

pITX-iMX8M

User Guide Rev. 1.5

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 PITX-IMX8M – USER GUIDE

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Kontron Europe GmbH
Gutenbergstraße 2
85737 Ismaning, Germany
www.kontron.com

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CAUTION

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

NOTICE

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

Revision History

Revision	Brief Description of Changes	Date of Issue	Author
1.0	Initial Issue	2021-February-17	hjs
1.1	Jumper J29 and J18 in Figure 4: Front Side corrected	2021-February-22	hjs
1.2	Word2016 issues	2021-March-25	hjs
1.3	Internal audio header (J9) in chapter 6.18 added, new Table 8: Switch SW1 and Table 9: Switch SW2Switch SW1/2	2021-July-05	hjs
1.4	LVDS updates in Table 4 and Table 7	2021-July-20	hjs
1.5	Four Variants in Table 1, Lite-processor removed	2021-November-10	hjs

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Symbols

The following symbols may be used in this manual

⚠ 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.
	<p>Electric Shock!</p> <p>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.</p>
	<p>ESD Sensitive Device!</p> <p>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.</p>
	<p>HOT Surface!</p> <p>Do NOT touch! Allow to cool before servicing.</p>
	<p>Laser!</p> <p>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.</p>
	<p>This symbol indicates general information about the product and the user guide.</p> <p>This symbol also indicates detail information about the specific product configuration.</p>
	<p>This symbol precedes helpful hints and tips for daily use.</p>

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 <https://www.kontron.com/about-kontron/corporate-responsibility/quality-management>.

Disposal and Recycling

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

WEEE Compliance

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

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



Environmental protection is a high priority with Kontron.

Kontron follows the WEEE directive

You are encouraged to return our products for proper disposal.

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1/ Introduction

This manual describes the pico-ITX board with four processors from NXP: i.MX8M Dual with 1.3 GHz and 1.5 GHz, i.MX8M Quad with 1.3 GHz and 1.5 GHz. This board will also be denoted pITX-iMX8M within this Users Guide.

The use of this Users Guide implies a basic knowledge of PC hard- and software. This manual is focussed on describing the pITX-iMX8M board's special features and is not intended to be a standard PC textbook.

New users are recommended to study the short installation procedure stated in the following chapter before switching-on the power.

All configuration and setup of the CPU board is either done automatically or manually by the user via the U-Boot setup menus.

Latest revision of this manual, datasheet, U-Boot scripts, drivers, BSPs (Board Support Packages) can be downloaded from Kontron Web Page.

2/ Description

The board is based on the NXP's i.MX8M processor with either dual or quad core ARM. It is mechanically compliant to the Pico-ITX (pITX) specification. Board key features are:

- ▶ 32-bit LPDDR4 3200 MT/s memory (up to 4 GB),
- ▶ eMMC v5.1 storage (Up to 128 GB MLC/64 GB pseudoSLC),
- ▶ Support graphic interfaces of 1x mini DP, 1x Internal Dual Channel LVDS Header, 1x HDMI, 2x Internal MIPI-CSI (2 lanes each) headers,
- ▶ 1x M.2 B-Key half-size connector with PCIe, USB 3.0/2.0 and micro SIM interface,
- ▶ 1x Dual-Stacked USB 3.0 Rear Port,
- ▶ 1x USB OTG microUSB Type AB socket
- ▶ 1x USB 2.0 via Internal Header
- ▶ 2x 10/100/1000 Gigabit Ethernet Rear Port
- ▶ 1x 4-wire RS-232 Serial Port via Internal Header
- ▶ 2x 2-wire RS-232/UART Serial Port via Internal Header
- ▶ 1x Internal Front Panel Header for Line-In/Out and Microphone
- ▶ 1x SPDIF Internal Header
- ▶ TPM 2.0
- ▶ 1x Internal Header for up to 8x configurable GPIOs
- ▶ 1x 12 V Fan Connector
- ▶ Temperature Sensor
- ▶ +12 V DC Input via locking barrel-type connector or internal power header
- ▶ pITX form factor and cooling solution

Built with these functions, pITX-iMX8M Mother Board is ideal for ATM, Automation, Kiosk applications, medical equipment, industrial automation, financial automation, process control, semiconductor equipment and network security markets.

2.1. Configurations

Kontron offers the pITX-iMX8M in five different configurations.

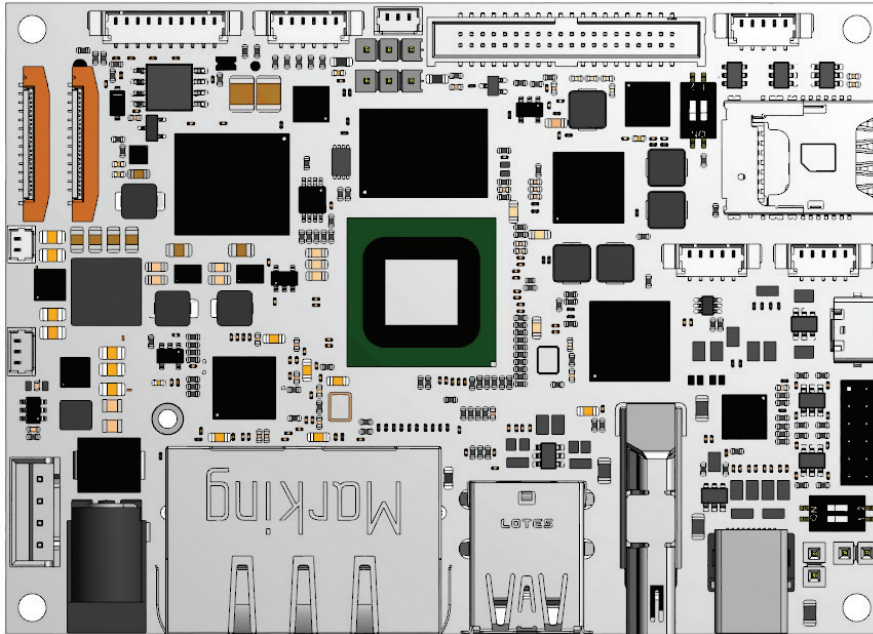
Table 1: Component Main Data

Product Number	Article	Description
44011-0208-13-2	pITX-iMX8M Dual Core Industrial	pITX- iMX8M with NXP i.MX8 M Dual Core Cortex®-A53 1.3 GHz with GPU, VPU and HDR10 encoding, industrial temperature range, 2 GByte LPDDR4, 8 GByte eMMC (pSLC), HDMI and LVDS
44011-0408-13-4	pITX-iMX8M Quad Core Industrial	pITX- iMX8M with NXP i.MX8 M Quad Core Cortex®-A53 1.3GHz with GPU, VPU and HDR10 encoding, industrial temperature range, 4 GByte LPDDR4, 8 GByte eMMC (pSLC), HDMI and LVDS
44011-0216-15-2	pITX-iMX8M Dual Core Commercial	pITX- iMX8M with NXP i.MX8 M Dual Core Cortex®-A53 1.5 GHz with GPU, VPU and HDR10 encoding, commercial temperature range, 2 GByte LPDDR4, 16 GByte eMMC (MLC), HDMI and mDP
44011-0416-15-4	pITX-iMX8M Quad Core Commercial	pITX- iMX8M with NXP i.MX8 M Quad Core Cortex®-A53 1.5 GHz with GPU, VPU and HDR10 encoding, commercial temperature range, 4 GByte LPDDR4, 16 GByte eMMC (MLC), HDMI and mDP.

⚠ WARNING

Warning: Please do not operate the pITX-IMX8M without sufficient cooling system.

Figure 1: pITX-iMX8M Board



2.2. Scope of Delivery

Table 2: Scope of Delivery pITX-iMX8M

Part	Description
Module	pITX-iMX8M
Miscellaneous	Quick Installation Guide

Table 3: Scope of pITX-iMX8M Kit

Part	Part No.	Description
Module		pITX-iMX8M
Power Supply	1067-1755	12 V Power Supply: SCM PSU AC/DC 60 W 12 V KYCON (0-40°C)
Cooling	1064-7069	Passive Cooler: heatsink with adhesive tape Fischer ICK S 25 X 25 X 12,5 + WLFT404
Cooling	1064-8396	Active Cooler
Software		Linux-Image
Miscellaneous		Foam Package, Quick Installation Guide

3/ Installation procedure

3.1. Installing the Board



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 M Ω to 10 M Ω)
 - Transport and store the board in its antistatic bag
 - Handle the board at an approved ESD workstation
 - Handle the board only by the edges
-

To get the board running follow these steps. If the board shipped from Kontron has already components like RAM and CPU cooler mounted, then relevant steps below can be skipped.

1. Turn off the PSU (Power Supply Unit)

NOTICE

Turn off PSU (Power Supply Unit) completely (no mains power connected to the PSU) or leave the Power Connectors unconnected while configuring the board. Otherwise components (RAM, LAN cards etc.) might get damaged. Make sure to use +12 V single supply only.

NOTICE

The power supply unit shall comply with the requirements as defined in IEC 62368-1 according Clause 6.2.2 to power source category PS2 "Limited Power Source".

2. Cooler Installation

Normally the cooler is pre-mounted, but in case not, then make sure that the heat paste etc. on the cooler is intact. Remove plastic foil from heat paste before mounting the cooler. Check for correct orientation. Connect cooler fan electrically to the FAN_CPU connector. We recommend 4 times M3x10 mm male-female standoffs to fix cooler to the SBC. This gives sufficient space for any M.2 modules.

3. Mounting the board in chassis

NOTICE

When mounting the board to chassis etc. please notice that the board contains components on both sides of the PCB which can easily be damaged if board is handled without reasonable care. A damaged component can result in malfunction or no function at all.

When fixing the Motherboard on a chassis it is recommended to use screws with integrated washer and a diameter of < 5.5 mm. Do not use washers with teeth, as they can damage the PCB and cause short circuits.

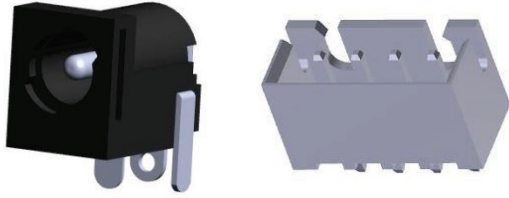
4. Connecting Interfaces

Insert all external cables for keyboard, COM, etc. A terminal must be connected in order to change U-Boot settings.

5. Connect and turn on PSU

Connect PSU to the board by a +12 V DC 2.5mm 4-pin wafer connector or alternatively connect an external +12 V DC power adapter to the rear DC jack.

Figure 2: Power Jack (left) and Internal Connector(right)



6. U-Boot Setup

Enter the U-Boot setup, more information in Chapter 7/.

3.2. Safety Requirements according IEC 62368

Take care when designing chassis interface connectors in order to fulfil the IEC 62368-1 standard. Users of pITX-iMX8M must evaluate the end product to ensure compliance the requirements of the IEC 62368-1 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 5 A to an external 12 V locking barrel-type DC jack or to an internal 12 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 IEC 62368-1.

NOTICE

The device is Class III equipment in which protection against electric shock relies upon supply from Safe Extra Low Voltage (SELV) circuits and in which hazardous voltages are not generated. The device is specified that only on earthed SELV DC Main Supply should be connected. It is only permitted SELV circuits connect to the device. Only current limited devices with fuse or circuit breaker for mains current limiting are allowed to be connected.

3.3. Lithium battery precautions

⚠ CAUTION

Danger of explosion if the lithium battery is incorrectly replaced.

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

VORSICHT! Explosionsgefahr bei unsachgemäßem Austausch der Batterie.

- Ersatz nur durch denselben oder einen vom Hersteller empfohlenen Typ
- Entsorgung gebrauchter Batterien nach Angaben des Herstellers

ATTENTION! Risque d'explosion avec l'échange inadéquat de la batterie.

- Remplacement seulement par le même ou un type équivalent recommandé par le producteur
- L'évacuation des batteries usagées conformément à des indications du fabricant

PRECAUCION! Peligro de explosi3n si la batería se sustituye incorrectamente.

- Sustituya solamente por el mismo o tipo equivalente recomendado por el fabricante
- Disponga las baterías usadas según las instrucciones del fabricante

ADVARSEL! Lithiumbatteri – Eksplosionsfare ved fejlagtig håndtering.

- Udskiftning må kun ske med batteri af samme fabrikat og type
- Levér det brugte batteri tilbage til leverandøren.

