IB956

11th Generation Intel®
Core™ i7/i5/i3/ Celeron®
3.5" Disk-Size SBC

User's Manual

Version 1.0A
(October 2022)

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Compliance

CE

This product has passed CE Class B tests for environmental specifications and limits. This product is in accordance with the directives of the European Union (EU). 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 B 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)

Important Safety Information

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

There is 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
- Optional Accessories
- Specifications
- Block Diagram
- Board Pictures
- Board Dimensions

1.1 Introduction

IB956 is a 3.5" disk-size single board computer based on the platform of 11th Gen Intel® Core™ i7/i5/i3/ Celeron® processor and Intel® QM580E/HM570E chipsets. It features one DDR4 SO-DIMM socket with 32GB capacity and display interfaces including DisplayPort, and 24-bit dual-channel LVDS. With two RJ45 for Gigabit Ethernet, the I/O on board also include 6x USB3.1, 2x USB2.0, 2x SATA III, 2x COM, and 2x M.2 sockets.

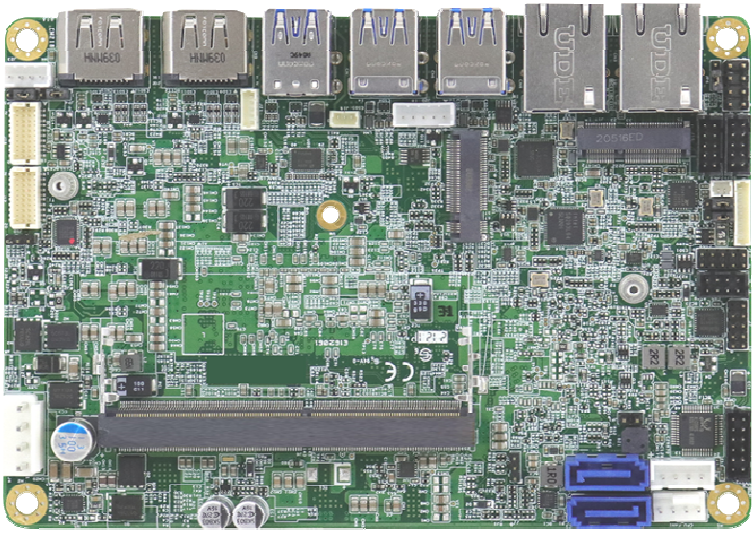


Photo of IB956

1.2 Features

- Onboard 11th Gen Intel® CoreTM i7/i5/i3 processor
- 1x DDR4 SO-DIMM, Max.32GB
- DisplayPort and 24-bit dual-channel LVDS interface
- 2x Intel® 2.5 Gigabit LAN
- 6x USB3.1, 2x USB2.0, 2x SATA III, 2x COM, 2x M.2
- Watchdog timer, Digital I/O, iAMT (15)*, TPM (2.0)

*iAMT (15) for IB956AF only

1.3 Packing List

Your IB956 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.

- IB956 SBC x 1
- Disk x 1
  (including chipset drivers and flash memory utility)
- This User's Manual x 1

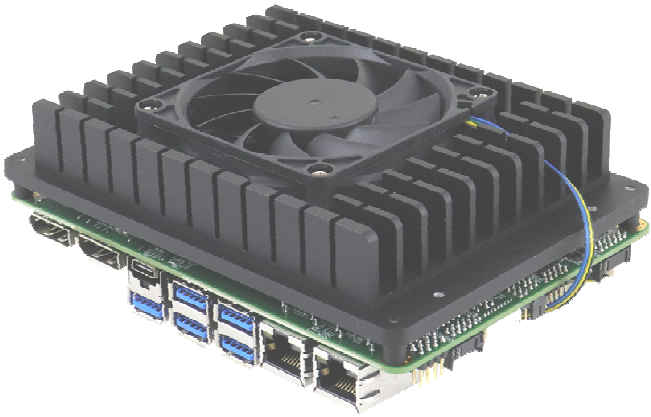
1.4 Optional Accessories

IBASE provides the following optional accessories:

- Cable Kit (IB92)

  Including:
  DC-In power cable (PW595) x 1
  COM ports cable (PK1H) x 1
  SATA & HDD power cable (SATA-53A) x 1

- Audio cable (Audio-18)
- USB 2.0 cable (USB29)
- Heat spreader (HSIB956-1)
- Heat sink (HSIB956-A)



1.5 Specifications

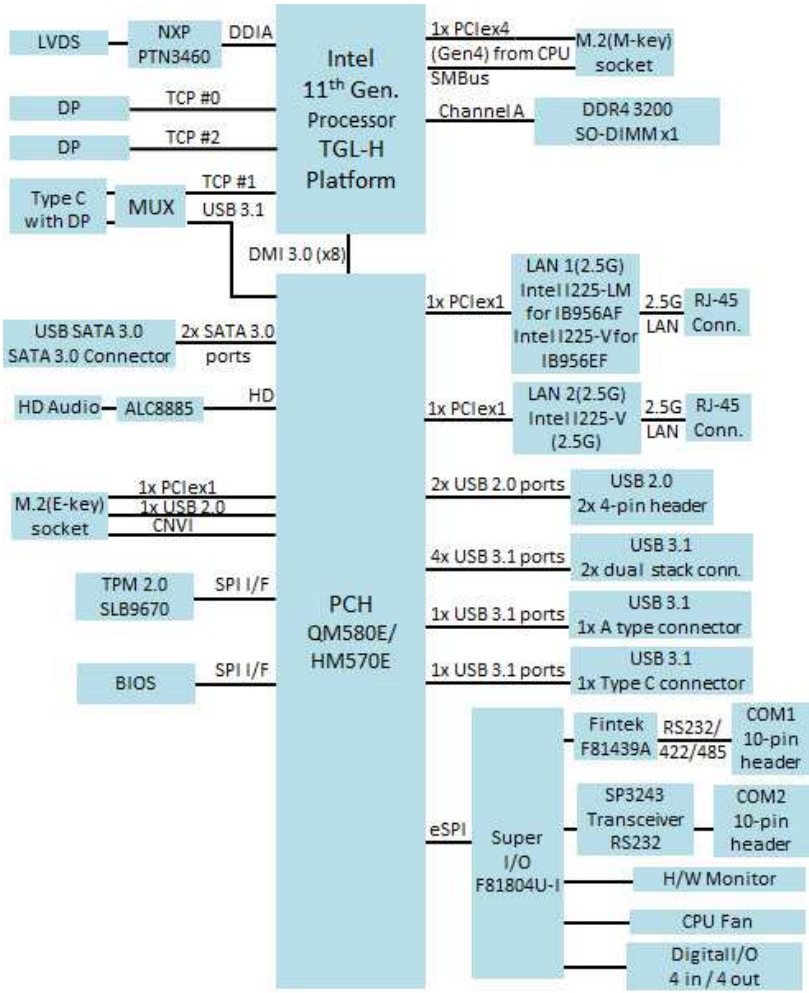
Model	IB956AF-i7	IB956AF-i5	IB956EF-i3
CPU	Intel Core i7-11850HE	Intel Core i5-11500HE	Intel Core i3-11100HE
CPU Speed	2.6GHz~4.7GHz	2.6GHz~4.5GHz	2.4GHz~4.4GHz
Smart Cache	24MB	12MB	8MB
Chipset	Intel® QM580E	Intel® QM580E	Intel® HM570E
Form Factor	3.5" disk-size SBC		
Operating System	Windows 10 Linux Ubuntu / Fedora		
Memory	1 x DDR4-3200 SO-DIMM, Max. 32GB		
Storage	NVMe		
Graphics	Processor Integrated Graphics		
Network	**1st LAN** IB956AF: Intel® I225-LM 2.5G IB956EF: Intel® I225-V 2.5G **2nd LAN** IB956AF: Intel® I225-V 2.5G IB956EF: Intel® I225-V 2.5G		
Super I/O	Fintek F81804U-I		
Audio Codec & Controller	Built-in HD with Realtek AL888S-VD2-GR		
Power Requirement	+12V (- 10 % tolerance) ~ +24V (+10 % tolerance) DC-in		
TPM	2.0		
Watchdog Timer	Yes (256 segments, 0, 1, 2…255 sec / min)		
BIOS	AMI BIOS		
H/W Monitor	Yes		
Dimensions	102.22 x 147.01 mm (4.02" x 5.8")		
RoHS 2	Yes		
Certification	CE, FCC Class B		

I/O Ports	
Display	• 3x DisplayPort (2x DP connector & Type-C) • 24-bit dual-channel LVDS
LAN	2 x RJ45 for 2.5 Gigabit Ethernet
USB	• 2x USB2.0 (Pin-header) • QM580E: 6x USB3.1 (GEN2) • HM570E: 4x USB3.1 (GEN2), 2x USB3.1(GEN1)
Serial	• 1x RS232/422/485 • 1x RS232 (COM2)
SATA	2 x SATA III
Audio	Built-in HD audio with Realtek ALC888S
Digital IO	4-In & 4-Out
Expansion Slots	• 1x M.2 (M-Key, Type:2280, supports NVMe with PCIe(4x) signal only) • 1x M.2 (E-Key, Type:2230, supports CNVi)

Environment	
Temperature	• Operation: 0 ~ 60 °C (32 ~ 140 °F) • Storage: -20 ~ 80 °C (-4 ~ 176 °F)
Relative Humidity	0 ~ 90 %, non-condensing at 60 °C

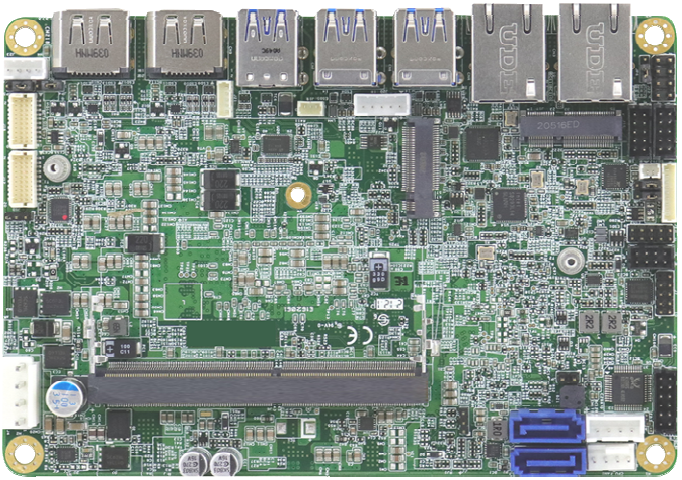
All specifications are subject to change without prior notice.

1.6 Block Diagram

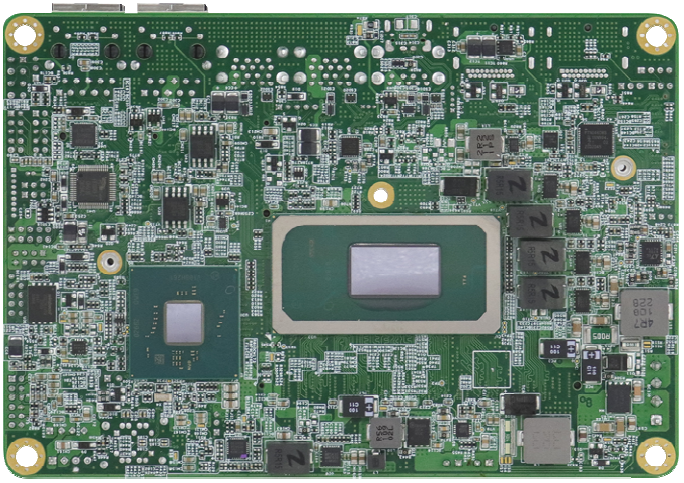


1.7 Board Pictures

Top View

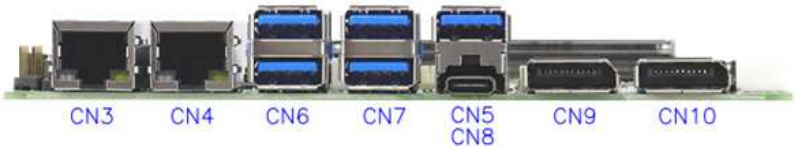


Bottom View



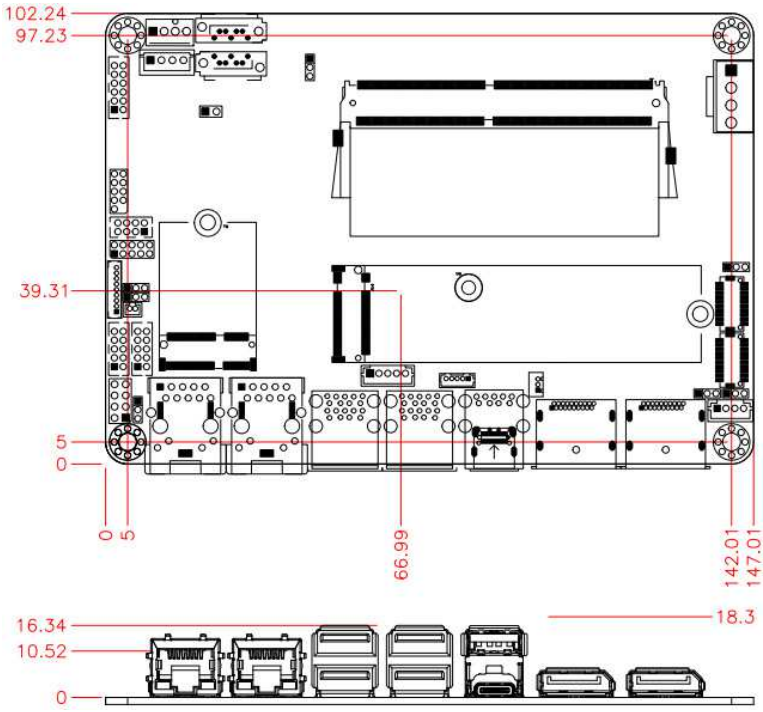
* The photos above are for reference only. Some minor components may differ.

