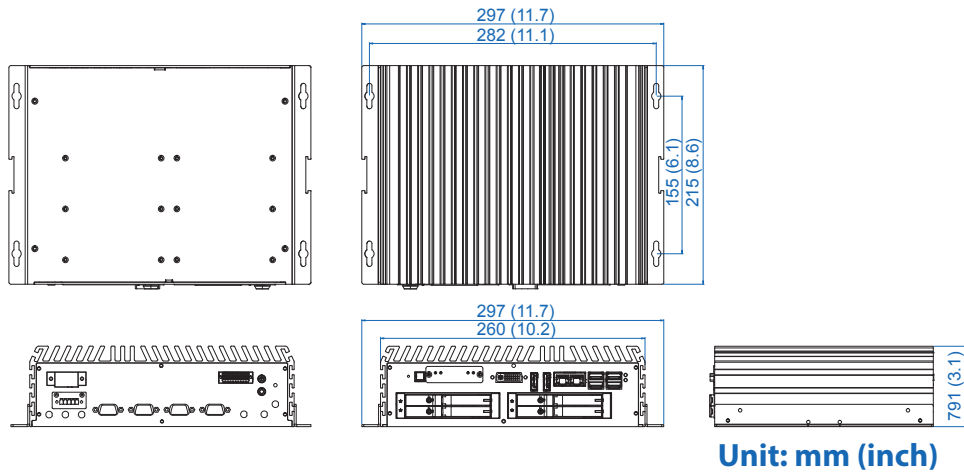
1.5.1 Dimensions of IVH-9016-PoER



1.5.2 Dimensions of IVH-9008-PoER



1.5.3 Dimensions of IVH-9000-2R



2

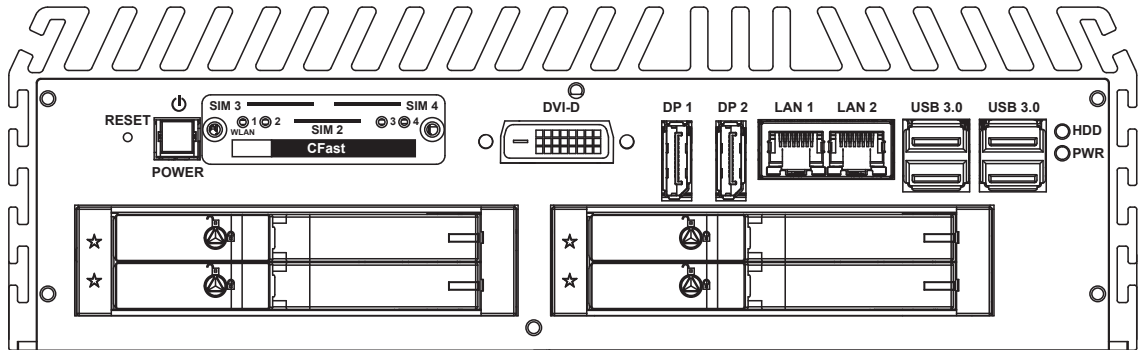
GETTING TO KNOW YOUR IVH-9000

2.1 Packing List

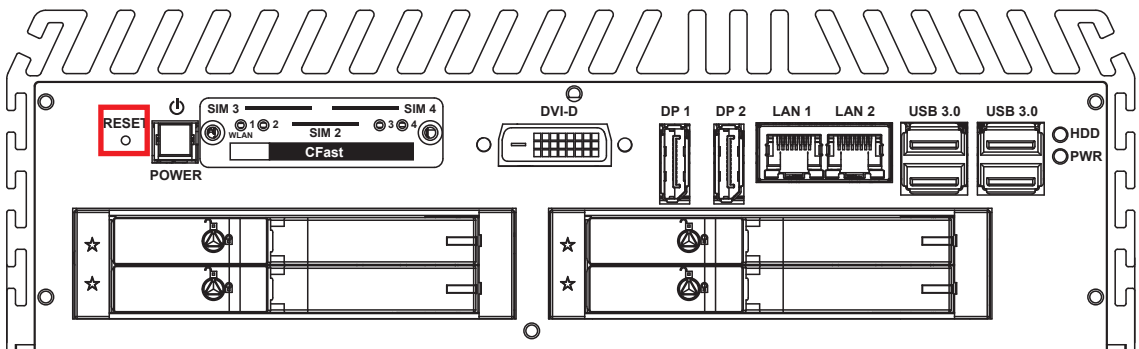
Item	Description	Qty
1	IVH-9000 In-Vehicle Fanless Embedded System (According to the configuration you order, the IVH-9000 series may contain SSD/HDD and DDR4 SO-DIMM. Please verify these items if necessary.)	1
2	Accessory box, which contains <ul style="list-style-type: none">• Wall-mounting bracket• KHS#6-32x6 screw for wall-mounting bracket• M2.5x6 screw for Mini PCIe socket• 3-pin pluggable terminal block• 5-pin Pluggable terminal block• 20-pin pluggable terminal block• Foot Pad• HDD Tray Key	2 4 8 1 1 1 4 2

2.2 Front Panel I/O Functions

In Vecow IVH-9000 series family, all I/O connectors are located on front panel and rear panel. Most of the general connections to computer device, such as USB, LAN Jack, Display, DVI-D, Display Port and any additional storage, are placed on the front panel.

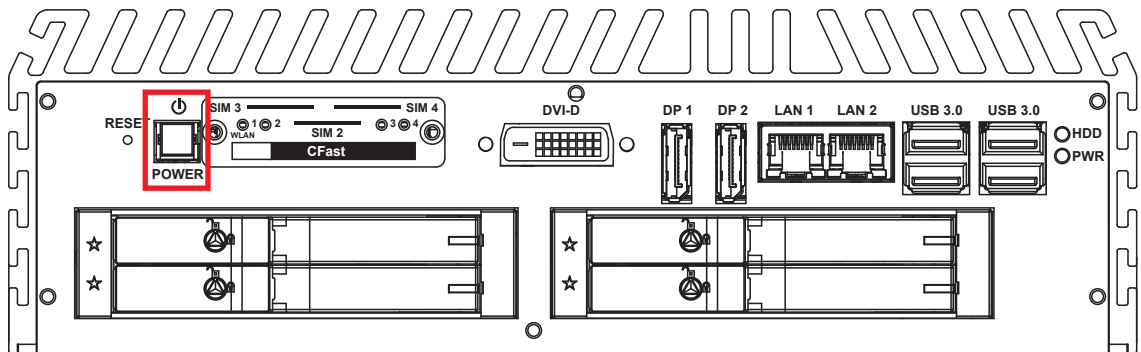


2.2.1 Reset Tact Switch



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.

2.2.2 Power Button



The Power Button is a non-latched switch with dual color LED indication. 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

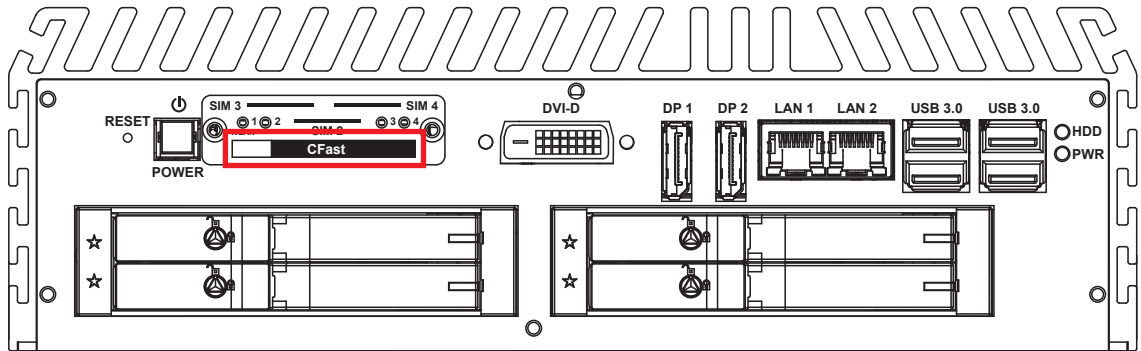
To power on the system, press the power button and then the blue LED is lightened.

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).

2.2.3 CFast Card



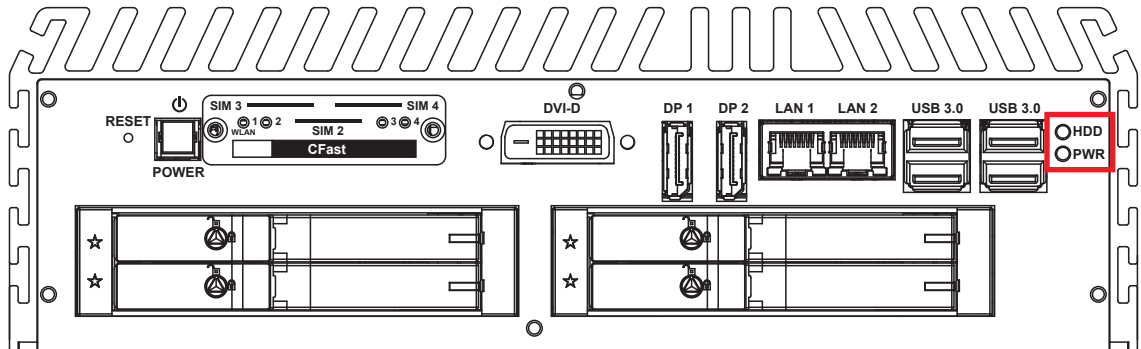
There is a CFast socket on the front panel supporting Type-I/II Compact Flash card.

It is implemented by a SATA III Port from CM236 PCH. Be sure to disconnect the power source and unscrew the CFast socket cover before installing a CFast card. The IVH-9000 does not support the CFast hot swap and PnP (Plug and Play) functions. It is necessary to remove power source first before inserting or removing the CFast card.

The pinouts of CFast port are listed as follows:

Pin No.	Description	Pin No.	Description
S1	GND	PC6	NC
S2	SATA_TXP5	PC7	GND
S3	SATA_TXN5	PC8	CFAST_LED
S4	GND	PC9	NC
S5	SATA_RXN5	PC10	NC
S6	SATA_RXP5	PC11	NC
S7	GND	PC12	NC
PC1	GND	PC13	+3.3V
PC2	GND	PC14	+3.3V
PC3	NC	PC15	GND
PC4	NC	PC16	GND
PC5	NC	PC17	NC

2.2.4 PWR and HDD LED Indicator

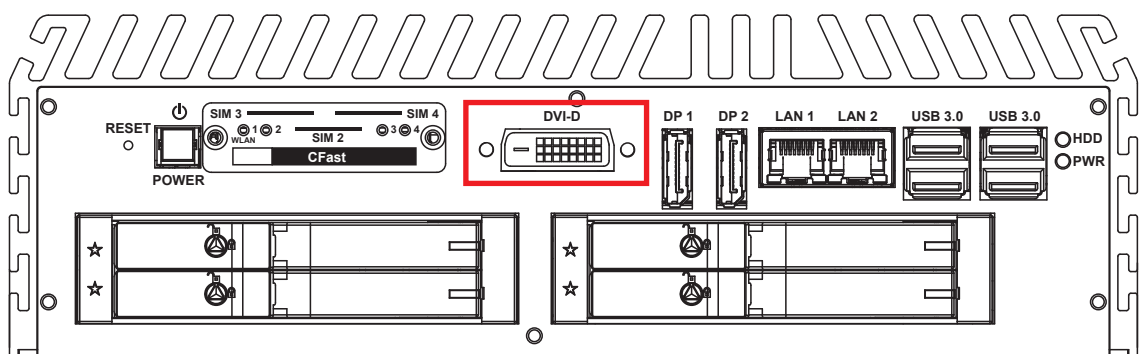


HDD LED/ Yellow: A Hard Disk/ CFast LED. If the LED is on, it indicates that the system's storage is functional. If it is off, it indicates that the system's storage is not functional. If it is flashing, it indicates data access activities.

Power LED/ Green: If the LED is solid green, it indicates that the system is powered on.

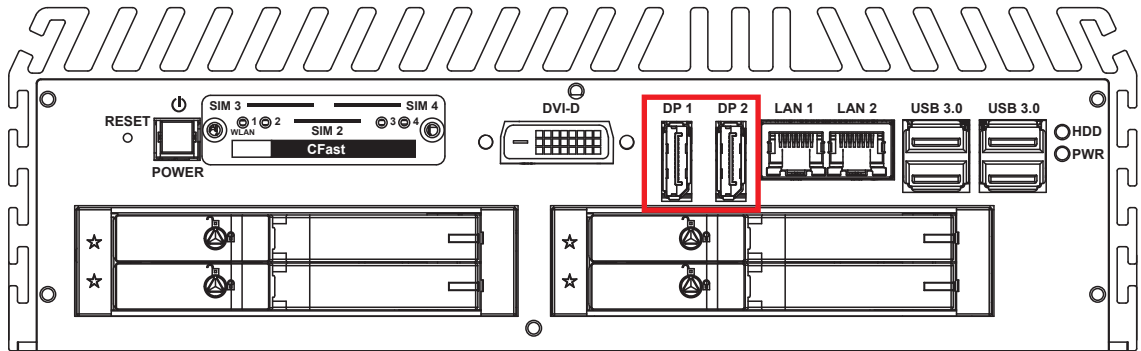
LED Color	Power Status	System Status
Yellow	HDD/ CFast	<ul style="list-style-type: none"> On/ Off : Storage status, function or not. Twinkling : Data transferring.
Green	Power	System power status (on/ off)

2.2.5 DVI-D Connector



The DVI-D connector on the front panel supports both DVI display. This connector can either output DVI signals signal. The DVI output mode supports up to 1920 x 1200 resolution and output mode supports up to 1920 x 1200 resolution. The DVI is automatically selected according to the display device connected. You will need a DVI-D cable when connecting to a display device.

2.2.6 DisplayPort

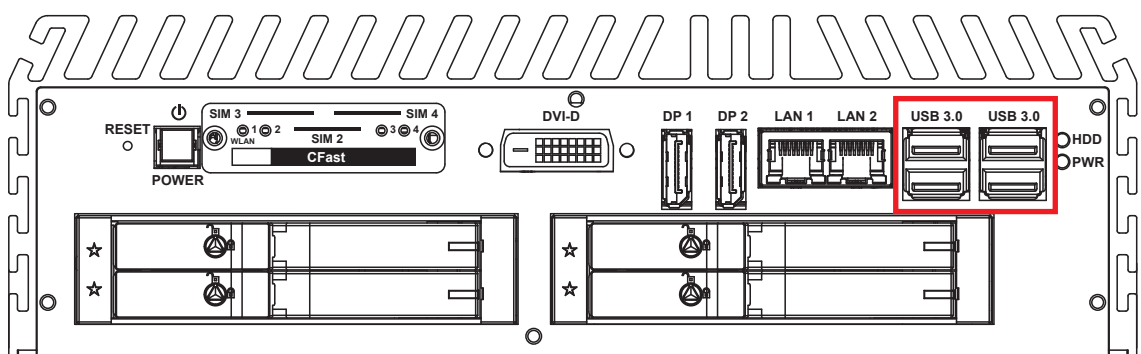


Onboard Display Port support auxiliary channel dual mode, connection supports up to 4096x2304 resolution at 60 Hz.

Multi-Stream Transport Display Resolutions Table:

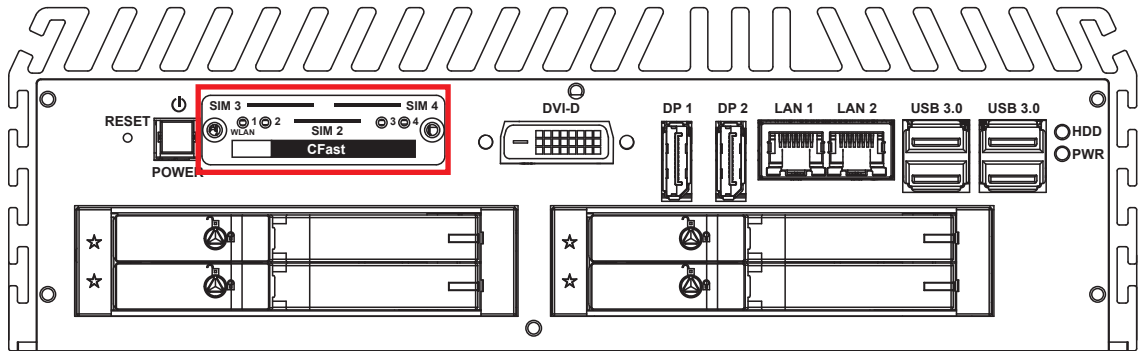
Multi-Stream Transport Display	Max. Resolution
One panel Display	4096x2304@60Hz
Two panel Displays concurrently	2880x1800@60Hz
Three panel Displays concurrently	2304x1440@60Hz

2.2.7 USB 3.0



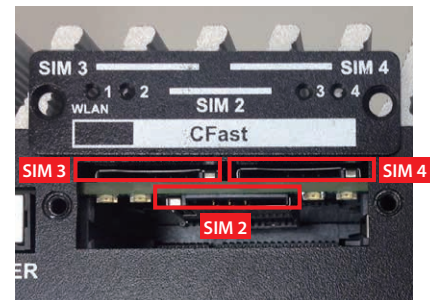
There are 4 USB 3.0 connections available supporting up to 5GB per second data rate in the front side of IVH-9000. It also compliant with the requirements of Super Speed (SS), high speed (HS), full speed (FS) and low speed (LS).

2.2.8 WLAN LED, Mini PCIe, SIM Card Comparison



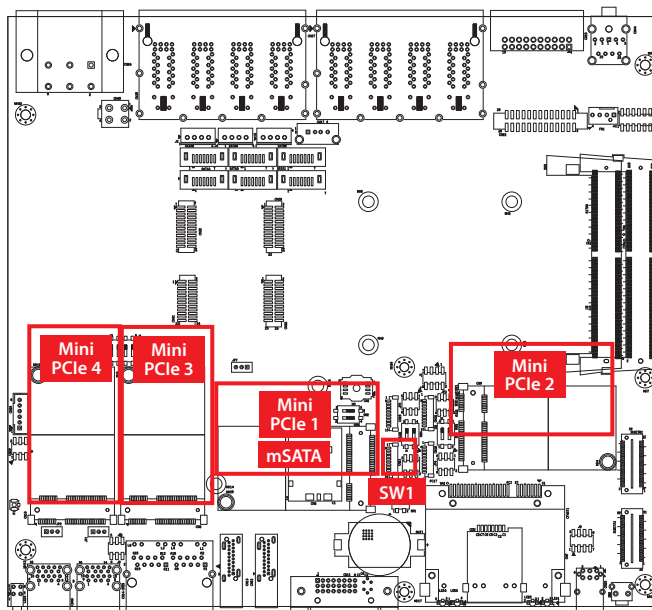
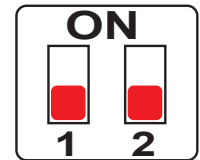
Mini PCIe Slot/ SIM Slot/ WLAN LED Mapping Table :

Mini PCIe	SIM	LED
Mini PCIe 1/ mSATA (CN4)	SIM 1 (CN5)	1
Mini PCIe 2 (CN6)	SIM 2 (CN7)	2
Mini PCIe 3 (CN8)	SIM 3 (CN9)	3
Mini PCIe 4 (CN10)	SIM 4 (CN42)	4



SW1: Mini PCIe 1/ mSATA Select SW

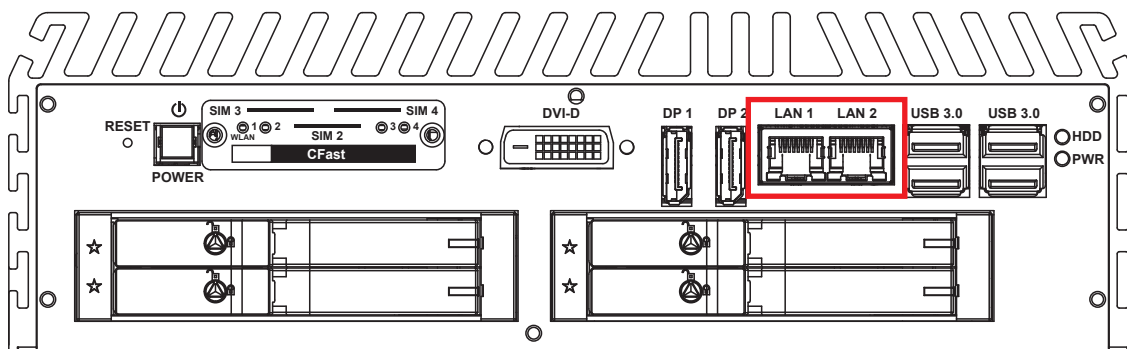
DIP Switch		LED
SW 1-1	SW 1-2	
ON	N/C	Mini PCIe
OFF	N/C	Auto Detection (Default)



Note:

The SIM card sockets do not support hot-plug. Please make sure to unplug the system power before inserting the SIM card(s).

2.2.9 10/ 100/ 1000 Mbps Ethernet Port



There are 2 8-pin RJ-45 jacks supporting 10/ 100/1000 Mbps Ethernet connections in the front side. LAN 1 is powered by Intel i219 Ethernet Phy; LAN 2 is powered by Intel I210 Ethernet engine. When both LAN 1 and LAN 2 work in normal status, iAMT 11.0 function is enabled.

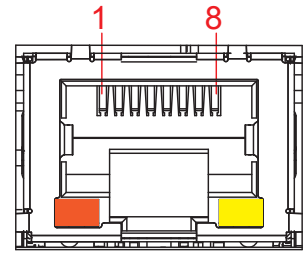
Using suitable RJ-45 cable, you can connect the system to a computer, or to any other devices with Ethernet connection, for example, a hub or a switch. Moreover, both of LAN 1 and LAN 2 supports Wake on LAN and Pre-boot functions. The pin-outs of LAN 1 and LAN 2 are listed as follows:

Pin No.	10/ 100Mbps	1000Mbps
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

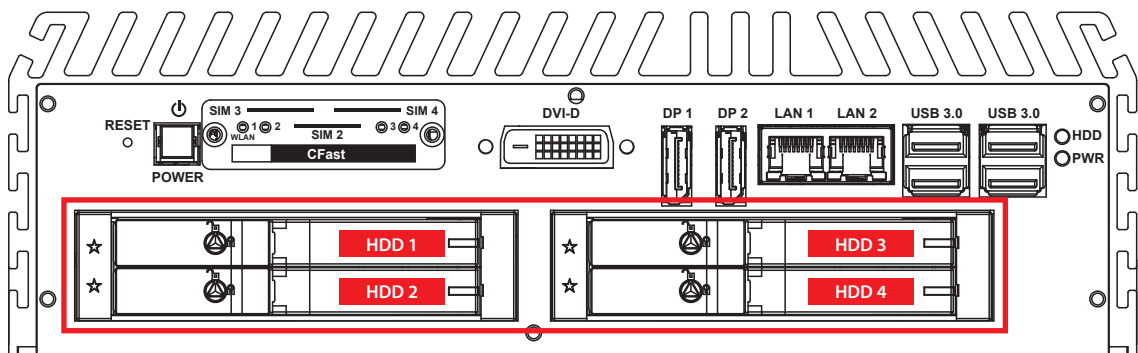
Each LAN port is supported by standard RJ-45 connector with LED indicators to present Active/ Link/ Speed status of the connection.

The LED indicator on the right bottom corner lightens in solid green when the cable is properly connected to a 100 Mbps Ethernet network; The LED indicator on the right bottom corner lightens in solid orange when the cable is properly connected to a 1000Mbps Ethernet network; The left LED will keep twinkling/ off when Ethernet data packets are being transmitted/ received.

	10Mbps	100Mbps	1000Mbps
Right Bottom Led	Off	Solid Green	Solid Orange
Left Bottom Led	Flash Yellow	Flash Yellow	Flash Yellow



2.2.10 Front-access SSD/ HDD Tray

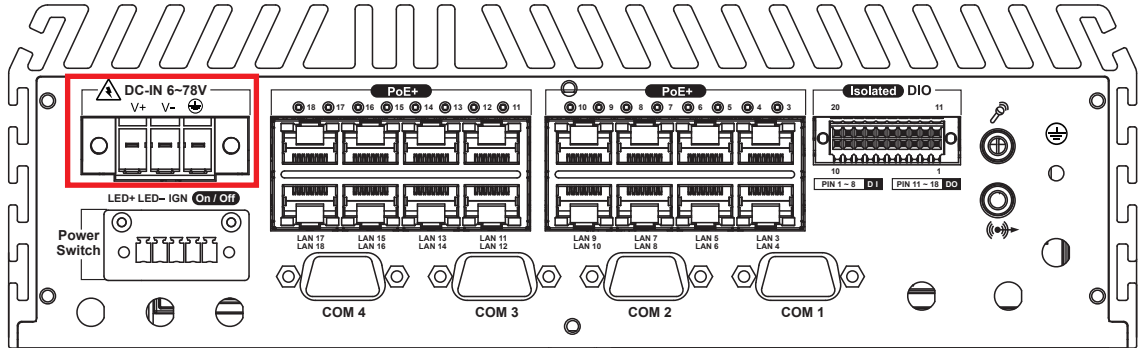


There are 4 front-access 2.5" SSD/ HDD trays in the front side of IVH-9000. Just trigger to open the SSD/ HDD tray, up to 8TB is available.

HDD Tray	MB Connector
HDD 1	SATA1
HDD 2	SATA2
HDD 3	SATA3
HDD 4	SATA4

2.3 Rear Panel I/O and Functions

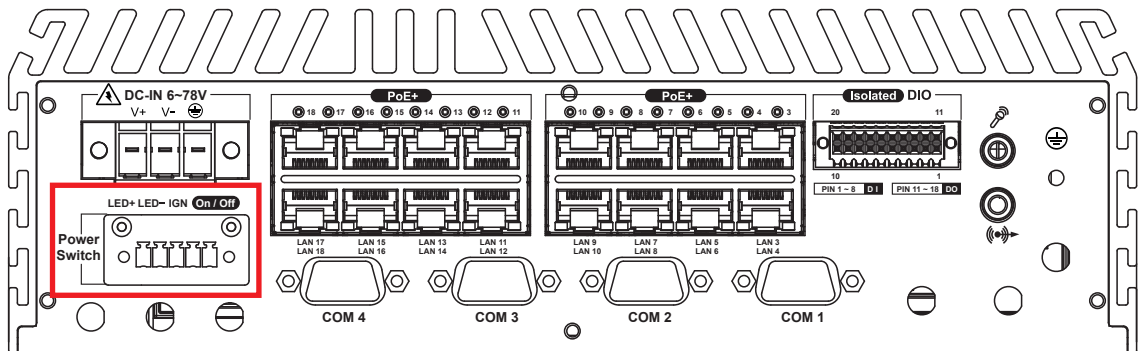
2.3.1 Power Terminal Block



This system supports 6V to 78V DC power input by terminal block in the rear side. In normal power operation, power LED lightens in solid green. Supports up to 200V surge protection.

Pin No.	Definition	Pin No.	Definition
1	V+	2	V-
3	Chassis Ground		

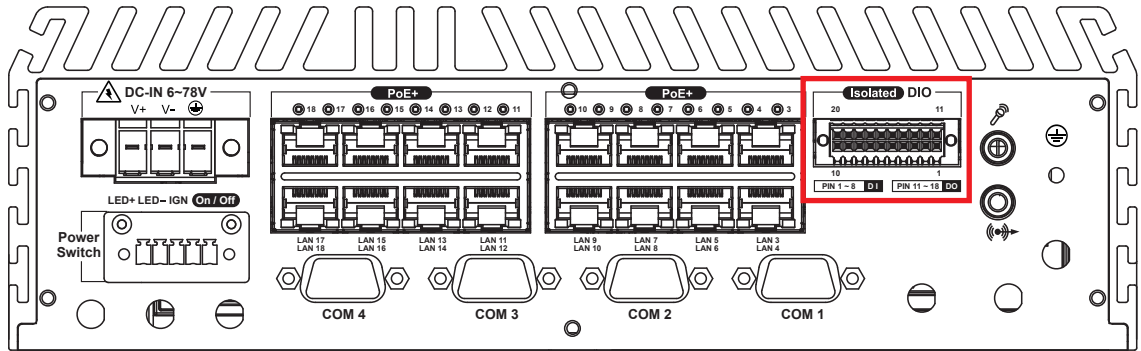
2.3.2 Remote Power On/ Off Switch & LED Terminal Block



It is a 5-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 suspend mode.

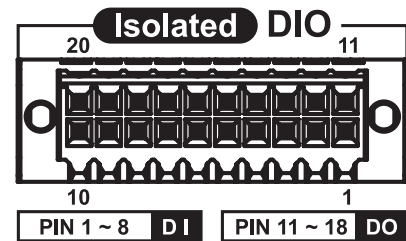
Pin No.	Definition	Pin No.	Definition
1	External Power Button V+	2	External Power Button V-
3	Ignition	4	External Power LED V-
5	External Power LED V+		

2.3.3 Isolated DIO



There is a 16-bit DIO (8-bit DI, 8-bit DO) connector in the rear side. Each DIO channel is equipped with a photocoupler for isolated protection. A power buffer device TPD2007F integrated in 8-bit DO circuit for motors, solenoids, and lamp driver applications. Please refer to [Appendix A](#) for more details.

