

BL iMX8M Mini

Doc. Rev. 1.0

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 BL IMX8M MINI - USER GUIDE

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Revision History

Revision	Brief Description of Changes	Date of Issue	Author/Editor
Rev. 0.1	Initial draft version	2020-12-08	Arn/Kl
Rev. 1.0	Final release	2020-12-21	Arn

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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 Electronics 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 Electronics 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 Electronics 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.

General Safety Instructions for IT Equipment

⚠ WARNING



Please read this chapter carefully and take careful note of the instructions, that have been compiled for your safety and to ensure to apply in accordance with intended regulations. If the following general safety instructions are not observed, it could lead to injuries to the operator and/or damage of the product; in cases of non-observance of the instructions Kontron Electronics 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, and 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.
- ▶ Do not place the system close to heat sources or damp places.
- ▶ Only products 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.
- ▶ If extensions are made to the product, the following must be observed:
 - ▶ All effective legal regulations and all technical data for the expansion devices are adhered to.

- ▶ The power consumption of any expansion devices 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 Electronics can be used.
 - ▶ Please note: safe operation is no longer possible when any of the following applies:
 - ▶ Damage is visible.
 - ▶ The device no longer functions.
- In these cases, 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 products with DC power supply voltages larger than 60 volts DC or a power consumption larger than 240 VA, please observe that:
 - ▶ The product 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 product 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 product is used in the application (e.g. overcurrent protective product), if the product itself is not disconnectable.
 - ▶ A disconnect product, if provided in or as part of the equipment, shall disconnect both poles simultaneously.
 - ▶ Interconnecting power circuits of different products causes 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 product does not generally fulfill the requirements for "centralized DC power systems" (UL 60950-1, Annex NAB; D2) and therefore may not be connected to such products!

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 Electronics' 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 Electronics and described in this user guide or received from Kontron Electronics 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 considered.

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 Electronics 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 Electronics' quality and environmental responsibilities, visit <https://www.kontron-electronics.de/unternehmen/qualitaet/>.

Disposal and Recycling

Kontron Electronics' 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 Electronics.

Kontron Electronics follows the WEEE directive.

You are encouraged to return our products for proper disposal.

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1/ Introduction

This user guide describes the Board-Line BL iMX8M Mini Quad. New users are recommended to study the installation instructions within this user guide before switching on the power.

Kontron Electronics' BL iMX8M Mini is developed specifically for sophisticated 3D graphics applications and computing-intensive system architectures. The fanless design ensures a significantly prolonged lifespan and high system availability.

1.1. Product Overview

Before working with the BL iMX8M Mini, Kontron Electronics recommends that users take a few minutes to learn about the various parts of the BL iMX8M Mini.

The BL iMX8M Mini is a flexible single board computer fanless device designed for use in demanding applications. Based on the i.MX8 (4x Arm® Cortex®-A53, 1x Arm® Cortex®-M4) Quad processor the BL iMX8M Mini features long-term availability and supports a varied amount of onboard interfaces to enable connectivity to nearly all applications. An SD card socket supports memory expansion for flexible data storage.

All variants are also available as a separate product named Automation-Line AL iMX8M Mini in a robust steel chassis, designed for operation in a DIN rail environment using a vertical orientation.

Please contact us for detailed information or visit <http://www.kontron-electronics.de>.

General features are:

- ▶ i.MX8 MIMX8MM6CVTKZAA 4x Arm® Cortex®-A53, 1x Arm® Cortex®-M4 processor
- ▶ 1 GB up to 4 GB RAM with LPDDR4 soldered memory
- ▶ 8 GB up to 64 GB memory storage via soldered eMMC
- ▶ External micro-SD drive slot
- ▶ External Interfaces 1x HDMI, 1x 1 Gbit/s, 1x 10/100 Mbit/s, 2x USB 2.0, 1x RS232, 1x RS485 and 1x CAN
- ▶ Fanless passive cooling (heat sink required)

The BL iMX8M Mini is intended for 24/7 continuous operation and longtime industrial applications. All components are selected to ensure a long lifetime.

Figure 1: BL iMX8M Mini



The BL iMX8M Mini is designed for operation in a customer-specific enclosure or device. Assembly and cooling must be implemented through the housing.

1.2. Ordering Information

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

Table 1: Scope of Delivery

Art.-No.	Delivered Item	Description
40099 187	BL i.MX8M Mini Quad 1GB/8 GB	Corresponding to the ordered product configuration
40099 220	BL i.MX8M Mini Quad 4 GB/32 GB	Corresponding to the ordered product configuration
	Other systems on request	

1.3. Accessories

Table 2: Accessories

Art.-No.	Delivered Item	Description
30099 001	Power Supply	External power supply 230VAC to 24VDC / 18W incl. 2pin power connector (Phoenix Contact origin no. 1826680)
30099 003	Connector Set 24V DC/RS232/RS485/CAN/GPIO mating connector	Connector set contains: 1x 2pin power connector (Phoenix Contact origin no. 1826680) 1x RS232: 8pin; 1x RS485/CAN: 8pin; 1x GPIO: 8pin (Phoenix Contact origin no. 1844594)

2/ Specification

2.1. Technical Specification

The BL i.MX8M Mini implements the following mainboard technical specification.

