

» User Guide «

AM4022

**Single Mid-Size or Full-Size AMC Module based on
3rd Generation Intel® Core™ i7 Processors with the
Mobile Intel® QM77 Express Chipset**

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Kontron Europe GmbH may be contacted via the following:

MAILING ADDRESS

Kontron Europe GmbH
Sudetenstraße 7
D - 87600 Kaufbeuren Germany

TELEPHONE AND E-MAIL

+49 (0) 800-SALESKONTRON
sales@kontron.com

For further information about other Kontron products, please visit our Internet web site: www.kontron.com.

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Table of Contents

<i>Revision History</i>	<i>ii</i>
<i>Imprint</i>	<i>ii</i>
<i>Disclaimer</i>	<i>ii</i>
<i>Table of Contents</i>	<i>iii</i>
<i>List of Tables</i>	<i>ix</i>
<i>List of Figures</i>	<i>xi</i>
<i>Proprietary Note</i>	<i>xiii</i>
<i>Trademarks</i>	<i>xiii</i>
<i>Environmental Protection Statement</i>	<i>xiii</i>
<i>Explanation of Symbols</i>	<i>xiv</i>
<i>For Your Safety</i>	<i>xv</i>
<i>High Voltage Safety Instructions</i>	<i>xv</i>
<i>Special Handling and Unpacking Instructions</i>	<i>xv</i>
<i>General Instructions on Usage</i>	<i>xvi</i>
<i>Two Year Warranty</i>	<i>xvii</i>
1. Introduction	1 - 3
1.1 <i>Board Overview</i>	1 - 3
1.2 <i>Board-Specific Information</i>	1 - 4
1.3 <i>System Relevant Information</i>	1 - 5
1.4 <i>Board Diagrams</i>	1 - 5
1.4.1 <i>Functional Block Diagram</i>	1 - 6
1.4.2 <i>Front Panel</i>	1 - 7
1.4.3 <i>Board Layouts</i>	1 - 8
1.5 <i>Technical Specification</i>	1 - 9
1.6 <i>Standards</i>	1 - 14
1.7 <i>Related Publications</i>	1 - 15
2. Functional Description	2 - 3
2.1 <i>Processor</i>	2 - 3
2.2 <i>Memory</i>	2 - 4
2.3 <i>Intel® QM77 Express Chipset</i>	2 - 4
2.4 <i>Timer</i>	2 - 5



2.5	Watchdog Timer	2 - 5
2.6	Battery	2 - 5
2.7	Power Monitor and Reset Generation	2 - 5
2.8	Flash Memory	2 - 6
2.8.1	SPI Boot Flash for uEFI BIOS	2 - 6
2.8.2	Serial ATA Flash Module (Optional)	2 - 6
2.9	Trusted Platform Module 1.2 (On Request)	2 - 6
2.10	Board Interfaces	2 - 7
2.10.1	Front Panel LEDs	2 - 7
2.10.2	Module Handle	2 - 11
2.10.3	General Purpose DIP Switches	2 - 12
2.10.4	Debug Interface	2 - 12
2.10.5	USB Host Interface	2 - 13
2.10.6	Serial Ports	2 - 14
2.10.7	Integrated Graphics Controller	2 - 16
2.10.7.1	Graphics Memory Usage	2 - 16
2.10.7.2	DisplayPort Interfaces	2 - 17
2.10.8	Serial ATA Interfaces	2 - 18
2.10.9	PCI Express Interfaces	2 - 18
2.10.10	Gigabit Ethernet Interfaces	2 - 18
2.10.10.1	Gigabit Ethernet Connectors	2 - 19
2.11	AMC Interconnection	2 - 20
2.11.1	Fabric Interface	2 - 20
2.11.2	Synchronization Clock Interface	2 - 22
2.11.3	System Management Interface	2 - 22
2.11.4	JTAG Interface	2 - 22
2.11.5	Module Power Interface	2 - 22
2.11.6	Pinout of AMC Card-edge Connector J1	2 - 23
2.12	Module Management	2 - 29
2.12.1	Module Management Controller	2 - 29
2.12.2	MMC Signals Implemented on the AM4022	2 - 30



3. Installation	3 - 3
3.1 Safety Requirements	3 - 3
3.2 Module Handle Positions	3 - 4
3.3 Hot Swap Procedures	3 - 5
3.3.1 Hot Swap Insertion	3 - 5
3.3.2 Hot Swap Extraction	3 - 7
3.4 Installation of Peripheral Devices	3 - 8
3.4.1 Installation of USB Devices	3 - 9
3.4.2 Installation of Serial Devices	3 - 10
3.4.3 SATA Flash Module Installation (Optional)	3 - 11
3.4.4 RTC Backup Battery Module Installation (Optional)	3 - 11
3.5 Software Installation	3 - 11
4. Configuration	4 - 3
4.1 DIP Switch Configuration	4 - 3
4.2 I/O Address Map	4 - 5
4.3 AM4022-Specific Registers	4 - 6
4.3.1 Status Register 0 (STAT0)	4 - 6
4.3.2 Control Register 1 (CTRL1)	4 - 7
4.3.3 Device Protection Register (DPROT)	4 - 8
4.3.4 Reset Status Register (RSTAT)	4 - 9
4.3.5 Board Interrupt Configuration Register (BICFG)	4 - 10
4.3.6 Board ID High Byte Register (BIDH)	4 - 10
4.3.7 Board and PLD Revision Register (BREV)	4 - 11
4.3.8 Geographic Addressing Register (GEOAD)	4 - 11
4.3.9 Watchdog Timer Control Register (WTIM)	4 - 12
4.3.10 Board ID Low Byte Register (BIDL)	4 - 14
4.3.11 User-Specific LED Configuration Register (LCFG)	4 - 15
4.3.12 User-Specific LED Control Register (LCTRL)	4 - 16
4.3.13 General Purpose Output Register (GPOUT)	4 - 17
4.3.14 General Purpose Input Register (GPIN)	4 - 17
4.3.15 IPMI Keyboard Controller Style Interface	4 - 17



