

SKU1 (Intel[®] R680E) SKU2 (Intel[®] Q670E) SKU3 (Intel[®] H610E)

MS-CF02

Industrial Computer Board

User Guide

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V1.4, 2025/02

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Regulatory Notices

CE Conformity

Hereby, Micro-Star International CO., LTD declares that this device is in compliance with the essential safety requirements and other relevant provisions set out in the European Directive.

FCC-B Radio Frequency Interference Statement

This equipment has been tested and found to comply with the limits for a Class B digital 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

FC

C E

and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the measures listed below:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/television technician for help.

Notice 1

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

Notice 2

Shielded interface cables and AC power cord, if any, must be used in order to comply with the emission limits.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

- 1. This device may not cause harmful interference, and
- 2. This device must accept any interference received, including interference that may cause undesired operation.

WEEE Statement

Under the European Union ("EU") Directive on Waste Electrical and Electronic Equipment, Directive 2012/19/EU, products of "electrical and electronic equipment" cannot be discarded as municipal waste anymore and manufacturers of covered electronic equipment will be obligated to take back such products at the end of their useful life.



Chemical Substances Information

In compliance with chemical substances regulations, such as the EU REACH Regulation (Regulation EC No. 1907/2006 of the European Parliament and the Council), MSI provides the information of chemical substances in products at:

https://csr.msi.com/global/index

Battery Information

Please take special precautions if this product comes with a battery.

- Danger of explosion if battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer.
- Avoid disposal of a battery into fire or a hot oven, or mechanically crushing or cutting of a battery, which can result in an explosion.
- Avoid leaving a battery in an extremely high temperature or extremely low air pressure environment that can result in an explosion or the leakage of flammable liquid or gas.
- Do not ingest battery. If the coin/button cell battery is swallowed, it can cause severe internal burns and can lead to death. Keep new and used batteries away from children.

European Union:



Batteries, battery packs, and accumulators should not be disposed of as unsorted household waste. Please use the public collection system to return, recycle, or treat them in compliance with the local regulations.

BSMI:



廢電池請回收 For better environmental protection, waste batteries should be collected separately for recycling or special disposal.

California, USA:



The button cell battery may contain perchlorate material and requires special handling when recycled or disposed of in California. For further information please visit: <u>http://www.dtsc.ca.gov/hazardouswaste/perchlorate/</u>

Environmental Policy

- The product has been designed to enable proper reuse of parts and recycling and should not be thrown away at its end of life.
- Users should contact the local authorized point of collection for recycling and disposing of their end-of-life products.
- Visit the MSI website and locate a nearby distributor for further recycling information.
- Users may also reach us at <u>gpcontdev@msi.com</u> for information regarding proper disposal, take-back, recycling, and disassembly of MSI products.
- Please visit <<u>https://us.msi.com/page/recycling</u>> for information regarding the recycling of your product in the US.

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The terms HDMI[™], HDMI[™] High-Definition Multimedia Interface, HDMI[™] Trade dress and the HDMI[™] Logos are trademarks or registered trademarks of HDMI[™] Licensing Administrator, Inc.

Technical Support

If a problem arises with your product and no solution can be obtained from the user's manual, please contact your place of purchase or local distributor. Alternatively, please visit <u>https://www.msi.com/support/</u> for further guidance.



Safety Information

Please read and follow these safety instructions carefully before installing, operating or performing maintenance on the equipment.

General Safety Instructions

- Always read the safety instructions carefully.
- Keep this User's Manual for future reference.
- Keep this equipment in a dry, humidity-free environment.
- Ensure that all components are securely connected to prevent issues during operation.
- Do not cover the air openings to prevent overheating.
- Avoid spilling liquids into the equipment to prevent damage or electrical shock.
- Do not leave the equipment in an unconditioned environment. Storage temperatures above 60°C (140°F) may cause damage.

Electrostatic Discharge (ESD) Precautions

The components included in this package are sensitive to electrostatic discharge. Follow these guidelines to prevent ESD-related damage:

- Hold the motherboard by the edges to avoid touching sensitive components.
- Wear an ESD wrist strap. If not available, discharge static electricity by touching a metal object before handling.
- When not installed, store the motherboard in an electrostatic shielding container or place it on an anti-static pad.

Power Safety

- Always turn off the power supply and unplug the power cord from the outlet before installing or removing any component.
- Ensure the electrical outlet provides the same voltage as indicated on the PSU before connecting.
- Arrange the power cord to avoid tripping hazards or damage. Do not place objects over the power cord.

Installation Instructions

- Lay the equipment on a stable, flat surface before setting it up.
- Before turning on the system, ensure there are no loose screws or metal components on the motherboard or within the system case.
- Do not boot the computer before completing all installations. Premature booting can cause permanent damage to components and pose safety risks.

When to Contact Service Personnel

Immediately consult service personnel if any of the following situations arise:

- The power cord or plug is damaged.
- Liquid has entered the equipment.
- The equipment has been exposed to moisture.
- The equipment does not function as described in the User Guide.
- The equipment has been dropped or physically damaged.
- The equipment shows visible signs of breakage.

Specifications

SKU1/ SKU2

Model	MS-CF02-SKU1 MS-CF02-SKU2		
Form factor	Mini-ITX		
Dimensions	170 x 170mm (6.7 x 6.7 inches)		
	• 14th Gen Intel [®] Raptor Lake-S Refresh i9/i7/i5/i3 IOTG Series Processor, Max 65W		
Processor	 13th Gen Intel[®] Raptor Lake-S i9/i7/i5/i3 Pentium[®]/ Celeron[®] IOTG Series Processor, Max 65W 1.6 GHz~5.1 GHz (depends on CPU) Socket LGA 1700 		
		i9/i7/i5/i3 Pentium [®] / Celeron [®] IOTG Series Processor, Max 65W - 1.6 GHz~5.1 GHz (depends on CPU)	
Chipset	Intel [®] R680E	Intel® Q670E	
Memory	 2 x DDR4 SO-DIMM slots (260-pin, vertical) Up to 3200 MT/s Up to 64GB Dual-Channel DDR4, Dual-Channel DDR4, 		
	ECC/ Non-ECC	Non-ECC	
Network	 3 x Intel[®] I225-LM PCIe 2.5GbE RJ45 LAN Co-Lay Intel[®] I225-V PCIe 2.5GbE RJ45 LAN 		
	• 1 x PCIe 4.0 x16 slot		
	 1 x M.2 B Key slot (3042) Supports PCIe x1, USB 5Gbps & USB 2.0 signal (480 Mbps) Support Nano SIM holder 1 x M.2 E Key slot (2230) Supports PCIe x1 & USB 2.0 signal (480 Mbps) Supports CNVi Support Intel® AX210 Wi-Fi 6E & BT-5.1 (vPro Supported) 1 x Nano SIM Holder Supported by M.2 B key (SIM) slot 		
Expansion Slots			

Model	MS-CF02-SKU1 MS-CF02-SKU2			
	 3 x SATA 3.0 6Gb/s ports Support RAID 0/1/5 Support AHCI mode 			
Storage	 1 x M.2 M Key slot (2242/2280) Supports PCIe 3.0 x4 NVMe signal Supports B+M Key module 			
Audio	 Realtek[®] ALC897 High Definition Audio Codec Co-lay Realtek[®] ALC888S-VD2 			
	• 2 x DP 1.4a up to 4096×2304 @60)Hz		
	• 1 x HDMI [™] 1.4b up to 4096x2304 (@24Hz		
	 1 x LVDS up to 1920x1200 @60Hz (Co-lay eDP) Switch between LVDS & eDP throuth BIOS settings. 18/24-bit dual channel 			
Graphics	 1 x eDP up to 4096×2304 @60 Hz (Co-lay LVDS) Switch between eDP & LVDS throuth BIOS settings. 			
	 4 independent display modes sup DP1 DP2 	oported		
	- DP2 - HDMI™			
	- LVDS or eDP			
Power	• 1 x 24-pin ATX power connector			
i onci	• 1 x 4-pin 12V ATX power connecto	pr		
Cooling	• 1 x 4-pin PWM CPU fan connector			
cooling	• 1 x 4-pin PWM system fan connec	tor		
	 1 x Line-out jack 			
	• 1 x Mic-in jack			
	• 3 x 2.5 GbE RJ-45 LAN ports			
	• 6 x USB 10Gbps Type-A ports			
Rear I/O	• 2 x DisplayPort (1.4a)			
	• 1 x HDMI [™] connector (1.4b)			
	• 2 x DB-9 RS-232/422/485 Serial p			
	 COM1: RI/0V/5V/12V, Auto-flow COM2: 0V/5V/12V, Auto-flow Co 			

Model	MS-CF02-SKU1 MS-CF02-SKU2		
	• 1 x ATX power connector (12-pin)		
	• 1 x 12V ATX power connector (4-pin)		
	• 1 x Front audio header (Headphone & Mic-in)		
	• 1 x Audio amplifier header		
	• 1 x LVDS Inverter box header		
	• 1 x LVDS + eDP Wafer Connector		
	• 1 x CPU fan box header		
	• 1 x System fan box header		
	• 1 x Front panel connector		
	• 1 x COM port box header		
Onboard Connector	• 1 x GPIO (DIO) connector		
	• 1 x I2C box header		
	• 1 x USB 2.0 box header (480 Mbps)		
	• 1 x USB 5Gbps box header		
	• 1 x CMOS battery header		
	• 4 x COM voltage select jumpers		
	• 1 x Clear CMOS jumper		
	• 1 x ME jumper		
	• 1 x AT/ ATX mode select jumper		
	• 1 x LVDS power jumper		
	• 1 x Chassis Intrusion jumper		
	 Windows 10 IoT Enterprise 2021 LTSC (64-bit) 		
OS Support	 Windows 11 IoT Enterprise LTSC 24H2 (64-Bit) 		
	• Linux Kernel 5.15 (ADL-S)/ Linux Kernel 5.19 (RPL-S) (by request)		
Certification	CE, FCC Class B, BSMI, RCM, VCCI, UKCA		
	• Operating Temperature: 0 ~ 60°C (Thermal Test w/ Airflow: 0.7m/s)		
Environment	 Storage Temperature: -20 ~ 80°C 		
Environment	 Operating Humidity: 10 ~ 90%, non-condensing 		
	 Storage Humidity: 10 ~ 90%, non-condensing 		

SKU3

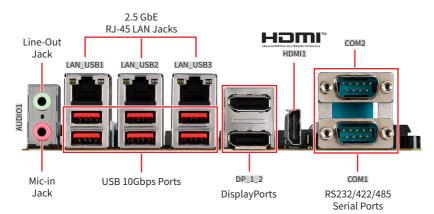
Model	MS-CF02-SKU3		
Form factor	Mini-ITX		
Dimensions	170 x 170mm (6.7 x 6.7 inches)		
	 14th Gen Intel[®] Raptor Lake-S Refresh i9/i7/i5/i3 IOTG Series Processor, Max 65W 		
Processor	 13th Gen Intel[®] Raptor Lake-S i9/i7/i5/i3 Pentium[®]/ Celeron[®] IOTG Series Processor, Max 65W 1.6 GHz~5.1 GHz (depends on CPU) Socket LGA 1700 		
	 12th Gen Intel[®] Alder Lake-S i9/i7/i5/i3 Pentium[®]/ Celeron[®] IOTG Series Processor, Max 65W 1.6 GHz~5.1 GHz (depends on CPU) Socket LGA 1700 		
Chipset	Intel® H610E		
Memory	 2 x DDR4 SO-DIMM slots (260-pin, vertical) Dual-Channel DDR4, Non-ECC Up to 3200 MT/s Up to 64GB 		
Network	 3 x Intel[®] I225-V PCIe 2.5GbE RJ45 LAN Co-Lay Intel[®] I225-LM PCIe 2.5GbE RJ45 LAN 		
Expansion Slots	 1 x PCle 4.0 x16 slot 1 x M.2 E Key slot (2230) Supports PCle x1 & USB 2.0 signal (480 Mbps) Supports CNVi Support Intel[®] AX210 Wi-Fi 6E & BT-5.1 (vPro Supported) 		
Storage	 3 x SATA 3.0 6Gb/s ports Support AHCI mode 1 x M.2 M Key slot (2242/ 2280) Supports PCIe 3.0 x4 NVMe signal 		
	- Supports B+M Key module		
Audio	 Realtek[®] ALC897 High Definition Audio Codec Co-lay Realtek[®] ALC888S-VD2 		