ADVARSEL! Eksplosjonsfare ved feilaktig skifte av batteri.

- Benytt samme batteritype eller en tilsvarende type anbefalt av apparatfabrikanten.
- Brukte batterier kasseres i henhold til fabrikantens instruksjoner

WARNING! Explosionsfara vid felaktigt batteribyte.

- Använd samma batterityp eller en ekvivalent typ som rekommenderas av apparattillverkaren.
- Kassera använt batteri enligt fabrikantens instruktion.

VAROITUS! Paristo voi räjähtää, jos se on virheellisesti asennettu.

- Vaihda paristo ainoastaan latteval- mistajan suosittellemaan tyyppiln
- Hävitä käytetty paristo valmistajan ohjeiden mukaisesti

4/ System specifications

4.1. Component Main Data

The table below summarizes the features of the pITX-iMX8M embedded motherboard.

Table 4: Component Main Data

Motherboard pITX-iMX8M	
Form factor	Pico-ITX (100 mm by 72 mm by 1.6 mm/Length x Width x Thickness)
Mechanical Dimensions with cooling	100 mm x 72 mm x 41 mm (Length x Width x Height)
Weight	pITX-iMX8M: 70 g Passive Cooler: 155 g Active Cooler: 153 g
Processor	Onboard CPU variants, SKU dependent: 8M Quad (1.3 GHz/Industry) 8M Quad (1.5 GHz/Commercial) 8M Dual (1.3 GHz/Industry) 8M Dual (1.5 GHz/Commercial)
SPI Flash	<ul style="list-style-type: none"> ▶ Winbond W25Q128 ▶ Macronix MX25L128 ▶ Micron N25Q128
EEPROM	Atmel AT24C32 for board information
Memory	up to 4 GB LPDDR4 3200 MTps Memory Down
eMMC	up to 128 GB MLC or 64 GB pSLC eMMC Memory v5.1
Onboard Controllers	
Display Bridge	DSI - DP DSI - LVDS
USB Hub	1x USB3.0 Hub
Audio	1x Cirrus WM8904 Audio Codec
Ethernet	1x 10/100/1000 Gigabit Ethernet PHY 1x 10/100/1000 Gigabit Ethernet Controller (I210/I211)
Serial Port	3x Texas Instruments MAX3232 RS-232 Transceiver
Temp Sensor	1x Texas Instruments LM75B
Fan Regulator and Monitor	1x Maxim Integrated MAX6650
TPM	Infineon SLB9670XQ2.0
Input /Output	
PCIe	1x PCIe from M.2 B-Key Half-size connector
Storage	1x eMMC v5.1 with up to 128 GB MLC/64 GB pseudoSLC capacity 1x microSD card interface
Ethernet	2x 10/100/1000 Gigabit Ethernet with integrated magnetic and LEDs at rear I/O
USB	1x USB 2.0 OTG microUSB type A/B 1x Dual-stacked USB3.0 at rear I/O 1x USB2.0 from internal headers 1x USB 3.0 from M.2 B-Key half-size connector

Power	1x Locking barrel-type DC Power Jack 1x Internal 4-pin Power connector
Display	The piTX-iMX8M utilizes the iMX8 M HDMI 2.0a and MIPI-DSI display interfaces. The following use cases are supported by iMX8 M: Dual display - HDMI driven by iMX8 M internal Display Controller, with video playback support on HDMI; - MIPI driven by iMX8 M internal LCDIF, without video playback support on MIPI Single display - HDMI driven by iMX8 M internal Display Controller, with video playback support on HDMI - MIPI driven by iMX8 M internal Display Controller, with video playback support on MIPI - MIPI driven by iMX8 M internal LCDIF, without video playback support on MIPI. Note: Video playback requires iMX8 M SKU with VPU.
- HDMI	HDMI 2.0a at rear I/O with ARC Suitable for resolutions of 640x480p60, 720x480p60, 1280x720p60, 1920x1080p60, 3840x2160p60, and 4096x2160p60
- Mini DP	Mini Display port at rear I/O (available on Commercial SKU only) via MIPI-DSI Bridge. Suitable for resolution of 1920x1080p60 or 1800x1200p60
- LVDS	Dual channel LVDS at internal header (available on Industrial SKU only) via MIPI-DSI Bridge. Suitable for resolution of 1920x1080p60 or 1800x1200p60 Note: Only AU Optronics G215HVN01.0 and Aampire AM-1280800N4TZQW LVDS displays are supported (via corresponding YOCTO BSP device tree overlays). Operation of other displays can not be guaranteed.
Camera	2x MIPI-CSI at internal FPC Connector Suitable for resolution of 320x240p30, 640x480p30, 720x480p30, 1280x720p30, 1920x1080p30, 2592x1944p15
Audio	SPDIF 3.3V IO output internal headers for external TOSLINK or COAX adapters Line-In L/R, Line-Out L/R and Microphone-In internal headers
GPIO	8x GPIO (Interrupt Capable) internal headers
COM	1x RS232 4-wire serial port from internal header 2x RS232 2-wire serial port from internal header
Battery	1x 2-pin header for BR2032/CR2032 external pigtail battery
Software BSPs	
Software	Linux 64-bit Yocto, Android only on request
U-Boot	LAN Enable/Disable with TFTP Server

⚠ CAUTION

Danger of explosion if the lithium battery is incorrectly replaced.

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

4.2. Environmental Conditions

Table 5: Environmental Conditions

Storage Temperature	IEC 60068-2-1 60068-2-2 -40°C to +85°C
Operating Temperature	IEC 60068-2-1 60068-2-2 -40°C to +85°C for Industrial variants (44011-xxxx-13-x) 0°C to +60°C for Commercial variants (44011-xxxx-15-x) Note: The pITX-iMX8M requires a cooling solution for proper operation. Kontron offers passive and active cooling solutions for operation temperature up to 60°C ambient. Please contact Kontron for customer specific cooling solutions.
Humidity	IEC 60068-2-78 50% to 95% Relative Humidity at 25°C to 30°C, non- condensing
RoHS	RoHS II compliant
REACH Compliance	Regulation (EC) No 1907/2006
EMC and EMI	EN55032 [Must compliance with no deviation allowed] Class B radiated and conducted EN 61000-6-3:2007 [Must compliance with no deviation allowed] (EMC) Generic emission standard Part 6-4: Emission standard for commercial environments IEC 61000 PT4-2, (EN 61000-4-2) Electrostatic discharge immunity ESD IEC 61000 PT4-3, (EN 61000-4-3 and ENV 50204) Radiated Field IEC 61000 PT4-4, (EN 61000-4-4) Electrical fast transient/burst (EFT) BURST IEC 61000 PT4-5, (EN 61000-4-5) Surge immunity test IEC 61000 PT4-6, (EN 61000-4-6) Immunity to conducted disturbances IEC 61000 PT4-8, (EN 61000-4-8) Immunity to magnetic fields (LOW) IEC 61000 PT4-11, (EN 61000-4-11) Testing and measuring techniques-voltage dips, short interruption, and voltage variations immunity tests
Safety	EN 62368-1 Safety for information technology equipment including electrical business equipment
Altitude	2000 m max
Shock	IEC 60068-2-27 Operation, half-sine wave, Acceleration: 2 g, Pulse duration: 11 ms Number of shocks: 18 shocks (3 shocks for each face)
Vibration	IEC 60068-2-64 Operation, sinusoidal, 10 to 300 Hz, 2g Acceleration, 1 oct/min, 20 cycles per axis, 3 directions.
Reliability including MTBF	5 years x 365 days x 24 hours The MTBF value according to Telcordia standard
Power Supply Specifications	
Voltage Ripple	Voltage Ripple maximum 100 mV peak to peak 0-20 MHz
Rise Time	2 ms to 20 ms rise time from input voltage <10% to nominal VCC

NOTICE

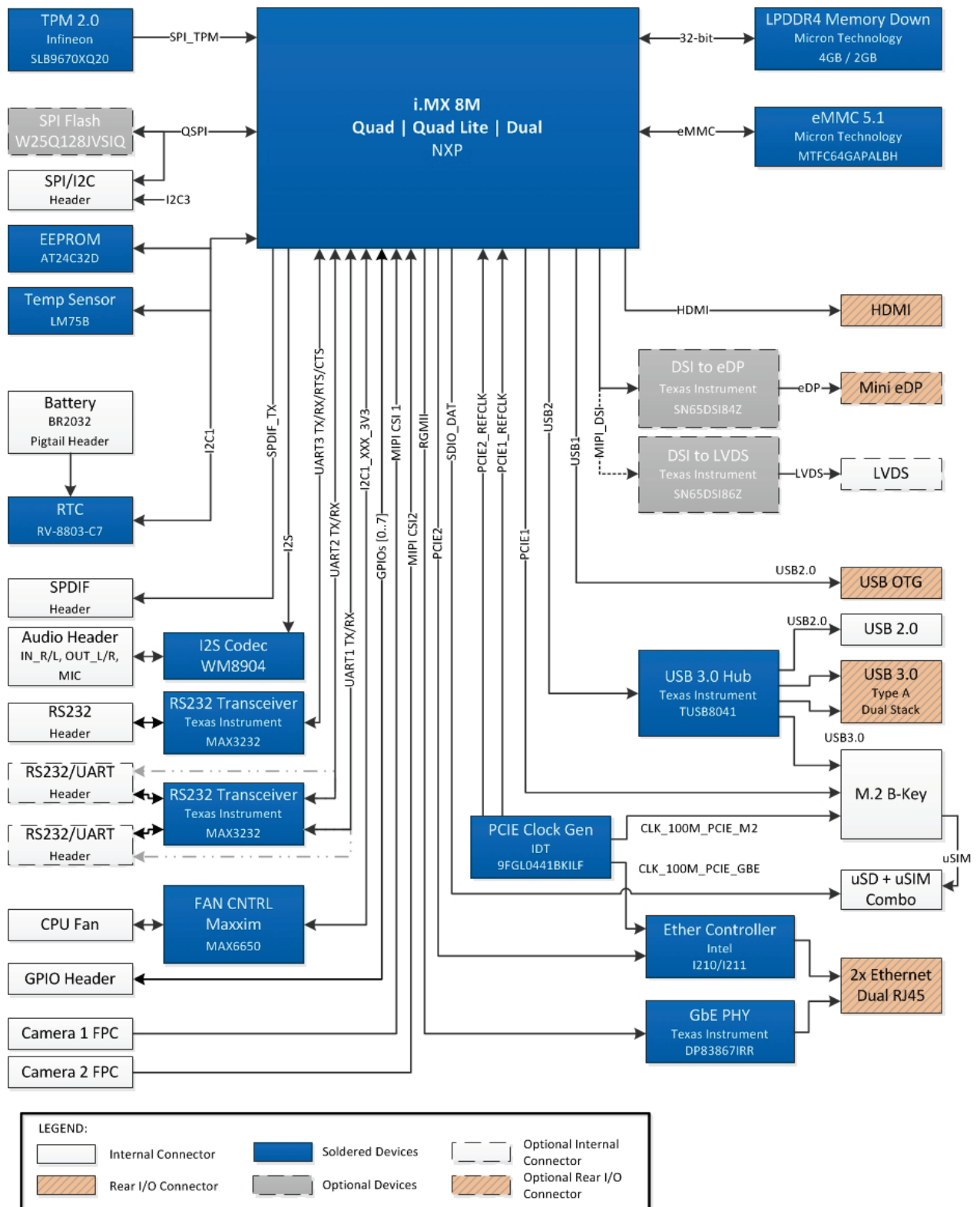
If any of the supply voltages drops below the allowed operating level longer than the specified hold-up time, all the supply voltages should be shut down and left OFF for a time long enough to allow the internal board voltages to discharge sufficiently.

If the OFF time is not observed, parts of the board or attached peripherals may work incorrectly or even suffer a reduction of MTBF.

The minimum OFF time depends on the implemented PSU model and other electrical factors and needs to be measured individually for each case.

4.3. Block Diagram

Figure 3: Block Diagram



4.4. Power Consumption

The pITX-iMX8M power consumption depends on variant used and load profile.

