USER GUIDE

mITX-SKL-S

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MITX-SKL-S - USER GUIDE

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Revision History

Revision	Brief Description of Changes	Date of Issue
1.0	Initial Issue	2018-Aug-17
1.1	Update multiple display	2018-Sep-18
1.2	Add a LPS power supply notice in Sec. 2.1	2020-Apr-11
1.3	Update BIOS Boot Setup menu	2021-Sep-07

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

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

Symbols

The following symbols may be used in this user guide

⚠DANGER	DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.
⚠WARNING	WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.
NOTICE	NOTICE indicates a property damage message.
⚠CAUTION	CAUTION indicates a hazardous situation which, if not avoided, may result in minor or moderate injury.
	Electric Shock! This symbol and title warn of hazards due to electrical shocks (> 60 V) when touching products or parts of products. Failure to observe the precautions indicated and/or prescribed by the law may endanger your life/health and/or result in damage to your material.
	ESD Sensitive Device! This symbol and title inform that the electronic boards and their components are sensitive to static electricity. Care must therefore be taken during all handling operations and inspections of this product in order to ensure product integrity at all times.
	HOT Surface! Do NOT touch! Allow to cool before servicing.
	Laser! This symbol inform of the risk of exposure to laser beam and light emitting devices (LEDs) from an electrical device. Eye protection per manufacturer notice shall review before servicing.
	This symbol indicates general information about the product and the user guide. This symbol also indicates detail information about the specific product configuration.
	This symbol precedes helpful hints and tips for daily use.

For Your Safety

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

High Voltage Safety Instructions

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

⚠CAUTION

Warning

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

⚠CAUTION

Electric Shock!

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

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

Special Handling and Unpacking Instruction

NOTICE

ESD Sensitive Device!

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

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

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

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

Lithium Battery Precautions

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

⚠CAUTION

Danger of explosion if the battery is replaced incorrectly.

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

General Instructions on Usage

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

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

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

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

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

Quality and Environmental Management

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

Disposal and Recycling

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

WEEE Compliance

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

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

Environmental protection is a high priority with Kontron.

Kontron follows the WEEE directive

You are encouraged to return our products for proper disposal.

Table of Contents

List of Tables

List of Figures

1/ Introduction

This user guide describe the mITX-SKL-S board made by Kontron. This board will also be denoted mITX-SKL-S within this user guide.

Use of this user guide implies a basic knowledge of PC-AT hardware and software. This user guide focuses on describing the mITX-SKL-S board's special features and is not intended to be a standard PC-AT 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 carried out automatically or manually by the user via the BIOS setup menus.

Latest revision of this user guide, datasheet, thermal simulations, BIOS, drivers, BSP's (Board Support Packages), mechanical drawings (2D and 3D) can de download from Kontron's Web Page.

2/ Installation Procedures

2.1. Installing the Board

NOTICE

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 (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

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

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 a standard ATX PSU and a standard ATX12V PSU with suitable cable kits and PS-ON# active.

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. **Insert the DDR4 SO-DIMM 260-pin module(s)**

   Be careful to push the memory module in the slot(s) before locking the tabs. For a list of approved SO-DIMMs contact your Distributor or FAE. See also chapter "System Memory Support". Use SO-DIMM with the same memory density in both sockets!

3. **Processor installation**

   Install the processor in the processor socket. Follow the steps in the delivered manual from the processor manufacturer.

4. **Cooler installation**

   You can connect the cooler fan electrically to the CPU FAN connector.

5. **Connecting interfaces**

   Insert all external cables for hard disk, keyboard etc. A monitor must be connected in order to change BIOS settings.

6. **Connect and turn on PSU**

   Connect PSU to the board by the 2x12-pin ATX wafer connector and 2x4-pin ATX wafer connector.

7. **BIOS setup**

   Enter the BIOS setup by pressing the <DEL> key during boot up.

   Enter "Exit Menu" and Load Setup Defaults.

   Refer to the "BIOS Configuration / Setup" section of this manual for details on BIOS setup.

To clear all BIOS setting, including Password protection, activate "Clear CMOS Jumper" for 10 sec (without power connected).

8. **Mounting the board in chassis**

NOTICE

When mounting the board to chassis etc. please note that the board contains components on both sides of the PCB that 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 board on a chassis, it is recommended to use screws with an integrated washer and a diameter of > 7 mm. Do not use washers with teeth, as they can damage the PCB and cause short circuits.

2.2. Chassis Safety Standards

Before installing the mITX-SKL-S in the chassis, users must evaluate the end product to ensure compliance with the requirements of the IEC60950-1 safety standard:

- The board must be installed in a suitable mechanical, electrical and fire enclosure.
- The system, in its enclosure, must be evaluated for temperature and airflow considerations.
- The board must be powered by a CSA or UL approved power supply that limits the maximum input current.
- For interfaces having a power pin such as external power or fan, ensure that the connectors and wires are suitably rated. All connections from and to the product shall be with SELV circuits only.
- Wires have suitable rating to withstand the maximum available power.
- The peripheral device enclosure fulfils the IEC60950-1 fire protecting requirements.

2.3. Lithium Battery Replacement

If replacing the lithium battery follow the replacement precautions stated in the notification below:

⚠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 gleichwertigen 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 explosión 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

VARNING! Explosionsfara vid felaktigt batteribyte.

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

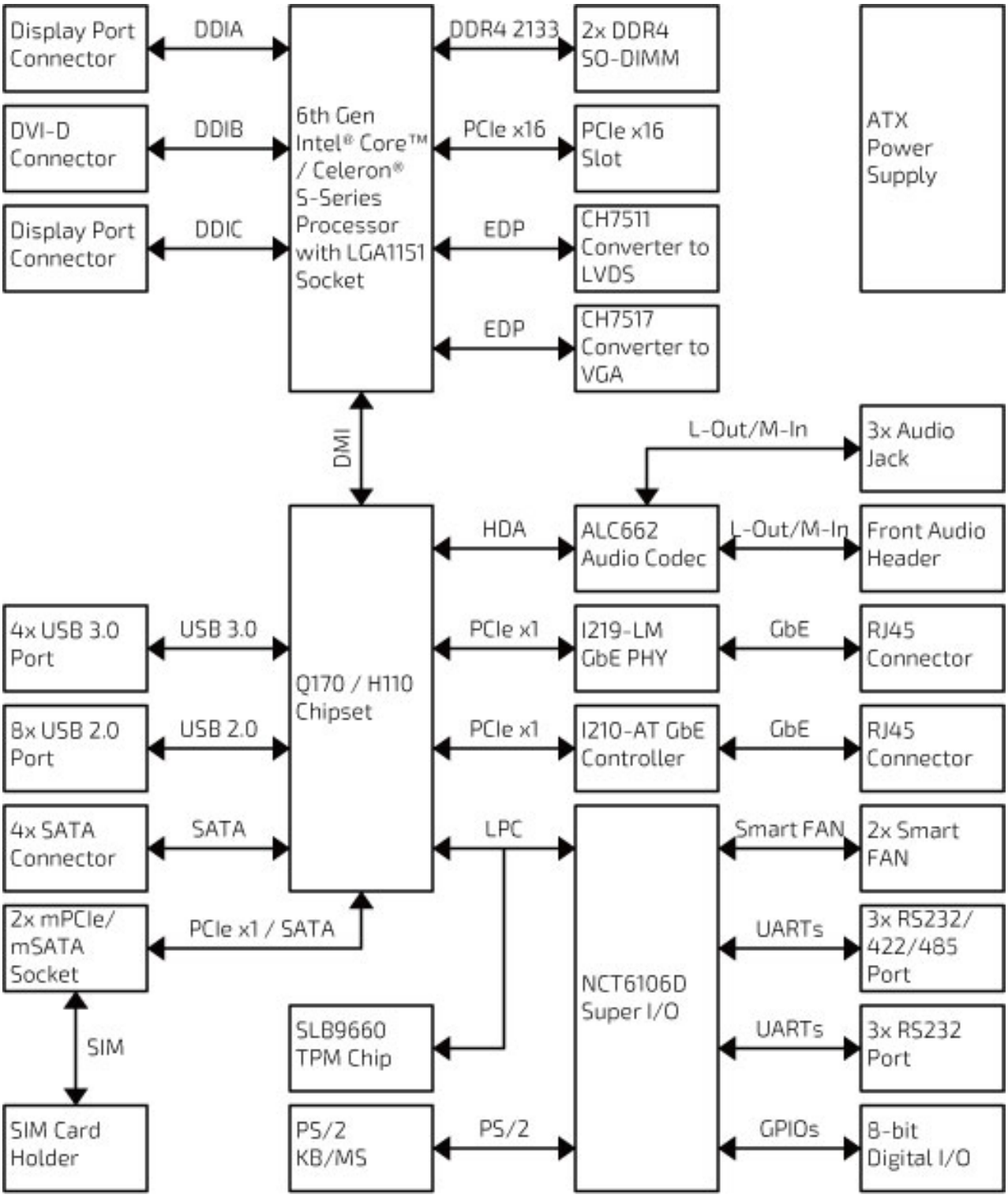
VAROITUS! Paristo voi räjähtää, jos se on virheellisesti asennettu.

- Vaihda paristo ainoastaan lalteval- mistajan suosittelemaan tyyppiln
- Hävitä käytetty paristo valmistajan ohjeiden mukaisesti

3/ System Specifications

3.1. System Block Diagram

Figure 1: System Block Diagram mITX-SKL-S



3.2. Component Main Data

The table below summarizes the features of the mITX-SKL-S motherboard.

Table 1: Component Main Data

System	
Processor	6th Generation Intel® Core™ / Celeron® S-Series Processors (FCLGA1151 Socket)
Chipset	▶ Intel® Q170 ▶ Intel® H110
Memory	2x DDR4 SO-DIMM memory socket
Video	
Display Interface	▶ 1x LVDS (24-bit, 2-ch) ▶ 2x DP (on rear) ▶ 1x DVI-D (on rear) ▶ 1x VGA (by header)
Multiple Display	▶ Dual (model w/ H110 chipset, LVDS and VGA are alternative each other) ▶ Triple (model w/ Q170 chipset, LVDS and VGA are alternative each other)
Audio	
Audio Codec	Realtek ALC662
Audio Interface	▶ 1x Line-in (on rear) ▶ 2x Line-out (1x on rear, 1x by header) ▶ 2x Mic-in (1x on rear, 1x by header) ▶ 1x S/PDIF (by header)
Network Connection	
Ethernet	2x GbE LAN (RJ45 on rear, 1x Intel® I219-LM, 1x Intel® I210-AT)
Peripheral Connection	
USB	▶ 4x USB 3.0 (Type A on rear, for H110 model) ▶ 6x USB 3.0 (4x Type A on rear, 2x by header, for Q170 model) ▶ 4x USB 2.0 (2x Type A on rear, 2x by header, for H110 model) ▶ 6x USB 2.0 (2x Type A on rear, 4x by header, for Q170 model)
Serial Port	▶ 3x RS232/422/485 (2x DB9 on rear, 1x by header) ▶ 3x RS232 (by header)
Other I/Os	▶ 1x PS/2 Keyboard / Mouse (by wafer) ▶ 1x 8-bit DIO (by wafer)
Storage & Expansion	
Storage & Expansion	▶ 4x SATA 3.0 (RAID support for Q170 model) ▶ 2x mSATA / mPCIe (1x full size, 1x half size, for Q170 model) ▶ 2x mPCIe (1x full size, 1x half size, for H110 model) ▶ 1x PCIe x16 ▶ 1x SIM Card Cage (by wafer)
Power	
Connector & Input Voltage	▶ 2x12-pin ATX connector (DC +5 V / -5 V / +12 V / -12 V / +3.3 V / 5 VSB)

	▶ 2x4-pin ATX connector (DC 12 V)
Firmware	
BIOS	AMI uEFI BIOS w/ 128 Mb SPI Flash
Watchdog	Programmable WDT to generate system reset event
H/W Monitor	Input & Core Voltages, CPU & System Temperatures
Real Time Clock	Chipset integrated RTC
TPM	Supported for Q170 model (Infineon SLB 9660 TPM 1.2)
System Control & Monitoring	
FP Header	▶ 1x Header for Reset button, HDD LED & External Speaker ▶ 1x Header for Power button, Power LED & SM bus ▶ 1x Header for LAN LED ▶ 1x Header for Port-80 Display
Cooling	
FAN	▶ 1x Wafer for CPU Smart Fan ▶ 1x Wafer for System Smart Fan
Software	
OS Support	Windows 7, Windows 8, Windows 10, Linux
Mechanical	
Dimension (L x W)	Mini-ITX (170 mm x 170 mm / 6.70" x 6.70")

3.3. Environmental Conditions

The mITX-SKL-S is compliant with the following environmental conditions. It is the customer's responsibility to provide sufficient airflow around each of the components to keep them within the allowed temperature range.