Pin No.	Definition	Mapping to SIO GPIO Function
1	INPUT 0	SIO_GPI80
2	INPUT 1	SIO_GPI81
3	INPUT 2	SIO_GPI82
4	INPUT 3	SIO_GPI83
5	INPUT 4	SIO_GPI84
6	INPUT 5	SIO_GPI85
7	INPUT 6	SIO_GPI86
8	INPUT 7	SIO_GPI87
9	DI_COM	-----
10	GND	-----
11	OUTPUT 0	SIO_GPO70
12	OUTPUT 1	SIO_GPO71

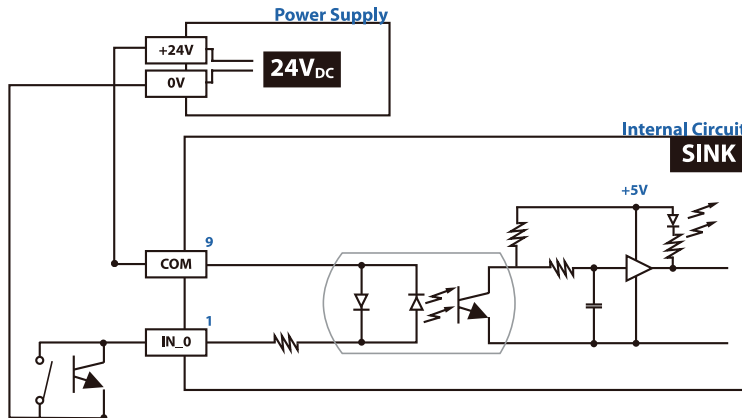


13	OUTPUT 2	SIO_GPO72
14	OUTPUT 3	SIO_GPO73
15	OUTPUT 4	SIO_GPO74
16	OUTPUT 5	SIO_GPO75
17	OUTPUT 6	SIO_GPO76
18	OUTPUT 7	SIO_GPO77
19	N.C.	-----
20	External 6V to 36V DC Input	-----

24V Application Diagram :

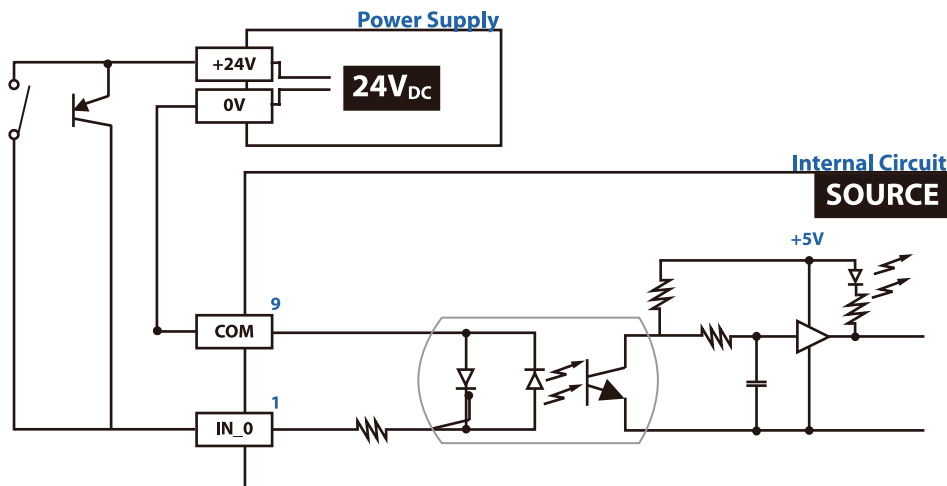
GPI SINK Mode

Isolated GPI input circuit in SINK mode (NPN) is illustrated as follow :



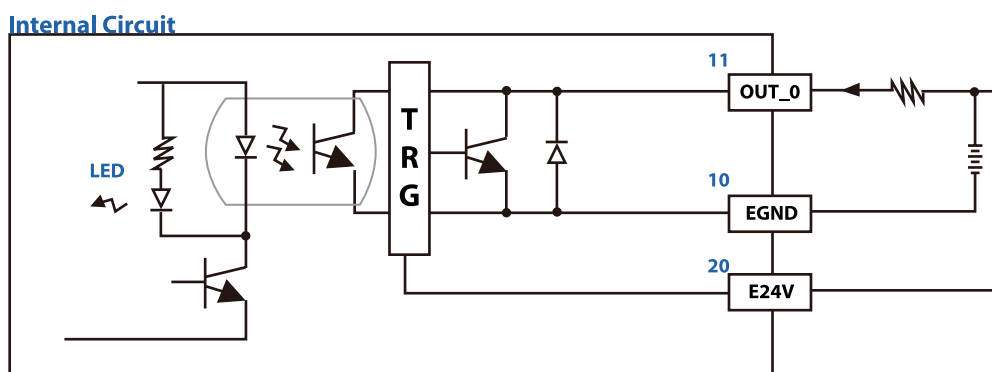
GPI SOURCE Mode

Digital GPI input signal circuit in SOURCE mode (PNP) is illustrated as follow :

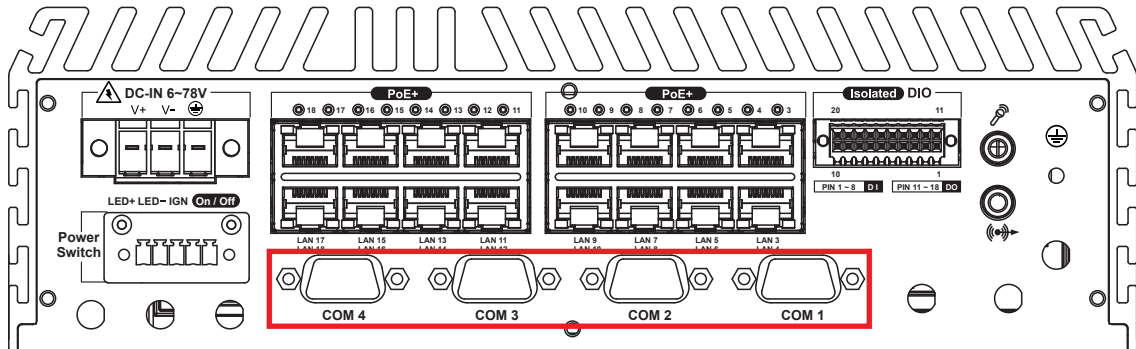


GPO SINK Mode

Digital GPO output circuit in SINK mode (NPN) is illustrated as follow :



2.3.4 Serial Port



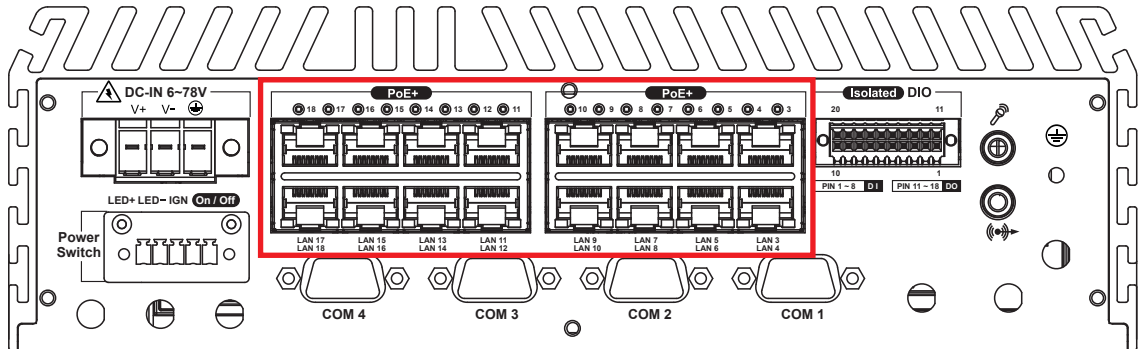
Serial port 1 to 4 (COM 1 to 4) can be configured for RS-232, RS-422, or RS-485 with auto flow control communication. The default definition of COM 1 and COM 2 is RS-232, if you want to change to RS-422 or RS-485, you can find the setting in BIOS.

BIOS Setting	Function
COM 1 (CN 18)	RS-232
	RS-422 (5-wire)
COM 2 (CN 19)	RS-422 (9-wire)
COM 3 (CN 20)	RS-485
COM 4 (CN 21)	RS-485 w/z auto-flow control

The pin assignments are listed in the table as follow :

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

2.3.6 PoE (Power over Ethernet) Ports



There are 16 RJ45 connectors in the rear side. It supports IEEE 802.3at (PoE+) Power over Ethernet (PoE) connection delivering up to 25.5W/ 48V per port (Total 160W) and 1000BASE-T gigabit data signals over standard Ethernet Cat 5/ Cat 6 cable.

Each PoE connection is powered by Intel® I350 Gigabit Ethernet controller and independent PCI express interface to connect with multi-core processor for network and data transmit optimization. Only when PoE port starts to supply power to power devices, the dedicated LED will be lightened.

PS. Suggest to use 160W PoE when power input is over 12V, use 80W PoE when power input is over 9V

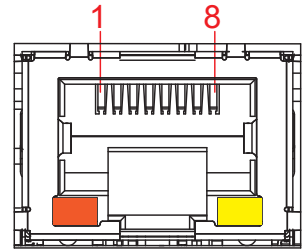
The pin-outs of LAN 3 and LAN 18 are listed as follows:

Pin No.	10/ 100 Mbps	1000 Mbps	PoE
1	E_TX+	MDIO_P	PoE+
2	E_TX-	MDIO_N	PoE+
3	E_RX+	MDI1_P	PoE-
4	----	MDI2_P	----
5	-----	MDI2_N	----
6	E_RX-	MDI1_N	PoE-
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.

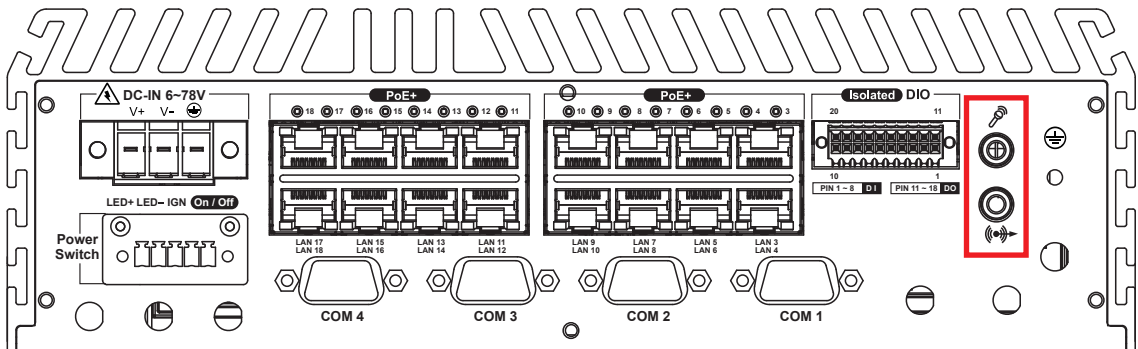
The LED indicator on the right bottom corner lightens in solid green when the cable is properly connected to a 100 Mbps Ethernet network; The LED indicator on the right bottom corner lightens in solid orange when the cable is properly connected to a 1000 Mbps Ethernet network; The left LED will keep twinkling/off when Ethernet data packets are being transmitted/ received.

LED Status	10Mbps	100Mbps	1000Mbps
Right Bottom Led	Off	Solid Green	Solid Orange
Left Bottom Led	Flash Yellow	Flash Yellow	Flash Yellow



POE LED	LED Color	POE Status
LED 3 - 18	Solid Green	POE ON

2.3.7 Audio Jack

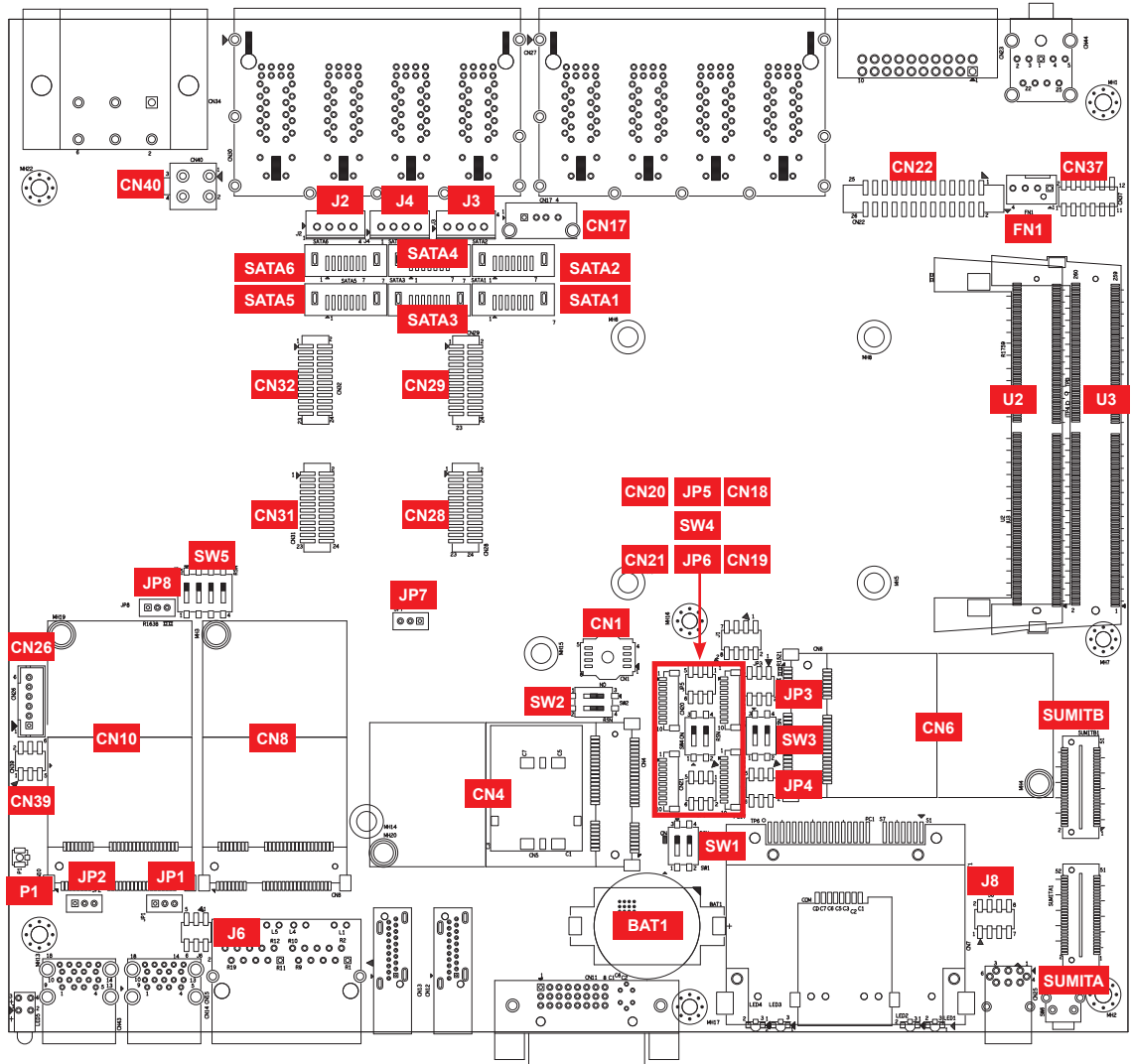


There are 2 audio connectors, Mic-in and Line-out, in the front side of IVH-9000. Onboard Realtek ALC888S-VD audio codec supports 7.1 channel HD audio and fully complies with Intel® High Definition Audio (Azalia) specifications.

To utilize the audio function in Windows platform, you need to install corresponding drivers for both Intel® CM236 chipset and Realtek ALC888S-VD codec.

2.4 Main Board Expansion Connectors

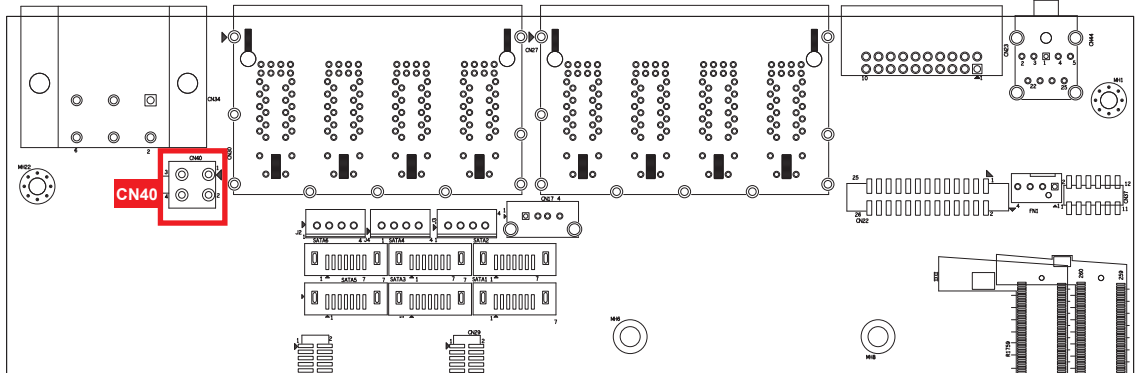
2.4.1 Inside View of IVH-9000 Main Board With Connector Location



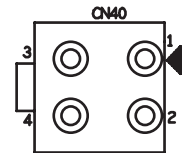
2.4.2 CN40 : UPS Power Connector

For UPS module optional, 4.2mm 2x2p power connector

This system have a UPS power input connector for Optional part UPS Module.



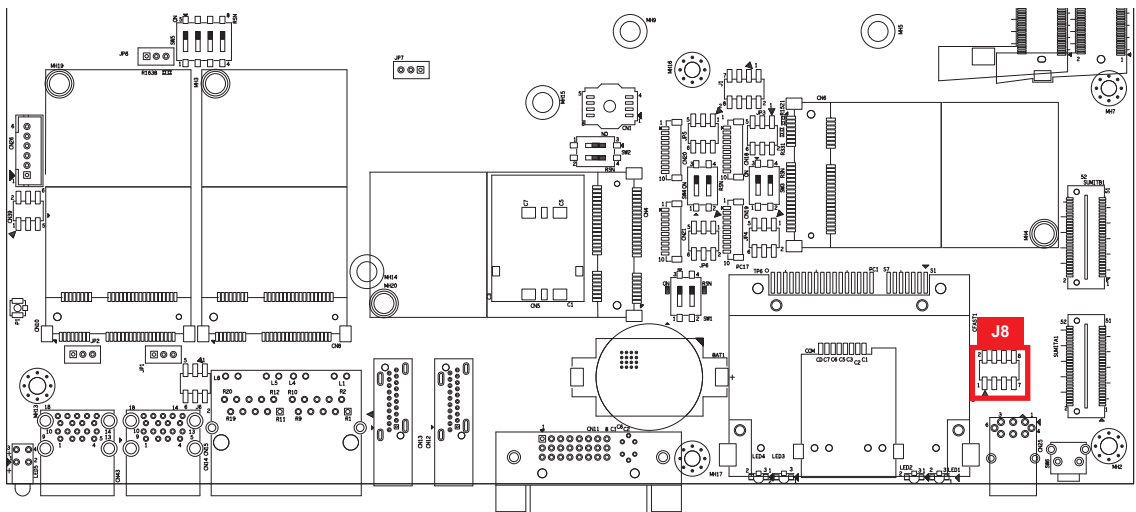
Pin No.	Definition	Pin No.	Definition
1	Ground	2	Ground
3	+VDC_IN (6~78V, Max.8A)	4	+VDC_IN (6~78V, Max.8A)



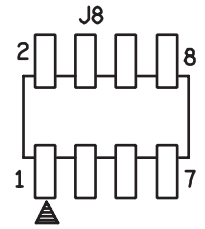
2.4.3 J8 : Miscellaneous Pin Header

2.0mm 2x4p header

This pin header can be used as a backup for following functions, hard drive LED indicator, reset button, power LED indicator, and power-on/ off button, which already can be accessed by front panel and top panel. The pin-outs of Miscellaneous port are listed in following table:

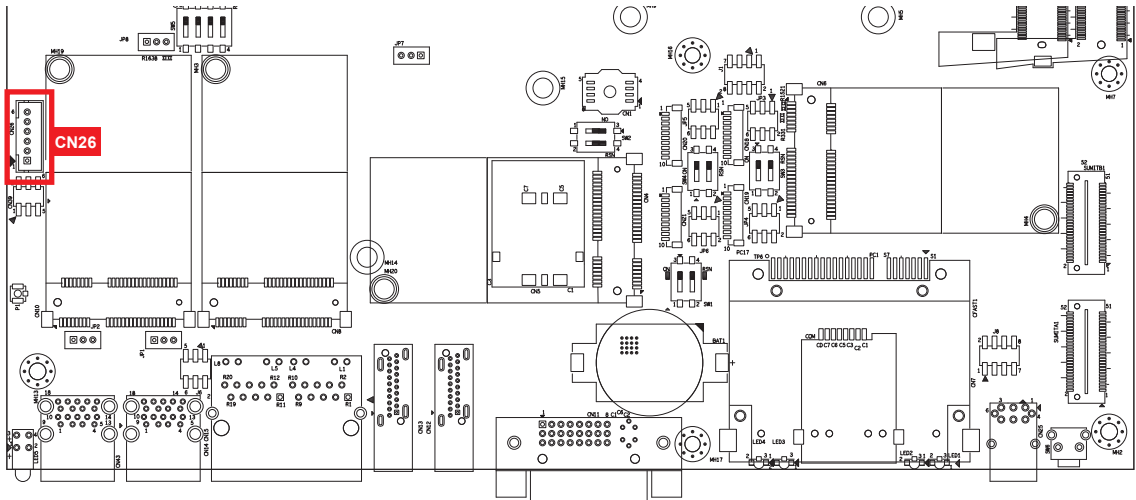


Group	Pin No.	Description
HDD LED	1	HDD_LED_P
	3	HDD_LED_N
RESET BUTTON	5	FP_RST_BTN_N
	7	Ground
POWER LED	2	PWR_LED_P
	4	PWR_LED_N
POWER BUTTON	6	FP_PWR_BTN_IN
	8	Ground

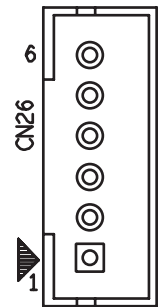


2.4.4 CN26 : Internal Remote Header

For External Remote Terminal Block, 2.0mm 1x6p Header

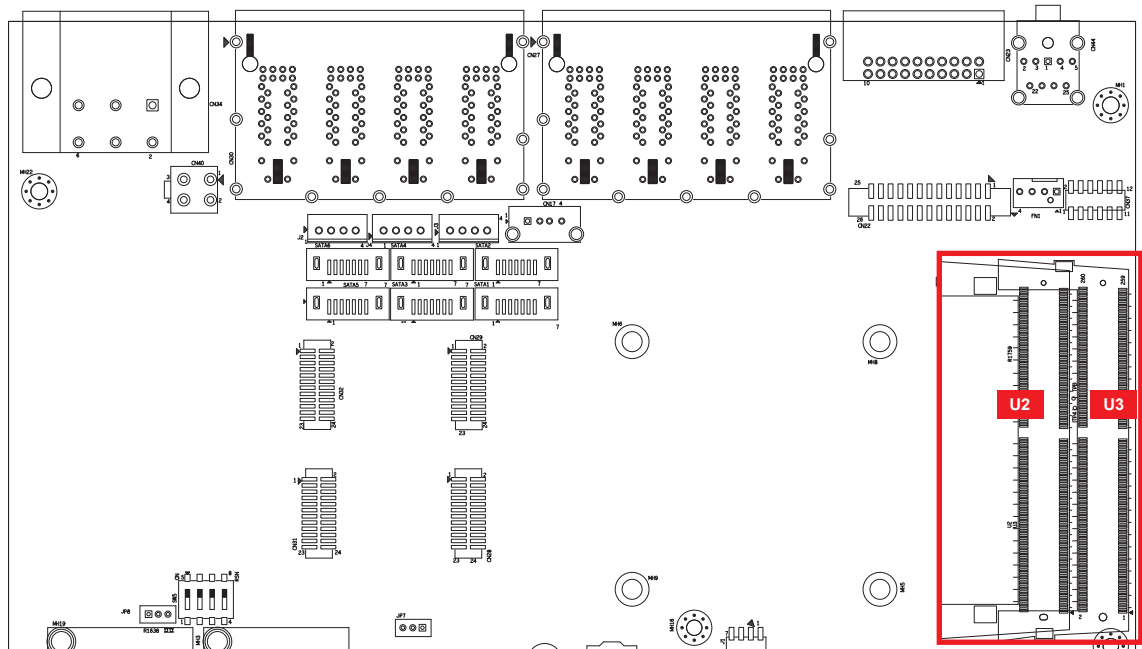


Pin No.	Definition	Pin No.	Definition
1	Power LED+ (3.3V/12mA)	2	Power LED-
3	NC	4	Ground
5	Power Button- (GND)	6	Power Button+ (FP_PWR_BTN_IN)



2.4.5 U2, U3 : DDR4 Slot

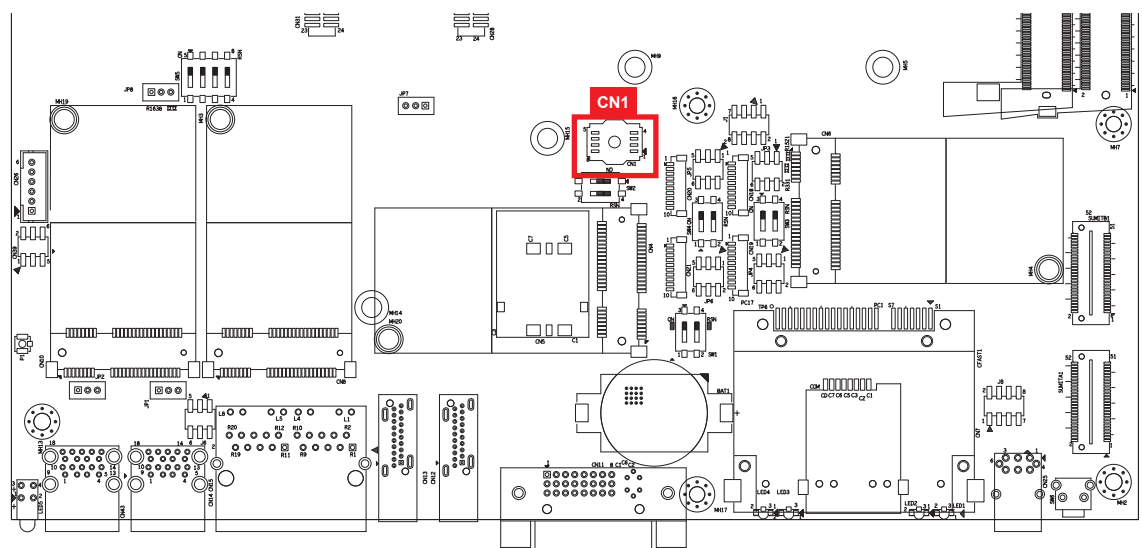
There are 2 DDR4 channel onboard, support DDR4 2133/1866, max 32GB
Each channel 16GB



Pin No.	Definition	Pin No.	Definition
Slot1 / U2	DDR4 Channel A	Slot2 / U3	DDR4 Channel B

2.4.6 CN1 : BIOS Socket

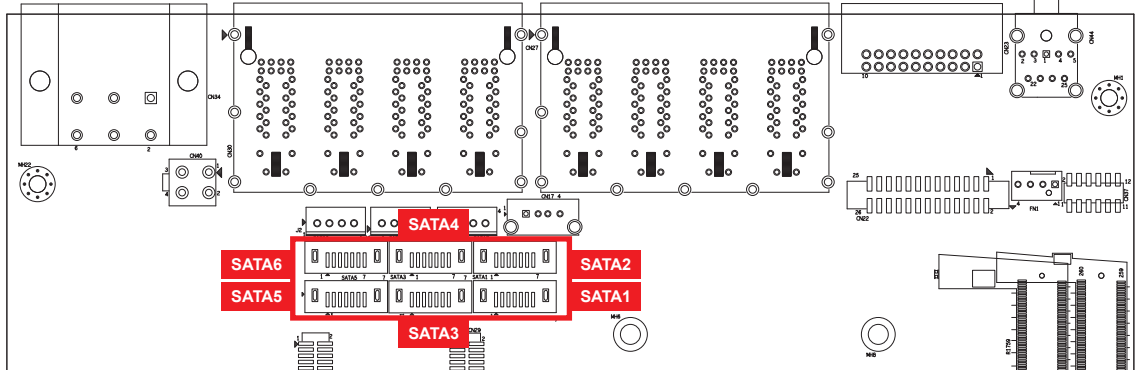
If the BIOS needs to be changed, please contact the Vecow RMA service team.



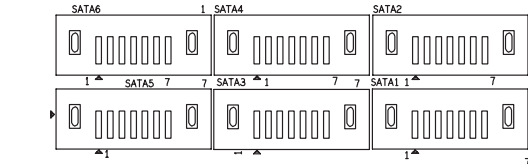
2.4.7 SATA 1 to 6 Connector

Standard 7 PIN SATA Connector

There are 6 onboard high performance Serial ATA III. It supports higher storage capacity with less cabling effort and smaller required space. The pin assignments of SATA 1 to 6 are listed in the following table :



Pin No.	Definition
1	Ground
2	TX DP
3	TX DN
4	Ground
5	RX DN

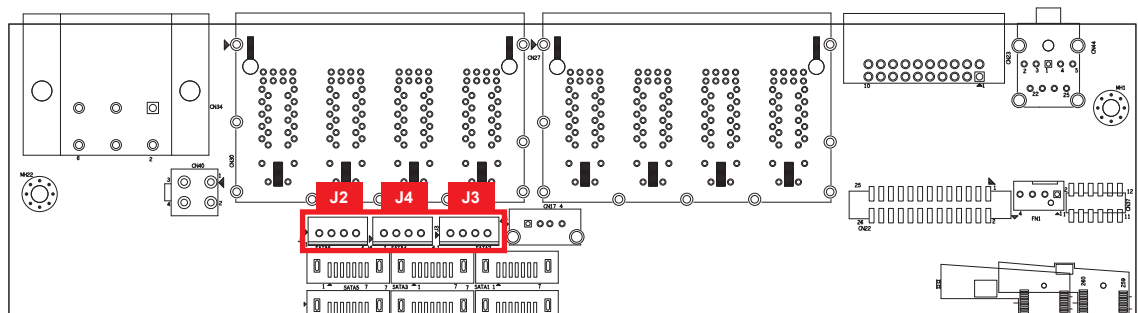


Pin No.	Definition
6	RX DP
7	Ground

2.4.8 J2, J3, J4 : SATA Power Header

Standard small form factor 1x4p power header

There are 3 HDD power header on board, each power header supports 2 2.5" SATA HDD.



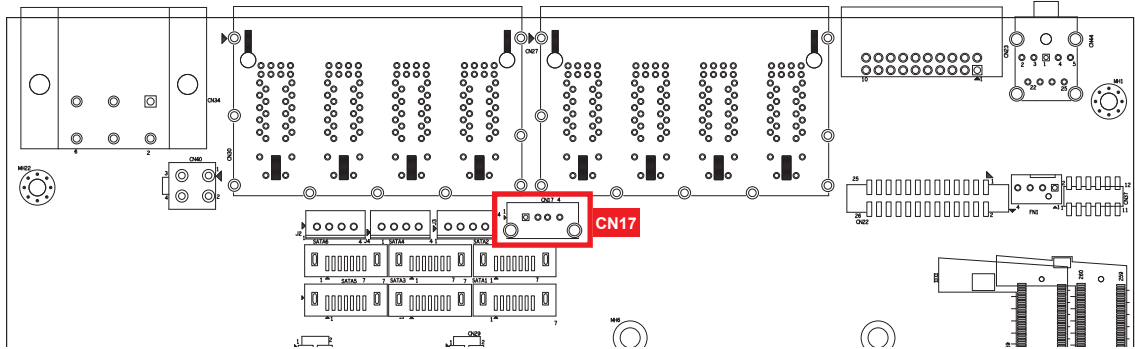
Pin No.	Definition	Pin No.	Definition
1	+V5 (Max. 4A)	2	Ground
3	Ground	4	+V12 (Max. 1.5A)

2.4.9 CN17 : Internal USB2.0

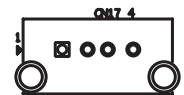
Standard Vertical USB2.0 Connector

The system main board provides one expansion USB port using plug-and-play for dongle key or LCD touch panel. 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 standard USB 2.0 connector. This USB 2.0 does not support wake up function.

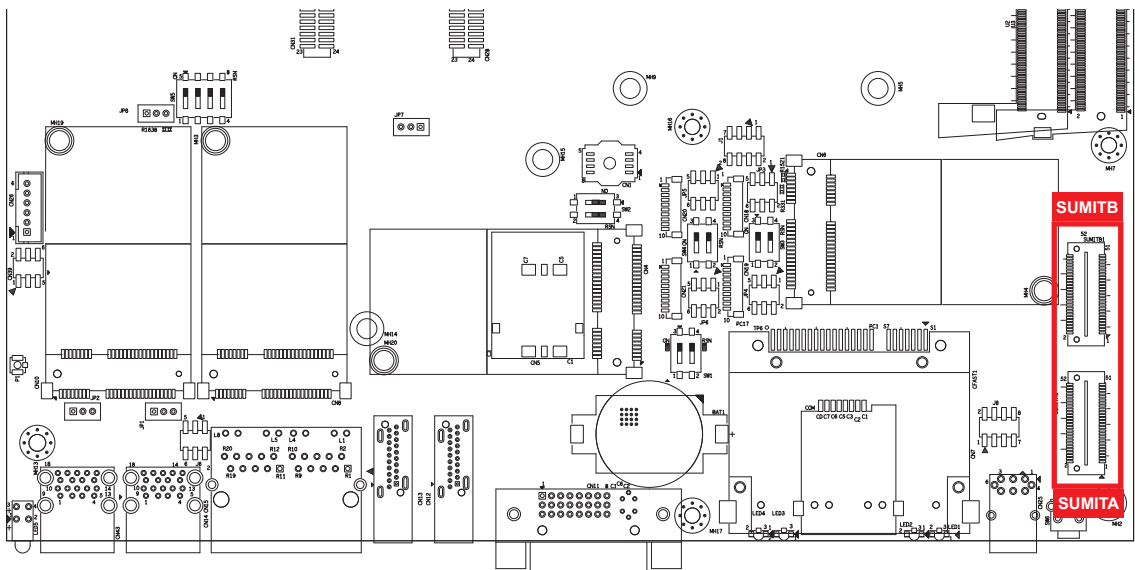


Pin No.	Definition	Pin No.	Definition
1	USB +VCC (+V5/Max. 0.5A)	2	DATA-
3	DATA+	4	Ground

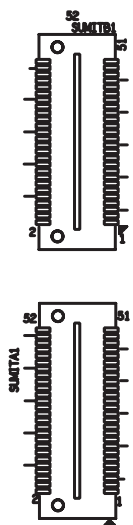


2.4.10 SUMIT A, SUMIT B

This system have standard SUMIT A and SUMIT B for SUMIT type add on cards.



