



# mITX-BW

Doc. User Guide, Rev. 1.6 Doc. ID: 1060-7044



# Disclaimer

Kontron would like to point out that the information contained in this manual may be subject to alteration, particularly as a result of the constant upgrading of Kontron products. This document does not entail any guarantee on the part of Kontron with respect to technical processes described in the manual or any product characteristics set out in the manual. Kontron assumes no responsibility or liability for the use of the described product(s), conveys no license or title under any patent, copyright or mask work rights to these products and makes no representations or warranties that these products are free from patent, copyright or mask work right infringement unless otherwise specified. Applications that are described in this manual are for illustration purposes only. Kontron makes no representation or warranty that such application will be suitable for the specified use without further testing or modification. Kontron expressly informs the user that this manual only contains a general description of processes and instructions which may not be applicable in every individual case. In cases of doubt, please contact Kontron.

This manual is protected by copyright. All rights are reserved by Kontron. No part of this document may be reproduced, transmitted, transcribed, stored in a retrieval system, or translated into any language or computer language, in any form or by any means (electronic, mechanical, photocopying, recording, or otherwise), without the express written permission of Kontron. Kontron points out that the information contained in this manual is constantly being updated in line with the technical alterations and improvements made by Kontron to the products and thus this manual only reflects the technical status of the products by Kontron at the time of publishing.

Brand and product names are trademarks or registered trademarks of their respective owners.

©2018 by Kontron S&T AG

Kontron S&T AG

Lise-Meitner-Str. 3-5 86156 Augsburg Germany www.kontron.com

# Intended Use

THIS DEVICE AND ASSOCIATED SOFTWARE ARE NOT DESIGNED, MANUFACTURED OR INTENDED FOR USE OR RESALE FOR THE OPERATION OF NUCLEAR FACILITIES, THE NAVIGATION, CONTROL OR COMMUNICATION SYSTEMS FOR AIRCRAFT OR OTHER TRANSPORTATION, AIR TRAFFIC CONTROL, LIFE SUPPORT OR LIFE SUSTAINING APPLICATIONS, WEAPONS SYSTEMS, OR ANY OTHER APPLICATION IN A HAZARDOUS ENVIRONMENT, OR REQUIRING FAIL-SAFE PERFORMANCE, OR IN WHICH THE FAILURE OF PRODUCTS COULD LEAD DIRECTLY TO DEATH, PERSONAL INJURY, OR SEVERE PHYSICAL OR ENVIRONMENTAL DAMAGE (COLLECTIVELY, "HIGH RISK APPLICATIONS").

You understand and agree that your use of Kontron devices as a component in High Risk Applications is entirely at your risk. To minimize the risks associated with your products and applications, you should provide adequate design and operating safeguards. You are solely responsible for compliance with all legal, regulatory, safety, and security related requirements concerning your products. You are responsible to ensure that your systems (and any Kontron hardware or software components incorporated in your systems) meet all applicable requirements. Unless otherwise stated in the product documentation, the Kontron device is not provided with error-tolerance capabilities and cannot therefore be deemed as being engineered, manufactured or setup to be compliant for implementation or for resale as device in High Risk Applications. All application and safety related information in this document (including application descriptions, suggested safety measures, suggested Kontron products, and other materials) is provided for reference only.

Revision	Brief Description of Changes	Date of Issue	Author
0.1	Initial issue	2016-June-30	CW
1.0	Release version	2016-Aug-25	CW
1.1	Removed the CANBus feature Updated the Memory Modules PN	2016-Sept-02	CW
1.2	Added 3.5.1 Audio Removed Suppend (S1 mode) from table:1 Added 7.9 MIC1 Connector (J2)	2016-Sept-14	CW
1.3	Replaced M.2 with mSATA/mPCIe	2016-Sept-27	CW
1.4	Updated LVDS flat panel connector pin assignment	2017-Apr-18	CW
1.5	Updated 7.17 SATA Power Connector Added the SATA Power Connector to Chapter 8 On-board and Mating Connector Types	2017-July-13	CW
1.6	Chapter 7.1.2: caution note added	2018-Oct-08	HJS

# **Revision History**

# **Terms and Conditions**

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

Kontron sells products worldwide and declares regional General Terms & Conditions of Sale, and Purchase Order Terms & Conditions. Visit <u>http://www.kontron.com/terms-and-conditions</u>.

For contact information, refer to the corporate offices contact information on the last page of this user guide or visit our website <u>CONTACT US</u>.

# **Customer Support**

Find Kontron contacts by visiting: <u>http://www.kontron.com/support</u>.

# **Customer Service**

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

For more details on Kontron's service offerings such as: enhanced repair services, extended warranty, Kontron training academy, and more visit <u>http://www.kontron.com/support-and-services/services</u>.

# **Customer Comments**

If you have any difficulties using this user guide, discover an error, or just want to provide some feedback, contact <u>Kontron support</u>. 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 signs and symbols may be used in this User Guide:

	DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.
	WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.
	CAUTION indicates a hazardous situation which, if not avoided, may result in minor or moderate injury.
NOTICE	NOTICE indicates a property damage message.
^	Electric Shock!
4	This symbol and title warn of hazards due to electrical shocks (> 60 V) when touching products or parts of them. 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.
	Please refer also to the "High-Voltage Safety Instructions" portion below in this section.
	ESD Sensitive Device!
	This symbol and title inform that the electronic boards and their components are sensitive to static electricity. Care must be taken during all handling operations and inspections of this product in order to ensure product integrity at all times.
$\wedge$	HOT Surface
	Do NOT touch! Allow to cool before servicing.
$\wedge$	Laser!
*	This symbol inform of the risk of exposure to laser beam 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.
i	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.

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

# ACAUTION

#### 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



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.

# 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's Technical 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.

## **Environmental Protection Statement**

This product has been manufactured to satisfy environmental protection requirements where possible. Many of the components used (structural parts, printed circuit boards, connectors, batteries, etc.) are capable of being recycled.

Final disposition of this product after its service life must be accomplished in accordance with applicable country, state, or local laws or regulations.



Environmental protection is a high priority with Kontron. Kontron follows the WEEE directive You are encouraged to return our products for proper disposal.

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

# Life Support Policy

KONTRON PRODUCTS ARE NOT FOR USE AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS WITHOUT EXPRESS WRITTEN APPROVAL OF THE GENERAL MANAGER OF KONTRON.

As used herein:

Life support devices or systems are devices or systems that (a) are intended for surgical implant into body or (b) support or sustain life and whose failure to perform when properly used in accordance with instructions for use provided in the labelling can be reasonably expected to result in significant injury to the user.

A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system or to affect its safety or effectiveness.

# Table of Contents

Symbols	5
Table of Contents	8
List of Tables	10
List of Figures	11
1/ Introduction	12
2/ Installation procedure	13
2.1. Installing the Board	13
2.2. Requirements IEC60950-1	14
2.3. Lithium battery precautions	14
3/ System specifications	15
3.1. Component Main Data	15
3.2. mITX Block Diagram	18
3.3. Processor Support Table	19
3.4. System Memory Support	20
3.5. mITX-BW Graphics Subsystem	21
3.5.1. Audio	22
3.6. Power Consumption	23
4/ Connector Locations	24
4.1. mITX-BW Front Side	24
5/ Connector Definitions	27
6/ IO-Area Connectors	28
6.1. DP Connectors DP1 and DP2 (J19 & J16)	28
6.2. Ethernet Connectors (J26 & J28)	29
6.3. USB Connectors /IO Area (J21 & J23).	
6.4. Audio Jack Connectors (J3 & J11)	32
7/ Internal Connectors	33
7.1. Power Connectors	33
7.1.1. DC Power Connector (J40)	33
7.1.2. DC Power-Jack Connector (J56)	34
7.2. Fan Connectors (J47 & J48)	34
7.3. PS/2 Keyboard and Mouse Connector (KBDMSE) (J15)	
7.4. SATA (Serial ATA) Disk Interfaces (J39 & J8)	
7.5. SATA Power Connector (J5)	
7.6. RS485 Bus Connector (J50)	
7.7. USB Connectors /Internal	
7.8. Speaker Connector (J1)	
7.9. MIC1 Connector (J2)	
7.10. SPDIF-OUT Connector (J9)	
7.11. Front Panel Connector (FRONTPNL) (J4)	
7.12. Serial COM1 – COM4 Ports (J20, J18, J22, J27)	41
7.13. LVDS FLAT PANEL CONNECTOR (J29)	42
7.14. Feature Connector (J13)	44
7.15. LOAD DEFAULT BIOS SETTINGS Jumper (J44)	47
7.16. ALWAYS ON Jumper Setting (J10)	47
7.17. SPI Connector (J6)	48
7.18. LPC Connector (J7)	49
7.19. Slot Connectors (mPCle) (J35)	50

7.20. Micro SD Card Connector (J45)	
7.21. SIM Card connector (J31)	
8/ On-Board Connectors & Mating Connector Types	
9/ BIOS	54
9.1. Starting the uEFI BIOS	54
9.2. Setup Menus	
9.2.1. Main Setup Menu	
9.2.2. Advanced Setup Menu	
9.2.3. Chipset Setup Menu	61
9.2.4. Security Setup Menu	61
9.2.4.1. Remember the Password	62
9.2.5. Boot Setup Menu	62
9.2.6. Save & Exit Setup Menu	63
9.3. The uEFI Shell	63
9.3.1. Introduction, Basic Operation	63
9.3.1.1. Entering the uEFI Shell	63
9.3.1.2. Exiting the uEFI Shell	64
9.3.2. Kontron-Specific uEFI Shell Commands	64
9.4. uEFI Shell Scripting	64
9.4.1. Startup Scripting	64
9.4.2. Create a Startup Script	64
9.4.3. Examples of Startup Scripts	64
9.5. Firmware Update	64
9.5.1. Updating the uEFI BIOS	65
9.5.1.1. uEFI BIOS Fail-Over Mechanism	65
9.5.1.2. Updating Procedure	65
9.5.1.3. uEFI BIOS Recovery	65
9.5.1.4. Determining the Active Flash	65
9.5.2. Updating the IPMI Firmware	65
9.5.2.1. IPMI Rollback Mechanism	65
9.5.2.2. Determining the Active IPMI Firmware Image	65
9.5.2.3. Updating Procedure	65
List of Acronyms	66

# List of Tables

Table 1: Component Main Data	15
Table 2: Environmental Conditions	17
Table 3: Processor Support	19
Table 4: Memory Operating Frequencies	20
Table 5: Three-displays Configurations	21
Table 6: Supply Voltages	23
Table 7: Total System power example	23
Table 8: Items on Front Side of Board	25
Table 9: Items on Rear Side of Board	
Table 10: Connector definitions	27
Table 11: Pin Assignment DP Connector J19, J16	
Table 12: Pin Assignment J26, J28	
Table 13: Signal description	29
Table 14: Pin Assignment J21, J23	
Table 15: Signal description	
Table 16: Pin Assignment J3 (Line Out, green)	
Table 17: Pin Assignment J11 (Line In, blue)	
Table 18: Signal description	
Table 19: Pin Assignment J40	
Table 20: Pin Assignment J56	
Table 21: 4-pin Mode J47, J48	
Table 22: 3-pin Mode J47. J48	
Table 23: Signal description	
Table 24: Pin Assignment J15	
Table 25: Signal description	
Table 26: Pin Assignment J39, J8	
Table 27: Signal description	
Table 28: Pin Assignment J5	
Table 29: Pin Assignment J50	
Table 30: Pin Assignment J1	
Table 31: Pin Assignment J2	
Table 32: Pin Assignment J9	
Table 33: Pin Assignment J4	
Table 34: Signal description	
Table 35: Pin Assignment J20, J18, J22, J27	
Table 36: Signal description	
Table 37: Pin Assignment J29	
Table 38: Signal description	
Table 39: Pin Assignment J13	
Table 40: Signal description	
Table 41: Signal description IT 8528E Embedded Controller	
Table 42: Jumper Description J10	
Table 43: Pin Assignment J6	
Table 44: Signal description	
Table 45: Pin Assignment J7	
Table 46: Pin Assignment J35	
Table 47: Pin Assignment J45	
Table 48: Pin Assignment J31	
Table 49: On-Board Connectors. Mating Connector Types	
Table 50: Navigation	
Table 51: Main Setup Menu Sub-Screens and Functions	
Table 52: Advanced Setup Menu Sub-Screens and Functions	56
Table 53: Boot Priority Order	
Table 54: Exit Setup Menu Functions	

