EM TOUGHBOX® TBM2 – Device Reference Manual

Please note that some systems may differ from the picture shown above

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

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Product Returns

If you return the EM system 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 EM system 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.

Technical Support

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

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Revision History

Date	Version	Changes	Proofed
28.01.2025	3.0	First release for HW Rev.3/4	
23.04.2025	3.1	Manual for TBM2 with Insyde BIOS variants	
16.10.2025	3.2	Additional technical drawings	

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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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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 EM TOUGHBOX during installation.

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

Device Safety

The EM TOUGHBOX 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.

The device may only be opened by a qualified person.

Cooling System

The EM TOUGHBOX 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 Quick-Start Guide

If connections are no longer accessible after system installation, connect all cables before final mounting.

Before switching on for the first time, we recommend connecting or inserting:

- Monitor + power cable
- USB keyboard and mouse
- Network cable (optional)

Other plug & play devices can be connected after power-up.

If you don't use a monitor or keyboard, you can access the console via a service interface (Mini USB-B, see chapter *4.6*).

1.1 Switching on the Device / Operation

After all preparations have been made, the system is ready to be connected to the power supply.
Press the power button (*Fig. 23*) to switch on the system. When the system is powered, the Power-LED will be on.
If an operating system is installed, it will load now. An operating system installation can be performed with all common 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.

2 System Information

2.1 Intended Use

The TBM2 is a robust and modular PC system for harsh environments.
The aluminum housing protects against mechanical shocks and is optimal for heat dissipation.
The TBM2 is free of rotating parts and therefore non-sensitive to shock and vibration.
The system is expandable by various USB-I/O-modules that enable a wide range of interfaces and applications.
The range of applications is almost unlimited. The TBM2 is well prepared for future expansions and developments by the standard USB-Bus-expansions.

2.2 Required Tools

For the installation of the EM TOUGHBOX the following standard tool is recommended:

- Torx screwdriver T10

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

2.3 Software

Supported operating systems are:

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

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2.4 Options

For ordering information on optional product features, please contact our sales department.

Options	Description
Memory Modules[1]	2x 32 GB dual channel up to DDR4-2400 (R2312) / DDR4-2667 (R2314, R2514) / DDR4-3200 (R2544) SO-DIMM memory with ECC support
SSD[1]	64 GB – 2 TB
4G/modem module kit[1,2]	M.2 4G/LTE card with SMA connector
BT module kit[1,2]	M.2 BT card with SMA connector
Operating System[1]	Windows® 11, Windows® 11 IoT Enterprise, Linux Ubuntu 24.04 LTS
[1]factory-assembled on request [2]ODM option	

Tab. 1: Options

2.5 Accessories

Please contact our sales department for ordering information of accessories.

Accessories	Ordering number/Description	
Mounting kits	20013	DIN rail mounting
	KIUNIHO1	universal mounting
Interface module holder kit	KITBMMH1	for USB-I/O modules
Interface modules*	MGPI	GPIO Adapter
	MREL	Relay USB module
	MADC	Analogue to digital converter
	M232/M485	RS-232/RS-485 Adapter
	METH	Gbit Ethernet Adapter
	MCAN	CAN Adapter
	MMC	Mini PCIe Adapter
Display cable	Cable DP to DP, 2 m Cable DP to HDMI, 2 m	
USB-C adapter cable	USB-C to USB-A adapter cable for HDI-devices	
External Fan	KITBEXFAN1 for additional cooling	

Tab. 2: Accessories

*For further information about the interface modules, please visit our website **USB I/O modules for industrial use** or contact our sales department.

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2.6 Scope of Delivery

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

2.6.1 Type Label

Fig. 1: Type label (example)

1 – Manufacturer

2 – Product name

3 – Voltage input range and DC/AC type

4 – Serial number with barcode

5 – Certification information

2.7 System Dimensions

Front view

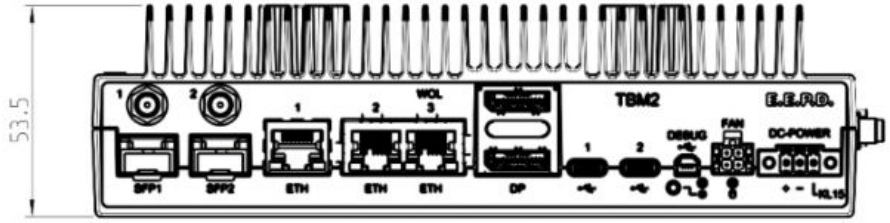

Fig. 2: Dimensions front view, approx. values [mm]

Top view

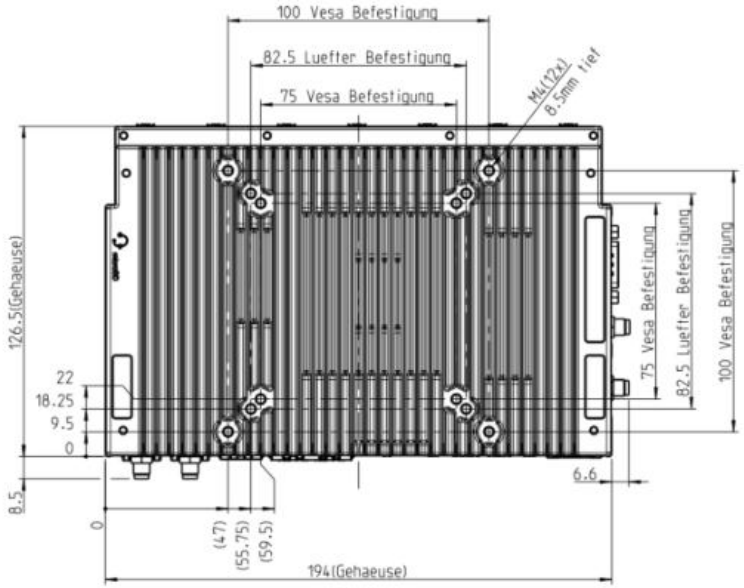

Fig. 3: Dimensions top view, approx. values [mm]

Bottom view

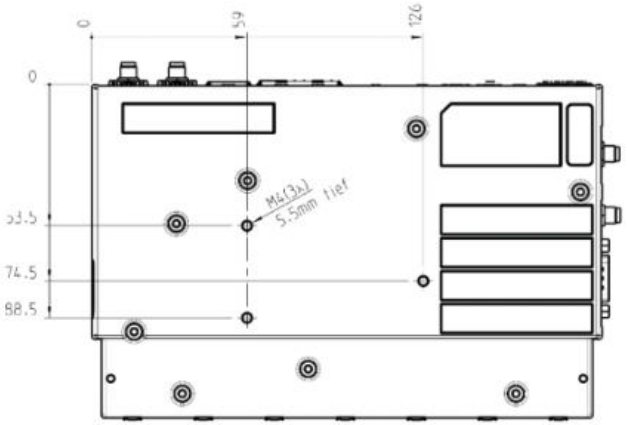

Fig. 4: Dimensions bottom view, approx. values [mm]

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2.8 Additional Interfaces | Module Holder (optional)

E.E.P.D. offers up to seven optional USB expansion modules to further expand the functionality (see chapter *2.5*).

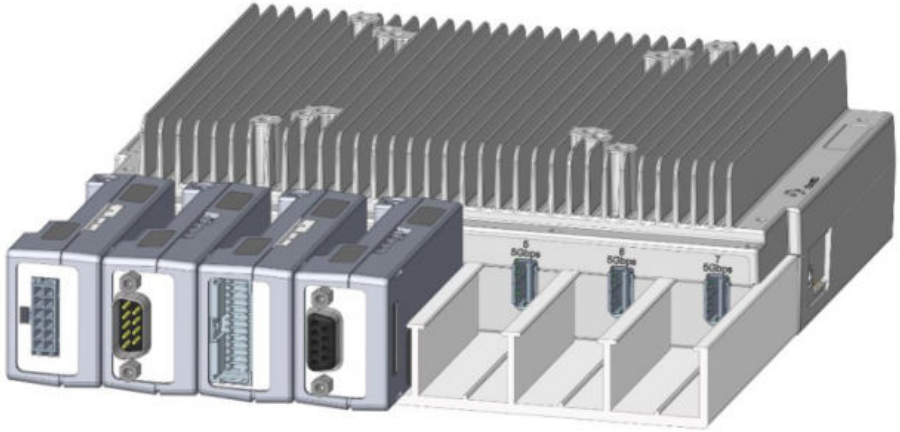

Fig. 5: TBM2 with module holder

Parts contained in the kit Ordering number KITBMMH1:

- 1x module holder
- 1x fixing strip
- 2x M3X8 countersunk screw
- 4x M3X6 pan head screw

Screw the module holder to the TBM2 system with the two countersunk M3X8 screws (*Fig. 6*).
Screw the fixing strip to the TBM2 system with the four M3X6 pan head screws (*Fig. 7*).
Max. tightening torque 1.0 Nm (metric class 8.8).

