VMS-EHLR

Intel® Atom™ x6425E SoC Processor Railway System

Quick Reference Guide

1st Ed – 21 June 2022

Part No. E2017HAQ0A0R

FCC Statement

THIS DEVICE COMPLIES WITH PART 15 FCC RULES. OPERATION IS SUBJECT TO THE FOLLOWING TWO CONDITIONS:

(1) THIS DEVICE MAY NOT CAUSE HARMFUL INTERFERENCE.

(2) THIS DEVICE MUST ACCEPT ANY INTERFERENCE RECEIVED INCLUDING INTERFERENCE THAT MAY CAUSE UNDESIRED OPERATION.

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 INSTATLLED 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.

A Message to the Customer

Avalue Customer Services

Each and every Avalue's product is built to the most exacting specifications to ensure reliable performance in the harsh and demanding conditions typical of industrial environments. Whether your new Avalue device is destined for the laboratory or the factory floor, you can be assured that your product will provide the reliability and ease of operation for which the name Avalue has come to be known.

Your satisfaction is our primary concern. Here is a guide to Avalue's customer services. To ensure you get the full benefit of our services, please follow the instructions below carefully.

Technical Support

We want you to get the maximum performance from your products. So if you run into technical difficulties, we are here to help. For the most frequently asked questions, you can easily find answers in your product documentation. These answers are normally a lot more detailed than the ones we can give over the phone. So please consult the user's manual first.

To receive the latest version of the user's manual; please visit our Web site at:

http://www.avalue.com.tw/

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1. Getting Started

1.1 Safety Precautions

Warning!

Always completely disconnect the power cord from your chassis whenever you work with the hardware. Do not make connections while the power is on. Sensitive electronic components can be damaged by sudden power surges. Only experienced electronics personnel should open the PC chassis.

Caution!

Always ground yourself to remove any static charge before touching the CPU card. Modern electronic devices are very sensitive to static electric charges. As a safety precaution, use a grounding wrist strap at all times. Place all electronic components in a static-dissipative surface or static-shielded bag when they are not in the chassis.

1.2 Packing List

- 1 x VMS-EHLR Intel® Atom™ x6425E SoC Processor Railway System
- Accessory box included the following parts:
  — DRAM Heatsink to Heatsink for memory
  — L shape hex key to L shape hex key for screws on appearance
  — Rubber foots
  — Screws for M.2, mPCIe, 2.5" drive bay
  — Wire tie to Wire tie for HDMI cable

If any of the above items is damaged or missing, contact your retailer.

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1.3 System Specifications

System	
Processor	Intel Atom® x6425E Processor (1.5M Cache, up to 3.00 GHz)
System Memory	1x 260-Pin SODIMM Socket Max. Up to 32GB DDR4 3200MT/s
BIOS Information	AMI uEFI lBIOS 256 Mbit SPI Flash ROM
Watchdog Timer	H/W Reset, 1sec. ~ 65535sec.
H/W Status Monitor	Horizontal battery socket Supports wide operating temperature Supports no RTC battery mode
SBC	EBM-EHLR + EBM-EHLR BD-A
Expansion	
mPCIe (Size, Signal)	mPCIe support PCIeIII x1/ USB2.0 and SIM slot2(external)
M.2 (Key-X, Size, Signal)	M.2 Key-B 2242/3042/3052 support PCIeIII x1/ USB3.1 Gen.2 and SIM slot1 (external) M.2 Key-E 2230 for Wi-Fi & BT Module (PCIeIIIx 1/ USB2.0)
Storage	
M.2 (Key-X, Size, Signal)	M.2 2242 (SATA III)
2.5" Drive Bay (Height)	2.5" Front Access Drive Bay (SATA III), supports w/9.5mm SSD
Edge I/O (Front)	
USB Port	2-USB 3.2 Gen.2 (10Gbp/s)
Power Button	Push Button for Power on/off (w/LED)
Reset Button	Push Button for Reset (Hidden)
LED Indicator	3-LED indicator (PWR/Wi-Fi/LTE) Storage LED (Yellow)- M.2 B-key SATA/ 2.5''SSD Storage LTE LED (Green)- M.2 B-key PCIe/USB3 Wi-Fi LED (Green)- M.2 E key
Digital I/O	8-Bit 2.5KV Isolated GPIO in DB-9
CAN Bus	4-Pin CAN Bus H/L in DB-9
SIM Slot	2-Front Access SIM Slot
Antenna	3-Antenna Mount
Edge I/O (Rear)	
USB Port	USB 2.0 in M12-A code connector
COM Port	2-COM Port (RS-232/422/385 in DB-9 (BIOS & Jumper)) Support auto flow control via H/W
HDMI	HDMI 2.0
DP	DP 1.4
VGA	VGA

VMS-EHLR

Audio	Line-In, Line-Out and Mic-In in DB-15
LAN port	2-LAN Port in M12-X code connector
Edge I/O (Right)	
Antenna	2-Antenna Mount
Edge I/O (Left)	
Antenna	2-Antenna Mount
Internal I/O	
MIO	4-Pin DC in 10-Pin header for 2 x USB 2.0 reservation (JUSB1/2) 15-Pin wafer for VGA 7-Pin SATA Interface 2-Pin SATA PWR Buzzer 3-Pin ACC connector 3-Pin CAN bus 1 x Audio
GPS	
Chipset	u-blox NEO-M9N GNSS LCC module with Untethered Dead Reckoning and onboard sensors
GNSS	BeiDou, Galileo, GLONASS, GPS / QZSS
Display	
Graphic Chipset	Intel® UHD Graphics for 10th Gen Intel® Processors
Resolution	DP to HDMI cable cann't support 4K@60Hz, max support 1920x1080(60Hz)
Audio	
Audio Codec	Realtek ALC888S
Ethernet	
LAN Chipset	Intel® Ethernet Controller I210-IT
Specification	10/100/1000Base-T

LED Indicator — 4 x LED indicator (LAN for active, speed)

ACT/LINK		SPEED	
LED	Definition	LED	Definition
Light Off	No Link	Solid Orange	1G
Solid Yellow	Connection	Solid Green	100M
Flashing	Activity	Light Off	10M

Power Requirement	
DC Input	Typical 24Vdc (+9~ 36Vdc) w/ Isolation TVS component for surge protection Reverse current/voltage protection
DC Input Connector	M12-A code (4 Poles: V+. V-, GND, IGN)

ACPI	Single power ATX Support S0,S3, S4, S5 ACPI 5.0 Compliant
Power Mode	AT/ATX (ATX is default setting)
Mechanical & Environment	
Operating Temp.	-40°C ~ 70°C (w/SSD) ambient w/ 0.2 or 0.5 air flow. Follow EN50155, Class OT4 -40 ~ 70°C, 85°C for 10 minutes
Storage Temp.	-40°C ~ 75°C (-40°F ~ 167°F)
Operating Humidity	40°C @ 95% Relative Humidity, Non-condensing
Dimension (W*L*H)	240*150*55 mm
Weight	2.2kg
Vibration Test (operation)	**Avalue Standard:** 1. PSD: 0.0505G²/Hz , 5 Grms 2. Operation mode 3. Test Frequency : 5-500Hz 4. Test Axis : X,Y and Z axis 5. 30 minutes per each axis 6. IEC 60068-2-64 Test:Fh 7. Storage : SSD **MIL-STD testing:** 1. Operating with SSD : MIL-STD-810G, Method 514.6, Category 4, common carrier US highway truck vibration exposure 2. Non-Operating with SSD : MIL-STD-810G, Method 514.6, Category 24, minimum integrity test
Vibration Test (non-operation)	1. Test Acceleration : 2G 2. Test frequency : 5~500 Hz 3. Sweep：1 Oct/ per one minute. (logarithmic) 4. Test Axis : X,Y and Z axis Test time :30 min. each axis 5. System condition : Non-Operating mode 6. Reference IEC 60068-2-6 Testing procedures
Package vibration test	1. PSD: 0.026G²/Hz , 2.16 Grms 2. Non-operation mode 3. Test Frequency : 5-500Hz 4. Test Axis : X,Y and Z axis 5. 30 min. per each axis 6. IEC 60068-2-64 Test: Fh
Shock	**Avalue Standard:** 1. Wave form：Half Sine Wave 2. Acceleration Rate：55g for operation mode 3. Duration Time：11ms

	4. No. of Shock：+/- XYZ axis 18 times 5. Operation mode 6. Reference IEC 60068-2-27 Testing procedures Test Eb: Shock Test **MIL-STD testing:** 1. Operating with SSD: MIL-STD-810H, Method 516.8, Procedure I, functional shock=20G 2. Non-Operating with SSD: MIL-STD-810H, Method 516.8, Procedure V, crash hazard shock test=75G
Drop Test	1. One corner , three edges, six faces 2. ISTA 2A, IEC-60068-2-32 Test:Ed
IP Rating	IP50
Mounting Kit	Wall mount kit (standard) DIN RAIL (optional)
Software Support	
OS Information	Win 10 64bit / Linux
Certification	
Certification Information	Standard: CE, FCC Class A, UKCA, EN50155 (24Vdc in), EN50121-3-2, EN45545-2 EN 50155: 2017 for 24V DC in - Ambient temperature EN 50155, Class OT4 (-40~70°C), 85°C for 10 minutes - Interruptions of voltage supply class S2 - Supply change over class C1, C2 - EMC EN 50121-3-2: 2016 - Environment EN 60068-2-1, EN 60068-2-2 - Shock and vibration IEC 61373
Power Management	
Certification Information	■ **Vehicle Power Mode** BIOS sets up as Vehicle PC ACC Function (JACC1) sets up as Enable AT/ATX Jumper (SW1) sets up as AT ■ **Industrial PC Power Mode** BIOS sets up as Industrial PC ACC Function (JACC1) sets up as Disable AT/ATX Jumper (SW1) sets up as AT or ATX ■ **ACC Function (JACC1)** It is Vehicle PC power mode (Power on/off controlled by Ignition or Power button) if ACC Function sets up as Enable. It is Industrial PC power mode (Power on/off controlled by Power

button) if ACC Function sets up as Disable.

■ **AT/ATX Jumper (SW1)**

This function will be active if ACC Function (JACC1) sets up Disable (Industrial PC power mode).

■ **Power Input Selection (SW2)**

To set up the DC input voltage is +12Vdc, +24Vdc or wide range from +9~36Vdc.

■ **Vin Work/Shutdown (BIOS)**

To set up the startup/shutdown voltage in accordance with DC input voltage as +12Vdc, +24Vdc or wide range from +9~36Vdc.

Mode	+12Vdc		+24Vdc	
	Startup	Shutdown	Startup	Shutdown
1	11.5V	10.5V	23V	21V
2	12.0V	11.0V	24V	22V
3	12.5V	11.0V	25V	22V
4	12.5V	11.5V	25V	23V

The following behaviors happen if ACC Function (JACC1) sets up as Enable:

- System won't power on if the DC Input voltage is lower than the startup voltage.

- System will automatically power on, if the DC input voltage reaches the startup voltage.

- System will automatically power on, if the DC input voltage reaches the startup voltage and power on delay ends up (the power on delay is Enable in BIOS).

- System will automatically power off, if the DC input voltage is lower than shutdown voltage, and the time exceeds 60sec. If it still doesn't power off and the time exceeds 6min, System will be forced power off immediately.

■ **Power on delay time is selectable by BIOS in following hierarchies**

10sec / 30sec / 1min / 5min / 10 min / 15min / 30min / 1hr.

The delay time starts to count if ignition turns on.

User can skip the delay time to turn on System if pressing power button.

System will automatically power on if the delay time ends up.

■ **Power off delay time is selectable by BIOS in following hierarchies**

20sec / 1min / 5min / 10min / 30min / 1hr / 6hr / 18hr.

The delay time starts to count if ignition turns off.

User can skip the delay time to turn off system if pressing power button.

	system will automatically power off, if the delay time ends up. If it still doesn't power off and the time exceeds 60sec, system will be forced power off immediately.
	■ **S3, S4 suspend mode** In the vehicle power mode, the S3/S4 is only able to resume from power button.
	■ The status of Ignition On/Off is detectable by SW
	■ The status of Low battery is detectable by SW
	■ System will shut down automatically when internal temperature is reach the setting (it is selectable by BIOS).
	■ System will cancel the delay function, and then continue to operate normally, if the ignition is turned on again and the power off delay is in process.
	■ System will shut down completely, and then power on again automatically, if the ignition is turned on again and the power off delay ended.
	■ System will cancel the delay and stayed in power off status, if the ignition is turned off again and power on delay is in process.
	■ System is only 10mA if it is off.

Note: Specifications are subject to change without notice.

1.4 System Overview

1.4.1   Front View
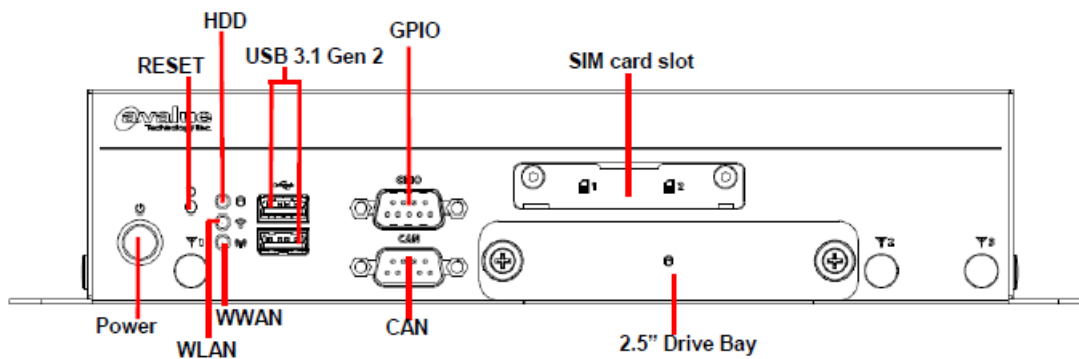
1.4.2   Rear View
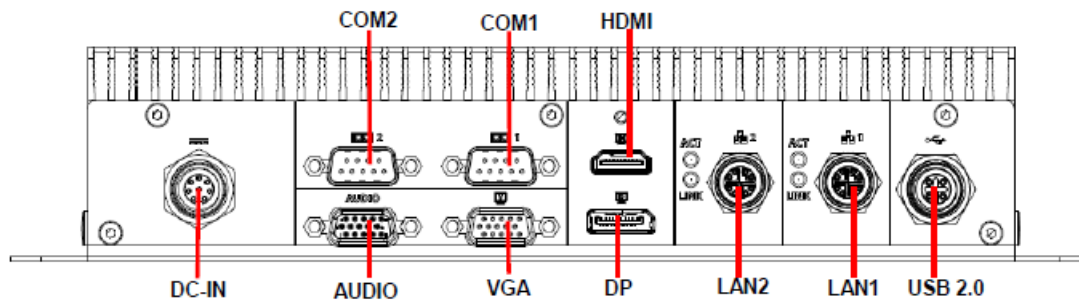
Connectors

Label	Function	Note
Power	Power on button	
USB 3.1 Gen 2	2 x USB 3.1 Gen 2 connector	
SIM card slot	2 x SIM card slot	
2.5" Drive Bay	2.5" Driver Bay socket	
GPIO	General purpose I/O connector	
CAN	CAN connector	
WWAN	WWAN Indicator	
WLAN	WLAN Indicator	
HDD	HDD Indicator	
RESET	Reset button	
LAN1/2	2 x M12-X code Ethernet connector	
DP	DP connector	
COM1/2	Serial port 1/2 connector	
DC-IN	M12-A code DC-IN connector	
HDMI	2 x HDMI connector	
VGA	VGA connector	
AUDIO	Audio connector	1 x Mic-In, 1 x Line-Out, 1 x Line-in
USB 2.0	M12-A code USB2.0 connector	

1.5 System Dimensions
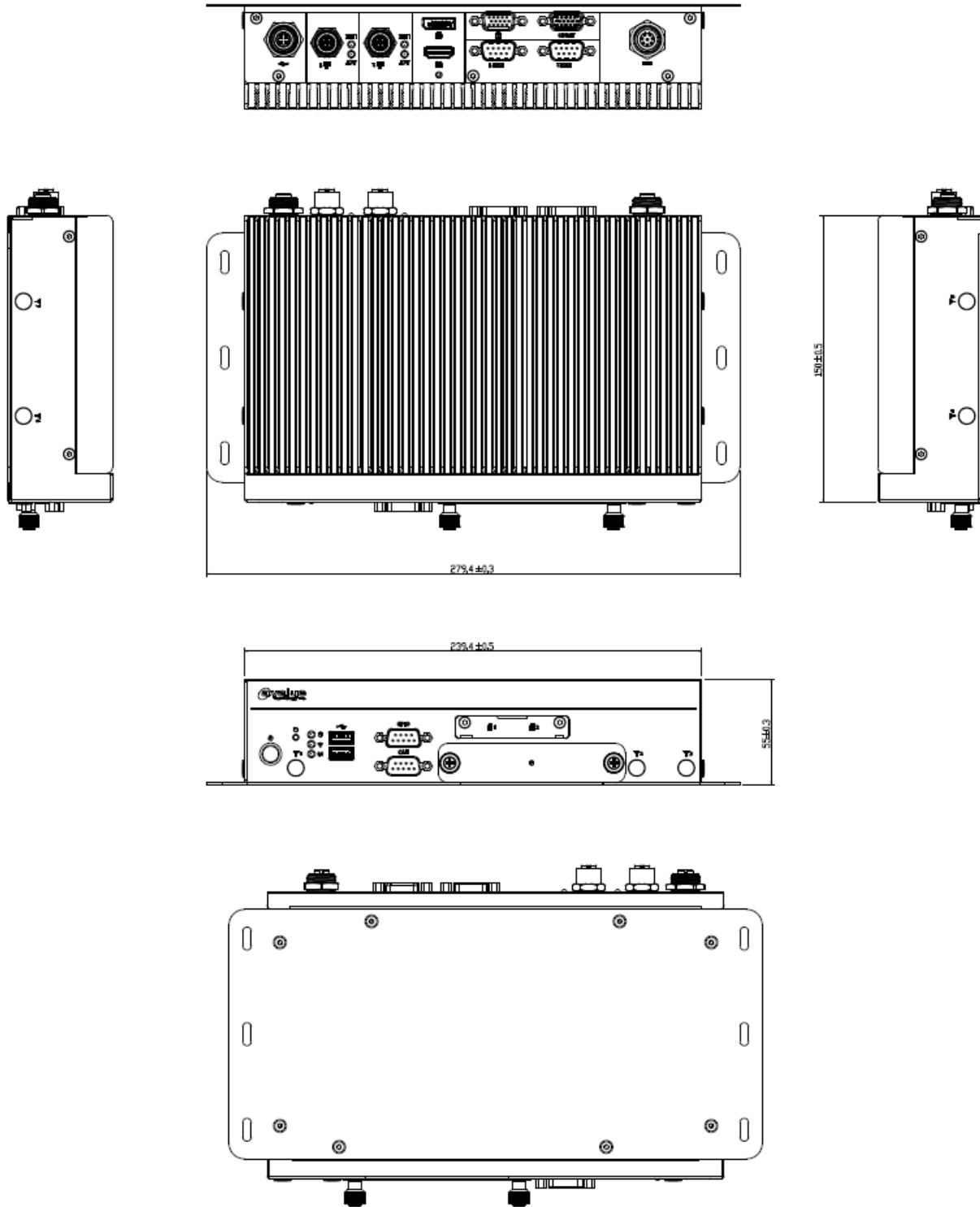
(Unit: mm)

2. Hardware Configuration

Jumper and Connector Setting, Driver and BIOS Installing

For advanced information, please refer to:

1- EBM-EHLR, EBM-EHLR DB-A included in this manual.

