**MSI**®

# SKU1
# SKU2

## MS-CF13

**Industrial Computer Board**

User Guide

# Contents

**Revision**

V1.2, 2025/05

# Regulatory Notices

## CE Conformity

This product has been tested and found to comply with the harmonized standards for Information Technology Equipment published under Directives of Official Journal of the European Union.

## 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.

# 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.

- Please visit <https://us.msi.com/page/recycling> for information regarding the recycling of your product in the US.

## Copyright and Trademarks Notice

Copyright © Micro-Star Int'l Co., Ltd. All rights reserved. The MSI logo used is a registered trademark of Micro-Star Int'l Co., Ltd. All other marks and names mentioned may be trademarks of their respective owners. No warranty as to accuracy or completeness is expressed or implied. MSI reserves the right to make changes to this document without prior notice.

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 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
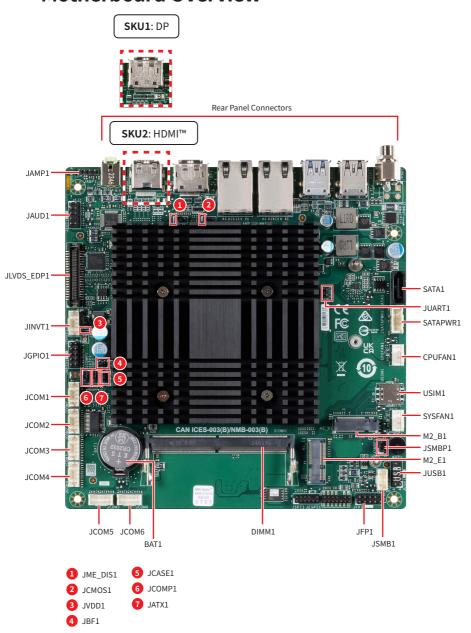
| Model | MS-CF13-SKU1 | MS-CF13-SKU2 |
|---|---|---|
| Form Factors | Mini-ITX | |
| Dimensions | 170(L)mm x 170(W)mm | |
| Processor | • Intel® IoTG Alder Lake-N<br>  - N97, QC, 12W<br>  - Core™ i3-N305, QC, 9W up to 15W<br>  - Atom® x7425E, QC, 12W | |
| Chipset | Within processor | |
| Memory | • 1 x DDR5 SO-DIMM slots (262-pin)<br>  - Single channel DDR5, Non-ECC<br>  - Up to 4800 MT/s<br>  - Up to 16GB | |
| Network | 2 x Intel® I226-V, 2.5GbE RJ45 LAN | |
| Storage | • 1 x SATA 3.0 6Gb/s ports<br>• 1 x M.2 B Key slot (2242/ 3042/ 2280)*<br>  - Supports SATA 3.0 signal<br><br>*There is only "one" **M.2 B Key Slot** on board, which is marked as **M2_B1**. | |
| Expansion Slots | • 1 x M.2 E Key slot (2230)<br>  - Supports PCIe 3.0 x1, USB 2.0 (480 Mbps) signal<br>• 1 x M.2 B Key slot (2242/ 3042/ 2280)*<br>  - Supports SATA 3.0/ PCIe 3.0 x1, USB 10Gbps & USB 2.0 (480 Mbps) signals<br>  - Supports Nano SIM holder<br>• 1 x Nano SIM holder<br>  - Supported by M.2 B key (SIM) slot<br><br>*There is only "one" **M.2 B Key Slot** on board, which is marked as **M2_B1**. | |
| Audio | Realtek® ALC897 High Definition Audio Codec | |
| Graphics | • **2 x DP 1.4a up to 4096×2340 @60Hz**<br>• 1 x eDP 1.4b up to 1920×1080** @60Hz<br>  - **\*\*N97 SKUs** supports up to 4096 x 2160<br>  - Signal shared with LVDS<br>  - Supports auto switch between eDP & LVDS<br>• 1 x LVDS 1.4a up to 1920×1200 @60Hz<br>  - Signal shared with eDP<br>  - Supports auto switch between eDP & LVDS<br>  - Supports 18/24-Bit Dual Channel<br>• 3 Independent display supported in OS<br>  - **DP1 + DP2 + LVDS/ eDP** | • **1 x DP 1.4a up to 4096×2340 @60Hz**<br>• **1 x HDMI™ 1.4b up to 3840x2160 @30Hz**<br>• 1 x eDP 1.4b up to 1920×1080** @60Hz<br>  - **\*\*N97 SKUs** supports up to 4096 x 2160<br>  - Signal shared with LVDS<br>  - Supports auto switch between eDP & LVDS<br>• 1 x LVDS 1.4a up to 1920×1200 @60Hz<br>  - Signal shared with eDP<br>  - Supports auto switch between eDP & LVDS<br>  - Supports 18/24-Bit Dual Channel<br>• 3 Independent display supported in OS<br>  - **DP + HDMI™ + LVDS/ eDP** |

