



RuggedClient-KLU

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 RUGGEDCLIENT-KLU - USER GUIDE

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Revision History

Revision	Brief Description of Changes	Date of Issue
1.0	Initial Issue	2018-Dec-27

Terms and Conditions

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

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

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Customer Comments

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

Symbols

The following symbols may be used in this user guide

⚠ DANGER

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

⚠ WARNING

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

NOTICE

NOTICE indicates a property damage message.

⚠ CAUTION

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



Electric Shock!

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



ESD Sensitive Device!

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



HOT Surface!

Do NOT touch! Allow to cool before servicing.



Laser!

This symbol inform of the risk of exposure to laser beam and light emitting devices (LEDs) from an electrical device. Eye protection per manufacturer notice shall review before servicing.



This symbol indicates general information about the product and the user guide.

This symbol also indicates detail information about the specific product configuration.



This symbol precedes helpful hints and tips for daily use.

For Your Safety

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

High Voltage Safety Instructions

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

CAUTION

Warning

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

CAUTION



Electric Shock!

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

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

Special Handling and Unpacking Instruction

NOTICE



ESD Sensitive Device!

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

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

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

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

Lithium Battery Precautions

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

⚠ CAUTION

Danger of explosion if the battery is replaced incorrectly.

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

General Instructions on Usage

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

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

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

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

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

Quality and Environmental Management

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

Disposal and Recycling

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

WEEE Compliance

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

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



Environmental protection is a high priority with Kontron.

Kontron follows the WEEE directive

You are encouraged to return our products for proper disposal.

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1/ General Safety Instructions for IT Equipment

⚠ WARNING

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

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

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

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

Additional safety instructions for DC power supply circuits

- ▶ To guarantee safe operation of devices with DC power supply voltages larger than 60 volts DC or a power consumption larger than 240 VA, please observe that:
 - ▶ the device is set up, installed and operated in a room or enclosure marked with "RESTRICTED ACCESS", if there are no safety messages on product as safety signs and labels on the device itself.
 - ▶ no cables or parts without insulation in electrical circuits with dangerous voltage or power should be touched directly or indirectly
 - ▶ a reliable protective earthing connection is provided
 - ▶ a suitable, easily accessible disconnecting device is used in the application (e.g. overcurrent protective device), if the device itself is not disconnectable
 - ▶ a disconnect device, if provided in or as part of the equipment, shall disconnect both poles simultaneously
 - ▶ interconnecting power circuits of different devices cause no electrical hazards
- ▶ A sufficient dimensioning of the power cable wires must be selected – according to the maximum electrical specifications on the product label – as stipulated by 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 9.3 "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 RuggedClient-KLU (corresponding to the ordered system configuration)
- ▶ 1x Power adapter with a 2-pin Phoenix Plug Terminal attached
- ▶ 1x Power cord (plug type depending on country)
- ▶ Mounting Clamps with Screws

3.2.2. Optional Parts

- ▶ Memory module(s) (It may be pre-installed in the system depending on ordered configuration.)
- ▶ Internal 2.5" HDD / SSD (It may be pre-installed in the system depending on ordered configuration.)
- ▶ mPCIe card (It may be pre-installed in the system depending on ordered configuration.)
- ▶ M.2 Key B card (It may be pre-installed in the system depending on ordered configuration.)
- ▶ Antenna(s)
- ▶ VESA mounting kit

4/ System Overview

Kontron RuggedClient-KLU integrates an industrial PC with an integrated touch screen display. The rugged design offers excellent mechanical stability for operation in harsh industrial environments.

It can be optionally factory-equipped with an mPCIe WLAN card as well as antenna(s). Users may choose the implementation of a 2.5" SATA HDD / SSD and / or an M.2 (Key B) SSD card as storage media.

The following interfaces are available with the RuggedClient-KLU:

Standard Rear Panel:

- ▶ 1x HDMI 2.0
- ▶ 1x DP
- ▶ 1x Line-in
- ▶ 1x Line-out
- ▶ 1x Mic-in
- ▶ 2x GbE LAN
- ▶ 4x USB 3.0
- ▶ 2x RS232/422/485
- ▶ 1x Phoenix Power Connector
- ▶ 1x Power Switch
- ▶ 1x Power LED
- ▶ 1x Storage LED

Standard Top Panel:

- ▶ 2x Antenna Port

Standard Baseboard and System Expansion Capabilities:

- ▶ 2x 260-pin DDR4 SO-DIMM memory socket (DIMM1 & DIMM2 socket)
- ▶ 1x SATA 3.0 connector (SATA1 or 2 connector) for 2.5" SATA 3.0 HDD / SSD
- ▶ 1x full-sized mPCIe socket (MPCIE1 socket) for mPCIe expansion card
- ▶ 1x M.2 Key B socket (CON1 socket) for M.2 SSD or M.2 expansion card

The device is designed to be operated in:

- ▶ Vertical position: mounted in an instrument / wall / other cabinet (with the corresponding supplied mounting clamps) or on the wall / VESA stand / VESA pole (with a VESA mounting kit)

NOTICE

When powering on the RuggedClient-KLU, make sure that the cooling fins located on the rear 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 RuggedClient-KLU. When installing the system, please keep clearance for air circulation.

4.1. System Expansion Capabilities

4.1.1. System Expansion via SATA Interface

The system reserves space allowing users to expand the RuggedClient-KLU with a 2.5" SATA 3.0 HDD / SSD drive via one of the onboard SATA 3.0 interface connectors.

4.1.2. System Expansion via mPCIe Card Interface

The baseboard comes with an onboard full-sized 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.

