



User's Manual

EB-EHL

Intel® Elkhart Lake Processor
Embedded Barebone & Compact BOX PC

EB-EHL-J6-8G

EB-EHL-J6-16G

EB-EHL-J6-32G

(Revision 1.0A)

REVISION

DATE	VERSION	DESCRIPTION
2023/8/4	Version 1.0A	New Release

ICOP TECHNOLOGY INC.

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For technical support or drivers download, please visit our websites at:

- https://www.icop.com.tw/resource_entrance

This Manual is for the EB-EHL series.

SAFETY INFORMATION

- Read these Safety instructions carefully.
- Please carry the unit with both hands, handle carefully.
- Make sure the voltage of the power source is correct before connecting the equipment to the power outlet.
- Do not expose your BOX PC to rain or moisture in order to prevent shock and fire hazard.
- Input voltage +12~24VDC Power Adapter Only
- Operating temperature between 0~+60°C.
- Keep EB-EHL away from humidity.
- When a M.2 SSD storage is the main operating system storage, please turn off power before inserting or removing. Do not open the cabinet to avoid electrical shock. Refer to your nearest dealer for qualified personnel servicing.
- Never touch un-insulated terminals or wire unless your power adaptor is disconnected.
- Locate your BOX PC as close as possible to the socket outline for easy access and to avoid force caused by entangling of your arms with surrounding cables from the BOX PC.
- USB connectors are not supplied with Limited Power Sources.
- If the equipment is not used for a long time, disconnect it from the power source to avoid damage by transient overvoltage.

WARNING!



DO NOT ATTEMPT TO OPEN OR TO DISASSEMBLE THE CHASSIS (ENCASING) OF THIS PRODUCT. PLEASE CONTACT YOUR DEALER FOR SERVICING FROM QUALIFIED TECHNICIAN.

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Ch. 1

General Information

[1.1 Product Description](#)

[1.2 Product Specifications](#)

[1.3 Product Dimensions](#)

[1.4 Mounting Instruction](#)

[1.5 Ordering Information](#)

1.1 Product Description

ICOP Technology Inc. is proudly going to release a brand new BOX PC, which offers fanless design, high performance and low power consumption. The EB-EHL is powered by Intel® Elkhart Lake J6412 processors, and up to 32GB of SO-DIMM DDR4 module that handles processing more efficiently and provides faster performance. The ultra-compact and thin exterior design is perfect for the present demanding embedded and productive applications.

The new EB-EHL inherited Embedded Barebone series' smooth appearance and ultra-texture aluminum exterior design to make your industrial applications look more stylish. The versatile I/O ports, 2.5GIGA high-speed Ethernet etc. can fulfill fundamental functions. Our consistent advantages feature stable performance, extended working temperature support, low power consumption and fanless design. The expandable customize I/O ports can be accommodated connectivity requirements to industrial machine platforms and industrial automation equipment's needs. The BOX PC also reserves the dual channel LVDS signals and inverter voltage supply & control for external TFT LCD Panel with LED backlight, which connects the LVDS and LED backlight cables to become a custom Panel PC product.

The EB-EHL supports Windows 10, Windows 10 IoT, Windows 11 and Linux to meet ready-to-market demand and provide competitive advantages for customers.

1.2 Product Specifications

CPU BOARD SPECIFICATIONS

CPU	Intel® Elkhart Lake J6412 (Quad core)
Cache	L2: 1.5MB Cache
BIOS	AMI BIOS
Memory	8GB / 16GB / 32GB DDR4
Display	<p>Intel® HD Graphics:</p> <p>HDMI x2 (Max. 4096x2160@60Hz)</p> <p>Dual Channel LVDS x1 (Max. 1920x1080@60Hz)</p> <p>eDP x1 (Max. 4096x2160@60Hz)</p> <p>(Only can choose either one of LVDS or eDP function)</p>
LAN	Intel® i225-V 2.5GbE x 2
Audio	HD Audio-Realtek ALC888S
Internal Drives	M.2 M-key (2242/2280) PCIe Gen. 3 *2 / SATA interface support NVME
Expansion I/O	M.2 B-key (3024) USB3.1/USB2.0 interface M.2 E-key (2230) USB2.0/PCIe Gen3 *1 interface
I/O	<p>HDMI x 2</p> <p>RS232/422/485 (COM1) x 1</p> <p>RS232 (COM2) x 1</p> <p>USB3.1 (Gen. 2) x 3</p> <p>USB2.0 x 3</p> <p>RJ45 x 2</p> <p>Phone Jack (Line-Out & Mic-In) x 1</p>

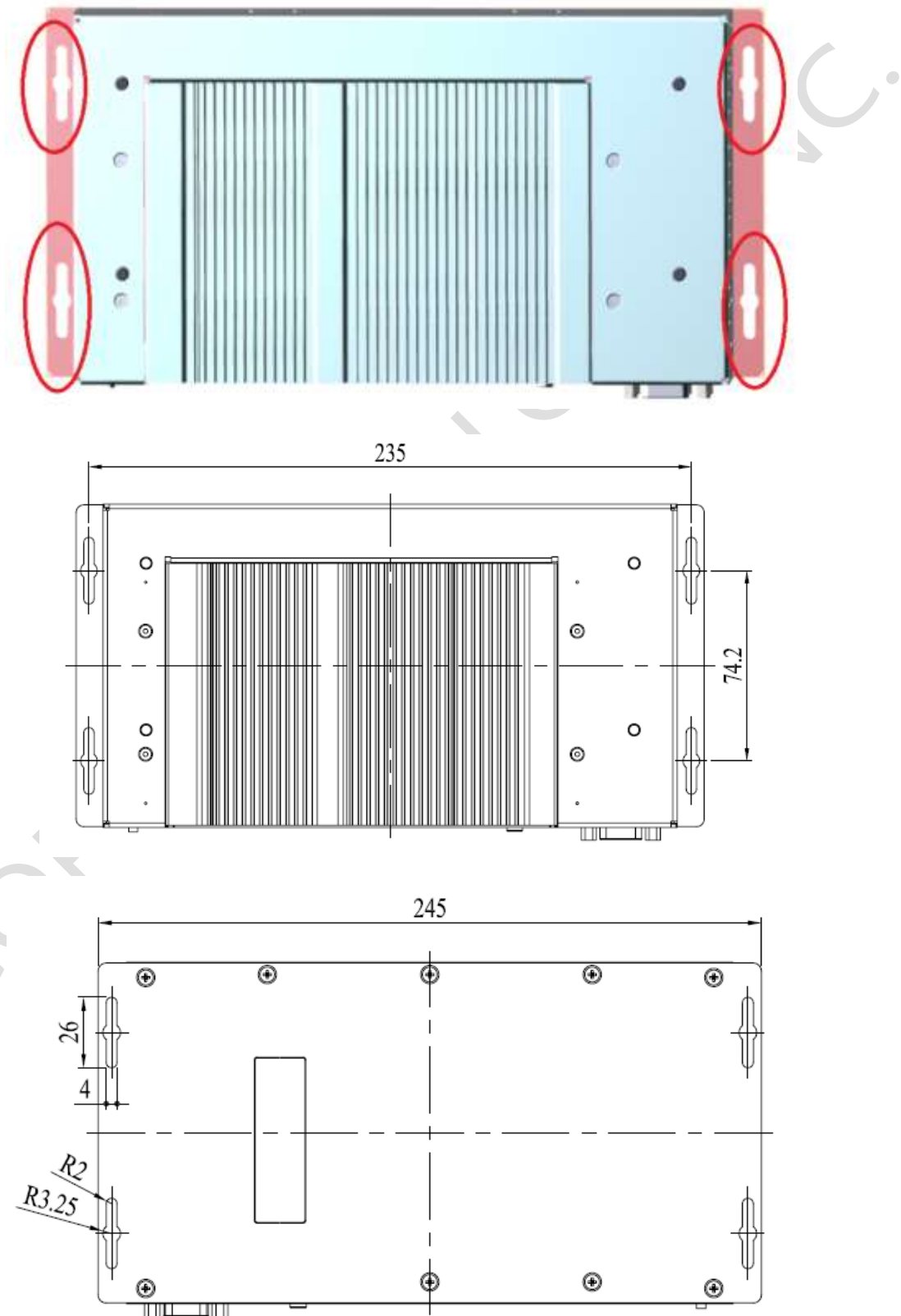
MECHANICAL & ENVIRONMENT

Power Requirement	+12~24 VDC Power Adatper Only (DC JACK 5.5x2.5mm plug support)
Power Adapter	+12VDC@ 3.34A (40W)
Operating Temperature	0~+60°C
Storage Temperature	-30~+70°C
Operating Humidity	0% ~ 90% Relative Humidity, Non-Condensing
Dimensions	245x126x37.2mm (9.65"x4.96"x1.46")
Weight	1.12 Kg
Certificates	CE / UKCA / FCC / VCCI

1.4 Mounting Instruction

EB-EHL series reserve 4 mounting holes as below figure.

Please use M3*4 screws to lock the EB-EHL system upon the chassis if want.



1.5 Ordering Information

Product Code	CPU Series	CPU Type	RAM
EB	EHL	J6	8G 16G 32G

1. Product Code : Code 1~2.

EB : Embedded Barebone & BOX PC Series.

2. CPU Serial : Code 3~5.

EHL: Intel® Elkhart Lake Series.

3. CPU Type : Code 6~7.

J6: Intel Elkhart Lake J6412.(Standard; Quad Core 10W)

4. RAM : Code 8~10.

8G : 8GB. 16 : 16GB. 32 : 32GB

PS: Power adapter and cord must be showed separate because different county has different power cord. The part numbers of power adapter and cord are as below.

(Please contact ICOP sales person or distributor to get the unit price of power adaper and cord. Thank you.)

POWER-12V3.34A-MW

POWERCABLE(A) / POWERCABLE(G)

PART NUMBER	DESCRIPTION
EB-EHL-J6-8G	Embedded Barebone & BOX PC w/Intel Elkhart Lake J6412/8GB DRAM /6U/2*2.5GbE LAN/2S
EB-EHL-J6-16G	Embedded Barebone & BOX PC w/Intel Elkhart Lake J6412/16GB DRAM /6U/2*2.5GbE LAN/2S
EB-EHL-J6-32G	Embedded Barebone & BOX PC w/Intel Elkhart Lake J6412/32GB DRAM /6U/2*2.5GbE LAN/2S
POWER-12V3.34A-MW	AC – DC power adapter / DC12V @ 3.34A (AC 90 ~ 240V Input)
POWERCABLE(A) / POWERCABLE(G) / POWERCABLE(EN) / POWERCABLE(AU)	US / Euro / UK / AU & NZ power cord for POWER-12V3.34A-MW

Ch. 2

System Installation

[2.1 CPU Board Outline](#)

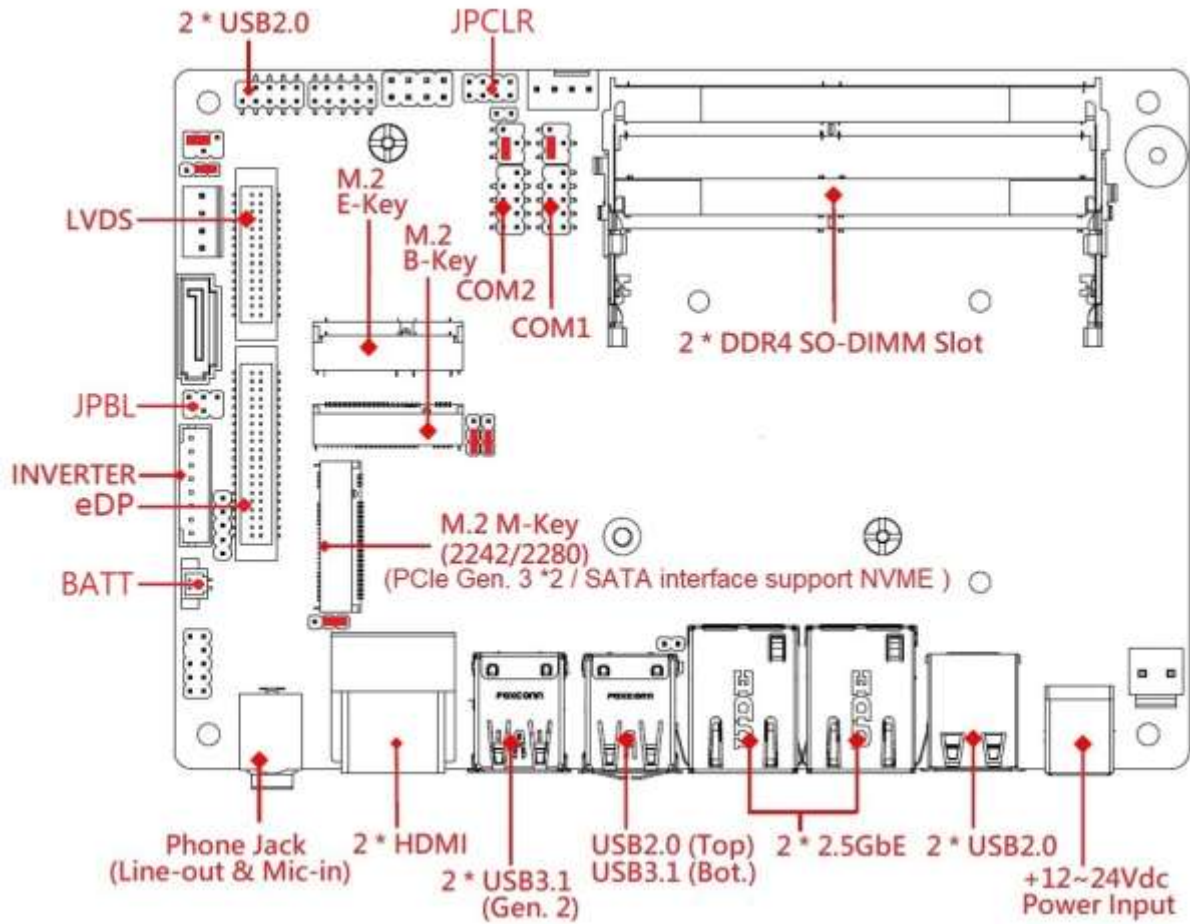
[2.2 Connector Summary](#)

