MIX-MTLD1

Industrial Motherboard

HDMI™
HIGH-DEFINITION MULTIMEDIA INTERFACE

E24324
First Edition
December 2024

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Contents

Chapter 1

Product overview

1.1 Package contents

Check your industrial motherboard package for the following items.

- ☑ 1 x Industrial Motherboard
- ☑ 1 x SATA 6.0Gb/s cable
- ☑ 1 x SATA power cable
- ☑ 1 x I/O Shield

> If any of the above items is damaged or missing, contact your distributor or sales representative immediately.

1.2 Features

- Intel® Meteor Lake-U/H, 14th Gen Intel® Ultra 5 / Ultra 7 processors, max. TDP: 15W (U-series) /28W (H-series)
- 2 x SO-DIMMs, max. 96GB, DDR5 5600MHz
- 2 x SATA 6.0 Gb/s ports, 1 x USB 3.2 Gen 1 header, 2 x USB 2.0 headers
- Realtek® ALC897 High Definition Audio CODEC
- Multi-display outputs: 4 x HDMI 2.0, 1 x LVDS, 1 x eDP
- Dual Ethernet LAN: 1 x Intel® i210AT, 1 x Intel® i226V
- 1 x PCIe [x8] slot
- 1 x M.2 B Key (3042/52) [PCIex2/USB3.2 Gen1] with Nano SIM socket (Default 3052 by BOM optional); 1 x M.2 E Key (2230) [one pair PCIex1/USB2/CNVi]

1.3   Specifications

System	
CPU	Intel® Meteor Lake-U/H, 14th Gen Intel® Ultra 5 / Ultra 7 processors, max. TDP: 15W (U-series) / 28W (H-series)
Memory	2 x SO-DIMMs, max. 96GB, DDR5 5600 MHz
	Dual channel memory architecture
Graphics	Intel® Xe Graphics
I/O Chipset	NCT6126D
Storage	1 x M.2 M Key (2280) [PCIex4; Gen4, NVMe]
	2 x SATA 6.0Gb/s port
Ethernet	1 x Intel® i210AT
	1 x Intel® i226V
Audio	Realtek® ALC897
TPM	Infineon SLB9672 TPM2.0 onboard
Expansion slots	1 x M.2 E Key (2230) [one pair PCIex1/USB2/CNVi]
	1 x M.2 B Key (3042/52) [PCIex2/USB3.2 Gen1] with Nano SIM socket (Default 3052 by BOM optional)
BIOS	256Mbit Flash ROM, AMI BIOS
H/W Status Monitor	Monitors CPU / system temperature
	Monitors Vcore / 3.3V / 5V / 12V voltages
	Monitors chassis fan speed
Watchdog Timer	1~255 steps by software program
Wake On LAN / PXE	Yes (WOL, PXE)
Power States	S4, S5
Graphics	
Graphics Multi Display	4 independent displays
HDMI	HDMI 2.0, up to 4096 x 2160 @60Hz, with Digital Audio
LVDS	Up to 1920 x 1080 @60Hz, Daul Channel 18/24 bit (Co-layout with eDP header; default: LVDS)
eDP	UP to 4096 x 2160 @60Hz (4ch; Co-layout with LVDS by BOM option)
Environment, Power and ME	
Battery	Lithium battery
Power requirement	12V (+/-5%) DC
Operating temperature	32°F ~ 131°F (0 ~ 60°C)
Storage temperature	-40°F~185°F (-40°C~85°C)
Operating humidity	60°C @ 90% RH Non-Condensing
Certificate	CE & FCC (Class A)
Form factor	Mini ITX Form Factor: 6.7"x 6.7" (170mm x 170mm)
Weight	1.1 lb (0.5 Kg)

(continued on the next page)

Internal I/O Connectors	
Storage	1 x M.2 M Key (2280) [PCIex4; Gen4, NVMe]
	2 x SATA 6.0Gb/s ports support RAID 0, 1
	1 x 4-pin SATA power connector
USB	1 x USB 3.2 Gen 1 header (2 x 10-pin, 2.0mm) supports 2 addition-al USB 3.2 Gen 1 ports
	1 x USB 2.0 header (2 x 5-pin, 2.00mm) supports 2 additional USB ports
Display	1 x LVDS/eDP header
Speaker	1 x 4-pin header supports 2W/4ohm
Serial port	3 x Boxer headers for RS-232
	1 x Boxer header for RS-232/422/485
GPIO	1 x 8-bit programmable (4-in/4-out)
Power	2 x 4-pin (2x2) DC-in 12V (-5%~+5%)
Others	1 x Clear CMOS jumper
	1 x Front Panel System header
	1 x Buzzer header
	1 x ATX/AT Mode selection jumper
	1 x ME disable header
	1 x eDP/LVDS Tcon IC voltage selection jumper
	1 x eDP/LVDS Panel Backlight Voltage selection jumper
	1 x SATA Power header
	1 x LVDS Invertor header
	1 x 3-pin ME Lock header
	1 x NCSI header for OOB module (Via i210AT)
Rear I/O Ports	
Rear I/O Ports	4 x HDMI™ 2.0 ports
	2 x USB3.2 Gen1 ports (1 x Type-A + 1 x Type-C®)
	3 x USB2.0 ports
	2 x LAN (RJ-45) ports
	1 x Mic-In audio jack (pink)
	1 x Line-Out audio jack (lime)
	1 x (4+4 pin) DC-in connector
Others	
OS Support	Windows 10 64-bit
	Windows 11 64-bit
	Ubuntu 20.04
	Kernel 6.8
Accessories	1 x SATA cable
	1 x SATA power cable
	1 x I/O shield

Specifications are subject to change without notice.

Chapter 2

Motherboard information

2.1 Before you proceed

Take note of the following precautions before you install motherboard components or change any motherboard settings.

CAUTION!

- Unplug the power cord from the wall socket before touching any component.

- Before handling components, use a grounded wrist strap or touch a safely grounded object or a metal object, such as the power supply case, to avoid damaging them due to static electricity.

- Hold components by the edges to avoid touching the ICs on them.

- Whenever you uninstall any component, place it on a grounded antistatic pad or in the bag that came with the component.

- Before you install or remove any component, ensure that the ATX power supply is switched off or the power cord is detached from the power supply. Failure to do so may cause severe damage to the motherboard, peripherals, or components.

2.2 Motherboard layout

Place four screws into the holes indicated by circles to secure the motherboard to the chassis.

Do not overtighten the screws! Doing so can damage the motherboard.

17.0cm(6.7in)

DC_PWR1

HDMI1_HDMI2

HDMI3_HDMI4

TYPEC_B1

LAN1

USB32G2_1 _USB3

LAN2_USB45

AUDIO1

SIM

M2_TYPE_B1

M2_TYPE_M1

M2_TYPE_E1

BATTERY_H

Intel® 210AT 2242

Intel® i226V 2280

ALC 897

AAFP1

AMP_CON1

PCIEX8

DOB1_SEL1

MIX-MTLD1

Intel® METEOR LAKE-U/H

ATX_AT

COM4   COM3   COM2   COM1   DIO1   SMBUS

Super I/O

3052

3042

DEBUG1

COM1_J1
COM1_J2
COM1_J3
COM1_J4

PNL_PWR1

COM1_V

INV1

BKL_PWR1

EDP/LVDS1

DDR5 SO-DIMM_B1 (64bit, 288-pin module)

DDR5 SO-DIMM_A1 (64bit, 288-pin module)

DIS_ME

CLRTC

CPU_FAN1

USB78

USB3G1_67

256Mb BIOS

SPI1

SATA_PWR1

SATA6G_2

SATA6G_1

F_PANEL

5V_LED1

5VSB_LED1

17.0cm(6.7in)

2-2

MIX-MTLD1

Connectors/Jumpers/Slots	Page
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2. Debug Card connector	2-14
3. COM1 RS232/RS422/RS485 terminator (2-pin COM1_J1~4)	2-8
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5. COM Port headers (10-pin COM1~4)	2-14
6. Digital I/O header (10-pin DIO1)	2-15
7. Power Management and System Health Monitoring header (4-pin SMBUS)	2-16
8. Backlight Inverter Power header (5-pin INV1)	2-16
9. eDP/LVDS connector	2-17
10. Inverter Voltage selection jumper (3-pin BKL_PWR1)	2-9
11. Intel® ME jumper (3-pin DIS_ME)	2-9
12. Clear RTC RAM jumper (3-pin CLRTC)	2-10
13. CPU Fan header (4-pin CPU_FAN1)	2-17
14. USB 2.0 header (10-pin USB78)	2-18
15. COM1 Ring/+5V/+12V selection jumper (6-pin COM1_V)	2-11
16. USB 3.2 Gen 1 header (20-1 pin USB3G1_67)	2-18
17. eDP/LVDS T-con IC Power selection jumper (6-pin PNL_PWR1)	2-11
18. SATA Power header (SATA_PWR1)	2-19
19. SATA 6.0Gb/s ports (7-pin SATA6G_1/2)	2-19
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30. M.2 B-Key slot (M2_TYPE_B1)	2-25
31. SIM Card slot (8-pin SIM)	2-25

