IVH-7700 USER Manual

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

Vecow

1.1.0 Edition 20151006

Record of Revision

Version	Date	Page	Description	Remark
0.1	07/23/2015	All	Preliminary Release	
1.0	08/10/2015	All	Official Release	
1.1	10/06/2015	100	Update Release	

Declaimer

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

CE

The product (s) described in this manual complies with all applicable European Union (CE) directives if it has a CE marking. For computer systems to remain CE compliant, only CE-compliant parts may be used. Maintaining CE compliance also requires proper cable and cabling techniques.

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Order Information

Part Number	Description
IVH-7700-QRD	IVH-7700 Intel® Quad Core™ In-Vehicle Fanless Embedded System, 6 GbE LAN with 4 RJ45 PoE+, 4 Front-access SSD, 4 COM, 11 USB, 4 SIM, 16 Isolated DIO, 16 GPIO
IVH-7700-QRDM	IVH-7700 Intel® Quad Core™ In-Vehicle Fanless Embedded System, 6 GbE LAN with 4 M12 PoE+, 4 Front-access SSD, 4 COM, 11 USB, 4 SIM, 16 Isolated DIO, 16 GPIO

Order Accessories

Part Number	Description
i7-3610QE	Ivy Bridge 3rd Gen Intel® Mobile Quad Core™ i7 Processor
i5-3610ME	Ivy Bridge 3rd Gen Intel® Mobile Core™ i5 Processor
i3-3120ME	Ivy Bridge 3rd Gen Intel® Mobile Core™ i3 Processor
M340S-W28M1	Vecow DDR3 4GB 1333/1066 MHz RAM, Wide Temperature -40°C to +85°C
Certified DDR3 4GB RAM	Certified DDR3 4GB 1333/1600 MHz RAM
Certified DDR3 8GB RAM	Certified DDR3 8GB 1333/1600 MHz RAM
PWA-160W-WT	160W, 24V, 85VAC to 264VAC Power Adaptor with 3-pin Terminal Block, Wide Temperature -30°C to +70°C
PWA-120W	120W, 24V, 90VAC to 264VAC Power Adapter with 3-pin Terminal Block
ECS-VESA-Mount	ECS-7000 series VESA Mounting Kit
3G Module	Mini PCIe 3G/GPS Module with Antenna
4G Module	Mini PCIe 4G/GPS Module with Antenna
WiFi Module	Mini PCIe WiFi Module with Antenna

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1

GENERAL INTRODUCTION

1.1 Overview

Powered by Quad Core Intel® Core™ i7/ i5/ i3 processor, DDR3 or DDR3L dual channel up to 16GB memory; Intel® HD 4000 graphics supports DVI-I, DisplayPort, and dual channel 24-bit LVDS triple independent displays; 4 front-access 2.5” SSD/ HDD trays, 4 GbE M12 PoE+ ports, dual GbE LAN ports, 4 Mini PCIe sockets, 4 SIM card sockets (3 front-access, 1 internal), 4 USB 3.0 with independent controllers, 6V to 78V wide range power input, smart surge protection up to 200V, configurable ignition power control, UPS supported, 16 isolated DIO, fanless design and -25°C to 70°C operating temperature, Vecow IVH-7700 Series In-Vehicle Fanless Embedded System delivers excellent system performance for in-vehicle mission critical applications.

1.2 Features

- Quad Core Intel® Core™ i7/ i5/ i3 Processor
- Fanless, -25°C to 70°C Operating Temperature
- 4 GbE M12 PoE+ ports and 2 GbE LAN ports
- 4 Mini PCIe sockets
- 4 SIM Card sockets (3 External)
- 4 Front-access 2.5" HDD/ SSD trays
- 4 USB 3.0 with Independent controllers
- Configurable Ignition Power Control
- 6V to 78V DC-in with 200V Surge Protection
- UPS supported (Optional)

1.3 Product Specification

1.3.1 Specifications of IVH-7700-QRD

System	
Processor	Intel® Core™ i7-3610QE/ i5-3610ME/ i3-3120ME
Chipset	Intel® QM77
BIOS	AMI
SIO	IT8783
Memory	• DDR3 1066/1333/1600 MHz or DDR3L 1066/1333MHz • Up to 16GB • 2 204-pin SO-DIMM Socket
I/O Interface	
Serial	• 2 COM RS-232/ 422/ 485 (COM 1, COM 2) • 2 COM RS-232 (COM 3, COM 4)
USB	• Front : 4 USB 3.0 • Rear : 4 USB 3.0 (4 Independent Controller) • 1 Internal USB 2.0 (Right Angle USB Connector) • 2 Internal USB 2.0 (6-pin JST)
Isolated DIO	16 Isolated DIO (8 DI, 8 DO, 24V to 78V DC Input)
LED	Power, HDD, Wireless, PoE
SIM Card	4 SIM Card Socket (3 External, 1 Internal)
GPIO	16 GPIO
Expansion	
Mini PCIe	• 1 Mini PCIe for PCIe/ USB/ Internal SIM Card/ mSATA • 3 Mini PCIe for PCIe/ USB/ External SIM Card
Graphics	
Chipset	Intel® HD Graphics 4000
Display Memory	Shared Memory, up to 1.7GB
Interface	Triple Independent Display : • DVI-I : Up to 1920 x 1200 • DisplayPort : Up to 2560 x 1600 • LVDS : Dual channel 24-bit, up to 1920 x 1200
Storage	
SATA	• 2 SATA III (6Gbps) • 2 SATA II (3Gbps)
mSATA	1 SATA II (Mini PCIe Type, 3Gbps)
Storage Device	• 1 CFast Socket, Push-in/ Push-out Ejector • 4 Front-access 2.5" SSD/ HDD Tray

Audio	
Audio Codec	Realtek ALC892, 5.1 Channel HD Audio
Audio Interface	1 Mic-in, 1 Line-out
Ethernet	
LAN 1	Intel® 82579LM Gigabit LAN supports iAMT 8.0
LAN 2	Intel® I210 Gigabit LAN
PoE	
LAN 3	Gigabit IEEE 802.3at (25.5W/48V) PoE+ by Intel® I210
LAN 4	Gigabit IEEE 802.3at (25.5W/48V) PoE+ by Intel® I210
LAN 5	Gigabit IEEE 802.3at (25.5W/48V) PoE+ by Intel® I210
LAN 6	Gigabit IEEE 802.3at (25.5W/48V) PoE+ by Intel® I210
Power	
Power Input	6V to 78V, DC-in
Power Interface	3-pin Terminal Block : V+, V-, IGN
Ignition Control	16 Mode
Remote Switch	2-pin Terminal Block
Surge Protection	Up to 200V/1ms Transient Power
UPS	Supported (Optional)
Others	
TPM	Optional Infineon SLB9635 supports TPM 1.0, 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 (Optional)
Software Support	
Microsoft	Windows 8, Windows 7, Windows XP
Linux	Fedora 13, Ubuntu 10.04 LTS, or Linux Kernel 3.0 above
Mechanical	
Dimensions (WxDxH)	260mm x 215mm x 79mm (10.2" x 8.5" x 3.1")
Weight	4.2 kg (9.26 lb)
Mounting	Wallmount by mounting bracket

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	• IEC 60068-2-27 • SSD : 50G @ Wallmount, Half-sine, 11ms
Vibration	• IEC 60068-2-64 • SSD : 5Grms, 5Hz to 500Hz, 3 Axis
EMC	CE, FCC, EN 50155, EN 50121-3-2

1.3.2 Specifications of IVH-7700-QRDM

System	
Processor	Intel® Core™ i7-3610QE/ i5-3610ME/ i3-3120ME
Chipset	Intel® QM77
BIOS	AMI
SIO	IT8783
Memory	• DDR3 1066/1333/1600 MHz or DDR3L 1066/1333MHz • Up to 16GB • 2 204-pin SO-DIMM Socket
I/O Interface	
Serial	• 2 COM RS-232/ 422/ 485 (COM 1, COM 2) • 2 COM RS-232 (COM 3, COM 4)
USB	• Front : 4 USB 3.0 • Rear : 4 USB 3.0 (4 Independent Controller) • 1 Internal USB 2.0 (Right Angle USB Connector) • 2 Internal USB 2.0 (6-pin JST)
Isolated DIO	16 Isolated DIO (8 DI, 8 DO, 24V to 78V DC Input)
LED	Power, HDD, Wireless, PoE
SIM Card	4 SIM Card Socket (3 External, 1 Internal)
GPIO	16 GPIO
Expansion	
Mini PCIe	• 1 Mini PCIe for PCIe/ USB/ Internal SIM Card/ mSATA • 3 Mini PCIe for PCIe/ USB/ External SIM Card

Graphics	
Chipset	Intel® HD Graphics 4000
Display Memory	Shared Memory, up to 1.7GB
Interface	Triple Independent Display : • DVI-I : Up to 1920 x 1200 • DisplayPort : Up to 2560 x 1600 • LVDS : Dual channel 24-bit, up to 1920 x 1200
Storage	
SATA	• 2 SATA III (6Gbps) • 2 SATA II (3Gbps)
mSATA	1 SATA II (Mini PCIe Type, 3Gbps)
Storage Device	• 1 CFast Socket, Push-in/ Push-out Ejector • 4 Front-access 2.5" SSD/ HDD Tray
Audio	
Audio Codec	Realtek ALC892, 5.1 Channel HD Audio
Audio Interface	1 Mic-in, 1 Line-out
Ethernet	
LAN 1	Intel® 82579LM Gigabit LAN supports iAMT 8.0
LAN 2	Intel® I210 Gigabit LAN
PoE	
LAN 3	Gigabit IEEE 802.3at (25.5W/48V) PoE+ by Intel® I210, M12 Connector
LAN 4	Gigabit IEEE 802.3at (25.5W/48V) PoE+ by Intel® I210, M12 Connector
LAN 5	Gigabit IEEE 802.3at (25.5W/48V) PoE+ by Intel® I210, M12 Connector
LAN 6	Gigabit IEEE 802.3at (25.5W/48V) PoE+ by Intel® I210, M12 Connector
Power	
Power Input	6V to 78V, DC-in
Power Interface	3-pin Terminal Block : V+, V-, IGN
Ignition Control	16 Mode
Remote Switch	2-pin Terminal Block
Surge Protection	Up to 200V/1ms Transient Power
UPS	Supported (Optional)

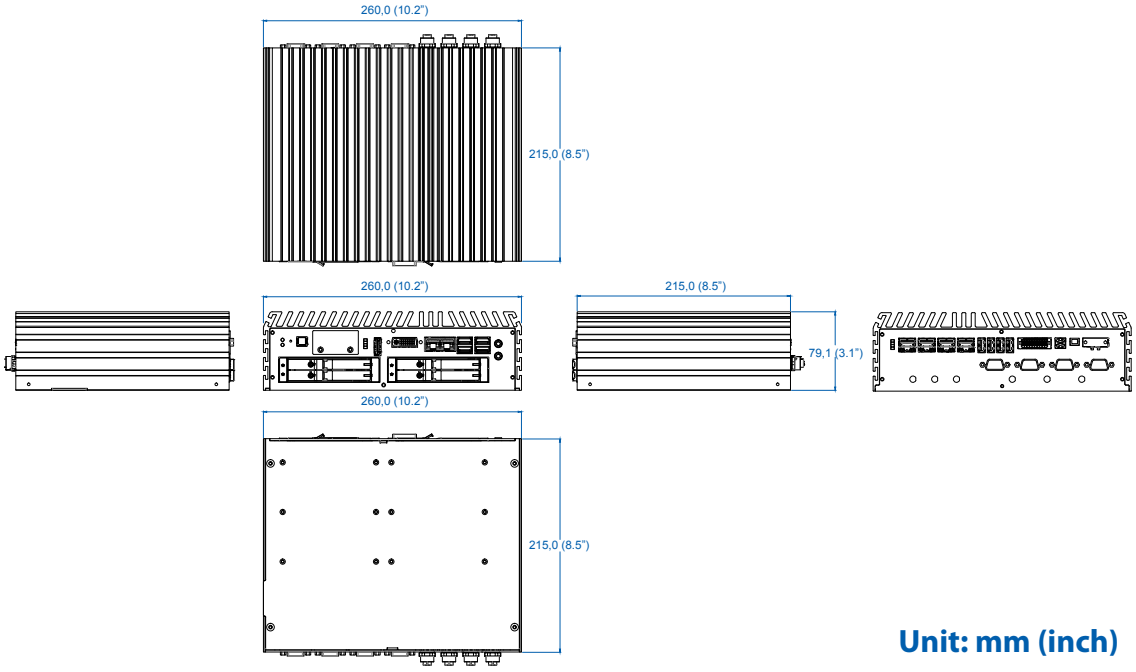
Others	
TPM	Optional Infineon SLB9635 supports TPM 1.0, LPC Interface
Watchdog Timer	Reset : 1 to 255 sec./min. per step
Smart Management	Wake on LAN, PXE supported
HW Monitor	Monitoring temperature, voltages. Auto throttling control when CPU overheats
GPS	Onboard GPS Module (Optional)
Software Support	
Microsoft	Windows 8, Windows 7, Windows XP
Linux	Fedora 13, Ubuntu 10.04 LTS, or Linux Kernel 3.0 above
Mechanical	
Dimensions (WxDxH)	260mm x 215mm x 79mm (10.2" x 8.5" x 3.1")
Weight	4.2 kg (9.26 lb)
Mounting	Wallmount by mounting bracket
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	• IEC 60068-2-27 • SSD : 50G @ Wallmount, Half-sine, 11ms
Vibration	• IEC 60068-2-64 • SSD : 5Grms, 5Hz to 500Hz, 3 Axis
EMC	CE, FCC, EN 50155, EN 50121-3-2

1.4 Supported CPU List

Processor No.	TDP	Cache	Max. Frequency	Embedded
i7-3940XM	55W	8M	Up to 3.90GHz	
i7-3920XM	55W	8M	Up to 3.80GHz	
i7-3840QM	45W	8M	Up to 3.80GHz	
i7-3820QM	45W	8M	Up to 3.70GHz	
i7-3740QM	45W	6M	Up to 3.7GHz	
i7-3720QM	45W	6M	Up to 3.60GHz	
i7-3630QM	45W	6M	Up to 3.40GHz	
i7-3612QE	45W	6M	Up to 3.10GHz	Yes
i7-3610QM	45W	6M	Up to 3.30GHz	
i7-3610QE	45W	6M	Up to 3.30GHz	Yes
i7-3540M	35W	4M	Up to 3.70GHz	
i7-3520M	35W	4M	Up to 3.60GHz	
i5-3610ME	35W	3M	Up to 3.30GHz	Yes
i5-3380M	35W	3M	Up to 3.60GHz	
i5-3360M	35W	3M	Up to 3.50GHz	
i5-3340M	35W	3M	Up to 3.40GHz	
i5-3320M	35W	3M	Up to 3.30GHz	
i5-3230M	35W	3M	Up to 3.20GHz	
i5-3210M	35W	3M	Up to 3.10GHz	
i3-3130M	35W	3M	Up to 2.60GHz	
i3-3120ME	35W	3M	Up to 2.40GHz	Yes
i3-3120M	35W	3M	Up to 2.50GHz	
i3-3110M	35W	3M	Up to 2.40GHz	
Celeron 1020M	35W	2M	Up to 2.10GHz	
Celeron 1020E	35W	2M	Up to 2.20GHz	Yes
Celeron 1000M	35W	2M	Up to 1.80GHz	

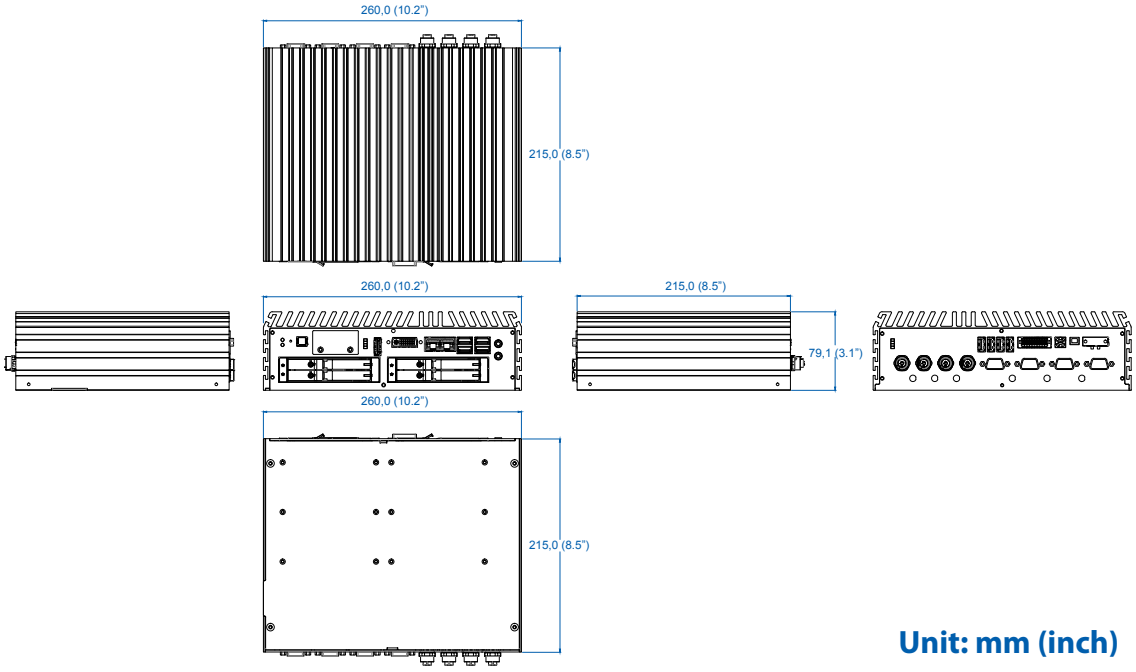
1.5 Mechanical Dimension

1.5.1 Dimensions of IVH-7700-QRD



Unit: mm (inch)

1.5.2 Dimensions of IVH-7700-QRDM



Unit: mm (inch)

2

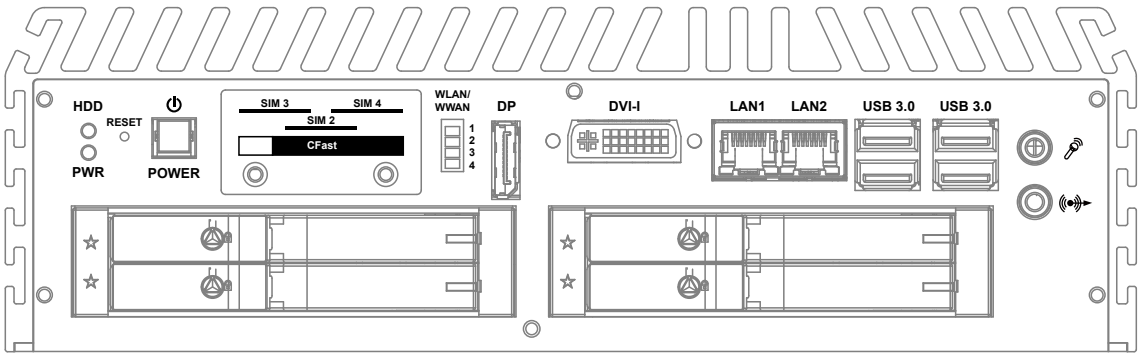
GETTING TO KNOW YOUR IVH-7700

2.1 Packing List

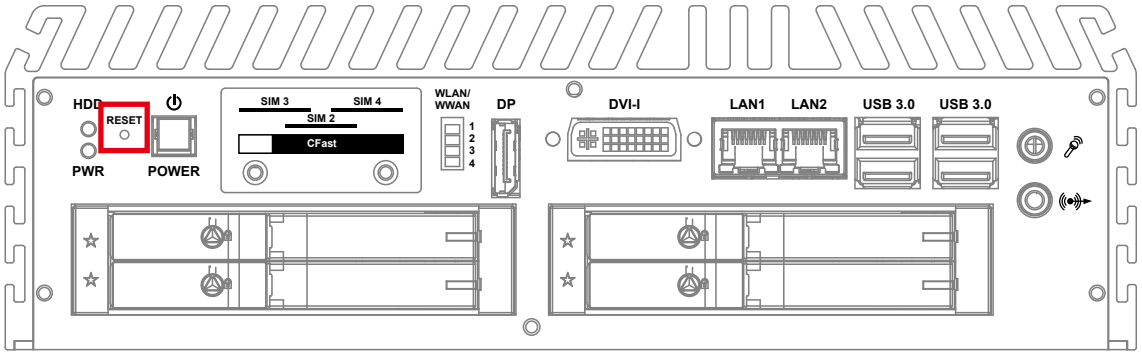
Item	Description	Qty
1	IVH-7700 In-Vehicle Fanless Embedded System (According to the configuration you order, the IVH-7700 series may contain SSD/HDD and DDR3L SO-DIMM. Please verify these items if necessary.)	1
2	Accessory box, which contains ● Vecow Drivers & Utilities DVD ● Wall-mounting bracket ● KHS#6-32x6 screw for wall-mounting bracket ● M2.5x6 screw for Mini PCIe socket ● 2-pin pluggable terminal block ● 3-pin Pluggable terminal block ● 20-pin pluggable terminal block ● Foot Pad ● HDD Tray Key	 1 2 4 8 1 1 1 4 2

2.2 Front Panel I/O Functions

In Vecow IVH-7700 series family, all I/O connectors are located on front panel and rear panel. Most of the general connections to computer device, such as audio, USB, DVI-I, VGA, DisplayPort and any additional storage, are placed on the front panel.

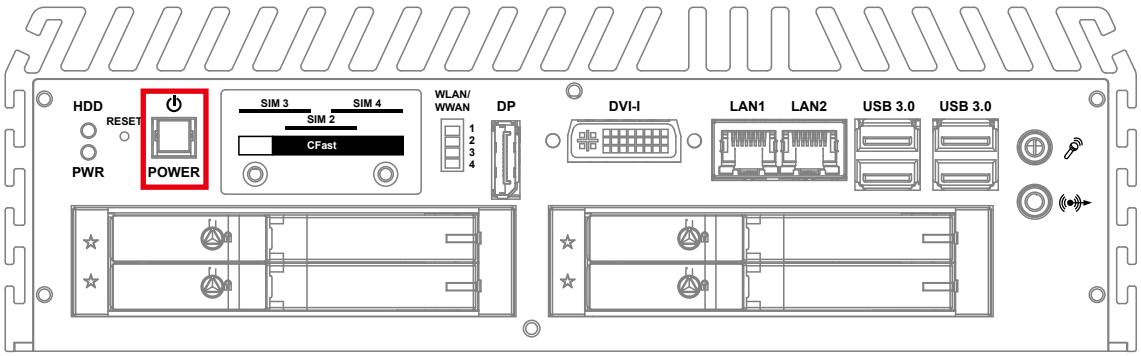


2.2.1 Reset Tact Switch



It is a hardware reset switch. Use this switch to reset the system without power off the IVH-7700. 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

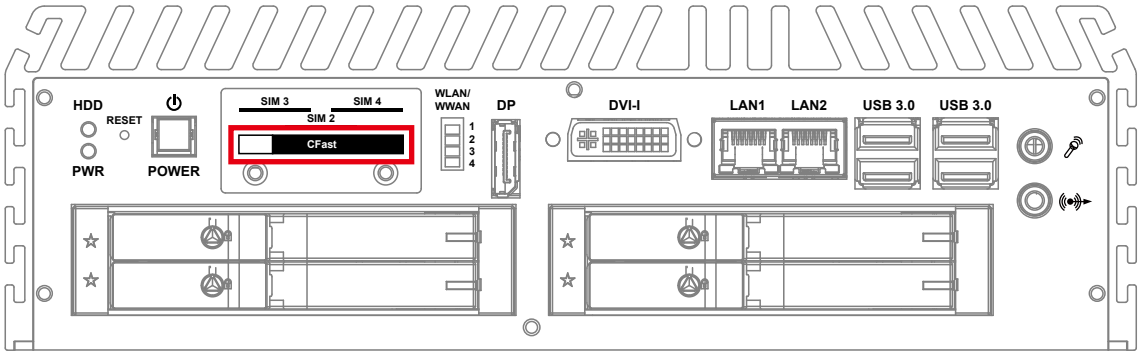
To power on IVH-7700, press the power button and then the blue LED is lightened.

To power off IVH-7700, 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

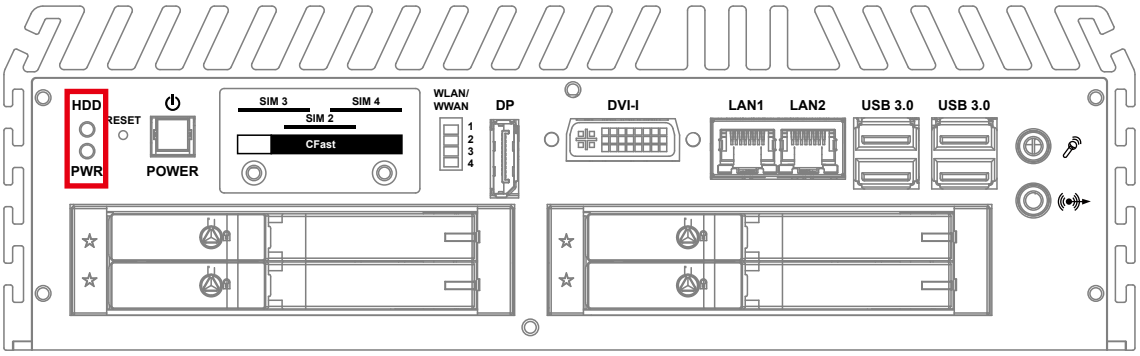


There is a CFast socket on the front panel supporting Type-I/ Type-II Compact Flash card.
It is implemented by a SATA II Port from QM77 PCH. Be sure to disconnect the power source and unscrew the CFast socket cover before installing a CFast card. The IVH-7700 does not support the CFast hot swap and PnP (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

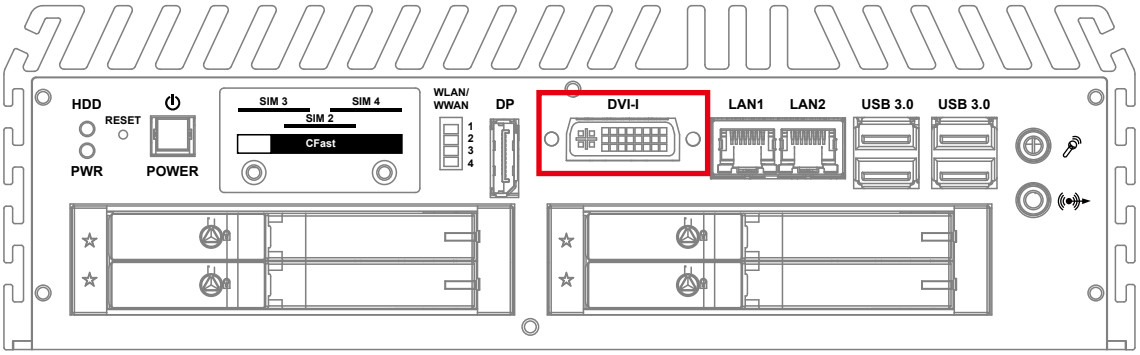


Yellow-HDD LED: A hard disk/ CFast LED. If the LED is on, it indicates that the system's storage is functional. If it is off, it indicates that the system's storage is not functional. If it is flashing, it indicates data access activities.

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

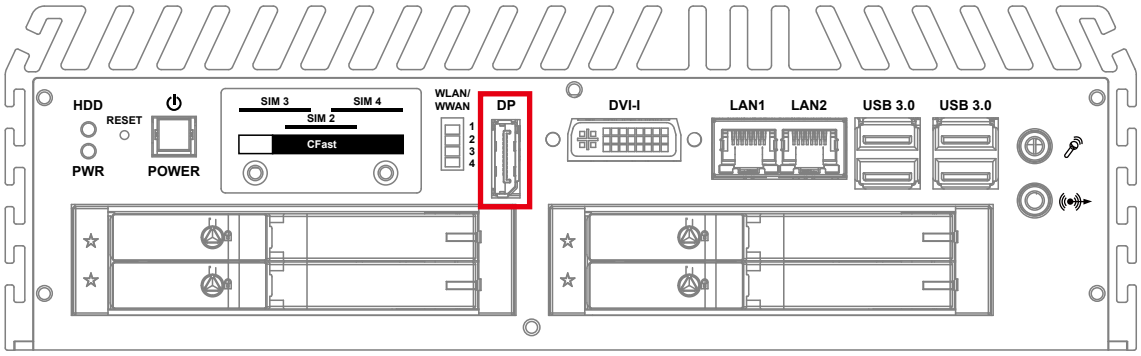
LED Color	Power Status	System Status
Yellow	HDD/ CFast	• On/ Off : Storage status, function or not. • Twinkling : Data transferring.
Green	Power	System power status (on/ off)

2.2.5 DVI-I/ HDMI Connector



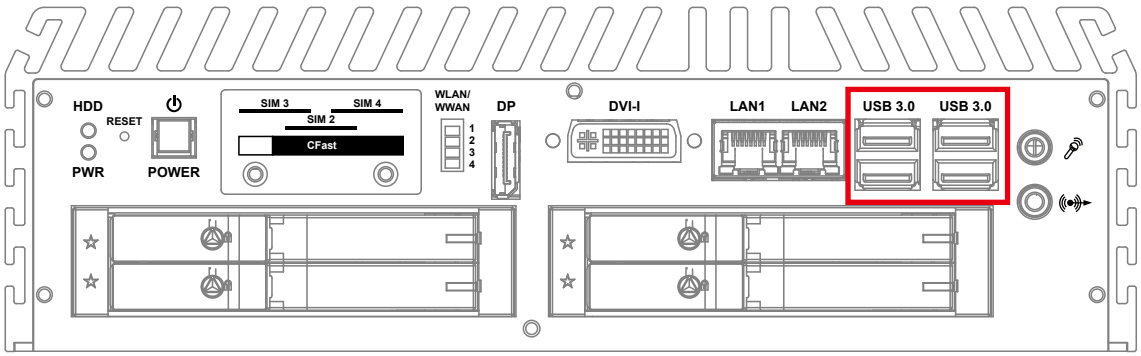
The DVI-I connector on the front panel supports both DVI and VGA display modes. This connector can either output DVI signals signal. The DVI output mode supports up to 1920 x 1200 resolution and output mode supports up to 1920 x 1200 resolution. The DVI mode is automatically selected according to the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

2.2.6 DisplayPort



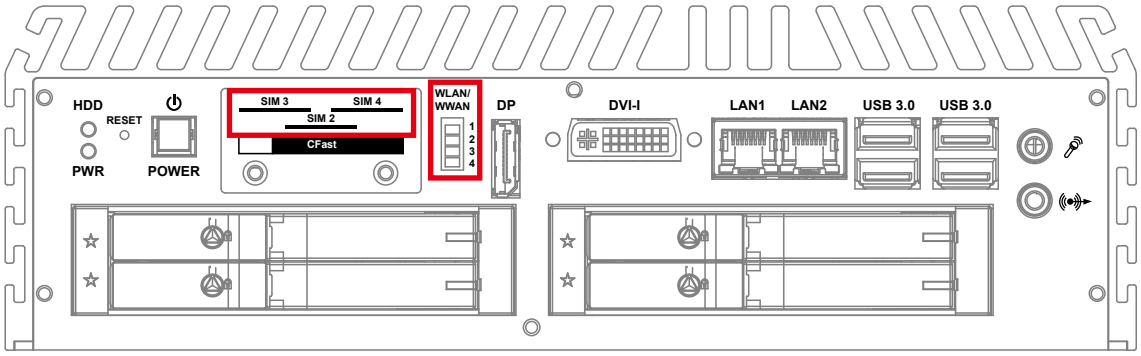
Onboard DisplayPort connection supports up to 2560 x 1600 resolution at 60 Hz.

