EM BOX® PC NUCD – Device Reference Manual

Picture shows EM BOX® PC NUCD with custom options

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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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Product Returns

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

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

Packaging

The BoxPC is in a protective package to avoid damage during transport.

This protective package should be recycled in an environmentally friendly way after use.

Disposal of Device

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

Customer Support

Please contact:
https://www.eepd.de/support/

Technical Support

For technical information about hardware and software please contact: **sales@eepd.de**

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Revision History

Date	Version	Changes	Proofed
25.02.2025	5.0	First release for HW Rev.5	

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Symbols

The red danger sign warns you if incorrect operation puts your life or health at great risk. Both the components and the peripherals could be destroyed.

The orange warning sign warns you that an incorrect or missing operation could seriously endanger your health or destroy the used components.

The yellow caution sign indicates that an incorrect or missing action could damage the components.

The yellow ESD symbol indicates that electrostatic sensitive components could be destroyed. Unpack shielded components only with ESD protection such as an ESD wristband or on an ESD protected area.

The information sign gives you further information and advice for optimal use of this product.
For example, it draws your attention to necessary or optional accessories.

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Safety Instructions

Safety of People

The product generates considerable heat. The housing transports this heat to the environment and thus becomes hot. Take care if you touch the housing as this may cause burns!

Please follow all safety instructions at the installation site. Make sure that no or only necessary cables are connected to the BoxPC during installation.

If access to the BoxPC interfaces is not available after installation, all necessary connections must be made before.

Device Safety

The BoxPC operates exclusively within the specified DC voltage range. Repair work should only be made by an authorized and certified specialty retailer or by the manufacturer's customer service. Do not open the device to avoid damage.

Modifications that have not been approved by the manufacturer void the warranty. Dust, dirt, moisture, and extreme temperatures may significantly impair proper operation.

Cooling System

The BoxPC consists of a compact, robust metal housing with ventilation holes. It is equipped with an automated fan. To ensure sufficient heat dissipation, never cover the ventilation holes of the case. Do not place any objects onto the device.

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1 System Information

1.1 Required Tools

For the installation of the BoxPC system the following standard tools are recommended:

- Torx screwdriver T10
- Slot screwdriver

Other required tools are depending on the installation place and method.

1.2 Software

Supported operating systems are:

Microsoft® Windows® 11
Microsoft® Windows® 11 IoT Enterprise
Microsoft® Windows® 10
Microsoft® Windows® 10 IoT Enterprise
Linux Ubuntu 24.04 LTS.

1.3 System Features and Intended Use

The BoxPC is the perfect industrial grade communicator for secure and reliable IoT communication. Many interfaces provide a wide range of applications. The simultaneous use of 4G (ODM only) and WLAN (ODM only) allows extended router applications.
The BoxPC is intended for indoor use only.

1.4 Options

Please contact our sales department for ordering information of optional product features.

Options	Description
Memory modules*	Max. 32 GB dual-channel DDR4 SODIMM up to 3200 MT/s
SSD*	64 GB – 2 TB
LTE/modem module*#	M.2 LTE card with three SMA connectors
WLAN/BT module kit*#	M.2 WLAN/BT card with 2 SMA-connectors
Operating System*	Windows® 11, Windows® 11 IoT Enterprise, Linux Ubuntu 24.04 LTS
RS232 interface*	9-pin D-SUB connector
RS485 interface*	9-pin D-SUB connector
Power switch*	Power switch with LED
Sound*	Audio connector 3.5 mm MIC IN / headphone OUT / CTIA-Standard
*factory-assembled on request #ODM option	

Tab. 1: Options

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1.5 Accessories

Please contact our sales department for ordering information.

Accessories	Description
4-pin power cable	Power cable with open ends
Power supply (90 W / 24 V)	Power supply incl. cable with EU plug
Display cable	Cable MiniDP to HDMI, 2 m, with interlock
WLAN/BT antenna	SMA antenna
LTE/GPS antenna	SMA antenna with or without cable
DIN rail clip	DIN rail clip with screws for „TS35“ hat-rails
VESA mounting	Allows installation behind a monitor
Universal holder	Allows further mounting options
M.2 module cooler	SSD and modem m.2 slot cooling

Tab. 2: Accessories

1.6 Scope of Delivery

Before you begin installation, please check that your shipment is complete and contains the items listed on the delivery note.

