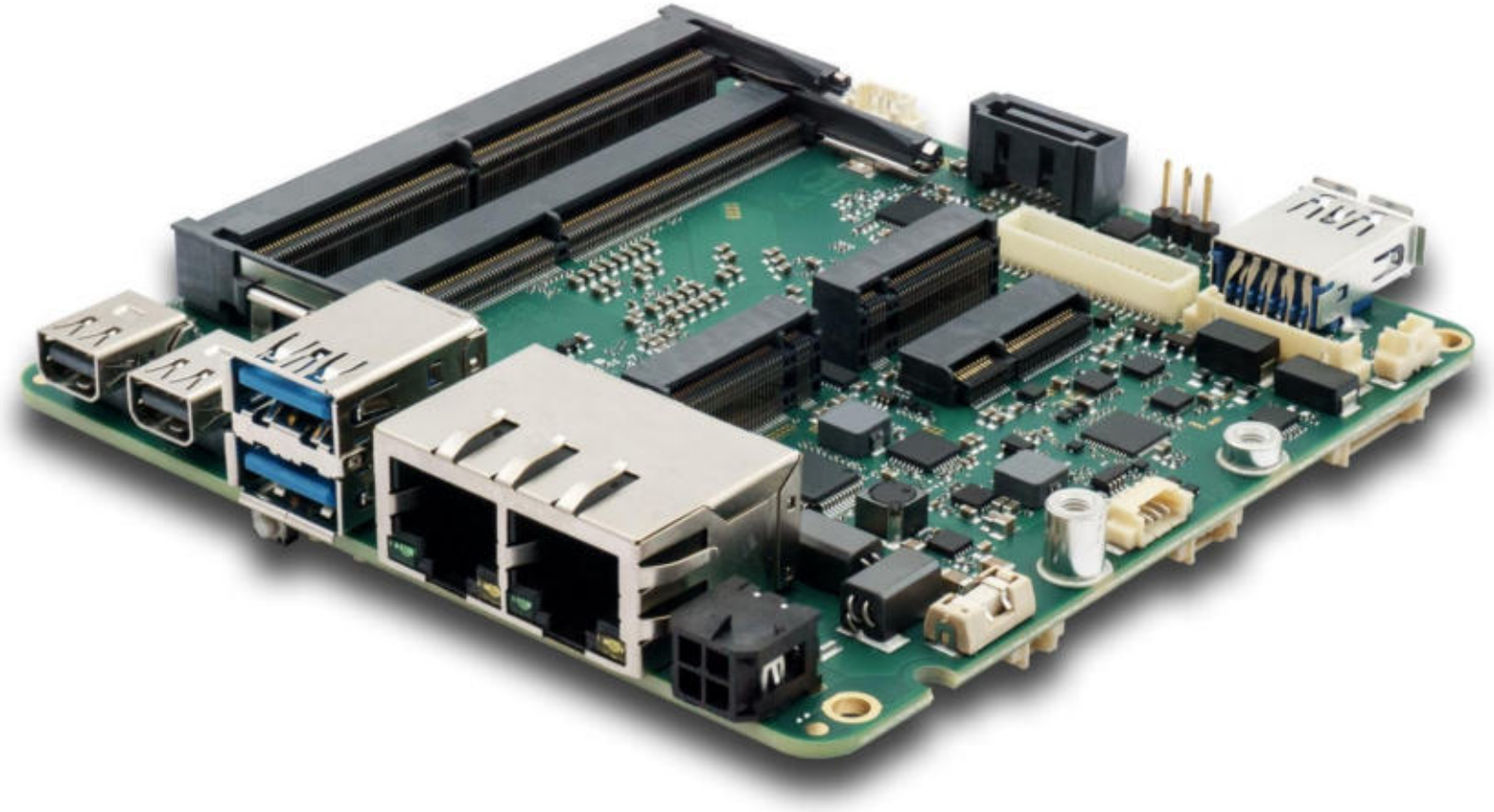
PROFIVE® NUCD – Hardware Reference Manual



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E.E.P.D.
...just embedded!

Manufacturer

E.E.P.D. Electronic Equipment Produktion & Distribution GmbH
Gewerbering 3
85258 Weichs

Phone: +49 8136 2282 – 0
Web: https://www.eepd.de
E-Mail: sales@eepd.de

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04/2025 Version 5.2

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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.

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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**

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Revision History

Date	Version	Changes	Proofed
08.04.2022	1.0	First release	
10.08.2023	1.1	BIOS added	
05.10.2023	5.0	Minor corrections; Version ≙ Revision	
03.12.2024	5.1	Minor corrections/updates; connection overview added	
11.04.2025	5.2	Update Power Connector and OS Support	

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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.

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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

Designed for min. 8 V to max. 32 V (DC) single power supply, max. 5 A, automotive grade | KL15 (ignition), min 90 W, 8 A fused.

Current rating of the power supply has to exceed the expected current draw depending on the system configuration, CPU variant and its TDP settings, and peripheral devices used with the system. Power supplies might derate due to lower efficiency at higher operating temperature. Insufficient power supply might lead to the system instability, shutdown and data loss.

Power Connector

Four-pin power connector with ignition input.

Molex 43045 Series or compatible 3.00 mm Micro MF connector with lock, max. 8.5 A.

Power Limit

Internal and external 3.3 V power max. 20 W.

Internal and external 5 V power max. 30 W.

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

Processor Support

AMD Ryzen™ Embedded R2000 processor series:

R2312 / 2C / 4T / 2.7 GHz – 3.5 GHz / 12 – 25 W

R2314 / 4C / 4T / 2.1 GHz – 3.5 GHz / 12 – 35 W

R2514 / 4C / 8T / 2.1 GHz – 3.7 GHz / 12 – 35 W

R2544 / 4C / 8T / 3.35 GHz – 3.7 GHz / 35 W

Ethernet Controller

2x Intel® i225-LM 2.5 Gbit/s Ethernet PCI Express® controllers with IEEE1588, TSN-support, Wake-on-LAN supported by ETH 1.

RAM Support

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

Display

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

1x LVDS up to 3840 x 2160 @ 60 Hz (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 Single-USB 3.2 Gen2 (10 Gb/s, OCP = 1.5 A), Type A at the rear side.

1x USB 3.2 Gen1 (5 Gb/s, OCP = 900 mA) on Molex (PicoBlade) connector (not available with R2312).

Up to 2x USB 2.0 (480 Mb/s, OCP = 500 mA each) on Molex (PicoBlade) connector (OEM/ODM only).

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Storage Support

1x microSD XC card slot at the rear side,
supports A1 Application Performance Class, UHS-Class1.

1x M.2 Key M, 2242, PCIe Gen3 x1 NVMe or SATA SSD.

1x SATA (6G) upright connector with separate power Molex (PicoBlade) connector (+5V DC, max. 1.5 A, not fused).

Expansion Slots

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

1x Key B, 2242/3042, support for PCIe Gen3 x1 / USB 2.0, e. g. for WWAN, µSIM card available on board, see chapter *4.18* for details.

Serial Ports

1x RS-232/485 (FDX|HDX) port on internal Molex (PicoBlade) connector.

1x RS-232 port on internal Molex (PicoBlade) connector.

Audio

HDA Codec; MIC IN, stereo HP OUT, stereo Line IN, stereo Line OUT on internal Molex (PicoBlade) connector.

Cooling

Fanless cooling / passive cooling options available

Optional CPU fan, 5 V DC, max. 250 mA, not fused

Optional auxiliary fan, 5 V DC, max. 250 mA, not fused

OS Support

Microsoft® Windows® 11

Microsoft® Windows® 11 IoT Enterprise

Microsoft® Windows® 10

Microsoft® Windows® 10 IoT Enterprise

Linux Ubuntu 24.04 LTS

Extended Features

Onboard µ-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 [3.3 V/50 kHz], Status LED)

Power LED onboard

Status LED onboard

LVDS panel backlight

RTC battery connector

Onboard Trusted Platform Module

TPM 2.0 support (Infineon SLB 9670) (R2312 variants OEM only)

Size approx. 102 x 102 mm

Weight approx. 110 g + options

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1.2 Environmental Specification

Max. Operating Temperature

0 °C to +60 °C ambient commercial grade, when adequate heatsink/cooling is provided.
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

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2 System Overview

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

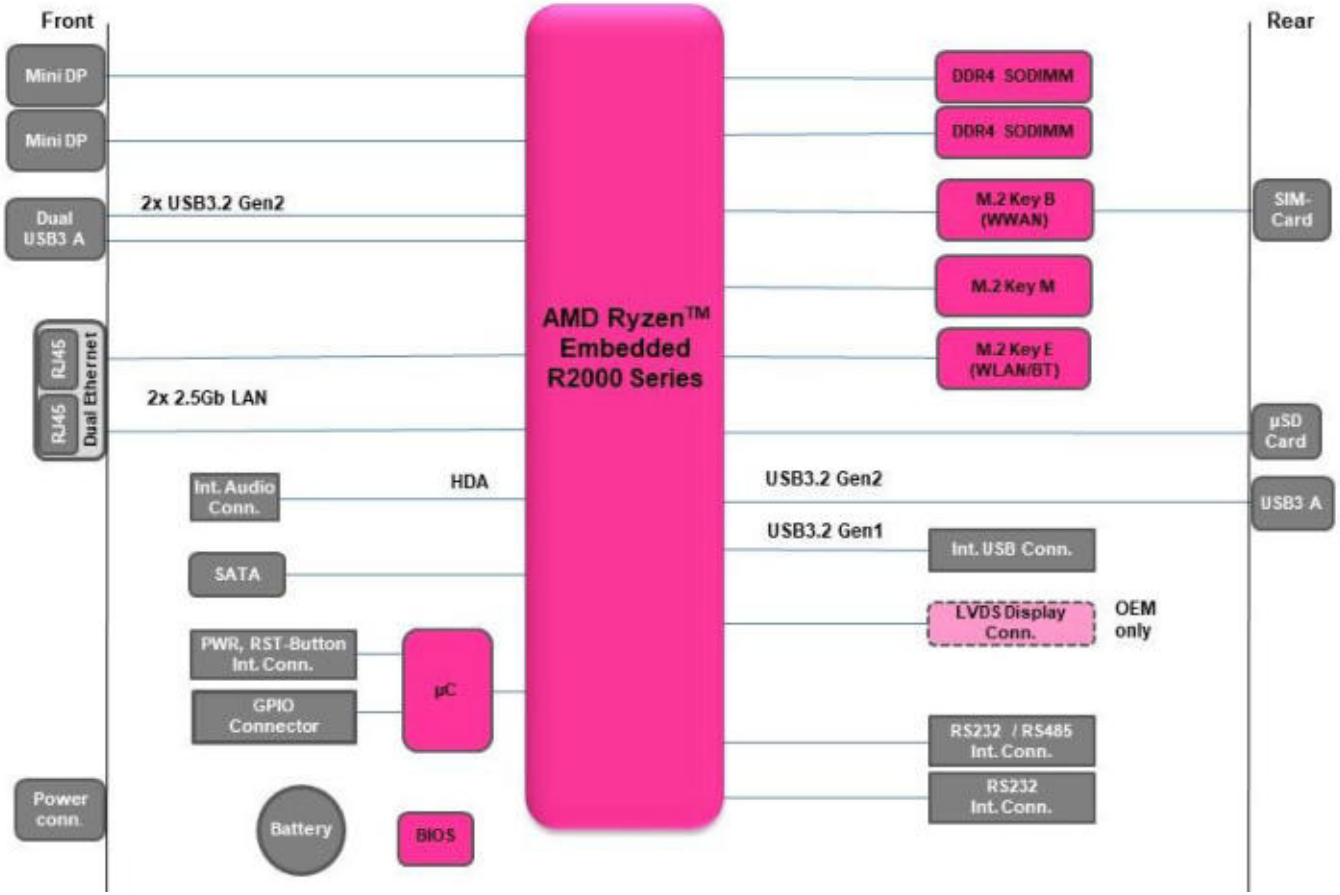

Fig. 1: System Overview

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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 connector 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** (Metric strength class 5.6 or better).

