



KBox E-210 Series

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 KBOX E-210 SERIES - USER GUIDE

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Revision History

Revision	Brief Description of Changes	Date of Issue
1.0	Initial Issue	2018-Sep-03
1.1	Update safety notice	2019-May-06
1.2	Adding information box in Sec. 7.2	2019-Jun-04
1.3	Add extended temperature	2019-Aug-28
2.0	Add UL standards	2020-Jan-10
2.1	Remove UL certification	2021-May-25
2.2	Update dimensions of extended temp. model	2022-Sep-01
2.3	Update VESA mount screw size	2022-Oct-21

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 <https://www.kontron.com/terms-and-conditions>.

Kontron sells products worldwide and declares regional General Terms & Conditions of Sale, and Purchase Order Terms & Conditions. Visit <https://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/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/support-and-services/services>.

Customer Comments

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

Symbols

The following symbols may be used in this user guide

⚠ DANGER

DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.

⚠ WARNING

WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.

NOTICE

NOTICE indicates a property damage message.

⚠ CAUTION

CAUTION indicates a hazardous situation which, if not avoided, may result in minor or moderate injury.



Electric Shock!

This symbol and title warn of hazards due to electrical shocks (> 60 V) when touching products or parts of products. Failure to observe the precautions indicated and/or prescribed by the law may endanger your life/health and/or result in damage to your material.



ESD Sensitive Device!

This symbol and title inform that the electronic boards and their components are sensitive to static electricity. Care must therefore be taken during all handling operations and inspections of this product in order to ensure product integrity at all times.



HOT Surface!

Do NOT touch! Allow to cool before servicing.



Laser!

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

Special Handling and Unpacking Instruction

NOTICE



ESD Sensitive Device!

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

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

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

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

Lithium Battery Precautions

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

CAUTION

Danger of explosion if the battery is replaced incorrectly.

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

General Instructions on Usage

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

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

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

Keep all the original packaging material for future storage or warranty shipments. If it is necessary to store or ship the product then re-pack it in the same manner as it was delivered.

Special care is necessary when handling or unpacking the product. See Special Handling and Unpacking Instruction.

Quality and Environmental Management

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

Disposal and Recycling

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

WEEE Compliance

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

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



Environmental protection is a high priority with Kontron.

Kontron follows the WEEE directive

You are encouraged to return our products for proper disposal.

Table of Contents

Symbols.....	6
For Your Safety	7
High Voltage Safety Instructions	7
Special Handling and Unpacking Instruction	7
Lithium Battery Precautions.....	8
General Instructions on Usage	8
Quality and Environmental Management	8
Disposal and Recycling.....	8
WEEE Compliance.....	8
Table of Contents	9
List of Tables	11
List of Figures	11
1/ General Safety Instructions for IT Equipment	13
1.1. Electrostatic Discharge (ESD).....	15
1.1.1. Grounding Methods	15
1.2. Lithium Battery Replacement	15
2/ Electromagnetic Compatibility	17
2.1. Electromagnetic Compatibility (EU).....	17
2.2. FCC Statement (USA).....	17
2.3. EMC Compliance (Canada)	17
3/ Shipment and Unpacking	18
3.1. Unpacking	18
3.2. Scope of Delivery	18
3.2.1. Standard	18
3.2.2. Optional Parts	18
4/ System Overview	19
4.1. System Expansion Capabilities	20
4.1.1. System Expansion via SATA Interface.....	20
4.1.2. System Expansion via mPCIe Card Interface.....	20
4.1.3. System Expansion via M.2 Card Interface.....	20
4.2. Front I/O Panel.....	21
4.2.1. Power Switch	21
4.2.2. Power LED	21
4.2.3. Storage LED	21
4.2.4. Line- In.....	21
4.2.5. Line-Out	22
4.2.6. Mic-In.....	22
4.2.7. RS232/422/485	22
4.2.8. Digital I/O	22
4.3. Rear I/O Panel	23
4.3.1. DC-In (DC Jack).....	23
4.3.2. DP	23
4.3.3. HDMI 2.0.....	23
4.3.4. GbE.....	23
4.3.5. USB 3.2 Gen 1	24
4.3.6. Wi-Fi Antenna Port.....	24

4.3.7. 3G / 4G Antenna Port.....	24
4.4. Internal View.....	25
4.4.1. DDR3L SO-DIMM Memory Socket.....	25
4.4.2. SATA Data Connector & SATA Power Output Wafer.....	25
4.4.3. mPCIe Socket.....	26
4.4.4. M.2 Socket.....	26
5/ Accessing Internal Components.....	27
5.1. Opening and Closing the KBox E-210 Series.....	28
5.1.1. Installing a HDD / SSD.....	29
5.1.2. Installing an mPCIe expansion card.....	29
5.1.3. Installing an M.2 SSD.....	30
6/ Thermal Considerations.....	31
6.1. Available Processors.....	31
6.2. Convection Cooling.....	31
6.3. System Clearance.....	31
6.4. Maximum Temperatures.....	31
6.5. Third Party Components.....	31
7/ Installation Instructions.....	32
7.1. System Mounting.....	33
7.2. DC Power Connection.....	36
8/ Starting Up.....	37
8.1. Connecting to DC Power Supply.....	37
8.2. Operating System and Hardware Component Drivers.....	38
9/ Maintenance and Cleaning.....	39
10/ Technical Specifications.....	40
10.1. Mechanical Specifications.....	41
10.1.1. Mechanical Drawing.....	41
10.2. Environmental Conditions.....	43
10.3. Standards and Certifications.....	43
11/ Standard Interfaces – Pin Assignments.....	44
11.1.1. 12V DC Power Input.....	44
11.1.2. Ethernet Connectors.....	44
11.1.3. USB 3.2 Gen 1 Port.....	44
11.1.4. DP Connector.....	45
11.1.5. HDMI Connector.....	46
11.1.6. RS232/422/485 Serial Port.....	46
11.1.7. Digital I/O Port.....	47
11.1.8. Line-In Connector.....	47
11.1.9. Line-Out Connector.....	47
11.1.10. Mic-In Connector.....	47
12/ uEFI BIOS.....	48
12.1. Starting the uEFI BIOS.....	48
12.2. Setup Menus.....	49
12.2.1. Main Setup Menu.....	49
12.2.2. Advanced Setup Menu.....	51
12.2.3. Power Setup Menu.....	62
12.2.4. Boot Setup Menu.....	64
12.2.5. Security Setup Menu.....	65
12.2.5.1. Remember the password.....	66

12.2.6. Save & Exit Setup Menu	67
Appendix A: List of Acronyms.....	68
About Kontron	69

List of Tables

Table 1: Technical Specifications.....	40
Table 2: Mechanical Specifications	41
Table 3: Environmental Conditions	43
Table 4: Standards and Certifications	43
Table 5: 12V DC Power Input (see Figure 2, pos.1)	44
Table 6: Ethernet Connector (see Figure 2, pos. 4).....	44
Table 7: USB 3.2 Gen 1 Port (see Figure 2, pos. 5)	44
Table 8: DP Connector (see Figure 2, pos. 2).....	45
Table 9: HDMI Connector (see Figure 2, pos. 3).....	46
Table 10: RS232/422/485 Serial Port (see Figure 1, pos. 7).....	46
Table 11: Digital I/O Port (see Figure 1, pos. 8).....	47
Table 12: Line-In Connector (see Figure 1, pos. 4)	47
Table 13: Line-Out Connector (see Figure 1, pos. 5)	47
Table 14: Mic-In Connector (see Figure 1, pos. 6).....	47
Table 15: Navigation Hot Keys Available in the Legend Bar	48
Table 16: Main Setup Menu Sub-Screens and Functions	49
Table 17: List of Acronyms.....	68

List of Figures

Figure 1: Front I/O Panel.....	21
Figure 2: Rear I/O Panel.....	23
Figure 3: Ethernet LED Status.....	23
Figure 4: Internal view - Baseboard.....	25
Figure 5: Internal view - Back side of the access cover.....	26
Figure 6: Descrewing the access cover of the KBox E-210 Series.....	28
Figure 7: 2.5" HDD / SSD bracket	29
Figure 8: Optional VESA mounting kit.....	33
Figure 9: Hole pattern of base mounting kit for KBox E-210 Series	33
Figure 10: Securing the base mounting bracket	34
Figure 11: Securing the hooked mounting bracket onto the KBox E-210 Series.....	34
Figure 12: Securing the KBox E-210 Series onto the mounting surface	34
Figure 13: Mechanical Drawing	41
Figure 14: BIOS Main Menu Screen System Data and Time.....	50
Figure 15: BIOS Advanced Menu.....	52
Figure 16: BIOS Advanced Menu - Display Configuration.....	53
Figure 17: BIOS Advanced Menu - Super IO Configuration	54
Figure 18: BIOS Advanced Menu - Super IO Configuration - Serial Port 1 Configuration	54
Figure 19: BIOS Advanced Menu - Super IO Configuration - Serial Port 2 Configuration.....	55
Figure 20: BIOS Advanced Menu - CPU Chipset Configuration.....	56
Figure 21: BIOS Advanced Menu - SATA Configuration	57
Figure 22: BIOS Advanced Menu - USB Configuration.....	58
Figure 23: BIOS Advanced Menu - TPM Configuration.....	59
Figure 24: BIOS Advanced Menu - DIO Configuration.....	60
Figure 25: BIOS Advanced Menu - H/W Monitor	61
Figure 26: BIOS Power Setup Menu	62
Figure 27: BIOS Power Setup Menu - WatchDog Timer Configuration	63
Figure 28: BIOS Boot Setup Menu	64
Figure 29: BIOS Security Setup Menu.....	65

Figure 30: BIOS Save & Exit Setup Menu 67

1/ General Safety Instructions for IT Equipment

⚠ WARNING

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

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

- ▶ The product must be used as specified in the product documentation, in which the instructions for safety for the product and for the operator are described. These contain guidelines for setting up, installation and assembly, maintenance, transport or storage.
- ▶ The on-site electrical installation must meet the requirements of the country's specific local regulations.
- ▶ If a power cable comes with the product, only this cable should be used. Do not use an extension cable to connect the product.
- ▶ To guarantee that sufficient air circulation is available to cool the product, please ensure that the ventilation openings are not covered or blocked. If an air filter is provided, this should be cleaned regularly. Do not place the system close to heat sources or damp places. Make sure the system is well ventilated.
- ▶ Only devices or parts which fulfill the requirements of SELV circuits (Safety Extra Low Voltage) as stipulated by IEC 60950-1 may be connected to the available interfaces.
- ▶ Before opening the device, make sure that the device is disconnected from the mains.
- ▶ Switching off the device by its power button does not disconnect it from the mains. Complete disconnection is only possible if the power cable is removed from the wall plug or from the device. Ensure that there is free and easy access to enable disconnection.
- ▶ The device may only be opened for the insertion or removal of add-on cards (depending on the configuration of the system). This may only be carried out by skilled operators.
- ▶ If extensions are being carried out, the following must be observed:
 - ▶ All effective legal regulations and all technical data are adhered to.
 - ▶ The power consumption of any add-on card does not exceed the specified limitations.
 - ▶ The current consumption of the system does not exceed the value stated on the product label.
- ▶ Only original accessories that have been approved by Kontron can be used.
- ▶ Please note: safe operation is no longer possible when any of the following applies:
 - ▶ The device has visible damages.
 - ▶ The device is no longer functioning.

