MI999

**Intel® 10th Gen. Xeon® W /
Core™ / Pentium® / Celeron®
Mini-ITX Motherboard**

User's Manual

Version 1.0

iBASE

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Compliance

$\mathsf{C}\mathsf{E}$

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

FC

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 is compliant with the current RoHS restrictions and prohibits use of the following substances in concentrations exceeding 0.1% by weight (1000 ppm) except for cadmium, limited to 0.01% by weight (100 ppm).

- Lead (Pb)
- Mercury (Hg)
- Cadmium (Cd)
- Hexavalent chromium (Cr6+)
- Polybrominated biphenyls (PBB)
- Polybrominated diphenyl ether (PBDE)

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Important Safety Information

Carefully read the precautions before using the board.

Environmental conditions:

- Use this product in environments with ambient temperatures between 0˚C and 60˚C.
- Do not leave this product in an environment where the storage temperature may be below -20° C or above 80° C. To prevent from damages, the product must be used in a controlled environment.

Care for your IBASE products:

- Before cleaning the PCB, unplug all cables and remove the battery.
- Clean the PCB with a circuit board cleaner or degreaser, or use cotton swabs and alcohol.
- Vacuum the dust with a computer vacuum cleaner to prevent the fan from being clogged.

⚠ WARNING

Attention during use:

- Do not use this product near water.
- Do not spill 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.
- Hold the edges of PCB when handling.
- Touch the edges of non-metallic components of the product instead of the surface of the PCB.
- Ground yourself by touching a grounded conductor or a grounded bit of metal frequently to discharge any static.

⚠ CAUTION

Danger of explosion if the internal lithium-ion battery is replaced by an incorrect type. Replace only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions or recycle them at a local recycling facility or battery collection point.

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.

* PRODUCTS, HOWEVER, THAT FAIL DUE TO MISUSE, ACCIDENT, IMPROPER INSTALLATION OR UNAUTHORIZED REPAIR SHALL BE TREATED AS OUT OF WARRANTY AND CUSTOMERS SHALL BE BILLED FOR REPAIR AND SHIPPING CHARGES.

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, you can download the RMA form at http://www.ibase.com.tw/english/Supports/RMAService/. Fill out the form and contact your distributor or sales representative.

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Chapter 1
General Information

The information provided in this chapter includes:

- Features

- Packing List

- Specifications

- Block Diagram

- Board View

- Board Dimensions

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1.1　Introduction

MI999 is a Mini-ITX motherboard based on 10th Gen. Intel® Xeon® W/ Core™ / Pentium® / Celeron® processor. Designed for a broad range of markets, including industrial control & automation, digital signage, thin client, gaming, and transportation applications, it offers high-definition visual experience with high performance graphics processing.

Photo of MI999
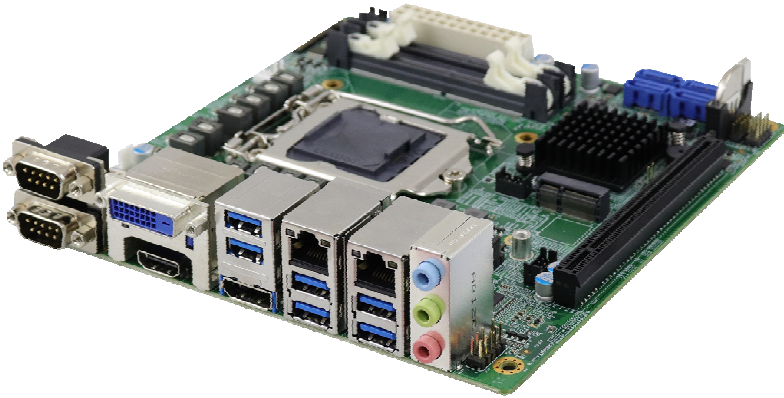
1.2　Features

- 2 x DDR4 SO-DIMM, expandable up to 64 GB, ECC supported Xeon/I3 CPU SKUs

- Dual Gigabit LAN

- 1 x HDMI, 1 x DisplayPort, 1 x DVI-D, 1 x eDP or 1 x 24-bit dual channel LVDS

- 6 x USB 3.1, 4 x SATA III, 4 x serial ports

- PCIe (x16), M.2 M2280 (for MI999AF-W / MI999AF-Q series only) and E2230 expansion slots

- Configurable watchdog timer and digital I/O

- TPM compliant

1.3 Packing List

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

- MI999AF Motherboard

- I/O Shield

- SATA Cable (SATA-3F)

- COM Port Cable (PK1-20BK)

- Disk (including chipset drivers)

- This User's Manual

1.4 Optional Accessories

IBASE provides optional accessories as follows. Please contact us or your dealer if you need any.

- Audio Cable (Audio-34)

- USB Cable (USB-29)

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1.5   Specifications

Product Name	• MI999AF-W • MI999AF**E**-W	• MI999AF-Q • MI999AF**E**-Q	• MI999EF-H • MI999EF**E**-H
Form Factor	Mini ITX motherboard		
System			
Operating System	• Windows 10 (64-bit) • Linux Ubuntu (64-bit) • Windows Server 2019 (For MI999AF(E)-W)		
CPU	- Intel® 10th Gen. Xeon®-W / Core™ / Pentium® / Celeron®, Speed up to 4.8GHz		
CPU Socket	LGA1200		
Chipset	W480E	Q470E	H420E
Memory	-SO-DIMM@ 260-pin x 2 for DDR4-2933/ 2666 @1.2V, Max. =64GB **ECC supported by W480E + specified processors only**		
Network	1st LAN : Intel® I219LM GbE PHY 2nd LAN : Intel® I210AT PCIe GbE	1st LAN : Intel® I219LM GbE PHY 2nd LAN : Intel® I211AT PCIe GbE	1st LAN : Intel® I219V GbE PHY 2nd LAN : Intel® I211AT PCIe GbE
Super I/O	Fintek F81964D-I		
Audio	Intel® CNL PCH-H built-in HD Audio controller + Realtek Codec ALC888S-VD2-GR		
System Voltage	ATX standard 24-pin type & 8 pin type		
Watchdog Timer	Yes (256 segments, 0, 1, 2…255 sec/min)		
BIOS	AMI BIOS		
iSMART	N/A		
RAID	RAID 0/ 1/ 5/ 10		N/A
iAMT	For MI999AF(E)-W & MI999AF(E)-Q w/ Xeon-E / Core i7/ i5 DT CPU		N/A
TPM	2.0		
vPro	Yes		
EuP /Erp	N/A		Yes
Dimensions	170mm x 170mm		
RoHS 2.0	Yes		
Certification	CE (EN55032:2012); FCC Class B		

I/O Ports	
Display	• 1x DVI-D x1 (Resolution Up to 1920x1080 at 60Hz) • 1x HDMI 1.4b (Resolution Up to 4096x2160 at 30Hz) • 1x DisplayPort 1.2 (Resolution up to 4096 x 2160 at 60Hz) • 1x eDP 1.4, (Resolution Up to 2560x1440 at 60Hz)* • 1 x LVDS, (Resolution Up to 1920x1200 at 60Hz* **Each model in the series supports either LVDS or eDP only.
LAN	• 2x RJ45 GbE LAN
USB	Intel® CML PCH-H integrated USB controller • USB 3.2 x 6 ports Gen1 @ rear panel • USB 2.0 x 4 ports via onboard pin header
Serial	**4 x COM ports:** • COM1 & COM2: RS-232/422/485 (I/O coastline connectors, jumper-less selection) for MI999AF(E)-W/ MI999AF(E)-Q • COM1 & COM2: RS-232 only for MI999EF(E)-H • COM3 ~ COM4: RS-232 only (via on-board box-headers)
SATA	Intel® CNL PCH-H built-in SATA controller, 4 x SATA (3.0) 6Gbps
Audio Jack	1x Line-in, 1x Line-Out, 1x Mic-In
Digital IO	4-In & 4-Out
SSD	1x M.2 (M2280)
Expansion	- 1x PCIe (16x) [Gen 3.0 PEG] - M.2(E-key@2230) x1, supports CNVi - M.2(M-key@2280) x1, supports NVMe	-1x PCIe (16X) [Gen 3.0 PEG] -M.2(E-key@2230) x1, only support PCI-E
Environment	
Temperature	• Operating: 0 ~ 60 °C (32 ~ 140 °F) • Storage: -20 ~ 80 °C (-4 ~ 176 °F)
Relative Humidity	0 ~ 95 %, non-condensing at 60 °C

All specifications are subject to change without prior notice.

