AM4901

MicroTCA™ Carrier Hub
Single, Full-size AMC Form Factor

Doc. ID: 1022-5813, Rev. 1.0
September 19, 2008

User Guide

kontron

Revision History

Publication Title:	AM4901: MicroTCA™ Carrier Hub Single, Full-size AMC Form Factor
Doc. ID:	1022-5813

Rev.	Brief Description of Changes	Date of Issue
1.0	Initial issue	Sep 19, 2008

Imprint

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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 MCH 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 piggybacks, 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.

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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.

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Chapter 1

Introduction

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1. Introduction

1.1 MicroTCA™ System Overview

The MicroTCA™ Carrier Hub (MCH) described in this manual is based on the Micro Telecommunications Computing Architecture (MicroTCA™ or µTCA™) defined by the *PCI Industrial Computer Manufacturers Group (PICMG®).* The main advantages of MicroTCA™ include high throughput, multi-protocol support, hot swappability, high scalability, and integrated system management. For further information regarding the MicroTCA™ standard and its use, please consult the complete Micro Telecommunications Computing Architecture Base Specification.

The Kontron MCH cards can be integrated into MicroTCA™ backplanes providing them with superior processing power and maximum design options. To learn more about the outstanding features and advantages of Kontron MicroTCA™ systems, please contact Kontron or visit the Kontron web site.

1.2 Board Overview

1.2.1 Board Introduction

The AM4901 is a MicroTCA™ Carrier Hub (MCH) implemented in the form factor of a Single, Full-size Advanced Mezzanine Card (AMC) Module with a single tongue. It combines the control and management infrastructure and the interconnect fabric resources needed to support up to twelve AMC modules, up to two cooling units and up to four power modules in a MicroTCA™ system. The MCH's design is based on the NXP® LPC2368 microcontroller and the Broadcom BCM5396 Gigabit Ethernet switch.

The NXP® LPC2368 microcontroller includes a 16-bit/32-bit, 70 MHz, ARM7 CPU with integrated 512 kB Flash, 58 kB SRAM, I²C busses for IPMB usage, and an Ethernet interface. On the AM4901, this microcontroller serves as the MicroTCA™ Carrier Management Controller (MCMC) with electronic keying (E-Keying) support.

The Broadcom BCM5396 Gigabit Ethernet switch uses 14 SerDes/SGMII ports and combines all functions of a high-speed base fabric including packet buffer, Media Access Controllers, address management and a non-blocking switch controller.

The AM4901 itself is hot swappable and uses E-Keying to provide hot swap capability for the FRUs installed in a MicroTCA™ system, such as AMCs, cooling units and power modules, thus enabling them to be replaced, monitored and controlled without having to shut down the MicroTCA™ system. Furthermore, it is able to monitor and control several onboard temperature conditions of the FRUs, their board voltages and their power supply status, manage hot swap operations, reboot them, etc.

The AM4901 supports one standard RS-232 serial port, one Gigabit Ethernet uplink port for fabric interconnection and one Ethernet port for carrier management as well as a variety of high-speed interconnect topologies to the MicroTCA™ system, such as 12 SerDes connections in the Gigabit Ethernet Fabric [A], one additional SerDes connection for the MCH update channel, 12 IPMB-L interfaces, two IPMB-0 interfaces, one Inter-MCH IPMB-L interface and one cross-over channel interface.

1.2.2 Board-Specific Information

Due to the comprehensive features of the AM4901, such as high-performance switching fabric and flexible interconnect topologies, this MCH provides a highly scalable solution not only for a wide range of telecom and data network applications, but also for highly integrated industrial environment applications with solid mechanical interfacing.