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

Additional safety instructions for DC power supply circuits

- ▶ To guarantee safe operation of devices with DC power supply voltages larger than 60 volts DC or a power consumption larger than 240 VA, please observe that:
 - ▶ the device is set up, installed and operated in a room or enclosure marked with "RESTRICTED ACCESS", if there are no safety messages on product as safety signs and labels on the device itself.
 - ▶ no cables or parts without insulation in electrical circuits with dangerous voltage or power should be touched directly or indirectly
 - ▶ a reliable protective earthing connection is provided
 - ▶ a suitable, easily accessible disconnecting device is used in the application (e.g. overcurrent protective device), if the device itself is not disconnectable
 - ▶ a disconnect device, if provided in or as part of the equipment, shall disconnect both poles simultaneously
 - ▶ interconnecting power circuits of different devices cause no electrical hazards
- ▶ A sufficient dimensioning of the power cable wires must be selected – according to the maximum electrical specifications on the product label – as stipulated by EN60950-1 or VDE0100 or EN60204 or UL508 regulations.
- ▶ The devices do not generally fulfill the requirements for "centralized DC power systems" (UL 60950-1, Annex NAB; D2) and therefore may not be connected to such devices!

1.1. Electrostatic Discharge (ESD)



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

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

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

1.1.1. Grounding Methods

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

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

1.2. Lithium Battery Replacement

If replacing the lithium battery, follow the replacement precautions stated below.

⚠ WARNING

Do not ingest battery, Chemical Burn Hazard

This product contains a coin / button cell battery. If the coin / button cell battery is swallowed, it can cause severe internal burns in just 2 hours and can lead to death.

Keep new and used batteries away from children.

If the battery compartment does not close securely, stop using the product and keep it away from children.

If you think batteries might have been swallowed or placed inside any part of the body, seek immediate medical attention.

Replacement of a battery with an incorrect type, that can result in an explosion. Replace only with the same or equivalent type recommended by the manufacturer. The lithium battery type must be UL recognized.

Disposal of a battery into fire or a hot oven, or mechanically crushing or cutting of a battery, that can result in an explosion.

Leaving a battery in an extremely high temperature surrounding environment that can result in an explosion or the leakage of flammable liquid or gas

A battery subjected to extremely low air pressure that may result in an explosion or the leakage of flammable liquid or gas



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 the collecting points for dispose of batteries).

2/ Electromagnetic Compatibility

For detailed information refer to section 10.3 "Standards and Certifications".

2.1. Electromagnetic Compatibility (EU)

This product is intended only for use in industrial areas. The most recent version of the EMC guidelines (EMC Directive 2004/108/EC) apply. If the user modifies and/or adds to the equipment (e.g. installation of add-on cards) the prerequisites for the CE conformity declaration (safety requirements) may no longer apply.

▲ WARNING

This is a class A product. In domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

2.2. FCC Statement (USA)

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

2.3. EMC Compliance (Canada)

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

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

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

3/ Shipment and Unpacking

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

3.1. Unpacking

Proceed as follows to unpack the unit:

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

3.2. Scope of Delivery

3.2.1. Standard

- ▶ 1x KBox E-210 Series (corresponding to the ordered system configuration)
- ▶ 1x Power adapter (corresponding to the ordered system configuration)
- ▶ 1x Power cord (plug type depending on country)
- ▶ 1x SATA data / power cable (pre-installed in the system)
- ▶ 1x Quick installation guide

3.2.2. Optional Parts

- ▶ Memory module(s)
- ▶ Internal 2.5" SATA HDD / SSD
- ▶ mPCIe card
- ▶ M.2 Key B card
- ▶ Antenna(s)
- ▶ VESA mounting kit

4/ System Overview

The KBox E-210 Series is a fanless system enclosed within a robust compact aluminum chassis with cooling fins, offering the superior qualities for operation in harsh environments.

It can be optionally factory-equipped with an mPCIe WLAN card for two antennas. Users may choose the implementation of a 2.5" SATA HDD / SSD and / or of an M.2 SSD card as storage media.

The following interfaces are available with the KBox E-210 Series:

Standard Front Panel:

- ▶ 2x RS232/422/485
- ▶ 1x 8-bit DIO
- ▶ 1x Line-Out
- ▶ 1x Line-In
- ▶ 1x Mic-In
- ▶ 1x Power Switch
- ▶ 1x Power LED
- ▶ 1x Storage LED

Standard Rear Panel:

- ▶ 1x DP
- ▶ 1x HDMI 2.0
- ▶ 2x GbE LAN
- ▶ 4x USB 3.2 Gen 1
- ▶ 1x DC Jack
- ▶ 2x Wi-Fi Antenna Port
- ▶ 1x 3G / 4G Antenna Port

Standard Baseboard and System Expansion Capabilities:

- ▶ 2x DDR4 SO-DIMM memory socket (DIMM1 & DIMM2)
- ▶ 1x SATA 3.0 connector (SATA1 or SATA2) for 2.5" HDD / SSD
- ▶ 1x full-sized mPCIe socket (MPCIE1)
- ▶ 1x M.2 Key B socket (type 22x42, CON1)

The device is designed to be operated in:

- ▶ Vertical position: mounted on the back of the monitor or inside a control cabinet / custom enclosure / machine (with a VESA mounting kit) or
- ▶ Horizontal position: placed as a desktop unit.

NOTICE

When powering on the KBox E-210 Series, make sure that the cooling fins of the chassis are not obstructed (covered) by any objects.

To provide sufficient heat dissipation by the cooling of the device, do not cover the cooling fins of the KBox E-210 Series. Do not place any objects on the device. When installing the system, please keep clearance for air circulation.

4.1. System Expansion Capabilities

4.1.1. System Expansion via SATA Interface

The baseboard comes with two onboard SATA interface connector and corresponding power connector. Users can choose one of them to expand the KBox E-210 Series with a 2.5" HDD / SSD drive (up to SASA 3.0).

4.1.2. System Expansion via mPCIe Card Interface

The baseboard comes with an onboard mPCIe interface connector. The connector is intended to be used to install an mPCIe WLAN card.

4.1.3. System Expansion via M.2 Card Interface

The baseboard comes with an onboard M.2 interface connector with Key B Type 2242 support. The connector is intended to be used to install an M.2 SSD card drive.

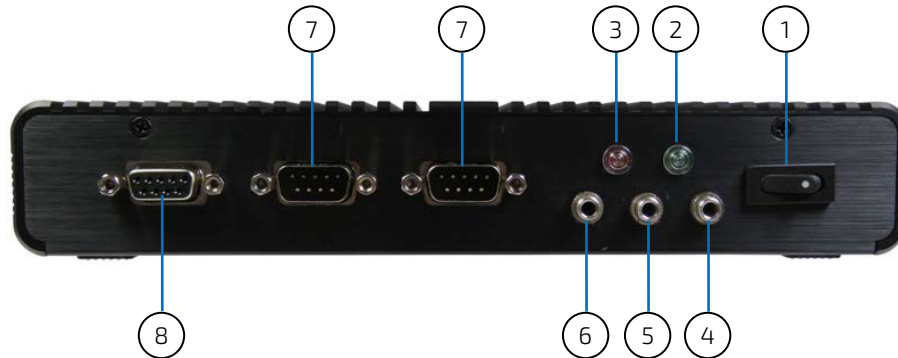


If a customer requires 3G / 4G functionality, it must be so stipulated when ordering, as an optional SIM card slot must be installed at the factory.

3G / 4G modem adapter card (and SIM card) is able to be functional with the full-sized mPCIe interface connector or M.2 Key B interface connector. The 3G / 4G signal can be selected to be connected to mPCIe or M.2 interface connector via the jumper JP7. At the same time, M.2 Key B interface must be switched to mPCIe function via the jumper JP6 as well if 3G / 4G signal is selected to be connected to M.2 Key B interface.

4.2. Front I/O Panel

Figure 1: Front I/O Panel



- 1 Power Switch (see Chapter 4.2.1)
- 2 Power LED (see Chapter 4.2.2)
- 3 Storage LED (see Chapter 4.2.3)
- 4 Line-In (see Chapter 4.2.4)
- 5 Line-Out (see Chapter 4.2.5)
- 6 Mic-In (see Chapter 4.2.6)
- 7 RS232/422/485 (see Chapter 4.2.7)
- 8 Digital I/O (see Chapter 4.2.8)

4.2.1. Power Switch

Press this switch to turn the system on or off.

⚠ WARNING

Even when the system is turned off via the power button there is still a standby voltage on the baseboard. The unit is only completely disconnected from the DC mains, when the power is removed.

4.2.2. Power LED

The power LED lights up green if the system powered on.

Prerequisite: The system must be attached by means of the power cord to an appropriate mains (DC).

4.2.3. Storage LED

The Storage LED blinks red when the data is being written into or read from the HDD / SSD.

4.2.4. Line- In

The Line-in jack is designed to take input from a higher-powered sound source.

4.2.5. Line-Out

The stereo headphone jack is used to connect the system's audio out signal to amplified speakers or headphones.

4.2.6. Mic-In

The microphone jack is designed to connect the microphone used for video conferencing, voice narrations, or simple audio recordings.

4.2.7. RS232/422/485

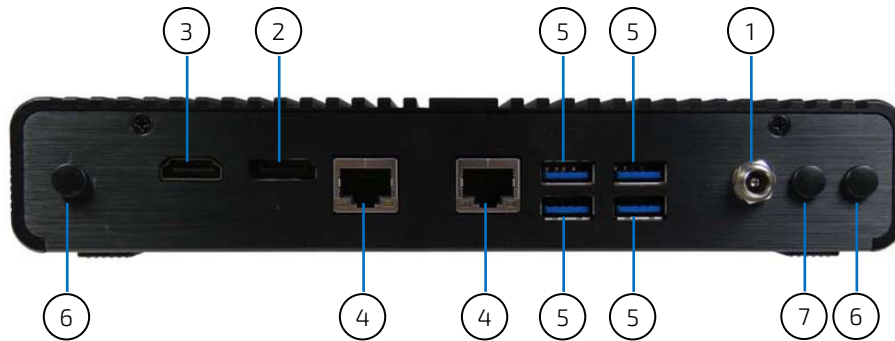
COM 1 and COM 2 are provided as a 9-pin D-SUB connector and allow the connection of a serial peripheral. They are designed to support RS232/422/485 serial communication which can be configured via BIOS setup.

4.2.8. Digital I/O

This interface is used to connect digital signals for input and output purposes.

4.3. Rear I/O Panel

Figure 2: Rear I/O Panel



- 1 DC-In (see Chapter 4.3.1)
- 2 DP (see Chapter 4.3.2)
- 3 HDMI 2.0 (see Chapter 4.3.3)
- 4 GbE (see Chapter 4.3.4)
- 5 USB 3.2 Gen 1 (see Chapter 4.3.5)
- 6 Wi-Fi Antenna Port (see Chapter 4.3.6)
- 7 3G / 4G Antenna Port (see Chapter 4.3.7)

4.3.1. DC-In (DC Jack)

The supplied power adapter converts AC power to DC for use with this jack. Power supplied through this jack supplies power to the PC. To prevent damage to the PC, always use the supplied power adapter.

▲WARNING

Adapter's power cord shall be connected to a socket-outlet with earthing connection

4.3.2. DP

An external (digital) display can be connected to this DP connector.

