



# KBox A-150-WKL

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 KBOX A-150-WKL - USER GUIDE

## Disclaimer

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## Intended Use

This DIN Rail industrial embedded computer platform, sold by Kontron, is part of Kontron's A-Series intended for control cabinet applications, offering high performance at low power dissipation. The KBox A-150 product family can operate in a temperature range from 0°C to 50°C with heatsink and 0°C to 40°C without heatsink, and a humidity of 10 to 90 percent does not affect the function of the product. The products fanless design ensures a significantly prolonged lifespan and high system availability. This product offers flexible DIN Rail mounting positions within a control cabinet even when space is limited. Users must comply with all product specifications stated in the product documentation and this user guide. If it is intended, to incorporate the product into any total systems or applications, carry out sufficient, compatibility and functions tests prior to any use or resale.

THIS PRODUCT IS NOT DESIGNED, MANUFACTURED OR INTENDED FOR USE OR RESALE FOR THE OPERATION OF APPLICATION IN A HAZARDOUS ENVIRONMENT, OR REQUIRING FAIL-SAFE PERFORMANCE, OR IN WHICH THE FAILURE OF PRODUCTS COULD LEAD DIRECTLY TO DEATH, PERSONAL INJURY, OR SEVERE PHYSICAL OR ENVIRONMENTAL DAMAGE (COLLECTIVELY "HIGH RISK APPLICATIONS").

You understand and agree that your use of Kontron product as a component in High Risk Applications is entirely at your own risk. To minimize the risks associated with your systems and applications, you must provide adequate design and operating safeguards. You are responsible to ensure that your systems (and any Kontron hardware or software products incorporated in your systems) meet all applicable requirements. Unless otherwise stated in the product documentation, the Kontron product is not provided with error-tolerance capabilities and therefore cannot be deemed as being engineered, manufactured or setup to be compliant for implementation or for resale as a component in High Risk Applications. All application and safety related information in this document (including application descriptions, suggested safety measures, suggested Kontron products, and other materials) is provided for reference only.

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**NOTICE**

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

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## Revision History

Revision	Brief Description of Changes	Date of Issue	Author/Editor
1.0	Initial version	2021-Sept-02	CW
1.1	Updates Figures 22, 23, 24, 25, 36 and 40 with DSUB connectors orientation changed. Changed Battery warning in Ch. 3.2 and Ch.11.1.1.	2022-Jan-05	CW
1.2	Replaced Ubuntu with Linux and added new logo	2023-Sept-06	CW

## 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>.

Kontron sells products worldwide and declares regional General Terms & Conditions of Sale, and Purchase Order Terms & Conditions. Visit <http://www.kontron.com/terms-and-conditions>.

For contact information, refer to the corporate offices contact information on the last page of this user guide or visit our website [CONTACT US](#).

## Customer Support

Find Kontron contacts by visiting: <https://www.kontron.com/en/support>.

## 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.

For more details on Kontron's service offerings such as: enhanced repair services, extended warranty, Kontron training academy, and more visit <https://www.kontron.com/en/service>

## 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 informs 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 informs 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.

#### ⚠ CAUTION

Handling and operation of the product is permitted only for trained personnel within a work place that is access controlled. Follow the "General Safety Instructions" supplied with the system.

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**

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**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




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**Environmental protection is a high priority with Kontron.**  
Kontron follows the WEEE directive

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# 1/ Introduction

This user guide focuses on describing the features of the KBox A-150-WKL, DIN Rail industrial computer platform also referred to as product within this user guide. This user guide includes detailed information and guidelines for set up, assembly, mounting and maintenance. Before working with the KBox A-150-WKL, Kontron recommends that users take a few minutes to learn about the product's various parts.

New users are recommended to study the instructions and any warning notices within this user guide before handling or switching on the product.

To ensure you have the latest version of this user guide, visit Kontron's Industrial Computer website:  
<https://www.kontron.com/de/produkte/systems/embedded-box-pc/>

## 2/ Compliance

The KBox A-150-WKL complies with the relevant requirements and the approximation of the laws relating to 'CE' (for no Wi-Fi variant) and 'RED' (for Wi-Fi variant), and the standards that are constitutional parts of the declaration.

Table 1: Compliance

CE	Electromagnetic Compatibility	Directive 2014/30/EU
	Low Voltage	Directive 2014/35/EU
	RoHS II	Directive 2011/65/EU
EMC-Emission 2014/30/EU	EN 55032 Class B CISPR 32	Electromagnetic compatibility (EMC) of multimedia equipment- Emission requirements
EMC-Immunity 2014/30/EU	EN 61000-6-2	Electromagnetic compatibility (EMC), part 6-2: Generic standards- Immunity for industrial environment
RED 2014/53/EU	ETSI EN 301 489-01 V2.2.0 (Draft)	ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements; Harmonized 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
	ETSI EN 301 489-17 V3.2.0 (Final Draft)	ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 17: Specific conditions for Broadband Data Transmission Systems; Harmonized Standard covering the essential requirements of article 3.1(b) of Directive 2014/53/EU
	ETSI 301 893 V2.1.1	5 GHz RLAN: Harmonized standard covering the essential requirements of article 3.2 of directive 2014/53/EU
	RoHS II	Directive 2011/65/EU
RF Spectrum Efficiency & Spurious Emission 2014/53/EU	ETSI EN 300 328 V2.2.2	Wideband transmission systems; Data transmission equipment operating in the 2,4 GHz band; Harmonized Standard for access to radio equipment
FCC	FCC CFR 47 Part 15 (Class B) ICES-003	Complies with part 15 FCC rules and regulations of title 47 of the CFR rules for class B products; under which an unintentional radiator may be operated, administrated and other conditions relating to the marketing of part 15 devices.
Safety 2014/35/EU	IEC/EN/UL 61010-1 (CB Certificate)	Safety requirements for electrical equipment for measurement, control and laboratory use - Part 1: General requirements
	IEC/EN/UL 61010-2-201 (CB certificate)	Safety requirements for electrical equipment for measurement, control and laboratory use - Part 2-201: Particular requirements for control equipment
Safety and Health 2014/35/EU 2014/53/EU Article 3.1(a)	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 2012/19/EU	Waste Electrical and Electronic Equipment Directive (WEEE)	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.

Table 2: Electrical Safety

Electrical Safety	Harmonized Standards
EUROPE	EN 61010-1
U.S.A. / CANADA	Conforms to UL 61010-1, UL 61010-2-201 Certified to CSA-C22.2 No. 61010-1, CSA C22.2 No. 61010-2-201
CB Report	IEC 61010-1 IEC 61010-2-201
Listed Mark	UL

Table 3: EMC

EMC	Harmonized Standards
EUROPE	Generic standards - Emission standard for industrial environments (Emission): EN 55032, Class B Generic standards - Immunity for industrial environments (Immunity): EN 61000-6-2 IEC 61000-4-2, IEC 61000-4-3-, IEC 61000-4-4, IEC 61000-4-5, IEC 61000-4-6, IEC 61000-4-8



If the product is modified, the prerequisites for specific approvals may no longer apply.

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For the KBox A-150 WKL Declaration of Conformity, visit [Kontron's Customer Section](#).

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Kontron is not responsible for any radio television interference caused by unauthorized modifications of the delivered product or the substitution or attachment of connecting cables and equipment other than those specified by Kontron. The correction of interference caused by unauthorized modification, substitution or attachment is the user's responsibility.

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### 3/ General Safety Instructions

Please read this passage 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 non-observance of the instructions Kontron Europe 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 disconnectable
- ▶ 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.

### 3.1. 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 ESD sensitive parts in ESD safe containers such as boxes or bags, until they arrive at an ESD safe workplace.
2. Always be properly grounded when touching sensitive components, or assembly.
3. Store ESD sensitive components in protective packaging or on antistatic mats.

#### 3.1.1. Grounding Methods

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

1. Cover workstations with approved antistatic material/mat. Always wear a wrist strap connected to workplace or heel straps.
2. Use properly grounded tools and equipment such as field service tools that are conductive.
3. Always handle ESD sensitive components by their edge or by their casing.
4. Avoid contact with pins, leads, or circuitry.
5. Switch 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.

### 3.2. Instructions for Lithium Battery

The KBox A-150-WKL is equipped with a Kontron specific battery assembly and is not designed to operate without a battery. If the battery is empty or disconnected, the BIOS settings will be set to the factory defaults. Replace the Kontron specific battery assembly only with the same type of battery (CR 2032) or with a Kontron recommended battery type. To replace the battery, observe the instructions described in Chapter 11.1.1: Replacing the Lithium Battery.

---

**⚠ CAUTION**

Caution: Risk of Explosion if Battery is replaced by an Incorrect Type. Dispose of Used Batteries According to the Instructions.

ATTENTION: Risque d'explosion si la batterie est remplacée par un type incorrect. Mettre au rebut les batteries usagées selon les instructions.

---

After removing the lithium battery, dispose of the lithium battery according to the regulations within your region.



---

Do not dispose of lithium batteries in general trash collection. Dispose of the battery according to the local regulations dealing with the disposal of these special materials, (e.g. to collecting points for battery disposal).

---

## 4/ Shipment and Unpacking

### 4.1. Packaging

All parts are delivered together in a product specific cardboard package designed to provide adequate protection to absorb shock. Kontron recommends keeping the packaging to store or transport the product.

### 4.2. Unpacking

To unpack the product, perform the following:

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

### 4.3. Scope of Delivery

Check that your delivery is complete, and contains the items listed below. If you discover damaged or missing items, contact your dealer.

**Table 4: Scope of Delivery**

Delivered Item	Part Description
KBox A-150-WKL	Corresponding to the ordered product configuration
Phoenix Power Connector	3-pin mating power connector (PSC 1,5/ 3-F), inserted on Input Power connector
DIN Rail Clamp	DIN Rail clamp installed on the rear side using 2x M4x6 screws
SSD Protective Film	Adhesive protective film attaches to the 2.5" SDD to protect the SSD against antistatic electrification when touched. ( External drive bay variant only)
General Safety Instructions	General safety instruction when operating or handling IT equipment

### 4.4. Accessories

**Table 5: Accessories**

Part Number	Part	Part Description
EE04-100001-01	Phoenix power connector	3-pin mating power connector (PSC 1,5/ 3-F) incl. housing
ER40-100001-01	Power Supply 24 VDC	External AC/DC PSU with 50 W, 24 VDC at 40°C
840-0059	Power cable EU	Power cable AC mains to external adapter, Europe, UK and USA
840-0115	Power cable UK	
840-0405 / 0-0064-4317	Power cable US	
PM00-100057-01	SSD extension frame	Adjusts drive's installation height from 7 mm to 9 mm
EN05-100003-01	Heatsink kit	Heatsink with four screws (M4x6 )

## 4.5. Type Label and Product Identification

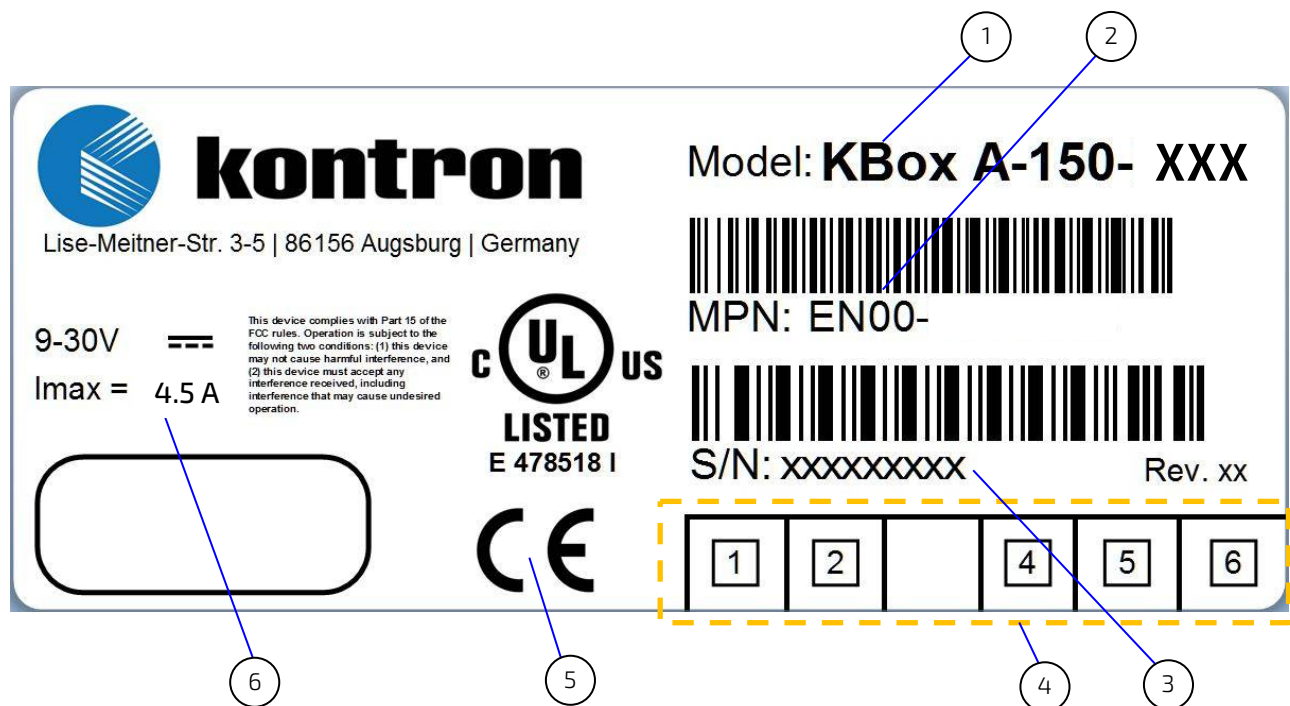
The KBox A-150-WKL is part of Kontron's DIN Rail embedded Box PC. Kontron's A-Series is intended for control cabinet applications.

Table 6: Product Identification

System Type	Product Designation	Model	Description
KBox A	KBox A-150	KBox A-150-WKL	Corresponds to system configurations based on 3.5"-SBC-WLU with 8th Gen Intel® Core™/Celeron® U-series processors

The type label contains specific product identification information and KBox A-150-WKL technical information.

Figure 1: Type Label Example



- |   |  |   |                           |
|---|--|---|---------------------------|
| 1 | Model (XXX replaced with WKL)                              | 4 | For internal use          |
| 2 | Material Part Number (MPN) EN00-03xxxxxx-xx, with bar code | 5 | Certification information |
| 3 | Serial Number (S/N) with barcode                           | 6 | Electrical specification  |

## 5/ Features

The KBox A-150-WKL is a flexible fanless industrial grade DIN Rail embedded box PC designed for use in performance demanding applications requiring flexible DIN Rail mounting positions in limited space, 24/7 continuous operation and longtime industrial employment.

Based on a 3.5" Single Board Computer (SBC) using the 8<sup>th</sup> Gen Intel® Core™/Celeron® U series of processors, the KBox A-150-WKL features a variety of on-board interfaces to enable extensive connectivity. Internal M.2 sockets support storage and Wi-Fi. All components are selected to ensure a long lifetime and the fanless design ensures a significantly prolonged lifespan and high system availability.

The KBox A-150-WKL's robust steel chassis is designed for horizontal or vertical operation in a DIN Rail control cabinet. The height of the chassis increases when an externally accessible 2.5" SSD drive bay is included.

General features are:

- ▶ Intel® Core™/Celeron® U series of processors
- ▶ Up to 32 GB RAM with 2x DDR4 SODIMMs
- ▶ External 2.5" SSD drive bay (option)
- ▶ External Interfaces: 2x DP, 2x GbE, 4x USB 3.1, 2x COM (RS232, RS422, RS485 configurable)
- ▶ M.2 Expansion sockets:
  - ▶ Storage (option)
  - ▶ Wi-Fi (2.4GHz/5GHz) /Bluetooth (5.0) (option)
  - ▶ LTE (on request)
- ▶ CAN Bus (option)
- ▶ Fanless passive cooling

Figure 2: KBox A-150-WKL Drive Bay Variant with Wi-Fi and CAN Bus (options)




---

### Protection label

#### NOTICE

The KBox A-150-WKL is factory configured to meet customer requirements and sealed with a protection label. Opening the product invalidates the warranty and may cause damage to internal components.

---



The KBox A-150-WKL is designed for both horizontal or vertical operation in a DIN Rail control cabinet.

---

## 5.1. Front Panel

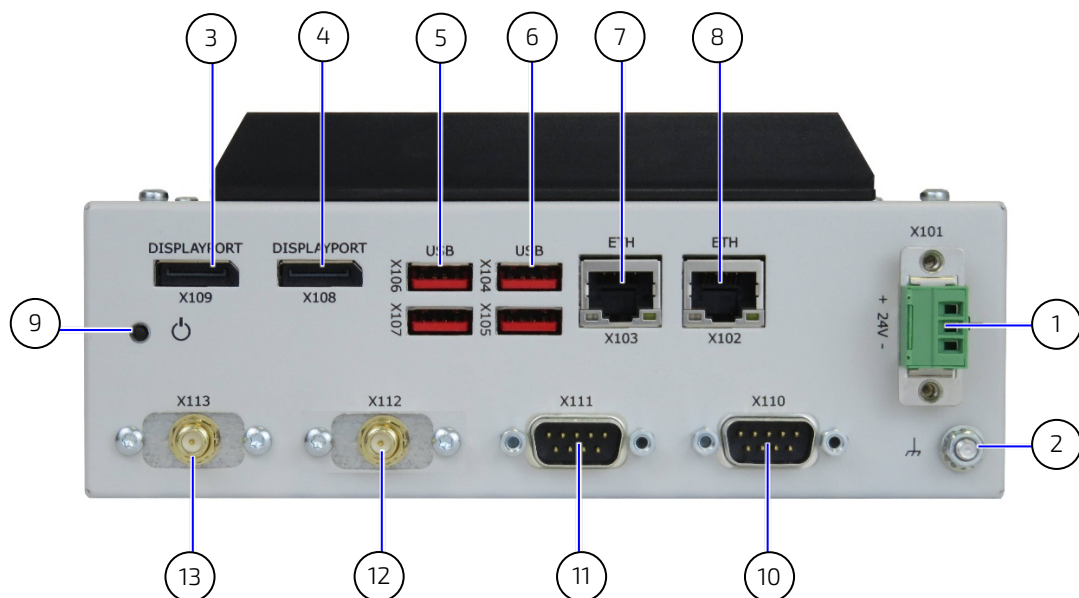
The front panel features all the I/O interfaces and power connectors.



The protective earth stud bolt's position varies depending on whether the KBox A-150-WKL includes or excludes an external 2.5" SSD drive bay:

- ▶ Bottom of the front panel with drive bay
- ▶ Top of the front panel without drive bay

Figure 3: Front Panel (with external 2.5" SSD drive bay)



- |   |   |    |                                    |
|---|---|----|------------------------------------|
| 1 | Input Power connector with mating power connector | 7  | GbE Ethernet (LAN2)                |
| 2 | Protective earth stud bolt                        | 8  | GbE Ethernet (LAN1)                |
| 3 | DP port 1 (DP1)                                   | 9  | Power-on switch                    |
| 4 | DP port 2 (DP2)                                   | 10 | Serial ports (COM1)                |
| 5 | USB 3.1 Port [4-3] (Top to Bottom)                | 11 | Serial port (COM2)                 |
| 6 | USB 3.1 Port [2-1] (Top to Bottom)                | 12 | Optional port X112: shown as Wi-Fi |
|   |   | 13 | Optional port X113: shown as Wi-Fi |

### 5.1.1. Input Power Connector (X101)

The 3-pin input power connector (PSC 1,5/ 3-M) connects to the appropriate DC power supply using the supplied mating power connector (PSC 1,5/ 3-F). To wire the mating power connector, see Chapter 10.1: Wiring the Mating Power Connector.

