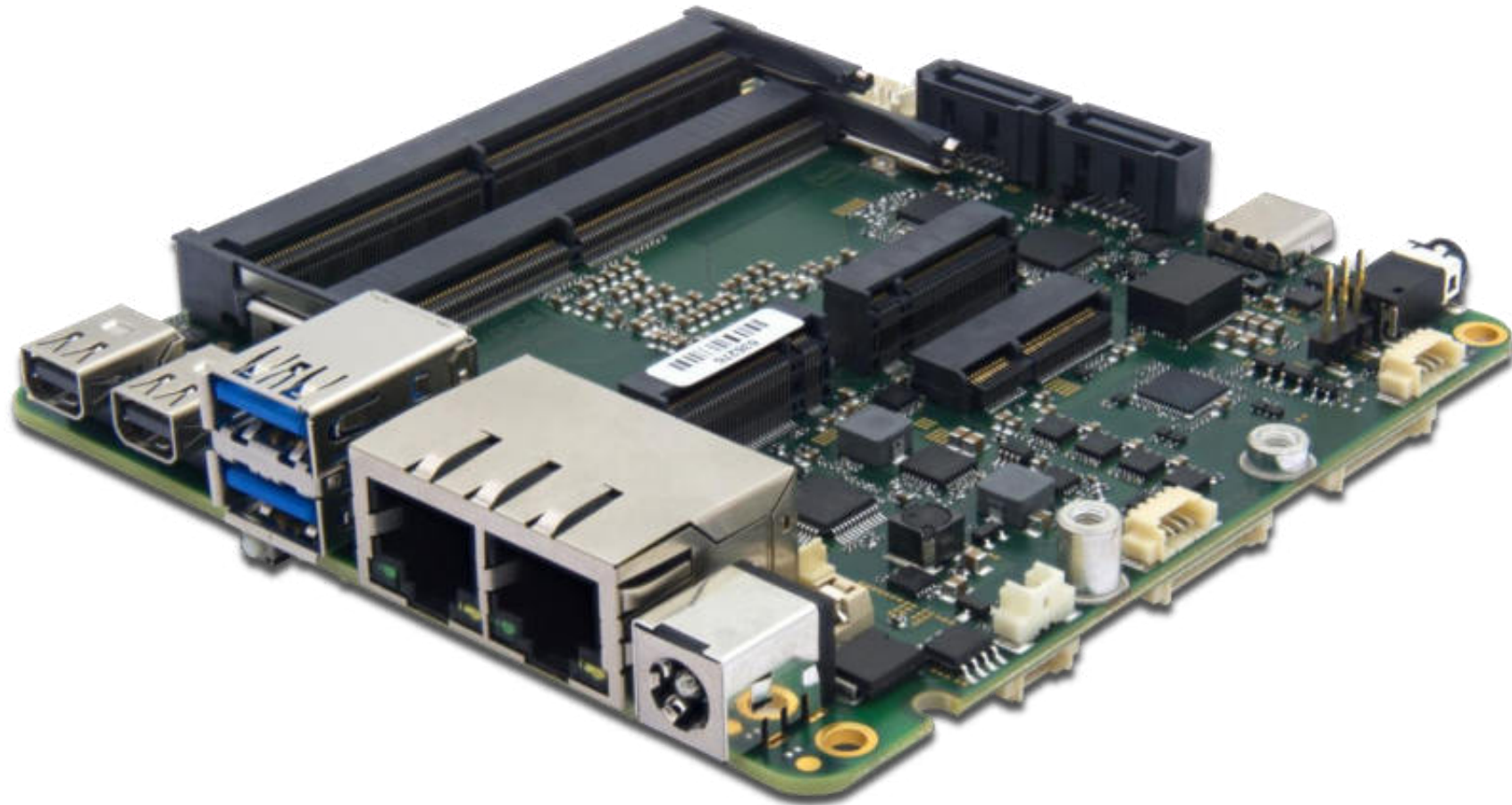


# PROFIVE® NUCE – Hardware Reference Manual – P – Rev. 5

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E.E.P.D. GmbH products are not intended for using as critical components in life support appliances, devices or systems in which the failing of an E.E.P.D. GmbH product could be expected to result in personal injury.

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This product cannot be used as a stand-alone product!

Therefore, it has to be integrated together with other products like power supplies, mass storage devices (i. e. hard disks), etc. to be functional.

To meet FCC and/or CE requirements every component as well as the combination of all components has to be validated against all standards required for the end product.

In order to meet FCC and/or CE requirements this product has to be integrated into a proper housing, which provides appropriate shielding and insulation.

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This product will be free from defects in workmanship and material under normal and proper use for the period of time defined in our General Terms of Business, effective the date of the original shipment from E.E.P.D. GmbH.

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## Product returns

If you return the product to E.E.P.D. GmbH please remove all connections and peripheral equipment.

Protect the unit through a suitable packaging, preferably use the original packaging.

## Packaging

The product is in a protective package to avoid damage during transport. This protective package should be environmentally friendly recycled after use.

## Disposal of Device



At the end of the lifetime please dispose and/or recycle the components of the device accordingly.

## Technical Support

For technical information about hardware and software please contact:  
[support@eepd.de](mailto:support@eepd.de)

**Revision History**

Date	Version	Changes	Proofed
22.08.2024	5.0	First release for HW Rev.5	
17.09.2024	5.1	Minor update in BIOS documentation	
23.10.2024	5.2	Minor Update in Feature Details	

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## Used Symbols



The red danger sign warns you when a wrong or missing action dramatically endangers your life or health. The used components as well as the peripheral components could be destroyed.



The orange warning sign warns you when a wrong or missing action could seriously harm your health or destroy the used components.



The yellow caution sign warns you when a wrong or missing action could damage the component.



The yellow ESD sign draws your attention that static sensitive parts of the component could be destroyed. Unpack shielded components only with ESD protections like an ESD wrist strap.



The information sign gives you more information and advice for optimal use of this product. For example, it helps you to purchase necessary or optional accessories.

## 1 Product Description

In the first chapter you will get a glance of all the integrated features. For further information and a brief description of all possible changes and extensions please refer to the corresponding chapter.

### 1.1 Feature Overview

#### Power Supply

Single power supply (DC), min. 10.8 V to max. 26.4 V, 10 A fused, CPU variants with TDP up to 25 W: min. 90 W / recommended 120 W; Variants with TDP up to 54 W: min. 120 W / recommended 150 W.

#### Power Connector

2-pin barrel connector for external DC Power and Ground.  
CUI Devices Power Plug ID 2.5 mm, AD 5.5 mm, max. 7 A.

#### Power Limit

Internal and external 3.3 V power max. 25 W.

Internal and external 5 V power max. 45 W.

Internal and external power is related to m.2 connectors, USB, FAN, SATA power and display.

#### Processor Support

AMD Ryzen™ Embedded V2000 series:

V2516 / 6C / 12T / 2.1 GHz – 3.95 GHz / 10 – 25 W  
V2718 / 8C / 16T / 1.7 GHz – 4.15 GHz / 10 – 25 W  
V2546 / 6C / 12T / 3.0 GHz – 3.95 GHz / 35 – 54 W  
V2748 / 8C / 16T / 2.9 GHz – 4.25 GHz / 35 – 54 W

#### Ethernet Controller

2x Intel® i225-LM 2.5 Gbit/s Ethernet PCI Express® controllers with IEEE1588, TSN-support, Wake-on-LAN supported by ETH1.

#### RAM Support

Max. 2x 32 GB dual channel up to DDR4-3200 SO-DIMM memory with ECC support.

#### Serial Ports

2x RS-232/485 (FDX|HDX) port (8 wires) on internal Molex (PicoBlade) connector.

#### Display

2x Mini-DP++ connectors (v1.4), up to 3840 x 2160 @ 60 Hz.

1x USB-C Alt-Mode, up to 3840 x 2160 @ 60 Hz (only as secondary monitor).

1x internal eDP (v1.3) connector, up to 3840 x 2160 @ 60Hz, with backlight control (OEM/ODM only).

#### USB Support

1x Dual-USB 3.2 Gen2 (10 Gb/s, OCP = 1.5 A each), Type A at the front side.

1x USB-C 3.2 Gen2 (10Gb/s, OCP = 3 A) or DP Alt-Mode, at the rear side.

2x USB 2.0 (480 Mb/s, OCP = 900 mA each) on internal Molex (PicoBlade) connector.

### Storage Support

1x M.2 socket Key M, 2242, support for PCIe Gen3 x4 NVMe or x1 SATA III SSD.

Up to 2x standard SATA III (6 Gb/s) upright connectors + 2 SATA Power Molex (PicoBlade) connectors (+5V DC, max. 1.5 A, not fused).

### Expansion Slots

1x Key E, 2230, PCIe Gen3 x1 / USB 2.0, e. g. for WLAN/BT.

1x Key B, 3042/2242, PCIe Gen3 x1 / USB 2.0, e. g. for WWAN.

### Audio

HDA CODEC with MIC IN, stereo HP OUT on 3.5 mm Audio Jack.

Stereo Line IN, stereo Line OUT on internal Molex (PicoBlade) connector.

### Cooling

Fanless cooling/passive cooling options available.

Optional CPU fan, 5V/12V, depending on variant, max. 250mA, not fused

Optional auxiliary fan, 5V/12V, depending on variant, max. 250mA, not fused

### OS Support

Microsoft® Windows® 11

Microsoft® Windows® 10

Microsoft® Windows® 10 IoT Enterprise

Linux Ubuntu 24.04 LTS

### Extended Features

Onboard  $\mu$ -Controller-IC for:

Input voltage level detection

Power-up sequencing and timing

System reset management

Temperature monitoring and FAN control

Watchdog

Power button input

Reset button input

Feature connector (max. 4x GPIO [3.3 V] / max. 3x GPO with PWM [3.3 V/50 kHz] / Status LED)

Power LED onboard

Status LED onboard

Onboard Trusted Platform Module

TPM 2.0 support (Infineon SLB 9670)

RTC battery connector

## 1.2 Environmental Specification

### Max. Operating Temperature

0 °C to +60 °C ambient commercial grade

Adequate heatsink/cooling is provided, depending on variant and cooling system.

CPU throttling may occur at higher ambient temperatures.

### Max. Storage Temperature

-40 °C to +85 °C, non-condensing

### Max. rel. Humidity for all versions

95 % @ 40 °C non-condensing while stored, 89% while working

## 2 System Overview

This chapter describes the main hardware components of the NUCEX board.

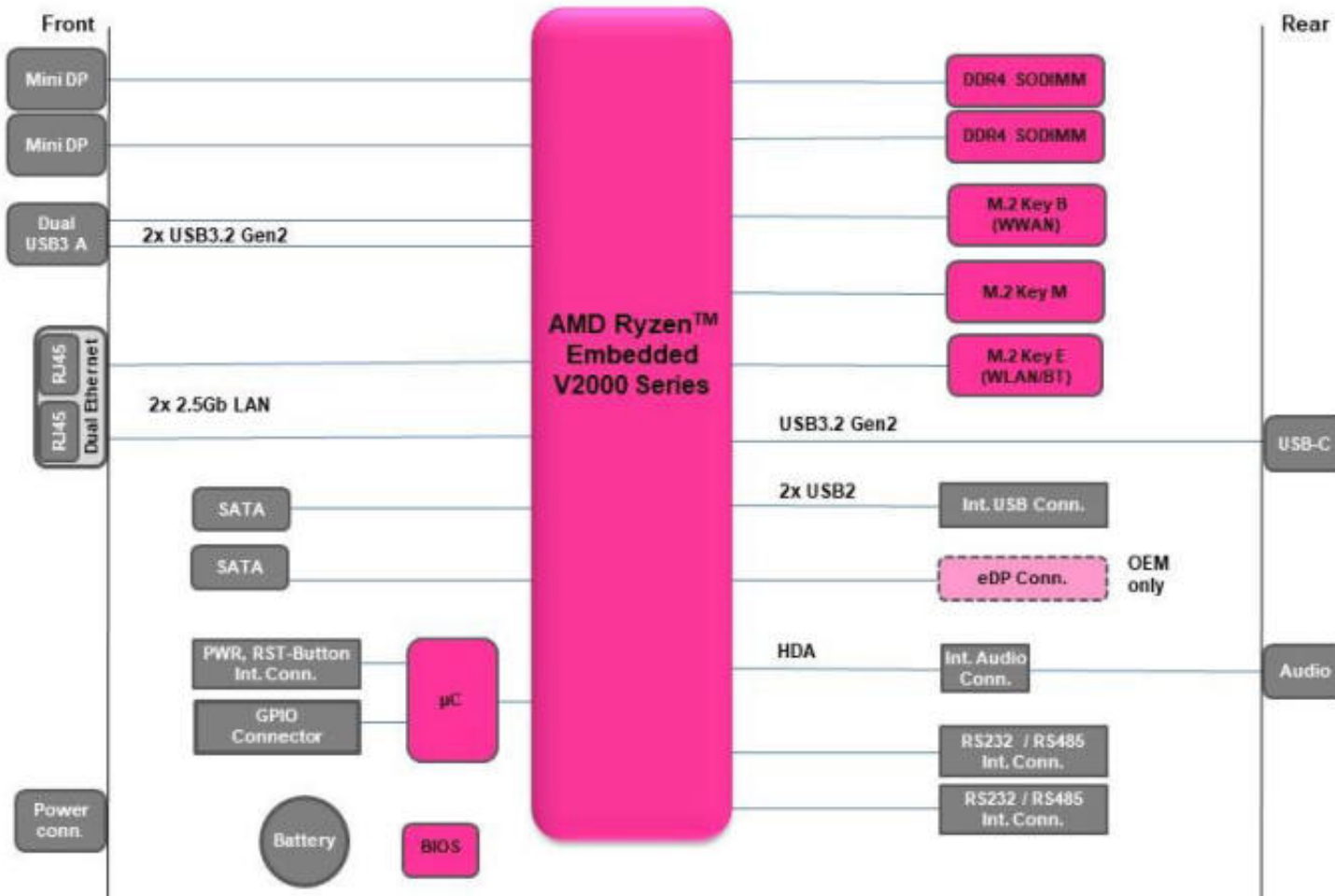


Fig. 1: System Overview

### 3 Assembly

The board must be mounted in a stable case. The mechanical mounting points according to chapter 3.2 must be used.

