CONTEC

Reference Manual

Industrial Mainboard

GMB-IW48000

CONTENTS

CONTEC CO., LTD.

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Introduction

This section provides necessary information of the product such as the outline, bundled items and manuals before actual use.

1.Related Manuals

The manuals related to the product are listed below.

Read them as necessary along with this document.

◆ Must Read the Following Manuals

Name	Purpose	Contents	How to get
Reference Manual	Read this when operating the product.	This describes the hardware aspects such as functions and settings.	Included in the package (Driver DVD)

◆ Download Manuals

Download the manuals accordingly from the following URL.

Download https://www.contec.com/download/

2.About the Product

This product is a mini-ITX form factor industrial mainboard which based on Intel® Core™ Processors that offer 14nm Hi-K process technology with energy efficient architecture. GMB-IW48000 adopts two DDR4 SO-DIMM sockets and supports up to 64GB memory.

Server SKU and Desktop SKU solutions are suitable for factory automation applications. Moreover, with the high performance and high-end specifications, GMB-IW48000 is our first Comet Lake generation architecture on Mini-ITX product line.

3.Features

■ Intel® 10th Comet Lake-S Platform

This product is equipped with the 10th generation Intel® Xeon®/ Core™ processors.
Adopting embedded-type CPU contributes to a stable supply.
Following CPUs are recommended for customer reference;
Intel® Xeon® W-1250E/ W-1250TE
Intel® Core™ i9 / i7 / i5 /i3 up to 95W TDP

■ Multi-display Supported

Full HD video can be smoothly played.
It also supports full HD output of the three-screen with VGA, DisplayPort, and HDMI.

■ Triple Gigabit Ethernet

The product has 3 RJ45 connectors on rear I/O for customer usage, which are 1 x Intel® I219LM + 2 x Intel® I210AT PCIe chip.

■ Extend Peripherals Freely Rich Interface

This product is equipped with a variety of interfaces such as serial port, USB 3.2/ 2.0, 8-bit GPIO, audio jack, Line-out/ Mic-in, M.2 Key E/ Key M, LAN, HDMI, ect. For customers with various needs.

4.Supported OS

- Windows®10 IoT Enterprise LTSC 2019 64 bit

5.Product Configuration List

The product consists of the items listed below.

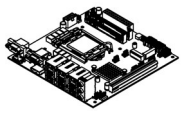
Check, with the following list, that your package is complete.

If you discover damaged or missing items, contact your retailer or the general CONTEC information.

	GMB-IW48000
Name	**Pcs.**
GMB-IW48000 Motherboard	1
IO Shield	1
Driver CD	1
Product Guide	1
Screw for fixing HDMI and I/O panel (M3x8)	1
Screw for fixing M.2 E key card (M3x6) (For M.2_1 Conn.)	1
Screw for fixing M.2 M key card (M3x6) with Standoff	1

*1 The configuration and parts of this product are shown below.
*2 The user manual for this product is available as a PDF file through CONTEC's website.

Production Configuration Drawings



GMB-L3WHL200
Motherboard

Driver CD

Product Guide

Screw for fixing
HDMI and I/O panel (M3x8)

Screw for fixing
M.2 E key card (M3x6)
(For M.2_1 Connector)

Screw for fixing
M.2 M key card (M3x6)
with Standoff
(For M.2_2 Connector)

Screw for fixing
Mini-PCIe card (M2x5)

* See the Product Configuration List to check if all the components are included for the specified number of units.

Safety Precautions

Understand the following definitions and precautions to use the product safely.
Never fail to read them before using the product.

1.Safety Information

This document provides safety information using the following symbols to prevent accidents resulting in injury or death and the destruction of equipment and resources.

Understand the meanings of these labels to operate the equipment safely.

⚠ **DANGER**	DANGER indicates a hazard with a high-risk level. If this hazardous situation is not avoided, it will result in death or serious injury.
⚠ **WARNING**	WARNING indicates a hazard with a medium risk level. If this hazardous situation is not avoided, it could result in death or serious injury.
⚠ **CAUTION**	CAUTION indicates a hazard with a low risk level. If this hazardous situation is not avoided, it could result in minor or moderate injury.
ⓘ **NOTE**	This symbol together with the NOTE signal word alerts the reader to a situation which may cause damage or malfunction to the device, hardware/software, or surrounding property.
ℹ **INFO**	Here you will find additional information or detailed sources of information.

2.Handling Precautions

⚠ WARNING

- Always check that the power supply is turned off before connecting or disconnecting power cables.
- Do not modify the product.
- Always turn off the power before inserting or removing circuit boards or cables.
- This product is not intended for use in aerospace, space, nuclear power, medical equipment, or other applications that require a very high level of reliability. Do not use the product in such applications.
- If using this product in applications where safety is critical such as in railways, automotive, or disaster prevention or security systems, please contact your retailer.
- Do not attempt to replace the battery as inappropriate battery replacement poses a risk of explosion.
- For battery replacement, contact your retailer as it must be performed as a process of repair.
- When disposing of a used battery, follow the disposal procedures stipulated under the relevant laws and municipal ordinances. For details on replacing the battery, refer to the appendix.
- This product is connected to a socket-outlet with earthing connection by means of a power cord.
- This product is not suitable for use in locations where children are likely to be present.

⚠ CAUTION

- Do not use or store this product in a location exposed to high or low temperature that exceeds range of specification or susceptible to rapid temperature changes.
  e.g. - Exposure to direct sun - In the vicinity of a heat source
- Do not use this product in extremely humid or dusty locations. It is extremely dangerous to use this product with its interior penetrated by water or any other fluid or conductive dust. If this product must be used in such an environment, install it on a dust-proof control panel, for example.
- Avoid using or storing this product in locations subject to shock or vibration that exceeds range of specification.
- Do not use this product in the vicinity of devices that generate strong magnetic force or noise. Such products will cause this product to malfunction.
- Do not use or store this product in the presence of chemicals.
- To clean this product, wipe it gently with a soft cloth dampened with either water or mild detergent.

- Do not use chemicals or a volatile solvent, such as benzene or thinner, to prevent pealing or discoloration of the paint.
- This product's case may become hot. To avoid being burned, do not touch that section while this product is in operation or immediately after turning off the power. Avoid installation in a location where people may come into contact with that section.
- Always remove the power cable from the power outlet before mounting or removing an expansion board and before connecting or disconnecting a connector.
- To prevent corruption of files, always shutdown the OS before turning off this product.
- CONTEC reserves the rOKight to refuse to service a product modified by the user.
- In the event of failure or abnormality (foul smells or excessive heat generation), unplug the power cord immediately and contact your retailer.
- To connect with peripherals, use a grounded, shielded cable.
- Component Life:
  1) Battery – The internal calendar clock and CMOS RAM are backed by a Lithium primary battery.
  * Replacement of expendables is handled as a repair (there will be a charge)
  * The service life for consumable parts are reference values and are not guaranteed values.
  * This product's specifications allow the device to be rebooted from the BIOS screen during startup. This has no effect on operation after the OS boots.

1. FCC PART 15 Class A Notice

NOTE

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

FCC WARNING

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

3.Security Warning

When connecting to the network, be aware of security-related problems. See the examples of Security measures below and set up the product properly along with the network devices.

1. Information security risks

- Unauthorized access from the outside through a network could cause the system halt, data damage, or exposure to malware. *1
- Invaded and used as a stepping stone, a device might attack the others through networks. (a victim becomes an assailant)
- Information might leak without realizing due to the connection to the network.
- Secondary damages such as harmful rumors, liability in damages, social credibility fall, and opportunity loss are expected led by the troubles described above.

*1: Malware (Malicious Software) is software that brings harm to a computer system and performs unintended operations.

2. Security measures – e.g.

- Do not keep using the default password. (Refer to the product manual for the password setting).
- Set a strong password.

Combined with upper and lowercase letters, and numbers so that it cannot be easily analogized by others.

- Change the password periodically.
- Disable unnecessary network services and functions.
- Restrict access to the network with network devices. *2
- Restrict ports to be released on the network with network devices. *2
- Create a closed network connection using such as dedicated network or VPN*3

*2: Inquire for setting procedure to manufacturers.

*3: VPN (Virtual Private Network) a secured network that wards off unauthorized access by protecting the communication path with authentication and encryption.

Unfortunately, there are no perfect ways to avert unauthorized access or close a security hole that are endlessly found day and night. Please understand that risks are always involved with the Internet connection, and we strongly recommend a user should constantly update information security measures.

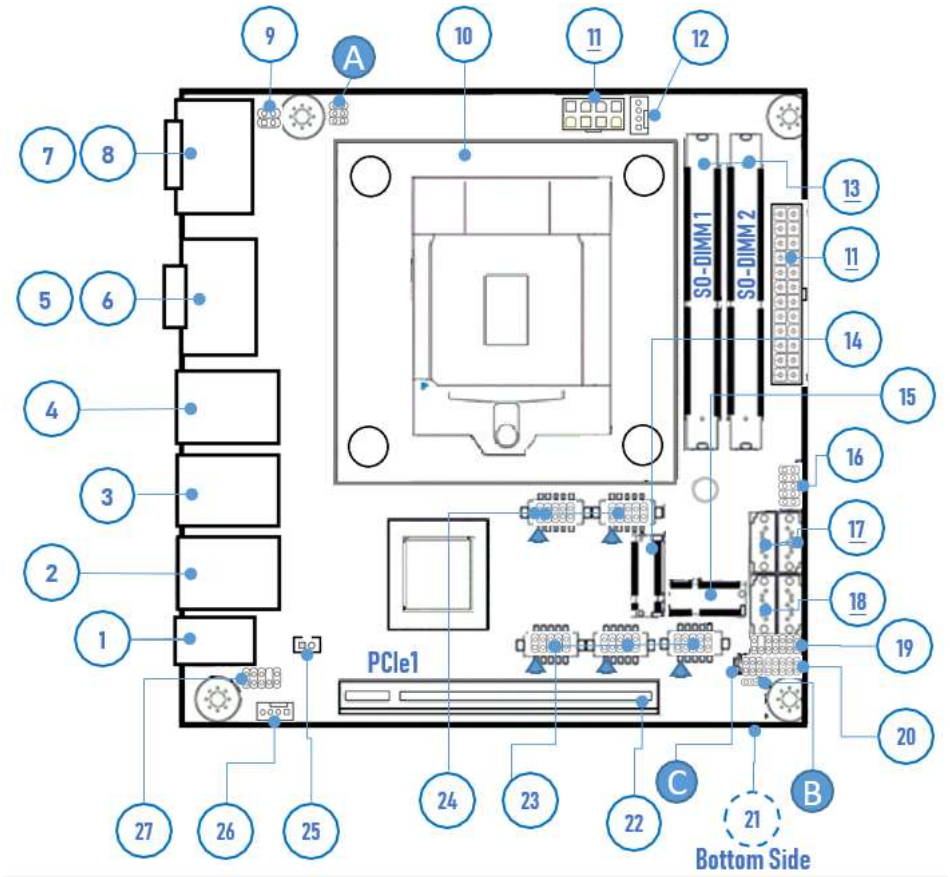
Product Nomenclature and Function

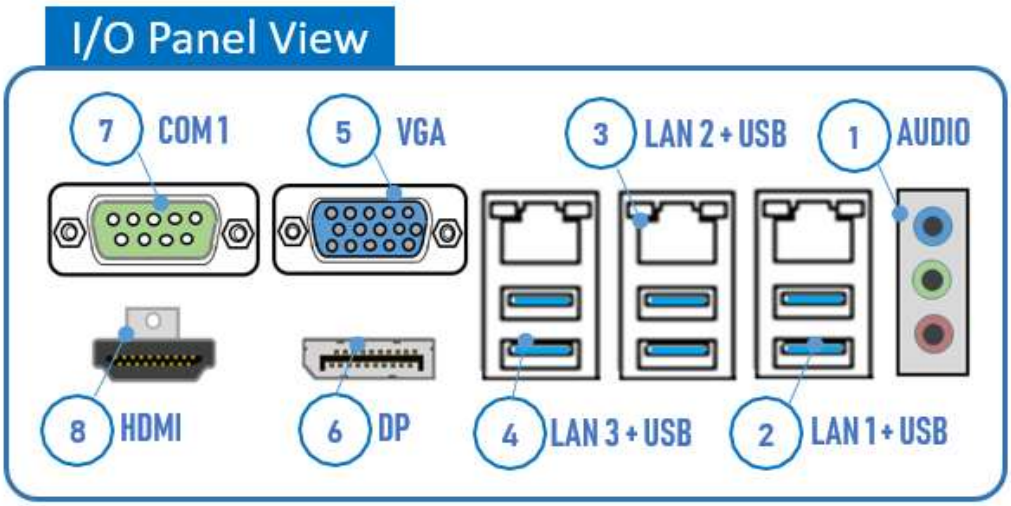
This section describes product component names and their functions, pin assignment of each connector.

1.Product Overview

connectors of the product are shown in the picture below.

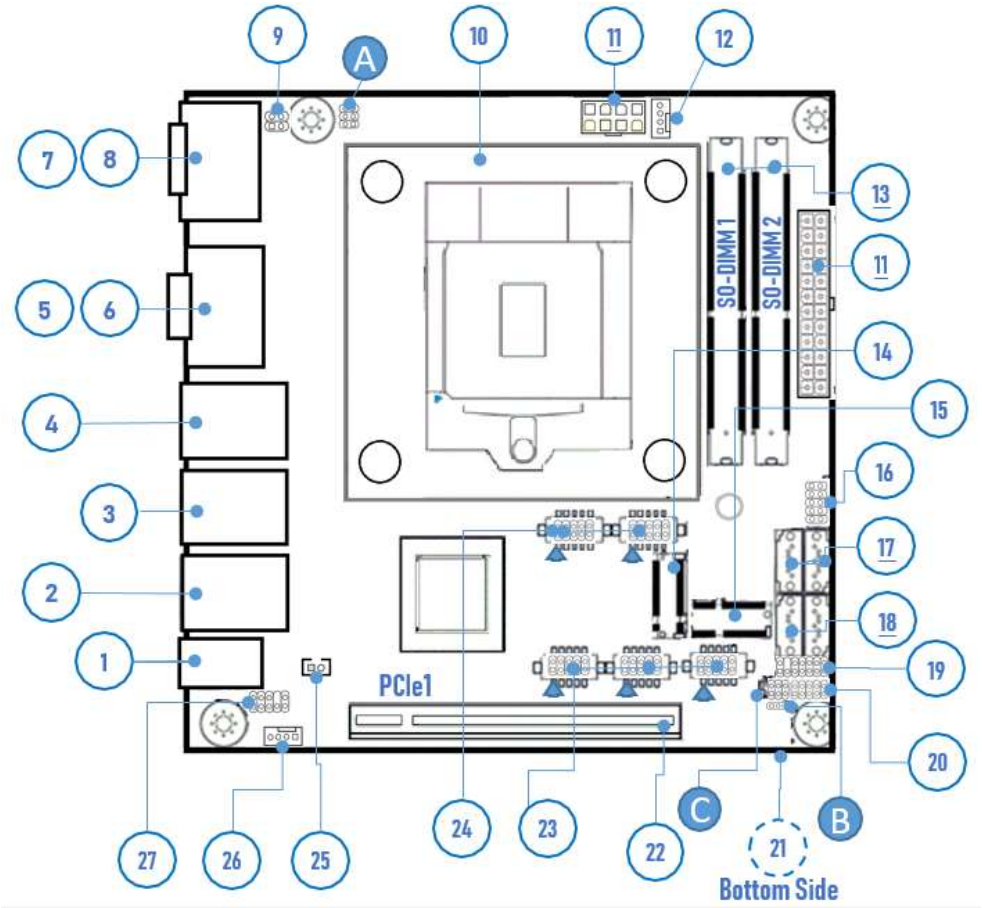
◆ Top View





2.Jumper List

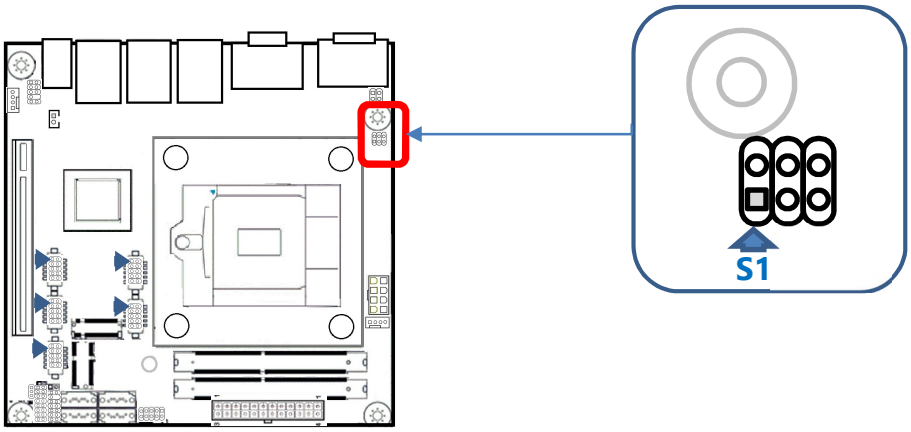
For users to customize GMB-IW48000 features. In the following sections, short means covering a jumper cap over jumper pins; Open or N/C (not connected) means removing a jumper cap from jumper pins. Users can refer to below Top view picture and tables for jumper positions, functions, and signal description.