# List of Figures

Figure 1: Block Diagram	18
Figure 2: DP Adapters	21
Figure 3: Reaktek HD Audio Manger- Device Advanced Settings	22
Figure 4: Windows Sound Manager- Recording FrontMic Settings	22
Figure 5: Windows Sound Manager- Recording Microphone Settings	23
Figure 6: Front Side	24
Figure 7: Rear Side	26
Figure 8: DP Connector J19, J16	28
Figure 9: Ethernet Connector J26, J28	29
Figure 10: USB 2.0 / 3.0 socket J21, J23	30
Figure 11: USB 2.0 High Speed Cable	31
Figure 12: USB 3.0 High Speed Cable	31
Figure 13: Audio Jack Connectors J3, J11	32
Figure 14: Power Connector J40	33
Figure 15: Power Connector J56	34
Figure 16: Fan Connector J47, J48	34
Figure 17: Keyboard and Mouse Connector J15	35
Figure 18: Available Cable Kit:	36
Figure 19: SATA Connector J39, J8	36
Figure 20: Available Cable Kit	37
Figure 21: SATA Power Connector J5	37
Figure 22: RS485 Bus Connector J50	37
Figure 23: Speaker Connector J1	38
Figure 24: MIC1 Connector J2	38
Figure 25: SPDIF-OUT Connector J9	
Figure 26: Front Panel Connector J4	
Figure 27: Available Cable Kit:	41
Figure 28: Serial COM J20, J18, J22, J27	41
Figure 29: Available Cable Kit (DB9 adapter cables)	42
Figure 30: LVDS Connector J29	42
Figure 31: Feature Connector J13	44
Figure 32: Available cable kit, Break-Out-Board:	47
Figure 33: LOAD DEFAULT BIOS SETTINGS Jumper (J44)	47
Figure 34: ALLWAYS ON Jumper (J10)	47
Figure 35: SPI Connector (pinheader 10x) J6	48
Figure 36: LPC Connector (pinheader 20x) J7	49
Figure 37: Micro SD Card Connector on rear side of board (selection)	52
Figure 38: SIM Card connector on rear side of board (selection)	52

# 1/ Introduction

This User Guide describes the mITX-BW board made by Kontron AG. This board will also be denoted mITX-BW within this Users Guide.

The mITX-BW board is based on the Intel<sup>®</sup> Braswell Celeron processors, N3xxx series. See "Processor Support Table" for more specific details.

Use of this Users Guide implies a basic knowledge of PC-AT hard- and software. This User Guide is focused on describing the mITX-BW 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 done 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 be downloaded from Kontron's Web Page.

# 2/Installation procedure

## 2.1. Installing the Board



#### ESD Sensitive Device!

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

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

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

#### 1. Turn off the PSU (Power Supply Unit)

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 +12V single supply only. Alternatively use a standard ATX PSU with suitable cable kit and PS\_ON# active.

## 2. Insert the DDR3L SO-DIMM 204pin SO-DIMM module(s)

Be careful to push it in the slot(s) before locking the tabs. For a list of approved DDR3L 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. Cooler Installation

NOTICE

The mITX-H comes with a passive heatsink pre-installed and a separate fan, which can be mounted onto the heatsink, should the system require additional airflow. Connect Cooler Fan electrically to the FANCPU connector.

#### 4. Connecting Interfaces

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

#### 5. Connect and turn on PSU

Connect PSU to the board by the ATX+12 V- 4p connector or alternatively connect a 12 to 24 V DC power adapter to the Rear I/O power jack.

#### 6. Power Button

If the board does not start by itself when switching on the ATX/DC PSU AC mains, then follow these instructions to start the board. Install the Always On Jumper in the Always On position or toggle the PWRBTN\_IN# signal (available in the FRONTPNL connector), by momentary shorting pins 16 (PWRBTN\_IN#) and pin 18 (GND). A "normally open" switch is recommended.

#### 7. BIOS Setup

Enter the BIOS setup by pressing the <F2> key during boot up.

Enter "Exit Menu" and Load Setup Defaults.

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



To clear all BIOS settings, including Password protection, activate "Load Default BIOS Settings" Jumper for 10 seconds (without power connected).

#### 8. Mounting the board in chassis

## NOTICE

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

When fixing the Motherboard on a chassis it is recommended using screws with 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. Requirements IEC60950-1

Take care when designing chassis interface connectors in order to fulfil the IEC60950-1 standard.

Users of mITX-BW must evaluate the end product to ensure compliance the requirements of the IEC60950-1 safety standard are met:

- > The motherboard must be installed in a suitable mechanical, electrical and fire enclosure.
- The system in its enclosure must be evaluated for temperature and air flow considerations.
- The motherboard must be powered by a CSA or UL approved power supply that limits the maximum input current to 10 A via external barrel-type 12-24 VDC connector, and to 16 A via internal square 12 VDC ATX connector.
- For interfaces having a power pin such as external power or fan, ensure that the connectors and wires are suitably rated. All connections from/to the product shall be with SELV circuits only.
- Wires have suitable rating to withstand the maximum available power.
- The enclosure of the peripheral device fulfils the fire protecting requirements of IEC60950-1.

## 2.3. Lithium battery precautions

#### 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. Component Main Data

The table below summarizes the features of the mITX-BW embedded motherboard.

## Table 1: Component Main Data

Form factor	mITX-BW: miniITX (170.18 mm by 170.18 mm)				
Processor	On board CPU variants support Intel® Atom™ (Braswell) processors in a Multi-chip package with the PCH (max. 12 W TDP)				
Memory	DDR3L SO-DIMM 204pin socket (2 sockets)				
	Support single and dual ranks DDR3L 1333/1600MT/s (PC3-10600/PC3-12800)				
	Support system memory from 1x 1GB up to 2x 4 GB.				
	Notes: Less than 4 GByte displayed in System Properties using 32 bit OS				
	(Shared Video Memory/PCI resources is subtracted)				
	ECC not supported				
Chipset	Intel® Braswell				
	Intel ® VT-d (Virtualisation Technology for Directed I/O)				
	Intel ® TXT (Trusted Execution Technology)				
	Intel ® HD Audio Technology				
	Intel ® RST (Rapid Storage Technology)				
	SATA (Serial ATA) 6 Gb/s				
	USB revision 2.0				
	USB revision 3.0				
	PCI Express revision 2.0				
	ACPI 4.0a compliant				
	Triple Display support (Triple Graphic Pipes)				
	Blue-ray HD video playback				
	Enhanced DMA controller, interrupt controller and timer functions				
Audio	Audio, 5.1 Channel High Definition Audio Codec using the Realtek ALC662 codec				
	Line-in and Line-out				
	Microphone: MIC1 and MIC2				
	SPDIF-Out (electrical Interface only)				
	On-board speaker (Electromagnetic Sound Generator like Hycom HY-05LF)				
Video	Intel® Braswell Generation processors support 3x digital display ports				
	Zx DP (DisplayPorts), comply with DisplayPort I. Ia specification.				
	HUMI panel support via DP to HUMI Adapter Converter.				
	LVDS panel support up to 2 pixel/clock 24 bit colors (VESA and JEIDA)				
	Iriple independent pipes for Mirror or Triple independent display support				
	OS. Any 3 displays via DP1, DP2 and LVDS can be used.				
I/O Control	Via ITE IT8528E Embedded Controller via LPC Bus interface				
Peripheral	Four USB 3.0 / USB 2.0 ON I/O Area				
Interfaces	Four USB 2.0 Ports on internal pinrows				
	Two Serial Ports (RS232) on internal pinrows				
	> Two Serial ATA-600 (one further SATA Port implemented in mSATA Connector)				
	RAID 0/1 support				
LAN Support	> 2x 10/100/1000Mbits/s LAN (ETHER2) using Intel® Pearsonville I211AT PCI Express				
	controller				
	PXE Netboot supported				
	Wake On LAN (WOL) supported				

Expansion Capabilities	1x mPCIe connector with USB 2.0 port support for 3G modem (SIM socket) as well as MSATA			
	► 1x μSD card connector			
	► 1x eMMC module option			
	SMBus, compatible with ACCES BUS and I2C BUS, (via Feature connector)			
	SPI bus routed to SPI connector (BIOS Recovery module interface)			
	<ul> <li>DDC/AUX Bus routed to DP connector (Auto detect to DDC when using passive DP to HDMI adapters)</li> </ul>			
	18x GPIOs (General Purpose I/Os), (via Feature connector)			
	DAC, ADC, PWM and TIMER (Multiplexed), (via Feature connector)			
	WAKE UP / Interrupt Inputs (Multiplexed), (via Feature connector)			
	> 3 Wire Bus for GPIO Expansion (up to 152 GPIOs), (via Feature connector)			
	8 bit Timer output, (via Feature connector)			
Hardware	Smart Fan control system, support Thermal® and Speed® cruise for two onboard			
Monitor	Fan connectors: CPU Fan (on-board) and System Fan (on-board)			
Subsystem	Thermal inputs: CPU Die temperature (precision +/- 3° C),			
	System temperature (precision +/- 3° C)			
	eep S5# Indication (via Feature connector)			
	System Powergood Signal (via Feature connector)			
Power Supply	ATX+12 V PSU 4-pin on internal 2x 2 pin connector.			
Unit	or:			
	12 to 24V DC notebook-style Power adapter through Rear I/O power jack.			
Battery	Exchangeable 3.0 V Lithium battery for on-board Real Time Clock and CMOS RAM.			
	Manufacturer Panasonic / Part-number CR-2032L/BN, CR2032N/BN or CR-2032L/BE.			
	Approximate 6.2 years retention.			
	Current uraw is less trian 4.2µA when PSO is disconnected and 0 µA in S0 – SS			
BIOS	Kontron AMI BIOS (EEL core version)			
2010	Support for ACPI 4.0 ( Advanced Configuration and Power Interface). Plug & Play			
	- Suspend To Ram (53 mode)			
	- Suspend To Disk (S4 mode)			
	"Always On" BIOS nower setting			
	RAID Support (RAID modes 0 and 1)			
Operating System	Windows			
Support				
	Board support packages in different flavors, downloadable from the web page			
	P board support packages in different flavors, downloadable from the web page			

## **A**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

#### Table 2: Environmental Conditions

Operating	0 °C to +60 °C operating temperature (forced cooling).
	It is the customer's responsibility to provide sufficient airflow around each of the components
	to keep them within allowed temperature range. Please refer to the thermal simulation report
	for information about airflow.
	10% to 90% relative humidity (non-condensing)
Storage	-20 °C to +70 °C; lower limit of storage temperature is defined by specification restriction of
	on-board CR2032 battery.
	Board with battery has been verified for storage temperature down to -40 $$ °C by Kontron.
	5% to 95% relative humidity (non-condensing)
Radiated Emissions	All Peripheral interfaces intended for connection to external equipment are EMI protected.
(EMI)	EN55022:2000 class B Generic Emission Standard
Safety	IEC 60950-1: 2005, 2nd Edition
	UL 60950-1
	CSA C22.2 No. 60950-1
	Product Category: Information Technology Equipment Including Electrical Business
	Equipment. Product Category CCN: NWGQ2, NWGQ8. File number: E147705
Shock	IAW IEC 60068-2-27, Test Ea, shock, 18 shocks 3 per axis, 6 directions.
	Shock pulse 15g, 11ms halfsine.
Bump	IAW IEC 60068-2-29, Test Eb, Bump, 3000 bumps, 500 per axis, 6 directions.
	Half Sine Waveform Acceleration 2g; Pulse Duration 11ms.
Vibration	IAW IEC 60068-2-64, Test Fh, Random Vibration. 90 min per axis, 3 axes, at 1.9 grms,
	with PSD: 10-20 Hz: 0.05 $g^2$ /Hz and 20-500 Hz: -3dB/octave.
Theoretical MTBF	365475 hours at 30° C for the mITX-BW
Restriction of	All boards in the mITX-BW family are RoHS compliant
Hazardous	
Substances (RoHS)	
Capacitor utilization	No Tantalum capacitors on board.
	Only Japanese brand Solid capacitors rated for 100 °C used on board

## 3.2. mITX Block Diagram

## Figure 1: Block Diagram



## 3.3. Processor Support Table

mITX-BW is designed to support the Braswell Celeron processors. The BGA CPU is premounted from factory. Kontron has defined the board versions as listed in the following table, so far all based on Embedded CPUs. Other versions are expected at a later date.

mITX-BW Variants		CPU			TDP / Tj
Name	Sales PN	Speed	Embedded	Cache	
mITX-BW N3710	810620-4500	1.6 GHz 4 core	Yes	2 MByte	6 W / 90°C
mITX-BW N3160	810621-4500	1.6 GHz 4 core	Yes	2 MByte	6 W / 90°C
mITX-BW N3060	810622-4500	1.6 GHz 2 core	Yes	2 MByte	6 W / 90°C

#### Table 3: Processor Support

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

The mITX-BW is delivered with premounted heatsink.