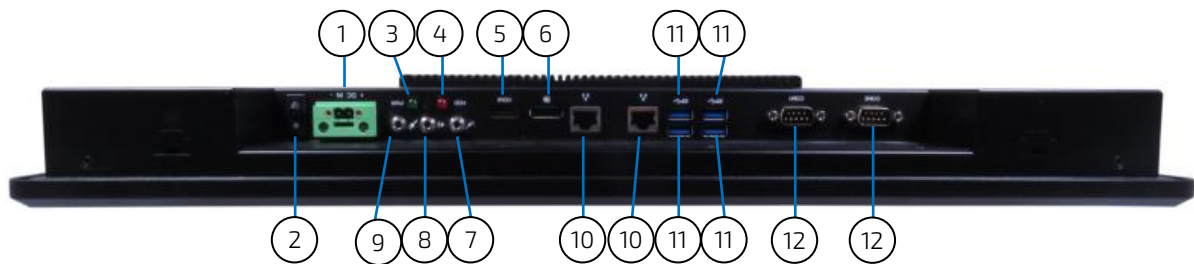


If a customer requires 3G / 4G functionality, it must be so stipulated when ordering, as an optional SIM card slot must be installed at the factory.

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.

4.2. Rear I/O Panel

Figure 1: Rear I/O Panel



- 1 2-pin Phoenix DC-In Power Connector (see Chapter 4.2.1)
- 2 Power Switch (see Chapter 4.2.2)
- 3 Power LED (see Chapter 4.2.3)
- 4 Storage LED (see Chapter 4.2.4)
- 5 HDMI 2.0 (see Chapter 4.2.5)
- 6 DP (see Chapter 4.2.6)
- 7 Line-In (see Chapter 4.2.7)
- 8 Line-Out (see Chapter 4.2.8)
- 9 Mic-In (see Chapter 4.2.9)
- 10 GbE (see Chapter 4.2.10)
- 11 USB 3.0 (see Chapter 4.2.11)
- 12 RS232/422/485 (see Chapter 4.2.12)

4.2.1. 2-pin Phoenix DC-In Power Connector

The supplied power adapter converts AC power to DC for use by the PC through this connector along with the supplied Phoenix plug terminal attached to the adapter. To prevent damage to the PC, always use the supplied power adapter. In case of connecting the PC directly to a DC main power supply, users should detach the Phoenix plug terminal from the power adapter and then use it to prepare the connecting wires for plugging into this connector.

▲WARNING

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

4.2.2. Power Switch

Press this switch to turn the system on or off.

▲WARNING

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

4.2.3. Power LDE

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.

4.2.4. Storage LED

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

4.2.5. HDMI 2.0

The RuggedClient-KLU provides one HDMI 2.0 connector. One external (digital) display can be connected to this HDMI 2.0 connector.

4.2.6. DP

The RuggedClient-KLU provides one DP connector. One external (digital) display can be connected to this DP connector.

4.2.7. Line-In

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

4.2.8. Line-Out

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

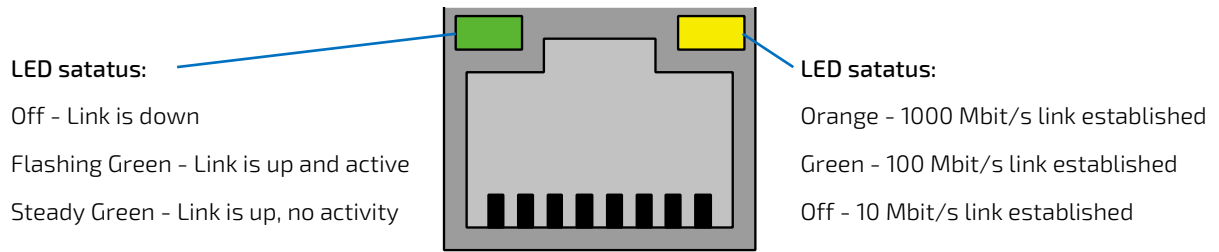
4.2.9. Mic-In

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

4.2.10. 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 2: Ethernet LED Status



4.2.11. USB 3.0

The RuggedClient-KLU provides four USB 3.0 / 2.0 interfaces. These connector allow connection of USB 3.0 or USB 2.0 compatible device to the system.

4.2.12. 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.

4.3. Top I/O Panel

Figure 3: Top I/O Panel



4.3.1. Antenna

The RuggedClient-KLU reserves two covered cutouts for the Reverse Polarity (RP) SMA connectors of two WLAN antennas (mPCIe WLAN card with two antennas is an option). The SMA connectors may be pre-installed in the cutouts depending on ordered configuration.

5/ Thermal Considerations

5.1. Available Processors

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



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

5.2. Convection Cooling

The applied cooling method provides adequate cooling of the device during operation and performs a one-way thermal transfer to the chassis. The rear side of the RuggedClient-KLU consists of an aluminum heat sink with cooling fins. The cooling fins provide heat dissipation during operation.



To provide sufficient heat dissipation for the cooling of the RuggedClient-KLU, never cover the cooling fins on the rear side of the chassis.

5.3. System Clearance

To provide a maximum of airflow through the rear side of the device, proper distances to the rear side must be observed.

5.4. Maximum Temperatures



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

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



The processor 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.

5.5. Third Party Components

When the RuggedClient-KLU is extended and configured with third party components like mPCIe / 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.

6/ Installation Instructions

The RuggedClient-KLU system is designed for operating:

- ▶ in an instrument / wall / other cabinet by use of the corresponding supplied mounting clamps
- ▶ onto a wall / VESA stand / VESA pole by use of a VESA mounting kit.

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 RuggedClient-KLU 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 RuggedClient-KLU has to be installed and operated only by trained and qualified personnel.

Only personnel with appropriate qualifications, trainings and authorization are permitted to install and work with the Kontron RuggedClient-KLU.

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 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!

The RuggedClient-KLU 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 RuggedClient-KLU and the attached components.

Please follow the local/national regulations for grounding.

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

The type label is located on the rear side of the system.