The available sockets and connectors for system build-up are specified in chapter 4.

E.E.P.D. recommends M3 Torx screws with a screw locking coating and a **maximum tightening torque of 0.5 Nm**.

#### 3.1 Product Views

##### Top View

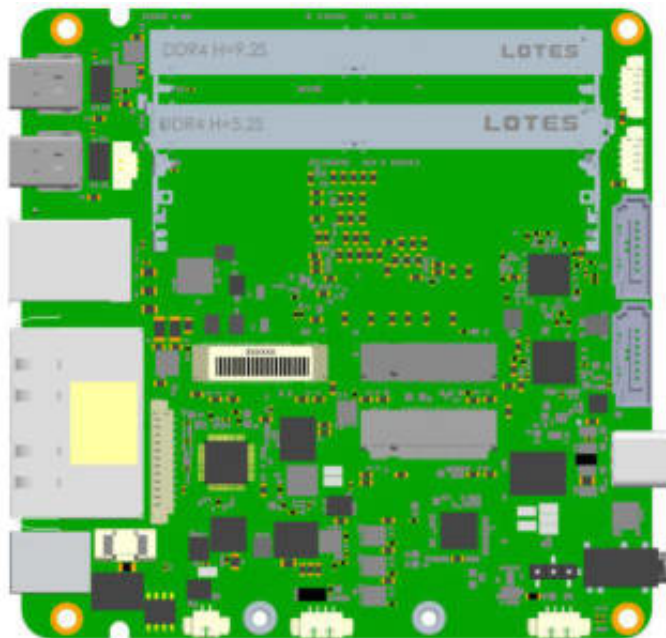


Fig. 2: Top View

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##### Bottom View

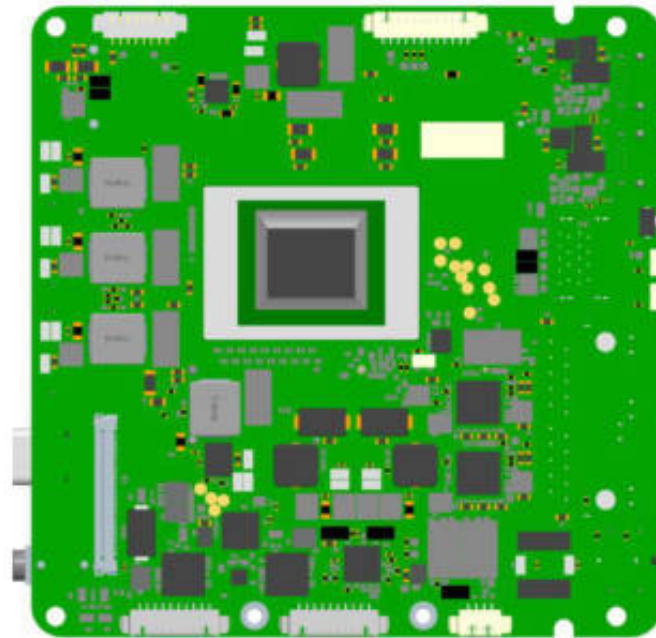


Fig. 3: Bottom View

Front View

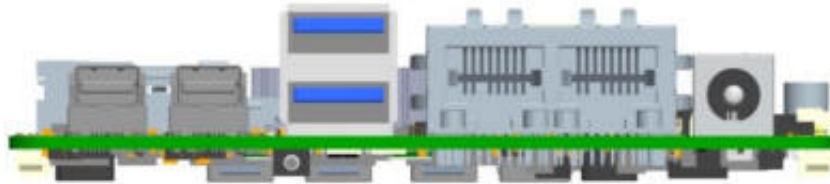


Fig. 4: Front View

Rear View

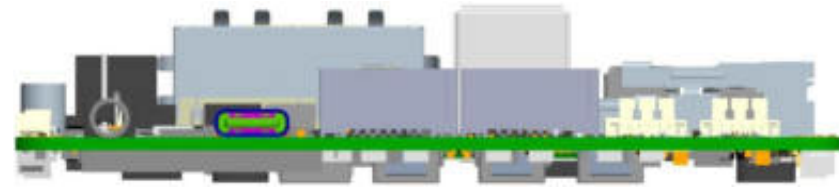


Fig. 6: Rear View

Assembly

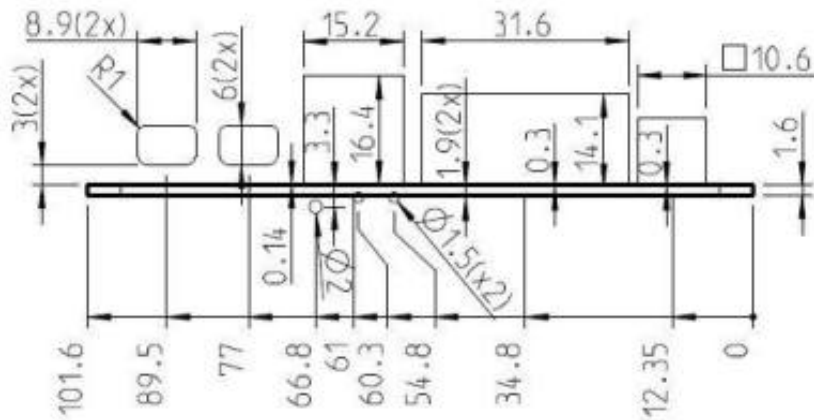


Fig. 5: Recommended cutouts front panel, values [mm]

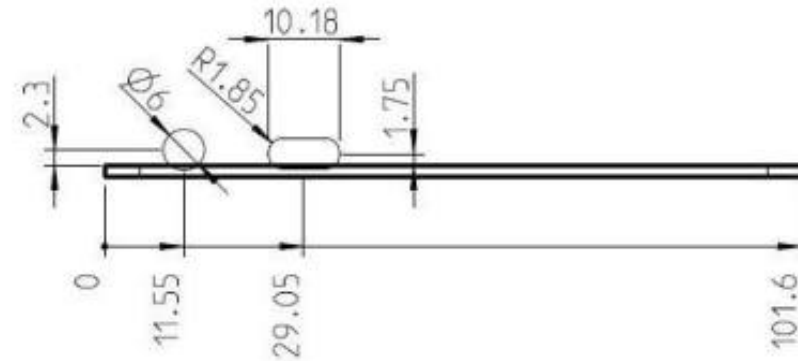


Fig. 7: Recommended cutouts rear panel, values [mm]

3.2 Mechanical Mounting

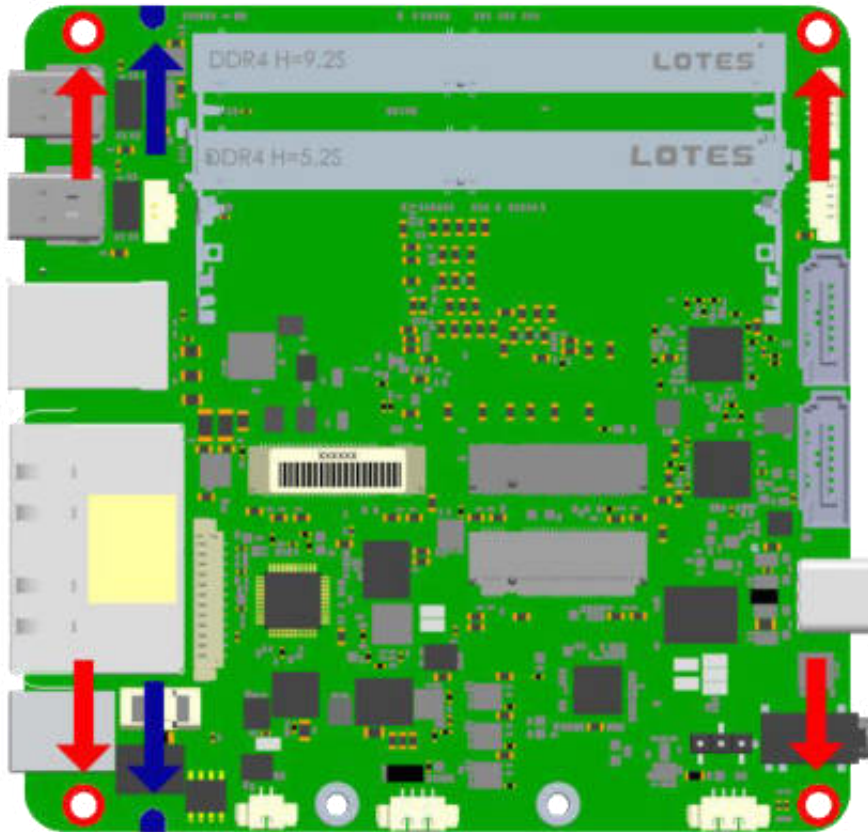


Fig. 8: Mechanical Mounting



Please use the 4 mounting points (red outline) to fasten the base board in order to prevent short circuits. Use 15.24 mm (0.6 inches) distance bolts for a stable mounting of the board.



The blue marked areas can be used for additional mounting in order to improve the mechanical concept or housing situation.

### 3.3 Dimensions

#### Dimensions of the board

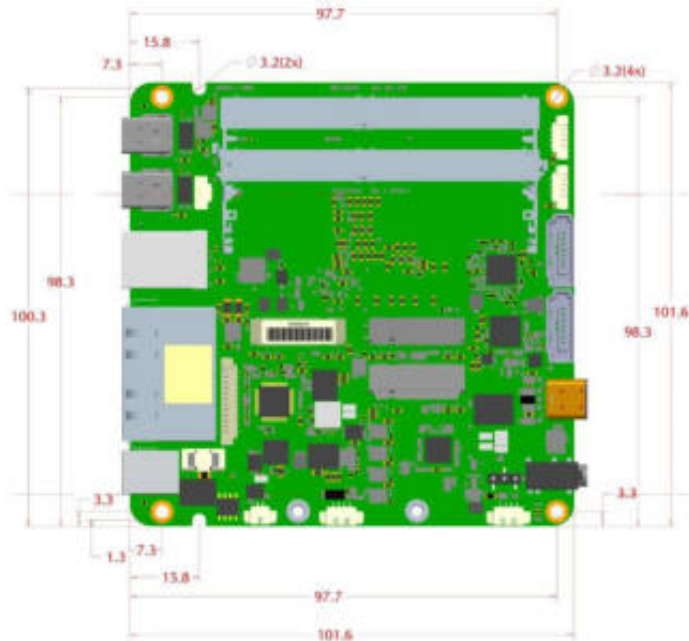


Fig. 9: Dimensions – Board, values [mm]

#### Dimensions of the CPU

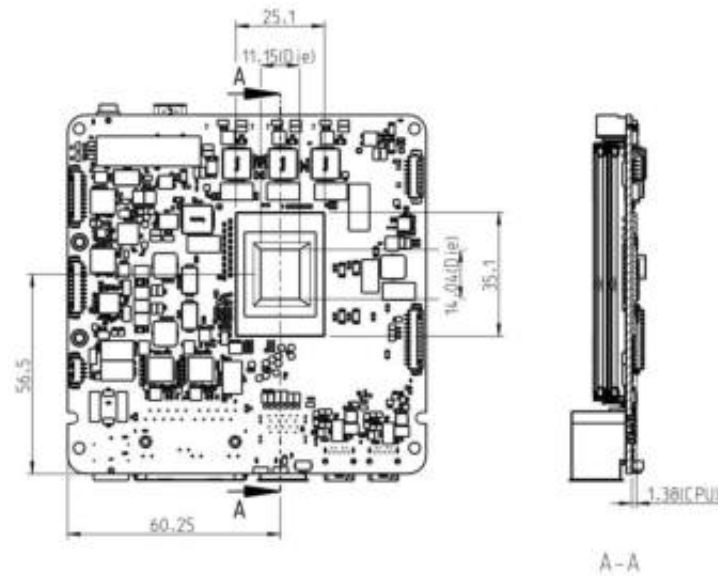


Fig. 10: Dimensions – CPU, values [mm]

#### Dimensions of the mounting points

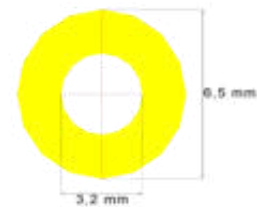


Fig. 11: Dimensions – Mounting Points, values [mm]

Assembly

## 4 Feature Details

The following schedule contains all the necessary information to connect the board to your peripheral equipment.