Table 2: Environmental Conditions

Operating Temperature	0 °C ~ 60 °C / 32 °F ~ 140 °F (Standard) -20 °C ~ 70 °C / -4 °F ~ 158 °F (Extended)
Storage Temperature	-20 °C ~ 80 °C / -4 °F ~ 176 °F (Standard) -40 °C ~ 85 °C / -40 °F ~ 185 °F (Extended)
Humidity	0 % ~ 95 %

3.4. Standards and Certifications

The mITX-SKL-S meets the following standards and certification tests.

Table 3: Standards and Certifications

CE	▶ EN55032:2015 + AC: 2016, CISPRE 32: 2015 + COR1: 2016 ▶ AS/NZS CISPRE 32: 2015 ▶ EN 61000-3-2: 2014 and IEC-61000-3-2: 2014 ▶ EN 61000-3-3: 2013 and IEC 61000-3-3: 2013 ▶ EN 55024: 2010 + A1: 2015 and CISPRE 24: 2010 + A1: 2015 ▶ EN 61000-4-2: 2009 and IEC 61000-4-2: 2008

	▶ EN 61000-4-3: 2006 + A1: 2008 + A2: 2010 and IEC 61000-4-3: 2006 + A1: 2007 + A2: 2010 ▶ EN 61000-4-4: 2012 and IEC 61000-4-4: 2012 ▶ EN 61000-4-5: 2014 and IEC 61000-4-5: 2014 ▶ EN 61000-4-6: 2014 + AC: 2015 and IEC 61000-4-6: 2013 ▶ EN 61000-4-8: 2010 and IEC 61000-4-8: 2009 ▶ EN 61000-4-11: 2004 and IEC 61000-4-11: 2004
FCC	▶ FCC CFR Title 47 Part 15 Subpart B: 2015 - Section 15.107 and 15.109 ▶ ANSI C63.4-2014 ▶ ICES-003 Issue 6: 2016 Class A

3.5. Processor Support

The mITX-SKL-S is designed to support the following processors which are connected to a discrete Intel® Q170 or H110 Chipset Platform Controller Hub on the motherboard.

- 6th Generation Intel® Core i7, i5, i3 / Celeron® S-Series processors (FCLGA1151 Socket, TDP up to 95 W)

Sufficient cooling must be applied to the CPU in order to remove the effect defined as TDP (Thermal Design Power). The sufficient cooling is also depending on the worst case maximum ambient operating temperature and the actual worst case load of processor.

3.6. System Memory Support

The mITX-SKL-S has two DDR4 SO-DIMM sockets. The sockets support the following memory features:

- 2x DDR4 SO-DIMM, 1.2 V
- Up to 32 GB (2x 16 GB)
- Dual channel, 260-pin, 1866 / 2133 MT/s
- SPD timing supported
- ECC supported

The installed DDR4 SO-DIMM should support the Serial Presence Detect (SPD) data structure. This allows the BIOS to read and configure the memory controller for optimal performance. If non-SPD memory is used, the BIOS will attempt to configure the memory settings, but performance and reliability may be impacted, or the board may not be able to boot totally.

3.6.1. Memory Operating Frequencies

In all modes, the frequency of system memory is the lowest frequency of all the memory modules placed in the system. Each memory module's frequency can be determined through the SPD registers on the memory modules.

The table below lists the resulting operating memory frequencies based on the combination of SO-DIMMs and processor.

Table 4: Memory Operating Frequencies

SO-DIMM Type	Module Name	Memory Data Transfer (MT/s)	Processor System Bus Frequency (MHz)	Resulting Memory Clock Frequency (MHz)	Peak Transfer Rate (MB/s)
DDR4 1866	PC4-1866	1867	933	233	14933
DDR4 2133	PC4-2133	2133	1067	267	17067

Memory modules have in general a much lower longevity than embedded motherboards, and therefore EOL of modules can be expected several times during lifetime of the motherboard.

As a minimum it is recommend using Kontron memory modules for prototype system(s) in order to prove stability of the system and as for reference.

For volume production you might request to test and qualify other types of RAM. In order to qualify RAM it is recommend configuring 3 systems running RAM Stress Test program in heat chamber at 60° C for a minimum of 24 hours.

3.7. On-board Graphics Subsystem

The mITX-SKL-S supports Intel® HD Graphics technology for high quality graphics capabilities. The model with Intel® H110 chipset supports two displays pipes while that with Intel® Q170 chipset supports three displays pipes.

Up to three displays can be used simultaneously and be used to implement independent or cloned display configuration.

Table 5: Three-displays Configurations

Display 1	Display 2	Display 3	Max. Resolution (Px) at 60 Hz		
			Display 1	Display 2	Display 3
LVDS	DVI-D	DP	1920 x 1200	1920 x 1200	4096 x 2304
LVDS	DP	DP	1920 x 1200	4096 x 2304	4096 x 2304
VGA	DVI-D	DP	1920 x 1200	1920 x 1200	4096 x 2304
VGA	DP	DP	1920 x 1200	4096 x 2304	4096 x 2304
DP	DP	DVI-D	4096 x 2304	4096 x 2304	1920 x 1200

3.8. Power Supply

In order to ensure safe operation of the board, the input power supply must monitor the supply voltage and shut down if the supply is out of range – refer to the actual power supply specification. Please note, in order to keep the power consumption to a minimal level, boards do not implement a guaranteed minimum load. In some cases, this can lead to compatibility problems with ATX power supplies that require a minimum load to stay in regulation. The mITX-SKL-S board must be powered through the ATX+12V-8p (8-pole) connector using standard ATX12V power supply and through the ATX-24p (24-pole) connector using standard ATX power supply.

ATX12V supply: ATX+12V-8p connector must be used in according to the ATX12V PSU standard.

ATX supply: ATX-24p connector must be used in according to the ATX PSU standard.

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

The requirements to the voltages of ATX power supply are as follows:

Table 6: Supply Voltages

Supply	Min.	Max.	Note
VCC3.3	3.135 V	3.265 V	Should be ±5% for compliance with the ATX specification
Vcc	4.75 V	5.25 V	Should be ±5% for compliance with the ATX specification. Should be minimum 5.00 V measured at USB connectors in order to meet the requirements of USB standard.
+12 V	11.4 V	12.6 V	Should be ±5% for compliance with the ATX specification
-12 V	-13.2 V	-10.8 V	Should be ±10% for compliance with the ATX specification
-5 V	-5.50 V	-4.5 V	Should be ±10% for compliance with the ATX specification
5VSB	4.75 V	5.25 V	Should be ±5% for compliance with the ATX specification

4/ Connector Locations

4.1. Top Side

Figure 2: Top Side

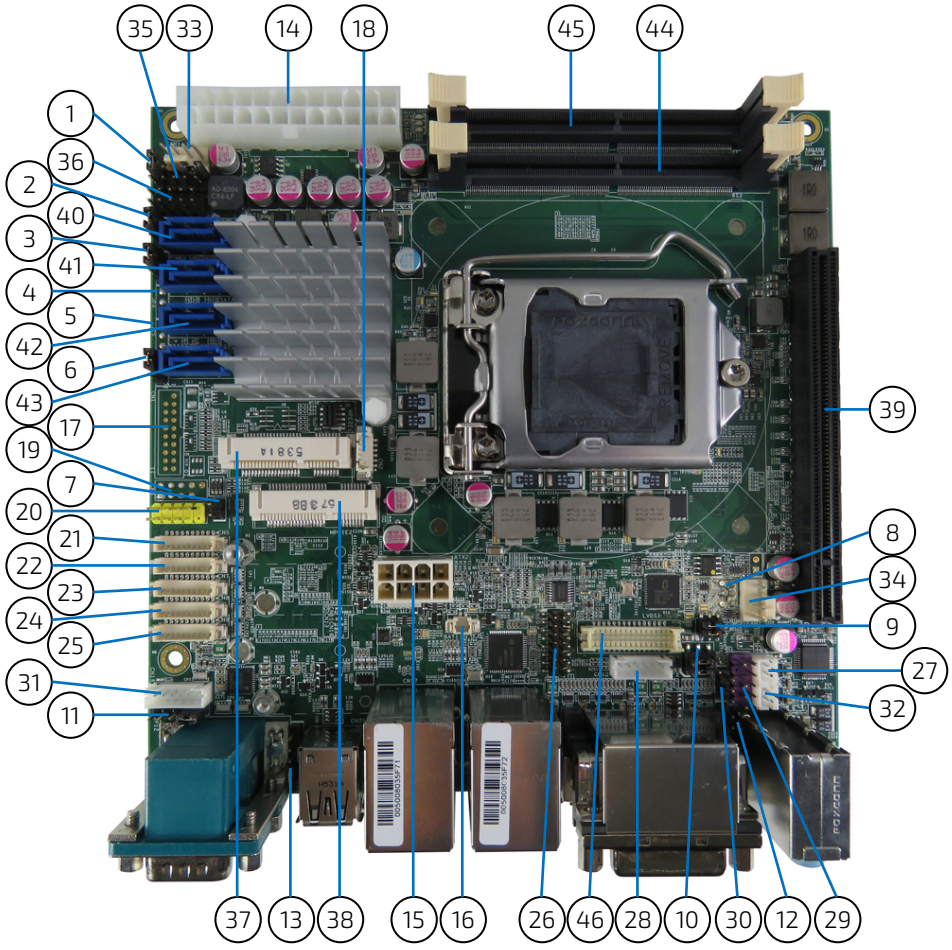


Table 7: Jumper List

Item	Designation	Description	See Chapter
1	JP1	AT / ATX Power Mode Selection	7.18.1
2	JP2	Clear ME Register	7.18.2
3	JP3	RTC Reset Selection	7.18.3
4	JP4	mPCIE / mSATA Selection for MPCIE1 (models w/ Q170 only)	7.18.4
5	JP5	mPCIE / mSATA Selection for MPCIE2 (models w/ Q170 only)	7.18.5
6	JP6	Keyboard Lock Selection	7.18.6
7	JP7	mPCIE LED Indicator Pin Header	7.18.7
8	JP9	PCIE Configuration Setting for PEG1 (models w/ Q170 only)	7.18.8
9	JP10	Backlight Power Enable Selection for LVDS1	7.18.9
10	JP11	Panel & Backlight Power Selection for LVDS1	7.18.10
11	JP12	Pin-9 Selection for COM1	7.18.11
12	JP13	ME F/W Selection	7.18.12
13	JP14	Pin-9 Selection for COM2	7.18.13