Note: If you need more information, please visit our website:

http://www.avalue.com.tw

2.1 VMS-EHLR connector mapping

2.1.1   General purpose I/O connector (GPIO)
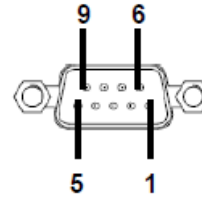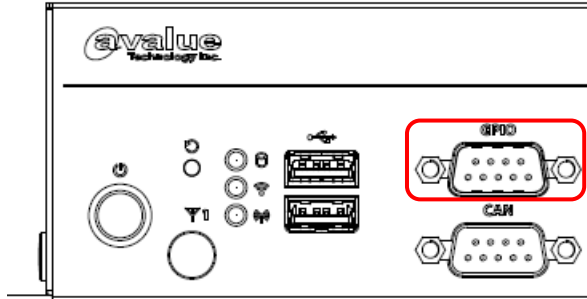
Signal	PIN	PIN	Signal
DIO_GP20	1	6	DIO_GP10
DIO_GP21	2	7	DIO_GP11
DIO_GP22	3	8	DIO_GP12
DIO_GP23	4	9	DIO_GP13
GND	5		

2.1.2   CAN connector (CAN)
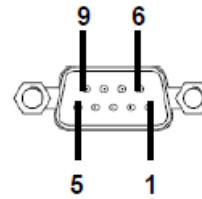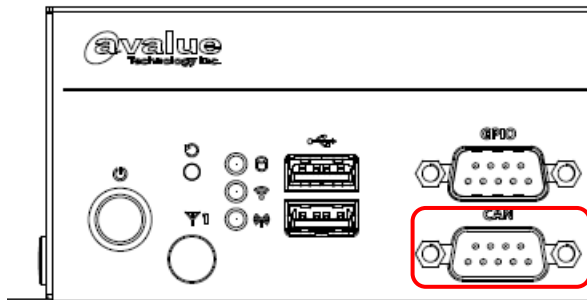
Signal	PIN	PIN	Signal
NC	1	6	NC
CAN_L	2	7	NC
CAN_H	3	8	NC
NC	4	9	NC
GND	5		

2.1.3 Serial Port 1/2 connector (COM1/2)
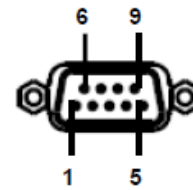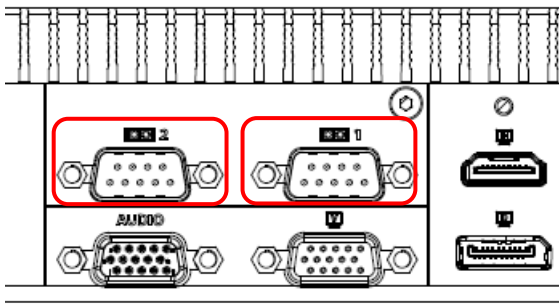
In RS-232 Mode

Signal	PIN	PIN	Signal
NDCD#	1	6	NDSR#
NRXD	2	7	NRTS#
NTXD	3	8	NCTS#
NDTR#	4	9	NRI#
GND	5		

In RS-422 Mode

Signal	PIN	PIN	Signal
TxD1-	1	6	NC
TxD1+	2	7	NC
RxD1+	3	8	NC
RxD1-	4	9	NC
GND	5		

In RS-485 Mode

Signal	PIN	PIN	Signal
DATA1-	1	6	NC
DATA1+	2	7	NC
NC	3	8	NC
NC	4	9	NC
GND	5		

2.1.4   VGA connector (VGA)
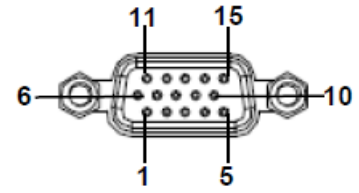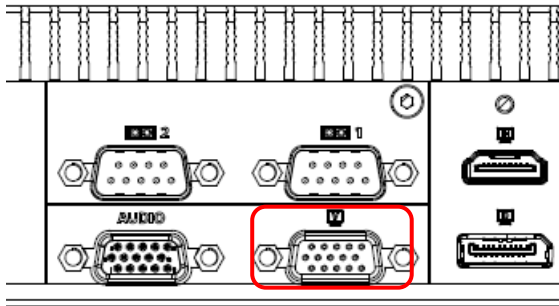
PIN	Signal	PIN	Signal	PIN	Signal
1	RED	6	GND	11	NC
2	GREEN	7	GND	12	DDCDAT
3	BLUE	8	GND	13	HSYNC
4	NC	9	+5V	14	VSYNS
5	GND	10	GND	15	DDCCLK

2.1.5   Audio connector (AUDIO)
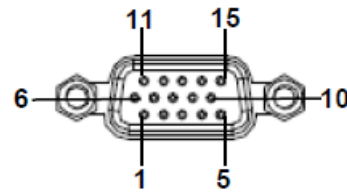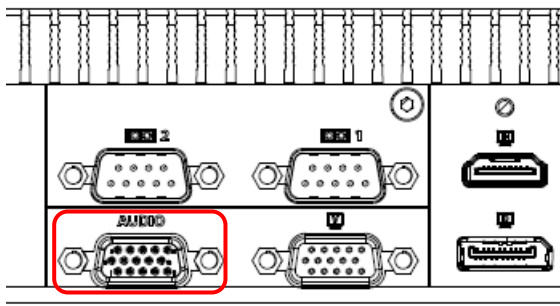
PIN	Signal	PIN	Signal	PIN	Signal
1	LINEOUT_L	6	MICIN_L	11	LINEIN_L
2	LINEOUT_JD	7	MICIN_JD	12	LINEIN_JD
3	GND	8	GND	13	GND
4	GND	9	GND	14	GND
5	LINEOUT_R	10	MICIN_R	15	LINEIN_R

2.2 EBM-EHLR and EBM-EHLR DB-A Overviews

2.2.1   EBM-EHLR
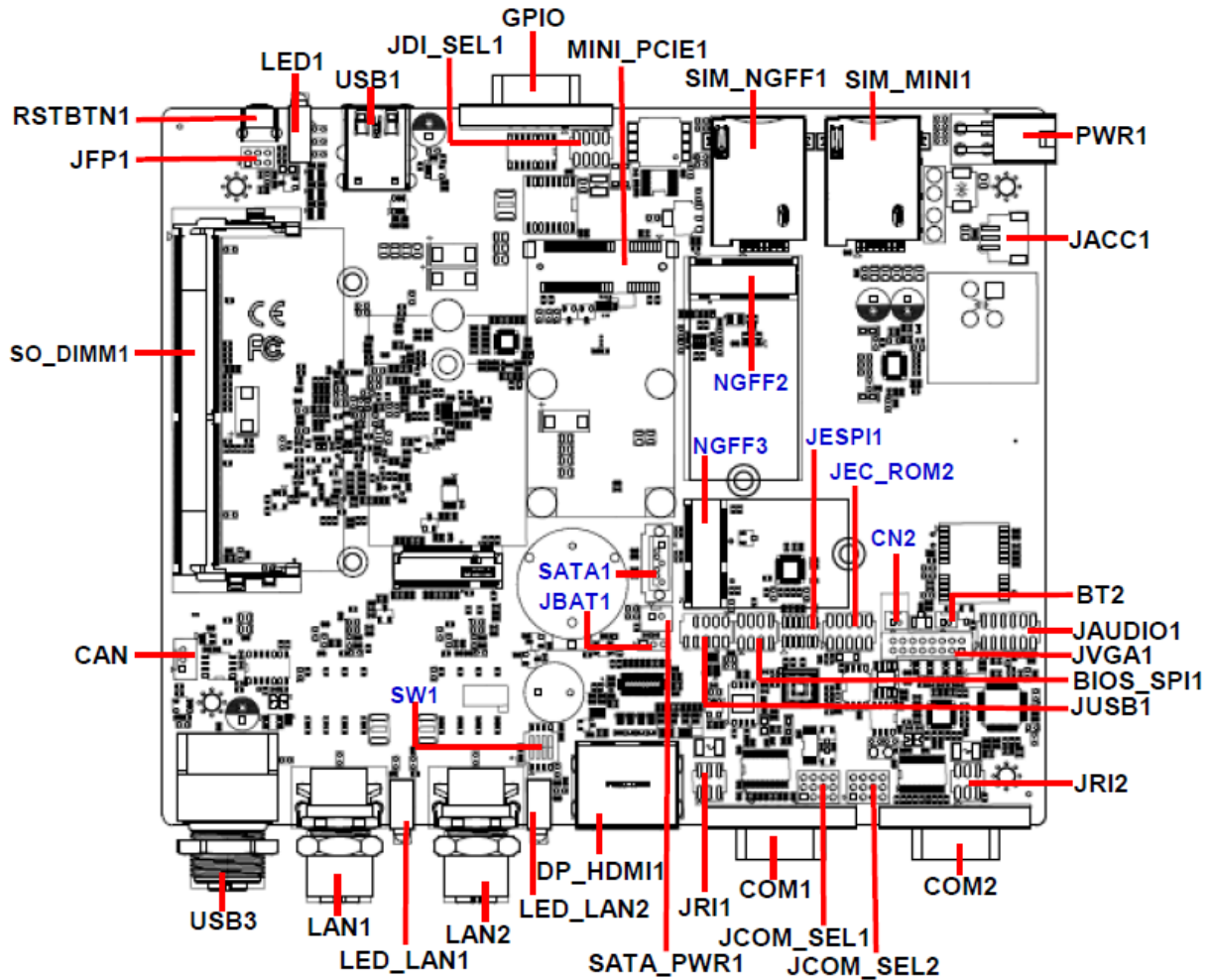
2.2.2   EBM-EHLR DB-A
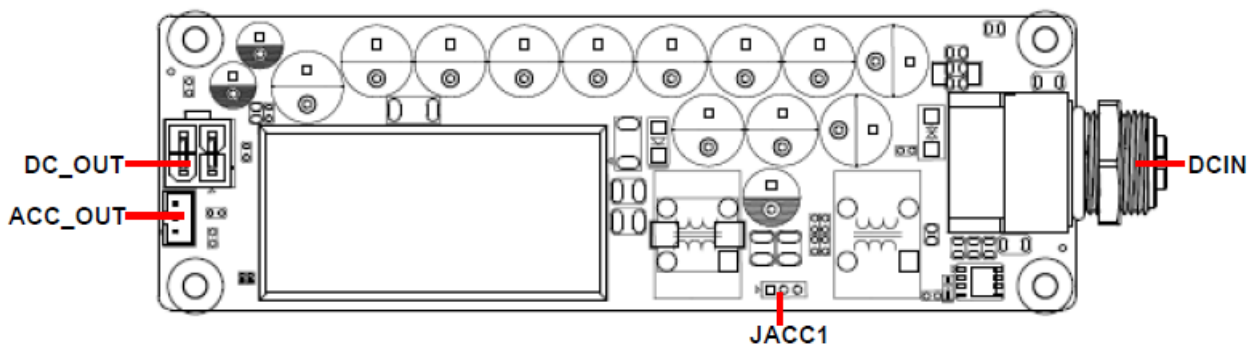
2.3 EBM-EHLR Jumper & Connector list

Jumpers

Label	Function	Note
JBAT1	Clear CMOS	3 x 1 header, pitch 2.00 mm
JRI1/2	COM 1/2 pin 9 signal selector	3 x 2 header, pitch 2.00 mm
SW1	Multi-function select	DIP switch 8pin
JCOM_SEL1/2	Serial port 1/2 – RS232/422/485 mode select	4 x 3 header, pitch 2.00 mm
JDI_SEL1	Digital Input selector	4 x 2 header, pitch 2.00 mm

Connectors

Label	Function	Note
USB1	2 x USB 3.1 connector	
USB3	USB 2.0 connector	
JUSB1	USB connector	5 x 2 header, pitch 2.00 mm
BT2	Battery connector	2 x 1 wafer, pitch 1.25 mm
LAN1/2	M12-X code Ethernet 1/2	
GPIO	General purpose I/O connector	
COM1/2	Serial port 1/2 connector	
CAN	CAN Module connector	3 x 1 wafer, pitch 2.00 mm
DP_HDMI1	DP connector HDMI connector	
MINI_PCIE1	Mini PCI Express connector	
RSTBTN1	Reset button	
LED1	LED Power HDD	
SIM_NGFF1	SIM card slot M.2 KEY-B 2242/3042/3052 connector	
NGFF2	M.2 KEY-B 2242/3042/3052 connector	
NGFF3	M.2 KEY-E 2230 connector	
SIM_MINI1	SIM card slot	
SO_DIMM1	DDR4 SODIMM connector	
JESPI1	ESPI connector	6 x 2 header, pitch 1.27 mm
SATA1	Serial ATA connector	
SATA_PWR1	SATA power connector	2 x 1 wafer, pitch 2.00 mm
JEC_ROM2	EC Debug connector	5 x 2 header, pitch 2.00 mm

PWR1	Power connector	2 x 2 wafer, pitch 4.20 mm
JFP1	Front Panel connector	3 x 2 header, pitch 2.00 mm
JACC1	Vehicle/Industrial PC power mode selector	3 x 1 wafer, pitch 2.00 mm
JAUDIO1	Audio connector	6 x 2 header, pitch 2.00 mm
JVGA1	VGA connector	8 x 2 wafer, pitch 2.00 mm
BIOS_SPI1	BIOS SPI connector	4 x 2 header, pitch 2.00 mm
LED_LAN1/2	4 x LED indicator	
CN2	GPS connector	2 x 1 wafer, pitch 1.25 mm

2.4 EBM-EHLR Jumpers & Connectors settings

2.4.1   COM 1/2 pin 9 signal selector (JRI1/2)

Ring*

+5V

+12V
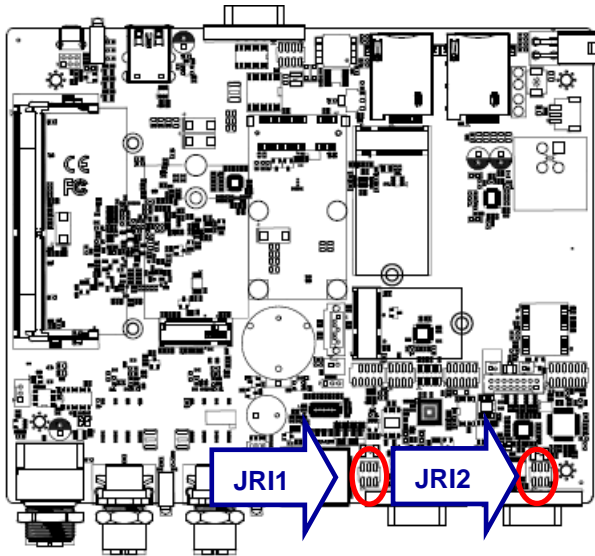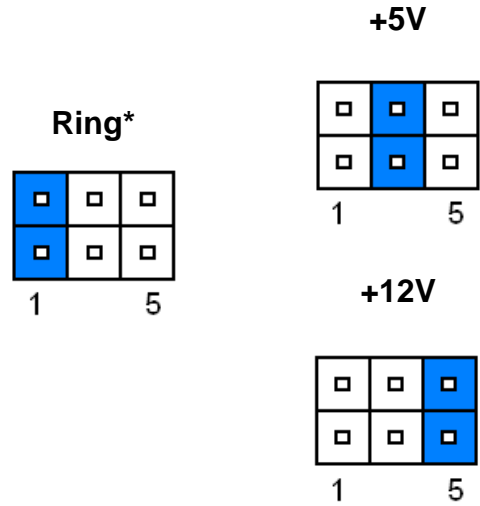
* Default

2.4.2   Serial port 1/2 – RS232/422/485 mode select (JCOM_SEL1/2)

RS-232*

RS422/485
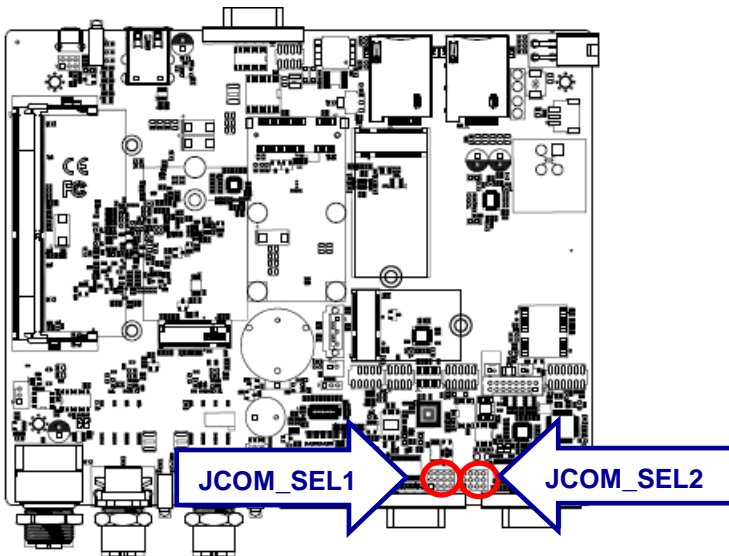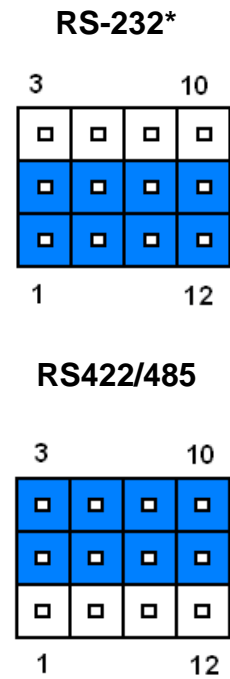
*Default

2.4.3 Clear CMOS (JBAT1)

Protect*

1

Clear CMOS

1
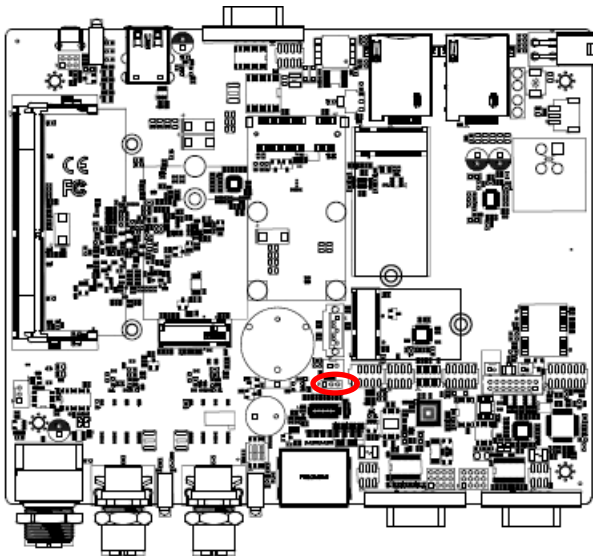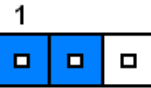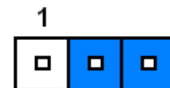
*Default

2.4.4 Digital Input selector (JDI_SEL1)

Dry*

7   1

Wet

7   1
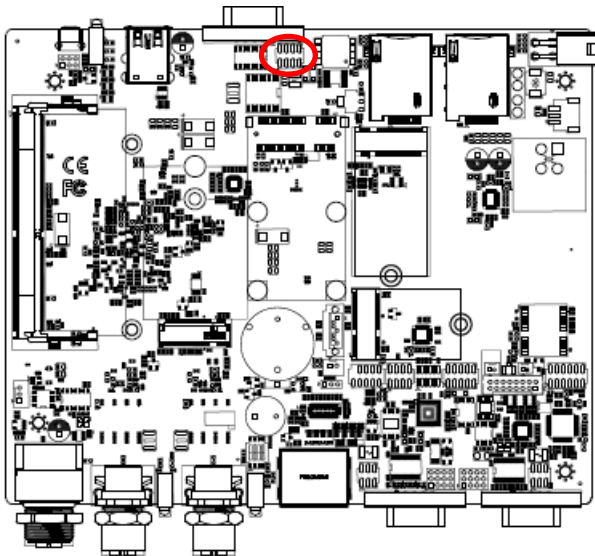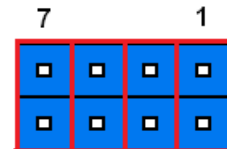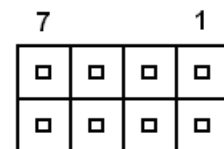
* Default

Mode	Digital Input
Dry	Logic level 1: Close to GND
	Logic level 0: Open
Wet	Logic level 1: < 3V
	Logic level 0: 5V ~ 30V