2.2.7 USB 3.0

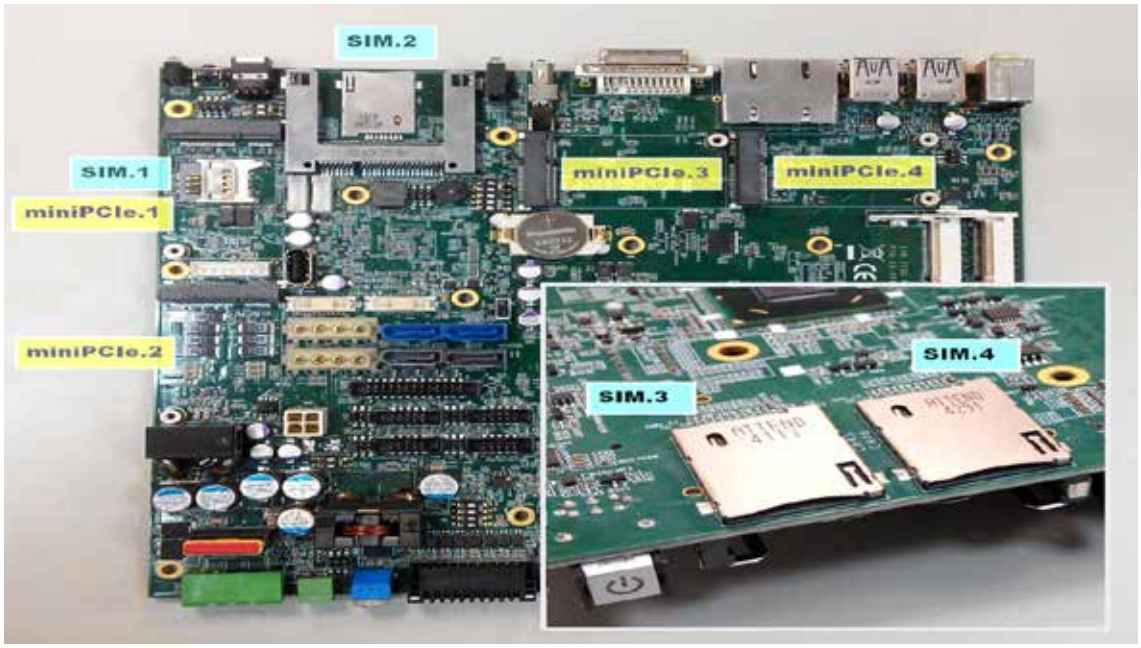


There are 4 USB 3.0 connections available supporting up to 5GB per second data rate in the front side of IVH-7700. It also compliant with the requirements of SuperSpeed (SS), High Speed (HS), Full Speed (FS) and Low Speed (LS).

2.2.8 Wireless LED Indicator, Mini PCIe and SIM Card

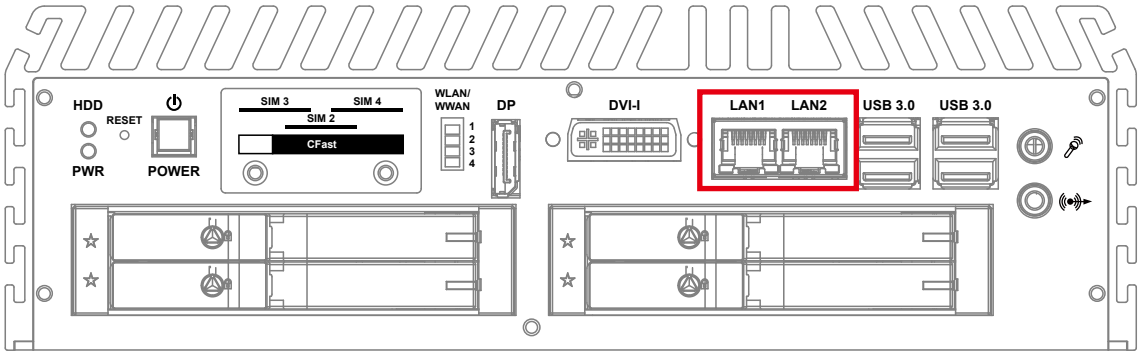


Mini PCIe	SIM	LED
CN43	CN44 (SIM 1)	1
CN42	CN31 (SIM 2)	2
CN14	CN45 (SIM 3)	3
CN7	CN46 (SIM 4)	4



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

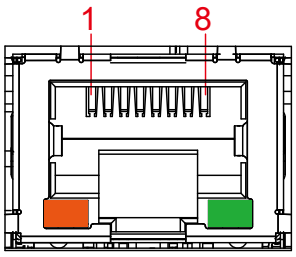


There are 2 8-pin RJ-45 jacks supporting 10/100/1000 Mbps Ethernet connections in the front side of IVH-7700. LAN 1 is powered by Intel® 82579LM Ethernet engine; LAN 2 is powered by Intel I210 Ethernet engine. When both LAN 1 and LAN 2 work in normal status, iAMT 8.0 function is enabled.
Using suitable RJ-45 cable, you can connect IVH-7700 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 pinouts of LAN 1 and LAN 2 are listed as follows:

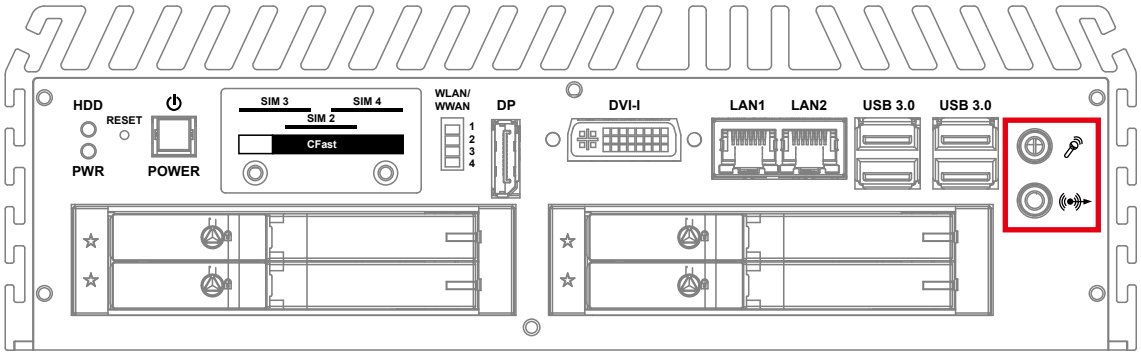
Pin No.	10/ 100Mbps	1000Mbps
1	E_TX+	MDI0_P
2	E_TX-	MDI0_N
3	E_RX+	MDI1_P
4	----	MDI2_P
5	-----	MDI2_N
6	E_RX-	MDI1_N
7	-----	MDI3_P
8	------	MDI3_N

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



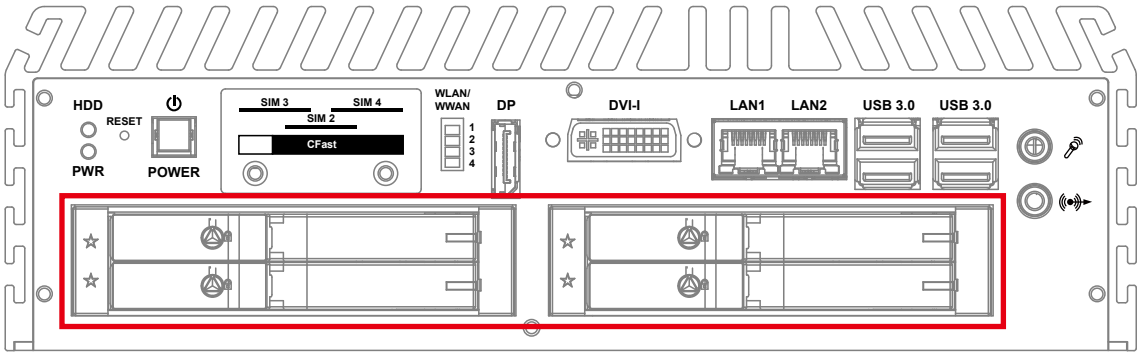
2.2.10 Audio Connector



There are 2 audio connectors, Mic-in and Line-out, in the front side of IVH-7700. Onboard Realtek ALC892 audio codec supports 5.1 channel HD audio and fully complies with Intel® High Definition Audio (Azalia) specifications.

To utilize the audio function in Windows platform, you need to install corresponding drivers for both Intel QM77 chipset and Realtek ALC892 codec. Please refer to Chapter 4 for more details of driver installation.

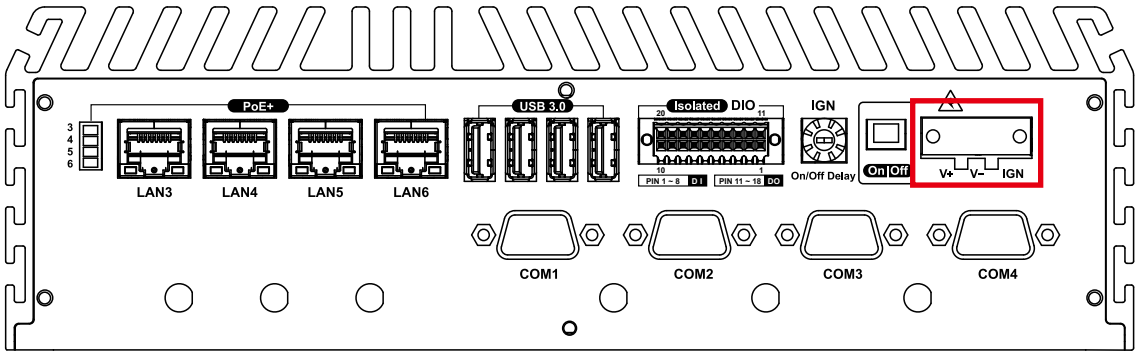
2.2.11 Front-access SSD/ HDD Tray



There are 4 front-access 2.5” SSD/ HDD trays in the front side of IVH-7700. Just trigger to open the SSD/ HDD tray, up to 8TB is available.

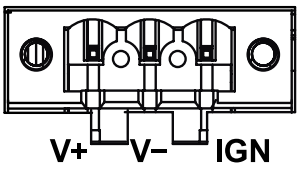
2.3 Rear Panel I/O and Functions

2.3.1 Power Terminal Block

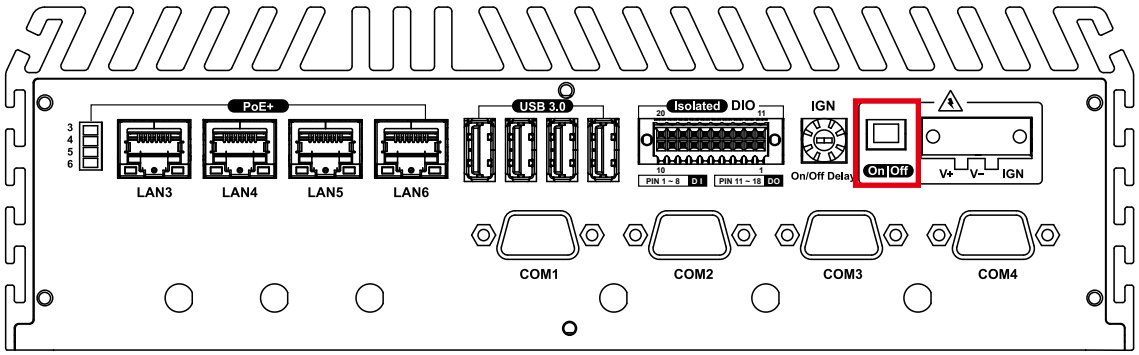


IVH-7700 supports 6V to 78V DC power input by terminal block in the rear side. In normal power operation, power LED lightens in solid green. Onboard LTC4364 supports up to 200V surge protection.

Pin No.	Definition
1	V+
2	V-
3	IGNITION



2.3.2 Remote Power On/ Off Switch



It is a 2-pin power-on or power-off switch through Phoenix Contact terminal block. You could turn on or off the system power by using this contact. This terminal block supports Power-on/ Power-off, and Suspend Mode.

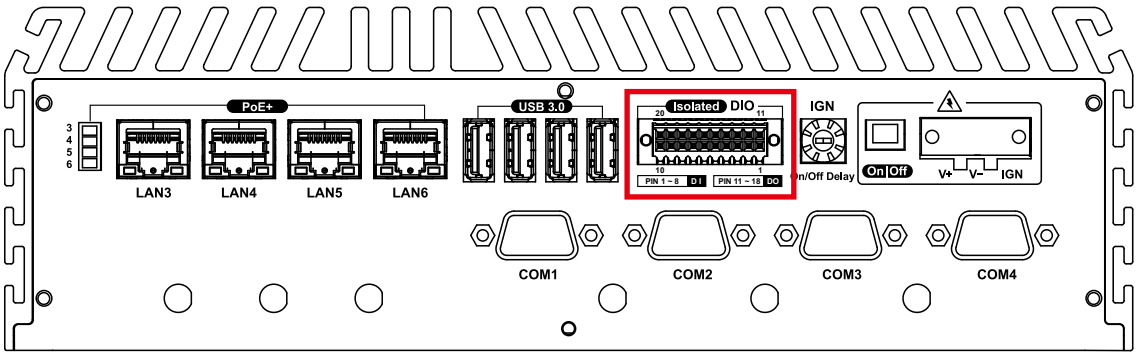
Note :

1. Remote Power-on/ Power-off Switch is a purely hardware feature which enables the same functions, such as shut down, sleep, hibernate, etc. defined in OS, when pressing the power button.

2. You can manage the power mode by different ways, “instant” or “4-second”, to press the power button.

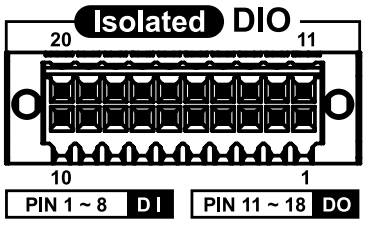
   - Instant Press : Shut Down/ Sleep/ Hibernate (Depends on OS setting).
   - 4-seconed Press : Shut down the system directly.

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-DO circuit for motors, solenoids, and lamp driver applications. Please refer to **Appendix A** for more details.

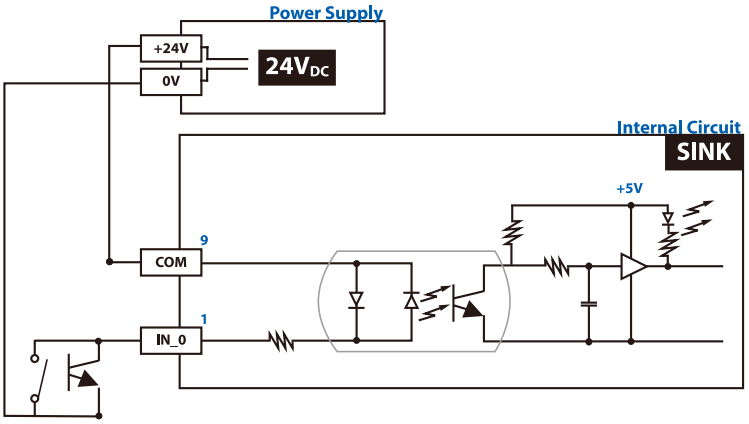
Pin No.	Definition	Mapping to SIO GPIO Function
1	INPUT 0	SIO_GPI50
2	INPUT 1	SIO_GPI51
3	INPUT 2	SIO_GPI52
4	INPUT 3	SIO_GPI53
5	INPUT 4	SIO_GPI54
6	INPUT 5	SIO_GPI55
7	INPUT 6	SIO_GPI56
8	INPUT 7	SIO_GPI57
9	DI_COM	----------
10	GND	----------
11	OUTPUT 0	SIO_GPO20
12	OUTPUT 1	SIO_GPO21



13	OUTPUT 2	SIO_GPO22
14	OUTPUT 3	SIO_GPO23
15	OUTPUT 4	SIO_GPO24
16	OUTPUT 5	SIO_GPO25
17	OUTPUT 6	SIO_GPO26
18	OUTPUT 7	SIO_GPO27
19	N.C.	----------
20	External 24~78VDC Input	----------

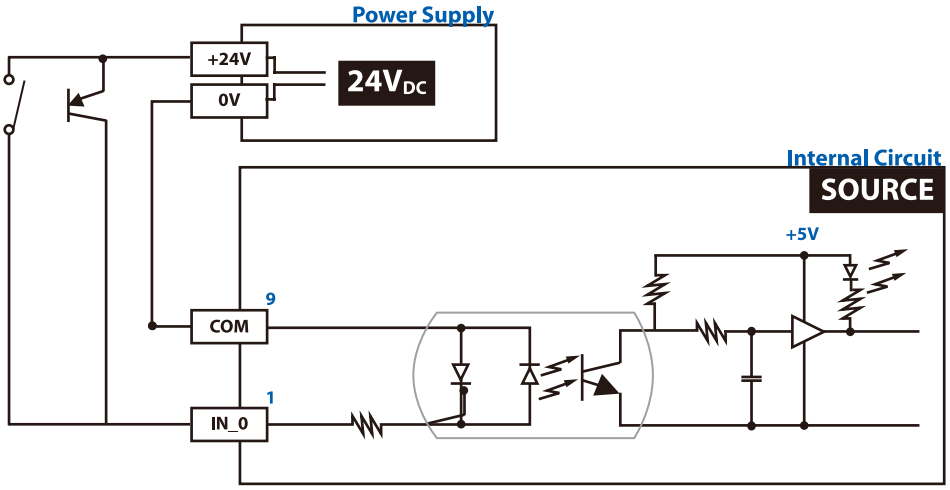
GPI SINK Mode

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



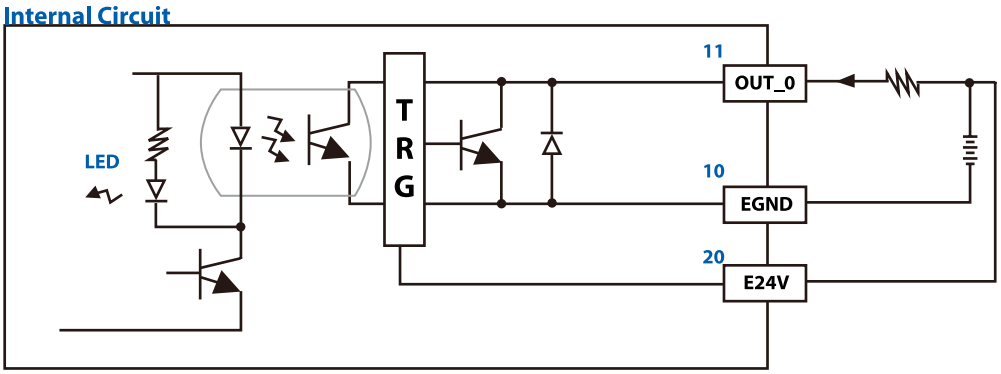
GPI SOURCE Mode

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

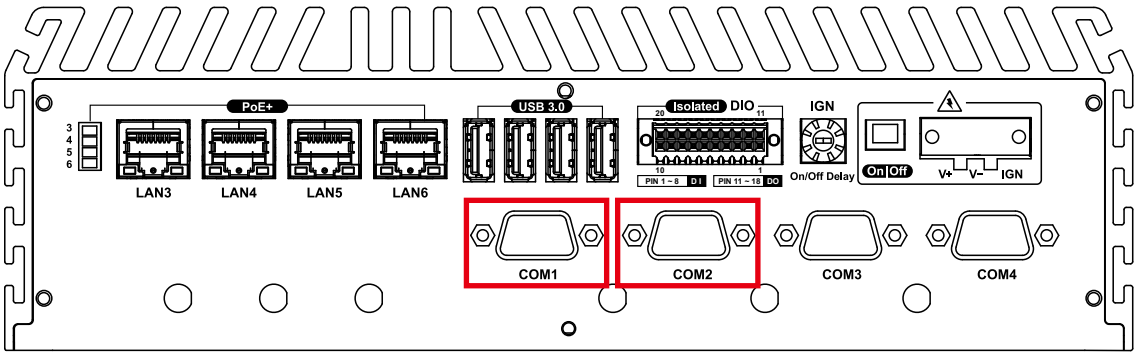


GPO SINK Mode

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



2.3.4 Serial Port COM 1 (CN19)/ COM 2 (CN26)



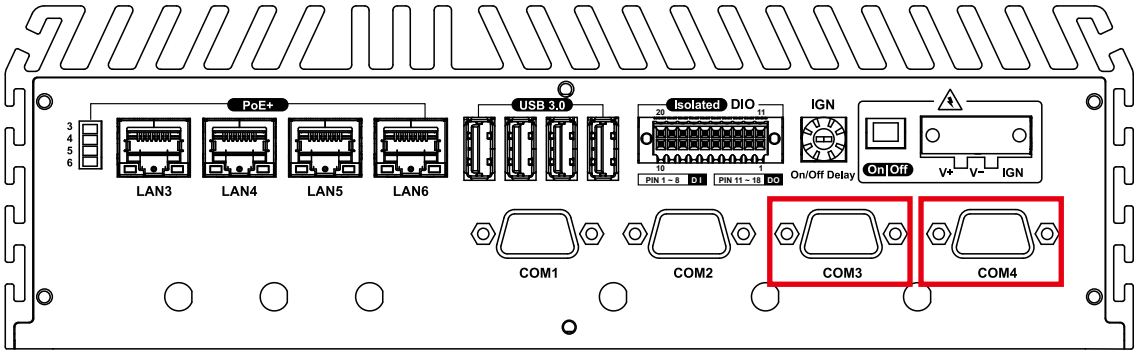
Serial port 1 (COM 1) and serial port 2 (COM 2) can be configured for RS-232, RS-422, or RS-485 with auto flow control communication. The default definition of COM 1 and COM 2 is RS-232, if you want to change to RS-422 or RS-485, you can find the setting in BIOS.

BIOS Setting	Function
COM 1 (CN19) / COM 2 (CN26)	RS-232
	RS-422 (5-wire)
	RS-422 (9-wire)
	RS-485
	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)
1,2	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-	----------

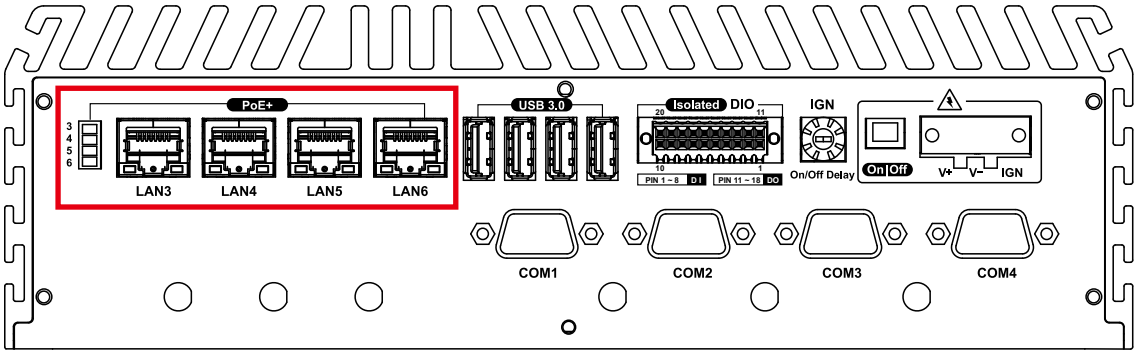
2.3.5 Serial Port COM 3 (CN18)/ COM 4 (CN27)



COM 3 and COM 4 support RS-232 only and provide up to 115200bps baud rate. The pin assignments are listed in the following table:

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

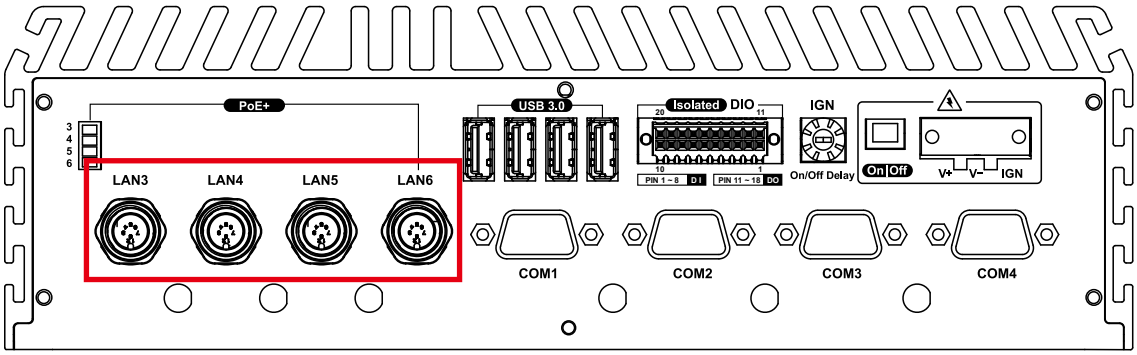
2.3.6 PoE (Power over Ethernet) Ports



There are 4 RJ45 connectors in the rear side of IVH-7700. They support IEEE 802.3at (PoE+) Power over Ethernet (PoE) connection delivering up to 25.5W/ 48V per port and 1000BASE-T gigabit data signals over standard Ethernet Cat 5/ Cat 6 cable.

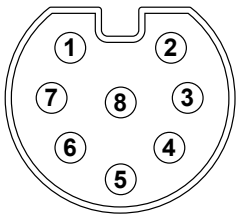
Each PoE connection is powered by Intel® I210 Gigabit Ethernet controller and independent PCI express interface to connect with multi-core processor for network and data transmit optimization. Only when PoE port starts to supply power to power devices, the dedicated LED will be lightened.

IVH-7700-QRDM (M12 PoE Ports)

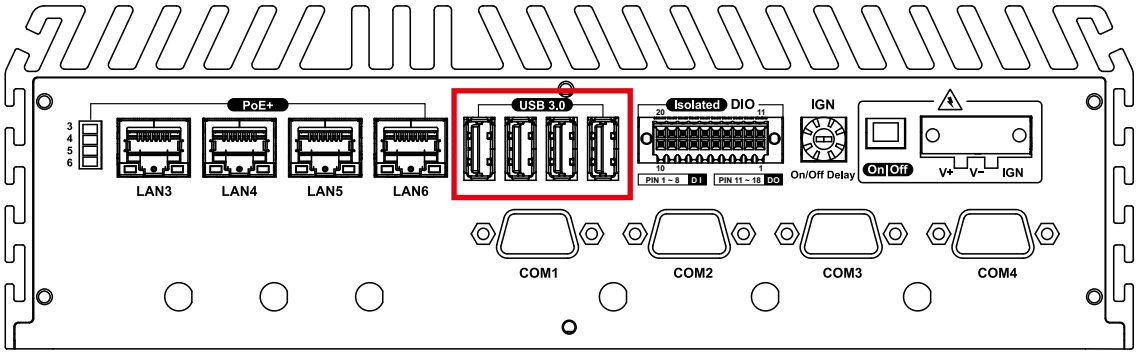


To further enhance the connectivity for in-vehicle applications, IVH-7700 provides the option of 4 onboard rugged IP67 M12 connectors for PoE ports. The M12 connector is an 8-pin A-coded male type with the following pin assignment.