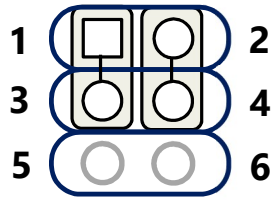


Jumper					
Ref.	label	Ref.	label	Ref.	label
A	S1	B	JP2	C	J_BAT1

Connector							
Ref.	label	Ref.	label	Ref.	label	Ref.	
1	AUDJ1	10	U14 (CPU)	17	SATA1	23	
2	LANUSB_3	11	ATXCONN_1		SATA2		
3	LANUSB_2		ATXCONN_2	18	SATA3		
4	LANUSB _1	12	CPU_FAN_1		SATA4	24	
5	VGA_1	13	SO-DIMM_1	19	LPC_1		
6	DP		SO-DIMM_2	20	F_PANEL_1	25	

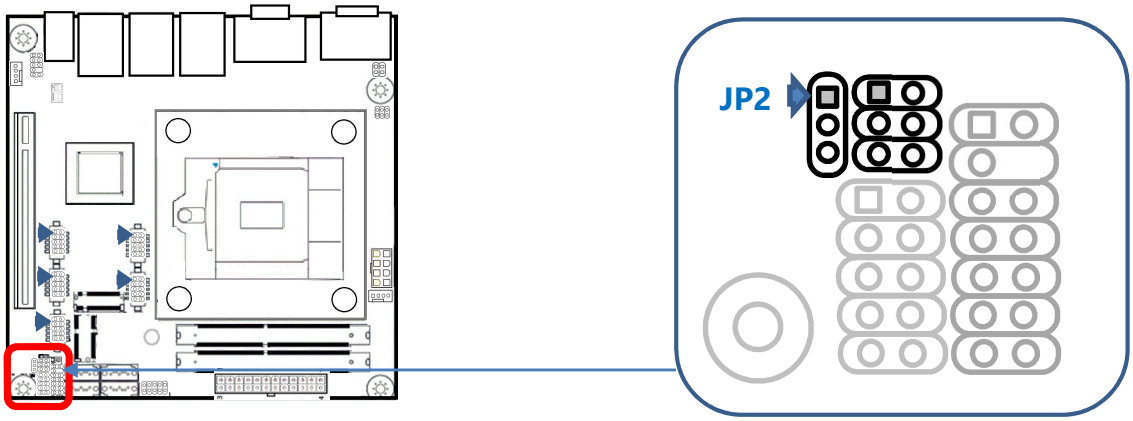
1. PCI Express Jumper (S1)

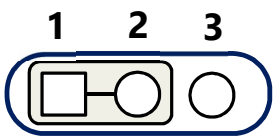




PCI Express Bifurcation	Signal Description	
	CFG[5]	CFG[6]
One x 16 (Default)	**1-3, Short**	**2-4, Short**
Two x 8	3-5, Short	2-4, Short
One x 8+Two x 4	3-5, Short	4-6, Short

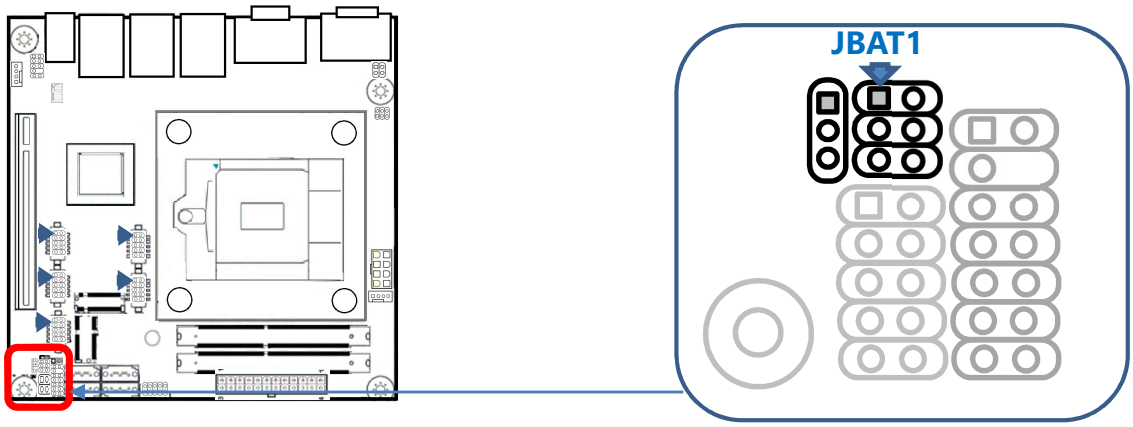
2. AT/ATX Mode Select (JP2)

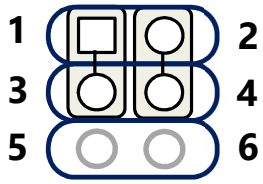




PIN No.	Signal Description
1-2, Short (Default)	**ATX**
2-3, Short	AT

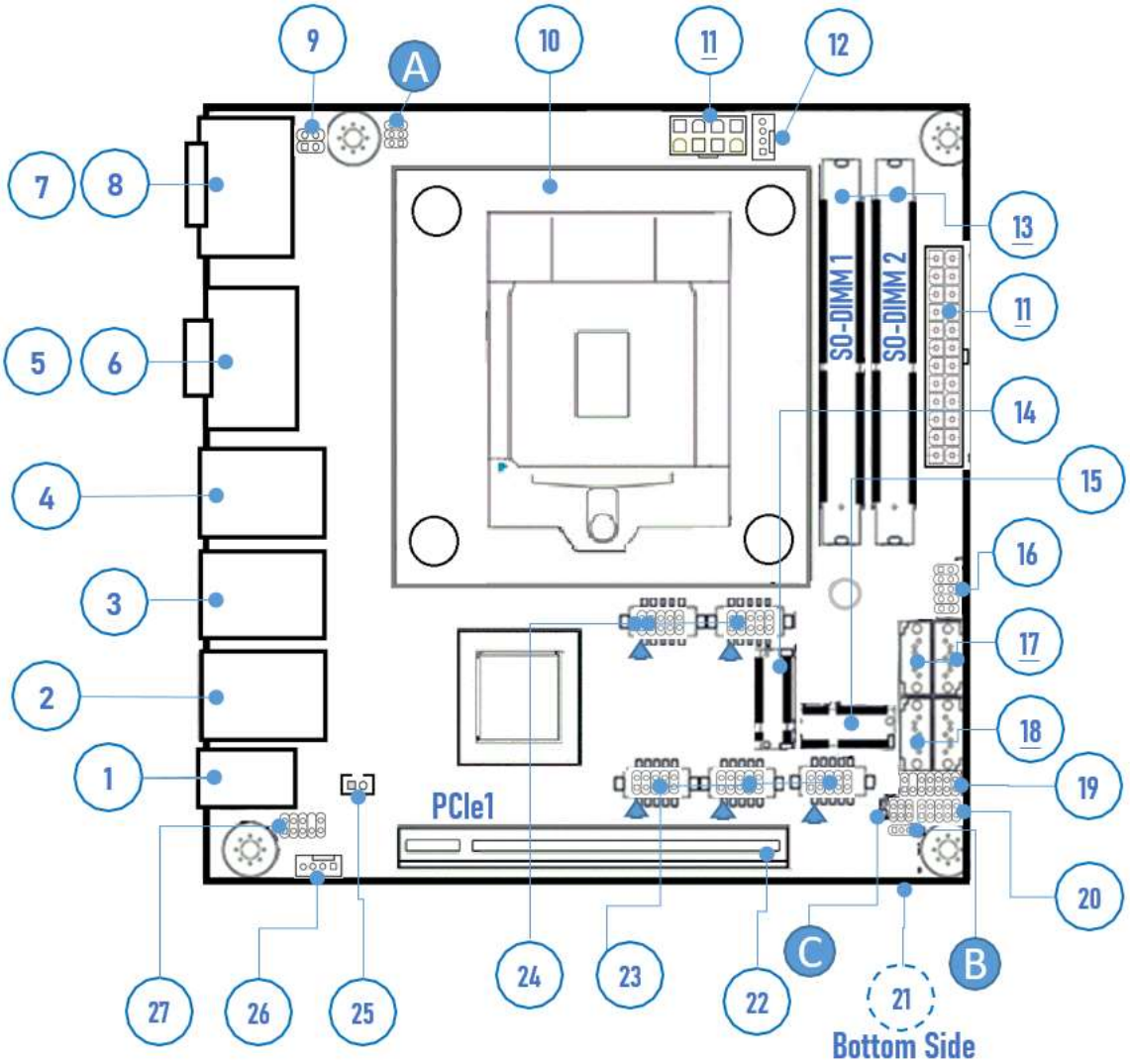
3. Clear CMOS/ROM (JBAT1)





PIN No.	Signal Description
1-3, Short (Default)	**Normal Operation**
3-5, Short	Clear CMOS Contents
2-4, Short (Default)	**Normal Operation**
4-6, Short	ROM Clear Contents

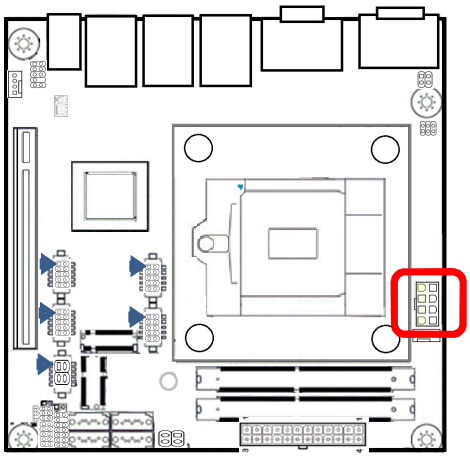
3.Connector List

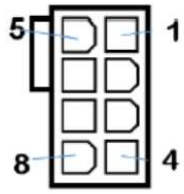


Connector							
Ref.	label	Ref.	label	Ref.	label	Ref.	label
1	AUDJ1	10	U14 (CPU)	17	SATA1	23	COM2
2	LANUSB_3	11	ATXCONN_1		SATA2		COM3
3	LANUSB_2		ATXCONN_2	18	SATA3		COM4
4	LANUSB _1	12	CPU_FAN_1		SATA4	24	USB_1
5	VGA_1	13	SO-DIMM_1	19	LPC_1		USB_2
6	DP		SO-DIMM_2	20	F_PANEL_1	25	JBAT_1
7	COM_1	14	M2_2	21	SPI_1	26	SYS_FAN_1
8	HDMI_1	15	M2_1	22	PCIE_1	27	F_AUDIO_1
9	CN1	16	GPIO_1				

Ref.	Connector	Function
1	AUDJ1	3.5mm Audio Jack (Mic in + Line in + Line out)
2	LANUSB_3	RJ45 + USB3.2 Connector (Onboard LAN C)
3	LANUSB_2	RJ45 + USB3.2 Connector (Onboard LAN B)
4	LANUSB_1	RJ45 + USB3.2 Connector (Onboard LAN A)
5	VGA_1	VGA port Connector
6	DP	Display port Connector
7	COM_1	COM 1 connector (RS-232/RS-422/RS-485)
8	HDMI_1	HDMI connector
9	CN1	Programming pin(for factory use only)
10	U14 (CPU)	CPU socket (LGA1200)
11.1	ATXCONN_1	ATX Power Connector (8P)
11.2	ATXCONN_2	ATX Power Connector (24P)
12	CPU_FAN_1	CPU Fan Connector (4P)
13	DIMM1	DDR4 SO-DIMM Socket / Channel A (260P)
	DIMM2	DDR4 SO-DIMM Socket / Channel B (260P)
14	M2_2	M.2 M key Socket (PCIe + SATA signal)
15	M2_1	M.2 E key Socket (PCIe + USB2.0 signal)
16	GPIO_1	8 bit GPIO Pin header (Pitch 2.54mm)
17	SATA1,SATA2	SATA 3.0 Connector
18	SATA3,SATA4	
19	LPC_1	LPC Interface Connector (Pitch 2.54mm)
20	F_PANEL_1	Front Panel Pin header (Pitch 2.54mm)
21	SPI_1	
22	PCIE_1	PCIe x16 Slot
23.1	COM 2	RS232 connector (Pin header / Pitch 2.0 mm)
23.2	COM 3	
23.3	COM 4	
24.1	USB_1	USB2.0 Pin header (Pitch 2.54mm)
24.2	USB_2	
25	JBAT_1	RTC Battery connector (BR2032)
26	SYS_FAN_1	System Fan Connector (4P)
27	F_AUDIO_1	Front panel Audio Connector (Pitch 2.54mm)

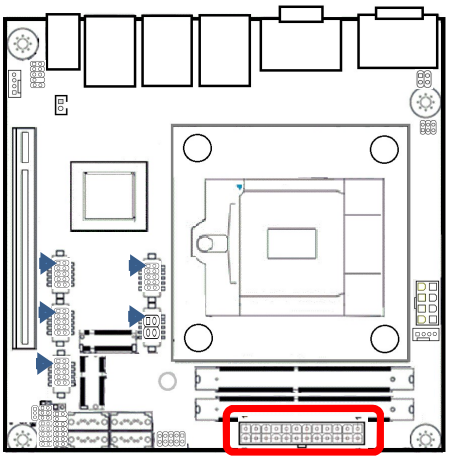
1. ATX Power Connector 8P (ATXCONN_1)

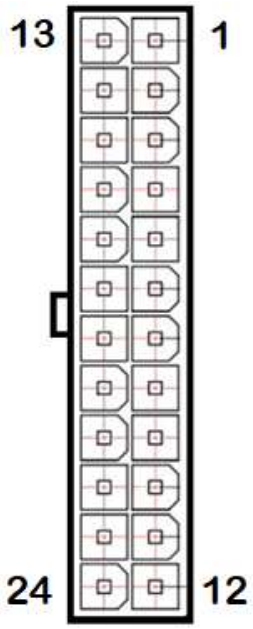




PIN No.	Signal Description	PIN No.	Signal Description
5	+12V	1	GND
6	+12V	2	GND
7	+12V	3	GND
8	+12V	4	GND

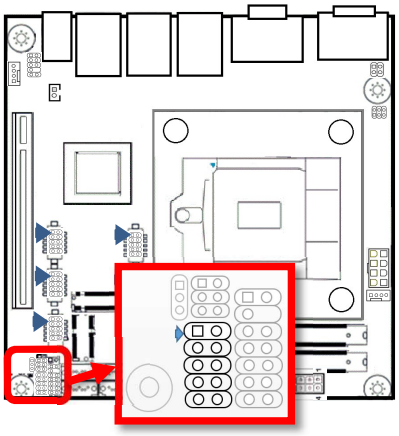
2. ATX Power Connector 24P (ATXCONN_2)

