



KBox A-250

User Guide, Rev. 1.2

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 KBOX A-250 – 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 for IT Equipment" supplied with the system.

Revision History

Revision	Brief Description of Changes	Date of Issue	Author/ Editor
1.0	Initial Issue	2019-Dec-11	MK
1.1	Jumper and GPIO information added; error corrections	2020-Mar-12	MK
1.2	GPIO information reworked; SIM Slot information added	2022-May-31	MK

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Customer Service

As a trusted technology innovator and global solutions provider, Kontron extends its embedded market strengths into a services portfolio allowing companies to break the barriers of traditional product lifecycles. Proven product expertise coupled with collaborative and highly-experienced support enables Kontron to provide exceptional peace of mind to build and maintain successful products.

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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 replaced incorrectly.

- ▶ Replace only with same or equivalent battery type recommended by the manufacturer.
 - ▶ Dispose of used batteries according to the manufacturer's instructions.
-

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 for IT Equipment

▲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 also to 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 an air filter is provided, this should be cleaned regularly. Do not place the system close to heat sources or damp places. Make sure the system is well ventilated.
- ▶ Only devices or parts which fulfill the requirements of SELV circuits (Safety Extra Low Voltage) as stipulated by IEC 60950-1 may be connected to the available interfaces.
- ▶ The 24VDC power supply voltage for the device must meet the requirements of a SELV Circuit according to UL/IEC 61010-2-201 Clause 3.11 and the "Limited Energy" according to UL/IEC 61010-1; Section 9.4. "Limited-energy circuits".
- ▶ The device should only be installed and operated indoors, in a dry environment.
- ▶ Both resistive and inductive loads can be connected to the GPIO interface.
- ▶ Before opening the device, make sure that the device is disconnected from the mains.
- ▶ Switching off the device 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 device. Ensure that there is free and easy access to enable disconnection.
- ▶ The device may only be opened for the insertion or removal of add-on cards (depending on the configuration of the system). 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 system does not exceed the value stated on the product label.
- ▶ Only original accessories that have been approved by Kontron can be used.
- ▶ Please note: safe operation is no longer possible when any of the following applies:
 - ▶ The device has visible damages.
 - ▶ The device is no longer functioning.

In this case the device must be switched off and it must be ensured that the device can no longer be operated.

Additional safety instructions for DC power supply circuits

- ▶ To guarantee safe operation of devices with DC power supply voltages larger than 60 volts DC or a power consumption larger than 240 VA, please observe that:
 - ▶ the device is set up, installed and operated in a room or enclosure marked with "RESTRICTED ACCESS", if there are no safety messages on product as safety signs and labels on the device itself.
 - ▶ 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 device itself is not disconnectable
 - ▶ a disconnect device, if provided in or as part of the equipment, shall disconnect both poles simultaneously
 - ▶ interconnecting power circuits of different devices 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 IEC 61010-1, IEC 61010-2-201, IEC60950-1 or VDE0100 or UL508 regulations.
- ▶ The devices do not generally fulfill the requirements for "centralized DC power systems" (UL 60950-1, Annex NAB; D2) and therefore may not be connected to such devices!
- ▶ Only certified at least IEC 60950-1 compliant main power supply unit shall be connected!

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 B digital device, pursuant to Part 15 of the FCC Rules.

2.3. EMC Compliance (Canada)

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

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

(French): Cet appareil numérique de la class B 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-250 (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 WiFi card (always factory-installed if ordered) with two antennas (enclosed)
- ▶ KBox A-250 can optionally be ordered with a factory-installed SSD Kit (mSATA [instead of WiFi] and/or M.2)
- ▶ Mini PCIe LTE card (always factory-installed if ordered) with two antennas (enclosed)
- ▶ SD card
- ▶ Two brackets for wall/table mounting
- ▶ Vertical mounting plate for control cabinet mounting
- ▶ Rubber feet (self-adhesive)
- ▶ Printed-circuit board connector - MC 1,5/ 9-ST-3,5 for GPIO

3.3. Type Label and Product Identification

The type label (product name, serial number) of your KBox A-250 system are located on the bottom side of the device (refer to Figure 1 and Figure 7 pos. 1).

Figure 1: Type Label



4/ System Overview

The KBox A-250 expands the Kontron line of computers - KBox Series. It is a highly scalable and flexible industrial computer. Based on the piTX-2.5" SBC with Intel Atom® processors of the E3900 series the KBox A-250 was developed as a cost optimized gateway for data intensive IoT edge applications.

For local data collection, e.g. link to sensor and machine level, it offers one serial port (RS232). The KBox A-250 is one of the first Kontron products which is Microsoft® Azure certified. This means the hardware is tested and verified and can be integrated into Microsoft® Azure IoT Services.



Refer to the information and technical data in the user manual of the installed piTX-APL Module.

The user's manual of the installed piTX-APL Module can be downloaded from our web page <http://www.kontron.com> . Search for the name of the installed module.

The connection to the IT infrastructure in general can be implemented through integrated Gigabit/Fast Ethernet interfaces or optional WiFi support.

Additional wireless technologies such as integrated LTE (4G) and GSM (2G/3G) are a further option. The KBox A-250 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 Security Chip will be factory installed by Kontron on request.

The KBox A-250 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 (on the rear side, when a DIN rail clip is factory-mounted). The KBox A-250 may be optionally factory-equipped with an mPCIe WLAN card for two antennas.

The following interfaces are available with the KBox A-250:

Standard front panel:

- ▶ 24 V DC input power (X101)
- ▶ DisplayPort (X109)
- ▶ 2x USB 3.0 (X105, X106)
- ▶ 2x Ethernet : 1x Gigabit Ethernet (10/100/1000) (X102) and 1x Fast Ethernet (10/100) (X103)
- ▶ COM 1, RS232 (X110)
- ▶ GPIO connector
- ▶ Power/Reset button PWR and power LED
- ▶ SSD or/and mSATA drive status LED
- ▶ WLAN status LED

The device is designed to be operated in:

- ▶ Vertical position: (KBox A-250 configuration with vertical mounting plate) mounted inside a control cabinet or
- ▶ Vertical/horizontal: wall mounted (KBox A-250 configuration with wall mounting brackets) or
- ▶ Horizontal position: KBox A-250 as desktop unit (equipped with the supplied rubber feet) or
- ▶ Vertical/horizontal: KBox A-250 DIN Rail mounting (with DIN Rail mounting clip)

NOTICE



When powering on the KBox A-250, make sure that the cooling fins of the chassis (Figure 8, Figure 9 and Figure 10, 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-250. 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-250 comprises a chipset internal RTC. To provide a valid date and time when no power is connected to the KBox A-250, the RTC is buffered by the CMOS battery (type CR2032). Refer also to the “Lithium Battery Precautions” on page 8.

4.1.1. RTC Buffer Time

The RTC buffer time (battery life span) depends on the quality and capacity of the battery, the ambient temperature and how long the box is connected to its power supply (since the battery is not used when the power supply is connected).

If the time is not valid this is indicated by a status bit in the RTC registers.

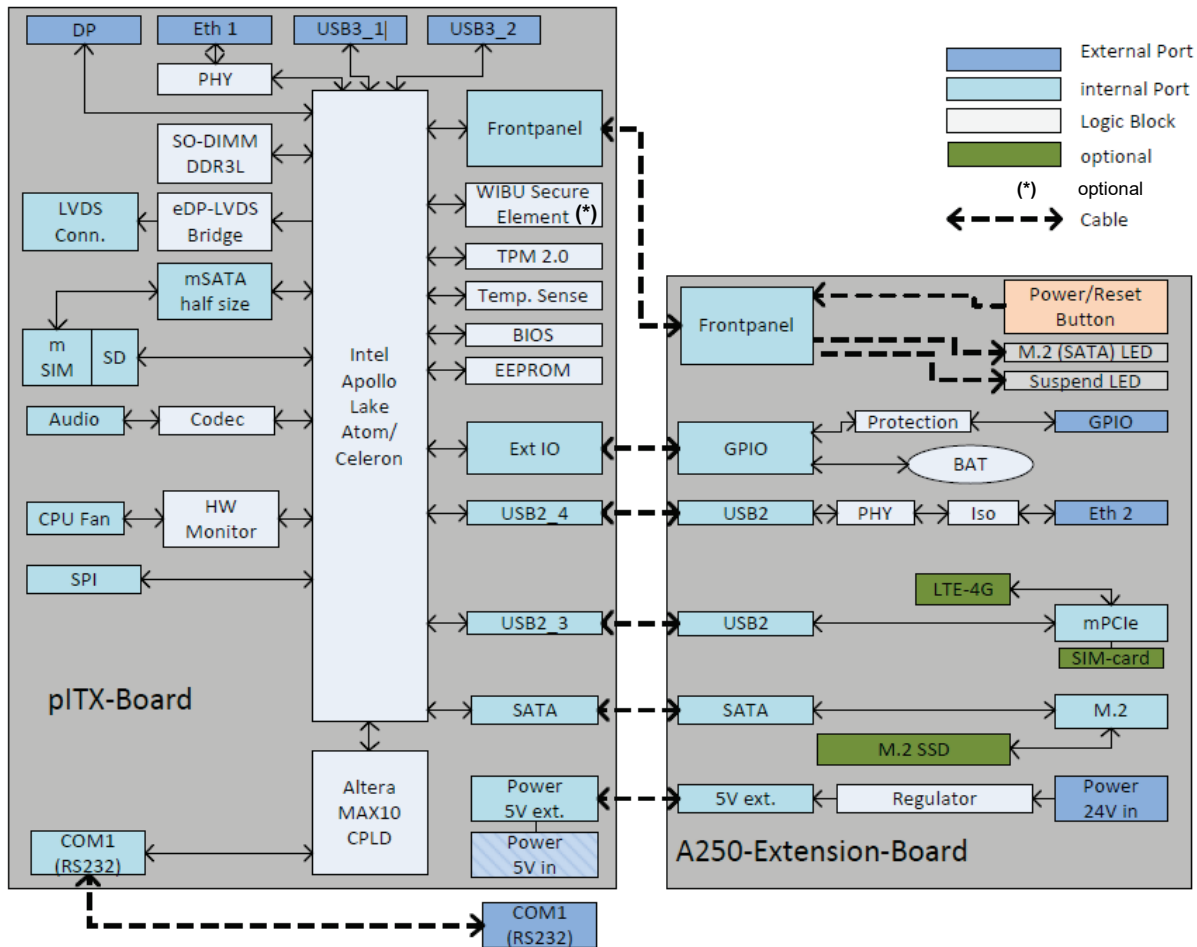
4.2. System Expansion Capabilities

The KBox A-250 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.

