MLB-3002 Series

Embedded System supporting MXM Graphics Module
with 8th/9th Generation Intel® Core™ i7/i5/i3
in LGA1151 Socket

User's Manual



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LEADING EDGE COMPUTING

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Revision History

Revision	Release Date	Description of Change(s)
1.0	2022-05-22	Initial release

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Preface

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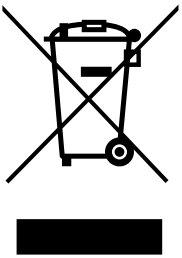
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Take note of the following conventions used throughout this manual to make sure that users perform certain tasks and instructions properly.

NOTE: Additional information, aids, and tips that help users perform tasks.

CAUTION: Information to prevent ***minor*** physical injury, component damage, data loss, and/or program corruption when trying to complete a task.
ATTENTION: Informations destinées à prévenir les blessures corporelles mineures, les dommages aux composants, la perte de données et/ou la corruption de programme lors de l'exécution d'une tâche.

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AVERTISSEMENT: Informations destinées à prévenir les blessures corporelles graves, les dommages aux composants, la perte de données et/ou la corruption de programme lors de l'exécution d'une tâche spécifique.

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1 Introduction

1.1 Overview

The MLB-3002 series is an optimized computing platform supporting performance-hungry workloads, such as deep learning, with expandability options and active cooling for applications requiring very high levels of computing in a limited space. The MLB-3002 series is one of the smallest embedded GPU platforms (5.5 liters) with a low TDP reliable MXM GPU design, scalable graphics processing ranging from Pascal to Turing GPUs, and two PCIe Gen3 x4 expansion slots for full-height, half-length add-on card support.

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1.2 Features

- ADLINK MXM Graphics module support (Type A/B/B+, up to 120W)
- 8th/9th Gen Intel® Core™ i7/i5/i3, Celeron® processors in LGA1151 socket
- Dual SODIMMs for up to 64GB DDR4 non-ECC memory (CPU dependent)
- 6x DisplayPort (2 from CPU, 4 from MXM)
- 1x M.2 E key supporting 1630 or 2230 for Wi-Fi/Bluetooth module
- 1x M.2 B key supporting 2242 or 2280 for SATA storage module
- 1x M.2 M key supporting 2242 or 2280 for SATA/PCIe x4 storage module
- Reliable Molex type 12V DC-in connector
- 1x Intel® i219-LM and 3x Intel® i210-AT
- 2x PCIe Gen3 x4 expansion slot for full-height, half-length add-on card. Each slot supports 25W power with an additional Molex 4-pin power cable (12V/1.5A and 5V/2A)
- Windows 10 IoT Enterprise SAC 64-bit support
- Ubuntu 18.04.1 LTS 64-bit support
- 2x SATA 6Gb/s, one SATA power connector;
  2x SATA 6Gb/s signals via M.2 M & B key connector;
  Intel® RST RAID support

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1.3 Packing List

Before unpacking, check the shipping carton for any damage. If the shipping carton and/or contents are damaged, inform your dealer immediately. Retain the shipping carton and packing materials for inspection. Obtain authorization from your dealer before returning any product to ADLINK. Ensure that the following items are included in the package.

- 1x MLB-3002 Embedded Computer
- Fasteners:
  - 3x M3 screws, P-head, L4, Ni for M.2 (P/N: 33-03013-0040)
  - 8x M3 screws, F-head, L4, Nylok for 2.5” storage bay (P/N: 33-03103-1040)
  - 2x M3 screws, I-head, L4, Nylok for MXM (P/N: 33-03306-0040)



If the MLB-3002 does not have a pre-installed MXM P3000/ P5000/RTX3000/RTX5000, the following additional installation items have been included.

- 4x M3 Screw, I-head, L5, Ni (PN: 33-03320-0050)
- 4x Washer 5.3 x 10 x 1.0, SUS (PN:33-90086-0000-A0)
- 4x Rubber footpad (PN:39-00039-0000)

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1.4 Optional Accessories

- CPU cooler (P/N: 32-20378-0000-A0)
- CPU cooler bracket (P/N: 32-50015-0100-A0)
- MXM cooler for P1000/P2000 (P/N: 32-20797-0200-A0)
- MXM cooler for T1000 (P/N: 32-20830-0200-A0)
- MXM cooler for RTX3000 (P/N: 32-20823-1100-A0)
- MXM cooler for RTX5000 (P/N: 32-20839-1000-A0)
- 12V/240W power adapter (P/N: 31-62164-0010-A0)
- 12V/500W power adapter (P/N: 91-95296-001E)
- 12V/150W medical grade adapter
- 12V/220W medical grade adapter
- Wall-mount bracket set (P/N: 34-34546-0000-A0) (2 pcs)
- WiFi Kit Intel® Wireless-AC 9260 non-vPRO (P/N: 91-95266-0020)

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2 Specifications

2.1 MLB-3002

Model	MLB-3002				
MXM Support	EGX-MXM-P1000	EGX-MXM-P2000	EGX-MXM-T1000	EGX-MXM-RTX3000	EGX-MXM-RTX5000
Processor	▶ Intel® Core™ i7-9700E, 2.6GHz, 12M Cache, 65W TDP, LGA1151, DDR4 2666MHz support (8C/8T) ▶ Intel® Core™ i7-9700TE, 1.8GHz, 12M Cache, 35W TDP, LGA1151, DDR4 2666MHz support (8C/8T) ▶ Intel® Core™ i5-9500E, 3.0GHz, 9M Cache, 65W TDP, LGA1151, DDR4 2666MHz support (6C/6T) ▶ Intel® Core™ i5-9500TE, 2.2GHz, 9M Cache, 35W TDP, LGA1151, DDR4 2666MHz support (6C/6T) ▶ Intel® Core™ i3-9100E, 3.1GHz, 6M Cache, 65W TDP, LGA1151, DDR4 2400MHz support (4C/4T) ▶ Intel® Core™ i3-9100TE, 2.2GHz, 6M Cache, 35W TDP, LGA1151, DDR4 2400MHz support (4C/4T) ▶ Intel® Core™ i7-8700, 3.2GHz, 12M Cache, 65W TDP, LGA1151, DDR4 2666MHz support (6C/12T) ▶ Intel® Core™ i7-8700T, 2.4GHz 12M Cache, 35W TDP, LGA1151, DDR4 2666MHz support (6C/12T) ▶ Intel® Core™ i5-8500, 3.0GHz, 9M Cache, 65W TDP, LGA1151, DDR4 2666MHz support (6C/6T) ▶ Intel® Core™ i5-8500T, 2.1GHz, 9M Cache, 35W TDP, LGA1151, DDR4 2666MHz support (6C/6T) ▶ Intel® Core™ i3-8100, 3.6GHz, 6M Cache, 65W TDP, LGA1151, DDR4 2400MHz support (4C/4T) ▶ Intel® Celeron® G4900, 3.1GHz, 2M Cache, 54W TDP, LGA1151, DDR4 2400MHz support (2C/2T) ▶ Intel® Celeron® G4900T, 2.9GHz, 2M Cache, 35W TDP, LGA1151, DDR4 2400MHz support (2C/2T)				
Chipset	Intel® Q370 Chipset				
Memory	Non-ECC DDR4 2666/2400MHz, 2x SODIMM, up to 64GB (CPU dependent)				

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Model	MLB-3002
I/O Interface	
Display	6x DisplayPort (2 from CPU, 4 from MXM)
Ethernet	1x GbE (Intel® i219-LM), 3x GbE (Intel® i210-AT)
Serial Ports	1x RS-232/422/485, 1x RS-232
USB	6x USB 3.2 Gen1 x1 ports, 2x USB 2.0 ports
Audio	Mic-in, L/R speaker-out (6W + 6W) (Optional)
M.2	▶ 1x M.2 E key for 1630 or 2230 WiFi/BT module ▶ 1x M.2 B key for 2242 or 2280 SATA storage module ▶ 1x M.2 M key for 2242 or 2280 SATA/PCIe x4 storage module
eSIM	Optional
DI/O	1x DI/DO with 4 in, 4 out
TPM 2.0	Yes
Expansion	2x PCIe Gen3 x4 expansion slots for full-height, half-length add-on card. Each slot supports 25W power and additional Molex 4-pin power cable (12V/1.5A and 5V/2A).
Storage	
SATA	▶ 2x SATA 6Gb/s, one SATA power connector ▶ 2x SATA 6Gb/s signals via M.2 M & B key connector ▶ Intel® RST RAID Support
Physical	
Dimensions	235 x 182 x 130mm (W x D x H, without foot pads)
Mounting	Optional wall-mount bracket
Power Supply	
DC Input	DC 12V input (Molex DC-in jack)
AC Input	▶ Optional: 240W (12V/20A) AC/DC adapter ▶ Optional: 500W (12V/41.7A) AC/DC power supply unit ▶ Optional: 150W (12V/12.5A) AC/DC Medical grade adapter ▶ Optional: 220W (12V/18.34A) AC/DC Medical grade adapter
Environmental	
Operating Temperature	0°C to 40°C
Storage Temperature	-20°C to 70°C
Humidity	5% to 95%, non-condensing
Vibration	Operating: 2Grms, 5-500Hz, 3 axes Package (non operating): 3.44Grms, 10-1000Hz, 3 axes (w/MXM, w/SSD)
EMC	EN55032/35, CE, FCC
Safety	UL/cUL and CB (62368-1:2014)
Medical	Compliant with IEC 60601-1 3.1 ed / IEC 60601-1-2:2014 + A1:2020

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2.2 MLB-3002 Functional Block Diagram

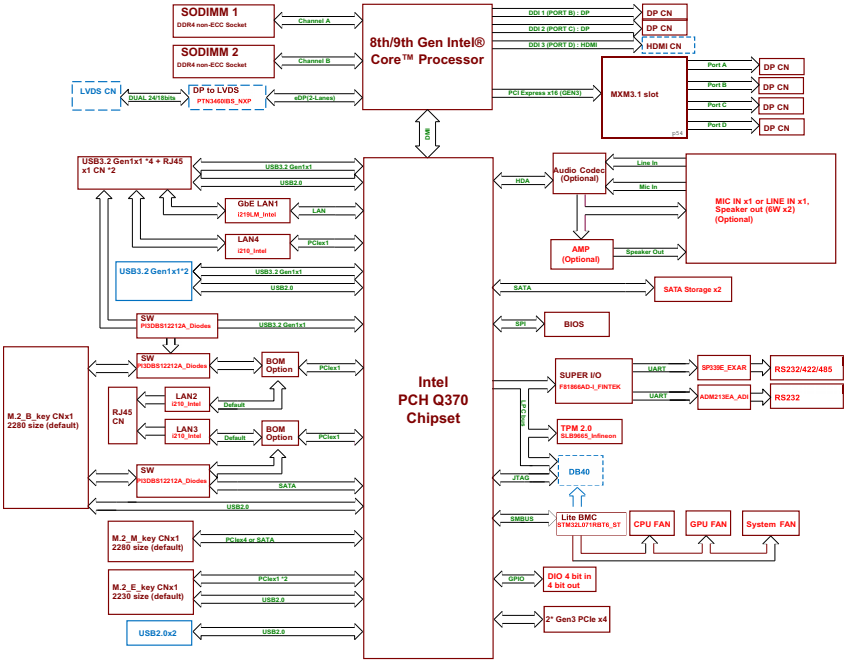


Figure 2-1: MLB-3002 Functional Block Diagram

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2.3 Display Options

The MLB-3002 includes six DisplayPort connectors, two DisplayPort signals from the CPU and four from MXM. All DisplayPorts support DP++. Use DisplayPort1 (DP 1) to connect a monitor when booting the system for the first time to properly access the display settings in the BIOS menu. Refer to Appendix D, DisplayPort BIOS Settings for more information.

	Port	Resolution
Display Port 1 from CPU	DP 1	4096x2304@60Hz
Display Port 2 from CPU	DP 2	4096x2304@60Hz
Display Port A from MXM	DP A	Based on MXM module
Display Port B from MXM	DP B	Based on MXM module
Display Port C from MXM	DP C	Based on MXM module
Display Port D from MXM	DP D	Based on MXM module

Table 2-1: Maximum Display Resolution

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2.4 Mechanical Dimensions

NOTE:

All dimensions are in millimeters, unless noted.

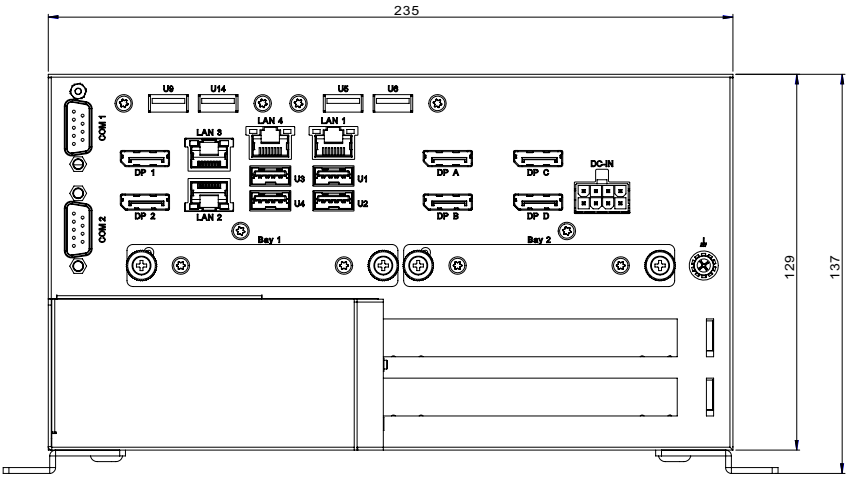


Figure 2-2: MLB-3002 Front View
(including wall-mount brackets and footpads)

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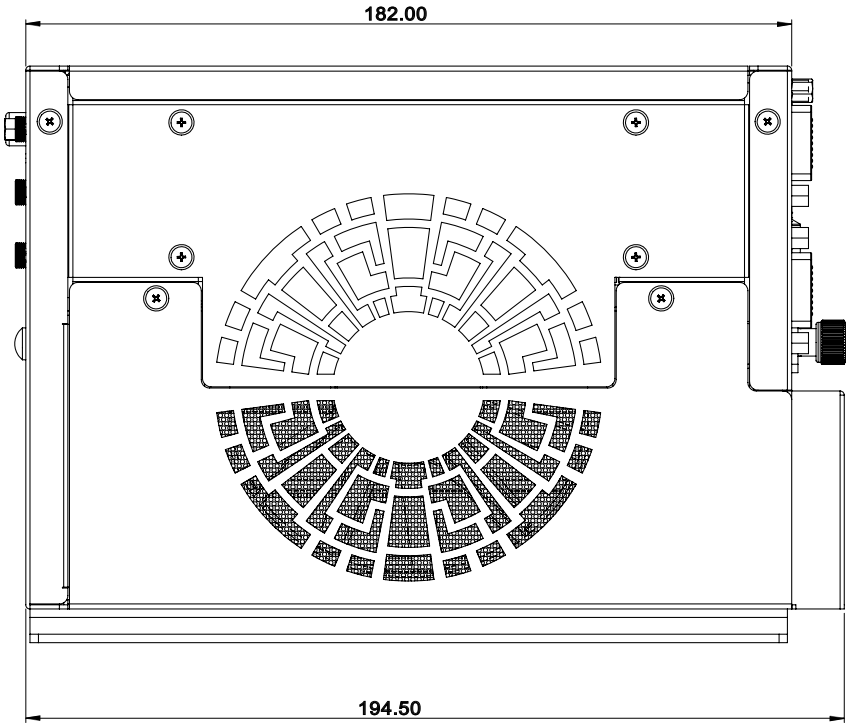


Figure 2-3: MLB-3002 Left Side View

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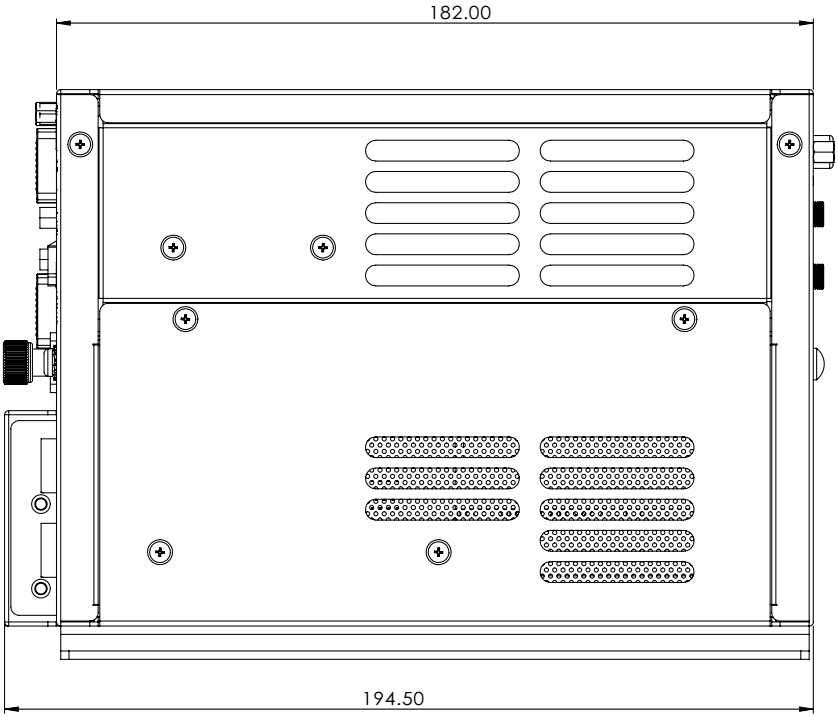


Figure 2-4: MLB-3002 Right Side View

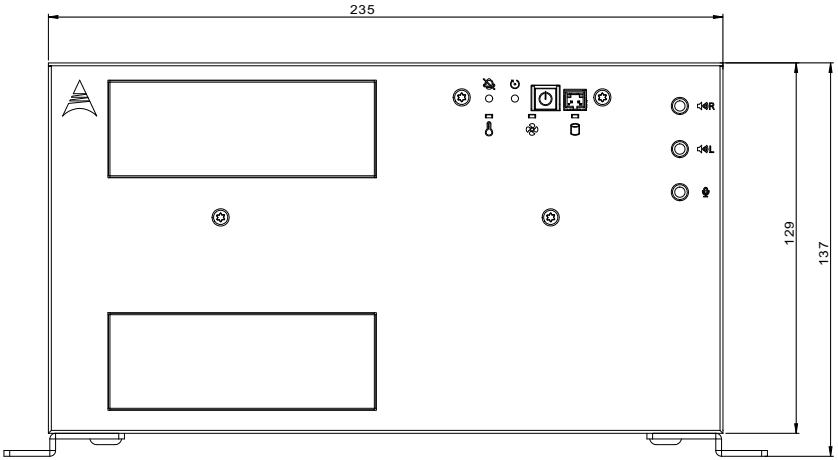


Figure 2-5: MLB-3002 Rear View

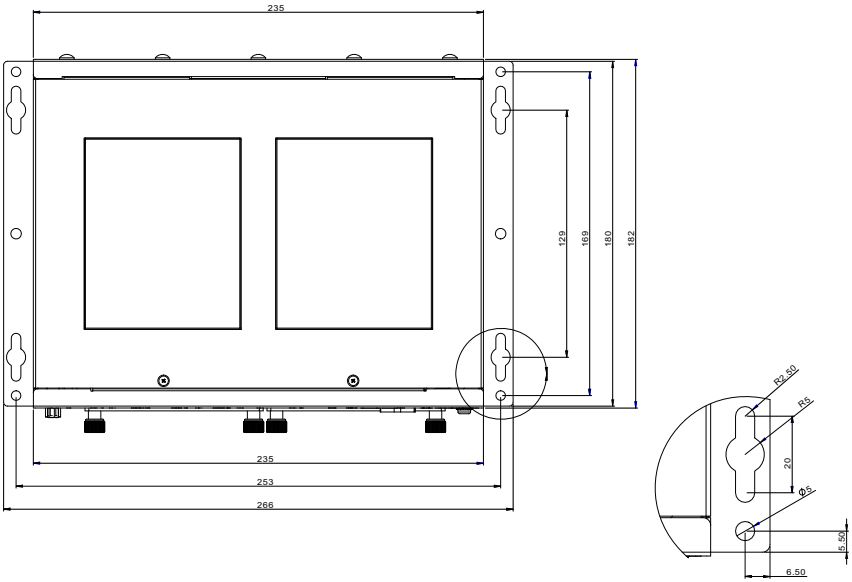


Figure 2-6: MLB-3002 Top View



To prevent damage to the system, ensure there is a minimum 10 cm clearance around the air vents for unrestricted airflow. The air temperature inside the enclosure could rise above the specified operating temperature limits if the airflow through the vents is restricted.

AVERTISSEMENT: Pour éviter d'endommager le système, assurez-vous qu'il y a un dégagement minimum de 10 cm autour des bouches d'aération pour une circulation d'air sans restriction. La température de l'air à l'intérieur du boîtier peut dépasser les limites de température de fonctionnement spécifiées si le flux d'air à travers les évents est restreint.

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3 System Layout

3.1 Front Panel

The MLB-3002 Series provides the following I/O access features.