Table 3: Technical Specification

Processor	4x Arm® Cortex®-A53 @1.6 GHz, 1x Arm® Cortex®-M4 @400 MHz, 2D GPU and 3D GPU
System Memory	LPDDR4-RAM 1 GB up to 4 GB
Storage	8 GB eMMC up to 64 GB 2 MB NOR Flash
Interfaces	2x USB 2.0, USB A 1x USB OTG, micro USB 1x 1 Gbit/s, 1x 10/100 Mbit/s 1x HDMI 1x RS232, 1x RS485 1x CAN 4x DIO (24V DC/up to 800mA)
Expansion Sockets	1x micro-SD Slot
Power	24V DC ±20% Input

Table 4: Software Specification

Operating System (OS)	Yocto Linux BSP documentation and support: https://docs.kontron-electronics.de
-----------------------	---

2.2. Mechanical Specification

Table 5: Mechanical Specification

Dimensions	BL i.MX8M Mini (form factor 4,3")
Width	105,5 mm (4,15")
Depth	67 mm (2,64")
Height	24 mm (0,94")
Weight (chassis only)	Approx. ~0,07 kg (~0,15 lbs.)
Mounting	screw mounting

For more detailed mechanical information, refer to the outline dimensions drawings within this chapter. Each dimension drawing shows the main external mechanical features such as the position and size of mounting holes.

2.3. Power Specification

The BL i.MX8M Mini is powered by a 2-pin Input power connector on the front panel and has no internal power supply. The standard input voltage of 24V DC is converted internally to supply all other required voltages.

NOTICE

Hot Plugging the power supply is not supported. Hot plugging might damage the board.

Table 6: Power Specification

Nominal Input Voltage	24V DC
Input Voltage Range	24V DC \pm 20%
Input Power Mating Connector	2-pin Phoenix Contact 180° MC1,5/2-ST-3,5

2.3.1. Power Consumption

The power consumption of the BL i.MX8M Mini depends on the implemented mainboard capacity and external interfaces, for more information see Table 7: Power Consumption.

Table 7: Power Consumption

Power Consumption			Type Label Rating	
Mainboard (Burn-In)	External Interfaces	Total		
100% RAM 100% CPU 100% Disk	2x Ethernet 2x USB 2.0 1x HDMI	Mainboard + External Interfaces	Voltage	24V DC \pm 20% (max. range)
			Current	tbd

2.3.2. Functional Earth

A functional earth connection to the board will be possible via the four mounting holes. These contact surfaces are directly attached to the electronic ground.