Table 8: Top Side Internal Connector Pin Assignment

Item	Designation	Description	See Chapter
14	ATX1	2x12-pin ATX Power Supply Wafer	7.1.1
15	ATX2	2x2-pin ATX Power Supply Wafer	7.1.2
16	BAT1	CR2032 Battery Power Input Wafer	7.1.3
17	CN1	USB3.0 Port-5, 6 Box Header (models w/ Q170 only)	7.4
18	CN2	SIM Interface Wafer for MPCIE2	7.15
19	CN3	USB2.0 Port 11, 12 Pin Header (models w/ Q170 only)	7.4
20	CN4	USB2.0 Port 7, 8 Pin Header	7.4
21	CN5	8-bit Digital Input / Output Pin Header	7.13
22	CN6	RS-232 / 422 / 485 Port 3 Wafer	7.9
23	CN7	RS-232 Port 4 Wafer	7.9
24	CN8	RS-232 Port 5 Wafer	7.9
25	CN9	RS-232 Port 6 Wafer	7.9
26	CN10	VGA Header	7.12
27	CN11	Left Channel 3W Audio AMP Output Wafer	7.5
28	CN12	Backlight Power Output Wafer for LVDS1	7.11
29	CN13	Front Panel Audio Pin Header	7.6
30	CN14	SPDIF-Out Pin Header	7.7
31	CN15	PS/2 Keyboard & Mouse Mini-DIN Connector	7.17
32	CN16	Right Channel 3W Audio AMP Output Wafer	7.5
33	FAN1	CPU FAN Wafer	7.2
34	FAN2	System FAN Wafer	7.2
35	FP1	Front Panel Pin Header 1	7.8
36	FP2	Front Panel Pin Header 2	7.8
37	MPCIE1	Half Size mPCIE / mSATA Socket	7.14
38	MPCIE2	Full Size mPCIE / mSATA Socket	7.14
39	PEG1	PCIEx16 Slot	7.16
40	SATA1	Serial ATA Port-0 Connector	7.3
41	SATA2	Serial ATA Port-1 Connector	7.3
42	SATA3	Serial ATA Port-2 Connector	7.3
43	SATA4	Serial ATA Port-3 Connector	7.3
44	DIMM1	DDR4 Memory SO-DIMM Socket	3.6
45	DIMM2	DDR4 Memory SO-DIMM Socket	3.6
46	LVDS1	Primary 24-bit, 2-channel LVDS Panel Connector	7.10

4.2. Connector Panel Side

Figure 3: Connector Panel Side

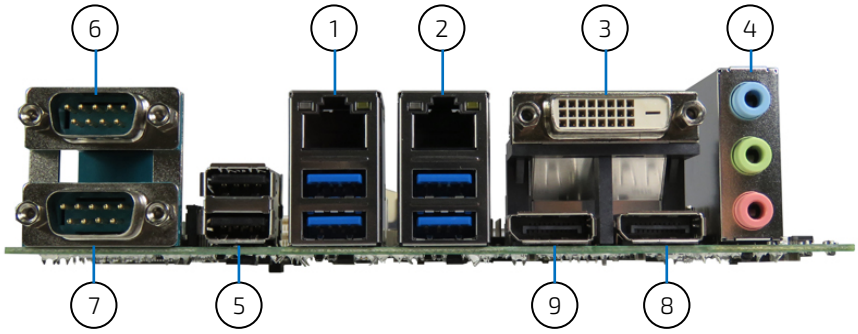


Table 9: Connector Panel Side Connector List

Item	Designation	Description	See Chapter
1	CN17	GbE LAN1 & USB3.0 Port-1, 2 Connector	6.3 & 6.4
2	CN18	GbE LAN2 & USB3.0 Port-3, 4 Connector	6.3 & 6.4
3	CN19	DVI-D Connector	6.2
4	CN20	Line-In, Line-Out & Mic-In Audio Jacks	6.6
5	CN21	USB2.0 Port-9, 10	6.4
6	CN22TOP	RS-232 / 422 / 485 COM2 Connector	6.5
7	CN22BOT	RS-232 / 422 / 485 COM1 Connector	6.5
8	CN23	Display Port B Connector	6.1
9	CN24	Display Port A Connector	6.1

5/ Connector Definitions

The following defined terms are used within this user guide to give more information concerning the pin assignment and to describe the connector's signals.

Defined Term	Description
Pin	Shows the pin numbers in the connector
Signal	The abbreviated name of the signal at the current pin The notation "XX#" states that the signal "XX" is active low
Note	Special remarks concerning the signal
Designation	Type and number of item described
See Chapter	Number of the chapter within this user guide containing a detailed description

The abbreviation TBD is used for specifications that are not available yet or which are not sufficiently specified by the component vendors.

6/ I/O-Area Connectors

6.1. DP Connector (CN23 & CN24)

The DP (DisplayPort) connector is based on standard DP female port.

Figure 4: DP Connector CN23, CN24

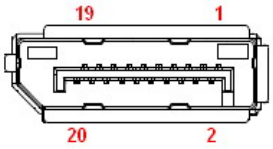


Table 10: Pin Assignment DP Connector CN23, CN24

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

6.2. DVI-D Connector (CN19)

The external I/O connector panel supports one DVI-D female port.

Figure 5: DVI-D Connector CN19

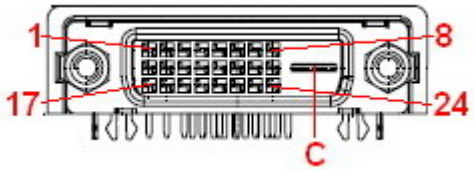


Table 11: Pin Assignment DVI-D Connector CN19

Pin	Signal	Description	Note
1	TX2-		
2	TX2+		
3	GND		
4	NC		
5	NC		
6	DDC_CLK		
7	DDC_DATA		
8	NC		
9	TX1-		
10	TX1+		
11	GND		
12	NC		
13	NC		
14	+5V		
15	GND		
16	HTPLG		
17	TX0-		
18	TX0+		
19	GND		
20	NC		
21	NC		
22	GND		
23	TXC+		
24	TXC-		
C	GND		

6.3. Ethernet Connectors (CN17 - LAN1 & CN18 - LAN2)

The mITX-SKL-S supports two channels of 10/100/1000 Mbit Ethernet, which are based Intel® I219-LM and Intel® I210-AT controllers.

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

The signals for the Ethernet ports are as follows:

Figure 6: Ethernet Connectors CN17 - LAN1, CN18 - LAN2

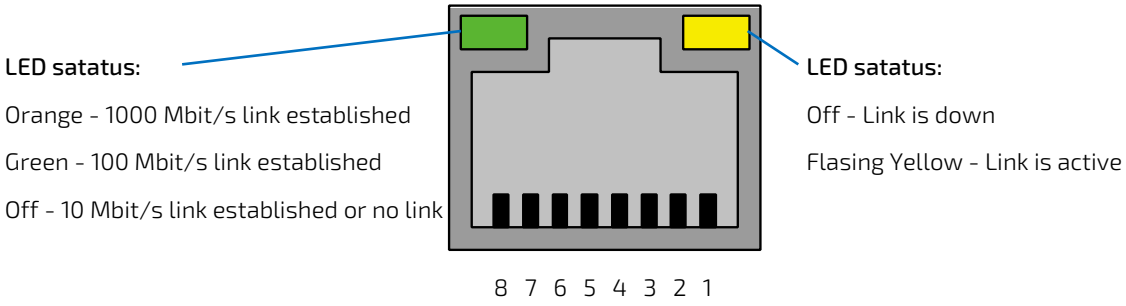


Table 12: Pin Assignment Ethernet Connectors CN17 - LAN1, CN18 - LAN2

Pin	Signal	Note
1	MDI[0]+	
2	MDI[0]-	
3	MDI[1]+	
4	MDI[1]-	
5	MDI[2]+	
6	MDI[2]-	
7	MDI[3]+	
8	MDI[3]-	

Signal Description

Signal	Description
MDI[0]+ / MDI[0]-	In MDI mode, this is the first pair in 1000Base-T, i.e. the BI_DA+/- pair, and is the transmit pair in 10Base-T and 100Base-TX. In MDI crossover mode, this pair acts as the BI_DB+/- pair, and is the receive pair in 10Base-T and 100Base-TX.
MDI[1]+ / MDI[1]-	In MDI mode, this is the second pair in 1000Base-T, i.e. the BI_DB+/- pair, and is the receive pair in 10Base-T and 100Base-TX. In MDI crossover mode, this pair acts as the BI_DA+/- pair, and is the transmit pair in 10Base-T and 100Base-TX.
MDI[2]+ / MDI[2]-	In MDI mode, this is the third pair in 1000Base-T, i.e. the BI_DC+/- pair. In MDI crossover mode, this pair acts as the BI_DD+/- pair.
MDI[3]+ / MDI[3]-	In MDI mode, this is the fourth pair in 1000Base-T, i.e. the BI_DD+/- pair.In MDI crossover mode, this pair acts as the BI_DC+/- pair.

'MDI' – media dependent Interface

6.4. USB Connectors (I/O Area)

The external I/O connector panel supports one dual USB 2.0 connectors and two dual USB 3.0 connectors.

USB3.0 ports are backward compatible with USB2.0.

Figure 7: USB 2.0 Connectors CN21 - USB 2.0 Port 9 / 10

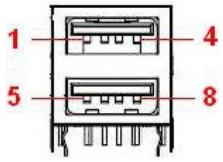


Table 13: Pin Assignment USB 2.0 Connectors CN21 - USB 2.0 Port 9 / 10

Pin	Signal	Note
Top		
1	+USBB_VCC	
2	USBB_D-	USB 2.0 Differential Pair (-)
3	USBB_D+	USB 2.0 Differential Pair (+)
4	GND	
Bottom		
5	+USBA_VCC	
6	USBA_D-	USB 2.0 Differential Pair (-)
7	USBA_D+	USB 2.0 Differential Pair (+)
8	GND	

Figure 8: USB 3.0 Connector CN17 - USB 3.0 Port 1 / 2, CN18 - USB 3.0 Port 3 / 4

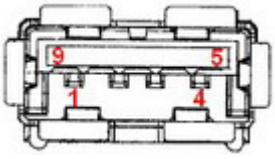


Table 14: Pin Assignment USB 3.0 Connector CN17 - USB3.0 Port 1 / 2, CN18 - USB 3.0 Port 3 / 4

Pin	Signal	Note
1	+USBVCC	+5 V Supply for USB device
2	USB_A-	USB 2.0 Differential Pair (-)
3	USB_A+	USB 2.0 Differential Pair (+)
4	GND	
5	USB3_SSRX-	USB 3.0 Rx. Differential Pair (-)
6	USB3_SSRX+	USB 3.0 Rx. Differential Pair (+)

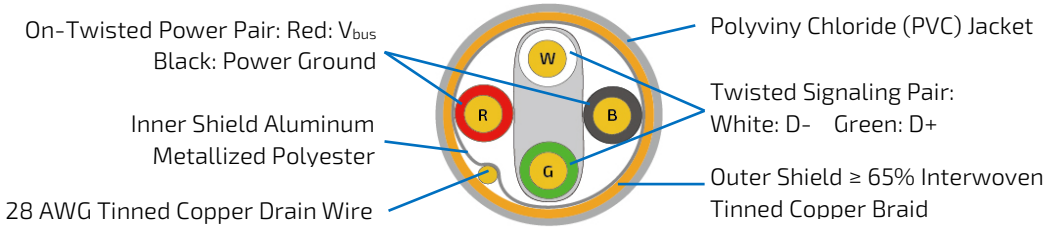
Pin	Signal	Note
7	GND	
8	USB3_SSTX-	USB 3.0 Tx. Differential Pair (-)
9	USB3_SSTX+	USB 3.0 Tx. Differential Pair (+)

Table 15: Signal Description

Signal	Description
USB3_SSTX+, USB3_SSTX-, USB3_SSRX+, USB3_SSRX-, USB_n-, USB_n-, USBn_D+, USBn_D-	Differential pair works as serial differential receive/transmit data lines. (n= A, B)
+USBVCC, +USBn_VCC	5 V supply for external devices. VCC is supplied during power-down to allow wakeup on USB device activity. Protected by a 1A current limiting IC covering each of the USB port. (n= A, B)

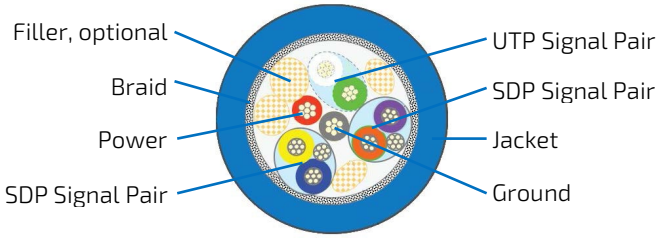
For HiSpeed rates it is required to use a USB cable, which is specified in USB 2.0 standard:

Figure 9: USB 2.0 High Speed Cable



For USB 3.0 cabling it is required to use only HiSpeed USB cable, specified in USB3.0 standard:

Figure 10: USB 3.0 High Speed Cable



6.5. Serial COM1 & COM2 Ports (CN22)

The external I/O connector panel supports one dual DB-9 RS-232/422/485 COM male ports.

