IPC950

Industrial Computers

User's Manual

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Safety Precautions

Before getting started, please read the following important safety precautions.

1. The IPC950 does not come equipped with an operating system. An operating system must be loaded first before installing any software into the computer.

2. Be sure to ground yourself to prevent static charge when installing the internal components. Use a grounding wrist strap and place all electronic components in any static-shielded devices. Most electronic components are sensitive to static electrical charge.

3. Disconnect the power cord from the IPC950 before making any installation. Be sure both the system and the external devices are turned OFF. Sudden surge of power could ruin sensitive components. Make sure the IPC950 is properly grounded.

4. Make sure the voltage of the power source is correct before connecting the equipment to the power outlet.

5. Turn OFF the system power before cleaning. Clean the system using a cloth only. Do not spray any liquid cleaner directly onto the screen.

6. Do not leave this equipment in an uncontrolled environment where the storage temperature is below -20℃ or above 80℃. It may damage the equipment.

7. Do not open the system's back cover. If opening the cover for maintenance is a must, only a trained technician is allowed to do so. Integrated circuits on computer boards are sensitive to static electricity. To avoid damaging chips from electrostatic discharge, observe the following precautions:

   ■ Before handling a board or integrated circuit, touch an unpainted portion of the system unit chassis for a few seconds. This will help to discharge any static electricity on your body.

   ■ When handling boards and components, wear a grounding wrist strap, available from most electronic component stores.

Classification

1. Degree of production against electric shock: not classified

2. Degree of protection against the ingress of water: none

3. Equipment not suitable for use in the presence of a flammable anesthetic mixture with air or with oxygen or nitrous oxide.

4. Mode of operation: Continuous

5. Type of protection against electric shock: Class I equipment

General Cleaning Tips

You may need the following precautions before you begin to clean the computer. When you clean any single part or component for the computer, please read and understand the details below fully.

When you need to clean the device, please rub it with a piece of dry cloth.

1. Be cautious of the tiny removable components when you use a vacuum cleaner to absorb the dirt on the floor.

2. Turn the system off before you start to clean up the component or computer.

3. Never drop the components inside the computer or get circuit board damp or wet.

4. Be cautious of all kinds of cleaning solvents or chemicals when you use them for the sake of cleaning. Some individuals may be allergic to the ingredients.

5. Try not to put any food, drink or cigarette around the computer.

Cleaning Tools:

Although many companies have created products to help improve the process of cleaning your computer and peripherals, users can also use household items to clean their computers and peripherals. Below is a listing of items you may need or want to use while cleaning your computer or computer peripherals.

Keep in mind that some components in your computer may require designated products for cleaning. If this is the case it will be mentioned in the cleaning instructions.

- Cloth: A piece of cloth is the best tool to use when rubbing up a component. Although paper towels or tissues can be used on most hardware as well, we still recommend rubbing it with a piece of cloth.

- Water or rubbing alcohol: You may moisten a piece of cloth a bit with some water or rubbing alcohol and rub it on the computer. Unknown solvents may be harmful to the plastics parts.

- Vacuum cleaner: Vacuuming the dust, dirt, hair, cigarette particles, and other particles out of a computer can be one of the best methods of cleaning a computer. Over time these items can restrict the airflow in a computer and cause circuitry to corrode.

- Cotton swabs: Cotton swabs moistened with rubbing alcohol or water are excellent tools for wiping hard to reach areas in your keyboard, mouse, and other locations.

- Foam swabs: Whenever possible it is better to use lint free swabs such as foam swabs.

Note: Shut down the system before you start to clean any single components.

Note: Please check the temperature of the system surface before maintenance.

Please follow the steps below:

1. Close all application programs;
2. Close operating software;
3. Turn off power switch;
4. Remove all devices;
5. Pull out the power cable.

Scrap Computer Recycling

Please inform the nearest Axiomtek distributor as soon as possible for suitable solutions in case computers require maintenance or repair; or for recycling in case computers are out of order or are no longer in use.

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SECTION 1
INTRODUCTION

This chapter contains general information and detailed specifications of the IPC950. Section 1 includes the following sections:

- General Description
- System Specifications
- Dimensions
- I/O Outlets
- Jumper Settings
- Connectors
- Package List

1.1   General Description

The IPC950 is a fanless system that supports Intel® 11th generation Core™ i7-1185G7E, i5-1145G7E, i3-1115G4E & Celeron® 6305E processors. The IPC950 is also built with a rugged design that makes the system suitable for the most endurable operation.

The operating systems supported by the IPC950 include Windows® 10, Ubuntu, and embedded OS.

1.2 System Specifications

1.2.1 Main CPU Board

● **CPU**

  ■ Intel® Tiger Lake U processor (15W) - i7-1185G7E, i5-1145G7E, i3-1115G4E & Celeron® 6305E

● **BIOS**

  ■ AMI BIOS

● **System Memory**

  ■ Two DR4-3200 un-buffered SO-DIMM max. up to 64GB

● **System Certification**

  ■ CE/FCC

● **Features**

  ■ Compact front IO design

  ■ Supports an optional PCIe expansion slot

  ■ DC to DC power supply with 24VDC (uMin=19V/uMax=30V) support

  ■ Supports one 2.5G LAN with TSN

  ■ Supports TPM2.0

  ■ Supports iAMT

  ■ Supports DIN rail, bookshelf and wall mount

1.2.2 System I/O

● **Standard I/O Interface -- Front**

  ■ One ATX power on/off switch

  ■ One ATX/AT mode switch

  ■ One 2-pin connector output for remote power on/off switch

  ■ DC to DC power supply, which supports 24VDC (uMin=19V/uMax=30V) with a phoenix power plug

  ■ Four USB 3.2 Gen.2 ports

✑ *Note: IPC950 supports an internal USB2.0 with 180D type A connector for the license key, up to 20mm)*

  ■ One HDD/SSD access LED

    ➢ Flashes green to indicate storage activity

  ■ One CPU status LED

    ➢ Flashes orange to warn abnormal CPU temperature
    ➢ Solid red shows DTS temp over spec. (Requires removal of DC input power to reset / clear)

  ■ One Power LED

    ➢ Solid green indicates device is on

  ■ One Programmable (GPIO) LED

> ➢ GPIO Controllable Green LED (controllable custom status)

- ■ Two LAN with Intel® PHY I211-AT LAN controller

- ■ One LAN with Intel® PHY I225-LM LAN controller

- ■ Extension system I/O module:

    ➢ AX93511 4 x RS-232/422/485 module (default RS-232)

    ➢ AX93512 2 x RS-232/422/485 w/ isolated 1.5KVDC protection and 8-in/8-out isolated 1.5KVDC DIO

    ➢ AX93516 4 x RS232/422/485 w/ isolated 2KVDC module

    ➢ AX93519 2 x RS232/422/485 + 10/100/1000 Mbps ethernet (i211AT) + 2 USB 2.0

Note: The RS-485 auto flow control only supports below formats to communicate data:

> 8 data bits + 1 stop bit
>
> 8 data bits + 1 parity bit + 1 stop bit
>
> 8 data bits + 1 parity bit + 2 stop bits
>
> 8 data bits + 2 stop bits
>
> 7 data bits + 1 parity bit (even or odd) + 2 stop bits

- ■ Two DP++ 1.2 4K support resolution up to 4096*2160 @60Hz

- ■ One Audio (Line-out)

● **Expansion Interface**

- ■ Mini Card slot w/ SIM slot

    One on board full-size PCI Express Mini Card slot with PCIe & USB interface w/ SIM slot

- ■ M.2 Key E socket

    One on board M.2 2230 E Key socket

- ■ PCIe x4 slot (optional)

    One optional PCIe x4 slot for Axiomtek I/O card

    ➢ AX92320 2/4-port GigE PoE LAN PCI Express Card

    Power from PCIe Slot max. 20W PoE power output

    Power from ATX connector max. 100W PoE power output

    ➢ AX92321 4-port/8-port USB 3.0 PCI Express Card with 4 Independent Host Controllers

    ➢ AX92322 2-port/4-port GbE LAN PCI Express Card

Note: The maximum power rating for expansion slots at 50℃ cannot exceed the following value:

The maximum loading of +3.3V+5V+12V<125W

Note: 12V maximum loading is 10A(100W).

Note: The system power rating may thus be changed based on differing

combinations of attached devices.

- Drive Capacity
  - One 2.5" HDD driver bay (SSD/HDD 7 or 9.5 mm height)
  - One M.2 2280 Key B+M socket (SATA signal)
- **Power Input**
  - 24VDC (uMin=19V/uMax=30V) with phoenix power plug

Note: Please maintain the system power input in 24VDC when plugging an add-on card.

- **Operating Temperature**
  - -10℃-50℃ w/ W.T. HDD/SSD

Note: The performance of the system might be adversely affected when it is operating at a temperature above the system's limitation or with an unrecommended processor.

Note: If the operating temperature is above 35℃, it is recommended to use a wide temperature SSD on the device.

- **Storage Temperature**
  - -20℃ ~ 80℃
- **Humidity**
  - 10% ~ 90% (Non-condensing)
- **Dimensions**

  IPC950
  - 69.5 mm (2.73") (W) x 225 mm (8.85") (H) x 230 mm (9") (D)

  IPC950 w/ 1 PCIe x4 expansion kit
  - 108.5 mm (4.27") (W) x 225 mm (8.85") (H) x 230 mm (9") (D)

Note: All specifications and images are subject to change without notice.

1.3   Dimensions

The following diagrams show you the dimensions and outlines of the IPC950.