2.3 Screw size

2.3.1 Component side
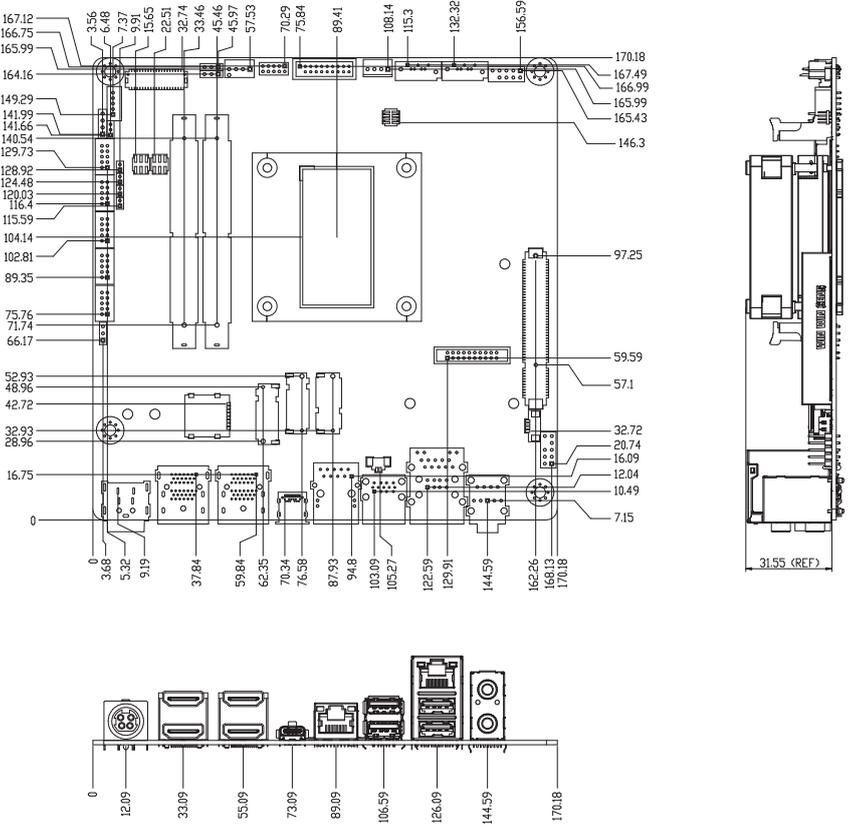
2.3.2   Solder side
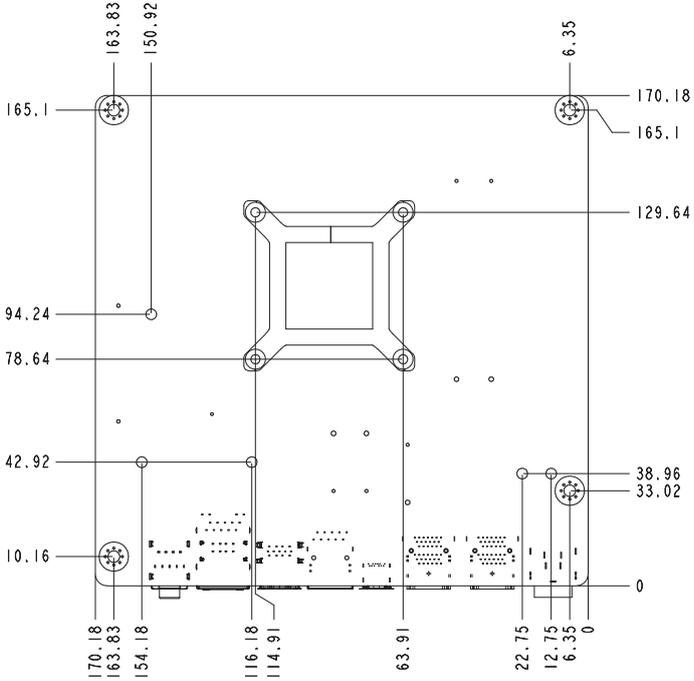
2.4　Central Processing Unit (CPU)

This motherboard comes with a 14th Gen Intel® Meteor Lake-U/H Ultra 5 / Ultra 7 processor.

Intel®
METEOR LAKE-U/H

MIX-MTLD1
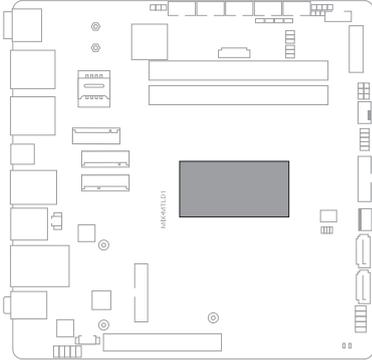
2.5   System memory

This motherboard comes with two Double Data Rate 5 (DDR5) Small Outline Dual Inline Memory Modules (SO-DIMM) sockets. The figure illustrates the location of the DDR5 SO-DIMM sockets:
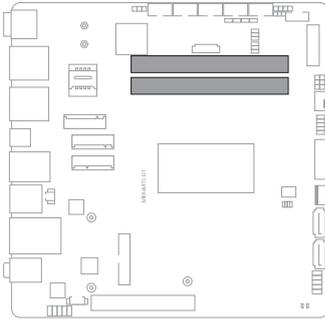
SO-DIMM_B1
SO-DIMM_A1

Use the DIMM_A1 slot when inserting only one SO-DIMM.

Recommended memory configurations

DIMM_A1

DIMM_B1

DIMM_B1
DIMM_A1
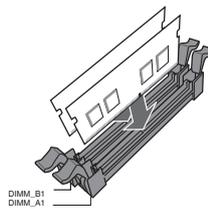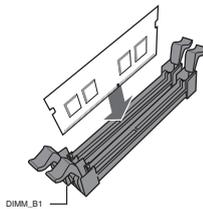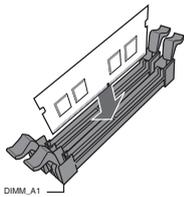
2.6   Jumpers

1.   **COM1 RS232/RS422/RS485 terminator (2-pin COM1_J1~4)**
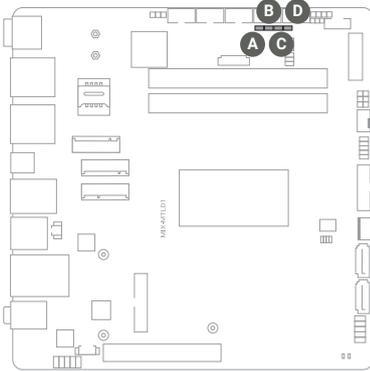
Ⓐ COM1_J1
Ⓑ COM1_J2
Ⓒ COM1_J3
Ⓓ COM1_J4

RS232 (Default)   RS485/RS422
                         with terminator

2.   **AT/ATX Mode selection jumper (3-pin ATX_AT)**

ATX_AT

1 2   2 3
ATX mode   AT mode
(Default)
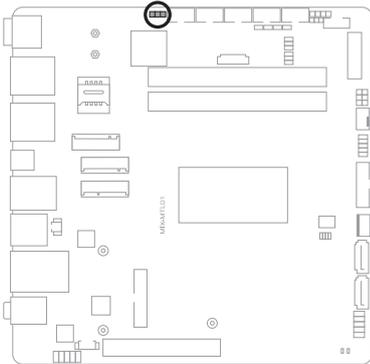
	Pins
ATX mode (Default)	1-2
AT mode	2-3

3. Inverter Voltage selection jumper (3-pin BKL_PWR1)

BKL_PWR1

1 2 +12V
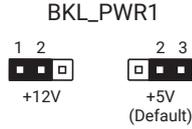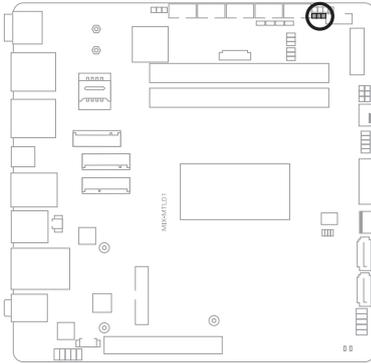
2 3 +5V (Default)

Setting	Pins
+12V	1-2
+5V (Default)	2-3

4. Intel® ME jumper (3-pin DIS_ME)

This jumper allows you to force the Intel® Management Engine (ME) to boot from recovery mode when ME becomes corrupted.