M12 Pin No.	1000Mbps	M12 Pin No.	1000Mbps
1	MDI2_P	5	MDI1_P
2	MDI3_P	6	MDI0_P
3	MDI3_N	7	MDI2_N
4	MDI0_N	8	MDI1_N



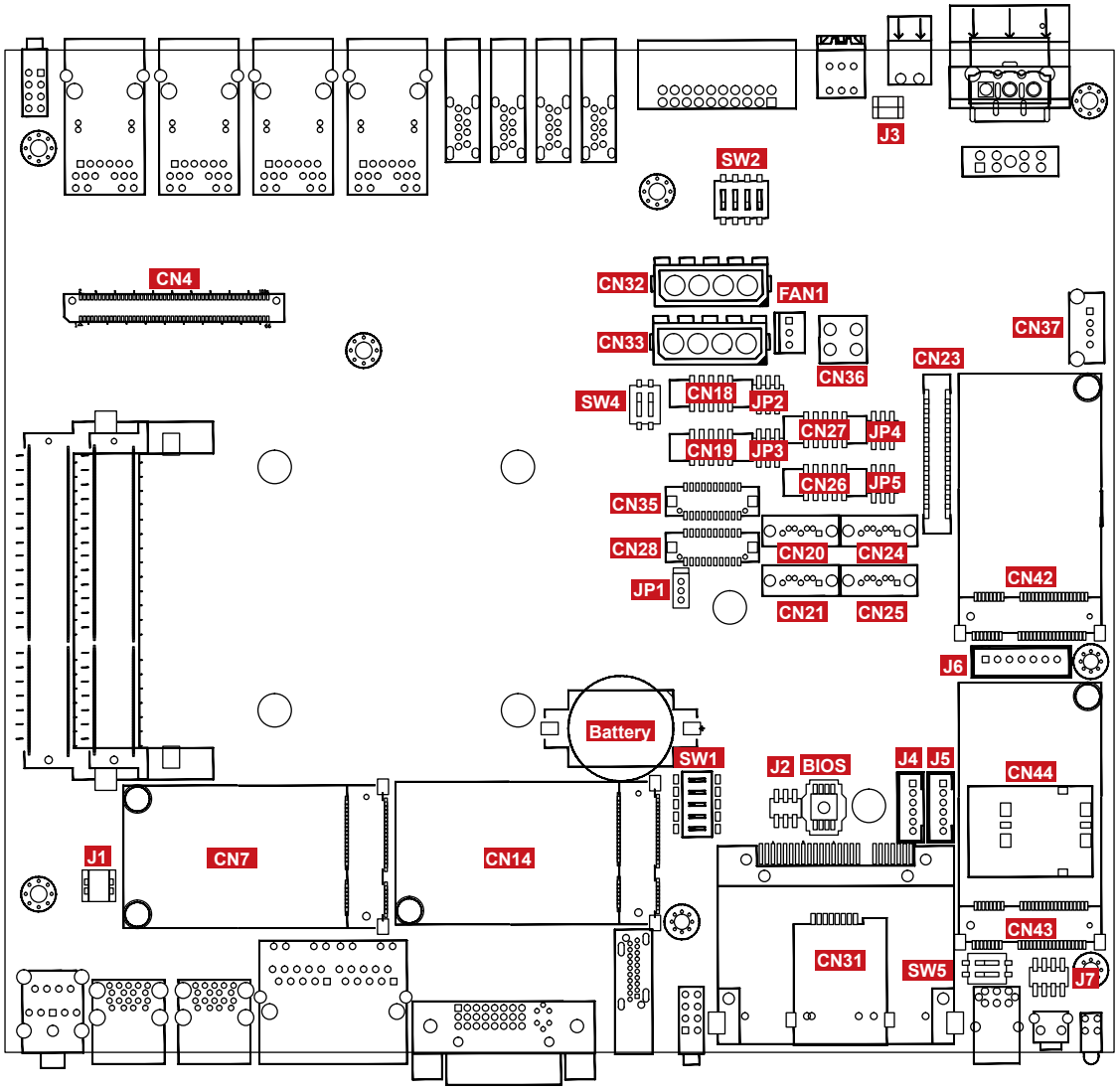
2.3.7 USB 3.0



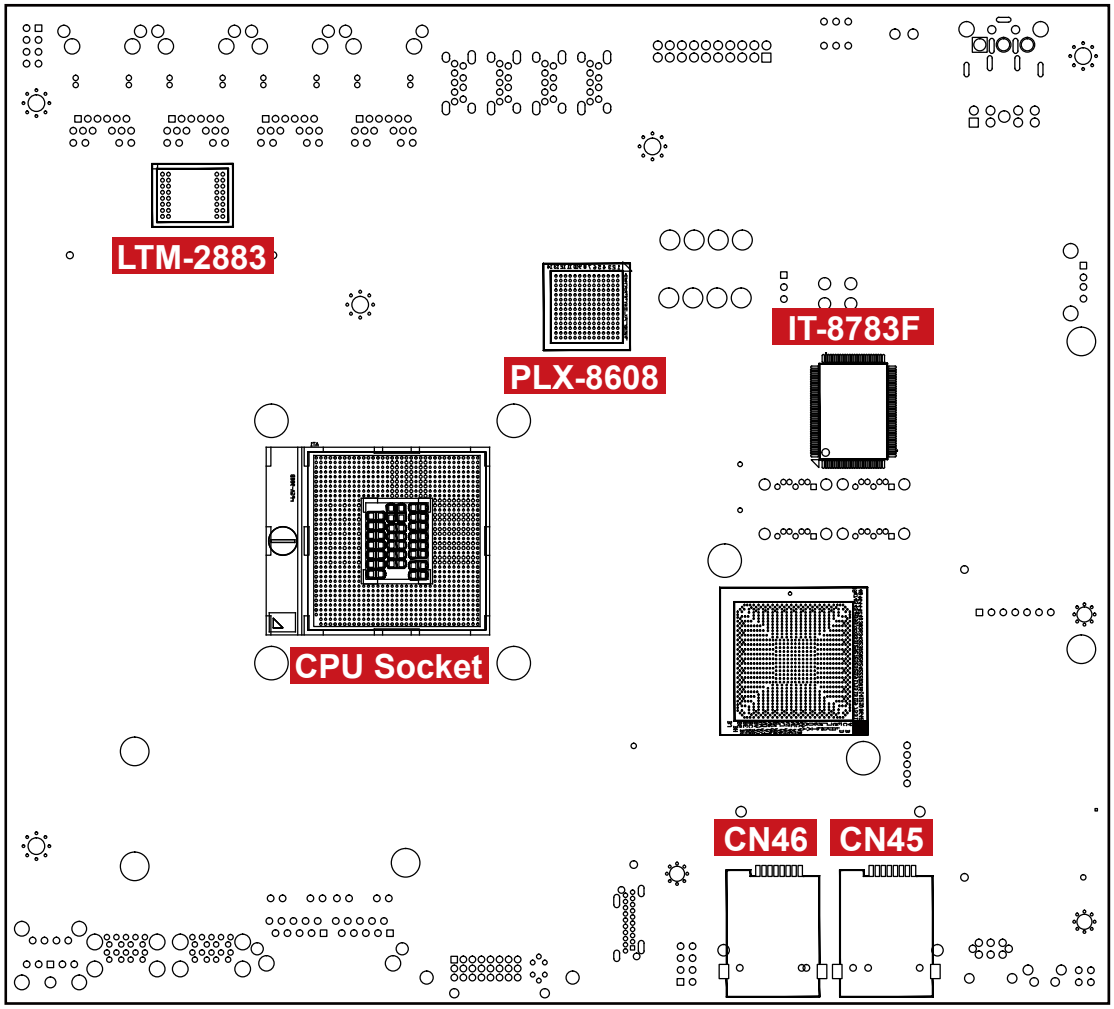
There are 4 USB 3.0 connections available in the rear side of IVH-7700. Each USB 3.0 channel is powered by independent USB 3.0 controller supporting up to 5GB per second data rate. It also compliant with the requirements of SuperSpeed (SS), High Speed (HS), Full Speed (FS) and Low Speed (LS).

2.4 Main Board Expansion Connectors

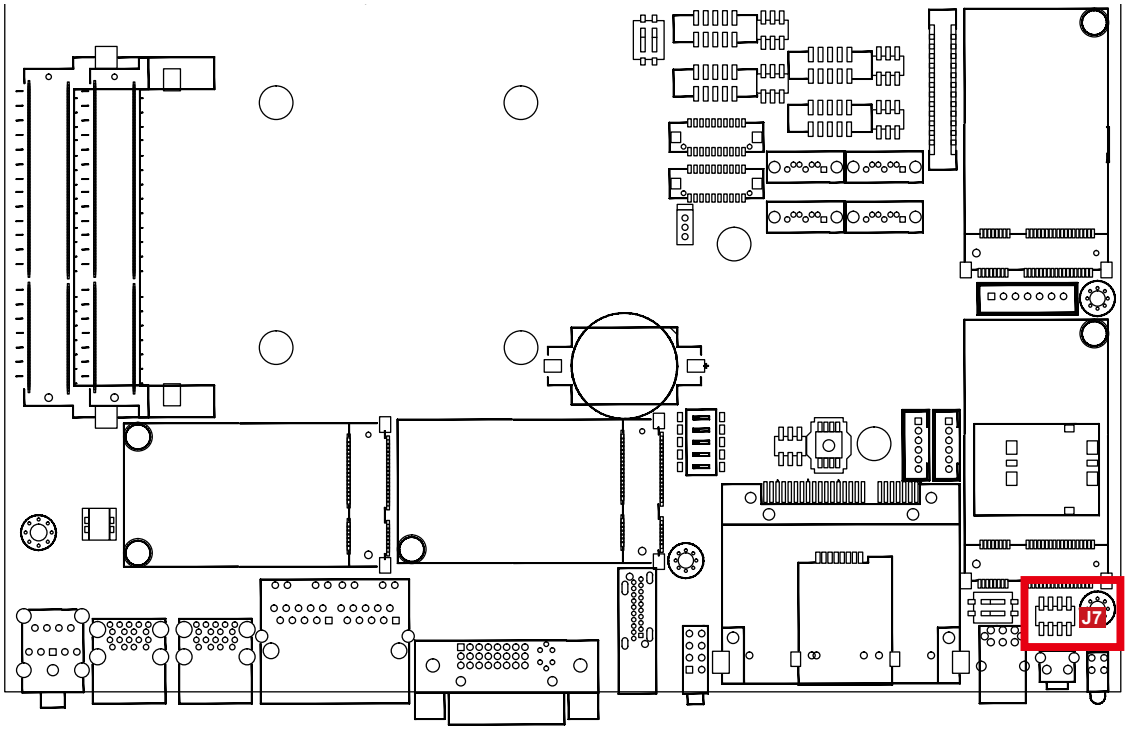
2.4.1 Front View of IVH-7700 Main Board With Connector Location



2.4.2 Rear View of IVH-7700 Main Board With Connector Location



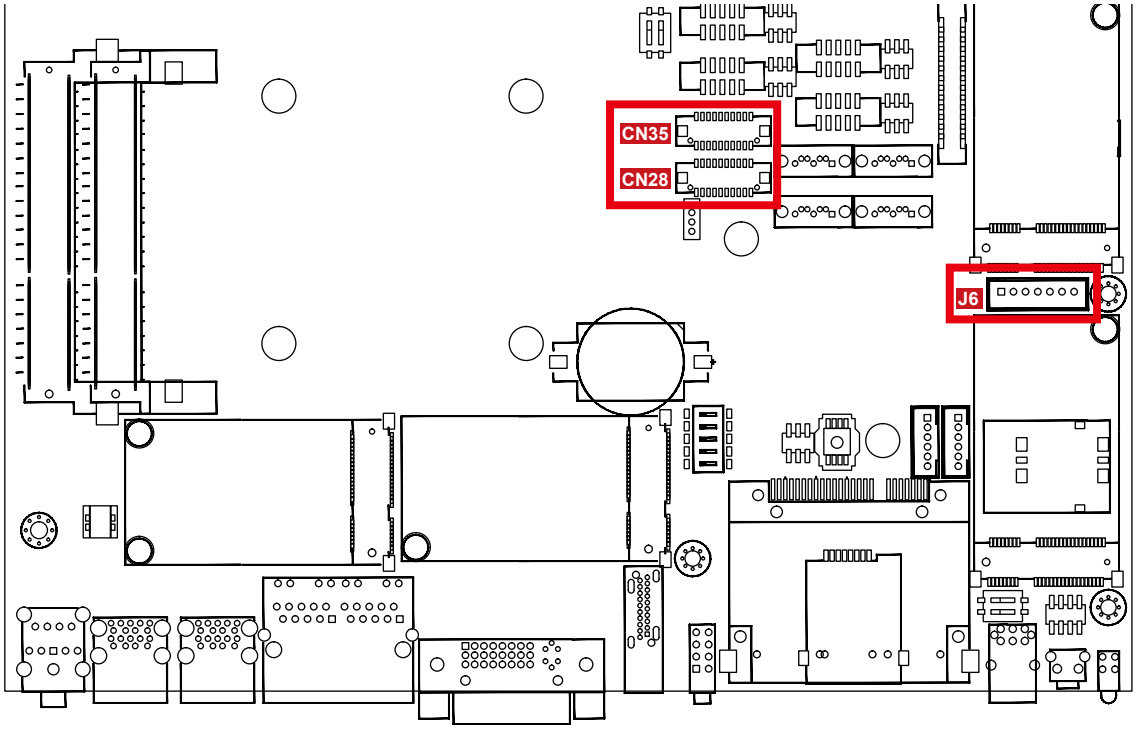
2.4.3 J7 Miscellaneous Pin Header



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 pinouts of Miscellaneous port are listed in following table:

Group	Pin No.	Description
HDD LED	2	HD_LED+
	4	HD_LED-
RESET BUTTON	6	FP_RST_BTN_N
	8	GND
POWER LED	1	PWR_LED+
	3	PWR_LED_N
POWER BUTTON	5	FP_PWR_BTN_N
	7	GND

2.4.4 CN35, CN28 : J6 LVDS



IVH-7700 supports dual-channel 24-bit LVDS display, up to 1366 x 768 pixels resolution. The pin assignments of CN35 and CN28 are listed in the following table:

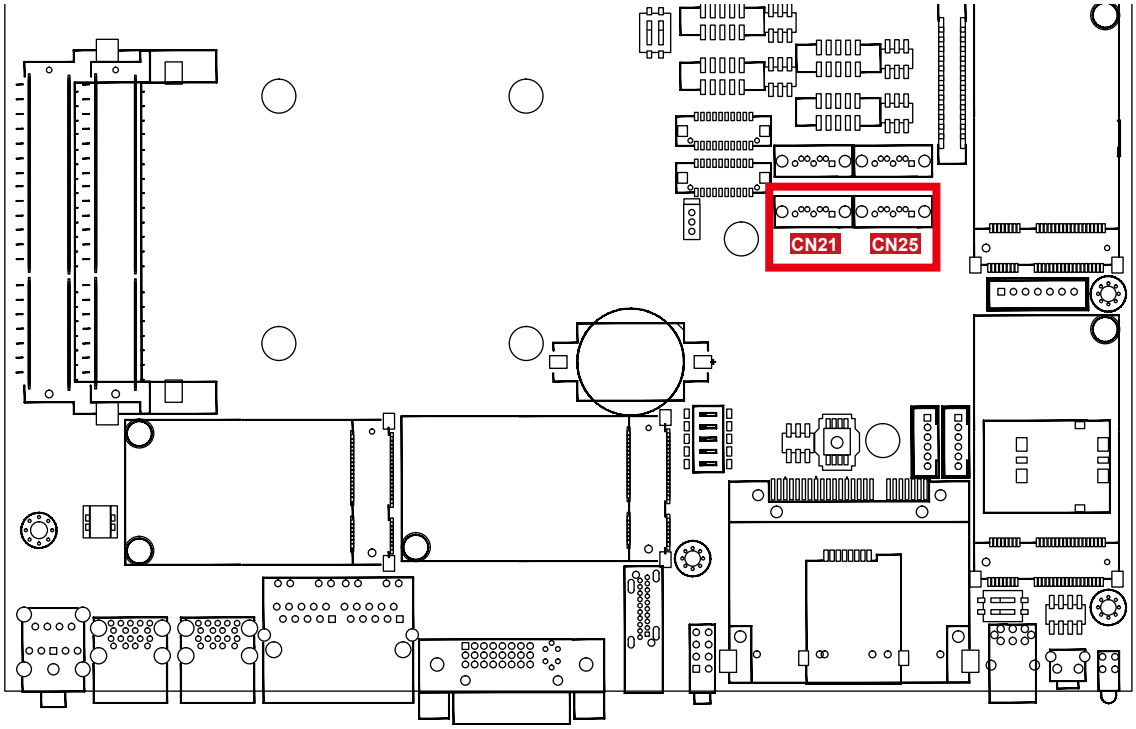
Pin No.	Definition	
	CN28 Channel A	CN35 Channel B
1	LVDS_DDC_CLK	LVDS_DDC_CLK
2	LVDS_DDC_DATA	LVDS_DDC_DATA
3	PANEL_VDD (+3.3V or +5V by jumper)	PANEL_VDD (+3.3V or +5V by jumper)
4	LVDS_A_DATA0P	LVDS_B_DATA0P
5	LVDS_A_DATA3P	LVDS_B_DATA3P
6	LVDS_A_DATA0P	LVDS_B_DATA0N
7	LVDS_A_DATA3N	LVDS_B_DATA3N
8	PANEL_VDD (+3.3V or +5V by jumper)	PANEL_VDD (+3.3V or +5V by jumper)
9	GND	GND
10	LVDS_A_DATA1P	LVDS_B_DATA1P

11	LVDS_A_CLKP	LVDS_B_CLKP
12	LVDS_A_DATA1N	LVDS_B_DATA1N
13	LVDS_A_CLKN	LVDS_B_CLKN
14	GND	GND
15	GND	GND
16	PANEL_BACKLIGHT (+12V)	PANEL_BACKLIGHT (+12V)
17	LVDS_A_DATA2P	LVDS_B_DATA2P
18	PANEL_BACKLIGHT (+12V)	PANEL_BACKLIGHT (+12V)
19	LVDS_A_DATA2N	LVDS_B_DATA2N
20	GND	GND

The LCD inverter is connected to J6 via a JST 7-pin, 2.5mm connector providing +5V/ +12V power to LCD display. The pin assignments are listed in the following table:

Pin No.	Definition
1	+5V
2	+12V
3	+12V
4	LBKLT_CTL
5	GND
6	GND
7	LBKLT_EN

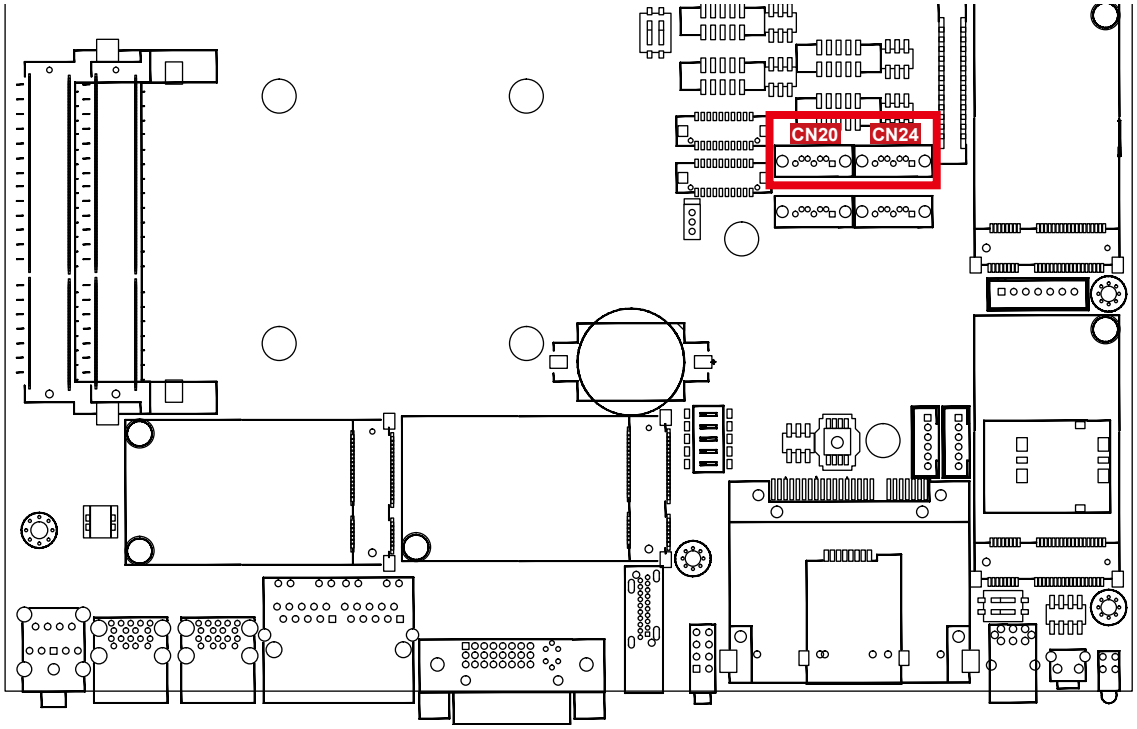
2.4.5 CN21, CN25 : SATA III Connector



There are 2 onboard high performance Serial ATA III (SATA III) on IVH-7700. It supports higher storage capacity with less cabling effort and smaller required space. The pin assignments of CN21 and CN25 are listed in the following table:

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

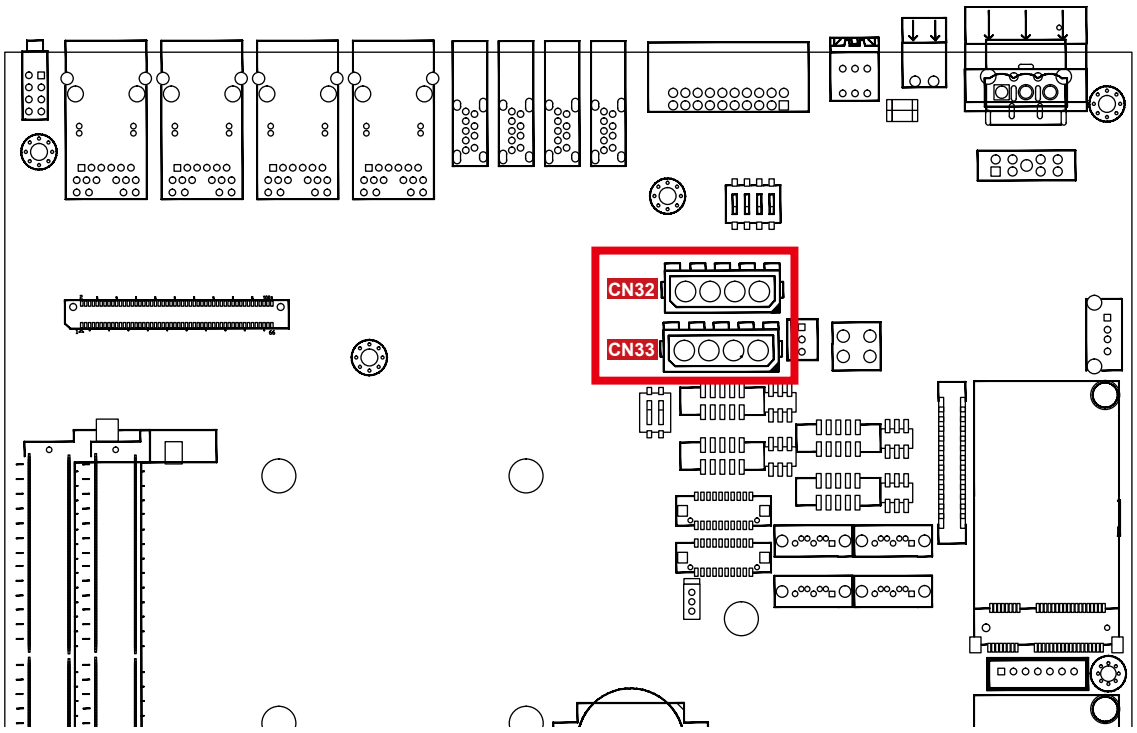
2.4.6 CN20, CN24 : SATA II Connector



There are 2 onboard high performance Serial ATA II (SATA II) on IVH-7700. It supports higher storage capacity with less cabling effort and smaller required space. The pin assignments of CN20 and CN24 are listed in the following table:

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

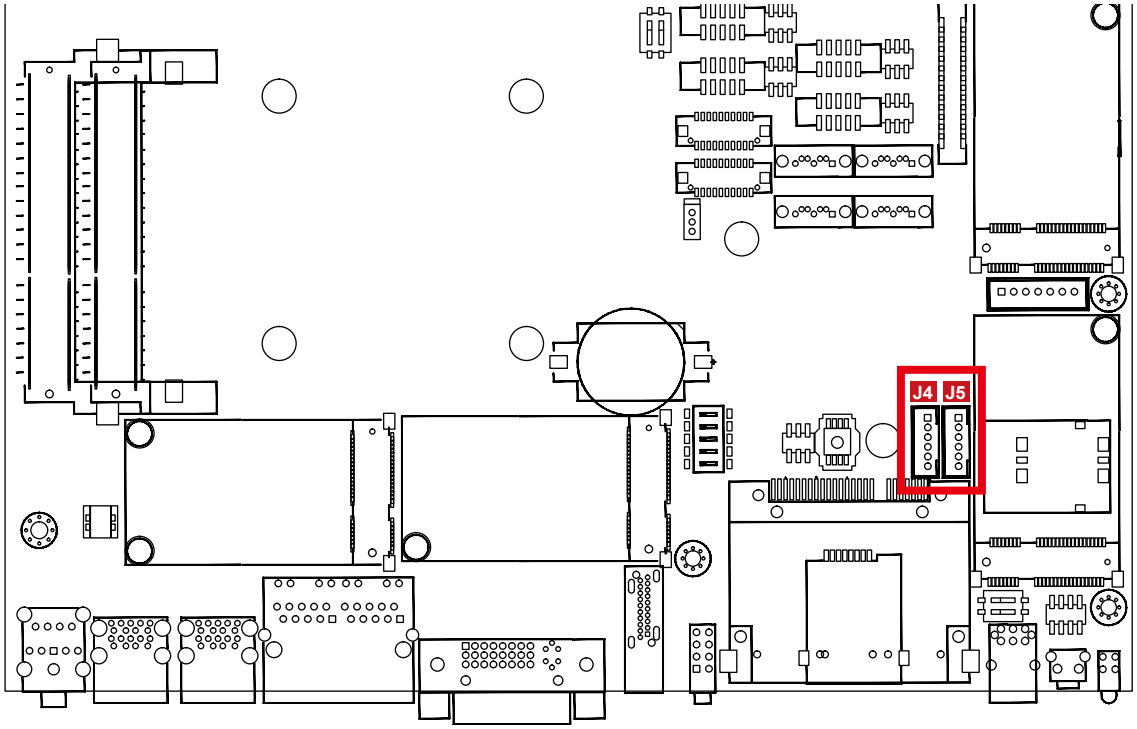
2.4.7 CN32, CN33 : SATA Power Connector



The IVH-7700 also equip with 2 SATA power connector. It supports 5V (Up to 2A) and 12V (Up to 1A) current to the hard drive or SSD. The pin assignments of CN32 and CN33 are listed in the following table:

Pin No.	Definition
1	+12V
2	GND
3	GND
4	+5V

2.4.8 J4, J5 : Internal Dual Port USB



The IVH-7700 main board provides up to 2 expansion USB ports 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, and are fuse protected.

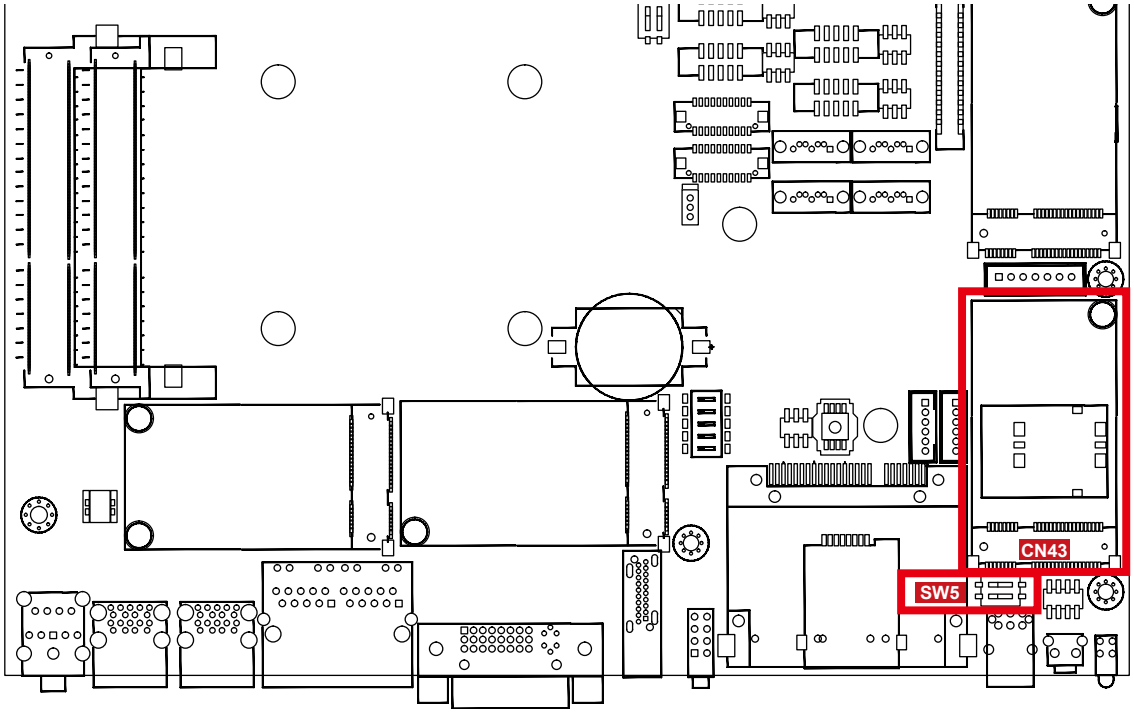
The USB interface is accessed through one 6-pin JST 2.0mm connector. You will need an adapter cable if you use a standard USB connector. The adapter cable has a 6-pin connector on one end and a USB connector on the other.

The pin assignments of J4 and J5 are listed in the following table:

Connector	Pin No.	Description	Pin No.	Description
J4	1	USB_VCC	2	USBD4-
	3	USBD4+	4	USBD5-
	5	USBD5+	6	GND

Connector	Pin No.	Description	Pin No.	Description
J5	1	USB_VCC	2	USBD6-
	3	USBD6+	4	USBD7-
	5	USBD7+	6	GND

2.4.9 CN43 : Mini PCIe, mSATA



Both mSATA and Mini PCIe share the same form factor and similar electrical pinout assignments on their connectors. There was 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.

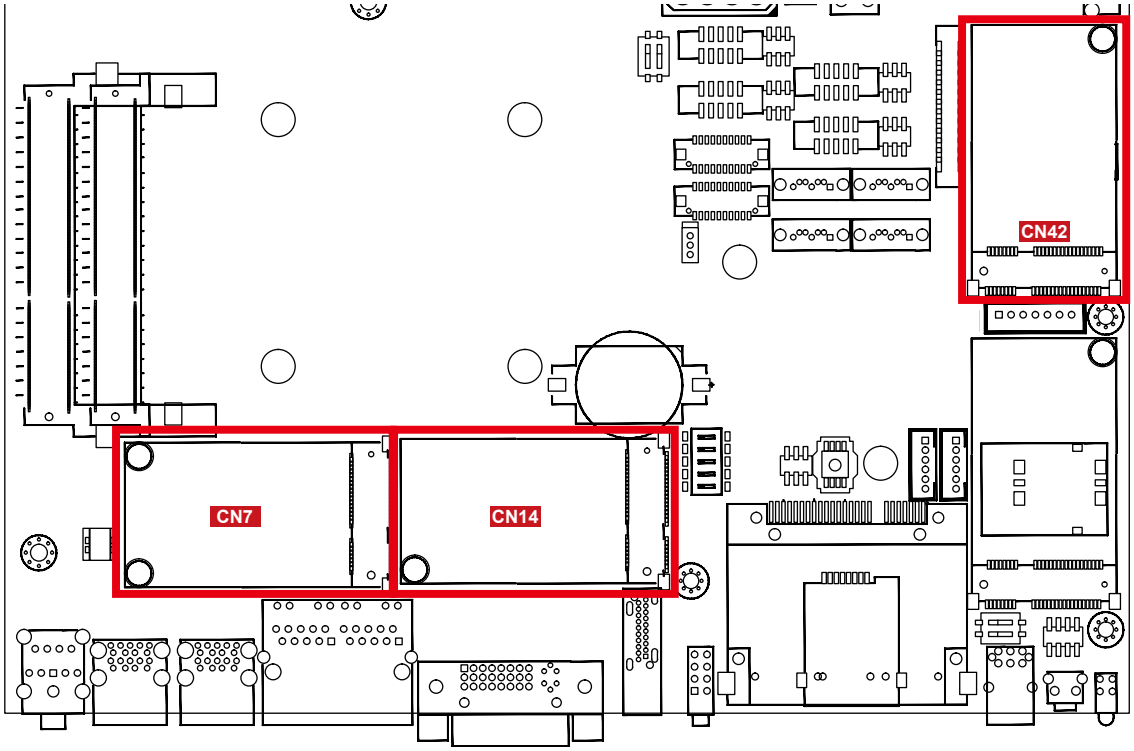
IVH-7700 SW5 Pin 43 status is designed for switching mSATA drive and Mini PCIe devices.