Some of the AM4901's outstanding features are:

- NXP® LPC2368 microcontroller (MCMC):
  - 16-bit/32-bit, 70 MHz ARM7 CPU
  - 512 kB Flash
  - 58 kB SRAM
  - Ethernet interface
  - IPMI
  - Watchdog timer
  - I²C busses for IPMB usage
- Broadcom BCM5396 Gigabit Ethernet switch:
  - 14 SerDes/SGMII ports
  - Non-blocking full-wire speed
  - Low latency
  - Unmanaged layer 2 switch
  - Automatic address learning and aging
  - 256 kB on-chip packet buffer
  - Low power consumption
- MCH interconnection:
  - 12 Gigabit Ethernet SerDes connections in Fabric [A]
  - One MCH update channel (SerDes)
  - 12 IPMB-L interfaces
  - One Inter MCH IPMB-L interface
  - One I²C to Carrier FRU
  - Two IPMB-0 interfaces
  - One MCH cross-over channel
- Full hot swap support
- One Gigabit Ethernet port on front I/O for Fabric [A] uplink
- One Ethernet port on front I/O for management purposes
- One serial port on front I/O (RS-232)
- JTAG interface for debugging and manufacturing purposes
- 14 Carrier Management LEDs
- Standard temperature range: -5°C to + 55°C
- Single, Full-size AMC form factor module with a single tongue (tongue 1)
- Designed to be compliant with the following specifications:
  - PICMG AMC.0, Advanced Mezzanine Card Specification R2.0
  - PICMG MTCA.0 Micro Telecommunications Computing Architecture R1.0
  - IPMI - Intelligent Platform Management Interface Specification, v1.5

1.3 System Relevant Information

The following system relevant information is general in nature but should still be considered when developing applications using the AM4901.

Table 1-1: System Relevant Information

SUBJECT	INFORMATION

Hardware Requirements	The AM4901 can be installed on any MicroTCA™ backplane that supports the following MCH interconnection:
	• Fabric [A]
	  • 12 Gigabit Ethernet SerDes ports
	• MCH update channel
	  • One Gigabit Ethernet SerDes port
	• MCH cross-over channel
	  • Serial interface shifted to M-LVDS
	For further information on the MCH interconnection, refer to section 2.3, “MCH Interconnection”.