Table 6: Power Consumption

Power Figures SBC	44011-0208-13-2	44011-0408-13-4	44011-0216-15-2	44011-0416-15-4
iMX8 M	Industrial + VPU	Industrial + VPU	Commercial + VPU	Commercial
iMX8 M Deep Sleep Mode	200 mW			
iMX8 M Idle	400 mW			
iMX8 M Run	1000 mW – 4000 mW			
pITX Peripherals	2000 mW – 5000 mW			
1x eDP ext.	not applicable		3.3 V * 750 mA = 2475 mW	
1x LVDS IO Voltage ext.	3.3 V * 1500 mA = 4950 mW Or 5.0 V * 1500 mA = 7500 mW		not applicable	
1x LVDS Backlight ext.	12.0 V * 1500 mA = 18000 mW Or 5.0 V * 1500 mA = 7500 mW		not applicable	
1x HDMI ext	5.0 V * 50 mA = 250 mW			
1x M.2 Module ext	3.3 V * 2500 mA = 8250 mW			
2x USB 2.0 ext	2 * 5.0 V * 500 mA = 5000 mW			
2x USB 3.0 ext	2 * 5.0 V * 900 mA = 9000 mW			
2x CSI Cam ext.	2 * 350 mW (e.g. OV5640)			
1x FAN ext.	5.0 V * 80 mA = 400 mW			

iMX8 M power numbers are typical values based on typical silicon at 25°C.

Power numbers distributed to external devices are max. allowed values, partially overcurrent protected.

NOTICE

Please refer to the NXP iMX8 M datasheets and application notes like i.MX 8M Quad Power Consumption Measurement for further details.

5/ Jumpers, Switches and Connectors

5.1. Hardware Configuration Setting

This chapter gives the definitions and shows the positions of jumpers, headers and connectors. All of the configuration jumpers on the board are in the proper position. The default settings shipped from factory are marked with an asterisk (*).

In general, jumpers on the board are used to select options for certain features. Some of the jumpers are designed to be user-configurable, allowing for system enhancement. The others are for testing purpose only and should not be altered. To select any option, cover the jumper cap over (SHORT) or remove (NC) it from the jumper pins according to the following instructions. Here, NC stands for "Not Connect".

Table 7: Jumpers and Connectors

Jumpers	Function	Remark
J18	LVDS Panel Voltage	Header Type: WTB 3-Pin header 2.54 mm pitch Possible Source: Samtec TSW-103-07-L-S
J29	LVDS Backlight Voltage Select Jumper	Header Type: WTB 3-Pin header 2.54 mm pitch Possible Source: Samtec TSW-103-07-L-S
Connectors		
Connectors	Function	Remark
CPU_FAN1 (J8)	CPU FAN Connector	Header Type: WTB 3-Pin header, 1.25 mm pitch Possible Source: Molex Picoblade™ 53398-0371
LVDS (J11)	LVDS Connector	Header Type: WTB 2x20-Pin header 1.27 pitch Possible Source: Samtec SHF-120-01-L-D-SM-K-TR Mates with: Don Connex A52-40-2-G, Samtec FFTP-20 series, or similar.
DC 4-pin (J16)	Power Connector	Header Type: WTB 4-Pin header 2.5 mm pitch Possible Source: JST B4B-XH-A(LF)(SN)
DC Jack (J15)	Power Connector	Header Type: Power Jack with locking option 2.0/5.7 mm Possible Source: Kycon KLDHCX-0202-A-LT
M.2 (J1)	PCISIG M.2 Key B socket	Standard 75-pin socket
GPIO (J17)	GPIO connector	Header Type: WTB 2x6-Pin header, 2.0 mm pitch Possible Source: Molex 87758-1216
MicroUSB OTG AB (J2)	USB connector	Standard 5-pin connector
USB 3.0 (J13)	USB connector	Standard Socket: Dual Stacked Type A Socket
USB 2.0 internal (J3)	USB internal	Header Type: WTB 4-Pin header, 1.25 mm pitch, Possible Source: Molex Picoblade™ 53398-0471
Internal audio (J9)	Audio connector	Header Type: WTB 9-Pin header, 1.25 mm pitch Possible Source: Molex Picoblade™ 53398-0671
SPI (J26)	SP/I2C3 header	Header Type: WTB 10-Pin header, 1.25 mm pitch, Possible Source: Molex Picoblade™ 53398-1071
RS232 (J19)	RS232 header w/HW flow control	Header Type: WTB 5-Pin header, 1.25 mm pitch Possible Source: Molex Picoblade™ 53398-0571
RS232 (J3, J25)	RS232 header w/HW flow control	Header Type: WTB 5-Pin header, 1.25 mm pitch Possible Source: Molex Picoblade™ 53398-0571
microSIM/microSD (J12)	Dual Card Card holder microSIM/microSD	Standard

Jumpers	Function	Remark
SPDIF (J10)	SPDIF header	Header Type: WTB 3-Pin header, 1.25 mm pitch Possible Source: Molex Picoblade™ 53047-0310
Camera (J5, J6)	Camera connector	Header Type: FCP 24-Pin 0.5 pitch Possible Source: Molex 52559-2452
Battery (J22)	Battery pigtail header	Header Type: WTB 2-Pin header, 1.25 mm pitch Possible Source: Molex Picoblade™ 53047-0210

Table 8: Switch SW1

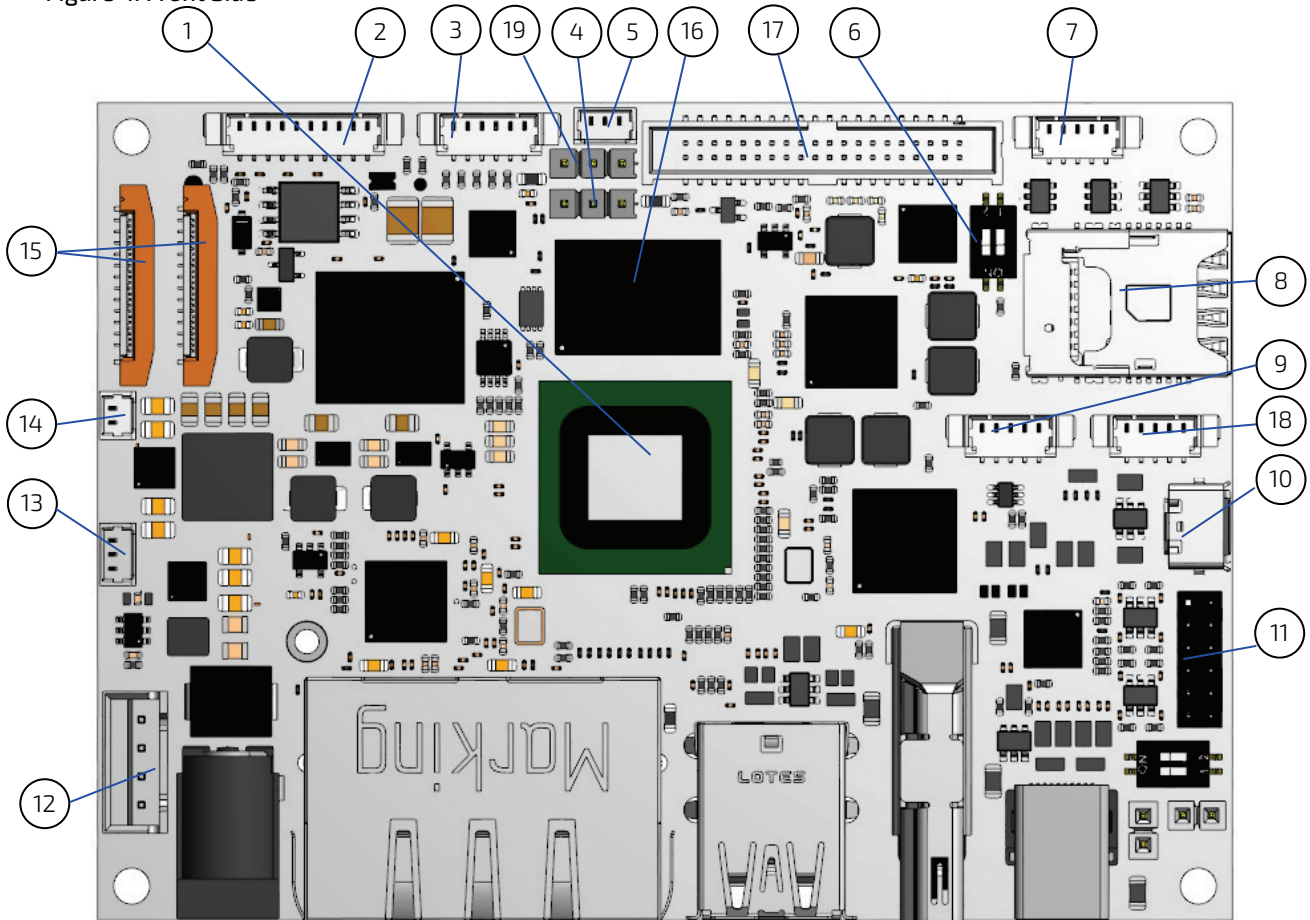
Switches	Function	Remark				
SW1.1-4	iMX8 M: Boot Select Switch Internal Boot/Boot from Fuse	SW1: 2-3	SW1: 1-4	iMX8M SCU Boot Mode 1	iMX8M SCU Boot Mode 0	Description
SW1.2-3		OFF	OFF	0	0	Boot from fuse (SD Card)
		OFF	ON	0	1	Serial Downloader
		ON	OFF	1	0	Internal Boot (eMMC)
		ON	ON	1	1	Reserved

Table 9: Switch SW2

Switches	Function	Remark		
SW2.1-4	MicroSD write protection	SW2: 1-4	iMX8M SDIO_WP	Description
		OFF	0	MicroSD card write protection is disabled.
		ON	1	MicroSD card write protection is active
SW2.2-3	iMX8 M: PCIE Spread Spectrum Clocking	SW2: 2-3	CLK_GEN_ SS_EN	Description
		OFF	0	PCle clock generator spread spectrum clock is disabled.
		ON	1	PCle clock generator -0.5% spread spectrum clocking is enabled.

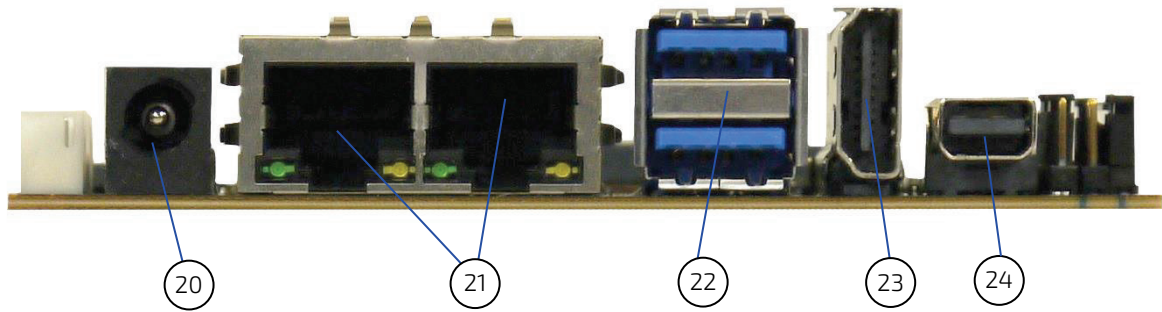
5.2. Mainboard Placement and I/O Locations

