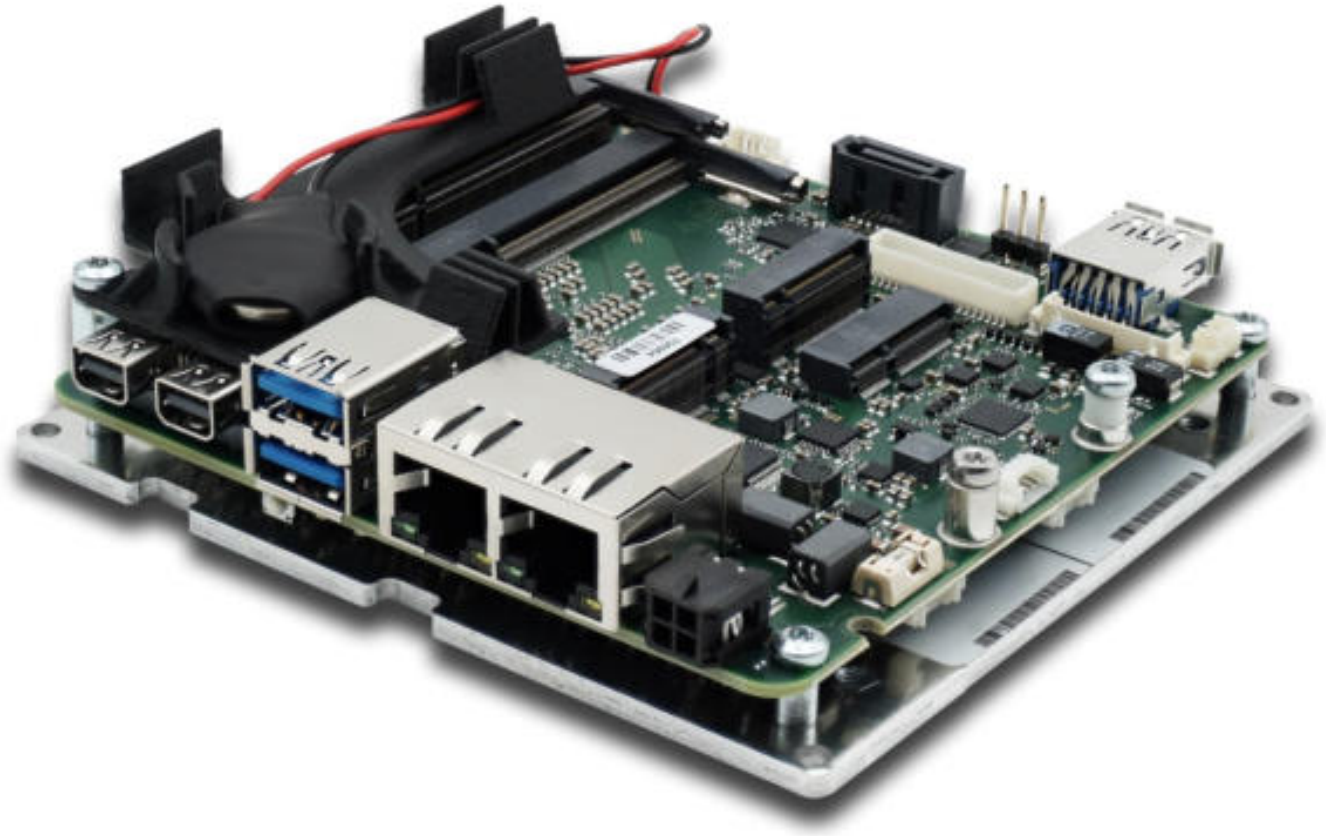
PROFIVE® NUCD “easy to integrate”
Hardware Reference Manual – P – Rev. 5



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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.

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It is on the customer's sole responsibility to assure that this end-product meets all required standards.

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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
25.01.2024	5.0	First release for NUCD_HS	
16.07.2024	5.1	Minor corrections/updates	
03.09.2024	5.2	Minor corrections/updates	
17.09.2024	5.3	Final corrections/updates	

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Table of Contents

General Notes **1**
Revision History **5**
Table of Contents ..... **- 6 -**
Used Symbols **7**
1 Product Description **8**
1.1 Feature Overview 8
1.2 Environmental Specification 10
2 System Overview **11**
3 Assembly **12**
3.1 Product Views 13
3.2 Mechanical Mounting 15
3.3 Dimensions of the board 16
4 Feature Details **17**
4.1 Connection Overview 18
4.2 Mini-DP++ Connectors 20
4.3 Dual-USB 3.2 Port 21
4.4 Rear USB 3.2 Port 21
4.5 2.5 Gigabit Ethernet Dual-Port 22
4.6 RS232 Connector 22
4.7 RS232/485 Connector 23
4.8 DDR4 SO-DIMM Sockets 24
4.9 Power Connector 25
4.10 Audio Connector 26
4.11 M.2 Sockets 27
4.12 SATA Data Connector 28
4.13 SATA Power Connector 28
4.14 LVDS Connector 29
4.15 LC-Display Backlight Connector 30
4.16 Feature Connector 31
4.17 USB Internal Connector 32
4.18 FAN Connectors 33
4.19 Power Button, Power and SATA LEDs 34
4.20 Reset Button Connector 34
4.21 Power Button Connector 35
4.22 Battery Connector 35
4.23 Battery 36
4.24 MicroSD Card Slot 36
4.25 MicroSIM Card Slot 36
5 BIOS **37**
5.1 Entering Setup 37
5.2 Most Common Settings 37
5.3 Main Menu 38
5.4 Advanced Menu 39
5.5 Security Menu 46
5.6 Power Menu 48
5.7 Boot Menu 48
5.8 AMD PBS Option 50
5.9 AMD CBS Option 51
5.10 Exit Menu 57
Index of Figures **58**
Index of Tables **60**
Terminology **61**
Classified Index **62**

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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 120 W / recommended 150 W, 8 A fused.

Four-pin power connector with ignition input.

Nexus Series 2300, 3.00 mm Micro MF housing with lock.

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 all variants)

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

Storage Support

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

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

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

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Expansion Slots

2 M.2 sockets:

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 4.25 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

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® 10

Microsoft® Windows® 10 IoT Enterprise

Linux Ubuntu 22.04 LTS

Extended Features

Onboard µ-Controller-IC for:

- Input voltage level detection
- Power-up sequencing and timing
- System reset management
- Temperature monitoring
- 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)

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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.

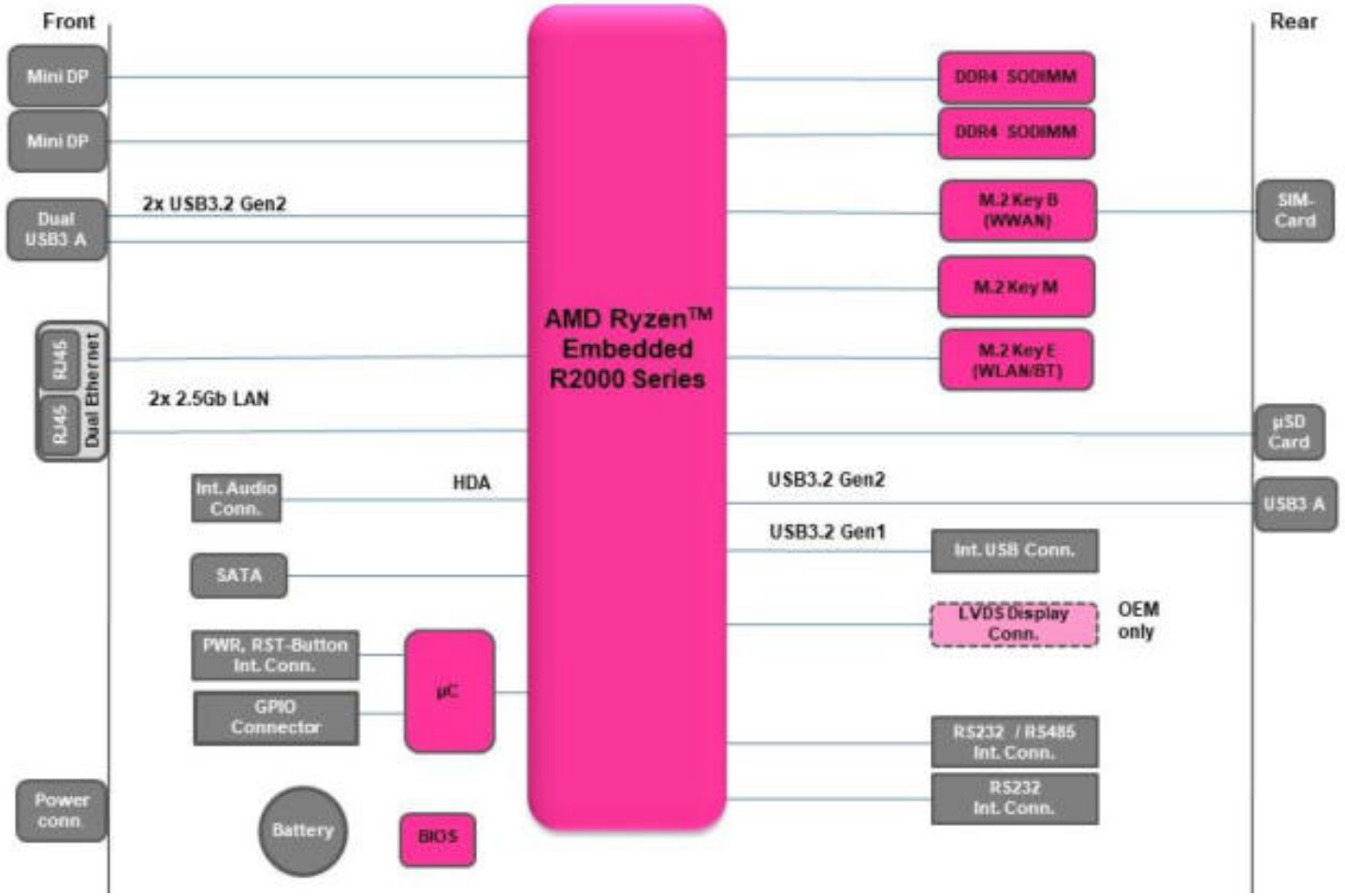

Fig. 1: System Overview

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3 Assembly

In order to obtain sufficient cooling, the “easy to integrate” unit with a heat spreader plate must be mounted to a cooling unit provided by customer with sufficient heat dissipation matching the TDP and ambient temperature.

It is recommended to improve the thermal transition with thermal paste or gap pads between the NUCD heat spreader plate and the cooling unit provided by customer. In order to obtain the necessary contact pressure, the mechanical fastening points according to Fig.3 must be used. **The length of the M3 screws must be chosen so that they can be screwed into the mounting points by a maximum depth of 3 mm.**

E.E.P.D. recommends M3 Torx screws (metric class 8.8/grade 5 or better) with screw lock coating and a tightening torque of 0.75 Nm to a maximum of 1 Nm.