| Model | MS-CF13-SKU1 | MS-CF13-SKU2 |
|---|---|---|
| **Rear Panel Connectors** | • **2 x DisplayPort**<br>• 2 x 2.5 GbE RJ-45 LAN ports<br>• 2 x USB 10Gbps Type-A ports<br>• 1 x USB 5Gbps Type-A ports<br>• 1 x USB 2.0 Type-A ports (480 Mbps)<br>• 1 x Line-out jack | • **1 x DisplayPort**<br>• **1 x HDMI™ connector**<br>• 2 x 2.5 GbE RJ-45 LAN ports<br>• 2 x USB 10Gbps Type-A ports<br>• 1 x USB 5Gbps Type-A ports<br>• 1 x USB 2.0 Type-A ports (480 Mbps)<br>• 1 x Line-out jack |
| **Internal USB Connectors** | 1 x USB 2.0 header (480 Mbps, for 2 USB ports) | |
| **Power Connectors** | • 1 x 4-pin SATA power connector<br>• 1 x DC jack connector (default)<br>  - Co-lay 1*4-pin DC-in connector (vertical type & right angle type)<br> | |
| **Fan Connectors** | • 1 x 4-pin CPU PWM fan connector<br>• 1 x 4-pin system PWM fan connector | |
| **System Connectors** | • 1 x Front panel header<br>• 1 x Front audio header (Line-out & Mic-in)<br>• 1 x Audio amplifier header<br>• 1 x LVDS inverter header<br>• 1 x LVDS +eDP wafer connector<br>• 6 x COM (serial) port headers<br>• 1 x GPIO header (8-bit, 4 x GPI, 4 x GPO)<br>• 1 x SMBus connector (5V/ 3V)<br>• 1 x Chassis intrusion header | |
| **Jumpers** | • 1 x COM voltage select jumper<br>• 1 x eDP/LVDS VDD power select jumper<br>• 1 x AT/ ATX mode select jumper<br>• 1 x BIOS flash switch jumper<br>• 1 x SMBus header voltage select jumper<br>• 1 x Clear CMOS jumper<br>• 1 x ME jumper | |

| Model | MS-CF13-SKU1 | MS-CF13-SKU2 |
|---|---|---|
| OS Driver Support | • Windows 10 IoT Enterprise LTSC 21H2 (64-bit)<br>• Windows 11 IoT Enterprise LTSC 24H2 (64-Bit)<br>• Linux (supports by request) | |
| Certification | CE, FCC Class B, BSMI, RCM, VCCI, UKCA, IC, IEC 62368: CE (LVD) | |
| Environment | • Operating Temperature: 0 ~ 60°C<br>　- Thermal w/ Airflow: 0.7m/s<br>• Storage Temperature: -20 ~ 80°C<br>• Relative Humidity: 10 ~ 90%, non-condensing | |
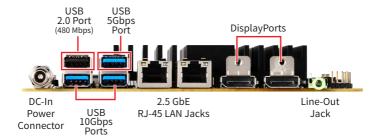
# Motherboard Overview

**SKU1**: DP

Rear Panel Connectors

**SKU2**: HDMI™



| | |
|---|---|
| JAMP1 | |
| JAUD1 | |
| JLVDS_EDP1 | |
| JINVT1 | |
| JGPIO1 | |
| JCOM1 | |
| JCOM2 | |
| JCOM3 | |
| JCOM4 | |

JCOM5  JCOM6

BAT1

DIMM1

JFP1

JSMB1

SATA1
JUART1
SATAPWR1
CPUFAN1
USIM1
SYSFAN1
M2_B1
JSMBP1
M2_E1
JUSB1

CAN ICES-003(B)/NMB-003(B)

- ❶ JME_DIS1
- ❷ JCMOS1
- ❸ JVDD1
- ❹ JBF1
- ❺ JCASE1
- ❻ JCOMP1
- ❼ JATX1

# Rear Panel Connectors

## SKU1

USB 2.0 Port (480 Mbps)  USB 5Gbps Port  DisplayPorts

DC-In Power Connector  USB 10Gbps Ports  2.5 GbE RJ-45 LAN Jacks  Line-Out Jack

## SKU2

USB 2.0 Port (480 Mbps)  USB 5Gbps Port  DisplayPort

HDMI™
HIGH-DEFINITION MULTIMEDIA INTERFACE

DC-In Power Connector  USB 10Gbps Ports  2.5 GbE RJ-45 LAN Jacks  Line-Out Jack

## DC Power Jack

Power supplied through this jack supplies power to the system.

## 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**.

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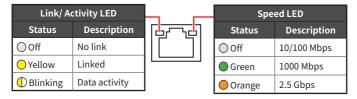
DisplayPort is a digital display interface standard. This connector is used to connect a monitor with DisplayPort inputs.

## HDMI™ Connector HDMI™ (**SKU2** Only)

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.

## 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/ Activity LED | | | Speed LED | |
|---|---|---|---|---|
| **Status** | **Description** | | **Status** | **Description** |
| ⚪ Off | No link | | ⚪ Off | 10/100 Mbps |
| 🟡 Yellow | Linked | | 🟢 Green | 1000 Mbps |
| 🌓 Blinking | Data activity | | 🟠 Orange | 2.5 Gbps |