For the pin assignment of the Input Power connector, see Chapter 14.1.1: Input Power Connector Pin Assignment (X101).

## 5.1.2. Protective Earth Stud Bolt

The protective earth stud bolt on the front panel connects to the chassis GND. The position of the protective earth stud bolt varies (Figure 3, pos. 2)




---

The protective earth stud bolt's position varies depending on whether the KBox A-150-WKL includes or excludes an external 2.5" SSD drive bay:

- ▶ Bottom of the front panel with drive bay
  - ▶ Top of the front panel without drive bay.
- 

## 5.1.3. Display Port (X109, X108)

There are two DP port with DP++ interface (4096 x 2160 @ 60Hz) for video only (Figure 3 pos.3 and 4).

For the pin assignment of the DP connector, see Chapter 14.1.2: Display Port Connector Pin Assignment (X109, X108).

## 5.1.4. USB 3.1 Ports (X107, X106, X105, X104)

There are four USB 3.1 ports (type A) allowing for the connection of a USB 3.0/USB 2.0 compatible devices (Figure 3 pos.5 and 6).

For the pin assignment of the USB 3.1 connectors, see Chapter 14.1.4: USB 3.1 Port Connector Pin Assignment (X107, X106, X105, X104)

## 5.1.5. LAN ports (X103, X102)

There are two GbE LAN ports both supporting 10/100/100 Mbit Ethernet (Figure 3 pos.7 and 8).

For the pin assignment of the RJ45 Ethernet connectors, see Chapter 14.1.3: GbE LAN Connector Pin Assignment (X103, X102).

## 5.1.6. Power-On Switch

There is a power-on switch on the front panel to apply power or perform an orderly shutdown (Figure 3 pos.9). The power-on switch is controlled by the on-board power-on switch pin header, see Chapter 14.3.8: Front Panel 2 Header Pin Assignment.

## 5.1.7. Serial Ports (X111, X110)

The two serial ports (X1) and (X2) support RS232/422/485 (Figure 3 pos.10 and 11). The serial port type is configured in the BIOS setup menu: **Advanced>Super IO Configuration> Serial Port # Configuration> Serial Port # Type>**.

For the pin assignment of the serial port connector, see Chapter 14.1.5: Serial Port Connector Pin Assignment (X111, X110).

## 5.1.8. Options (X112, X113)

The two metal breakouts allow for the installation of optional I/O, such as Wi-Fi, CAN and Audio.

### 5.1.8.1. Wi-Fi (option)

The Wi-Fi module populates a M.2 2230 Key E socket with an IEEE 802.11ac/a/b/g/n dual band Wi-Fi + Bluetooth M.2 2230 key E module, capable of support operating frequencies of 2.4 GHz to 2.49 GHz and 5.12 GHz to 5.85 GHz.



---

**Each M.2 module has a unique mechanical key, and should be inserted only in the appropriate socket; the M.2 modules are not interchangeable between sockets**

---

### 5.1.8.2. CAN Bus (option)

The CAN Bus module connects to the 3.5" SBC via a USB 2.0 port headers (Figure 10, pos. 11 & 12).

### 5.1.8.3. Audio (option)

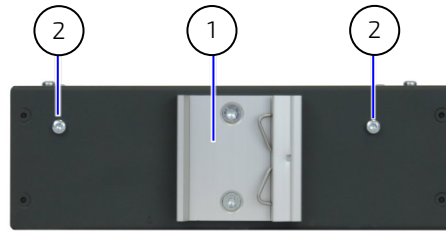
The audio option connects to the 3.5" SBC via the Audio headers (Figure 10, pos. 10).



## 5.2. Rear Side

The rear side features a set of mounting holes for a DIN Rail clamp.

Figure 4: Rear View



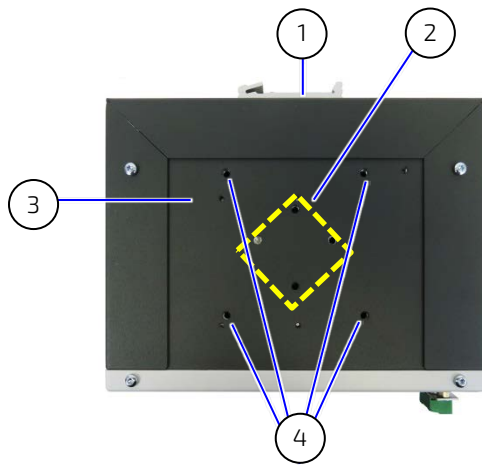
1 DIN Rail clamp

2 Front panel-SBC assembly screw

## 5.3. Top Side

The top side features a heatsink plate with mounting holes for a removable heatsink and DIN Rail clamp, that enable horizontal or vertical mounting.

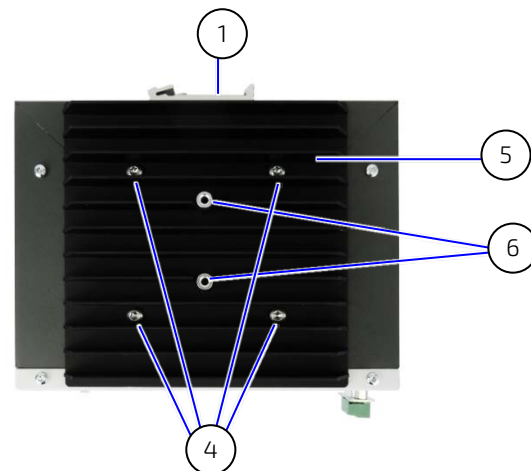
Figure 5: Top View (with and without heatsink)



1 DIN Rail clamp

2 2x DIN Rail mounting hole pairs

3 Heatsink plate



4 4x Heatsink mounting holes

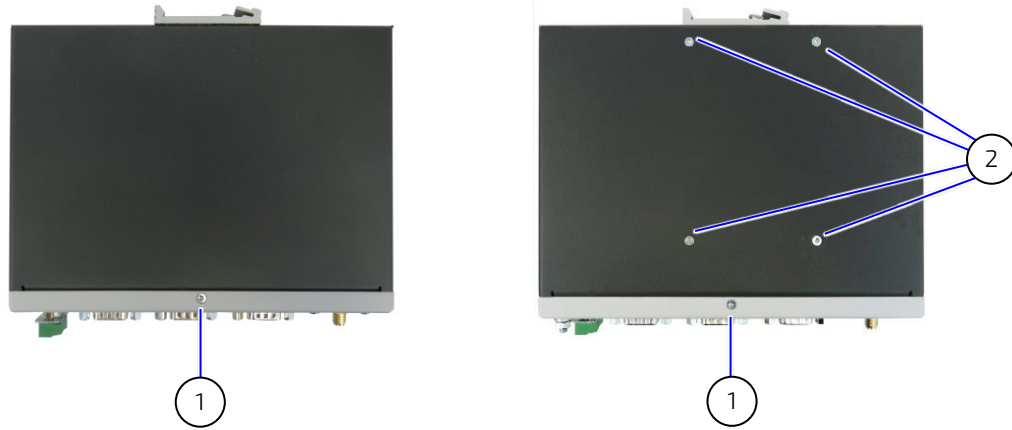
5 Heatsink

6 Heatsink DIN Rail clamp mounting holes

## 5.4. Bottom Side

The bottom side features no operational parts and when mounted requires no clearance, thus enabling the KBox A-150-WKL to be placed directly on top of other items in a control cabinet.

Figure 6: Bottom Side (without and with Internal Drive bay)



1 Front panel and SBC assembly screw.

2 4x Screws from internal drive bay (Do not remove!)

## 5.5. Right and Left Sides

The left side features an external 2.5" SSD drive bay. The chassis height increases with the drive bay option:

- ▶ 58 mm high with drive bay
- ▶ 50 mm high without drive bay

Figure 7: Left Side View and Right Side View (with external 2.5" SSD drive bay)

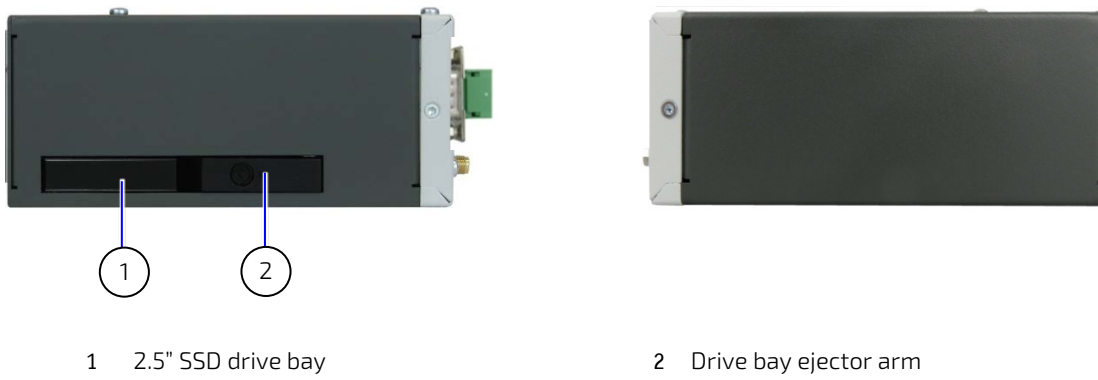
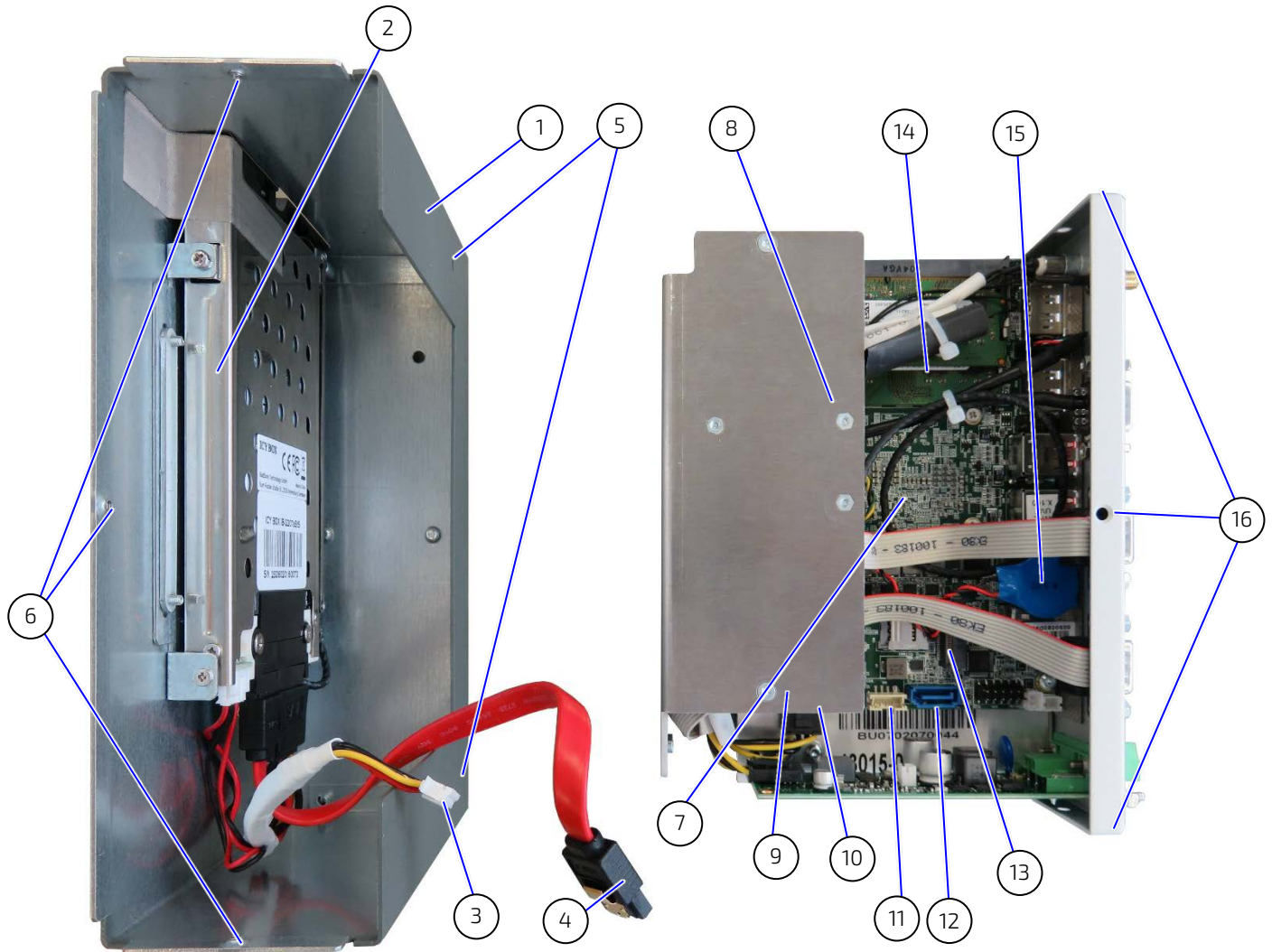


Figure 8: Left Side View and Right Side View (with no external drive bay)



## 5.6. Internal Components

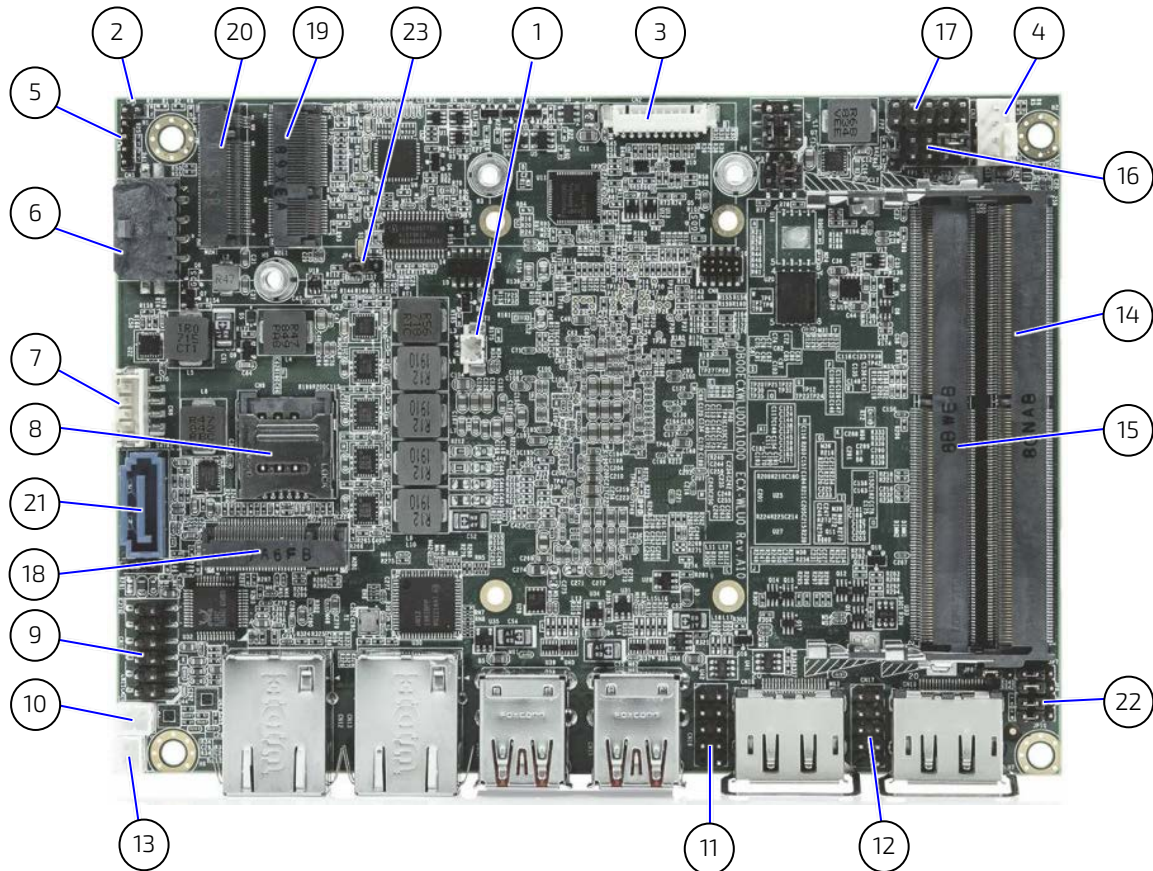
Figure 9: Internal Components



- |   |  |
|---|--|
| <ul style="list-style-type: none"> <li>1 Main chassis</li> <li>2 2.5" SSD drive bay</li> <li>3 1x SATA power connector</li> <li>4 1x SATA data connector</li> <li>5 2x Screw holes for 2x bottom head (M3x5) screws</li> <li>6 3x Main chassis screws holes for 3x flathead (M2.5x4) screws (Corresponding to pos.16)</li> <li>7 3.5" SBC</li> <li>8 Internal heat transfer plate (Will only be installed in Wi-Fi or CAN option variants)</li> </ul> | <ul style="list-style-type: none"> <li>9 1x M.2 Key M 2242/2280 sockets for M.2 SSD (underneath heat transfer plate)</li> <li>10 1x M.2 Key E 2330 socket for Wi-Fi/Bluetooth &amp; Field bus (underneath heat transfer plate)</li> <li>11 1x SATA power connector (corresponding to Pos. 3)</li> <li>12 1x SATA data connector (corresponding to Pos. 4)</li> <li>13 1x M.2 Key B 3042 socket incl. SIM card socket</li> <li>14 System Memory (SODIMM1 and SODIMM2)</li> <li>15 1x Lithium battery</li> <li>16 3x Front panel screw holes for flathead (M2.5x4) screws (Corresponding to pos. 6)</li> </ul> |
|---|--|

### 5.6.1. SBC On-board Components

Figure 10: Top Side On-Board Components



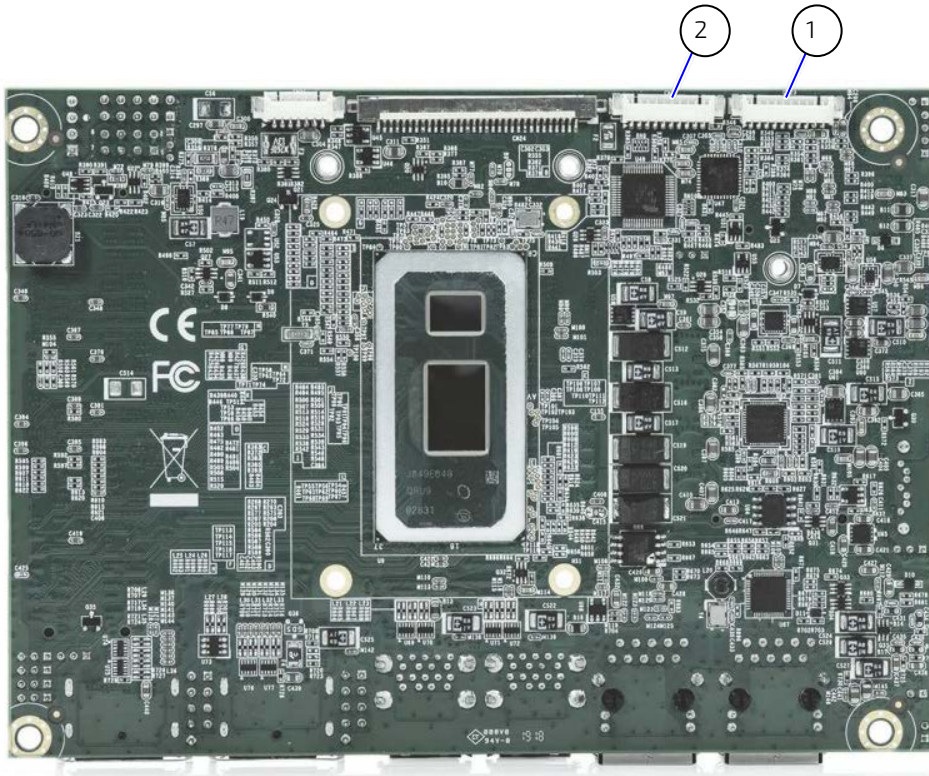
- |    |                                       |    |  |
|----|---------------------------------------|----|--|
| 1  | RTC battery power Input wafer (BAT1)  | 13 | Left channel audio AMP Output header                       |
| 2  | Activity Indicator header for M2B1    | 14 | DDR4 channel 0 SODIMM slot                                 |
| 3  | SDXC/DIO header                       | 15 | DDR4 channel 1 SODIMM slot                                 |
| 4  | Fan wafer SATA2 connector             | 16 | Front panel header 1 (FP1)                                 |
| 5  | Activity indicator header for M2E1    | 17 | Front panel header 2 (FP2)                                 |
| 6  | +12 VDC power Input header            | 18 | M.2 Key B 3042 socket (M2B1)                               |
| 7  | +5 V DC HDD/SSD Power Output header   | 19 | M.2 Key E 2230 socket (M2E1)                               |
| 8  | Micro SIM card holder for M2B1        | 20 | M.2 Key M 2240/2280 sockets (M2M1)                         |
| 9  | Audio Input / Output header           | 21 | SATA port 0 connector                                      |
| 10 | Right channel Audio AMP Output header | 22 | USB Power selection jumper                                 |
| 11 | USB 2.0 port 6-7 header               | 23 | Integrated CNVi Selection for M.2 Key E 2230 (M2E1) jumper |
| 12 | USB 2.0 port 8-9 header               |    |  |



For the implemented main on-board connector pin assignments, see Chapter 14/Connector, Sockets and Jumper Pin Assignments.



