

IB996

**Intel® 14th/13th/12th Gen Core™ i9/i7/i5/i3
Full-Size CPU Card
with Intel®Q670E PCH**

User's Manual

Version 1.0
(September 2025)



Copyright

© 2025 IBASE Technology, Inc. All rights reserved.

No part of this publication may be reproduced, copied, stored in a retrieval system, translated into any language or transmitted in any form or by any means, electronic, mechanical, photocopying, or otherwise, without the prior written consent of IBASE Technology, Inc. (hereinafter referred to as “IBASE”).

Disclaimer

IBASE reserves the right to make changes and improvements to the products described in this document without prior notice. Every effort has been made to ensure the information in the document is correct; however, IBASE does not guarantee this document is error-free.

IBASE assumes no liability for incidental or consequential damages arising from misapplication or inability to use the product or the information contained herein, nor for any infringements of rights of third parties, which may result from its use.

Trademarks

All the trademarks, registrations and brands mentioned herein are used for identification purposes only and may be trademarks and/or registered trademarks of their respective owners.

Compliance



In a domestic environment, this product may cause radio interference in which case users may be required to take adequate measures.



This product has been tested and found to comply with the limits for a Class A device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with manufacturer's instructions, may cause harmful interference to radio communications.

WEEE



This product must not be disposed of as normal household waste, in accordance with the EU directive of for waste electrical and electronic equipment (WEEE - 2012/19/EU). Instead, it should be disposed of by returning it to a municipal recycling collection point. Check local regulations for disposal of electronic products.

Green IBASE



This product complies with RoHS 2 restrictions, which prohibit the use of certain hazardous substances in electrical and electronic equipment. The following substances must not exceed the specified concentrations:

- Hexavalent chromium: 1,000 ppm
- Poly-brominated biphenyls (PBBs): 1,000 ppm
- Poly-brominated diphenyl ethers (PBDEs): 1,000 ppm
- Cadmium: 100 ppm
- Mercury: 1,000 ppm
- Lead: 1,000 ppm
- Bis(2-ethylhexyl) phthalate (DEHP): 1,000 ppm
- Butyl benzyl phthalate (BBP): 1,000 ppm
- Dibutyl phthalate (DBP): 1,000 ppm
- Diisobutyl phthalate (DIBP): 1,000 ppm

Important Safety Information

Carefully read the precautions before using the board.



WARNING

Attention during use:

- Do not use this product near water.
- Avoid spilling water or any other liquids on this product.
- Do not place heavy objects on the top of this product.

Anti-static precautions

- Wear an anti-static wrist strap to avoid electrostatic discharge.
- Place the PCB on an anti-static kit or mat.
- Handle the PCB by its edges.
- Touch the edges of non-metallic components rather than the PCB surface.
- Frequently ground yourself by touching a grounded metal object to discharge any static.



CAUTION

Risk of explosion if the internal lithium-ion battery is replaced with an incorrect type. Use only the same or an equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions or recycle them at an appropriate facility.

Warranty Policy

- **IBASE standard products:**

24-month (2-year) warranty from the date of shipment. If the date of shipment cannot be ascertained, the product serial numbers can be used to determine the approximate shipping date.

- **3rd-party parts:**

12-month (1-year) warranty from delivery for the 3rd-party parts that are not manufactured by IBASE, such as CPU, CPU cooler, memory, storage devices, power adapter, panel and touchscreen.

Note: Failures caused by or unauthorized repair will be considered out of warranty. Customers will be billed for repair and shipping charges in such cases.

Technical Support & Services

1. Visit the IBASE website at www.ibase.com.tw to find the latest information about the product.
2. If you need any further assistance from your distributor or sales representative, prepare the following information of your product and elaborate upon the problem.
 - Product model name
 - Product serial number
 - Detailed description of the problem
 - The error messages in text or in screenshots if there is any
 - The arrangement of the peripherals
 - Software in use (such as OS and application software, including the version numbers)
3. If repair service is required, please visit the IBASE website to request an RMA number, authorizing you to send the product for repair.

Table of Contents

Chapter 1	General Information	1
1.1	Introduction	2
1.2	Features	2
1.3	Packing List	3
1.4	Optional Accessories	3
1.5	Specifications	4
1.6	Block Diagram	6
1.7	Board Pictures	7
1.8	Dimensions	8
Chapter 2	Hardware Configuration	9
2.1	Essential Installations Before You Begin	10
2.1.1	Installing the CPU	10
2.1.2	Installing the Memory	11
2.2	Setting the Jumpers	12
2.3	Jumper & Connector Locations on IB996	13
2.4	Jumpers Quick Reference	14
2.4.1	PCIe (x16) Bifurcation Selection (JP7)	15
2.4.2	LVDS Power Brightness Selection (JP5)	16
2.4.3	LVDS Panel Power Selection (JP6)	16
2.4.4	Clearing ME Register (JP4)	17
2.4.5	Clearing CMOS Data (JP3)	17
2.5	Connectors Quick Reference	18
2.5.1	COM1 RS-232/422/485 & COM2 RS-232 Serial Port (J1) ...	19
2.5.2	COM3~COM4 RS-232 Ports (J2)	20
2.5.3	Digital I/O Connector (J10)	21
2.5.4	LCD Backlight Connector (J18)	21
2.5.5	ATX Power Connector (ATX_12V)	22
2.5.6	USB 3.1/2.0 Connector (J5, J6, J15)	23
2.5.7	USB 3.1/2.0 Connector (CN9)	24
2.5.8	Front Panel Audio Connector (J12)	24
2.5.9	Front Panel Settings Connector (J8)	25
2.5.10	LVDS Connector (J17, J20)	26
2.5.11	Fan Power Connector (CPU_FAN1)	27
2.5.12	DVI-D Connector (J21)	28
2.5.13	Parallel Port (J9)	29

Chapter 3	Drivers Installation	31
3.1	Introduction	32
3.2	Intel® Chipset Software Installation Utility	32
3.3	VGA Driver Installation	34
3.4	HD Audio Driver Installation	37
3.5	LAN Driver Installation	38
3.6	Intel® Management Engine Interface	40
3.7	Intel® Serial IO Drivers	41
Chapter 4	BIOS Setup	43
4.1	Introduction	44
4.2	BIOS Setup	44
4.3	Main Settings	46
4.4	Advanced Settings	47
4.5	Chipset Settings	62
4.6	Security Settings	67
4.7	Boot Settings	70
4.8	Save & Exit Settings	71
4.9	MEBx	72
Appendix	73
A.	I/O Port Address Map	74
B.	Interrupt Request Lines (IRQ)	76
C.	Watchdog Timer Configuration	77
D.	Onboard Connector Type	81

Chapter 1

General Information

The information provided in this chapter includes:

- Introduction
- Features
- Packing List
- Optional Accessories
- Specifications
- Block Diagram
- Board Pictures
- Board Dimensions

1.1 Introduction

The IB996 PICMG1.3 SHB Express CPU Card is powered by the latest **14th/13th/12th Gen Intel® Core™ i9/i7/i5/i3 processors**, supporting two DDR5 slots with a maximum capacity of **64GB memory**. It features an **integrated graphics core** compatible with LVDS, DVI-I, and DVI-D display outputs.

Designed to leverage Intel's latest advancements, the IB996 delivers a significant performance boost. Measuring **338mm x 126mm**, it includes support for **6Gbps SATA** (up to 7 ports), **USB 3.1** (8 ports), and interfaces for **two 2.5G LAN** connections, making it ideal for high-performance applications.



Photo of IB996

1.2 Features

- 14th/13th/12th Gen Intel® Core™ i9/i7/i5/i3 Desktop Processors
- 2x DDR5 DIMM, Max. 64GB
- 2x Intel® 2.5G LAN
- Intel® processor integrated Xe graphics, supports DVI-I & LVDS & DVI-D
- 8x USB 3.1, 5x SATA III, 4x COM
- 2x M.2 socket (M-Key/E-Key)

1.3 Packing List

Your IB996 package should include the items listed below. If any of the items is missing, please contact the distributor or dealer from whom you have purchased the product.

- IB996 PICMG1.3 SHB x 1
- SATA cable (SATA-3F)
- COM port cable (PK1-20B)

1.4 Optional Accessories

- Audio cable (AUDIO-18K)
- DVI-D cable (DVIK-3)
- USB3.0 cable (USB-3K)
- Printer port cable (PK3K)

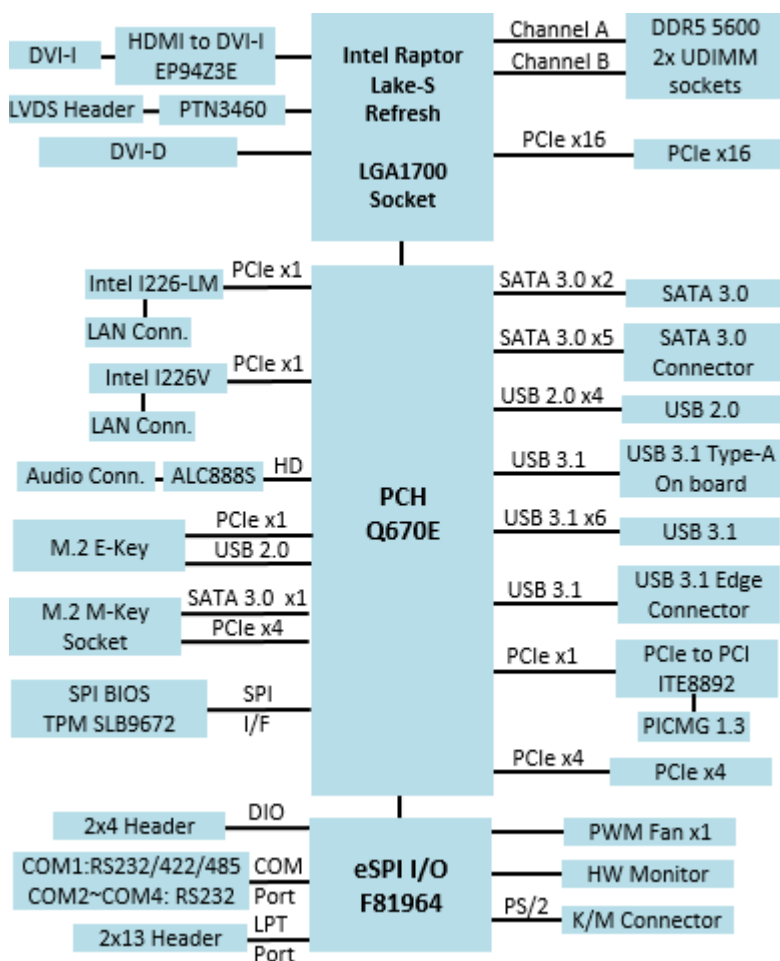
1.5 Specifications

Product Name	IB996
Form Factor	PICMG 1.3 SHB Express Full- Size CPU card
CPU Socket	LGA1700
CPU	14th/13th/12th Gen Intel® Core® i9/i7/i5/i3 processors
PCH	Intel® Q670E PCH
Memory	2x DDR5-5600MHz DIMM, Max. 64GB, Non-ECC
BIOS	AMI
Watchdog Timer	256 levels
H/W Monitor	Yes
Storage Device	1x M.2 (supports NVMe)
Expansion Slots	<ul style="list-style-type: none"> • 4x PCI, 4x PCI-E (x1) or 1x PCI-E (x4) • 1x PCI-E (x16) from backplane
Mini Type Slots	<ul style="list-style-type: none"> • 1x M.2 (M-Key, type:2280, supports NVMe) • 1x M.2 (E-Key, type:2230, supports CNVi)
Graphics	Intel® DT processor integrated Xe graphics
Video Output	Supports DVI-I, LVDS, DVI-D
Ethernet	<ul style="list-style-type: none"> • Intel® I226LM 2.5G LAN • Intel® I226V 2.5G LAN (as 2nd LAN)
I/O Chipset	Fintek F81964
Serial Port	1x RS232/422/485 (jumperless select), 3x RS232
USB 2.0	1x USB 2.0 via M.2 (E-Key)
USB 3.1	<ul style="list-style-type: none"> • 6x USB 3.1 on board • 1x USB 3.1 on edge • 1x USB 3.1 Type-A on board (vertical type)
Serial ATA	5x SATA III
Audio	Intel® PCH built-in HD audio controller + Realtek ALC888S codec
TPM	TPM 2.0 (SPI)
Others	Printer Port, Digital I/O (4-in/4-out), RAID, iAMT (16.1)
Dimensions (LxW)	338mm x 126mm (13.3" x 4.96")
RoHS2	Yes
Certification	CE, FCC

Environmental	
Temperature	<ul style="list-style-type: none">• Operating: 0°C ~ 60°C (32°F ~ 140°F)• Storage: -20°C ~ 80°C (-4°F ~ 176°F)
Relative Humidity	0 ~ 90 %, non-condensing at 60 °C

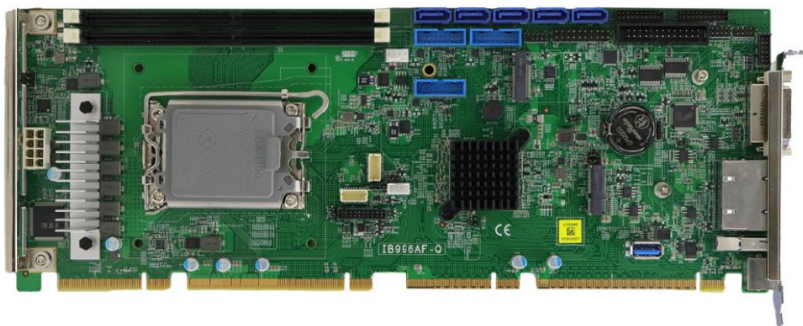
All specifications are subject to change without prior notice.