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1.6   Block Diagram
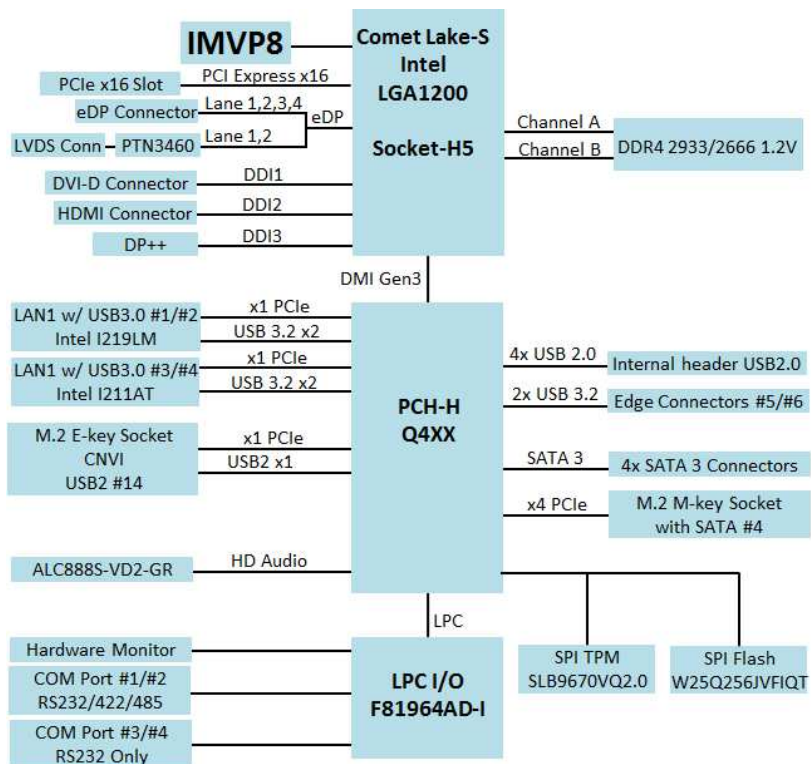
1.7 Board View

Top View
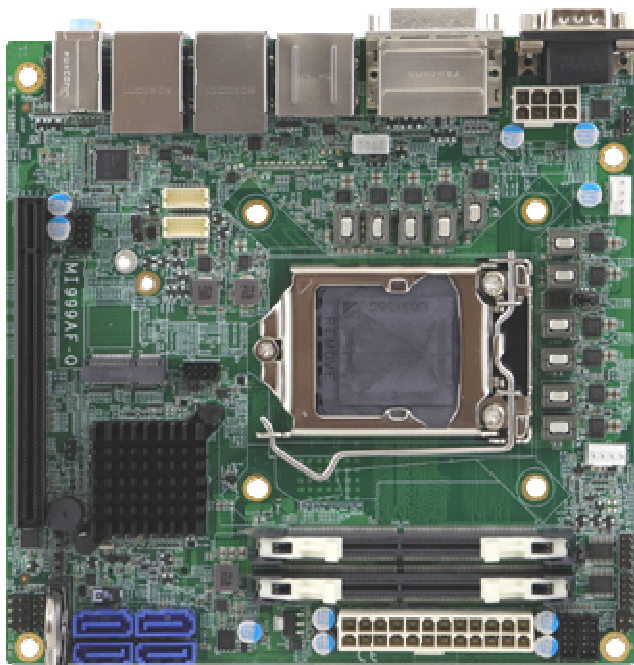
* The photos are for reference only. Some minor components may differ.

Bottom View
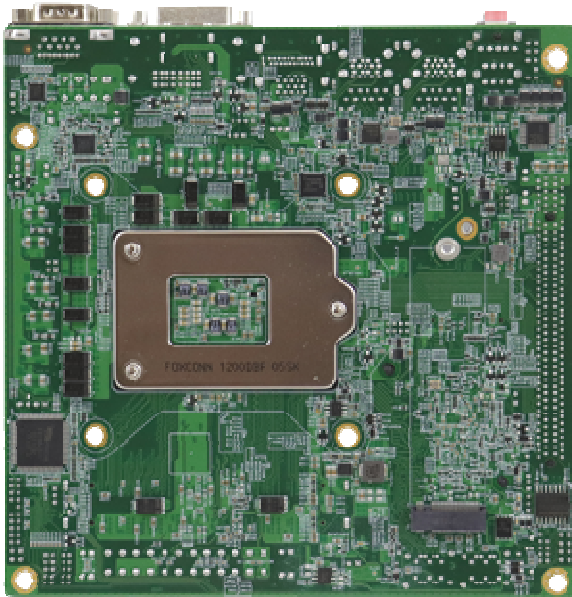
I/O View
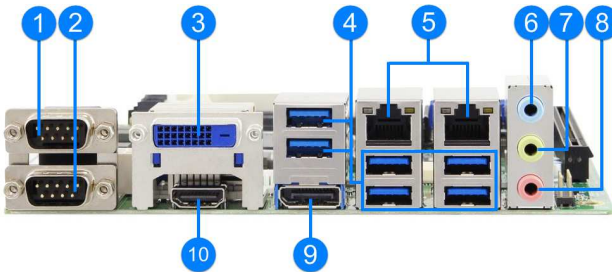
No.	Name	No.	Name
1	COM1 Port	6	Audio Line-In
2	COM2 Port	7	Audio Line-Out
3	DVI-D Port	8	Microphone-In
4	USB 3.0 Ports	9	DisplayPort
5	GbE LAN Ports	10	HDMI Port

1.8   Dimensions
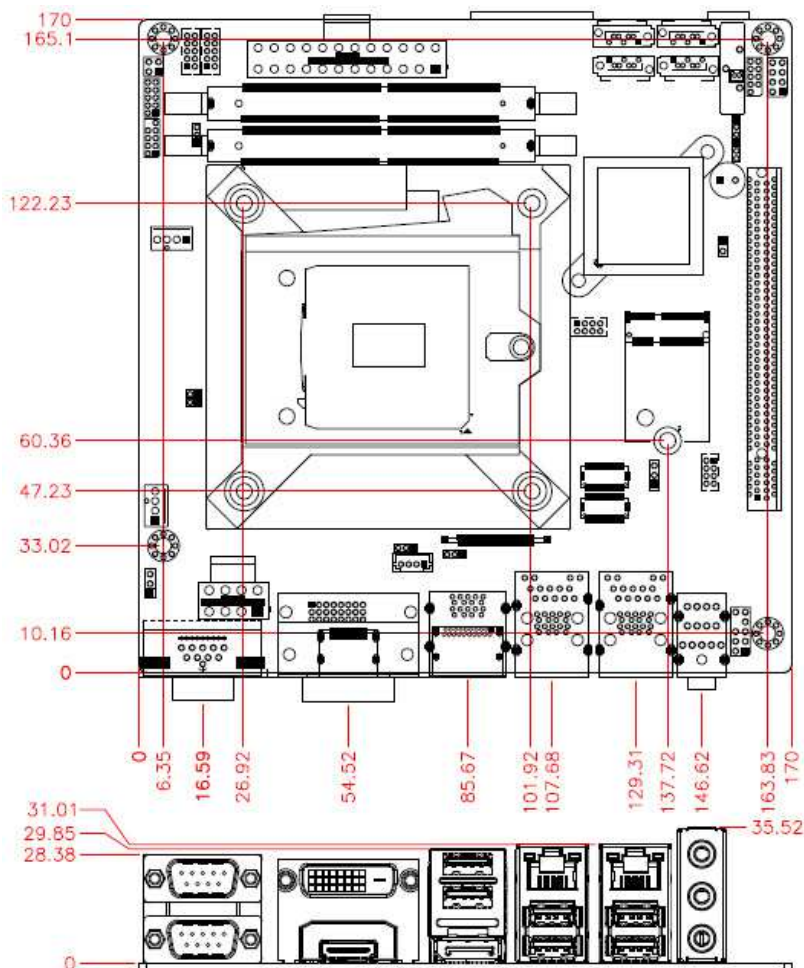
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Chapter 2
Hardware Configuration

This section provides information on jumper settings and connectors on the board 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
- Jumper and connector locations
- Jumper settings and information of connectors

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2.1 Installations

2.1.1 Installing the CPU

1. Unlock the CPU 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.
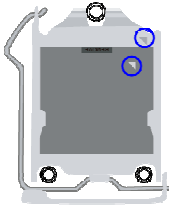
3. Carefully insert the CPU into the socket and push down the lever to secure the CPU.

Then install the CPU cooler and fan back.

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

To install the modules, locate the memory slot on the board and perform the following steps.

1. Press the ejector tab of the memory slot outwards with your fingertips.
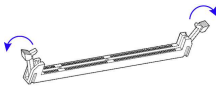
2. Hold the meomry module and align the key of the module with that on the memory slot.

3. Gently push the module in an upright position unitl the ejector tabs of the memory slot close to hold the module in place when the module touches the bottom of the slot.
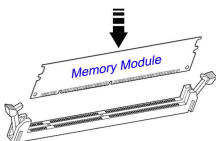
To remove the module, press the ejector tabs outwards with your fintertips to eject the module.

2.2 Setting the Jumpers

Set up and configure your product 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.
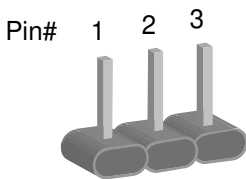
A 3-pin jumper   **A jumper cap**

Refer to the illustration below to set jumpers.