3.1 Product Views

Top View

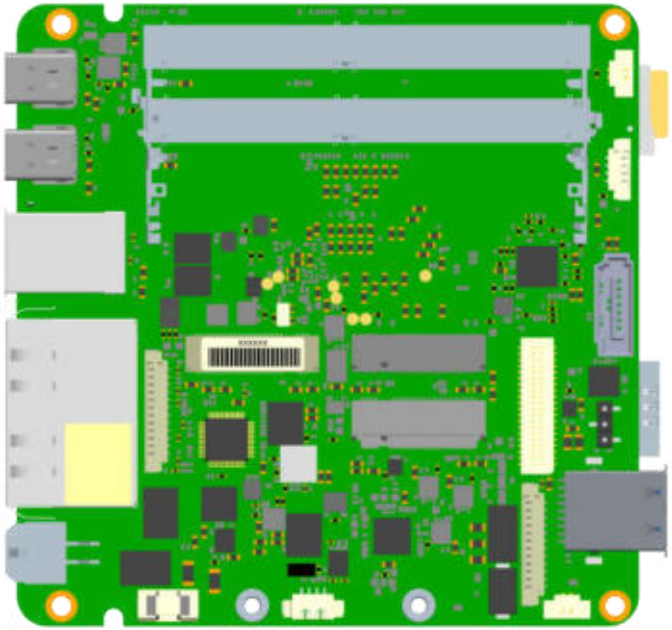

Fig. 2: Top View

Bottom View

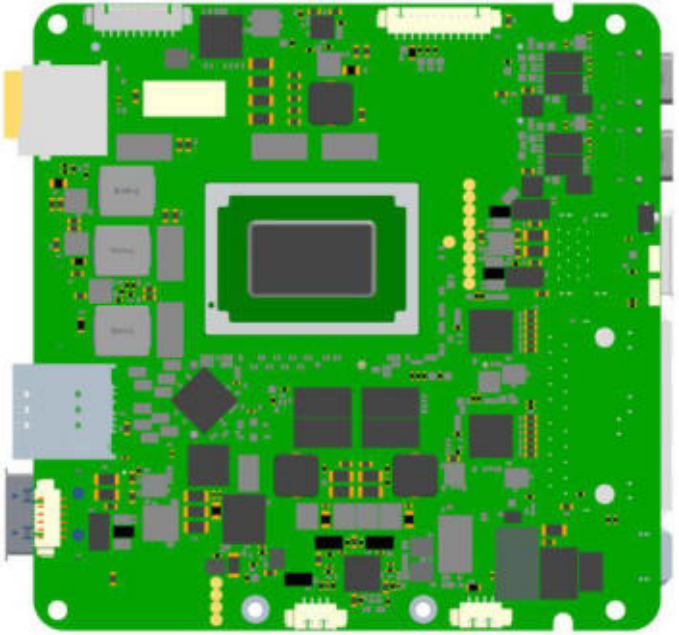

Fig. 3: Bottom View

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Front View

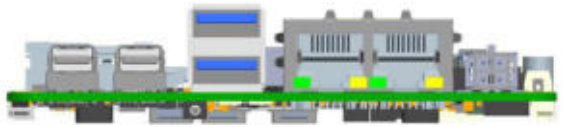

Fig. 4: Front View

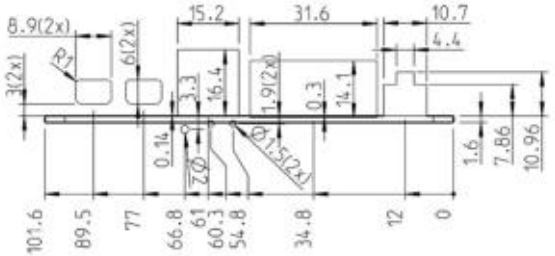

Fig. 5: recommended cutouts front panel, approx. values [mm]

Rear View

Fig. 6: Rear View

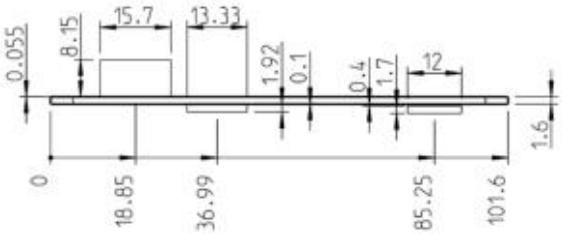

Fig. 7: recommended cutouts rear panel, approx. values [mm]

3.2 Mechanical Mounting

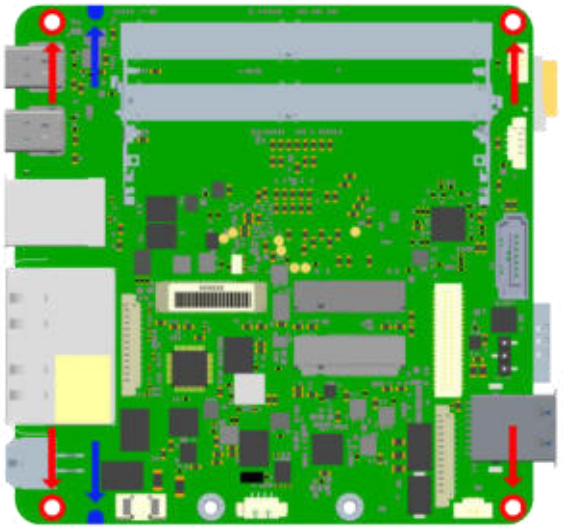

Fig. 8: Mechanical Mounting

Please use the 4 mounting points (red outline) to fasten the base board. In order to prevent short circuit use distance bolts with a minimum length of 15.24 mm (0.6 inches).

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

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3.3 Dimensions

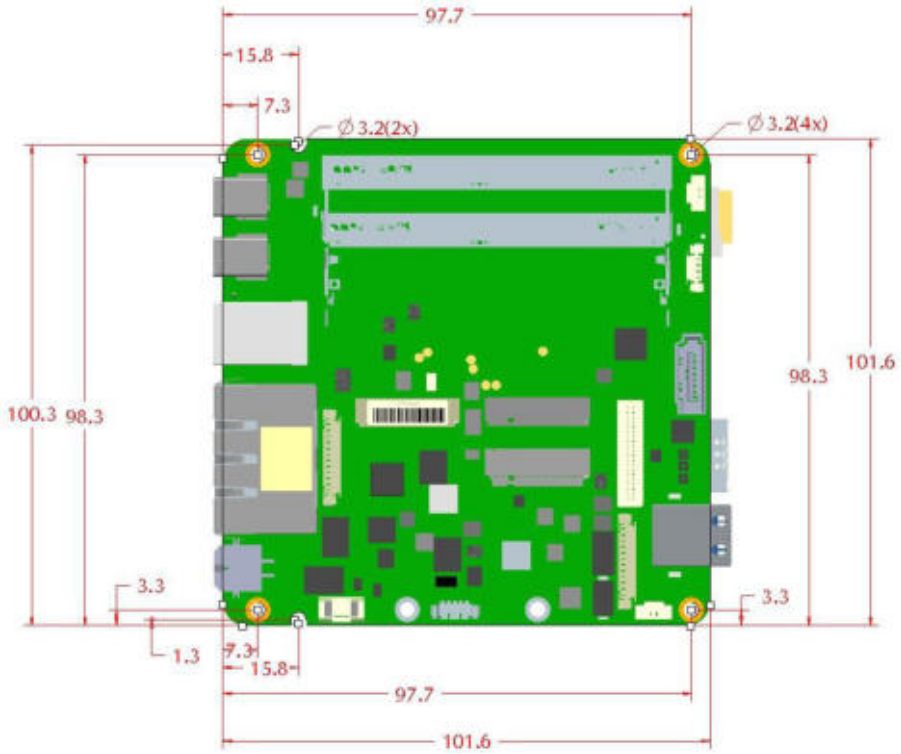

Fig. 9: Dimensions of the Board, approx. values [mm]

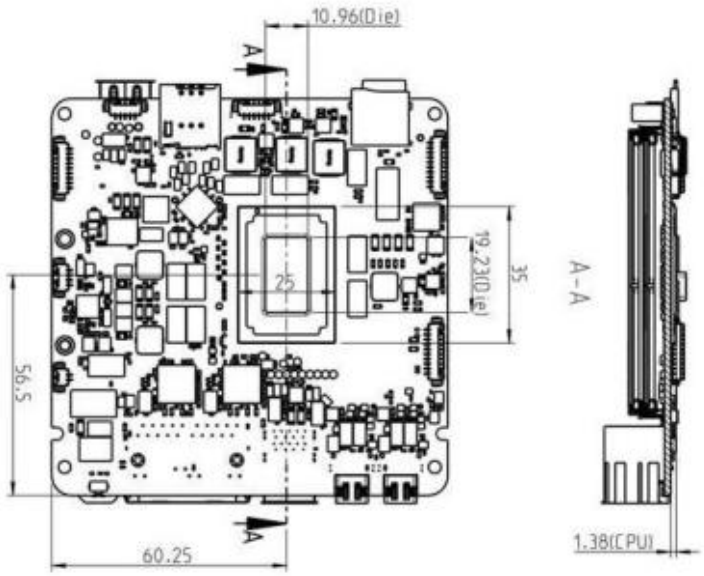

Fig. 10: Dimensions of the CPU, approx. values [mm]

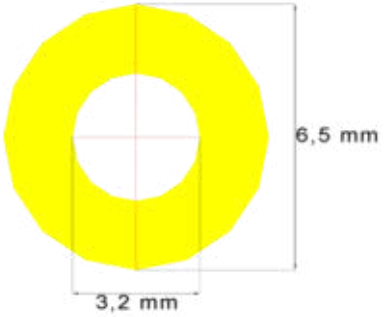

Fig. 11: Dimensions of the mounting points, approx. values [mm]

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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%
P12V_DISPLAY	12 V +/- 5%
PVIN (min. – max.)	8 – 32 V
VDD_LCD	3.3 V/5 V +/- 5%