1.6 Block Diagram



1.7 Board Pictures

Top View



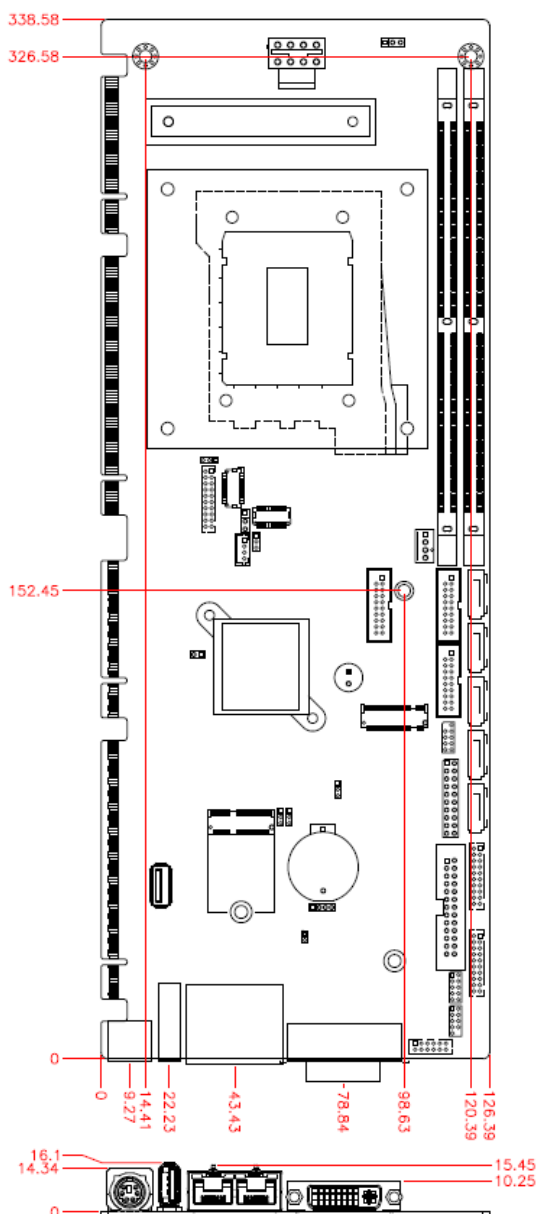
Bottom View



I/O View



1.8 Dimensions



Chapter 2

Hardware Configuration

This section provides information on jumper settings and connectors on the IB996 in order to set up a workable system. On top of that, you will also need to install crucial pieces such as the CPU and the memory before using the product. The topics covered are:

- Essential installations before you begin:
CPU and the memory
- Jumper and connector locations
- Jumper settings and information of connectors

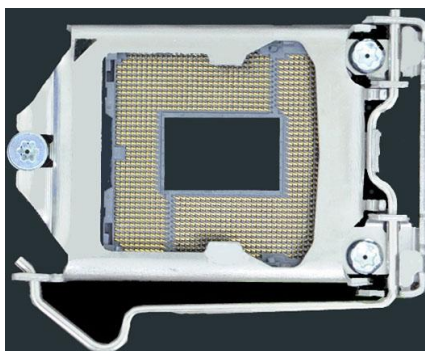
2.1 Essential Installations Before You Begin

Follow the instructions below to install the CPU and the memory.

2.1.1 Installing the CPU

The IB996 board supports an LGA1700 (SOCKET V) for Intel® processors. Follow the instructions below to install the CPU.

1. Unlock the socket by pressing the lever sideways, then lift up the lever and the metal lid.
2. Position the CPU above the socket such that the CPU corner aligns with the gold triangle matching the socket corner with a small triangle.
3. Carefully insert the CPU into the socket and push down the lever to secure the CPU.

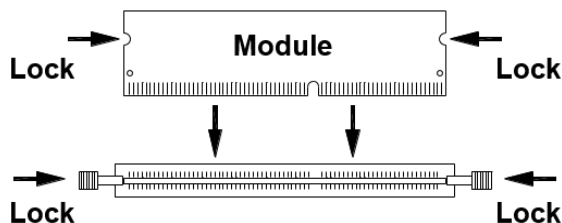


Then you can install the CPU cooler and fan.

Note: Ensure that the CPU cooler and the CPU top surface are in total contact to avoid CPU overheating problem that would cause your system to hang or be unstable.

2.1.2 Installing the Memory

The IB996 board supports two DDR5 memory socket for a maximum total memory of 64GB in DDR5 UDIMM memory type. To install the modules, locate the memory slot on the board and perform the following steps:



1. Hold the module so that the key of the module aligned with that on the memory slot.
2. Gently push the module in an upright position until the clips of the slot close to hold the module in place when the module touches the bottom of the slot.

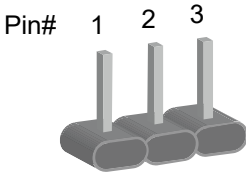
To remove the module, press the clips outwards with both hands

2.2 Setting the Jumpers

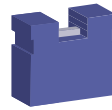
Set up and configure your IB996 by using jumpers for various settings and features according to your needs and applications. Contact your supplier if you have doubts about the best configuration for your use.

2.2.1 How to Set Jumpers

Jumpers are short-length conductors consisting of several metal pins with a non-conductive base mounted on the circuit board. Jumper caps are used to have the functions and features enabled or disabled. If a jumper has 3 pins, you can connect either PIN1 to PIN2 or PIN2 to PIN3 by shorting.

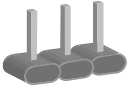

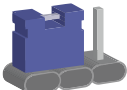

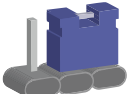



A 3-pin jumper



A jumper cap

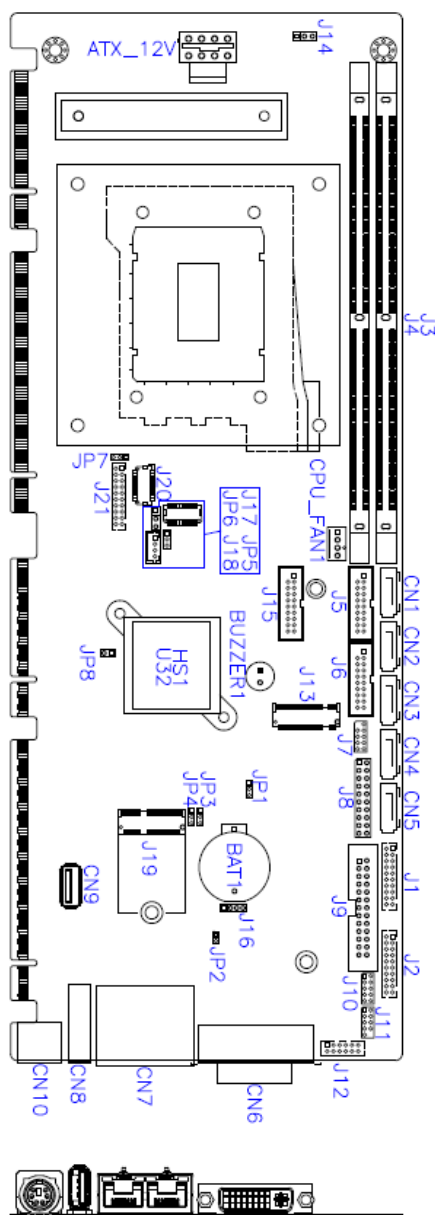
Refer to the illustration below to set jumpers.

Pin closed	Oblique view	Illustration
Open		 1 2 3
1-2		 1 2 3
2-3		 1 2 3

When two pins of a jumper are encased in a jumper cap, this jumper is **closed**, i.e. turned **On**.

When a jumper cap is removed from two jumper pins, this jumper is **open**, i.e. turned **Off**.

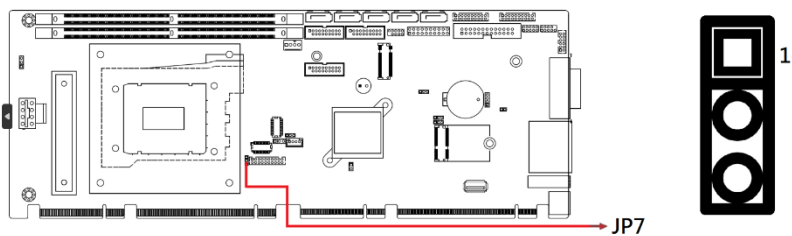
2.3 Jumper & Connector Locations on IB996



2.4 Jumpers Quick Reference

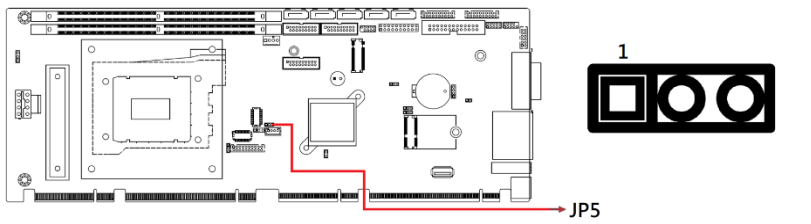
Function	Jumper
PCIe Bifurcation Selection	JP7
LVDS Panel Brightness Selection	JP5
LVDS Panel Power Selection	JP6
Clearing ME Register	JP4
Clearing CMOS Data	JP3

2.4.1 PCIe (x16) Bifurcation Selection (JP7)



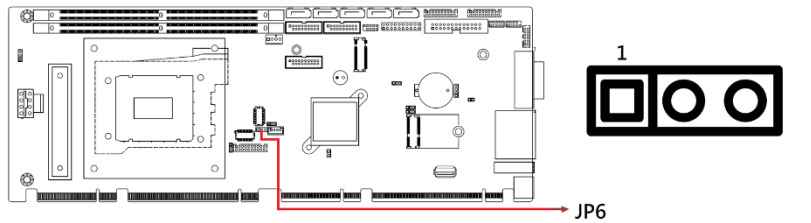
Function	Pin closed	Illustration
1 x PCIe (x16) (default)	1-2	
2 x PCIe (x8)	2-3	

2.4.2 LVDS Power Brightness Selection (JP5)



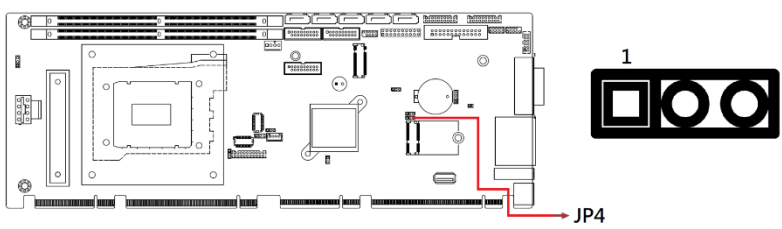
Function	Pin closed	Illustration
3.3V (default)	1-2	1
5V	2-3	1

2.4.3 LVDS Panel Power Selection (JP6)



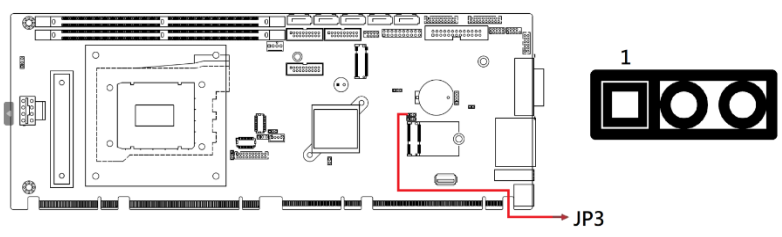
Function	Pin closed	Illustration
3.3V (default)	1-2	1
5V	2-3	1

2.4.4 Clearing ME Register (JP4)



Function	Pin closed	Illustration
Normal (default)	1-2	1
Clear ME	2-3	1

2.4.5 Clearing CMOS Data (JP3)

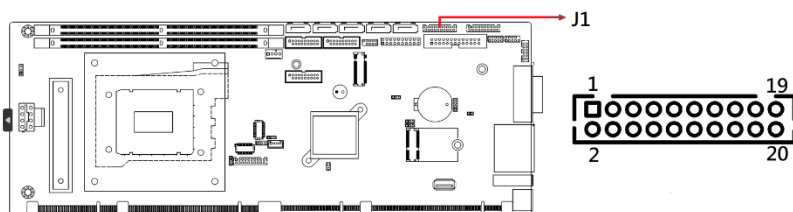


Function	Pin closed	Illustration
Normal (default)	1-2	1
Clear CMOS	2-3	1

2.5 Connectors Quick Reference

Function	Connector
COM1 RS-232/422/485 Ports	J1
COM2~COM4 RS-232 Ports	J1 (COM2), J2 (COM3)&(COM4)
Digital I/O Connector	J10
LCD Backlight Connector	J18
ATX 12V Power Connector	ATX_12V
Dual USB 3.1/2.0 Pin-Header	J5,J6,J15
USB3.0/ 2.0 Connector	CN9
Front Panel Audio Connector	J12
Front Panel Settings Connector	J8
LVDS Connector	J17, J20
Fan Power Connector	CPU_FAN1
DVI-D Connector	J21
Parallel Port	J9

