USER GUIDE

KBox A-203-sXAL4

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KBOX A-203-SXAL4 - USER GUIDE

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⚠CAUTION Handling and operation of the product is permitted only for trained personnel within a work place that is access controlled. Please follow the “General Safety Instructions” supplied with the system.

NOTICE You find the most recent version of the “General Safety Instructions“ online in the download area of this product.

Revision History

Revision	Brief Description of Changes	Date of Issue	Author/ Editor
1.0	Initial release	2022-Mar-07	MK

Terms and Conditions

Kontron warrants products in accordance with defined regional warranty periods. For more information about warranty compliance and conformity, and the warranty period in your region, visit http://www.kontron.com/terms-and-conditions.

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Customer Comments

If you have any difficulties using this user guide, discover an error, or just want to provide some feedback, contact Kontron support. Detail any errors you find. We will correct the errors or problems as soon as possible and post the revised user guide on our website.

Symbols

The following symbols may be used in this user guide

⚠DANGER	DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.
⚠WARNING	WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.
NOTICE	NOTICE indicates a property damage message.
⚠CAUTION	CAUTION indicates a hazardous situation which, if not avoided, may result in minor or moderate injury.
	Electric Shock! This symbol and title warn of hazards due to electrical shocks (> 60 V) when touching products or parts of products. Failure to observe the precautions indicated and/or prescribed by the law may endanger your life/health and/or result in damage to your material.
	ESD Sensitive Device! This symbol and title inform that the electronic boards and their components are sensitive to static electricity. Care must therefore be taken during all handling operations and inspections of this product in order to ensure product integrity at all times.
	HOT Surface! Do NOT touch! Allow to cool before servicing.
	Laser! This symbol inform of the risk of exposure to laser beam and light emitting devices (LEDs) from an electrical device. Eye protection per manufacturer notice shall review before servicing.
	This symbol indicates general information about the product and the user guide. This symbol also indicates detail information about the specific product configuration.
	This symbol precedes helpful hints and tips for daily use.

For Your Safety

Your new Kontron product was developed and tested carefully to provide all features necessary to ensure its compliance with electrical safety requirements. It was also designed for a long fault-free life. However, the life expectancy of your product can be drastically reduced by improper treatment during unpacking and installation. Therefore, in the interest of your own safety and of the correct operation of your new Kontron product, you are requested to conform with the following guidelines.

High Voltage Safety Instructions

As a precaution and in case of danger, the power connector must be easily accessible. The power connector is the product's main disconnect device.

⚠CAUTION

Warning

All operations on this product must be carried out by sufficiently skilled personnel only.

⚠CAUTION

Electric Shock!

Before installing a non hot-swappable Kontron product into a system always ensure that your mains power is switched off. This also applies to the installation of piggybacks. Serious electrical shock hazards can exist during all installation, repair, and maintenance operations on this product. Therefore, always unplug the power cable and any other cables which provide external voltages before performing any work on this product.

Earth ground connection to vehicle's chassis or a central grounding point shall remain connected. The earth ground cable shall be the last cable to be disconnected or the first cable to be connected when performing installation or removal procedures on this product.

Special Handling and Unpacking Instruction

NOTICE

ESD Sensitive Device!

Electronic boards and their components are sensitive to static electricity. Therefore, care must be taken during all handling operations and inspections of this product, in order to ensure product integrity at all times.

Do not handle this product out of its protective enclosure while it is not used for operational purposes unless it is otherwise protected.

Whenever possible, unpack or pack this product only at EOS/ESD safe work stations. Where a safe work station is not guaranteed, it is important for the user to be electrically discharged before touching the product with his/her hands or tools. This is most easily done by touching a metal part of your system housing.

It is particularly important to observe standard anti-static precautions when changing piggybacks, ROM devices, jumper settings etc. If the product contains batteries for RTC or memory backup, ensure that the product is not placed on conductive surfaces, including anti-static plastics or sponges. They can cause short circuits and damage the batteries or conductive circuits on the product.

Lithium Battery Precautions

If your product is equipped with a lithium battery, take the following precautions when replacing the battery.

⚠CAUTION

Danger of explosion if the battery is incorrectly replaced. Examples that shall be considered include:

- **Replacement of a battery with an incorrect type that can defeat a safeguard (e.g., in the case of some lithium battery types);**
- **Disposal of a battery into fire or a hot oven, or mechanically crushing or cutting of a battery, that can result in an explosion;**
- **Leaving a battery in an extremely high temperature surrounding environment that can result in an explosion or the leakage of flammable liquid or gas;**
- **A battery subjected to extremely low air pressure that may result in an explosion or the leakage of flammable liquid or gas.**

In case of using an optional Lithium battery, please consider limited operating temperature to maximum 40°C.

General Instructions on Usage

In order to maintain Kontron's product warranty, this product must not be altered or modified in any way. Changes or modifications to the product, that are not explicitly approved by Kontron and described in this user guide or received from Kontron Support as a special handling instruction, will void your warranty.

This product should only be installed in or connected to systems that fulfill all necessary technical and specific environmental requirements. This also applies to the operational temperature range of the specific board version that must not be exceeded. If batteries are present, their temperature restrictions must be taken into account.

In performing all necessary installation and application operations, only follow the instructions supplied by the present user guide.

Keep all the original packaging material for future storage or warranty shipments. If it is necessary to store or ship the product then re-pack it in the same manner as it was delivered. Special care is necessary when handling or unpacking the product. See Special Handling and Unpacking Instruction.

Quality and Environmental Management

Kontron aims to deliver reliable high-end products designed and built for quality, and aims to complying with environmental laws, regulations, and other environmentally oriented requirements. For more information regarding Kontron's quality and environmental responsibilities, visit http://www.kontron.com/about-kontron/corporate-responsibility/quality-management.

Disposal and Recycling

Kontron's products are manufactured to satisfy environmental protection requirements where possible. Many of the components used are capable of being recycled. Final disposal of this product after its service life must be accomplished in accordance with applicable country, state, or local laws or regulations.

WEEE Compliance

The Waste Electrical and Electronic Equipment (WEEE) Directive aims to:

- Reduce waste arising from electrical and electronic equipment (EEE)
- Make producers of EEE responsible for the environmental impact of their products, especially when the product become waste
- Encourage separate collection and subsequent treatment, reuse, recovery, recycling and sound environmental disposal of EEE
- Improve the environmental performance of all those involved during the lifecycle of EEE

Environmental protection is a high priority with Kontron.

Kontron follows the WEEE directive

You are encouraged to return our products for proper disposal.

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1/ General Safety Instructions

⚠WARNING

Please read this chapter carefully and take careful note of the instructions, which have been compiled for your safety and to ensure to apply in accordance with intended regulations. If the following general safety instructions are not observed, it could lead to injuries to the operator and/or damage of the product; in cases of nonobservance of the instructions Kontron is exempt from accident liability, this also applies during the warranty period.

The product has been built and tested according to the basic safety requirements for low voltage (LVD) applications and has left the manufacturer in safety-related, flawless condition. To maintain this condition and to also ensure safe operation, the operator must not only observe the correct operating conditions for the product but also the following general safety instructions:

- The product must be used as specified in the product documentation, in which the instructions for safety for the product and for the operator are described. These contain guidelines for setting up, installation and assembly, maintenance, transport or storage.
- The on-site electrical installation must meet the requirements of the country's specific local regulations.
- If a power cable comes with the product, only this cable should be used. Do not use an extension cable to connect the product.
- To guarantee that sufficient air circulation is available to cool the product, please ensure that the ventilation openings are not covered or blocked. If a filter mat is provided, this should be cleaned regularly. Do not place the product close to heat sources or damp places. Make sure the product is well ventilated.
- Only connect the product to an external power supply providing the voltage type (AC or DC) and the input power (max. current) specified on the Kontron Product Label and meeting the requirements of the Limited Power Source (LPS) and Power Source (PS2) of UL/IEC 62368-1 .
- Only products or parts that meet the requirements for Power Source (PS1) of UL/IEC 62368-1 may be connected to the product's available interfaces (I/O).
- Before opening the product, make sure that the product is disconnected from the mains.
- Switching off the product by its power button does not disconnect it from the mains. Complete disconnection is only possible if the power cable is removed from the wall plug or from the product. Ensure that there is free and easy access to enable disconnection.
- The product may only be opened for the insertion or removal of add-on cards (depending on the configuration of the product). This may only be carried out by qualified operators.
- If extensions are being carried out, the following must be observed:
  - all effective legal regulations and all technical data are adhered to
  - the power consumption of any add-on card does not exceed the specified limitations
  - the current consumption of the product does not exceed the value stated on the product label
- Only original accessories that have been approved by Kontron Europe can be used.
- Please note: safe operation is no longer possible when any of the following applies:
  - the product has visible damages or
  - the product is no longer functioning
    In this case the product must be switched off and it must be ensured that the product can no longer be operated.
- Handling and operation of the product is permitted only for trained personnel within a work place that is access controlled.
- CAUTION: Risk of explosion if the battery is replaced incorrectly (short-circuited, reverse-poled, wrong battery type). Dispose of used batteries according to the manufacturer's instructions.
- This product is not suitable for use in locations where children are likely to be present

Additional Safety Instructions for DC Power Supply Circuits

- **To guarantee safe operation, please observe that:**
  - the external DC power supply must meet the criteria for LPS and PS2 (UL/IEC 62368-1)
- no cables or parts without insulation in electrical circuits with dangerous voltage or power should be touched directly or indirectly
- a reliable protective earthing connection is provided
- a suitable, easily accessible disconnecting device is used in the application (e.g. overcurrent protective device), if the product itself is not disconnect able
- a disconnect device, if provided in or as part of the product, shall disconnect both poles simultaneously
- interconnecting power circuits of different products cause no electrical hazards
- **A sufficient dimensioning of the power cable wires must be selected – according to the maximum electrical specifications on the product label – as stipulated by EN62368-1 or VDE0100 or EN60204 or UL61010-1 regulations.**

1.1. Electrostatic Discharge (ESD)

A sudden discharge of electrostatic electricity can destroy static-sensitive devices or micro-circuitry.

Therefore proper packaging and grounding techniques are necessary precautions to prevent damage. Always take the following precautions:

1. Transport boards in ESD-safe containers such as boxes or bags.
2. Keep electrostatic sensitive parts in their containers until they arrive at the ESD-safe workplace.
3. Always be properly grounded when touching a sensitive board, component, or assembly.
4. Store electrostatic-sensitive boards in protective packaging or on antistatic mats.

1.1.1. Grounding Methods

By adhering to the guidelines below, electrostatic damage to the device can be avoided:

1. Cover workstations with approved antistatic material. Always wear a wrist strap connected to workplace. Always use properly grounded tools and equipment.
2. Use antistatic mats, heel straps, or air ionizers for more protection.
3. Always handle electrostatically sensitive components by their edge or by their casing.
4. Avoid contact with pins, leads, or circuitry.
5. Turn off power and input signals before inserting and removing connectors or connecting test equipment.
6. Keep work area free of non-conductive materials such as ordinary plastic assembly aids and Styrofoam.
7. Use only field service tools which are conductive, such as cutters, screwdrivers, and vacuum cleaners.
8. Always place drives and boards PCB-assembly-side down on the foam.

2/ Electromagnetic Compatibility

For detailed information refer to section 9.3 “CE Directives and Standards”.

2.1. Electromagnetic Compatibility (EU)

This product is intended only for use in industrial areas. The most recent version of the EMC guidelines (EMC Directive 2014/30/EU) and/or the German EMC laws apply. If the user modifies and/or adds to the equipment (e.g. installation of add-on cards) the prerequisites for the CE conformity declaration (safety requirements) may no longer apply.

2.2. FCC Statement (USA)

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

2.3. EMC Compliance (Canada)

The method of compliance is self-declaration to Canadian standard ICES-003:

(English): This Class A digital apparatus complies with the Canadian ICES-003.

(French): Cet appareil numérique de la Class A est conforme à la norme NMB-003 du Canada.

3/ Shipment and Unpacking

Please check that your package is complete, and contains the items below (according to the ordered unit configuration). If you discover damaged or missing items, please contact your dealer.

3.1. Unpacking

Proceed as follows to unpack the unit:

1. Remove packaging.
2. Do not discard the original packaging. Keep it for future relocation.
3. Check the delivery for completeness by comparing it with your order.
4. Please keep the associated paperwork. It contains important information for handling the unit.
5. Check the contents for visible shipping damage.
6. If you notice any shipping damage or inconsistencies between the contents and your order, please contact Kontron for help and information.

3.2. Scope of Delivery

3.2.1. Standard

- KBox A-203-sXAL4 (corresponding to the ordered system configuration)
- Power connector, 2-pin plug (TE Connectivity 796859-2)
- General Safety Instructions for IT Equipment

3.2.2. Optional Parts

- DIN rail mounting clip
- Mini PCIe WLAN (WiFi) card (always factory-installed if orderd) with two antennas (enclosed)
- KBox A-203-sXAL4 can optionally be ordered with a factory-installed SSD Kit
- SD card
- Bracket for wall/table mounting
- Vertical mounting plate for control cabinet mounting
- Rubber feet (self-adhesive)
- AC/DC Adapter 24V/60W

3.3. Type Label and Product Identification

The type label (product name, serial number) of your KBox A-203-sXAL4 system are located on the bottom side of the device (refer to Figure 1 and Figure 8 pos. 1).

Figure 1: Type Label (consisting of two stickers)

Space for certification markings

Image for illustration only!

4/ System Overview

The KBox A-203-sXAL4 expands the Kontron line of computers - KBox Series. It is a highly scalable and flexible industrial computer. Based on the latest Intel Atom® processor of the E3900 series the new maintenance-free, fanless and battery-free KBox A-203-sXAL4 was developed as an intelligent gateway for data-intensive IoT edge applications.

Refer to the information and technical data in the user manual of the installed SMARC sXAL Module.

The user's manual of the installed SMARC module can be downloaded from our web page http://www.kontron.com . Search for the name of the installed module.

The compact KBox A-203-sXAL4 shows a broad range of interfaces which allow a connection on various communication levels. For local data collection, e.g. link to sensor and machine level, it offers up to two serial ports (RS232/485) and an optional fieldbus (e.g. Profi Bus).

The KBox A-203-sXAL4 supports Security Solution Kontron APPROTECT. It combines a software framework with an integrated security chip in addition to the TPM 2.0 (Trusted Platform Module) chip to provide comprehensive protection for the application software.

The KBox A-203-sXAL4 hardware system configuration and the robust construction with excellent mechanical stability offer the superior qualities of a computer designed for operation in harsh industrial environment. It is a fanless system based on a compact U-shaped aluminum chassis with cooling fins.

The rated voltage of the mains (+24 V DC) can be found on the type label. The type label is located at the bottom side of the device. The KBox A-203-sXAL4 may be optionally factory-equipped with an mPCIe WLAN/Bluetooth card for two antennas.

The following interfaces are available with the KBox A-203-sXAL4:

Standard:

- 24 V DC input power (X101)
- DisplayPort (X103)
- 2x USB 3.0 (X104, X105)
- 2x Ethernet (X106, X107) : Gigabit Ethernet (10/100/1000)
- COM 1 (X102), RS232 (optional: RS422/485)
- Reset button
- Power LED, SSD LED and GP LED

Optional:

- COM 2 (X202), RS232
- Fieldbus Connector (X203)

The device is designed to be operated in:

- Vertical position: (KBox A-203-sXAL4 configuration with vertical mounting plate) mounted inside a control cabinet or
- Vertical/horizontal: wall mounted (KBox A-203-sXAL4 configuration with wall mounting bracket) or
- Horizontal position: KBox A-203-sXAL4 as desktop unit (equipped with the supplied rubber feet) or
- Vertical/horizontal: KBox A-203-sXAL4 DIN Rail mounting (with DIN Rail mounting clip)

NOTICE

When powering on the KBox A-203-sXAL4, make sure that the cooling fins of the chassis (Figure 9, Figure 10 and Figure 11, pos. 6) are not obstructed (covered) by any objects.

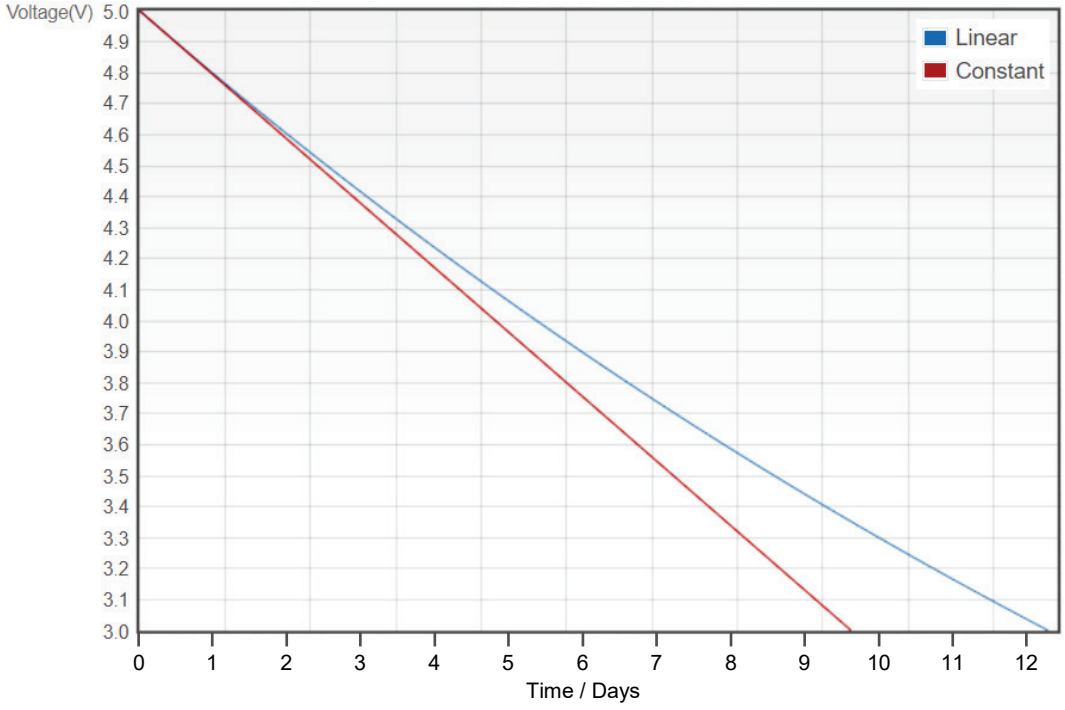
To provide sufficient heat dissipation by the cooling of the device, do not cover the cooling fins of the KBox A-203-sXAL4. Do not place any objects on the device. When installing the system, please note the clearance recommendation in the section 6.1 “System Mounting”.

4.1. RTC

The KBox A-203-sXAL4 comprises a chipset external RTC. This RTC is connected to the SMBus of the processor module. A RTC of type RV-8564 or compatible is used. To provide a valid date and time when no power is connected to the KBox A-203-sXAL4, the RTC is equipped with a goldcap buffer.

4.1.1. RTC Buffer Time

Figure 2: RTC buffer time



If the time is not valid this is indicated by a status bit in the RTC registers. For details see the RV-8564 application manual.

To get the maximum buffer time it is necessary to have the system a certain time powered on. This ensures that the buffer capacitors are fully loaded.

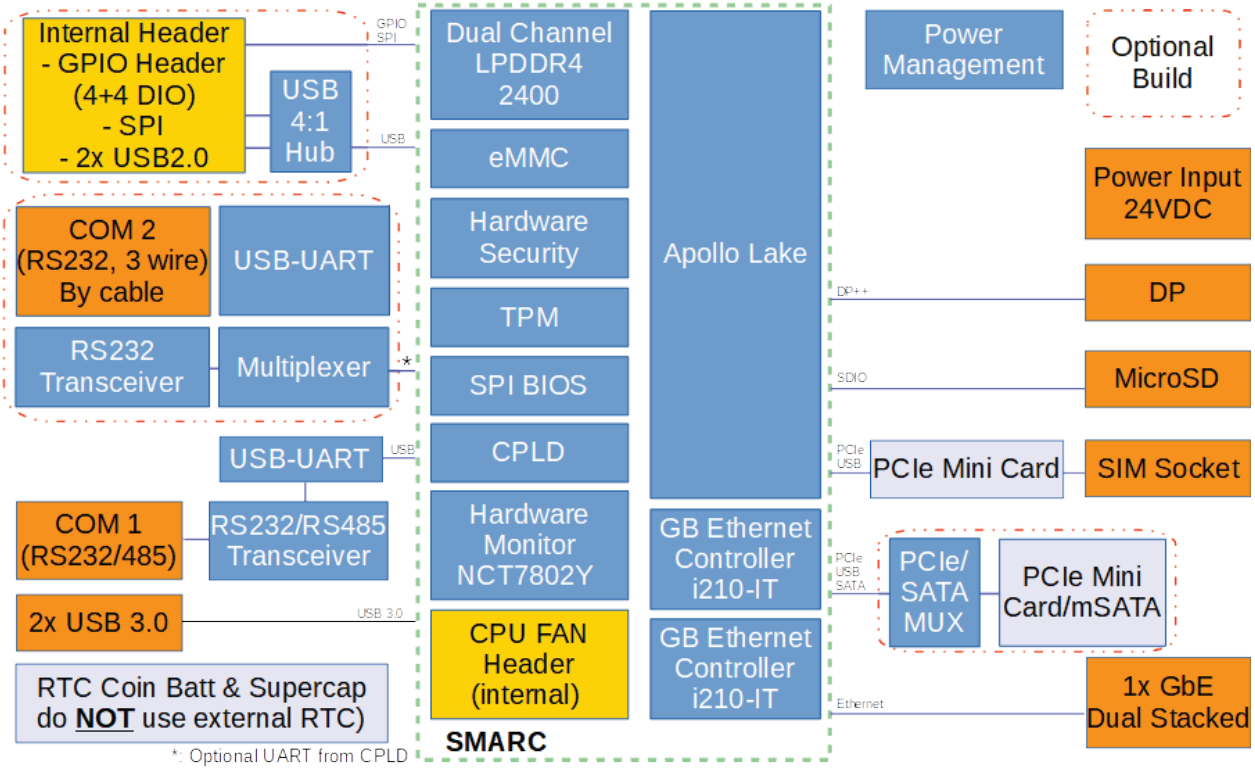
The buffer time depends on the ambient temperature and on how long the box is connected to its power supply.