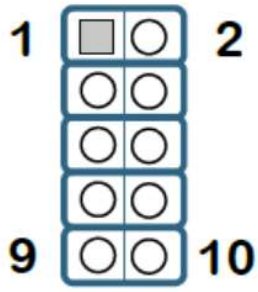




PIN No.	Signal Description	PIN No.	Signal Description
13	3V3	1	3.3V
14	-12V	2	3V3
15	GND	3	GND
16	ATX_PSON#	4	5V
17	GND	5	GND
18	GND	6	5V
19	GND	7	GND
20	-5V	8	PG_ATX
21	5V	9	5V_SB
22	5V	10	12V
23	5V	11	12V
24	GND	12	3V3

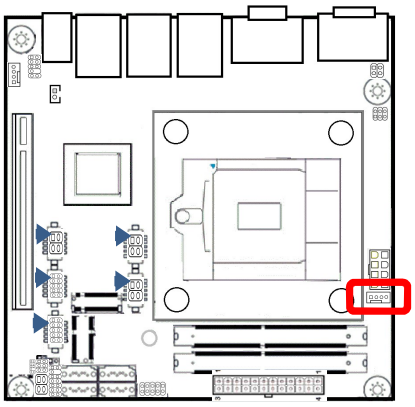
3. Front Panel Pin HDR (F_PANEL_1)

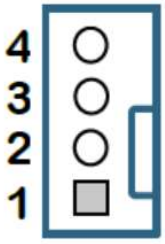




PIN No.	Signal Description	PIN No.	Signal Description
1	SATA_LED+	2	PWR LED +
3	SATA_LED-	4	PWR LED -
5	GND	6	PWR_SW
7	RST_SW	8	GND
9	NC	10	NC

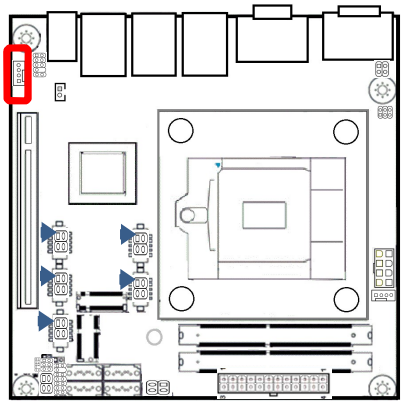
4. CPU FAN Connector (CPU_FAN_1)

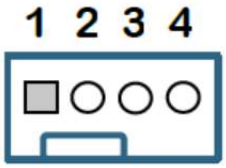




PIN No.	Signal Description
1	GND
2	+12V
3	Sense
4	Control

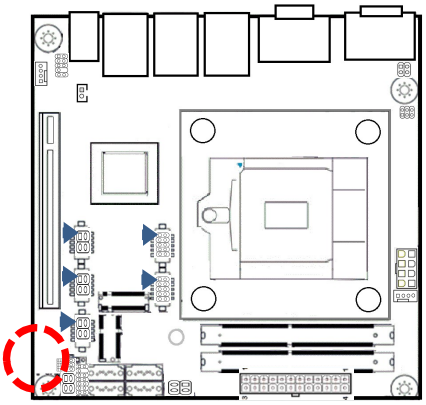
5. System FAN Connector (SYS_FAN_1)

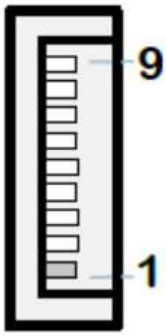




PIN No.	Signal Description
1	GND
2	+12V
3	Sense
4	Control

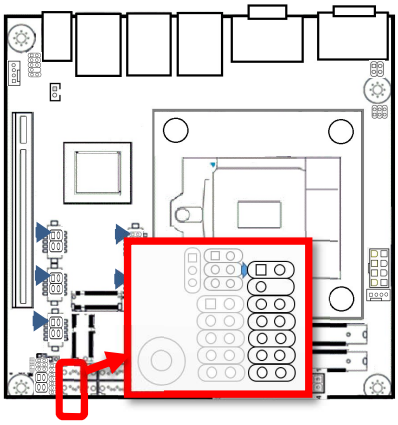
6. SPI ROM Programming Pin (SPI_1)

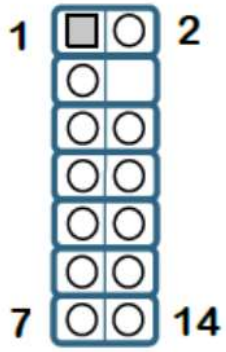




PIN No.	Signal Description	PIN No.	Signal Description
1	3.3V_SPI	6	SPI_SO
2	SPI_CLK	7	NC
3	NC	8	SPI_CS#
4	SPI_SI	9	GND
5	NC		

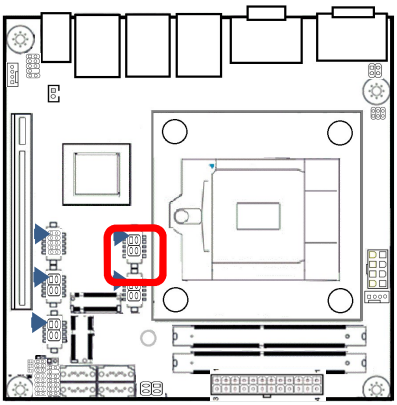
7. LPC Interface Connector (LPC_1)

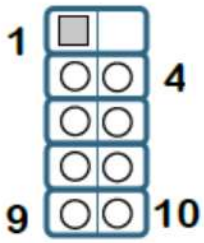




PIN No.	Signal Description	PIN No.	Signal Description
1	LCLK	2	GND
3	LFRAME#	4	
5	LRESET#	6	+3.3V
7	LAD0	8	+3.3VDUAL
9	LAD1	10	LPCPD#
11	LAD2	12	SERIRQ
13	LAD3	14	CLJRUN#

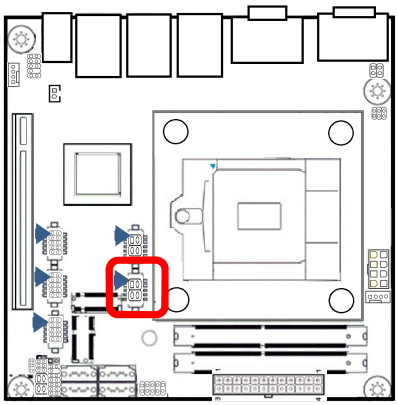
8. USB 2.0 Pin HDR (USB_1)

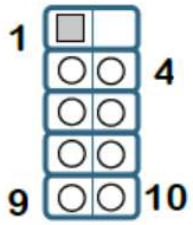




PIN No.	Signal Description	PIN No.	Signal Description
1	GND	2	
3	GND	4	GND
5	USBDN10(-)	6	USBDN8(-)
7	USBDP10(+)	8	USBDP8(+)
9	+5V_USB	10	+5V_USB

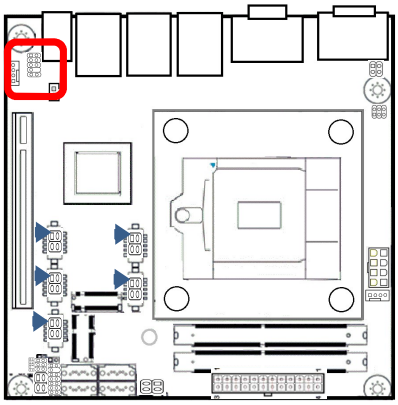
9. USB 2.0 Pin HDR (USB_2)

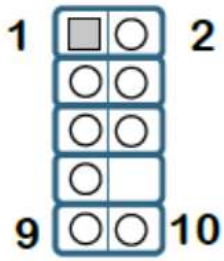




PIN No.	Signal Description	PIN No.	Signal Description
1	GND	2	
3	GND	4	GND
5	USBDN12(-)	6	USBDN13(-)
7	USBDP12(+)	8	USBDP13(+)
9	+5V_USB	10	+5V_USB

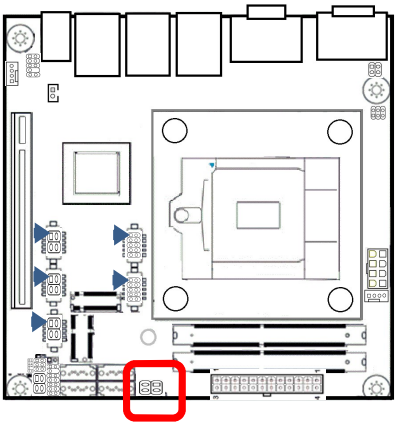
10. Front Panel Audio Connector (F_AUDIO_1)

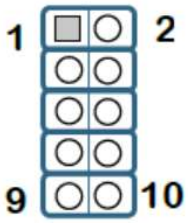




PIN No.	Signal Description	PIN No.	Signal Description
1	MIC2_L	2	AGND
3	MIC2_R	4	PRESENCE#
5	LINE2_R	6	B_MIC2-JD
7	AGND	8	
9	LINE2_L	10	B_LINE2-JD

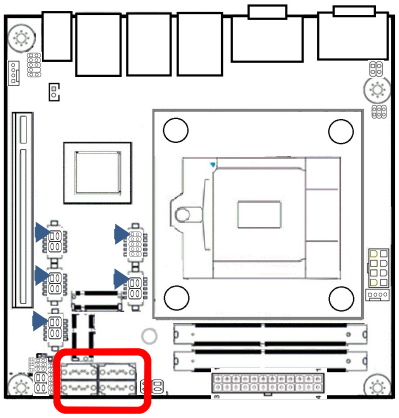
11. 8 bit GPIO Pin HDR (GPIO_1)

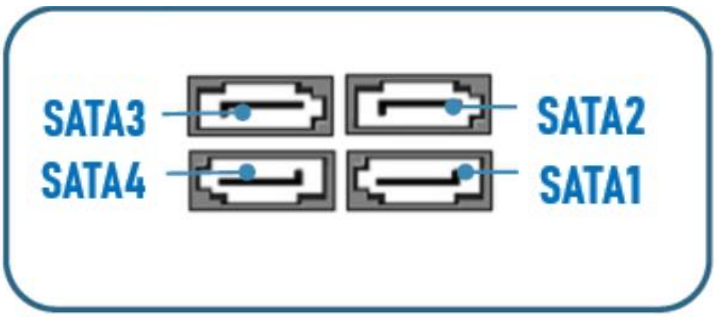




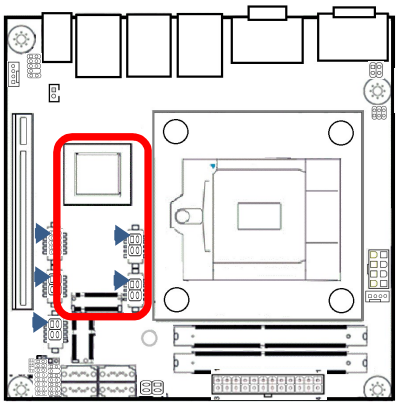
PIN No.	Signal Description	PIN No.	Signal Description
1	DIO_GP1	2	DIO_GP2
3	DIO_GP3	4	DIO_GP4
5	DIO_GP5	6	DIO_GP6
7	DIO_GP7	8	DIO_GP8
9	5V_GPIO	10	GND

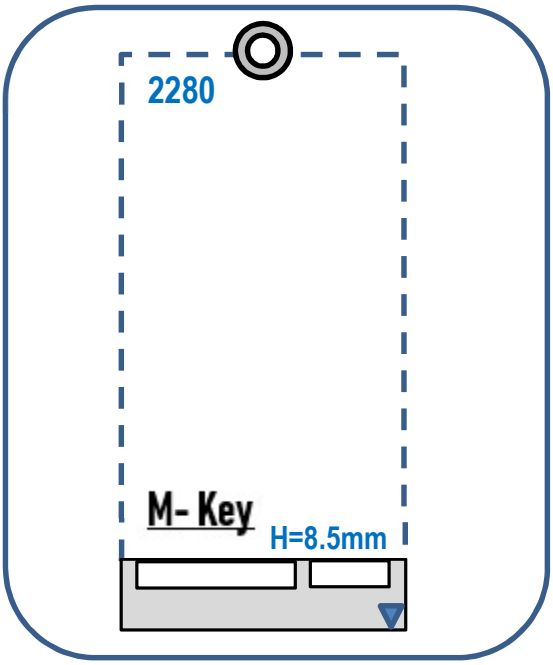
12. SATA 3.0 Connector (SATA1/SATA2/SATA3/SATA4)





13. M.2 M Key Socket (M2_2)

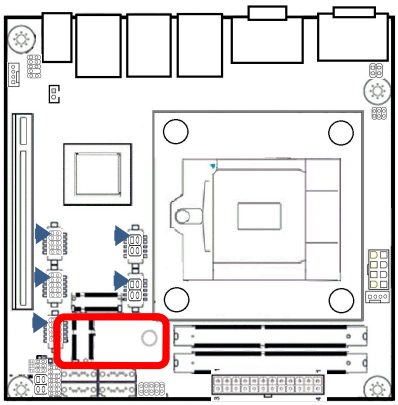


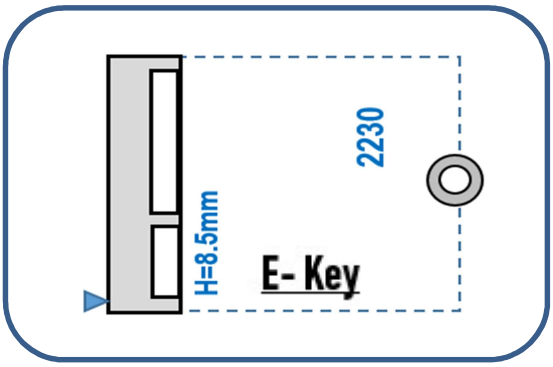


M.2 M Key Socket (PCIe + SATA Signal)

The board has one mechanical connector key M, accepting type 2280 of M.2 modules (H-8.5mm/ double sided)

14. M.2 E Key Socket (M2_1)

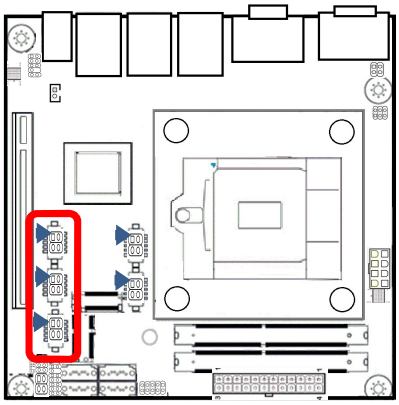


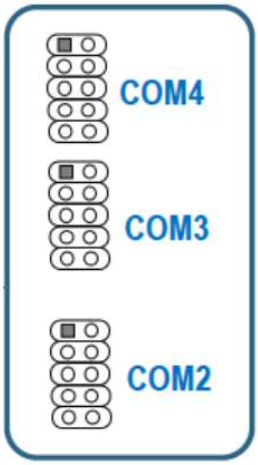


M.2 E Key Socket (PCIe + USB 2.0 Signal)

The board has one mechanical connector key E, accepting type 2230 of M.2 modules (H-8.5mm/ double sided)

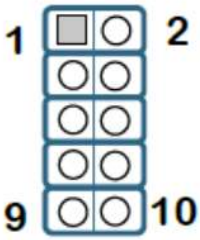
15. RS-232 Connector (COM2/COM3/COM4)





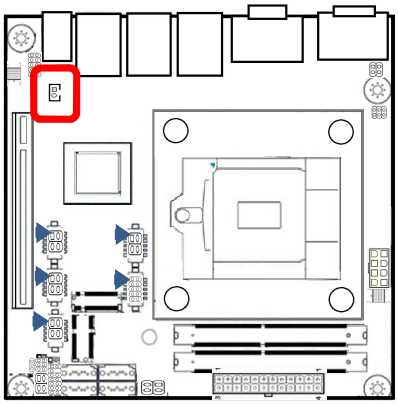
COM2~COM4 (Pin header)

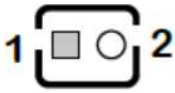
COM2, COM3, COM4 provide three serial connections and support RS-232 function.