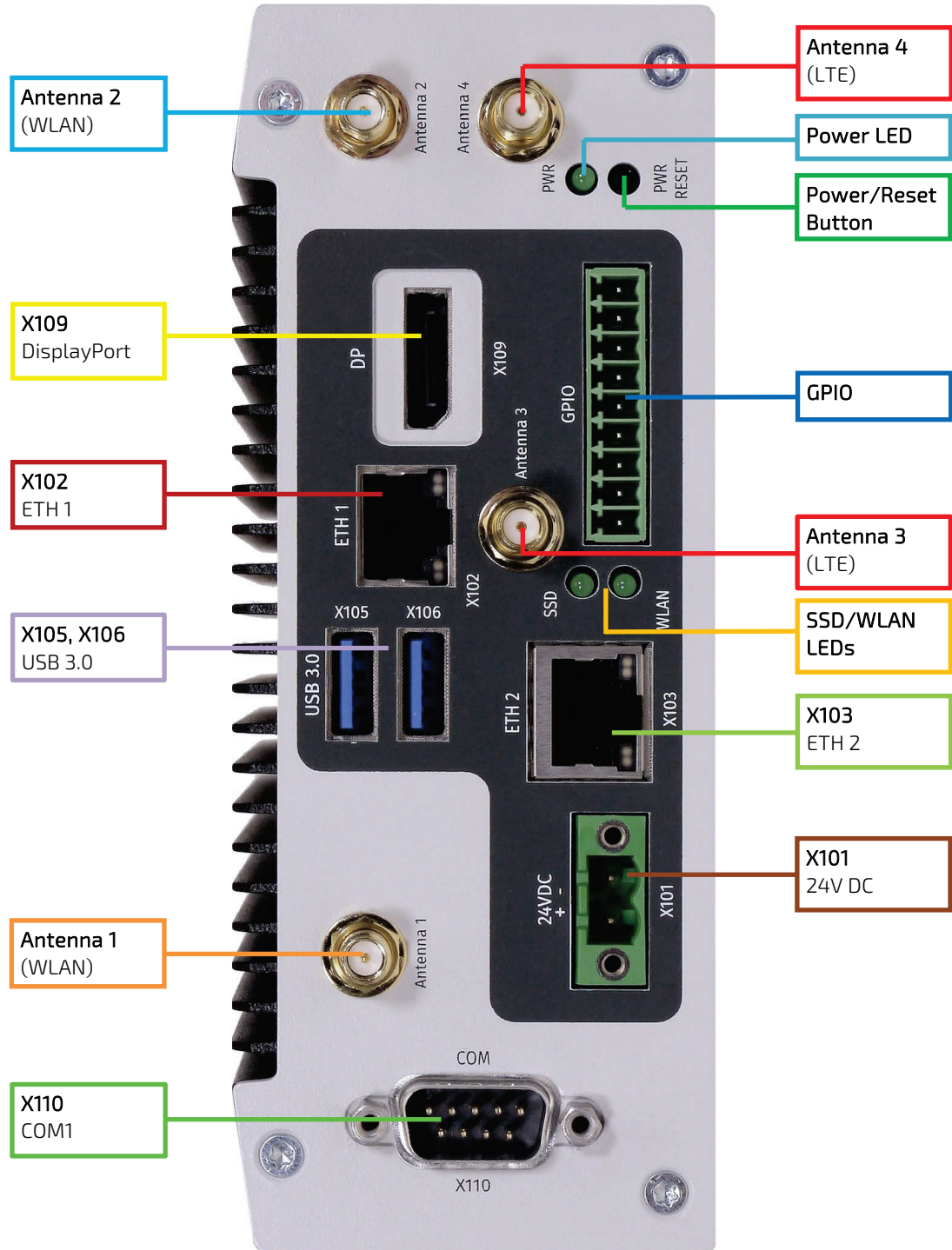
4.3. Block Diagram of the KBox A-250

Figure 2: Block Diagram of the KBox A-250



4.4. Front Side

Figure 3: KBox A-250 – Front View



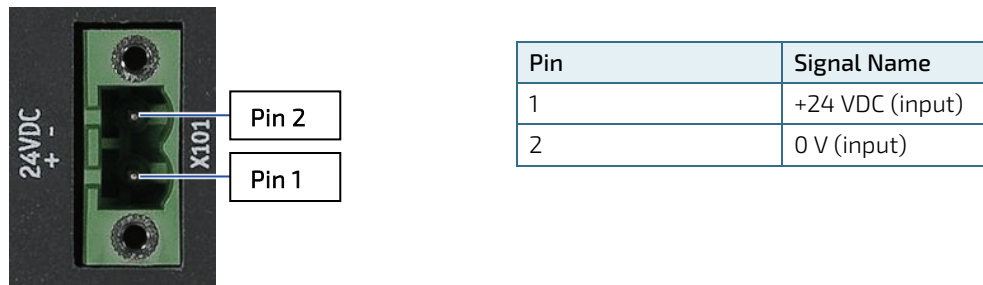
4.5. Front Interfaces of the KBox A-250

4.5.1. X101 - Power Input Connector

The 2-pin connector (X101, Figure 3) provides the power connection of the KBox A-250 to the appropriate DC main power supply. For pin assignments refer to the subsection 10.1.1.

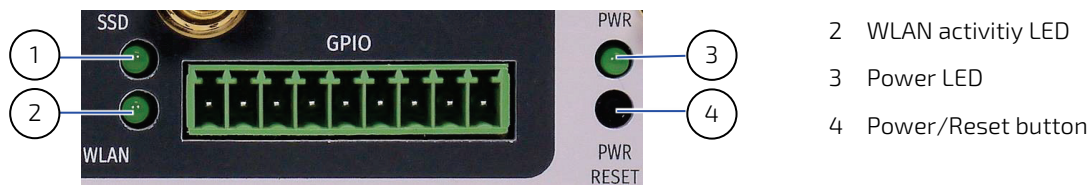
The external cable connector is a "TE Connectivity 796859-2" 2-pin plug. This power plug is provided along with the KBox A-250. Please observe the section 7.1 "Connecting to DC Main Power Supply".

Figure 4: X101 - 24VDC power input connector



4.5.2. Controls and LED Indicators

Figure 5: Detail - Power button and LED indicators



SSD LED (green)	The SSD LED (Figure 3 and Figure 5, pos. 1) indicates storage (SSD/mSATA/M.2) activity.
WLAN LED (green)	The WLAN LED (Figure 3 and Figure 5, pos. 2) indicates WLAN activity.
Power Button	Press this button (Figure 5, pos. 4) to turn the system on or off. Pressing the power button for more than 4 seconds will lead to a hardware reset. Please observe the setting options for the power button in the BIOS-Setup.
Power LED (green)	The power LED (marked PWR, Figure 3 and Figure 5, pos. 3) 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).

⚠ WARNING

Even when the system is turned off via the power button 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-250 by connecting appropriate wires to the Phoenix power terminal, refer to subsection 6.2.1 "Cabling".

4.5.3. X102/X103 - Ethernet Connectors (ETH)

These connectors (X102 as ETH 1 and X103 as ETH 2, Figure 3) are Gigabit Ethernet 10/100/1000 Mbit/s, IEEE 1588 (ETH1) and Fast Ethernet 10/100 Mbit/s (ETH2) 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, orange (10/100[/1000] MBit/s).

For pin assignment refer to subsection 10.1.2.

4.5.4. X105/X106 - USB 3.0

The KBox A-250 provides two USB 3.0 interfaces. This connectors (X105, X106, Figure 3) allows connection of USB 3.0 or USB 2.0 compatible devices to the system. For pin assignment refer to subsection 10.1.3.

4.5.5. X109 - DisplayPort

This is a DisplayPort compliant interface realized using a standard DisplayPort connector. An external (digital) display can be connected to the DisplayPort connector (X109, Figure 3). For pin assignment refer to subsection 10.1.4.

4.5.6. X110 – Serial Port COM 1

This interface (X110, Figure 3) 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.

4.5.7. GPIO Interface

Figure 6: GPIO interface



This interface (GPIO, Figure 6) is provided as a 9-pin Phoenix connector. The mating connector for the GPIO interface is not supplied with the system.



Both resistive and inductive loads can be connected to the GPIO interface.

4.6. Left and Right Side View

Figure 7: Right side of the KBox A-250 system

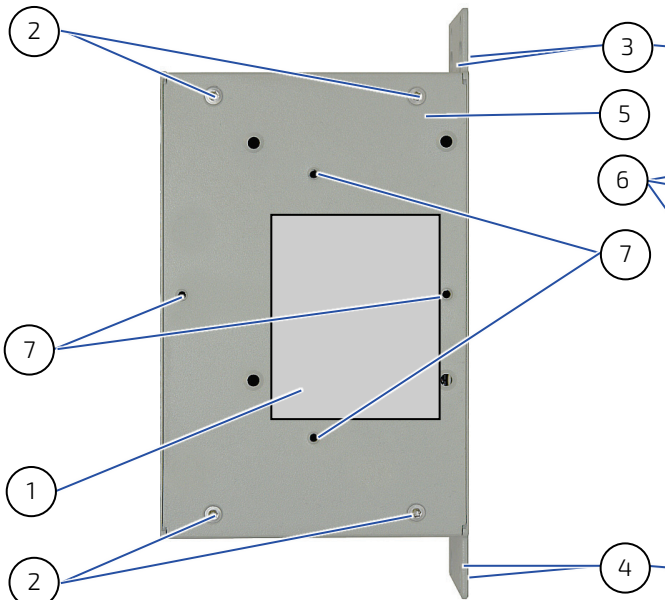
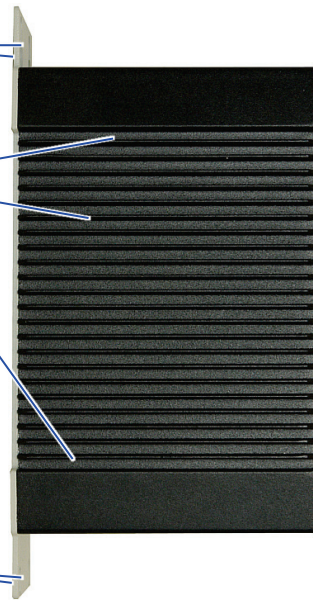


Figure 8: Left side of the KBox A-250 system



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

4.7. Top and Bottom Side View

Figure 9: Top side of the KBox A-250 system

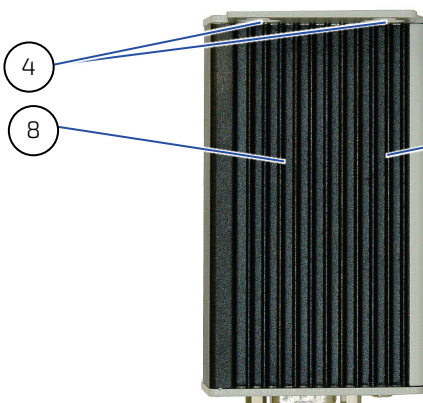
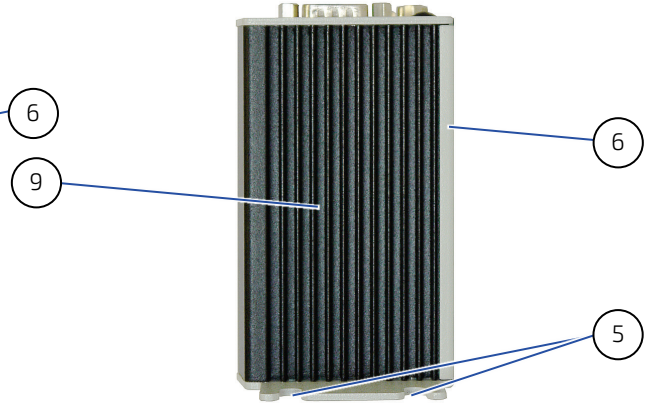


Figure 10: Bottom side of the KBox A-250 system



NOTICE

To provide sufficient heat dissipation for the cooling of the KBox A-250 platform, never cover the cooling fins of the chassis. Do not place any objects onto the device.

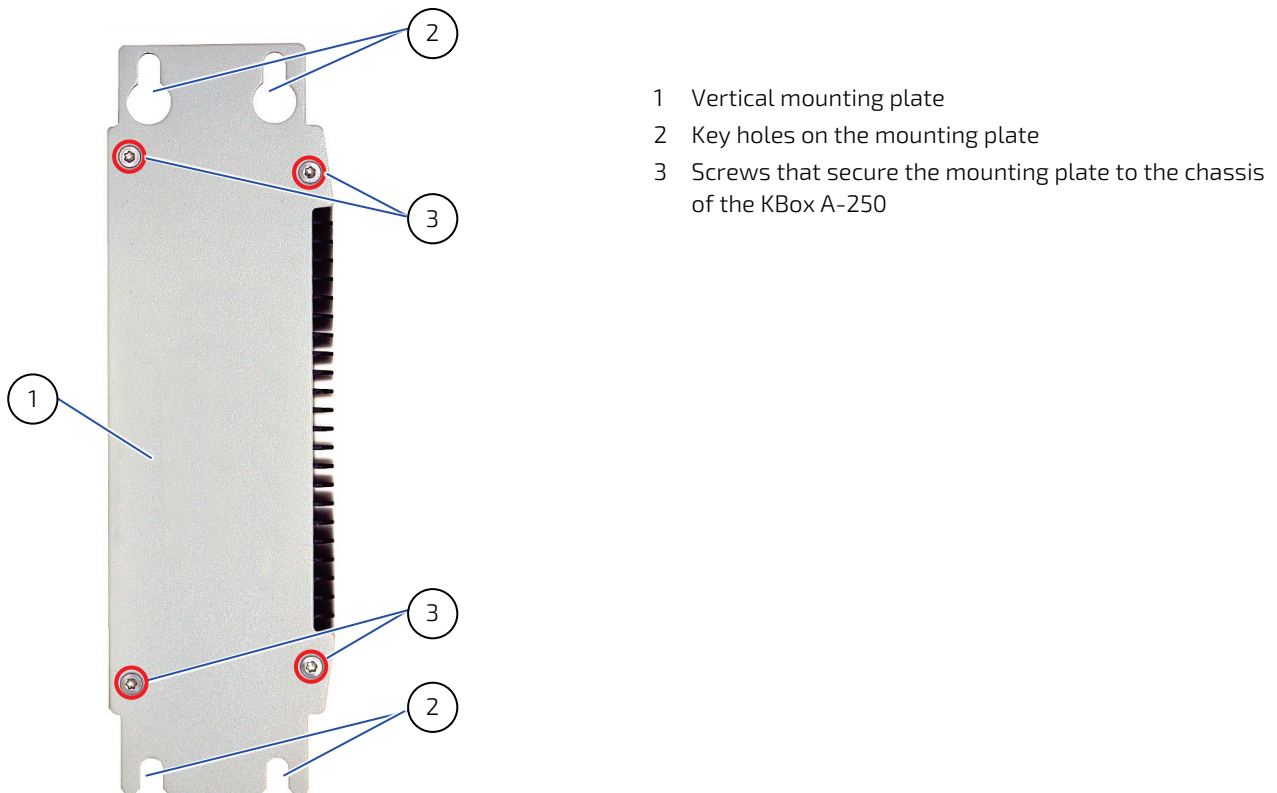
4.8. Rear Side View

4.8.1. Rear Side View of the KBox A-250 with Vertical Mounting Bracket

The KBox A-250 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-250 with Vertical Mounting Plate".

Figure 11: Rear side of the KBox A-250 system with vertical mounting plate



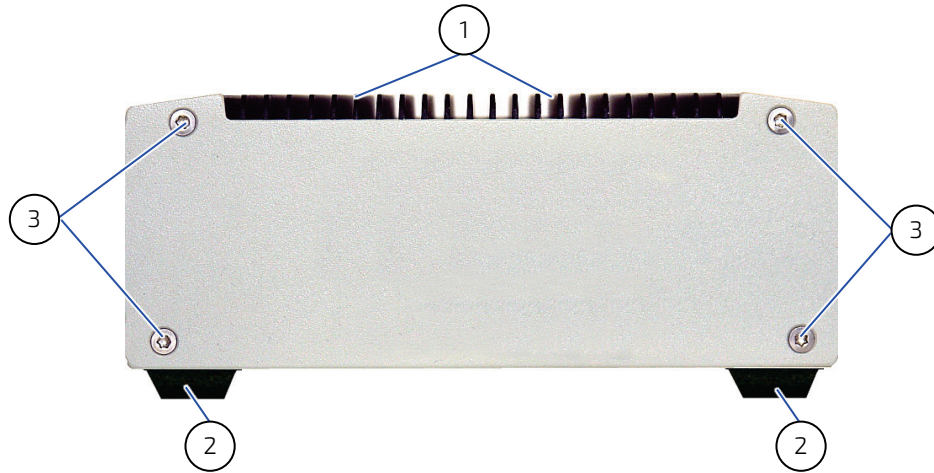
The vertical mounting plate is factory-installed (when KBox A-250 was ordered with vertical mounting plate).