4.2. System Expansion Capabilities

The KBox A-203-sXAL4 is available in the configurations described in this manual.
If you are interested in a different, customer-specific configuration, feel free to contact Kontron and ask for your requirements. Contact information can be found on our web site www.kontron.com.

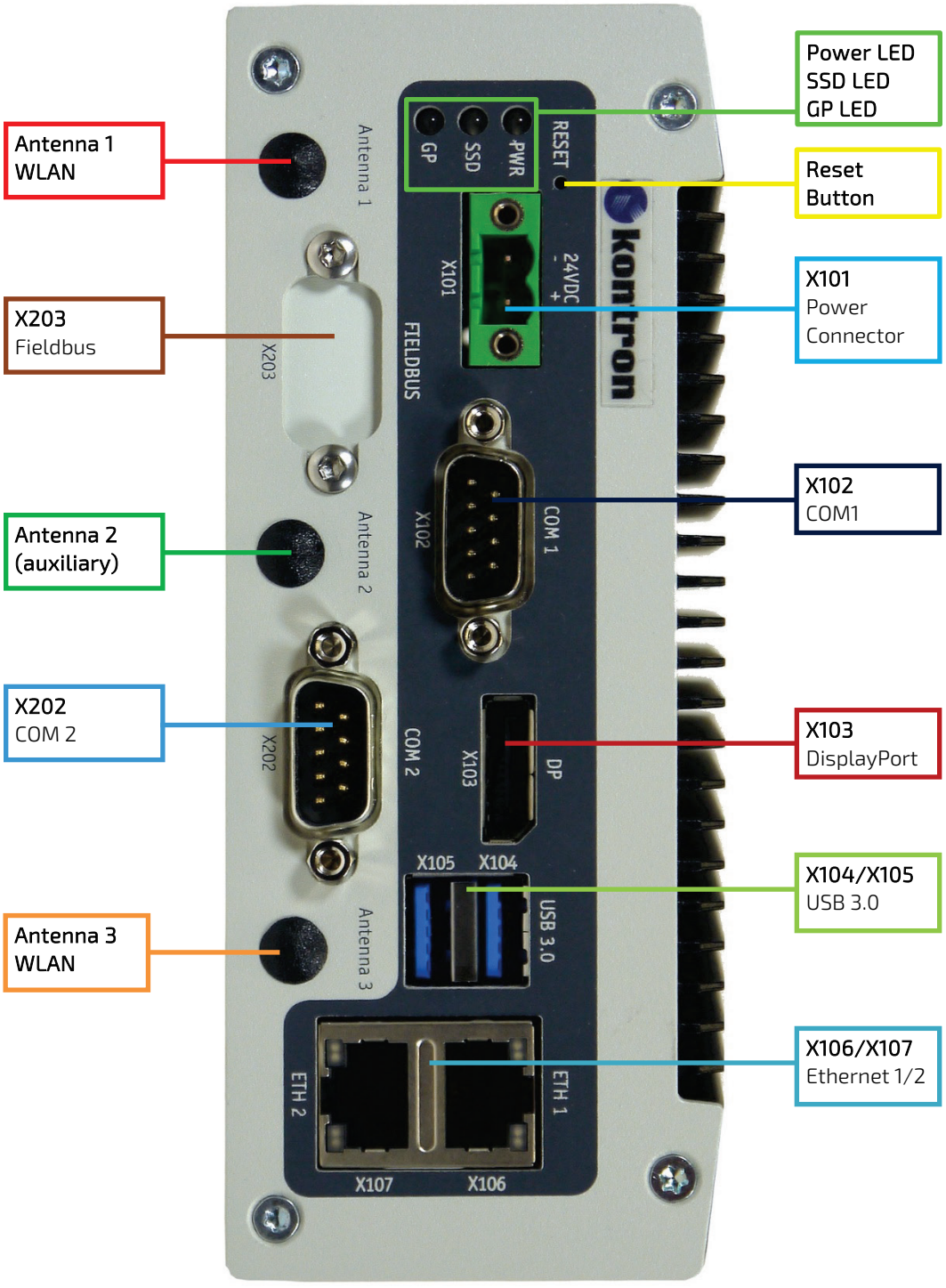
4.3. Block Diagram of the KBox A-203-sXAL4

Figure 3: Block Diagram of the KBox A-203-sXAL4



4.4. Front Side

Figure 4: KBox A-203-sXAL4 – Front View



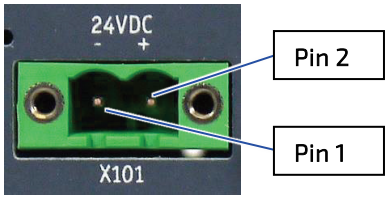
4.5. Front Interfaces of the KBox A-203-sXAL4

4.5.1. X101 - Power Input Connector

The 2-pin connector (X101, Figure 4) provides the power connection of the KBox A-203-sXAL4 to the appropriate DC main power supply. For pin assignments refer to the subsection 10.1.1.

The external cable connector is a "TE Connectivity 796859-2" 2-pin plug. This power plug is delivered along with the KBox A-203-sXAL4. Please observe the section 7.1 "Connecting to DC Main Power Supply".

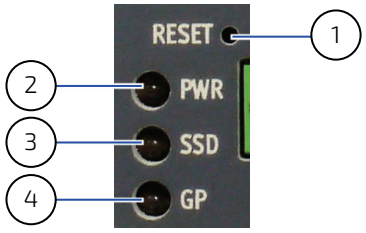
Figure 5: X101 - 24VDC power input connector



Pin	Signal Name
1	0 VDC (input)
2	+24 V (input)

4.5.2. Controls and LED Indicators

Figure 6: Detail - Power button and LED indicators



1 Reset button
2 Power LED
3 SSD activity LED
4 GP (General Purpose) LED

Reset Button	Press the reset button to restart your system. Use a pointed object (e.g. a pencil) to press the recessed reset button (Figure 6, pos. 1).
Power LED (green)	The power LED (marked PWR, Figure 4 and Figure 6, pos. 2) lights up green if the system powered on. **Prerequisite:** The system must be attached by means of the power cord to an appropriate mains (DC).
SSD LED (orange)	The SSD LED (marked SSD, Figure 4 and Figure 6, pos. 3) indicates storage (SATA/mSATA) activity.
GP LED (red/green)	The General Purpose LED (marked GP, Figure 4 and Figure 6, pos. 4) is GPIO controlled. The PG LED lights up red when set to Low and green when set to High.

⚠WARNING

Even when the system is shut down (via the operating system) there is still a standby voltage on the baseboard. The unit is only completely disconnected from the DC mains, when the power is removed.

For preparing the power cable for the KBox A-203-sXAL4 by connecting appropriate wires to the Phoenix power terminal, refer to subsection 6.2.1 "Cabling"

4.5.3. X106/X107 - Ethernet Connectors (ETH)

These connectors (X106 as ETH 1 and X107 as ETH 2, Figure 4) are Gigabit Ethernet 10/100/1000 Mbit/s, IEEE 1588 capable interfaces. The connectors are standard 8-pin RJ45 type connectors with status LEDs:

- **Activity/link: green = link up; green blinking = activity.**
- **Speed: off, green, yellow (10/100/1000 MBit/s).**

For pin assignment refer to subsection 10.1.2.

NOTICE **WOL feature is supported by KBox A-203-sXAL4 but is not indicated by LEDs.**

4.5.4. X104/X105 - USB 3.0

The KBox A-203-sXAL4 provides two USB 3.0 interfaces. These connectors (X104, X105, Figure 4) allow connection of USB 3.0 or USB 2.0 compatible devices to the system. For pin assignment refer to subsection 10.1.3.

NOTICE **Not all available USB stick devices may work or may work with limitations.**

4.5.5. X103 - DisplayPort

This is a DisplayPort++ compliant interface realized using a standard DisplayPort connector. An external (digital) display can be connected to the DisplayPort connector (X103, Figure 4). For pin assignment refer to subsection 10.1.4.

4.5.6. X102 - Serial Port COM 1

This interface (X102, Figure 4) is provided as a 9-pin D-SUB connector; it is RS232 configured and allows the connection of a serial peripheral. Optionally, the COM1 port can be configured as RS422 or RS 485 port in the system BIOS. For pin assignment refer to subsection 10.1.5.

4.5.7. X202 - Serial Port COM 2 (Option)

This interface (X202, Figure 4) is provided as a 9-pin D-SUB connector; it is RS232 configured and allows the connection of a serial peripheral. For pin assignment refer to subsection 10.1.5.

4.5.8. X203 - Fieldbus Interface (Option)

This interface (X203, Figure 4) is provided as a 9-pin D-SUB connector.

Figure 7: X203 - Optional FIELDBUS interface

The optional Fieldbus interface (FIELDBUS) on the front side of the KBox A-203-sXAL4 (X203, Figure 4) is provided as a 9-pin D-SUB connector and must be ordered separately.

To expand KBox A-203-sXAL4 with an interface for FIELDBUS communication, the FIELDBUS additional card will be installed always into the second mPCIe slot on the bottom of the baseboard. This connection can be implemented at factory only.

4.6. Left and Right Side View

Figure 8: Right side of the KBox A-203-sXAL4 system

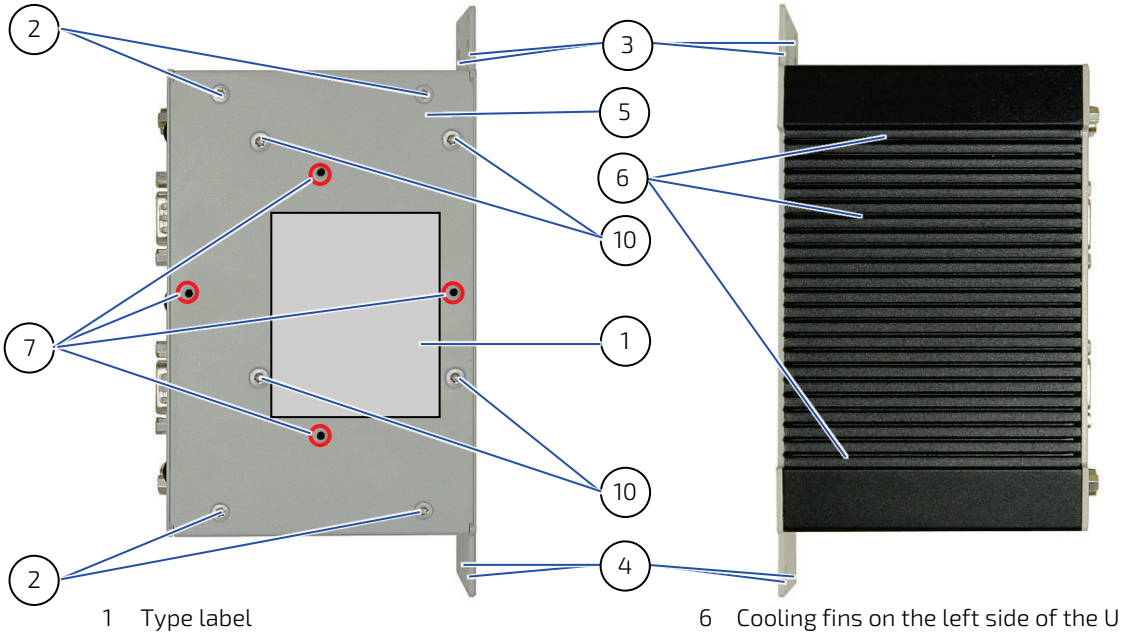


Figure 9: Left side of the KBox A-203-sXAL4 system

1 Type label
2 4x torx screws (3x8) that secure the access cover
3 Upper side of the mounting plate with key holes
4 Lower side of the mounting plate with key holes
5 Access cover
6 Cooling fins on the left side of the U-shaped chassis
7 Threaded holes for mounting the DIN rail mounting clip
8 Cooling fins on the top side of the U-shaped chassis
9 Cooling fins on the bottom side of the U-shaped chassis
10 4x torx screws that secure the internal HDD/SSD drive

4.7. Top and Bottom Side View

Figure 10: Top side of the KBox A-203-sXAL4 system

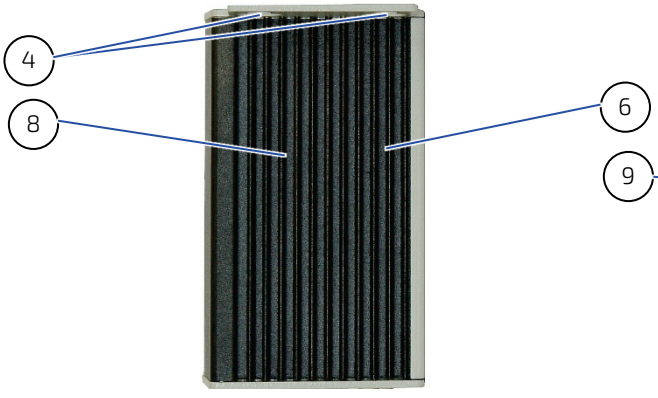
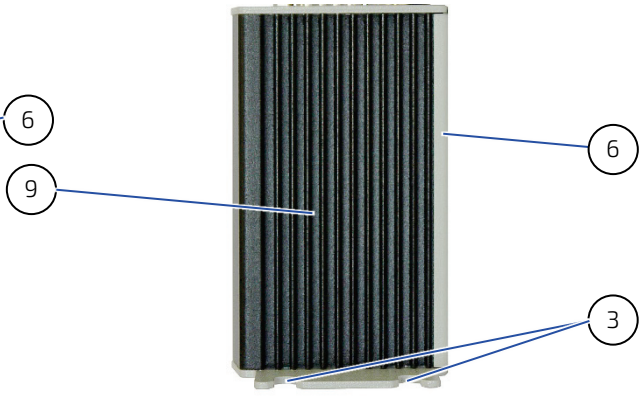


Figure 11: Bottom side of the KBox A-203-sXAL4 system



NOTICE

To provide sufficient heat dissipation for the cooling of the KBox A-203-sXAL4 platform, never cover the cooling fins of the chassis. Do not place any objects onto the device.

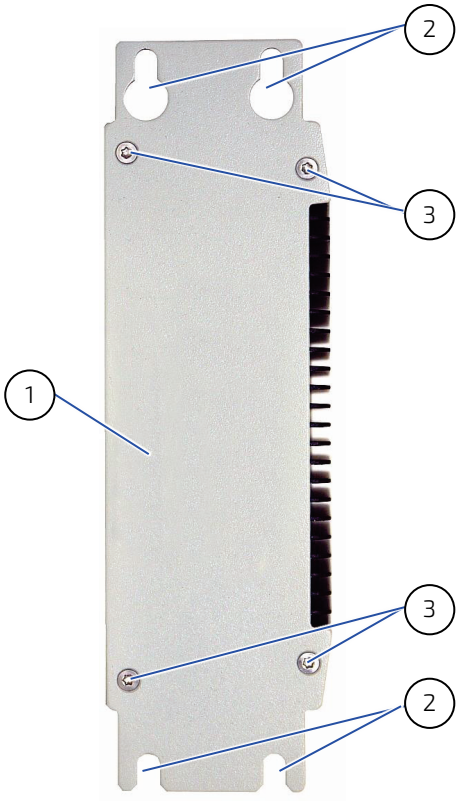
4.8. Rear Side View

4.8.1. Rear Side View of the KBox A-203-sXAL4 with Vertical Mounting Bracket

The KBox A-203-sXAL4 is designed for wall mounting, in vertical position inside of a control cabinet or as desktop.

Please observe the mounting instructions included in the section 6/ "Installation Instructions", and the outline dimensions in the subsection 9.1.2 "Mechanical Specifications of the KBox A-203-sXAL4 with Vertical Mounting Plate".

Figure 12: Rear side of the KBox A-203-sXAL4 system with vertical mounting plate



1 Vertical mounting plate
2 Key holes on the mounting plate
3 Screws that secure the mounting plate to the chassis of the KBox A-203-sXAL4

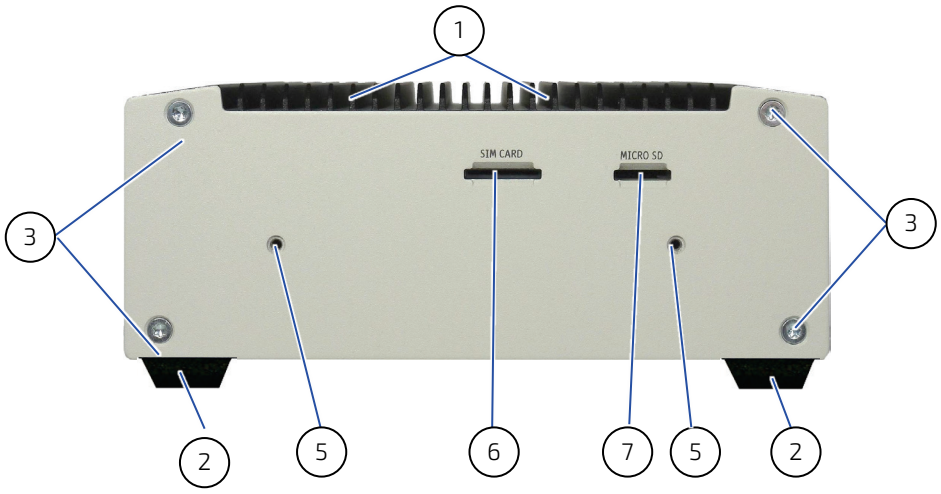
The vertical mounting plate is factory-installed (when KBox A-203-sXAL4 was ordered with vertical mounting plate).

If the vertical mounting plate was ordered later and is to be mounted subsequently, first remove the rear panel of the KBox A-203-sXAL4. Do not mount the vertical mounting plate on top of the rear panel!

To access the SIM card and the MicroSD card slot, the vertical mounting plate has to be removed!

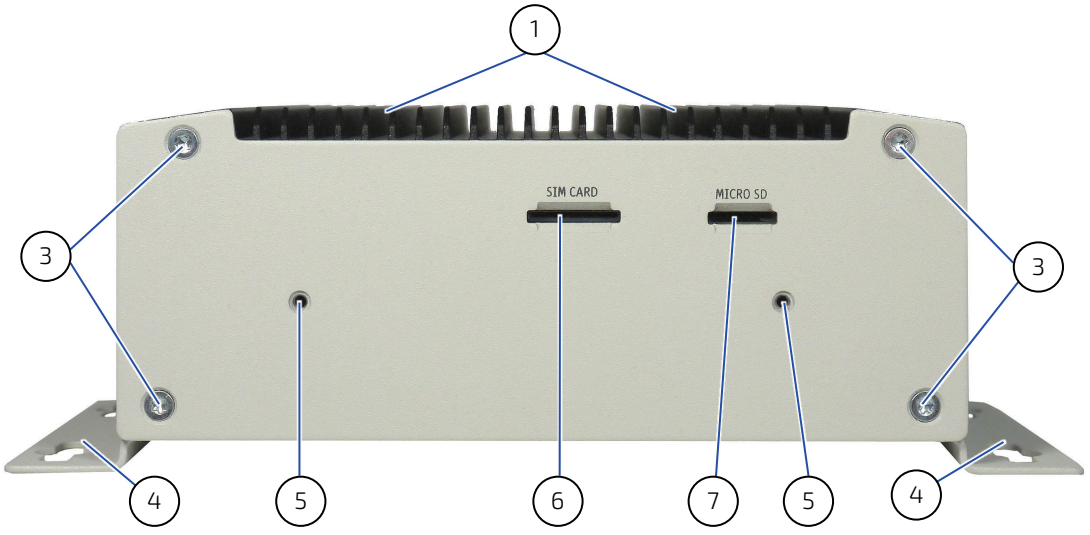
4.8.2. Rear Side View of the KBox A-203-sXAL4 as Desktop with Rubber Feet

Figure 13: Rear side of the KBox A-203-sXAL4 (shown as desktop unit)



4.8.3. Rear Side View of the KBox A-203-sXAL4 with Wallmount Bracket

Figure 14: Rear side of the KBox A-203-sXAL4 (shown with vertical/horizontal mounting brackets)



1 Cooling fins on the top side of the chassis
2 Rubber feet
3 Countersunk screws M3x8 ISO14581 torx
4 Wall/table mount bracket with key holes (left and right) for horizontal or vertical (with interface sides downwards or upwards) mounting position
5 Tapped holes for mounting the optional DIN Rail clip
6 SIM card slot
7 Micro SD card slot

NOTICE

SD Card up to SDHC (SD 2.0) are supported. SDXC (SD 3.0 and SDUC (SD 7.0) cards are not properly supported by Apollo Lake SD Card interface.

4.9. Optional Parts

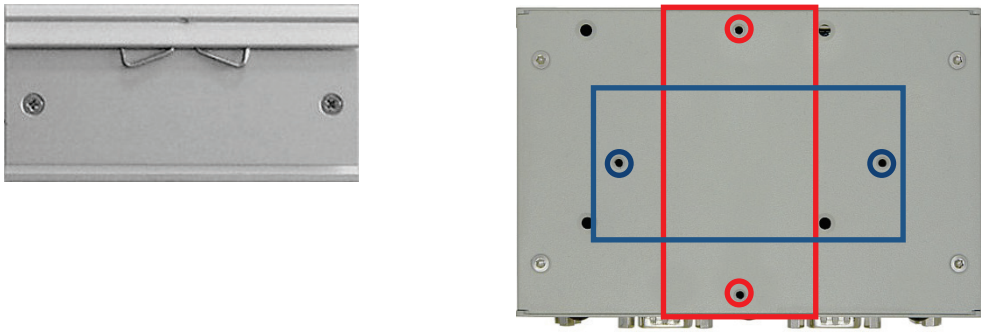
4.9.1. DIN Rail Clip (Option)

For DIN Rail mounting of the KBox A-203-sXAL4 a DIN Rail clip can be ordered (refer to subsection 3.2.2 "Optional Parts").
If ordered, you can adopt your system for mounting to a DIN rail.