PIN No.	Signal Description	PIN No.	Signal Description
1	DCD(n)	2	DSR(n)
3	SIN(n)	4	RTS(n)
5	TXD(n)	6	CTS(n)
7	DTR(n)	8	RI(n)
9	GND	10	GND

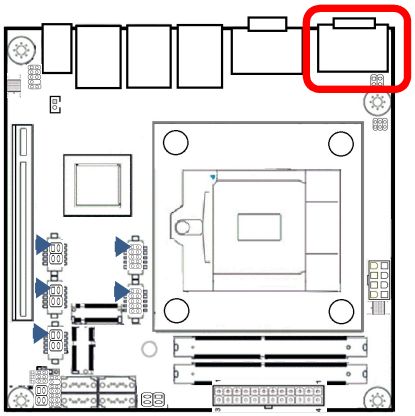
16. RTC Battery Connector (JBAT_1)

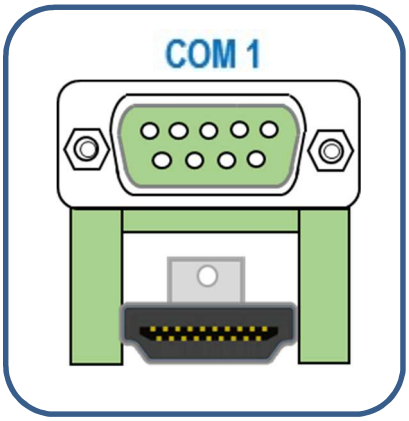




PIN No.	Signal Description	PIN No.	Signal Description
1	3.0Vdc(+)	2	GND(-)

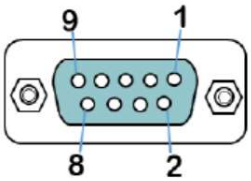
17. COM1 Connector (COM_1)





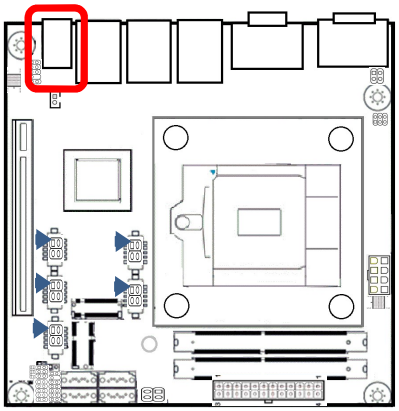
COM1 (RS-232/422/485)

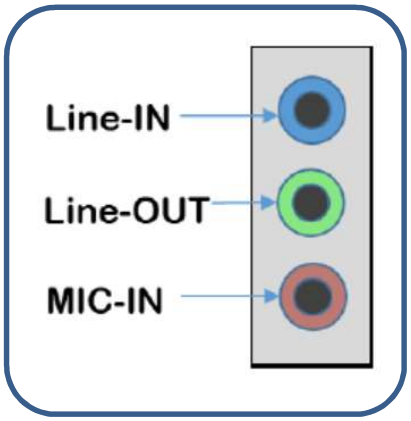
The pin function of COM1 is based on BIOS setting.



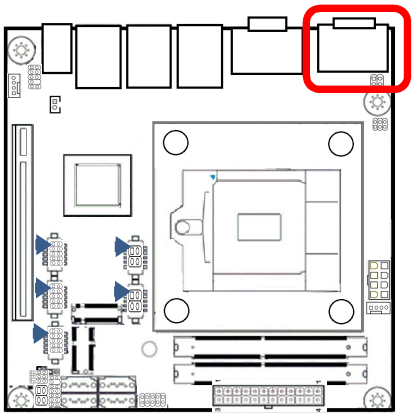
	Signal Description			
	PIN No.	**RS-232C**	**RS-422**	**RS-485**
	1	DCD	TX-	TX-
	2	RX	TX+	TX+
	3	TX	RX+	RX+
	4	DTR	RX-	RX-
	5	GND	GND	GND
	6	DSR	RTS-	NC
	7	RTS	RTS+	NC
	8	CTS	CTS+	NC
	9	RI	CTS-	NC

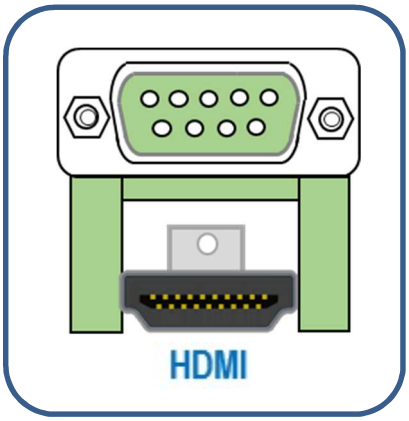
18. 3.5mm Audio Jack (COM_1)

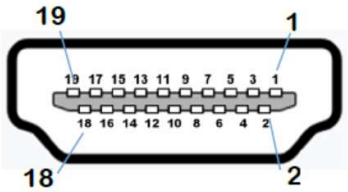




19. HDMI Connector (HDMI_1)

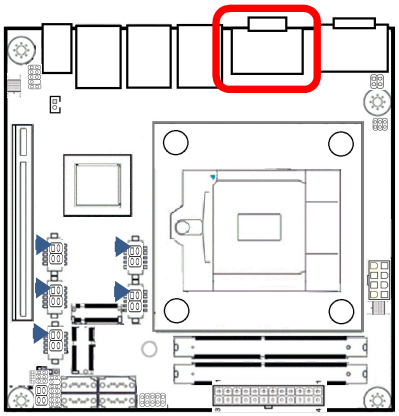


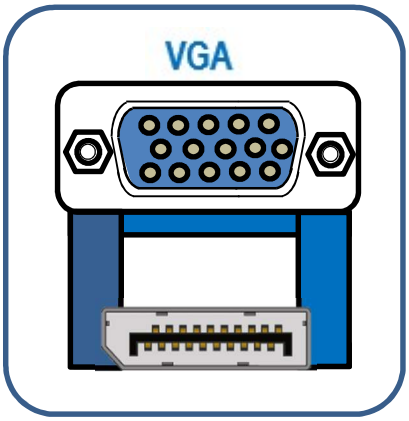


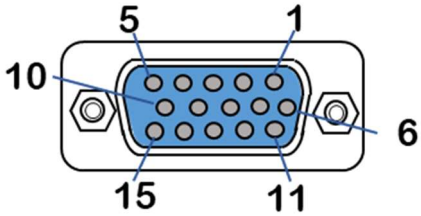


PIN No.	Signal Description	PIN No.	Signal Description
1	HDMI1 DATA2(+)	2	GND
3	HDMI1 DATA2(-)	4	HDMI1 DATA1(+)
5	GND	6	HDMI1 DATA1(-)
7	HDMI1 DATA0(+)	8	GND
9	HDMI1 DATA0(-)	10	HDMI1 CLK(+)
11	GND	12	HDMI1 CLK(-)
13	NC	14	NC
15	HDMI1 DDC_SCL	16	HDMI1 DDC_SDA
17	GND	18	HDMI1_5V
19	HDMI1 HPD		

20. VGA Port Connector (VGA_1)

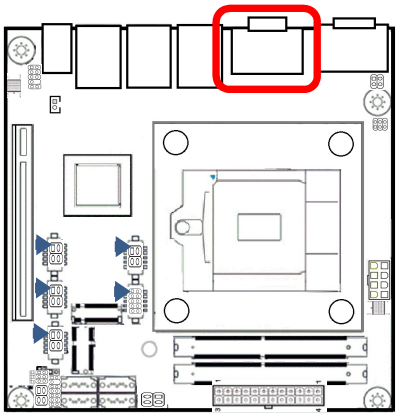


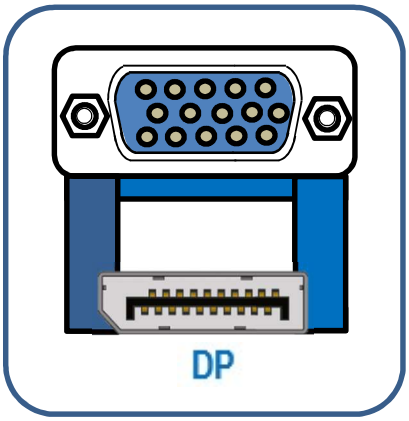


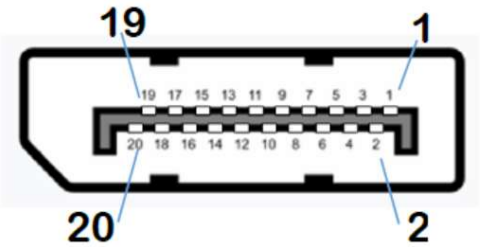


PIN No.	Signal Description	PIN No.	Signal Description	PIN No.	Signal Description
1	VGA_RED	6	GND	11	NC
2	VGA_GREEN	7	GND	12	DDC_DAT
3	VGA_BLUE	8	GND	13	VGA_HSYNC
4	NC	9	+5V_VGA	14	VGA_VSYNC
5	GND	10	GND	15	DDC_CLK

21. Display Port Connector (DP)

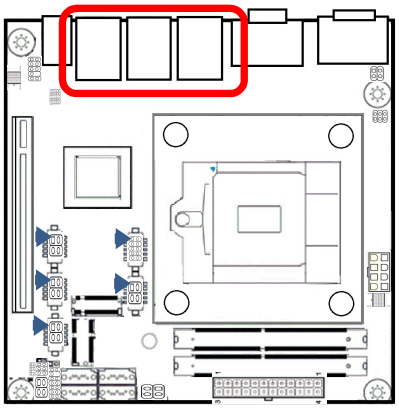


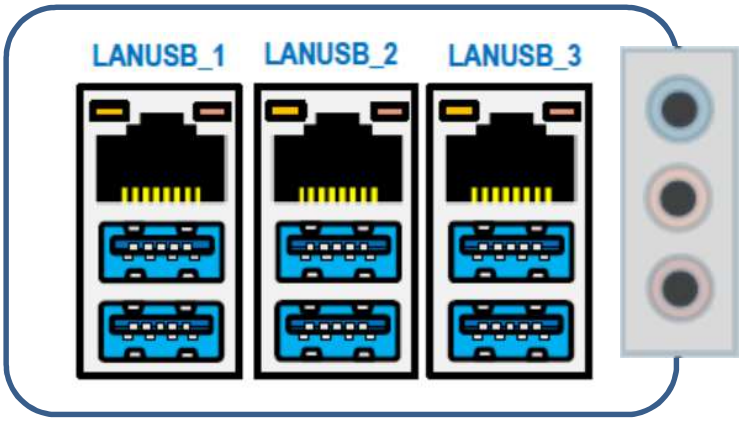




PIN No.	Signal Description	PIN No.	Signal Description
1	Lane 0（+）	2	GND
3	Lane 0（-）	4	Lane 1（+）
5	GND	6	Lane 1（-）
7	Lane 2（+）	8	GND
9	Lane 2（-）	10	Lane 3（+）
11	GND	12	Lane 3（-）
13	GND	14	GND
15	AUX_CH（+）	16	GND
17	AUX_CH（-）	18	Hot Plug
19	GND	20	3.3V

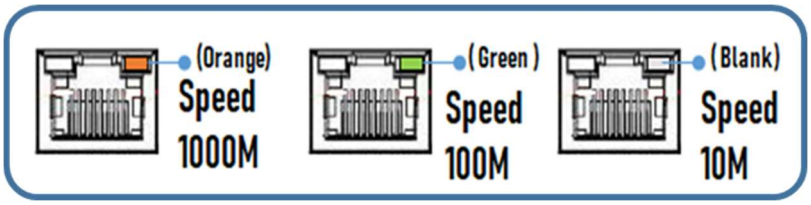
22. RJ45+USB3.2 Connector (LANUSB_1/2/3)

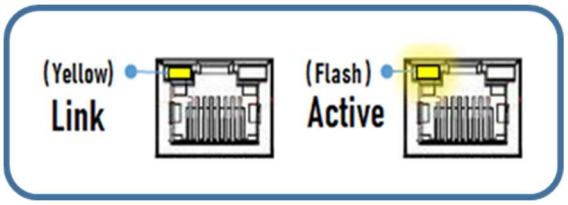


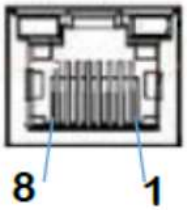


RJ45 Connector

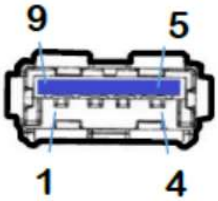
RJ45 LEDs for display of network status:







PIN No.	Signal Description
1	TX1+
2	TX1-
3	TX2+
4	TX3+
5	TX3-
6	TX2-
7	TX4+
8	TX4-



PIN No.	Signal Description	PIN No.	Signal Description
1	VCC	5	USB RX-
2	USB D-	6	USB RX+
3	USB D+	7	GND
4	GND	8	USB TX-
/	/	9	USB TX+

23. Watch-Dog Timer

The watchdog timer serves as a safeguard against possible system lock-up in your industrial computer system. In most industrial environments, there are heavy equipment, generators, high-voltage power lines, or power drops that have adverse effects on your computer system. For instance, when a power drop occurs, it could cause the CPU to come to a halt state or enter into an infinite loop, resulting in a system lock-up.

The application software created by user with the watchdog timer enabled, a RESET automatically generated unless the software periodically triggers the timer within the setting time-out interval. That is, while the system gets hung up, the running program can't trigger the timer periodically. The timer will generate a reset signal to reboot the system.

With this function, running programs can be restarted in the usual way even if an abnormal state occurs.

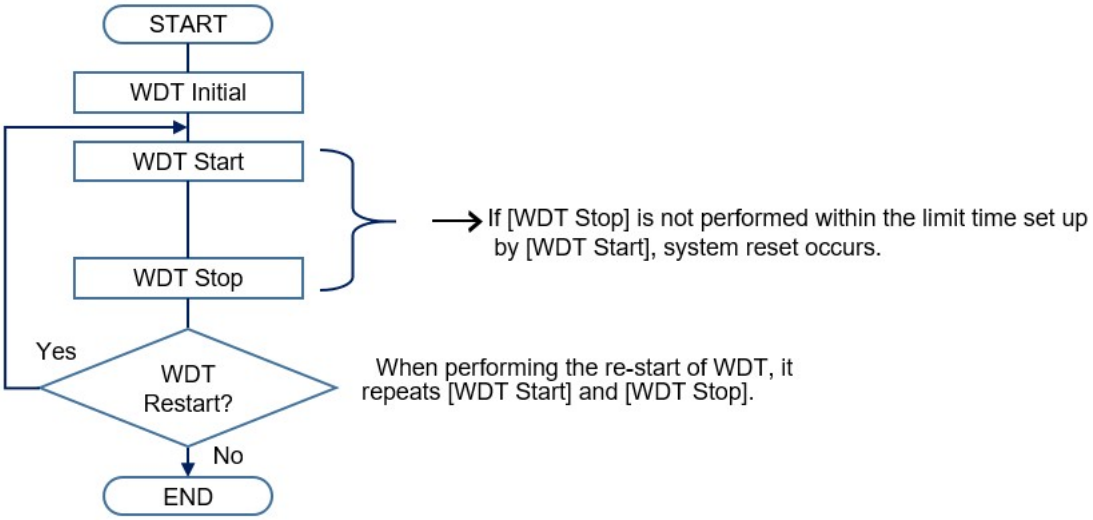
The software can be configured using 255 levels (1 to 255 seconds) of timeout intervals for the watchdog timer. There is also a 2-second tolerance for timeout intervals. To maintain normal system operation, trigger the watchdog timer again using a user-written program with the tolerance in mind.

Ex.) If the time-out interval is set to 30 seconds, the user-created program must retrigger the watchdog timer before 28 seconds will have elapsed in consideration of the tolerance. If the program failed to retrigger the timer (if 28 - 32 seconds have elapsed), the system will automatically reboot.

The I/O port is defined at address 2e/2fH. You can trigger/enable disable the timer by writing address 2e/2fH.

Here is an example for flow chart and programming how to use the watch-dog-timer.

(1) Example flow chart



* It is also possible not to perform [WDT Stop] instead of performing [WDT Stop] to [WDT Start], but to perform [WDT Start] continuously at the time of a re-start.