## Line-Out Jack
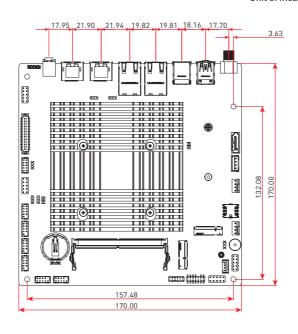
This connector is provided for headphones or speakers.
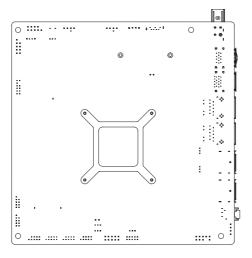
# ME Overview
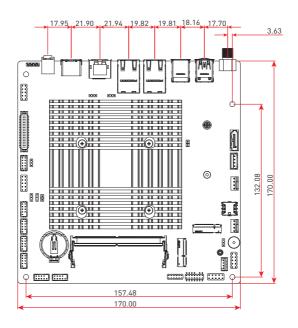
## Board Dimensions
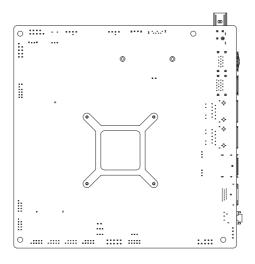
### SKU1 (DP + DP)

Unit of measurement: mm

17.95　21.90　21.94　19.82　19.81　18.16　17.70

3.63

132.08

170.00

157.48

170.00

## SKU2 (DP + HDMI)

Unit of measurement: mm

17.95  21.90  21.94  19.82  19.81  18.16  17.70

3.63

132.08

170.00

157.48

170.00
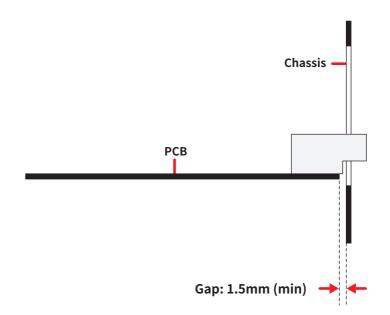
# Suggested Chassis I/O Gap Dimension

Chassis

PCB

Gap: 1.5mm (min)

# Component Contents

# Memory

## DIMM1: DDR5 SO DIMM Slot

The SO-DIMM slot is intended for memory module.



**Installing DDR5 Memory Module**

1. Locate the SO-DIMM slot. Align the notch on the DIMM with the key on the slot and insert the DIMM into the slot.

2. Push the DIMM gently downwards until the slot levers click and lock the DIMM in place.

3. To uninstall the DIMM, flip the slot levers outwards and the DIMM will be released instantly.
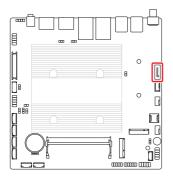
> ⚠️ **Important**

*You can barely see the golden finger if the DIMM is properly inserted in the DIMM slot.*

# Storage

## JSATA1: SATA 3.0 6Gb/s Port

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



JSATA1
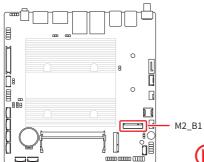
## ⚠️ *Important*

- *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_B1: M.2 Slot (B Key, 2242, 3042, 2280)

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



M2_B1
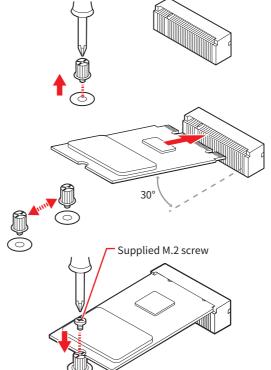
▶ *Video Demonstration*

Watch the video to learn how to Install M.2 SSD.
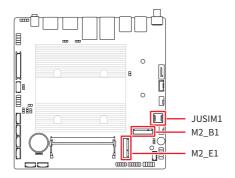
## Installing M.2 SSD

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.

30°

4. Secure the M.2 SSD in place with the supplied M.2 screw.

Supplied M.2 screw

# Expansions



JUSIM1
M2_B1
M2_E1
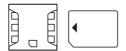
## SIM Card Slot

### JUSIM1: SIM Holder
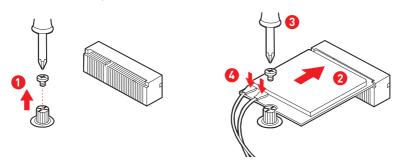
This holder is provided for 3G, 4G, LTE, 5G SIM cards.

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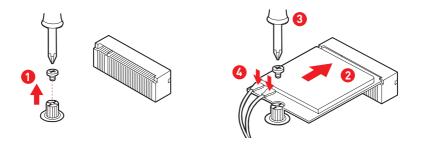
## M2_E1: M.2 Slot (E Key, 2230)

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



## M2_B1: M.2 Slot (B Key, 2242, 3042, 2280)

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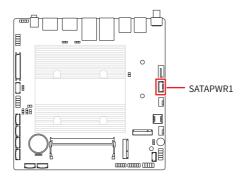


## ⚠️ *Important*

*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.*
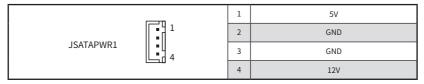
# Connectors

## Power Connectors



SATAPWR1

### JSATAPWR1: SATA Power Connector

This connector is used to provide power to SATA devices.

| JSATAPWR1 | | 1 | 5V |
| --- | --- | --- | --- |
| | | 2 | GND |
| | | 3 | GND |
| | | 4 | 12V |
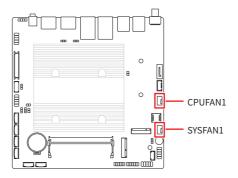
### ⚠ *Important*

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

# Cooling Connectors



## CPUFAN1, SYSFAN1:  CPU/ System Fan Connectors

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.

| CPUFAN1 SYSFAN1 | 1 ▪▪▪▪ 4 | 1 | GND |
| :---: | :---: | :---: | :---: |
| | | 2 | FAN POWER |
| | | 3 | FAN SENSE |
| | | 4 | FAN_PWM |

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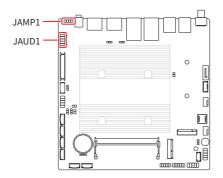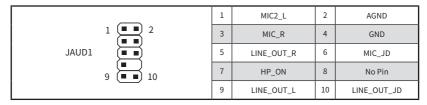
Please refer to the recommended CPU fans at processor' s official website or consult the vendors for proper CPU cooling fan.