SW5-1	SW5-2	Interface
ON	OFF	Auto Detection
OFF	ON	Mini PCIe (Forced)
OFF	OFF	mSATA (Forced)

The pin assignments of CN43 are listed in the following table:

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	Status	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	Reserved
13	REFCLK+	14	Reserved
11	REFCLK-	12	Reserved
9	GND	10	Reserved
7	CLKREQ#	8	Reserved
5	Reserved	6	1.5V
3	Reserved	4	GND
1	WAKE#	2	3.3Vaux

2.4.10 CN7, CN14, CN42 : Mini PCIe

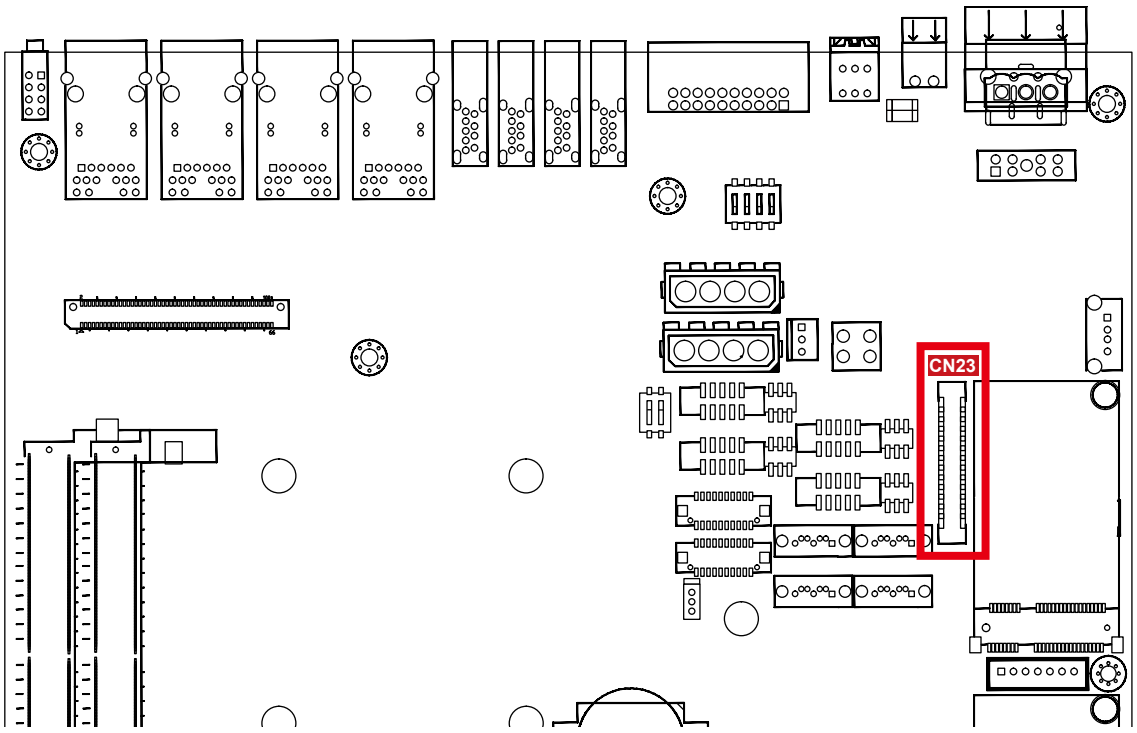


The pin assignments of CN7, CN14 and CN42 are listed in the following table:

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	Reserved
13	REFCLK+	14	Reserved
11	REFCLK-	12	Reserved
9	GND	10	Reserved
7	CLKREQ#	8	Reserved
5	Reserved	6	1.5V
3	Reserved	4	GND
1	WAKE#	2	3.3Vaux

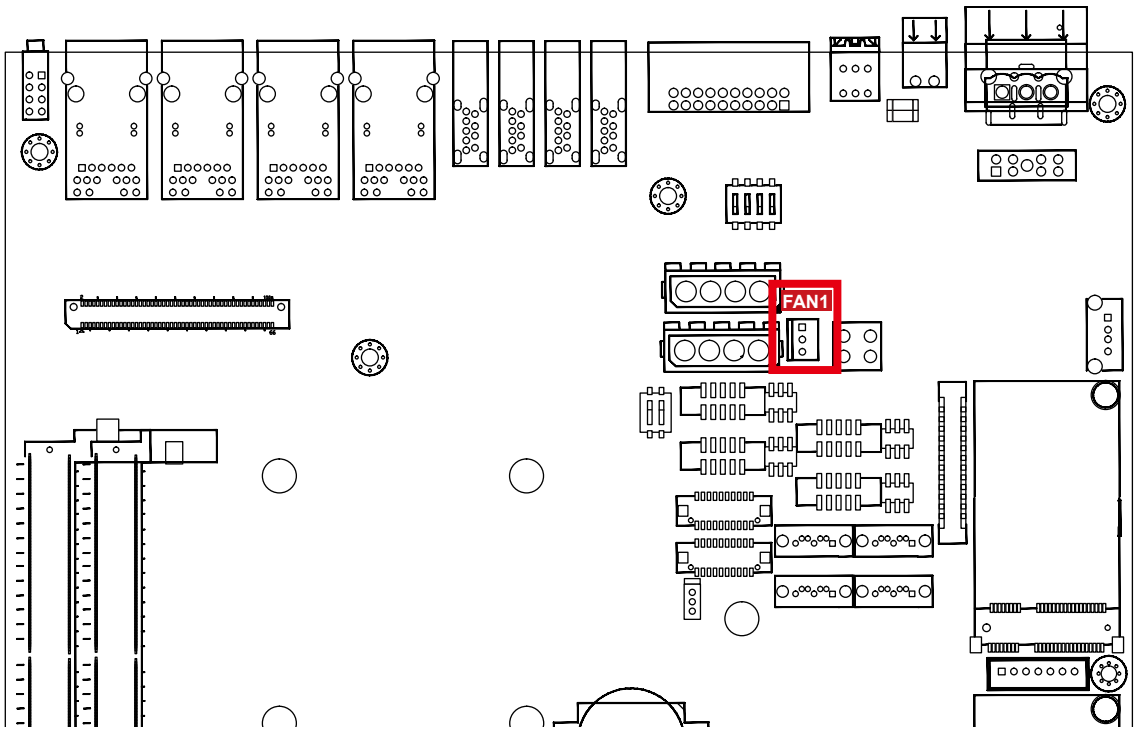
2.4.11 CN23 : GPIO



The IVH-7700 offers 16 programmable I/O within TTL 5V 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.

Pin No.	SIO GPIO Function	Pin No.	SIO GPIO Function
1	GND	14	GND
2	SIO_GP17	15	SIO_GP67
3	SIO_GP16	16	SIO_GP66
4	SIO_GP15	17	SIO_GP65
5	SIO_GP14	18	SIO_GP64
6	GND	19	GND
7	SIO_GP13	20	SIO_GP63
8	SIO_GP12	21	SIO_GP62
9	SIO_GP11	22	SIO_GP61
10	SIO_GP10	23	SIO_GP60
11	GND	24	GND
12	SMB_DATA	25	+5V
13	SMB_CLK	26	+5V

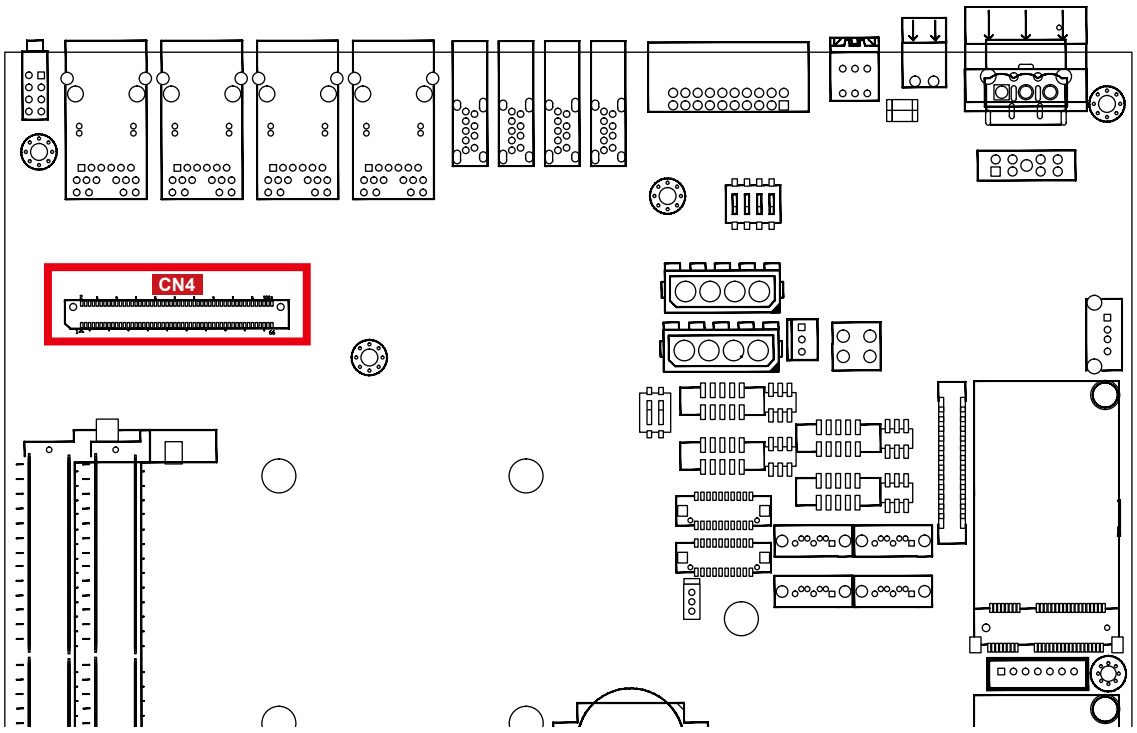
2.4.12 FAN 1



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

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

2.4.13 CN4 : M12, SUMIT Board Connector



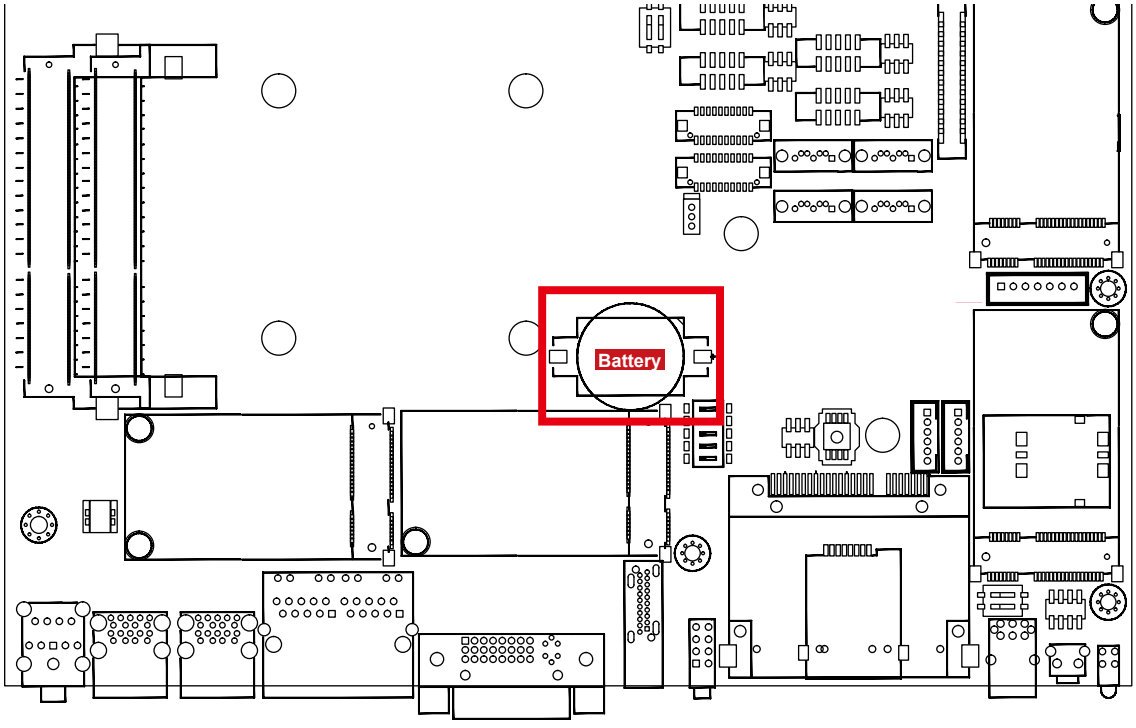
The pin assignments of CN4 are listed in the following table:

Pin No.	Function	Pin No.	Function
1	LAN3_MDI3_P	2	3.3V
3	LAN3_MDI3_N	4	NC
5	GND	6	VEE_LAN3
7	LAN3_MDI2_P	8	VEE_LAN3
9	LAN3_MDI2_N	10	VEE_LAN3
11	GND	12	GND_POE
13	LAN3_MDI1_P	14	GND_POE
15	LAN3_MDI1_N	16	GND_POE
17	GND	18	NC
19	LAN3_MDI0_P	20	1.5V_LAN3
21	LAN3_MDI0_N	22	LAN3_L100#
23	GND	24	LAN3_L1000#
25	GND	26	LAN3_ACTLED#
27	LAN4_MDI3_P	28	NC
29	LAN4_MDI3_N	30	VEE_LAN4

31	GND	32	VEE_LAN4
33	LAN4_MDI2_P	34	VEE_LAN4
35	LAN4_MDI2_N	36	GND_POE
37	GND	38	GND_POE
39	LAN4_MDI1_P	40	GND_POE
41	LAN4_MDI1_N	42	NC
43	GND	44	1.5V_LAN4
45	LAN4_MDI0_P	46	LAN4_L100#
47	LAN4_MDI0_N	48	LAN4_L1000#
49	GND	50	LAN4_ACTLED#
51	GND	52	NC
53	LAN5_MDI3_P	54	VEE_LAN5
55	LAN5_MDI3_N	56	VEE_LAN5
57	GND	58	VEE_LAN5
59	LAN5_MDI2_P	60	GND_POE
61	LAN5_MDI2_N	62	GND_POE
63	GND	64	GND_POE
65	LAN5_MDI1_P	66	NC
67	LAN5_MDI1_N	68	1.5V_LAN5
69	GND	70	LAN5_L100#
71	LAN5_MDI0_P	72	LAN5_L1000#
73	LAN5_MDI0_N	74	LAN5_ACTLED#
75	GND	76	NC
77	GND	78	VEE_LAN6
79	LAN6_MDI3_P	80	VEE_LAN6
81	LAN6_MDI3_N	82	VEE_LAN6
83	GND	84	GND_POE
85	LAN6_MDI2_P	86	GND_POE
87	LAN6_MDI2_N	88	GND_POE
89	GND	90	NC

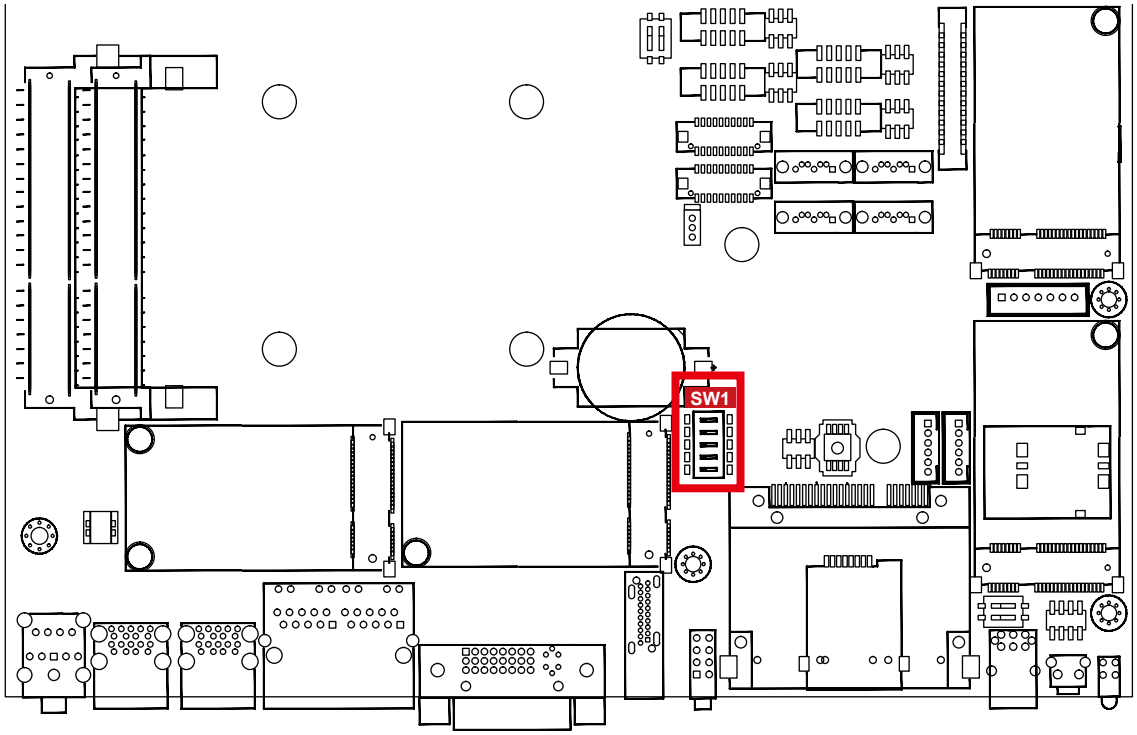
91	LAN6_MDI1_P	92	1.5V_LAN6
93	LAN6_MDI1_N	94	LAN6_L100#
95	GND	96	LAN6_L1000#
97	LAN6_MDI0_P	98	LAN6_ACTLED#
99	LAN6_MDI0_N	100	3.3V_SB

2.4.14 Battery



The IVH-7700's real-time clock is powered by a lithium battery. It is Equipped with Panasonic BR2032 190mAh lithium battery. It is recommended that you not replace the lithium battery on your own. If the battery needs to be changed, please contact Vecow RMA Service Team.

2.4.15 SW1



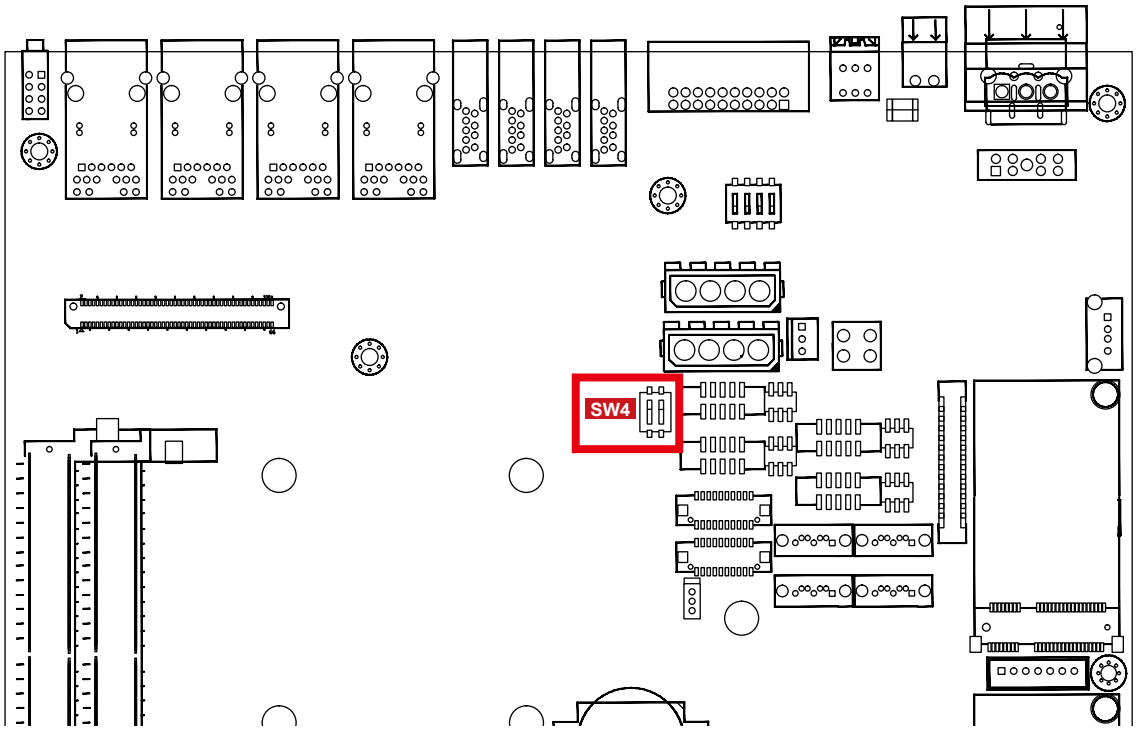
SW1-1	CMOS Clear Setting
ON	Clear CMOS
OFF	* Normal

SW1-2	ME Clear Setting
ON	Clear ME
OFF	* Normal

SW1-3	SW1-4	ATX / AT Power Mode
ON	OFF	AT MODE
OFF	ON	* ATX MODE

SW1-5	Front USB Power Selection
ON	* +5V Main Power (No Wake-up Function)
OFF	+5V Standy Power (Supports Wake-up Function)

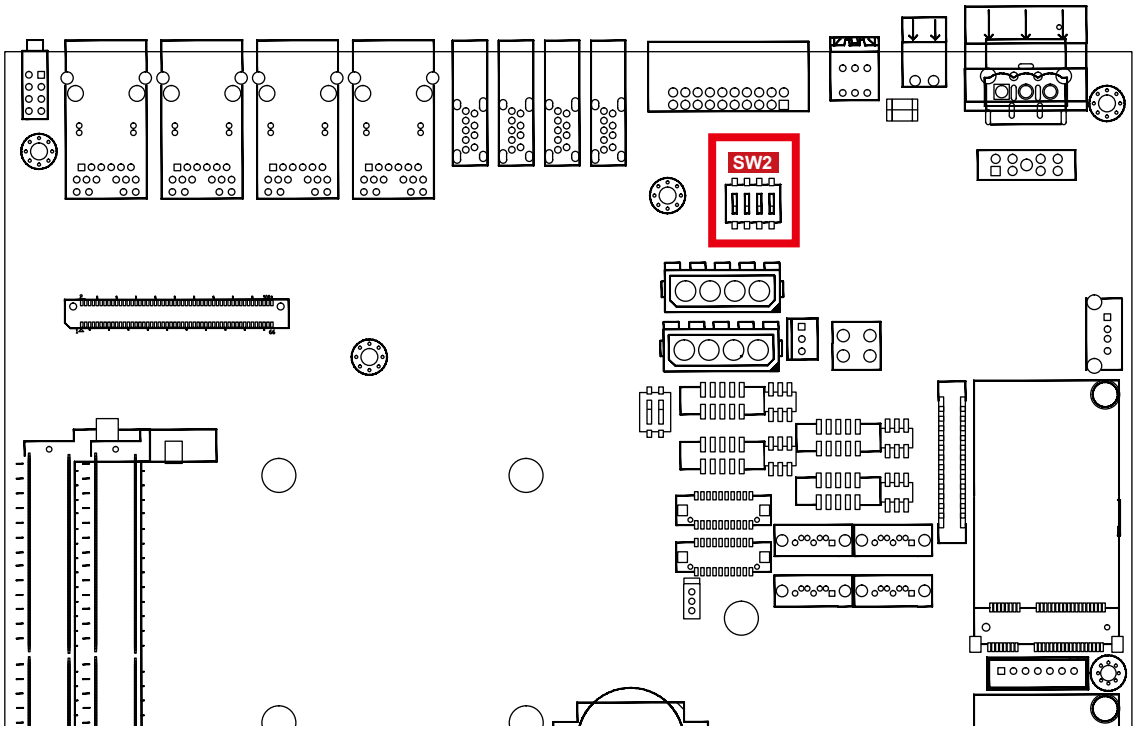
2.4.16 SW4 : COM 1, COM 2 RS-422/485 Receiver Termination ON/OFF



SW4-1	COM1 RS-422/485 Receiver Termination
ON	* Enabled
OFF	Disabled

SW4-2	COM1 RS-422/485 Receiver Termination
ON	* Enabled
OFF	Disabled

2.4.17 SW2 : Current Limitation



User-configurable 900mA and 1500mA current limitation.

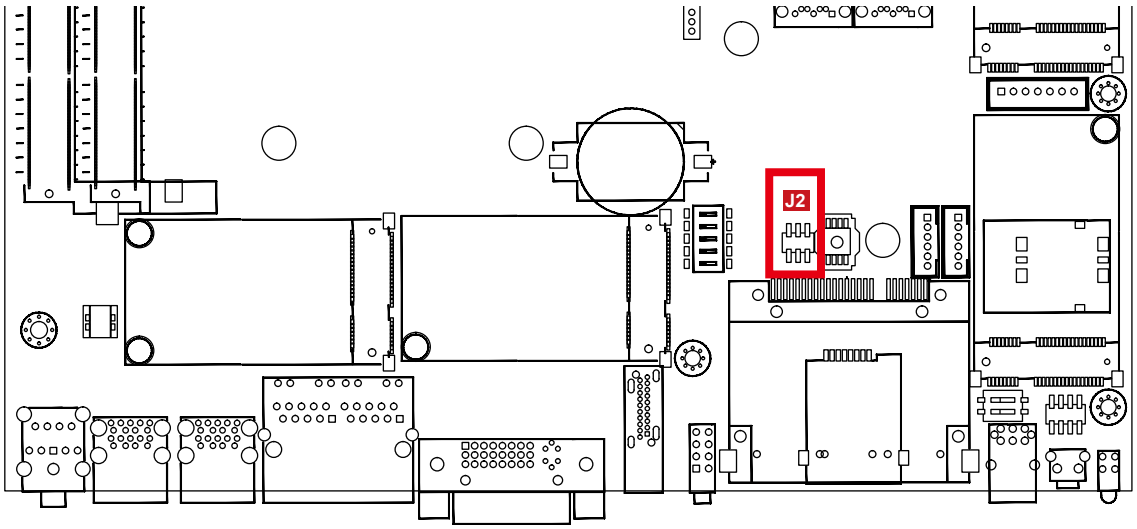
SW2-1	Rear USB #1 Current Limitation (CN11)
ON	1.5A
OFF	* 0.9A

SW2-2	Rear USB #2 Current Limitation (CN13)
ON	1.5A
OFF	* 0.9A

SW2-3	Rear USB #3 Current Limitation (CN15)
ON	1.5A
OFF	* 0.9A

SW2-4	Rear USB #4 Current Limitation (CN16)
ON	1.5A
OFF	* 0.9A

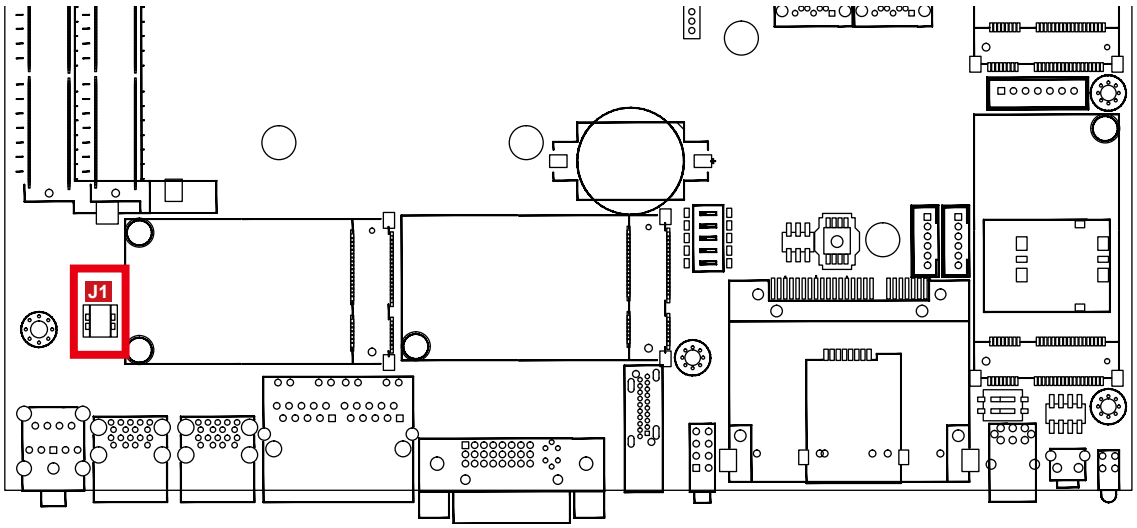
2.4.18 J2



The pin assignments of J2 are listed in the following table:

Pin No.	Function	Pin No.	Function
1	SCLOCK	2	SDATA_OUT0
3	SLOAD	4	GND
5	SDATA_OUT1	6	GND

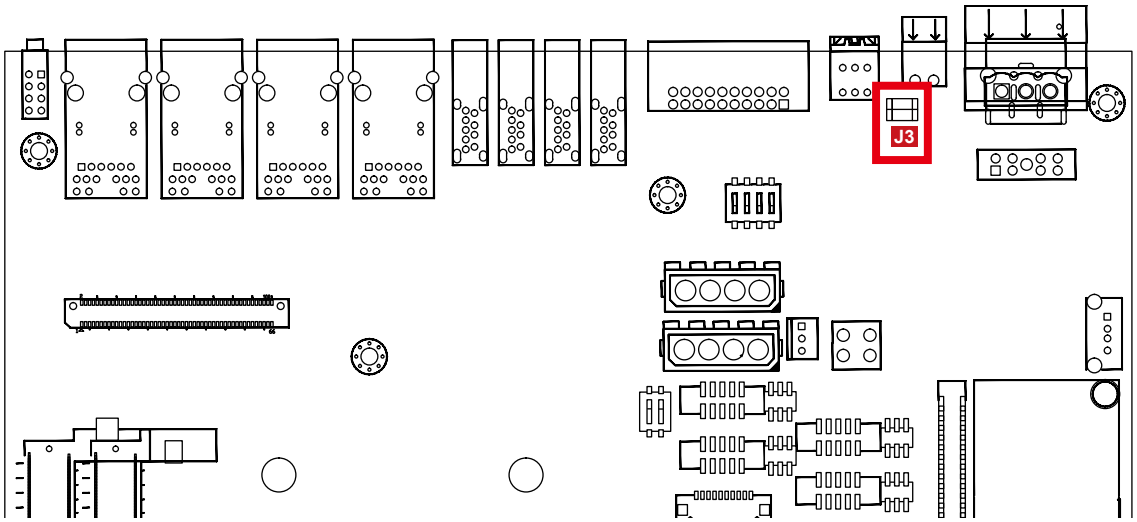
2.4.19 J1 : LAN2 I210 SDP



The pin assignments of J1 are listed in the following table:

Pin No.	Function	Pin No.	Function
1	LAN2_SDP0	2	LAN2_SDP1
3	LAN2_SDP2	4	LAN2_SDP3
5	GND	6	GND

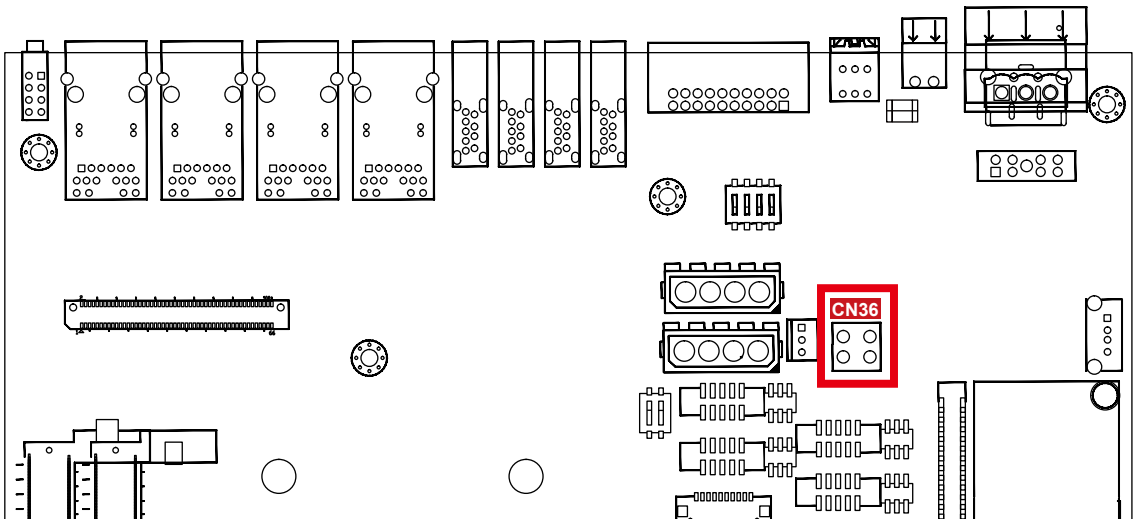
2.4.20 J3 : MCU Spy-bi Wire Interface for FW Downloading



The pin assignments of J3 are listed in the following table:

Pin No.	Function	Pin No.	Function
1	GND	2	MCU_RST#
3	3.3V_MCU	4	MCU_PRG

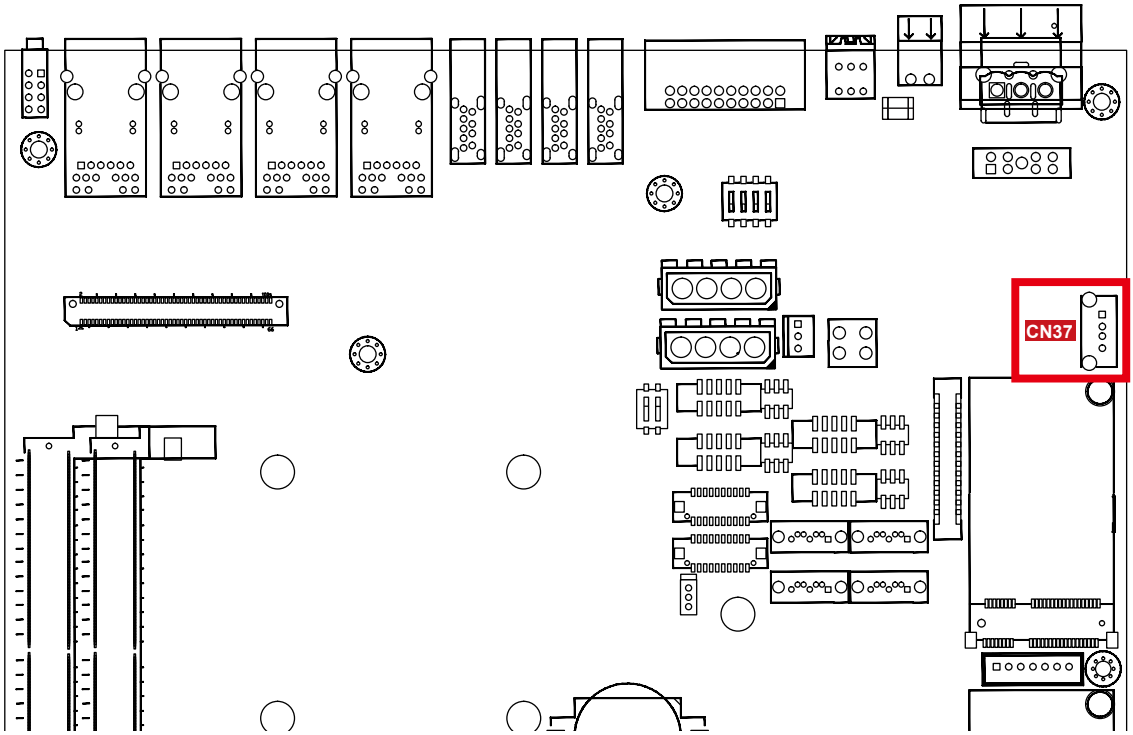
2.4.21 CN36 : +V12_SB Output



The pin assignments of CN36 are listed in the following table:

Pin No.	Function	Pin No.	Function
1	GND	2	GND
3	+V12_SB	4	+V12_SB

2.4.22 CN37 : USB 2.0



CN37 enables 1 onboard USB 2.0 connection. The USB interface supports plug-and-play, which enables you to connect or disconnect a device whenever you want, without turning off the system. The hosts can be used for an external flash disk or hard drive for storing large amounts of data. You can also use these USB hosts to connect to a keyboard or a mouse.