(2) Example programming

The following example is written in Intel8086 assembly language.

```
;===============
;<WDT Initial>
;===============
    ;-----------------------------------------
;Enter the extended function mode
;-----------------------------------------
MOV DX,2EH
MOV AL,87H
OUT DX,AL
OUT DX,AL
;---------------------------------------------
;Select logical device WDT(number 8)
;---------------------------------------------
MOV DX,2EH
MOV AL,07H
OUT DX,AL
MOV DX,2FH
MOV AL,08H
OUT DX,AL
;----------------------------------------------
;Activate logical device WDT(number 8)
;----------------------------------------------
MOV DX,2EH
MOV AL,30H
OUT DX,AL
MOV DX,2FH
MOV AL,03H
OUT DX,AL
;---------------------------------------------------
;Stop WDT
;---------------------------------------------------
MOV DX,2EH
MOV AL,F1H
OUT DX,AL
MOV DX,2FH
MOV AL,00H
```

```
OUT DX,AL
;----------------------------------------
;Exit the extended function mode
;----------------------------------------
MOV DX,2EH
MOV AL,AAH
OUT DX,AL

;================================
;<WDT START: counter set and a start>
;================================
;---------------------------------------------
;Enter the extended function mode
;---------------------------------------------
MOV DX,2EH
MOV AL,87H
OUT DX,AL
OUT DX,AL
;-----------------------------------------------
;Select logical device WDT(number 8)
;-----------------------------------------------
MOV DX,2EH
MOV AL,07H
OUT DX,AL
MOV DX,2FH
MOV AL,08H
OUT DX,AL
;-----------------------------------------------------
;Set time of WDT and start to count down
;-----------------------------------------------------
MOV DX,2EH
MOV AL,F1H
OUT DX,AL
MOV DX,2FH
;-------------------------------------------------------------------------------
;The data of an example is 15 seconds.(01H=1sec.-FFH=255sec.)
MOV AL,0FH        ;0FH=15Sec
;-------------------------------------------------------------------------------
```

```
OUT DX,AL
;---------------------------------------
;Exit the extended function mode
;---------------------------------------
MOV DX,2EH
MOV AL,AAH
OUT DX,AL

;==============
;<WDT STOP>
;==============
;----------------------------------------
;Enter the extended function mode
;----------------------------------------
MOV DX,2EH
MOV AL,87H
OUT DX,AL
OUT DX,AL
;-----------------------------------
;Select logical device WDT(number 8)
;-----------------------------------
MOV DX,2EH
MOV AL,07H
OUT DX,AL
MOV DX,2FH
MOV AL,08H
OUT DX,AL
;-----------------------------------
;Stop count down of WDT
;-----------------------------------
MOV DX,2EH
MOV AL,F1H
OUT DX,AL
MOV DX,2FH
;-----------------------------------
;The data of 00H is stop WDT
MOV AL,00H
;-----------------------------------
```

```
OUT DX,AL
;-----------------------------------
;Exit the extended function mode
;-----------------------------------
MOV DX,2EH
MOV AL,AAH
OUT DX,AL
```

⚠ CAUTION

- The timer's intervals have a tolerance of ± 2 seconds.

BIOS Setup

This section describes AMI's Setup program built into the FLASH ROM BIOS.

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.

1. Starting Setup

The AMI BIOS is immediately activated when you first power on the computer. The BIOS reads the system information contained in the FLASH ROM 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 <Del> or <ESC> immediately after switching the system on.
- By pressing the <Del> or <ESC> key when the following message appears on the screen during the POST (Power On Self-Test).

Press <DEL> or <ESC> 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. You may also restart by simultaneously pressing <Ctrl>, <Alt>, and <Delete> keys. If you do not press the keys at the correct time and the system does not boot, an error message will be displayed, and you will again be asked to.

Press F1 to Continue, DEL to enter setup.

2. 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.

Key	Function
↑	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

3. 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> key or the F1 key again.

4. In Case of Problems

If, after making and saving system changes with Setup, you discover that your computer no longer can boot, the AMI 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 BIOS Vendor and 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.

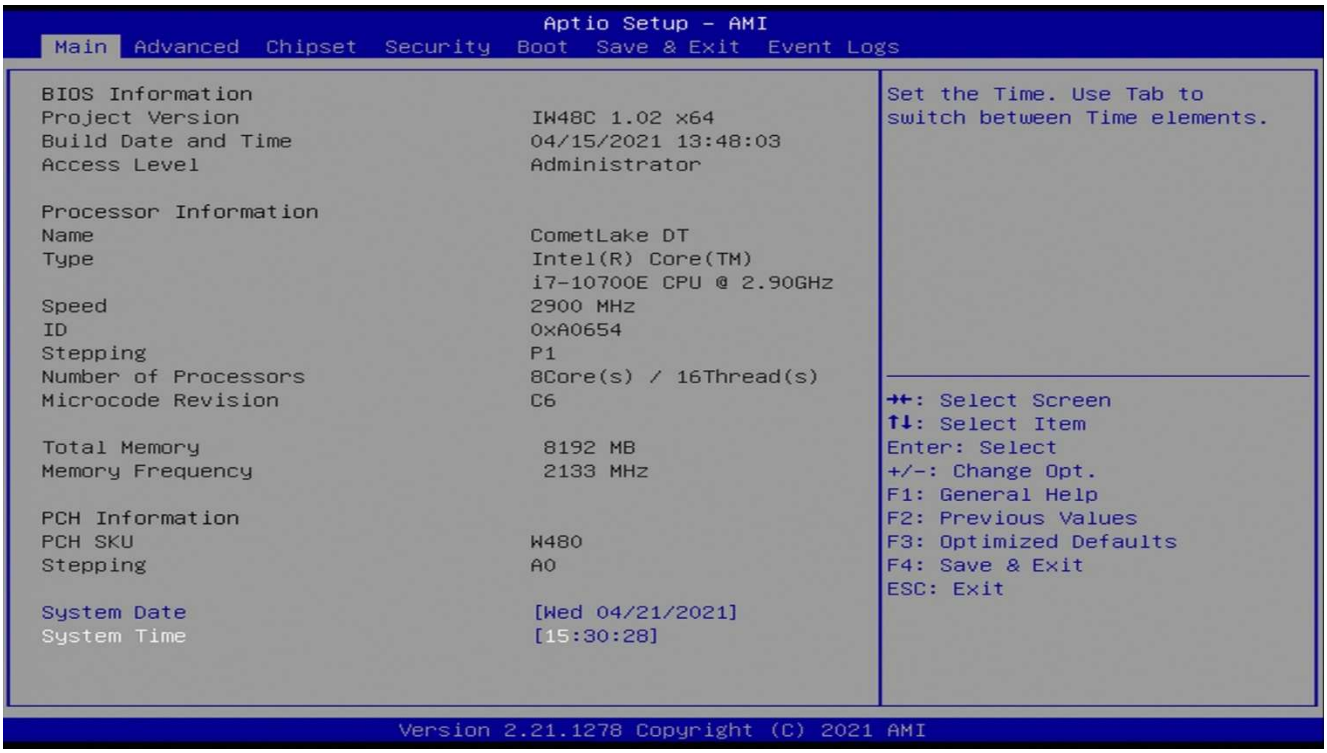
5. A Final Note About Setup

The information in this section is subject to change without notice.

2.Main Menu

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.

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



1. Setup Items

The selectable tabs are as follows.

Main

Record some basic hardware configurations in your computer and set the system clock.

Advanced

configure your CPU and other system devices for basic operation through the following sub-menus.

Chipset

Specify the detailed functions that can be set on the system used.

Security

Set the password to be used to protect the security of the system.

Boot

Configure the settings related to how the system will boot.

Save & Exit

Load/ save setup items and exit the setup menu.

Event Logs

Configure the setting for smbios Event Log.

3.Main

View the basic system structure. The following items are displayed.

Indication item of the main menu

Item	Indication Example	Explanation
Project Name	GMB-IW48000	Displays the BIOS name.
Project Version	IW48C 1.02 x64	Displays the BIOS version.
Build Date and Time	04/15/2021	Displays the BIOS creation date and time.
Access Level	Administrator	Displays the access rights level.

Main Menu Selections

Item	Option	Description
System Date	xx / xx / xx	Set the system date. Manually enter the day, month, and year.
System Time	xx-: xx : xx	Set the system time. Manually enter the hours, minutes, and seconds.

NOTE

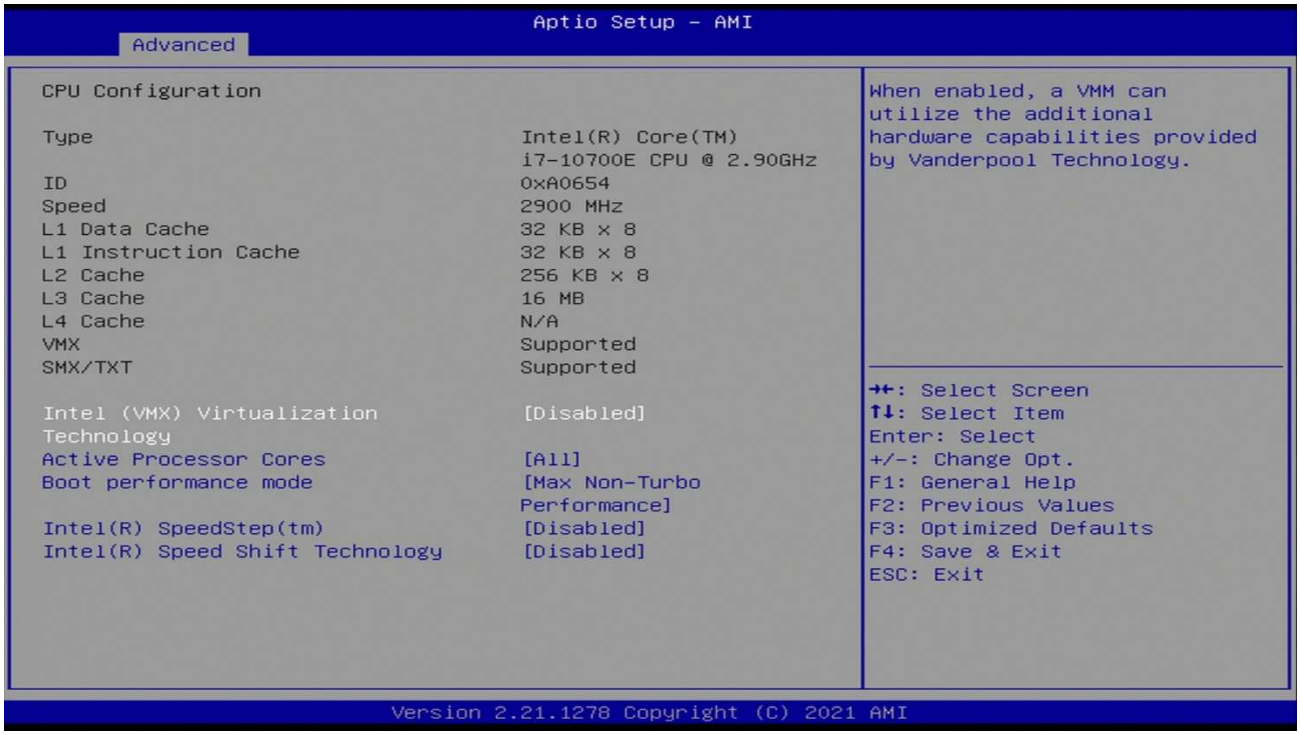
- The BIOS setup screens shown in this chapter are for reference purposes only and may not exactly match what you see on your screen. Please ask your agent for the latest BIOS information.

4.Advanced

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

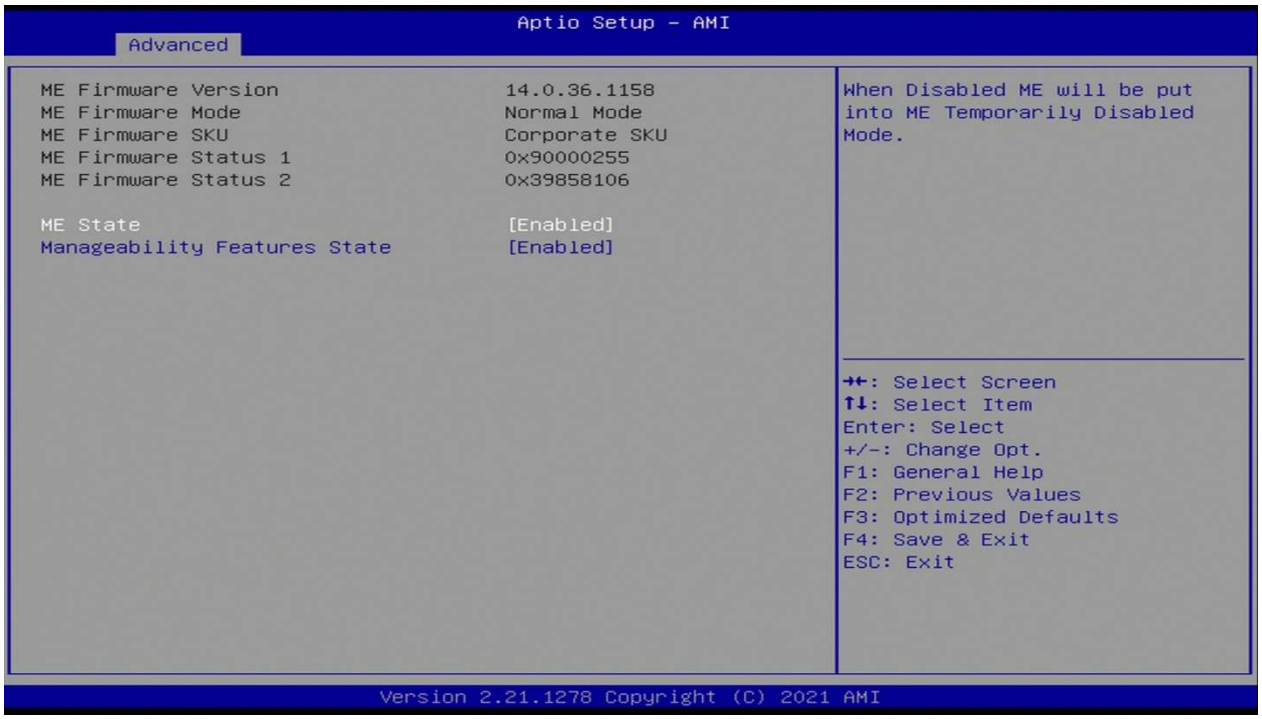
1. CPU Configuration

CPU Configuration



Item	Options	Description
Intel (VMX) Virtualization Technology	Enabled Disabled	When enabled, a VMM can utilize the additional hardware capabilities provided by Vander pool Technology.
Active Processor Cores	All 1 2 3 4 5 6 7	Number of cores to enable in each processor packages.
Boot performance mode	Max Battery Max Non-Turbo Performance Turbo Performance	Select the performance state That the BIOS will set string from reset vector
Intel(R) SpeedStep(tm)	Enabled Disabled	Allows more than two frequency ranges to be supported.
Intel(R) Speed Shift Technology	Enabled Disabled	Enabling will expose the CPPC v2 interface to allow for hardware-controlled P-states.

2. PCH-FW Configuration



PCH-FW Configuration

Item	Options	Description
ME State	Enabled Disabled	When Disabled Me will be put into ME Temporarily Disabled Mode.

Item	Options	Description
Manageability Features State	Enabled Disabled	Enable /Disable Intel® manageability features. Note: This option disables/enables manageability features Support in FW. To disable support platform must be in an un provisioned state first.

