# AM4901

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

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# User Guide

kontron

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# Imprint

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# Disclaimer

# Table of Contents

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# List of Tables

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# List of Figures

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***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.

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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

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***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.

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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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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:<br>• Fabric [A]<br>  • 12 Gigabit Ethernet SerDes ports<br>• MCH update channel<br>  • One Gigabit Ethernet SerDes port<br>• MCH cross-over channel<br>  • Serial interface shifted to M-LVDS<br>For further information on the MCH interconnection, refer to section 2.3, “MCH Interconnection”. |

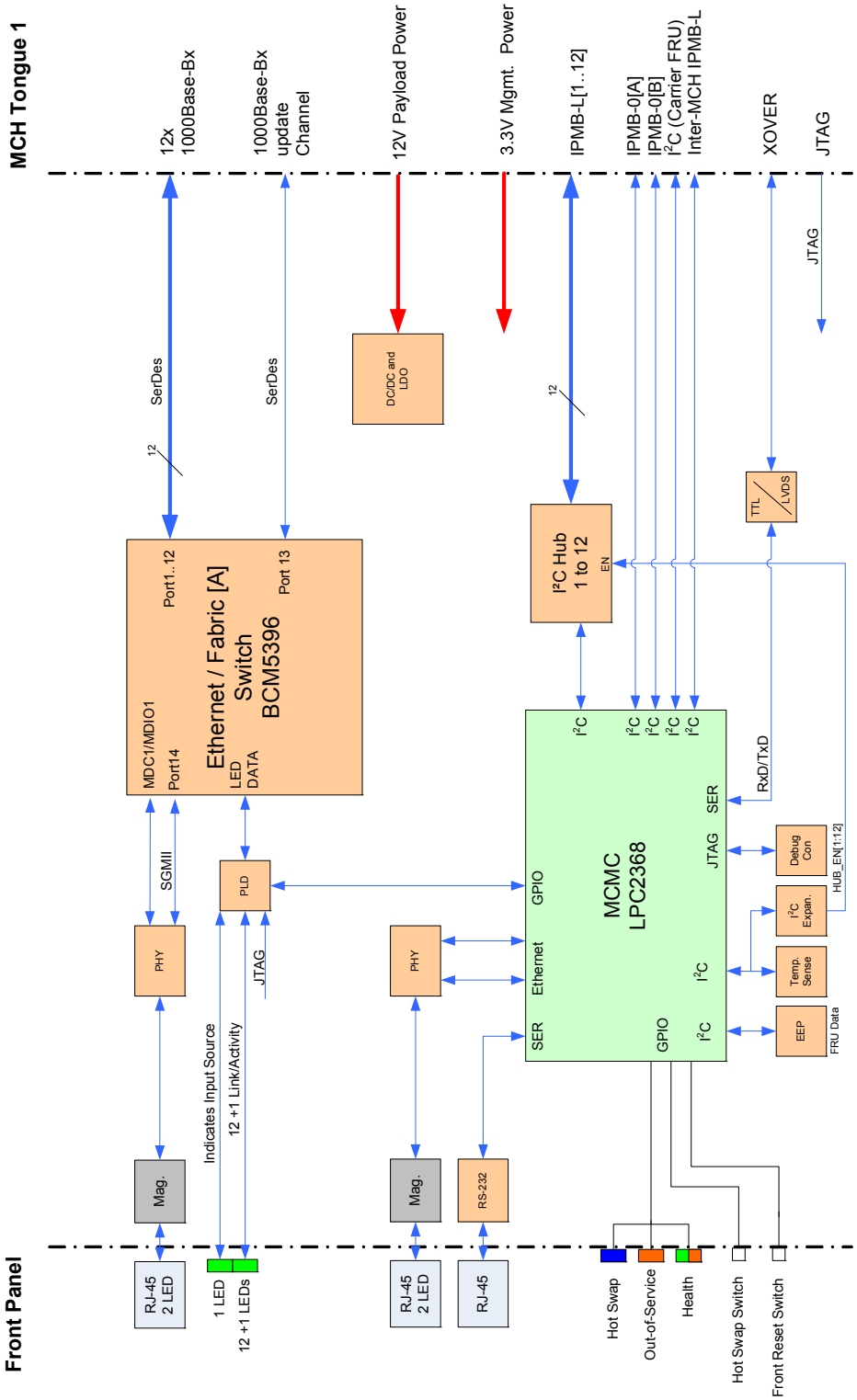
## 1.4 Board Diagrams

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

### 1.4.1 Functional Block Diagram

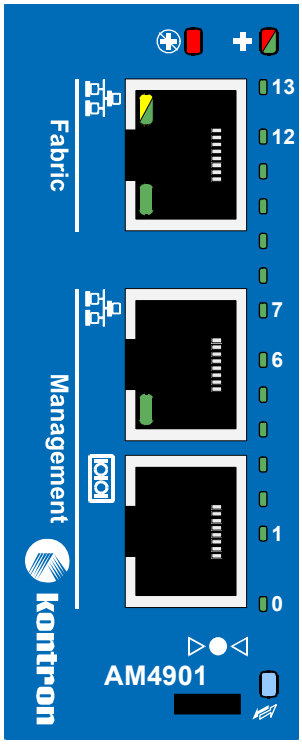
The following figure shows the block diagram of the AM4901.