DIS_ME

1 2 ME Enable (Default)

2 3 ME Disable
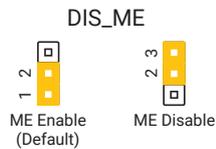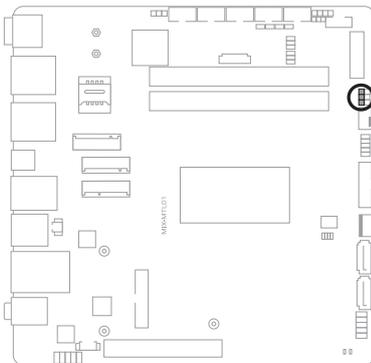
5. Clear RTC RAM (3-pin CLRTC)

This jumper allows you to clear the Real Time Clock (RTC) RAM in CMOS. You can clear the CMOS memory of system setup parameters by erasing the CMOS RTC RAM data. The onboard button cell battery powers the RAM data in CMOS, which include system setup information such as system passwords.

CLRTC

Normal (Default)

Clear RTC
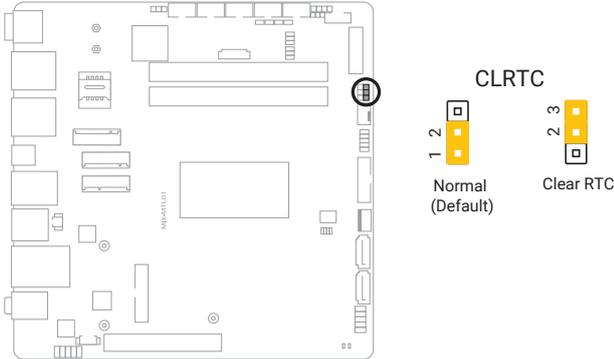
To erase the RTC RAM:

1. Turn OFF the computer and unplug the power cord.

2. Move the jumper cap from pins 1-2 (default) to pins 2-3. Keep the cap on pins 2-3 for about 5~10 seconds, then move the cap back to pins 1-2.

3. Plug the power cord and turn ON the computer.

4. Hold down the **<Del>** key during the boot process and enter BIOS setup to reenter data.

> Except when clearing the RTC RAM, never remove the cap on CLRTC jumper default position. Removing the cap will cause system boot failure!

> *   If the steps above do not help, remove the onboard battery and move the jumper again to clear the CMOS RTC RAM data. After clearing the CMOS, reinstall the battery.
> *   You do not need to clear the RTC when the system hangs due to overclocking. For system failure due to overclocking, use the CPU Parameter Recall (C.P.R) feature. Shut down and reboot the system so the BIOS can automatically reset parameter settings to default values.

6. COM1 Ring/+5V/+12V selection jumper (6-pin COM1_V)
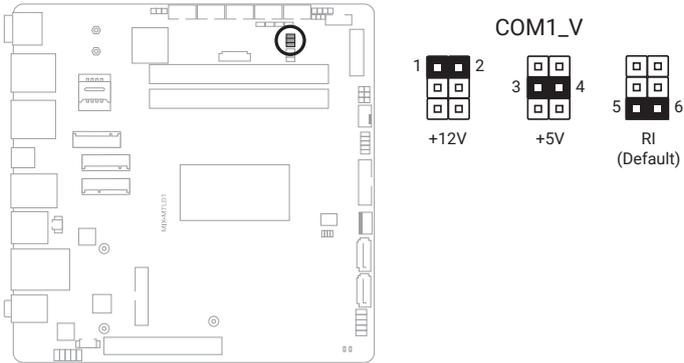
Setting	Pins
+12V	1-2
+5V	3-4
Ring (Default)	5-6

7. eDP/LVDS T-con IC Power selection jumper (6-pin PNL_PWR1)
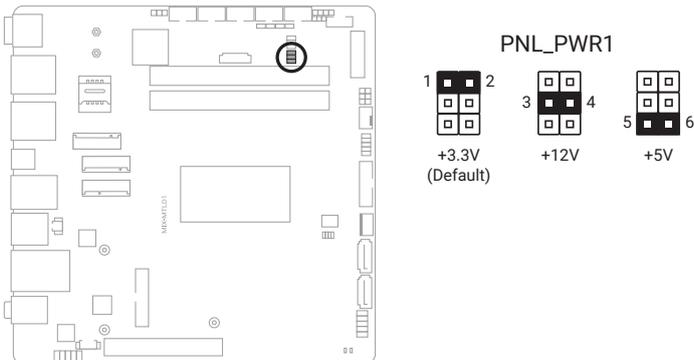
Setting	Pins
+3V	1-2 (Default)
+12V	3-4
+5V	5-6

2.7 Connectors

2.7.1 Rear panel connectors
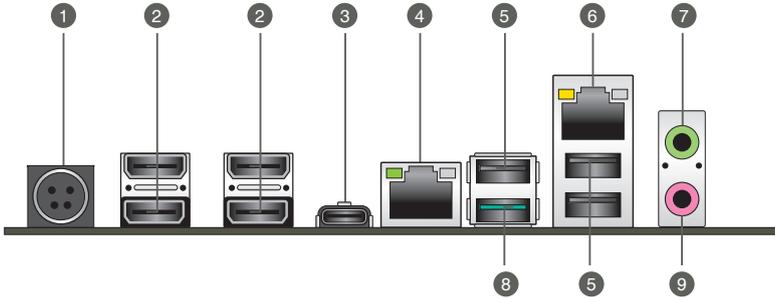
1. **DC power connector.** Insert the power adapter into this port.

2. **HDMI™ ports.** These ports are for High-Definition Multimedia Interface (HDMI™) connectors, and are HDCP compliant allowing playback of HD DVD, Blu-ray, and other protected content.

3. **USB 3.2 Gen 1 port (Type-C®).** This Universal Serial Bus 3.2 Gen 1 (USB 3.2 Gen 1) port is for a USB 3.2 Gen 1 Type-C® device.

4. **2.5G Ethernet port.** This port allows 2.5Gbps Ethernet connection to a Local Area Network (LAN) through a network hub. Refer to the table below for the Ethernet port LED indications.

    LAN port LED indications

ACT/LINK LED		SPEED LED	
Status	**Description**	**Status**	**Description**
-	-	Green	2.5 Gbps connection
Off	No link	Orange	1 Gbps connection
Green	Linked	Off	100 Mbps connection
Blinking	Data activity	Off	10 Mbps connection
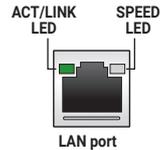
5. **USB 2.0 ports.** These 4-pin Universal Serial Bus (USB) ports are available for connecting USB 2.0/1.1 devices.

6.   **LAN (RJ-45) ports.** These ports allow Gigabit connection to a Local Area Network (LAN) through a network hub. Refer to the table below for the LAN port LED indications.

LAN port LED indications

ACT/LINK LED		SPEED LED	
Status	**Description**	**Status**	**Description**
Off	No link	Green	1 Gbps connection
Yellow	Linked	Orange	100 Mbps connection
Blinking	Data activity	Off	10 Mbps connection

Activity Link LED   Speed LED

LAN port
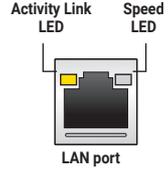
7.   **Line Out port (lime).** This port connects to a headphone or a speaker.

8.   **USB 3.2 Gen 2 ports (Teal Blue, Type-A).** These 9-pin Universal Serial Bus (USB) ports connect to USB 3.2 Gen 2 devices.

> We strongly recommend that you connect USB 3.2 Gen 2 devices to USB 3.2 Gen 2 ports for a faster and better performance from your USB 3.2 Gen 2 devices.

9.   **Microphone port (pink)**. This port connects to a microphone.

2.7.2   Internal connectors

1.   Debug Card connector

This connector allows connection to a Debug card.

DEBUG

(NC)
GND
+3.3V
ESPI_CLK_DB
GND
ESPI_RESET#_DB
ESPI_CS0#_DB
+3.3V
ESPI_IO3_DB
ESPI_IO2_DB
ESPI_IO1_DB
ESPI_IO0_DB

PIN 1
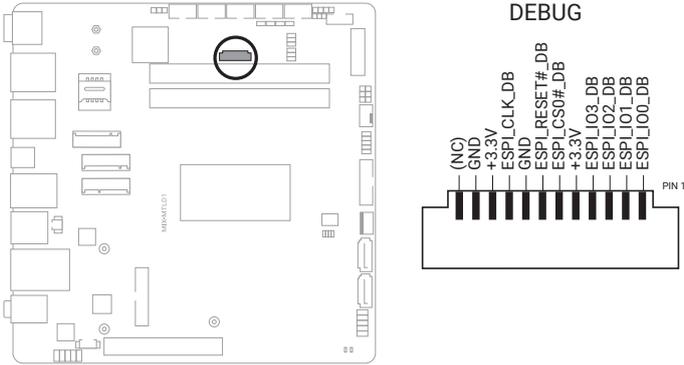
2.   COM Port headers (10-pin COM1~4)

These headers are for serial (COM) ports. Connect the serial port module cables to these header, then install the modules to slot openings at the back of the system chassis.