IPC950
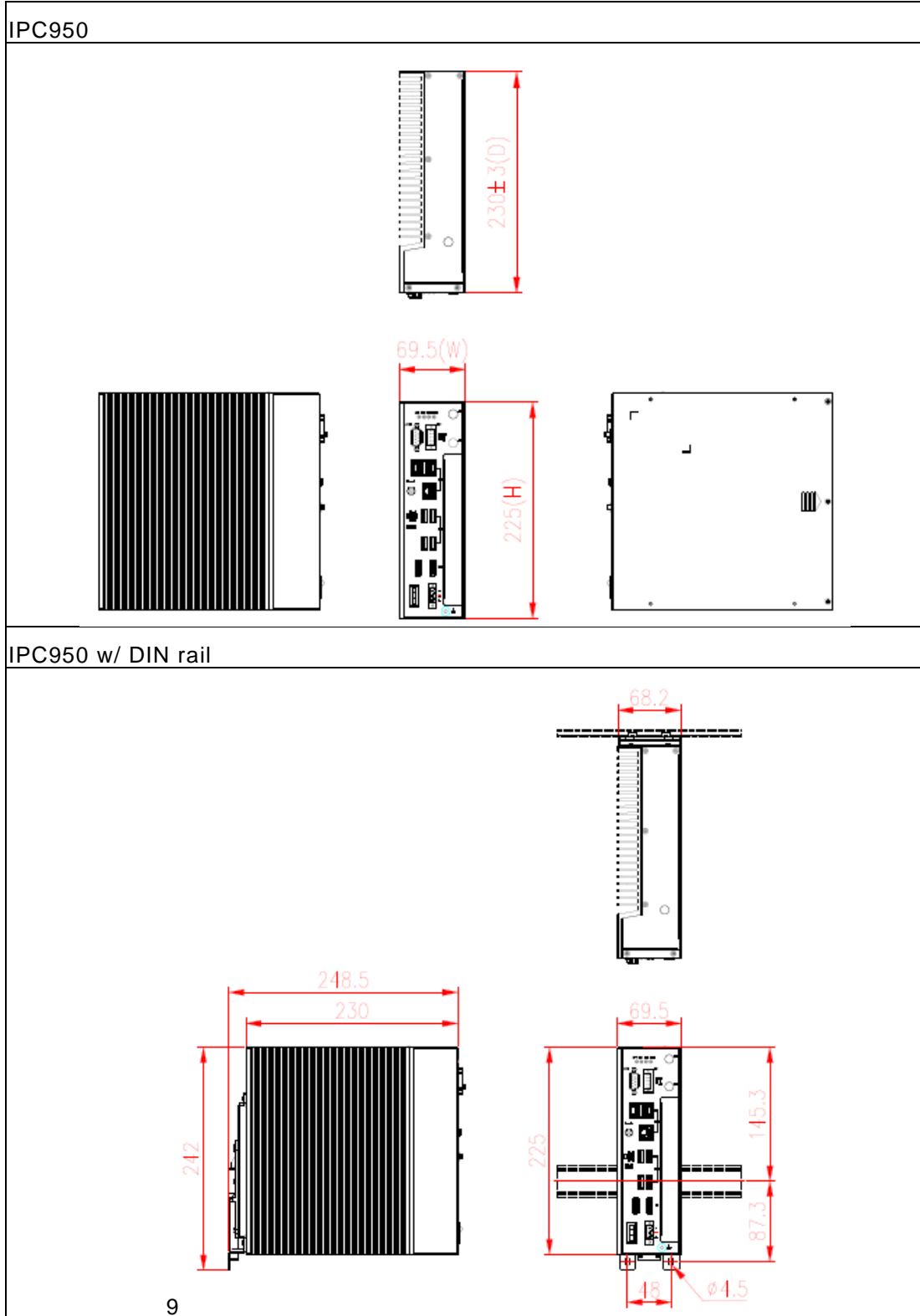
IPC950 w/ DIN rail

IPC950 w/ bookshelf
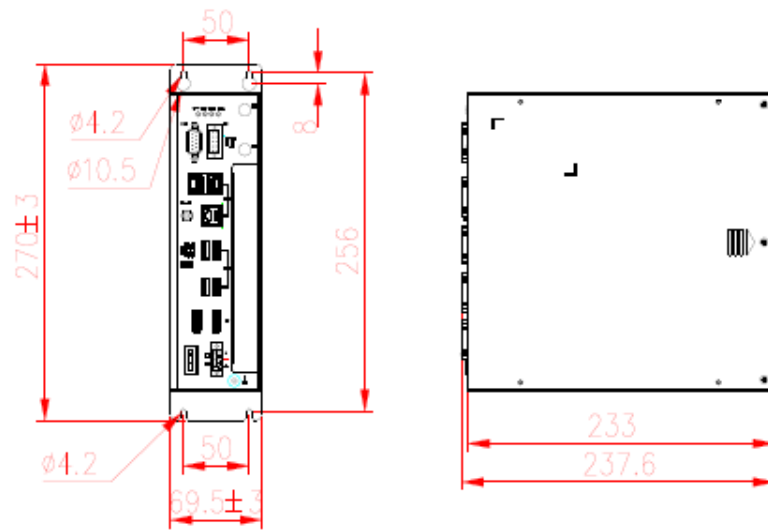
IPC950 w/ wall mount
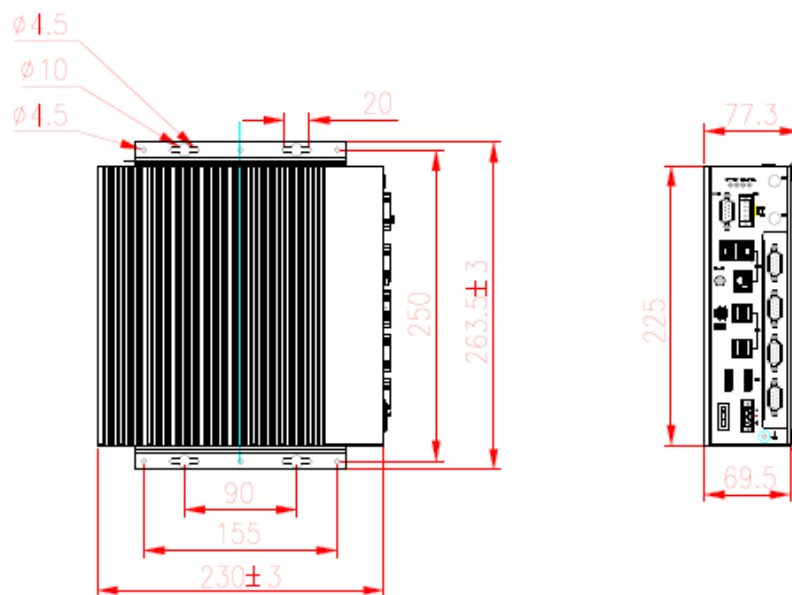
IPC950 w/ 1 PCIe x4 expansion kit
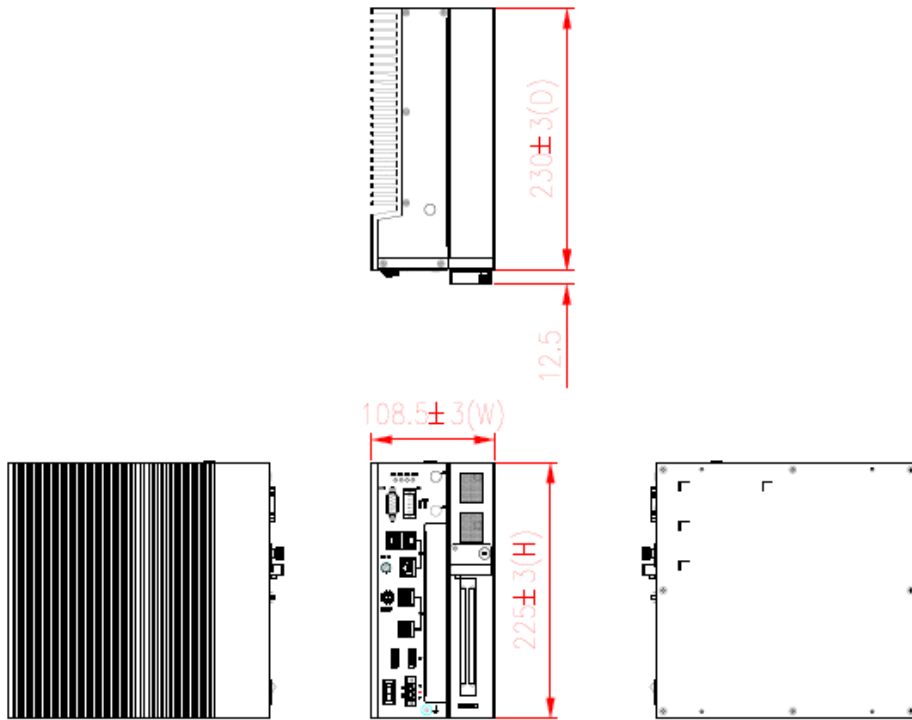
IPC950 w/ 1 PCIe x4 expansion kit and DIN rail
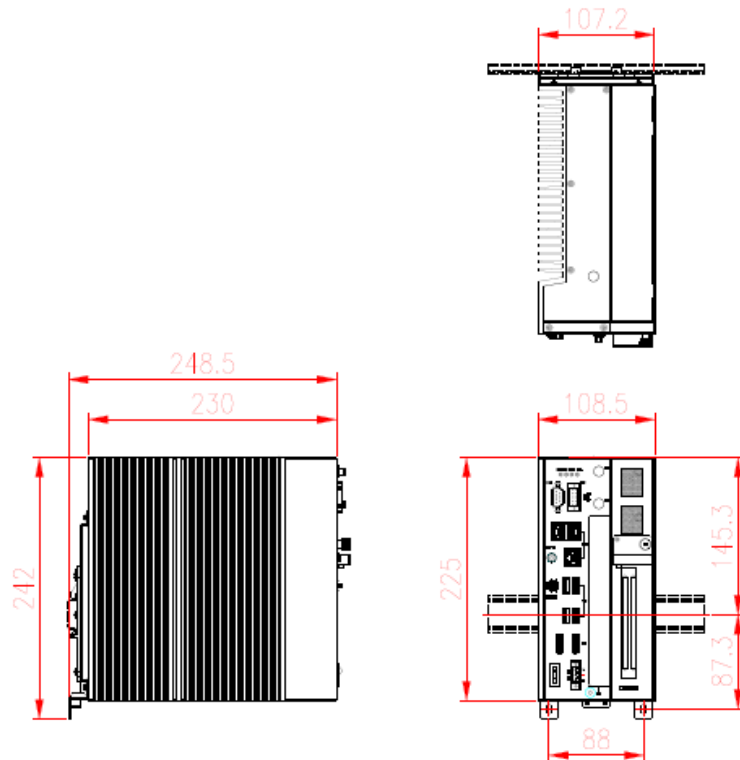
IPC950 w/ 1 PCIe x4 expansion kit and bookshelf
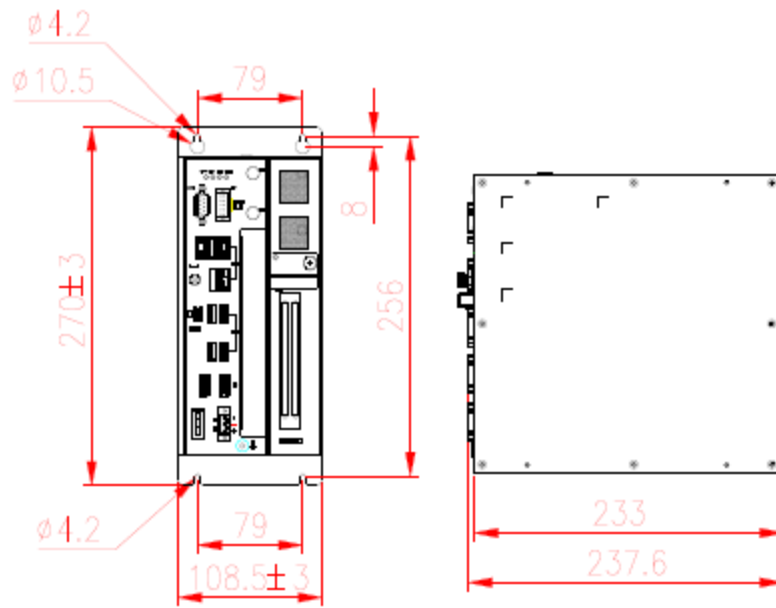
IPC950 w/ 1 PCIe x4 expansion kit and wall mount
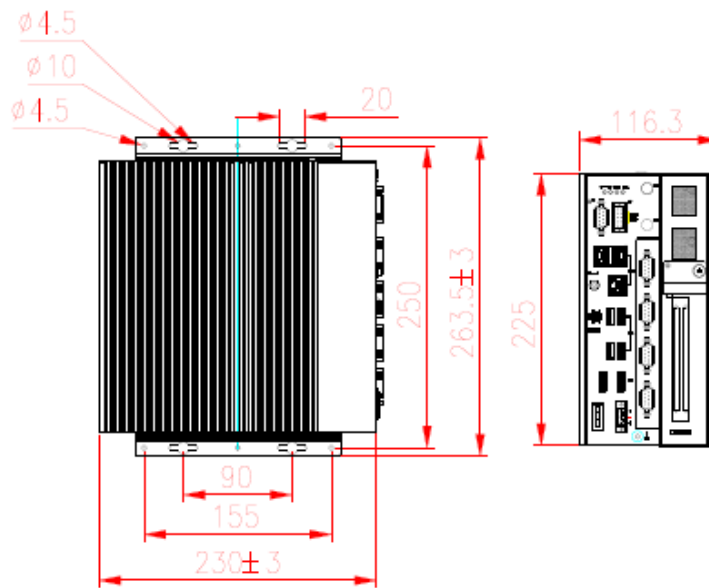
1.4   I/O Outlets

The following figures show the locations of the IPC950 series I/O outlets.

▲ Front Side of IPC950   ▲ IPC950 with 1 PCIe x4 slot
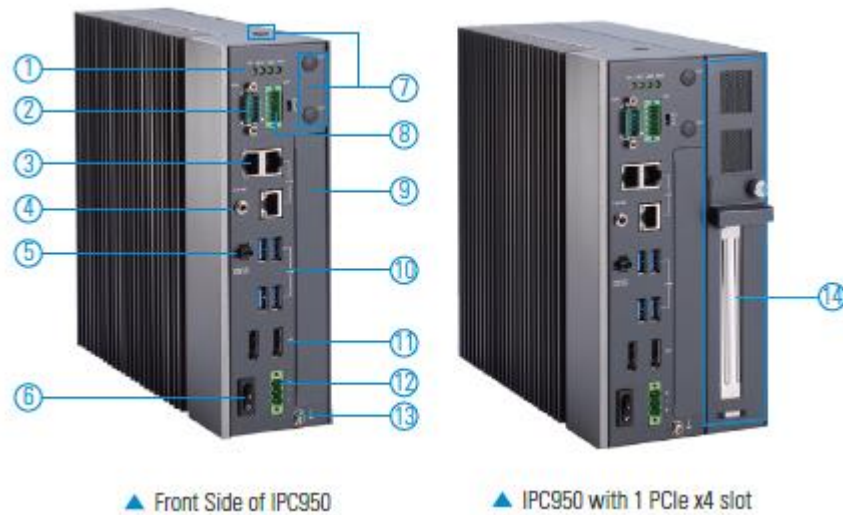
Mark	Description
1	4 x LED
2	1 x RS-232/422/485 (default RS-232)
3	3 x LAN
4	1 x Line out
5	1 x Remote power switch
6	1 x Switch for power on/off
7	3 x Antenna opening
8	8CH DIO
9	Flexible system I/O window
10	4 x USB3.2 Gen.2 (10G)
11	2 x DP++
12	1 x 3-pin terminal block
13	1 x Ground terminal
14	1 x PCIe x4 slot (optional)

1.5 Packing List

The package bundled with your IPC950 should contain the following items:

- IPC950 unit x 1

- Screw pack x 1

- Terminal block x 1

- Remote power switch cable x 1

- Antenna plastic isolated washer x 3

If you cannot find this package or any items are missing, please contact Axiomtek distributors immediately.

1.6 System Block Diagram

The following figure shows you the system diagram.
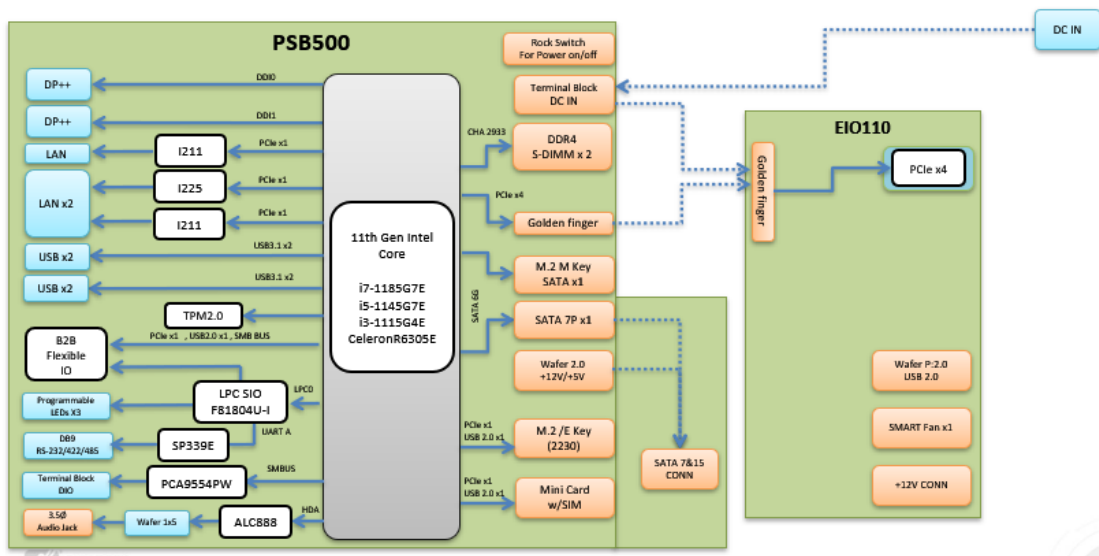
1.7 Jumper Setting Summary

Proper jumper settings configure the IPC950 to meet your application purpose. We are herewith listing a summary table of all jumpers and default settings for onboard devices, respectively.

Jumper	Function/Default Setting	Jumper Setting
JP4	Restore BIOS Optimal Defaults Default: Normal Operation	Short 1-2

Note: How to setup Jumpers

The illustration shows how to set up jumpers. When the jumper cap is placed on pins, the jumper is "closed", if not, that means the jumper is "open".

[Open]　　　　　　[Closed]　　　　　[Pin1-2 Closed]
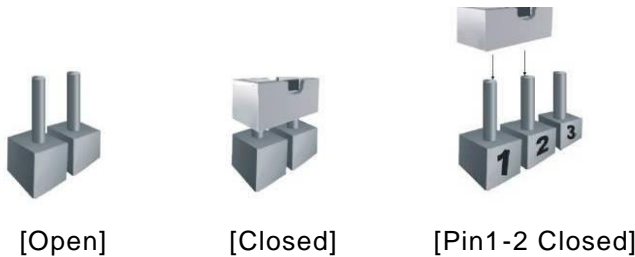
1.7.1 Restore BIOS Optimal Defaults (JP4)

Put the jumper clip on pin 2-3 for a few seconds then move it back to pin 1-2. Doing this procedure can restore BIOS optimal defaults.