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2.4.5   Multi-function select (SW1)

on

1
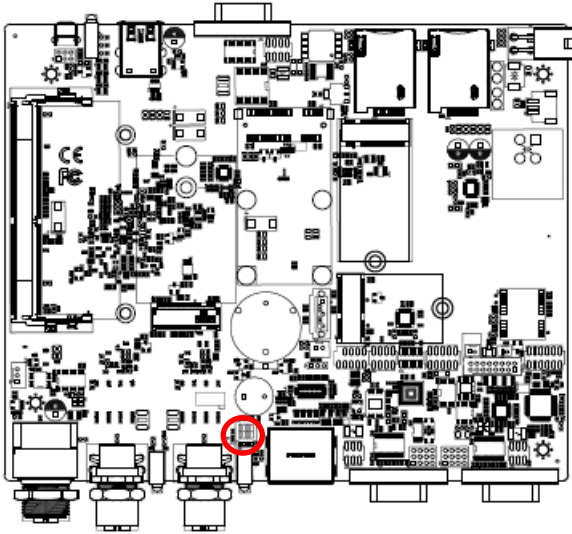
* Default

Power mode

	AT*	ATX
1	ON	OFF

DP++ mode

	DisplayPort*	HDMI
2	ON	OFF

Battery Type

	+12V*	+24V	+9V~+36V
3	OFF	ON	OFF
4	ON	ON	OFF

2.4.6   ESPI connector (JESPI1)
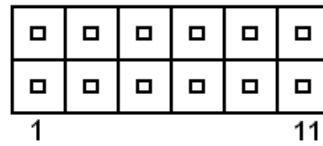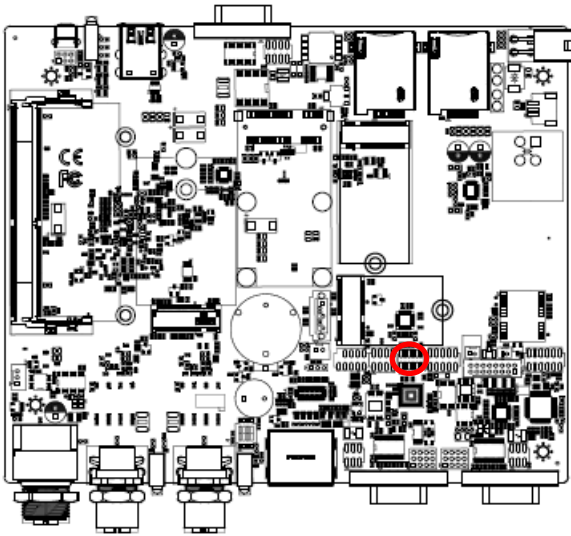
Signal	PIN	PIN	Signal
CN_ESPI_IO0	1	2	+3.3V
CN_ESPI_IO1	3	4	PLT_RST1#
CN_ESPI_IO2	5	6	ESPI_CS#
CN_ESPI_IO3	7	8	CN_ESPI_CLK
NC	9	10	GND
ESPI_RST	11	12	ESPI_ALERT#2

2.4.7   EC Debug connector (JEC_ROM2)
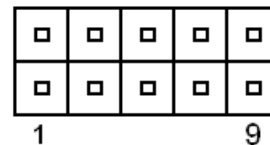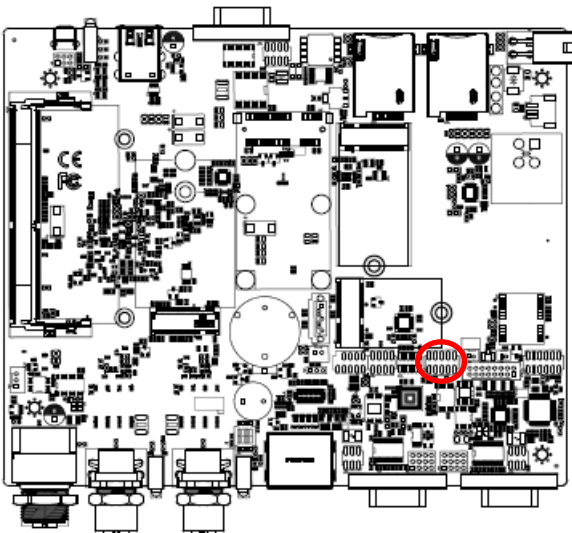
Signal	PIN	PIN	Signal
+VSPI_EC	1	2	GND
EC_FSCE#	3	4	EC_FSCK
EC_FMISO	5	6	EC_FMOSI
EC_HOLD#	7	8	NC
EC_SMCLK_DBG	9	10	EC_SMDAT_DBG

2.4.8　CAN Module connector (CAN)
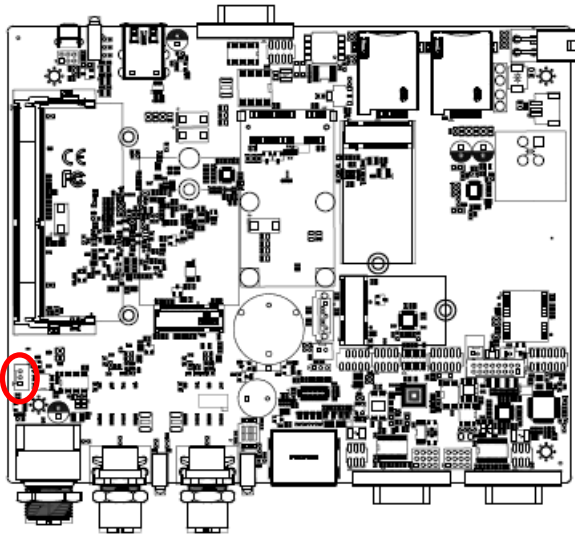
Signal	PIN
GND	3
CAN_L	2
CAN_H	1

2.4.9　Battery connector (BT2)
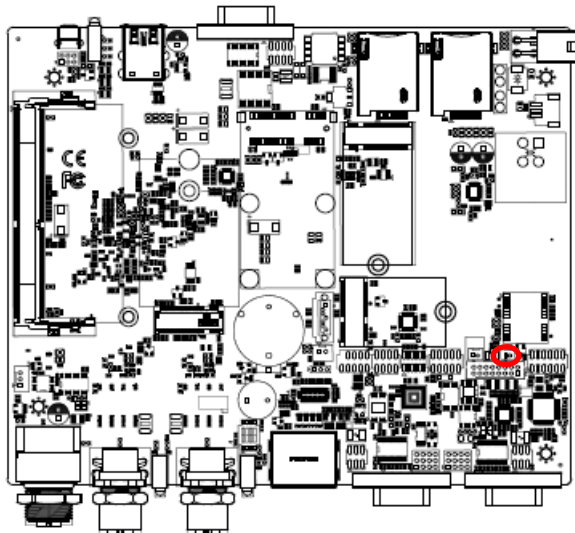
Signal	PIN
+RTCBATT	1
GND	2

2.4.10   GPS connector (CN2)
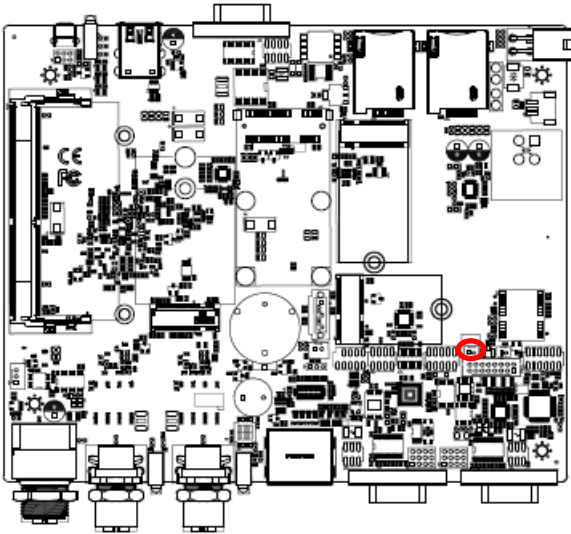
Signal	PIN
GPS_TIMEPULSE	1
GND	2

2.4.11   Front Panel connector (JFP1)
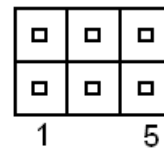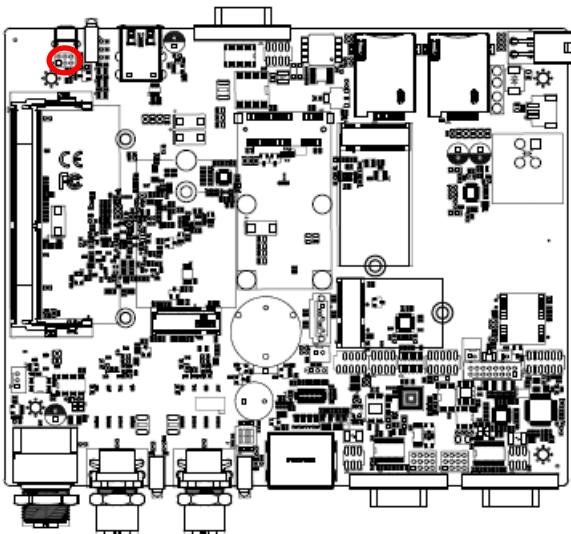
Signal	PIN	PIN	Signal
PWRBTN#_R	1	2	GND
PWR_LED+	3	4	PWR_LED-
PM_R_SYSRST#	5	6	GND

2.4.12 SATA power connector (SATA_PWR1)

1
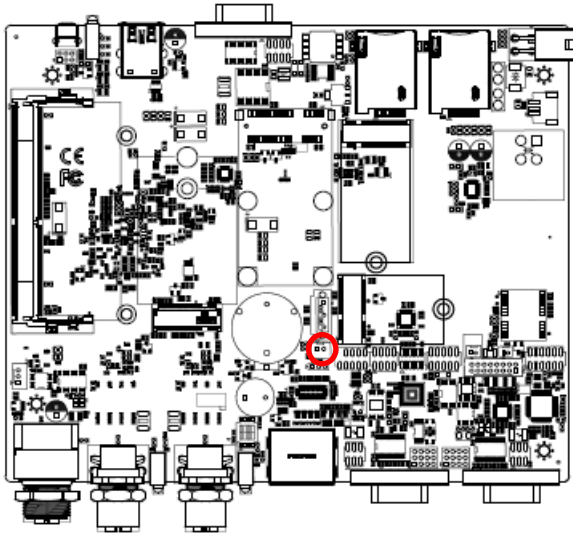
Signal	PIN
GND	1
+5V	2

2.4.13 Power connector (PWR1)

1
2
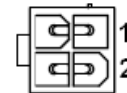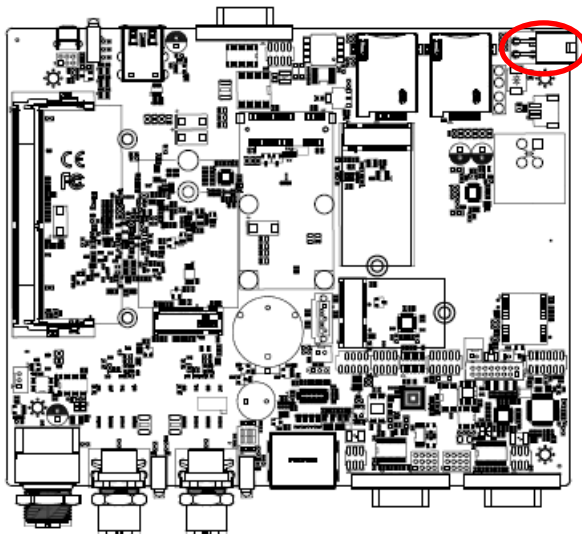
Signal	PIN	PIN	Signal
+VIN_BAT	3	1	GND
+VIN_BAT	4	2	GND

2.4.14   USB connector (JUSB1)
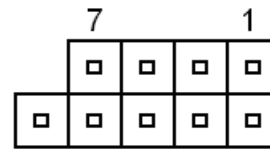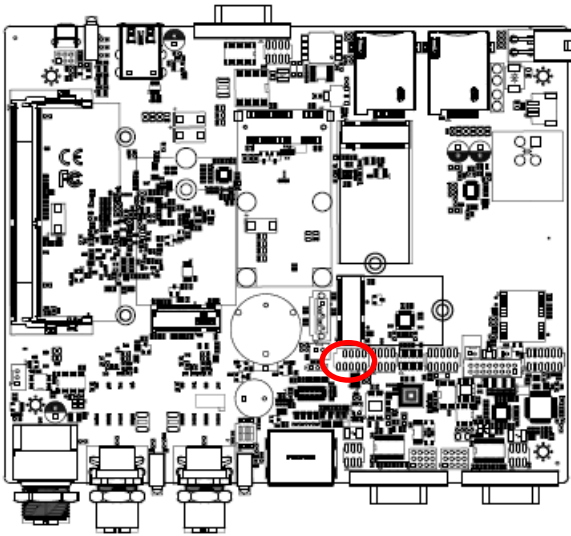
Signal	PIN	PIN	Signal
+5VSB	1	2	+5VSB
USB_R_DN4	3	4	USB_R_DN5
USB_R_DP4	5	6	USB_R_DP5
GND	7	8	GND
		10	GND

2.4.15   Vehicle/Industrial PC power mode selector (JACC1)
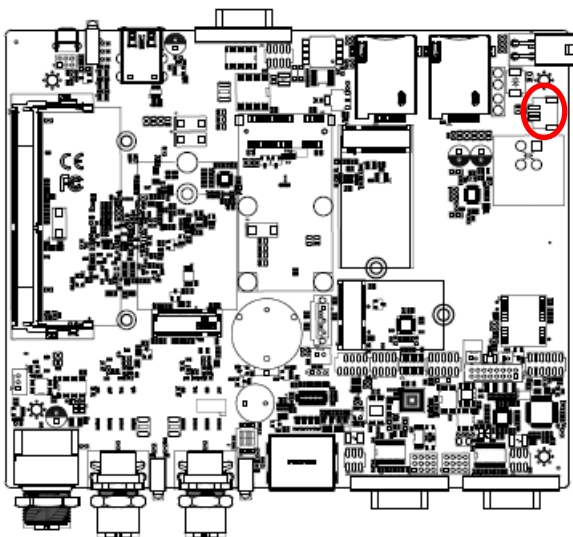
Signal	PIN
GND	3
ACC_ON	2
+VIN_1	1

2.4.16   Audio connector (JAUDIO1)
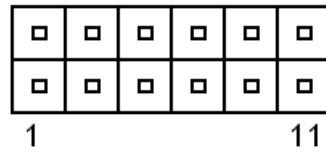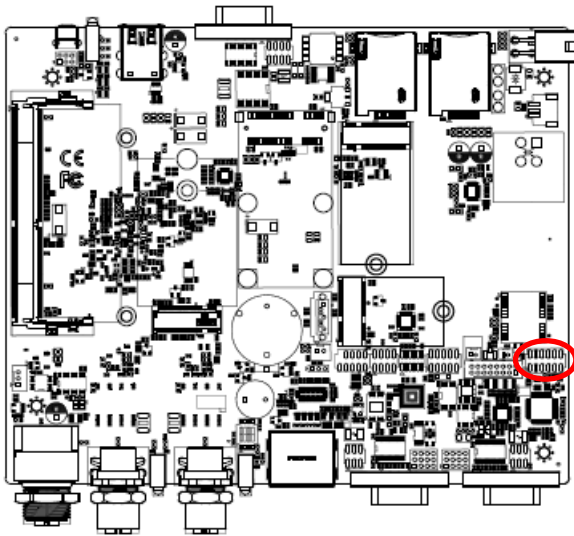
Signal	PIN	PIN	Signal
LINEOUT_R	1	2	LINEOUT_L
GND	3	4	GND
LINEIN_R	5	6	LINEIN_L
MICIN_R	7	8	MICIN_L
LINEOUT1_JD	9	10	LINE1-JD
MIC1_JD	11	12	GND

2.4.16.1 Signal Description – Audio connector (JAUDIO1)

Signal	Signal Description
LINE1-JD	AUDIO IN (LINE_RIN/LIN) sense pin
MIC1_JD	MIC IN (MIC_RIN/LIN) sense pin
LINEOUT1_JD	AUDIO OUT (ROUT/LOUT) sense pin

2.4.17   VGA connector (JVGA1)
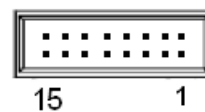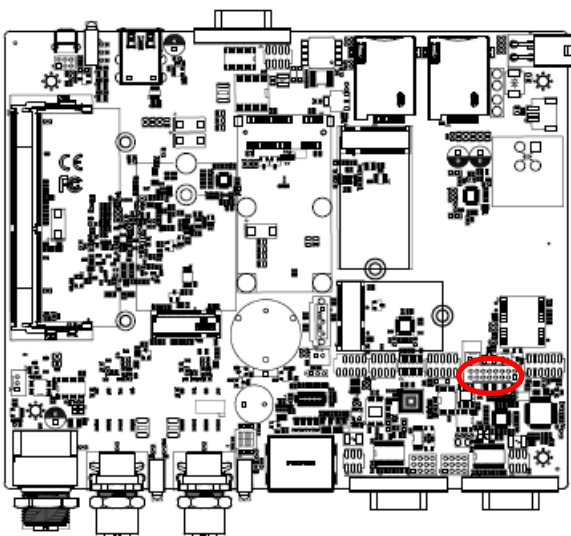
Signal	PIN	PIN	Signal
+5V	1	2	VGA_RED
GND	3	4	VGA_GREEN
NC	5	6	VGA_BLUE
VGA_DDCDAT	7	8	NC
VGA_HSYNC_R	9	10	GND
VGA_VSYNC_R	11	12	GND
VGA_DDCCLK	13	14	GND
GND	15	16	GND

2.4.18   BIOS SPI connector (BIOS_SPI1)
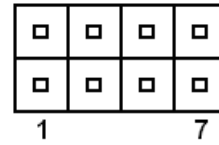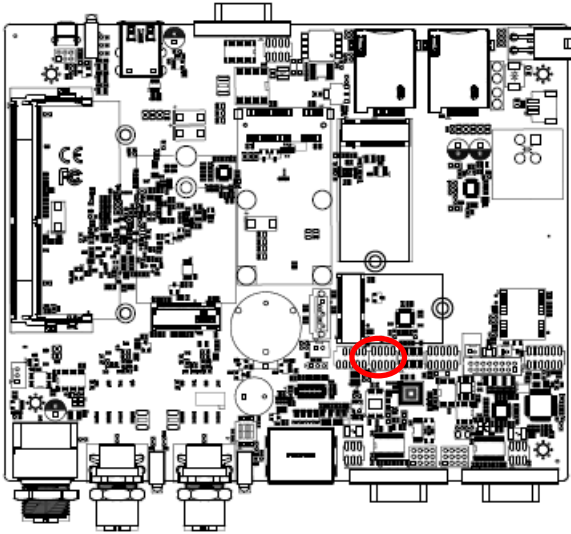
Signal	PIN	PIN	Signal
+3.3VSB	1	2	GND
SPI_CS#0	3	4	SPI_CLK
SPI_MISO	5	6	SPI_MOSI
SPI_HOLD#	7	8	SPI_WP#

2.5 EBM-EHLR DB-A Jumper & Connector list

Jumpers

Label	Function	Note
JACC1	Vehicle/Industrial PC power mode selector	3 x 1 wafer, pitch 2.00 mm

Connectors

Label	Function	Note
DCIN	DC Input connector	
DC_OUT	DC Output connector	2 x 2 wafer, pitch 4.20 mm
ACC_OUT	ACC Output connector	3 x 1 wafer, pitch 2.00 mm

2.6 EBM-EHLR DB-A Jumpers & Connectors settings

2.6.1 Vehicle/Industrial PC power mode selector (JACC1)

Disable

1

Enable*

1
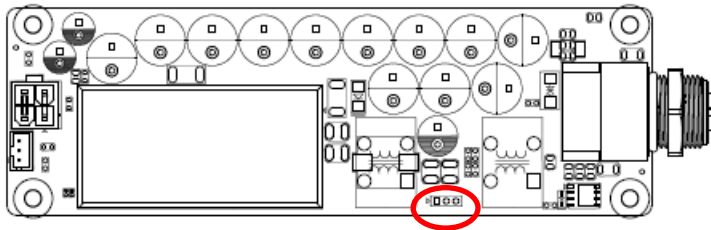
***Default**
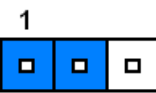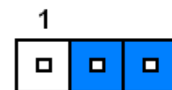
2.6.2 ACC Output connector (ACC_OUT)

1
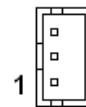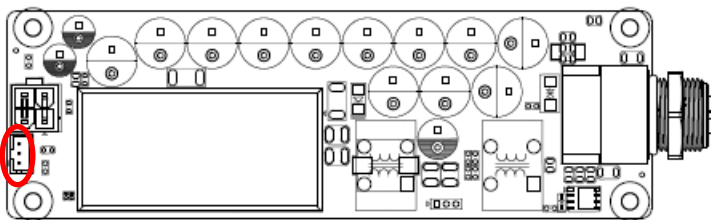
Signal	PIN
GND	3
ACC_OUT	2
NC	1

2.6.3 DC Output connector (DC_OUT)

3
1
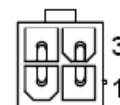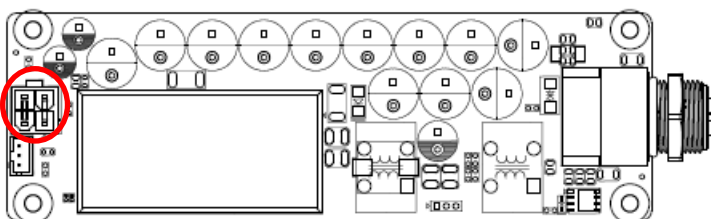
Signal	PIN	PIN	Signal
+12V	4	3	+12V
GND	2	1	GND

2.7 Installing Hard Disk, SIM card & Memory
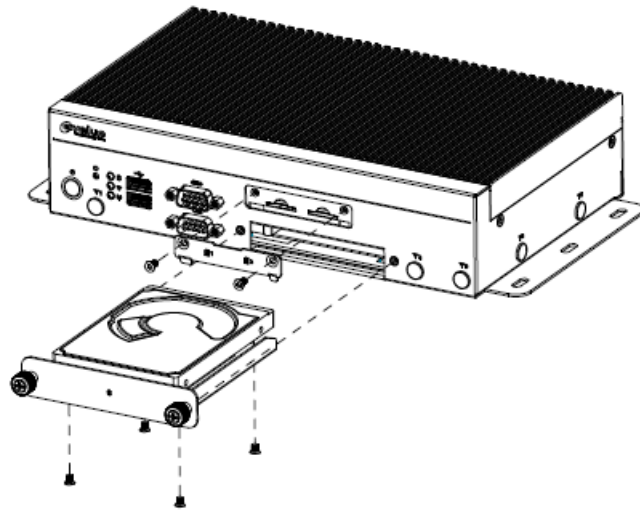
Step 1. Unfasten 4 screws from the HDD bracket/SIM card slot and take it off.