Model	MS-CF02-SKU3		
	• 2 x DP 1.4a up to 4096×2304 @60Hz		
	• 1 x HDMI [™] 1.4b up to 4096x2304 @24Hz		
	• 1 x LVDS up to 1920x1200 @60Hz (Co-lay eDP)		
	 Auto switch between LVDS & eDP 18/24-bit dual channel 		
Graphics	'		
Graphics	 1 x eDP up to 4096 × 2304 @60 Hz (Co-lay LVDS) Auto switch between eDP & LVDS 		
	 3 independent display modes supported 		
	- DP1/DP2		
	- HDMI™ - LVDS or eDP		
Power	• 1 x 24-pin ATX power connector		
	• 1 x 4-pin 12V ATX power connector		
Cooling	• 1 x 4-pin PWM CPU fan connector		
	• 1 x 4-pin PWM system fan connector		
	• 1 x Line-out jack		
	• 1 x Mic-in jack		
	• 2 x 2.5 GbE RJ-45 LAN ports		
	• 2 x USB 10Gbps Type-A ports		
	• 2 x USB 5Gbps Type-A ports		
Rear I/O	• 2 x USB 2.0 Type-A ports (480 Mbps)		
	• 2 x DisplayPort (1.4a)		
	• 1 x HDMI [™] connector (1.4b)		
	• 2 x DB-9 RS-232/422/485 Serial ports		
	- COM1 RI/0V/5V/12V, Auto-flow Control		
	- COM2 0V/5V/12V, Auto-flow Control		

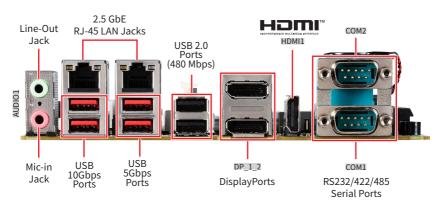
Model	MS-CF02-SKU3	
	• 1 x ATX power connector (12-pin)	
	• 1 x 12V ATX power connector (4-pin)	
	• 1 x Front audio header (Headphone & Mic-in)	
	• 1 x Audio amplifier header	
	• 1 x LVDS Inverter box header	
	• 1 x LVDS + eDP Wafer Connector	
	• 1 x CPU fan box header	
	• 1 x System fan box header	
	• 1 x Front panel connector	
Onboard	• 1 x COM port box header	
Connector	• 1 x GPIO (DIO) connector	
	• 1 x I2C box header	
	• 1 x USB 2.0 box header (480 Mbps)	
	• 1 x CMOS battery header	
	• 4 x COM voltage select jumpers	
	• 1 x Clear CMOS jumper	
	• 1 x ME jumper	
	• 1 x AT/ ATX mode select jumper	
	• 1 x LVDS power jumper	
	• 1 x Chassis Intrusion jumper	
	• Windows 10 IoT Enterprise 2021 LTSC (64-bit)	
OS Support	 Windows 11 IoT Enterprise LTSC 24H2 (64-Bit) 	
	• Linux Kernel 5.15 (ADL-S)/ Linux Kernel 5.19 (RPL-S) (by request)	
Certification	CE, FCC Class B, BSMI, RCM, VCCI, UKCA	
	 Operating Temperature: 0 ~ 60°C (Thermal Test w/ Airflow: 0.7m/s) 	
Environment	 Storage Temperature: -20 ~ 80°C 	
	 Operating Humidity: 10 ~ 90%, non-condensing 	
	 Storage Humidity: 10 ~ 90%, non-condensing 	

Rear I/O Panel

SKU1/ SKU2



SKU3



Line-Out Jack

This connector is provided for headphones or speakers.

Mic-In Jack

This connector is provided for microphones.

2.5 GbE RJ-45 LAN Jack

The standard single RJ45 LAN jack is provided for connection to the Local Area Network (LAN). You can connect a network cable to it.

Link/ A	ctivity LED	Spe	ed LED
Status	Description	Status	Description
Off	No link	Off	10/100 Mbps
⊖ Yellow	Linked	Green	1000 Mbps
Blinking	Data activity	Orange	2.5 Gbps

USB 10Gbps Ports

USB 10Gbps ports delivers high-speed data transfer for various devices, such as storage devices, hard drives, video cameras, etc.

USB 5Gbps Port

The USB (Universal Serial Bus) port is for attaching USB devices such as keyboards, mouse, or other USB-compatible devices.

USB 2.0 Port

This connector is provided for USB peripheral devices. (Speed up to 480 Mbps)

Important

High-speed devices are recommended for USB 3.2 ports whereas low-speed devices, such as mouse or keyboard, are suggested to be plugged into the USB 2.0 ports.

DisplayPort

DisplayPort is a digital display interface standard. This connector is used to connect a monitor with DisplayPort inputs.

HDMI[™] is an all-digital interface for uncompressed audio/video streams, supporting standard, enhanced, or high-definition video, and multi-channel digital audio on a single cable.

RS232/422/485 Serial Port

The serial port is a 16550A high speed communications port that sends/receives 16 bytes FIFOs. It supports barcode scanners, barcode printers, bill printers, credit card machine, etc.



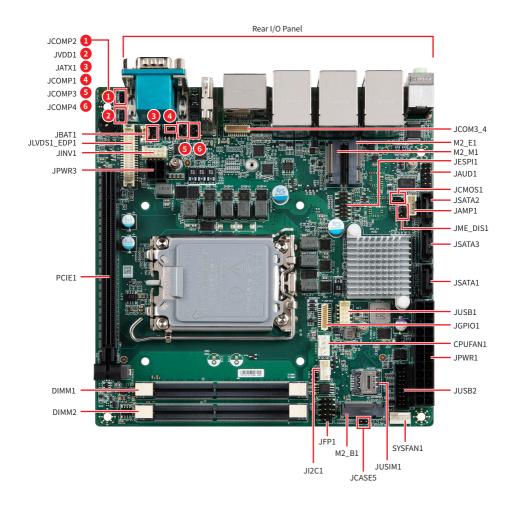
RS232		
PIN	SIGNAL	DESCRIPTION
1	NDCD	Data Carrier Detect
2	NSIN	Signal In
3	NSOUT	Signal Out
4	NDTR	Data Terminal Ready
5	GND	Signal Ground
6	NDSR	Data Set Ready
7	NRTS	Request To Send
8	NCTS	Clear To Send
9	VCC_COM	VCC_COM

RS422		
PIN	SIGNAL	DESCRIPTION
1	422 TXD-	Transmit Data, Negative
2	422 TXD+	Transmit Data, Positive
3	422 RXD+	Receive Data, Positive
4	422 RXD-	Receive Data, Negative
5	GND	Signal Ground
6	NC	No Connection
7	NC	No Connection
8	NC	No Connection
9	NC	No Connection

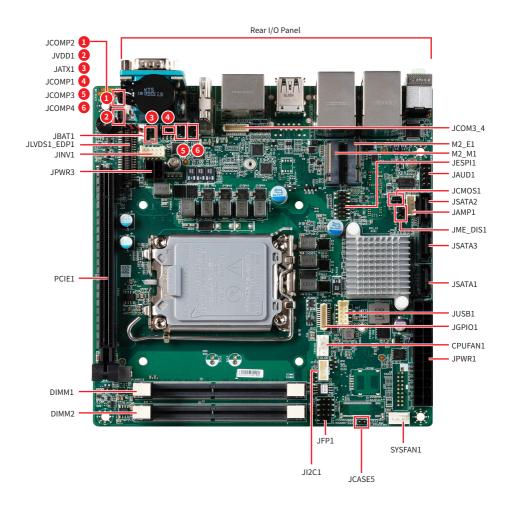
RS485						
PIN	SIGNAL	DESCRIPTION				
1	TXD-	Transmit Data, Negative				
2	NC	No Connection				
3	TXD+	Transmit Data, Positive				
4	NC	No Connection				
5	GND	Signal Ground				
6	NC	No Connection				
7	NC	No Connection				
8	NC	No Connection				
9	NC	No Connection				

Motherboard Overview

SKU1/ SKU2



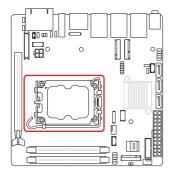
SKU3

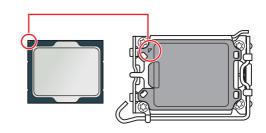


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JFP1: Front Panel Connector	35
JCASE5: Chassis Intrusion Header	35
JCOM3_4: COM Port Box Header	36
JGPIO1: GPIO (DIO) Box Header	38
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CPU Socket





Introduction to the LGA1700 CPU

The surface of the LGA1700 CPU has four notches and a golden triangle to assist in correctly lining up the CPU for motherboard placement. The golden triangle is the Pin 1 indicator.

🕼 Important

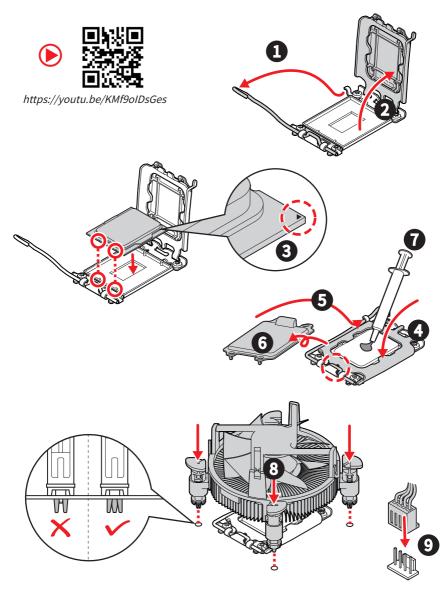
- Always unplug the power cord from the power outlet before installing or removing the CPU.
- When **installing a CPU**, always remember to install a CPU heatsink. A CPU heatsink is necessary to prevent overheating and maintain system stability.
- Confirm that the CPU heatsink has formed a tight seal with the CPU before booting your system.
- **Overheating** can seriously damage the CPU and motherboard. Always make sure the cooling fans work properly to protect the CPU from overheating. Be sure to apply an even layer of thermal paste (or thermal tape) between the CPU and the heatsink to enhance heat dissipation.
- Whenever the CPU is not installed, always protect the CPU socket pins by covering the socket with the plastic cap.
- If you purchased a separate CPU and heatsink/ cooler, Please refer to the documentation in the heatsink/ cooler package for more details about installation.

CPU & Heatsink Installation

Use appropriate ground straps, gloves and ESD mats to protect yourself from electrostatic discharge (ESD) while installing the processor.

Important

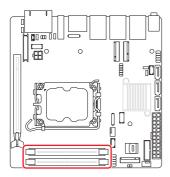
Images are for illustration purposes only; actual parts may vary.



Memory

DIMM1~2: DDR4 SO DIMM Slots

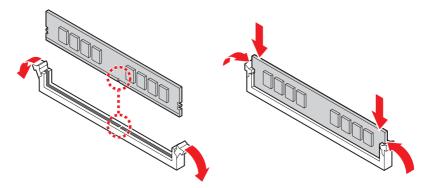
The SO-DIMM slots is intended for memory modules.





Installing DDR4 Memory

- 1. Open the side clips to unlock the DIMM slot.
- 2. Insert the DIMM vertically into the slot, ensuring that the off-center notch at the bottom aligns with the slot.
- 3. Push the DIMM firmly into the slot until it clicks and the side clips automatically close.
- 4. Verify that the side clips have securely locked the DIMM in place.



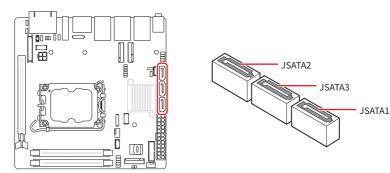
🕼 Important

- Always insert memory modules in the DIMM2 slot first.
- You can barely see the golden finger if the DIMM is properly inserted in the DIMM slot.
- To ensure system stability for Dual channel mode, memory modules must be of the same type, number and density.

Storage

JSATA1: SATA 3.0 6Gb/s Ports

This connector is SATA 6Gb/s interface port, it can connect to one SATA device.