I/O View



Connector	Function
CN3, CN4	2.5 GbE Ports
CN6, CN7, CN8, CN5	USB 3.1 Ports
CN9, CN10	DisplayPort

1.8 Dimensions



Chapter 2
Hardware Configuration

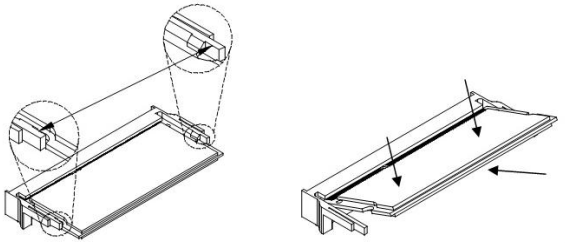
This section provides information on jumper settings and connectors on the IB956 in order to set up a workable system. On top of that, you will also need to install crucial pieces such as the CPU and the memory before using the product. The topics covered are:

- Essential installations
- Jumpers and connectors

2.1 Essential Installations

2.1.1 Installing the Memory

The IB956 supports one DDR4 memory socket. To install a module, locate the memory slot on the board and perform the following steps:



1. Align the key of the memory module with that on the memory slot and insert the module slantwise.
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.

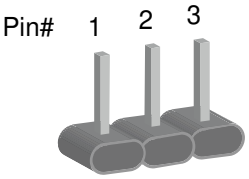
To remove the module, press the clips outwards with both hands, and the module will pop-up.

2.2 Setting the Jumpers

Set up and configure your IB956 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

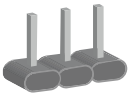
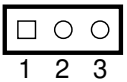
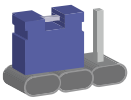
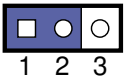
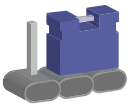
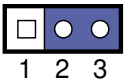
Jumpers are short-length conductors consisting of several metal pins with a non-conductive base mounted on the circuit board. Jumper caps are used to have the functions and features enabled or disabled. If a jumper has 3 pins, you can connect either PIN1 to PIN2 or PIN2 to PIN3 by shorting.



A 3-pin jumper

A jumper cap

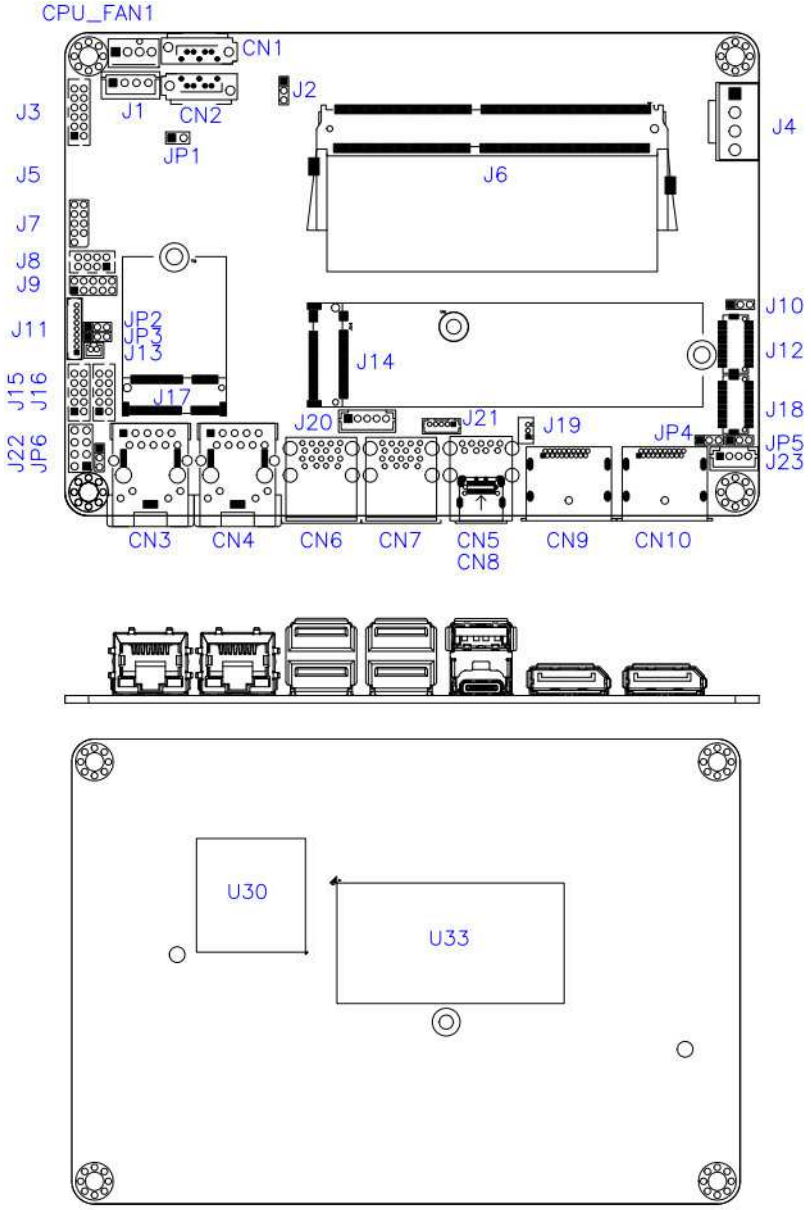
Refer to the illustration below to set jumpers.

Pin closed	Jumper	Setting
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**.

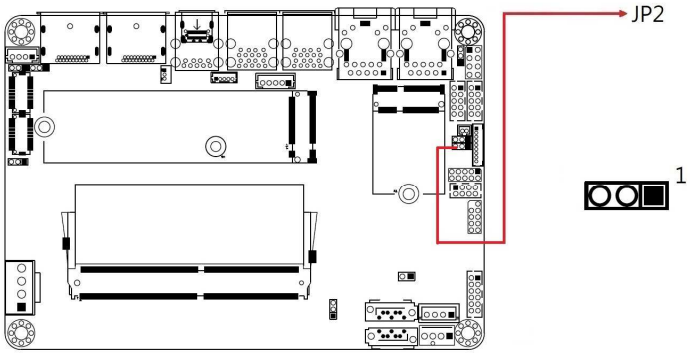
2.3 Jumper & Connector Locations

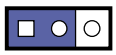
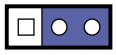


2.4 Jumpers Quick Reference

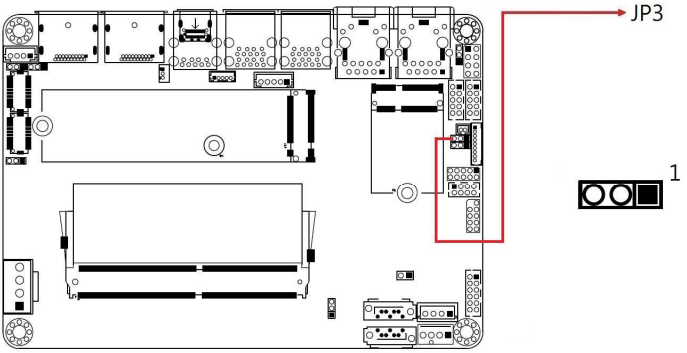
Function	Jumper
Clear RTC Data	JP2
Clear CMOS Data	JP3
AT/ATX Selection	JP6
LVDS Panel Power / Brightness Selections	JP4 (For power) JP5 (For brightness)

2.4.1 Clear RTC Data (JP2)



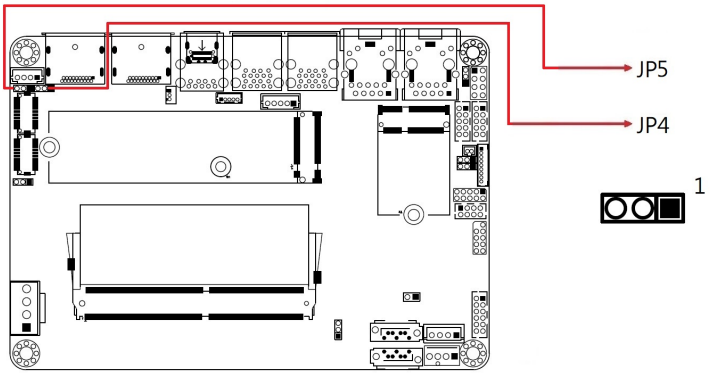
Function	Pin closed	Setting
Normal (default)	1-2	
Clear RTC	2-3	

2.4.2 Clear CMOS Data (JP3)



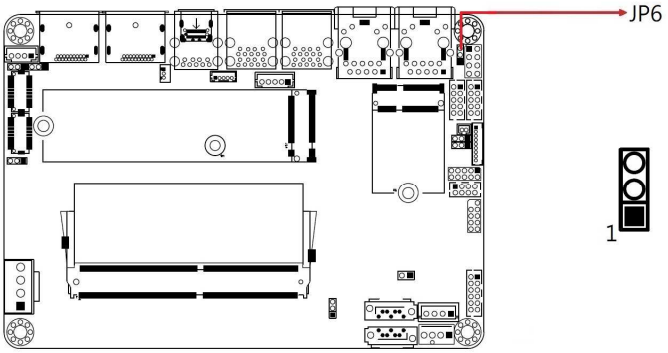
Function	Pin closed	Setting
Normal (default)	1-2	1
Clear CMOS	2-3	1

2.4.3 LVDS Panel Power / Brightness Selections (JP4 / JP5)



Jumper	Function	Pin closed	Setting
JP4 (For power)	3.3V (default)	1-2	1
	5V	2-3	1
JP5 (For Brightness)	3.3V (default)	1-2	1
	5V	2-3	1

2.4.4 AT / ATX Selection (JP6)

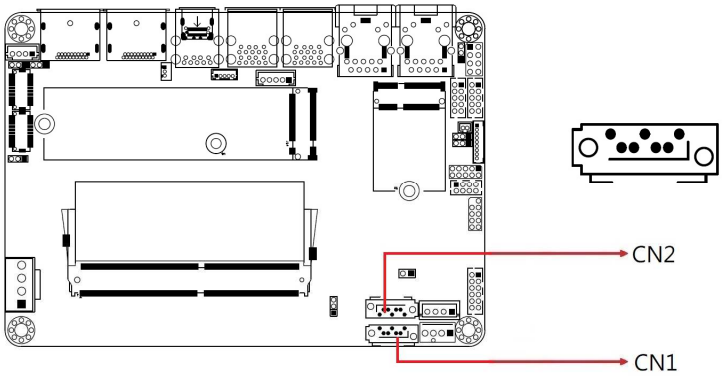


Function	Pin closed	Setting
ATX	1-2	1
AT	2-3	1

2.5 Connectors Quick Reference

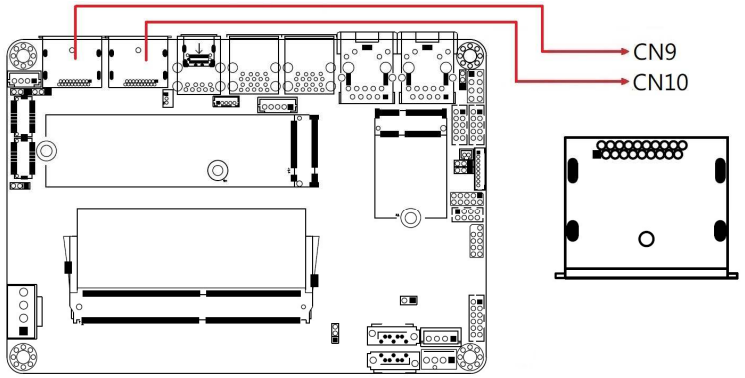
Function	Connector
SPI Flash Connector (factory use only)	J7
eSPI Debug (factory use only)	J11
Battery Connector	J13
DDR4 UDIMM CH-A	J6
M.2 M-Key 2280	J14
USB Type C Connector	CN8
USB 3.1 Connector	CN5
Dual USB 3.1 Ports	CN6, CN7
Two 2.5 GbE Ports	CN3, CN4
M.2 E-Key with CNVi	J17
SATA Connectors	CN1, CN2
SATA Power Connector	J1
DP Connectors	CN9, CN10
Audio Connector	J3
USB2 #7 #8	J8
DC-In Connector	J4
LVDS CHA Connector (1st, 2nd)	J18, J12
LVDS Backlight Connector	J23
Digital I/O Connector	J9
Front Panel Setting Connector	J22
COM1, COM2 Serial Ports	J15, J16
CPU Fan Power Connector	CPU_FAN1

2.5.1 SATA Connectors (CN1, CN2)



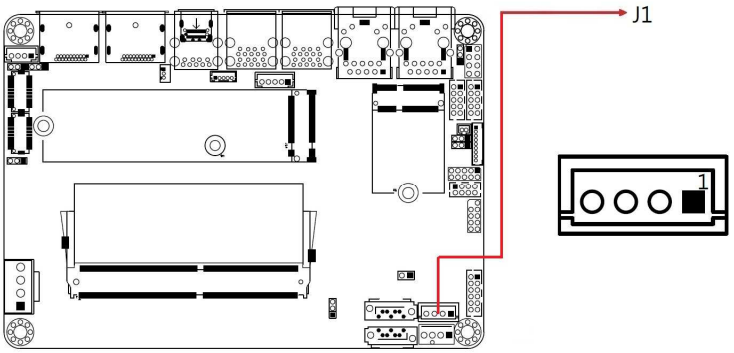
Pin	Assignment	Pin	Assignment
1	Ground	5	RX-
2	TX+	6	RX+
3	TX-	7	Ground
4	Ground		