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4.1 Connection Overview

Top Side

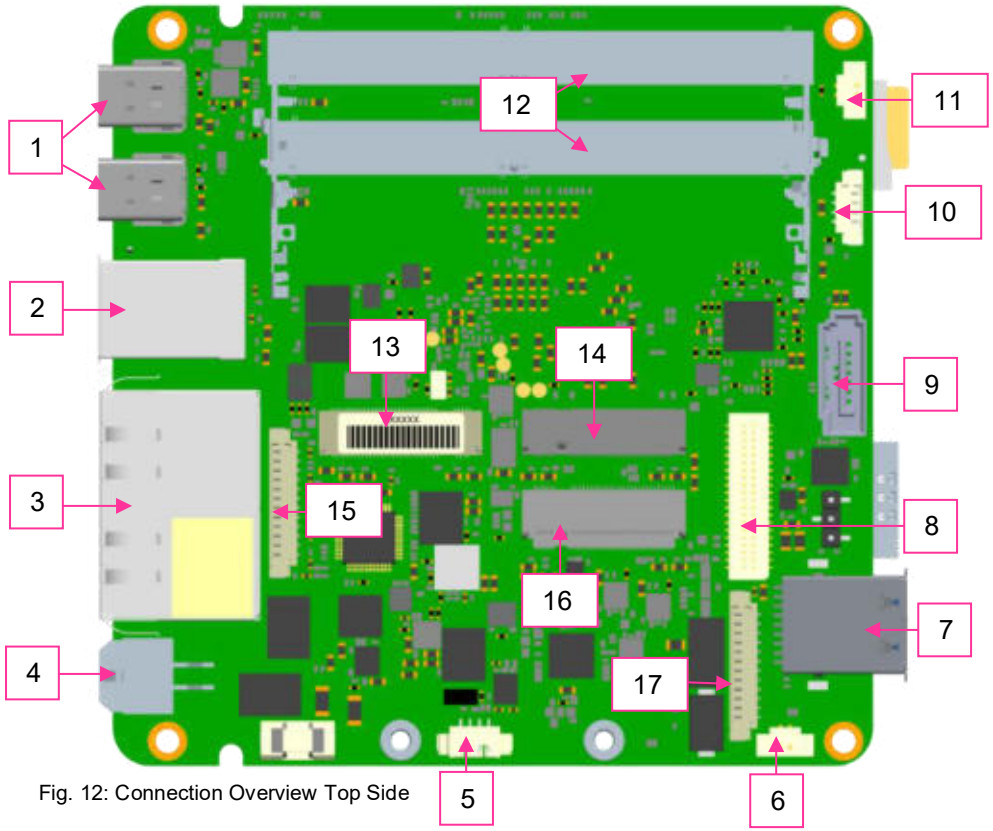

Fig. 12: Connection Overview Top Side

1 – Mini-DP++ connectors, see chapter *4.2*
2 – Dual-USB 3.2 port, see chapter *4.5*
3 – 2.5 Gigabit Ethernet Dual-Port, see chapter *4.3*
4 – Power connector, see chapter *4.4*
5 – Auxiliary Fan connector, see chapter *4.19*
6 – Reset button connector, see chapter *4.22*
7 – Rear USB 3.2 port, see chapter *4.5*
8 – LVDS connector, see chapter *4.12*
9 – SATA Data connector, see chapter *4.10*
10 – SATA Power connector, see chapter *4.11*
11 – Battery connector, see chapter *4.20*
12 – DDR4 SO-DIMM sockets, see chapter *4.7*
13 – M.2 Key M socket, see chapter *4.9*
14 – M.2 Key B socket, see chapter *4.9*
15 – Audio connector, see chapter *4.8*
16 – M.2 Key E socket, see chapter *4.9*
17 – LC-Display Backlight connector, see chapter *4.13*

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Bottom Side

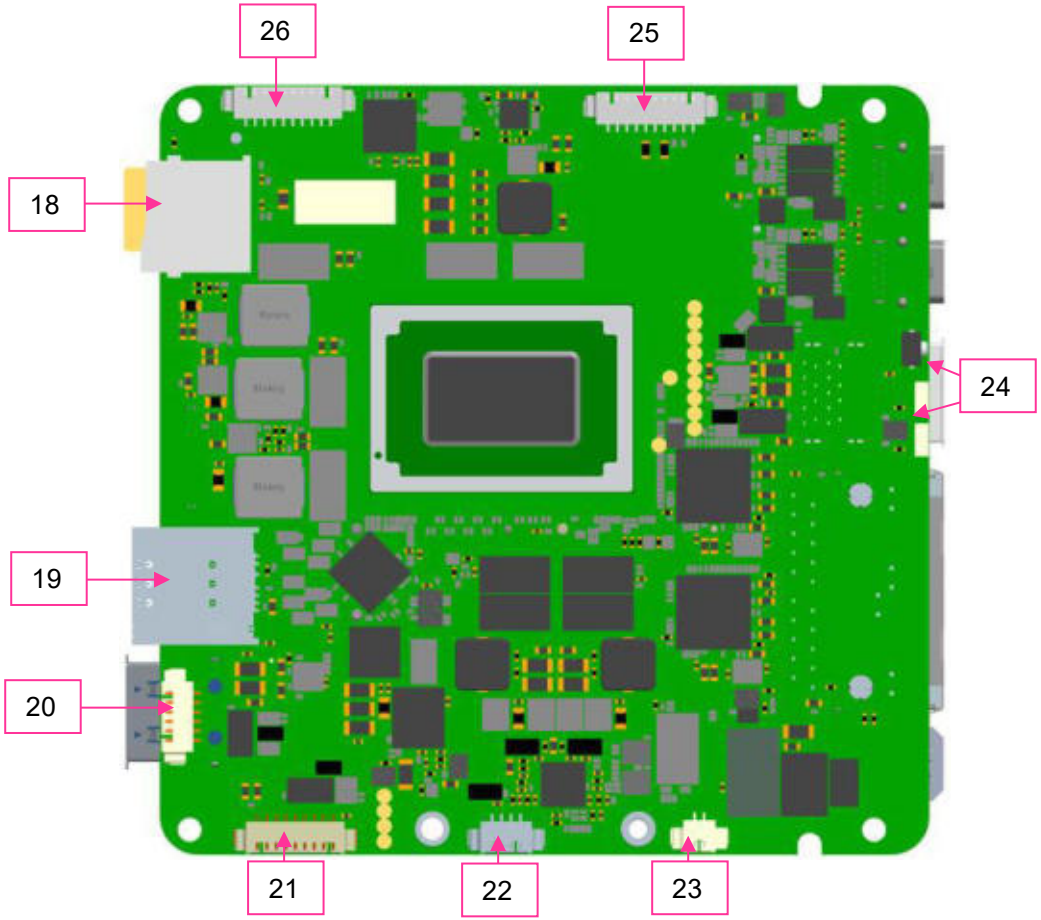

Fig. 13: Connection Overview Bottom Side

18 – MicroSD card slot, see chapter *4.17*

19 – MicroSIM card slot, see chapter *4.18*

20 – RS232 connector, see chapter *4.15*

21 – internal USB connector, see chapter *4.6*

22 – CPU fan connector, see chapter *4.19*

23 – Power button connector, see chapter *4.23*

24 – Power Button, Power and SATA LEDs, see chapter *4.21*

25 – Feature connector, see chapter *4.16*

26 – RS232/485 connector, see chapter *4.14*

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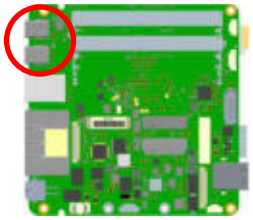
4.2 Mini-DP++ Connectors



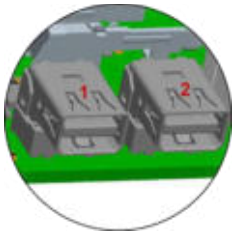


Fig. 14: Mini-DP++ Connector Detail

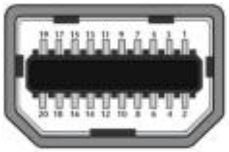


Fig. 15: Mini-DP++ Connector Schematic

CAUTION

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.

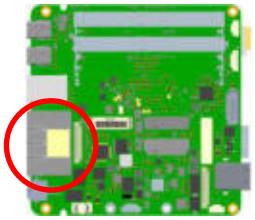
If you use active cables/adapters (e.g. Mini DP to DP, Mini DP to HDMI), please use cable with Pin 20 (supply voltage) on both ends that are connected.

Possible effects if wrong cable is used:

System might not start up properly.
Dongle does not work properly (black display).

4.3 2.5 Gigabit Ethernet Dual-Port

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



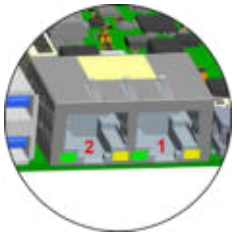


Fig. 16: Ethernet Dual-Port Detail

Yellow LED
Speed-LED is on during 2.5 and 1 Gbit transmission and switched off during 10/100 Mb/s 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.

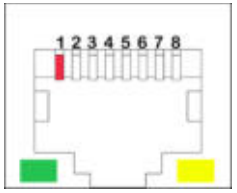


Fig. 17: Ethernet Port Schematic

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4.4 Power Connector

CAUTION

For a stable operation:

Please ensure a system power supply of min. 90 W.
Power source must be capable to respond to fast load changes!
Supply voltage (V_{in}) min. 8 V / max. 32 V.

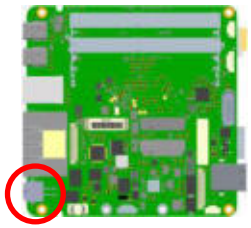

Fig. 18: Power Connector Detail

Counterpart – plug:

MOLEX 43045 Series or compatible 3.00 mm Micro MF connector with lock, max. 8.5 A

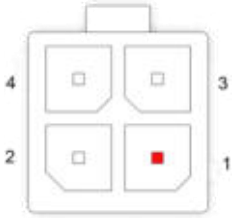

Fig. 19: Power Connector Schematic

Pin	Signal
1	GND_IN, max. 8.5 A
2	GND_IN, max. 8.5 A
3	PVIN, max. 8.5 A
4	KL_15*, max. 8.5 A

Tab. 1: Power Connector

*KL_15 is ignition enable pin required for automotive applications:

KL_15 is default off in BIOS setup (see chapter *5.4.8*).
When enabled:

- Switching on the PC with ignition
- Switching off when the ignition is off with adjustable timers (timer 1 – shutdown; timer 2 – hard off, if shutdown times out; Countdown timer between 1 and 65535 seconds)
  The timers can be set via the “ignition signal” BIOS menu. Default is 180 seconds: 180 seconds after the ignition is off, the board is shut down by the onboard microcontroller.

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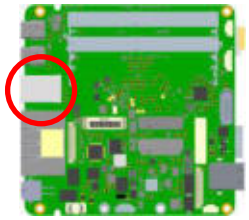
4.5 USB 3.2 Ports

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



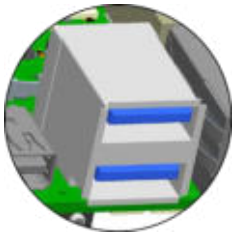


Fig. 20: Dual-USB 3.2 Port Detail

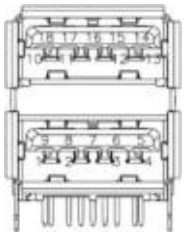


Fig. 21: Dual-USB 3.2 Port Schematic

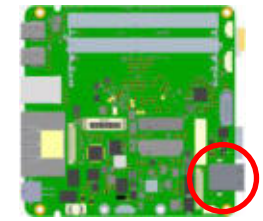


Fig. 22: Rear USB 3.2 Port Detail

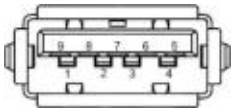
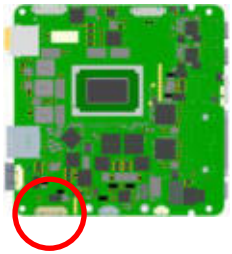


Fig. 23: Rear USB 3.2 Port Schematic

4.6 USB Internal Connector

USB 3.2 port providing max. 900 mA (OCP).
Support for USB 2.0 and USB 3.2 Gen1 (5Gb/s).