**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)**

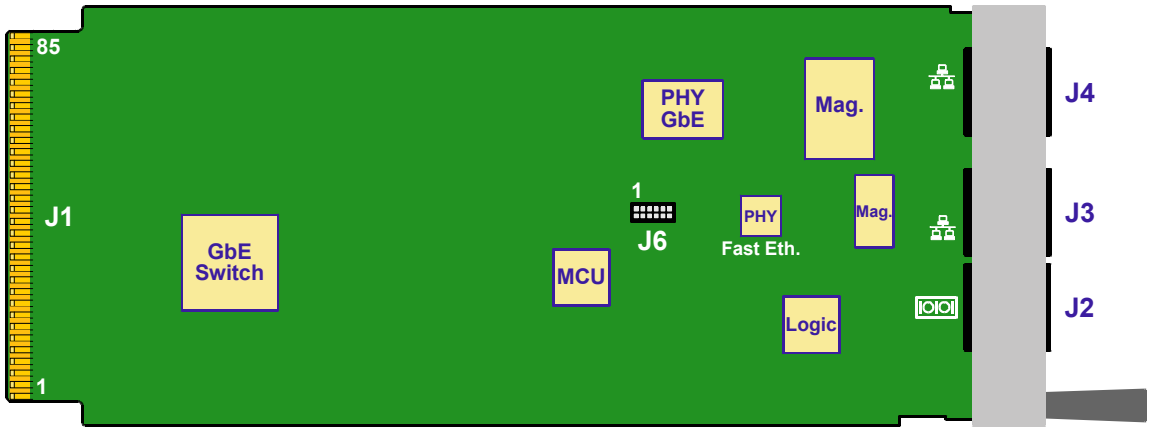
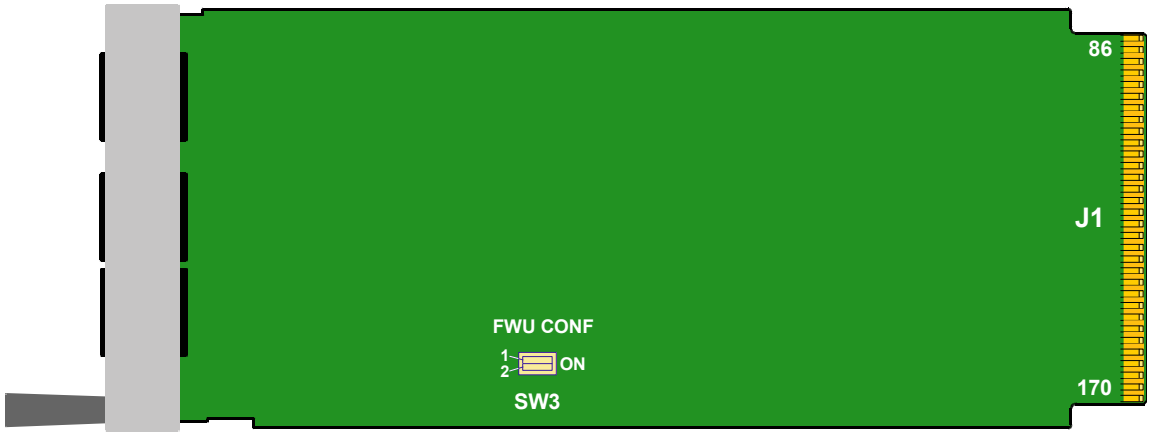