5. Power Considerations	5 - 3
5.1 AM4022 Voltage Ranges	5 - 3
5.2 Carrier Power Requirements	5 - 3
5.2.1 Module Management Power	5 - 3
5.2.2 Payload Power	5 - 3
5.2.3 Payload and MMC Voltage Ramp	5 - 4
5.2.4 Power Sequencing for Unmanaged Systems	5 - 4
5.3 Payload Power Consumption	5 - 4
5.3.1 Payload Power Consumption with COM Port on Front I/O	5 - 6
5.3.2 Payload Power Consumption with DP on Front I/O	5 - 6
5.4 Payload Power Consumption of Accessories	5 - 7
5.5 IPMI FRU Payload Power Consumption	5 - 7
6. Thermal Considerations	6 - 3
6.1 Board Thermal Monitoring	6 - 3
6.2 Processor Thermal Monitoring	6 - 3
6.2.1 Digital Thermal Sensor (DTS)	6 - 3
6.2.2 Adaptive Thermal Monitor	6 - 3
6.2.3 Frequency/VID Control	6 - 4
6.2.4 Clock Modulation	6 - 5
6.2.5 Catastrophic Cooling Failure Sensor	6 - 5
6.3 Chipset Thermal Monitor Feature	6 - 5
6.4 System Airflow	6 - 6
6.4.1 Thermal Characteristic Diagrams for the AM4022	6 - 8
6.4.2 Airflow Impedance	6 - 10
6.4.3 Airflow Paths	6 - 11
A. SATA Flash Module	A - 3
A.1 Technical Specifications	A - 3
A.2 SATA Flash Module Layout	A - 4





B. RTC Backup Battery Module	B - 3
<i>B.1 Technical Specifications</i>	<i>B - 3</i>
<i>B.2 RTC Backup Battery Module Layout</i>	<i>B - 4</i>



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List of Tables

1-1	<i>System Relevant Information</i>	1 - 5
1-2	<i>AM4022 Main Specifications</i>	1 - 9
1-3	<i>Standards</i>	1 - 14
1-4	<i>Related Publications</i>	1 - 15
2-1	<i>Features of the Processors Supported on the AM4022</i>	2 - 4
2-2	<i>Module Management LED Functions</i>	2 - 8
2-3	<i>User-Specific LED Functions</i>	2 - 9
2-4	<i>POST Code Sequence</i>	2 - 10
2-5	<i>POST Code Example</i>	2 - 10
2-6	<i>Module Handle Positions</i>	2 - 11
2-7	<i>DIP Switch SW2 Functions</i>	2 - 12
2-8	<i>DIP Switch SW3 Functions</i>	2 - 12
2-9	<i>Mini USB Type A Con. J2 Pinout</i>	2 - 13
2-10	<i>Mini Con. J5 (COMA) Pinout</i>	2 - 14
2-11	<i>Pinout of the Serial Adapter Connectors</i>	2 - 15
2-12	<i>DisplayPort Connector J6 Pinout</i>	2 - 17
2-13	<i>Gigabit Ethernet Port Mapping</i>	2 - 18
2-14	<i>Gigabit Ethernet Connectors J3 and J4 Pinout</i>	2 - 19
2-15	<i>Pinout of AMC Card-edge Connector J1</i>	2 - 23
2-16	<i>Reserved Pins Description</i>	2 - 26
2-17	<i>Extended Options Region Single-Ended Pins Description</i>	2 - 26
2-18	<i>Optional Single-Ended GPIO Pins Description</i>	2 - 26
2-19	<i>Extended Options Region Pins for the AM4022 with AMC USB Support</i>	2 - 27
2-20	<i>Extended Options Region Pins for the AM4022 with AMC DP Support</i>	2 - 28
2-21	<i>JTAG Pins Description</i>	2 - 28
2-22	<i>Processor and Chipset Supervision</i>	2 - 30
2-23	<i>AMC-Specific Signals</i>	2 - 30
2-24	<i>Onboard Power Supply Supervision</i>	2 - 30
2-25	<i>Temperature Signals</i>	2 - 31
4-1	<i>Configuration of DIP Switch SW2, Switches 1 and 2</i>	4 - 4
4-2	<i>Configuration of DIP Switch SW2, Switches 3 and 4</i>	4 - 4
4-3	<i>DIP Switch SW3 Configuration</i>	4 - 4



4-4	<i>I/O Address Map</i>	4 - 5
4-5	<i>Status Register 0 (STAT0)</i>	4 - 6
4-6	<i>Control Register 1 (CTRL1)</i>	4 - 7
4-7	<i>Device Protection Register (DPROT)</i>	4 - 8
4-8	<i>Reset Status Register (RSTAT)</i>	4 - 9
4-9	<i>Board Interrupt Configuration Register (BICFG)</i>	4 - 10
4-10	<i>Board ID High Byte Register (BIDH)</i>	4 - 10
4-11	<i>Board and PLD Revision Register (BREV)</i>	4 - 11
4-12	<i>Geographic Addressing Register (GEOAD)</i>	4 - 11
4-13	<i>Watchdog Timer Control Register (WTIM)</i>	4 - 13
4-14	<i>Board ID Low Byte Register (BIDL)</i>	4 - 14
4-15	<i>User-Specific LED Configuration Register (LCFG)</i>	4 - 15
4-16	<i>User-Specific LED Control Register (LCTRL)</i>	4 - 16
4-17	<i>General Purpose Output Register (GPOUT)</i>	4 - 17
4-18	<i>General Purpose Input Register (GPIN)</i>	4 - 17
5-1	<i>DC Operational Input Voltage Ranges</i>	5 - 3
5-2	<i>Payload Power Consumption with COM Port on Front I/O</i>	5 - 6
5-3	<i>Payload Power Consumption with DP on Front I/O</i>	5 - 6
5-4	<i>Payload Power Consumption of AM4022 Accessories</i>	5 - 7
5-5	<i>IPMI FRU Payload Power Consumption</i>	5 - 7
6-1	<i>Mid-Size AM4022 Airflow Impedance by Zone [N/m²]</i>	6 - 10
6-2	<i>Mid-Size AM4022 Airflow Impedance by Zone [inches H₂O]</i>	6 - 11
6-3	<i>Deviation of the Airflow Rate on a Mid-Size AM4022</i>	6 - 12
A-1	<i>SATA Flash Module Main Specifications</i>	A - 3
B-1	<i>RTC Backup Battery Module Specifications</i>	B - 3