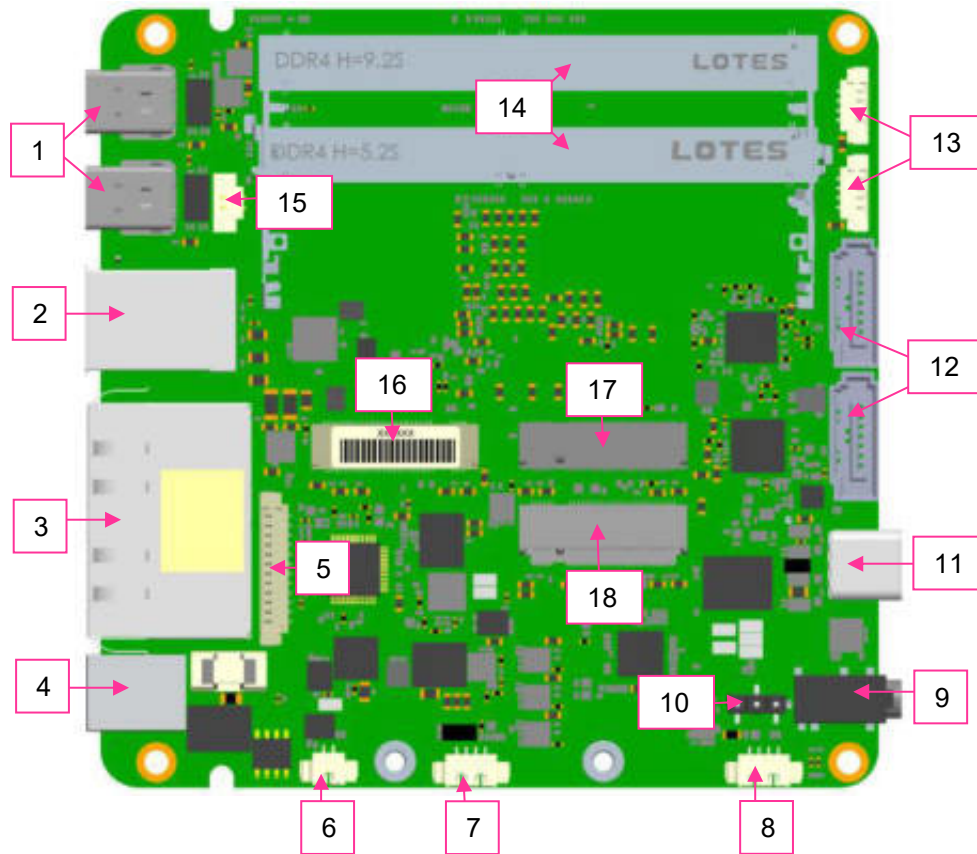
On the left side of the page, you will see the position on the board (red mark) and on the right side a magnified image of the explained item.

The explanation provides general information, electrical specifications and a pin assignment table.

All voltages are DC:	
VCC	5 V +/-5%
P3V3	3.3 V +/-5%
VDD_LCD	10.4 V +/-5%
VDD_BKL	5 V +/-5% or PVIN
VDD_FAN	5 V / 12 V +/-5%
P12V_DISPLAY	12 V +/-5%
PVIN	10.8 – 26.4 V
P12V_FAN	12 V +/-5%

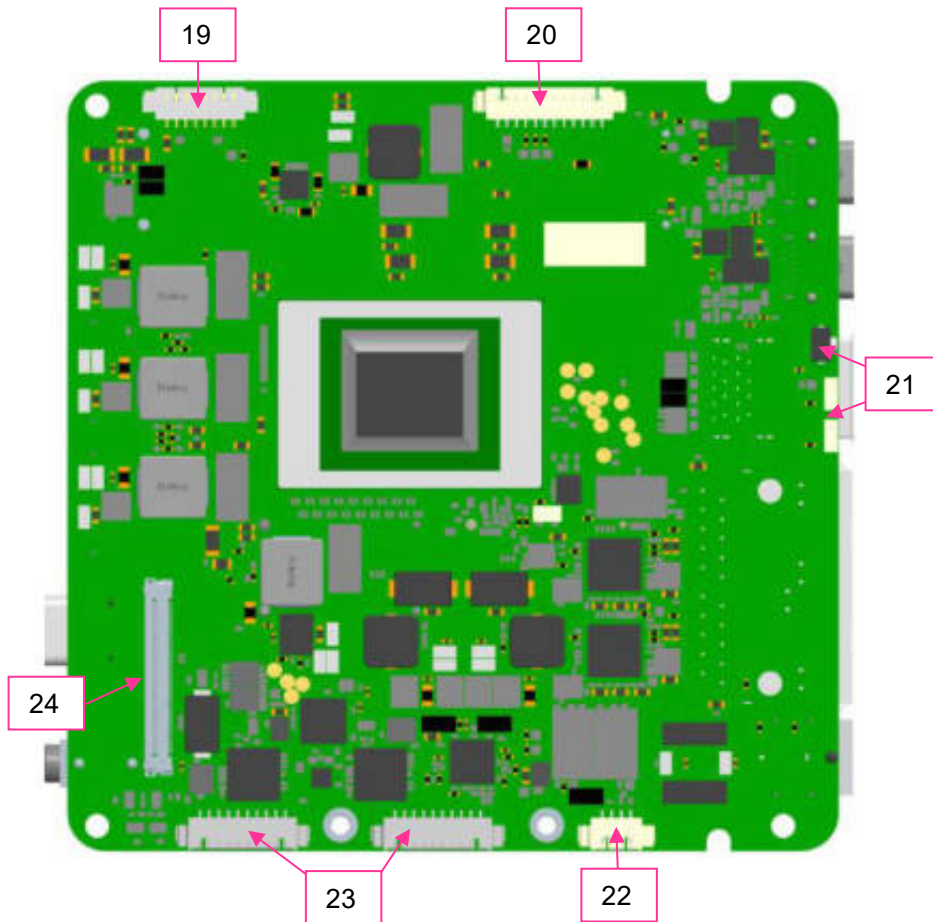
4.1 Connection Overview

Top Side



- 1 – Mini-DP++ connectors, see chapter 4.2
- 2 – Dual-USB 3.2 Gen2 Port, see chapter 4.3
- 3 – 2.5 Gigabit Ethernet Dual-Port, see chapter 4.4
- 4 – Power Connector, see chapter 4.5
- 5 – Audio connector, see chapter 4.7
- 6 – Reset Button Connector, see chapter 4.19
- 7 – Auxiliary Fan Connector, see chapter 4.20
- 8 – Power Button connector, see chapter 4.17
- 9 – Audio Jack, see chapter 4.8
- 10 – Jumper setting for eDP backlight, see chapter 4.16
- 11 – USB-C port, see chapter 4.10
- 12 – SATA Data connectors, see chapter 4.13
- 13 – SATA power connectors, see chapter 4.14
- 14 – DDR4 SO-DIMM sockets, see chapter 4.6
- 15 – Battery connector, see chapter 4.15
- 16 – M.2 Key M socket, see chapter 4.9
- 17 – M.2 Key B socket, see chapter 4.9
- 18 – M.2 Key E socket, see chapter 4.9

Bottom Side



- 19 – Internal USB connector, see chapter 4.11
- 20 – Feature connector, see chapter 4.22
- 21 – Power Button, Power and SATA LEDs, see chapter 4.18
- 22 – CPU Fan connector, see chapter 4.20
- 23 – RS232/485 connectors, see chapter 4.21
- 24 – eDP connector, see chapter 4.12

4.2 Mini-DP++ Connectors

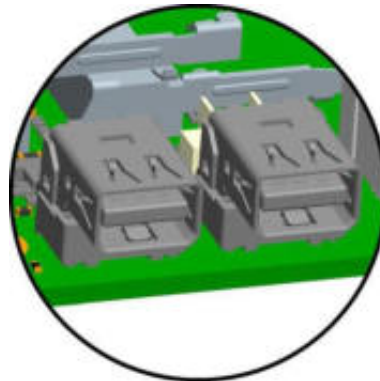
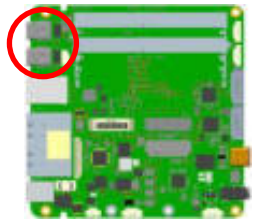


Fig. 12: Mini-DP++ Connector Detail

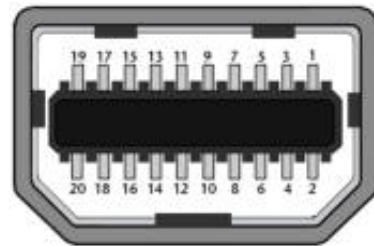


Fig. 13: Mini-DP++ Connector Schematic



Important Note:

There are two types of DisplayPort cables:

If you connect the display **directly** to the Mini DP, please use cable with **Pin 20 not connected**.

If you use **active cables/adapters** (e. g. Mini DP to DP, Mini DP to HDMI), please use cable with **Pin 20** (supply voltage) on both ends that are **connected**.

Possible effects if wrong cable is used:

System might not start up properly.

Dongle does not work properly (black display).

### 4.3 Dual-USB 3.2 Gen2 Port



USB 3.2 Gen2 type ports providing max. 1.5 A per port (OCP). Support for USB 2.0 and USB 3.2 Gen2 (10 Gb/s).

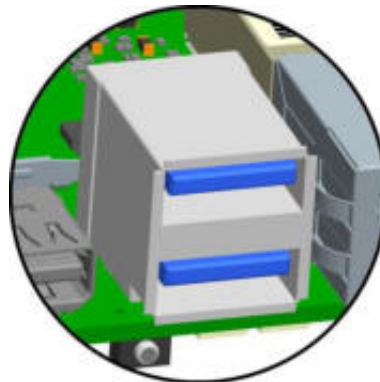
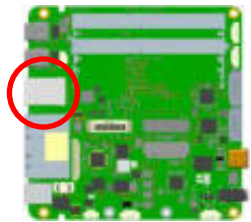


Fig. 14: Dual-USB 3.2 Gen2 Port Detail

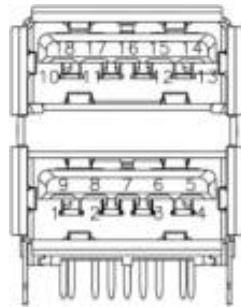


Fig. 15: Dual-USB 3.2 Gen2 Port Schematic

### 4.4 2.5 Gigabit Ethernet Dual-Port

The Dual-Ethernet socket uses two Intel i225 controllers. ETH1 supports wake-on-LAN.

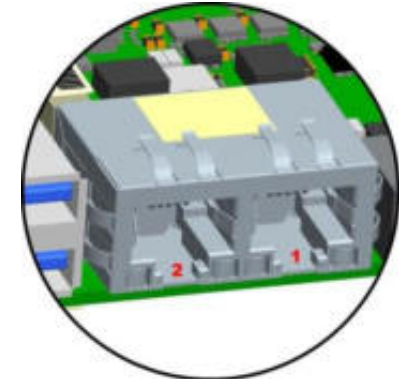
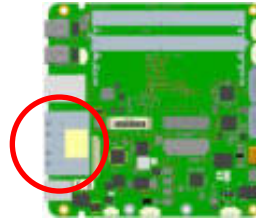


Fig. 16: Ethernet Dual-Port Detail

#### Yellow LED

Speed-LED is on during 2.5 or 1 Gbit transmission and switched off during 10/100 Mbit transmission.