4.9.1.1. Mounting the DIN Rail Clip to the Access Cover

Tapped holes are provided on the access cover (Figure 8, pos. 7) for mounting the optional DIN Rail clip in vertical or horizontal orientation (Figure 15).

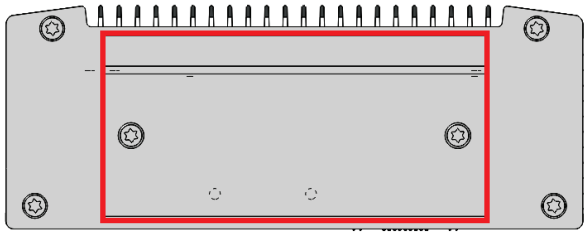
Figure 15: DIN rail clip mounted to the access cover



4.9.1.2. Mounting the DIN Rail Clip to the Rear Plate

Tapped holes are provided on the rear plate (Figure 13, Figure 14, pos 5) for mounting the optional DIN Rail clip in horizontal orientation (Figure 15).

Figure 16: DIN rail clip mounted to the rear plate



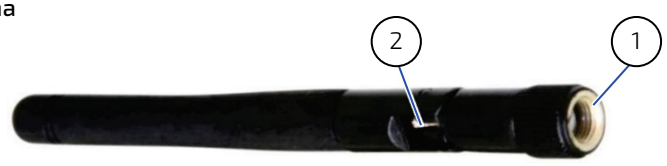
4.9.2. WLAN/Bluetooth (Option)

Depending on the ordered system configuration, the KBox A-203-sXAL4 system (only KBox A-203-sXAL4 used as desktop or KBox A-203-sXAL4 with vertical/horizontal wallmount brackets or with DIN Rail clip) can be equipped with WLAN (WiFi)/Bluetooth hardware.

4.9.2.1. WLAN Antenna

Depending on the ordered system configuration, the KBox A-203-sXAL4system can be equipped with WLAN hardware. If you have ordered a system configuration including WLAN, Reverse (RP) SMA-connectors for screwing on the provided WLAN antennas are installed at the front side (Figure 4; “Antenna 1/Antenna3”).

Figure 17: WLAN (WiFi) antenna



1 Reverse (RP) SMA antenna connector

2 Hinge for positioning the antenna

5/ Power and Thermal Considerations

5.1. System Power Portfolio

Below information gives more insight on the power portfolio of KBOX A-203-sXAL4:

- **Input Voltage Nominal 24 VDC (+20% / -15%)**

Please find in below tables values to calculate the total needed power for the 24 Volt power supply depending on the application. Be aware that the DC power supply must be able to handle peak currents for several seconds.

Table 1: Power Consumption

Power Consumption	SMARC	USB 3.0	MiniPCIe	Sata SSD
CPU	TDP	2 Conn.	2 Slot	2 Pcs.
Intel® Atom™ x5-E3930	6.5W	0-10 W	0-8 W	0-10 W
Intel® Atom™ x7-E3950	12W	0-10 W	0-8 W	0-10 W

5.2. Tuning CPU Power and Performance

There are BIOS settings that can help to limit the power consumption, peak current and thermal heat dissipation.

5.3. Available Processors

Table 2: Overview of some of the features of the used CPU versions in KBOX A-203-sXAL4

CPU	Core/Thread	Processor Base Freq	Burst Freq.	Graphics GPU
Intel® Atom™ x5-E3930	2/2	1.3 GHz	1.8 GHz	UHD 500
Intel® Atom™ x7-E3950	4/4	1.6 GHz	2.0 GHz	UHD 505

5.4. Convection Cooling

The KBox A-203-sXAL4 is designed for convection cooling within the specified ambient air temperature ranges. Therefore it is imperative that air flow to and from the unit is guaranteed.

In addition, implementers must empirically verify the cooling concept for the KBox A-203-sXAL4 including optionally installed devices prior implementing the unit in the intended application.

5.5. Minimum System Clearance

To provide a maximum of airflow through and around the box, minimum distances to surrounding parts must be observed. Please refer to the chapter 6.1 “System Mounting” and Figure 18 “Restricted area for mounting around KBox A-203-sXAL4 (desktop side view with antenna)”.

5.6. Maximum Temperatures

The maximum system ambient temperature depends mostly on the power consumption of the processor and the chipset.

For the temperature evaluation a specialised tool from Intel® was used to set the processor to a defined workload. Depending on the power consumption one or more cores were set to 70% workload. This includes the graphics core. The tool also handles the usage of the "Turbo Mode" of certain processor types.

The processor utilisation depends highly on the software used. Software using multicore feature will run on several cores whereas standard software will only utilise one core.

5.7. Processor Thermal Monitoring

The processor used with the KBox A-203-sXAL4 system provides internal thermal monitoring. Every core of the processor comprises a temperature sensor.

To allow an optimal operation and long-term reliability, the processor must operate in the specified temperature range. To avoid overheating the processor performs an automatic thermal management, which intends to keep the processor temperature below the highest value of the temperature range. This behavior is a CPU standard feature.

5.8. Processor Thermal Trip Feature

The Processor Thermal Trip feature protects the processor from catastrophic overheating. The Thermal Trip Sensor threshold is set well above the normal operating temperature to ensure that there are no false trips. When triggered, the processor will stop all executions. This behavior cannot be altered. Once activated, the event remains latched until power is cycled.

6/ Installation Instructions

The KBox A-203-sXAL4 system is designed for operating:

- installed onto a wall or within a control cabinet by use of the vertical mounting plate
- installed within a control cabinet by use of the DIN Rail mounting clip

NOTICE

Whenever possible, unpack or pack this product only at EOS/ESD safe work stations. Where a safe work station is not guaranteed, it is important for the user to be electrically discharged before touching the product with his/her hands or tools. This is most easily done by touching a metal part of the system chassis.

Do not handle this product out of its protective enclosure while it is not used for operational purposes unless it is otherwise protected.

Prior any installation work, ensure that there are no live wires on the installation site.

Do not handle the device if there is any damage visible.

Do not operate the KBox A-203-sXAL4 with foreign objects inside the chassis.

Further do not insert any retrieval device into the device while it is connected to power.

Kontron rejects all liability for any and all damages resulting from operation of the unit with foreign objects inside the chassis.

The KBox A-203-sXAL4 has to be installed and operated only by trained and qualified personnel.

Only personnel with appropriate qualifications, trainings and authorization are permitted to install and work with the Kontron KBox A-203-sXAL4.

This device shall only be installed in or connected to systems that fulfill all necessary technical and specific environmental requirements.

The unit must be placed such that there is sufficient space in front of it for connecting the cables to the I/O interface connectors and for operating the power button.

Leave sufficient free space around the unit to prevent the device from possibly overheating!

To ensure proper operation, we recommended free space as specified in Figure 18 “and Figure 19.

Refer also to section 9.1.2 “Mechanical Specifications”.

The KBox A-203-sXAL4 must be firmly attached to a clean flat and solid mounting surface. Use proper fastening materials suitable for the mounting surface. Ensure that the mounting surface type and the used mounting solution safely support the load of the KBox A-203-sXAL4 and the attached components.

Please follow the local/national regulations for grounding.

The voltage feeds must not be overloaded. Adjust the cabling and the overcurrent protection to correspond with the electrical figures indicated on the type label.

The type label is located on the access cover of the system.

It is recommended that the last cable attached to the system should be the power cable! Refer to the section 6.2 “DC Power Connection” and chapter 7/ “Starting Up”.

6.1. System Mounting

In order to adapt the KBox A-203-sXAL4 for mounting Kontron offers different mounting solution such as:

- **KBox A-203-sXAL4 configuration with vertical mounting plate for installation into a control cabinet or to a wall**
- **KBox A-203-sXAL4 for DIN Rail mounting into a control cabinet**
- **KBox A-203-sXAL4 configuration with horizontal mounting brackets for installation into a control cabinet or to a wall**
- **KBox A-203-sXAL4 for desktop operation without mounting (with rubber feet)**

Depending on the ordered KBox A-203-sXAL4 configuration, your system is supplied with the corresponding mounting plate, mounting brackets and/or DIN Rail clip.

The key holes of the vertical mounting plate (Figure 12, pos. 2) allow you to mount the KBox A-203-sXAL4 inside the control cabinet in vertical position.

The key holes of the mounting brackets (Figure 12, pos. 2) allow you to mount the KBox A-203-sXAL4 to a wall or table in vertical as well as in horizontal position.

Prepare the mounting surface with four screws and if necessary anchors corresponding to the mounting surface type (fire-resistant material). Please refer to the information for mounting in the section 9.1.2, “Mechanical Specifications of the KBox A-203-sXAL4 with Vertical Mounting Plate”, 9.1.3 “Mechanical Specifications of the KBox A-203-sXAL4 with Wallmount Bracket”, 9.1.1 “Mechanical Specifications of the KBox A-203-sXAL4 as Desktop” or refer to the drawings for KBox A-203-sXAL4 on our web site. The drawings can be downloaded from our web site www.kontron.com by selecting the product name. Register for the EMD Customer Section to get access.

For a sufficient air circulation around the device, we recommend not to mount or operate any other devices within the “Restricted Area” around the KBox A-203-sXAL4; refer to the red marked area in Figure 18, Figure 19.

Figure 18: Restricted area for mounting around KBox A-203-sXAL4 (desktop side view with antenna)

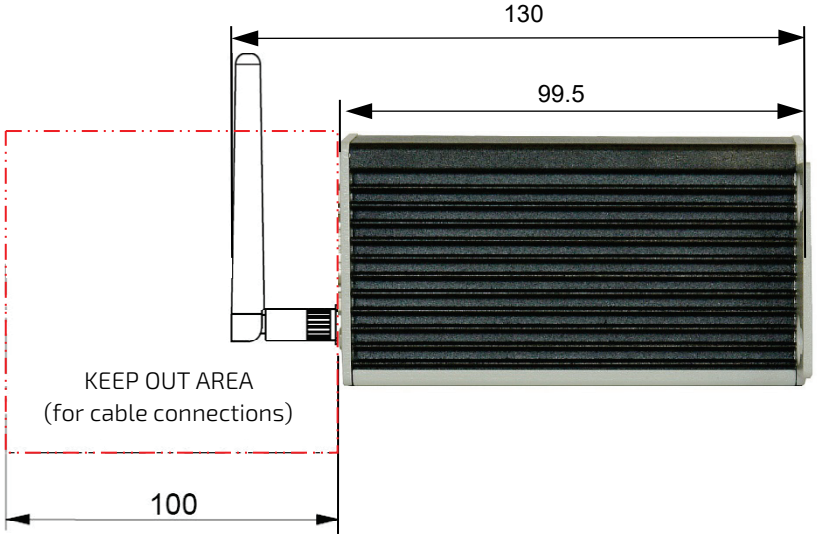
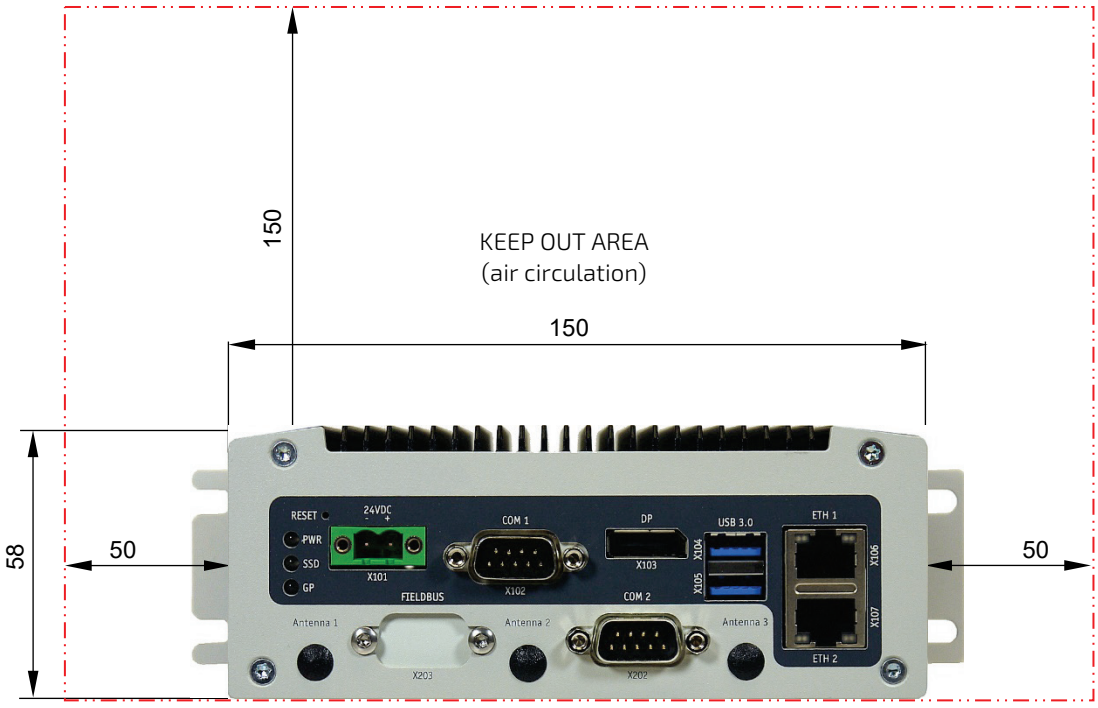


Figure 19: Restricted area for mounting around KBox A-203-sXAL4 (front view with mounting brackets)

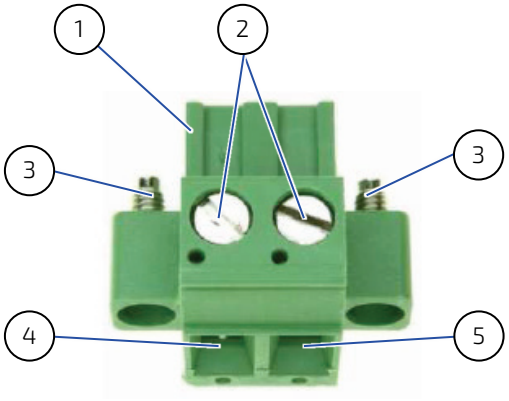


6.2. DC Power Connection

The KBox A-203-sXAL4 is connected by a power plug terminal ("TE Connectivity 796859-2") connector to a DC power source via a DC power supply wiring (only the power plug terminal is included).

The KBox A-203-sXAL4 is delivered with a DC power plug terminal (2-pin power connector). For DC connection, prepare the connecting wires using the supplied TE Connectivity plug terminal: 796859-2.

Figure 20: Power plug terminal



1 2-pin power plug terminal

2 Slotted pan head screws

3 Screws for securing the power plug terminal

4 Location for inserting the "+24V" wire

5 Location for inserting the "0V" wire

6.2.1. Cabling

For the pin assignment of the Phoenix power plug terminal refer to the subsection 4.5.1 "X101 - Power Input Connector"

1. Cut the required length three isolated wires (1 mm2) AWG18 and strip each end 5 –7 mm.
2. Twist the striped wire-ends and provide them with ferrules.
3. Loosen the two slotted pan head screws (Figure 20, pos. 2) of the DC plug terminal far enough so that you can insert the end of the prepared wires.
4. Insert the wires into the corresponding clamp of the power plug terminal. Make sure that you have the right polarity of the connection [refer to Figure 20, Figure 5 or subsection 10.1.1, "(X101) Power Input Connector"].
5. Fasten the screws to secure the wires into the clamps of the plug terminal.

7/ Starting Up

The KBox A-203-sXAL4 must be only operated with the nominal voltage of 24V DC of type SELV. For details refer to the chapter 9/ "Technical Specifications".

7.1. Connecting to DC Main Power Supply

The DC input connector (Figure 4 and Figure 5, marked X101) is located on the front side of the KBox A-203-sXAL4. The KBox A-203-sXAL4 will be connected to a DC main power supply via the supplied power plug terminal (see Figure 20) and corresponding power wires (not included).

Before using your system, become familiar with the system components and check that everything is connected properly. Following a proper cabling procedure will prevent a false power-on condition, which could result in unit operational failure.

Also, it is recommended that the last connections attached to the system should be the power wires!

NOTICE

The KBox A-203-sXAL4 may not be connected to a central DC power supply.

The KBox A-203-sXAL4 must be connected DC mains power supply complying with the SELV (Safety Extra Low Voltage) requirements of EN 60950-1 standard.
It must be observed that wiring and short-circuit/overcurrent protection is performed according to the applicable standards, regulations and respect to the electrical specification of the KBox A-203-sXAL4.

Even when the system is shut down (via the operating system) parts of the system are still energized.

The disconnecting device (fuse/circuit backer) rating must be in accordance with the wire cross-section and the rated current of the KBox A-203-sXAL4.

After connecting to power, the KBox A-203-sXAL4 starts up automatically.

The wires used for power connections must be clearly marked (+/-) to ensure that they will be proper connected to the DC IN connector of the KBox A-203-sXAL4 and to the main power source, corresponding to signals marked. Refer to Figure 5 and Figure 20.

In addition, the cables must have some form of support so as to minimize the strain on the unit's connectors.

To connect the KBox A-203-sXAL4 to a corresponding DC main power supply, please perform the following steps:

1. Ensure that the DC power source is switched off via a disconnecting device (circuit breaker), in order to ensure that no power is flowing from the external DC power source during the connection procedure.
2. Connect the power terminal prepared as described in the subsection 6.2.1 "Cabling" to the DC input connector (Figure 4 and Figure 5 marked X101) of the KBox A-203-sXAL4. The DC input connector is located on the front side and is marked "24VDC".
3. Connect the other ends of the DC power wires to the connections of the DC main power supply. Pay attention to the polarity of the connections.
4. Switch on the disconnecting device (circuit breaker) in order to apply voltage to the terminals of the power wires.

7.2. Operating System and Hardware Component Drivers

Your system can be supplied optionally with a pre-installed operating system.

If you have ordered your KBox A-203-sXAL4 with a pre-installed operating system, all drivers are installed in accordance with the system configuration ordered (optional hardware components). Your system is fully operational when you switch it on for the first time. Please pay attention to the following note.

Important information on the use of the pre-installed "WINDOWS 10 IOT FOR EMBEDDED SYSTEMS" operating system:

The terms and conditions for the use of the pre-installed operating systems are specified in the document "MICROSOFT SOFTWARE LICENSE TERMS".

You can download this document from our web site www.kontron.com by selecting Product/ Downloads tab/Windows.

If you have ordered The KBox A-203-sXAL4 without a pre-installed operating system, you will need to install the operating system and the appropriate drivers for the system configuration you have ordered (optional hardware components) yourself.

You can download the relevant drivers for the installed hardware from our web site at https://www.kontron.com/ by selecting the product. Register for the EMD Customer Section to get access.

Pay attention to the manufacturer specifications of the operating system and the integrated hardware components.

Latest Linux Distribution and Kernel shall be used in order to properly support the APL architecture (e.g. for Yocto)

8/ Maintenance and Cleaning

Equipment from Kontron requires only minimum servicing and maintenance for proper operation.

- For light soiling, clean the KBox A-203-sXAL4 with a dry cloth.
  Carefully remove dust from the surface of the cooling fins of the chassis using a clean, soft brush.
- Stubborn dirt should be removed using a mild detergent and a soft cloth.

Do not use steel wool, metallic threads or solvents like abrasives, alcohol, acetone or benzene for cleaning the KBox A-203-sXAL4.

9/ Technical Specifications

Table 3: Technical Specifications

KBox A-203-sXAL4	
Installed CPU Module and Baseboard	Baseboard with SMARC sXAL4 module Intel Atom® x5-E3930 Intel Atom® x7-E3950
RAM	up to 8 GB LPDDR4
BIOS	AMI® BIOS
Interfaces (front side accessible)	2x Ethernet (10/100/1000 Mbit/s) 2x USB 3.0 1x DisplayPort 1x COM 1 (RS232; optional: RS422/RS485) *Optional:* 1x COM 2 (RS232) 1x Fieldbus Port
Storage	1x microSD card socket (accessible from rear) up to 32 GByte onboard flash (eMMC) 1x mSATA socket Drive Bay to install 1x 2.5" SATA SSD
Expansion	Up to 2x mPCIe sockets for full-size modules (1x with SIM Card socket, 1x for Fieldbus expansion/shared with mSATA)
Controls (at the front side)	Reset button (RESET)
Indicators (at the front side)	PWR (Power LED) SSD (SSD activity LED) GP (General Purpose LED)
DC IN Connector (at the front side)	2-pin DC input connector
Protection Class	IP20
Rated Voltage (tolerance)	24 VDC (+20%/-15%)

9.1. Mechanical Specifications

Table 4: Mechanical Specifications

Dimensions	KBox A-203-sXAL4 with vertical mounting plate	KBox A-203-sXAL4 with vert./horiz. mounting brackets	KBox A-203-sXAL4 as desktop
Height	150 mm (10.47")	192 mm (5.33")	62 mm (2.58")
Width	58 mm (2.28")	58mm (10.63") vertical 65mm (xxxx) wall/table	150 mm (8.27")
Depth	99.5 mm (5.43")	99.5 mm (2.56")	99.5 mm (5.51")
Weight (without packaging, without expansions)	Approx. 1.85 kg (4.08 lbs.)	Approx. 2 kg (4.41 lbs.)	Approx. 1.8 kg (3.97 lbs.)
Chassis	Cooling fins, black Chassis: steel sheet, light grey (RAL 7035) Side with External Interfaces : trim strips, traffic grey (RAL 7043)		

For vertical mounting plate and wall/table mounting brackets, the dimensions are provided in vertical orientation, for desktop operation, the dimensions are provided in horizontal orientation of the KBox a-250.