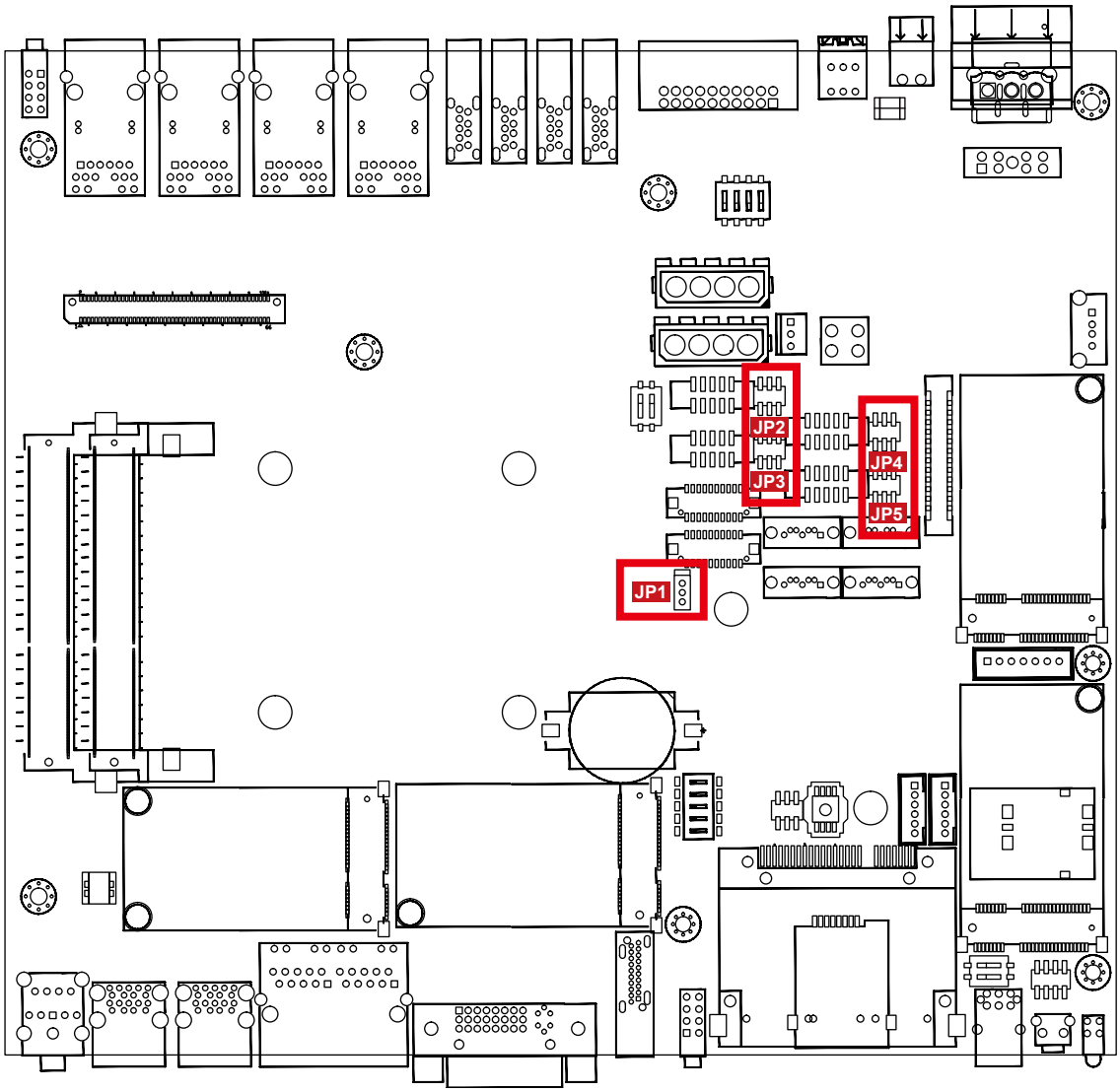
The pin assignments of CN37 are listed in the following table:

Pin No.	Function	Pin No.	Function
1	+5V	2	USB13-
3	USB13+	4	GND

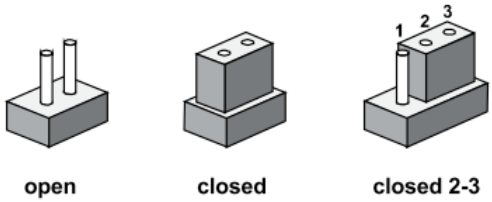
2.5 Main Board Jumper Settings

2.5.1 Front View of IVH-7700 Main Board With Jumper Location

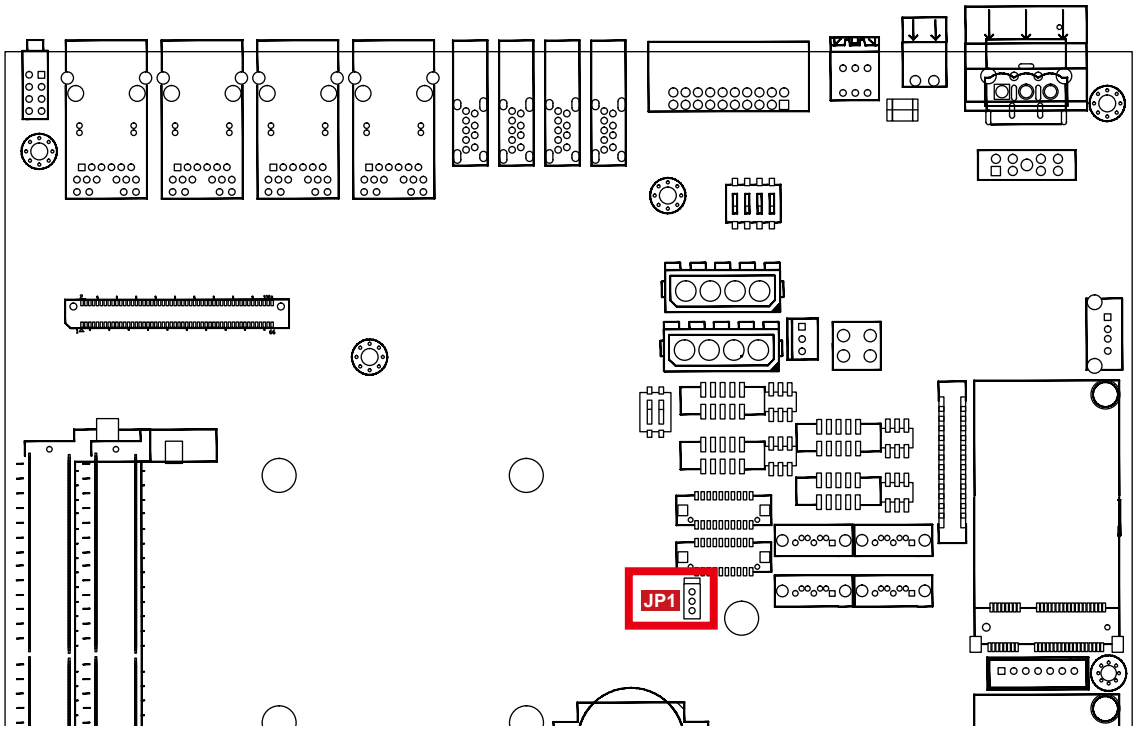
The figure below is the top view of the IVH-7700 main board which is the main board used in the IVH-7700 Series system. It shows the location of the jumpers.



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.



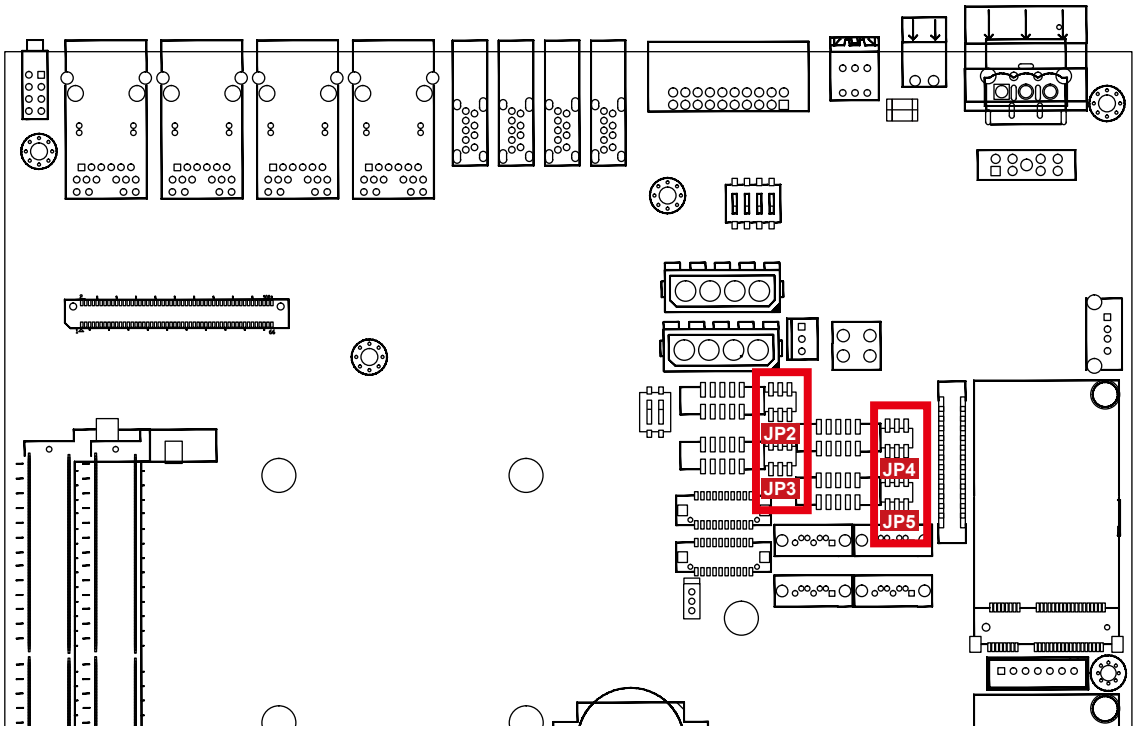
2.5.2 JP1 : LVDS Backlight, Power Selection



JP1 provides LVDS voltage selection function, closing Pin 1, 2 is for 3.3V LVDS power input; closing Pin 2, 3 is for 5V LVDS power input.

Pin No.	Function
1-2	+3.3V (Default)
2-3	+5V

2.5.3 JP2, JP3, JP4, JP5



	JP3	RI/ +5V/ +12V
COM1 Pin 9 Function	1-2	+12V
	3-4	+5V
	5-6	* RI

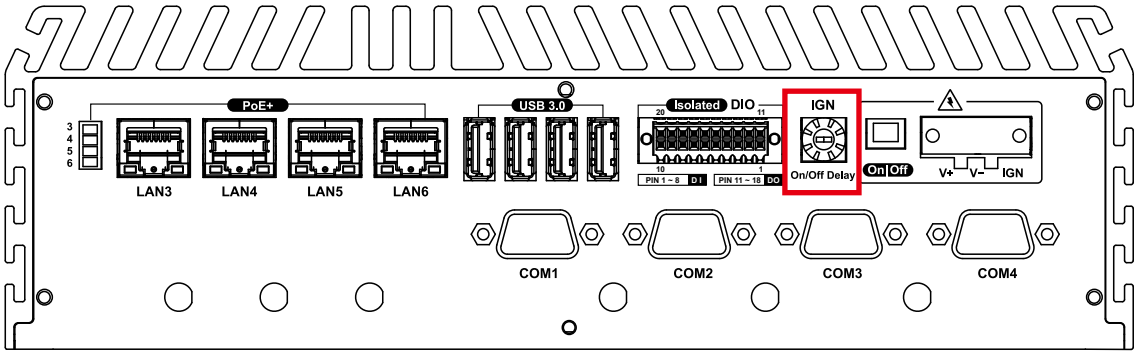
	JP3	RI/ +5V/ +12V
COM2 Pin 9 Function	1-2	+12V
	3-4	+5V
	5-6	* RI

	JP3	RI/ +5V/ +12V
COM3 Pin 9 Function	1-2	+12V
	3-4	+5V
	5-6	* RI

	JP3	RI/ +5V/ +12V
COM4 Pin 9 Function	1-2	+12V
	3-4	+5V
	5-6	* RI

2.6 Ignition Control

IVH-7700 series provides ignition power control feature for in-vehicle applications. The built-in MCU monitors the ignition signal and turns on/ off the system according to pre-defined on/ off delay period.



2.6.1 Adjust Ignition Control Modes

IVH-7700 series provides 16 modes of different power on/ off delay periods adjustable via rotary switch. The default rotary switch is set to 0 in ATX/ AT power mode.

The modes are listed in below table:

Rotary Switch Position	Power-on Delay	Power-off Delay
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

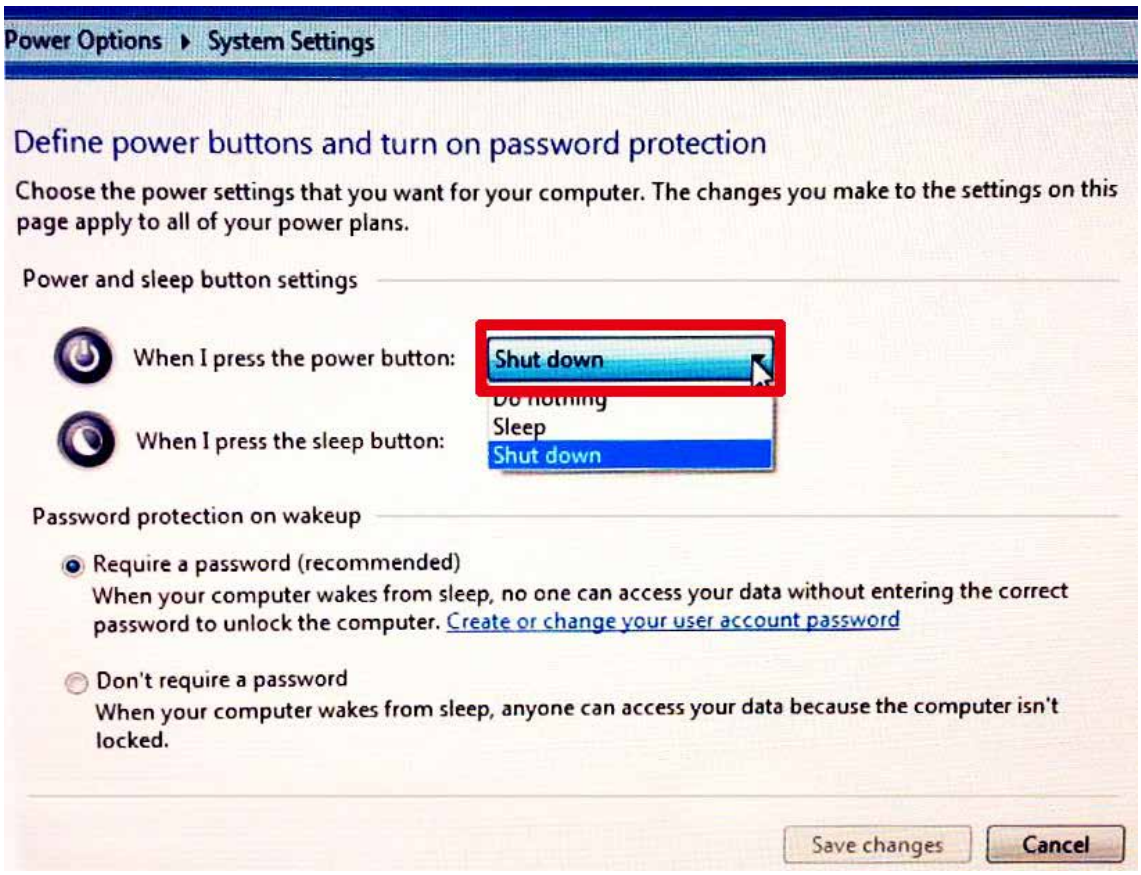
To activate ignition control, you need to provide IGN signal via the 3-pin pluggable terminal block locates in the back panel. Please find below the general wiring configuration.

V+ : Positive polarity of DC power input
(Car battery+ for 12/24/48V)
V- : Ground of DC power input
(Car battery -/GND line to GND)
IGN : Ignition signal input
(ACC power of vehicle)

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

1. DC power source and IGN share the same ground.
2. IVH-7700 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.

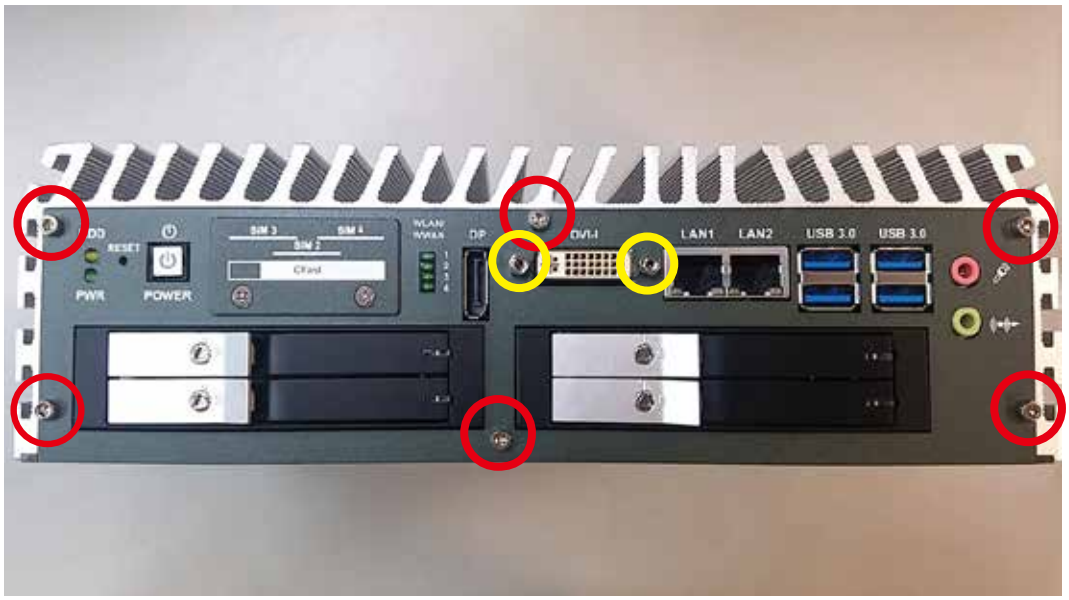


3

SYSTEM SETUP

3.1 How to Open Your IVH-7700-QRD/ IVH-7700-QRDM

Step 1 Remove 6 pcs KHS#6-32 screws (circled in red) and 2 pcs DVI-I #4-40 screws (circled in yellow) in the front side. (IVH-7700-QRD/ IVH-7700-QRDM)



Step 2 Take off the front panel. (IVH-7700-QRD/ IVH-7700-QRDM)

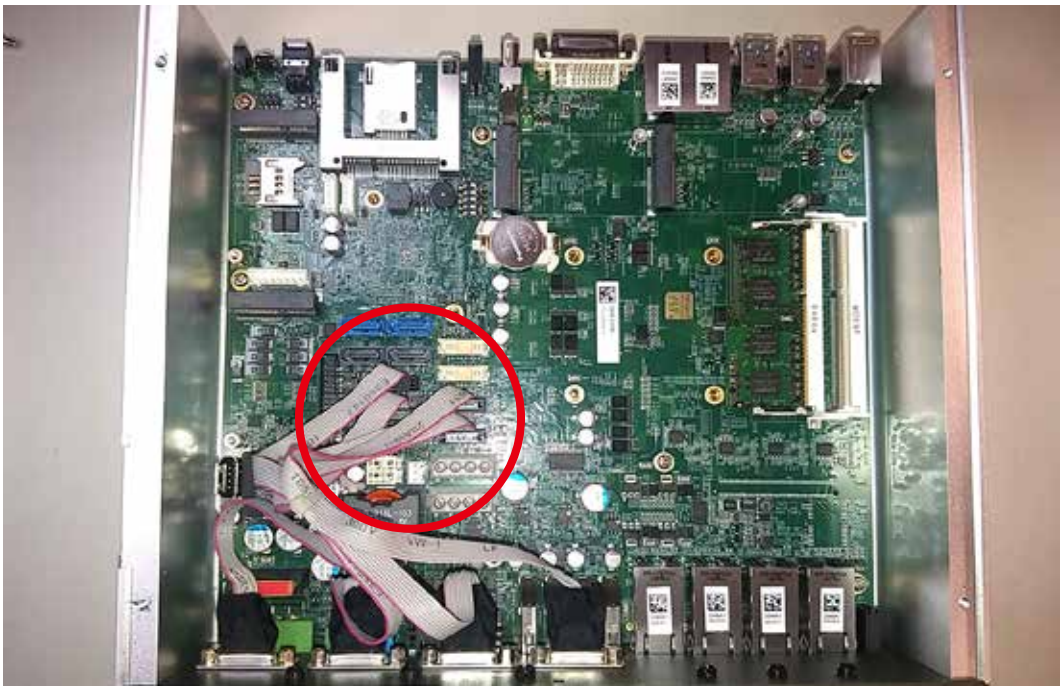
Step 3 Remove 4 pcs F#6-32x6 screws (circled in red) in the bottom side. (IVH-7700-QRD/ IVH-7700-QRDM)

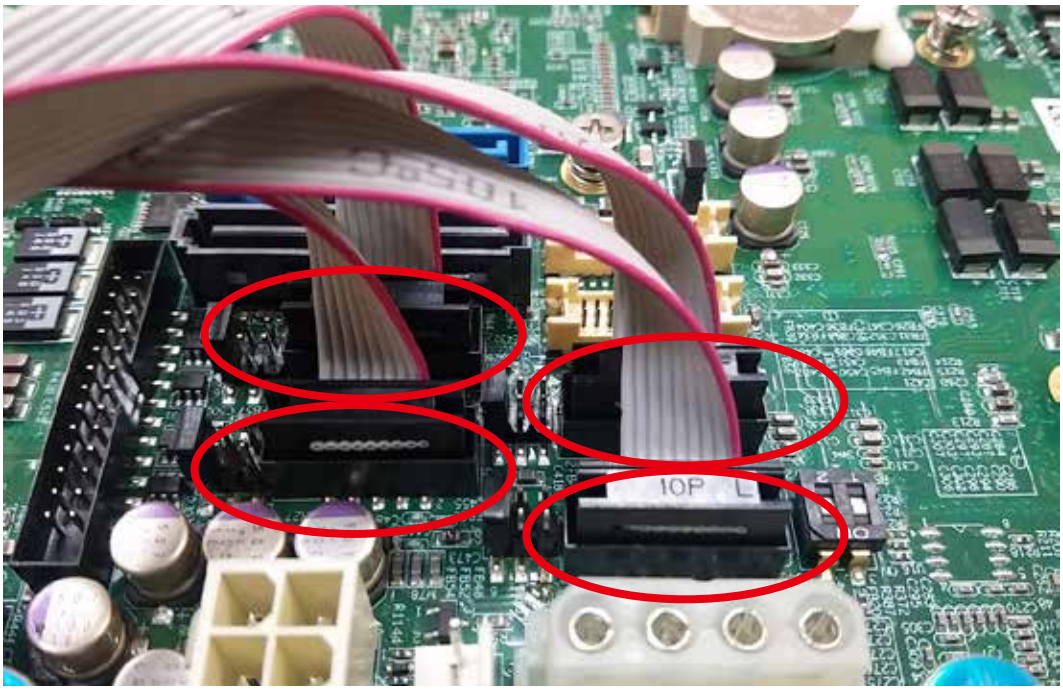
Step 4 Remove 1 pcs KHS#6-32 screw (circled in red) on the rear panel. (IVH-7700-QRD/ IVH-7700-QRDM)

Step 5 Turn over IVH-7700-QRD/ IVH-7700-QRDM to keep the bottom side up. Take off the lower cover slowly and carefully. (IVH-7700-QRD/ IVH-7700-QRDM)

Step 6 Unplug 4 pcs 7-pin SATA and 2 pcs power connectors. (IVH-7700-QRD/ IVH-7700-QRDM)

Step 7 Unplug 4 pcs DB9 connectors on the main board.
(IVH-7700-QRD/ IVH-7700-QRDM)





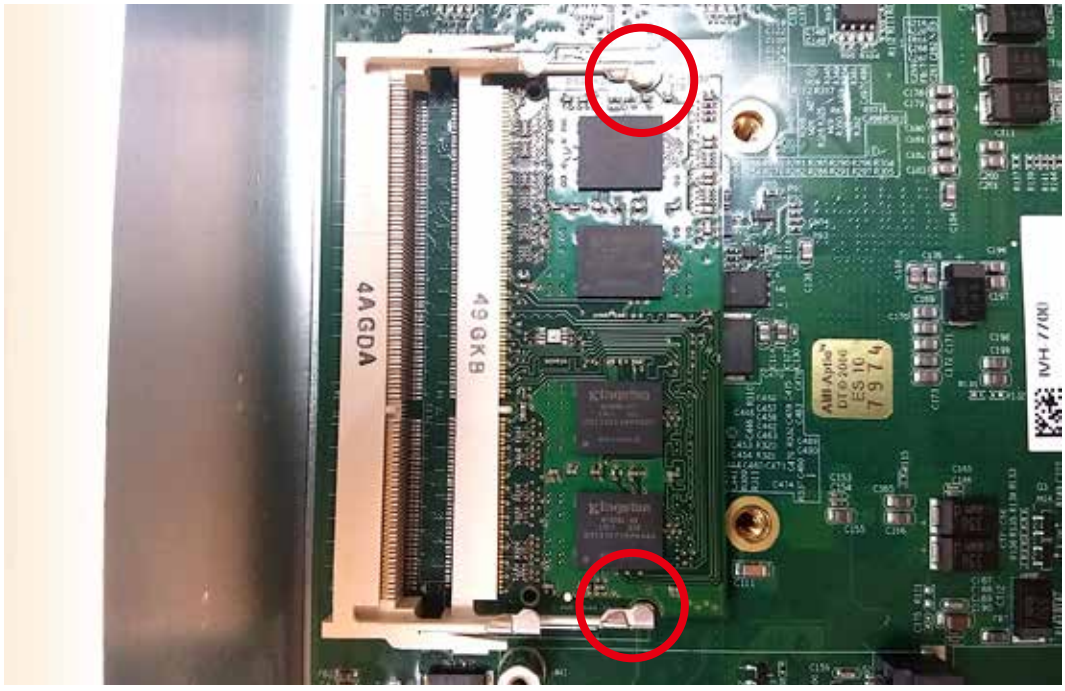
Step 8 Remove 5 pcs KHS#6-32x6 screws (circled in red) on rear panel. (IVH-7700-QRD/ IVH-7700-QRDM)

Step 9 Take off the rear panel. (IVH-7700-QRD/ IVH-7700-QRDM)

3.2 Installing DDR3L/ DDR3 SO-DIMM Modules

Step 1 Install DDR3L/ DDR3 RAM module into SO-DIMM slot.
(IVH-7700-QRD/ IVH-7700-QRDM)

Step 2 Make sure the RAM module is locked by the memory slot.
(IVH-7700-QRD/ IVH-7700-QRDM)



3.3 Installing Mini PCIe Card

Step 1 Install Mini PCIe card into the Mini PCIe socket. (IVH-7700-QRD/ IVH-7700-QRDM)