[2.3 Connector Pin Assignments](#)

[2.4 External I/O Overview](#)

[2.5 External I/O Pin Assignment](#)

2.1 CPU Board Outline



EB-EHL CPU Board

2.2 Connector Summary

Connector	Type of Connections	Pin #
DDR4 SO-DIMM Slot	External SO-DIMM Slot	260-pin
Power DC Jack	External Power DC Jack Connector	2-pin
2 * USB3.1 (Gen. 2)	External Dual USB3.1 Connector	18-pin
2* USB3.0	External Dual USB2.0 Connector	10-pin
2 * HDMI	External Dual HDMI Connector	38-pin
2 *2.5GbE	External Dual RJ45 Connector	16-pin
M.2 M-Key	External M.2 M-Key (2242/2280) PCIe Gen. 3 *2 / SATA interface support NVME	75-pin
M.2 E-Key	External M.2 E-Key	75-pin
M.2 B-Key	External M.2 B-Key	75-pin
COM1 (RS232/422/485)	2.0mm 9-pin pin header	9-pin
COM2 (RS232)	2.0mm 9-pin pin header	9-pin
USB2.0 x 2	2.0mm 9-pin pin header	9-pin
LVDS	1.25mm 30-pin box header	30-pin
INVERTER	2.0mm 8-pin box header	8-pin
eDP	1.25mm 40-pin box header	40-pin
JPCLR	2.0mm 8-pin pin header	8-pin
JPBL	2.0mm 4-pin pin header	4-pin
BATT	1.25mm 2-pin box header	2-pin

2.3 Connector Pin Assignments

Power DC Jack

Pin #	Signal Name
1	+12~24V Power Adapter Input
2	GND

COM1 (RS232/422/485)

Pin #	Signal Name	Pin #	Signal Name
1	DCD1 /422TX- /RS485-	2	DSR1
3	RXD1 /422TX+ /RS485+	4	RTS1
5	TXD1/422RX+	6	CTS1
7	DTR1/422RX-	8	RI1
9	GND		

COM2 (RS232)

Pin #	Signal Name	Pin #	Signal Name
1	DCD2	2	DSR2
3	RXD2	4	RTS2
5	TXD2	6	CTS2
7	DTR2	8	RI2
9	GND		

J11: USB2.0 x 2

Pin #	Signal Name	Pin #	Signal Name
1	VCC	2	VCC
3	USB2_D1-	4	USB2_D2-
5	USB2_D1 +	6	USB2_D2 +
7	GND	8	GND
		10	NC

LVDS

Pin #	Signal Name	Pin #	Signal Name
1	LVDSB_D3-	2	LVDSB_D3+
3	LVDSB_CLK-	4	LVDSB_CLK+
5	LVDSB_D2-	6	LVDSB_D2+
7	LVDSB_D1-	8	LVDSB_D1+
9	LVDSB_D0-	10	LVDSB_D0+
11	NC/DDC_DAT	12	NC/DDC_CLK
13	GND	14	GND
15	GND	16	GND
17	LVDSA_D3+	18	LVDSA_D3-
19	LVDSA_CLK+	20	LVDSA_CLK-
21	LVDSA_D2+	22	LVDSA_D2-
23	LVDSA_D1+	24	LVDSA_D1-
25	LVDSA_D0+	26	LVDSA_D0-
27	LCD_VDD	28	LCD_VDD
29	LCD_VDD	30	LCD_VDD

Inverter

Pin #	Signal Name
1	Backlight_Enable
2	Backlight_PWM
3	Backlight LED VCC
4	Backlight LED VCC
5	GND
6	GND
7	Backlight UP SW
8	Backlight DN SW

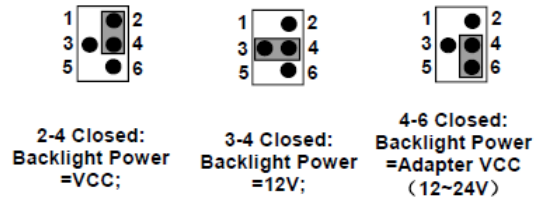
BATT

Pin #	Signal Name
1	VBATT+
2	GND

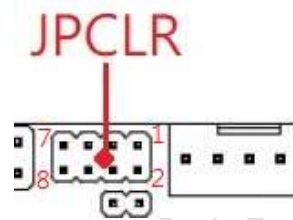
eDP

Pin #	Signal Name	Pin #	Signal Name
1	NC	2	NC
3	GND	4	NC
5	EDP_LANE3-	6	GND
7	EDP_LANE3+	8	GND
9	GND	10	GND
11	EDP_LANE2-	12	GND
13	EDP_LANE2+	14	EDP_LCD_HPD
15	GND	16	GND
17	EDP_LANE1-	18	GND
19	EDP_LANE1+	20	GND
21	GND	22	GND /EDP_DET
23	EDP_LANE0-	24	PNL0_BLEN
25	EDP_LANE0+	26	PNL0_BLCTL
27	GND	28	EDP_SDA
29	EDP_AUXP	30	EDP_SCL
31	EDP_AUXN	32	BL_PWR
33	GND	34	BL_PWR
35	LCD_VCC	36	BL_PWR
37	LCD_VCC	38	BL_PWR
39	LCD_VCC	40	BL_PWR

JPBL

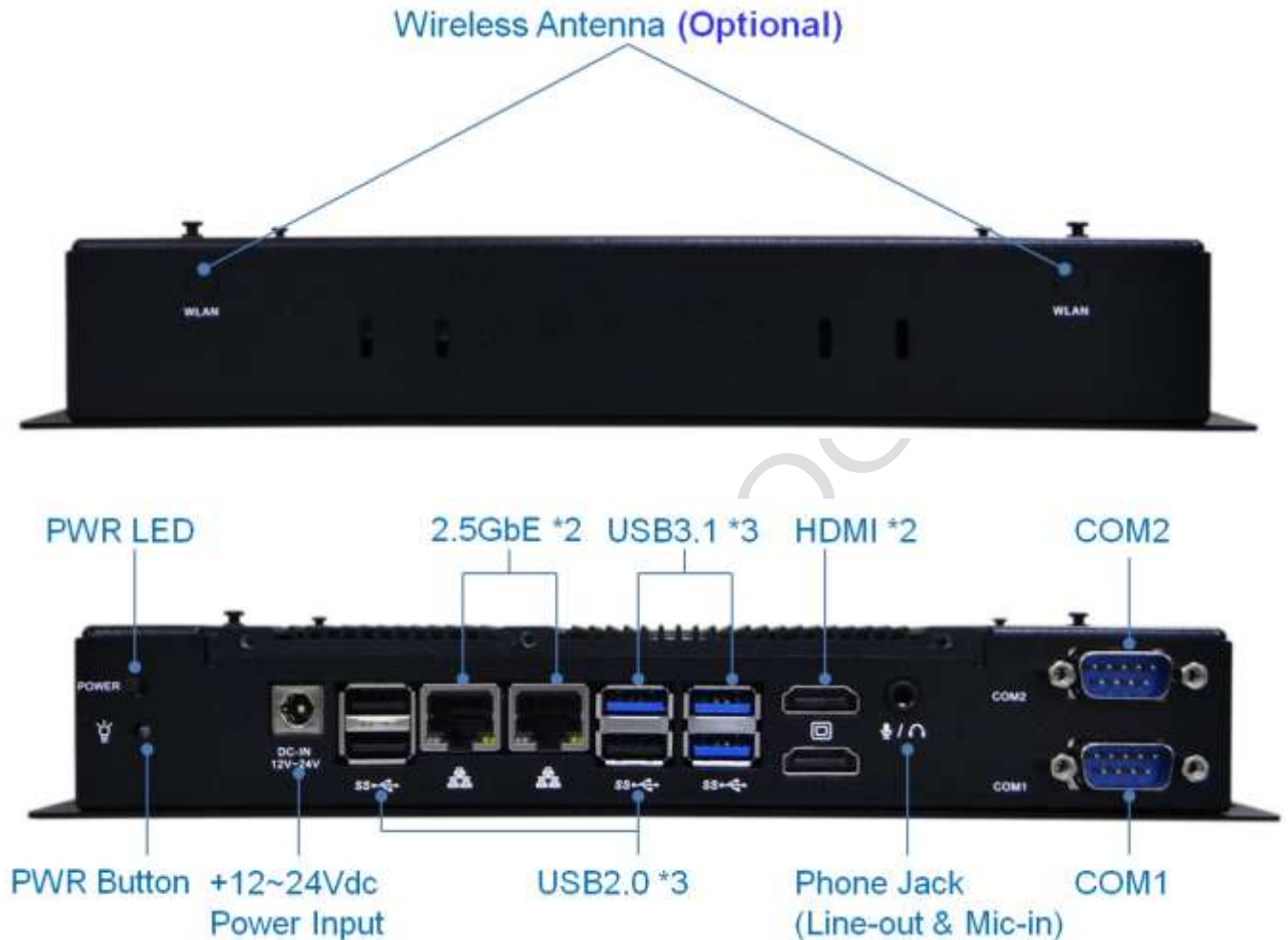


JPCLR



Pin #	Signal Name
1-2 Open (Default)	Normal
1-2 Closed	Clear RTC
3-4 Open (Default)	Normal
3-4 Closed	Clear CMOS
5-6 Open (Default)	Normal
5-6 Closed	ME Disable
7-8 Open (Default)	Normal
7-8 Closed	CASE OPEN


2.4 External I/O Overview



NOTE: COM1 RS232/422/485 is selected by BIOS setting. Please refer the section, 4.3 to set the function in the BIOS setup.

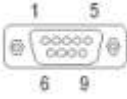
2.5 External I/O Pin Assignment

DC Jack (+12~24Vdc Power Adpater Input)

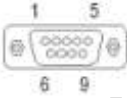
	Pin #	Signal Name
	1	+12~24Vdc Power Input
	2	GND

COM1 (RS232/422/485)

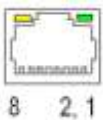
(Change mode by BIOS Setup)

	Pin #	Signal Name	Pin #	Signal Name
	1	DCD1 /422TX- /RS485-	2	RXD1 /422TX+ /RS485+
	3	TXD1 /422RX+	4	DTR1 /422RX-
	5	GND	6	DSR1
	7	RTS1	8	CTS1
	9	RI1		

COM2 (RS232)

	Pin #	Signal Name	Pin #	Signal Name
	1	DCD2	2	RXD2
	3	TXD2	4	DTR2
	5	GND	6	DSR2
	7	RTS2	8	CTS2
9	RI2			

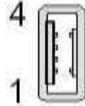
2.5 GbE

	Pin #	Signal Name	Pin #	Signal Name
	1	TP0+	2	TP0-
	3	TP1+	4	TP2+
	5	TP2-	6	TP1-
7	TP3+	8	TP3-	


HDMI

	Pin #	Signal Name
	1	TMDS_Data2+
	2	TMDS_Data2_Shield
	3	TMDS_Data2-
	4	TMDS_Data1+
	5	TMDS_Data1_Shield
	6	TMDS_Data1-
	7	TMDS_Data0+
	8	TMDS_Data0_Shield
	9	TMDS_Data0-
	10	TMDS_CLK+
	11	TMDS_CLK_Shield
	12	TMDS_CLK-
	13	CEC
	14	Reserved
	15	SCL
	16	SDA
	17	DDC/CEC_GND
	18	+5V Power
19	Hop_Plug_Detect	

USB2.0

	Pin #	Signal Name
	1	VCC
	2	USB0-
	3	USB0+
4	GND	

USB 3.1

	Pin #	Signal Name
	1	VCC
	2	D-
	3	D+
	4	GND
	5	SSRX-
	6	SSRX+
	7	GND
	8	SSTX-
	9	SSTX+

Ch. 3

Hardware Installation

EB-EHL supports various kinds of storages for industrial application, divided into M.2 2242 SATA (M-Key) and 2.5" SATAIII HDD/SSD.