9.1.1. Mechanical Specifications of the KBox A-203-sXAL4 as Desktop

Figure 21: Dimensions: Front as desktop

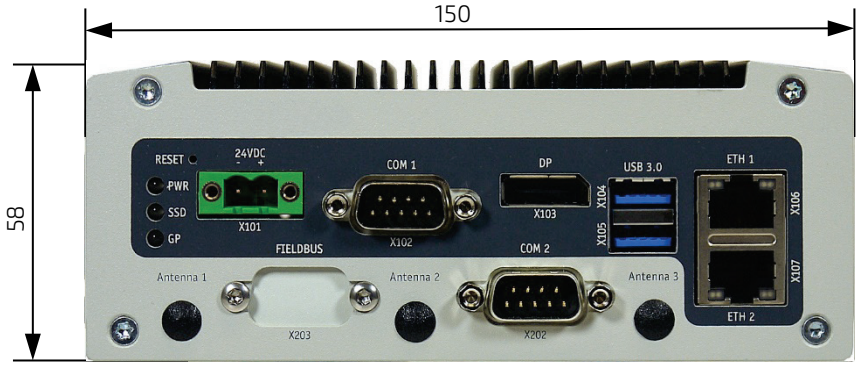
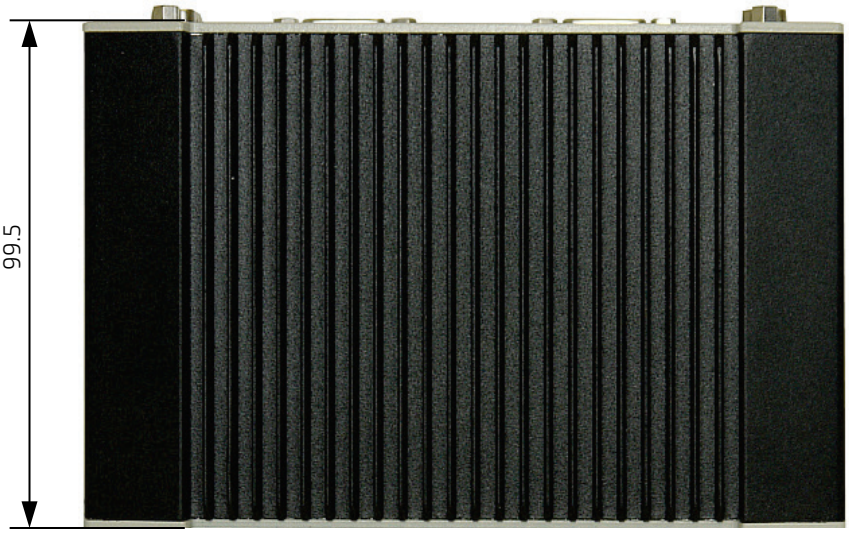


Figure 22: Dimensions: Front side with antennas and wall/table mounting brackets



9.1.2. Mechanical Specifications of the KBox A-203-sXAL4 with Vertical Mounting Plate

Figure 23: Dimensions: Left side

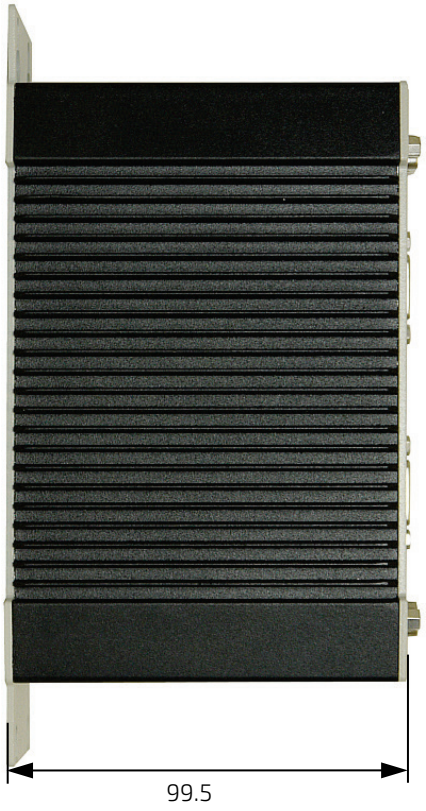


Figure 24: Dimensions: Rear side with vertical mounting plate

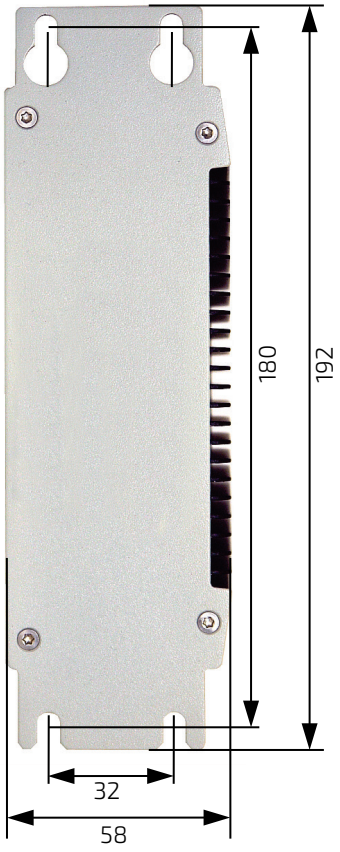
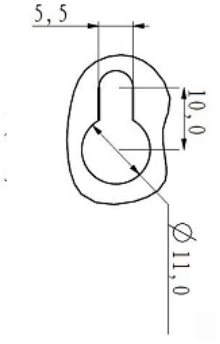


Figure 25: Dimensions: Detail key hole



9.1.3. Mechanical Specifications of the KBox A-203-sXAL4 with Wallmount Bracket

Figure 26: Dimensions: Top side (with wall/table mounting brackets)

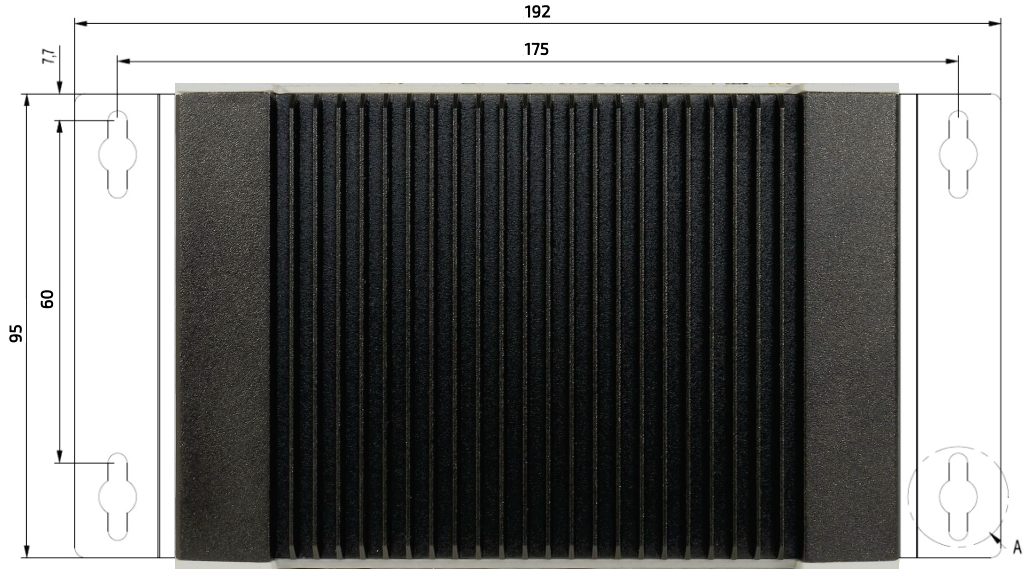


Figure 27: Dimensions: front side (with wall/table mounting brackets)

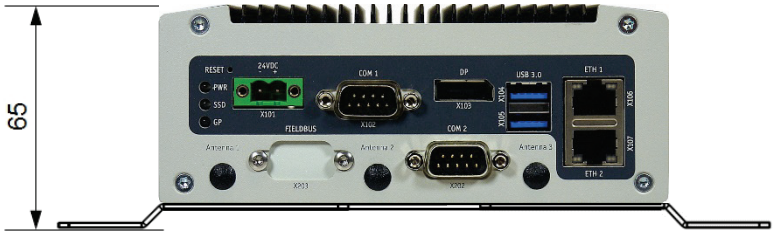
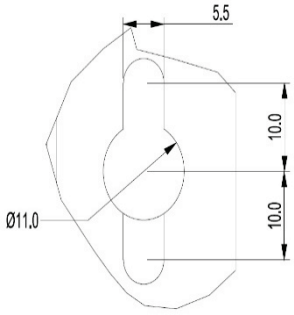


Figure 28: Detail mounting slide hole (wall/table mounting brackets)



9.2. Environmental Specifications

Table 5: Environmental Specifications

	KBox A-203-sXAL4 (Standard Version)
Thermal Management	Fanless cooling
Operating Temperature	With SMARC module eMMC: 0°C … +60°C (32 … 140°F) With additional SSD: 0°C … +50°C (32 … 122°F)
Storage/Transit Temperature	-40°C … +85°C (-40°F … +185°F)
Relative Humidity (Operating/Transit)	93 % @ 40 °C (non-condensing) acc. to IEC 60068-2-78
Max. Operation Altitude	2,000 m (6,560 ft)
Max. Storage/Transit Altitude	10,000 m (32,810 ft)
Operating Shock	15 G, 11 ms, half sine, acc. to IEC 60068-2-27
Non-operating/Transit Shock	50 G, 11 ms, half sine (IEC 60068-2-27)
Operating Vibration	5 - 500 Hz, 1 G (IEC 60068-2-6)
Non-operating/Transit Vibration	5 - 500 Hz, 2 G (IEC 60068-2-6)

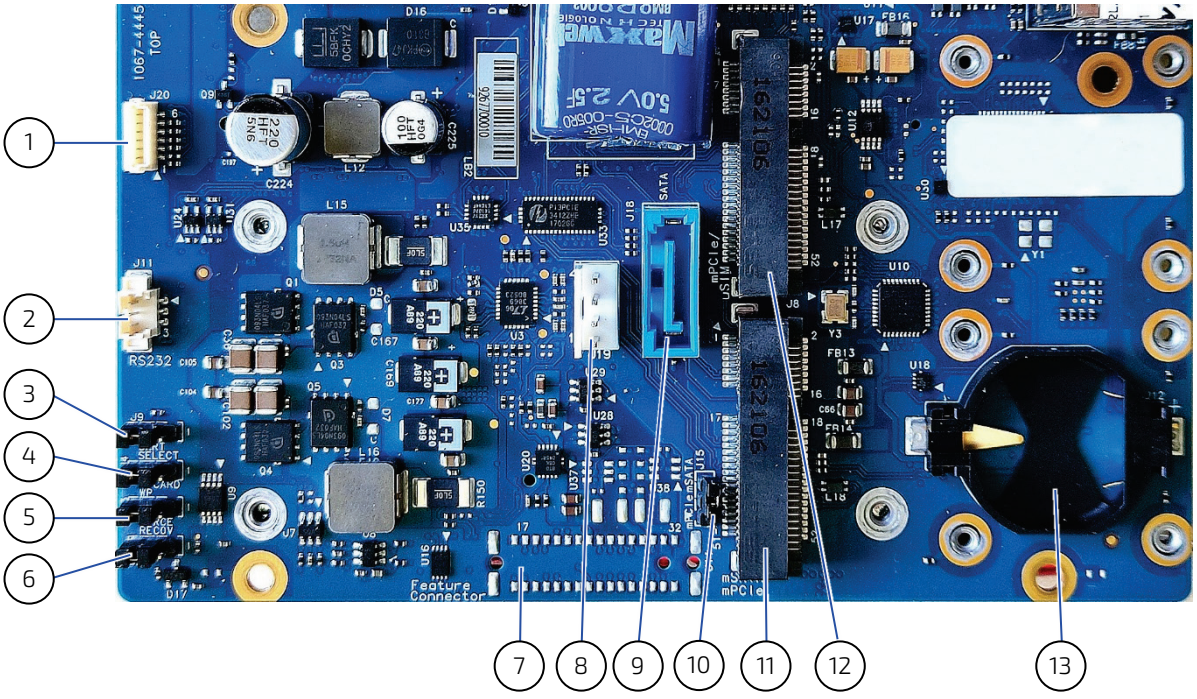
9.3. CE Directives and Standards

Table 6: CE Directives and Standards

CE-Mark Compliant	Electromagnetic Compatibility	Directive 2014/30/EU
	Low Voltage	Directive 2014/35/EU
	RoHS II	Directive 2011/65/EU
CE-Mark Compliant (on request)	Radio Equipment Directive (RED)	Directive 2014/53/EU
	RoHS II	Directive 2011/65/EU
EMC Emission	EN 55032	Industrial, scientific and medical equipment - Radio-frequency disturbance characteristics - Limits and methods of measurement
EMC Immunity	EN 61000-6-2	Electromagnetic compatibility (EMC), part 6-2: Generic standards- Immunity for industrial environment
EMC Radio Interference	EN 301 489-1 V2.2.0	ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements; Harmonised Standard covering the essential requirements of article 3.1(b) of Directive 2014/53/EU and the essential requirements of article 6 of Directive 2014/30/EU
EMC Radio Interference	*EN 301 489-17 V3.1.1*	ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 17: Specific conditions for Broadband Data Transmission Systems; Harmonised Standard covering the essential requirements of article 3.1(b) of Directive 2014/53/EU
RF Spectrum Efficiency & Spurious Emission	EN 300 328 V2.2.2	Wideband transmission systems; Data transmission equipment operating in the 2,4 GHz ISM band and using wide band modulation techniques; Harmonised Standard covering the essential requirements of article 3.2 of Directive 2014/53/EU
FCC CFR 47 Part 15, Subpart B	ANSI C63.4 CISPR 16 ICES-003	The American National Standards Institute standard ANSI C63.4 is the key standard for measuring electrical and electronic equipment for showing compliance to FCC and Industry Canada regulations.
Safety	UL/IEC/EN 62368-1	Safety requirements for multimedia equipment
Safety and Health	EN 62311	Assessment of the compliance of low power electronic and electrical equipment with the basic restrictions related to human exposure to electromagnetic fields (10 MHz to 300 GHz)

9.4. KBox A-203-sXAL4 Shunt Jumper and Connector Information

Figure 29: Jumper Locations on the Baseboard



1 **J20**: SPI Debug Connector

2 **J11**: RS232 Connector

3 **J9**: UART Select (To select UART source for COM2)
- Pin 1 - 2: Enable CPLD_UART to COM2 (In case there is a need for Serial Console Redirection)
- Pin 2 - 3: Enable USB to UART to COM2

4 **J4**: SD Card WP (To enable write project on the SD Card)
- Pin 1 - 2: Enable Write Protect
- **Pin 2 - 3: Disable Write Protect**

5 **J13**: CMOS Reset (To Restore BIOS defaults)
- Pin 1 - 2: CMOS Reset
- Pin 2 - 3: Default Operation (Default)

6 **J21**: Boot Select (For debug purpose, to allow user to emulate external BIOS chip or flash BIOS through J20)
- Pin 1 - 2: Boot from BIOS Debug Header
- Pin 2 - 3: Boot from Module (Default)

7 **J14**: Feature Connector (optional)

8 **J19**: SATA Power Connector

9 **J18:** SATA Disk Interfaces

10 **J15**: mSata/PCIe select (To select when either mSATA or mPCIE is used)
- Pin 1 - 2: mPCIE (Default for Standard A-203)
- Pin 2 - 3: mSATA

11 **J8**: mSATA/mPCIe Connector

12 **J7**: mPCIe Connector

13 **J12**: Battery Connector

Refer also to chapter 10.2 "Internal interfaces" for connector pinout information.

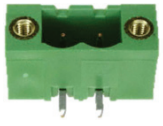
10/ Standard Interfaces – Pin Assignments

10.1. External interfaces

Low-active signals are indicated by a minus sign.

10.1.1. (X101) Power Input Connector

Table 7: (X101) Power Input Connector

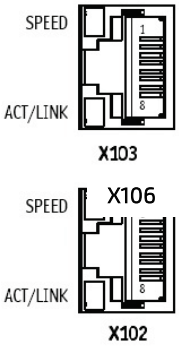
Pin	Signal Name	2-pin POWER SUBCON (male)
1	+24 VDC (input)	
2	0V (input)	

NOTICE

If any of the supply voltages drops below the allowed operating level longer than the specified hold-up time, all the supply voltages should be shut down and left OFF for a time long enough to allow the internal board voltages to discharge sufficiently.
If the OFF time is not observed, parts of the board or attached peripherals may work incorrectly or even suffer a reduction of MTBF.
The minimum OFF time depends on the implemented PSU model and other electrical factors and needs to be measured individually for each case.

10.1.2. (X106 as ETH 1 and X107 as ETH 2) Ethernet Connectors

Table 8: (X106, X107) Ethernet Connectors

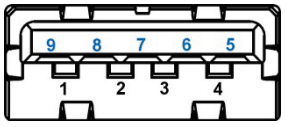
Pin	Signal Name	ETH1, ETH2 (RJ45)
1	MDI0+	
2	MDI0-	
3	MDI1+	
4	MDI2+	
5	MDI2-	
6	MDI1-	
7	MDI3+	
8	MDI3-	

X107

Speed (Mbps)		LINK/ACT	
		LINK	ACTIVE
10	off	on	orange on (blinking)
100	green	on	orange on (blinking)
1000	orange	on	orange on (blinking)

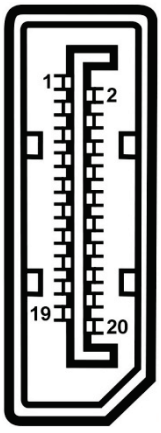
10.1.3. (X104, X105) USB 3.0 Ports

Table 9: (X104, X105) USB 3.0 Port

Pin	Signal Name	Pin	Signal Name	9-pin USB Connector Type A Version 3.0/2.0
USB 2.0 contact pins		USB 3.0 contact pins		
1	VCC, fused (900 mA max.)	5	StdA_SSRX-	
2	Data-	6	StdA_SSRX+	
3	Data+	7	GND_DRAIN	
4	GND	8	StdA_SSTX-	
		9	StdA_SSTX+	

10.1.4. (X103) DisplayPort

Table 10: (X103) DisplayPort

Pin	Signal Name	DisplayPort	Signal Name	Pin
1	ML Lane 0 (p)		GND (ML Lane 0)	2
3	ML Lane 0 (n)		Lane 1 (p)	4
5	GND (ML Lane 1)		Lane 1 (n)	6
7	Lane 2 (p)		GND (ML Lane 2)	8
9	Lane 2 (n)		Lane 3 (p)	10
11	GND (ML Lane 3)		Lane 3 (n)	12
13	AUX SEL#		Pull-down to GND	14
15	AUX CH (p)		GND (AUX CH)	16
17	AUX CH (n)		Hot Plug	18
19	GND (GND_DDC)		3.3V (DDC EEPROM power 500 mA fused	20

10.1.5. (X102) Serial Interface COM 1 (RS232/485/422)

Table 11: (X102) Serial Interface COM 1 (RS232)

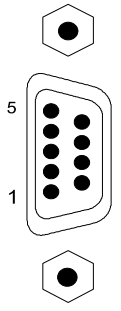
Pin	RS232		RS485/422* Full Duplex	RS485/422* Half Duplex
1				
2	RXD	(Receive Data)	RX+	
3	TXD	(Transmit Data)	TX-	Data-
4				
5	Ground			
6				
7	RTS	(Request to Send)	TX+	Data+
8	CTS	(Clear to Send)	RX-	
9				

*Once configured to RS485 in BIOS, COM1 can work as 485 or 422

This port provides no internal termination in RS485/422 mode. If necessary, it has to be terminated externally.