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3.1 Product Views

Top View

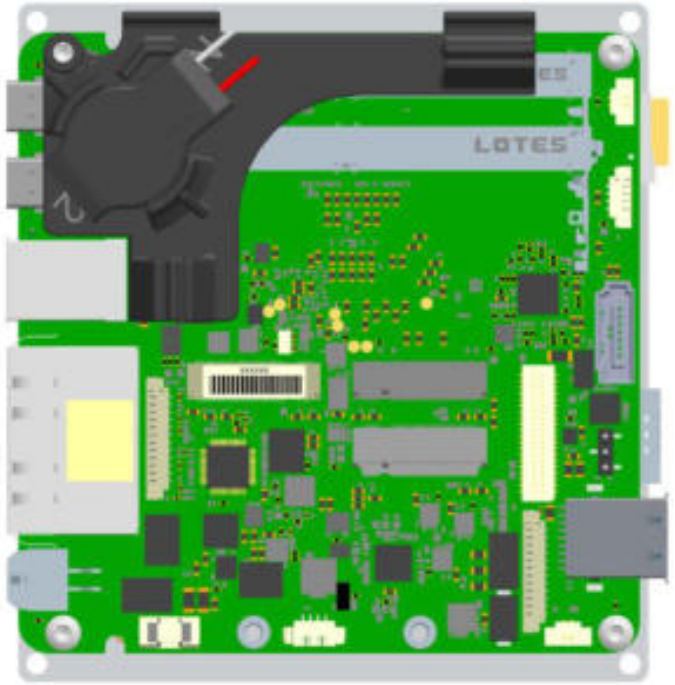

Fig. 2: Top View

Bottom View

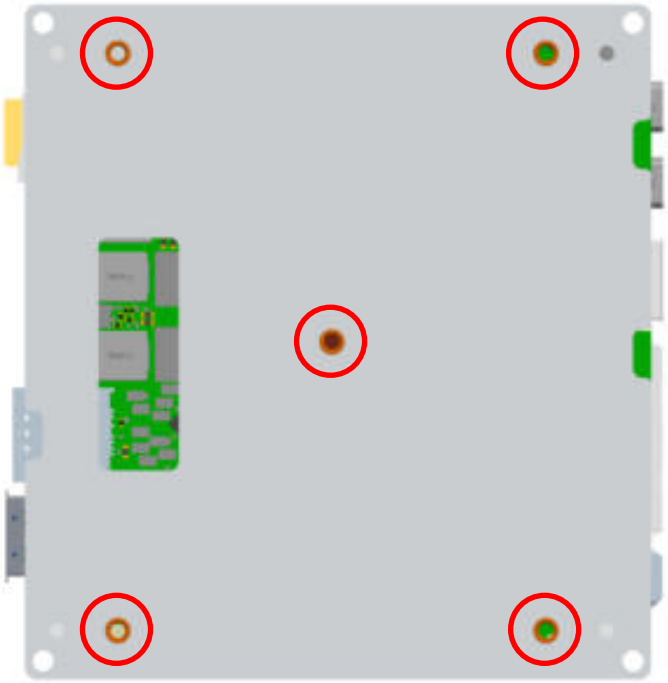

Fig. 3: Bottom View

Bottom View with heat spreader plate and mounting points for customer’s cooling unit. Please refer to chapter 3.3 for technical drawing.

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Front View

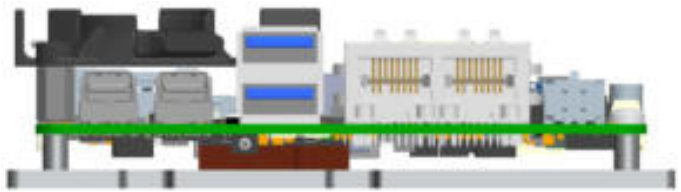

Fig. 4: Front View

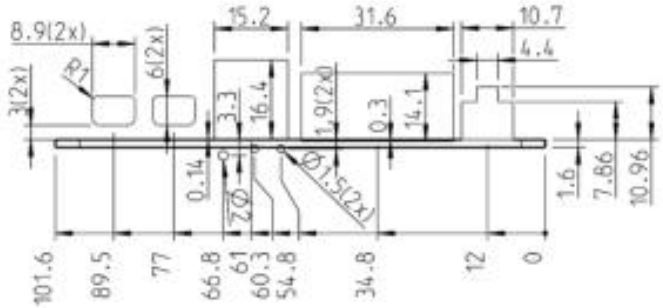

Fig. 5: Recommended cutouts front panel, values [mm]

Rear View

Fig. 6: Rear View

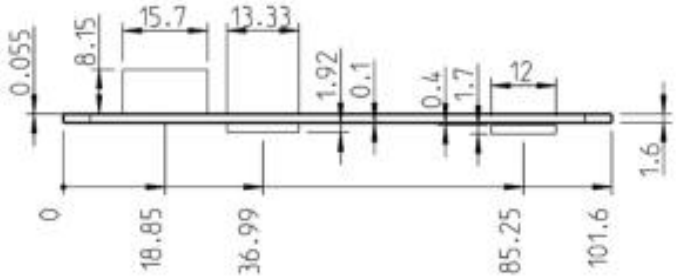

Fig. 7: Recommended cutouts rear panel, values [mm]

Side View

Fig. 8: Side View

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3.2 Mechanical Mounting

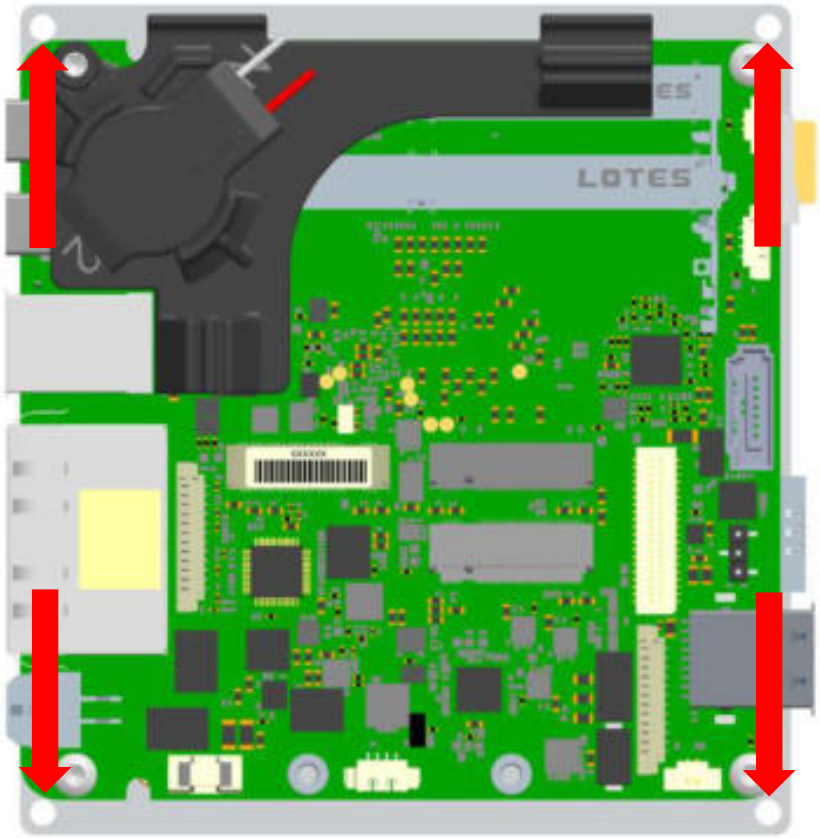

Fig. 9: Mechanical Mounting

CAUTION

The combination of “easy to integrate” NUCD and customer responsible cooling unit can be mounted using these four Ø 3.5 mm additional attachment points if necessary.

Disassembling the NUCD motherboard and the heat spreader plate will void the warranty.

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3.3 Dimensions of the board

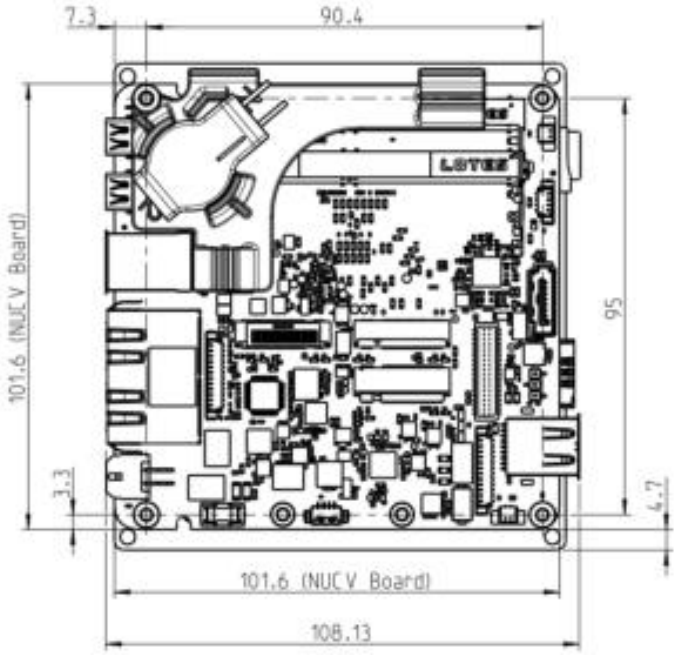

Fig. 10: Dimensions top side, values [mm]

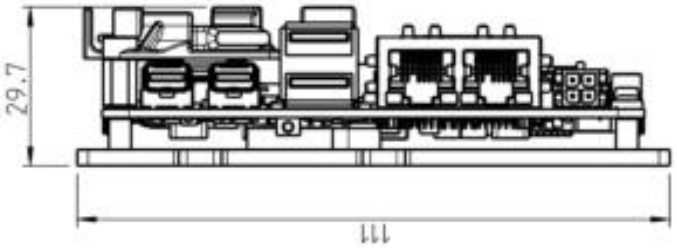

Fig. 11: Dimensions front side, values [mm]

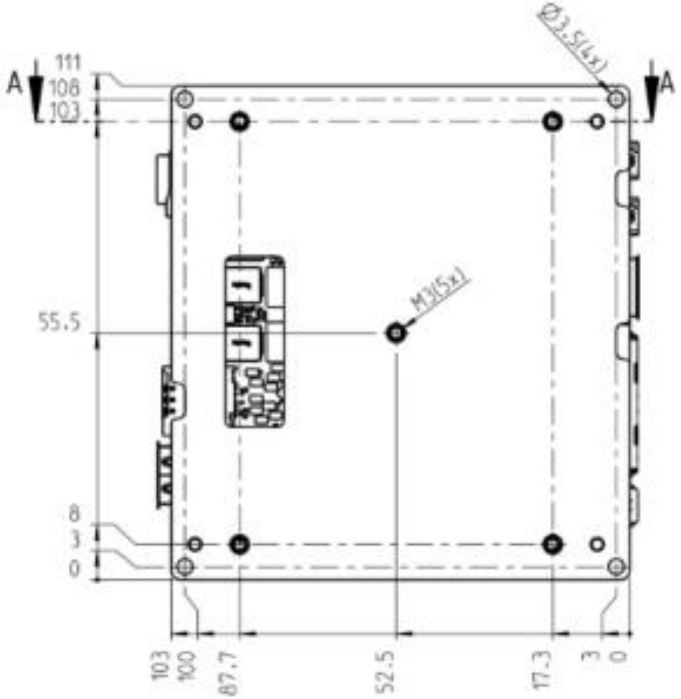

Fig. 12: Dimensions bottom side, values [mm]