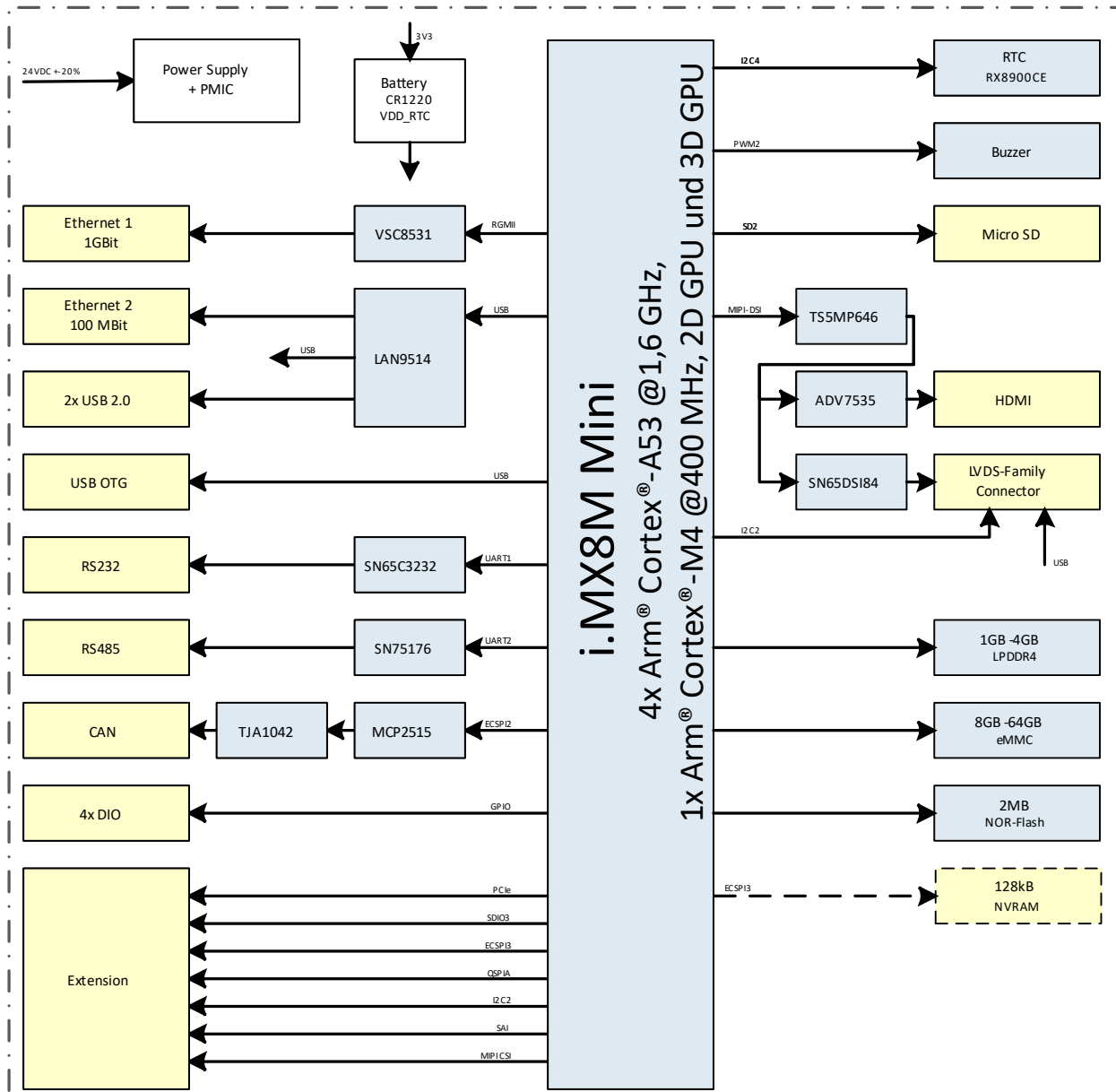
2.3.3. Environmental Specification

Table 8: Environmental Specification

Temperature (Operating)	0°C...70°C ambient
Relative Humidity (Operating)	93% @ 40°C, non condensing

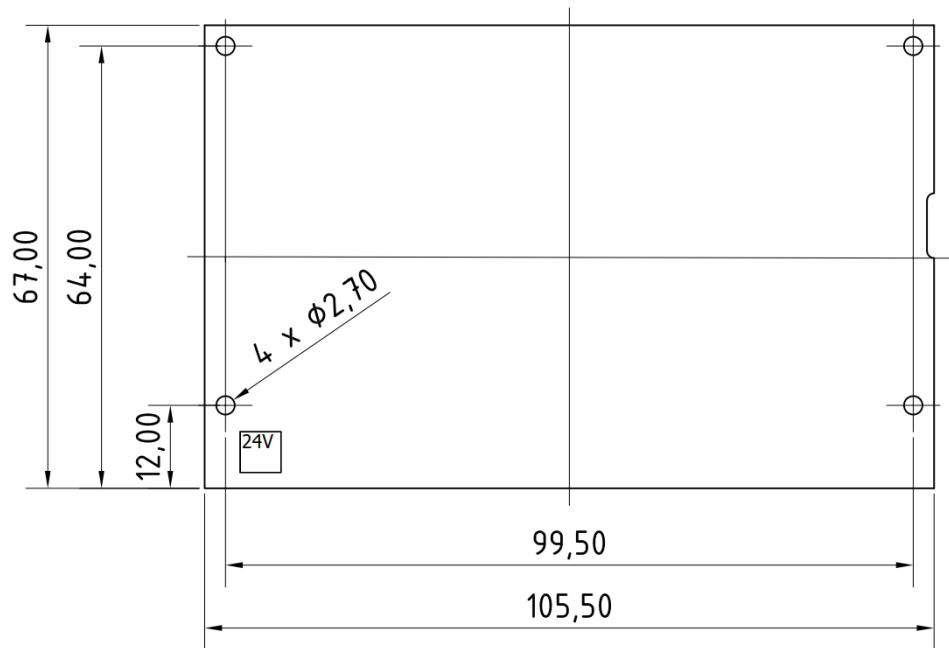
2.4. Block Diagram

Figure 2: Block Diagram



The following outline dimensions drawings shows the main external mechanical features for the BL i.MX8M Mini.

Figure 3: Dimensions (Measurements in mm)



3/ Connector Description

The top side of the board includes most of the I/O connectors.