**Figure 1-4: AM4901 Board Layout (Bottom View)**



## 1.5 Technical Specification

**Table 1-2: AM4901 Main Specifications**

| FEATURES | | SPECIFICATIONS |
|---|---|---|
| Microcontroller and Ethernet Switch | MCMC | NXP® LPC2368 microcontroller<br>• 16-bit/32-bit, 70 MHz ARM7 CPU<br>• 512 kB Flash<br>• 58 kB SRAM<br>• One Ethernet connection to the management uplink port (J3) on the front panel via Remote Monitoring and Control Protocol (RMCP)<br>• IPMI<br>• Watchdog timer<br>• I²C busses for IPMB usage<br>• Command line interface |
| | Fabric [A] | Broadcom BCM5396 Gigabit Ethernet switch<br>• 16 SerDes/SGMII ports, only 14 ports are used on the AM4901:<br>  • 12 ports connected to the Fabric [A]<br>  • 1 port connected to the MCH update channel<br>  • 1 port connected to the fabric uplink port (J4) on the front panel<br>• Non-blocking<br>• Low latency<br>• Unmanaged layer 2 switch<br>• Automatic address learning and aging<br>• 256 kB on-chip packet buffer<br>• Low power consumption |
| MCH Interconnection | Tongue 1 | • 12 Gigabit Ethernet SerDes connections in the Fabric [A]<br>• One MCH update channel (SerDes)<br>• 12 IPMB-L interfaces<br>• One Inter MCH IPMB-L interface<br>• One I²C to Carrier FRU<br>• Two IPMB-0 interfaces<br>• One MCH cross-over channel |
| Connectors | Front Panel Connectors | • One serial port with RS-232 signaling level on the RJ-45 connector J2<br>• One Gigabit Ethernet port on the RJ-45 connector J4<br>• 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<br>• LED2 (red/green/amber): Health LED<br>• 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<br>• CMLED12..1 (green): Link signal from the AMC SerDEs ports or the MCMC<br>• CMLED0 (green): Indicates the input source for the CMLED13..1 (Fabric [A] or MCMC) |
| IPMI | MCMC | • IPMI integrated in the NXP® LPC2368 microcontroller<br>• 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<br>• 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:<br>• Hot swap capability of the AM4901 MCH<br>• Hot swap capability for the installed AMC modules<br>• 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<br>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<br>EN61000-6-3<br>EN300386 | -- |
| | Immission | EN55024<br>EN61000-6-2<br>EN300386 | -- |
| | Electrical Safety | EN60950-1 | -- |
| Mechanical | Mechanical Dimensions | IEEE 1101.10 | -- |
| Environmental and Health Aspects | Vibration<br>(sinusoidal, operating) | GR-63-CORE<br>EN300019-2-3<br>IEC61131-2<br>IEC60068-2-6 | 5-150 [Hz] frequency range<br>1 [g] acceleration<br>1 [oct/min] sweep rate<br>10 sweeps/axis<br>3 directions: x,y,z |
| | Shock (operating) | EN300019-2-3<br>IEC61131-2<br>IEC60068-2-27 | 15 [g] acceleration<br>11 [ms] pulse duration<br>3 shocks per direction<br>5 [s] recovery time<br>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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Chapter 2

# Functional Description

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# 2. Functional Description

## 2.1 MCMC and Fabric [A] Switch

### 2.1.1 MicroTCA™ Carrier Management Controller (MCMC)

The AM4901 supports the NXP® LPC2368 microcontroller running at 70 MHz clock speed. This microcontroller is based on a 16-bit/32-bit ARM7TDMI-S CPU with real-time emulation and 512 kB of embedded high-speed Flash memory.

The following list sets out some of the key features of the MCMC:

- ARM7TDMI-S processor running at up to 70 MHz
- 512 kB on-chip Flash program memory with In-System Programming (ISP) and In-Application Programming (IAP) capabilities
- 42 kB of SRAM on the ARM local bus for high-performance CPU access
- 16 kB SRAM for Ethernet interface
- Serial interfaces:
  - Ethernet Interface
  - Two UARTs
  - Seven I²C-bus interfaces
- Other peripherals:
  - Several digital and analog sensors
  - Optional Real-Time Clock (RTC) running with management power
  - Watchdog Timer (WDT)
- Access to the onboard temperature sensor
- Fast Firmware start-up

### 2.1.2 Fabric [A] Switch

The AM4901 is equipped with a 16 Port Gigabit Ethernet Switch BCM5396 for implementing the 12 SerDes interconnects for the Fabric [A] interface, the MCH update channel and the Gigabit uplink channel on the front panel. The BCM5396 is a highly integrated solution, combining all of the functions of a high-speed switch system, including packet buffer, Media Access Controls (MACs), addressing management and non-blocking switch control into a single monolithic device. The BCM5396 complies with the IEEE 802.3x specifications, including MAC control PAUSE frame and auto-negotiation subsections, providing compatibility with all industry-standard Ethernet (IEEE 802.3), Fast Ethernet (IEEE 802.3u) and Gigabit Ethernet (IEEE 802.3ab) devices.

## 2.2 Board Interfaces

### 2.2.1 Front Panel LEDs

The AM4901 is equipped with three Module Management LEDs and 14 Carrier Management LEDs. The input source for the Carrier Management LEDs is controlled via the MCMC.