[3.1 Installing the M.2 2242/2280 Storage](#)

[3.2 Installing the M.2 B-Key \(3024\) and M.2 M-Key \(2230\) Modules](#)

[3.3 Installing the Micro SIM Card \(Must have 3G/4G of M.2 B-Key \(3024\) Module in advance\)](#)

[3.4 Installing the LVDS and backlight cables for external LCD panel](#)

3.1 Installing the M.2 M-key (2242/2280) Storage

EB-EHL series support M.2 M-key (2242/2280) PCIe Gen. 3 *2 / SATA interface NVME. Please refer the below instructions.

[STEP]

1. Remove the 9 screws of bottom side as the image below.



2. Pull up the rear cover.



3. Support M.2 2240/2280 storage, which the green area is for 2242 and red area is for 2280.



- For 2242 or 2280 storage, please use a M2 screw driver to remove the top screw in advance, and then use M4 screw driver to move the bottom screw to the correct position.

(For example, The below figures show moving the screw for M.2 2242 storage.)



- Plug the M.2 storage in the slot and lock it up.



- Take the rear cover back and lock 9 screws.

ICOP offers the standard M2. 2242 SATA storage as below.

[SPEC]

Standard M.2 2242 form factor
22 x 42 x 3.2 mm



[M.2 2242 SATA LIST]

P/N	Flash Type	Capacity	Operating Temperature
IM242S-64G-M	MLC	64GB	0°C ~ +70°C
IM242S-128G-M	MLC	128GB	0°C ~ +70°C
IM242S-256G-M	MLC	256GB	0°C ~ +70°C
IM242S-128G-T	TLC	128GB	0°C ~ +70°C
IM242S-256G-T	TLC	256GB	0°C ~ +70°C
IM242S-512G-T	TLC	512GB	0°C ~ +70°C
IM242S-1T-T	TLC	1TB	0°C ~ +70°C

3.2 Installing the M.2 B-Key (3024) and M.2 E-Key (2230) Modules

EB-EHL series support M.2 B-key (3024) USB3.1/USB2.0 interface and M.2 E-key (2230) USB2.0/PCIe Gen3 *1 interface. Please refer the below instructions.

[STEP]

1. Remove the 9 screws of bottom side as the image below.



2. Pull up the rear cover.



3. Remove the screw and plug the M.2 B-Key (3024) and M.2 E-Key (2230) modules on the slots, and then lock them up.



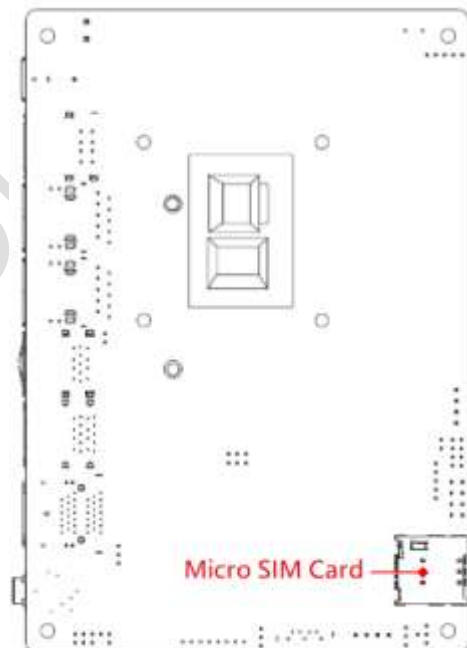
4. Take the rear cover back and lock 9 screws.

3.3 Installing the Micro SIM Card (Must have 3G/4G of M.2 B-key (3024) Module in advance)

EB-EHL series support Micro SIM Card for 3G/4G of M.2 B-key (3024) USB3.1/USB2.0 module

[STEP]

1. Please refer the section, 3.2 to install 3G/4G of M.2 B-key (3024) Module in advance.
2. Plug Micro SIM Card on the slot.



3.4 Installing LVDS and LED backlight cables for external LCD panel

EB-EHL series has reserved one hole to through the LVDS and LED backlight cables for external LCD panel.

[STEP]

1. Remove the 9 screws of bottom side as the image below.



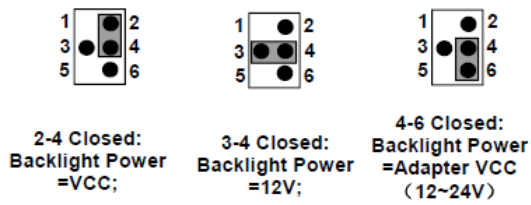
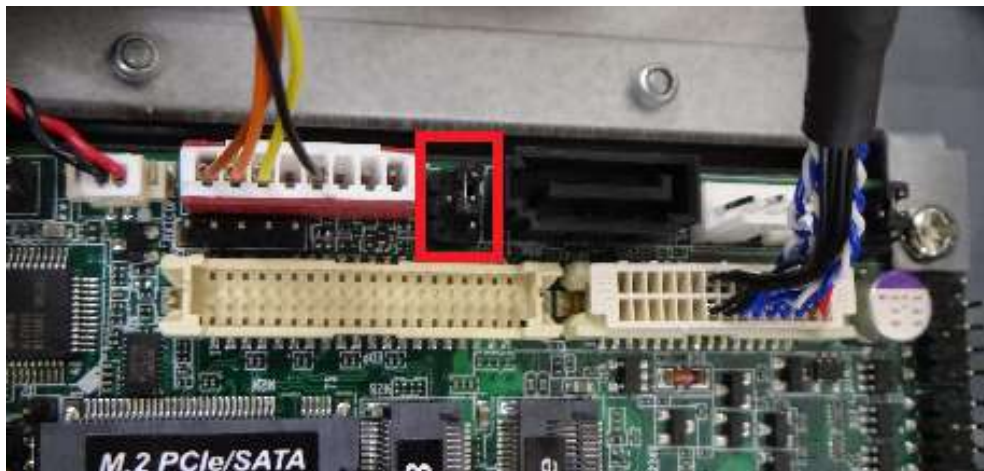
2. Pull up the rear cover.



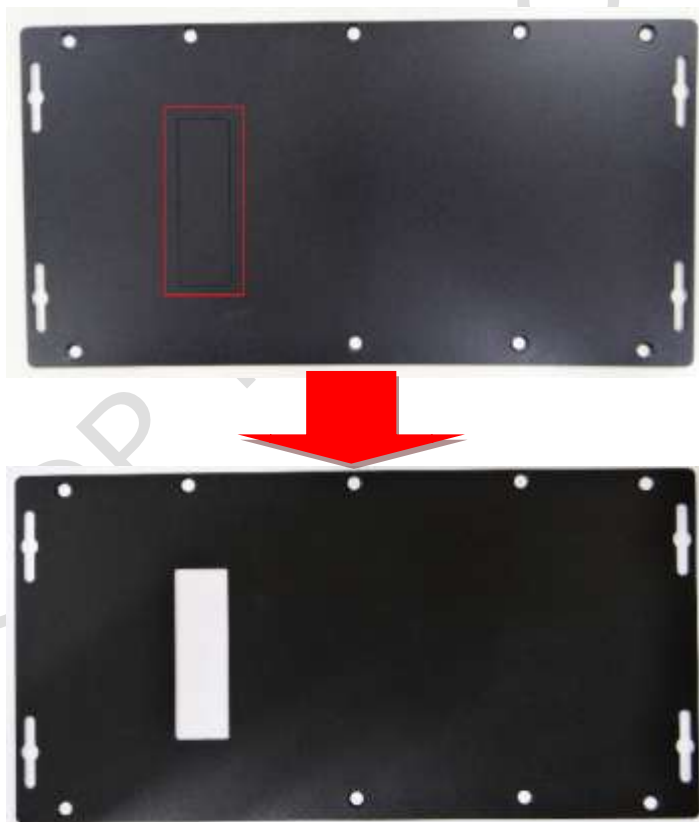
3. Plug the LVDS and LED backlight cables upon the board.



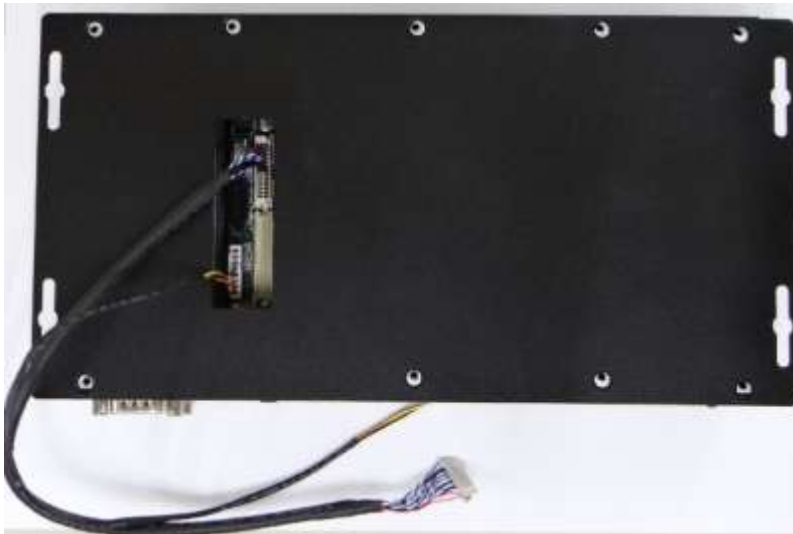
4. Set the LED backlight Voltage.



5. Push out and remove the small cover.



6. Through the cables to the rear cover and put the cover back.



7. Lock 9 screws back.



8. Please refer the section 4.6 to setup the LCD display settings.

Ch. 4

Drivers and BIOS Instruction

[4.1 Operating System Support and Drivers](#)

[4.2 BIOS Hot Key](#)

[4.3 BIOS COM1 Setting \(RS232/RS422/RS485\)](#)

[4.4 BIOS COM2 Setting \(Change Settings\)](#)

[4.5 BIOS AT Mode Setting \(Support Auto-Power On Function\)](#)

[4.6 BIOS LCD Display Settings \(by LVDS Signals\)](#)

[4.7 BIOS Serial Port Console Redirection](#)

[4.8 BIOS Load Default Setting](#)

4.1 Operating System Support and Drivers

The EB-EHL provides the Win10 and Win11 drivers.

Please get the drivers from ICOP technical support URL:

https://www.icop.com.tw/resource_entrance

For Linux, most Linux distributions support Intel® Elkhart Lake Processor and user can install Linux upon EB-EHL directly. Please contact your region sales for technical support if you have any question.

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4.2 BIOS Hot Key

After power on, it supports BIOS hot key as below.