Figure 11: Serial COM1 & COM2 Ports CN22

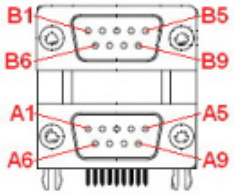


Table 16: Pin Assignment Serial COM1 & COM2 Ports CN22

Pin	RS232 Signal	RS422 Signal	Half Duplex RS485 Signal	Full Duplex RS485 Signal	Note
Top (COM2)					
B1	DCD	TX-	DATA-	TX-	
B2	RXD	RX+	N/A	RX+	
B3	TXD	TX+	DATA+	TX+	
B4	DTR	RX-	N/A	RX-	
B5	GND	GND	GND	GND	
B6	DSR	N/A	N/A	N/A	
B7	RTS	N/A	N/A	N/A	
B8	CTS	N/A	N/A	N/A	
B9	RI*	N/A	N/A	N/A	
Bottom (COM1)					
A1	DCD	TX-	DATA-	TX-	
A2	RXD	RX+	N/A	RX+	
A3	TXD	TX+	DATA+	TX+	
A4	DTR	RX-	N/A	RX-	
A5	GND	GND	GND	GND	
A6	DSR	N/A	N/A	N/A	
A7	RTS	N/A	N/A	N/A	
A8	CTS	N/A	N/A	N/A	
A9	RI*	N/A	N/A	N/A	

*: Pin configuration can be selected by Jumper JP12 (for COM1) and JP14 (for COM2).

RS232 / 422 / 485 can be selected in BIOS setup.

Table 17: Signal Description

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

6.6. Audio Jack (CN20)

The external I/O connector panel supports one 3.5 mm triple-port Azalia audio phone jack for headset, microphone and audio input devices. The audio output signals are shared with those of the speaker connectors CN11 & CN16.

Figure 12: Audio Jack CN20

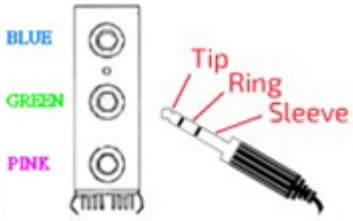


Table 18: Pin Assignment Audio Jack CN20

Pin	Signal	Note
Top		
Tip	Line-In_L	
Ring	Line-In_R	
Sleeve	GND	
Middle		
Tip	Line-Out_L	
Ring	Line-Out_R	
Sleeve	GND	
Bottom		
Tip	Mic-In_L	
Ring	Mic-In_R	
Sleeve	GND	

7/ Internal Connectors

7.1. Power Connector

The mITX-SKL-S is designed to be supplied from a 2x12-pin ATX main power supply and a 2x4-pin +12 VDC power supply.

NOTICE

Hot plugging any of the power connector is not allowed.

Hot plugging might damage the board. In other words, turn off main supply etc. to make sure all the power lines are turned off when connecting to the motherboard.

7.1.1. 2x12-pin ATX Power Supply Wafer (ATX1)

Figure 13: 2x12-pin ATX Power Supply Wafer ATX1

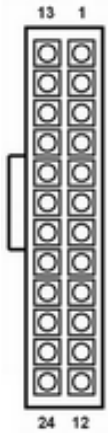


Table 19: Pin Assignment ATX1

Pin	Signal	Description
1	+3.3V	
2	+3.3V	
3	GND	Ground
4	+5V	
5	GND	Ground
6	+5V	
7	GND	Ground
8	POWER OK	
9	+5VSB	
10	+12V	
11	+12V	
12	+3.3V	
13	+3.3V	
14	-12V	
15	GND	Ground
16	PS_ON	
17	GND	

Pin	Signal	Description
18	GND	Ground
19	GND	Ground
20	-5V	
21	+5V	
22	+5V	
23	+5V	
24	GND	Ground

Table 20: Signal Description

Signal	Description
POWER OK	POWER_OK is a power good signal and should be asserted high by the power supply to indicate that the +5VDC and +3.3VDC outputs are above the undervoltage thresholds of the power supply. When this signal is asserted high, there should be sufficient energy stored by the converter to guarantee continuous power operation within specification. Conversely, when the output voltages fall below the undervoltage threshold, or when mains power has been removed for a time sufficiently long so that power supply operation is no longer guaranteed, POWER_OK should be de-asserted to a low state. The recommended electrical and timing characteristics of the POWER_OK signal are provided in the ATX12V Power SupplyDesign Guide. It is strongly recommended to use an ATX supply, in order to implement the supervision of the 5V and 3V3 supplies. These supplies are not supervised on-board.
PS_ON	Active low open drain signal from the board to the power supply to turn on the power supply outputs. Signal must be pulled high by the power supply.

7.1.2. 2x4-pin ATX Power Supply Wafer (ATX2)

Figure 14: 2x4-pin ATX Power Supply Wafer ATX2

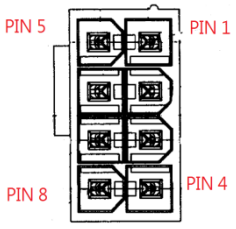


Table 21: Pin Assignment ATX2

Pin	Signal	Description
1	GND	Ground
2	GND	Ground
3	GND	Ground
4	GND	Ground
5	+12V	Power +12 V
6	+12V	Power +12 V
7	+12V	Power +12 V
8	+12V	Power +12 V

7.1.3. CR2032 Battery Power Input Wafer (BAT1)

Figure 15: CR2032 Battery Power Input Wafer BAT1

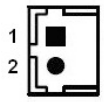


Table 22: Pin Assignment BAT1

Pin	Signal	Description
1	Battery+	
2	Battery-	

7.2. Fan Wafers (FAN1 & FAN2)

The CPU FAN Wafer (FAN1) is used for the connection of the FAN for the CPU while the System FAN Wafer (FAN2) for the connection of the FAN for the system.

Figure 16: Fan Wafer FAN1, FAN2

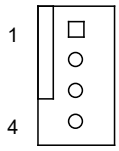


Table 23: Pin Assignment FAN1, FAN2

Pin	Signal	Description
1	GND	Ground
2	+12V	Power +12 V
3	SENSE	Sense signal
3	PWM	PWM output

Table 24: Signal description

Signal	Description
GND	Power Supply GND signal
+12V	+12V supply for fan
SENSE	Sense input signal from the fan, for rotation speed supervision RPM (Rotations Per Minute). The signal shall be generated by an open collector transistor or similar.
PWM	PWM output signal for FAN speed control

7.3. SATA (Serial ATA) Disk Interfaces (SATA1, SATA2, SATA3 & SATA4)

The SATA connectors supply the data connection for the SATA hard disk and are SATA 3.0 compatible.

Figure 17: SATA Connector SATA1, SATA2, SATA3, SATA4

Table 25: Pin Assignment SATA1, SATA2, SATA3, SATA4

Pin	Signal	Note
1	GND	
2	TX+	
3	TX-	
4	GND	
5	RX-	
6	RX+	
7	GND	

Table 26: Signal Description

Signal	Description
RX+ / RX-	Host transmitter differential signal pair
TX+ / TX-	Host receiver differential signal pair

7.4. USB Connectors (Internal) (CN1, CN3 & CN4)

The USB 2.0 Port 7 and 8 are supplied via the internal pin header (CN4).

The USB 2.0 Port 11 and 12 are supplied via the internal pin header (CN3) only for the models with Intel® Q170 chipset.

The USB 3.0 Port 5 and 6 are supplied via the internal pin header (CN1) only for the models with Intel® Q170 chipset.

Figure 18: USB 2.0 Port Pin Header CN3, CN4

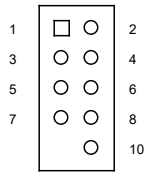


Table 27: Pin Assignment CN3, CN4

Pin	Signal	Note
1	+USBVCC	
2	+USBVCC	
3	USB_A-	
4	USB_B-	
5	USB_A+	
6	USB_B+	
7	GND	
8	GND	
9	KEY	
10	GND	

Figure 19: USB 3.0 Port Pin Header CN1

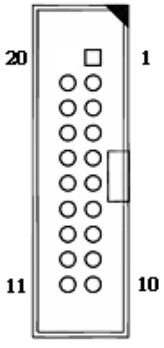


Table 28: Pin Assignment CN1

Pin	Signal	Note
1	USBA_VBUS	
2	USBA_RX-	
3	USBA_RX+	

Pin	Signal	Note
4	GND	
5	USBA_TX-	
6	USBA_TX+	
7	GND	
8	USBA_D-	
9	USBA_D+	
10	NC	
11	USBB_D+	
12	USBB_D-	
13	GND	
14	USBB_TX+	
15	USBB_TX-	
16	GND	
17	USBB_RX+	
18	USBB_RX-	
19	USBB_VBUS	
20	KEY	

Table 29: Signal Description

Signal	Description
+USBVCC, USBn_VBUS	5 V supply for external devices. SB5V is supplied during power down to allow wakeup on USB device activity. Protected by active power switch 1 A fuse for each USB port. (n= A, B)
USB_n-/+, USBn_RX-/+, USBn_TX-/+, USBn_D-/+	Universal Serial Bus Differentials: Bus Data / Address / Command Bus. (n= A, B)

7.5. Speaker Connector (CN11 & CN16)

The Speaker audio-out interface is available through the wafers CN11 and CN16. These outputs are shared with the audio output (Line-out) signals of the audio jack CN20 and audio pin header CN13.

Figure 20: 3W Audio AMP Output Wafer CN11 (Left Channel), CN16 (Right Channel)

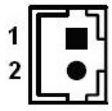


Table 30: Pin Assignment CN10, CN11

Pin	Signal	Note
1	Speaker+	
2	Speaker-	

7.6. Front Panel Audio Pin Header (CN13)

The front panel audio pin header provides audio output (Line-Out) and microphone (Mic-In) signals through the pin header CN13. The audio output signals are shared with those of the speaker connectors CN11 & CN16.

Figure 21: Front Panel Audio Pin Header CN13

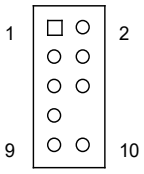


Table 31: Pin Assignment CN13

Pin	Signal	Note
1	MIC2-L	
2	Audio GND	
3	MIC2-R	
4	Audio GND	
5	Line2-R	
6	MIC2_JD	
7	Audio GND	
8	KEY	
9	Line2-L	
10	Line2_JD	

7.7. S/PDIF Out Pin Header (CN14)

The S/PDIF audio output jack is supplied via the internal pin header (CN14).

Figure 22: S/PDIF Out Pin Header CN14

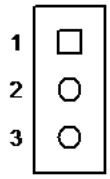


Table 32: Pin Assignment CN14

Pin	Signal	Note
1	SPDIF-out	
2	+VSPDIF	
3	GND	

7.8. Front Panel Pin Header (FP1 & FP2)

Figure 23: Front Panel Pin Header FP1

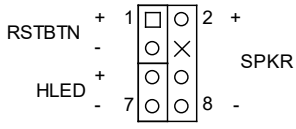


Table 33: Pin Assignment FP1

Pin	Signal	Note
1	Reset Button +	
2	Speaker +	
3	Reset Button -	
4	NC	
5	HDD LED +	
6	Internal Speaker -	
7	HDD LED -	
8	Speaker -	

Internal Buzzer is enabled when Pin6-8 is shorted.

Table 34: Signal Description

Signal	Description
Reset Button -/+	Reset Button. This 2-pin connector is for chassis mounted reset button for system reboot without turning off the system power.
HDD LED -/+	Hard Disk Drive Activity LED. This 2-pin connector is for HDD Activity LED. Connect the HDD Activity LED cable to this connector. The HDD LED lights up or flashes when data is read from or written to the HDD.
Internal Speaker - Speaker -/+	System warning speaker. The speaker allows user to hear beeps and warnings.