Pin closed	Oblique view	Illustration
Open		
1-2		
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 MI999
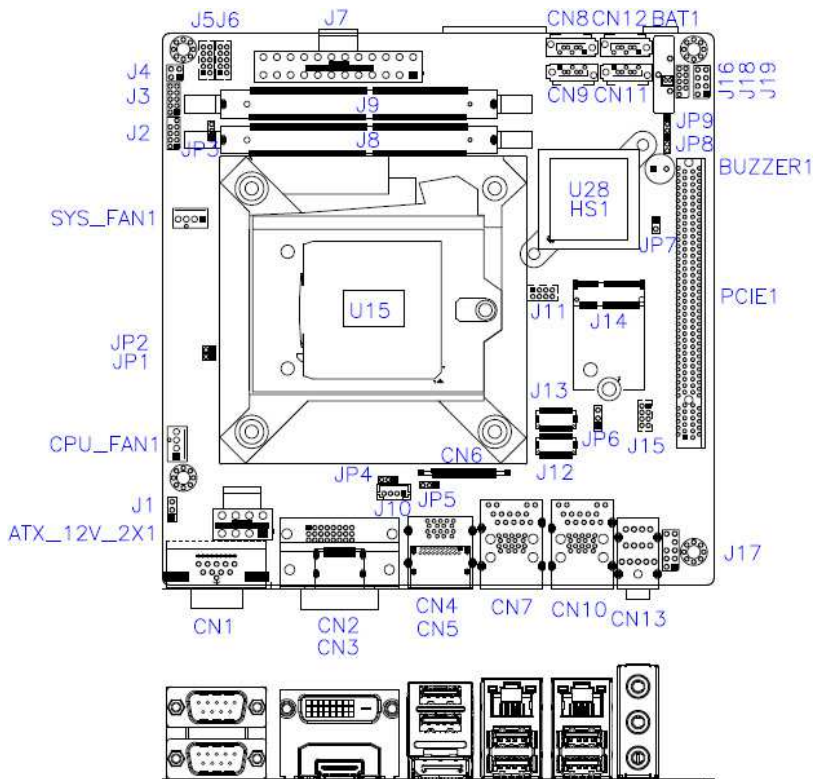
2.4 Jumpers Quick Reference

Function	Jumper	Page
eDP Panel Power Selection	JP5	15
Clear CMOS Data	JP9	16
Clear ME Register	JP8	17
ATX & AT Power Mode Select	JP3	18
LVDS Panel Brightness Selection	JP4	19
LVDS Panel Power Selection	JP6	20
PCIe Bifurcation Selection	JP1, JP2	21

Note: The board drawings below include all the connectors of different models.

2.4.1 eDP Panel Power Selection (JP5)

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

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2.4.2 Clear CMOS Data (JP9)

JP9
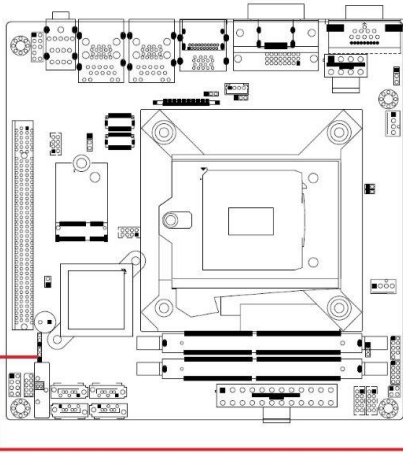
Function	Pin closed	Illustration
Normal (default)	1-2	1
Clear CMOS	2-3	1

2.4.3   Clear ME Register (JP8)

JP8
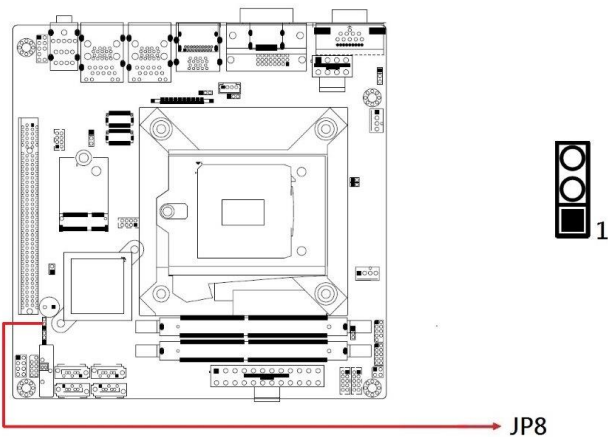
Function	Pin closed	Illustration
Normal (default)	1-2	
Clear ME	2-3	

2.4.4   ATX & AT Power Mode Selection (JP3)
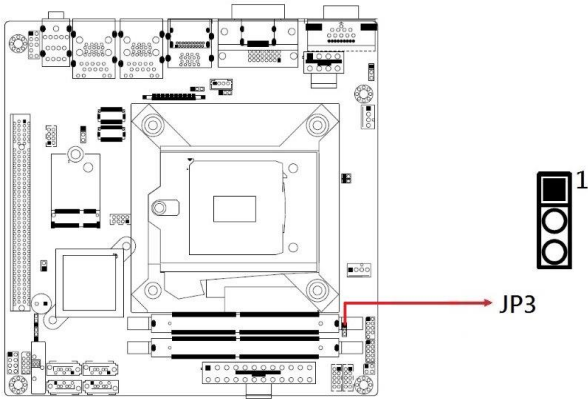
Function	Pin closed	Illustration
ATX Mode (default)	1-2	
AT Mode	2-3	

2.4.5   LVDS Power Brightness Selection (JP4)
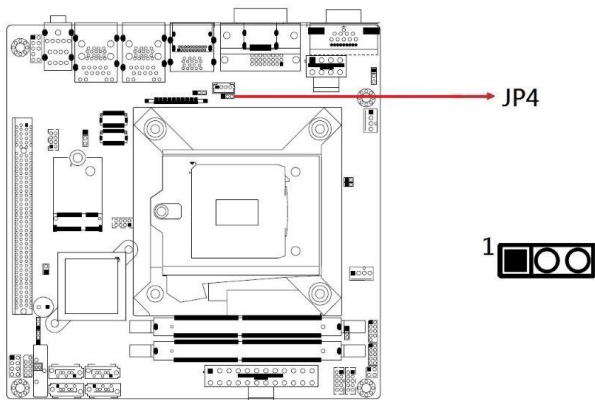
Function	Pin closed	Illustration
3.3V (default)	1-2	○ ● ■ 1
5V	2-3	● ● □ 1

2.4.6   LVDS Panel Power Selection (JP6)

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

2.4.7 PCIe (x16) Bifurcation Selection (JP1 & JP2)
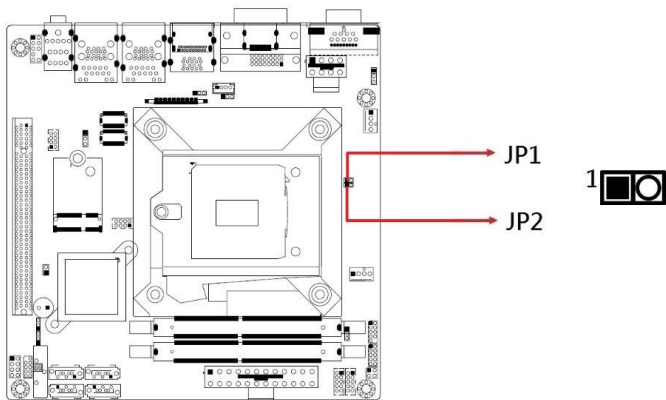
Function	Pin closed	Illustration
1 x PCIe (x16) (default)	**JP2:** Open	○ □ 1
	JP1: Open	○ □ 1
2 x PCIe (x8)	**JP2:** Open	○ □ 1
	JP1: Close	● □ 1
1 x PCIe (x8) 2 x PCIe (x4)	**JP2:** Close	● □ 1
	JP1: Close	● □ 1

2.5   Connectors Quick Reference

Function	Connector Name	Page
COM1 & COM2 RS-232/422/485 Ports	CN1	23
COM3 & COM4 RS-232 Ports	J5 (COM3), J6 (COM4)	24
eDP Connector	CN6	25
Digital I/O Connector	J3	26
LCD Backlight Connector	J10	26
ATX Power Connector	J7	27
ATX 12V Power Connector	ATX_12V_2X1	28
Dual USB 2.0 Connector	J11, J15	28
Front Panel Audio Connector	J17	29
Front Panel Settings Connector	J19	30
LVDS Connector	J12, J13	31
Fan Power Connector	CPU_FAN1, SYS_FAN1	32
RTC Lithium Battery Cell Connector	BAT1	--
DVI-D	CN2	--
HDMI Port	CN3	--
Dual USB 3.1 Ports	CN4	--
DisplayPort++	CN5	--
SATA III Port	CN8, CN9, CN11, CN12	--
GbE LAN & Dual USB 3.1 Ports	CN7, CN10	--
DDR4 SO-DIMM Slot	J8, J9	--
M.2 M2280 Slot	J20	--
M.2 E2230 Slot	J14	--
PCIe (x16) Slot	PCIE1	--
Factory Use Only	J1, J2, J18	--

2.5.1   COM1 & COM2 RS-232/422/485 Ports (CN1)

CN1
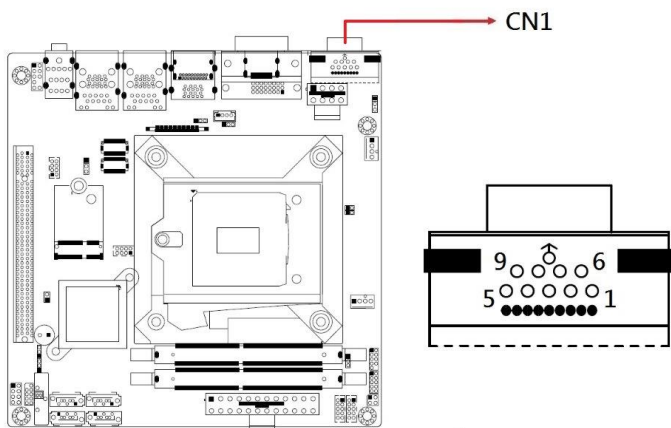
Pin	Signal Name	Pin	Signal Name
1	DCD, Data carrier detect	6	DSR, Data set ready
2	RXD, Receive data	7	RTS, Request to send
3	TXD, Transmit data	8	CTS, Clear to send
4	DTR, Data terminal ready	9	RI, Ring indicator
5	Ground		