1.6.1 Type Label

Fig. 1: Type label

1 – Manufacturer

2 – Product name

3 – Serial number with barcode

4 – Power input voltage range

5 – Certification information

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1.7 System Dimensions

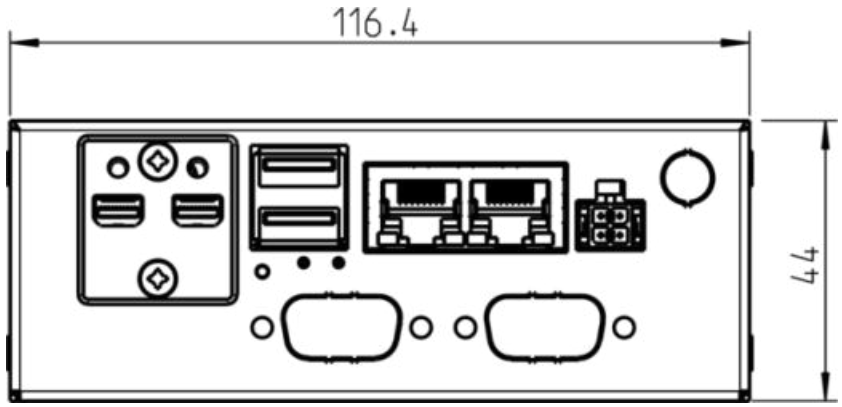

Fig. 2: Dimensions frontside, all values approx. in mm

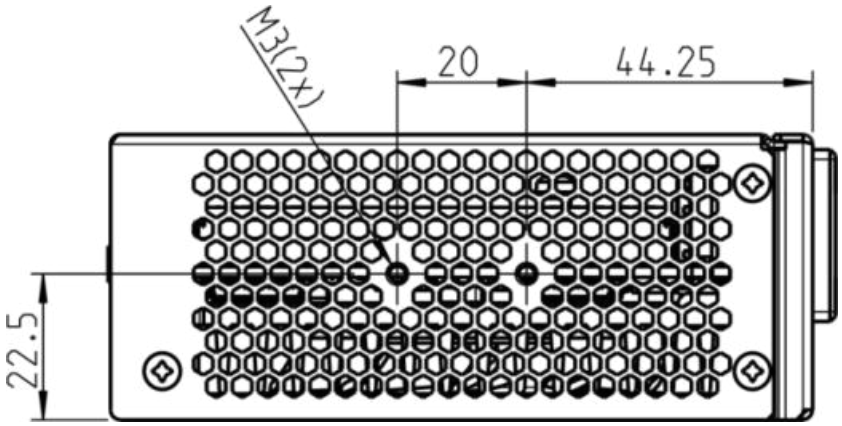

Fig. 3: Dimensions left side, all values approx. in mm

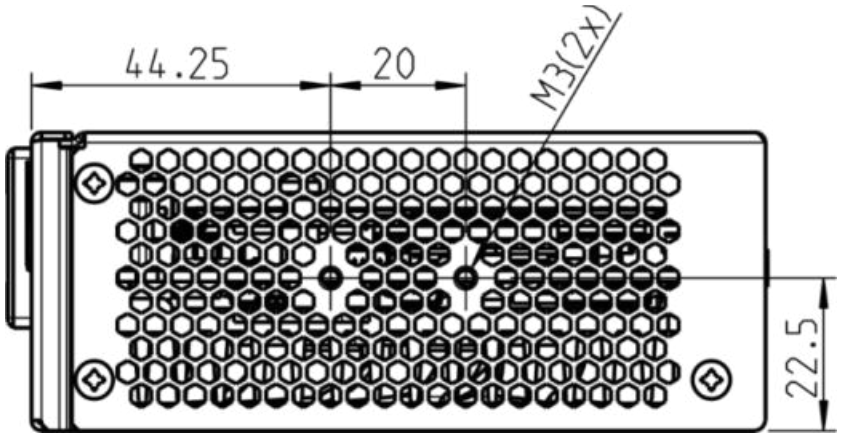

Fig. 4: Dimensions right side, all values approx. in mm

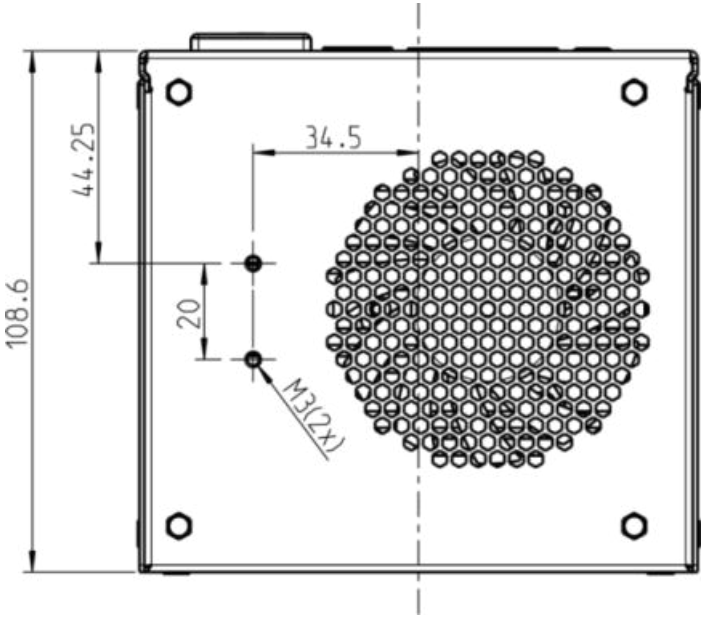

Fig. 5: Dimensions bottom side, all values approx. in mm

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1.8 System Mounting

1.8.1 Stand-alone

For use as a desktop computer, apply the self-adhesive rubber feet to the bottom of the housing.

Before attaching the rubber feet, please clean / degrease the bonding areas with a suitable solvent, e.g. alcohol.

Fig. 6: EM BOX® PC NUCD with rubber feet

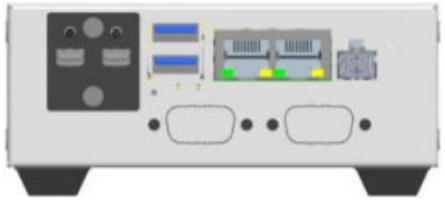

Fig. 7: Front view with rubber feet

1.8.2 VESA mounting (optional)

The EM BOX PC is also designed for VESA mounting. There is an optional VESA mount available as shown in *Fig. 8*.

Fig. 8: VESA mounting

1.8.3 Universal Holder (optional)

The EM BOX PC is also designed for other mounting options. There is an universal holder available as shown in *Fig. 9*.

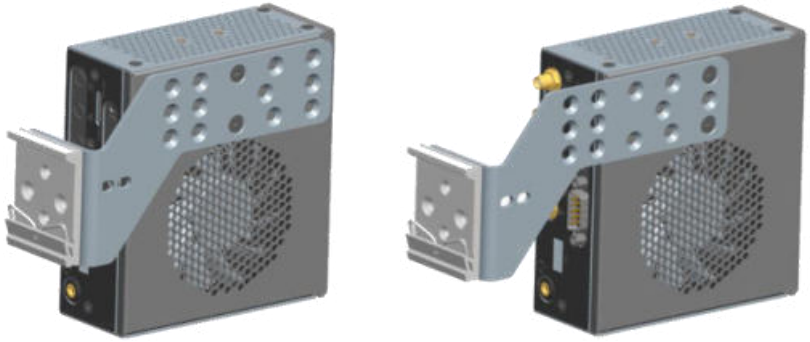

Fig. 9: Universal holder for mounting

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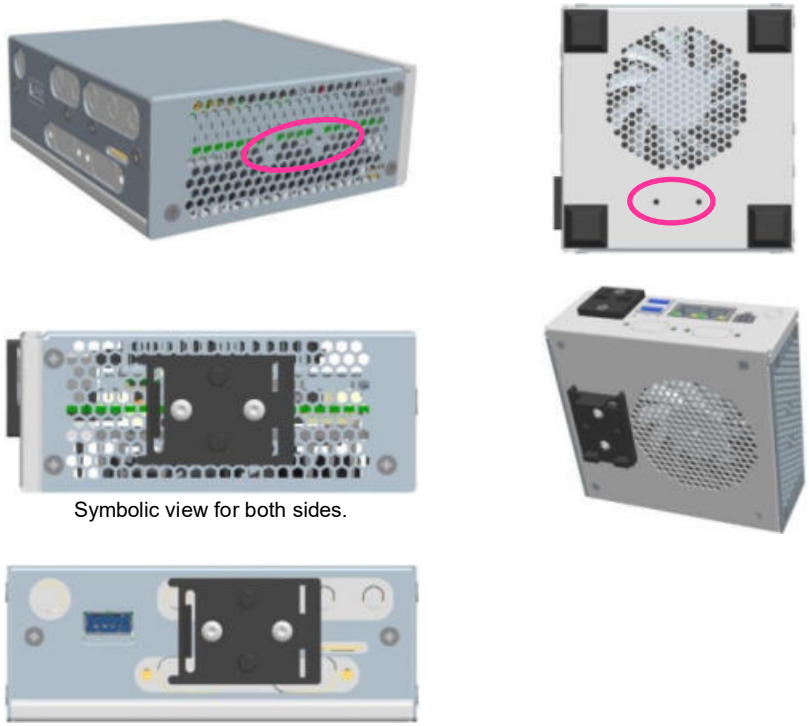
1.8.4 DIN Rail Mounting (optional)

The EM BoxPC is also designed for DIN rail mounting. There are drilled holes for mounting the optional DIN rail holder in various positions (*Fig. 10*).



Symbolic view for both sides.

Fig. 10: DIN rail holder positions

Please follow the instructions below:

- Mount the top-hat rail holder with two screws M3x6mm as shown in *Fig. 11* and *Fig. 12*. The top-hat rail holder is suitable for “TS35” DIN rails.
- Place the EM Box PC on the DIN rail. Swivel it inwards until it snaps securely into place.
- To detach the system, push it from bottom to top. Swivel it outwards and remove it.

Fig. 11: DIN rail holder mounting

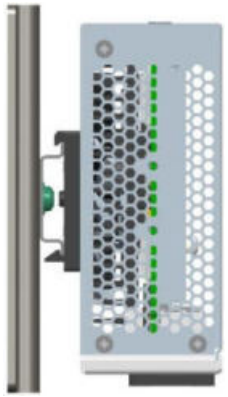


Fig. 12: Side view DIN rail mounted system

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2 Technical Data

- AMD 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
- Memory: max. 2x 32 GB dual-channel up to DDR4-3200 SO-DIMM memory with ECC support
- Ethernet: 2x Intel® i225-LM with 2.5 Gbit/s with IEEE1588, TSN-support, ETH1 supports Wake-on-LAN
- LTE/4G (ODM option): 300 Mbps max. / EMEA, APAC / Diversity / GNSS
- WiFi/BT (ODM option): 802.11 AC with diversity / Bluetooth version 5
- SSD (optional): M.2 SATA or NVMe / 64 GB – 2 TB
- SD card: µSD XC card slot, supports A1 Application Performance Class, UHS-Class 1
- USB ports:
  2x USB 3.2 Gen2 (10Gb/s, OCP = 1500 mA each) at front side
  1x USB 3.2 Gen2 (10 Gb/s, OCP = 1500 mA) at rear side
- Serial ports (optional):
  1x RS-232 on D-Sub DE-9
  1x RS-232/485 (FDX/HDX) on D-Sub DE-9
- 2x Mini-DP++, v1.4, up to 3840 x 2160 @ 60 Hz
- Sound (optional): 3.5 mm MIC in / HP out on 3.5 mm Audio Jack
- Cooling: CPU fan (5V DC, max. 250 mA, not fused), optional auxiliary fan (5V DC, max. 250 mA, not fused)
- Controlled FAN (PWM + Tacho), temperature sensor, power supply voltage monitoring and watchdog
- Power and status LED
- Power supply: Min. 8.0 V / Max. 32.0 V (DC) / max. 7.5 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:
  4-pin power connector with ignition input.
  Molex 43045 series or compatible 3.00 mm Micro MF housing 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
- AMD® firmware Trusted Platform Module
  TPM 2.0 support (Infineon SLB 9670) (R2312 variants OEM only)
- Operating temperature: 0 °C to +50 °C ambient commercial grade
  Adequate cooling provided, depending on variant and cooling system, CPU throttling may occur at higher ambient temperatures
- Storage temperature: -40 °C to +85 °C, non-condensing
- Relative humidity: 95 % @ 40 °C, non-condensing while stored, 89% while working
- Housing: sturdy metal case
- Mounting: stand alone, optional VESA, optional hat rail
- Dimensions approx.: 117 x 51 x 115 mm
- Weight approx.: 700g + options