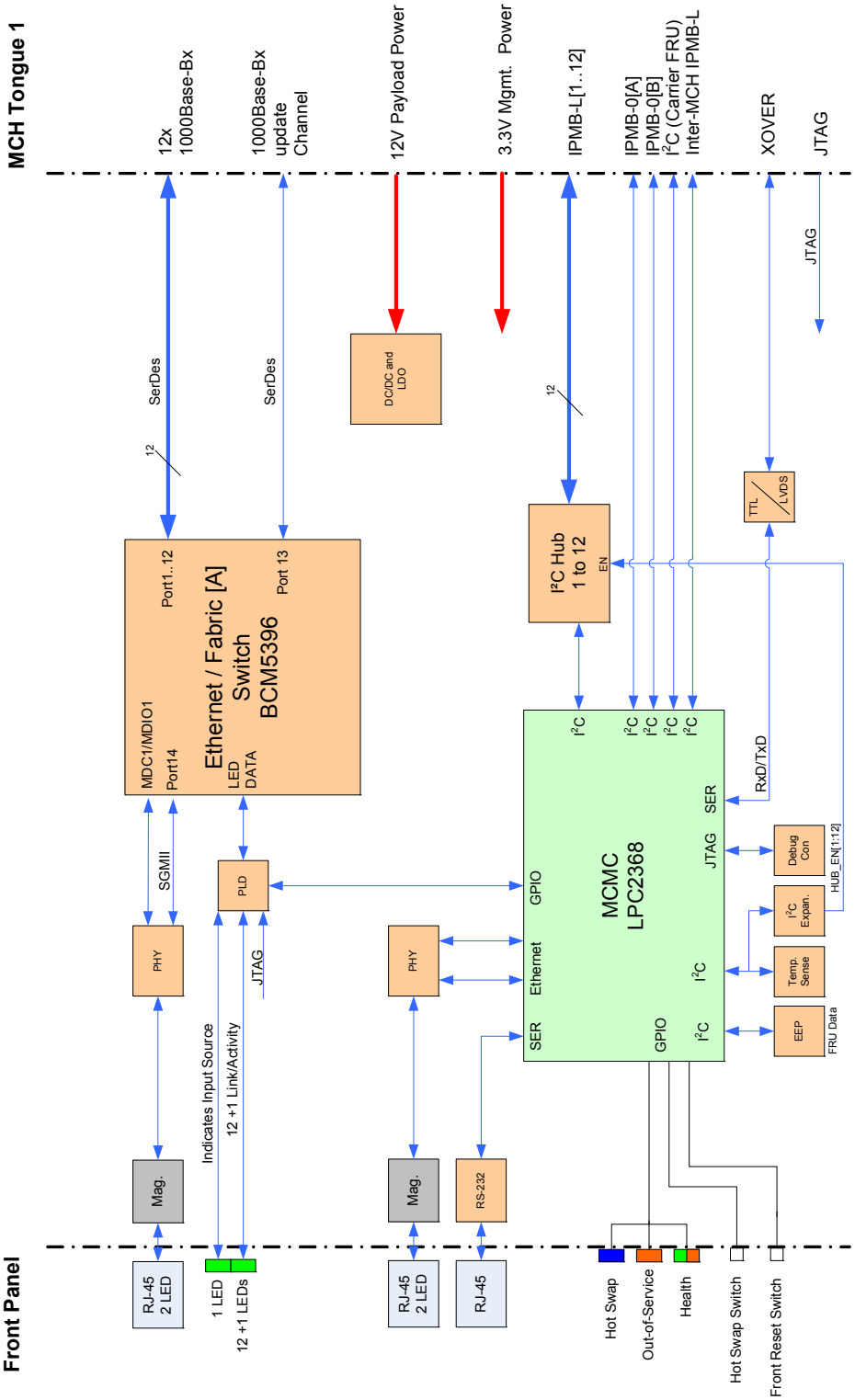
1.4 Board Diagrams

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

1.4.1 Functional Block Diagram

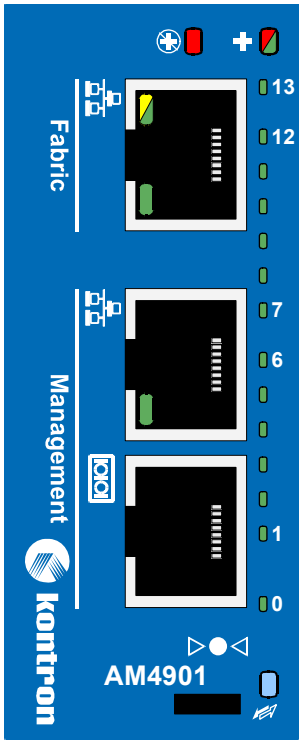
The following figure shows the block diagram of the AM4901.

Figure 1-1: AM4901 Functional Block Diagram



1.4.2 Front Panel

Figure 1-2: AM4901 Front Panel



Module Management LEDs

	• LED1 (red):	Out-of-Service LED
	• LED2 (red/green/amber):	Health LED
	• HS LED (blue):	The hot swap indicator provides basic feedback to the user on the hot swap state of the module. The HS LED states are *off*, *short blink*, *long blink*, and *on*.

Carrier Management LEDs

13	• CMLED13 (green):	Link signal from MCH update channel or MCMC
1..12	• CMLED12..1 (green):	Link signal from the AMC SerDEs ports or the MCMC
0	• CMLED0 (green):	Indicates the input source for the CMLED13..1 (Fabric [A] or MCMC)

Connectors/Switch

- Serial Connector
- Ethernet Connector
- MCMC Reset Switch

For further information about the LEDs used on the AM4901, refer to section 2.2.1, “Front Panel LEDs”.