Figure 11: Bottom Side On-board Components



1 COM1 RS232/422/485 header

2 COM2 header RS232/422/485



---

For the implemented main on-board connector pin assignments, see Chapter 14/Connector, Sockets and Jumper Pin Assignments.

---

## 6/ System Expansion

The KBox A-150-WKL supports system expansion using an external 2.5" SSD drive bay for storage expansion and internal M.2 sockets for further storage and interface expansion.

### 6.1. Before Expanding

Before expanding, consider the maximum power consumption allowed by the PSU, see Table 20: Power Consumption.

#### **WARNING**

Before opening the product, the product must be switched off using the power-on switch, and all peripheral devices disconnected. Disconnect the product by removing the power cable from the input power connector or the main power supply. Observe the General Safety Instructions within this user guide.



#### ESD Sensitive

Follow the safety instructions for components that are sensitive to electrostatic discharge (ESD). Failure to observe this warning notice may result in damage to the product or/and internal components.

#### **NOTICE**

#### Protection label

The KBox A-150-WKL is factory configured to meet customer requirements and then sealed with a protection label. Opening the KBox A-150-WKL invalidates the warranty and may cause damage to internal components.



Pay attention to manufacturer's instructions before installing/removing expansion cards. Due to the limited predetermined lifespan of expansion devices, Kontron recommends that users check on the condition of installed expansion devices regularly and pay attention to the manufacturer's lifespan specifications.

### 6.2. External Storage Expansion

The drive bay variant supports one removable external 2.5" SSD drive.

Table 7: External Storage Devices

Access	External	
Type	Removable drive	
Size	2.5"	
SSD	SSD (9.5 mm)	SSD (7 mm) <sup>[1]</sup>
#Drives	1x	1x
Capacity	1 TB	1 TB

<sup>[1]</sup> Note 1: For 7 mm SSDs use the Storage Extension Frame, see Table 5: Accessories.



Due to the manufacturer's limited specified lifespan for SSD drives. Kontron recommends checking installed SSD drives via S.M.A.R.T. regularly.

### 6.3. Internal Expansion

The three internal M.2 sockets are used for further storage and interface expansion with Wi-Fi/Bluetooth. Kontron recommends the use of Kontron reference M.2 modules.

**NOTICE**

**Protection label**

The KBox A-150-WKL is factory configured to meet customer requirements and then sealed with a protection label. Opening the KBox A-150-WKL invalidates the warranty and may cause damage to internal components.

#### 6.3.1. M.2 Module

The M.2 module are factory installed. To remove or install an M.2 module Kontron recommends returning the KBox A-150-WKL to Kontron, see Chapter 16.1: Returning Defective Merchandise.

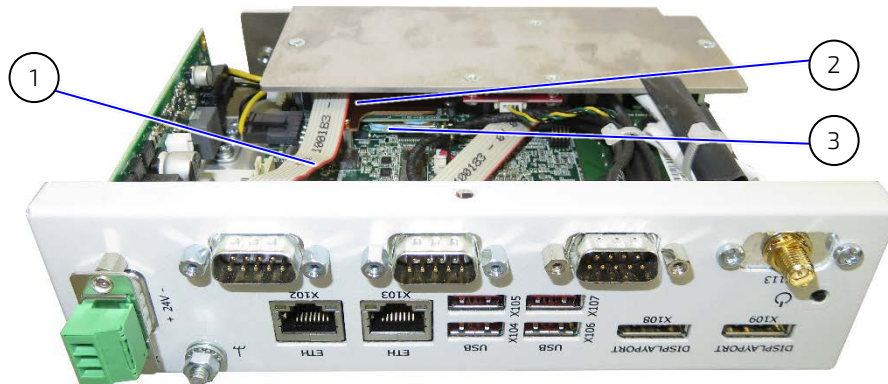
**CAUTION**

Before inserting a M.2 module into one of the available M.2 sockets determine the socket type and keying.

**CAUTION**

M.2 modules are not hot-swappable. Performing hot-swap may damage M.2 modules and cause personal injury.

Figure 12: M.2 Sockets



- 1 M.2 Key B 3042
- 2 M.2 Key M 2242/2280
- 3 M.2 Key E 2230 socket

Table 8: M.2 Module Option

M.2 Slot	M.2 slot Interface	Function	Reference Modules
M.2 2242/2280 Key M	NVME SATA	SATA III SSD Drive	Transcend MTS552T-I
M.2 2230 Key E	PCIe x1 USB2.0 CNVi	Wi-Fi/Bluetooth	Intel AC9260 Wi-Fi Module
M.2 3042 Key B	USB3.1 PCIe x1	LTE/serial port/GbE	



## 7/ Accessing Components

This chapter contains important information regarding accessing components. Observe the procedures and instructions within this chapter properly when installing, removing or handling any internal components.

### NOTICE

#### Protection label

The KBox A-150-WKL is factory configured to meet customer requirements and then sealed with a protection label. Opening the KBox A-150-WKL invalidates the warranty and may cause damage to internal components.

### WARNING

Before opening the KBox A-150-WKL, the product must be switched off using the power-on switch, and all peripheral devices disconnected. Disconnect the product by removing the power cable from the Input Power connector or the DC power supply. Observe the General Safety Instructions within this user guide.



#### ESD Sensitive

Follow the safety instructions for components that are sensitive to electrostatic discharge (ESD). Failure to observe this warning notice may result in damage to the product or/and internal components.



Pay attention to manufacturer's instructions before installing/removing expansion devices.

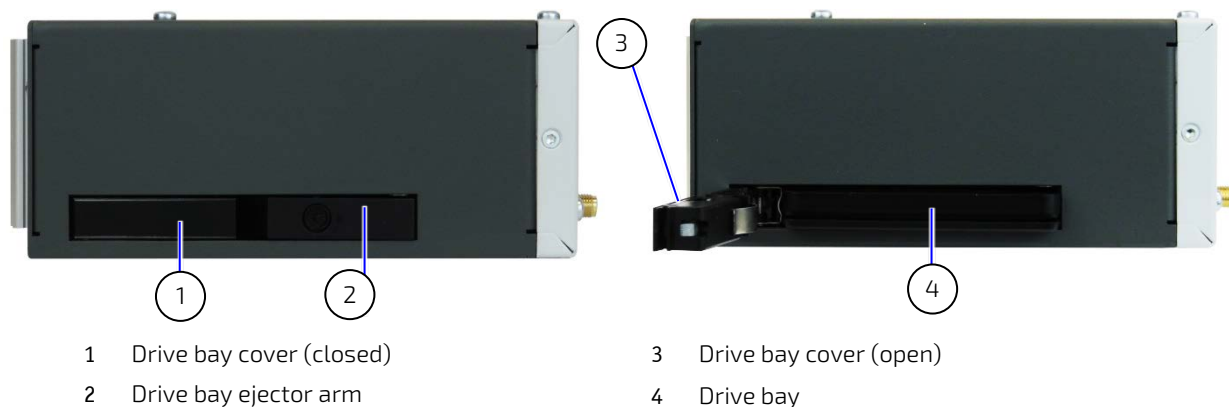
Due to the limited predetermined lifespan of expansion devices, Kontron recommends that users check on the condition of installed expansion devices regularly and pay attention to the manufacturer's lifespan specifications.

### 7.1. Accessing the 2.5" SSD Drive Bay

To install or remove a 2.5" SSD drive (7 mm or 9.5 mm) in the external drive bay, perform the following:

1. Close all applications. Shut down properly using the power-on switch and disconnect the power cable from the DC power supply.
2. Pull the drive bay ejector arm outwards (Figure 13, pos. 2), to release the drive bay cover and gain access to the drive bay. When released the drive bay cover flips open automatically. (Figure 13, pos. 3)

Figure 13: 2.5" SSD Drive Bay



3. Remove an existing drive by holding the sides of the drive and carefully pulling the drive out of the drive bay.
4. Insert a 9.5 mm high drive into the drive bay by carefully pushing the drive into the drive bay, with the drive's contacts facing inward, until the connectors attach. Alternatively, attach an extension frame to a 7 mm high drive and insert the drive with extension frame into the drive bay with the drive's contacts facing inward, until the connectors attach.




---

Attaching an extension frame for 7 mm to 9.5 mm to 7 mm high drives adjusts the height and ensure that the 2.5" SSD is connected correctly into the drive bays internal SATA data and SATA power connectors.

---

5. Push the drive bay cover into the closed position (Figure 13, pos. 1) until the drive bay eject button clicks.

## 7.2. Opening the Product

To access the internal component, open the KBox A-150-WKL as described in this chapter.

### NOTICE

#### Protection label

The KBox A-150-WKL is factory configured to meet customer requirements and then sealed with a protection label. Opening the KBox A-150-WKL invalidates the warranty and may cause damage to internal components.

### WARNING

Before opening the KBox A-150-WKL, the product must be switched off using the power-on switch, and all peripheral devices disconnected. Disconnect the product by removing the power cable from the Input power connector or the main DC power supply. Observe the General Safety Instructions within this user guide.

Only qualified personnel aware of the associated dangers must perform activities inside the chassis!

### WARNING

#### Operated in closed condition only

It is only ensured that users do not have access to internal components during operation if the product is closed and secured.

To access KBox A-150-WKL's internal components, open the chassis by performing the following:

1. Close all applications. Shut down properly using the power-on switch and disconnect the power cable from the DC power supply. Disconnect all peripherals.
2. Place on a flat, clean and ESD-safe surface with the top side facing upwards.
3. The front panel is attached to the SBC and forms a front panel-SBC assembly. To release the front panel-SBC assembly, from the main chassis remove the two screws shown in Figure 14, pos. 1. Retain the screws for later use.

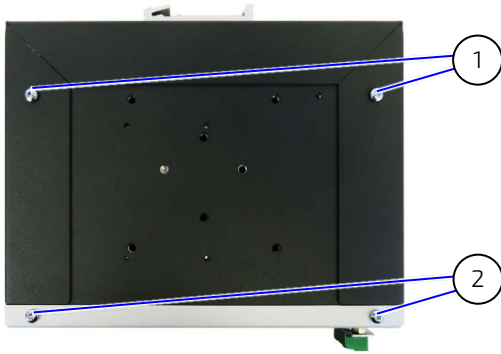
### NOTICE

---

Do not remove or loosen the two screws (Figure 14, pos. 2) that fasten the front panel and SBC together to form a front panel-SBC assembly that can slide in/out of the chassis.

---

Figure 14: Front Panel-SBC Assembly Fastening Screws



- 1 2x Bottom head torx (M3x5) screws
- 2 Do not remove or loosen the screws

4. Turn the product around with the bottom side facing upwards. Remove the screw located in the middle of the front panel (Figure 15, Pos. 1). Then, remove the two screws located on the front panel's right and left sides (Figure 15, Pos. 2). Retain the screws for later use.

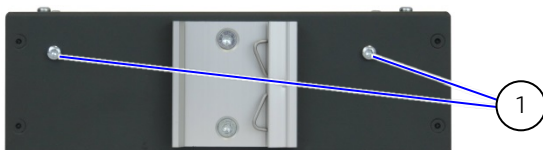
Figure 15: Front Panel Fastening Screws



- 1 1x Flathead (M2.5x4) screw
- 2 2x Flathead (M2.5x4) screw (right side & left side)

5. Remove the two screws on the rear side that secure the front panel-SBC assembly's internal heat transfer plate to the main chassis. Retain the screws

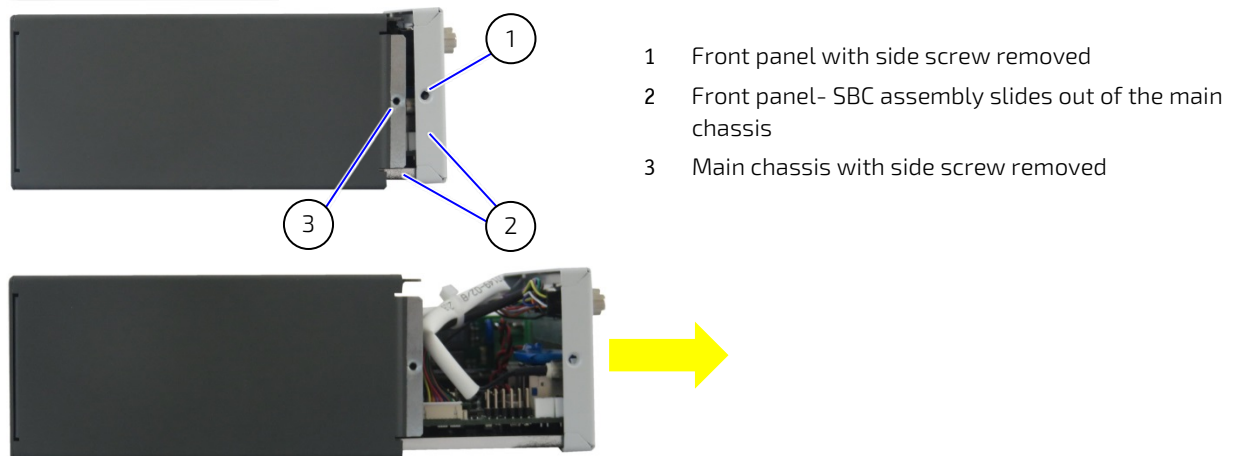
Figure 16: Front panel-SBC Rear Side Screws



- 1 2x screws attach to the front-panel-SBC's internal heat transfer plate.

6. Carefully slide the front panel-SBC assembly out of the main chassis while taking care not to damage the SBC and internal components and ensuring that internal cables do not catch on internal components. For the external drive bay variant there are two additional cable that connect to the drives SATA power and data connectors on the SBC. To slide the front panel-SBC assembly out of main chassis, disconnect the SATA power and data connectors (Figure 9 pos. 3, 4).

Figure 17: Removing the Front panel- SBC Assembly



### NOTICE

The SBC contains components on both sides of the PCB that can easily be damaged if the SBC is handled without reasonable care. Note, a damaged component can result in malfunction or no function at all.

7. Place the front panel-SBC assembly on an ESD-safe surface.
8. Close the product, by proceeding in the reverse order. Align the front panel-SBC assembly with the open chassis. Carefully slide the front panel-SBC assembly towards the rear side of the chassis, while taking care that the internal cables have space and do not catch on or damage internal components. Secure using the screws retained in steps 3, 4 and 5.

## 7.3. M.2 Modules

To install or remove a M.2 module in one of the internal M.2 sockets, Kontron recommends returning the product to Kontron, see Chapter 16.1: Returning Defective Merchandise.

### NOTICE

#### Protection label

The KBox A-150-WKL is factory configured to meet customer requirements and sealed with a protection label. Opening the KBox A-150-WKL invalidates the warranty and may cause damage to internal components.

### NOTICE

The Wi-Fi variant is configured with an internal cooling solution. Installation or removal of the M.2 2242/2280 Key M and the M.2 2230 Key E modules must be performed by Kontron. Refer to Chapter 16.1: Returning Defective Merchandise.

To remove and/or insert a M.2 2242/2280 Key M module, perform the following:

1. Open the chassis as described in Chapter 7.2: Opening the Product.
2. Release the screw that fastens both M.2 modules M.2 Key M 2242/2280 and M.2 Key E 2230 to the SBC. Retain the screw and standoff for later user.

Figure 18: Fastening Screw M 2242/2280 and M.2 Key E 2230



3. Removed the M.2 Key M 2242/2280 module by carefully holding the sides of the module and pulling the M.2 module out of the upper socket.
4. Insert the new M.2 Key M 2242/2280 module into the upper socket, at an angle (approx. 30°). If required move the M.2 module slightly from side to side to ease the module carefully into the socket.
5. To fasten the M.2 module and close the chassis, push down on the M.2 module's free end until the M.2 module's screw hole aligns with the screw hole on the standoff and secure with the screw retained in step 2.
6. Close the chassis as described in Chapter 7.2: Opening the Product, step 8.

To remove and/or insert the M.2 2230 Key E module below the M.2 2242/2280 Key M, perform the following:

1. Open the chassis as described in Chapter 7.2: Opening the Product.
2. Release the screw that fastens both M.2 modules M.2 Key M 2242/2280 and M.2 Key E 2230 to the SBC. Retain the screw and standoff for later user.
3. Removed the M.2 2230 Key E module by carefully holding the sides of the module and pulling the M.2 module out of the lower socket.
4. Insert the new M.2 2230 Key E module into the lower socket, at an angle (approx. 30°). If required move the M.2 module slightly from side to side to ease the module carefully into the socket.
5. To fasten the 2230 Key E module, push down on the M.2 module's free end until the screw hole aligns with the standoff and secure with the screw retain in step 2.

6. Close the chassis is described in Chapter 7.2: Opening the Product, step 8.

**⚠ WARNING**

---

After changing an M.2 SSD module, the partitioning of the memory may differ and require repartitioning.

---

## 7.4. CAN Module

To install or remove a CAN module return the product to Kontron, see Chapter 16.1: Returning Defective Merchandise.

**NOTICE**

---

**Protection label**

The KBox A-150-WKL is factory configured to meet customer requirements and sealed with a protection label. Opening the KBox A-150-WKL invalidates the warranty and may cause damage to internal components.

---

## 8/ Thermal Considerations

The KBox A-150-WKL is fanless and passively cooled using a heatsink plate and optional heatsink. The heatsink plate and optional heatsink absorb the heat produced by the internal components and transfers the heat away from the internal components by dissipating the heat into the ambient environment.

### **WARNING**

#### Hot Surface

Heatsinks can get very hot. To avoid burns and personal injury:

- Do not touch the heatsink when the product is in operation
- Allow the product to cool before handling
- Wear protective gloves
- Always turn the product off when not in use

### 8.1. Heatsink Plate

When mounting in a DIN Rail control cabinet take care not to obstruct the airflow over the heatsink plate, as this can stop sufficient heat dissipating into the ambient environment and cause a build-up of heat.