Figure 4: Front Side



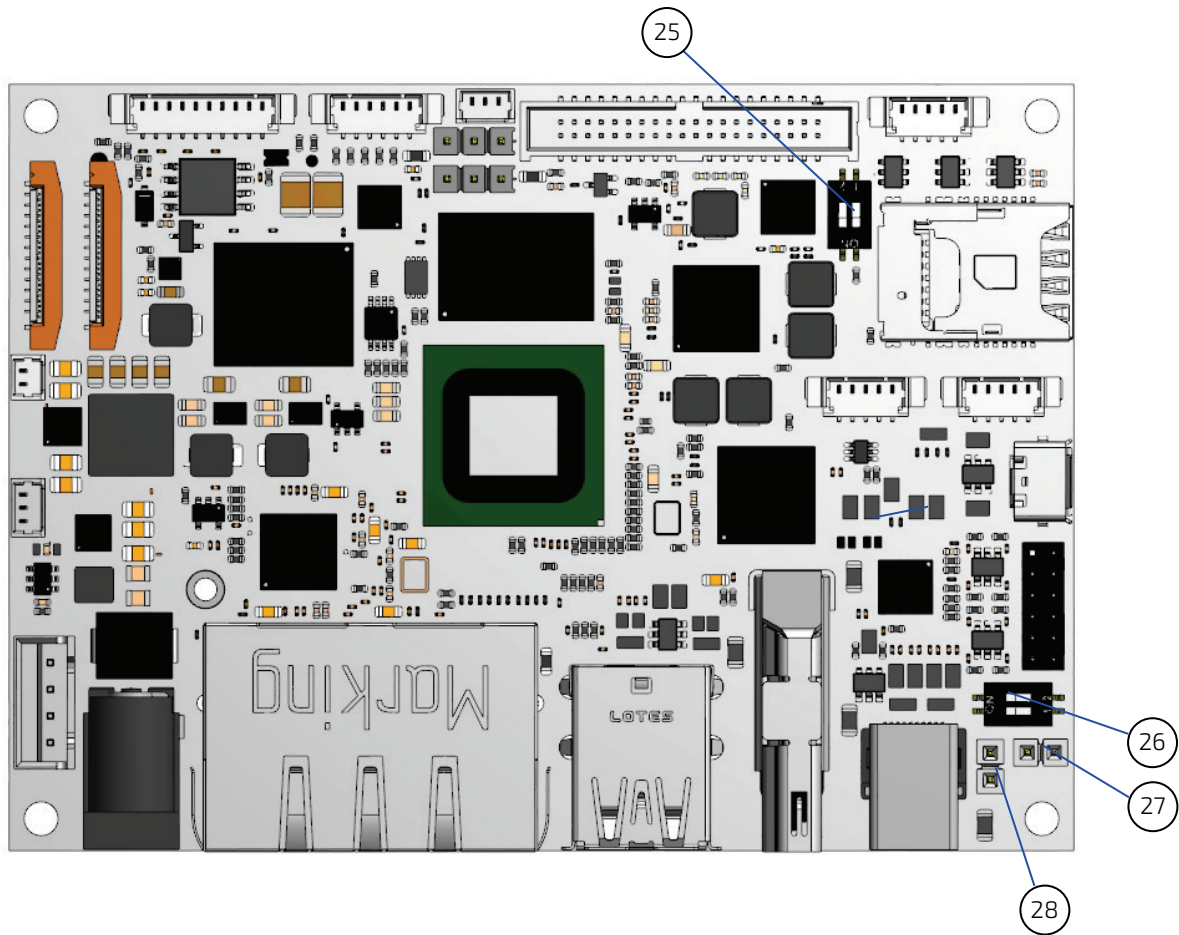
- | | | | |
|---|---------------------------|----|-------------------------------------|
| 1 | CPU | 10 | USB OTG (J28) |
| 2 | SPI/I2C header (J26) | 11 | GPIO connector (J17) |
| 3 | Internal Audio Codec (J9) | 12 | Internal DC Power connector (J16) |
| 4 | LVDS Voltage Jumper (J18) | 13 | SPDIF header (J10) |
| 5 | Fan connector (J8) | 14 | RTC Pigtail Battery Connector (J22) |
| 6 | Boot Select (SW2) | 15 | 2x Camera connector (J5, J6) |
| 7 | COM P3 (J19) | 16 | LPDDR4 memory down |
| 8 | SIM card connector (J12) | 17 | LVDS connector (J11) |
| 9 | COM P2 (J3) | 18 | COM P1 (J25) |
| | | 19 | LVDS Backlight Select Jumper (J29) |

Figure 5: Interfaces



- 20 DC Power Jack
- 21 2x Ethernet
- 22 2x USB 3.0
- 23 HDMI
- 24 Mini DP

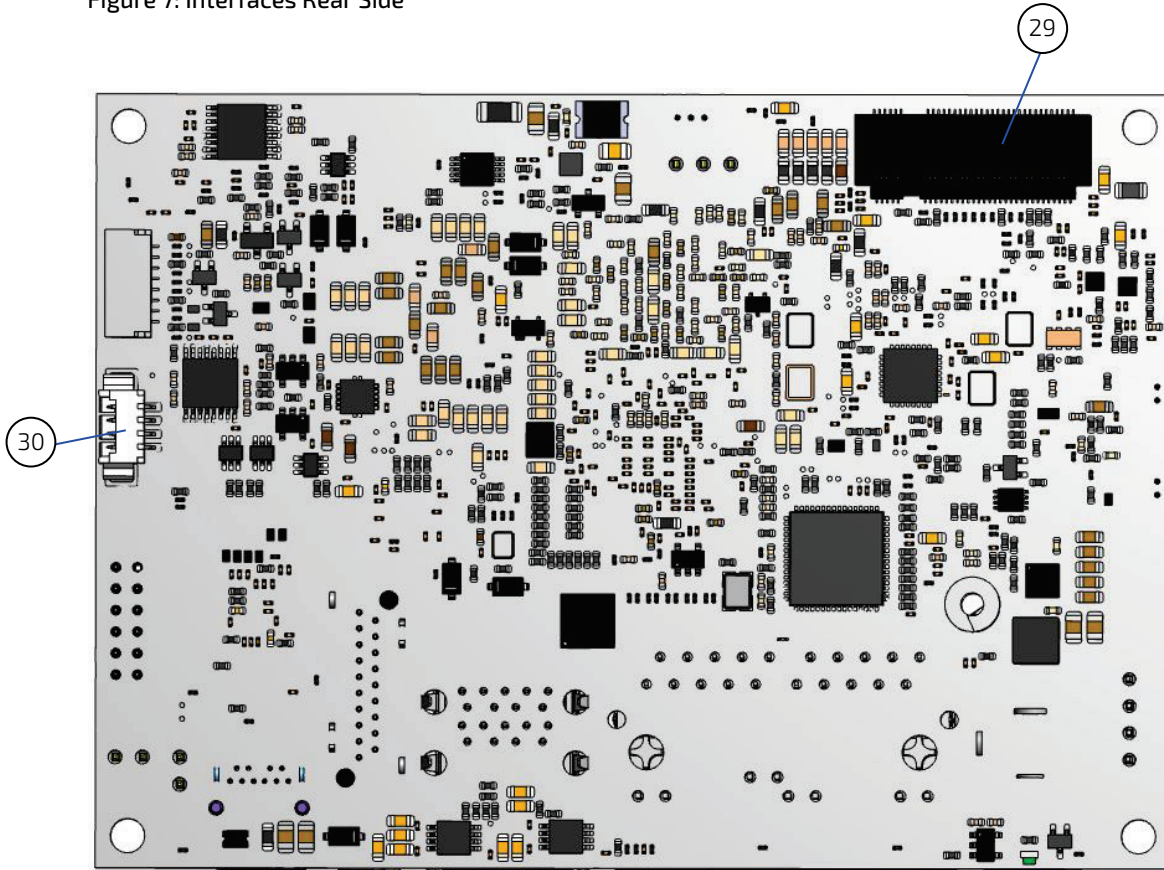
Figure 6: Front View Jumpers/Switches



- 25 Switch MicroSD (SW2)
- 26 Switch Boot Select (SW1)
- 27 External ON/OFF (J24)
- 28 External Reset (J23)

5.2.1. Interfaces Rear Side

Figure 7: Interfaces Rear Side



29 M.2 Socket Key B

30 USB 2.0 P4

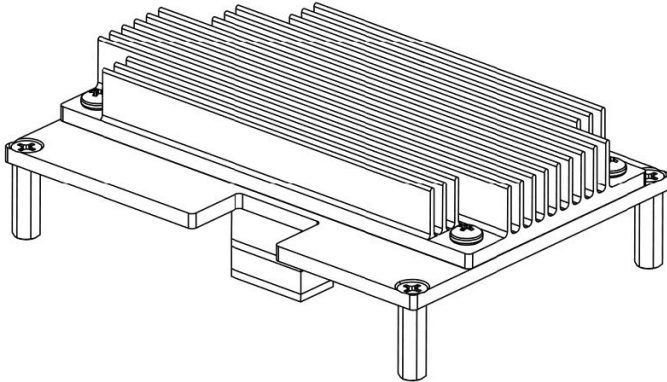
5.3. Cooler Solutions

CAUTION

pITX-iMX8M should only operated with a suitable heat sink. Allow to cool down after operation.

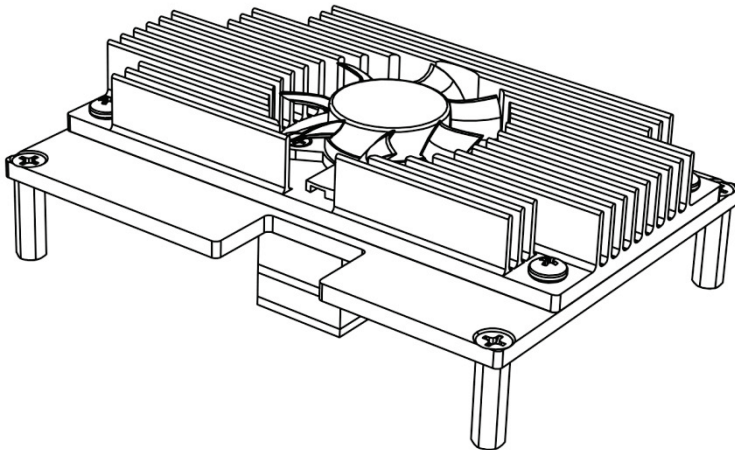
5.3.1. Passive Cooler (1064-7069)

Figure 8: Passive Cooler



5.3.2. Active Cooler (1064-8396)

Figure 9: Active Cooler



6/ Hardware Specifications

6.1. Processor Support

The i.MX 8M family of applications processors based on Arm® Cortex®-A53 and Cortex-M4 cores provide audio, voice and video processing for applications that scale from commercial home audio to industrial building automation and mobile computers. The processors offer:

- ▶ Video quality with full 4K UltraHD resolution and HDR (HDR10 and HLG)
- ▶ optimized for fanless operation and low thermal system cost
- ▶ flexible memory options

The pITX-iMX8M supports the listed embedded SKUs:

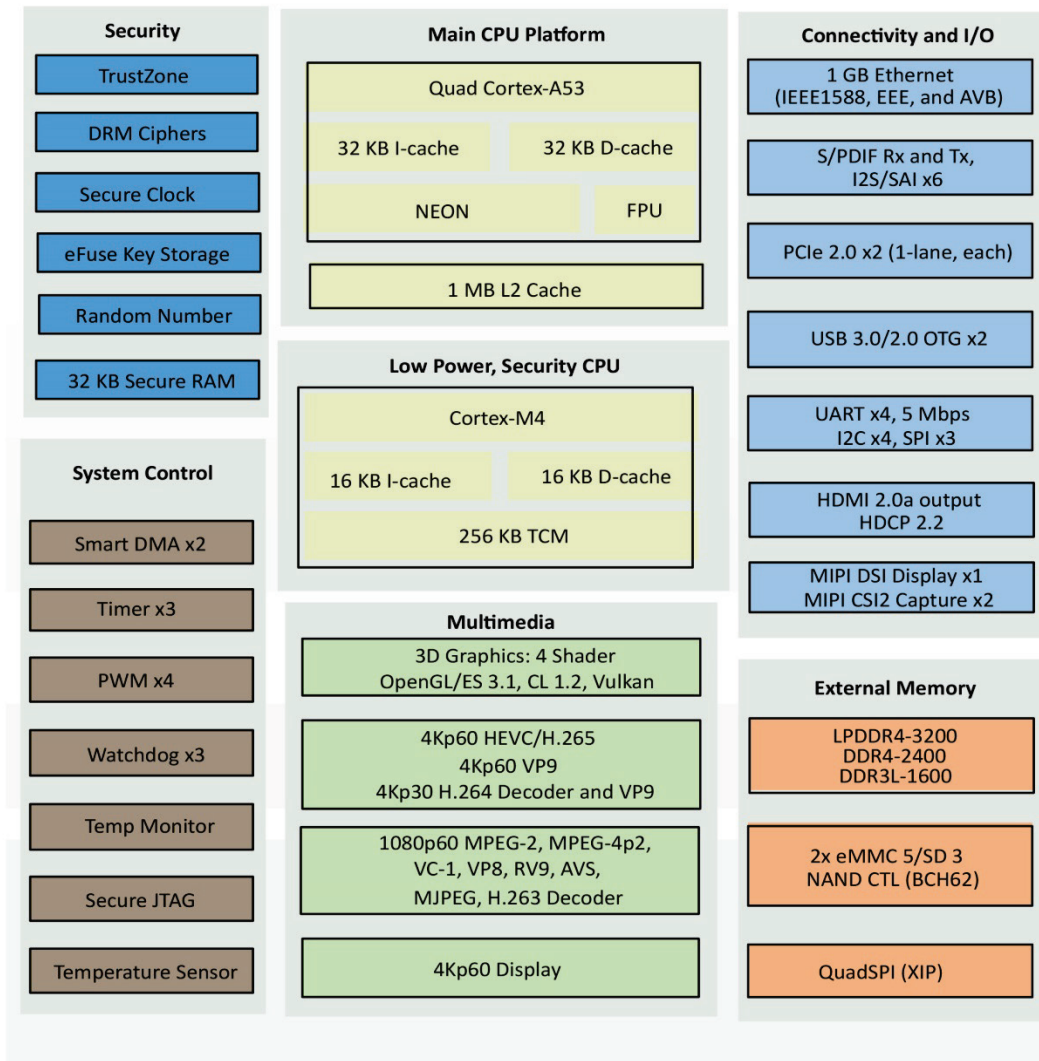
- ▶ i.MX 8M Quad (1.3/1.5 GHz, Industry/Commercial)
- ▶ i.MX 8M Dual (1.3/1.5 GHz, Industry/Commercial)

Kontron has defined the board versions as listed in the following table, so far all based on Embedded CPUs.