Pin	Signal Name		
	RS-232	RS-422	RS-485
1	DCD	TX-	DATA-
2	RX	TX+	DATA+
3	TX	RX+	NC
4	DTR	RX-	NC
5	Ground	Ground	Ground
6	DSR	NC	NC
7	RTS	NC	NC
8	CTS	NC	NC
9	RI	NC	NC

2.5.2   COM3 & COM4 RS-232 Ports (J5, J6)

J5
J6
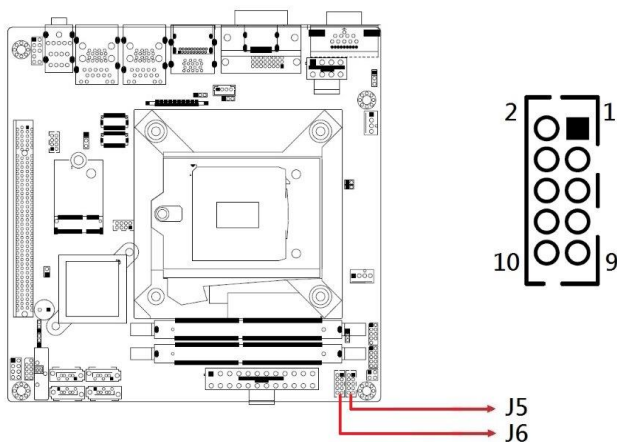
Pin	Signal Name	Pin	Signal Name
1	DCD, Data carrier detect	2	RXD, Receive data
3	TXD, Transmit data	4	DTR, Data terminal ready
5	Ground	6	DSR, Data set ready
7	RTS, Request to send	8	CTS, Clear to send
9	RI, Ring indicator	10	Key

2.5.3 eDP Connector (CN6)
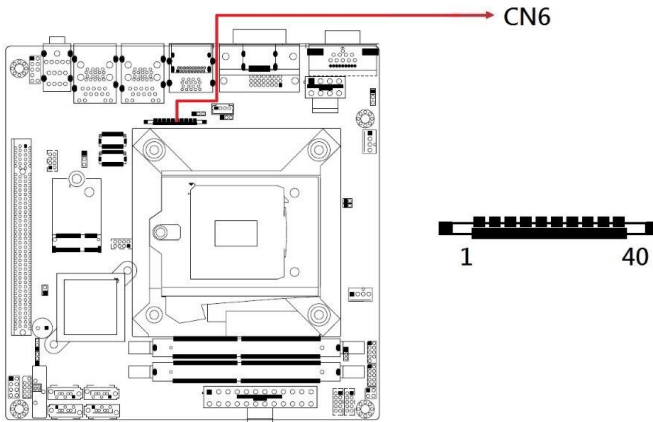
Pin	Signal Name	Pin	Signal Name
1	eDP VCC	21	TXN0
2	eDP VCC	22	TXP0
3	eDP VCC	23	Ground
4	eDP VCC	24	AUXP
5	eDP VCC	25	AUXN
6	Ground	26	NC
7	Ground	27	+3.3V
8	Ground	28	+12V
9	Ground	29	NC
10	Hot Plug detect	30	Ground
11	Ground	31	+5V
12	TXN3	32	NC
13	TXP3	33	Back Light Control
14	Ground	34	Back Lignt Enable
15	TXN2	35	+12V
16	TXP2	36	+3.3V
17	Ground	37	Ground
18	TXN1	38	NC
19	TXP1	39	NC
20	Ground	40	NC

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2.5.4   Digital I/O Connector (J3)
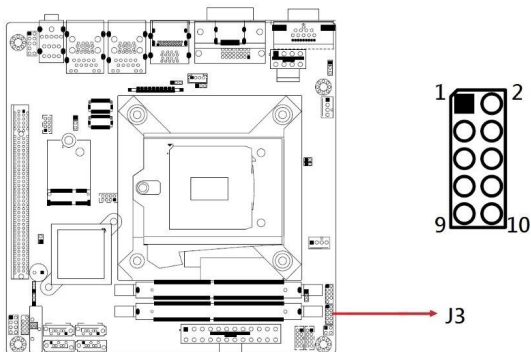
Pin	Signal Name	Pin	Signal Name
1	Ground	2	+5V
3	OUT3	4	OUT1
5	OUT2	6	OUT0
7	IN3	8	IN1
9	IN2	10	IN0

2.5.5   LCD Backlight Connector (J10)
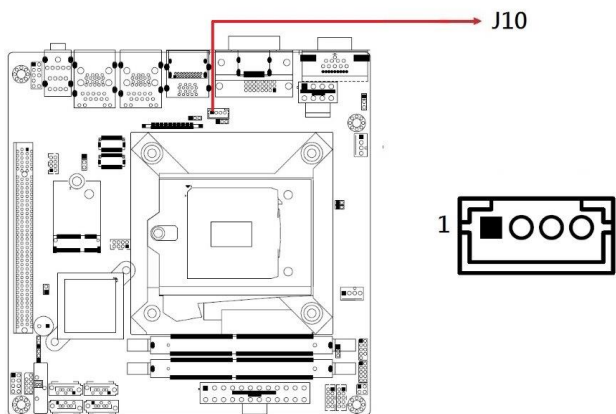
Pin	Signal Name	Pin	Signal Name
1	+12V	3	Brightness Control
2	Backlight Enable	4	Ground

2.5.6   ATX Power Connector (J7)
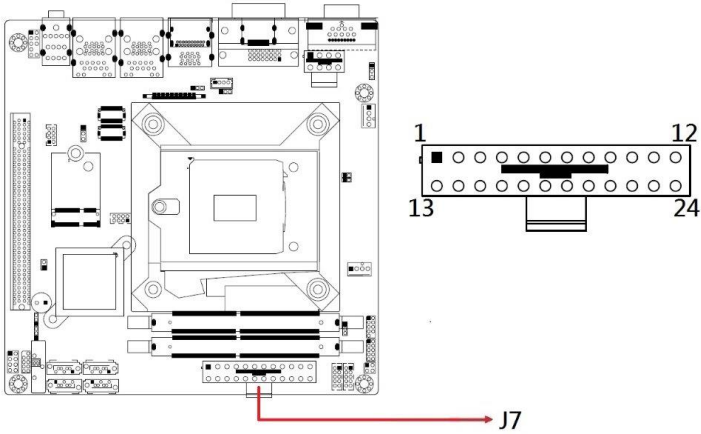
Pin	Signal Name	Pin	Signal Name
1	3.3V	13	3.3V
2	3.3V	14	-12V
3	Ground	15	Ground
4	+5V	16	PS-ON
5	Ground	17	Ground
6	+5V	18	Ground
7	Ground	19	Ground
8	Power good	20	-5V
9	5VSB	21	+5V
10	+12V	22	+5V
11	+12V	23	+5V
12	3.3V	24	Ground

2.5.7   ATX 12V Power Connector (ATX_12V_2x1)
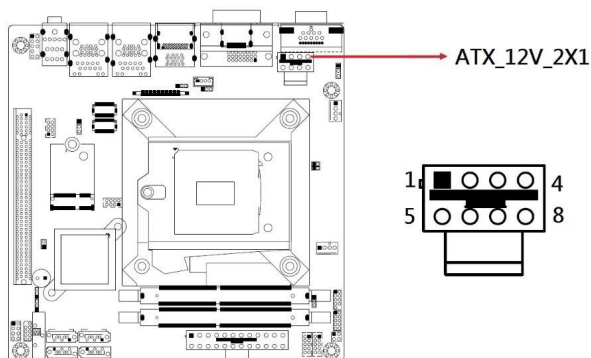
Pin	Signal Name	Pin	Signal Name
1	Ground	5	+12V
2	Ground	6	+12V
3	Ground	7	+12V
4	Ground	8	+12V

2.5.8   Dual USB 2.0 Connector (J11, J15)
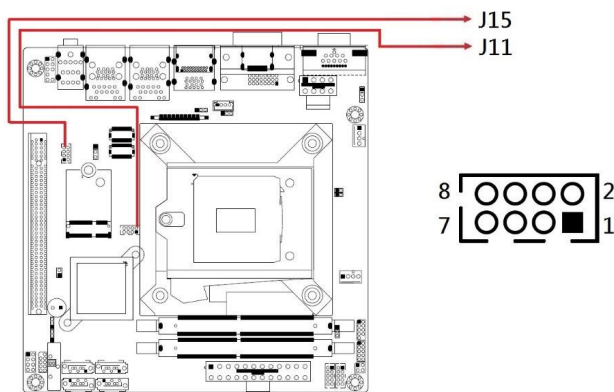
Pin	Signal Name	Pin	Signal Name
1	VCC	2	Ground
3	D0-	4	D1+
5	D0+	6	D1-
7	Ground	8	VCC

2.5.9   Front Panel Audio Connector (J17)
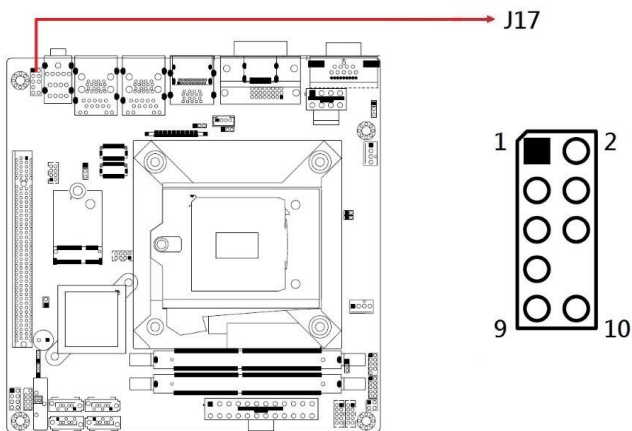
Pin	Signal Name	Pin	Signal Name
1	MIC IN_L	2	Ground
3	MIC IN_R	4	DET
5	LINE_R	6	Ground
7	Sense	8	Key
9	LINE_L	10	Ground