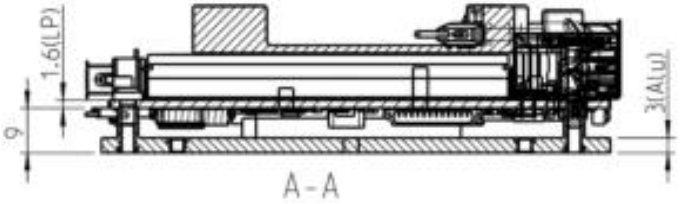

Fig. 13: Dimensions heatsink, values [mm]

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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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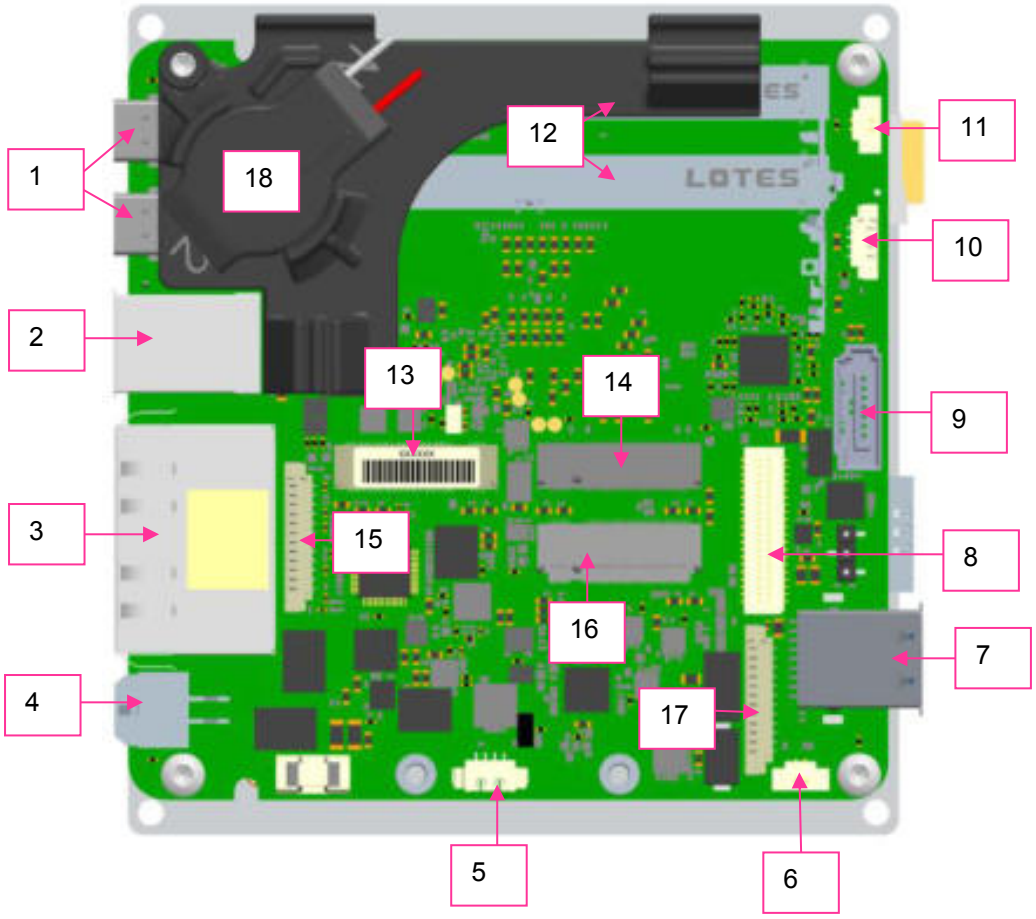
4.1 Connection Overview

Top Side



1 – Mini-DP++ connectors, see chapter *4.2*
2 – Dual-USB 3.2 port, see chapter *4.3*
3 – 2.5 Gigabit Ethernet Dual-Port, see chapter *4.5*
4 – Power connector, see chapter *4.9*
5 – Auxiliary Fan connector, see chapter *4.18*
6 – Reset button connector, see chapter *4.20*
7 – Rear USB 3.2 port, see chapter *4.4*
8 – LVDS connector, see chapter *4.14*
9 – SATA Data connector, see chapter *4.12*
10 – SATA Power connector, see chapter *4.13*
11 – Battery connector, see chapter *4.22*
12 – DDR4 SO-DIMM sockets, see chapter *4.8*
13 – M.2 Key M socket, see chapter *4.11*
14 – M.2 Key B socket, see chapter *4.11*
15 – Audio connector, see chapter *4.10*
16 – M.2 Key E socket, see chapter *4.11*
17 – LC-Display Backlight connector, see chapter *4.15*
18 – Battery, see chapter *4.23*

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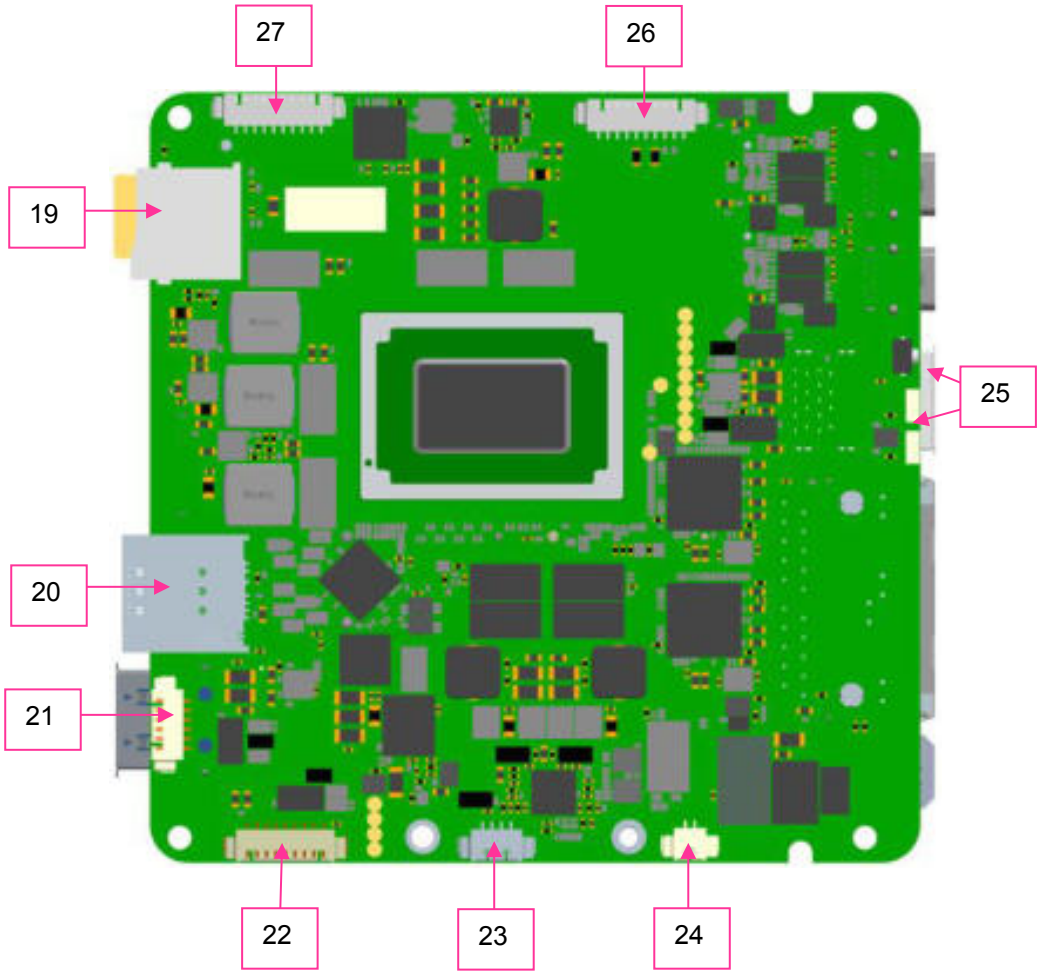
Bottom Side



19 – MicroSD card slot, see chapter *4.24*

20 – MicroSIM card slot, see chapter *4.25*

21 – RS232 connector, see chapter *4.6*

22 – internal USB connector, see chapter *4.17*

23 – CPU fan, see chapter *4.18*

24 – Power button connector, see chapter *4.21*

25 – Power Button, Power and SATA LEDs, see chapter *4.19*

26 – Feature connector, see chapter *4.16*

27 – RS232/485 connector, see chapter *4.7*

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4.2 Mini-DP++ Connectors

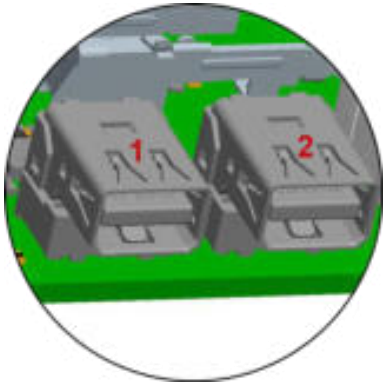

Fig. 14: Mini-DP++ Connector Detail

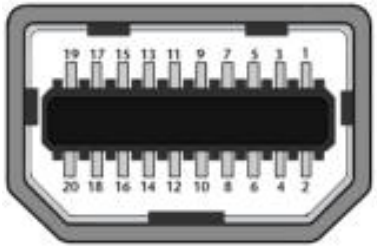

Fig. 15: Mini-DP++ Connector Schematic

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).