# Audio Connectors



## JAUD1:  Front Audio Header (Line-out/ MIC-in)

This header allows you to connect front panel audio.

| | | | |
|---|---|---|---|
| 1 | MIC2_L | 2 | AGND |
| 3 | MIC_R | 4 | GND |
| 5 | LINE_OUT_R | 6 | MIC_JD |
| 7 | HP_ON | 8 | No Pin |
| 9 | LINE_OUT_L | 10 | LINE_OUT_JD |

## JAMP1: Audio Amplifier Header

This header is used to connect audio amplifiers to enhance audio performance.
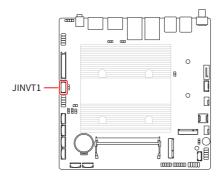
| | |
|---|---|
| 1 | AMP_OUT_R- |
| 2 | AMP_OUT_R+ |
| 3 | AMP_OUT_L- |
| 4 | AMP_OUT_L+ |

# Graphics Connectors

## JINVT1: LVDS Inverter Header
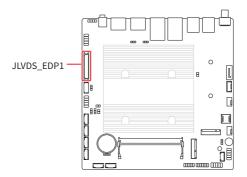
The connector is provided for LCD backlight options.

| | | | | | |
|---|---|---|---|---|---|
| 1 | GND | | 2 | GND | |
| 3 | VCC5 | | 4 | VCC5 | |
| 5 | +12V | | 6 | +12V | |
| 7 | INV_ON#1 | | 8 | N/A | |
| 9 | LVDS_BKLCTL | | 10 | N/A | |

JINV1

1  2
9  10

JINVT1

## 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 **eDP/ LVDS power select jumper(JVDD1)** to the correct power voltage.

JLVDS_EDP1 ——

⚠ *Important*
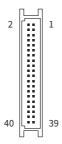
*Please refer to the following pages for the pin-out of the LVDS + eDP Box Header and the pin-out for LVDS/eDP interface flat panels.*

JLVDS_EDP1

```
     2  ▪▪  1
        ▪▪
        ▪▪
        ▪▪
        ▪▪
        ▪▪
        ▪▪
        ▪▪
        ▪▪
        ▪▪
    40  ▪▪  39
```

| eDP Panel (P1) | CF13 Motherboard (P2) | | | | eDP Panel (P1) |
|---|---|---|---|---|---|
| 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 |

JLVDS_EDP1
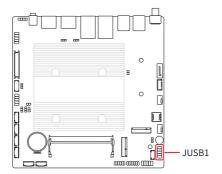


| LVDS Panel (P1) | CF13 Motherboard (P2) | | | | | LVDS Panel (P1) |
|---|---|---|---|---|---|---|
| | EDP_LINE3_DP | 1 | 2 | EDP_LINE2_DP | | |
| | EDP_LINE3_DN | 3 | 4 | EDP_LINE2_DN | | |
| | DDC0_CLK_7513_R | 5 | 6 | DDC0_DATA_7513_R | | |
| VCC | LCD_VDD | 7 | 8 | LCD_VDD | | VCC |
| VCC | LCD_VDD | 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.*

# USB Connectors



JUSB1

## 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**.

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

JUSB1

10 9
2 1

# Other Connectors

## JFP1: Front Panel Header
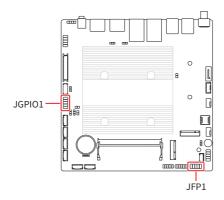
This front-panel header is provided for electrical connection to the front panel switches & LEDs and is compliant with Intel Front Panel I/O Connectivity Design Guide.

| | | | |
|---|---|---|---|
| 1 | HDD LED+ | 2 | POWER LED |
| 3 | HDD LED- | 4 | POWER LED |
| 5 | RESET SWITCH- | 6 | POWER SWITCH+ |
| 7 | RESET SWITCH+ | 8 | POWER SWITCH- |
| 9 | NC | 10 | No pin |

JFP1

## JGPIO1: GPIO Header
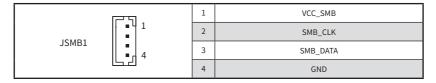
This connector is provided for the General-Purpose Input/Output (GPIO) peripheral module.

| | | | |
|---|---|---|---|
| 1 | GND | 2 | N_GPIO_VCC (VCC5) |
| 3 | N_GPI0 | 4 | N_GPO0 |
| 5 | N_GPI1 | 6 | N_GPO1 |
| 7 | N_GPI2 | 8 | N_GPO2 |
| 9 | N_GPI3 | 10 | N_GPO3 |

JGPIO1

JGPIO1

JFP1
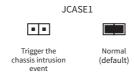
## JSMB1:  SMBus Header
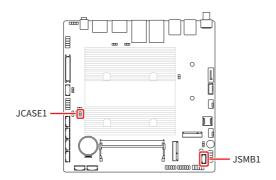
This header enables users to connect to the System Management Bus (SMBus) interface.