Step 2. Remove 4 screws to release the HDD bracket.

Step 3. Slide HDD/SIM card into its brackets until properly seated.

Step 4. Secure HDD by means of 4 screws.

Step 5. Insert HDD bracket into designated locations and fasten with 2 screws to complete HDD installation.
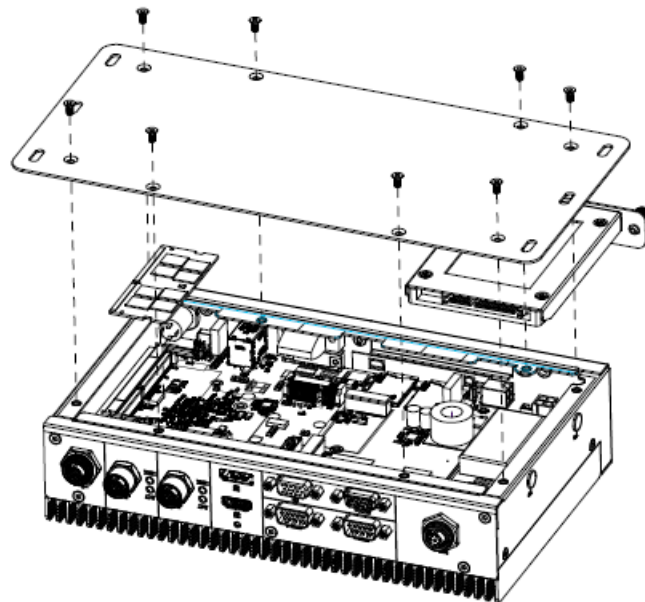
Step 1. Unfasten 2 screws from the HDD bracket and take it off.

Step 2. Remove 8 screws from the bottom of your system and take it off.

Step 3. Slide the DDR4 SODIMM into the memory socket and press it down until properly seated.

2.8 HDMI Cable Lock

Step 1.   Lock the cable tie on the screw to secure the HDMI cable.

3.BIOS Setup

3.1 Introduction

The BIOS setup program allows users to modify the basic system configuration. In this following chapter will describe how to access the BIOS setup program and the configuration options that may be changed.

3.2 Starting Setup

AMI BIOS™ is immediately activated when you first power on the computer. The BIOS reads the system information contained in the NVRAM and begins the process of checking out the system and configuring it. When it finishes, the BIOS will seek an operating system on one of the disks and then launch and turn control over to the operating system.

While the BIOS is in control, the Setup program can be activated in one of two ways:
By pressing <F2> or <Del> immediately after switching the system on, or
By pressing the <F2> or <Del> key when the following message appears briefly at the left-top of the screen during the POST (Power On Self Test).

Press <F2> or <Del> to enter SETUP

If the message disappears before you respond and you still wish to enter Setup, restart the system to try again by turning it OFF then ON or pressing the "RESET" button on the system case. You may also restart by simultaneously pressing <Ctrl>, <Alt>, and <Delete> keys.

3.3 Using Setup

In general, you use the arrow keys to highlight items, press <Enter> to select, use the PageUp and PageDown keys to change entries, press <F1> for help and press <Esc> to quit. The following table provides more detail about how to navigate in the Setup program using the keyboard.

Button	Description
↑	Move to previous item
↓	Move to next item
←	Move to the item in the left hand
→	Move to the item in the right hand
Esc key	Main Menu -- Quit and not save changes into NVRAM Status Page Setup Menu and Option Page Setup Menu -- Exit current page and return to Main Menu
+ key	Increase the numeric value or make changes
- key	Decrease the numeric value or make changes
F1 key	General help, only for Status Page Setup Menu and Option Page Setup Menu
F2 key	Previous Values
F3 key	Optimized defaults
F4 key	Save & Exit Setup

- **Navigating Through The Menu Bar**
  Use the left and right arrow keys to choose the menu you want to be in.

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

- **To Display a Sub Menu**
  Use the arrow keys to move the cursor to the sub menu you want. Then press <Enter>.   A "➢" pointer marks all sub menus.

3.4 Getting Help

Press F1 to pop up a small help window that describes the appropriate keys to use and the possible selections for the highlighted item. To exit the Help Window press <Esc> or the F1 key again.

3.5 In Case of Problems

If, after making and saving system changes with Setup, you discover that your computer no longer is able to boot, the BIOS supports an override to the NVRAM settings which resets your system to its defaults.

The best advice is to only alter settings which you thoroughly understand. To this end, we strongly recommend that you avoid making any changes to the chipset defaults. These defaults have been carefully chosen by both your systems manufacturer to provide the absolute maximum performance and reliability. Even a seemingly small change to the chipset setup has the potential for causing you to use the override.

3.6 BIOS setup

Once you enter the Aptio Setup Utility, the Main Menu will appear on the screen. The Main Menu allows you to select from several setup functions and exit choices. Use the arrow keys to select among the items and press <Enter> to accept and enter the sub-menu.

3.6.1 Main Menu

This section allows you to record some basic hardware configurations in your computer and set the system clock.

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

    BIOS Information                                     Choose the system default
    BIOS Vendor                  American Megatrends     language
    Core Version                 5.19
    Compliancy                   UEFI 2.7; PI 1.6
    Project Version              1AWHS 0.11 x64
    Build Date and Time          06/16/2022 13:35:18
    Access Level                 Administrator
    EC 5571 Firmware             08
    BIOS Name                    VMSEHL0A

    System Language              [English]
  ▶ Intel RC

    System Date                  [Thu 06/16/2022]        →←: Select Screen
    System Time                  [15:04:47]              ↑↓: Select Item
                                                         Enter: Select
                                                         +/−: Change Opt.
                                                         F1: General Help
                                                         F2: Previous Values
                                                         F3: Optimized Defaults
                                                         F4: Save & Exit
                                                         ESC: Exit


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```

```
                          Aptio Setup – AMI
    Main

    FSP Information
    FSP version                  09.03.09.23
    RC version                   09.03.09.23
    Build Date
    FSP Mode                     API Mode

    PSE Information
    PSE version                  N/A

    Board Information
    Board Name                   EBM-EHLR(VMSEHL0A)
    Board ID                     N/A                     →←: Select Screen
    Fab ID                       Default string          ↑↓: Select Item
    LAN PHY Revision             N/A                     Enter: Select
                                                         +/−: Change Opt.
    Processor Information                                F1: General Help
    Name                         ElkhartLake ULX         F2: Previous Values
    Type                         Intel Atom(R) x6425E    F3: Optimized Defaults
                                 Processor @ 2.00GHz     F4: Save & Exit
    Speed                        2000 MHz                ESC: Exit
    ID                           0x90661
    Stepping                     B0
    Package                      Not Implemented Yet ▼


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```

3.6.1.1   System Language

This option allows choosing the system default language.

3.6.1.2   System Date

Use the system date option to set the system date. Manually enter the day, month and year.

3.6.1.3   System Time

Use the system time option to set the system time. Manually enter the hours, minutes and seconds.

Note: The BIOS setup screens shown in this chapter are for reference purposes only, and may not exactly match what you see on your screen.
Visit the Avalue website (www.avalue.com.tw) to download the latest product and BIOS information.

3.6.2   Advanced Menu

This section allows you to configure your CPU and other system devices for basic operation through the following sub-menus.

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

   ▶ CPU Configuration                         CPU Configuration Parameters
   ▶ Power & Performance
   ▶ PCH-FW Configuration
   ▶ Trusted Computing
   ▶ ACPI Settings
   ▶ IT5571 Super IO Configuration
   ▶ EC 5571 HW monitor
   ▶ S5 RTC Wake Settings
   ▶ Serial Port Console Redirection
   ▶ USB Configuration
   ▶ Network Stack Configuration
   ▶ NVMe 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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```

3.6.2.1 CPU Configuration

Use the CPU configuration menu to view detailed CPU specification and configure the CPU.

```
                        Aptio Setup - AMI
     Advanced

 CPU Configuration                                  Enable/Disable CPU Flex Ratio
                                                    Programming
 Type                        Intel Atom(R) x6425E
                             Processor @ 2.00GHz
 ID                          0x90661
 Speed                       2000 MHz
 L1 Data Cache               32 KB x 4
 L1 Instruction Cache        32 KB x 4
 L2 Cache                    1536 KB x 4
 L3 Cache                    4 MB
 L4 Cache                    N/A
 VMX                         Supported
 SMX/TXT                     Not Supported
                                                    ++: Select Screen
 CPU Flex Ratio Override     [Disabled]             ↑↓: Select Item
 CPU Flex Ratio Settings     20                     Enter: Select
 Intel (VMX) Virtualization  [Enabled]              +/-: Change Opt.
 Technology                                         F1: General Help
 Active Processor Cores      [All]                  F2: Previous Values
                                                    F3: Optimized Defaults
                                                    F4: Save & Exit
                                                    ESC: Exit



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```

Item	Options	Description
CPU Flex Ratio Override	Disabled**[Default]** Enabled	Enable/Disable CPU Flex Ratio Programming.
Intel (VMX) Virtualization Technology	Disabled Enabled**[Default]**	When enabled, a VMM can utilize the additional hardware capabilities provided by Vanderpool Technology.
Active Processor Cores	All**[Default]** 1 2 3	Number of cores to enable in each processor package.

3.6.2.2   Power & Performance
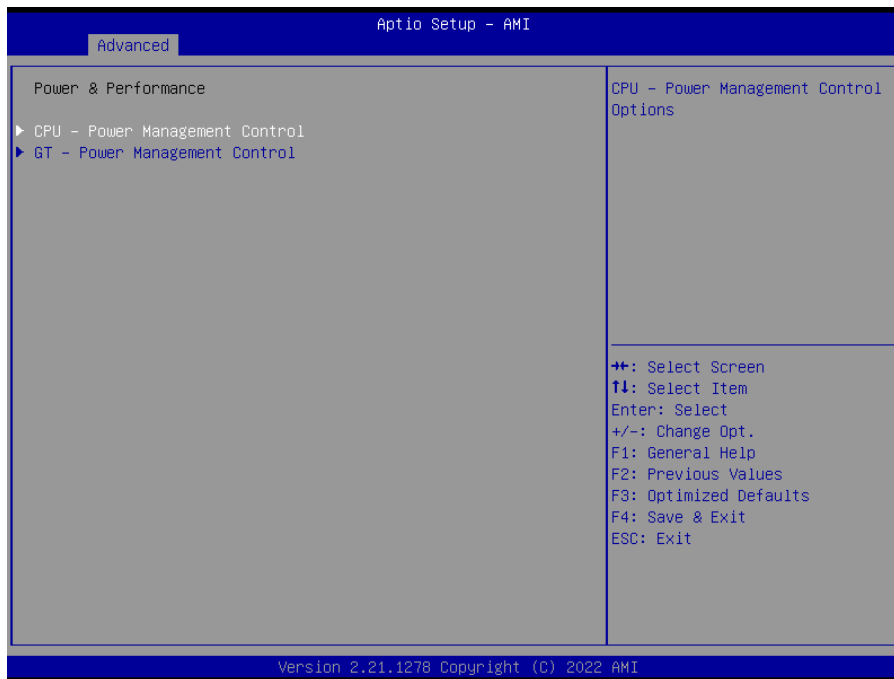
3.6.2.2.1 CPU – Power Management Control
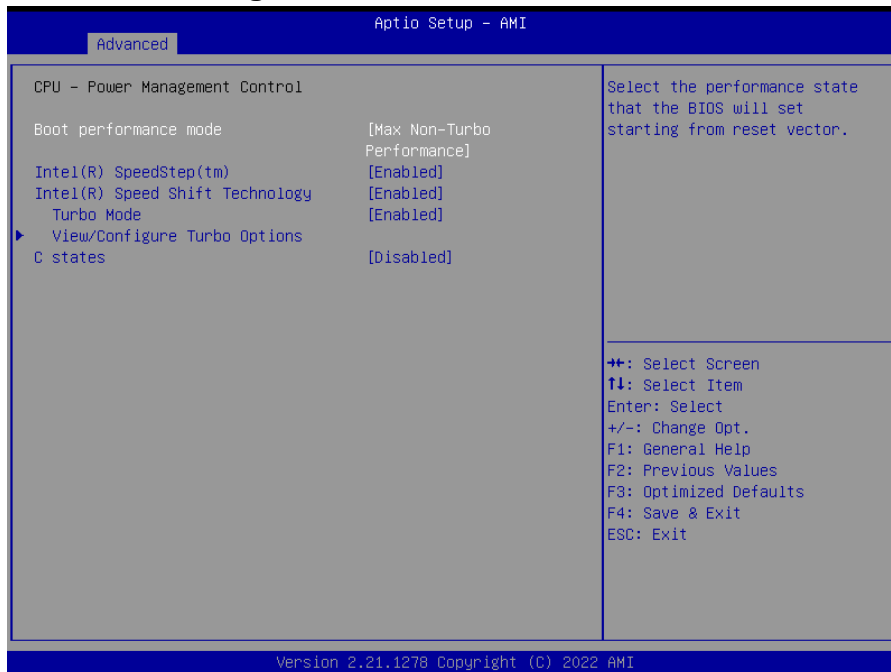
Item	Option	Description
Boot performance mode	Max Non-Turbo Performance**[Default]**, Turbo Performance	Select the performance state that the BIOS will set starting from reset vector.
Intel® SpeedStep™	Enabled**[Default]**, Disabled	Allows more than two frequency ranges to be supported.
Intel® Speed Shift Technology	Enabled**[Default]**, Disabled	Eanble/Disable Intel® Speed Shift Technology support. Enabling will

		expose the CPPC v2 interface to allow for hardware controlled P-states.
Turbo Mode	Enabled**[Default]**, Disabled	Enable/Disable processor Turbo Mode (requires EMTTM enabled too). AUTO means enabled.
C States	Enabled, Disabled**[Default]**	Enable/Disable CPU Power Management. Allows CPU to go to C states when it's not 100% utilized.

3.6.2.2.1.1 View/Configure Turbo Options

```
                            Aptio Setup - AMI
           Advanced

    Current Turbo Settings                        Enable/Disable Energy
                                                  Efficient P-state feature.
    Max Turbo Power Limit        4095.875         When set to 0, will disable
    Min Turbo Power Limit        0.0              access to
    Package TDP Limit            12.0             ENERGY_PERFORMANCE_BIAS MSR
    Power Limit 1                12.0             and CPUID Function 6 ECX[3]
    Power Limit 2                20.0             will read 0 indicating no
    1-core Turbo Ratio           30               support for Energy Efficient
    2-core Turbo Ratio           30               policy setting. When set to 1
    3-core Turbo Ratio           27               will enable access to
    4-core Turbo Ratio           27               ENERGY_PERFORMANCE_BIAS MSR  ▼

    Energy Efficient P-state     [Enabled]
    Energy Efficient Turbo       [Enabled]        →←: 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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```

Item	Option	Description
Energy Efficient P-state	Disabled Enabled**[Default]**	Enable/Disable Energy Efficient P-state feature. When set to 0, will disable access to ENERGY_PERFORMANCE_BIAS MSR and CPUID Function 6 ECX[3] will read 0 indicating no support for Energy Efficient policy setting. When set to 1 will enable access to ENERGY_PERFORMANCE_BIAS MSR 1B0h.
Energy Efficient Turbo	Disabled Enabled**[Default]**	Enable/Disable Energy Efficient Turbo Feature. This feature will opportunistically lower the turbo frequency to increase efficiency. Recommended only to disable in overclocking situations where turbo frequency must remain constant. Otherwise, leave enabled.

3.6.2.2.2 GT – Power Management Control

```
                              Aptio Setup – AMI
      Advanced

 GT – Power Management Control                                  Check to enable render standby
                                                               support.
 RC6(Render Standby)            [Enabled]
 Maximum GT frequency           [Default Max Frequency]
 Disable Turbo GT frequency     [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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```

Item	Option	Description
RC6(Render Standby)	Enabled**[Default]**, Disabled	Check to enable render standby support.
Maximum GT frequency	Default Max Frequency**[Default]** 100Mhz/150Mhz/200Mhz/250Mhz/300Mhz /350Mhz/400Mhz/450Mhz/500Mhz/550Mhz /600Mhz/650Mhz/700Mhz/750Mhz/800Mhz /850Mhz/900Mhz/950Mhz/1000Mhz/1050Mhz /1100Mhz/1150Mhz/1200Mhz	Maximum GT frequency limited by the user. Choose between 200MHz (RPN) and 750MHz (PRO). Value beyond the range will be clipped to min/max supported by SKU.
Disable Turbo GT frequency	Enabled Disabled**[Default]**	Enabled: Disables Turbo GT frequency. Disabled: GT frequency is not limited.

3.6.2.3 PCH-FW Configuration

```
                              Aptio Setup - AMI
       Advanced

   ME Firmware Version          15.40.10.2252          Configure Management Engine
   ME Firmware Mode             Normal Mode            Technology Parameters
   ME Firmware SKU              Consumer SKU
   ME Firmware Status 1         0x90000255
   ME Firmware Status 2         0x39850106

   ME State                     [Enabled]

 ▶ Firmware Update Configuration
 ▶ PTT 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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```

3.6.2.3.1 Firmware Update Configuration

```
                              Aptio Setup - AMI
       Advanced

   Me FW Image Re-Flash         [Disabled]             Enable/Disable Me FW Image
                                                       Re-Flash function.












                                                     ↔: 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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```

Item	Option	Description
Me FW Image Re-Flash	Disabled**[Default]**, Enabled	Enable/Disable Me FW Image Re-Flash function.

3.6.2.3.2 PTT Configuration
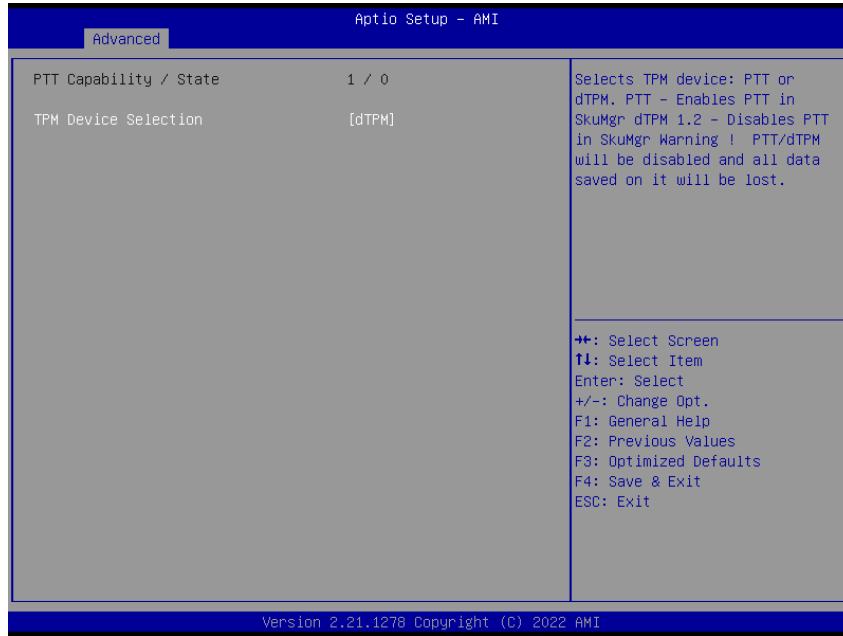
Item	Option	Description
TPM Device Selection	dTPM**[Default]**, PTT	Selects TPM device: PTT or dTPM. PTT – Enables PTT in SkuMgr dTPM 1.2-Disables PTT in SkuMgr Warning! PTT/dTPM will be disabled and all data saved on it will be lost.