Ⓐ COM1

PIN 2

SINN (422TXD+ / 485TXD+)
DTRN (422RXD-)
DSRN
CTSN
(NC)

DCDN (422TXD- / 485TXD-)
SOUTN (422RXD+)
GND
RTSN
Ring / +5V / +12V

PIN 1   PIN 9

Ⓑ COM2
Ⓒ COM3
Ⓓ COM4

PIN 2

SINN
DTRN
DSRN
CTSN
(NC)

DCDN
SOUTN
GND
RTSN
Ring / +5V / +12V

PIN 1   PIN 9
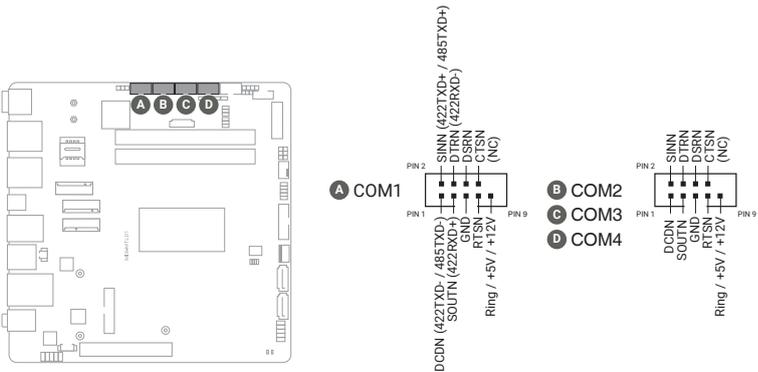
NOTES:

- The COM module is purchased separately.
- COM1 also supports RS-232 / RS-422 / RS-485. See the table below and section **3.3.7 SIO Configuration** for details.

Pin	Signal	Pin	Signal
1	DCDN (422TXD- / 485TXD-)	2	SINN (422TXD+ / 485TXD+)
3	SOUTN (422RXD+)	4	DTRN (422RXD-)
5	GND	6	DSRN
7	RTSN	8	CTSN
9	Ring / +5V / +12V	10	(NC)

3. Digital I/O header (10-pin DIO1)

This header includes 8 I/O lines (In/Out programmable). All of the Digital I/O lines are programmable and each I/O pin can be individually programmed to support various devices.
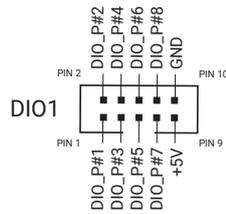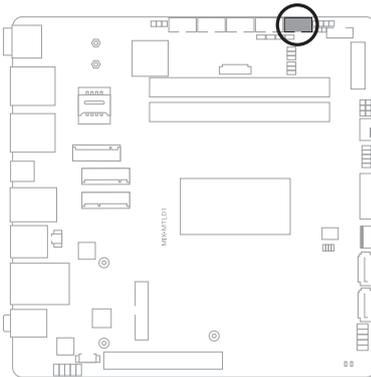
To configure the I/O pins in BIOS, go to the Advanced tab > Digital IO Port Configuration. See section **3.3.11 Digital IO Port Configuration** for details.

4. **Power Management and System Health Monitoring header (4-pin SMBUS)**

   The 4-pin SMBus (System Management Bus) is a two-wire interface used for communication with low-bandwidth devices, primarily for power management and system health monitoring.

SMBUS

PIN1

+3V
CLK
DATA
GND
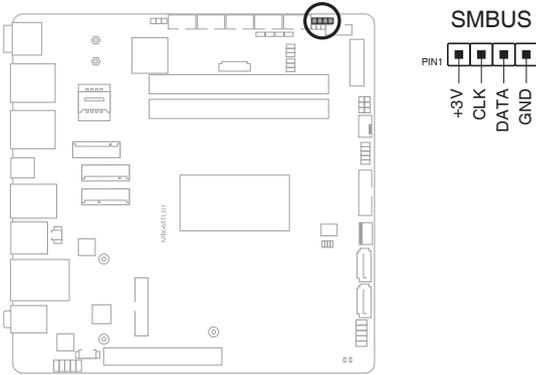
5. **Backlight Inverter Power header (5-pin INV1)**

   Connect the backlight inverter power cable to this header.

INV1

PIN1

BLK_PWR
Back Light Control
GND
GND
Back Light Enable
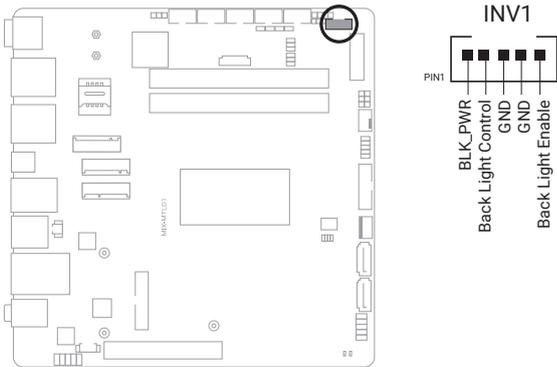
The backlight inverter power connector supports 1A current to the maximum.

6. eDP/LVDS connector

The connector is for an LCD monitor that supports Embedded DisplayPort (EDP) and Low Voltage Differential Signaling (LDVS) interfaces.

EDP

PIN 40   PIN 39

(NC)	(NC)
(NC)	(NC)
(NC)	(NC)
GND	GND
(NC)	eDP_AUXP
(NC)	eDP_AUXN
GND	GND
(NC)	eDP_TX0P
(NC)	eDP_TX0N
GND	GND
eDP_TX2P	eDP_TX1P
eDP_TX2N	eDP_TX1N
GND	GND
eDP_TX3P	eDP_HPD
eDP_TX3N	(NC)
GND	GND
BLK_PWR	BLK_PWR
GND	BLK_PWR
Back Light Control	Back Light Enable
PNL_PWR	PNL_PWR

PIN 2   PIN 1

LVDS

PIN 40   PIN 39

EDID_Data	EDID_Clk
LVDS1_D3+	LVDS0_D3+
LVDS1_D3-	LVDS0_D3-
GND	GND
LVDS1_CLK+	LVDS0_CLK+
LVDS1_CLK-	LVDS0_CLK-
GND	GND
LVDS1_D2+	LVDS0_D2+
LVDS1_D2-	LVDS0_D2-
GND	GND
LVDS1_D1+	LVDS0_D1+
LVDS1_D1-	LVDS0_D1-
GND	GND
LVDS1_D0+	LVDS0_D0+
LVDS1_D0-	LVDS0_D0-
GND	GND
BLK_PWR	BLK_PWR
GND	BLK_PWR
Back Light Control	Back Light Enable
PNL_PWR	PNL_PWR

PIN 2   PIN 1

7. CPU Fan header (4-pin CPU_FAN1)

Connect the fan cable to the fan header on the motherboard, ensuring that the black wire of the cable matches the ground pin of the header.

CPU_FAN1

GND
VCC
SENSE
PWM

PIN 1

⚠️ Do not forget to connect the fan cables to the fan connectors. Insufficient air flow inside the system may damage the motherboard components. These are not jumpers! Do not place jumper caps on the fan connectors!

8. USB 2.0 header (10-pin USB78)

This USB header complies with USB 2.0 specifications.

USB78

PIN 10   PIN 9

+5V_USB2_P78 — GND
USB2_PN8_CN — GND
USB2_PP8_CN — USB2_PP7_CN
GND — USB2_PN7_CN
GND — +5V_USB2_P78

PIN 2   PIN 1
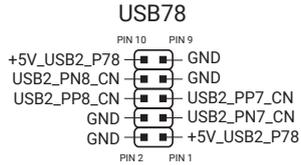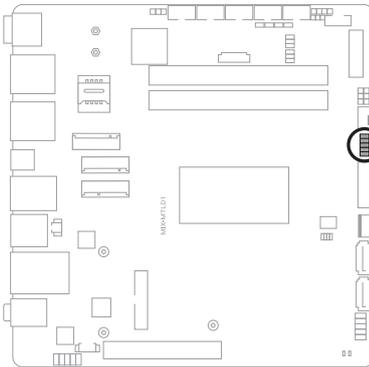
⚠ Never connect a 1394 cable to the USB header. Doing so will damage the motherboard.

9. USB 3.2 Gen 1 header (20-1 pin USB3G1_67)

The USB 3.2 Gen 1 header allows you to connect a USB 3.2 Gen 1 module for additional USB 3.2 Gen 1 ports. The USB 3.2 Gen 1 header provides data transfer speeds of up to 5 Gb/s.