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4.3 Dual-USB 3.2 Port

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. 16: Dual-USB 3.2 Port Detail

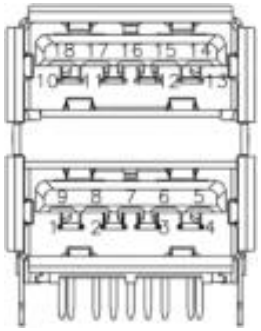

Fig. 17: Dual-USB 3.2 Port Schematic

4.4 Rear USB 3.2 Port

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

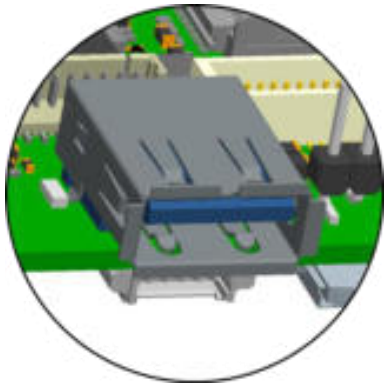

Fig. 18: USB 3.2 Port Detail

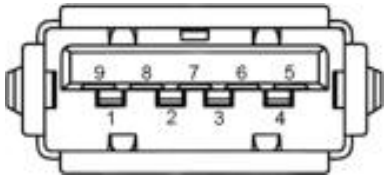

Fig. 19: USB 3.2 Port Schematic

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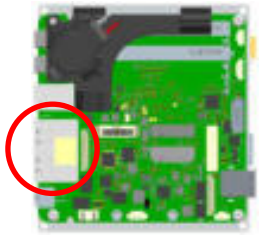
4.5 2.5 Gigabit Ethernet Dual-Port

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



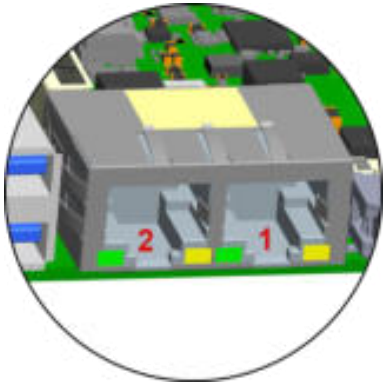


Fig. 20: Ethernet Dual-Port Detail

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.

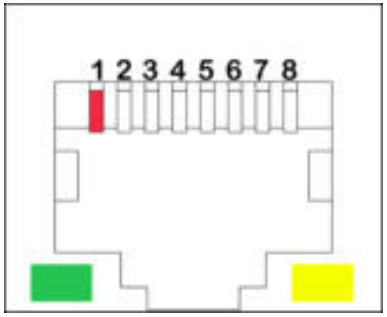


Fig. 21: Ethernet Port Schematic

4.6 RS232 Connector

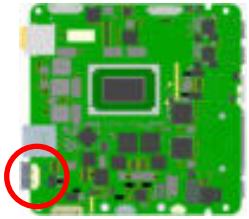


Fig. 22: Molex RS232 Connector Detail

Counterpart – plug:
MOLEX Pico Blade 0510210600

Fig. 23: 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. 1: RS232 Connector

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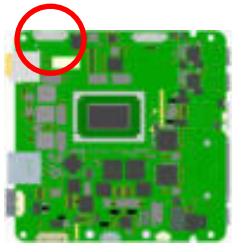
4.7 RS232/485 Connector



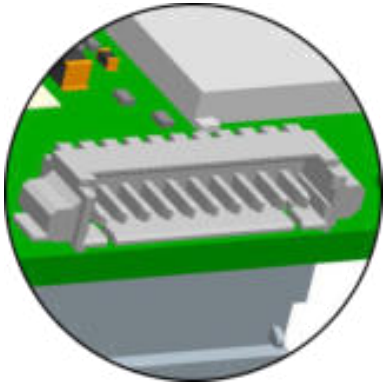


Fig. 24: Molex RS232/485 Connector Detail

Counterpart – plug:

MOLEX Pico Blade 0510211000

Fig. 25: 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. 2: RS232/485 Connector

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4.8 DDR4 SO-DIMM Sockets

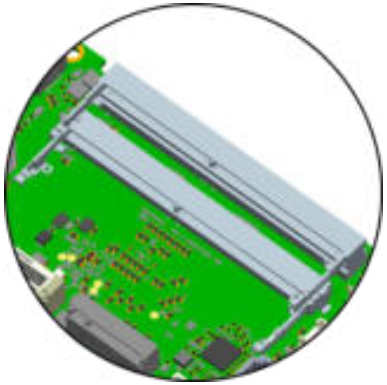

Fig. 26: DDR4 SO-DIMM Socket Detail

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.

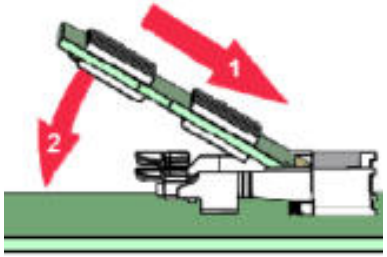

Fig. 27: RAM Assembly

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

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4.9 Power Connector

CAUTION

For a stable operation:

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 (V_{in}) min. 8 V / max. 32 V.

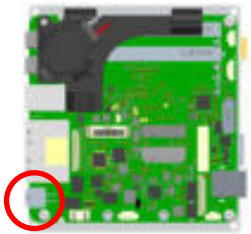

Fig. 28: Power Connector Detail

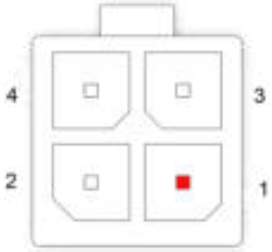

Fig. 29: Power Connector Schematic

Counterpart – plug:

Nexus Series 2300, 3.00 mm Micro MF housing with lock
Ordering number 2300P04xxx

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. 3: Power Connector

*KL_15 is ignition enable pin required for automotive applications.
KL_15 is default off in BIOS setup (see chapter *5.4.7*).
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 does not work; Countdown timer between 1 and 65535 seconds)
  The timers can be set via the “ignition signal” item. Default is 180 seconds: 180 seconds after the ignition is off, the board is shut down. The microcontroller takes over the control.

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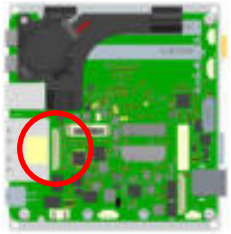
4.10 Audio Connector



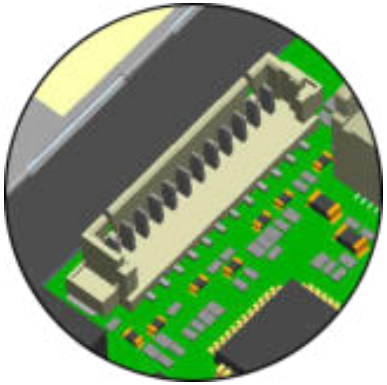


Fig. 30: Molex Audio Connector Detail

Fig. 31: Molex Audio Connector Schematic

Pin	Signal
1	JD_LINE_IN*
2	LINE_IN_L
3	LINE_IN_R
4	GND_AUDIO
5	MIC_IN
6	GND_AUDIO
7	JD_LINE_OUT*
8	LINE_OUT_L
9	LINE_OUT_R
10	GND_AUDIO
11	HP_OUT_L
12	HP_OUT_R

Tab. 4: Audio Connector

*JD = Jack Detect

Counterpart – plug:

MOLEX Pico Blade 0510211200

CAUTION

For optimum audio performance:

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

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4.11 M.2 Sockets

M.2 Socket Key M

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

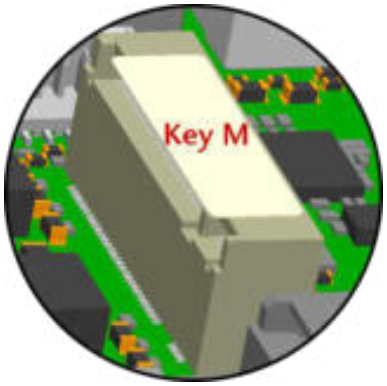

Fig. 32: M.2 Key M Connector Detail

M.2 Socket Key E

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

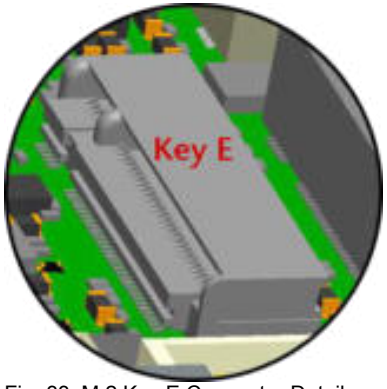

Fig. 33: M.2 Key E Connector Detail

M.2 Socket Key B

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

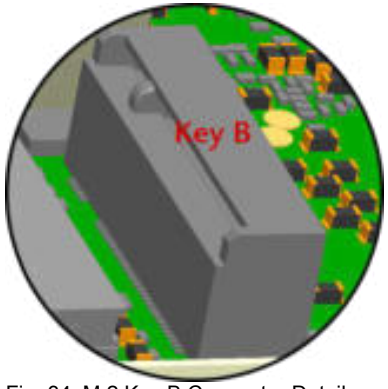

Fig. 34: M.2 Key B Connector Detail

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4.12 SATA Data Connector

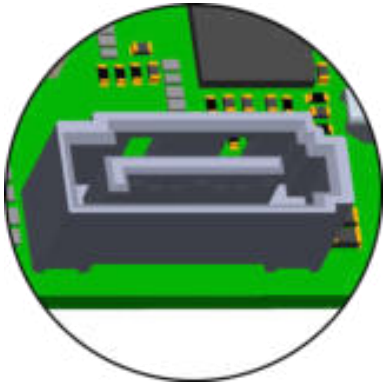

Fig. 35: SATA Data Connector Detail

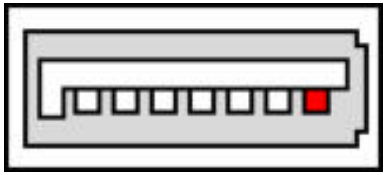

Fig. 36: SATA Data Connector Schematic

4.13 SATA Power Connector

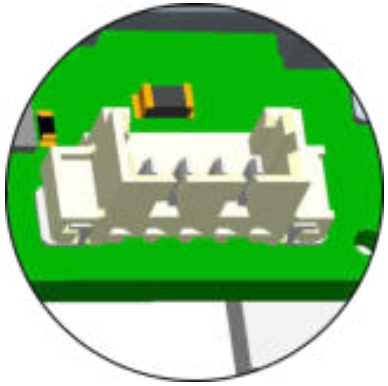

Fig. 37: Molex SATA Power Connector Detail

Counterpart – plug:

MOLEX Pico Blade 0510210400

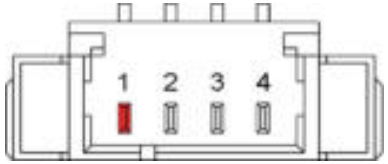

Fig. 38: Molex SATA Power Connector Schematic

Pin	Signal
1	VCC 5V +/- 5%*, not fused
2	VCC 5V +/- 5%*, not fused
3	GND
4	GND

Tab. 5: SATA Power Connector

*Port provides max. 1.5 A.

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09/2024 Version 5.3

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

4.14 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 (chapter *4.14.1*).