10.1.6. (X202) Serial Interface COM 2 (RS232)

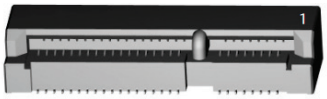
Table 12: (X202) Serial Interface COM 2 (RS232)

Pin	Signal Name		9-pin D-SUB Connector (male)
1	NC		
2	RXD	(Receive Data)	
3	TXD	(Transmit Data)	
4	NC		
5	GND	(Signal Ground)	
6	NC		
7	NC		
8	NC		
9	NC		

10.2. Internal interfaces

10.2.1. (J7) mPCIe

Table 13: (J7) mPCIe

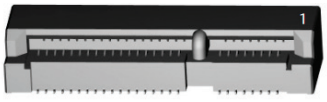


Pin	Signal	Type
1	WAKE#	
2	+3V3	PWR
3	NC	NC
4	GND	PWR
5	NC	NC
6	+1.5V	PWR
7	CLKREQ#	
8	UIM_PWR	PWR
9	GND	PWR
10	UIM_DATA	NC
11	PCIE_mini CLK#	
12	UIM_CLK	NC
13	PCIE_mini CLK	
14	UIM_RESET	NC
15	GND	PWR
16	UIM_VPP	NC
17	UIM_IC_DM	NC
18	GND	PWR
19	UIM_IC_DP	
20	W_Disable#	
21	GND	PWR
22	RST#	
23	PCIE_RX-	
24	+3V3	PWR
25	PCIE_RX+	
26	GND	PWR
27	GND	PWR
28	+1.5 V	PWR
29	GND	PWR
30	SMB_CLK	
31	PCIE_TX-	
32	SMB_DATA	
33	PCIE_TX+	
34	GND	PWR
35	GND	PWR

Pin	Signal	Type
36	USBhub_D1_N	IO
37	GND	PWR
38	USBhub_D1_P	IO
39	+3V3	PWR
40	GND	PWR
41	+3V3	PWR
42	NC	NC
43	SATA_DET5#	
44	NC	NC
45	NC	NC
46	NC	NC
47	NC	NC
48	+1.5 V	PWR
49	NC	NC
50	GND	PWR
51	NC	NC
52	+3V3	PWR

10.2.2. (J8) mSATA/mPCIe

Table 14: (J8) mSATA/mPCIe



Pin	Signal	Type
1	WAKE#	
2	+3V3	PWR
3	NC	NC
4	GND	PWR
5	NC	NC
6	+1.5V	PWR
7	CLKREQ#	
8	UIM_PWR	PWR
9	GND	PWR
10	UIM_DATA	NC
11	PCIE_mini CLK#	
12	UIM_CLK	NC
13	PCIE_mini CLK	
14	UIM_RESET	NC
15	GND	PWR

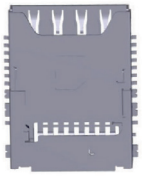
Pin	Signal	Type
16	UIM_VPP	NC
17	UIM_IC_DM	NC
18	GND	PWR
19	UIM_IC_DP	
20	W_Disable#	
21	GND	PWR
22	RST#	
23	PCIE_RX-	
24	+3V3	PWR
25	PCIE_RX+	
26	GND	PWR
27	GND	PWR
28	+1.5 V	PWR
29	GND	PWR
30	SMB_CLK	
31	PCIE_TX-	
32	SMB_DATA	
33	PCIE_TX+	
34	GND	PWR
35	GND	PWR
36	USBhub_D1_N	IO
37	GND	PWR
38	USBhub_D1_P	IO
39	+3V3	PWR
40	GND	PWR
41	+3V3	PWR
42	NC	NC
43	SATA_DET5#	
44	NC	NC
45	NC	NC
46	NC	NC
47	NC	NC
48	+1.5 V	PWR
49	NC	NC
50	GND	PWR
51	NC	NC
52	+3V3	PWR

NOTICE

Mini PCI modules fitted on mPCIe connector J8 of the KBox A-203-SXAL4 are not properly detected by the KBOX_A203_sXA4R_BIOS_Ver_0.01. Just the mSATA interface may be used. This will be fixed with the next BIOS version. Please check the EMD customer section for a BIOS update.

10.2.3. (J16) microSD

Table 15: (J16) microSD

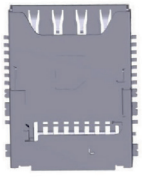


Pin	Type
1	DAT2
2	CD/DAT3
3	CMD
4	V_VDD
5	CLK_T5
6	VSS/GND
7	DAT0
8	DAT8
S1	Card Detect
S2	Switch

NOTICE SD Card up to SDHC (SD 2.0) are supported. SDXC (SD 3.0 and SDUC (SD 7.0) cards are not properly supported by Apollo Lake SD Card interface.

10.2.4. (J17) SIM

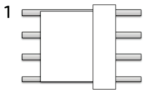
Table 16: (J17) SIM



Pin	Type
C1	V_VCC
C2	RST
C3	CLK_S3
C5	GND_S5
C6	V_VPP
C7	I/O
CD1	UIM_D+
CD2	UIM_D-

10.2.5. (J19) SATA Power Connector

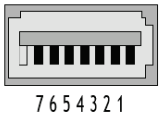
Table 17: (J19) SATA Power Connector



Pin	Signal	Description	Type
1	5V0	Power +5V	PWR
2	GND	Ground	PWR
3	GND	Ground	PWR
4	NC		

10.2.6. (J18) SATA (Serial ATA) Disk Interfaces

Table 18: (J18) SATA (Serial ATA) Disk Interfaces



Pin	Signal	Type
1	GND	PWR
2	SATA* TX+	
3	SATA* TX-	
4	GND	PWR
5	SATA* RX-	
6	SATA* RX+	
7	GND	PWR

10.2.7. (J11) RS232

Table 19: (J11) RS232

Pin	Signal	Type
1	RS232_SIN	
2	RS232_OUT	
3	GND	PWR

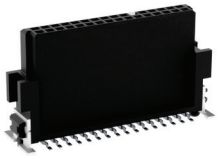
10.2.8. (J12) Battery Connector

Table 20: (J12) Battery Connector

Pin	Signal	Type
1	V_BAT	PWR
2	GND	PWR

10.2.9. (J14) Feature Connector (optional)

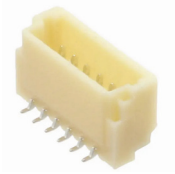
Table 21: (J14) Feature Connector



Pin	Description	Pin	Description
1	I2C_GP_CLK_1V8	17	GND
2	I2C_GP_DATA_1V8	18	SIO_SPI_FS1_1V8
3	GND	19	SIO_SPI_FS0_1V8
4	USBHUB_DN4_+	20	SIO_SPI_CLK_1V8
5	USBHUB_DN4_-	21	SIO_SPI_MISO_1V8
6	GND	22	SIO_SPI_MOSI_1V8
7	GND	23	GND
8	PM_CARRIER_PWR_ON_1V8	24	GND
9	GPIO0/CAM0_PWR#_1V8	25	GPIO4/HDA_RST#_1V8
10	GPIO1/CAM1_PWR#_1V8	26	GPIO5/PWM_OUT#_1V8
11	GPIO2/CAM0_RST#_1V8	27	GPIO6/TACHIN_1V8
12	GPIO3/CAM1_RST#_1V8	28	GPIO7_1V8
13	GND	29	V_3V3_OUT
14	USBHUB_DN3_+	30	RESET_IN_1V8#
15	USBHUB_DN3_-	31	V_1V8
16	GND	32	V_5V0_OUT

10.2.10. (J20) SPI Debug Connector

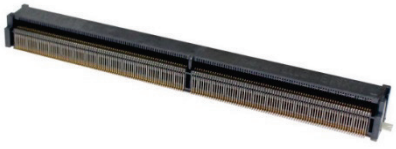
Table 22: (J20) SPI Debug Connector



Pin	Signal	Type
1	V_1V8	PWR
2	SPI_CS#	
3	SPI_CLK	
4	SPI_MISO	
5	SPI_MOSI	
6	GND	PWR

10.2.11. (J1) SMARC 2.0 Connector

Table 23: (J1) SMARC 2.0 Connector



P-Pin	Signal	S-Pin	Signal
P1	SMB_ALERT_1V8#	S1	CSI1_TX+/I2C_CAM1_CK
P2	GND	S2	CSI1_TX-/I2C_CAM1_DAT
P3	CSI1_CK+	S3	GND
P4	CSI1_CK-	S4	RSVD
P5	GBE1_SDP	S5	CSI0_TX-/I2C_CAM0_CK
P6	GBE0_SDP	S6	CAM_MCK
P7	CSI1_RX0+	S7	CSI0_TX+/I2C_CAM0_DAT
P8	CSI1_RX0-	S8	CSI0_CK+
P9	GND	S9	CSI0_CK-
P10	CSI1_RX1+	S10	GND
P11	CSI1_RX1-	S11	CSI0_RX0+
P12	GND	S12	CSI0_RX0-
P13	CSI1_RX2+	S13	GND
P14	CSI1_RX2-	S14	CSI0_RX1+
P15	GND	S15	CSI0_RX1-
P16	CSI1_RX3+	S16	GND
P17	CSI1_RX3-	S17	GBE1_MDI0+
P18	GND	S18	GBE1_MDI0-

P-Pin	Signal	S-Pin	Signal
P19	GBE0_MDI3-	S19	GBE1_LINK100#
P20	GBE0_MDI3+	S20	GBE1_MDI1+
P21	GBE0_LINK100#	S21	GBE1_MDI1-
P22	GBE0_LINK1000#	S22	GBE1_LINK1000#
P23	GBE0_MDI2-	S23	GBE1_MDI2+
P24	GBE0_MDI2+	S24	GBE1_MDI2-
P25	GBE0_LINK_ACT#	S25	GND
P26	GBE0_MDI1-	S26	GBE1_MDI3+
P27	GBE0_MDI1+	S27	GBE1_MDI3-
P28	GBE0_CTREF	S28	GBE1_CTREF
P29	GBE0_MDI0-	S29	PCIE_D_TX+
P30	GBE0_MDI0+	S30	PCIE_D_TX-
P31	SPI0_CS1#	S31	GBE1_LINK_ACT#
P32	GND	S32	PCIE_D_RX+
P33	SDIO_WP	S33	PCIE_D_RX-
P34	SDIO_CMD	S34	GND
P35	SDIO_CD#	S35	USB4+
P36	SDIO_CK	S36	USB4-
P37	SDIO_PWR_EN	S37	USB3_VBUS_DET
P38	GND	S38	AUDIO_MCK
P39	SDIO_D0	S39	I2S0_LRCK
P40	SDIO_D1	S40	I2S0_SDOUT
P41	SDIO_D2	S41	I2S0_SDIN
P42	SDIO_D3	S42	I2S0_CK
P43	SPI0_CS0#	S43	ESPI_ALERT0#
P44	SPI0_CK	S44	ESPI_ALERT1#
P45	SPI0_DIN	S45	RSVD
P46	SPI0_DO	S46	RSVD
P47	GND	S47	GND
P48	SATA_TX+	S48	I2C_GP_CK
P49	SATA_TX-	S49	I2C_GP_DAT
P50	GND	S50	HDA_SYNC/I2S2_LRCK
P51	SATA_RX+	S51	HDA_SDO/I2S2_SDOUT
P52	SATA_RX-	S52	HDA_SDI/I2S2_SDIN
P53	GND	S53	HDA_CK/I2S2_CK
P54	ESPI_CS0#	S54	SATA_ACT#
P55	ESPI_CS1#	S55	USB5_EN_OC#
P56	ESPI_CK	S56	ESPI_IO_2
P57	ESPI_IO_1	S57	ESPI_IO_3
P58	ESPI_IO_0	S58	ESPI_RESET#
P59	GND	S59	USB5+
P60	USB0+	S60	USB5-

P-Pin	Signal	S-Pin	Signal
P61	USB0-	S61	GND
P62	USB0_EN_OC#	S62	USB3_SSTX+
P63	USB0_VBUS_DET	S63	USB3_SSTX-
P64	USB0_OTG_ID	S64	GND
P65	USB1+	S65	USB3_SSRX+
P66	USB1-	S66	USB3_SSRX-
P67	USB1_EN_OC#	S67	GND
P68	GND	S68	USB3+
P69	USB2+	S69	USB3-
P70	USB2-	S70	GND
P71	USB2_EN_OC#	S71	USB2_SSTX+
P72	RSVD	S72	USB2_SSTX-
P73	RSVD	S73	GND
P74	USB3_EN_OC#	S74	USB2_SSRX+
	Key	S75	USB2_SSRX-
P75	PCIE_A_RST#		*Key*
P76	USB4_EN_OC#	S76	PCIE_B_RST#
P77	RSVD	S77	PCIE_C_RST#
P78	RSVD	S78	PCIE_C_RX+
P79	GND	S79	PCIE_C_RX-
P80	PCIE_C_REFCK+	S80	GND
P81	PCIE_C_REFCK-	S81	PCIE_C_TX+
P82	GND	S82	PCIE_C_TX-
P83	PCIE_A_REFCK+	S83	GND
P84	PCIE_A_REFCK-	S84	PCIE_B_REFCK+
P85	GND	S85	PCIE_B_REFCK-
P86	PCIE_A_RX+	S86	GND
P87	PCIE_A_RX-	S87	PCIE_B_RX+
P88	GND	S88	PCIE_B_RX-
P89	PCIE_A_TX+	S89	GND
P90	PCIE_A_TX-	S90	PCIE_B_TX+
P91	GND	S91	PCIE_B_TX-
P92	HDMI_D2+/DP1_LANE0+	S92	GND
P93	HDMI_D2-/DP1_LANE0-	S93	DP0_LANE0+
P94	GND	S94	DP0_LANE0-
P95	HDMI_D1+/DP1_LANE1+	S95	DP0_AUX_SEL
P96	HDMI_D1-/DP1_LANE1-	S96	DP0_LANE1+
P97	GND	S97	DP0_LANE1-
P98	HDMI_D0+/DP1_LANE2+	S98	DP0_HPD
P99	HDMI_D0-/DP1_LANE2-	S99	DP0_LANE2+
P100	GND	S100	DP0_LANE2-
P101	HDMI_CK+/DP1_LANE3+	S101	GND

P-Pin	Signal	S-Pin	Signal
P102	HDMI_CK-/DP1_LANE3-	S102	DP0_LANE3+
P103	GND	S103	DP0_LANE3-
P104	HDMI_HPD/DP1_HPD	S104	USB3_OTG_ID
P105	HDMI_CTRL_CK/DP1_AUX+	S105	DP0_AUX+
P106	HDMI_CTRL_DAT/DP1_AUX-	S106	DP0_AUX-
P107	DP1_AUX_SEL	S107	LCD1_BKLT_EN
P108	GPIO0/CAM0_PWR#	S108	LVDS1_CK+/eDP1_AUX+/DSI1_CLK+
P109	GPIO1/CAM1_PWR#	S109	LVDS1_CK-/eDP1_AUX-/DSI1_CLK-
P110	GPIO2/CAM0_RST#	S110	GND
P111	GPIO3/CAM1_RST#	S111	LVDS1_0+/eDP1_TX0+/DSI1_D0+
P112	GPIO4/HDA_RST#	S112	LVDS1_0-/eDP1_TX0-/DSI1_D0-
P113	GPIO5/PWM_OUT	S113	eDP1_HPD
P114	GPIO6/TACHIN	S114	LVDS1_1+/eDP1_TX1+/DSI1_D1+
P115	GPIO7	S115	LVDS1_1-/eDP1_TX1-/DSI1_D1-
P116	GPIO8	S116	LCD1_VDD_EN
P117	GPIO9	S117	LVDS1_2+/eDP1_TX2+/DSI1_D2+
P118	GPIO10	S118	LVDS1_2-/eDP1_TX2-/DSI1_D2-
P119	GPIO11	S119	GND
P120	GND	S120	LVDS1_3+/eDP1_TX3+/DSI1_D3+
P121	I2C_PM_CK	S121	LVDS1_3-/eDP1_TX3-/DSI1_D3-
P122	I2C_PM_DAT	S122	LCD1_BKLT_PWM
P123	BOOT_SEL0#	S123	RSVD
P124	BOOT_SEL1#	S124	GND
P125	BOOT_SEL2#	S125	LVDS0_0+/eDP0_TX0+/DSI0_D0+
P126	RESET_OUT#	S126	LVDS0_0-/eDP0_TX0-/DSI0_D0-
P127	RESET_IN#	S127	LCD0_BKLT_EN
P128	POWER_BTN#	S128	LVDS0_1+/eDP0_TX1+/DSI0_D1+
P129	SER0_TX	S129	LVDS0_1-/eDP0_TX1-/DSI0_D1-
P130	SER0_RX	S130	GND
P131	SER0_RTS#	S131	LVDS0_2+/eDP0_TX2+/DSI0_D2+
P132	SER0_CTS#	S132	LVDS0_2-/eDP0_TX2-/DSI0_D2-
P133	GND	S133	LCD0_VDD_EN
P134	SER1_TX	S134	LVDS0_CK+/eDP0_AUX+/DSI0_CLK+
P135	SER1_RX	S135	LVDS0_CK-/eDP0_AUX-/DSI0_CLK-
P136	SER2_TX	S136	GND
P137	SER2_RX	S137	LVDS0_3+/eDP0_TX3+/DSI0_D3+
P138	SER2_RTS#	S138	LVDS0_3-/eDP0_TX3-/DSI0_D3-
P139	SER2_CTS#	S139	I2C_LCD_CK
P140	SER3_TX	S140	I2C_LCD_DAT
P141	SER3_RX	S141	LCD0_BKLT_PWM
P142	GND	S142	RSVD
P143	CAN0_TX	S143	GND

P-Pin	Signal	S-Pin	Signal
P144	CAN0_RX	S144	eDP0_HPD
P145	CAN1_TX	S145	WDT_TIME_OUT#
P146	CAN1_RX	S146	PCIE_WAKE#
P147	VDD_IN	S147	VDD_RTC
P148	VDD_IN	S148	LID#
P149	VDD_IN	S149	SLEEP#
P150	VDD_IN	S150	VIN_PWR_BAD#
P151	VDD_IN	S151	CHARGING#
P152	VDD_IN	S152	CHARGER_PRSNT#
P153	VDD_IN	S153	CARRIER_STBY#
P154	VDD_IN	S154	CARRIER_PWR_ON
P155	VDD_IN	S155	FORCE_RECOV#
P156	VDD_IN	S156	BATLOW#
		S157	TEST#

11/ Technical Support

For technical support contact our Support Department:

- E-Mail: support@kontron.com
- Phone: +49-821-4086-888

Make sure you have the following information available when you call:

- Product ID Number (PN),
- Serial Number (SN)

The serial number can be found on the Type Label, located on the product's rear side.

Be ready to explain the nature of your problem to the service technician.

11.1. Warranty

Due to their limited service life, parts that by their nature are subject to a particularly high degree of wear (wearing parts) are excluded from the warranty beyond that provided by law. This applies to the CMOS battery, for example.

If there is a protection label on your product, then the warranty is lost if the product is opened.

11.2. Returning Defective Merchandise

All equipment returned to Kontron must have a Return of Material Authorization (RMA) number assigned exclusively by Kontron. Kontron cannot be held responsible for any loss or damage caused to the equipment received without an RMA number. The buyer accepts responsibility for all freight charges for the return of goods to Kontron's designated facility. Kontron will pay the return freight charges back to the buyer's location in the event that the equipment is repaired or replaced within the stipulated warranty period. Follow these steps before returning any product to Kontron.

1. Visit the RMA Information website:
https://www.kontron.com/support-and-services/support/rma-information

   Download the RMA Request sheet for **Kontron Europe GmbH** and fill out the form. Take care to include a short detailed description of the observed problem or failure and to include the product identification Information (Name of product, Product number and Serial number). If a delivery includes more than one product, fill out the above information in the RMA Request form for each product.

2. Send the completed RMA-Request form to the fax or email address given below at Kontron Europe GmbH. Kontron will provide an RMA-Number.

   Kontron Europe GmbH
   RMA Support
   Phone: +49 (0) 821 4086-0
   Fax: +49 (0) 821 4086 111
   Email: service@kontron.com

3. The goods for repair must be packed properly for shipping, considering shock and ESD protection.

Goods returned to Kontron Europe GmbH in non-proper packaging will be considered as customer caused faults and cannot be accepted as warranty repairs.

4. Include the RMA-Number with the shipping paperwork and send the product to the delivery address provided in the RMA form or received from Kontron RMA Support.

12/ uEFI BIOS

12.1. Starting the uEFI BIOS

The KBOX-A203-sXAL4 uses a Kontron-customized, pre-installed and configured version of Aptio ® V uEFI BIOS based on the Unified Extensible Firmware Interface (uEFI) specification and the Intel® Platform Innovation Framework for EFI. This uEFI BIOS provides a variety of new and enhanced functions specifically tailored to the hardware features of the KBOX-A203-sXAL4.

The BIOS version covered in this document might not be the latest version. The latest version might have certain differences to the BIOS options and features described in this chapter.

Register for the EMD Customer Section to get access to BIOS downloads and PCN service.

The uEFI BIOS KBOX-A203-sXAL4 comes with a Setup program that provides quick and easy access to the individual function settings for control or modification of the uEFI BIOS configuration. The Setup program allows for access to various menus that provide functions or access to sub-menus with further specific functions of their own.

To start the uEFI BIOS Setup program, follow the steps below:

1. Switch on the board.
2. Wait until the first characters appear on the screen (POST messages or splash screen).
3. 3. Press the <DEL> key.
4. If the uEFI BIOS is password-protected, a request for password will appear. Enter either the User Password or the Supervisor Password (see Security Setup Menu), press <RETURN>, and proceed with step 5.
5. A Setup menu appears.

The KBOX-A203-sXAL4 uEFI BIOS Setup program uses a hot key navigation system. The hot key legend bar is located at the bottom of the Setup screens. The following table provides a list of navigation hot keys available in the legend bar.

