

# MS-CF16

# **Industrial Computer Board**

User Guide

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### Revision

V1.2, 2025/05

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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 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.





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## **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: http://www.dtsc.ca.gov/hazardouswaste/perchlorate/

## **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 gpcontdev@msi.com for information regarding proper disposal, take-back, recycling, and disassembly of MSI products.

# **Copyright and Trademarks Notice**



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# **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 https://www.msi.com/support/ 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.

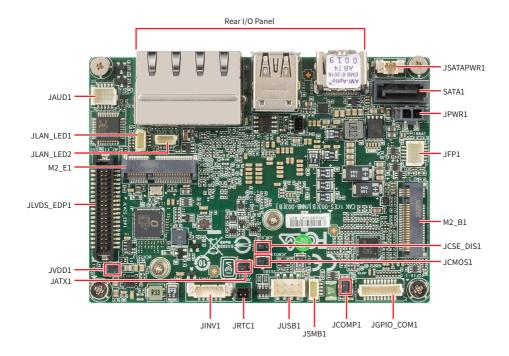
# **Specifications**

Model	Alder Lake-N SKUs	Amston Lake SKUs						
Dimensions	101(L)mm x 73(W)mm, PICO-ITX							
Processor	<ul> <li>Intel<sup>®</sup> IoTG Alder Lake-N,</li> <li>Processor N97, 4 cores, 12W</li> <li>Atom<sup>®</sup> x7425E, 4 cores, 12W</li> </ul>	<ul> <li>Intel<sup>®</sup> IoTG Amston Lake,</li> <li>Atom<sup>®</sup> x7433RE, 4 cores, 9W</li> </ul>						
Chipset	Within processor	or						
ТРМ	Infineon <sup>®</sup> SLB 9672VU2.0	Infineon <sup>®</sup> SLB 9672XU2.0						
Network	<ul> <li>1 x Realtek<sup>®</sup> RTL8125BG-CG 2.5GbE LAN</li> <li>1 x Realtek<sup>®</sup> RTL8111K-CG 1GbE PHY LAN</li> </ul>	<ul> <li>1 x Realtek<sup>®</sup> RTL8125BI-CG 2.5GbE LAN</li> <li>1 x Realtek<sup>®</sup> RTL8111KI-CG 1GbE LAN</li> </ul>						
Memory	<ul> <li>LPDDR5 on board</li> <li>Single channel, Non-ECC</li> <li>Up to 4800 MT/s</li> <li>Up to 16GB</li> </ul>							
Storage	1 x SATA 3.0 6Gb/s ports							
Expansion Slots	<ul> <li>1 x M.2 E Key slot (2230)</li> <li>Supports PCIe 3.0 x1, USB 2.0 (480 Mbps) signal</li> <li>1 x M.2 B Key slot (2242/ 3042)</li> <li>Supports SATA 3.0/ PCIe 3.0 x1, USB 10Gbps &amp; USB 2.0 (480 Mbps) signals</li> <li>Supports B+M key PCIe 3.0 x1 module</li> <li>Supports Quectel EM05-G Wi-Fi module with E-SIM</li> </ul>							
Audio	Realtek® ALC897 High Definition Audio Codec							
Graphics	<ul> <li>1 x HDMI<sup>™</sup> 1.4b up to 3840x2160 @30Hz</li> <li>1 x eDP up to 1920 × 1080 @60Hz</li> <li>Supports auto switch between eDP &amp; LVDS</li> <li>Connector shared with LVDS</li> <li>1 x LVDS up to 1920 × 1080 @60Hz</li> <li>Supports 18/24-bit dual channel</li> <li>Supports auto switch between eDP &amp; LVDS</li> <li>Connector shared with eDP</li> <li>2 Independent display supported</li> </ul>							
Rear Panel Connectors	<ul> <li>HDMI<sup>™</sup> + LVDS/ eDP</li> <li>1 x HDMI<sup>™</sup> connector (1.4b)</li> <li>1 x 2.5 GbE RJ-45 LAN port</li> <li>1 x 1 GbE RJ-45 LAN port</li> <li>1 x USB 10Gbps Type-A ports</li> <li>1 x USB 5Gbps Type-A ports</li> </ul>							