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3 Interfaces

3.1 Connection Overview

The EM BOX® PC is equipped with the following standard interfaces:

1 – 2x Mini-DP++ connector
2 – Dual-USB 3.2 Gen2 port, type A
3 – 2x Ethernet 10/100/1000/2500 Mbit/s (RJ45), port 1 supports WoL
4 – Power supply
5 – Auxiliary power button (accessible with a paperclip)
5a – Power button (optional)
6 – Up to 2x Serial port RS-232 (optional)
7 – Sound 3.5 mm MIC in / headphone out (optional)
8 – USB 3.2 Gen2 port, type A
9 – MicroSD card slot
10 – Up to 5x SMA connector (optional)
11 – Internal microSIM card slot

The following illustrations show all interfaces available in EM BOX PC. Depending on the variant and its configuration, the number of interfaces might be different.

Front View

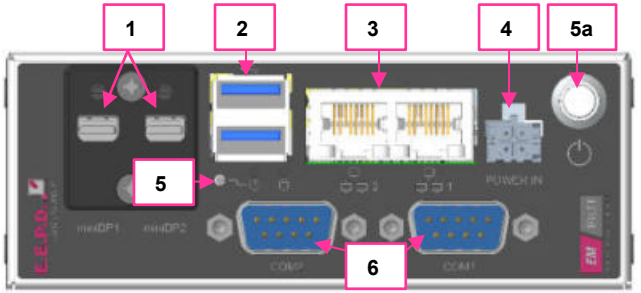

Fig. 13: EM BOX® PC NUCD front view

Rear View

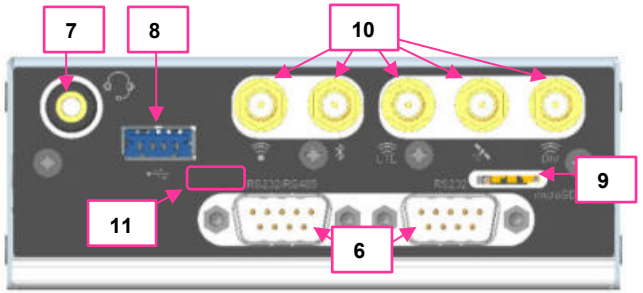

Fig. 14: EM BOX® PC NUCD rear view

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3.2 Mini Display Ports

Standard pin assignment

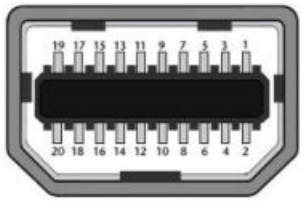

Fig. 15: Mini DisplayPort schematic

CAUTION

Important Note:

There are two types of DisplayPort cables available:

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 doesn't work properly (e. g. black display).

3.3 USB 3.2 Gen2 Ports

Standard pin assignment

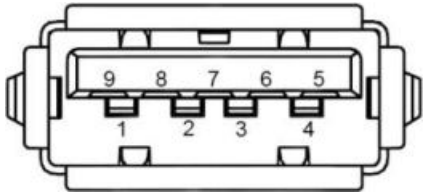

Fig. 16: USB 3.2 schematic

3.4 2.5 Gigabit Ethernet Dual-Port

Standard pin assignment

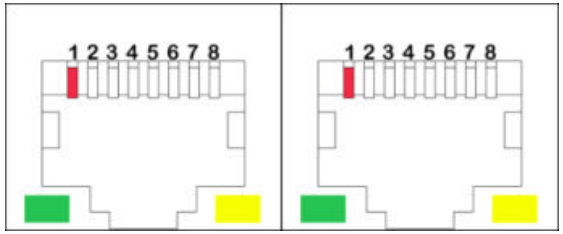

Fig. 17: Dual-Ethernet schematic

Yellow LED
Speed-LED is on during 1 or 2.5 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.

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3.5 Power Connector (DC)

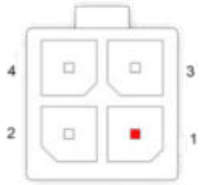

Fig. 18: Power connector schematic

Counterpart - plug:

Molex 43045 series or compatible
3.00 mm micro MF connector with lock, max. 8.5 A

Pin	Signal	Description
1	GND_IN, max. 7.5 A	Ground
2	GND_IN, max. 7.5 A	Ground
3	PVIN, max. 7.5 A	DC+ (min. 8 V to max. 32 V)
4	KL_15*, max. 7.5 A	Ignition

Tab. 3: Pin assignment power connector

*KL_15 is ignition enable pin required for automotive applications.
KL_15 is default off in BIOS setup → *NUCD Options*
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 can be set 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 EM BOX PC is shut down by the onboard microcontroller.

3.6 Power Button (optional)

Press the power button (*Fig. 19*) once to switch the computer on and off.
Press and hold the power button (>4 sec.) to hard power off the system.
Hard power off may result in data loss.

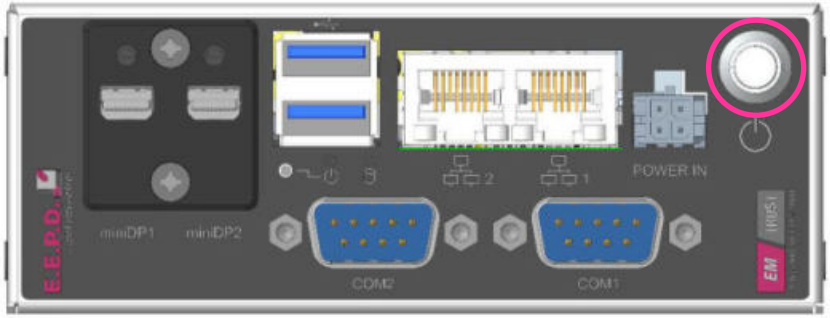

Fig. 19: Power button

3.7 Auxiliary Power Button | Power and HDD/SSD LED

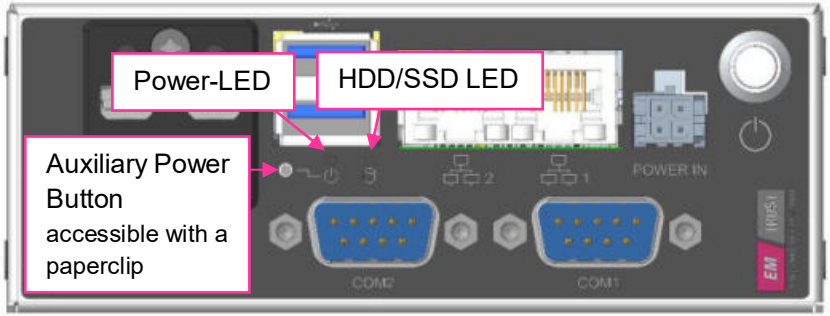

Fig. 20: Auxiliary power button | power and HDD/SSD-LED

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3.8 RS232 (optional)

This option must be enabled in the BIOS → *UART Configuration Options*
The 9-pin standard D-Sub connector (*Fig. 21*) is connected to four wires.