USB3G1_67

PIN 1

   +5V
+5V — H_U3RXDN1
H_U3RXDN2 — H_U3RXDP1
H_U3RXDP2 — GND
GND — H_U3TXDN1
H_U3TXDN2 — H_U3TXDP1
H_U3TXDP2 — GND
GND — H_U2DN1
H_U2DN2 — H_U2DP1
H_U2DP2 — GND
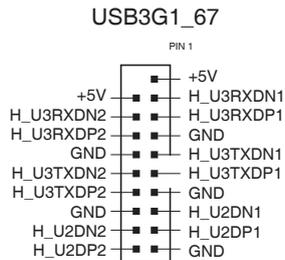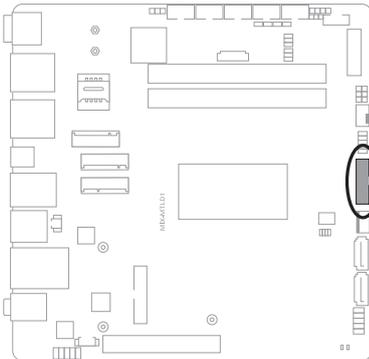
📝 The USB 3.2 Gen 1 module is purchased separately.

✎ The plugged USB 3.2 Gen 1 device may run on xHCI or EHCI mode depending on the operating system's setting.

10. SATA Power header (4-pin SATA_PWR1)

This header is for the SATA power cable. The power cable plug is designed to fit this header in only one orientation. Find the proper orientation and push down firmly until the header completely fit.

SATA_PWR1

+12V
GND
GND
+5V
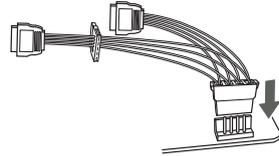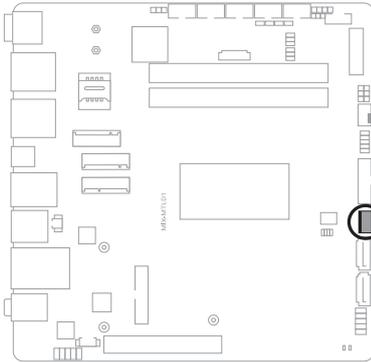
PIN 1
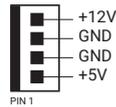
The SATA power header supports 1A current to the maximum.

11. SATA 6.0Gb/s port (7-pin SATA6G_1/2)

These ports connect to Serial ATA 6.0 Gb/s hard disk drives via Serial ATA 6.0 Gb/s signal cables.

Ⓐ SATA6G_2
Ⓑ SATA6G_1

GND
RSATA_TXP
RSATA_TXN
GND
RSATA_RXN
RSATA_RXP
GND
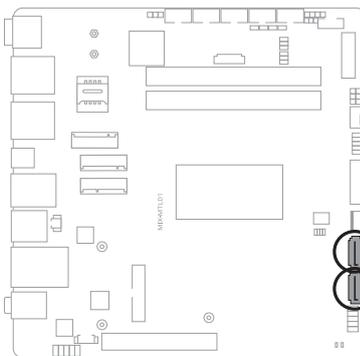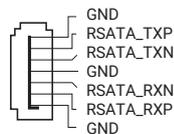
When using hot-plug and NCQ, set the SATA Mode Selection item in the BIOS to [AHCI]. See section **3.3.3 SATA Configuration** for details.

12. System Panel header (10-1 pin F_PANEL)

This header supports several chassis-mounted functions.
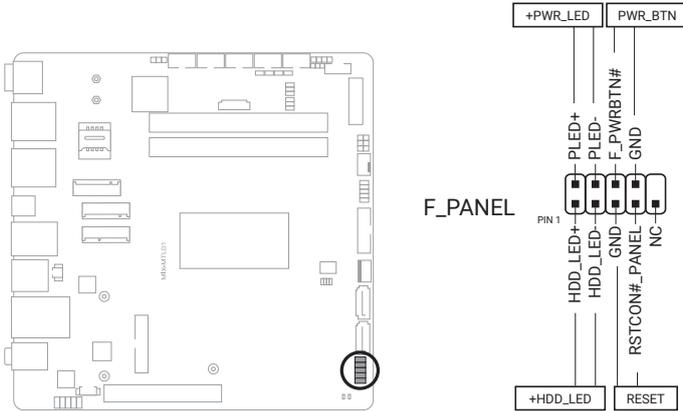
- **System power LED (2-pin PWR_LED)**

  This 2-pin header is for the system power LED. Connect the chassis power LED cable to this header. The system power LED lights up when you turn on the system power, and blinks when the system is in sleep mode.

- **Hard disk drive activity LED (2-pin HDD_LED)**

  This 2-pin header is for the HDD Activity LED. Connect the HDD Activity LED cable to this header. The IDE LED lights up or flashes when data is read from or written to the HDD.

- **ATX power button/soft-off button (2-pin PWR_BTN)**

  This 2-pin header is for the system power button.

- **Reset button (2-pin RESET)**

  This 2-pin header is for the chassis-mounted reset button for system reboot without turning off the system power.

13. Standby Power LEDs (5V_LED1/5VSB_LED1)

The motherboard comes with two standby power LEDs that light up to indicate that the system is ON, in sleep mode or in soft-off mode. This is a reminder that you should shut down the system and unplug the power cable before removing or plugging in any motherboard component. The illustration below shows the location of the onboard LEDs.

5V_LED1

ON
Standby Power

OFF
Powered Off

5VSB_LED1

ON
Main Power

OFF
Main Power Off
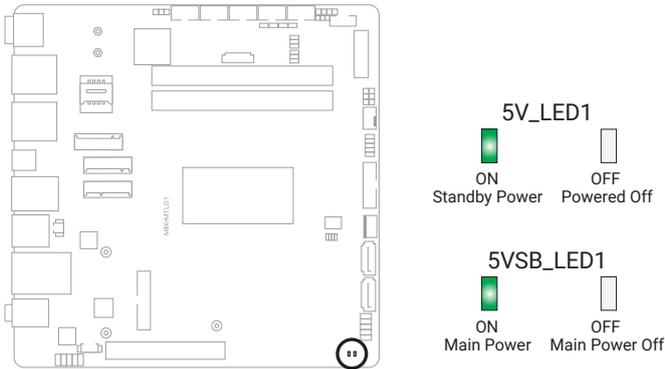
System state	LED indication
S0 state	5V_LED1 & 5VSB_LED1 keep lighting
S5 state	Only 5VSB_LED1 keep lighting

14. BIOS Programmable header (8-pin SPI1)

Use this header to flash the BIOS ROM.

SPI_1

PIN 2   GND
        S_SPI_CLK_1Q
        S_SPI_MOSI_1Q
PIN 8   (NC)

PIN 1   +1.8VSB_SPI
        S_SPI_CS0#Q
        S_SPI_MISO_1Q
PIN 7   (NC)
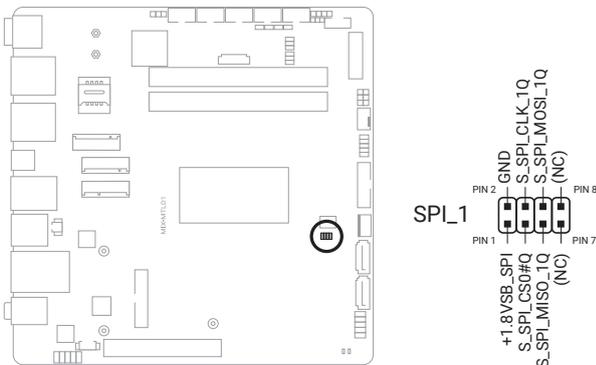
15. Out-Of-Band Selection header (20-pin OOB1_SEL_1)

This header allows you to manage network devices or computer systems independently of the operating system.

OOB1_SEL_1

PIN 1		PIN 2
+5VSB		+5VSB
GND		GND
F_PWRBTN#		O_RSTCON#
SPI_EN#		SIO_GPIO32
OOB_UART_RXD		OOB_SMB_CLK_R
OOB_UART_TXD		OOB_SMB_DAT_R
GND		L2_NC_SI_TXD0
L2_NC_SI_CLK_IN		L2_NC_SI_TXD1
L2_NC_SI_CRS_DV		L2_NC_SI_TX_EN
L2_NC_SI_RXD1		L2_NC_SI_RXD0
PIN 19		PIN 20
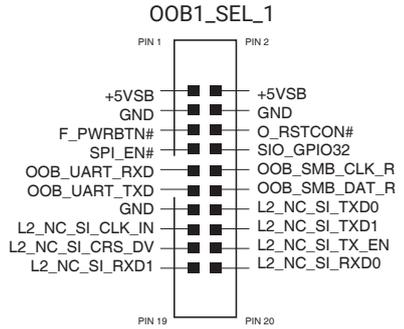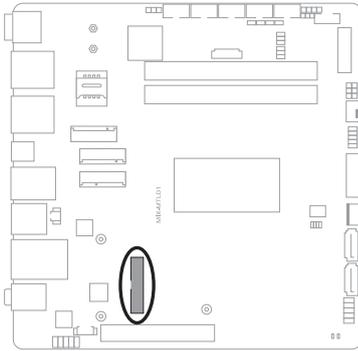
16. Audio Amplifier connector (4-pin AMP_CON1)

This connector is for an internal stereo amplifier speakers support (2W/4Ω via WtoB header).