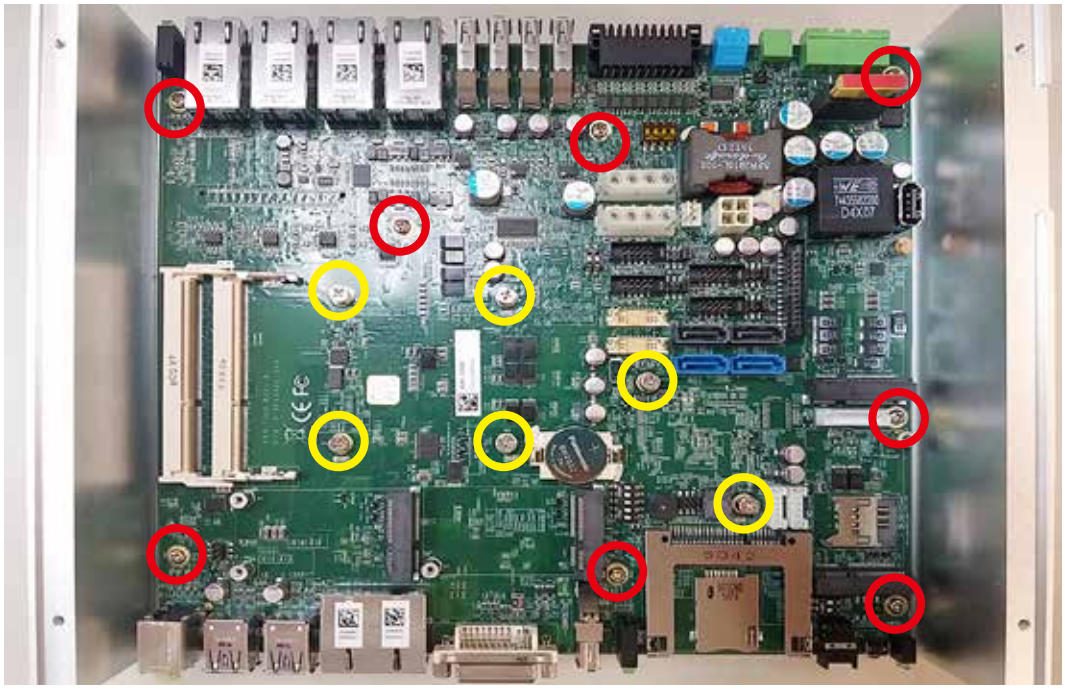
Step 2 Fasten 2 pcs M2.5 screws. (IVH-7700-QRD/ IVH-7700-QRDM)

3.4 Installing CPU

3.4.1 IVH-7700-QRD

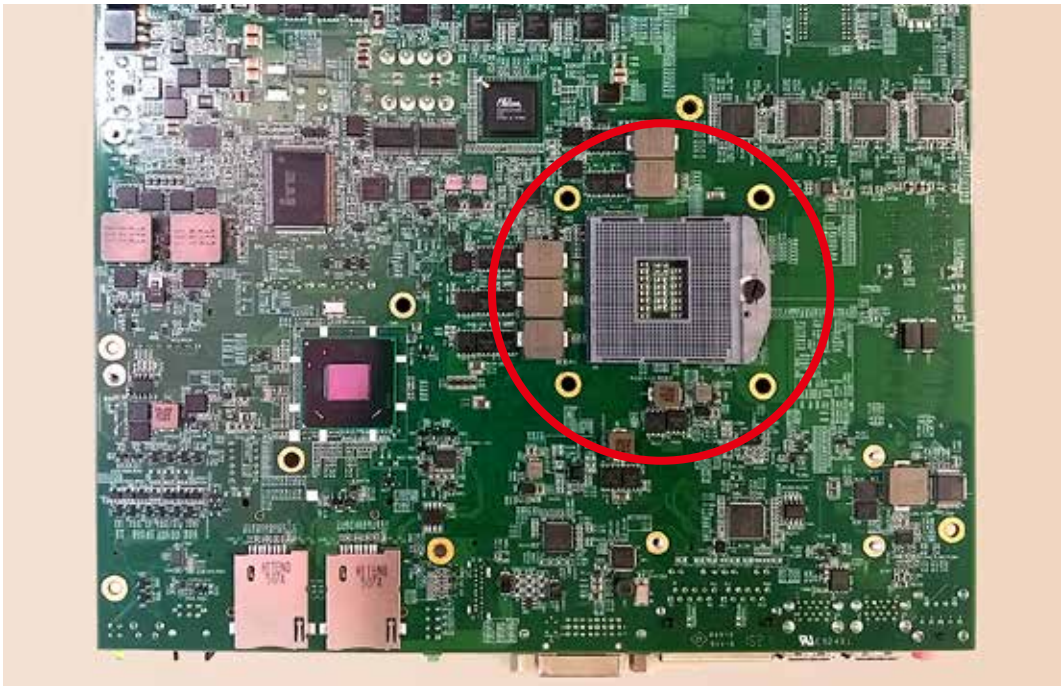
Step 1 Remove IVH-7700 main board from upper case

Step 2 Remove 6 pcs M3x11 springs (circled in yellow) and 8 pcs M3x6 screws (circled in red) on the main board.

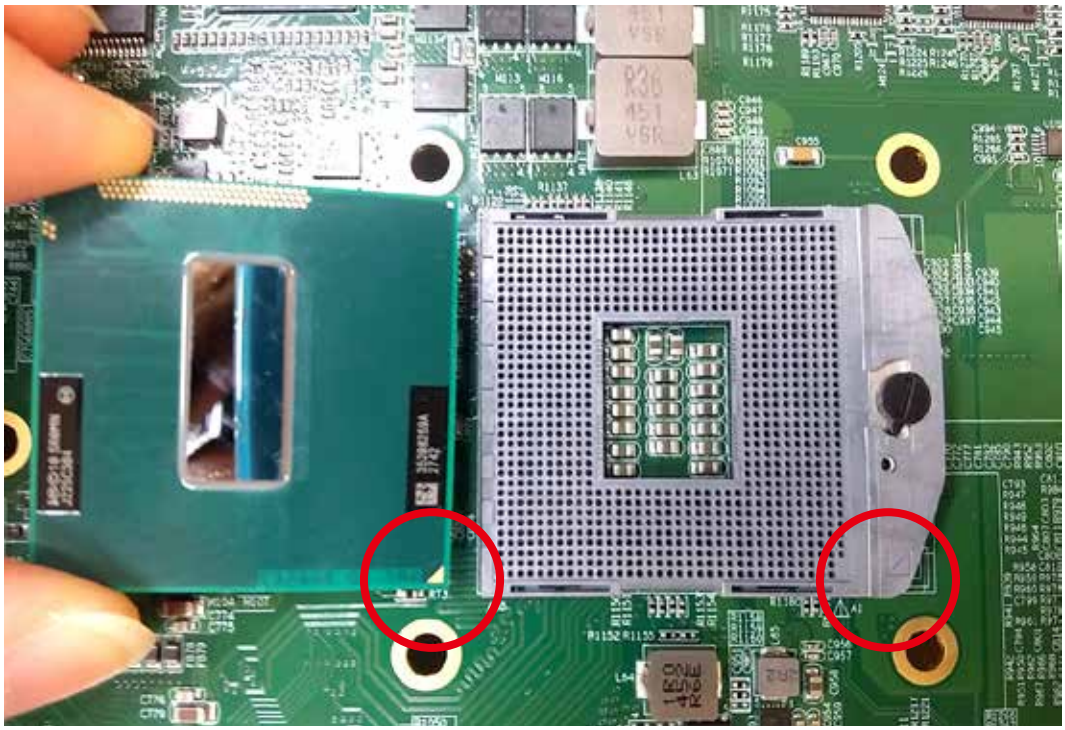


Step 3 Get the main board from upper case.

Step 4 Turn over the main board and find CPU socket.



Step 5 Do check if CPU direction fits the CPU socket.

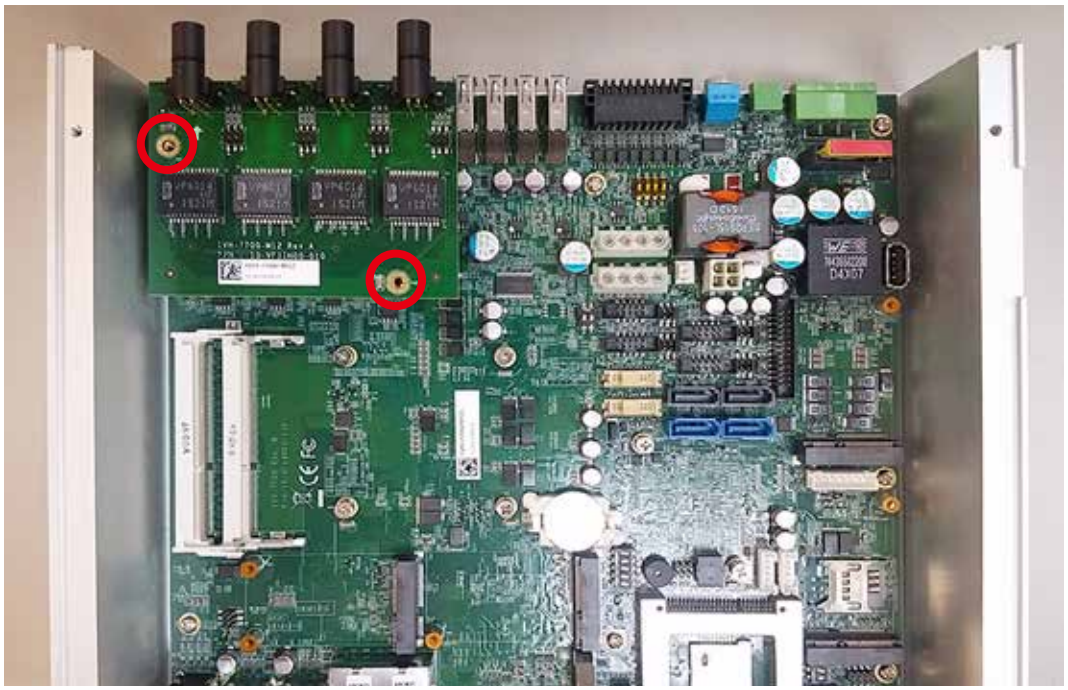


Step 6 Install CPU and lock the socket.

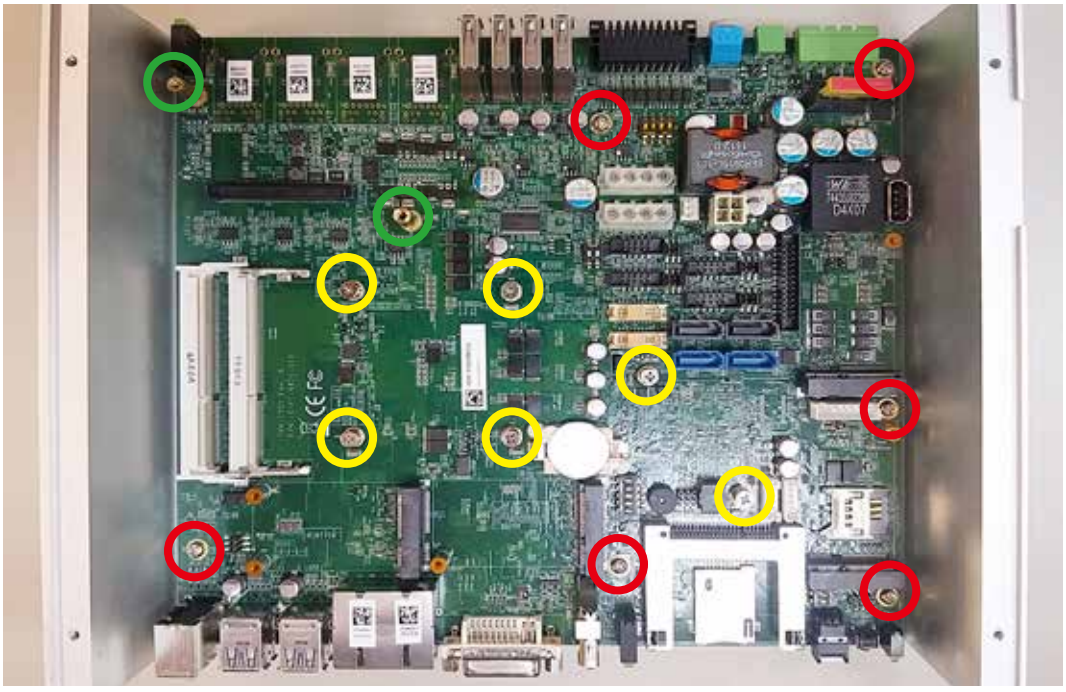
3.4.2 IVH-7700-QRDM

Step 1 Remove IVH-7700 main board from upper case.

Step 2 Remove 2 pcs M3x6 screws (circled in red) on M12 module.

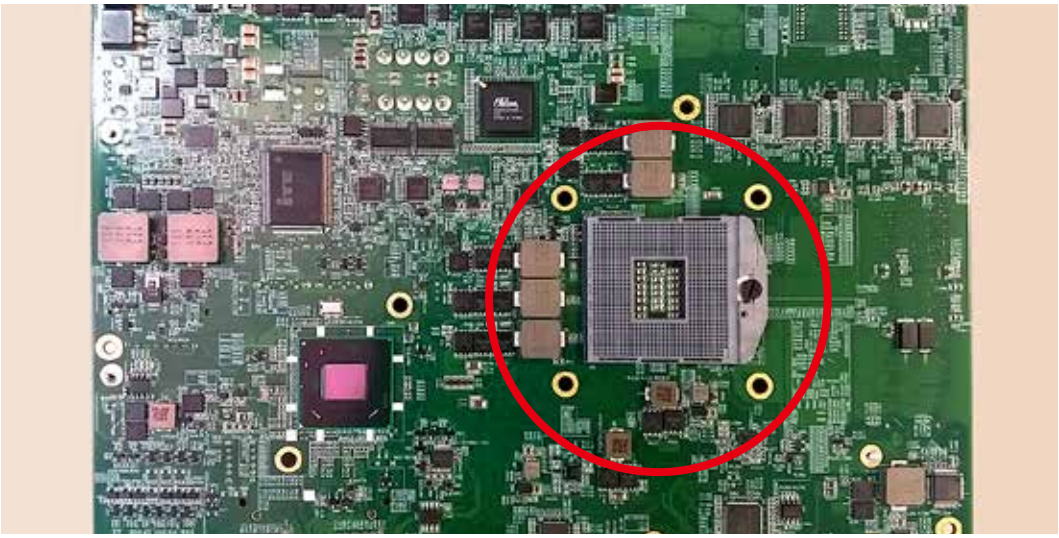


Step 3 Remove 6 pcs M3x11 springs (circled in yellow), 6 pcs M3x6 screws (circled in red) and 2 pcs M3x16 copper tubes (marked in green) on the main board.

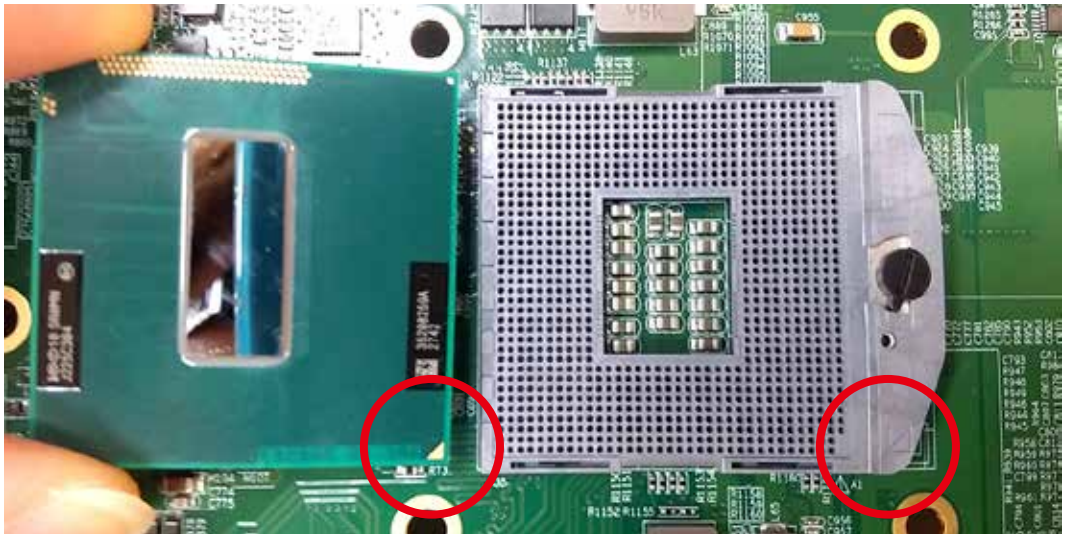


Step 4 Get the main board from upper case.

Step 5 Turn over the main board and find CPU socket.



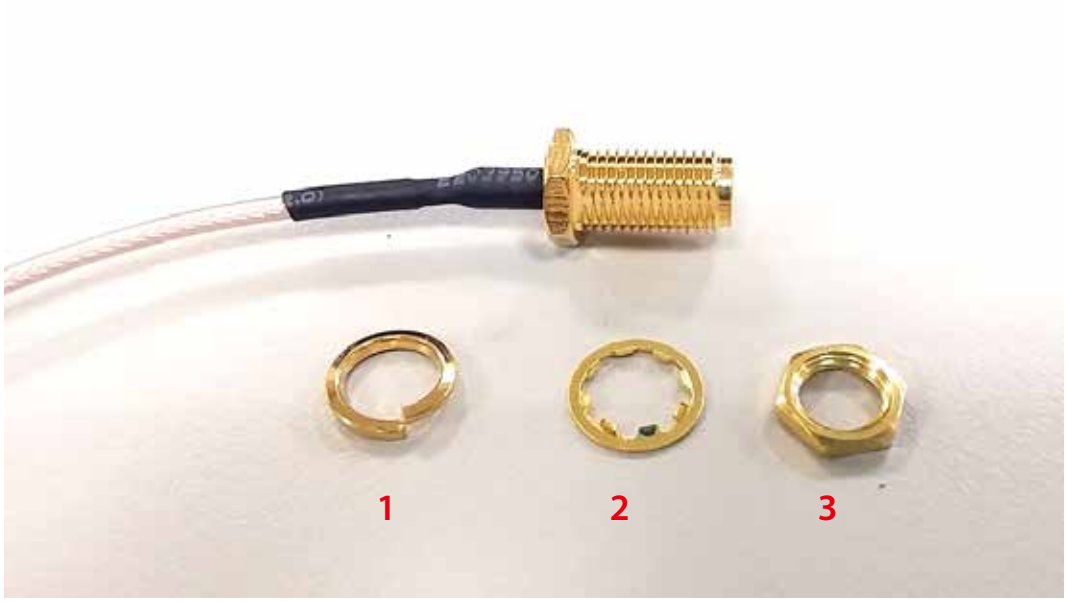
Step 6 Do check if CPU direction fits the CPU socket.



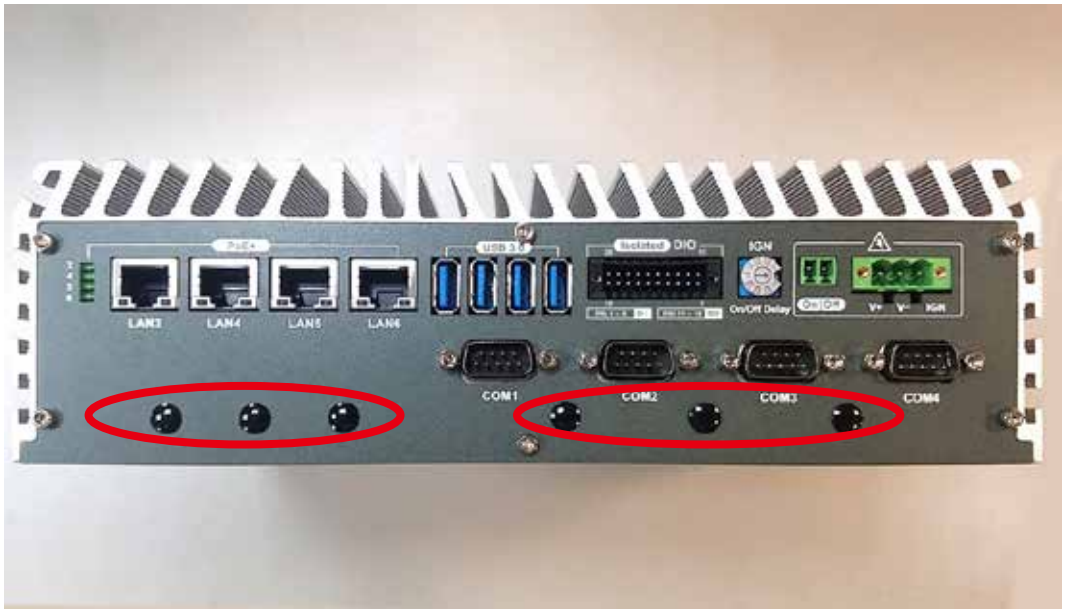
Step 7 Install CPU and lock the socket.

3.5 Installing Antenna Cable

Step 1 Check Antenna cable and washers.



Step 2 Remove the rubber cork on rear panel.
(Pick up the location you want.)



Step 3 Put Antenna cable connector into the hole on rear panel.

Step 4 Fasten the washer 1, washer 2 and washer 3 on Antenna cable connector.

Step 5 Antenna cable is installed ready.

3.6 Installing CFast Card and SIM Card

Step 1 Remove 2 pcs F-M3x4 screws on CFast Card and SIM Card cover at front panel.

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

Step 3 Insert CFast card and push to lock.

Step 4 Before Inserting SIM card, make sure the system power is not working.

Step 5 Insert SIM card and push to lock.

Step 6 SIM card and CFast card are installed ready.

3.7 Installing SSD/HDD

Step 1 Trigger and open SSD/HDD tray.

Step 2 Insert 2.5” SSD/HDD in the tray.

Step 3 Push back and close the SSD/HDD tray.

Step 4 Lock the SSD/HDD tray with key.

3.8 Mounting IVH-7700

Step 1 Ensure the screw holes on the right and left side of upper case match the ones on IVH-7700 wall mount bracket.

Step 2 Fasten 4pcs KHS#6-32 screws.

4

BIOS AND DRIVER SETTING

4.1 BIOS Settings

4.1.1 BIOS Setup

The board uses UEFI BIOS that is use Serial Peripheral Interface (SPI) Flash. The SPI Flash contains the BIOS Setup program, POST, the PCI auto-configuration utility, LAN, EEPROM information, and Serial port support. The BIOS setup program is accessed by pressing the <Del> key after the Power-On Self-Test (POST) memory test begins and before the operating system boot begins. The menu bar is shown below.

Figure 4-1-1: BIOS Menu Bar

4.2 Main Menu

4.2.1 BIOS Main Menu

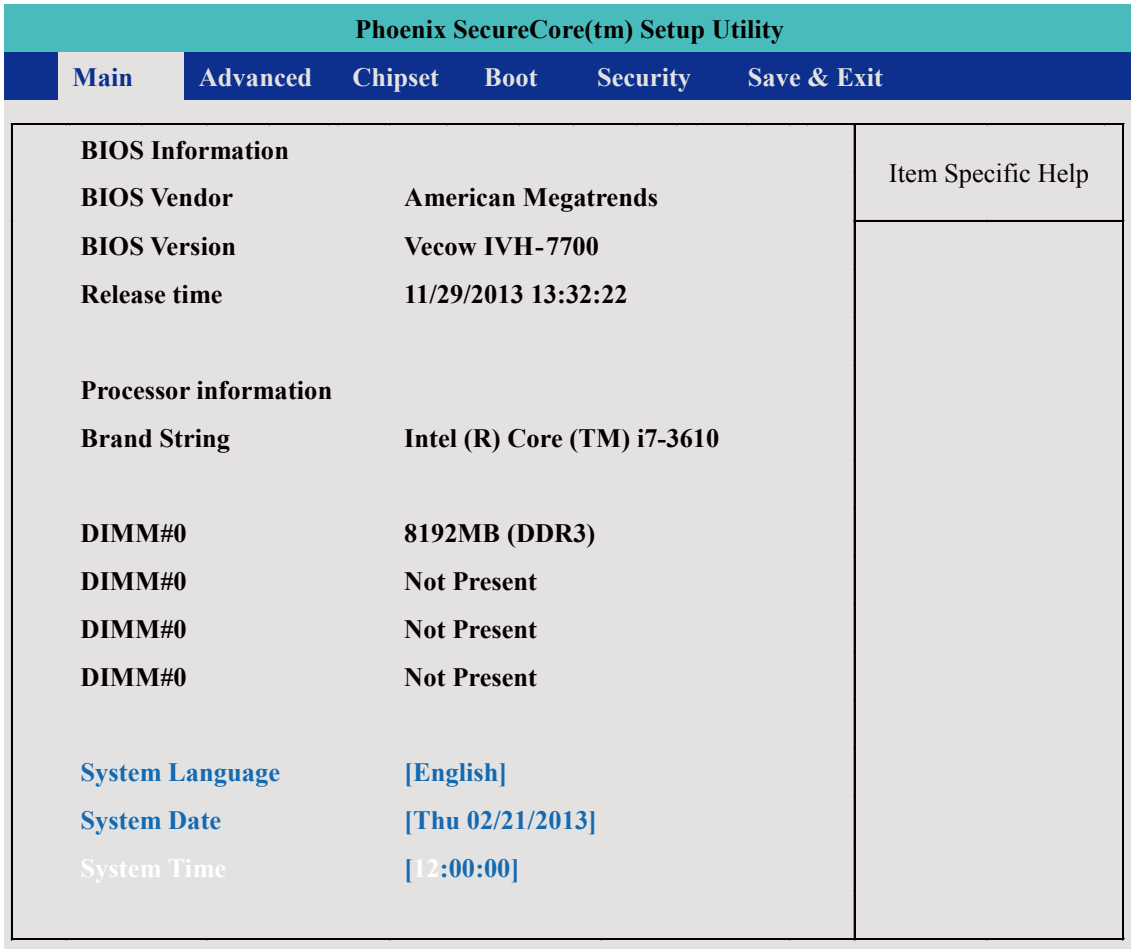


Figure 4-2-1: BIOS Main screen

System Time/ Date

Press “TAB” key to switch sub-items of value .Then press “ +” key or “-“ key number key for modify value.

In this page, you could make sure you CPU type and DRAM type that you are install into this system.

4.3 Advanced Function

4.3.1 ACPI Setting

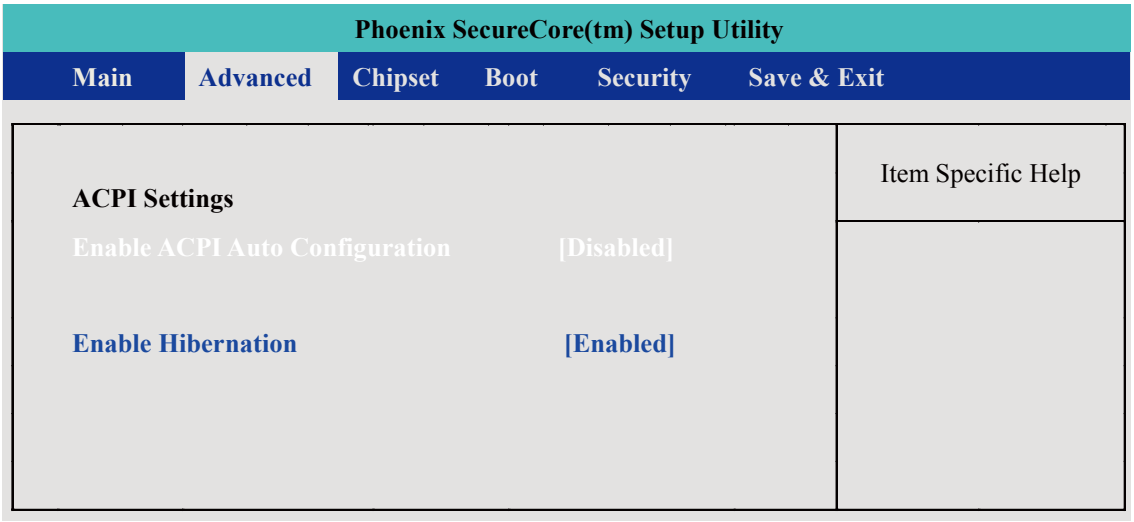


Figure 4-3-1: ACPI Setting setup screen

Enable ACPI Auto Configuration

This system support ACPI function as auto process. You should Enable / Disable that depend as your O.S.

Enable Hibernation

It is able to use Hibernate function if O.S support. But some O.S maybe not effective with this function.

4.3.2 Trusted Computing

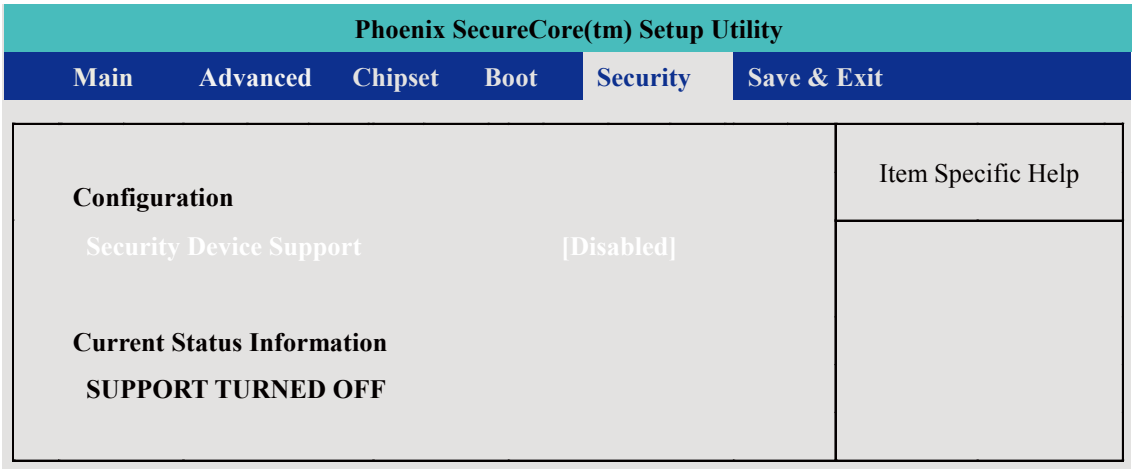


Figure 4-3-2 : Serial Port 1 Setup screen

Security Device Support

Enables or Disables BIOS support for security device. O.S. will now show Security Device. TCG EFT protocol and INT1A interface will not be available.