Press < **Del** > to enter the AMI BIOS setup

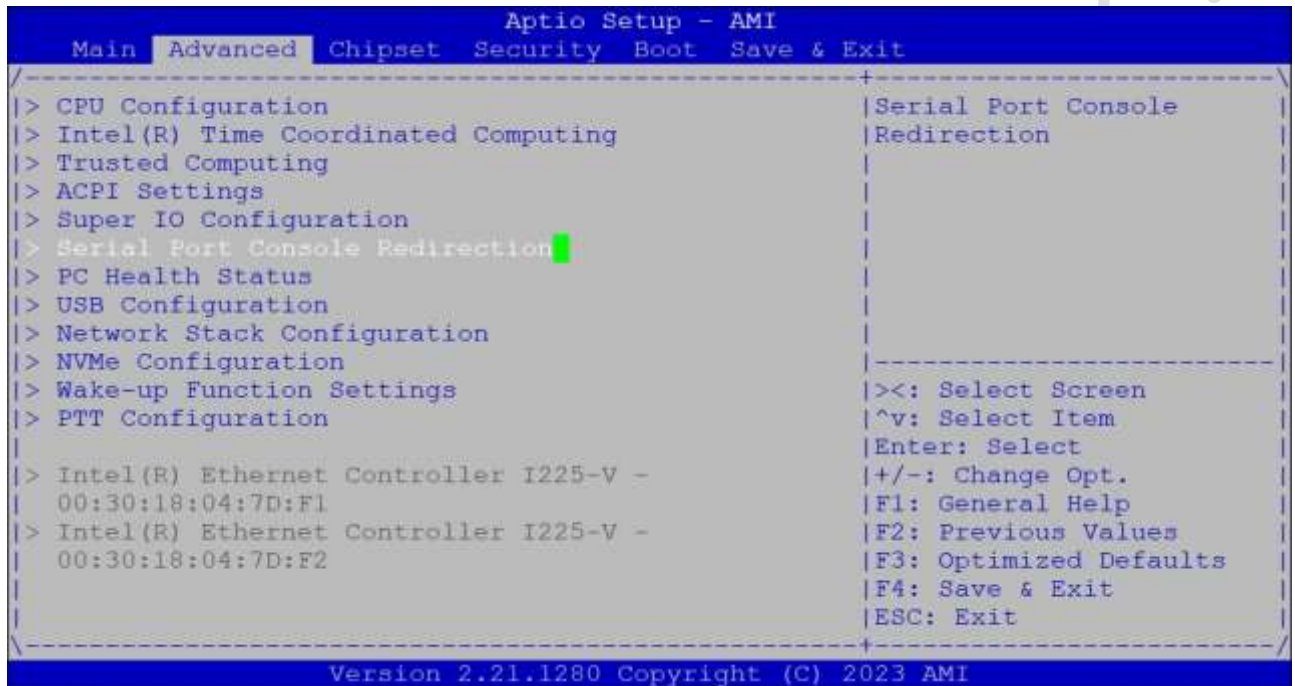


Press < **F7** > to enter Popup Menu

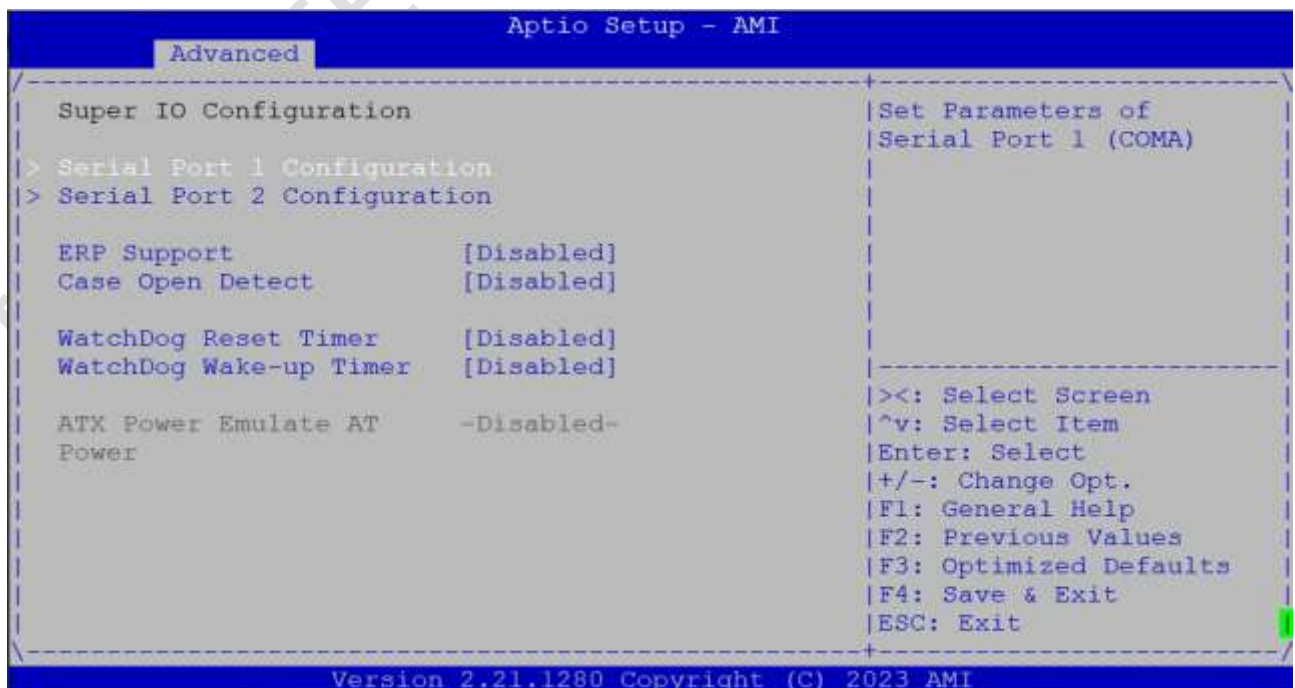
4.3 BIOS COM1 Setting (RS232/422/485)

COM1 can be set to be RS232/422/485 function. Please refer the instruction as below.

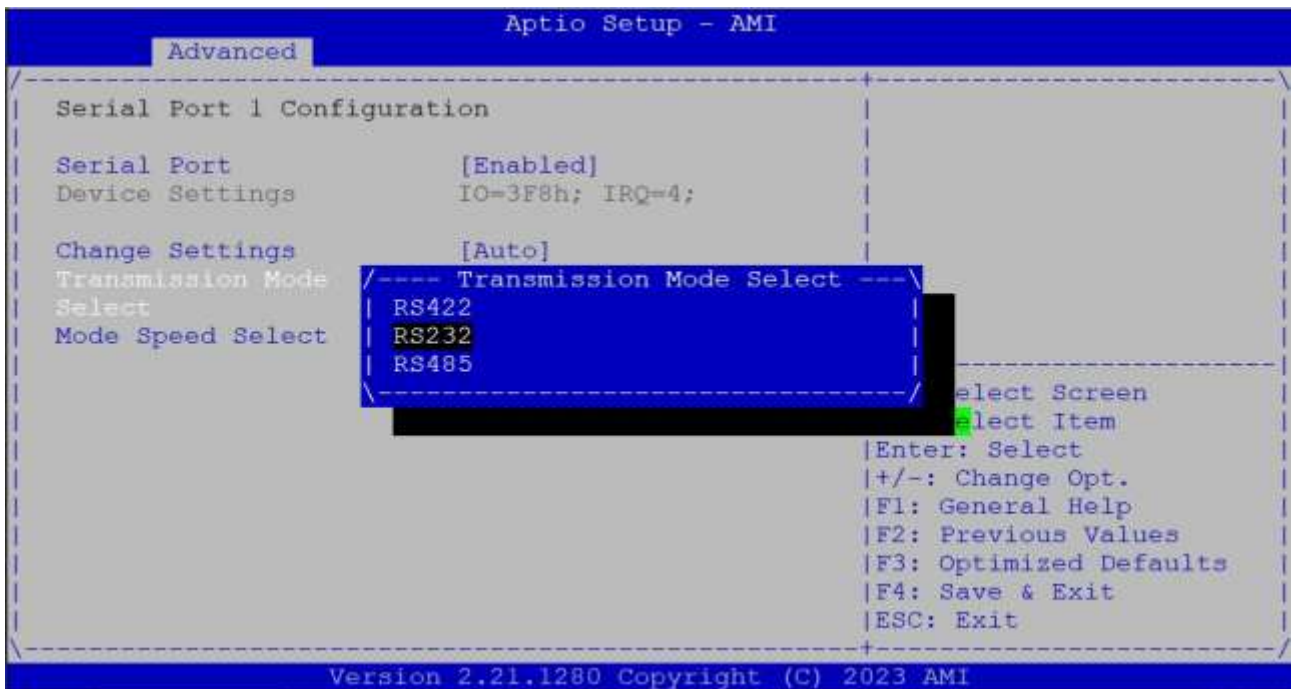
- (1) Press “Del” key into the BIOS setup, and go to “Advanced” and “Super IO Configuration”.



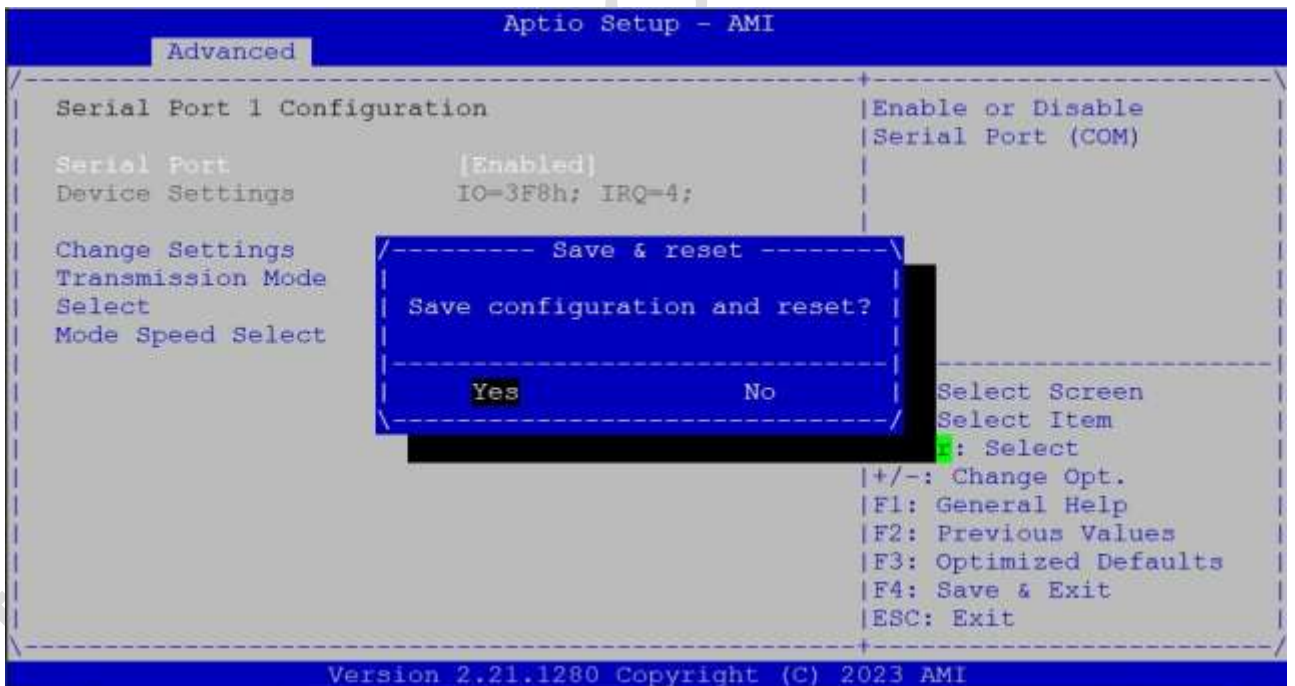
- (2) Go to “Serial Port 1 Configuration”.



(3) Go to Transmission Mode and set RS232/422/485 function.