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

6.1. System Mounting

In order to adapt the RuggedClient-KLU for mounting Kontron offers different mounting solution such as:

- ▶ Panel mount: RuggedClient-KLU configuration with the corresponding supplied mounting clamps for vertical installation into an instrument / wall / other cabinet
- ▶ VESA mount: RuggedClient-KLU configuration with a VESA mounting kit for vertical installation onto a wall / VESA stand / VESA pole

6.1.1. System Mounting by Use of the Mounting Clamps

Depending on the ordered RuggedClient-KLU configuration, your system is supplied with a number of the corresponding mounting clamps (Figure 4) sufficient to mount the system into an instrument / wall / other cabinet.

Figure 4: Mounting clamp



Table 1: Specification for mounting by use of the mounting clamps

Model	21.5" Model
Cut-out for mounting to a wall / panel (W x H) [mm]	520 x 319 mm (20.47" x 12.56")
Thickness for the mounting wall / panel for proper mounting [mm]	1.5 ~ 15
Number of the clamps with screws for mounting to a wall / panel	9 (3 for top side, 2 for bottom / right / left side)
Required tool	Phillips screwdriver

NOTICE

In order to ensure IP65 front sealing against dust and water, *mount the system on a non-textured surface.*

Before you install the RuggedClient-KLU into a panel or a wall, verify the perfect condition of the gasket at the rear of the front bezel.

The gasket has to be in place without surface imperfections / defects and dirt.

Ensure the vertical and horizontal alignment of the system.

WARNING

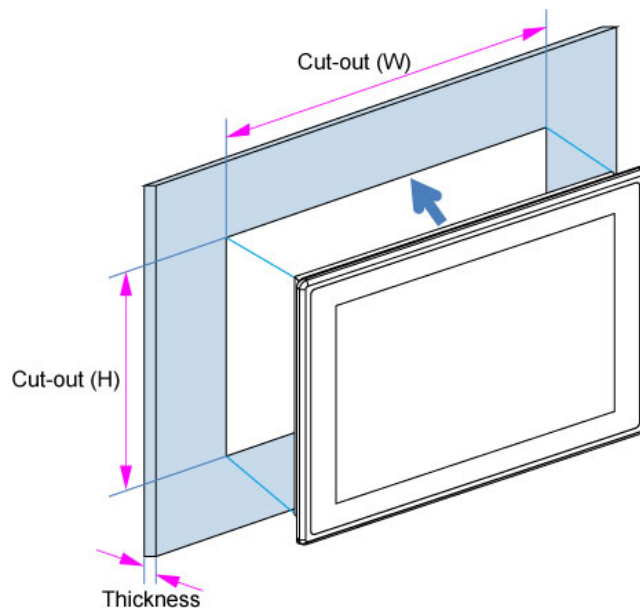
The screen of the RuggedClient-KLU is fragile. Handle with care to prevent personal injury or material damage. Always use two hands when carrying the device.

The screen of the RuggedClient-KLU is provided with a protective film. Only remove this protective material after the installation of the RuggedClient-KLU.

To mount the system to a wall or to a panel, please proceed according to the steps described:

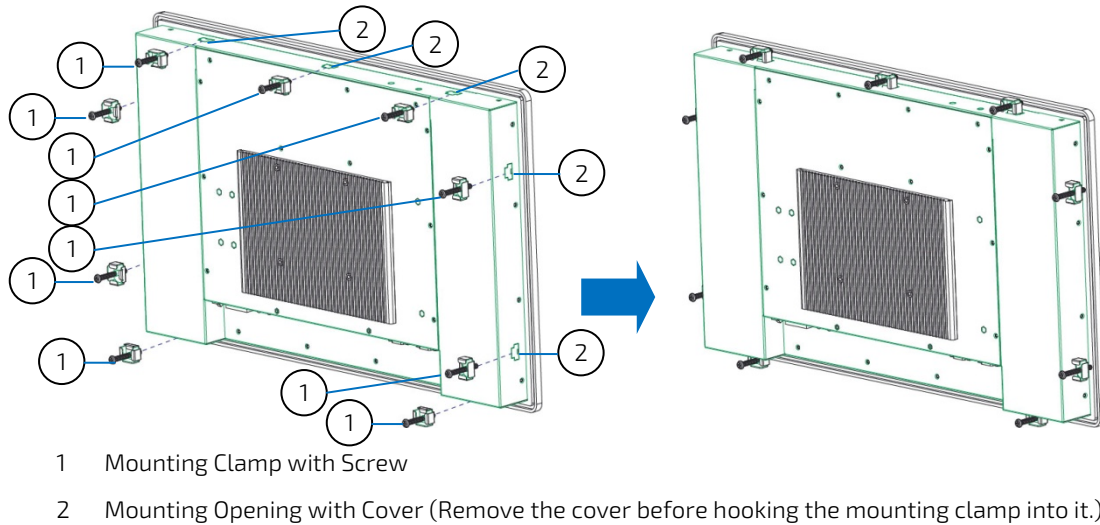
1. Depending on the dimension of your RuggedClient-KLU, prepare a cutout in the wall / panel. The maximum thickness of the wall / panel is 6 mm. Refer to Table 1 and Figure 5 for the wall / panel cutout dimensions or to Figure 13 for the corresponding mechanical drawings of your RuggedClient-KLU.
2. The system must be properly powered down and disconnected from the power source and peripherals.
3. The wall / panel where you intend to install the system must be accessible from both sides (front as well as rear). The material strength and stiffness must be sufficient to hold the system unit.
4. Insert the system into the wall / panel cutout front the front as shown in Figure 5.

Figure 5: Insert the system into the cutout



5. In order to ensure the protection class IP65 on the front side in the installed condition, the contact surface with the gasket must be clean and flush.
6. Remove the mounting opening covers from the chassis with Phillips screwdriver. The number of mounting openings (Table 1) varies depending on the ordered RuggedClient-KLU configuration.
7. Hook the mounting clamps with screws (Figure 4) from the rear side of the wall / panel into the corresponding mounting openings as shown in Figure 6.