Function	Setting
Normal (Default)	1-2
Clear RTC	2-3
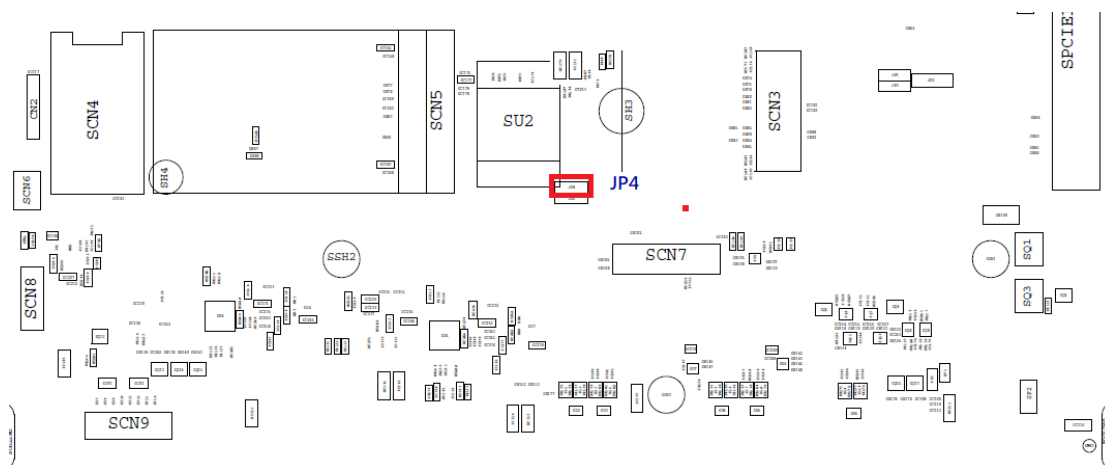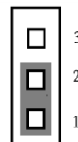
1.8   Connectors

Connectors connect the board with other parts of the system. Loose or improper connection might cause problems. Make sure all connectors are properly and firmly connected. Here is a table summarizing all connectors and buttons on the **IPC950** series.

External Connectors	Section
DC-in Phoenix Power Connector	3.3.1
DisplayPort Connector	3.3.3
Serial Port Connector	3.3.4
USB 3.0 Connector	3.3.5
Ethernet Connector	3.3.6
Audio Connector	3.3.7
ATX Power On/Off Button	3.3.8
Remote Power Switch Connector	3.3.9
AT/ATX Switch	3.3.10
Digital I/O	3.3.11
Front Panel Connector	3.3.12
Internal Connectors	**Section**
Serial ATA (SATA) Connector	3.3.13
SATA Power Connector	3.3.14
SIM Card Slot	3.3.15
Full-Size Express Mini Card slot	3.3.16
USB 2.0 Connector	3.3.17
M.2 M key Connector (2280)	3.3.18
M.2 E key Connector (2242)	3.3.19

1.8.1 DC-in Phoenix Power Connector

The system supports a 9~36V Phoenix DC-in connector (CN8) for system power input.

Pin	Signal
1	DC +
2	DC -
3	Chassis gnd
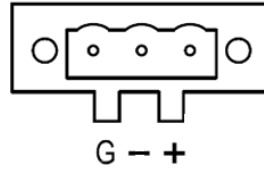
1.8.2 DisplayPort Connector

The IPC950 supports two dual-mode DP interfaces (DP1), which support DP resolution up to 4096x2304 @ 60Hz.

Pin	Signal	Pin	Signal
1	DPB_LANE0	11	GND
2	GND	12	DPB_LANE3#
3	DPB_LANE0#	13	Detect Pin
4	DPB_LANE1	14	GND
5	GND	15	DPB_AUX
6	DPB_LANE1#	16	GND
7	DPB_LANE2	17	DPB_AUX#
8	GND	18	DPB_HPDE
9	DPB_LANE2#	19	GND
10	DPB_LANE3	20	+3.3V
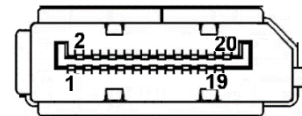
1.8.3 Serial Port Connector

The system has one 9-pin D-sub connector, which supports RS-232/422/485. The default setting is RS-232, and it can be configured to RS422 or RS485 via BIOS settings. Please refer to Section 3 for detailed BIOS settings.

※**COM1**

Pin	RS-232	RS-422	RS-485
1	DCD, Data Carrier Detect	TX-	Data-
2	RXD, Receive Data	TX+	Data+
3	TXD, Transmit Data	RX+	No use
4	DTR, Data Terminal Ready	RX-	No use
5	GND, Ground	No use	No use
6	DSR, Data Set Ready	No use	No use
7	RTS, Request To Send	No use	No use
8	CTS, Clear To Send	No use	No use
9	RI, Ring Indicator	No use	No use
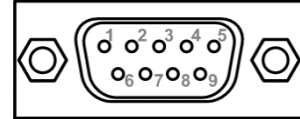
1.8.4 USB 3.2 Connector

The IPC950 supports four USB 3.2 Gen2 (10Gb/s) ports (CN5, CN6), which can be used to install USB peripherals such as scanners, cameras and USB devices. Each USB port is set to use standby power by default, which can be enabled or disabled by GPIOs.

Pin	Signal USB Port 0	Pin	Signal USB Port 1
1	USB_VCC (+5V level standby power)	10	USB_VCC (+5V level standby power)
2	USB_Data-	11	USB_Data-
3	USB_Data+	12	USB_Data+
4	GND	13	GND
5	SSRX-	14	SSRX-
6	SSRX+	15	SSRX+
7	GND	16	GND
8	SSTX-	17	SSTX-
9	SSTX+	18	SSTX+

1.8.5   Ethernet Connector (LAN1~LAN3)

The system supports three Ethernet ports (CN3, CN4): two RJ45 connectors with Intel® i211-AT controller support 10/100/1000 Mbps, while the other RJ45 connector with Intel® i225-LM supports AMT and speed up to 2500Mbps, which is located at the lower side of CN3.

Pin	LAN Signal	Pin	LAN Signal
L1	**MDI0+**	**L5**	**MDI2+**
L2	**MDI0-**	**L6**	**MDI2-**
L3	**MDI1+**	**L7**	**MDI3+**
L4	**MDI1-**	**L8**	**MDI3-**
A	**Activity link LED(Yellow)** **OFF: No link** **Blinking: Link established; data activity detected**		
B	**Speed LED** **LAN1: Intel® i225-LM** **OFF: 10/100Mbps data rate** **Green: 1Gbps data rate** **Orange: 2.5Gbps data rate** **LAN2/LAN3: Intel® i211-AT** **OFF: 10Mbps data rate** **Green: 100Mbps data rate** **Orange: 1Gbps data rate**		
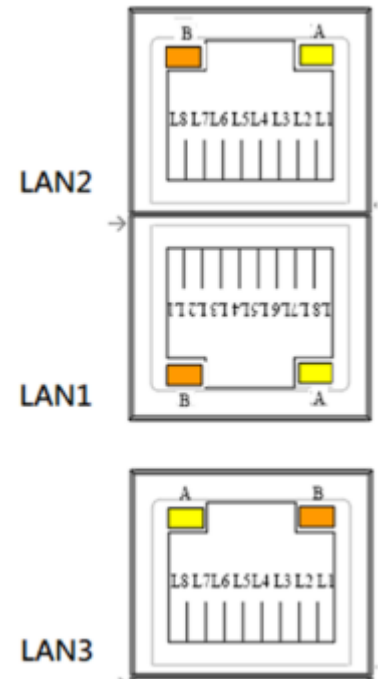
1.8.6   Audio Connector

The IPC950 features one phone jack connector that supports stereo Line Out.

Pin	Signal
1	Line Out

1.8.7   ATX Power On/OFF Button

The system has one ATX power button on the I/O side that allows users to control the IPC950's power on/off state.

Function	Description
On	Turn on/off system
Off	Keep system status
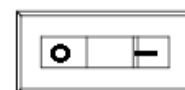
1.8.8   Remote Power Switch Connector

The remote power on/off feature can be achieved by using the 2-pin connector on the system I/O side.

Function	Description
Short(1-2)	Turn on/off system
Open	Keep system status
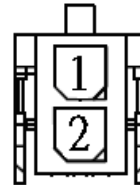
1.8.9   AT/ATX Switch

The system can be automatically powered on without pressing the power button when power input is supplied by setting the AT/ATX switch to AT mode. Auto power-on feature can be achieved by setting this switch.
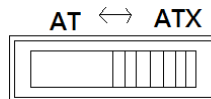
1.8.10 Digital I/O Connector

The IPC950 is equipped with an 8-channel digital I/O connector that meets requirements for the system customary automation control. The digital I/O can be configured to control cash drawers and sense warning signals from an Uninterrupted Power System (UPS), or perform store security control. You may use software programming to control these digital signals.

Pin	Signal	Pin	Signal
1	DIO1	6	DIO5
2	DIO2	7	DIO6
3	DIO3	8	DIO7
4	DIO4	9	DIO8
5	NA	10	GND
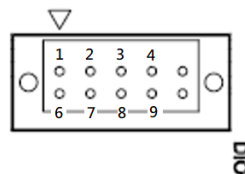
1.8.11 Front Panel LED

The IPC950 implements four LEDs which indicate system status. Solid green on PWR LED indicates the system is on. Flashing green on HDD LED indicates storage activity. Users can program customized system status indication with programmable LED. The system will flash orange while PROCHOT# is asserted, and solid red while THERMTRIP# is asserted on CPU LED.

Pin	Signal
1	CPU LED
2	Programmable LED
3	HDD LED
4	PWR LED

1.8.12 SATA Connector

The IPC950 has one Serial Advanced Technology Attachment (Serial ATA or SATA) 3.0 port (CN11) with 6Gb/s performance. This interface is for connecting to devices such as hard disk drives.

Pin	Signal
1	GND
2	SATA_TX+
3	SATA_TX-
4	GND
5	SATA_RX-
6	SATA_RX+
7	GND
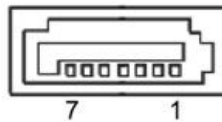
1.8.13 SATA Power Connector

The SATA power connector (CN12) provides +12V and +5V power for 2.5" HDD or SSD devices.

Pin	Signal
1	+12V level
2	GND
3	GND
4	+5V level
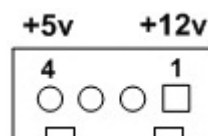
1.8.14 SIM Card Slot

The IPC950 includes one SIM slot (SCN4) on the bottom side of the system for inserting the SIM Card. It is mainly used in 3G/LTE wireless network applications on SCN5.

Pin	Signal
1	PWR
2	RST
3	CLK
4	NC
5	GND
6	VPP
7	I/O
8	NC

1.8.15 Full-Size PCI Express Mini Card Slot

The IPC950 provides one full-size PCI-Express Mini Card slot, which supports both PCI-Express and USB 2.0 signals, and complies with PCI-Express Mini card specification version 1.2.

Pin	Signal	Pin	Signal
1	WAKE#	2	+3.3VSB
3	No use	4	GND
5	No use	6	+1.5V
7	CLKREQ#	8	No use
9	GND	10	No use
11	REFCLK-	12	No use
13	REFCLK+	14	No use
15	GND	16	No use
17	No use	18	GND
19	No use	20	W_DISABLE#
21	GND	22	PERST#
23	PE_RXN8	24	+3.3VSB
25	PE_RXP8	26	GND
27	GND	28	+1.5V
29	GND	30	SMB_CLK
31	PE_TXN8	32	SMB_DATA
33	PE_TXP8	34	GND
35	GND	36	USB_D6-
37	GND	38	USB_D6+
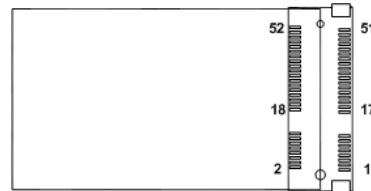
39	+3.3VSB	40	GND
41	+3.3VSB	42	No use
43	GND	44	No use
45	No use	46	No use
47	No use	48	+1.5V
49	No use	50	GND
51	No use	52	+3.3VSB

1.8.16 USB 2.0 Connector (CN9)

The Universal Serial Bus connectors are compliant with USB 2.0 (480Mbps), ideal for installing USB peripherals such as the keyboard, mouse, scanner, etc.

Pin	Signal USB Port
1	USB VCC (+5V level)
2	USB #5_D-
3	USB #5_D+
4	Ground (GND)
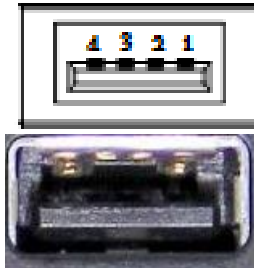
1.8.17 M.2 B+M KEY 2280 Connector (SCN1)

The IPC950 provides one M.2 B+M key 2280 connector (SCN1), which supports Serial Advanced Technology Attachment (Serial ATA or SATA) 3.0 port interface with 6Gb/s performance.

Pin	Signal	Pin	Signal
1	GND	2	+3.3VS
3	GND	4	+3.3VS
5	No use	6	No use
7	No use	8	No use
9	GND	10	M2_SATA_LED
11	No use	12	+3.3VS
13	No use	14	+3.3VS
15	GND	16	+3.3VS
17	No use	18	+3.3VS
19	No use	20	No use
21	GND	22	No use

23	No use	24	No use
25	No use	26	No use
27	GND	28	No use
29	No use	30	No use
31	No use	32	No use
33	GND	34	No use
35	No use	36	No use
37	No use	38	DEVSLP1
39	GND	40	No use
41	SATA1_RXP	42	No use
43	SATA1_RXN	44	No use
45	GND	46	No use
47	SATA1_TXN	48	No use
49	SATA1_TXP	50	No use
51	GND	52	No use
53	No use	54	No use
55	No use	56	No use
57	GND	58	No use
59		60	No use
61		62	No use
63		64	No use
65		66	No use
67	No use	68	No use
69	No use	70	GND
71	GND	72	GND
73	GND	74	GND
75	GND		

1.8.18 M.2 E-KEY 2230 Connector

The IPC950 provides one M.2 E key 2230 connector (SCN3), which supports both PCI-E and USB 2.0 signals for the M.2 wireless module.

Pin	Signal	Pin	Signal
1	GND	2	+3.3V_SBY
3	USBP_7P	4	+3.3V_SBY
5	USBP_7N	6	No use
7	GND	8	No use
9	No use	10	M2_SATA_LED
11	No use	12	No use
13	GND	14	No use
15	No use	16	No use
17	No use	18	GND
19	GND	20	UART_WAKE#
21	No use	22	UART_TXD
23	No use	24	
25		26	
27		28	
29		30	
31		32	UART_RXD
33	GND	34	UART_RTS
35	PCIE_TX_DP7	36	UART_CTS
37	PCIE_TX_DN7	38	
39	GND	40	
41	PCIE_RX_DP7	42	
43	PCIE_RX_DN7	44	
45	GND	46	
47	CK_100M_DP1	48	
49	CK_100M_DN1	50	SUSCLK
51	GND	52	PERST0#
53	CLKREQ#	54	W_DISABLE2#
55	PCIE_WAKE_N	56	W_DISABLE1#
57	GND	58	I2C_DATA
59		60	I2C_CLK
61		62	No use
63	GND	64	No use
65		66	No use
67		68	No use
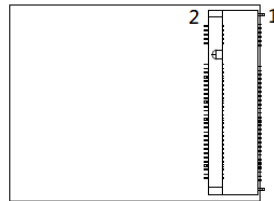
69	GND	70	No use
71		72	+3.3V_SBY
73		74	+3.3V_SBY
75	GND		

1.8.19 Flexible IO - COM I/O Card Connector (AX93511)

The system has four serial ports. COM2~COM5 are RS-232/422/485 ports.