SUMIT A Pin Out:

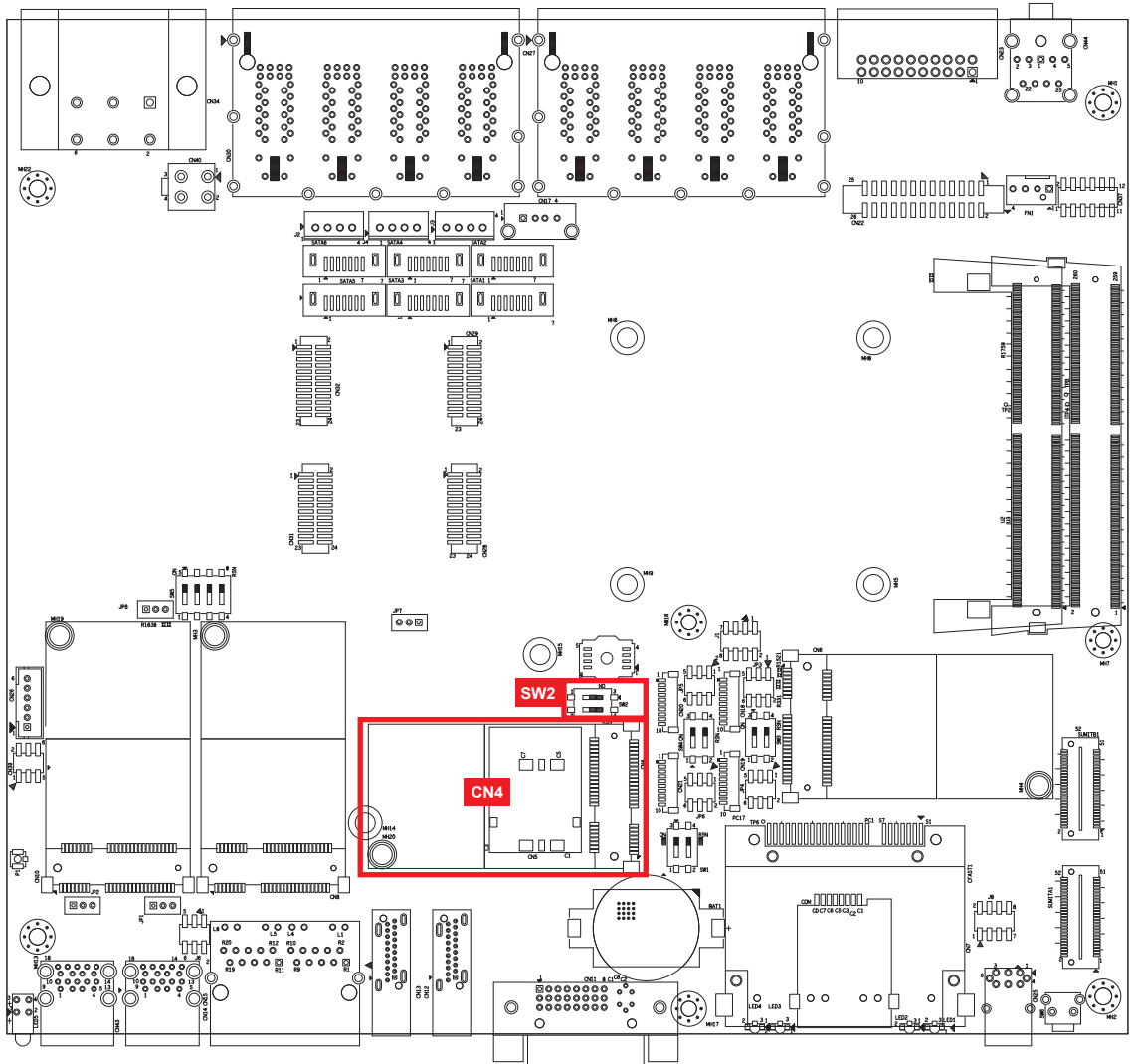


Pin No.	Function	Pin No.	Function
1	+5V_AUX	2	+12V
3	+3.3V	4	SMB_DATA
5	+3.3V	6	XMB_CLK
7	Reserved	8	Reserved
9	Reserved	10	SPI_MISO
11	USB_OC#	12	SPI_MOSI
13	Reserved	14	SPI_CLK
15	+5V	16	SPI_CS10
17	USB_3+	18	SPI_CS1#
19	USB_3-	20	Reserved
21	+5V	22	LPC_DRQ1#
23	USB_2+	24	LPC_AD0
25	USB_2-	26	LPC_AD1
27	+5V	28	LPC_AD2
29	USB_1+	30	LPC_AD3
31	USB_1-	32	LPC_FRAME#
33	+5V	34	SERIRQ#
35	USB_0+	36	Reserved
37	USB_0-	38	CLK_33MHz
39	GND	40	GND
41	A_PET_P0	42	A_PER_P0
43	A_PET_N0	44	A_PER_N0
45	GND	46	APRSNT#/A_PE_CLKREQ#
47	PERST#	48	A_CLKP
49	WAKE#	50	A_CLKN
51	+5V	52	GND

SUMIT B Pin Out:

Pin No.	Function	Pin No.	Function
1	GND	2	GND
3	B_PET_P0	4	B_PER_P0
5	B_PET_N0	6	B_PER_N0
7	GND	8	GND
9	C_CLKP	10	B_CLKP
11	C_CLKN	12	B_CLKN
13	CPRSNT#/C_PE_CLKREQ#	14	GND
15	C_PET_P0	16	C_PER_P0
17	C_PET_N0	18	C_PER_N0
19	GND	20	GND
21	C_PET_P1	22	C_PER_P1
23	C_PET_N1	24	C_PER_N1
25	GND	26	GND
27	C_PET_P2	28	C_PER_P2
29	C_PET_N2	30	C_PER_N2
31	GND	32	GND
33	C_PET_P3	34	C_PER_P3
35	C_PET_N3	36	C_PER_N3
37	GND	38	GND
39	PERST#	40	WAKE#
41	Reserved	42	Reserved
43	+5V	44	Reserved
45	+5V	46	+3.3V
47	+5V	48	+3.3V
49	+5V	50	+3.3V
51	+5V	52	+5V_AUX

2.4.11 CN4 : Mini PCIe 1/ mSATA



Mini PCIe and mSATA share the same form factor and similar electrical pinout assignments on their connectors. There is no clear mechanism to distinguish if a mSATA drive or a Mini PCIe device is plugged into the socket until recently that SATA I/O issued an ECN change (ECN #045) to redefine pin-43 on mSATA connector as “no connect” instead of “return current path” (or GND). When an mSATA drive is inserted, its pin-43 is “no connect”, and the respective pin on the socket is being pulled-up to logic 1. When a Mini PCIe device is inserted, its pin-43 forces the respective pin on the socket to ground, or logic 0.

SW2-1 is for switching mSATA drive and Mini PCIe device.

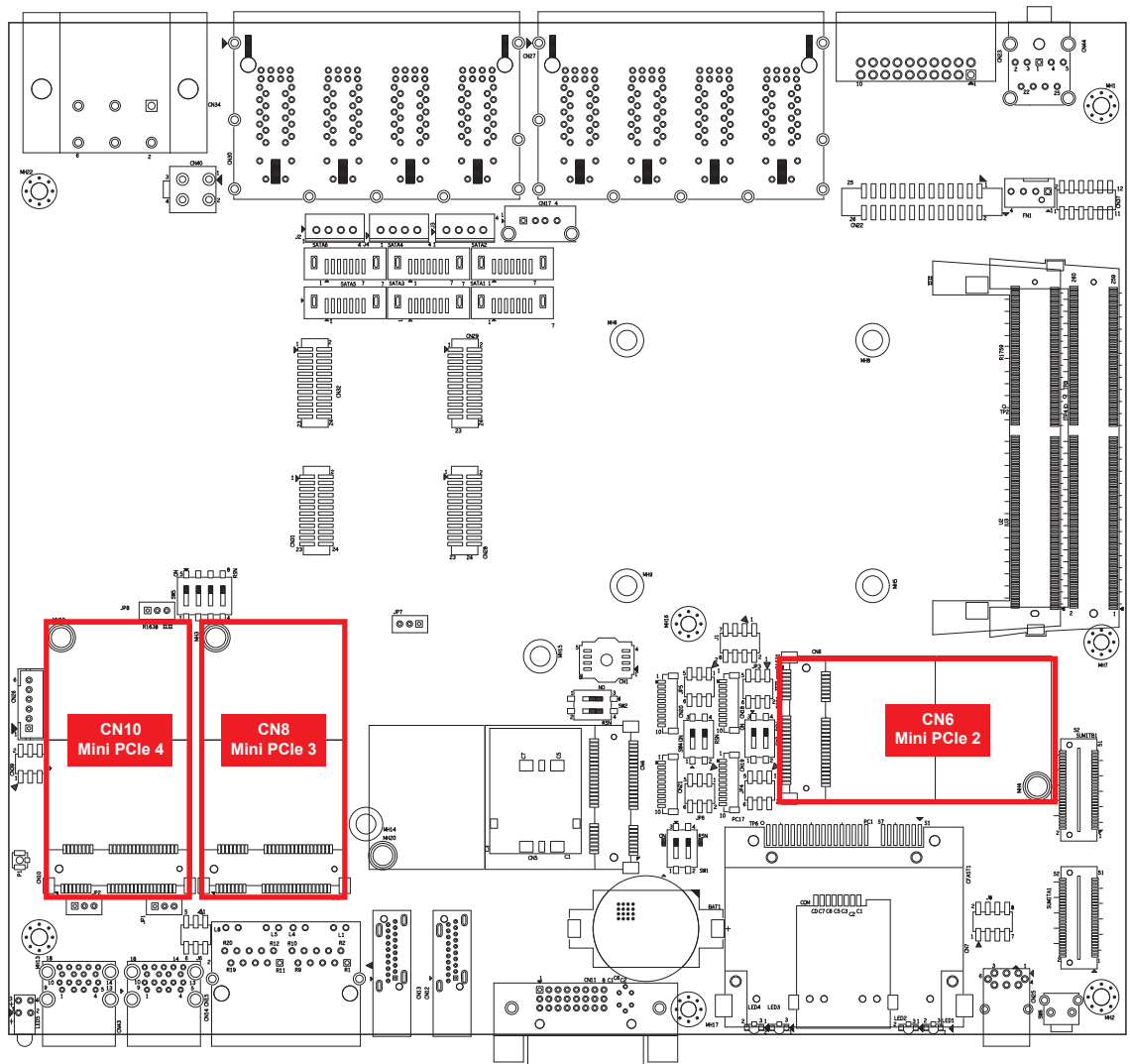
DIP Switch		Interface
SW 2-1	SW 2-2	
ON	N/C	Mini PCIe
OFF	N/C	Auto Detection (Default)

CN4 Pin Out:

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

2.4.12 CN6, 8,10 : Mini PCIe 2, 3, 4

Standard full length Mini PCIe slot



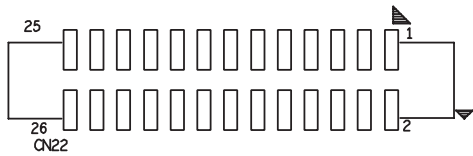
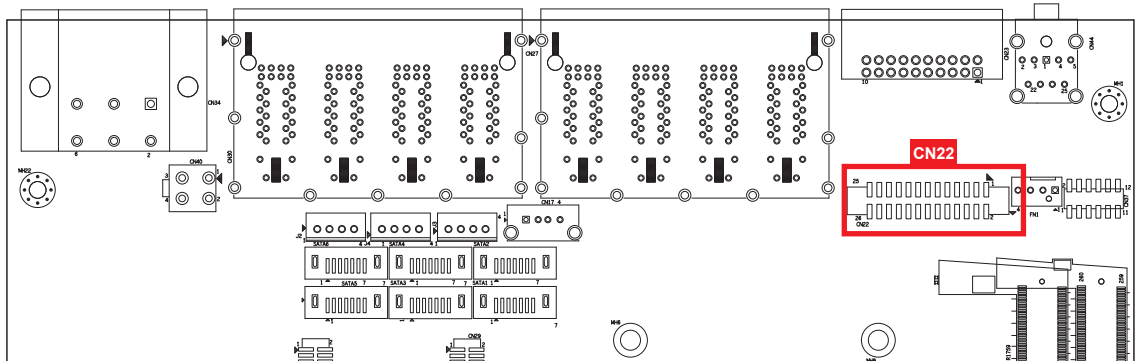
CN6, 8, 10:

Pin No.	Signal Name	Pin No.	Signal Name
51	Reserved	52	+3.3Vaux
49	Reserved	50	GND
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	PERp0	26	GND
23	PERn0	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

2.4.13 CN12 : GPIO

This system offers sixteen programmable I/O within TTL 5V (1mA max. /pin) tolerance. If the GPIO is logic high, it indicates that the mapping SIO GPIO pin is logic high level. If the GPIO is logic low, it indicates that the mapping SIO GPIO pin is logic low level.

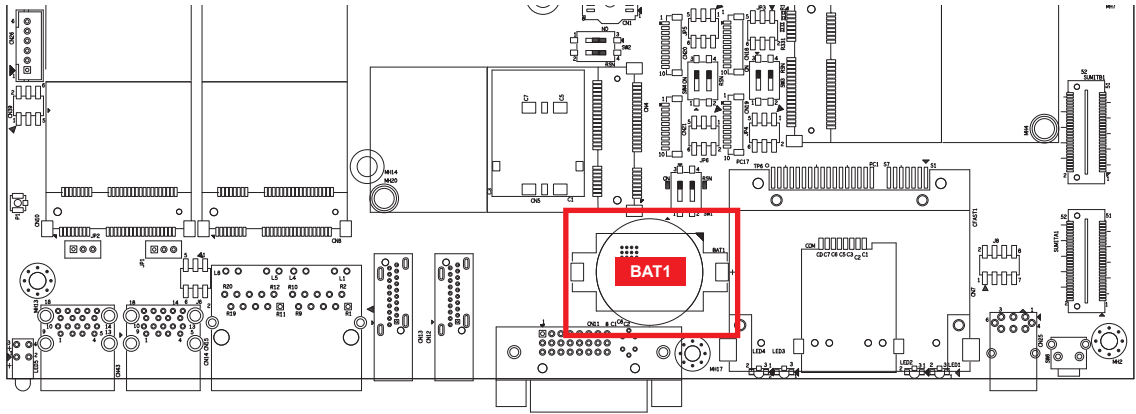


The pin assignments of CN7, CN14, and CN42 are listed in the following table:

Pin No.	SIO GPIO Function	Pin No.	SIO GPIO Function
1	GND	14	GND
2	SIO_GP11	15	SIO_GP37
3	SIO_GP12	16	SIO_GP50
4	SIO_GP15	17	SIO_GP51
5	SIO_GP16	18	SIO_GP52
6	GND	19	GND
7	SIO_GP32	20	SIO_GP56
8	SIO_GP33	21	SIO_GP57
9	SIO_GP35	22	SIO_GP64
10	SIO_GP36	23	SIO_GP65
11	GND	24	GND
12	SMB_DATA	25	+5V
13	SMB_CLK	26	+5V

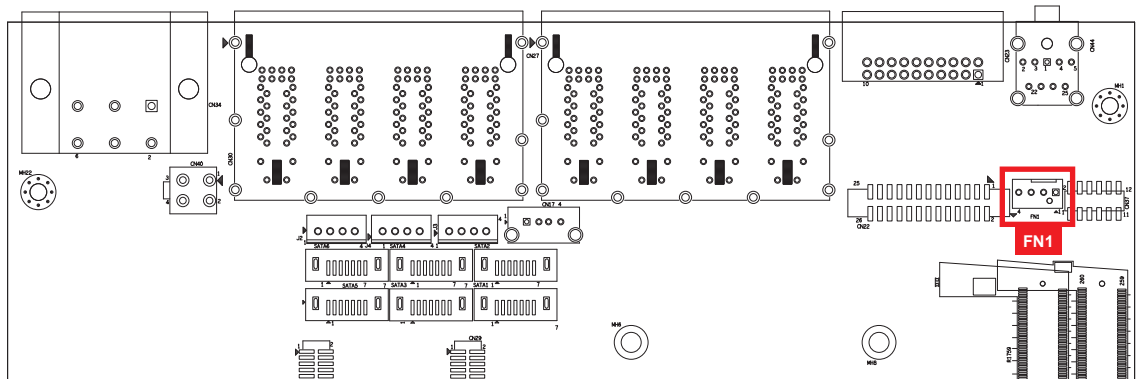
2.4.14 BAT1 : RTC Battery

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

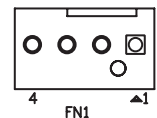


2.4.15 FAN1 : FAN Header

Fan power connector supports for additional thermal requirements. The pin assignments of FAN 1 are shown in the following diagram:

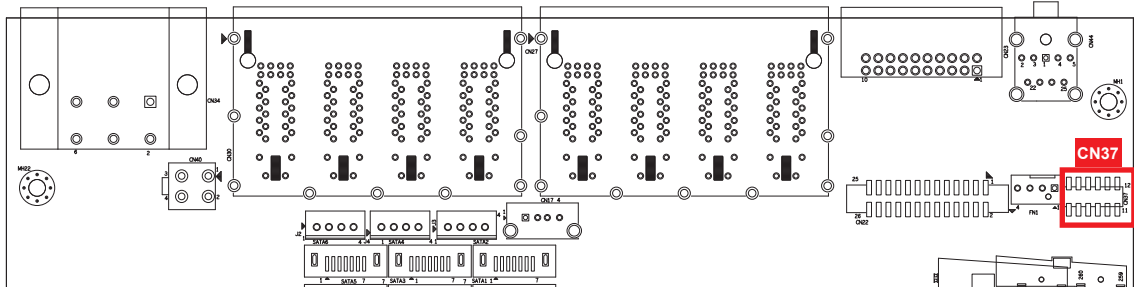


Pin No.	Definition	Pin No.	Definition
1	GND	2	+12V (1.5A max)
3	Fan speed sensor	4	Fan PWM



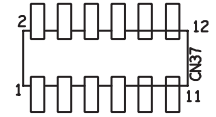
2.4.16 CN37 : LPC Port 80 Header

The systems provide a LPC Port 80 Header for debug card.



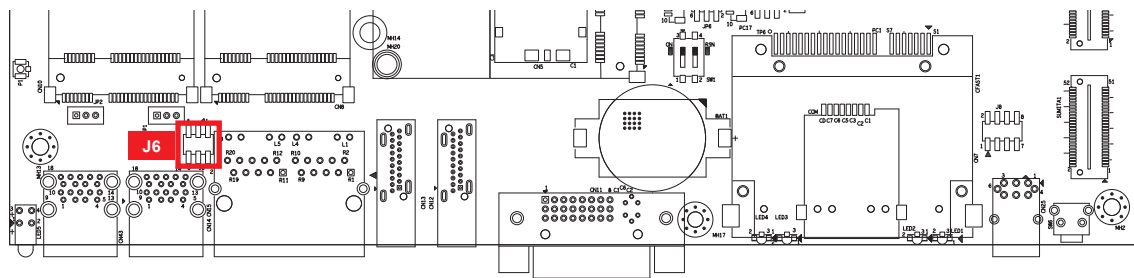
Pin out:

Pin No.	Function	Pin No.	Function
1	SERIRQ	7	LFRAME#
2	+3.3V	8	LAD0
3	LA3	9	N/C
4	RESET#	10	Ground
5	LAD1	11	CLOCK
6	LAD2	12	Ground



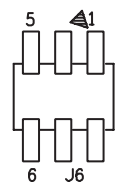
2.4.17 J6 : LAN 2 i210 Reserved Header

LAN 2 provides a header for IEEE1588 related applications.



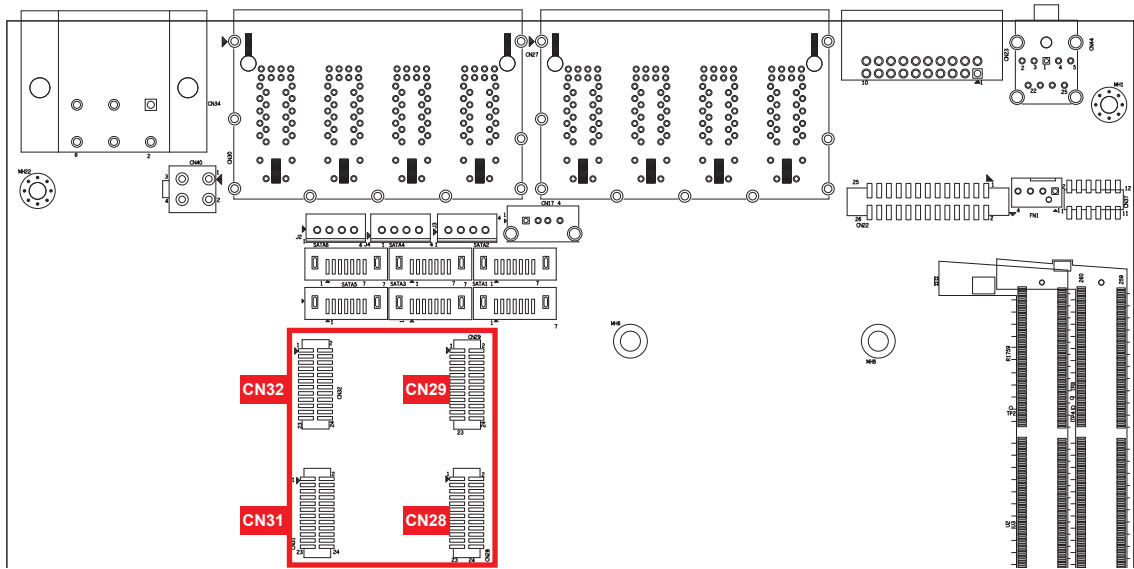
Pin out:

Pin No.	Function	Pin No.	Function
1	SPD0	4	SPD3
2	SPD1	5	Ground
3	SPD2	6	Ground

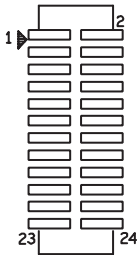


2.4.18 CN28, CN29, CN31, CN32 : LAN 3 to LAN 18 Reserved Headers

Each i350 supports a header for IEEE 1588 related applications.



CN28:



Pin No.	Description	LAN Port	Pin No.	Description	LAN Port
1	Ground	---	2	Ground	---
3	SPD0_0	LAN3	4	SPD2_0	LAN4
5	SPD0_1	LAN3	6	SPD2_1	LAN4
7	SPD0_2	LAN3	8	SPD2_2	LAN4
9	SPD0_3	LAN3	10	SPD2_3	LAN4
11	Ground	---	12	Ground	---
13	Ground	---	14	Ground	---
15	SPD1_0	LAN5	16	SPD3_0	LAN6
17	SPD1_1	LAN5	18	SPD3_1	LAN6
19	SPD1_2	LAN5	20	SPD3_2	LAN6
21	SPD1_3	LAN5	22	SPD3_3	LAN6
23	Ground	---	24	Ground	---

CN29:

Pin No.	Description	LAN Port	Pin No.	Description	LAN Port
1	Ground	---	2	Ground	---
3	SPD0_0	LAN7	4	SPD2_0	LAN8
5	SPD0_1	LAN7	6	SPD2_1	LAN8
7	SPD0_2	LAN7	8	SPD2_2	LAN8
9	SPD0_3	LAN7	10	SPD2_3	LAN8
11	Ground	---	12	Ground	---

13	Ground	---	14	Ground	---
15	SPD1_0	LAN9	16	SPD3_0	LAN10
17	SPD1_1	LAN9	18	SPD3_1	LAN10
19	SPD1_2	LAN9	20	SPD3_2	LAN10
21	SPD1_3	LAN9	22	SPD3_3	LAN10
23	Ground	---	24	Ground	---

CN31:

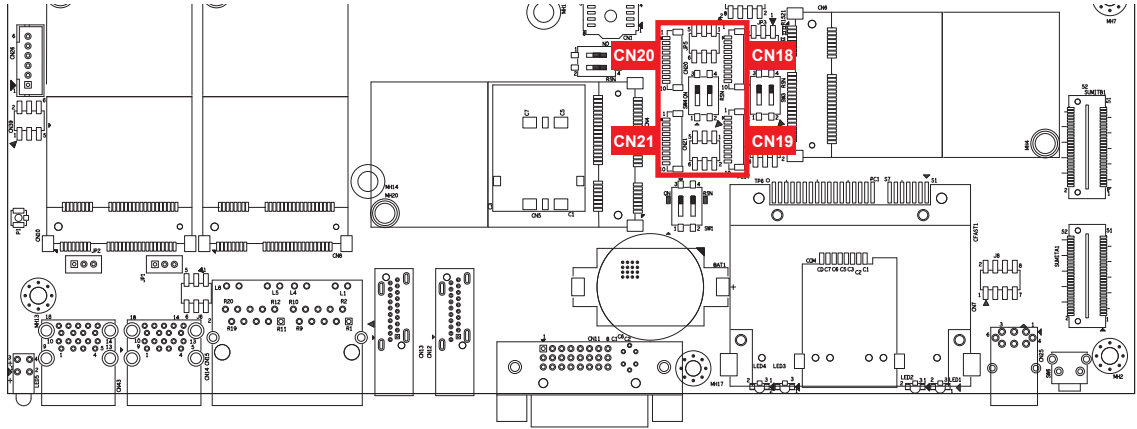
Pin No.	Description	LAN Port	Pin No.	Description	LAN Port
1	Ground	---	2	Ground	---
3	SPD0_0	LAN11	4	SPD2_0	LAN12
5	SPD0_1	LAN11	6	SPD2_1	LAN12
7	SPD0_2	LAN11	8	SPD2_2	LAN12
9	SPD0_3	LAN11	10	SPD2_3	LAN12
11	Ground	---	12	Ground	---
13	Ground	---	14	Ground	---
15	SPD1_0	LAN13	16	SPD3_0	LAN14
17	SPD1_1	LAN13	18	SPD3_1	LAN14
19	SPD1_2	LAN13	20	SPD3_2	LAN14
21	SPD1_3	LAN13	22	SPD3_3	LAN14
23	Ground	---	24	Ground	---

CN32:

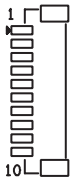
Pin No.	Description	LAN Port	Pin No.	Description	LAN Port
1	Ground	---	2	Ground	---
3	SPD0_0	LAN15	4	SPD2_0	LAN16
5	SPD0_1	LAN15	6	SPD2_1	LAN16
7	SPD0_2	LAN15	8	SPD2_2	LAN16
9	SPD0_3	LAN15	10	SPD2_3	LAN16
11	Ground	---	12	Ground	---
13	Ground	---	14	Ground	---
15	SPD1_0	LAN17	16	SPD3_0	LAN18
17	SPD1_1	LAN17	18	SPD3_1	LAN18
19	SPD1_2	LAN17	20	SPD3_2	LAN18
21	SPD1_3	LAN17	22	SPD3_3	LAN18
23	Ground	---	24	Ground	---

2.4.19 CN18, CN19, CN20, CN21 : COM Port Header

The system provides four COM port headers for internal COM port cable.



CN18:



Pin No.	Description	Port
1	Ground_Frame	COM1
2	Ground	COM1
3	RI	COM1
4	DTR	COM1
5	CTS	COM1
6	TXD	COM1
7	RTS	COM1
8	RXD	COM1
9	DSR	COM1
10	DCD	COM1

CN19:

Pin No.	Description	Port
1	Ground_Frame	COM2
2	Ground	COM2
3	RI	COM2
4	DTR	COM2
5	CTS	COM2
6	TXD	COM2
7	RTS	COM2
8	RXD	COM2
9	DSR	COM2
10	DCD	COM2

CN20:

Pin No.	Description	Port
1	Ground_Frame	COM3
2	Ground	COM3
3	RI	COM3
4	DTR	COM3
5	CTS	COM3
6	TXD	COM3
7	RTS	COM3
8	RXD	COM3
9	DSR	COM3
10	DCD	COM3

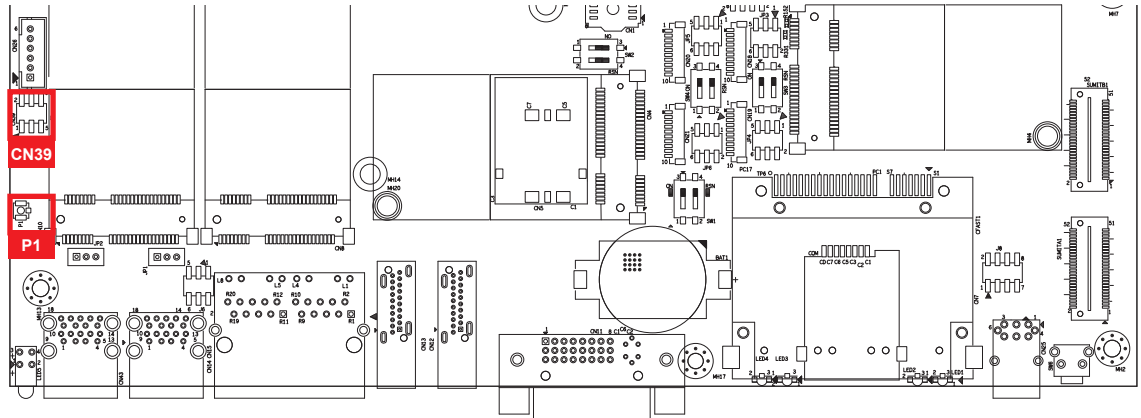
CN21:

Pin No.	Description	Port
1	Ground_Frame	COM4
2	Ground	COM4
3	RI	COM4
4	DTR	COM4
5	CTS	COM4
6	TXD	COM4
7	RTS	COM4
8	RXD	COM4
9	DSR	COM4
10	DCD	COM4

2.4.20 CN39 : GPS Module Header

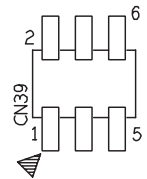
P1/External Antenna Cable connector

The system optional with a GPS module and provides a pair of inputs for the hardware speed-pulse and forward/reverse direction indication. The dead-reckoning capability relies on speed information from either the hardware speed-pulse or messages indicating vehicle speed.