#### Green LED

Link-/Activity-LED is permanently on to indicate an active connection on the Ethernet port. LED blinks during communication with the Ethernet network.

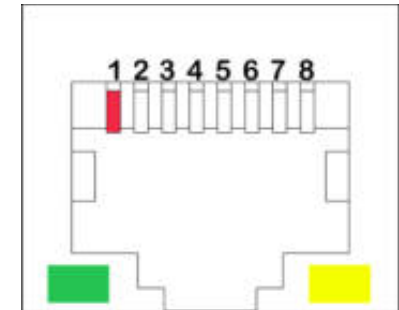


Fig. 17: Ethernet Port Schematic

### 4.5 Power Connector



For a stable operation:

For CPU Variants with TDP up to 25 W:  
Please ensure a system power supply of min. 90 W.  
E.E.P.D. recommends a system power supply of 120 W.

For CPU Variants with TDP up to 54 W:  
Please ensure a system power supply of min. 120 W.  
E.E.P.D. recommends a system power supply of 150 W.

Power source must be capable to respond to fast load changes!

Supply voltage (PVIN) min. 10.8 V / max. 26.4 V (DC)

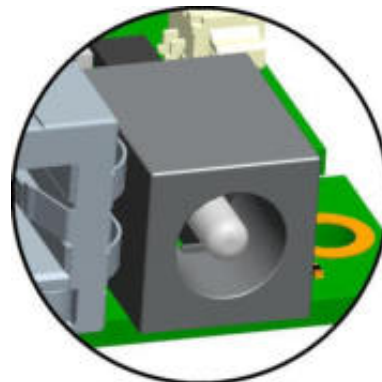
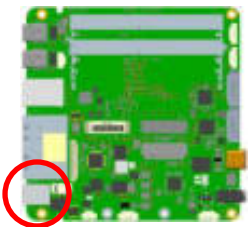


Fig. 18: Power Connector Detail

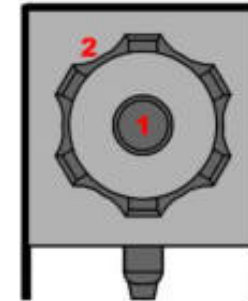


Fig. 19: Power Connector Schematic



Counterpart – plug:

CUI Devices Power Plug ID 2.5 mm, AD 5.5 mm, max. 7 A  
Ordering number: PP3-002B

Pin	Signal
1	PVIN
2	GND

Tab. 1: Power Connector

4.6 DDR4 SO-DIMM Sockets

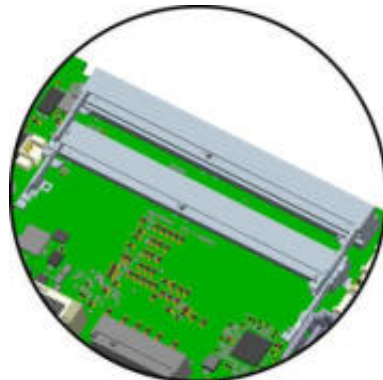
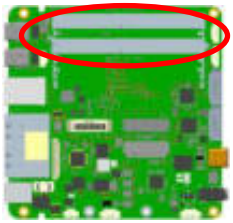


Fig. 20: DDR4 SO-DIMM Socket Detail



Use only 1.2 V DDR4 SO-DIMM modules compliant with the DDR4 Standard.  
Dual channel DDR4 SO-DIMM memory, max. 2x 32 GB, up to 3200 MT/s, with ECC support.

**Assembly:**

First slide RAM module into the RAM socket.  
Then press the module in direction to the board till you hear it snap.

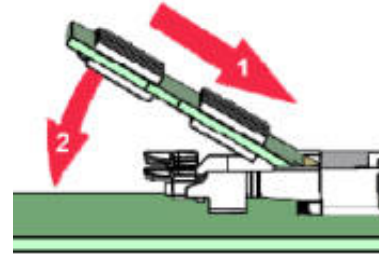


Fig. 21: RAM Assembly

**Disassembly:**

First press both clamps outwards.  
Then the RAM module will set upright automatically.  
Remove the module from the socket.

### 4.7 Audio Connector

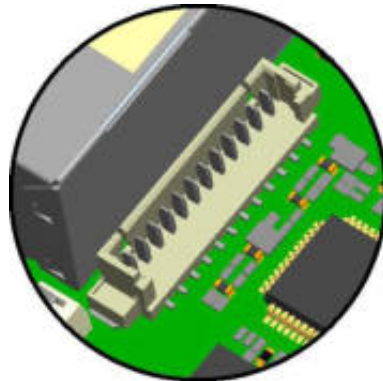
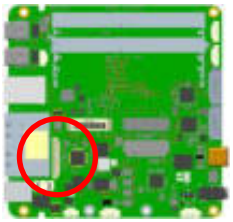


Fig. 22: Molex Audio Connector Detail



Counterpart – plug:  
MOLEX Pico Blade  
0510211200



Fig. 23: Molex Audio Connector Schematic

Pin	Signal	Pin	Signal
1	JD_LINE_IN*	7	JD_LINE_OUT*
2	LINE_IN_L	8	LINE_OUT_L
3	LINE_IN_R	9	LINE_OUT_R
4	GND_AUDIO	10	GND_AUDIO
5	N.C.	11	N.C.
6	GND_AUDIO	12	N.C.

Tab. 2: Audio Connector

\*JD=Jack Detect

### 4.8 Audio Jack

3.5 mm Audio Jack provides mono microphone IN and stereo headset OUT.

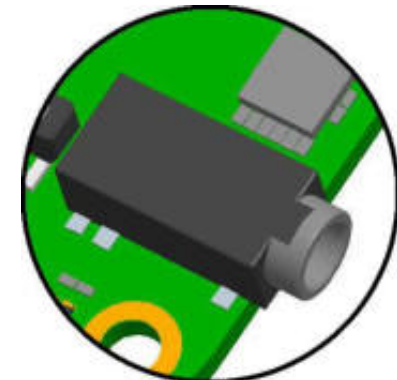
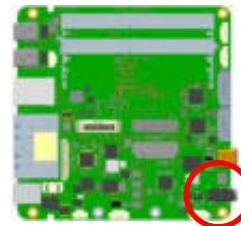


Fig. 24: Audio Jack Detail



For optimum audio performance:  
Please ensure to use cables provided by E.E.P.D.

## 4.9 M.2 Sockets

### M.2 Socket Key M

2242, PCIe Gen 3x4 NVMe or x1 SATA III SSD, P3V3 max. 3.5 A, not fused

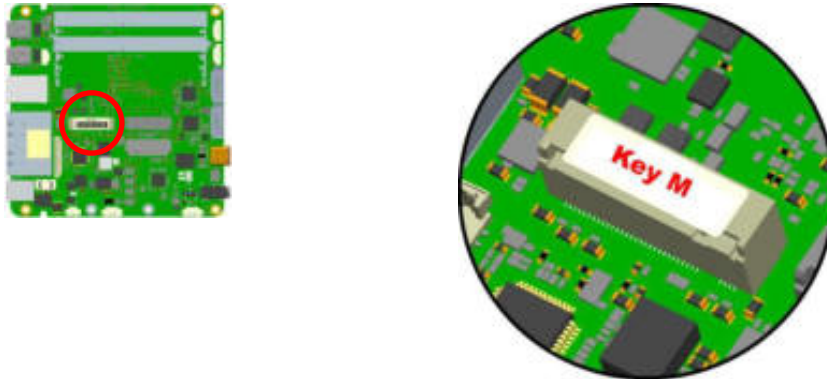


Fig. 25: M.2 Key M Connector Detail

### M.2 Socket Key E

2230, PCIe Gen3 x1 and USB 2.0, P3V3 max. 2 A, not fused

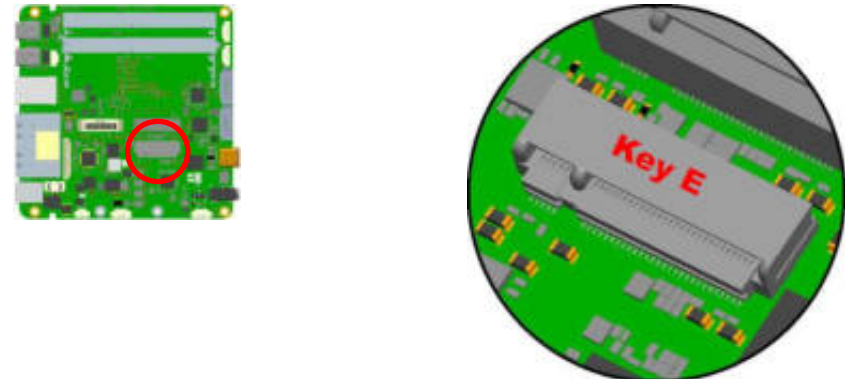


Fig. 26: M.2 Key E Connector Detail

### M.2 Socket Key B

3042/2242, PCIe Gen3 x1 and USB 2.0, P3V3 max. 2.5 A, not fused

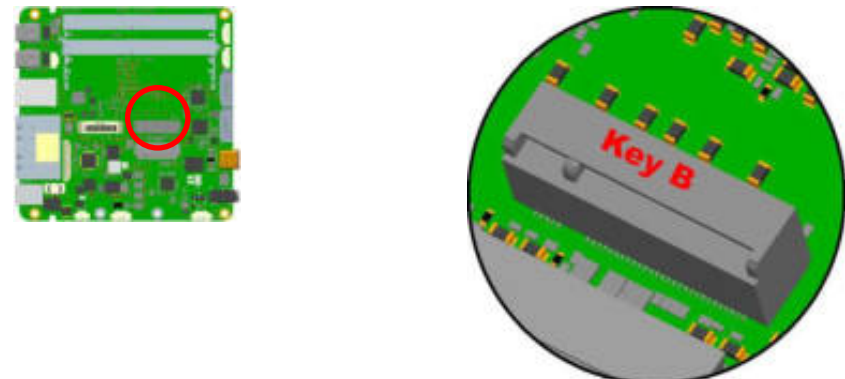


Fig. 27: M.2 Key B Connector Detail

4.10 Rear USB-C Port



Support for USB 2.0 and USB 3.2 Gen2 (10Gb/s). DisplayPort Alt-Mode (up to 3840 x 2160 @ 60 Hz), combined modes. Port provides 3 A (OCP).

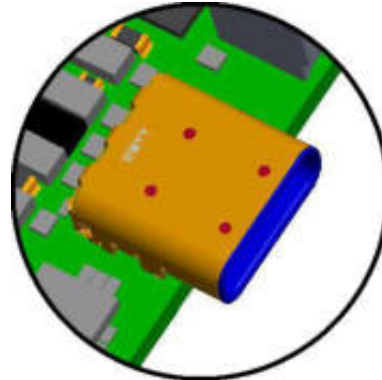
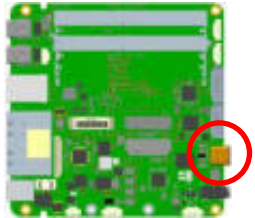


Fig. 28: USB-C Port Detail

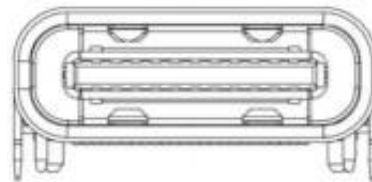


Fig. 29: USB-C Port Schematic

4.11 USB Internal Connector



Support for USB 2.0 (480 Mb/s), max. 900 mA per port (OCP).