Table 10: Processor Support

Name	Speed (GHz)	Cache	Tj	Cores	Function
i.MX 8M Quad	1.3	1 MB unified L2 cache	-40 to +105 °C	4	GPU, VPU, HDR10 encoding
i.MX 8M Quad	1.5	1 MB unified L2 cache	0 °C to 95 °C	4	GPU, VPU, HDR10 encoding
i.MX 8M Dual	1.3	1 MB unified L2 cache	-40 to +105 °C	2	GPU, VPU, HDR10 encoding
i.MX 8M Dual	1.5	1 MB unified L2 cache	0 °C to 95 °C	2	GPU, VPU, HDR10 encoding

Figure 10: Block Diagram i.MX8M processor (Source: NXP)



6.2. System Memory Support

The pITX-iMX8M board supports a 32-bit DRAM interface LPDDR4 memory interface. The integrated memory controller can support memory speeds up to 3200 MT/s. Maximum memory supported is 4 GB.



If using 32 Bit OS, less than 4 GB are displayed in the system (Shared Video Memory/PCI resources are subtracted).

6.3. MicroSD and MicroSIM (J12)

The pITX-iMX8M board supports micro SD cards via micro SD/micro SIM combo connector.

The micro SD card interface supports the following transfer modes:

- ▶ SD 1-bit
- ▶ SD 4-bit
- ▶ SD/SDIO full speed mode up to 25 MHz
- ▶ SD/SDIO high speed mode up to 50 MHz
- ▶ SD/SDIO UHS-I mode up to 208 MHz in SDR mode and up to 50 MHz in DDR mode.

NOTICE

Micro SD Card write protection switchable via SW2: 1-4

Figure 11: Combo Connector for MicroSD and MicroSIM

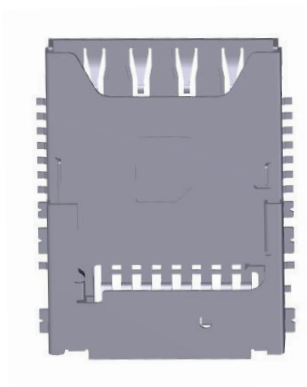


Table 11: Pin Assignment MicroSIM Combo Socket

Pin	Function	Direction	Description
S1	V_UIM_PWR	Power	
S2	UIM_RST	Out	
S3	UIM_CLK	Out	
S4	NC		
S5	GND	Ground	
S6	NC		
S7	UIM_DATA	In/Out	
S8	NC		
T1	SDIO_DAT2	In/Out	
T2	SDIO_DAT3	In/Out	
T3	SDIO_CMD	In/Out	
T4	V_3V3_SD	Power	+3.3V
T5	SDIO_CLK	In/Out	
T6	GND	Ground	
T7	SDIO_DAT0	In/Out	

Pin	Function	Direction	Description
T8	SDIO_DAT1	In/Out	
SW	SDIO_CD#	In	SD card detect
G1-G8	GND	Ground	

6.4. Ethernet Connectors (I/O area, J4)

The piTX-iMX8M supports two channels of 10/100/1000 Mbit/s Ethernet (ETH0 to ETH1).

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

Figure 12: Ethernet Connector RJ-45 Jack with Integrated Magnetic



Table 12: Pin Assignment Dual Ethernet

Pin	Function
ETH0 1	ETHERNET PORT 0_MDIO0+
ETH0 2	ETHERNET PORT 0_MDIO0-
ETH0 3	ETHERNET PORT 0_MDIO1+
ETH0 6	ETHERNET PORT 0_MDIO1-
ETH0 4	ETHERNET PORT 0_MDIO2+
ETH0 5	ETHERNET PORT 0_MDIO2-
ETH0 7	ETHERNET PORT 0_MDIO3+
ETH0 8	ETHERNET PORT 0_MDIO3-
ETH1 1	ETHERNET PORT 1_MDIO0+
ETH1 2	ETHERNET PORT 1_MDIO0-
ETH1 3	ETHERNET PORT 1_MDIO1+
ETH1 6	ETHERNET PORT 1_MDIO1-
ETH1 4	ETHERNET PORT 1_MDIO2+
ETH1 5	ETHERNET PORT 1_MDIO2-
ETH1 7	ETHERNET PORT 1_MDIO3+
ETH1 8	ETHERNET PORT 1_MDIO3-

6.4.1. ETH0 LEDs

Table 13: ETH0 LED Signal Description

Left RJ45 LEDs	Function
Green	Off = no receive or transmit activities On = receive or transmit activity
Yellow	Off = no link, 10/100Base-T Link On = 1000Base-T Link

6.4.2. ETH1 LEDs

Table 14: ETH1 LED Signal Description

Right RJ45 LEDs	Function
Green	Off = no receive or transmit activities Blinking = receive or transmit activity On = link established
Yellow	Off = no link, 10/100Base-T Link On = 1000Base-T Link

6.5. USB Connectors

pITX-iMX8M board supports a dual-stacked USB3.0 interface with 5 Gbps speed. The following connections are available:

- ▶ 1x Dual-stacked USB3.0 Type A at rear I/O
- ▶ 1x Dual internal USB2.0
- ▶ 1x USB OTG

6.5.1. USB Connectors (I/O area, J13)

Figure 13: USB 2.0/3.0 socket

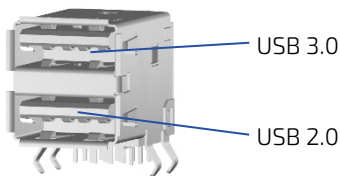


Table 15: Pin Assignment Dual USB

Pin	Connector Pin	Direction	Description
1	VBUS_BOT	POWER	USB 5V Power Distribution to downstream device.
2	USB_BOT_D-	BIDIR	USB3 HUB P2 differential USB 2.0 data pairs.
3	USB_BOT_D+	BIDIR	

Pin	Connector Pin	Direction	Description
4	GND_BOT	GROUND	Ground
5	USB_BOT_SSRX-	INPUT	USB3 HUB P2 differential USB 3.0 receive data pairs.
6	USB_BOT_SSRX+	INPUT	
7	GND_DRAIN_BOT	GROUND	Ground
8	USB_BOT_SSTX-	OUTPUT	USB3 HUB P2 differential USB 3.0 transmit data pairs.
9	USB_BOT_SSTX+	OUTPUT	
10	VBUS_TOP	POWER	USB 5V Power Distribution to downstream device.
11	USB_TOP_D-	BIDIR	USB2 differential USB 2.0 data pairs.
12	USB_TOP_D+	BIDIR	
13	GND_TOP	GROUND	Ground
14	USB_TOP_SSRX-	INPUT	USB2 differential USB 3.0 receive data pairs.
15	USB_TOP_SSRX+	INPUT	
16	GND_DRAIN_TOP	GROUND	Ground
17	USB_TOP_SSTX-	OUTPUT	USB2 differential USB 3.0 receive data pairs.
18	USB_TOP_SSTX+	OUTPUT	

Table 16: Signal Description

Signal	Description
USBn+ USBn- RXn+ RXn- TXn+ TXn-	Differential pair works as serial differential receive/transmit data lines. Change to: USB2.0 (n=0,1,2,3), USB3.0 (n=0,1)
5 V/SB5 V	5 V supply for external devices. SB5 V is supplied during power-down to allow wakeup on USB device activity. Protected by a 2 A current limiting IC (1 A for each port).

For USB2.0 cabling it is required to use only HiSpeed USB cable, specified in USB2.0 standard:

6.5.2. USB internal (J2)

Figure 14: USB Internal Connector

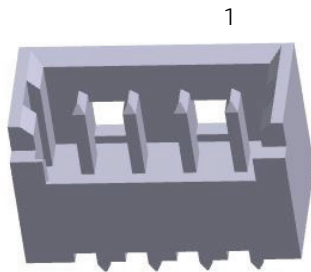


Table 17: USB Internal Connection

Pin	Function	Direction	Description
1	GND	Ground	
2	USB3_P4_D+	In/Out	
3	USB3_P4_D-	In/Out	
4	V_5V0_USB	Power	VBUS +5.0V power distribution 500 mA max

6.5.3. USB OTG (J28)

Figure 15: USB OTG Connector

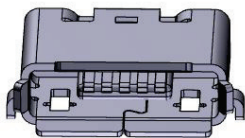


Table 18: USB OTG Connection

Pin	Function	Direction	Description
1	V_5V0_USB1	Power	VBUS +5.0 V power distribution 500 mA max, if ID pin is high.
2	USB1_OTG_D-	In/Out	
3	USB1_OTG_D+	In/Out	
4	USB1_OTG_ID	In	USB1 OTG ID pin. ID pin = low, iMX8M USB1 operates in USB 2.0 Endpoint mode. ID pin = high, iMX8M USB1 operates in USB 2.0 Host mode
5	GND	Ground	

6.6. Fan Connector (internal, J8)

The fan can be used to actively cool the heatsink mounted on the board. The fan rotation speed can be monitored and the fan speed controlled by the temperature of the PCB (near SoC).

Figure 16: 3-pin Fan Connector

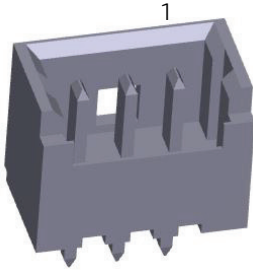


Table 19: Fan Header Mapping

Pin	Function	Direction	Description
1	FAN TACHOIN	IN	Tachometer input from FAN, pulled high to +3.3V
2	+5V FAN	Power	
3	RTN 5V	IN	Return path to GND, static low or pulsed

Table 20: Signal Description

Signal	Description
GND	Power Supply GND signal
TACHO	Tacho input signal from the fan, for rotation speed supervision RPM (Rotations Per Minute).

6.7. DC Power Supply Connector Options

Either the DC Power Jack Connector (12 Vin Ext.) or the "12 Vin Int." connector must be used to supply the board with +12 V +/-10 %.

⚠ CAUTION

The board can be supplied via the AC/DC adapter plugged into the power jack. Such adapters have usually no connection to protective earth. Consequently, the potential of the conductive parts on the board may drift. If a human touches such a part, this may lead to an electric shock. The board must be grounded separately, if the unit is supplied via power jack.

⚠ WARNING

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

NOTICE

To protect the external power lines of peripheral devices make sure that

- ▶ the wires have the right diameter to withstand the maximum available current.
- ▶ to enclosure of the peripheral device fulfills the fire-protecting conditions of IEC/EN 60950.

6.7.1. DC Power Jack Connector (12 Vin Ext., J15)

The piTX-iMX8M operates with a 12 V DC +/- 10% power supply.

Figure 17: Power Jack Connector

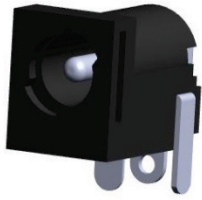


Table 21: Power Jack Connector

Pin	Function	Direction
1	VIN 12VDC	
2	RTN_12V	Ground
3	RTN_12V	Ground

The 12 Vin Ext. power connector has Vin to the center pin and mates with Ø 6.3 mm DC Power jack with Ø 2.0 mm pin hole. (DC Connector RA 2 mm locking type). Maximum allowed current is 5 A.