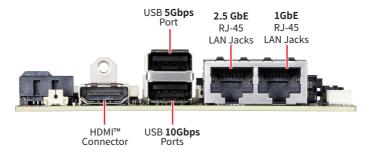
Continued on next column

Model	Alder Lake-N SKUs	Amston Lake SKUs					
Internal USB Connectors	1 x USB 2.0 header (480 Mbps, for 2 USB ports)						
Power	• 1 x 2-Pin DC-In 12V Power Connector						
Connectors	• 1 x 2-Pin SATA 5V Power Connector	• 1 x 2-Pin SATA 5V Power Connector					
Fan Connectors	1 x 3-pin DC system fan connector						
	• 1 x Front panel header						
	• 2 x LAN LED connector						
	• 1 x Front audio header (Line-out & Mic-in)						
	• 1 x LVDS inverter header (5V/ 12V)						
System	• 1 x LVDS +eDP wafer connector						
Connectors	<ul> <li>1 x GPIO + COM header</li> <li>COM (serial): Supports RS-232/422/485, with 0V/5V/12V (default 5V)</li> <li>GPIO: 8-bit, 4 x GPI, 4 x GPO</li> </ul>						
	• 1 x SMBus header						
	• 1 x CMOS battery header						
	• 1 x COM voltage select jumper						
	• 1 x LVDS/ eDP power select jumper (3V/ 5V)						
Jumpers	• 1 x AT/ ATX mode select jumper						
	• 1 x Clear CMOS jumper						
	• 1 x ME jumper						
	• Windows 10 IoT Enterprise 21H2 LTSC (64-I	Bit)					
OS Driver Support	• Windows 11 IoT Enterprise 24H2 LTSC (64-I	Bit)					
	• Linux (support by request)						
Certification	CE, FCC Class B, BSMI, RCM, VCCI, UKCA, IC, II	EC 62368: CE (LVD) Compliant					
Environment	<ul> <li>Operating Temperature: -10 ~ 60°C</li> <li>Thermal w/ Airflow: 0.7m/s</li> <li>The standard thermal solution only supports TDP up to 12W.</li> <li>Storage Temperature: -20 ~ 80°C</li> </ul>	<ul> <li>Operating Temperature: -40 ~ 70°C         <ul> <li>Thermal w/Airflow: 0.7m/s</li> <li>The standard thermal solution only supports TDP up to 9W.</li> <li>(-40 ~ 85°C by request)</li> </ul> </li> <li>Storage Temperature: -40 ~ 85°C</li> </ul>					
	<ul> <li>Operating Humidity: 10 ~ 90%, non-conder</li> </ul>						
	<ul> <li>Relative Humidity: 10 ~ 90%, non-condens</li> </ul>	-					
	• Relative fulfility. 10 - 50%, non-condens	ш <u></u> б					

# **Motherboard Overview**



# **Rear I/O Panel**



## 

HDMI<sup>™</sup> 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.

## **USB 10Gbps Ports**

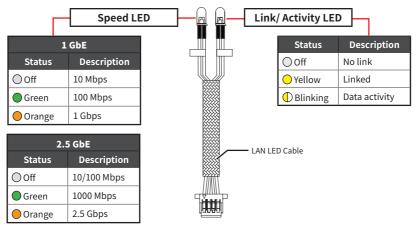
This connector delivers high-speed data transfer for various devices, such as storage devices, hard drives, video cameras, etc.It supports data transfer rates up to **10 Gbps**.

## **USB 5 Gbps Ports**

The USB (Universal Serial Bus) port is for attaching USB devices such as keyboards, mouse, or other USB-compatible devices. It supports data transfer rates up to **5 Gbps**.

## GbE RJ-45 LAN Jack

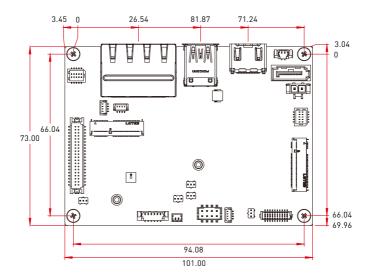
The standard single RJ45 LAN jack is provided for connection to the Local Area Network (LAN). You can connect a network cable to it.

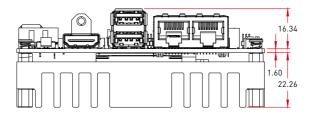


# **ME Overview**

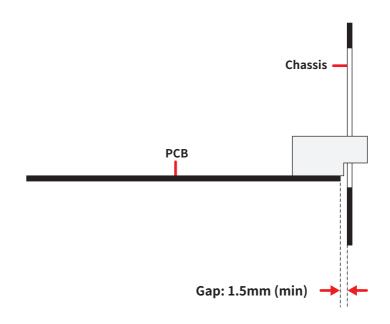
## **Board Dimension**

Unit of measurement: mm





# Suggested Chassis I/O Gap Dimension



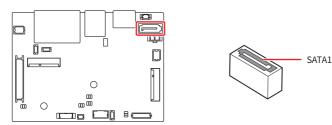
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# Storage

### SATA1: SATA 3.0 6Gb/s Port

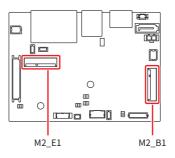
This connector is SATA 6Gb/s interface port, it can connect to one SATA device.