3.6.2.4 Trusted Computing

Item	Options	Description
Security Device Support	Disable, Enable**[Default]**	Enables or Disables BIOS support for security device. O.S. will not show Security Device. TCG EFI protocol and INT1A interface will not be available.

3.6.2.5   APCI Settings
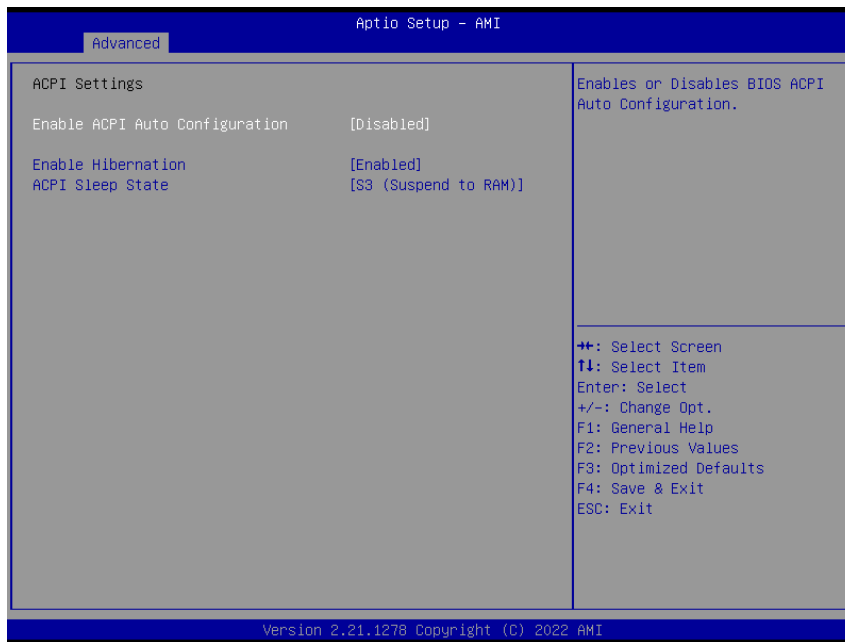
Item	Options	Description
Enable ACPI Auto Configuration	Disabled**[Default]**, Enabled	Enables or Disables BIOS ACPI Auto Configuration.
Enable Hibernation	Disabled Enabled**[Default]**,	Enables or Disables System ability to Hibernate (OS/S4 Sleep State). This option may not be effective with some operating systems.
ACPI Sleep State	Suspend Disabled, S3 (Suspend to RAM)**[Default]**	Select the highest ACPI sleep state the system will enter when the SUSPEND button is pressed.

3.6.2.6 IT5571 Super IO Configuration

You can use this item to set up or change the IT8528 Super IO configuration for serial ports. Please refer to 3.6.2.6.1~ 3.6.2.6.2 for more information.

```
                              Aptio Setup - AMI
        Advanced

      IT5571 Super IO Configuration                      Set Parameters of Serial Port
                                                         1 (COMA)
      Super IO Chip                    IT5571
   ▶ Serial Port 1 Configuration
   ▶ Serial Port 2 Configuration






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



                     Version 2.21.1278 Copyright (C) 2022 AMI
```
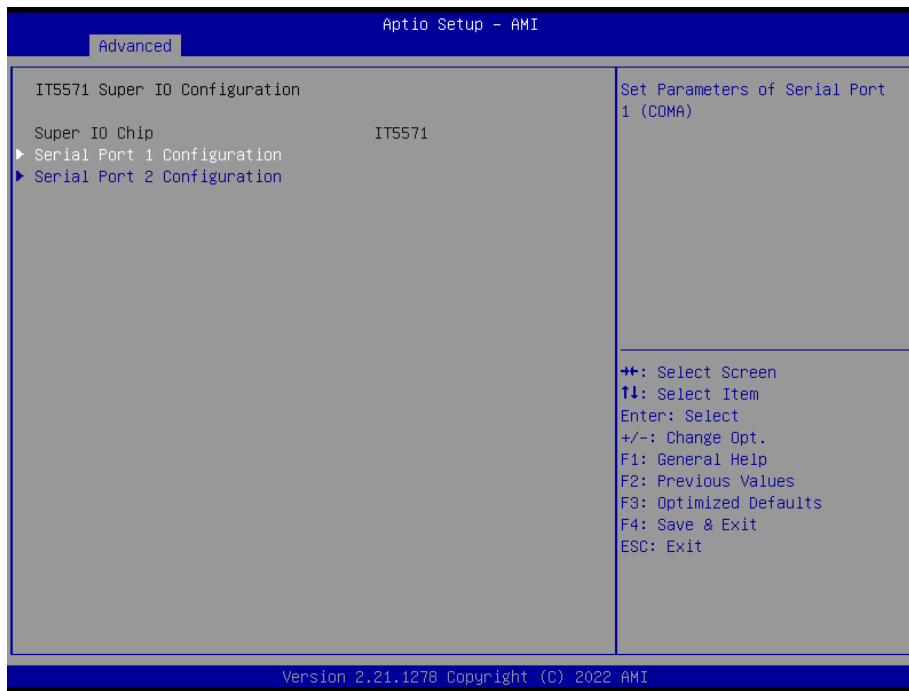
Item	Description
Serial Port 1 Configuration	Set Parameters of Serial Port 1 (COMA).
Serial Port 2 Configuration	Set Parameters of Serial Port 2 (COMB).

3.6.2.6.1 Serial Port 1 Configuration

```
                              Aptio Setup - AMI
        Advanced

      Serial Port 1 Configuration                        Enable or Disable Serial Port
                                                         (COM)
      Serial Port                      [Enabled]
      Device Settings                  IO=3F8h; IRQ=4;

      UART 232 422 485                 [UART 232]





                                                         →←: 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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```

Item	Option	Description
Serial Port	Enabled**[Default]** Disabled	Enable or Disable Serial Port (COM).
RS 232 422 485	UART 232**[Default]**, UART 422 UART 485	Change the Serial Port as RS232/422/485.

3.6.2.6.2 Serial Port 2 Configuration
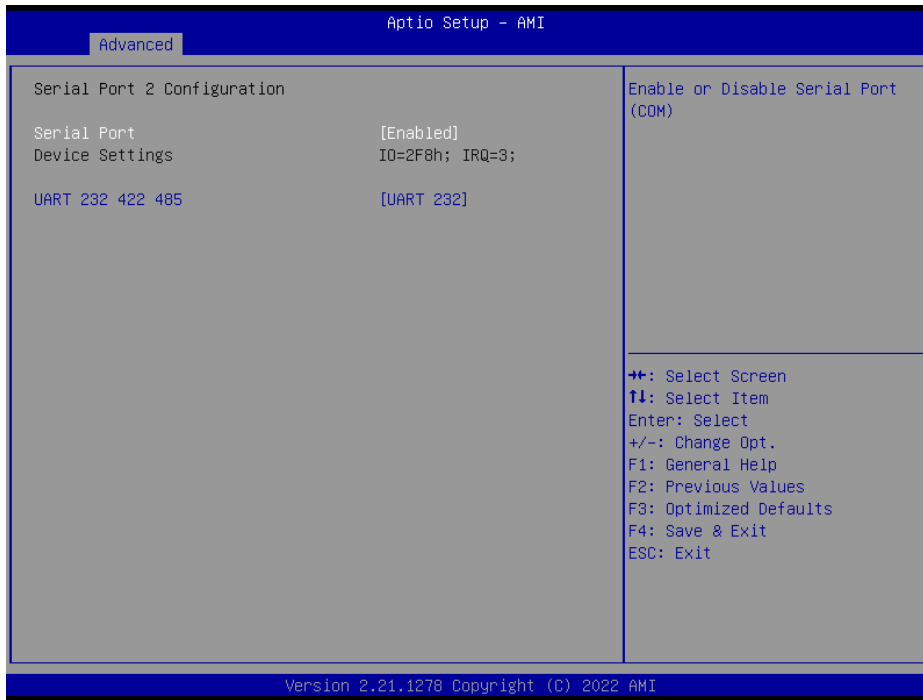
```
                            Aptio Setup - AMI
          Advanced

     Serial Port 2 Configuration                         Enable or Disable Serial Port
                                                          (COM)
     Serial Port                      [Enabled]
     Device Settings                  IO=2F8h; IRQ=3;

     UART 232 422 485                 [UART 232]




                                                         →←: 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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```

Item	Option	Description
Serial Port	Enabled**[Default]**, Disabled	Enable or Disable Serial Port (COM).
RS 232 422 485	UART 232**[Default]**, UART 422 UART 485	Change the Serial Port as RS232/422/485.

3.6.2.7 EC 5571 HW Monitor

```
                              Aptio Setup - AMI
        Advanced

    Pc Health Status
    PC Mode select                [Railway PC]          Set this item for
    Power On Delay                [w/o delay]           Industry/Vehicle/Railway PC
    Power Off Delay               [w/o delay]           funciton
    Vin boot/Shutdown             [Disabled]

    CPU temperature               : +62  C
    System temperature            : +43  C
    VIN                           : +23.538 V
    VCORE                         : +1.624 V
    IGNITION state                : On
    SHDN_U state                  : On
    Power off delay count down    : Stop
    BAT mode switch(Onboard)      : 9V-36V                ↔: Select Screen
    Vin<Vshutdown 1min timer      :                       ↕: Select Item
    Vin<Vshutdown 5min timer      : 00:00:00             Enter: Select
    Force shutdown 1min timer     : 00                   +/-: Change Opt.
                                                         F1: General Help
                                                         F2: Previous Values
                                                         F3: Optimized Defaults
                                                         F4: Save & Exit
                                                         ESC: Exit



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```

Item	Options	Description
PC Mode select	Industry PC Vehicle PC Railway PC**[Default]**	Set this item for Industry/Vehicle/Railway PC function.
Power On Delay	w/o delay**[Default]** 10 Sec 30 Sec 1 Min 5 Min 10 Min 15 Min 30 Min 1 Hour	Power On Delay.
Power Off Delay	w/o delay**[Default]** 20 Sec 1 Min 5 Min 10 Min 30 Min 1 Hour 6 Hour 18 Hour	Power Off Delay.

3.6.2.8 S5 RTC Wake Settings

```
                           Aptio Setup - AMI
      Advanced

Wake system from S5                  [Disabled]            Enable or disable System wake
                                                           on alarm event. Select
                                                           FixedTime, system will wake on
                                                           the hr::min::sec specified.
                                                           Select DynamicTime , System
                                                           will wake on the current time
                                                           + Increase minute(s)




                                                           →←: 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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```

Item	Options	Description
Wake system from S5	Disabled**[Default]**, Fixed Time Dynamic Time	Enable or disable System wake on alarm event. Select Fixed Time, system will wake on the hr::min::sec specified. Select Dynamic Time, System will wake on the current time + Increase minute(s).

3.6.2.9 Serial Port Console Redirection

```
                           Aptio Setup - AMI
      Advanced

                                                          Console Redirection Enable or
  COM0                                                    Disable.
  Console Redirection                  [Disabled]
▶ Console Redirection Settings

  COM1(Pci Bus0,Dev0,Func0) (Disabled)
  Console Redirection                  Port Is Disabled

  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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```

Item	Options	Description
Console Redirection	Disabled**[Default]**, Enabled	Console Redirection Enable or Disable.
Console Redirection EMS	Disabled**[Default]**, Enabled	Console Redirection Enable or Disable.

3.6.2.10 USB Configuration

The USB Configuration menu helps read USB information and configures USB settings.
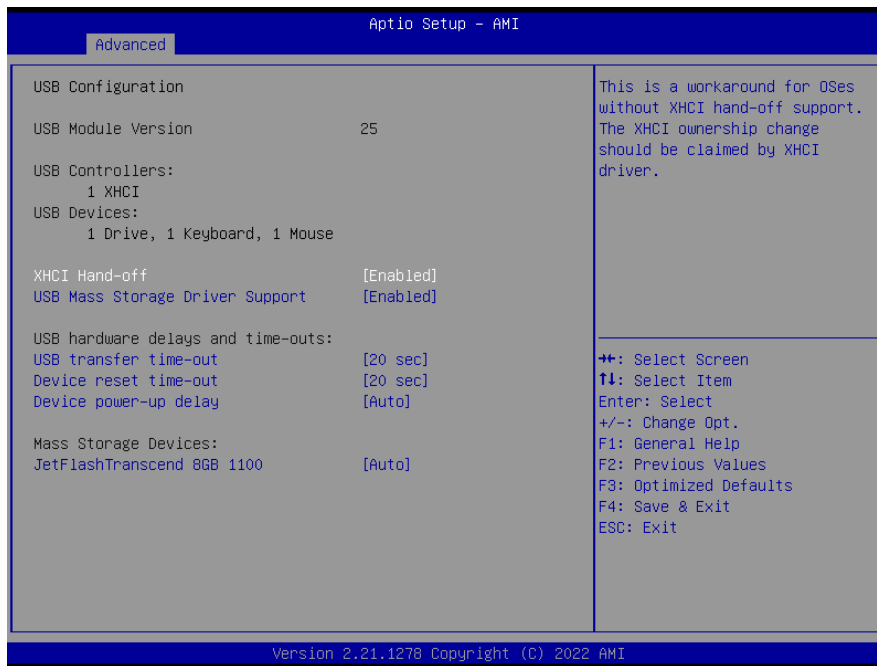
Item	Options	Description
XHCI Hand-off	Enabled**[Default]**, Disabled	This is a workaround for OSes without XHCI hand-off support. The XHCI ownership change should be claimed by XHCI driver.
USB Mass Storage Driver Support	Disabled Enabled**[Default]**,	Enable/Disable USB Mass Storage Driver Support.
USB transfer time-out	1 sec 5 sec 10 sec 20 sec**[Default]**	The time-out value for Control, Bulk, and Interrupt transfers.
Device reset time-out	10 sec 20 sec**[Default]** 30 sec 40 sec	USB mass storage device Start Unit command time-out.
Device power-up delay	Auto**[Default]** Manual	Maximum time the device will take before it properly reports itself to the Host Controller. 'Auto' uses default value: for a Root port it is 100ms, for a Hub port the delay is taken form Hub descriptor.
Mass Storage Devices	Auto**[Default]** Floppy	Mass storage device emulation type. 'AUTO' enumerates devices according to their media

	Forced FDD Hard Disk CD-ROM	format. Optical drives are emulated as 'CDROM', drives with no media will be emulated according to a drive type.

3.6.2.11 Network Stack Configuration

```
                          Aptio Setup - AMI
          Advanced

    Network Stack                    [Disabled]            Enable/Disable UEFI Network
                                                           Stack




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



                     Version 2.21.1278 Copyright (C) 2022 AMI
```
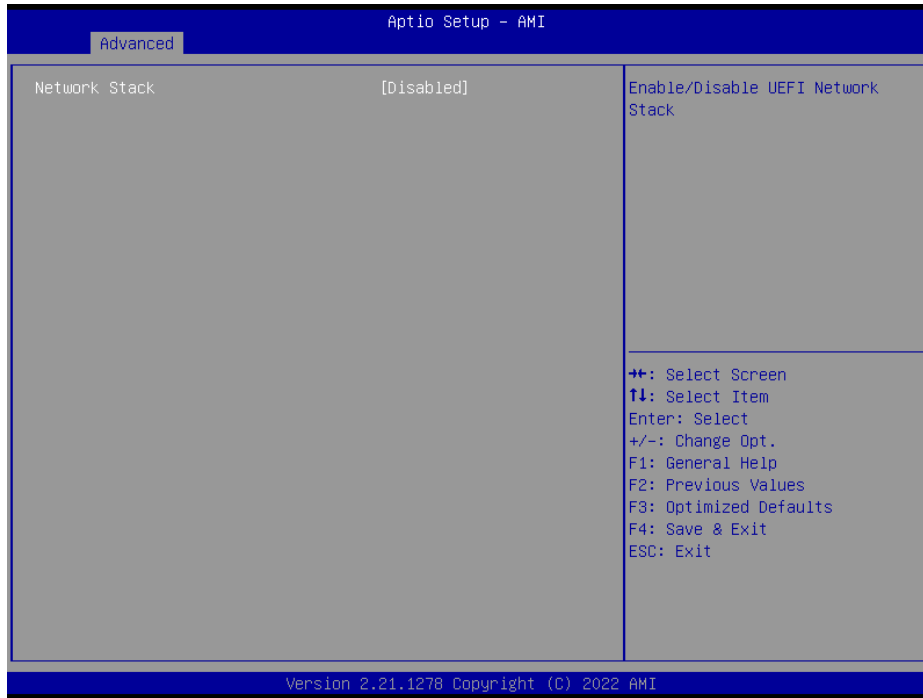
Item	Options	Description
Network Stack	Enabled Disabled**[Default]**	Enable/Disable UEFI Network Stack.

3.6.2.12 NVMe Configuration

```
                          Aptio Setup - AMI
          Advanced

    NVMe Configuration

    No NVME Device Found




                                                           →←: 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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```

3.6.3 Chipset

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

▶ System Agent (SA) Configuration              System Agent (SA) Parameters
▶ PCH-IO Configuration
▶ Board & Panel 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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```

3.6.3.1 System Agent (SA) Configuration

```
                          Aptio Setup - AMI
              Chipset

 System Agent (SA) Configuration                Memory Configuration Parameters

 VT-d                         Supported

▶ Memory Configuration
▶ Graphics Configuration
 VT-d                         [Enabled]
 Above 4GB MMIO BIOS assignment  [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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```

Item	Option	Description
VT-d	Enabled**[Default]** Disabled	VT-d capability.
Above 4GB MMIO BIOS	Enabled	Enable/Disable above 4GB

assignment	Disabled**[Default]**	MemoryMappedIO BIOS assignment. This is enabled automatically when Aperture Size is set to 2048MB.

3.6.3.1.1 Memory Configuration

```
                            Aptio Setup - AMI
          Chipset

Memory Configuration

Memory RC Version            0.0.4.104
Memory Data Rate             3200 MTPS
Memory Timings (tCL-tRCD-tRP-tRAS)  22-22-22-52

Channel 0 Slot 0             Populated & Enabled
    Size                     8192 MB (Unknown)
    Number of Ranks          1
    Manufacturer             Micron

                                            ↔: 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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```

3.6.3.1.2 Graphics Configuration

```
                            Aptio Setup - AMI
          Chipset

Graphics Configuration                      Graphics turbo IMON current
                                            values supported (14-31)
Graphics Turbo IMON Current      31

Primary Display                  [Auto]
GTT Size                         [8MB]
Aperture Size                    [256MB]



                                            ↔: 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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```

Item	Option	Description
Graphics Turbo IMON Current	14-31**[Default]**	Graphics turbo IMON current values supported (14-31).
Primary Display	Auto**[Default]** IGFX	Select which of IGFX/PEG/PCI Graphics device should be Primary Display Or select SG for Switchable Gfx.
GTT Size	2MB 4MB 8MB**[Default]**	Select the GTT Size.
Aperture Size	128MB 256MB**[Default]** 512MB 1024MB	Select the Aperture Size. Note: Above 4GB MMIO BIOS assignment is automatically enabled when selecting 2048MB aperture. To use this feature, please disable CSM Support.

3.6.3.2   PCH-IO Configuration

3.6.3.2.1 PCI Express Configuration

```
                          Aptio Setup - AMI
              Chipset

   PCI Express Configuration                            PCI Express Root Port Settings.