Figure 4: Top Side View

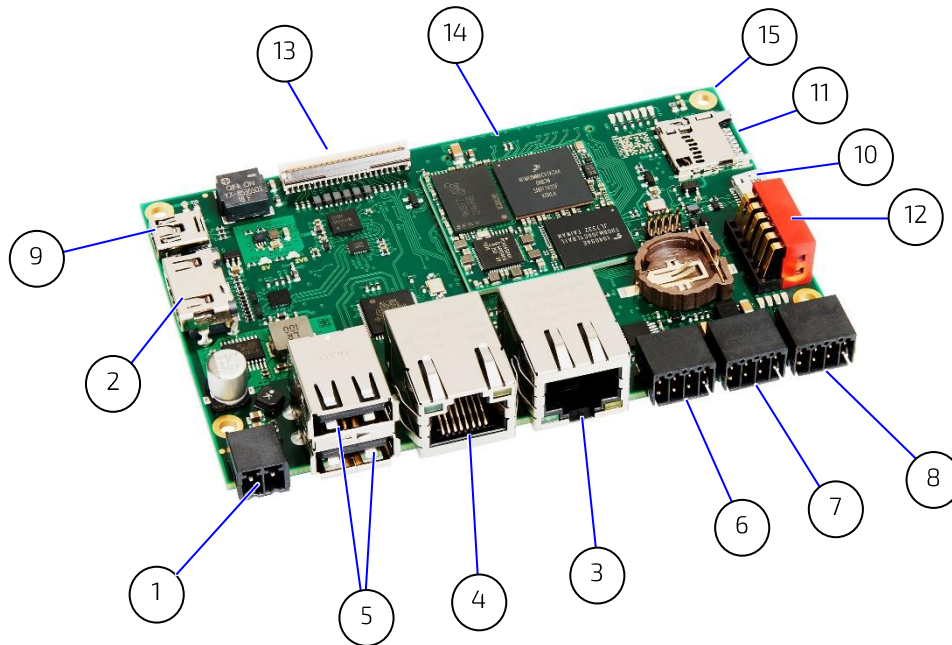


Table 9: Overview of all Connectors

Item	Label	Function	See Chapter
1	X1	DC Power connector (2-pin Phoenix Contact)	3.2.1
2	X5	HDMI connector	3.2.2
3	X4	1 Gbit/s LAN1 RJ-45 connector	3.2.3
4	X1101	10/100 Mbit/s LAN2 RJ-45 connector	3.2.4
5	X9	USB2.0 Port 0 / 1 connectors (upper / lower)	3.2.5
6	X11	RS232 connector	3.2.6
7	X12	RS485 / CAN connector	3.2.7
8	X13	GPIO connector	3.2.9
9	X3	Debug UART	3.2.10
10	X10	USB OTG	3.2.11
11	X401	SD-Card	3.2.14
12	S1	Switch CAN Address	3.2.8
13	X6	LVDS connector	0
14	X14 (bottom side)	Extension connector	3.2.13
15	FE	Functional earth	

3.1.1. Power Connector

There is one 2-pin power connector on the top side supporting an input DC voltage range of 24V DC $\pm 20\%$, see Figure 4 (pos.1). The mating connector required to connect the power connector to a DC main power source is not supplied with the BL i.MX8M Mini. For information on how to connect the supplied mating connector to the input power connector, refer to Chapter 6.2: Wiring the DC Mating Power Connector.

For the pin assignment of the Input power connector, refer to Chapter 3.2.1: Input Power Connector.

3.1.2. Protective Earth

The GND pin of the power connector is connected to protective ground of the electronics of the BL i.MX8M Mini.

3.1.3. HDMI

There is one HDMI 1.4 interface (1920 x1080 pixel resolution), for video/audio solutions, see Figure 4 (pos.2).

3.1.4. Ethernet (LAN1, LAN2)

There are two LAN ports, see Figure 4 (pos.3 & 4).

For the pin assignment of the RJ45 Ethernet connectors, refer to Chapter 3.2.3 ETH RJ45 Connectors (X4).

3.1.5. USB 2.0

There are two USB 2.0 ports allowing for the connection of a USB 2.0 compatible devices, see Figure 4 (pos.5).

For the pin assignment of the USB 2.0 connector, refer to Chapter: 3.2.5 USB Port (X9)

3.1.6. Debug Port

There is a Debug port over UART with a Micro USB connector, see Figure 4 (pos.9).

You need an additional adapter to translate the 3.3V-UART signals (provided on the Micro-USB port) to USB.

3.1.7. Serial Ports & CAN

There is a single serial port supporting RS232 RX/TX with RTS/CTS, see Figure 4 (pos.6).

The RS485 port Figure 4 (pos. 7) contains also the wiring for CAN.

For the pin assignment of the serial port connectors, refer to Chapter 3.2.6: Serial Port Connector

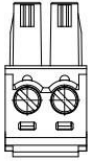
3.1.8. GPIO Ports

There is a four port GPIO interface available on the front panel of the BL i.MX8M Mini, see Figure 4 (pos.8).

The voltage level is 24V DC nominally. It can be used as output (24V DC out – high side drivers) or direct input with 24V DC.

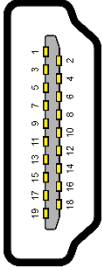
3.2. Connector Pin Assignments

3.2.1. Input Power Connector (X1)

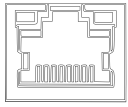
2-Pin Power Mating Connector	Pin	Signal Name
 1(+), 2(-),	1	VCC
	2	GND

Phoenix Contact Connector 180° MC1,5/2-ST-3,81(Phoenix 1826680)

3.2.2. HDMI Connector (X5)

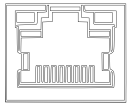
HDMI	Pin	Signal Name
	1	TMDS Data2+
	2	GND
	3	TMDS Data2-
	4	TMDS Data1+
	5	GND
	6	TMDS Data1-
	7	TMDS Data0+
	8	GND
	9	TMDS Data0-
	10	TMDS Clock+
	11	GND
	12	TMDS Clock-
	13	Reserved
	14	Reserved
	15	DDC_CLK
	16	DDC_DATA
	17	GND
	18	+5V Power
	19	Hot Plug Detect

3.2.3. ETH RJ45 Connectors (X4)

RJ45 (female)	Pin	Signal Name	Pin	Signal Name
	1	TX0+	5	TX2-
	2	TX0-	6	TX1-
	3	TX1+	7	TX3+
	4	TX2+	8	TX3-

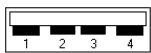
Left LED: Activity / Link		Right LED: Activity 10/100/1000	
Off	NO LAN connectivity	Off	100 Mbit
Green	Link	Yellow	100 Mbit
Blinking	Activity	Blinking	1000 Mbit

3.2.4. ETH RJ45 Connectors (X1101)

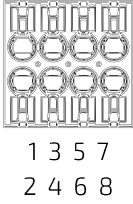
RJ45 (female)	Pin	Signal Name	Pin	Signal Name
	1	TX+	5	n.c.
	2	TX-	6	RX-
	3	RX+	7	n.c.
	4	n.c.	8	n.c.