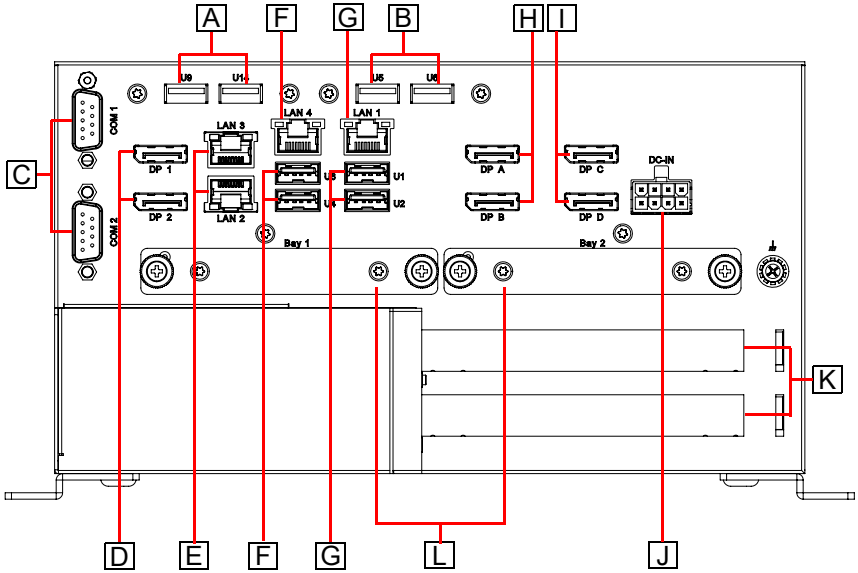


Figure 3-1: MLB-3002 Front Panel I/O

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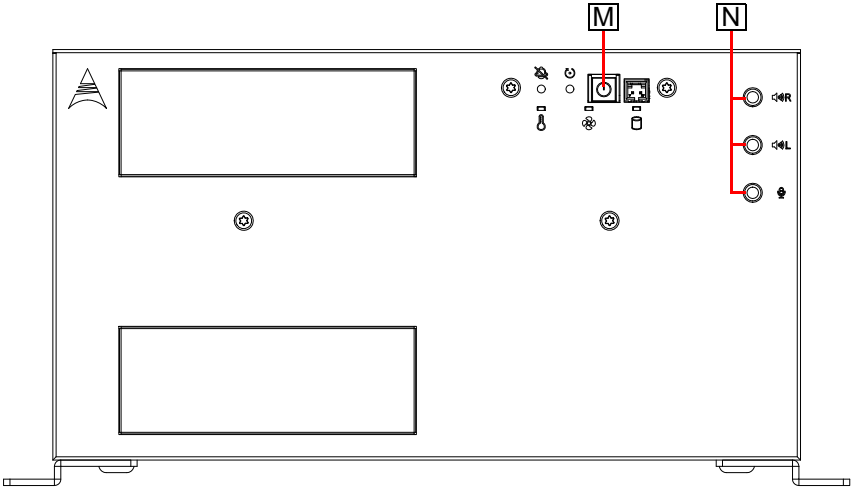


Figure 3-2: MLB-3002 Rear Panel I/O

A	USB 2.0 Type-A x2 (U9, U14)	**H**	DisplayPort from MXM for DP A/DP B
B	USB 3.2 Gen1 x1 Type-A x2 for U5/U6	**I**	DisplayPort from MXM for DP C/DP D
C	RS-232 for COM1, RS-232/422/485 for COM2	**J**	12V DC Power Input
D	DisplayPort x2 (DP 1/DP 2)	**K**	2x PCIe x4 Gen3 slots
E	i210-AT (LAN 2/ LAN 3)	**L**	2x 2.5” hot swappable storage bay (Bay 1/Bay 2)
F	i210-AT (LAN 4), USB 3.2 Gen1 x1 Type-A (U3/U4)	**M**	Power-on module. (See 3.1.1: Power-on Module)
G	i219-LM (LAN 1), USB 3.2 Gen1 x1 Type-A (U1/U2)	**N**	Speaker out Left and Right, Mic-in (Optional. Audio hole is sealed when not available.)

Table 3-1: I/O Legend

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3.1.1 Power-on Module

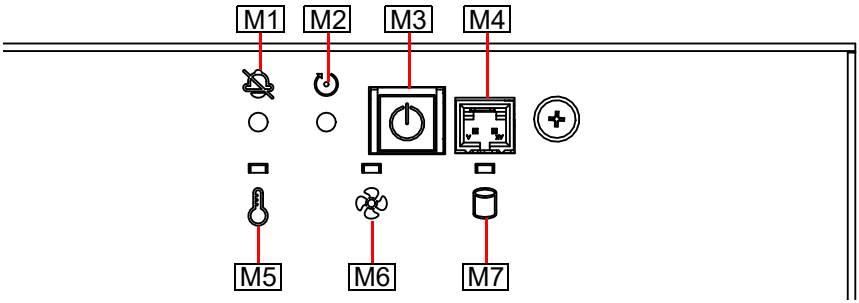


Figure 3-3: Power-on Module

M1	**Alarm Reset Button**: When the fan or GPU temperature alarm has been triggered, insert a small, thin object like a paper clip and press the reset button to turn off the alarm. This is to reset the alarm beeper only, not to reset the alarm LED.
M2	**Reset Switch**: Push to reset the system.
M3	**Power On Button**: Lights blue when the system is powered on, blinks when the system suspends to RAM, and is off when the system suspends to disk.
M4	**Remote Power On Button Connector**: Remote power on control. **Note**: Requires additional cable with an ALEX 9566-02G tin plated connector. The left pin is GND and the right pin is PRWBTN#, short enabled. (MPN: ALEX, 9553-02-PBT, black)
M5	**Temperature Alarm LED**: Blinks white when CPU or GPU overheats.
M6	**Fan Alarm LED**: Blinks amber when CPU, GPU, or system fan is <300 rpm.
M7	**Storage Status LED**: Blinks red when storage is accessed.

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3.1.2 Audio Connectors

The MLB-3002 provides the following default audio connectors.

- 3.5 mm mono jack for left channel speaker-out (6W)
- 3.5 mm mono jack for right channel speaker-out (6W)
- Microphone-in


NOTE:

The MLB-3002 series audio connectors are (from top to bottom) speaker-out L channel (6W), speaker-out R channel (6W), and Mic-in. The speaker-out connector should be a 3.5mm mono jack plug. If a line-out (headphone-out) is needed instead of the speaker-out (with amplifier 6W+6W), contact your local ADLINK sales representative.

The following audio configurations are also available.

- Mic-in, Line-out, Line-in
- Line-in, L/R speaker-out (6W + 6W)
- Without audio function

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3.1.3 Digital I/O Connector

The MLB-3002 provides 4 channels of non-isolation digital input and 4 channels of non-isolation digital output circuits, with specifications and circuits as follows.

4-channel Digital Input

- VIH: 1.5 to 5V
- VIL: 0 to 0.5V

4-channel Digital Output

- Output type: Open drain N-channel
- MOSFET driver with internal pull high of 200Ω resistance.
- Source/Sink current for all channels: 22mA
- VOH: 4.956 to 5V
- VOL: 0 to 0.085V

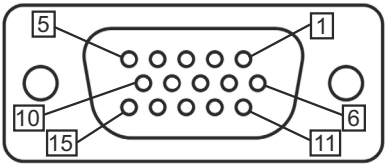


Figure 3-4: Digital I/O Connector Pin Definition

Pin	Signal	Pin	Signal	Pin	Signal
1	DI0	6	VCC (5V standby is always on except when in ACPI S5)	11	DO0
2	DI1	7	NC	12	DO1
3	DI2	8	NC	13	DO2
4	DI3	9	NC	14	DO3
5	GND	10	GND	15	NC

Table 3-2: Digital Input/Output Connector Pin Definition

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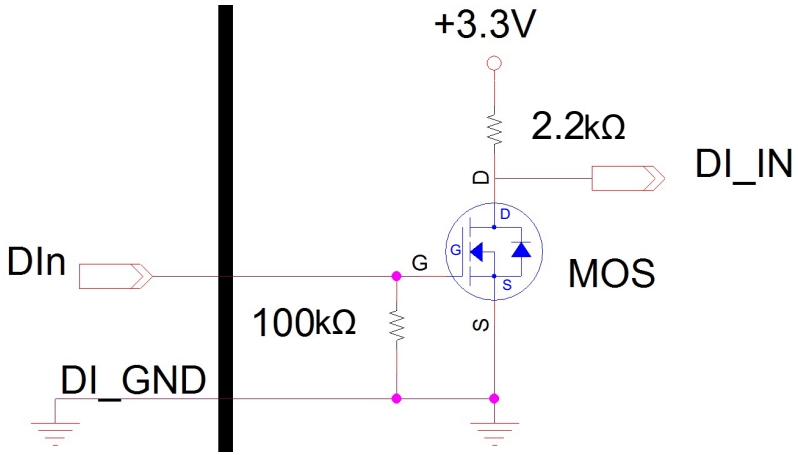


Figure 3-5: Digital Input Circuit

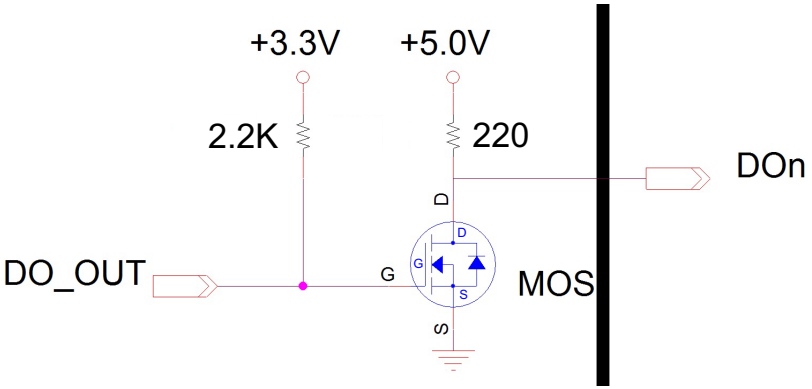


Figure 3-6: Digital Output Circuit

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3.1.4 Gigabit Ethernet Ports

LED Color	Status	Description
Orange	Off	Ethernet port is disconnected.
	On	Ethernet port is connected with no activity.
	Flashing	Ethernet port is connected and active.

Table 3-3: Active/Link LED Indicators

LED Color	Status	Description
Green/Orange	Off	10 Mbps
	Green	100 Mbps
	Orange	1000 Mbps

Table 3-4: Speed LED Indicators

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3.1.5 COM Port Connectors

The MLB-3002 provides two COM ports through D-sub 9-pin connectors. The COM2 port supports RS-232/422/485 modes by BIOS setting, while COM1 supports only RS-232.

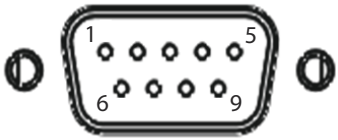


Figure 3-7: COM Port Pin Definition

Pin	Signal Name		
	RS-232	RS-422	RS-485
1	DCD#	TXD422-	485DATA-
2	RXD	TXD422+	485DATA+
3	TXD	RXD422+	N/S
4	DTR#	RXD422-	N/S
5	GND	N/S	N/S
6	DSR#	N/S	N/S
7	RTS#	N/S	N/S
8	CTS#	N/S	N/S
9	RI#	N/S	N/S

Table 3-5: D-Sub 9-pin Signal Function of COM Ports

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3.2 Internal I/O Connectors

WARNING:

Installation of add-on devices must be carried out by ADLINK service personnel only. Users must not disassemble the device themselves. Failure to comply with this instruction will result in loss of warranty.

AVERTISSEMENT: L'installation de périphériques complémentaires doit être effectuée uniquement par le personnel de service ADLINK. Les utilisateurs ne doivent pas démonter l'appareil eux-mêmes. Le non-respect de cette instruction entraînera la perte de la garantie.

3.2.1 Mainboard Connector Locations

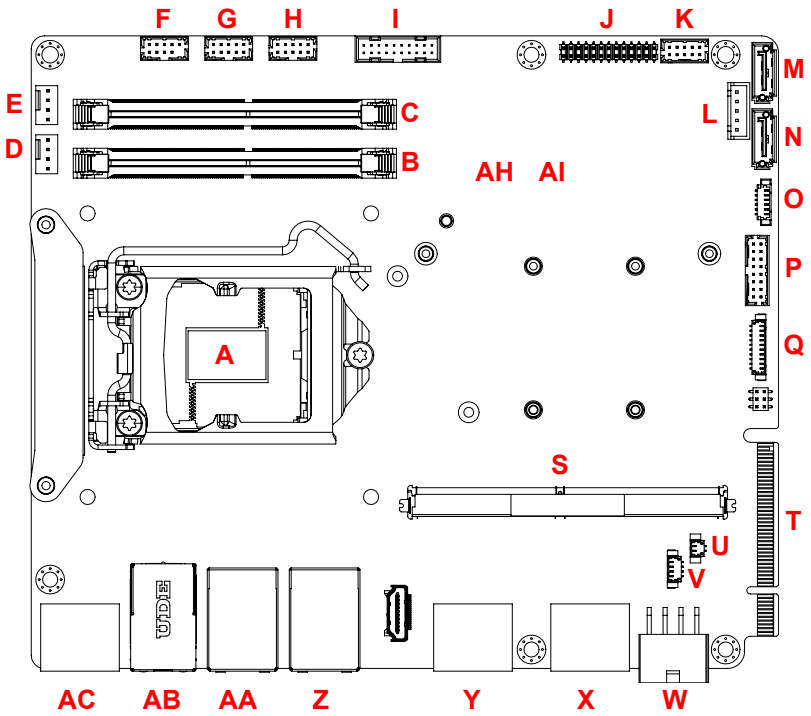


Figure 3-8: Mainboard Connectors (Top)

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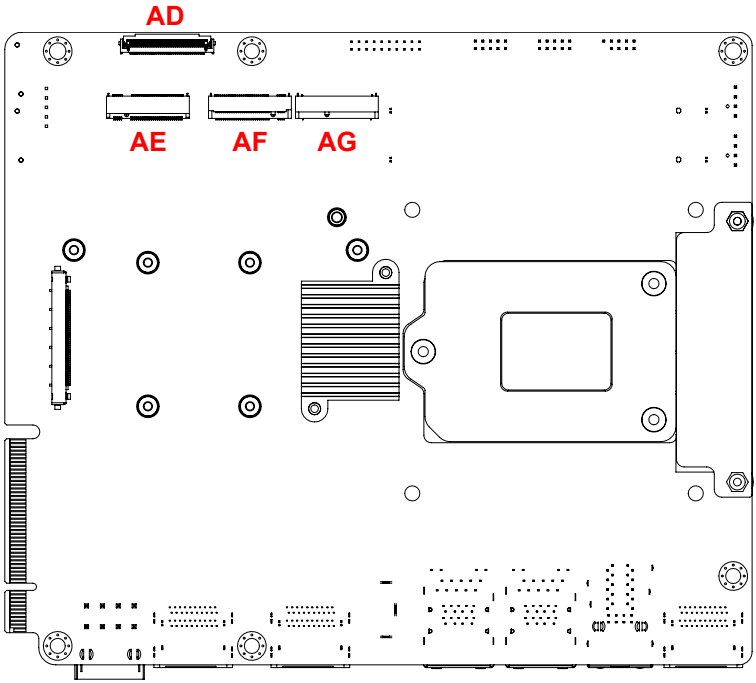


Figure 3-9: Mainboard Connectors (Bottom)

A	CPU socket
B	DRAM socket for DIMM1
C	DRAM socket for DIMM2
D	CPU Fan connector
E	System Fan connector
F	2x USB 2.0 Gen1 x1 pin header for U9/U14
G	RS-232 pin header for COM1
H	RS-232/422/485 pin header for COM2
I	2x USB 3.2 Gen1 x1 pin header for U5/U6
J	Multi I/O connector
K	Audio pin header
L	PCIe power connector

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M	SATA connector
N	SATA connector
O	SATA power connector
P	Power-on module connector
Q	DIO connector
S	MXM connector
T	PCB edge connector
U	RTC battery connector
V	GPU fan connector
W	12V DC in connector
X	DisplayPort C and D from MXM
Y	DisplayPort A and B from MXM
Z	LAN 1 and USB 3.2 Gen 1 x1 ports 1 and 2
AA	LAN 4 and USB 3.2 Gen 1 x1 ports 3 and 4
AB	LAN 2 and LAN 3
AC	DisplayPort 1 and 2 from CPU
AD	DB40 connector
AE	M.2_B Key connector
AF	M.2_M Key connector
AG	M.2_E Key connector
AH	Blue LED2_BMC status
AI	RED LED3_BMC watchdog

Table 3-6: Mainboard Connector Legend

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3.2.2 BMC Status LED and WDT LED

3.2.2.1 Status LED (Blue)

The Status LED is controlled by SEMA to signal system state changes and power-up failures. The system state changes can be HW-Reset, SW-Reset, Power-Up, Power-Down, Reset-Button and Power-Button activity. The Status LED will light for short time. Power-Up failures can indicate a corrupted BIOS or failure of the onboard power supply. A blink code displays in cases of failure.

When the system is in an S3 state, the Status LED flashes every four seconds.

LED Blink Code	Status
0	NOERROR
2	NO_SUSCLK
3	NO_SLP_S5
4	NO_RSMRST
5	NO_SLP_S3
7	PLTRST_FAIL
8	NO_SYS_PWRGD
10	CRITICAL_TEMP
11	NO_VIN
12	NO_VRTC

3.2.2.2 WDT LED (Red)

The WDT LED is driven by SEMA and will light when a watchdog timeout occurs. It stays on until it is cleared by software or the reset button.

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3.2.3 USB 2.0 Connector

One USB 2.0 pin header is provided on the mainboard for an internal USB dongle.

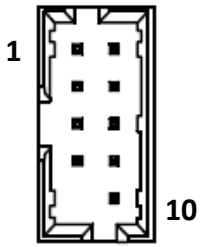


Figure 3-10: USB 2.0 Connector Pin Definition

Pin	Signal	Pin	Signal
1	P5V_USB1	6	CN_U2_USB14_P
2	P5V_USB1	7	GND
3	CN_U2_USB9_N	8	GND
4	CN_U2_USB14_N	9	NC
5	CN_U2_USB9_P	10	GND

Table 3-7: USB 2.0 Connector Pin Definition

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3.2.4 USB 3.2 Connector

One USB 3.2 Gen1 x1pin header is provided on the mainboard for an internal USB dongle.

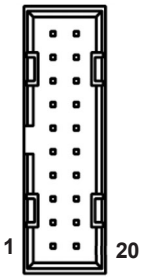


Figure 3-11: USB 3.2 Connector Pin Definition

Pin	Signal	Pin	Signal
1	NC	11	P5V_USB56
2	CN_U3_USB6_T_P	12	CN_U2_USB5_N
3	CN_U3_USB6_T_N	13	CN_U2_USB5_P
4	GND	14	GND
5	CN_U3_USB6_R_P	15	CN_U3_USB5_R_N
6	CN_U3_USB6_R_N	16	CN_U3_USB5_R_P
7	GND	17	GND
8	CN_U2_USB6_P	18	CN_U3_USB5_T_N
9	CN_U2_USB6_N	19	CN_U3_USB5_T_P
10	P5V_USB56	20	NC

Table 3-8: USB 3.2 Connector Pin Definition

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3.2.5 PCIe Power Connector

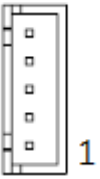


Figure 3-12: PCIe Power Connector Pin Definition

Pin	Signal
1	P_+12V_S
2	P_+12V_S
3	P_+5V0_S
4	P_+5V0_S
5	GND

Table 3-9: PCIe Power Connector Pin Definition

3.2.6 SATA Power Connector



Figure 3-13: SATAConnector Pin Definition

Pin	Signal
1	P_+5V0_S
2	P_+5V0_S
3	P_+5V0_S
4	GND
5	GND
6	GND

Table 3-10: SATA Connector Pin Definition

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3.2.7 COM Connector

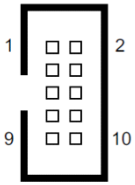


Figure 3-14: COM Connector Pin Definition

Pin	Signal Name		
	RS-232	RS-422	RS-485
1	DCD#	Tx-	Tx/Rx-
2	DSR#	Tx+	Tx/Rx+
3	RxD	Rx+	N/A
4	RTS#	Rx-	N/A
5	TxD	N/A	N/A
6	CTS#	N/A	N/A
7	DTR#	N/A	N/A
8	RI#	N/A	N/A
9	GND	GND	GND

Table 3-11: COM Connector Pin Definition

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3.2.8 CPU/System Fan Connectors

Two connectors are provided for CPU and system fan power.

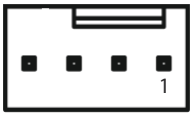


Figure 3-15: CPU/System Fan Connector Pin Definition

Pin	Signal
1	FAN_GND
2	P_+12V_FAN
3	FAN_IN
4	FAN_OUT

Table 3-12: CPU/System Fan Connector Pin Definition

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3.2.9 GPU Fan Connector

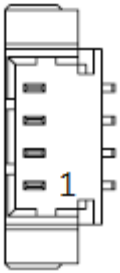


Figure 3-16: GPU Fan Connector Pin Definition

Pin	Signal
1	FAN_OUT
2	FAN_IN
3	P_+12V_FAN
4	FAN_GND

Table 3-13: GPU Fan Connector Pin Definition

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3.2.10 Audio Connector



Figure 3-17: Audio Connector Pin Definition

Pin	Signal	Pin	Signal
1	AUDIO_Sense	6	GND_AUD
2	SPK_RP	7	A_MIC_IN_L
3	A_L_IN_L	8	SPK_LP
4	SPK_RN	9	A_MIC_IN_R
5	A_L_IN_R	10	SPK_LN

Table 3-14: Audio Connector Pin Definition

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3.2.11 Multiple I/O Connector

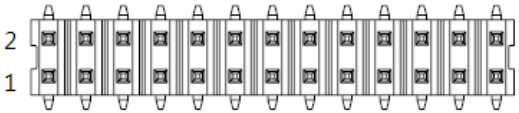


Figure 3-18: Multiple I/O Connector Pin Definition

3.2.11.1 COM1 RS-232/CCtalk Selection Jumper

RS-232/CCtalk	
1-3	RS-232 (default)
2-4	
7-9	
8-10	
3-5	CCtalk
4-6	
9-11	
10-12	

Table 3-15: COM1 RS-232/CCtalk Selection Jumper

3.2.11.2 Case Open Jumper

Case open	
13-14	Function ON
N/A	Undo (default)

Table 3-16: Case Open Jumper

3.2.11.3 ME Lock Jumper

ME Lock	
15-16	Lock
N/A	Undo (default)

Table 3-17: ME Lock Jumper

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3.2.11.4 Clear CMOS Jumper

Clear CMOS	
17-18	Clear CMOS
N/A	Undo (default)

Table 3-18: Clear CMOS Jumper

3.2.11.5 BIOS WP Jumper

BIOS WP	
19-20	BIOS WP
N/A	Undo (default)

Table 3-19: BIOS WP Jumper


NOTE:

- S3 and S4 not supported under operating system.
- IAMT is not supported while pairing with Q370.
- BIOS ME version information is shown as “zero”.
- Do not install an operating system when BIOS WP is enabled.
- Intel GbE LAN cannot update the MAC address.
- A special PN/process is needed if the default setting is Write Protect Enabled.