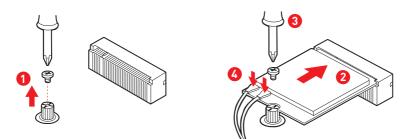
- This SATA port supports hot plug.
- Please do not fold the SATA cable at a 90-degree angle. Data loss may result during transmission otherwise.
- SATA cables have identical plugs on either sides of the cable. However, it is recommended that the flat connector be connected to the motherboard for space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

# **Expansion Slots**



### M2\_B1: M.2 Slot (B Key, 2242, 3042)

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

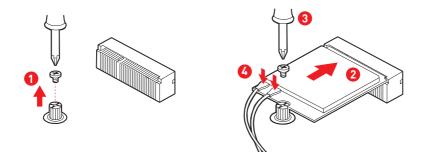


#### Feature

- Supports SATA 3.0/ PCIe 3.0 x1, USB 10Gbps & USB 2.0 (480 Mbps) signals.
- Supports B+M key PCIe x1 module.
- Supports Quectel EM05-G Wi-Fi module with E-SIM.

### M2\_E1: M.2 Slot (E Key, 2230)

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



#### Feature

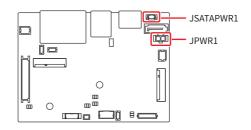
- Supports PCIe 3.0 x1, USB 2.0 (480 Mbps) signal.
- Supports Intel<sup>®</sup> Wi-Fi 6E AX210 + BT 5.2 wireless card.

# 🕼 Important

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.

# Connectors

## **Power Connectors**



### JPWR1: 2-Pin DC-In 12V Power Connector

This connector allows you to connect an power supply.

	1	DC-IN
JPWR1	2	GND

### JSATAPWR1: 2-Pin SATA 5V Power Connector

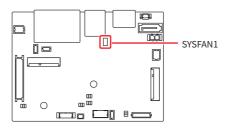
This connector is used to provide power to SATA devices.

	1 [] [] 2	1	VCC5
JSATAPWR1	- 66	2	GND

# 🚹 Important

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

## **Cooling Connectors**



### SYSFAN1: System Fan Connector

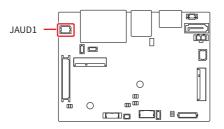
The fan connector supports CPU/ system cooling fans with +12V. When connecting the wire to the connectors, always note that the red wire is the positive and should be connected to the +12V; the black wire is Ground and should be connected to GND.

	1	FAN SENSE
SYSFAN1	2	FAN_PWM
	3	GND

# (1) Important

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

## **Audio Connectors**

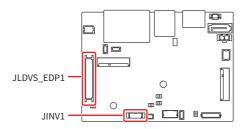


## JAUD1: Front Audio Header

This connector allows you to connect front panel audio.

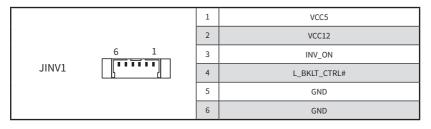
	10 2	1	LINE_OUT_R_F_J	2	MIC1_RA
		3	LINE_OUT_L_F_J	4	MIC1_LA
JAUD1		5	FRONT_JD	6	MIC1_JD
		7	GND	8	GND
	9 1	9	NC	10	NC

## **Graphics Connectors**



### JINV1: LVDS Inverter Header

The connector is provided for LCD backlight options.



### JLVDS\_EDP1: LVDS+eDP Wafer Connector

This connector is intended for use with LVDS/eDP interface flat panels. When connecting your flat panel to this connector, please refer to the panel datasheet to ensure that you set the <u>JVDD1 (eDP/ LVDS power select jumper)</u> to the correct power voltage.

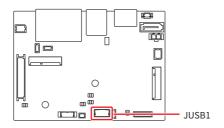
eDP Panel (P1)	CF16 M	eDP Panel (P1)			
	40 J				
	39			1	
Lane3_P	EDP_LINE3_DP	1	2	EDP_LINE2_DP	Lane2_P
Lane3_N	EDP_LINE3_DN	3	4	EDP_LINE2_DN	Lane2_N
	DDC0_CLK	5	6	DDC0_DATA	
LCD_VCC	LCD_VDD	7	8	LCD_VDD	LCD_VCC
LCD_VCC	LCD_VDD	9	10	VCC3	
	BKLT_EN	11	12	LVDS_DETECT#	LCD_GND
Lane1_P	LVDSA_DATA1+	13	14	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)	CF16 I	LVDS Panel (P1)			
	40  39				
	EDP_LINE3_DP	1	2	EDP_LINE2_DP	
	EDP_LINE3_DN	3	4	EDP_LINE2_DN	
	DDC0_CLK	5	6	DDC0_DATA	
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.

## **USB** Connectors



### JUSB1: USB 2.0 Header

This header is ideal for connecting USB devices such as keyboard, mouse, or other USB-compatible devices. It supports data transfer rate up to **480 Mbps**.