Table 24: Navigation Hot Keys Available in the Legend Bar

Sub-screen	Description
<F1>	<F1> key invokes the General Help window
<->	<Minus> key selects the next lower value within a field
<+>	<Plus> key selects the next higher value within a field
<F2>	<F2> key loads previous values
<F3>	<F3> key loads optimized defaults
<F4>	<F4> key Saves and Exits
<→> or <←>	<Left/Right> arrows selects major Setup menus on menu bar, for example, Main or Advanced
<↑> or <↓>	<Up/Down> arrows select fields in the current menu, for example, Setup function or sub-screen
<ESC>	<ESC> key exits a major Setup menu and enters the Exit Setup menu Pressing the <ESC> key in a sub-menu displays the next higher menu level
<RETURN>	<RETURN> key executes a command or selects a submenu

12.2. Setup Menus

The Setup utility features menus listed in the selection bar at the top of the screen are:

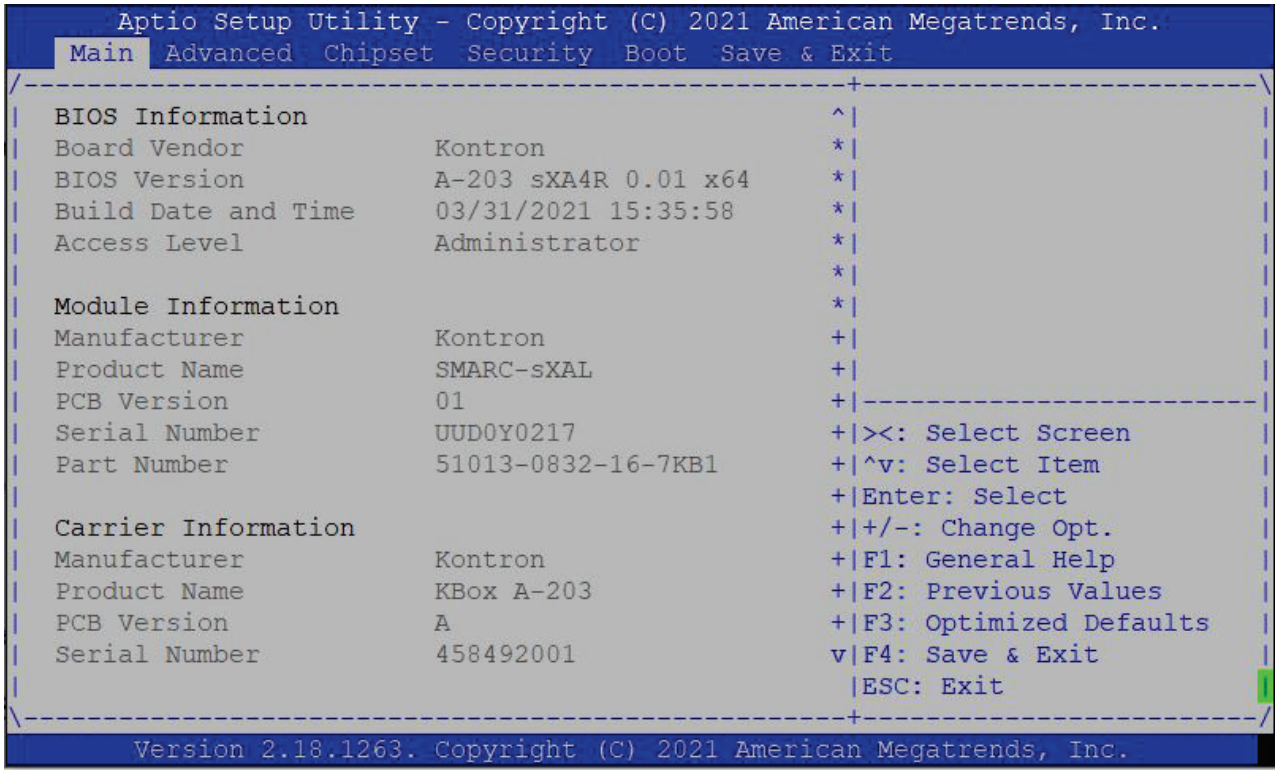
- Main
- Advanced
- Chipset
- Security
- Boot
- Save & Exit

The currently active menu and the currently active uEFI BIOS Setup item are highlighted in white. Use the left and right arrow keys to select the Setup menus.
Each Setup menu provides two main frames. The left frame displays all available functions. Configurable functions are displayed in blue. Functions displayed in grey provide information about the status or the operational configuration. The right frame displays a Help window providing an explanation of the respective function.

12.2.1. Main Setup Menu

On entering the uEFI BIOS, the setup program displays the Main Setup menu. This screen lists the Main Setup menu sub-screens and provides basic system information as well as functions for setting the system language, time and date.

Figure 30: Main Setup Menu Initial Screen



The following table shows the Main Menu sub-screens and functions and describes the content.

Table 25: Main Setup Menu Sub-screens and Functions

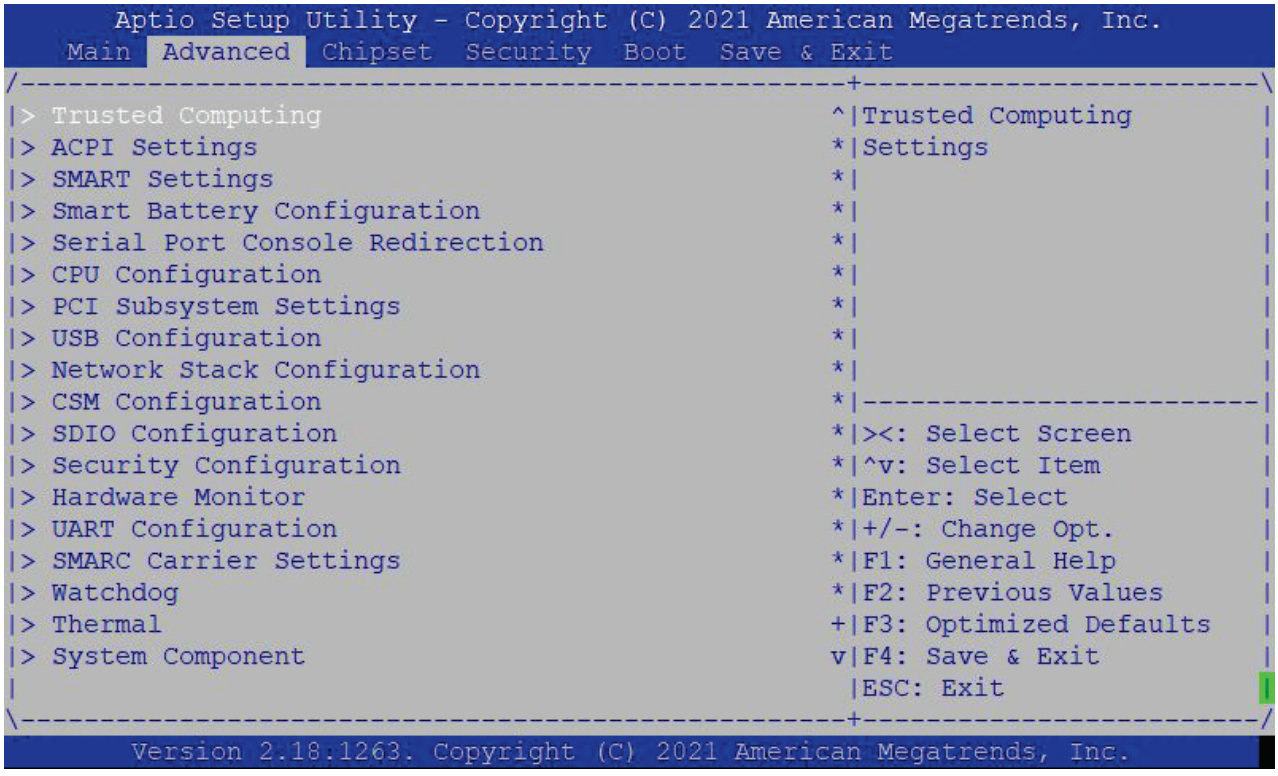
Sub-Screen	Description
BIOS Information>	Read only field Board vendor, BIOS version, Build date and time, and Access level
Module Information	Read only field Manufacturer, Product name, PCB version, Serial number, Part number
Carrier Information	Read only field Manufacturer, Product name, PCB version, Serial number, Part number and Boot count
Onboard LAN Information>	Read only field LAN MAC Address **Additional information for MAC Address** The MAC address entry is the value used by the Ethernet controller and may contain the entry 'Inactive' - Ethernet chip is inactive. To activate the Ethernet chip set the following: Advanced > Network Stack Configuration > Network Stack > Enable 88:88:88:88:87:88 is a special pattern that will be filled in by the Ethernet firmware if there is no valid entry in the firmware block of the BIOS SPI (i.e. the MAC address has been overwritten during the last attempt to flash the system).
CPU Information>	Read only field Processor Type, CPU Signature, Microcode Patch, Processor Cores, Intel VT-x Technology
Memory Information>	Read only field Total memory and Memory speed
Platform Firmware Information>	Read only field *Module Information* BXT SOC, MRC Version, PUNIT FW, PMC FW, TXE FW, GOP, and CPLD Version
System Date>	Displays the system date [Week day mm/dd/yyyy]
System Time>	Displays the system time [hh:mm:ss]

12.2.2. Advanced Setup Menu

The Advanced Setup menu displays sub-screens and second level sub-screens with functions, for advanced configurations.

NOTICE Setting items, on this screen, to incorrect values may cause system malfunctions.

Figure 31: Advanced Setup Menu Initial Screen



The following table shows the Advanced sub-screens and functions and describes the content. Default settings are in **bold** and for some functions, additional information is included.

Table 26: Advanced Setup menu Sub-screens and Functions

Sub-Screen	Function	Second level Sub-Screen/Description
Trusted Computing>	Read only Information TPM20 device Found, Vendor and Firmware version	
	Security Device Support>	Enables or disables BIOS support for security device. Operating System will not show security device, and TCG EFI protocol and INT1A interface are not available. [**Enabled**, Disabled]
	Active PCR Banks>	Read only field Displays active PCR Banks
	Available PCR Banks>	Read only field Displays available PCR Banks
	SHA-1 PCR Bank>	SHA-1 PCR Bank [**Enabled**, Disabled]

Sub-Screen	Function	Second level Sub-Screen/Description
Trusted Computing> (continued)	SHA256 PCR Bank>	SHA256 PCR Bank [**Enabled**, Disabled]
	Pending Operation>	Schedules an operation for security device Note: Computer reboots on restart to change the state of the security device. [**None**, TPM Clear]
	Platform Hierarchy>	Platform Hierarchy [**Enabled**, Disabled]
	Storage Hierarchy>	Storage Hierarchy [**Enabled**, Disabled]
	Endorsement Hierarchy>	Endorsement Hierarchy [**Enabled**, Disabled]
	TPM2.0 UEFI Spec Version>	Selects TCG2 Spec Version support TCG_1_2: is compatible mode for Win8/Win10 and TCG_2: supports TCG2 protocol and event format Win 10 or later. [TCG_1_2, **TCG_2**]
	Physical Presence Spec Version>	Select to inform OS to support either PPI Spec 1.2 or 1.3 Note: Some HCK tests might not support 1.3. [1.2, **1.3**]
	TPM 20 InterfaceType>	Read only field
	Device Select>	Selects BIOS support for security devices. Auto: supports both TPM 1.2 and TPM 2.0 TPM 1.2: restricts support to TPM 1.2 devices TPM 2.0: restricts support to TPM 2.0 devices [TPM 1.2, TPM 2.0, **Auto**]
	Disable Block Sid	Override to allow SID authentication in TCG Storage device [Enabled, **Disabled**]
ACPI Settings>	Enable ACPI Auto Configuration>	Enables or disables BIOS ACPI auto configuration. If enabled, the system uses generic ACPI settings that may not fit the system best. [Enabled, **Disabled**]
	Enable Hibernation>	Enables or disables systems ability to hibernate (OS/S4 Sleep State) This option may not be effective with some operating systems. [**Enabled**, Disabled]
	ACPI Sleep State>	Selects highest ACPI sleep state the system enters when the SUSPEND button is pressed [Suspend Disabled, **S3 Suspend to Ram**]
	Lock Legacy Resources>	Lock of legacy resources [Enabled, **Disabled**]
SMART Settings>	SMART Self Test>	Run SMART Self Test on all HDDs during POST [Enabled, **Disabled**]
Smart Battery Configuration>	M.A.R.S.	Preset M.A.R.S. Smart Battery System mode. System must be restarted to reflect mode changes. [**Disabled**, Auto, Charger, Manager]
Serial Port Console Redirection>	COM0 (Disabled) Console Redirection	Port is Disabled

Sub-Screen	Function	Second level Sub-Screen/Description	
Serial Port Console Redirection> (continued)	**Additional Information COM # Console** If redirection is enabled then the port settings such as Terminal type, Bits per second, Data bits, Parity etc. can be adjusted here. On-module COM ports do not support flow control. If the Port is disabled, the COM# port is displayed as a read only field.		
	Legacy Console Redirection settings>	Redirection COM Port>	Selects a COM port to display redirection of legacy OS and legacy OPROM messages [**COM0,** COM1 (Disabled), COM2 (Pci Bus0, Dev0, Func0) (Disabled), COM3 (Pci Bus0, Dev0, Func0) (Disabled)]
		Resolution>	On Legacy OS, the Number of Rows and Colums supported redirection [**80x24**, 80x25]
		Redirect After POST>	When Bootloader is selected, then Legacy Console Redirection is disabled before booting to legacy OS. When Always Enable is selected, then Legacy Console Redirection is enabled. [**Always Enable**, BootLoader]
	Serial Port for Out-of-Band Management/Windows EMS Console Redirection>	Console Redirection Enabled or Disabled [Enabled, **Disabled**]	
CPU Configuration>	C-States>	Enable/Disable C-States [**Enabled**, Disabled]	
	Turbo Mode>	Enables or disables processor turbo mode [**Enabled**, Disabled]	
	Active Processor Core>	Number of cores to enable in each processor package [Enabled, **Disabled**]	
	Intel Virtualization>	Enables VMM to utilize additional hardware capabilities provided by Vanderpool Technology [**Enabled**, Disabled]	
	VT-d>	Enable/Disable CPU VT-d [Enabled, **Disabled**]	
	Monitor Mwait>	Enable/Disable Monitor Mwait [Enabled, **Disabled**, Auto]	
	P-STATE Coordination>	Change P-STATE Coordination type [**HW_ALL**, SW_ALL, SW_ANY]	
	Local APIC Mode>	Select Local APIC mode. If Auto, use x2APIC if required, otherwise, xAPIC mode. xAPIC will disable CPUs with APIC IDs greater than 254. Some OSes don't support x2APIC mode. [Auto, x2APIC, **xAPIC**]	
PCI Subsystem Settings>	Read only field AMI PCI driver version		
	Above 4G Decoding>	64 bit capable devices to be decoded in above 4G address space [Enabled, **Disabled**]	
	BME DMA Mitigation>	Re-enable Bus Master Atrribute disabled during PCI enumeration for PCI Bridges after SMM Locked	

Sub-Screen	Function	Second level Sub-Screen/Description
PCI Subsystem Settings> (continued)		[Enabled, **Disabled**]
	Hot-Plug Support>	Hot-Plug support for the entire system [**Enabled**, Disabled]
USB Configuration>	Read only fields USB Configuration, UBS module Version, USB controllers, and USB devices	
	Legacy USB Support>	Enable- supports legacy USB Auto– disables legacy support, if no USB devices are connected Disable-keeps USB devices available for EFI applications only [**Enabled**, Disabled, Auto]
	XHCI Hand-off>	XHCI ownership change should be claimed by XHCI driver. Note: This is a work around for OS(s) without XHCI hand-off support. [**Enabled,** Disabled]
	USB Mass Storage Driver Support>	Enables or disables USB mass storage driver support [**Enabled,** Disabled]
	USB Transfer Time-out>	Displays timeout value for control, bulk and interrupt transfers [1 sec, 5 sec, 10 sec, **20 sec**]
	Device Reset Time-out>	Displays USB mass storage device start unit command time-out [10 sec, **20 sec**, 30 sec, 40 sec]
	Device Power-up Delay>	Displays maximum time taken for the device to report itself to the Host Controller. 'Auto' uses the default: root port 100 ms /hub port delay is taken from hub port descriptor. [**Auto**, Manual]
Network Stack Configuration>	Network Stack>	UEFI Network Stack [Enabled, **Disabled**]
CSM Configuration>	CSM Support>	CSM Support (Compatibility Support Module Support) [**Enabled**, Disabled]
	CSM16 Module Version>	Read-Only Field
	GateA20 Active	UPON REQUEST – GA20 can be disabled using BIOS services. ALWAYS – do not allow disabling GA20; this option is useful when any RT code is executed above 1MB [**Upon Request**; Always]
	INT19 Trap Response>	BIOS reaction on INT19 trapping by Option ROM: IMMEDIATE – execute the trap right away; POSTPONED – execute the trap during legacy boot [**Immediate**; Postponed]
	Boot option filter>	This option controls Legacy/UEFI ROMs priority [**UEFI and Legacy**; Legacy only; UEFI only]
	Network>	Controls the execution of UEFI and Legacy PXE OpROM [Do not launch; **UEFI**; Legacy]
	Storage>	Controls the execution of UEFI and Legacy Storage OpROM [Do not launch; **UEFI**; Legacy]
	Video>	Controls the execution of UEFI and Legacy Video OpROM [Do not launch; **UEFI**; Legacy]
	Other PCI devices>	Determines OpROM execution policy for devices other than Network, Storage, or Video [Do not launch; **UEFI**; Legacy]

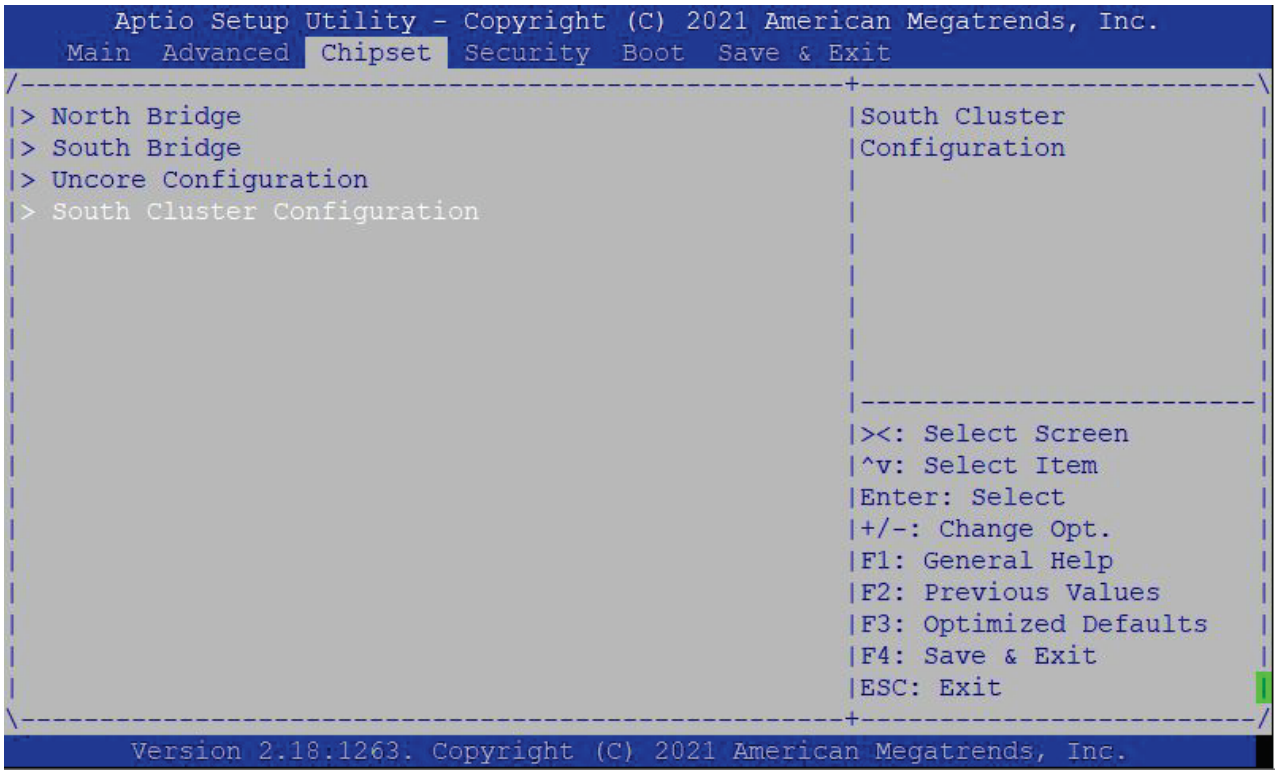
Sub-Screen	Function	Second level Sub-Screen/Description
SDIO Configuration>	SDIO Access Mode>	Auto Option: Access SD device in DMA mode if controller supports it, otherwise in PIO mode. DMA option: Access SD device in DMA mode. PIO Option: Access SD device in PIO mode. [**Auto**, ADMA, SDMA, PIO]
	Mass storage devices>	Mass storage device emulation type. 'Auto' enumerates devices less than 530MB as floppies. Forced FDD option can be used to force HDD formatted drive to boot as FDD. [**Auto**, Floppy, Forced FDD, Hard Disk]
Security Configuration>	TXE HMRFPO>	TXE HMRFPO [Enabled, **Disabled]**
	TXE EOP Message>	Send EOP Message before enter OS [**Enabled,** Disabled]
Hardware Monitor>	CPU DTS Temperature (CPU MSR)>	Read only field CPU DTS temperature (°C)
	PCB Temperature (TD1)>	Read only field PCB temperature (°C)
	NCT7802Y Temperature>	Read only field NCT7802Y temperature (°C)
	NCT7802Y Voltage>	Read only field NCT7802Y voltage (V)
	RTC Voltage>	Read only field RTC Voltage (V)
	DDR Voltage>	Read only field DDR Voltage (V)
	Input Voltage>	Read only field Input Voltage (V)
UART Configuration>	RS232 Interface from CPLD>	Settings when RS232 connector (COM2) is configured to CPLD UART (On UART SELECT jumper, pin 1 & pin 2 are shorted) [Enabled, **Disabled**]
	Base Address>	Configure Serial Port Base Address. [3F8, **2F8**, 3E8, 2E8]
	IRQ>	Configure Serial Port IRQ [7, 9, **10**, 11, 12, 13, 15]
	RS485/RS232 Connector>	Switch to configure RS232 or RS485 for RS485/RS232 Connector (X102) [**RS232**, RS485]
SMARC Carrier Settings>	Carrier I2C0/SMBUS>	Switch to select which controller (SMBUS or LPSS I2C0) own the I2C_PM_CK & I2C_PM_DAT pins on SMARC connector. [**Use I2C0 Controller**, Use SMBUS Controller]
Watchdog>	Auto Reload>	Enables automatic reload of watchdog timers on timeout [Enabled, **Disabled**]
	Global Lock>	Enable sets all Watchdog registers (except for WD_KICK) to read only, until the module is reset. [Enabled, **Disabled**]

