kontron

»Kontron User's Guide«

AdvancedTCA®

AM4521

Document Revision 1.1
December 2009

Revision History

Rev. Index	Brief Description of Changes	Date of Issue
1.0	First Release	March 2009
1.1	Second Release	December 2009

Customer Service

Contact Information:

Kontron Canada, Inc.
4555 Ambroise-Lafortune
Boisbriand, Québec, Canada
J7H 0A4
Tel: (450) 437-5682
(800) 354-4223
Fax: (450) 437-8053
E-mail: support@ca.kontron.com

Kontron Modular Computer GMBH
Sudetenstrasse 7
87600 Kaufbeuren
Germany
+49 (0) 8341 803 333

+49 (0) 8341 803 339
support-kom@kontron.com

Visit our site at: www.kontron.com

Table of Contents

List of Figures

List of Tables

Safety Instructions

Before You Begin

Before handling the board, read the instructions and safety guidelines on the following pages to prevent damage to the product and to ensure your own personal safety. Refer to the "Advisories" section in the Preface for advisory conventions used in this user's guide, including the distinction between Warnings, Cautions, Important Notes, and Notes.

- Always use caution when handling/operating the computer. Only qualified, experienced, authorized electronics service personnel should access the interior of the computer. The power supplies produce high voltages and energy hazards, which can cause bodily harm.
- Use extreme caution when installing or removing components. Refer to the installation instructions in this user's guide for precautions and procedures. If you have any questions, please contact Kontron Technical Support

Preventing Electrostatic Discharge

Static electricity can harm system boards. Perform service at an ESD workstation and follow proper ESD procedure to reduce the risk of damage to components. Kontron strongly encourages you to follow proper ESD procedure, which can include wrist straps and smocks, when servicing equipment.

Take the following steps to prevent damage from electrostatic discharge (ESD):

- When unpacking a static-sensitive component from its shipping carton, do not remove the component's antistatic packing material until you are ready to install the component in a computer. Just before unwrapping the antistatic packaging, be sure you are at an ESD workstation or grounded. This will discharge any static electricity that may have built up in your body.
- When transporting a sensitive component, first place it in an antistatic container or packaging.
- Handle all sensitive components at an ESD workstation. If possible, use antistatic floor pads and workbench pads.
- Handle components and boards with care. Don't touch the components or contacts on a board. Hold a board by its edges or by its metal mounting bracket.
- Do not handle or store system boards near strong electrostatic, electromagnetic, magnetic, or radioactive fields.

Preface

How to Use This Guide

This user's guide is designed to be used as step-by-step instructions for installation, and as a reference for operation, troubleshooting, and upgrades.

You can find the latest release of this User's Guide at:

http://www.kontron.com or at: ftp://ftp.kontron.ca/support/

For the circuits, descriptions and tables indicated, Kontron assumes no responsibility as far as patents or other rights of third parties are concerned.

The following is a summary of chapter contents:

- Chapter 1, Product Description
- Chapter 2, Board Features
- Chapter 3, Installing the board
- Appendix A, Connector Pinout
- Appendix B, Getting Help
- Appendix C, Glossary

Customer Comments

If you have any difficulties using this user's guide, discover an error, or just want to provide some feedback, please send a message to: Tech.Writer@ca.kontron.com. Detail any errors you find. We will correct the errors or problems as soon as possible and post the revised user's guide on our Web site. Thank you.

Advisory Conventions

Seven types of advisories are used throughout the user guides to provide helpful information or to alert you to the potential for hardware damage or personal injury. They are Note, Signal Paths, Related Jumpers, BIOS Settings, Software Usage, Cautions, and Warnings. The following is an example of each type of advisory. Use caution when servicing electrical components.

Note:
Indicate information that is important for you to know.

WARNING

Indicates potential for bodily harm and tells you how to avoid the problem.

Disclaimer: We have tried to identify all situations that may pose a warning or a caution condition in this user's guide. However, Kontron does not claim to have covered all situations that might require the use of a Caution or a Warning.