Figure 6: Hook mounting clamps into mounting openings

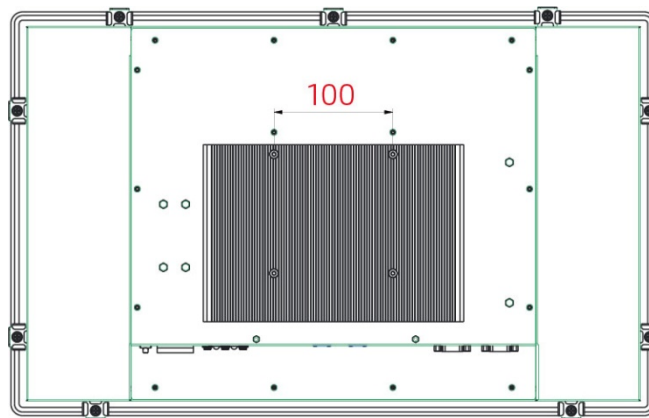


8. The system must be attached firmly by tightening the screws. Always tighten screws on the opposite side of the front panel.

6.1.2. System Mounting by Use of a VESA Mounting Kit

The Ruggedclient-KLU comes with VESA FDMI 100 standard mounting holes (Figure 7).

Figure 7: VESA mounting hole locations



Depending on the ordered RuggedClient-KLU 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 RuggedClient-KLU with a hand-screw knob (Figure 8, pos. 2) to secure two brackets.

Figure 8: Optional VESA mounting kit

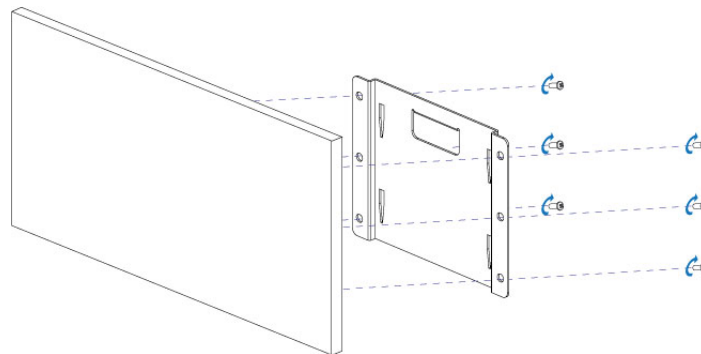


- 1 Base mounting bracket
- 2 Hooked mounting bracket with a hand-screw knob

To mount the RuggedClient-KLU please proceed according to the steps described:

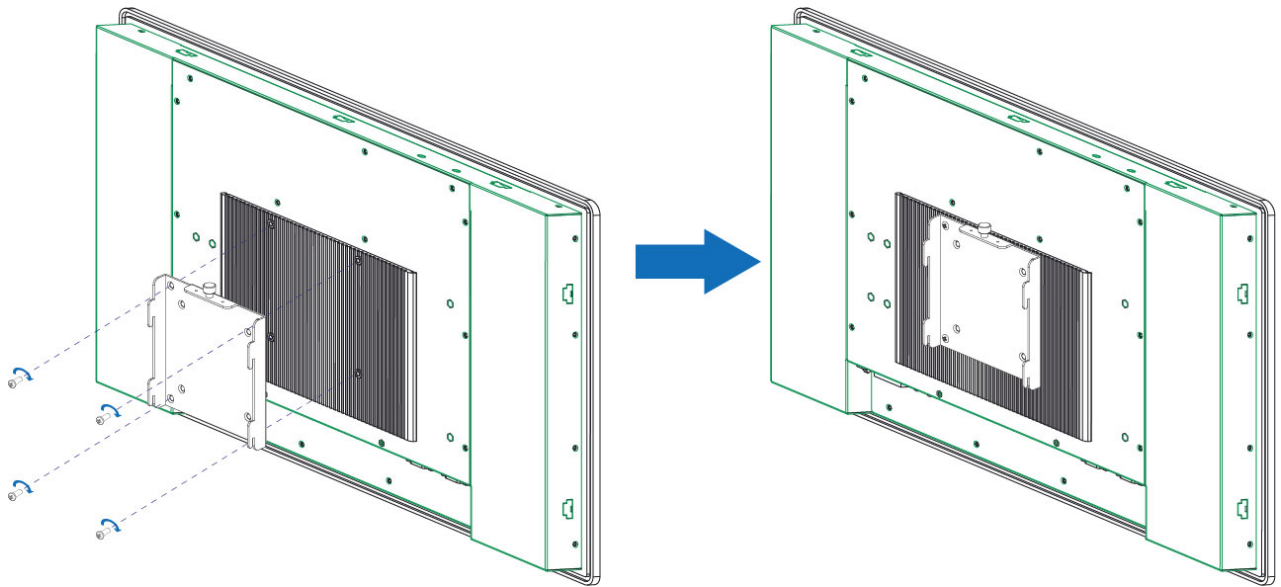
1. Prepare the mounting surface with sufficient screws (six screws for base mounting bracket) and if necessary anchors corresponding to the mounting surface type if no screw holes are available.
2. Secure the base mounting bracket to the mounting surface with screws (Figure 9).