9-pin D-Sub	Signal
2	RXD1_X
3	TXD1_X
5	GND
7	RTS1_X_m
8	CTS1_X_m

Tab. 4: Pin assignment RS232

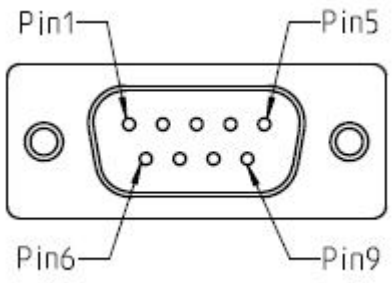

Fig. 21: 9-pin D-SUB connector

3.9 RS232 / RS485 (optional)

This option must be enabled in the BIOS → *UART Configuration Options*
The serial RS232/RS485 interface is provided by a multiprotocol transceiver. The RS485 mode is available as a full duplex configuration only. The RS232 mode is connected to four wires. The connector is a standard 9-pin D-Sub connector (*Fig. 21*).

9-pin D-Sub	Signal RS-232	Signal RS-485|FDX only
1	-	RS485_TX_N
2	RXD0_X	RS485_TX_P
3	TXD0_X	RS485_RX_P
4	-	RS485_RX_N
5	GND	GND
7	RTS0_X_m	-
8	CTS0_X_m	-

Tab. 5: Pin assignment RS232/RS485

3.10 MicroSD Slot

Standard pin assignment

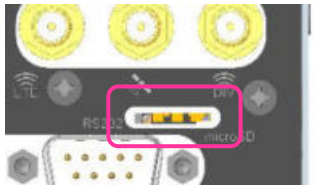

Fig. 22: MicroSD slot

To lock the card, slide it completely into the slot until you hear a click. To remove it, first push the card inwards.

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4 Opening the System

1. Turn off the system and disconnect from the electrical outlet.
2. Remove the 8 screws (M3X4) (4 screws each side, see *Fig. 23* / *Fig. 24*).
3. Lift the cover away from the system (*Fig. 25*).
4. The assembly is carried out in reverse order.

CAUTION

Do not remove any screws other than those specified, otherwise the warranty will be void and you may damage the system.

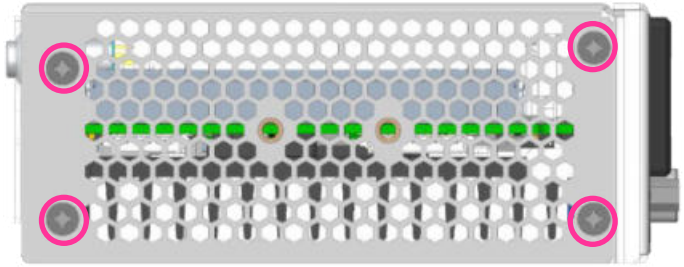

Fig. 23: Screws on the left side

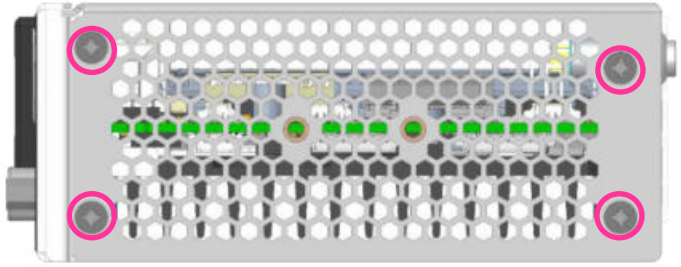

Fig. 24: Screws on the right side

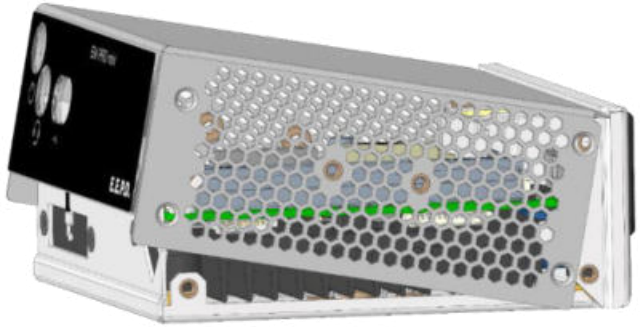

Fig. 25: Cover lifting

4.1 Installing MicroSIM Card

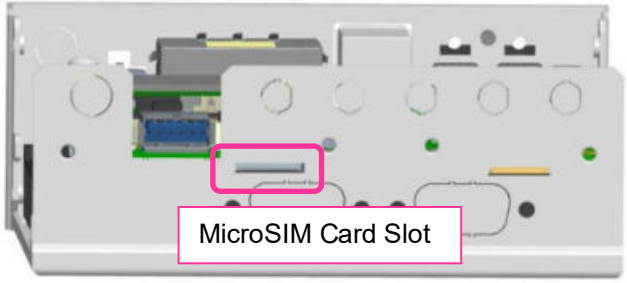

Fig. 26: Open housing | MicroSIM card slot

To lock the card, fully insert it into the slot (*Fig. 26*). Make sure the golden contacts are facing downwards.
To remove the card, first push it inwards.

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

4.2 Installing M.2 Modules/SSD

Insert the module into the corresponding slot (*Fig. 28*) at an angle. Press it down on the side that protrudes and secure it with the screw provided.

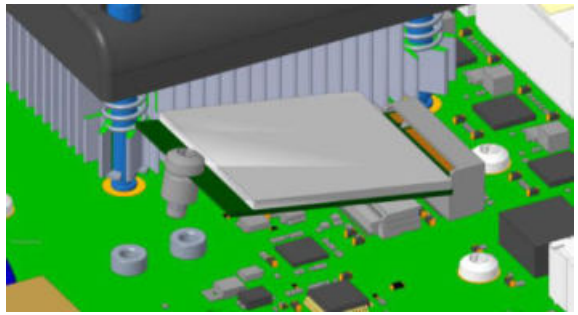

Fig. 27: M.2 module assembly

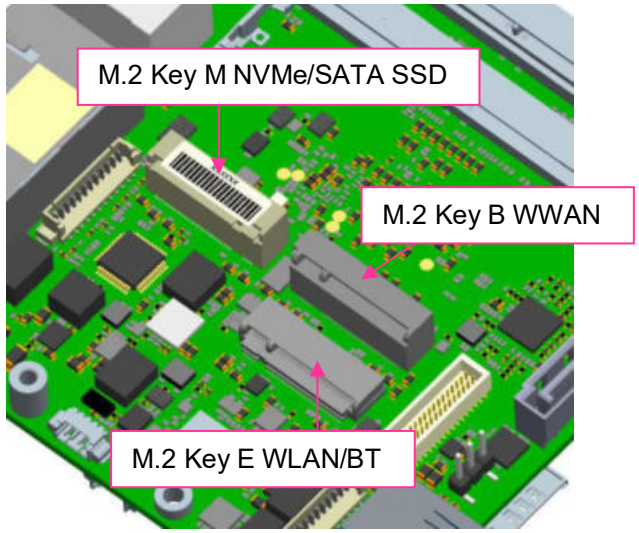

Fig. 28: M.2 module position

4.3 Installing RAM Modules

To install the memory modules, the battery holder must be loosened by the marked screw:

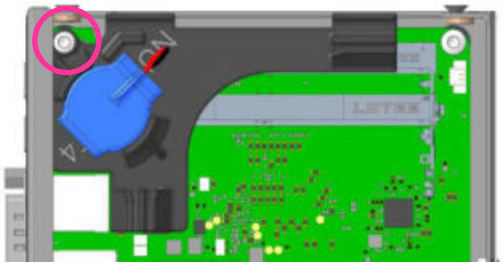

Fig. 29: Installing SO-DIMM modules

Use only 1.2 V DDR 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.

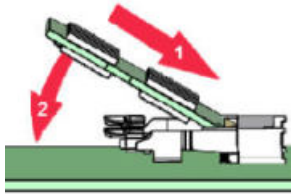

Fig. 30: RAM assembly

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5 Start-up Guide

If connections are no longer accessible after system installation, connect all cables before final mounting. If necessary, also insert the microSD card and the microSIM card in advance.

Only connect the power cable when the power supply is switched off.

Only insert the microSIM card when the system is switched off.
Only remove the MicroSIM card when the system is switched off.

Before commissioning, we recommend connecting or inserting:

- Monitor
- USB keyboard and mouse
- Network cable (optional)
- MicroSD card and microSIM card (optional)
- DC power supply

Other plug & play devices can be connected after commissioning.