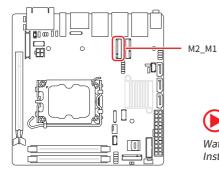


🕼 Important

- This SATA port supports hot plug.
- Please do not fold the SATA cable at a 90-degree angle. Data loss may result during transmission otherwise.
- SATA cables have identical plugs on either sides of the cable. However, it is recommended that the flat connector be connected to the motherboard for space saving purposes.

M2_M1: M.2 Slot (M Key, 2242, 2280)

Please install the M.2 solid-state drive (SSD) into the M.2 slot as shown below.



Feature

- Supports PCIe 3.0 x4 signal.
- Supports B+M key module.

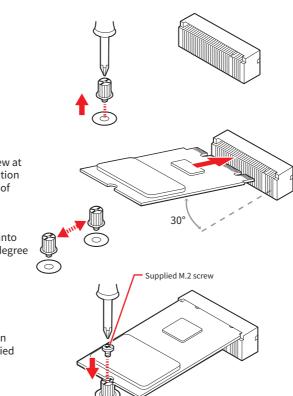


Install M.2 SSD.

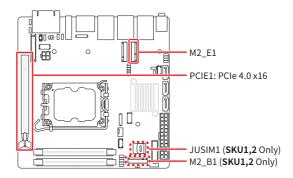


Installing M.2 SSD

- 1. Loosen the M.2 riser screw from the motherboard.
- 2. Set the M.2 riser screw at the appropriate location based on the length of your M.2 SSD.
- 3. Insert your M.2 SSD into the M.2 slot at a 30-degree angle.
- 4. Secure the M.2 SSD in place with the supplied M.2 screw.



Expansion Slots



PCIE1: PCIe Expansion Slots

The PCI Express(Peripheral Component Interconnect Express) slots support PCIe interface expansion cards.

JUSIM1: Nano SIM Holder (SKU1,2 Only)

This holder is provided for 3G, 4G, LTE, 5G Nano SIM cards.

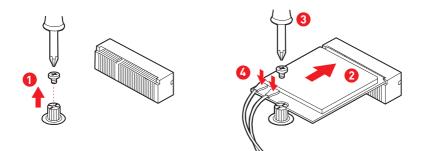




When adding or removing expansion cards, make sure that you unplug the power supply first. Meanwhile, read the documentation for the expansion card to configure any necessary hardware or software settings for the expansion card, such as jumpers, switches or BIOS configuration.

M2_E1: M.2 Slot (E Key, 2230)

Please install the Wi-Fi/ Bluetooch card into the M.2 slot as shown below.

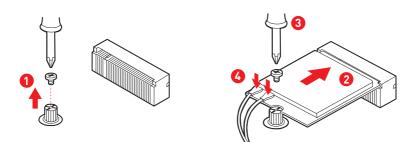


Feature

- Supports PCIe x 1 & USB 2.0 signal.
- Supports CNVi.

M2_B1: M.2 Slot (B Key, 3042) (SKU1,2 Only)

Please install the WWAN Card/ solid-state drive (SSD) into the M.2 slot as shown below.

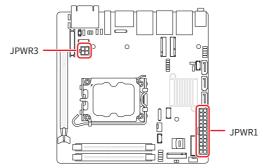


Feature

- Supports PCIe x 1, USB 10Gbps x 1, USB 2.0 signal.
- Supports 5G modules.

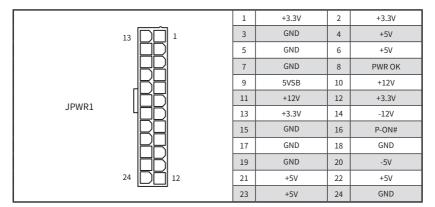
Connectors

Power Connectors



JPWR1: ATX 24-Pin Power Connector

This connector allows you to connect an ATX power supply.



JPWR3: ATX 4-Pin 12V Power Connector

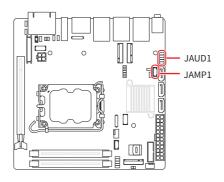
This connector allows you to connect an ATX power supply.

	1	GND	2	GND
JPWR3 4 2	3	12V	4	12V

🕼 Important

Make sure that all the power cables are securely connected to a proper power supply to ensure stable operation of the system.

Audio Connectors



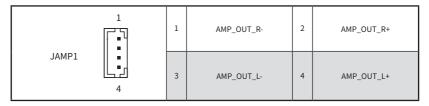
JAUD1: Front Audio Header

This connector allows you to connect front panel audio.

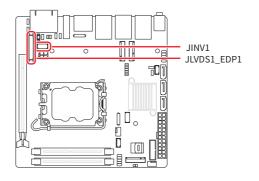
	1	MIC_L	2	GND	
1 2	3	MIC_R	4	PRESENCE#	
JAUD1	5	F_OUTR	6	MIC2_JD	
9 10	7	HPON	8	No pin	
	9	F_OUTL	10	LIN2_JD	

JAMP1: Audio Amplifier Header

The connector is used to connect audio amplifiers to enhance audio performance.



Graphics Connectors



JINV1: LVDS Inverter Box Header

The connector is provided for LCD backlight options.

	1	GND	2	GND
JINV1	3	VCC5	4	VCC5
9 [■ ■ ■ ■ ■] 1	5	+12V	6	+12V
10 10 2	7	INV_ON#1	8	NC
	9	L_BKLT_CTRL#1	10	NC

JLVDS1_EDP1: LVDS+eDP Wafer Connector

This connector is designed for use with LVDS/eDP interface flat panels. When connecting your flat panel to this connector, be sure to check the panel datasheet to ensure that you set the JVDD1 LVDS power jumper to the appropriate power voltage.

eDP Panel (P1)	CF02 M	eDP Panel (P1)			
	40 JL 				
Lane3_P	EDP_LINE3_DP	1	2	EDP_LINE2_DP	Lane2_P
Lane3_N	EDP_LINE3_DN	3	4	EDP_LINE2_DN	Lane2_N
	DDC0_CLK_7513_R	5	6	DDC0_DATA_7513_R	
LCD_VCC	LCD_VDD	7	8	LCD_VDD	LCD_VCC
LCD_VCC	LCD_VDD	9	10	VCC3	
	BKLT_EN	11	12	LVDS_DETECT#	LCD_GND
Lane1_P	LVDSA_DATA1+	13	14	EHPDET/ LVDSA_DATA0+	HPD
Lane1_N	LVDSA_DATA1-	15	16	LVDSA_DATA0-	
H_GND	GND	17	18	GND	H_GND
	LVDSA_DATA3+	19	20	LVDSA_DATA2+	Lane0_P
	LVDSA_DATA3-	21	22	LVDSA_DATA2-	Lane0_N
H_GND	GND	23	24	GND	H_GND
	LVDSB_DATA1+	25	26	LVDSB_DATA0+	
	LVDSB_DATA1-	27	28	LVDSB_DATA0-	
H_GND	GND	29	30	GND	GND
	LVDSB_DATA3+	31	32	LVDSB_DATA2+	
	LVDSB_DATA3-	33	34	LVDSB_DATA2-	
	NA	35	36	GND	GND
	LVDSB_CLK+	37	38	LVDSA_CLK+	AUX_CH_P
	LVDSB_CLK-	39	40	LVDSA_CLK-	AUX_CH_N

LVDS Panel (P1)	CF02 I	LVDS Panel (P1)			
	40 J				
	EDP_LINE3_DP	1	2	EDP_LINE2_DP	
	EDP_LINE3_DN	3	4	EDP_LINE2_DN	
	DDC0_CLK_7513_R	5	6	DDC0_DATA_7513_R	
VCC	LCD_VDD	7	8	LCD_VDD	VCC
VCC	LCD_VDD	9	10	VCC3	
	BKLT_EN	11	12	LVDS_DETECT#	GND
RXO1+	LVDSA_DATA1+	13	14	EHPDET/ LVDSA_DATA0+	RXO0+
RXO1-	LVDSA_DATA1-	15	16	LVDSA_DATA0-	RXO0-
GND	GND	17	18	GND	GND
RXO3+	LVDSA_DATA3+	19	20	LVDSA_DATA2+	RXO2+
RXO3-	LVDSA_DATA3-	21	22	LVDSA_DATA2-	RXO2-
GND	GND	23	24	GND	GND
RXE1+	LVDSB_DATA1+	25	26	LVDSB_DATA0+	RXE0+
RXE1-	LVDSB_DATA1-	27	28	LVDSB_DATA0-	RXE0-
GND	GND	29	30	GND	GND
RXE3+	LVDSB_DATA3+	31	32	LVDSB_DATA2+	RXE2+
RXE3-	LVDSB_DATA3-	33	34	LVDSB_DATA2-	RXE2-
	NA	35	36	GND	GND
RXEC+	LVDSB_CLK+	37	38	LVDSA_CLK+	RXOC+
RXEC-	LVDSB_CLK-	39	40	LVDSA_CLK-	RXOC-

Important

Pin 12 is a detect pin. When using a customized LVDS cable, pin 12 should be a signal ground with a low impedance. Otherwise, LVDS will not function.

Other Connectors

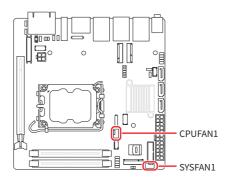
CPUFAN1, SYSFAN1: CPU/ System Fan Box Headers

The fan power connector supports CPU/ system cooling fans with +12V. When connecting the wire to the connectors, always note that the red wire is the positive and should be connected to the +12V; the black wire is Ground and should be connected to GND.

CPUFAN1	1	GND	2	FAN POWER
SYSFAN1 4 4 1	3	FAN SENSE	4	FAN_PWM

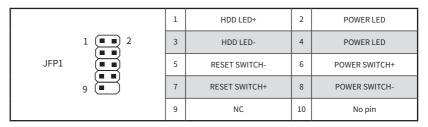
🕼 Important

Please refer to the recommended CPU fans at processor's official website or consult the vendors for proper CPU cooling fan.



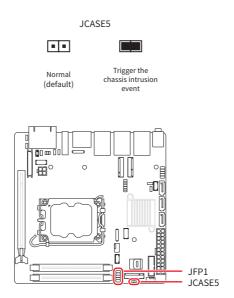
JFP1: Front Panel Connector

This front-panel connector is provided for electrical connection to the front panel switches & LEDs and is compliant with Intel Front Panel I/O Connectivity Design Guide.



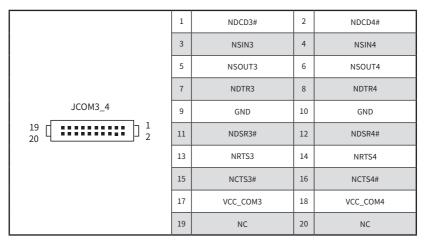
JCASE5: Chassis Intrusion Header

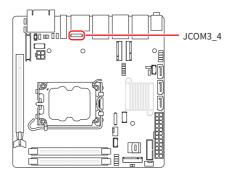
This connector connects to the chassis intrusion switch cable. If the chassis is opened, the chassis intrusion mechanism will be activated. The system will record this status and show a warning message on the screen. To clear the warning, you must enter the BIOS utility and clear the record.



JCOM3_4: COM Port Box Header

This connector is a 16550A high speed communications port that sends/ receives 16 bytes FIFOs. You can attach a serial device to it.





🕼 Important

After connect COM port box headers to printer, garbage can't be printed when power on/off.

Feature

- Support True RS-232
- Support TTL RS-232
- Support Auto flow control
- RS- 422/ 485 support TR 1000+ Meter
- RS- 232/ 422/ 485, selection by BIOS control

SKU1/ SKU2

• **COM1** Connector (Rear I/O) Supports RS-232/ 422/ 485, With Ring/ 0V/ 5V/ 12V (Default set to Ring).

• COM2 (Rear I/O), JCOM3_4 Connector

Supports RS-232/ 422/ 485, With 0V/ 5V/ 12V (Default set to 5V).

SKU3

• **COM1** Connector (Rear I/O)

Supports RS-232/422/485, With Ring/0V/5V/12V (Default set to Ring).

• **COM2** Connector (Rear I/O)

Supports RS-232/ 422/ 485, With 0V/ 5V/ 12V (Default set to 5V).