List of Figures

1-1	<i>AM4022 Functional Block Diagram</i>	1 - 6
1-2	<i>AM4022 Mid-size Front Panel Versions</i>	1 - 7
1-3	<i>AM4022 Board Layout (Top View)</i>	1 - 8
1-4	<i>AM4022 Board Layout (Bottom View)</i>	1 - 8
2-1	<i>Front Panel LEDs</i>	2 - 7
2-2	<i>Module Handle Positions</i>	2 - 11
2-3	<i>Mini USB Type A Con. J2</i>	2 - 13
2-4	<i>Adapter for Mini USB Type A to USB Type A Connector</i>	2 - 13
2-5	<i>Mini Con. J5 (COMA)</i>	2 - 14
2-6	<i>Adapter for 10-Pin Mini Connector to 9-Pin D-Sub Female Connector</i> .	2 - 15
2-7	<i>DisplayPort Connector J6</i>	2 - 17
2-8	<i>Gigabit Ethernet Connectors J3 and J4</i>	2 - 19
2-9	<i>AM4022 Port Mapping</i>	2 - 21
3-1	<i>Module Handle Positions</i>	3 - 4
3-2	<i>Connecting a Peripheral Device to the AM4022</i>	3 - 8
3-3	<i>Adapter for Mini USB Type A to USB Type A Connectors</i>	3 - 9
3-4	<i>Adapter for 10-Pin Mini Connector to 9-Pin D-Sub Female Connector</i> .	3 - 10
4-1	<i>DIP Switches SW2 and SW3</i>	4 - 3
6-1	<i>Mid-Size AM4022 with i7-3612QE, 2.1 GHz, COM Port</i>	6 - 8
6-2	<i>Mid-Size AM4022 with i7-3612QE, 2.1 GHz, DisplayPort</i>	6 - 8
6-3	<i>Mid-Size AM4022 with i7-3555LE, 2.5 GHz, COM Port</i>	6 - 9
6-4	<i>Mid-Size AM4022 with i7-3555LE, 2.5 GHz, DisplayPort</i>	6 - 9
6-5	<i>Mid-Size AM4022 Airflow Impedance</i>	6 - 10
6-6	<i>Thermal Zones of the Mid-Size AM4022 Module</i>	6 - 11
A-1	<i>SATA Flash Module Layout (Bottom View)</i>	A - 4
A-1	<i>RTC Backup Battery Module Layout (Front and Rear Views)</i>	B - 4



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



Explanation of Symbols



Caution, Electric Shock!

This symbol and title warn of hazards due to electrical shocks (> 60V) 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 section “High Voltage Safety Instructions” on the following page.



Warning, ESD Sensitive Device!

This symbol and title inform that 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.

Please read also the section “Special Handling and Unpacking Instructions” on the following page.



Warning!

This symbol and title emphasize points which, if not fully understood and taken into consideration by the reader, may endanger your health and/or result in damage to your material.



Note ...

This symbol and title emphasize aspects the reader should read through carefully for his or her own advantage.



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



Warning!

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



Caution, Electric Shock!

Before installing any piggybacks or carrying out maintenance operations always ensure that your mains power is switched off.

Serious electrical shock hazards can exist during all installation, repair and maintenance operations with this product. Therefore, always unplug the power cable and any other cables which provide external voltages before performing work.

Special Handling and Unpacking Instructions



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.



Warning!

This product has gold conductive fingers which are susceptible to contamination. Take care not to touch the gold conductive fingers of the AMC Card-edge connector when handling the board.

Failure to comply with the instruction above may cause damage to the board or result in improper system operation.

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 piggy-backs, ROM devices, jumper settings etc. If the product contains batteries for RTC or memory backup, ensure that the board 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 board.

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 device, which are not explicitly approved by Kontron and described in this manual or received from Kontron's Technical Support as a special handling instruction, will void your warranty.

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

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

Keep all the original packaging material for future storage or warranty shipments. If it is necessary to store or ship the board, please re-pack it as nearly as possible in the manner in which it was delivered.

Special care is necessary when handling or unpacking the product. Please consult the special handling and unpacking instruction on the previous page of this manual.



Two Year Warranty

Kontron grants the original purchaser of Kontron's products a **TWO YEAR LIMITED HARDWARE WARRANTY** as described in the following. However, no other warranties that may be granted or implied by anyone on behalf of Kontron are valid unless the consumer has the express written consent of Kontron.

Kontron warrants their own products, excluding software, to be free from manufacturing and material defects for a period of 24 consecutive months from the date of purchase. This warranty is not transferable nor extendible to cover any other users or long-term storage of the product. It does not cover products which have been modified, altered or repaired by any other party than Kontron or their authorized agents. Furthermore, any product which has been, or is suspected of being damaged as a result of negligence, improper use, incorrect handling, servicing or maintenance, or which has been damaged as a result of excessive current/voltage or temperature, or which has had its serial number(s), any other markings or parts thereof altered, defaced or removed will also be excluded from this warranty.

If the customer's eligibility for warranty has not been voided, in the event of any claim, he may return the product at the earliest possible convenience to the original place of purchase, together with a copy of the original document of purchase, a full description of the application the product is used on and a description of the defect. Pack the product in such a way as to ensure safe transportation (see our safety instructions).

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Chapter

1

Introduction



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1. Introduction

1.1 Board Overview

The AM4022 is a highly integrated CPU board implemented as a Single Mid-size or Full-size Advanced Mezzanine Card (AMC) Module. The design is based on 3rd generation Intel® Core™ i7 processors combined with the mobile Intel® QM77 Express Chipset.

The board supports the 3rd generation Intel® Core™ i7-3612QE quad-core and the 3rd generation Intel® Core™ i7-3555LE dual-core processors in 22 nm technology. The 2.1 GHz Intel® Core™ i7-3612QE has a 4x 64 kB L1 cache, 4x 256 KB L2 cache and 6 MB L3 cache. The 2.5 GHz Intel® Core™ i7-3555LE has a 2x 64 kB L1 cache, 2x 256 KB L2 cache and 4 MB L3 cache. Both the processor and the memory are soldered resulting in a higher MTBF and a significant improvement in cooling.

The AM4022 includes up to 8 GB, dual-channel Double Data Rate (DDR3) memory with Error Checking and Correcting (ECC) running at 1600 MHz. The graphics controller and the memory controller are integrated in the processor.

One Quad Gigabit Ethernet Controller directly connected to the processor ensures maximum data throughput. The AM4022 further provides up to 64 GB Flash memory via an optional on-board Serial ATA Flash module.