1.4.3 Board Layouts

Figure 1-3: AM4901 Board Layout (Top View)

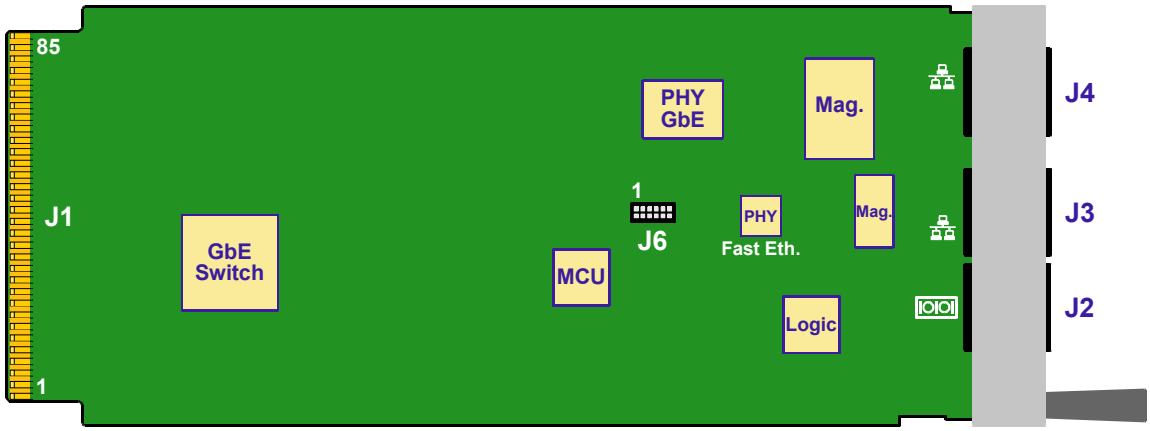
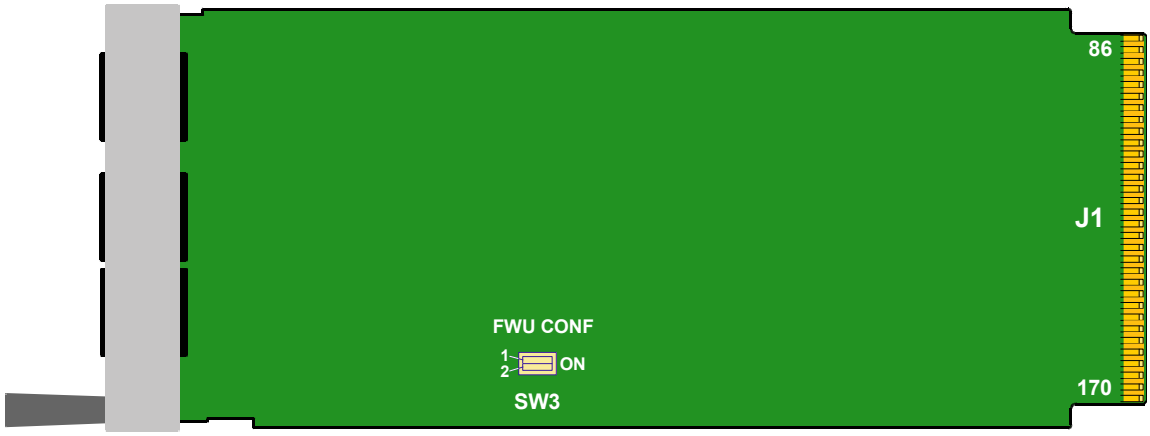


Figure 1-4: AM4901 Board Layout (Bottom View)



1.5 Technical Specification

Table 1-2: AM4901 Main Specifications

FEATURES		SPECIFICATIONS
Microcontroller and Ethernet Switch	MCMC	NXP® LPC2368 microcontroller • 16-bit/32-bit, 70 MHz ARM7 CPU • 512 kB Flash • 58 kB SRAM • One Ethernet connection to the management uplink port (J3) on the front panel via Remote Monitoring and Control Protocol (RMCP) • IPMI • Watchdog timer • I²C busses for IPMB usage • Command line interface