3. Trusted Computing

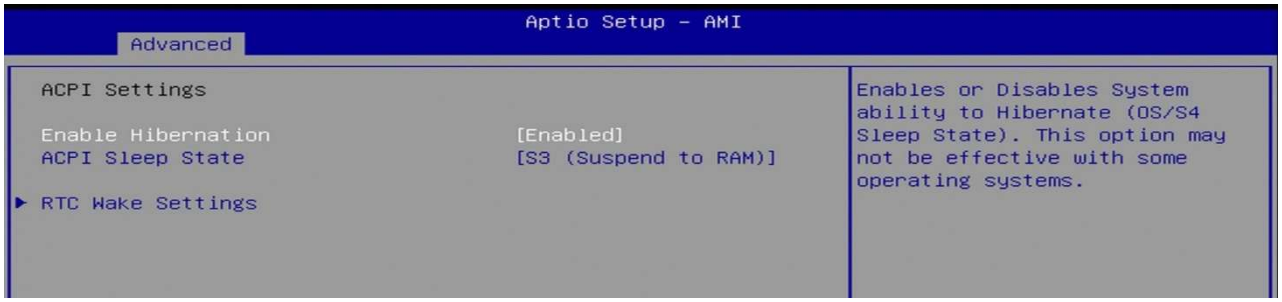
Trusted Computing

Item	Options	Description
Security Device Support	Enable Disable	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.
SHA-1 PCR Bank	Enable Disable	Enable or Disable SHA-1 PCR Bank
SHA256 PCR Bank	Enable Disable	Enable or Disable SHA256 PCR Bank
Pending operation	None DTPM clear	Schedule an Operation for the security Device. Note: Your Computer will reboot During restart in order to Change State of security Device.
Platform Hierarchy	Enable Disable	Enable or Disable Platform Hierarchy
Storage Hierarchy	Enable Disable	Enable or Disable Storage Hierarchy
Endorsement Hierarchy	Enable Disable	Enable or Disable Endorsement Hierarchy
STPM 2.0 UEFI Spec Version	TCG_1_2 TCG_2	Select the TCG2 Spec Version Support. TCG_1_2: the Compatible mode for win8/win/10 TCG_2 : support new TCG2 protocol and even format for the win10 or later

Item	Options	Description
Physical Presence Spec Version	1_ 2 1 .3	Select to tell O.S to support PPI Spec version 1.2 or 1.3 . Note: some HCK tests might not support 1.3.
Device Select	TPM_1.2 TPM_1.3 Auto	TPM 1.2 will restrict support to TPM 1.2 devices, TPM 2.0 will restrict support to TPM 1.3 devices Auto will support both with the default set to TPM 2.0 devices if not found ,TPM 1.2 devices will be enumerated.

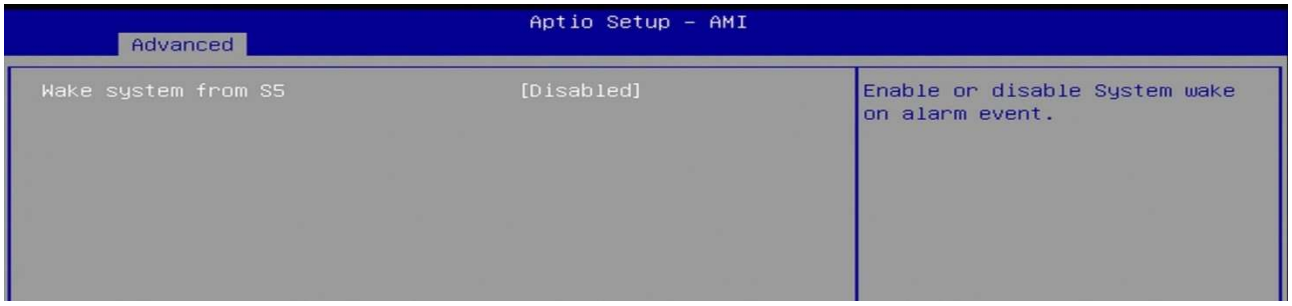
4. ACPI Settings

ACPI Settings



Item	Options	Description
Enable ACPI Auto Configuration	Enabled Disabled	Do not change this setting.
Enable Hibernation	Enabled Disabled	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)	Select the highest ACPI sleep state the system will enter when the SUSPEDN button is pressed.

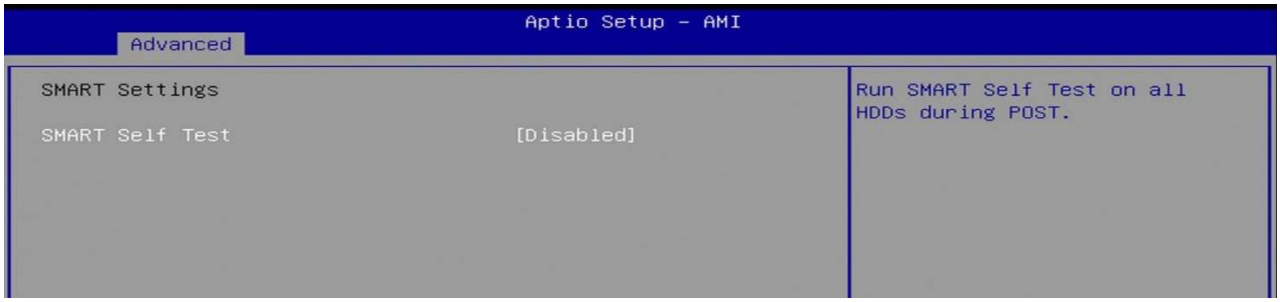
RTC Wake Settings



Item	Options	Description
Wake system from S5	Enabled Disabled	Enables or Disables System wake on alarm even
Wake up hour	0	Select 0-23 for example enter 3 for 3am and 15 for 3 pm
Wake up minute	0	Select 0-59 for minute
Wake up second	0	Select 0-59 for second

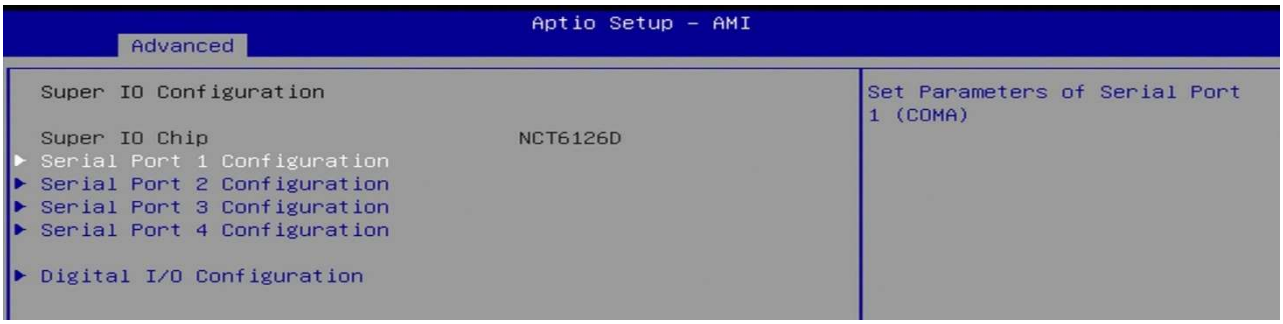
5. SMART Settings

SMART Settings



Item	Options	Description
SMART Self Test	Enabled Disabled	Run SMART self test on all HDDs during POST.

6. Super IO Configuration



Super IO Configuration

Item	Options	Description
Serial Port 1 Configuration	-	Refer to Serial Port 1 (COMA)
Serial Port 2 Configuration	-	Refer to Serial Port 2 (COMB)
Serial Port 3 Configuration	-	Refer to Serial Port 3 (COMC)
Serial Port 4 Configuration	-	Refer to Serial Port 4 (COMD)

Serial Port 1 Configuration

Item	Options	Description
Serial Port	Enabled Disabled	Enable or Disable Serial Port (COM).
UART 232 422 485	RS232 RS422 RS485	Set COM Port as RS232, RS422 or RS485 mode.

Serial Port 2 Configuration

Item	Options	Description
Serial Port	Enabled Disabled	Enable or Disable Serial Port (COM).

Serial Port 3 Configuration

Item	Options	Description
Serial Port	Enabled Disabled	Enable or Disable Serial Port (COM).

Serial Port 4 Configuration

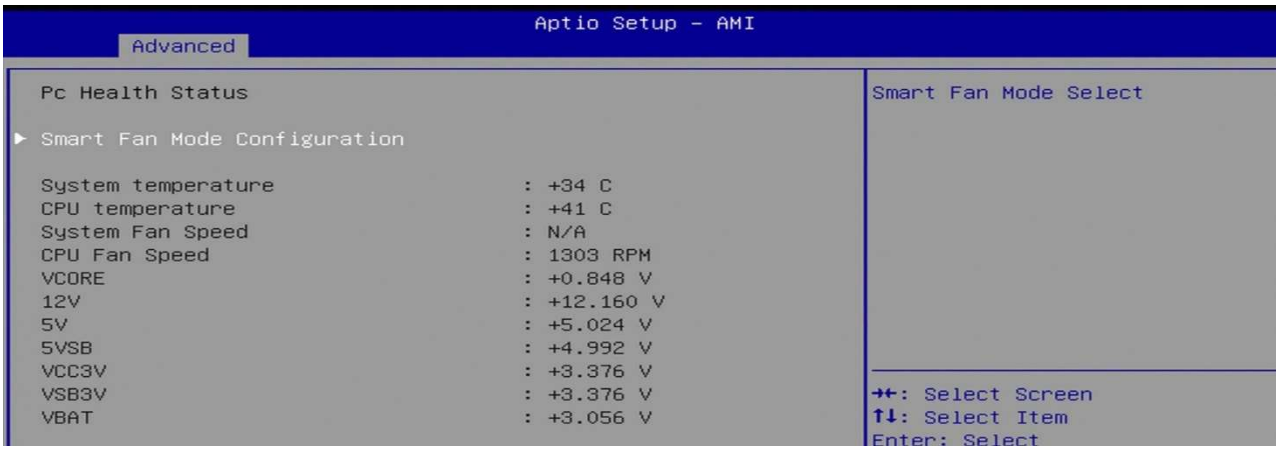
Item	Options	Description
Serial Port	Enabled Disabled	Enable or Disable Serial Port (COM).

Digital I/O Configuration

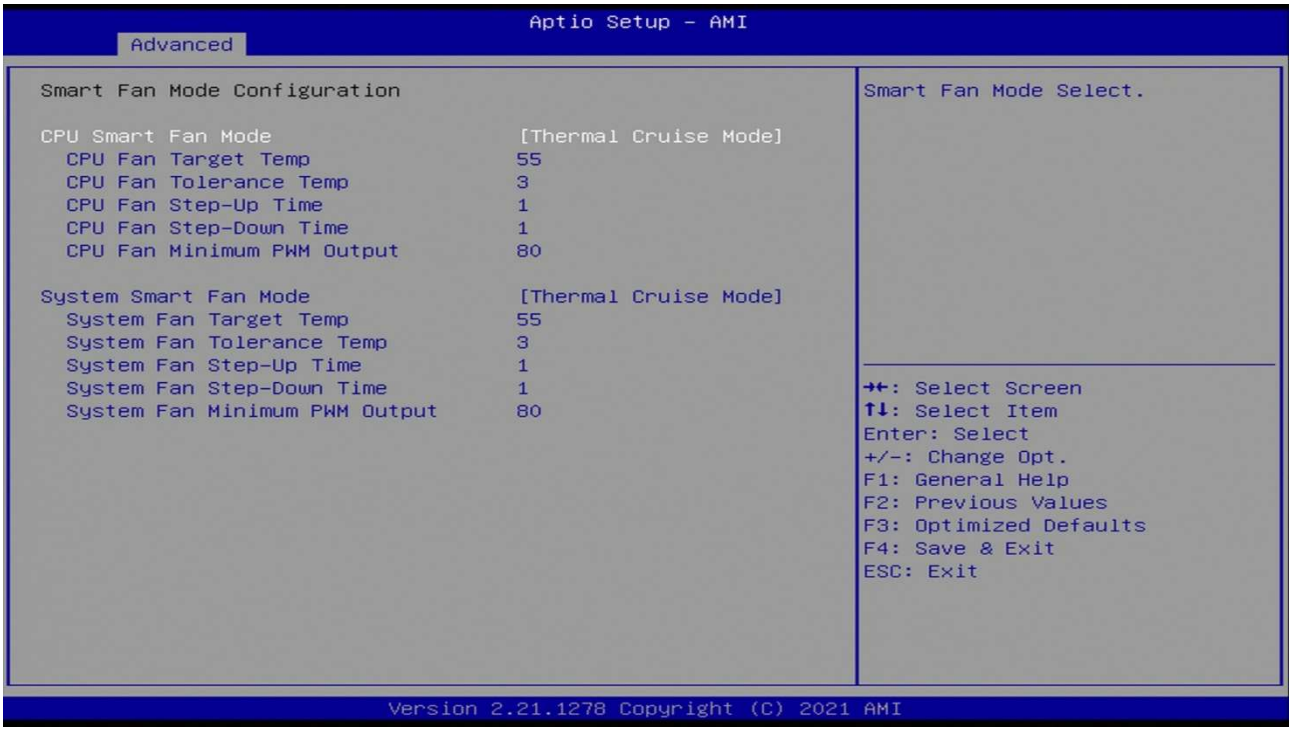
Item	Options	Description
Digital I/O Pin 0	Input Output High Output Low	Configure Digital I/O pin
Digital I/O Pin 1	Input Output High Output Low	Configure Digital I/O pin
Digital I/O Pin 2	Input Output High Output Low	Configure Digital I/O pin
Digital I/O Pin 3	Input Output High Output Low	Configure Digital I/O pin
Digital I/O Pin 4	Input Output High Output Low	Configure Digital I/O pin
Digital I/O Pin 5	Input Output High Output Low	Configure Digital I/O pin
Digital I/O Pin 6	Input Output High Output Low	Configure Digital I/O pin
Digital I/O Pin 7	Input Output High Output Low	Configure Digital I/O pin

7. Hardware Monitor

View hardware monitor information such as the CPU temperature.



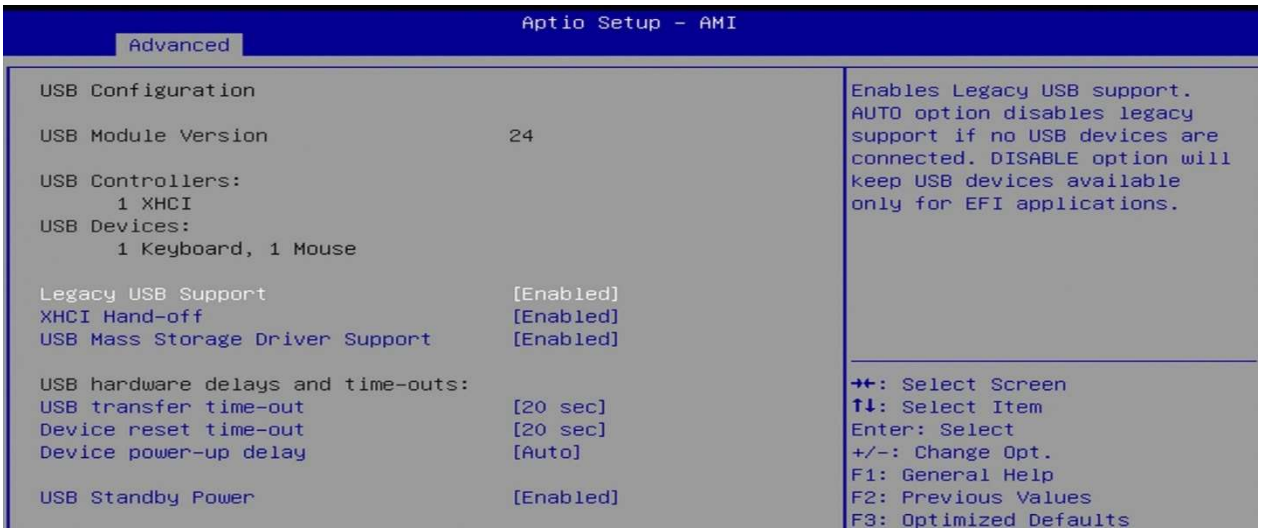
Smart FAN Mode Configuration



Item	Options	Description
CPU FAN Mode	PWM Manual Mode Thermal Cruise Mode	Smart Fan Mode select
SYS FAN Mode	PWM Manual Mode Thermal Cruise Mode	Smart Fan Mode select

8. USB Configuration

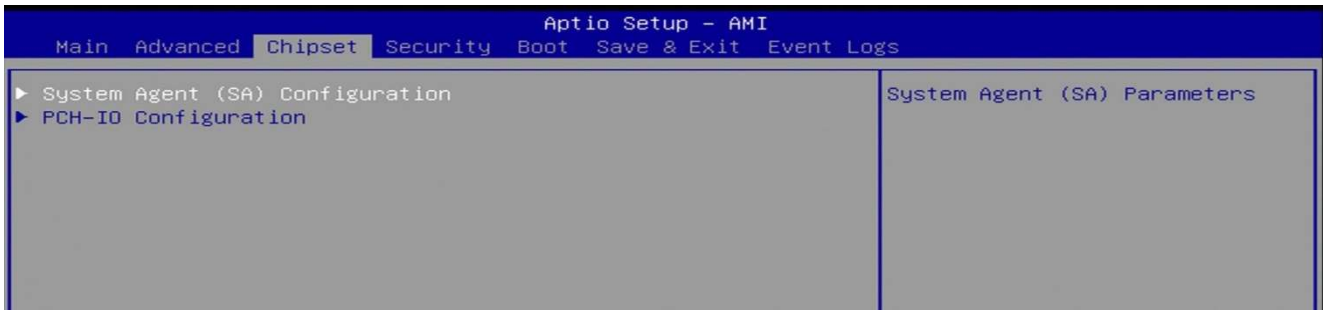
USB Configuration



Item	Options	Description
Legacy USB Support	Enabled Disabled Auto	Enables Legacy USB Support. AUTO option: Disables legacy support if no USB device Are connected. Disable option: will keep USB devices available only for EFI applications.
XHCI Hand-off	Enabled Disabled	This is a workaround for OSes without XHCI hand-off support. the XHCI owners ship change should be claimed by XHCI Driver
USB Mass Storage Driver support	Enabled Disabled	Enable/Disable USB Mass Storage Driver support
USB transfer time-out	1 sec 5 sec 10 sec 20 sec	The time-out. Value for control ,Bulk and interrupt transfers.
Device reset time-out	10 sec 20 sec 30 sec 40 sec	USB mass storage device Start Unit command time-out.
Device Power-up Delay	Auto 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.