Figure 24: Front Panel Pin Header FP2

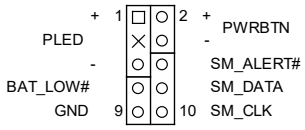


Table 35: Pin Assignment FP2

Pin	Signal	Note
1	Power LED +	

Pin	Signal	Note
2	Power Button +	
3	NC	
4	Power Button -	
5	Power LED -	
6	SM_ALERT#	
7	BAT_LOW#	
8	SMBus Data	
9	GND	
10	SMBus Clock	

Table 36: Signal Description

Signal	Description
Power LED -/+	System Power LED. The power LED lights up when users turn on the system power, and blinks when the system is in sleep mode.
Power Button -/+	The 2-pin connector is for the system power button. Pressing the power button turns the system on or puts the system in sleep or soft-off mode depending on the operating system settings. Pressing the power switch for more than four seconds while the system turns from ON to OFF.
SM_ALERT#	System Management Bus Alert
SMBus Data	System Management Bus bidirectional data line
SMBus Clock	System Management Bus bidirectional clock line
BAT_LOW#	Battery low input. This signal may be driven low by external circuitry to signal that the system battery is low. It also can be used to signal some other external power management event.

7.9. Serial COM3 - COM6 Ports (CN6 - CN9)

Figure 25: Serial COM CN6 - CN9

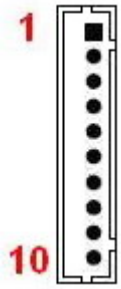


Table 37: Pin Assignment CN6

Pin	RS232 Signal	RS422 Signal	Half Duplex RS485 Signal	Full Duplex RS485 Signal	Note
1	DCD	TX-	DATA-	TX-	
2	DSR	N/A	N/A	N/A	
3	RXD	TX+	DATA+	TX+	
4	RTS	N/A	N/A	N/A	
5	TXD	RX+	N/A	RX+	
6	CTS	N/A	N/A	N/A	
7	DTR	RX-	N/A	RX-	
8	RI	N/A	N/A	N/A	
9	GND	GND	GND	GND	
10	+5V	+5V	+5V	+5V	

Table 38: Pin Assignment CN7 - CN9

Pin	RS232 Signal	Note
1	DCD	
2	DSR	
3	RXD	
4	RTS	
5	TXD	
6	CTS	
7	DTR	
8	RI	
9	GND	
10	+5V	

The COM ports need to install an OS patch from ITE. The patch is only available for Windows and is not available Linux.

Table 39: Signal Description

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

7.10. LVDS Panel Connector (LVDS1)

The LVDS connector is based on 30-pole connector type HOMETOM WF30H6-7AJA178 and supports dual channel 24-bit LVDS cable for LCD panel / display.

Figure 26: LVDS Connector LVDS1

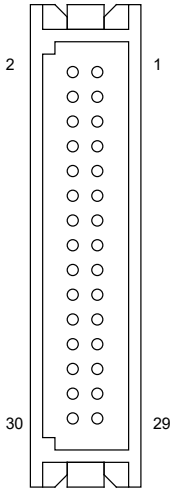


Table 40: Pin Assignment LVDS1

Pin	Signal	Note
1	VDD_EN	
2	GND	
3	+3.3V / +5V*	
4	+3.3V / +5V*	
5	TxclkA-	
6	TxclkB-	
7	TxclkA+	
8	TxclkB+	
9	GND	
10	GND	
11	TxoutA0-	
12	TxoutB0-	
13	TxoutA0+	
14	TxoutB0+	
15	TxoutA1-	
16	TxoutB1-	
17	TxoutA1+	
18	TxoutB1+	
19	TxoutA2-	
20	TxoutB2-	
21	TxoutA2+	

Pin	Signal	Note
22	TxoutB2+	
23	TxoutA3-	
24	TxoutB3-	
25	TxoutA3+	
26	TxoutB3+	
27	GND	
28	GND	
29	DDC_Data	
30	DDC_CLK	

* **Panel Power can be selected by JP3.**

Table 41: Signal Description

Signal	Description
TxoutA0..A3	LVDS A Channel data
TxclkA	LVDS A Channel clock
TxoutB0..B3	LVDS B Channel data
TxclkB	LVDS B Channel clock
VDD_EN	Output Display Enable
DDC_DATA	DDC channel Data
DDC_CLK	DDC Channel Clock

7.11. Backlight Power Output Wafer for LVDS1 (CN12)

Figure 27: Backlight Power Output Wafer CN12

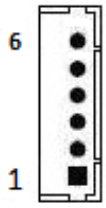


Table 42: Pin Assignment CN12

Pin	Signal	Note
1	BL_EN**	
2	BL_ADJ_PWM	
3	+5V / +12V*	
4	+5V / +12V*	
5	GND	
6	GND	

* **Backlight Power can be selected by JP3.**

** **BL_EN can be selected by JP7.**

Table 43: Signal Description

Signal	Description
BL_ADJ_PWM	Backlight Adjustment PWM (Pulse Width Modulation) signal
BL_EN	Backlight Enable signal

7.12. VGA Header (CN10)

The VGA connector is supplied via the VGA header (CN10). Only one output is supported between the VGA header (CN10) and LVDS panel connector (LVDS1).

Figure 28: VGA Header CN10

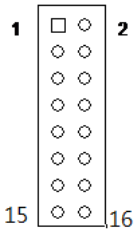


Table 44: Pin Assignment CN10

Pin	Signal	Note
1	Red	
2	Green	
3	Blue	
4	NC	
5	GND	
6	GND	
7	GND	
8	GND	
9	5V	
10	GND	
11	NC	
12	DDC_DATA	
13	HSYNC	
14	VSYNC	
15	DDC_CLK	
16	KEY	

7.13. Digital Input / Output Wafer (CN5)

Figure 29: Digital Input / Output Wafer CN5

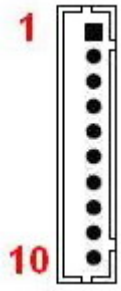


Table 45: Pin Assignment CN5

Pin	Signal	Note
1	+5V	
2	DIO_0	
3	DIO_1	
4	DIO_2	
5	DIO_3	
6	DIO_4	
7	DIO_5	
8	DIO_6	
9	DIO_7	
10	GND	

7.14. mPCIe Socket (MPCIE1 & MPCIE2)

Half-sized Mini-PCI Express V1.2 socket (MPCIE1). Socket MPCIE1 supports mPCIe and USB2.0. The model with Intel® Q170 chipset supports mSATA additionally. The switch between mSATA and mPCIe modes can be selected via the Jumper (JP4). The mSATA interface complies with SATA 3.0. The USB does support WAKE function.

Full-sized Mini-PCI Express V1.2 socket (MPCIE2). Socket MPCIE2 supports mPCIe, USB2.0 and SIM-card socket. The SIM-card socket makes it possible to use a 3G/4G-wireless modem in this mPCIe slot. The model with Intel® Q170 chipset supports mSATA additionally. The switch between mSATA and mPCIe modes can be selected via the Jumper (JP5). The mSATA interface complies with SATA 3.0. The USB does support WAKE function.

Figure 30: mPCIe Slot Connector MPCIE1, MPCIE2

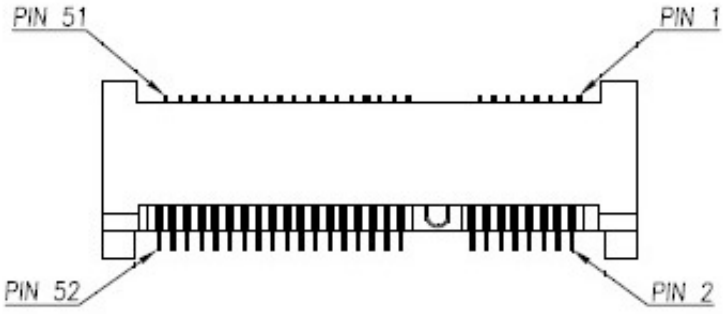


Table 46: Pin Assignment MPCIE1

Pin	Signal	Note
1	WAKE#	
2	+3.3VSB	
3	Reserved	
4	Ground	
5	Reserved	
6	+1.5V	
7	CLKREQ#	
8	Reserved	
9	Ground	
10	Reserved	
11	REFCLK-	
12	Reserved	
13	REFCLK+	
14	Reserved	
15	Ground	
16	Reserved	
17	Reserved	
18	Ground	
19	Reserved	
20	W_Disable#	
21	Ground	

Pin	Signal	Note
22	PERST#	
23	PERn0 / SATA_RX+*	
24	+3.3VSB	
25	PERp0 / SATA_RX-*	
26	Ground	
27	Ground	
28	+1.5V	
29	Ground	
30	SMB_CLK	
31	PETn0 / SATA_TX-*	
32	SMB_DATA	
33	PETp0 / SATA_TX+*	
34	Ground	
35	Ground	
36	USB_D-	
37	Ground	
38	USB_D+	
39	+3.3VSB	
40	Ground	
41	+3.3VSB	
42	LED_WWAN#	
43	Ground / NC*	
44	LED_WLAN#	
45	Reserved	
46	LED_WPAN#	
47	Reserved	
48	+1.5V	
49	Reserved	
50	Ground	
51	Reserved	
52	+3.3VSB	

*** These pins are switchable to mPCIe or mSATA mode via the jumper JP4.**

Table 47: Pin Assignment MPCIE2

Pin	Signal	Note
1	WAKE#	
2	+3.3VSB	
3	Reserved	
4	Ground	

Pin	Signal	Note
5	Reserved	
6	+1.5V	
7	CLKREQ#	
8	UIM_PWR**	
9	Ground	
10	UIM_DATA**	
11	REFCLK-	
12	UIM_CLK**	
13	REFCLK+	
14	UIM_RESET**	
15	Ground	
16	UIM_VPP**	
17	Reserved	
18	Ground	
19	Reserved	
20	W_Disable#	
21	Ground	
22	PERST#	
23	PERn0 / SATA_RX+*	
24	+3.3VSB	
25	PERp0 / SATA_RX-*	
26	Ground	
27	Ground	
28	+1.5V	
29	Ground	
30	SMB_CLK	
31	PETn0 / SATA_TX-*	
32	SMB_DATA	
33	PETp0 / SATA_TX+*	
34	Ground	
35	Ground	
36	USB_D-	
37	Ground	
38	USB_D+	
39	+3.3VSB	
40	Ground	
41	+3.3VSB	
42	LED_WWAN#	
43	Ground / NC*	
44	LED_WLAN#	
45	Reserved	
46	LED_WPAN#	

Pin	Signal	Note
47	Reserved	
48	+1.5V	
49	Reserved	
50	Ground	
51	Reserved	
52	+3.3VSB	

* These pins are switchable to mPCIe or mSATA mode via the jumper JP5.

** These pins are connected to CN2 SIM Interface directly.

7.15. SIM Interface Wafer for MPCIE2 (CN2)

Figure 31: SIM Interface Wafer CN2

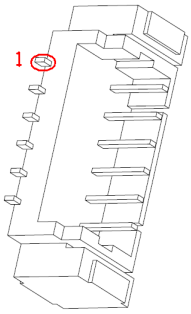


Table 48: Pin Assignment CN2

Pin	Signal	Description	Note
1	UIM_PWR	Power +5V or +3.3V	
2	UIM_DATA	Input or Output for serial data	
3	UIM_RESET	Reset signal	
4	UIM_VPP	Programming voltage input	
5	UIM_CLK	Clock signal	
6	GND	Ground	

7.16. PCI Express x16 Slot (PEG1)

The mITX-SKL-S supports PCI Express x16 via slot PEG1 and supports PEG Bifurcation. PEG Bifurcation enables the PCI Expression lanes to be divided into:

- 2x PCIe x8

For PEG Bifurcation to function a PCIe Riser Card with bifurcation is required.

The 16-lane (x16) PCI Express (PEG1) (PCIe 2.0 and PCIe 3.0) port can be used for external PCI Express cards inclusive graphics card. The maximum theoretical bandwidth using 16 lane is 16 GB/s.