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

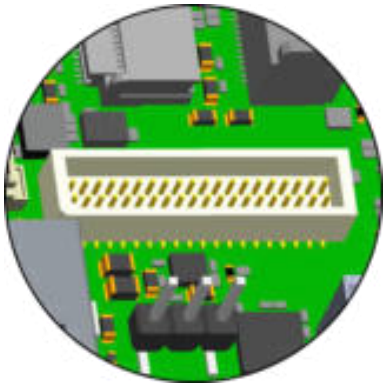

Fig. 39: LVDS Data Connector Detail

Counterpart – plug:

JST SHDR-40V-S-B

Fig. 40: LVDS Data Connector Schematic

4.14.1 Jumper setting for LVDS Data section of the LC-display (OEM/ODM only)

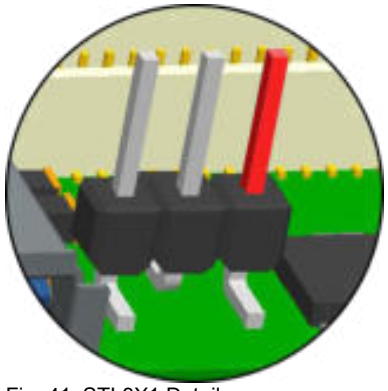

Fig. 41: STL3X1 Detail

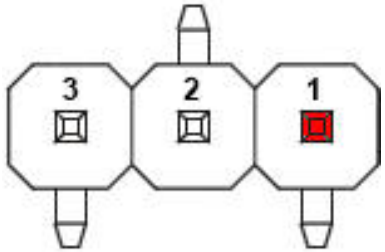

Fig. 42: STL3X1 Schematic

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

Tab. 6: STL3X1

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

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4.15 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.

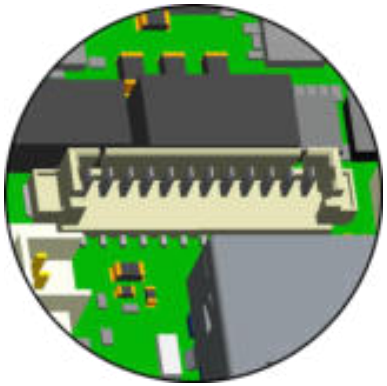

Fig. 43: Molex LC-Display Backlight Connector Detail

Counterpart – plug:

MOLEX Pico Blade 0510211200

Fig. 44: Molex LC-Display Backlight Connector Detail

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

Tab. 7: LC-Display Backlight Connector

* ∑Pin [1:3] = max. 3 A, not fused

*2 ∑Pin [4:6] = max. 2.5 A, not fused

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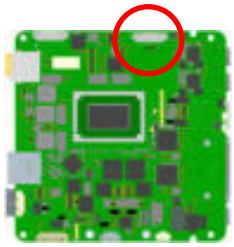
4.16 Feature Connector

Status LED and GPIO Connector.



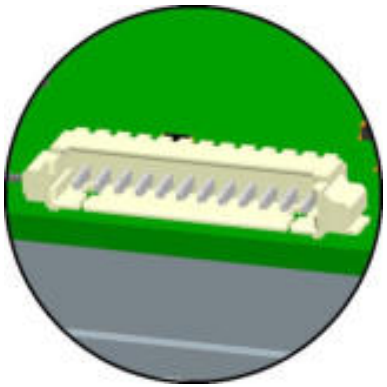


Fig. 45: Molex Feature Connector Detail

Counterpart – plug:

MOLEX Pico Blade 0510211200

Fig. 46: Molex Feature Connector Schematic

Pin	Signal
1	P3V3 +/- 5% | 200 mA max., not fused
2	Reserved
3	GPIO0*1
4	GPIO1*1
5	GPIO2*1
6	GPIO3*1
7	GPO1*2
8	GPO2*2
9	GPO3*2
10	STATUS_LED_ANODE 3.3 V +/- 5% with 100 Ω series resistor | 33 mA max. not fused
11	STATUS_LED_CATHODE
12	GND

Tab. 8: Feature Connector

*1 GPIO [0:3]: max. 3.3 V | max. 15 mA sink/source
*2 GPO [4:6]: max. voltage = PVIN max.
series resistor 100 Ω (1/16 W)

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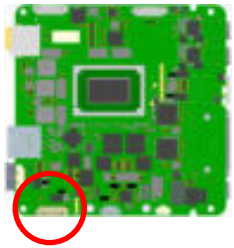
4.17 USB Internal Connector

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



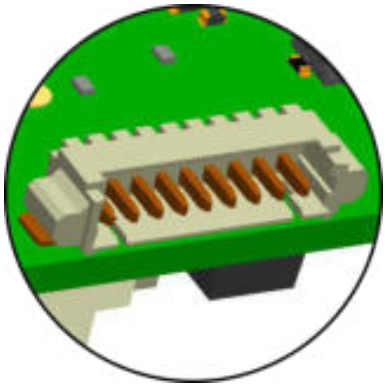


Fig. 47: Molex USB internal Connector Detail

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. 9: USB internal Connector

Counterpart – plug:

MOLEX Pico Blade 0510210900

Fig. 48: Molex USB internal Connector Schematic

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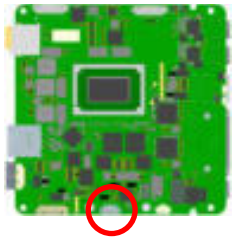
4.18 FAN Connectors

CPU FAN Connector



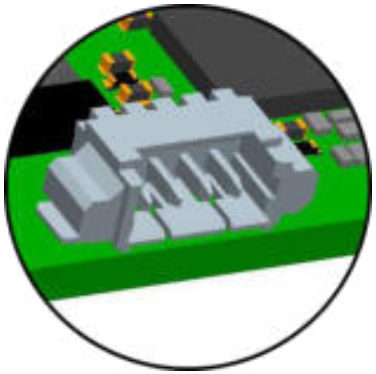


Fig. 49: Molex CPU FAN Connector Detail

Auxiliary FAN Connector

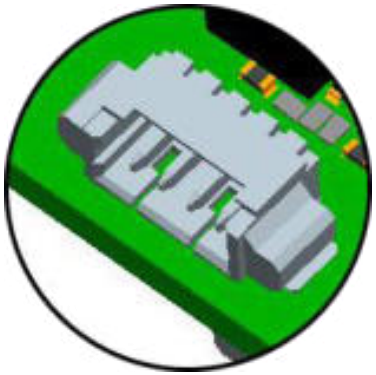


Fig. 50: Molex Auxiliary FAN Connector Detail

Counterpart – plug:

MOLEX Pico Blade 0510210400

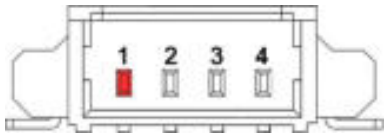


Fig. 51: Molex FAN Connectors Schematic

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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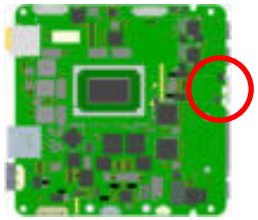
4.19 Power Button, Power and SATA LEDs

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).



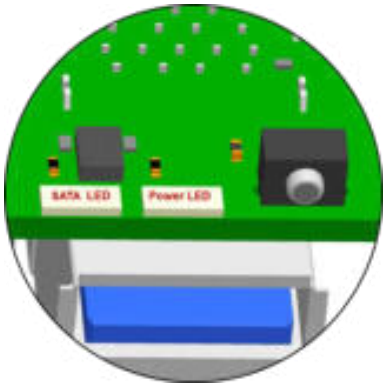


Fig. 52: Power Button/Power and SATA LEDs Detail

4.20 Reset Button Connector

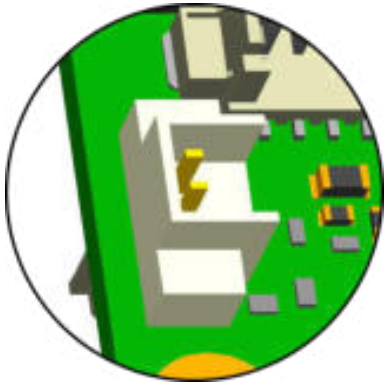


Fig. 53: Molex Reset Button Connector Detail

Counterpart – plug:

MOLEX Pico Blade 0510210200

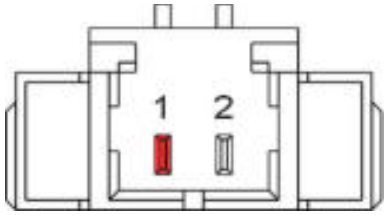


Fig. 54: Molex Reset Button Connector Schematic

Pin	Signal
1	GND
2	RESET_IN_m

Tab. 11: Reset Button Connector

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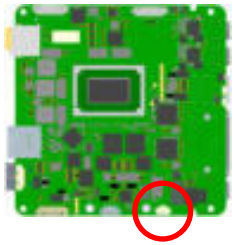
4.21 Power Button Connector

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).



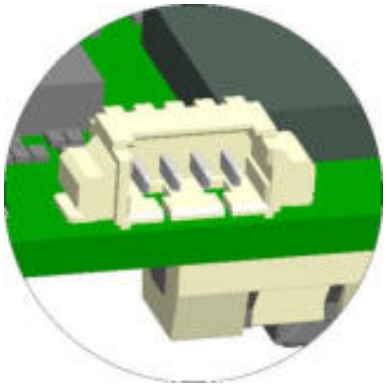


Fig. 55: Molex Power Button Connector Detail

Counterpart – plug:

MOLEX Pico Blade 0510210400

Fig. 56: Molex Power Button Connector Schematic

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

Tab. 12: Power Button Connector

4.22 Battery Connector

Fig. 57: Battery Connector Detail

Counterpart – plug:

MOLEX Pico Blade 0510210200

Battery with cable ordering number:

W-BATCR1A

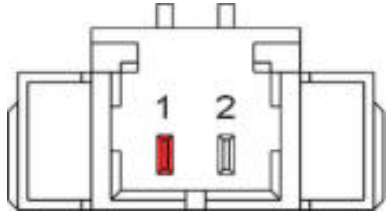


Fig. 58: Battery Connector Schematic

Pin	Signal
1	BATT
2	GND

Tab. 13: Battery Connector

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4.23 Battery

Fig. 59: Battery Detail

Danger of explosion if battery is incorrectly replaced.

Use only Lithium cell assemblies from EEPD. Battery assemblies can be obtained through **sales@eepd.de**

For proper function of the board change the battery every five years.