If the vertical mounting plate was ordered later and is to be mounted subsequently, first remove the rear panel of the KBox A-250.

Do not mount the vertical mounting plate on top of the rear panel!

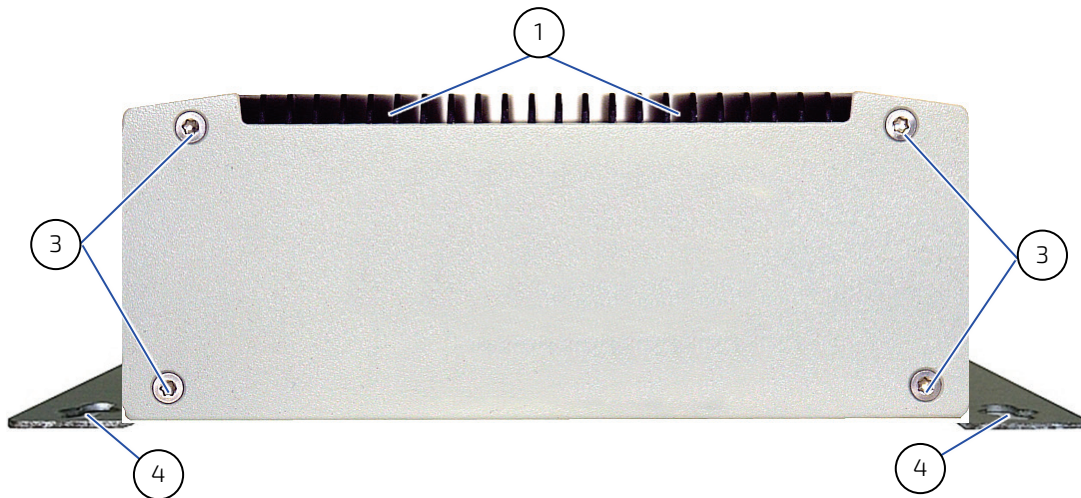
4.8.2. Rear Side View of the KBox A-250 as Desktop with Rubber Feet

Figure 12: Rear side of the KBox A-250 (shown as desktop unit)



4.8.3. Rear Side View of the KBox A-250 with Wallmount Brackets

Figure 13: Rear side of the KBox A-250 (shown with vertical/horizontal mounting brackets)

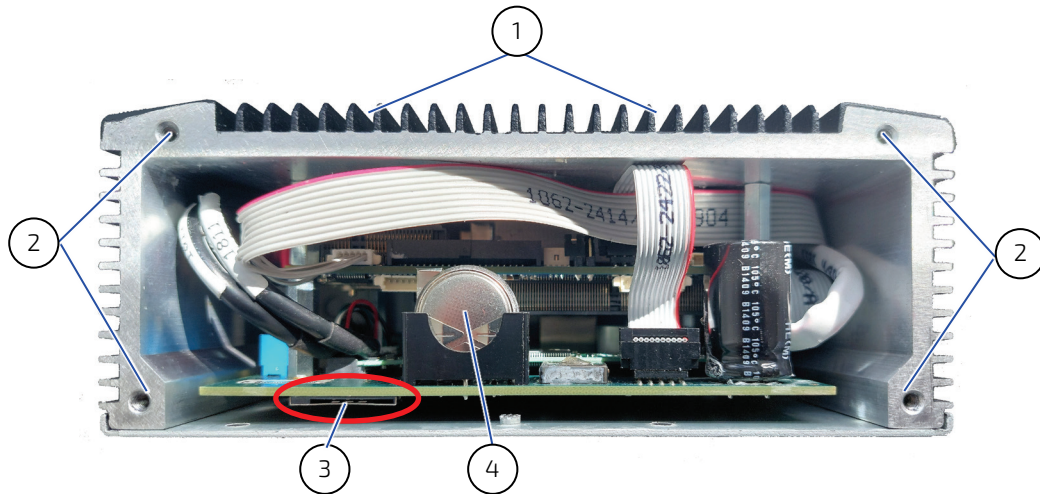


- | | |
|--|---|
| <ul style="list-style-type: none"> 1 Cooling fins on the top side of the chassis 2 Rubber feet | <ul style="list-style-type: none"> 3 Countersunk screws M3x8 ISO14581 torx 4 Wall/table mount brackets with key holes (left and right) for horizontal or vertical (with interface sides downwards or upwards) mounting position |
|--|---|

4.8.4. SIM Card Socket and CMOS Battery

For installaing/removing a SIM card or replacing the CMOS battery, remove the 4x torx screws (see Figure 11, pos. 3, Figure 12, pos. 3, Figure 13, pos. 3) and the rear plate (or vertical mounting plate) from the rear side of the KBox A-250.

Figure 14: Rear side of the KBox A-250 (shown with rear plate removed)



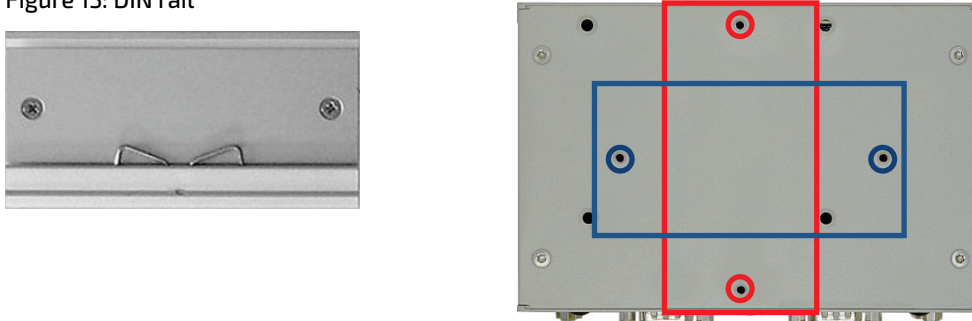
- | | | | |
|---|---|---|---------------|
| 1 | Cooling fins on the top side of the chassis | 3 | SIM card slot |
| 2 | Threaded holes for Countersunk screws M3x8
ISO14581 torx | 4 | CMOS battery |

4.9. Optional Parts

4.9.1. DIN Rail Clip (Option)

For DIN Rail mounting of the KBox A-250 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. Tapped holes are provided on the access cover (Figure 7, pos. 8) for mounting the optional DIN Rail clip in vertical or horizontal orientation (Figure 15).

Figure 15: DIN rail



4.9.2. WiFi/WLAN (Option)

Depending on the ordered system configuration, the KBox A-250 system (only KBox A-250 used as desktop or KBox A-250 with vertical/horizontal wallmount brackets or with DIN Rail clip) can be equipped with WiFi hardware.

4.9.2.1. WLAN/WiFi Antenna

Depending on the ordered system configuration, the KBox A-250 system can be equipped with WiFi hardware. If you have ordered a system configuration including WLAN, a Reverse (RP) SMA-connector for screwing on the provided WLAN antenna is installed at the front side (Figure 3; "Antenna 1, Antenna 2"). The "Antenna 3" and "Antenna 4" connectors are intended for use with LTE option.

Figure 16: WLAN (WiFi) antenna



- 1 Reverse (RP) SMA antenna connector
- 2 Hinge for positioning the antenna

4.9.2.2. LTE (Option)

The KBox A-250 can optionally be equipped with cellular technology LTE (G4) to meet GCF or PTCRB. Please request this option if required.

5/ Thermal Considerations

5.1. Available Processors

Please refer to the chapter 9/ "Technical Specifications".



The list of processors is not complete and may be extended over the product lifetime.

5.2. Convection Cooling

The applied cooling method provides adequate cooling of the device during operation and performs a one-way thermal transfer to the chassis. Three sides of the KBox A-250 consist of a compact aluminum U-shaped chassis are with cooling fins. The cooling fins provide heat dissipation during operation.



To provide sufficient heat dissipation for the cooling of the KBox A-250, never cover the cooling fins of the chassis. Do not place any objects on the device.

5.3. 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 17).

5.4. 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 75% 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.

6/ Installation Instructions

The KBox A-250 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-250 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 device should only be installed and operated indoors, in a dry environment.

The KBox A-250 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-250.

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 17 and Figure 18.

Refer also to section 9.1.2 "Mechanical Specifications".

The KBox A-250 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-250 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-250 for mounting Kontron offers different mounting solution such as:

- ▶ KBox A-250 configuration with vertical mounting plate for installation into a control cabinet or to a wall
- ▶ KBox A-250 for DIN Rail mounting into a control cabinet
- ▶ KBox A-250 configuration with horizontal mounting brackets for installation into a control cabinet or to a wall
- ▶ KBox A-250 for desktop operation without mounting (with rubber feet)

Depending on the ordered KBox A-250 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 11, pos. 2) allow you to mount the KBox A-250 inside the control cabinet in vertical position.

The key holes of the mounting brackets (Figure 11, pos. 2) allow you to mount the KBox A-250 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-250 with Vertical Mounting Plate", 9.1.3 "Mechanical Specifications of the KBox A-250 Wall/Table Mounting Brackets", 9.1.1 "Mechanical Specifications of the KBox A-250 as Desktop" or refer to the drawings for KBox A-250 on our web site. The drawings can be downloaded from our web site www.kontron.com by selecting the product name.



For a sufficient air circulation around the device, we recommend not mount or operate any other devices within the "Restricted Area" around the KBox A-250; refer to the red marked area in Figure 17, Figure 18.

Figure 17: Restricted area for mounting around KBox A-250 (desktop side view with antenna)

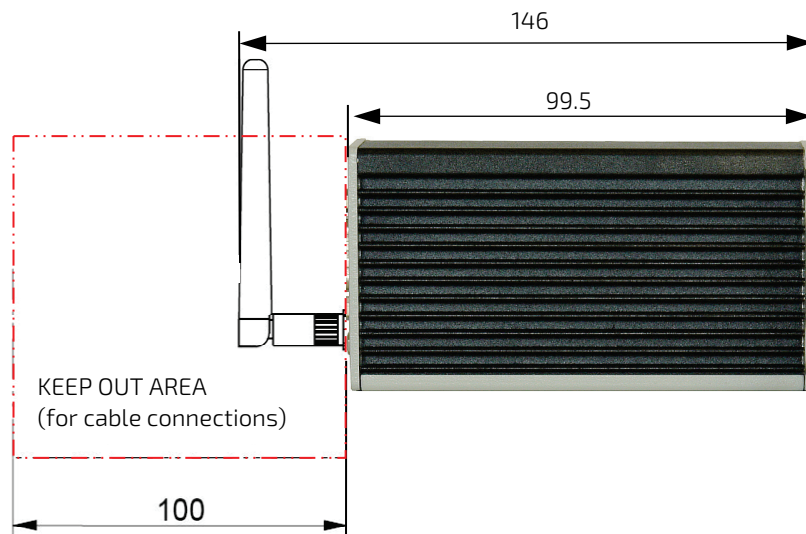
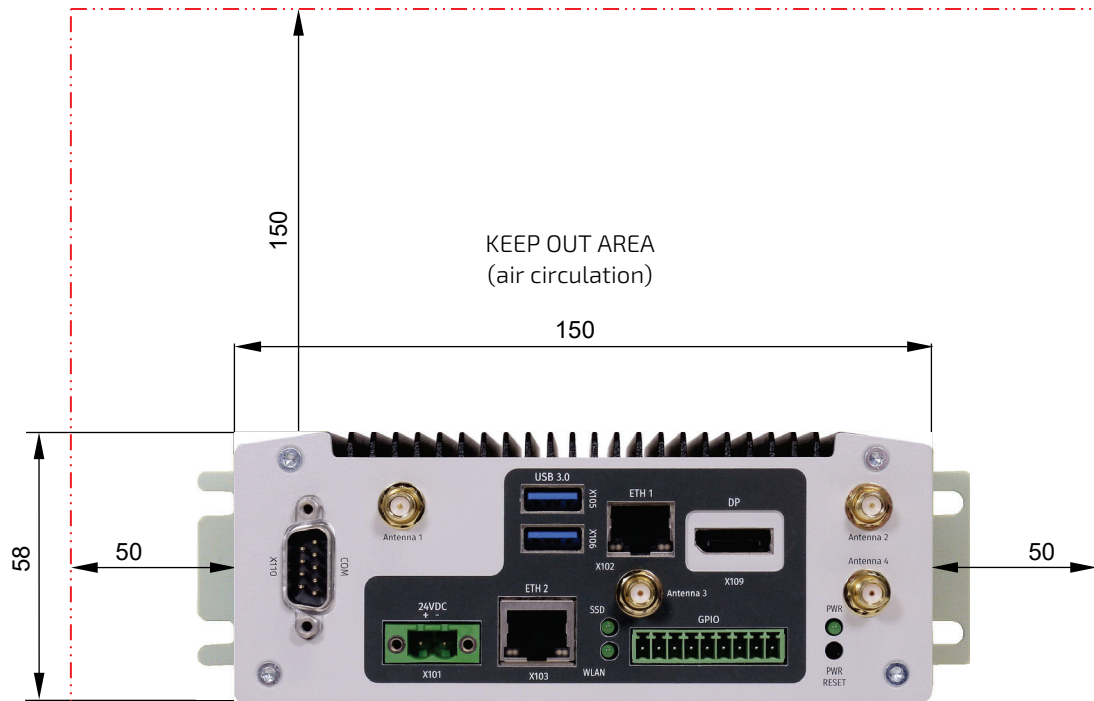


Figure 18: Restricted area for mounting around KBox A-250 (front view with vert./horiz. mounting brakets)

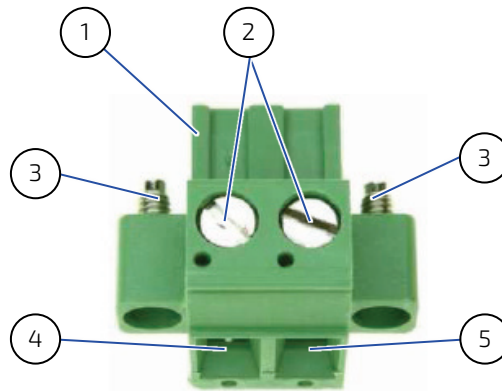


6.2. DC Power Connection

The KBox A-250 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-250 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 19: Power plug terminal



- | | | | |
|---|---|---|--|
| 1 | 2-pin power plug terminal | 4 | Location for inserting the "+24V" wire |
| 2 | Slotted pan head screws | 5 | Location for inserting the "0V" wire |
| 3 | Screws for securing the power plug terminal | | |

6.2.1. Cabling

For the pin assignment 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 19, 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 19, Figure 4 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-250 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 3 and Figure 4, marked X101) is located on the front side of the KBox A-250. The KBox A-250 will be connected to a DC main power supply via the supplied power plug terminal (see Figure 19) 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-250 may not be connected to a central DC power supply.