Left LED: Activity / Link		Right LED: Activity 10/100	
Off	NO LAN connectivity	Off	10 Mbit
Green	Link	Yellow	100 Mbit
Blinking	Activity		

3.2.5. USB Port (X9)

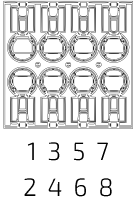
USB 2.0 Port	Pin	Signal Name
	1	+USB_VCC
	2	Dat-
	3	Dat+
	4	GND

3.2.6. Serial Port Connector (X11)

Serial Port	Pin	RS232
	1	VIN
	2	GND
	3	TxD
	4	RXD
	5	RTS
	6	CTS
	7	+5VDC
	8	GND

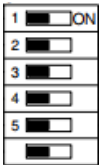
Phoenix Contact Connector 180° DFMC 0,5/4-ST-2,54 (Phoenix 1844594)

3.2.7. RS485/CAN Connector (X12)

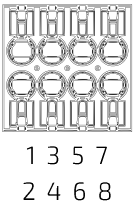
Serial Port	Pin	Signal Name
	1	VIN
	2	GND
	3	RS485 A
	4	CAN H
	5	RS485 B
	6	CAN L
	7	+5V DC
	8	GND

Phoenix Contact Connector 180° DFMC 0,5/4-ST-2,54 (Phoenix 1844594)

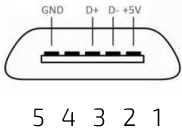
3.2.8. CAN Address Switch (S1)

CAN Address	Switch	Signal Name
	1	Address 1
	2	Address 2
	3	Address 3
	4	Address 4
	5	CAN Termination
	6	RS485 Termination

3.2.9. GPIO Connector (X17)

GPIO	Pin	Signal Name
	1	Dout1 / Din1 (Dout I _{max} =800mA)
	2	GND
	3	Dout2 / Din2 (Dout I _{max} =800mA)
	4	GND
	5	Dout3 / Din3 (Dout I _{max} =800mA)
	6	GND
	7	Dout4 / Din4 (Dout I _{max} =800mA)
	8	GND

3.2.10. USB Debug Port (X10)

Micro USB Port	Pin	Signal Name
	1	VCC
	2	Dat-
	3	Dat+
	4	N.C.
	5	GND

You need an additional adapter to translate the UART signals provided on the Micro-USB port to USB.

This adapter must be connected between an USB port on your computer and the debug port on the i.MX8 board using a standard USB cable.

Figure 5: UART USB-Serial-Adapter

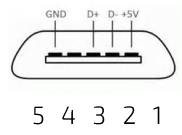


This adapter is only supplied as standard with our development kits.

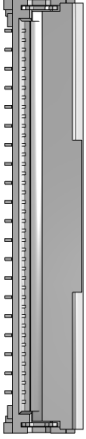
For more detailed information please have a look at the online documentation <https://docs.kontron-electronics.de>.

This documentation includes all information you need to put your device into operation including a quick start guide as well as further information on how to get access to the Yocto based GitLab software repository and how to make your own software images.

3.2.11. USB OTG Port (X10)

Micro USB Port	Pin	Signal Name
	1	VCC
	2	D-
	3	D+
	4	ID
	5	GND
	6	SHIELD (FE)

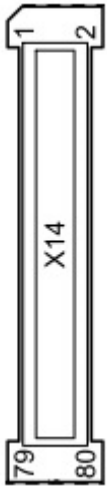
3.2.12. LVDS-Family Connector (X6)

ZIF 40pol.	Pin	Signal Name	Pin	Signal Name
	1	VCC 3V3	21	RXIN3+
	2	Vcc 3V3	22	GND
	3	VCC 3V3	23	USB_DN
	4	GPIO0	24	USB_DP
	5	GPIO1	25	GND
	6	STBY	26	I2C2_SDA
	7	GND	27	I2C2_SCL
	8	RXIN0-	28	TOUCH_INT
	9	RXIN0+	29	TOUCH_RST
	10	GND	30	GND
	11	RXIN1-	31	+24V
	12	RXIN1+	32	+24V
	13	GND	33	GPIO2
	14	RXIN2-	34	GPIO3
	15	RXIN2+	35	PWM1
	16	GND	36	GND
	17	RXCLKIN-	37	GND
	18	RXCLKIN+	38	+5V
	19	GND	39	+5V
	20	RXIN3-	40	+5V

Connector Type

X6: Molex ZIF-Buchse 501951-4010 (180° FPC 40 pol. RM0,5)

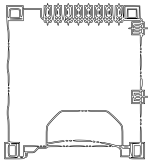
3.2.13. Extension slot (X14)