5.1 Switching on the device / Operation

After all preparations have been made, the BOX PC system is ready to be connected to the power supply.
Press the power button to switch on the PC. When the system is powered, the Power LED on the optional power button will be on. When the system boots, the Status LED on the housing lights up to indicate that all internal voltages are at normal levels.
If an operating system is installed, it will start now. An operating system installation can be performed with installation media such as USB stick, USB DVD drive or PXE remote network start. The BIOS boot order has to be adjusted accordingly. To enter the BIOS setup, press the [ESC] key immediately after switching on.
Please refer to the operating system manual for switching off / shutting down.

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6 BIOS

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

Asterisk (*) indicates default setting.

6.1 Entering Setup

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

6.2 Most Common Settings

1. Firmware / BIOS Version:
   Setup Utility → *Main Menu*
   or Setup Utility → AMD PBS → *AMD Firmware Version*

2. Boot / PXE Boot:
   Boot Manager
   or Setup Utility → *Boot Menu*

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

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

   Boost mode:
   Setup Utility → AMD CBS → *Zen Common Options* → Core Performance Boost

4. Change shared graphics memory
   Setup Utility → AMD CBS → NBIO Common Options → *GFX Configuration* → UMA Frame Buffer Size

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

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6.3 Main Menu

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

Fig. 31: 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. 6: Main Menu

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6.4 Advanced Menu

Fig. 32: 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, Power LED Mode, KL 15 support, USB Power Off in S5

Tab. 7: Advanced Menu

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6.4.1 Boot Configuration

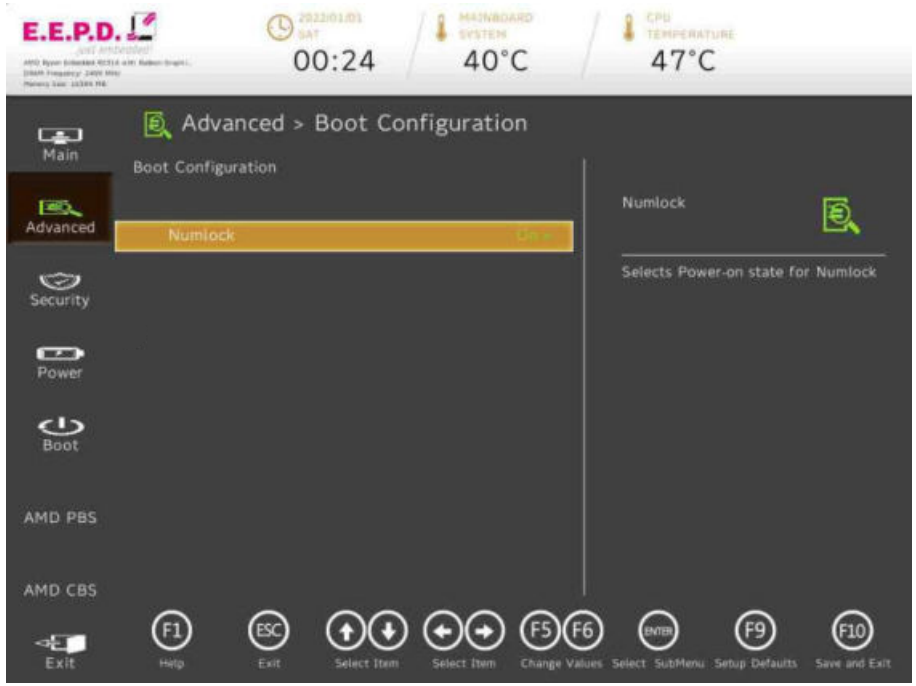

Fig. 33: Boot Configuration

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

Tab. 8: Boot Configuration

6.4.2 Peripheral Configuration

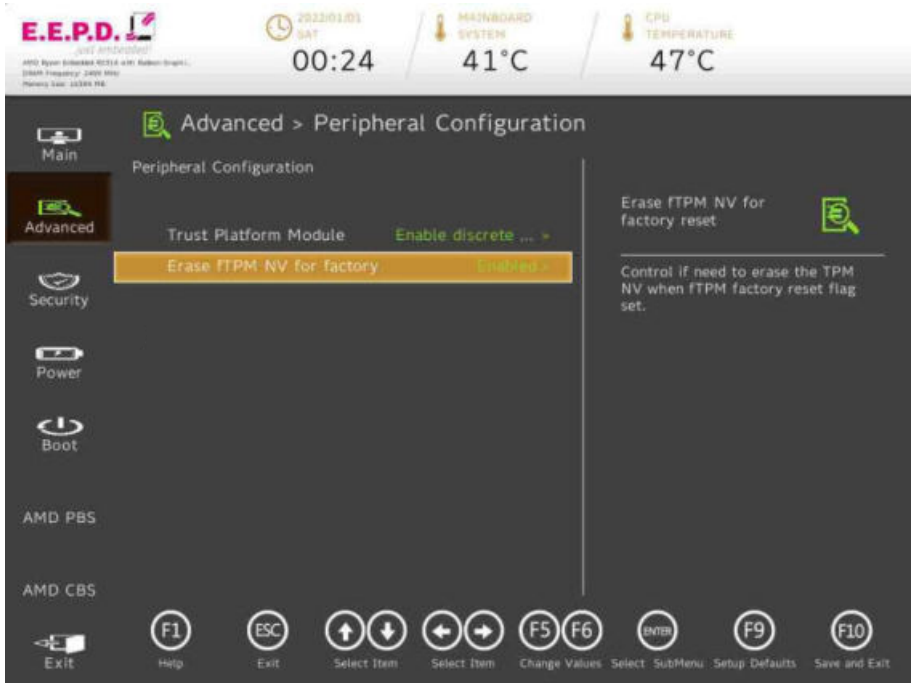

Fig. 34: Peripheral Configuration

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. 9: Peripheral Configuration