Fig. 6: Screw the module holder to the TBM2

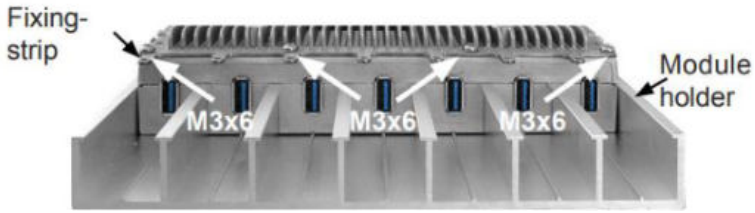

Fig. 7: Screw the fixing strip to the TBM2

To mount an E.E.P.D. USB-I/O-module slide it along the guiding ridge and plug it into the USB connector. With the supplied screw it is interlocked with the fixing strip.

Fig. 8: Mounting USB-I/O-modules

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2.9 DIN Rail Mounting (optional)

The TBM2 is designed for DIN rail mounting.

Please follow the instructions below:

- Mount the DIN rail holder with the two provided M4X8 countersunk screws at the intended fastening points, max. tightening torque is 1.1 Nm. The DIN rail holder is suitable for “TS35” DIN rails.
- Place the system 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.

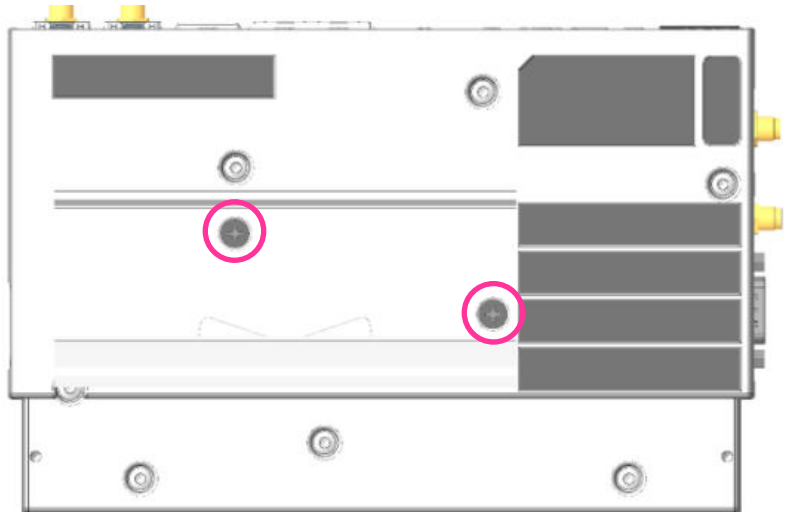

Fig. 9: DIN rail mounting

2.10 VESA Mounting (optional)

The TBM2 is also designed for VESA mounting.
Please consult the VESA mount manual. Max. tightening torque for M3X5 screws (metric class 8.8) is 1 Nm.

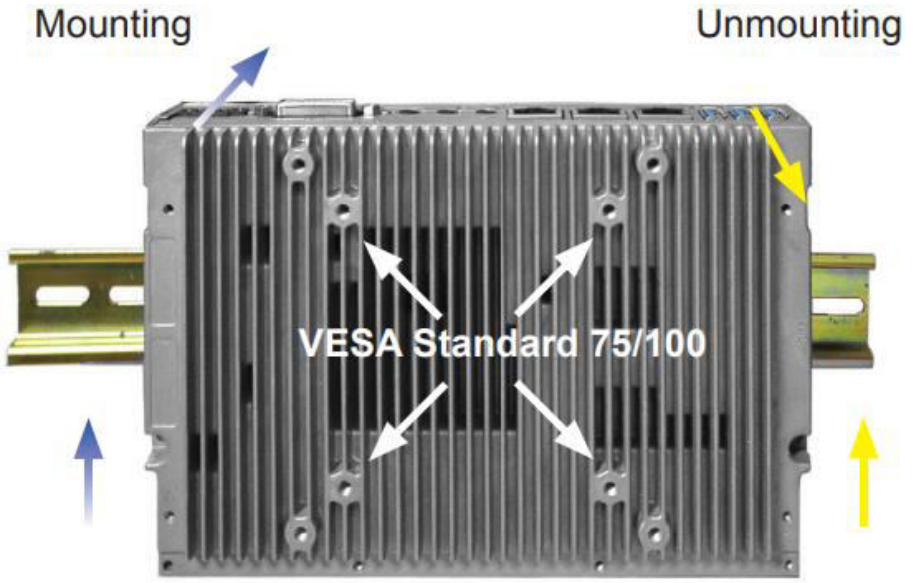

Fig. 10: VESA mounting

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3 Technical Data

- AMD Ryzen™ Embedded R2000 processor series:
  R2312 / 2C / 4T / 2.7 GHz – 3.5 GHz / 15 W (12 – 25 W)
  R2314 / 4C / 4T / 2.1 GHz - 3.5 GHz / 15 W (12 - 35 W)
  R2514 / 4C / 8T / 2.1 GHz - 3.7 GHz / 15 W (12 - 35 W)
  R2544 / 4C / 8T / 3.35 GHz – 3.7 GHz / 35 W
- Memory: SO-DIMM memory with ECC support
  R2312: up to 2x 32 GB dual channel up to DDR4-2400
  R2314, R2514: up to 2x 32 GB dual channel up to DDR4-2667
  R2544: up to 2x 32 GB dual channel up to DDR4-3200
- Ethernet ports:
  Up to 3 Intel® i225-LM with 2.5 Gbit/s with IEEE1588, TSN support, support for Wake-on-LAN on port 3 only
- Serial port: up to 1x RS-232 on D-Sub DE-9
- LTE/4G (OEM/ODM option only):
  300 Mbps max. / EMEA, APAC / Diversity / GNSS
- SSD (optional):
  1x Key M, 2280, PCIe Gen3 x4 NVMe
  Up to 1x Key M, 2280, PCIe Gen3 x2 NVMe
  64 GB – 2 TB each slot
- SD card:
  1x µSD XC card slot, supports A1 Application Performance Class, UHS-Class 1
- Audio (optional):
  HDA codec with MIC in / headphone out at a 3.5 mm audio jack
- Service interface (console):
  1x Mini USB-B (4-pin), UART-to-USB
- Power connector: Phoenix COMBICON MC 1,5/3-ST-3.81
- Power supply: min. 10.8 V / max. 26.4 V (DC) / max. 8 A,
  KL15 (ignition), fused to 10 A

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 Limit:

  Internal and external 3.3 V power max. 20 W
  Internal and external 5 V power max. 30 W (+20 W w/ 4x USB 3.2 Gen1 ports)
  Internal and external power is related to m.2 connectors, USB and display
- USB ports:
  Up to 2x USB-C 3.2 Gen2 (10Gb/s, OCP = 3 A) or USB-C Alt Mode (limited support) at front side
  2x USB 3.2 Gen2 (10Gb/s, OCP = 900 mA each) type A at rear side
  Up to 4x USB 3.2 Gen1 (5 Gb/s, OCP = 900 mA each) type A at rear side
  1x USB 2.0 (480 Mb/s, OCP = 900 mA) at rear side
- Display output:
  2x DisplayPort++, v1.4, up to 3840 x 2160 @ 60 Hz
  Up to 2x USB-C Alt Mode, up to 3840 x 2160 @ 60 Hz (only as secondary monitor)
- Cooling (optional):
  External fan, 12 V or 4-pin Molex connector, max. 250 mA, not fused; Nexus series 2300-PT 3.00 mm Micro MF Power
- Controlled FAN (PWM + Tacho), temperature sensor, power supply voltage monitoring, watchdog