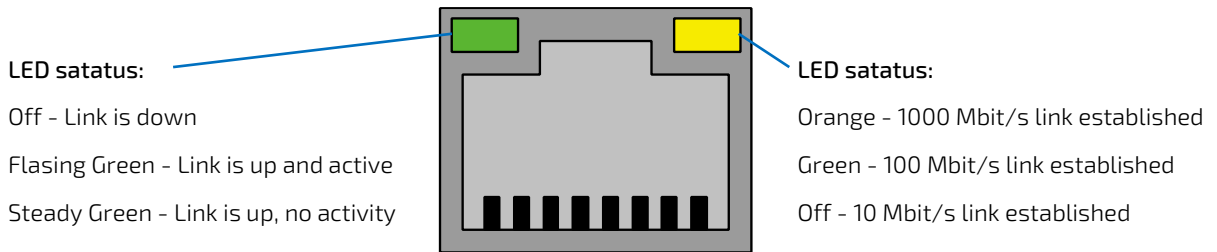
4.3.3. HDMI 2.0

An external (digital) display can be connected to this HDMI 2.0 connector.

4.3.4. GbE

These connectors are Gigabit Ethernet 10/100/1000 Mbit/s, IEEE 1588 capable interfaces. The connectors are standard 8-pin RJ45 type connectors with status LEDs:

Figure 3: Ethernet LED Status



4.3.5. USB 3.2 Gen 1

The KBox E-210 Series provides four USB 3.2 Gen 1 / 2.0 interface. These connectors allow connection of USB 3.2 Gen 1 or USB 2.0 compatible device to the system.

4.3.6. Wi-Fi Antenna Port

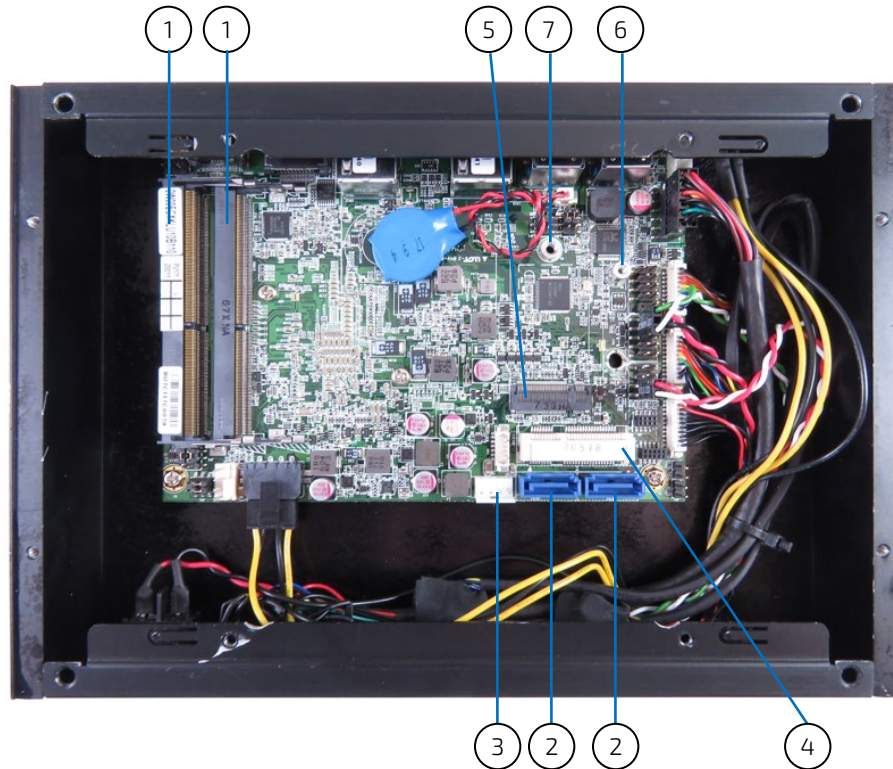
The KBox E-210 Series reserves two covered cutouts for the Reverse (RP) SMA connectors of the WLAN antennas (mPCIe WLAN card with 2 antennas is an option).

4.3.7. 3G / 4G Antenna Port

The KBox E-210 Series reserves one covered cutout for the Reverse (RP) SMA connector of the 3G / 4G antenna (M.2 3G / 4G card or mPCIe 3G / 4G card with 1 antenna is an option).

4.4. Internal View

Figure 4: Internal view - Baseboard



- 1 DDR4 SO-DIMM Memory Socket (DIMM1 & DIMM2, see Chapter 4.4.1)
- 2 SATA Data Connector (SATA1 & SATA2, see Chapter 4.4.2)
- 3 SATA Power Output Wafer (CN1, See Chapter 4.4.2)
- 4 mPCIe Socket (MPCIE1, see Chapter 4.4.3)
- 5 M.2 Key B Socket (CON1, see Chapter 4.4.4)
- 6 mPCIe fixing bolt
- 7 M.2 fixing bolt for Key B type 22x42

4.4.1. DDR3L SO-DIMM Memory Socket

The KBox E-210 Series provides two 260-pin DDR4 SO-DIMM socket to install memory RAM.

4.4.2. SATA Data Connector & SATA Power Output Wafer

The KBox E-210 Series provided two SATA data connectors along with a SATA power output wafer to install a 2.5" SATA HDD / SSD (up to SATA 3.0). An additional bracket is required for holding and fixing the hard disk.

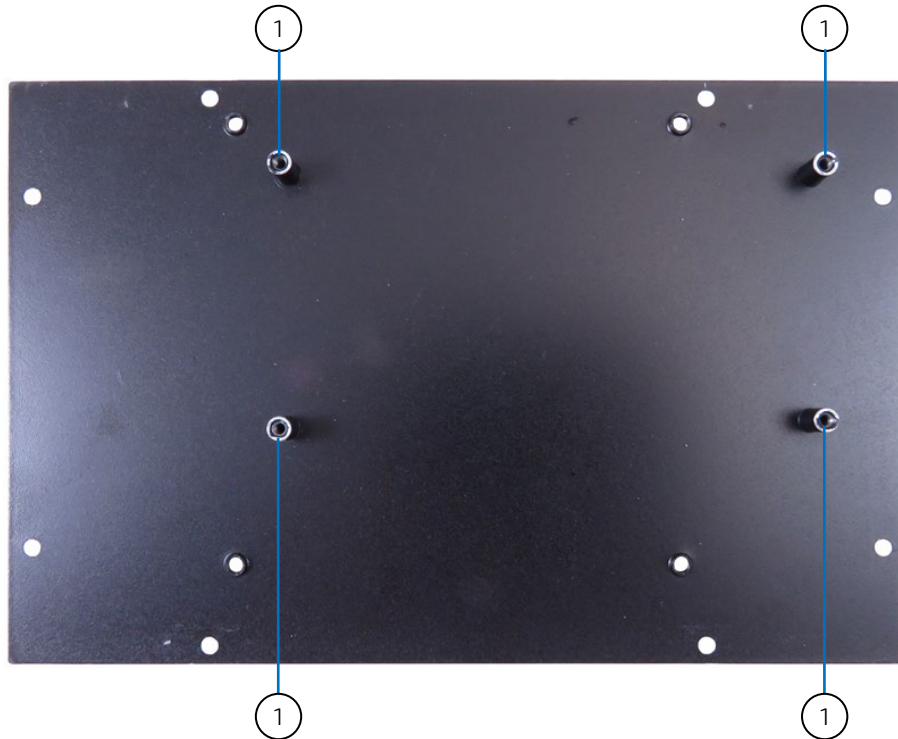
4.4.3. mPCIe Socket

The KBox E-210 Series reserves one mPCIe socket for expansion with a full-sized mPCIe WLAN card.

4.4.4. M.2 Socket

The KBox E-210 Series reserves one M.2 Key B socket, allowing itself being extended with an M.2 Type 22x42 SSD.

Figure 5: Internal view - Back side of the access cover



- 1 2.5" HDD / SSD bracket fixing bolt

5/ Accessing Internal Components

This section contains important information that you must read before accessing the internal components. You must follow these procedures properly when installing, removing or handling any board.

It is recommended to expand your system with additional mPCIe and / or M.2 card(s) before it is installed into an equipment, machine or cabinet. Please consider following instruction when you install (or remove) expansion cards.

Before installing/removing an add-on card, please pay attention to the following information:

CAUTION

Please observe the "General Safety Instructions for IT-Equipment" provided with the system (refer to the chapter 1/) and the installation instructions in this manual.

Only personnel with appropriate qualifications, trainings and authorization are permitted to install and work with the device.

The installation/removal of HDD / SSD and/or expansion cards may only be performed by a skilled person, according to the description in this manual.

Before removing the cover of the device, make sure that the device is turned off and disconnected from the power supply.

Before you upgrade the device with add-on cards, pay attention to the power specifications in chapter 10/ "Technical Specifications" and make sure that the power consumption of the add-on cards does not exceed 5 W per card.



Please 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 device or the latter's components.



Please pay attention to the manufacturer's instructions before installing/removing an add-on card.

5.1. Opening and Closing the KBox E-210 Series

CAUTION

Before opening the KBox E-210 Series, the system must be switched off and disconnected from the main power supply. Also, disconnect all peripheral devices from the KBox E-210 Series. Before you begin, ensure that you have a clean, flat and ESD-safe surface to work on.

For opening and closing the KBox E-210 Series, please perform the following steps:

1. Close all applications. Shut down the system properly and disconnect the connection to the main power source. Disconnect all peripherals.
2. The KBox E-210 Series should lay on a flat, clean surface with the access cover facing upwards.
3. Loosen and remove the Phillips screws (eight screws on the bottom), that secure the access cover to the chassis. Retain the screws for later use.

Figure 6: Descrewing the access cover of the KBox E-210 Series



4. Lift the access cover up.
5. Now you have access to the internal DDR4 SO-DIMM, SATA, mPCIe and M.2 slots / sockets respectively in order to remove or install hardware components.
6. For closing replace carefully the access cover to the system and screw it on with the retained screws.
7. Tighten the retained screws when the cover is firmly in place.

NOTICE

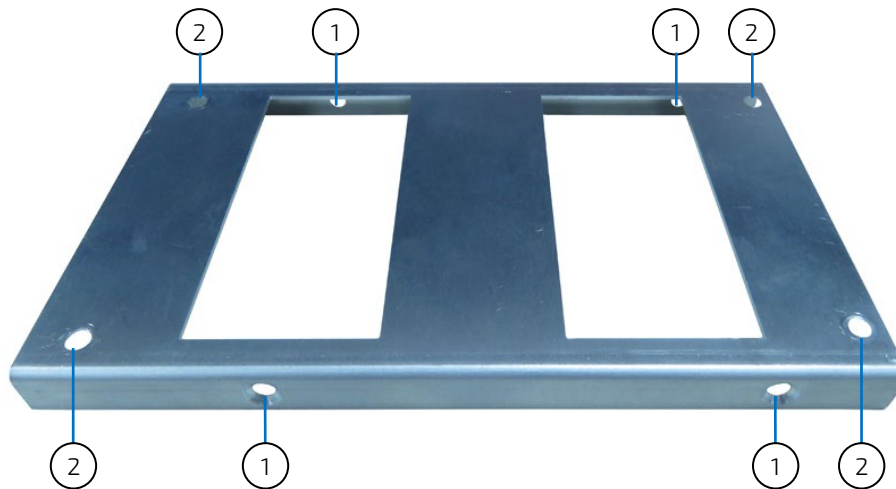
When used as intended, the KBox E-210 Series is to operate only in closed condition. Only when the access cover is properly fixed with the screws and the rear side with WLAN (and / or 3G / 4G by request) antennas are properly installed and secured with the screws, it is ensured that the user does not have access to the internal parts of the KBox E-210 Series.