## 3.4. System Memory Support

The mITX-BW has two DDR3L SO-DIMM sockets. The sockets support the following memory features:

- > 2x DDR3L 1.35 V SO-DIMM 204-pin
- Dual-channel with 1 SO-DIMM per channel
- From 1 GByte and up to 2x 4 GByte.
- Single/dual rank unbuffered 1333/1600MT/s (PC3-10600/PC3-12800)
- SPD timings supported
- ECC not supported



If only one SO-DIMM is used, then slot J24 must be used as the primary slot (ChannelA).

If Slot J25 (Channel B) is populated, then the board will not boot.



If using 32bit OS then less than 4GB in displayed in System (Shared Video Memory/PCI resources is subtracted). Use SO-DIMM with the same memory density in both sockets!

The installed DDR3L 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.

#### Memory Operating Frequencies

Regardless of the SO-DIMM type used, the memory frequency will either be equal to or less than the processor system bus frequency. For example, if DDR3L 1600 memory is used with a 1333 MHz system bus frequency processor, the memory clock will operate at 167 MHz. 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 Transfers (MT/s)	Processor System Bus Frequency (MHz)	Resulting Memory Clock Frequency (MHz)	Peak Transfer Rate (MB/s)
DDR3L 1333	PC3-10600	1333	1333	167	10666
DDR3L 1600	PC3-12800	1600	1600	200	12800



#### Kontron offers the following memory modules:

2 GByte DDR3L 1600 PC3-12800, P/N: 1060-2520

- 4 GByte DDR3L 1600 PC3-12800, P/N: 1060-2522
- 8 GByte DDR3L 1600 PC3-12800, P/N: 1060-2524

Memory modules have in general a much lower longevity than embedded motherboards, and therefor EOL of modules can be expected several times during lifetime of the motherboard. Kontron guarantees that the above P/N will be maintained so that EOL module will be replaced by other similar type of qualified module.

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.

## 3.5. mITX-BW Graphics Subsystem

The mITX-BW equipped with Intel<sup>®</sup> Celeron processor, supports Intel<sup>®</sup> Gen 8 HD Graphics core. All mITXBW versions support three displays pipes. The DP interface supports the DisplayPort 1.2a specification. The PCH supports Highbandwidth Digital Content Protection for high definition content playback over digital interfaces. The PCH also integrates audio codecs for audio support over DP interfaces.

Up to three displays (DP1, DP2 & LVDS) can be used simultaneously and be used to implement independent or cloned display configuration. PCIe cards can be used to replace on-board graphics or in combination with on-board graphics.

## Intel® HD Graphics

Features of the Intel Graphics core built into the N3xxx series processors, includes:

- High quality graphics engine supporting
  - 3 Symmetric Pipe Support
  - DirectX12 and OpenGL 4.x compliant and lower
  - Full H.265, H.264, MPEG2, MVC, WMV9 HW Decode
  - VP8\* Decode HW Acceleration
  - Advanced Scheduler 2.0, 1.0, XPDM support
  - DirectX12, OpenGL 4.2, OpenCL 1.2 support
- DP1 & DP2
  - 24bit colours in WQXGA 3840x2160 @ 30 Hz, 2560x1600 @ 60 Hz
  - DisplayPort standard 1.1a, HDMI standard 1.4b
- LVDS
- One or two pixels per clock, up to 1920x1200 24b bit colors.
- 12V for backlight, up to 2.5A
- 3.3V or 5V for panel power, up to 1.0A
- PWM Brightness/Dimming
- VESA and JEIDA color coding

#### Table 5: Three-displays Configurations

Display 1	Display 2	Display 3	Max. Resolution (Px) at 60 Hz		
			Display 1	Display 2	Display 3
LVDS	DP	DP	1920x1200	3840x2160	3840x2160
LVDS	HDMI	DP	1920x1200	2560x1600	3840x2160
LVDS	HDMI	HDMI	1920x1200	2560x1600	2560×1600

Use of DP Adapter Converters (3rd party accessories) can provide HDMI panel support. The DP to HDMI supports the HDMI 1.4a specification including audio codec.

#### Figure 2: DP Adapters

DP to HDMI (PN 1045-5781)

Cable DP Extender cable 200mm (PN1051-7619)





## 3.5.1. Audio

The PCH integrates audio Codecs for audio support. To set the HDA Codec in the Windows environment, install the ALC886 driver. The Realtek HD Audio Manager will be located in the Control Panel. Implement the following steps to set the Realtek HD Audio Manger.



Front Mic must be enabled as Jack Detect is not supported on the Front Panel connector. Internal MIC1 must be enabled as Jack detect is not supported on the internal MIC1 connector.

1. Select the following to enable two separate and simultaneous audio streams.

HD Audio 2<sup>nd</sup> output>Device advanced settings> Select 'Make front and rear output devices playback two different audio streams simultaneously'

Main Volume	Device advanced settings	ANALOG Back Panel
Speaker Configuration Speaker Configuration Stereo	Playback Device Mute the rear output device, when a front headphone plugged in. Mute thor rear output devices playback two different audo streams smultaneously.	
	OK Cance	
Full-range Speakers	Headphone Wirtualization	DIGITAL

Figure 3: Reaktek HD Audio Manger- Device Advanced Settings

2. Enable 'FrontMic' in the Windows Sound Manager to activate the Front MIC2 (J4) function.

Sound>Recording>FrontMic>Enable Select 'Show Disabled Devices' and 'Show Disconnected Devices'

#### Figure 4: Windows Sound Manager- Recording FrontMic Settings

~	FrontMic Realtek High Definition Audio	
	Microphone Realtek High Definition Audio	Enable Set as Default Device Set as Default Communication Device
	Line In Realtek High Definition Audio Default Device	Show Disabled Devices Show Disconnected Devices
	Stereo Mix Realtek High Definition Audio Disabled	Properties

3. Enable 'Microphone' in the Windows Sound Manager to activate the MIC1 (J2) function.

Sound>Recording>Microphone>Enable Select 'Show Disabled Devices' and 'Show Disconnected Devices'

#### Figure 5: Windows Sound Manager- Recording Microphone Settings



## 3.6. Power Consumption

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, which require a minimum load to stay in regulation. The mITX-BW board must be powered through either the ATX+12V-4p (4-pole) connector using standard ATX power supply or by an external 12 to 24V power adapter through the Rear I/O power jack.

ATX12V supply: Both ATX+12V-4p connector must be used in according to the ATX12V PSU standard.

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

The requirements to the supply voltages are as follows:

#### Table 6: Supply Voltages

Supply	Min.	Max.	Note
+12 V	11.4 V	12.6 V	Should be ±5% for compliance with the ATX specification
+12 to +24 V	11.4 V	25.2 V	Should be ±5% for mITX-BW compatibility

#### Table 7: Total System power example

Operating System	Current Consumption	Power Consumption
Windows 8.1 (Idle)	1.214 A	14.568 W
Windows 8.1 (3DMark 2014)	1.673 A	20.076 W

#### More detailed Static Power Consumption

TBD



Power consumption of PSU (power loss), Monitor and HDD are not included

# 4/ Connector Locations

## 4.1. mITX-BW Front Side

Figure 6: Front Side



#### Item Desig. Description See section J7 LPC Connector (Low Pin Count, Serial bus) 7.18 1 2 J13 7.14 Feature Connector J50 3 RS485 connector 7.6 110 4 "ALWAYS ON" Jumper 7.16 J15 5 PS/2 Keyboard and Mouse Connector (KBDMSE) 7.3 14 6 **FRONTPNL** Connector 7.11 J39 7 SATA Disk Interface #0 7.4 8 J8 SATA Disk Interface #1 7.4 J5 19 SATA Power Connector 7.5 10 J6 SPI Connector 7.17 11 Backup Battery \_ J24 12 SODIMM J25 13 SODIMM 14 J44 "LOAD DEFAULT BIOS SETTINGS" jumper 7.15 J35 15 mPCIe Slot Connector 7.19 J33 16 PCle 7.19 J47 17 CPU Fan (FANCPU) 7.2 18 J48 System Fan (FANSYS) 7.2 J9 19 SPDIF-Out Connector 7.10 20 \_ **Onboard Speaker** J2 21 MIC1 7.9 J11 22 Line In (Audio Jack, blue) 6.4 23 JЗ Line Out (Audio Jack, green) 6.4 J1 24 Speaker Connector 7.8 128 25 LAN 1 Ethernet Connector 6.2 J26 26 LAN 2 Ethernet Connector 6.2 J23 77 USB 0, USB 1 (Dual Connector, shared USB2.0 / USB3.0) 6.3 J21 28 USB 2, USB 3 (Dual Connector, shared USB2.0 / USB3.0) 6.3 J16 29 DP2 (Display Port) 6.1 30 J19 DP1 (Display Port) 6.1 31 J56 DC Power Jack Connector +12 V to 24 V 7.1.2 J40 32 DC Power ATX Connector +12 V to 24 V 7.1.1 33 J29 LVDS Flat Panel Connector 7.13 34 J20 COM #1 Serial Bus 7.12 35 J18 COM #2 Serial Bus 7.12 J22 COM #3 Serial Bus 7.12 36 37 J27 COM #4 Serial Bus 7.12

#### Table 8: Items on Front Side of Board

## Figure 7: Rear Side



## Table 9: Items on Rear Side of Board

ltem	Desig.	Description	See section
1	J45	Micro SD Card Connector	0
2	J31	SIM Card Connector	7.21

# 5/ Connector Definitions

The following sections provide pin definitions and detailed description of all on-board connectors. The connector definitions follow the following notation:

## Table 10: Connector definitions

Column Name	Description				
Pin	Shows the pin-numbers in the connector. The graphical layout of the connector				
	definition tables is made similar to the physical connectors.				
Signal	The mnemonic name of the signal at the current pin.				
	The notation "XX#" states that the signal "XX" is active low.				
Type AI: Analogue Input.					
	AO: Analogue Output.				
	I: Input, TTL compatible if nothing else stated.				
	IO: Input / Output. TTL compatible if nothing else stated.				
	IOT: Bi-directional tristate IO pin.				
	IS: Schmitt-trigger input, TTL compatible.				
	IOC: Input / open-collector Output, TTL compatible.				
	OD: Input / Output, CMOS level Schmitt-triggered. (Open drain output)				
	Pin not connected.				
	0: Output, TTL compatible.				
	OC: Output, open-collector or open-drain, TTL compatible.				
	OT: Output with tri-state capability, TTL compatible.				
	LVDS: Low Voltage Differential Signal.				
	PWR: Power supply or ground reference pins.				
	Ioh: Typical current in mA flowing out of an output pin through a grounded load,				
	while the output voltage is > $2.4$ V DC (if nothing else stated).				
	Iol: Typical current in mA flowing into an output pin from a VCC connected load,				
	while the output voltage is < 0.4 V DC (if nothing else stated).				
Pull U/D	On-board pull-up or pull-down resistors on input pins or open-collector output pins.				
Note	Special remarks concerning the signal.				
Designation	Type and number of item described				
see Section	Number of section in this User Guide containing detailed description				

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

# 6/IO-Area Connectors

## 6.1. DP Connectors DP1 and DP2 (J19 & J16)

The DP (DisplayPort) connectors are based on standard DP type Foxconn 3VD51203-H7JJ-7H or similar. DP to DVI dongle Digital Visual Inteface (DVI) dongle is only supported on DP1.

Figure 8: DP Connector J19, J16



## Table 11: Pin Assignment DP Connector J19, J16

Pin	Signal	Description	Type	Note
1	Lane 0 (p)		LVDS	
2	GND		PWR	
3	Lane 0 (n)		LVDS	
4	Lane1(p)		LVDS	
5	GND		PWR	
6	Lane 1 (n)		LVDS	
7	Lane 2 (p)		LVDS	
8	GND		PWR	
9	Lane 2 (n)		LVDS	
10	Lane 3 (p)		LVDS	
11	GND		PWR	
12	Lane 3 (n)		LVDS	
13	Config1	Aux or DDC selection	1	Internally pull down (1 $M\Omega$ ).
				Aux channel on pin 15/17 selected as default
				(when NL)
14	Config2	(Not used)	0	Internally connected to GND
15	Aux Ch (p)	Aux Channel (+) or DDC Clk		AUX (+) channel used by DP
	21.2			DDC Clk used by HDMI
16	GND		PWR	
17	Aux Ch (n)	Aux Channel (-) or DDC Data		AUX (-) channel used by DP
10				DDC Data used by HDMI
18	Hot Plug		1	Internally pull down (100 KΩ).
19	Return		PWR	Same as GND
20	3.3 V		PWR	Fused by 1.5 A resetable PTC fuse.