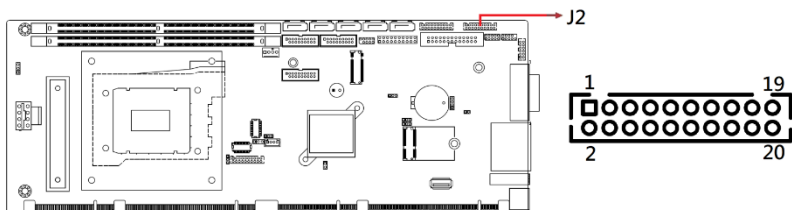
2.5.1 COM1 RS-232/422/485 & COM2 RS-232 Serial Port (J1)



Pin	Signal Name	Pin	Signal Name
1/11	DCD, Data carrier detect	3/13	RXD, Receive data
5/15	TXD, Transmit data	7/17	DTR, Data terminal ready
9/19	Ground	2/12	DSR, Data set ready
4/14	RTS, Request to send	6/16	CTS, Clear to send
8/18	RI, Ring indicator	10/20	NC

Pin	COM1			Pin	COM2
	RS-232	RS-422	RS-485		RS-232
1	DCD1	TX-	DATA-	11	DCD2
3	RX1	TX+	DATA+	13	RX2
5	TX1	RX+	NC	15	TX2
7	DTR1	RX-	NC	17	DTR2
9	Ground	Ground	Ground	19	Ground
2	DSR1	NC	NC	12	DSR2
4	RTS1	NC	NC	14	RTS2
6	CTS1	NC	NC	16	CTS2
8	RI1	NC	NC	18	RI2
10	NC	NC	NC	20	NC

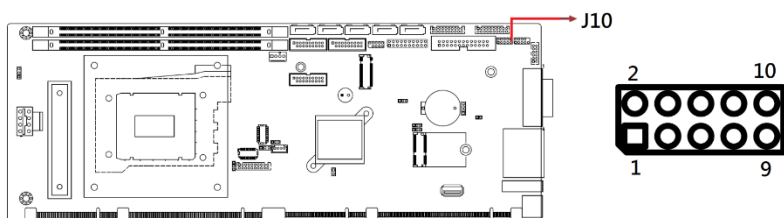
2.5.2 COM3~COM4 RS-232 Ports (J2)



Pin	Signal Name	Pin	Signal Name
1/11	DCD, Data carrier detect	3/13	RXD, Receive data
5/15	TXD, Transmit data	7/17	DTR, Data terminal ready
9/19	Ground	2/12	DSR, Data set ready
4/14	RTS, Request to send	6/16	CTS, Clear to send
8/18	RI, Ring indicator	10/20	NC

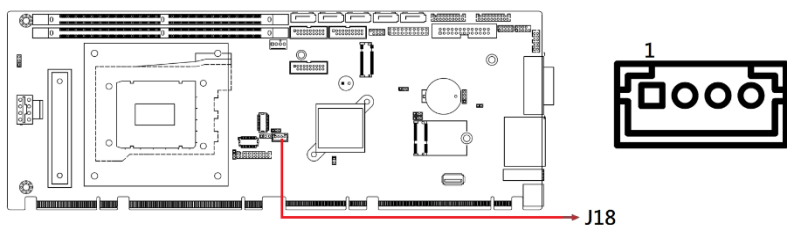
Pin	COM3	Pin	COM4
	RS-232		RS-232
1	DCD3	11	DCD4
3	RX3	13	RX4
5	TX3	15	TX4
7	DTR3	17	DTR4
9	Ground	19	Ground
2	DSR3	12	DSR4
4	RTS3	14	RTS4
6	CTS3	16	CTS4
8	RI3	18	RI4
10	NC	20	NC

2.5.3 Digital I/O Connector (J10)



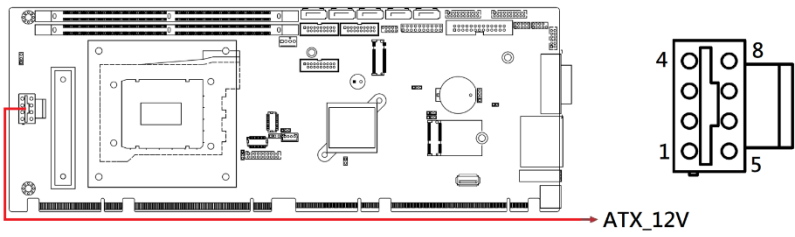
Pin	Signal Name	Pin	Signal Name
1	Ground	2	+5V
3	OUT3	4	OUT1
5	OUT2	6	OUT0
7	IN3	8	IN1
9	IN2	10	IN0

2.5.4 LCD Backlight Connector (J18)



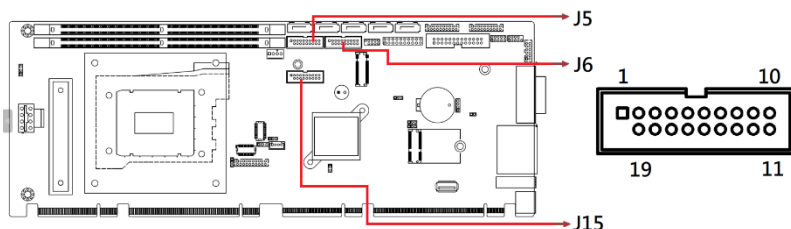
Pin	Signal Name	Pin	Signal Name
1	+12V	3	Brightness Control
2	Backlight Enable	4	Ground

2.5.5 ATX Power Connector (ATX_12V)



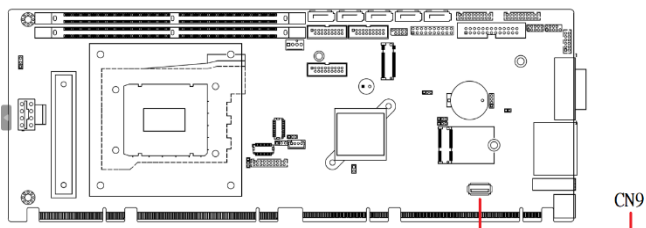
Pin	Assignment	Pin	Assignment
1~4	Ground	5~8	+12V

2.5.6 USB 3.1/2.0 Connector (J5, J6, J15)

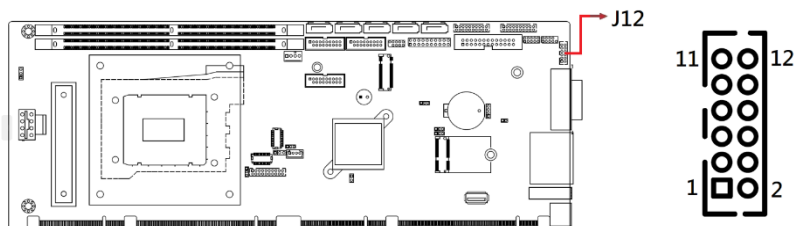


Pin #	Assignment	Pin #	Assignment
1	VCC(900mA)	11	P2_U2_D+
2	P1_SSRX-	12	P2_U2_D-
3	P1_SSRX+	13	GND
4	GND	14	P2_SSTX+
5	P1_SSTX-	15	P2_SSTX-
6	P1_SSTX+	16	GND
7	GND	17	P2_SSRX+
8	P1_U2_D-	18	P2_SSRX-
9	P1_U2_D+	19	VCC(900mA)
10	NC		

2.5.7 USB 3.1/2.0 Connector (CN9)

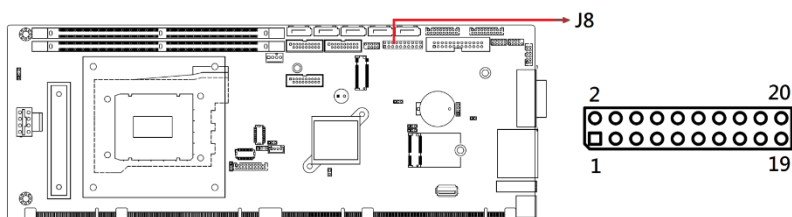


2.5.8 Front Panel Audio Connector (J12)



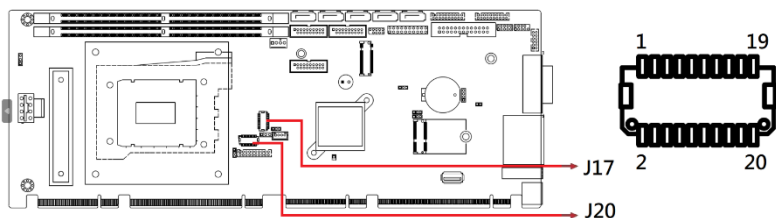
Pin	Signal Name	Pin	Signal Name
1	HPOUT_L	2	HPOUT_R
3	HPOUT_JD	4	Ground
5	LINE_L	6	LINE_R
7	LINE_JD	8	Ground
9	MIC IN_L	10	MIC IN_R
11	MIC IN_JD	12	Ground

2.5.9 Front Panel Settings Connector (J8)



Pin	Signal Name	Pin	Signal Name
1	Power LED+	2	Speak Out
3	NC	4	NC
5	Power LED-	6	Ground
7	NC	8	VCC5
9	Ground	10	NC
11	Ground	12	NC
13	Power BTN-	14	Power BTN+
15	NC	16	NC
17	Reset BTN-	18	Reset BTN+
19	HDD LED+	20	HDD LED-

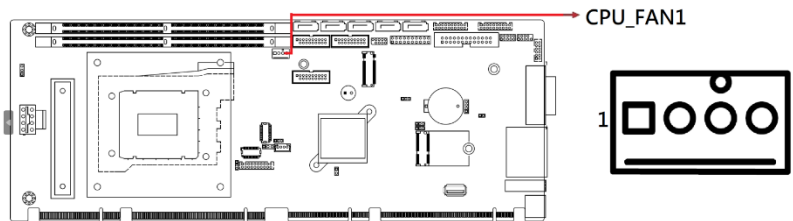
2.5.10 LVDS Connector (J17, J20)



Pin	Signal Name	Pin	Signal Name
1	TX0P	2	TX0N
3	Ground	4	Ground
5	TX1P	6	TX1N
7	Ground	8	Ground
9	TX2P	10	TX2N
11	Ground	12	Ground
13	CLKP	14	CLKN
15	Ground	16	Ground
17	TX3P	18	TX3N
19	VDD	20	VDD

Remarks: J20 is 1st LVDS; J17 is 2nd LVDS.

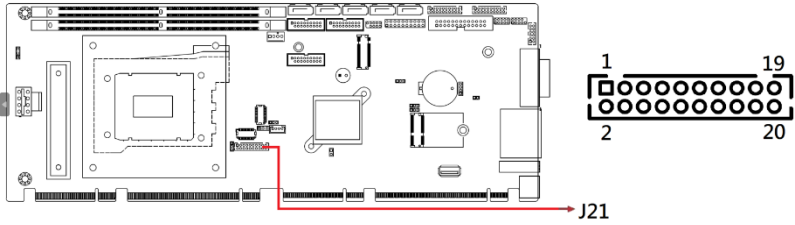
2.5.11 Fan Power Connector (CPU_FAN1)



Pin	Signal Name	Pin	Signal Name
1	Ground	3	Rotation detection
2	+12V	4	Control

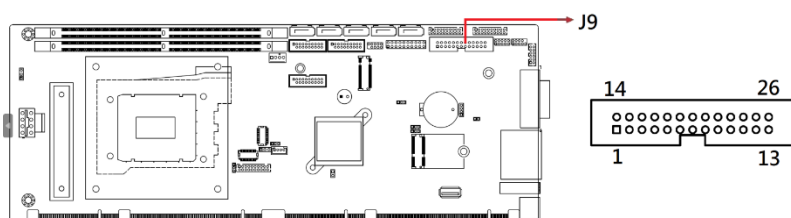
Remarks: (PWM Mode Only)

2.5.12 DVI-D Connector (J21)



Pin	Signal Name	Pin	Signal Name
1	TMDS_DATA1_P	2	TMDS_DATA1_N
3	Ground	4	Ground
5	TMDS_CLK_P	6	TMDS_CLK_N
7	Ground	8	Ground
9	Hot Plug Detect	10	NC
11	TMDS_DATA2_P	12	TMDS_DATA2_N
13	Ground	14	Ground
15	TMDS_DATA0_P	16	TMDS_DATA0_N
17	NC	18	NC
19	TMDS_SDA	20	TMDS_SCL

2.5.13 Parallel Port (J9)



Pin	Signal Name	Pin	Signal Name
1	Line printer strobe	14	Auto Feed
2	PD0, parallel data 0	15	Error
3	PD1, parallel data 1	16	Initialize
4	PD2, parallel data 2	17	Select-Printer / Select-In
5	PD3, parallel data 3	18	Ground
6	PD4, parallel data 4	19	Ground
7	PD5, parallel data 5	20	Ground
8	PD6, parallel data 6	21	Ground
9	PD7, parallel data 7	22	Ground
10	ACK, acknowledge	23	Ground
11	Busy	24	Ground
12	Paper Empty	25	Ground
13	Select	26	Ground

This page is intentionally left blank.