The KBox A-250 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-250.

Even when the system is turned off via the power button (Figure 3 and Figure 5, marked PWR) parts of the system are still energized.

The disconnecting device (fuse/circuit breaker) rating must be in accordance with the wire cross-section and the rated current of the KBox A-250.

When powered on, the KBox A-250 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-250 and to the main power source, corresponding to signals marked. Refer to Figure 4 and Figure 19.

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-250 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 3 and Figure 4 marked X101) of the KBox A-250. 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-250 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.

If you have ordered The KBox A-250 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/support-and-services/support/customer-section>.

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-250 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-250.

9/ Technical Specifications

Table 1: Technical Specifications

KBox A-250	
Installed Module and Baseboard	Baseboard with pITX SBC Intel Atom® x5-E3930/E3940/E3950
RAM	up to 8 GB DDR3L
BIOS	AMI® BIOS
Interfaces (front side accessible)	1x Ethernet (10/100 Mbit/s) 1x Ethernet (10/100/1000 Mbit/s) 2x USB 3.0 1x DisplayPort 1x COM 1 (RS232) 1x GPIO Port
Free Expansion Sockets (e.g. for Storage Media)	1x mPCIe socket (USB only), full-size with SIM card socket 1x mSATA/mPCIe, half-size (autoselect) 1x SD card socket 1x M.2 SATA socket
Controls (at the front side)	Power/Reset button (PWR)
Indicators (at the front side)	PWR (power LED) SSD (SSD activity LED) WLAN (WLAN activity LED)
DC IN Connector (at the front side)	2-pin DC input connector
Protection Class	IP20
Rated Voltage (tolerance)	24 VDC (+20%/-15%), 1 A max.

9.1. Mechanical Specifications

Table 2: Mechanical Specifications

Dimensions	KBox A-250 with vertical mounting plate	KBox A-250 with vert./horiz. mounting brackets	KBox A-250 as desktop*
Height	150 mm (10.47")	192 mm (5.33")	62 mm (2.58")
Width	58 mm (2.28")	58mm (10.63") vertical mount 65mm (xxxx) wall/table mount	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. 1.02 kg (2.25 lbs.)	Approx. 1.02 kg (2.25 lbs.)	Approx. 1 kg (2.20 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 of the KBox a-250 are provided in vertical orientation, for desktop operation the dimensions are provided in horizontal orientation.

9.1.1. Mechanical Specifications of the KBox A-250 as Desktop

Figure 20: Dimensions: Front as desktop

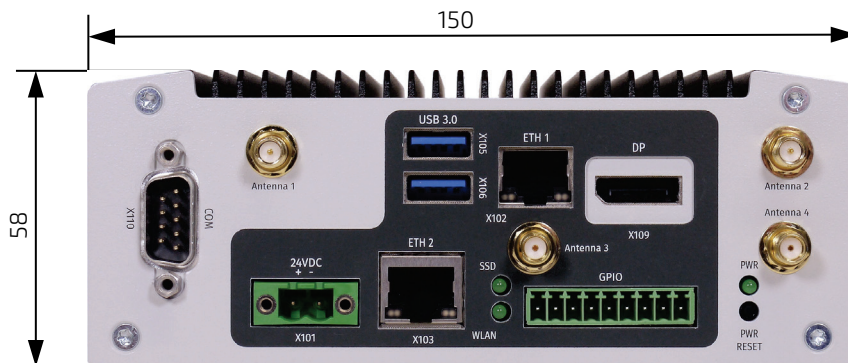
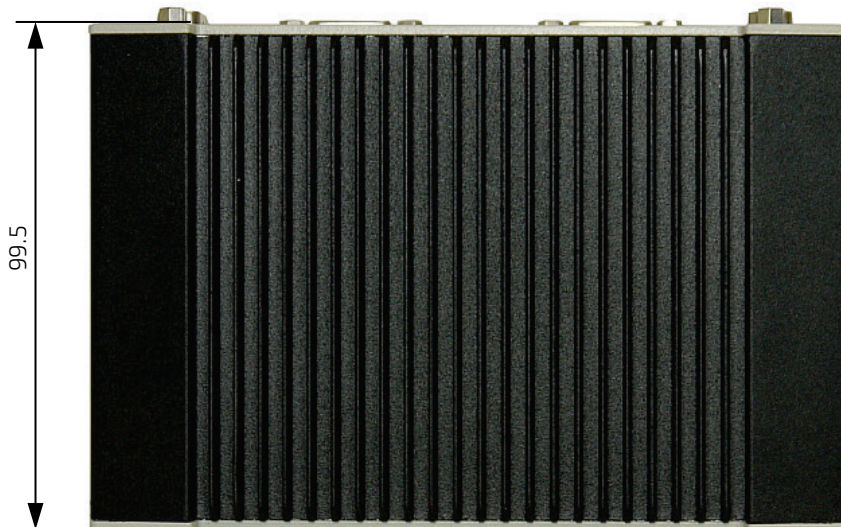


Figure 21: Dimensions: Front side with antennas and wall/table mounting brackets



9.1.2. Mechanical Specifications of the KBox A-250 with Vertical Mounting Plate

Figure 22: Dimensions: Left side



Figure 23: Dimensions: Rear side with vertical mounting plate

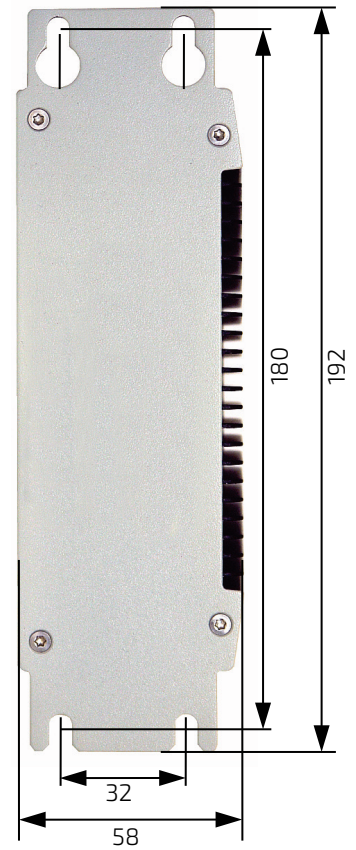
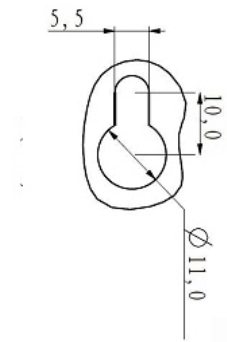


Figure 24: Dimensions: Detail key hole



9.1.3. Mechanical Specifications of the KBox A-250 Wall/Table Mounting Brackets

Figure 25: Dimensions: Top side (with wall/table mounting brackets)

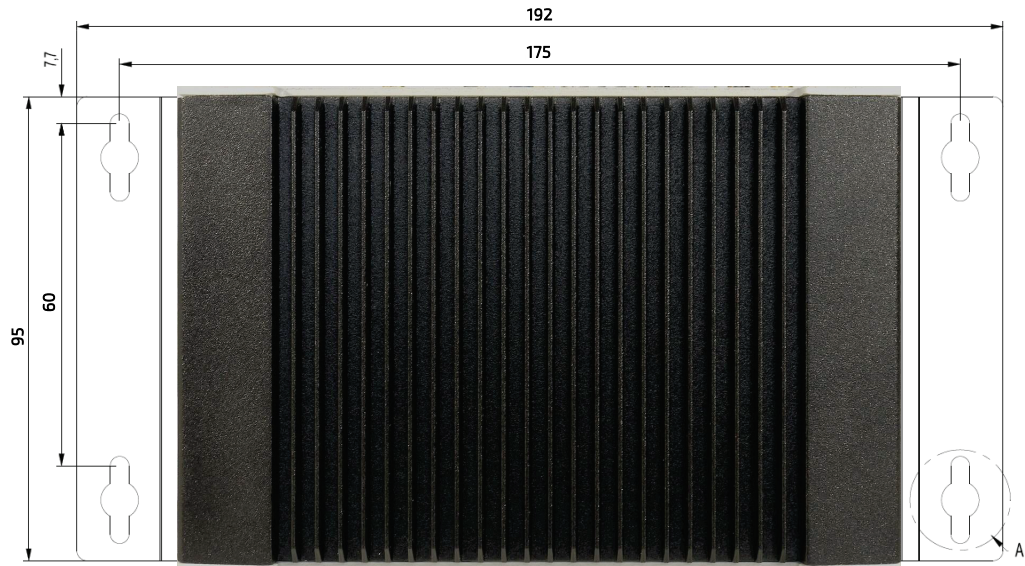


Figure 26: Dimensions: front side (with wall/table mounting brackets)

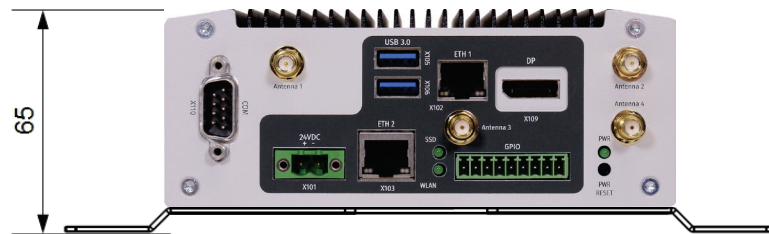
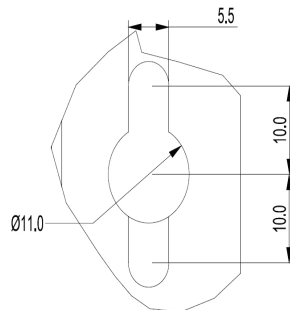


Figure 27: Detail mounting slide hole (wall/table mounting brackets)



9.2. Environmental Specifications

Table 3: Environmental Specifications

	KBox A-250 (Standard Version)
Thermal Management	Fanless cooling
Operating Temperature	0°C ... +40°C (32 ... 104°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	30 G, 11 ms, half sine (IEC 60068-2-27) no HDD and add on cards
Operating Vibration	5 - 150 Hz, 1 G (IEC 60068-2-6)
Non-operating/Transit Vibration	5 - 150 Hz, 2 G (IEC 60068-2-6)

9.3. CE Directives and Standards

Table 4: CE Directives and Standards

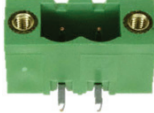
CE-Mark Compliant with EU Directives	Electromagnetic Compatibility	Directive 2014/30/EU
	Low Voltage	Directive 2014/35/EU
	Radio Equipment Directive (RED)	Directive 2014/53/EU
	RoHS II	Directive 2011/65/EU
EMC 2014/30/EU Emission	CISPR 11 EN 55011	Industrial, scientific and medical equipment - Radio-frequency disturbance characteristics - Limits and methods of measurement
EMC 2014/30/EU Immunity	EN 61000-6-2	Electromagnetic compatibility (EMC), part 6-2: Generic standards- Immunity for industrial environment
EMC 2014/53/EU	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 2014/53/EU	<i>EN 301 489-17 V3.1.1</i>	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 2014/53/EU	EN 300 328 V2.1.1	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
EMC 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 2014/35/EU	IEC 61010-1 EN 61010-1 UL 61010-1	Safety requirements for electrical equipment for measurement, control and laboratory use - Part 1: General requirements Minimum temperature rating of the cable to be connected to the field wiring terminals: 80°C
	IEC 61010-2-201 EN 61010-2-201 UL 61010-2-201	Safety requirements for electrical equipment for measurement, control and laboratory use - Part 2-201: Particular requirements for control equipment Minimum temperature rating of the cable to be connected to the field wiring terminals: 80°C
Safety and Health 2014/35/EU	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)
WEEE 2002/96/EC	The Waste Electrical and Electronic Equipment Directive (WEEE Directive)	Compliant with the Waste Electrical and Electronic Equipment (WEEE) directive to reduce waste of electrical and electronic equipment, encourage recycling and environmental disposal and increase the environmental awareness of producers

10/ Standard Interfaces – Pin Assignments

Low-active signals are indicated by a minus sign.