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3.2.12 Power-on Module Connector

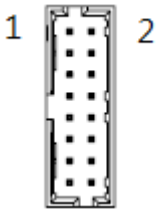


Figure 3-19: Power-on Module Connector Pin Definition

Pin	Signal	Pin	Signal
1	P_+5V0_A	9	LED_TEMP_ALARM
2	P_+3V3_A	10	GND
3	PWR_BTN	11	LED_FAN_ALARM
4	LED_STANDBY	12	GND
5	RST_BTN#	13	P_+12V_A
6	POWER_ON	14	GND
7	RESET_BUTTON_ALARM#	15	BEEP_TEMP_ALARM
8	PCH_SATS-L	16	GND

Table 3-20: Power-on Module Connector Pin Definition

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3.2.13 DIO Connector



Figure 3-20: DIO Connector Pin Definition

Pin	Signal
1	5V_12V_S
2	GND
3	DI0
4	DI1
5	DI2
6	DI3
7	DO0
8	DO1
9	DO2
10	DO3

Table 3-21: DIO Connector Pin Definition

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3.2.14 12V DC-in Connector



Figure 3-21: 12V DC-in Connector Pin Definition

Pin	Signal	Pin	Signal
1	GND	2	DCIN
3	GND	4	DCIN
5	GND	6	DCIN
7	GND	8	DCIN

Table 3-22: 12V DC-in Connector Pin Definition



Before providing DC power, ensure the voltage and polarity provided are compatible with the DC input. Improper input voltage and/or polarity could result in system damage.
AVERTISSEMENT: Avant de fournir une alimentation CC, assurez-vous que la tension et la polarité fournies sont compatibles avec l'entrée CC. Une tension d'entrée et/ou une polarité incorrectes peuvent endommager le système.

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3.2.15 PCB Edge Connector

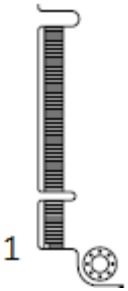


Figure 3-22: PCB Edge Connector Pin Definition

Pin	Signal
A1 (Pin 1 on bottom)	GND
A2	P_+12V_S
A3	P_+12V_S
A4	GND
A5	JTAGE_CLK(NC)
A6	JTAGE_DI(NC)
A7	JTAGE_DO(NC)
A8	JTAGE_MS(NC)
A9	P_+3V3_S
A10	P_+3V3_S
A11	PCH_PLTRST-L_BUF
A12	GND
A13	CLKOUT_PCIE_P7
A14	CLKOUT_PCIE_N7
A15	GND
A16	GF_PCIEX21_RX_P
A17	GF_PCIEX21_RX_N
A18	GND
A19	NC
A20	GND
A21	GF_PCIEX22_RX_P

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Pin	Signal
A22	GF_PCIEX22_RX_N
A23	GND
A24	GND
A25	GF_PCIEX23_RX_P
A26	GF_PCIEX23_RX_N
A27	GND
A28	GND
A29	GF_PCIEX24_RX_P
A30	GF_PCIEX24_RX_N
A31	GND
A32	NC
A33	NC
A34	GND
A35	GF_PCIEX1_RX_P
A36	GF_PCIEX1_RX_N
A37	GND
A38	GND
A39	GF_PCIEX2_RX_P
A40	GF_PCIEX2_RX_N
A41	GND
A42	GND
A43	GF_PCIEX3_RX_P
A44	GF_PCIEX3_RX_N
A45	GND
A46	GND
A47	GF_PCIEX4_RX_P
A48	GF_PCIEX4_RX_N
A49	GND
B1 (Pin 1 on top)	P_+12V_S
B2	P_+12V_S
B3	P_+12V_S
B4	GND
B5	PCH_SMB_CLK_A

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Pin	Signal
B6	PCH_SMB_DAT_A
B7	GND
B8	P_+3V3_S
B9	JTAGE_RST(NC)
B10	P_+3V3_S
B11	X_PCIE_WAKE-L
B12	NC
B13	GND
B14	GF_PCIEX5_21_TX_P
B15	GF_PCIEX5_21_TX_N
B16	GND
B17	PCH_CLK_REQ7-L
B18	GND
B19	GF_PCIEX22_TX_P
B20	GF_PCIEX22_TX_N
B21	GND
B22	GND
B23	GF_PCIEX23_TX_P
B24	GF_PCIEX23_TX_N
B25	GND
B26	GND
B27	GF_PCIEX24_TX_P
B28	GF_PCIEX24_TX_N
B29	GND
B30	NC
B31	PCH_CLK_REQ7-L
B32	GND
B33	GF_PCIEX1_TX_P
B34	GF_PCIEX1_TX_N
B35	GND
B36	GND
B37	GF_PCIEX2_TX_P
B38	GF_PCIEX2_TX_N

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Pin	Signal
B39	GND
B40	GND
B41	GF_PCIEX3_TX_P
B42	GF_PCIEX3_TX_N
B43	GND
B44	GND
B45	GF_PCIEX4_TX_P
B46	GF_PCIEX4_TX_N
B47	GND
B48	PCH_CLK_REQ7-L
B49	GND

Table 3-23: PCB Edge Connector Pin Definition

3.2.16 DB40 Connector

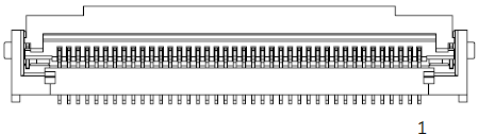


Figure 3-23: DB40 Connector Pin Definition

Pin	Signal
1	VCC_SPI_IN
2	GND
3	SPI_BIOS_CS0#
4	SPI_BIOS_CS1#
5	SPI_BIOS_MISO
6	SPI_BIOS_MOSI
7	SPI_BIOS_CLK
8	3V3_LPC
9	GND
10	BIOS_DIS0

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Pin	Signal
11	RST#
12	CLK33_LPC
13	LPC_FRAME#
14	LPC_AD3
15	LPC_AD2
16	LPC_AD1
17	LPC_AD0
18	3.3V_SMC
19	3.3V_A
20	GND
21	TXD6
22	RXD6
23	FUMD0
24	RESET_IN#
25	DATA
26	CLK
27	OCD0A
28	OCD0B
29	PWRBTN#
30	SYS_RESET#
31	CB_RESET#
32	CB_PWROK
33	SUS_S3#
34	SUS_S4#
35	SUS_S5#
36	POSTWDT_DIS#
37	SEL_BIOS
38	BIOS_MODE
39	SMC_STATUS
40	RESVD

Table 3-24: DB40 Connector Pin Definition

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4 Getting Started

This chapter outlines the procedures for 2.5" storage, M.2 module, MXM module, wall-mount brackets, and driver installation.



Installation of an add-on device must be carried out by ADLINK service personnel only. Users must not disassemble the device themselves. Failure to comply with this instruction will result in loss of warranty.
AVERTISSEMENT: L'installation d'une carte d'extension PCIe doit être effectuée uniquement par le personnel de service ADLINK. Les utilisateurs ne doivent pas démonter l'appareil eux-mêmes.



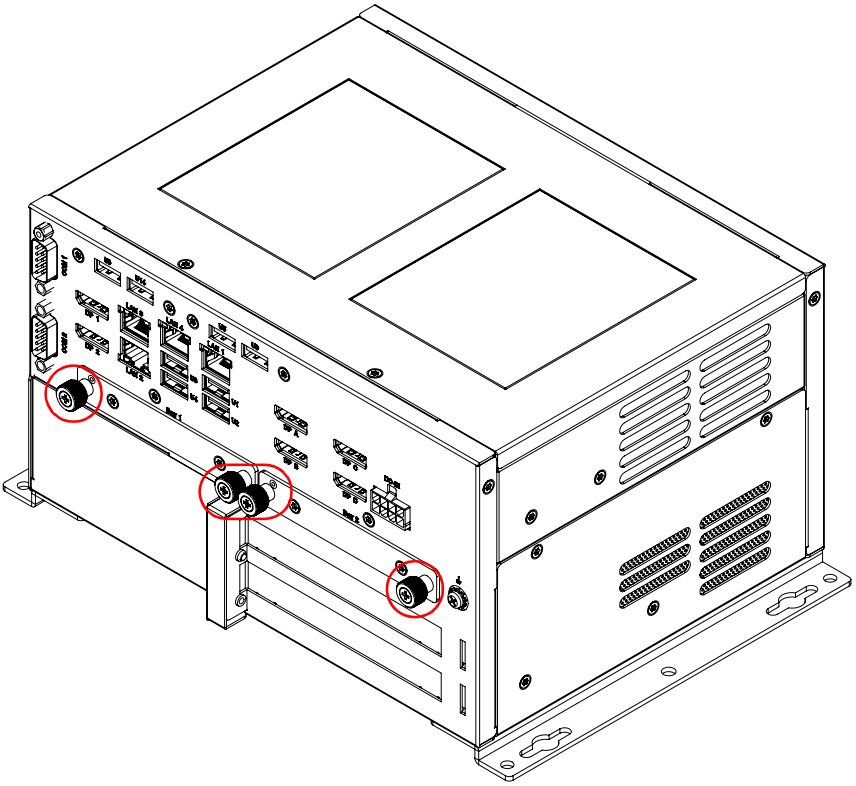
Disconnect the unit from power before opening the chassis, or installing any internal components. See “Important Safety Instructions” on page 135.
ATTENTION: Débranchez l'unité de l'alimentation avant d'ouvrir le châssis ou d'installer des composants internes. Le non-respect de cette instruction entraînera la perte de la garantie. Voir “Consignes de sécurité importantes” à la page 135.

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4.1 Installing 2.5” Storage

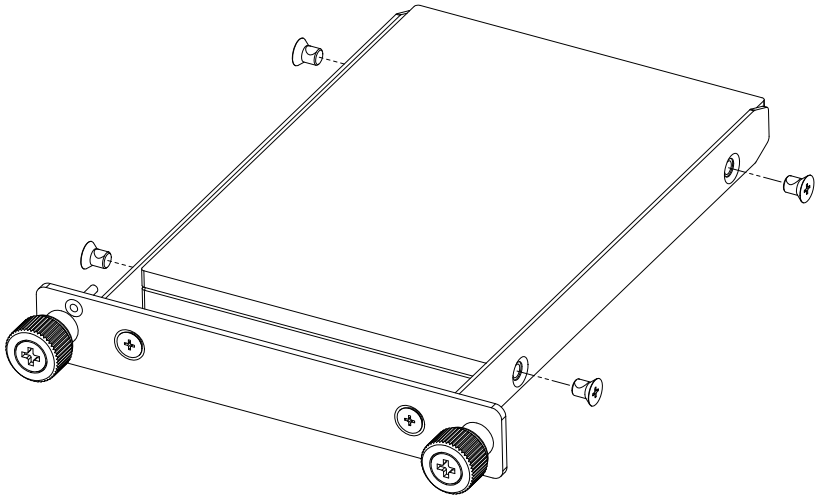
Before installing a disk drive, the drive bracket must be removed.

1. Remove the thumbscrews and take out the 2.5” drive bay.



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2. Place a 2.5” SSD up to 9mm thick into the bracket and use the 4 provided M3 screws at 4kgf/cm torque to attach the drive to the bracket.



3. Gently slide the bracket back into the drive bay until the SATA connector on the PCB is engaged, and then refasten the thumbscrews.

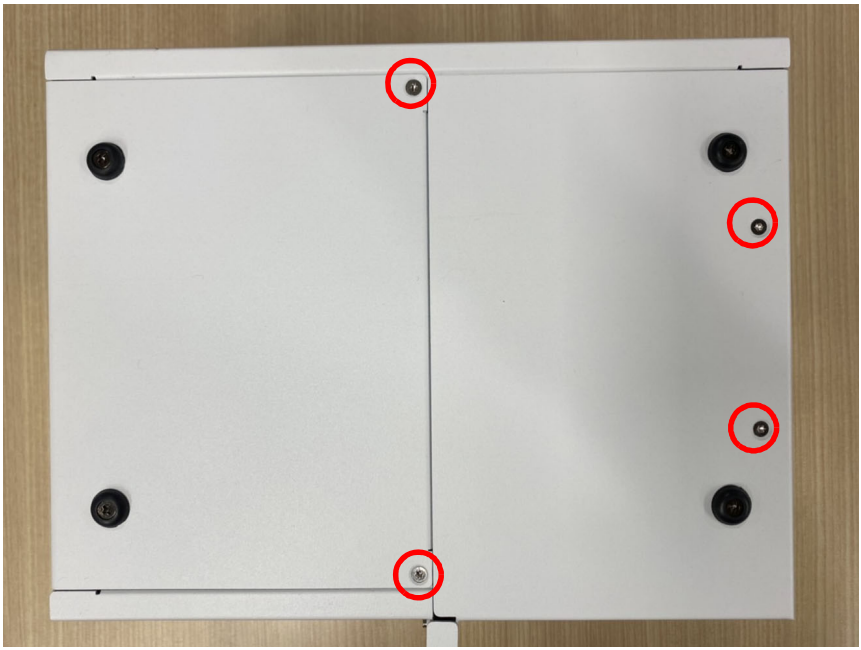
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4.2 Installing an M.2 Module

Remove the bottom panel before installing an M.2 Module.

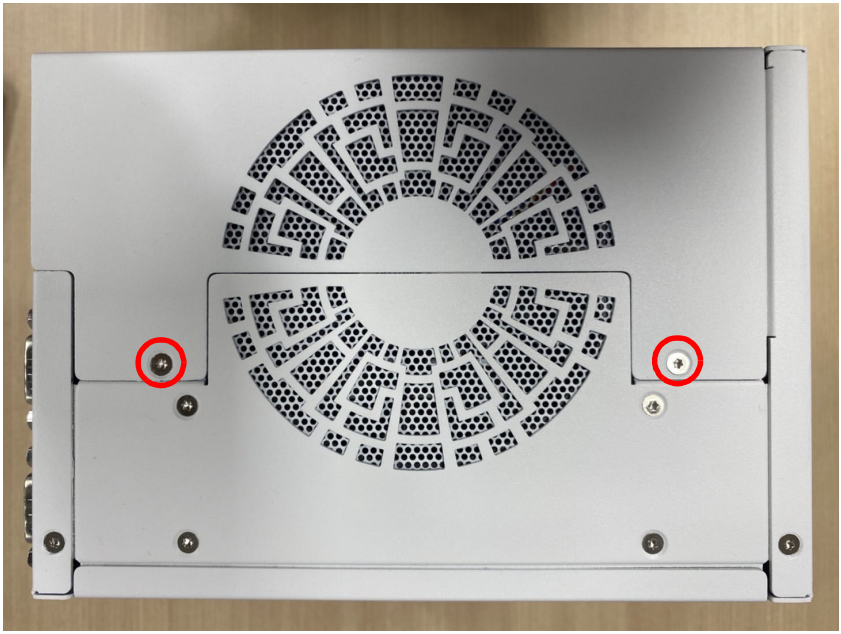
1. Remove 10 screws total to release the bottom panel from the chassis: 4 on the bottom, 2 on the left side, and 4 on the right side.

Bottom screws



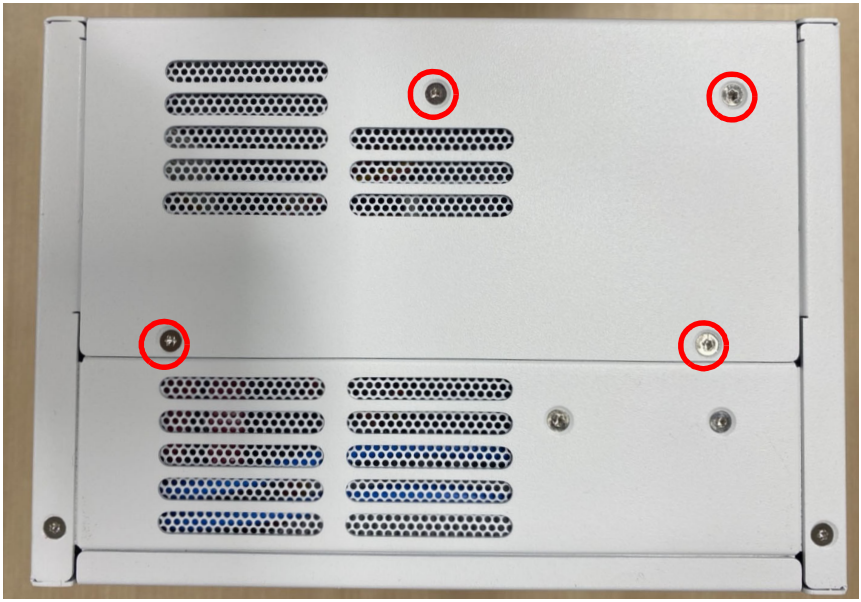
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Left side screws



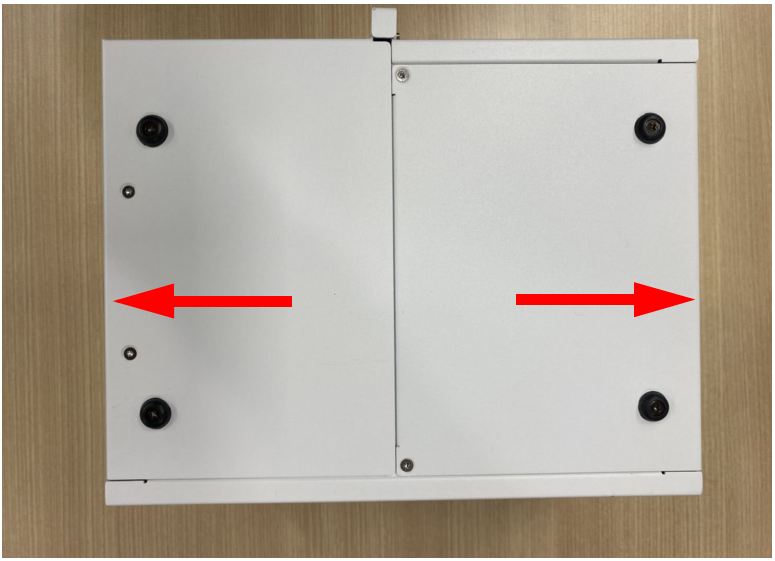
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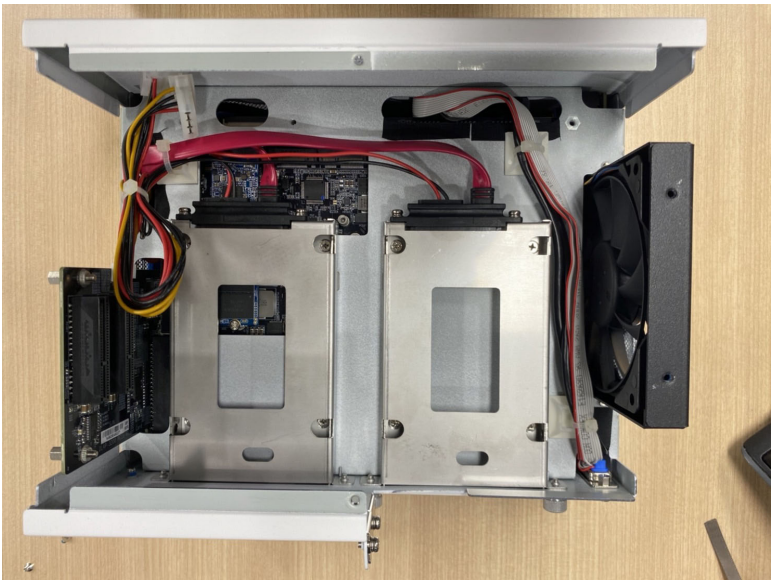
Right side screws



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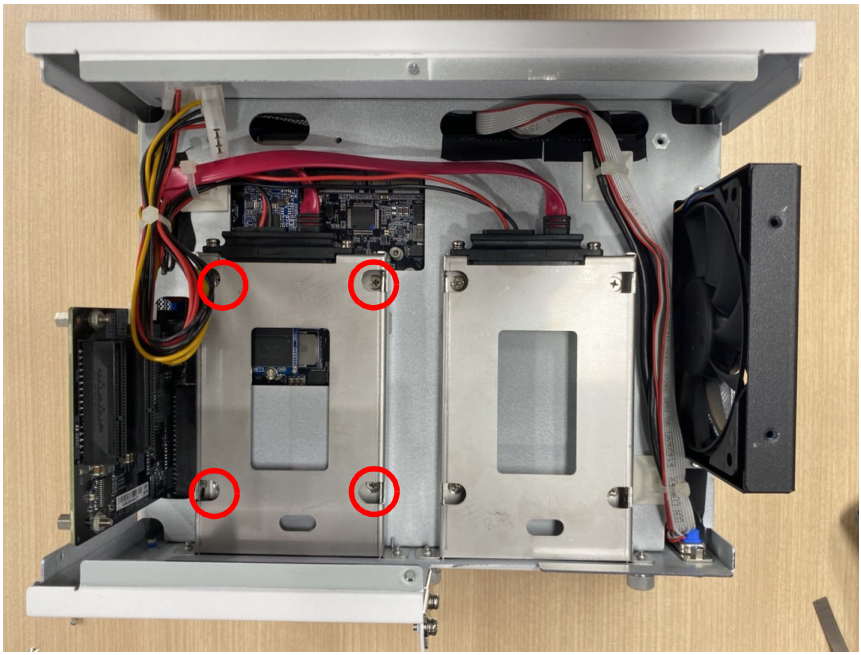
2. Apply the minimum amount of pressure necessary to slide the panels apart in the directions shown to reveal the internal contents of the unit.