5.1.1. Installing a HDD / SSD

To install a 2.5" HDD / SSD please proceed according to the steps described:

1. Open the device as described in the subsection 5.1 "Opening and Closing the KBox E-210 Series" (step 1-5).
2. Screw the HDD / SSD to the bracket (Figure 7) and connect the SATA cable to it.

Figure 7: 2.5" HDD / SSD bracket



- 1 2.5" HDD / SSD fixing hole
- 2 2.5" HDD / SSD bracket fixing hole

3. Screw the HDD / SSD bracket with HDD / SSD to the back side of the access cover (Figure 5).
4. Plus the SATA data cable into SATA data connector (SATA1 or SATA2) (Figure 4, pos. 2) and the SATA power cable into SATA power output wafer (CN1) (Figure 4, pos. 3).
5. In order to close the KBox E-210 Series, proceed step 6 & 7 described in the subsection 5.1 "Opening and Closing the KBox E-210 Series".

5.1.2. Installing an mPCIe expansion card

To install an mPCIe expansion card please proceed according to the steps described:

1. Open the device as described in the subsection 5.1 "Opening and Closing the KBox E-210 Series" (step 1-5).
2. Locate the mPCIe socket (MPCIE1) (Figure 4, pos. 4) and the corresponding fixing bolt. (Figure 4, pos. 6).

3. Align the notches on the mPCIe expansion card with the notches in the mPCIe socket (MPCIE1). Insert the mPCIe expansion card into the corresponding socket (Figure 4, pos. 4) and rotate it down with the fixing hole of the card over the fixing bolt.
4. Press the mPCIe expansion card down on the side with the fixing hole and secure it with the available fastening screw (Figure 4, pos. 6).
5. In order to close the KBox E-210 Series, proceed step 6 & 7 described in the subsection 5.1 "Opening and Closing the KBox E-210 Series".

5.1.3. Installing an M.2 SSD

To install an M.2 SSD please proceed according to the steps described:

1. Open the device as described in the subsection 5.1 "Opening and Closing the KBox E-210 Series" (step 1-5).
2. Locate the M.2 Key B socket (CON1) (Figure 4, pos. 5) and the corresponding fixing bolt. (Figure 4, pos. 7).
3. Align the notches on the M.2 Key B Type 22x42 SSD with the notches in the M.2 Key B socket (CON1). Insert the M.2 SSD into the corresponding socket (Figure 4, pos. 5) and rotate it down with the fixing hole of the card over the fixing bolt.
4. Press the M.2 SSD down on the side with the fixing hole and secure it with the available fastening screw (Figure 4, pos. 7).
5. In order to close the KBox E-210 Series, proceed step 6 & 7 described in the subsection 5.1 "Opening and Closing the KBox E-210 Series".

6/ Thermal Considerations

6.1. Available Processors

Please refer to the chapter 10/ "Technical Specifications".



The list of processors may be extended over the product lifetime.

6.2. Convection Cooling

The applied cooling method provides adequate cooling of the device during operation and performs a one-way thermal transfer to the chassis. Three sides of the KBox E-210 Series consist of a compact aluminum U-shaped chassis are with cooling fins. The cooling fins provide heat dissipation during operation.



To provide sufficient heat dissipation for the cooling of the KBox E-210 Series, never cover the cooling fins of the chassis. Do not place any objects on the device.

6.3. System Clearance

To provide a maximum of airflow through and around the box, proper distances to surrounding parts must be observed.

6.4. Maximum Temperatures



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

For the temperature evaluation a specialised tool from Intel® was used to set the processor to a defined workload. Depending on the power consumption one or more cores were set to 75% workload. This includes the graphics core. The tool also handles the usage of the "Turbo Mode" of certain processor types.



The processor utilization depends highly on the software used. Software using multicore feature will run on several cores whereas standard software will only utilize one core. In this case the processor will use the "Turbo Mode" to increase the clock for the core with the highest workload, as long as the temperature is within limits.

6.5. Third Party Components

When the KBox E-210 Series is extended and configured with third party components like mPCIe expansion card, M.2 expansion card and hard drives (HDD or SSD), it has to be taken into account that the air temperature inside the system is higher than the ambient temperature. An approximately internal temperature rise is given for assistance.

7/ Installation Instructions

The KBox E-210 Series system is designed for operating:

- ▶ within a control cabinet/ custom enclosure / machine or onto a wall / the back of a monitor by use of a VESA mounting kit
- ▶ as desktop unit.



Expansion card installation should be performed before installing the KBox E-210 Series into control cabinet / custom enclosure / machine, or onto wall / monitor.

NOTICE

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

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

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

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

Do not operate the KBox E-210 Series with foreign objects inside the chassis.

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

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

The KBox E-210 Series has to be installed and operated only by skilled personnel.

Only personnel with appropriate qualifications, trainings and authorization are permitted to install and work with the Kontron KBox E-210 Series.

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

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

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

Refer also to section 10.1.2 "Mechanical Specifications".

The KBox E-210 Series must be firmly attached to a clean flat and solid mounting surface. Use proper fastening materials suitable for the mounting surface. Ensure that the mounting surface type and the used mounting solution safely support the load of the KBox E-210 Series and the attached components.

Please follow the local/national regulations for grounding.

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

The type label is located next to the access cover of the system.

It is recommended that the last cable attached to the system should be the power cable! Refer to the section 7.2 "DC Power Connection" and chapter 8/ "Starting Up".

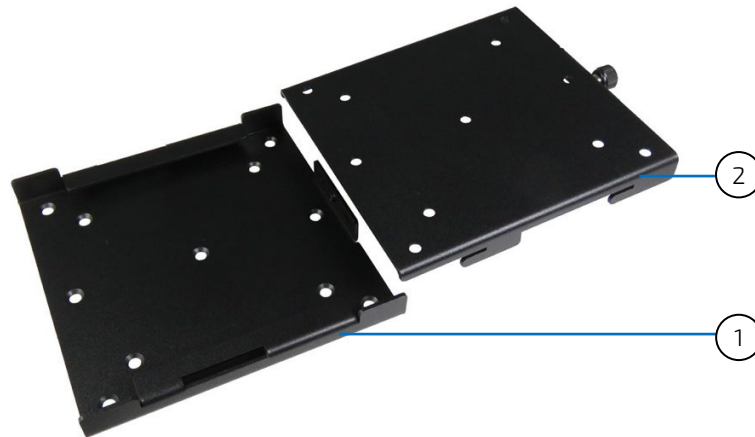
7.1. System Mounting

In order to adapt the KBox E-210 Series for mounting Kontron offers different mounting solution such as:

- ▶ KBox E-210 Series configuration with a VESA mounting kit for vertical installation into a control cabinet / custom enclosure / machine or onto a wall / the back of a monitor
- ▶ KBox E-210 Series as desktop unit

Depending on the ordered KBox E-210 Series configuration, your system may be supplied with a VESA mounting kit (Figure 8). The kit consists of two parts: a base bracket (Figure 8, pos. 1) to be fixed permanently on the mounting surface and another hooked bracket to hold the KBox E-210 Series with a hand-screw knob (Figure 8, pos. 2) to secure two brackets.

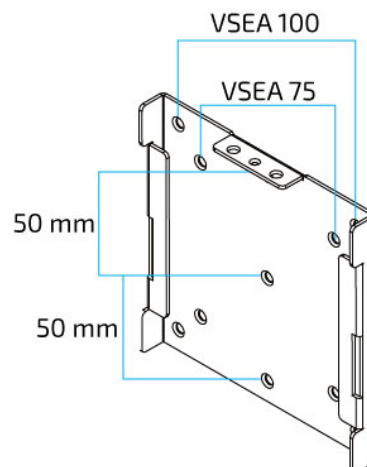
Figure 8: Optional VESA mounting kit



- 1 Base mounting bracket
- 2 Hooked mounting bracket with a hand-screw knob

The base mounting bracket complies with VESA 75 and VESA 100 patterns (Figure 9). To fasten the bracket, the control cabinet / custom enclosure / machine / monitor / wall must have VESA 75, VESA 100 or other screw pattern shown as Figure 9 for mounting.

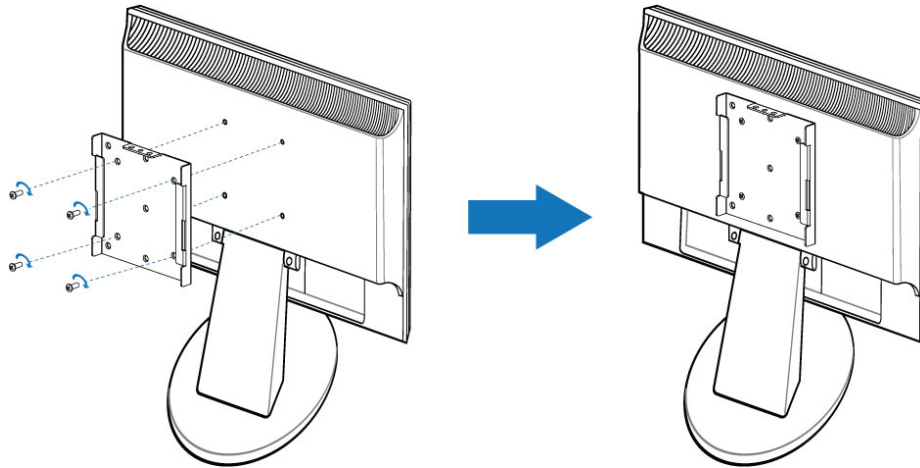
Figure 9: Hole pattern of base mounting kit for KBox E-210 Series



To mount the KBox E-210 Series please proceed according to the steps described:

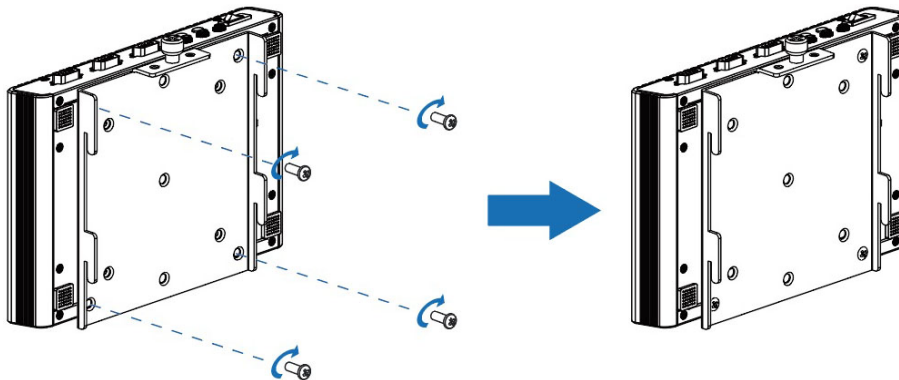
1. Prepare the mounting surface with sufficient screws (four screws for VESA mount) and if necessary anchors corresponding to the mounting surface type if no VESA-compliant screw holes are available. (The recommended screw size is M4 x 6 ~ 10 mm but it still depends on the available screw holes of the mounting surface and never be larger than M4 if any.)
2. Secure the base mounting bracket to the mounting surface with screws (Figure 10). The following figures take VESA mounting to a monitor as an example.