## 6.2. Ethernet Connectors (J26 & J28)

The mITX-BW supports two channels of 10/100/1000 Mbit Ethernet, one (LAN1) is based on Intel® Pearsonville i211AT PCI Express controller.

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 9: Ethernet Connector J26, J28



## Table 12: Pin Assignment J26, J28

Pin	Signal	Туре	loh / lol	Note
1	MDI0+			
2	MDIO-			
3	MDI1+			
4	MDI2+			
5	MDI2-			
6	MDI1-			
7	MDI3+			
8	MDI3-			

#### Table 13: 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.			

## 6.3. USB Connectors /IO Area (J21 & J23).

The mITX-BW board contains a XHCI (Extensible Host Controller Interface).

The XHCI controller supports up to four USB 3.0 ports allowing data transfers up to 5Gb/s. Four of the USB 3.0 ports are shared with four of the USB 2.0 ports (USB0 – USB3).

Note: Not all USB 2.0 and USB 3.0 ports are physically connected to the board.

Legacy Keyboard/Mouse and wakeup from sleep states are supported. Over-current detection on all USB ports is supported.

The following USB connectors are available in the IO Area.

- USB 2.0/3.0 Ports 0, 1, 2, 3 are supplied on the dual USB connectors in the IO Area (J21 & J23).
- USB 2.0 Ports 5, 6 are supplied on the combined Front Panel connector (J4).
- USB 2.0 Port 4 is available in the mPCIe connector (J35).



Enhanced Host Controlled Interface (EHCI) is not supported by the mITX-BW Board. The mITX-BW board only support XHCI.

#### Figure 10: USB 2.0 / 3.0 socket J21, J23



# ...

## Table 14: Pin Assignment J21, J23

Pin	туре	Signal	Note	
1	PWR	5 V / SB 5 V	USB2.0 / 3.0	
2	10	USB 3-	USB2.0 / 3.0	
3	10	USB 3+	USB2.0 / 3.0	
4	PWR	GND	USB2.0 / 3.0	
5	10	RX 2-	USB3.0	
6	10	RX 2+	USB3.0	
7	PWR	GND	USB3.0	
8	10	TX 2-	USB3.0	
9	10	TX 2+	USB3.0	

#### Table 15: Signal description

Signal	Description	
USBn+ USBn-	Differential pair works as serial differential receive/transmit data lines.	
RXn+ RXn-	(n= 0,1,2,3)	
TXn+ TXn-		
5 V / SB5 V	5 V supply for external devices.	
	SB5 V is supplied during power-down to allow wakeup on USB device activity.	
	Protected by resettable 2A fuse covering both USB ports.	

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

## Figure 11: USB 2.0 High Speed Cable



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



#### Figure 12: USB 3.0 High Speed Cable

mITX-BW – User Guide, Rev. 1.6

## 6.4. Audio Jack Connectors (J3 & J11)

Figure 13: Audio Jack Connectors J3, J11



J3, Line OUT J11, Line IN



Mating Audio Jack (example)

## Table 16: Pin Assignment J3 (Line Out, green)

Pin Designation	Signal	Туре	Note
Тір	Front_L	OA	For headphone, max 1.6 $V_{RMS}$
Ring	Front R	OA	For headphone, max 1.6 $V_{RMS}$
Sleeve	GND	PWR	

## Table 17: Pin Assignment J11 (Line In, blue)

Pin Designation	Signal	Туре	Note
Тір	LINE1_L	IA	1.0 V <sub>RMS</sub> , 30kΩ
Ring	LINE1_R	IA	1.0 V <sub>RMS</sub> , 30kΩ
Sleeve	GND	PWR	

#### Table 18: Signal description

Signal	Description	Note
LINE1_L	Line In signal Left	
LINE1_R	Line In signal Right	
Front_L	Line Out Left	
Front_R	Line Out Right	

# 7/ Internal Connectors

## 7.1. Power Connectors

Either the DC Power Jack Connector "EXT12 V" or the "Int12 V." connector must be used to supply the board with +12 (-10%) to +24 VDC (+10%).

## NOTICE

Hot plugging any of the power connectors (J40 and J56) is not allowed. Hot plugging might damage the board. In other words, turn off main supply etc. to make sure all the power lines (+12 V to +24 V) are turned off when connecting to the motherboard.

## 7.1.1. DC Power Connector (J40)

Figure 14: Power Connector J40



#### Table 19: Pin Assignment J40

Pin	Signal	Description	Туре
1	GND	Ground	PWR
2	GND	Ground	PWR
3	12 V	Power +12 V to +24 V	PWR
4	12 V	Power +12 V to +24 V	PWR

## 7.1.2. DC Power-Jack Connector (J56)

Figure 15: Power Connector J56



#### Table 20: Pin Assignment J56

Pin Designation	Signal	Description	Туре
Center	Vin	Power +12 V to +24 V $(2.5 \text{ mm Center Pin})$	PWR
Ring	GND	Ground (5.5 mm Ring hole)	PWR

## 

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

## 7.2. Fan Connectors (J47 & J48)

The FANSYS (J48) can be used to power, control and monitor a fan for chassis ventilation etc.

The FANCPU (J47) is used for the connection of the FAN for the CPU.

The 4-pin header is recommended to be used for driving 4-wire type Fan in order to implement FAN speed control. 3-wire Fan support is also possible, but no fan speed control is integrated.

#### Figure 16: Fan Connector J47, J48



#### Table 21: 4-pin Mode J47, J48

Pin	Signal	Description	Туре
1	GND	Ground	PWR
2	12 V	Power +12 V	PWR
3	ТАСНО	Tacho signal	I
4	PWM	PWM output	0-3.3

#### Table 22: 3-pin Mode J47, J48

Pin	Signal	Description	Туре
1	GND	Ground	PWR
2	12 V	Power +12 V	PWR

mITX-BW – User Guide, Rev. 1.6

Pin	Signal	Description	Туре
3	ТАСНО	Tacho signal	I
4	-	Not used	

#### Table 23: Signal description

Signal	Description	Туре
GND	Power Supply GND signal	PWR
12 V	+12 V supply for fan. A maximum of 2000 mA can be supplied from this pin.	PWR
ТАСНО	Tacho 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. Onboard is a pull-up resistor 4K7 to +12 V. The signal has to be pulsed and onboard circuit is prepared for two pulses per rotation.	1
PWM	PWM output signal for FAN speed control.	0

## 7.3. PS/2 Keyboard and Mouse Connector (KBDMSE) (J15)

Attachment of a PS/2 keyboard/mouse can be done through the pinrow connector KBDMSE (J15).

Both interfaces utilize open-drain signalling with on-board pull-up.

The PS/2 mouse and keyboard is supplied from SB5 V when in standby mode in order to enable keyboard or mouse activity to bring the system out from power saving states. The supply is provided through a 1.1 A resettable fuse.



The PS/2 connector does not support wake functions.

## Figure 17: Keyboard and Mouse Connector J15



## Table 24: Pin Assignment J15

Pin	Signal	Туре	loh / Iol	Pull U / D	Note
1	KBDCLK	IOD	- / 14 mA	2.7 kΩ	
2	KBDDAT	IOD	- / 14 mA	2.7 kΩ	
3	MSCLK	IOD	- / 14 mA	2.7 kΩ	
4	MSDAT	IOD	- / 14 mA	2.7 kΩ	
5	5 V/SB5 V	PWR	-	-	
6	GND	PWR	-	-	

#### Table 25: Signal description

Signal	Description
MSCLK	Bi-directional clock signal used to strobe data/commands from/to the PS/2 mouse.

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

#### Figure 18: Available Cable Kit:



PN 1053-2384 Bracket Cable 6-Pin to PS2-Kbd-Mse

## 7.4. SATA (Serial ATA) Disk Interfaces (J39 & J8)

The mITX-BW has an integrated SATA Host controller (PCH in the BW chipset) that supports independent DMA operation on two ports. One device can be installed on each port for a maximum of two SATA devices via two SATA connectors and one mSATA/mPCIe connector. A point-to-point interface (SATA cable) is used for host to device connections. Data transfer rates of up to 6.0/3.0/1.5Gb/s are supported on all SATA ports.



Before installing OS on a SATA drive make sure the drive is not a former member of a RAID system. If so, some hidden data on the disk has to be erased. To do this, connect two SATA drives and select RAID in BIOS. Save settings and select <Ctrl> <I> while booting to enter the RAID setup menu. Now the hidden RAID data will be erased from the selected SATA drive.

#### Supported SATA features:

- > 2 to 4-drive RAID 0 (data striping)
- 2-drive RAID 1 (data mirroring)
- AHCI (Advanced Host Controller Interface)
- NCQ (Native Command Queuing). NCQ is for faster data access.
- Swap bay support (not supported on mSATA/mPCle)
- Intel<sup>®</sup> Rapid Recover Technology
- 2 256 TByte volume (Data volumes only)
- Capacity expansion
- TRIM in Windows 7 (in AHCI and RAID mode for drives not part of a RAID volume). (TRIM is for SSD data garbage handling).

#### Figure 19: SATA Connector J39, J8



#### Table 26: Pin Assignment J39, J8

Pin	Signal	Туре	loh / Iol	Note
1	GND	PWR	-	
2	SATA* TX+			
3	SATA* TX-			
4	GND	PWR	-	
5	SATA* RX-			
6	SATA* RX+			
7	GND	PWR	-	

#### Table 27: Signal description

Signal	Description
SATA* RX+ / RX-	Host transmitter differential signal pair
SATA* TX+ / TX-	Host receiver differential signal pair
"+" ·C' O 1	

"\*" specifies 0 or 1 depending on SATA port.

## Figure 20: Available Cable Kit



## PN 821035 Cable SATA 500 mm

## 7.5. SATA Power Connector (J5)

Figure 21: SATA Power Connector J5



#### Table 28: Pin Assignment J5

Pin	Signal	Description	Туре
1	+5V	Power +5 V	PWR
2	GND	Ground	PWR
3	GND	Ground	PWR
4	+12V	Power +12 V	PWR

## 7.6. RS485 Bus Connector (J50)

Figure 22: RS485 Bus Connector J50



#### Table 29: Pin Assignment J50

Pin	Signal	Description	Туре
1	GND	Ground	PWR
2	RS485_DATA-	Data Low	10 12.0
3	RS485_DATA+	Data High	10 12.0

## 7.7. USB Connectors /Internal

The following USB2.0 ports are available on Internal pinrows:

- USB2.0 Ports 5, 6 are supplied on the internal FRONTPNL connector (J4). See "Front Panel Header" description (section 7.11).
- USB2.0 Port 4 is supplied on the internal mPCle connectors (J35). See "PCle Connectors" description (section 7.19).

## 7.8. Speaker Connector (J1)

The headphone interface is available through the connector J1 (4 pins). This output is shared with the Speaker Audio Jack connector (J3, green). The Signal-to-Noise Ratio (SNR) is up to 100 dB.

#### Figure 23: Speaker Connector J1



Table	30:	Pin	Assig	nment	J1
-------	-----	-----	-------	-------	----

Pin	Signal	Туре	Note
1	GND	PWR	
2	HPOUT-L	AO	
3	GND	PWR	
4	HPOUT-R	AO	

## 7.9. MIC1 Connector (J2)

The MIC1 interface is available through the connector J2 (4 pins). The input is enabled through the Windows Audio Manager. The Signal-to-Noise Ratio (SNR) is up to 100 dB.

#### Figure 24: MIC1 Connector J2



#### Table 31: Pin Assignment J2

Pin	Signal	Туре	Note
1	GND	PWR	
2	MIC1_L_Header	AO	
3	GND	PWR	
4	MIC1_R_Header	AO	

## 7.10. SPDIF-OUT Connector (J9)

The digital audio interface (electrical SPDIF-Out) is available through the 2 pin connector J9 and can be used to implement 6 (5.1) Channel High Definition Audio. Circuit is based on high fidelity 6-channel HD audio codec which is compatible with Intel HD Audio specification and supports stereo 24-bit resolution and up to 192 kHz sample rate for DACs/ADCs. The Signal-to-Noise Ratio (SNR) is up to 90 dB.