2.5.2 DP Connectors (CN9, CN10)



Pin	Assignment	Pin	Assignment
1	LAN0_P	11	GND
2	GND	12	LAN3_N
3	LAN0_N	13	CONFIG
4	LAN1_P	14	GND
5	GND	15	AUXP
6	LAN1_N	16	GND
7	LAN2_P	17	AUXN
8	GND	18	Hot Plug
9	LAN2_N	19	GND
10	LAN3_P	20	+5V

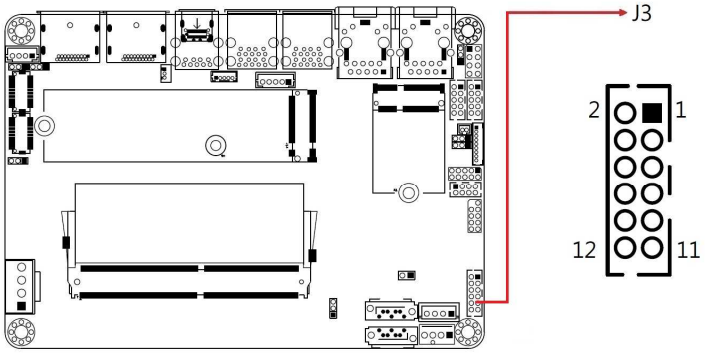
2.5.3 SATA Power Connector (J1)



Remarks: E-CALL_0110-071-040

Pin	Assignment
1	+5V
2	GND
3	GND
4	+12V

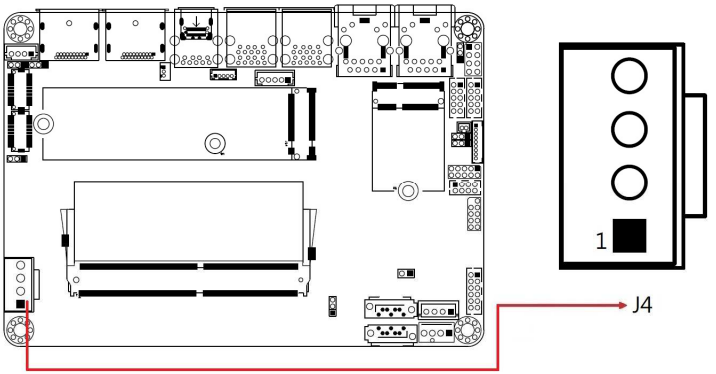
2.5.4 Audio Connector (J3)



Remarks: HK_DF11-12S-PA66H

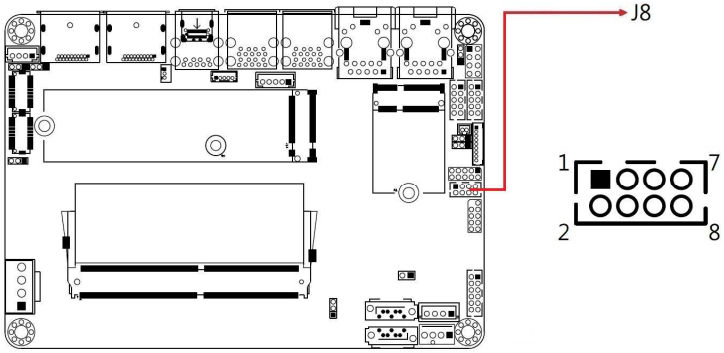
Pin	Assignment	Pin	Assignment
1	LINE OUT_L	2	LINE OUT_R
3	FRONT_JD	4	GND
5	LINE IN_L	6	LINE IN_R
7	LINE _JD	8	GND
9	MIC_L	10	MIC_R
11	MIC_JD	12	GND

2.5.5 DC-In Connector (J4)



Pin	Assignment
1	+12V~+24V
2	+12V~+24V
3	GND
4	GND

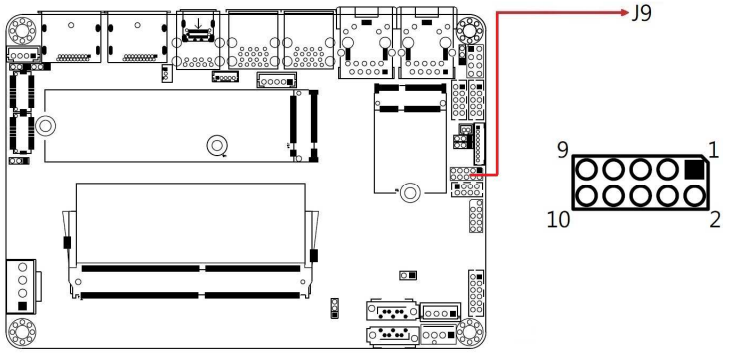
2.5.6 USB2 #7 #8 (J8)



Remarks: HK_DF11-8S-PA66H

Pin	Assignment	Pin	Assignment
1	+5V	2	GND
3	USB_PN	4	USB_PP
5	USB_PP	6	USB_PN
7	GND	8	+5V

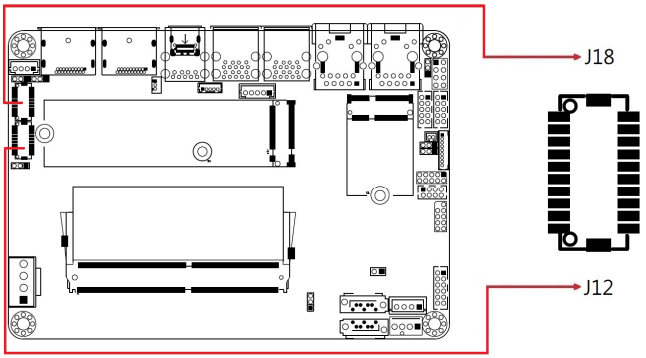
2.5.7 Digital I/O Connector (J9)



Remarks: 4 in, 4 out

Pin	Assignment	Pin	Assignment
1	Ground	2	+5V
3	Out3	4	Out1
5	Out2	6	Out0
7	IN3	8	IN1
9	IN2	10	IN0

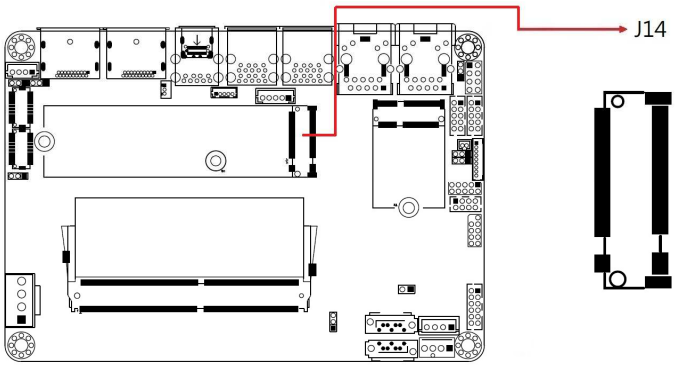
2.5.8 LVDS Connector (J12 - 2nd, J18 - 1st)



Remarks: Hirose DF20G-20DP-1V(56)

Pin	Assignment	Pin	Assignment
1	TX0P	2	TX0N
3	GND	4	GND
5	TX1P	6	TX1N
7	GND	8	GND
9	TX2P	10	TX2N
11	GND	12	GND
13	CLKP	14	CLKN
15	GND	16	GND
17	TX3P	18	TX3N
19	+3.3V or +5V	20	+3.3V or +5V

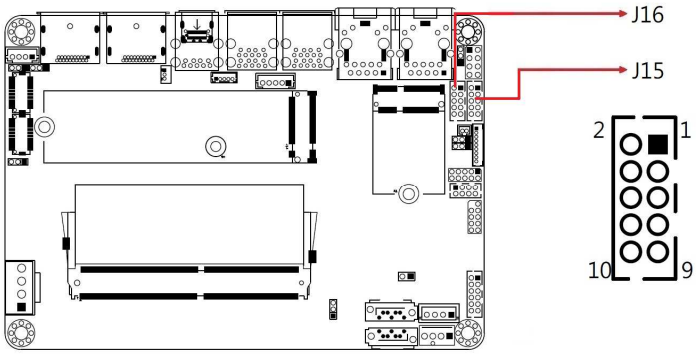
2.5.9 M.2 M-Key 2280 (J14)



M.2 M-Key 2280 (J14)

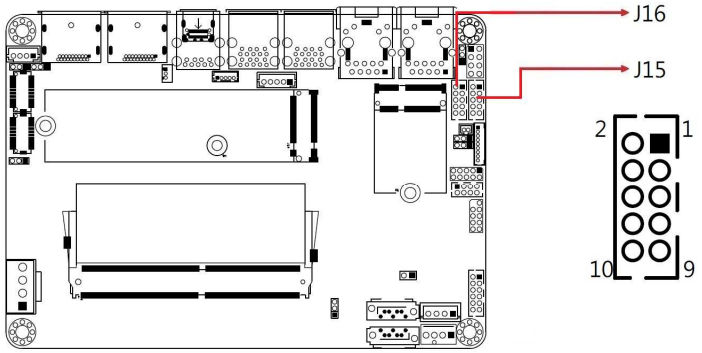
Pin	Assignment	Pin	Assignment
1	GND	2	+3.3V
3	GND	4	+3.3V
5	PERn3	6	NC
7	PERp3	8	NC
9	GND	10	HDD_LED#
11	PETn3	12	+3.3V
13	PETp3	14	+3.3V
15	GND	16	+3.3V
17	PERn2	18	+3.3V
19	PERp2	20	NC
21	GND	22	NC
23	PETn2	24	NC
25	PETp2	26	NC
27	GND	28	NC
29	PERn1	30	NC
31	PERp1	32	NC
33	GND	34	NC
35	PETn1	36	NC
37	PETp1	38	NC
39	GND	40	NC
41	PERn0	42	NC
43	PERp0	44	NC
45	GND	46	NC
47	PETn0	48	NC
49	PETp0	50	PERST#
51	GND	52	CLKREQ#
53	REFCLKn	54	PEWAKE#
55	REFCLKp	56	NC
57	GND	58	NC
	M-KEY		M-KEY
67	NC	68	SUSCLK
69	NC	70	+3.3V
71	GND	72	+3.3V
73	GND	74	+3.3V
75	GND		

2.5.10 COM2 RS-232 Port (J15)



Pin	Signal Name	Pin	Signal Name
1	Data carrier detect	2	Receive data
3	Transmit data	4	Data terminal ready
5	Ground	6	Data set ready
7	Request to send	8	Clear to send
9	Ring indicator	10	Key

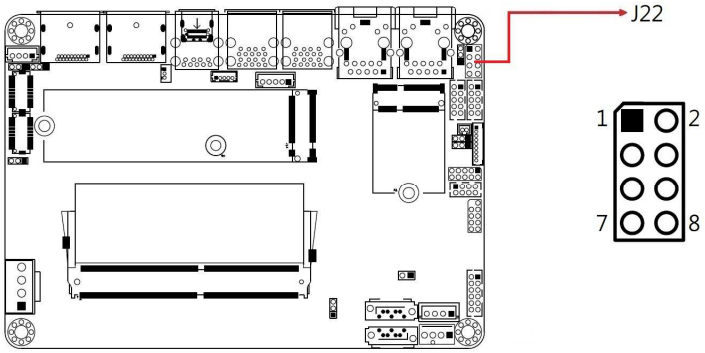
2.5.11 COM1 RS-232/422/485 Port (J16)



Remarks: HK_DF11-10S-PA66H

Pin	Assignment		
	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
10	NC	NC	NC

2.5.12 Front Panel Setting Connector (J22)



* E-CALL_0126-01-203-080

Pin	Assignment	Pin	Assignment
1	Power BTN	2	Power BTN
3	HDD LED+	4	HDD LED-
5	Reset BTN	6	Reset BTN
7	Power LED+	8	Power LED-

This connector provides interfaces for the following functions.

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

  The 2 pins make an “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 (Pins 3 and 4)**

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

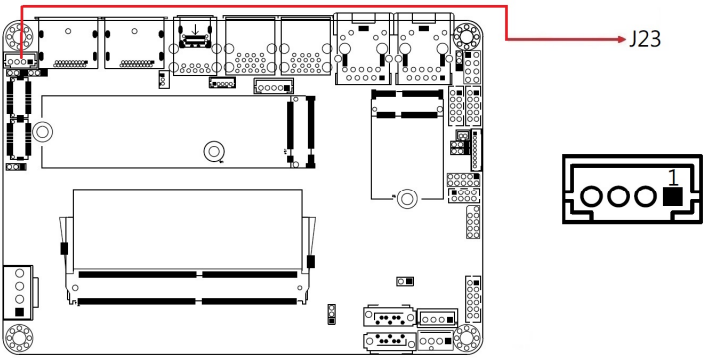
- **Reset Switch (Pins 5 and 6)**

  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: Pins 7 and 8**

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

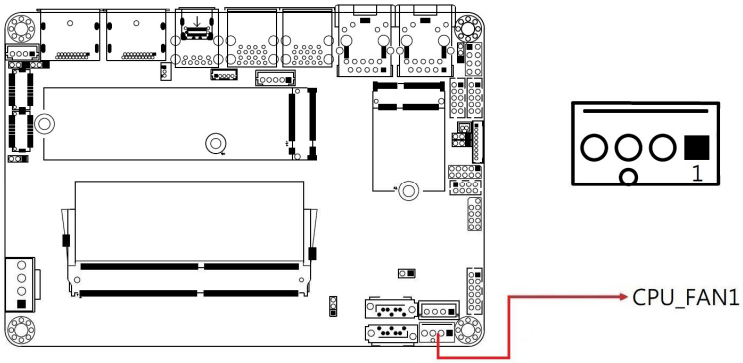
2.5.13 LVDS Backlight Connector (J23)



Remarks: E-CALL_0110-161-040

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

2.5.14 CPU Fan Power Connector (CPU_FAN1)



Remarks: PWM only

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

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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 Drivers

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 drivers disk in the disk drive. Click **Intel** on the left pane and then **Intel(R) TigerLake-H 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. Accept the software license agreement and proceed with the installation process.
5. On the *Readme File Information* screen, click **Install**.
6. After completing the installation, click **Finish** to complete the setup process.