| | |
|---|---|
| 1 | VCC_SMB |
| 2 | SMB_CLK |
| 3 | SMB_DATA |
| 4 | GND |

## JCASE1: 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.

JCASE1

Trigger the chassis intrusion event

Normal (default)

## JCOM1~6: COM Port Headers
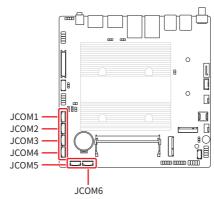
These connectors are a 16550A high speed communications port that sends/ receives 16 bytes FIFOs. You can attach a serial device to it.

| | | | | |
|---|---|---|---|---|
| | | 1 | DCD# | 2 | NSIN |
| JCOM1~6 | 9    1 / 10    2 | 3 | NSOUT | 4 | DTR |
| | | 5 | GND | 6 | DSR# |
| | | 7 | RTS | 8 | CTS# |
| | | 9 | RI / POWER | 10 | No pin |

## ⚠ *Important*

*After connect serial port connectors to printer, garbage can' t be printed when power on/off.*

- **COM1**

Support RS-232/ 422/ 485, with 0V/5V/12V (default set to 5V).

- **COM2/3/4/5/6**

Support RS-232, no power.

**Feature**

- Supports auto flow control.
- Supports True RS-232.
- RS-422/485 support TR 1000+ Meter.
- RS-232/422/485 can be selected through BIOS control.
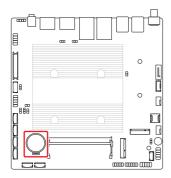
| RS232 | | |
|---|---|---|
| PIN | SIGNAL | DESCRIPTION |
| 1 | NDCD | Data Carrier Detect |
| 2 | NSIN | Signal In |
| 3 | NSOUT | Signal Out |
| 4 | NDTR | Data Terminal Ready |
| 5 | GND | Signal Ground |
| 6 | NDSR | Data Set Ready |
| 7 | NRTS | Request To Send |
| 8 | NCTS | Clear To Send |
| 9 | VCC_COM | VCC_COM |

| RS422 | | |
|---|---|---|
| PIN | SIGNAL | DESCRIPTION |
| 1 | 422 TXD- | Transmit Data, Negative |
| 2 | 422 TXD+ | 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 | 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 |

## BAT1: CMOS Battery

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. Push the retainer clip to free the battery.

2. Remove the battery from the socket.

3. Install the new CR2032 coin-cell battery with the **+** sign facing up. Ensure that the retainer holds the battery securely.



*WARNING*

***KEEP OUT OF REACH OF CHILDREN***
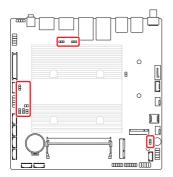
- *Swallowing can cause chemical burns, perforation of soft tissue, and even death.*

- *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
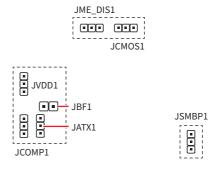
⚠️ *Important*

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



| Jumper | Default Setting | Description |
|--------|-----------------|-------------|
| JCOMP1 | 1 | **COM Voltage Select Jumper** |
| | | 1-2: 5V (default) |
| | | 2-3: 12V |
| JVDD1 | 1 | **eDP/ LVDS Power Select Jumper** |
| | | 1-2: 3.3V (default) |
| | | 2-3: 5V |
| JATX1 | 1 | **AT/ ATX Mode Select Jumper** |
| | | 1-2: ATX (default) |
| | | 2-3: AT |
| JBF1 | 1 | **BIOS Flash Switch Jumper** |
| | | 1-2: Normal (default) |
| | | 2-3: Flash |
| JSMBP1 | 1 | **SMBus Header Voltage Select Jumper** |
| | | 1-2: VCC5 (default) |
| | | 2-3: VCC3 |
| JCMOS1 | 1 | **Clear CMOS Jumper** |
| | | 1-2: Normal (default) |
| | | 2-3: Clear CMOS |
| JME_DIS1 | 1 | **ME Jumper** |
| | | 1-2: ME enabled (default) |
| | | 2-3: ME disabled |

# 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, **<F11>** key to Boot Menu, **<F12>** key to PXE Boot .

> **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

| ← → | 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> | Scroll help area upwards |
| <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 ( ↑ ↓ )** 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 ( ↑ ↓ )** 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

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

 System Date                    [Fri 09/06/2024]        Set the Date. Use Tab to
 System Time                    [14:44:14]              switch between Date elements.
                                                        Default Ranges:
 SATA_1                         Not Present             Year: 2000-2099
 SATA_2                         Not Present             Months: 1-12
 M.2_1                          Not Present             Days: Dependent on month
                                                        Range of Years may vary.

 USB Devices:
       1 Drive, 2 Keyboards

 BIOS Version                   ECF13IMS.800

 Intel(R) N97 @2000 MHz
 Processor ID                   0xB06E0                 ++: Select Screen
 Build Type                     64                      ↑↓: Select Item
 Total Memory                   8192 MB(DDR5)           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

               Version 2.22.1292 Copyright (C) 2024 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

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

   System Date                    [Fri 09/06/2024]        Set the Date. Use Tab to
   System Time                    [14:44:14]              switch between Date elements.
                                                          Default Ranges:
   SATA_1                         Not Present             Year: 2000-2099
   SATA_2                         Not Present             Months: 1-12
   M.2_1                          Not Present             Days: Dependent on month
                                                          Range of Years may vary.