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- Power and status LEDs
- AMD firmware Trusted Platform Module, TPM 2.0 support (Infineon SLB 9670) (R2312 OEM only)
- OS support:
  Microsoft® Windows® 11
  Microsoft® Windows® 11 IoT Enterprise
  Microsoft® Windows® 10
  Microsoft® Windows® 10 IoT Enterprise
  Linux Ubuntu 24.04 LTS
- Operating temperature:
  Min. 0 °C to max. +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: robust aluminum housing
- Mounting: stand alone, optional VESA, optional hat rail
- Dimensions approx.: 195 x 129 x 54 mm
- Weight: approx. 1370 g + options

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4 Interfaces

4.1 Connection Overview

The EM TOUGHBOX is equipped with the following standard interfaces:

1 – Up to 2x SMA connectors for WWAN, WiFi antennas (optional)
2 – Up to 3x Ethernet, port 3 supports WoL
3 – 2x DP++ connector
4 – 2x USB-C port
5 – 1x Mini USB-B (4-pin) service interface (console), UART-to-USB
6 – External fan connector
7 – DC power in
8 – Power button
9 – Power-LED
10 – HDD/SSD-LED
11 – Up to 7x USB Type A ports
12 – 1x RS-232 (optional)
13 – Audio 3.5 mm MIC in / headphone out (optional)
14 – MicroSD card slot (optional)

Front View

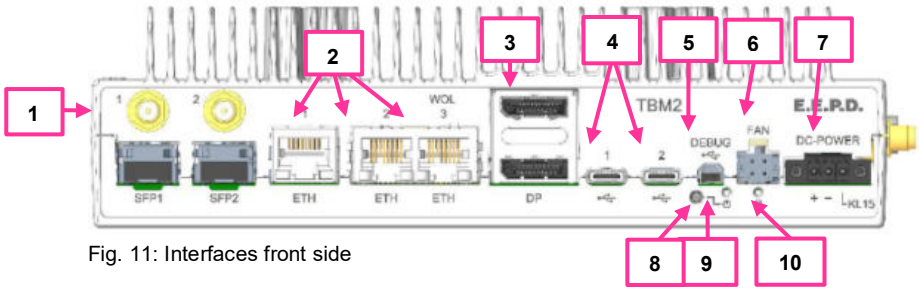

Fig. 11: Interfaces front side

Rear View

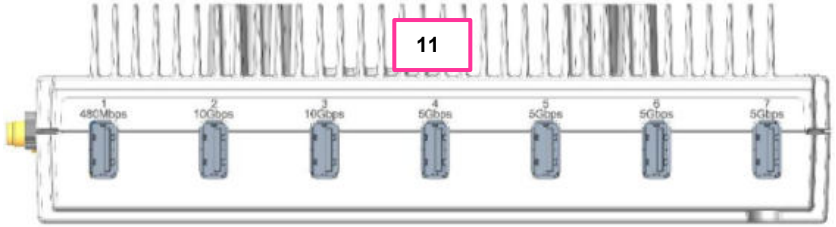

Fig. 12: Interfaces rear side

Side Views

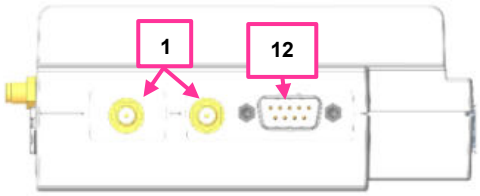

Fig. 13: Interfaces right side

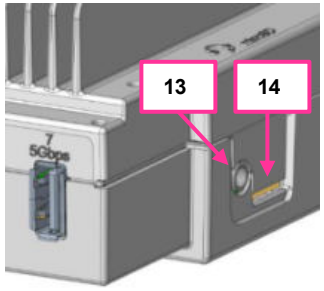

Fig. 14: Interfaces left side

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4.2 2.5 Gigabit Ethernet Ports

Standard pin assignment

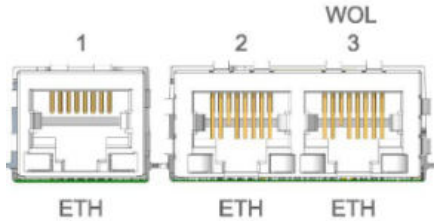

Fig. 15: Ethernet ports detail

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.

4.3 Dual DisplayPort

Standard pin assignment

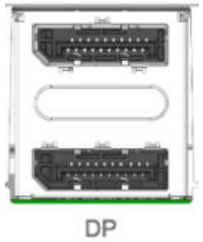

Fig. 16: Dual DisplayPort detail

4.4 USB-C ports

Standard pin assignment

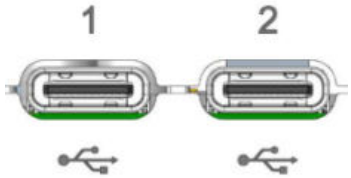

Fig. 17: USB-C ports detail

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4.5 MicroSD Slot (optional)

Standard pin assignment.

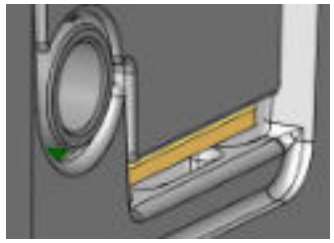

Fig. 18: MicroSD slot detail

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

4.6 Service Interface

Service interface (console) with UART-to-USB interface. Data speed rate is configurable in the operating system.
Standard pin assignment

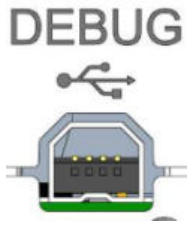

Fig. 19: Mini USB-B detail

4.7 Serial Port (optional)

This option must be enabled in the BIOS → *UART Configuration Options*.
The 9-pin standard D-Sub connector (*Fig. 20*) is connected to four wires.

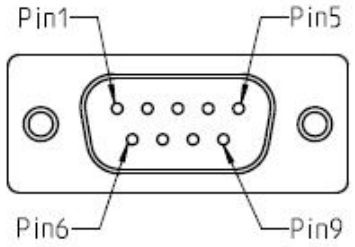

Fig. 20: 9-pin D-Sub connector

9-pin D-Sub	Signal
2	RXD
3	TXD
5	GND
7	RTS_m
8	CTS_m

Tab. 3: RS232 pin assignment

4.8 Fan Connector

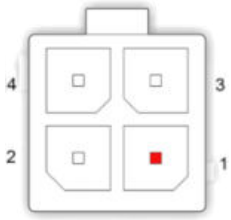

Fig. 21: Fan connector schematic

Pin	Signal
1	12V +/-5%, max. 250 mA, not fused
2	GND
3	EXT_FAN_TACHO
4	EXT_FAN_PWM

Tab. 4: Fan connector pin assignment

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4.9 Power Connector

Fig. 22: Power connector detail

Pin	Signal
1/+	PVIN 10.8 – 26.4 V
2/-	GND
3/KL15	KL_15*

Tab. 5: Power connector pin assignment

Counterpart – plug: Phoenix MC 1,5/3-STF-3.81

Ordering number: 1827716

* KL_15: ignition enable pin for automotive applications.
The KL_15 pin serves as the ignition enable signal, commonly used in automotive environments.
By default, KL_15 is disabled in the BIOS setup (see chapter *6.4.7*)

When enabled:

- Automatic system startup when ignition is switched on
- Controlled shutdown when the ignition is turned off, using two adjustable timers:
  - Timer 1 – normal shutdown;
  - Timer 2 – forces a hard power-off, if normal shutdown fails

Both timers can be set via the „ignition signal“-setting in the BIOS-Setup.
The Countdown range is 1 to 65535 seconds. Default is 180 seconds – meaning the system will shut down 180 seconds after the ignition is turned off.

4.10 Power Button | Power and HDD/SSD-LEDs

Press the power button (*Fig. 23*) 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.