Unpacking

Follow these recommendations while unpacking:

- Remove all items from the box. If any items listed on the purchase order are missing, notify Kontron customer service immediately.
- Inspect the product for damage. If there is damage, notify Kontron customer service immediately.
- Save the box and packing material for possible future shipment.

Storing Boards

Electronic boards are sensitive devices. Do not handle or store device near strong electrostatic, electromagnetic, magnetic or radioactive fields.

Regulatory Compliance Statements

FCC Compliance Statement for Class A Devices

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generated, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experience radio/TV technician for help.

WARNING

This is a Class A product. If not installed in a properly shielded enclosure and used in accordance with this User's Guide, this product may cause radio interference in which case users may need to take additional measures at their own expense.

Safety Certification

All Kontron equipment meets or exceeds safety requirements based on the IEC/EN/UL/CSA 60950-1 family of standards entitled, "Safety of information technology equipment." All components are chosen to reduce fire hazards and provide insulation and protection where necessary. Testing and reports when required are performed under the international IECEE CB Scheme. Please consult the "Kontron Safety Conformity Policy Guide" for more information.

CE Certification

The product described in this user's guide was tested in a representative system and is found to be compliant with the CE marking requirements. For computer systems to remain CE compliant, only CE-compliant parts may be used. Maintaining CE compliance also requires proper cable and cabling techniques. Although Kontron offers accessories, the customer must ensure that these products are installed with proper shielding to maintain CE compliance. Kontron does not offer engineering services for designing cabling systems. In addition, Kontron will not retest or recertify systems or components that have been reconfigured by customers.

Limited 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).

Kontron provides for repair or replacement of any part, assembly or sub-assembly at their own discretion, or to refund the original cost of purchase, if appropriate. In the event of repair, refunding or replacement of any part, the ownership of the removed or replaced parts reverts to Kontron, and the remaining part of the original guarantee, or any new guarantee to cover the repaired or replaced items, will be transferred to cover the new or repaired items. Any extensions to the original guarantee are considered gestures of goodwill, and will be defined in the "Repair Report" issued by Kontron with the repaired or replaced item.

Kontron will not accept liability for any further claims resulting directly or indirectly from any warranty claim, other than the above specified repair, replacement or refunding. In particular, all claims for damage to any system or process in which the product was employed, or any loss incurred as a result of the product not functioning at any given time, are excluded. The extent of Kontron liability to the customer shall not exceed the original purchase price of the item for which the claim exists.

Kontron issues no warranty or representation, either explicit or implicit, with respect to its products' reliability, fitness, quality, marketability or ability to fulfil any particular application or purpose. As a result, the products are sold "as is," and the responsibility to ensure their suitability for any given task remains that of the purchaser. In no event will Kontron be liable for direct, indirect or consequential damages resulting from the use of our hardware or software products, or documentation, even if Kontron were advised of the possibility of such claims prior to the purchase of the product or during any period since the date of its purchase.

Please remember that no Kontron employee, dealer or agent is authorized to make any modification or addition to the above specified terms, either verbally or in any other form, written or electronically transmitted, without the company's consent.

1. Product Description

1.1 Product Overview

The AM4521 is an Advanced Mezzanine Card (AMC) module which incorporates an enterprise class dual port SAS disk drive onto a mid-size of a full-size module. The module boasts several unique features intended to help embedded systems designers address both thermal and signal integrity design challenges associated with in-chassis ATCA and MicroTCA applications.

The AM4521 includes new signal integrity 'tuning' circuits to adjust and optimize the high speed SAS serial links to best match the electrical routing environment of your specific ATCA or uTCA backplanes. These signal wave-shape parameters are stored in non-volatile memory installed on the module.

The AM4521 was developed as single-width AMC, with ship options for mid or full height panels. All hard drives are 2.5" small form factor, and spin at a minimum of 10,000 rotations per minute (RPM). The AM4521 also includes a modular management controller (MMC).

1.2 What's Included

This board is shipped with the following items:

- One Quick Reference Sheet.
- One CD-ROM containing documentation and drivers.
- One AM4521 board

If any item is missing or damaged, contact Kontron.