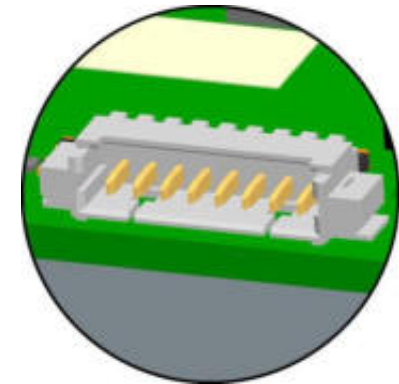
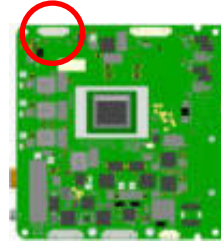


Fig. 30: Molex USB internal Connector Detail



Counterpart – plug:  
MOLEX Pico Blade  
0510210800



Fig. 31: Molex USB internal Connector Schematic

Pin	Signal	Pin	Signal
1	VCC_USB2_6: 5V +/-5%, OCP = 900mA	5	VCC_USB2_7: 5V +/-5%, OCP = 900mA
2	USB2_6_N	6	USB2_7_N
3	USB2_6_P	7	USB2_7_P
4	GND	8	GND

Tab. 3: USB internal Connector

4.12 eDP Connector – OEM/ODM only

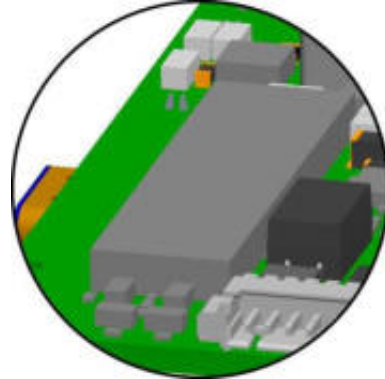
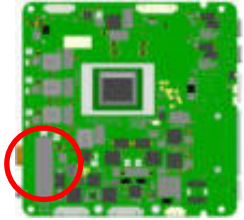


Fig. 32: eDP Connector Detail

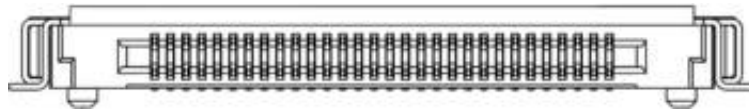


Fig. 33: eDP Connector Schematic



Counterpart – plug:  
e. g. ACES 50204-40

Pin	Signal	Pin	Signal
1	N.C.	23	GND
2	GND	24	GND
3	eDP_TX3_N	25	GND
4	eDP_TX3_P	26	GND
5	GND	27	eDP_HPDP
6	eDP_TX2_N	28	GND
7	eDP_TX2_P	29	GND
8	GND	30	GND
9	eDP_TX1_N	31	GND
10	eDP_TX1_P	32	eDP_BKLEN
11	GND	33	eDP_BKLCTL_uC_OUT
12	eDP_TX0_N	34	N.C.
13	eDP_TX0_P	35	N.C.
14	GND	36	VDD_BKL *2
15	eDP_AUX_P	37	VDD_BKL *2
16	eDP_AUX_N	38	VDD_BKL *2
17	GND	39	VDD_BKL *2
18	VDD_LCD*	40	N.C.
19	VDD_LCD*	41	SHIELD_eDP
20	VDD_LCD*	42	SHIELD_eDP
21	VDD_LCD*	43	SHIELD_eDP
22	N.C.	44	SHIELD_eDP

Tab. 4: eDP Connector

\* VDD\_LCD = 10.4 V +/-5%, I\_max = 1.5 A not fused (other on request)

\*2 VDD\_BKL = 5 V +/-5% or PVIN, depends on jumper setting (4.16), not fused

4.13 SATA Data Connectors

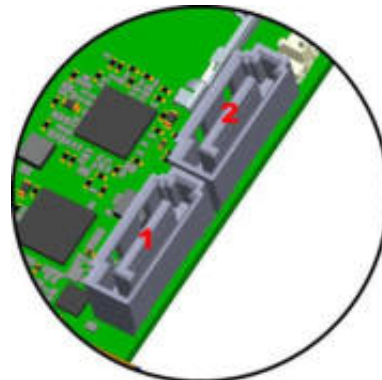
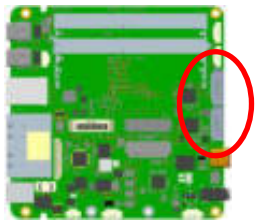


Fig. 34: SATA Data Connector Detail

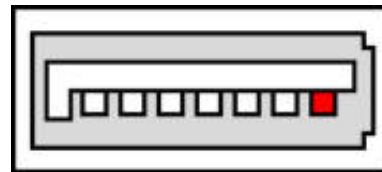


Fig. 35: SATA Data Connector Schematic

4.14 SATA Power Connectors

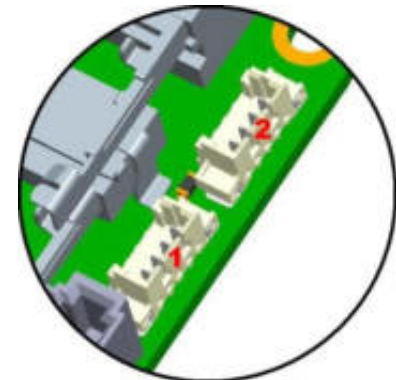
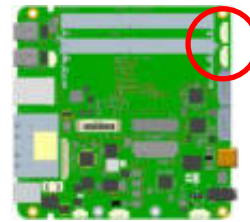


Fig. 36: Molex SATA Power Connector Detail



Counterpart – plug:  
MOLEX Pico Blade  
0510210400

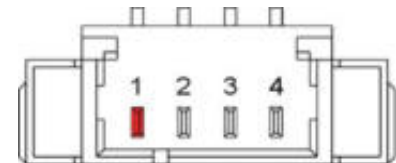


Fig. 37: Molex SATA Power Connector Schematic

Pin	Signal	
1	VCC 5V +/- 5%	max. 1.5 A, not fused
2	VCC 5V +/- 5%	
3	GND	
4	GND	

Tab. 5: SATA Power Connector

4.15 Battery Connector

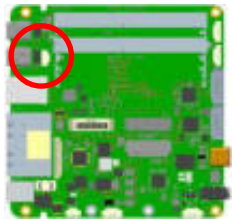


Fig. 38: Molex Battery Connector Detail



Counterpart – plug:  
MOLEX Pico Blade  
0510210200

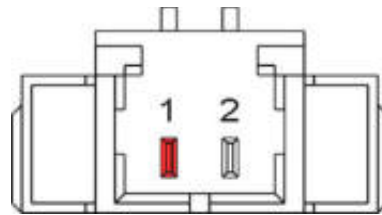


Fig. 39: Molex Battery Connector Schematic

Pin	Signal
1	BATT
2	GND

Tab. 6: Battery Connector

4.16 Jumpersetting for Display Backlight – OEM/ODM only

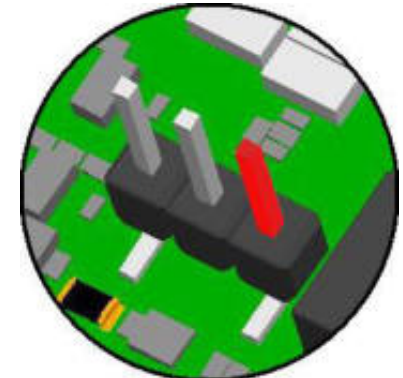
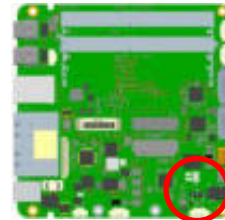


Fig. 40: STL3X1 Detail

Pin	Signal
1	PVIN → 10.8V – 26.4V*
2	VDD_BKL* <sup>2</sup>
3	VCC_A → 5V +/-5%

Tab. 7: STL3X1

\* depends on power in voltage

\*<sup>2</sup> VDD\_BKL provides max. 3 A, not fused

VDD\_BKL = PVIN → set Jumper between Pin 1 and 2

VDD\_BKL = 5 V → set Jumper between Pin 2 and 3

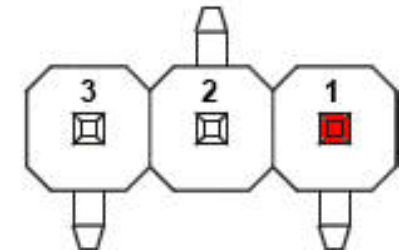


Fig. 41: STL3X1 Schematic

### 4.17 Power Button Connector

Press power button once to start up.  
 Press power button to shut down into S3/S4/S5 (Standby/Hibernate/OFF; depending on OS setting).  
 Hold power button (> 4 sec.) to shut down into S5 (OFF).

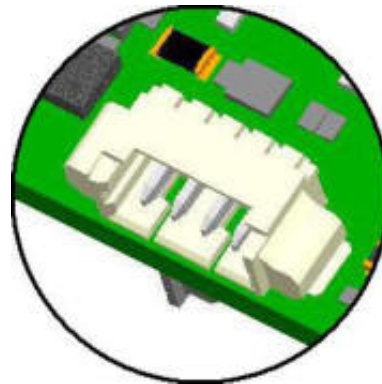
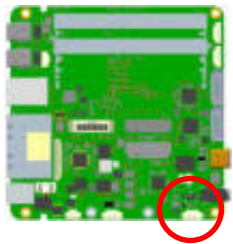


Fig. 42: Molex Power Button Connector Detail

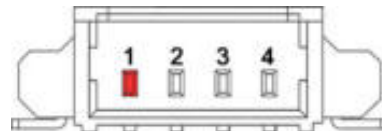


Fig. 43: Molex Power Button Connector Schematic

Pin	Signal
1	PWR_LED_ANODE 3.3 V +/- 5% with 100 Ω series resistor, max. 33 mA, not fused
2	PWR_LED_CATHODE
3	GND
4	POWERBUTTON

Tab. 8: Power Button Connector

### 4.18 Power Button, Power and SATA LEDs

Press power button once to start up.  
 Press power button to shut down into S3/S4/S5 (Standby/Hibernate/OFF; depending on OS setting).  
 Hold power button (> 4 sec.) to shut down into S5 (OFF).

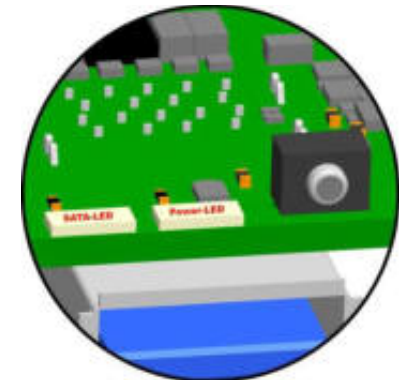
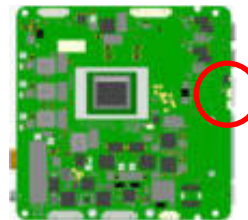


Fig. 44: Power Button/Power and SATA LEDs Detail



Counterpart – plug: MOLEX Pico Blade 0510210400  
 Power cable, 80 mm: Ordering number W-NUPWON3

### 4.19 Reset Button Connector

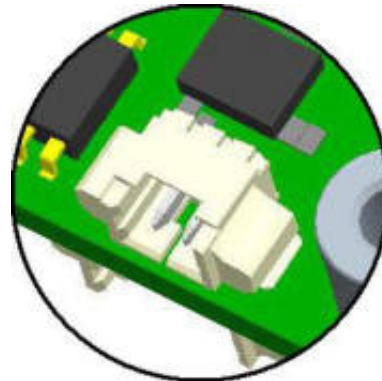
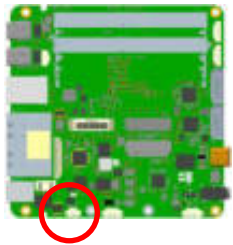


Fig. 45: Molex Reset Button Connector Detail



Counterpart – plug:  
MOLEX Pico Blade  
0510210200

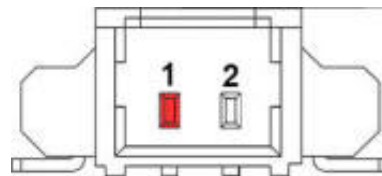


Fig. 46: Molex Reset Button Connector Schematic

Pin	Signal
1	RESET_IN
2	GND

Tab. 9: Reset Button Connector

4.20 FAN Connectors

CPU Fan Connector

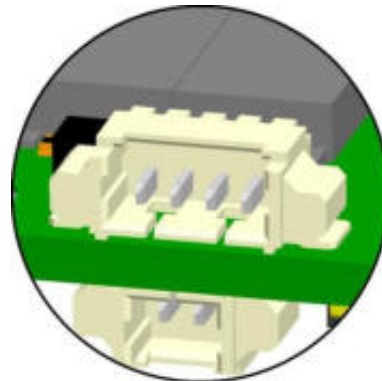
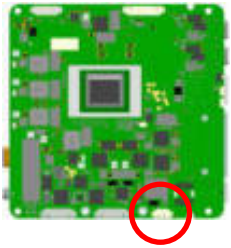


Fig. 47: Molex CPU Fan Connector Detail

Auxiliary Fan Connector

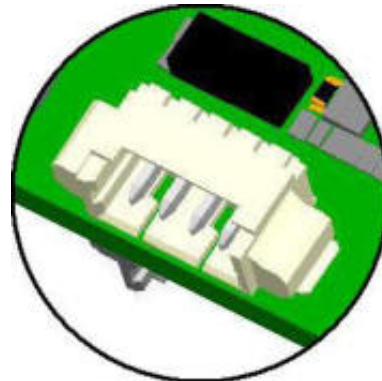
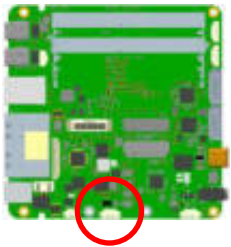


Fig. 48: Molex Auxiliary Fan Connector Detail



Counterpart – plug:  
MOLEX Pico Blade  
0510210400

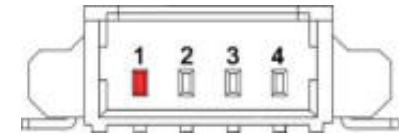


Fig. 49: Molex FAN Connector Schematic

Pin	Signal
1	GND
2	VDD_FAN *
3	FAN_TACHO
4	FAN_PWM

Tab. 10: FAN Connectors

\*Voltage depends on board variant:  
NUCEA-G, NUCEO = 5 V +/- 5%, max. 250 mA, not fused  
NUCEH-I = 12 V +/- 5%, max. 250 mA, not fused



An incorrectly connected fan can cause damage to the fan and the board!