The heatsink plate dimensions are:

- ▶ 171 mm (6.7") x 105 mm (4.1")

### 8.2. Heatsink (option)

The heatsink is installed on top of the heatsink plate. It is possible to rotate the heatsink by 90° to enable the heatsink to remain in the vertical position to support vertical airflow within a DIN Rail control cabinet. A DIN Rail clamp can be installed directly on the top of the heatsink.

### **NOTICE**

When operating in the temperature range (>+40 °C to +50°C) the optional heatsink must be used.

Figure 19: Heatsink and Heatsink with DIN Rail Clamp



Heatsink



Heatsink with DIN Rail clamp

When mounting in a DIN Rail control cabinet, take care not to obstruct the airflow over the heatsink. Obstructing the airflow can stop sufficient heat dissipating into the ambient environment and causes a build-up of heat.

The heatsink dimensions are:

- ▶ 130 mm (5.12"), 130 mm (5.12"), 19.2 mm (0.76")

For additional heatsink mechanical information, see Chapter 13.4: Mechanical Diagrams Heatsink.




---

The Heatsink Kit's part number is EN05-100003-01.

---

### 8.3. Maximum Temperatures

As the Intel® processors provide only certain settings for maximal power consumption some typically are used for the following table. This table can be seen as a guideline.

**Table 9: Maximum Temperatures**

Processor (Max. Power Consumption )	KBox A-150-WKL with heatsink		KBox A-150-WKL without heatsink	
	Max. Ambient Temperature [°C]	Approx. System Internal Temp. Rise [°C] <sup>[1]</sup>	Max. Ambient Temperature [°C]	Approx. System Internal Temp. Rise [°C] <sup>[1]</sup>
Intel® Core™ i7-8665UE (15 W)	50	15-25 <sup>[2]</sup>	40	15-25 <sup>[2]</sup>
Intel® Core™ i5-8365UE (15 W)	50	15-25 <sup>[2]</sup>	40	15-25 <sup>[2]</sup>
Intel® Core™ i3-8145UE (15 W)	50	15-25 <sup>[2]</sup>	40	15-25 <sup>[2]</sup>
Intel® Celeron® 4305UE (15 W)	50	15-25 <sup>[2]</sup>	40	15-25 <sup>[2]</sup>

<sup>[1]</sup> Depends on configuration

<sup>[2]</sup> Also depends on the position of the sensors




---

The maximum system ambient temperature depends mostly on the power consumption of the processor, chipset and third party components. For information regarding the power consumption, see Chapter 13.6.2: Power Consumption.

---



## 9/ Installation Instructions

It is recommended to expand the KBox A-150-WKL with internal components, before installing in an industrial control cabinet.



Due to possible access restrictions, before installing in a control cabinet ensure that the product is configured as required. If access to the front panel is restricted, connect peripherals to the corresponding system ports before installation.

### 9.1. Control cabinet Mounting

#### 9.1.1. DIN Rail Mounting

The mount in an industrial control cabinet using a DIN Rail clamp, assemble the DIN Rail clamp on the top side heatsink plate or heat sink or on the rear side of the chassis.

The position and direction of the DIN Rail clamp decides the product's orientation within the control cabinet. Therefore, take the following into consideration:

- ▶ Do not obstruct the airflow over the heatsink, this can stop sufficient heat dissipating and causes a build-up of heat.
- ▶ Access to the Input power connector, I/O connectors and external drive bay

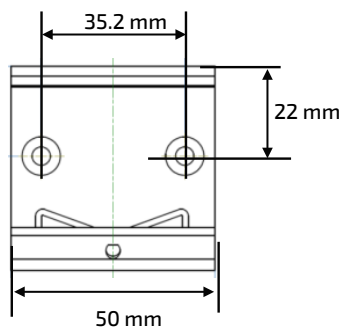


Designed for horizontal or vertical operation in a DIN Rail control cabinet.

Figure 20: DIN Rail Locations



Figure 21: DIN Rail Clamp Upper Position



To attach a DIN Rail clamp, perform the following:

1. Make sure that the DIN Rail clamp is in the upper position, for the required mounting option.
2. Fasten the DIN Rail clamp firmly using the supplied two flathead (M4x6) screws only.
3. Clip the top of the DIN Rail clamp onto the DIN Rail and push the bottom of the DIN Rail clamp firmly until it clamps on to the bottom of the DIN Rail.

## 9.2. System Clearance

For sufficient air circulation around the KBox A-150-WKL, Kontron recommends users not to place, mount or operate any other devices within the specified keep out areas around the product.

Users must observe the marked keep out areas shown in Figure 22, Figure 23, Figure 24 and Figure 25.



Cable clearance depends on the installed connector types and is typically up to 50 mm.

Figure 22: Keep Out Area for Mounting with external 2.5" SSD drive bay

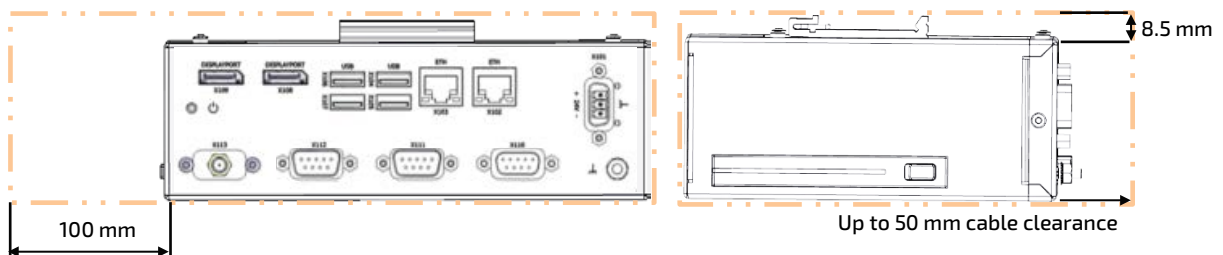


Figure 23: Keep Out Area for Mounting with no drive bay

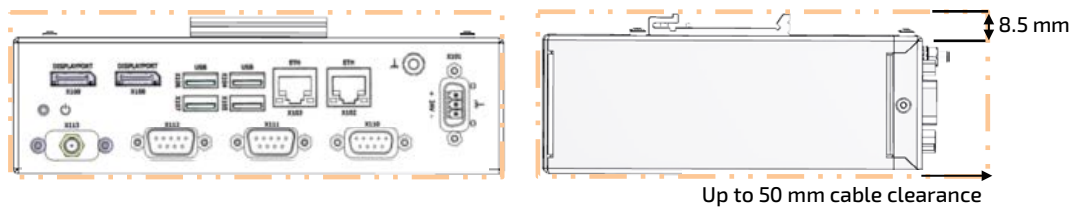


Figure 24: Keep Out Area for Mounting with heatsink & external 2.5" SSD drive bay

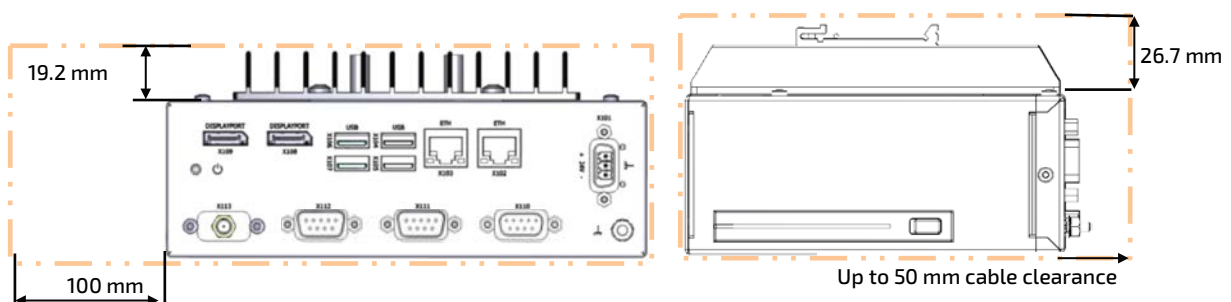
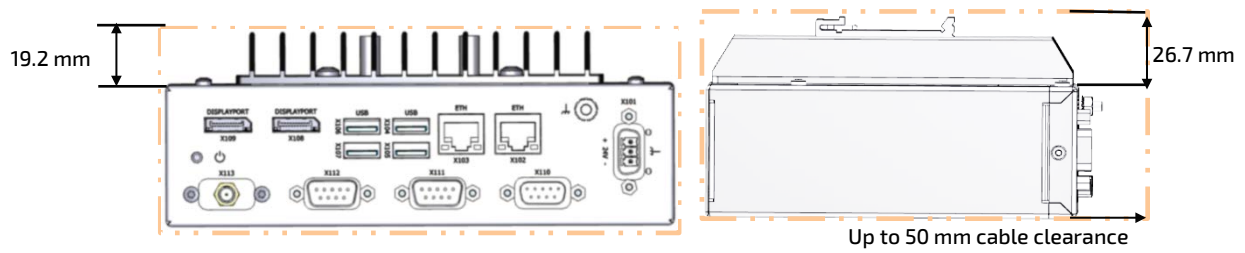
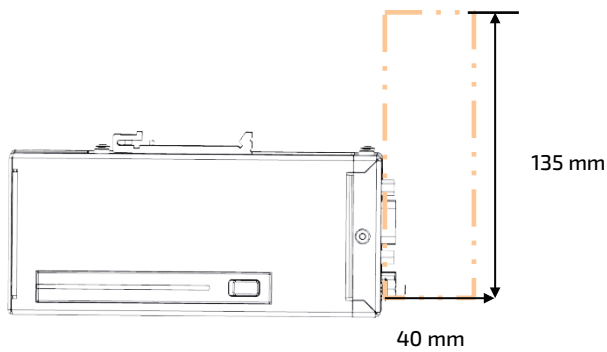


Figure 25: Keep Out Area for Mounting with heatsink & no drive bay



For the KBox A-150-WKL with Wi-Fi, the front panel keep out area depends on the dimensions and orientation of the implemented Wi-Fi antennas.

Figure 26: Keep Out Area for Wi-Fi Antenna



Wi-Fi antennas require an additional keep out area. Kontron's reference Wi-Fi antennas require a clearance of minimum of 40 mm horizontally and 135 mm vertically.

## 10/ Switching On

Before switching on the KBox A-150-WKL, observe the instructions in Chapter 3/: General Safety Instruction and the instructions within this chapter.

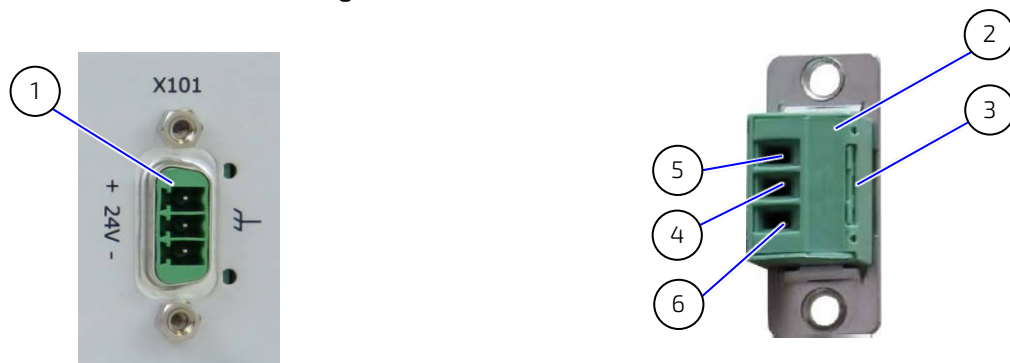
### 10.1. Wiring the Mating Power Connector

The Input Power connector connects to a DC power supply using the supplied mating power connector (PSC 1.5/ 3-F) and the corresponding wiring inserted into the mating power connector's clamps (Figure 27, pos. 4, 5 & 6). The wires must be clearly marked (+/-/functional earth) to ensure proper connection to the DC power supply.

The wiring is not part of the delivery und must be provided by the user.

- ▶ Use copper conductors only if the field wiring terminal is only for connection to copper wire.
- ▶ Minimum temperature rating of the field wiring terminals is 75° C.

Figure 27: Input Power Connector and Mating Power Connector



- |   |                                   |
|---|-----------------------------------|
| 1 3-pin Input Power connector (PSC 1,5/ 3-M)  | 4 Clamp for functional earth wire |
| 2 3-pin mating power connector (PSC 1,5/ 3-F) | 5 Clamp for 0 VDC wire            |
| 3 Cover over the slotted pan head screws      | 6 Clamp for +24 VDC wire          |

To wire the supplied mating power connector (PSC 1,5/ 3-F), perform the following:

1. Cut three (1 mm<sup>2</sup>) AWG18 isolated wires to the required length and strip each end 5 mm – 7 mm.
2. Twist the striped wire-ends and provide them with ferrules.
3. Access the slotted pan head screws by opening the mating power connector's cover (Figure 27, pos. 3).
4. Loosen the slotted pan head screws far enough so that you can insert the end of the prepared wires.
5. Insert the wires into the corresponding clamp of the mating power connector. Make sure that you have the right polarity of the connection.
6. Fasten the screws to secure the wires into the mating power connector's clamps.
7. Close the mating power connector's cover (Figure 27, pos. 3).

#### NOTICE

Mark the wires clearly as (+/-/functional earth) to ensure a safe connection from the input power connector to the DC power supply.

#### NOTICE

Support the power and I/O cables to minimize the strain on the product's connectors.

## 10.2. Connecting to a DC Power Supply

### **⚠ WARNING**

Operated in closed condition only

It is only ensured that users do not have access to internal components during operation if the product is closed and secured.

### **⚠ CAUTION**

Observed that wiring and short-circuit/overcurrent protection is performed according to the applicable standards, regulations and in respect to the product's electrical specification. The disconnecting device (fuse/circuit breaker) rating must be in accordance with the product wire cross-section.

### **⚠ CAUTION**

Even when switched off using the power-on switch, parts of the system are still energized. The product is only completely switched off when the power has been switched off using the power-on switch and the power cable is disconnected from either the DC power supply or the Input power connector.

### **NOTICE**

Following a proper cabling procedure prevents a false power-on condition, that could result in operational failure. When installing/disconnecting the product ensure that:

- ▶ The functional earth connection is made first and disconnected last.
- ▶ The last connection made to the product is the power wiring.

### **NOTICE**

The wires used for power connections must be marked clearly (+/-/functional earth) to ensure a safe connection from the input power connector to the DC power supply.

### **NOTICE**

Support the power and I/O cables to minimize the strain on the product's connectors.

### **NOTICE**

Do not disconnect the power while the product is switched on! This performs a forced shutdown and can lead to loss of data. To shutdown without data loss, switch off using the Power-on switch.

To connect to the external DC power supply, perform the following:

1. Wire the supplied mating power connector/terminal (PSC 1.5/3-F) as described in, see Chapter 10.1. Wiring the Mating Power Connector.
2. Switch off the external DC power supply via a disconnecting device (fuse/circuit breaker), to ensure that no power flows during the connection procedure.
3. Connect the protective earth stud bolt to an appropriate common earth connection.
4. Connect the wired mating power connector (PSC 1.5/3-F) to the input power connector. Pay attention to the polarity of the connections.
5. Connect the other end of the wired mating power connector to the external DC power supply.



Once connected to an external DC power supply the product can be switch on and switch off using the power-on switch.

### 10.3. Switch On/OFF

To switch on while the KBox A-150-WKL is connected to the DC power supply, perform the following:

1. Press the power-on button (Figure 3, pos. 9).
2. The product switches on.

#### NOTICE

---

Do not disconnect the power while the product is switched on. This performs a forced shutdown and can lead to loss of data. To shutdown properly without data loss, switch off using the Power-on switch

---

To switch off the KBox A-150-WKL without performing a force shutdown, perform the following:

1. Press the power-on button (Figure 3, pos. 9).
2. The system performs an orderly shutdown.
3. To completely switch off, disconnect the power connection at the input power connector or the DC power supply.

#### CAUTION

---

Even when switched off using the power-on switch, parts of the product are still energized. The product is only completely switched off when the power has been switched off using the power-on switch and the power wiring is disconnected from either the DC power supply or the Input power connector.

---

#### NOTICE

---

Do not disconnect the power while the product is switched on. This performs a forced shutdown and can lead to loss of data. To shutdown properly without data loss, switch off using the Power-on switch.

---

### 10.4. Operating System (OS) and Drivers

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

If you have ordered your KBox A-150-WKL 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 power it on for the first time.

If you have ordered The KBox A-50-WKL 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.




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To download relevant drivers for the factory installed hardware components, visit [Kontron's Customer Section](#).

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Pay attention to the manufacturer OS specifications relating to the integrated hardware components.

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## 11/Maintenance

Maintenance or repair on the open product may only be carried out by Kontron authorized qualified personnel.

### ⚠ CAUTION

Handling and operation of the product is permitted only for trained personnel aware of the associated dangers, within a work place that is access controlled and fulfills all the necessary technical and environmental requirements.

### 11.1. Cleaning

To clean the surface of the chassis:

- ▶ For light soiling, clean the product with a dry cloth
- ▶ Carefully remove dust from the surface of the chassis and heatsink using a clean, soft brush
- ▶ Stubborn dirt should be removed using a mild detergent and a soft cloth

### NOTICE

Do not use steel wool, metallic threads or solvents like abrasives, alcohol, acetone or benzene to clean the product.

#### 11.1.1. Replacing the Lithium Battery

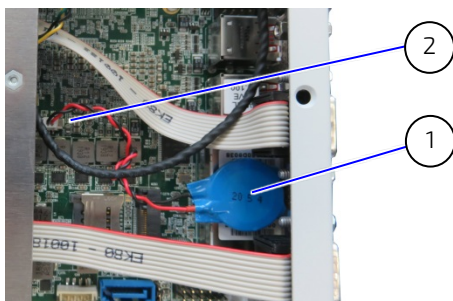
The KBox A-150-WKL is equipped with a Kontron specific battery assembly that may need to be replaced during the lifetime of the product. The KBox A-150-WKL is not designed to operate without a battery. If the battery is empty or disconnected, the BIOS settings will be set to the factory defaults.

Replace the lithium battery only when the product has been shut down properly by using the power-on switch and removing the power cable to disconnect the DC power supply. Replace the Kontron specific battery assembly only with the same type of battery (CR 2032) or with a Kontron recommended battery type.

To replace the lithium battery, perform the following:

1. Open the product as described in Chapter 7.2: Opening the Product (steps 1 to 7)
2. The lithium battery (Figure 28, pos. 1) is attached to the top of one of the internal connectors using a double – sided adhesive pad. Carefully, remove the lithium battery from the internal connector and disconnect the battery's cable from the on-board battery header (Figure 28, pos. 2)

Figure 28: Lithium Battery Location



- 1 Lithium battery (CR 2032, 3 V) attached to connector with an adhesive pad
- 2 Lithium battery header.

3. Replace with a new lithium battery (of the same battery type) by inserting the battery's connector into the on-board battery connector, while paying attention to the polarity of lithium battery connector cables.
4. Position the battery cable to ensure that the cables do not interfere with other components and attach the lithium battery to the top of an internal connector (Figure 28, pos. 1), using a double-sided adhesive pad.

5. Close the product, see Chapter 7.2: Opening the Product (step 8).

**CAUTION**

---

Caution: Risk of Explosion if Battery is replaced by an Incorrect Type. Dispose of Used Batteries According to the Instructions.

ATTENTION: Risque d'explosion si la batterie est remplacée par un type incorrect. Mettre au rebus les batteries usagées selon les instructions.

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The KBox A-150-WKL is not designed to operate without a battery. If the battery is empty or disconnected, the BIOS settings will be set to the factory defaults.

---



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Do not dispose of lithium batteries in general trash collection. Dispose of the battery according to the local regulations dealing with the disposal of these special materials, (e.g. to collecting points for battery disposal).