The AM4022 is available with two front panel versions, one with a DisplayPort and one with a COM port. Further interfaces include one USB 2.0 host interface and two Gigabit Ethernet ports to the front as well as a variety of high-speed interconnect topologies to the system, such as Dual Gigabit SerDes connection and Dual Serial ATA storage interface in the Common Options Region, two x4 or one x8 PCI Express interfaces in the Fat Pipes Region, one Serial ATA storage interface, a DisplayPort (on request), one USB 3.0 port and three USB 2.0 ports (all on request) in the Extended Options Region, and a Debug port in the Extended Options Region. The AM4022 can provide an FCLKA PCI Express clock to the host system. The AM4022 does not, however, synchronize on an external clock input.

The AM4022 provides safety and security features via an on request Trusted Platform Module (TPM) 1.2.

The AM4022 has full hot swap capability. A dedicated Module Management Controller (MMC) is used to manage the board and support a defined subset of Intelligent Platform Management Interface (IPMI) commands and PICMG (ATCA/AMC) command extensions, which enables operators to detect and eliminate faults faster at module level. This includes monitoring several onboard temperature conditions, board voltages and the power supply status, managing hot swap operations, rebooting the board, etc. All in all, IPMI enhances the board's availability and reliability while reducing the operating costs and the mean-time-to-repair.

Optimized for high-performance, packet-based telecom systems, the AM4022 is targeted towards, but not limited to the telecom market application such as radio network controllers, media streaming, traffic processing, database management and routing. The AM4022 also fits into all applications situated in industrial environments, including I/O intensive applications. The careful design and the selection of high temperature resistant components ensure a high product availability. This, together with a high level of scalability, reliability, and stability, make this state-of-the-art product a perfect core technology for long-life embedded applications.



The board is offered with various Board Support Packages including Windows and Linux operating systems. For further information concerning the operating systems available for the AM4022, please contact Kontron.

1.2 Board-Specific Information

Due to the outstanding features of the AM4022, such as superior processing power and flexible interconnect topologies, this AMC board provides a highly scalable solution not only for a wide range of telecom and data network applications, but also for several highly integrated industrial environment applications with solid mechanical interfacing.

Some of the AM4022's outstanding features are:

- Support for the following 3rd generation Intel® Core™ quad- and dual-core processors:
 - Intel® Core™ i7-3612QE (SV) processor with ECC, 2.1 GHz, 6 MB L3 cache
 - Intel® Core™ i7-3555LE (LV) processor with ECC, 2.5 GHz, 4 MB L3 cache
- Intel® QM77 Express Chipset
- Up to 8 GB, dual-channel, DDR3 SDRAM memory with ECC running at 1600 MHz
- Integrated 3D high performance graphics controller
- Display support for resolutions up to 2560 x 1600 pixels @ 60 Hz
- AMC interconnection:
 - Dual Gigabit SerDes connection in the Common Options Region
 - Dual SATA storage interface in the Common Options Region
 - Two x4 or one x8 PCI Express interface in the Fat Pipes Region (up to 8.0 GT/s and as a root complex controller only)
 - One SATA storage interface in the Extended Options Region
 - DisplayPort interface (on request) in the Extended Options Region
 - One USB 3.0 and three USB 2.0 (all on request) in the Extended Options Region
 - Serial port in the Extended Options Region
 - PCI Express reference clock (FCLKA) either output to host or non-synchronized external input
- Full hot swap support
- One Quad Gigabit Ethernet Controller, Intel® I350
- Onboard extension connector for either an optional SATA Flash module with up to 64 GB NAND Flash memory or an optional battery module for RTC backup
- One mini USB 2.0 host port on Front I/O
- Two Gigabit Ethernet ports on Front I/O
- One Serial port (RS-232) or DisplayPort on Front I/O, depending on the front panel version
- TCG 1.2-compliant Trusted Platform Module (TPM) (on request)
- Two SPI Flash chips (2 x 8 MB) for two separate uEFI BIOS images:
 - One standard SPI boot flash
 - One recovery SPI boot flash
- Dedicated IPMI Module Management Controller with redundant Firmware Flash (2 x 512 kB)
- Watchdog Timer
- Four bicolor User-Specific LEDs (providing debugging and POST code information, etc.)
- Two onboard DIP switches SW2 and SW3 (for selecting the SPI boot flashes, overwriting E-Keying, etc.)
- Standard temperature range: - 5°C to + 55°C
- Extended temperature range: - 40°C to + 70°C (on request)
- Thermal management and passive heat sink solution for forced airflow cooling
- Single Mid-size and Full-size AMC module with or without retaining screws (Full-size and front panels with retaining screws on request)
- AMI Aptio®, a uEFI-compliant platform firmware



- Designed to be compliant with the following PICMG specifications:
 - PICMG® AMC.0 R2.0, Advanced Mezzanine Card Specification
 - PICMG® AMC.1 R2.0, PCI Express™ on AdvancedMC™
 - PICMG® AMC.2 R1.0, Ethernet Advanced Mezzanine Card Specification
 - PICMG® AMC.3 R1.0 Advanced Mezzanine Card Specification for Storage
 - PICMG® MTCA.0 R1.0 Micro Telecommunications Computing Architecture Base Specification
 - PICMG® MTCA.1 R1.0 Air Cooled Rugged MicroTCA Specification
 - IPMI - Intelligent Platform Management Interface Specification, v2.0, R1.0

1.3 System Relevant Information

The following system relevant information is general in nature but should still be considered when developing applications using the AM4022.

Table 1-1: System Relevant Information

SUBJECT	INFORMATION
Hardware Requirements	<p>The AM4022 can be installed on any AMC-supporting carrier board or MicroTCA backplane with the following AMC Card-edge connector port mapping:</p> <ul style="list-style-type: none"> • Common Options Region ports 0-1: <ul style="list-style-type: none"> • Two Gigabit Ethernet SerDes ports • Common Options Region ports 2-3: <ul style="list-style-type: none"> • Two Serial ATA ports • Fat Pipes Region ports 4-11: <ul style="list-style-type: none"> • Two x4 or one x8 PCI Express interface • Extended Options Region port 12: <ul style="list-style-type: none"> • One Serial ATA port • Extended Options Region port 13: <ul style="list-style-type: none"> • One USB 3.0 port (on request) • Extended Options Region port 14: <ul style="list-style-type: none"> • One Debug port • One USB 2.0 (on request) • Extended Options Region port 15: <ul style="list-style-type: none"> • One Serial port • Extended Options Region port 16: <ul style="list-style-type: none"> • Four GPIOs (on request) • Extended Options Region ports 17-20: <ul style="list-style-type: none"> • One DisplayPort (on request) • Two USB 2.0 ports (on request, one on port 19 and one on port 20) • Clock: <ul style="list-style-type: none"> • PCI Express reference clock, FCLKA <p>For further information on the AMC interconnection, refer to Chapter 2.11, “AMC Interconnection”.</p>
PCI Express Configuration	<p>The AM4022 only supports the PCI Express root complex configuration; non-transparent bridge functionality is not supported.</p>
Operating Systems	<p>The board is offered with various Board Support Packages including Windows and Linux operating systems. For further information concerning the operating systems available for the AM4022, please contact Kontron.</p>