• JCOM3_4 Connector

Supports RS-232, With 0V/ 5V/ 12V (Default set to 5V).

R\$232				
PIN	SIGNAL DESCRIPTION			
1	NDCD	Data Carrier Detect		
2	NSIN	Signal In		
3	NSOUT	Signal Out		
4	NDTR	Data Terminal Ready		
5	GND	Signal Ground		
6	NDSR	Data Set Ready		
7	NRTS	Request To Send		
8	NCTS	Clear To Send		
9	VCC_COM	VCC_COM		

RS422				
PIN	N SIGNAL DESCRIPTION			
1	422 TXD-	Transmit Data, Negative		
2	422 TXD+	Receive Data, Positive		
3	422 RXD+	Transmit Data, Positive		
4	422 RXD-	Receive Data, Negative		
5	GND	Signal Ground		
6	NC	No Connection		
7	NC	No Connection		
8	NC	No Connection		
9	NC	No Connection		

RS485				
PIN	N SIGNAL DESCRIPTION			
1	TXD-	Transmit Data, Negative		
2	NC	No Connection		
3	TXD+	Transmit Data, Positive		
4	NC	No Connection		
5	GND	Signal Ground		
6	NC	No Connection		
7	NC	No Connection		
8	NC	No Connection		
9	NC	No Connection		

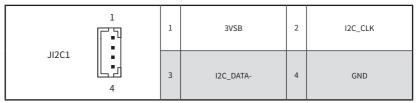
JGPIO1: GPIO (DIO) Box Header

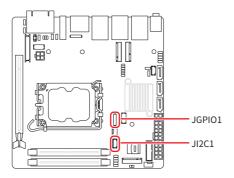
This connector is provided for the General-Purpose Input/Output (GPIO) peripheral module.

	1	GND	2	GND
JGPI01		N_GPO0	4	N_GPI0
		N_GPO1	6	N_GPI1
	7	N_GPO2	8	N_GPI2
1 2	9	N_GPO3	10	N_GPI3
	11	N_GPO4	12	N_GPI4
19 20	13	N_GPO5	14	N_GPI5
	15	N_GPO6	16	N_GPI6
	17	N_GPO7	18	N_GPI7
	19	VCC5	20	VCC5

JI2C1: I2C Box Header

This connector is used to connect to the System Management Bus (SMBus).





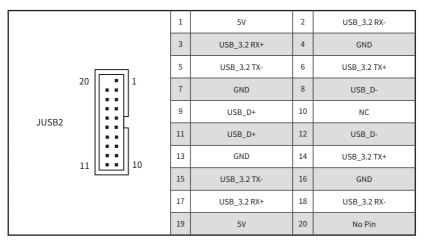
JUSB1: USB 2.0 Box Header

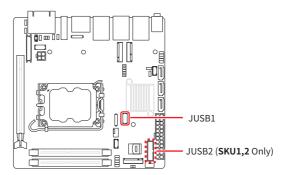
These connectors are ideal for connecting USB devices such as keyboard, mouse, or other USB-compatible devices.

		1	5V	2	5V
	10 9	3	USB_D-	4	USB_D-
JUSB1		5	USB_D+	6	USB_D+
		7	GND	8	GND
		9	No pin	10	NC

JUSB2: USB 5Gbps Box Header (sku1,2 Only)

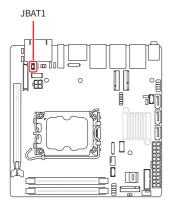
This port is backward-compatible with USB 2.0 devices and supports data transfer rate up to 5 Gbps.





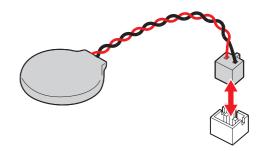
JBAT1: CMOS Battery Header

If the CMOS battery is out of charge, the time in the BIOS will be reset and the data of system configuration will be lost. In this case, you need to replace the CMOS battery.



Replacing CMOS battery

- 1. Unplug the battery wire from the BAT1 connector and remove the battery.
- 2. Connect the new CR2032 battery with wire to the BAT1 connector.





WARNING

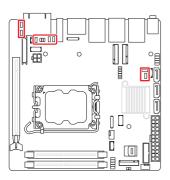
KEEP OUT OF REACH OF CHILDREN

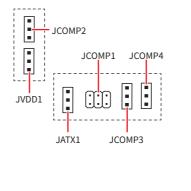
- Swallowing can lead to chemical burns, perforation of soft tissue, can death.
- Severe burns can occur within 2 hours of ingestion.
- If you think batteries might have been swallowed or placed inside any part of the body, seek immediate medical attention.

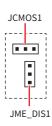
Jumpers



Avoid adjusting jumpers when the system is on; it will damage the motherboard.







Jumper Name	Default Setting	Description
	2 6	COM Voltage Select Jumper
JCOMP1		1-2: 5V Power
JCOMPI		3-4: 12V Power
	1 5	5-6: NRI (Default)
JCOMP2		COM Voltage Select Jumper
JCOMP3		1-2: 5V Power (Default)
JCOMP4		2-3: 12V Power
		Clear CMOS Jumper
JCMOS1	1	1-2: Normal (Default)
		2-3: Clear CMOS
		ME Jumper
JME_DIS1		1-2: ME enabled (Default)
		2-3: ME disabled
		AT/ ATX Mode Select Jumper
JATX1		1-2: ATX (Default)
		2-3: AT
	1	LVDS Power Jumper
JVDD1		1-2: 3.3V (Default)
		2-3: 5V

BIOS Setup

This chapter provides information on the BIOS Setup program and allows users to configure the system for optimal use.

Users may need to run the Setup program when:

- An error message appears on the screen at system startup and requests users to run SETUP.
- Users want to change the default settings for customized features.

\Lambda Important

- Please note that BIOS update assumes technician-level experience.
- As the system BIOS is under continuous update for better system performance, the illustrations in this chapter should be held for reference only.

Entering Setup

Power on the computer and the system will start POST (Power On Self Test) process. When the message below appears on the screen, press or <F2> key to enter Setup, <F11> key to Boot Menu, <F12> key to PXE Boot.

Press or <F2> to enter SETUP

If the message disappears before you respond and you still wish to enter Setup, restart the system by turning it **OFF** and **On** or pressing the **RESET** button. You may also restart the system by simultaneously pressing **<Ctrl>**, **<Alt>**, **and <Delete>** keys.

\Lambda Important

The items under each BIOS category described in this chapter are under continuous update for better system performance. Therefore, the description may be slightly different from the latest BIOS and should be held for reference only.

Control Keys

$\leftarrow \rightarrow$	Select Screen		
↑↓	Select Item		
Enter	Select		
+ -	Change Value		
Esc	Exit		
F1	General Help		
F7	Previous Values		
F9	Optimized Defaults		
F10	Save & Reset*		
F12	Screenshot capture		
<k></k>	Scroll help area upwards		
<m></m>	Scroll help area downwards		

* When you press **<F10>**, a confirmation window appears and it provides the modification information. Select between **Yes** or **No** to confirm your choice.

Getting Help

Upon entering setup, you will see the Main Menu.

Main Menu

The main menu lists the setup functions you can make changes to. You can use the **arrow keys (** $\uparrow \downarrow$) to select the item. The on-line description of the highlighted setup function is displayed at the bottom of the screen.

Sub-Menu

If you find a right pointer symbol appears to the left of certain fields that means a sub-menu can be launched from this field. A sub-menu contains additional options for a field parameter. You can use **arrow keys** ($\uparrow \downarrow$) to highlight the field and press **<Enter>** to call up the sub-menu. Then you can use the **control keys** to enter values and move from field to field within a sub-menu. If you want to return to the main menu, just press the **<Esc>**.

General Help <F1>

The BIOS setup program provides a General Help screen. You can call up this screen from any menu by simply pressing **<F1>**. The Help screen lists the appropriate keys to use and the possible selections for the highlighted item. Press **<Esc>** to exit the Help screen.

The Menu Bar

Main Advanced Boot Security Chi	Aptio Setup – AMI oset Power Save & Exit	
System Date System Time	[Wed 07/19/2023] [14:41:49]	Set the Date. Use Tab to switch between Date elements. Default Ranges:
SATA_1	Not Present	Year: 2000–2099
SATA_2	Not Present	Months: 1–12
SATA_3	Not Present	Days: Dependent on month
M.2	Not Present	Range of Years may vary.
SATA Mode Selection	[AHCI]	
USB Devices: 1 Drive, 1 Keyboard, 1 Mouse		
BIOS Version ECF02IMS.109		++: Select Screen ↑↓: Select Item Enter: Select
13th Gen Intel(R) Core(TM) i9–13900E	@1800 MHz	+/-: Change Opt.
Processor ID	0×B0671	ESC: Exit
Build Type	64	F1: General Help
Total Memory	16384 MB(DDR4)	F7: Previous Values
		F9: Optimized Defaults
		F10: Save & Reset Setup
		F12: Screenshot capture
		<k>: Scroll help area upwards</k>
		<m>: Scroll help area downwards</m>
		1
Version 2	.22.1288 Copyright (C) 2023	AMI

► Main

Use this menu for basic system configurations, such as time, date, etc.

Advanced

Use this menu to set up the items of special enhanced features.

► Boot

Use this menu to specify the priority of boot devices.

► Security

Use this menu to set supervisor and user passwords.

Chipset

This menu controls the advanced features of the on-board chipsets.

Power

Use this menu to specify your settings for power management.

Save & Exit

This menu allows you to load the BIOS default values or factory default settings into the BIOS and exit the BIOS setup utility with or without changes.

Main

System Date System Time SATA_1 SATA_2 SATA_3	[Wed 07/19/2023] [14:41:49] Not Present Not Present Not Present	Set the Date. Use Tab to switch between Date elements. Default Ranges: Year: 2000-2099 Wonths: 1-12 Days: Dependent on month
M.2 SATA Mode Selection USB Devices:	Not Present [AHCI]	Range of Years may vary.
1 Drive, 1 Keyboard, 1 Mo BIOS Version ECF02IMS.109		++: Select Screen ↑↓: Select Item Enter: Select
13th Gen Intel(R) Core(TM) 19- Processor ID Build Type Total Memory	13900E @1800 MHz 0x80671 64 16384 MB(DDR4)	+/-: Change Opt. ESC: Exit F1: General Help F7: Previous Values F9: Optimized Defaults F10: Save & Reset Setup F12: Screenshot capture <kb: area="" help="" scroll="" upwards<br=""><mb: area="" downward<="" help="" scroll="" td=""></mb:></kb:>
HDD Information		

► System Date

This setting allows you to set the system date.

Format: <Day> <Month> <Date> <Year>.

► System Time

This setting allows you to set the system time.

Format: <Hour> <Minute> <Second>.

SATA Mode Selection

This setting specifies SATA controller mode.

- [AHCI] AHCI (Advanced Host Controller Interface), is a technical standard for an interface that allows the software to communicate with Serial ATA (SATA) devices. It offers advanced SATA features such as Native Command Queuing (NCQ) and hot-plugging.
- [RAID] RAID (Redundant Array of Independent Disks) is a virtual disk storage technology that combines multiple physical disks into one unit for data redundancy, performance improvement, or both.

🕼 Important

SKU3 (Intel® H610E) does not support M.2_2 (M.2 B Key) and SATA [RAID] mode.

Advanced

Main Advanced Boot Security	Aptio Setup – AMI Chipset Power Save & Exit					
Full Screen Logo Display Bootup NumLock State CPU Configuration H/X Monitor Samert Fan Configuration PCI/PCIE Device Configuration Network Stack Configuration GPIO Group Configuration PCIE ASPM Settings	[Disabled] [on]	Enables or disables Full Screen Logo Display option				
		++: Select Screen 14: Select Item Enter: Select +/-: Change Opt. ESC: Exit F1: General Help F7: Previous Values F9: Optimized Defaults F10: Save & Reset Setup F12: Screenshot capture (x): Scroll help area dowawads <mo: area="" dowawads<="" help="" scroll="" td=""></mo:>				
Vers	Version 2.22.1288 Copyright (C) 2023 AMI					

► Full Screen Logo Display

This BIOS feature determines if the BIOS should hide the normal POST messages with the motherboard or system manufacturer' s full-screen logo.