*RS-232/422/485 can be configured via BIOS settings

※**COM2,COM3,COM4,COM5**

Pins	RS-232	RS-422	RS-485
1	DCD, Data Carrier Detect	TX-	Data-
2	RXD, Receive Data	TX+	Data+
3	TXD, Transmit Data	RX+	No use
4	DTR, Data Terminal Ready	RX-	No use
5	GND, Ground	No use	No use
6	DSR, Data Set Ready	No use	No use
7	RTS, Request To Send	No use	No use
8	CTS, Clear To Send	No use	No use
9	RI, Ring Indicator	No use	No use
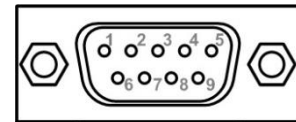
1.8.20 Flexible IO – Isolated COM & DIO I/O Card (AX93512)

The system has an optional module to support COM2~COM3, which are RS-232/422/485 with isolated 1.5KVDC protection and DIO1~DIO2 8-in/8-out isolated 1.5KVDC DIO ports. Please refer to Chapter 4 for the details of BIOS settings.

※**COM2,COM3,DIO1,DIO2**

CN1 (COM2)& CN2(COM3)			
Pins	**RS-232**	**RS-422**	**RS-485**
1	DCD, Data Carrier Detect	TX-	Data-
2	RXD, Receive Data	TX+	Data+
3	TXD, Transmit Data	RX+	No use
4	DTR, Data Terminal Ready	RX-	No use
5	GND, Ground	No use	No use
6	DSR, Data Set Ready	No use	No use
7	RTS, Request To Send	No use	No use
8	CTS, Clear To Send	No use	No use
9	RI, Ring Indicator	No use	No use
10	GND_EARTH	No use	No use

CN3(DIO1)		CN4(DIO2)	
Pin	**Function**	**Pin**	**Function**
1	Common1 PWR+	1	Common2 PWR+
2	DO10	2	DO20
3	DO11	3	DO21
4	DO12	4	DO22
5	DO13	5	DO23
6	Common1 PWR-	6	Common2 PWR-
7	External1 Power	7	External2 Power
8	DI10	8	DI20
9	DI11	9	DI21
10	DI12	10	DI22
11	DI13	11	DI23
12	Isolation1 GND	12	Isolation2 GND
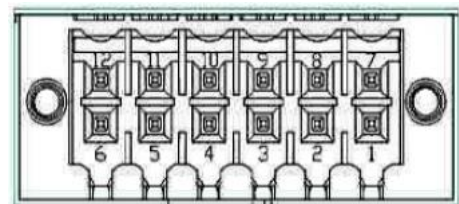
Digital I/O Specification (per port)

● **Isolated Digital Input**

The figure shows how to connect between an external input source and the system.

Each of the isolated digital input channels accepts 0~30 VDC with sink type and source type.
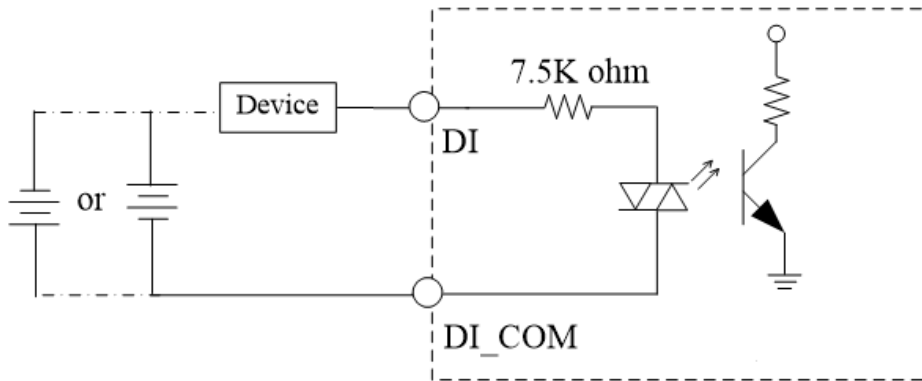
● **Isolated Digital Output**

The figure shows how to connect between an output channel and the system.

If an external voltage 5~30 VDC is applied to an isolated output channel, the current will flow from the external voltage source to the system.

Please note that the current flowing through each DO channel should not exceed 200 mA.
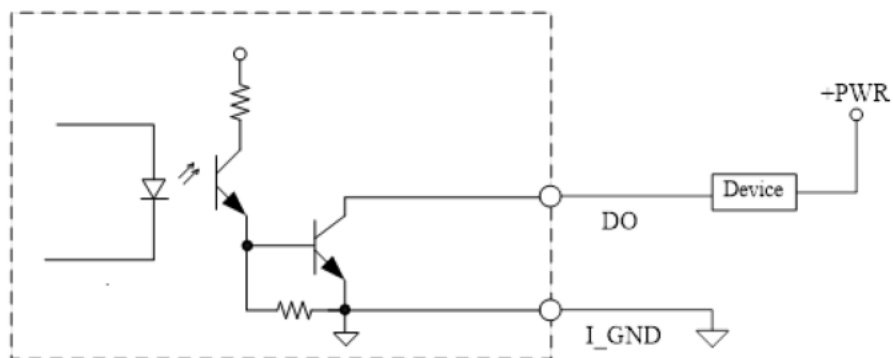
1.8.21 Flexible IO – Isolated COM x4 I/O Card (AX93516)

The system has an optional module with four serial ports. COM2~COM5 are RS-232/422/485 with isolated 2KV ports. Please refer to Chapter 4 for the details of BIOS settings.

※COM2,COM3,COM4,COM5

Pins	RS-232	RS-422	RS-485
1	DCD, Data Carrier Detect	TX-	Data-
2	RXD, Receive Data	TX+	Data+
3	TXD, Transmit Data	RX+	No use
4	DTR, Data Terminal Ready	RX-	No use
5	GND, Ground	No use	No use
6	DSR, Data Set Ready	No use	No use
7	RTS, Request To Send	No use	No use
8	CTS, Clear To Send	No use	No use
9	RI, Ring Indicator	No use	No use
10	GND_EARTH	No use	No use

1.8.22 Flexible IO- USB3.0x2 & COMx2(RS232/422/485) & LAN(AX93519)

The system has an optional module to support two USB 2.0 ports, two RS232/422/485, and one Gigabit LAN. Please refer to Chapter 4 for the details of BIOS settings.

➢   AX93519 2 x RS232/422/485 + 1 GE LAN(i211AT) + 2 USB 2.0

Pins	Signal USB Port 0	Pins	Signal USB Port 1
1	USB_VCC (+5V level standby power)	1	USB_VCC (+5V level standby power)
2	USB_Data2-	2	USB_Data3-
3	USB_Data2+	3	USB_Data3+
4	GND	4	GND
5	Reserve	5	Reserve
6	Reserve	6	Reserve
7	GND	7	GND
8	Reserve	8	Reserve
9	Reserve	9	Reserve
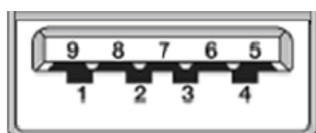
The system has two serial ports. COM2~COM3 are RS-232/422/485 ports. Please refer to Chapter 3 for the details of BIOS settings.

※**COM2,COM3**

Pins	RS-232	RS-422	RS-485
1	DCD, Data Carrier Detect	TX-	Data-
2	RXD, Receive Data	TX+	Data+
3	TXD, Transmit Data	RX+	No use
4	DTR, Data Terminal Ready	RX-	No use
5	GND, Ground	No use	No use
6	DSR, Data Set Ready	No use	No use
7	RTS, Request To Send	No use	No use
8	CTS, Clear To Send	No use	No use
9	RI, Ring Indicator	No use	No use
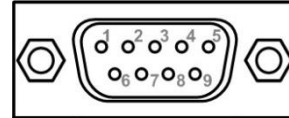
The system has two RJ-45 connectors: a LAN Ethernet connection can be established by plugging one end of the Ethernet cable into this RJ-45 connector and the other end (phone jack) to a 1000/100/10-Base-T hub.

Pins	1000 Base-T	100/10 Base-T	Descriptions
L1	BI_DA+	TX+	Bidirectional or Transmit Data+
L2	BI_DA-	TX-	Bidirectional or Transmit Data-
L3	BI_DB+	RX+	Bidirectional or Receive Data+
L4	BI_DC+	N.C.	Bidirectional or Not Connected
L5	BI_DC-	N.C.	Bidirectional or Not Connected
L6	BI_DB-	RX-	Bidirectional or Receive Data-
L7	BI_DD+	N.C.	Bidirectional or Not Connected
L8	BI_DD-	N.C.	Bidirectional or Not Connected
A	Active Link LED (Yellow) Off: No link Blinking: Data activity detected		
B	Speed LED 1000: Orange 100: Green 10: OFF		
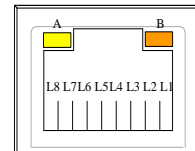
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SECTION 2
HARDWARE INSTALLATION

The IPC950 products are convenient for your various hardware configurations, such as the memory module, HDD (Hard Disk Drive) and PCIe card. Chapter 2 will show you how to install these hardware parts.

Procedure of Installation:

Step 1   Turn off the system.

Step 2   Disconnect the power connector.

Step 3   Loosen seven screws and follow the direction of "〰〰▷" to remove the back cover from the chassis.
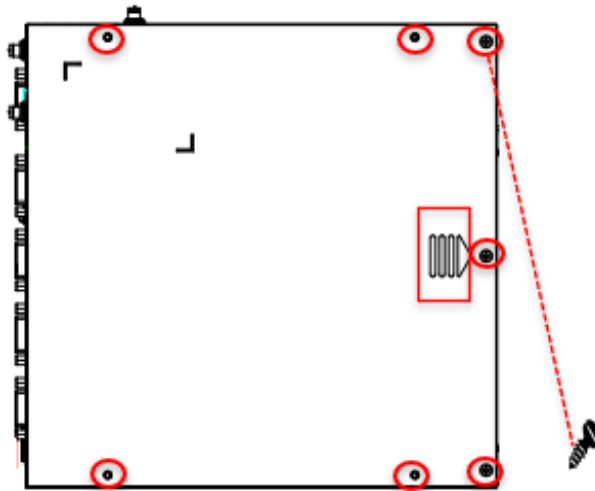
2.1   Installing the Memory Module
Step 1 Loosen four screws and remove the bracket.
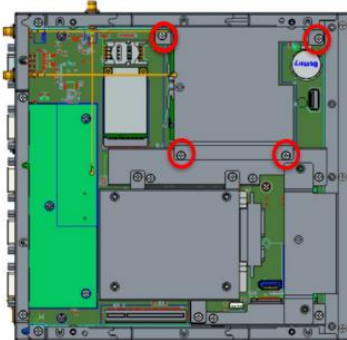
Step 2   Rip the mylar from thermal pads which are stuck on the system cover and main board. Install the memory module into the socket and push it firmly down until it is fully seated. The socket latches are clipped onto the edges of the memory module.
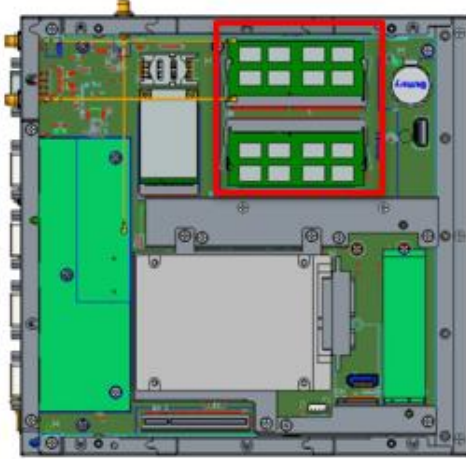
Step 3   After installing the memory modules, screw the bracket and close the cover back to the chassis and fasten all screws.

2.2   Installing the Hard Disk Drive

The IPC950 offers an internal drive bay for users to install HDD/SSD. Please follow the steps to install.

Step 1   Loosen three screws and remove the bracket.
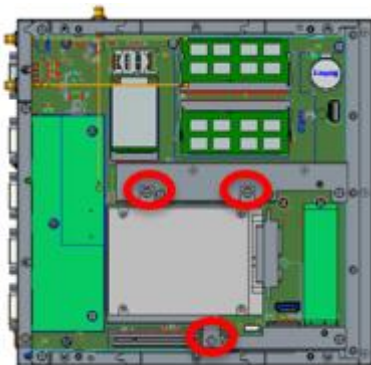
Step 2 Screw the HDD/SDD to the bracket with 3 screws.
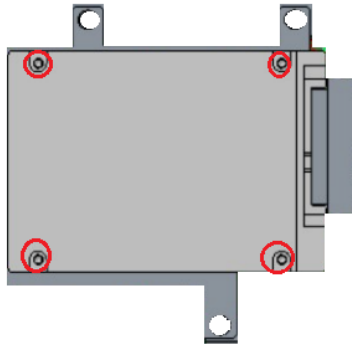
Step 3   Screw the HDD/SSD bracket back to the system and plug the data and power cables to HDD/SSD. Installation is complete.
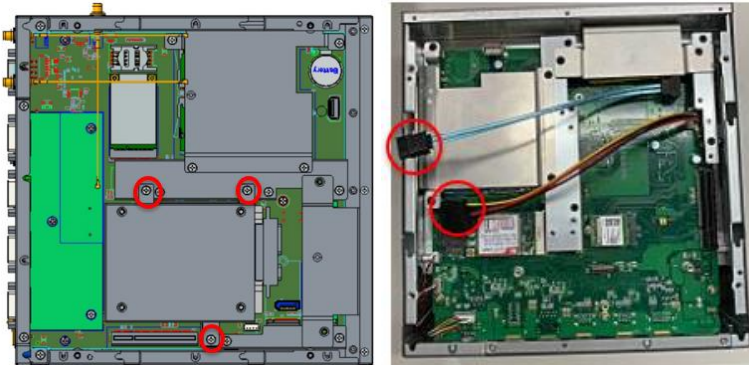
2.3   Installing the NVMe SSD

The IPC950 offers a M.2 B+M key socket for users to install NVMe SSD. Please follow the steps to install.

Step 1   Loosen two screws and remove the bracket.
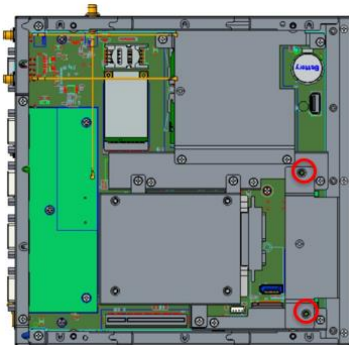
Step 2   Rip the mylar from thermal pads which are stuck on the system cover and main board. Install the SSD into the socket and screw a screw to fix it.
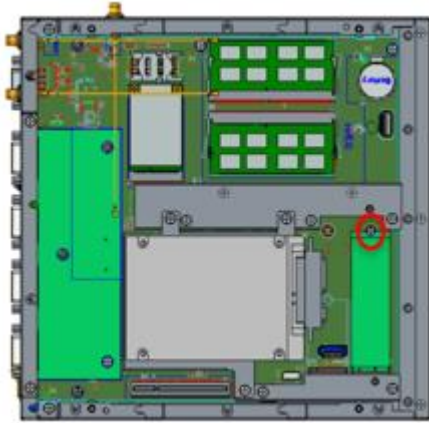
Step 3 Fix the bracket into the system. Installation is complete.