	7 1	1	SVCC2	2	GND
		3	JUSB_4-	4	JUSB_3+
JUSB1		5	JUSB_4+	6	JUSB_3-
	8 2	7	GND	8	SVCC2

## **Other Connectors**

### JFP1: Front Panel Connector

This front-panel connector is provided for electrical connection to the front panel switches & LEDs.

	10 2	1	HDD LED+	2	PLED
		3	HDD LED-	4	SLED
JFP1		5	GND	6	PWRBTIN#
9 1	7	SYS_RESET-	8	GND	
	9 1	9	NC	10	NC

## LAN\_LED1~2: LAN LED Connector

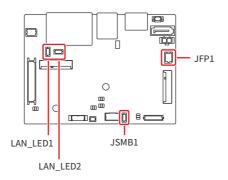
The LAN LED connector provides status indication for network connections via LEDs.

	1	LAN_LED_LINK#
	2	LAN_ACT_LINK
LAN_LED2	3	LAN_LED_2500#
	4	LAN_LED_1000#

### JSMB1: SMBus Header

This header enables users to connect to the System Management Bus (SMBus) interface.

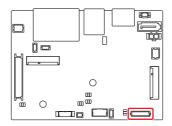
JSMB1 4	1	5VSB
	2	SMBCLK
	3	SMBDATA
	4	GND



### JGPIO\_COM1: GPIO + COM Connector

This connector is designed to provide a flexible combination of General Purpose Input/ Output (GPIO) signals and serial communication capabilities.

	1	GND	2	VCC5_F
	3	NGPO_0	4	NGPI_0
	5	NGPO_1	6	NGPI_1
	7	NGPO_2	8	NGPI_2
JGPIO_COM1	9	NGPO_3	10	NGPI_3
$\begin{array}{c}19\\20\end{array}$	11	NDCT1#	12	NSIN1
	13	NSOUT1	14	NDTR1#
	15	GND	16	NDSR1#
	17	NRTS1	18	NCTS1#
	19	VCC_COM1	20	NC



### Feature

- Supports RS-232/422/485, with 0V/5V/12V.
- RS- 232/ 422/ 485, selection by BIOS control.
- Supports True RS-232
- Supports Auto flow control.
- Supports 1000m cable.

# Important

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

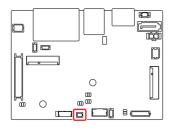
	RS232			
PIN	SIGNAL	DESCRIPTION		
1 2 3 4 5 6 7 8 9	NDCD NSIN NSOUT NDTR GND NDSR NRTS NCTS VCC COM	Data Carrier Detect Signal In Signal Out Data Terminal Ready Signal Ground Data Set Ready Request To Send Clear To Send VCC COM		

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

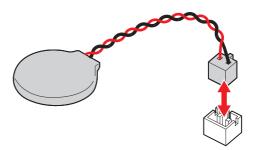
### JRTC1: CMOS Battery Header

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 JRTC1 connector and remove the battery.
- 2. Connect the new CR2032 battery with wire to the JRTC1 connector.





### WARNING

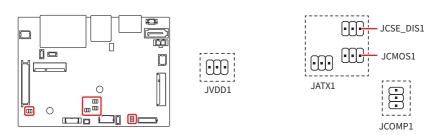
### KEEP OUT OF REACH OF CHILDREN

- Swallowing can lead to chemical burns, perforation of soft tissue, and even 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	
	1	COM Power Select Jumper	
JCOMP1		1-2: 5V (Default)	
		2-3: 12V	
		Clear CMOS Jumper	
JCMOS1		1-2: Normal (Default)	
		2-3: Clear CMOS	
		CSE Jumper	
JCSE_DIS1		1-2: Normal (Default)	
		2-3: ME disable	
		AT/ ATX Mode Select Jumper	
JATX1		1-2: ATX (Default)	
		2-3: AT	
		eDP/ LVDS Power Select Jumper	
JVDD1		1-2: 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.

# 🕼 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 <DEL> or <F2> key to enter Setup.

Press <DEL> 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.

# 🕼 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 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	Chipset Power Save & Exit	
System Date System Time	[Tue 12/03/2086] [20:24:56]	Set the Date. Use Tab to switch between Date elements. Default Ranges:
SATA_1 SATA_2 M.2_1	Not Present Not Present Not Present	Year: 200–2099 Months: 1–12 Days: Dependent on month Range of Years may vary.
USB Devices: 1 Drive, 2 Keyboards		
BIOS Version	ECF16IMS.800	
Intel(R) N97 02000 MHz Processor ID Build Type Total Memory	0xB06E0 64 8192 MB(LPDDR5)	+: 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>
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#### 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 onboard 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