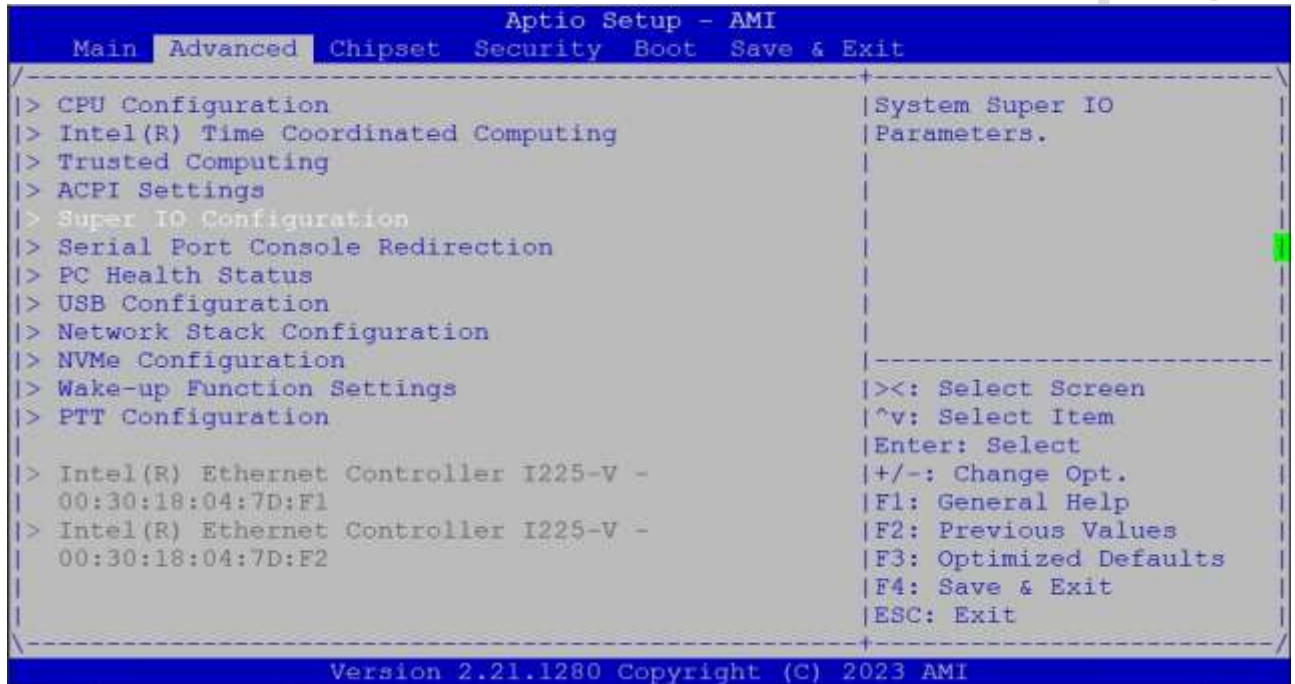
(4) After setting, please press "F4" key to save & exit.



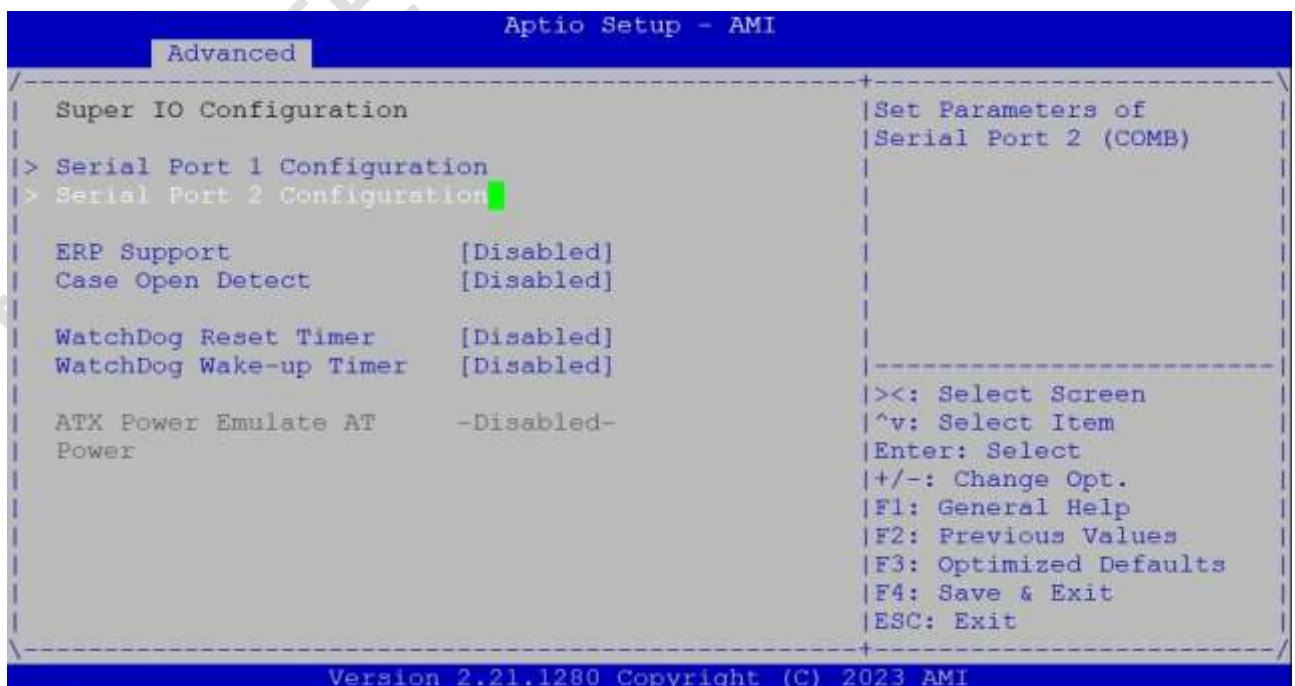
4.4 BIOS COM2 Setting (Change Settings)

COM2 can be changed settings as below.

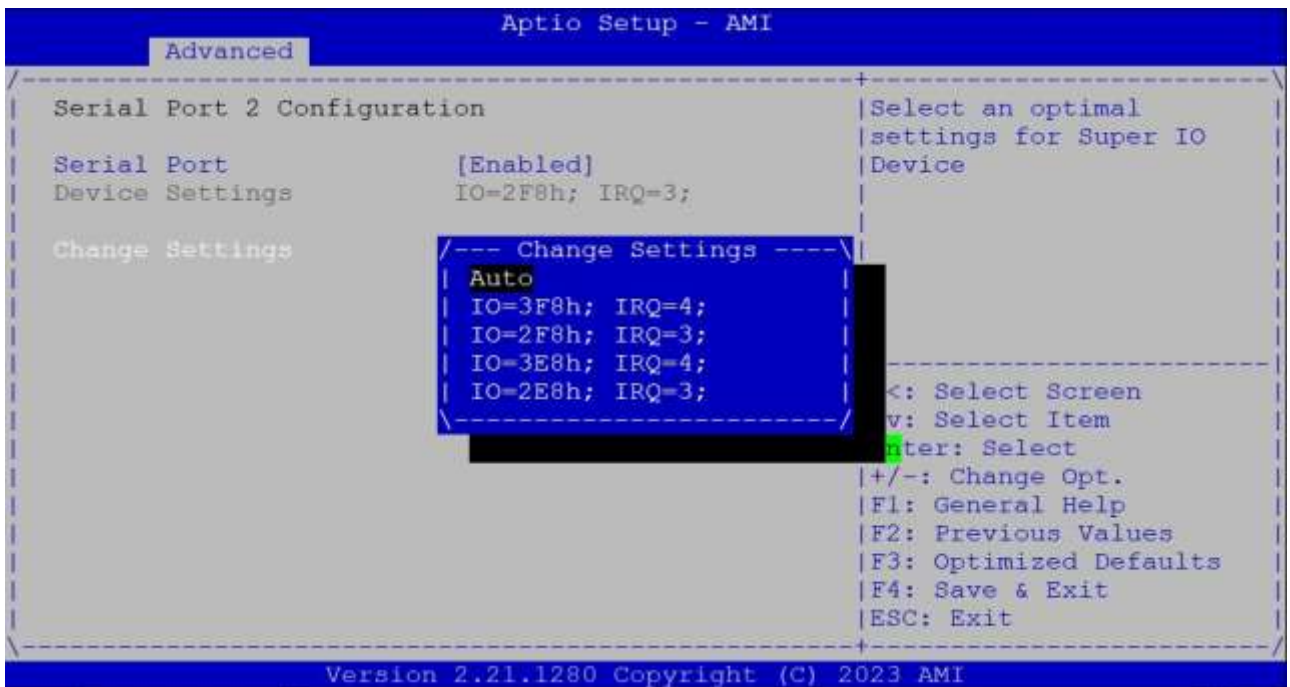
- (1) Press “Del” key into the BIOS setup, and go to “Advanced” and “Super IO Configuration”.



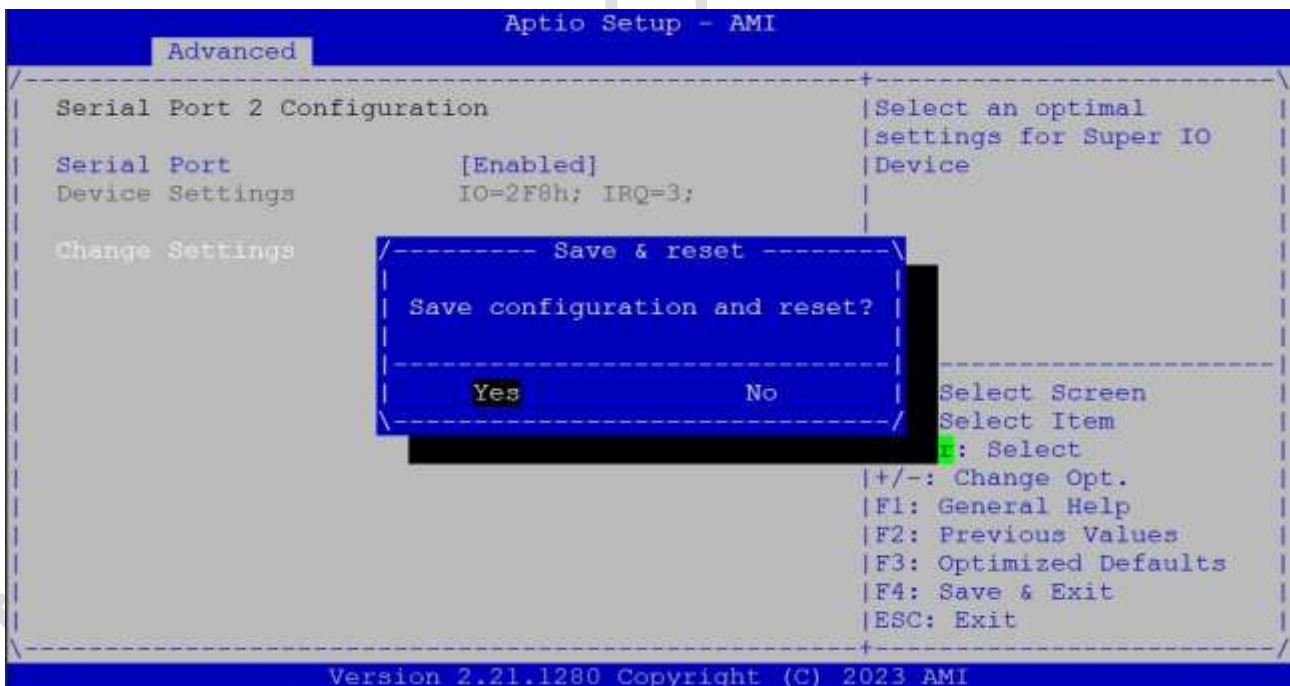
- (2) Go to “Serial Port 2 Configuration”.



(3) Go to “Change Settings” and set IO address and IRQ if you want.



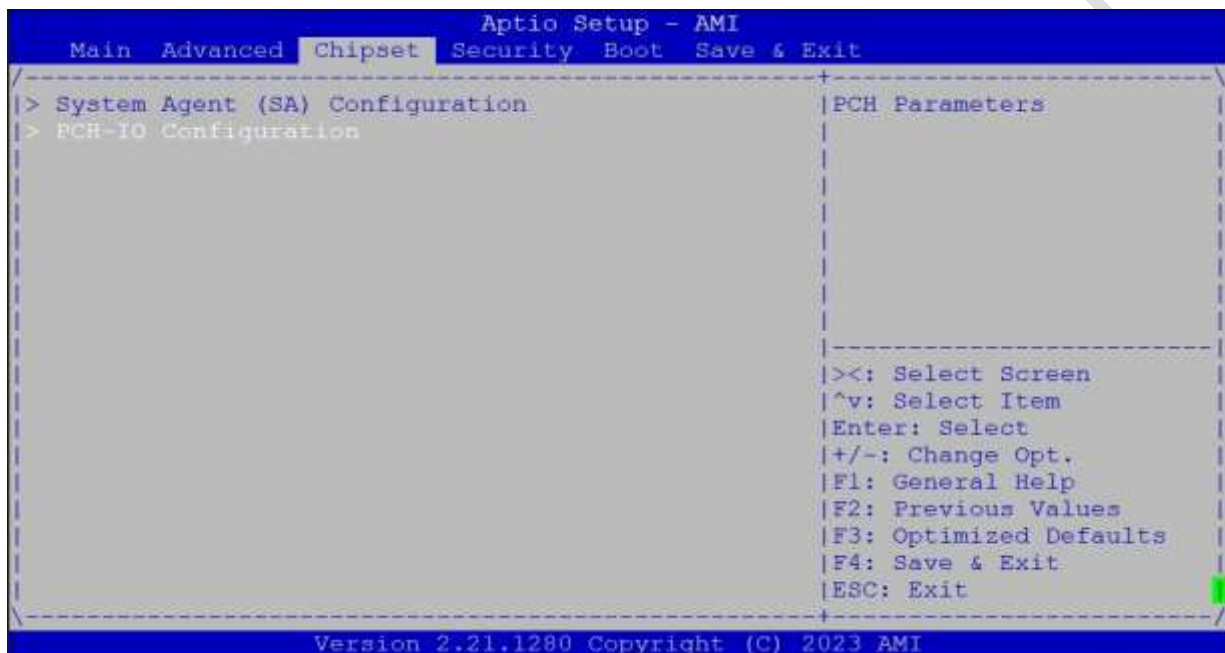
(4) After setting, please press “F4” key to save & exit.