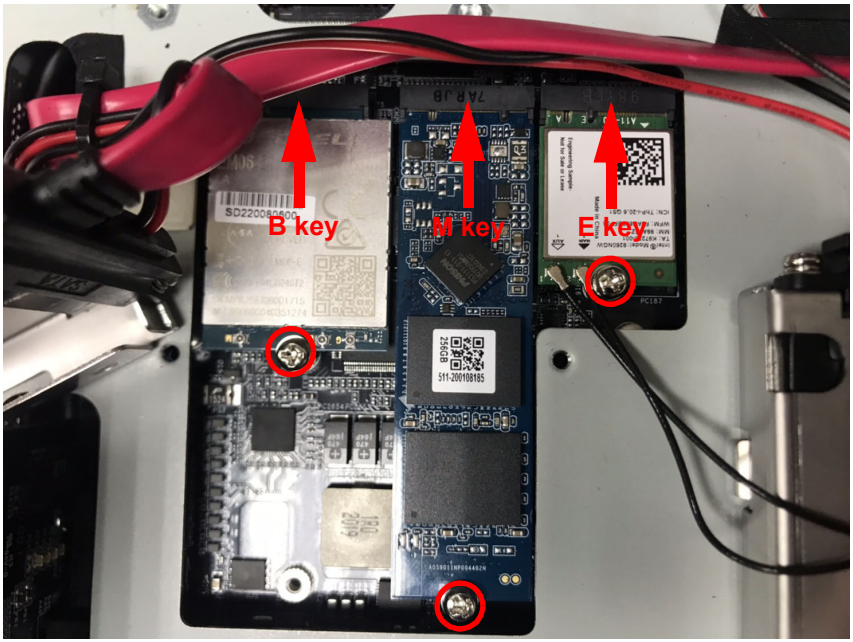
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3. Remove the 4 screws attaching the left drive bay to the chassis.



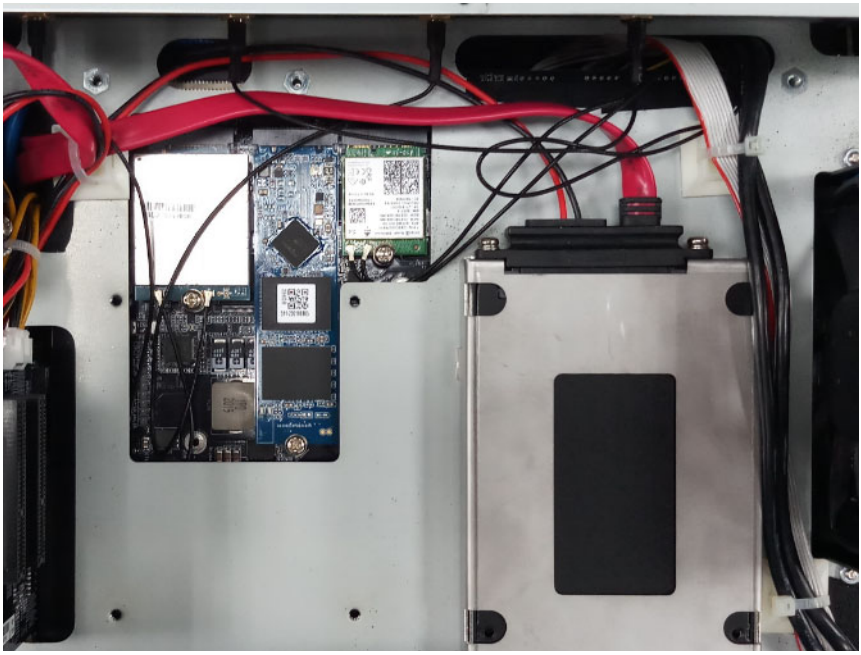
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4. Move the drive bay to reveal the M.2 socket underneath and install an M.2 module with an M3 screw at 4kgf/cm torque. (P/N: 33-03013-0040)
   - ▷ M.2 E-key module: Wi-Fi Kit Intel® Wireless-AC 9260 non-vPRO (P/N: 91-95266-0020)
   - ▷ M.2 M-key module example: M.2 PCIe Gen3 x4 SSD 128G PS5012-E12 M.2 2280 (P/N: 95-31102-4310)
   - ▷ M.2 B-key module example: 4G Module EM06-A Kit (M.2 B Key) with Antenna (P/N: 91-95284-000E). A 4G module needs to be used with the MLB-3002 with an eSIM SKU. Contact an ADLINK sales representative for more information.

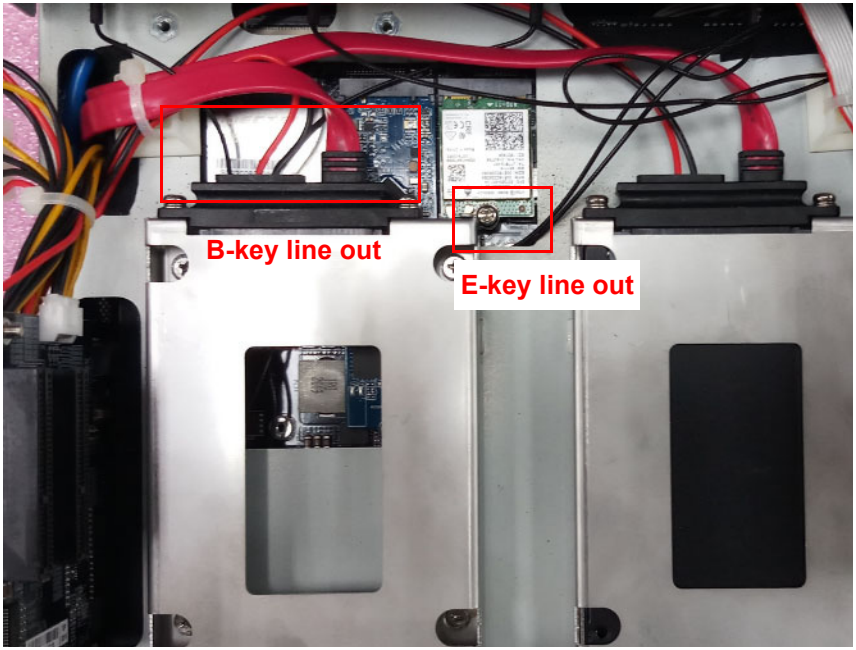


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5. The antenna cables of the M.2 B-key and E-key modules are installed as shown in the figures below. For improved cable management, route the M.2 B-key cables under the drive bay support plate before making the antenna connections.



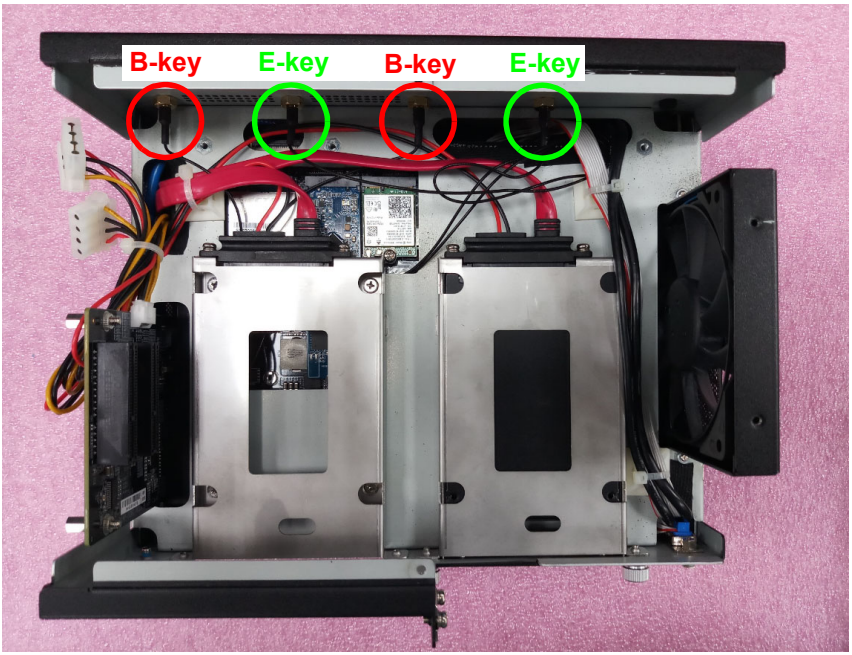
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Make sure the antenna wires are properly soldered to the M.2 B-key and E-key modules.

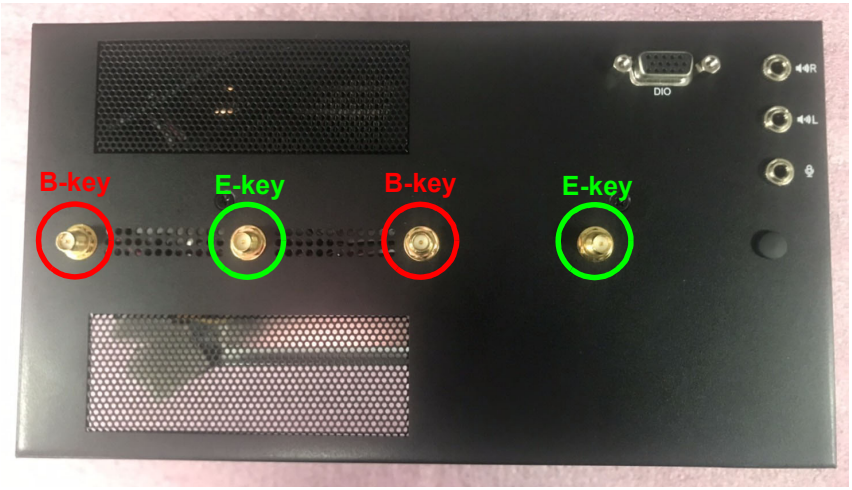


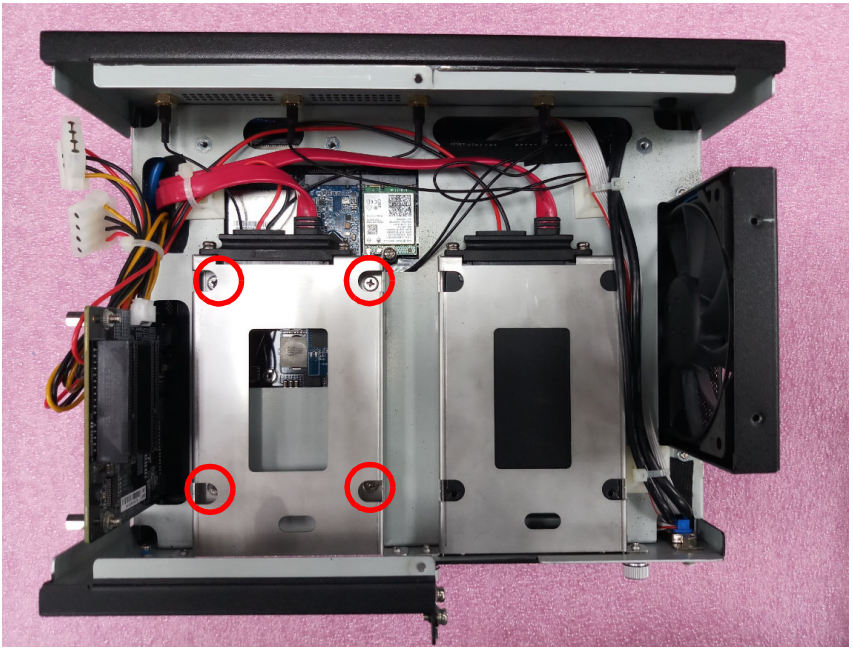
6. The figure below shows the locations of the M.2 B-key and E-key module antenna cable connections.



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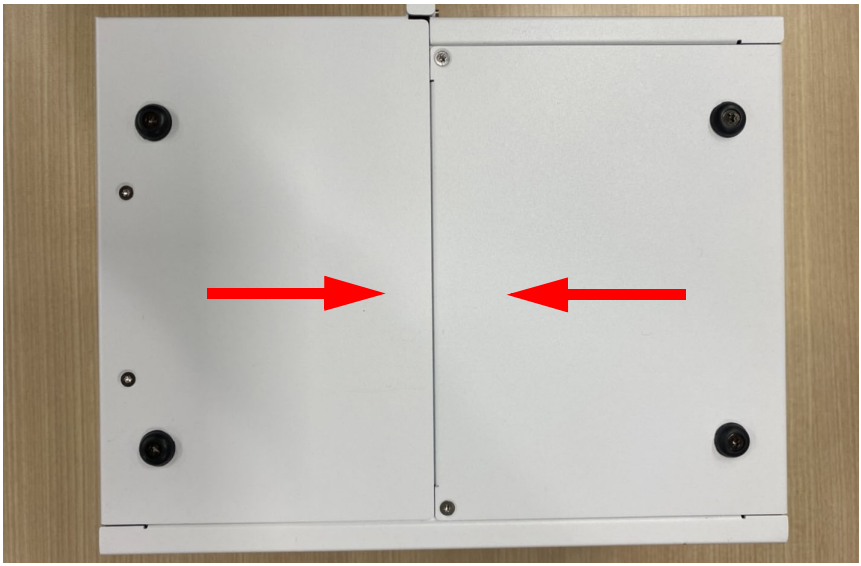
7. Attach the antenna cable connectors and the drive bay screws at 6kgf/cm torque.





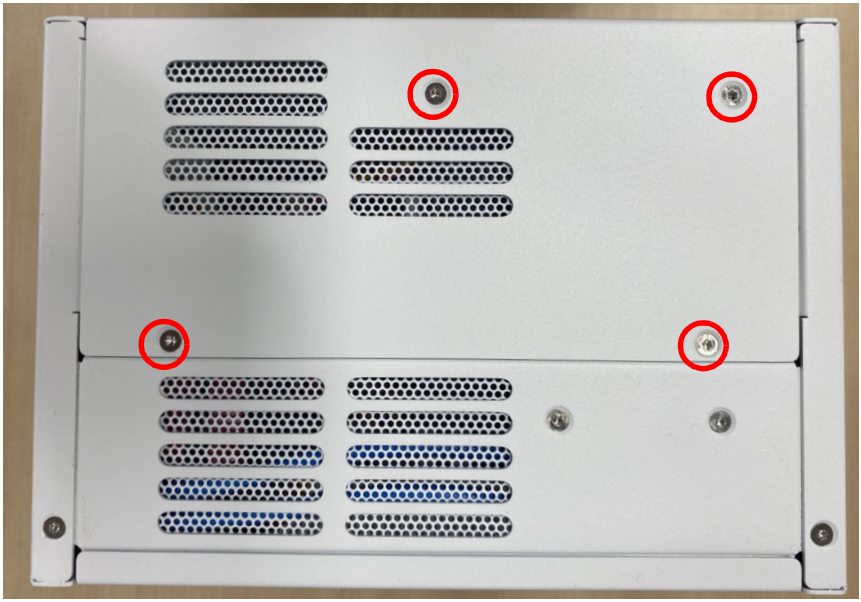
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8. After reinstalling the left and right side covers, fasten all the screws at 6kgf/cm torque.



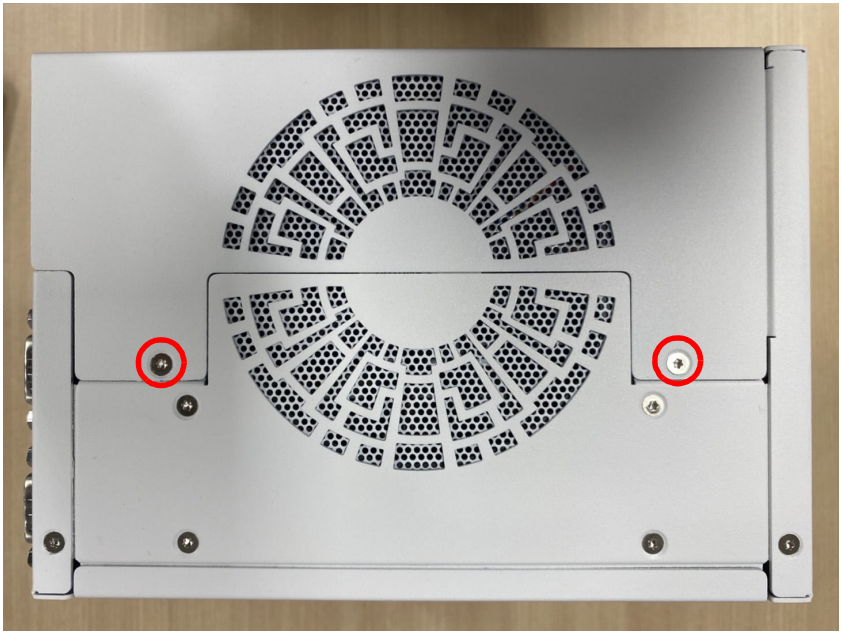
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Right side screws



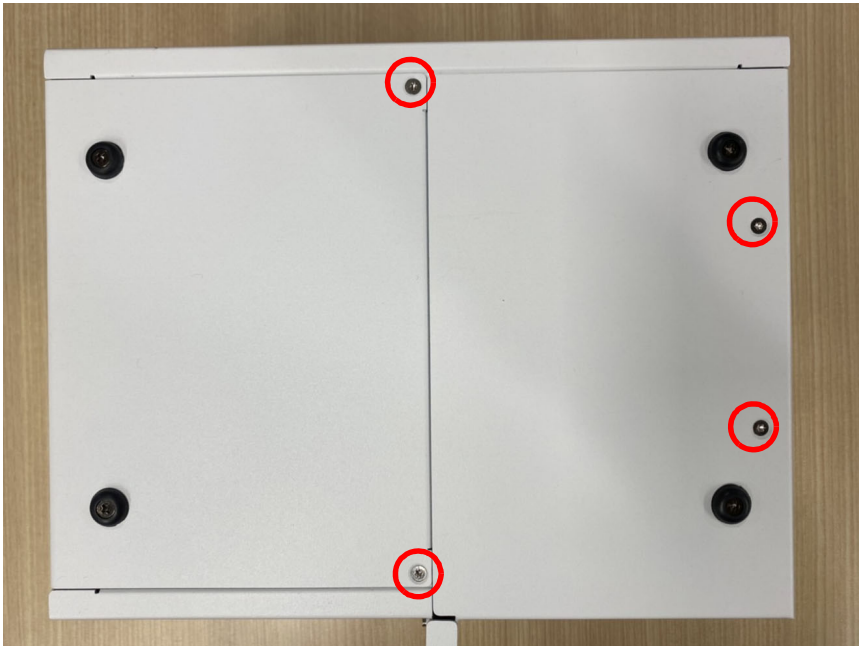
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Left side screws

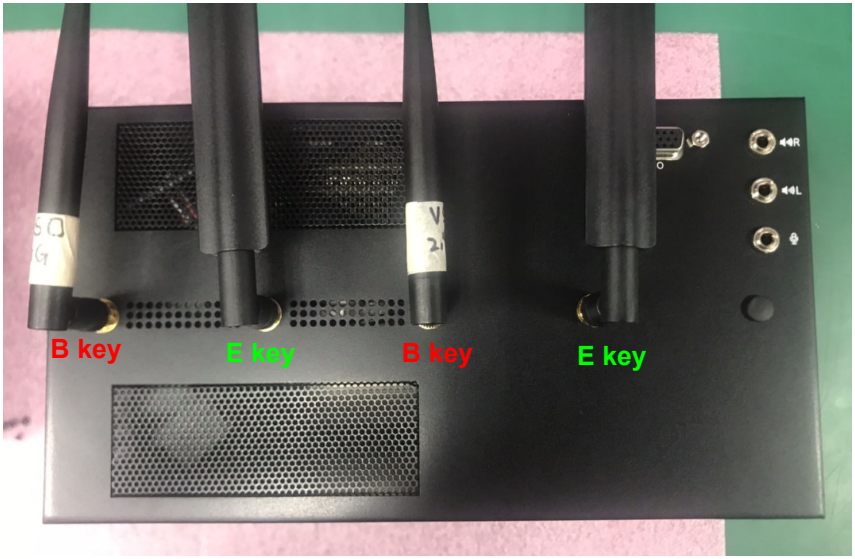


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Bottom screws



9. Install and lock the antennas as shown.





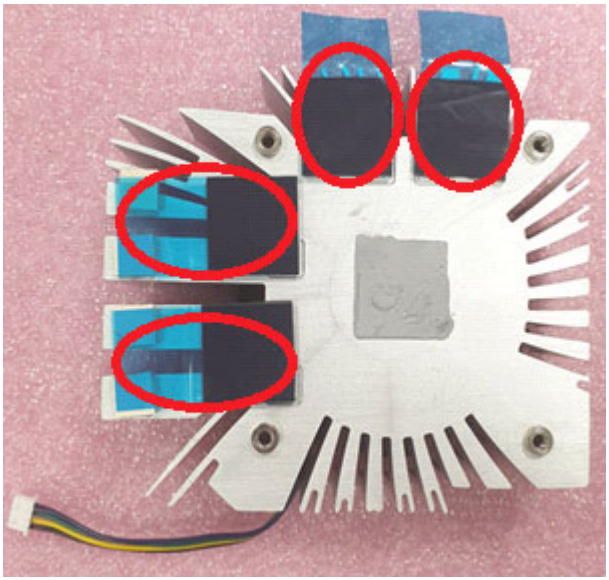
B key



E key

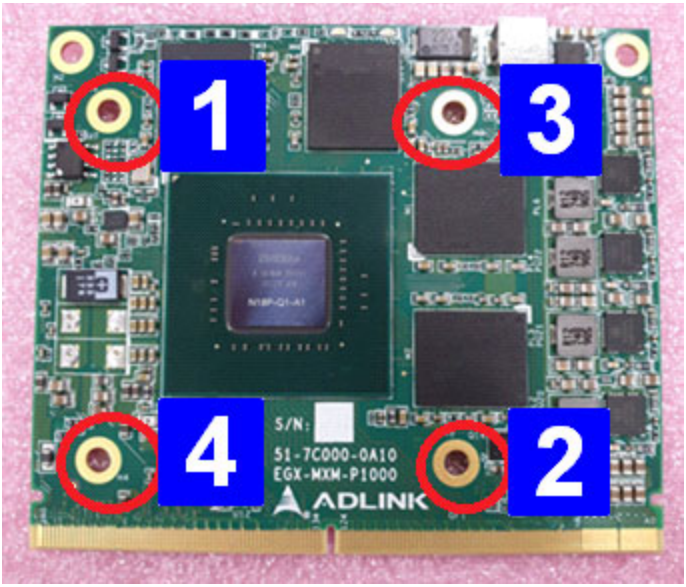
4.3 Installing MXM P1000/P2000/T1000 Module

1. Remove the protective film from the MXM cooler.



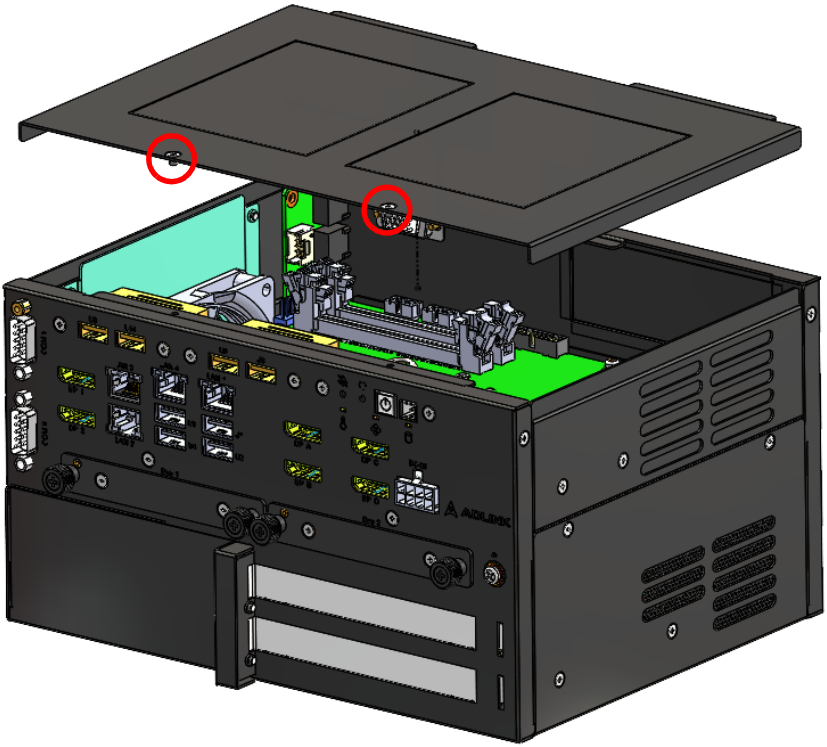
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2. Attach the MXM cooler to the MXM module. Tighten the screws in the order indicated at 4kgf/cm torque.