   USB Devices:
        1 Drive, 2 Keyboards

   BIOS Version                   ECF13IMS.800

   Intel(R) N97 @2000 MHz                                 →←: Select Screen
   Processor ID                   0xB06E0                 ↑↓: Select Item
   Build Type                     64                      Enter: Select
   Total Memory                   8192 MB(DDR5)           +/-: 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

                      Version 2.22.1292 Copyright (C) 2024 AMI
```

► **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

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

    Full Screen Logo Display          [Disabled]          Enables or disables Full
    Bootup NumLock State              [On]                Screen Logo Display option
    M.2 B key Peripheral              [Enabled]
  ▶ CPU Configuration
  ▶ Super IO Configuration
  ▶ H/W Monitor
  ▶ Smart Fan Configuration
  ▶ PCI/PCIE Device Configuration
  ▶ Network Stack Configuration
  ▶ GPIO Group Configuration
  ▶ PCIE ASPM Settings

                                                          →←: 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
                                                          <m>: Scroll help area downwards

                    Version 2.22.1292 Copyright (C) 2024 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 full-screen 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.

► **M.2 B key Peripheral**

Enables or disables peripherals for M.2 B key.

► **CPU Configuration**

```
            Advanced

CPU Configuration                                VT-d capability

Intel(R) N97
Processor ID                     0xB06E0
Processor Speed                  2000 MHz

E-core Information
L1 Data Cache                    32 KB x 4
L1 Instruction Cache             64 KB x 4
L2 Cache                         2048 KB
L3 Cache                         6 MB

VT-d                             [Enabled]
Intel Virtualization Technology  [Enabled]    →←: Select Screen
Active Efficient-cores           [All]        ↑↓: Select Item
Intel(R) SpeedStep(tm)           [Enabled]    Enter: Select
Intel(R) Speed Shift Technology  [Enabled]    +/-: Change Opt.
C states                         [Enabled]    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
```

▸ **VT-d**

Enables or disables Intel VT-D (Intel Virtualization for Directed I/O) technology.

▸ **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.

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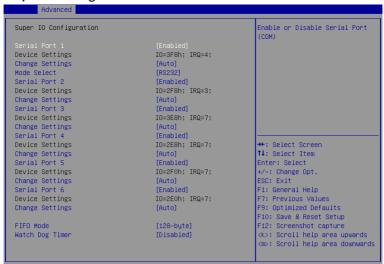
This setting controls the C-States (CPU Power states).

[Enabled]      Detects the idle state of system and reduce CPU power consumption accordingly.

[Disabled]     Disable this function.

‣ **Super IO Configuration**

```
        Advanced

  Super IO Configuration                              Enable or Disable Serial Port
                                                      (COM)
  Serial Port 1                 [Enabled]
  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]
  Serial Port 3                 [Enabled]
  Device Settings               IO=3E8h; IRQ=7;
  Change Settings               [Auto]
  Serial Port 4                 [Enabled]
  Device Settings               IO=2E8h; IRQ=7;        ↔: Select Screen
  Change Settings               [Auto]                 ↑↓: Select Item
  Serial Port 5                 [Enabled]              Enter: Select
  Device Settings               IO=2F0h; IRQ=7;        +/-: Change Opt.
  Change Settings               [Auto]                 ESC: Exit
  Serial Port 6                 [Enabled]              F1: General Help
  Device Settings               IO=2E0h; IRQ=7;        F7: Previous Values
  Change Settings               [Auto]                 F9: Optimized Defaults
                                                       F10: Save & Reset Setup
  FIFO Mode                     [128-byte]             F12: Screenshot capture
  Watch Dog Timer               [Disabled]             <k>: Scroll help area upwards
                                                       <m>: Scroll help area downwards
```

▶ **Serial Port 1/ 2/ 3/ 4/ 5/ 6**

This setting enables or disables the specified serial port.

» **Device Settings**

This setting shows the address & IRQ of 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/ 5/ 6.

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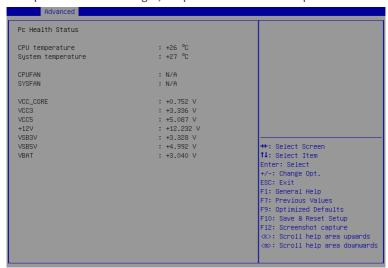
This setting controls the FIFO (First In First Out) data transfer mode.

▶ **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                  : +26 °C
   System temperature               : +27 °C

   CPUFAN                           : N/A
   SYSFAN                           : N/A

   VCC_CORE                         : +0.752 V
   VCC3                             : +3.336 V
   VCC5                             : +5.087 V
   +12V                             : +12.232 V
   VSB3V                            : +3.328 V
   VSB5V                            : +4.992 V          ➜←: Select Screen
   VBAT                             : +3.040 V          ↑↓: 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
```

► **Smart Fan Configuration**

```
              Advanced

   Configuration Smart FAN                      Disabled/Enabled Smart FAN
                                                Function
   CPUFAN                         [Disabled]
   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                                                              │
├──────────────────────────────────────────────┬───────────────────────────┤
│  Network Stack                 [Disabled]     │ Enable/Disable UEFI Network │
│                                               │ Stack                      │
│                                               │                            │
│                                               │                            │
│                                               │                            │
└──────────────────────────────────────────────┴───────────────────────────┘
```