Figure 10: Securing the base mounting bracket



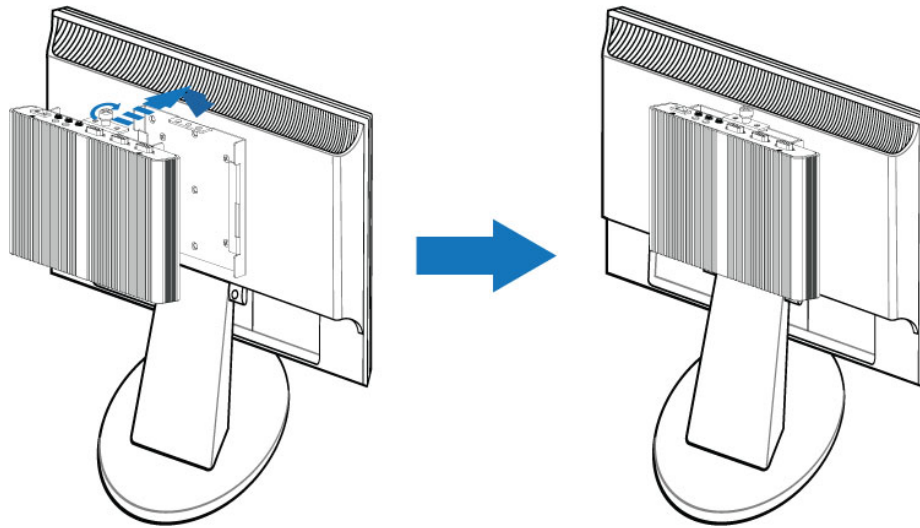
3. Secure the hooked mounting bracket onto the bottom side of the KBox E-210 (Figure 11) with M4 screw (6 mm long). The front I/O panel should be placed upward.

Figure 11: Securing the hooked mounting bracket onto the KBox E-210 Series



4. Place the KBox E-210 Series onto the mounting surface by sliding the hooked mounting bracket into the based mounting bracket (Figure 12).
5. Secure the hand-screw knob located on the hooked mounting bracket to fix two brackets (Figure 12).

Figure 12: Securing the KBox E-210 Series onto the mounting surface



For a sufficient air circulation around the device, we recommend keep a proper clearance and not mount / operate any other devices within the clearance around the KBox E-210 Series.

7.2. DC Power Connection

The KBox E-210 Series is connected by a DC power input jack (Figure 2, pos. 1) to a DC power source.

The KBox E-210 Series is delivered with a power adapter to convert AC voltage into DC 12V (default) and a power cord to carry AC power to the power adapter.



This product is intended to be supplied by a listed power adapter or DC power source, rated output 12 Vdc at 5 A or 24 Vdc at 2 A, LPS compliant, and Tma = 50 °C.

For further assistance in purchasing the power source, please contact your agency for further information.

8/ Starting Up



The KBox E-210 Series must be only operated with the nominal voltage of 12 V DC of type SELV (default). For details refer to the chapter 10/ "Technical Specifications".

8.1. Connecting to DC Power Supply

The DC power input jack (Figure 2, pos. 1) is located on the rear side of the KBox E-210 Series. The KBox E-210 Series will be connected to a AC-to-DC power adapter via the supplied male DC power plug and corresponding power cable attached to the adapter.



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

When you install/disconnect the unit, the functional earth connection must always be made first and disconnected last.

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

NOTICE

The KBox E-210 Series must be connected DC power supply complying with the SELV (Safety Extra Low Voltage) requirements of EN 60950-1 standard. It must be observed that wiring and short-circuit/overcurrent protection is performed according to the applicable standards, regulations and respect to the electrical specification of the KBox E-210 Series.

Even when the system is turned off via the power switch (Figure 1, pos. 1) parts of the system are still energized.

The disconnecting device (fuse/circuit breaker) rating must be in accordance with the wire cross-section and the rated current of the KBox E-210 Series.



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

To connect the KBox E-210 Series to a corresponding DC power supply, please perform the following steps:

1. Connect the power adapter cable to the DC jack (DC IN, Figure 2, pos. 1) of the KBox E-210 Series.
2. Connect the power cable to the power adapter.
3. Connect the power cable to a power outlet.
4. Press the power switch (Figure 1, pos. 1) on the front panel to turn on the system.

8.2. Operating System and Hardware Component Drivers

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

If you have ordered your KBox E-210 Series with a pre-installed operating system, all drivers are installed in accordance with the system configuration ordered (optional hardware components). Your system is fully operational when you switch it on for the first time.

If you have ordered The KBox E-210 Series without a pre-installed operating system, you will need to install the operating system and the appropriate drivers for the system configuration you have ordered (optional hardware components) yourself.



You can download the relevant drivers for the installed hardware from our web site at www.kontron.com by selecting the product.

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

9/ Maintenance and Cleaning

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

- ▶ For light soiling, clean the KBox E-210 Series with a dry cloth. Carefully remove dust from the surface of the cooling fins of the chassis using a clean, soft brush.
- ▶ Stubborn dirt should be removed using a mild detergent and a soft cloth.



Do not use steel wool, metallic threads or solvents like abrasives, alcohol, acetone or benzene for cleaning the KBox E-210 Series.

10/ Technical Specifications

Table 1: Technical Specifications

System	
Processor	<ul style="list-style-type: none"> ▶ Intel® Core™ i5-6300U (Dual Core, 3M Cache, up to 3.00 GHz, FCBGA1356, 15 W TDP) ▶ Intel® Core™ i7-6600U (Dual Core, 4M Cache, up to 3.40 GHz, FCBGA1356, 15 W TDP) ▶ Intel® Celeron® 3955U (Dual Core, 2M Cache, 2.00 GHz, FCBGA1356, 15 W TDP) ▶ Intel® Core™ i5-7300U (Dual Core, 3M Cache, up to 3.50 GHz, FCBGA1356, 15 W TDP) ▶ Intel® Core™ i7-7600U (Dual Core, 4M Cache, up to 3.90 GHz, FCBGA1356, 15 W TDP) ▶ Intel® Celeron® 3965U (Dual Core, 2M Cache, 2.20 GHz, FCBGA1356, 15 W TDP) ▶ Intel® Core™ i3-7100U (Dual Core, 3M Cache, 2.40 GHz, FCBGA1356, 15 W TDP)
Memory	2x DDR4 SO-DIMM memory socket
Video	
Display Interface	<ul style="list-style-type: none"> ▶ 1x DP (on rear) ▶ 1x HDMI 2.0 (on rear)
Multiple Display	Dual
Audio	
Audio Codec	Realtek ALC662
Audio Interface	<ul style="list-style-type: none"> ▶ 1x Line-In (on front) ▶ 1x Line-Out (on front) ▶ 1x Mic-In (on front)
Network Connection	
Ethernet	2x GbE LAN (RJ45 on rear, 1x Intel® I219-LM, 1x Intel® I210-AT)
Peripheral Connection	
USB	4x USB 3.2 Gen 1 (Type A on rear)
Serial Port	<ul style="list-style-type: none"> ▶ 2x RS232/422/485 (DB9 on front) ▶ 1x DIO (DB9 Female on front)
Storage & Expansion	
Storage & Expansion	<ul style="list-style-type: none"> ▶ 1x 2.5" SATA 3.0 HDD / SSD ▶ 1x mPCIe Socket (full size, w/ PCIe / USB 2.0 / UIM) ▶ 1x M.2 Key B Socket (Type 2242, w/ PCIe x2 / SATA 3.0 / USB 2.0 / USB 3.2 / UIM) ▶ 1x SIM Card Holder (optional)
Power	
Input Voltage	<ul style="list-style-type: none"> ▶ DC 12 V (default) ▶ DC 24 V
Connector	Lockable DC Jack (on rear)
Power Adapter	AC to DC, 100 V ~ 240 V
Firmware	
BIOS	AMI uEFI BIOS w/ 128 Mb SPI Flash
Watchdog	Programmable WDT to generate system reset event
H/W Monitor	Voltages, Temperatures
Real Time Clock	Processor integrated RTC

TPM	<ul style="list-style-type: none"> ▶ TPM 2.0 (Infineon SLB 9665, 7th Gen Core™ i7 / i5) ▶ TPM 1.2 (Infineon SLB 9660, 6th Gen Core™ i7 / i5)
iAMT	Yes (models w/ Core™ i7 / i5)
System Control & Monitoring	
Button, Switch & Indicator	<ul style="list-style-type: none"> ▶ 1x Power Switch (on front) ▶ 1x Power LED (on front) ▶ 1x Storage LED (on front)
Cooling	
Cooling Method	Passive
Software	
OS Support	Windows 10, Linux

10.1. Mechanical Specifications

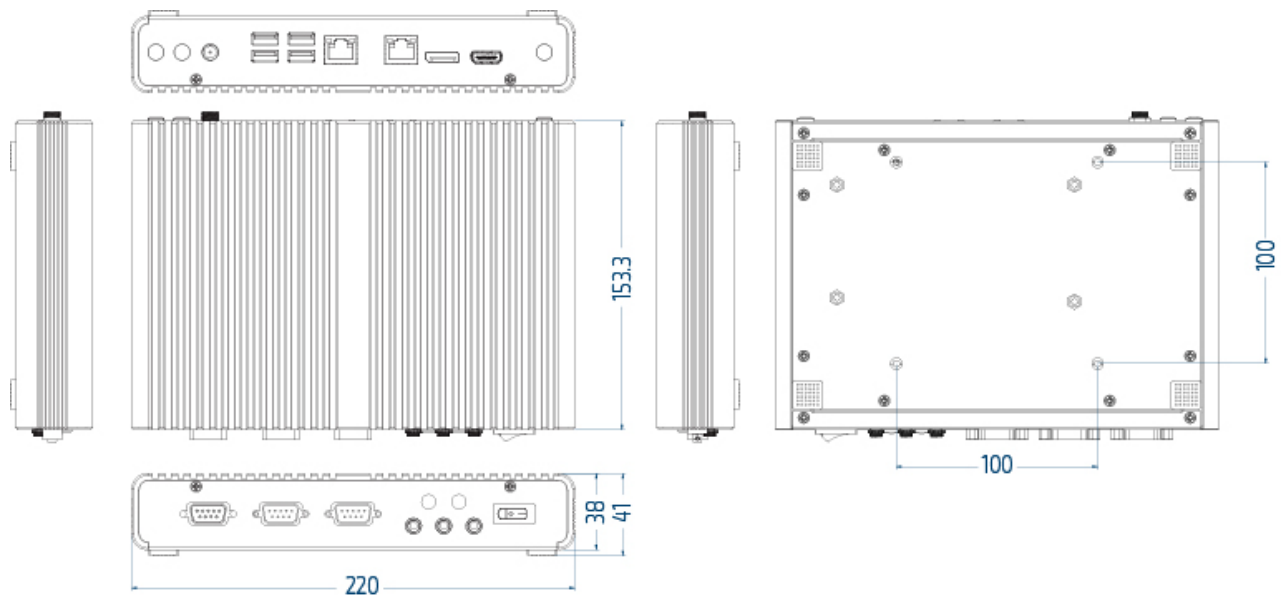
Table 2: Mechanical Specifications

Construction	Aluminum Chassis
Dimensions (W x D x H)	220 mm x 153.3 mm x 38 mm / 8.66" x 6.04" x 1.50" (Standard temperature model) 220 mm x 153.3 mm x 50 mm / 8.66" x 6.04" x 1.97" (Extended temperature model)
Weight	1600 g / 3.53 lb
Mounting	VESA Mount (100 mm x 100 mm)