**Figure 2-1: Front Panel LEDs**

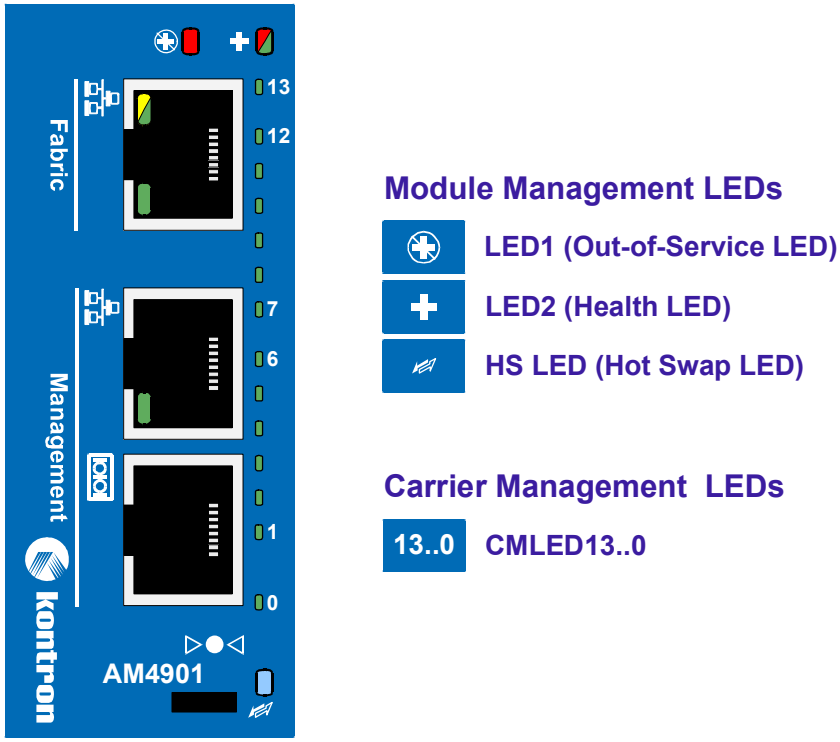


**Table 2-1: Module Management LEDs Function**

| MODULE MANAGEMENT LED | COLOR | NORMAL MODE |
|---|---|---|
| LED1 (Out-of-Service LED) | red | Off = Default |
| | | On = MMC out of service or in reset state |
| | | Slow Blinking = MMC upgrade |
| LED2 (Health LED) | red | On / Blinking = Health error detected |
| | green | On = Default, no health error detected |
| | | Slow Blinking = IPMI heartbeat |
| HS LED | blue | On = a) Ready for hot swap module extraction<br>b) Hot swap failure after module insertion |
| | | Blinking = Hot swap in progress |
| | | Off = Module in normal operation, do not extract the module |

**Table 2-2: Carrier Management LED 0 Function**

| CARRIER MANAGEMENT LED | COLOR | DESCRIPTION | FUNCTION |
|---|---|---|---|
| CMLED0 | green | Indicates the input source for the CMLED13..1 | OFF = The CMLEDs 13..1 are mapped to Fabric [A]<br>ON = The CMLEDs 13..1 are mapped to the MCMC |

**Table 2-3: Carrier Management LEDs 13..1 Function**

| CARRIER MANAGEMENT LED | COLOR | FUNCTION IF THE LED IS MAPPED TO FABRIC [A] | FUNCTION IF THE LED IS MAPPED TO THE MCMC |
|---|---|---|---|
| CMLED13 | green | ON = Link to redundant MCH<br>OFF = No link to redundant MCH | TBD |
| CMLED12 | green | ON = Link to AMC12<br>OFF = No Link to AMC12 | TBD |
| CMLED11 | green | ON = Link to AMC11<br>OFF = No Link to AMC11 | TBD |
| CMLED10 | green | ON = Link to AMC10<br>OFF = No Link to AMC10 | TBD |
| CMLED9 | green | ON = Link to AMC9<br>OFF = No Link to AMC9 | TBD |
| CMLED8 | green | ON = Link to AMC8<br>OFF = No Link to AMC8 | TBD |
| CMLED7 | green | ON = Link to AMC7<br>OFF = No Link to AMC7 | TBD |
| CMLED6 | green | ON = Link to AMC6<br>OFF = No Link to AMC6 | TBD |
| CMLED5 | green | ON = Link to AMC5<br>OFF = No Link to AMC5 | TBD |
| CMLED4 | green | ON = Link to AMC4<br>OFF = No Link to AMC4 | TBD |
| CMLED3 | green | ON = Link to AMC3<br>OFF = No Link to AMC3 | TBD |
| CMLED2 | green | ON = Link to AMC2<br>OFF = No Link to AMC2 | TBD |
| CMLED1 | green | ON = Link to AMC1<br>OFF = No Link to AMC1 | TBD |

### 2.2.2 Module Handle

At the front panel, the AM4901 provides a module handle for module extraction for securing the module in the chassis and actuating the hot swap switch.

The module handle supports a three-position operation.

**Figure 2-2: Module Handle Positions**

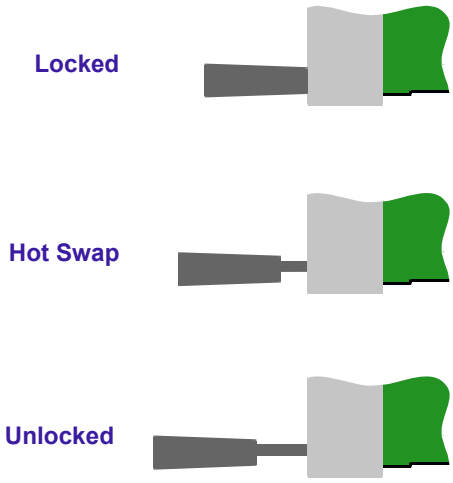


**Table 2-4: Module Handle Positions**

| MODULE HANDLE POSITION | FUNCTION |
|---|---|
| Locked | When the AM4901 is installed, the module handle is pushed in the “Locked” position and the following actions result:<br>• The module is locked in the chassis<br>• The hot swap switch is actuated |
| Hot Swap | When an extraction process of the AM4901 is initiated, the module handle is pulled in the “Hot Swap” position and the following actions result:<br>• The module is locked in the chassis<br>• The hot swap switch is deactuated |
| Unlocked | When the module handle is pulled to the “Unlocked” position, the AM4901 can be fully extracted and the following actions result:<br>• The module is unlocked in the chassis<br>• The hot swap switch is deactuated |