Figure 32: PCI Express x16 Slot PEG1

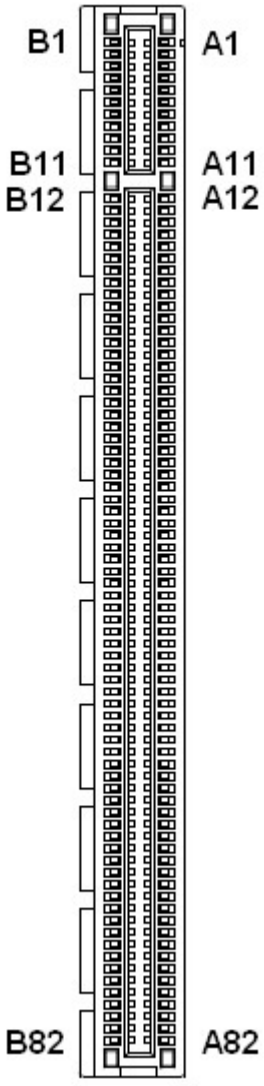


Table 49: Pin Assignment PEG1

Pin	Side B		Side A	
	Signal	Description	Signal	Description
1	+12V	+12 V power	PRSNT1#	Hot plug presence detect
2	+12V	+12 V power	+12V	+12 V power
3	Reserved		+12V	+12 V power
4	Ground		Ground	
5	SMCLK	SMBus clock	Reserved	
6	SMDAT	SMBus data	Reserved	
7	Ground		Reserved	
8	+3.3V	+3.3 V power	Reserved	
9	Reserved		+3.3V	+3.3 V power
10	+3.3VSB	+3.3 V standby power	+3.3V	+3.3 V power
11	WAKE#	Link reactivation	PERST#	PCI Express reset
Mechanical Key				
12	Reserved		Ground	
13	Ground		REFCLK+	Reference clock, differential pair
14	HSOP0	Transmitter Lane 0, Differential pair	REFCLK-	
15	HSON0		Ground	
16	Ground		HSIP0	Receiver Lane 0, Differential pair
17	PRSNT2#	Hot plug presence detect	HSIN0	
18	Ground		Ground	
19	HSOP1	Transmitter Lane 1, Differential pair	Reserved	
20	HSON1		Ground	
21	Ground		HSIP1	Receiver Lane 1, Differential pair
22	Ground		HSIN1	
23	HSOP2	Transmitter Lane 2, Differential pair	Ground	
24	HSON2		Ground	
25	Ground		HSIP2	Receiver Lane 2, Differential pair
26	Ground		HSIN2	
27	HSOP3	Transmitter Lane 3, Differential pair	Ground	
28	HSON3		Ground	
29	Ground		HSIP3	Receiver Lane 3, Differential pair
30	Ground		HSIN3	
31	PRSNT2#	Hot plug presence detect	Ground	
32	Ground		Reserved	
33	HSOP4	Transmitter Lane 4, Differential pair	Reserved	
34	HSON4		Ground	
35	Ground		HSIP4	Receiver Lane 4, Differential pair
36	Ground		HSIN4	
37	HSOP5	Transmitter Lane 5, Differential pair	Ground	
38	HSON5		Ground	
39	Ground		HSIP5	Receiver Lane 5, Differential pair
40	Ground		HSIN5	

Pin	Side B		Side A	
	Signal	Description	Signal	Description
41	HSOP6	Transmitter Lane 6, Differential pair	Ground	
42	HSON6		Ground	
43	Ground		HSIP6	Receiver Lane 6, Differential pair
44	Ground		HSIN6	
45	HSOP7	Transmitter Lane 7, Differential pair	Ground	
46	HSON7		Ground	
47	Ground		HSIP7	Receiver Lane 7, Differential pair
48	Ground		HSIN7	
49	Ground		Ground	
50	HSOP8	Transmitter Lane 8, Differential pair	Reserved	
51	HSON8		Ground	
52	Ground		HSIP8	Receiver Lane 8, Differential pair
53	Ground		HSIP8	
54	HSOP9	Transmitter Lane 9, Differential pair	Ground	
55	HSON9		Ground	
56	Ground		HSIP9	Receiver Lane 9, Differential pair
57	Ground		HSIN9	
58	HSOP10	Transmitter Lane 10, Differential pair	Ground	
59	HSON10		Ground	
60	Ground		HSIP10	Receiver Lane 10, Differential pair
61	Ground		HSIN10	
62	HSOP11	Transmitter Lane 11, Differential pair	Ground	
63	HSON11		Ground	
64	Ground		HSIP11	Receiver Lane 11, Differential pair
65	Ground		HSIN11	
66	HSOP12	Transmitter Lane 12, Differential pair	Ground	
67	HSON12		Ground	
68	Ground		HSIP12	Receiver Lane 12, Differential pair
69	Ground		HSIN12	
70	HSOP13	Transmitter Lane 13, Differential pair	Ground	
71	HSON13		Ground	
72	Ground		HSIP13	Receiver Lane 13, Differential pair
73	Ground		HSIN13	
74	HSOP14	Transmitter Lane 14, Differential pair	Ground	
75	HSON14		Ground	
76	Ground		HSIP14	Receiver Lane 14, Differential pair
77	Ground		HSIN14	
78	HSOP15	Transmitter Lane 15, Differential pair	Ground	
79	HSON15		Ground	
80	Ground		HSIP15	Receiver Lane 15, Differential pair
81	PRSNT2#	Hot plug presence detect	HSIN15	

Pin	Side B		Side A	
	Signal	Description	Signal	Description
82	Reserved		Ground	

7.17. PS/2 Keyboard and Mouse Wafer (CN15)

Attachment of a PS/2 keyboard / mouse can be done through the pinrow connector CN15.

Figure 33: PS/2 Keyboard / Mouse Wafer CN15

Table 50: Pin Assignment CN15

Pin	Signal	Note
1	MSCLK	
2	VCC	
3	MSDAT	
4	KBDAT	
5	GND	
6	KBCLK	

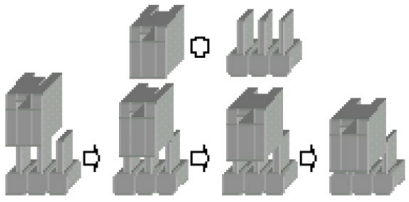
Table 51: Signal Description

Signal	Description
MSCLK	Bi-directional clock signal used to strobe data/commands from/to the PS/2 mouse.
MSDAT	Bi-directional serial data line used to transfer data from or commands to the PS/2 mouse.
KBCLK	Bi-directional clock signal used to strobe data/commands from/to the PC-AT keyboard.
KBDAT	Bi-directional serial data line used to transfer data from or commands to the PC-AT keyboard.

7.18. Switches and Jumpers

The product has several jumpers which must be properly configured to ensure correct operation.

Figure 34: Jumper Connector



For a three-pin jumper (see Figure 35), the jumper setting is designated “1-2” when the jumper connects pins 1 and 2. The jumper setting is designated “2-3” when pins 2 and 3 are connected and so on. You will see that one of the lines surrounding a jumper pin is thick, which indicates pin No.1.

To move a jumper from one position to another, use needle-nose pliers or tweezers to pull the pin cap off the pins and move it to the desired position.

7.18.1. AT / ATX Power Mode Selection (JP1)

Figure 35: AT / ATX Power Mode Selection JP1

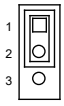


Table 52: Pin Assignment JP1

Jumper 1 Position		Description
Pin 1-2	Pin 2-3	
X	-	ATX Mode
-	X	AT Mode

“X” = Jumper set (short) and “-” = jumper not set (open)

7.18.2. Clear ME Register (JP2)

Figure 36: Clear ME Register JP2

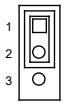


Table 53: Pin Assignment JP2

Jumper 1 Position		Description
Pin 1-2	Pin 2-3	
X	-	Normal
-	X	Clear ME Register

"X" = Jumper set (short) and "-" = jumper not set (open)

7.18.3. RTC Reset Selection (JP3)

The "RTC Reset" jumper (JP3) can be used to reset the Real Time Clock (RTC) and drain RTC well.

The jumper has one position: Pin 1-2 mounted (default position) and Pin 2-3 mounted. More information on setting the "RTC Reset" jumper can be founf in the following table.

Figure 37: RTC Reset Selection JP3

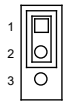


Table 54: Pin Assignment JP3

Jumper 1 Position		Description
Pin 1-2	Pin 2-3	
X	-	Normal (default position)
-	X	Clear RTC CMOS (board does not boot with the jumper in this position)

"X" = Jumper set (short) and "-" = jumper not set (open)

Do not leave the jumper in position 2-3, otherwise if the power is disconnected, the battery will fully deplete within a few weeks.

7.18.4. mPCIE / mSATA Selection for MPCIE2 (JP4)

This jumper is available only for the models with Intel® Q170 Chipset.

Figure 38: mPCIE / mSATA Selection JP4

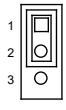


Table 55: Pin Assignment JP4

Jumper 1 Position	Description

Pin 1-2	Pin 2-3	
X	-	mSATA
-	X	mPCIE

"X" = Jumper set (short) and "-" = jumper not set (open)

7.18.5. mPCIE / mSATA Selection for MPCIE1 (JP5)

This jumper is available only for the models with Intel® Q170 Chipset.

Figure 39: mPCIE / mSATA Selection JP5

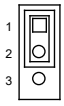


Table 56: Pin Assignment JP5

Jumper 1 Position		Description
Pin 1-2	Pin 2-3	
X	-	mSATA
-	X	mPCIE

"X" = Jumper set (short) and "-" = jumper not set (open)

7.18.6. Keyboard Lock Selection (JP6)

Figure 40: Keyboard Lock Selection JP6

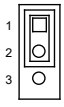


Table 57: Pin Assignment JP6

Jumper 1 Position		Description
Pin 1-2	Pin 2-3	
X	-	Normal
-	X	Keyboard Locked

"X" = Jumper set (short) and "-" = jumper not set (open)

7.18.7. MPCIE LED Indication Pin Header (JP7)

Figure 41: MPCIE LED Indication Pin Header JP7

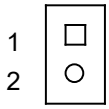


Table 58: Pin Assignment JP7

Pin	Signal	Note
1	LED+	
2	LED-	

7.18.8. PCIE Configuration Setting for PEG1 (JP9)

This jumper is available only for the models with Intel® Q170 Chipset.

Figure 42: PCIE Configuration Setting JP9

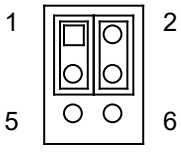


Table 59: Pin Assignment JP9

Jumper Position				Description
Pin 1-3	Pin 3-5	Pin 2-4	Pin 4-6	
X	-	X	-	x16
-	X	X	-	x8 x8

"X" = Jumper set (short) and "-" = jumper not set (open)

7.18.9. Backlight Power Enable Selection for LVDS1 (JP10)

Figure 43: Backlight Power Enable Selection JP10

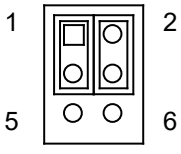


Table 60: Pin Assignment JP10

Jumper 1 Position		Description
Pin 1-3	Pin 3-5	
X	-	Backlight Enable Voltage = +3.3V

Jumper 1 Position		Description
Pin 1-3	Pin 3-5	
-	X	Backlight Enable Voltage = +5V
Jumper 2 Position		Description
Pin 2-4	Pin 4-6	
X	-	Active High
-	X	Active Low

"X" = Jumper set (short) and "-" = jumper not set (open)

7.18.10. Panel & Backlight Power Selection for LVDS1 (JP11)

Figure 44: Panel & Backlight Power Selection JP11

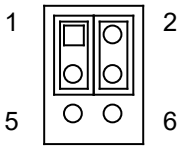


Table 61: Pin Assignment JP11

Jumper 1 Position		Description
Pin 1-3	Pin 3-5	
X	-	Backlight Power = +12V
-	X	Backlight Power = +5V
Jumper 2 Position		Description
Pin 2-4	Pin 4-6	
X	-	Panel Power = +3.3V
-	X	Panel Power = +5V

"X" = Jumper set (short) and "-" = jumper not set (open)