Current Status Information

Show as below option :

- SUPPORT TURNED OFF
- SUPPORT TURNED ON

4.3.3 CPU Configuration

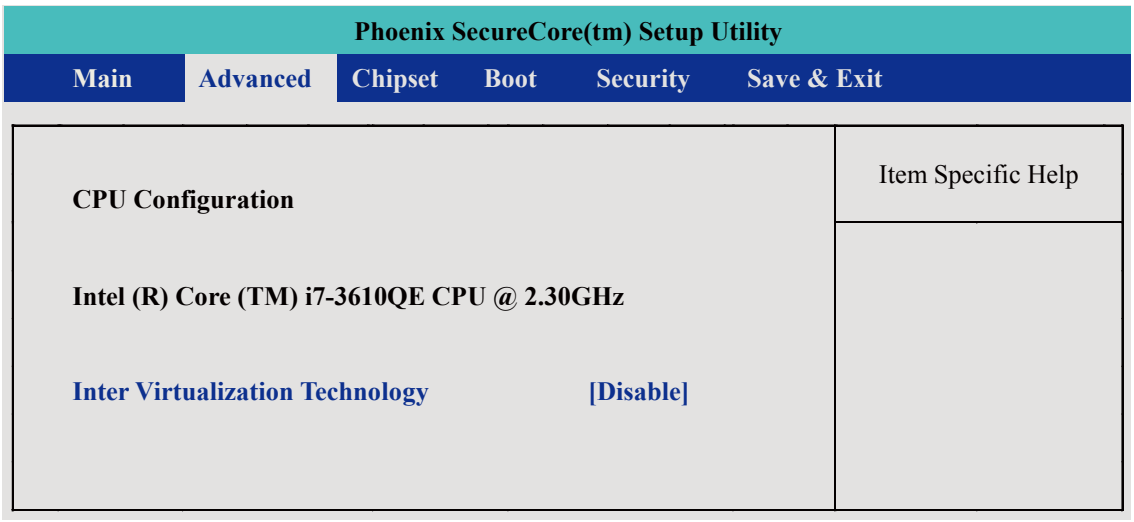


Figure 4-3-3 : CPU Configuration Setup screen

Intel Virtualization Technology

This for for Virtualization Application or platform usage, when enabled, a VMM can utilize the additional hardware capabilities provided by Vanderpool Technology.

4.3.4 SATA Configuration

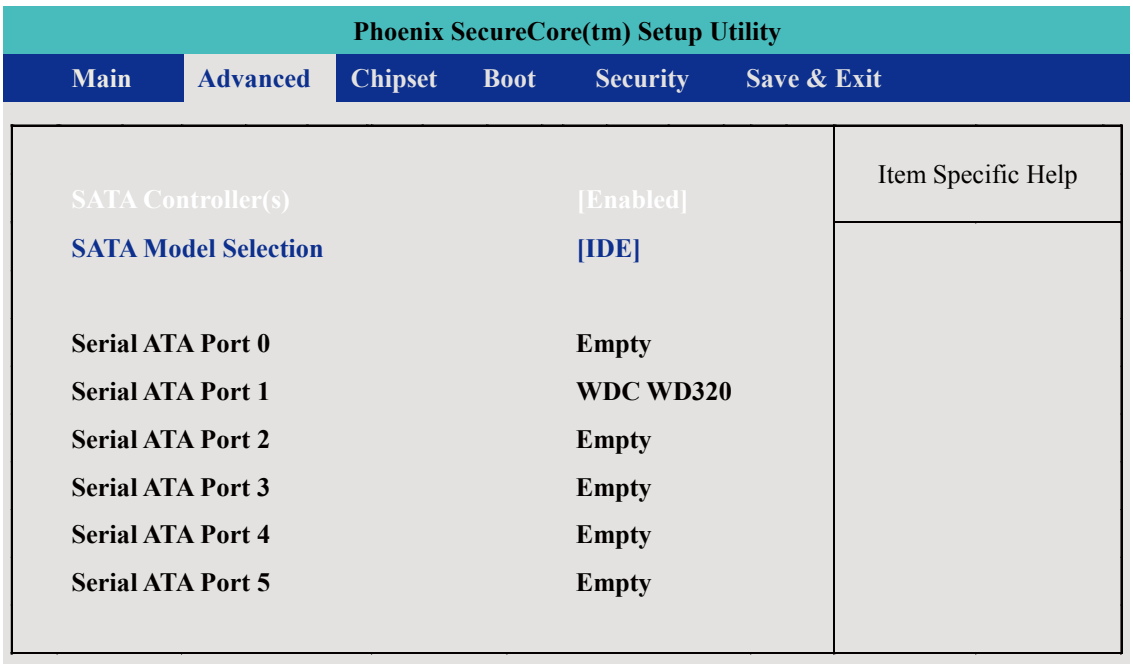


Figure 4-3-4 : SATA Configuration setup screen

SATA Controller(s)
Enables or Disables integrate SATA controller for storage devices.

SATA Mode Selection
Pick up the SATA Mode you need. There are 3 options to choose [IDE]/ [AHCI]/ [RAID] Mode. For the RAID mode setup, please go to **Appendix F** for detail information.

Serial Port 0 to 5
There are 6 SATA ports available for SATA device connection.

4.3.5 AMT Configuration

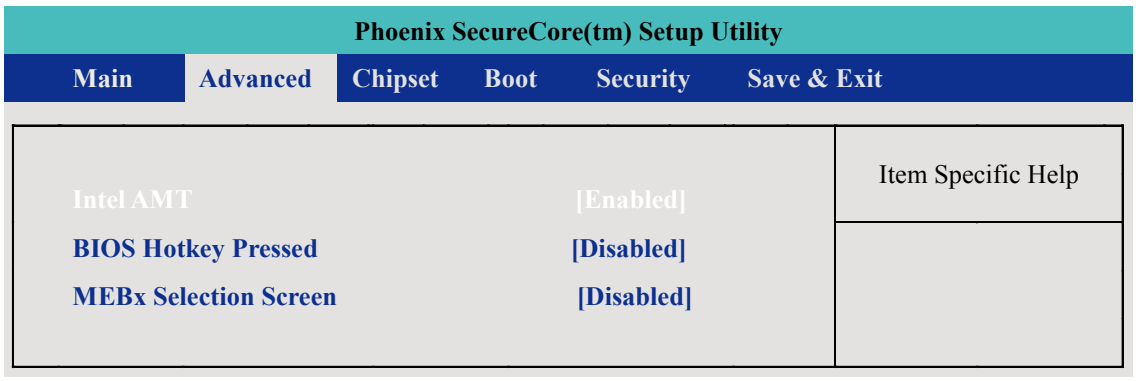


Figure 4-3-5 : AMT Setup screen

Intel AMT

Enables or Disables Intel(R) Active Management Technology BIOS extension. This option just controls the BIOS extension executes.

4.3.6 Serial Port 1 Configuration

Advanced → IT8783F Super IO Configuration → Serial Port 1

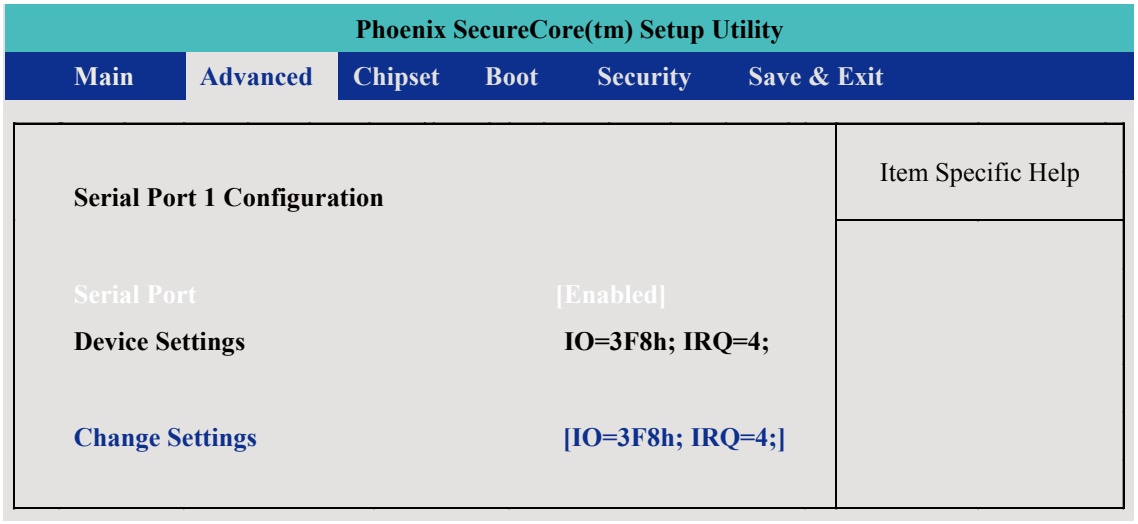


Figure 4-3-6 : Serial Port 1 Setup screen

Serial Port
Enable or Disable Serial Port.

Device Setting
Current IO address and interrupt resource of Serial Port.

Change Settings
Select another device setting.
There are 4 options as follow :

- IO=3F8h; IRQ=4;
- IO=2F8h; IRQ=3;
- IO=3E8h; IRQ=10;
- IO=2E8h; IRQ=11;

Interface Mode
There are 3 options as follow :

- RS-232 Mode
- RS-422 Mode
- RS-485 Mode

4.3.7 Serial Port 2 Configuration

Advanced → IT8783F Super IO Configuration → Serial Port **2**

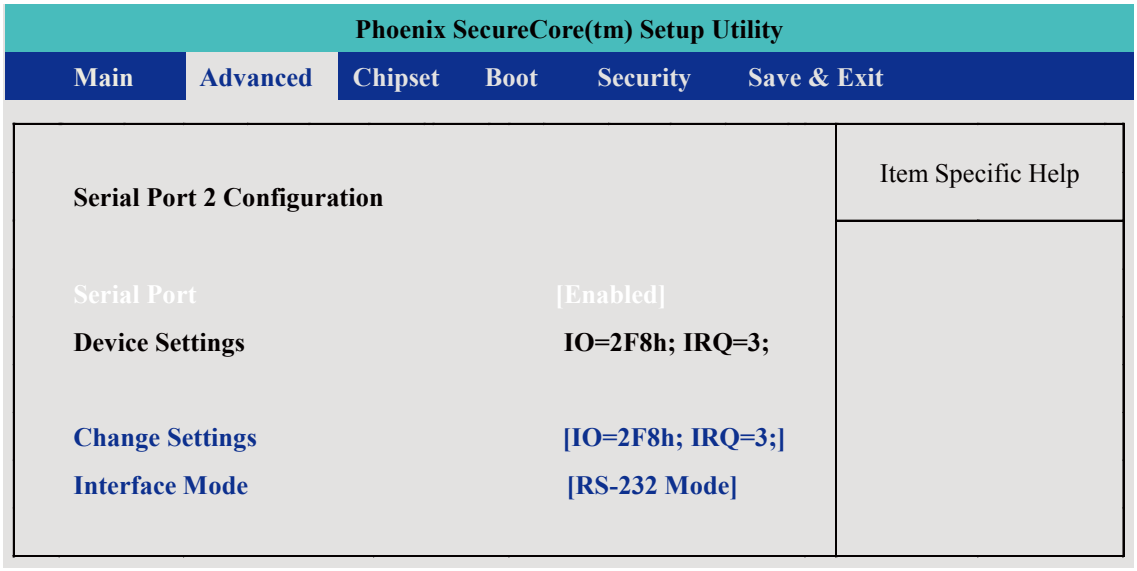


Figure 4-3-7 : Serial Port 2 Setup screen

Serial Port
Enable or Disable Serial Port.

Device Setting
Current IO addresses and interrupts resource of Serial Port.

Change Settings
Select another device setting.
There are 4 options as follow :

- IO=3F8h; IRQ=4;
- IO=2F8h; IRQ=3;
- IO=3E8h; IRQ=10;
- IO=2E8h; IRQ=11;

Interface Mode
There are 3 options as follow :

- RS-232 Mode
- RS-422 Mode
- RS-485 Mode

4.3.8 Serial Port 3 Configuration

Advanced → IT8783F Super IO Configuration → Serial Port **3**

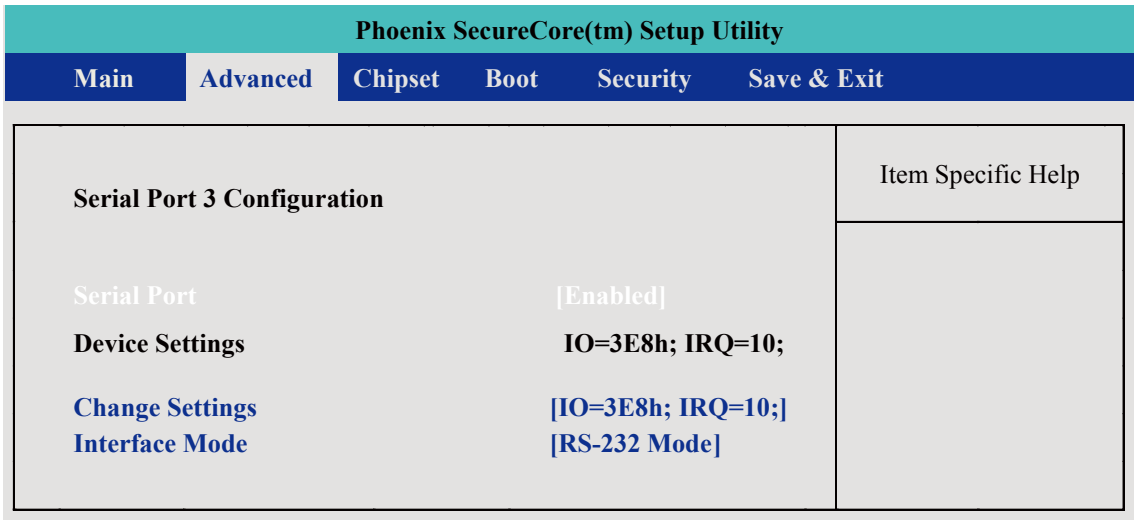


Figure 4-3-8 : Serial Port 3 Setup screen

Serial Port
Enable or Disable Serial Port.

Device Setting
Current IO address and interrupt resource of Serial Port.

Change Settings
Select another device setting.
There are 6 options as follow :

- IO=3F8h; IRQ=4;
- IO=2F8h; IRQ=3;
- IO=3E8h; IRQ=10;
- IO=2E8h; IRQ=11;
- IO=2F0h; IRQ=6;
- IO=2E0h; IRQ=7;

4.3.9 Serial Port 4 Configuration

Advanced → IT8783F Super IO Configuration → Serial Port **4**

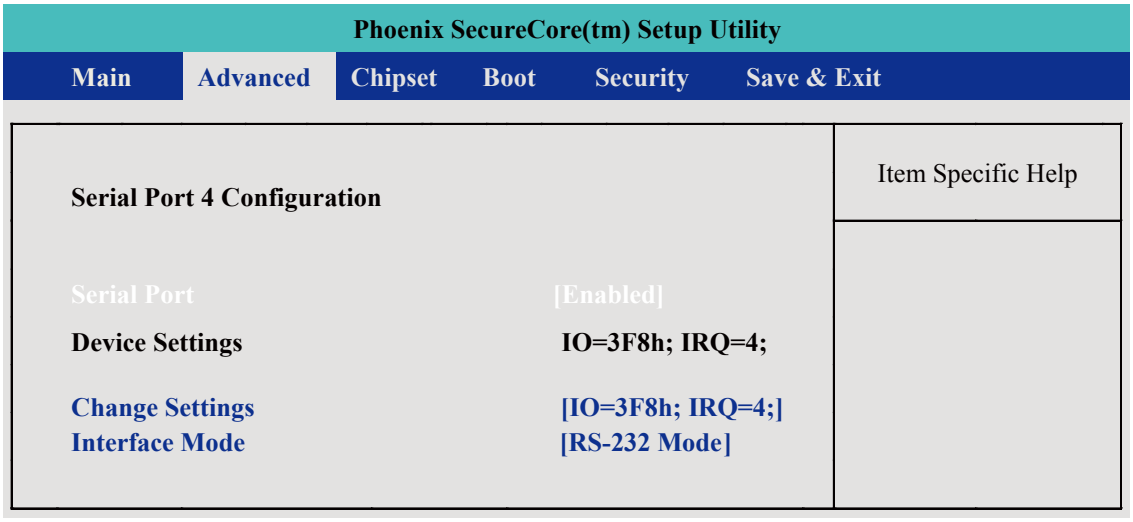


Figure 4-3-9 : Serial Port 4 Setup screen

Serial Port
Enable or Disable Serial Port.

Device Setting
Current IO address and interrupt resource of Serial Port.

Change Settings
Select another device setting.
There are 6 options as follow :

- IO=3F8h; IRQ=4;
- IO=2F8h; IRQ=3;
- IO=3E8h; IRQ=10;
- IO=2E8h; IRQ=11;
- IO=2F0h; IRQ=6;
- IO=2E0h; IRQ=7;

4.4 Chipset Function

4.4.1 WOL Configuration

Chipset → PCH IO Configuration → Wake on LAN

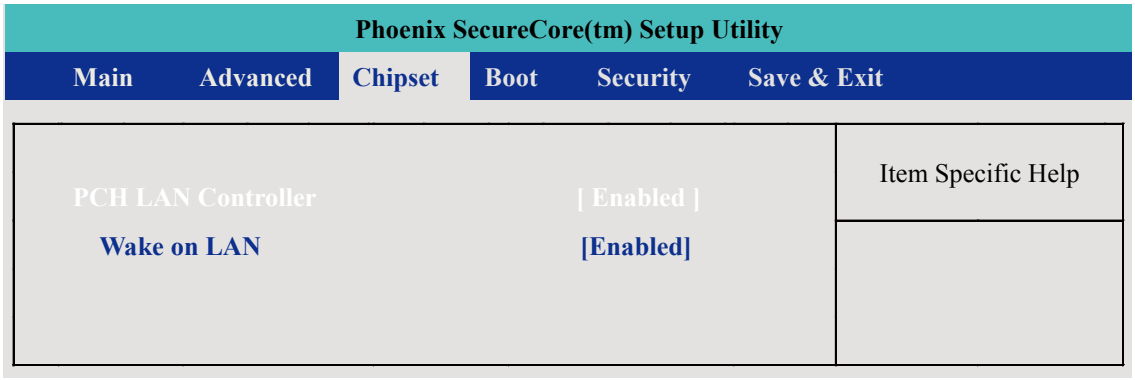


Figure 4-4-1 : Network Setup screen

PCH LAN Controller

Enable or Disable on board network device.

Wake on LAN

Enable or Disable integrated LAN to wake the system.
This function also can active by O.S.

4.4.2 Power Loss Configuration

Chipset → PCH IO Configuration → Restore AC Power Loss

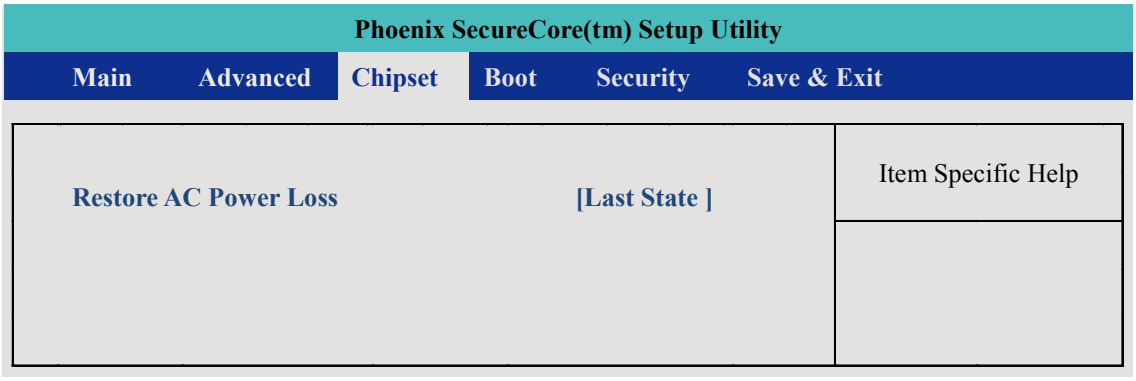


Figure 4-4-2 : Power Loss Setup screen

Restore AC Power Loss

[Power Off] : When plug-in the power source, system will keep on SB mode.
[Power On] : When plug-in the power source, system will auto booting .
[Last State] : When plug-in the power source, system will keep on last power status.

4.5 Boot Function

4.5.1 Boot Option

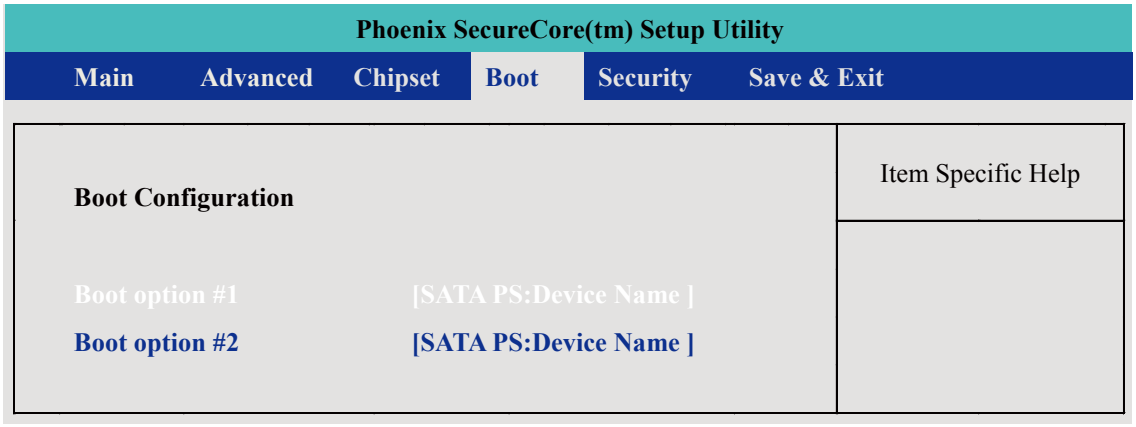


Figure 4-5-1 : Boot Setup screen

Boot option

When you press “Enter”, you can select which device you would like to boot.

A

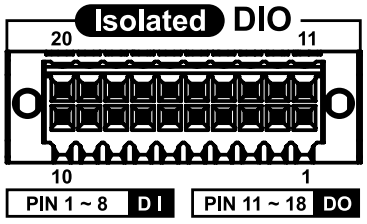
APPENDIX A : ISOLATED DIO GUIDE

A.1 IO Pin Definition

IO Pin	Base Adr	Usage
GPIO 10~17	0xA00	CN16-GPIO
GPIO 20~27	0xA01	DIO Output
GPIO 30~37	0xA02	----------
GPIO 40~47	0xA03	----------
GPIO 50~57	0xA04	DIO Input
GPIO 60~67	0xA05	CN16-GPIO

A.2 Function Description

The IVH-7000 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:

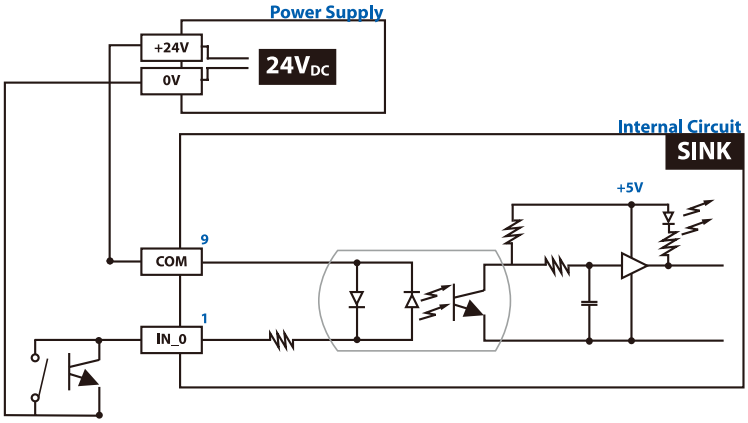


Pin No.	Definition	Description	Pin No.	Definition	Description
1	EXT_IN0	GPIO Input 0	11	EXT_OUT0	GPIO Output 0
2	EXT_IN1	GPIO Input 1	12	EXT_OUT1	GPIO Output 1
3	EXT_IN2	GPIO Input 2	13	EXT_OUT2	GPIO Output 2
4	EXT_IN3	GPIO Input 3	14	EXT_OUT3	GPIO Output 3
5	EXT_IN4	GPIO Input 4	15	EXT_OUT4	GPIO Output 4

6	EXT_IN5	GPIO Input 5	16	EXT_OUT5	GPIO Output 5
7	EXT_IN6	GPIO Input 6	17	EXT_OUT6	GPIO Output 6
8	EXT_IN7	GPIO Input 7	18	EXT_OUT7	GPIO Output 7
9	DI_COM	GPIO COM	19	Reserved	NC
10	EGND	GPIO GND	20	E24V	External 24V DC

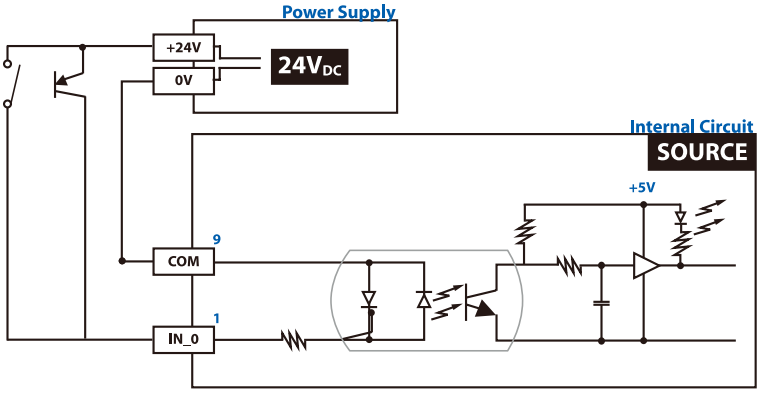
Signal Circuit of Input NPN

Digital GPIO input signal circuit in SINK mode (NPN) is illustrated as follow.



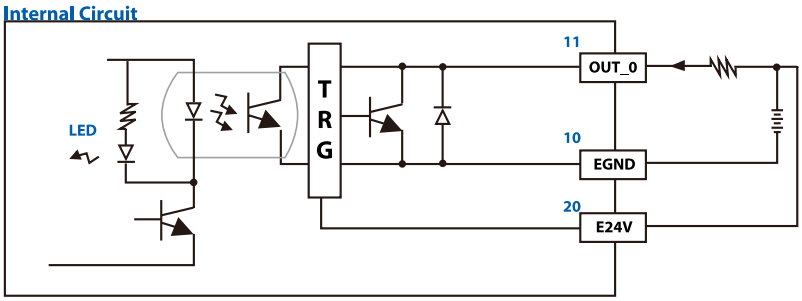
Signal Circuit of Input PNP

Digital GPIO input signal circuit in SOURCE mode (PNP) is illustrated as follow.



Signal Circuit of Output NPN

Digital GPIO output signal circuit in SINK mode (NPN) is illustrated as follow.



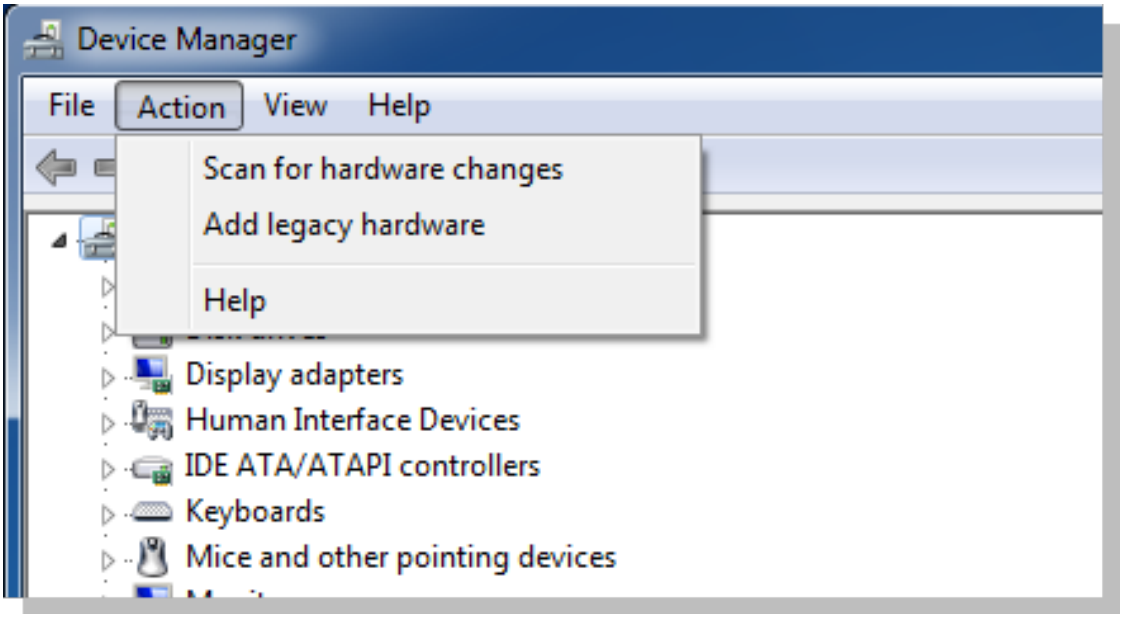
A.3 Software Package

There are 2 folders inside :
1. Driver Folder
2. DIO Demo Tool Folder

A.4 Driver Installing

Supports WinXP 32-bit and Windows 7 32-bit. Please do make sure your OS version before installing.

For WinXP : Please select “add new hardware” manually on Control panel
For Windows 7 : Please select “Add legacy hardware” on device management



B

APPENDIX B : GPIO and WDT Functions

B.1 Function Description

The WDT are using internal Super IO function. However, you must entry super I/O configuration mode to set it.

Super I/O special address port = 0x2E
Super I/O special data port = 0x2F
GPIO Logical device is 0x07

B.2 Entry Functions

1. Entry MB PnP Mode.

//write twice 0x87 value.
outportb(Super I/O special address port, 0x87);
outportb(Super I/O special address port, 0x01);
outportb(Super I/O special address port, 0x55);
outportb(Super I/O special address port, 0x55);

2. Located on Logical Device 7(LOGIC_DEVICE_WDT)

//write 0x07 on Reg [0x07] , this setup must follow Step A. that can be workable.
outportb(Super I/O special address port, 0x07);
outportb(Super I/O special data port, 0x07);

3. Config the WDT Register

outb(WDT_Config,SPECIAL_ADDRESS_PORT);
outb(WDT_As_Second|WDT_Pin_PWRGD,SPECIAL_DATA_PORT);

4. Start WDT TimeOut Value

Here have 2 Byte for WDT timing count, MSB and LSB should be write the value separate.