Hirose 80pol.	Pin	Signal Name	Pin	Signal Name
	1	+24V	41	USB DM 5
	2	VDD_RTC	42	I2C2_SDA
	3	+24V	43	UDB DP 5
	4	GND	44	NAND_CE0_B(QSPIA_nSS0)
	5	+24V	45	GND
	6	+3V3	46	NAND_ALE(QSPIA_SCLK)
	7	GND	47	PRT CTL 5
	8	+3V3	48	NAND_DATA00(QSPIA_DATA0)
	9	+5V	49	n.c.
	10	GND	50	NAND_DATA01(QSPIA_DATA1)
	11	+5V	51	MIPI_CSI_CLK_P
	12	GND	52	NAND_DATA02(QSPIA_DATA2)
	13	+5V	53	MIPI_CSI_CLK_N
	14	NAND_DATA04(SD3_DATA0)	54	NAND_DATA03(QSPIA_DATA3)
	15	GND	55	GND
	16	NAND_DATA05(SD3_DATA1)	56	GND
	17	n.c.	57	MIPI_CSI_D0_P
	18	NAND_DATA06(SD3_DATA2)	58	UART2_TXD(ECSPI3_S50)
	19	n.c.	59	MIPI_CSI_D0_N
	20	NAND_DATA07(SD3_DATA3)	60	UART1_RXD(ECSPI3_SCLK)
	21	GND	61	GND
	22	GND	62	UART2_RXD(ECSPI3_MISO)
	23	GND	63	MIPI_CSI_D1_P
	24	NAND_WP_B(SD3_CMD)	64	UART1_TXD(ECSPI3_MOSI)
	25	PCIE_CLK_P	65	MIPI_CSI_D1_N
	26	NAND_WE_B(SD3_CLK)	66	SAI1_MCLK
	27	PCIE_CLK_N	67	GND
	28	GND	68	SAI1_TXC
	29	GND	69	MIPI_CSI_D2_P
	30	NAND_RE_B(SD3_DATA4)	70	SAI1_TXFS
	31	PCIE_RXN_P	71	MIPI_CSI_D2_N
	32	NAND_CE2_B(SD3_DATA5)	72	SAI1_RXD0
	33	PCIE_RXN_N	73	GND
	34	NAND_CE3_B(SD3_DATA6)	74	GND
	35	GND	75	MIPI_CSI_D3_P
	36	NAND_CLE(SD3_DATA7)	76	SAI1_TXD0
	37	PCIE_TXN_P	77	MIPI_CSI_D3_N
	38	GND	78	SAI1_RXD1
	39	PCIE_TXN_N	79	GND
	40	I2C2_SCL	80	SAI1_TXD1

Connector Type

X14: Hirose FX10A-80P/8-SV1(91)

3.2.14. SD-Card

Micro SD	Pin	Signal Name	Pin	Signal Name
	1	DTA2	8	DAT1
	2	CD/DAT3	9	Shield
	3	CMD	10	Shield
	4	VDD	11	Shield
	5	CLK	12	Shield
	6	VSS	13	DSW1
	7	DAT0	14	DSW2



Pay attention to the manufacturer's lifespan specification. Due to the limited lifespan of SD-Cards/SSD drives Kontron Electronics recommends checking the condition regularly.

4/ Accessing Components

This chapter contains important information that users must read before accessing components. Follow these procedures properly when accessing or installing component to extend the system.

⚠ WARNING

The installation/removal of system components may only be performed by a qualified person. Observe the "General Safety Instructions for IT-Equipment" and the "Installation Instructions" contained within this user guide.



ESD Sensitive

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



Because of the limited predetermined lifespan of expansion devices, Kontron Electronics recommends checking the condition of installed expansion devices regularly and to pay attention to the manufacturer specifications for lifespan.

4.1. Accessing External Components

4.1.1. Micro SD-Card Drive Bay

The BL i.MX8M Mini supports a removable micro SD-Card

To remove/install a removable micro SD-Card, perform the following steps:

1. Press the micro SD-Card on the right-hand side of the BL i.MX8M Mini, to remove a micro SD-Card from the drive bay.
2. The micro SD-Card automatically slides out a bit for removal.
3. Slide in the micro SD-Card, if needed. Take care of the correct position.

5/ Thermal Considerations

⚠WARNING**Hot Surface - heatsink**

Danger of burns. Heatsink can get very hot. To avoid burns and personal injury:

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

5.1. Passive Cooling

The BL i.MX8M Mini is a fanless and passively cooled system. When mounting the BL i.MX8M Mini in a housing take care not to obstruct the airflow over the components, as this stops sufficient heat dispersing into the ambient environment and causes a build-up of heat.

6/ Installation Instructions

6.1. Power Connector

The BL i.MX8M Mini is connected by the input power connector on the front panel to a DC power source via a DC power supply wiring consisting of the power mating connector and the assembled wires. For information on how to wire the connector, see Chapter 6.1.1: Wiring the DC Mating Power Connector.

6.1.1. Wiring the DC Mating Power Connector

To wire the power mating connector, following the step below.