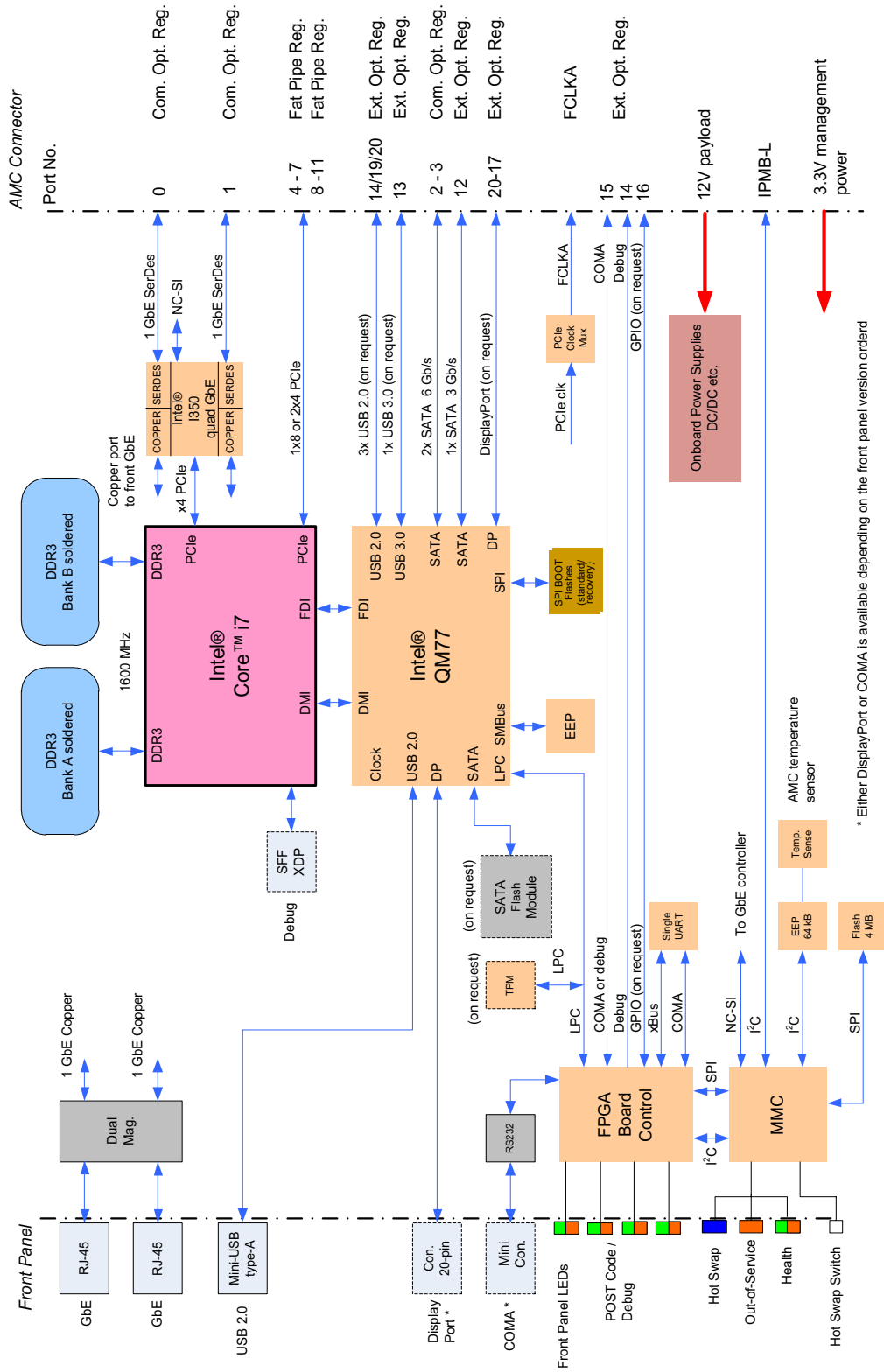
1.4 Board Diagrams

The following diagrams provide additional information concerning board functionality and component layout.

1.4.1 Functional Block Diagram

The following figure shows the block diagram of the AM4022.

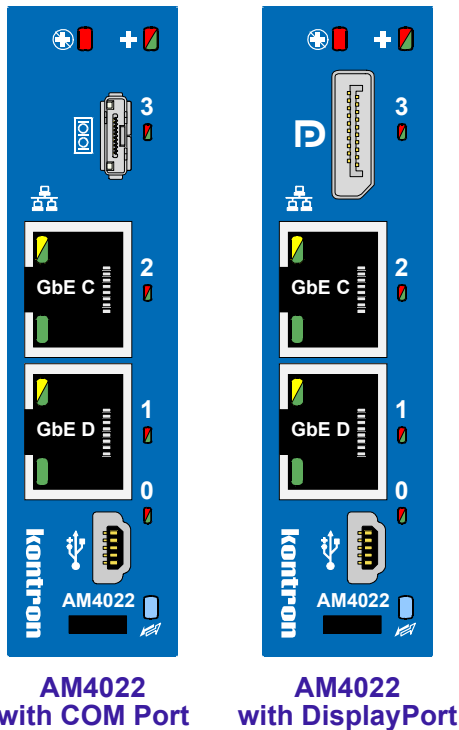
Figure 1-1: AM4022 Functional Block Diagram





1.4.2 Front Panel

Figure 1-2: AM4022 Mid-size Front Panel Versions



AM4022 with COM Port




AM4022 with DisplayPort







Note ...

On request, the AM4022 is available with retaining screws on the front panel as well as in full-size versions with or without retaining screws.