- [Enabled] BIOS will display the full-screen logo during the boot-up sequence, hiding normal POST messages.
- [Disabled] BIOS will display the normal POST messages, instead of the fullscreen logo.

Please note that enabling this BIOS feature often adds 2-3 seconds to the booting sequence. This delay ensures that the logo is displayed for a sufficient amount of time. Therefore, **it is recommended to disable this BIOS feature for faster boot-up.**

Bootup NumLock State

This setting is to set the state of the Num Lock key on the keyboard when the system is powered on.

- [On] Turn on the Num Lock key when the system is powered on.
- [Off] Allow users to use the arrow keys on the numeric keypad.

► CPU Configuration

Advanced		
CPU Configuration		When enabled, a VMM can utilize the additional
13th Gen Intel(R) Core(TM) i9–1390	0E	hardware capabilities provided
Processor ID	0×B0671	by Vanderpool Technology.
Processor Speed	1800 MHz	
P-core Information		
L1 Data Cache	48 KB × 8	
L1 Instruction Cache	32 KB x 8	
L2 Cache	2048 KB × 8	
L3 Cache	36 MB	
E-core Information		
L1 Data Cache	32 KB x 16	++: Select Screen
L1 Instruction Cache	64 KB × 16	↑↓: Select Item
L2 Cache	4096 KB x 4	Enter: Select
L3 Cache	36 MB	+/-: Change Opt.
		ESC: Exit
Intel Virtualization Technology		F1: General Help
Hyper-Threading	[Enabled]	F7: Previous Values
Active Performance-cores	[A11]	F9: Optimized Defaults
Active Efficient-cores	[A11]	F10: Save & Reset Setup
Intel(R) SpeedStep(tm)	[Enabled]	F12: Screenshot capture
Intel(R) Speed Shift Technology	[Enabled]	<k>: Scroll help area upwards</k>
C states	[Enabled]	<m>: Scroll help area downwards</m>

Intel Virtualization Technology

Enables or disables Intel Virtualization technology.

[Enabled] Enables Intel Virtualization technology and allows a platform to run multiple operating systems in independent partitions. The system can function as multiple systems virtually.

[Disabled] Disables this function.

Hyper-Threading (HT Function)

Enables or disables Intel Hyper-Threading technology.

The processor uses Hyper-Threading technology to improve utilization of the CPU resources and potentially increasing overall performance by allowing it to handle multiple threads simultaneously. If you disable the function, it will restricts the CPU to operate as a single-threaded processor, with only one logical core per physical core. Please disable this item if your operating system does not support HT Function or unreliability and instability may occur.

Active Performance-cores

Select the number of active Performance-cores (P-cores).

Active Efficient-cores

Select the number of active Efficient-cores (E-cores).

Intel(R) SpeedStep(TM)

Enhanced Intel SpeedStep[®] Technology enables the OS to control and activate performance states (P-States) of the processor.

[Enabled] When enabled, Intel SpeedStep® technology is activated. This technology allows the processor to manage its power consumption via performance state (P-State) transitions.

[Disabled] Disables this function

Intel(R) Speed Shift Technology

Intel[®] Speed Shift Technology is an energy-efficient method that allows frequency control by hardware rather than the OS.

[Enabled] When enabled, Intel® Speed Shift Technology is activated. The technology enables the management of processor power consumption via hardware performance state (P-State) transitions.

[Disabled] Disable this function.

C States

This setting controls the C-States (CPU Power states).

- [Enabled] Detects the idle state of system and reduce CPU power consumption accordingly.
- [Disabled] Disable this function.

Super IO Configuration

Havanced		
Super IO Configuration		Enable or Disable Serial Port (COM)
Device Settings	IO=3F8h; IRQ=4;	
Change Settings	[Auto]	
Mode Select	[RS232]	
Serial Port 2	[Enabled]	
Device Settings	IO=2F8h; IRQ=3;	
Change Settings	[Auto]	
Mode Select	[RS232]	
Serial Port 3	[Enabled]	
Device Settings	IO=3E8h; IRQ=7;	
Change Settings	[Auto]	
Mode Select	[RS232]	++: Select Screen
Serial Port 4	[Enabled]	↑↓: Select Item
Device Settings	IO=2E8h; IRQ=7;	Enter: Select
Change Settings	[Auto]	+/-: Change Opt.
Mode Select	[RS232]	ESC: Exit
		F1: General Help
FIFO Mode	[128-byte]	F7: Previous Values
Shared IRQ Mode	[Edge/Low Active]	F9: Optimized Defaults
Watch Dog Timer	[Disabled]	F10: Save & Reset Setup
		F12: Screenshot capture
		<k>: Scroll help area upwards</k>
		<m>: Scroll help area downwards</m>

Serial Port 1/2/3/4

This setting enables or disables the specified serial port.

» Change Settings

This setting is used to change the address & IRQ settings of the specified serial port.

» Mode Select

Select an operation mode for Serial Port 1/2/3/4.

► FIFO Mode

This setting controls the FIFO (First In First Out) data transfer mode.

Shared IRQ Mode

This setting provides the system with the ability to share interrupts among its serial ports.

► Watch Dog Timer

You can enable the system watchdog timer, a hardware timer that generates a reset when the software that it monitors does not respond as expected each time the watchdog polls it.

H/W Monitor (PC Health Status)

These items display the current status of all monitored hardware devices/ components such as voltages, temperatures and all fans' speeds.

Advanced		
PC Health Status		Thermal Shutdown
CPU temperature System temperature CPUFAN SYSFAN	: +45 C : +27 C : 3875 RPM : N/A	
VCC_CORE VCC3 VCC5 +12V VCC3V VSB3V VSB3V VSB5V VBAT	: +1.312 V : +3.312 V : +5.067 V : +12.144 V : +3.344 V : +3.312 V : +5.040 V : +3.120 V	<pre>++: Select Screen 14: Select Item Enter: Select +/-: Change Opt. ESC: Exit F1: General Help F7: Previous Values F9: Optimized Defaults F10: Save & Reset Setup F12: Screenshot capture <k>: Scroll help area downwards </k></pre>

Thermal Shutdown

This setting determines the behavior of the system when the CPU temperature reaches a predefined threshold.

[Enabled] Initiate an automatic shutdown of the system to protect from potential damage due to overheating.

[Disabled] Disable this function.

Smart Fan Configuration

Advanced		
Configuration Smart FAN		Disabled/Enabled Smart Fan Function
CPUFAN		
SYSFAN	[Disabled]	

► CPUFAN/ SYSFAN

This setting enables or disables the Smart Fan function. Smart Fan is an excellent feature which will adjust the CPU/system fan speed automatically depending on the current CPU/system temperature, avoiding the overheating to damage your system. The following item will display when **CPUFAN/ SYSFAN** is enabled.

» Min. Speed (%)

The beginning speed of the System fan.

► PCI/PCIE Device Configuration

Advanced		
Audio Controller	[Enabled]	Control Detection of the Audio Controller. Disabled = Audio Controller Will be unconditionally disabled. Enabled = Audio Controller Will be unconditionally Enabled.

Audio Controller

This setting enables or disables the detection of the onboard audio controller.

Network Stack Configuration

This menu provides Network Stack settings for users to enable network boot (PXE) from BIOS.

Advanced		
		Enable/Disable UEFI Network
IPv4 PXE Support	[Disabled]	Stack
IPv4 HTTP Support	[Disabled]	
IPv6 PXE Support	[Disabled]	
IPv6 HTTP Support	[Disabled]	
PXE boot wait time	0	
Media detect count	1	

Network Stack

This menu provides Network Stack settings for users to enable network boot (PXE) from BIOS. The following items will display when **Network Stak** is enabled.

» IPV4 PXE Support

Enables or disables IPv4 PXE boot support.

» IPV4 HTTP Support

Enables or disables Ipv4 HTTP Support.

» IPV6 PXE Support

Enables or disables Ipv6 PXE Support.

» IPV6 HTTP Support

Enables or disables Ipv6 HTTP Support.

» PXE boot wait time

Use this option to specify the wait time to press the ESC key to abort the PXE boot. Press "+" or "-" on your keyboard to change the value. The default setting is 0.

» Media detect count

Use this option to specify the number of times media will be checked. Press "+" or "-" on your keyboard to change the value. The default setting is 1.

► GPIO Group Configuration

Advanced			
GPOO		Set GPOO to output High/Low	
GP01	[Low]		
GP02	[Low]		
GP03	[Low]		
GP04	[Low]		
GP05	[Low]		
GP06	[Low]		
GP07	[Low]		

▶ GPO0 ~ GPO7

These settings control the operation mode of the specified GPIO.

Intel(R) RST

Enables or disables Intel[®] RST. Intel[®] Rapid Storage Technology (Intel[®] RST) is a feature that combines the capabilities of both hardware and software to enhance storage performance, data protection, and flexibility.



🕼 Important

SKU3 (Intel® H610E) does not support "Intel(R) RST".

Create RAID Volume

This menu allows for the management of RAID volumes.

Advanced		
Create RAID Volume		Enter a unique volume name that has no special characters
Name:	Volume1	and is 16 characters or less.
RAID Level:	[RAIDO (Stripe)]	
Select Disks:		
SATA 0.4, SanDisk SSD PLUS 240GB	[]	
23063J451313, 223.5GB		
SATA 0.5, INTEL SSDSC2KW256G8	[]	
LA730401GL256CGN, 238.4GB		
SATA 0.6, 2.5" SATA SSD 3TE7	[]	
0012305110090002, 447.1GB		
Strip Size:	[64KB]	→+: Select Screen
Capacity (MB):	0	↑↓: Select Item
		Enter: Select
▶ Create Volume		+/−: Change Opt.
		ESC: Exit
Select at least two disks		F1: General Help
		F7: Previous Values
		F9: Optimized Defaults
		F10: Save & Reset Setup F12: Screenshot capture
		<pre><k>: Scroll help area upwards</k></pre>
		<m>: Scroll help area downwards</m>
		Time conora noap anea aominiar ao T

► PCIE ASPM settings

This menu provide settings for PCIe ASPM (Active State Power Management) level for different installed devices.

Advanced		
M2_B1	[Disabled]	PCI Express Active State Power
M2_E1	[Disabled]	Management settings.
M2_M1	[Disabled]	
PCIE1	[Disabled]	

M2_B1/ M2_E1/ M2_M1/ PCIE1

Sets PCI Express ASPM (Active State Power Management) state for power saving.

- [L0s] Initiate an automatic shutdown of the system to protect from potential damage due to overheating.
- [L1] Higher latency, lower power "standby" state (optional).
- [L0sL1] Activate both L0s and L1 support.
- [Disabled] Disable this function.

Boot

Aptio Setup – AMI Main Advanced <mark>Boot)</mark> Security Chipset Power Save & Exit		
Boot Option Priorities Boot Option #1	[UEFI: USB DISK 3.0 PMAP, Partition 1 (USB DISK 3.0 PMAP)]	Sets the system boot order
Boot Option #2	[UEFI: Built-in EFI Shell]	

► Boot Option #1-2

This setting allows users to set the sequence of boot devices where BIOS attempts to load the disk operating system.

Security

Aptio Setup - AMI Main Advanced Boot Security Chipset Power Save &	Exit
Administrator Password User Password	Set Administrator Password
Chassis Intrusion [Disabled] Intel Trusted Execution Technology [Disabled]	
 PCH-FW Configuration AMT Configuration Trusted Computing Serial Port Console Redirection Secure Boot 	

Administrator Password

Administrator Password controls access to the BIOS Setup utility.

User Password

User Password controls access to the system at boot and to the BIOS Setup utility.

Chassis Intrusion

Enables or disables recording messages while the chassis is opened. This function is ready for the chassis equips a chassis intrusion jumper(switch).

[Enabled]	Once the chassis is opened , the system will record and issue a warning message. A beep sound will be emitted before this function is reset.
[Disabled]	Once the chassis is closed , the system will record and issue a warning message.

[Reset] Clear the warning message. After clearing the message, please return to Enabled or Disabled.

Intel Trusted Execution Technology

Enables or disables the Intel Trusted Execution Technology. Intel® Trusted Execution Technology (Intel® TXT) is a security feature that provides hardwarebased security to protect the system and maintain the confidentiality and integrity of data stored or created on the system.