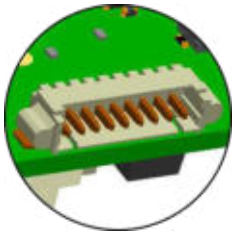


Fig. 24: Molex USB internal Connector Detail

Counterpart – plug:

MOLEX Pico Blade 0510210900

Fig. 25: Molex USB internal Connector Schematic

Pin	Signal
1	VCC_USBSS_4 → 5V +/- 5%, OCP = 900 mA
2	USB2_4_N
3	USB2_4_P
4	GND
5	USBSS_4_TX_N
6	USBSS_4_TX_P
7	GND
8	USBSS_4_RX_N
9	USBSS_4_RX_P

Tab. 2: USB internal Connector

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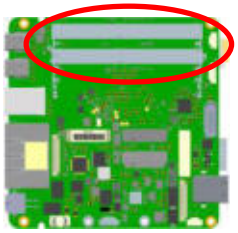
4.7 DDR4 SO-DIMM Sockets



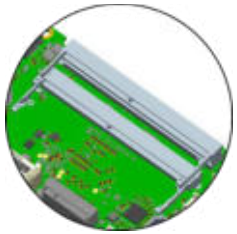


Fig. 26: DDR4 SO-DIMM Socket Detail

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.

Disassembly:

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

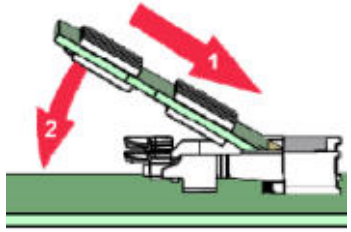
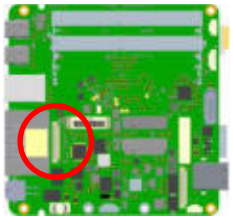


Fig. 27: RAM Assembly

4.8 Audio Connector



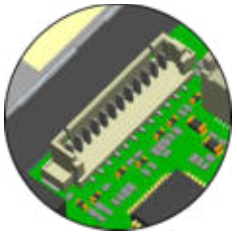


Fig. 28: Molex Audio Connector Detail

Counterpart – plug:

MOLEX Pico Blade
0510211200

Fig. 29: Molex Audio Connector Schematic

CAUTION

For optimum audio performance:

Please ensure to use cables provided by E.E.P.D.

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	MIC_IN	11	HP_OUT_L
6	GND_AUDIO	12	HP_OUT_R

Tab. 3: Audio Connector

*JD = Jack Detect

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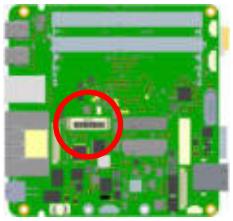
4.9 M.2 Sockets

M.2 Socket Key M

2242, PCIe Gen3 x1 NVMe or SATA SSD, P3V3 max. 3.5 A, not fused



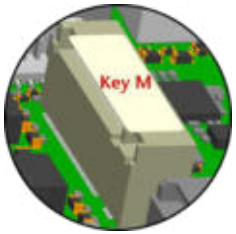


Fig. 30: M.2 Key M Connector Detail

M.2 Socket Key E

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

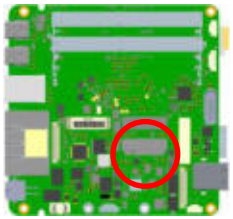
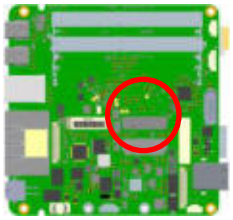


Fig. 31: M.2 Key E Connector Detail

M.2 Socket Key B

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



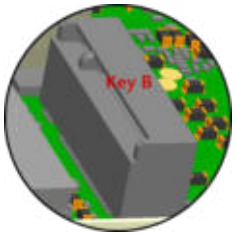


Fig. 32: M.2 Key B Connector Detail

Installing M.2 modules

Insert the M.2 module into the corresponding slot at an angle. Press it down on the side that protrudes and secure it with the screw provided.

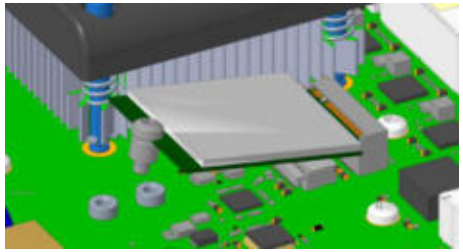


Fig. 33: M.2 Key B Module Assembly

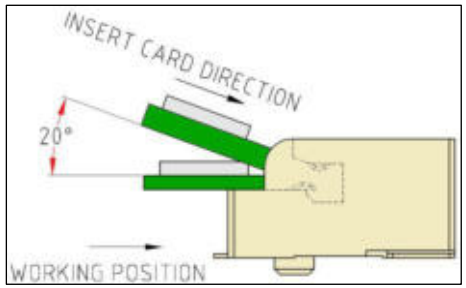


Fig. 34: M.2 Module Assembly Angle

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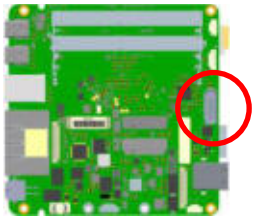
4.10 SATA Data Connector



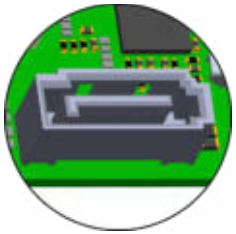


Fig. 35: SATA Data Connector Detail

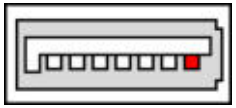
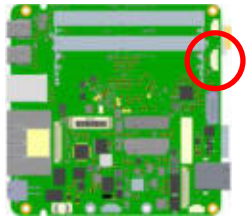


Fig. 36: SATA Data Connector Schematic

4.11 SATA Power Connector



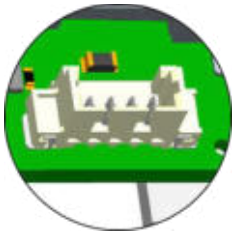


Fig. 37: Molex SATA Power Connector Detail

Counterpart – plug:

MOLEX Pico Blade
0510210400

Fig. 38: 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. 4: SATA Power Connector

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4.12 LVDS Connector – OEM/ODM only

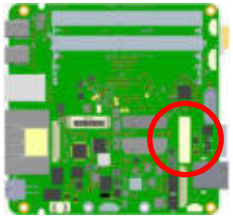
Interface for controlling TFT- and LC-Displays. For specific panel support, please contact E.E.P.D.

CAUTION

The connector supplies the LVDS data/logic section of your LC-display with 3.3 V or 5 V.

Selection via jumper (see chapter *4.12.1*)

Please assure the correct setting of the LVDS panel power supply before connecting the LC-display to the board.



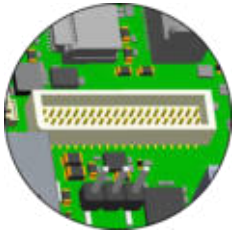


Fig. 39: LVDS Data Connector Detail

Counterpart – plug:

JST SHDR-40V-S-B

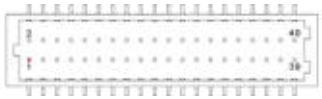
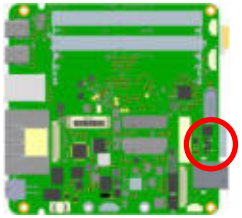


Fig. 40: LVDS Data Connector Schematic

4.12.1 Jumpersetting for LVDS Data section of the LC-display – OEM/ODM only



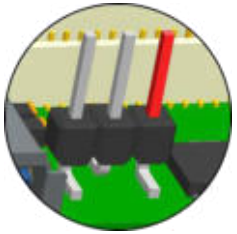


Fig. 41: STL3X1 Detail

Pin	Signal
1	VCC → 5V +/- 5%
2	VDD_LCD*, not fused
3	P3V3 → 3.3 V +/- 5%

Tab. 5: STL3X1

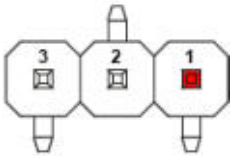


Fig. 42: STL3X1 Schematic

*VDD_LCD = 3.3 V → set Jumper between Pin 2 and 3
VDD_LCD = 5 V → set Jumper between Pin 1 and 2

Maximum current draw from VDD_LCD line is 3.5 A (not fused). Please be aware of the total power limit for the external and internal devices on 3.3 V and 5 V lines as specified in Chapter 1.1

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4.13 LC-Display Backlight Connector – OEM/ODM only

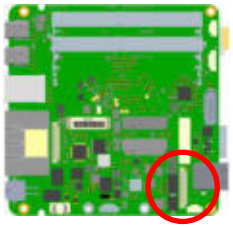
Connector supplies the power section of your LC-Display with power.

CAUTION

The connector supplies your Backlight Inverter with 5 V and 12 V (maximum load of 3 A).

For 12 V backlight supply PVIN must be min. 15 V.

Please pay attention to this, when selecting the Backlight Inverter.



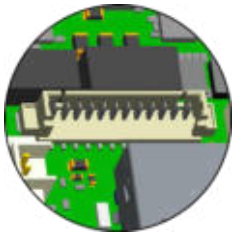


Fig. 43: Molex LC-Display Backlight Connector Detail

Counterpart – plug:

MOLEX Pico Blade
0510211200

Fig. 44: Molex LC-Display Backlight Connector Detail

Pin	Signal	
1	VCC 5V +/- 5%	max. 3 A, not fused
2	VCC 5V +/- 5%	
3	VCC 5V +/- 5%	
4	P12V_DISPLAY 12V +/- 5%	max. 2.5 A, not fused
5	P12V_DISPLAY 12V +/- 5%	
6	P12V_DISPLAY 12V +/- 5%	
7	GND	
8	GND	
9	LCD_BKLEN	
10	GND	
11	BRT_ADJ (PWM)	
12	GND	

Tab. 6: LC-Display Backlight Connector

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4.14 RS232/485 Connector

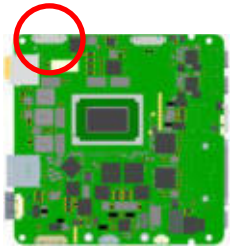

Fig. 45: Molex RS232/485 Connector Detail

Counterpart – plug:

MOLEX Pico Blade
0510211000

Fig. 46: 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	RXD0	RS485-TX_P	RS485-RX/TX_P
4	RTS0_m	-	
5	TXD0	RS485-RX_P	
6	CTS0_m	-	
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. 7: RS232/485 Connector

*see BIOS setting chapter *5.9.3.2*

4.15 RS232 Connector

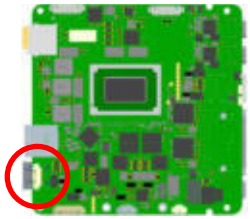

Fig. 47: Molex RS232 Connector Detail

Counterpart – plug:

MOLEX Pico Blade
0510210600

Fig. 48: Molex RS232 Connector Schematic

Pin	Signal
1	RXD1
2	RTS1_m
3	TXD1
4	CTS1_m
5	VCC 5 V +/-5%, max. 500 mA, not fused
6	GND

Tab. 8: RS232 Connector

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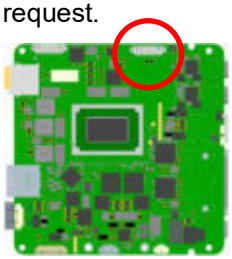
4.16 Feature Connector

This feature requires Linux driver or Windows Library for OEM customers on request.