1.3 Board Specifications

Table 1-1:Board Specifications

Features	Description
Compliancy	• AMC.0 R2.0 • AMC.3 R1.0
OS Compatibility	• RedHat Linux Enterprise 4
IPMI Features	• Management Controller compliant to PICMG 3.0, AMC.0 R2.0 and IPMI v1.5 rev 1.1. • Management Controller is run time field reprogrammable without payload impact. • Robust fail safe reprogramming implementation (which includes two firmware images) that could perform automatic or manual rollback if a problem occurs during critical reprogramming phase. • Remote upgrade capability from IPMI interface (via IPMB-L). • Management Controller self test which can detect failure under its code integrity and trig an automatic rollback.
Supervisory	• Hardware system monitor through IPMI (voltages, currents, temperature), temperature monitor / alarm; board temperature sensor, power failure.
Mechanical	• Single-width Full-Size (181.5 x 75 x 30.16 mm) or mid-size (181.5 x 75 x 18.96 mm)
Power Requirements	• Management power is less than 100mA peak at 3.3V • Payload power is drive dependant
Environmental Temperature*	• Operating: 0-55°C/32-131°F • Storage and Transit: -40 to +70°C/-40 to 158°F
Environmental Humidity*	• Operating: 15% to 90% @55°C/131°F non-condensing • Storage and Transit: 5% to 95% @ 40°C/104°F non-condensing
Environmental Altitude*	• Operating: 4,000 m / 13,123 ft • Storage and Transit: 15,000 m / 49,212 ft
Environmental Shock*	• Operating: 100G / 1ms duration • Storage and Transit: 400G / 1ms duration
Environmental Vibration*	• Operating: 1.0G, 20-300Hz • Storage and Transit: 5.0G, 20-300Hz
Safety / EMC	Meet or exceed: • Safety: UL 60950-1; CSA C22.2 No 60950-1-03; EN 60950-1:2001; IEC60950-1 • EMI/EMC: FCC 47 CFR Part 15, Class A; CE Mark to EN55022/EN55024/EN300386
Warranty	• Two years limited warranty

* Designed to meet or exceed

1.4 Compliance

This product conforms to the following specifications:

- PICMG3.0 R2.0 (Advanced TCA Core Specification)
- AMC.0 R2.0 (Advanced Mezzanine Card Base Specification)
- AMC.3 R1.0 (Advanced Mezzanine Card Storage)
- IPMI rev 1.5
- Serial Attached SCSI 1.1

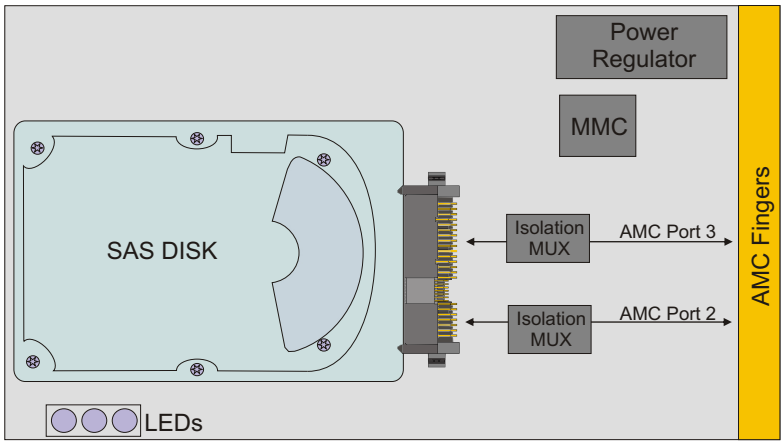
1.5 Hot-Swap Capability

The AM4521 supports Full Hot Swap capability as per PICMG3.0 R2.0. It can be removed from or installed in the system while it is on (without powering-down the system). Please refer to the PICMG3.0 R2.0 specification for additional details. (OS must support drive hot swap)

2. Board Features

2.1 Block Diagram

Figure 2-1:Block Diagram



2.2 Serial Storage I/O Interfaces

The AM4521 modules plug into ATCA carrier blades and uTCA backplanes which support AMC.3 storage signaling. Port 2 is wired to the SAS primary port and Port 3 is wired the SAS secondary port.