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6.4.3 IDE Configuration

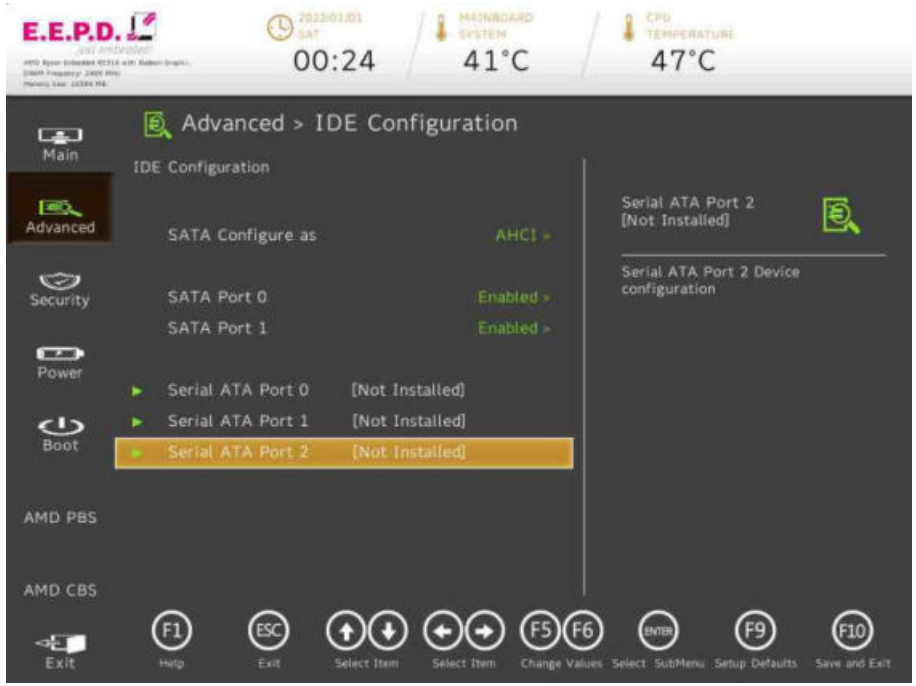

Fig. 35: IDE Configuration

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. 10: IDE Configuration

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6.4.4 NVMe Configurations

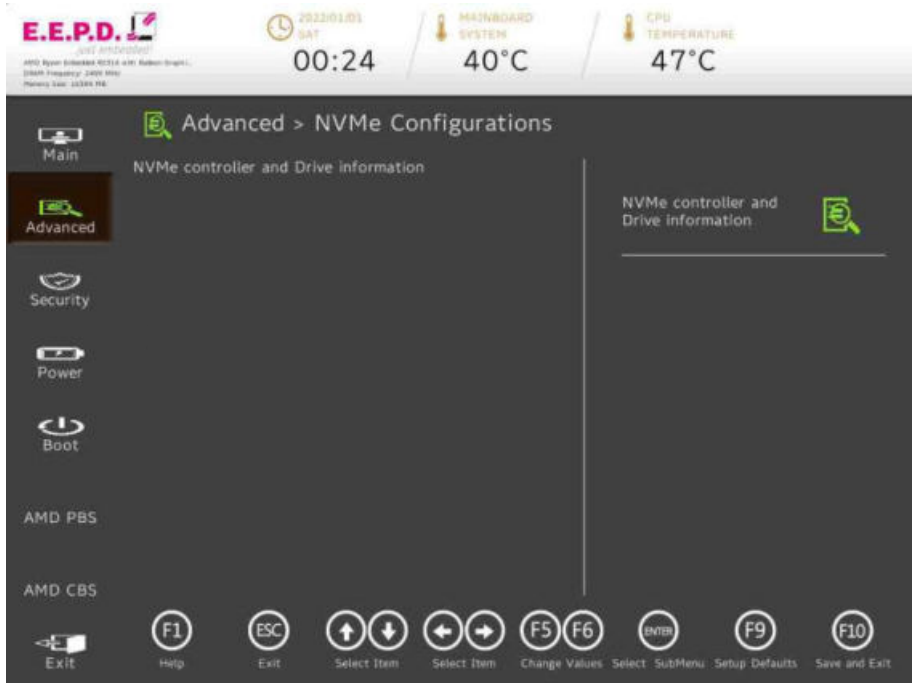

Fig. 36: NVMe Configuration

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

6.4.5 USB Configuration

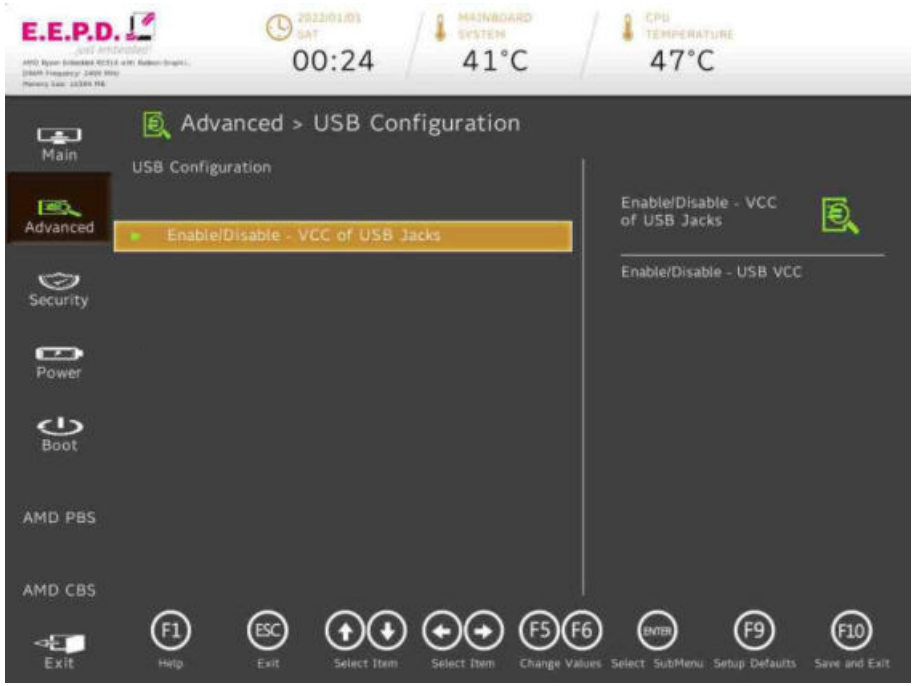

Fig. 37: USB Configuration

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

Tab. 11: USB Configuration

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6.4.5.1 Enable/Disable – VCC of USB Jacks

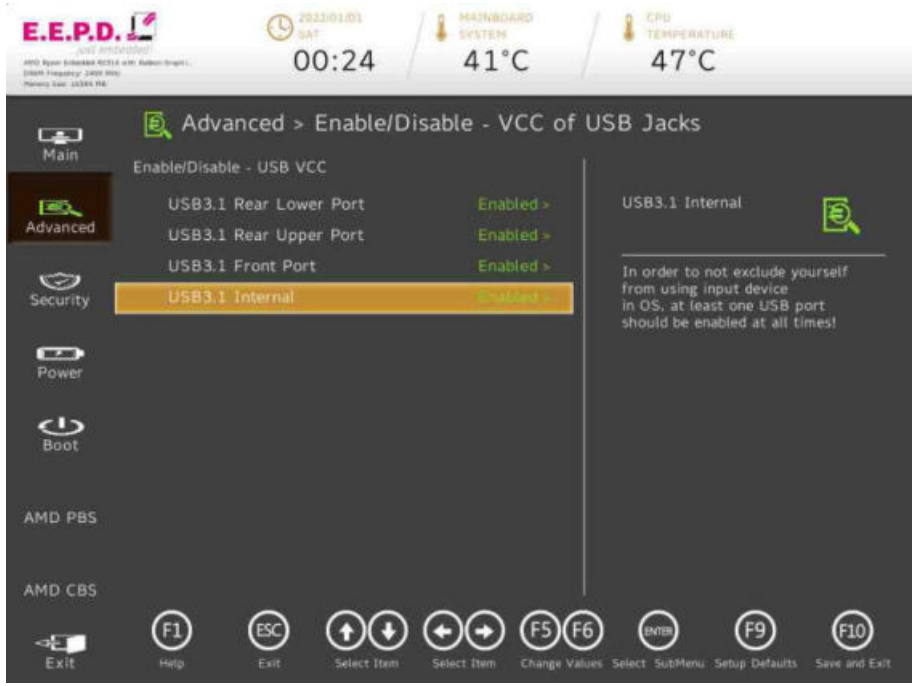

Fig. 38: Enable/Disable – VCC of USB Jacks

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. 12: 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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6.4.6 ACPI Table/Features Control

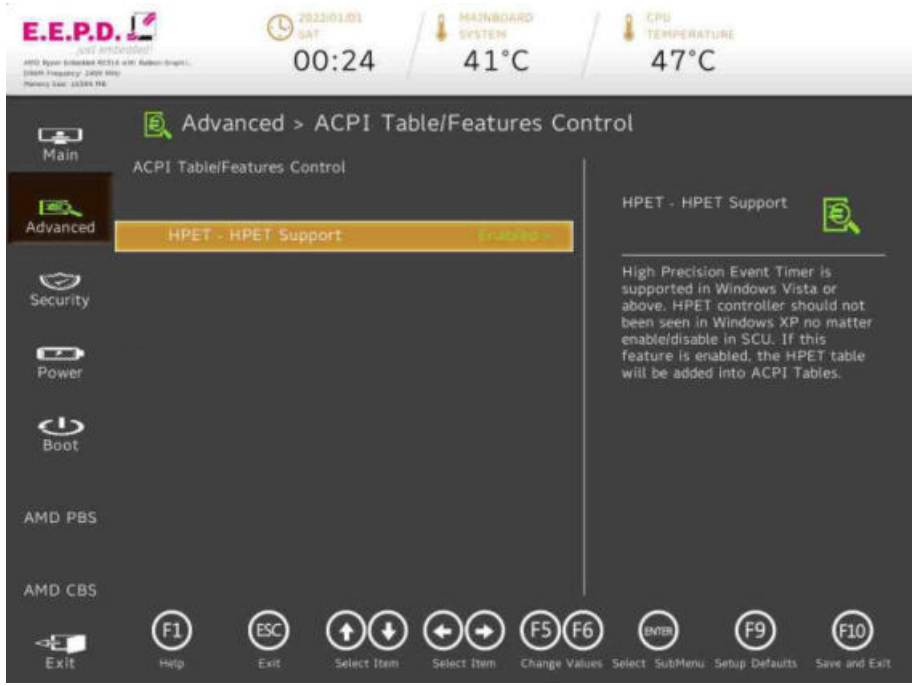

Fig. 39: ACPI Table/Features Control

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. 13: ACPI Table/Features Control