4.21 RS232/485 Connectors

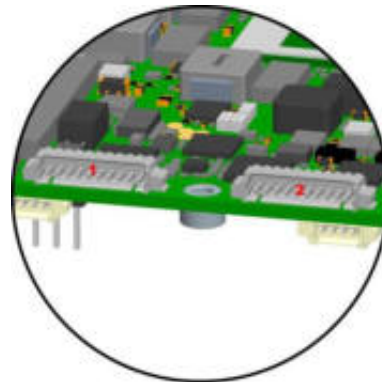
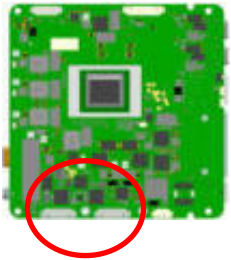


Fig. 50: Molex RS232/485 Connector Detail



Fig. 51: Molex RS232/485 Connector Schematic

Pin	Signal RS232	Signal RS485/FDX	Signal RS485/HDX for Windows 10/11 only
1	-	RS485-TX_N	RS485-RX/TX_N
2	-	-	
3	RXD	RS485-TX_P	RS485-RX/TX_P
4	RTS	-	
5	TXD	RS485-RX_P	
6	CTS	-	
7	-	RS485-RX_N	
8	-	-	
9	VCC 5 V +/-5%, max. 500 mA not fused	VCC 5 V +/-5%, max. 500 mA not fused	VCC 5 V +/-5%, max. 500 mA not fused
10	GND	GND	GND

Tab. 11: RS232/485 Connectors

Feature Details



Counterpart – plug:  
 MOLEX Pico Blade 0510211000  
 RS232 cable ordering number: W-RS232M1B  
 RS485 cable ordering number: W-RSXXM1A

4.22 Feature Connector

Status LED and GPIO Connector.

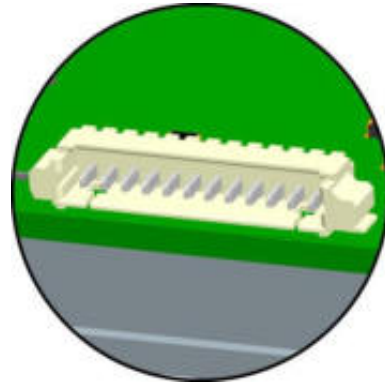
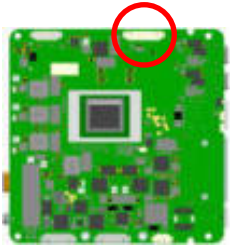


Fig. 52: Molex Feature Connector Detail



Counterpart – plug:  
MOLEX Pico Blade  
0510211200



Fig. 53: Molex Feature Connector Schematic

Pin	Signal
1	3.3V +/- 5%   200 mA max., not fused
2	P12V_FAN*   100 mA max., not fused
3	GPIO0
4	GPIO1
5	GPIO2
6	GPIO3
7	GPO4
8	GPO5
9	GPO6
10	STATUS_LED_ANODE 3.3V +/- 5% with 100 Ω / 422 Ω series resistor**, 33 mA max., not fused
11	STATUS_LED_CATHODE
12	GND

Tab. 12: Feature Connector

\*Voltage depends on board variant:

NUCEA-G, NUCEO = N.C.

NUCEH-I = 12 V +/-5%

\*\*series resistor depends on board variant:

NUCEA-G, NUCEO = 100 Ω (1/16W)

NUCEH-I = 422 Ω (1/16W)

## 5 BIOS

The following description shows a snapshot of the BIOS setup. Later BIOS updates may change the content slightly.

Asterisk (\*) indicates default setting.

### 5.1 Entering Setup

Power on the board and press and hold [ESC] immediately to enter Setup.

### 5.2 Most Common Settings

- Firmware / BIOS Version:  
Setup Utility → Main (chapter 5.3)  
or Setup Utility → AMD PBS → AMD Firmware Version (chapter 5.8.1)
- Boot / PXE Boot  
Boot Manager  
or Setup Utility → Boot (chapter 5.7)
- Change shared graphics memory  
Setup Utility → AMD CBS → NBIO Common Options → GFX Configurations → UMA Frame Buffer Size (chapter 5.9.2.1)
- TDP, fan control, boost mode  
TDP setting (chapter 5.9.2.2):  
Setup Utility → AMD CBS → NBIO Common Options → SMU Common Options → System Configuration  
Fan control (chapter 5.9.2.2.1):  
Setup Utility → AMD CBS → NBIO Common Options → SMU Common Options → CPU and Auxiliary Fan Control  
Boost mode (chapter 5.9.1):  
Setup Utility → AMD CBS → CPU Common Options → Core Performance Boost
- USB power  
USB Power off in S5 (chapter 5.4.9):  
Setup Utility → Advanced → NUCE Options → USB Power off in S5  
or  
USB VCC control (chapter 5.4.5):  
Setup Utility → Advanced → USB Configuration

### 5.3 Main Menu

Once you enter the Setup Utility, the Main Menu will appear on the screen:



Fig. 54: Main Menu



This setup menu shows an overview of board configuration, CPU type, memory and firmware revisions.

BIOS

BIOS Settings	Options	Description
Language	<English>*	
System Time	No options	Set the time. Use tab to switch between time elements [hour:min:sec]. Valid range is from 0 to 23, 0 to 59, 0 to 59. INCREASE/REDUCE: +/-.
System Date	No options	Set the date. Use tab to switch between date elements [month:day:year]. Valid range is from 1 to 12, 1 to 31, 2000 to 2099. (Error checking will be done against month/day/year combinations that are not supported.) INCREASE/REDUCE: +/-.
About this Software		

Tab. 13: Main Menu

5.4 Advanced Menu



Fig. 55: Advanced Menu

BIOS Settings	Options	Description
Boot Configuration	See submenu	Configures Boot Settings.
Peripheral Configuration	See submenu	Configures the peripheral devices.
IDE Configuration	See submenu	Select the IDE controller and hard disk drive type installed in your system
NVMe Configurations	See submenu	This function shows the connected NVMe devices.
USB Configuration	See submenu	Configure the USB support
Chipset Configuration	See submenu	Advanced Chipset Configuration Options.
ACPI Table/Features Control	See submenu	Configures ACPI Tables/Features setting.
CPU Related setting	See submenu	CPU Related setting
Above 4GB MMIO	<Disabled> <Enabled>*	Enable/Disable above 4GB MemoryMappedIO BIOS assignment. It's only available with Uefi Boot Mode.
NUCE Options	See submenu	Configure: PIC watchdog, Wake on LAN, Power LED, USB Power off in S5
SIO SCH3223	See submenu	SIO SCH3223 configuration menu

Tab. 14: Advanced Menu

BIOS

5.4.1 Boot Configuration



Fig. 56: Boot Configuration

BIOS Settings	Options	Description
Numlock	<Off> <On>*	Configuration of Numlock key at power up.

Tab. 15: Boot Configuration

5.4.2 Peripheral Configuration



Fig. 57: Peripheral Configuration

BIOS Settings	Options	Description
Trusted Platform Module	<Disabled> <Enable discrete TPM>* <Enable firmware TPM>	Enable/Disable TPM physical presence. Need to reboot when set from disable to enable before selecting TPM Operation.
Erase fTPM NV for factory reset	<Disabled> <Enabled>*	Control if need to erase the TPM NV when fTPM factory reset flag set.

Tab. 16: Peripheral Configuration

BIOS

5.4.3 IDE Configuration



Fig. 58: IDE Configuration

BIOS Settings	Options	Description
SATA	<Disabled> <Auto>*	AUTO: Auto detect the SATA controller. DISABLED: Disable the SATA controller
SATA Configure as	<IDE> <AHCI>*	Set SATA Configure Type
SATA-Controller	See submenu	Enable/Disable SATA Controller
Serial ATA Port 0 [Not Installed]	See submenu	Serial ATA Port 0 Device configuration
Serial ATA Port 1 [Not Installed]	See submenu	Serial ATA Port 1 Device configuration
Serial ATA Port 2 [Not Installed]	See submenu	Serial ATA Port 2 Device configuration

Tab. 17: IDE Configuration

BIOS

5.4.3.1 SATA-Controller



Fig. 59: SATA Controller

BIOS Settings	Options	Description
SATA Port 0	<Disabled> <Enabled>*	SATA Port 0 Enable/Disable
SATA Port 1	<Disabled> <Enabled>*	SATA Port 1 Enable/Disable
SATA Port 0	<Disabled> <Enabled>*	SATA Port 0 Enable/Disable

Tab. 18: SATA Controller

5.4.4 NVMe Configurations

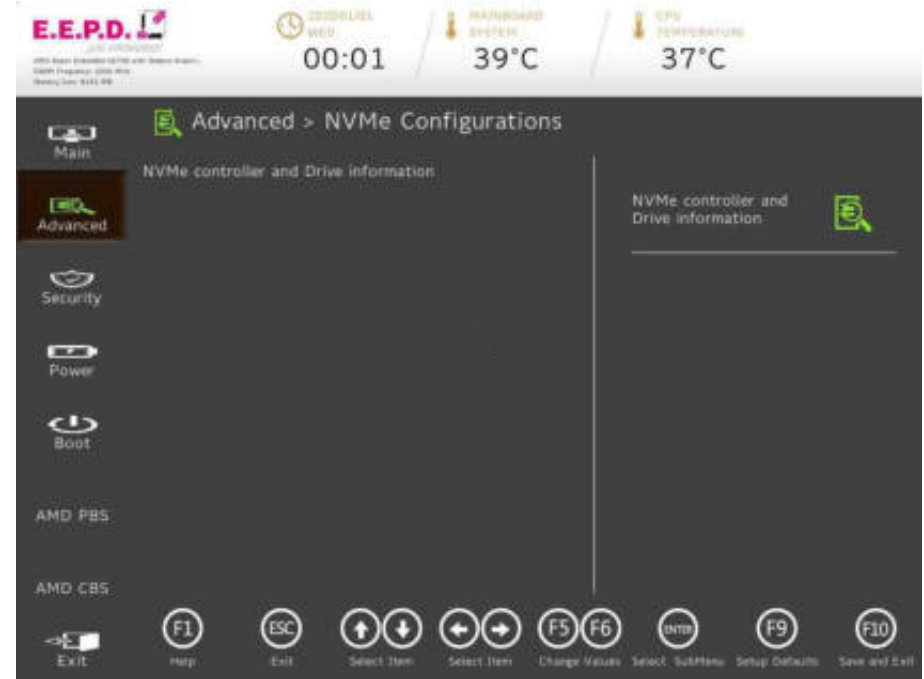


Fig. 60: NVMe Configurations

BIOS Settings	Options	Description
NVMe controller and Drive information		This function shows the connected NVMe devices.

Tab. 19: NVMe Configurations

BIOS

5.4.5 USB Configuration



Fig. 61: USB Configuration

5.4.5.1 Enable/Disable – VCC of USB Jacks



Fig. 62: USB Ports

BIOS

BIOS Settings	Options	Description
Enable/Disable – VCC of USB Jacks	See submenu	Enable/Disable – USB VCC

Tab. 20: USB Configuration

BIOS Settings	Options	Description
USB 3.1 Rear Port	<Disabled> <Enabled>*	This function allows you to enable or disable the power for the Rear USB port.
USB 2.0 Internal	<Disabled> <Enabled>*	This function allows you to enable or disable the power for the internal USB port.