🕼 Important

 The following items must be enabled before "Intel Trusted Execution Technology" can be enabled:

- All Intel processor cores
- Hyper-threading
- Intel Virtualization Technology
- Trusted Platform Module (TPM)
- Secure Boot
- SKU3 (Intel® H610E) does not support "Intel Trusted Execution Technology".

► PCH-FW Configuration

This menu allows you to configure settings related to the PCH firmware.

Sec	urity	44
ME Firmware Version ME Firmware Mode ME Firmware SKU ME Firmware Status 1 ME Firmware Status 2	16.1.25.2020 Normal Mode Corporate SKU 0x90000255 0x30858106	When Disabled ME will be put into ME Temporarily Disabled Mode.
HE State Manageability Features Sta ME Unconfig on RTC Clear Comms Hub Support JHI Support Core Bios Done Message	[Enabled] te [Enabled] [Enabled] [Disabled] [Disabled] [Enabled]	
 Firmware Update Configurat PTT Configuration ME Debug Configuration Anti-Rollback SVN Configur Extend CSME Measurement to 	ation	++: Select Screen 14: Select Item Enter: Select +/-: Change Opt. ESC: Exit
Firmware Informati	on	
ME Firmware Version ME Firmware Mode	ME Firmware SKU ME Firmware Status 1-2	These settings show the firmware information of the Intel ME (Management Engine).

ME State

This menu controls the Intel[®] Management Engine State (ME state) parameters, which provides various management and security capabilities. The following items will display when **ME State** is enabled.

» Manageability Feature State

Enables or disables Manageability Feature State. Enabling this item for remote management capabilities.

» ME Unconfig on RTC Clear

Enables or disables ME Unconfig on RTC Clear. Enabling this item resets the ME configuration to its default state, removing any customizations or settings applied.

» Comms Hub Support

Enables or disables the communications hub support.

» JHI Support

Enables or disables JHI Support. JHI stands for Intel® Dynamic Application Loader Host Interface Service (Intel® DAL HIS) and is the engineering name for this feature. Enabling JHI Support in the BIOS settings allows the system to utilize this interface for communication between trusted applications and host-based applications.

» Core BIOS Done Message

Enables or disables Core BIOS Done Message sent to ME.

Firmware Update Configuration

Security		
Me FW Image Re-Flash	[Disabled]	Enable/Disable Me FW Image
Local FW Update	[Enabled]	Re-Flash function.

» ME FW Image Re-Flash

Enables or disables the ME Firmware Image Re-flashing.

» Local FW Update

Enables or disables the capability to perform a firmware update of the ME locally.

PTT Configuration

Intel[®] Platform Trust Technology (PTT) is a platform functionality for credential storage and key management used by Microsoft Windows.

Securit	y .	
PTT Capability ∕ State	1 / 0	Selects TPM device: PTT or dTPM. PTT – Enables PTT in
		SkuMgr dTPM 1.2 - Disables PTT in SkuMgr Warning ! PTT/dTPM will be disabled and all data saved on it will be lost.

» TPM Device Selection

Select TPM (Trusted Platform Module) devices from PTT or dTPM (Discrete TPM).

 [PTT]
 Enables PTT in SkuMgr.

 [dTPM]
 Disables PTT in SkuMgr. Warning! PTT/ dTPM will be disabled and all data saved on it will be lost.

ME Debug Configuration

This menu allows you to configure debug-related options for the Intel® Management Engine (ME).

Security		
HECI Timeouts	[Enabled]	Enable/Disable HECI Send/Receive Timeouts.
Force ME DID Init Status	[Disabled]	
CPU Replaced Polling Disable	[Disabled]	
HECI Message check Disable	[Disabled]	
MBP HOB Skip	[Disabled]	
HECI2 Interface Communication	[Disabled]	
KT Device	[Enabled]	
End Of Post Message	[Send in DXE]	
DOI3 Setting for HECI Disable	[Disabled]	
MCTP Broadcast Cycle	[Disabled]	

» HECI Timeouts

This setting enables/ disables the HECI (Host Embedded Controller Interface) send/receive timeouts.

» Force ME DID Init Status

Forces the ME Device ID (DID) initialization status value.

» CPU Replaced Polling Disable

Setting this option disables the CPU replacement polling loop.

» HECI Message Check Disable

This setting disables message check for BIOS boot path when sending messages.

» MBP HOB Skip

Setting this option will skip ME's Memory-Based Protection (MBP) H0B region.

» HECI2 Interface Communication

This setting Adds/ Removes HECI2 device from PCI space.

» KT Device

Enables or disables Key Transfer (KT) Device.

» End of Post Message

Enables or disables End of Post Message sent to ME.

» DOI3 Setting for HECI Disable

Setting this option disables setting DOI3 bit for all HECI devices.

» MCTP Broadcast Cycle

Enables or disables Management Component Transport Protocol (MCTP) Broadcast Cycle.

Anti-Rollback SVN Configuration

Security		
Minimal Allowed Anti-Rollback SVN	0	When enabled,
Executing Anti-Rollback SVN	4	hardware-enforced
		Anti-Rollback mechanism is automatically activated: once
Set HW-Enforced Anti-Rollback for Current SVN	[Disabled]	ME FW was successfully run on a platform, FW with lower ARB-SVN will be blocked from execution

» Automatic HW-Enforced Anti-Rollback SVN

Setting this item enables will automatically activate the hardware-enforced anti-rollback protection based on the Secure Version Number (SVN). Once enabled, the hardware will enforce that only firmware updates with an SVN equal to or higher than the current SVN can be installed.

» Set HW-Enforced Anti-Rollback for Current SVN

Enable HW ERB mechanism for current ARB SVN value. FW with lower ARB-SVN will be blocked from execution. The value will be restored to disable after the command is sent. This item will display when **Automatic HW-Enforced Anti-Rollback SVN** is enabled.

Extend CSME Measurement to TPM-PCR

Enables or disables the Extend CSME Measurement to TPM-PCR. This item enables capturing and recording the Intel® Converged Security and Management Engine (Intel® CSME) firmware in the Trusted Platform Module Platform Configuration Registers (TPM-PCR). This enhances system security by protecting against unauthorized modifications.

🕼 Important

Please note that for "Extend CSME Measurement to TPM-PCR" function to work, your system should have a TPM module installed and enabled in the BIOS, which is a separate hardware component providing secure storage and cryptographic functions.

► AMT Configuration

Intel® Active Management Technology (Intel® AMT) is hardware-based technology for remotely managing and securing PCs out-of-band (OOB).

Security	Aptio Setup – AMI	
USB Provisioning of AHT MAC Pass Through Activate Remote Assistance Process Unconfigure ME > ASF Configuration > Secure Erase Configuration > MEBx One Click Recovery(OCR) Configuration > Remote Platform Erase Configuration	[Disabled] [Disabled] [Disabled] [Disabled]	Enable/Disable of AMT USB Provisioning.
		++: Select Screen 14: Select Item Enter: Select 4/-: Change Opt. ESC: Exit F1: General Help F7: Previous Values F9: Optimized Defaults F10: Save & Reset Setup F12: Screenshot capture <<>: Scroll help area upwards <m>: Scroll help area downwards</m>

USB Provisioning of AMT

Enables or disables the ability to provision AMT using a USB device.

Mac PASS Through

Enables or disables the ability of AMT to pass through network traffic without altering the original MAC (Media Access Control) addresses of the network interface. Enabling Mac PASS Through ensures that the network traffic appears to originate from the original MAC address of the system.

Activate Remote Assistance Process

Enables or disables remote assistance sessions to be initiated on systems with AMT support.

Unconfigure ME

Enables or disables the Unconfigure ME.

ASF Configuration

Secu	rity	
PET Progress	[Enabled]	Enable/Disable PET Events
WatchDog	[Disabled]	Progress to receive PET Events.
OS Timer	0	
BIOS Timer	0	
ASF Sensors Table	[Disabled]	

» PET Progress

Enables or disable the this item to receive PET Events.

» WatchDog

Enables or disable the watchdog timer.

» OS Timer

This item displays OS Timer.

» BIOS Timer

This item displays BIOS Timer.

» ASF Sensor Table

Enables or disable the Alert Standard Format (ASF) Sensor Table.

Secure Erase Configuration

	Security	
Secure Erase mode Force Secure Erase	(Simulated) [Disabled]	Change Secure Erase module behavior: Simulated: Performs SE flow without erasing SSD Real: Erase SSD. *** If SATA device is used, DEM could use SECURE_ERASE_HOOK_PROTOCOL to remove SATA power to skip G3 cycle. ***

» Secure Erase Mode

This setting change Secure Erase module behavior.

[Simulated] Performs SE flow without erasing SSD. [Real] Erase SSD.

» Force Secure Erase

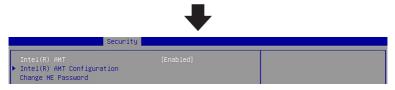
Enables or disables to force Secure Erase on next boot.

MEBx (Management Engine BIOS Extension)

Security	
Intel(R) ME Password	MEBx Login

» Intel(R) ME Password

Set the Intel[®] ME Password for securing access to the ME configuration through the MEBx menu. Upon setting up Intel[®] ME Password for the first time, type "**admin**" as the default password, then enter your own.



» Intel(R) AMT

Enables or disables Intel(R) AMT (Intel® Active Management Technology).

🕼 Important

The **MEBx menu** can be accessed only by pressing the ** or <F2> key** during the process of booting up the system.

» Intel(R) AMT Configuration

Security		
 Redirection features User Consent Password Policy 	[Anytime]	
 Network Setup Network Access State Remote Setup And Configuration Power Control 	[Network Inactive]	

» Redirection features

Securi	ty	
SOL	[Enabled]	Enable FW SOL Interface
Storage Redirection	[Enabled]	
KVM Feature Selection	[Enabled]	

SOL

Enables or disables SOL (Serial Over LAN).

Storage Redirection

Enables or disables Storage Redirection.

• KVM Feature Selection

Enables or disables the ability to remotely control a system's keyboard, video, and mouse (KVM) by a distant management console.

» User consent

Security		
User Opt-in	[KVM]	Configure When User Consent
Opt-in Configurable from Remote IT	[Enabled]	Should be Required

• User Opt-in

[None]	Local user consent is not required for a remote console to establish KVM remote control session.
[KVM]	Local user consent is required for a remote console to establish KVM remote control session.
[ALL]	Local user consent is required for SOL, IDER and KVM.

• Opt-in Configurable from Remote IT

Enables or disables remote User's ability to set the User Opt-in.

» Password Policy

This feature determines when the user is allowed to change the ${\rm Intel}^{\otimes}\,{\rm MEBX}$ password through the network.

[Default Passw	rord Only]		e Intel [®] MEBx password through ice only if the default password ged yet.
[During Setup		networ	e Intel [®] MEBx password via k interface during setup and but not afterward. Once the process is hterface.
[Anytime]	Allows changing the Intel [®] MEBx password th the network interface at any time.		

🕼 Important

- The Password Policy involves 2 passwords: the Intel® MEBx password (local), entered when physically at the system, and the network password (remote), used for accessing an Intel ME enabled system through the network. By default, they are the same until the network password is changed via the network. Once changed over the network, the network password remains separate from the local Intel® MEBx password.
- The Intel MEBx password can always be changed via the Intel[®] MEBX user interface, regardless of the setting.

» Network Setup

Security	
 ▶ Intel(R) ME Network Name Settings ▶ TCP/IP Settings 	

Intel[®] ME Network Name Settings

Security		
FQDN Shared/Dedicated FQDN Dynamic DNS Update	[Shared] [Disabled]	Computer's FQDN

- Shared/Dedicated FQDN

Determines if the Intel[®] ME Fully Qualified Domain Name (FQDN, which is "HostName. DomainName") is **shared** with the host OS or **dedicated** exclusively to the Intel ME.