4.5 BIOS AT Mode Setting (Support Auto-Power On Function)

EB-EHL supports “Auto-Power On function”, user doesn’t need to press “power button” for system power on and just needs to plug power source input and system will be power on automatically.

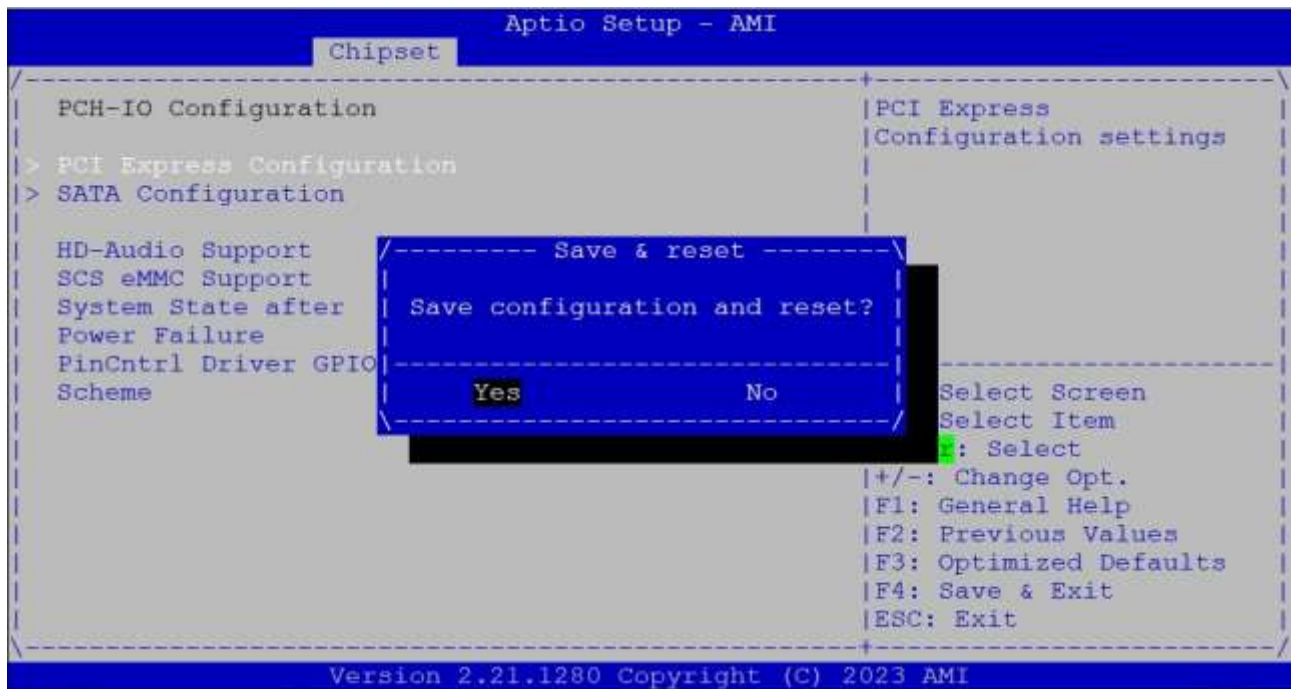
- (1) Press “Del” key into the BIOS setup, and go to “Chipset” and “PCH-IO Configuration”.



- (2) Set “System State after Power Failure” to be “Always On”.



(3) After setting, please press “F4” key to save & exit.



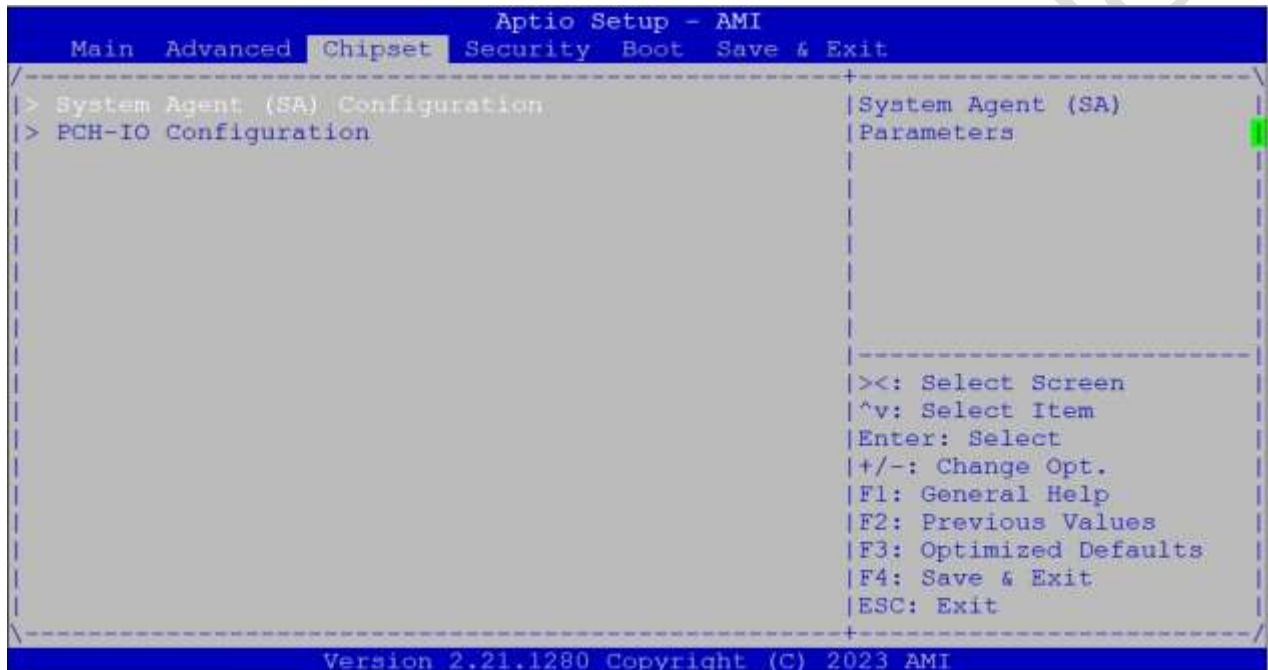
Note:

After system shut down by operating system, EB-EHL will be power-off. For next booting up, user just needs to re-plug power adapter or power reset again, while system will be boot-up automatically.

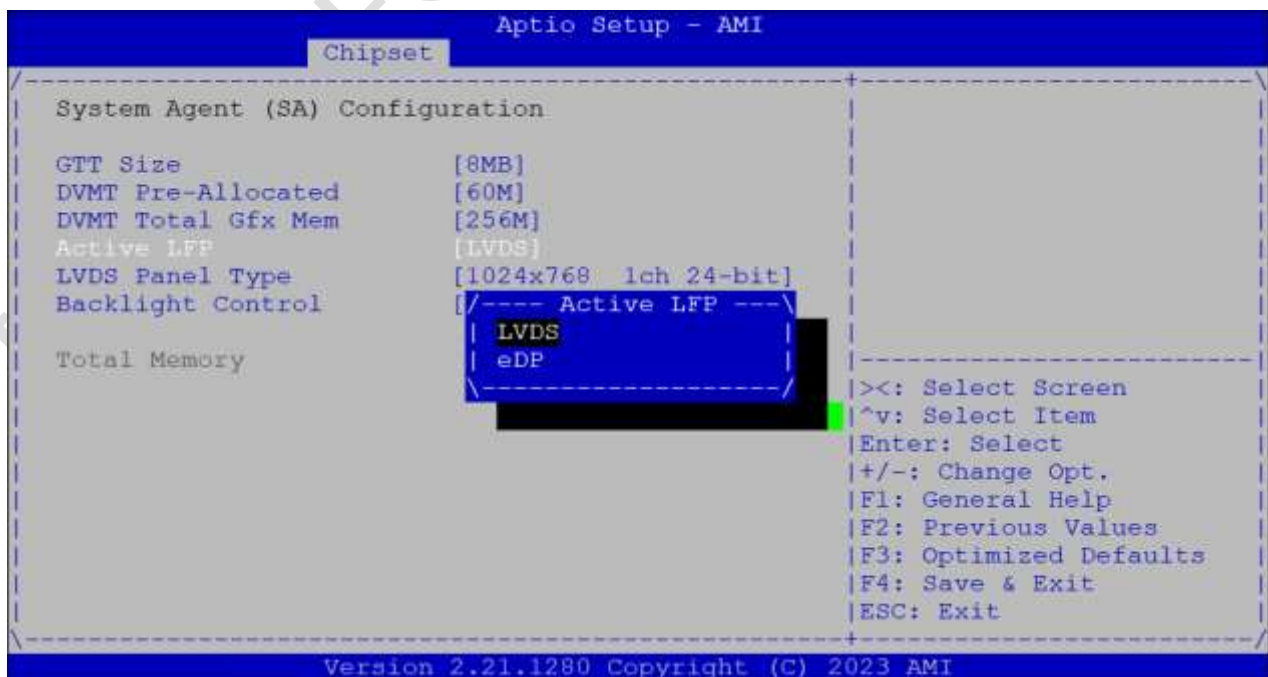
4.6 BIOS LCD Display Settings (by LVSD Signals)

EB-EHL supports external LCD display by LVDS signals output. Please refer the LCD display settings as below.

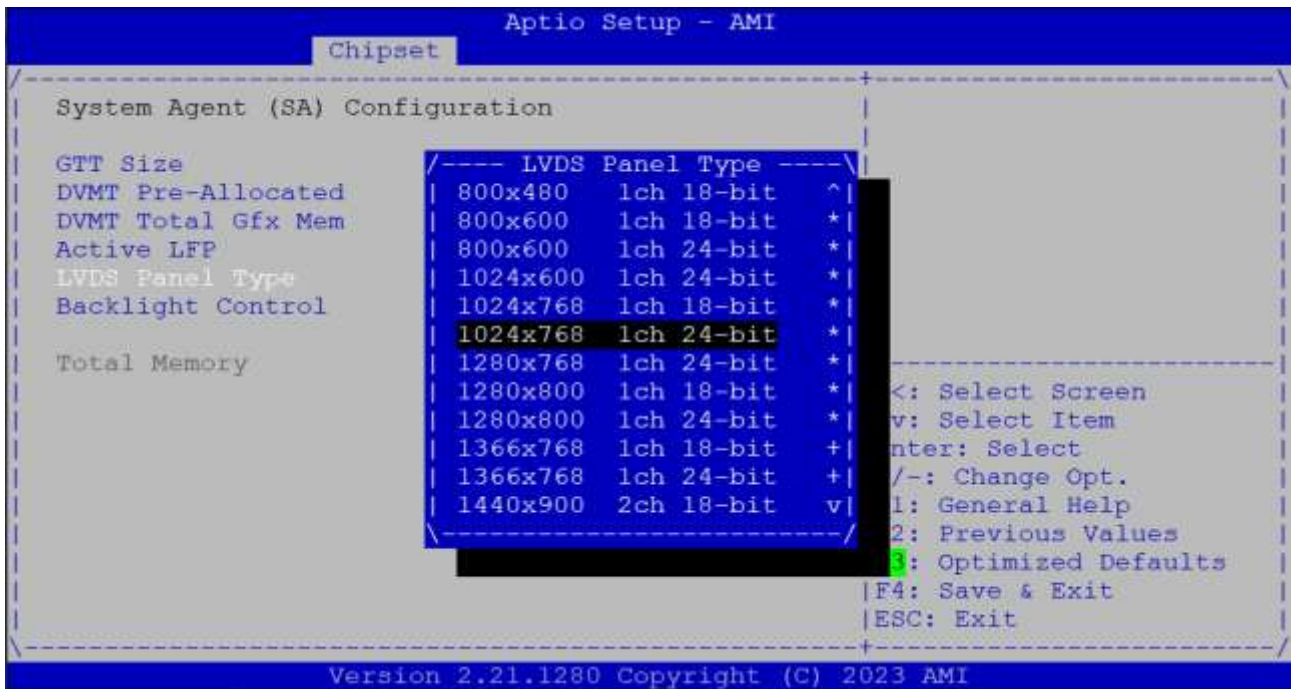
- (1) Press “Del” key into the BIOS setup and go to “Chipset” and “System Agent (SA) Configuration”.