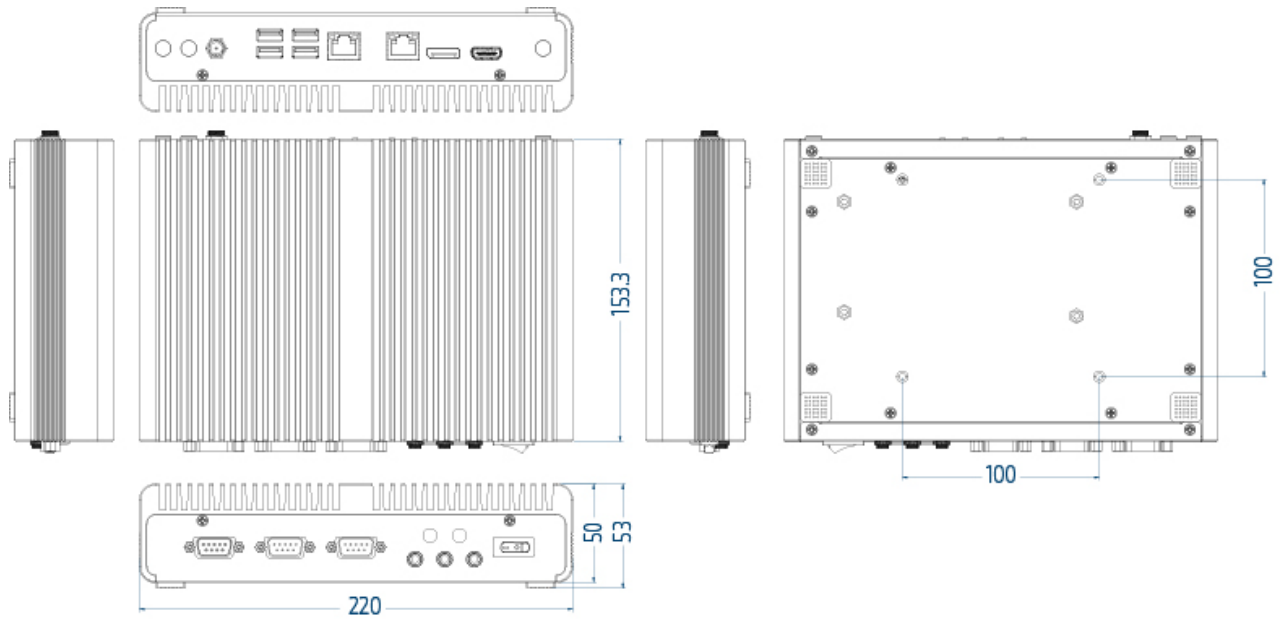
10.1.1. Mechanical Drawing

Figure 13: Mechanical Drawing

▶ Standard Temperature Model



▶ Extended Temperature Model



(unit: mm)

10.2. Environmental Conditions

Table 3: Environmental Conditions

Operating Temperature	0 °C ~ 50 °C / 32 °F ~ 122 °F (Standard) -20 °C ~ 70 °C / -4 °F ~ 158 °F (Extended)
Storage Temperature	-20 °C ~ 80 °C / -4 °F ~ 176 °F
Humidity	0 % ~ 90 %

10.3. Standards and Certifications

Table 4: Standards and Certifications


CE Class A	<ul style="list-style-type: none"> ▶ EN 55032: 2015 + AC: 2016, CISPR 32: 2015 + COR1: 2016: Class A, AS/NZS CISPR 32: 2015 ▶ EN 61000-3-2: 2014 and IEC 61000-3-2: 2014 ▶ EN 61000-3-3: 2013 and IEC 61000-3-3: 2013 ▶ EN 55024: 2010 + A1: 2015 and CISPR 24: 2010 + A1: 2015 ▶ EN 61000-4-2: 2009 and IEC 61000-4-2: 2008 ▶ EN 61000-4-3: 2006 + A1: 2008 + A2: 2010 and IEC 61000-4-3: 2006 + A1: 2007 + A2: 2010 ▶ EN 61000-4-4: 2012 and IEC 61000-4-4: 2012 ▶ EN 61000-4-5: 2014 and IEC 61000-4-5: 2014 ▶ EN 61000-4-6: 2014 + AC: 2015 and IEC 61000-4-6: 2013 ▶ EN 61000-4-8: 2010 and IEC 61000-4-8: 2009 ▶ EN 61000-4-11: 2004 and IEC 61000-4-11: 2004
FCC Class A	<ul style="list-style-type: none"> ▶ FCC CFR Title 47 Part 15 Subpart B: 2017 - Section 15.107 and 15.109 ▶ ANSI C63.4-2014 ▶ ICES-003 Issue 6: 2016 ▶ Class A

11/Standard Interfaces – Pin Assignments

Low-active signals are indicated by a minus sign.

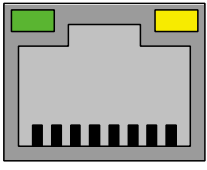
11.1.1. 12V DC Power Input

Table 5: 12V DC Power Input (see Figure 2, pos.1)

Pin	Signal Name	DC Jack (Female)
1	12V DC	
2	GND	

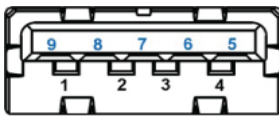
11.1.2. Ethernet Connectors

Table 6: Ethernet Connector (see Figure 2, pos. 4)

Pin	Signal Name	8-pin RJ45 Female Connector
1	TX1+	 8 7 6 5 4 3 2 1
2	TX1-	
3	TX2+	
4	TX3+	
5	TX3-	
6	TX2-	
7	TX4+	
8	TX4-	

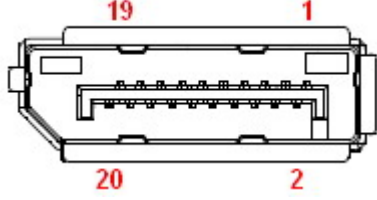
11.1.3. USB 3.2 Gen 1 Port

Table 7: USB 3.2 Gen 1 Port (see Figure 2, pos. 5)

USB 2.0 Contact Pins		USB 3.2 Gen 1 Contact Pins		9-pin USB Connector Type A Version 3.2 Gen 1 / 2.0
Pin	Signal Name	Pin	Signal Name	
1	+USBVCC	5	USB_RX-	
2	USB_D-	6	USB_RX+	
3	USB_D+	7	GND	
4	GND	8	USB_TX-	
		9	USB_TX+	

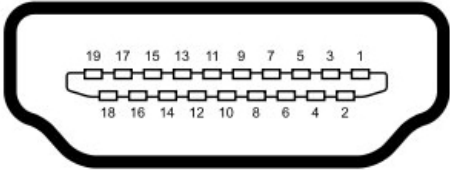
11.1.4. DP Connector

Table 8: DP Connector (see Figure 2, pos. 2)

Pin	Signal Name	20-pin DP Connector
1	TX0+	
2	GND	
3	TX0-	
4	TX1+	
5	GND	
6	TX1-	
7	TX2+	
8	GND	
9	TX2-	
10	TX3+	
11	GND	
12	TX3-	
13	GND	
14	GND	
15	AUX+	
16	GND	
17	AUX-	
18	HPD	
19	GND	
20	PWR	

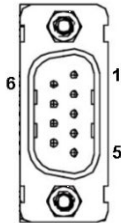
11.1.5. HDMI Connector

Table 9: HDMI Connector (see Figure 2, pos. 3)

Pin	Signal Name	HDMI Connector Type A Version 2.0
1	TMD_DATA2+	
2	GND	
3	TMD_DATA2-	
4	TMD_DATA1+	
5	GND	
6	TMD_DATA1-	
7	TMD_DATA0+	
8	GND	
9	TMD_DATA0-	
10	TMD_CLK+	
11	GND	
12	TMD_CLK-	
13	CEC	
14	RESERVED	
15	DDC_CLK	
16	DDC_DATA	
17	GND	
18	5 V	
19	HPET	

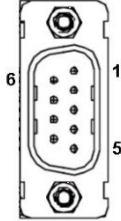
11.1.6. RS232/422/485 Serial Port

Table 10: RS232/422/485 Serial Port (see Figure 1, pos. 7)

Pin	RS232	RS422	RS485 Half Duplex	RS485 Full Duplex	9-pin D-SUB Male Connector
1	DCD	TX-	DATA-	TX-	
2	RXD	TX+	DATA+	TX+	
3	TXD	RX+	N/A	RX+	
4	DTR	RX-	N/A	RX-	
5	GND	GND	GND	GND	
6	DSR	N/A	N/A	N/A	
7	RTS	N/A	N/A	N/A	
8	CTS	N/A	N/A	N/A	
9	RI	N/A	N/A	N/A	

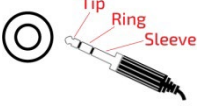
11.1.7. Digital I/O Port

Table 11: Digital I/O Port (see Figure 1, pos. 8)

Pin	Signal Name	DIO Port (9-pin D-SUB Female Connector)
1	Digital Input 0	
2	Digital Output 0	
3	Digital Input 1	
4	Digital Output 1	
5	Digital Input 2	
6	Digital Output 2	
7	Digital Input 3	
8	Digital Output 3	
9	+5V	

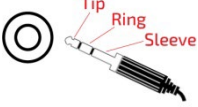
11.1.8. Line-In Connector

Table 12: Line-In Connector (see Figure 1, pos. 4)

Pin	Signal Name	Line-In Connector & Corresponding Audio Jack Plug
Tip	Line-In_L	
Ring	Line-In_R	
Sleeve	GND	

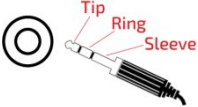
11.1.9. Line-Out Connector

Table 13: Line-Out Connector (see Figure 1, pos. 5)

Pin	Signal Name	Line-Out Connector & Corresponding Audio Jack Plug
Tip	Line-Out_L	
Ring	Line-Out_R	
Sleeve	GND	

11.1.10. Mic-In Connector

Table 14: Mic-In Connector (see Figure 1, pos. 6)

Pin	Signal Name	Mic-In Connector & Corresponding Audio Jack Plug
Tip	Mic-In_L	
Ring	Mic-In_R	
Sleeve	GND	

12/ uEFI BIOS

12.1. Starting the uEFI BIOS

The KBox E-210 Series is provided with a Kontron-customized, pre-installed and configured version of AMI Aptio® V uEFI BIOS. AMI BIOS firmware is based on the Unified Extensible Firmware Interface (uEFI) specification and the Intel® Platform Innovation Framework for EFI. This uEFI BIOS provides a variety of new and enhanced functions specifically tailored to the hardware features of the KBox E-210 Series.



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

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

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

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

The KBox E-210 Series uEFI BIOS setup program uses a hot key-based navigation system. A hot key legend bar is located on the bottom of the setup screens.

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

Table 15: Navigation Hot Keys Available in the Legend Bar

Hotkeys	Description
<F1>	The <F1> key invokes the General Help window.
<->	The <Minus> key selects the next lower value within a field.
<+>	The <Plus> key selects the next higher value within a field.
<F2>	The <F2> key loads the previous values.
<F3>	The <F3> key loads the standard default values.
<F4>	The <F4> key saves the current settings and exit the uEFI BIOS setup.
<-> or <<->	The <Left/Right> arrows selects major setup menus on the menu bar. For example: Main, Advanced, Security, etc.
<↑> or <↓>	The <Up/Down> arrows selects fields in the current menu. For example: A setup function or a sub-screen.
<ESC>	The <ESC> key exits a major setup menu and enter the Exit setup menu. Pressing the <ESC> key in a sub-menu displays the next higher menu level.
<RERURN>	The <RETURN> key executes a command or select a submenu.