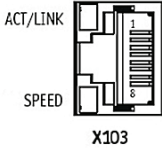
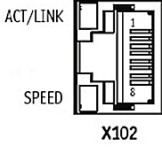
10.1.1. (X101) Power Input Connector

Table 5: (X101) Power Input Connector

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

10.1.2. (X102 as ETH 1 and X103 as ETH 2) Ethernet Connectors

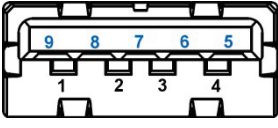
Table 6: (X102, X103) Ethernet Connectors

Pin	Signal Name	RJ45 plug socket
1	MDI0+	 <p style="text-align: center;">X103</p>  <p style="text-align: center;">X102</p>
2	MDI0-	
3	MDI1+	
4	MDI2+	
5	MDI2-	
6	MDI1-	
7	MDI3+	
8	MDI3-	

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

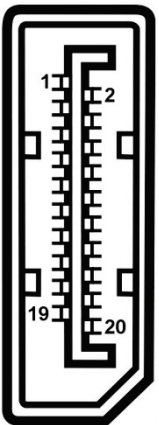
10.1.3. (X105, X106) USB 3.0 Ports

Table 7: (X105, X106) 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. (X109) DisplayPort

Table 8: (X109) 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. (X110) Serial Interface COM 1 (RS232)

Table 9: (X110) Serial Interface COM 1 (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	

10.1.6. GPIO Interface

Table 10: GPIO Interface

Pin	Signal Name	9-pin GPIO Connector (male)
1	GND	
2	GPIO1	
3	GPIO2	
4	GPIO3	
5	GPIO4	
6	GPIO5	
7	GPIO6	
8	GPIO7	
9	GPIO8	

The GPIO interface of the KBox A-250 is suitable for small application circuits. It provides a flexible configuration as input or output per pin.

When a pin is configured as an output, a low-side switch acts on the pin. When active the pin is shorted to ground. When de-activated the pin is in an open state.

When a pin is configured as an input, a voltage level lower than 10V will be recognised as logical low. If the input voltage is above 10.5V the input is recognised as logical high.

Each pin may switch / sink up to 32mA. This ensures that over the operating temperature range of the KBox A-250 no over-temperature events or issues occur.

Items to observe when using the GPIO interface:

- ▶ To avoid back-powering and EMC issues it is recommended that connected I/O circuits and A-250 are supplied by the same power supply
- ▶ The GPIO are not suitable to drive a LED. In OFF state a leakage current may illuminate the connected LED
- ▶ The GPIO interface may not be used for high inductive loads and stepper motors
- ▶ The ground for the I/O circuits shall be connected to the ground for the box supply

NOTICE

Voltage of application power has to be less or equal to supply voltage of the KBox A-250!

$$V_{App} \leq V_{KBox}$$

Do not directly connect V_{App} or V_{KBox} to any of the GPIO pins. Neither in output nor in input mode. This may damage the GPIO interface. Always use a protective resistor on GPIO pins which are configured as input.

The following illustrations show how the input or output function can be used.

Figure 28: GPIO wiring Example: Output

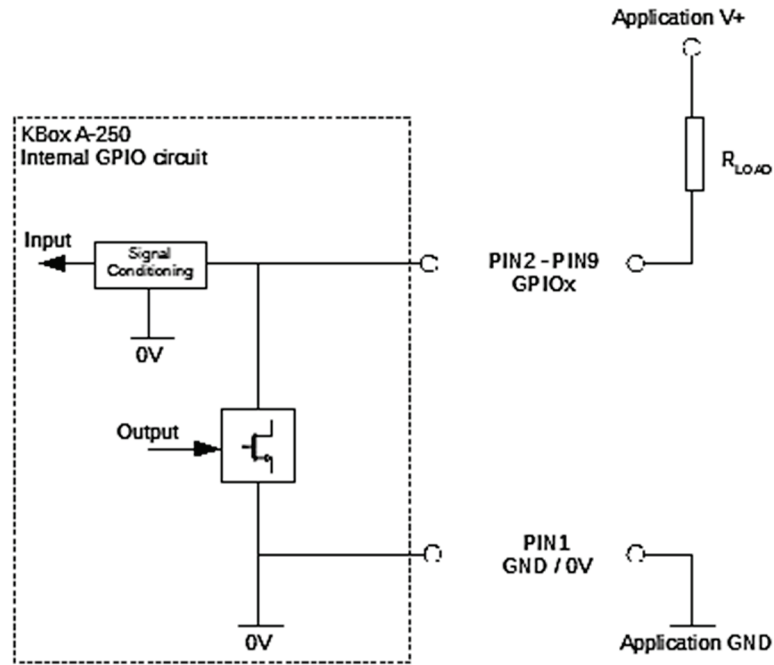
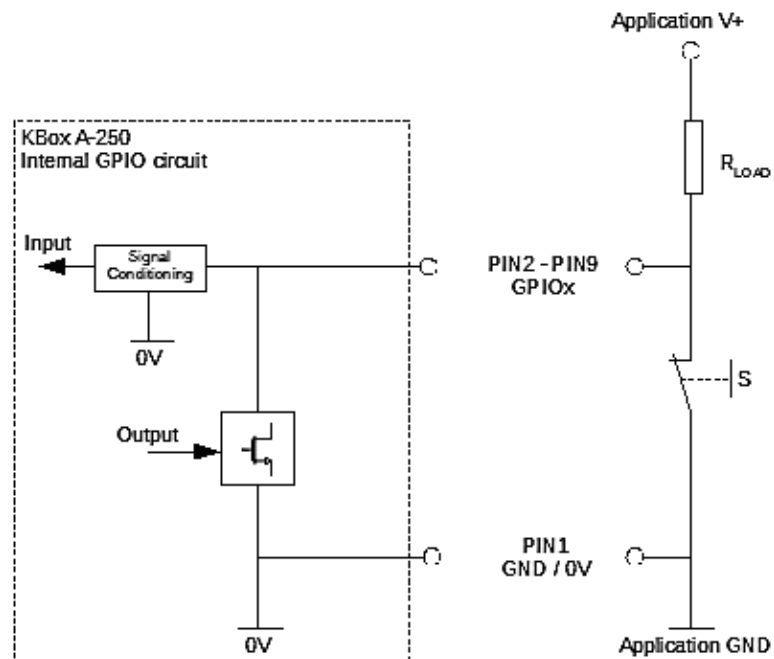
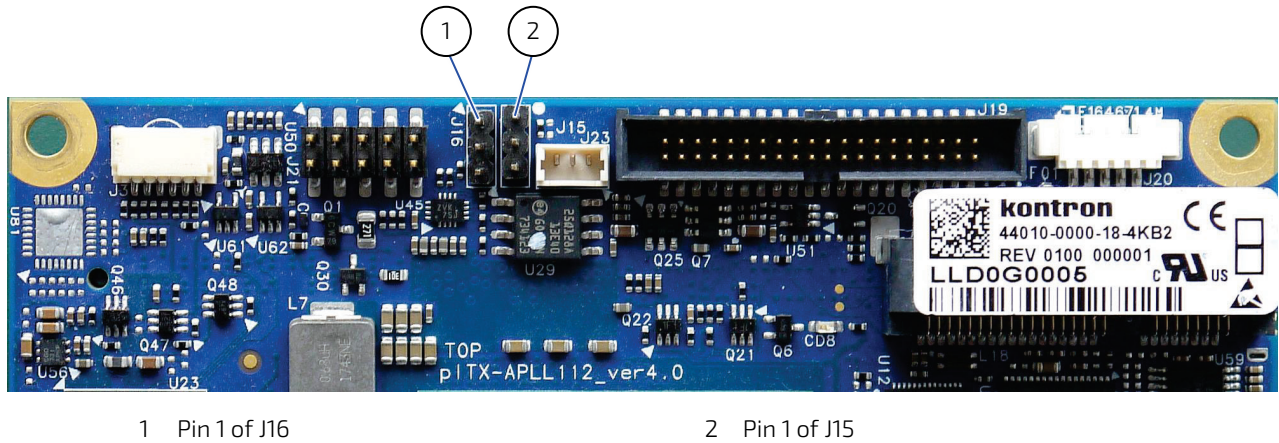


Figure 29: GPIO wiring Example: Input



10.1.7. Jumper Load BIOS Default and Clear CMOS (J15)

Figure 30: Position of J15 and J16



1 Pin 1 of J16

2 Pin 1 of J15

NOTICE

The device may only be opened by qualified personnel.
Jumper for J15 not included.

Figure 31: CMOS Internal Connector (J15)

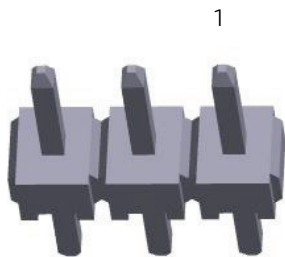


Table 11: CMOS Internal Connection

Pin	Description
1	Clear RTC memory (RTC_TEST#)
2	GND
3	Restore BIOS defaults (DIS_SECCMOS)



Function:
Pin 1-2: Clear RTC and Legacy CMOS memory
Pin 1-X: Default
Pin 2-3: Load BIOS default settings and clear PW

10.1.8. Jumper Always ON (J16)

Figure 32: Always ON (J16)

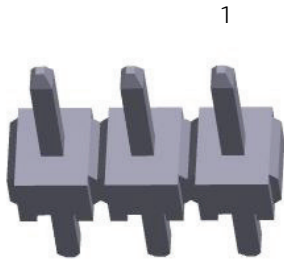


Table 12: Always ON Internal Connection

Pin	Description
1	GND
2	AUTOSTART#
3	NC



Function:

Pin1-2: Always ON after G3

Pin2-3: BIOS Configuration (Default Position)

11/ uEFI BIOS

11.1. Starting the uEFI BIOS

The KBox A-250 is provided with a Kontron-customized, pre-installed and configured version of American Megatrends, Inc. (AMI). It is 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 A-250.



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.

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

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

1. Power on the board.
2. Wait until the first characters appear on the screen (POST messages or splash screen).
3. Press the 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 menu), press <RETURN>, and proceed with step 5.
5. A Setup menu will appear.

The KBox A-250 uEFI BIOS Setup program uses a hot key-based navigation system. A hot key legend bar is located on the bottom of the Setup screens.

The following table provides information concerning the usage of these hot keys.

Table 13: Navigation Hot Keys Available in the Legend Bar

Hotkeys	Description
<F1>	The <F1> key is used to invoke the General Help window.
<->	The <Minus> key is used to select the next lower value within a field.
<+>	The <Plus> key is used to select the next higher value within a field.
<F4>	The <F4> key is used to Exit saving Changes.
<F3>	The <F3> key is used to load Optimized Defaults.
<←> or <↔>	The <Left/Right> arrows are used to select major Setup menus on the menu bar. For example: Main screen, Advanced screen, Security screen, etc.
<↑> or <↓>	The <Up/Down> arrows are used to select fields in the current menu. For example a Setup function or a sub-screen.
<ESC>	The <ESC> key is used to exit a Setup menu.
<ENTER>	The <ENTER> key is used to execute a command or select a submenu.



To enter the Boot menu (instead of the BIOS setup), press the <F7> key.

11.2. Setup Menus

The Setup utility features a selection bar at the top of the screen that lists the available menus:

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

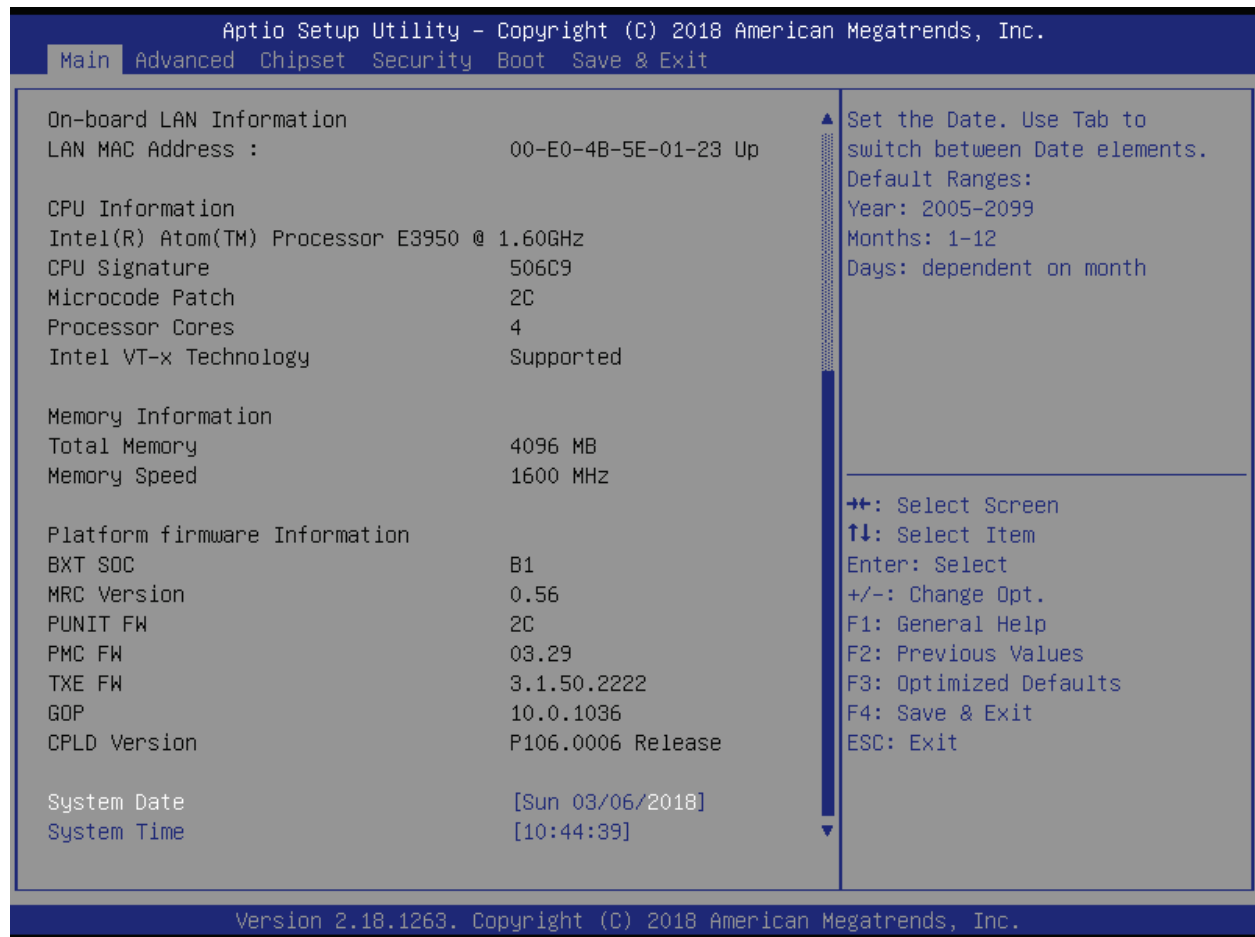
The currently active menu and the currently active uEFI BIOS Setup item are highlighted in white. Use the left and right arrow keys to select the Setup menus.