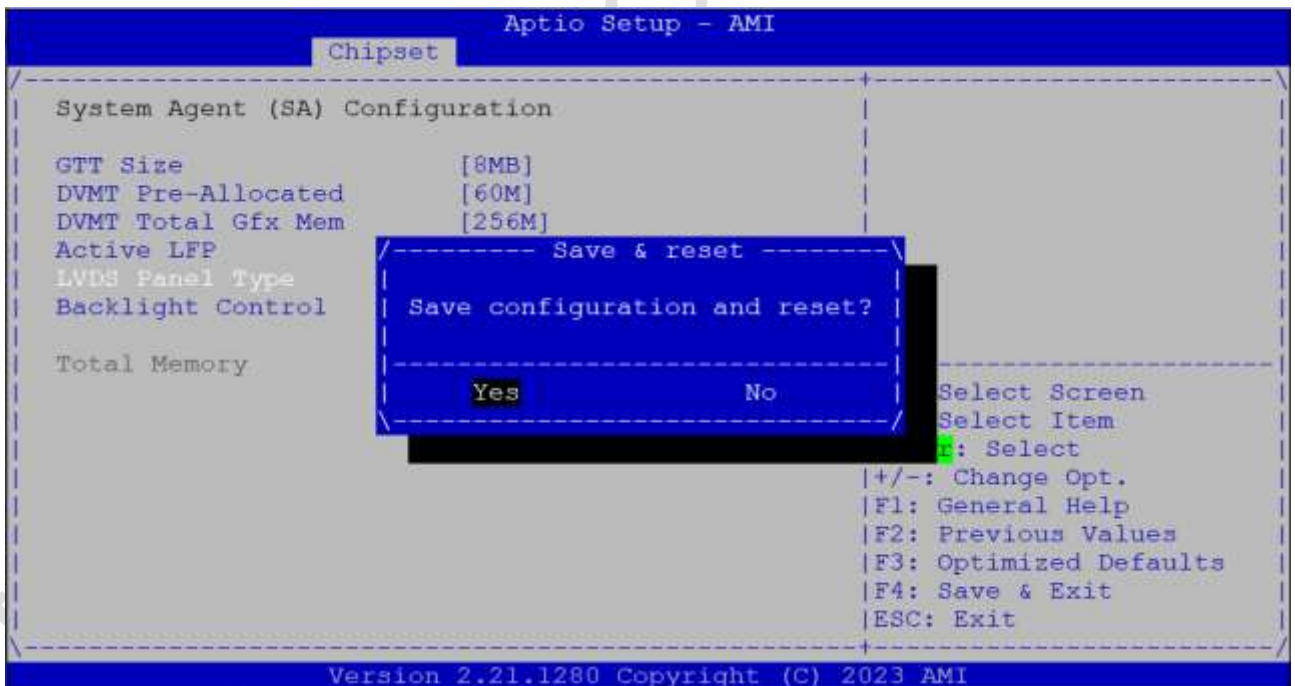
- (2) Set “Active LFP” to be “LVDS”.



(3) Set “LVDS Panel Type” you want.



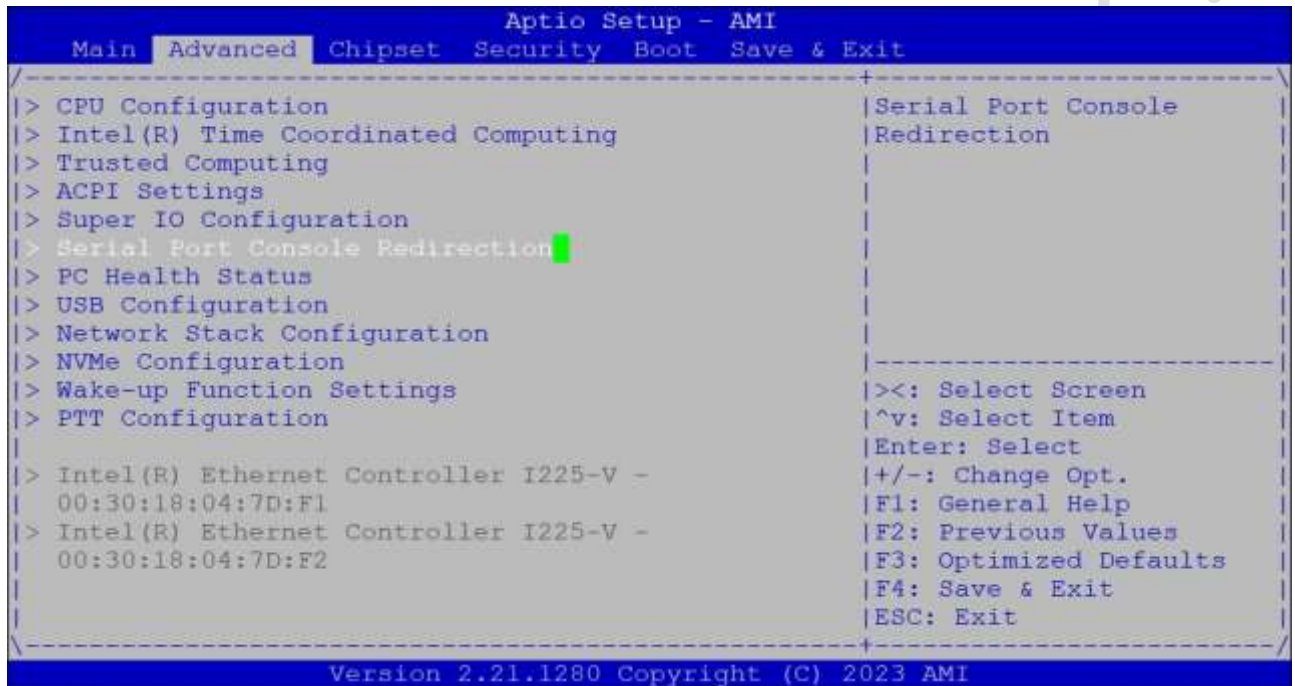
(4) Press “F4” key to save configuration and reset.



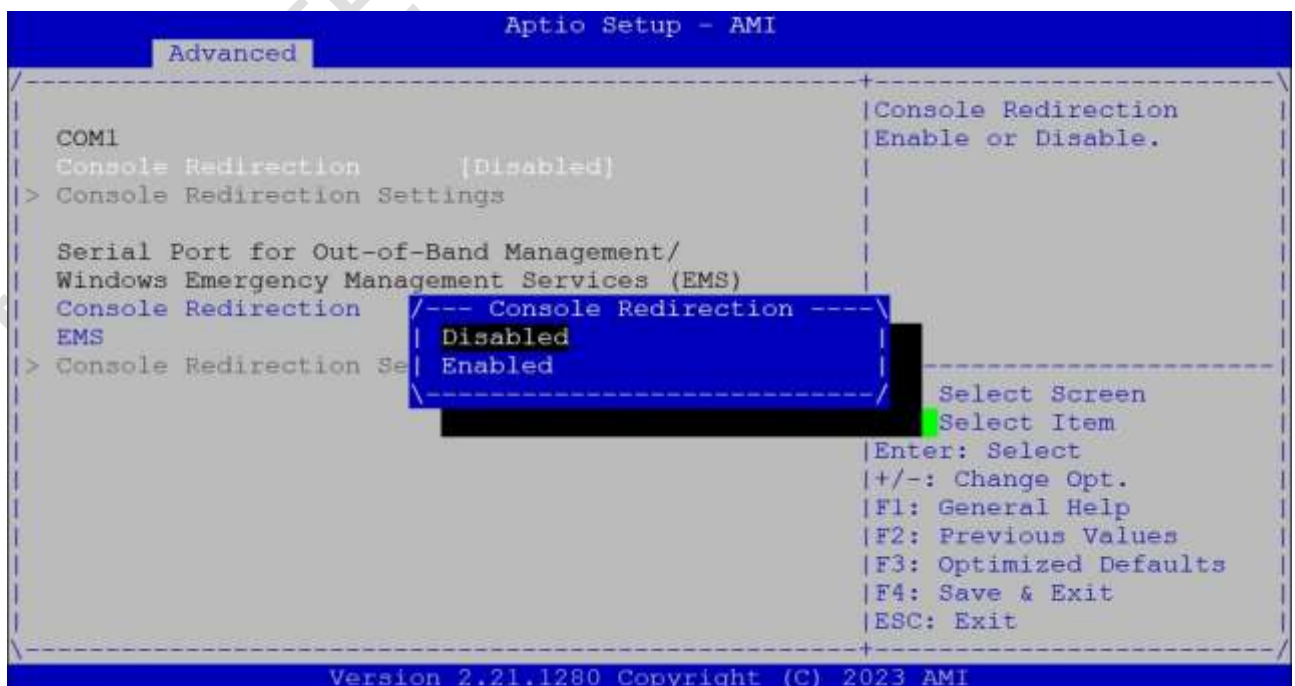
4.7 BIOS Serial Port Console Redirection

EB-EHL supports Serial Port Console Redirection as below.

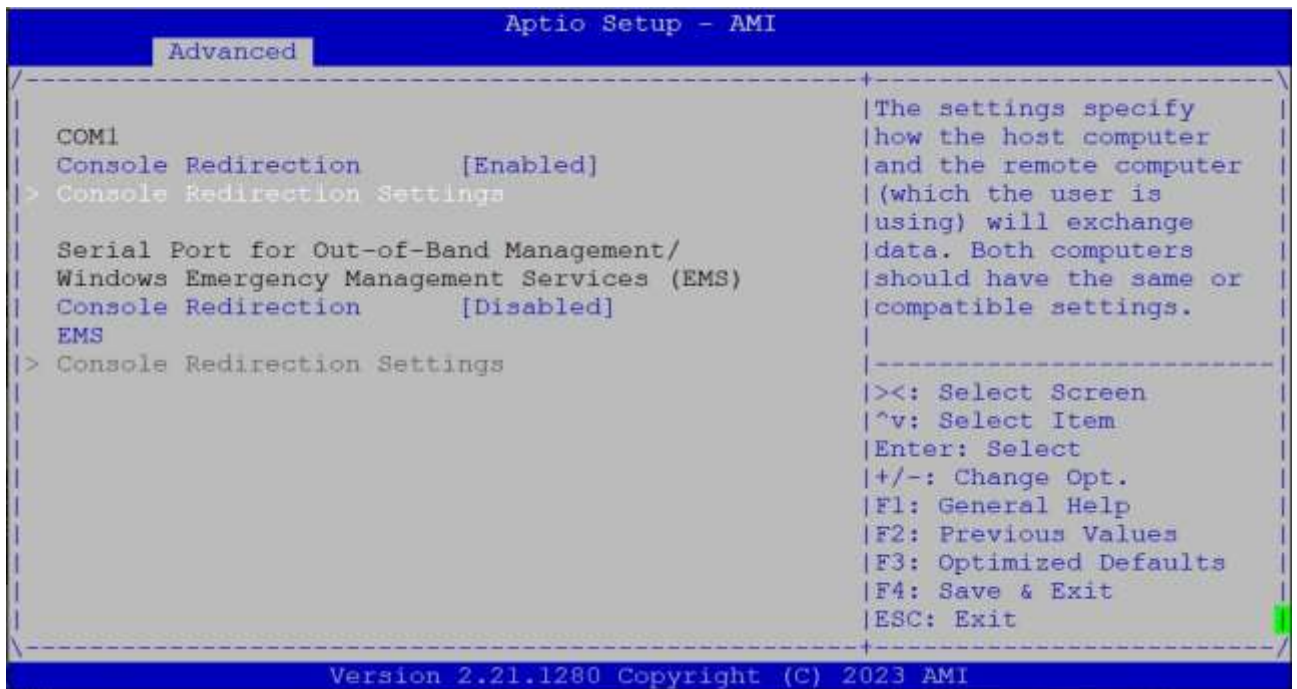
- (1) Press “Del” key into the BIOS setup and go to “Advanced” and “Serial Port Console Redirection”.



- (3) Set “Console Redirection” to be “Enabled”.



(4) Go to “Console Redirection Settings”.