16/20/24-bit SPDIF TX Outputs supporting 48 K/96 K/44.1 K/88.2 KHz sample rate

#### Figure 25: SPDIF-OUT Connector J9



Table 32: Pin Assignment J9

Pin	Signal	Туре	Note
1	F_SPDIF_OUT	0-3.3	
2	GND	PWR	

## 7.11. Front Panel Connector (FRONTPNL) (J4)

Figure 26: Front Panel Connector J4



#### Table 33: Pin Assignment J4

Pin	Signal	Туре	loh / Iol	Pull U / D	Note
1	USB_PWR_D2	PWR	-	-	
2	USB_PWR_D3	PWR	-	-	
3	USBhub_D2-				
4	USBhub_D3-				

mITX-BW – User Guide, Rev. 1.6

Pin	Signal	Туре	loh / lol	Pull U / D	Note
5	USBhub_D2+				
6	USBhub_D3+				
7	GND	PWR			
8	GND	PWR			
9	NC	NC			
10	LINE2-L				
11	+5 V	PWR			
12	+5 V	PWR			
13	SATA_LED#	0	25 / 25 mA		
14	SUS_LED	0	7 mA		
15	GND	PWR			
16	PWRBTN_IN#	I		1.1 kΩ	
17	RSTIN#	I		4.7 kΩ	
18	GND	PWR			
19	SB3V3	PWR			
20	LINE2-R				
21	AGND	PWR			
22	AGND	PWR			
23	MIC2-L	AI			
24	MIC2-R	AI			

## Table 34: Signal description

Signal	Description				
USB_PWR_D2/	5 V supply for external devices. SB5V is supplied during powerdown to allowwakeup on USB				
USB_PWR_ D3	device activity. Protected by active power switch 1 A fuse for each USB port.				
USBhub_D2-/+	Universal Serial Bus Differentials: Bus Data/Address/Command Bus.				
USBhub_D3-/+	Universal Serial Bus Differentials: Bus Data/Address/Command Bus.				
+5 V	Maximum load per pin is 1 A (using IDC connector) or 2 A (using crimp terminals).				
SATA_LED#	SATA Activity LED (active low signal). 3V3 output when passive.				
SUS_LED	<b>S_LED</b> Suspend Mode LED (active high signal). Output 3.3 V via 470Ω.				
PWRBTN_IN#	Power Button In. Toggle this signal low to start the ATX / BTX PSU and boot the board.				
RSTIN#	Reset Input. When pulled low for a minimum 16ms, the reset process will be initiated. The reset process continues even though the Reset Input is kept low.				
LINE2	Line2 is second stereo Line signals				
MIC2	MIC2 is second stereo microphone input.				
SB3V3	Standby 3.3 V voltage				
AGND	Analogue Ground for Audio				

Figure 27: Available Cable Kit:





## 7.12. Serial COM1 – COM4 Ports (J20, J18, J22, J27)

Figure 28: Serial COM J20, J18, J22, J27



Table 35: Pin Assignment J20, J18, J22, J27

Pin	Signal	Туре	loh / Iol	Pull U / D	Note
1	DCD	I			
2	DSR	I			
3	RxD	I			
4	RTS	0			
5	TxD	0			
6	CTS	1			
7	DTR	0			
8	RI	I			
9	GND	PWR			
10	5V	PWR			



The COM1, COM2 and COM3, COM4 5V supply is fused with common 1.5A resettable fuse.



The COM1 and COM2 serial ports need to install an OS patch from ITE. The patch is only available for Windows and is not available Linux.

#### Table 36: 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.

## Figure 29: Available Cable Kit (DB9 adapter cables)



PN 821017 - 100 mm / PN 821016 - 200 mm

## 7.13. LVDS FLAT PANEL CONNECTOR (J29)

The LVDS connector is based on 40-pole connector type Don Connex C44-40BSB1-G.

## Figure 30: LVDS Connector J29

	39	37	35	33	31	29	27	25	23	21	19	17	15	13	11	9	7	5	3	1	
Γ										_											
	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	-	_	_	_	
	40	38	36	34	32	30	28	26	24	22	20	18	16	14	12	10	8	6	4	2	

## Table 37: Pin Assignment J29

Pin	Signal	Туре	Note
1	+12 V	PWR	Max. 0.5 A
2	+12 V	PWR	Max. 0.5 A
3	+12 V	PWR	Max. 0.5 A
4	+12 V	PWR	Max. 0.5 A
5	+12 V	PWR	Max. 0.5 A
6	GND	PWR	Max. 0.5 A
7	+5 V	PWR	Max. 0.5 A
8	GND	PWR	Max. 0.5 A
9	LCDVCC	PWR	Max. 0.5 A
10	LCDVCC	PWR	Max. 0.5 A

Pin	Signal	Туре	Note
11	DDC CLK	ОТ	2.2 kΩ, 3.3 V
12	DDC DATA	ОТ	2.2 kΩ, 3.3 V
13	BKLTCTL	ОТ	
14	VDD ENABLE	OT	
15	BKLTEN#	ОТ	
16	GND	PWR	
17	LVDS A0-	LVDS	
18	LVDS A0+	LVDS	
19	LVDS A1-	LVDS	
20	LVDS A1+	LVDS	
21	LVDS A2-	LVDS	
22	LVDS A2+	LVDS	
23	LVDS ACLK-	LVDS	
24	LVDS ACLK+	LVDS	
25	LVDS A3-	LVDS	
26	LVDS A3+	LVDS	
27	GND	PWR	Max. 0.5 A
28	GND	PWR	Max. 0.5 A
29	LVDS BO-	LVDS	
30	LVDS B0+	LVDS	
31	LVDS B1-	LVDS	
32	LVDS B1+	LVDS	
33	LVDS B2-	LVDS	
34	LVDS B2+	LVDS	
35	LVDS BCLK-	LVDS	
36	LVDS BCLK+	LVDS	
37	LVDS B3-	LVDS	
38	LVDS B3+	LVDS	
39	GND	PWR	Max. 0.5 A
40	GND	PWR	Max. 0.5 A



The mITX-BW on-board LVDS connector supports single and dual channel, 18/24 bit SPWG panels up to a resolution of 1600x1200 px or 1920x1080 px and with limited frame rate up to 1920x1200 px.

## Table 38: Signal description

Signal	Description
LVDS A0A3	LVDS A Channel data
LVDS ACLK	LVDS A Channel clock
LVDS B0B3	LVDS B Channel data
LVDS BCLK	LVDS B Channel clock
BKLTCTL	Backlight control (1), PWM signal to implement voltage in the range 0-3.3 V
BKLTEN#	Backlight Enable signal (active low) (2)
VDD ENABLE	Output Display Enable.
LCDVCC	VCC supply to the display. 5 V or 3.3 V (1 A Max.) selected in BIOS setup menu.

Signal	Description
	Power sequencing depends on LVDS panel selection. (Shared with eDP connector)
DDC CLK	DDC Channel Clock



Windows API will be available to operate the BKLTCTL signal. Some Inverters have a limited voltage range 0- 2.5V for this signal: If voltage is > 2.5V the Inverter might latch up. Some Inverters generate noise on the BKLTCTL signal, causing the LVDS transmission to fail (corrupted picture on the display).

By adding a 1 k $\Omega$  resistor in series with this signal, mounted at the Inverter end of the cable kit, the noise is limited and the picture is stable.

If the Backlight Enable is required to be active high then, check the following BIOS Chipset setting: Backlight Signal Inversion = Enabled.

## 7.14. Feature Connector (J13)

#### Figure 31: Feature Connector J13

43	41	39	37	35	33	31	29	27	25	23	21	19	17	15	13	11	9	7	5	3	1	
44	42	40	38	36	34	32	30	28	26	24	22	20	18	16	14	12	10	8	6	4	2	

#### Table 39: Pin Assignment J13

Pin	Signal	Туре	loh / lol	Pull U / D	Note
1	NC	1	/ 4 mA	2ΜΩ /	Pull-up to on-board Battery
2	SMBC		/ 4 mA	10kΩ /	Pull-up to +3V3Dual (+3V3 or SB3V3)
3	S4#	0	25 / 25 mA		
4	SMBD		/ 4 mA	10kΩ /	Pull-up to +3V3Dual (+3V3 or SB3V3)
5	PWR_OK	0	25 / 25 mA		
6	EXT_BAT	PWR			
7	NC	l			
8	NC	0			
9	SB3V3	PWR			
10	SB5V	PWR			
11	GPIOO	IOT			
12	GPI01	IOT			
13	GPIO2	IOT			
14	GPIO3	IOT			
15	GPIO4	IOT			
16	GPIO5	IOT			
17	GPIO6	IOT			
18	GPI07	IOT			
19	GND	PWR			
20	GND	PWR			

Pin	Signal	Туре	loh / Iol	Pull U / D	Note
21	GPI08	I			
22	GPIO9	I			
23	GPI010	I			
24	GPI011	I			
25	GPI012	I			
26	GPI013	IOT			
27	GPI014	IOT			
28	GPI015	IOT			
29	GPIO16	IOT			
30	GPI017	IOT			
31	GND	PWR			
32	GND	PWR			
33	EGCLK	0	8 / 8 mA		
34	EGCS#	0	8 / 8 mA		
35	EGAD		8 / 8 mA		
36	TMA0	0			
37	+12 V	PWR			
38	GND	PWR			
39	NC	I		1 kΩ	Pull-up to SB3V3
40	NC	0		1 kΩ	Pull-up to SB3V3
41	GND	PWR			
42	GND	PWR			
43	GND	PWR			
44	S3#	0	25 / 25 mA		

## Table 40: Signal description

Signal	Description
SMBC	SMBus Clock signal
SMBD	SMBus Data signal
S3#	S3 sleep mode, active low output, optionally used to deactivate external system.
S5#	S5 sleep mode, active low output, optionally used to deactivate external system.
PWR_OK	PoWeR OK, signal is high if no power failures are detected. (This is not the same as the P_OK signal generated by ATX PSU).
EXT_BAT	(EXTernal BATtery) option for connecting + terminal of an external primary cell battery (2.5 - 3.47 V) (– terminal connected to GND).
	The external battery is protected against charging and can be used with / without the on-board battery installed.
SB3V3	Max. load is 0.75 A (1.5 A < 1 sec.)
SB5 V	StandBy +5 V supply.
GPI0017	General Purpose Inputs / Output. These Signals may be controlled or monitored through the use of the KT-API-V2 (Application Programming Interface). See details in table below.
EGCLK	Extend GPIO Clock signal
EGAD	Extend GPIO Address Data signal
EGCS#	Extend GPIO Chip Select signal, active low
TMA0	Timer Output
+12 V	Max. load is 0.75 A (1.5 A < 1 sec.)

The GPIO's are controlled via the ITE IT8528E Embedded Controller. Each GPIO has 100pF to ground, clamping Diode to 3V3 and has multiplexed functionality.

Some pins can be DAC (Digital to Analogue Converter output), PWM (Pulse Width Modulated signal output), ADC (Analogue to Digital Converter input), TMRI (Timer Counter Input), WUI (Wake Up Input), RI (Ring Indicator Input) or some special function.