Figure 9: Secure the base mounting bracket



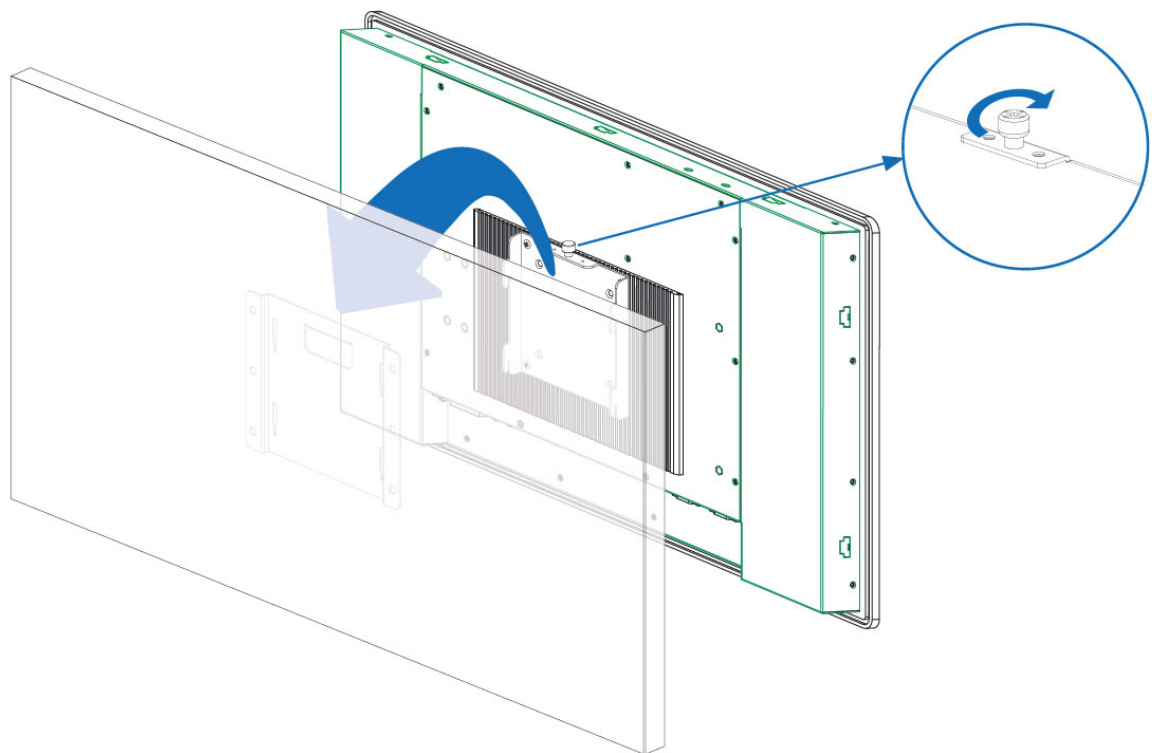
3. Secure the hooked mounting bracket onto the rear side of the RuggedClient-KLU (Figure 10).

Figure 10: Secure the hooked mounting bracket onto the RuggedClient-KLU



4. Place the RuggedClient-KLU onto the mounting surface by sliding the hooked mounting bracket into the based mounting bracket (Figure 11).
5. Secure the hand-screw knob located on the hooked mounting bracket to fix two brackets (Figure 11).

Figure 11: Secure the RuggedClient-KLU onto the mounting surface



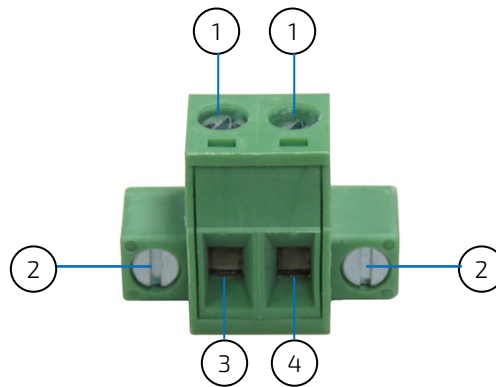
6.2. Power Connection

The RuggedClient-KLU is connected by a 2-pin Phoenix connector (Figure 1, pos. 1) to a DC power source.

The RuggedClient-KLU is delivered with a power adapter to convert AC voltage into DC 12 V and a power cord to carry AC power to the power adapter. A 2-pin Phoenix plug terminal (Figure 12) is pre-attached to the power adapter.

In case of connecting the RuggedClient-KLU directly to a DC main power supply, users should detach the Phoenix plug terminal (Figure 12) from the power adapter first and then use it to prepare the connecting wires for plugging into the Phoenix connector (Figure 1, pos. 1).

Figure 12: Phoenix power plug terminal



- 1 Slotted pan head screw for securing the wire
- 2 Slotted pan head screw for securing the Phoenix plug terminal to the Phoenix connector
- 3 Location for inserting the positive (+) input wire
- 4 Location for inserting the negative (-) input wire

6.2.1. Cabling

For the pin assignment Phoenix power plug terminal refer to the subsection 10.1.1 "Power Input Connector".

1. Cut the required length two isolated wires (1mm²) AWG 18 and strip each end 5 ~ 7 mm.
2. Twist the striped wire-ends and provide them with ferrules.
3. Loosen the two slotted pan head screws of the DC plug terminal far enough so that you can insert the end of the prepared wires.
4. Insert the wires into the corresponding clamp of the Phoenix plug terminal. Make sure that you have the right polarity of the connection [refer to Figure 12 or subsection 10.1.1 "Power Input Connector"].
5. Fasten the screws to secure the wires into the clamps of the plug terminal.

7/ Starting Up



The RuggedClient-KLU must be only operated with the nominal voltage of 12V DC of type SELV. For details refer to the chapter 9/ "Technical Specifications".

7.1. Connecting to Power Supply

The DC power input connector (Figure 1, pos. 1) is located on the rear side of the RuggedClient-KLU. The RuggedClient-KLU will be connected to (1) an AC-to-DC power adapter via the attached Phoenix power plug terminal (see Figure 12) and corresponding power cable, or (2) a DC main power supply via the Phoenix power plug terminal (see Figure 12) and corresponding power wired (not included).



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

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 RuggedClient-KLU 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 RuggedClient-KLU.

Even when the system is turned off via the power switch (Figure 1, pos. 2) 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 RuggedClient-KLU.



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

To connect the RuggedClient-KLU to a corresponding DC power supply, please perform the following steps:

In case of using the supplied power adapter

1. Plug the Phoenix plug terminal (Figure 12) of the power adapter cable to the Phoenix connector (Figure 1, pos. 1) of the RuggedClient-KLU.
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. 2) on the rear panel to turn on the system.