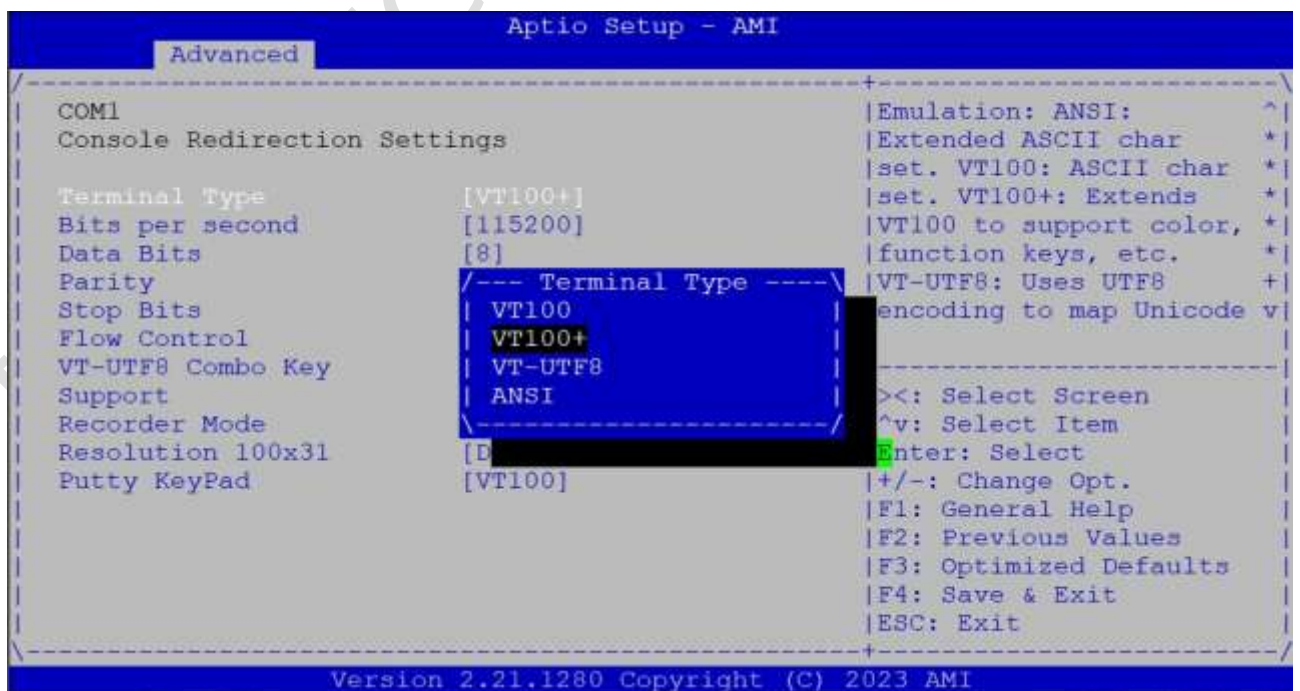


(5) Set “Terminal Type” to “VT100+”.

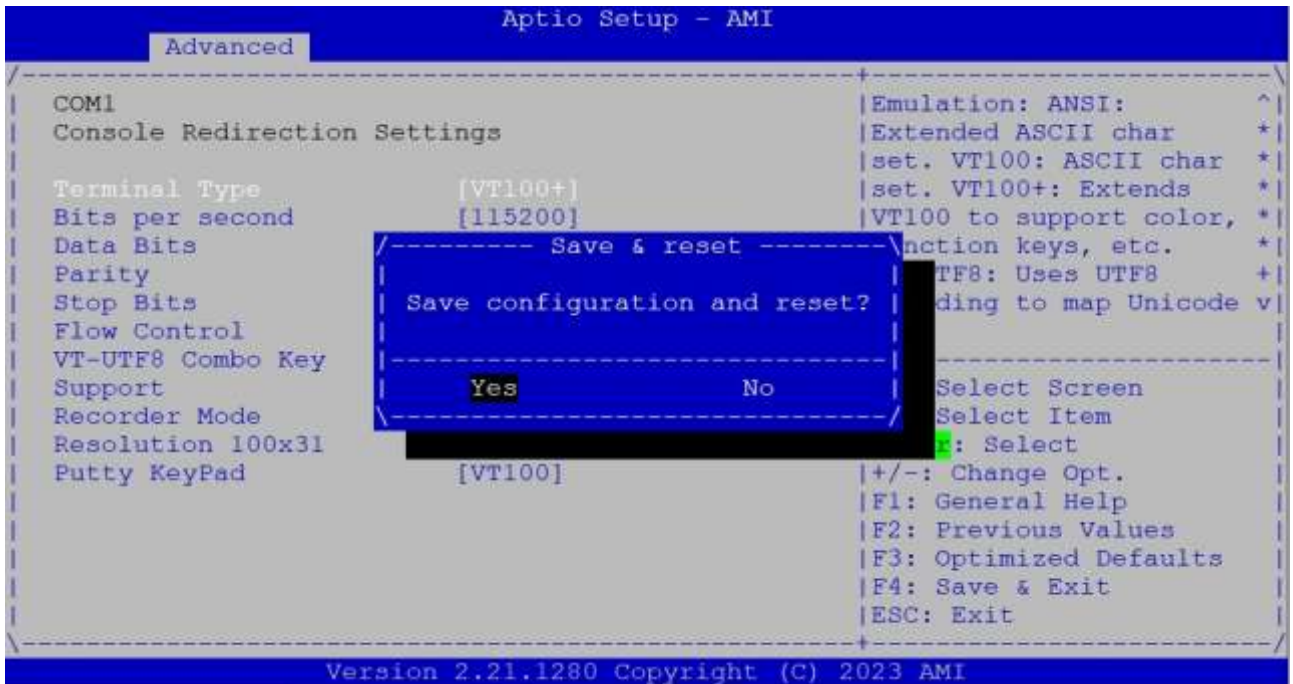
Emulation: [ANSI]: Extended ASCII char set; [VT100]: ASCII char set;

[VT100+]: Extended VT100 to support color, function keys, etc.;

[VT-UTF8]: Uses UTF8 encoding to map Unicode chars onto 1 or more Bytes.

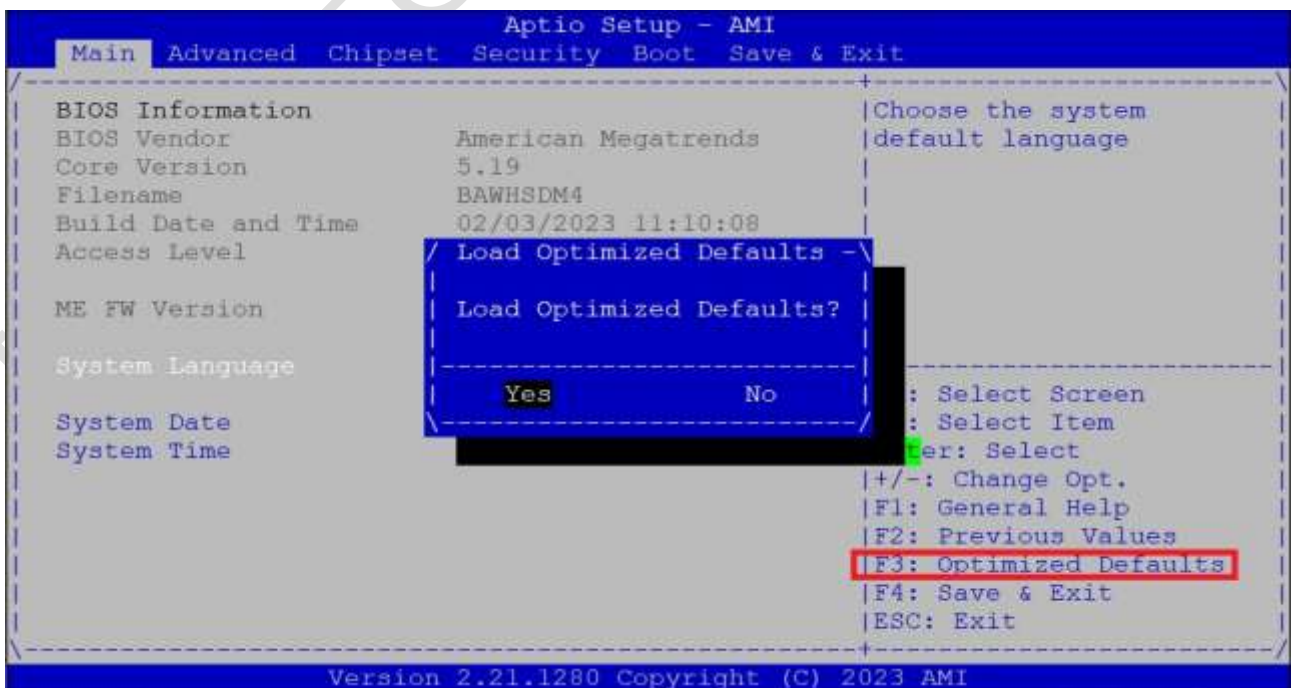


(4) After setting, please press “F4” key to save & exit.

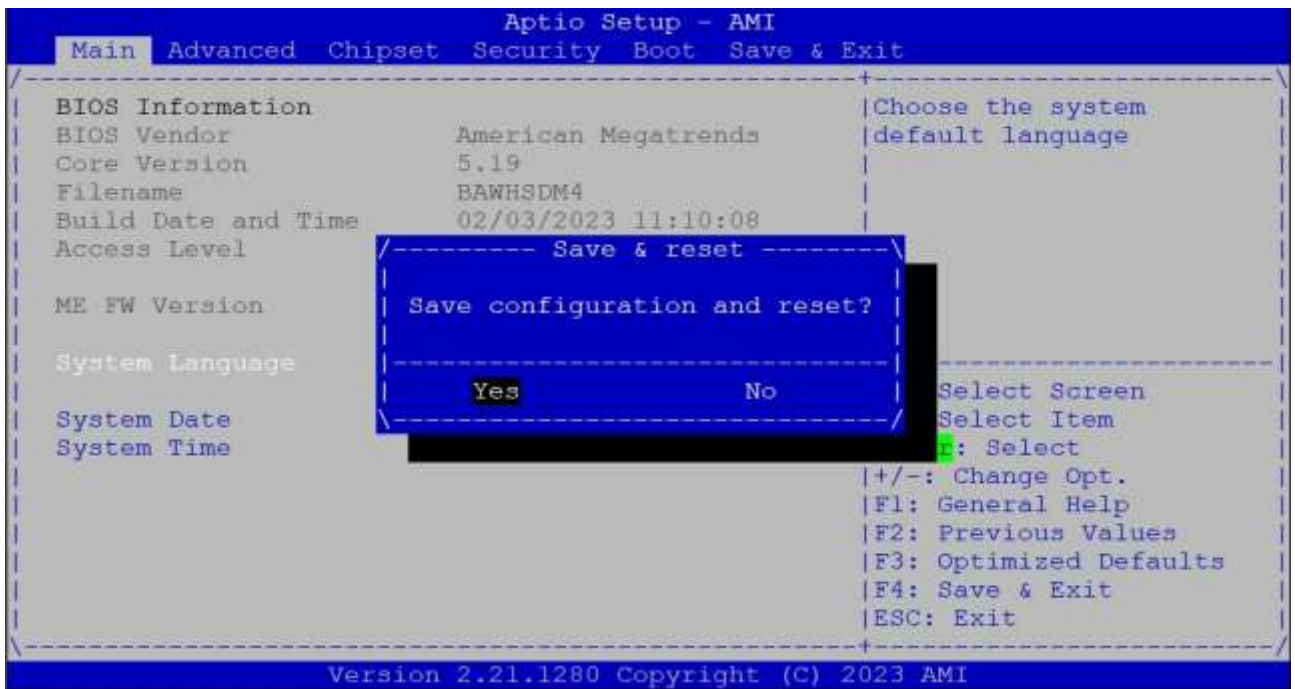


4.8 BIOS Load Default Setting

(1) Press “Del” key into the BIOS setup, and press “F3” key to load optimized defaults.



(2) After setting, please press “F4” key to save & exit.



Warranty

This product is warranted to be in good working order for a period of one year from the date of purchase. Should this product fail to be in good working order at any time during this period, we will, at our option, replace or repair it at no additional charge except as set forth in the following terms. This warranty does not apply to products damaged by misuse, modifications, accident or disaster. Vendor assumes no liability for any damages, lost profits, lost savings or any other incidental or consequential damage resulting from the use, misuse of, originality to use this product. Vendor will not be liable for any claim made by any other related party. Return authorization must be obtained from the vendor before returned merchandise will be accepted. Authorization can be obtained by calling or faxing the vendor and requesting a Return Merchandise Authorization (RMA) number. Returned goods should always be accompanied by a clear problem description.

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