- Dynamic DNS Update

Enables or disables automatic registration of the firmware's IP addresses and FQDN in the Domain Name System (DNS) using the Dynamic DNS Update protocol. **To enable Dynamic DNS Update, the Host Name and Domain Name must be set.**

TCP/IP Settings

Security

• Wired Lan IPV4 Configuration

Securit	9	
DHCP Mode IPV4 Address Subnet Mask Address Default Gateway Address Preferned DNS Address Alternate DNS Address	[Disəbled] 0.0.0.0 255.255.255.254 0.0.0.0 0.0.0.0 0.0.0.0	Enable/Disable IPV4 DHCP Mode

- DHCP Mode

Enables or disables the DHCP (Dynamic Host Configuration Protocol) mode. The items shown above will display when **DHCP Mode** is set to **disabled**.

» Network Access State

» Remote Setup And Configuration



• Remote Configuration**

Enables or disables the Remote Configuration**.

• Manage Certificates

This item display when **Remote Configuration**** is disabled. After entering the Manage Certificates menu, the following screen will display:

Security	
▶ Go Daddy Class 2 CA	
► Go Daddy Root CA-G2	
► Comodo AAA CA	
Starfield Class 2 CA	
Starfield Root CA-G2	
VeriSign Class 3 Primary CA-G5	
 Baltimore CyberTrust Root 	
► USERTrust RSA CA	
 Verizon Global Root 	
 Entrust.net CA (2048) 	
► Entrust Root CA	
► Entrust Root CA-G2	
 VeriSign Universal Root CA 	
	Mr. Onlant Onnan
Affirm Trust Premium Dirigent Olebel Bast On	++: Select Screen
 DigiCert Global Root CA 	↑↓: Select Item
DigiCert Global Root G2	Enter: Select
DigiCert Global Root G3	+/-: Change Opt.
DigiCert Trusted Root G4	ESC: Exit
GlobalSign Root CA - R3	F1: General Help
GlobalSign ECC Root CA - R5	F7: Previous Values
GlobalSign Root CA - R6	F9: Optimized Defaults

The details of the selected certificate hash includes "Hash Name, Active State, Default State, Hash Type and Hash Data".

» Power control

This menu configures the Intel ME platform power-related policies, and the configurations are effective only after ME provisioning has started.

Security		
These configurations are effec provisioning has started	tive only after ME	
ME ON in Host Sleep States		
Idle Timeout	65535	

► One Click Recovery (OCR) Configuration

00001213		
OCR Https Boot		Enable/Disable One Click
OCR PBA Boot	[Enabled]	Recovery Https Boot
OCR Windows Recovery Boot	[Enabled]	
OCR Disable Secure Boot	[Enabled]	

» OCR Https Boot

Enables or disables the use of HTTPS (Hypertext Transfer Protocol Secure) for the OCR boot process. When enabled, the OCR process will utilize HTTPS for enhanced security during the process of booting up the system.

» OCR PBA Boot

Enables or disables the PBA (Pre-Boot Authentication) for the OCR boot process. When enabled, users may be required to authenticate themselves before the OCR boot process begins, adding an extra layer of security.

» OCR Windows Recovery Boot

Enables or disables the Windows Recovery Boot for the OCR boot process. When enabled, the OCR boot process will prioritize Windows recovery options, allowing users to restore the system to a previous Windows state or initiate other Windows-specific recovery procedures.

» OCR Disable Secure Boot

Enabling this item will disable Secure Boot during the OCR process.

Remote Platform Erase Configuration

Intel[®] Remote Platform Erase (Intel[®] RPE) Configuration provides settings for the remote erasure of the platform information or specific storage devices connected to the system.

Security		
Enable Remote Platform Erase Feature	[Enabled]	Enable/Disable Remote Platform Erase Feature
SSD Erase Mode	[Simulated]	

» Enable Remote Platform Erase Feature

Enables or disables the ability to initiate the remote erasure process for the system or selected storage devices.

» SSD Erase Mode

This setting determines the erase mode to be used specifically for solid-state drives (SSDs) during the erasure process.

- [Simulated] Simulates the erasure process without permanently deleting SSD data to estimate the time and resources required.
- [Real] Actual erasure process that **permanently** deletes the SSD data to ensure that the data is no longer accessible.

Trusted Computing

Security		
TPM 2.0 Device Found Firmware Version: Vendor: Security Device Support Active FCR banks Available FCR banks SHA256 FCR Bank Pending operation Platform Hierarchy Storage Hierarchy	7.85 IFX [Enable] SH4256 SH4256 [Enabled] [Enabled] [Enabled]	Enables or Disables BIOS support for security device. O.S. will not show Security Device. TCG EFI protocol and INTIA interface will not be available.
Endorsement Hierarchy Physical Presence Spec Version TFM 2.0 InterfaceType PH Randomization Device Select	[Enabled] [1.3] [TIS] [Enabled] [TPM 2.0]	<pre>+: Select Screen 14: Select Item Enter: Select +/-: Change Opt. ESC: Exit F1: General Help F7: Previous Values F9: Optimized Defaults F10: Save & Reset Setup F12: Screenshot capture <k>: Scroll help area upwards <m>: Scroll help area downwards</m></k></pre>

Security Device Support

This item enables or disables BIOS support for security device. When set to [Disable], the OS will not show security device.

SHA256 PCR Bank

These settings enables or disables the SHA-1 PCR Bank and SHA256 PCR Bank.

Pending Operation

When **Security Device Support** is set to [Enable], **Pending Operation** will appear. It is advised that users should routinely back up their TPM secured data.

[TPM Clear] Clear all data secured by TPM.

[None] Discard the se lection.

Platform Hierarchy, Storage Hierarchy, Endorsement Hierarchy

These settings enables or disables the Platform Hierarchy, Storage Hierarchy and Endorsement Hierarchy.

Physical Presence Spec Version

This settings show the Physical Presence Spec Version.

TPM 2.0 Interface Type

This setting shows the TPM 2.0 Interface Type.

PH Randomization

Enables or disables Platform Hierarchy (PH) Randomization.

► Device Select

Select your TPM device through this setting.

► Serial Port Console Redirection

Security		
COM1 Console Redirection ▶ Console Redirection Settings	[Disabled]	Console Redirection Enable or Disable.
		++: Select Screen 14: Select Item Enter: Select +/-: Change Opt.
		F: General Help F1: General Help F7: Previous Values F9: Optimized Defaults F10: Save & Reset Setup
		F12: Screenshot capture <k>: Scroll help area upwards <m>: Scroll help area downwards</m></k>

► Console Redirection

Console Redirection operates in host systems that do not have a monitor and keyboard attached. This setting enables or disables the operation of console redirection. When set to [Enabled], BIOS redirects and sends all contents that should be displayed on the screen to the serial COM port for display on the terminal screen. Besides, all data received from the serial port is interpreted as keystrokes from a local keyboard.

Console Redirection Settings (COM1)

This option appears when Console Redirection is enabled.

Security		Security	
COM1 Console Redirection Settings		Emulation: ANSI: Extended ASCII char set. VT100: ASCII char set. VT100Plus: Extends	
		VT100 to support color,	
Bits per second	[115200]	function keys, etc. VT-UTF8:	
Data Bits	[8]	Uses UTF8 encoding to map	
Parity	[None]	Unicode chars onto 1 or more	
Stop Bits	[1]	bytes.	
Flow Control	[None]		
VT-UTF8 Combo Key Support	[Enabled]		
Recorder Mode	[Disabled]		
Resolution 100x31	[Disabled]		
Putty KeyPad	[VT100]		
		at a Collect Concern	

» Terminal Type

To operate the system's console redirection, you need a terminal supporting ANSI terminal protocol and a RS-232 null modem cable connected between the host system and terminal(s). You can select emulation for the terminal from this setting.

[ANSI]	Extended ASCII character set.
[VT100]	ASCII character set.
[VT100Plus]	Extends VT100 to support color, function keys, etc.
[VT-UTF8]	Uses UTF8 encoding to map Unicode characters onto one or more bytes.

» Bits per second, Data Bits, Parity, Stop Bits

These setting specifies the transfer rate (bits per second, data bits, parity, stop bits) of Console Redirection.

» Flow Control

Flow control is the process of managing the rate of data transmission between two nodes. It's the process of adjusting the flow of data from one device to another to ensure that the receiving device can handle all of the incoming data. This is particularly important where the sending device is capable of sending data much faster than the receiving device can receive it.

» VT-UTF8 Combo Key Support

This setting enables or disables the VT-UTF8 combination key support for ANSI/VT100 terminals.

» Recorder Mode, Resolution 100x31

These settings enables or disables the recorder mode and the resolution 100x31.

» Putty KeyPad

PuTTY is a terminal emulator for Windows. This setting controls the numeric keypad for use in PuTTY.

► Secure Boot

Secu	rity	
System Mode	Setup	Secure Boot feature is Active if Secure Boot is Enabled,
Secure Boot	[Disabled] Not Active	Platform Key(PK) is enrolled and the System is in User mode. The mode change requires
Secure Boot Mode ► Restore Factory Keys ► Reset To Setup Mode	[Custom]	platform reset
▶ Key Management		
		++: Select Screen 14: Select Item
		Enter: Select +/-: Change Opt.
		ESC: Exit F1: General Help
		F7: Previous Values F9: Optimized Defaults F10: Save & Reset Setup
		F12: Screenshot capture <k>: Scroll help area upwards</k>
		<m>: Scroll help area downwards</m>

► Secure Boot

Secure Boot function can be enabled only when the **Platform Key (PK)** is enrolled and running accordingly.

► Secure Boot Mode

Selects the secure boot mode. This item appears when **Secure Boot** is enabled.

[Standard] The system will automatically load the secure keys from BIOS.

[Custom] Allows user to configure the secure boot settings and manually load the secure keys.

Restore Factory Keys

Allows you to restore all factory default keys. The settings will be applied after reboot or at the next reboot. This item appears when **"Secure Boot Mode"** sets to **[Custom]**.

Reset to setup Mode

Allows you to delete all the Secure Boot keys (PK,KEK,db,dbt,dbx). The settings will be applied after reboot or at the next reboot. This item appears when "**Secure Boot Mode**" sets to [**Custom**].

► Key Management

Press **Enter** key to enter the sub-menu. Manage the secure boot keys. This item appears when **"Secure Boot Mode"** sets to **[Custom]**.

Secu	rity	
Vendor Keys	Valid	Install factory default Secure Boot keys after the platform
Factory Key Provision • Restore Factory Keys • Reset To Setup Mode • Enroll Efi Image • Export Secure Boot variable	[Disabled] S	reset and while the System is in Setup mode
Secure Boot variable > Flatform Key (PK) > Key Exchange Key (FEK) > Authorized Signatures(dbx) > Authorized TimeStamps(dbt) > OsRecovery Signatures(dbr)	0 0 0 No Keys 0 0 No Keys	<pre>++: Select Screen 1: Select Item Enter: Select +/-: Change Opt. ESC: Exit F1: General Help F7: Previous Values F9: Optimized Defaults F10: Save & Reset Setup F10: Screenshot capture <k>: Scroll help area upwards <m>: Scroll help area downwards</m></k></pre>

» Platform Key (PK):

The Platform Key (PK) can protect the firmware from any un-authenticated changes. The system will verify the PK before your system enters the OS. Platform Key (PK) is used for updating KEK.

» Set New Key

Sets a new PK to your system.

» Delete Key

Deletes the PK from your system.

» Key Exchange Keys (KEK):

Key Exchange Key (KEK) is used for updating DB or DBX.

» Set New Key

Sets a new KEK to your system.

» Append Key

Loads an additional KEK from storage devices to your system.

» Delete Key

Deletes the KEK from your system.

» Authorized Signatures (db) :

Authorized Signatures (db) lists the signatures that can be loaded.

» Set New Key

Sets a new db to your system.

» Append Key

Loads an additional db from storage devices to your system.

» Delete Key

Deletes the db from your system.

» Forbidden Signatures (dbx):

Forbidden Signatures (dbx) lists the forbidden signatures that are not trusted and cannot be loaded.

» Set New Key

Sets a new dbx to your system.

» Append Key

Loads an additional dbx from storage devices to your system.

» Delete Key

Deletes the dbx from your system.

» Authorized TimeStamps (dbt):

Authorized TimeStamps (dbt) lists the authentication signatures with authorization time stamps.

» Set New Key

Sets a new DBT to your system.

» Append Key

Loads an additional DBT from storage devices to your system.

» OsRecovery Singnatures (dbr):

Lists the available signatures for OS recovery.