6.4.7 CPU Related Setting

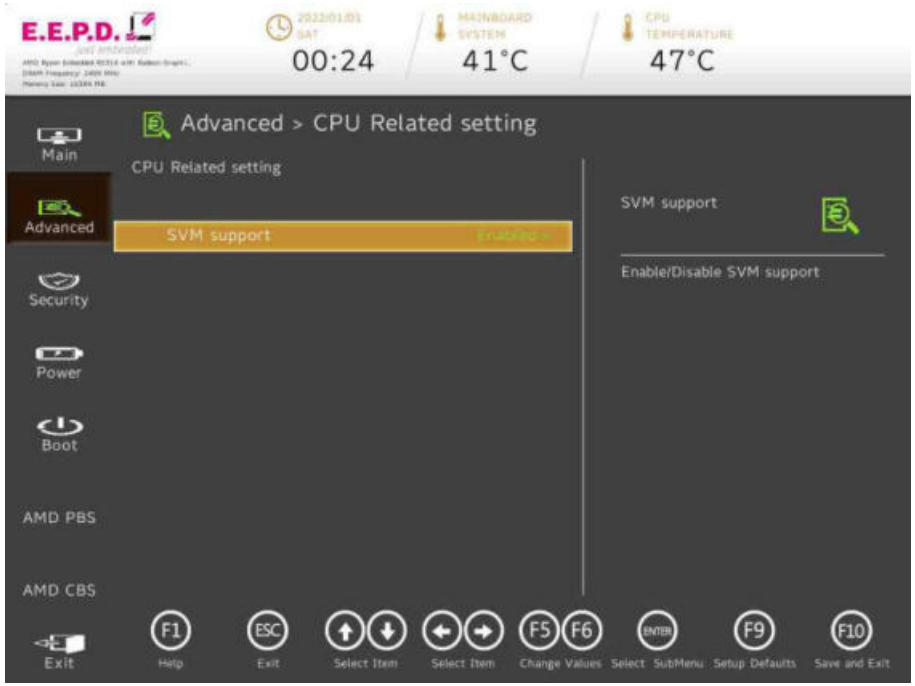

Fig. 40: CPU Related Setting

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. 14: CPU Related Setting

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6.4.8 NUCD Options

Fig. 41: 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
Power LED-Mode	<Disabled> <Enabled>*	Set Power LED Mode (Enable/Disable)
KL 15 support (see chapter **3.5**)	<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. 15: NUCD Options

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6.5 Security Menu

Fig. 42: 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. 16: Security Menu

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6.5.1 Storage Password Setup Page

Fig. 43: 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. 17: Storage Password Setup Page

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6.6 Power Menu

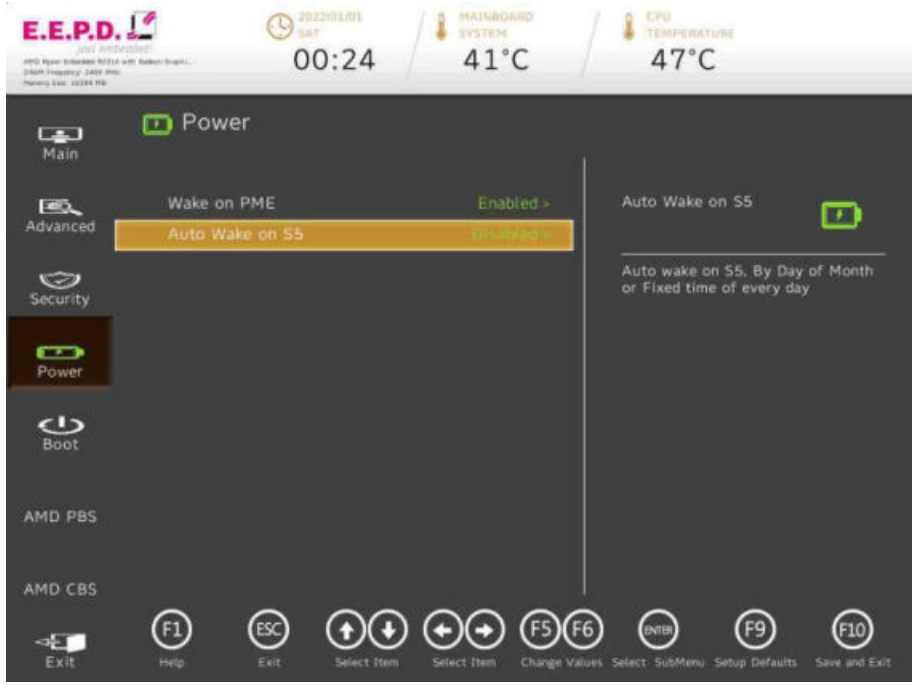

Fig. 44: Power Menu

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. 18: Power Menu

6.7 Boot Menu

Fig. 45: 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. 19: Boot Menu

6.7.1 EFI

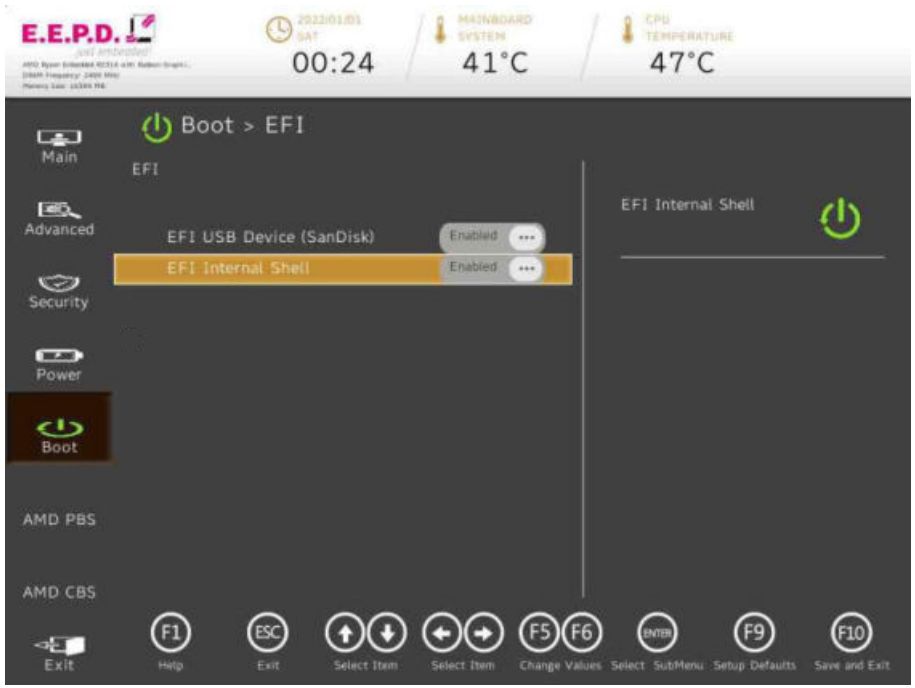

Fig. 46: EFI

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

Tab. 20: EFI

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6.8 AMD PBS Option

Fig. 47: 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. 21: AMD PBS Option