Chapter 3

Drivers Installation

This chapter introduces installation of the following drivers:

- Intel® Chipset Software Installation Utility
- VGA Driver
- HD Audio Driver
- LAN Driver
- Intel® Management Engine Interface
- Intel® Serial IO Driver

3.1 Introduction

This section describes the installation procedures for software and drivers. The contents of this section include the following:

Note: After installing your Windows operating system, you must install the Intel® Chipset Software Installation Utility first before proceeding with the drivers installation.

3.2 Intel® Chipset Software Installation Utility

The Intel® Chipset drivers should be installed first before the software drivers to install INF files for Plug & Play function for Intel chipset components. Follow the instructions below to complete the installation.

1. Go to the download page of the product. Copy the compressed drivers file to your computer. Double click the file to decompress it. Run “CDGuide” to go to the main drivers page as shown. Click **Intel** and then **Intel(R) AlderLake-S/RaptorLake-S Chipset Drivers**.



- Click Intel(R) Chipset Software Installation Utility.



- When the *Welcome* screen to the Intel® Chipset Device Software appears, click **Next** to continue.
- Click **Accept** to accept the software license agreement and proceed with the installation process.
- On the *Readme File Information* screen, click **Install**.



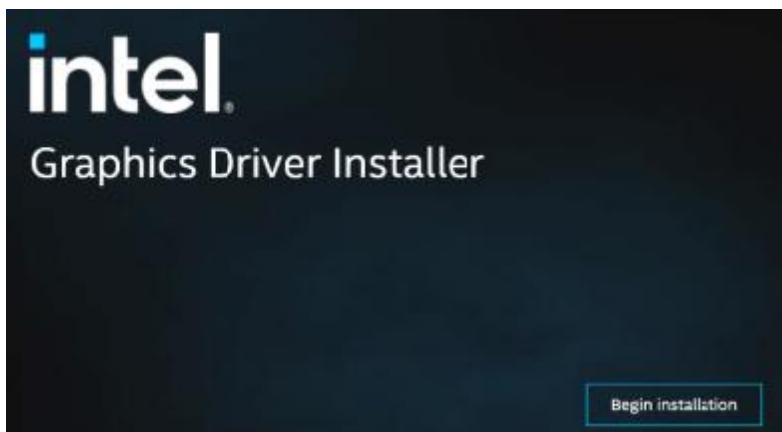
- When installation is complete, click **Finish**.

3.3 VGA Driver Installation

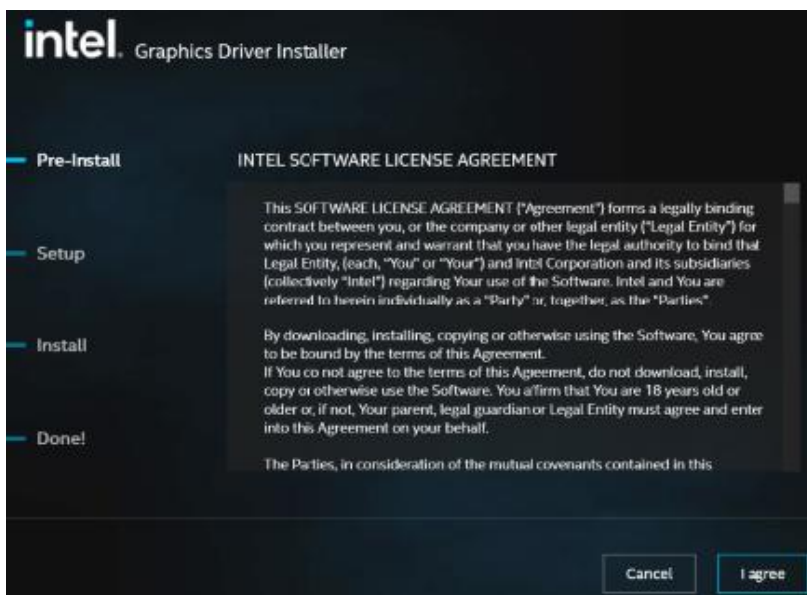
1. Click **Intel** and then **Intel(R) AlderLake-S/RaptorLake-S Chipset Drivers**.
2. Click **Intel(R) HD Graphics Driver**.



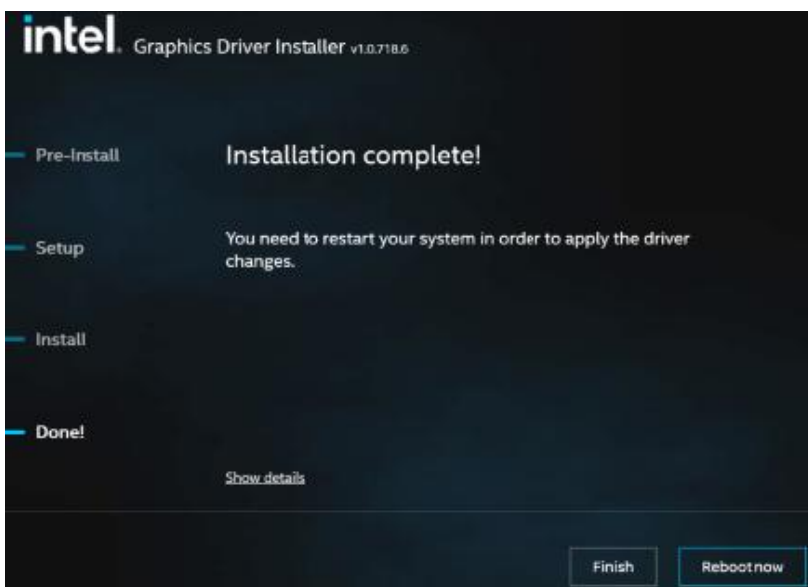
3. Click **Begin Installation**.



4. Click **I agree**.



5. When installation is complete, restart your system in order to apply the driver changes.



3.4 HD Audio Driver Installation

1. Click **Intel** and then **Intel(R) AlderLake-S/RaptorLake-S Chipset Drivers**.
2. Click **Realtek High Definition Audio Driver**.



3. On the *Welcome* screen of the InstallShield Wizard, click **Next** to start the installation.

Welcome to the InstallShield Wizard for Realtek High Definition Audio Driver

The InstallShield Wizard will install Realtek High Definition Audio Driver on your computer. To continue, click Next.

4. When installation is complete, click **Finish**.

InstallShield Wizard Complete

The InstallShield Wizard has successfully installed Realtek High Definition Audio Driver. Before you can use the program, you must restart your computer.

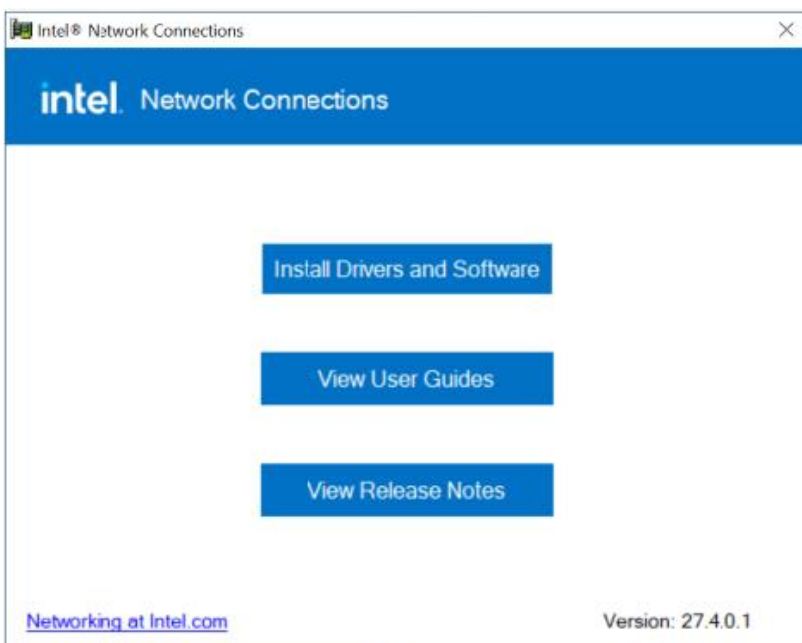
- ☒ Yes, I want to restart my computer now.
- ☐ No, I will restart my computer later.

3.5 LAN Driver Installation

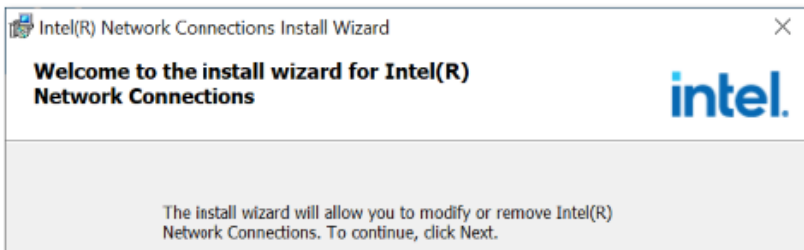
1. Click **Intel** and then **Intel(R) AlderLake-S/RaptorLake-S Chipset Drivers**.
2. Click Intel(R) PRO LAN Network Drivers.



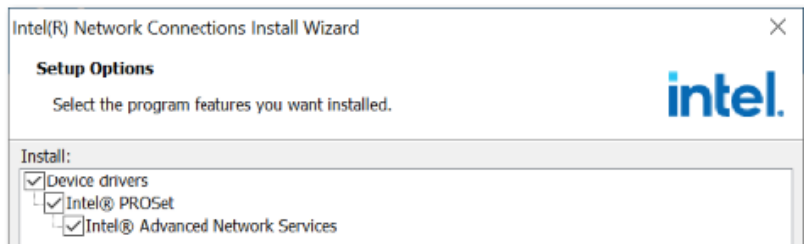
3. Click **Install Drivers and Software**.



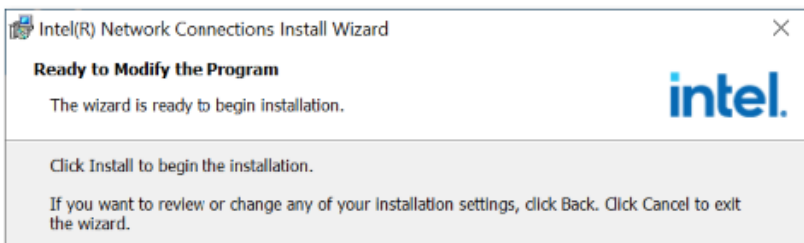
4. On the Welcome screen, click **Next**.



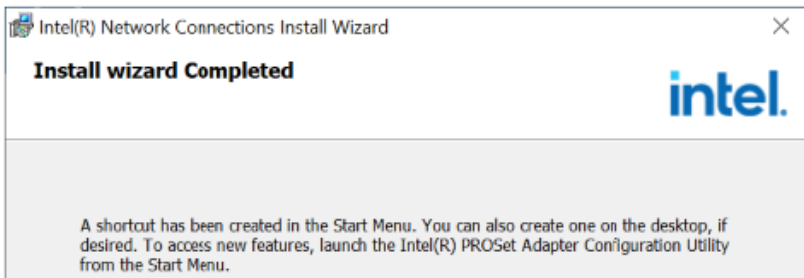
5. In the Setup Options screen, click **Next**.



6. Click **Install** to begin installation.



7. Click **Finish** when installation has been completed.

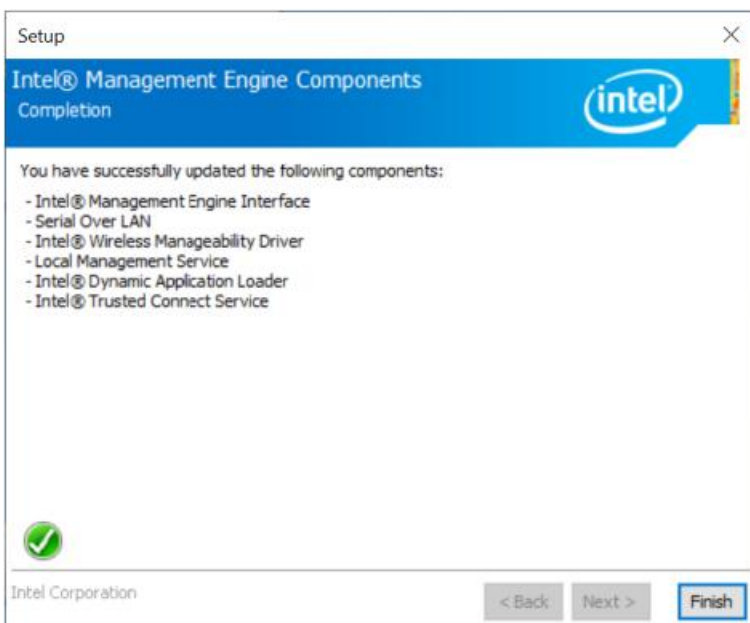


3.6 Intel® Management Engine Interface

1. Click **Intel** and then **Intel(R) AlderLake-S/RaptorLake-S Chipset Drivers**.
2. Click **Intel(R) ME Drivers**.



3. When the *Welcome* screen appears, click **Next**.
4. Accept the terms in the license agreement. Click **Next**.
5. After the Intel® Management Engine Components have been installed, click **Finish**.