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## 12/ BIOS

The KBox A-150-WKL uses the AMI Aptio V uEFI BIOS based on the Unified Extensible Firmware Interface (uEFI) specification and the Intel® Platform Innovation Framework for EFI. The uEFI BIOS preferences are preset and do not require further adjustment for operation. Enhanced uEFI BIOS configurable features are the serial port type (RS232, RS422, RS485) and power management settings and LAN settings.

The UEFI BIOS setup menus and available selection may vary. For specific information on the BIOS for your product, contact [Kontron Support](#).




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**UEFI only! No legacy support and no Master Boot Record (MBR) installation.**

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**The BIOS features listed in this user guide are open to change and may not be available in the latest version of the BIOS. For the latest BIOS Information, visit [Kontron's Customer Section](#).**

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### 12.1. Starting the uEFI BIOS

The uEFI BIOS's Setup program 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 functions that include sub-menus with further functions and sub-menus.

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

1. Switch on.
2. Wait until the first characters appear on the screen (POST messages or splash screen).
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, press <RETURN>, and proceed with step 5.
5. The BIOS setup utility appears in the Main menu

Using the hot key navigation system users can navigate through the BIOS. 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 10: 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
- ▶ Power
- ▶ Boot
- ▶ Security
- ▶ Save & Exit

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

Each Setup menu is made up of 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 an explanation of the respective function in a help window.

### 12.2.1. Main Setup Menu

Upon entering the uEFI BIOS Setup program, the Main Setup menu is displayed. This screen lists the Main Setup menu sub-screens and provides basic system information. Additionally, functions for setting the system time and date are offered.

The Main Menu provides an overview of the system information and enables users to set the System date and time.

Figure 29: Main Setup Menu Example

BIOS SETUP UTILITY					
Main	Advanced	Power	Boot	Security	Save & Exit
Product Information					
Product Name	3.5-SBC-WLU				
BIOS Version	UEXWLU0Y.001 (x64)				
BIOS Build Date	04/29/2021				
ME Firmware SKU	Corporate SKU				
ME Firmware Version	12.0.49.1534				
CPU Information					
Intel® Core™ i5-8365UE CPU @ 1,60GHz					
Microcode Revision	CA				
Processor Cores	4 Core(s) / 4 Threads(s)				
Memory Information					
Total Size	xxxx MB (DDR4)				
Frequency	xxxx MHz				
Board Information					
UUID	XXXXXXXX-XXXX-XXXX-XXXX-XXXXXXXXXXXX				
				→ ←: Select Screen	

BIOS SETUP UTILITY					
Main	Advanced	Power	Boot	Security	Save & Exit
Serial #		BUXXXXXXXXXX		↑ ↓ : Select Item	
LAN1 MAC Address		xx:xx:xx:xx:xx:xx		Enter: Select	
LAN2 MAC address		xx:xx:xx:xx:xx:xx		+/-: Change Opt.	
System Date		[xxx xx/xx/xxxx]		F1: General Help	
System Time		[xx:xx:xx]		F2: Previous Values	
Access Level		Administrator		F3: Optimized Defaults	
				F4: Save & Reset	
				ESC: Exit	
Version 2.18.1263. Copyright (C) 2018, American Megatrends, Inc.					

## 12.2.2. Advanced Setup Menu

Figure 30: Advanced Setup Menu Example

BIOS SETUP UTILITY					
Main	Advanced	Power	Boot	Security	Save & Exit
Onboard LAN1 Controller		[Enabled]			
Onboard LAN2 Controller		[Enabled]			
Load I219 UNDI Driver		[Disabled]			
Load I210 UNDI Driver		[Disabled]			
Audio Controller		[Enabled]			
> Display Configuration					
> Super IO Configuration					
> Serial Port Configuration					
> CPU Chipset Configuration					
> NVMe Configuration					
> SATA Configuration					
> USB Configuration					
> AMT Configuration					
> Trusted Computing					
> H/W Monitor					
> DIO Configuration					
> Network Stack					
				→ ←: Select Screen	
				↑ ↓: Select Item	
				Enter: Select	
				+/-: Change Opt.	
				F1: General Help	
				F2: Previous Values	
				F3: Optimized Defaults	
				F4: Save & Reset	
				ESC: Exit	
Version 2.20.1275. Copyright (C) 2020, American Megatrends, Inc.					

The following table gives more information for important setup options within the Advanced Menu. Default settings are displayed in **bold**.

Table 11: Advanced Setup Menu Sub-screens and Functions

Sub-screen	Additional Sub-screens with Description		
Onboard LAN 1 Controller>	[ <b>Enabled</b> , Disabled]		
Onboard LAN 2 Controller>	[ <b>Enabled</b> , Disabled]		
Audio Controller>	[ <b>Enabled</b> , Disabled]		
Display Configuration	Primary Display>	[ <b>IGFX</b> , PEG]	
	Aperture Size>	[128MB, <b>256MB</b> , 512MB, 1024 MB, 2048 MB]	
	DVMT Pre-Allocated>	[ <b>32M</b> ; 64M; 4M; 8M; 12M; 16M; 20M; 24M; 28M; 32M/F7; 36M; 40M; 44M; 48M; 52M; 56M; 60M;]	
	DVMT Total Gfx Mem>	[128M, <b>256M</b> , MAX]	
	Active LVDS>	[Enabled, <b>Disabled</b> ]	
Super IO Configuration>	Serial Port 1 Configuration >	Serial Port>	[ <b>Enabled</b> , Disabled]
		Device Settings>	<i>Read only field</i> IO=3F8h; IRQ=4;

Sub-screen	Additional Sub-screens with Description		
Super IO Configuration> (continued)	Serial Port 1 Configuration > (continued)	Change Settings>	[ <b>Auto</b> IO=3F8h; IRQ=4; IO=3F8h; IRQ=3,4,5,6,7,9,10,11,12; IO=2F8h; IRQ=3,4,5,6,7,9,10,11,12; IO=3E8h; IRQ=3,4,5,6,7,9,10,11,12; IO=2E8h; IRQ=3,4,5,6,7,9,10,11,12;]
		Serial Port 1 Type>	[ <b>RS232</b> , RS422, RS485]
		RS485 Duplex Mode>	[ <b>Half Duplex</b> , Full Duplex] <i>Note: only visible in RS485 mode</i>
		Auto Flow Control >	[Disabled, <b>Enabled</b> ] <i>Note: Only visible in RS422 / RS485 Mode</i>
		RS485/422 Receiver Termination>	[ <b>Disabled</b> , Enabled] <i>Note: Only visible in RS422 / RS485 Mode</i>
	Serial Port 2 Configuration>	Serial Port>	[ <b>Enabled</b> , Disabled]
		Device settings>	<i>Read only field</i> IO=2F8h; IRQ3;
		Change Settings>	[ <b>Auto</b> IO=2F8h; IRQ=3; IO=3F8h; IRQ=3,4,5,6,7,9,10,11,12; IO=2F8h; IRQ=3,4,5,6,7,9,10,11,12; IO=3E8h; IRQ=3,4,5,6,7,9,10,11,12; IO=2E8h; IRQ=3,4,5,6,7,9,10,11,12;]
		Serial Port Type>	[ <b>RS232</b> , RS422, RS485]
		RS485 Duplex Mode>	[ <b>Half Duplex</b> , Full Duplex] <i>Note: only visible in RS485 mode</i>
		Auto Flow Control>	[Disabled, <b>Enabled</b> ] <i>Note: Only visible in RS422 / RS485 Mode</i>
		RS485/422 Receiver Termination>	[ <b>Disabled</b> , Enabled] <i>Note: Only visible in RS422 / RS485 Mode</i>
		CPU Chipset Configuration>	EIST>
	Hyper-Threading>		[Enabled, <b>Disabled</b> ]
VT-d>	[ <b>Enabled</b> , Disabled]		
Active Processor Cores>	[ <b>All</b> , 1, 2, 3]		
Intel® (VMX) Virtualization Technology>	<i>Read only field</i> Disabled		
Intel® Trusted Execution Technology>	Disabled		
C-State>	[Enabled, <b>Disabled</b> ]		

Sub-screen	Additional Sub-screens with Description	
NvMe Configuration	<i>Read Only Field</i> No NVME device found	
SATA Configuration>	Serial-Controllers(s)>	[ <b>Enabled</b> , Disabled]
	SATA Mode Selection>	[Intel RST Premium with Intel Optane System Acceleration, <b>AHCI</b> ]
	Serial ATA Port 1	
	Port 1>	[ <b>Enabled</b> , Disabled]
	M.2 Port 1	
	Port 1>	[ <b>Enabled</b> , Disabled]
USB Configuration>	Legacy USB Support>	[ <b>Enabled</b> , Disabled, Auto]
	XHCI hand-off>	[ <b>Enabled</b> , Disabled]
	USB Mass Storage Driver Support>	[ <b>Enabled</b> , Disabled]
AMT Configuration>	AMT BIOS Feature>	[Enabled, <b>Disabled</b> ]
Trusted Computing>	Firmware Version>	<i>Read Only Field</i> 5.62 Note: Hidden if security device support = disabled
	Vendor >	<i>Read Only Field</i> IFX Note: Hidden if security device support = disabled
	Security Device Support>	[ <b>Enabled</b> , Disabled]
	Active PCR Banks>	<i>Read only field</i> SHA-1, SHA256 Note: Hidden if security device support = disabled
	Available PCR Banks >	<i>Read only field</i> SHA-1, SHA256 Note: Hidden if security device support = disabled
	SHA-1 PCR Bank >	[ <b>Enabled</b> , Disabled]
	SHA256 PCR Bank>	[ <b>Enabled</b> , Disabled]
	Pending Operation>	[ <b>None</b> , TPM Clear] Note: Hidden if security device support = disabled
	Platform Hierarchy>	[ <b>Enabled</b> , Disabled] Note: Hidden if security device support = disabled
	Storage Hierarchy>	[ <b>Enabled</b> , Disabled] Note: Hidden if security device support = disabled
	Endorsement Hierarchy>	[ <b>Enabled</b> , Disabled] Note: Hidden if security device support = disabled
	TPM2.0 UEFI Spec Version>	[TCG_1_2; <b>TCG_2</b> ] Note: Hidden if security device support = disabled

Sub-screen	Additional Sub-screens with Description	
Trusted Computing> (continued)	Physical Presence Spec>	[1.2, 1.3] <i>Note: Hidden if security device support = disabled</i>
	TPM 20 Interface Type>	<i>Read only field</i> TIS <i>Note: Hidden if security device support = disabled</i>
H/W Monitor>	<i>Read only text</i> CPU temperature, memory temperature, System temperature, CPU fan speed, +VCORE, +Vin, +3 VCC, +3 VSB, +VBAT, +5 VA, +3 VA	
	Smart FAN Configuration>	CPU FAN Setting> [Manual, Smart]
		Manual Duty> [255]
DIO Configuration>	User Configured>	[Enabled, Disabled]
	DIO-0 Value >	[Output Low, Output High]
	DIO-1 Value >	[Output Low, Output High]
	DIO-2 Value >	[Output Low, Output High]
	DIO-3 Value >	[Output Low, Output High]
	DIO-4 Value >	[Output Low, Output High]
	DIO-5 Value >	[Output Low, Output High]
	DIO-6 Value >	[Output Low, Output High]
	DIO-7 Value >	[Output Low, Output High]
	DIO_0 as Input Value>	[1]
	DIO_1 as Input Value>	[1]
	DIO_2 as Input Value>	[1]
	DIO_3 as Input Value>	[1]
	DIO_4 as Input Value>	[1]
	DIO_5 as Input Value>	[1]
	DIO_6 as Input Value>	[1]
	DIO_7 as Input Value>	[1]
Network Stack>	Network Stack>	[Enabled, Disabled]
	Ipv4 PXE Support>	[Enabled, Disabled]
	Ipv4 HTTP Support>	[Enabled, Disabled]
	Ipv6 PXE Support>	[Enabled, Disabled]
	Ipv6 HTTP Support>	[Enabled, Disabled]
	IPSEC Certificate>	[Enabled, Disabled]
	PXE boot wait time>	Range [0-5] [0]
	Media detect count>	Range [0-50] [1]

### 12.2.3. Power Setup Menu

Figure 31: Power Setup Menu Example

Aptio Setup Utility – Copyright (C) 2018 American Megatrends, Inc.					
Main	Advanced	Power	Boot	Security	Save & Exit
Power Configuration					
ACPI Sleep State		[S3 (Suspend to RAM)]			
Restore AC Power Loss		[Power Off]			
Power Saving Mode		[Disabled]			
Resume Event Control					
Resume by LAN Device		[Disabled]			
Resume By Ring Device		[Disabled]			
Resume by RTC Alarm		[Disabled]			
>Watchdog Timer Configuration					
			→ ←: Select Screen ↑ ↓: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Reset ESC: Exit F4: Save & Reset		

The following table gives more information for important setup options within the Power Menu. Default settings are displayed in **bold**.

Table 12: Power Setup Menu Sub-screens and Functions

Function	Description
ACPI Sleep State>	<i>Read only field</i> [S3 (Suspend to RAM) ]
Restore AC Power Loss>	[Power Off, Power On, Last State]
Power Saving Mode>	[EUP Enabled, <b>Disabled</b> ]
Resume Event Control	
Resume by LAN>	[Enabled, <b>Disabled</b> ]
Resume By Ring Device>	[Enabled, <b>Disabled</b> ]
Resume By RTC Alarm>	[Enabled, <b>Disabled</b> ]
Watchdog Timer Configuration>	WDT Function> [Enabled, <b>Disabled</b> ]



## 12.2.4. Boot Setup Menu

Figure 32: Boot Setup Menu Example

Aptio Setup Utility – Copyright (C) 2018 American Megatrends, Inc.					
Main	Advanced	Power	Boot	Security	Save & Exit
Boot Configuration					
Full Screen LOGO Display		[Disabled]			
Setup Prompt Timeout		1			
Bootup NumLock State		[On]			
CSM Support			[Disabled]		
Boot Option Filter		[UEFI only]			
Boot Option Priorites					
Boot Option #1		[Windows Boot Manger (xx:xxxxxxxxxxxx)]			
				→ ←: Select Screen	
				↑ ↓: Select Item	
				Enter: Select	
				+/-: Change Opt.	
				F1: General Help	
				F2: Previous Values	
				F3: Optimized Defaults	
				F4: Save & Reset	
				ESC: Exit	
Version 2.18.1263. Copyright (C) 2018, American Megatrends, Inc.					

The following table gives more information for important setup options within the Boot Menu. Default settings are displayed in **bold**.

Table 13: Boot Setup Menu Sub-screens and Functions

Function	Description
Full Screen LOGO Display>	Full Screen LOGO Display: [ <b>Disabled</b> , Enabled]
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 [ <b>ON</b> , OFF]
CSM Support>	[Enabled, <b>Disabled</b> ]
Boot Option Filter>	[UEFI and Legacy, Legacy only, <b>UEFI only</b> ]
OS Reset Select>	[Warm Reset, <b>Cold Reset</b> ]
Boot Option #1>	Customer setting is Windows Boot manager



UEFI only! No legacy support and no Master Boot Record (MBR) installation.



Function	Description		
Secure Boot Menu> (continued)	Vendor Key>	<i>Read only field</i> [Valid)	
	Factory Key Provision>	[Enabled, <b>Disabled</b> ]	
		Restore Factory Keys>	
		Reset To Setup Mode>	
		Export To Secure Boot variables>	
		Enroll Efi Image>	
	Device Guard Ready>	<i>Read Only Fields</i>	
		Remove 'UEFI CA' from DB>	
		Restore DB defaults>	
	Secure Boot Variable>	Read only Fields	
		Platform Key (PK)>	
		Key Exchange Keys>>	
		Authorized Signatures	
		Forbidden Signatures>	
		Authorized TimeStamps>	
		OsRecovery Signatures>	

## 12.2.6. Save and Exit Setup Menu

Figure 34: Save and Exit Setup Menu Example

Aptio Setup Utility – Copyright (C) 2018 American Megatrends, Inc.					
Main	Advanced	Power	Boot	Security	Save & Exit
Save Changes and Reset					
Discard Changes and Reset					
Save Options				→ ←: Select Screen	
Save Changes				↑ ↓: Select Item	
Discard Changes				Enter: Select	
Restore Defaults				+/-: Change Opt.	
				F1: General Help	
				F2: Previous Values	
				F3: Optimized Defaults	
				F4: Save & Reset	
				ESC: Exit	
Version 2.18.1263. Copyright (C) 2018, American Megatrends, Inc.					

The following table gives more information for important setup options within the Save and Exit Menu.

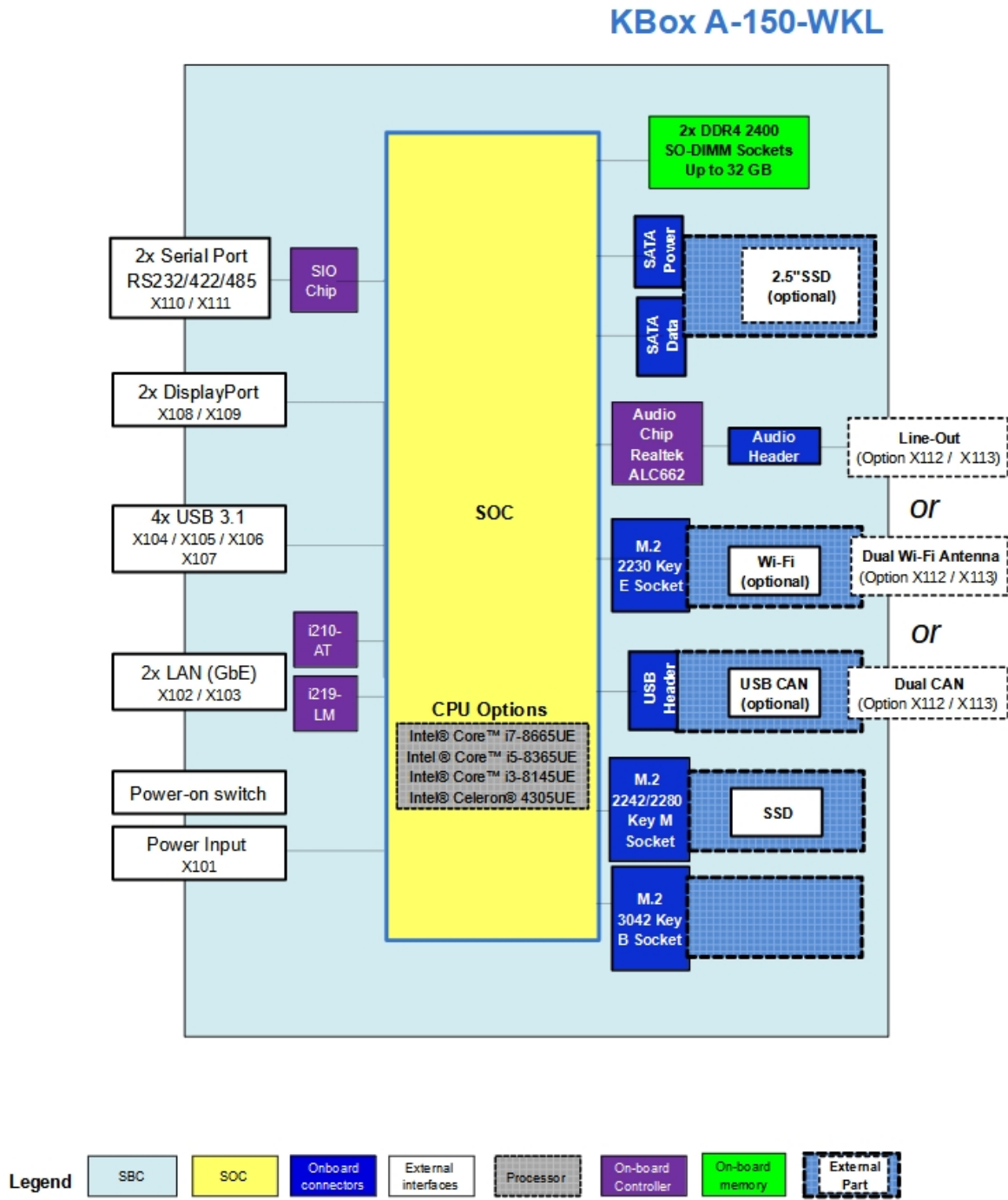
Table 15: Save and Exit Setup Menu Sub-screens and Functions

Function	Description
Save Changes and Reset>	Exits system after saving changes Once you are finished making your selections, choose this option to ensure the values you selected are saved to the CMOS RAM. The CMOS RAM is sustained by an on-board backup battery and stays on even when the PC is turned off. When you select this option, a confirmation window appears. Select <b>[Yes]</b> to save changes and exit.
Discard Changes and Reset>	Exits system setup without saving changes Select this option only if you do not want to save the changes that you made to the Setup program. If you made changes to fields other than system date, system time, and password, the BIOS will ask for a confirmation before exiting.
Save Options>	<i>Read only field</i>
Save Changes>	Saves changes made so far for any setup options
Discard Changes>	Discards changes made so far to any of the setup values This option allows you to discard the selections you made and restore the previously saved values. After selecting this option, a confirmation appears. Select <b>[Yes]</b> to discard any changes and load the previously saved values.
Restore Defaults>	Restores/loads standard default values for all setup options <u>Load Optimal Default values for all the setup values</u> This option allows you to load <b>optimal</b> default values for each of the parameters on the Setup menus, that provides the <b>best performance</b> settings The F9 key can be used for this operation. <u>Load Failsafe Default values for all the setup values</u> This option allows you to load failsafe default values for each of the parameters on the Setup menus, that provides the most stable performance settings. The F8 key can be used for this operation.