***Note ...***

For normal operation, the module handle must be in the “Locked” position.

### 2.2.3 General Purpose DIP Switch

The AM4901 is equipped with a general purpose, 2-bit DIP switch, which enables the user to configure the AM4901 according to his individual needs.

The following table indicates the functions of the two switches integrated in the DIP switch.

**Table 2-5: DIP Switch Functions**

| SWITCH | FUNCTION |
|---|---|
| 1 | Firmware update configuration |
| 2 | Reserved |

For further information on the DIP switch configuration, refer to section 4.1.1, “DIP Switch Configuration”.

### 2.2.4 Debug Interface

The AM4901 provides one optional JTAG connector, J6, intended for debugging and manufacturing purposes.

### 2.2.5 Serial Ports

The AM4901 provides two serial ports, both fully compatible with the 16550 controller.

One serial port is implemented as an RJ-45 connector on the front panel and is used for management outputs via the command line interface and for Firmware updates. The second serial port is available on the MCH cross-over interface on the MCH Card-edge connector and is converted to M-LVDS signaling level.

#### 2.2.5.1 Management Serial Port

The management serial port includes the RxD and TxD signals as well as the DSR and CTS signals for Firmware update and operates with up to 115.2kB/s. After Firmware start-up all standard messages are served on this port as well as over Ethernet.

The following figure and table provide pinout information on the management serial port connector J2.

**Figure 2-3: Serial Connector J2**

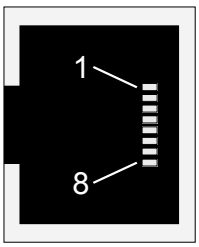


**Table 2-6: Serial Connector J2 Pinout**

| PIN | SIGNAL | FUNCTION | I/O |
|---|---|---|---|
| 1 | NC | Not connected | -- |
| 2 | NC | Not connected | -- |
| 3 | TXD | Transmit data | O |
| 4 | GND | Signal ground | -- |
| 5 | GND | Signal ground | -- |
| 6 | RXD | Receive data | I |
| 7 | DSR* | Data send ready | I |
| 8 | CTS* | Clear to send | I |

* The DSR and CTS signals are required to initialize the Firmware update.

### 2.2.5.2 MCH Cross-Over Channel Interface

The second serial port, which is available on the MCH cross-over interface, includes only RxD and TxD signals and operates with up to 115.2kB/s. The serial port signaling on the MCH Card-edge connector is converted to M-LVDS signaling level. This port is used for the communication between two MCHs in a system.

## 2.2.6 Ethernet Interfaces

The AM4901 includes one 10BASE-T Ethernet port served by the MCMC (realized as connector J3) for management purposes, one 10Base-T/100Base-TX/1000Base-T Ethernet port providing an uplink from the Fabric [A] (realized as connector J4), twelve SerDes ports for the Fabric [A] and one SerDes Port for the MCH update channel. For further information on the Fabric [A] interface, refer to section 2.1.2 in this chapter.

### 2.2.6.1 Management Ethernet Interface (10Base-T)

The AM4901 includes one 10Base-T Ethernet port integrated within the MCMC. This port is realized as an RJ-45 connector, J3, on the front panel and supplies the 10Base-T interface to the MCMC. It can be used to mange the system via the Remote Monitoring and Control Protocol (RMCP) and is also capable of operating without payload power.

The following figure and table provide pinout information on the Ethernet connector J3.

**Figure 2-4: Ethernet Connector J3**

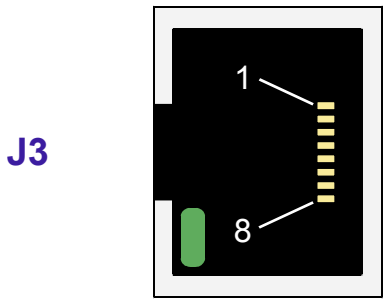


**Table 2-7: Ethernet Connector J3 Pinout**

| PIN | SIGNAL | FUNCTION | I/O |
|---|---|---|---|
| 1 | TX+ | Transmit + | O |
| 2 | TX- | Transmit - | O |
| 3 | RX+ | Receive + | I |
| 4 | NC | -- | -- |
| 5 | NC | -- | -- |
| 6 | RX- | Receive - | I |
| 7 | NC | -- | -- |
| 8 | NC | -- | -- |

#### Ethernet LED Status

Green: ACT: This LED monitors network connection and activity. When this LED is lit, it means that a link has been established. The LED blinks when network packets are sent or received through the RJ-45 port. When this LED is not lit, there is no link established.