Module Management LEDs

-  • LED1 (red): Out-of-Service LED
-  • LED2 (red/green/amber): Health LED
-  • HS LED (blue): Hot Swap LED

Connectors

-  • Serial Connector
-  • DisplayPort Connector
-  • Gigabit Ethernet Connector
-  • Mini-USB Connector

User-Specific LEDs

-  • ULED3 (red/green): AMC Ethernet port A link signal status, AMC port 0 (green) + POST
-  • ULED2 (red/green): AMC Ethernet port B link signal status, AMC port 1 (green) + POST
-  • ULED1 (red/green): SATA channels active (green) + POST
-  • ULED0 (red/green): POST



Note ...

If one or more of the ULEDs 0..3 remain lit or blinking red, a failure is indicated. For further information, please contact Kontron.

For further information on the LEDs used on the AM4022, refer to section 2.10.1, “Front Panel LEDs”.



1.4.3 Board Layouts

Figure 1-3: AM4022 Board Layout (Top View)

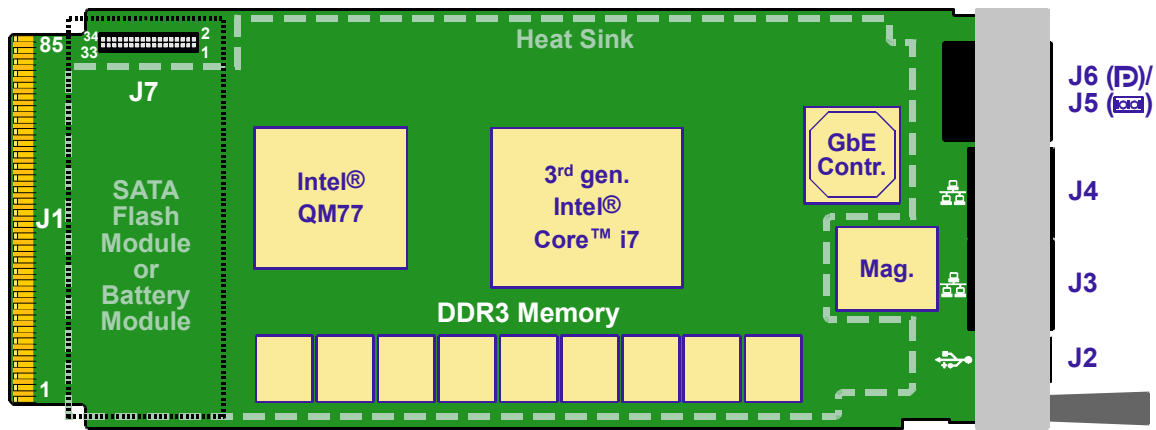
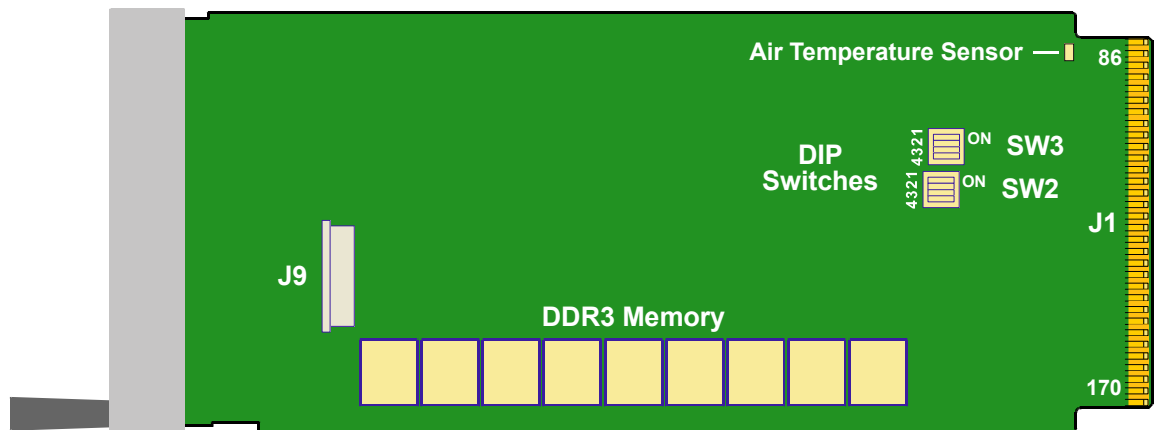


Figure 1-4: AM4022 Board Layout (Bottom View)





1.5 Technical Specification

Table 1-2: AM4022 Main Specifications

AM4022		SPECIFICATIONS
Processor and Memory	CPU	<p>The AM4022 supports the following 3rd generation Intel® Core™ processors:</p> <ul style="list-style-type: none"> Intel® Core™ i7-3612QE (SV) processor with ECC, 2.1 GHz, 6 MB L3 cache Intel® Core™ i7-3555LE (LV) processor with ECC, 2.5 GHz, 4 MB L3 cache <p>Further processor features:</p> <ul style="list-style-type: none"> Up to four physical execution cores Intel® Hyper-Threading Technology (Intel® HT Technology) Intel® 64 Architecture Intel® Turbo Boost Technology Intel® Intelligent Power Sharing (IPS) System Memory interface with optimized support for dual-channel DDR3 SDRAM memory at 1600 MHz with ECC Integrated 2D and 3D Graphics Engines DMI and FDI interfaces to the Intel® QM77 chipset One x16 PCI Express port operating at up to 8.0 GT/s <p>Please contact Kontron for further information concerning the suitability of other Intel processors for use with the AM4022.</p>
	Memory	<p>Main Memory:</p> <ul style="list-style-type: none"> Up to 8 GB, dual-channel DDR3 SDRAM memory with ECC running at 1600 MHz <p>Cache Structure:</p> <ul style="list-style-type: none"> 64 kB L1 cache for each core <ul style="list-style-type: none"> 32 kB instruction cache 32 kB data cache 256 kB L2 shared instruction/data cache for each core Up to 6 MB L3 shared instruction/data cache shared between all cores <p>Flash Memory:</p> <ul style="list-style-type: none"> Two SPI Flash chips (2 x 8 MB) for two separate uEFI BIOS images selectable via the IPMI controller or the DIP switch SW3 <p>Mass Storage Device:</p> <ul style="list-style-type: none"> Up to 64 GB NAND Flash via an optional onboard Serial ATA Flash module <p>Serial EEPROM with 64 kbit</p>
Chipset	Intel® QM77	<p>Mobile Intel® QM77 Express Chipset:</p> <ul style="list-style-type: none"> Eight x1 PCI Express 2.0 ports (not used on the AM4022) SATA host controller with six ports; two with 6 Gbit/s and four with 3 Gbit/s data transfer rate and RAID 0/1/5/10 support (only four ports are used on the AM4022) USB 2.0 host interface with 14 USB ports available (only four ports are used on the AM4022) USB 3.0 host interface with 4 USB ports available (only one port is used on the AM4022) SPI Flash interface support Low Pin Count (LPC) interface