Table 2-1: I/O Ports Available On AMC Connector

AMC I/O	Description
Port 2	3Gb SAS Receive and transmit pairs, Primary port
Port 3	3Gb SAS Receive and transmit pairs, Secondary port
MMC device	Serial IPMI management bus

2.2.1 SAS Port Isolation Multiplexer Circuit

The AM4521 includes SAS re-transmitter circuits that can be used to adjust or "wave-shape" the transmit signal characteristics driven out the AMC finger connections (storage signaling ports 2 and 3). At manufacturing time, this circuit is pre-set to values that are optimal for the majority of deployments.

Programmable parameters include:

- Transmit pre-emphasis (five levels)
- Receiver equalization (three levels)
- Transmit output swing to support SAS up to 1600mV

Tools are available to adjust these circuits to accommodate a typical backplane or cable situations. Please contact your Kontron technical support department if you feel your deployment will require different settings.

2.3 IPMI Subsystem

The IPMI subsystem provides module management control (MMC) for the board. It is based on an Atmel microcontroller. Its function is to monitor module functions such as power, temperature, and hot swap requests via the ejector handle and report these to the base controller in the enclosure. It also stores information about the module including serial number and E-Keying.

2.4 IPMI and Management Controller (IPMC)

The design features an IPMI controller consisting of a 16-bit microcontroller, flash and SRAM. The microcontroller uses I2C interface to communicate the shelf management controller (ShMC), and sensors and MMC devices on AdvancedMC modules.

- An I2C connection provides the communication path between the MMC the temperature sensor. The I2C serial bus also routes to the SFP+ modules.
- Support hot-swap operation as defined for AMC modules in PICMG AMC.0 specification "Fail-safe flash update" - if interrupted at anytime, the MMC firmware is still able to respond and re-flash.
- "I2C hang recovery" - able to detect and recover from an I2C bus hang.

2.5 Sensor Data Records

The MMC monitors the status of the module and provides this data so the shelf manager can read it. Below are the SDRs that the AM4521 module creates.

Table 2-2:Sensor Data Records

Sensor	UNR	UC	UNC	LNC	LC	LNR	ID String
1.8V	1.98	1.93	1.90	1.70	1.67	1.62	+1.8V
5.0V	5.50	5.35	5.25	4.75	4.65	4.5	+5V
12V	13.60	13.40	13.00	11.00	10.60	10.400	+12V
Board Temp (LM60)	80	70	60	N/A	N/A	N/A	Board Temp
Inlet Temp (LM75)	70	60	50	N/A	N/A	N/A	Inlet Temp

The AM4521 includes the standard FRU data records per the IPMI Platform Management FRU Information Storage Definition, Board Info Area. The AM4521 includes additional FRU records as defined in the PICMG 2.9 specification.

Table 2-3:Standard FRU Data Records

Board Information	AM4521
Version	1
Language Code	25 (EN-English)
MFG date.time	
Manufacturer Name	Kontron
Product Name	AM4521
Product Serial Number	068LYMMSSSS
Product Part / Model#	AM4521
Product Version	A

2.5.1 AMC Port Assignments

The AM4521 connects up to two ports on the AMC connector. These are defined by the AMC.3 specification for serial storage. The link type and link type extension are defined in the table below.

Table 2-4:AM4521 E-Key Port Assignments

Port #	Port Name	Link type	AMC port map region
0	unused		
1	unused		
2	Channel 0	Link type 7 = AMC.3 Storage, Link type extension = 2 (SAS/SATA) AMC Asymmetric Match = 00b (SAS)	Common Options
3	Channel 1	Link type 7 = AMC.3 Storage, Link type extension = 2 (SAS/SATA) AMC Asymmetric Match = 00b (SAS)	Common Options
4-20	unused		

2.6 Supported IPMI Commands

The MMC communicates with the carrier controller through the local IPMB-L bus of the carrier and responds to all mandatory commands for AMC Module Management Controllers (as defined in the AMC Specification), as well as some optional ones.