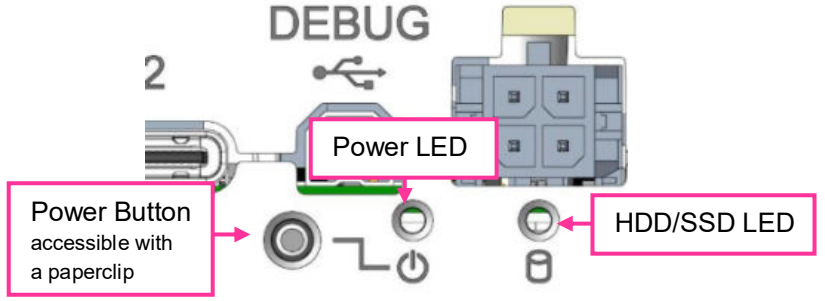

Fig. 23: Power button | power and HDD/SSD-LEDs Position

4.11 USB-A Ports

Standard pin assignments.

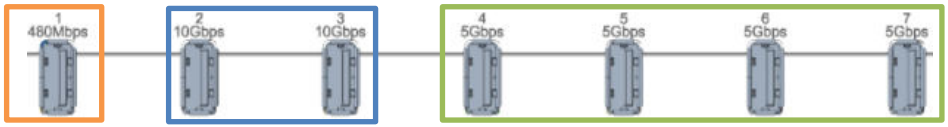

Fig. 24: USB-A ports detail

- 1x USB 2.0 (480 Mb/s, OCP = 900 mA)
- 2x USB 3.2 Gen2 (10Gb/s, OCP = 900 mA each port)
- Up to 4x USB 3.2 Gen1 (5 Gb/s, OCP = 900 mA each port)

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5 Installing SSD

1. Turn off the system and disconnect from the electrical outlet.
2. Remove the 8 (M3X10) screws at the bottom side and open the system (see *Fig. 25*).
3. 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.

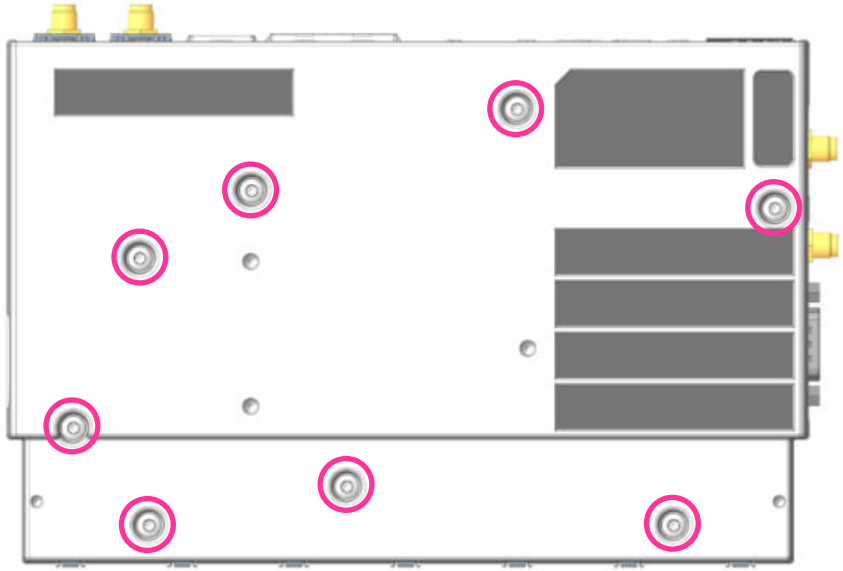

Fig. 25: screws to open the system

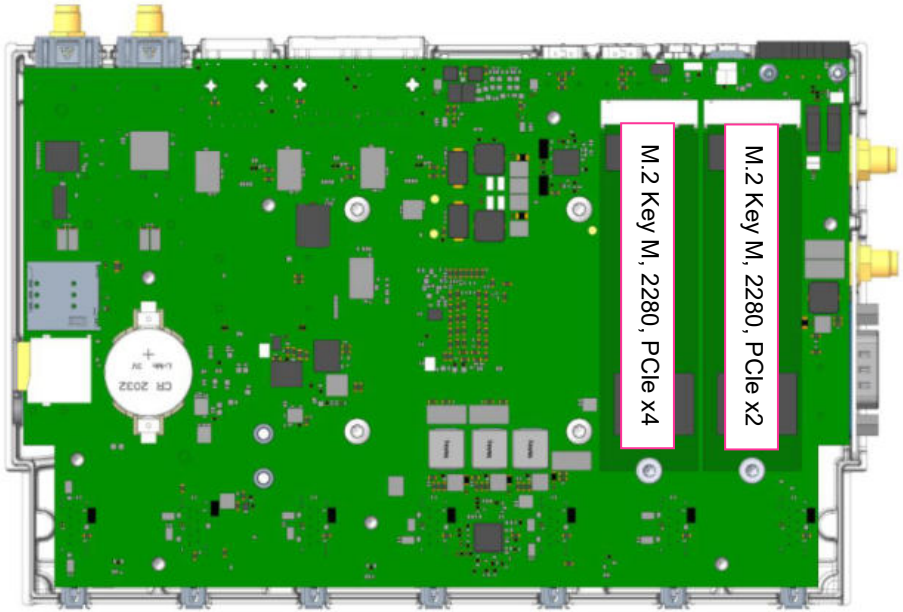

Fig. 26: SSD module position

Insert the module into the corresponding slot (see *Fig. 26*) at an angle. Press it down on the side that protrudes and secure it with the screw provided.

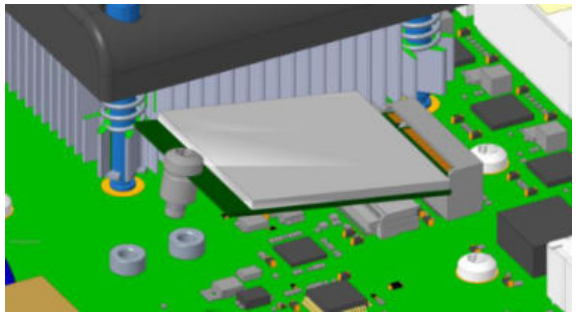

Fig. 27: M.2 module assembly example

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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:
   Main (chapter *6.3*)

2. Boot / PXE Boot:
   Boot → Network Stack Configuration (chapter *6.7*)

3. TDP, fan control, boost mode:
   TDP setting:
   AMD CBS → NBIO Common Options → System Configuration (chapter *6.5.2*)

   Fan control:
   AMD CBS → NBIO Common Options → Fan Control (chapter *6.5.2.2*)
   Boost mode:
   Advanced → AMD CBS → Zen Common Options → Core Performance Boost (chapter *6.5.1*)

4. Change shared graphics memory
   AMD CBS → NBIO Common Options → GFX Configurations → UMA Frame Buffer Size (chapter *6.5.2.1*)