Tab. 21: USB Ports



**Note:**  
In order to not exclude yourself from the BIOS setup, at least one USB port should be enabled at all times.

5.4.6 Chipset Configuration



Fig. 63: Chipset Configuration

BIOS Settings	Options	Description
PCI Latency Timer	<32> <64>* <96> <128> <160> <192> <224> <248>	PCI Latency Timer

Tab. 22: Chipset Configuration

5.4.7 ACPI Table/Features Control



Fig. 64: ACPI Table/Features Control

BIOS Settings	Options	Description
HPET - HPET Support	<Disabled> <Enabled>*	High Precision Event Timer is supported in Windows Vista or above. HPET controller should not been seen in Windows XP no matter enable/disable in SCU. If this feature is enabled, the HPET table will be added into ACPI Tables.

Tab. 23: ACPI Table/Features Control

5.4.8 CPU Related setting

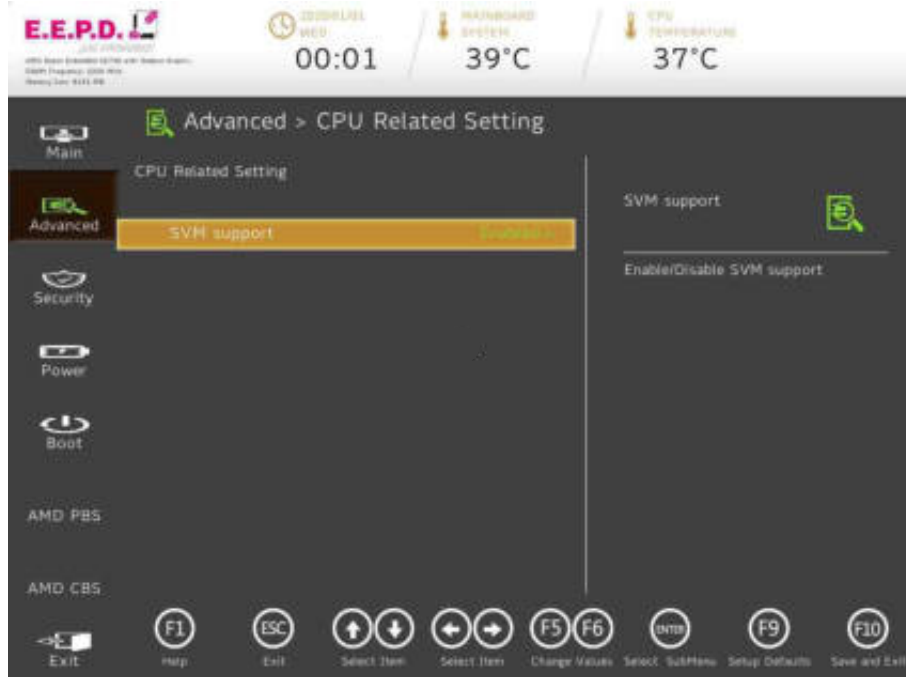


Fig. 65: CPU related setting

5.4.9 NUCE Options



Fig. 66: NUCE options

BIOS

BIOS Settings	Options	Description
SVM support	<Disabled> <Enabled>*	Enable/Disable SVM support SVM mode is an option to enable a so-called secure virtual machine

Tab. 24: CPU Related setting

BIOS Settings	Options	Description
PIC Watchdog	<Disabled>* <Enabled>	Enable/Disable the PIC watchdog
Watchdog Timeout (s)	Adjust value [30-254] Default value [40]*	Seconds before PIC watchdog times out. Range 30-254 seconds.
Wake on LAN	<Disabled> <Enabled>*	Enable/Disable Wake on LAN
Power LED Mode	<Disabled> <Enabled>*	Set Power LED Mode (Enable/Disable)

USB 3.1 Rear Port	<Disabled>* <Enabled>	Force USB VCC Off in S5. [Disabled]: Leaves VCC of USB Jack unchanged as in Advanced > USB Configuration > Enable/Disable - VCC of USB Jacks [Enabled]: Switches USB VCC off in S5 (System Power Off)!
USB 2.0 Internal	<Disabled>* <Enabled>	

Tab. 25: NUCE options



API or code sample to reset watchdog on request.



Enabling watchdog leads to the reset of the board after time out. Please contact EEPD for further instructions.

5.4.10 SIO SCH3223



Fig. 67: SIO SCH3223

BIOS Settings	Options	Description
UART Port 1 Configuration	See submenu	UART Configuration
UART Port 2 Configuration	See submenu	UART Configuration

Tab. 26: SIO SCH3223

5.4.10.1 UART Port 1 Configuration

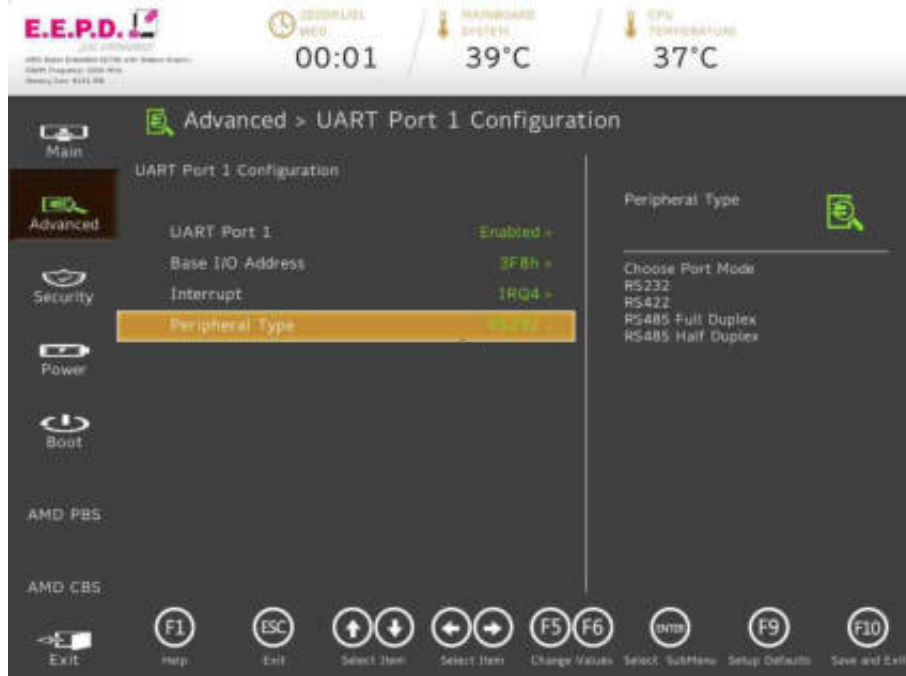


Fig. 68: UART Port 1 Configuration

BIOS Settings	Options	Description
UART Port 1	<Disabled> <Enabled>*	Configure UART port using options: [Disabled] Disable device [Enabled] Enable device and use below settings
Base I/O Address	<3F8h>* <2F8h> <3E8h> <2E8h> <338h> <228h> <220h> <238h>	System I/O base resources
Interrupt	<IRQ3> <IRQ4>* <IRQ6> <IRQ7> <IRQ11>	System interrupt resources
Peripheral Type	<RS232>* <RS422> <RS485 FULL DUPLEX> <RS485 HALF DUPLEX>	Choose Port Mode: RS232 RS422 RS485 Full Duplex RS485 Half Duplex

BIOS

Tab. 27: UART Port 1 Configuration

5.4.10.2 UART Port 2 Configuration

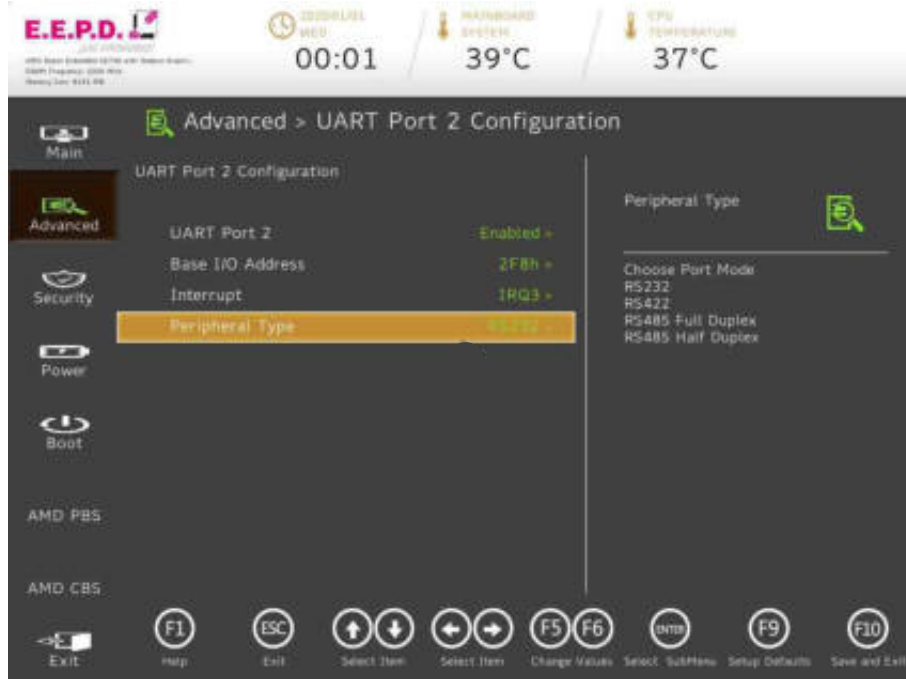


Fig. 69: UART Port 2 Configuration

BIOS Settings	Options	Description
UART Port 2	<Disabled> <Enabled>*	Configure UART port using options: [Disabled] Disable device [Enabled] Enable device and use below settings
Base I/O Address	<3F8h> <2F8h>* <3E8h> <2E8h> <338h> <228h> <220h> <238h>	System I/O base resources
Interrupt	<IRQ3>* <IRQ4> <IRQ6> <IRQ7> <IRQ11>	System interrupt resources
Peripheral Type	<RS232>* <RS422> <RS485 FULL DUPLEX> <RS485 HALF DUPLEX>	Choose Port Mode: RS232 RS422 RS485 Full Duplex RS485 Half Duplex

BIOS

Tab. 28: UART Port 2 Configuration

5.5 Security Menu



Fig. 70: Security Menu

BIOS Settings	Options	Description
Current TPM Device	<Not Detected> <TPM 1.2> <TPM 2.0 (DTPM)>*	Current TPM Device: TPM1.2, or TPM2.0.

TrEE Protocol Version	<1.0> <1.1>*	TrEE Protocol Version: 1.0 or 1.1
TPM Availability	<Available>* <Hidden>	When hidden, doesn't expose TPM to OS
TPM Operation	<No Operation>* <Enable> <SetPCRBanks(Algorithm)> <LogAllDigests> <SetPPRequiredForClear_True> <SetPPRequiredForClear_False> <SetPPRequiredForTurnOn_True> <SetPPRequiredForTurnOn_False> <SetPPRequiredForTurnOff_True> <SetPPRequiredForTurnOff_False> <SetPPRequiredForChangePCRs_False> <SetPPRequiredForChangePCRs_True> <SetPPRequiredForChangeEPS_False> <SetPPRequiredForChangeEPS_True> <ChangeEPS>	Select one of the supported operations to change TPM2 state.
Clear TPM	<Disabled>* <Enabled>	Clear TPM. Removes all TPM context associated with a specific Owner.
Set Supervisor Password	None	Install or change the password and the length of password must be greater than one character.