6.7.2. Internal Power Connector (Vin Int., J16)

Figure 18: Internal Power Connector

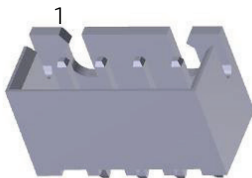


Table 22: Internal Power Connector

Header	Pin	Signal	Description
1	+12 V	+12 V power input	PWR
2	+12 V	+12 V power input	PWR
3	RTN_12V	Power Ground	PWR
4	RTN_12V	Power Ground	PWR

Maximum allowed current on each pin is 5 A.

6.8. Pigtail Battery Header (J22)

The 2-pin header has a 1.25 mm pitch.

Figure 19: Pigtail Battery Header

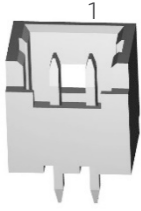


Table 23: Pin Assignment

Pin	Signal
1	V_BAT
2	GND

6.9. GPIO Connector (internal, J17)

Figure 20: GPIO Connector

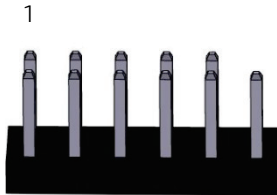


Table 24: GPIO Connector

Pin	Function	Direction	Description
1	V_3V3_S0	Power	
2	GPIO0	IN/OUT	Connects to iMX8M
3	GPIO1	IN/OUT	
4	GPIO2	IN/OUT	
5	GPIO3	IN/OUT	
6	GPIO4	IN/OUT	
7	GPIO5	IN/OUT	
8	GPIO6	IN/OUT	
9	GPIO7	IN/OUT	
10	GND	Ground	
11	GND	Ground	
12	V_BAT_GPIO	Power	Connects to RTC battery power rail.

6.10. Jumper LVDS Panel Voltage (J18)

Figure 21: LVDS Panel Voltage

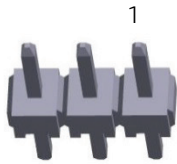


Table 25: LVDS Panel Voltage

Pin	Function	Direction
1	V_5V_S0	Power
2	V_5V0_3V3_JP	Power
3	V_3V3_S0	Power



Function:

Pin 1-2: 5V LVDS Panel Voltage is 5.0 V

Pin 2-3: 3.3V LVDS Panel Voltage (Default)

6.11. Jumper LVDS Backlight Voltage (J29)

Figure 22: LVDS Backlight Voltage Select Jumper

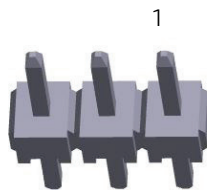


Table 26: LVDS Panel Voltage

Pin	Function	Direction
1	V_5V_S0	Power
2	V_5V0_12V_BL_JP	Power
3	V_12V_S0	Power



Function:

Pin 1-2: LVDS backlight voltage is +5.0 V

Pin 2-3: LVDS backlight voltage is +12.0 V (Default)

6.12. Switches

6.12.1. Boot Select (SW1)

The Boot Select Switch SW 1 determines the iMX8M boot modes.

Table 27: Boot Select Switch (SW1)

SW1: 2-3	SW1: 1-4	iMX8M SCU Boot Mode 1	iMX8M SCU Boot Mode 0	Description
OFF	OFF	0	0	Boot from fuse (default)
OFF	ON	0	1	Serial Downloader
ON	OFF	1	0	Internal Boot (Development)
ON	ON	1	1	Reserved

6.12.2. MicroSD Card Write Protection (SW2)

Table 28: MicroSD Card Write Protection Switch

SW2: 1-4	SDIO_WP	Description
OFF	0	MicroSD card write protection is disabled.
ON	1	MicroSD card write protection is active

6.12.3. PCIe Spread Spectrum Clocking -0.5% (SW2: 2-3)

Table 29: PCIe Spread Spectrum Clocking -0.5% Switch

SW2: 2-3	CLK_GEN_SS_EN	Description
OFF	0	PCIe clock generator spread spectrum clock is disabled.
ON	1	PCIe clock generator -0.5% spread spectrum clocking is enabled.

6.13. Buttons

6.13.1. External ON-OFF Button (J24)

Table 30: External ON-OFF Button

Pin	Function	Direction
1	ON-OFF	IN
2	GND	Ground

6.13.2. External Reset (J23)

Table 31: External Reset Button

Pin	Function	Direction
1	RESET#	IN
2	GND	Ground

6.14. LVDS (Industrial Variant, internal, J11)

Figure 23: LVDS Connector (optional)



Table 32: LVDS Pin Assignment

Pin	Function	Direction	Description
1	V_12V_LVDS_BS	Power	+12V LVDS Backlight Circuit Supply
2	V_12V_LVDS_BS	Power	+12V LVDS Backlight Circuit Supply
3	V_12V_LVDS_BS	Power	+12V LVDS Backlight Circuit Supply
4	V_12V_LVDS_BS	Power	+12V LVDS Backlight Circuit Supply
5	V_12V_LVDS_BS	Power	+12V LVDS Backlight Circuit Supply
6	GND	Ground	
7	V_12V_LVDS_BS	Power	+12V LVDS Backlight Circuit Supply
8	GND	Ground	
9	V_LVDS	Power	LVDS IO voltage, +3.3V or +5.0V
10	V_LVDS	Power	LVDS IO voltage, +3.3V or +5.0V
11	I2C1 SCL 3V3	Out	I2C1 Serial Clock
12	I2C1 SDA 3V3	In/Out	I2C1 Serial Data
13	LVDS BL PWM	Out	LVDS Backlight PWM
14	LVDS VDD EN	Out	LVDS VDD Enable
15	LVDS BL EN	Out	LVDS Backlight Enable
16	GND	Ground	
17	LVDS0_0-	Out	LVDS channel 0, lane 0, negative
18	LVDS0_0+	Out	LVDS channel 0, lane 0, positive
19	LVDS0_1-	Out	LVDS channel 0, lane 1, negative
20	LVDS0_1+	Out	LVDS channel 0, lane 1, positive
21	LVDS0_2-	Out	LVDS channel 0, lane 2, negative
22	LVDS0_2+	Out	LVDS channel 0, lane 2, positive
23	LVDS0_CK-	Out	LVDS channel 0, clock, negative

Pin	Function	Direction	Description
24	LVDS0_CK+	Out	LVDS channel 0, clock, positive
25	LVDS0_3-	Out	LVDS channel 0, lane 3, negative
26	LVDS0_3+	Out	LVDS channel 0, lane 3, positive
27	GND	Ground	
28	GND	Ground	
29	LVDS1_0-	Out	LVDS channel 1, lane 0, negative
30	LVDS1_0+	Out	LVDS channel 1, lane 0, positive
31	LVDS1_1-	Out	LVDS channel 1, lane 1, negative
32	LVDS1_1+	Out	LVDS channel 1, lane 1, positive
33	LVDS1_2-	Out	LVDS channel 1, lane 2, negative
34	LVDS1_2+	Out	LVDS channel 1, lane 2, positive
35	LVDS1_CK-	Out	LVDS channel 1, clock, negative
36	LVDS1_CK+	Out	LVDS channel 1, clock, positive
37	LVDS1_3-	Out	LVDS channel 1, lane 3, negative
38	LVDS1_3+	Out	LVDS channel 1, lane 3, positive
39	GND	Ground	
40	GND	Ground	

6.15. HDMI connector (J7)

CAUTION

HDMI or general connectors: connect only approved devices

Figure 24: 19-pin HDMI connector

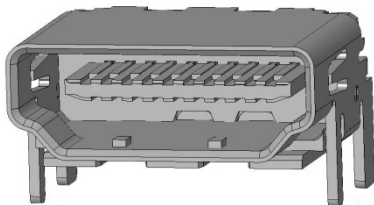


Table 33: HDMI Mapping

Pin	Function	Direction	Description
1	HDMI_D2_+	Out	TMDS Link Channel 2
2	GND	Ground	
3	HDMI_D2_-	Out	
4	HDMI_D1_+	Out	TMDS Link Channel 1
5	GND	Ground	
6	HDMI_D1_-	Out	
7	HDMI_D0_+	Out	TMDS Link Channel 0
8	GND	Ground	
9	HDMI_D0_-	Out	

Pin	Function	Direction	Description
10	HDMI_D3_+	Out	TMDS Clock Channel
11	GND	Ground	
12	HDMI_D3_-	Out	
13	HDMI_CEC	In/Out	
14	HDMI_AUX_-	In	Optional usage as Audio Return Channel
15	HDMI_DDC_SCL	Out	HDMI DDC Serial Clock
16	HDMI_DDC_SDA	In/Out	HDMI DDC Serial Date
17	GND	Ground	
18	V_5V0_HDMI	Power	
19	HDMI_AUX_+/HPD	In	Hot plug detect, optional usage as Audio Return Channel

6.16. Mini Display Port (J14)

Figure 25: Mini Display Port

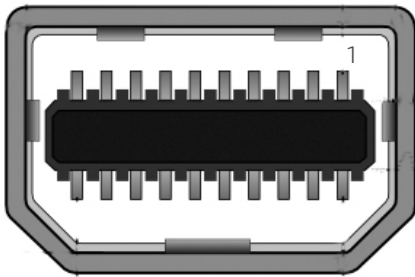


Table 34: Mini Display Port

Pin	Function	Direction	Description
1	GND	Ground	
2	HOT_PLUG	In	
3	DPO TX0+	Out	
4	NC	n.a	Config 1 is not connected
5	DPO TX0-	Out	
6	GND	Ground	Config 2 is pulled to GND
7	GND	Ground	
8	GND	Ground	
9	DPO TX1+	Out	
10	DPO TX3+	Out	
11	DPO TX1-	Out	
12	DPO TX3-	Out	
13	GND	Ground	
14	GND	Ground	

Pin	Function	Direction	Description
15	DP0 TX2+	Out	
16	DP0 AUX+	In/Out	
17	DP0 TX2-	Out	
18	DP0 AUX-	In/Out	
19	GND	Ground	
20	DP Power	Power Out	+3.3V, 0.75A max

6.17. SPDIF Internal Audio Header (J10)

Figure 26: SPDIF Internal Header with 3 pins

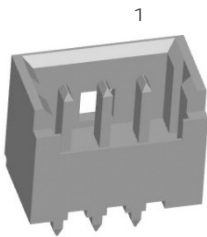


Table 35: Pin Assignment

Pin	Function	Direction	Description
1	V_3V3_S0_SPDIF	Power	Fused 3.3 V power distribution. I max 0.75 A.
2	SPDIF	Out	Sony/Philips Digital Interface 3.3 V VIO (other levels below +3.3 V VIO are possible via resistor divider, assembly option)
3	GND	Ground	

NOTICE

SPDIF is a Sony/Philips Digital Interface 3.3 V VIO. Other levels below +3.3 V VIO are possible via resistor divider (assembly option).