AMP_CON

PIN 1

ROUTP
ROUTN
LOUTN
LOUTP
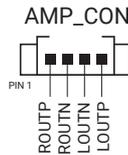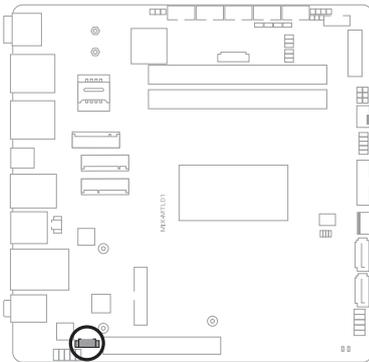
17. Front Panel Audio header (10-1 pin AAFP1)

This header is for a chassis-mounted front panel audio I/O module that supports HD Audio audio standard. Connect one end of the front panel audio I/O module cable to this header.

AAFP1

A_MIC2_L
A_MIC2_R
A_LINE2_R
A_JD_FRONT
A_LINE2_L

GND
(NC)
A_JD_MIC2
A_JD_LINE2

PIN 2   PIN 10
PIN 1   PIN 9
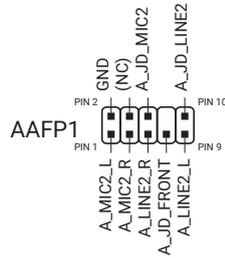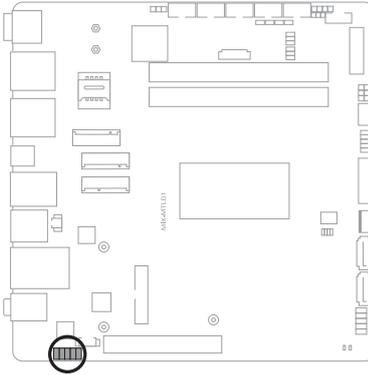
We recommend that you connect a high-definition front panel audio module to this connector to avail of the motherboard's high-definition audio capability.

18. Battery connector (2-pin BATTERY_H)

This connector is for the lithium CMOS battery.

AMP_CON

PIN 1

ROUTP
ROUTN
LOUTN
LOUTP
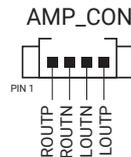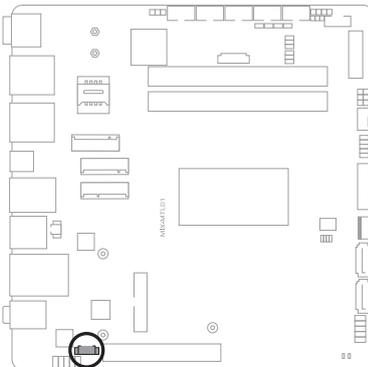
19. M.2 E-Key slot

The M.2 E-key slot allows you to install an M.2 Wi-Fi module.
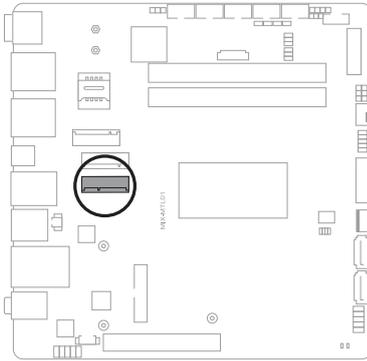
M2_TYPE_E1

NOTES:

- The M.2 module is purchased separately.
- The M.2 E-key slot supports PCIe x1 / CNVi / USB 2 device.

20. M.2 M Key slot

This slot allows you to install an M.2 (NGFF) module.
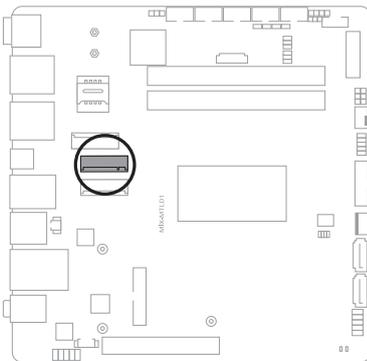
M2_TYPE_M1

- The M.2 SSD module is purchased separately.
- The M.2 M Key slot supports type 2280 PCIe x4 (Gen4) NVMe storage devices.

21. M.2 B-Key slot

The M.2 B-key slot allows you to install an M.2 B key device.
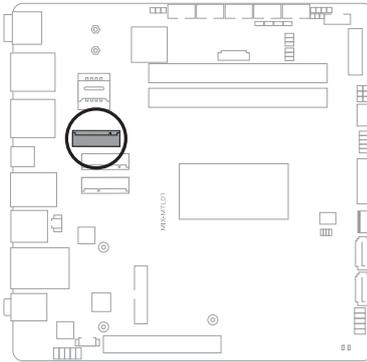
M2_TYPE_B1

NOTES:

- The M.2 module is purchased separately.
- The M.2 B-key slot supports type 3042/3052 PCIe x1 / USB3.2 Gen 1 with Nano SIM socket (default 3052 by BOM optional).

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22. SIM Card slot (10-pin SIM)

This slot connects to a SIM card reader module.
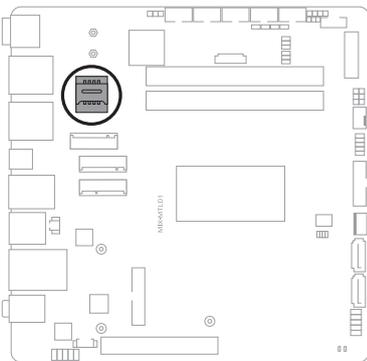
SIM
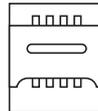
Chapter 3

BIOS setup

3.1 BIOS setup program

Use the BIOS Setup program to configure its parameters. The BIOS screens include navigation keys and brief online help to guide you in using the BIOS Setup program.

Entering BIOS Setup at startup

To enter BIOS Setup at startup:

Press <Delete> during the Power-On Self Test (POST). If you do not press <Delete>, POST continues with its routine.

Entering BIOS Setup after POST

To enter BIOS Setup after POST:

- Press **<Ctrl>** + **<Alt>** + **<Del>** simultaneously.
- Press the reset button on the system chassis.
- Press the power button to turn the system off then back on. Do this option only if you failed to enter BIOS Setup using the first two options.

> Using the power button, reset button, or the **<Ctrl>** + **<Alt>** + **<Del>** keys to reboot a running operating system can cause damage to your data or system. Always shut down the system properly from the operating system.

> - The default BIOS settings for this motherboard apply to most working conditions and ensures optimal performance. If the system becomes unstable after changing any BIOS settings, load the default settings to regain system stability. Select the option Restore Defaults under the Save & Exit menu. See section **3.7 Save & Exit**.
> - The BIOS setup screens shown in this section are for reference purposes only, and may not exactly match what you see on your screen.

3.1.1   Menu bar

The menu bar on top of the screen has the following main items:

Main	For changing the basic system configuration.
Advanced	For changing the advanced system settings.
Chipset	For viewing and changing chipset settings.
Security	For setting up BIOS security settings.
Boot	For changing the system boot configuration.
Save & Exit	For selecting the exit options and loading default settings.
MEBx	For viewing and changing MEBx settings.

To select an item on the menu bar, press the right or left arrow key on the keyboard until the desired item is highlighted.

3.2   Main menu

The Main menu provides you an overview of the basic system information, and allows you to set the system date, time, language, and security settings.

3.2.1   System Date [Day MM/DD/YYYY]

Allows you to set the system date.

3.2.2   System Time [HH:MM:SS]

Allows you to set the system time.

3.3 Advanced menu

The Advanced menu items allow you to change the settings for the CPU and other system devices.

⚠️ Be cautious when changing the settings of the Advanced menu items. Incorrect field values can cause the system to malfunction.

3.3.1 CPU Configuration

The items in this menu show CPU-related information the BIOS automatically detects.

✎ The items shown in the submenu may be different depending on the type of CPU installed.

Performance-core

The item displays the P-Core information.

Hyper-threading [Enabled]

The Intel Hyper-Threading Technology allows a hyper-threading processor to appear as two logical processors to the operating system, allowing the operating system to schedule two threads or processes simultaneously.

[Enabled]   Two threads per activated core are enabled.

[Disabled]   Only one thread per activated core is enabled.

✎ Configuration options for active processor cores are dependent on the installed CPU.

Intel (VMX) Virtualization Technology [Enabled]

[Enabled]   Allows a hardware platform to run multiple operating systems separately and simultaneously, enabling one system to virtually function as several systems.

[Disabled]   Disables this function.

Turbo Mode [Enabled]

This item allows you to automatically set the CPU cores to run faster than the base operating frequency when it is below the operating power, current and temperature specification limit. Configuration options: [Enabled] [Disabled]

✎ Turbo Mode is only available on selected CPU models only.