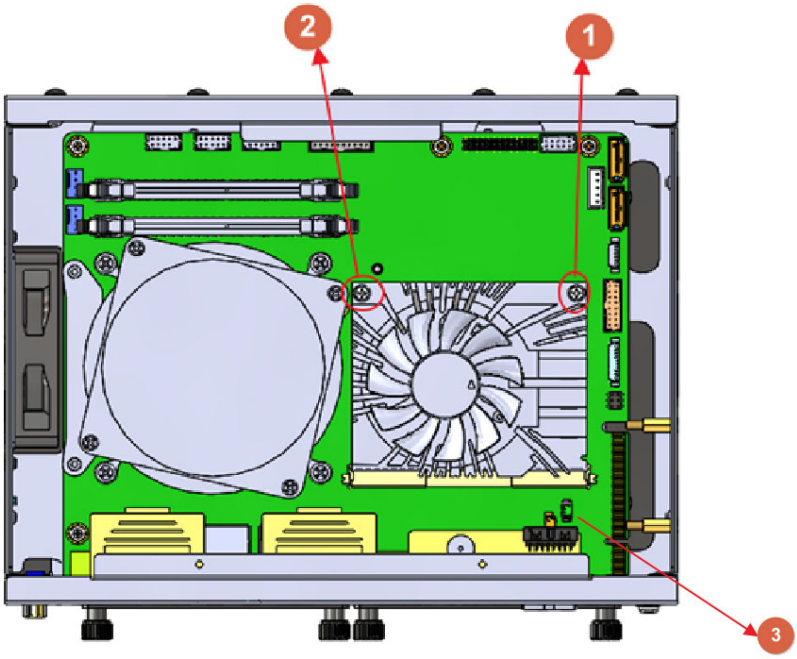
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3. Remove 2 screws to detach the top panel from the chassis. Remove the top panel to reveal the internal components of the system.



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4. Attach the MXM module with 2 M3 screws P/N: 33-03306-0040 at 4kgf/cm torque and plug the MXM cooling fan connector into the GPU fan connector.

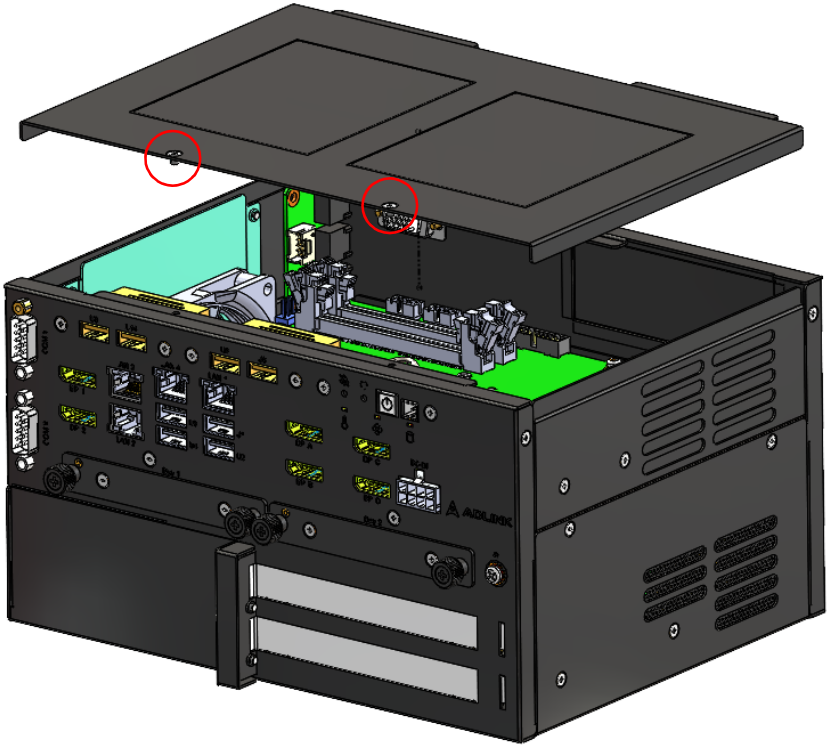


5. Screw the top panel back on to complete the installation.

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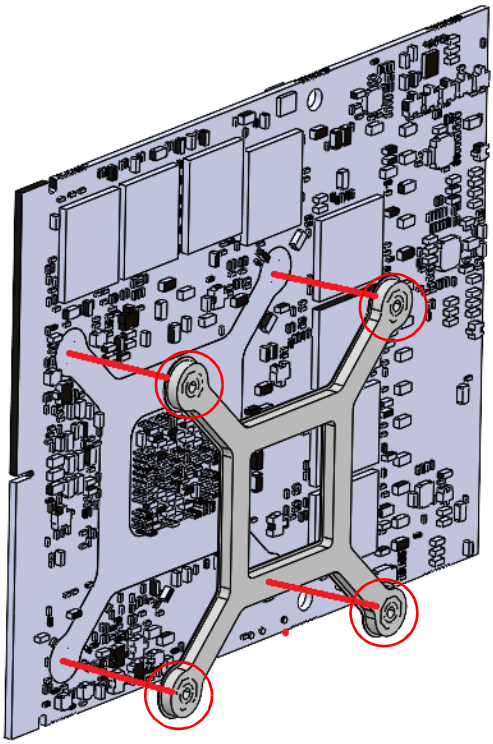
4.4 Installing MXM P3000/P5000/RTX3000/RTX5000 Module

1. Remove 2 screws to detach the top panel from the chassis and reveal the internal components of the system.



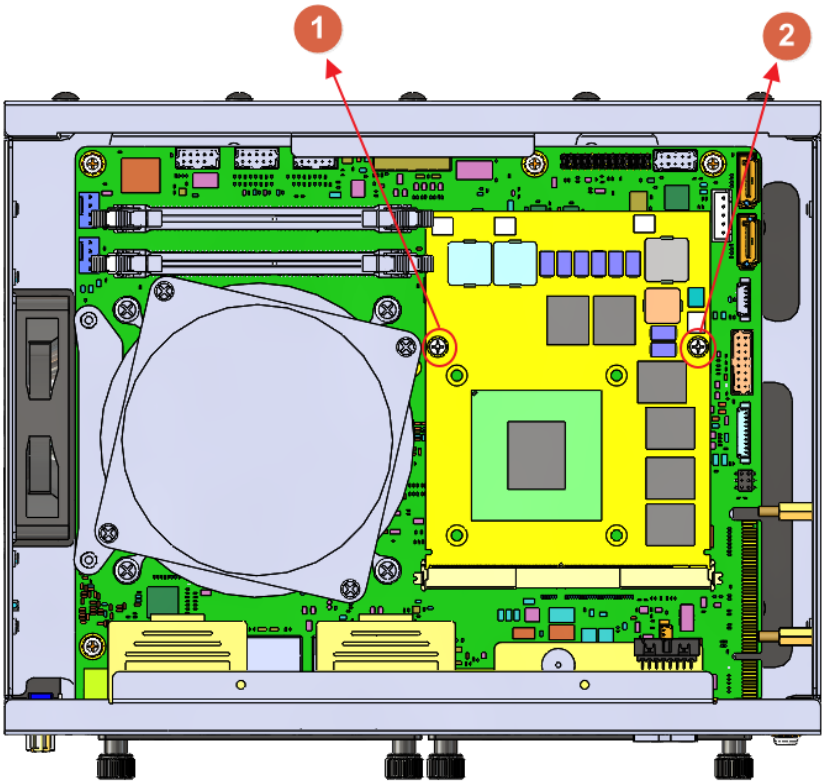
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2. Remove the protective film from the MXM cooler bracket and attach the MXM bracket to the bottom side of the MXM module.



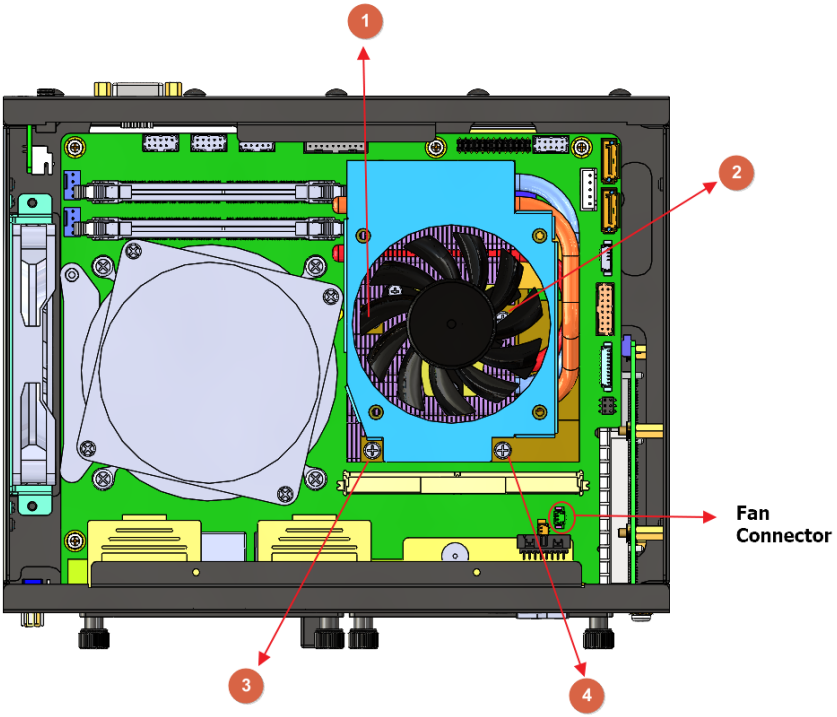
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3. Attach the MXM module with 2 M3 screws
   P/N: 33-03306-0040 at 4kgf/cm torque to the mainboard.



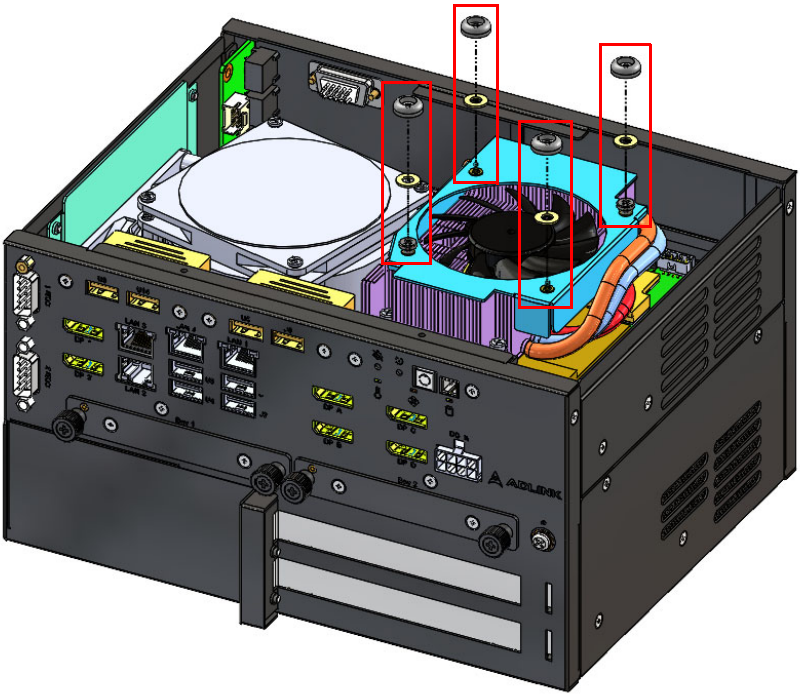
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4. Remove the protective film from the MXM cooler and lock the MXM cooler on the MXM module via the four spring screws. Then plug the MXM cooling fan connector into the GPU fan connector.



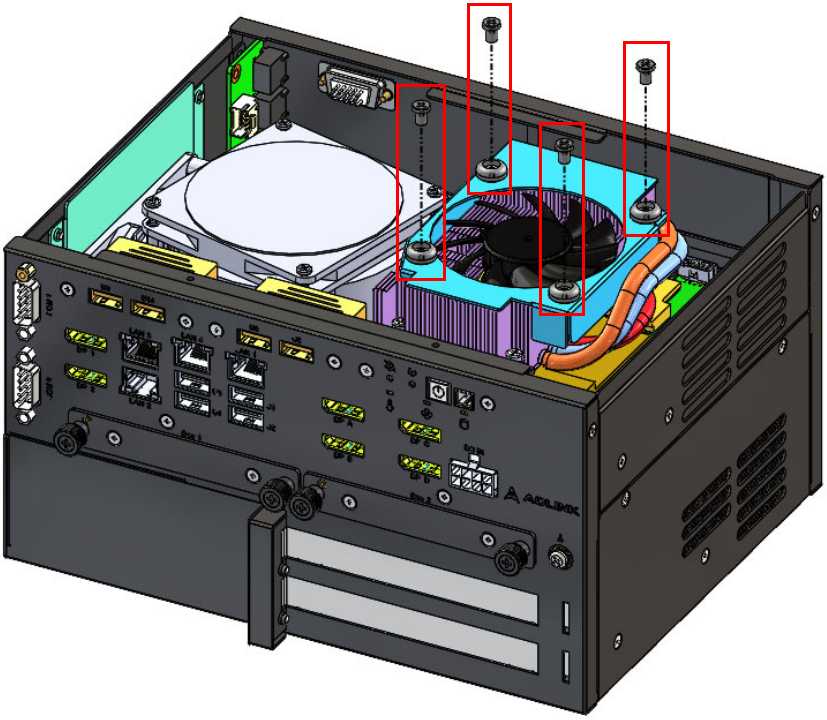
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5. Place 4 washers PN: 33-90086-0000-A0 and 4 rubber spacers PN: 39-00039-0000 over the screw holes on the top of the fan.



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6. Use 4 screws PN: 33-03320-0050 to secure the rubber spacers to the fan at 4kgf/cm torque.



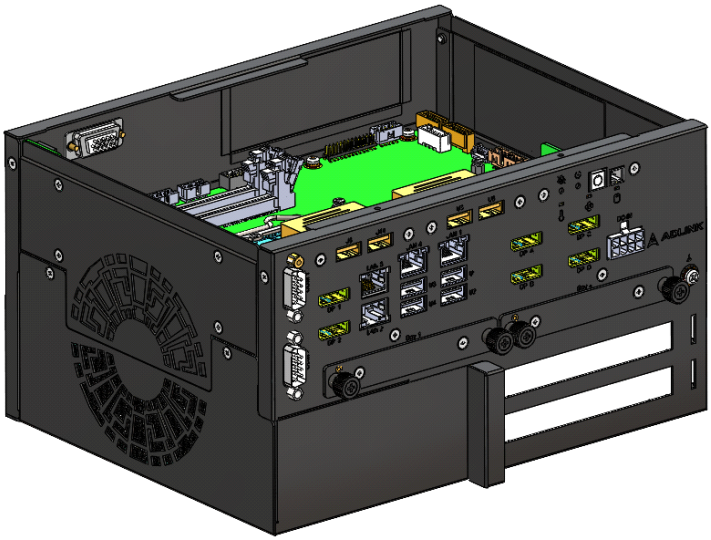
7. Screw the top panel back on at 6kgf/cm torque to complete the installation.

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4.5 Installing a PCIe x4 Add-on Card

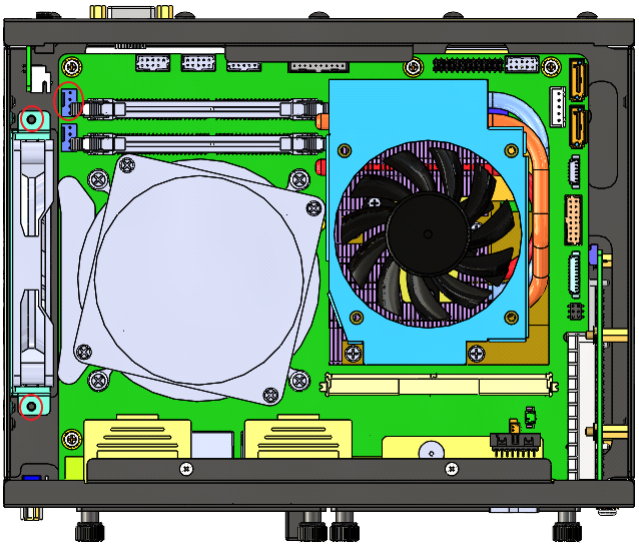
1. Remove 2 screws to detach the top panel from the chassis.





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2. Remove the 2 screws attaching the fan bracket to the chassis and disconnect the fan cable.

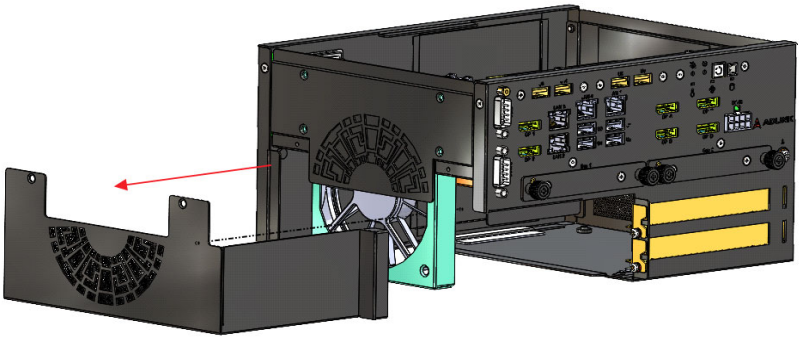


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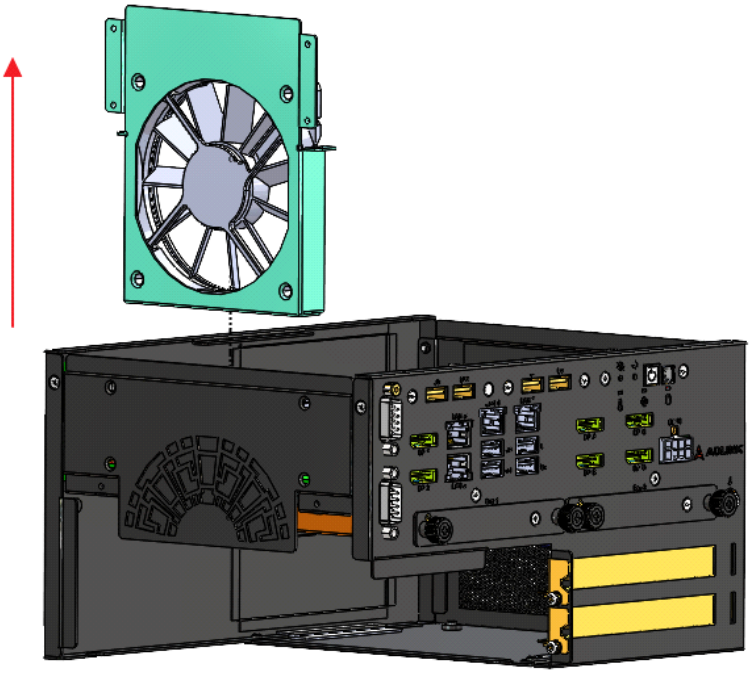
3. Remove the 8 screws attaching the BM cover to the chassis.



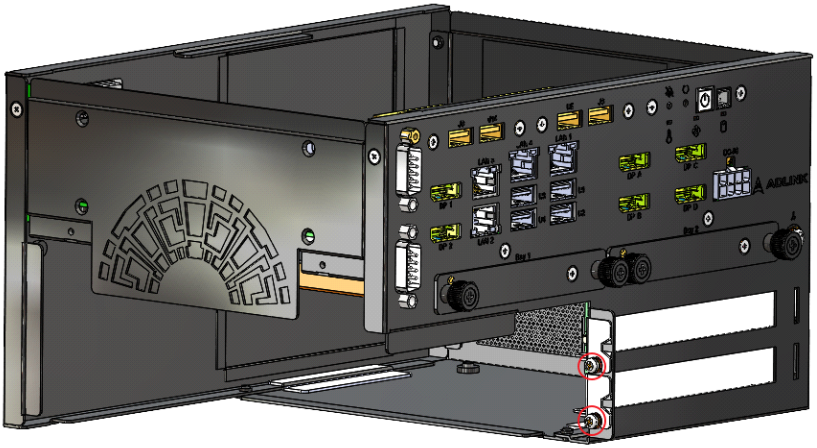
4. Remove the BM cover.