Signal	IT8528E Pin Name	Туре	Description
GPI00	TACH2/HDIO2/GPJ0	A0/I05	TACH2 – Tachometer Input
			HDIO2 – HSPI In/Out 2
			GPJ0 – GPIO signals
GPI01	HDIO3/GPJ1	A0/105	HDIO3 – HSPI In/Out 3
			GPJ1 – GPIO signals
GPIOZ	DACZ/TACH0B/GPJ2	A0/105	DAC2 – 3.3V CMOS I/F DAC Output
			TACH0B – Tachometer Input
			GPJ2 – GPIO signals
GPI03	DAC3/TACH1B/GPJ3	A0/105	DAC3 – 3.3V CMOS I/F DAC Output
			IACHIB – Iachometer Input
			GPJ3 – GPIO signals
GPIO4	PWM2/GPA2	08/105	PWM2 - Pulse Width Modulation Output
			GPA2 - GPIO signals
GPI05	PWM3/GPA3	08/105	PWM3 - Pulse Width Modulation Output
			GPA3 - GPIO signals
GPI06	PWM4/GPA4	08/105	PWM4 - Pulse Width Modulation Output
			GPA4 - GPIO signals
GPI07	PWM5/GPA5	08/105	PWM5 - Pulse Width Modulation Output
			GPA5 - GPIO signals
GPI08	ADC0/GPI0	AI/IS	ADC0 - ADC Input / Alternate GPIO
			GPIO - GPIO signals
GPIO9	ADC1/GPI1	AI/IS	ADC1 - ADC Input / Alternate GPIO
			GPI1 - GPIO signals
GPI010	ADC2/GPI2	AI/IS	ADC2 - ADC Input / Alternate GPIO
			GPI2 - GPIO signals
GPIO11	ADC3/GPI3	AI/IS	ADC3 - ADC Input / Alternate GPIO
			GPI3 - GPIO signals
GPI012	ADC4/GPI4	AI/IS/IS	ADC4 - ADC Input / Alternate GPIO
			GPI4 - GPIO signals
GPI013	RI1#/GPD0	IS/IS/IOS	RI1# - Receive Interrupt
			GPD0 - GPIO signals
GPI014	RI2#/GPD1	IS/IS/IOS	RI2# - Receive Interrupt
			GPD1 - GPIO signals
GPI015	TMRI0/GPC4	IS/IS/IOS	TMRIO - Counter Input
			GPC4 - GPIO signals
GPIO16	TMRI1/GPC6	IS/IS/IOS	TMRI1 – Counter Input
			GPC6 - GPIO signals
GPI017	L80HLAT/BAO/GPE0	04/04/IS/I05	L80HLAT - LPC I/O Port 80, High-nibble LAD Latch
			BAO - Buffer A Output
			GPE0 - GPIO signals

#### Table 41: Signal description IT 8528E Embedded Controller

Figure 32: Available cable kit, Break-Out-Board:





PN 1052-5885 Cable, Feature 44pol 1 to1, 300 mm

PN 820978 Feature BOB (Break-Out-Board)

## 7.15. LOAD DEFAULT BIOS SETTINGS Jumper (J44)

The "Load Default BIOS Settings" Jumper (J44) can be used to recover from incorrect BIOS settings. As an example, an incorrect BIOS setting which causes the attached display not to turn on can be erased by this Jumper. The Jumper by default is in open position.

## Figure 33: LOAD DEFAULT BIOS SETTINGS Jumper (J44)



## 7.16. ALWAYS ON Jumper Setting (J10)

Figure 34: ALLWAYS ON Jumper (J10)



#### Table 42: Jumper Description J10

J10 position		Pescription					
Pin 1-2	Pin 2-3	Description					
Х	-	ALWAYS ON feature enabled					
		Board will power up, when the external power supply is switched on					
-	Х	ALWAYS ON feature disabled					
		Board will not power up, when the external power supply is switched on Activate the power on button (PWRBTN_IN#) at the Front Panel connector (FRONTPNI)					
		in order to switch on the board.					

X = Jumper is set

#### www.kontron.com

## 7.17. SPI Connector (J6)

The SPI Connector is normally not used.

If however a SPI BIOS is connected via the SPI Connector then the board will attempt to boot from it.

#### Figure 35: SPI Connector (pinheader 10x) J6



#### Table 43: Pin Assignment J6

Pin	Signal	Туре	loh / Iol	Pull U / D	Note
1	CLK				
2	SB3V3	PWR			
3	CSO#	l			
4	ADDIN	10		/ 10 kΩ	
5	3V3_SPI			10 kΩ /	
6	NC				
7	MOSI	10			
8	ISOLATE#	10			
9	MISO	10			
10	GND	PWR			

#### Table 44: Signal description

Signal	Description
CLK	Serial Clock
SB3V3/3V3_SPI	3.3 V Standby Voltage power line. Normally output power, but when Motherboard is turned off then the on-board SPI Flash can be 3.3 V power sourced via this pin.
CS0#	CS0# Chip Select 0, active low.
ADDIN	ADDIN input signal must be NC
MOSI	Master Output, Slave Input.
ISOLATE#	The ISOLATE# input, active low, is normally NC, but must be connected to GND when programming the SPI flash. Power Supply to the Motherboard must be turned off when loading SPI flash.
	The pull up resistor is connected via diode to 5VSB.
MISO	Master Input, Slave Output

## 7.18. LPC Connector (J7)

The LPC connector is in general unsupported. Only under special circumstances may the LPC interface be of interest.

## Figure 36: LPC Connector (pinheader 20x) J7

2	4	6	8	10	12	14	16	18	20
	$\square$								
$\searrow$	$\smile$	$\smile$		$\smile$	$\smile$	$\frown$	$\smile$	$\smile$	$\smile$
1	3	5	7	9	11	13	15	17	19

## Table 45: Pin Assignment J7

Pin	Signal	Туре	loh / Iol	Pull U / D	Note
1	LPC CLK	PWR			
2	GND				
3	LPC FRAME #	PWR			
4	KEY				
5	LPCRST#				
6	+5 V				
7	LPC AD3				
8	LPC AD2				
9	+3V3				
10	LPC AD1				
11	LPC AD0				
12	GND				
13	SMB_CL K				
14	SMB_DAT A				
15	SB3V3				
16	LPC SERIRQ				
17	GND				
18	CLKRUN#				
19	SUS_ST AT#				
20	TPM_DRQ #0				

mITX-BW – User Guide, Rev. 1.6

## 7.19. Slot Connectors (mPCIe) (J35)

MiniPCIe with mSATA/USB2.0 & SIM-card support (J35). Slot J35 supports mPCIe, USB2.0 and SIM-card socket

The SIM-card socket makes it possible to use a 2G/3G-wireless modem in this mPCIe slot.

The USB does support WAKE function.

## Table 46: Pin Assignment J35

Pin	Signal	Туре	loh / Iol	Pull U / D	Note
1	WAKE#				
2	+3V3	PWR			
3	NC	NC			
4	GND	PWR			
5	NC	NC			
6	+1.5V	PWR			
7	CLKREQ#				10 kΩ pull-up to 3V3
8	UIM_PWR	PWR			
9	GND	PWR			
10	UIM_DATA	NC			
11	PCIE_mini CLK#				
12	UIM_CLK	NC			
13	PCIE_mini CLK				
14	UIM_RESET	NC			
15	GND	PWR			
16	UIM_VPP	NC			
17	UIM_IC_DM	NC			
18	GND	PWR			
19	UIM_IC_DP				
20	W_Disable#				20 kΩ pull-up to 3V3 Dual
21	GND	PWR			
22	RST#				
23	SATA2SW_RXN				
24	+3V3	PWR			
25	SATA2SW_RXP				
26	GND	PWR			
27	GND	PWR			
28	+1.5 V	PWR			
29	GND	PWR			
30	SMB_CLK				
31	SATA2SW_TXN				
32	SMB_DATA				
33	SATA2SW_TXP				
34	GND	PWR			
35	GND	PWR			
36	USBhub_D1_N	10			
37	GND	PWR			
38	USBhub_D1_P	10			

Pin	Signal	Туре	loh / lol	Pull U / D	Note
39	+3V3	PWR			
40	GND	PWR			
41	+3V3	PWR			
42	NC	NC			
43	SATA_DET5#				
44	NC	NC			
45	NC	NC			
46	NC	NC			
47	NC	NC			
48	+1.5 V	PWR			
49	NC	NC			
50	GND	PWR			
51	NC	NC			
52	+3V3	PWR			

## 7.20. Micro SD Card Connector (J45)

Figure 37: Micro SD Card Connector on rear side of board (selection)



### Table 47: Pin Assignment J45

Pin	Signal	Description	Туре
1	SD3_D2	Data bit 2	10 3.3/1.8
2	SD3_D3	Card Detect / Data bit 3	10 3.3/1.8
3	SD3_CMD	Command line	10 3.3/1.8
4	VDD	Power +3V3	PWR
5	SD3_CLK	Clock	0 - 1.8/3.3
6	GND	Ground	PWR
7	SD3_D0	Data bit 0	10 3.3/1.8
8	SD3_D1	Data bit 1	10 3.3/1.8

## 7.21. SIM Card connector (J31)

Figure 38: SIM Card connector on rear side of board (selection)



Pin	Signal	Description	Туре
1	V_UIM_PWR	Power +5V or 3V3	PWR
2	UIM_RESET	Reset signal	
3	UIM_CLK	Clock signal	CLK
4	UIM_IC_DP	AUX1 (Optional)	
5	GND	Ground	PWR
6	UIM_VPP	Programing voltage input (optional)	
7	UIM_DATA	Input or Output for serial data	
8	UIM_IC_DM	AUX2 (Optional)	

#### Table 48: Pin Assignment J31

# 8/On-Board Connectors & Mating Connector Types

The mating connectors / cables are connectors or cable kits that fit the on-board connector.

The Kontron cable kits marked with "\*" are included in the "mITX-BW Cable & Driver Kit" PN 826603.

Connector	On-Board Con	nectors	Mating Connec	tors / Cables
	Manufact.	Type No.	Manufact.	Type No.
FANCPU (J47)	Foxconn	HF2704E-M1	AMP	1375820-4 (4-pole)
FANSYS (J48)	Foxconn	HF2704F-M2	AMP	1375820-3 (3-pole)
	AMP	1470947-1		
PS/2 or	Molex	22-23-2061	Molex	22-01-2065
KBDMSE (J15)	Тусо АМР	3-647050-6	Kontron	1046-3381 (kit) *
	Jaws	254K-WS-06T-S	Kontron	1053-2384 (kit)
LPC (J7)	Wieson	G2100C888-034H		
	Foxconn	HC11101-P0		
SATA (J39, J8)	Lotes	ABA-SAT-010-K08	Molex	67489-8005
			Kontron	821035 (kit)
ATX +12V -4p (J40)	Lotes	ABA-POW-003-K02	Molex	39-01-2045
Speaker (J1)	Molex	53047-0410		
LVDS (J29)	Don Connex	C44-40BSB1-G	Don Connex	A32-40-C-G-B-1
	Samtec	SHF-120-01-FDSMKTR	Kontron	91000005
	Hon Con	HB12-220-VFS-20R	Kontron	821515 (kit) *
	Wieson	G2124-03200101-00	Kontron	821155 (kit)
COM 1, 2, 3, 4	Pinrex	510-90-10GB00	Molex	90635-1103
(J20, J18, J22, J27)	Cen Link	ZP91-014B1-10Y1	Kontron	821016 (kit)
	Foxconn	HL2205F	Kontron	821017 (kit) *
USB 5/6 (*)	(FRONTPNL)	-	Kontron	821401 (kit)
SPI (J6)	Pinrex	210-92-06GB01		
SPDIF –Out (J9)	Molex	53047-0210		
FRONTPNL (J4)	Pinrex	510-80-24GB05	Molex	90635-1243
	Foxconn	HL2112V-P9	Kontron	821042 (kit) *
FEATURE (J13)	Pinrex	52A-90-44GB00	Don Connex	A05c-44-B-G-A-1-G
	Molex	87831-4420	Kontron	1052-5885 (kit) *
SATA POWER (J5)	Molex	22-12-2044	Molex	0022013047

Table /10: On Board	Connoctors N	Mating Conn	octor Typoc
1 able 49. 011-board	connectors, r	Macing Com	ector rypes

(\*) USB 2.0 ports 5 and 6 are located in FRONTPNL connector.



More than one connector can be listed for each type of on-board connectors even though several types with same fit, form and function are approved and could be used as alternative. Please also notice that standard connectors like DP, miniPCIe, Audio Jack, Ethernet and USB are not included in the list.

# 9/ BIOS

## 9.1. Starting the uEFI BIOS

The mITX-BW is provided with a Kontron-customized, pre-installed and configured version of AptioV uEFI BIOS. AMI BIOS firmware 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-BW.

The uEFI BIOS comes with a Setup program which 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 which 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-BW 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.

HOTKEYS	DESCRIPTION			
<f1></f1>	The <f1> key is used to invoke the General Help window.</f1>			
<->	The <minus> key is used to select the next lower value within a field.</minus>			
<+>	The <plus> key is used to select the next higher value within a field.</plus>			
<f2></f2>	The <f2> key is used to load previous values.</f2>			
<f3></f3>	The <f3> key is used to load optimized defaults.</f3>			
<f4></f4>	The <f3> key is used to Save and Exit.</f3>			
<→> 0r <←>	The <left right=""> arrows are used to select major Setup menus on the menu bar. For example: Main screen, Advanced screen, Security screen, etc.</left>			
<†> or <↓>	The <up down=""> arrows are used to select fields in the current menu. For example a Setup function or a sub-screen.</up>			
<esc></esc>	The <esc> key is used to exit a major Setup menu and enter the Exit Setup menu. Pressing the <esc> key in a sub-menu causes the next higher menu level to be displayed.</esc></esc>			
<return></return>	The <return> key is used to execute a command or select a submenu.</return>			

#### Table 50: Navigation

## 9.2. Setup Menus

The Setup utility features four menus listed in the selection bar at the top of the screen:

- Main
- Advanced
- Chipset
- Security
- Boot
- 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.