3.3 VGA Driver Installation

1. Insert the drivers disk in the disk drive. Click **Intel** on the left pane and then **Intel(R) TigerLake-H 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.
5. On the *Readme File Information* screen, click **Next** until the installation starts.
6. When Setup is Complete, click **Finish**.

3.4 HD Audio Driver Installation

1. Insert the drivers disk in the disk drive. Click **Intel** on the left pane and then **Intel(R) TigerLake-H Chipset Drivers** on the right pane.

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

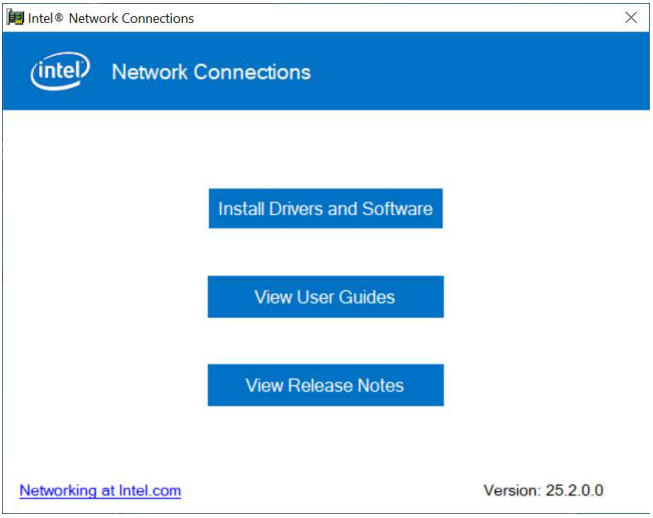
3. On the *Welcome* screen of the InstallShield Wizard, click **Next**.
4. Click **Next** until installation starts.
5. After completing the installation, click **Finish** to restart the computer for changes to take effect.

3.5 LAN Driver Installation

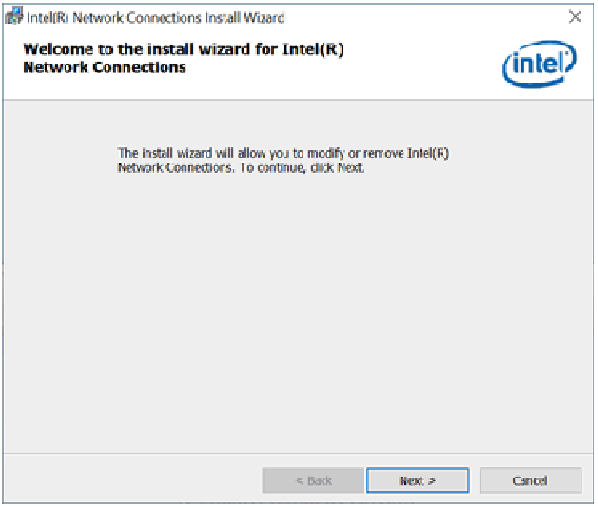
1. Insert the drivers disk in the disk drive. Click **Intel** on the left pane and then **Intel(R) TigerLake-H Chipset Drivers** on the right pane.

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

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



4. When the *Welcome to the install wizard for Intel(R) Network Connections* screen appears, click **Next**.



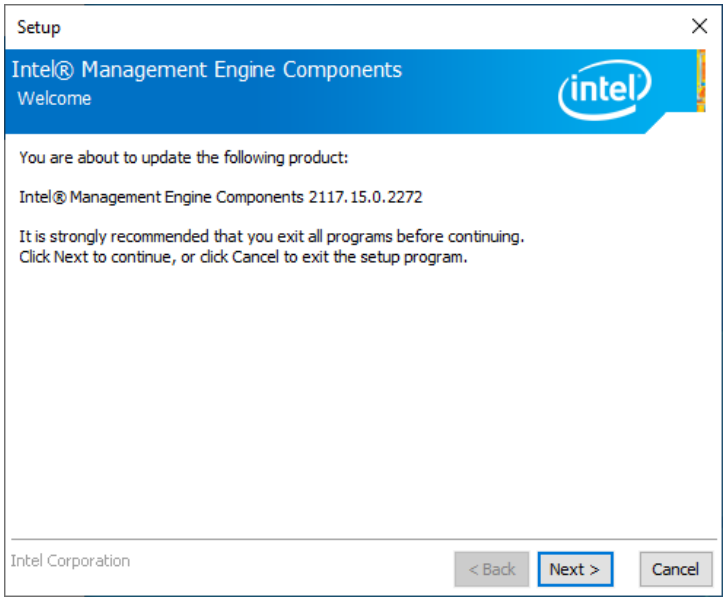
5. On the next screen, accept the license agreement and click **Next**.
6. On the *Setup Options* screen, click the checkbox to select the desired driver(s) for installation. Then click **Next** to continue.
7. On the *Ready to Install the Program* screen, click **Install** to begin the installation. When the Install wizard has completed, click **Finish**.

3.6 Intel® Management Engine Components Drivers Installation

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

2. Click **Intel(R) ME Drivers**.

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



4. Accept the license agreement and click **Next**.
5. After 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.

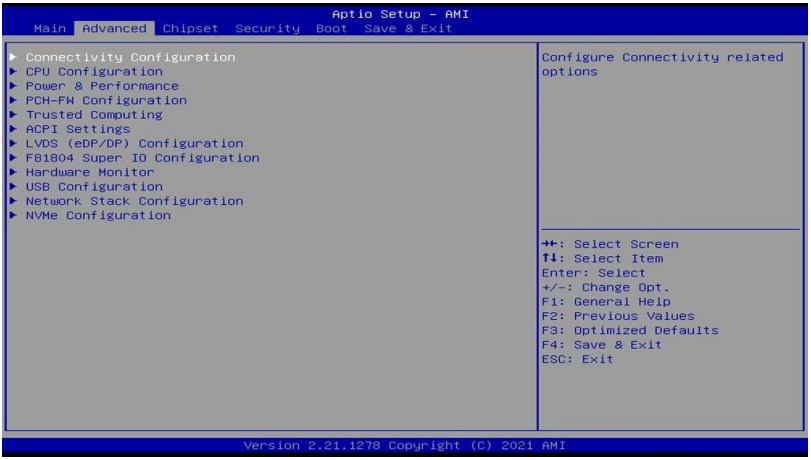
When you enter the BIOS Setup utility, the *Main Menu* screen will appear on the screen. The Main Menu allows you to select from various setup functions and exit choices.

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.

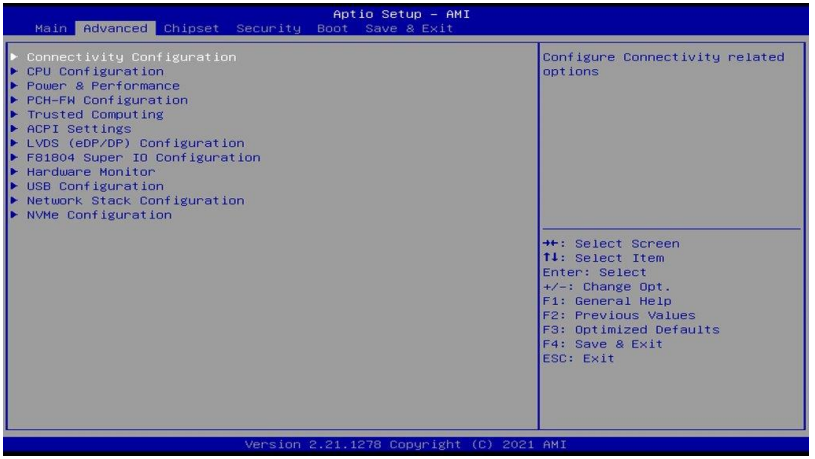
4.3 Main Settings

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.

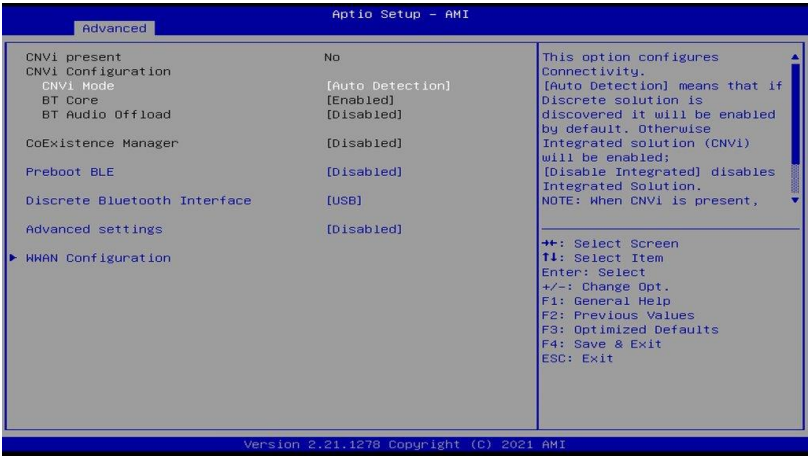


4.4 Advanced Settings

This section allows you to configure system features according to your preference.

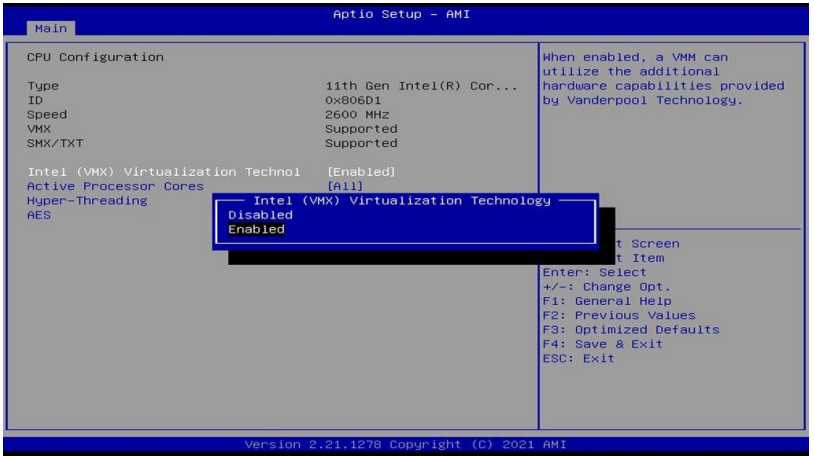


4.4.1 Connectivity Configuration



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.
Preboot BLE	This will be used to enable Preboot Bluetooth function.
Discrete Bluetooth Module	Seiral IO UART0 needs to be enabled to select BT Module. Default: Disabled
Advanced Settings	Configure ACPI objects for wireless devices Default: Disabled
WWAN Configuration	Configure WWAN related options. WWAN Device: enable or disable M.2 WWAN device
WWAN Reset Workaround	Default: Enabled

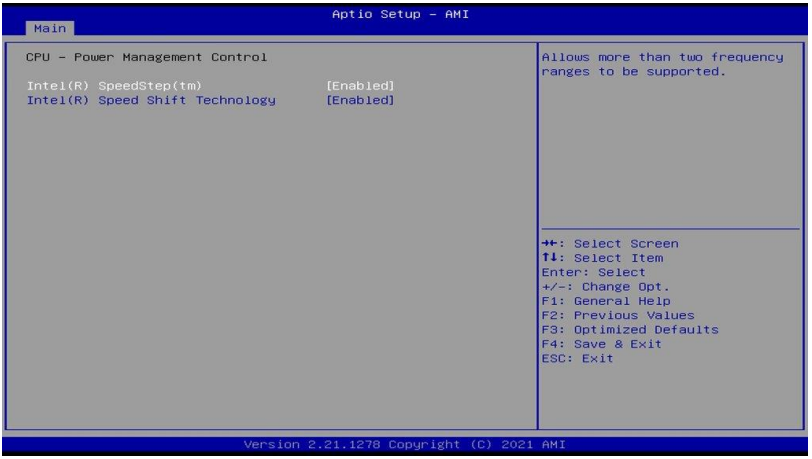
4.4.2 CPU Configuration



This section displays the type, ID and speed of the CPU.