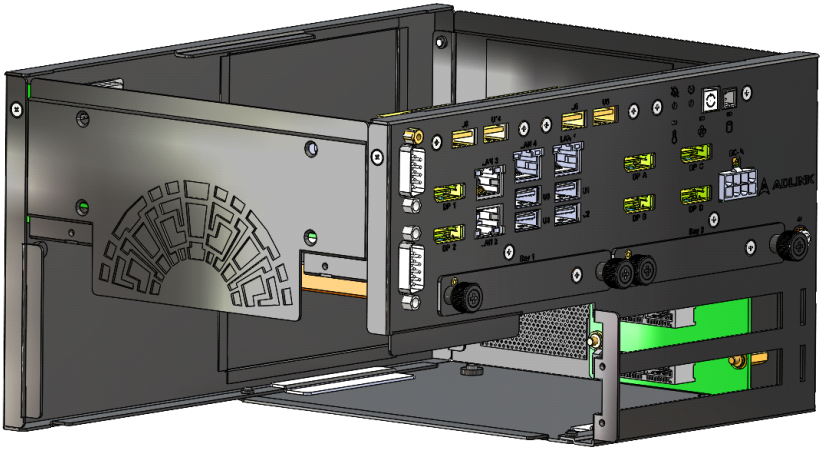
5. Remove the fan.



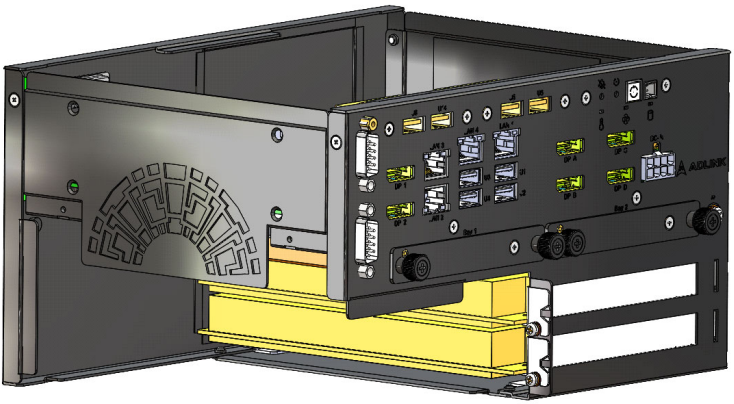
6. Remove the 2 screws connecting the PCIe bracket.



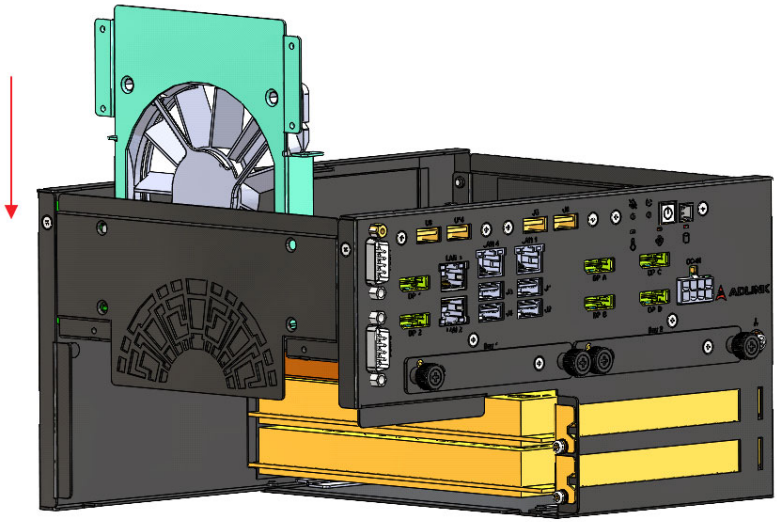
7. Remove the PCIe bracket.



8. Install a PCIe x4 add-on card and tighten the lock screw at 6kgf/cm torque.

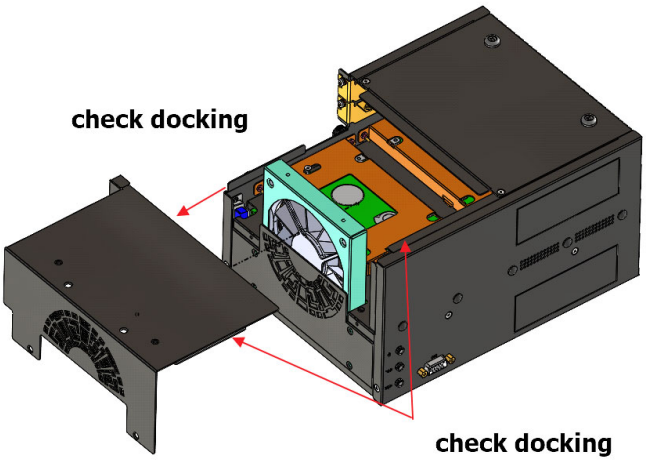


9. Reinstall the fan, connect the fan power cable and tighten the screws at 6kgf/cm torque.



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10. Attach the bottom cover and tighten the screws at 6kgf/cm torque.



11. Attach the BM and top covers and tighten the screws at 6kgf/cm torque.

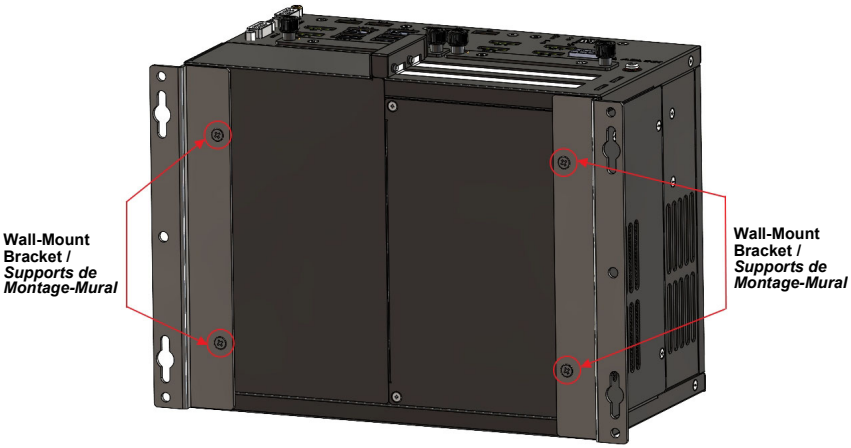
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4.6 Mounting

4.6.1 Installing the Wall-Mount Brackets / Installation des Supports de Montage-Mural

Use the 4 footpad screws to attach the 2 wall-mount brackets to the chassis.

Utilisez les 4 incluses dans la boîte d'accessoires pour fixer les 2 supports de montage mural inclus au châssis.

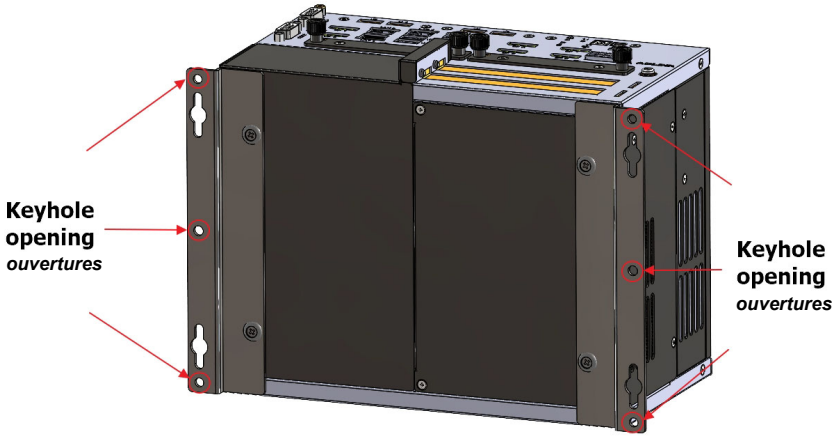


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Mounting the Device / Montage de l'Appareil

Mount the device to a wall using the 4 keyhole openings indicated with M4 6mm screws torqued to 6kgf/cm, or the 6 mounting holes circled, according to the spacing dimensions of the holes in the bracket as shown in Figure 2-6 MLB-3002 Top View.

Montez l'appareil sur un mur en utilisant les 4 ouvertures en forme de trou de serrure indiquées avec des vis M4 de 6 mm serrées à 6 kgf/cm, ou les 6 trous de montage encerclés, selon les dimensions d'espacement des trous dans le support comme indiqué dans Figure 2-6 MLB-3002 Top View.



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4.7 Driver Installation

Download the Windows 10 drivers from the product page at https://www.adlinktech.com/Products/Industrial_PCs_Fanless_Embedded_PCs/IPCSystems/MLB-3002_Series.

The following drivers must be installed:

- Intel GPU
- Chipset
- ME
- LAN
- Audio (There are two different codec drivers. Check the audio device after driver installation.)
- MXM
- DIO
- RAID

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Appendix A Power Consumption



Information in this Appendix is for power budget planning and design purposes only. Actual power consumption may differ based on final application.

A.1 Power Consumption Reference

Power consumption as follows is based on lab data in which 12V DC is applied and current is measured by the DC power supply. The power consumption (W) is calculated as the product of applied voltage (V) and the current (A).

Platforms tested for this data have available external I/O interfaces, and are attached to supported devices such as keyboard/ mouse, USB dummy load, COM loopback, LAN port, PCIe add-on card, and with an internal SSD driver installed.

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Information is presented for reference only. Actual power consumption will vary with different attached devices and operating system.

MLB-3002	Power Consumption
65W CPU/RTX5000 Full loading	365W
65W CPU/RTX3000 Full loading	335W
65W CPU/T1000 Full loading	305W
65W CPU/P5000 Full loading	355W
65W CPU/P3000 Full loading	330W
65W CPU/P2000 Full loading	313W
65W CPU/P1000 Full loading	302W
35W CPU/RTX5000 Full loading	335W
35W CPU/RTX3000 Full loading	305W
35W CPU/T1000 Full loading	275W
35W CPU/P5000 Full loading	325W
35W CPU/P3000 Full loading	300W
35W CPU/P2000 Full loading	283W
35W CPU/P1000 Full loading	272W

Table A-1: MLB-3002 Power Consumption

NOTE:

- Sufficient power for the entire system is required to meet these specifications. We recommend using a DC source instead of the optional 240W adapter when power consumption is over 240W in an environment where the temperature is 40°C.
- Heat generated by add-on PCIe adapters affects thermal stability. Additional heat dissipation is required when the system operates at high temperatures or in harsh environments with add-on adapters.

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Appendix B Resource Mapping

B.1 BIOS Mapping in SPI ROM

The chipset supports up to three SPI ROMs (SPI_CS0#, SPI_CS1# and SPI_CS2#). The motherboard uses SPI flash SPI_CS0# to select the SPI flash which stores ME firmware and the system BIOS. The size of the SPI ROM is 16MB for H310, and 32MB for Q370 chipsets.

From a software standpoint, the serial peripheral interface (SPI) resides in the memory mapped space. This function contains registers that allow for the setup and programming of devices that reside on the SPI interface. The physical SPI ROM can be accessed by putting an address into the flash address register.

The motherboard SPI ROM mapping is as below.

Region	Size
Descriptor	4 KB
ME	8 MB - 4 KB
BIOS	8 MB

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B.2 PCI/PCIe Devices

The following table lists all PCI/PCIe devices in the system.

Bus Number	Device Number	Function Number	Routing	Description
0	0x00	0	N/A	Intel HOST Bridge - 6 Cores/Desktop
0	0x02	0	Internal	IGFX - GT2/6 Cores/Desktop
0	0x01	0	Internal	PEG Root Port D1F0
0	0x12	0	Internal	Thermal Subsystem
0	0x14	0	Internal	USB 3.1 xHCI HC
0	0x14	2	Internal	Shared SRAM
0	0x15	0	Internal	I^2C Controller #0
0	0x15	1	Internal	I^2C Controller #1
0	0x16	0	Internal	HECI #1
0	0x17	0	Internal	SATA Controller (AHCI)
0	0x1C	0	Internal	PCI Express* Root Port #1
0	0x1D	0	Internal	PCI Express* Root Port #9
0	0x1D	3	Internal	PCI Express* Root Port #12
0	0x1E	0	Internal	UART #0
0	0x1F	0	Internal	LPC Controller
0	0x1F	3	Internal	Intel® High Definition Audio Interface
0	0x1F	4	Internal	SMBus Controller
0	0x1F	5	Internal	SPI (flash) Controller
0	0x1F	6	Internal	GbE Controller


NOTE:

* - The bus number changes if a PEG/PCIe port has a bridge device attached.

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B.3 IRQ Lines (APIC Mode)

The following table lists the IRQ line mapping when APIC mode is enabled.

IRQ #	Typical Interrupt Resource	Connected to Pin	Available
0	Counter 0	N/A	No
1	Keyboard Controller	N/A	No
2	Cascade Interrupt from slave PIC	N/A	No
3	Serial Port 2 (COM2)	IRQ3 via SERIRQ/PIRQ	No
4	Serial Port 1 (COM1)	IRQ4 via SERIRQ/PIRQ	No
5	N/A	IRQ5 via SERIRQ/PIRQ	No
6	N/A	IRQ6 via SERIRQ/PIRQ	No
7	N/A	IRQ7 via SERIRQ/PIRQ	No
8	Real-Time Clock	N/A	No
9	Generic	N/A	No
10	N/A	IRQ10 via SERIRQ/PIRQ	No
11	N/A	IRQ11 via SERIRQ/PIRQ	No
12	N/A	IRQ12 via SERIRQ/PIRQ	No
13	Math Processor	N/A	No
14	Generic	N/A	No
15	N/A	N/A	No
16-511	Microsoft ACPI-Compliant System	N/A	Yes

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B.4 IRQ Lines (PIC Mode)

The following table lists the IRQ line mapping when APIC mode is disabled.

IRQ #	Typical Interrupt Resource	Connected to Pin	Available
0	Counter 0	N/A	No
1	Keyboard Controller	N/A	No
2	Cascade Interrupt from slave PIC	N/A	No
3	Serial Port 2 (COM2)	IRQ3 via SERIRQ/PIRQ	See note.
4	Serial Port 1 (COM1)	IRQ4 via SERIRQ/PIRQ	See note.
5	N/A	IRQ5 via SERIRQ/PIRQ	See note.
6	N/A	IRQ6 via SERIRQ/PIRQ	See note.
7	N/A	IRQ7 via SERIRQ/PIRQ	See note.
8	Real-Time clock	N/A	No
9	Generic	N/A	No
10	N/A	IRQ10 via SERIRQ/PIRQ	See note.
11	N/A	IRQ11 via SERIRQ/PIRQ	See note.
12	N/A	IRQ12 via SERIRQ/PIRQ	No
13	Math Processor	N/A	No
14	Generic	N/A	No
15	N/A	N/A	See note.

NOTE:

The IRQs can be used for PCI devices when the onboard device is disabled.

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B.5 System Memory Mapping

The following table lists the system memory mapping.

Address Range (Decimal)	Address Range (Hex)	Size	Description
(4GB – 2MB)	FFE00000 – FFFFFFFF	2 MB	High BIOS Area
(4GB – 18MB) – (4GB –17MB – 1)	FEE00000 – FEEFFFFF	1 MB	MSI Interrupt
(4GB – 20MB) – (4GB – 19MB – 1)	FEC00000 – FECFFFFF	1 MB	APIC Configuration Space
15MB – 16MB	F00000 – FFFFFF	1 MB	ISA Hole
1MB – 15MB	100000 – EFFFFF	14 MB	Main Memory
0K – 1MB	00000 – FFFFF	1 MB	DOS Compatibility Memory

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B.6 System I/O Mapping

The following table lists the system I/O mapping.

I/O Range (Hex)	Device
020h – 02Dh & 030h – 03Dh	Interrupt controller 1, 8259 equivalent
02Eh – 02Fh	Motherboard resource
040h – 043h & 050h – 053h	System Timer
04Eh – 04Fh	Motherboard resource
060h, 062h, 064h, 066h, 068h – 06Fh	8042 equivalent (keyboard)
061h, 063h, 065h, 067h	NMI control and status
070h – 077h	Real Time Clock Controller (bit 7 – NMI mask)
092h	Reset(Bit 0)/Fast Gate A20 (Bit 1)
0A0h – 0B1h & 0B4h – 0BDh	Interrupt Controller 2, 8259 equivalent
0B2h and 0B3h	APM control and status port
0E0h – 0EFh	Available
0F0h	Co-processor error register
2F8h – 2FFh	Serial Port 2
3F8h – 3FFh	Serial Port 1
378h – 37Fh	Available
380h – 3AFh	Available
4D0h	Master PIC Edge/Level Trigger register
4D1h	Slave PIC Edge/Level Trigger register
0A00h – 0A2Fh	Reserved for SIO functions base address (e.g. PME/GPIO etc.)
0CF8h – 0CFBh	PCI configuration address register (32-bit I/O only)
0CF9h	Reset Controller register (8-bit I/O)
0CFCh – 0CFFh	PCI configuration data register
1800h	PM (ACPI) Base Address for SB

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B.7 PCI/PCIe Interrupt Routing Mapping

B.7.1 Internal Devices

INT Line	Audio Controller	xHCI Controller	TXE Controller #1	LPC Controller	SATA Controller	SMBus Controller
Int0	INTA: 16	INTA: 16	INTA: 16	INTA: 16	INTA: 16	INTA: 16
Int1		INTB: 17	INTB: 17	INTB: 17		
Int2		INTC: 18	INTC: 18	INTC: 18		
Int3		INTD: 19	INTD: 19	INTD: 19		

B.7.2 PCIe Root Ports

INT Line	PCIe Port 1	PCIe Port 5	PCIe Port 6	PCIe Port 11	PCIe Port 17	PCIe Port 21
Int0	INTA: 16	INTA: 16	INTB: 17	INTC: 18	INTA: 16	INTA: 16
Int1	INTB: 17	INTB: 17	INTC: 18	INTD: 19	INTB: 17	INTB: 17
Int2	INTC: 18	INTC: 18	INTD: 19	INTA: 16	INTC: 18	INTC: 18
Int3	INTD: 19	INTD: 19	INTA: 16	INTB: 17	INTD: 19	INTD: 19

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B.8 SMBus Slave Address Mapping

The following table lists the SMBus slave address (8-bit addressing) mapping.

Device	Address
DIMM A	0A0h
DIMM B	0A4h
BMC	050h
NXP	0C0h

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Appendix C BIOS Setup

BIOS can be configured via the BIOS Setup Utility that is invoked during BIOS boot phase. The BIOS configuration is kept in NVRAM which is the same hardware part where the BIOS is stored. All settings will remain after the system is powered down.

C.1 BIOS Setup Menu

The BIOS Setup Utility is invoked by pressing <ESC> or <DEL> when the system boots. A system reboot is required when changes are made in the BIOS setup utility.

The BIOS Setup Utility includes the following hotkeys.

- <F1>: General help
- <F8>: Load previous BIOS values
- <F9>: Load BIOS default values
- <F10>: Save & Exit the setup utility

Menu Selection Bar

The Menu Selection Bar is located at the top of the screen. It displays the top level menus available to the user.

- Main Menu
- Advanced Menu
- Chipset Menu
- Security Menu
- Boot Menu
- Save & Exit Menu

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Menu Conventions

The appearance of the setup menus and items listed in this chapter are based on a VT100 terminal connection via serial console with the following menu conventions.

- Using color

  The default BIOS setup fields are in black. The BIOS setup fields currently not used are in grey. The display strings are in black.

- Using brackets

  Editable menu options are marketed with square brackets, '[' and ']'.

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C.2 Menu Structure

This section presents the six primary menus of the BIOS Setup Utility. Use the following tables as a quick reference for the contents of the BIOS Setup Utility. The remainder of this chapter describe the submenus and options for each menu item. The default settings are presented in bold, and the function of each setting is described in the right hand column of the table.

Main	Advanced
- BIOS Information	- CPU Configuration ►
- System Information	- Graphics Configuration ►
- Processor Information	- Power Management ►
- Memory Information	- System Management ►
- PCH Information	- Thermal Management ►
- Board Information►	- Watchdog Timer ►
- System Date	- Super IO Configuration ►
- System Time	- Serial Console Redirection ►
- Access level	- Trusted Computing ►
	- S5 RTC Wake Settings ►
	- NVMe Configuration ►
	- Network Stack Configuration ►
	- RAM Disk Configuration ►
	- Network Configuration ►

Chipset	Security
- System Agent (SA) Configuration ►	- Password Description
- PCH-IO Configuration ►	- Administrator Password
	- User Password
	- Secure Boot menu ►

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Boot	Save & Exit
- Boot Configuration	- Save Changes and Exit
- Setup Prompt Timeout	- Discard Changes and Exit
- Bootup NumLock State	- Save Changes and Reset
- Quiet Boot	- Discard Changes and Reset
- Fast Boot	- Save Changes
- Boot Order	- Discard Changes
	- Restore Defaults
	- Save as User Defaults
	- Restore User Defaults
	- Boot Override


NOTE:

- ▶ indicates a submenu
- Gray text indicates info only
- **Bold text** indicates a default setting

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C.3 Main Menu

This menu provides read-only information about your system and also allows you to set the System Date and Time. Refer to the tables below for details of the submenus and settings.