Sub-Screen	Function	Second level Sub-Screen/Description
Watchdog> (continued)	Stage 1 Mode>	Selects action for Watchdog stage 1 [**Disable**, Reset, NMI, SCI, Delay, WDT Signal only]
Thermal>	Automatic Thermal Reporting>	Configure _CRT, _PSV and _AC0 automatically based on values recommended in BWG's Thermal Reporting for Thermal management Settings. [Enabled, **Disabled**]
	Critical Trip Point>	Configure temperature value of the ACPI Critical Trip Point – point which OS will shut the system off. [15°C, 23°C, 31°C, 39°C, 47°C, 55°C, 63°C, 71°C, 79°C, 87°C, 95°C, **100°C**, 103°C, 110°C, 119°C, 125°C]
	Passive Trip Point>	Configure temperature value of the ACPI Passive Trip Point – point which OS will begin throttling the processor. [Disable, 15°C, 23°C, 31°C, 39°C, 47°C, 55°C, 63°C, 71°C, 79°C, **87°C**, 95°C, 103°C, 111°C]
	Passive TC1 Value>	Sets the TC1 value for the ACPI Passive Cooling Formula. (Range: 1 – 16) [**1**]
	Passive TC2 Value>	Sets the TC2 value for the ACPI Passive Cooling Formula. (Range: 1 – 16) [**5**]
	Passive TSP Value>	Sets the TSP value for the ACPI Passive Cooling Formula. (Range: 2 – 32) [**10**]
System Component>	PNP Setting>	Select PNP setting mode [Disable, **Power&Performance**]
	OS Reset Selet>	Select the reset type in FACP table [Warm Reset, **Cold Reset**]
	Spread Spectrum Clocking Configuration (SSC)	
	DDR SSC>	Enable DDR Spread Spectrum Clocking configuration [**Enable**, Disable]
	DDR SSC Selection Table>	Select the item in SSC selection table for DDR spread spectrum [0% (No SSC), -0.1%, -0.2%, -0.3%, -0.4%, **-0.5%**,]
	DDR Clock Bending Selection Table>	Select Clock Bending [1.3%, 0.6%, **0% (No Clock Bending)**, -0.9%]
	HighSpeed SerialIO SSC>	Enable HighSpeed SerialIO SSC configuration [**Enable**, Disable]
	HighSpeed SerialIO SSC Selection Table>	Select the item in SSC selection table for HighSpeed SerialIO spread spectrum [0% (No SSC), -0.1%, -0.2%, -0.3%, -0.4%, **-0.5%**,]
RC ACPI Setting>	Native PCIE Enable>	Enable or disable PCI Express Native Control in Windows [**Enable**, Disable]
	Native ASPM>	On enable, windows will control the ASPM support for the device. If disabled, the BIOS will [**Enable**, Disable]
	PCI Delay Optimization>	Experimental ACPI additions for FW latency optimizations [**Disabled,** Enabled]

12.2.3. Chipset Setup Menu

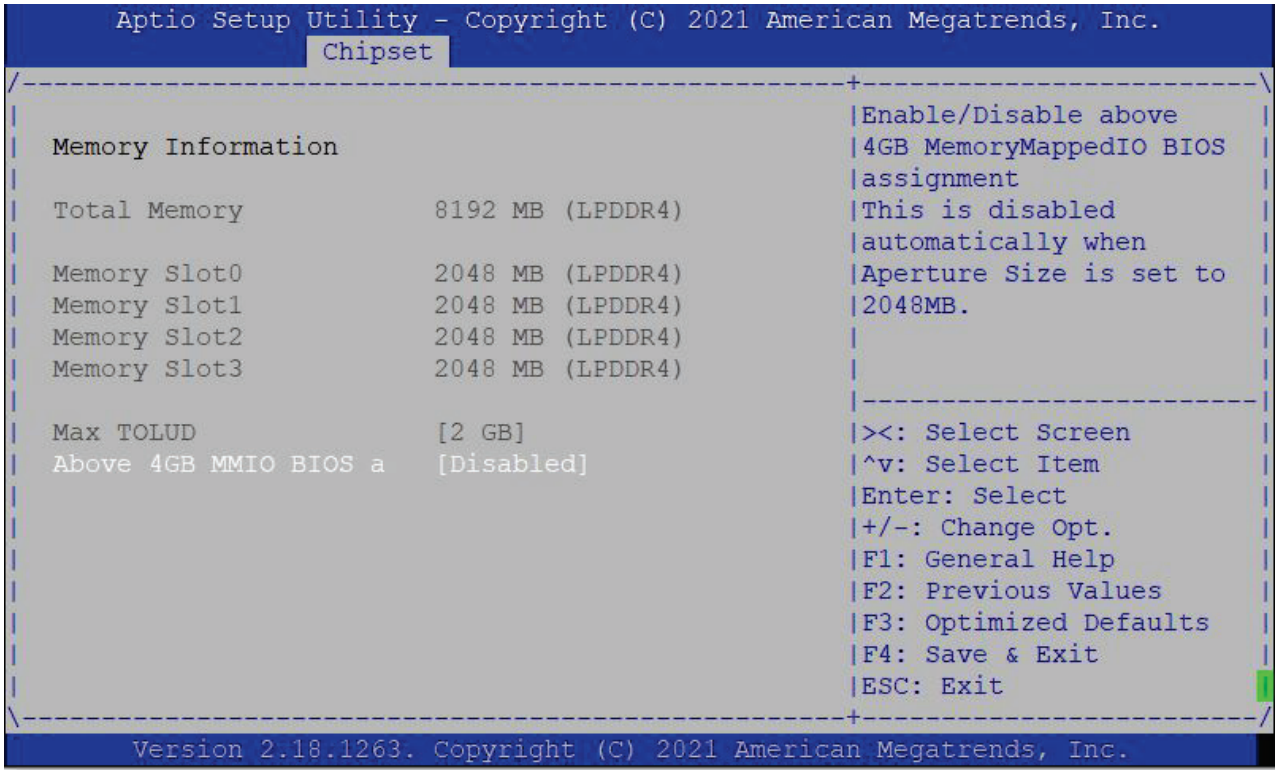
On entering the Chipset Setup menu, the screen lists four sub-screen options North Bridge, South Bridge, Uncore Configuration and South Cluster Configuration.

Figure 32: Chipset Setup Menu Initial Screen



12.2.3.1. Chipset> North Bridge

Figure 33: Chipset > North Bridge Menu Initial Screen



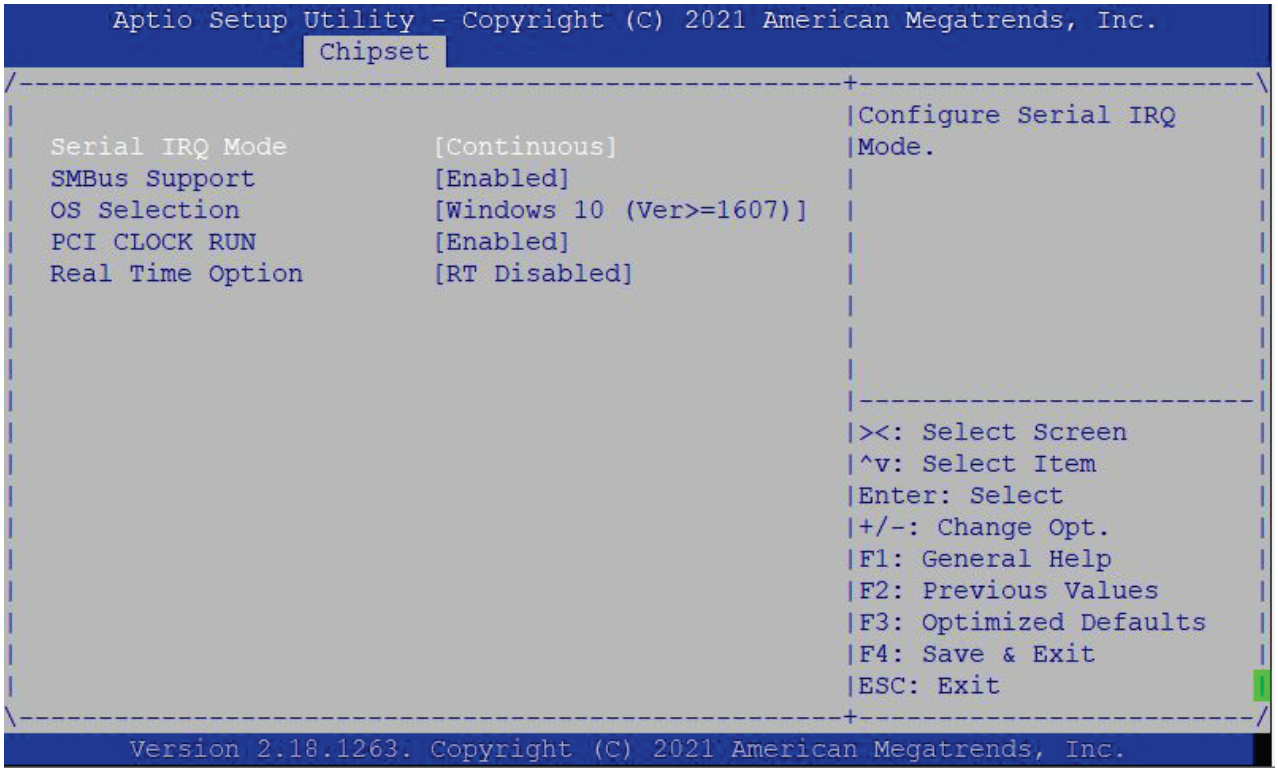
The following table shows the North bridge sub-screens and functions and describes the content. Default settings are in **bold**.

Table 27: Chipset Set > North Bridge Sub-screens and Function

Function	Second level Sub-Screen/Description
Memory Information>	Read-only field. Shows Total Memory, Memory Slot 0-3, Max Tolud
Above 4GB MMI BIOS assignment>	Enable/Disable above 4GB MemoryMappedIO BIOS assignment. This is disabled automatically when Aperture Size is set to 2048MB. [Enabled, **Disabled**]

12.2.3.2. Chipset > South Bridge

Figure 34: Chipset>South Bridge Menu Initial Screen



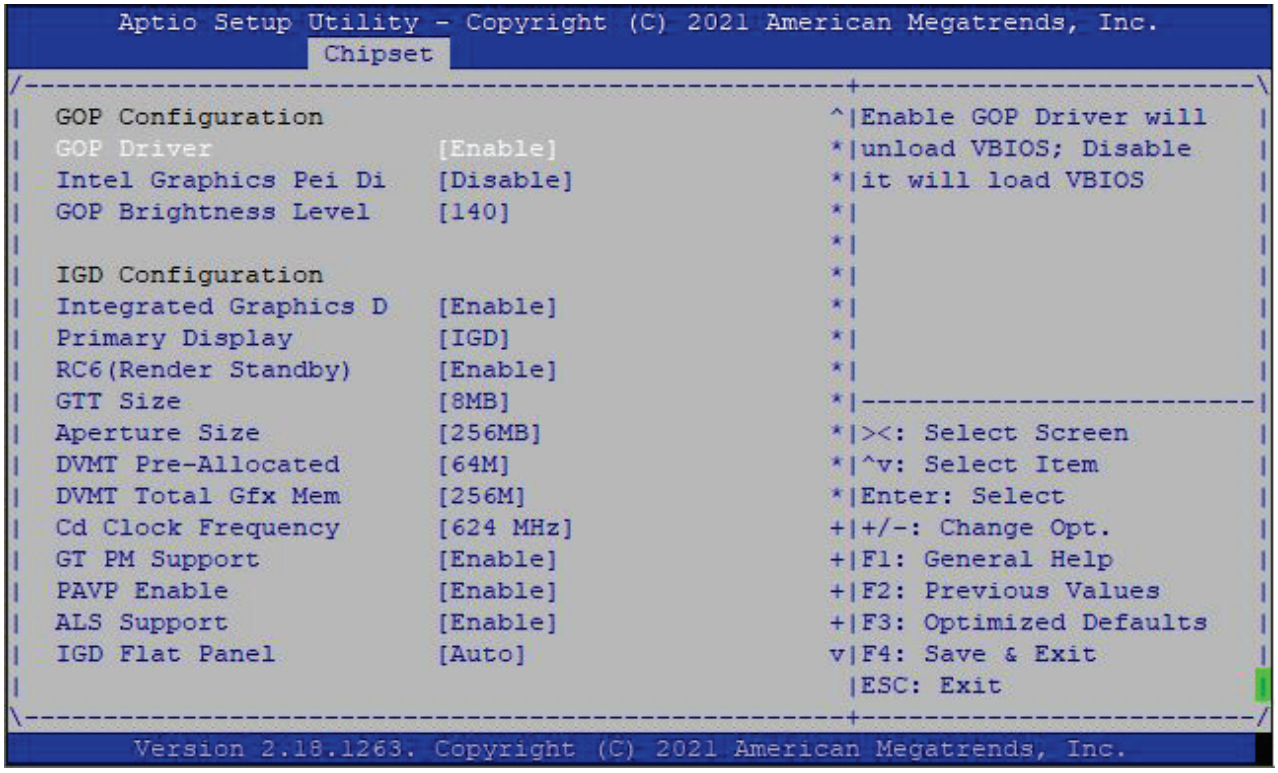
The following table shows the South Bridge sub-screens and functions, and describes the content. Default settings are in **bold**.

Table 28: Chipset Set> South Bridge Sub-screens and Functions

Function	Second level Sub-Screen/Description
Serial IRQ Mode>	Configure Serial IRQ Mode [Quiet, **Continuous**]
SMBus Support>	Enable or disable SMBus Support [**Enabled**, Disabled]
OS Selection>	Selects target OS. [**Windows 10 (Ver>=1607)**, Intel Linux]
PCI Clock Run>	Enables CLKRUN# logic to stop PCI clocks [**Enabled**, Disabled]
Real Time Option>	Select Read-Time Enable and IDI Agent Real-Time Traffic Mask Bits [**RT Disabled**, RT Enabled (Agent IDI1), RT Enabled (Agent Disabled)]

12.2.3.3. Chipset> Uncore Configuration

Figure 35: Chipset>Uncore Configuration Menu Initial Screen



The following table shows the Uncore Configuration sub-screens and functions and describes the content. Default settings are in **bold**.

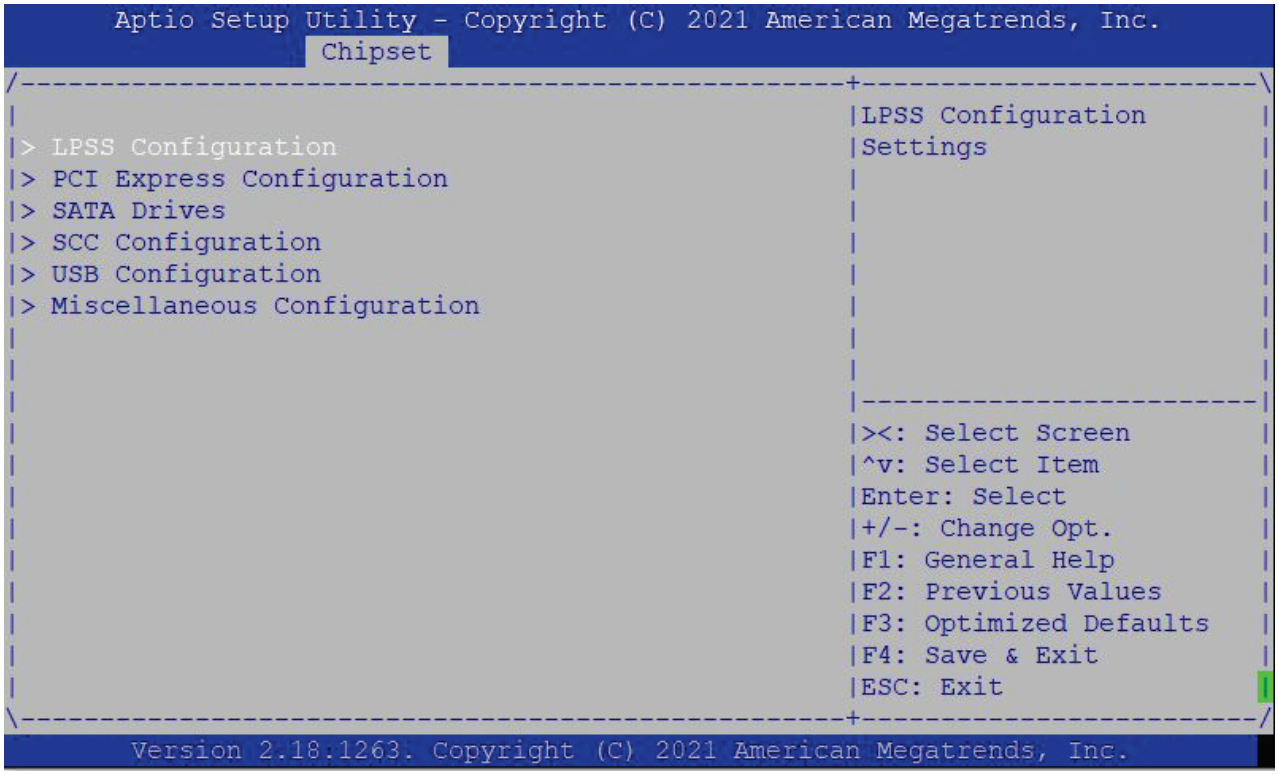
Table 29: Chipset Set> Uncore Configuration Sub-screens and Functions

Function	Second level Sub-Screen/Description
GOP Driver>	Enable GOP Driver will unload VBIOS; Disable it will load VBIOS [**Enabled**, Disabled]
Intel Graphics Pei Display Peim>	Enable or disable Pei (Early) Display [Enabled, **Disabled**]
GOP Brightness Level>	Set GOP Brightness Level; (Range: 0 – 255) [20, 40, 60, 80, 100, 120, **140**, 160, 180, 200, 220, 240, 255]
Integrated Graphics Device (IGD)>	Enable: Enable IGD when selected as the Primary Video Adaptor; Disable: Always disable IGD [**Enabled**, Disabled]
Primary Display>	Select which of IGD/PCI Graphics device should be Primary Display [**IGD**, PCIe, HG]
RC6 (render Standby)>	Check to enable render standby support. IF SOix is enabled, RC6 should be enabled. This function is read only if SOix is enabled. [**Enabled**, Disabled]
GTT Size>	Selects the GTT size [2 MB, 4 MB, **8 MB**]

Function	Second level Sub-Screen/Description
Aperature Size>	Selects the aperture size [**256 MB**]
DVMT Pre-Allocated>	Selects DVMT 5.0 pre-allocated (fixed) graphics memory size used by Internal graphics [**64 M**, 96 M, 128 M, 160 M, 192 M, 224 M, 256 M, 288 M, 320 M, 352 M 384 M, 416 M, 448 M, 480M, 512 M]
DVMT Total Gfx Mem>	Selects DVMT 5.0 total graphics memory size used by internal graphics device [128 M, **256 M**, MAX]
Cd Clock Frequency>	Selects the highest Cd clock frequency supported by the platform [144 MHz, 288 MHz, 384 MHz, 576 MHz, **624 MHz**]
GT PM Support>	GT PM Support [**Enabled**, Disabled]
PAVP Enable>	PAVP [**Enabled**, Disabled]
ALS Support>	Valid only for ACPI [**Enable**, Disable]
IGD Flat Panel>	[**Auto**, 640x480, 800x600, 1024x768, 1280x1024, 1366x768, 1680x1050, 1920x1200, 1280x800]
IGD Boot Type>	Select preference for IGD display interface used when system boots. [**Auto**, VGA port, HDMI, DP Port B, Dp Port C, eDP, DSI Port A, DSI Port C]
Panel Scaling>	Sets Panel scaling [**Auto**, Centering, Stretching]
GMCH BLC Control>	Back Light Control Setting [**PWM-Inverted**, GMBus-Inverted, PWM-Normal, GMBus-Normal]
Memory Scrambler>	Enable/Disable Memory Scambler support [**Enable**, Disable]

12.2.3.4. Chipset> South Cluster Configuration

Figure 36: Chipset>South Cluster Configuration Menu Initial Screen



The following table shows the South Cluster Configuration sub-screens and functions and describes the content. Default settings are in **bold** and for some functions, additional information is included.