6.18. Internal audio (J9)

Figure 27: Internal Audio Header with 6 pins

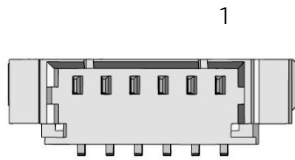


Table 36: Pin Assignment

Pin	Function
1	Line-Out Right
2	Audio GND
3	Line-Out Left
4	Line-In Right
5	Microphone In
6	Line-In Left

6.19. SPI/I2C3 (J26)

Table 37: SPI/I2C Pin Assignment

Pin	Function	Direction	Description
1	I2C3_SCL_3V3	Out	
2	GND		
3	I2C3_SDA_3V3	In/Out	
4	NC		
5	QSPI_IO1 (MISO)	In/Out	
6	V_3V3_SPI	Power	+3.3V fused power rail,
7	QSPI_CLK	In/Out	
8	QSPI_IO0 (MOSI)	In/Out	
9	QSPI_CS#	In/Out	
10	GND	Ground	

6.20. M.2 Connector (B-Key) (J1)

Figure 28: M.2 Connector (B-Key)

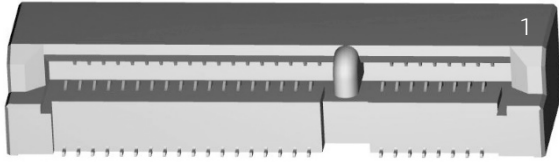


Table 38: Pin Assignment

Signal/Function	M.2 Signal	Pin	Pin	M.2 Signal	Signal/Function
V_3V3_M2, +3.3V S0 filtered	3.3V	2	1	CONFIG_3	M2_CONFIG_3, Pull-up to 3.3V S0
V_3V3_M2 (V_3V3_S0)	3.3V	4	3	GND	GND
M2_FULL_CARD_POWER_OFF# pulled up to V_3V3_M2	FULL_CARD_POWER_OFF# (O) (0/1.8V or 3.3V)	6	5	GND	GND
W_DISABLE# Pulled up to V_3V3_M2 iMX8M GPIO5_I029 (ALT5)	W_DISABLE1# (O) (0/3.3V)	8	7	USB_D+	USB3_M2_D+
NC	GPIO_9/DAS/DSS# (I/O)/LED# (I) (0/3.3V)	10	9	USB_D-	USB3_M2_D-
NC	Connector Key	12	11	GND	GND
NC	Connector Key	14	13	Connector Key	NC
NC	Connector Key	16	15	Connector Key	NC
NC	Connector Key	18	17	Connector Key	NC
NC	GPIO_5 (I/O)(0/1.8V)	20	19	Connector Key	NC
NC	GPIO_6 (I/O)(0/1.8V)	22	21	CONFIG_0	M2_CONFIG_0, Pull-up to 3.3V M2
NC	GPIO_7 (I/O)(0/1.8V)	24	23	GPIO_11 (I/O)(0/1.8V)	
NC	GPIO_10 (I/O)(0/1.8V)	26	25	DPR (O) (0/1.8V)	
NC	GPIO_8 (I/O)(0/1.8V)	28	27	GND	GND
UIM_RST	UIM-RESET (I)	30	29	PERn1/USB3.0-Rx-/SSIC-RxN	USB3_SSRX_M2-
UIM_CLK	UIM-CLK (I)	32	31	PERp1/USB3.0-Rx+/SSIC-RxP	USB3_SSRX_M2+
UIM_DATA	UIM-DATA (I/O)	34	33	GND	GND
UIM_PWR	UIM-PWR (I)	36	35	PETn1/USB3.0-Tx-/SSIC-TxN	USB3_SSTX_M2-

Signal/Function	M.2 Signal	Pin	Pin	M.2 Signal	Signal/Function
NC	DEVSLP (O)	38	37	PETp1/USB3.0-Tx+/SSIC-TxP	USB3_SSTX_M2+
I2C2_SCL_1V8	GPIO_0 (I/O)(0/1.8V)	40	39	GND	GND
I2C2_SDA_1V8	GPIO_1 (I/O)(0/1.8V)	42	41	PERn0/SATA-B+	PCIE_M2_RX_+
NC	GPIO_2 (I/O)(0/1.8V)	44	43	PERp0/SATA-B-	PCIE_M2_RX_-
NC	GPIO_3 (I/O)(0/1.8V)	46	45	GND	GND
NC	GPIO_4 (I/O)(0/1.8V)	48	47	PETn0/SATA-A-	PCIE_M2_TX_-
M2_PERST# IMX8M GPIO1_IO09	PERST# (O) (0/3.3V)	50	49	PETp0/SATA-A+	PCIE_M2_TX_+
CLK_M2_CLKREQ# Pulled up to V_3V3_S0 9FGL0441.OE#	CLKREQ# (I/O) (0/3.3V)	52	51	GND	GND
PCIE_WAKE# Pulled up to V_3V3_S0 IMX8M GPIO1_IO08	PEWAKE# (I/O) (0/3.3V)	54	53	REFCLKn	CLK_100M_PCIE1_ M2_- 9FGL0441.OUT-
NC	N/C	56	55	REFCLKp	CLK_100M_PCIE1_ M2_+ 9FGL0441.OUT2+
NC	N/C	58	57	GND	GND
NC	COEX3 (I/O) (0/1.8V)	60	59	ANTCTL0 (I) (0/1.8V)	NC
NC	COEX2 (I/O) (0/1.8V)	62	61	ANTCTL1 (I) (0/1.8V)	NC
NC	COEX1 (I/O) (0/1.8V)	64	63	ANTCTL2 (I) (0/1.8V)	NC
SIM_DETECT Pull- down to GND Optional Pull-up is not assembled	SIM DETECT (O)	66	65	ANTCTL3 (I) (0/1.8V)	NC
NC	SUSCLK (32kHz) (O) (0/3.3V)	68	67	RESET# (O) (0/1.8V)	M2_PCIE_RESET# Pull-up to +3.3V S0
V_3V3_M2, +3.3V S0 filtered	3.3V	70	69	CONFIG_1	M2_CONFIG_1, Pull-up to +3.3V S0
V_3V3_M2, +3.3V S0 filtered	3.3V	72	71	GND	GND
V_3V3_M2, +3.3V S0 filtered	3.3V	74	73	GND	GND
			75	CONFIG_2	M2_CONFIG_2, Pull-up to +3.3V S0

6.21. Serial COM P1 (J25)

Figure 29: Serial Wafer Socket COM P1

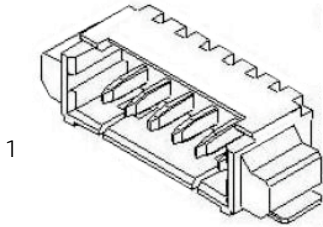


Table 39: Pin Assignment

Pin	Signal	Direction
1	RS232_P1_TXD	OUT
2	RS232_P1_RXD	IN
3	NC	
4	NC	
5	GND	Ground

6.22. Serial COM P2 (J3)

Figure 30: Serial Wafer Socket COM P2

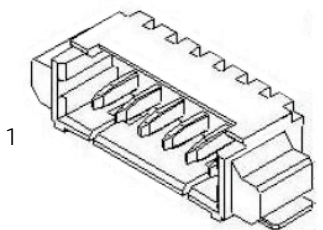


Table 40: Pin Assignment

Pin	Signal	Direction
1	RS232_P2_TXD	OUT
2	RS232_P2_RXD	IN
3	NC	
4	NC	
5	GND	Ground

Table 41: Pin Assignment (assembly option)

Pin	Signal	Direction
1	NC	
2	NC	
3	RS232_P2_TXD	OUT
4	RS232_P2_RXD	IN
5	GND	Ground

6.23. Serial COM P3 (J19)

Figure 31: Serial Wafer Socket COM P3

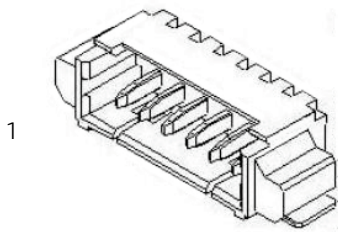


Table 42: Pin Assignment RS232 only

Pin	Signal	Direction
1	RS232_P3_TXD	OUT
2	RS232_P3_RXD	IN
3 1	RS232_P3_RTS#	OUT
4	RS232_P3_CTS#	IN
5	GND	Ground

6.24. Camera connector (J5, J6)

Figure 32: 24-pin Camera CSI Connector



Table 43: Pin Assignment (J5)

Pin	Signal	Direction
1	NC	
2	V_2V8_CAM1_S0	Power

Pin	Signal	Direction
3	CSI1_RX0-	In
4	NC	
5	CSI1_RX0+	In
6	NC	
7	CSI1_CK-	In
8	NC	
9	CSI1_CK+	In
10	GND	
11	CSI1_RX1-	In
12	CAM_XCLK_1V8_CAM1	Out
13	CSI1_RX1+	In
14	V_1V8_S0_CSI1	Power
15	V_1V5_CAM_CSI1	Power
16	NC	
17	CSI_P1_PWDN_1V8	Out
18	NC	
19	CSI_P1_RST_1V8#	Out
20	I2C1_SCL_1V8	Out
21	V_2V8_CAM1_S0	
22	I2C1_SDA_1V8	In/Out
23	GND	Ground
24	NC	

Table 44: Pin Assignment (J6)

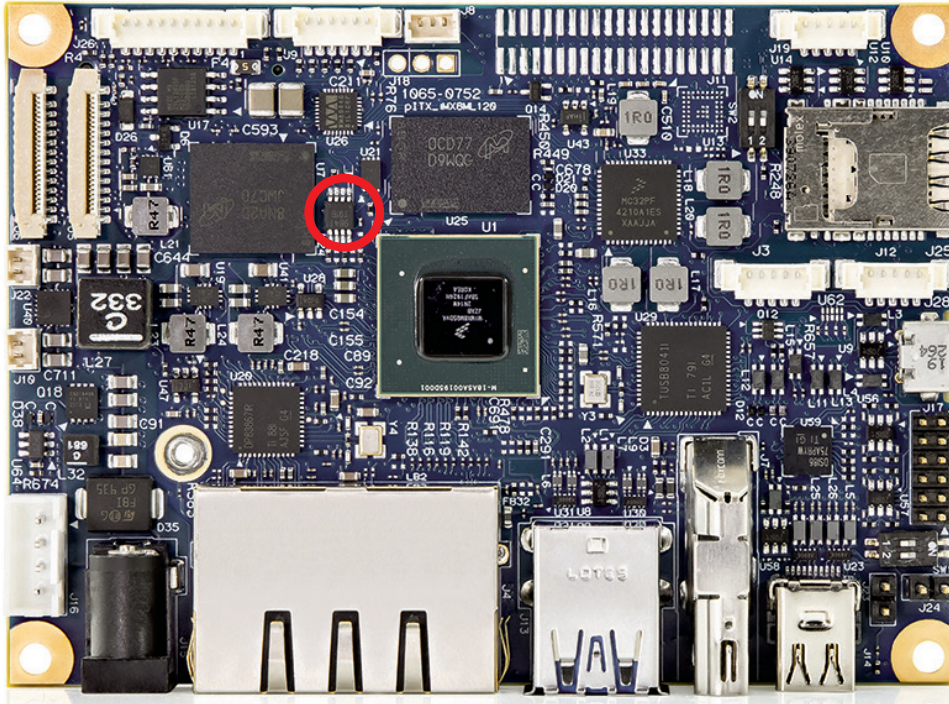
Pin	Signal	Direction
1	NC	
2	V_2V8_CAM2_S0	Power
3	CSI2_RX0-	In
4	NC	
5	CSI2_RX0+	In
6	NC	
7	CSI2_CK-	In
8	NC	
9	CSI2_CK+	In
10	GND	
11	CSI2_RX1-	In
12	CAM_XCLK_1V8_CAM1	Out
13	CSI2_RX1+	In
14	V_1V8_S0_CSI1	Power
15	V_1V5_CAM_CSI1	Power
16	NC	
17	CSI_P2_PWDN_1V8	Out
18	NC	
19	CSI_P2_RST_1V8#	Out
20	I2C3_SCL_1V8	Out
21	V_2V8_CAM2_S0	Power
22	I2C3_SDA_1V8	In/Out
23	GND	Ground
24	NC	

6.25. Thermal Sensor (U24)

The pITX-iMX8M monitors the PCB ambient temperature between iMX8 M, eMMC and LPDDR4 device with an LM75B temperature sensor.

The iMX8 M I2C 1 interface connects to LM75B. The I2C 7-bit address is set to 0x4B.

Figure 33: Sensor Location (red circle)



⚠ CAUTION

pITX-iMX8M should only operated with a suitable heat sink. Allow to cool down after operation.

7/ Bootloader Operation

7.1. Copyrights and Licensing of U-Boot

U-Boot is free Software. It is copyrighted by Wolfgang Denk and many others who contributed code. U-Boot can be redistributed and modified under the terms of version 2 of the GNU General Public (GPL V2) License as published by the Free Software Foundation.

Actual source code of pITX-iMX8M u-boot can be obtained from the git repository at

- ▶ <https://gitlab.kontron.com/imx/u-boot-imx>

PITX-iMX8M bootloader sources are derived work from a dedicated version of NXP development branch which is hosted at source.codeaurora.org

- ▶ <https://source.codeaurora.org/external/imx/uboot-imx.git>

NXP work itself is based on mainline u-boot versions as hosted at [denx](https://git.denx.de):

- ▶ [git://git.denx.de/u-boot.git](https://git.denx.de/u-boot.git)

As a result, any bootloader for the pITX-iMX8M is based on a mainline u-boot version (e.g. v2020.04) and a branch in NXP's [uboot-imx.git](https://source.codeaurora.org/external/imx/uboot-imx.git) repository (e.g. `imx_v2020.04_5.4.24_2.1.0`) hosted at [codeaurora.org](https://source.codeaurora.org).