2.4 Installing the M.2 Key E Module

The IPC950 offers an M.2 key E socket for users to install a wireless module. When installing the wireless LAN card, refer to the following instructions and illustration:

Step 1 Loosen three screws and remove the bracket.
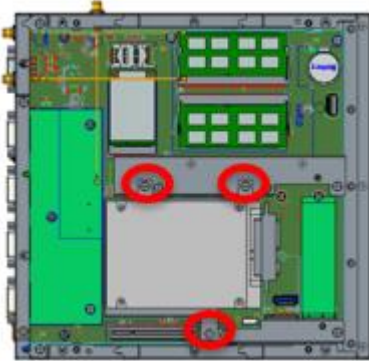
Step 2 Install the wireless module into the socket and screw a screw to fix it.

Step 3 Please take the plastic antenna isolated washer out of the accessory box.
Put a washer into an antenna cable.

 →
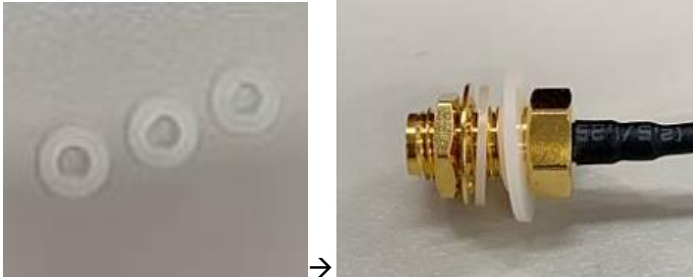
Step 4 Connect the antenna cables to the wireless LAN card.

Step 5 The IPC950 supports three antenna openings, please remove the antenna plugs from the cover and Install the antenna cables, then screw the bracket. Installation completed.

2.5   Installing the Mini PCIe Module

The IPC950 offers a mini PCIe socket for users to install a wireless module. When installing the wireless LAN card, refer to the following instructions and illustration:

Step 1   Find the mini PCI socket in the main board, then install the wireless module to the socket and screw a screw to fix it.
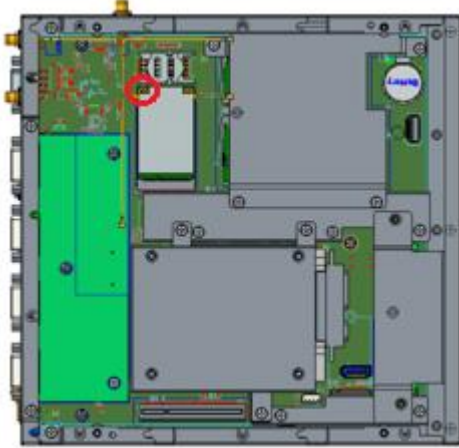
Note: When installing a half-size mini card, please use the extended bracket to secure the card in place.

Step 2   Connect the antenna cables to the wireless LAN card.

Step 3   The IPC950 supports three antenna openings. Please remove the antenna plugs from the cover and Install the antenna cable. Installation is complete.

2.6   Installing the Flexible I/O Module

The IPC50 provides four flexible I/O modules for further expansion needs. The procedure of installing the flexible I/O module into the system is instructed below.

Step 1   Loosen two screws and remove the blank I/O cover.
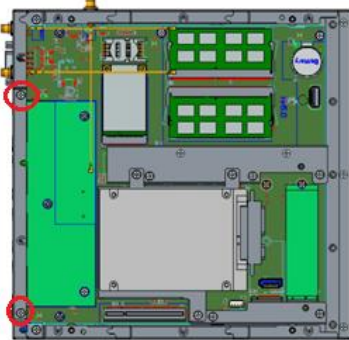
Step 2   Find the flexible I/O connector on the main board. Align the flexible I/O module with the slot, press the card into the connector until it is firmly seated, and then screw its bracket to the system. Installation is complete.
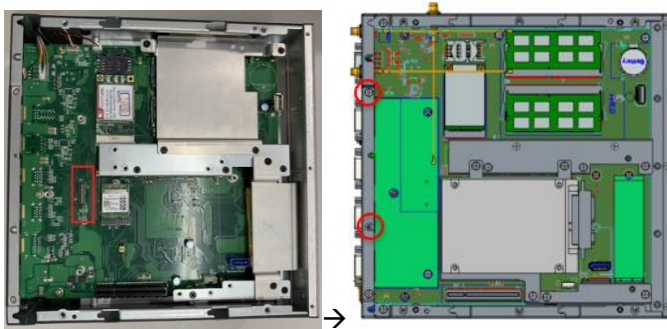
2.7   Installing the expansion box kit

The IPC50 provides a PCIe x4 slot expansion box kit for further expansion use. The procedure of installing the expansion box kit into the system is instructed below.

Step 1   Loosen eight screws to remove the cover from the EIO110 expansion box kit.
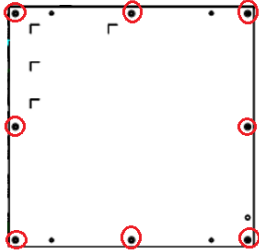
Step 2   Find the slot on the main board. Align the EIO110 with the slot, press the riser into the slot until it is firmly seated, and then screw the expansion box kit.
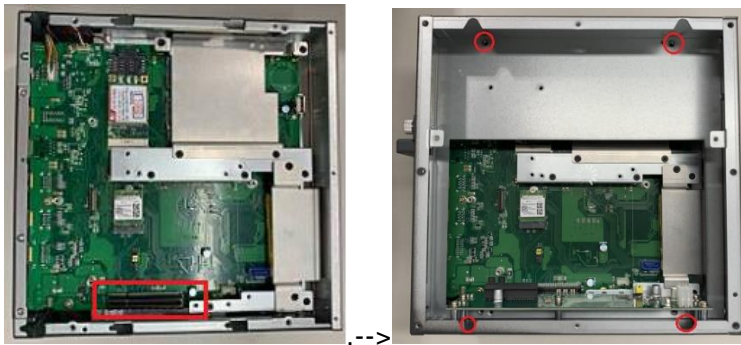
Step 3   After installing the expansion box kit, close the cover back to the chassis and fasten the screw. Installation is complete.
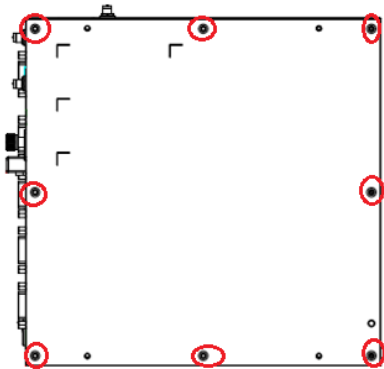
2.8 Mounting

The IPC950 provides a DIN rail kit, a bookshelf bracket, and a wall mount kit for optional selection.

DIN rail mount
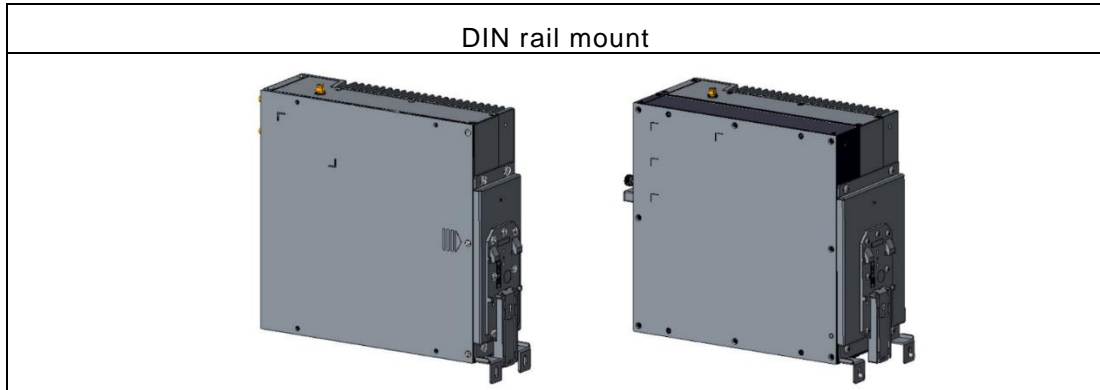
Step 1 Screws the below two parts together with seven screws.
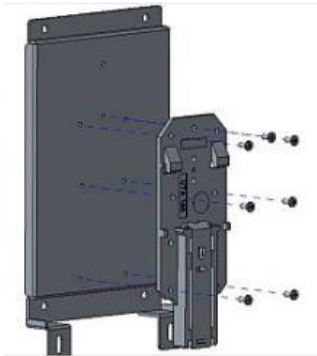
Step 2 Fasten the DIN rail to the chassis with four screws. Installation is complete.
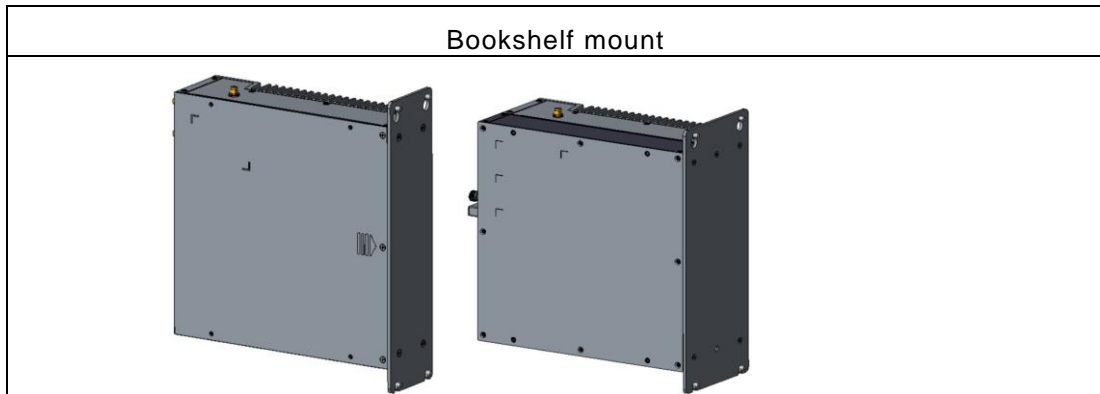
Bookshelf mount

Step 3 Fasten the book shelf bracket to the chassis with four screws. Installation is complete.
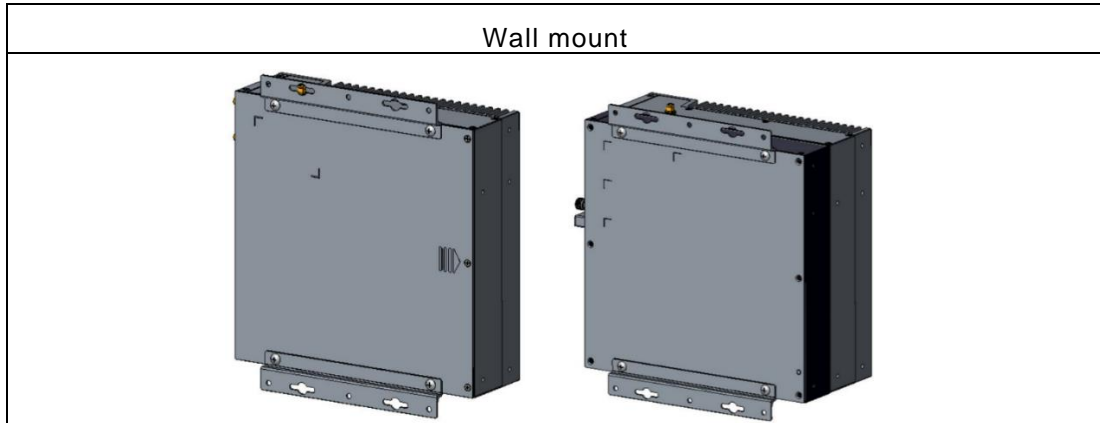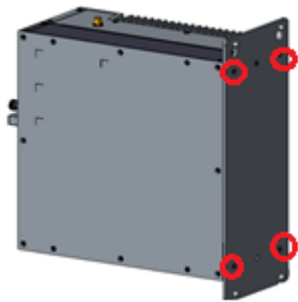
Wall mount

Step 4 Fasten the wall mount kit to the chassis with four screws. Installation is complete.

Screw
Minimum diameter:Φ5.5mm **Minimun Length:3.0mm+ Wall's hole depth** **Thread type should be decide accordingly.**
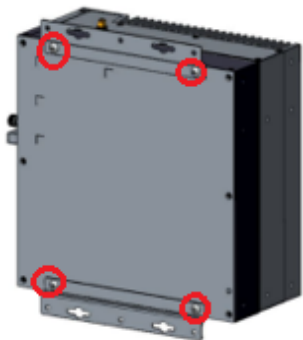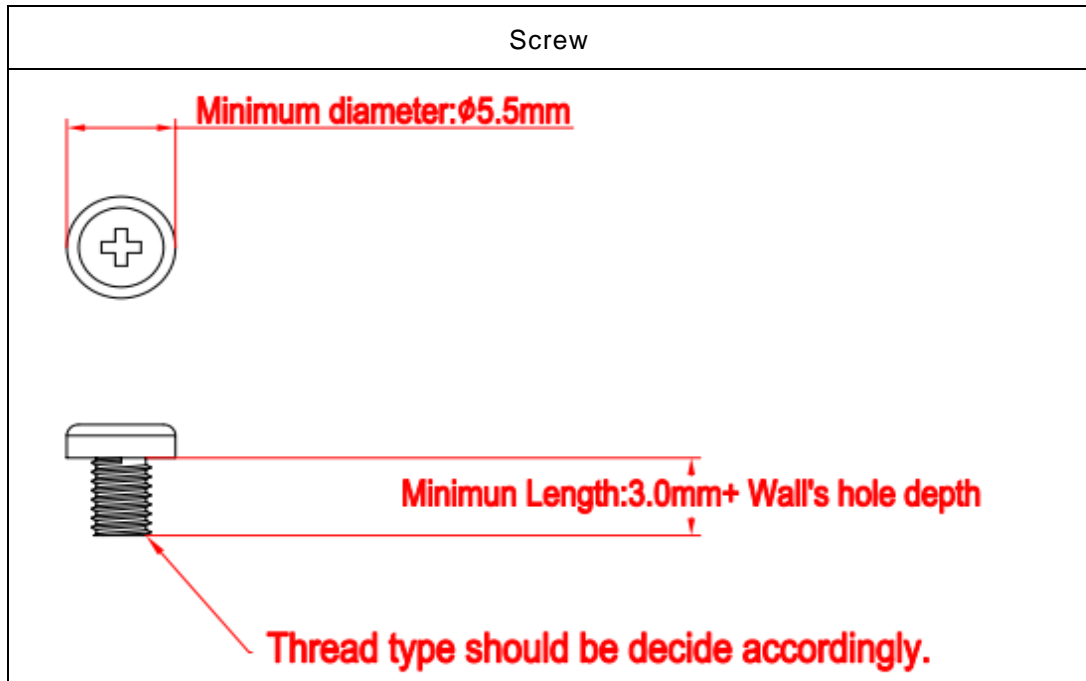
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SECTION 3
AMI BIOS UTILITY

The AMI UEFI BIOS provides users with a built-in setup program to modify basic system configuration. All configured parameters are stored in a 16MB flash chip to save the setup information whenever the power is turned off. This chapter provides users with detailed description about how to set up basic system configuration through the AMI BIOS setup utility.