▶ **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.
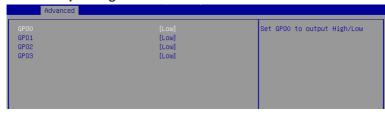
» **PXE boot wait time**

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
  GPO0                          [Low]              Set GPO0 to output High/Low
  GPO1                          [Low]
  GPO2                          [Low]
  GPO3                          [Low]
```

▸ **GPO0 ~ GPO3**

These settings control the operation mode of the specified GPIO.

► **PCIE ASPM settings (HW Design)**

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_B1, M2_E1**

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.

[L0sL1]        Activate both L0s and L1 support.

[Disabled]     Disable this function.

# Boot

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

    Boot Option Priorities                           Sets the system boot order
    Boot Option #1               [UEFI: SCSI DISK 1.00,
                                 Partition 1 (SCSI DISK
                                 1.00)]
    Boot Option #2               [UEFI: Built-in EFI
                                 Shell]




                                                     →←: 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
                                                     <m>: Scroll help area downwards

                   Version 2.22.1292 Copyright (C) 2024 AMI
```

► **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                            Set Administrator Password
    User Password

    Chassis Intrusion                [Disabled]
  ▶ PCH-FW Configuration
  ▶ Trusted Computing
  ▶ Serial Port Console Redirection
  ▶ Secure Boot


                                                   →←: 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
                                                   <m>: Scroll help area downwards

                    Version 2.22.1292 Copyright (C) 2024 AMI
```

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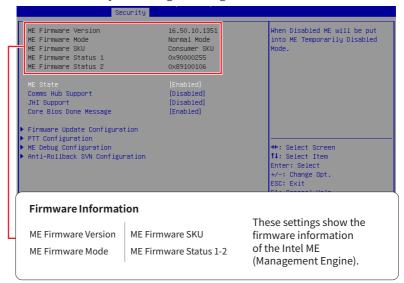
 Enables or disables recording messages while the chassis is opened. This function is ready for the chassis equips a chassis intrusion jumper(switch).

| | |
|---|---|
| [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. |

► **PCH-FW Configuration**

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

```
                              Security

ME Firmware Version          16.50.10.1351        When Disabled ME will be put
ME Firmware Mode             Normal Mode          into ME Temporarily Disabled
ME Firmware SKU              Consumer SKU         Mode.
ME Firmware Status 1         0x90000255
ME Firmware Status 2         0x89100106

ME State                     [Enabled]
Comms Hub Support            [Disabled]
JHI Support                  [Disabled]
Core Bios Done Message       [Enabled]

▶ Firmware Update Configuration
▶ PTT Configuration
▶ ME Debug Configuration                          ↔: Select Screen
▶ Anti-Rollback SVN Configuration                 ↕: Select Item
                                                  Enter: Select
                                                  +/-: Change Opt.
                                                  ESC: Exit
```

**Firmware Information**

| | | These settings show the firmware information of the Intel ME (Management Engine). |
|---|---|---|
| ME Firmware Version | ME Firmware SKU | |
| ME Firmware Mode | ME Firmware Status 1-2 | |

▶ **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.

» **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.

```
                        Security
 PTT Capability / State        1 / 0           Selects TPM device: PTT or
                                               dTPM. PTT - Enables PTT in
 TPM Device Selection          [dTPM]          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).
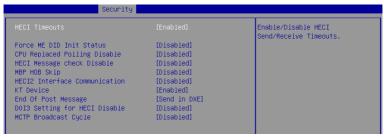
[PTT]                Enables PTT in SkuMgr.

[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          1              hardware-enforced
Automatic HW-Enforced                [Disabled]     Anti-Rollback mechanism is
Anti-Rollback SVN                                   automatically activated: once
Set HW-Enforced Anti-Rollback for    [Disabled]     ME FW was successfully run on
Current SVN                                         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.

▶ **Trusted Computing**

```
                    Security

     TPM 2.0 Device Found                            Enables or Disables BIOS
     Firmware Version:          15.23                support for security device.
     Vendor:                    IFX                  O.S. will not show Security
                                                     Device. TCG EFI protocol and
     Security Device Support    [Enable]             INT1A interface will not be
     Active PCR banks           SHA256               available.
     Available PCR banks        SHA256,SHA384

     SHA256 PCR Bank            [Enabled]
     SHA384 PCR Bank            [Disabled]

     Pending operation          [None]
     Platform Hierarchy         [Enabled]
     Storage Hierarchy          [Enabled]            ←→: Select Screen
     Endorsement Hierarchy      [Enabled]            ↑↓: Select Item
     Physical Presence Spec Version  [1.3]           Enter: Select
     TPM 2.0 InterfaceType      [TIS]                +/-: Change Opt.
     PH Randomization           [Enabled]            ESC: Exit
     Device Select              [TPM 2.0]            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
```

▸ **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, SHA384 PCR Bank**

These settings enables or disables 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 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.

▸ **Device Select**

Select your TPM device through this setting.