5. USB power
   Advanced → USB Configuration Options → Enable/Disable – VCC of USB Jacks (chapter *6.4.4.1*)

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6.3 Main Menu

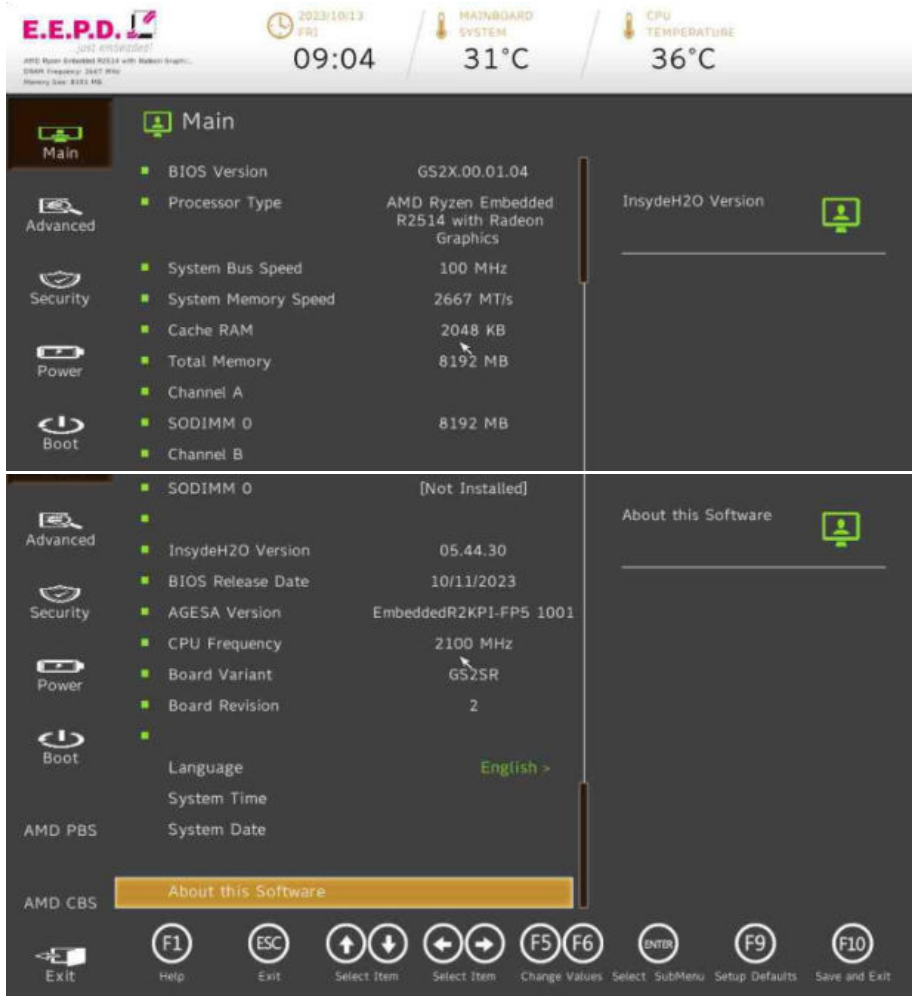

Fig. 28: Main Menu

BIOS Settings	Options	Description
Language	<English>*	
System Time	No options	Set the time. Use tab to switch between time elements. 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. 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. 29: Advanced Menu

BIOS Settings	Options	Description
Boot Configuration	See submenu	Configures Boot Settings
Peripheral Configuration	See submenu	Configures the peripheral devices.
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 settings
Above 4GB MMIO	<Disabled> <Enabled>*	Enable/Disable above 4GB MemoryMappedIO BIOS assignment. It's only available with Uefi Boot mode.
GS2XX Options	See submenu	Configure: PIC watchdog, Wake on LAN, Power LED, KL15 support, USB power off in S5