7.2. Bootloader Quickstart

The PITX-iMX8M board comes with U-Boot preinstalled on the eMMC device. Follow the steps below to gain access to the bootloader command line (CLI) on your host PC.

- ▶ Connect your host machine to the modules serial connector J19 using a flat ribbon DB9 adapter cable.
- ▶ Set the i.MX8M boot mode using the Boot Select DIP Switch SW1[1:2] to [Off:On] to select internal boot mode.
- ▶ Start a suitable terminal program on your host and attach it to the port connected with the board's serial interface. Configure the serial line using 115200 baud, 8 data bits, 1 stop bit, no parity.
- ▶ Connect power supply to the pITX-iMX8M and power up.
- ▶ When boot messages appear, press any key to stop automatic boot sequence.

After power on, bootloader boot messages will appear as shown below. There is a 3 second boot delay counter that will try to boot linux OS automatically after expiration. Pressing any key will stop the boot delay counter and enter the bootloader CLI.

Figure 34: U-Boot Start Screen

```

U-Boot 2020.04-00181-gdf4caed7c3 (Dec 09 2020 - 14:52:15 +0100), Build: PITX-IMX8M-R11

CPU:   i.MX8MQ rev2.1 1300 MHz (running at 800 MHz)
CPU:   Industrial temperature grade (-40C to 105C) at 56C
Reset cause: POR
Model: Kontron pITX-iMX8M
DRAM:  4 GiB
WDT:   Started with servicing (60s timeout)
MMC:   FSL_SDHC: 0, FSL_SDHC: 1
Loading Environment from MMC... OK
In:    serial
Out:   serial
Err:   serial

BuildInfo:
- ATF 0645021
- U-Boot 2020.04-00181-gdf4caed7c3

flash target is MMC:1
Net:   eth0: ethernet@30be0000
Fastboot: Normal
Normal Boot
Hit any key to stop autoboot:  0
=>

```

7.3. Bootloader Commands

The bootloader CLI provides various of powerful commands to control the board, which basically can be grouped into

- ▶ Information Commands
- ▶ Memory Commands
- ▶ Flash Memory Commands
- ▶ Execution Control Commands
- ▶ Download Commands
- ▶ Environment Control Commands
- ▶ Flattened Device Tree Support Commands
- ▶ Storage Device Control Commands
- ▶ File System Support Commands
- ▶ Kontron Command Extensions



Typing "help" at the bootloader command line prompt will show up a list of the commands available. Typing "help <command>" will show specific command help. Further help can be found under <https://www.denx.de/wiki/view/DULG/UBoot>

On the PITX-iMX8M bootloader, the powerful hush shell is enabled, which derived from to Bourne shell and provides features similar to a linux shell:

- ▶ Control structures (if ... then ... else ... fi etc.)
- ▶ Command line completion
- ▶ Command line editing
- ▶ Command line history up to 20 entries
- ▶ Local environment variables

7.4. Kontron Bootloader Command Extensions

Kontron's implementation of U-Boot includes some enhancements to provide board specific functions. They are not part of standard U-Boot as maintained by DENX. The following table provides a complete listing of all Kontron command extensions on the PITX-iMX8M.

Table 45: Bootloader Command Extensions

Command	Description
kboardinfo	Kontron Board Information - Displays a summary of board and configuration information

7.4.1. kboardinfo - Kontron Board Information

The "kboardinfo" command shows a summary of board serialization data gathered from the system EEPROM.

Figure 35: Kboardinfo

```
=> => kboardinfo
Manufacturer:      Kontron Europe GmbH
Product name:     pITX-iMX8M
Material number:  44011-0408-13-4
Serial number:    UTD080002
MAC0 (ethaddr):  00:e0:4b:6f:dc:cd
MAC1 (eth1addr): na
Manufacturer Date: 06/03/2020
Revision:         B00
CPU:              i.MX8MQ rev2.1 1300 MHz (running at 800 MHz)
CPU:              Industrial temperature grade (-40C to 105C) at 65C
Reset cause:     POR
```

7.5. Bootloader Environment

The bootloader environment is used to control bootloader and OS startup behavior. Environment variables can be used to control boot timing (e.g. bootdelay), interface properties (e.g. baudrate, ethact) or they define memory locations where OS images are stored before boot (e.g. loadaddr, fdt_addr). In addition, bootloader shell commands can be combined to environment scripts.

The redundant bootloader environment is permanently stored on SDcard at offset 0x400000. During bootloader operation, the environment is held in RAM memory and can be modified and written back to persistent storage.

Bootloader commands to modify the environment are summed up under the "env" command group:

- ▶ env default [-f] -a [forcibly] reset default environment
- ▶ env default [-f] var [...] [forcibly] reset variable(s) to their default values
- ▶ env delete [-f] var [...] [forcibly] delete variable(s)
- ▶ env edit name edit environment variable
- ▶ env exists name tests for existence of variable
- ▶ env print [-a | name ...] print environment
- ▶ env run var [...] run commands in an environment variable
- ▶ env save save environment
- ▶ env set [-f] name [arg ...]

However, the legacy commands for environment handling are still available:

- ▶ "setenv",

- ▶ "editenv",
- ▶ "printenv"
- ▶ "saveenv".

U-Boot standard environment variables are set up for the PITX-iMX8M module.

Table 46: Standard Environment Variables

Variable	Value	Description
baudrate	115200	Serial line baudrate
bootcmd	run distro_bootcmd	Try booting (in this order) from devices defined in the boot_targets variable: mmc0 (eMMC), mmc1 (SD card), usb0, dhcp
bootdelay	3	Wait 3 seconds before executing bootcmd
ethprime	FEC	Use Ethernet port FEC as default
loadaddr	0x40480000	Default memory location for OS boot

7.6. Bootloader Environment Update

On the PITX-iMX8M it is possible to update the U-Boot environment separately.

This enables the user to either update from a previous version of the official Kontron U-Boot environment (default U-Boot settings), or restore the default in case of problems.

Update procedure:

- ▶ Download the official U-Boot environment from the Kontron EMD Customer Section.
- ▶ For Release R10 of the U-Boot, the file is called 'pitx-imx8m-env-r10.bin'.
- ▶ Put the file into the root directory of a FAT or EXT formatted USB drive.
- ▶ Start the system and stop the boot process at the U-Boot prompt.
- ▶ Run the following commands to load the file and flash it into the correct flash memory address (example for R10):

```
usb start && load usb 0:1 $loadaddr pitx-imx8m-env-r10.bin
env import -b $loadaddr 4000
saveenv
```

- ▶ After reset the updated environment will be active.

7.7. Kontron Bootloader Environment Extensions

To support PITX-iMX8M board properly, Kontron adds some environment variables to the standard set of variables provided by mainline U-Boot. These variables are shown below.

Table 47: Bootloader Environment Extensions

Variable	Value	Description
board_name	pitx-imx8m	
board_serial	UTD080002	Board serial number read from KEU EEPROM
cpu	armv8	CPU family
eth1addr	From I210/I211 iNVM	Ethernet port FEC1 MAC address
ethaddr	From EEPROM	Ethernet port FEC0 MAC address
fdt_addr_r	0x43000000	DTB load address used by distroboot
kernel_addr_r	0x40480000	Kernel load address used by distroboot
pxefile_addr_r	0x40480000	PXE load address as required by distroboot spec.
ramdisk_addr_r	0x44000000	Ramdisk load address used by distroboot
fdtfile	pitx-imx8m_hdmi.dtb	Default device tree file for the module
hw_rev	L130	Board revision read from strappings
scriptaddr	0x40400000	Script file load address used by distroboot
serial#	From SoC	SoC internal serial number
soc	imx8m	SoC and SoC type
soc_type	imx8mq	
vendor	kontron	
video_off	no	Enable video by default



Variables from the table above marked in bold are set automatically each time U-Boot starts. They will override different settings possibly stored in persistent environment.

7.8. Bootloader Mass Storage Support

U-Boot provides support to read and write from mass storage devices like

- ▶ QSPI flash
- ▶ eMMC device
- ▶ SD card
- ▶ USB thumb device

7.8.1. QSPI flash

QSPI flash is accessed using the "sf" command

Example: Load one sector (64K) from SPI flash

```
=> sf probe 0
=> sf read ${loadaddr} 0 10000
```

7.8.2. SD Card and eMMC Devices

eMMC and SD card are accessed using the "mmc" command

Example: Load 256 blocks from eMMC

```
=> mmc dev 1
=> mmc read ${loadaddr} 0 100
```

7.8.3. USB Storage Device

USB storage devices are accessed using "usb" command

Example: Load bootloader update file from USB thumb device

```
=> usb start
=> usb dev 0
=> fatload usb 0:1 $loadaddr
Image
```

7.9. Bootloader File System Support

U-Boot for the piTX-iMX8M provides support for FAT and EXT4 file systems. EXT4 support also includes EXT2 and EXT3 formatted file systems. There are file system specific commands available to list file system contents (ext2ls, fatls) and load a given file into board memory (ext2load, fatload). However, U-Boot also provides generic commands ("ls" and "load"), that will detect the file system on the device and use appropriate file system functions automatically.

Example: Show/boot folder contents from SD card file system

```
ls mmc 0:2 /boot
<DIR>      4096 .
<DIR>      4096 ..
 23578632 Image-4. 19. 35-1. 1. 0+g10e5efaa3776
  185372 config-4. 19. 35-1. 1. 0+g10e5efaa3776
 5100327 System.map-4. 19. 35-1. 1. 0+g10e5efaa3776
 728843 Module.symvers-4. 19. 35-1. 1. 0+g10e5efaa3776
<SYM>      33 Image

load mmc 0:2 ${loadaddr} /boot/Image
23578632 bytes read in 180 ms (124.9 MiB/s)
```

7.10. Bootloader Update

Bootloader update on piTX-iMX8M is based on the distroboot feature implemented in u-boot. A new bootloader image is provided by Kontron on an USB thumb device containing a scriptfile and update images in the dedicated "update_pitx" folder.

After USB thumb device has been attached to the module, the update is applied by typing 'run usb_boot' from the console, as would be used for a standard distroboot installation. U-Boot will find the update script in the update_pitx folder and install the new bootloader image on the current boot device (either eMMC or SD card).

```
=> run usb_boot
```



It is recommended to use only the update script for bootloader update. This ensures that all necessary installation images are checksum controlled and copied to the appropriate location in QSPI flash.

8/ Technical Support

For technical support contact our Support department:

- ▶ E-mail: support@kontron.com
- ▶ Phone: +49-821-4086-888

Make sure you have the following information available when you call:

- ▶ Product ID Number (PN),
- ▶ Serial Number (SN)



The serial number can be found on the Type Label, located on the product's rear side.

Be ready to explain the nature of your problem to the service technician.

8.1. Warranty

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



If there is a protection label on your product, then the warranty is lost if the product is opened.

8.2. Returning Defective Merchandise

All equipment returned to Kontron must have a Return of Material Authorization (RMA) number assigned exclusively by Kontron. Kontron cannot be held responsible for any loss or damage caused to the equipment received without an RMA number. The buyer accepts responsibility for all freight charges for the return of goods to Kontron's designated facility. Kontron will pay the return freight charges back to the buyer's location in the event that the equipment is repaired or replaced within the stipulated warranty period. Follow these steps before returning any product to Kontron.

1. Visit the RMA Information website:
<http://www.kontron.com/support-and-services/support/rma-information>

Download the RMA Request sheet for **Kontron Europe GmbH** and fill out the form. Take care to include a short detailed description of the observed problem or failure and to include the product identification Information (Name of product, Product number and Serial number). If a delivery includes more than one product, fill out the above information in the RMA Request form for each product.

2. Send the completed RMA-Request form to the fax or email address given below at Kontron Europe GmbH. Kontron will provide an RMA-Number.

Kontron Europe GmbH
RMA Support
Phone: +49 (0) 821 4086-0

Fax: +49 (0) 821 4086 111
Email: service@kontron.com

3. The goods for repair must be packed properly for shipping, considering shock and ESD protection.



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

4. Include the RMA-Number with the shipping paperwork and send the product to the delivery address provided in the RMA form or received from Kontron RMA Support.

About Kontron – Member of the S&T Group

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.

For more information, please visit: <http://www.kontron.com/>



GLOBAL HEADQUARTERS

Kontron Europe GmbH
Kontron Europe GmbH
Gutenbergstraße 2
85737 Ismaning, Germany
Tel.: +49 821 4086-0
Fax: +49 821 4086-111
info@kontron.com