WDT_TimeOut_MSB,SPECIAL	***WDT_TimeOut_LSB,SPECIAL***

outb(WDT_TimeOut_LSB,SPECIAL_ADDRESS_PORT);
outb(WDT_TimeOutValue,SPECIAL_DATA_PORT);

APPENDIX C : Power Consumption

IVH-7700 Power Consumption Testing :

IVH-7700			
Storage-CFast	MRCAJ5B032GC2CAC00	Aux card 1	N/A
Storage-SATA 0	N/A	Aux card 2	N/A
Storage-SATA 1	N/A	Power Source	Chroma 62006P-100-25

Power Source :

CPU	DC-in	Standby Mode	
		Max Current	Max Consumption
i7-3610QE	12V	0.224A	02.69W
i7-3610QE	19V	0.156A	02.96W
i7-3610QE	24V	0.149A	03.58W
i7-3610QE	36V	0.123A	04.43W
i7-3610QE	48V	0.103A	04.94W
i7-3610QE	60V	0.092A	05.52W
i7-3610QE	78V	0.086A	06.71W

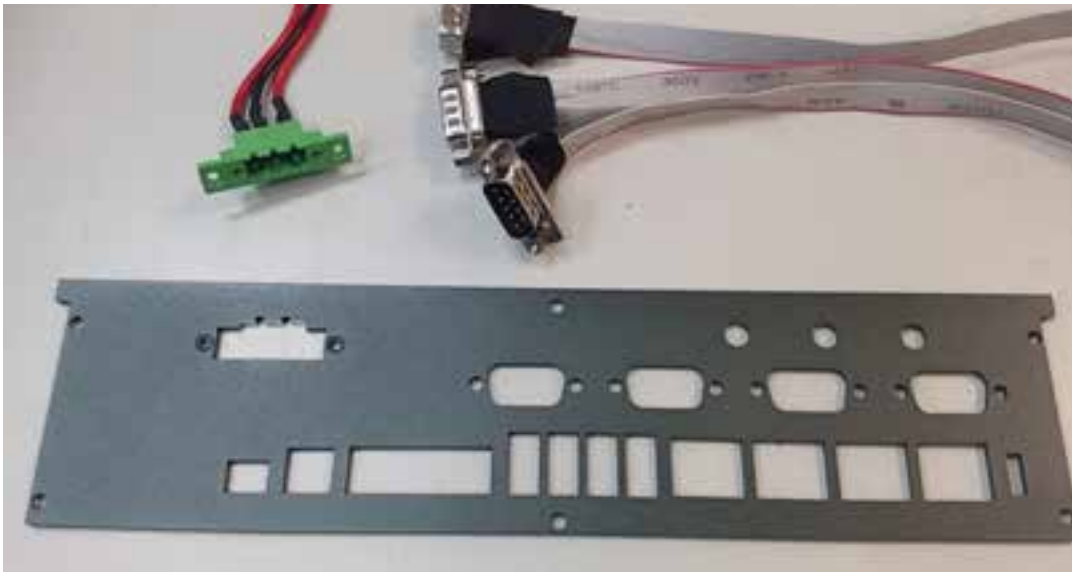
CPU	DC-in	Power-on and boot to Win7 64-bit			
		Idle Status : CPU usage less 3%		Run 100% CPU usage	
		Max Current	Max Consumption	Max Current	Max Consumption
i7-3610QE	12V	1.780A	21.36W	3.620A	43.44W
i7-3610QE	19V	1.091A	20.73W	2.260A	42.94W
i7-3610QE	24V	0.870A	20.88W	1.750A	42.00W
i7-3610QE	36V	0.622A	22.39W	1.220A	43.92W
i7-3610QE	48V	0.485A	23.28W	0.935A	44.88W
i7-3610QE	60V	0.407A	24.42W	0.750A	45.00W
i7-3610QE	78V	0.331A	25.82W	0.605A	47.19W

D

APPENDIX D : UPS Installation

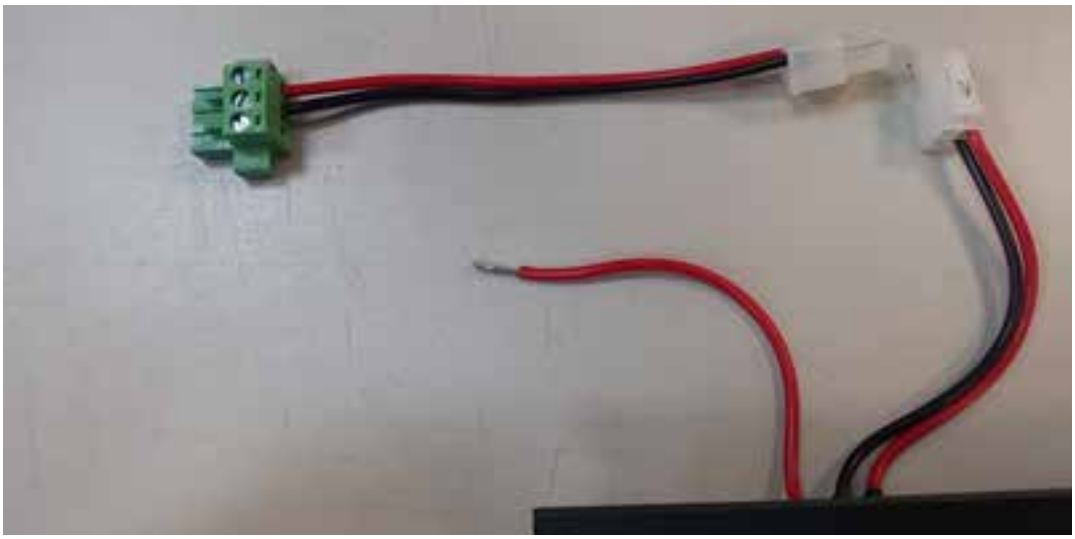
Please do refer to Chapter 3 for chassis assembly.

Step 1 You need 1pcs new Rear Panel, 1pcs new 3-pin terminal block and 4pcs DB9 cable from your IVH-7700.



Step 2 Fix the external connector of new terminal block on the IVH-7700 real panel with 2pcs F-M3x4 screws.

Step 3 Assemble the internal power connector and power cables.



Step 4 Fasten the screws to fix power cables on internal power connector.

Step 5 Plug the power connector into the power socket on IVH-7700 main board.

Step 6 Plug the internal power connector into the power socket.

Step 7 Plugged ready.

Step 8 Assemble and fix the rear panel with 5pcs KSH#6-32 screws (circled in red).

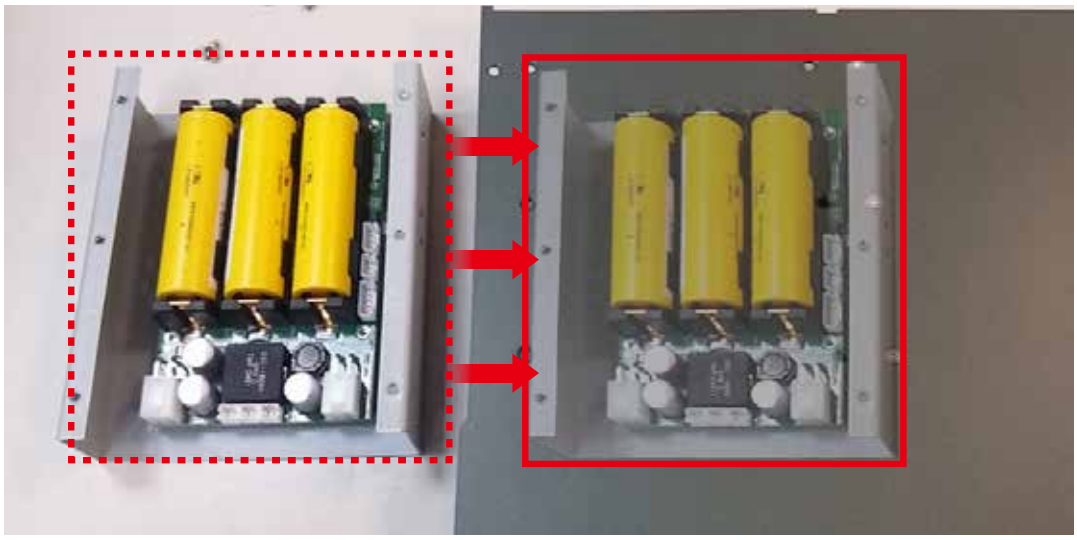
Step 9 Assemble 4pcs DB9 cables.

Step 10 You need a UPS Module and SSD/ HDD bracket of IVH-7700.

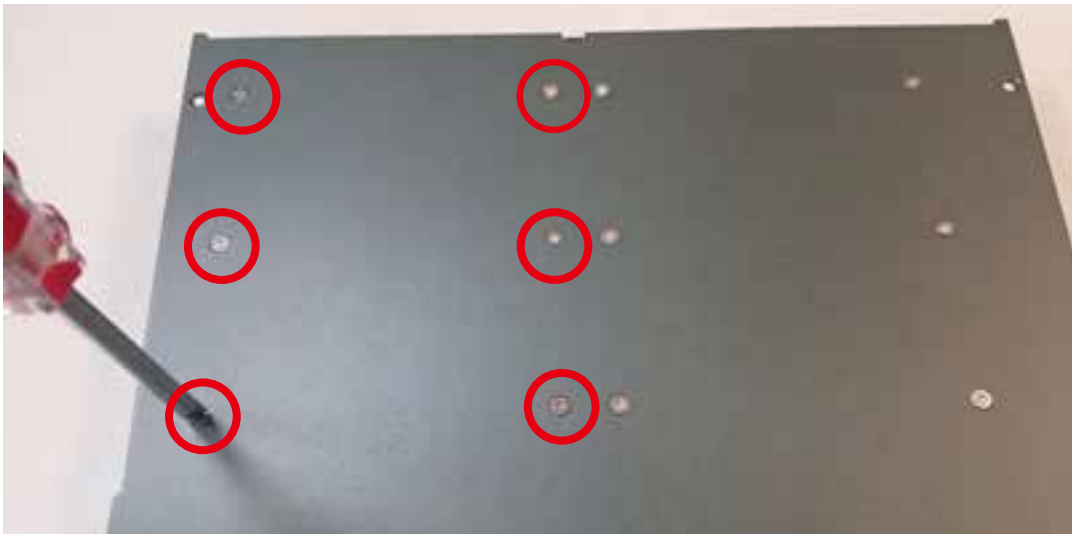
Step 11 Put the UPS Module into the bracket.

Step 12 Fix the UPS Module on the bracket with 4pcs screws.

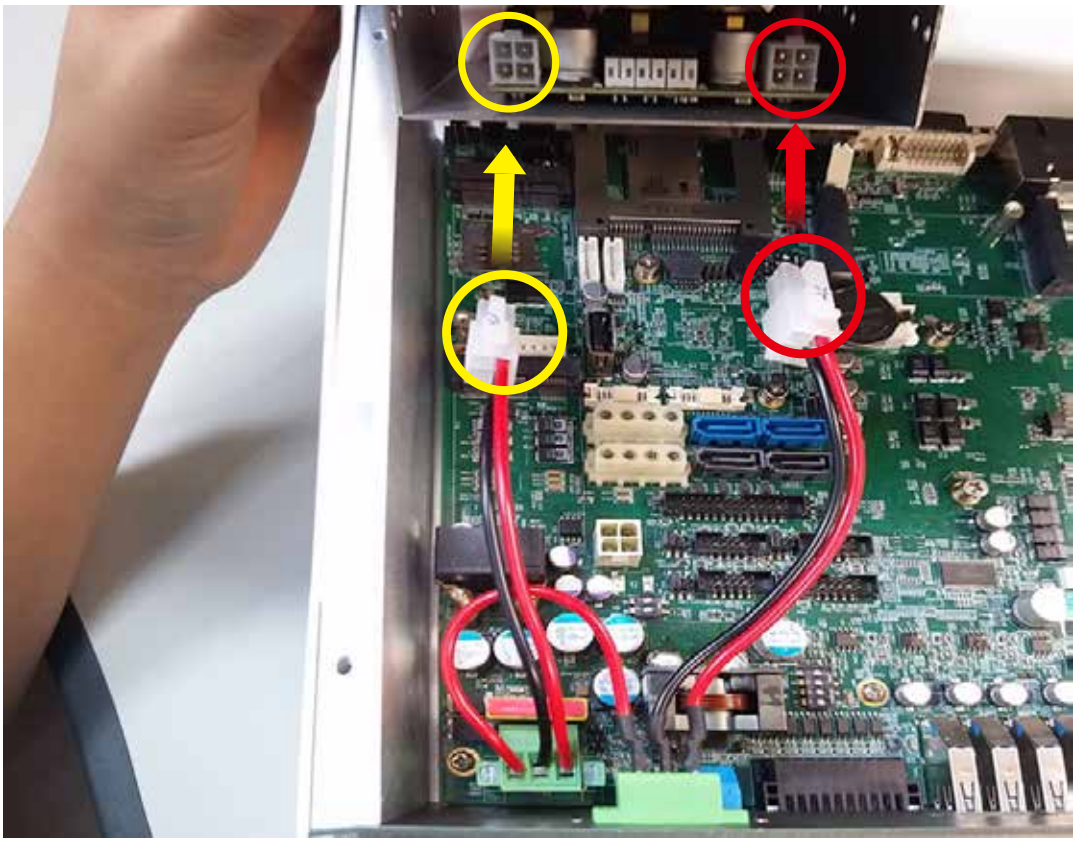
Step 13 Fix the UPS Module on the inner side of IVH-7700 Lower Cover.



Step 14 Fasten 6pcs F-MSx4 screws to fix the UPS Module with bracket.



Step 15 Plug-in the power cable from the main board power socket to UPS Power socket (Circled in Yellow). Plug-in the power cable from the terminal block on the rear panel to UPS Power socket (Circled in Red).



Step 16 Power cables plugged ready.

Step 17 Fasten 4pcs F-#6-32 screws to fix IVH-7700 Lower Cover.

Step 18 Fasten 1 pcs KSH-#6-32 screw to fix IVH-7700 rear panel.

Step 19 Fasten 6 pcs KSH-#6-32 screws to fix IVH-7700 front panel.

Step 20 Do remember to fasten 2 pcs #4-40 screws on the front panel to fix DVI-D connector.

Note:
The external power input goes to UPS, and the UPS provides power to IVH-7700. When Internal UPS is installed, please ensure appropriate voltage/polarity power input to UPS.

APPENDIX E : Ignition Control

Power-on Delay

```
case 1:Count=5;break;          //5Sec
case 2:Count=10;break;         //10Sec
case 3:Count=15;break;         //15Sec
case 4:Count=20;break;         //20Sec
case 5:Count=25;break;         //25Sec
case 6:Count=30;break;         //30Sec
case 7:Count=40;break;         //40Sec
case 8:Count=50;break;         //50Sec
case 9:Count=60;break;         //60Sec
case 10:Count=300;break;       //5min
case 11:Count=600;break;       //10min
case 12:Count=900;break;       //15min
case 13:Count=1200;break;      //20min
case 14:Count=1800;break;      //30min
case 15:Count=3600;break;      //1hr
```

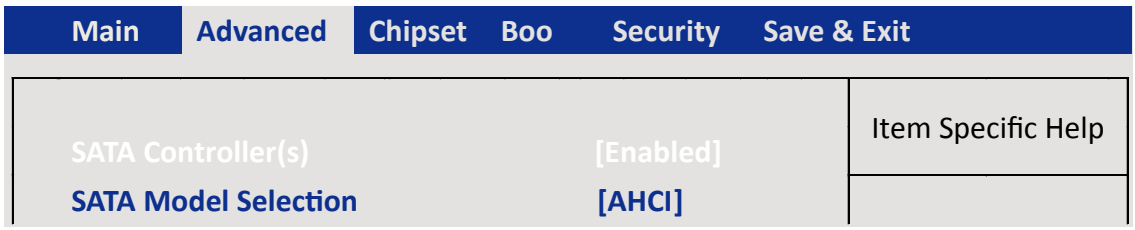
Power-off Delay

```
case 1:Count=20;               //20sec
case 2:Count_1=1;break;        //1min
case 3:Count_1=5;break;        //5min
case 4:Count_1=10;break;       //10min
case 5:Count_1=20;break;       //20min
case 6:Count_1=30;break;       //30min
case 7:Count_1=50;break;       //50min
case 8:Count_1=1;              //1Hr
case 9:Count_1=2;              //2Hr
case 10:Count_1=3;             //3Hr
case 11:Count_1=6;             //6Hr
case 12:Count_1=9;             //9Hr
case 13:Count_1=12;            //12Hr
case 14:Count_1=15;            //15Hr
case 15:Count_1=18;            //18Hr
```

APPENDIX F : RAID Installation Guide

F.1 SATA Mode for RAID

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



F.2 OS Installation

IVH-7700 is featured with 6 SATA, include 4 internal SATA, 1 mSATA and 1 CFast.

You can select one of SATA port for OS installation
We use CFast card for Windows 7 OS installation as an example.

F.3 To Install All Device Drivers of IVH-7700 System

Please follow installation sequences :

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

F.4 To Install "Intel Rapid Storage Technology" Software

You can get the software on IVH-7700 driver CD.
Also, you can find latest information and 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.

F.5 To Insert SATA HDD for RAID 1

Please notice, you can use 5 SATA ports for SATA HDD, except the CFast port.

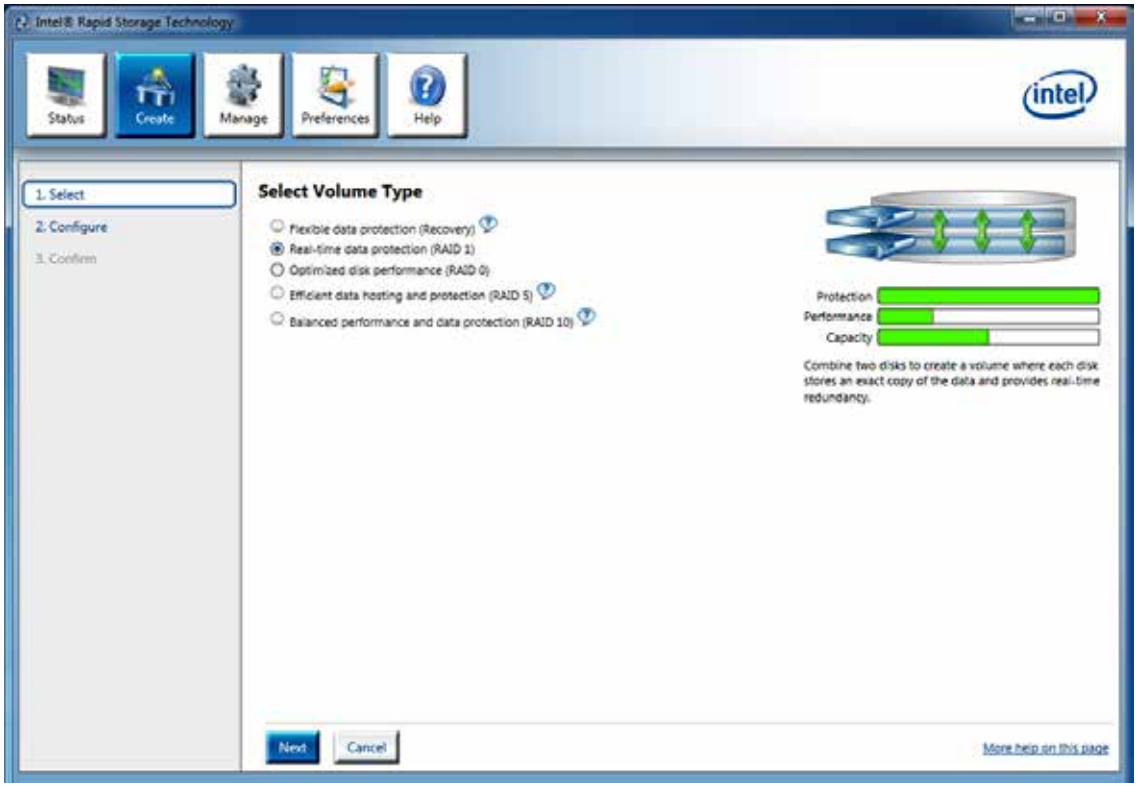
F.6 To Enable "Hot Plug" Function

Please enable 'Hot Plug' for Hard Disk or RAID volume.

Hot Plug	**[Enabled]**	

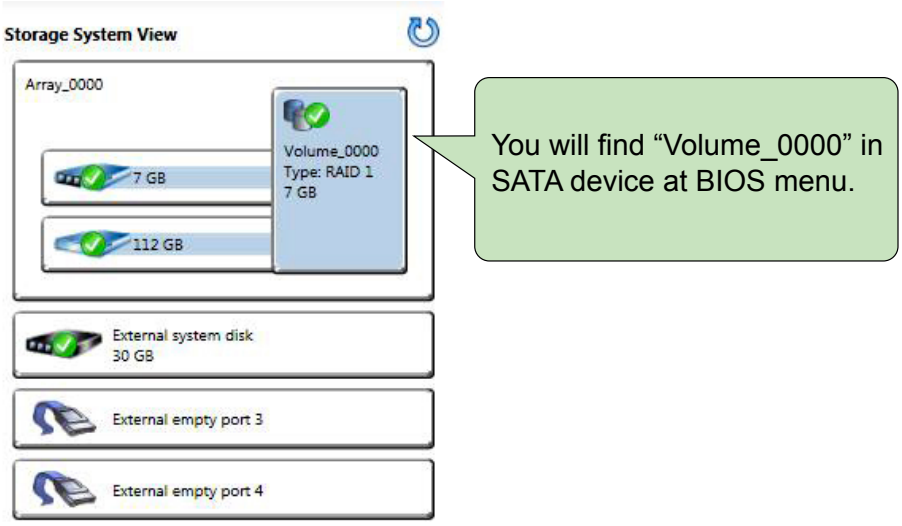
F.7 To Create RAID Volume on "Rapid Storage Technology" Software

IVH-7700 is featured with 4 SATA HDDs for RAID volume, so there are three options for choose on this page. Let's take RAID 1 as example, please select "RAID 1".



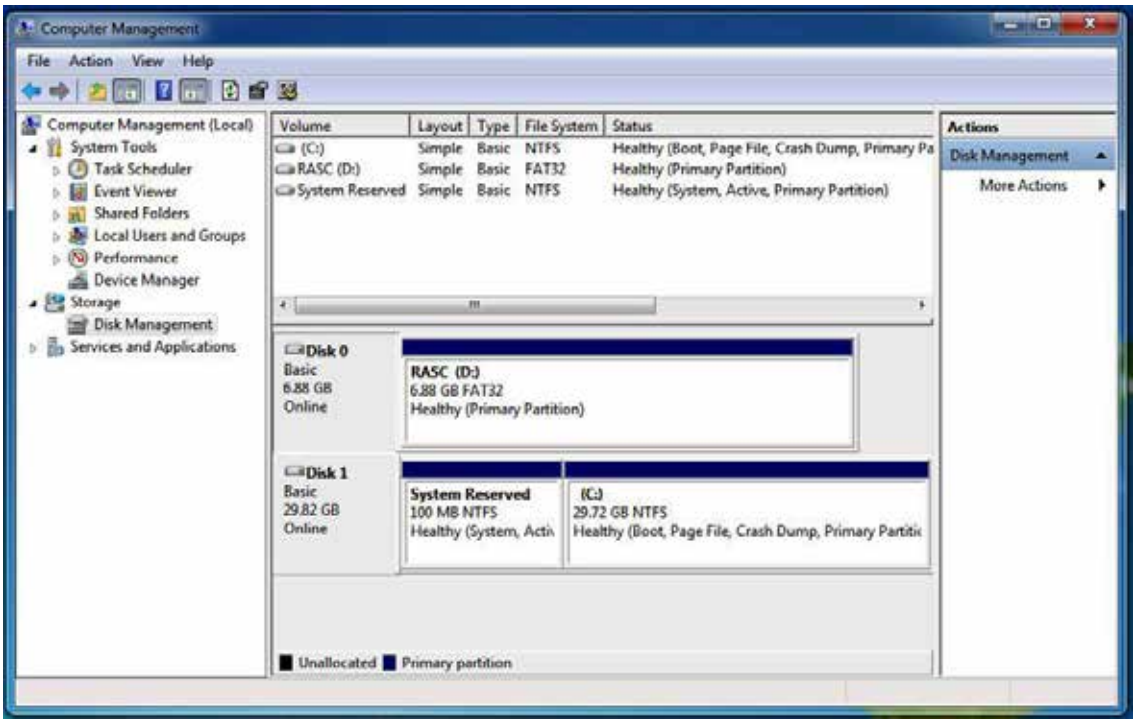
F.8 Disk Management : Partition the Disk

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



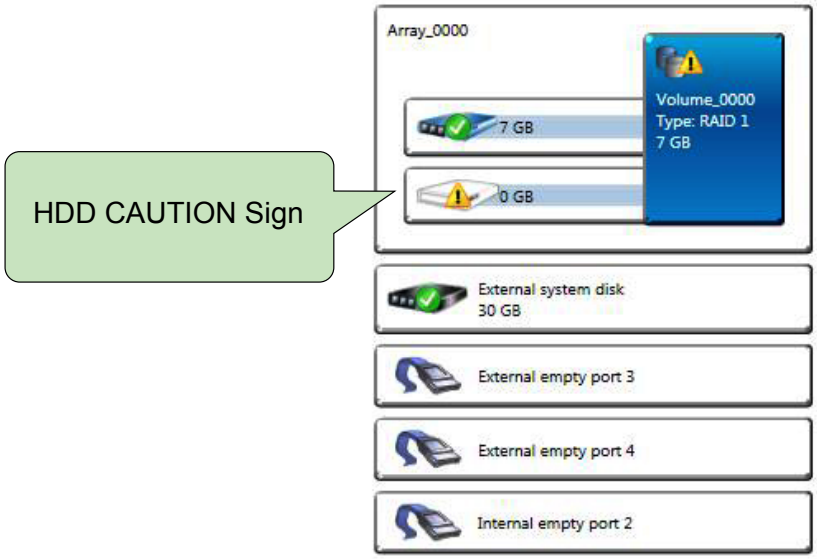
To start Disk Management tool and select “Initialize Disk”.

Then add “Logical Device” for Windows access.

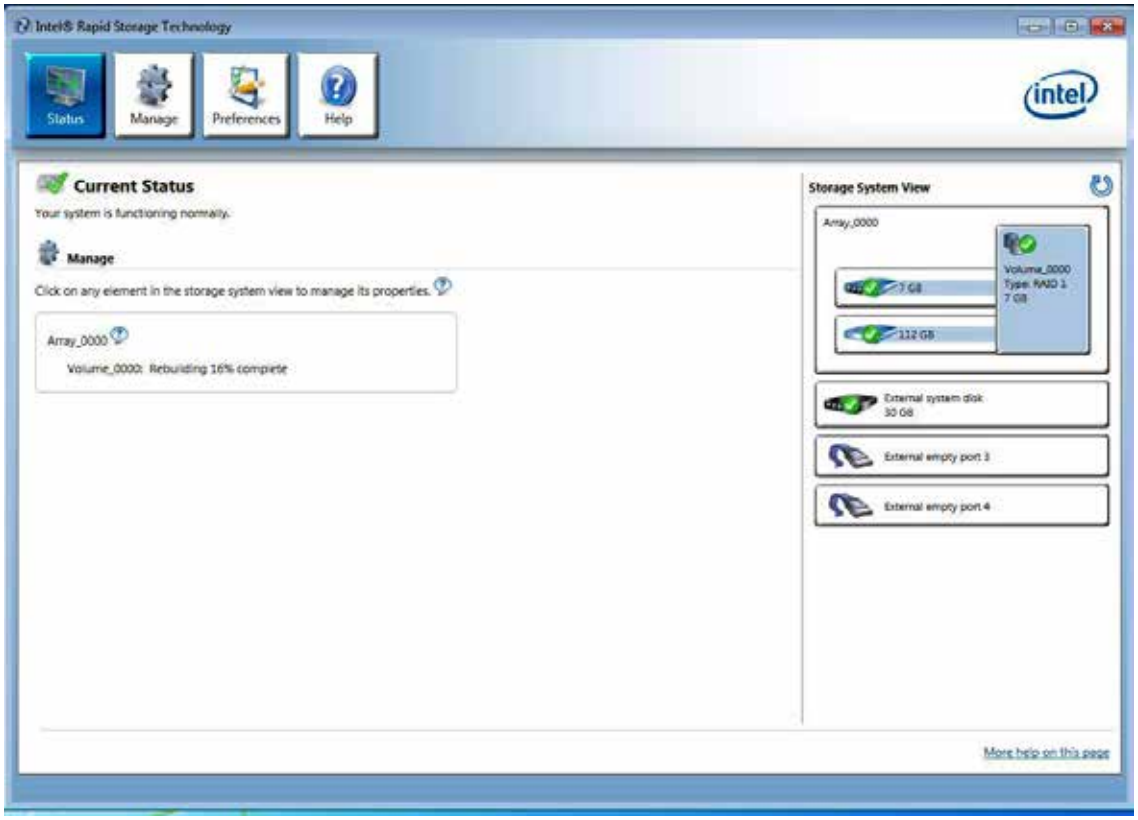


F.9 If One SATA HDD on RAID Volume is Out-of-use

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



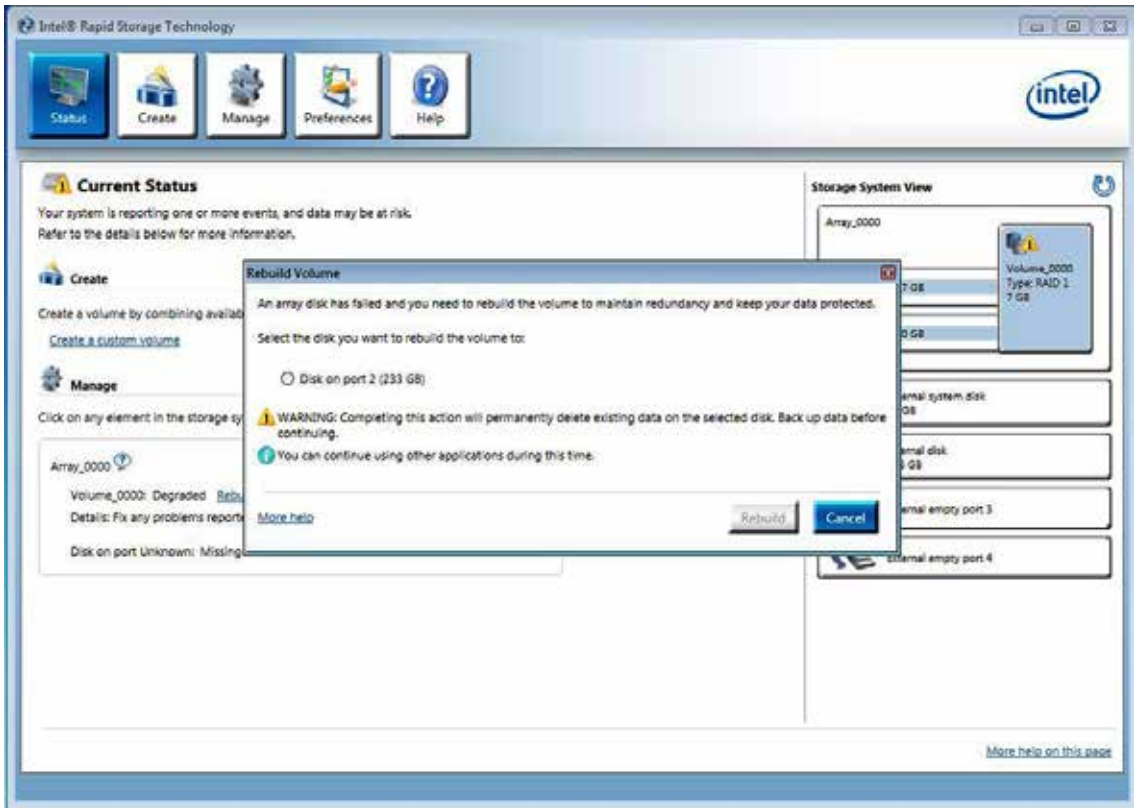
F.10 Recovery and Auto Re-build When Use the SAME RAID HDD



F.11 Recovery and Auto Re-build When Use DIFFERENT RAID HDD

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

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



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