Each Setup menu provides two main frames. The left frame displays all available functions. Configurable functions are displayed in blue. Functions displayed in black provide information about the status or the operational configuration. The right frame displays a Help window providing an explanation of the respective function.

11.2.1. Main Setup Menu

On entering the uEFI BIOS, the Setup program displays the Main Setup menu. This screen lists basic system and board information.

Figure 33: Main Setup Menu Initial Screen (partial view)



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

Table 14: Main Setup Menu Sub-screens

Sub-Screen	Function	Second level Sub-Screen / Description
BIOS Information	Read only field	
	<i>Displays BIOS Information</i>	
		Board Vendor, BIOS Version, Build Date and Time, Access Level
Board Information	Read only field	
	<i>Displays Board Information</i>	
		Manufacturer, Product Name, PCB Version, Serial Number, Part Number, Boot Count
On-board LAN Information	Read only field	
	<i>Displays LAN MAC Address of pITX board</i>	
CPU Information	Read only field	
	<i>Displays CPU Information</i>	
Memory Information	Read only field	
	<i>Displays Memory Information</i>	
Platform firmware Information	Read only field	
	<i>Displays Platform firmware Information</i>	
System Date>	Sets the system date	
		[mm/dd/yyyy]
System Time>	Sets the system time	
		[hh:mm:ss]

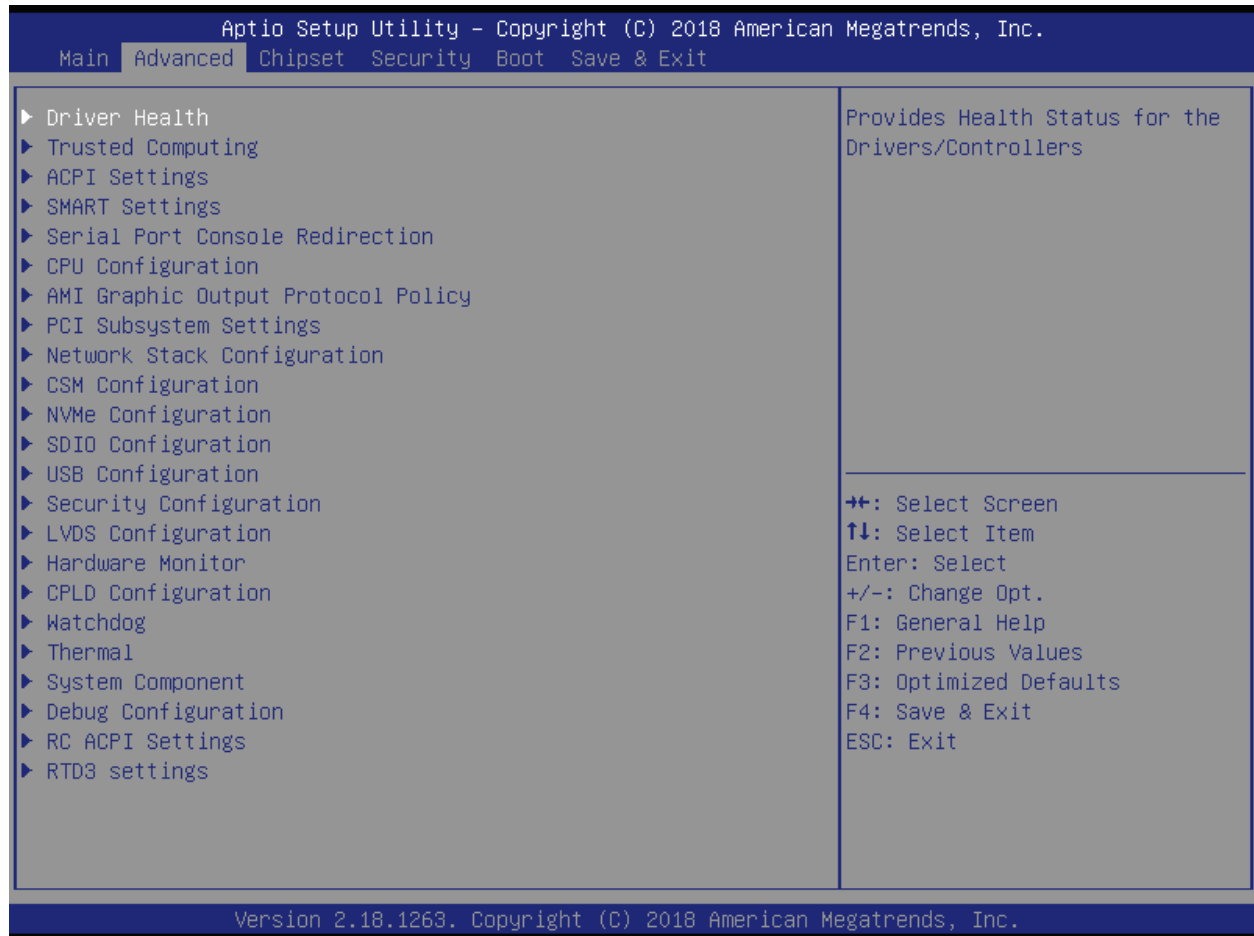
11.2.2. Advanced Setup Menu

The Advanced Setup menu provides sub-screens and second level sub-screens with functions, for advanced configuration and Kontron specific configurations.

NOTICE

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

Figure 34: 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 some functions include additional information. The function / submenu in *italic* indicate either status display or submenu string that cannot be selected. The underlined statement indicates the condition for the availability of the second-level submenu in reference to submenu.

Table 15: Advanced Setup menu Sub-screens and Functions

Sub-Screen	Function	Second level Sub-Screen / Description
Driver Health	<i>Intel® PRO/1000 7.0.06 PCI-E</i>	
Trusted Computing	TPM20 Device Status, Vendor and Firmware Version. Security Device Support [Enable]	<u>When set to Enable:</u> <i>Active PCR banks</i> <i>Available PCR banks</i>
		SHA-1 PCR Bank [Enabled]
		SHA256 PCR Bank [Enabled]
		Pending operation [None]
		Platform Hierarchy [Enabled]
		Storage Hierarchy [Enabled]
		Endorsement Hierarchy [Enabled]
		TPM2.0 UEFI Spec Version [TCG_2]
		Physical Presence Spec Version [1.3]
		<i>TPM 20 InterfaceType [TIS]</i>
		Device Select [Auto]
ACPI Settings	Enable ACPI Auto Configuration (Disabled)	<u>When set to Disable:</u> Enable Hibernation [Enabled] ACPI Sleep State [S3 (Suspend to RAM)] Lock Legacy Resources [Disabled]
SMART Settings	SMART Self Test [Disabled]	
Serial Port Console Redirection	Console Redirection (COM0) > [Disabled]	<u>When set to Enabled:</u> COM# Console Redirection Settings [ANSI] Bits per second [115200] Data Bits [None] Stop Bits [1] Flow Control [None] VT-UTF8 Combo Key Support [Enabled] Recorder Mode [Disabled] Resolution 100x31 [Disabled] Legacy OS Redirection Resolution [80x24] Putty KeyPad [VT100] Redirection After BIOS POST [Always Enable]
	Legacy Console Redirection Settings >	Legacy Serial Redirection Port [COM0]
	Serial Port for Out-of-Band Management / Windows Emergency Management Services (EMS) Console Redirection > [Disabled]	<u>When set to Enabled:</u> Console Redirection Settings > Out-of-Band Mgmt Port [COM0] Terminal Type [VT-UTF8] Bits per second [115200] Flow Control [None] Data Bits [8]

Sub-Screen	Function	Second level Sub-Screen / Description
		Parity [None] Stop Bits [1]
CPU Configuration	Turbo Mode [Enabled]	
	Intel Virtualization Technology [Enabled]	
	VT-d [Disabled]	
	Monitor Mwait [Disabled]	
AMI Graphic Output Control Policy	<i>Intel® Graphics Controller</i> <i>Intel® GOP Driver</i> Output select [DP1]	
PCI Subsystem Settings	<i>AMI PCI Driver Version</i> Above 4G Decoding [Disabled]	
	Hot-Plug Support [Enabled]	
Network Stack Configuration	Network Stack [Disabled]	
CSM Configuration	CSM Support [Enabled]	<u>When set to Enabled:</u> <i>CSM16 Module Version 07.79</i> GateA20 Active [Upon Request] INT19 Trap Response [Immediate] Boot option filter [UEFI and Legacy] <i>Option ROM execution</i> Network [UEFI] Storage [UEFI] Video [UEFI] Other PCI devices [UEFI]
NVMe Configuration	<i>NVME controller and Drive information</i>	
SDIO Configuration	SDIO Access Mode [Auto] <i>Mass Storage Devices:</i>	
USB Configuration	Legacy USB Support [Enabled]	
	XHCI Hand-off [Enabled]	
	USB Mass Storage Driver Support [Enabled]	
	USB transfer time-out [20 sec]	
	Device reset time-out [20 sec]	
	Device power-up delay [Auto]	
Security Configuration	TXE HMRFP0 [Disabled]	
	TXE EOP Message [Enabled]	

Sub-Screen	Function	Second level Sub-Screen / Description
LVDS Configuration	LVDS Flat Panel Display Support [Disabled]	<p><u>When set to Enabled:</u></p> <p>Panel Type [Standard] Resolution [1024 x 768] Panel Color Depth [24-Bit VESA] Panel Voltage [3.3V] Channel [Dual] Bus Swapping [Normal] Clock Frequency Center Spread [Disabled] Differential Output Swing Level [300 mV] Backlight [Enable] Backlight Signal Inversion [Disable] Backlight PWM Frequency [200 Hz] Brightness Level [80%]</p>
Hardware Monitor	<i>Hardware Monitoring:</i> CPU DTS Temperature (CPU MSR) PCB Temperature (TD1) NCT7802Y Temperature (LTD) LM75B Temperature (IZCO) NCT7802Y Voltage (VCC) RTC Voltage (VCORE) DDR Voltage (VSENS2) Input Voltage (VSENS3)	
	CPU Fan: CPU Fan Pulse CPU Fan Control Mode [SMART FAN IV] Fan Trip Point Trip Point Speed	
CPLD Configuration	Serial Port 0 [Enabled]	<p><u>When set to Enabled:</u></p> Base Address [3F8] IRQ [10]
	GPIO IRQ [Disabled] I2C IRQ [Disabled]	
Watchdog	Auto-reload [Disabled]	
	Global Lock [Disabled]	
	Stage 1 mode [Disabled]	
Thermal	Automatic Thermal Reporting [Disabled]	<p><u>When set to Disabled:</u></p> Critical Trip Point [125 C] Passive Trip Point [95 C] Passive TC1 value 1 Passive TC2 value 5 Passive TSP value 10
System Component	OS Reset Select [Cold Reset]	
	<i>Spread Spectrum Clocking Configuration</i>	
	DDR SSC [Enable]	<p><u>When set to Enable:</u></p> DDR SSC Selection Table [-0.5%]

Sub-Screen	Function	Second level Sub-Screen / Description
	DDR SSC Bending Selection Table [0% (No Clock Bending)]	
	HighSpeed SerialIO SSC [Enable]	<u>When set to Enable:</u> HighSpeed SerialIO SSC Selection Table [-0.5%]
Debug Configuration	<i>Kernel Debugger Configuration</i> Kernel Debugger Enable [Disabled]	
	<i>APEI BERT Configuration</i> APEI BERT [Enable]	
	<i>ACPI Memory Debug Switch</i> ACPI Memory Debug [Disable]	
	<i>TXE Debug Option</i> End of Post [Disable] Lock Directory [Disable]	
	<i>PTT Debug Option</i> Suppress PTT Commands [Disable]	
	<i>TDO GPIO Pin Switch</i> TDO GPIO Pin [Enable]	
	Max Memory 2G [Disable]	
	Persistent RAM Size [Disable]	
	<i>OS DnX</i> OS DnX focus entry [Disable]	
	<i>Processor Trace Configuration</i> Processor Trace memory allocation [Disable]	
	<i>CSE Data Clear Option</i> CSE Data Clear (Yes / No)	
	<i>Option to clear Data region during IFWI Update</i> Capsule Data Clear [Enable]	
	<i>NPK Debug Configuration ></i>	North Peak Enable [Auto] FW Trace Enable [Enable] FW Trace Destination [PTI] NPK Recovery Dump [Disable] Memory Region 0 Buffer Size [None] Memory Region 0 Buffer WrapAround [Wrap] Memory Region 1 Buffer Size [None] Memory Region 1 Buffer WrapAround [Wrap] PTI Mode [X4] PTI Training [Off] PTI Speed [Quarter Speed]

Sub-Screen	Function	Second level Sub-Screen / Description
		Punit Message Level [LEVEL LOW] PMC Message Level [LEVEL LOW]
RC ACPI Settings	Native PCIE Enable [Enable]	
	Native ASPM [Enable]	
RTD3 Settings	RTD3 Support [Disable]	

11.2.3. Chipset Setup Menu

The Chipset Setup menu provides sub-screens, second level and third level sub-screens with functions, for Intel Chipset configurations.