# 13/ Technical Data

## 13.1. Block Diagram

Figure 35: Block Diagram



## 13.2. Technical Specification

Table 16: Technical Specification

<b>Processor Board</b>	3.5" Single Board Computer (SBC)			
<b>Processor</b>	Intel® Core™ i7-8665UE	8 MB Cache	1.7 GHz/up to 4.4 GHz	15 W TDP
	Intel® Core™ i5-8365UE	6 MB Cache	1.6 GHz/up to 4.1 GHz	15 W TDP
	Intel® Core™ i3-8145UE	4 MB Cache	2.2 GHz/up to 3.9 GHz	15 W TDP
	Intel® Celeron® 4305UE	2MB Cache	2.0 GHz	15 W TDP
<b>System Memory</b>	2x DDR4 2400 SODIMM Up to 32 GB max.			
<b>Interfaces</b>	4x USB 3.1 2x GbE LAN (1x Intel® I219-LM, 1x Intel® I210-AT) 2x Display Port 2x Serial ports (RS232, RS422, RS485, BIOS configurable) 1x Power switch			
<b>External Storage</b>	1x 2.5" slim SSD drive (option) <sup>[1]</sup>			
<b>Audio</b>	Line-In/Line-Out/Mic via Audio connector (option)			
<b>Expansion Slots</b>	1x M.2 3042 Key B, USB3.1/PCIe x1			
	1x M.2 2230 Key E Module, PCIe x1/USB2.0			
	1x M.2 M.2 2242/2280 Key M, PCIe x4 /SATA			
<b>Lithium Battery</b>	CR 2032, 3 V			
<b>Power</b>	24 VDC nominal (Input range: 9 VDC to 30 VDC) 4.5 A input current max.			
<b>IP Protection Class</b>	IP 20			
<b>Operating System (OS)</b>	Windows 10 IoT LTSC – BSP and Image Linux			
<b>BIOS</b>	AMI Aptio V			

<sup>[1]</sup> Only the KBox A-150-WKL variant with externally 2.5" SSD drive bay

### 13.3. Mechanical Specification

Table 17: Mechanical Specification

Dimensions	KBox A-150-WKL (with SSD Drive Bay)	KBox A-150-WKL (without SSD Drive Bay)
Width	180 mm (7.09")	
Depth	134 mm (5.28")	
Height	58 mm (2.28")	50 mm (1.97")
	76 mm (2.99") with heatsink	68 mm (2.68") with heatsink
Weight (chassis only)	Approx. ~1 kg (~2.2 lbs.)	
Construction	Steel chassis	
Mounting	DIN Rail	
Color	RAL7035 (front panel) RAL7043 (top cover and main chassis) Black (heatsink)	

#### 13.3.1. Mechanical Diagrams

For detailed mechanical information, refer to the outline dimension diagrams in this chapter showing the main external mechanical dimensions.

The following outline dimension drawings show the KBox A-150-WKL with an external 2.5" SSD drive bay.

Figure 36: Front Panel Dimensions with External 2.5" SSD Drive Bay (mm)

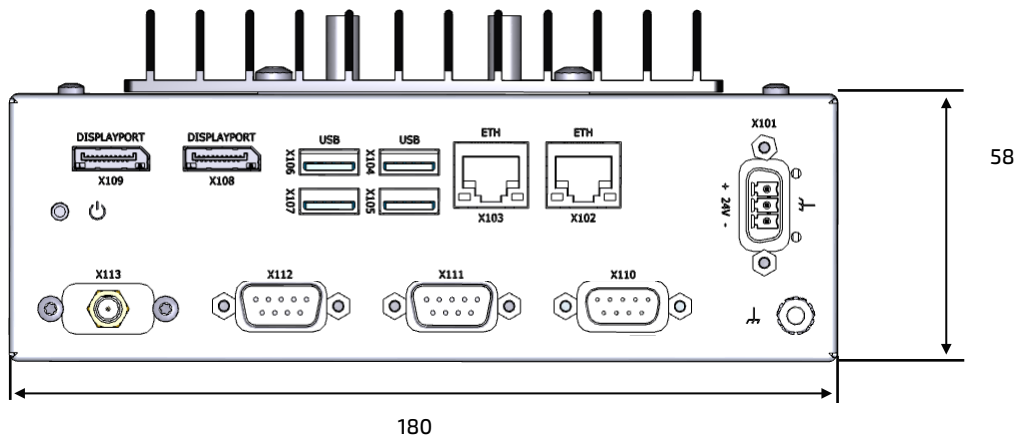


Figure 37: Rear Side Dimensions with External 2.5" SSD Drive Bay (mm)

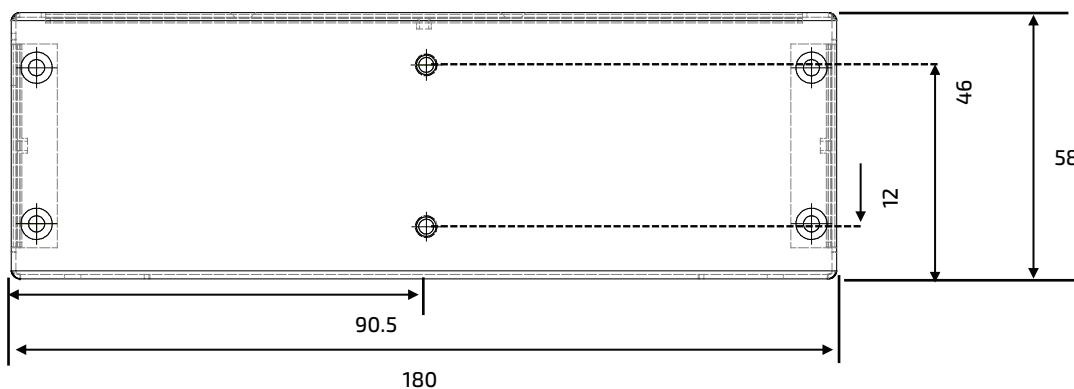


Figure 38: Top Side Dimensions with External 2.5" SSD Drive Bay (mm)

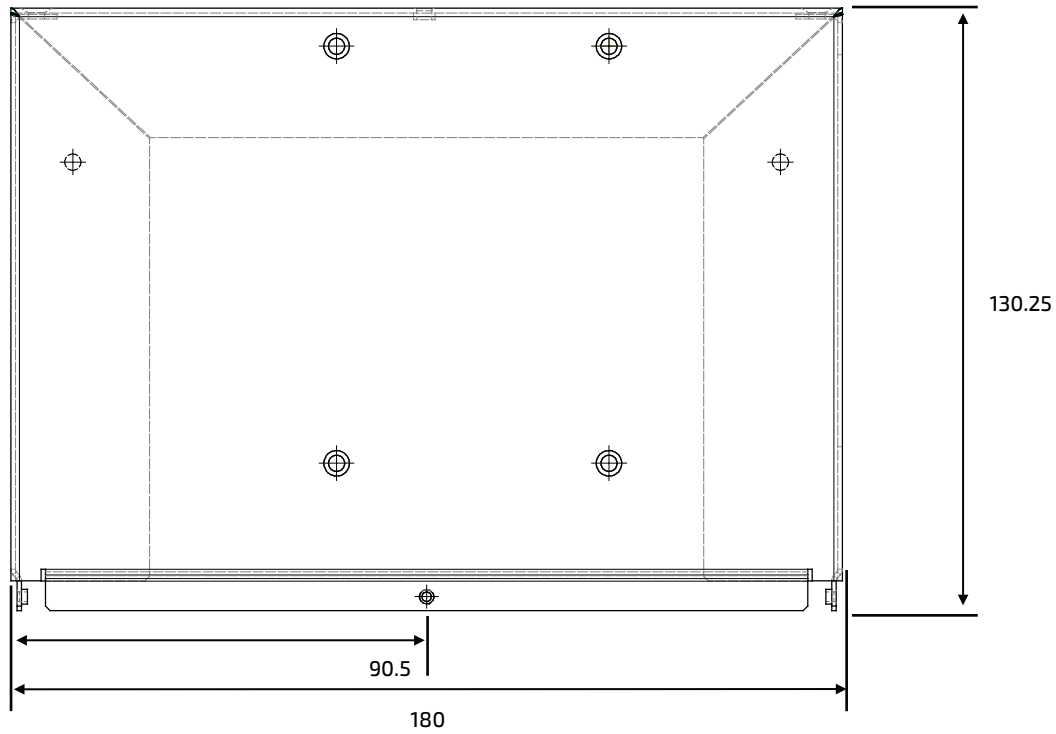
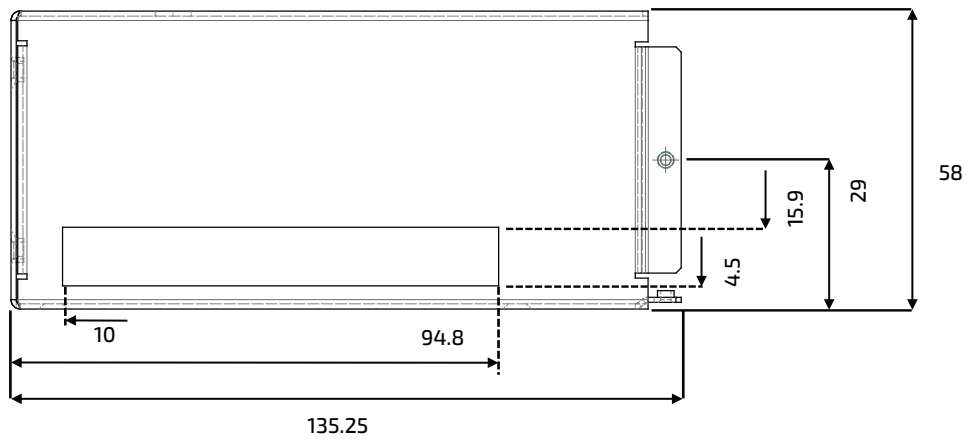


Figure 39: Side View Dimensions with External 2.5" SSD Drive Bay (mm)





The following outline dimension drawings show the KBox A-150-WKL without a drive bay.

Figure 40: Front Panel Dimensions without Drive Bay (mm)

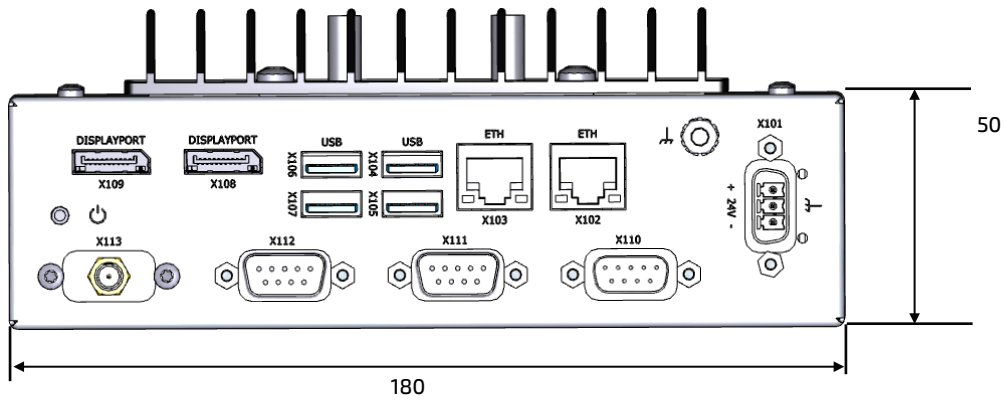


Figure 41: Rear Side Dimensions without Drive Bay (mm)

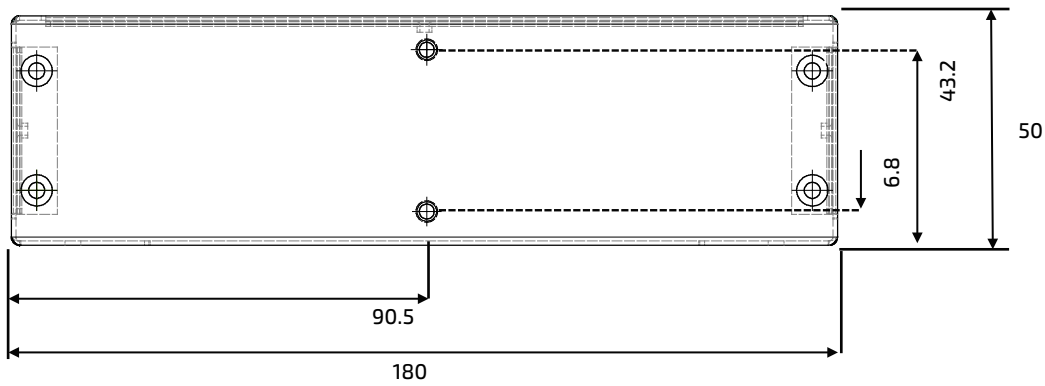


Figure 42: Top Side Dimensions without Drive Bay (mm)

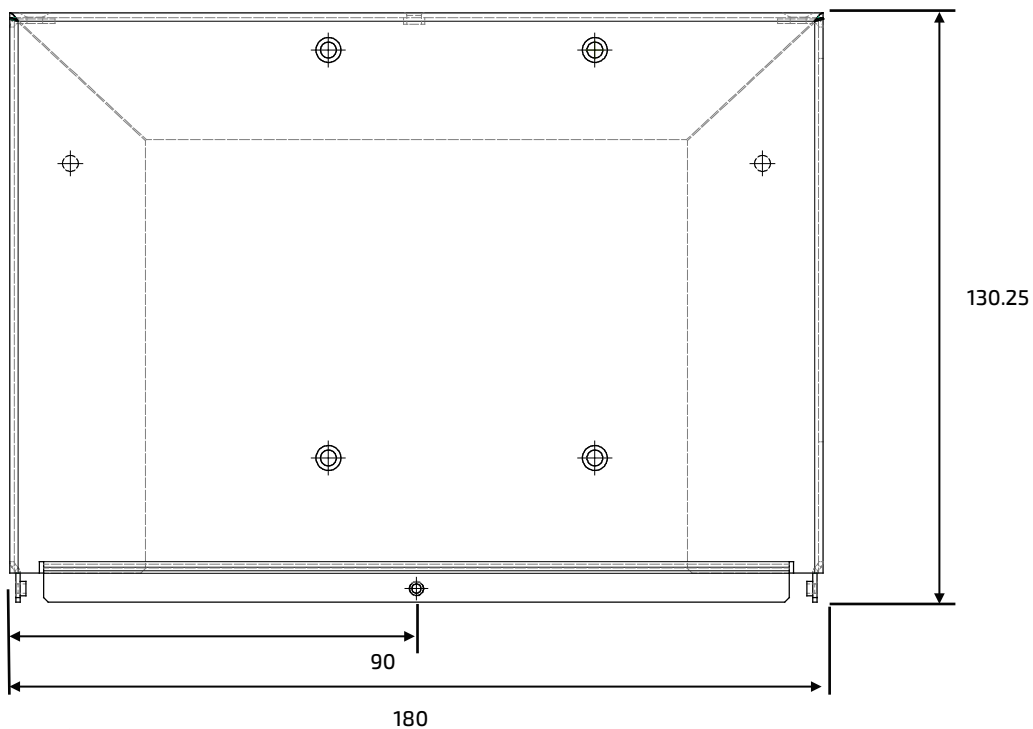
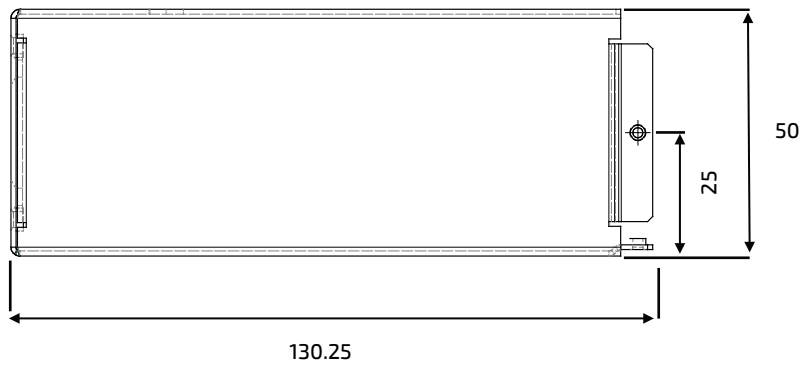


Figure 43: Side View Dimensions without Drive Bay (mm)



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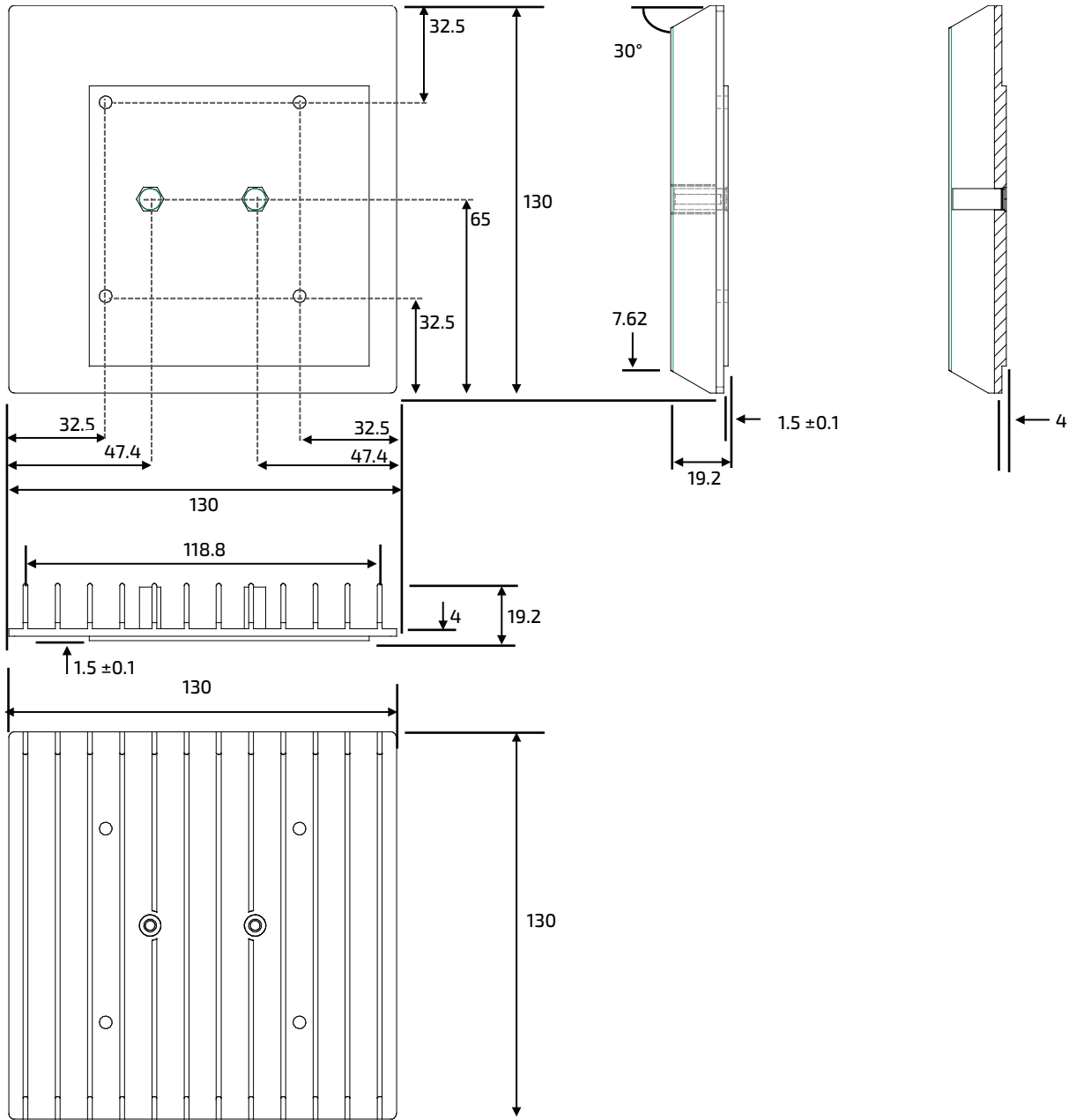
STEP file date is available for the KBox A-150-WKL with and without external drive bay and with and without heatsink. To access the files, visit [Kontron's Customer Section](#).