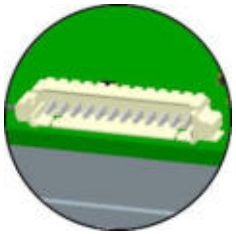


Fig. 49: Molex Feature Connector Detail

Counterpart – plug:

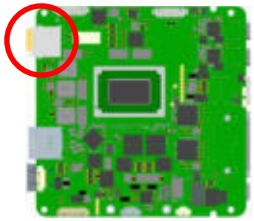
MOLEX Pico Blade
0510211200

Fig. 50: Molex Feature Connector Schematic

Pin	Signal	
1	3.3 V +/- 5% | 200 mA max., not fused	
2	Reserved	
3	GPIO0	max. 3.3 V / max. 15 mA sink/source
4	GPIO1	
5	GPIO2	
6	GPIO3	
7	GPO1	PWM open drain outputs with 100 Ω series resistor. I_{sink} max. = 25 mA.
8	GPO2	
9	GPO3	
10	STATUS_LED_ANODE 3.3 V +/- 5% with 100 Ω series resistor (1/16W), 33 mA max., not fused	
11	STATUS_LED_CATHODE	
12	GND	

Tab. 9: Feature Connector

4.17 MicroSD Card Slot



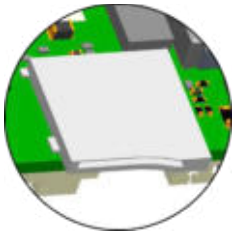
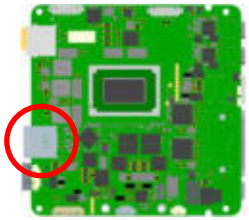


Fig. 51: MicroSD Card Slot Detail

4.18 MicroSIM Card Slot



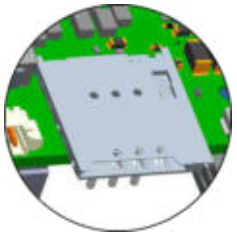


Fig. 52: MicroSIM Card Socket Detail

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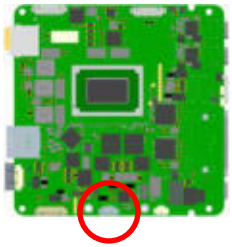
4.19 FAN Connectors

CPU FAN Connector



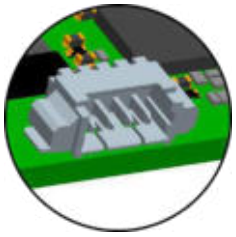
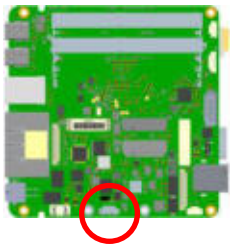


Fig. 53: Molex CPU FAN Connector Detail

Auxiliary FAN Connector (e. g. for SSD)



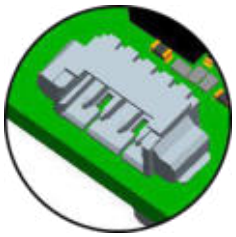


Fig. 54: Molex Auxiliary FAN Connector Detail

Counterpart – plug:

MOLEX Pico Blade
0510210400

Fig. 55: Molex FAN Connector Schematic

Pin	Signal
1	GND
2	VCC 5V +/- 5%, max. 250 mA, not fused
3	FAN_TACHO
4	FAN_PWM

Tab. 10: FAN Connectors

CAUTION

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

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4.20 Battery Connector

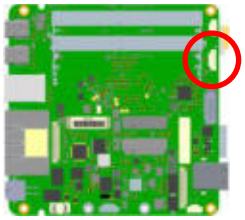

Fig. 56: Molex Battery Connector Detail

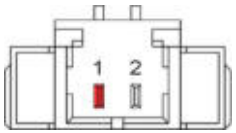

Fig. 57: Molex Battery Connector Schematic

Counterpart – plug:

MOLEX Pico Blade 0510210200
Battery with cable ordering number: W-BATCR1A

Pin	Signal
1	BATT
2	GND

Tab. 11: Battery Connector

4.21 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).

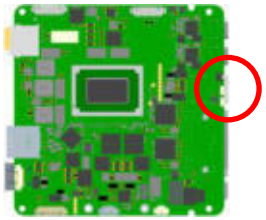

Fig. 58: Power Button/Power and SATA LEDs Detail

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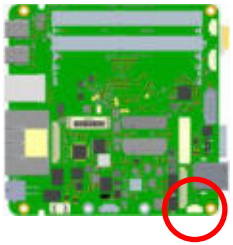
4.22 Reset Button Connector



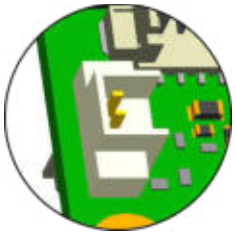


Fig. 59: Molex Reset Button Connector Detail

Counterpart – plug:

MOLEX Pico Blade
0510210200

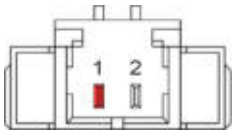


Fig. 60: Molex Reset Button Connector Schematic

Pin	Signal
1	GND
2	RESET_IN_m

Tab. 12: Reset Button Connector

4.23 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).

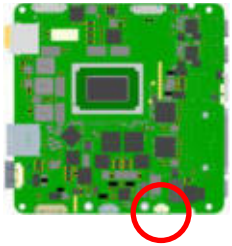


Fig. 61: Molex Power Button Connector Detail

Counterpart – plug:

MOLEX Pico Blade
0510210400

Fig. 62: Molex Power Button Connector Schematic

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

Tab. 13: Power Button Connector

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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

1. Firmware / BIOS Version:
   Setup Utility → Main (chapter *5.3*)
   or Setup Utility → AMD PBS → AMD Firmware Version (chapter *5.8.1*)

2. Boot / PXE Boot:
   Boot Manager
   or Setup Utility → Boot (chapter *5.7*)

3. TDP, fan control, boost mode:
   TDP setting (chapter *5.9.2*):
   Setup Utility → AMD CBS → NBIO Common Options → System Configuration

   Fan control (chapter *5.9.2.2*):
   Setup Utility → AMD CBS → NBIO Common Options → CPU and Auxiliary Fan Control

   Boost mode (chapter *5.9.1*):
   Setup Utility → AMD CBS → Zen Common Options → Core Performance Boost

4. Change shared graphics memory
   Setup Utility → AMD CBS → NBIO Common Options → GFX Configurations → UMA Frame Buffer Size (chapter *5.9.2.1*)

5. USB power
   USB Power off in S5 (chapter *5.4.8*):
   Setup Utility → Advanced → NUCD Options → USB Power off in S5
   or
   USB VCC control (chapter *5.4.5.1*):
   Setup Utility → Advanced → USB Configuration

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5.3 Main Menu

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

Fig. 63: Main Menu

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

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. 14: Main Menu

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5.4 Advanced Menu

Fig. 64: 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
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.
NUCD options	See submenu	Configure PIC watchdog, Wake On LAN, LVDS, Power LED Mode, KL 15 support, USB Power Off in S5

Tab. 15: Advanced Menu

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5.4.1 Boot Configuration

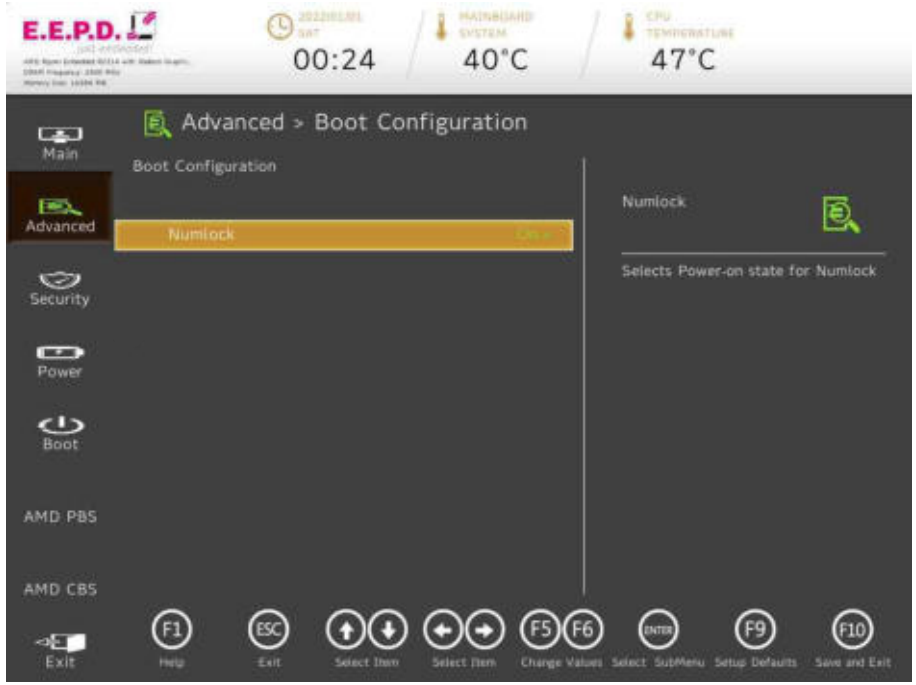

Fig. 65: Boot Configuration

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

Tab. 16: Boot Configuration

5.4.2 Peripheral Configuration

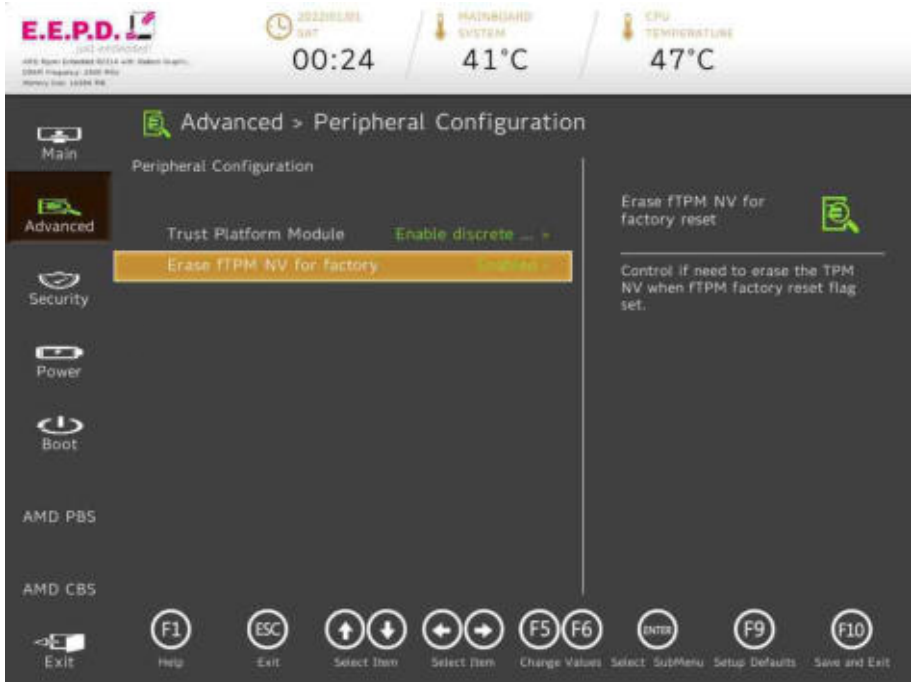

Fig. 66: Peripheral Configuration

BIOS Settings	Options	Description
Trust 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. 17: Peripheral Configuration