2.5.10   Front Panel Settings Connector (J19)

→ J19
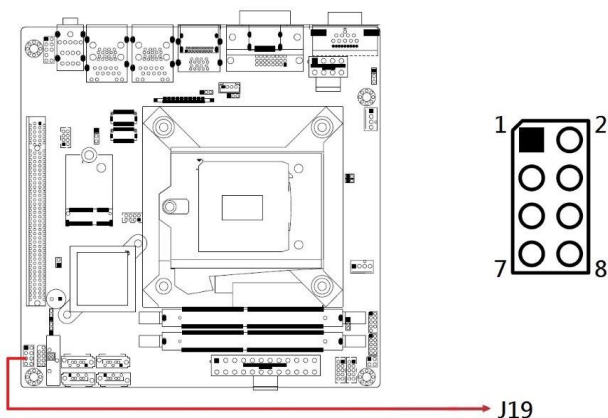
Pin	Signal Name	Pin	Signal Name
1	Power BTN	2	Power BTN
3	HDD LED+	4	HDD LED-
5	Reset BTN	6	Reset BTN
7	Power LED+	8	Power LED-

J18 provides light indication of the computer activities and switches to change the computer status. The functions are as follows:

- **ATX Power ON Switch (Pin 1 and Pin 2)**

    Pin 1 and Pin 2 is the "ATX Power Supply On/Off Switch" for the system that connects to the power switch on the case. When pressed, the power switch will force the system to power on. When pressed again, it will power off the system.

- **Hard Disk Drive LED Connector (Pin 3 and Pin 4)**

    This connector connects to the hard drive activity LED on control panel. This LED will flash when the HDD is being accessed.

- **Reset Switch (Pin 5 and Pin 6)**

    The reset switch allows you to reset the system without turning the main power switch off and then on again. Orientation is not required when making a connection to this header.

- **Power LED (Pin 7 and Pin 8)**

    This connector connects to the system power LED on control panel. This LED will light when the system turns on.

2.5.11 LVDS Connector (J12, J13)
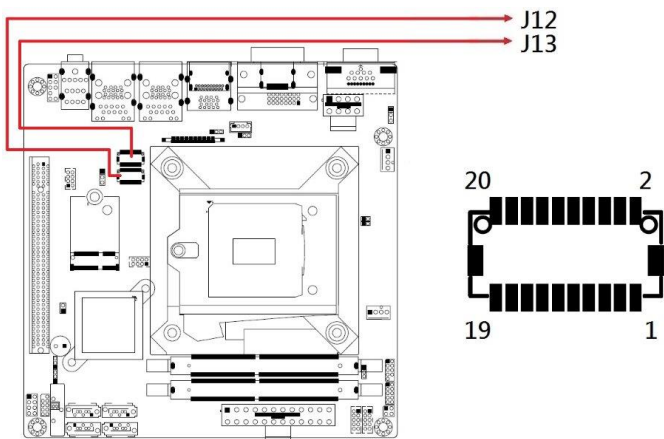
Pin	Signal Name	Pin	Signal Name
1	TX0P	2	TX0N
3	Ground	4	Ground
5	TX1P	6	TX1N
7	Ground	8	Ground
9	TX2P	10	TX2N
11	Ground	12	Ground
13	CLKP	14	CLKN
15	Ground	16	Ground
17	TX3P	18	TX3N
19	VDD	20	VDD

2.5.12   Fan Power Connector (SYS_FAN1, CPU_FAN1)
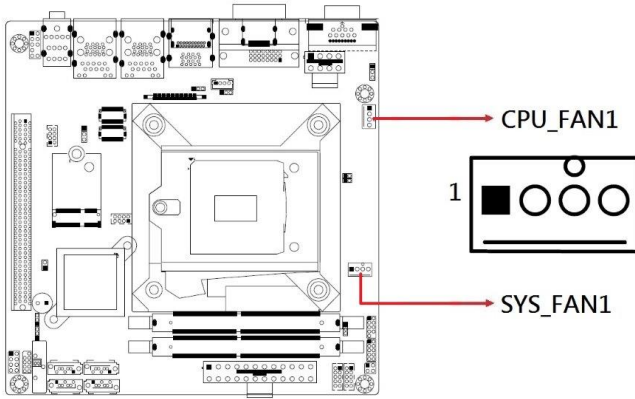
Pin	Signal Name	Pin	Signal Name
1	Ground	3	Rotation detection
2	+12V	4	Control

Chapter 3
Drivers Installation

This chapter introduces installation of the following installations:

- Intel Chipset Software Installation Utility
- Intel HD Graphics Driver
- Realtek High Definition Audio Driver
- Intel PRO LAN Network Drivers
- Intel ME 14.x Drivers

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3.1   Introduction

This section describes the installation procedures for software and drivers. The software and drivers are included with the motherboard. If you find anything missing, please contact the distributor where you made the purchase. 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.   Insert the disk enclosed in the package with the board. Click **Intel** on the left pane and then **Intel(R) CometLake Chipset Drivers** on the right pane.

2. Click **Intel(R) Chipset Software Installation Utility**.

3. When the *Welcome* screen to the Intel® Chipset Device Software appears, click **Next** to continue.

4. Click **Yes** to accept the software license agreement and proceed with the installation process.

5. On the *Readme File Information* screen, click **Install**.
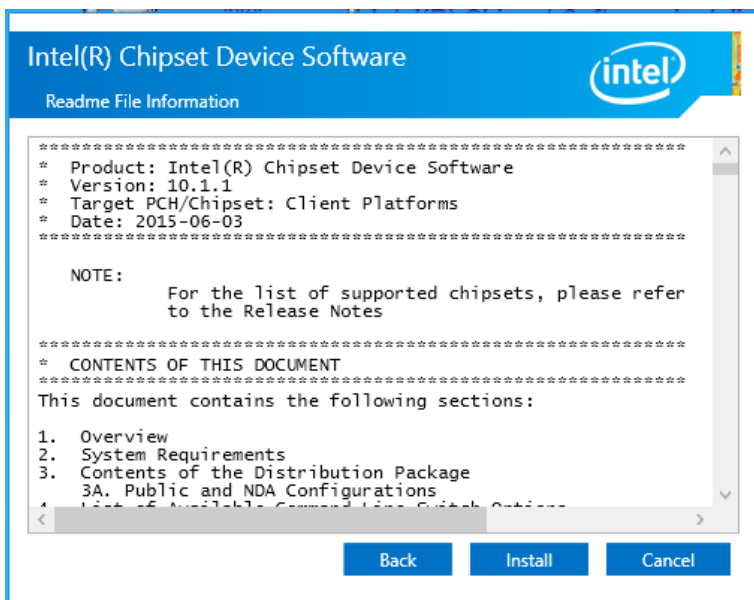
6. After the Intel Chipset Device Software has been installed, click **Finish** to complete the setup process.

3.3   VGA Driver Installation

1.   Insert the disk enclosed in the package with the board. Click **Intel** on the left pane and then **Intel(R) CometLake Chipset Drivers** on the right pane.

2.   Click **Intel(R) HD Graphics Driver**.

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

4.   Click **Yes** to accept the license agreement and click **Next**.

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

6.   Whent Setup is complete, click **Finish**

3.4 Realtek High Definition Audio Driver

1.   Insert the disk enclosed in the package with the board. Click **Intel** on the left pane and then **Intel(R) CometLake Chipset Drivers** on the right pane.

2.   Click **Realtek High Definition Audio Driver**.

3.   On the *Welcome* screen of the InstallShield Wizard, click **Next**. The InstallShield Wizard will install the driver on your computer.

4.   When the InstallShield Wizard has successfully installed the audio driver, restart the computer.

3.5 Intel(R) PRO LAN Network Drivers

1. Insert the disk enclosed in the package with the board. Click **Intel** on the left pane and then **Intel(R) CometLake Chipset Drivers** on the right pane.

2. Click **Intel(R) PRO LAN Network Drivers**.

3. On the next screen, click **Install Drivers and Software**.

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

5. Click **Next** to accept the license agreement.

6. Select the program features you want installed and click **Next**.

7. Click **Install** to begin the installation.

3.6 Intel(R) ME 14.x Drivers

1. Insert the disk enclosed in the package with the board. Click **Intel** on the left pane and then **Intel(R) CometLake Chipset Drivers** on the right pane.