In case of connecting to a DC main power supply

1. Ensure that the DC power source is switched off via a disconnecting device (circuit breaker), in order to ensure that no power is flowing from the external DC power source during the connection procedure.

2. Connect the Phoenix power terminal (Figure 12) prepared as described in the subsection 6.2.1 "Cabling" to the DC input connector (Figure 1, pos. 1) of the RuggedClient-KLU. The DC input connector is located on the rear side.
3. Connect the other ends of the DC power wires to the connections of the DC main power supply. Pay attention to the polarity of the connections.
4. Switch on the disconnecting device (circuit breaker) in order to apply voltage to the terminals of the power wires.
5. Press the power switch (Figure 1, pos. 2) on the rear panel to turn on the system.

7.2. Operating System and Hardware Component Drivers

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

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

If you have ordered the RuggedClient-KLU 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.

8/ Maintenance and Cleaning

Kontron systems require minimal maintenance and care to keep operation correctly.

- ▶ Occasionally wipe the RuggedClient with a soft dry microfiber cloth.
- ▶ You should only remove persistent dirt by use of a soft, slightly damp cloth and mild detergent.

8.1. Touch Screen Care and Cleaning

NOTICE

The touch screen is covered by an anti-glare surface finish and care should be taken when cleaning it. The front side of the touch display unit is sealed against dust and liquids.

The touch screen is protected by an anti-glare surface finish. Care should be taken to avoid using sharp objects such as knife, pen or pencil tips. Sharp objects may permanently damage the surface of the anti-glare surface finish.

Mild detergent and water is recommended for cleaning the touch screen. Use of strong solvents must be avoided. Wet the display surface with a microfiber cloth lightly moistened with warm water and mild glass cleaner.

8.2. Replacing the Lithium Battery

NOTICE

The lithium battery is located on the baseboard and is not a serviceable part. Please contact Kontron support if the lithium battery needs to be replaced.

9/ Technical Specifications

Table 2: Technical Specifications

System		
Processor	Intel® Kaby Lake U-Series Processors (15 W TDP)	
Memory	2x DDR4 SO-DIMM memory socket	
Video		
Display	Size	21.5"
	Ratio	16:9
	Backlight	LED
	Resolution	1920 x 1080 Full HD
	Touch	5-wire Resistive
Display Interface	<ul style="list-style-type: none"> ▶ 1x HDMI 2.0 (on rear) ▶ 1x DP (on rear) 	
Multiple Display	Triple	
Audio		
Audio Codec	Realtek ALC662	
Audio Interface	<ul style="list-style-type: none"> ▶ 1x Line-in (on rear) ▶ 1x Line-out (on rear) ▶ 1x Mic-in (on rear) 	
Network Connection		
Ethernet	2x GbE LAN (RJ45 on rear, 1x Intel® I219-LM, 1x Intel® I210-AT)	
Peripheral Connection		
USB	4x USB 3.0 (Type A on rear)	
Serial Port	2x RS232/422/485 (DB9 on rear, w/ auto flow control for RS485)	
Storage & Expansion		
Storage & Expansion	<ul style="list-style-type: none"> ▶ 1x 2.5" SATA 3.0 HDD / SSD ▶ 1x mPCIe (full size) ▶ 1x M.2 Key B Socket (mixed w/ USB 2.0 or SATA) ▶ 1x SIM Card Cage (optional, switchable for mPCIe or M.2) 	
Power		
Input Voltage	DC 12 V	
Connector	Phoenix Connector (on rear)	
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	Supported for Core™ i7 / i5 model (Infineon SLB 9665 TPM 2.0)	
System Control & Monitoring		
Button, Switch & Indicator	<ul style="list-style-type: none"> 1x Power Switch (on rear) 1x Power LED (on rear) 1x Storage LED (on rear) 	

Cooling	
Cooling Method	Passive
Software	
OS Support	Windows 10, Linux

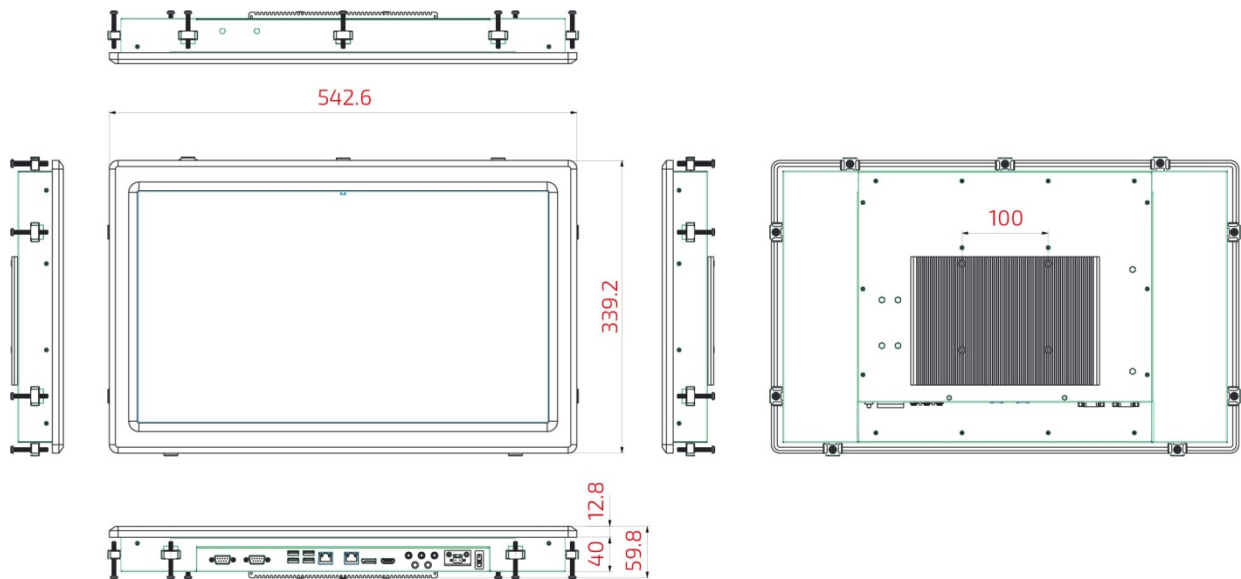
9.1. Mechanical Specifications

Table 3: Mechanical Specifications

Construction	Metal Chassis + Aluminum Front Bezel
Dimensions (W x H x D)	542.6 mm x 339.2 mm x 59.8 mm (21.36" x 13.35" x 2.35")
Weight	6800 g (14.99 lb)
Mounting	Panel Mount, VESA Mount