Main Advanced Boot Security	Aptio Setup – AMI Chipset Power Save & Exit	
System Date System Time	[Tue 12/03/2086] [20:24:56]	Set the Date. Use Tab to switch between Date elements. Default Ranges:
SATA_1 SATA_2 M.2_1	Not Present Not Present Not Present	Year: 2000-2099 Months: 1-12 Days: Dependent on month Range of Years may vary.
USB Devices: 1 Drive, 2 Keyboards		
BIOS Version	ECF16IMS.800	
Intel(R) N97 02000 MHz Processor ID Build Type Total Memory	0xB06E0 64 8192 MB(LPDDR5)	++: 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 <<>> Scroll help area upwards <m>: Scroll help area downwards</m>
Vens	ion 2,22,1292 Convright (C) 202	4 AMT

### ► 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>.

# Advanced

Main Advanced Boot Security	Aptio Setup – AMI Chipset Power Save & Exit	
Full Screen Logo Display Bootup NumLock State P CPU Configuration Super IO Configuration H/X/M Monitor Smart Fan Configuration PCI/PCIE Device Configuration Retwork Stack Configuration GPIO Group Configuration PCIE ASPM Settings	(Disabled) [On]	Enables or disables Full Screen Logo Display option
		<pre>++: Select Screen 14: Select Item Enter: Select +/-: Change Opt. ESC: Exit F1: General Help F7: Previous Values F9: Optimized Defaults F10: Save &amp; Reset Setup F12: Screenshot capture <k>: Scroll help area upwards <m>: Scroll help area downwards</m></k></pre>

### ► 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 of delay to the booting sequence. This delay ensures that the logo is displayed for a sufficient amount of time. Therefore, it is recommended that you disable this BIOS feature for a faster boot-up time.

### Bootup NumLock State

This setting is to set the Num Lock status 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 Intel(R) N97 Processor ID Processor Speed	0×B06E0 2000 MHz	When enabled, a VMM can utilize the additional hardware capabilities provided by Vanderpool Technology.
E-core Information L1 Data Cache L1 Instruction Cache L2 Cache L3 Cache Intel Virtualization Technology	32 KB × 4 64 KB × 4 2048 KB 6 MB [Enabled]	
Active Efficient-cores Intel(R) SpeedStep(tm) Intel(R) Speed Shift Technology C states	[A11] [Enabled] [Enabled] [Enabled]	+: Select Screen t1: Select Item Enter: Select +/-: Change Opt. ESC: Exit F1: General Help F7: Previous Values F9: Optimized Defaults
	0.00.1000.0cmusidat	F10: Save & Reset Setup F12: Screenshot capture <k>: Scroll help area upwards <m>: Scroll help area downwards</m></k>

#### Intel (VMX) Virtualization Technology

Virtualization enhanced by Intel Virtualization Technology will allow a platform to run multiple operating systems and applications in independent partitions. With Virtualization, one computer system can function as multiple "virtual" systems.

#### Active Efficient-cores

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

#### Intel(R) SpeedStep(TM)

EIST (Enhanced Intel SpeedStep Technology) allows the system to dynamically adjust processor voltage and core frequency, which can result in decreased average power consumption and decreased average heat production. When disabled, the processor will return the actual maximum CPUID (CPU Identification) input value of the processor when queried.

#### 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.

#### Memory Configuration

Advanced		
Memory Configuration		Enable/Disable In-Band ECC. Will be enabled if memory has
In-Band ECC Support In-Band ECC Operation Mode IBECC Error Injection Control	[Enabled] [2] [No Error Injection]	will be enabled if memory has symmetric configuration
		++: Select Screen
		†∔: 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 <mp: area="" downwards<="" help="" scroll="" td=""></mp:></k>

#### In-Band ECC Support

Enables or disables In-Band ECC(Error-Correcting Code) Support.

[Enabled] When enabled this function, a portion(1/32) of memory space will be reserved to store ECC data.

[Disabled] Disables this function.

#### ► In-Band ECC Error Operation Mode

Select an operation mode from 0-2. This feature only display when In-Band ECC Support is enabled.

#### In-Band ECC Error Injection Control

Enables or disables In-Band ECC Error Injection. This feature only display when **In-Band ECC Support** is enabled.

Super IO Configuration

Advanced		
Super IO Configuration		Watch Dog Timer
Serial Port1 Device Settings Change Settings Mode Select	[Enabled] IO=3F8h; IRQ=4; [Auto] [R\$232]	
FIFO Mode Hatch Dog Timer Set Watch Dog Timer	[128-byte] [Enabled] 30	
		<pre>++: Select Screen 14: Select Item Enter: Select +/-: Change Opt. ESC: Exit F1: General Help F7: Previous Values F9: Optimized Defaults F10: Save &amp; Reset Setup F12: Screenshot capture <k>: Scroll help area upwards <m>: Scroll help area downwards</m></k></pre>

#### Serial Port 1

This setting enables/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.

► FIFO Mode

This setting controls the FIFO data transfer mode.