## 9.2.1. 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 as well as functions for setting the system time and date.

Function	Description			
BIOS Information	Read only field. Displays information about the system BIOS			
CPU configuration	ead only field. isplays information about CPU Microcode version			
Memory Information	Read only field. Displays information about total memory			
GOP Information	Read only field. Displays information about Intel GOP Driver version			
TXE Information	Read only field. Displays information about TXE information			
System Language	Select System language			
System Date	Set System Date			
System Time	Set System Time			

#### Table 51: Main Setup Menu Sub-Screens and Functions

## 9.2.2. Advanced Setup Menu

The Advanced Setup menu provides sub-screens and functions for advanced configuration.

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

Sub-Screen	Funtion	Description
Trusted Computing	Security Device Support	Enables or Disables BIOS support for security device
	Active PCR banks	Read only field Display information about active PCR banks
	Available PCR banks	Read only field Display information about available PCR banks
	SHA-1 PCR Bank	Enable or Disable SHA-1 PCR Bank
	SHA256 PCR Bank	Enable or Disable SHA256 PCR Bank
	Pending operation	Schedule an Operation for the Security Device
	Platform Hierarchy	Enable or Disable Platform Hierarchy
	Storage Hierarchy	Enable or Disable Storage Hierarchy
	Endorsement Hierarchy	Enable or Disable Endorsement Hierarchy
	TPM2.0 UEFI Spec Version	Select the TCG2 Spec Version Support
	TPM 20 InterfaceType	Read only field Display information about TPM Interface Type
	Device Select	Select TPM 1.2 or TPM 2.0
ACPI Setting	Enable ACPI Auto Configuration	Enables or Disables BIOS ACPI Auto Configuration
	Enable Hibernation	Enables or Disables System ability to Hibernate
	ACPI Sleep State	Select the highest ACPI sleep state the system will enter when the SUSPEND button is pressed
	Lock Legacy Resources	Enables or Disables Lock of Legacy Resources
LVDS Configuration	Panel Type	Select Panel Type or Panel Manufacturer
	Resolution	Select Monitor resolution
	Panel Color Depth	Select Panel Color Depth
	LVDS Channel	Select LVDS Channel single or dual
Hardware Health Configuration	System Temperature	Read only field Display information of system temperature
	CPU Temperature	Read only field Display information of CPU temperature
	System Fan Speed	Read only field Display information of system Fan Speed
	Fan Cruise Control	Select System Fan Speed Control method
	CPU Fan Speed	Read only field Display information of system Fan Speed
	Fan Cruise Control	Select System Fan Speed Control method
	Watchdog Function	Set service interval before system reset

## Table 52: Advanced Setup Menu Sub-Screens and Functions

Sub-Screen	Funtion	Description
Serial Port Console Redirection	COM0 Console Redirection	Enable/Disable COM0 Console Redirection
	COM0 Console Redirection Setting	Setting for COM0 Console Redirection
	COM1 Console Redirection	Enable/Disable COM1 Console Redirection
	COM1 Console Redirection Setting	Setting for COM1 Console Redirection
	COM2 Console Redirection	Enable/Disable COM2 Console Redirection
	COM2 Console Redirection Setting	Setting for COM2 Console Redirection
	COM3 Console Redirection	Enable/Disable COM3 Console Redirection
	COM3 Console Redirection Setting	Setting for COM3 Console Redirection
	COM4 Console Redirection	Enable/Disable COM4 Console Redirection
	COM4 Console Redirection Setting	Setting for COM4 Console Redirection
	COM5 Console Redirection	Enable/Disable COM5 Console Redirection
	COM5 Console Redirection Setting	Setting for COM5 Console Redirection
	Legacy Console Redirection Settings	Com port selection for Legacy Console Redirection Settings
	Windows Emergency Management Services (EMS) Console Redirection	Enable/Disable Windows Emergency Management Services (EMS) Console Redirection
	Windows Emergency Management Services (EMS) Console Redirection	Settings for Windows Emergency Management Services (EMS) Console Redirection
CPU configuration	Socket 0 CPU Information	Read only field Display information of socket 0 CPU information
	CPU Thermal Configuration	Settings for CPU Thermal
	CPU Speed	Read only field Display information of CPU speed
	64-bit	Read only field Display information 64-bit supported or not
	Limit CPUID Maximum	Ebnable/Disable Limit CPUID Maximum
	Bi-directional PROCHOT	Enable/Disable Bi-directional PROCHOT

Sub-Screen	Funtion	Description
	Intel Virtualization Technology	Enable/Disable Intel Virtualization Technology
	Power Technology	Enable/Disable Power Technology
	EIST	Enable/Disable EIST
	Turbo Mode	Enable/Disable Turbo Mode
	P-STATE Coordination	Select the type of P-STATE
	Package C State limit	Select the C state limit
PPM Configuration	EIST	Enable/Disable EIST
	CPU C state Report	Enable/Disable CPU C state Report
	Max CPU C-state	Select Max CPU C-state
	50ix	Enable/Disable S0ix
Thermal	Critical Trip Point	Set ACPI critical Trip Point that OS will shutdown
Configuration	Passive Trip Point	Set ACPI critical Trip Point that OS will begin throttle the processor
	DPTF	Enable/Disable DPTF
SATA Configuration	SATA Controller	Enable/Disable SATA Device
	SATA Mode Selection	Determines how SATA controller operate
	SATA Interface Speed	Select SATA Interface Speed
	SATA Test Mode	Enable/Disable SATA Test Mode
	Aggressive LPM Support	Enable/Disable PCH to aggressively enter link power state
	Software Feature Mask Configuration	Settings Software Feature Mask
	SATA Port 0	Enable/Disable port 0, Spin Up device and Device Sleep support
	SATA Port 1	Enable/Disable port 1, Spin Up device and Device Sleep support
Miscellaneous	SMBus Support (*)	Enable/Disable SMBus Support
Configuration	Serial IRQ	Enable/Disable SIRQ Logic
	Serial IRQ Mode	Configure Serial IRQ Mode
	WIFI Module Select	Select WIFI module BCRM or STP
	BOM Confing	Selection of BOM configuration default, legacy system or Yocto Linux
	Virtual Button Support	Enable/disable Virtual Button Support
	USB3 Clock Spread Spectrum	Enable/Disable USB3 Clock Spread Spectrum
	Display Clock Spread Spectrum	Enable/Disable Display Clock Spread Spectrum
	SATA Clock Spread Spectrum	Enable/Disable SATA Clock Spread Spectrum
	PCIe/mSATA	Selection of PCIe or mSATA for connector (J35)
LPSS & SCC Configuration	SCC eMMC Support (D16:F0)	Select SCC eMMC Support PCI or ACPI
	SCC eMMC Support on legacy	Enable/Disable SCC eMMC Support Legacy eMMC
	SCC eMMC 4.5 DDR50 Support	SCC eMMC 4.5 DDR50 Support Enable\Disable
	SCC eMMC 4.5 HS200 Support	SCC eMMC 4.5 HS200 Support Enable\Disable

Sub-Screen	Funtion	Description
	eMMC Secure Erase	Disable/Enable eMMC Secure Erase
	SCC SDIO Support (D17:F0)	Select SCC SDIO Support (D17:F0) PCI or ACPI
	SCC SD Card Support (D18:F0)	Enable\Disable SCC SD Card Support (D18:F0)
	eMMC RX DLL Tuning Support	Enable\Disable eMMC RX DLL Tuning Support
	eMMC TX DLL Tuning Support	Enable\Disable eMMC TX DLL Tuning Support
	MIPI HSI Support	Enable \Disable MIPI HSI Support
	LPSS with GPIO Devices Support	Enable\Disable LPSS with GPIO Devices Support
	LPSS DMA #1 (D30:F0)	Enable/Disable LPSS DMA #1 Support
	LPSS DMA #2 (D24:F0)	Enable/Disable LPSS DMA #2 Support
	LPSS I2C #1 (D24:F1)	Enable/Disable LPSS I2C #1 Support
	LPSS I2C #2 (D24:F2)	Enable/Disable LPSS I2C #2 Support
	Runtime D3 Support	Enable/Disable Runtime D3 Support
	LPSS I2C #3 (D24:F3)	Enable/Disable LPSS I2C #3 Support
	Runtime D3 Support	Enable/Disable Runtime D3 Support
	LPSS I2C #4 (D24:F3)	Enable/Disable LPSS I2C #4 Support
	Runtime D3 Support	Enable/Disable Runtime D3 Support
	LPSS I2C #5 (D24:F3)	Enable/Disable LPSS I2C #5 Support
	LPSS I2C #6 (D24:F3)	Enable/Disable LPSS I2C #6 Support
	Runtime D3 Support	Enable/Disable Runtime D3 Support
	LPSS I2C #7 (D24:F3)	Enable/Disable LPSS I2C #7 Support
	Runtime D3 Support	Enable/Disable Runtime D3 Support
	I2c Touch Device Address	I2c Touch Device Address:CHIMEI(0x4C)/SHARP(0x4A)
	Secure NFC	Enable\Disable Secure NFC
System Component	PMIC ACPI OBJECT	Enable /Disable PMIC ACPI OBJECT
	PNP Setting	Select PNP Auto, Ax stepping or or Bx Stepping
	Android Boot	Enable\Disable Android Boot
	Witt Setting	Enable\Disable Witt Configuration
	HG Rework	Enable\Disable HG Rework on RVP
SIO Configuration	Serial Port 1	Set properties of Serial Port 1 (IO Base, IRQ, DMA and Device Mode)
	Serial Port 2	Set properties of Serial Port 2 (IO Base, IRQ, DMA and Device Mode)
	Serial Port 3	Set properties of Serial Port 3 (IO Base, IRQ, DMA and Device Mode)
	Serial Port 4	Set properties of Serial Port 4 (IO Base, IRQ, DMA and Device Mode)
	Serial Port 5	Set properties of Serial Port 5 (IO Base, IRQ, DMA and Device Mode)
	Serial Port 6	Set properties of Serial Port 6 (IO Base, IRQ, DMA and Device Mode)
	PS2 Keyboard	Set properties of PS2 keyboard (IO Base, IRQ, DMA and Device Mode)
	PS2 Mouse	Set properties of PS2 Mouse (IO Base, IRQ, DMA and Device Mode)

Sub-Screen	Funtion	Description
PCI Subsystem	PCI Latency Timer	Value to be programmed into PCI Latency Timer Register
Settings	PCI-X Latency Timer	Value to be programmed into PCI-XLatency Timer Register
	VGA Palette Snoop	Enable\Disable VGA Palette Registers Snooping
	PERR# Generation	Enable\Disable PCI Device to Generate PERR#
	SERR# Generation	Enable\Disable PCI Device to Generate SERR#
	Above 4G Decoding	Enable\Disable 64bit capable Devices to be Decoded in Above 4G Address Space
	SR-IOV Support	Enable\Disable Single Root IO Virtualization Support
	Don't Reset VC-TC Mapping	Enable\Disable Software to reset Traffic Class mapping through Virtual Channels
	PCI Express Settings	Configuration of PCI EXpress
	PCI Express GEN 2 Settings	Configuration of PCI Express GEN 2 devices
Network Stack Configuration	Network Stack	Enable\Diable UEFI Network Stack
CSM Configuration	CSM Support	Enable/Disable CSM Support
	CSM16 Module Version	Read only field Display information of CSM16 module
	GateA20 Active	Setting Gate A20 to Upon Request or Always
	Option ROM Messages	Set display mode for Option ROM
	INT19 Trap Response	Setting INT 19 trapping to Immediate or Postponed
	Boot option filter	controls Legacy/UEFI ROMs priority
	Network	Controls the execution of UEFI and Legacy PXE OpROM
	Storage	Controls the execution of UEFI and Legacy Storage OpROM
	Video	Controls the execution of UEFI and Legacy Video OpROM
	Other PCI devices	Determines OpROM execution policy for devices other than Network, Storage, or Video
Debug Port Table	Debug Port Table	Enable\Disable Debug Port Table
Configuration	Debug Port Table 2	Enable\Disable Debug Port Table 2
NVMe Configuration	NVMe Controller and Drive Information	Read only field If NVME device if found, It display information of NVMe Controller and Drive
SDIO Configuration	SDIO Access Mode	Select SDIO Access Mode
USB Configuration	USB Configuration	Read only field Display information USB Module version, USB controllers and USB Devices
	Legacy USB Support	Enable\Disable Legacy USB Support
	XHCI Hand-off	Enable\Disable XHCI Hand-off support
	USB Mass Storage Driver Support	Enable\Disable USB Mass Storage Driver Support
	USB transfer time-out	The time-out value for Control, Bulk, and Interrupt transfers
	Device reset time-out	USB mass storage device Start Unit command time-out
	Device power-up delay	Maximum time the device will take before it properly reports itself to the Host Controller

Sub-Screen	Funtion	Description
Platform Trust Technology	fTPM	Enable\Disable fTPM
Security Configuration	TXE HMRFPO	Enable\Disable TXE HMRFPO
	TXE Firmware Update	Enable\Disable TXE Firmware Update
	TXE EOP Message	Enable\Disable TXE EOP Message
IntelRMT Configuration	Intel RMT Support	Enable\Disable Intel RMT Support

(\*)- EC to KE-API interface for SMBUS Readblock and SMBUSWriteblock commands is not supported.