9.1.1. Mechanical Drawing

Figure 13: Mechanical Drawing



(unit: mm)

9.2. Environmental Conditions

Table 4: Environmental Conditions

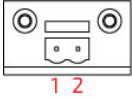
Operating Temperature	0 °C ~ 50 °C / 32 °F ~ 122 °F
Storage Temperature	-20 °C ~ 70 °C / -4 °F ~ 158 °F
Humidity	0 % ~ 95 %

10/ Standard Interfaces – Pin Assignments

Low-active signals are indicated by a minus sign.

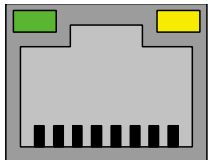
10.1.1. Phoenix Connector

Table 5: Phoenix Connector (see Figure 1, pos.1)

Pin	Signal Name	2-pin Phoenix Connector (female)
1	12VDC (input)	
2	0V (input)	

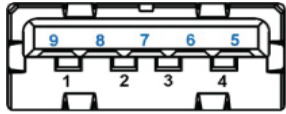
10.1.2. Ethernet Connectors

Table 6: Ethernet Connector (see Figure 1, pos. 10)

Pin	Signal Name	LAN1, LAN2 (RJ45)
1	TX1+	
2	TX1-	
3	TX2+	
4	TX3+	
5	TX3-	
6	TX2-	
7	TX4+	
8	TX4-	

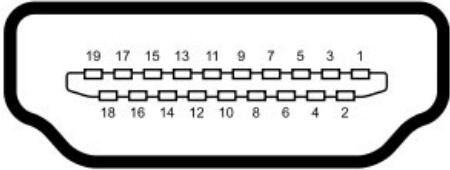
10.1.3. USB 3.0 Port

Table 7: USB 3.0 Port (see Figure 1, pos. 11)

USB 2.0 Contact Pins		USB 3.0 Contact Pins		9-pin USB Connector Type A Version 3.0 / 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+	

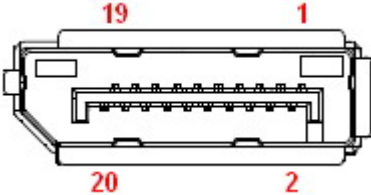
10.1.4. HDMI Connector

Table 8: HDMI Connector (see Figure 1, pos. 5)

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	5V	
19	HPET	

10.1.5. DP Connector

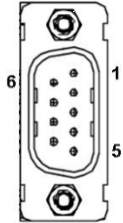
Table 9: DP Connector (see Figure 1, pos. 6)

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+	

Pin	Signal Name	20-pin DP Connector
16	GND	
17	AUX-	
18	HPD	
19	GND	
20	PWR	

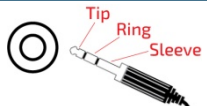
10.1.6. RS232/422/485 Serial Port

Table 10: RS232/422/485 Serial Port (see Figure 1, pos. 12)

Pin	RS232	RS422	RS485 Half Duplex	RS485 Full Duplex	COM1, COM2 (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	

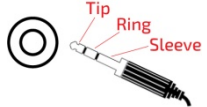
10.1.7. Line-In Connector

Table 11: Line-In Connector (see Figure 1, pos. 7)

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

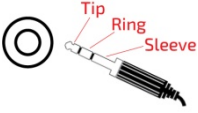
10.1.8. Line-Out Connector

Table 12: Line-Out Connector (see Figure 1, pos. 8)

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

10.1.9. Mic-In Connector

Table 13: Mic-In Connector (see Figure 1, pos. 9)

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

11/ uEFI BIOS

11.1. Starting the uEFI BIOS

The RuggedClient-KLU 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 RuggedClient-KLU.



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 RuggedClient-KLU 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 14: 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.

11.2. 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.

11.2.1. 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 15: 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		RuggedClient-KLU2-215-P			
BIOS Version		R 0.0C (x64)			
BIOS Build Date		06/26/2017			
ME FW Version		11.6.29.3287			
CPU Information					
Intel® Core™ i5-7300U CPU @ 2.60GHz					
Microcode Revision		BA			
Processor Cores		2Core(s) / 4Thread(s)			
Memory Information					
Total Size		4096 MB (DDR4)			
Frequency		2133 MHz			
System Date		[Wed 08/09/2017]			
System Time		[11:20:40]			
Access Level		Administrator			
→ ←: 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
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.

11.2.2. 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
- ▶ AMT Configuration
- ▶ Trusted Computing
- ▶ Network Stack
- ▶ 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	
> AMT Configuration				F2: Previous Values	
> Trusted Computing				F3: Optimized Defaults	
> Network Stack				F4: Save & Exit	
> H/W Monitor				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]			
Aperture Size		[256MB]			
DVMT Pre-Allocated		[64MB]		→ ←: Select Screen	
DVMT Total Gfx Mem		[256MB]		↑ ↓: Select Item	
Primary IGFX Boot Display		[VBIOS Default]		Enter: Select	
Active LVDS		[Enabled]		+/-: Change Opt.	
LVDS Panel Type		[1920x1080 2CH]		F1: General Help	
LVDS Panel Color Depth		[24Bit]		F2: Previous Values	
PWM Backlight Control		[By External]		F3: Optimized Defaults	
LVDS Backlight Control - PWM		190		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.
Aperture Size	[128MB], [256MB], [512MB], [1024MB], [2048MB]	Select the Aperture Size.
DVMT Pre-Allocated	[32M], [64M], [4M], [8M], [12M], [16M], [20M], [24M], [28M], [32M/F7], [36M], [40M], [44M], [48M], [52M], [56M], [60M]	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], [LVDS]	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.
Active LVDS	[Disabled], [Enabled]	Select Active LVDS Configuration. [Disabled]: VBIOS does not enable LVDS. [Enabled]: VBIOS will enable LVDS.
LVDS Panel Type	[800x600 1CH], [1024x768 1CH], [1280x1024 2CH], [1366x768 1CH], [1366x768 2CH], [1600x1200 2CH], [1920x1080 2CH]	Select the appropriate setup item for LVDS panel.
LVDS Panel Color	[18Bit], [24Bit]	Select the appropriate setup item for LVDS panel color depth.