Table 30: Chipset>South Cluster Configuration Sub-screens and Functions

Function	Second level Sub-Screen/Description		
LPSS Configuration>	Feature Connector I2C>	Enable/Disable Feature Connector I2C Support [**Enable**, Disable]	
	Feature Connector SPI>	Enable/Disable Feature Connector SPI Support [**Enable**, Disable]	
	Enable LoRa over SPI>	Enable/Disable LoRa over SPI [Enable, **Disable**]	
PCI Express Configuration>	PCI Express Clock Gating>	PCI Express clock gating for each root port [**Enabled**, Disabled]	
	Port8xh Decode>	PCI express port 8xh decode [Enabled, **Disabled**]	
	Peer Memory Write Enable>	Peer memory write [Enabled, **Disabled**]	
	Compliance Mode>	Enable when using compliance load board [Enabled, **Disabled**]	
	PCIe # 4 I210 Gbe LAN (ETH2, X107)>	PCI Express Root Port[#]>	Controls the PCI Express port

Function	Second level Sub-Screen/Description		
PCI Express Configuration> (continued)	or PCIe #5 I210 Gbe LAN (ETH1, X106)> or PCIe #1 mPCIe Slot (J7)> or PCIe #2 mPCIe/mSATA Slot (J8)>		Auto automatically disables the unused root port for optimum power saving. [**Auto**, Enabled, Disabled]
		ASPM>	Active State Power Management (ASPM) level settings [**Disabled**, Auto, L0s, L1, L0sL1]
		L1 Substates>	PCI Express L1 substrates settings [Disabled, L1.1, L1.2, **L1.1 & L1.2**]
		ACS>	Access Control Service Extended Capability [**Enabled**, Disabled]
		URR>	PCI Express unsupported request reporting [Enabled, **Disabled**]
		FER>	PCI Express device fatal error reporting [Enabled, **Disabled**]
		NFER>	PCI Express device non-fatal error reporting [Enabled, **Disabled**]
		CER>	PCI Express device correctable error reporting [Enabled, **Disabled**]
		CTO>	PCI Express completion timer (T0) [**Default Setting**, 16-55 ms, 65-210 ms, 260-900 ms, 1-3.5 s, Disabled]
		SEFE>	Root PCI Express System Error on Fatal Error [Enabled, **Disabled**]
		SENFE>	Root PCI Express System Error on non-Fatal Error [Enabled, **Disabled**]
		SECE>	Root PCI Express System Error on correctable error [Enabled, **Disabled**]
		PME SCI>	PCI Express PME SCI [**Enabled**, Disabled]
		Hot Plug>	PCI Express hot plug [Enabled, **Disabled**]
		PCIe Speed>	Configures PCIe speed [**Auto**, Gen 1, Gen2]
		Transmitter Half Swing>	Transmitter half swing [Enabled, **Disabled**]
		Extra Bus Reserved>	Extra bus reserved for bridges behind this root bridge. (0-7) [**0**]
		Reserved Memory>	Reserved memory and prefetchable memory for this root bridge

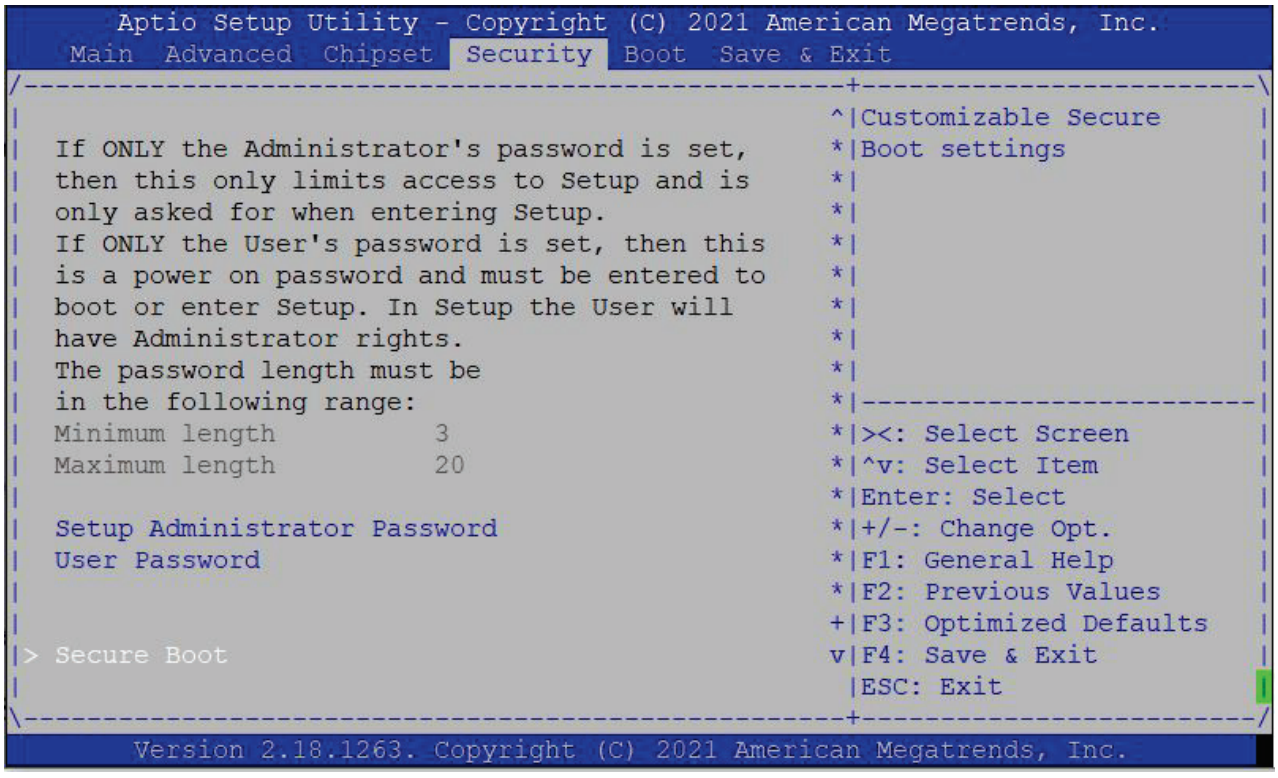
Function	Second level Sub-Screen/Description		
PCI Express Configuration> (continued)			Range: (1 MB-20 MB) [**10**]
		Reserved I/O>	Reserved I/O for this root bridge Range: (**4** k, 8 k, 12 k, 16 k, 20 k)
		PCH PCIE LTR>	PCH PCIE latency reporting [**Enabled**, Disabled]
		Snoop Latency Override>	Snoop latency override or Non Snoop override for PCH PCIE. Disabled: disables override Manual: manually enters override values Auto: maintains default BIOS flow. [Disabled, Manual, **Auto**]
		Non Snoop Latency Override>	
		PCIE1 LTR Lock>	PCIE LTR configuration lock [Enabled, **Disabled**]
		PCIE Selectable De-emphasis>	Selects level of de-emphasis for an upstream component, if the Link operates at 5.0 GT/s speed. 1b – 3.5 dB 0b – 6 dB [**Enabled,** Disabled]
SATA Drives>	Aggessive LPM Support>	Enable PCH to aggressively enter link power state [**Enabled,** Disabled]	
	Port 0>	SATA port 0 [**Enabled,** Disabled]	
	SATA Port 0 Hot Plug Capability>	Reports SATA port as being Hot Plug capable [Enabled, **Disabled]**	
SCC Configuration>	SCC SD Card Support (D27:F0)>	SCC card support [**Enabled**, Disabled]	
	SCC eMMC Support (D28:F0)>	SCC eMMC Support [**Enabled**, Disabled]	
	eMMC Max Speed>	Selects the eMMC max. speed allowed [HS400, **HS200**, DDR50]	
USB Configuration>	XHCI Pre-Boot Driver>	Enable/Disable XHCI Pre-Boot Driver support [**Enable**, Disable]	
	USB Port Disable Override>	Selectively enables or disables the corresponding USB port from reporting a device connection to the controller. [Enable, **Disable**]	
	XDCI Support>	Enable/Disable XDCI. Set to Enable will enable USB client mode. Set to Disable will enable Host mode. [Enable, **Disable**]	
	xHCI Disable Compliance Mode>	Options to disable XHCI Link Compliance Mode. Default is FALSE to not disable Compliance Mode. Set TRUE to disable Compliance Mode. [**FALSE**, TRUE]	

Function	Second level Sub-Screen/Description	
USB Configuration> (continued)	USB HW Mode AFE Comparators>	USB HW mode AFE comparators [Enabled, **Disabled**]
Miscellaneous Configuration>	High Precision Timer>	Enable or Disable the High Precision Event Timer [**Enable**, Disable]
	State After G3>	Specifies the state to go to if power is reapplied after power failure (G3 state) S0 state: system boots directly as soon as power is applied. S5 state: system remains in power-off states until the power button is pressed. [**S0 State**, S5 State]
	Power Button Debounce Mode>	Enable interrupt when PWRBTN# is asserted [**Enable**, Disable]
	Wake On LAN>	Wake on LAN [Enable, **Disable**]
	BIOS Lock>	Enable/Disable the SC BIOS Lock Enable feature. Required to be enabled to ensure SMM protection of flash [**Enabled**, Disabled]
	RTC Lock>	Enable will lock bytes 38h-3Fh in the lower/upper 128-byte bank of RTC RAM [**Enabled**, Disabled]
	TCO Lock>	Enable TCO and Lock Down TCO [Enabled, **Disabled**]
	DCI Enable (HDCIEN)>	If enabled the user is considered to have consented to enable DCI and allows debug over the USB 3 interface. If disabled, the host controller does not enable the DCI feature. [Enabled, **Disabled**]
	DCI Auto Detect Enable>	If set, DCI Auto detects if DCI is connected during BIOS post time and enables DCI. If not set, DCI is disabled. [**Enabled**, Disabled]
	GPIO Lock>	Enable to set GPIO Pad Configuration Lock for security [Enabled, **Disabled**]

12.2.4. Security Setup Menu

The Security Setup menu provides information about the passwords and functions for specifying the security settings such as Hard Disk user and master passwords.

Figure 37: Security Setup Menu Initial Screen



The following table shows the Security sub-screens and functions and describes the content.

Table 31: Security Setup Menu Sub-screens and Functions

Function	Description
Setup Administrator Password>	Sets Setup Administrator Password
User Password>	Sets User Password
HDD Security Configuration>	Read Only Information Allows access to set, modify and clear Hard Disk user and master passwords. User Passwords need to be installed for Enabling Security. Master Password can be modified only when successfully unlocked with the Master Password in Post. If the 'Set HDD Password' is grayed out, then power cycle to enable the option again. HDD Password Configuration Security supported: Yes Security Enabled: No Security Locked: No Security Frozen: No HDD User Pwd Status: Not Installed

Function	Description		
HDD Security Configuration> (continued)	HDD Master Pwd Status: Installed		
	Set User Password>	Sets HDD password. Note: It is advisable to power cycle the system after setting Hard Disk passwords. The 'Discarding or Saving Changes' in the setup does not have an impact on HDD when the password is set or removed. If the setup HDD user Password is grayed out, do power cycle enable the option again.	
Secure Boot>	System Mode>	Read only information.	
	Secure Boot>		
	Vendor Keys>		
	Attempt Secure Boot>	Secure Boot activated when Platform Key (PK) is enrolled, System mode is User/Deployed, and CSM function is disabled [Enabled, **Disabled**]	
	Secure Boot Mode>	Set UEFI Secure Boot Mode to STANDARD mode or CUSTOM mode [Standard, **Customized**]	
	Key Management>	Enables expert users to modify Secure Boot Policy variables without full authentication	
		Factory Key Provision>	Provision factory default keys on next re-boot only when system in Setup Mode [Enabled, **Disabled**]
		Install Factory Default keys>	Force System to User Mode – install all Factory Default keys
		Enroll Efi Image>	Allow the image to run in Secure Boot mode. Enroll SHA256 Hash Certificate of the Image into Authorized Signature Database (db)
		Restore DB defaults>	Restore DB variable to factory defaults
		Platfrom Key (PK)>	Enroll Factory Defaults or load certificates from a file: Public Key Certicate in: EFI_SIGNATURE_LIST EFI_CERT_X509 (DER encoded) EFI_CERT_RSA2048 (bin) EFI_CERT_SHA256,385,512 Authenticated UEFI Variable EFI PE/COFF Image (SHA256) Key Source : Default, External, Mixed, test
		Key Exchange Keys>	
		Authorized Signatures>	
		Forbidden Signatures>	
		Authorized TimeStamps>	

Function	Description		
Secure Boot> (continued)		OsRecovery Signatures>	

If only the administrator's password is set, then only access to setup is limited. The password is only entered when entering the setup.

If only the user's password is set, then the password is a power on password and must be entered to boot or enter setup. Within the setup menu the user has administrator rights.

Password length requirements are maximum length 20 and minimum length 3.

Remember the Password

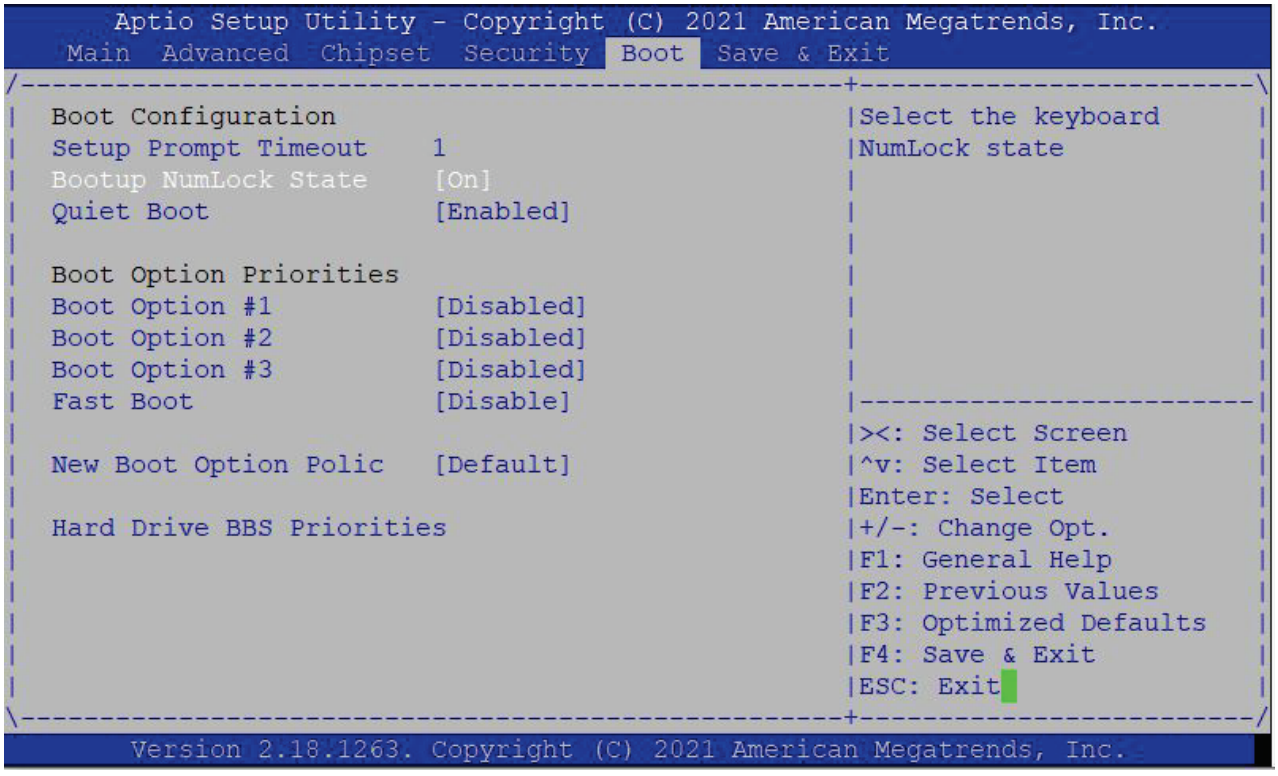
It is recommended to keep a record of all passwords in a safe place. Forgotten passwords results in the user being locked out of the system. If the system cannot be booted because the User Password or the Supervisor Password are not known, clear the uEFI BIOS settings, or contact Kontron Support for further assistance.

HDD security passwords cannot be cleared using the above method.

12.2.5. Boot Setup Menu

The Boot Setup menu lists the dynamically generated boot-device priority order.

Figure 38: Boot Setup Menu Initial Screen



The following table shows the Boot set up sub-screens and functions and describes the content. Default settings are in bold.

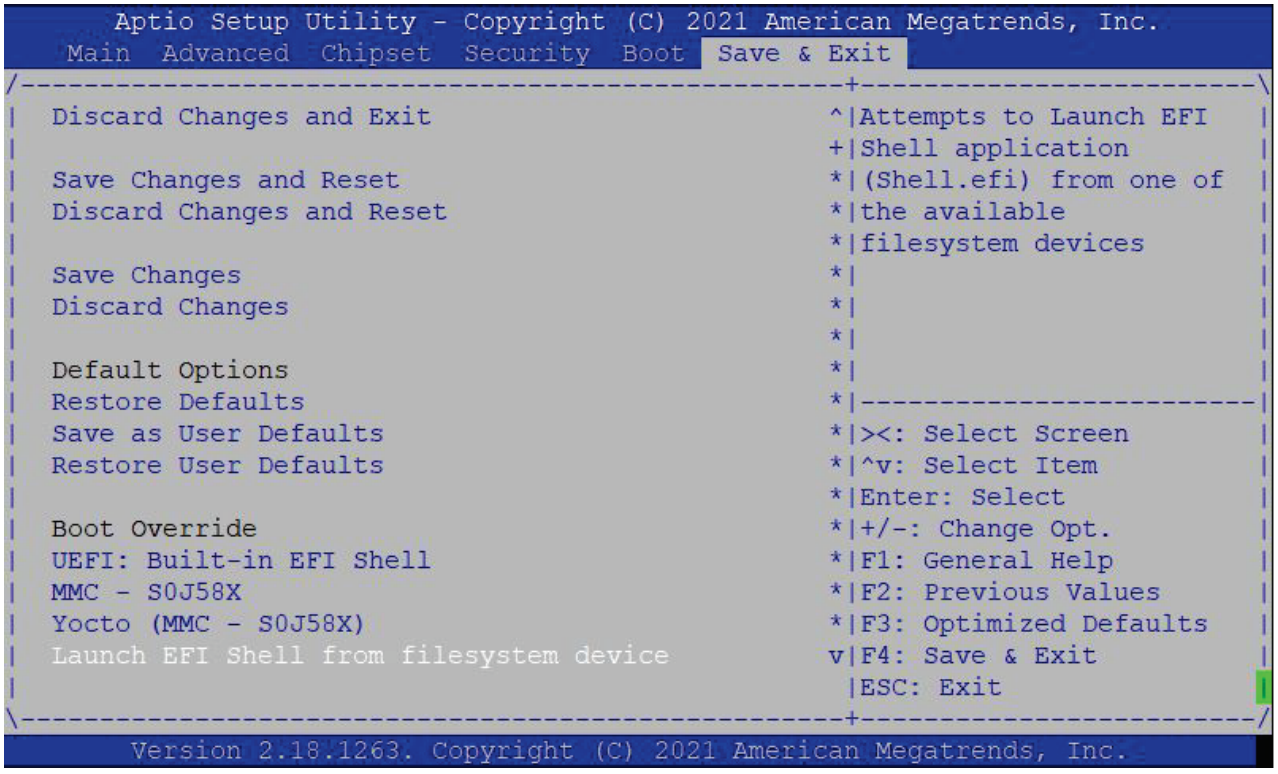
Table 32: Boot Setup Menu Sub-screens and Functions

Function	Description
Setup Prompt Timeout>	Displays number of seconds that the firmware waits for setup activation key The value 65535(0xFFFF) means an indefinite wait. [**1**]
Bootup NumLock State>	Selects keyboard NumLock state [**ON**, OFF]
Quiet Boot>	Quiet Boot [**Enabled**, Disable**d**]
Boot Option # (1-3)>	Sets the system boot order [UEFI: Built-in EFI Shell, MMC – S0J58X, Yocto (MMC – S058X), **Disabled**]
Fast Boot>	Enables or disables FastBoot features Note: Most probes are skipped to reduce time and cost during boot. [Enabled, **Disabled**]
New Boot Option Policy>	Controls the placement of newly detected UEFI boot options [**Default**, Place First, Place Last]
Hard Drive BBS Priorities>	Set the order of the legacy devices in this group

12.2.6. Save and Exit Setup Menu

The Save and Exit Setup menu provides functions for handling changes made to the settings and exiting the program.

Figure 39: Save and Exit Setup Menu Initial Screen



The following table shows the Save and Exit sub-screens and functions and describes the content.

Table 33: Save and Exit Setup Menu Sub-screens and Functions

Function	Description
Save Changes and Exit >	Exits system after saving changes
Discard Changes and Exit>	Exits system setup without saving changes
Save Changes and Reset>	Resets system after saving changes
Discard Changes and Reset>	Resets system setup without saving changes
Save Changes>	Saves changes made so far for any setup options
Discard Changes>	Discards changes made so far for any setup options
Restore Defaults>	Restores/loads standard default values for all setup options
Save as User Defaults>	Saves changes made so far as user defaults
Restore User Defaults>	Restores user defaults to all setup options
UEFI: Built in EFI Shell>	Attempts to launch the boot option #1
MMC – S0J58X>	Attempts to launch the boot option #2
Yocto (MMC – S0J58X)>	Attempts to launch the boot option #3
Launch EFI Shell from File System Device>	Attempts to launch EFI Shell application (Shell.efi) from one of the available filesystem devices

12.3. Firmware Update

Firmware updates are typically delivered as a ZIP archive containing the firmware image, update tools and instructions. The content of the archive with the directory structure must be copied onto a data storage device with FAT32 partition.

Updating Procedure

BIOS can be updated with the Intel tool fpt.efi using the flash.nsh script.

For further instructions please read the flash_instruction.txt in the ZIP archive.

Do not switch off the power during the flash process!
Doing so leaves your module unrecoverable.

Appendix A: List of Acronyms

Table 34: List of Acronyms (Example)

API	Application Programming Interface
BMC	Base Management Controller
CLI	Command-Line Interface
COM	Computer-on-Module
ECC	Error Checking and Correction
FRU	Field Replaceable Unit
GPU	Graphics Processing Unit
HD/HDD	Hard Disk /Drive
HPM	PICMG Hardware Platform Management specification family
IOL	IPMI-Over-LAN
IOT	Internet of Things
IPMI	Intelligent Platform Management Interface
KCS	Keyboard Controller Style
KVM	Keyboard Video Mouse
MEI	Management Engine Interface
NCSI	Network Communications Services Interface
PCIe	PCI-Express
PECI	Platform Environment Control Interface
PICMG®	PCI Industrial Computer Manufacturers Group
RTC	Real Time Clock
SEL	System Event Log
ShMC	Shelf Management Controller
SMBus	System Management Bus
SMWI	System Monitor Web Interface
SOL	Serial Over LAN
SSH	Secure Shell
TPM	Trusted Platform Module
UEFI	Unified Extensible Firmware Interface
VLP	Very Low Profile

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Kontron is a global leader in IoT/Embedded Computing Technology (ECT). As part of the S&T technology group, Kontron offers individual solutions in the areas of Internet of Things (IoT) and Industry 4.0 through a combined portfolio of hardware, software and services. With its standard and customized products based on highly reliable state-of-the-art technologies, Kontron provides secure and innovative applications for a wide variety of industries. As a result, customers benefit from accelerated time-to-market, lower total cost of ownership, extended product lifecycles and the best fully integrated applications.

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