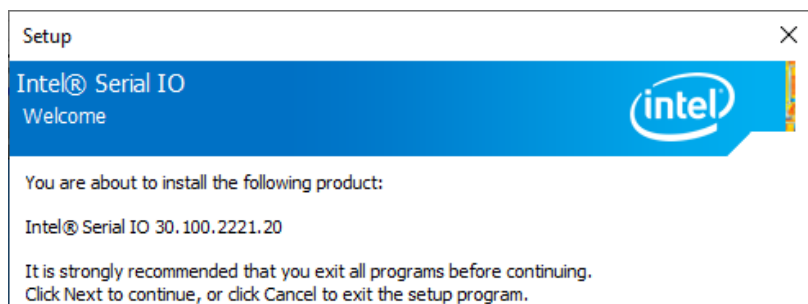


3.7 Intel® Serial IO Drivers

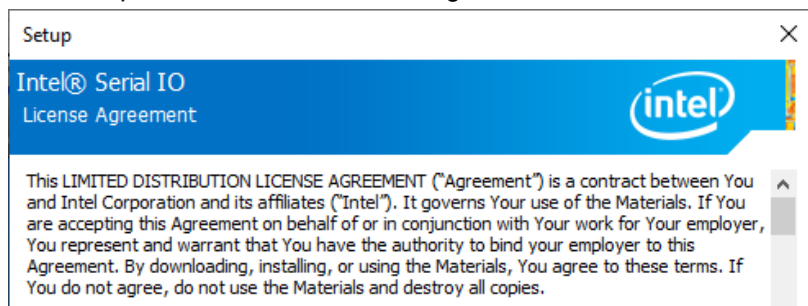
1. Click **Intel** and then **Intel(R) AlderLake-S/RaptorLake-S Chipset Drivers**.
2. Click **Intel(R) Serial IO Drivers**.



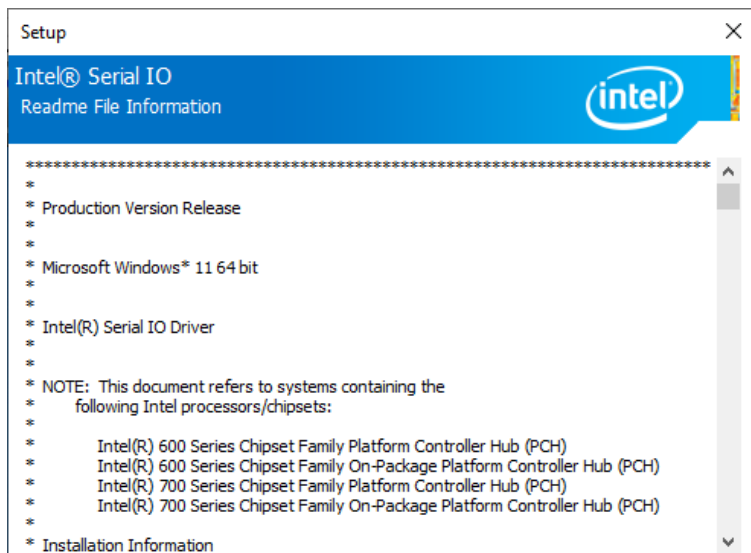
3. When the *Welcome* screen appears, click **Next**.



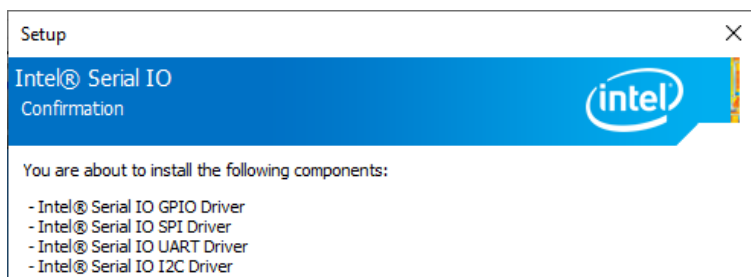
4. Accept the terms in the license agreement. Click **Next**.



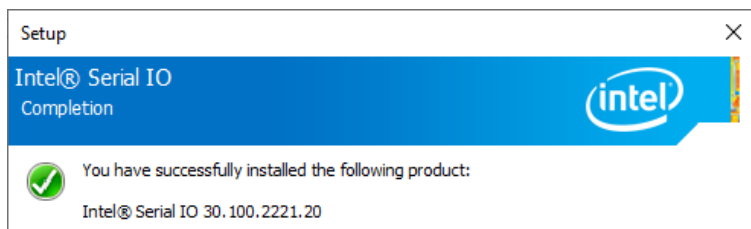
5. In the Readme File Information screen, click **Next**.



6. In the Confirmation screen, click **Next**.



7. After the components have been installed, click **Finish**.



Chapter 4

BIOS Setup

This chapter describes the different settings available in the AMI BIOS that comes with the board. The topics covered in this chapter are as follows:

- Main Settings
- Advanced Settings
- Chipset Settings
- Security Settings
- Boot Settings
- Save & Exit

4.1 Introduction

The BIOS (Basic Input/Output System) installed in the ROM of your computer system supports Intel® processors. The BIOS provides critical low-level support for standard devices such as disk drives, serial ports and parallel ports. It also provides password protection as well as special support for detailed fine-tuning of the chipset controlling the entire system.

4.2 BIOS Setup

The BIOS provides a Setup utility program for specifying the system configurations and settings. The BIOS ROM of the system stores the Setup utility. When you turn on the computer, the BIOS is immediately activated. Pressing the key immediately allows you to enter the Setup utility. If you are a little bit late pressing the key, POST (Power On Self Test) will continue with its test routines, thus preventing you from invoking the Setup.

If you still need to enter Setup, restart the system by pressing the "Reset" button or simultaneously pressing the <Ctrl>, <Alt> and <Delete> keys.

You can also restart by turning the system Off and back On again.

The following message will appear on the screen:

```
Press <DEL> to Enter Setup
```

In general, press the arrow keys to highlight items, <Enter> to select, the <PgUp> and <PgDn> keys to change entries, <F1> for help, and <Esc> to quit.

When you enter the BIOS Setup utility, the *Main Menu* screen will appear on the screen. The Main Menu allows you to select from various setup functions and exit choices.

Warning: It is strongly recommended that you avoid making any changes to the chipset defaults.

These defaults have been carefully chosen by both AMI and your system manufacturer to provide the absolute maximum performance and reliability. Changing the defaults could make the system unstable and crash in some cases.

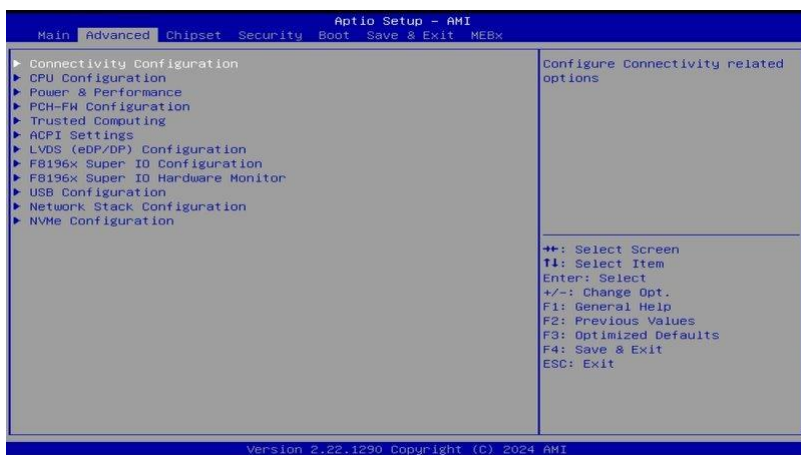
4.3 Main Settings



BIOS Setting	Description
System Date	Sets the date. Use the <Tab> key to switch between the date elements.
System Time	Set the time. Use the <Tab> key to switch between the time elements.

4.4 Advanced Settings

This section allows you to configure, improve your system and allows you to set up some system features according to your preference.



4.4.1 Connectivity Configuration

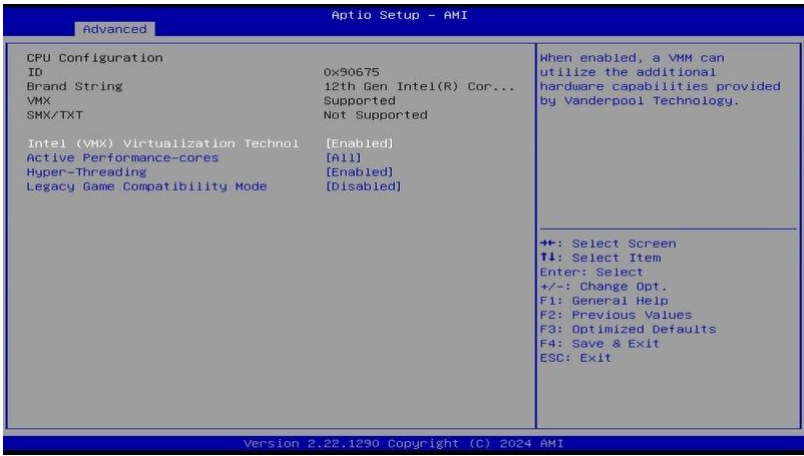


BIOS Setting	Description
CNVi Mode	This option configures Connectivity [Auto Detection] means that if Discrete solution is discovered it will be enabled by default. Otherwise integrated solution (CNVi) will be enabled; [Disable Integrated] disables integrated solution.
BT Audio Offload	This is an option to Enable/Disable BT Audio Offload which enables audio input from BT device to the audio DSP and enables power efficient audio output to BT device.
RFI Mitigation	This is an option intended to Enable/Disable DDR-RFIM feature for Connectivity. This RFI mitigation feature may result in temporary slowdown of the DDR speed.
CoExistence Manager	CoEx Manager mitigates radio coexistence issues between Intel WWAN (modem) and Intel WLAN (WiFi/BT). This should be enabled only if both WWAN and WLAN solutions are based on Intel components.
Discrete Bluetooth Module	Seriallo UART0 needs to be enabled to select BT Module
Advanced settings	Configure ACPI objects for wireless devices

WWAN Configuration

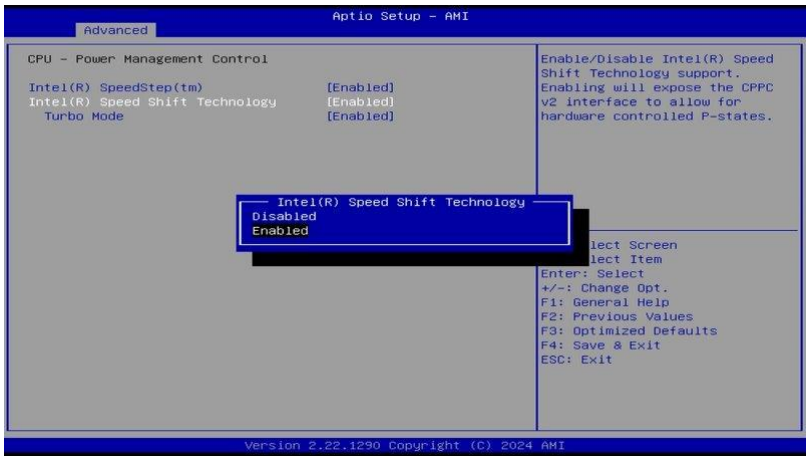


4.4.2 CPU Configuration



BIOS Setting	Description
Intel (VMX) Virtualization Technology	When enabled, a VMM can utilize the additional hardware capabilities provided by Vanderpool Technology
Active Processor Cores	Number of cores to enable in each processor package. Options are All, 1, 2, 3, 4, 5
Hyper-Threading	Enabled for Windows XP and Linux (OS optimized for Hyper-Threading Technology) and Disabled for other OS (OS not optimized for Hyper-Threading Technology).
Legacy Game Compatibility Mode	When enabled, pressing the scroll lock key will toggle the Efficient-cores between being parked when Scroll Lock LED is on and un-parked when LED is off.

4.4.3 Power & Performance



BIOS Setting	Description
Intel(R) SpeedStep(tm)	Allows more than two frequency ranges to be supported
Intel(R) Speed Shift Technology	Enable/Disable Intel(R) Speed Shift Technology support. Enabling will expose the CPPC v2 interface to allow for hardware controlled P-states.