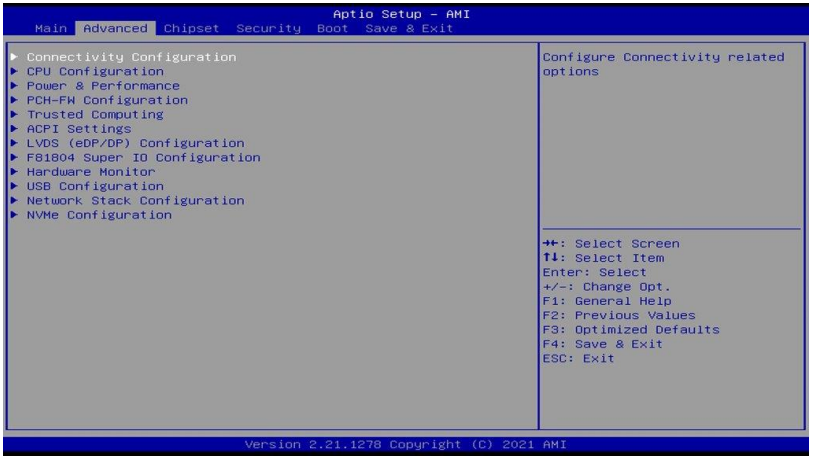
BIOS Setting	Description
Intel (VMX) Virtualization Technology	When enabled, a VMM can utilize the additional hardware capabilities provided by Vanderpool Technology.
Active Processor Cores	Number of cores to enable in each processor package
Hyper-Threading	Options; Enabled or Disabled
AES	Enable/Disable AES (Advanced Encryption Standard)

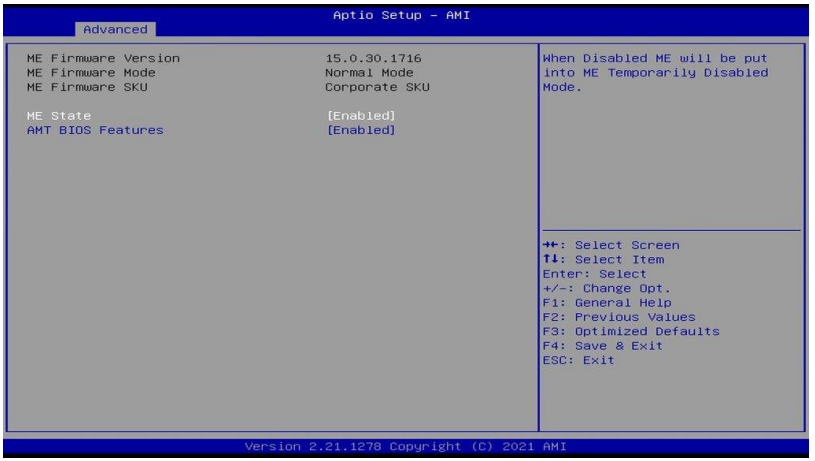
4.4.3 Power & Performance



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

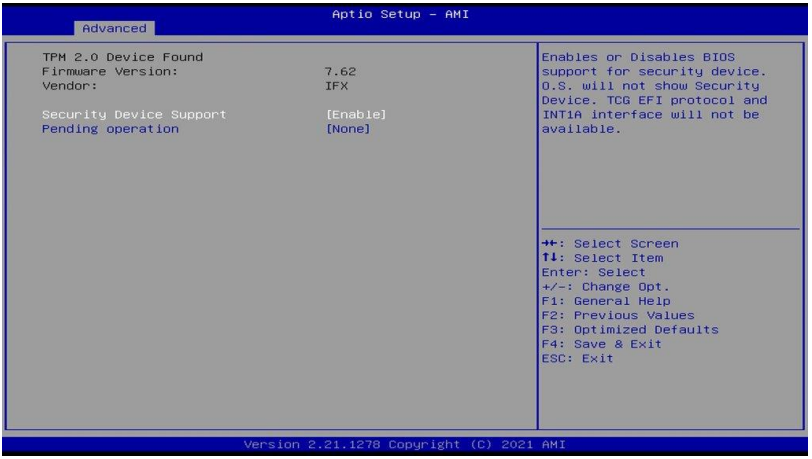
4.4.4 PCH-FW Configuration





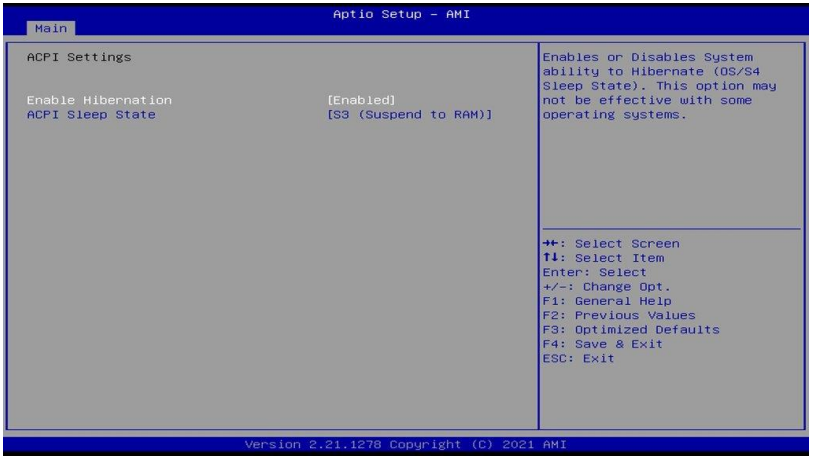
BIOS Setting	Description
ME State	When disabled, ME will be put into ME Temporarily Disabled Mode.
AMT BIOS Features	When disabled, AMT BIOS Features are no longer supported and user is no longer able to access MEBx Setup. Note: This option does not disable Manageability Features in FW.

4.4.5 Trusted Computing



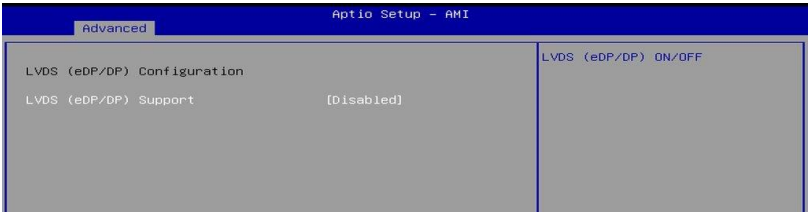
BIOS Setting	Description
Security Device Support	Enables / Disables BIOS support for security device. OS will not show security device. TCG EFI protocol and INT1A interface will not be available.
Pending operation	Schedule an operation for the security device. Note: Your computer will reboot during restart in order to change state of security device.

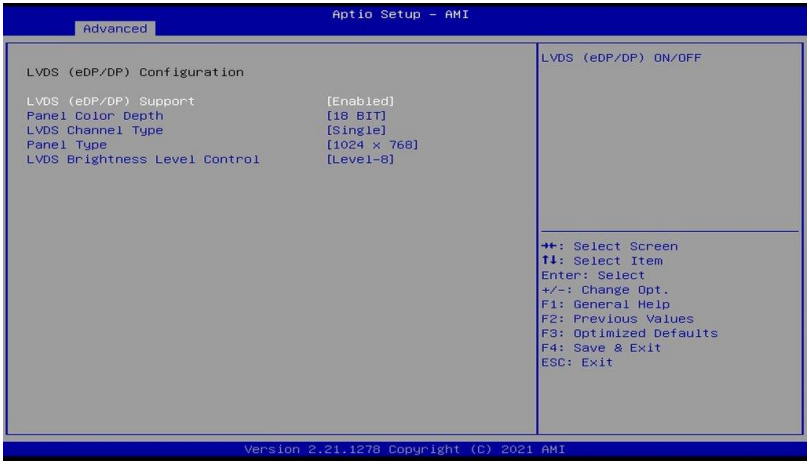
4.4.6 ACPI Settings



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	Select the highest ACPI sleep state the system will enter when SUSPEND button is pressed.

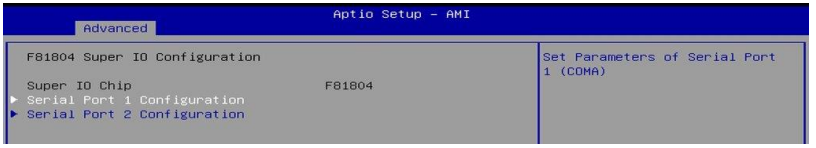
4.4.7 LVDS Configuration



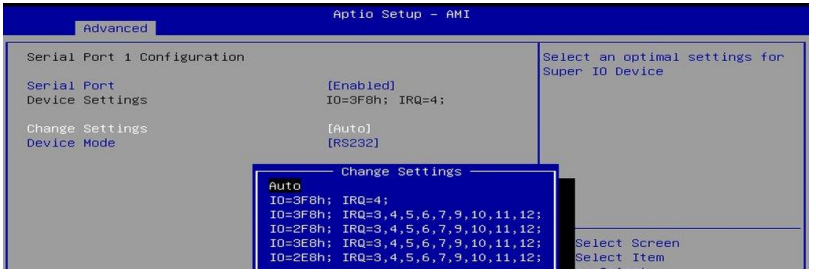


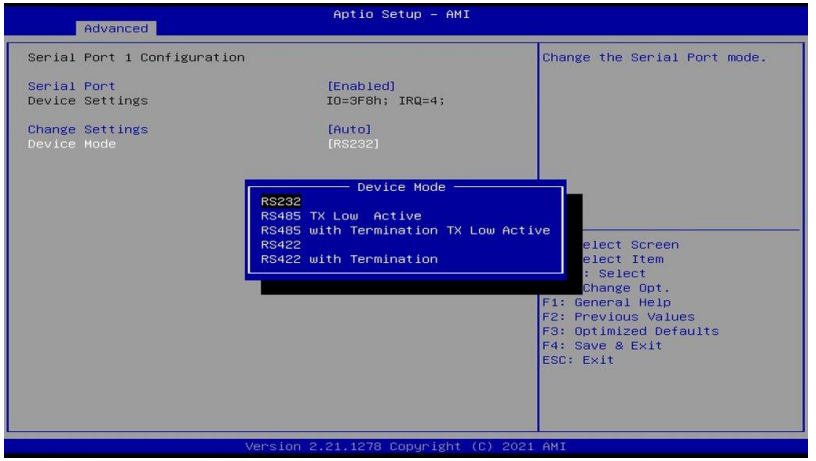
BIOS Setting	Description
LVDS (eDP/DP) Support	*LVDS (eDP/DP) ON/OFF*
Panel Color Depth	Selects the panel color depth. Options: 18 bit, 24bit (VESA/JEIDA)
LVDS Channel Type	Chooses the LVDS as single or dual channel.
Panel Type	Panel Type (Resolution) Options: 640 x 480, 800 x 600, 1024 x 768, 1280 x 768, 1280 x 800, 1280 x 960, 1280 x 1024, 1366 x 768, 1440 x 900, 1600 x 900, 1600 x 1200, 1680 x 1050, 1920 x 1080, 1920 x 1200
LVDS Brightness Level Control	Options: Level-1 to Level-8

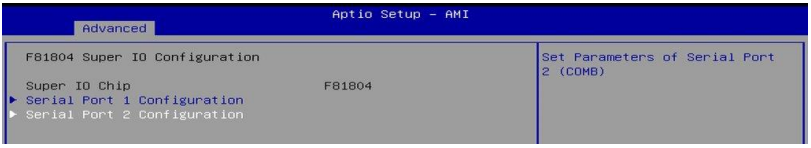
4.4.8 F81804 Super IO Configuration

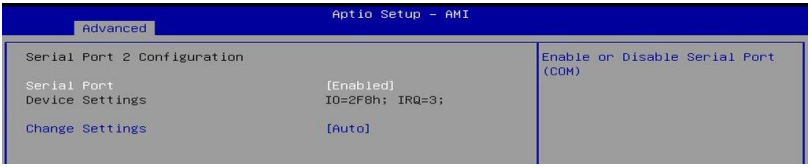


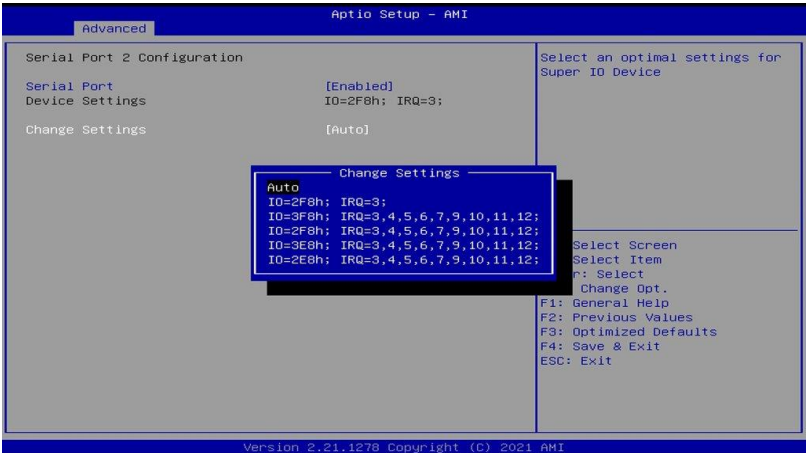
BIOS Setting	Description
Serial Ports Configuration	Sets parameters of serial ports. Enables / Disables the serial port and select an optimal setting for the Super IO device.