Chipset

Main Advanced Boot	Aptio Setup - AMI Security Chipset Power Save & Ex	xit
DVMT Total Gf× Mem	[256M]	Select DVMT5.0 Total Graphic Memory size used by the
Panel Select	[eDP]	Internal Graphics Device.
		<pre>++: Select Screen 14: Select Item Enter: Select +/-: Change Opt. ESC: Exit F1: General Help F7: Previous Values F9: Optimized Defaults F10: Save & Reset Setup F12: Screenshot capture <kb: <="" area="" downwards="" help="" pre="" scroll=""></kb:></pre>

DVMT Total Gfx Mem

This setting specifies the total graphics memory size for Dynamic Video Memory Technology (DVMT).

► Panel Select

Set your video signal interface as LVDs or eDP.

► LCD Panel Type

This setting specifies the LCD Panel's resolution and distribution formats. The item **will display when LVDS is enabled**.

▶ Panel 1/ 2 Backlight Control

This setting controls the intensity of the LED's backlight output. When lighting conditions are brighter, set it high for a clearer image and low when it is darker.

LED' s backlight output		
[Level 1]	20%	
[Level 2]	40%	
[Level 3]	60%	
[Level 4]	80%	
[Level 5]	100%	

Power

Main Advanced Boot Security	Aptio Setup – AMI Chipset Power Save & Exit	
Restore AC power Loss Deep Sleep Mode Advanced Resume Events Control	[Last State] [S4 + S5]	Select AC power state when power is re-applied after a power failure.
OnChip USB	[Enabled]	
LAN PCIE PME/Ring	[Enabled] [Disabled]	
RTC	[Disabled]	

► Restore AC Power Loss

This setting specifies whether your system will reboot after a power failure or interrupt occurs. Available settings are:

[Power Off]	Leaves the computer in the power off state.
[Power On]	Leaves the computer in the power on state.
[Last State]	Restores the system to the previous status before power failure or interrupt occurred.

► Deep Sleep Mode

The setting enables or disables the Deep S5 power saving mode. S5 is almost the same as G3 Mechanical Off, except that the PSU still supplies power, at a minimum, to the power button to allow return to S0. A full reboot is required. No previous content is retained. Other components may remain powered so the computer can "wake" on input from the keyboard, clock, modem, LAN, or USB device.

► OnChip USB

The item allows the activity of the OnChip USB device to wake up the system from S4/ S5 sleep state.

► LAN

Enables or disables the system to be awakened from the power saving modes when activity or input signal of Intel LAN device is detected.

► PCIE PME/Ring

Enables or disables the system to be awakened from power saving modes when activity or input signal of onboard PCIE PME/Ring is detected.

► RTC

When [Enabled], your can set the date and time at which the RTC (real-time clock) alarm awakens the system from suspend mode.

Save & Exit

Aptio Setup – AMI Main Advanced Boot Security Chipset Power <mark>Save & Exit</mark>	
Save Changes and Reset Discard Changes and Exit Discard Changes Load Optimized Defaults Save as User Defaults Restore User Defaults Launch EFI Shell from filesystem device	Reset the system after saving the changes.

Save Changes and Reset

Save changes to CMOS and reset the system.

Discard Changes and Exit

Abandon all changes and exit the Setup Utility.

Discard Changes

Abandon all changes.

Load Optimized Defaults

Use this menu to load the default values set by the motherboard manufacturer specifically for optimal performance of the motherboard.

Save as User Defaults

Save changes as the user's default profile.

► Restore User Defaults

Restore the user's default profile.

Launch EFI Shell from filesystem device

This setting helps to launch the EFI Shell application from one of the available file system devices.

GPIO WDT BKL Programming

This chapter provides WDT (Watch Dog Timer), GPIO (General Purpose Input/ Output) and LVDS Backlight programming guide.

Abstract

In this section, code examples based on C programming language provided for customer interest. **Inportb, Outportb, Inportl** and **Outportl** are basic functions used for access IO ports and defined as following.

Inportb: Read a single 8-bit I/O port.
Outportb: Write a single byte to an 8-bit port.
Inportl: Reads a single 32-bit I/O port.
Outportl: Write a single long to a 32-bit port.

General Purpose IO

1. General Purposed IO – GPIO/DIO

The GPIO port configuration addresses are listed in the following table:

Name	IO Port	IO address	Name	IO Port	IO address
N_GPI0	0x22	Bit 4	N_GPO0	0x11	Bit 4
N_GPI1	0x22	Bit 5	N_GPO1	0x11	Bit 5
N_GPI2	0x22	Bit 6	N_GPO2	0x11	Bit 6
N_GPI3	0x22	Bit 7	N_GPO3	0x11	Bit 7
N_GPI4	0x42	Bit 0	N_GPO4	0x21	Bit 0
N_GPI5	0x42	Bit 1	N_GPO5	0x21	Bit 1
N_GPI6	0x42	Bit 2	N_GPO6	0x21	Bit 2
N_GPI7	0x42	Bit 3	N_GPO7	0x21	Bit 3

Note:

GPIO should be accessed through controller device **0x6E** on SMBus.

The associated access method in examples (SMBus_ReadByte, SMBus_WriteByte) are provided in part 4.

1.1 Set output value of GPO

- 1. Read the value from GPO port.
- 2. Set the value of GPO address.
- 3. Write the value back to GPO port.

Example: Set N_GPO0 output "high"

val =SMBus_ReadByte (0x6E, 0x11); val = val | (1<<4); SMBus_WriteByte (0x6E, 0x11, val);

Example: Set N_GPO1 output "low"

val = SMBus_ReadByte (0x6E, 0x11); val = val & (~(1<<5)); SMBus_WriteByte (0x6E, 0x11, val); // Read value from N_GPO0 port through SMBus.
// Set N_GPO0address (bit 4) to 1 (output "high").
// Write back to N_GPO0 port through SMBus.

// Read value from N_GPO1 port through SMBus..
// Set N_GPO1 address (bit 5) to 0 (output "low").
// Write back to N_GPO1 port through SMBus.

1.2 Read input value from GPI:

- 1. Read the value from GPI port.
- 2. Get the value of GPI address.

Example: Get N_GPI2 input value.

 val = SMBus_ReadByte (0x6E, 0x22); // Read value from N_GPI2 port through SMBus.

 val = val & (1<<6);</td>
 // Read N_GPI2 address (bit 6).

 if (val)
 printf ("Input of N_GPI2 is High");

 else
 printf ("Input of N_GPI2 is Low");

Example: Get N_GPI3 input value.

val = SMBus_ReadByte (0x6E, 0x22);		, <mark>0x22</mark>);	// Read value from N_GPI3 port through SMBus.
val = val &	(1<<7);		// Read N_GPI3 address (bit 7).
if (val)	printf ("Input of	N_GPI3	is High");
else	printf ("Input of	N_GPI3	is Low");

Watchdog Timer

2. Watchdog Timer – WDT

The base address (WDT_BASE) of WDT configuration registers is 0xA10.

2.1 Set WDT Time Unit

val = Inportb (WDT_BASE + 0x05);	// Read current WDT setting
<u>val = val 0x08</u> ;	// minute mode. $val = val \& 0xF7$ if second mode
Outportb (WDT_BASE + 0x05, val);	// Write back WDT setting

2.2 Set WDT Time

Outportb (WDT_BASE + 0x06, Time); // W	rite WDT time, value 1 to 255.
--	--------------------------------

2.3 Enable WDT

val = Inportb (WDT_BASE + 0x0A);	<pre>// Read current WDT_PME setting</pre>
val = val 0x01;	// Enable WDT OUT: WDOUT_EN (bit 0) set to 1.
Outportb (WDT_BASE + 0x0A, val);	// Write back WDT setting.
val = Inportb (WDT_BASE + 0x05);	// Read current WDT setting
val = val 0x20;	// Enable WDT by set WD_EN (bit 5) to 1.
Outportb (WDT_BASE + 0x05, val);	// Write back WDT setting.

2.4 Disable WDT

val = Inportb (WDT_BASE + 0x05);	// Read current WDT setting
val = val & 0xDF;	// Disable WDT by set WD_EN (bit 5) to 0.
Outportb (WDT_BASE + 0x05, val);	// Write back WDT setting.

2.5 Check WDT Reset Flag

If the system has been reset by WDT function, this flag will set to 1.

val = Inpo	rtb (WDT_BASE + 0x05);	// Read current WDT setting.
val = val & 0x40;		// Check WDTMOUT_STS (bit 6).
if (val)	printf ("timeout event occurred");	
else	printf ("timeout event not occurre	d");

2.6 Clear WDT Reset Flag

val = Inportb (WDT_BASE + 0x05);	// Read current WDT setting
val = val 0x40;	// Set 1 to WDTMOUT_STS (bit 6);
Outportb (WDT_BASE + 0x05, val);	// Write back WDT setting

LVDS Backlight Control - BKL

3. LVDS Backlight Control – BKL

The controller support **LVDS** backlight level control from 0(0%) to 255(100%), the default backlight level is 100%. It must be controlled by SMBus access. The details of SMBus access (SMBus_ReadByte, SMBus_WriteByte) are provided in this document.

3.1 Set the Level of LVDS Backlight

- 1. Write 0x0D into address 0x00 on SMBus device 0x42.
- 2. Write desired backlight level from 0(0%) to 255(100%) into address 0x35 on SMBus device 0x42.

Example 3: Set LVDS backlight level to "100%"

SMBus_WriteByte (0x42, 0x00, 0x0D) SMBus_WriteByte (0x42, 0x35, 0xFF)

3.2 Read the Level of LVDS Backlight

- 4. Write **0x0D** into address **0x00** on SMBus device 0x42.
- 5. Read current backlight level from address **0x35** on SMBus device **0x42**.

Example 4: Get LVDS backlight level

SMBus_WriteByte(0x42, 0x00, 0x0D); BKL_Value = SMBus_ReadByte(0x42, 0x35);

SMBus Access

4. SMBus Access

The base address of SMBus must know before access.

The relevant bus and device information are as following.

#define IO_SC	0xCF8
#define IO_DA	0xCFC
#define PCIBASEADDRESS	0x80000000
#define PCI_BUS_NUM	0
#define PCI_DEV_NUM	31
#define PCI_FUN_NUM	4

4.1 Get SMBus Base Address

```
int SMBUS_BASE;
int DATA_ADDR = PCIBASEADDRESS + (PCI_BUS_NUM<<16) +
(PCI_DEV_NUM<<11) +
(PCI_FUN_NUM<<8);
```

Outportl (DATA_ADDR + 0x20, IO_SC); **SMBUS_BASE** = Inportl (IO_DA) & 0xffffff0;

4.2 SMBus_ReadByte (char DEVID, char offset)

Read the value of OFFSET from SMBus device DEVID.

 Outportb (LOWORD (SMBUS_BASE), 0xFE);

 Outportb (LOWORD (SMBUS_BASE) + 0x04, <u>DEVID</u> + 1); //out Base + 04, (DEVID + 1)

 Outportb (LOWORD (SMBUS_BASE) + 0x03, <u>OFFSET</u>); //out Base + 03, OFFSET

 Outportb (LOWORD (SMBUS_BASE) + 0x02, 0x48); //out Base + 02, 48H

 mdelay (20); //delay 20ms to let data ready

 while ((InportI (SMBUS_BASE) & 0x01) != 0); //wait SMBus ready

 SMB_DATA = Inportb (LOWORD (SMBUS_BASE) + 0x05); //input Base + 05

4.3 SMBus_WriteByte (char DEVID, char offset, char DATA)

Write DATA to OFFSET on SMBus device DEVID.

 Outportb (LOWORD (SMBUS_BASE), 0xFE);

 Outportb (LOWORD (SMBUS_BASE) + 0x04, <u>DEVID</u>);
 //out Base + 04, (DEVID)

 Outportb (LOWORD (SMBUS_BASE) + 0x03, <u>OFFSET</u>);
 //out Base + 03, OFFSET

 Outportb (LOWORD (SMBUS_BASE) + 0x05, <u>DATA</u>);
 //out Base + 05, DATA

 Outportb (LOWORD (SMBUS_BASE) + 0x02, 0x48);
 //out Base + 02, 48H

 mdelay (20);
 //wait 20ms