4.4.4 PCH-FW Configuration

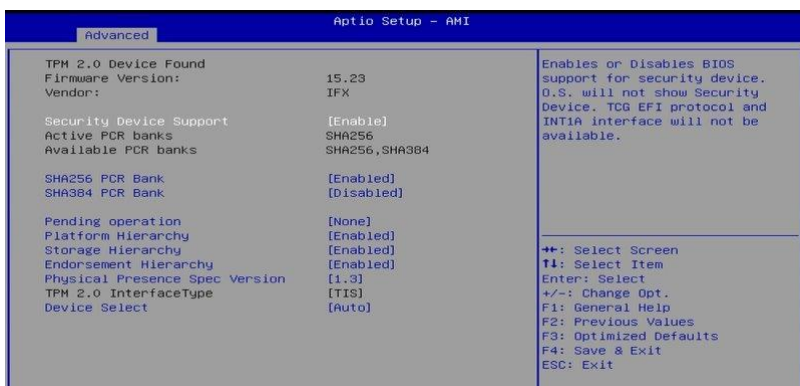
ME Firmware Version	16.1.30.2269	When Disabled ME will be put into ME Temporarily Disabled Mode.
ME Firmware Mode	Normal Mode	
ME Firmware SKU	Corporate SKU	
ME State	[Enabled]	
Manageability Features State	[Enabled]	
AMT BIOS Features	[Enabled]	

ME Firmware Version	16.1.30.2269	Enable/Disable Intel(R) Manageability features.
ME Firmware Mode	Normal Mode	NOTE:
ME Firmware SKU	Corporate SKU	This option disables/enables Manageability Features support in FW.
ME State	[Enabled]	To disable support platform must be in an unprovisioned state first.
Manageability Features State	[Enabled]	
AMT BIOS Features	[Enabled]	

ME Firmware Version	16.1.30.2269	When disabled AMT BIOS Features are no longer supported and user is no longer able to access MEBx Setup.
ME Firmware Mode	Normal Mode	Note:
ME Firmware SKU	Corporate SKU	This option does not disable Manageability Features in FW.
ME State	[Enabled]	
Manageability Features State	[Enabled]	
AMT BIOS Features	[Enabled]	

BIOS Setting	Description
ME State	When disabled, ME will be put into ME Temporarily Disabled Mode
Manageability Features State	Enable/Disable Intel(R) Manageability features. NOTE: This option disables/enables Manageability Features support in FW. To disable support platform must be in an unprovisioned state first.
AMT BIOS Features	When disabled, AMT BIOS features are no longer supported and user is no longer able to access MEBx Setup.

4.4.5 Trusted Computing



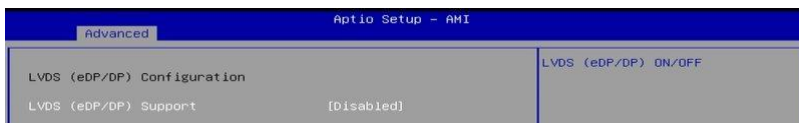
BIOS Setting	Description
Security Device Support	Enables / Disables BIOS support for security device. OS will not show security device. TCG EFI protocol and INTiA interface will not be available.
SHA256/384 PCR Bank	Enables / Disables SHA256/384 PCR Bank.
Pending operation	Schedule an operation for the security device. Note: Your computer will reboot during restart in order to change state of security device.
Platform / Storage/ Endorsement Hierarchy	Enables / Disables the hierarchy.
Physical Presence Spec Version	Selects to show the PPI Spec Version (1.2 or 1.3) that the OS supports. Note: Some HCK tests might not support 1.3.
Device Select	TPM 1.2 will restrict support to TPM 1.2 devices only. TPM 2.0 will restrict support to TPM 2.0 devices only. Auto will support both with the default being set to TPM 2.0 devices if not found, and TPM 1.2 device will be enumerated.

4.4.6 ACPI Settings

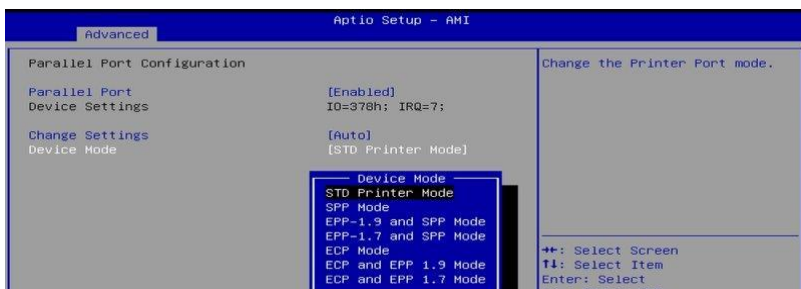
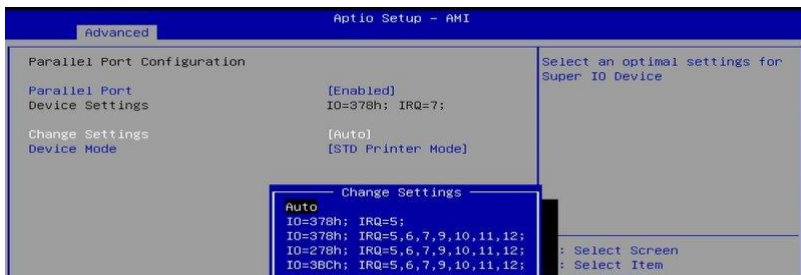
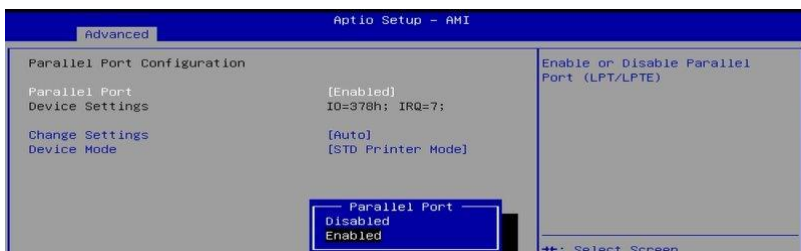


BIOS Setting	Description
Enable ACPI Auto Configuration	Enables / Disables BIOS ACPI Auto Configuration.
Enable Hibernation	Enables / Disables the system ability to hibernate (OS/S4 Sleep State). This option may be not be effective with some operating systems.
ACPI Sleep State	Selects the highest ACPI sleep state the system will enter when the suspend button is pressed. Options: Suspend Disabled, S3 (Suspend to RAM)

4.4.7 LVDS (eDP/DP) Configuration



BIOS Setting	Description
LVDS (eDP/DP) Support	LVDS (eDP/DP) ON/OFF
Panel Color Depth	Options: 18 BIT, 24bit(VESA), 24bit(JEIDA)
LVDS Channel Type	Options: Single, Dual
Panel Type	Options: 800x480, 800x600, 1024x768, 1280x768, 1280x800, 1280x960, 1280x1024, 1366x768, 1440x900, 1600x900, 1600x1200, 1680x1050, 1920x1080, 1920x1200
LVDS Brightness Level Control	Options: Level-1, Level-2, Level-3, Level-4, Level-5, Level-6, Level-7, Level-8
PWM Frequency	Selections are: 23.5 KHz, 11.75 KHz, 5.875 KHz, and 220 Hz
PWM Frequency Invert	Options: Normal, Invert
LVDS Spread Spectrum Clock	Selections are: 0.5%, 1.0%, 1.5%, 2.0%, and 2.5%



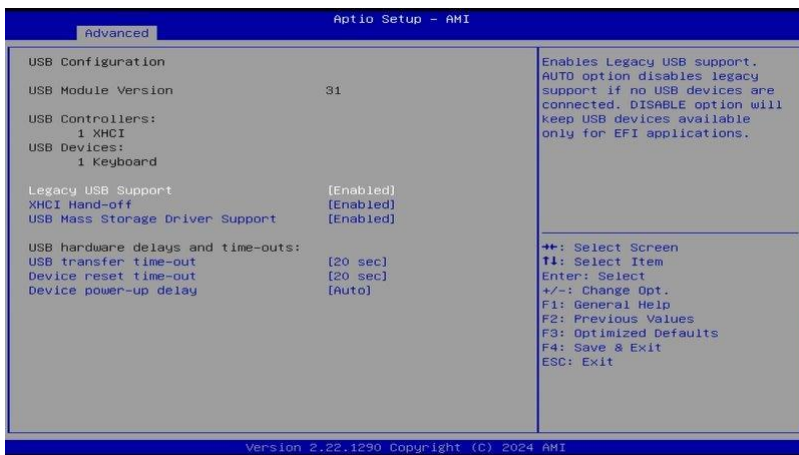
BIOS Setting	Description
Serial Port Configuration	Sets parameters of serial ports. Enables / Disables the serial port and select an optimal setting for the Super IO device.
Parallel Port Configuration	Set parameters of parallel port (LPT/LPTE)
Power Failure	Options: Always on, Always off

4.4.9 F8196x Hardware Monitor



BIOS Setting	Description
CPU Smart Fan Control	Enables / Disables the CPU smart fan feature. Options: Disabled / 50 °C / 60 °C / 70 °C / 80 °C
Temperatures / Voltages	These fields are the parameters of the hardware monitoring function feature of the motherboard. The values are read-only values as monitored by the system and show the PC health status.

4.4.10 USB Configuration



BIOS Setting	Description
Legacy USB Support	Enables Legacy USB support. "Auto" disables legacy support if there is no USB device connected. "Disable" keeps USB devices available only for EFI applications.
XHCI Hand-off	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	Enables / Disables the support for USB mass storage driver.
USB Transfer time-out	The time-out value for Control, Bulk, and Interrupt transfers.
Device reset time-out	USB mass storage device start unit command time-out. Options: 10/20/30/40 sec
Device power-up delay	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 100 ms, for a Hub port the delay is taken from Hub descriptor

4.4.11 Network Stack Configuration

Aprio Setup - AMI	
Advanced	
Network Stack	[Disabled]

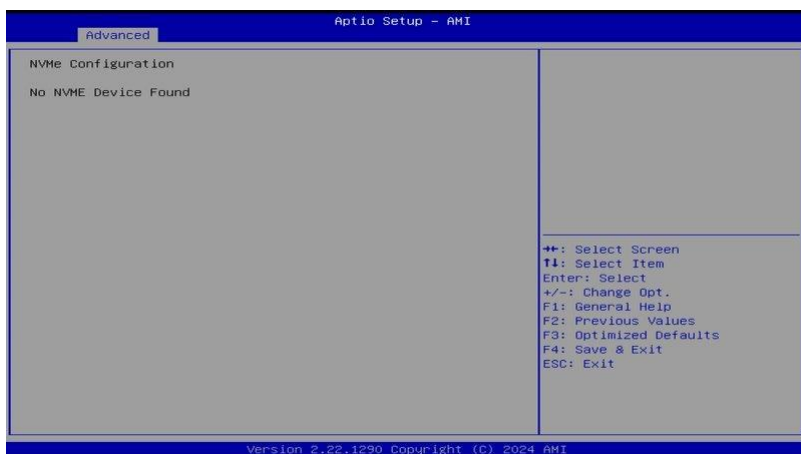
BIOS Setting	Description
Network Stack	Enable/Disable UEFI Network Stack

Aprio Setup - AMI	
Advanced	
Network Stack	[Enabled]
IPv4 PXE Support	[Disabled]
IPv4 HTTP Support	[Disabled]
IPv6 PXE Support	[Disabled]
IPv6 HTTP Support	[Disabled]
PXE boot wait time	0
Media detect count	1

BIOS Setting	Description
Ipv4 PXE Support	Enable/Disable IPv4 PXE boot support. If disabled, IPv4 PXE boot support will not be available
Ipv4 HTTP Support	Enable/Disable IPv4 HTTP boot support. If disabled, IPv4 HTTP boot support will not be available
Ipv6 PXE Support	Enable/Disable IPv6 PXE boot support. If disabled, IPv4 PXE boot support will not be available
Ipv6 HTTP Support	Enable/Disable IPv6 HTTP boot support. If disabled, IPv4 HTTP boot support will not be available
PXE boot wait time	Wait time in seconds to press ESC key to abort the PXE boot. Use either +/- or numeric keys to set the value
Media detect count	Number of times the presence of media will be checked. Use either +/- or numeric keys to set the value

4.4.12 NVMe Configuration

This sets the NVMe Device Options.