1. Cut two (1 mm²) AWG18 isolated wires to the required length and strip each end 5 mm – 7 mm.
2. Twist the striped wire-ends and provide them with ferrules.
3. Loosen the slotted pan head screws of the Phoenix power mating connector far enough so that you can insert the end of the prepared wires.
4. Insert the wires into the corresponding clamp of the Phoenix power mating connector. Make sure that you have the right polarity of the connection. For the pin assignment of the input power connector, refer to Chapter 3.2.1: Input Power Connector.
5. Fasten the screws to secure the wires into the Phoenix power mating connector's clamps.



The wires used for power connections must be clearly marked (+/-) to ensure proper connection to the front panel input power connector and to the main power source. In addition, the cables must have some form of support to minimize the strain on the unit's connectors.



ESD Sensitive Device!

Electrostatic discharge (ESD) can damage equipment and impair electrical circuitry.

- **Wear ESD-protective clothing and shoes.**
 - **Wear an ESD-preventive wrist strap attached to a good earth ground.**
 - **Check the resistance value of the wrist strap periodically (OK: 1 MΩ to 10 MΩ).**
 - **Transport and store the board in its antistatic bag.**
 - **Handle the board at an approved ESD workstation.**
 - **Handle the board only by the edges.**
-

6.2. Requirements IEC60950-1

Take care when designing chassis interface connectors in order to fulfil the IEC60950-1 standard. Users of pITX-iMX8M must evaluate the end product to ensure compliance the requirements of the IEC60950-1 safety standard are met:

- ▶ The motherboard must be installed in a suitable mechanical, electrical and fire enclosure.
- ▶ The system in its enclosure must be evaluated for temperature and air flow considerations.
- ▶ The motherboard must be powered by a CSA or UL approved power supply that limits the maximum input current to 6 A to an external 5 V locking barrel-type DC jack or to an internal 5 V 4-pin DC power connector.
- ▶ For interfaces having a power pin such as external power or fan, ensure that the connectors and wires are suitably rated. All connections from/to the product shall be with SELV circuits only.
- ▶ Wires have suitable rating to withstand the maximum available power.
- ▶ The enclosure of the peripheral device fulfils the fire protecting requirements of IEC60950-1.

7/ Starting Up

Before using the system, become familiar with the system components and follow the startup instructions below.

7.1. Connecting to Power Supply

The BL iMX8M Mini connects to a DC main power supply via a Phoenix Contact input power connector and corresponding power cable.



When starting the BL iMX8M Mini, the functional earth connection must always be made first and disconnected last. Kontron Electronics recommended that the last connections attached to the system should be the power cable. Following a proper cabling procedure will prevent a false power-on condition, which could result in an operational failure.

CAUTION

The Board-Line BL iMX8M Mini must be connected to a DC mains power supply complying with the SELV (Safety Extra Low Voltage) requirements of EN 60950-1 standard. It must be observed that wiring and short-circuit/overcurrent protection is performed according to the applicable standards, regulations and respect to the electrical specification of the BL iMX8M Mini. The disconnecting device (fuse/circuit breaker) rating must be in accordance with the BL iMX8M Mini's wire cross-section.

To start the BL iMX8M Mini, follow the steps below:

1. Ensure that the DC power source is switched off via a disconnecting device (circuit breaker), in order to ensure that no power is flowing from the external DC power source during the connection procedure.
2. Connect the power connector with wiring (refer to Chapter 6.1: Power Connector and Chapter 6.1.1: Wiring the DC Mating Power Connector) to the Input power connector located on the front panel, see Figure 4: (pos. 1). Pay attention to the polarity of the connections. For more information on the input power connector's polarity, see Chapter 3.2.1: Input Power Connector.
3. Connect the DC power cable's other end to the DC main power supply.
4. Switch on the disconnecting device (circuit breaker) in order to apply voltage to the BL iMX8M Mini.

NOTICE

Do not disconnect the power from BL iMX8M Mini while BL iMX8M Mini is powered up! Performing a forced shutdown can lead to loss of data or other undesirable effects!

7.2. Operating System (OS) and Drivers

The standard BL iMX8M Mini is fully operational when switched on for the first time with pre-installed OS and drivers. Drivers are available from Kontron Electronics' GitLab Server <https://git.kontron-electronics.de>.

If ordered without pre-installed OS, before starting the BL iMX8M Mini the operating system and the appropriate drivers need to be installed for the ordered system configuration.

8/ Standards, Certifications and Directives

The BL i.MX8M Mini is currently in test and aims to comply with the requirements of the following standards.



If the user modifies the product, prerequisites for specific approvals such as CE conformity declaration (safety requirements) may no longer apply.

Table 10: Standards, Certifications and Directives Compliance

CE-Mark Compliant with EU Directives	Electromagnetic Compatibility	Directive 2014/30/EU
	Low Voltage	Directive 2014/35/EU
	RoHS II	Directive 2011/65/EU
EMC 2014/30/EU Immunity/E mission	EN 61000-6-2 EN 61000-6-3	Electromagnetic compatibility (EMC), part 6-2: Generic Standards- Immunity for industrial environment Electromagnetic compatibility (EMC), part 6-3: Generic Standards- Emission for industrial environment
WEEE 2002/96/ EC	Waste Electrical and Electronic Equipment Directive (WEEE Directive)	Compliant with the Waste Electrical and Electronic Equipment (WEEE) directive to reduce waste of electrical and electronic equipment, encourage recycling and environmental disposal and increase the environmental awareness of producers.