Item	Options	Description
USB Standby Power	Enabled Disabled	Enabled : On standby state USB Power provide. Disabled: On standby state USB Power does not provide.

5.Chipset



1. System Agent (SA) Configuration

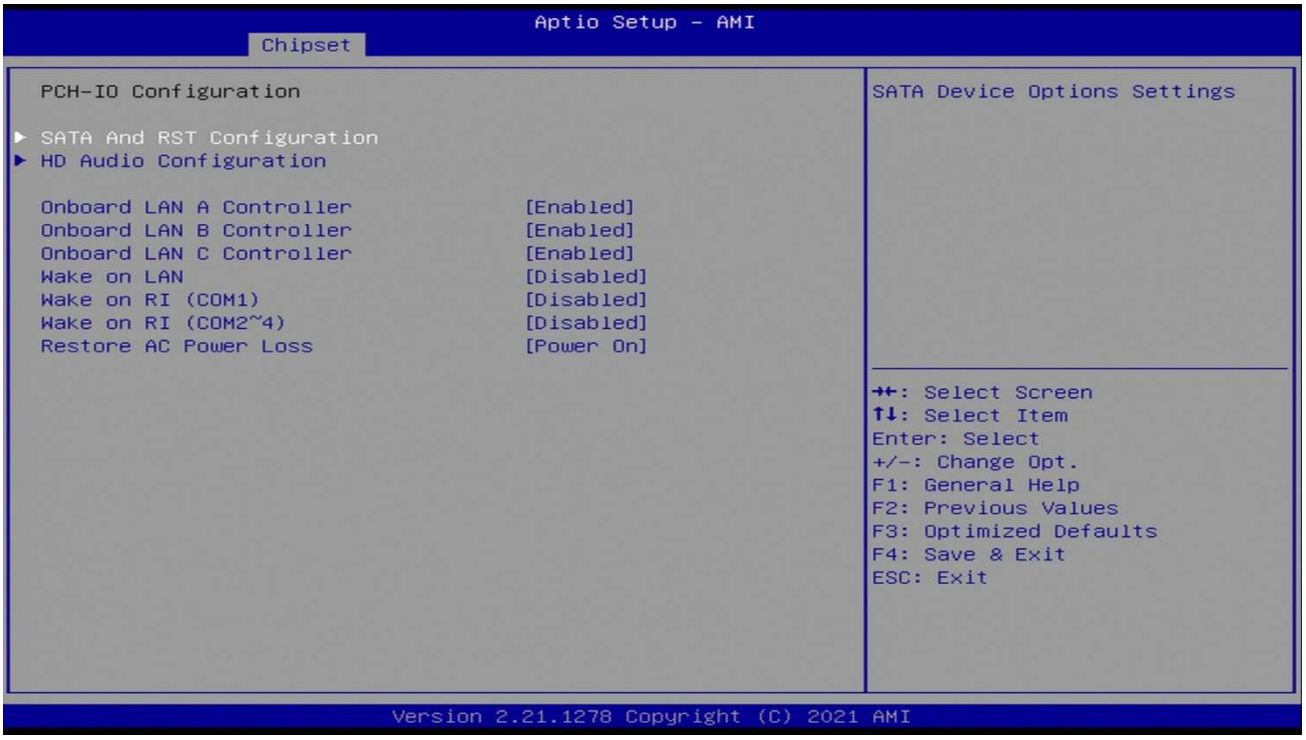
System Agent (SA) Configuration

Graphic Configuration

Item	Options	Description
Primary Display	[Auto] IGFX PEG PCI SG	Select which of IGFX/PEG/PCI graphics device should be primary display or select SG for switchable DFx
Internal Graphics	[Auto] Disabled Enabled	Keep IGFX enabled based on the setup options.
GTT Size	2MB 4MB [8MB]	Select the GTT size
Aperture Size	128MB [256MB] 512MB 1024MB 2048MB	Select the Aperture Size Note: Above $GB MMIO BIOS assignment is automatically enable when selecting 2048MB Aperture .to use this feature please disable CSM support.

Item	Options	Description
DVMT Pre-allocated	0M 32M 64M 4M 8M 12M 16M 20M 24M 28M 32M/F7 36M 40M 44M 48M 52M 56M 60M	Select DVMT 5.0 Pre-allocated(Fixed) Graphics memory size used by the internal Graphics Device.
DVMT Total Gfx Mem	128M 256M MAX	Select DVMT 5.0 total Graphics memory size the internal used By the internal Graphics Device
PAVP Enable	Enabled Disabled	Enable / Disable RAVP

2. PCH-IO Configuration



SATA and RST Configuration

Item	Options	Description
SATA Configuration(S)	Enabled Disabled	Enable/Disable SATA Device.
SATA Mode Selection	AHCI Intel RST Premium with intel OPtane system acceleration	Determines how SATA controller(s) operate.

HD Audio Configuration

Item	Options	Description
HD Audio	Enabled Disabled	Control Detection of the HD-Audio device. Disabled = HDA will be unconditionally disabled Enabled = HAD will be unconditionally enabled.

PCH-IO Configuration

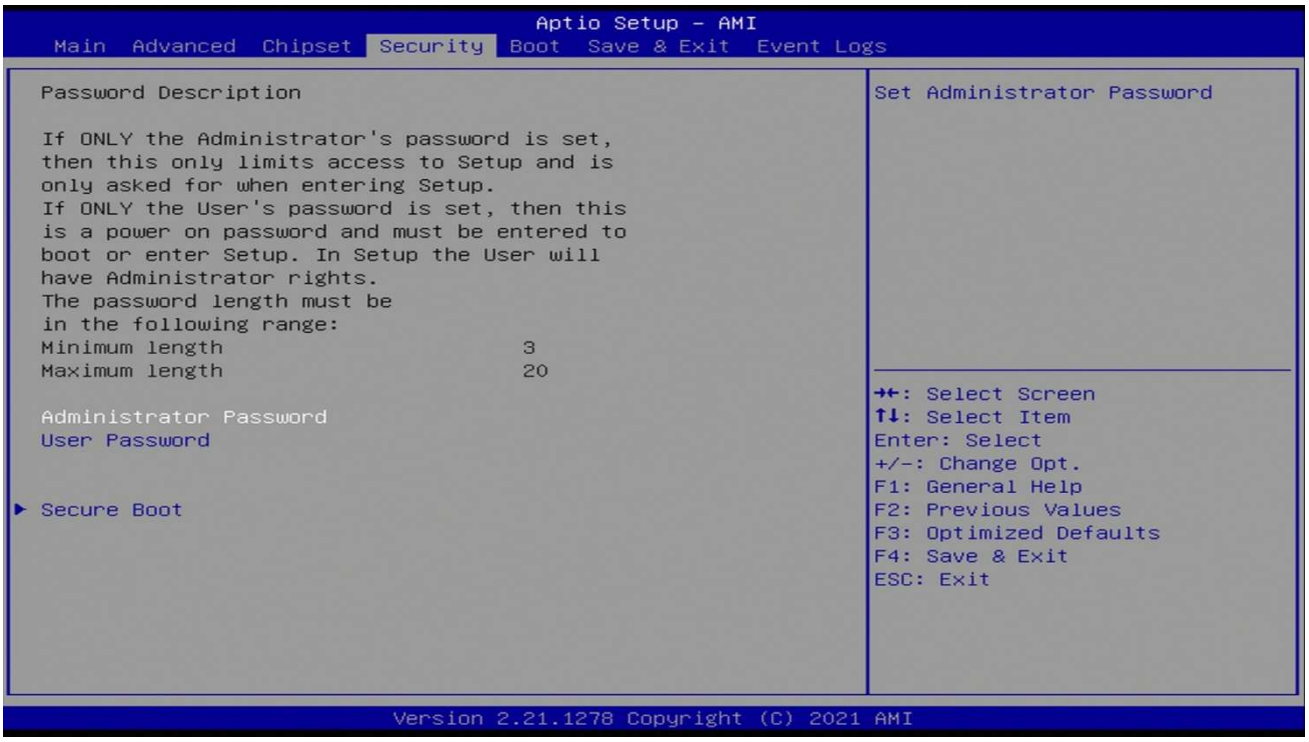
Item	Options	Description
Onboard LAN A Controller	Enabled Disabled	Enable/Disable onboard NIC
Onboard LAN B Controller	Enabled Disabled	Enable/Disable onboard NIC

Item	Options	Description
Onboard LAN C Controller	Enabled Disabled	Enable/Disable onboard NIC

Item	Options	Description
Wake on LAN	Enabled Disabled	Enable/Disable integrated LAN to wake the system
Wake on RI (COM1)	Enabled Disabled	Enable/Disable RI to wake the system
Restore AC Power loss	Power On Power Off	Specify what state to go to when power is re-applied after a power failure (G3 state)

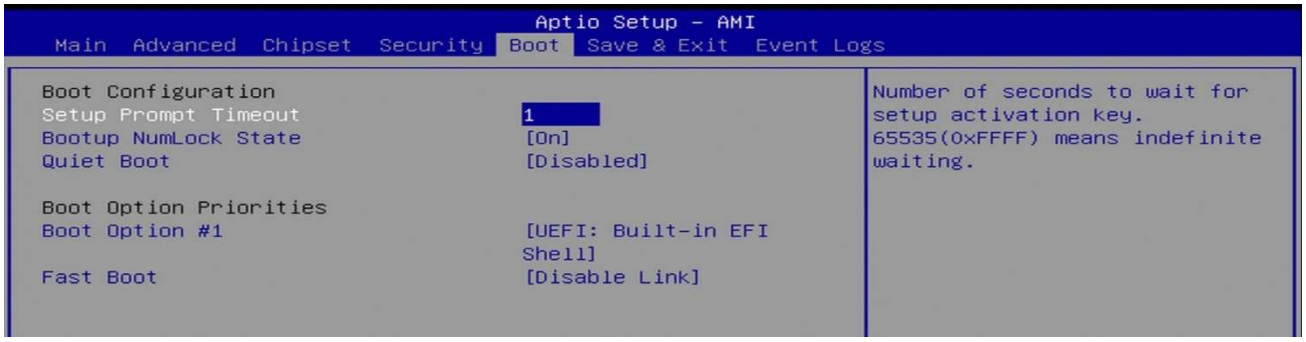
6.Security

Secure Boot



Item	Options	Description
Secure Boot	Enabled Disabled	Secure Boot feature is Active if Secure Boot is Enabled, Platform Key(PK) is enrolled and the System is in User mode. The mode change requires platform reset
Secure Boot Mode	Standard Custom	Secure Boot mode options: Standard or Custom. In Custom mode, Secure Boot Policy variables can be configured by a physically present user without full authentication

7.Boot



Boot

Item	Options	Description
Setup Prompt Timeout	1	Number of seconds to wait for setup activation key. 65535(0xFFFF) means indefinite waiting.
Bootup NumLock State	On Off	Select the keyboard Numlock state
Quiet Boot	Enabled Disabled	Enables or disables Quite boot option
Boot Option #1	--	Set the system boot order
Fast Boot	Disable Link Enabled	Enables or disables boot with initialization of a minimal set of device boot option. has no effect for BBS boot options.

7.Save and Exit

Save Changes and Exit

Exit system setup after saving the changes.

Discard Changes and Exit

Exit system setup without saving any changes.

Save Changes and Reset

Reset the system after saving the changes.

Discard Changes and Reset

Reset system setup without saving any changes.

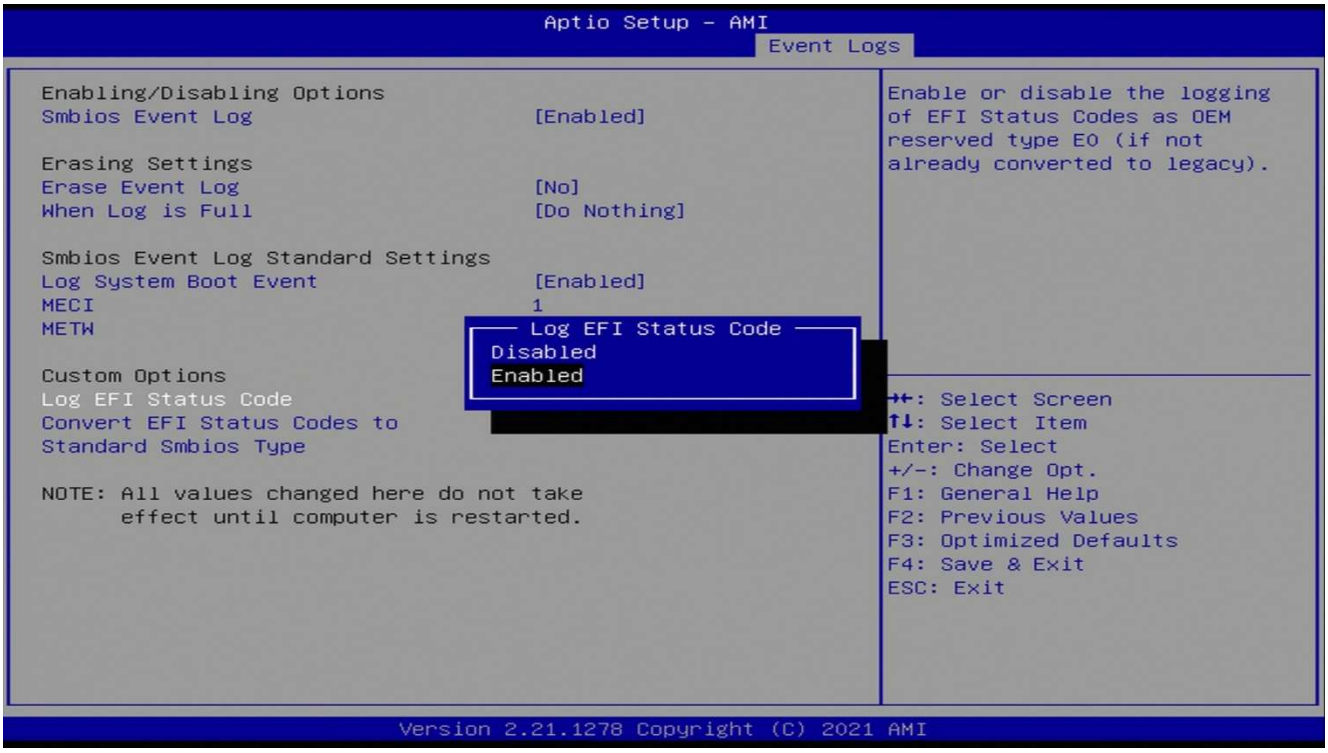
Restore Defaults

Restore/Load Default Value for all the setup options..