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6.8.1 AMD Firmware Version

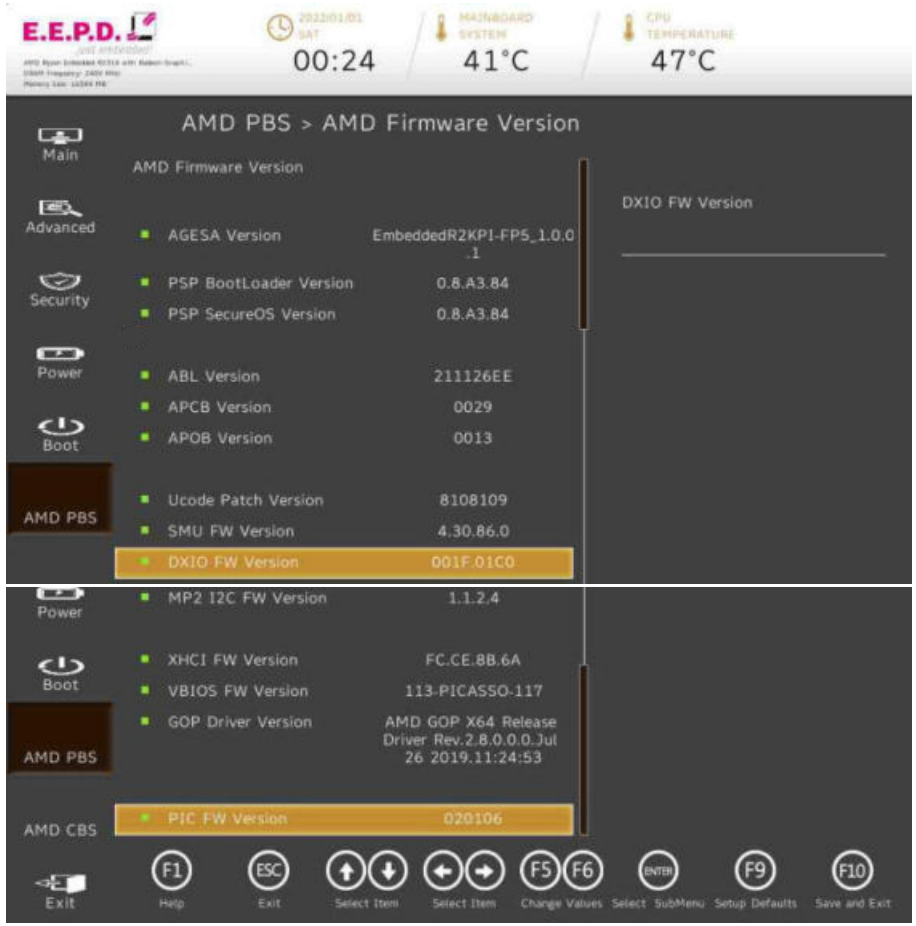

Fig. 48: AMD Firmware Version

6.9 AMD CBS Option

Fig. 49: 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. 22: AMD CBS Option

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6.9.1 Zen Common Options

Fig. 50: Zen Common Options

BIOS Settings	Options	Description
Core Performance Boost	<Disabled>* <Auto>	This allows the processor to dynamically adjust and control the processor operating frequency to enable performance improvement.
CPU Thermal Throttling Control	<Disabled>* <Enabled>	CPU Thermal Throttling Enable/Disable

Tab. 23: Zen Common Options

6.9.2 NBIO Common Options

Fig. 51: 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. 24: NBIO Common Options

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6.9.2.1 GFX Configuration

Fig. 52: 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. 25: GFX Configuration

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6.9.2.1.1 CPU and Auxiliary Fan Control

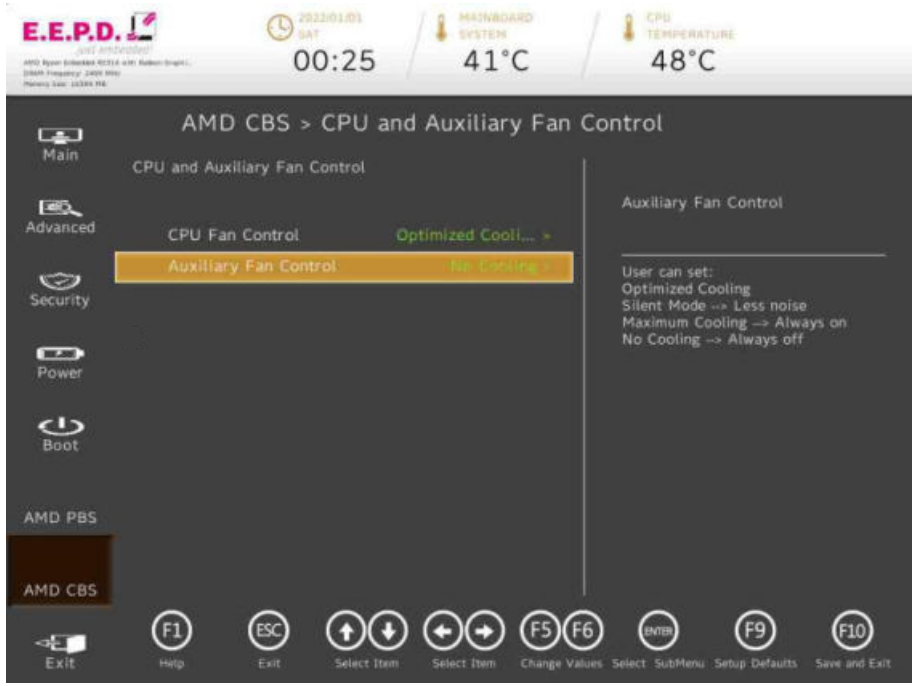

Fig. 53: CPU and Auxiliary Fan Control

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. 26: CPU and Auxiliary Fan Control

6.9.3 FCH Common Options

Fig. 54: 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. 27: FCH Common Options

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6.9.3.1 Ac Power Loss Options

Fig. 55: 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. 28: Ac Power Loss Options

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6.9.3.2 UART Configuration Options

Fig. 56: 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. 29: UART Configuration Options

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6.10 Exit Menu

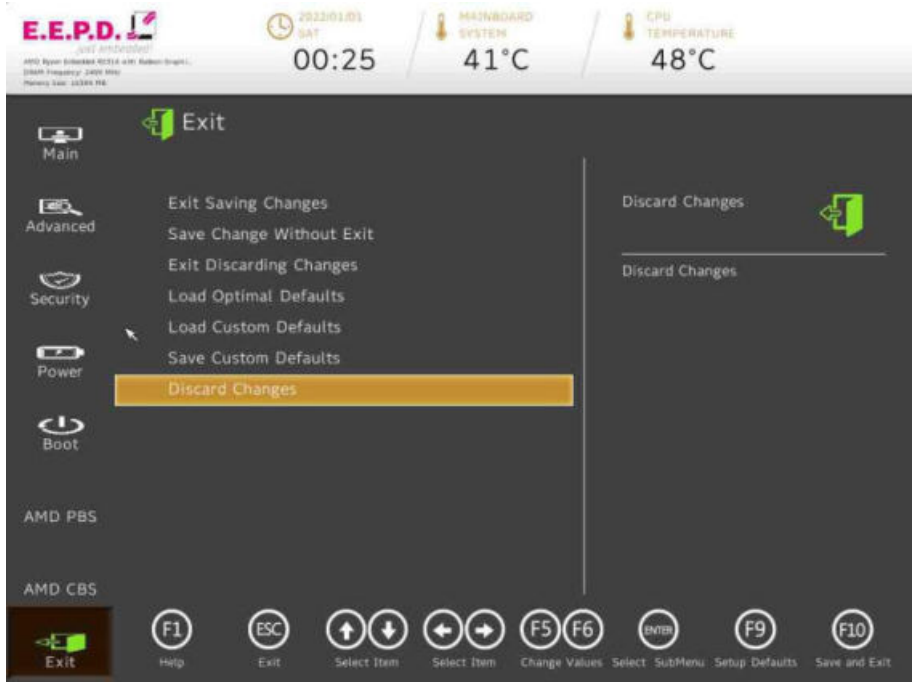

Fig. 57: Exit Menu

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. 30: Exit Menu

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List of Abbreviations

AC	Alternating current
APAC	Asia Pacific and countries
BIOS	Basic input/output system
BT	Bluetooth
DC	Direct current
DDR4	Fourth generation „double data rate“ memory technology
DP	Display port
EMEA	Europe, Middle East, Africa
GND	Ground
GNSS	Global Navigation Satellite System
IoT	Internet of Things
LTE	Long Term Evolution
MIC	Microphone
M.2	Next generation mSATA
NVME	Non-Volatile Memory Express
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
SMA	Subminiature version A connector
SODIMM	Small outline dual inline memory module
SSD	Solid state drive
UART	Universal Asynchronous Receiver / Transmitter
USB	Universal serial bus
WLAN	Wireless local area network

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