#### ► 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		
CPU temperature	: +31 °C	
System temperature	: +34 °C	
SYSFAN	: N/A	
VCC_CORE	: +0.856 V	
VCC3	: +3.336 V	
VCC5	: +5.003 V	
+12V	: +19.184 V	
VSB3V	: +3.344 V	
VSB5V	: +4.872 V	
VBAT	: +3.072 V	++: Select Screen
		tl: Soloct Itom

### Smart Fan Configuration

Advanced		
Configuration Smart FAN		Disabled/Enabled Smart FAN Function
Min. Speed (%)	[50.0%]	

#### SYSFAN

This setting enables/ disables the Smart Fan function. Smart Fan is an excellent feature which will adjust the System fan speed automatically depending on the current system temperature, avoiding the overheating to damage your system.

#### » 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/disables the onboard audio controller.

### Network Stack Configuration

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

Advanced		
Network Stack IPv4 PXE Support IPv4 HTTP Support IPv6 PXE Support IPv6 HTTP Support	(Enabled) (Disabled) (Disabled) (Disabled) (Disabled)	Enable/Disable UEFI Network Stack
PXE boot wait time Media detect count	0 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		
GPIO Group Configuration		Set GPOO to output High/Low
6P00 6P01 6P02 6P03	[Low] [Low] [Low] [Low]	

#### ▶ GPO0 ~ GPO3

These settings control the operation mode of the specified GPIO.

### ► PCIE ASPM settings

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

Advanced		
M2_81 M2_E1	[Disabled] [Disabled]	PCI Express Active State Power Management settings.
		++: Select Screen 1: Select Item Enter: Select +/-: Change Opt.
		<ul> <li>F)- brange opt.</li> <li>ESC: Exit</li> <li>F1: General Help</li> <li>F7: Previous Values</li> <li>F9: Optimized Defaults</li> <li>F10: Save &amp; Reset Setup</li> <li>F12: Screenshot capture</li> <li><k>: Scroll help area upwards</k></li> <li><mp: area="" downwards<="" help="" li="" scroll=""> </mp:></li></ul>
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#### ► M2\_B1/ M2\_E1

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

#### Lanes form PCH:

[Disabled]	Disable this function.
[L1]	Higher latency, lower power "standby" state.
[Auto]	Set the best state supported by the system.

#### Lanes form SA:

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

## Boot

Main Advanced Boot Security	Aptio Setup – AMI Chipset Power Save & Exit	
Boot Option Priorities Boot Option #1	[UEFI: SCSI DISK 1.00, Partition 1 (SCSI DISK 1.00)]	Sets the system boot order
Boot Option #2		
		<pre>++: Select Screen 11: Select Item Enter: Select +/-: Change Opt. ESC: Exit F1: General Help F7: Previous Values F9: Optimized Defaults F10: Save &amp; Reset Setup</pre>
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### ► 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 <mark>Security</mark> Chipset Power Save & Exit	
Administrator Password User Password	Set Administrator Password
<ul> <li>PCH-FW Configuration</li> <li>Trusted Computing</li> <li>Serial Port Console Redirection</li> <li>Secure Boot</li> </ul>	
	+: 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>
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## ► 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.

### PCH-FW Configuration

Security		
HE Firmware Version HE Firmware Mode HE Firmware Stu HE Firmware Status 1 HE Firmware Status 2 HE Firmware Status 3 HE Firmware Status 5 HE Firmware Status 5 HE Firmware Status 6	16.50.10.135 Normal Mode Consumer SKU 0×90000255 0×89100106 0×00000000 0×00000000 0×00000000 0×000000	When Disabled ME will be pu into ME Temporarily Disable Mode.
HE State Comms Hub Support JHI Support Core Bios Done Message Firmware Update Configuration PTT Configuration ME Debug Configuration Anti-Rollback SVN Configuration	(Enabled) (Disabled) (Disabled) (Enabled)	++: Select Screen fl: 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="" help="" scroll="" upwar<br=""><mb: area="" help="" scroll="" td="" upwar<=""></mb:></kb:>

#### **Firmware Information**

ME Firmware Version ME Firmware Mode ME Firmware SKU System Integrity Value ME Firmware Status 1~6 These settings show the firmware information of the Intel ME (Management Engine).

#### ME State

This setting specifies the Intel Management Engine state.

#### ► Comms Hub Support

This setting enables/disables Communications Hub Support.

#### ► JHI Support

This setting enables/disables support for Intel Dynamic Application Loader Host Interface (JHI).

#### Core BIOS Done Message

This setting enables/disables Core BIOS Done Message sent to ME.

#### ► Firmware Update Configuration

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

#### » ME FW Image Re-Flash

This setting enables/ disables the ME FW (Firmware) image re-flash.

#### » FW Update

This setting enables/ disables the FW (Firmware) update.