Launch EFI Shell from Filesystem Device

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

8.Event Logs



Change Smbios Even Log Settings

Item	Options	Description
Smbios Event Log	Enabled Disabled	Change this to enable or disable all feature of smbios event logging during boot.
Erase Event Log	On Yes,Next Reset Yes,Every Reset	Choose options for erasing smbios event Log , erasing is done prior to any logging activation during reset.
When Log is Full	Do Nothing Erase Immediately	Choose options for reacions to a full smbios even Log.
Log system boot Event	Enabled Disabled	Choose options to enable/disable logging of system boot event
MECI	1	Multiple Event count Increment: The number of occurrences of duplicate even that must pass before the multiple-even counter of log entry is updated the value ranges from 1 to 255
METW	60	Multiple Event Time Window: The number of minutes which must pass between duplicate log entries which utilize a multiple-even counter the value ranges from 0 to 99 minute
Log EFI Status Codes to standard smbios type	Disabled Enabled	Enable or disable the logging of EFI Status Codes as OEM reserved type E0 (if not already converted to legacy).

Appendix

This section lists the specifications and components suggestion, block diagram, driver installation, and mechanical drawing.

1.System Reference

1. Specifications

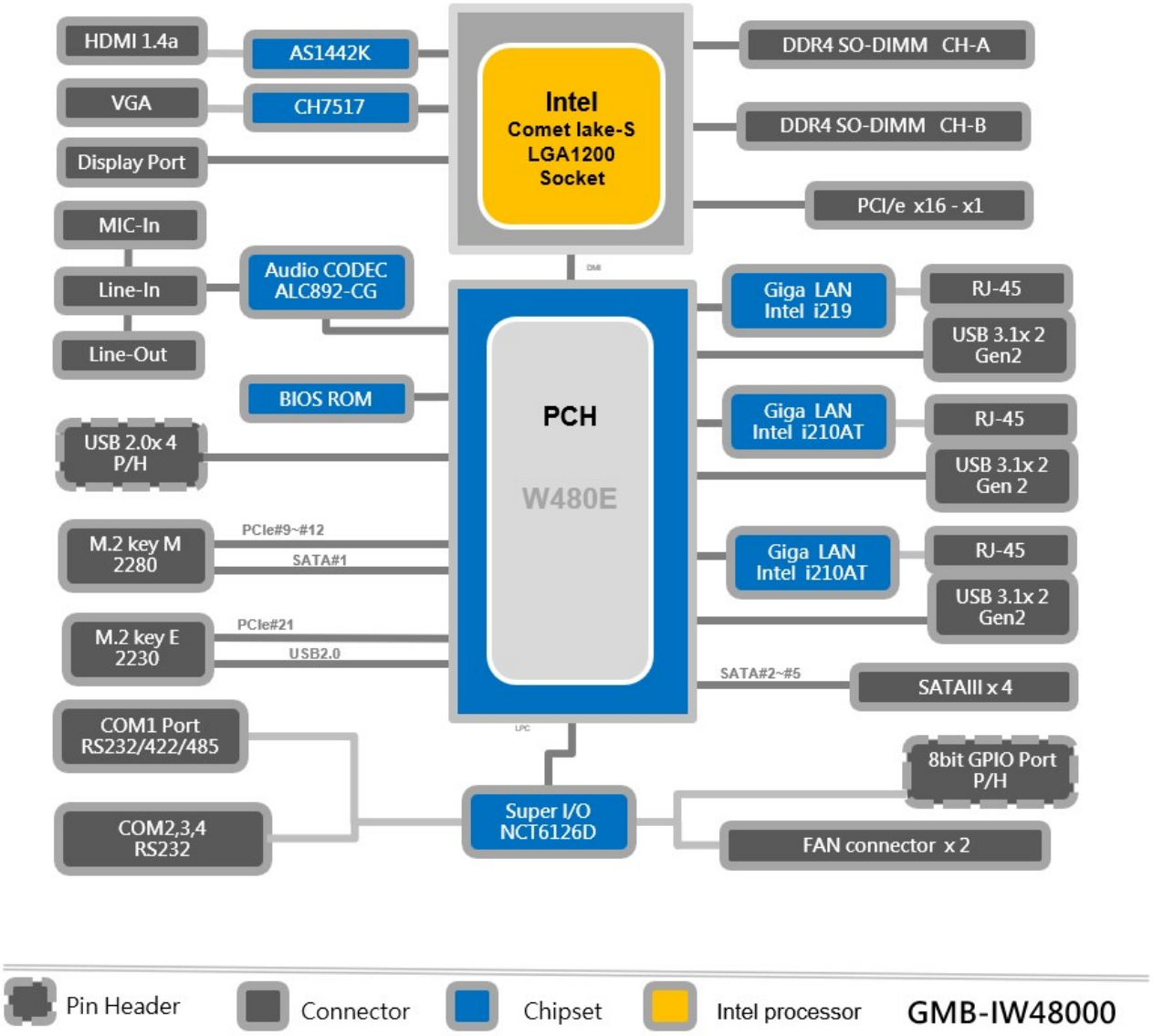
Model Name	GMB-IW48000
CPU	Intel® 10th Gen. Comet Lake-S Xeon®W / Core™ Processors (LGA1200)
Chipset	Intel® W480E Express Chipset
BIOS	AMI UEFI BIOS
Operation System	Windows®10 IoT Enterprise LTSC 2019 64 bit
System Memory	2 x 260-pin DDR4SO-DIMM socket, up to 64GB (ECC supported depends on CPU) DDR4-2933 (with Xeon® W-1290E/ Xeon® W-1270E/ Core™i9/ Core™i7 CPU) DDR4-2666 (with Xeon® W-1250E/ Core™i5/ Core™i3 CPU)
Storage	4 x SATA III (6.0Gb/s) Port
Graphic	Controller: Intel® UHD 610 & 630 graphics (by processor) Triple display supported: VGA port: Up to resolution 1920 x 1080 @ 60Hz Display port: Up to resolution 4096 x 2160 @ 60Hz HDMI port: Up to resolution 4096 x 2160 @ 60Hz
Expansion Interface	1 x PCIe Gen3 x16 slot 1 x M.2 M Key 2280 (PCIe + SATA Signal) 1 x M.2 E Key 2230 (PCIe + USB Signal)
Input/ Output	4 x Serial Port: - 1 x RS-232/422/485 on real panel - 3 x RS-232 with pin-header on board 10 x USB Port: - 6 x USB3.2 Gen2 on real panel - 4 x USB2.0 port internal 2.0mm pin header GPIO connector: 8-bit general purpose input/output Audio interface: connector for Mic-in, Line-in, and Line-out
Ethernet	10/100/1000Mbps Ethernet port Controller: 1 x Intel i219LM + 2 x Intel i210AT
MISC	One front panel I/O with pin-header on board CPU & System FAN connector TPM2.0 on board
Mechanical And Environmental	Operation Temperature: 0 to 60°C Storage Temperature: -40 to 80°C Relative Humidity: 5 to 95% non-condensing Power Supply Voltage: +3.3V, +5V, +12V, 5VSB Board Size: 170mm x 170mm (6.7" x 6.7")

2. CPU Selection Guide

Intel® 10th Gen. processor in LGA1200				
ECC memory supported				
CPU		TDP	Core	Max Speed
Intel® Xeon®	W-1290E	95W	10	4.80 GHz
	W-1290TE	35W	10	4.50 GHz
	W-1270E	80W	8	4.80 GHz
	W-1270TE	35W	8	4.40 GHz
	W-1250E	80W	6	4.70 GHz
	W-1250TE	35W	6	3.80 GHz
Core™ i3	i3-10100E	65W	4	3.80 GHz
	i3-10100TE	35W	4	3.60 GHz

Intel® 10th Gen. processor in LGA1200				
Non-ECC memory supported				
CPU		TDP	Core	Max Speed
Core™ i9	i9-10900E	65W	10	4.70 GHz
	i9-10900TE	35W	10	4.50 GHz
Core™ i7	i7-10700E	65W	8	4.50 GHz
	i7-10700TE	35W	8	4.40 GHz
Core™ i5	i5-10500E	65W	6	4.20 GHz
	i5-10500TE	35W	6	3.70 GHz

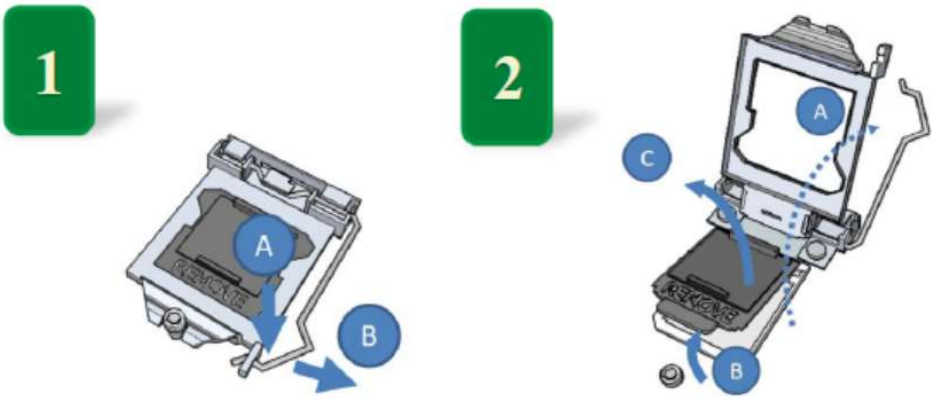
2.Block Diagram



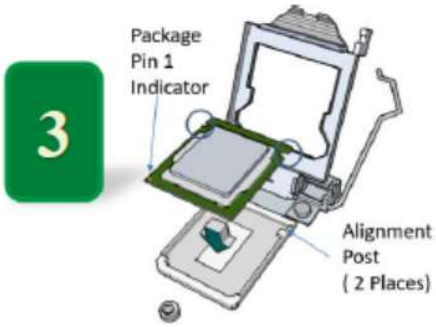
3.Installation

1. CPU Installation

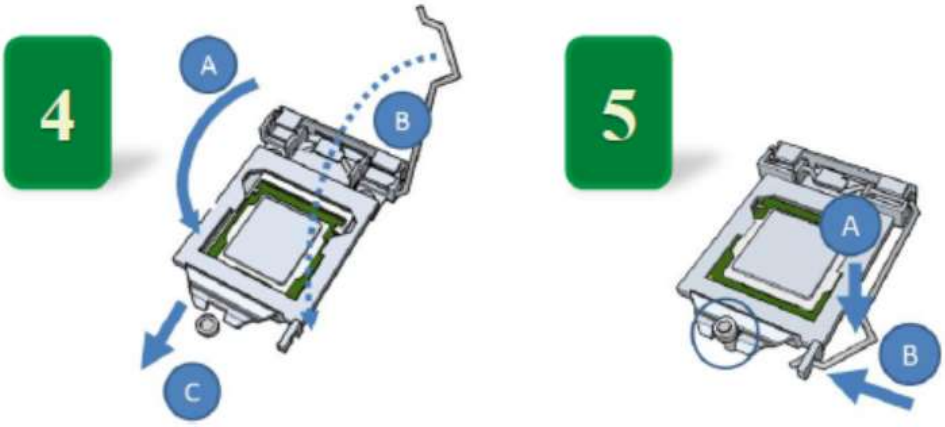
1. Make sure PC and all other peripheral devices are shut down.
2. Disconnect all power cords and cables.
3. Open the load plate then remove the plastic cap as below picture 1 and 2 showed.



4. Be careful to put CPU straight down into the socket. (Make sure socket keys and CPU pin1 are put at right location marked in below picture 3.)

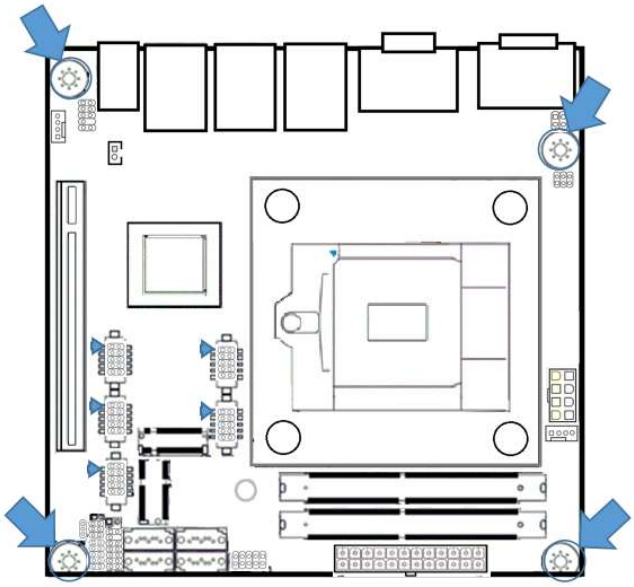


5. Press socket cover and lever down then lock socket by screw as picture 4 and picture 5 (Make sure CPU is inserted into socket properly before close socket cover.)



9. Motherboard Installation

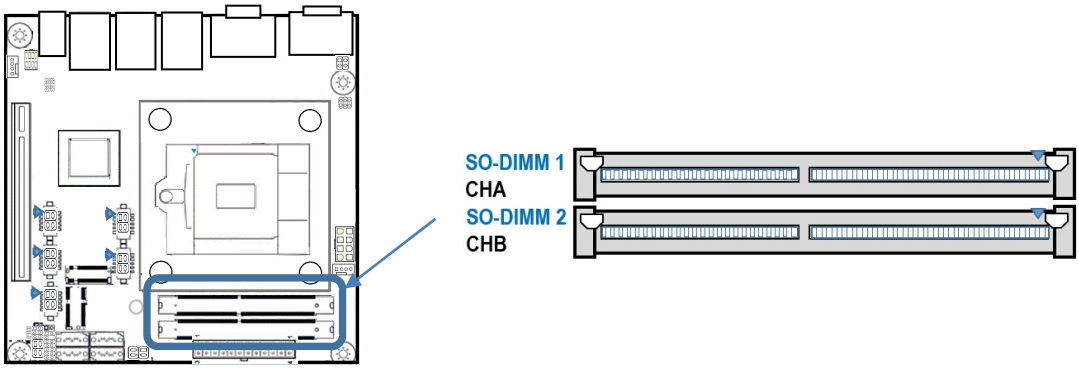
Some components are very close to the mounting holes. Please take precautionary measure to avoid damaging these components when installing the motherboard.



Mounting Holes

10. Memory Installation

1. The DDR4 memory sockets are divided into A and B two channels, each has two sockets showed as below.



2. Please don't mixed double side or single side DDR4 module at the same time.
3. Use the same type and size memories will result in interleaved memory, which can improve memory performance.

List of Optional Products

This section lists optional items that can be used along with the product.

1.Optional Product

Optional product items are as follows, please acquire them as required.

Accessory		
Parts Name	**Product Code**	**Description**

Visit the CONTEC website for the latest optional products.

Download https://www.contec.com/

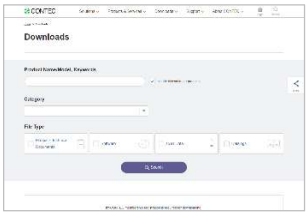
Customer Support and Inquiry

CONTEC provides the following support services for you to use CONTEC products more efficiently and comfortably.

1.Services

CONTEC offers the useful information including product manuals that can be downloaded through the CONTEC website.

Download



https://www.contec.com/download/

You can download updated driver software, firmware, and differential manuals in several languages. Membership registration (myCONTEC) is required to use the services.

Revision History

MONTH YEAR	Summary of Changes
April 2021	The First Edition
May 2021	Page 35 Display Port
May 2021	Page 71 add on CPU selection Guide

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CONTEC CO., LTD. 3-9-31, Himesato, Nishiyodogawa-ku, Osaka 555-0025, Japan

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