### 2.2.6.2 Uplink Ethernet Port (1000Base-T)

The uplink Ethernet port provides automatic detection and switching between 10Base-T, 100Base-TX and 1000Base-T data transmission (Auto-Negotiation) and is implemented as an RJ-45 connector, J4, on the front panel. Auto wire switching for crossed cables is also supported (Auto-MDI/X). This interface is connected as an uplink port to the switch which is serving the Fabric [A].

The following figure and table provide pinout information on the Gigabit Ethernet connector J4.

**Figure 2-5: GbE Connector J4**

J4

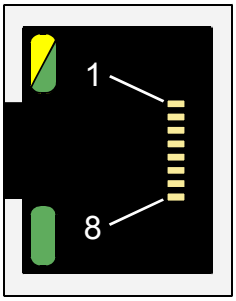


**Table 2-8: Gigabit Ethernet Connector J4 Pinout**

| PIN | MDI / STANDARD ETHERNET CABLE | | | | | |
|---|---|---|---|---|---|---|
| | 10BASE-T | | 100BASE-TX | | 1000BASE-T | |
| | I/O | SIGNAL | I/O | SIGNAL | I/O | SIGNAL |
| 1 | O | TX+ | O | TX+ | I/O | BI_DA+ |
| 2 | O | TX- | O | TX- | I/O | BI_DA- |
| 3 | I | RX+ | I | RX+ | I/O | BI_DB+ |
| 4 | - | - | - | - | I/O | BI_DC+ |
| 5 | - | - | - | - | I/O | BI_DC- |
| 6 | I | RX- | I | RX- | I/O | BI_DB- |
| 7 | - | - | - | - | I/O | BI_DD+ |
| 8 | - | - | - | - | I/O | BI_DD- |

#### Ethernet LED Status

**ACT (green):** This LED monitors network connection and activity. When this LED is lit, it means that a link has been established. The LED blinks when network packets are sent or received through the RJ-45 port. When this LED is not lit, there is no link established.

**SPEED (green/yellow):** This LED lights up to indicate a successful 100Base-TX or 1000BASE-T connection. When green it indicates a 100Base-TX connection and when yellow it indicates a 1000Base-T connection. When not lit and the ACT-LED is active, the connection is operating at 10Base-T.

### 2.2.7 MCMC Reset

The AM4901 is automatically reset by a precision voltage monitoring circuit that detects a drop in voltage below the acceptable operating limit of 3.1 V for the management power. Other reset sources include the Watchdog Timer and the push-button switch on the front panel. The AM4901 responds to any of these sources by initializing the MCMC without having impact on the FRUs installed in the MicroTCA™ system.

A reset will be generated if one the following events occurs:

- +3.3 V supply falls below 3.1 V (typ.)
- Push-button "RESET" pressed (on the front panel)
- Watchdog expired

## 2.3 MCH Interconnection

The MicroTCA.0 interconnect framework maps signals to the MCH Card-edge connector (which mates the MCH with the backplane) and routes those signals among the AMCs, across the backplane and to the MCH-based switching elements.

The AM4901 provides a single tongue, tongue 1, and communicates with the MicroTCA™ backplane via the MCH Card-edge connector, which is a serial interface optimized for high-speed interconnects. The MCH Card-edge connector supports a variety of fabric topologies divided into the following functional groups:

- Fabric interface
- MCH-specific interfaces, such as:
  - IPMB-L interface
  - Inter-MCH IPMB-L interface
  - IPMB-0 interface
  - MCH update channel interface
  - MCH cross-over channel interface
  - MCH PWR_ON interface
- JTAG interface

The following sections provide detailed information on these interfaces.

### 2.3.1 Fabric Interface

The MicroTCA™ backplane provides fabric connectivity to each of the supported AMCs. The MicroTCA.0 defines one to seven fabric interfaces per MCH for every AMC present in the system.

The AM4901 provides only one fabric interface (Fabric [A], GbE) to the backplane and is mapped to the corresponding AMC ports.

### 2.3.2 IPMB-L Interface

The IPMB-L interface of the AM4901 serves 12 discrete interfaces to tongue 1. These interfaces provide the E-Keying information as well as all other management information between the MCH and the AMCs. On the MCH, all 12 AMC interfaces are combined via a switch matrix to one interface, which is presented to the MCMC.

### 2.3.3 Inter-MCH IPMB-L Interface

The AM4901 provides an Inter-MCH IPMB-L interface for enabling communication to a redundant MCH. This interface is a shared direct connection between the MCHs and not a cross-over interface.