Tab. 7: Advanced Menu

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6.4.1 Boot Configuration

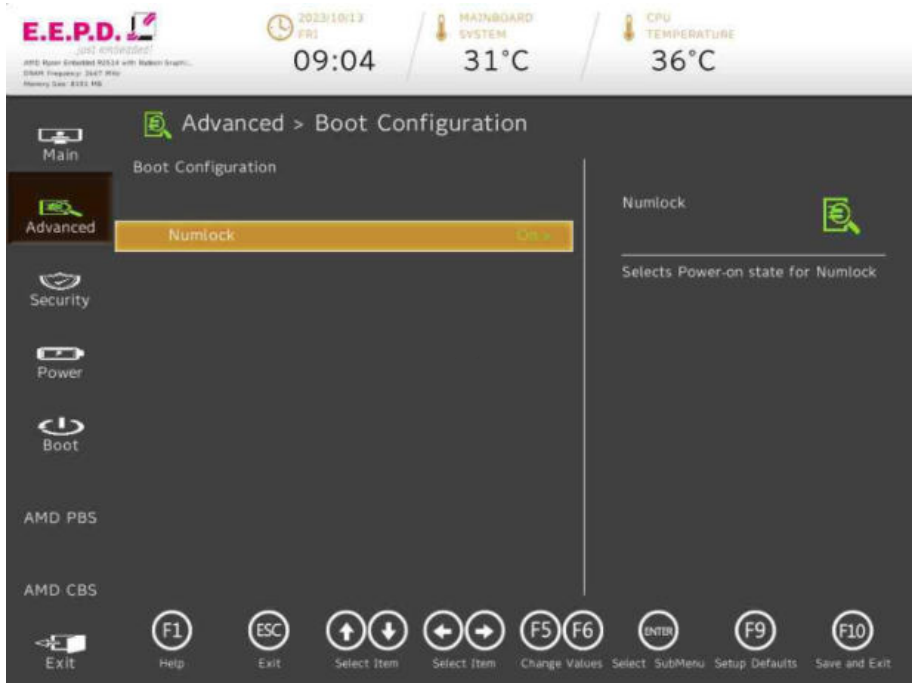

Fig. 30: Boot Configuration

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

Tab. 8: Boot Configuration

6.4.2 Peripheral Configuration

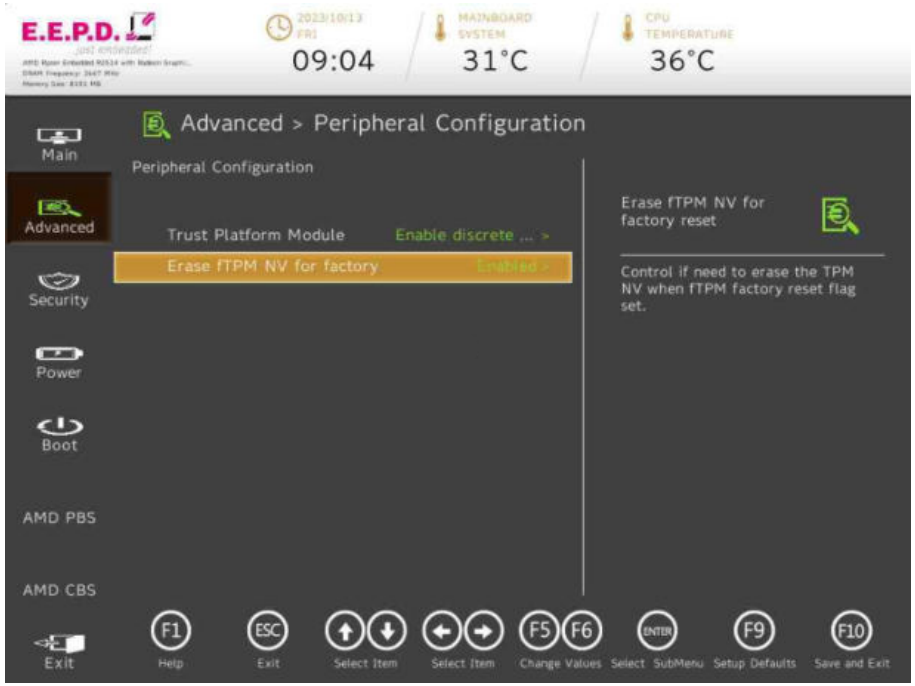

Fig. 31: Peripheral Configuration

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 NVMe Configurations

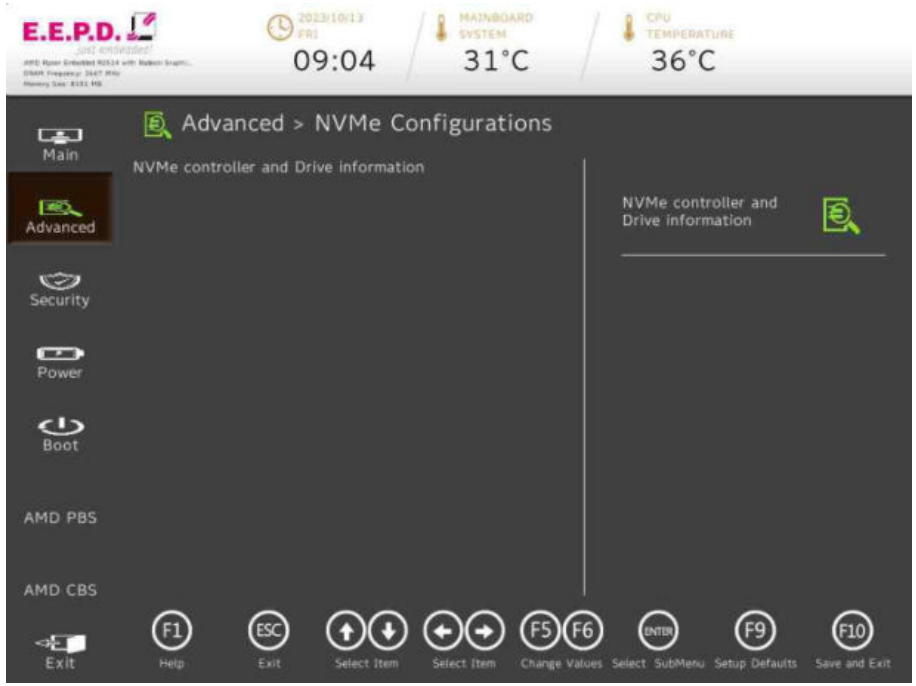

Fig. 32: NVMe Configurations

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

Tab. 10: NVMe Configurations

6.4.4 USB Configuration

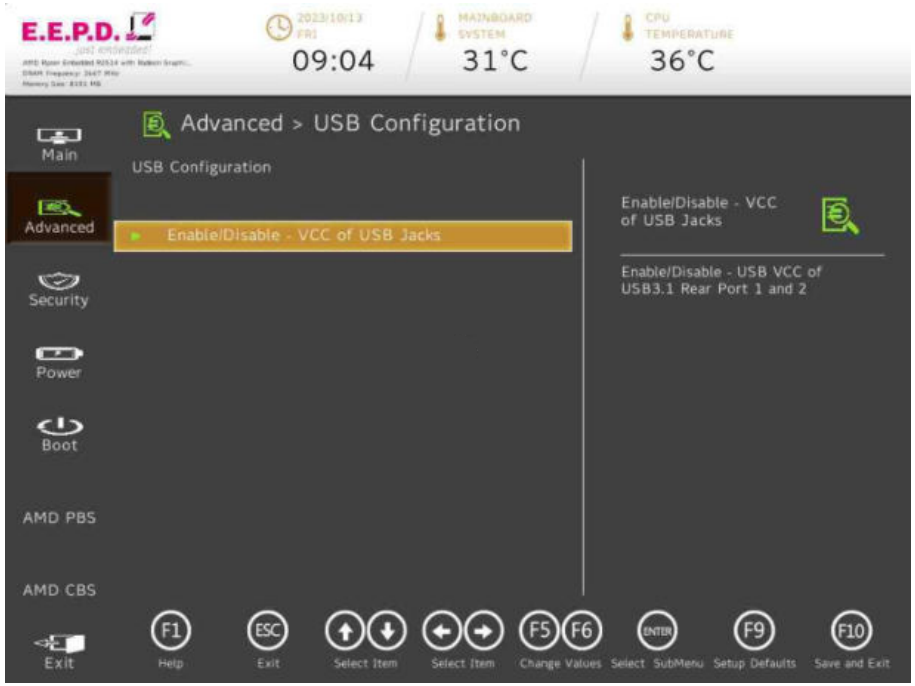

Fig. 33: USB Configurations

BIOS Settings	Options	Description
Enable/Disable – VCC of USB Jacks	See submenu	Enable/Disable – USB VCC of USB3.1 Rear Port 1 and 2

Tab. 11: USB Configuration

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6.4.4.1 Enable/Disable – VCC of USB Jacks

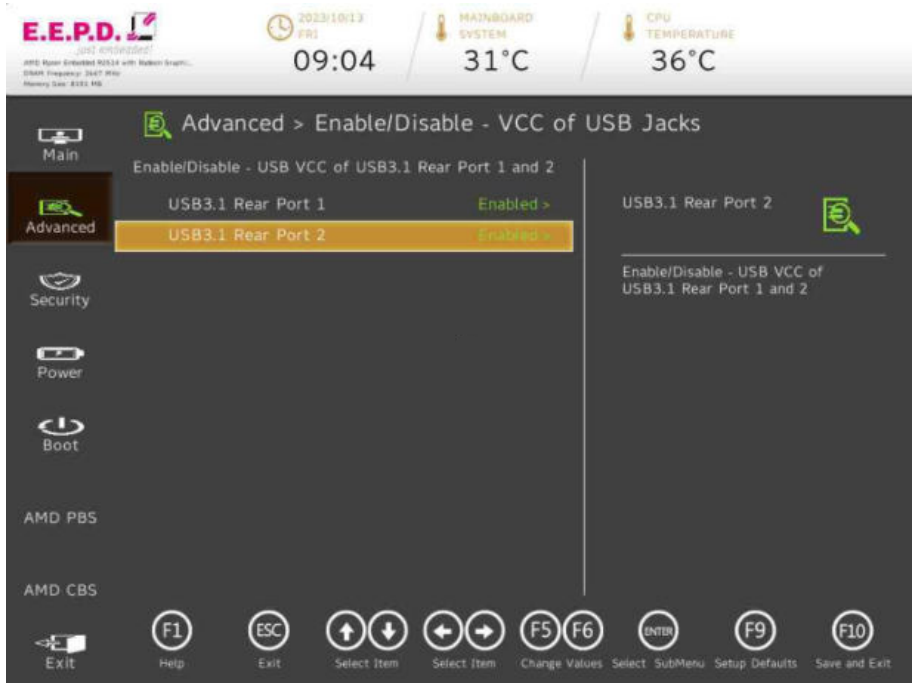

Fig. 34: Enable/Disable – VCC of USB Jacks

BIOS Settings	Options	Description
USB 3.1 Rear Port 1	<Disabled> <Enabled>*	This function allows you to enable or disable the power for the USB 3.1 Rear Port 1
USB 3.1 Rear Port 2	<Disabled> <Enabled>*	This function allows you to enable or disable the power for the USB 3.1 Rear Port 2

Tab. 12: Enable/Disable – VCC of USB Jacks

6.4.5 ACPI Table/Features Control

Fig. 35: 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

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6.4.6 CPU Related Setting

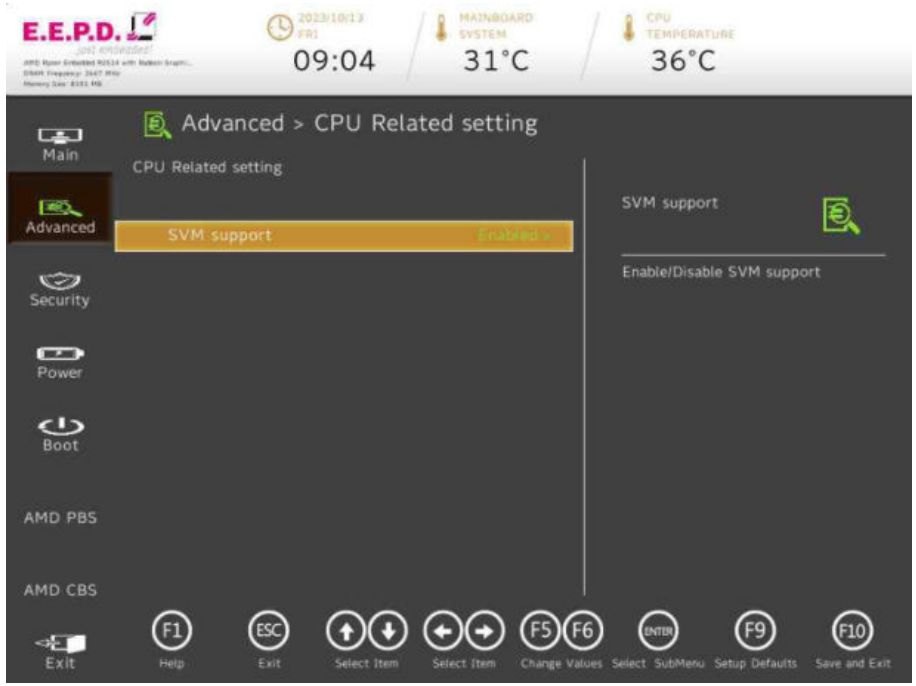

Fig. 36: CPU Related Setting

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

6.4.7 GS2XX Options

Fig. 37: GS2XX Options

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)
KL15 support	<Disabled>*	KL15 support (Enable/Disable)

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see chapter *4.9*	<Enabled>	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 GS2XX 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 Port 1	<Disabled>* <Enabled>	Force VCC Off of USB Jacks in S5. Let VCC of USB Jack unchanged as in Advanced > USB Configuration > Enable/Disable - VCC of USB Jacks or Switches it off when in S5 (System Power Off)!
USB3.1 Rear Port 2	<Disabled>* <Enabled>	

Tab. 15: GS2XX Options

API or code sample to reset watchdog on request.