4.5 Chipset Settings

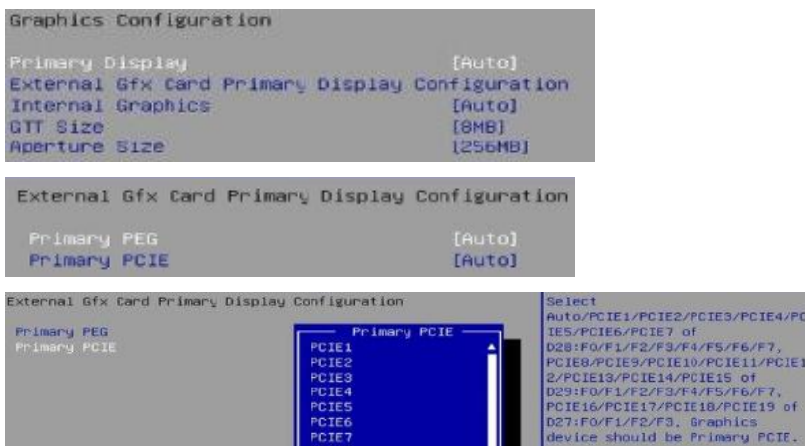


BIOS Setting	Description
System Agent (SA) Configuration	System Agent (SA) parameters
PCH-IO Configuration	PCH parameters

4.5.1 System Agent (SA) Configuration



4.5.1.1 Graphics Configuration and VMD setup menu



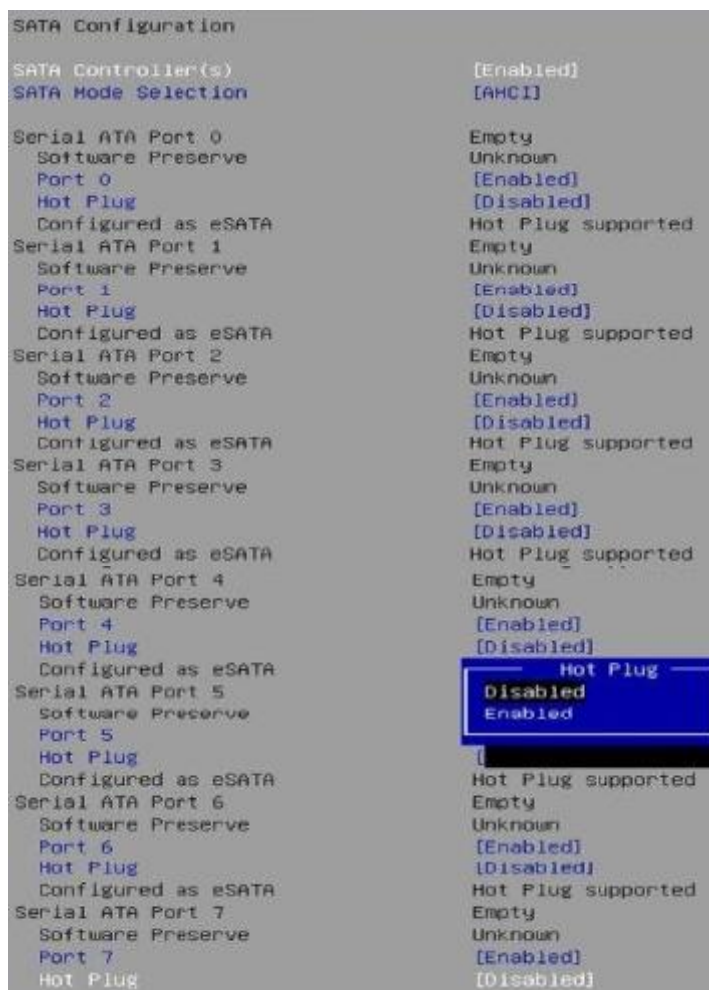
BIOS Setting	Description
Primary Display	Selects which of IGFX/PEG/PCI graphics device should be primary display, or selects HG for Hybrid Gfx.
Internal Graphics	Keeps IGFX enabled based on the setup options.
GTT Size	Select the GTT Size Options: 2MB / 4MB / 8MB
Aperture Size	Select the Aperture Size Note: Above 4MB MMIO BIOS assignment is automatically enabled when selecting 2048MB aperture. To use this feature, please disable CSM Support. Options: 128MB / 256MB / 512MB / 1024MB / 2048MB



4.5.2 PCH-IO Configuration

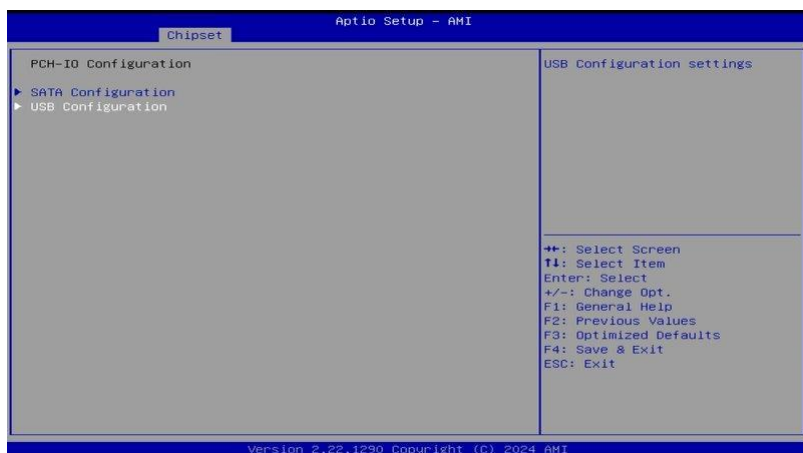


SATA Configuration



BIOS Setting	Description
SATA Controller	Enable/Disable SATA Device.
SATA Mode Selection	Determines how SATA controller(s) operate.
Hot Plug	Designates this port as Hot Pluggable.

USB Configuration



4.6 Security Settings



BIOS Setting	Description
Administrator Password	Sets an administrator password for the setup utility.
User Password	Sets a user password.

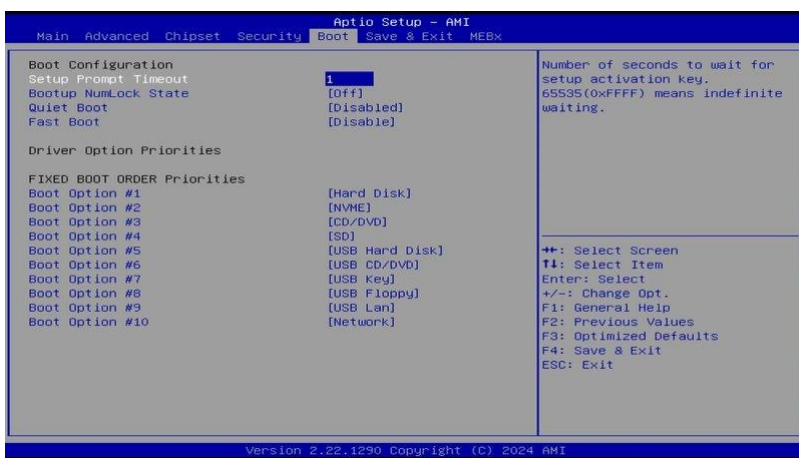
4.6.1 Secure Boot Configuration



BIOS Setting	Description
Secure Boot	Secure Boot feature is active if Secure Boot enabled. Platform Key(PK) is enrolled and the system is in user mode. The mode change requires platform reset.
Secure Boot Mode	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.
Restore Factory Keys	Force System to User Mode. Install factory default Secure Boot key databases.
Reset To Setup Mode	Delete all Secure Boot key databases from NVRAM
Key Management	Enables expert users to modify Secure Boot Policy variables without full authentication

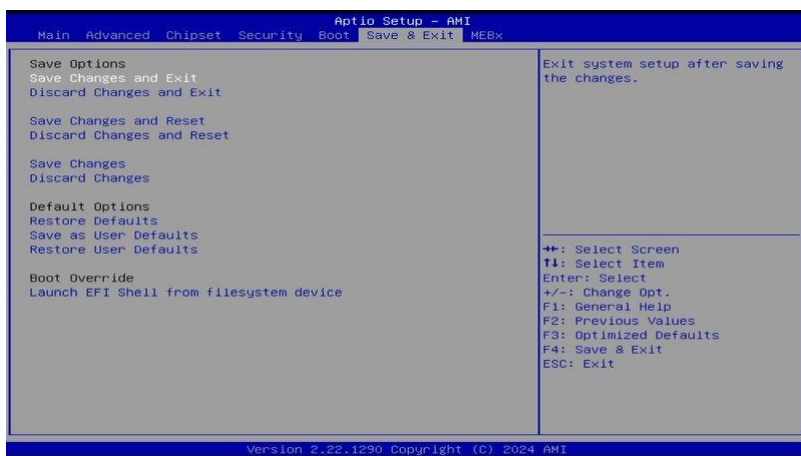
System Mode	Setup	Secure Boot feature is Active if Secure Boot is Enabled, Platform Key(PK) is enrolled and the System is in User mode. The mode change requires platform reset
Secure Boot	[Disabled] Not Active	
Secure Boot Mode	[Custom]	
System Mode	Setup	Secure Boot mode options: Standard or Custom.
Secure Boot	[Disabled] Not Active	In Custom mode, Secure Boot Policy variables can be configured by a physically present user without full authentication
Secure Boot Mode	[Custom]	
Restore Factory Keys		
System Mode	Setup	Force System to User Mode. Install factory default Secure Boot key databases
Secure Boot	[Disabled] Not Active	
Secure Boot Mode	[Custom]	
Restore Factory Keys		
Reset To Setup Mode		
System Mode	Setup	Enables expert users to modify Secure Boot Policy variables without variable authentication
Secure Boot	[Disabled] Not Active	
Secure Boot Mode	[Custom]	
Restore Factory Keys		
Reset To Setup Mode		
Key Management		
Vendor Keys	Valid	Install factory default Secure Boot keys after the platform reset and while the System is in Setup mode
Factory Key Provision	[Disabled]	
Restore Factory Keys		
Reset To Setup Mode		
Enroll Efi Image		
Export Secure Boot variables		
Secure Boot variable		
Platform Key (PK)	Size: 0 Keys: 0 Key Source: No Keys	
Key Exchange Keys (KEK)	0 0 No Keys	
Authorized Signatures (db)	0 0 No Keys	
Forbidden Signatures(dbx)	0 0 No Keys	
Authorized TimeStamps(dbt)	0 0 No Keys	
OsRecovery Signatures(dbr)	0 0 No Keys	++: Select Screen !!: Select Item
Vendor Keys	Valid	Force System to User Mode. Install factory default Secure Boot key databases
Factory Key Provision	[Disabled]	
Restore Factory Keys		
Vendor Keys	Valid	Allow Efi Image to run in Secure Boot mode.
Factory Key Provision	[Disabled]	Enroll SHA256 Hash certificate of a PE Image into Authorized Signature Databases (db)
Restore Factory Keys		
Reset To Setup Mode		
Enroll Efi Image		
Vendor Keys	Valid	Enroll Factory Defaults or load certificates from a file:
Factory Key Provision	[Disabled]	1.Public Key Certificate:
▶ Restore Factory Keys		a)EFI_SIGNATURE_LIST
▶ Reset To Setup Mode		b)EFI_CERT_X509 (DER)
▶ Enroll Efi Image		c)EFI_CERT_RSA2048 (bin)
▶ Export Secure Boot variables		d)EFI_CERT_SHAXXX
Secure Boot variable		2.Authenticated UEFI Variable
▶ Platform Key (PK)	Size: 0 Keys: 0 Key Source: No Keys	3.EFI PE/COFF Image(SHA256)
▶ Key Exchange Keys (KEK)	0 0 No Keys	Key Source:
▶ Authorized Signatures (db)	0 0 No Keys	Factory, Modified, Mixed
▶ Forbidden Signatures(dbx)	0 0 No Keys	
▶ Authorized TimeStamps(dbt)	0 0 No Keys	
▶ OsRecovery Signatures(dbr)	0 0 No Keys	++: Select Screen !!: Select Item Enter: Select

4.7 Boot Settings



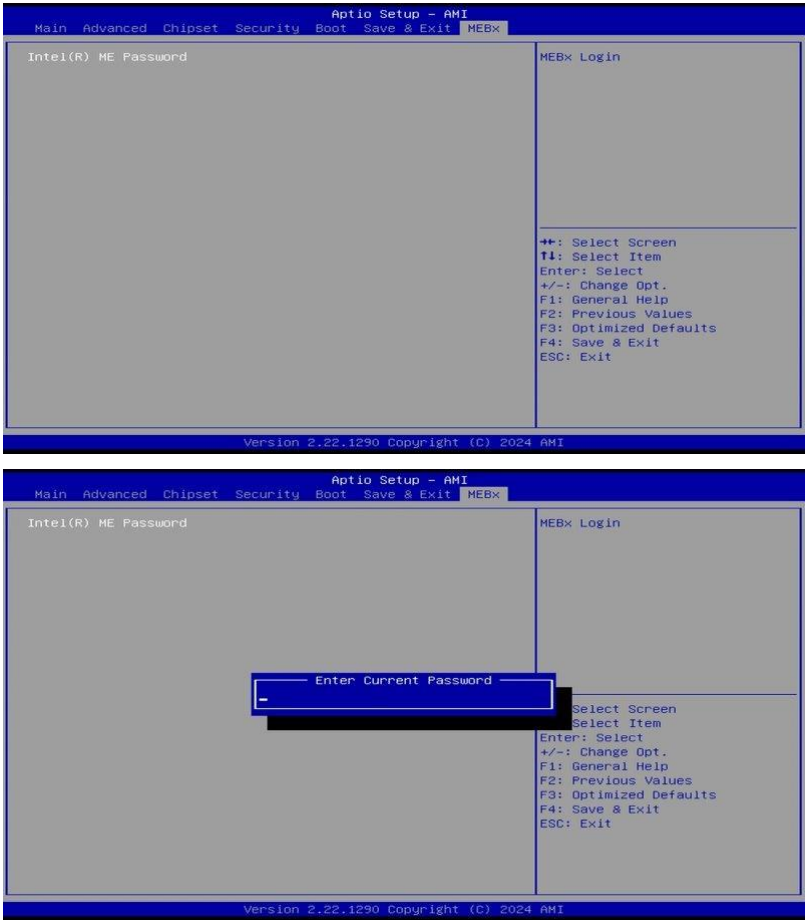
BIOS Setting	Description
Setup Prompt Timeout	Number of seconds to wait for setup activation key. 65535(0xFFFF) means indefinite waiting.
Bootup NumLock State	Selects the keyboard NumLock state.
Quiet Boot	Enables / Disables Quiet Boot option.
Fast Boot	Enables / Disables boot with initialization of a minimal set of devices required to launch active boot option. Has no effect for BBS boot options.
FIXED BOOT ORDER Priorities	Sets the system boot order.