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5.4.3 IDE Configuration

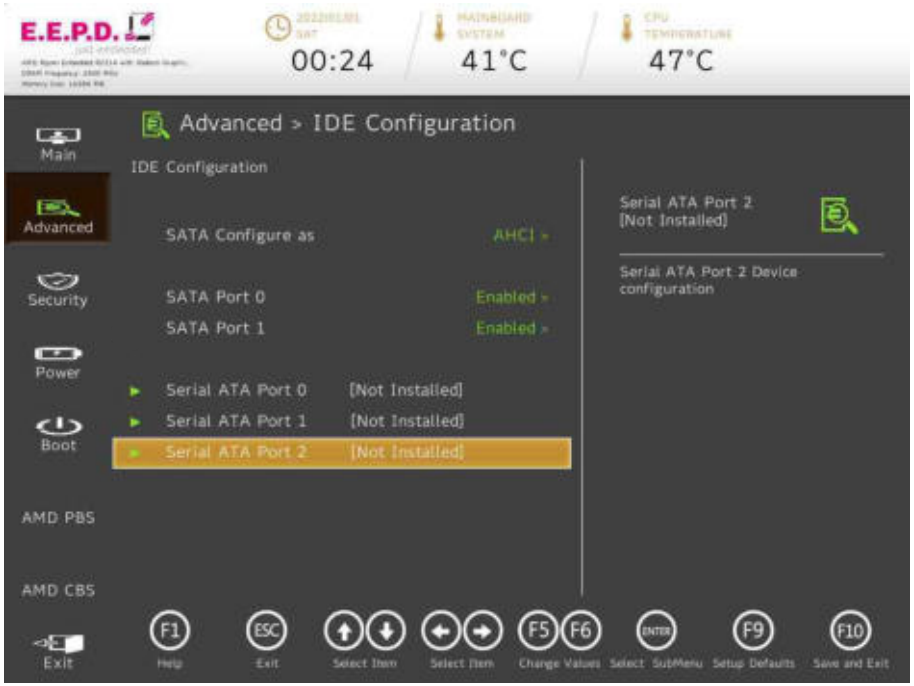

Fig. 67: IDE Configuration

BIOS Settings	Options	Description
SATA Configure as	<AHCI>*	Set SATA Configure Type
SATA Port 0	<Disabled> <Enabled>*	SATA Port 0 Enable/Disable
SATA Port 1	<Disabled> <Enabled>*	SATA Port 1 Enable/Disable
Serial ATA Port 0	See submenu	Serial ATA Port 0 Device configuration
Serial ATA Port 1	See submenu	Serial ATA Port 1 Device configuration
Serial ATA Port 2	See submenu	Serial ATA Port 2 Device configuration

Tab. 18: IDE Configuration

5.4.4 NVMe Configurations

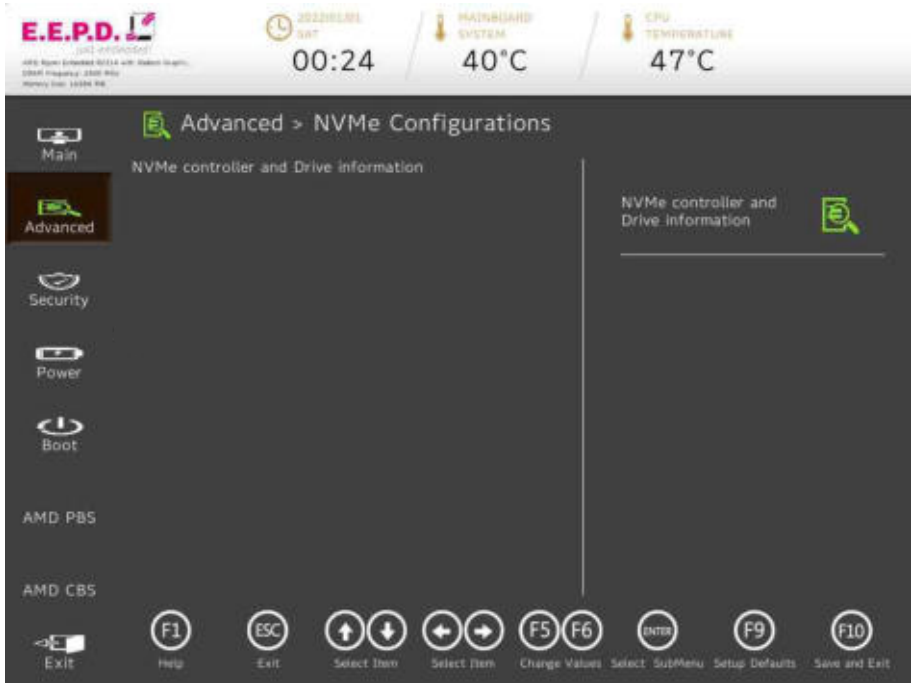

Fig. 68: NVMe Configuration

BIOS Settings	Options	Description
NVMe Controller and Drive Information		This function shows the connected NVME devices.

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5.4.5 USB Configuration

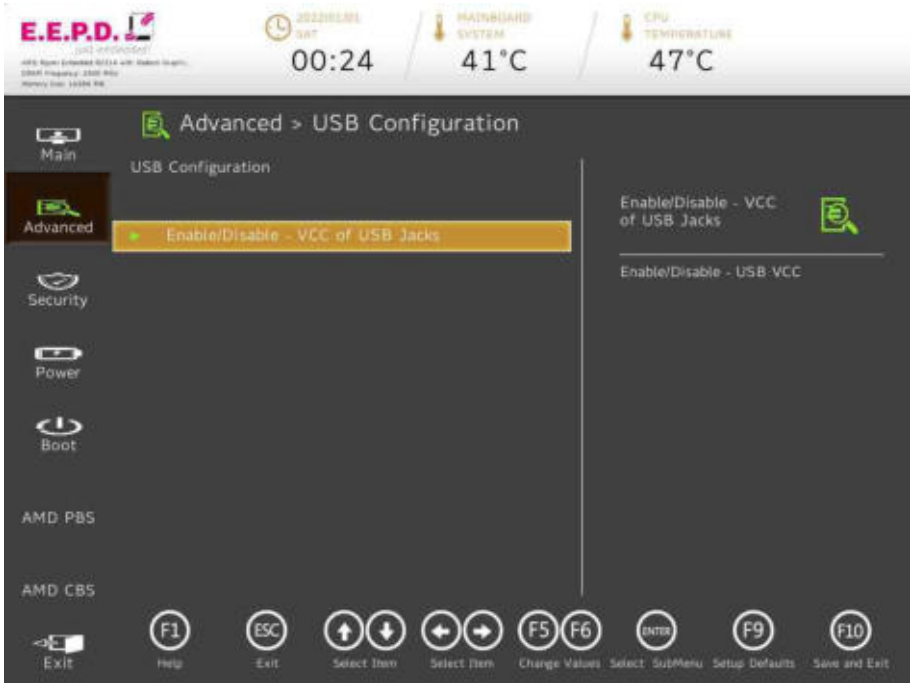

Fig. 69: USB Configuration

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

Tab. 19: USB Configuration

Note:
In order to not exclude yourself from the BIOS setup, at least one USB port should be enabled at all times. In case you select the “Disabled” option on all ports, the “USB3.1 Rear Lower” port will automatically be enabled by the system.

5.4.5.1 Enable/Disable – VCC of USB Jacks

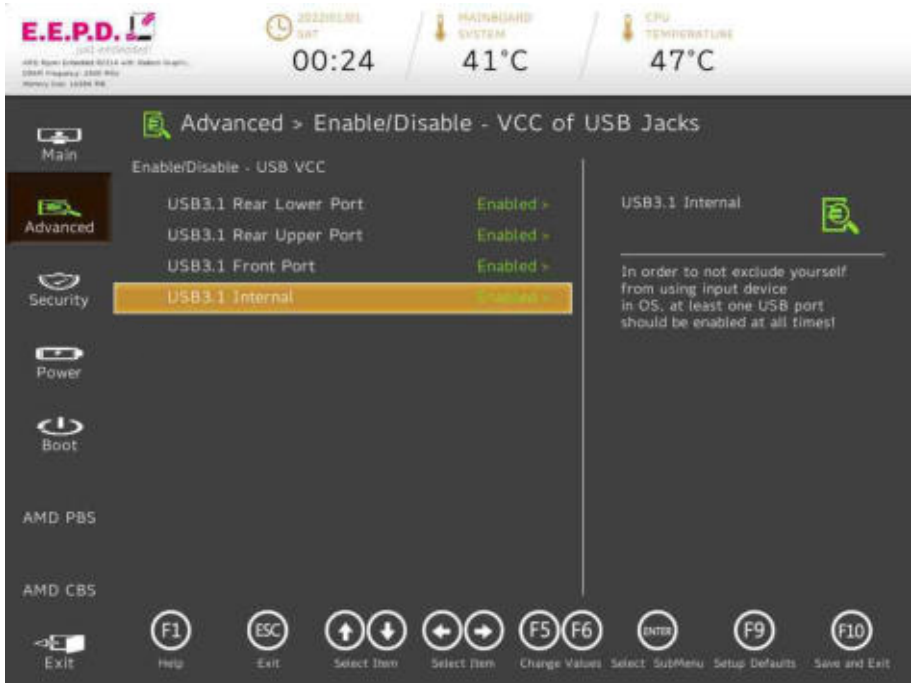

Fig. 70: Enable/Disable – VCC of USB Jacks

BIOS Settings	Options	Description
USB3.1 Rear Lower Port	<Disabled> <Enabled>*	This function allows you to enable or disable the power for the Rear Lower USB port.
USB3.1 Rear Upper Port	<Disabled> <Enabled>*	This function allows you to enable or disable the power for the Rear Upper USB port.
USB3.1 Front Port	<Disabled> <Enabled>*	This function allows you to enable or disable the power for the Front USB port.
USB3.1 Internal	<Disabled> <Enabled>*	This function allows you to enable or disable the power for the Internal USB port.