Pin out:

Pin No.	Function	Pin No.	Function
1	WHELLTICK_ SPEED+	4	NC
2	WHELLTICK_ SPEED-	5	FORWARD+
3	NC	6	FORWARD-

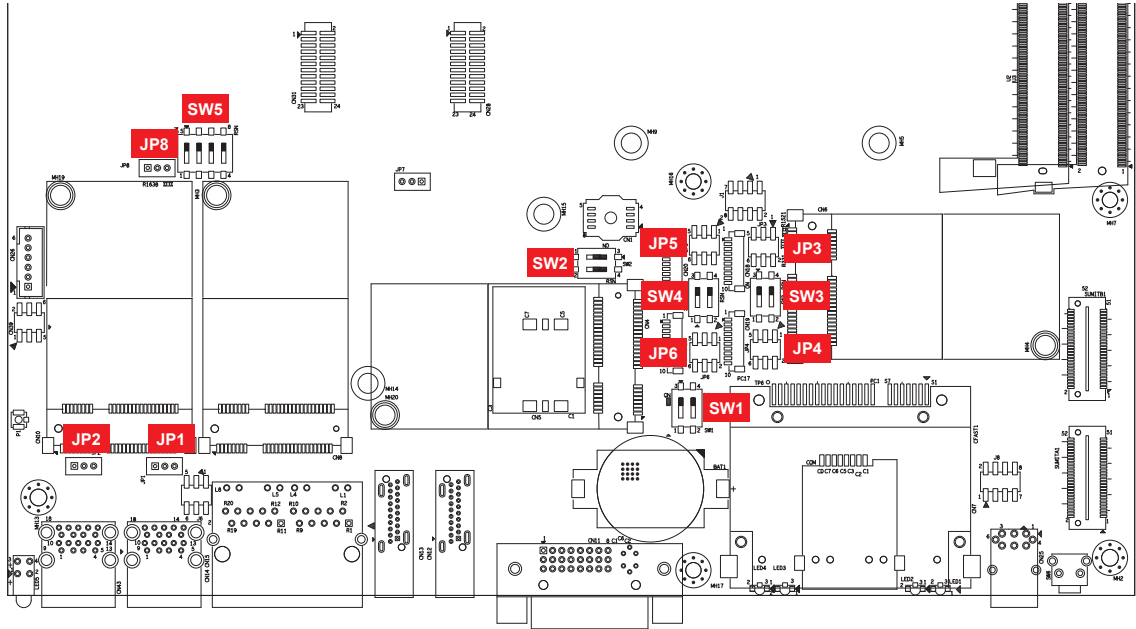


P1/I-PEX_CONN, Antenna Cable connector



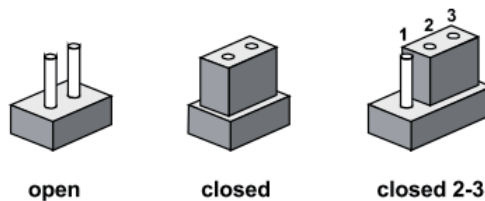
2.5 Main Board Jumper & DIP Switch Settings

2.5.1 Top View of IVH-9000 With Jumper and DIP Switch

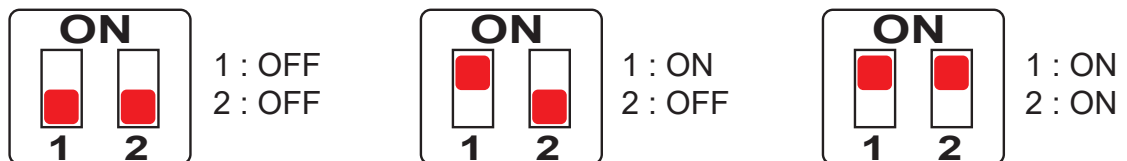


The figure below is the top view of the system board, and it shows the location of the jumpers and the switches.

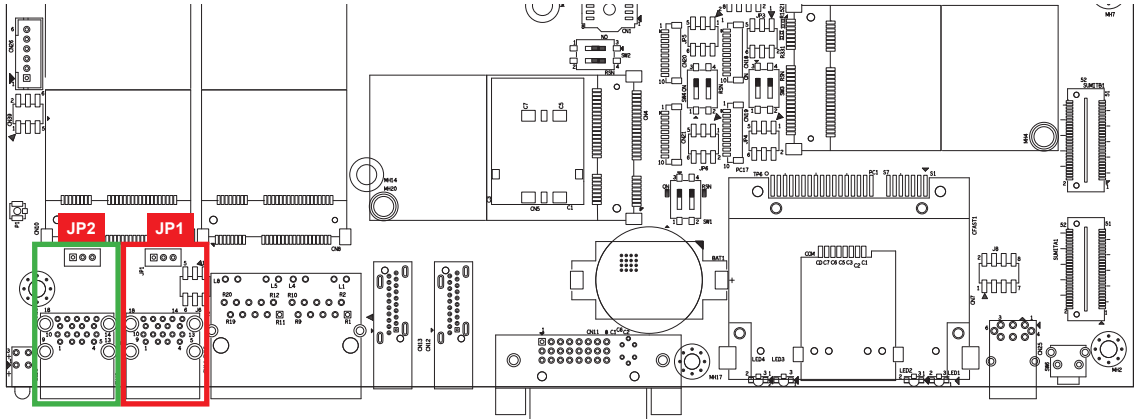
You may configure your card to match the needs of your application by setting jumpers. A jumper is a metal bridge used to close an electric circuit. It consists of two metal pins and a small metal clip (often protected by a plastic cover) that slides over the pins to connect them. To “close” a jumper, 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.



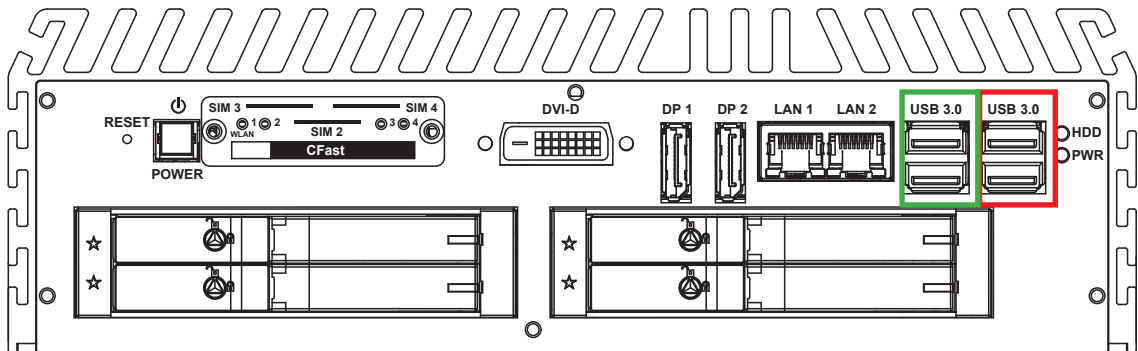
You may configure your card to match the needs of your application by DIP switch as shown below (the DIP switch on and off)



2.5.2 JP1, JP2 : USB Wake Up

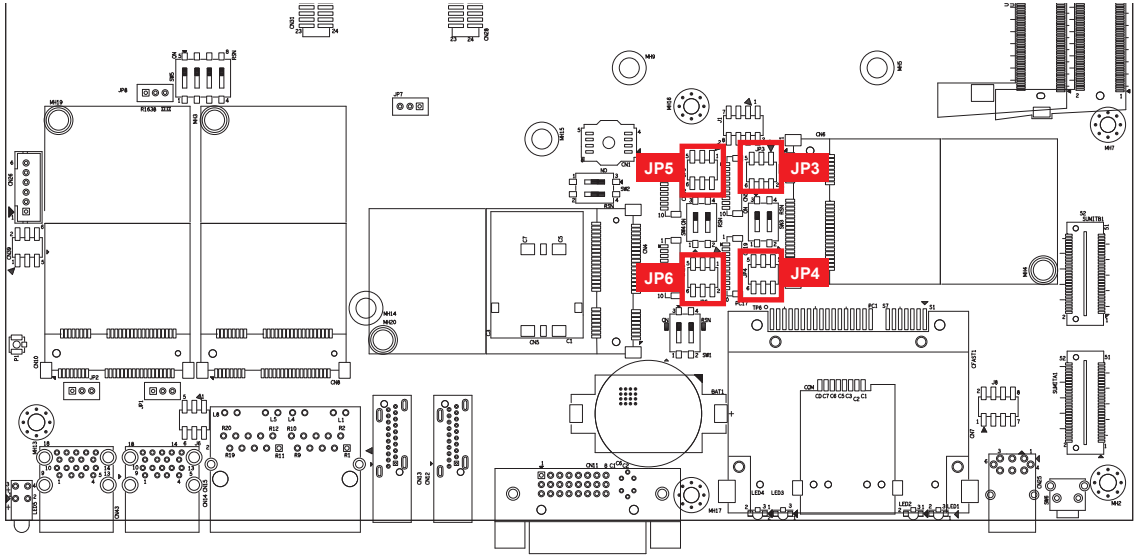


Front Plane View :



Jumper	Setting	Function	USB Port
JP1	1:2	Non Wake Up support	As front plane view blue mark
JP1	2:3	Supported Wake Up(Default)	As front plane view blue mark
JP2	1:2	Non Wake Up support	As front plane view red mark
JP2	2:3	Supported Wake Up(Default)	As front plane view red mark

2.5.3 JP3, JP4, JP5, JP6 : COM Port RI pin Select



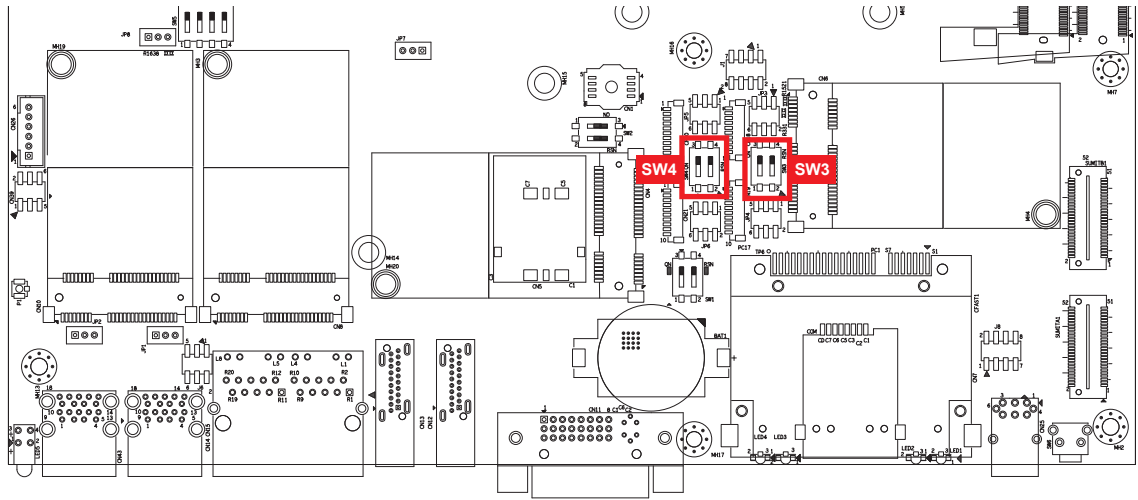
Pin Header	Pin No.	Description
COM1 JP3	1-2	+5V (1A max.)
	3-4	+12V (0.5A max.)
	5-6	RI(Default)

Pin Header	Pin No.	Description
COM2 JP4	1-2	+5V (1A max.)
	3-4	+12V (0.5A max.)
	5-6	RI(Default)

Pin Header	Pin No.	Description
COM3 JP5	1-2	+5V (1A max.)
	3-4	+12V (0.5A max.)
	5-6	RI(Default)

Pin Header	Pin No.	Description
COM4 JP6	1-2	+5V (1A max.)
	3-4	+12V (0.5A max.)
	5-6	RI(Default)

2.5.4 SW3, SW4 : COM Port RS-422/RS-485 Receiver Terminator



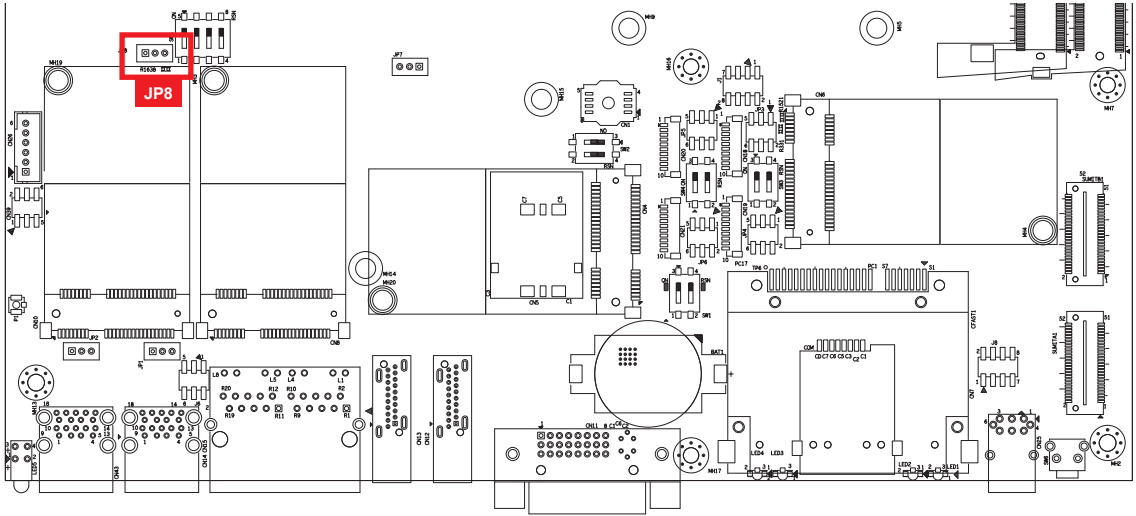
Function	DIP Switch	Description
	SW 3-1	
COM1 RS-422/485 Receiver Terminator	ON	*Enable
	OFF	Disable

Function	DIP Switch	Description
	SW 3-2	
COM2 RS-422/485 Receiver Terminator	ON	*Enable
	OFF	Disable

Function	DIP Switch	Description
	SW 4-1	
COM3 RS-422/485 Receiver Terminator	ON	*Enable
	OFF	Disable

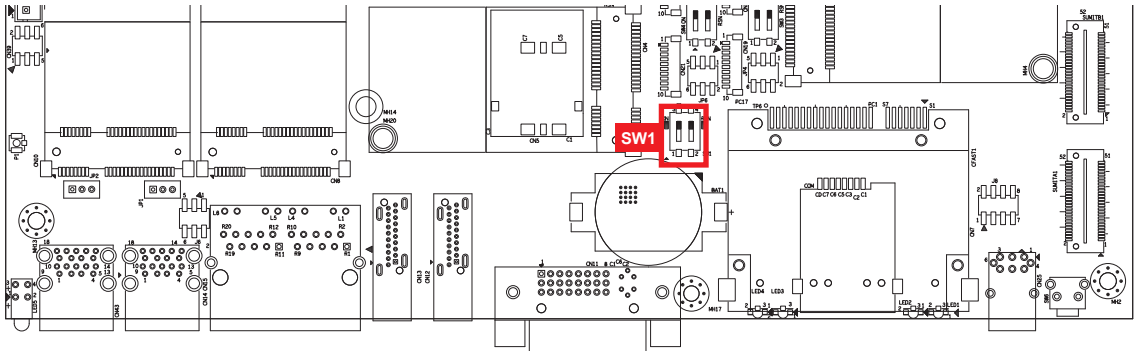
Function	DIP Switch	Description
	SW 4-2	
COM4 RS-422/485 Receiver Terminator	ON	*Enable
	OFF	Disable

2.5.5 JP8 : POE Power ON Select



Jumper	Setting	Function
JP8	1:2	POE power on at standby power ready
JP8	2:3	POE power on after system power on(Default)

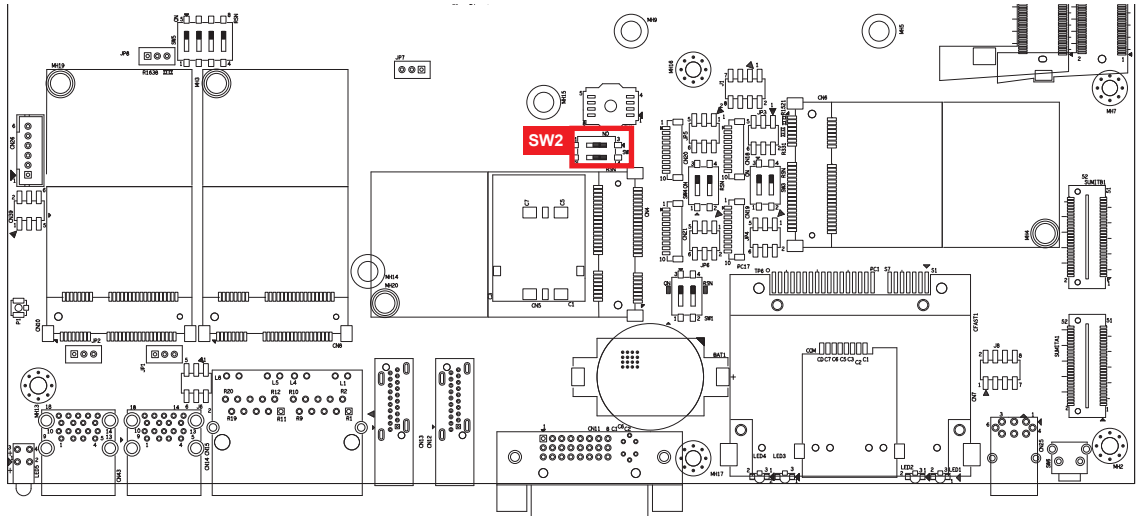
2.5.6 SW1 : CMOS & ME Clear



Function	DIP Switch	Description
	SW 1-1	
CMOS Clear Setting	ON	Clear CMOS
	OFF	*Normal

Function	DIP Switch	Description
	SW 1-2	
ME Clear Setting	ON	Clear ME
	OFF	*Normal

2.5.7 SW2 : Mini PCIe1 & mSATA Select



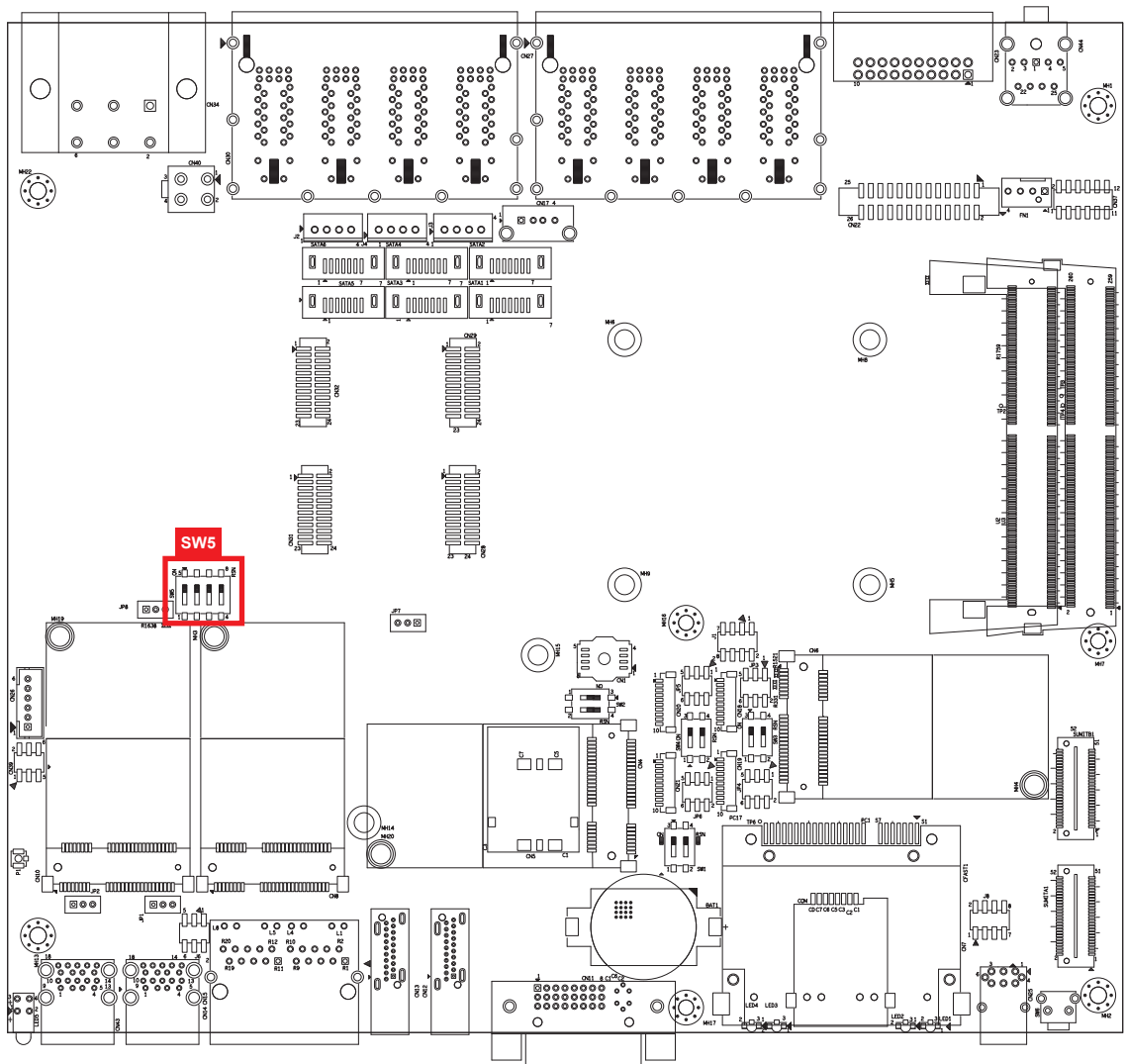
Function	DIP Switch	Description
	SW 2-1	
CMOS Clear Setting	ON	Fixed On PCIe
	OFF	Default Mini PCIe1 Auto Select (By PIN 43)

2.6 Ignition Control



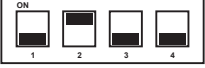
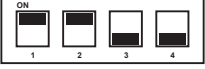
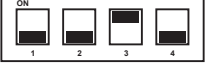
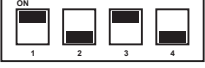
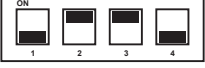
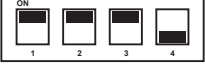



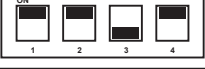
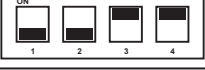
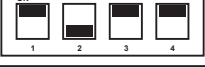
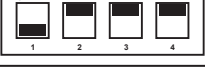
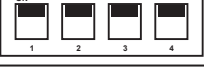
IVH-9000 series provides ignition power control feature for in-vehicle applications. The built-in MCU monitors the ignition signal and turns on/off the system according to pre-defined on/off delay periods.

2.6.1 Adjust Ignition Control Modes

IVH-9000 series provide sixteen modes of different power on/off delay periods adjustable via SW5 switch. The default rotary switch is set to 0 in ATX/AT power mode.

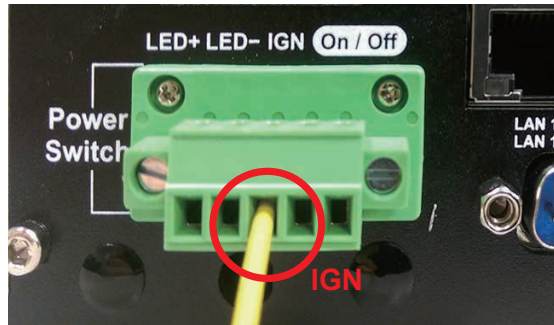


The modes are listed in the following table:

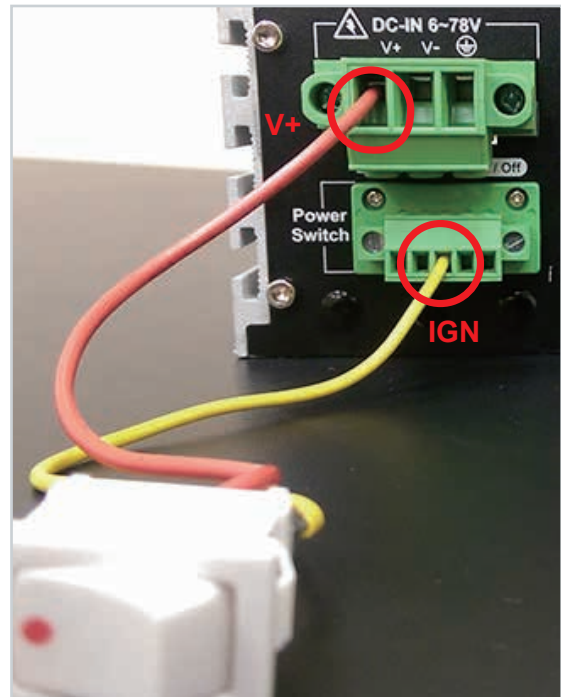
DIP-Switch Position	Power on delay	Power off delay	Switch Position
0	ATX/AT mode		
1	No delay	No delay	
2	No delay	5 seconds	
3	No delay	10 seconds	
4	No delay	20 seconds	
5	5 seconds	30 seconds	
6	5 seconds	60 seconds	
7	5 seconds	90 seconds	
8	5 seconds	30 minutes	
9	5 seconds	1 hour	
A	10 seconds	2 hours	
B	10 seconds	4 hours	
C	10 seconds	6 hours	
D	10 seconds	8 hours	
E	10 seconds	12 hours	
F	10 seconds	24 hours	

2.6.2 Ignition Control Wiring

To activate ignition control, you need to provide IGN signal via the 5-pin pluggable terminal block located in the back panel. It is below the general wiring configuration.



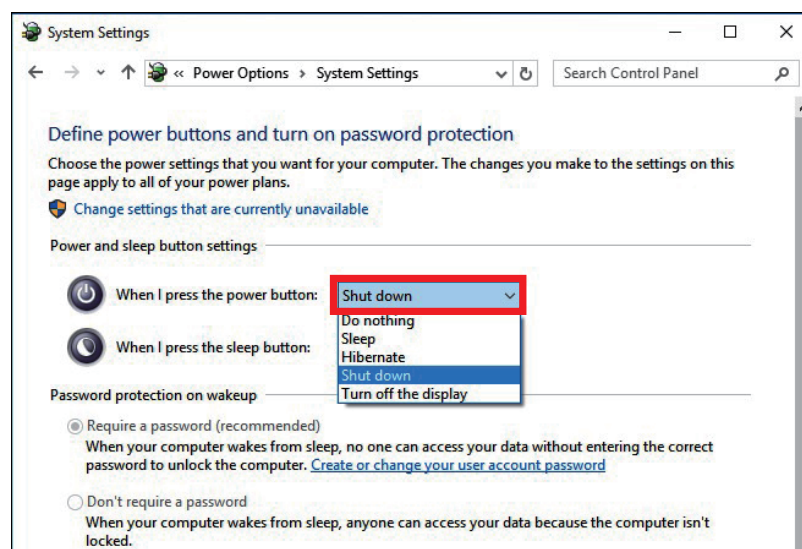
Pin No.	Definition
1	External Power Button V+
2	External Power Button V-
3	Ignition (IGN)
4	External Power LED V-
5	External Power LED V+



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

Note:

1. DC power source and IGN share the same ground.
2. IVH-9000 supports 6V~78V wide range DC power input in ATX/AT mode. In Ignition mode, the input voltage is fixed to 12V/24V/48V for car battery scenario.
3. For proper ignition control, the power button setting should be "Power down" mode.



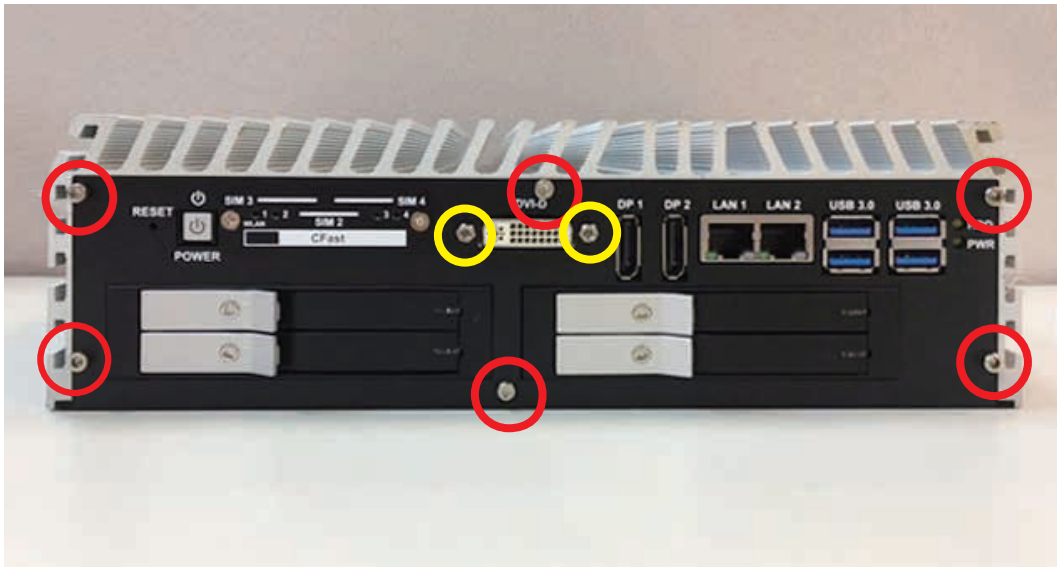
In Windows, for example, you need to set "When I press the power button" to "Shut down."

3

SYSTEM SETUP

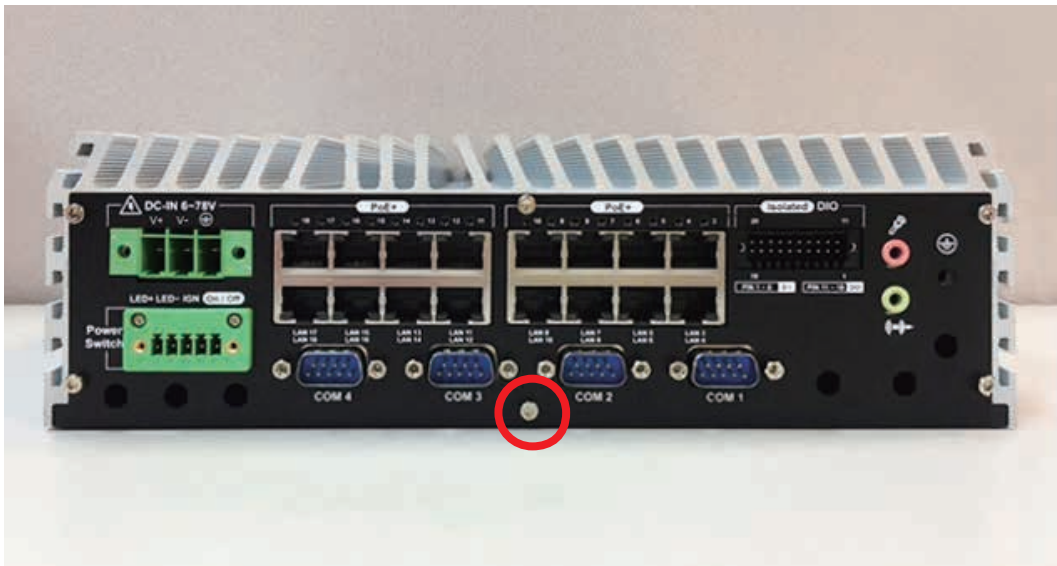
3.1 How to Open Your IVH-9000

Step 1 Remove six KHS#6-32 screws (circled in red) and two DVI-D #4-40 screws (circled in Yellow) in the front side.



Step 2 Take off the front panel.

Step 3 Remove one KHS#6-32 screw on the rear panel.



Step 4 Remove four F#6-32x6 screws in the bottom side.



Step 5 Turn the bottom side up. Take off the lower cover slowly and carefully.



Step 6 Put down the bottom side at rear panel.