4.8 Save & Exit Settings



BIOS Setting	Description
Save Changes and Exit	Exits system setup after saving the changes.
Discard Changes and Exit	Exits system setup without saving any changes.
Save Changes and Reset	Resets the system after saving the changes.
Discard Changes and Reset	Resets system setup without saving any changes.
Save Changes	Saves changes done so far to any of the setup options.
Discard Changes	Discards changes done so far to any of the setup options.
Restore Defaults	Restores / Loads defaults values for all the setup options.
Save as User Defaults	Saves the changes done so far as User Defaults.
Restore User Defaults	Restores the user defaults to all the setup options.
Launch EFI Shell from filesystem device	Attempts to launch EFI shell application (Shell.efi) from one of the available filesystem devices.

4.9 MEBx



Appendix

This section provides the mapping addresses of peripheral devices and the sample code of watchdog timer configuration.

A. I/O Port Address Map

Each peripheral device in the system is assigned a set of I/O port addresses which also becomes the identity of the device. The following table lists the I/O port addresses used.

Address	Device Description
0x00000A00-0x00000A0F	Motherboard resources
0x00000A10-0x00000A1F	Motherboard resources
0x00000A20-0x00000A2F	Motherboard resources
0x0000002E-0x0000002F	Motherboard resources
0x0000004E-0x0000004F	Motherboard resources
0x00000061-0x00000061	Motherboard resources
0x00000063-0x00000063	Motherboard resources
0x00000065-0x00000065	Motherboard resources
0x00000067-0x00000067	Motherboard resources
0x00000070-0x00000070	Motherboard resources
0x00000080-0x00000080	Motherboard resources
0x00000092-0x00000092	Motherboard resources
0x000000B2-0x000000B3	Motherboard resources
0x00000680-0x0000069F	Motherboard resources
0x0000164E-0x0000164F	Motherboard resources
0x00000378-0x0000037F	Printer Port (LPT1)
0x00000040-0x00000043	System timer
0x00000050-0x00000053	System timer
0x000003F8-0x000003FF	Communications Port (COM1)
0x000002F8-0x000002FF	Communications Port (COM2)
0x000003E8-0x000003EF	Communications Port (COM3)
0x000002E8-0x000002EF	Communications Port (COM4)
0x0000EFA0-0x0000EFBF	SM Bus Controller
0x00003090-0x00003097	Standard SATA AHCI Controller

0x00003080-0x00003083	Standard SATA AHCI Controller
0x00003060-0x0000307F	Standard SATA AHCI Controller
0x00001854-0x00001857	Motherboard resources
0x00000000-0x000000CF7	PCI Express Root Complex
0x00000D00-0x0000FFFF	PCI Express Root Complex
0x00000020-0x00000021	Programmable interrupt controller
0x00000024-0x00000025	Programmable interrupt controller
0x00000028-0x00000029	Programmable interrupt controller
0x0000002C-0x0000002D	Programmable interrupt controller
0x00000030-0x00000031	Programmable interrupt controller
0x00000034-0x00000035	Programmable interrupt controller
0x00000038-0x00000039	Programmable interrupt controller
0x0000003C-0x0000003D	Programmable interrupt controller
0x000000A0-0x000000A1	Programmable interrupt controller
0x000000A4-0x000000A5	Programmable interrupt controller
0x000000A8-0x000000A9	Programmable interrupt controller
0x000000AC-0x000000AD	Programmable interrupt controller
0x000000B0-0x000000B1	Programmable interrupt controller
0x000000B4-0x000000B5	Programmable interrupt controller
0x000000B8-0x000000B9	Programmable interrupt controller
0x000000BC-0x000000BD	Programmable interrupt controller
0x000004D0-0x000004D1	Programmable interrupt controller
0x00003000-0x0000303F	Microsoft Basic Display Adapter
0x00002000-0x000020FE	Motherboard resources
0x00000060-0x00000060	Standard PS/2 Keyboard
0x00000064-0x00000064	Standard PS/2 Keyboard

B. Interrupt Request Lines (IRQ)

Peripheral devices use interrupt request lines to notify CPU for the service required. The following table shows the IRQ used by the devices on board.

Level	Function
IRQ 4294967290	Intel(R) USB 3.20 eXtensible Host Controller - 1.20 (Microsoft)
IRQ 0	System timer
IRQ 4294967289	Intel(R) Management Engine Interface #1
IRQ 4294967279~83	Intel(R) Ethernet Controller I226-V #6
IRQ 4	Communications Port (COM1)
IRQ 3	Communications Port (COM2)
IRQ 10	Communications Port (COM3)
IRQ 11	Communications Port (COM4)
IRQ 4294967291	Standard SATA AHCI Controller
IRQ 4294967284~88	Intel(R) Ethernet Controller I226-LM #3
IRQ 4294967293	PCI Express Root Port
IRQ 4294967294	PCI Express Root Port
IRQ 55~204	Microsoft ACPI-Compliant System
IRQ 256~511	Microsoft ACPI-Compliant System
IRQ 17	High Definition Audio Controller

C. Watchdog Timer Configuration

The Watchdog Timer (WDT) is used to generate a variety of output signals after a user programmable count. The WDT is suitable for use in the prevention of system lock-up, such as when software becomes trapped in a deadlock. Under these sorts of circumstances, the timer will count to zero and the selected outputs will be driven.

Under normal circumstance, you will need to restart the WDT at regular intervals before the timer counts to zero.

Sample Code:

```
//-----
//
// THIS CODE AND INFORMATION IS PROVIDED "AS IS" WITHOUT WARRANTY OF ANY
// KIND, EITHER EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE
// IMPLIED WARRANTIES OF MERCHANTABILITY AND/OR FITNESS FOR A PARTICULAR
// PURPOSE.
//
//-----
#include <dos.h>
#include <conio.h>
#include <stdio.h>
#include <stdlib.h>
#include "F81964.H"
//-----
int main (int argc, char *argv[]);
void EnableWDT(int);
void DisableWDT(void);
//-----
int main (int argc, char *argv[])
{
    unsigned char bBuf;
    unsigned char bTime;
    char **endptr;

    char SIO;

    printf("Fintek 81964 watch dog program\n");
    SIO = Init_F81964();
    if (SIO == 0)
    {
        printf("Can not detect Fintek 81964, program abort.\n");
        return(1);
    }
    }/if (SIO == 0)

    if (argc != 2)
    {
        printf("Parameter incorrect!!\n");
```

```

        return (1);
    }

    bTime = strtol(argv[1], endptr, 10);
    printf("System will reset after %d seconds\n", bTime);

    if (bTime)
    {
        EnableWDT(bTime);
    }
    else
    {
        DisableWDT();
    }
    return 0;
}
//-----
void EnableWDT(int interval)
{
    unsigned char bBuf;

    bBuf = Get_F81964_Reg(0x2B);
    bBuf &= (~0x20);
    Set_F81964_Reg(0x2B, bBuf);           //Enable WDTO

    Set_F81964_LD(0x07);                 //switch to logic device 7
    Set_F81964_Reg(0x30, 0x01);          //enable timer

    bBuf = Get_F81964_Reg(0xF5);
    bBuf &= (~0x0F);
    bBuf |= 0x52;
    Set_F81964_Reg(0xF5, bBuf);           //count mode is second

    Set_F81964_Reg(0xF6, interval);       //set timer

    bBuf = Get_F81964_Reg(0xFA);
    bBuf |= 0x01;
    Set_F81964_Reg(0xFA, bBuf);           //enable WDTO output

    bBuf = Get_F81964_Reg(0xF5);
    bBuf |= 0x20;
    Set_F81964_Reg(0xF5, bBuf);           //start counting
}
//-----
void DisableWDT(void)
{
    unsigned char bBuf;

    Set_F81964_LD(0x07);                 //switch to logic device 7

    bBuf = Get_F81964_Reg(0xFA);
    bBuf &= ~0x01;
    Set_F81964_Reg(0xFA, bBuf);           //disable WDTO output

    bBuf = Get_F81964_Reg(0xF5);
    bBuf &= ~0x20;
    bBuf |= 0x40;
    Set_F81964_Reg(0xF5, bBuf);           //disable WDT
}
//-----

```

```

//-----
//
// THIS CODE AND INFORMATION IS PROVIDED "AS IS" WITHOUT WARRANTY OF ANY
// KIND, EITHER EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE
// IMPLIED WARRANTIES OF MERCHANTABILITY AND/OR FITNESS FOR A PARTICULAR
// PURPOSE.
//
//-----
#include "F81964.H"
#include <dos.h>
//-----
unsigned int F81964_BASE;
void Unlock_F81964 (void);
void Lock_F81964 (void);
//-----
unsigned int Init_F81964(void)
{
    unsigned int result;
    unsigned char ucDid;

    F81964_BASE = 0x4E;
    result = F81964_BASE;

    ucDid = Get_F81964_Reg(0x20);
    if (ucDid == 0x07)                //Fintek 81964
    {
        goto Init_Finish;
    }

    F81964_BASE = 0x2E;
    result = F81964_BASE;

    ucDid = Get_F81964_Reg(0x20);
    if (ucDid == 0x07)                //Fintek 81964
    {
        goto Init_Finish;
    }

    F81964_BASE = 0x00;
    result = F81964_BASE;

Init_Finish:
    return (result);
}
//-----
void Unlock_F81964 (void)
{
    outputb(F81964_INDEX_PORT, F81964_UNLOCK);
    outputb(F81964_INDEX_PORT, F81964_UNLOCK);
}
//-----
void Lock_F81964 (void)
{
    outputb(F81964_INDEX_PORT, F81964_LOCK);
}
//-----
void Set_F81964_LD( unsigned char LD)
{
    Unlock_F81964();
    outputb(F81964_INDEX_PORT, F81964_REG_LD);
    outputb(F81964_DATA_PORT, LD);
}

```

```

        Lock_F81964();
    }
//-----
void Set_F81964_Reg( unsigned char REG, unsigned char DATA)
{
    Unlock_F81964();
    outportb(F81964_INDEX_PORT, REG);
    outportb(F81964_DATA_PORT, DATA);
    Lock_F81964();
}
//-----
unsigned char Get_F81964_Reg(unsigned char REG)
{
    unsigned char Result;
    Unlock_F81964();
    outportb(F81964_INDEX_PORT, REG);
    Result = inportb(F81964_DATA_PORT);
    Lock_F81964();
    return Result;
}
//-----

//-----
//
// THIS CODE AND INFORMATION IS PROVIDED "AS IS" WITHOUT WARRANTY OF ANY
// KIND, EITHER EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE
// IMPLIED WARRANTIES OF MERCHANTABILITY AND/OR FITNESS FOR A PARTICULAR
// PURPOSE.
//
//-----
#ifndef F81964_H
#define F81964_H                1
//-----
#define F81964_INDEX_PORT      (F81964_BASE)
#define F81964_DATA_PORT      (F81964_BASE+1)
//-----
#define F81964_REG_LD          0x07
//-----
#define F81964_UNLOCK          0x87
#define F81964_LOCK            0xAA
//-----
unsigned int Init_F81964(void);
void Set_F81964_LD( unsigned char);
void Set_F81964_Reg( unsigned char,
unsigned char); unsigned char
Get_F81964_Reg( unsigned char);
//-----
#endif // F81964_H

```


D. Onboard Connector Type

Function	Connector	Onboard Type	Compatible Mating Type for Reference
ATX 12V Power	ATX_12V	HAOGUO 01-0018-03	ATX 4.2 mm 2*4-pin
Front Panel Settings	J8	E-CALL 0126-01-203-200	Dupont 2.54 mm 2*5-pin
Digital I/O Connector	J10	E-CALL 0196-01-200-100	Dupont 10P 2.0 mm-pitch (female)
Audio Connector	J12	E-CALL 0126-01-2821009	Dupont 10P 2.54 mm-pitch (female)
LVDS Connectors	J17,J20	HRS_DF20EG-20DP-1V(52)	HRS_DF20EG-20DP-1V(52)
Fan Power Connectors	CPU_FAN1	TechBest W2-031104132S1WT(A)-L	Molex 47054-1000