12.2. Setup Menus

The Setup utility features shows six menus in the selection bar at the top of the screen:

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

The Setup menus are selected via the left and right arrow keys. The currently active menu and the currently active uEFI BIOS Setup item are highlighted in white. Each Setup menu provides two main frames. The left frame displays all available functions. Functions that can be configured are displayed in blue. Functions displayed in gray provide information about the status or the operational configuration. The right frame displays an Item Specific Help window providing an explanation of the respective function.

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.

Table 16: Main Setup Menu Sub-Screens and Functions

Function	Description
BIOS Information	Read only field. Displays information about the system BIOS
Memory Information	Read only field. Displays information about total memory
ME Information	Read only field. Displays information about Intel Management Engine (ME) version
Firmware Information	Code version and firmware information
System Date	Set System Date
System Time	Set System Time

Figure 14: BIOS Main Menu Screen System Data and Time

BIOS SETUP UTILITY					
Main	Advanced	Power	Boot	Security	Save & Exit
Product Information					
Product Name		KBox E-211			
BIOS Version		R0.05 (x64)			
BIOS Build Date		12/15/2016			
ME FW Version		11.0.0.1202			
CPU Information					
Intel® Core™ i7-6600U CPU @ 2.60GHz					
Microcode Revision		7C			
Processor Cores		2		→ ←: Select Screen	
Memory Information					
Total Size		4096 MB (DDR4)		↑ ↓: Select Item	
Frequency		2133 MHz		Enter: Select	
System Date		[Fri 01/01/2016]		+/-: Change Opt.	
System Time		[00:16:42]		F1: General Help	
Access Level		Administrator		F2: Previous Values	
				F3: Optimized Defaults	
				F4: Save & Exit	
				ESC: Exit	
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Feature	Option	Description
System Date	[dd/mm/yyyy]	Set the Date. Use Tab to switch between Data elements.
System Time	[hh:mm:ss]	Set the Time. Use Tab to switch between Time elements.

12.2.2. Advanced Setup Menu

The Advanced setup menu provides sub-screens and functions for advanced configurations. The following sub-screen functions are included in the menu:

- ▶ LAN & Audio Configuration
- ▶ Display Configuration
- ▶ Super IO Configuration
- ▶ CPU Chipset Configuration
- ▶ SATA Configuration
- ▶ USB Configuration
- ▶ TPM Configuration
- ▶ DIO Configuration
- ▶ H/W Monitor

NOTICE

Setting items on this screen to incorrect values may cause the system to malfunction.

Figure 15: BIOS Advanced Menu

BIOS SETUP UTILITY					
Main	Advanced	Power	Boot	Security	Save & Exit
Onboard LAN1 Controller		[Enabled]			
Onboard LAN1 Boot		[Disabled]			
Onboard LAN2 Controller		[Enabled]			
Onboard LAN2 Boot		[Disabled]			
Audio Controller		[Enabled]			
> Display Configuration				→ ←: Select Screen	
> Super IO Configuration				↑ ↓: Select Item	
> CPU Chipset Configuration				Enter: Select	
> SATA Configuration				+/-: Change Opt.	
> USB Configuration				F1: General Help	
> TPM Configuration				F2: Previous Values	
> DIO Configuration				F3: Optimized Defaults	
> H/W Monitor				F4: Save & Exit	
				ESC: Exit	
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Feature	Option	Description
Onboard LAN1 Controller	[Disabled], [Enabled]	Select whether to enable or disable Onboard LAN1 Controller.
Onboard LAN1 Boot	[Disabled], [Enabled]	Select whether to enable or disable load onboard PXE (Preboot Execution Environment).
Onboard LAN2 Controller	[Disabled], [Enabled]	Select whether to enable or disable Onboard LAN2 Controller.
Onboard LAN2 Boot	[Disabled], [Enabled]	Select whether to enable or disable load onboard PXE (Preboot Execution Environment).
Audio Controller	[Disabled], [Enabled]	Select whether to enable or disable Audio Controller.

Figure 16: BIOS Advanced Menu - Display Configuration

BIOS SETUP UTILITY					
Main	Advanced	Power	Boot	Security	Save & Exit
Display Configuration					
Primary Display		[Auto]		→ ←: Select Screen	
UWA Frame Buffer Size		[256MB]		↑ ↓: Select Item	
DVMT Pre-Allocated		[64M]		Enter: Select	
DVMT Total Gfx Mem		[256M]		+/-: Change Opt.	
Primary IGFX Boot Display		[VBIOS Default]		F1: General Help	
				F2: Previous Values	
				F3: Optimized Defaults	
				F4: Save & Exit	
				ESC: Exit	
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Feature	Option	Description
Primary Display	[Auto], [IGFX], [PCIE]	Select which graphic controller to be used as the primary display device.
UWA Frame Buffer Size	[128MB], [256MB], [512MB]	Select the Aperture Size.
DVMT Pre-Allocated	[32M], [64M], [96M], [128M], [160M], [192M], [224M], [256M], [288M], [320M], [352M], [384M], [416M], [448M], [480M], [512M], [1024M]	Select DVMT Pre-Allocated (Fixed) Graphics Memory size used by the Internal Graphics Device.
DVMT Total Gfx Mem	[128M], [256M], [MAX]	Select DVMT Total Graphic Memory size used by the Internal Graphics Device.
Primary IGFX Boot Display	[VBIOS Default], [DP], [HDMI]	Select the Video Device which will be activated during POST. This has no effect if external graphics present. Secondary boot display selection will appear based on your selection. DOS modes will be supported only on primary display.

Figure 17: BIOS Advanced Menu - Super IO Configuration

BIOS SETUP UTILITY					
Main	Advanced	Power	Boot	Security	Save & Exit
Super IO Configuration					
> Serial Port 1 Configuration > Serial Port 2 Configuration				→ ←: Select Screen ↑ ↓: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit	
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Figure 18: BIOS Advanced Menu - Super IO Configuration - Serial Port 1 Configuration

BIOS SETUP UTILITY					
Main	Advanced	Power	Boot	Security	Save & Exit
Serial Port 1 Configuration					
Serial Port		[Enabled]		→ ←: Select Screen ↑ ↓: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit	
Device Settings		IO=3F8h; IRQ=4;			
Change Setting		[Auto]			
Serial Port 1 Type		[RS232]			
RS485 Deplx Mode*		[Half Duplex]			
RS485 Auto Flow Control*		[Disabled]			
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* These items appear only when selecting RS485 for the Serial Port 1 Type.

Feature	Option	Description
Serial Port	[Disabled], [Enabled]	Select whether to enable or disable Serial Port (COM).
Change Settings	[Auto], [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;]	Select an optional setting for Super IO device.

Feature	Option	Description
Serial Port 1 Type	[RS232], [RS422], [RS485]	Select an appropriate type for Serial Port 1.
RS485 Duplex Mode	[Half Duplex], [Full Duplex]	Select an appropriate RS485 Duplex Mode.
RS485 Auto Flow Control	[Disabled], [Enabled]	Select whether to enable or disable RS485 Auto Flow Control.

Figure 19: BIOS Advanced Menu - Super IO Configuration - Serial Port 2 Configuration

BIOS SETUP UTILITY					
Main	Advanced	Power	Boot	Security	Save & Exit
Serial Port 2 Configuration					
Serial Port		[Enabled]		→ ←: Select Screen	
Device Settings		IO=2F8h; IRQ=3;		↑ ↓: Select Item	
Change Setting		[Auto]		Enter: Select	
Serial Port 2 Type		[RS232]		+/-: Change Opt.	
RS485 Duplex Mode*		[Half Duplex]		F1: General Help	
RS485 Auto Flow Control*		[Disabled]		F2: Previous Values	
				F3: Optimized Defaults	
				F4: Save & Exit	
				ESC: Exit	
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* These items appear only when selecting RS485 for the Serial Port 2 Type.

Feature	Option	Description
Serial Port	[Disabled], [Enabled]	Select whether to enable or disable Serial Port (COM).
Change Settings	[Auto], [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;]	Select an optional setting for Super IO device.
Serial Port 2 Type	[RS232], [RS422], [RS485]	Select an appropriate type for Serial Port 2.
RS485 Duplex Mode	[Half Duplex], [Full Duplex]	Select an appropriate RS485 Duplex Mode.
RS485 Auto Flow Control	[Disabled], [Enabled]	Select whether to enable or disable RS485 Auto Flow Control.

Figure 20: BIOS Advanced Menu - CPU Chipset Configuration

BIOS SETUP UTILITY					
Main	Advanced	Power	Boot	Security	Save & Exit
CPU Chipset Configuration					
EIST		[Enabled]		→ ←: Select Screen	
Turbo Mode		[Enabled]		↑ ↓: Select Item	
Hyper-threading		[Enabled]		Enter: Select	
VT-d		[Enabled]		+/-: Change Opt.	
Active Processor Cores		[All]		F1: General Help	
Limit CPUID Maximum		[Disabled]		F2: Previous Values	
Execute Disable Bit		[Enabled]		F3: Optimized Defaults	
Intel Virtualization Technology		[Enabled]		F4: Save & Exit	
Intel TXT(LT) Technology		[Disabled]		ESC: Exit	
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Feature	Option	Description
EIST	[Disabled], [Enabled]	Select whether to enable or disable Enhanced Intel SpeedStep Technology.
Turbo Mode	[Disabled], [Enabled]	Select whether to enable or disable turbo mode.
Hyper-threading	[Disabled], [Enabled]	Select whether to enable or disable Hyper-threading technology.
VT-d	[Disabled], [Enabled]	Select whether to enable or disable VT-d capability.
Active Processor Cores	[All], [1]	Select the number of cores to enable in each processor package.
Limit CPUID Maximum	[Disabled], [Enabled]	Select whether to limit CPUID maximum value.
Execute Disable Bit	[Disabled], [Enabled]	Select whether to enable or disable Execute Disable Bit functionality, which prevents malicious buffer overflow attacks.
Intel Virtualization Technology	[Disabled], [Enabled]	Select whether to enable or disable Intel Virtualization Technology.
Intel TXT(LT) Technology	[Disabled], [Enabled]	Select whether to enable or disable Intel TXT(LT) support.

Figure 21: BIOS Advanced Menu - SATA Configuration

BIOS SETUP UTILITY					
Main	Advanced	Power	Boot	Security	Save & Exit
SATA Configuration					
SATA Controller		[Enabled]	→ ←: Select Screen		
SATA Mode Selection		[AHCI]	↑ ↓: Select Item		
Serial ATA Port 1		Empty	Enter: Select		
Port 1		[Enabled]	+/-: Change Opt.		
Serial ATA Port 2		Empty	F1: General Help		
Port 2		[Enabled]	F2: Previous Values		
M.2 Port 1		Empty	F3: Optimized Defaults		
Port 1		[Enabled]	F4: Save & Exit		
			ESC: Exit		
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Feature	Option	Description
SATA Controller	[Enabled], [Disabled]	Select whether to enable or disable SATA Controller(s).
SATA Mode Selection	[AHCI], [RAID]	Determine how SATA controller(s) operate.
Port 1..2	[Enabled], [Disabled]	Select whether to enable or disable SATA Port 1 / 2 or mSATA Port 1.