Table 2-5:Supported IPMI Commands

Command	IPMI/PICMG/AMC Spec	NetFn	CMD	MMC Req
IPM Device "Global" Commands				
Get Device ID	17.1	App	01h	Mandatory
Broadcast "Get Device ID	17.9	App	01h	Mandatory
Messaging Commands				
Send Message	18.7	App	34h	Optional
Event Commands				
Platform Event	23.3	S/E	02h	Mandatory
Sensor Device Commands				
Get Device SDR Info	29.2	S/E	20h	Mandatory
Get Device SDR	29.3	S/E	21h	Mandatory
Reserve Device SDR Repository	29.4	S/E	22h	Mandatory
Get Sensor Reading Factors	29.5	S/E	23h	Optional
Set Sensor Hysteresis	29.6	S/E	24h	Optional
Get Sensor Hysteresis	29.7	S/E	25h	Optional
Set Sensor Threshold	29.8	S/E	26h	Optional
Get Sensor Threshold	29.9	S/E	27h	Optional
Set Sensor Event Enable	29.10	S/E	28h	Optional

Command	IPMI/PICMG/AMC Spec	NetFn	CMD	MMC Req
Get Sensor Event Enable	29.11	S/E	29h	Optional
Rearm Sensor Events	29.12	S/E	2Ah	Optional
Get Sensor Event Status	29.13	S/E	2Bh	Optional
Get Sensor Reading	29.14	S/E	2Dh	Mandatory
FRU Device Commands				
Get FRU Inventory Area Info	28.1	Storage	10h	Mandatory
Read FRU Data	28.2	Storage	11h	Mandatory
Write FRU Data	28.3	Storage	12h	Mandatory
AdvancedTCA™ Commands				
Get PICMG Properties	3-9	PICMG	00h	Mandatory
FRU Control	3-22	PICMG	04h	Mandatory
Get FRU LED Properties	3-24	PICMG	05h	Mandatory
Get LED Color Capabilities	3-25	PICMG	06h	Mandatory
Set FRU LED State	3-26	PICMG	07h	Mandatory
Get FRU LED State	3-27	PICMG	08h	Mandatory
Get Device Locator Record ID	3-29	PICMG	0Dh	Mandatory
AMC® Commands				
Set AMC Port State	3-27	PICMG	19h	Mandatory
Get AMC Port State	3-28	PICMG	1Ah	Mandatory

2.7 IPMI Firmware Upgrade Procedure

If a board requires new firmware, the firmware upgrade can be performed remotely from the chassis with the IPMB-based upgrade option, via a LAN connection to the shelf manager.

2.7.1 The ipmitool utility

Firmware upgrades are accomplished with ipmitool, a utility for managing IPMI-enabled devices. The utility is an open source derivative which is modified by the shelf management supplier.

The AM4521 keeps a redundant copy of the firmware in the FLASH. Upgrades are reliable and reversible. A failure in the download (error or interruption) does not disturb the IPMC's ability to continue using the "old" firmware or its ability to restart the download process. The IPMC automatically falls back to the previous firmware if there is a problem when first running new code.

2.7.1.1 Synopsis

The minimum information to complete a firmware upgrade is documented here.

```
$ ipmitool [-I|-H|-T|-B|-t|-b] hpm upgrade <firmware_file>
$ ipmitool [-I|-H|-T|-B|-t|-b] hpm activate
```

2.7.1.2 Description

ipmitool lets you manage Intelligent Platform Management Interface (IPMI) functions of either a local or remote system using IPMI V1.5 and IPMI v2.0. Capabilities include printing FRU information, LAN configuration, sensor readings, and remote chassis power control.