Figure 35: Chipset Setup Menu Initial Screen

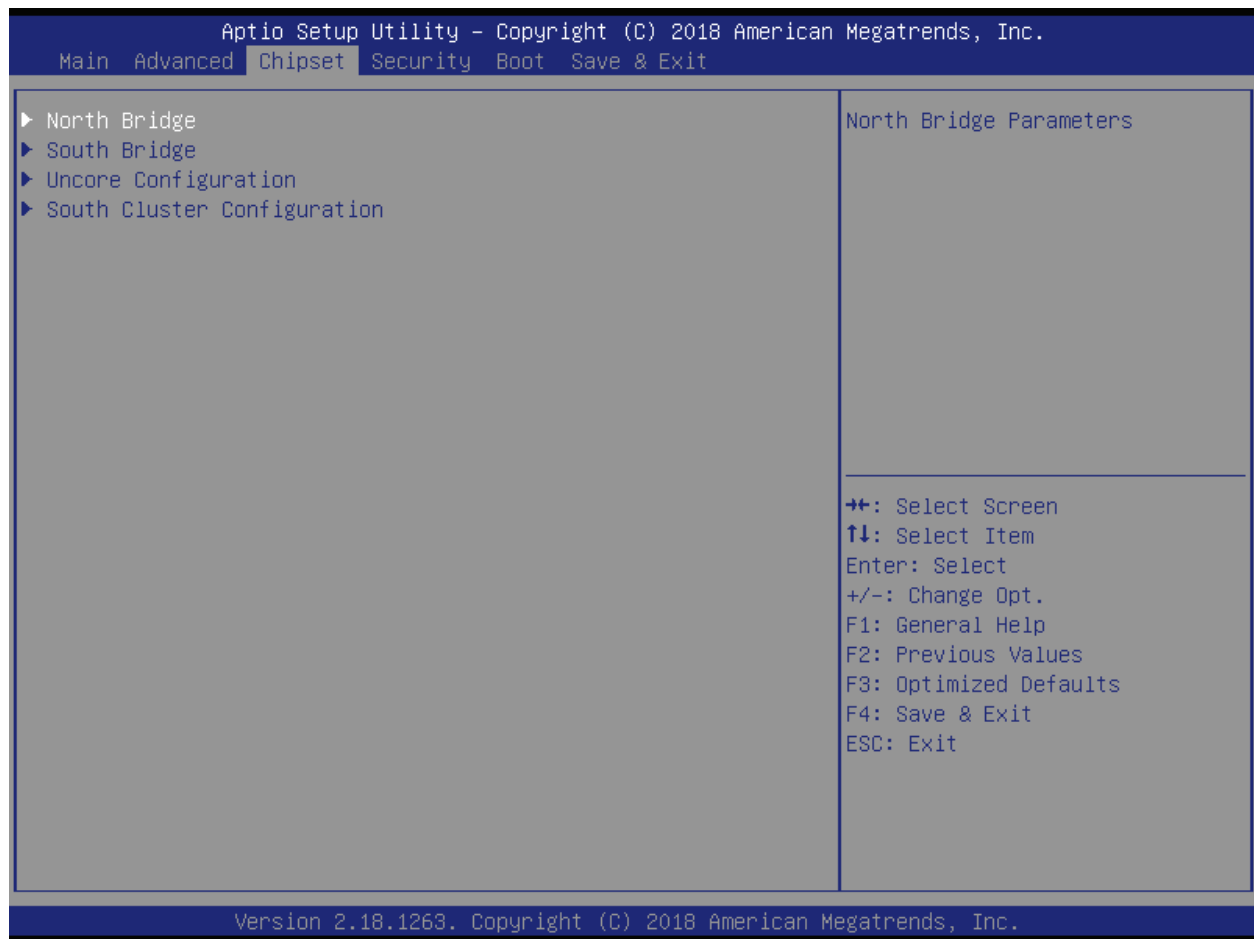


Table 16: Chipset Setup menu Sub-screens and Functions

Sub-Screen	Function	Second level Sub-Screen / Description
North Bridge	Max TOLUD [2 GB]	
	PCIE VGA Workaround [Disable]	
South Bridge	Serial IRQ Mode [Continuous]	
	SMBus Support [Enabled]	
	OS Selection [Windows 10 (Ver>=167)]	

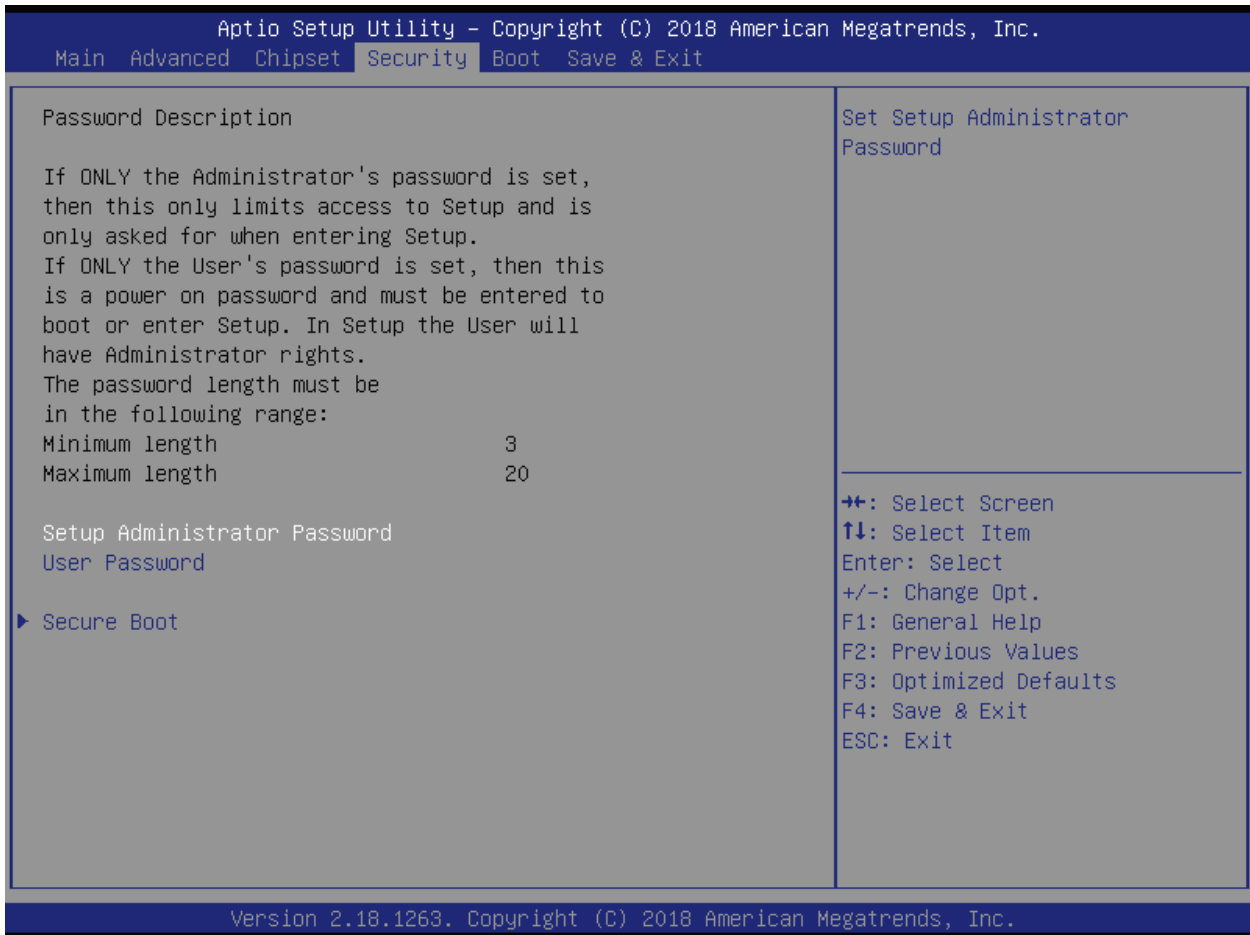
Sub-Screen	Function	Second level Sub-Screen / Description
	PCI Clock Run [Enable]	
	Real Time Option [RT Disable]	
Uncore Configuration	<i>GOP Configuration</i> GOP Driver [Enable] Intel Graphics Pei Display PEIM [Disable] GOP Brightness Level [140]	
	<i>IGD Configuration</i> Integrated Graphics Device [Enable] Primary Display [IGD] RC6 (Render Standby) [Disable] GTT Size [8MB] Aperture Size [256MB] DVMT Pre-Allocated [64M] DVMT Total Gfx Mem [256M] Cd Clock Frequency [624 MHz] GT PM Support [Enable] PAVP Enable [Enable]	
	<i>IGD – LCD Control</i> BIA [Auto] ALS Support [Enable] IGD Flat Panel [Auto] IGD Boot Type [Auto] Panel scaling [Auto] GMCH BLC Control [PWM-Inverted]	
South Cluster Configuration	<i>HD-Audio Configuration ></i>	HD-Audio Support [Enable]
		<i>Low Power Sub System</i> LPSS HSUART #3 Support (D24:F2) [Enable] LPSS SPI #1 Support (D25:F0) [Enable] LPSS IOSF PMCTL SOix Enable [Enable]
	<i>LPSS Configuration ></i>	<i>PCI Express Configuration</i> PCI Express Clock Gating [Enable] Port8xh Decode [Disable] Peer Memory Write Enable [Disable] Compliance Mode [Disable] > PCIe #0 BDF[00:13:00] LAN 1 > PCIe #1 BDF[00:13:01] mPCIe When PCIE #X is enabled: PCIe #X BDF[XX:XX:XX] [Auto] ASPM [Disable] L1 Substates [L1.1 & L1.2] ACS [Enable] URR [Disable] FER [Disable] NFER [Disable] CER [Disable] CTO [Default Setting] SEFE [Disable] SENF [Disable] SECE [Disable] PME SCI [Enable] Hot Plug [Disable] PCIe Speed [Auto] Transmitter Half Swing [Disable] <i>Extra Bus Reserved 0</i> <i>Reserved Memory 10</i> <i>Reserved I/O 4</i> PCH PCIe LTR [Enable] Snoop Latency Override [Auto]
<i>PCI Express Configuration ></i>		

Sub-Screen	Function	Second level Sub-Screen / Description
		Non Snoop Latency Override [Auto] PCIE LTR Lock [Disable] PCIE Selectable De-emphasis [Enable]
	<i>SATA Drives ></i>	<i>SATA Drives</i> <i>Chipset-SATA Controller Configuration</i> <i>SATA Port 0</i> Port 0 [Enable] SATA Port 0 Hot Plug Capability [Disable] <i>SATA Port 1 (mSATA)</i> Port 0 [Enable] SATA Port 0 Hot Plug Capability [Disable]
	<i>SCC Configuration ></i>	SCC SD Card Support (D27:F0) [Enable]
	<i>USB Configuration ></i>	USB Port Disable Override [Disable] XHCI Disable Compliance Mode [FALSE]
	<i>Miscellaneous Configuration ></i>	State After G3 [S0 State] Power Button Debounce Mode [Enable] Wake on LAN [Disable] BIOS Lock [Disable] RTC Lock [Enable] TCO Lock [Disable] DCI Enable (HDCIEN) [Disable] DCI Auto Detect Enable [Enable] GPIO Lock [Disable]

11.2.4. Security Setup Menu

The Security Setup menu provides information about the passwords and functions for specifying the security settings. The passwords are case-sensitive.

Figure 36: Security Setup Menu Initial Screen



The following table shows Security sub-screens and functions.

Table 17: Security Setup Menu Functions

Function	Description
Setup Administrator Password User Password	Create / change password to enter Setup
HDD Security Configuration	Create / change password to allow access to Set, Modify and Clear HardDisk User and Master Passwords for Enabling Security.
Attempt Secure Boot [Disable]	Enable or Disable the Secure Boot support. Please also set Secure Boot Mode to "Standard" to install standard Microsoft Platform Key (PK).
Secure Boot Mode	Set Secure Boot Mode to "Standard" to boot standard Windows or Linux boot loader signed with Microsoft's platform key. Select "Customized" mode only if you have a custom OS with OS boot loader signed with your own platform key. Kontron provide services for Customized Secure Boot, visit Kontron SEC-Line home page

Function	Description
	https://www.kontron.com/products/solutions/security/sec-line.html for more information.
Key Management	Enables expert users to modify Secure Boot Policy Variables without full authentication.



If only the administrator password is set, the password is only requested when entering the BIOS setup. The user has full access to the BIOS setup.

If only the user password is set, then the password is a power-on password and must be entered to boot or enter setup. The user has full access to the BIOS setup.

If both passwords are set, you need to enter one of the passwords to boot the system. While the administrator password provides full access to the BIOS setup, the user password provides only restricted access to the BIOS setup (e.g. no CPU configuration).