3.1   Starting

To enter the setup screens, follow the steps below:

1.   Turn on the computer and press the <Del> key immediately.

2.   After you press the <Del> key, the main BIOS setup menu displays. You can access the other setup screens from the main BIOS setup menu, such as the Advanced and Chipset menus.

Note: ***If your computer cannot boot after making and saving system changes with Setup, you can restore BIOS optimal defaults by setting JP1 (see section 1.6.2).***

It is strongly recommended that you should avoid changing the chipset's defaults. Both AMI and your system manufacturer have carefully set up these defaults that provide the best performance and reliability.

3.2   Navigation Keys

The BIOS setup/utility uses a key-based navigation system called hot keys. Most of the BIOS setup utility hot keys can be used at any time during the setup navigation process. These keys include <F1>, <F2>, <Enter>, <ESC>, <Arrow> keys, and so on.

Note: **Some of the navigation keys may differ from one screen to another.**

Hot Keys	Description
→← Left/Right	The Left and Right <Arrow> keys allow you to select a setup screen.
↑↓ Up/Down	The Up and Down <Arrow> keys allow you to select a setup screen or sub-screen.
+– Plus/Minus	The Plus and Minus <Arrow> keys allow you to change the field value of a particular setup item.
Tab	The <Tab> key allows you to select setup fields.
F1	The <F1> key allows you to display the General Help screen.
F2	The <F2> key allows you to Load Previous Values.
F3	The <F3> key allows you to Load Optimized Defaults.
F4	The <F4> key allows you to save any changes you have made and exit Setup. Press the <F4> key to save your changes.
Esc	The <Esc> key allows you to discard any changes you have made and exit the Setup. Press the <Esc> key to exit the setup without saving your changes.
Enter	The <Enter> key allows you to display or change the setup option listed for a particular setup item. The <Enter> key can also allow you to display the setup sub- screens.

3.3   Main Menu

The first time you enter the setup utility, you will be in the Main setup screen. You can always return to the Main setup screen by selecting the Main tab. System Time/Date can be set up as described below. The Main BIOS setup screen is shown below.

```
                          Aptio Setup - AMI
    Main  Advanced  Chipset  Security  Boot  Save & Exit

   BIOS Information                              ▲│Set the Date. Use Tab to
   Build Date and Time      09/09/2021 13:11:43   │switch between Date elements.
   Project Version          PSB500 X011 CRB        │Default Ranges:
                                                   │Year: 1998-9999
   Firmware Information                            │Months: 1-12
   ME Firmware Version      15.0.10.1469           │Days: Dependent on month
   ME Firmware Mode         Normal Mode            │Range of Years may vary.
   ME Firmware SKU          Consumer SKU           │

   Board Information
    Processor Name          TigerLake ULT
            Type            11th Gen Intel(R)
                            Core(TM) i3-1115G4E @
                            3.00GHz                │→←: Select Screen
            Stepping        B0                     │↑↓: Select Item
                                                   │Enter: Select
    PCH     Name            TGL PCH-LP             │+/-: Change Opt.
            SKU             U Premium              │F1: General Help
            Stepping        B0                     │F2: Previous Values
    Memory  Size             4096 MB               │F3: Optimized Defaults
            Frequency        2667 MT/s             │F4: Save & Exit
                                                   │ESC: Exit
   System Date              [Fri 01/01/2021]
   System Time              [04:59:33]            ▼│

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```

- **System Date/Time**

    Use this option to change the system time and date. Highlight System Time or System Date using the <Arrow> keys. Enter new values through the keyboard. Press the <Tab> key or the <Arrow> keys to move between fields. The date must be entered in MM/DD/YY format. The time is entered in HH:MM:SS format.

3.4 Advanced Menu

The Advanced menu allows users to configure the CPU and other system devices. You can select any of the items in the left frame of the screen to go to the sub menus.

For items marked with "▶", please press <Enter> for more options.

```
                         Aptio Setup - AMI
     Main  Advanced  Chipset  Security  Boot  Save & Exit

 ▶ F81804 Super IO Configuration           System Super IO Chip
 ▶ Hardware Monitor                        Parameters.
 ▶ Trusted Computing
 ▶ CPU Configuration
 ▶ Storage Configuration
 ▶ AMT Configuration
 ▶ NCT7802Y HW Monitor
 ▶ USB Configuration
 ▶ Serial Port Console Redirection
 ▶ CSM Configuration

                                           →←: Select Screen
                                           ↑↓: Select Item
                                           Enter: Select
                                           +/-: Change Opt.
                                           F1: General Help
                                           F2: Previous Values
                                           F3: Optimized Defaults
                                           F4: Save & Exit
                                           ESC: Exit

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```

● **HW Monitor**

This screen monitors hardware health.

```
                            Aptio Setup - AMI
     Advanced

 Pc Health Status

 CPU temperature                  : +99 ℃
 System temperature               : +28 ℃
 VIN1                             : +3.072 V
 VIN2                             : +5.011 V
 VCC3V                            : +3.328 V
 VSB3V                            : +3.360 V
 VSB5V                            : +5.016 V



                                           →←: Select Screen
                                           ↑↓: Select Item
                                           Enter: Select
                                           +/-: Change Opt.
                                           F1: General Help
                                           F2: Previous Values
                                           F3: Optimized Defaults
                                           F4: Save & Exit
                                           ESC: Exit




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```
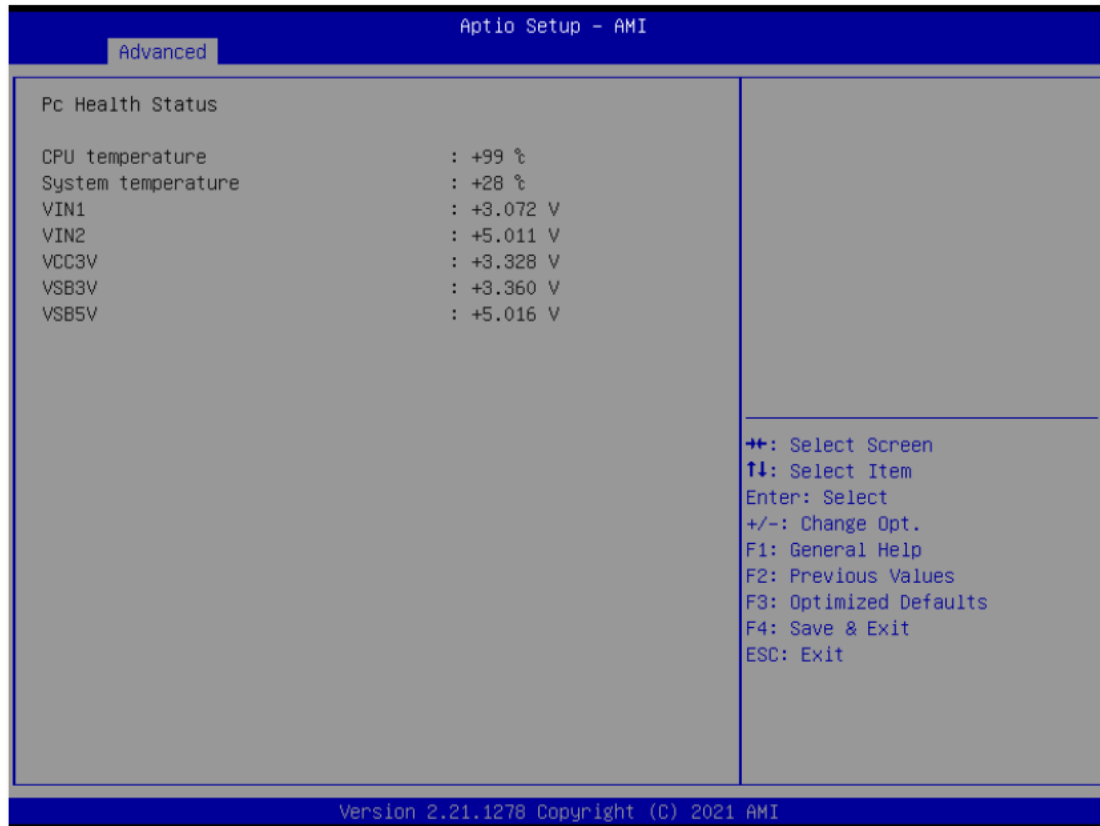
● **NCT7802Y HW Monitor**

This screen monitors the hardware health of the EIO110 PCIe x4 riser card.

```
                              Aptio Setup - AMI
        Advanced

 Pc Health Status

 System temperature              : +21 C
 +3.3VS                          : +3.372 V
 +12VS                           : +12.160 V




                                        ↔: Select Screen
                                        ↑↓: Select Item
                                        Enter: Select
                                        +/-: Change Opt.
                                        F1: General Help
                                        F2: Previous Values
                                        F3: Optimized Defaults
                                        F4: Save & Exit
                                        ESC: Exit




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```
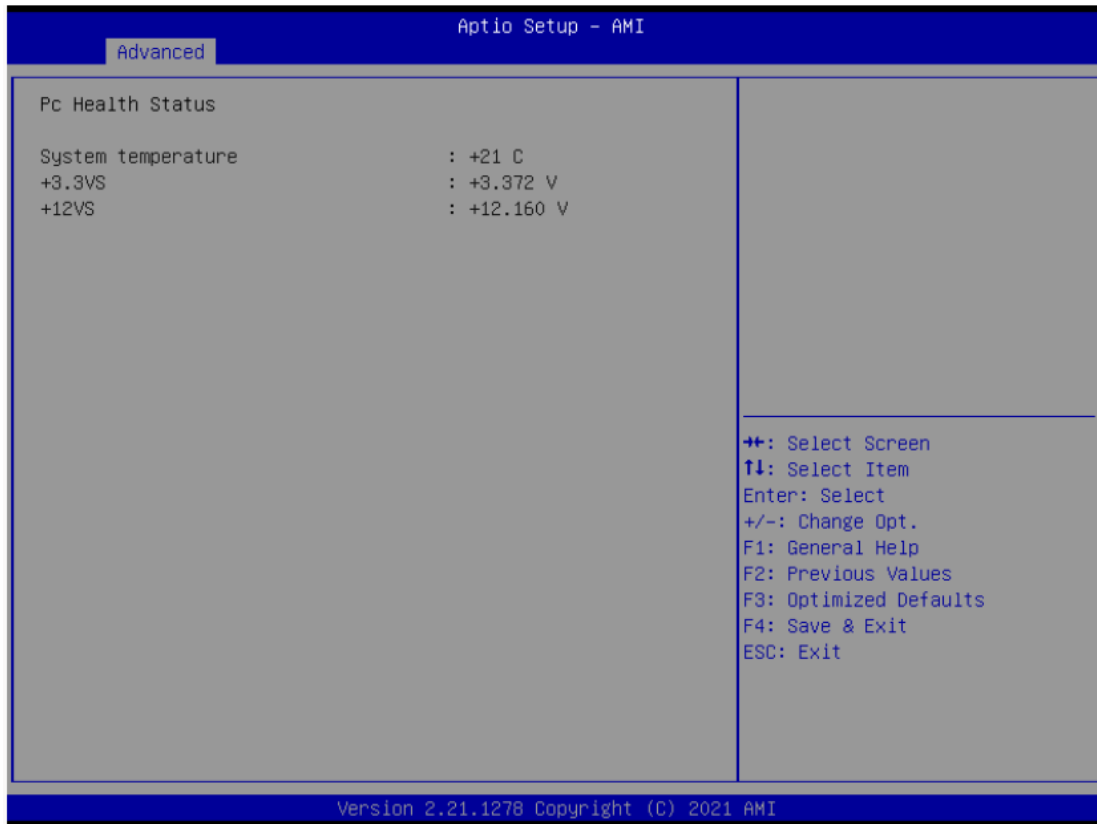
● **Trusted Computing**

Select Security Device Support to enable or disable the TPM function.

```
                          Aptio Setup - AMI
      Advanced

   TPM 2.0 Device Found                            Enables or Disables BIOS
   Firmware Version:                               support for security device.
   Vendor:                                         O.S. will not show Security
                                                   Device. TCG EFI protocol and
   Security Device Support        [Disable]        INT1A interface will not be
                                                   available.



                                                  _____

                                                  ↔: Select Screen
                                                  ↑↓: Select Item
                                                  Enter: Select
                                                  +/-: Change Opt.
                                                  F1: General Help
                                                  F2: Previous Values
                                                  F3: Optimized Defaults
                                                  F4: Save & Exit
                                                  ESC: Exit




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```

● **CPU Configuration**

This screen shows the CPU configuration, where you can change the value of the selected option.

```
                           Aptio Setup - AMI
         Advanced

  CPU Configuration                                   Enable or Disable
                                                      Hyper-Threading Technology.
  Type                     11th Gen Intel(R)
                           Core(TM) i3-1115G4E @
                           3.00GHz
  ID                       0x806C1
  Speed                    3000 MHz
  L1 Data Cache            48 KB x 2
  L1 Instruction Cache     32 KB x 2
  L2 Cache                 1280 KB x 2
  L3 Cache                 6 MB
  L4 Cache                 N/A
  VMX                      Supported
  SMX/TXT                  Not Supported              →←: Select Screen
  Package C State Limit    [C0/C1]                    ↑↓: Select Item
                                                      Enter: Select
  Hyper-Threading          [Enabled]                  +/-: Change Opt.
  Intel (VMX) Virtualization [Enabled]                F1: General Help
  Technology                                          F2: Previous Values
  Intel(R) SpeedStep(tm)   [Disabled]                 F3: Optimized Defaults
  Configurable TDP Boot Mode [Nominal]                F4: Save & Exit
  Disable Turbo GT frequency [Disabled]               ESC: Exit
  Boot performance mode    [Turbo Performance]


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```

➢ **Intel Virtualization Technology**

This item allows a hardware platform to run multiple operating systems separately and simultaneously, enabling one system to virtually function as several systems.