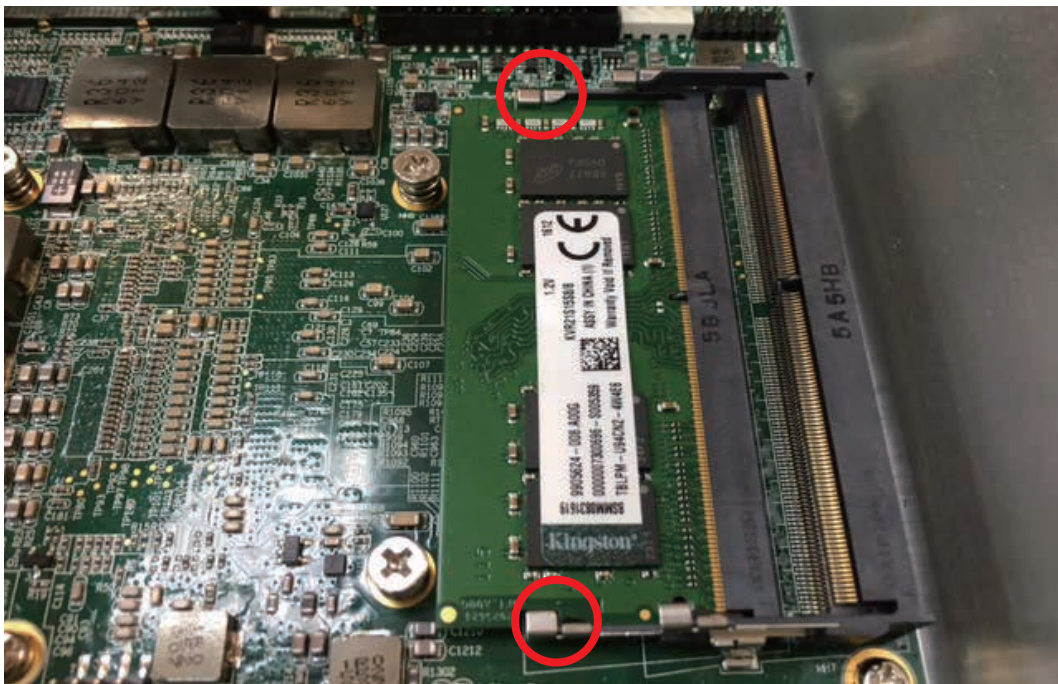


3.2 Installing DDR4 SO-DIMM Modules

Step 1 DDR4 RAM module into SO-DIMM slot.



Step 2 Make sure the RAM module is locked by the memory slot.



3.3 Installing Mini PCIe Card

Step 1 Install Mini PCIe card into the Mini PCIe socket.



Step 2 Fasten one M2.5 screw.

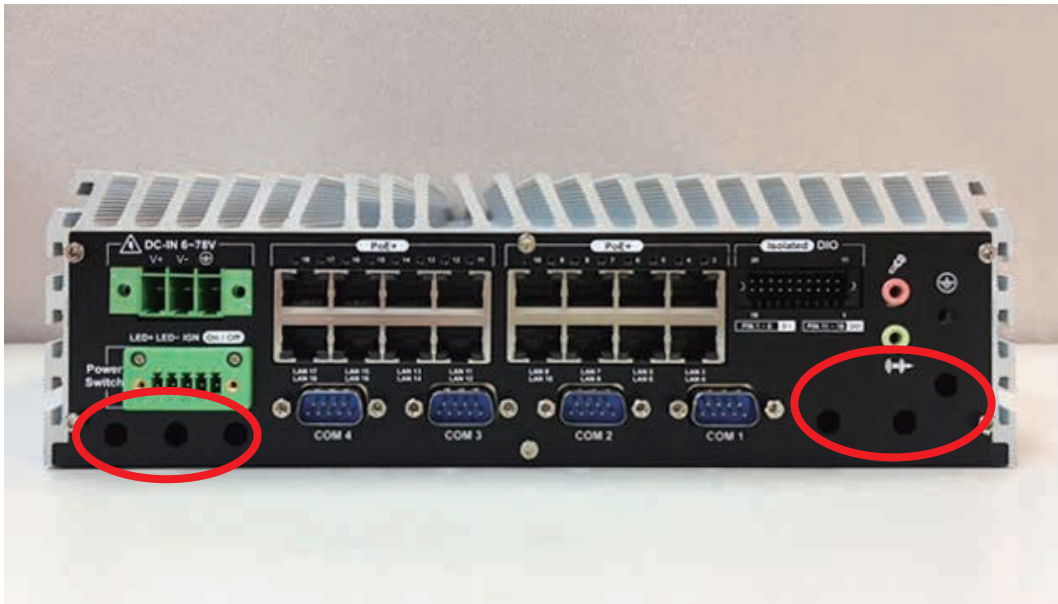


3.4 Installing Antenna Cable

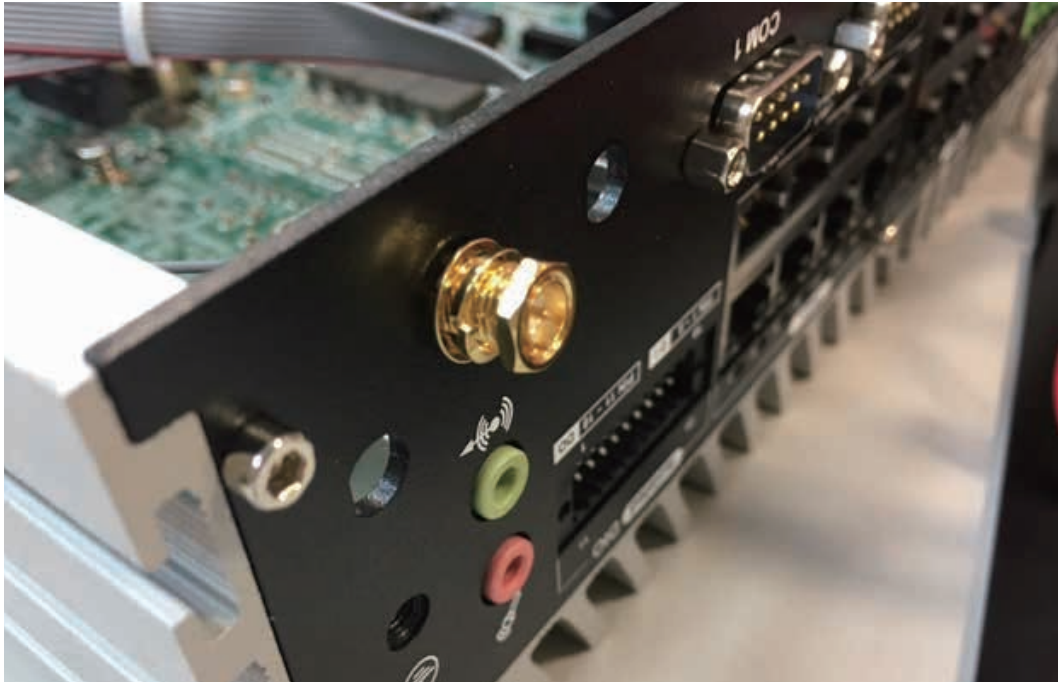
Step 1 Check antenna cable and washers.



Step 2 Remove the rubber corks on the rear panel.



Step 3 Put antenna cable connector into the hole on rear panel and fasten washer 1, washer 2, and washer 3 on the antenna cable connector.

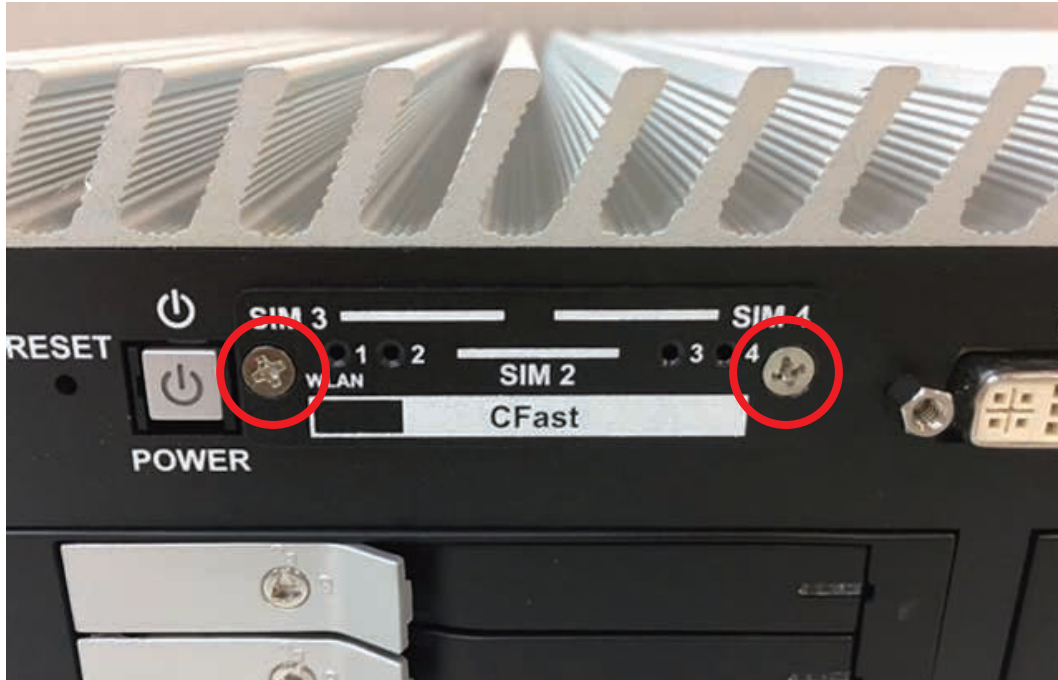


Step 4 Finish.

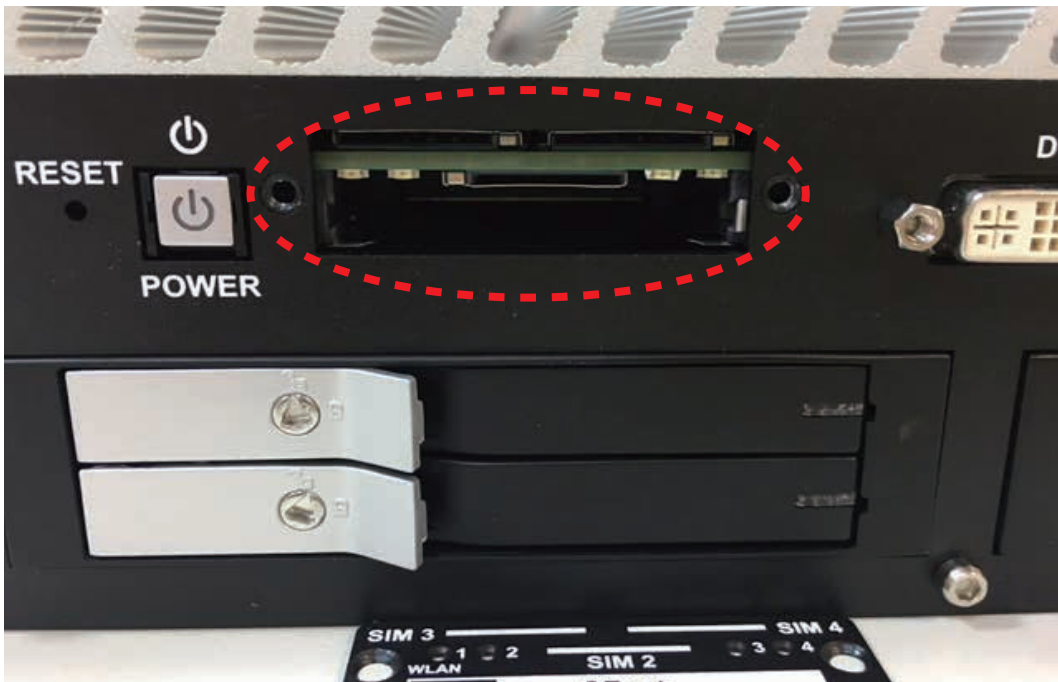


3.5 Installing CFast Card and SIM Card

Step 1 Remove two F-M3x4 screws on CFast Card and SIM Card cover from the front panel.



Step 2 Remove CFast Card and SIM Card cover from the front panel.



Step 3 Before Inserting CFast & SIM Card, make sure the system power is unplugged.

Step 4 Insert CFast card and push to lock.



Step 5 Insert SIM card and push to lock.



Step 6 SIM card and CFast card are installed ready.



3.6 Installing SSD/HDD

Step 1 Use the trigger and open SSD/HDD tray.



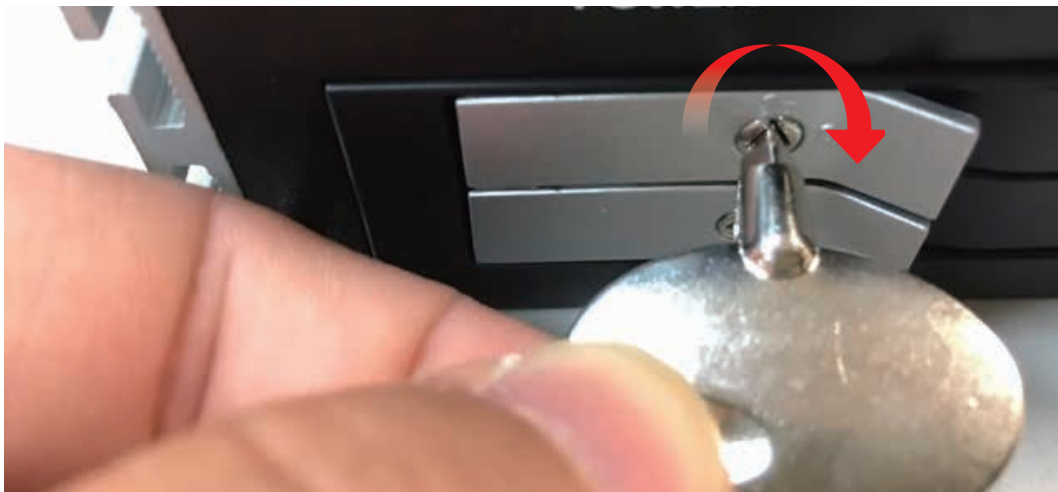
Step 2 Insert 2.5" SSD/HDD into the tray.



Step 3 Close the SSD/HDD tray.



Step 4 Lock the SSD/HDD tray with key.



3.7 Mounting Your IVH-9000

3.7.1 Wall Mount Bracket

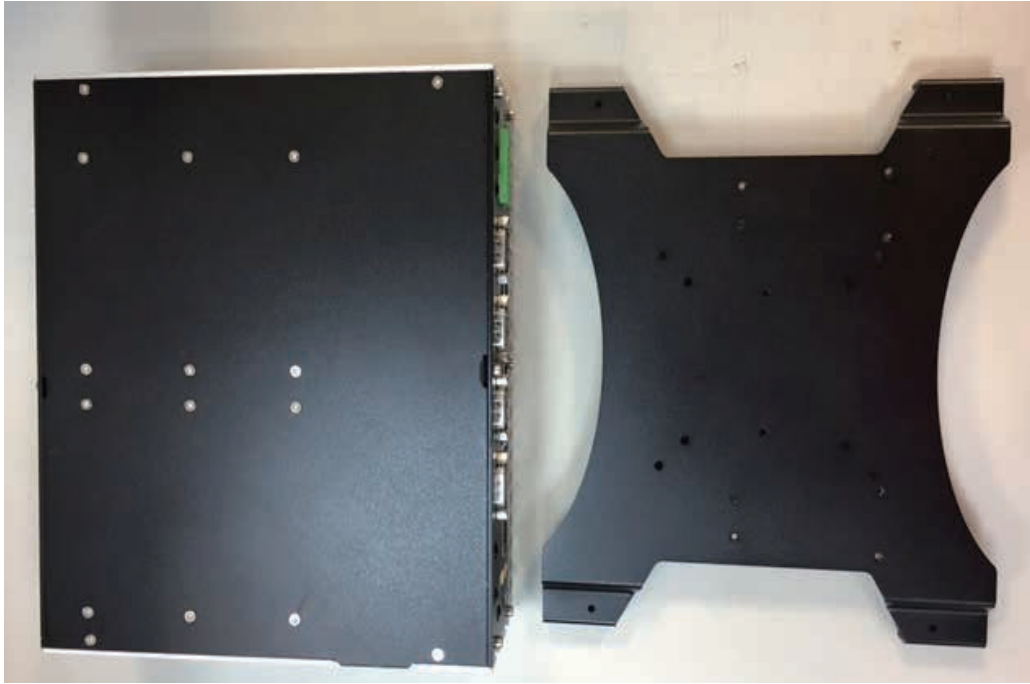
Step 1 Ensure the screw holes on the right and left side of the upper case match the ones on IVH-9000 wall mount bracket.





3.7.2 VESA Mount

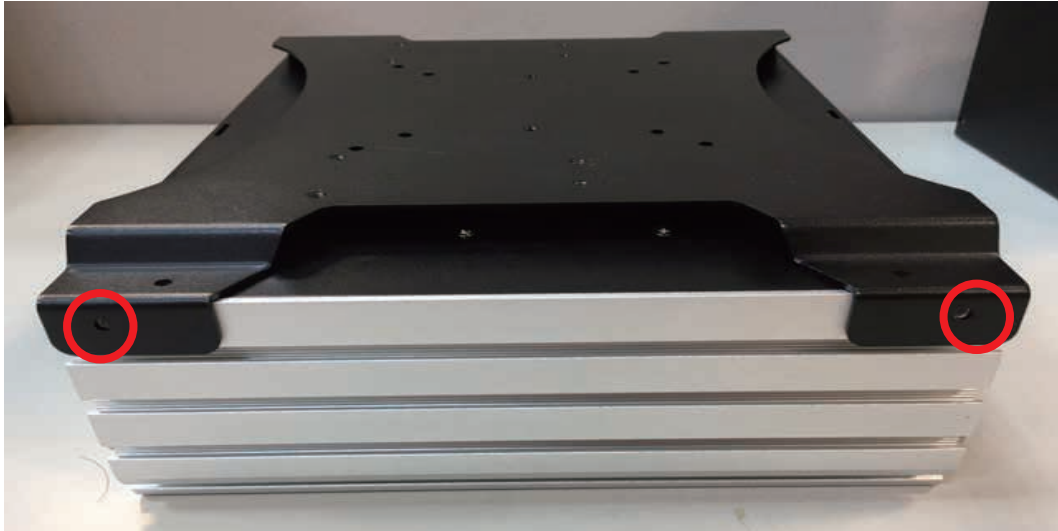
Step 1 IVH-9000 and VESA Mount.



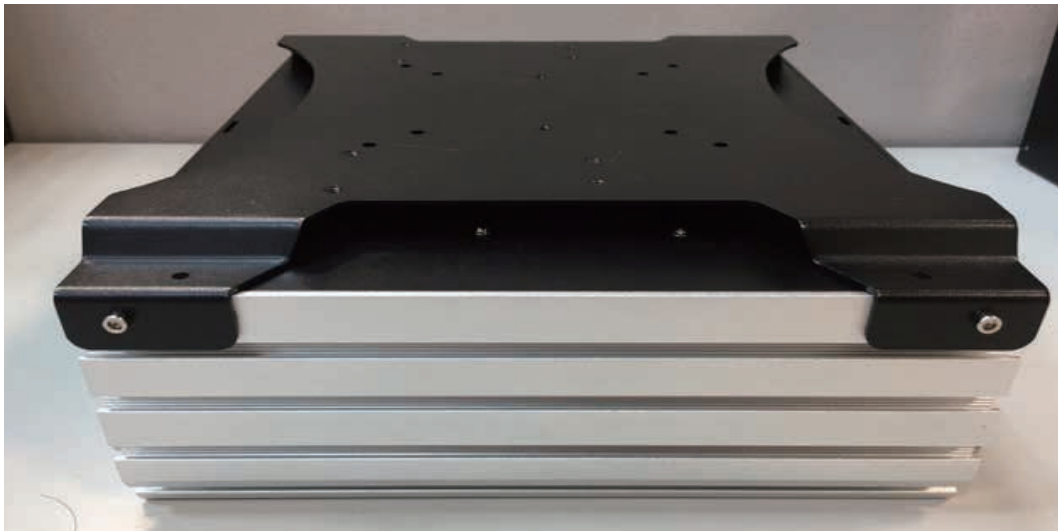
Step 2 Take IVH-9000 and VESA Mount and fasten four KHS#6-32 screws in the four marked corners..



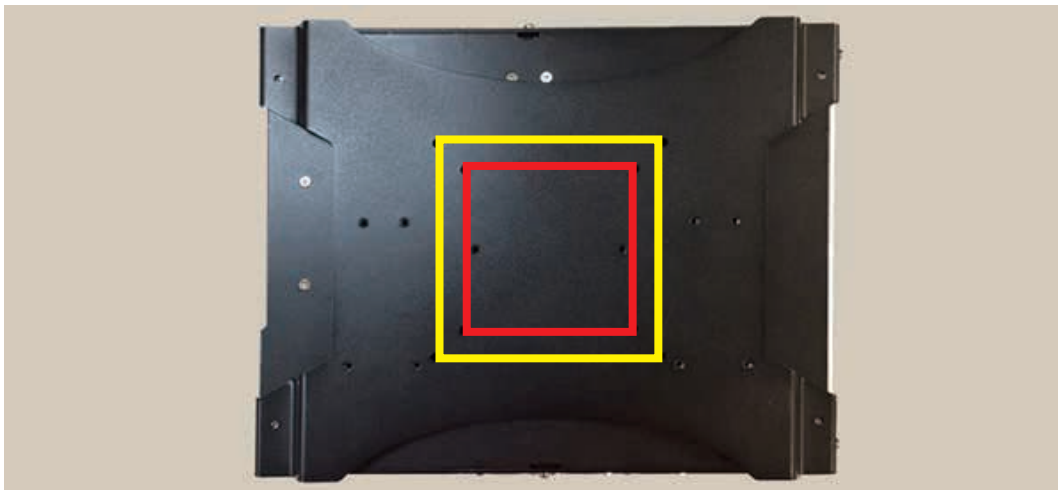
Step 3 Fasten four KHS#6-32 screws and then finish.



Step 4 Finish.



Step 5 VESA size have 75x75mm(red) and 100x100mm(yellow).



3.7.3 Din Rail Kit

Step 1 IVH-9000 and Din Rail Kit.



Step 2 Take IVH-9000 and Din Rail Kit and fasten four KHS#6-32 screws in the four marked corners.



Step 3 Fasten four KHS#6-32 screws and then finish.



Step 4 Finish.



Step 5 IVH-9000 With Din Rail.



4

BIOS AND DRIVER SETTING

4.1 Entering Setup

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

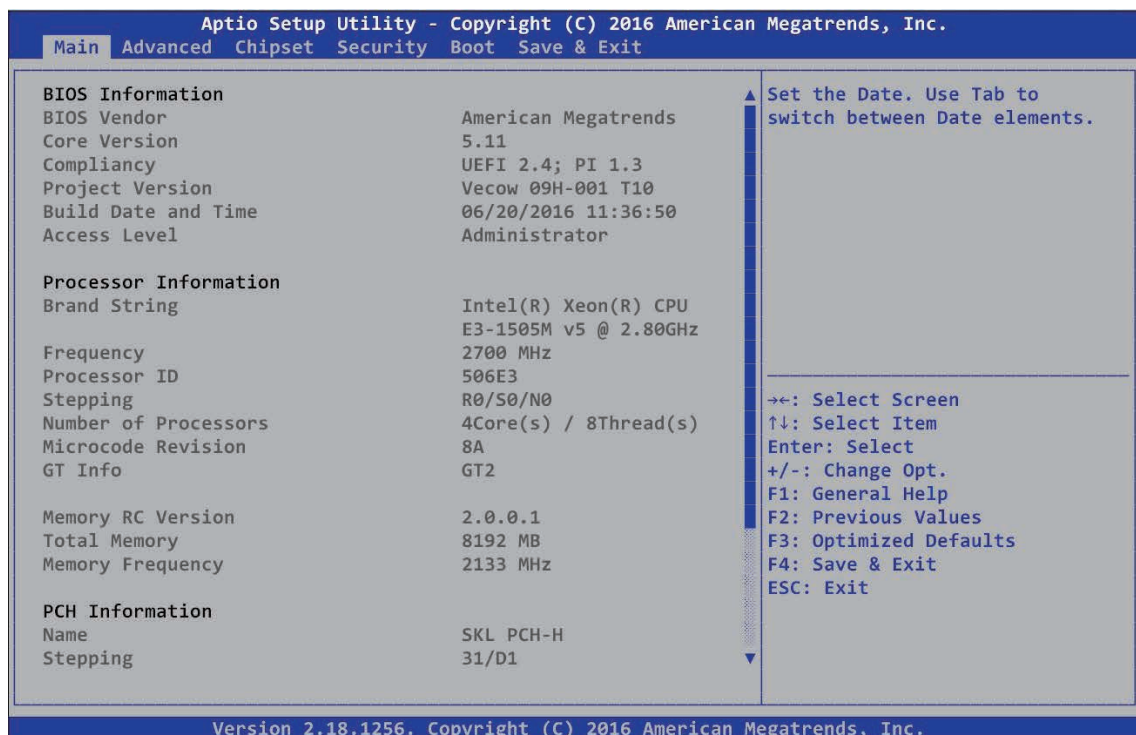


Figure 4-1: Entering Setup Screen

4.2 Main Menu

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

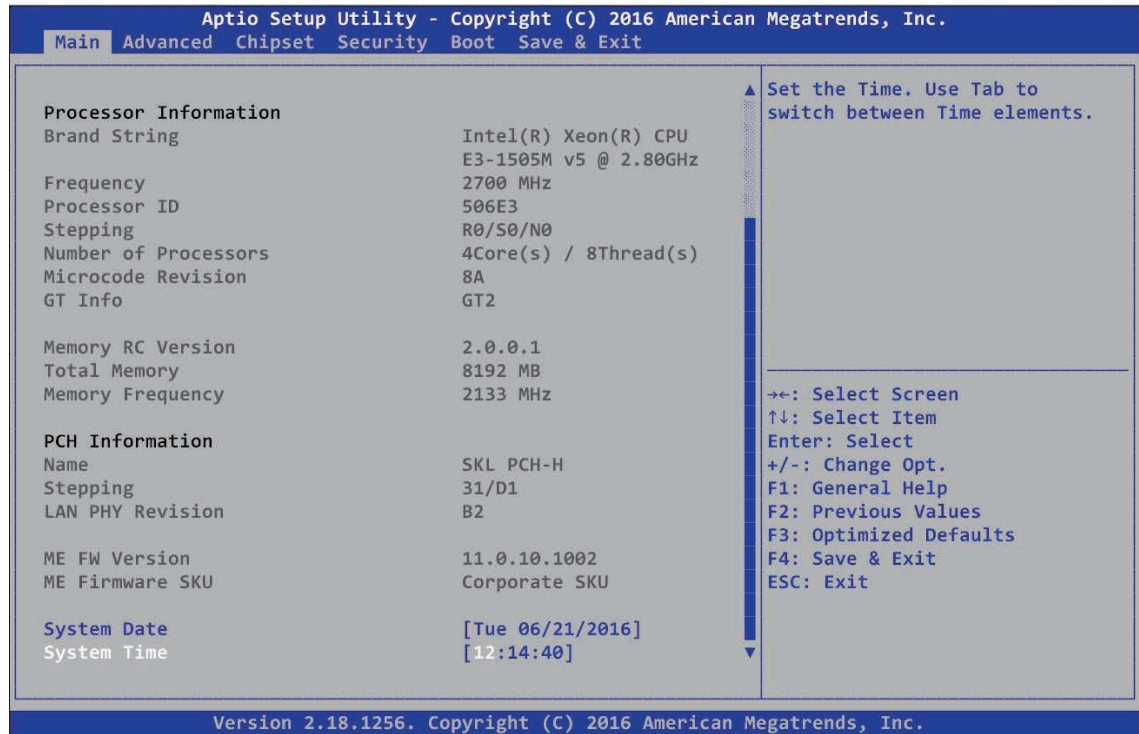


Figure 4-2: BIOS Main Menu

System Date

Set the date. Use <Tab> to switch between date elements.

System Time

Set the time. Use <Tab> to switch between time elements.

4.3 Advanced Functions

Select advanced tab to enter advanced BIOS setup options, such as CPU configuration, SATA configuration, and USB configuration.

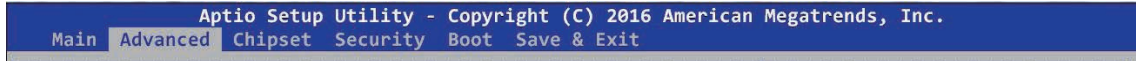


Figure 4 3: BIOS Advanced Menu

4.3.1 ACPI Settings

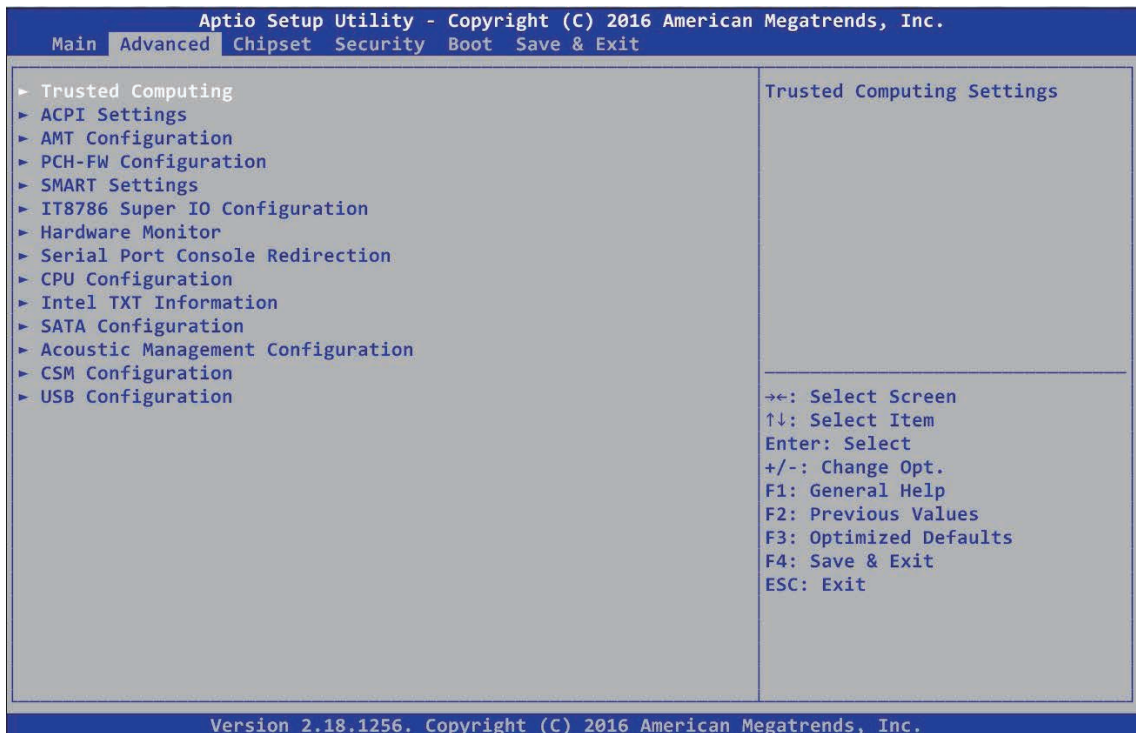


Figure 4 3-1: ACPI Settings

Enable Hibernation

Enables or disables system's ability to hibernate (OS/S4 sleep state). This option may not be effective with some OS.

ACPI Sleep State

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

S3 Video Repost

Enables or disables S3 video repost.

ACPI Low Power S0 Idle

Enables or disables ACPI low power S0 idle support.