Figure 22: BIOS Advanced Menu - USB Configuration

BIOS SETUP UTILITY					
Main	Advanced	Power	Boot	Security	Save & Exit
USB Configuration					
USB Devices: 1 Keyboard, 1 Mouse				→ ←: Select Screen ↑ ↓: Select Item Enter: Select	
Legacy USB Support		[Enabled]		+/-: Change Opt.	
XHCI Hand-off		[Enabled]		F1: General Help	
USB Mass Storage Driver Support		[Enabled]		F2: Previous Values	
				F3: Optimized Defaults	
				F4: Save & Exit	
				ESC: Exit	
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Feature	Option	Description
Legacy USB Support	[Enabled], [Disabled]	Select whether to enable or disable Legacy USB support. AUTO option disables legacy support if no USB devices are connected.
XHCI Hand-off	[Enabled], [Disabled]	Select whether to enable or disable XHCI Hand-off function. This is a workaround for OSeS without XHCI hand-off support. The XHCI ownership change should be claimed by XHCI driver.
USB Mass Storage Driver Support	[Disabled], [Enabled]	Select whether to enable or disable USB Mass Storage Driver Support.

Figure 23: BIOS Advanced Menu - TPM Configuration

BIOS SETUP UTILITY					
Main	Advanced	Power	Boot	Security	Save & Exit
TPM Configuration					
Security Device Support		[Enabled]			
TPM State		[Enabled]		→ ←: Select Screen	
Pending operation		[None]		↑ ↓: Select Item	
Current Status Information				Enter: Select	
TPM Enabled Status:		[Enabled]		+/-: Change Opt.	
TPM Active Status:		[Activated]		F1: General Help	
TPM Owner Status:		[Owned]		F2: Previous Values	
				F3: Optimized Defaults	
				F4: Save & Exit	
				ESC: Exit	
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Feature	Option	Description
Security Device Support	[Disabled], [Enabled]	Select whether to enable or disable BIOS support for security device.
TPM State	[Disabled], [Enabled]	Select whether to enable or disable the TPM chip when the Supervisor Password has been set.
Pending operation	[None], [TPM Clear]	Control the TPM permission level.

Figure 24: BIOS Advanced Menu - DIO Configuration

BIOS SETUP UTILITY							
Main	Advanced	Power	Boot	Security	Save & Exit		
DIO Configuration							
User Configuration		[Disabled]					
DO_1*		[Output Low]					
DO_2*		[Output Low]					
DO_3*		[Output Low]					
DO_4*		[Output Low]					
DI_1		1		→ ←: Select Screen ↑ ↓: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit			
DI_2		1					
DI_3		1					
DI_4		1					
DO_1		0					
DO_2		0					
DO_3		0					
DO_4		0					
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* These items appear only when enabling User Configuration.

Feature	Option	Description
User Configuration	[Enabled], [Disabled]	Select whether or not to allow user to set the DO pin output value.
DO_1..4	[Output Low], [Output High]	Set up the DO pin output value.

Figure 25: BIOS Advanced Menu - H/W Monitor

BIOS SETUP UTILITY					
Main	Advanced	Power	Boot	Security	Save & Exit
PC Health Status					
CPU Temperature		: +60 C			
Memory Temperature		: +54 C			
System Temperature		: +51 C		→ ←: Select Screen	
+VCORE		: +0.904 V		↑ ↓: Select Item	
+VIN		: +18.240 V		Enter: Select	
+3VCC		: +3.312 V		+/-: Change Opt.	
+3VSB		: +3.344 V		F1: General Help	
+VBAT		: +3.120 V		F2: Previous Values	
+5VA		: +5.064 V		F3: Optimized Defaults	
+3VA		: +3.280 V		F4: Save & Exit	
				ESC: Exit	
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12.2.3. Power Setup Menu

The Power setup menu provides functions and a sub-screen for power configurations. The following sub-screen function is included in the menu:

- ▶ WatchDog Timer Configuration

Figure 26: BIOS Power Setup Menu

BIOS SETUP UTILITY					
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 PCI-E 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 & Exit	
				ESC: Exit	
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Feature	Option	Description
ACPI Sleep State	[S3 (Suspend to RAM)]	Select whether to enable or disable suspend function and determine an appropriate suspend mode.
Restore AC Power Loss	[Power Off], [Power On], [Last State]	Control whether the system will stay on after AC power is removed and then restored. Select [Power Off] if you want the system to remain off after power restored. Select [Power On] if you use a power strip to turn the system on. [DeepSx Enabled]: The system will enter to DeepSx Power Saving Mode during S3/S4/S5 power off.
Power Saving Mode	[Disabled], [EUP Enabled], [DeepSx Enabled]	Select whether to enable Power Saving Mode.
Resume By LAN Device	[Disabled], [Enabled]	Select whether to enable or disable Wake from LAN Device.
Resume By PCI-E Device	[Disabled], [Enabled]	Select whether to enable or disable Wake from PCI-E Device.
Resume By Ring Device	[Disabled], [Enabled]	Select whether to enable or disable Wake from Ring Device.
Resume By RTC Alarm	[Disabled], [Enabled]	Select whether to enable or disable Wake Up on Alarm, to turn on your system on a special day of the month.

Figure 27: BIOS Power Setup Menu - WatchDog Timer Configuration

BIOS SETUP UTILITY					
Main	Advanced	Power	Boot	Security	Save & Exit
WatchDog Timer Configuration					
WDT Function		[Disabled]		→ ←: Select Screen ↑ ↓: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit	
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* These items appear only when enabling WDT Function.

Feature	Option	Description
WDT Function	[Disabled], [Enabled]	Select whether to enable or disable WatchDog Timer function.

12.2.4. Boot Setup Menu

The boot setup menu lists the for boot device priority order, that is generated dynamically.

Figure 28: BIOS Boot Setup Menu

BIOS SETUP UTILITY					
Main	Advanced	Power	Boot	Security	Save & Exit
Boot Configuration					
Full Screen LOGO Display		[Disabled]			
Setup Prompt Timeout		1		→ ←: Select Screen	
Bootup NumLock State		[On]		↑ ↓: Select Item	
CSM Support		[Disabled]		Enter: Select	
Boot Option Filter		[Legacy Only]		+/-: Change Opt.	
Boot Option Priorities				F1: General Help	
				F2: Previous Values	
				F3: Optimized Defaults	
				F4: Save & Exit	
				ESC: Exit	
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Feature	Option	Description
Full Screen LOGO Display	[Disabled], [Enabled]	Select whether to enable or disable to display logo screen.
Bootup NumLock State	[On], [Off]	Select the state of the NumLock feature of the keyboard after Startup. [On]: The keys on the keypad will act as numeric keys. [Off]: The keys on the keypad will act as cursor keys.
CSM Support	[Enabled], [Disabled]	Select whether to enable or disable CSM support.
Boot Option Filter	[UEFI and Legacy], [Legacy only], [UEFI only]	Control Legacy / UEFI ROMs priority.

12.2.5. Security Setup Menu

The Security setup menu provides information about the passwords and functions for specifying the security settings. The passwords are case-sensitive. The KBox E-210 Series provides no factory-set passwords.

NOTICE

If there is already a password installed, the system asks for this first. To clear a password, simply enter nothing and acknowledge by pressing <RETURN>. To set a password, enter it twice and acknowledge by pressing <RETURN>.

Figure 29: BIOS Security Setup Menu

BIOS SETUP UTILITY					
Main	Advanced	Power	Boot	Security	Save & Exit
Password Description If ONLY the Administrator's password is set, then this only limits access to Setup and is only asked for when entering Setup If ONLY the User's password is set, then this is a power on password and must be entered to boot or enter Setup. In Setup the User will have Administrator rights The password length must be in the following range:					
Minimum Length		3		→ ←: Select Screen ↑ ↓: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit	
Maximum length		20			
Administrator Password					
User Password					
> Secure Boot					
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Feature	Description
Administrator Password	Set administrator password
User Password	Set user password



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

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

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

12.2.5.1. Remember the password

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

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



HDD security passwords cannot be cleared using the above method.

12.2.6. Save & Exit Setup Menu

The exit setup menu provides functions for handling changes made to the UEFI BIOS settings and the exiting of the setup program.

Figure 30: BIOS Save & Exit Setup Menu

BIOS SETUP UTILITY					
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 & Exit	
				ESC: Exit	
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Feature	Description
Save Changes and Exit	Exit system setup after saving the changes. Once you are finished making your selections, choose this option from the Exit menu to ensure the values you selected are saved to the CMOS RAM. The CMOS RAM is sustained by an onboard backup battery and stays on even when the PC is turned off. When you select this option, a confirmation window appears. Select [Yes] to save changes and exit.
Discard Changes and Exit	Exit system setup without saving any 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 asks for a confirmation before exiting.
Save Changes	Save changes done so far to any of the setup values. This option allows you to save the selections you made. After selecting this option, a confirmation appears. Select [Yes] to save any changes.
Discard Changes	Discards changes done 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 [Yes] to discard any changes and load the previously saved values.
Restore Defaults	Restore Default values for all the setup values. This option allows you to load optimal default values for each of the parameters on the Setup menus, which will provide the best performance settings for your system. The F9 key can be used for this operation.

Appendix A: List of Acronyms



The following table does not contain the complete acronyms used in signal names, signal type definitions or similar. A description of the signals is included in the I/O Connector and Internal connector chapters within this user guide.

Table 17: List of Acronyms

2D	Two-Dimensional
3D	Three-Dimensional
AT	Advanced Technology
ATX	Advanced Technology eXtended
BGA	Ball Grid Array
BIOS	Basic Input / Output System
BSP	Board Support Package
CMOS	Complementary Metal Oxide Semiconductor
CPU	Central Processing Unit
DC	Direct Current
DDC	Display Data Channel
DIO	Digital Input / Output
ECC	Error-Correcting Code
EEE	Electrical and Electronic Equipment
EOS	Electrical OverStress
ESD	ElectroStatic Discharge
GbE	Gigabit Ethernet
HDD	Hard Disk Drive
HDMI	High Definition Multimedia Interface
LAN	Local Area Network
LED	Light Emitting Device
LVDS	Low-Voltage Differential Signaling
ME F/W	Management Engine Firmware
mPCIe	mini Peripheral Component Interconnect express
PC-AT	Personal Computer - Advanced Technology
PCB	Printed Circuit Board
PSU	Power Supply Unit
PVC	PolyViny Chloride
PWM	Pulse Width Modulation

RAM	Random Access Memory
ROM	Read-Only Memory
RTC	Real-Time Clock
SATA	Serial Advanced Technology Attachment
SDP	Serial Download Protocol
SELV	Safety Extra-Low Voltage
SIM	Subscriber Identity Module
SMBus	System Management Bus
SoC	System on Chip
SO-DIMM	Small Outline Dual In-line Memory Module
SPD	Serial Presence Detect
SPI	Serial Peripheral Interface
TDP	Thermal Design Power
TPM	Trusted Platform Module
UEFI	Unified Extensible Firmware Interface
USB	Universal Serial Bus
UTP	Update Transfer Protocol
VGA	Video Graphics Array
WDT	WatchDog Timer
WEEE	Waste Electrical and Electronic Equipment



About Kontron

Kontron, a global leader in embedded computing technology (ECT), offers a combined portfolio of secure hardware, middleware and services for Internet of Things (IoT) and Industry 4.0 applications. With its standard products and tailor-made solutions based on highly reliable state-of-the-art embedded technologies, Kontron provides secure and innovative applications for a variety of industries. As a result, customers benefit from accelerated time-to-market, reduced total cost of ownership, product longevity and the best fully integrated applications overall. Kontron is a listed company. Its shares are traded in the Prime Standard segment of the Frankfurt Stock Exchange and on other exchanges under the symbol "KBC". For more information, please visit: www.kontron.com



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