### 2.3.4 IPMB-0 Interface

The IPMB-0 interface, consisting of the IPMB-0 [A] and the IPMB-0 [B] interfaces, is used for the communication between the MCH and the power modules as well as between the MCH and the cooling units in a MicroTCA™ system to control the power served to the dedicated AMCs as well as the system cooling state.

### 2.3.5 MCH Update Channel Interface

The MCH update channel on the AM4901 is realized as a SerDes interface to the switching element of Fabric [A]. Thus, the AM4901 can support up to 12 AMCs and a redundant MCH.

### 2.3.6 MCH Cross-Over Channel Interface

The MCH cross-over channel is provided for vendor-specific signaling between the MCHs. Via this interface, the AM4901 provides a serial port, which is fully compatible with the 16550 controller. To serve this serial port, an M-LVDS transmitter is used. For the communication over the serial port, only the XOVER0+/- and XOVER2+/- signals are used. For further information concerning the MCH cross-over channel interface, please contact Kontron.

### 2.3.7 MCH PWR_ON Interface

The MCH PWR_ON interface is used to detect the type of module installed in the MCH slot. When an MCH module is installed, this signal is pulled high to the management power (MP) to indicate that the MCH payload power is to be turned on.

If the power module (PM) detects that the signal is asserted (detects that the module is an MCH), the MCH payload power will automatically be provided to the MCH.

### 2.3.8 JTAG Interface

JTAG support is provided on the MCH Card-edge connector. The JTAG interface is used for vendor product test and logic update.

On the AM4901, the PLD JTAG port is connected to the debug JTAG connector J6.

### 2.3.9 Pinout of MCH Card-edge Connector J1

The MCH Card-edge connector is a high-speed serial interface with 170 pins. The following table provides the pinout of the MCH Card-edge connector J1. The shaded table cells indicate signals that are not used on the AM4901.

**Table 2-9: Pinout of MCH Card-edge Connector J1**

| BASIC SIDE (COMPONENT SIDE 1) | | | | EXTENDED SIDE (COMPONENT SIDE 2) | | | |
|---|---|---|---|---|---|---|---|
| PIN | SIGNAL | FUNCTION | DRIVEN BY | PIN | SIGNAL | FUNCTION | DRIVEN BY |
| 1 | GND | Logic Ground | MCH | 170 | PWR_ON | MCH/AMC Differentiator to PM(s) | MCH |
| 2 | PWR | Payload Power | BACKPL | 169 | TDI | JTAG Test Data Input | BACKPL |
| 3 | PS1# | MCH Presence 1 | MCH | 168 | TDO | JTAG Test Data Output | MCH |
| 4 | MP | Management Power | BACKPL | 167 | TRST# | JTAG Test Reset Input | BACKPL |
| 5 | GA0 | Geographic Address 0 | BACKPL | 166 | TMS | JTAG Test Mode Select Input | BACKPL |
| 6 | RSV | Reserved | - | 165 | TCK | JTAG Test Clock Input | BACKPL |
| 7 | GND | Logic Ground | - | 164 | GND | Logic Ground | - |
| 8 | RSV | Reserved | - | 163 | TxFA-1+ | Fabric [A] to AMC Transmit+ | MCH |
| 9 | PWR | Payload Power | BACKPL | 162 | TxFA-1- | Fabric [A] to AMC Transmit- | MCH |
| 10 | GND | Logic Ground | - | 161 | GND | Logic Ground | - |
| 11 | TxFUA+ | Fabric Update Transmit+ | MCH | 160 | RxFA-1+ | Fabric [A] to AMC Receive+ | AMC |
| 12 | TxFUA- | Fabric Update Transmit- | MCH | 159 | RxFA-1- | Fabric [A] to AMC Receive- | AMC |
| 13 | GND | Logic Ground | - | 158 | GND | Logic Ground | - |
| 14 | RxFUA+ | Fabric Update Receive+ | Other MCH | 157 | TxFA-2+ | Fabric [A] to AMC Transmit+ | MCH |
| 15 | RxFUA- | Fabric Update Receive- | Other MCH | 156 | TxFA-2- | Fabric [A] to AMC Transmit- | MCH |
| 16 | GND | Logic Ground | - | 155 | GND | Logic Ground | - |
| 17 | GA1 | Geographic Address 1 | BACKPL | 154 | RxFA-2+ | Fabric [A] to AMC Receive+ | AMC |
| 18 | PWR | Payload Power | BACKPL | 153 | RxFA-2- | Fabric [A] to AMC Receive- | AMC |
| 19 | GND | Logic Ground | - | 152 | GND | Logic Ground | - |
| 20 | TxFA-3+ | Fabric [A] to AMC Transmit+ | MCH | 151 | TxFA-4+ | Fabric [A] to AMC Transmit+ | MCH |
| 21 | TxFA-3- | Fabric [A] to AM3 Transmit- | MCH | 150 | TxFA-4- | Fabric [A] to AMC Transmit- | MCH |
| 22 | GND | Logic Ground | - | 149 | GND | Logic Ground | - |
| 23 | RxFA-3+ | Fabric [A] to AMC Receive+ | AMC | 148 | RxFA-4+ | Fabric [A] to AMC Receive+ | AMC |