4.3.2 AMT Configuration

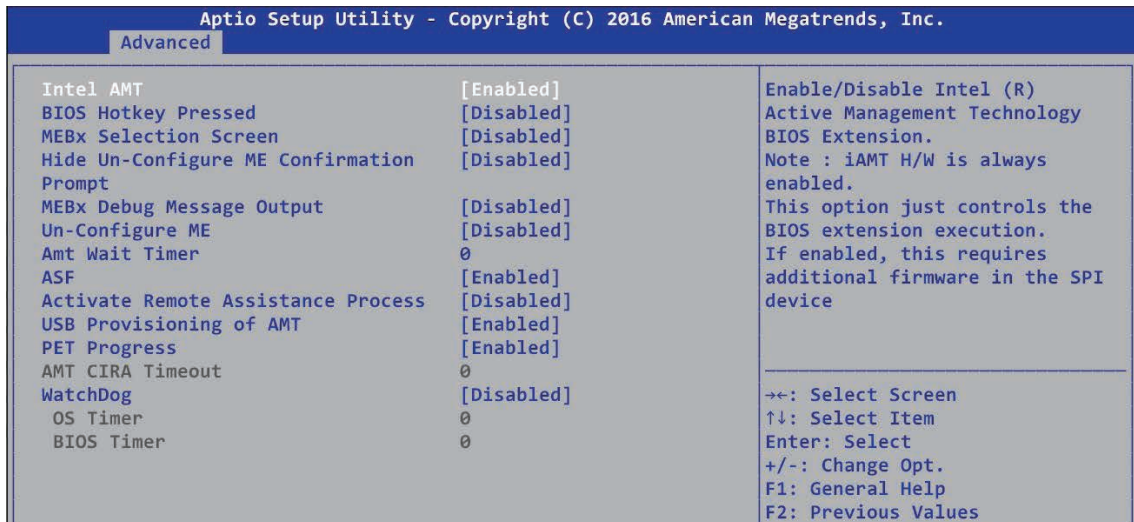


Figure 4 3-2: Intel AMT Settings

Intel AMT

Enables/disables Intel (R) Active Management Technology BIOS extension. Note: iAMT H/W is always enabled. This option just controls the BIOS extension execution. If enabled, this requires additional firmware in the SPI device.

4.3.3 PCH-FW Configuration



Figure 4 3-3: PCH-FW Settings

ME Unconfig on RTC Clear State

Disabling this option will cause ME not to unconfigure on RTC clear.

ME State

Set ME to Soft temporarily disabled.

4.3.4 SMART Settings

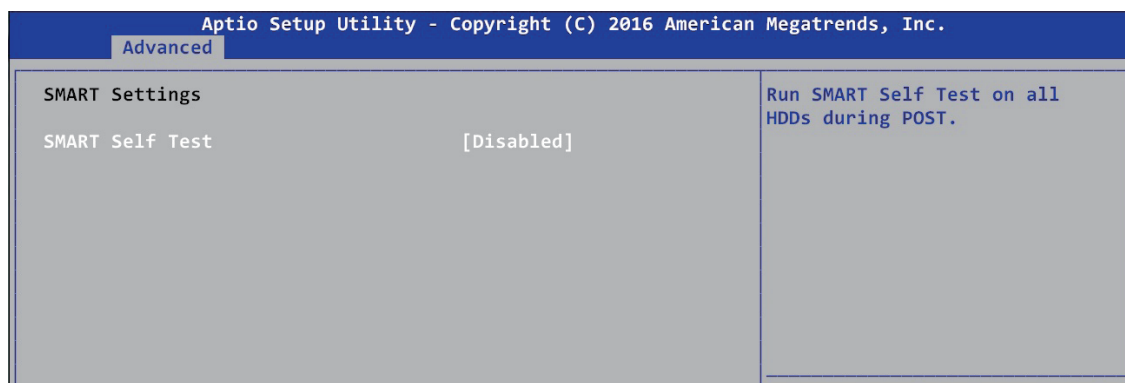


Figure 4-3-4: SMART Settings

SMART Self Test

Run SMART self test on all HDDs during POST.

4.3.5 IT8786 Super IO Configuration

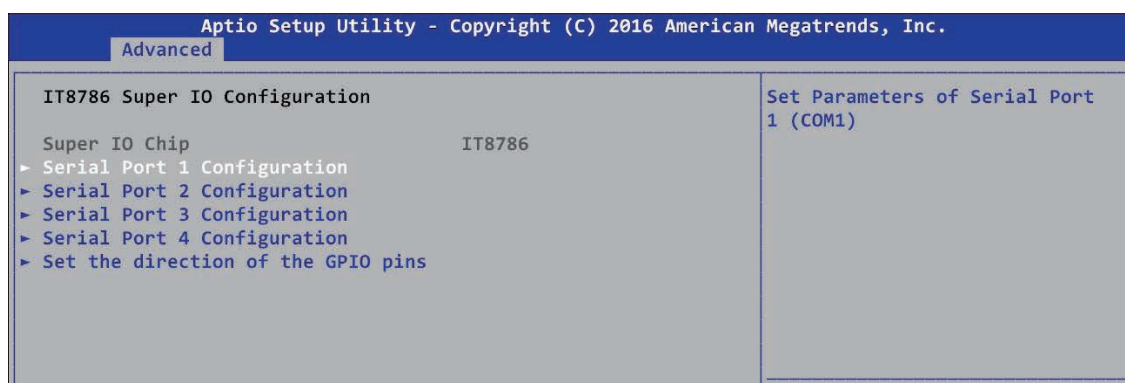


Figure 4-3-5: Super IO Settings

Serial Port 1 Configuration

Set parameters of serial port 1 (COM1).

Serial Port 2 Configuration

Set parameters of serial port 2 (COM2).

Serial Port 3 Configuration

Set parameters of serial port 3 (COM3).

Serial Port 4 Configuration

Set parameters of serial port 4 (COM4).

Set the direction of the GPIO pins

Set the GPIO to input/output pins of internal GPIO.

4.3.6 Hardware Monitor

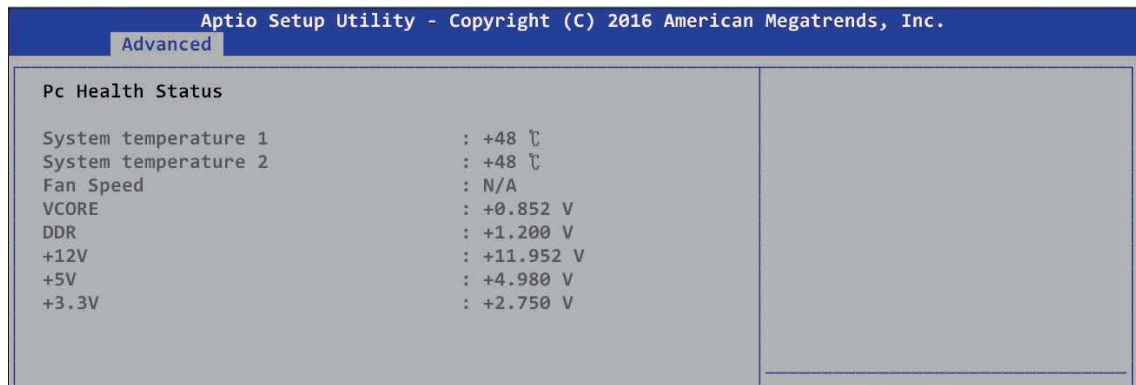


Figure 4-3-6: Hardware Monitor Settings

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

4.3.7 Serial Port Console Redirection

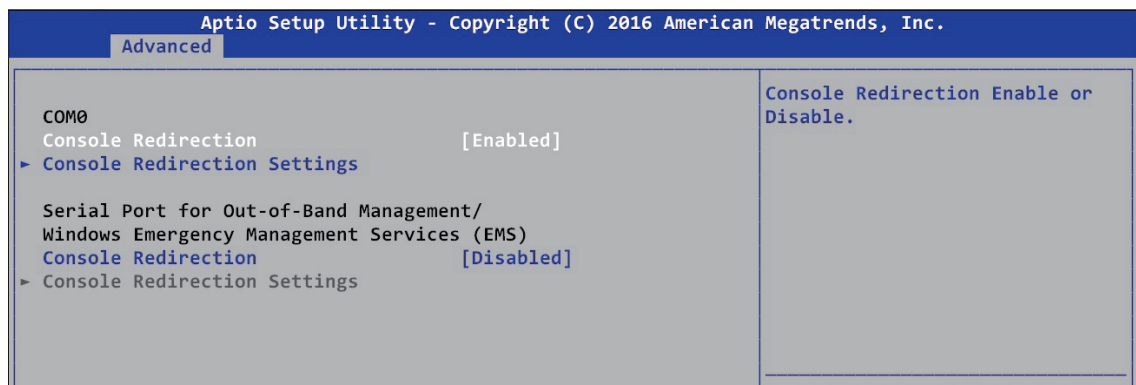


Figure 4-3-7: Serial Port Console Redirection Settings

Console Redirection

Console redirection enable or disable.

Console Redirection Settings

These settings specify how the host computer and the remote computer (which the user is using) will exchange data. Both computers should have the same or compatible settings.

4.3.8 CPU Configuration

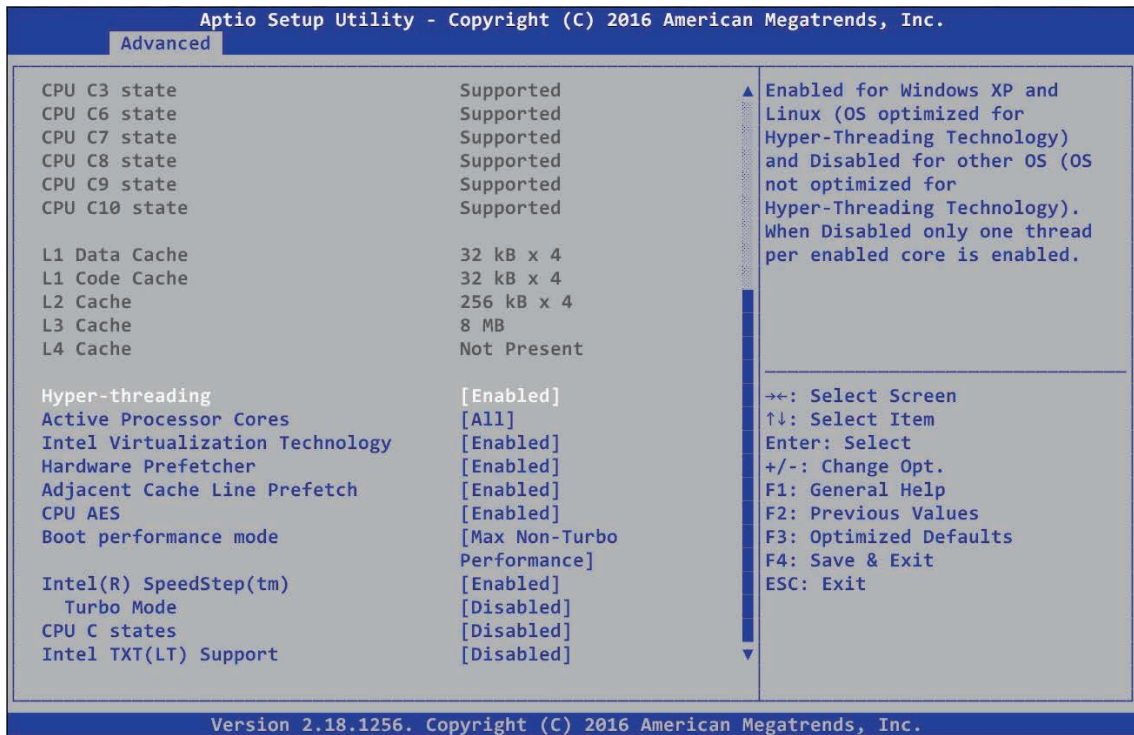


Figure 4-3-8: CPU Function Settings

Hyper-threading

Enabled for Windows XP and Linux (OS optimized for Hyper-Threading Technology) and disabled for other OS (OS not optimized for Hyper-Threading Technology). When disabled only one thread per core is enabled.

Active Processor Cores

Number of cores to enable in each processor package.

Intel Virtualization Technology

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

Hardware Prefetcher

To turn on/off the MLC streamer prefetcher.

Adjacent Cache Line Prefetch

To turn on/off prefetching of adjacent cache lines.

CPU AES

Enable/disable CPU Advanced Encryption Standard instructions.

Boot performance mode

Select the performance state that the BIOS will set before OS handoff.

Intel(R) SpeedStep(tm)

Allows more than two frequency ranges to be supported.

Turbo Mode

Turbo Mode.

CPU C state

Enable or disable CPU C states.

Enhanced C-states

Enable/disable C1E. When enabled, CPU will switch to minimum speed when all cores enter C-State.

Package C State limit

Package C State limit.

Intel TXT(LT) Support

Enables or disables Intel (R) TXT (LT) support.

4.3.9 Intel TXT Information

Display Intel TXT information.

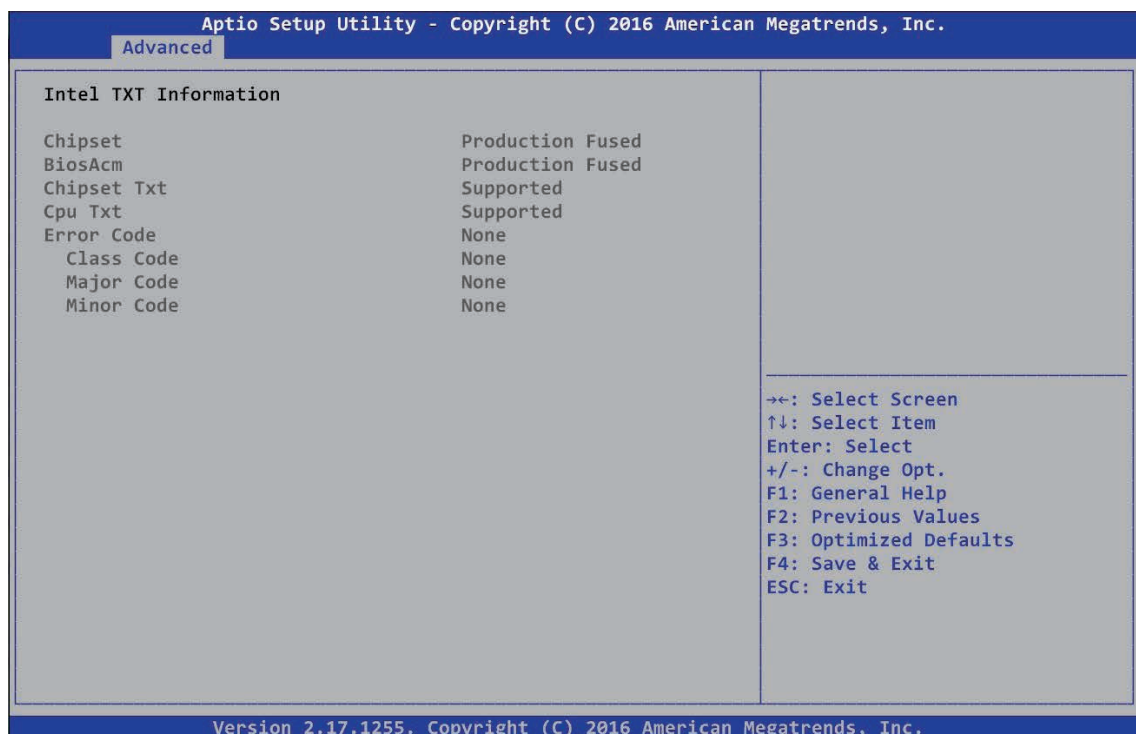


Figure 4-3-9: Intel TXT Information

4.3.10 CPU Configuration

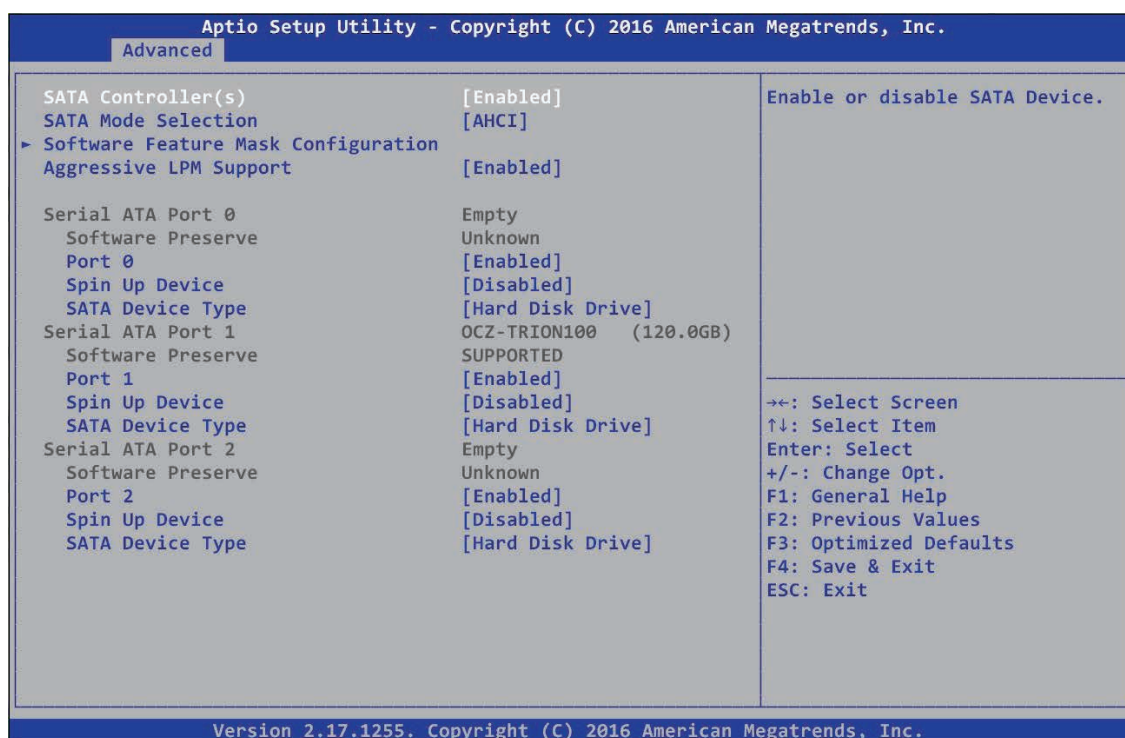


Figure 4-3-10: SATA Devices Settings

SATA Controller(s)

Enable or disable SATA Device.

SATA Mode Selection

Determines how SATA controller(s) operate.

Software Feature Mask Configuration

RAID OROM/RST driver will refer to the SWFM configuration to enable or disable the storage features.

Aggressive LPM Support

Enable PCH to aggressively enter link power state.

Options for each SATA port:

Port 0

Enable or disable SATA Port.

SATA Device Type

Identifies that the SATA port is connected to solid state drive or hard disk drive.

4.3.11 Acoustic Management Configuration

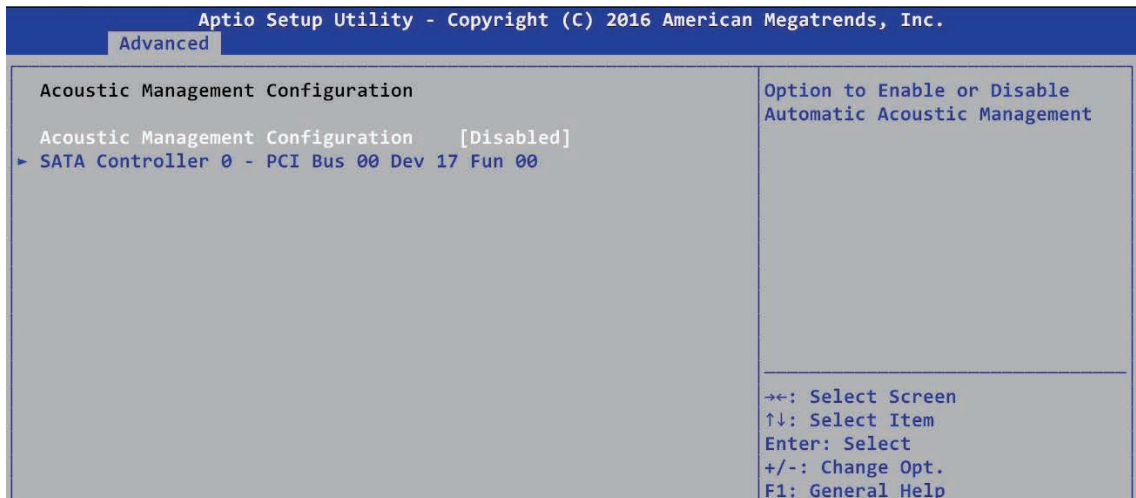


Figure 4-3-11: Acoustic Management Settings

Acoustic Management Configuration

Option to enable or disable automatic acoustic management.

4.3.12 CSM Configuration

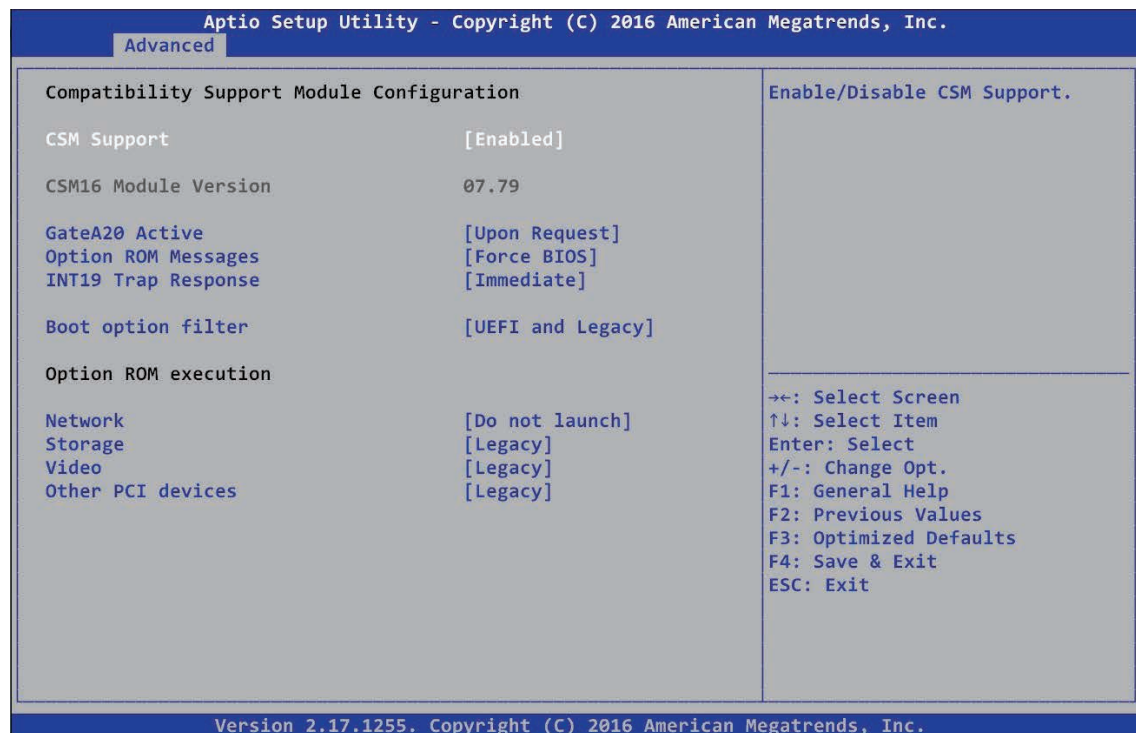


Figure 4-3-12: CSM Settings

CSM Support

Enable/disable CSM support

GateA20 Active

UPON REQUEST - GA20 can be disabled using BIOS services.

ALWAYS - do not allow GA20 to be disabled; this option is useful when any RT code is executed above 1MB.

Option ROM Messages

Set display mode for Option ROM.

INT19 Trap Response

BIOS reaction on INT19 trapping by Option ROM:

IMMEDIATE - execute the trap right away;

POSTPONED - execute the trap during legacy boot.

Boot option filter

This option controls Legacy/UEFI ROM's priority.

Network

Controls the execution of UEFI and Legacy PXE OpROM.

Storage

Controls the execution of UEFI and Legacy Storage OpROM.

Video

Allows more than two frequency ranges to be supported.

Other PCI devices

Determines OpROM execution policy for devices other than network, storage, or video.

4.3.13 USB Configuration

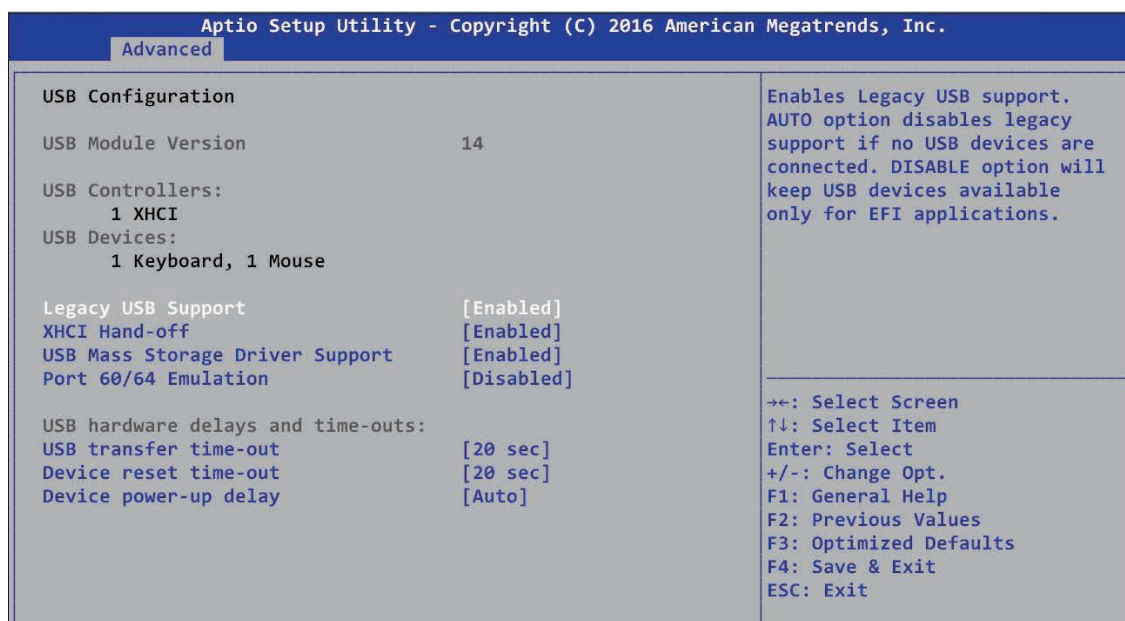


Figure 4-3-13: USB Settings

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 OS-es 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.

Port 60/64 Emulation

Enables I/O port 60h/64h emulation support. This should be enabled for the complete USB keyboard legacy support for non-USB aware OS-es.

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

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 the hub descriptor.

4.4 Chipset Functions



Figure 4-4: BIOS Chipset Menu

System Agent (SA) Configuration

System Agent (SA) parameters.

PCH-IO Configuration

PCH parameters.

4.4.1 System Agent (SA) Configuration

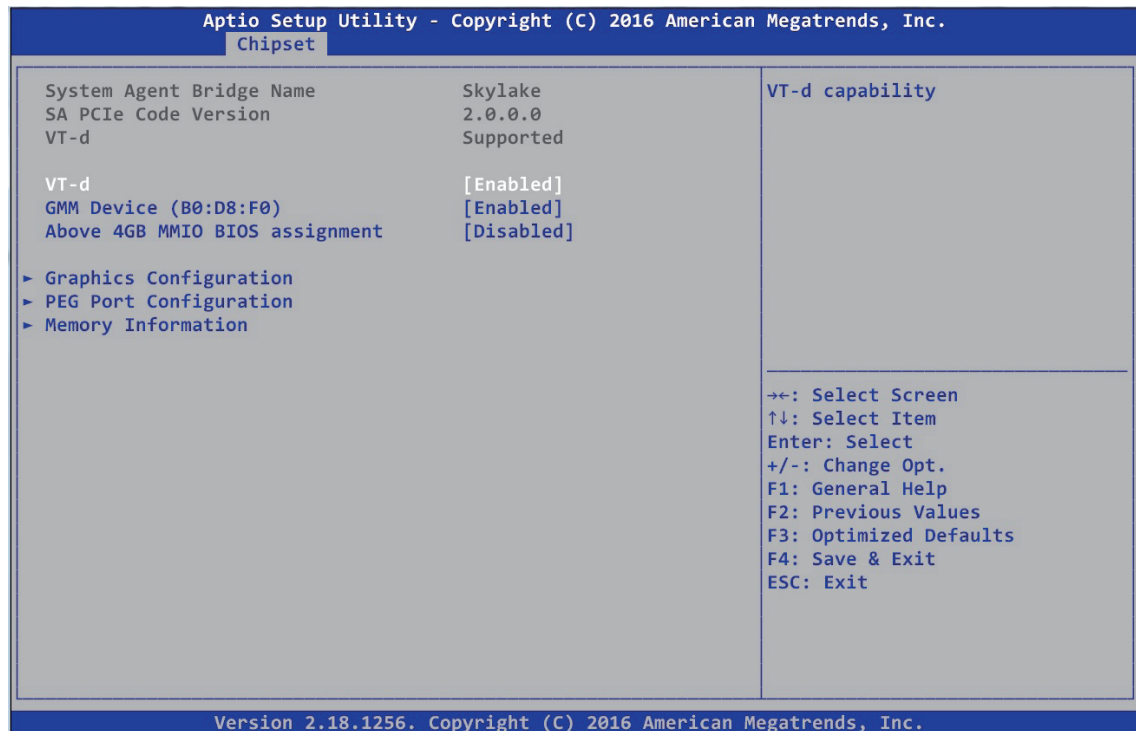


Figure 4-4-1: System Agent Settings

VT-d

VT-d capability.

GMM Device (B0:D8:F0)

Enable/disable SA GMM device.

Above 4GB MMIO BIOS assignment

Enable/disable above 4GB MemoryMappedIO BIOS assignment. This is disabled automatically when aperture size is set to 2048MB.

4.4.2 Graphics Configuration

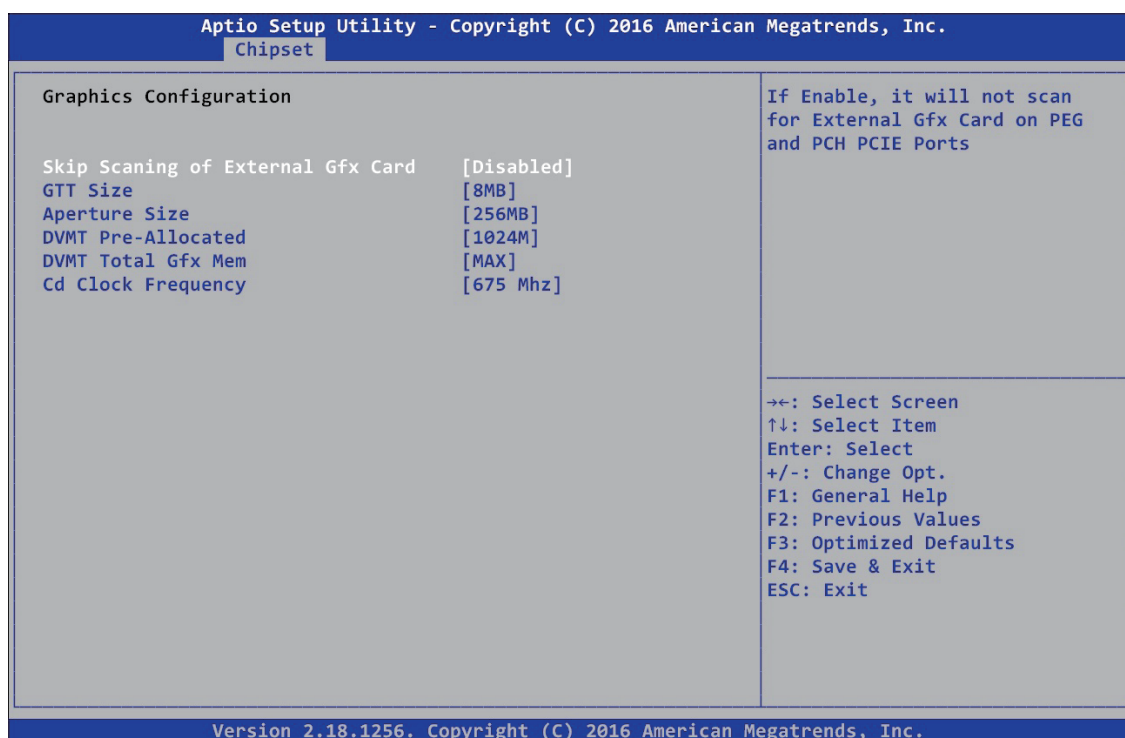


Figure 4-4-2: Graphics Settings

Skip Scanning of External Gfx Card

If enable, it will not scan for external Gfx card on PEG and PCH PCIE ports.