 ▶ PCI Express Root Port 2(mPCIE)
 ▶ PCI Express Root Port 3(M.2 KeyE)
 ▶ PCI Express Root Port 4(LAN1-I210)
 ▶ PCI Express Root Port 5(M.2 KeyB)
 ▶ PCI Express Root Port 7(LAN2-I210)


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



                   Version 2.21.1278 Copyright (C) 2022 AMI
```
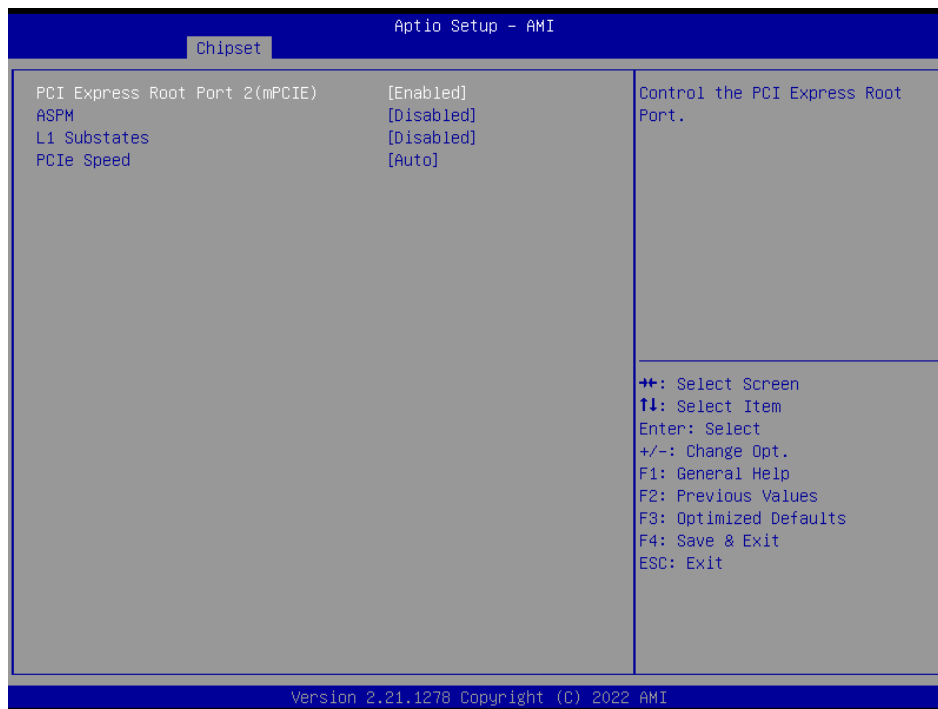
3.6.3.2.1.1 PCI Express Root Port 2(mPCIE)

```
                          Aptio Setup - AMI
              Chipset

   PCI Express Root Port 2(mPCIE)      [Enabled]        Control the PCI Express Root
   ASPM                                [Disabled]       Port.
   L1 Substates                        [Disabled]
   PCIe Speed                          [Auto]









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



                   Version 2.21.1278 Copyright (C) 2022 AMI
```

Item	Option	Description
PCI Express Root Port 2(mPCIE)	Enabled**[Default]**, Disabled	Control the PCI Express Root Port.
ASPM	Disabled**[Default]**, L0s L1 L0sL1	Set the ASPM Level: Force L0s – Force all links to L0s State AUTO – BIOS auto configure DISABLE – Disables ASPM.

	Auto	
L1 Substates	Disabled**[Default]** L1.1 L1.1 & L1.2	PCI Express L1 Substates settings.
PCIe Speed	Auto**[Default]** Gen1 Gen2 Gen3	Configure PCIe Speed.

3.6.3.2.1.2 PCI Express Root Port 3(M.2 KeyE)
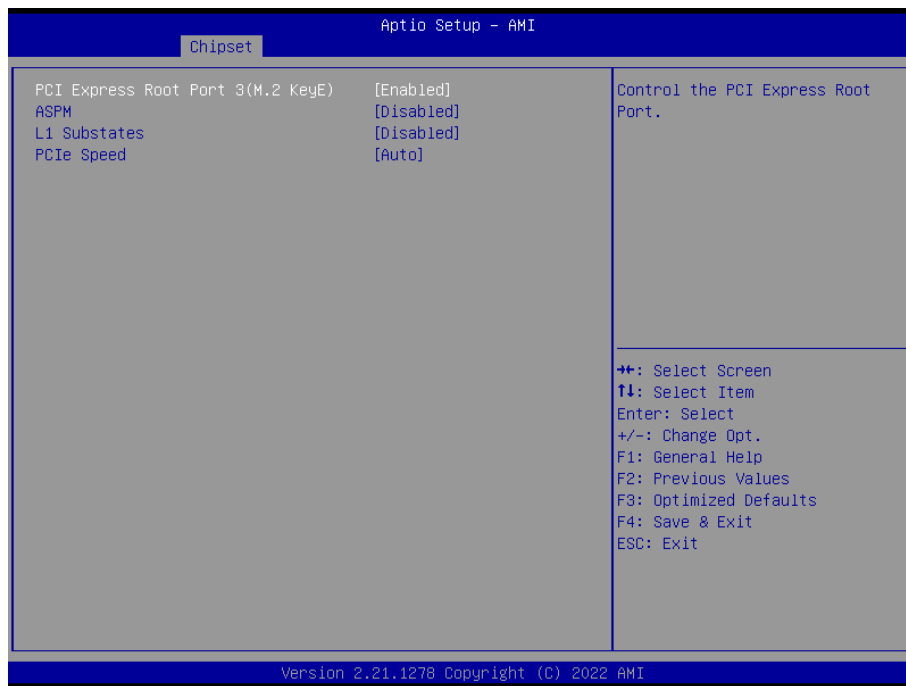
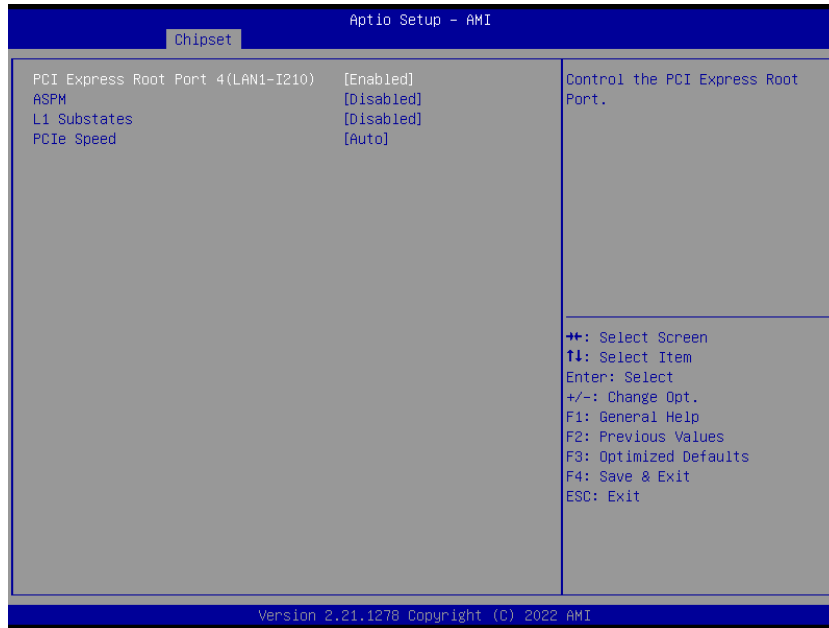| Item	Option	Description
PCI Express Root Port 3(M.2 KeyE)	Enabled**[Default]**, Disabled	Control the PCI Express Root Port.
ASPM	Disabled**[Default]**, L0s L1 L0sL1 Auto	Set the ASPM Level: Force L0s – Force all links to L0s State AUTO – BIOS auto configure DISABLE – Disables ASPM.
L1 Substates	Disabled**[Default]** L1.1 L1.1 & L1.2	PCI Express L1 Substates settings.
PCIe Speed	Auto**[Default]** Gen1 Gen2 Gen3	Configure PCIe Speed.

3.6.3.2.1.3 PCI Express Root Port 4(LAN1-I210)

```
                              Aptio Setup – AMI
            Chipset

  PCI Express Root Port 4(LAN1-I210)   [Enabled]       Control the PCI Express Root
  ASPM                                 [Disabled]      Port.
  L1 Substates                         [Disabled]
  PCIe Speed                           [Auto]




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



                         Version 2.21.1278 Copyright (C) 2022 AMI
```

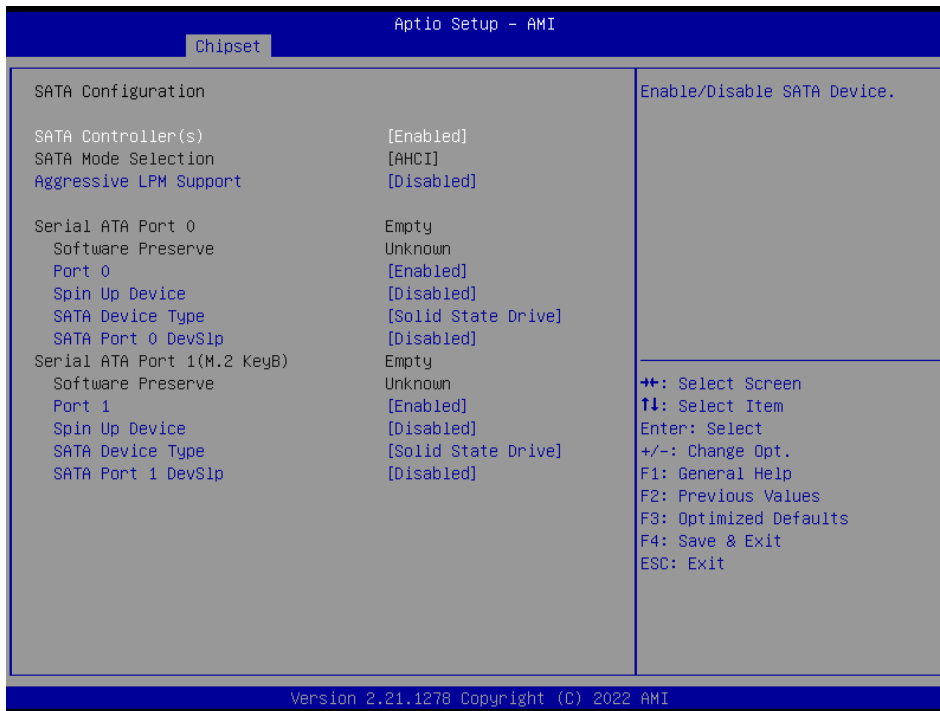| Item	Option	Description
PCI Express Root Port 4(LAN1-I210)	Enabled**[Default]**, Disabled	Control the PCI Express Root Port.
ASPM	Disabled**[Default]**, L0s L1 L0sL1 Auto	Set the ASPM Level: Force L0s – Force all links to L0s State AUTO – BIOS auto configure DISABLE – Disables ASPM.
L1 Substates	Disabled**[Default]** L1.1 L1.1 & L1.2	PCI Express L1 Substates settings.
PCIe Speed	Auto**[Default]** Gen1 Gen2 Gen3	Configure PCIe Speed.

3.6.3.2.1.4 PCI Express Root Port 5(M.2 KeyB)

```
                              Aptio Setup – AMI
         Chipset

  PCI Express Root Port 5(M.2 KeyB)    [Enabled]          Control the PCI Express Root
  ASPM                                 [Disabled]         Port.
  L1 Substates                         [Disabled]
  PCIe Speed                           [Auto]




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




                         Version 2.21.1278 Copyright (C) 2022 AMI
```
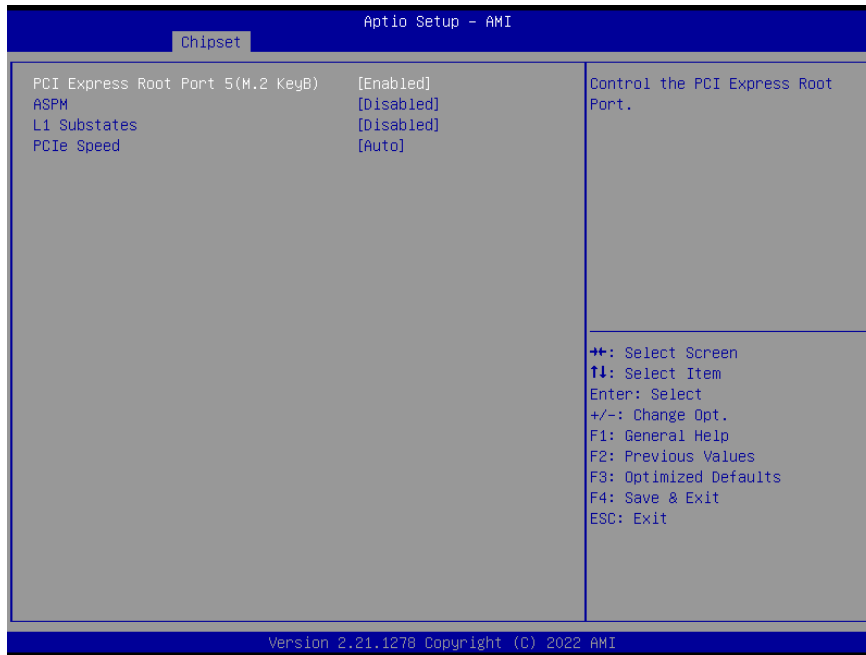
Item	Option	Description
PCI Express Root Port 5(M.2 KeyB)	Enabled**[Default]**, Disabled	Control the PCI Express Root Port.
ASPM	Disabled**[Default]**, L0s L1 L0sL1 Auto	Set the ASPM Level: Force L0s – Force all links to L0s State AUTO – BIOS auto configure DISABLE – Disables ASPM.
L1 Substates	Disabled**[Default]** L1.1 L1.1 & L1.2	PCI Express L1 Substates settings.
PCIe Speed	Auto**[Default]** Gen1 Gen2 Gen3	Configure PCIe Speed.

3.6.3.2.1.5 PCI Express Root Port 7(LAN2-I210)

```
                              Aptio Setup - AMI
              Chipset

 PCI Express Root Port 7(LAN2-I210)    [Enabled]          Control the PCI Express Root
 ASPM                                  [Disabled]         Port.
 L1 Substates                          [Disabled]
 PCIe Speed                            [Auto]




                                                          →←: 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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```

Item	Option	Description
PCI Express Root Port 7(LAN2-I210)	Enabled**[Default]**, Disabled	Control the PCI Express Root Port.
ASPM	Disabled**[Default]**, L0s, L1, L0sL1, Auto	Set the ASPM Level: Force L0s – Force all links to L0s State AUTO – BIOS auto configure DISABLE – Disables ASPM.
L1 Substates	Disabled**[Default]** L1.1, L1.1 & L1.2	PCI Express L1 Substates settings.
PCIe Speed	Auto**[Default]** Gen1, Gen2, Gen3	Configure PCIe Speed.

3.6.3.2.2 SATA Configuration

```
                              Aptio Setup - AMI
           Chipset

   SATA Configuration                                        Enable/Disable SATA Device.

   SATA Controller(s)                  [Enabled]
   SATA Mode Selection                 [AHCI]
   Aggressive LPM Support              [Disabled]

   Serial ATA Port 0                   Empty
     Software Preserve                 Unknown
     Port 0                            [Enabled]
     Spin Up Device                    [Disabled]
     SATA Device Type                  [Solid State Drive]
     SATA Port 0 DevSlp                [Disabled]
   Serial ATA Port 1(M.2 KeyB)         Empty
     Software Preserve                 Unknown
     Port 1                            [Enabled]         ++: Select Screen
     Spin Up Device                    [Disabled]        ↑↓: Select Item
     SATA Device Type                  [Solid State Drive] Enter: Select
     SATA Port 1 DevSlp                [Disabled]        +/-: Change Opt.
                                                         F1: General Help
                                                         F2: Previous Values
                                                         F3: Optimized Defaults
                                                         F4: Save & Exit
                                                         ESC: Exit




                   Version 2.21.1278 Copyright (C) 2022 AMI
```

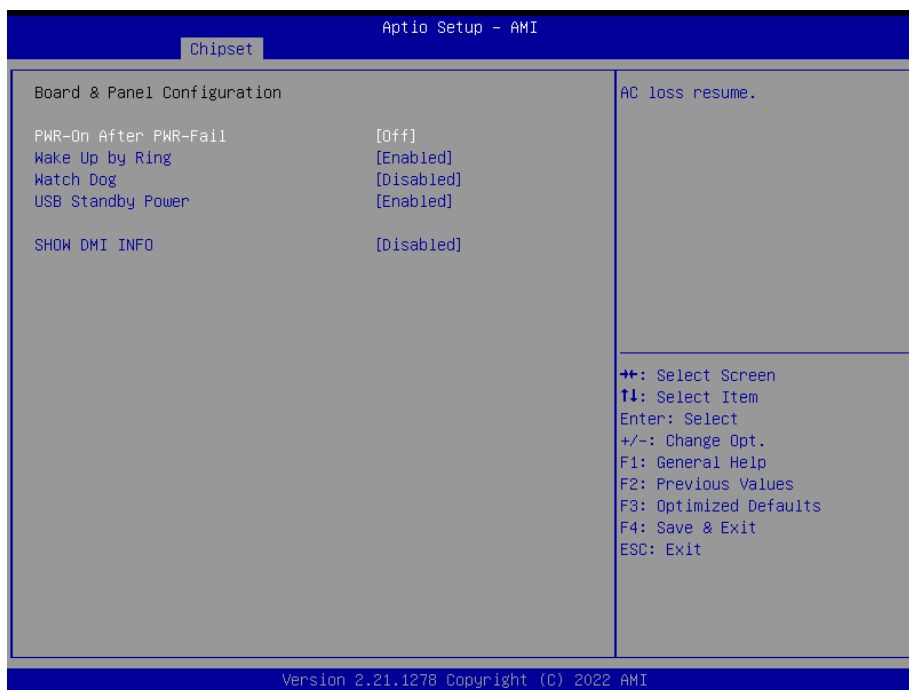| Item	Options	Description
SATA Controller(s)	Enabled**[Default]** Disabled,	Enable/Disable SATA Device.
Aggressive LPM Support	Enabled Disabled**[Default]**	Enable PCH to aggressively enter link power state.
Port 0	Enabled**[Default]** Disabled	Enable or Disable SATA Port.
Spin Up Device	Enabled Disabled**[Default]**	If enabled for any of ports Staggerred Spin Up will be performed and only the drives which have this option enabled will spin up at boot. Otherwise all drives spin up at boot.
SATA Device Type	Hard Disk Drive Solid State Drive**[Default]**	Identify the SATA port is connected to Solid State Drive or Hard Disk Drive.
SATA Port 0 DevSlp	Disabled**[Default]** Enabled	Enable/Disable SATA Port 0 DevSlp. For DevSlp to work, both hard drive and SATA port need to support DevSlp function, otherwise an unexpected behaviour might happen. Please check board design before enabling it.
Port 1	Enabled**[Default]** Disabled	Enable or Disable SATA Port.
Spin Up Device	Enabled Disabled**[Default]**	If enabled for any of ports Staggerred Spin Up will be performed and only the drives which have this option enabled will spin up at boot. Otherwise all drives spin up at boot.

SATA Device Type	Hard Disk Drive Solid State Drive**[Default]**	Identify the SATA port is connected to Solid State Drive or Hard Disk Drive.
SATA Port 1 DevSlp	Disabled**[Default]** Enabled	Enable/Disable SATA Port 1 DevSlp. For DevSlp to work, both hard drive and SATA port need to support DevSlp function, otherwise an unexpected behaviour might happen. Please check board design before enabling it.

3.6.3.2.3 USB Configuration

```
                              Aptio Setup – AMI
              Chipset

    USB Configuration                              Option to enable Compliance
                                                   Mode. Default is to disable
    XHCI Compliance Mode            [Disabled]     Compliance Mode. Change to
                                                   enabled for Compliance Mode
                                                   testing.




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


                    Version 2.21.1278 Copyright (C) 2022 AMI
```

Item	Options	Description
XHCI Compliance Mode	Disabled**[Default]** Enabled	Option to enable Compliance Mode. Default is to disable Compliance Mode. Change to enabled for Compliance Mode testing.