Tab. 20: Enable/Disable – VCC of USB Jacks

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5.4.6 ACPI Table/Features Control

Fig. 71: 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. 21: ACPI Table/Features Control

5.4.7 CPU Related Setting

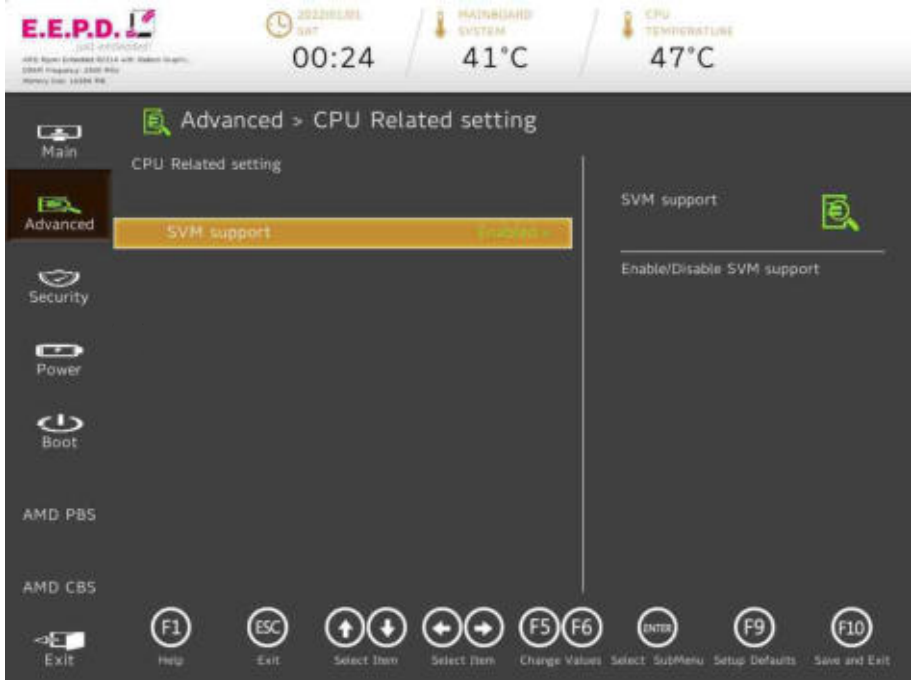

Fig. 72: CPU Related Setting

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. 22: CPU Related Setting

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5.4.8 NUCD options

Fig. 73: NUCD options

CAUTION

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

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
LVDS	<Disabled>* <Enabled>	Enable/Disable the eDP to LVDS transceiver
Power LED Mode	<Disabled> <Enabled>*	Set Power LED Mode (Enable/Disable)
KL 15 support (see also chapter **4.4**)	<Disabled>* <Enabled>	KL 15 support (Enable/Disable) If enabled, set AMD CBS > FCH Common Options > AC Power Loss Options > Always Off To achieve minimum of power consumption when system is Off, set also in NUCD option > USB Power Off in S5 to Enabled (for all USB Ports) and Wake on LAN to Disabled In addition set in OS that power button press shuts down the system!
USB3.1 Rear Lower 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)!
USB3.1 Rear Upper Port	<Disabled>* <Enabled>	
USB3.1 Front Port	<Disabled>* <Enabled>	
USB3.1 Internal	<Disabled>* <Enabled>	

Tab. 23: NUCD options

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5.5 Security Menu

Fig. 74: 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, don't expose TPM to OS
TPM Operation	<No Operation>* <Enable> <SetPCRBanks(Algorithm)> <LogAllDigests> <SetPPRequiredForClear_True> <SetPPRequiredForClear_False> <SetPPRequiredForTurnOn_False> <SetPPRequiredForTurnOn_True> <SetPPRequiredForTurnOff_False> <SetPPRequiredForTurnOff_True> <SetPPRequiredForChangePCRs_False> <SetPPRequiredForChangePCRs_True> <SetPPRequiredForChangeEPS_False> <SetPPRequiredForChangeEPS_True> <ChangeEPS>	Select one of the supported operations to change TPM2 state.
Clear TPM	[ ] [X]	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. 24: Security Menu

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5.5.1 Storage Password Setup Page

Fig. 75: 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. 25: Storage Password Setup Page

5.6 Power Menu

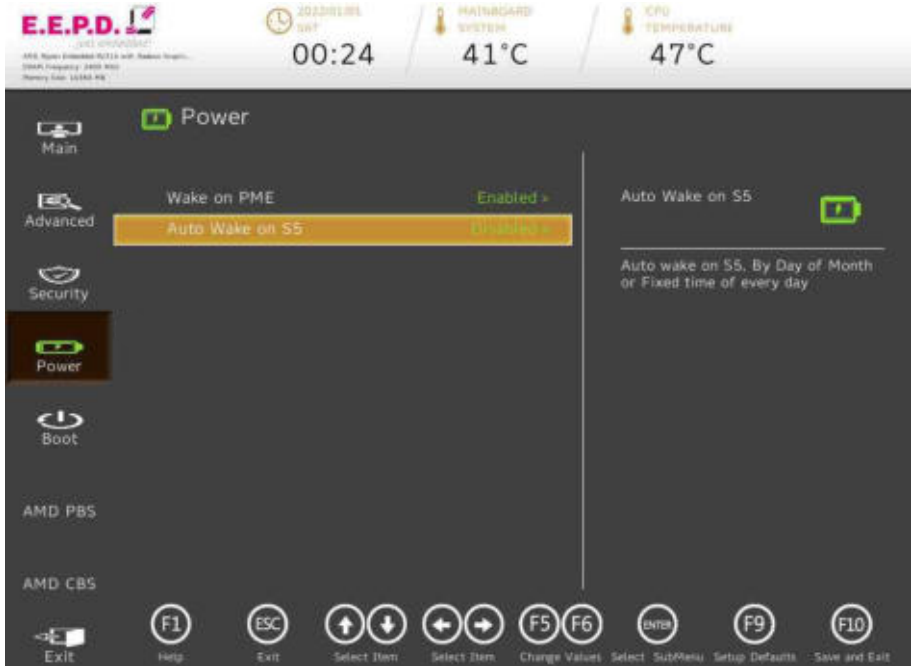

Fig. 76: Power Menu

BIOS Settings	Options	Description
Wake on PME	<Disabled> <Enabled>*	Determines the action taken when the system power is off and a PCI Power Management Enable wake up event occurs.
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. 26: Power Menu

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5.7 Boot Menu

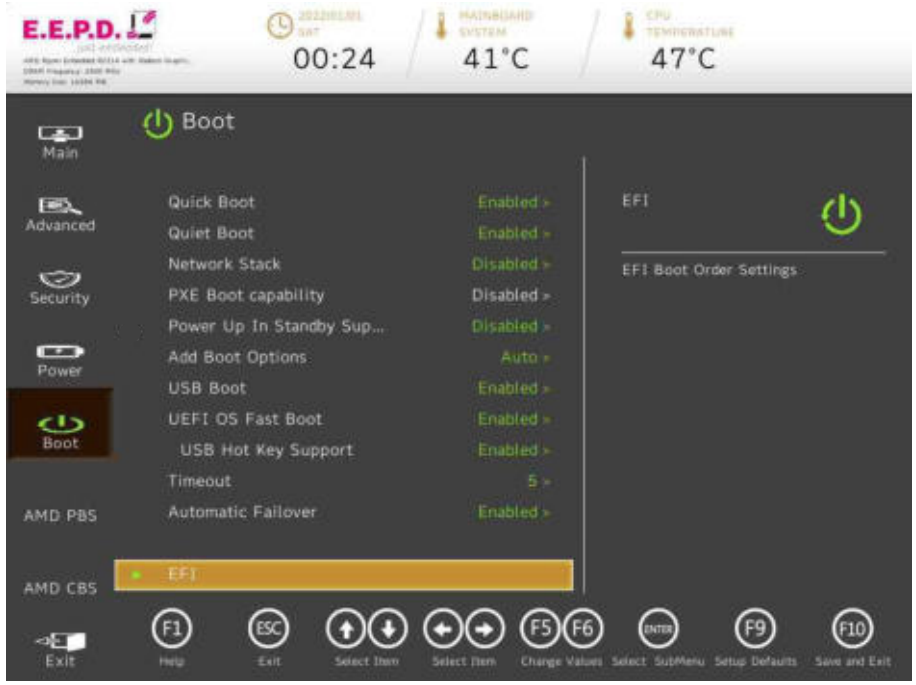

Fig. 77: Boot Menu

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	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. 27: Boot Menu

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5.7.1 EFI

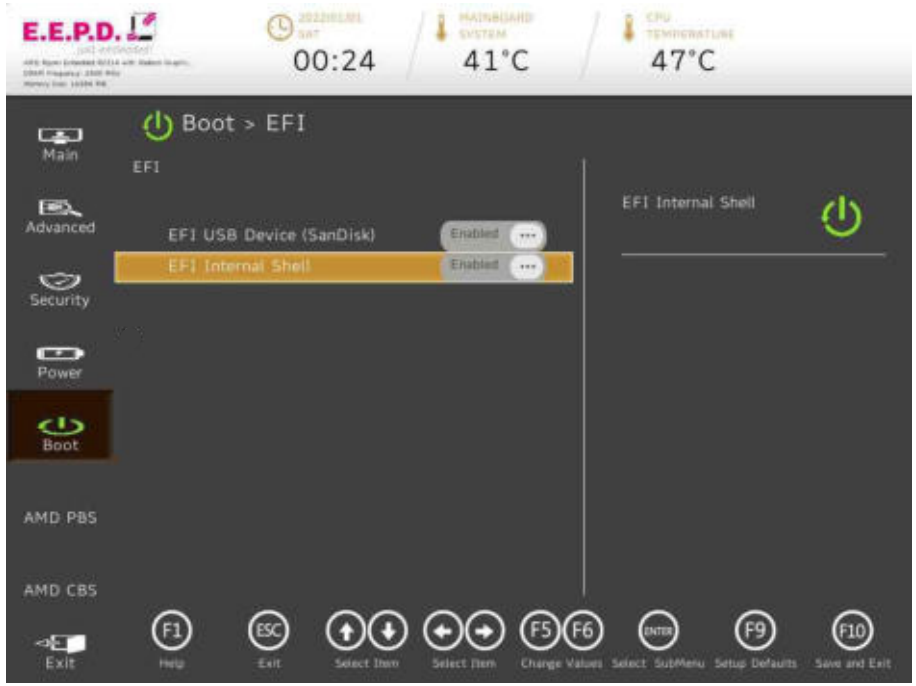

Fig. 78: EFI

BIOS Settings	Options	Description
EFI USB Device (SanDisk)	[ ]* [X]	
EFI Internal Shell	[ ]* [X]	

Tab. 28: EFI

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5.8 AMD PBS Option

Fig. 79: AMD PBS Option

BIOS Settings	Options	Description
AMD Firmware Version	Info page	Show all of AMD Firmware Version
M.2 Key B Power & Radio Control	<Power Disabled> <Power Only Enabled> <Power & Radio Operation Enabled>*	Enable/disable Power & Radio (WWAN) Operation of M.2 Key B Slot
M.2 Key E Radio Control	<Radio 1 & 2 (WLAN & BT) Operation Disabled> <Radio 1 (WLAN) Operation Enabled> <Radio 2 (BT) Operation Enabled> <Radio 1 & 2 (WLAN & BT) Operation Enabled>*	Enable/disable Radio operation of M.2 Key E Slot