GTT Size

Select the GTT size.

Aperture Sizer

Select the aperture size.

Note: Above 4GB MMIO BIOS assignment is automatically enabled when selecting 2048MB aperture. To use this feature, please disable CSM Support.

DVMT Pre-Allocated

Select DVMT 5.0 pre-allocated (fixed) graphics memory size used by the internal graphics device.

DVMT Total Gfx Mem

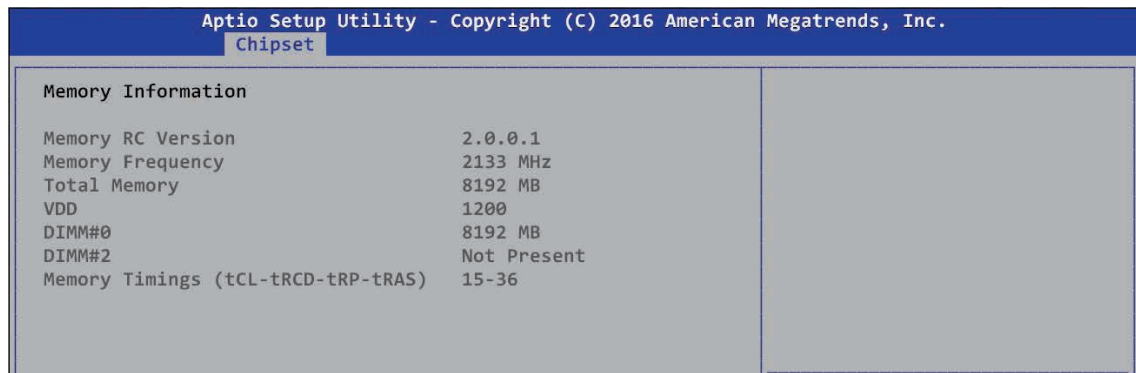
Select DVMT5.0 total graphic memory size used by the internal graphics device.

Cd Clock Frequency

Select the highest Cd clock frequency supported by the platform.

4.4.4 Memory Information

Displays memory information.

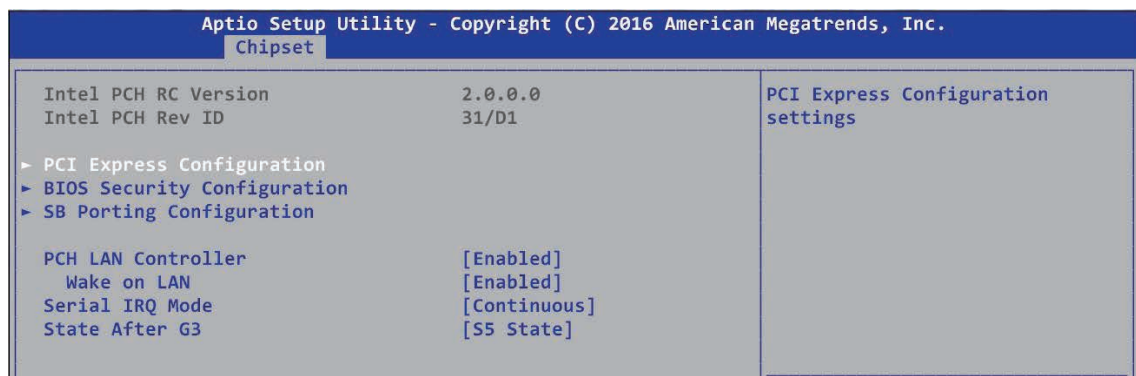


The screenshot shows the 'Memory Information' section of the Aptio Setup Utility. The title bar reads 'Aptio Setup Utility - Copyright (C) 2016 American Megatrends, Inc.' and the sub-header is 'Chipset'. The main content area lists the following memory-related parameters:

Parameter	Value
Memory RC Version	2.0.0.1
Memory Frequency	2133 MHz
Total Memory	8192 MB
VDD	1200
DIMM#0	8192 MB
DIMM#2	Not Present
Memory Timings (tCL-tRCD-tRP-tRAS)	15-36

Figure 4-4-4: Memory Information

4.4.5 PCH-IO Configuration



The screenshot shows the 'PCH-IO Configuration' section of the Aptio Setup Utility. The title bar reads 'Aptio Setup Utility - Copyright (C) 2016 American Megatrends, Inc.' and the sub-header is 'Chipset'. The main content area lists the following PCH-IO settings:

Parameter	Value
Intel PCH RC Version	2.0.0.0
Intel PCH Rev ID	31/D1
PCI Express Configuration	PCI Express Configuration settings
BIOS Security Configuration	
SB Porting Configuration	
PCH LAN Controller	[Enabled]
Wake on LAN	[Enabled]
Serial IRQ Mode	[Continuous]
State After G3	[S5 State]

Figure 4-4-5: PCH-IO Settings

PCH LAN Controller

Enable or disable onboard NIC.

Wake on LAN

Enable or disable integrated LAN to wake the system. (The wake On LAN cannot be disabled if ME is on at Sx state.)

Serial IRQ Mode

Configure serial IRQ mode.

State After G3

Specify what state to go to when power is re-applied after a power failure (G3 state).

S0 State: Always turn-on the system when power source plugged-in.

S5 State: Always turn-off the system when power source plugged-in.

4.4.6 PCI Express Configuration

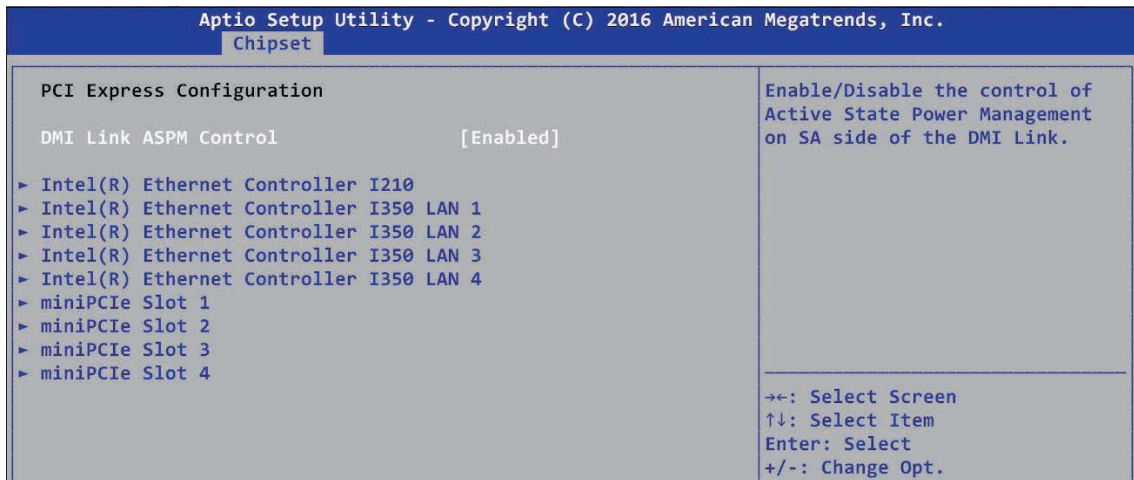


Figure 4-4-6: PCH-IO Settings

DMI Link ASPM Control

Enable/disable the control of active state power management on SA side of the DMI link.

Intel(R) Ethernet Controller I210

Intel(R) Ethernet Controller I210 Settings.

Intel(R) Ethernet Controller I350 LAN 1

Enable or disable of I350 LAN.

Intel(R) Ethernet Controller I350 LAN 2

Enable or disable of I350 LAN.

Intel(R) Ethernet Controller I350 LAN 3

Enable or disable of I350 LAN.

Intel(R) Ethernet Controller I350 LAN 4

Enable or disable of I350 LAN.

MiniPCIe Slot 1

MiniPCIe slot settings.

MiniPCIe Slot 2

MiniPCIe slot settings.

MiniPCIe Slot 3

MiniPCIe slot settings.

MiniPCIe Slot 4

MiniPCIe slot settings.

4.4.7 BIOS Security Configuration of PCH-IO

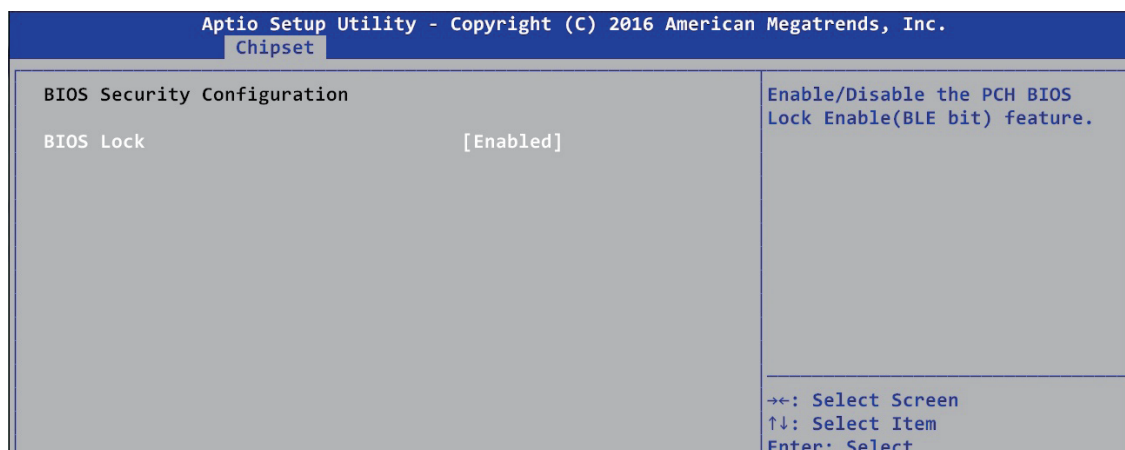


Figure 4-4-7: BIOS Security Settings

BIOS Lock

Enable/disable the PCH BIOS Lock Enable (BLE bit) feature.

4.4.8 SB Porting Configuration of PCH-IO

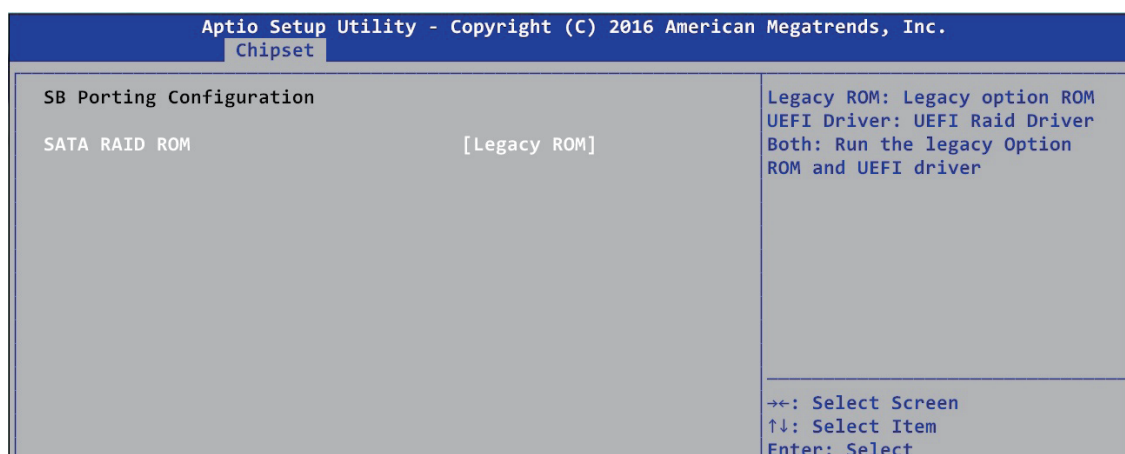


Figure 4-4-8: RAID ROM Settings

SATA RAID ROM

Legacy ROM: Legacy option ROM

UEFI Driver: UEFI Raid Driver

Both: Run the Legacy Option ROM and UEFI driver.

4.5 Security Functions



Figure 4-5: BIOS Security Menu

Administrator Password

Set administrator password.

User Password

Set user password.

4.5.1 HDD Security Configuration

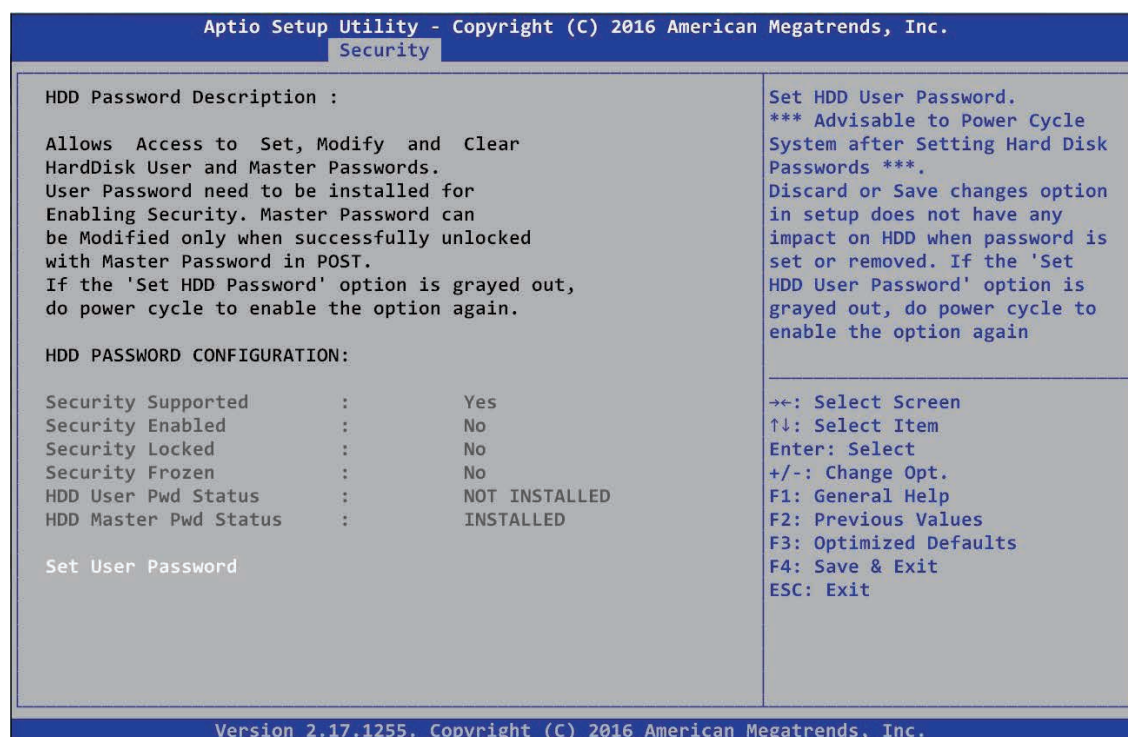


Figure 4-5-1 HDD Security Settings

Set User Password

Set HDD user password.

*** Advisable to power cycle system after setting hard disk passwords ***

Discard or save changes option in setup does not have any impact on HDD when password is set or removed. If the 'Set HDD User Password' option is gray, do power cycle to enable the option again.

4.6 Boot Functions

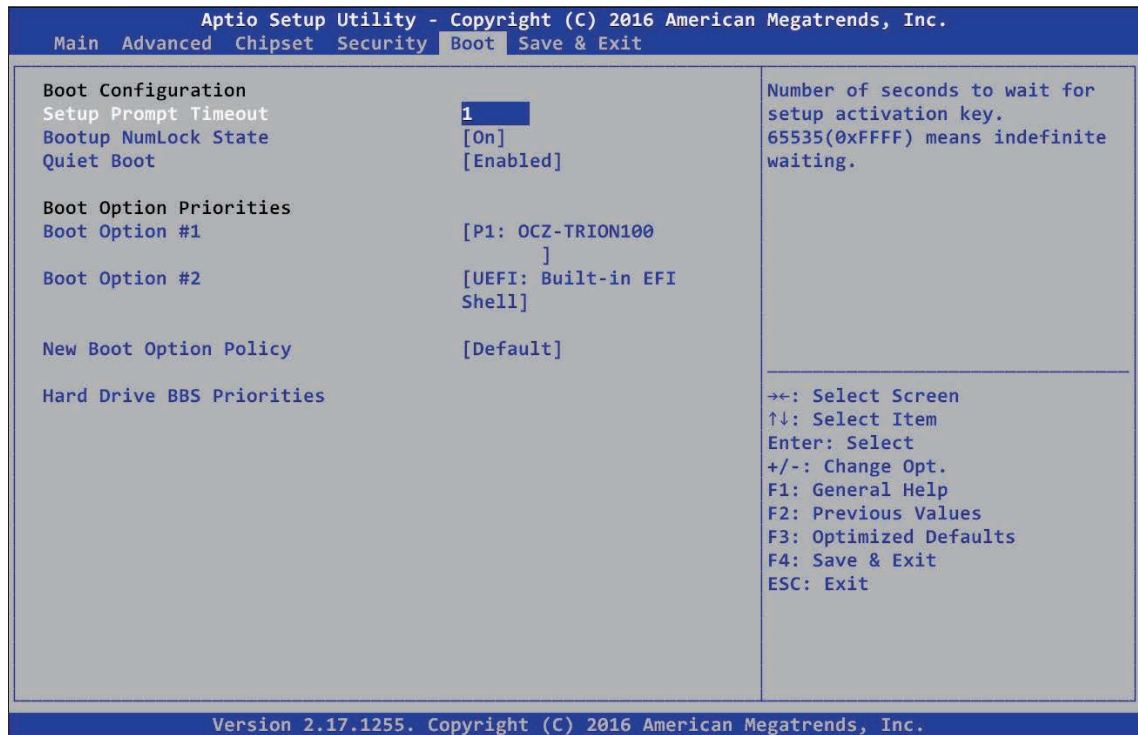


Figure 4-6: BIOS Boot Menu

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

Sets the system boot order.

New Boot Option Policy

Controls the placement of newly detected UEFI boot options.

Hard Drive BBS Priorities

Set the order of the Legacy devices in this group.

4.7 Save & Exit

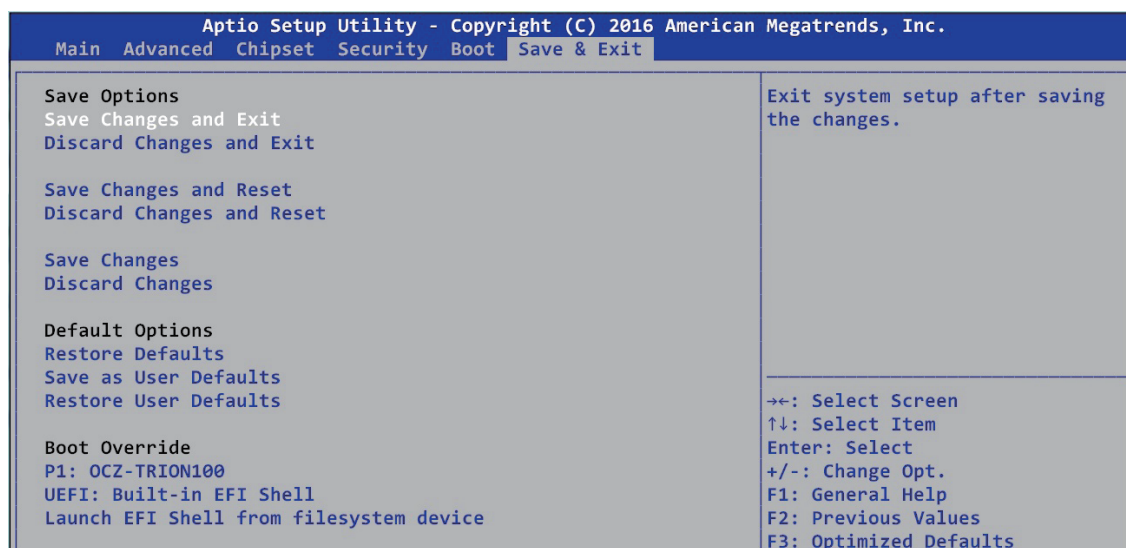


Figure 4-7: Bios Save and Exit Menu

Save Changes and Exit

Exit system setup after saving the changes.

Discard Changes and Exit

Exit system setup without saving any changes.

Save Changes and Reset

Reset the system after saving the changes.

Discard Changes and Reset

Reset system setup without saving any changes.

Save Changes

Save changes done so far to any of the setup options.

Discard Changes

Discard changes done so far to any of the setup options.

Options for each SATA port:

Restore Defaults

Restore/load default values for all the setup options.

Save as User Defaults

Save the changes done so far as user defaults.

Restore User Defaults

Restore the user defaults to all the setup options.

A

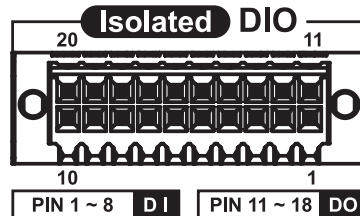
APPENDIX A : ISOLATED DIO GUIDE

A.1 IO Pin Definition

GPIO Pin	Base Address	Usage
10, 13, 14, 17	0xA00	-----
11, 12, 15, 16		CN16-GPIO
20 ~ 27	0xA01	-----
30, 31, 34	0xA02	-----
32, 33, 35 ~ 37		CN16-GPIO
40 ~ 47	0xA03	-----
50 ~ 52, 56, 57	0xA04	CN16-GPIO
53, 54		-----
60 ~ 63, 66, 67	0xA05	-----
64, 65		CN16-GPIO
70 ~ 77	0xA06	DO
80 ~ 87	0xA07	DI

A.2 Function Description

The IVH-9000 offers a 16-bit DIO (8-DI/ 8-DO) 20-pin terminal block connector. Each bit of DI and DO equipped with a photo-coupler for isolated protection. All IO pins are fixed by Hardware design and cannot change in/out direction in runtime process. The definition is listed as follows:



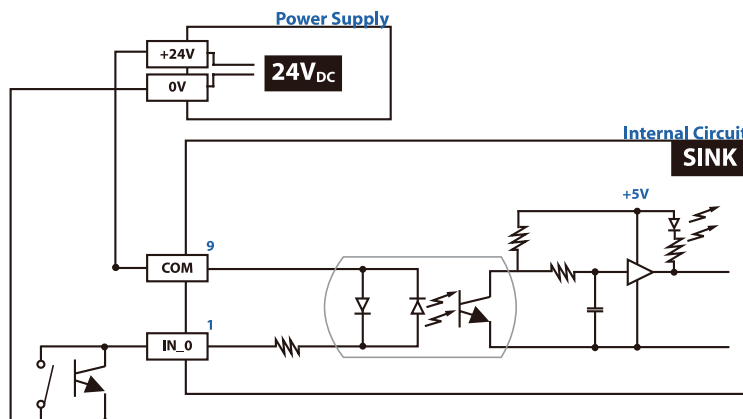
Pin No.	Definition	Description	Pin No.	Definition	Description
1	INPUT 0	DI0	11	OUTPUT 0	DO0
2	INPUT 1	DI1	12	OUTPUT 1	DO1
3	INPUT 2	DI2	13	OUTPUT 2	DO2
4	INPUT 3	DI3	14	OUTPUT 3	DO3
5	INPUT 4	DI4	15	OUTPUT 4	DO4
6	INPUT 5	DI5	16	OUTPUT 5	DO5
7	INPUT 6	DI6	17	OUTPUT 6	DO6
8	INPUT 7	DI7	18	OUTPUT 7	DO7
9	DI_COM	DI COM	19	N.C.	NC
10	GND	DIO GND	20	External DC	External 6-36V DC

A.3 DIO Signal Circuit

24V Application Diagram:

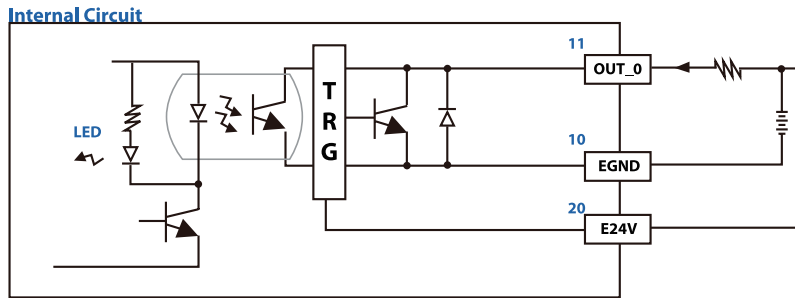
DI in SINK mode (NPN)

Signal Circuit of Input NPN



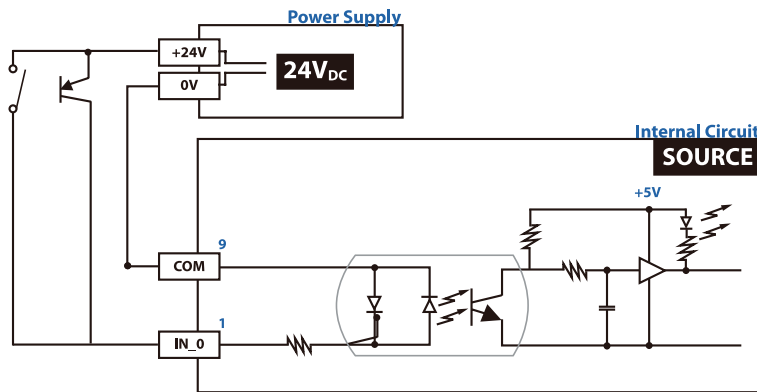
DO in SINK mode (NPN)

Signal Circuit of output NPN



DI in SOURCE mode (PNP)

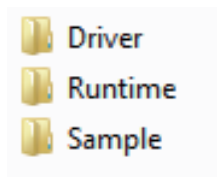
Signal Circuit of Input NPN



A.4 Software Package contain

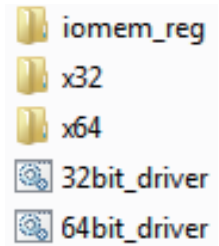
There are three folders with the following inside:

- Driver folder includes x32 & x64 versions
- Runtime folder includes DLL and header file for software developer or system integration
- Sample folder includes sample program



A.5 Driver Install

In Driver folder, you can find the files below inside.
Please right click the batch file that is chosen by your OS version, and run as administrator.



Please press any key to install Framework 3.5.

```
C:\Windows\System32\cmd.exe
1 file(s) copied.
1 file(s) copied.
1 file(s) copied.
1 file(s) copied.
Microsoft PnP Utility
Processing inf : iomem.inf
Successfully installed the driver on a device on the system.
Driver package added successfully.
Published name : oem3.inf

Total attempted: 1
Number successfully imported: 1

Please check the Network on Windows 8.1 / 10.
If On Windows 7, Please ignore it.
Press any key to continue . . .

Deployment Image Servicing and Management tool
Version: 10.0.10586.0

Image Version: 10.0.10586.0

Enabling feature(s)
[===== 11.8% ]
```

Please press any key to restart.

```
C:\Windows\System32\cmd.exe
1 file(s) copied.
1 file(s) copied.
1 file(s) copied.
1 file(s) copied.
Microsoft PnP Utility
Processing inf : iomem.inf
Successfully installed the driver on a device on the system.
Driver package added successfully.
Published name : oem3.inf

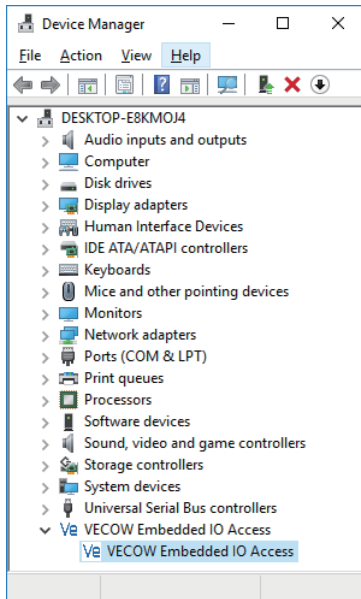
Total attempted: 1
Number successfully imported: 1

Please check the Network on Windows 8.1 / 10.
If On Windows 7, Please ignore it.
Press any key to continue . . .

Deployment Image Servicing and Management tool
Version: 10.0.10586.0

Image Version: 10.0.10586.0

Enabling feature(s)
[=====100.0%=====]
The operation completed successfully.
Ready to Restart!
```

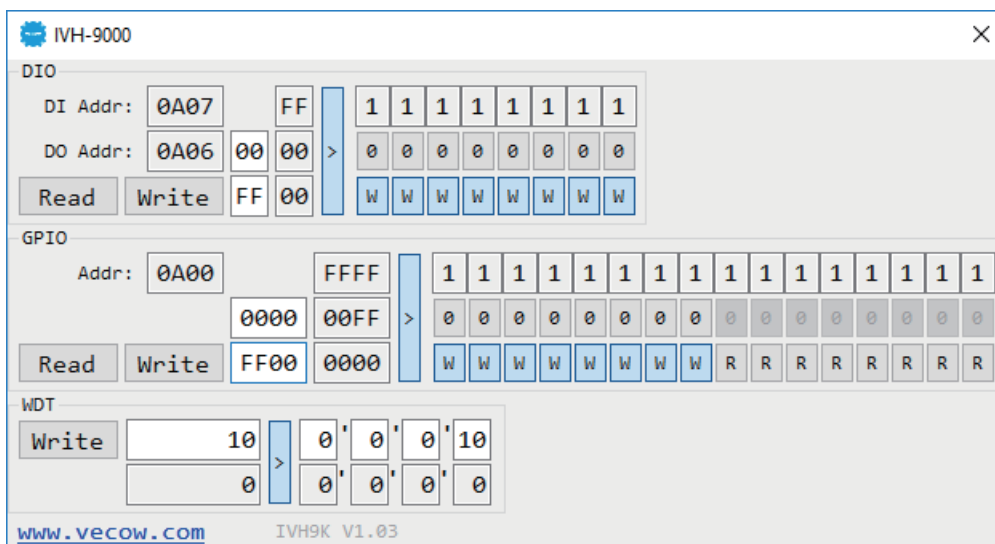
On Device Manager, “VEECOW Embedded IO Access” will be added.

A.6 DIO Demo Tool

Execute DIO demo tool (IVH9K.exe).



Operation on DIO demo tool utility.



Operation on DIO demo tool utility.

Click “Read” button to get value; Input any number in Write and Write Mask textbox, and click “Write” Button to set value.

Please check the In-Out pin for GPIO.

B

APPENDIX B : GPIO & WDT Functions

B.1 IOMem.Dll API

int Outp(unsigned long Port, unsigned char Value);

Description: Set Byte-Data to Port.

Return: if success return 1; else return 0.

unsigned char Inp(unsigned long Port);

Description: Get Byte-Data from Port.

B.2 Entry Functions

int Get_DI(unsigned char *DI);

Description: Get DI Data for DIO.

Return: if success return 1; else return 0.

int Set_DO(unsigned char DO);

Description: Set DO Data for DIO.