Aptio Setup – AMI
Advanced
F81804 Super IO Configuration
Super IO Chip F81804
Serial Port 1 Configuration
Serial Port 2 Configuration
Set Parameters of Serial Port 2 (COMB)


Aptio Setup – AMI
Advanced
Serial Port 2 Configuration
Serial Port [Enabled]
Device Settings IO=2F8h; IRQ=3;
Change Settings [Auto]
Enable or Disable Serial Port (COM)


Aptio Setup – AMI
Advanced
Serial Port 2 Configuration
Serial Port [Enabled]
Device Settings IO=2F8h; IRQ=3;
Change Settings [Auto]
Select an optimal settings for Super IO Device
Change Settings
Auto
IO=2F8h; IRQ=3;
IO=3F8h; IRQ=3,4,5,6,7,9,10,11,12;
IO=2F8h; IRQ=3,4,5,6,7,9,10,11,12;
IO=3E8h; IRQ=3,4,5,6,7,9,10,11,12;
IO=2E8h; IRQ=3,4,5,6,7,9,10,11,12;
Select Screen
Select Item
r: Select
Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
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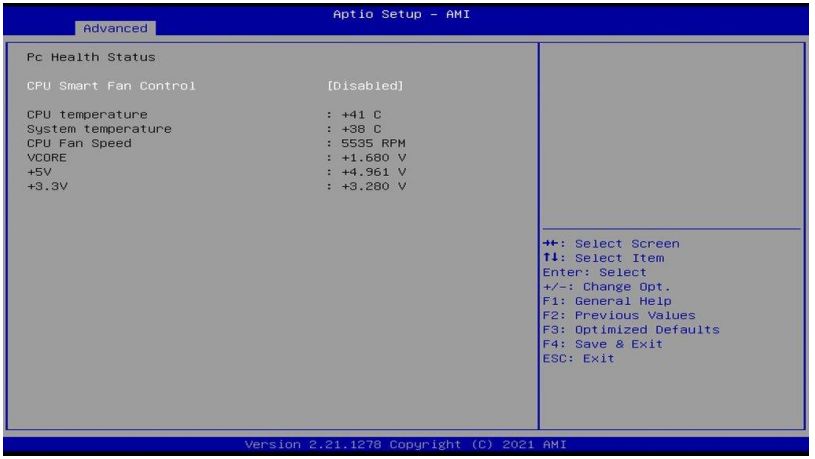
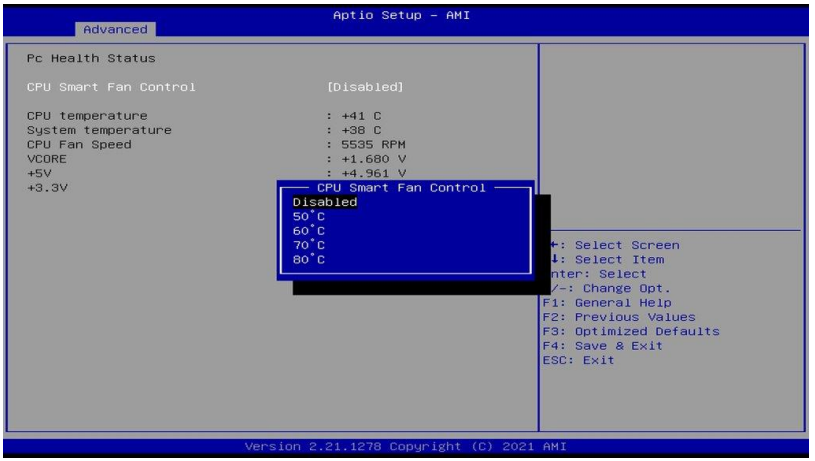
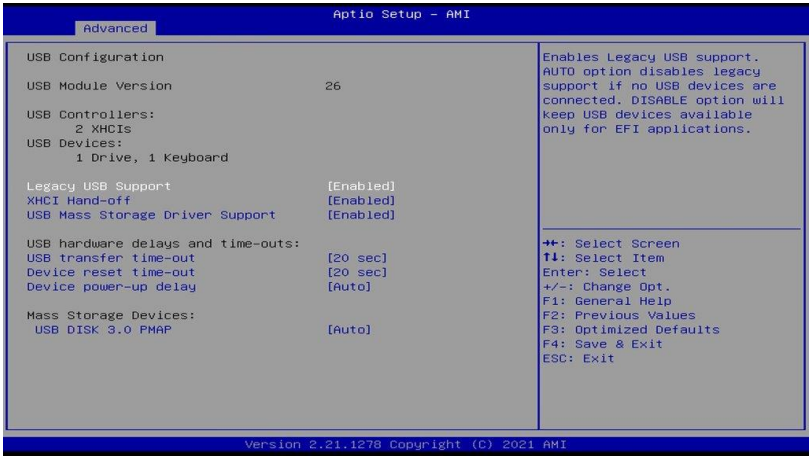
4.4.9 Hardware Monitor





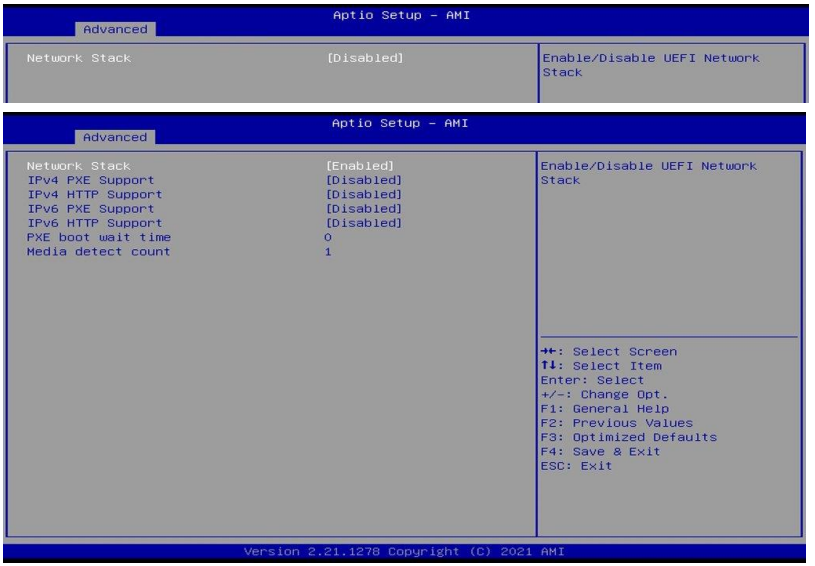
BIOS Setting	Description
CPU Fan Smart Fan Control	Enables / Disables smart fan control.
Temperatures / Voltages	These fields are the parameters of the hardware monitoring function feature of the motherboard. The values are read-only values as monitored by the system and show the PC health status.

4.4.10 USB Configuration



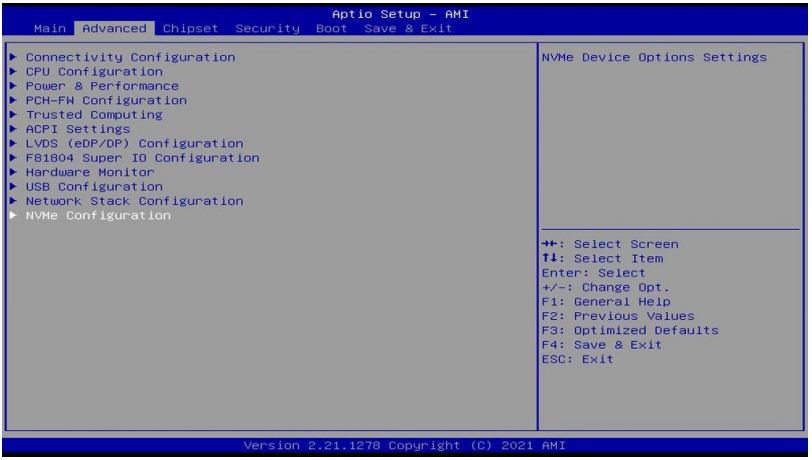
BIOS Setting	Description
Legacy USB Support	• **Enabled** enables Legacy USB support. • **Auto** disables legacy support if there is no USB device connected. • **Disabled** keeps USB devices available only for EFI applications.
XHCI Hand-off	This is a workaround for OSes without XHCI hand-off support. 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 (1 / 5 10 / 20 secs) for Control, Bulk, and Interrupt transfers.
Device reset time-out	Gives seconds (10 / 20 / 30 / 40 secs) to delay execution of Start Unit command to USB mass storage device.
Device power-up delay	Max.time the device will take before it properly reports itself to the Host Controller. '**Auto**' uses default value: for a Root port it is 100ms, for a Hub port the delay is taken from Hub descriptor.
Mass Storage Devices	Mass storage device emulation type. AUTO enumerates devices according to their media format. Optical drives are emulated as CDROM, drives with no medial will be emulated according to a drive type.

4.4.11 Network Stack Configuration



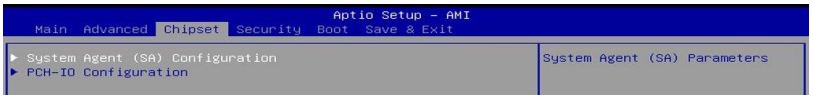
BIOS Setting	Description
Network Stack	Enable/Disable UEFI Network Stack
Ipv4 PXE Support	If disabled, IPv4 PXE boot support will not be available.
Ipv4 HTTP Support	If disabled, IPv4 HTTP boot support will not be available.
Ipv6 PXE Support	If disabled, IPv6 PXE boot support will not be available.
Ipv6 HTTP Support	If disabled, IPv6 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 +/- nurmeric keys to set the value.

4.4.12 NVMe Configuration

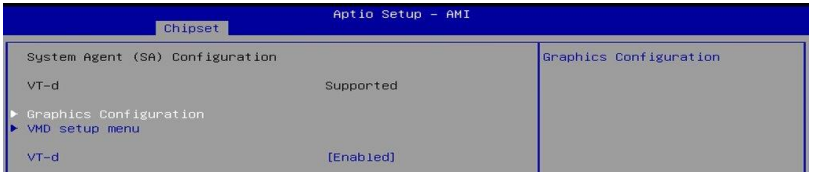


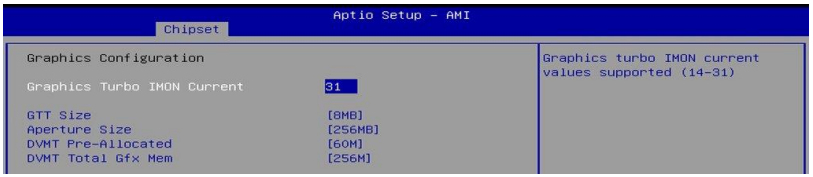
4.5 Chipset Settings

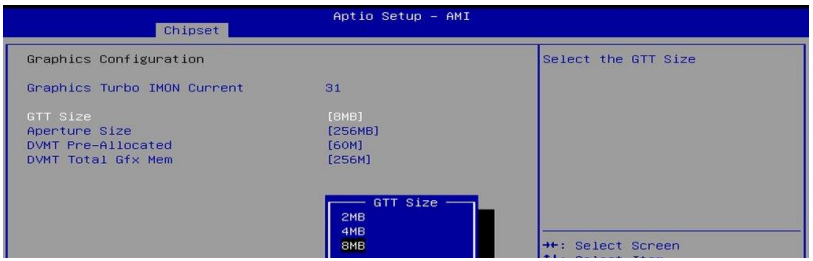
4.5.1 System Agent (SA) Configuration

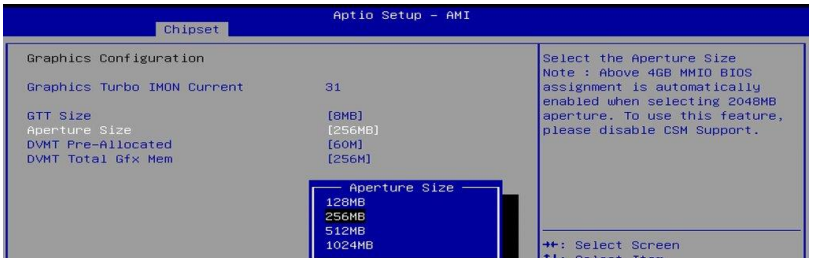


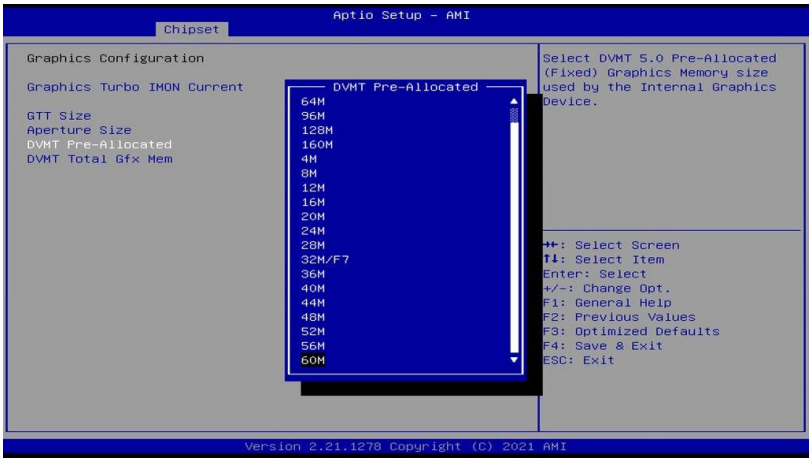
4.5.1.1. Graphics Configuration:










Aptio Setup – AMI
Chipset
Graphics Configuration
Graphics Turbo IMON Current
GTT Size
Aperture Size
DVMT Pre-Allocated
DVMT Total Gfx Mem
DVMT Pre-Allocated
64M
96M
128M
160M
4M
8M
12M
16M
20M
24M
28M
32M/F7
36M
40M
44M
48M
52M
56M
60M
Select DVMT 5.0 Pre-Allocated (Fixed) Graphics Memory size used by the Internal Graphics Device.
→←: 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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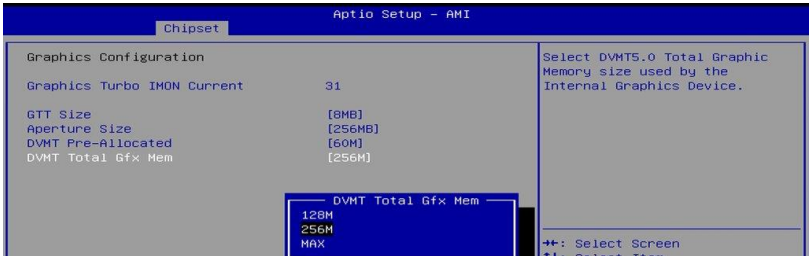
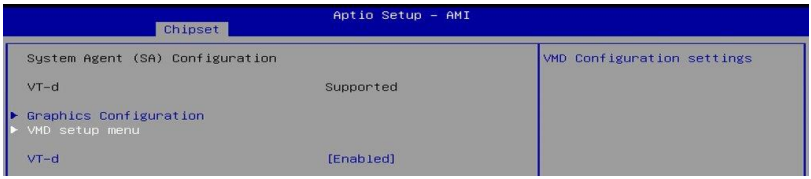
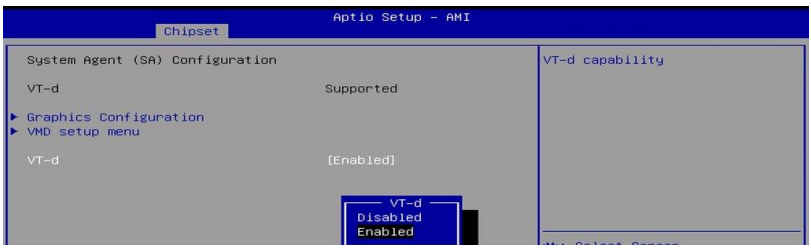
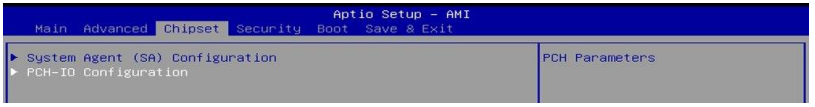

Aptio Setup – AMI
Chipset
Graphics Configuration
Graphics Turbo IMON Current 31
GTT Size [8MB]
Aperture Size [256MB]
DVMT Pre-Allocated [60M]
DVMT Total Gfx Mem [256M]
DVMT Total Gfx Mem
128M
256M
MAX
Select DVMT5.0 Total Graphic Memory size used by the Internal Graphics Device.
→←: Select Screen

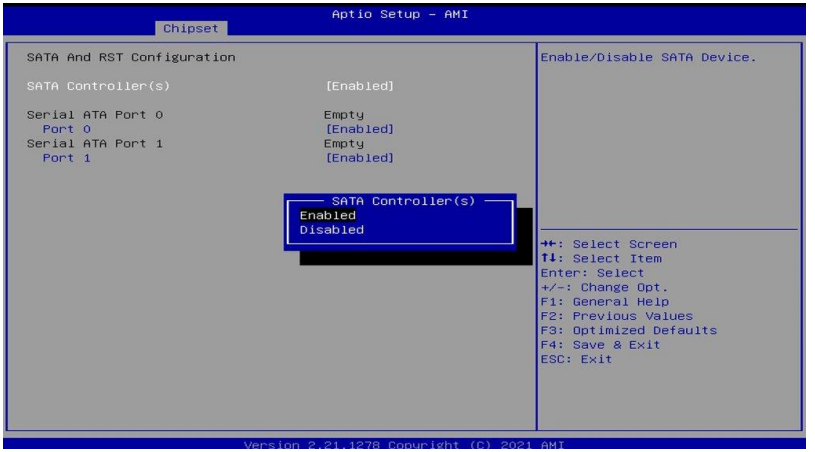

Aptio Setup – AMI
Chipset
System Agent (SA) Configuration
VT-d Supported
Graphics Configuration
VMD setup menu
VT-d [Enabled]
VMD Configuration settings


Aptio Setup – AMI
Chipset
System Agent (SA) Configuration
VT-d Supported
Graphics Configuration
VMD setup menu
VT-d [Enabled]
VT-d
Disabled
Enabled
VT-d capability

4.5.2 PCH-IO Configuration

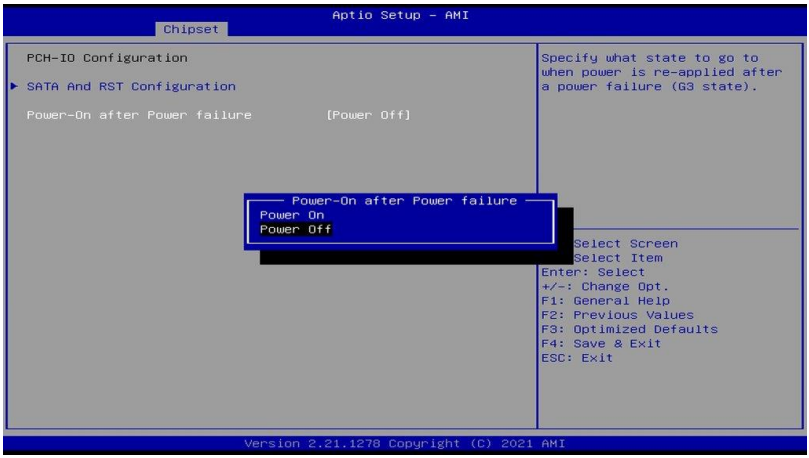


4.5.2.1 SATA and RST Configuration:



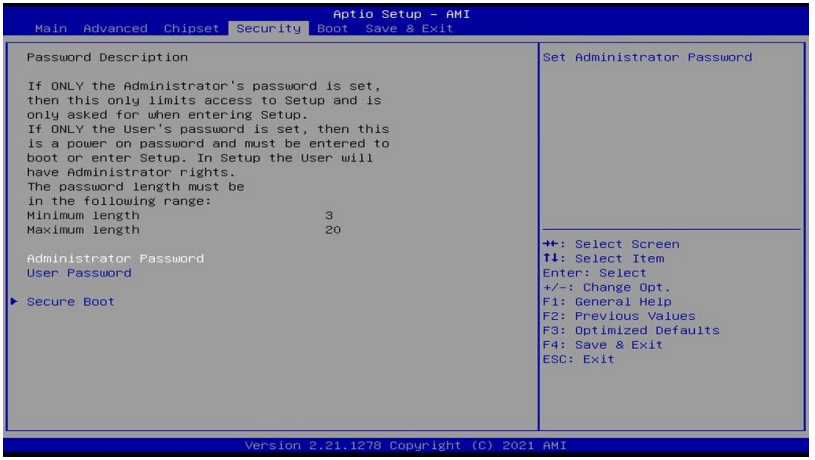
BIOS Setting	Description
SATA and RST Configuration	SATA device options and settings
SATA Controller(s)	Enables / Disables the Serial ATA.
Power-On after Power failure	Specify what state to go to when power is re-applied after a power failure (G3 state).

4.5.2.2 SATA and RST Configuration:

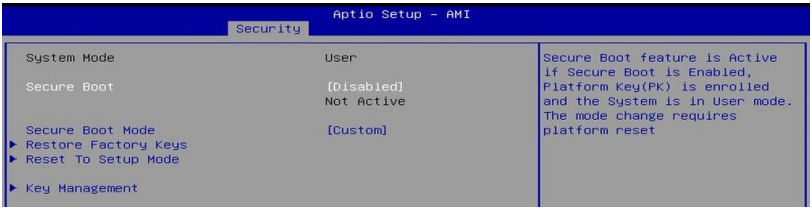


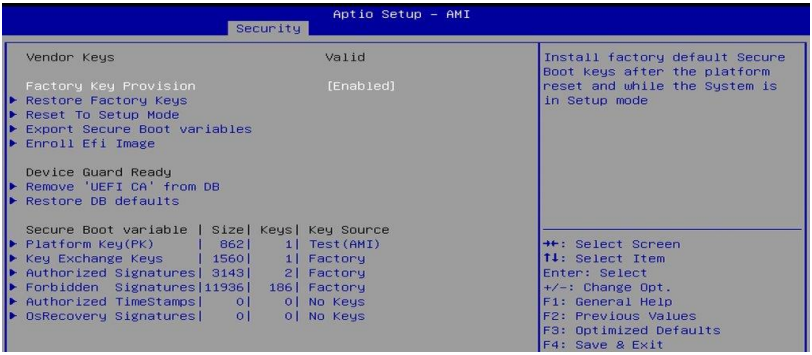
BIOS Setting	Description
Power-On after Power failure	Specify what state to to when power is re-applied after a power failure (G3 state)

4.6 Security Settings

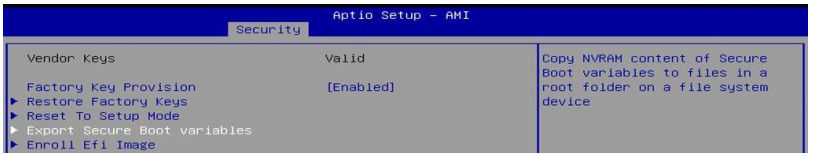


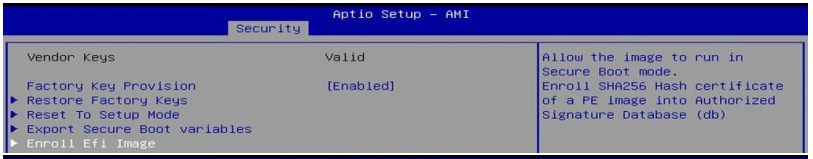
BIOS Setting	Description
Setup Administrator Password	Sets an administrator password for the setup utility.
User Password	Sets a user password.
Secure Boot	Secure Boot feature is Active if Secure Boot is enabled. Platform Key(PK) is enrolled and the system is in user mode. The mode change requires platform reset.
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

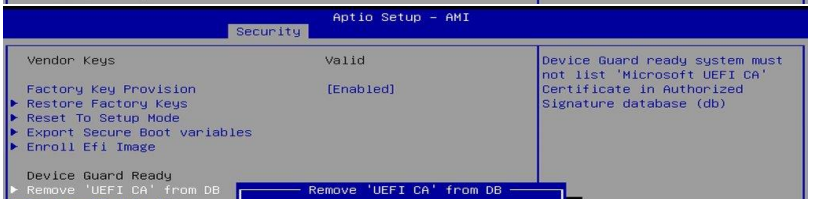


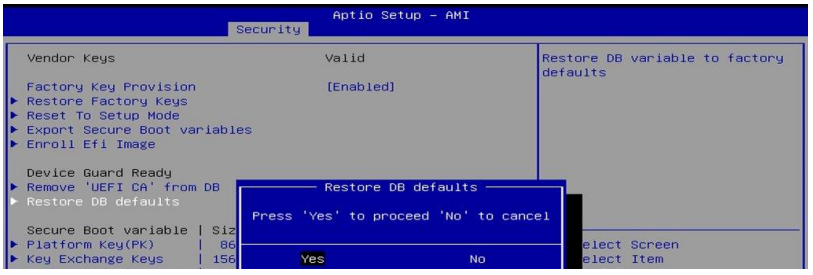


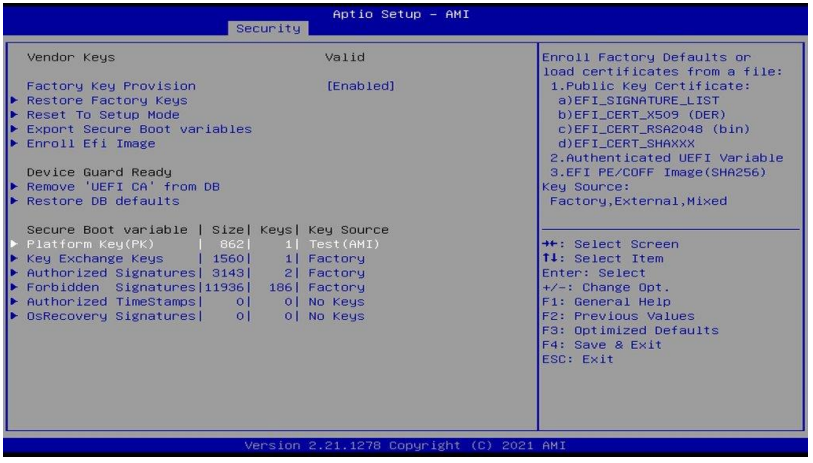
BIOS Setting	Description
Secure Boot	Secure Boot feature is Active if Secure Boot is enabled. Platform Key (PK) Is enrolled and the system is in User mode. The mode change requires platform reset.
Secure Boot Mode	Secure Boot mode options: Standard or Custom. In Custom mode, Secure Boot Policy variables 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.
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.