2.7.1.3 Options

Table 2-6: ipmitool options relevant to firmware upgrades

Option	Description
-I <interface>	Selects IPMI interface to use. Supported interfaces that are compiled in are visible in the usage help output. Use lan to designate Ethernet.
-H <address>	Remote server address, can be IP address or hostname. This option is required for lan interfaces.
-T <address>	If updating an AMC, use to specify the address and Bus ID of the carrier that holds the AMC. These entries are not needed when updating the carrier alone.
-B <bus id>	
-t <address>	IPMB-L address of the target MMC or Carrier
-b <bus id>	Bus ID of the target MMC or Carrier (use 0 for a carrier, 7 for an AMC/RTM)

2.7.1.4 Command Syntax Examples

Example 1. The following example shows the command sequence for firmware upgrade of an AMC installed on a carrier:

```
$ ipmitool -I lan -H 192.168.0.2 -T 0x82 -B 0 -t 0x74 -b 7 hpm upgrade hpm1fw.img
$ ipmitool -I lan -H 192.168.0.2 -T 0x82 -B 0 -t 0x74 -b 7 hpm activate
```

Line 1 puts the new firmware in the flash device, where hpm1fw.img is the image.

Line 2 is used to dynamically load and activate the new firmware.

Example 2. The following example shows the command performing firmware upgrade on the carrier itself:

```
$ ipmitool -I lan -H 192.168.0.2 -t 0x82 -b 0 hpm upgrade hpm1fw.img
$ ipmitool -I lan -H 192.168.0.2 -t 0x82 -b 0 hpm activate
```

Line 1 puts the new firmware in the flash device, where hpm1fw.img is the image.

Line 2 is used to dynamically load and activate the new firmware.

2.8 AMC LEDs Signification

Table 2-7:AMC LEDs Signification

Indicator	Color	State	Function
Hot Swap (HS)	BLUE	On	Management power available to the module and the module can safely be extracted
		Off	The module is operational and is unsafe for extraction
		Long Blink	Delay before module is activated
		Short Blink	Delay before module is de-activated
Fault or "Out of Service" (OOS)	RED	On	Module Fault set by Shelf manager or 12V payload power not detected.
		Off	No module fault 12V payload power is being supplied to board
Module Active(ACT) and “in service”	GREEN	On	12V payload power is being supplied to board
		Blink	Indicates SAS disk I/O activity
		Off	12V payload power is not detected

3. Installing the Board

3.1 Onboard Connectors and Headers

Table 3-1:Onboard Connectors & Headers

Description	Connector	Comments
AMC Connector	J4	AMC Connector
SATA Connector	J5	Serial ATA Connector

3.2 Board Hot Swap and Installation

Some precautions must be taken when connecting or disconnecting a board:

1 Rail guides must be installed on the enclosure to slide the board to the backplane.

2 Do not force the board if there is mechanical resistance while inserting the board.

3 Use extractor handle to disconnect and extract the board from its enclosure.

WARNING

Always use a grounding wrist wrap before installing or removing the board from a chassis.

3.2.1 Installing an AMC

To install an AMC:

1 Remove the AMC filler panel.

2 Carefully engage the AMC into the card guide. Push the AMC until it fully mate with it's connector. Secure the AMC handle to the locking position.

3 In normal condition, the blue LED shall turn ON as soon as the AMC is fully inserted. It will turn OFF at the end of the hot swap sequence.

3.2.2 Removing an AMC

To remove an AMC:

1 Open the AMC handle.

2 The blue LED will start blinking; wait until it is solid blue.

3 Extract the AMC by pulling it out with the handle.

Note:
Ensure that your OS is Hot Plug compliant before pulling out AMC's handle.