3.3.2   Trusted Computing

Security Device Support [Enable]

Allows you to enable or disable BIOS support for security devices. Configuration options: [Disable] [Enable]

SHA256 PCR Bank [Enabled]

Allows you to enable or disable SHA256 PCR Bank. Configuration options: [Disabled] [Enabled]

SHA384 PCR Bank [Disabled]

Allows you to enable or disable SHA384 PCR Bank. Configuration options: [Disabled] [Enabled]

Pending operation [None]

Allows you to schedule an operation for the Security Device. Configuration options: [None] [TPM Clear]

> The computer reboots during restart in order to change the state of the Security Device.

Platform Hierarchy [Enabled]

Allows you to enable or disable Platform Hierarchy. Configuration options: [Enabled] [Disabled]

Storage Hierarchy [Enabled]

Allows you to enable or disable Storage Hierarchy. Configuration options: [Enabled] [Disabled]

Endorsement Hierarchy [Enabled]

Allows you to enable or disable Endorsement Hierarchy. Configuration options: [Enabled] [Disabled]

Physical Presence Spec Version [1.3]

Selects to tell operating system to support PPI S pec Version 1.2 or 1.3. Some HCK tests might not support 1.3. Configuration options: [1.2] [1.3]

Device Select [Auto]

Allows you to select the TPM device. Configuration options: [TPM1.2] [TPM2.0] [Auto]

3.3.3   SATA Configuration

The BIOS automatically detects the presence of SATA devices. The Serial ATA Ports listed will display **Empty** if there are no Serial devices connected to the ports.

SATA Controller(s) [Enabled]

Allows you to enable or disable SATA devices.

Configuration options: [Enabled] [Disabled]

> The following items appear only when you set **SATA Controller(s)** to [Enabled].

Enable VMD controller [Disabled]

This item allows you to disable VMD controller or enable VMD controller (RAID Mode). Configuration options: [Disabled] [Enabled]

SATA6G_ 1/2

Port 1/2 [Enabled]

Allows you to enable / disable the SATA port(s).
Configuration options: [Disabled] [Enabled]

Hot Plug [Disabled]

Allows you to enable / disable the SATA Hot Plug Support.
Configuration options: [Disabled] [Enabled]

3.3.4   USB Configuration

> The USB Devices item lists auto-detected values. If no USB device is detected, the item shows None.

USB Mass Storage Driver Support [Enabled]

Allows you to enable or disable USB Mass Storage Driver Support.
Configuration options: [Disabled] [Enabled]

3.3.5   Hardware Monitor

The items in this menu allow you to configure the smart fan.

Smart Fan Function

CPU Smart Fan Setting

Fan Mode [Smart Fan IV]

Allows you to select the FAN mode. Configuration options: [Manual mode] [Thermal Cruise] [Speed Cruise] [Smart Fan IV]

> The following item appears only when you set **Fan Mode** to [Manual mode].

Manual PWM [128]

Allows you to set the Manual PWM value.

> The fan will work with this Manual PWM Value (0~255 for 10% ~100%).

Critical temperature [60]
Input value range: [0~255]

Enable critical duty [Disabled]
Configuration options: [Disabled] [Enabled]

Critical duty value [10]
Input value range: [0~127]

Fan target temperature [40]
Input value range: [0~127]

Tolerance value [0]
Input value range: [0~7]

Stop duty [Disabled]
Configuration options: [Disabled] [Enabled]

Stop value [1]
Input value range: [0~127]

Startup value [1]
Input value range: [0~127]

Stop time [60]
Input value range: [0~127]

Fan step up value [1]
Input value range: [0~15]

Fan step down value [1]
Input value range: [0~15]

Target speed count [2000]
Input value range: [0~4095]

Tolerance value [0]
Input value range: [0~63]

MIX-TLUD1

Temperature 1 [25] / Temperature 2 [35] / Temperature 3 [45] / Temperature 4 [55]

Determines the temperature value for the Smart Fan IV mode.
Input value range: [0~255]

FD/RPM 1 [140] / FD/RPM 2 [170] / FD/RPM 3 [200] / FD/RPM 4 [230]

Determines the Fan Duty / RPM value.
Input value range: [0~255]

Critical temperature [60]

Input value range: [0~255]

Critical tolerance [0]

Input value range: [0~7]

Enable critical duty [Disabled]

Configuration options: [Disabled] [Enabled]

Critical duty value [10]

Input value range: [0~127]

Tolerance value [0]

Input value range: [0~7]

RPM Mode [Disabled]

Allows you to enable or disable Smart Fan IV Close Loop Fan Control RPM Mode. Configuration options: [Disabled] [Enabled]

RPM High Speed Mode [Disabled]

Configuration options: [Disabled][Enabled]

RPM Tolerance [2]

Input value range: [0~15]

3.3.6   SIO Configuration

The items in this menu allow you to configure Super IO settings.

[*Active*] Serial Port 1

Use This Device [Enabled]

Allows you to enable or disable this logical device. Configuration options: [Enabled] [Disabled]

The following two items appear only when you set **Use This Device** to [Enabled].

Possible [Use Automatic Settings]

Allows you to select an optimal setting for Super I/O devices. Configuration options: [Use Automatic Settings] [IO=3F8h; IRQ=4;] [IO=2F8h; IRQ=3]

Mode [RS232]

Allows you to select the Serial Port mode. Configuration options: [RS232] [RS422] [RS485]

[*Active*] Serial Port 2

Use This Device [Enabled]

Allows you to enable or disable this logical device. Configuration options: [Enabled] [Disabled]

Possible [Use Automatic Settings]

This item appears only when you set **Use This Device** to [Enabled] and allows you to select an optimal setting for Super I/O devices. Configuration options: [Use Automatic Settings] [IO=2F8h; IRQ=3] [IO=3F8h; IRQ=4;]

[*Active*] Serial Port 3

Use This Device [Enabled]

Allows you to enable or disable this logical device. Configuration options: [Enabled] [Disabled]

Possible [Use Automatic Settings]

This item appears only when you set **Use This Device** to [Enabled] and allows you to select an optimal setting for Super I/O devices. Configuration options: [Use Automatic Settings] [IO=3E8h; IRQ=6;] [IO=2E8h; IRQ=10;]

[*Active*] Serial Port 4

Use This Device [Enabled]

Allows you to enable or disable this logical device. Configuration options: [Enabled] [Disabled]

Possible [Use Automatic Settings]

This item appears only when you set **Use This Device** to [Enabled] and allows you to select an optimal setting for Super I/O devices. Configuration options:

[Use Automatic Settings] [IO=2E8h; IRQ=10;] [IO=3E8h; IRQ=6;]

3.3.7   AMT Configuration

AMT BIOS Features [Enabled]

When disabled, you are not able to access the MEBx setup.
Configuration options: [Enabled] [Disabled]

3.3.8   PCH-FW Configuration

The items listed in this screen display firmware related information.

TPM Device Selection [dTPM]

This item allows you to select the TPM device. Configuration options: [dTPM] [PTT]

Firmware Update Configuration

Me FW Image Re-Flash [Disabled]

Allows you to enable or disable Me firmware Image Re-Flash function.
Configuration options: [Disabled] [Enabled]

FW Update [Disabled]

Allows you to enable or disable ME FW Update function. Configuration
options: [Disabled] [Enabled]

3.3.9   NVMe Configuration

The NVMe Configuration menu displays the NVMe controller and drive information
of the devices connected and allows you to configure NVMe device options
settings.

3.3.10   Power Management

Power Mode [ATX Type]

Select power supply mode. Configuration options: [ATX Type] [AT Type]

> The following items appear when you set **Power Mode** to [ATX Type].

Restore AC Power Loss [Always Off]

[Last State]	The system goes into either off or on state, whatever the system state was.
[Always On]	The system goes into on state after an AC power loss.
[Always Off]	The system goes into off state after an AC power loss.

RI Wake Event [Disabled]

Enable or disable system to wake up from RI#. Configuration options: [Enabled]

[Disabled]

RTC wake system from S5 [Disabled]

[Disabled]   Disables system wake up from S5.

[Fixed Time]   The system will wake up at the specified hr::min::sec.

[Dynamic Time]   The system will wake up at the current time plus a specified

> The following items appear when **Fixed Time** is enabled.

Wake up day/hour/minute/second [0]
Specify the values for day/hour/minute/second.

> The following item appears when **Dynamic Time** is enabled.

Wake up minute increase [1]
Specify the number of minutes added to the current time before waking up system. Input value range: [1~5]

3.3.11   Digital IO Port Configuration

The items listed in this screen configure Digital IO settings.

DIO Port1~DIO Port4 [Output]
Configuration options: [Input] [Output]

> The following item appears only when you set **DIO Port1/2/3/4** to [Output].