Tab. 29: Security Menu

BIOS

5.5.1 Storage Password Setup Page



Fig. 71: Storage Password Setup Page

BIOS Settings	Options	Description
TCG Storage Action	<No Operation> <Enable_BlockSIDFunc> <Disable_BlockSIDFunc> <PPRequiredForEnableBlockSID_True> <PPRequiredForEnableBlockSID_False> <PPRequiredForDisableBlockSID_True> <PPRequiredForDisableBlockSID_False>	Change BlockSID actions, includes enable or disable BlockSID, Require or not require physical presence when remote enable or disable BlockSID

Tab. 30: Storage Password Setup Page

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5.6 Power Menu



Fig. 72: Power Menu

BIOS Settings	Options	Description
Auto Wake on S5	<Disabled> <By Every Day> <By Day of Month>	Auto wake on S5, By Day of Month or Fixed time of every day

Tab. 31: Power Menu

BIOS

5.7 Boot Menu

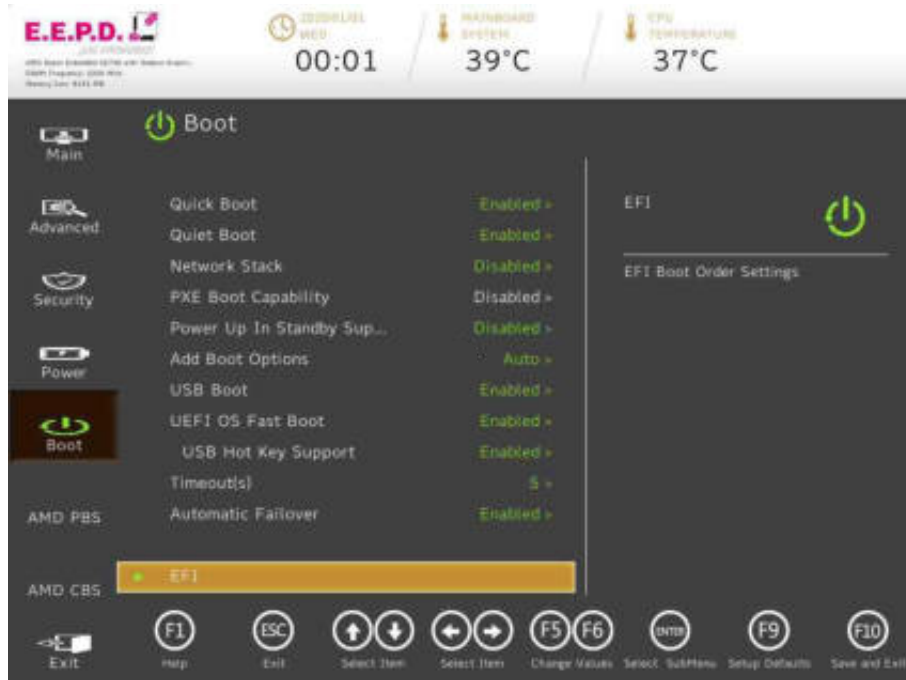


Fig. 73: Boot Menu

BIOS Settings	Options	Description
Quick Boot	<Enabled>* <Disabled>	Allows InsydeH2O to skip certain tests while booting. This will decrease the time needed to boot the system.
Quiet Boot	<Enabled>* <Disabled>	Disables or enables booting in Text Mode.
Network Stack	<Disabled>* <Enabled>	Network Stack Support: Windows 8 BitLocker Unlock

		UEFI IPv4/IPv6 PXE Legacy PXE OPROM
PXE Boot capability	<Disabled>*	Disabled: Support Network Stack UEFI PXE: IPv4/IPv6 Legacy: Legacy PXE OPROM only
Power Up In Standby Support	<Enabled> <Disabled>*	Disable or enable Power Up in Standby Support. The PUIS feature set allows devices to be powered-up into the Standby power management state to minimize inrush current at power-up and to allow the host to sequence the spin-up of devices.
Add Boot Options	<First> <Last> <Auto>*	Position in Boot Order for Shell, Network and Removables
USB Boot	<Enabled>* <Disabled>	Disables or enables booting to USB boot devices.
UEFI OS Fast Boot	<Enabled>* <Disabled>	If enabled the system firmware does not initialize keyboard and check for firmware menu key.
USB Hot Key Support	<Disabled>* <Enabled>	Enable/Disable to support USB hot key while booting. This will decrease the time needed to boot the system.
Timeout(s)	Adjust value [0-10] Default value [5]	The number of seconds that the firmware will wait before booting the original default boot selection.
Automatic Failover	<Disabled> <Enabled>*	Enable: if boot to default device fail, it will directly try to boot next device. Disable: if boot to default device fail, it will pop warning message then go into firmware UI.
EFI	See submenu	EFI Boot Order Settings

Tab. 32: Boot Menu

BIOS

5.7.1 EFI



Fig. 74: EFI

BIOS Settings	Options	Description
EFI USB Device (SanDisk)	<Enabled> <Disabled>	
Internal EFI Shell	<Enabled> <Disabled>	

Tab. 33: EFI

BIOS

5.8 AMD PBS Menu



Fig. 75: AMD PBS Menu

BIOS Settings	Options	Description
AMD Firmware Version	See submenu	Show all of AMD Firmware Version
M.2 Key M SATA/PCIE Selection	<Force PCIE> <Force SATA> <Auto Detection>*	M.2 Key M SATA/PCIE Selection usage: SATA, PCIE or Auto Detection
WWAN Power Control	<Enabled>* <Disabled>	Enable/disable Power of M.2 Key B Slot (WWAN)
WWAN Radio Operation	<Enabled>* <Disabled>	Enable/disable Radio Operation of M.2 Key B Slot (WWAN)
WLAN Radio Operation	<Enabled>* <Disabled>	Enable/disable WLAN Radio Operation of M.2 Key E Slot
BT Radio Operation	<Enabled>* <Disabled>	Enable/disable Bluetooth (BT) Radio Operation of M.2 Key E Slot

Tab. 34: AMD PBS Option

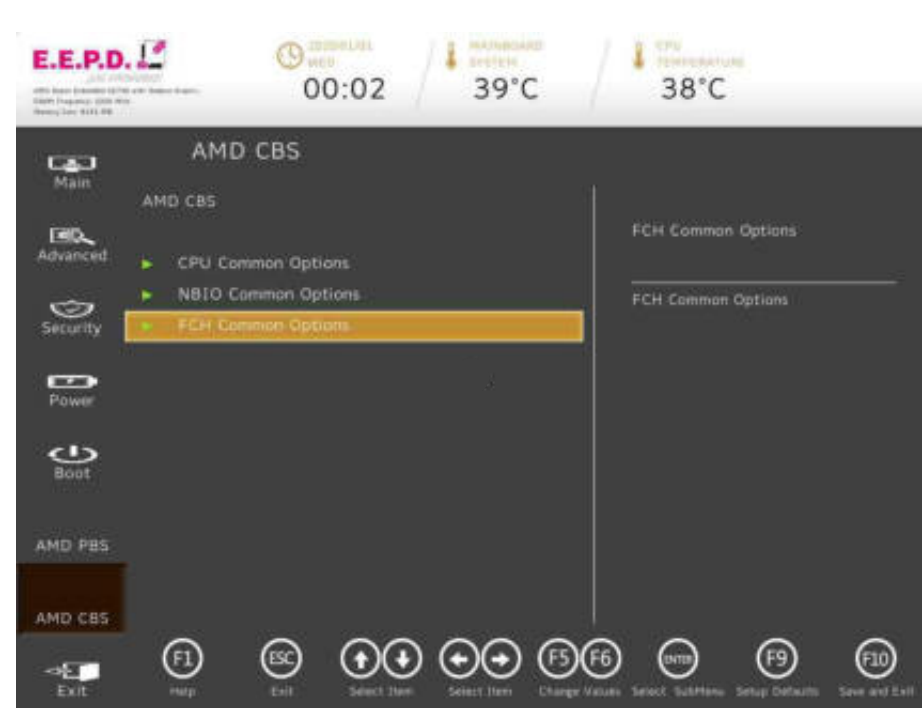
BIOS

5.8.1 AMD Firmware Version



Fig. 76: AMD Firmware Version

5.9 AMD CBS Menu



BIOS

Fig. 77: AMD CBS Menu

BIOS Settings	Options	Description
CPU Common Options	See submenu	CPU Common Options
NBIO Common Options	See submenu	NBIO Common Options
FCH Common Options	See submenu	FCH Common Options

Tab. 35: AMD CBS Menu

5.9.1 CPU Common Options



Fig. 78: CPU Common Options

BIOS Settings	Options	Description
Core Performance Boost	<Disabled>* <Auto>	This allows the processor to dynamically adjust and control the processor operating frequency to enable performance improvement.
CPU Thermal Throttling Temperature	Adjust value [50 - 100*]	CPU Thermal Throttling Temperature Limit (50-100[°C])

Tab. 36: CPU Common Options

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5.9.2 NBIO Common Options



Fig. 79: NBIO Common Options

BIOS Settings	Options	Description
GFX Configuration	See submenu	GFX Configuration
SMU Common Options	See submenu	SMU Common Options

Tab. 37: NBIO Common Options

BIOS

5.9.2.1 GFX Configuration



Fig. 80: GFX Configuration

BIOS Settings	Options	Description
iGPU Configuration	<Auto>* <UMA_SPECIFIED> <UMA_AUTO> <UMA_GAME_OPTIMIZED>	UMA Mode Select UMA_SPECIFIED to set UMA Frame Buffer Size.
UMA Frame Buffer Size	<Auto> <64M> <128M> <256M> <384M> <512M> <80M> <96M> <768M> <1G> <2G>* <3G> <6G> <8G> <16G>	This allows the system to manage the amount of shared memory for graphics. For systems equipped with 8GB of RAM or more, set the UMA buffer size to 1GB or 2GB
UMA Version	<Legacy> <Non-Legacy> <Hybrid Secure> <Auto>*	UMA Legacy Version UMA Non-Legacy Version Hybrid Secure
GPU Host Translation Cache	<Disabled> <Enabled> <Auto>*	Option to disable GPU Host Translation Cache

Tab. 38: GFX Configuration

BIOS

5.9.2.2 SMU Common Options



Fig. 81: SMU Common Options

BIOS Settings	Options	Description
CPU and Auxiliary Fan Control	See submenu	CPU and Auxiliary Fan Control
System Configuration	<10W – 54W POR Configuration> (depending on the system)	Warning: Select System Configuration may cause the system to hang, as some System Configuration may not be supported by your OPN.

Tab. 39: SMU Common Options

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5.9.2.2.1 CPU and Auxiliary Fan Control



Fig. 82: CPU and Auxiliary Fan Control

BIOS Settings	Options	Description
CPU Fan Control	<Optimized Cooling>* <Silent Mode> <Maximum Cooling> <No Cooling>	Optimized Cooling --> Automatic PWM control depending on temperature Silent Mode --> Less noise (30%)
Auxiliary Fan Control	<Optimized Cooling> <Silent Mode> <Maximum Cooling> <No Cooling>*	Maximum Cooling --> Always on (100%) No Cooling --> Always off

Tab. 40: CPU and Auxiliary Fan Control

BIOS

5.9.3 FCH Common Options



Fig. 83: FCH Common Options

5.9.3.1 Ac Power Loss Options



Fig. 84: Ac Power Loss Options

BIOS

BIOS Settings	Options	Description
Ac Power Loss Options	See submenu	Ac Power Loss Options

Tab. 41: FCH Common Options

BIOS Settings	Options	Description
Ac Loss Control	<Always Off> <Always On>* <Previous>	This function allows you to set the power status after a power failure. Select [Always Off] to keep the system power off after a power failure. Select [Always On] to turn the system power after a power failure. Select [Previous] to allow the System to resume its last power state before a power failure.

Tab. 42: Ac Power Loss Options

5.10 Exit Menu



Fig. 85: Exit Menu

BIOS Settings	Options	Description
Exit Saving Changes		Exit system setup after saving your changes.
Save Change Without Exit		Save your changes without exiting system setup.
Exit Discarding Changes		Exit system setup without saving your changes.
Load Optimal Defaults		Load Optimal Defaults to all the setup options.
Load Custom Defaults		Load Custom Defaults to all the setup options.
Save Custom Defaults		Save changes done so far as Custom Defaults.
Discard Changes		Discard Changes done so far to any of the setup options.

Tab. 43: Exit Menu

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## Terminology

<b>BT</b>	Bluetooth
<b>CPU</b>	Central Processing Unit or processor
<b>DC</b>	Direct Current
<b>DDR4</b>	Fourth generation „Double Data Rate“ memory technology
<b>DP</b>	Display port
<b>EMI</b>	ElectroMagnetic Interference
<b>Gigabit Ethernet</b>	Ethernet connection with a frame transfer speed up to 1000 Mbit/s
<b>GND</b>	Ground
<b>MIC</b>	Microphone
<b>M.2</b>	Next generation mSATA
<b>OCP</b>	Over Current Protection
<b>PWM</b>	Pulse-Width Modulation
<b>RAM</b>	Random Access Memory
<b>RS-232</b>	Serial standard interface
<b>RS-485</b>	Serial standard interface
<b>SD</b>	Secure Digital memory card
<b>SIM</b>	Subscriber Identity Module (Card) used to store information in mobile phones
<b>SoC</b>	System on a Chip means the integration of all or a large part of the functions of a programmable electronic system on a single chip
<b>SODIMM</b>	Small Outline Dual Inline Memory Module
<b>SSD</b>	Solid State Drive
<b>USB</b>	Universal Serial Bus
<b>Watchdog</b>	A watchdog (timer) is a computer hardware timing device that triggers a system reset if the main program hangs, in order to keep the computer running
<b>WLAN</b>	Wireless Local Area Network
<b>WWAN</b>	Wireless Wide Area Network

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