2. On the next screen, click **Intel(R) ME 14.x Drivers**.

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

4. Click **Next** to accept the license agreement.

5. In the *Destination Folder* screen, click **Next**.

6. When the Intel management engine components have been successfully installed, click **Finish**.

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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. Press the <Del> key immediately allows you to enter the Setup utility. If you are a little bit late pressing the <Del> 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


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

    BIOS Information                                        Set the Date. Use Tab to
                                                           switch between Date elements.
    BIOS Version                MI999AF-Q-JS001-201006      Default Ranges:
                                                           Year: 1998-9999
    Total Memory                8192 MB                     Months: 1-12
    Memory Frequency            2400 MHz                    Days: Dependent on month
                                                           Range of Years may vary.
    System Date                 [Tue 10/13/2020]
    System Time                 [13:48:49]


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


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```

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

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

  ▶ Connectivity Configuration               Configure Connectivity related
  ▶ CPU Configuration                        options
  ▶ Power & Performance
  ▶ PCH-FW Configuration
  ▶ Trusted Computing
  ▶ ACPI Settings
  ▶ LVDS (eDP/DP) Configuration
  ▶ F81964 Super IO Configuration
  ▶ F81964 Hardware Monitor
  ▶ USB Configuration
  ▶ Network Stack Configuration
  ▶ NVMe Configuration
                                             →←: Select Screen
                                             ↑↓: Select Item
                                             Enter: Select
                                             +/-: Change Opt.
                                             F1: General Help
                                             F2: Previous Values
                                             F3: Optimized Defaults
                                             F4: Save & Exit
                                             ESC: Exit



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```

BIOS Setting	Description
Connectivity Configuration	Configures connectivity related options.
CPU Configuration	Displays CPU configuration parameters.
Power & Performance	Power & Performance control options.
PCH-FW Configuration	Configures management engine technology parameters.
Trusted Computing	Trusted computing settings.
ACPI Settings	Displays system ACPI parameters.
LVDS (eDP/DP) Configuration [1]	Configures LVDS (eDP/DP).
F81964 Super IO Configuration	Displays super IO chip parameters.
F81964 Hardware Monitor	Shows super IO monitor hardware status.
USB Configuration	Displays USB configuration parameters.
Network Stack Configuration	Netowrk Stack settings.
NVMe Configuration [2]	NVMe device option settings.

[1]: LVDS (eDP/DP) Configuration is available for MI999AF series and MI999EF.

[2]: NVMe Configuration is available for MI999AF series only.

4.4.1 Connectivity Configuration

BIOS Setting	Description
CNV1 Mode	This option configures connectivity. **Auto Detection** means that if Discrete solution is discovered it will be enabled by default. Otherwise Integrated solution (CNV1) will be enabled. **Disable Integrated** disables Integrated Solution.
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 solution are based on Intel components.
Discrete Bluetooth Module	Serial I/O UART0 needs to be enabled to select BT module.
Advanced settings	Configures ACPI objects for wireless devices.
WWAN Configuration	Configures WWAN related options.

4.4.2   CPU Configuration
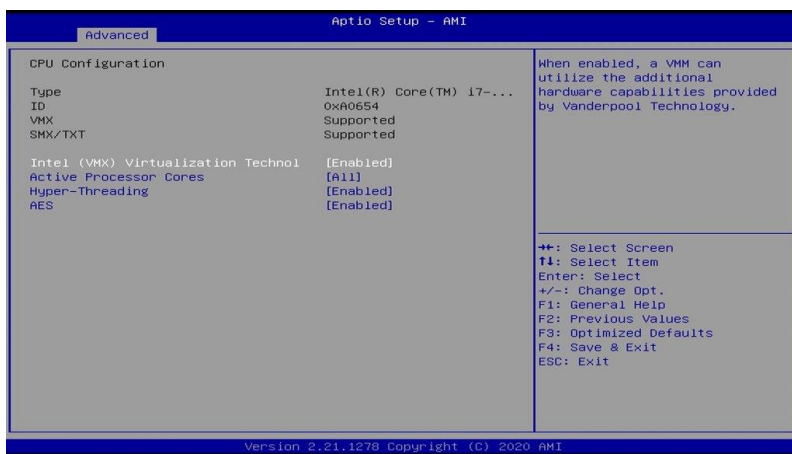
BIOS Setting	Description
Intel (VMX) Virtualization Technology	Enables / Disables a VMM to utilize the additional hardware capabilities provided by Vanderpool Technology.
Active Processor Cores	Number of cores to enable in each processor package. Options: All, 1, 2, 3, 4, 5
Hyper-Threading	**Enabled** for Windows XP and Linux (OS optimized for Hhyper-Threading Technology) and **Disabled** for other OS (OS not optimized for Hyper-Threading Technology).
AES	Enables / Disables AES (Advaned Encryption Standard).

4.4.3   Power & Performance

```
                              Aptio Setup - AMI
        Advanced

     Power & Performance                                 CPU - Power Management Control
                                                         Options
  ▶ CPU - Power Management Control
```

```
                              Aptio Setup - AMI
        Advanced

     CPU - Power Management Control                      Select the performance state
                                                         that the BIOS will set
     Boot performance mode            [Turbo Performance] starting from reset vector.
     Intel(R) SpeedStep(tm)           [Enabled]
     Intel(R) Speed Shift Technology  [Enabled]
     Turbo Mode                       [Enabled]
```

BIOS Setting	Description
CPU – Power Management Control	CPU – Power management control options.
Boot performance mode	Select the performance state that the BIOS will set starting from reset vector. Options: Max Battery, Maxc non-Turbo Performance, and Turbo Performance
Intel(R) SpeedStep(tm)	Allows more than two frequency ranges to be supported.
Intel(R) Speed Shift Technology	Enable/Disable intel Speed Shift Technology support. Enabling will expose the CPPC v2 interface to allow for hardware controlled P-states.
Turbo Mode	Enable/Disable processor Turbo Mode (requires Intel Speed Step or Intel Speed Shift to be available and enabled.)

4.4.4   PCH-FW Configuration
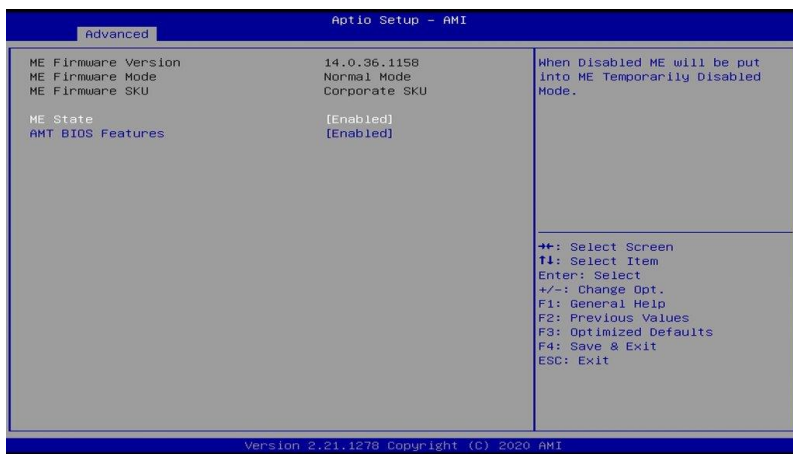
BIOS Setting	Description
ME State	When disabled, mEwill nbe put into ME Temporarily Disabled Mode.
AMT BIOS Features	When disabled, AMT BIOS Features are no longer able to access MEBx Setup. Note: This option does not disable Manageability Features in FW.

4.4.5   Trusted Computing

```
                            Aptio Setup - AMI
    Advanced

  TPM 2.0 Device Found                           Enables or Disables BIOS
  Firmware Version:            7.62              support for security device.
  Vendor:                     IFX               O.S. will not show Security
                                                Device. TCG EFI protocol and
  Security Device Support      [Enable]         INT1A interface will not be
  Pending operation            [None]           available.




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



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```

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.
Pending operation	Scheule an operation for the security device. Note: Your computer will reboot during restart in order to change state of security device.

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4.4.6   ACPI Settings

```
                              Aptio Setup - AMI
     ┌─────────┐
     │Advanced │
     └─────────┘
    ACPI Settings                                     Enables or Disables System
                                                      ability to Hibernate (OS/S4
    Enable Hibernation           [Enabled]            Sleep State). This option may
    ACPI Sleep State             [S3 (Suspend to RAM)]not be effective with some
                                                      operating systems.



                   ┌─────── Enable Hibernation ───────┐
                   │ Disabled                          │
                   │ Enabled                           │  →←: Select Screen
                   └───────────────────────────────────┘  ↑↓: Select Item
                                                      Enter: Select
                                                      +/-: Change Opt.
                                                      F1: General Help
                                                      F2: Previous Values
                                                      F3: Optimized Defaults
                                                      F4: Save & Exit
                                                      ESC: Exit


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```

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

4.4.7   LVDS (eDP/DP) Configuration


```
                              Aptio Setup - AMI
        Advanced
                                                        LVDS (eDP/DP) ON/OFF
    LVDS (eDP/DP) Configuration

    LVDS (eDP/DP) Support            [Disabled]




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



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```

Note: LVDS (eDP/DP) configuration is only available for MI999AF series and MI999EF.

BIOS Setting	Description
LVDS (eDP/DP) Support	Enables / Disables LVDS (eDP/DP).
Panel Color Depth	Selects a panel color depth as 18 or 24 (VESA or JEIDA) bit.
LVDS Channel Type	Sets the LVDS channel type as single or dual channel.
Panel Type	Selects a resolution that fits your panel. Options are from 800 x 480 to 1920 x 1200
LVDS Backlight Level Control	Selects from Level 1 to Level 8 for the LVDS backlight.

4.4.8   F81964 Super IO Configuration

BIOS Setting	Description
Standby Power On S5 (ERP)	Enables / Disables the standby power. * Available for MI999EF only.
Power Failure	Options: Always on, Always off
Serial Port Configuration	Sets parameters of Serial Ports. Enables / Disables the serial port and select an optimal setting for the Super IO device.

4.4.7.1.   Serial Port 1~4 Configuration

BIOS Setting	Description
Serial Port	Enables / Disables the serial port.
Change Settings	Selects an optimal settings for Super IO device.
Device Mode* *(for Port 1/2 only)*	Changes the serial port mode to: • RS232 • RS485 TX Low Active • RS485 with Termination TX Low Active • RS422 • RS422 with Termination

**Remarks: Device Mode is supported on MI999AF(E)-Q and
MI999AF(E)-W, but not MI999EF(E)-H.*

F81964 Hardware Monitor