● **SATA and RST Configuration**

You can read the current installed hardware configurations from those SATA ports in the SATA and RST Configuration menu. During system boot up, BIOS will detect the present SATA devices automatically.

```
                              Aptio Setup – AMI
   ┌──────────┐
   │ Advanced │
   └──────────┘

   SATA And RST Configuration                              Enable/Disable SATA Device.

   SATA Controller(s)              [Enabled]
 ▶ VMD setup menu

   Serial ATA Port 1               Empty
   Serial ATA Port 2               Empty




                                                           ⇄: Select Screen
                                                           ↑↓: Select Item
                                                           Enter: Select
                                                           +/-: Change Opt.
                                                           F1: General Help
                                                           F2: Previous Values
                                                           F3: Optimized Defaults
                                                           F4: Save & Exit
                                                           ESC: Exit




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```
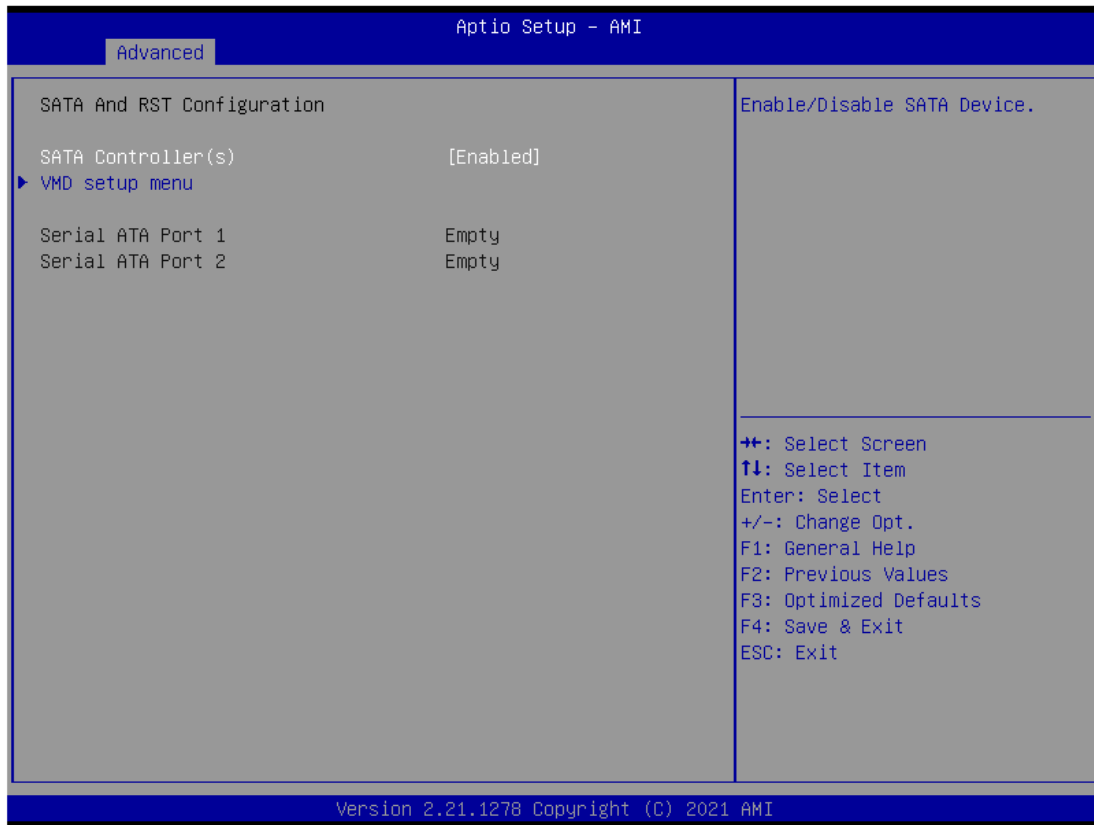
● **AMT Configuration**

Enable or disable Active Management Technology BIOS features. The default is disabled.

```
                              Aptio Setup - AMI
      Advanced

   AMT Configuration                                    When disabled AMT BIOS
                                                        Features are no longer
   AMT BIOS Features              [Disabled]            supported and user is no
                                                        longer able to access MEBx
                                                        Setup.
                                                        Note:
                                                        This option does not disable
                                                        Manageability Features in FW.


                                                        ━━━━━━━━━━━━━━━━━━━━━━━━━━━━

                                                        ↔: Select Screen
                                                        ↑↓: Select Item
                                                        Enter: Select
                                                        +/-: Change Opt.
                                                        F1: General Help
                                                        F2: Previous Values
                                                        F3: Optimized Defaults
                                                        F4: Save & Exit
                                                        ESC: Exit




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```

● **USB Configuration**

USB configuration can be configured here by selecting and changing each item. A description of the selected item appears on the right side of the screen.

```
                          Aptio Setup - AMI
    Advanced

 USB Configuration

 USB Module Version               26

 USB Devices:
       1 Drive, 1 Keyboard




                                         ↔: Select Screen
                                         ↑↓: Select Item
                                         Enter: Select
                                         +/-: Change Opt.
                                         F1: General Help
                                         F2: Previous Values
                                         F3: Optimized Defaults
                                         F4: Save & Exit
                                         ESC: Exit




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```
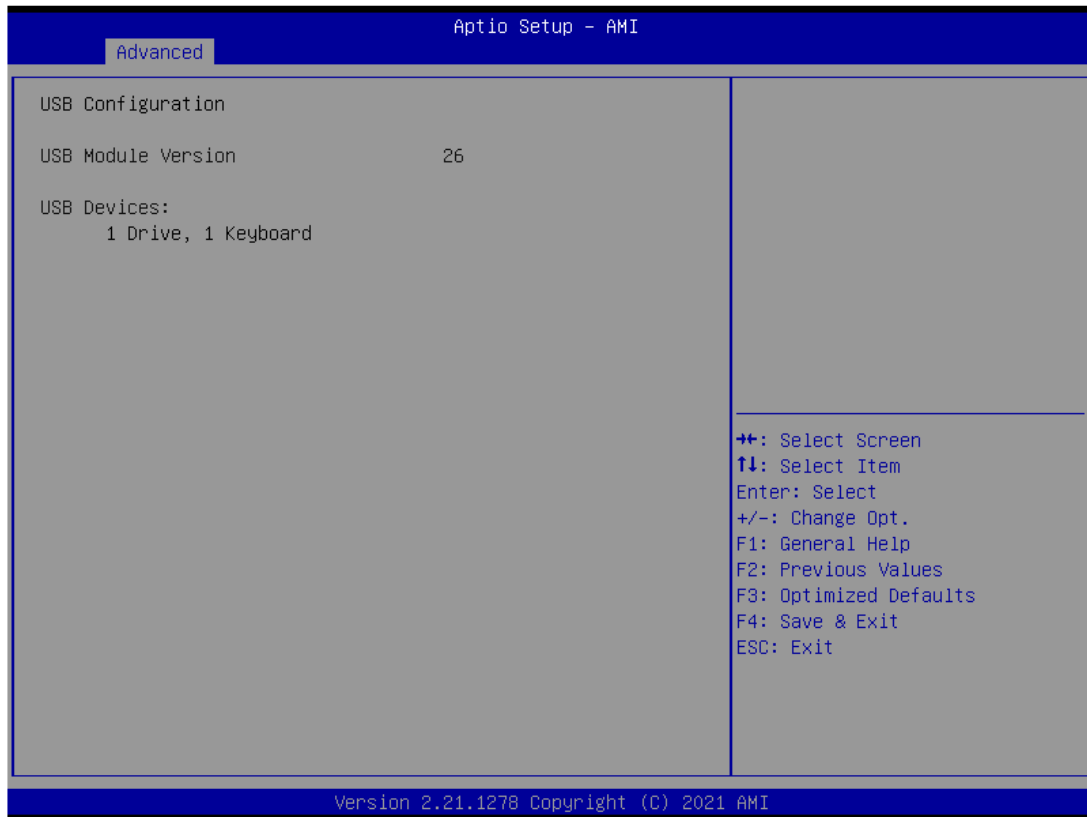
➢ **USB Devices**

Display all detected USB devices.

● **F81804 Super IO Configuration**

You can use this screen to select options for the Super IO Configuration and change the value of the selected option. A description of the selected item appears on the right side of the screen. For items marked with " ► ", please press <Enter> for more options.

```
                          Aptio Setup – AMI
      Advanced

   F81804 Super IO Configuration                    Set Parameters of Serial Port
                                                    1 (COMA)
   Super IO Chip                     F81804
 ▶ Serial Port 1 Configuration



                                                    ++: Select Screen
                                                    ↑↓: Select Item
                                                    Enter: Select
                                                    +/-: Change Opt.
                                                    F1: General Help
                                                    F2: Previous Values
                                                    F3: Optimized Defaults
                                                    F4: Save & Exit
                                                    ESC: Exit



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```
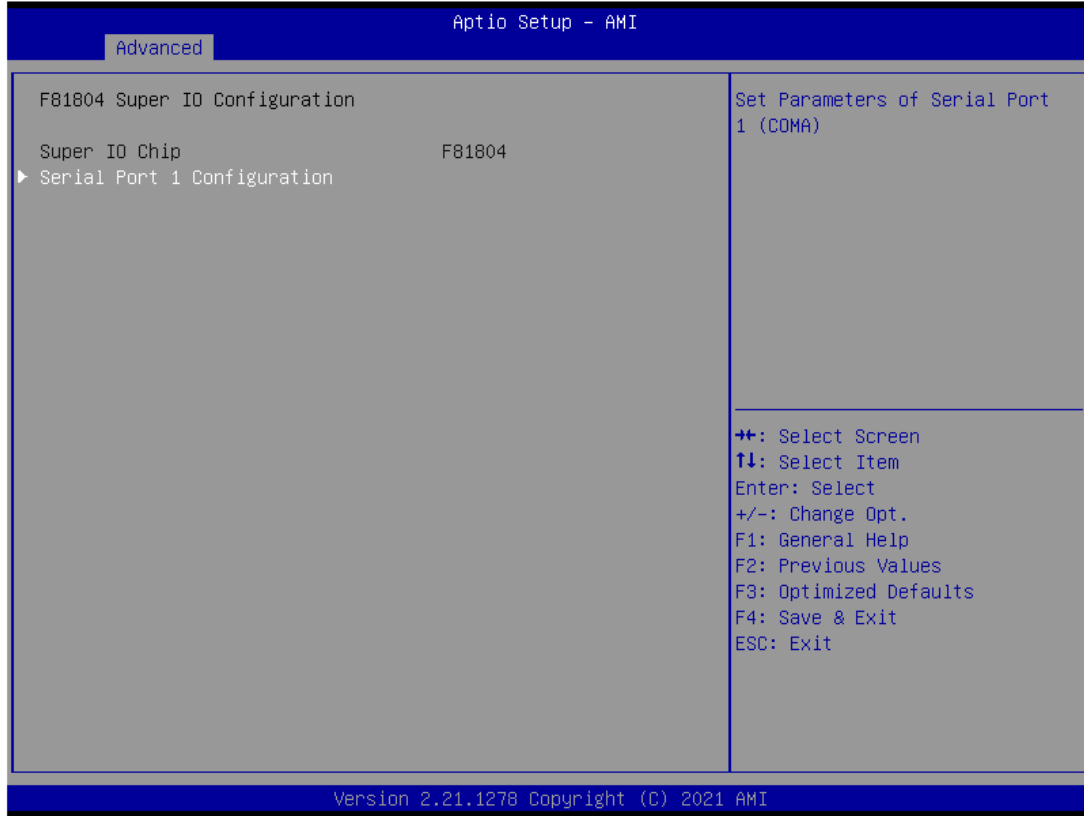
➢ **Serial Port 1 Configuration**

Use this item to set parameters of serial port 1.

```
                              Aptio Setup - AMI
     Advanced

   Serial Port 1 Configuration                            Enable or Disable Serial Port
                                                          (COM)
   Serial Port                       [Enabled]
   Device Settings                   IO=2F8h; IRQ=4;

   COM Port Type                     [RS232]
   COM Port Term Type                [Disabled]

                                                          ↔: Select Screen
                                                          ↑↓: Select Item
                                                          Enter: Select
                                                          +/-: Change Opt.
                                                          F1: General Help
                                                          F2: Previous Values
                                                          F3: Optimized Defaults
                                                          F4: Save & Exit
                                                          ESC: Exit

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```
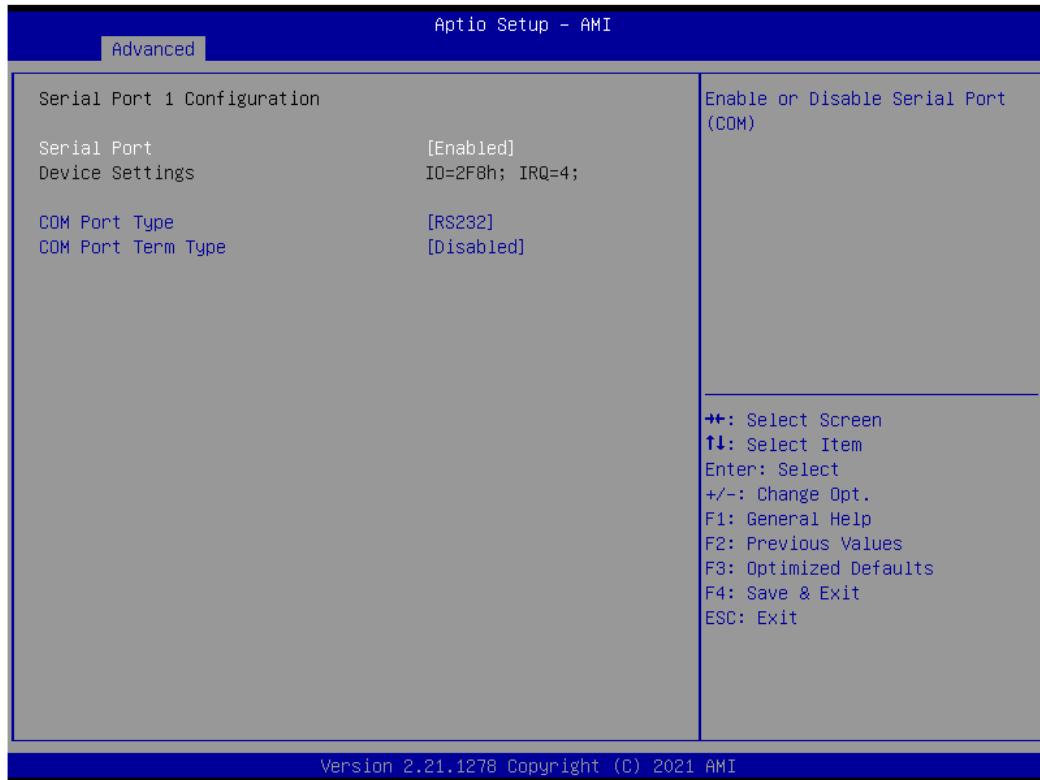
● **Serial Port Console Redirection**

This screen allows you to set serial port console redirection.