4.24 MicroSD Card Slot

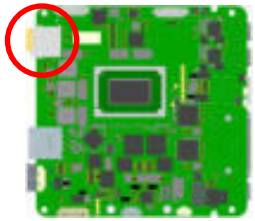
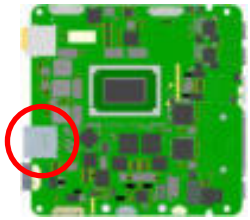


Fig. 60: MicroSD Card Slot Detail

4.25 MicroSIM Card Slot



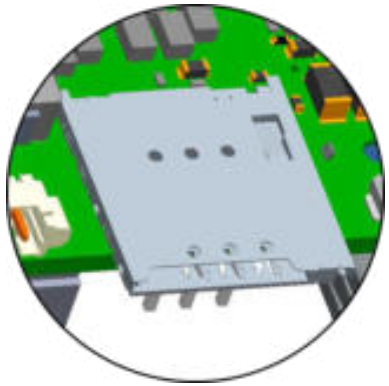


Fig. 61: MicroSIM Card Socket Detail

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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

- 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):
  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

- USB power
  USB Power off in S5 (chapter 5.4.7):
  Setup Utility → Advanced → NUCD Options → USB Power off in S5
  or
  USB VCC control (chapter 5.4.4.1):
  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. 62: 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. 63: 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

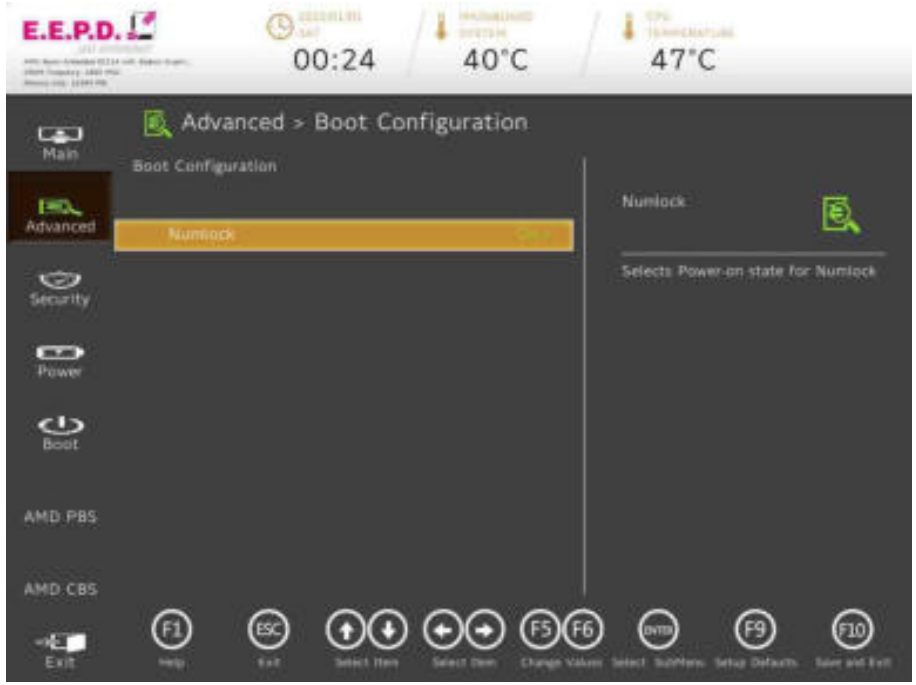

Fig. 64: Boot Configuration

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

Tab. 16: Boot Configuration

5.4.2 Peripheral Configuration

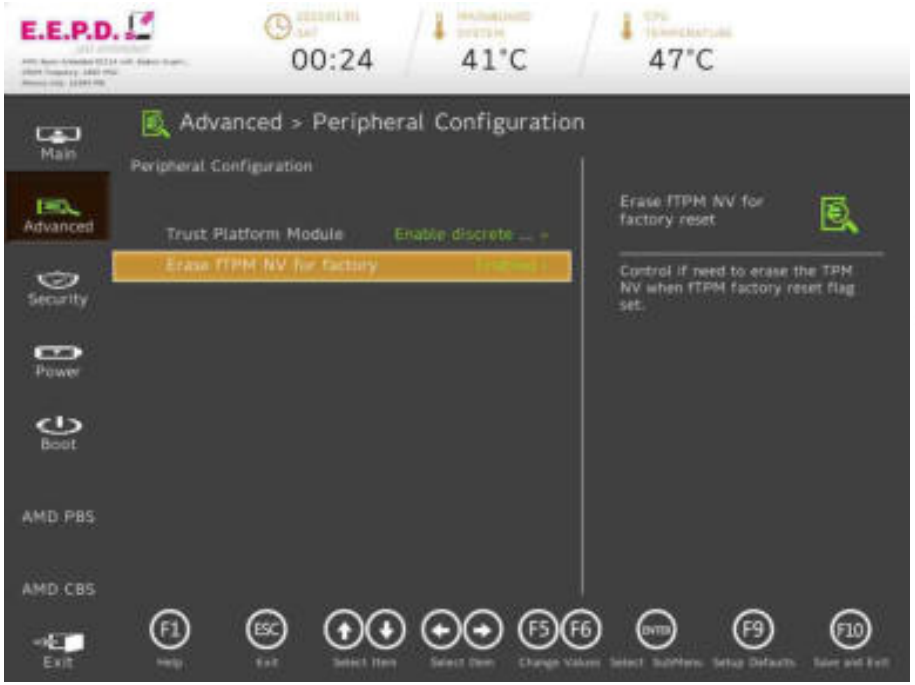

Fig. 65: Peripheral Configuration

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

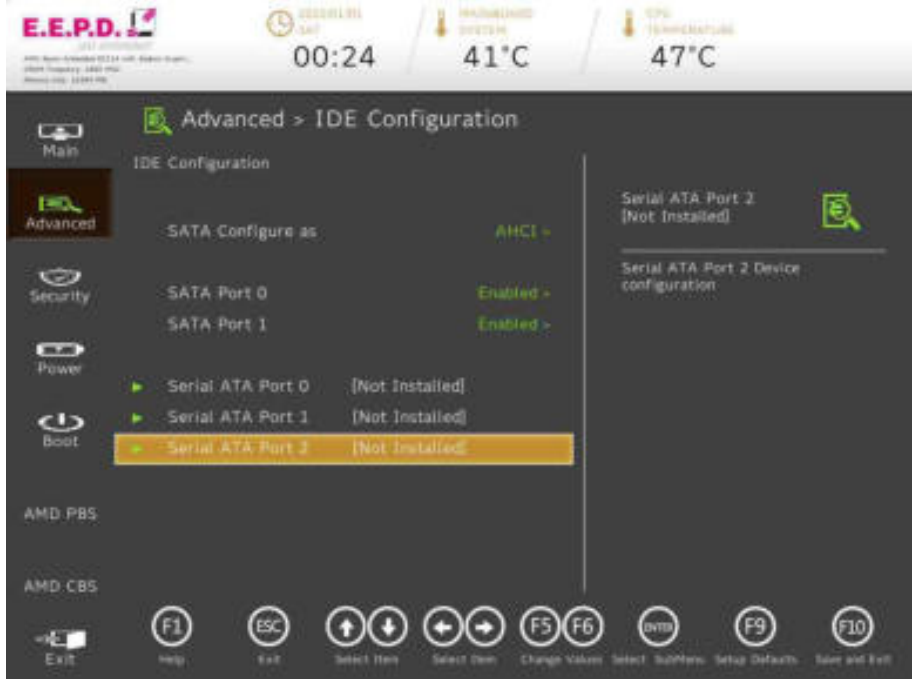

Fig. 66: IDE Configuration

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

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5.4.4 USB Configuration

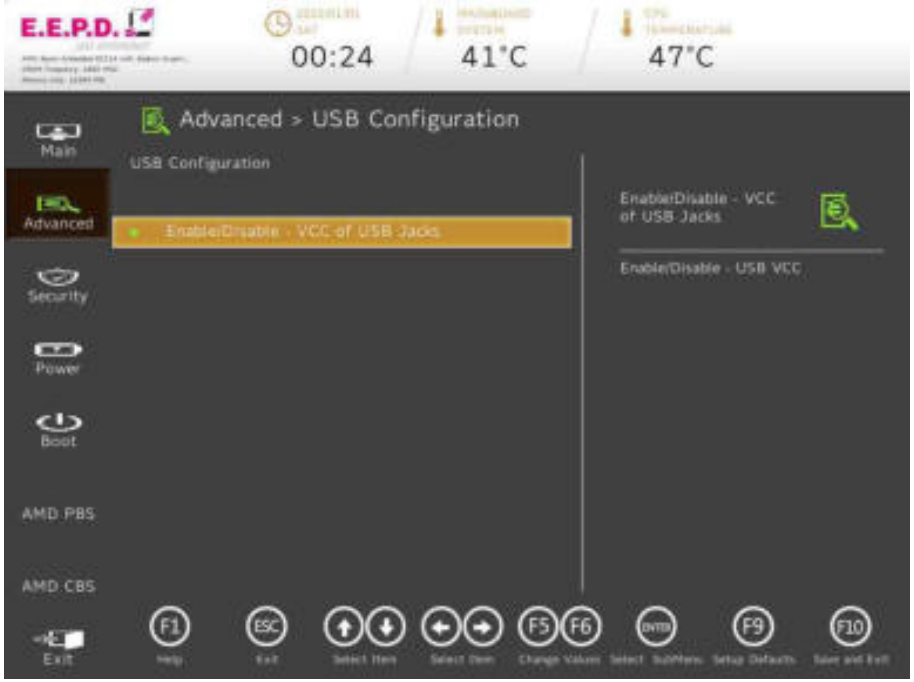

Fig. 67: USB Configuration

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

Tab. 19: USB Configuration

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5.4.4.1 Enable/Disable – VCC of USB Jacks

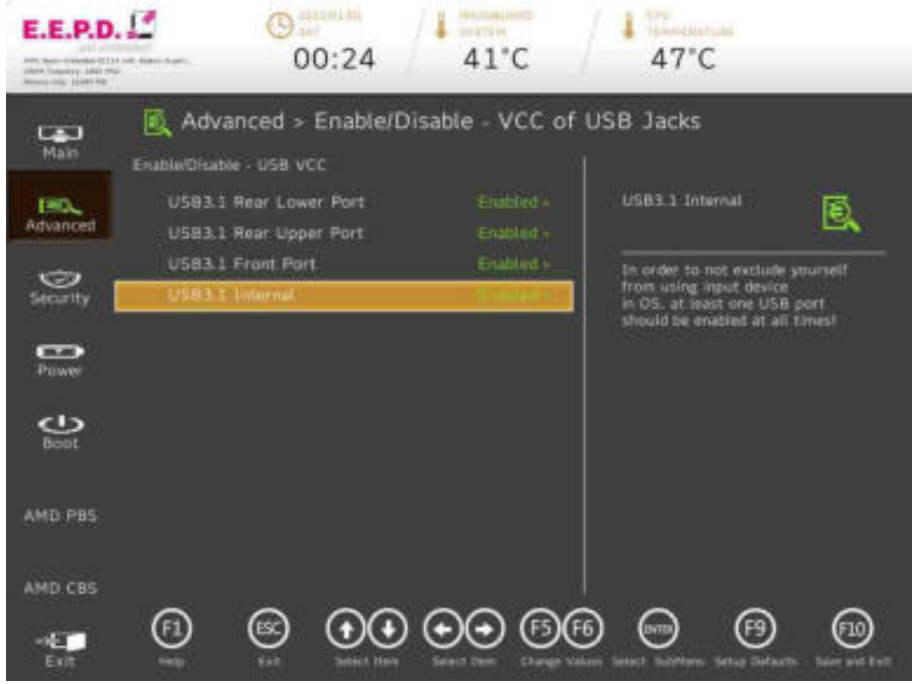

Fig. 68: Enable/Disable – VCC of USB Jacks

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

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.