11.2.4.1. Remember the Password

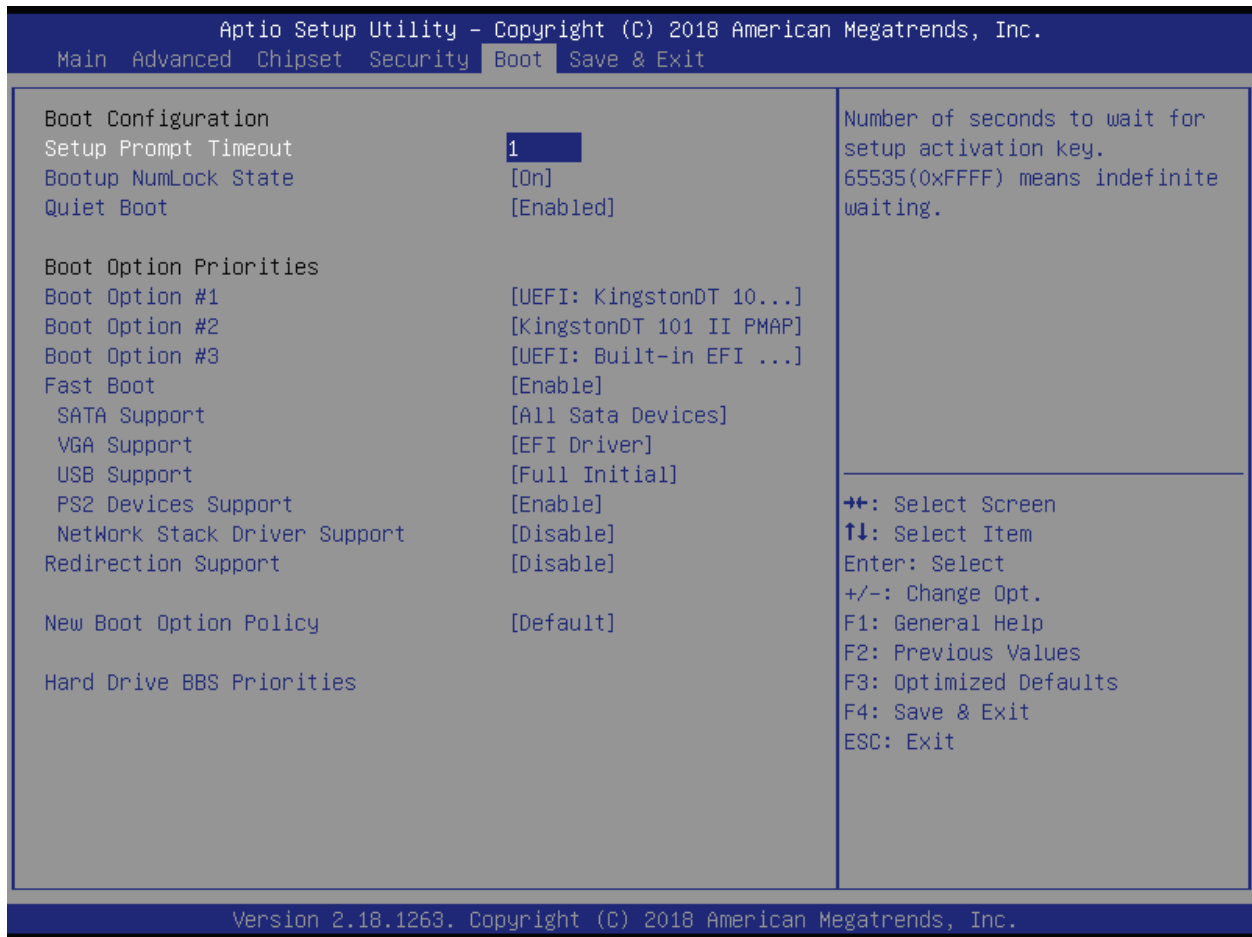
It is highly recommended to keep a record of all passwords in a safe place. Forgotten passwords result in the user being locked out of the system.

If the system cannot be booted because the User Password or the Supervisor Password are not known, contact Kontron Support for further assistance.

11.2.5. Boot Setup Menu

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

Figure 37: Boot Setup Menu Initial Screen



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

Table 18: Boot Setup Menu Functions

Function	Description
<i>Boot Configuration</i> Setup Prompt Timeout 1 Bootup NumLock State [On] Quiet Boot [Enabled]	
<i>Boot Option Priorities</i> Boot Option #1 Boot Option #2 Boot Option #3 Boot Option #4 Fast Boot [Enable] SATA Support VGA Support USB Support	To set the system boot order. Use +/- keys to change option. When Fast Boot is Enabled, SATA, VGA, USB, PS2 support, devices initialization, Network Stack driver can be customized.

Function	Description
PS2 Support Network Stack Driver Support Redirection Support	
New Boot Option Policy	Controls the placement of newly detected UEFI boot options
Hard Drive BBS Priorities	Sets the placement of legacy boot options

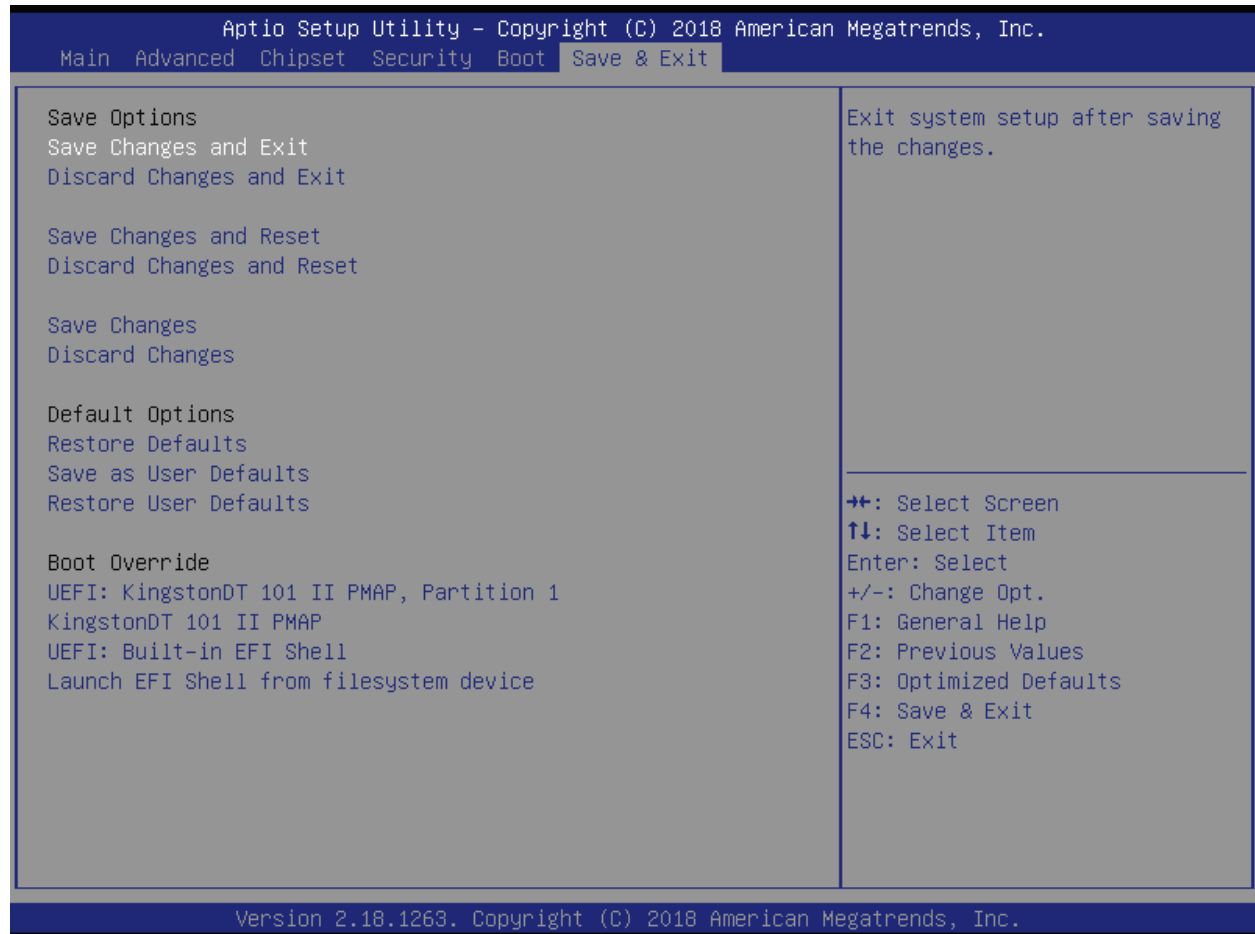
11.2.6. Exit Setup Menu

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



If system cannot boot or work properly due to incorrect setting, shorting Pin-2 and Pin-3 on J15 jumper will load the default setting of BIOS upon power cycle. Once safely booted with default setting, you may undo the jumper setting to save new changes on BIOS Setup Menu. Refer also to 10.1.7 “Jumper Load BIOS Default and Clear CMOS (J15)”

Figure 38: Save and Exit Setup Menu Initial Screen



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

Table 19: Save and Exit Setup Menu Functions

Function	Description
<i>Save Options</i> Save Changes and Exit Discard Changes and Exit Save Changes and Reset Discard Changes and Reset <i>Default Options</i> Restore Defaults	

Function	Description
Save as User Defaults Restore User Defaults	
<i>Boot Override</i> UEFI: Built-in EFI Shell Launce EFI Shell from filesystem device	

11.3. The uEFI Shell

The Kontron uEFI BIOS features a built-in and enhanced version of the uEFI Shell. For a detailed description of the available standard shell scripting, refer to the EFI Shell User Guide. For a detailed description of the available standard shell commands, refer to the EFI Shell Command Manual. Both documents can be downloaded from the EFI and Framework Open Source Community homepage (<http://sourceforge.net/projects/efi-shell/files/documents/>).



Kontron uEFI BIOS does not provide all shell commands described in the EFI Shell Command Manual. If Secure Boot is enabled, the UEFI shell may not be able to be entered.

11.3.1. Basic Operation of the uEFI Shell

11.3.1.1. Entering the uEFI Shell

To enter the uEFI Shell, follow the steps below:

1. Power on the board.
2. Press the <F7> key (instead of) to display a choice of boot devices.
3. Choose 'UEFI: Built-in EFI Shell'.

```
EFI Shell version 2.50 [5.12]
Current running mode 1.1.2
Device mapping table
fs0      :Removable HardDisk - Alias hd18c0b blk0
         PciRoot(0x0)/Pci(0x15,0x0)/USB(0x2,0x0)/HD(1,MBR,0x0002B27D,0x3F,0x785BEC)
blk0     :Removable HardDisk - Alias hd18c0b fs0
         PciRoot(0x0)/Pci(0x15,0x0)/USB(0x2,0x0)/HD(1,MBR,0x0002B27D,0x3F,0x785BEC)
blk1     :Removable BlockDevice - Alias (null)
         PciRoot(0x0)/Pci(0x15,0x0)/USB(0x2,0x0)
```

Press the ESC key within 5 seconds to skip startup.nsh, and any other key to continue.

4. The output produced by the device-mapping table can vary depending on the board's configuration.
5. If the ESC key is pressed before the 5 second timeout elapses, the shell prompt is shown:

```
Shell>
```

11.3.1.2. Exiting the uEFI Shell

To exit the uEFI Shell, follow one of the steps below:

1. Use the **exit** uEFI Shell command to select the boot device, in the Boot menu, that the OS will boot from.
2. Reset the board using the **reset** uEFI Shell command.

11.4. uEFI Shell Scripting

11.4.1. Startup Scripting

If the ESC key is not pressed and the timeout has run out then the uEFI Shell tries to execute some startup scripts automatically. It searches for scripts and executes them in the following order:

1. Initially searches for Kontron flash-stored startup script.
2. If there is no Kontron flash-stored startup script present then the uEFI-specified **startup.nsh** script is used. This script must be located on the root of any of the attached FAT formatted disk drive.
3. If none of the startup scripts are present or the startup script terminates then the default boot order is continued.

11.4.2. Create a Startup Script

Startup scripts can be created using the uEFI Shell built-in editor edit or under any OS with a plain text editor of your choice. To create a startup shell script, simply save the script on the root of any FAT-formatted drive attached to the system.

11.4.3. Examples of Startup Scripts

11.4.3.1. Execute Shell Script on other Harddrive

This example (**startup.nsh**) executes the shell script named **bootme.nsh** located in the root of the first detected disc drive (**fs0**).

```
fs0:
bootme.nsh
```

11.5. Firmware Update

Firmware updates are typically delivered as a ZIP archive containing only the firmware images. The content of the archive with the directory structure must be copied onto a data storage device with FAT partition.

11.5.1. Updating Procedure

BIOS can be updated with the Intel tool **fpt64.efi** using the procedure below:

1. Copy these files to an USB stick.
 - ▶ flash.nsh or flash_with_fpt.nsh (if available)
 - ▶ fpt.efi
 - ▶ fparts.txt
 - ▶ pITX_APL_BIOS_Ver_<xxx>.....bin (where xxx stands for the version #)
2. Start the system into the uEFI shell (see chapter 11.3.1.1 "Entering the uEFI Shell").
3. Change to the drive representing the USB stick.

```
fsx: (x = 0,1,2,etc. represents the USB stick)
```

Change to the directory where you copied the flash tool.

```
cd <your directory>
```

4. Start flash.nsh or flash_with_fpt.nsh (if available)

OR type

```
fpt -y -f pITX APL BIOS Ver <xxx>.....bin
```

5. Wait until flashing is successful and then power cycle the board.



Do not switch off the power during the flash process!

12/ 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.

12.1. 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.

12.2. 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.

Visit the RMA Information website: <https://www.kontron.com/en/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.

1. 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

2. 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.

3. 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.

Appendix A: List of Acronyms

Table 20: 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



About Kontron

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.

For more information, please visit: www.kontron.com



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