C.3.1 Main > BIOS Information

Feature	Options	Description
BIOS Information	Info only	
BIOS Vendor	Info only	BIOS Vendor
BIOS Version	Info only	BIOS Version.
Build Date	Info only	BIOS build date
MRC Version	Info only	MRC Version
GOP Version	Info only	GOP Version
ME FW Version	Info only	ME FW Version

C.3.2 Main > System Information

Feature	Options	Description
System Information	Info only	
Project Name	Info only	Project Name

C.3.3 Main > Processor Information

Feature	Options	Description
CPU Board Version	Info only	CPU Board Version
CPU Brand String	Info only	CPU Brand String
Stepping	Info only	CPU Stepping
GT Info	Info only	GT Info
CPU Frequency	Info only	CPU Frequency

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C.3.4 Main > Memory Information

Feature	Options	Description
Total Memory	Info only	Total Memory
Memory Frequency	Info only	Memory Frequency

C.3.5 Main > PCH Information

Feature	Options	Description
PCH SKU	Info only	PCH SKU
Stepping	Info only	PCH Stepping

C.3.6 Main > Board Information > Board Information

Feature	Options	Description
Board Information	Info only	
Serial Number	Info only	Serial Number
Manufacturing Date	Info only	Manufacturing Date
Last Repair Date	Info only	Last Repair Date
MAC ID	Info only	MAC ID

C.3.7 Main > Board Information > Runtime Statistics

Feature	Options	Description
Runtime Statistics	Info only	
Total Runtime	Info only	Total Runtime
Current Runtime	Info only	Current Runtime
Power Cycles	Info only	Power Cycles
Boot Cycles	Info only	Boot Cycles
Boot Reason	Info only	Boot Reason

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C.3.8 Main > System Date & Time

Feature	Options	Description
System Date	Weekday, MM/DD/ YYYY	Requires the alpha-numeric entry of the day of the week, day of the month, calendar month, and all 4 digits of the year, indicating the century and year (Fri XX/XX/20XX)
System Time	HH/MM/SS	Presented as a 24-hour clock setting in hours, minutes, and seconds

C.3.9 Main > Access Level

Feature	Options	Description
Access	Level	Administrator / User

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C.4 Advanced Menu

This menu contains the settings for most of the user interfaces in the system.

C.4.1 Advanced > CPU Configuration

Feature	Options	Description
CPU Configuration	Info only	
Type	Info only	Displays the Processor Type
Package	Info only	Displays the Processor Package
Stepping	Info only	Displays the Processor Stepping.
Number of Processors	Info only	Displays number of CPU cores.
CPUID	Info only	Displays the Processor ID.
Microcode Revision	Info only	CPU Microcode Revision
Speed	Info only	Displays the Processor Speed.
L1 Data Cache	Info only	Displays the Processor L1 Data Cache size.
L1 Instruction Cache	Info only	Displays the Processor L1 Instruction Cache size.
L2 Cache	Info only	Displays the Processor L2 Cache size.
L3 Cache	Info only	Displays the Processor L3 Cache size.
L4 Cache	Info only	Displays the Processor L4 eDRAM size.
VMX	Info only	VMX Supported or Not
SMX/TXT	Info only	SMX/TXT Supported or Not
Active Processor Cores	**All** (based on CPU SKU)	Number of cores to enable in each processor package.
Intel (VMX) Virtualization Technology	Disabled **Enabled**	When enabled, a VMM can utilize the additional hardware capabilities provided by Vanderpool Technology.
Intel Trusted Execution Technology	**Disabled** Enabled	Enables utilization of additional hardware capabilities provided by Intel (R) Trusted Execution Technology.
Intel(R) SpeedStep(tm)	Disabled **Enabled**	Allows more than two frequency ranges to be supported.

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Feature	Options	Description
Intel(R) Speed Shift Technology	Disabled **Enabled**	Enables/Disables Intel(R) Speed Shift Technology support. Enabling will expose the CPPC v2 interface to allow for hardware controlled P-states.
Turbo Mode	Disabled **Enabled**	Enables/Disables processor Turbo Mode (requires Intel Speed Step or Intel Speed Shift to be available and enabled).
C states	Disabled **Enabled**	Enables/Disables CPU Power Management. Allows CPU to go to C states when not 100% utilized.
C-State Auto Demotion	Disabled C1 C3 **C1 and C3**	Configure C-State Auto Demotion
C-State Un-demotion	Disabled C1 C3 **C1 and C3**	Configure C-State Un-demotion
Package C-State Demotion	**Disabled** Enabled	Package C-State Demotion
Package C-State Un-demotion	**Disabled** Enabled	Package C-State Un-demotion
Package C State Limit	C0/C1 C2 C3 C6 C7 C7S C8 C9 C10 Cpu Default **Auto**	Maximum Package C State Limit Setting. Cpu Default: Leaves to Factory default value. Auto: Initializes to deepest available Package C State Limit.

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Feature	Options	Description
Tcc Activation Offset	0-63 **Default: 0**	Offset from factory set Tcc activation temprature at which the Thermal Control Circuit must be activated. Tcc will be activated at: Tcc Activation Temp - Tcc Activation Offset. Tcc Activation Offset range is 0 to 63.

C.4.2 Advanced > Graphics Configuration

Feature	Options	Description
Graphics Configuration	Info only	
LVDS	Info only	
eDP/LVDS	Disabled **Enabled**	Enables/Disables eDP/LVDS
LFP Panel Type	**VBIOS Default** 640x480 800x600 1024x768 1280x1024 1400x1050 1266x768 1600x1200 1366x768 1680x1050 1920x1200 1440x900 1600x900 1024x768 1280x800 1920x1080 2048x1536	Select LFP panel used by Internal Graphics Device by selecting the appropriate setup item.
Spreading depth	**No Spreading** 0.50% 1.00% 1.50% 2.00% 2.50%	Clock frequency center spreading depth.

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Feature	Options	Description
Data format and Color Depth	**VESA 24 bpp** JEIDA 24 bpp JEIDA/vesa 18 bpp	Data format and Color Depth select
LVDS Output Mode	**Dual LVDS bus** Single LVDS bus	Single/Dual mode select
DE Polarity	**Active High** Active Low	DE Polarity select
Vsync Polarity	**Active High** Active Low	Vsync Polarity select
Hsync Polarity	**Active High** Active Low	Hsync Polarity select
LVDS Backlight Mode	BMC Mode **GTT Mode**	Select LVDS Backlight control function.
LVDS Backlight Brightness	BMC Mode: 0-255 **Default: 255**	Set LVDS Backlight Brightness Percentage. The change takes effect immediately.
	GTT Mode: 0-100 **Default 100**	

C.4.3 Advanced > Power Management

Feature	Options	Description
Power Management	Info only	
Enable ACPI Auto Configuration	**Disabled** Enabled	Enables/Disables BIOS ACPI Auto Configuration.
Enable Hibernation	Disabled **Enabled**	Enables/Disables System ability to Hibernate (OS/S4 Sleep State). This option may not be effective with some operating systems.
ACPI Sleep State	Suspend Disabled **S3 (Suspend to RAM)**	Select the highest ACPI sleep state the system will enter when the SUSPEND button is pressed.

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Feature	Options	Description
Lock Legacy Resources	**Disabled** Enabled	Enables/Disables Lock of Legacy Resources
Restore AC Power Loss	Power On Power Off **Last State**	Select AC power state when power is re-applied after a power failure.
Power Supply Unit	Emulate AT Mode **ATX Mode**	ATX: OS will turn off system power when shutdown. NOTE: AT mode will not support S3 & S4, so it will change Power Loss State to Power On
PCI Express Wake	Disabled **Enabled**	Enables/Disables PCI Express Wake ping for PCIe device wake function
Power Consumption ►	Sub-Menu	Power Consumption

C.4.4 Advanced > Power Management > Power Consumption

Feature	Options	Description
Power Consumption	Info only	
Current Input Current	Info only	Current Input Current
Current Input Power	Info only	Current Input Power
VIN	Info only	VIN
VCORE	Info only	VCORE
RTC	Info only	RTC

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C.4.5 Advanced > System Management

Feature	Options	Description
System Management	Info only	
Version	Info only	
SEMA Firmware	Info only	Version of SEMA Firmware
Build Date	Info only	Build Date of SEMA Firmware
SEMA Bootloader	Info only	Version of SEMA Bootloader
Build Date	Info only	Build Date of SEMA Bootloader
SEMA Features ►	Sub-Menu	SEMA Features
Flags ►	Sub-Menu	Flags
SPI ROM WP ►	Sub-Menu	SPI ROM write protect
BIOS Post Update Menu	Sub-Menu	An update BIOS interface

C.4.6 Advanced > System Management > SEMA Features

Feature	Options	Description
SEMA Features	Info only	
Uptime & Power Cycles Counter	Info only	Uptime & Power Cycles Counter
System Restart Event	Info only	System Restart Event
1024 Bytes User-Flash	Info only	1024 Bytes User-Flash
Watchdog	Info only	Watchdog
Temperatures	Info only	Temperatures
Voltage Monitor	Info only	Voltage Monitor
Display Backlight control	Info only	Display Backlight control
Power-Up Watchdog	Info only	Power-Up Watchdog
Power Monitor (current sense)	Info only	Power Monitor (current sense)
Boot Counter	Info only	Boot Counter
5V Input-Voltage	Info only	5V Input-Voltage
4mR Rsense for Input-Voltage	Info only	4mR Rsense for Input-Voltage
CPU Fan	Info only	CPU Fan
System Fan 1	Info only	System Fan 1

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Feature	Options	Description
AT/ATX mode	Info only	AT/ATX mode
ACPI Thermal Trigger	Info only	ACPI Thermal Trigger
Backlight restore	Info only	Backlight restore
DTS register available	Info only	DTS register available
System Fan 2	Info only	System Fan 2
TIVA BMC	Info only	TIVA BMC
Board2 Temperature	Info only	Board2 Temperature
SEMA Error Log	Info only	SEMA Error Log
Soft Fan	Info only	Soft Fan

C.4.7 Advanced > System Management > Flags

Feature	Options	Description
Flags	Info only	
BMC Flags	Info only	BMC Flags
BIOS Select	Info only	BIOS Select
ATX/AT-Mode	Info only	ATX/AT-Mode
Exception Code	Info only	Exception Code

C.4.8 Advanced > System Management > SPI ROM WP

Feature	Options	Description
SPI ROM Write Protect	**Disabled** Enabled	Enables/Disables SPI ROM Write Protect

C.4.9 Advanced > System Management > BIOS Post Update Menu

Feature	Description
BIOS Post Update Menu	An update BIOS interface.
Choose BIOS Image	An interface to let users choose a BIOS image in a local storage device.
Start Flash	Start to flash BIOS

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C.4.10 Advanced > Thermal Management

Feature	Options	Description
Thermal Management	Info only	
CPU Temperature	Info only	
Current	Info only	Current CPU temperature
Startup	Info only	Startup CPU temperature
Min	Info only	Min. CPU temperature
Max	Info only	Max. CPU temperature
Board Temperatures	Info only	
Current	Info only	Current Board temperature
Startup	Info only	Startup Board temperature
Min	Info only	Min. Board temperature
Max	Info only	Max. Board temperature
GPU Temperatures	Info only	
Current	Info only	Current GPU temperature
Startup	Info only	Startup GPU temperature
Min	Info only	Min. GPU temperature
Max	Info only	Max. GPU temperature
CPU Fan Speed	Info only	CPU Fan Speed
System Fan Speed	Info only	System Fan Speed
GPU Fan Speed	Info only	GPU Fan Speed
Smart Fan ►	Sub-Menu	Smart Fan
Critical Trip Point	**Disabled** 80 C 90 C 95 C	This value is the temperature threshold of the Critical Trip Point.
Passive Cooling Trip Point	Disabled 70 C 80 C 90 C **99 C**	This value is the temperature threshold of the Passive Cooling Trip Point.

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C.4.11 Advanced > Thermal Management > Smart Fan

Feature	Options	Description
Smart Fan	Info only	
CPU Smart FanTemperature Source	**CPU Sensor**	CPU Smart FanTemperature Source
CPU Fan Mode	**AUTO (Smart Fan)** Fan Off Fan On	CPU Fan Mode
Trigger Point 1	Info only	
Trigger Temperature	0-100 **Default: 0**	Trigger Temperature
PWM Level	0-100 **Default: 30**	PWM Level
Trigger Point 2	Info only	
Trigger Temperature	0-100 **Default: 50**	Trigger Temperature
PWM Level	0-100 **Default: 65**	PWM Level
Trigger Point 3	Info only	
Trigger Temperature	0-100 **Default: 85**	Trigger Temperature
PWM Level	0-100 **Default: 80**	PWM Level
Trigger Point 4	Info only	
Trigger Temperature	0-100 **Default: 92**	Trigger Temperature
PWM Level	0-100 **Default: 100**	PWM Level
System Smart FanTemperature Source	**CPU Sensor**	System Smart FanTemperature Source
System Fan Mode	**AUTO (Smart Fan)** Fan Off Fan On	System Fan Mode
Trigger Point 1	Info only	

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Feature	Options	Description
Trigger Temperature	0-100 **Default: 0**	Trigger Temperature
PWM Level	0-100 **Default: 30**	PWM Level
Trigger Point 2	Info only	
Trigger Temperature	0-100 **Default: 50**	Trigger Temperature
PWM Level	0-100 **Default: 45**	PWM Level
Trigger Point 3	Info only	
Trigger Temperature	0-100 **Default: 85**	Trigger Temperature
PWM Level	0-100 **Default: 65**	PWM Level
Trigger Point 4	Info only	
Trigger Temperature	0-100 **Default: 92**	Trigger Temperature
PWM Level	0-100 **Default: 100**	PWM Level
GPU Smart FanTemperature Source	**GPU Sensor**	GPU Smart FanTemperature Source
GPU Fan Mode	**AUTO (Smart Fan)** Fan Off Fan On	GPU Fan Mode
Trigger Point 1	Info only	
Trigger Temperature	0-100 **Default: 0**	Trigger Temperature
PWM Level	0-100 **Default: 25**	PWM Level
Trigger Point 2	Info only	
Trigger Temperature	0-100 **Default: 45**	Trigger Temperature
PWM Level	0-100 **Default: 50**	PWM Level
Trigger Point 3	Info only	

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Feature	Options	Description
Trigger Temperature	0-100 **Default: 60**	Trigger Temperature
PWM Level	0-100 **Default: 75**	PWM Level
Trigger Point 4	Info only	
Trigger Temperature	0-100 **Default: 80**	Trigger Temperature
PWM Level	0-100 **Default: 100**	PWM Level

C.4.12 Advanced > Watchdog Timer

Feature	Options	Description
Watchdog Timer	Info only	
Power-Up Watchdog	**Disabled** Enabled	The Power Up Watchdog resets the system after a certain amount of time after power up.
Timeout	0-65535 **Default: 65535**	The time the Power Up Watchdog should wait until it resets the system.
ATTENTION: Pressing F12 during start up disables the Power Up Watchdog.	Info only	
RunTime Watchdog	**Disabled** Enabled	The RunTime Watchdog resets the system after a certain amount of time after power up.
Timeout	0-65535 **Default: 24**	The Power Up Watchdog should wait until it resets the system.
Watchdog ACPI Event Shutdown	**Disabled** Enabled	Enables/Disables Watchdog ACPI Event Shutdown

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C.4.13 Advanced > Super IO Configuration

Feature	Options	Description
Super IO Configuration	Info only	
COM1 Device Settings	Info only	IO=3F8h; IRQ=4;
COM1 Control	**RS232**	Select COM1 mode. RS232 only
Ring1 Wake	Disabled **Enabled**	Disable/Enable RI ping for Wake On Ring function(PCH PME# signal)
COM2 Device Settings	Info only	IO=2F8; IRQ=3;
COM2 Control	**RS232** RS422 RS485	Select COM2 mode. RS232, RS422 or RS485
Ring2 Wake	Disabled **Enabled**	Disable/Enable RI ping for Wake On Ring function(PCH PME# signal)

C.4.14 Advanced > Serial Console Redirection

Feature	Options	Description
Serial Console Redirection	Info only	
COM1	Info only	
Console Redirection	**Disabled** Enabled	Enables/Disables Console Redirection
Console Redirection Settings ►	Submenu	The settings specify how the host computer and the remote computer will exchange data. Both computers should have the same or compatible settings.
COM2	Info only	
Console Redirection	**Disabled** Enabled	Enables/Disables Console Redirection
Console Redirection Settings ►	Submenu	The settings specify how the host computer and the remote computer will exchange data. Both computers should have the same or compatible settings.

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C.4.15 Advanced > Console Redirection Settings [COM1-2]

Feature	Options	Description
COM[1-2] Console Redirection Settings	Info only	
Terminal Type	VT100 VT100+ VT-UTF8 **ANSI**	Emulation: ANSI: Extended ASCII char set. VT100: ASCII char set. VT100+: Extends VT100 to support color, function keys, etc. VT-UTF8: Uses UTF8 encoding to map Unicode chars onto 1 or more bytes.
Bits per second	9600 19200 38400 57600 **115200**	Selects serial port transmission speed. The speed must be matched on both connected systems. Long or noisy lines may require lower speeds.
Data Bits	7 **8**	Data Bits.
Parity	**None** Even Odd Mark Space	A parity bit can be sent with the data bits to detect some transmission errors. Even: parity bit is 0 if the num of 1's in the data bits is even. Odd: parity bit is 0 if num of 1's in the data bits is odd. Mark: parity bit is always 1. Space: Parity bit is always 0. Mark and Space Parity do not allow for error detection. They can be used as an additional data bit.
Stop Bits	**1** 2	Stop bits indicate the end of a serial data packet. (A start bit indicates the beginning). The standard setting is 1 stop bit. Communication with slow devices may require more than 1 stop bit.

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Feature	Options	Description
Flow Control	**None** Hardware RTS/CTS	Flow control can prevent data loss from buffer overflow. When sending data, if the receiving buffers are full, a 'stop' signal can be sent to stop the data flow. Once the buffers are empty, a 'start' signal can be sent to re-start the flow. Hardware flow control uses two wires to send start/stop
VT-UTF8 Combo Key Support	Disabled **Enabled**	Enable VT-UTF8 Combination Key Support for ANSI/VT100 terminals
Recorder Mode	**Disabled** Enabled	With this mode enabled only text will be sent. This is to capture Terminal data.
Resolution 100x31	**Disabled** Enabled	Enables/Disables extended terminal resolution
Putty KeyPad	**VT100** LINUX XTERMR6 SCO ESCN VT400	Select FunctionKey and KeyPad on Putty.

C.4.16 Advanced > Trusted Computing [TPM 2.0 Configuration]

Feature	Options	Description
Configuration	Info only	
Security Device Support	Disabled **Enabled**	Enables/Disables BIOS support for security device. OS will not show Security Device. TCG EFI protocol and INT1A interface will not be available.
TPM 2.0 Configuration	Info only	
TPM20 Device Found	Info only	
Firmware Version:	Info only	
Vendor:	Info only	

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Feature	Options	Description
Security Device Support	Disabled **Enabled**	Enables/Disables BIOS support for security device. OS will not show Security Device. TCG EFI protocol and INT1A interface will not be available.
Active PCR banks	Info only	
Available PCR banks	Info only	
SHA-1 PCR Bank	Disabled **Enabled**	Enables/Disables SHA-1 PCR Bank
SHA256 PCR Bank	Disabled **Enabled**	Enables/Disables SHA256 PCR Bank
Pending operation	**None** TPM Clear	Schedule an Operation for the Security Device. NOTE: Your Computer will reboot during restart in order to change State of Security Device.
Platform Hierarchy	Disabled **Enabled**	Enables/Disables Platform Hierarchy
Storage Hierarchy	Disabled **Enabled**	Enables/Disables Storage Hierarchy
Endorsement Hierarchy	Disabled **Enabled**	Enables/Disables Endorsement Hierarchy
TPM2.0 UEFI Spec Version	TCG_1_2 **TCG_2**	Select the TCG2 Spec Version Support
Physical Presence Spec Version	1.2 **1.3**	Select to Tell OS to support PPI Spec Version 1.2 or 1.3. Note some HCK tests might not support 1.3.
PH Randomization	Disabled **Enabled**	Enables/Disables Platform Hierarchy randomization. DO NOT ENABLE THIS QUESTION IN PRODUCTION PLATFORMS. THIS IS FOR DEVELOPMENT TESTING. OVERRIDE ChangePlatformAuth ELINK for production platforms supporting TXT.

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C.4.17 Advanced > RTC Wake Settings

Feature	Options	Description
RTC Wake system from S5	**Disabled** Fixed Time Dynamic Time	Enables/Disables System wake on alarm event. FixedTime: system will wake on the hr::min::sec specified. DynamicTime: System will wake on the current time + Increase minute(s)
Wake up hour	0-23 **Default: 0**	Range: 0-23 hr For example enter 3 for 3am and 15 for 3pm
Wake up minute	0-59 **Default: 0**	Range: 0-59 min
Wake up second	0-59 **Default: 0**	Range: 0-59 sec
Wake up minute increase	1-5 **Default: 1**	Range: 1-5 min

C.4.18 Advanced > NVMe Configuration

Feature	Options	Description
NVMe Configuration	Info only	
List NVMe Device	Info only	

C.4.19 Advanced > Network Stack Configuration

Feature	Options	Description
Network Stack	**Disabled** Enabled	Enables/Disables UEFI Network Stack
Ipv4 PXE Support	**Disabled** Enabled	Enables/Disables IPv4 PXE boot support. If disabled, IPv4 PXE boot support will not be available.
Ipv4 HTTP Support	**Disabled** Enabled	Enables/Disables IPv4 HTTP boot support. If disabled, IPv4 HTTP boot support will not be available.

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Feature	Options	Description
Ipv6 PXE Support	**Disabled** Enabled	Enables/Disables IPv6 PXE boot support. If disabled, IPv6 PXE boot support will not be available.
Ipv6 HTTP Support	**Disabled** Enabled	Enables/Disables IPv6 HTTP boot support. If disabled, IPv6 HTTP boot support will not be available.
IPSEC Certificate	Disabled **Enabled**	Enables/Disables IPSEC certificate for Ikev.
PXE boot wait time	0-5 **Default: 0**	Wait time in seconds to press ESC key to abort PXE boot. Use either +/- or numeric keys to set the value.
Media detect count	1-50 **Default: 1**	Number of times the presence of media will be checked. Use either +/- or numeric keys to set the value.

C.4.20 Advanced > [Network Name] Network Configuration

Feature	Options	Description
This sub-menu is controlled by device firmware, refer to the actual layout.		

C.4.21 Advanced > RAM Disk Configuration

Feature	Options	Description
Disk Memory Type:	**Boot Service Data** Reserved	Specifies type of memory to use from available memory pool in system to create a disk.
Create raw ►	Sub-Menu	Create a raw RAM disk.
Create from file ►	Sub-Menu	Create a RAM disk from a given file.
Created RAM disk list:	Info only	
Remove selected RAM disk(s)	Remove selected RAM disk(s)	

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C.4.22 Advanced > RAM Disk Configuration > Create raw

Feature	Options	Description
Size (Hex):	Number	The valid RAM disk size should be multiples of the RAM disk block size.
Create & Exit	Yes	Create a new RAM disk with the given starting and ending address.
Discard & Exit	Yes	Discard and exit.