#### PTT Configuration

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

Advanced		
PTT Capability ∕ State	1 / 0	Selects TPM device: PTT or dTPM. PTT – Enables PTT in
TPM Device Selection		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/ Discrete TPM will be disabled and all data saved on it will be lost.

#### ME Debug Configuration

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 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 MBP HOB.

#### » HECI2 Interface Communication

This setting Adds/ Removes HECI2 device from PCI space.

#### » KT Device

This setting enables/ disables KT Device.

» End of Post Message

This setting enables/ 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

This setting enables/ disables Management Component Transport Protocol (MCTP) Broadcast Cycle.

#### Anti-Rollback SVN Configuration



#### » Automatic HW-Enforced Anti-Rollback SVN

Setting this option enables will automatically activate the hardware-enforced Anti-Rollback security version (HW ERB SVN). Once ME FW was successfully run on a platform, FW with lower ARB-VN will be blocked from execution.

#### » 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.

### Trusted Computing

Security		
TPM 2.0 Device Found Firmware Version: Vendor: Security Device Support Active PCR banks Available PCR banks SHA256 PCR Bank SHA384 PCR Bank Pending operation	15.23 IFX [Enable] SH4256 SH4256,SH4384 [Enabled] [Disabled] [None]	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.
Platform Hierarchy Storage Hierarchy Endorsement Hierarchy Physical Presence Spec Version TPM 2.0 InterfaceType PH Randomization Device Select	[Enabled] [Enabled] [1.3] [TIS] [Enabled] [TPM 2.0]	+: Select Screen 11: Select Item Enter: Select +/-: 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>

#### 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/ SHA384 PCR Bank

These settings enable/disable the SHA256 PCR Bank and SHA384 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 selection.

#### ▶ Platform Hierarchy, Storage Hierarchy, Endorsement Hierarchy

These settings enable/disable 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

This setting enables/disables PH Randomization.

#### Device Select

Select your TPM device throgh this setting.

► Serial Port Console Redirection

Security		
COM1 Console Redirection ▶ Console Redirection Settings	[Enabled]	Console Redirection Enable or Disable.
		++: Select Screen 11: 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:>
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#### ► Console Redirection

Console Redirection operates in host systems that do not have a monitor and keyboard attached. This setting enables/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)

Security		
COM1 Console Redirection Settings		Emulation: ANSI: Extended ASCII char set. VT100: ASCII char set. VT100Plus: Extends
Terminal Type Bits per second Data Bits Parity Stop Bits Flow Control VT-UTF8 Combo Key Support Reconder Made Resolution 100x31 Putty KeyPad	[ANSI] [115200] [8] [None] [1] [None] [Enabled] [Disabled] [Disabled] [V100]	VT100 to support color, function keys, etc. VT-UTFB: Uses UTFB encoding to map Unicode chars onto 1 or more bytes.

#### » 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/disables the VT-UTF8 combination key support for ANSI/VT100 terminals.

#### » Recorder Mode, Resolution 100x31

These settings enable/disable 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

Se	curity	
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 †1: 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>

#### 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]**.

# Chipset

DVMT Total Sfx Mem     [256M]     Select DVMT5.0 Total       DVMT Pre-Allocated     [64M]     Hemory size used by t       Type Select     [LVDS]     Internal Graphics Dev       LVDS Panel Type     [1024 x 768 & 24bit]     Internal Graphics Dev	ol Crophia
	y the
<pre>+*: Select Screen 11: Select Item Enter: Select +/-: Change Opt. ESC: Exit F1: General Help F7: Previous Values F9: Optimized Default F10: Save &amp; Reset Set F12: Screenshot captu <k>: Scroll help area <m>: Scroll help area</m></k></pre>	ults Setup pture rea upwards

#### DVMT Total Gfx Mem

This setting specifies the memory size for DVMT.

### DVMT Pre-Allocated

This setting defines the DVMT pre-allocated memory. Pre-allocated memory is the small amount of system memory made available at boot time by the system BIOS for video. Pre-allocated memory is also known as locked memory. This is because it is "locked" for video use only and as such, is invisible and unable to be used by the operating system.

#### ► Type Select

Set your video signal interface as LVDs or eDP.

#### » LVDS Panel Type

This setting specifies the LCD Panel's resolution and distribution formats. The item will display when **Panel 1 Type is set to LVDs**.

## Power

Main Advanced Boot Security	Aptio Setup - AMI Chipset Power Save & Exit	
Restore AC power Loss	[Last State]	Select AC power state when power is re-applied after a
Deep Sleep Mode	[S4 + S5]	power failure.
Advanced Resume Events Control		
OnChip USB	[Enabled]	
LAN/PCIE PME	[Disabled]	
RTC	[Disabled]	
		++: 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
		<pre><k>: Scroll help area upwards</k></pre>
		<pre><m>: Scroll help area downwards</m></pre>
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#### 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 st	ate.
---	------

[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/disables the S4 + S5 power saving mode.