7.18.11. Pin-9 Selection for COM1 (JP12)

Figure 45: Pin-9 Selection JP12

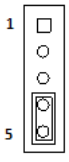


Table 62: Pin Assignment JP12

Jumper Position				Description
Pin 1-2	Pin 2-3	Pin 3-4	Pin 4-5	

Jumper Position				Description
Pin 1-2	Pin 2-3	Pin 3-4	Pin 4-5	
X	-	-	-	COM1, Pin-9 = +12V
-	X	-	-	COM1, Pin-9 = +5V
-	-	X	-	COM1, Pin-9 = +5V
-	-	-	X	COM1, Pin-9 = RI

"X" = Jumper set (short) and "-" = jumper not set (open)

7.18.12. ME F/W Selection (JP13)

Figure 46: ME F/W Selection JP13

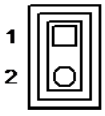


Table 63: Pin Assignment JP13

Jumper Position	Description
Pin 1-2	
X	Security Measures Defined by BIOS are Over-written
-	Security Measures Defined are Set

"X" = Jumper set (short) and "-" = jumper not set (open)

7.18.13. Pin-9 Selection for COM2 (JP14)

Figure 47: Pin-9 Selection JP14

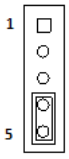


Table 64: Pin Assignment JP14

Jumper Position				Description
Pin 1-2	Pin 2-3	Pin 3-4	Pin 4-5	
X	-	-	-	COM2, Pin-9 = +12V
-	X	-	-	COM2, Pin-9 = +5V
-	-	X	-	COM2, Pin-9 = +5V
-	-	-	X	COM2, Pin-9 = RI

"X" = Jumper set (short) and "-" = jumper not set (open)

8/ BIOS

8.1. Starting the uEFI BIOS

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

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

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

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

The mITX-SKL-S uEFI BIOS setup program uses a hot key-based navigation system. A hot key legend bar is located on the bottom of the setup screens.

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

Table 65: Font Size Table

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

8.2. Setup Menus

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

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

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

8.2.1. Main Setup Menu

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

Table 66: Main Setup Menu Sub-Screens and Functions

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

Figure 48: BIOS Main Menu Screen System Data and Time

BIOS SETUP UTILITY					
Main	Advanced	Power	Security	Boot	Save & Exit
Product Information					
Product Name		mITX-SKL-S-Q170			
BIOS Version		R0.03 (x64)			
BIOS Build Date		01/15/2016			
ME FW Version		11.0.0.1178			
CPU Information					
Intel® Core™ i7-6700K CPU @ 4.00GHz					
Microcode Revision		39			
Processor Cores		4		→ ←: Select Screen	
Memory Information				↑ ↓: Select Item	
Total Size		16384 MB		Enter: Select	
Frequency		2133 MHz		+/-: Change Opt.	
				F1: General Help	
System Date		[Wed 04/06/2016]		F2: Previous Values	
System Time		[17:53:22]		F3: Optimized Defaults	
				F4: Save & Exit	
Access Level		Administrator		ESC: Exit	
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Feature	Option	Description
System Date	[dd/mm/yyyy]	Set the Date. Use Tab to switch between Data elements.
System Time	[hh:mm:ss]	Set the Time. Use Tab to switch between Time elements.

8.2.2. Advanced Setup Menu

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

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

NOTICE

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

Figure 49: BIOS Advanced Menu

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

Figure 50: BIOS Advanced Menu - Display Configuration

BIOS SETUP UTILITY					
Main	Advanced	Power	Security	Boot	Save & Exit
Display Configuration					
Primary Display		[Auto]			
UWA Frame Buffer Size		[256MB]		→ ←: Select Screen	
DVMT Pre-Allocated		[64M]		↑ ↓: Select Item	
DVMT Total Gfx Mem		[256M]		Enter: Select	
				+/-: Change Opt.	
Primary IGFX Boot Display		[VBIOS Default]		F1: General Help	
Active LVDS		[Disabled]		F2: Previous Values	
				F3: Optimized Defaults	
				F4: Save & Exit	
				ESC: Exit	
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Feature	Option	Description
Primary Display	[Auto], [IGFX], [PEG], [PCIE]	Select which graphic controller to be used as the primary display device.
UWA Frame Buffer Size	[128MB], [256MB], [512MB]	Select the Aperture Size.
DVMT Pre-Allocated	[32M], [64M], [96M], [128M], [160M], [192M], [224M], [256M], [288M], [320M], [352M], [384M], [416M], [448M], [480M], [512M], [1024M]	Select DVMT Pre-Allocated (Fixed) Graphics Memory size used by the Internal Graphics Device.
DVMT Total Gfx Mem	[128M], [256M], [MAX]	Select DVMT Total Graphic Memory size used by the Internal Graphics Device.
Primary IGFX Boot Display	[VBIOS Default], [CRT], [DVI], [DP], [DP2]	Select the Video Device which will be activated during POST. This has no effect if external graphics present. Secondary boot display selection will appear based on your selection. DOS modes will be supported only on primary display.
Active LVDS	[Disabled], [Enabled]	Select the Active LVDS Configuration. [Disabled]: VBIOS does not enable LVDS. [Enabled]: VBIOS will enable LVDS.

Figure 51: BIOS Advanced Menu - Super IO Configuration

BIOS SETUP UTILITY					
Main	Advanced	Power	Security	Boot	Save & Exit
Super IO Configuration					
> Serial Port 1 Configuration				→←: Select Screen	
> Serial Port 2 Configuration				↑ ↓: Select Item	
> Serial Port 3 Configuration				Enter: Select	
> Serial Port 4 Configuration				+/-: Change Opt.	
> Serial Port 5 Configuration				F1: General Help	
> Serial Port 6 Configuration				F2: Previous Values	
> Parallel Port Configuration				F3: Optimized Defaults	
				F4: Save & Exit	
				ESC: Exit	
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Figure 52: BIOS Advanced Menu - Super IO Configuration - Serial Port 1 Configuration

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

Feature	Option	Description
Serial Port	[Disabled], [Enabled]	Select whether to enable or disable Serial Port (COM).
Change Settings	[Auto], [IO=3F8h; IRQ=4;], [IO=3F8h; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12;], [IO=2F8h; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12;], [IO=3E8h; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12;], [IO=2E8h; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12;]	Select an optional setting for Super IO device.

Feature	Option	Description
Serial Port 1 Type	[RS232], [RS422], [RS485]	Select an appropriate type for Serial Port 1.
RS485 Duplex Mode	[Half Duplex], [Full Duplex]	Select an appropriate RS485 Duplex Mode.

Figure 53: BIOS Advanced Menu - Super IO Configuration - Serial Port 2 Configuration

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

Feature	Option	Description
Serial Port	[Disabled], [Enabled]	Select whether to enable or disable Serial Port (COM).
Change Settings	[Auto], [IO=2F8h; IRQ=3;], [IO=3F8h; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12;], [IO=2F8h; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12;], [IO=3E8h; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12;], [IO=2E8h; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12;]	Select an optional setting for Super IO device.
Serial Port 2 Type	[RS232], [RS422], [RS485]	Select an appropriate type for Serial Port 2.
RS485 Duplex Mode	[Half Duplex], [Full Duplex]	Select an appropriate RS485 Duplex Mode.

Figure 54: BIOS Advanced Menu - Super IO Configuration - Serial Port 3 Configuration

BIOS SETUP UTILITY					
Main	Advanced	Power	Security	Boot	Save & Exit
Serial Port 3 Configuration					
Serial Port		[Enabled]		→ ←: Select Screen	
Device Settings		IO=3E8h; IRQ=7;		↑ ↓: Select Item	
				Enter: Select	
Change Setting		[Auto]		+/-: Change Opt.	
Serial Port 3 Type		[RS232]		F1: General Help	
RS485 Deplux Mode*		[Half Duplex]		F2: Previous Values	
				F3: Optimized Defaults	
				F4: Save & Exit	
				ESC: Exit	
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* These items appear only when selecting RS485 for the Serial Port 3 Type.

Feature	Option	Description
Serial Port	[Disabled], [Enabled]	Select whether to enable or disable Serial Port (COM).
Change Settings	[Auto], [IO=3E8h; IRQ=7;], [IO=3E8h; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12;], [IO=2E8h; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12;], [IO=2F0h; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12;], [IO=2E0h; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12;]	Select an optional setting for Super IO device.
Serial Port 3 Type	[RS232], [RS422], [RS485]	Select an appropriate type for Serial Port 2.
RS485 Duplex Mode	[Half Duplex], [Full Duplex]	Select an appropriate RS485 Duplex Mode.

Figure 55: BIOS Advanced Menu - Super IO Configuration - Serial Port 4 Configuration

BIOS SETUP UTILITY					
Main	Advanced	Power	Security	Boot	Save & Exit
Serial Port 4 Configuration					
Serial Port		[Enabled]		→ ←: Select Screen	
Device Settings		IO=2E8h; IRQ=7;		↑ ↓: Select Item	
				Enter: Select	
Change Setting		[Auto]		+/-: Change Opt.	
				F1: General Help	
				F2: Previous Values	

BIOS SETUP UTILITY					
Main	Advanced	Power	Security	Boot	Save & Exit
				F3: Optimized Defaults F4: Save & Exit ESC: Exit	
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Feature	Option	Description
Serial Port	[Disabled], [Enabled]	Select whether to enable or disable Serial Port (COM).
Change Settings	[Auto], [IO=2E8h; IRQ=7;], [IO=3E8h; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12;], [IO=2E8h; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12;], [IO=2F0h; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12;], [IO=2E0h; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12;]	Select an optional setting for Super IO device.

Figure 56: BIOS Advanced Menu - Super IO Configuration - Serial Port 5 Configuration

BIOS SETUP UTILITY					
Main	Advanced	Power	Security	Boot	Save & Exit
Serial Port 5 Configuration					
Serial Port		[Enabled]		→ ←: Select Screen	
Device Settings		IO=2F0h; IRQ=7;		↑ ↓: Select Item	
				Enter: Select	
Change Setting		[Auto]		+/-: Change Opt.	
				F1: General Help	
				F2: Previous Values	
				F3: Optimized Defaults	
				F4: Save & Exit	
				ESC: Exit	
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Feature	Option	Description
Serial Port	[Disabled], [Enabled]	Select whether to enable or disable Serial Port (COM).
Change Settings	[Auto], [IO=2F0h; IRQ=7;], [IO=3E8h; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12;], [IO=2E8h; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12;], [IO=2F0h; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12;], [IO=2E0h; IRQ=3, 4, 5, 6, 7, 9, 10,	Select an optional setting for Super IO device.

Feature	Option	Description
	11, 12;]	

Figure 57: BIOS Advanced Menu - Super IO Configuration - Serial Port 6 Configuration

BIOS SETUP UTILITY					
Main	Advanced	Power	Security	Boot	Save & Exit
Serial Port 6 Configuration					
Serial Port		[Enabled]		→ ←: Select Screen	
Device Settings		IO=2E0h; IRQ=7;		↑ ↓: Select Item	
				Enter: Select	
Change Setting		[Auto]		+/-: Change Opt.	
				F1: General Help	
				F2: Previous Values	
				F3: Optimized Defaults	
				F4: Save & Exit	
				ESC: Exit	
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Feature	Option	Description
Serial Port	[Disabled], [Enabled]	Select whether to enable or disable Serial Port (COM).
Change Settings	[Auto], [IO=2E0h; IRQ=7;], [IO=3E8h; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12;], [IO=2E8h; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12;], [IO=2F0h; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12;], [IO=2E0h; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12;]	Select an optional setting for Super IO device.