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5.4.5 ACPI Table/Features Control

Fig. 69: 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

5.4.6 CPU Related setting

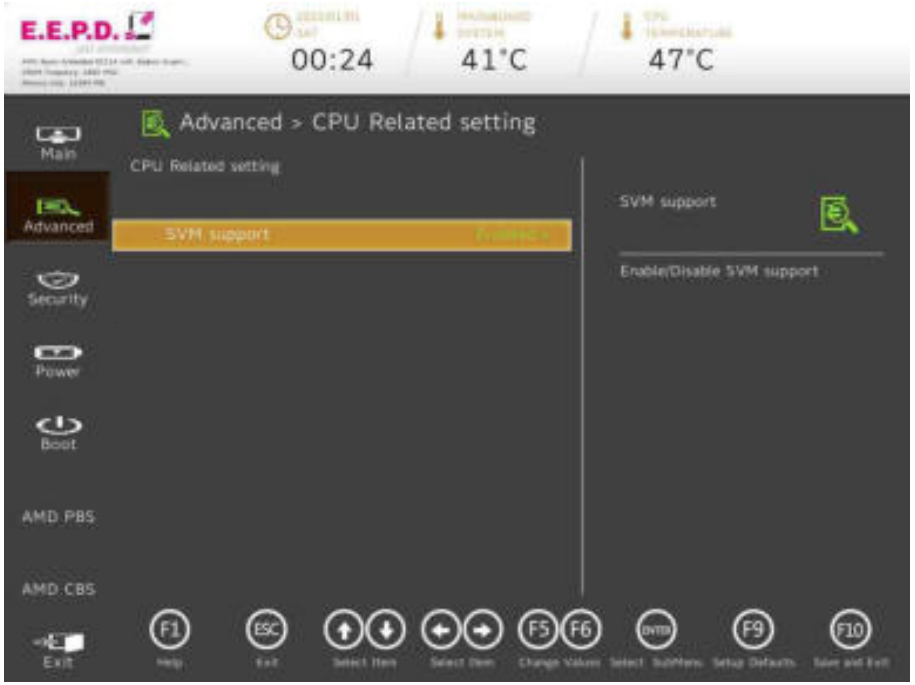

Fig. 70: CPU Related setting

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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5.4.7 NUCD options

Fig. 71: 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 *4.9*)	<Disabled>* <Enabled>	KL 15 support: 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. 72: 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. 73: 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

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5.6 Power Menu

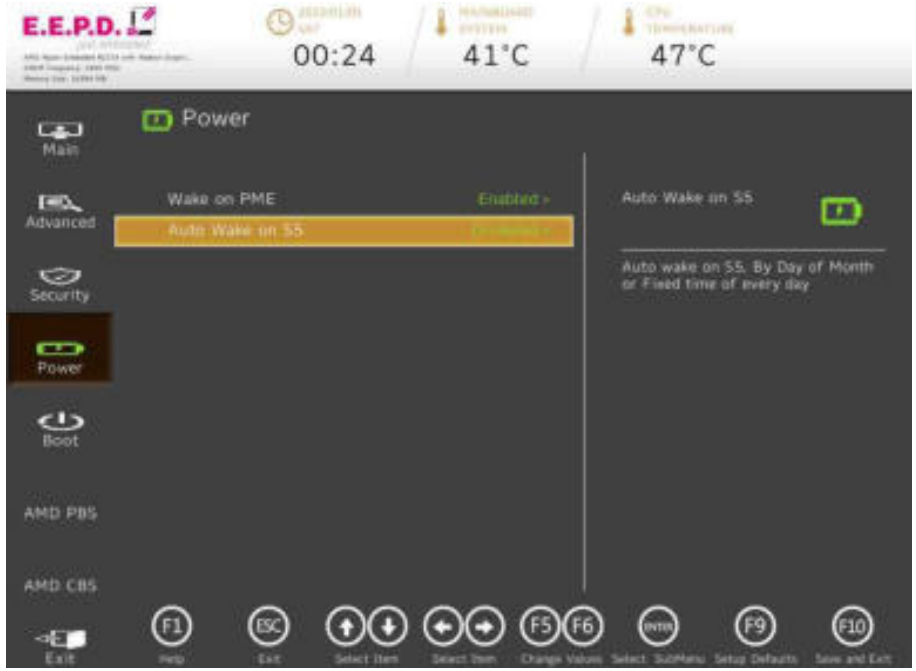

Fig. 74: Power Menu

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

5.7 Boot Menu

Fig. 75: 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

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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

5.7.1 EFI

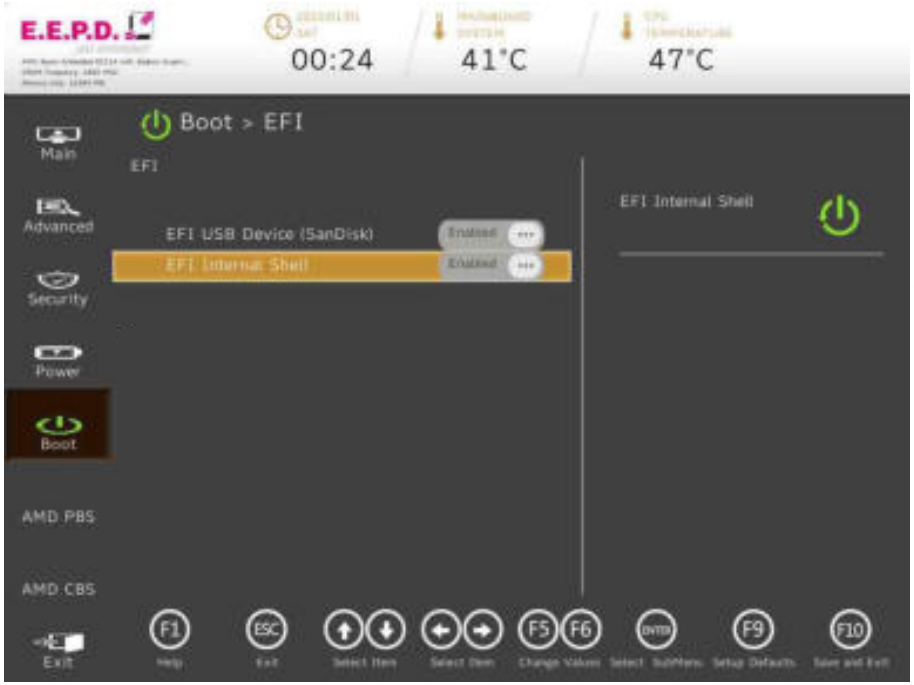

Fig. 76: EFI

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. 77: 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

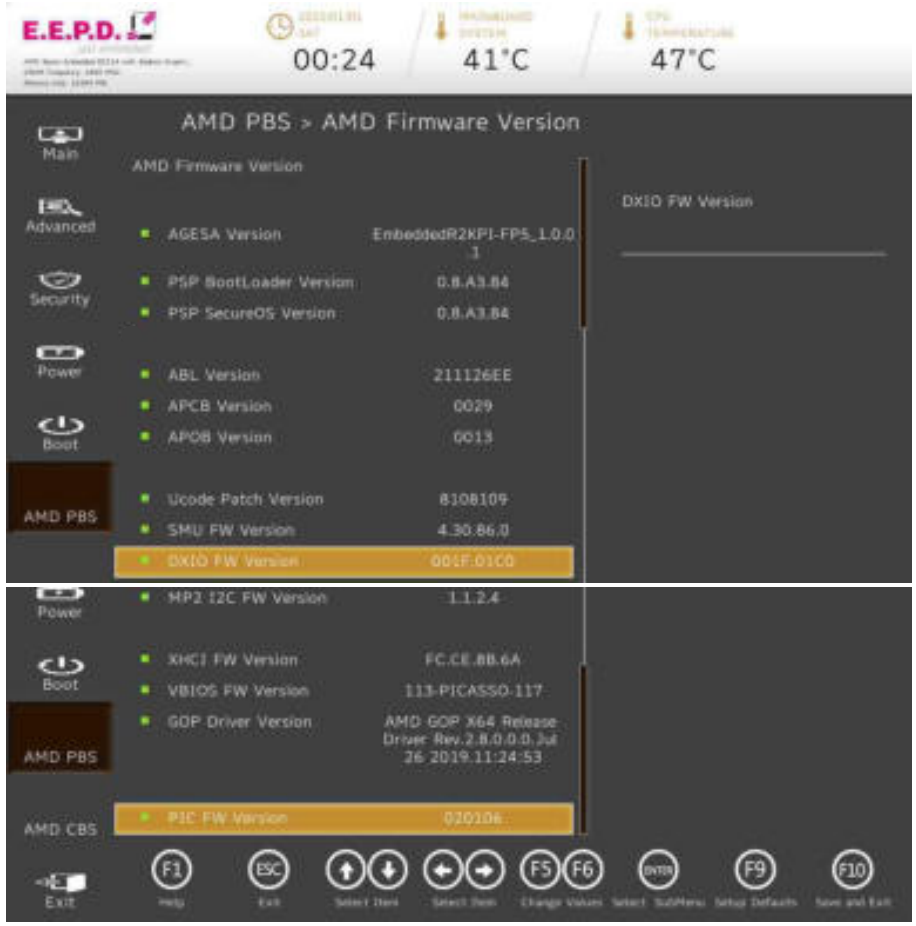

Fig. 78: AMD Firmware Version

5.9 AMD CBS Option

Fig. 79: 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. 80: Zen Common Options

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

Tab. 31: Zen Common Options

5.9.2 NBIO Common Options

Fig. 81: 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. 82: 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