Tab. 29: AMD PBS Option

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5.8.1 AMD Firmware Version

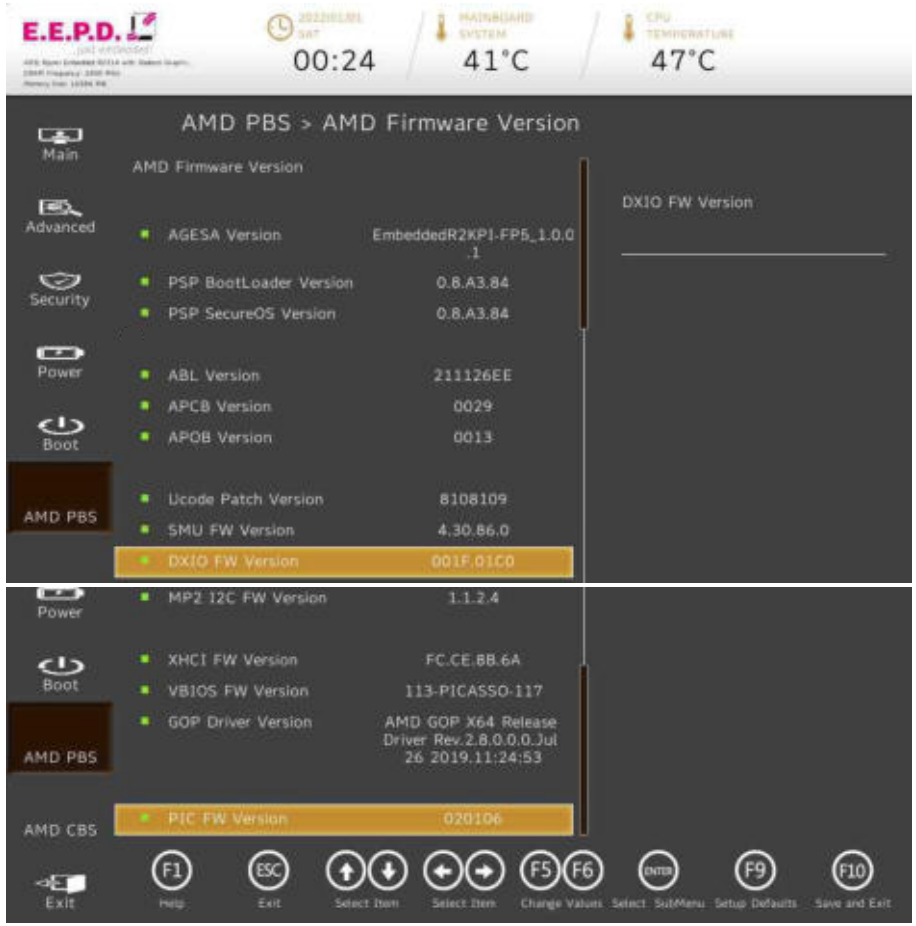

Fig. 80: AMD Firmware Version

5.9 AMD CBS Option

Fig. 81: AMD CBS Option

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

Tab. 30: AMD CBS Option

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5.9.1 Zen Common Options

Fig. 82: Zen Common Options

BIOS Settings	Options	Description
Core Performance Boost	<Disabled>* <Auto>	Set Core Performance Boost to Disabled or Auto.
CPU Thermal Throttling Control	<Disabled>* <Enabled>	CPU Thermal Throttling Enable/Disable

Tab. 31: Zen Common Options

5.9.2 NBIO Common Options

Fig. 83: NBIO Common Options

BIOS Settings	Options	Description
GFX Configuration	See submenu	GFX Configuration
CPU and Auxiliary Fan Control	See submenu	CPU and Auxiliary Fan Control
System Configuration	<12W – 35W 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. 32: NBIO Common Options

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5.9.2.1 GFX Configuration

Fig. 84: GFX Configuration

BIOS Settings	Options	Description
UMA Mode	<Auto> <UMA_SPECIFIED>* <UMA_AUTO>	UMA Mode Select UMA_SPECIFIED to set UMA Frame Buffer Size.
UMA Version	<Legacy> <non-Legacy> <Hybrid Secure> <Auto>*	UMA Legacy Version UMA Non-Legacy Version Hybrid Secure
UMA Frame buffer Size	<Auto>* <64M> <128M> <256M> <384M> <512M> <80M> <96M> <768M> <1G> <2G> <3G> <4G> <6G> <8G> <16G>	Set UMA FB size. 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 Above 4G	<Disabled> <Enabled> <Auto>*	If requested UMA frame buffer size can't be fit under 4GB or the system has enough available memory above 4GB, this option may be set to TRUE to allow UMA frame buffer size to be allocated successfully.
NB Azalia	<Disabled> <Enabled> <Auto>*	Enable Integrate HD Audio controller

Tab. 33: GFX Configuration

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5.9.2.2 CPU and Auxiliary Fan Control

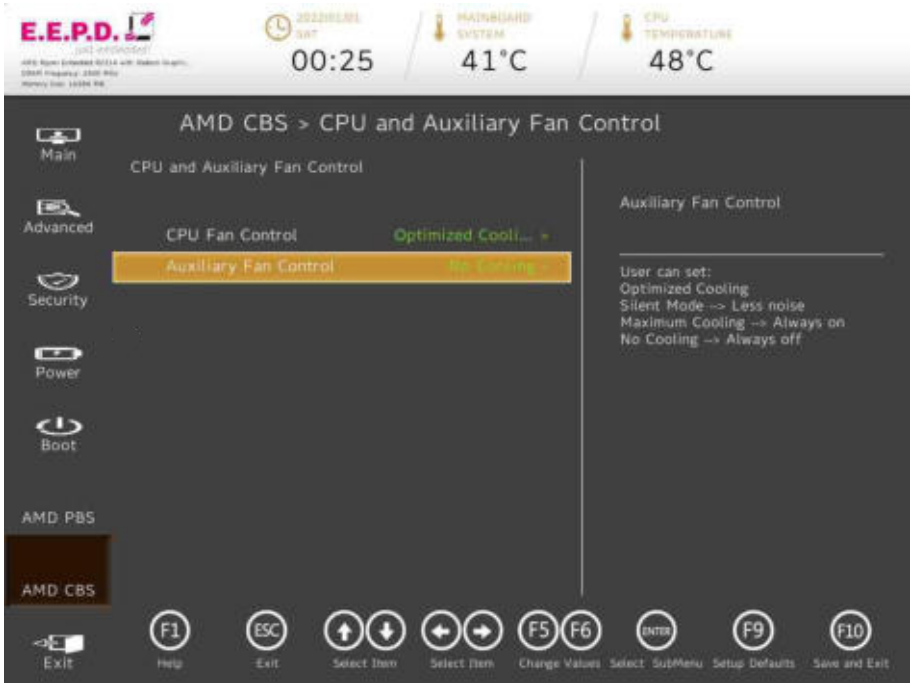

Fig. 85: CPU and Auxiliary Fan Control

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

Tab. 34: CPU and Auxiliary Fan Control

5.9.3 FCH Common Options

Fig. 86: FCH Common Options

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

Tab. 35: FCH Common Options

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5.9.3.1 Ac Power Loss Options

Fig. 87: Ac Power Loss Options

BIOS Settings	Options	Description
Ac Loss Control	<Always Off> <Always On> <Reserved> <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. 36: Ac Power Loss Options

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5.9.3.2 UART Configuration Options

Fig. 88: UART Configuration Options

BIOS Settings	Options	Description
UART 0 Enable	<Disabled> <Enabled>*	Enable or disable the UART0 port.
UART 0 Legacy Options	<Disabled> <COM1 0x3F8>* <COM2 0x2F8> <COM3 0x3E8> <COM4 0x2E8>	This function specifies the base I/O port address of a user-specified serial port.
UART 0 Mode	<RS232>* <RS485 Half Duplex> <RS485/RS422 Full Duplex>	Select UART0 operating mode
UART 0 Termination	<120 Ohm diff.> <Termination Off>*	Select UART0 transceiver termination
UART 1 Enable	<Disabled> <Enabled>*	Enable or disable the UART1 port.
UART 1 Legacy Options	<Disabled> <COM1 0x3F8> <COM2 0x2F8>* <COM3 0x3E8> <COM4 0x2E8>	This function specifies the base I/O port address of a user-specified serial port.

Tab. 37: UART Configuration Options

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5.10 Exit Menu

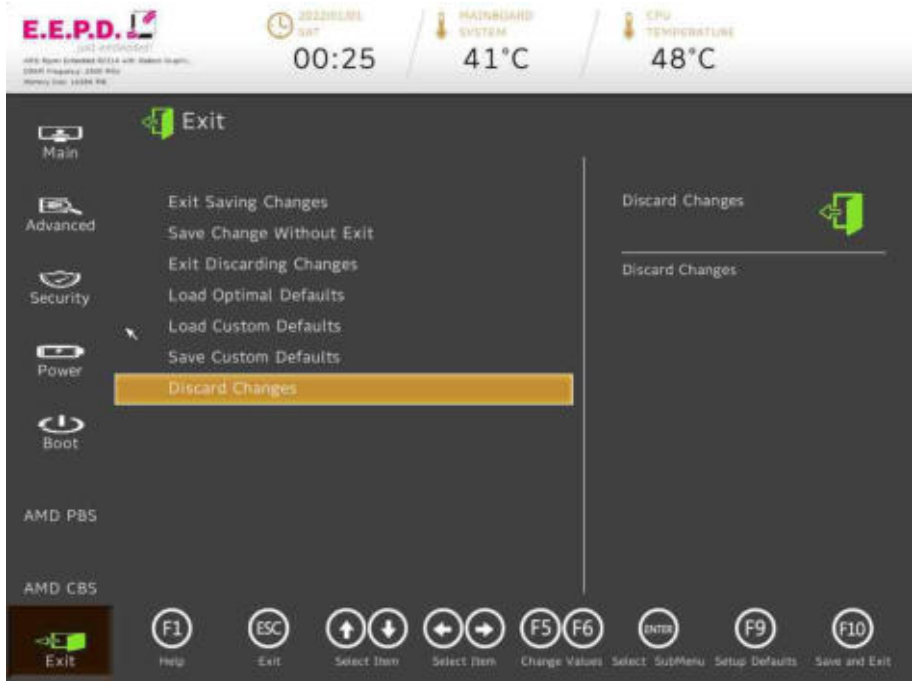

Fig. 89: Exit Menu

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. 38: Exit Menu

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Terminology

BT	Bluetooth
CPU	Central Processing Unit or processor
DC	Direct Current
DDR4	Fourth generation „Double Data Rate“ memory technology
DP	Display port
EMI	ElectroMagnetic Interference
2.5 Gigabit Ethernet	Ethernet connection with a frame transfer speed up to 2500 Mbit/s
GND	Ground
MIC	Microphone
M.2	Next generation mSATA
OCP	Over Current Protection
PWM	Pulse-Width Modulation
RAM	Random Access Memory
RS-232	Serial standard interface
RS-485	Serial standard interface
SD	Secure Digital memory card
SIM	Subscriber Identity Module (Card) used to store information in mobile phones
SoC	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
SO-DIMM	Small Outline Dual Inline Memory Module
SSD	Solid State Drive
USB	Universal Serial Bus
Watchdog	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
WLAN	Wireless Local Area Network
WWAN	Wireless Wide Area Network

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