A. Connector Pinouts

A.1 AMC Connector

Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
B1	GND	B43	GND	B86	GND	B129	N.C.
B2	12V	B44	N.C.	B87	N.C.	B130	N.C.
B3	PRSNT1_L	B45	N.C.	B88	N.C.	B131	GND
B4	AMC_VCC3	B46	GND	B89	GND	B132	N.C.
B5	GA0	B47	N.C.	B90	N.C.	B133	N.C.
B6	N.C.	B48	N.C.	B91	N.C.	B134	GND
B7	GND	B49	GND	B92	GND	B135	N.C.
B8	N.C.	B50	N.C.	B93	N.C.	B136	N.C.
B9	12V	B51	N.C.	B94	N.C.	B137	GND
B10	GND	B52	GND	B95	GND	B138	N.C.
B11	N.C.	B53	N.C.	B96	N.C.	B139	N.C.
B12	N.C.	B54	N.C.	B97	N.C.	B140	GND
B13	GND	B55	GND	B98	GND	B141	N.C.
B14	N.C.	B56	IPMI_SCL_L	B99	N.C.	B142	N.C.
B15	N.C.	B57	12V	B100	N.C.	B143	GND
B16	GND	B58	GND	B101	GND	B144	N.C.
B17	GA1	B59	N.C.	B102	N.C.	B145	N.C.
B18	12V	B60	N.C.	B103	N.C.	B146	GND
B19	GND	B61	GND	B104	GND	B147	N.C.
B20	N.C.	B62	N.C.	B105	N.C.	B148	N.C.
B21	N.C.	B63	N.C.	B106	N.C.	B149	GND
B22	GND	B64	GND	B107	GND	B150	N.C.
B23	N.C.	B65	N.C.	B108	N.C.	B151	N.C.
B24	N.C.	B66	N.C.	B109	N.C.	B152	GND
B25	GND	B67	GND	B110	GND	B153	N.C.
B26	GA2	B68	N.C.	B111	N.C.	B154	N.C.
B27	12V	B69	N.C.	B112	N.C.	B155	GND
B28	GND	B70	GND	B113	GND	B156	N.C.
B29	TX_SATA_2+	B71	IPMI_SDA_L	B114	N.C.	B157	N.C.
B30	TX_SATA_2-	B72	12V	B115	N.C.	B158	GND
B31	GND	B73	GND	B116	GND	B159	N.C.
B32	RX_SATA_2+	B74	N.C.	B117	N.C.	B160	N.C.
B33	RX_SATA_2-	B75	N.C.	B118	N.C.	B161	GND
B34	GND	B76	GND	B119	GND	B162	N.C.
B35	TX_SATA_3+	B77	N.C.	B120	N.C.	B163	N.C.
B36	TX_SATA_3-	B78	N.C.	B121	N.C.	B164	GND

Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
B37	GND	B79	GND	B122	GND	B165	N.C.
B38	RX_SATA_3+	B80	N.C.	B123	N.C.	B166	N.C.
B39	RX_SATA_3-	B81	N.C.	B124	N.C.	B167	N.C.
B40	GND	B82	GND	B125	GND	B168	N.C.
B41	AMC_ENABLE_L	B83	PRSNT0_L	B126	N.C.	B169	N.C.
B42	12V	B84	12V	B127	N.C.	B170	GND
		B85	GND	B128	GND		

A.2 SAS (J5)

Pin	Signal	Pin	Signal
S1	GND	P1	3.3V
S2	PortA_TX+	P2	3.3V
S3	PortA_TX-	P3	3.3V
S4	GND	P4	GND
S5	PortA_RX-	P5	GND
S6	PortA_RX+	P6	GND
S7	GND	P7	5V
S8	GND	P8	5V
S9	PortB_TX+	P9	5V
S10	PortB_TX-	P10	GND
S11	GND	P11	Ready LED
S12	PortB_RX-	P12	GND
S13	PortB_RX+	P13	12V
S14	GND	P14	12V
		P15	12V

B. Getting Help

If, at any time, you encounter difficulties with your application or with any of our products, or if you simply need guidance on system setups and capabilities, contact our Technical Support at:

North America	EMEA
Tel.: (450) 437-5682	Tel.: +49 (0) 8341 803 333
Fax: (450) 437-8053	Fax: +49 (0) 8341 803 339

If you have any questions about Kontron, our products, or services, visit our Web site at: www.kontron.com

You also can contact us by E-mail at:

North America: support@ca.kontron.com

EMEA: support-kom@kontron.com

Or at the following address:

North America	EMEA
Kontron Canada, Inc.	Kontron Modular Computers GmbH
4555, Ambroise-Lafortune	Sudetenstrasse 7
Boisbriand, Québec	87600 Kaufbeuren
J7H 0A4 Canada	Germany

B.1 Returning Defective Merchandise

Before returning any merchandise please do one of the following:

- Call

    1 Call our Technical Support department in North America at (450) 437-5682 and in EMEA at +49 (0) 8341 803 333. Make sure you have the following on hand: our Invoice #, your Purchase Order #, and the Serial Number of the defective unit.