```
                              Aptio Setup - AMI
       Advanced

    Pc Health Status

    CPU Smart Fan Control             [Disabled]
    SYS Smart Fan Control             [Disabled]

    CPU temperature                   : +36 °C
    SYS temperature                   : +34 °C
    CPU Fan Speed                     : 0 RPM
    SYS Fan Speed                     : 4043 RPM
    VCore                             : +1.136 V
    VCC5V                             : +5.129 V
    VCC12V                            : +12.320 V
    Memory                            : +1.192 V
                                                        →←: Select Screen
                                                        ↑↓: Select Item
                                                        Enter: Select
                                                        +/-: Change Opt.
                                                        F1: General Help
                                                        F2: Previous Values
                                                        F3: Optimized Defaults
                                                        F4: Save & Exit
                                                        ESC: Exit


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```

BIOS Setting	Description
CPU Smart Fan Control	Enables / Disables the CPU smart fan feature.
	Options: Disabled / 50 °C / 60 °C / 70 °C / 80 °C
System Smart Fan Control	Enables / Disables the system 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.
CPU Shutdown Temperature	Options: Disabled / 70 °C / 75 °C / 80 °C / 85 °C / 90 °C / 95 °C

4.4.9 USB Configuration
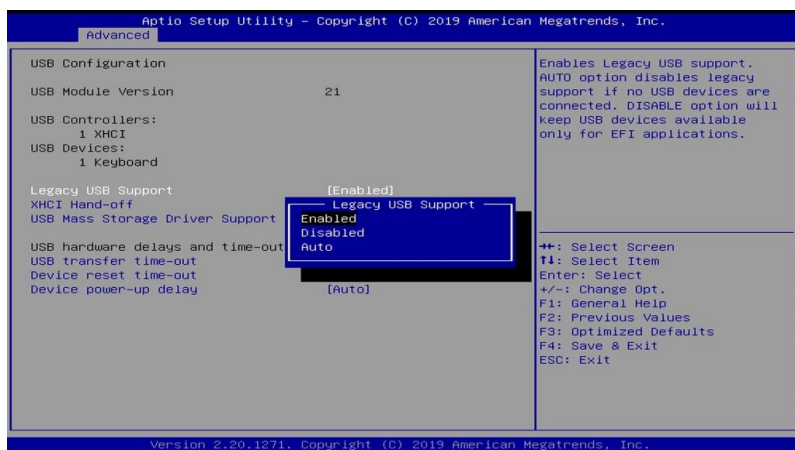
BIOS Setting	Description
Legacy USB Support	Enables Legacy USB support. • **Auto** disables legacy support if there is no USB device connected. • **Disable** keeps USB devices available only for EFI applications.
XHCI Hand-off	This is a workaround for OSes without XHCI hand-off support. The XHCI ownership 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. Options: 1 sec / 5 sec / 10 sec / 20 sec
Device reset time-out	Seconds of delaying execution of start unit command to USB mass storage device. Options: 10 sec / 20 sec / 30 sec / 40 sec
Device power-up delay	The 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. But for a Hub port, the delay is taken from Hub descriptor. Options: Auto / Manual

4.4.10 Network Stack Configuration
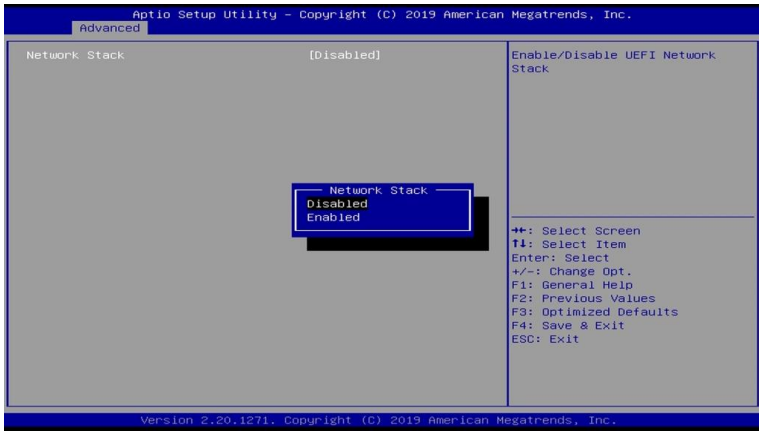
BIOS Setting	Description
Network Stack	Enables / Disables UEFI Network Stack.

4.4.11 NVMe Configuration

4.5 Chipset Settings

```
            Aptio Setup Utility – Copyright (C) 2019 American Megatrends, Inc.
      Main  Advanced  Chipset  Security  Boot  Save & Exit

   ▶ System Agent (SA) Configuration              System Agent (SA) Parameters
   ▶ PCH-IO Configuration




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


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```

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

4.5.1   System Agent (SA) Configuration

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

   System Agent (SA) Configuration                Graphics Configuration

   SA PCIe Code Version          7.0.72.64
   VT-d                          Supported

 ▶ Graphics Configuration
   VT-d                          [Enabled]
```

BIOS Setting	Description
Graphics Configuration	Configures the graphics settings.
VT-d	Checks if VT-d function on MCH is supported.

4.5.1.1. Graphics Configuration

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

    Graphics Configuration                                    Select which of IGFX/PEG/PCI
                                                              Graphics device should be
    Primary Display                  [Auto]                   Primary Display Or select SG
    Select PCIE Card                 [Auto]                   for Switchable Gfx.
    Internal Graphics                [Auto]
    GTT Size                         [8MB]
    Aperture Size                    [256MB]




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



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```

| BIOS Setting	Description
Primary Display	Select which of IGFX/PEG/PCI Graphics device should be primary display or select SG for switchable Gfx. Options: Auto, IGFX, PEG, PCI, SG
Select PCIE Card	Selects the card used on the platform. **Auto** skips GPIO based Power Enable to dGPU. **E1k Creek 4:** DGPU Power Enable = Active Low. **PEG Eva1:** DGPU Power Enable = Active High.
Internal Graphics	Keep IGFX enabled based on the setup options. Options: Auto, Disabled, Enabled
GTT Size	Sets the GTT size as 2 MB, 4 MB, or 8 MB.
Aperture Size	Sets the aperture size as 128 MB, 256 MB, 512 MB, 1024 MB or 2048 MB. **Note:** Above 4 GB MMIO BIOS assignment is automatically enabled when selecting 2048 MB aperture. To use this feature, disable CSM support.

4.5.2   PCH-IO Configuration

BIOS Setting	Description
SATA and RST Configuration	Configures SATA devices.
PCH LAN Controller	Enables / Disables the onboard NIC.
Wake on LAN Enable	Enables / Disables the integrated LAN to wake up the system.
PS_ON Enable	Enables / Disables PS_ON support a new C10 state from the CPU on desktop SKUs that enables a lower power target that will be required by the California Energy commission (CEC).

4.5.2.1.   SATA and RST Configuration:
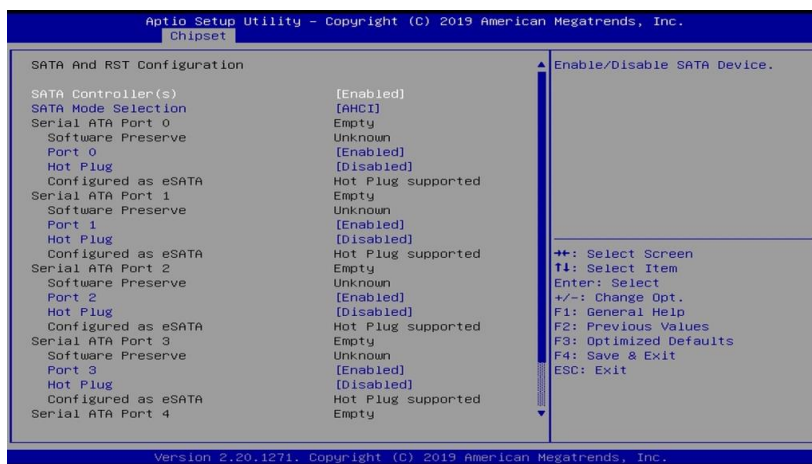
BIOS Setting	Description
SATA Controller(s)	Enables / Disables the SATA device.
SATA Mode Selection	Determines how SATA controller(s) operate. Options: AHCI / Intel RST Premium
Serial ATA Ports	Enables / Disables serial ports.
SATA Ports Hot Plug	Enables / Disables SATA Ports HotPlug.