3.6.3.2.4 HD Audio Configuration

```
                Aptio Setup Utility - Copyright (C) 2019 American Megatrends, Inc.
                    Chipset

    HD Audio Subsystem Configuration Settings                Control Detection of the
                                                             HD-Audio device.
    HD Audio                            [Enabled]            Disabled = HDA will be
                                                             unconditionally disabled
                                                             Enabled = HDA will be
                                                             unconditionally enabled.



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



                Version 2.20.1271. Copyright (C) 2019 American Megatrends, Inc.
```

Item	Option	Description
HD Audio	Disabled Enabled**[Default]**	Control Detection of the HD-Audio device. Disable = HDA will be unconditionally disabled Enabled = HDA will be unconditionally enabled

3.6.3.3 Board & Panel Configuration

```
                                        Aptio Setup - AMI
                    Chipset

    Board & Panel Configuration                              AC loss resume.

    PWR-On After PWR-Fail               [Off]
    Wake Up by Ring                     [Enabled]
    Watch Dog                           [Disabled]
    USB Standby Power                   [Enabled]

    SHOW DMI INFO                       [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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```

VMS-EHLR

Item	Option	Description
PWR-On After PWR-Fail	Off**[Default]** On Last state	AC loss resume.
Wake Up by Ring	Disabled Enabled**[Default]**	Wake Up by Ring from S3/S4/S5.
Watch Dog	Disabled**[Default]** 30 sec 40 sec 50 sec 1 min 2 min 10 min 30 min	Select WatchDog.
USB Standby Power	Disabled Enabled**[Default]**	Enable/Disabled USB Standby Power during S3/S4/S5.
SHOW DMI INFO	Disabled**[Default]** Enabled	SHOW DMI INFO.

3.6.4   Security

```
                              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