```
                            Aptio Setup - AMI
    ┌─ Advanced ─┐
    └────────────┘

                                                  Console Redirection Enable or
       COM1                                        Disable.
       Console Redirection               [Disabled]
    ▶ Console Redirection Settings

       Legacy Console Redirection
    ▶ Legacy Console Redirection Settings

       Serial Port for Out-of-Band Management/
       Windows Emergency Management Services (EMS)
       Console Redirection EMS           [Disabled]
    ▶ Console Redirection Settings
                                                  →←: Select Screen
                                                  ↑↓: Select Item
                                                  Enter: Select
                                                  +/-: Change Opt.
                                                  F1: General Help
                                                  F2: Previous Values
                                                  F3: Optimized Defaults
                                                  F4: Save & Exit
                                                  ESC: Exit




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```

➢ **COM Port Type**

Use this item to set parameters of RS232/422/485.

● **Compatibility Support Module (CSM) Configuration**

This screen displays CSM information.

```
                        Aptio Setup - AMI
     Advanced

Compatibility Support Module Configuration          Enable/Disable CSM Support.

CSM Support                      [Disabled]




                                               ←→: Select Screen
                                               ↑↓: Select Item
                                               Enter: Select
                                               +/-: Change Opt.
                            F1: General Help     F1: General Help
                                               F2: Previous Values
                                               F3: Optimized Defaults
                                               F4: Save & Exit
                                               ESC: Exit




               Version 2.21.1278 Copyright (C) 2021 AMI
```
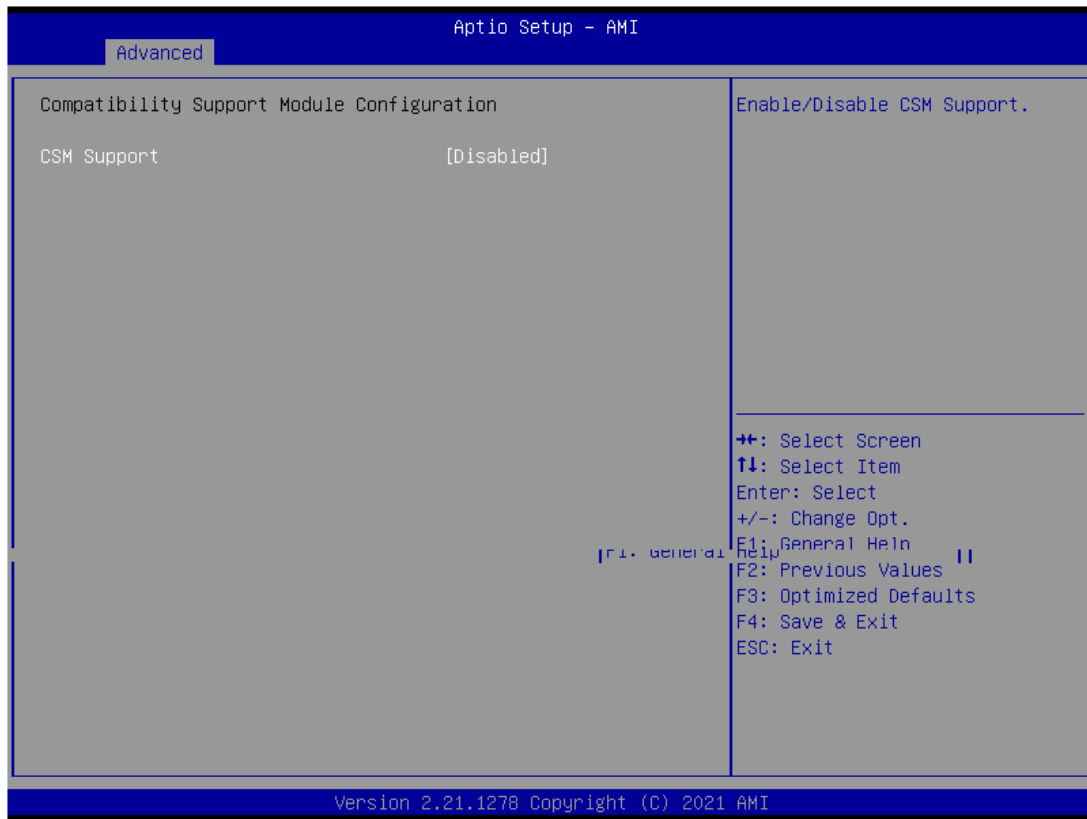
3.5   Chipset Menu

The Chipset menu allows users to change the advanced chipset settings. You can select any of the items in the left frame of the screen to go to the sub menus:

```
                         Aptio Setup - AMI
      Main  Advanced  Chipset  Security  Boot  Save & Exit

   System Agent (SA) Configuration                     Select which of IGFX/PEG/PCI
                                                       Graphics device should be
   Graphics Configuration                              Primary Display Or select HG
   IGFX GOP Version              17.0.1052             for Hybrid Gfx.
   IGFX VBIOS Version            N/A
   Primary Display              [Auto]
   Internal Graphics            [Auto]

   PCH-IO Configuration

   State After G3               [Power Off]

                                                       →←: Select Screen
                                                       ↑↓: Select Item
                                                       Enter: Select
                                                       +/-: Change Opt.
                                                       F1: General Help
                                                       F2: Previous Values
                                                       F3: Optimized Defaults
                                                       F4: Save & Exit
                                                       ESC: Exit

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```

3.6 Security Menu

The Security menu allows users to change the security settings for the system.

```
                          Aptio Setup - AMI
     Main  Advanced  Chipset  Security  Boot  Save & Exit

  Password Description                            Set Administrator Password

  If ONLY the Administrator's password is set,
  then this only limits access to Setup and is
  only asked for when entering Setup.
  If ONLY the User's password is set, then this
  is a power on password and must be entered to
  boot or enter Setup. In Setup the User will
  have Administrator rights.
  The password length must be
  in the following range:
  Minimum length                    3
  Maximum length                    20                →←: Select Screen
                                                        ↑↓: Select Item
  Administrator Password                                Enter: Select
  User Password                                         +/-: Change Opt.
                                                        F1: General Help
▶ Secure Boot                                           F2: Previous Values
                                                        F3: Optimized Defaults
                                                        F4: Save & Exit
                                                        ESC: Exit




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```

➢ **Administrator Password**

This item indicates whether an administrator password has been set (installed or uninstalled).

➢ **User Password**

This item indicates whether an user password has been set (installed or uninstalled).

⚫ **Secure Boot**

```
                              Aptio Setup - AMI
              Security

  System Mode                    Setup                 Secure Boot feature is Active
                                                       if Secure Boot is Enabled,
  Secure Boot                    [Disabled]            Platform Key(PK) is enrolled
                                 Not Active            and the System is in User mode.
                                                       The mode change requires
  Secure Boot Mode               [Custom]              platform reset
▶ Restore Factory Keys
▶ Reset To Setup Mode
▶ Key Management
                                                       ➕: Select Screen
                                                       ↑↓: Select Item
                                                       Enter: Select
                                                       +/-: Change Opt.
                                                       F1: General Help
                                                       F2: Previous Values
                                                       F3: Optimized Defaults
                                                       F4: Save & Exit
                                                       ESC: Exit

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```

3.7 Boot Menu

The Boot menu allows users to change boot options of the system.

```
                            Aptio Setup – AMI
     Main  Advanced  Chipset  Security  Boot  Save & Exit

  Boot Configuration                                    Number of seconds to wait for
  Setup Prompt Timeout        1                         setup activation key.
  Bootup NumLock State        [On]                      65535(0xFFFF) means indefinite
  Quiet Boot                  [Disabled]                waiting.
  Network Stack               [Disabled]

  Boot Option Priorities
  Boot Option #1              [UEFI: Generic Flash
                              Disk 8.07, Partition 1
                              (Generic Flash Disk
                              8.07)]
  Boot Option #2              [UEFI: Built-in EFI
                              Shell]
                                                        →←: Select Screen
                                                        ↑↓: Select Item
                                                        Enter: Select
                                                        +/-: Change Opt.
                                                        F1: General Help
                                                        F2: Previous Values
                                                        F3: Optimized Defaults
                                                        F4: Save & Exit
                                                        ESC: Exit



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```

➢ **Setup Prompt Timeout**
Set the number of seconds to wait for setup activation key. 65535(0xFFFF) means indefinite waiting.

➢ **Bootup NumLock State**
Use this item to select the power-on state for the keyboard NumLock.

➢ **Quiet Boot**
Select to display either POST output messages or a splash screen during boot-up.

➢ **Boot Option Priorities**
These are settings for boot priority. Specify the boot device priority sequence from the available devices.

3.8   Save & Exit Menu

The Save & Exit menu allows users to load your system configuration with optimal or fail-safe default values.

```
                            Aptio Setup - AMI
     Main  Advanced  Chipset  Security  Boot  Save & Exit

    Save Options                                 Exit system setup after saving
    Save Changes and Exit                        the changes.
    Discard Changes and Exit

    Save Changes and Reset
    Discard Changes and Reset

    Save Changes
    Discard Changes

    Default Options
    Restore Defaults
    Save as User Defaults                        ──────────────────────────
    Restore User Defaults
                                                 →←: Select Screen
    Boot Override                                 ↑↓: Select Item
    UEFI: Generic Flash Disk 8.07, Partition 1 (Generic Flash    Enter: Select
    Disk 8.07)                                    +/-: Change Opt.
    UEFI: Built-in EFI Shell                      F1: General Help
                                                 F2: Previous Values
                                                 F3: Optimized Defaults
                                                 F4: Save & Exit
                                                 ESC: Exit



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```

➢ **Save Changes and Exit**

When finishing the system configuration settings, select this option to leave Setup and return to Main Menu. Select Save Changes and Exit from the Save & Exit menu and press <Enter>. Select Yes to save changes and exit.

➢ **Discard Changes and Exit**

Select this option to quit Setup without making any permanent changes to the system configuration and return to Main Menu. Select Discard Changes and Exit from the Save & Exit menu and press <Enter>. Select Yes to discard changes and exit.

➢ **Save Changes and Reset**

When finishing the system configuration settings, select this option to leave Setup and reboot the computer so the new system configuration parameters can take effect. Select Save Changes and Reset from the Save & Exit menu and press <Enter>. Select Yes to save changes and reset.

➢ **Discard Changes and Reset**

Select this option to quit Setup without making any permanent changes to the system configuration and reboot the computer. Select Discard Changes and Reset from the Save & Exit menu and press <Enter>. Select Yes to discard changes and reset.

➢ **Save Changes**

When finishing the system configuration settings, select this option to save changes. Select Save Changes from the Save & Exit menu and press <Enter>. Select Yes to save changes.

➢ **Discard Changes**

Select this option to quit Setup without making any permanent changes to the system configuration. Select Discard Changes from the Save & Exit menu and press <Enter>. Select Yes to discard changes.

➢ **Save as User Defaults**

Select this option to save your current system configuration settings as User Defaults. Select Save as User Defaults from the Save & Exit menu and press <Enter>.

➢ **Restore User Defaults**

After selecting this option, all the settings will be restored to user defaults automatically. Select Restore User Defaults from the Save & Exit menu and press <Enter>.

➢ **Boot Override**

Select a drive to immediately boot that device regardless of the current boot order.

This page is intentionally left blank.

APPENDIX A
# WATCHDOG TIMER

A.1　About Watchdog Timer

Software stability is a major issue in most applications. Some embedded systems are not watched by an operator for 24 hours. It is usually too late to wait for someone to reboot when computer hangs. The systems need to be able to reset automatically when things go wrong. The watchdog timer gives us a solution in this regard.

The watchdog timer is a counter that triggers a system reset when it counts down to zero from a preset value. The software starts the counter with an initial value and must reset it periodically. If the counter ever reaches zero which means the software has crashed, the system will reboot.

A.2　How to Use Watchdog Timer

The I/O port base addresses of watchdog timer are 2E (hex) and 2F (hex). The 2E (hex) and 2F (hex) are address and data port respectively.

Assume that program A is put in a loop that must execute at least once every 10ms. Initialize watchdog timer with a value bigger than 10ms. If the software has no problems, watchdog timer will never expire because software will always restart the counter before it reaches zero.
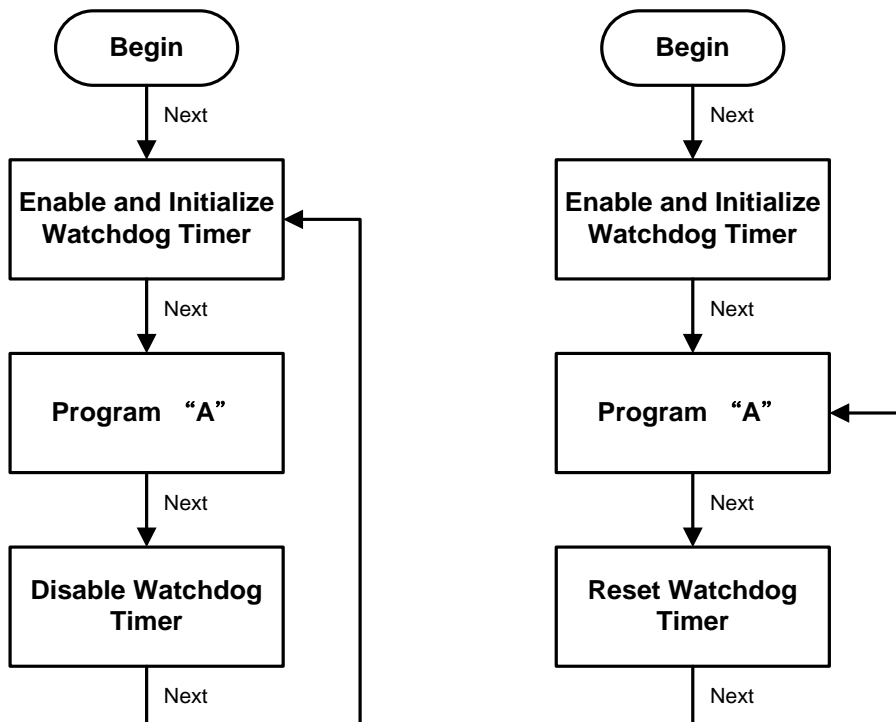
A.3   Sample Program

1.Enable configuration (following is an example to enable configuration using debug)

    -O 2E 87

    -O 2E 87

2. Select Logic device:

    -O 2E 07

    -O 2F 07

3. WDT Device Enable

    -O 2E 30

    -O 2F 01

4. Activate WDT:

    -O 2E FA

    -O 2F 01

5. Set base timer:

    -O 2E F6

    -O 2F 0A →Set Reset Time (Ex. A: 10 Sec)

6. Set timer unit

    -O 2E F5

    -O 2F 71(1: Sec ; 9: Minute)

7. Disable WDT

    -O 2E 30

    -O 2F 00