---

### 13.4. Mechanical Diagrams Heatsink

The following outline dimension drawings show the features of the optional heatsink with DIN Rail mounting holes.

Figure 44: Mechanical Diagram Heatsink (mm)



## 13.5. Environmental Specification

Table 18: Environmental Specification

Temperature		Description
Temperature	Operating	0°C to +40°C (32°F to 104°F) without heatsink 0°C to +50°C (32°F to 122°F) with heatsink
	Storage & Transit	-20°C to 60°C (-4°F to 140°F) ambient
Relative Humidity	Operating	10%-90% RH @ 39°C, non-condensing
Environmental		Description
Shock EN 60068-2-27	Operating	Half sine, 15 g, 11 ms
	Storage & Transit	Half sine, 30 g, 11 ms
Vibration EN 60068-2-6	Operating	10 to 150 Hz, 1.0 g
Altitude		Up to 2,000 m (operating)
Cooling		Fanless passive cooling with heatsink plate and optional heatsink.

## 13.6. Power Specification

Before connecting the product to a DC power supply, ensure that the power supply meets the required electrical specification for the product and that protection and supply limitation have been taken into consideration. Additionally, the power supply used must automatically recover from AC power loss and start up under peak loading.

Connect the product only to a power supply designed to achieve NEC Class-2 and Limited Power Source (LPS).

Table 19: Power Specification

Input Voltage (nominal)	24 VDC
Input Voltage (range)	9 VDC to 30 VDC
Input Current	4.5 A (max.)
Inrush Current	6 A
Input Power Connector	3-pin Phoenix PSC 1.5/3-M

### ⚠ CAUTION

Observed that wiring and short-circuit/overcurrent protection is performed according to the applicable standards, regulations and in respect to the product's electrical specification. The disconnecting device (fuse/circuit breaker) rating must be in accordance with the product's wire cross-section.

### ⚠ CAUTION

Only connect to an external power supply delivering the specified input rating and complying with the requirements of Safety Extra Low Voltage (SELV) and Limited Power Source (LPS) of UL/IEC 60950-1 or (PS2) of UL/IEC 62368-1.

### NOTICE

Ensure that the power supply is used according to the manufacturer's instructions.

**NOTICE**

Ensure the power supply has been fully tested to meet the minimum immunity of AC inputs requirements, as stipulated in IEC 55024. Including power supplies marketed with a separate AC/DC power converter.

**NOTICE**

Do not disconnect the power from the system while the system is switched on!  
Performing a forced shut down can lead to loss of data or other undesirable effects!

### 13.6.1. Power Supply Protection Requirements

The used external power supply is required to incorporate protection and supply features such as over current protection, inrush current protection, over voltage protection and under voltage (brownout) protection, to protect the product against fluctuations and interruptions in the delivered DC power supply.

**NOTICE**

If an under voltage (brownout) condition occurs the used power supply must remain in the "off state" long enough to allow internal voltages to discharge sufficiently. Failure to observe this "off state" may mean that parts of the product or peripherals work incorrectly or suffer a reduction of MTBF. The minimum "off state", to allow internal voltages to discharge sufficiently, is dependent on the power supply and additional electrical factors. To determine the required "off state", each case must be considered individually. For more information, contact [Kontron Support](#).

### 13.6.2. Power Consumption

The total power consumption depends on factors such as the capacity of the SBC, external interfaces and system expansion. Use an appropriate PSU that is able to supply the power required by all configured components.

Table 20: Power Consumption

Power Consumption	Type Label Rating	
<b>SBC (Burn-In)</b>		
50% RAM, 50% CPU, 50% 2D 50% 3D 50% Disk WLAN 5GHz Load	Voltage	23.9 VDC (max. range)
	Current	1.128 A (max.)
	Power	27.04 W



The PSU must supply the power required by all KBox A-150-WKL configured components.



The maximum system ambient temperature depends mostly on the power consumption of the processor, chipset and third party components. For information regarding the maximum Ambient temperature, see Chapter 8.3: Maximum Temperatures.

### 13.6.3. Protective Earth Stud Bolt

The protective earth stud bolt connects to the internal chassis GND. The protective earth stud bolt is located next to the input power connector at the bottom of the front panel when the external 2.5" SSD drive bay is included and at the top of the front panel without an external drive bay.

When installing cables to the product the first cable connection must be to the protective earth stud bolt and when disconnecting the last cable to be disconnected must be from the protective earth stud bolt.

## 14/ Connector, Sockets and Jumper Pin Assignments

This chapter describes relevant KBox A-150-WKL connectors, headers, sockets and jumpers.

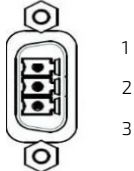
Note that: not all connectors, headers, sockets or jumpers are listed. For further SBC board information, refer to <https://www.kontron.com/de/produkte/3.5--sbc-wlu>.

Before handling internal components, observe the procedures and instructions within this user guide.

### 14.1. Front Panel Connector Pin Assignments

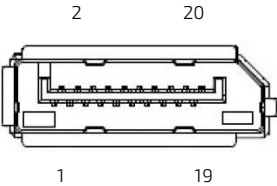
#### 14.1.1. Input Power Connector Pin Assignment (X101)

The input power connector connects to a DC power supply using the supplied mating power connector/terminal (PSC 1.5/ 3-F) and the corresponding wiring.

3-Pin Phoenix PSC 1.5/3-M Power Connector	Pin	Signal Name
	1	GND (-)
	2	Functional Earth
	3	VCC (+)

#### 14.1.2. Display Port Connector Pin Assignment (X109, X108)


The display port connectors are Dual-mode DP ++ports.

20-pin Female Connector	Pin	Signal Name	Description
	1	TX0+	Display Port Lane 0 transmitter differential pair (+)
	2	GND	Ground
	3	TX0-	DisplayPort Lane 0 transmitter differential pair (-)
	4	TX1+	DisplayPort Lane 1 transmitter differential pair (+)
	5	GND	Ground
	6	TX1-	DisplayPort Lane 1 transmitter differential pair (-)
	7	TX2+	DisplayPort Lane 2 transmitter differential pair (+)
	8	GND	Ground
	9	TX2-	DisplayPort Lane 2 transmitter differential pair (-)
	10	TX3+	DisplayPort Lane 3 transmitter differential pair (+)
	11	GND	Ground
	12	TX3-	DisplayPort Lane 3 transmitter differential pair (-)
	13	GND	Ground
	14	GND	Ground
	15	AUX+	DisplayPort Auxiliary channel differential pair (+)
	16	GND	Ground
	17	AUX-	DisplayPort Auxiliary channel differential pair (-)
	18	HPD	DisplayPort hot plug detect
	19	GND	Ground
	20	PWR	Power for connector

### 14.1.3. GbE LAN Connector Pin Assignment (X103, X102)

The two LAN RJ45 10/100/1000 Mbit Ethernet connectors, are based on the Intel® I219-LM and Intel® I210-AT controller respectively.

In order to achieve the specified performance of the Ethernet port, Category 5 twisted pair cables must be used for 10/100 MByte and Category 5E, 6 or 6E for 1 Gbit LAN networks.

RJ45 (female)	Pin	Signal Name	Pin	Signal Name
	1	TX1+	5	TX 3-
	2	TX1-	6	TX 2-
	3	TX 2+	7	TX 4+
	4	TX 3+	8	TX 4-

Left LED: Speed		Right LED: Activity/Link	
Off	10 Mbit	Off	Link down
Green	100 Mbit	Green	Link up no activity
Orange	1000 Mbit/s	Blinking	Link is up and active



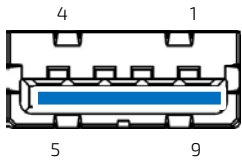
The LAN Status LEDs are inverted and located at the bottom of the RJ45 LAN connector.

Pin	Description
TX1+ / TX1-	In MDI mode, this is the first pair in 1000Base-T, i.e. the BI_DA+/- pair, and is the transmit pair in 10Base-T and 100Base-TX. In MDI crossover mode, this pair acts as the BI_DB+/- pair, and is the receive pair in 10Base-T and 100Base-TX.
TX2+ / TX2-	In MDI mode, this is the second pair in 1000Base-T, i.e. the BI_DB+/- pair, and is the receive pair in 10Base-T and 100Base-TX. In MDI crossover mode, this pair acts as the BI_DA+/- pair, and is the transmit pair in 10Base-T and 100Base-TX.
TX3+ / TX3-	In MDI mode, this is the third pair in 1000Base-T, i.e. the BI_DC+/- pair. In MDI crossover mode, this pair acts as the BI_DD+/- pair.
TX4+ / TX4-	In MDI mode, this is the fourth pair in 1000Base-T, i.e. the BI_DD+/- pair. In MDI crossover mode, this pair acts as the BI_DC+/- pair.



#### 14.1.4. USB 3.1 Port Connector Pin Assignment (X107, X106, X105, X104)

The USB 3.1 ports allowing for the connection of a USB 3.0/USB 2.0 compatible devices.

USB Type A	Pin	Signal Name	Description
	1	+USB_VCC <sup>[1]</sup>	+5 V power supply for USB device
	2	USB_D-	USB 2.0 differential pair (-)
	3	USB_D+	USB 2.0 differential pair (+)
	4	GND	Ground
	5	USB_RX-	USB 3.1 receiver differential pair (-)
	6	USB_RX+	USB 3.1 receiver differential pair (+)
	7	GND	Ground
	8	USB_TX-	USB 3.1 transmitter differential pair (-)
	9	USB_TX+	USB 3.1 transmitter differential pair (+)

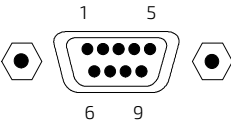
<sup>[1]</sup> 5 VDC power supply for USB devices. The power source of +USB\_VCC can be selected by JP7



For USB power source can be selected by the USB Power Selection Jumper (xx).

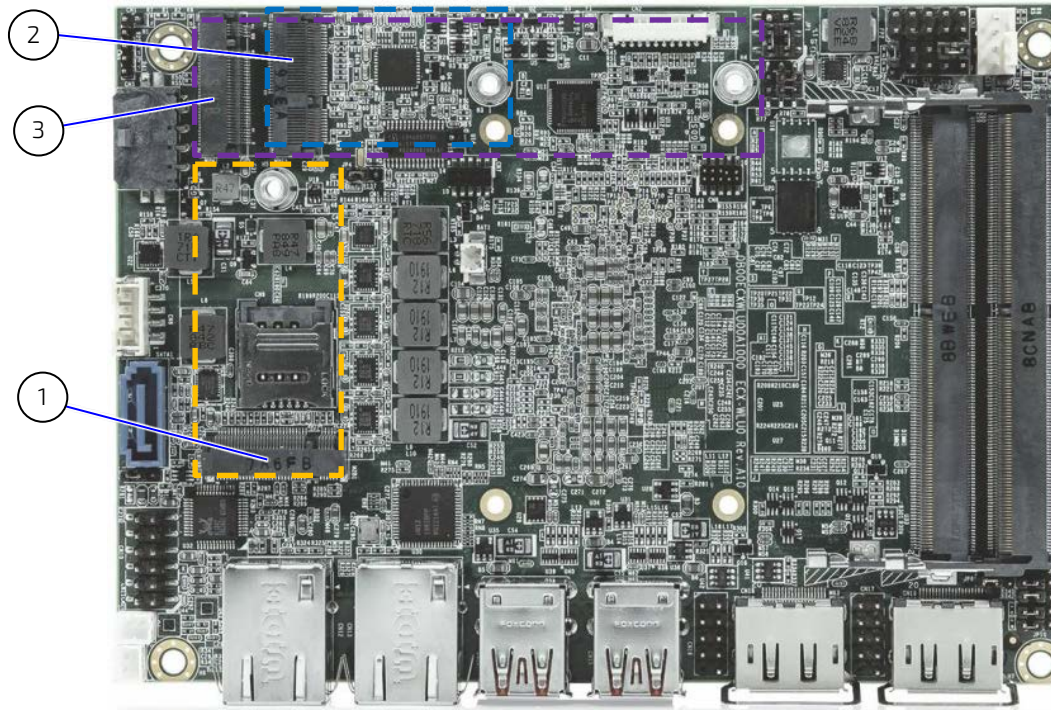
#### 14.1.5. Serial Port Connector Pin Assignment (X111, X110)

The two serial ports support RS232/422/485 configurations.

9-pin D-SUB (male)	Pin	RS232	RS422	RS485 Half Duplex	RS485 Full Duplex
	1	DCD	Tx-	Data-	Tx-
	2	RxD	Tx+	Data+	Tx+
	3	TxD	Rx+		Rx+
	4	DTR	Rx-		Rx-
	5	GND	GND	GND	GND
	6	DSR			
	7	RTS			
	8	CTS			
	9	RI			

## 14.2. Socket Pin Assignments

Figure 45: M.2 Modules



- |   |   |
|---|---|
| <p>1 M.2 3042 Key B socket and mounting hole</p> <p>2 M.2 2230 Key E socket and mounting hole</p> | <p>3 M.2 2242/2280 Key M socket and mounting hole</p> |
|---|---|

### 14.2.1. M.2 3042 Key B Socket Pin Assignment (Option)

The KBox A-150-WKL supports one M.2 3042 with Key B format module. The M.2 3042 socket's specification supports PCIe x1 and USB 3.1 signals. The socket can be used to integrate LTE and serial port/GbE communication on request.

Figure 46: M.2 3042 key B Socket

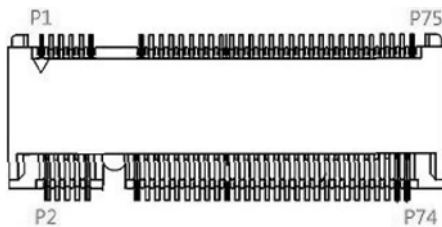


Table 21: Pin Assignment M.2 Key B 3042 socket (M2B1)

Pin	Signal Name	Description
1	GND	Ground
2	+3.3V	3.3 V power supply
3	GND	Ground
4	+3.3V	3.3 V power supply
5	GND	Ground
6	PWROFF#	M.2 module power enable
7	USB-D+	USB 2.0 data differential pair (+)
8	DISABLE#	Wireless disable
9	USB-D-	USB 2.0 data differential pair (-)
10	LED#	Device active signal
11	GND	Ground
12	KEY	
13	KEY	
14	KEY	
15	KEY	
16	KEY	
17	KEY	
18	KEY	
19	KEY	
20	-	
21	-	
22	-	
23	-	
24	-	
25	-	
26	-	
27	GND	Ground
28	-	
29	USB3.0_RX-	USB 3.1 receiver differential pair (-)
30	UIM_RESET <sup>[1]</sup>	SIM card reset
31	USB3.0_RX+	USB 3.1 receiver differential pair (+)
32	UIM_CLK <sup>[1]</sup>	SIM card clock
33	GND	Ground
34	UIM_DATA <sup>[1]</sup>	SIM card data
35	USB3.0_TX-	USB 3.1 transmitter differential pair (-)
36	UIM_PWR <sup>[1]</sup>	SIM card power
37	USB3.0_TX+	USB 3.1 transmitter differential pair (+)
38	-	
39	GND	Ground
40	-	
41	PERn0	PCIe Lane 0 receiver pair (-)

Pin	Signal Name	Description
42	-	
43	PERp0	PCIe Lane 0 receiver pair (+)
44	-	
45	GND	Ground
46	-	
47	PETn0	PCIe Lane 0 transmitter pair (-)
48		
49	PETp0	PCIe Lane 0 transmitter pair (+)
50	PERST#	PCIe reset
51	GND	Ground
52	CLKREQ#	Reference clock request signal
53	REFCLKn	PCIe reference clock pair (-)
54	WAKE#	PCIe wake
55	REFCLKp	PCIe reference clock pair (+)
56	-	
57	GND	Ground
58	-	
59	-	
60	-	
61	-	
62	-	
63	-	
64	-	
65	-	
66	SIM_DETECT	SIM card detect
67	-	
68	SUSCLK	32.768 kHz clock supply input
69	-	PCIe detect
70	+3.3V	3.3 V power supply
71	GND	Ground
72	+3.3V	3.3 V power supply
73	GND	Ground
74	+3.3V	3.3 V power supply
75	-	

<sup>[1]</sup> Note 1: A Micro SIM card is not implemented.

## 14.2.2. M.2 2230 Key E Socket Pin Assignment

The KBox A-150.WKL supports one M.2 2230 with Key E format module. The M.2 2230 socket's specification supports PCIe x1, USB 2.0 and / or CNVi signals. The slot can be used to integrate Wi-Fi or CNVi Wi-Fi / Bluetooth.