#### OnChip USB

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

#### ► LAN/ PCIE PME

Enables or disables the system to be awakened from the power saving modes when activity or input signal of Intel LAN device and onboard PCIE PME 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 &amp; Exit</mark>	
Save Changes and Reset Discard Changes and Exit Discard Changes	Restore/Load Default values for all the setup options.
Load Optimized Defaults Save as User Defaults Restore User Defaults	
Launch EFI Shell from filesystem device	
	++: 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>
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#### 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.

# **Audio Driver Setup**

## Installing the Intel<sup>®</sup> SST Audio Driver

The Intel® Smart Sound Technology (Intel® SST) driver enables high-quality audio processing, voice interactions, and microphone functionality on your device. This section guides you through installing the Intel® SST driver and the associated audio codec driver on a Windows operating system.

# Important

To enable the **Realtek audio codec** to function under the Intel<sup>®</sup> Smart Sound Technology (Intel<sup>®</sup> SST) framework on your PC, the Intel<sup>®</sup> SST driver **must be installed** before the Realtek audio driver.

## Prerequisites

- Operating System: Windows 10 or Windows 11 (64-bit).
- Administrative Privileges: Administrator access to the PC.
- Internet Connection: Required for driver downloads.

#### **Key Reminder**

Install the Intel<sup>®</sup> SST driver before the Realtek audio driver. The Intel<sup>®</sup> SST driver provides the necessary framework to prevent errors.

### **Installation Steps**

- 1. Download the Intel<sup>®</sup> SST Driver:
  - Visit the MSI Support Page for your IPC model.
  - Download the Intel<sup>®</sup> SST driver (.zip) and save it to a known location.
- 2. Locate and Extract the Driver File:
  - Right-click and select **Extract All** to a folder.
- 3. Sort and Identify the .inf File:
  - Open the extracted folder and sort contents by Type to group .inf files.
  - Locate the Intel<sup>®</sup> SST .inf file.
- 4. Install the Driver:
  - Right-click all the .inf file and select Install.
  - If prompted by User Account Control (UAC)window, click "Yes" to allow changes.
  - On Windows 10, click "OK" when "The operation completed successfully" appears.
- 5. Restart your PC to apply the driver.
- 6. Verify Intel<sup>®</sup> SST Installation:
  - Open **Device Manager** (Windows + X > Device Manager).
  - Expand **Sound**, **Video**, **and Game Controllers** and confirm that Intel<sup>®</sup> Smart Sound Technology (Intel<sup>®</sup> SST) Audio Controller is listed without a yellow exclamation mark.



 Note: After completing Intel<sup>®</sup> SST installation, the "Intel High Definition Audio" item will be shown at "Other devices" of Device Manager. Please install the audio codec driver for this.

# **GPIO WDT Programming**

This chapter provides GPIO (General Purpose Input/ Output) and WDT (Watch Dog Timer) 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	0xA0A	Bit 0	N_GPO0	0xA0A	Bit 4
N_GPI1	0xA0A	Bit 1	N_GPO1	0xA0A	Bit 5
N_GPI2	0xA0A	Bit 2	N_GPO2	0xA0A	Bit 6
N_GPI3	0xA0A	Bit 3	N_GPO3	0xA0A	Bit 7

#### 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 = Inportb (0xA0A);	// Read value from N_GPO0 port.
val = val   (1<<4);	// Set N_GPO0 address (bit 4) to 1 (output "high").
Outportb (0xA0A, val);	// Write back to <b>N_GPO0</b> port.

#### Example: Set N\_GPO1 output "low"

val = Inportb (0xA0A);	// Read value from <b>N_GPO1</b> port.
val = val & (~(1<<5));	// Set N_GPO1 address (bit 5) to 0 (output "low").
Outportb (0xA0A, val);	// Write back to <b>N_GPO1</b> port.

#### 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 = Inpor	tb ( <mark>0xA0A</mark> );	,	// Read value from <b>N_GPI2</b> port.
val = val &	(1<<2);	,	// Read <b>N_GPI2</b> address (bit 2).
if (val)	printf ("Input of	N_GPI2	is High");
else	printf ("Input of	N_GPI2	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. <u>val = val &amp; 0xF7</u> if second mode
Outportb (WDT_BASE + 0x05, val);	// Write back WDT setting

#### 2.2 Set WDT Time

Outportb (WDT\_BASE + 0x06, <u>Time</u>); // Write 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 = Inportb (WDT_BASE + 0x05);
                                     // Read current WDT setting.
                                      // Check WDTMOUT_STS (bit 6).
val = val & 0x40;
if (val) printf ("timeout event occurred");
        printf ("timeout event not occurred");
else
```

#### 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
```