► **Serial Port Console Redirection**

```
                        Security

    COM1
    Console Redirection              [Enabled]      The settings specify how the
  ► Console Redirection Settings                     host computer and the remote
                                                     computer (which the user is
                                                     using) will exchange data.
                                                     Both computers should have the
                                                     same or compatible settings.



                                                    ←→: 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
                                                    <m>: Scroll help area downwards
```

▸ **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
  COM1                                         Emulation: ANSI: Extended
  Console Redirection Settings                 ASCII char set. VT100: ASCII
                                               char set. VT100Plus: Extends
  Terminal Type              [ANSI]            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]
```

» **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**

```
                          Security

  System Mode              Setup                  Secure Boot feature is Active
                                                  if Secure Boot is Enabled,
  Secure Boot              [Disabled]             Platform Key(PK) is enrolled
                           Not Active             and the System is in User mode.
                                                  The mode change requires
  Secure Boot Mode         [Custom]               platform reset
▶ Restore Factory Keys
▶ Reset To Setup Mode

▶ Key Management

                                                  ⇆: 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
                                                  <m>: Scroll help area downwards
```

▶ **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]**.
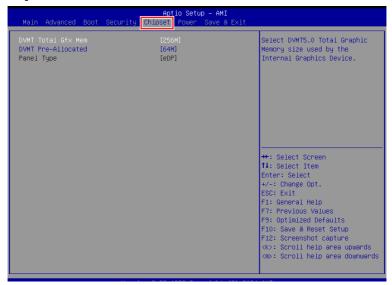
▶ **Reset to setup Mode**

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

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

   DVMT Total Gfx Mem            [256M]              Select DVMT5.0 Total Graphic
   DVMT Pre-Allocated           [64M]               Memory size used by the
   Panel Type                   [eDP]               Internal Graphics Device.



                                                    →←: 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
                                                    <m>: Scroll help area downwards
```

► **DVMT Total Gfx Mem**

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

► **Panel Type**

This setting specifies the Panel's resolution and distribution formats.

# Power

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

   Restore AC power Loss              [Last State]      Select AC power state when
   Deep Sleep Mode                    [S4 + S5]         power is re-applied after a
   Advanced Resume Events Control                       power failure.
   OnChip USB                         [Enabled]
   LAN/PCIE PME                       [Disabled]

   RTC                                [Disabled]



                                                        →←: 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
                                                        <m>: Scroll help area downwards

                   Version 2.22.1292 Copyright (C) 2024 AMI
```

► **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**

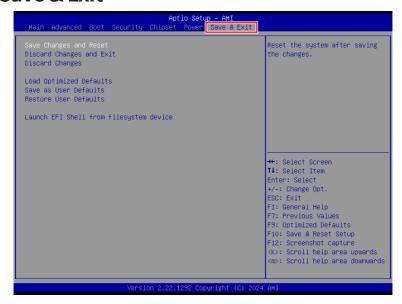The item allows the activity of the OnChip USB device to wake up the system from S4/ S5 sleep state.

► **LAN/ 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 power saving modes.

# Save & Exit

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

    Save Changes and Reset                        Reset the system after saving
    Discard Changes and Exit                      the changes.
    Discard Changes

    Load Optimized Defaults
    Save as User Defaults
    Restore User Defaults

    Launch EFI Shell from filesystem device




                                                  →←: 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
                                                  <m>: Scroll help area downwards

                    Version 2.22.1292 Copyright (C) 2024 AMI
```

► **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® 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® Smart Sound Technology (Intel® SST) framework on your PC, the Intel® 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® SST driver before the Realtek audio driver.** The Intel®
> SST driver provides the necessary framework to prevent errors.

## Installation Steps

1. **Download** the Intel® SST Driver:
   - Visit the MSI Support Page for your IPC model.
   - Download the Intel® 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® 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® SST Installation:
   - Open **Device Manager** (Windows + X > Device Manager).
   - Expand **Sound, Video, and Game Controllers** and confirm that Intel® Smart
     Sound Technology (Intel® SST) Audio Controller is listed without a yellow
     exclamation mark.



   - *Note: After completing Intel® 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 | 0xA02 | Bit 0 | N_GPO0 | 0xA02 | Bit 4 |
| N_GPI1 | 0xA02 | Bit 1 | N_GPO1 | 0xA02 | Bit 5 |
| N_GPI2 | 0xA02 | Bit 2 | N_GPO2 | 0xA02 | Bit 6 |
| N_GPI3 | 0xA02 | Bit 3 | N_GPO3 | 0xA02 | 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 (0xA02); | // Read value from **N_GPO0** port. |
| val = val \| (1<<4); | // Set **N_GPO0** address (bit 4) to 1 (output "high"). |
| Outportb (0xA02, val); | // Write back to **N_GPO0** port. |

**Example:** Set **N_GPO1** output "low"

| | |
|---|---|
| val = Inportb (0xA02); | // Read value from **N_GPO1** port. |
| val = val & (~(1<<5)); | // Set **N_GPO1** address (bit 5) to 0 (output "low"). |
| Outportb (0xA02, val); | // Write back to **N_GPO1** 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 = Inportb (0xA02); | // Read value from **N_GPI2** port. |
| val = val & (1<<2); | // Read **N_GPI2** address (bit 2). |
| if (val)     printf ("Input of    **N_GPI2**    is High"); | |
| else     printf ("Input of    **N_GPI2**    is Low"); | |

# Watchdog Timer – WDT

## 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
val = val | 0x08;                     // 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);     // Write WDT time, value 1 to 255.
```

### 2.3    Enable WDT

```
val = Inportb (WDT_BASE + 0x0A);      // Read current WDT_PME setting
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.
val = val & 0x40;                     // Check WDTMOUT_STS (bit 6).
if (val)    printf ("timeout event occurred");
else        printf ("timeout event not occurred");
```

### 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
```