CAUTION

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

6.5 AMD CBS

Fig. 38: AMD CBS

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

Tab. 16: AMD CBS

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6.5.1 Zen Common Options

Fig. 39: 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. 17: Zen Common Options

6.5.2 NBIO Common Options

Fig. 40: 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	<35W POR Configuration>*	Warning: Select System Configuration may cause the system to hang, as some System Configuration may not be supported by your OPN.

Tab. 18: NBIO Common Options

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6.5.2.1 GFX Configuration

Fig. 41: 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>	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. 19: GFX Configuration

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6.5.2.2 CPU and Auxiliary Fan Control

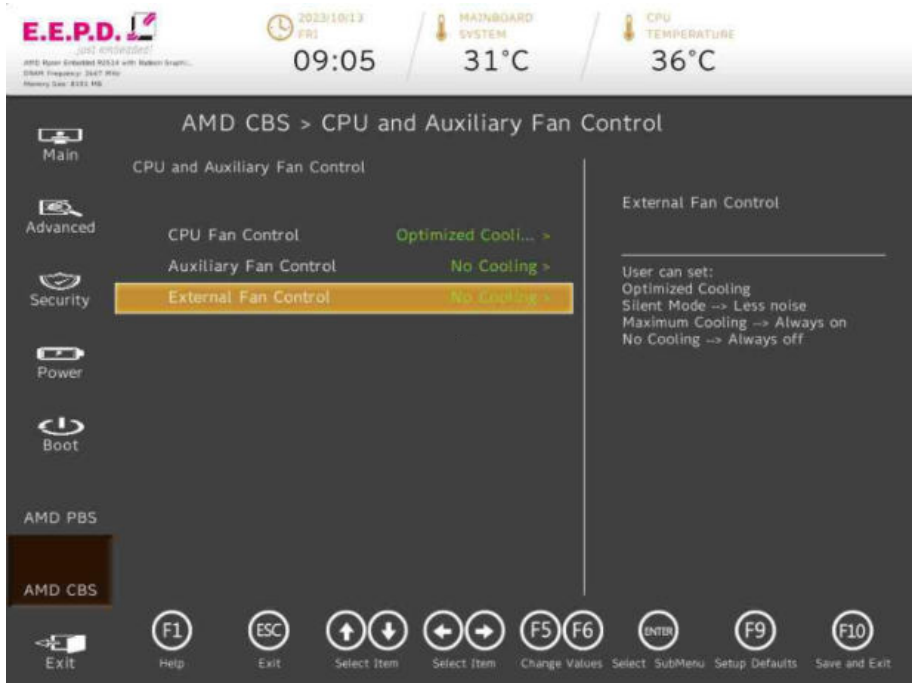

Fig. 42: CPU and Auxiliary Fan Control

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>*	
External Fan Control		

Tab. 20: CPU and Auxiliary Fan Control

6.5.3 FCH Common Options

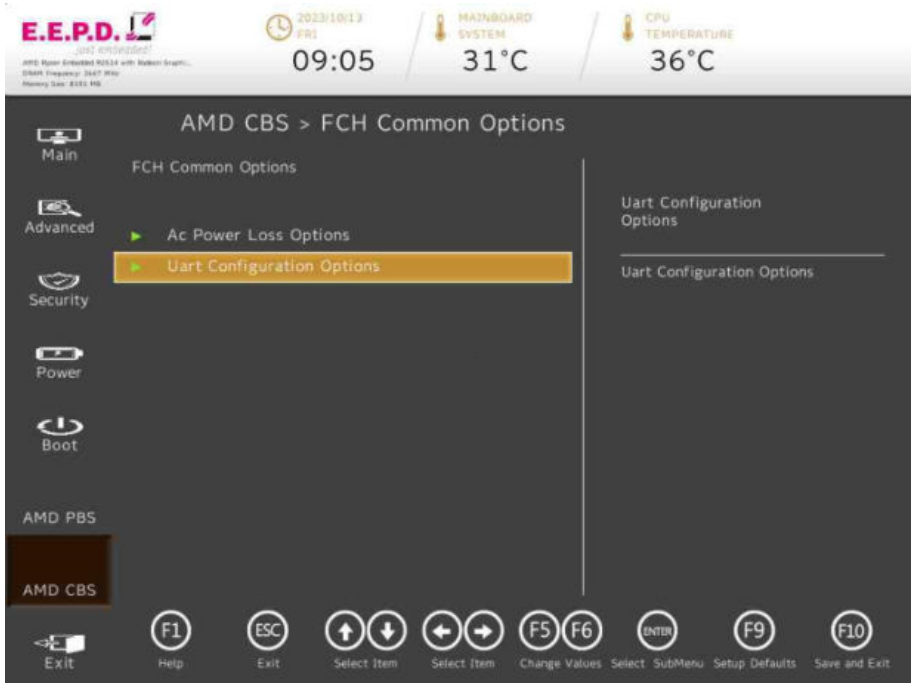

Fig. 43: FCH Common Options

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

Tab. 21: FCH Common Options

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6.5.3.1 Ac Power Loss Options

Fig. 44: Ac Power Loss Options

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

Tab. 22: Ac Power Loss Options

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6.5.3.2 UART Configuration Options

Fig. 45: UART Configuration Options

BIOS Settings	Options	Description
UART 0 Enable	<Disabled> <Enabled>*	Disable or enable UART port 0
UART 0 Legacy Options	<Disabled> <COM1 0x3F8>* <COM2 0x2F8> <COM3 0x3E8> <COM4 0x2E8>	No help string
UART 1 Enable	<Disabled> <Enabled>*	Disable or enable UART port 1
UART 1 Legacy Options	<Disabled> <COM1 0x3F8> <COM2 0x2F8>* <COM3 0x3E8> <COM4 0x2E8>	No help string

Tab. 23: UART Configuration Options

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6.6 AMD PBS Menu

Fig. 46: AMD PBS Menu

BIOS Settings	Options	Description
AMD Firmware Version	See submenu	Show all of AMD Firmware Version
WWAN Power Control	<Disabled> <Enabled>*	Enable/disable power of M.2 Key B Slot
WLAN Radio Operation	<Enabled>* <Disabled>	Enable/disable WLAN radio operation of M.2 Key E Slot
BT Radio Operation	<Enabled>* <Disabled>	Enable/disable Bluetooth (BT) radio operation of M.2 Key E Slot