9/ Shipment and Unpacking

9.1. Packaging

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

9.2. Unpacking

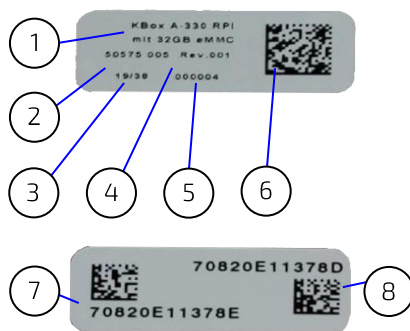
Proceed as follows to unpack the unit:

1. Remove packaging.
2. Do not discard the original packaging. Keep packaging for future relocation or storage.
3. Check the delivery for completeness by comparing it with the original order.
4. 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 the original order, contact Kontron Electronics for help and information.

9.3. Type Label and Product Identification

The type label is position on contains the following information.

Figure 6: AL i.MX8M Mini Type Label (Example)



1. Product name (AL i.MX8M Mini)
2. Article number
3. Production date
4. Revision number
5. Serial number
6. Barcode with article-, rev., date and serial number
7. MAC address

10/ Technical Support

10.1. First Steps – Startup-Information Baseboard

For the first startup of your Board, which includes the BL i.MX8M Mini SoM, you will find more information about the Software / BSP and additional hardware information at the online documentation.

Please follow the link <https://docs.kontron-electronics.de/yocto-ktn/build-ktn-imx/>

The online documentation is primarily intended for our Eval-Kit / Evalboard, but will help you also to put your BL i.MX8M Mini into operation. Additionally, you will find information how to get access to the Yocto based GitLab software repository and how to make your own software images.

10.2. Extended Support

For detailed technical support please contact:

- ▶ E-Mail: support@kontron-electronics.de

Make sure you have the following product identification information in your e-mail:

- ▶ Product name
- ▶ Product model number
- ▶ Serial number (SN) of the unit

Please explain the nature of your problem in your e-mail.



The serial number can be found on the type label on the system.

10.3. Disclaimer & License Information

The software contained in the device (BSP) contains parts which were licensed as free respectively open source software under the GNU General Public License, version 2 and/or 3, respectively the GNU Lesser General Public License, versions 2.1 and/or 3.0.

You can obtain a copy of the source code of the BSP by following the instructions in the manual at <https://docs.kontron-electronics.de/build-system> or contact:

Kontron Electronics GmbH
Kantstr. 10
72663 Großbettlingen
Germany
Web: www.kontron-electronics.de
E-Mail: support@kontron-electronics.de

11/Storage, Transportation and Maintenance

11.1. Storage

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

11.2. Transportation

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

11.3. Maintenance

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

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

NOTICE

Do not use steel wool, metallic threads or solvents like abrasives, alcohol, acetone or benzene for cleaning the BL i.MX8M Mini.

11.3.1. Replacing the Lithium Battery

The lithium battery must only be replaced with the same type of battery or with a type of battery recommended by Kontron Electronics. If the on-board Lithium battery needs to be replaced, follow the steps below:

1. Remove the lithium battery from the holder by pulling it outwards.
2. Place a new lithium battery in the battery holder.
3. Pay attention to the polarity of the battery.

CAUTION

Danger of explosion when replacing with wrong type of battery. Replace only with the same or equivalent type recommended by the manufacturer. The lithium battery type must be UL recognized.



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).

12/ Warranty

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

4. Visit Kontron Electronics' Term and Conditions webpage.
<http://www.kontron-electronics.de/downloads/agbaebs>
5. Click on the relevant document.



The AL i.MX8M Mini is factory configured to meet customer requirements. Kontron Electronics does not recommend opening the system as this may cause damage to internal

12.1. Limitation/Exemption from Warranty Obligation

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

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

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

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

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

13/ Disposal

Final disposal of this product after the product's service life must be accomplished in accordance with the applicable country, state, or local laws or regulations.



Kontron Electronics manufactures products to satisfy environmental protection requirements where possible. Many of the components used are capable of being recycled.

Kontron Electronics follows the Waste Electrical and Electronic Equipment (WEEE) Directive that aims to reduce waste arising from Electrical and Electronic waste and encourages customers to return Kontron Electronics products for proper disposal. For more information regarding WEEE compliance, see the Disposal and Recycling section at the start of this user guide.

Appendix A: List of Acronyms

Table 11: List of Acronyms (Example)

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

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



About Kontron Electronics

Kontron Electronics is your complete supplier of electronics and automation solutions. We offer

- ▶ Own control products for the automation of machines and devices.
- ▶ Development and production for individual, complex electronic modules.
- ▶ Production services for your existing electronic assemblies.
- ▶ Assembly services for complete systems.

With our existing control, visualisation and automation systems, we can put together turnkey complete solutions for your machines and equipment in the shortest possible time. For your individual requirements we have a large group of engineers and technicians available, who develop your tailor-made solution with a lot of experience and imagination. Kontron Electronics is a full-service provider for the development and production of complex electronic modules, components and systems for industrial and medical applications.



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