## 9.2.3. Chipset Setup Menu

The Chipset Setup menu provides sub-screens and functions for North Bridge and South Bridge configuration

#### Table 45: Chipset

Function		Description
North Bridge	Intel IGD Configuration	Intel IGD settings
	IGD – LCD Control	IGD – LCD Control settings
	Graphics Power Management Control	Graphics Power Management settings
	Memory Configuration Options	MRC EV settings
	Memory Information	Read only field Display information total memory, memory slot0 and memory slot1
	Max Tolud	Set maximum value of TOLUD
South Bridge	Security Configuration	Security Configuration settings
	Azalia Configuration	Azalia HD Audio Options
	USB Configuration	USB settings
	PCI Express Configuration	PCI Express settings
	Restore AC Power Loss	AC power state after power failure
	Serial IRQ Mode	Set Serial IRQ mode to Quite or Continuous

## 9.2.4. Security Setup Menu

The Security Setup menu provides information about the passwords and functions for specifying the security settings. The passwords are case-sensitive.

#### Table 46: Security Setup Menu Functions

Function	Description
Administrator Password	Set Administrator Password
User Password	Set User Password

Function		Description
HDD Security Configuration		Set HDD User password (only if HDD is attached)
Secure Boot Menu System Mode	System Mode	Read only field Display information about system mode
	Secure Boot	Read only field Display information about secure boot active or not active
	Vendor Keys	Read only field Display information about vendor keys active or not active
	Secure Boot	Enable\Disable Secure Boot
	Secure Boot Mode	Select Secure Boot Mode Standard or Custom
	Key Management	Secure Boot variables settings (for experienced users)

## 9.2.4.1. Remember the Password

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

If the system cannot be booted because neither the User Password nor the Supervisor Password are known, refer to the Chapter 3.1, for information about clearing the uEFI BIOS settings, or contact Kontron for further assistance.

## **NOTICE** The HDD security passwords cannot be cleared using the above method.

## 9.2.5. Boot Setup Menu

The Boot Setup menu lists the for boot device priority order, which is dynamically generated.

Function	Description
Setup Prompt Timeout	Set number of seconds that the firmware will wait before initiating the original default boot selection
Bootup NumLock State	Enable\Disable keyboard NumLock state
Quite Boot	Enable\Disable Quite Boot
Boot Option #N	(N=1,2,3,)Display the boot devices
Fast Boot	Enable\Disable boot with initialization of a minimal set of devices required to launch active boot option
SATA Support	Fast boot option to select All SATA or only last Boot HDD
VGA Support	Fast boot option to Select to install EFI driver or only install OpRom with Legacy OS
USB Support	Fast boot option to Disable, Partial or FULL initialization of USB devices before OS
PS2 Devices Support	Fast boot option to Enable\Disable PS2 devices
Network Stack Driver Support	Fast boot option to Enable\Disable Network Stack Driver
Redirection Support	Enable\Disable Redirection
New Boot Option Policy	Controls placement of new detected UEFI boot option
Hard Drive BBS Priorities	Set the order of the legacy devices

#### Table 53: Boot Priority Order

## 9.2.6. 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.

Function	Description
Save Changes and Exit	Exit the system after saving the changes
Discard Changes and Exit	Exit system setup without saving changes
Save Changes and Reset	Reset the system after saving the changes
Discard Changes and Reset	Reset system setup without saving changes
Save Changes	Save changes done
Discard Changes	Discard changes done
Restore Defaults	Load standard default values.
Save as User Defaults	Save the changes done so far as User Defaults
Restore User Defaults	Restore the user defaults to all the setup options
Boot Override	List of bootable devices
Reset system with ME disable Mode	ME will runs into the temporary disable mode, Ignore if ME Ignition FW

## Table 54: Exit Setup Menu Functions

## 9.3. The uEFI Shell

For a detailed description of the available standard shell scripting refer to the EFI Shell User's Guide. For a detailed description of the available standard shell commands, refer to the EFI Shell Command Manual. Both documents can be downloaded from the EFI and Framework Open Source Community homepage (http://sourceforge.net/projects/efi-shell/files/documents/).

## 9.3.1. Introduction, Basic Operation

The uEFI Shell forms an entry into the uEFI boot order and is the first boot option by default.

## 9.3.1.1. Entering the uEFI Shell

To enter the uEFI Shell, follow the steps below:

- 1. Power on the board.
- 2. Ignore the message: "Press the <DEL> or <ESC> to enter setup".
- 3. Press the ESC key within 5 seconds after a message such as the one below appears:

```
EFI Shell version 2.40 [5.11]
Current running mode 1.1.2
Device mapping table
blk0 : Removable HardDisk - Alias hd33b0b0b fs0
Acpi(PNP0A03,0)/Pci(1D|7)/Usb(1, 0)/Usb(1, 0)/HD(Part1,Sig17731773)
```

•••

Press the ESC key within 5 seconds to skip startup.nsh, and any other key to continue. The output produced by the device mapping table can vary depending on the board's configuration. If the ESC key is pressed before the 5-second timeout has elapsed, the shell prompt is shown: Shell>

## 9.3.1.2. Exiting the uEFI Shell

To exit the uEFI Shell, follow one of the steps below:

- 1. Invoke the exit uEFI Shell command to select the boot device in the boot menu for the OS to boot from.
- 2. Reset the board using the reset uEFI Shell command.

## 9.3.2. Kontron-Specific uEFI Shell Commands

Not Applicable

## 9.4. uEFI Shell Scripting

## 9.4.1. Startup Scripting

If the ESC key is not pressed and the timeout is run out, the uEFI Shell tries to execute some startup scripts automatically. It searches for scripts and executes them in the following order:

- 1. Kontron flash-stored startup script
- 2. If there is no Kontron flash-stored startup script present, the uEFI-specified **startup.nsh** script is used. This script must be located on the root of any of the attached FAT formatted disk drive.
- 3. If none of the startup scripts is present or the startup script terminates, the default boot order is continued.

## 9.4.2. Create a Startup Script

Startup scripts can be created using the uEFI Shell built-in editor **edit** or under any OS with a plain text editor of your choice.

To create a startup shell script, simply save the script on the root of any FAT-formatted drive attached to the system.

## 9.4.3. Examples of Startup Scripts

Not Applicable

## 9.5. Firmware Update

See 1.5.1.2. Updating Procedure

## 9.5.1. Updating the uEFI BIOS

## 9.5.1.1. uEFI BIOS Fail-Over Mechanism

Not Applicable

## 9.5.1.2. Updating Procedure

BIOS can be updated with the Intel fpt64.efi following below procedure:

1. Copy following files to USB stick

fpt64.efi

error.log

fparts.txt

bios\_image.bin (example: MITXBSWR01.B21)

- **2.** Boot to EFI shell and following command fsx: (x = 0,1,2,etc represents the USB stick)
- 3. fpt64.efi -f bios\_image.bin
- 4. Wait until flashing is successful and then power cycle the board

## 9.5.1.3. uEFI BIOS Recovery

Not Applicable

## 9.5.1.4. Determining the Active Flash

Not Applicable

## 9.5.2. Updating the IPMI Firmware

## 9.5.2.1. IPMI Rollback Mechanism

Not Applicable

## 9.5.2.2. Determining the Active IPMI Firmware Image

Not Applicable

## 9.5.2.3. Updating Procedure

Not Applicable

# List of Acronyms



The following table does not contain the complete acronyms used in signal names, signal type definitions or similar. See Table 1: 'Component Main Data' for more information.

ACPI	Advanced Configuration and Power Interface (standard that operating systems use to perform discovery and configuration of computer hardware components, to perform power management)
ADC	Analog Digital Converter
AHCI	Advanced Host Controller Interface (technical standard that specifies the operation of Serial ATA (SATA) host bus adapters)
АТХ	Advanced Technology Extended (motherboard configuration specification)
BIOS	Basic Input/Output System (type of firmware used to perform hardware initialization during the booting process)
BOB	Break-Out-Board
BSP	Board support package (implementation of specific support code (software) for a given (device motherboard) board that conforms to a given operating system)
CMOS	Complementary Metal Oxide Semiconductor (technology for constructing integrated circuits)
сом	Communication Equipment (Serial Bus)
CPU	Central Processing Unit
DAC	Digital Analog Converter
DDC	Display Data Channel
DDR3	Double Data Rate (SDRAM interface)
DIMM	Dual Inline Memory Module
DirectX	Collection of application programming interfaces (APIs) for handling tasks
DP	Display Port
ECC	Error Checking and Correction
EFI	Extensible Firmware Interface
EMI	Electromagnetic Interference
eMMC	Embedded Multimedia Card
EOL	End Of Life
ESD	Electrostatic discharge
EHCI	Enhanced Host Controller Interface
GB	Gigabyte

GBE	Gigabyte Ethernet
GND	Ground (Earthing)
GPIO	General-purpose input/output
GPU	Graphics Processing Unit
HDD	Harddisk Drive
HDMI	High-Definition Multimedia Interface
IPMI	Intelligent Platform Management Interface
LED	Light Emitting Diode
LPC	Low Pin Count (serial bus)
LVDS	Low-voltage differential signaling
MDI	Media Dependent Interface
microSD	micro SD card (form factor memory card)
mITX	MinilTX (form factor for motherboards)
mPCle	Mini PCI Express (a small form factor expansion card utilizing serial PCI Express and USB interfaces)
mSATA	Mini SATA (interface to harddisk / solid state disk)
OpenGL	Application programming interface (API) for rendering vector graphics
РСВ	Printed Circuit Board
РСН	The Platform Controller Hub
PCI	Peripheral Component Interconnect (local computer bus for attaching hardware devices)
PCIe	Peripheral Component Interconnect Express ( high-speed serial computer expansion bus)
POST	Power On Self Test
PS/2	Interface for connecting keyboards and mice
PSU	Power Supply Unit
PWM	Pulse-width modulation
PXE	Preboot Execution Environment
RAID	Redundant Array of Independent Disks
RoHS	Restriction of Hazardous Substances
RTC	Real Time Clock
SATA	Serial ATA (bus interface)
SD	SD card, memory card form factor

mITX-BW – User Guide, Rev. 1.6

SELV	Safety extra-low voltage
SIM	SIM card, subscriber identification module
SO-DIMM	Small outline dual in-line memory module
SPD	Serial Presence Detect
SPDIF	Sony/Philips Digital Interface Format (type of digital audio interconnection)
SPI	Serial Peripheral Interface
SPWG	Standard Panels Working Group, standard for transferring graphics and video
TBD	To Be Defined

TDG	Thermal Design Guideline
ТРМ	Trusted Platform Module (secure cryptoprocessor)
TRIM	Part of the ATA command set
uEFI	Unified Extensible Firmware Interface
USB	Universal Serial Bus
WOL	Wake On LAN
хнсі	Extensible Host controller Interface



## **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. For more information, please visit: **www.kontron.com** 



HEADQUARTERS

#### KONTRON S&T AG

Lise-Meitner-Str. 3-5 86156 Augsburg Germany Tel.: + 49 821 4086-0 Fax: + 49 821 4086-111 info@kontron.com