C.4.23 Advanced > RAM Disk Configuration > Create from file

Feature	Options	Description
Create from file	Select file	Create a RAM disk from a given file.

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C.5 Chipset

C.5.1 Chipset > System Agent (SA) Configuration

Feature	Options	Description
System Agent (SA) Configuration	Info only	
SA PCIe Code Version	Info only	SA PCIe Code Version
VT-d	Info only	Supported or not
Memory Configuration ►	Sub-Menu	Memory Configuration Parameters
Graphics Configuration ►	Sub-Menu	Graphics Configuration
PEG Port Configuration ►	Sub-Menu	PEG Port Options
VT-d	Disabled **Enabled**	VT-d capability
Above 4GB MMIO BIOS assignment	**Disabled** Enabled	Enables/Disables above 4GB MemoryMappedIO BIOS assignment

C.5.2 Chipset > System Agent (SA) Configuration > Memory Configuration

Feature	Options	Description
Memory Configuration	Info only	
Memory RC Version	Info only	Memory RC Version
Memory Frequency	Info only	Memory Frequency
Memory Timings (tCL-tRCD-tRP-tRAS)	Info only	Memory Timings (tCL-tRCD-tRP-tRAS)
DIMM 1	Info only	DIMM 1 info
Size	Info only	Size of DIMM 1
Number of Ranks	Info only	Number of Ranks of DIMM 1
Manufacturer	Info only	Manufacturer of DIMM 1
DIMM 2	Info only	DIMM 2 info
Size	Info only	Size of DIMM 2
Number of Ranks	Info only	Number of Ranks of DIMM 2
Manufacturer	Info only	Manufacturer of DIMM 2

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Feature	Options	Description
Memory Remap	Disabled **Enabled**	Enables/Disables Memory Remap above 4GB
Fast Boot	Disabled **Enabled**	Enables/Disables fast path through MRC

C.5.3 Chipset > System Agent (SA) Configuration > Graphics Configuration

Feature	Options	Description
Graphics Configuration	Info only	
Graphics Turbo IMON Current	14-31 **Default: 31**	Graphics turbo IMON current values supported (14-31)
Primary Display	Auto **IGFX** PEG	Select which of IGFX/PEG Graphics device should be Primary Display.
Internal Graphics	Auto Disabled **Enabled**	Keep IGFX enabled based on the setup options.
GTT Size	2MB 4MB **8MB**	GTT Size
DVMT Total Gfx Mem	128M **256M** MAX	DVMT5.0 Total Graphic Memory size used by the Internal Graphics Device.

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C.5.4 Chipset > System Agent (SA) Configuration > PEG Port Configuration

Feature	Options	Description
PEG Port Configuration	Info only	
PEG [Bus, Dev, Fun]	Info only	PEG location and info
Enable Root Port	Disabled Enabled **Auto**	Enables/Disables the Root Port
Max Link Speed	**Auto** Gen1 Gen2 Gen3	Configure PEG [Bus, Dev, Fun] Max Speed
PCIe Spread Spectrum Clocking	Disabled **Enabled**	Allows disabling Spread Spectrum Clocking for compliance testing

C.5.5 Chipset > PCH-IO Configuration

Feature	Options	Description
PCH-IO Configuration	Info only	
PCI Express Configuration ►	Sub-Menu	PCI Express Configuration settings
SATA Configuration ►	Sub-Menu	SATA Device Settings
USB Configuration ►	Sub-Menu	USB Configuration settings
Security Configuration ►	Sub-Menu	Security Configuration settings
PCH digital I/O device	**Disabled** Enabled	Enables/Disables PCH digital I/O device
SPD Write Disable	**TRUE** FALSE	Enables/Disables setting SPD Write Disable. For security recommendations, SPD write disable bit must be set.

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C.5.6 Chipset > PCH-IO Configuration > PCI Express Configuration

Feature	Options	Description
PCI Express Configuration	Info only	
PCI Express Clock Gating	Disabled **Enabled**	Enables/Disables PCI Express Clock Gating for each root port.
Pcie Pll SSC	Auto 0.0% 0.1% 0.2% 0.3% 0.4% 0.5% 0.6% 0.7% 0.8% 0.9% 1.0% 1.1% 1.2% 1.3% 1.4% 1.5% 1.6% 1.7% 1.8% 1.9% 2.0%	Pcie Pll SSC percentage. AUTO - Keep hw default, no BIOS override. Range is 0.0%-2.0%.

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C.5.7 Chipset > PCH-IO Configuration > SATA Configuration

Feature	Options	Description
SATA Configuration	Info only	
SATA Mode Selection	**AHCI** Intel RST Premium With Intel Optane System Acceleration	Determines how SATA controller(s) operate.
Serial ATA Port 0	Info only	SATA device info
Serial ATA Port 2	Info only	SATA device info
Serial ATA Port 3	Info only	SATA device info
Serial ATA Port 4	Info only	SATA device info

C.5.8 Chipset > PCH-IO Configuration > USB Configuration

Feature	Options	Description
USB Configuration	Info only	
USB Overcurrent	Disabled **Enabled**	Select 'Disabled' for pin-based debug. If pin-based debug is enabled but USB overcurrent is not disabled, USB DbC does not work.
USB Overcurrent Lock	Disabled **Enabled**	Select 'Enabled' if Overcurrent functionality is used. Enabling this will make xHCI controller consume the Overcurrent mapping data
USB Port Disable Override	**Disable Link** Select Per-Pin	Selectively Enables/Disables the corresponding USB port from reporting a Device Connection to the controller.

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Feature	Options	Description
U3_USB1_TX_P (EXTERNAL USB)	Disabled **Enabled**	Enables/Disables this USB Physical Connector (physical port). Once disabled, any USB devices plugged into the connector will not be detected by BIOS or OS.
U3_USB2_TX_P (EXTERNAL USB)	Disabled **Enabled**	
U3_USB3_TX_P (EXTERNAL USB)	Disabled **Enabled**	
U3_USB4_TX_P (EXTERNAL USB)	Disabled **Enabled**	
U3_USB5_TX_P (PIN HEADER USB)	Disabled **Enabled**	
U3_USB6_TX_P (PIN HEADER USB)	Disabled **Enabled**	
U2_USB1_P (EXTRENAL USB)	Disabled **Enabled**	
U2_USB2_P (EXTRENAL USB)	Disabled **Enabled**	
U2_USB3_P (EXTRENAL USB)	Disabled **Enabled**	
U2_USB4_P (EXTRENAL USB)	Disabled **Enabled**	
U2_USB5_P (PIN HEADER USB)	Disabled **Enabled**	
U2_USB6_P (PIN HEADER USB)	Disabled **Enabled**	
U2_USB7_P (M.2 Key_B)	Disabled **Enabled**	
U2_USB8_P (M.2 Key_E)	Disabled **Enabled**	
U2_USB9_P (INTERNAL USB)	Disabled **Enabled**	
U2_USB14_P (INTERNAL USB)	Disabled **Enabled**	

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C.5.9 Chipset > PCH-IO Configuration > Security Configuration

Feature	Options	Description
Security Configuration	Info only	
BIOS Lock	**Disabled** Enabled	Enables/Disables the PCH BIOS Lock Enable feature. Required to be enabled to ensure SMM protection of flash.

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C.6 Security

C.6.1 Security > Password Description

Feature	Options	Description
Password Description	Info only	
Administrator Password	Enter password	Sets Administrator Password
User Password	Enter password	Sets User Password
Secure Boot menu ►	Submenu	Secure Boot configuration

C.6.2 Security > Secure Boot menu

Feature	Options	Description
Secure Boot	Info only	
System Mode	Info only	Setup / User / Audit / Deployed
Secure Boot	Info only	Active / Not Active
Vendor Keys	Info only	Valid / Modified
Secure Boot Control	**Disabled** Enabled	Secure Boot feature is Active if Secure Boot is Enabled, Platform Key(PK) is enrolled and the System is in User mode. Changing this requires a platform reset.
Secure Boot Mode	**Standard** Custom	Secure Boot mode options: Standard or Custom. In Custom mode, Secure Boot Policy variables can be configured by a physically present user without full authentication.
Key Management ►	Sub-Menu	Enables expert users to modify Secure Boot Policy variables without full authentication.

C.6.3 Security > Secure Boot menu > Key Management

Feature	Options	Description
This sub-menu is provided by AMI.		

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C.7 Boot

C.7.1 Boot > Boot Configuration

Feature	Options	Description	
Boot Configuration	Info only		
Setup Prompt Timeout	1	Number of seconds to wait for setup activation key. 65535 (0xFFFF) means indefinite waiting.	
Bootup NumLock State	On **Off**	Selects the keyboard NumLock state.	
Quiet Boot	Disabled **Enabled**	Enables/Disabless Quiet Boot option.	
Fast Boot	**Disabled** Enabled	Enables/Disables boot with initialization of a minimal set of devices required to launch active boot option. Has no effect for BBS boot options.	
Boot Configuration	Info only		
Boot Option #1	Hard Disk CD/DVD USB Hard Disk USB CD/DVD USB Key USB Floppy USB Lan Network Disabled	**Hard Disk**	Sets the system boot order
Boot Option #2		**CD/DVD**	
Boot Option #3		**USB Hard Disk**	
Boot Option #4		**USB CD/DVD**	
Boot Option #5		**USB Key**	
Boot Option #6		**USB Floppy**	
Boot Option #7		**USB Lan**	
Boot Option #8		**Network**	
UEFI [Device] BBS Priorities ►	Sub-Menu	Specifies the Boot Device Priority sequence from available UEFI device	

C.7.2 Boot > Boot Configuration > UEFI [Device] BBS Priorities

Feature	Options	Description
Boot Option #[Num]	[Device] Disabled	Sets the system boot order

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C.8 Save & Exit

Feature	Options	Description
Save Changes and Exit	Yes No	Exits system setup after saving the changes.
Discard Changes and Exit	Yes No	Exits system setup without saving any changes.
Save Changes and Reset	Yes No	Resets the system after saving the changes.
Discard Changes and Reset	Yes No	Resets system setup without saving any changes.
Save Options	Info only	
Save Changes	Yes No	Saves changes done so far to any of the setup options.
Discard Changes	Yes No	Discards changes done so far to any of the setup options.
Restore Defaults	Yes No	Restores/Loads default values for all the setup options.
Save as User Defaults	Yes No	Saves the changes done so far as User Defaults.
Restore User Defaults	Yes No	Restores the User Defaults to all the setup options.
Boot Override	Info only	
Boot options	Do one time boot override to boot selected boot option.	

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Appendix D DisplayPort BIOS Settings

This appendix describes use of the DisplayPort BIOS settings for MXM modules.

D.1 MXM P1000/P2000/T1000/RTX3000/RTX5000

BIOS Setting			DisplayPort			
Primary Display	Internal Graphics	LVDS	POST Stage		Windows 10	
			DP from CPU	DP from MXM	DP from CPU	DP from MXM
IGFX	Enabled	Enabled	Yes	No	Yes	Yes
PEG	Enabled	Enabled	No	Yes	No	Yes
Auto	Enabled	Enabled	No	Yes	No	Yes
IGFX	Disabled	Enabled	No	No	No	Yes
PEG	Disabled	Enabled	No	Yes	No	Yes
Auto	Disabled	Enabled	No	Yes	No	Yes
IGFX	Auto	Enabled	Yes	No	Yes	Yes
PEG	Auto	Enabled	No	Yes	No	Yes
Auto	Auto	Enabled	No	Yes	No	Yes
IGFX	Enabled	Disabled	Yes	No	Yes	Yes
PEG	Enabled	Disabled	No	Yes	Yes	Yes
Auto	Enabled	Disabled	No	Yes	Yes	Yes
IGFX	Disabled	Disabled	No	No	No	Yes
PEG	Disabled	Disabled	No	Yes	No	Yes
Auto	Disabled	Disabled	No	Yes	No	Yes
IGFX	Auto	Disabled	Yes	No	Yes	Yes
PEG	Auto	Disabled	No	Yes	No	Yes
Auto	Auto	Disabled	No	Yes	No	Yes

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D.2 MXM P3000/P5000

BIOS Setting			DisplayPort			
Primary Display	Internal Graphics	LVDS	POST Stage		Windows 10	
			DP from CPU	DP from MXM	DP from CPU	DP from MXM
IGFX	Enabled	Enabled	Yes	No	Yes	Yes
PEG	Enabled	Enabled	No	Yes	No	Yes
Auto	Enabled	Enabled	No	Yes	No	Yes
IGFX	Disabled	Enabled	No	Yes	No	Yes
PEG	Disabled	Enabled	No	Yes	No	Yes
Auto	Disabled	Enabled	No	Yes	No	Yes
IGFX	Auto	Enabled	Yes	No	Yes	Yes
PEG	Auto	Enabled	No	Yes	No	Yes
Auto	Auto	Enabled	No	Yes	No	Yes
IGFX	Enabled	Disabled	Yes	No	Yes	Yes
PEG	Enabled	Disabled	No	Yes	Yes	Yes
Auto	Enabled	Disabled	No	Yes	Yes	Yes
IGFX	Disabled	Disabled	No	Yes	No	Yes
PEG	Disabled	Disabled	No	Yes	No	Yes
Auto	Disabled	Disabled	No	Yes	No	Yes
IGFX	Auto	Disabled	Yes	No	Yes	Yes
PEG	Auto	Disabled	No	Yes	Yes	Yes
Auto	Auto	Disabled	No	Yes	Yes	Yes


NOTE:

When using a four DisplayPort configuration, use vBIOS 86.04.70.00.3D with the P3000, and vBIOS 86.04.70.00.3C with the P5000.

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Appendix E Digital Input/Output Function Library

DI/O provides input/output to support inter-device communications. Simple programming guides allow easy transmission of digital signals between the system and attached peripherals.

DI/O with API/Windows

MLB-3002 DI/O API library files and a demo program (including source code) can be downloaded from: https://www.adlinktech.com/Products/Industrial_PCs_Fanless_Embedded_PCs/IPCSystems/MLB-3002_Series.

To use the DI/O function library for the MLB-3002 series, include the header file (GpioLib.h) and linkage library (GpioLib.lib) in the C++ project. DI/O functions are as follows.

GPIO_Init

This API checks if the GPIO driver handle is valid.

char GPIO_Init ()

Return values:

GPIO_OK on success. ***GPIO_ERROR*** on failure.

GPI_Read

This API reads the digital input (DI) pin status:

char GPI_Read(UCHAR GpioNum, PUCHAR data)

Arguments:

GpioNum: The number of a digital input pin (0-3)

data: The digital input pin status will be copied to this address reference

Return values:

GPIO_OK on success. ***GPIO_ERROR*** on failure.

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GPO_Write

This API is used to write the new state of a digital output (DO):

char GPO_Write(UCHAR GpioNum,UCHAR GpioPortVal)

Arguments:

GpioNum: The number of a digital output pin (4-7).

GpioPortVal: A new output state 0 or 1.

Return values:

GPIO_OK on success. ***GPIO_ERROR*** on failure.

RegisterInterruptEvent

The event passed will be signaled when there is a change in state on a digital input pin. This API is used to register the event.

char RegisterInterruptEvent(HANDLE Event, UCHAR Pin)

Argument:

Event: Handle of the event that wait for Interrupt notification.

Pin: The number of an input pin.

Return values:

GPIO_OK on success. ***GPIO_ERROR*** on failure.

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Important Safety Instructions

For user safety, please read and follow all instructions, Warnings, Cautions, and Notes marked in this manual and on the associated device before handling/operating the device, to avoid injury or damage.

- Read these safety instructions carefully.
- Keep the User's Manual for future reference.
- Read the Specifications section of this manual for detailed information on the recommended operating environment.
- It is recommended that the device be installed in Information Technology Rooms that are in accordance with Article 645 of the National Electrical Code and NFPA 75.
- To avoid electrical shock and/or damage to device:
  - Keep device away from water or liquid sources.
  - Keep device away from high heat or humidity.
  - Keep device properly ventilated (do not block or cover ventilation openings).
  - Always use recommended voltage and power source settings.
  - Always install and operate device near an easily accessible electrical outlet.
  - Secure the power cord (do not place any object on/over the power cord).
  - Only install/attach and operate device on stable surfaces and/or recommended mountings.
  - The power cord must be connected to a socket or outlet with a ground connection.
- If the device will not be used for long periods of time, turn off and unplug from its power source.
- Never attempt to repair the device, which should only be serviced by qualified technical personnel using suitable tools.

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- A Lithium-type battery may be provided for uninterrupted backup or emergency power.

CAUTION:

Risk of explosion if battery is replaced with one of an incorrect type; please dispose of used batteries appropriately.

- This equipment is not suitable for use in locations where children are likely to be present.
- The device must be serviced by authorized technicians when:
  - The power cord or plug is damaged
  - Liquid has entered the device interior
  - The device has been exposed to high humidity and/or moisture
  - The device is not functioning or does not function according to the User's Manual
  - The device has been dropped and/or damaged and/or shows obvious signs of breakage
- Disconnect the power supply cord before loosening the thumbscrews and always fasten the thumbscrews with a screwdriver before starting the system up
- It is recommended that the device be installed only in a server room or computer room where access is:
  - Restricted to qualified service personnel or users familiar with restrictions applied to the location, reasons therefor, and any precautions required
  - Only afforded by the use of a tool or lock and key, or other means of security, and controlled by the authority responsible for the location



BURN HAZARD

Hot surface! Do not touch! Touching this surface could result in bodily injury. To reduce risk, allow the surface to cool before touching.

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Consignes de Sécurité Importante

S'il vous plaît prêter attention stricte à tous les avertissements et mises en garde figurant sur l'appareil, pour éviter des blessures ou des dommages.

- *Lisez attentivement ces consignes de sécurité.*
- *Conservez le manuel de l'utilisateur pour pouvoir le consulter ultérieurement.*
- *Lisez la section Spécifications de ce manuel pour des informations détaillées sur l'environnement d'exploitation recommandé.*
- *Il est recommandé d'installer l'appareil dans des salles de technologie de l'information conformes à l'article 645 du National Electrical Code et à la NFPA 75.*
- *Pour éviter les chocs électriques et/ou d'endommager l'appareil:*
  - *Tenez l'appareil à l'écart de toute source d'eau ou de liquide.*
  - *Tenez l'appareil à l'écart d'une forte chaleur ou d'une humidité élevée.*
  - *Maintenez l'appareil correctement ventilé (n'obstruer ou ne couvrez pas les ouvertures de ventilation).*
  - *Utilisez toujours les réglages de tension et de source d'alimentation recommandés.*
  - *Installez et utilisez toujours l'appareil près d'une prise de courant facilement accessible.*
  - *Fixez le cordon d'alimentation (ne placez aucun objet sur le cordon d'alimentation).*
  - *Installez/fixez et utilisez l'appareil uniquement sur des surfaces stables et/ou sur les fixations recommandées.*
  - *Le cordon d'alimentation doit être connecté à une prise ou à une prise de courant avec mise à la terre.*
- *Si l'appareil ne doit pas être utilisé pendant de longues périodes, éteignez-le et débranchez-le de sa source d'alimentation*

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- *N'essayez jamais de réparer l'appareil, qui ne doit être réparé que par un personnel technique qualifié à l'aide d'outils appropriés*
- *Une batterie de type Lithium peut être fournie pour une alimentation de secours ininterrompue ou d'urgence.*



ATTENTION: Risque d'explosion si la pile est remplacée par une autre de type incorrect. Veuillez jeter les piles usagées de façon appropriée.

- *Cet équipement ne convient pas à une utilisation dans des lieux pouvant accueillir des enfants.*
- *L'appareil doit être entretenu par des techniciens agrees lorsque:*
- *Le cordon d'alimentation ou la prise est endommagé(e)*
- *Un liquide a pénétré à l'intérieur de l'appareil.*
- *L'appareil a été exposé à une forte humidité et/ou de la buée.*
- *L'appareil ne fonctionne pas ou ne fonctionne pas selon le manuel de l'utilisateur.*
- *L'appareil est tombé et/ou a été endommagé et/ou présente des signes évidents de dommage.*
- *Débranchez le cordon d'alimentation avant de desserrer les vis à oreilles et serrez toujours les vis à oreilles avec un tournevis avant de mettre le système en marche.*
- *Il est recommandé d'installer l'appareil uniquement dans une salle de serveurs ou une salle informatique où l'accès est:*
  - *Réservé au personnel de service qualifié ou aux utilisateurs familiarisés avec les restrictions appliquées à l'emplacement, aux raisons de ces restrictions et toutes les précautions requises*
  - *Uniquement autorisé par l'utilisation d'un outil, d'une serrure et d'une clé, ou d'un autre moyen de sécurité, et contrôlé par l'autorité responsable de l'emplacement.*

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	***RISQUE DE BRÛLURES*** ***Partie chaude!*** *Ne touchez pas cette surface, cela pourrait entraîner des blessures. Pour éviter tout danger, laissez la surface refroidir avant de la toucher.*

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Getting Service

Ask an Expert: http://askanexpert.adlinktech.com

ADLINK Technology, Inc.
No. 66, Huaya 1st Rd., Guishan District
Taoyuan City 333411, Taiwan
Tel: +886-3-216-5088
Fax: +886-3-328-5706
Email: service@adlinktech.com

Ampro ADLINK Technology, Inc.
6450 Via Del Oro
San Jose, CA 95119-1208, USA
Tel: +1-408-360-0200
Toll Free: +1-800-966-5200 (USA only)
Fax: +1-408-600-1189
Email: info@adlinktech.com

ADLINK Technology (China) Co., Ltd.
300 Fang Chun Rd., Zhangjiang Hi-Tech Park
Pudong New Area, Shanghai, 201203 China
Tel: +86-21-5132-8988
Fax: +86-21-5132-3588
Email: market@adlinktech.com

ADLINK Technology GmbH
Hans-Thoma-Straße 11
D-68163 Mannheim, Germany
Tel: +49-621-43214-0
Fax: +49-621 43214-30
Email: emea@adlinktech.com

Please visit the Contact page at www.adlinktech.com for information on how to contact the ADLINK regional office nearest you.

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