Figure 47: M.2 2230 Key E Socket

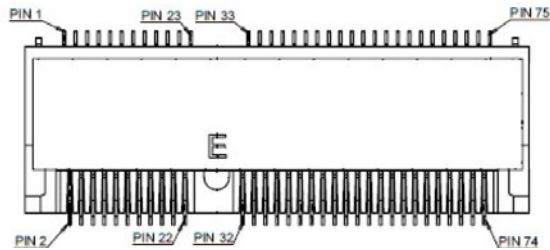


Table 22: Pin Assignment M.2 Key E 2230 (M2E1)

Key E			CNVi	
Pin	Signal Name	Description	Signal	Description
1	GND	Ground	GND	Ground
2	+3.3V	3.3 V power supply	+3.3V	3.3 V power supply
3	USB_D+	USB 2.0 data diff. pair (+)	-	
4	+3.3V	3.3 V power supply	+3.3V	3.3 V power supply
5	USB_D-	USB 2.0 data diff. pair (-)	-	
6	LED1#	Device active signal 1	LED1#	Device active signal 1
7	GND	Ground	GND	Ground
8	PCM_CLK	PCM synchronous data clock	-	
9	-		WGR_D1N	CNVio bus Rx Lane 1 (-)
10	PCM_SYNC	PCM synchronous data sync	LCP_RSTN	RF companion (CRF) reset
11	-		WGR_D1P	CNVio bus Rx Lane 1 (+)
12	PCM_IN	PCM synchronous data input		
13	GND	Ground	GND	Ground
14	PCM_OUT	PCM synchronous data output	CLKREQ0	Clock request
15	-		WGR_D0N	CNVio bus Rx Lane 0 (-)
16	+3.3V	3.3 V power supply	LED2#	Device active signal 2
17	-		WGR_D0P	CNVio bus Rx Lane 0 (+)
18	GND	Ground	GND	Ground
19	GND	Ground	GND	Ground
20	UART_WAKE#	UART wake-up		
21	-		WGR_CLKN	CNVio bus Rx clock (-)
22	UART_RX	UART data input	BRI_RSP	BRI bus Rx
23	-		WGR_CLKP	CNVio bus Rx clock (+)
24	Key		Key	
25	Key		Key	
26	Key		Key	
27	Key		Key	

Pin	Key E		CNVI	
	Signal Name	Description	Signal	Description
28	Key		Key	
29	Key		Key	
30	Key		Key	
31	Key		Key	
32	UART_TX	UART data output	RGI_DT	RGI bus Tx
33	GND	Ground	GND	Ground
34	UART_CTS	UART clear to send	RGI_RSP	RGI bus Rx
35	PET0+	PCIe Lane 0 Tx pair (+)	-	
36	UART_RTS	UART request to send	BRI_DT	BRI bus Tx
37	PET0-	PCIe Lane 0 Tx pair (-)	-	
38	Clink_RST	Wi-Fi CLINK host bus reset	-	
39	GND	Ground	GND	Ground
40	Clink_DATA	Wi-Fi CLINK host bus data	-	
41	PER0+	PCIe Lane 0 Rx pair (+)	-	
42	Clink_CLK	Wi-Fi CLINK host bus clock	-	
43	PER0-	PCIe Lane 0 Rx pair (-)	-	
44	-		-	
45	GND	Ground	GND	Ground
46	-		-	
47	REFCLK0+	PCIe reference clock pair (+)	-	
48	-		-	
49	REFCLK0-	PCIe reference clock pair (-)	-	
50	SUSCLK	32.768 kHz clock supply input	SUSCLK	32.768 kHz clock supply input
51	GND	Ground	GND	Ground
52	PERST0#	PCIe reset	-	
53	CLKREQ0#	Reference clock request signal	-	
54	W_DISABLE2#	Wireless disable 2	W_DISABLE2#	Wireless disable 2
55	PEWAKE0#	PCIe wake	-	
56	W_DISABLE1#	Wireless disable 1	W_DISABLE1#	Wireless disable 1
57	GND	Ground	GND	Ground
58	-		-	
59	-		WT_D1N	CNVio bus Tx Lane 1 (-)
60	-		-	
61	-		WT_D1P	CNVio bus Tx Lane 1 (+)
62	-		-	
63	GND	Ground	GND	Ground
64	-		WT_D0N	WT_D0N
65	-		WT_D0N	WT_D0N
66	-		-	
67	-		WT_D0P	WT_D0P
68	-		-	
69	GND	Ground	GND	Ground
70	-	-	-	

Key E			CNVi	
Pin	Signal Name	Description	Signal	Description
71	-	-	WT_CLKN	CNVio bus Tx clock (-)
72	+3.3V	3.3 V power supply	+3.3V	3.3 V power supply
73	-	-	WT_CLKP	CNVio bus Tx clock (+)
74	+3.3V	3.3 V power supply	+3.3V	3.3 V power supply
75	GND	Ground	GND	Ground



Integrated CNVi can be selected by the Integrated CNVi Selection for M.2 Key E 2230 jumper.

### 14.2.3. M.2 2242/2280 Key M Socket Pin Assignment

The KBox A-150-WKL supports one M.2 2242 or 2280 with Key M format module. The M.2 2242/2280 socket's specification supports PCIe x4 and SATA 3.0 signals. The slot can be used to integrate a SATA/NVMe storage.

Figure 48: M.2 2242/2280 Key M (M2M1)

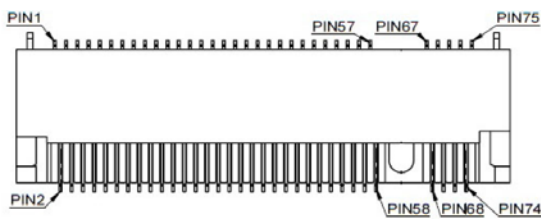


Table 23: Pin Assignment M.2 2242/2280 Key M (M2M1)

Pin	Signal Name	Description
1	GND	Ground
2	+3.3V	3.3 V power supply
3	GND	Ground
4	+3.3V	3.3 V power supply
5	PERn3	PCIe Lane 3 receiver pair (-)
6	-	
7	PERp3	PCIe Lane 3 receiver pair (+)
8	-	
9	GND	Ground
10	DAS / DSS# / LED1#	Device active signal / disable staggered spin-up / LED
11	PETn3	PCIe Lane 3 transmitter pair (-)
12	+3.3V	3.3 V power supply
13	PETp3	PCIe Lane 3 transmitter pair (+)
14	+3.3V	3.3 V power supply
15	GND	Ground
16	+3.3V	3.3 V power supply

Pin	Signal Name	Description
17	PERn2	PCIe Lane 2 receiver pair (-)
18	+3.3V	3.3 V power supply
19	PERp2	PCIe Lane 2 receiver pair (-)
20	-	
21	GND	Ground
22	-	
23	PETn2	PCIe Lane 2 transmitter pair (-)
24	-	
25	PETp2	PCIe Lane 2 transmitter pair (+)
26	-	
27	GND	Ground
28	-	
29	PERn1	PCIe Lane 1 receiver pair (-)
30	-	
31	PERp1	PCIe Lane 1 receiver pair (+)
32	-	
	GND	Ground
34	-	
35	PETn1	PCIe Lane 1 transmitter pair (-)
36	-	
37	PETp1	PCIe Lane 1 transmitter pair (+)
38	DEVSLP	Device sleep
39	GND	Ground
40	-	
41	PERn0 / SATA_B+	PCIe Lane 0 receiver pair (-) / SATA receiver pair (+)
42	-	
43	PERp0 / SATA_B-	PCIe Lane 0 receiver pair (+) / SATA receiver pair (-)
44	-	
45	GND	Ground
46	-	
47	PETn0 / SATA_A-	PCIe Lane 0 transmitter pair (-) / SATA transmitter pair (-)
49	PETp0 / SATA_A+	PCIe Lane 0 transmitter pair (+) / SATA transmitter pair (+)
50	PERST# / -	PCIe reset
51	GND	Ground
52	CLKREQ# / -	Reference clock request signal
53	REFCLKn	PCIe reference clock pair (-)
54	PEWAKE# / -	PCIe wake
55	REFCLKp	PCIe reference clock pair (+)
56	-	
57	GND	Ground
58	-	
59	Key	
60	Key	



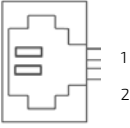
Pin	Signal Name	Description
61	Key	
62	Key	
63	Key	
64	Key	
65	Key	
66	Key	
67	-	
68	SUSCLK	32.768 kHz clock supply input
69	PEDET	PCIe detect
70	+3.3V	3.3 V power supply
71	GND	Ground
72	+3.3V	3.3 V power supply
73	GND	Ground
74	+3.3V	3.3 V power supply
75	GND	Ground

## 14.3. Header and Jumper Pin Assignments

### 14.3.1. RTC Battery Power Input Header Pin Assignment


The on-board RTC battery power input header (BAT1) connects to the RTC battery. The battery provides power to the system clock to retain the time when power is turn off.

Connector for Kontron's RTC battery assembly.

2-pin, 1.25 mm pitch	Pin	Signal Name	Description
	1	+VRTC	Real-time clock backup battery input
	2	GND	Ground

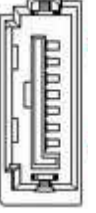
### 14.3.2. SSD Power Output Header Pin Assignment

The on-board SSD power out header provides power to the drive bay.

4-pin 2.0 mm pitch	Pin	Signal Name	Description
	1	+5V	+5 V power supply for SSD
	2	GND	Ground
	3	GND	Ground
	4	+5V	+5 V power supply for SSD


### 14.3.3. SATA Port 0 Connector Pin Assignment

The on-board SATA connector supplies the data connector for the SATA drive bay and is SATA 3.0 compatible.

7-pin, 1.27 mm pitch	Pin	Signal Name	Description
	1	GND	Ground
	2	TX+	Host transmitter differential signal pair (+)
	3	TX-	Host transmitter differential signal pair (+)
	4	GND	Ground
	5	RX+	Host receiver differential signal pair (-)
	6	RX-	Host receiver differential signal pair (+)
	7	GND	Ground


### 14.3.4. USB Power Selection Jumper Pin Assignment

The on-board USB Power selection jumper determines whether the USB ports are powered in the S4 or S5 state.

3-pin 2.0 mm Pitch	Jumper Position		Description
	Pin 1-2	Pin 2-3	
	X	-	+5 V
	-	X	+5 VSB

### 14.3.5. Serial Ports Header Pin Assignment

The two on-board serial ports COM1 and COM2 provide RS232, RS422 and RS485 connections to the front panel serial port connectors X111 and X110.

10-pin 1.25 mm	Pin	RS232	RS422	RS485 Half Duplex	RS485 Full Duplex	
	1	DCD	Tx-	Data-	Tx-	
	2	DSR				
	3	RXD	Tx+	Data+	Tx+	
	4	RTS				
	5	TXD		RX+		RX+
	6	CTS				
	7	DTR		RX-		RX-
	8	RI				
	9	GND		GND	GND	GND
	10	+5V		+5V	+5V	+5V


Signal Name	Description
TXD	Transmitted Data, sends data to the communications link. The signal is set to the marking state (-12 V) on hardware reset when the transmitter is empty or when loop mode operation is initiated.
RXD	Received Data, receives data from the communications link.
DTR	Data Terminal Ready, indicates that the on-board UART is ready to establish communication link.
DSR	Data Set Ready, indicates that the modem etc. is ready to establish a communications link.
RTS	Request To Send, indicates to the modem etc. that the on-board UART is ready to
RTS	Request To Send, indicates to the modem etc. that the on-board UART is ready to
RTS	Request To Send, indicates to the modem etc. that the on-board UART is ready to
RI	Ring Indicator, indicates that the modem has received a ringing signal from the telephone line.
TX+/-	Transmitted Data differential pair sends data to the communications link.
RX+/-	Received Data differential pair receives data from the communications link.
GND	Power Supply GND signal



The serial port signal type is configurable in the BIOS setup menu **Advanced>Super IO configuration>Serial port # configuration>Serial port # Type> RS232, RS422, RS485.**

### 14.3.6. Audio AMP Output Header Pin Assignment

The on-board speaker output left and speaker output right Audio AMP output headers provide the speaker audio-out interface. These outputs are shared with the audio output (Line-out) signals of the audio pin header.

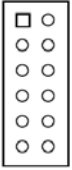
	Pin	Signal Name	Description
	1	Speaker+	Speaker output (+)
	2	Speaker-	Speaker output (-)



Audio is an option and not connected as standard.

### 14.3.7. Audio Input/Output Header Pin Assignment

The on-board audio input/output header provides audio output (Line-Out), audio input (Line-In) and microphone (Mic-In) signals through the 12-pin 2.54 mm pitch header. The audio output signals are shared with those of the speaker connectors right channel audio AMP output header and left channel audio AMP output headers.

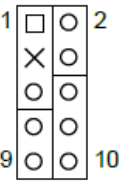
6-pin 2.54 mm pitch	Pin	Signal Name	Description
	1	MIC-In_L	Microphone input left channel signal
	2	MIC-In_R	Microphone input right channel signal
	3	MIC-In_JD#	Microphone jack detection
	4	GND	Ground
	5	Line-In_L	Audio input left channel signal
	6	Line-In_R	Audio input right channel signal
	7	Line-In_JD#	Audio input jack detection
	8	GND	Ground
	9	Line-Out_L	Audio output left channel signal
	10	Line-Out_R	Audio output right channel signal
	11	Line-Out_JD#	Audio output jack detection
	12	GND	Ground



Audio is an option and not connected as standard.


### 14.3.8. Front Panel 2 Header Pin Assignment

The on-board 10-pin front panel pin header FP2 supplies signals for the front panel's power button.

10-pin 2.54 mm Pitch	Pin	Signal Name	Description
	1	Power LED +	System Power LED (+) The LED lights up when users turn on the system power, and blinks when the system is in sleep mode.
	2	Power Button +	System power button (+) Pressing the power button turns the system on or puts the system in sleep or soft-off mode depending on the operating system settings. Pressing the power switch for more than four seconds turns the system from ON to OFF.
	3	-	No connection
	4	Power Button -	System power button (-)
	5	Power LED -	System Power LED (-)
	6	-	No connection
	7	-	No connection
	8	SMBus Data	System management bus bidirectional data line
	9	GND	Ground
	10	SMBus Clock	System management bus bidirectional clock line

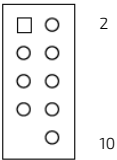
### 14.3.9. Integrated CNVi Selection for M.2 Key E 2230 Jumper Pin Assignment

The on-board Integrated CNVi Selection jumper enables or disables the integrated CNVi device in the M.2 Key E 2230 socket.

3-pin 2.0 mm Pitch	Jumper Position		Description
	Pin 1-2	Pin 2-3	
	X	-	Integrated CNVi Disabled
	-	X	Integrated CNVi enabled

### 14.3.10. USB 2.0 Port header 8, 9 Pin Assignment

On on-board 9-pin USB 2.0 port header is used to connect the CAN Bus adapter to the SBC.

2x5-pin, 2.54 mm pitch	Pin	Signal Name	Description
	1	+USBVCC*	V supply. SB5V is supplied during power down to allow wakeup.
	2	+USBVCC*	V supply. SB5V is supplied during power down to allow wakeup.
	3	USB_DA-	USB 2.0 differential pair (-) for channel A
	4	USN_DB-	USB 2.0 differential pair (-) for channel B
	5	USB_DA+	USB 2.0 differential pair (+) for channel A
	6	USN_DN+	USB 2.0 differential pair (+) for channel B
	7	GND	Ground
	8	GND	Ground
	9	KEY	
	10	GND	Ground

## 15/ Storage, Transportation

### 15.1. Storage

If the product is not in use for an extended period time, disconnect from the main DC power supply .If it is necessary to store the product then re-pack the product as originally delivered to avoid damage. The storage facility must meet the products environmental requirements as stated within this user guide. Kontron recommends keeping the original packaging material for future storage or warranty shipments.

### 15.2. Transportation

To ship the product, use the original packaging designed to withstand impact and adequately protect the product. When packing or unpacking products always take shock and ESD protection into consideration and use an EOS/ESD safe working area.

## 16/ Technical Support

For technical support contact Kontron's 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)




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The serial number can be found on the product's type label.

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### 16.1. 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 Kontron's [RMA Information website](#).
2. Download the RMA Request sheet for **Kontron Europe GmbH – Ismaning** 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.
3. Send the completed RMA-Request form to the fax or email address given on the RMA Request sheet and Kontron will provide an RMA-Number.
4. The goods for repair must be packed properly for shipping, considering shock and ESD protection.




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

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5. 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.

## 17/ Warranty

Kontron defines product warranty in accordance with regional warranty definitions. Claims are at Kontron's discretion and limited to the defect being of a material nature. To find out more about the warranty conditions and the defined warranty period for your region, following the steps below:

1. Visit Kontron's [Term and Conditions webpage](#).
2. Click on your region's General Terms and Conditions of Sale.

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**NOTICE****Protection label**

The KBox A-150-WKL is factory configured to meet customer requirements and then sealed with a protection label. Opening the KBox A-150-WKL invalidates the warranty and may cause damage to internal components.

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### 17.1. Limitation/Exemption from Warranty Obligation

In general, Kontron shall not be required to honor the warranty, even during the warranty period, and shall be exempted from the statutory accident liability obligations in the event of damage caused to the product due to failure to observe the following:

- ▶ General safety instructions within this user guide
- ▶ Warning labels on the product and warning symbols within this user guide
- ▶ Information and hints within this user guide

Additionally, alterations or modifications to the product that are not explicitly approved by Kontron, described in this user guide, or received from Kontron Support as a special handling instruction will void your warranty.

Within the warranty period, the product should only be opened by Kontron. Removing the protection label and opening the product within the warranty period exempts the product from the statutory warranty obligation.

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.



## List of Acronyms

Table 24: List of Acronyms

<b>AC</b>	Alternating Current
<b>ACPI</b>	Advanced Configuration Control Interface
<b>CPU</b>	Central Processing Unit
<b>DC</b>	Direct Current
<b>DIO</b>	Digital Input/Output
<b>DP</b>	Display Port
<b>ECC</b>	Error Checking and Correction
<b>EHCI</b>	Enhanced Host Controller Interface
<b>ESD</b>	Electrostatic Discharge
<b>GbE</b>	Gigabit Ethernet
<b>GPU</b>	Graphics Processing Unit
<b>HD/HDD</b>	Hard Disk /Drive
<b>HDMI</b>	High Definition Multimedia Interface
<b>HPM</b>	PICMG Hardware Platform Management specification family
<b>H/W</b>	Hardware
<b>IOL</b>	IPMI-Over-LAN
<b>IOT</b>	Internet of Things
<b>KVM</b>	Keyboard Video Mouse
<b>LAN</b>	Local Area Network
<b>LVD</b>	Low Voltage Device
<b>M.2</b>	Next smaller generation of mSATA
<b>MDI</b>	Media Dependent Interface
<b>MEI</b>	Management Engine Interface
<b>mPCIe</b>	Mini PCI-Express
<b>mSATA</b>	Mini SATA
<b>OS</b>	Operating System

<b>PCIe</b>	PCI-Express
<b>PSU</b>	Power Supply Unit
<b>RAM</b>	Read Access Memory
<b>RoHS</b>	Restriction of the use of certain hazardous substances
<b>RTC</b>	Real Time Clock
<b>SATA</b>	Serial-ATA
<b>SBC</b>	Single Board Computer
<b>SEL</b>	System Event Log
<b>SELV</b>	Safety Extra Low Voltage
<b>SIO</b>	Super Input/output
<b>SMBus</b>	System Management Bus
<b>SMWI</b>	System Monitor Web Interface
<b>SOL</b>	Serial Over LAN
<b>SSD</b>	Solid State Drive
<b>TPM</b>	Trusted Platform Module
<b>UEFI</b>	Unified Extensible Firmware Interface
<b>USB</b>	Universal Serial Bus
<b>VGA</b>	Video Graphics Array
<b>VLP</b>	Very Low Profile
<b>WEEE</b>	Waste Electrical and Electronic Equipment
<b>WLAN</b>	Wireless Local Area Network
<b>WWAN</b>	Wireless Wide Area Network
<b>XHCI</b>	eXtensible Host Controller Interface



## About Kontron

Kontron is a global leader in IoT/Embedded Computing Technology (ECT). 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](http://www.kontron.com)



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