Output Level [High]
Configuration options: [Low] [High]

DIO Port5~DIO Port8 [Input]
Configuration options: [Input] [Output]

3.4 Chipset menu

The Chipset menu items allow you to change the settings for the chipset.

3.4.1 System Agent (SA) Configuration

Primary Display [Auto]

Allows you to decide which graphics controller to use as the primary boot device. Configuration options: [Auto] [IGFX] [HG]

PCIEX8 Gen Speed [Auto]

Allows you to select the PCI Express port speed. Configuration options: [Auto] [Gen1] [Gen2] [Gen 3] [Gen 4] [Gen 5]

LVDS Panel Support [Disabled]

Allows you to enable or disable LVDS Panel support. Configuration options: [Disabled] [Enabled]

> The following items appear only when you set **LVDS Panel Support** to [Enabled].

LVDS Color Depth [18-bit]

Select the color depth of the LCD panel to be used as display. Configuration options: [24-bit] [18-bit]

LVDS Channel Type [Single]

Select the channel type of the LCD panel to be used as display. Configuration options: [Single] [Dual]

LVDS Brightness Invert [Normal]

Allows you to select the LVDS brightness type. Configuration options: [Normal] [Inverted]

LVDS Brightness Output Level [80%]

Allows you to select the LVDS brightness level. Configuration options: [10%] ~ [80%] [90%] [100%]

LCD Panel Type [VBIOS Default]

Allows you to select the LCD panel used by Internal Graphics Device by selecting the appropriate setup item. Configuration options: [VBIOS Default] [640x480] [800x600] [1024x768] [1024x600 [1400x1050] [1400x1050] [1280x1024] [1366x768] [1680x1050] [1920x1200] [1440x900] [1600x900] [1024x768] [1280x800] [1920x1080]

3.4.2 PCH-IO Configuration

HD Audio [Enabled]

This item controls the detection of HD Audio devices. Configuration options: [Disabled] [Enabled]

3.5 Security menu

The Security menu items allow you to change the system security settings.

3.5.1 Administrator Password

If you have set an administrator password, we recommend that you enter the administrator password for accessing the system. Otherwise, you might be able to see or change only selected fields in the BIOS setup program.

To set an administrator password:

1. Select the **Administrator Password** item and press <Enter>.

2. From the **Create New Password** box, key in a password, then press <Enter>.

3. Confirm the password when prompted.

To change an administrator password:

1. Select the **Administrator Password** item and press <Enter>.

2. From the **Enter Current Password** box, key in the current password, then press <Enter>.

3. From the **Create New Password** box, key in a new password, then press <Enter>.

4. Confirm the password when prompted.

To clear the administrator password, follow the same steps as in changing an administrator password, but press <Enter> when prompted to create/confirm the password. After you clear the password, the **Administrator Password** item on top of the screen shows **Not Installed**.

3.5.2 User Password

If you have set a user password, you must enter the user password for accessing the system. The User Password item on top of the screen shows the default Not Installed. After you set a password, this item shows Installed.

To set a user password:

1. Select the **User Password** item and press <Enter>.

2. From the **Create New Password** box, key in a password, then press <Enter>.

3. Confirm the password when prompted. To change a user password:

To change a user password:

1. Select the **User Password** item and press <Enter>.

2. From the **Enter Current Password** box, key in the current password, then press <Enter>.

3. From the **Create New Password** box, key in a new password, then press <Enter>.

4.   Confirm the password when prompted.

To clear the user password, follow the same steps as in changing a user password, but press <Enter> when prompted to create/confirm the password. After you clear the password, the **User Password** item on top of the screen shows **Not Installed**.

3.5.3   Secure Boot

Secure Boot

Secure Boot feature is active when Secure Boot is set to [Enabled], Platform Key (PK) is enrolled and the system is running in User mode. Changing the mode requires platform reset. Configuration options: [Disabled] [Enabled]

Secure Boot Mode

Allows you to select Secure Boot Mode. When set to [Custom], Secure Boot Policy variables can be configured by a physically present user without full authentication. Configuration options: [Standard] [Custom]

Restore Factory Keys

Allows you to install factory default secure boot key databases.

Restore to Setup Mode

Allows you to delete all secure boot key databases from NVRAM.

Expert Key Management

Allows you to modify Secure Boot Policy variables without full authentication.

Factory Key Provision

Allows you to install factory default Secure Boot keys when the system is in Setup mode. Configuration options: [Enabled] [Disabled]

Restore Factory Keys

Allows you to install factory default secure boot key databases.

Reset To Setup Mode

Allows you to delete all Secure Boot key databases from NVRAM.

Enroll EFi Image

Allows you to enroll SHA256 Hash certificate of a PE image into Authorized Signature database (db).

Export Secure Boot variables

Allows you to save NVRAM content of Secure boot variable to a file.

Platform Key (PK)

Configuration options: [Details] [Export] [Update] [Delete]

Key Exchange Keys / Authorized Signatures / Forbidden Signatures

Configuration options: [Details] [Export] [Update] [Append] [Delete]

Authorized TimeStamps / OsRecovery Signatures

Configuration options: [Update] [Append]

3.6 Boot menu

The Boot menu items allow you to change the system boot options.

3.6.1 Boot Configuration

Quiet Boot [Enabled]

This item enables/disables Quiet Boot. Configuration options: [Disabled] [Enabled]

Network Stack [Disabled]

This item allows user to disable or enable the UEFI network stack. Configuration options: [Disabled] [Enabled]

3.6.2 FIXED BOOT ORDER Priorities

Boot Option #1~#10

This item allows you to set the system boot order. Configuration options: [USB Key] [USB Hard Disk] [Hard Disk] [NVME] [Network] [USB Lan] [CD/DVD] [USB CD/DVD] [USB Floppy] [SD] [Disabled]

3.7 Save & Exit menu

Save Changes and Reset

Once you are finished making your selections, choose this option from the Save & Exit menu to ensure the values you selected are saved. When you select this option, a confirmation window appears. Select Yes to save changes and reset.

Discard Changes and Exit

This option allows you to exit the Setup program without saving your changes. When you select this option or if you press <Esc>, a confirmation window appears. Select Yes to discard changes and exit.

Restore Defaults

Save or restore User Defaults to all setup options.

3.8   MEBx menu

The MEBx menu items allow you to view and change MEBx configurations.

Intel(R) ME Password

The default password is **admin**. The IT administrator must change the default password when entering the Intel® MEBx configuration menu for the first time so that any feature can be used.

To set a new Intel® ME password under the MEBx page:

Press <Enter> and follow the rules below to change the default password (admin):

1.   Password length: at least 8 characters, and no more than 32;

2.   Password complexity: the password must include:

   • at least one digital character ('0', '1', … '9');

   • at least one 7-bit ASCII non alpha-numeric character (e.g. '!', '$', ';'), but exclude ':', ',' and '"' characters;

   • at least one lowercase letter ('a', 'b'…'z') and at least one uppercase letter ('A', 'B'…'Z').

• The underscore (_) and whitespace ( ) characters are valid in password but do NOT contribute to the password's complexity.

• There are certain limitations when creating passwords with non-US layout keyboards. Remote system connectivity issues may occur if different keyboard layouts are used on the same hardware.

• When entering more than 32 characters in the MEBx UI, the software changes the 32nd character with each new character typed in the last character position. Therefore, the most recent character typed at the 32nd position will replace the existing character at that position.

• The password can be reset to the default setting (admin) by shutting down the system, disconnecting AC and DC power, and performing a RTC reset.

Appendix

Notices

Federal Communications Commission Statement

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

•   This device may not cause harmful interference.

•   This device must accept any interference received including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class A 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 manufacturer's instructions, 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 following measures:

•   Reorient or relocate the receiving antenna.

•   Increase the separation between the equipment and receiver.

•   Connect the equipment to an outlet on a circuit different from that to which the receiver is connected.

•   Consult the dealer or an experienced radio/TV technician for help.

The use of shielded cables for connection of the monitor to the graphics card is required to assure compliance with FCC regulations. Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

DO NOT throw the motherboard in municipal waste. This product has been designed to enable proper reuse of parts and recycling. This symbol of the crossed out wheeled bin indicates that the product (electrical and electronic equipment) should not be placed in municipal waste. Check local regulations for disposal of electronic products.

DO NOT throw the mercury-containing button cell battery in municipal waste. This symbol of the crossed out wheeled bin indicates that the battery should not be placed in municipal waste.

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部件名称	有害物质					
	铅(Pb)	汞(Hg)	镉(Cd)	六价铬(Cr(VI))	多溴联苯(PBB)	多溴二苯醚(PBDE)
印刷电路板及其电子组件	×	○	○	○	○	○
外壳	×	○	○	○	○	○
电源适配器	×	○	○	○	○	○
外部信号连接头及线材	×	○	○	○	○	○
中央处理器与内存	×	○	○	○	○	○

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