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

                Version 2.21.1278 Copyright (C) 2022 AMI
```

● **Administrator Password**

Set setup Administrator Password

● **User Password**

Set User Password

3.6.4.1 Secure Boot
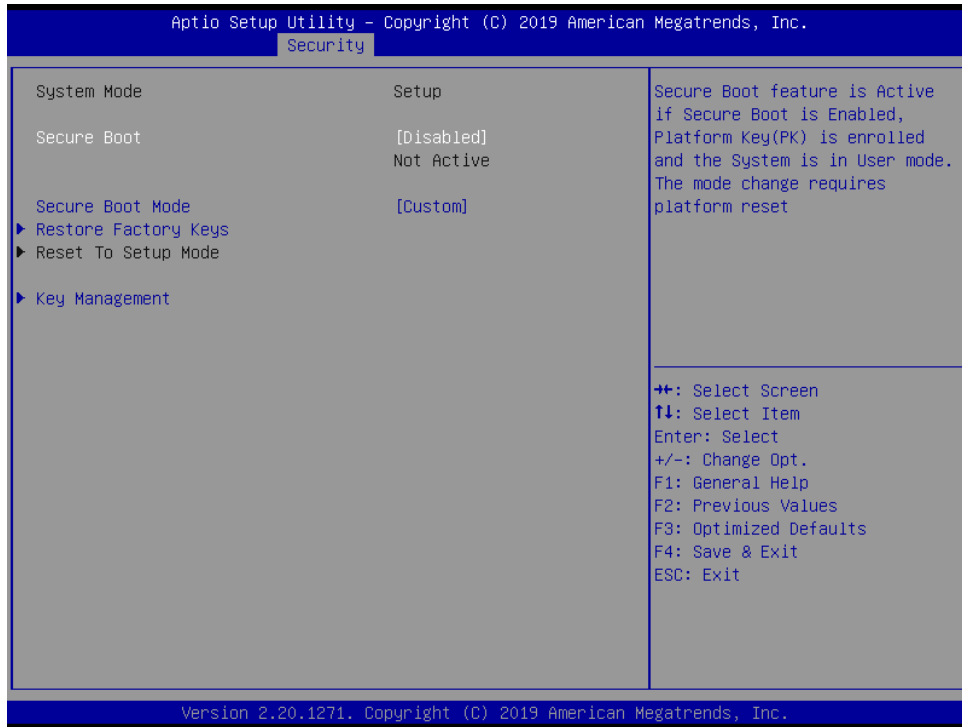
Item	Option	Description
Secure Boot	Disabled**[Default]** Enabled	Secure Boot feature is Active if Secure Boot is Enabled, Platform Key(PK) is enrolled and the System is in User mode. The mode chagne requires

	platform reset.
Secure Boot Mode	Standard Custom**[Default]**	Secure Boot mode selector: Standard/Custom. In Custom mode Secure Boot Variables can be configured without authentication.

3.6.4.1.1 Key Management
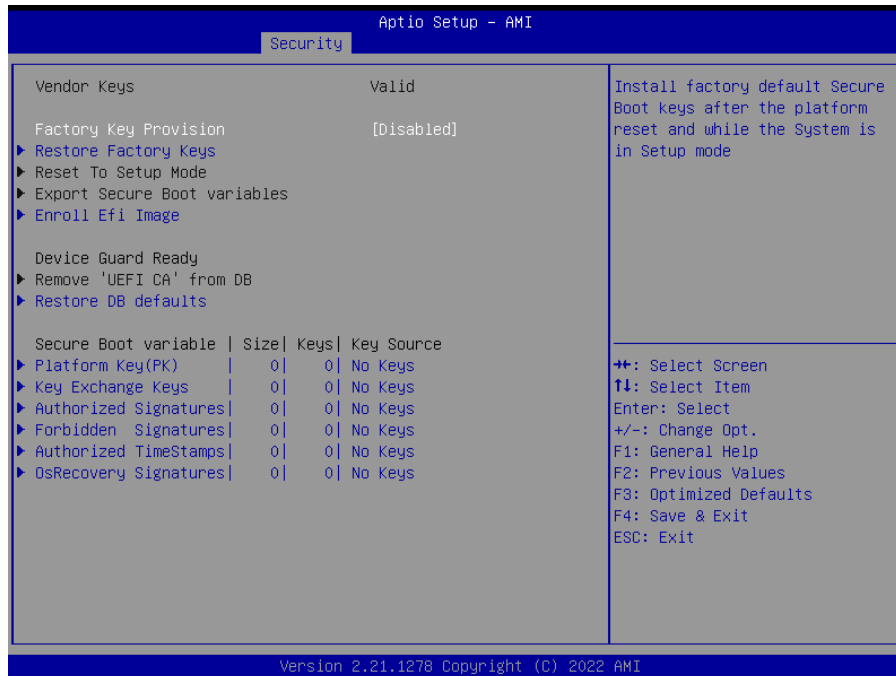
Item	Option	Description
Factory Key Provision	Disabled**[Default]** Enabled	Install factory default Secure Boot keys after the platform reset and while the System is in Setup mode.

3.6.5　　Boot
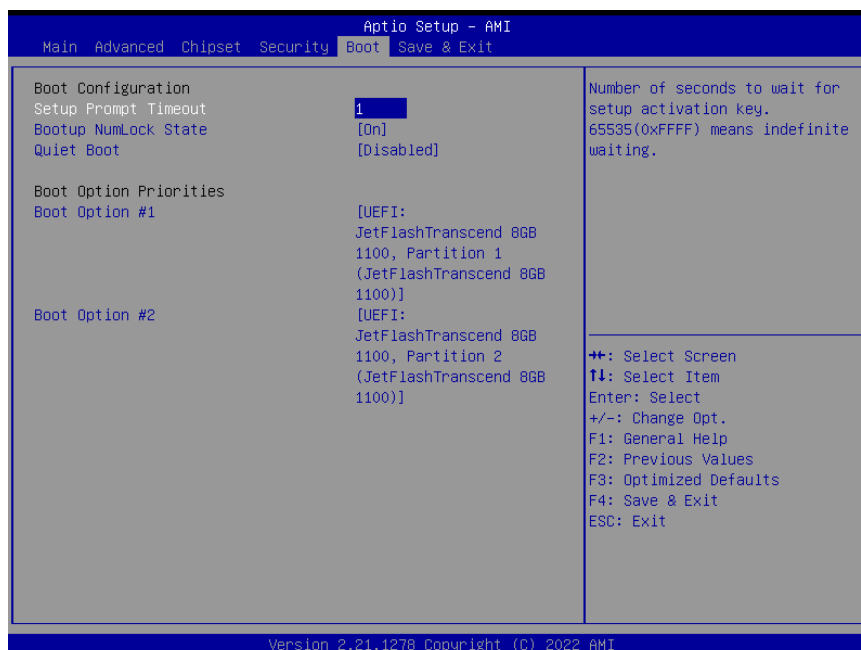
Item	Option	Description
Setup Prompt Timeout	1~ 65535	Number of seconds to wait for setup activation key. 65535(0xFFFF) means indefinite waiting.
Bootup NumLock State	On**[Default]** Off	Select the Keyboard NumLock state
Quiet Boot	Disabled**[Default]** Enabled	Enables or disables Quiet Boot option
Boot Option #1/2	Set the system boot order.	

3.6.6 Save and exit
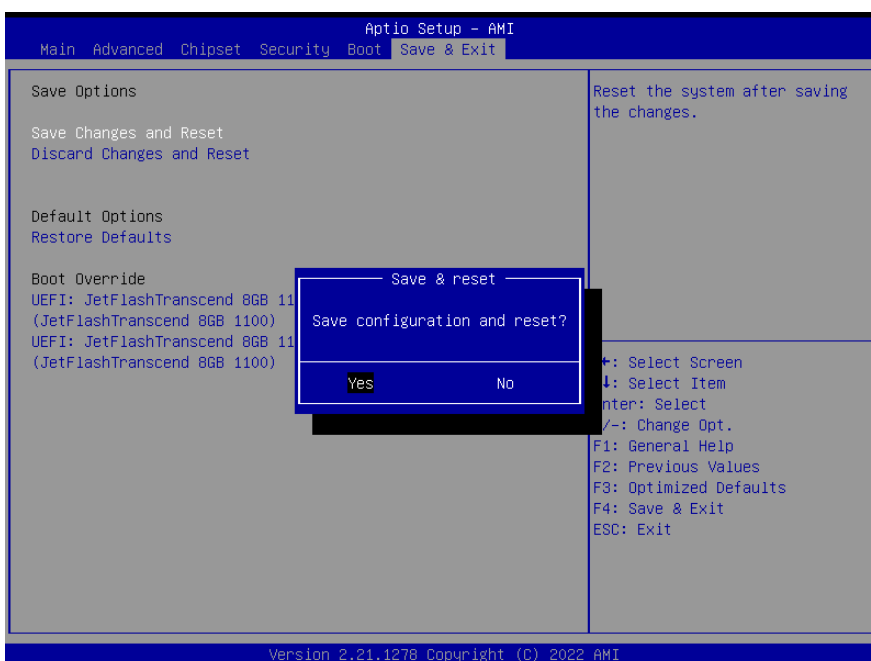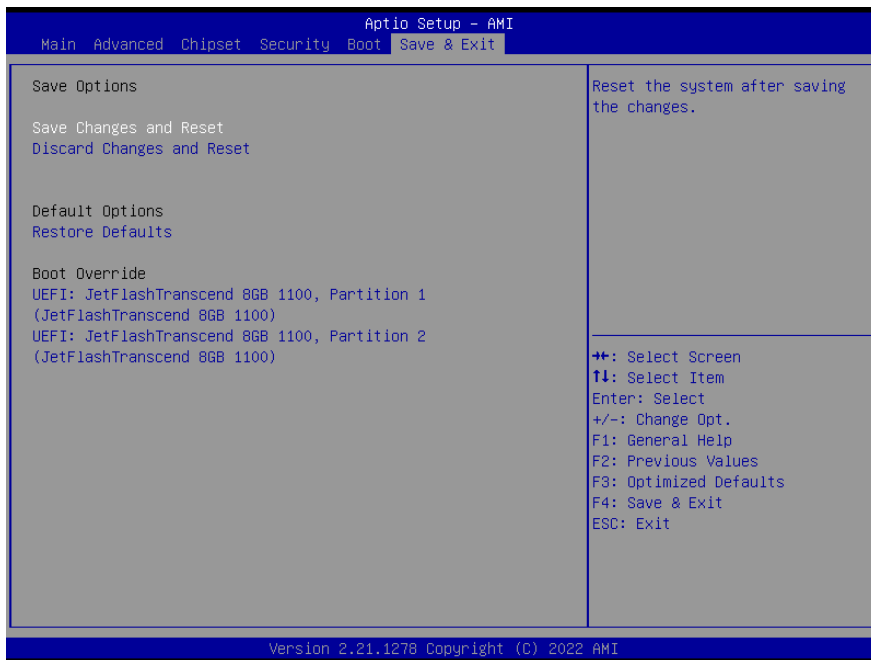
3.6.6.1 Save Changes and Reset

Reset the system after saving the changes.

3.6.6.2 Discard Changes and Reset

Any changes made to BIOS settings during this session of the BIOS setup program are discarded. The setup program then exits and reboots the controller.

3.6.6.3 Restore Defaults

This option restores all BIOS settings to the factory default. This option is useful if the controller exhibits unpredictable behavior due to an incorrect or inappropriate BIOS setting.

3.6.6.4 Launch EFI Shell from filesystem device

Attempts to Launch EFI Shell application (Shellx64.efi) from one of the available filesystem devices.

4. Drivers Installation

Note: Installation procedures and screen shots in this section are for your reference and may not be exactly the same as shown on your screen.

4.1 Install Chipset Driver

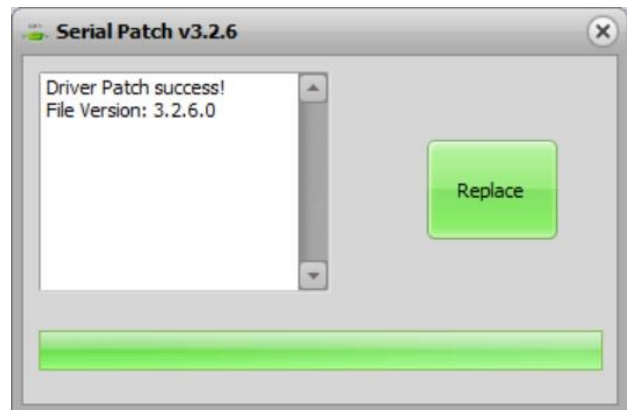All drivers can be found on the Avalue
Official Website:
http://www.avalue.com.tw.

Note: The installation procedures and screen shots in this section are based on Windows 10 operation system. If the warning message appears while the installation process, click Continue to go on.
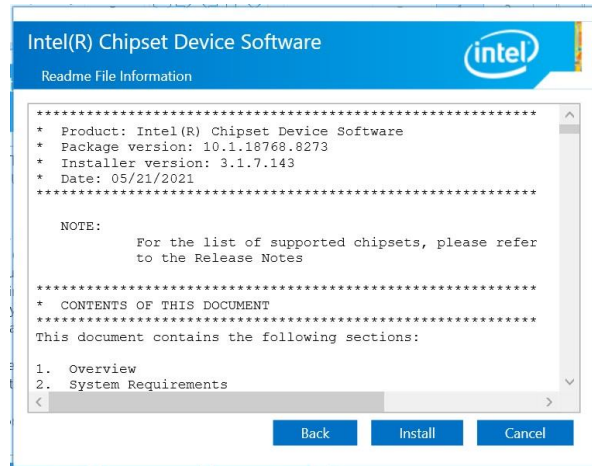
Step 3. Click **Install**.
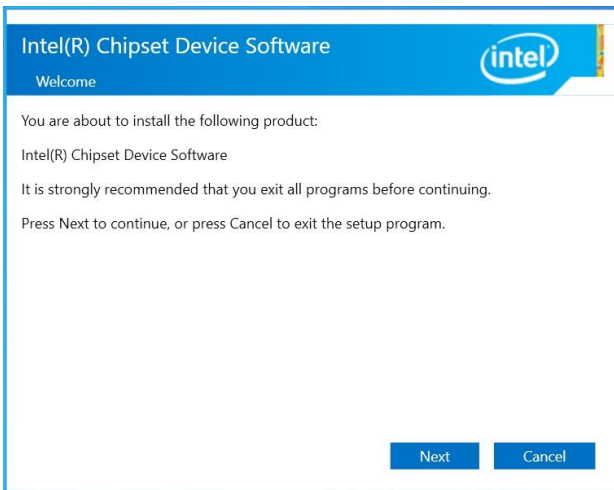
Step1. Click **Next**.

Step 4. Click **Finish** to complete setup.
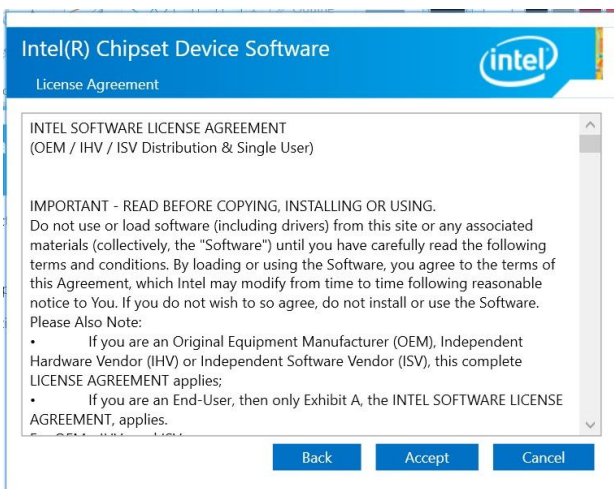
Step 2. Click **Accept**.

4.2 Install VGA Driver

All drivers can be found on the Avalue
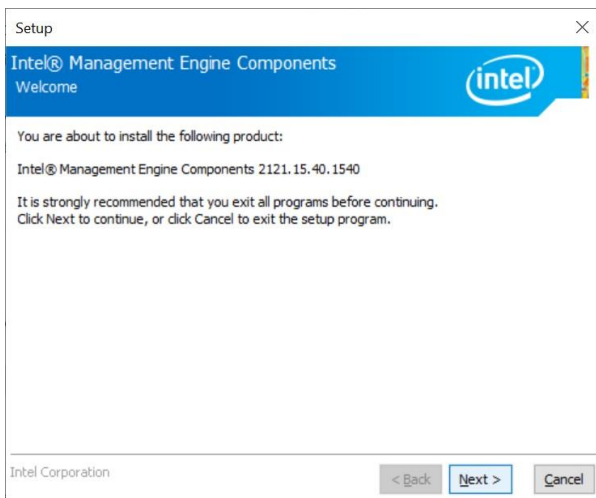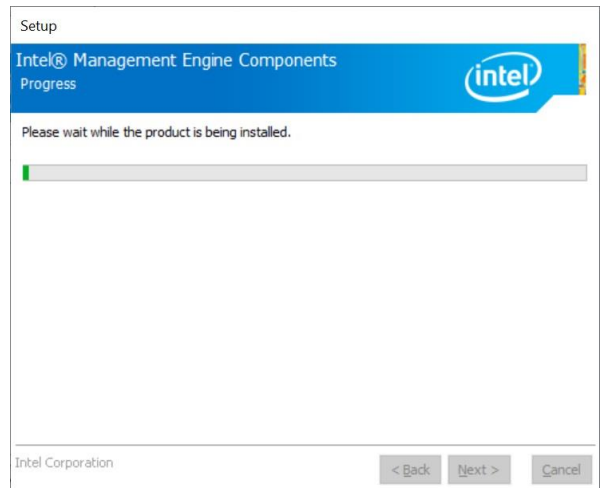Official Website:
http://www.avalue.com.tw.

Note: The installation procedures and
screen shots in this section are
based on Windows 10 operation
system.
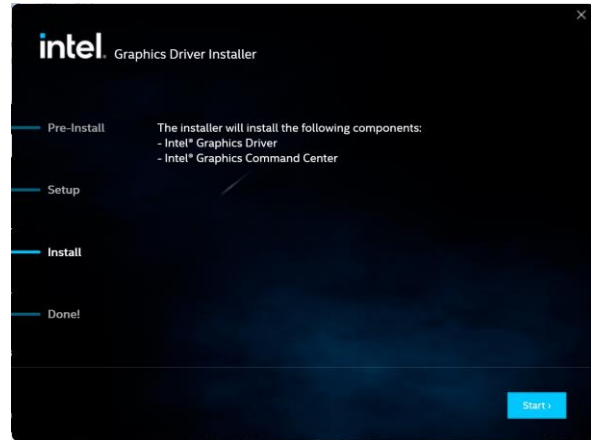
Step 3. Click **Start.**

Step 1. Click **Begin installation**.
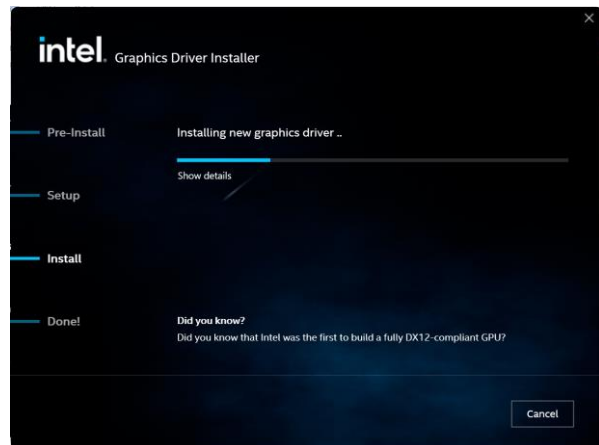
Step 4. Installing.
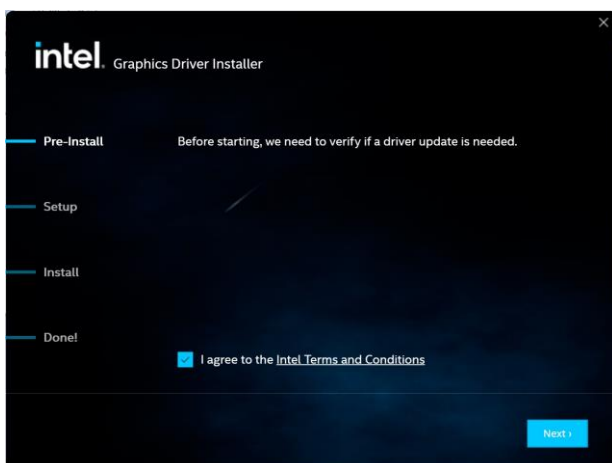
Step 2.
Click **Next** to accept license agreement.
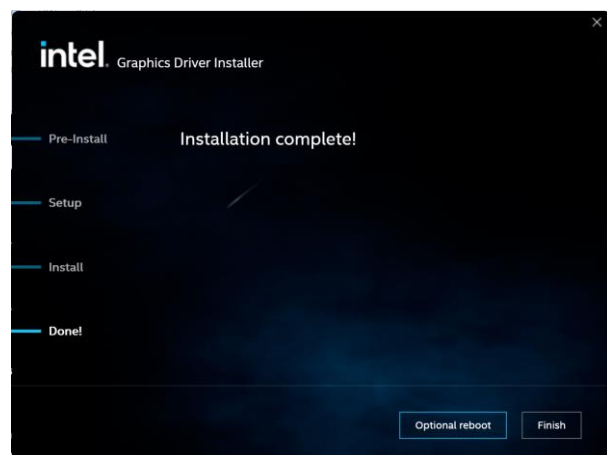
Step 5. Click **Finish** to complete setup.

4.3 Install GPIO Driver

All drivers can be found on the Avalue
Official Website:
http://www.avalue.com.tw.

Note: The installation procedures and
screen shots in this section are
based on Windows 10 operation
system. If the warning message
appears while the installation
process, click Continue to go on.
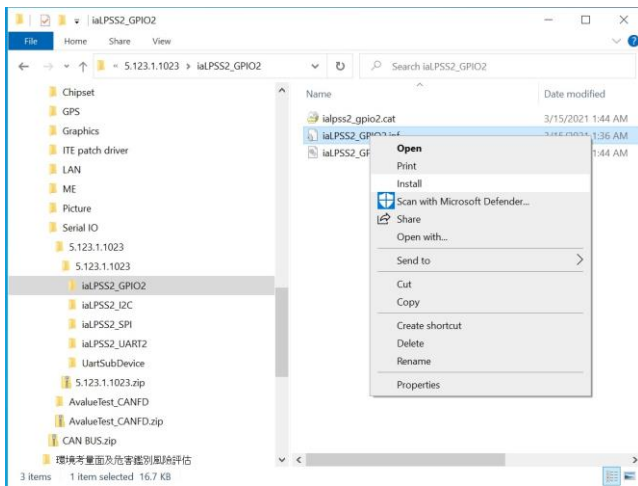
Step1. Click **Install** to Install.
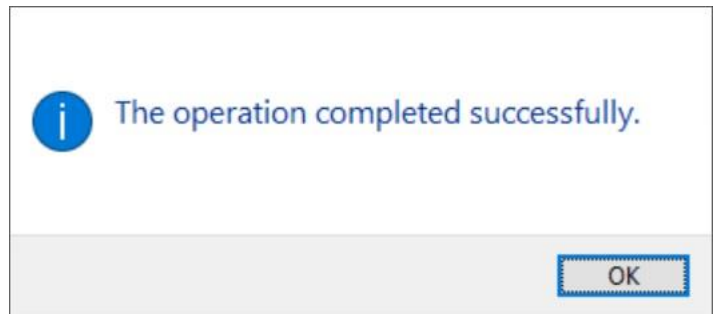
Step 2. Setup completed.

4.4 Install LAN Driver

All drivers can be found on the Avalue Official Website:

http://www.avalue.com.tw.

Note: The installation procedures and screen shots in this section are based on Windows 10 operation system.
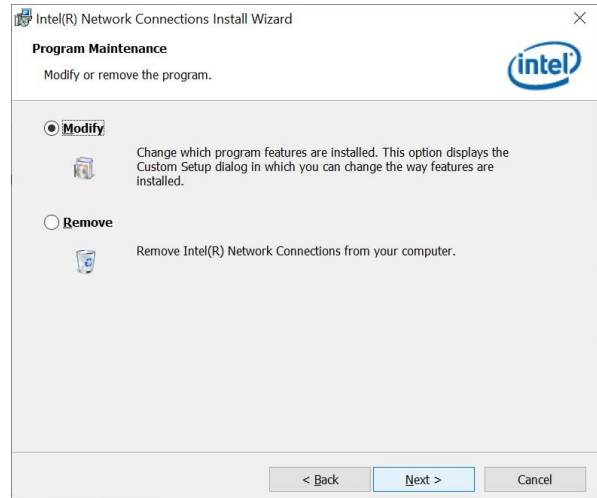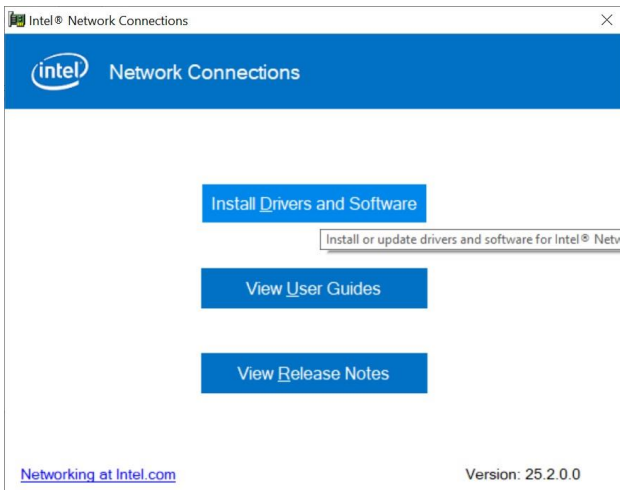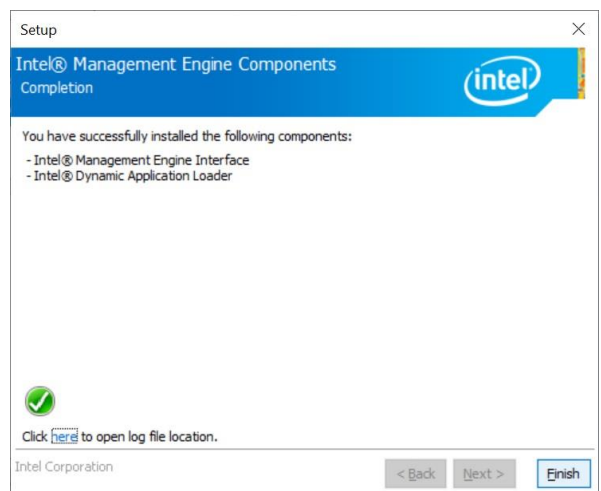
Step 3. Click **Next**.

Step 1. Click **Install Drivers and Software** to continue installation.
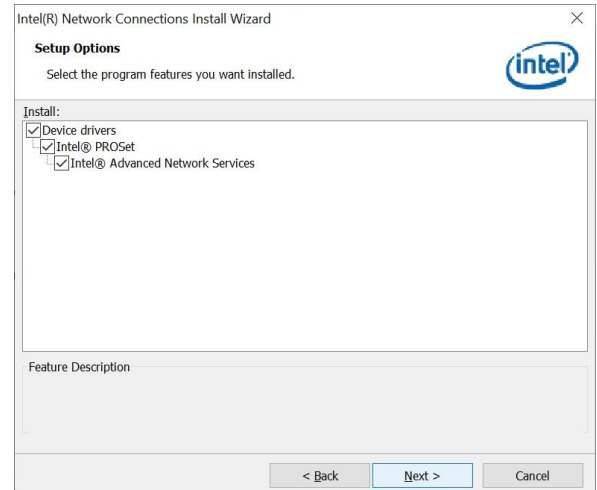
Step 4. Click **Next**.
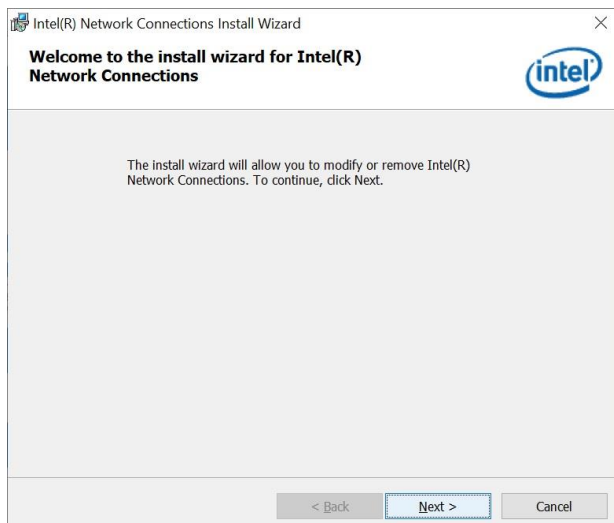
Step 2. Click **Next**.
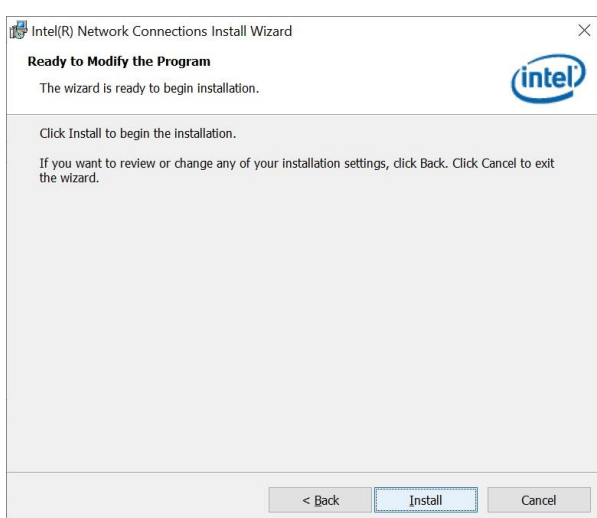
Step 5. Click **Install**.
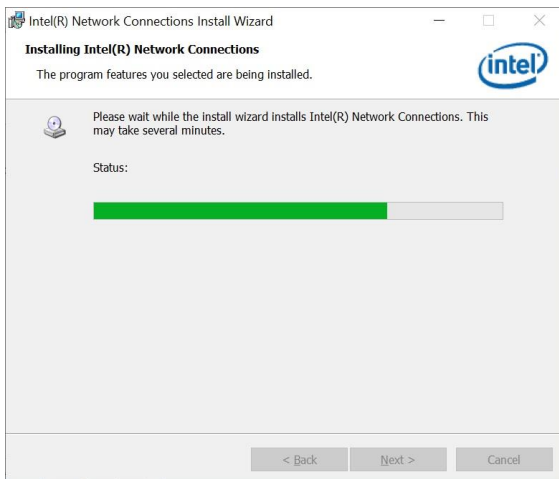
Step 6. Installing.
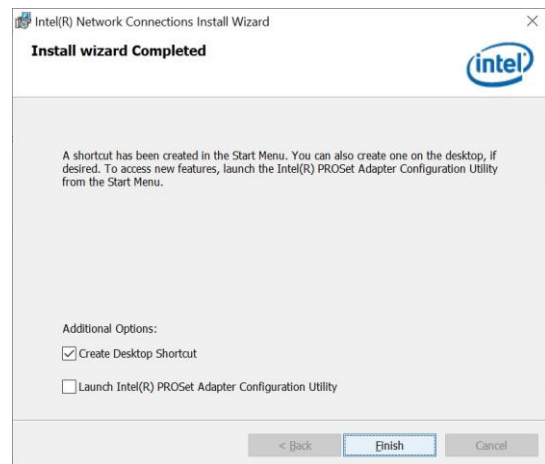
Step 7. Click **Finish** to complete setup.

4.5 Install ITE patch Driver

All drivers can be found on the Avalue
Official Website:
http://www.avalue.com.tw.

Note: The installation procedures and
screen shots in this section are
based on Windows 10 operation
system.
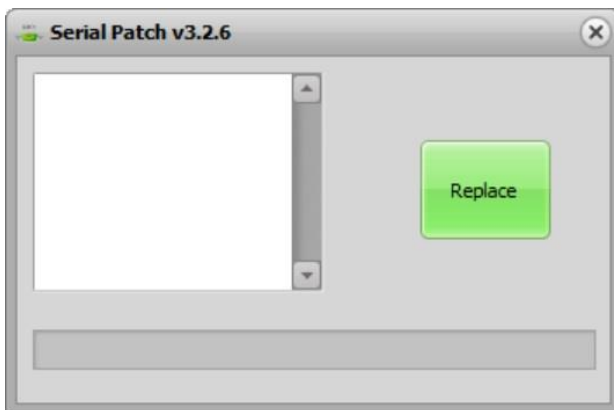
Step 1. Installing.

Step 2. Setup completed.

4.6 Install ME Driver

All drivers can be found on the Avalue Official
Website:
http://www.avalue.com.tw.

Note: The installation procedures and screen
shots in this section are based on
Windows 10 operation system.
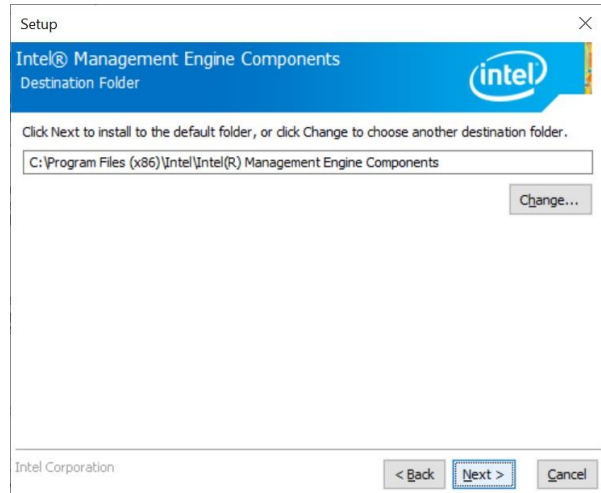
Step 3. Click **Next**

**Step 1.** Click **Next** to continue setup.

Step 4. Installing.
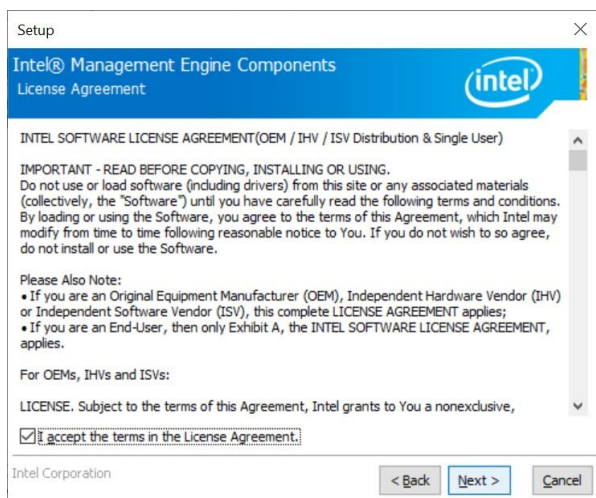
Step 2. Click **Next**.

Step 5. Click **Finish** to complete the
setup.

4.7 Install GPS Driver

All drivers can be found on the Avalue Official Website: **http://www.avalue.com.tw**.

Note: The installation procedures and screen shots in this section are based on Windows 10 operation system.
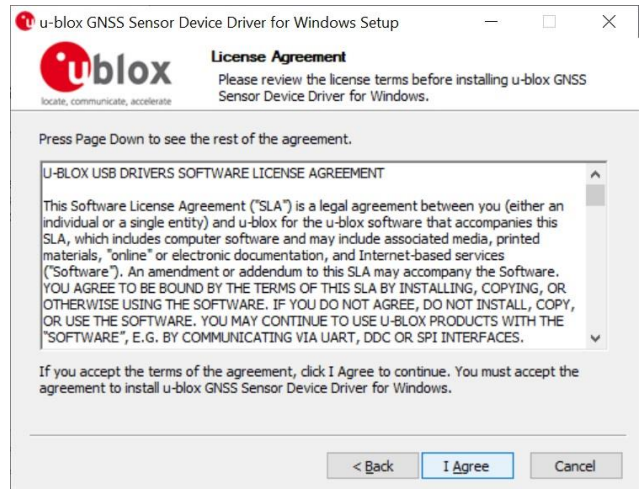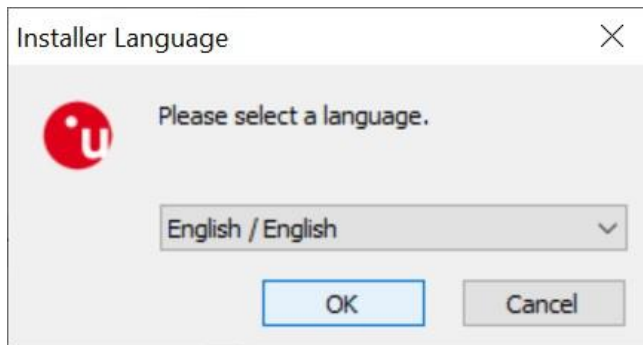
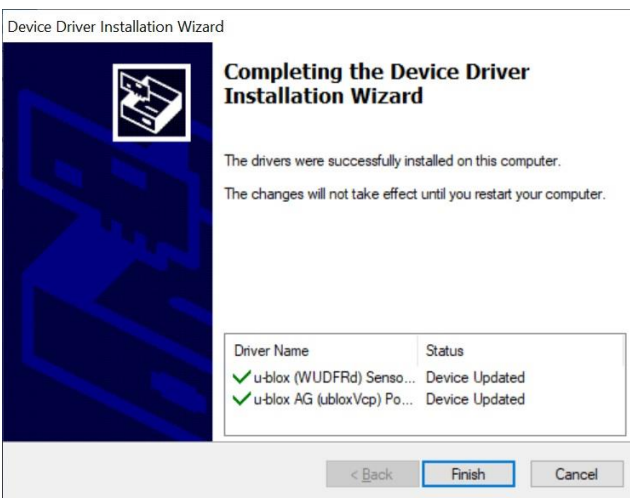**Step 1.** Please select a language.

Step 2. Click **Next**.

Step 3. Click **I Agree**.
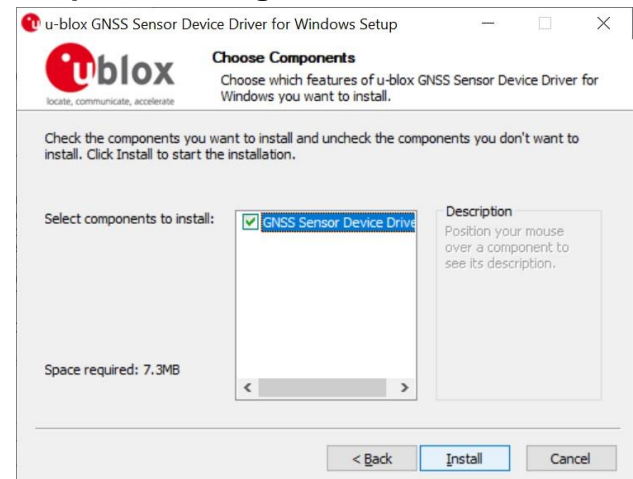
Step 4. Click **Install**.
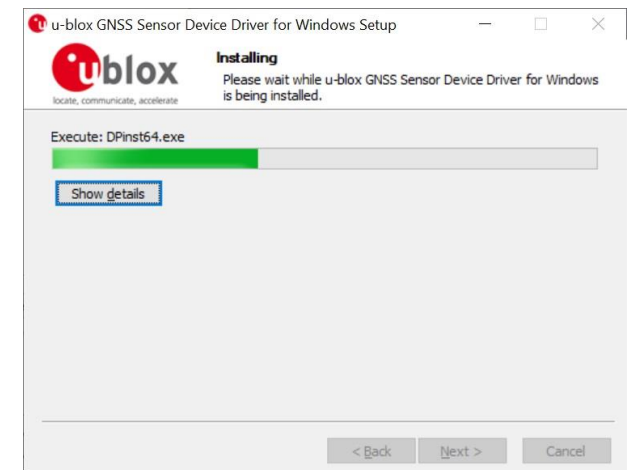
Step 5. Installing.

Step 6. Click **Next**.

Step 7. Click **Finish**.

Step 8. Click Finish to complete setup.