Table 1-2: AM4022 Main Specifications (Continued)

AM4022		SPECIFICATIONS
Chipset (Cont'd)	Intel® QM77	<ul style="list-style-type: none"> Power management logic support Enhanced DMA controller, interrupt controller, and timer functions System Management Bus (SMBus) compatible with most I²C™ devices DMI and FDI interfaces to the processor High Definition Audio Interface (not used on the AM4022) Analog display port (not used on the AM4022) Three digital display ports (only two ports are used on the AM4022) Integrated RTC
Integrated Controller	Graphics controller	<p>High-performance 3D graphics controller integrated in the processor:</p> <ul style="list-style-type: none"> Supports resolutions up to 2560 x 1600 pixels @ 60 Hz DisplayPort hot plug support Dynamic Video Memory Technology <p>When the AM4022 is populated with a COM connector on the front panel, the graphics controller is disabled.</p>
Onboard Controller	Gigabit Ethernet	<p>Intel® I350 Quad Gigabit Ethernet PCI Express bus controller with advanced management features such as serial redirection over LAN:</p> <ul style="list-style-type: none"> Two interfaces routed to the front I/O connectors Two interfaces routed to the AMC Card-edge connector
	Serial	<p>One 16550-compatible UART routed either to the front I/O (RS-232 signaling) or the AMC Card-edge connector (TTL level), depending on front panel version</p>
AMC Interconnection	Gigabit Ethernet	<p>Common Options Region ports 0-1:</p> <ul style="list-style-type: none"> Two Gigabit Ethernet SerDes ports
	Serial ATA	<p>Common Options Region ports 2-3:</p> <ul style="list-style-type: none"> Two Serial ATA ports <p>Extended Options Region port 12:</p> <ul style="list-style-type: none"> One Serial ATA port
	PCI Express	<p>Fat Pipes Region ports 4-11:</p> <ul style="list-style-type: none"> Two x4 or one x8 PCI Express interfaces as root complex controller only and operating up to 8.0 GT/s
	Debug Interface	<p>Extended Options Region port 14:</p> <ul style="list-style-type: none"> One Debug port
	USB Interfaces	<p>Extended Options Region port 13:</p> <ul style="list-style-type: none"> One USB 3.0 port (on request) <p>Extended Options Region ports 14/19/20:</p> <ul style="list-style-type: none"> Three USB 2.0 ports (on request)
	Serial Interface	<p>Extended Options Region port 15:</p> <ul style="list-style-type: none"> One Serial port
	DisplayPort	<p>Extended Options Region ports 17-20:</p> <ul style="list-style-type: none"> One DisplayPort (on request)
	Clock	<p>Clock:</p> <ul style="list-style-type: none"> PCI Express clock FCLKA to the host system, does not synchronize on an external clock input

Table 1-2: AM4022 Main Specifications (Continued)

AM4022		SPECIFICATIONS
Connectors	Front Panel Connectors	<ul style="list-style-type: none"> One USB 2.0 port on a 5-pin, mini USB Type A connector Two Gigabit Ethernet ports on two RJ-45 connectors One Serial port (COMA) with RS-232 signal level on a 10-pin mini connector (on the front panel version with a COM port) One 20-pin DisplayPort connector (on the front panel version with a DisplayPort)
	Onboard Connector	<ul style="list-style-type: none"> One extension connector for either Serial ATA Flash or an RTC Backup Battery module
	AMC Card-edge Connector	<ul style="list-style-type: none"> One 170-pin AMC Card-edge connector
Switches	DIP Switches	<ul style="list-style-type: none"> Two DIP switches for board configuration, SW2 and SW3, consisting of four switches each
	Hot Swap	<ul style="list-style-type: none"> One Hot Swap switch
LEDs	Module Management LEDs	<ul style="list-style-type: none"> LED1 (red): Out-of-Service LED LED2 (red/green/amber): Health LED HS LED (blue): Hot swap LED
	User-Specific LEDs	<ul style="list-style-type: none"> ULED3 (red/green): AMC Ethernet port A link signal status, AMC port 0 (green) + POST code ULED2 (red/green): AMC Ethernet port B link signal status, AMC port 1 (green) + POST code ULED1 (red/green): SATA channels active (green) + POST code ULED0 (red/green): POST code
	Ethernet LEDs	<ul style="list-style-type: none"> Act (green): Network/Link Activity Speed (green/yellow): Network speed
Timer	Watchdog Timer	<ul style="list-style-type: none"> Software-configurable, two-stage Watchdog with programmable timeout ranging from 125 ms to 4096 s in 16 steps Serves for generating IRQ or hardware reset
	System Timer	<ul style="list-style-type: none"> The Intel® QM77 chipset contains three 8254-style counters which have fixed uses In addition to the three 8254-style counters, the Intel® QM77 chipset includes eight individual high-precision event timers that may be used by the operating system. They are implemented as a single counter each with its own comparator and value register.
IPMI	Module Management Controller	<ul style="list-style-type: none"> ARM7 microcontroller with redundant 512 kB Firmware Flash and automatic roll-back strategy The MMC carries out IPMI commands such as monitoring several onboard temperature conditions, board voltages and the power supply status, and managing hot swap operations. The MMC is accessible via a local IPMB (IPMB-L) and one host Keyboard Controller Style Interface (KCS) One MMC system EEPROM for FRU data and firmware private data
	Hot Swap	The AM4022 has full hot swap capability.