Figure 58: BIOS Advanced Menu - CPU Chipset Configuration

BIOS SETUP UTILITY					
Main	Advanced	Power	Security	Boot	Save & Exit
CPU Chipset Configuration					
EIST		[Enabled]		→ ←: Select Screen	
Turbo Mode		[Enabled]		↑ ↓: Select Item	
Hyper-threading		[Enabled]		Enter: Select	
VT-d		[Enabled]		+/-: Change Opt.	
Active Processor Cores		[All]		F1: General Help	
Limit CPUID Maximum		[Disabled]		F2: Previous Values	
Execute Disable Bit		[Enabled]		F3: Optimized Defaults	
Intel Virtualization Technology		[Disabled]		F4: Save & Exit	
				ESC: Exit	
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Feature	Option	Description
EIST	[Disabled], [Enabled]	Select whether to enable or disable Enhanced Intel SpeedStep Technology.
Turbo Mode	[Disabled], [Enabled]	Select whether to enable or disable turbo mode.
Hyper-threading	[Disabled], [Enabled]	Select whether to enable or disable Hyper-threading technology. [Enabled] for Windows XP and Linux (OS optimized for Hyper-Threading Technology). [Disabled] for other OS (OS not optimized for Hyper-Threading Technology).
VT-d	[Disabled], [Enabled]	Select whether to enable or disable VT-d capability.
Active Processor Cores	[All], [1], [2], [3]	Select the number of cores to enable in each processor package.
Limit CPUID Maximum	[Disabled], [Enabled]	Select whether to limit CPUID maximum value.
Execute Disable Bit	[Disabled], [Enabled]	Select whether to enable or disable Execute Disable Bit functionality, which prevents malicious buffer overflow attacks..
Intel Virtualization Technology	[Disabled], [Enabled]	Select whether to enable or disable Intel Virtualization Technology.

Figure 59: BIOS Advanced Menu - SATA Configuration

BIOS SETUP UTILITY					
Main	Advanced	Power	Security	Boot	Save & Exit
SATA Configuration					
SATA Controller(s)		[Enabled]			
SATA Mode Selection		[AHCI]			
Serial ATA Port 1		Empty			
Port 1		[Enabled]			
Serial ATA Port 2		Empty			
Port 2		[Enabled]		→←: Select Screen	
Serial ATA Port 3		Empty		↑ ↓: Select Item	
Port 3		[Enabled]		Enter: Select	
Serial ATA Port 4		Empty		+/-: Change Opt.	
Port 4		[Enabled]		F1: General Help	
mS ATA Port 1		Empty		F2: Previous Values	
Port 1		[Enabled]		F3: Optimized Defaults	
mSATA Port 2		Empty		F4: Save & Exit	
Port 2		[Enabled]		ESC: Exit	
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Feature	Option	Description
SATA Controller(s)	[Enabled], [Disabled]	Select whether to enable or disable SATA Device.
SATA Mode Selection	[AHCI], [RAID]	Determine how SATA controller(s) operate.
Port 1..4	[Disabled], [Enabled]	Select whether to enable or disable SATA Port 1/2/3/4 or mSATA Port 1/2.

Figure 60: BIOS Advanced Menu - USB Configuration

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

Figure 61: BIOS Advanced Menu - DIO Configuration

BIOS SETUP UTILITY					
Main	Advanced	Power	Security	Boot	Save & Exit
DIO Configuration					
User Configuration		[Disabled]			
DIO_0*		[Output Low]			
DIO_1*		[Output Low]			
DIO_2*		[Output Low]			
DIO_3*		[Output Low]			
DIO_4*		[Output Low]			
DIO_5*		[Output Low]			
DIO_6*		[Output Low]			
DIO_7*		[Output Low]			
				→←: Select Screen	
DIO_0 Value		1		↑ ↓: Select Item	
DIO_1 Value		1		Enter: Select	
DIO_2 Value		1		+/-: Change Opt.	
DIO_3 Value		1		F1: General Help	
DIO_4 Value		0		F2: Previous Values	
DIO_5 Value		0		F3: Optimized Defaults	
DIO_6 Value		0		F4: Save & Exit	
DIO_7 Value		0		ESC: Exit	
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* These items appear only when enabling "User Configuration".

Feature	Option	Description
User Configuration	[Enabled], [Disabled]	Select whether or not to allow user to set the DIO pin value.
DIO_0..7	[Output Low], [Output High], [Input]	Set up the DIO pin value.

Figure 62: BIOS Advanced Menu - H/W Monitor

BIOS SETUP UTILITY					
Main	Advanced	Power	Security	Boot	Save & Exit
PC Health Status					
CPU Warning Temperature		[Disabled]			
> Smart FAN Configuration					
CPU Temperature		: +60 C			
System Temperature		: +33 C			
CPU Fan Speed		: 4166 RPM			
SYS Fan Speed		: N/A			
+VCORE		: +0.887 V		→ ←: Select Screen ↑ ↓: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit	
+12V		: +12.060 V			
+5V		: +4.986 V			
+VMEN		: +1.221 V			
+3.3VSB		: +3.296 V			
+3.3V		: +3.376 V			
+VRTC		: +3.216 V			
+1.05V		: +1.064 V			
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Feature	Option	Description
CPU Warning Temperature	[Disabled], [80], [85], [90], [95]	Determine whether to enable or disable CPU Warning Temperature function and select a temperature that will sound an alarm.

BIOS SETUP UTILITY					
Main	Advanced	Power	Security	Boot	Save & Exit
Smart FAN Configuration					
CPU FAN Setting		[Manual]		→ ←: Select Screen ↑ ↓: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit	
Manual Duty		255			
System FAN Setting		[Manual]			
Manual Duty		255			
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Feature	Option	Description
CPU FAN Setting	[Manual], [Smart]	Switch the CPU FAN control mode.
System FAN Setting	[Manual], [Smart]	Switch the System FAN control mode.

8.2.3. Power Setup Menu

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

- WatchDog Timer Configuration

Figure 63: BIOS Power Setup Menu

BIOS SETUP UTILITY					
Main	Advanced	Power	Security	Boot	Save & Exit
Power Configuration					
ACPI Sleep State		[S3 (Suspend to RAM)]			
Restore AC Power Loss		[Power Off]			
Power Saving Mode		[Disabled]			
				→←: Select Screen	
Resume Event Control				↑ ↓: Select Item	
Resume From S3 By PS/2 Keyboard		[Disabled]		Enter: Select	
Resume From S3 By PS/2 Mouse		[Disabled]		+/-: Change Opt.	
Resume By LAN Device		[Disabled]		F1: General Help	
Resume By PCI-E Device		[Disabled]		F2: Previous Values	
Resume By Ring Device		[Disabled]		F3: Optimized Defaults	
Resume By RTC Alarm		[Disabled]		F4: Save & Exit	
> WatchDog Timer Configuration				ESC: Exit	
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Feature	Option	Description
ACPI Sleep State	[Suspend Disabled], [S3 (Suspend to RAM)]	Select whether to enable or disable suspend function and determine an appropriate suspend mode.
Restore AC Power Loss	[Power Off], [Power On], [Last State]	Control whether the system will stay on after AC power is removed and then restored. Select [Power Off] if you want the system to remain off after power restored. Select [Power On] if you use a power strip to turn the system on.
Power Saving Mode	[Disabled], [EUP Enabled], [DeepSx Enabled]	Select whether to enable Power Saving Mode.
Resume From S3 By PS/2 Keyboard	[Enabled], [Disabled]	Select whether to allow wakening the system up from the S3 sleep state by PS/2 keyboard.
Resume From S3 By PS/2 Mouse	[Enabled], [Disabled]	Select whether to allow wakening the system up from the S3 sleep state by PS/2 mouse.
Resume By LAN Device	[Disabled], [Enabled]	Select whether to enable or disable Wake from LAN Device.
Resume By PCI-E Device	[Disabled], [Enabled]	Select whether to enable or disable Wake from PCI-E Device.
Resume By Ring Device	[Disabled], [Enabled]	Select whether to enable or disable Wake from Ring Device.

Feature	Option	Description
Resume By RTC Alarm	[Disabled], [Enabled]	Select whether to enable or disable Wake Up on Alarm, to turn on your system on a special day of the month.

Figure 64: BIOS Power Setup Menu - WatchDog Timer Configuration

BIOS SETUP UTILITY					
Main	Advanced	Power	Security	Boot	Save & Exit
WatchDog Timer Configuration					
WDT Function		[Disabled]		→←: Select Screen ↑ ↓: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit	
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Feature	Option	Description
WDT Function	[Disabled], [Enabled]	Select whether to enable or disable WatchDog Timer function.

8.2.4. Security Setup Menu

The Security setup menu provides information about the passwords and functions for specifying the security settings. The passwords are case-sensitive. The mITX-SKL-S provides no factory-set passwords.

NOTICE

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

Figure 65: BIOS Boot Setup Menu

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

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

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

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

8.2.4.1. Remember the password

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

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

HDD security passwords cannot be cleared using the above method.

8.2.5. Boot Setup Menu

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

Figure 66: BIOS Boot Setup Menu

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

8.2.6. Save & Exit Setup Menu

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

Figure 67: BIOS Boot Setup Menu

BIOS SETUP UTILITY					
Main	Advanced	Power	Security	Boot	Save & Exit
Save Changes and Reset					
Discard Changes and Reset					
				→←: Select Screen	
Save Options				↑ ↓: Select Item	
Save Changes				Enter: Select	
Discard Changes				+/-: Change Opt.	
				F1: General Help	
Restore Defaults				F2: Previous Values	
				F3: Optimized Defaults	
				F4: Save & Exit	
				ESC: Exit	
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Feature	Description
Save Changes and Exit	Exit system setup after saving the changes. Once you are finished making your selections, choose this option from the Exit menu to ensure the values you selected are saved to the CMOS RAM. The CMOS RAM is sustained by an onboard backup battery and stays on even when the PC is turned off. When you select this option, a confirmation window appears. Select [Yes] to save changes and exit.
Discard Changes and Exit	Exit system setup without saving any changes. Select this option only if you do not want to save the changes that you made to the Setup program. If you made changes to fields other than system date, system time, and password, the BIOS asks for a confirmation before exiting.
Save Changes	Save changes done so far to any of the setup values. This option allows you to save the selections you made. After selecting this option, a confirmation appears. Select [Yes] to save any changes.
Discard Changes	Discards changes done so far to any of the setup values. This option allows you to discard the selections you made and restore the previously saved values. After selecting this option, a confirmation appears. Select [Yes] to discard any changes and load the previously saved values.
Restore Defaults	Restore Default values for all the setup values. This option allows you to load optimal default values for each of the parameters on the Setup menus, which will provide the best performance settings for your system. The F9 key can be used for this operation.

Appendix A: List of Acronyms

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

Table 67: List of Acronyms

2D	Two-Dimensional
3D	Three-Dimensional
AT	Advanced Technology
ATX	Advanced Technology eXtended
BGA	Ball Grid Array
BIOS	Basic Input / Output System
BSP	Board Support Package
CMOS	Complementary Metal Oxide Semiconductor
CPU	Central Processing Unit
DC	Direct Current
DDC	Display Data Channel
DIO	Digital Input / Output
ECC	Error-Correcting Code
EEE	Electrical and Electronic Equipment
EOS	Electrical OverStress
ESD	ElectroStatic Discharge
GbE	Gigabit Ethernet
HDD	Hard Disk Drive
HDMI	High Definition Multimedia Interface
LAN	Local Area Network
LED	Light Emitting Device
LVDS	Low-Voltage Differential Signaling
ME F/W	Management Engine Firmware
mPCIe	mini Peripheral Component Interconnect express
PC-AT	Personal Computer - Advanced Technology
PCB	Printed Circuit Board
PSU	Power Supply Unit
PVC	PolyViny Chloride
PWM	Pulse Width Modulation
RAM	Random Access Memory
ROM	Read-Only Memory
RTC	Real-Time Clock
SATA	Serial Advanced Technology Attachment
SDP	Serial Download Protocol
SELV	Safety Extra-Low Voltage
SIM	Subscriber Identity Module
SMBus	System Management Bus
SoC	System on Chip
SO-DIMM	Small Outline Dual In-line Memory Module
SPD	Serial Presence Detect
SPI	Serial Peripheral Interface
TDP	Thermal Design Power
TPM	Trusted Platform Module
UEFI	Unified Extensible Firmware Interface
USB	Universal Serial Bus
UTP	Update Transfer Protocol
VGA	Video Graphics Array
WDT	WatchDog Timer
WEEE	Waste Electrical and Electronic Equipment

About Kontron

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

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