4.6 Security Settings
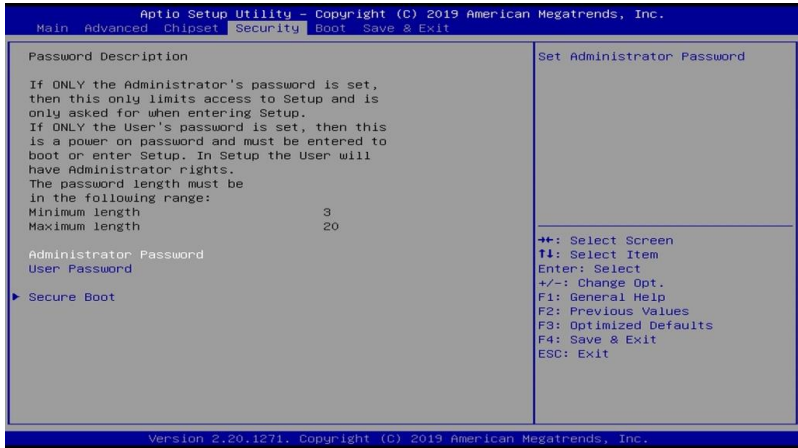
| BIOS Setting	Description
Administrator Password	Sets an administrator password for the setup utility.
User Password	Sets a user password.
Secure Boot	Configures Secure Boot.

4.6.1   Secure Boot

BIOS Setting	Description
Secure Boot	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.

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BIOS Setting	Description
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	Forces system to user mode. Install factory default Secure Boot key databases.
Key Management	Enables expert users to modify Secure Boot Policy variables without full authentication.

4.6.1.1.   Key Management

BIOS Setting	Description
Factory Key Provision	Install factory default Secure Boot keys after the platform reset and while the system is in Setup mode.
Restore Factory Keys	Forces system to use mode. Install factory default Secure Boot Key databases.
Enroll Efi Image	Allow the image to run in Secure Boot mode. Enroll SHA256 Hash certificate of a PE image into Authorized Signature Database (db).
Restore DB defaults	Restore DB variable to factory defaults.
Secure Boot variable	Enroll factory defaults or load certificates from a file. 1. Public key certificate: EFI_SIGNATIRE_LIST, EFI_CERT_X509 (DER), EFI_CERT_RSA2048 (bin), EFI_CERT_SHAxxx 2. Authenticated UEFI Variable 3. EFI PE/COFF image (SHA256)

4.7 Boot Settings

```
                 Aptio Setup Utility – Copyright (C) 2019 American Megatrends, Inc.
      Main  Advanced  Chipset  Security  Boot  Save & Exit

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

      Boot mode select                          [UEFI]

      FIXED BOOT ORDER Priorities
      Boot Option #1                            [Hard Disk]
      Boot Option #2                            [CD/DVD]
      Boot Option #3                            [USB Hard Disk]
      Boot Option #4                            [USB CD/DVD]
      Boot Option #5                            [USB Key]         ++: Select Screen
      Boot Option #6                            [USB Floppy]      ↑↓: Select Item
      Boot Option #7                            [USB Lan]         Enter: Select
      Boot Option #8                            [Network]         +/-: Change Opt.
                                                                  F1: General Help
                                                                  F2: Previous Values
                                                                  F3: Optimized Defaults
                                                                  F4: Save & Exit
                                                                  ESC: Exit


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

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.
Boot mode select	Selects a Boot mode, Legacy / UEFI.
Boot Option Priorities	Sets the system boot order.

4.8 Save & Exit Settings
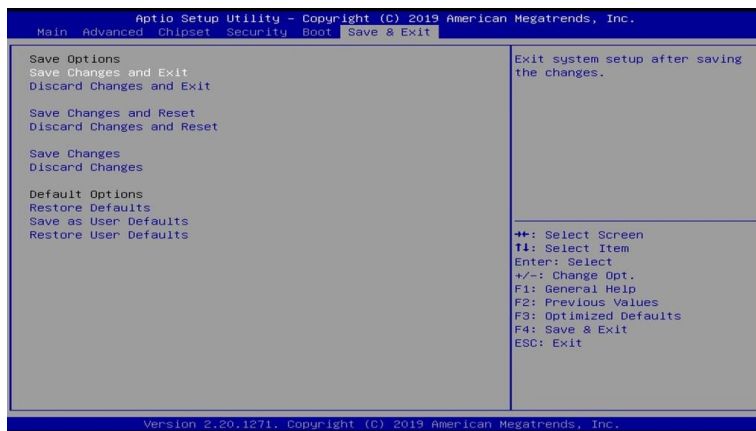
BIOS Setting	Description
Save Changes and Exit	Exits system setup after saving the changes.
Discard Changes and Exit	Exits system setup without saving any changes.
Save Changes and Reset	Resets the system after saving the changes.
Discard Changes and Reset	Resets system setup without saving any changes.
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.

Appendix

This section provides the mapping addresses of peripheral devices, the sample code of watchdog timer configuration, and types of on-board connectors.

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
0x00003000-0x00003FFF	Intel(R) PCI Express Root Port #12 - 06B3
0x0000EFA0-0x0000EFBF	Intel(R) SMBus - 06A3
0x000003F8-0x000003FF	Communications Port (COM1)
0x000002F8-0x000002FF	Communications Port (COM2)
0x000003E8-0x000003EF	Communications Port (COM3)
0x000002E8-0x000002EF	Communications Port (COM4)
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
0x00001800-0x000018FE	Motherboard resources
0x00004000-0x0000403F	Intel(R) UHD Graphics 630
0x000000F0-0x000000F0	Numeric data processor
0x00000000-0x00000CF7	PCI Express Root Complex
0x00000D00-0x0000FFFF	PCI Express Root Complex
0x00000040-0x00000043	System timer
0x00000050-0x00000053	System timer
0x00001854-0x00001857	Motherboard resources
0x00002000-0x000020FE	Motherboard resources
0x00004090-0x00004097	Standard SATA AHCI Controller
0x00004080-0x00004083	Standard SATA AHCI Controller
0x00004060-0x0000407F	Standard SATA AHCI Controller
0x0000FFF8-0x0000FFFF	Intel(R) Active Management Technology - SOL (COM5)

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 0	System timer
IRQ 4	Communications Port (COM1)
IRQ 3	Communications Port (COM2)
IRQ 7	Communications Port (COM3)
IRQ 6	Communications Port (COM4)
IRQ 13	Numeric data processor
IRQ 14	Intel(R) Serial IO GPIO Host Controller - INT3450
IRQ 16	High Definition Audio Controller
IRQ 19	Intel(R) Active Management Technology - SOL (COM5)
IRQ 4294967290	Intel(R) Ethernet Connection (11) I219-LM
IRQ 4294967279~89	Intel(R) I211 Gigabit Network Connection
IRQ 4294967278	Intel(R) Management Engine Interface
IRQ 4294967294	Intel(R) PCI Express Root Port #12 - 06B3
IRQ 4294967293	Intel(R) PCIe Controller (x16) - 1901
IRQ 4294967280	Intel(R) UHD Graphics 630
IRQ 4294967291	Intel(R) USB 3.1 eXtensible Host Controller - 1.10 (Microsoft)
IRQ 55 ~ IRQ 204	Microsoft ACPI-Compliant System
IRQ 256 ~ IRQ 511	Microsoft ACPI-Compliant System
IRQ 4294967279	Intel(R) I210 Gigabit Network Connection
IRQ 4294967290	Intel(R) UHD Graphics
IRQ 4294967289	Intel(R) USB 3.1 eXtensible Host Controller - 1.10 (Microsoft)
IRQ 4	Communications Port (COM1)
IRQ 3	Communications Port (COM2)
IRQ 5	Communications Port (COM3)
IRQ 10	Communications Port (COM4)
IRQ 4294967292	Standard SATA AHCI Controller
IRQ 4294967292	Standard SATA AHCI Controller
IRQ 45	Trusted Platform Module 2.0

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 = F81866_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)
{
            outportb(F81964_INDEX_PORT, F81964_UNLOCK);
            outportb(F81964_INDEX_PORT, F81964_UNLOCK);
}
//-------------------------------------------------------------------------
void Lock_F81964 (void)
{
            outportb(F81964_INDEX_PORT, F81964_LOCK);
}
//-------------------------------------------------------------------------
void Set_F81964_LD( unsigned char LD)
{
            Unlock_F81964();
            outportb(F81964_INDEX_PORT, F81964_REG_LD);
            outportb(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;
}
//-----------------------------------------------------------------------




//-----------------------------------------------------------------------
//
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// 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_F81866(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.   On-Board Connector Types

Function	Connector	Onboard Type	Mating Type
COM1 & COM2 RS-232/422/485 Ports	CN1	Yimtex 409S09PAANSNKR	D-Sub 9P (female)
COM3 & COM4 RS-232 Ports	J5 (COM3), J6 (COM4)	Haoguo DF11-10S-PA66H	HRS DF11-10DS-2C
eDP Connector	CN6	KEL SSL00-40S	KEL SSL20-40S
Digital I/O Connector	J3	E-call P2101-10S	Dupont 10P 2mm-pitch (female)
ATX Power Connector	J7	Haoguo 01-0018-03	Molex 39-01-2240
ATX 12V Power Connector	ATX_12V_2X1	Haoguo 01-0018-02	Molex 39-01-2080
Dual USB 2.0 Connector	J11, J15	Haoguo DF11-8S-PA66H	HRS DF11-8DS-2C
Front Panel Audio Connector	J17	E-call P2100-9S10H	Dupont 10P 2.54 mm-pitch (female)
Front Panel Settings Connector	J19	E-call P2100-8S	Dupont 8P 2.54 mm-pitch (female)
LVDS Connector	J12, J13	HRS DF20G-20DP-1V(56)	HRS DF20A-20DS-1C
Fan Power Connector	CPU_FAN1, SYS_FAN1	Techbest W2-03I104132S1WT(A)-L	Molex 47054-1000