Aptio Setup – AMI
Security
Vendor Keys
Valid
Factory Key Provision
[Enabled]
Restore Factory Keys
Reset To Setup Mode
Export Secure Boot variables
Enroll Efi Image
Copy NVRAM content of Secure Boot variables to files in a root folder on a file system device


Aptio Setup – AMI
Security
Vendor Keys
Valid
Factory Key Provision
[Enabled]
Restore Factory Keys
Reset To Setup Mode
Export Secure Boot variables
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)


Aptio Setup – AMI
Security
Vendor Keys
Valid
Factory Key Provision
[Enabled]
Restore Factory Keys
Reset To Setup Mode
Export Secure Boot variables
Enroll Efi Image
Device Guard Ready
Remove 'UEFI CA' from DB
Remove 'UEFI CA' from DB
Device Guard ready system must not list 'Microsoft UEFI CA' Certificate in Authorized Signature database (db)


Aptio Setup – AMI
Security
Vendor Keys
Valid
Factory Key Provision
[Enabled]
Restore Factory Keys
Reset To Setup Mode
Export Secure Boot variables
Enroll Efi Image
Device Guard Ready
Remove 'UEFI CA' from DB
Restore DB defaults
Secure Boot variable | Siz
Platform Key(PK) | 86
Key Exchange Keys | 156
Restore DB defaults
Press 'Yes' to proceed 'No' to cancel
Yes
No
Restore DB variable to factory defaults
elect Screen
elect Item


Aptio Setup – AMI
Security
Vendor Keys
Valid
Factory Key Provision
[Enabled]
Restore Factory Keys
Reset To Setup Mode
Export Secure Boot variables
Enroll Efi Image
Device Guard Ready
Remove 'UEFI CA' from DB
Restore DB defaults
Secure Boot variable | Size | Keys | Key Source
Platform Key(PK) | 862 | 1 | Test(AMI)
Key Exchange Keys | 1560 | 1 | Factory
Authorized Signatures | 3143 | 2 | Factory
Forbidden Signatures | 11936 | 186 | Factory
Authorized TimeStamps | 0 | 0 | No Keys
OsRecovery Signatures | 0 | 0 | No Keys
Enroll Factory Defaults or load certificates from a file:
1.Public Key Certificate:
a)EFI_SIGNATURE_LIST
b)EFI_CERT_X509 (DER)
c)EFI_CERT_RSA2048 (bin)
d)EFI_CERT_SHAXXX
2.Authenticated UEFI Variable
3.EFI PE/COFF Image(SHA256)
Key Source:
Factory,External,Mixed
→←: 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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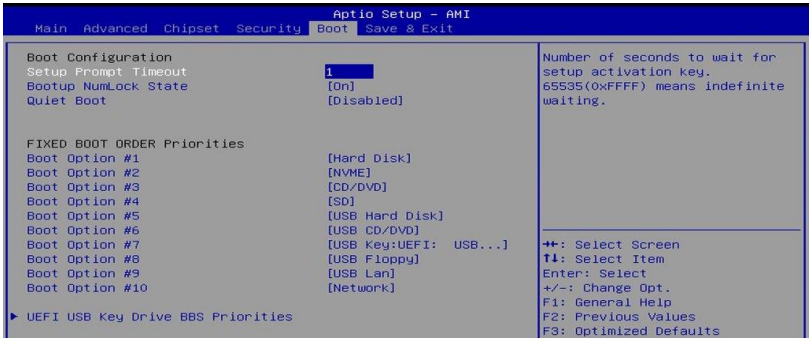
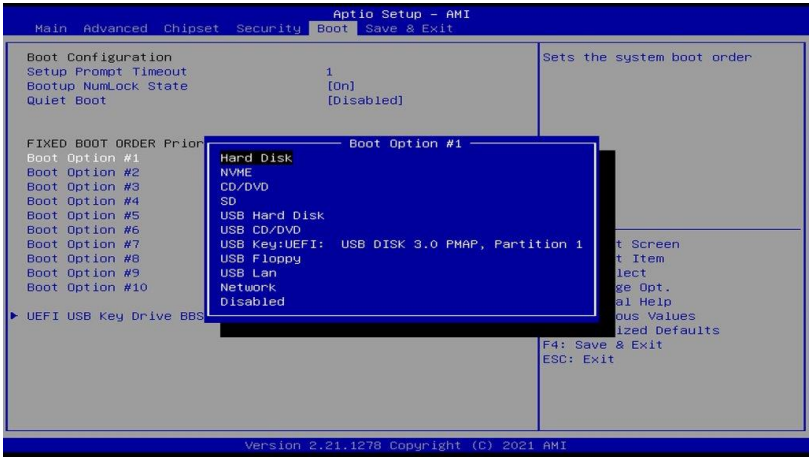
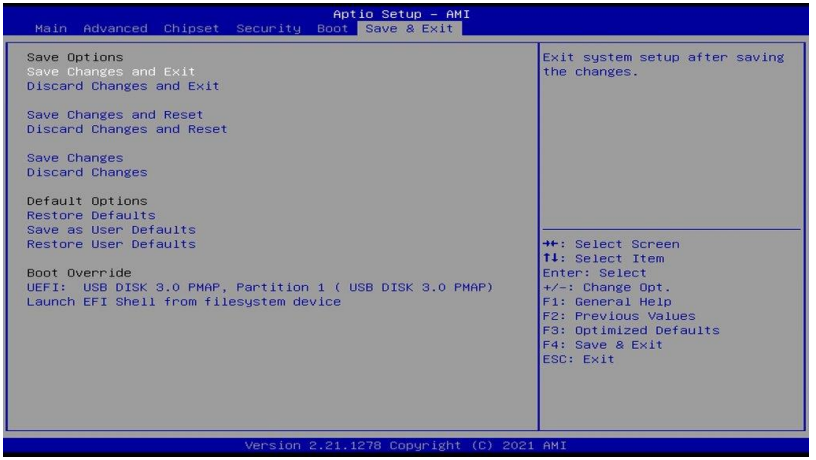
4.7 Boot Settings



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.
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.

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
0x0000EFA0-0x0000EFBF	Intel(R) SMBus - 43A3
0x000003F8-0x000003FF	Communications Port (COM1)
0x000002F8-0x000002FF	Communications Port (COM2)
0x00001800-0x000018FE	Motherboard resources
0x00003090-0x00003097	Standard SATA AHCI Controller
0x00003080-0x00003083	Standard SATA AHCI Controller
0x00003060-0x0000307F	Standard SATA AHCI Controller
0x00000000-0x00000CF7	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
0x00002000-0x000020FE	Motherboard resources
0x000000F0-0x000000F0	Numeric data processor
0x0000FFF8-0x0000FFFF	Intel(R) Active Management Technology - SOL (COM5)
0x00000040-0x00000043	System timer
0x00000050-0x00000053	System timer
0x00003000-0x0000303F	Intel(R) UHD Graphics
0x00001854-0x00001857	Motherboard resources

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 4294967271-799	Intel(R) Ethernet Controller (3) I225-LM
IRQ 16	High Definition Audio Controller
IRQ 4	Communications Port (COM1)
IRQ 3	Communications Port (COM2)
IRQ 4294967293	Intel(R) PCI Express Root Port #10 - 43B1
IRQ 14	Intel(R) GPIO Controller - 34C6
IRQ 4294967292	Standard SATA AHCI Controller
IRQ 55-204	Microsoft ACPI-Compliant System
IRQ 256-511	Microsoft ACPI-Compliant System
IRQ 4294967291	Intel(R) USB 3.20 eXtensible Host Controller - 1.20 (Microsoft)
IRQ 28	Trusted Platform Module 2.0
IRQ 4294967294	Intel(R) PCI Express Root Port #9 - 43B0
IRQ 13	Numeric data processor
IRQ 4294967280-88	Intel(R) Ethernet Controller (3) I225-V
IRQ 19	Intel(R) Active Management Technology - SOL (COM5)
IRQ 0	System timer
IRQ 4294967290	Intel(R) USB 3.10 eXtensible Host Controller - 1.20 (Microsoft)
IRQ 4294967289	Intel(R) UHD Graphics
IRQ 4294967270	Intel(R) Management Engine Interface #1
IRQ 4294967271-799	Intel(R) Ethernet Controller (3) I225-LM

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 " F81804.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 81866 watch dog program\n");
        SIO = Init_ F81804();
        if (SIO == 0)
        {
                printf("Can not detect Fintek 81866, 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_ F81804_Reg(0x2B);
        bBuf &= (~0x20);
        Set_ F81804_Reg(0x2B,   bBuf);          //Enable WDTO

        Set_ F81804_LD(0x07);                   //switch to logic device  7
        Set_ F81804_Reg(0x30,   0x01);          //enable timer

        bBuf = Get_ F81804_Reg(0xF5);
        bBuf &= (~0x0F);
        bBuf |= 0x52;
        Set_ F81804_Reg(0xF5,   bBuf);          //count mode is second

        Set_ F81804_Reg(0xF6,   interval);      //set timer

        bBuf = Get_ F81804_Reg(0xFA);
        bBuf |= 0x01;
        Set_ F81804_Reg(0xFA,   bBuf);          //enable WDTO output

        bBuf = Get_ F81804_Reg(0xF5);
        bBuf |= 0x20;
        Set_ F81804_Reg(0xF5,   bBuf);          //start counting
}
//---------------------------------------------------------------------------
void DisableWDT(void)
{
        unsigned char bBuf;

        Set_ F81804_LD(0x07);                   //switch to logic device 7

        bBuf = Get_ F81804_Reg(0xFA);
        bBuf &= ~0x01;
        Set_ F81804_Reg(0xFA,   bBuf);          //disable WDTO output

        bBuf = Get_ F81804_Reg(0xF5);
        bBuf &= ~0x20;
        bBuf |= 0x40;
        Set_ F81804_Reg(0xF5,   bBuf);          //disable WDT
}
//---------------------------------------------------------------------------


//---------------------------------------------------------------------------
```

```
//
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// IMPLIED WARRANTIES OF MERCHANTABILITY AND/OR FITNESS FOR A PARTICULAR
// PURPOSE.
//
//---------------------------------------------------------------------------
#include " F81804.H"
#include <dos.h>
//---------------------------------------------------------------------------
unsigned int  F81804_BASE;
void Unlock_ F81804 (void);
void Lock_ F81804 (void);
//---------------------------------------------------------------------------
unsigned int Init_ F81804(void)
{
                unsigned int result;
                unsigned char ucDid;

                 F81804_BASE = 0x4E;
                result =  F81804_BASE;

                ucDid = Get_ F81804_Reg(0x20);
                if  (ucDid  ==  0x07)                   //Fintek 81866
                {               goto    Init_Finish;            }

                 F81804_BASE = 0x2E;
                result =  F81804_BASE;

                ucDid = Get_ F81804_Reg(0x20);
                if  (ucDid  ==  0x07)                   //Fintek 81866
                {               goto    Init_Finish;            }

                 F81804_BASE = 0x00;
                result =  F81804_BASE;

Init_Finish:
                return (result);
}
//---------------------------------------------------------------------------
void Unlock_ F81804 (void)
{
                outportb( F81804_INDEX_PORT,  F81804_UNLOCK);
                outportb( F81804_INDEX_PORT,  F81804_UNLOCK);
}
//---------------------------------------------------------------------------
void Lock_ F81804 (void)
{
                outportb( F81804_INDEX_PORT,  F81804_LOCK);
}
//---------------------------------------------------------------------------
void Set_ F81804_LD( unsigned char LD)
{
                Unlock_ F81804();
                outportb( F81804_INDEX_PORT,  F81804_REG_LD);
                outportb( F81804_DATA_PORT, LD);
                Lock_ F81804();
```

```
}
//---------------------------------------------------------------------------
void Set_ F81804_Reg( unsigned char REG, unsigned char DATA)
{
                Unlock_ F81804();
                outportb( F81804_INDEX_PORT, REG);
                outportb( F81804_DATA_PORT, DATA);
                Lock_ F81804();
}
//---------------------------------------------------------------------------
unsigned char Get_ F81804_Reg(unsigned char REG)
{
                unsigned char Result;
                Unlock_ F81804();
                outportb( F81804_INDEX_PORT, REG);
                Result = inportb( F81804_DATA_PORT);
                Lock_ F81804();
                return Result;
}
//---------------------------------------------------------------------------




//---------------------------------------------------------------------------
//
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// PURPOSE.
//
//---------------------------------------------------------------------------
#ifndef    F81804_H
#define    F81804_H                        1
//---------------------------------------------------------------------------
#define         F81804_INDEX_PORT       ( F81804_BASE)
#define         F81804_DATA_PORT        ( F81804_BASE+1)
//---------------------------------------------------------------------------
#define         F81804_REG_LD           0x07
//---------------------------------------------------------------------------
#define         F81804_UNLOCK           0x87
#define         F81804_LOCK             0xAA
//---------------------------------------------------------------------------
unsigned int Init_ F81804(void);
void Set_ F81804_LD( unsigned char);
void Set_ F81804_Reg( unsigned char,
unsigned char); unsigned char
Get_ F81804_Reg( unsigned char);
//---------------------------------------------------------------------------
#endif  //    F81804_H
```

Onboard Connector Reference Types

Function	Connector	Onboard Type	Compatible Mating Type
Audio	J3	Hao Guo Xing Ye DF11-12S-PA66H	Hirose DF11-12DS-2C
SATA HDD Power	J1	E-CALL 0110-071-040	JST XHP-4
Front Panel Setting	J22	E-CALL 2.5 mm-pitch pin header (Female)	Dupont 2.0 mm-pitch (Female)
USB 2.0	J8	Hao Guo Xing Ye DF11-8S-PA66H	Hirose DF11-8DS-2C
Battery	J13	Molex 53047-0210	Molex 51021-0200
COM1,2 Serial Port	J15, J16	Hao Guo Xing Ye DF11-10S-PA66H	Hirose DF11-10DS-2C
DC Power Input	J4	Yimtex 532VW4STR	JST VHR-4N
Digital I/O	J9	Dupont 2.00 mm-pitch pin header (Male)	Dupont 2.00 mm-pitch (Female)
LCD Backlight	J23	E-CALL 0110-161-040	JST PHR-4.
LVDS	J12, J18	Hirose DF20G-20DP-1V	Hirose DF20A-20DS-1C