    2 Provide the serial number found on the back of the unit and explain the nature of your problem to a service technician.

    3 The technician will instruct you on the return procedure if the problem cannot be solved over the telephone.

    4 Make sure you receive an RMA # from our Technical Support before returning any merchandise.

- E-mail

    1 Send us an e-mail at: RMA@ca.kontron.com in North America and at: orderprocessing@kontron-modular.com in EMEA. In the e-mail, you must include your name, your company name, your address, your city, your postal/zip code, your phone number, and your e-mail. You must also include the serial number of the defective product and a description of the problem.

B.2 When Returning a Unit

- In the box, you must include the name and telephone number of a contact person, in case further explanations are required. Where applicable, always include all duty papers and invoice(s) associated with the item(s) in question.
- Ensure that the unit is properly packed. Pack it in a rigid cardboard box.
- Clearly write or mark the RMA number on the outside of the package you are returning.
- Ship prepaid. We take care of insuring incoming units.

North America	EMEA
Kontron Canada, Inc.	Kontron Modular Computers GmbH
4555, Ambroise-Lafortune	Sudetenstrasse 7
Boisbriand, Québec	87600 Kaufbeuren
J7H 0A4 Canada	Germany

C. Glossary

Acronyms	Descriptions
AdvancedMC	(Same as AMC). Advanced Mezzanine Card.
AMC	(Same as AdvancedMC). Advanced Mezzanine Card.
AMC.0	Advanced Mezzanine Card Base Specification.
AMC.1	PCI Express and Advanced Switching on AdvancedMC. A subsidiary specification to the Advanced Mezzanine Card Base Specification (AMC.0).
AMC.2	Ethernet Advanced Mezzanine Card Specification. A subsidiary specification to the Advanced Mezzanine Card Base Specification (AMC.0).
AMC.3	Advanced Mezzanine Card Specification for Storage. A subsidiary specification to the Advanced Mezzanine Card Base Specification (AMC.0).
ATA	Advanced Technology Attachment
ATCA	Advanced Telecommunications Computing Architecture
BIOS	Basic Input/Output System
FRU	Field Replaceable Unit. Any entity that can be replaced by a user in the field. Not all FRUs are hot swappable.
FW	FirmWare
Gb	Gigabit
GB	(Same as GByte) GigaByte.
GByte	(Same as GB) GigaByte.
GND	GrouND
HDD	Hard Disc Drive
HPM	PICMG Hardware Platform Management specification family
HPM.1	Hardware Platform Management IPM Controller Firmware Upgrade Specification
HW	HardWare
I2C	Inter Integrated Circuit bus
IPM	Intelligent Platform Management
IPMB	Intelligent Platform Management Bus
IPMB-0	Intelligent Platform Management Bus Channel 0, the logical aggregation of IPMB-A and IPMB-B.
IPMB-A	Intelligent Platform Management Bus A
IPMB-B	Intelligent Platform Management Bus B
IPMB-L	Intelligent Platform Management Bus Local
IPMC	Intelligent Platform Management Controller
IPMI	Intelligent Platform Management Interface
OOS	Out Of Service
OS	Operating System
PCB	Printed Circuit Board
PCI	Peripheral Component Interconnect
PCI-32	Peripheral Component Interconnect 32 bits
PCI®	Peripheral Component Interconnect
PCIe	(Same as PCI-E). PCI-Express. Next generation I/O standard
PCI-E	(Same as PCIe). PCI-Express. Next generation I/O standard.

Acronyms	Descriptions
PICMG	PCI Industrial Computer Manufacturers Group
PICMG®	PCI Industrial Computer Manufacturers Group
SAS	Serial Attached SCSI
SATA	Serial ATA
SSD	Solid State Drive