Table 1-2: AM4022 Main Specifications (Continued)



AM4022		SPECIFICATIONS
Thermal	Thermal Management	CPU and board overtemperature protection is provided by: <ul style="list-style-type: none"> • Up to four Digital Thermal Sensors (DTS), one for each core • One Digital Thermal Sensor (DTS) for the graphics controller • Catastrophic Cooling Failure Sensor (THERMTRIP#) • One temperature sensor integrated in the Intel® QM77 chipset for monitoring the chipset • One onboard temperature sensor for monitoring the board temperature • Specially designed heat sinks
Security	TPM	Trusted Platform Module (TPM) 1.2 for enhanced hardware- and software-based data and system security (on request)
General	Power Consumption	Refer to Chapter 5, "Power Considerations" for information related to the power consumption of the AM4022.
	Temperature Range	Operational: -5°C to +55°C Standard -40°C to +70°C Extended (on request) Storage: -40°C to +70°C  <p>Note ... When the RTC Backup Battery Module is installed, refer to the operational specifications of this module as this determines the storage temperature of the AM4022 (See "RTC Backup Battery Module" below).</p>  <p>Note ... When additional components are installed, refer to their operational specifications as this will influence the operational and storage temperature of the AM4022.</p>
	RTC Backup Battery Module (on request)	Special battery mezzanine module with up to two batteries connected in parallel; uses the J7 connector for interfacing with the AM4022 If this module is installed, the SATA Flash module cannot be installed. Temperature ranges: Operational: -5°C to +55°C Storage: -30°C to +60°C
	Mechanical	Single Module: <ul style="list-style-type: none"> • Mid-size version • Full-size version Both versions available with and without retaining screws

Table 1-2: AM4022 Main Specifications (Continued)

AM4022		SPECIFICATIONS
General	Dimensions	Dimensions of the AM4022 without retention screws on front panel: <ul style="list-style-type: none"> • Mid-size: 181.5 mm x 73.5 mm x 18.96 mm • Full-size: 181.5 mm x 73.5 mm x 28.95 mm
	Board Weight	Mid-size with heat sink and without SATA Flash module: 247 grams Full-size with heat sink and without SATA Flash module: 310 grams
	JTAG	Two JTAG interfaces: <ul style="list-style-type: none"> • One processor JTAG interface routed to the onboard debug connector for debugging purposes • One JTAG interface connected to the AMC Card-edge connector for debugging and manufacturing purposes
Software	Software uEFI BIOS	AMI Aptio®, AMI's next-generation BIOS firmware based on the uEFI Specification and the Intel Platform Innovation Framework for EFI. <ul style="list-style-type: none"> • Serial console redirection via the Serial port or LAN • LAN boot capability for diskless systems (standard PXE) • Redundant image; automatic fail-safe recovery in case of a damaged image • Non-volatile storage of setting in the SPI Flash (battery only required for the RTC) • Compatibility Support Module (CSM) providing legacy BIOS compatibility based on AMIBIOS8 • Command shell for diagnostics and configuration • EFI shell commands executable from mass storage device in a Pre-OS environment (open interface) • MMC support in the command shell
	Software IPMI	Module Management Controller Firmware providing the following features: <ul style="list-style-type: none"> • The MMC is accessible via IPMB-L and one KCS interface with interrupt support • The MMC Firmware can be updated in field through all supported onboard interfaces • Two MMC Flash banks with roll-back capability in case of an upgrade Firmware failure • Board supervision and control extensions such as board reset, power monitor and control, Host Firmware Hub Flash control, and Host boot order configuration
	Operating Systems	The board is offered with various Board Support Packages including Windows and Linux operating systems. For further information concerning the operating systems available for the AM4022, please contact Kontron.

1.6 Standards

The AM4022 complies with the requirements of the following standards.

Table 1-3: Standards

COMPLIANCE	TYPE	STANDARD	TEST LEVEL
CE	Emission	EN55022 EN61000-6-3 EN300386	--
	Immision	EN55024 EN61000-6-2 EN300386	--
	Electrical Safety	EN60950-1	--
Mechanical	Mechanical Dimensions	IEEE 1101.10	--
Environmental and Health Aspects	Vibration (sinusoidal, operating)	GR-63-CORE EN300019-2-3 IEC61131-2 IEC60068-2-6	5-150 [Hz] frequency range 1 [g] acceleration 1 [oct/min] sweep rate 10 sweeps/axis 3 directions: x, y, z
	Shock (operating)	EN300019-2-3 IEC61131-2 IEC60068-2-27	15 [g] acceleration 11 [ms] pulse duration 3 shocks per direction 5 [s] recovery time 6 directions, $\pm x$, $\pm y$, $\pm z$
	Climatic Humidity	IEC60068-2-78	93% RH at 40°C, non-condensing (see note below)
	WEEE	Directive 2002/96/EC	Waste electrical and electronic equipment
	RoHS	Directive 2002/95/EC	Restriction of the use of certain hazardous substances in electrical and electronic equipment



Note ...

Kontron performs comprehensive environmental testing of its products in accordance with applicable standards.

Customers desiring to perform further environmental testing of Kontron products must contact Kontron for assistance prior to performing any such testing. This is necessary, as it is possible that environmental testing can be destructive when not performed in accordance with the applicable specifications.

In particular, for example, boards **without conformal coating** must not be exposed to a change of temperature exceeding 1K/minute, averaged over a period of not more than five minutes. Otherwise, condensation may cause irreversible damage, especially when the board is powered up again.

Kontron does not accept any responsibility for damage to products resulting from destructive environmental testing.



1.7 Related Publications

The following publications contain information relating to this product.

Table 1-4: Related Publications

PRODUCT	PUBLICATION
ATCA	PICMG® 3.0 R3.0, AdvancedTCA® Base Specification, March 24, 2008
MicroTCA	PICMG® MTCA.0 R1.0, Micro Telecommunications Computing Architecture Base Specification, July 6, 2006 PICMG MTCA.1 R1.0, Air Cooled Rugged MicroTCA Specification, March 19, 2009
AMC	PICMG® AMC.0 R2.0, Advanced Mezzanine Card Base Specification, Nov. 15, 2006 PICMG® AMC.1 R2.0, PCI Express™ on AdvancedMC™, Oct. 8, 2008 PICMG® AMC.2 R1.0, Ethernet Advanced Mezzanine Card Specification, March 1, 2007 PICMG® AMC.3 R1.0, Advanced Mezzanine Card Specification for Storage, Aug. 25, 2005
IPMI	IPMI - Intelligent Platform Management Interface Specification, v2.0 Document Revision 1.0, February 12, 2004 IPMI - Platform Management FRU Information Storage Definition, V1.0 Document Revision 1.1, September 27, 1999
PCI Express	PCI Express Base Specification Revision 3.0, Nov. 18, 2010
Serial ATA	Serial ATA Specification, Revision 3.0 Serial ATA II: Extensions to Serial ATA 1.0, Revision 1.0
Platform Firmware	Unified Extensible Firmware Interface (UEFI) specification, version 2.1
All Kontron Products	Product Safety and Implementation Guide, ID 1021-9142



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