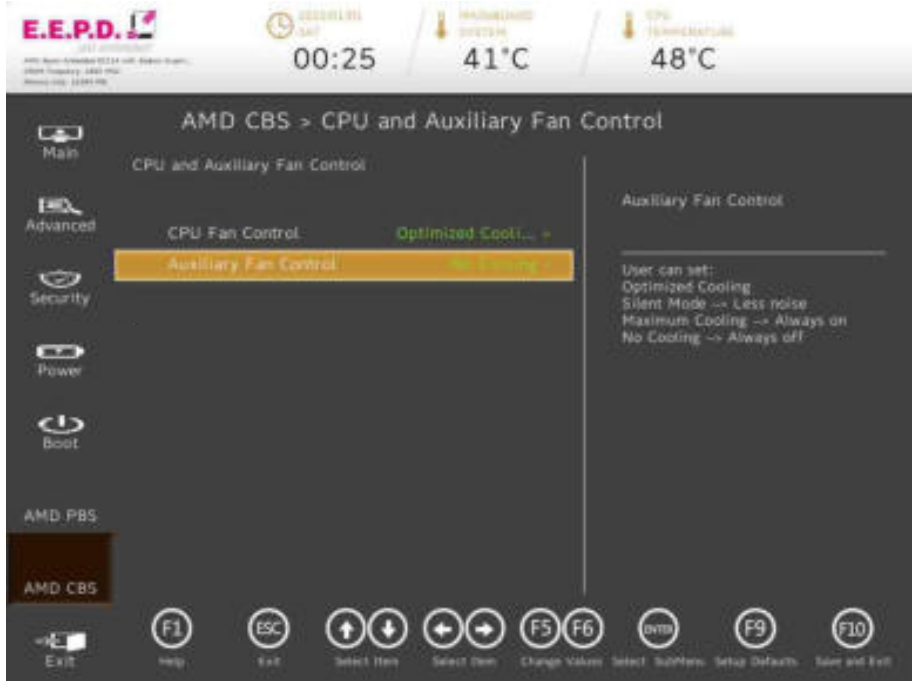

Fig. 83: CPU and Auxiliary Fan Control

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%) 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. 84: 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

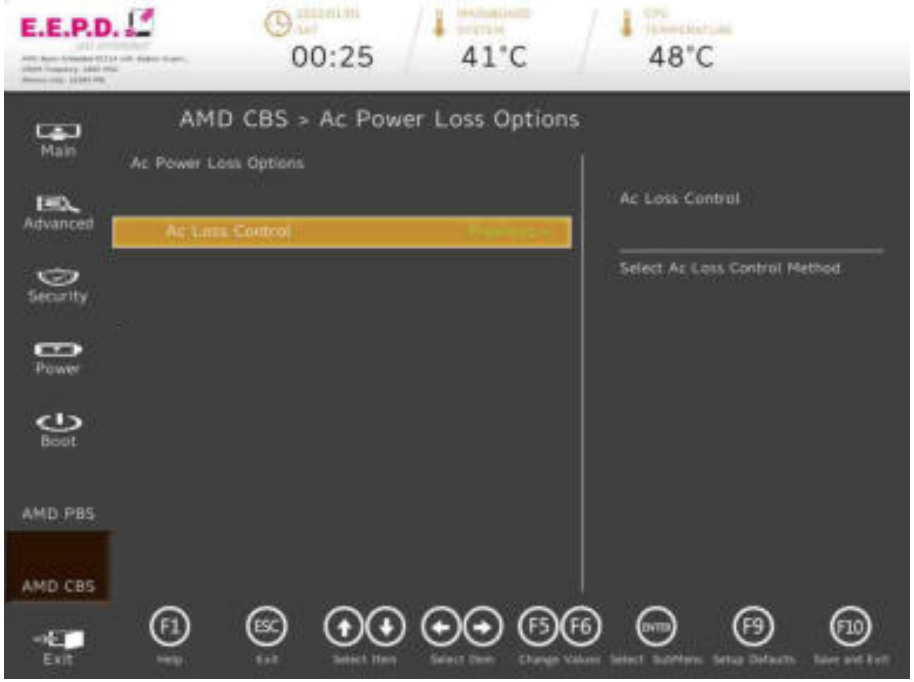

Fig. 85: Ac Power Loss Options

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. 86: 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 Uart 0 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. 87: 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.
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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Index of Figures

Fig. 1: System Overview 11
Fig. 2: Top View 13
Fig. 3: Bottom View 13
Fig. 4: Front View 14
Fig. 5: Recommended cutouts front panel, values [mm] 14
Fig. 6: Rear View 14
Fig. 7: Recommended cutouts rear panel, values [mm] 14
Fig. 8: Side View 14
Fig. 9: Mechanical Mounting 15
Fig. 10: Dimensions top side, values [mm] 16
Fig. 11: Dimensions front side, values [mm] 16
Fig. 12: Dimensions bottom side, values [mm] 16
Fig. 13: Dimensions heatsink, values [mm] 16
Fig. 14: Mini-DP++ Connector Detail 20
Fig. 15: Mini-DP++ Connector Schematic 20
Fig. 16: Dual-USB 3.2 Port Detail 21
Fig. 17: Dual-USB 3.2 Port Schematic 21
Fig. 18: USB 3.2 Port Detail 21
Fig. 19: USB 3.2 Port Schematic 21
Fig. 20: Ethernet Dual-Port Detail 22
Fig. 21: Ethernet Port Schematic 22
Fig. 22: Molex RS232 Connector Detail 22
Fig. 23: Molex RS232 Connector Schematic 22
Fig. 24: Molex RS232/485 Connector Detail 23
Fig. 25: Molex RS232/485 Connector Schematic 23
Fig. 26: DDR4 SO-DIMM Socket Detail 24
Fig. 27: RAM Assembly 24
Fig. 28: Power Connector Detail 25
Fig. 29: Power Connector Schematic 25
Fig. 30: Molex Audio Connector Detail 26
Fig. 31: Molex Audio Connector Schematic 26
Fig. 32: M.2 Key M Connector Detail 27
Fig. 33: M.2 Key E Connector Detail 27
Fig. 34: M.2 Key B Connector Detail 27
Fig. 35: SATA Data Connector Detail 28
Fig. 36: SATA Data Connector Schematic 28
Fig. 37: Molex SATA Power Connector Detail 28
Fig. 38: Molex SATA Power Connector Schematic 28
Fig. 39: LVDS Data Connector Detail 29
Fig. 40: LVDS Data Connector Schematic 29
Fig. 41: STL3X1 Detail 29
Fig. 42: STL3X1 Schematic 29
Fig. 43: Molex LC-Display Backlight Connector Detail 30
Fig. 44: Molex LC-Display Backlight Connector Detail 30
Fig. 45: Molex Feature Connector Detail 31
Fig. 46: Molex Feature Connector Schematic 31
Fig. 47: Molex USB internal Connector Detail 32
Fig. 48: Molex USB internal Connector Schematic 32
Fig. 57: Molex CPU FAN Connector Detail 33
Fig. 58: Molex Auxiliary FAN Connector Detail 33
Fig. 59: Molex FAN Connectors Schematic 33
Fig. 51: Power Button/Power and SATA LEDs Detail 34
Fig. 52: Molex Reset Button Connector Detail 34
Fig. 53: Molex Reset Button Connector Schematic 34
Fig. 54: Molex Power Button Connector Detail 35
Fig. 55: Molex Power Button Connector Schematic 35
Fig. 56: Battery Connector Detail 35
Fig. 57: Battery Connector Schematic 35
Fig. 58: Battery Detail 36
Fig. 59: MicroSD Card Slot Detail 36
Fig. 60: MicroSIM Card Socket Detail 36

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09/2024 Version 5.3

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Fig. 61: Main Menu 38
Fig. 62: Advanced Menu 39
Fig. 63: Boot Configuration 40
Fig. 64: Peripheral Configuration 40
Fig. 65: IDE Configuration 41
Fig. 66: USB Configuration 42
Fig. 67: Enable/Disable – VCC of USB Jacks 43
Fig. 68: ACPI Table/Features Control 44
Fig. 69: CPU Related setting 44
Fig. 70: NUCD options 45
Fig. 71: Security Menu 46
Fig. 72: Storage Password Setup Page 47
Fig. 73: Power Menu 48
Fig. 74: Boot Menu 48
Fig. 75: EFI 49
Fig. 76: AMD PBS Option 50
Fig. 77: AMD Firmware Version 51
Fig. 78: AMD CBS Option 51
Fig. 79: Zen Common Options 52
Fig. 80: NBIO Common Options 52
Fig. 81: GFX Configuration 53
Fig. 82: CPU and Auxiliary Fan Control 54
Fig. 83: FCH Common Options 54
Fig. 84: Ac Power Loss Options 55
Fig. 85: UART Configuration Options 56
Fig. 86: Exit Menu 57

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Index of Tables

Tab. 1: RS232 Connector 22
Tab. 2: RS232/485 Connector 23
Tab. 3: Power Connector 25
Tab. 4: Audio Connector 26
Tab. 5: SATA Power Connector 28
Tab. 6: STL3X1 29
Tab. 7: LC-Display Backlight Connector 30
Tab. 8: Feature Connector 31
Tab. 9: USB internal Connector 32
Tab. 12: FAN Connectors 33
Tab. 11: Reset Button Connector 34
Tab. 12: Power Button Connector 35
Tab. 13: Battery Connector 35
Tab. 14: Main Menu 38
Tab. 15: Advanced Menu 39
Tab. 16: Boot Configuration 40
Tab. 17: Peripheral Configuration 40
Tab. 18: IDE Configuration 41
Tab. 19: USB Configuration 42
Tab. 20: Enable/Disable – VCC of USB Jacks 43
Tab. 21: ACPI Table/Features Control 44
Tab. 22: CPU Related setting 44
Tab. 23: NUCD options 45
Tab. 24: Security Menu 46
Tab. 25: Storage Password Setup Page 47
Tab. 26: Power Menu 48
Tab. 27: Boot Menu 49
Tab. 28: EFI 49
Tab. 29: AMD PBS Option 50
Tab. 30: AMD CBS Option 51
Tab. 31: Zen Common Options 52
Tab. 32: NBIO Common Options 52
Tab. 33: GFX Configuration 53
Tab. 34: CPU and Auxiliary Fan Control 54
Tab. 35: FCH Common Options 54
Tab. 36: Ac Power Loss Options 55
Tab. 37: UART Configuration Options 56
Tab. 38: Exit Menu 57

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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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Classified Index

–A–
Advanced Menu 39
AMD CBS Option 51
AMD PBS Option 50
Assembly 12
Audio Connector 26

–B–
Battery 36
Battery Connector 35
BIOS 37
Boot Menu 48

–C–
Connection Overview 18

–D–
DDR4 SO-DIMM Sockets 24
Dimensions 16
Dual-USB 3.2 Port 21

–E–
Entering Setup 37
Environmental Specification 10
Exit Menu 57

–F–
FAN Connectors 33
Feature Connector 31
Feature Details 17
Feature Overview 8

–G–
Gigabit Ethernet Dual-Port 22

–L–
LC-Display Backlight Connector 30
LVDS Connector 29

–M–
M.2 Sockets 27
Main Menu 38
Mechanical Mounting 15
MicroSD Card Slot 36
MicroSIM Card Slot 36
Mini-DP++ Connectors 20
Most Common Settings 37

–P–
Power Button Connector 35
Power Button, Power and Status LEDs 34
Power Connector 25
Power Menu 48
Product Views 13

–R–
Rear USB 3.2 Port 21
Reset Button Connector 34
RS232 Connector 22
RS232/485 Connector 23

–S–
SATA Data Connector 28
SATA Power Connector 28
Security Menu 46
System Overview 11

–U–
USB Internal Connector 32

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