Feature	Option	Description
Depth		
PWM Backlight Control	[By External], [By Internal]	Select the PWM backlight controller. [By External]: Control by external HW circuit. [By Internal]: Control by LBKLT_CTL on the Intel Chipset.

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 Deplx 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	
Intel (VMX) Virtualization Technology		[Enabled]		F2: Previous Values	
Intel Trusted Execution Technology		[Disabled]		F3: Optimized Defaults	
				F4: Save & Exit	
				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. [Enabled] for Windows XP and Linux (OS optimized for Hyper-Threading Technology). [Disabled] for other OS (OS not optimized for 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.
Intel (VMX) Virtualization Technology	[Disabled], [Enabled]	Select whether to enable or disable Intel (VMX) Virtualization Technology.
Intel Trusted Execution Technology	[Disabled], [Enabled]	Select whether to enable or disable Intel Trusted Execution Technology.

Figure 21: BIOS Advanced Menu - SATA Configuration

BIOS SETUP UTILITY					
Main	Advanced	Power	Boot	Security	Save & Exit
SATA Configuration					
SATA Controller(s)		[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 SATA Port 1		M.2 SATA M3B (32.0GB)	F3: Optimized Defaults		
Port 1		[Enabled]	F4: Save & Exit		
			ESC: Exit		
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Feature	Option	Description
SATA Controller(s)	[Enabled], [Disabled]	Select whether to enable or disable SATA Device.
SATA Mode Selection	[AHCI], [Intel RST Premium]	Determine how SATA controller(s) operate.
Port 1..2	[Disabled], [Enabled]	Select whether to enable or disable SATA Port 1..2 / M.2 SATA 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, 1 Point				→ ←: 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], [Auto]	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 - AMT Configuration

BIOS SETUP UTILITY					
Main	Advanced	Power	Boot	Security	Save & Exit
AMT Configuration					
AMT BIOS Features		[Enabled]	→ ←: Select Screen		
Unconfigure ME		[Disabled]	↑ ↓: 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
AMT BIOS Features	[Disabled], [Enabled]	Select whether to enable or disable Intel AMT (Active Management Technology) BIOS Features.
Unconfigure ME	[Disabled], [Enabled]	Select whether to enable or disable unconfigure ME (Management Engine).

Figure 24: BIOS Advanced Menu - Trusted Computing

BIOS SETUP UTILITY					
Main	Advanced	Power	Boot	Security	Save & Exit
Configuration					
Security Device Support		[Disabled]			
NO Security Device Found				→ ←: 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
Security Device Support	[Disabled], [Enabled]	Select whether to enable or disable security device support.

Figure 25: BIOS Advanced Menu - Network Stack

BIOS SETUP UTILITY					
Main	Advanced	Power	Boot	Security	Save & Exit
Network Stack		[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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Feature	Option	Description
Network Stack	[Disabled], [Enabled]	Select whether to enable or disable network stack.

Figure 26: BIOS Advanced Menu - H/W Monitor

BIOS SETUP UTILITY					
Main	Advanced	Power	Boot	Security	Save & Exit
PC Health Status					
CPU Temperature		: +46 C			
Memory Temperature		: +46 C			
System Temperature		: +45 C		→ ←: Select Screen	
+V CORE		: +0.920 V		↑ ↓: Select Item	
+VIN		: +12.000 V		Enter: Select	
+3VCC		: +3.360 V		+/-: Change Opt.	
+3VSB		: +3.360 V		F1: General Help	
+VBAT		: +3.120 V		F2: Previous Values	
+5VA		: +5.160 V		F3: Optimized Defaults	
+3VA		: +3.296 V		F4: Save & Exit	
				ESC: Exit	
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11.2.3. 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 27: 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]		→ ←: Select Screen	
Resume Event Control				↑ ↓: Select Item	
Resume By LAN Device		[Disabled]		Enter: Select	
Resume By PCI-E Device		[Disabled]		+/-: Change Opt.	
Resume By Ring Device		[Disabled]		F1: General Help	
Resume By RTC Alarm		[Disabled]		F2: Previous Values	
> WatchDog Timer Configuration				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.
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 PCIE 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 28: 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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Feature	Option	Description
WDT Function	[Disabled], [Enabled]	Select whether to enable or disable WatchDog Timer function.

11.2.4. Boot Setup Menu

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

Figure 29: 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		[Enabled]		Enter: Select	
Boot Option Filter		[UEFI and Legacy]		+/-: 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.

11.2.5. 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 RuggedClient-KLU 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 30: 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:				→ ←: Select Screen	
Minimum Length		3		↑ ↓: Select Item	
Maximum length		20		Enter: Select	
Administrator Password				+/-: Change Opt.	
User Password				F1: General Help	
				F2: Previous Values	
				F3: Optimized Defaults	
				F4: Save & Exit	
				ESC: Exit	
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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.

11.2.5.1. 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.

11.2.6. 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 31: 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 16: 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 is a global leader in embedded computing technology (ECT). As a part of technology group S&T, Kontron 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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