Tab. 24: AMD PBS Menu

6.6.1 AMD Firmware Version

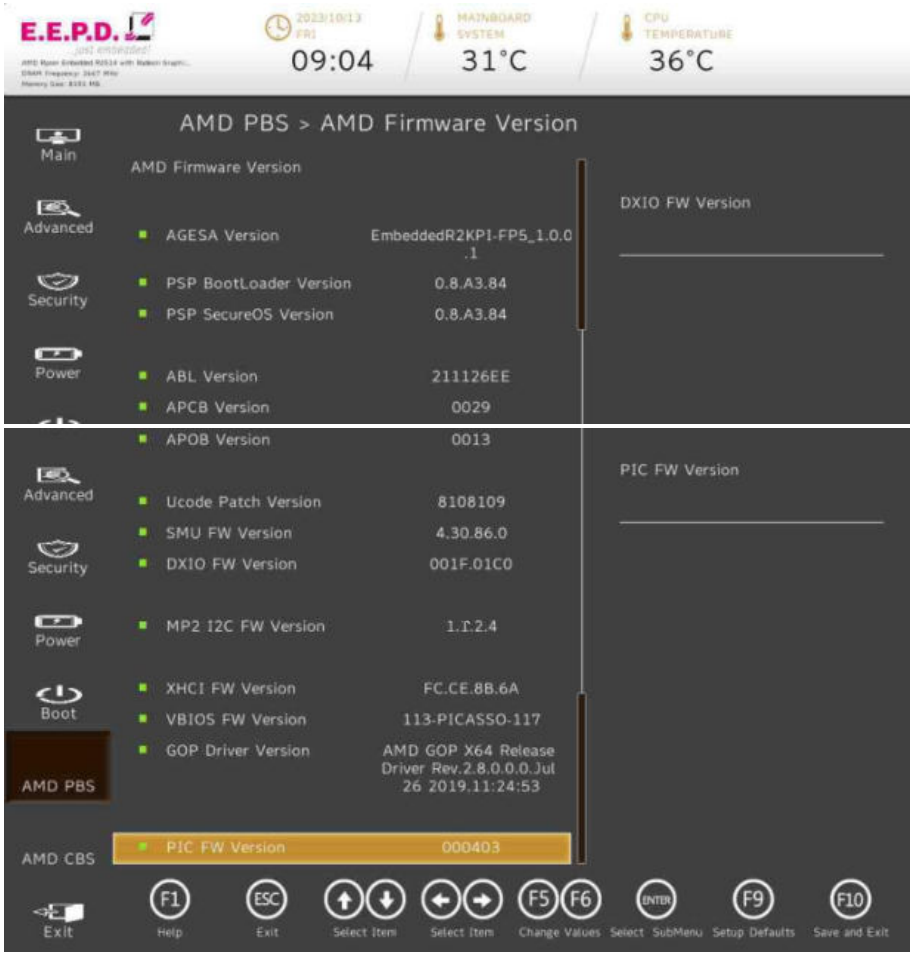

Fig. 47: AMD Firmware Version

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6.7 Boot Menu

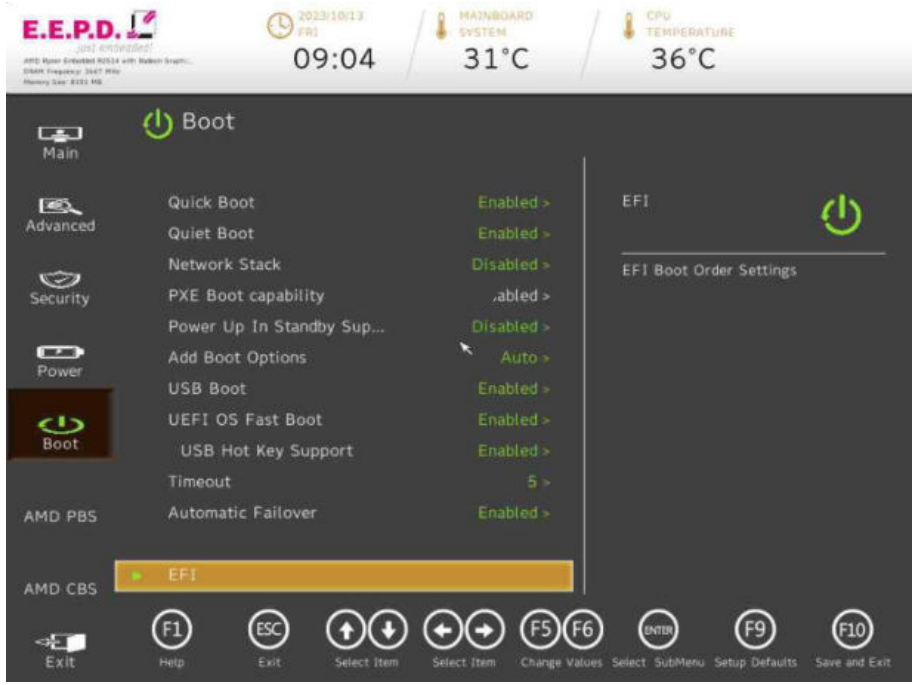

Fig. 48: Boot Menu

BIOS Settings	Options	Description
Quick Boot	<Enabled>* <Disabled>	Allows InsydeH2O to skip certain tests while booting. This will decrease the time needed to boot the system.
Quiet Boot	<Enabled>* <Disabled>	Disables or enables booting in Text Mode.
Network Stack	<Disabled>* <Enabled>	Network Stack Support: Windows 8 BitLocker Unlock UEFI IPv4/IPv6 PXE Legacy PXE OPROM
PXE Boot capability	<Disabled>*	Disabled: Support Network Stack UEFI PXE: IPv4/IPv6 Legacy: Legacy PXE OPROM only
Power Up In Standby Support	<Enabled> <Disabled>*	Disable or enable Power Up in Standby Support. The PUIS feature set allows devices to be powered-up into the Standby power management state to minimize inrush current at power-up and to allow the host to sequence the spin-up of devices.
Add Boot Options	<First> <Last> <Auto>*	Position in Boot Order for Shell,Network and Removables
USB Boot	<Enabled>* <Disabled>	Disables or enables booting to USB boot devices.
UEFI OS Fast Boot	<Enabled>* <Disabled>	If enabled the system firmware does not initialize keyboard and check for firmware menu key.
USB Hot Key Support	<Disabled> <Enabled>*	Enable/Disable to support USB hot key while booting. This will decrease the time needed to boot the system.
Timeout	Adjust value [0-10] Default value [5]	The number of seconds that the firmware will wait before booting the original default boot selection.
Automatic Failover	<Disabled> <Enabled>*	Enable: if boot to default device fail, it will directly try to boot next device. Disable: if boot to default device fail, it will pop warning message then go into firmware UI.
EFI	See submenu	EFI Boot Order Settings

Tab. 25: Boot Menu

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6.7.1 EFI

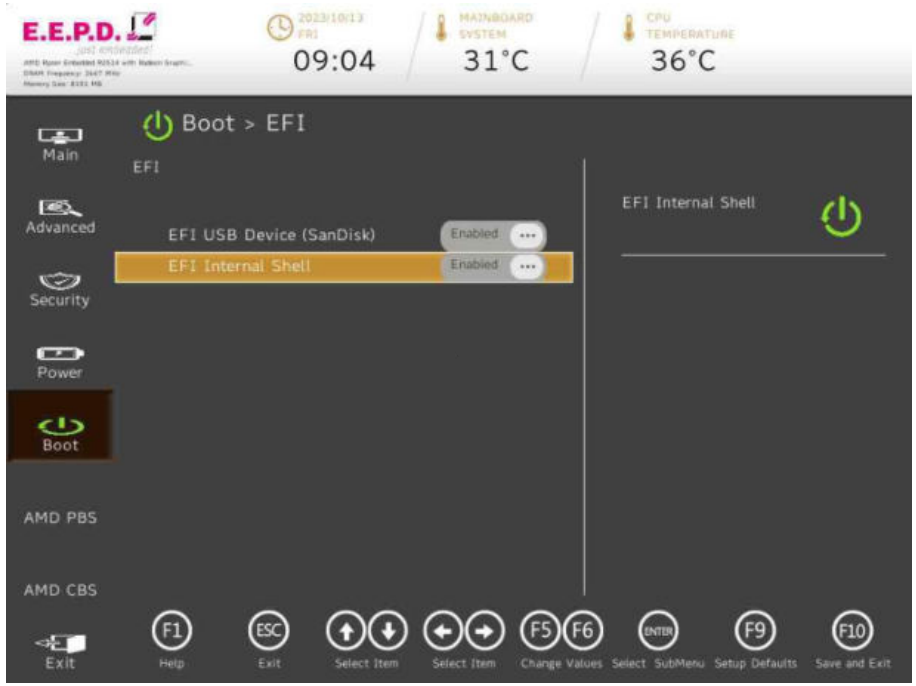

Fig. 49: EFI

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

Tab. 26: EFI

6.8 Power Menu

Fig. 50: 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. 27: Power Menu

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6.9 Exit Menu

Fig. 51: 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. 28: Exit Menu

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6.10 Security Menu

Fig. 52: 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. 29: Security Menu

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6.10.1 Storage Password Setup Page

Fig. 53: Storage Password Setup Page

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

Tab. 30: Storage Password Setup Page

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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
SO-DIMM	Small outline dual inline memory module
SSD	Solid state drive
UART	Universal Asynchronous Receiver / Transmitter
USB	Universal serial bus
WLAN	Wireless local area network
WWAN	Wireless wide area network

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