Return: if success return 1; else return 0.

int Get_GPI(unsigned short *GPI, unsigned short *Mask);

Description: Get GPI Data for GPIO.

Return: if success return 1; else return 0.

Mask [bit]=0 for read; [bit]=1 for write; If no Mask, read all

int Set_GPO(unsigned short GPO, unsigned short *Mask);

Description: Set GPO Data for GPIO.

Return: if success return 1; else return 0.

Mask [bit]=0 for read; [bit]=1 for write; If no Mask, write all

int Set_WDT(unsigned long time);

Description: Set WDT Time for WDT.

Return: if success return 1; else return 0.

C

APPENDIX C : RAID Installation Guide

C.1 SATA Mode for RAID

Please select SATA device to RAID mode on BIOS menu.
Advanced → SATA Configuration → SATA Mode Selection

Main	Advanced	Chipset	Boo	Security	Save & Exit	
SATA Controller(s)					[Enabled]	Item Specific Help
SATA Model Selection					[AHCI]	

C.2 OS Installation

IVH-9000 is featured with eight SATA, including six internal SATA, 1 mSata, and 1 CFast.

You can select one of the SATA ports for OS installation.
We use CFast card for Windows 10 OS installation as an example.

C.3 To Install All Device Drivers of IVH-9000 System

The instructions are as follows:

1. To install Chipset driver
2. To install Network driver
3. To install ME driver (if available)
4. To install Audio driver
5. To install VGA driver

C.4 To Install “Intel Rapid Storage Technology” Software

You can get the latest information and the software directly from Intel website.

http://www.intel.com/p/en_US/support/highlights/chpsts/imsm

The RAID environment has been done if you completed the steps above.

C.5 To Insert SATA HDD for RAID 1

Please notice, you can use six SATA ports for SATA HDD, except for the CFast port and mSATA slot.

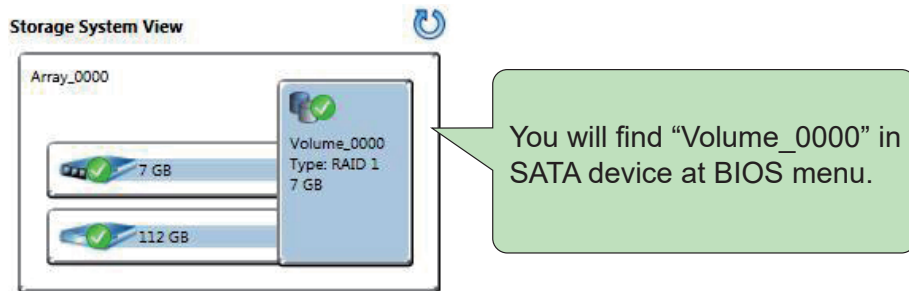
C.6 To Create RAID Volume on “Rapid Storage Technology” Software

IVH-9000 is featured with six SATA HDDs for RAID volume, so there are three options for choose on this page. Let’s take RAID 1 as an example, please select “RAID 1”.



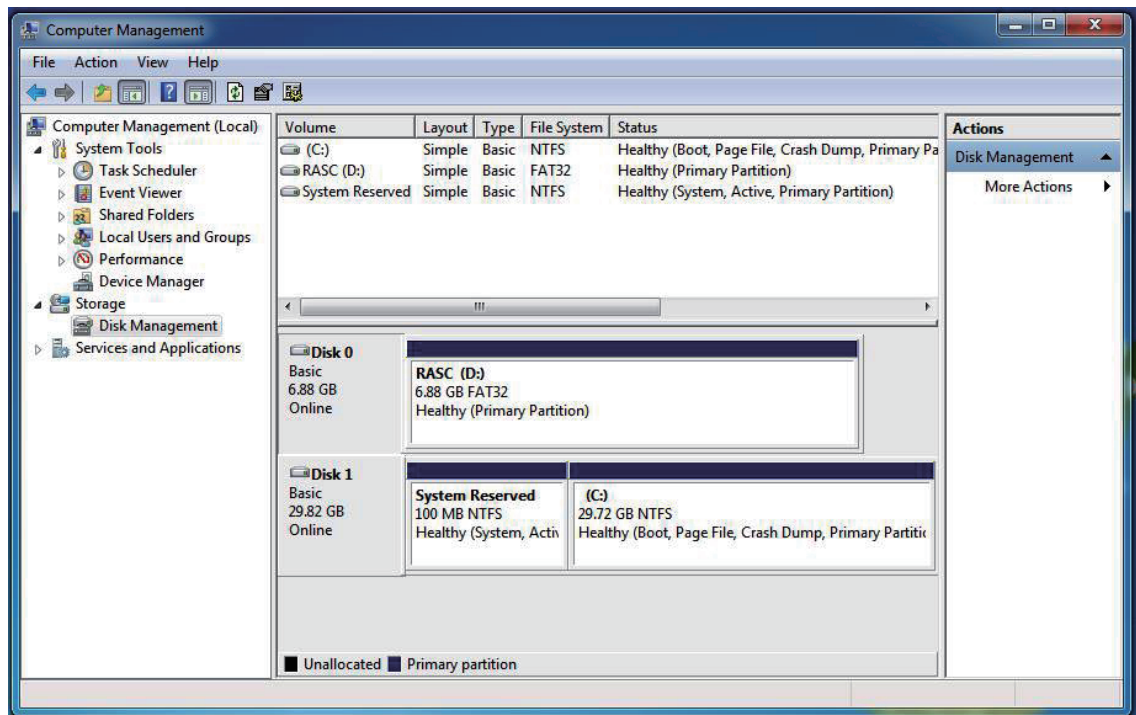
C.7 Disk Management : Partition the Disk

After RAID 1 volume created, you can see the figure of SATA device allocation.



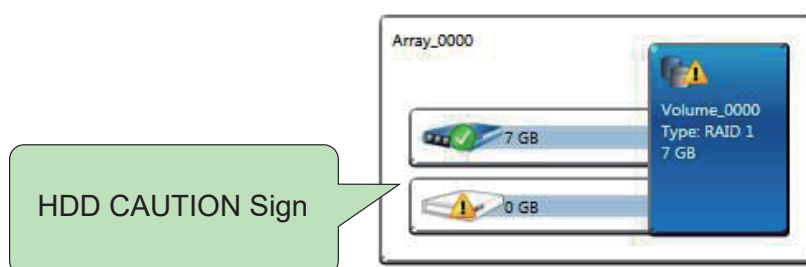
To start Disk Management tool, select "initialize disk."

Then add "Logical Device" for Windows access.

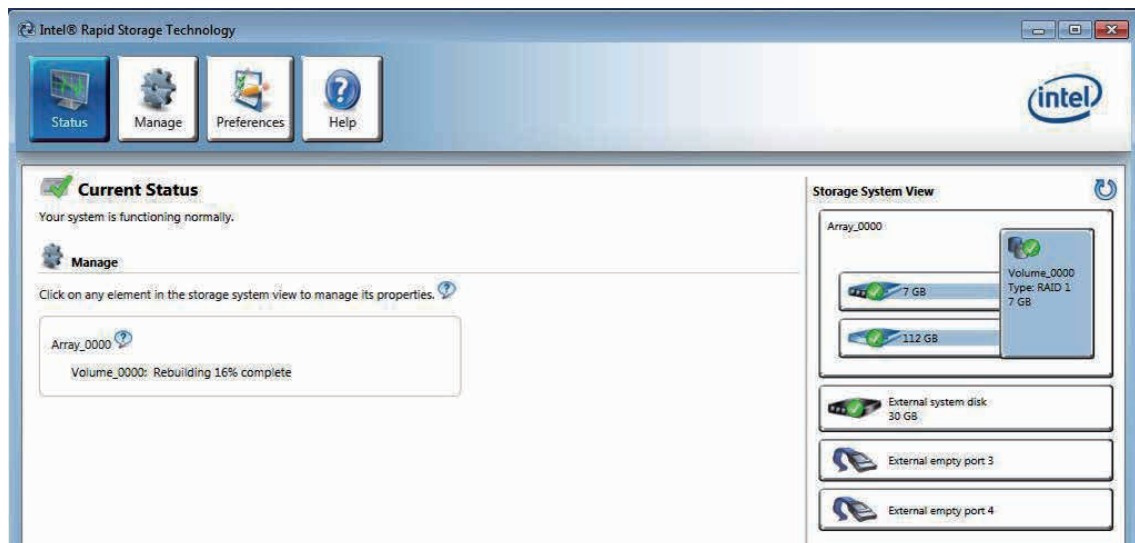


C.8 If One SATA HDD on RAID Volume is Out-of-use

After RAID 1 volume created, you can see the figure of SATA device allocation.



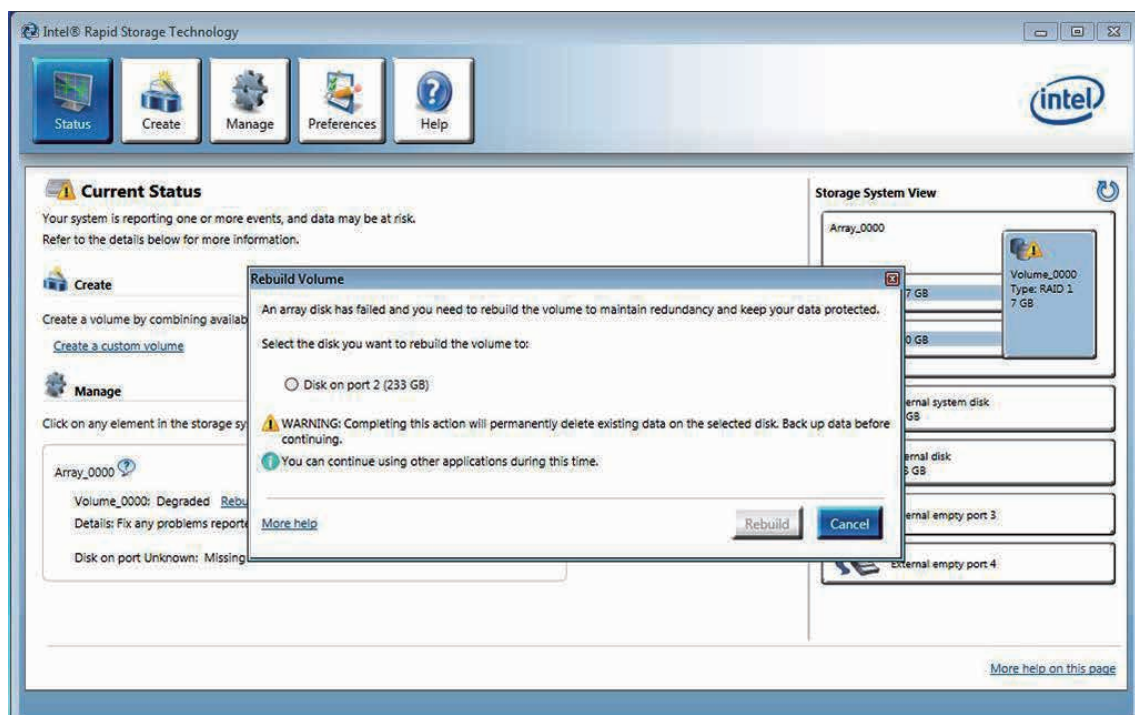
C.9 Recovery and Auto Re-build When Use the **SAME** RAID HDD



C.10 Recovery and Auto Re-build When Use **DIFFERENT** RAID HDD

A warning will pop-up to ask you if the disk is not a member of the original RAID volume.

If you press “Rebuild”, it will replace the broken SATA HDD to the last SATA HDD of RAID volume.



D

APPENDIX D : Power Consumption

Testing Board	IVH-9000
RAM	16GB x 2
USB-1	USB Keyboard Logitech K120
USB-2	USB Mouse Microsoft 1113
USB-3	USB Flash Transcend 3.0 8GB
USB-4	USB Flash Transcend 3.0 8GB
CFAST	Innodisk Cfast 3ME3 64GB
SATA 0	Transcedn SATA-3 SSD420 256GB
SATA 1	Seagate HDD 160GB
LAN 1 (i219)	1.0 Gbps
LAN 2 (i210)	1.0 Gbps
Graphics Output	DVI
Power Plan	Balance (Windows7 Power Plan)
Power Source	Chroma 62006P-100-25

D.1 Intel® Xeon® E3-1505M v5 (8M Cache, 2.80 GHz)

Power on and boot to Win7 64bit

CPU	Power Input	Standby Mode		Sleep Mode		Idle Status : CPU usage less 3%	
		Max Current	Max Consumption	Max Current	Max Consumption	Max Current	Max Consumption
Xeon® E3-1505M v5	6V	1.460A	08.76W	1.600A	09.60W	5.360A	32.16W
Xeon® E3-1505M v5	12V	0.730A	08.76W	0.800A	09.60W	2.580A	30.96W
Xeon® E3-1505M v5	24V	0.390A	09.36W	0.430A	10.32W	1.340A	32.16W
Xeon® E3-1505M v5	48V	0.170A	08.16W	0.200A	09.60W	0.630A	30.24W
Xeon® E3-1505M v5	60V	0.130A	07.80W	0.150A	09.00W	0.490A	29.40W
Xeon® E3-1505M v5	78V	0.107A	08.35W	0.120A	09.36W	0.410A	31.98W

CPU	Power Input	Run 100% CPU usage without 3D		Run 100% CPU usage with 3D	
		Max Current	Max Consumption	Max Current	Max Consumption
Xeon® E3-1505M v5	6V	9.400A	56.40W	10.780A	64.68W
Xeon® E3-1505M v5	12V	4.570A	54.84W	5.160A	61.92W
Xeon® E3-1505M v5	24V	2.210A	53.04W	2.520A	60.48W
Xeon® E3-1505M v5	48V	1.120A	53.76W	1.230A	59.04W
Xeon® E3-1505M v5	60V	0.880A	52.80W	0.980A	58.80W
Xeon® E3-1505M v5	78V	0.670A	52.26W	0.740A	57.72W

D.2 Intel® Core™ i7-6820EQ (8M Cache, 2.80 GHz)

Power on and boot to Win7 64bit

CPU	Power Input	Standby Mode		Sleep Mode		Idle Status : CPU usage less 3%	
		Max Current	Max Consumption	Max Current	Max Consumption	Max Current	Max Consumption
Core™ i7-6820EQ	6V	1.460A	08.76W	1.650A	09.90W	5.230A	31.38W
Core™ i7-6820EQ	12V	0.750A	09.00W	0.820A	09.84W	2.650A	31.80W
Core™ i7-6820EQ	24V	0.400A	09.60W	0.430A	10.32W	1.350A	32.40W
Core™ i7-6820EQ	48V	0.180A	08.64W	0.200A	09.60W	0.660A	31.68W
Core™ i7-6820EQ	60V	0.140A	08.40W	0.150A	09.00W	0.520A	31.20W
Core™ i7-6820EQ	78V	0.110A	08.58W	0.121A	09.44W	0.387A	30.19W

CPU	Power Input	Run 100% CPU usage without 3D		Run 100% CPU usage with 3D	
		Max Current	Max Consumption	Max Current	Max Consumption
Core™ i7-6820EQ	6V	10.150A	60.90W	11.130A	66.78W
Core™ i7-6820EQ	12V	4.800A	57.60W	5.310A	63.72W
Core™ i7-6820EQ	24V	2.400A	57.60W	2.680A	64.32W
Core™ i7-6820EQ	48V	1.170A	56.16W	1.300A	62.40W
Core™ i7-6820EQ	60V	0.947A	56.82W	0.999A	59.94W
Core™ i7-6820EQ	78V	0.698A	54.44W	0.774A	60.37W

D.3 Intel® Core™ i5-6440EQ (6M Cache, 2.70 GHz)

Power on and boot to Win7 64bit

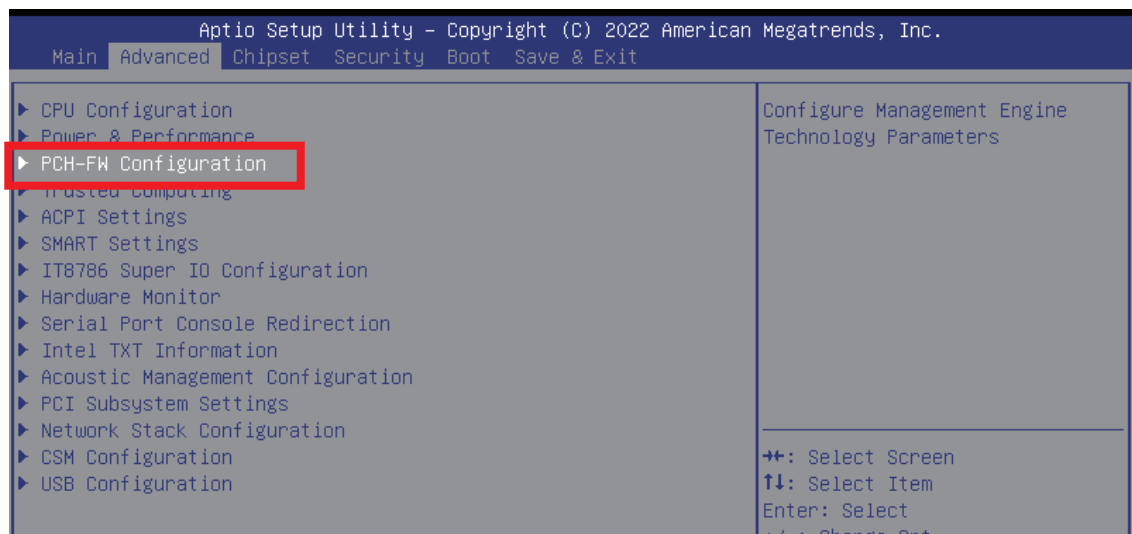
CPU	Power Input	Standby Mode		Sleep Mode		Idle Status : CPU usage less 3%	
		Max Current	Max Consumption	Max Current	Max Consumption	Max Current	Max Consumption
Core™ i5-6440EQ	6V	1.380A	08.28W	1.590A	09.54W	5.610A	33.66W
Core™ i5-6440EQ	12V	0.710A	08.52W	0.812A	09.74W	2.690A	32.28W
Core™ i5-6440EQ	24V	0.402A	09.65W	0.420A	10.08W	1.373A	32.95W
Core™ i5-6440EQ	48V	0.183A	08.78W	0.195A	09.36W	0.658A	31.58W
Core™ i5-6440EQ	60V	0.143A	08.58W	0.146A	08.76W	0.583A	34.98W
Core™ i5-6440EQ	78V	0.110A	08.58W	0.119A	09.28W	0.393A	30.65W

CPU	Power Input	Run 100% CPU usage without 3D		Run 100% CPU usage with 3D	
		Max Current	Max Consumption	Max Current	Max Consumption
Core™ i5-6440EQ	6V	8.720A	52.32W	10.110A	60.66W
Core™ i5-6440EQ	12V	4.070A	48.84W	4.800A	57.60W
Core™ i5-6440EQ	24V	1.980A	47.52W	2.370A	56.88W
Core™ i5-6440EQ	48V	0.991A	47.57W	1.133A	54.38W
Core™ i5-6440EQ	60V	0.776A	46.56W	0.904A	54.24W
Core™ i5-6440EQ	78V	0.587A	45.79W	0.690A	53.82W

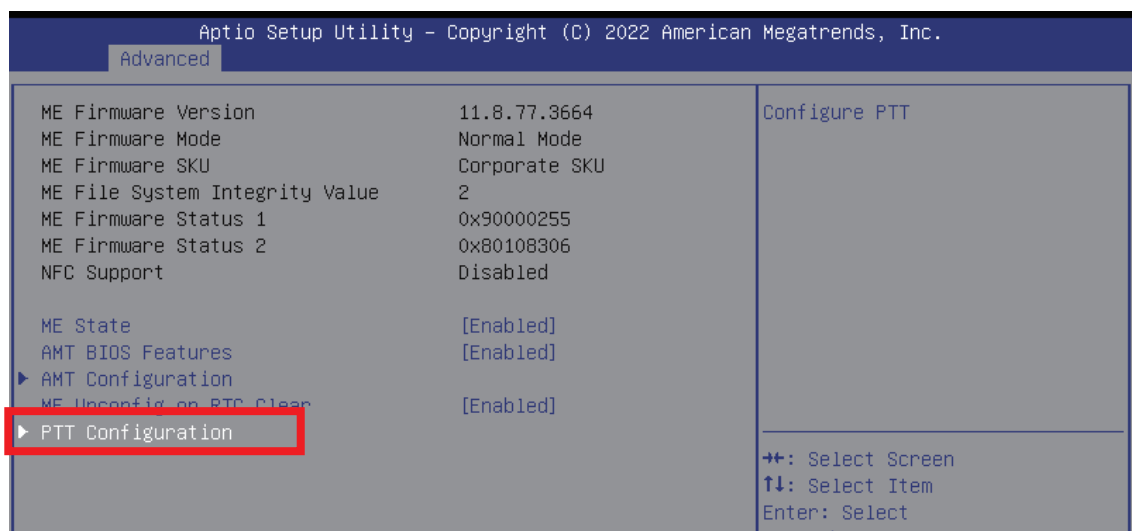
E

APPENDIX E : Install Win11 (BIOS TPM Setting)

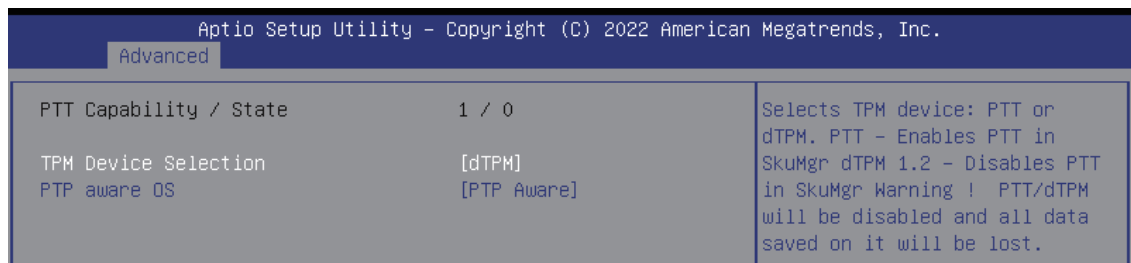
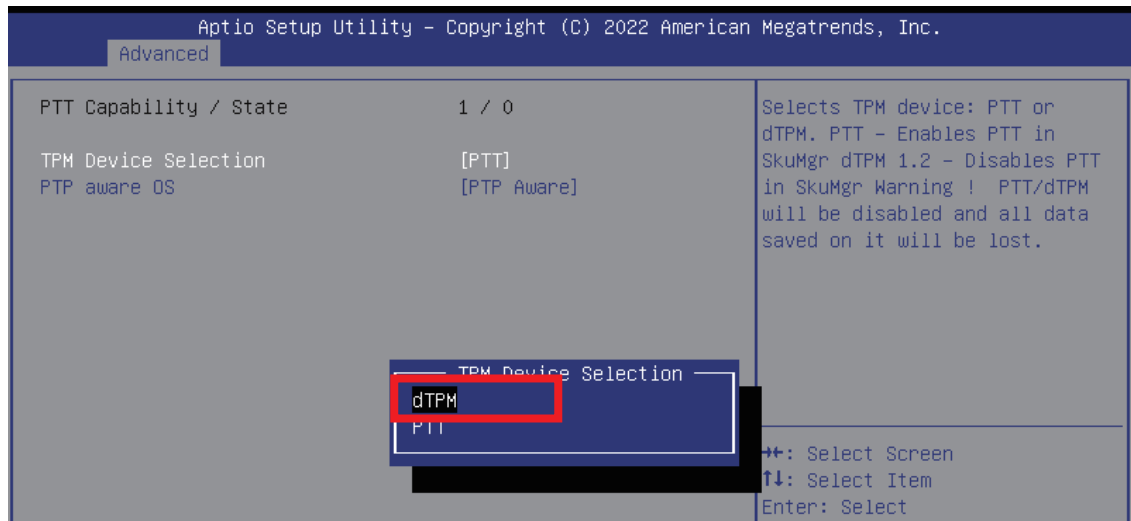
Step 1 Click on “Advanced”, then click on “PCH-FW Configuration”



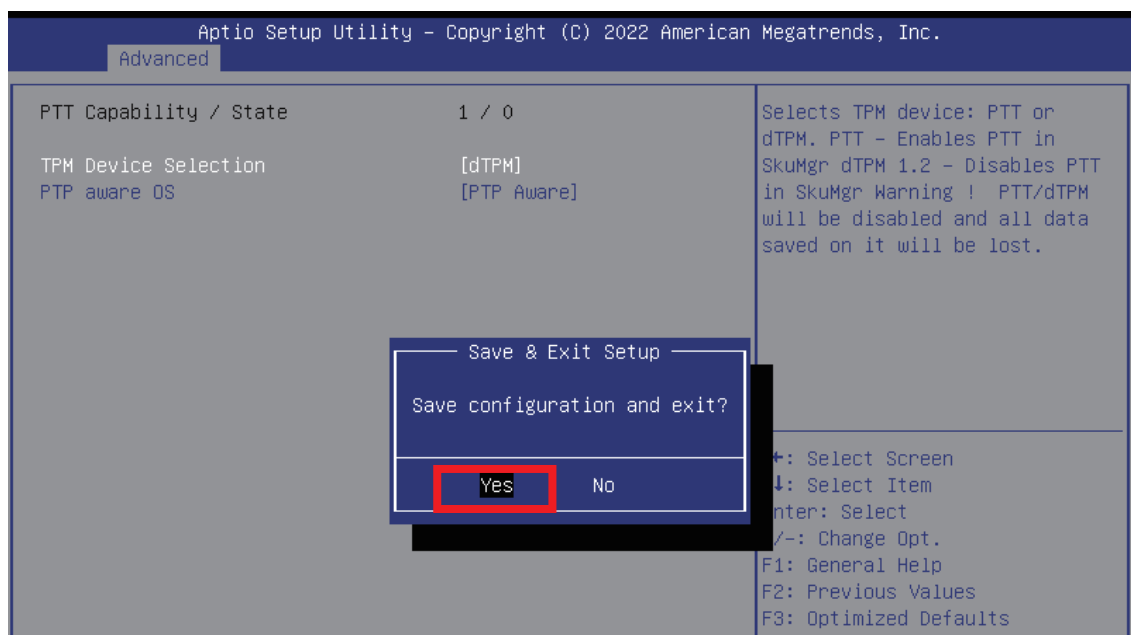
Step 2 Click on “PTT Configuration”



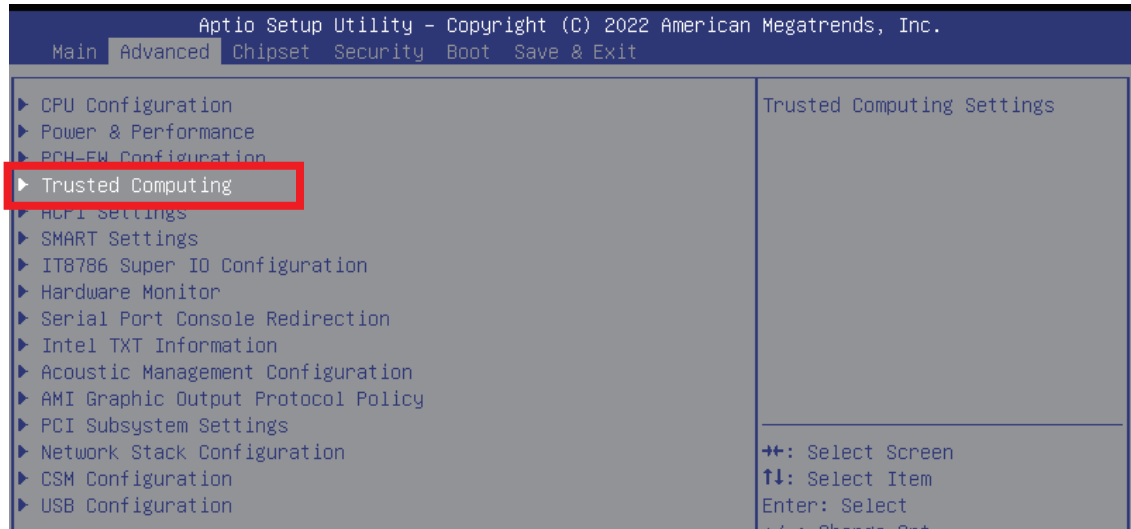
Step 3 Click on “dTPM” (TPM Device Selection)



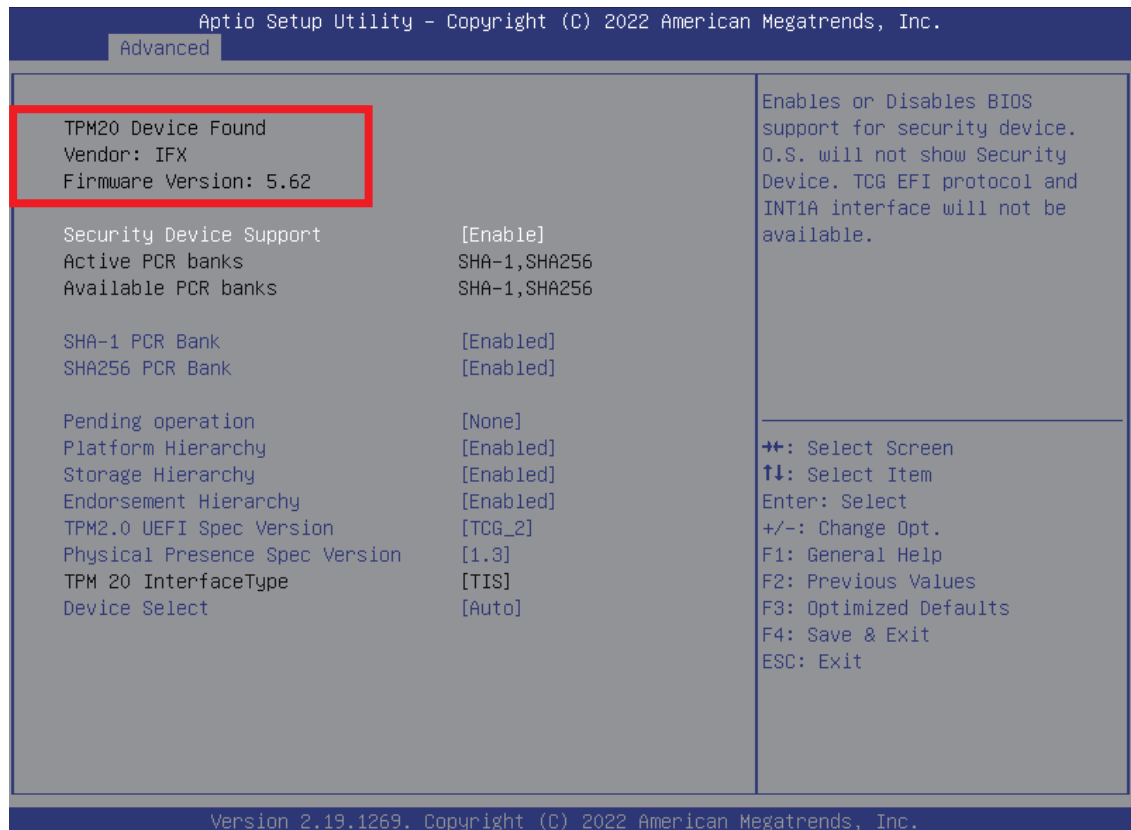
Step 4 Please save the BIOS settings by pressing F4. Please press Enter when the pop-up window which asks “Save configuration and exit?” appears. The computer will then restart.



Step 5 Click on “Trusted Computing”



Step 6 If the window shows “TPM2.0 Device Found Firmware Version:5.62”, then the setting is completed.



** If more help is needed, please contact Vecow technical support **



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

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