	Fabric [A]	Broadcom BCM5396 Gigabit Ethernet switch
		• 16 SerDes/SGMII ports, only 14 ports are used on the AM4901:
		  • 12 ports connected to the Fabric [A]
		  • 1 port connected to the MCH update channel
		  • 1 port connected to the fabric uplink port (J4) on the front panel
		• Non-blocking
		• Low latency
		• Unmanaged layer 2 switch
		• Automatic address learning and aging
		• 256 kB on-chip packet buffer
		• Low power consumption

MCH Interconnection	Tongue 1	• 12 Gigabit Ethernet SerDes connections in the Fabric [A] • One MCH update channel (SerDes) • 12 IPMB-L interfaces • One Inter MCH IPMB-L interface • One I²C to Carrier FRU • Two IPMB-0 interfaces • One MCH cross-over channel
Connectors	Front Panel Connectors	• One serial port with RS-232 signaling level on the RJ-45 connector J2 • One Gigabit Ethernet port on the RJ-45 connector J4 • One Ethernet port on the RJ-45 connector J3
	Onboard Connector	• One JTAG connector J6
	MCH card-edge Connector	• One 170-pin MCH card-edge connector J1
Switches	DIP Switch	One onboard DIP switch consisting of two switches for Firmware update (FWU) configuration
	MCMC Reset Switch	One MCMC hardware reset switch on the front panel

Table 1-2: AM4901 Main Specifications (Continued)

	FEATURES	SPECIFICATIONS
LEDs	Module Management LEDs	• LED1 (red): Out-of-Service LED • LED2 (red/green/amber): Health LED • HS LED (blue): The hot swap indicator provides basic feedback about the hot swap state of the module. The HS LED states are *off*, *short blink*, *long blink*, and *on*.
	Carrier Management LEDs	• CMLED13 (green): Link signal from MCH update channel or the MCMC • CMLED12..1 (green): Link signal from the AMC SerDEs ports or the MCMC • CMLED0 (green): Indicates the input source for the CMLED13..1 (Fabric [A] or MCMC)
IPMI	MCMC	• IPMI integrated in the NXP® LPC2368 microcontroller • The MCMC receives the relevant IPMI events from the AMC modules and carries out IPMI commands such as monitoring several onboard temperature conditions, board voltages and the power supply status, and managing hot swap operations • The MCMC is accessible via a local IPMB (IPMB-L) bus, the serial port or the Ethernet port
	Hot Swap	Full hot swap capability via E-Keying: • Hot swap capability of the AM4901 MCH • Hot swap capability for the installed AMC modules • Hot swap capability for the installed power modules and cooling units
General	Power Consumption	See Chapter 4.2, “Power Considerations” for details.
	Temperature Range	Operational: -5 °C to +55 °C Storage: -40 °C to +70 °C
	Mechanical	Single, Full-size AMC form factor
	Dimensions	181.5 mm x 73.5 mm x 28.95 mm
	Board Weight	100 grams

1.6 Standards

The *Kontron* MCH boards comply with the requirements of the following standards.

Table 1-3: Standards

COMPLIANCE	TYPE	STANDARD	TEST LEVEL
CE	Emission	EN55022 EN61000-6-3 EN300386	--
	Immission	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, ±x, ±y, ±z
	Climatic Humidity	IEC60068-2-78	93% RH at 40°C, non-condensing
	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

1.7 Related Publications

The following publications contain information relating to this product.

Table 1-4: Related Publications

PRODUCT	PUBLICATION
MicroTCA™	PICMG® MTCA.0 Micro Telecommunications Computing Architecture R1.0, July 6, 2006
AMC	PICMG® AMC.0, Advanced Mezzanine Card Specification R2.0
IPMI	IPMI - Intelligent Platform Management Interface Specification, v1.5
All Kontron products	Product Safety and Implementation Guide, ID 1021-9142

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