**Table 2-9: Pinout of MCH Card-edge Connector J1 (Continued)**

| BASIC SIDE (COMPONENT SIDE 1) | | | | EXTENDED SIDE (COMPONENT SIDE 2) | | | |
|---|---|---|---|---|---|---|---|
| PIN | SIGNAL | FUNCTION | DRIVEN BY | PIN | SIGNAL | FUNCTION | DRIVEN BY |
| 24 | RxFA-3- | Fabric [A] to AMC Receive- | AMC | 147 | RxFA-4- | Fabric [A] to AMC Receive- | AMC |
| 25 | GND | Logic Ground | - | 146 | GND | Logic Ground | - |
| 26 | GA2 | Geographic Address 2 | BACKPL | 145 | TxFA-6+ | Fabric [A] to AMC Transmit+ | MCH |
| 27 | PWR | Payload Power | BACKPL | 144 | TxFA-6- | Fabric [A] to AMC Transmit+ | MCH |
| 28 | GND | Logic Ground | - | 143 | GND | Logic Ground | - |
| 29 | TxFA-5+ | Fabric [A] to AMC Transmit+ | MCH | 142 | RxFA-6+ | Fabric [A] to AMC Receive+ | AMC |
| 30 | TxFA-5- | Fabric [A] to AMC Transmit- | MCH | 141 | RxFA-6+ | Fabric [A] to AMC Receive+ | AMC |
| 31 | GND | Logic Ground | - | 140 | GND | Logic Ground | - |
| 32 | RxFA-5+ | Fabric [A] to AMC Receive+ | AMC | 139 | TxFA-8+ | Fabric [A] to AMC Transmit+ | MCH |
| 33 | RxFA-5- | Fabric [A] to AMC Receive- | AMC | 138 | TxFA-8+ | Fabric [A] to AMC Transmit+ | MCH |
| 34 | GND | Logic Ground | - | 137 | GND | Logic Ground | - |
| 35 | TxFA-7+ | Fabric [A] to AMC Transmit+ | MCH | 136 | RxFA-8+ | Fabric [A] to AMC Receive+ | AMC |
| 36 | TxFA-7- | Fabric [A] to AMC Transmit- | MCH | 135 | RxFA-8- | Fabric [A] to AMC Receive- | AMC |
| 37 | GND | Logic Ground | - | 134 | GND | Logic Ground | - |
| 38 | RxFA-7+ | Fabric [A] to AMC Receive+ | AMC | 133 | TMREQ# | JTAG Test Master Request | BACKPL |
| 39 | RxFA-7- | Fabric [A] to AMC Receive+ | AMC | 132 | RSV | Reserved | -- |
| 40 | GND | Logic Ground | - | 131 | GND | Logic Ground | - |
| 41 | ENABLE# | MCH Enable | BACKPL | 130 | I²C_SCL | Carrier FRU I²C Clock | MCH |
| 42 | PWR | Payload Power | BACKPL | 129 | I²C_SDA | Carrier FRU I²C Data | MCH |
| 43 | GND | Logic Ground | - | 128 | GND | Logic Ground | - |
| 44 | TxFA-9+ | Fabric [A] to AMC Transmit+ | MCH | 127 | IPMB0-SCL-A | IPMB-0 A Clock | IPMI Agent |
| 45 | TxFA-9- | Fabric [A] to AMC Transmit- | MCH | 126 | IPMB0-SDA-A | IPMB-0 A Data | IPMI Agent |
| 46 | GND | Logic Ground | - | 125 | GND | Logic Ground | - |

**Table 2-9: Pinout of MCH Card-edge Connector J1 (Continued)**

| BASIC SIDE (COMPONENT SIDE 1) | | | | EXTENDED SIDE (COMPONENT SIDE 2) | | | |
|---|---|---|---|---|---|---|---|
| PIN | SIGNAL | FUNCTION | DRIVEN BY | PIN | SIGNAL | FUNCTION | DRIVEN BY |
| 47 | RxFA-9+ | Fabric [A] to AMC Receive+ | AMC | 124 | IPMB0-SCL-B | IPMB-0 B Clock | IPMI Agent |
| 48 | RxFA-9- | Fabric [A] to AMC Receive- | AMC | 123 | IPMB0-SDA-B | IPMB-0 B Data | IPMI Agent |
| 49 | GND | Logic Ground | - | 122 | GND | Logic Ground | - |
| 50 | TxFA-10+ | Fabric [A] to AMC Transmit+ | MCH | 121 | IPMBL-SCL-1 | IPMB-L to AMC | IPMI Agent |
| 51 | TxFA-10- | Fabric [A] to AMC Transmit- | MCH | 120 | IPMBL-SDA-1 | IPMB-L to AMC | IPMI Agent |
| 52 | GND | Logic Ground | - | 119 | GND | Logic Ground | - |
| 53 | RxFA-10+ | Fabric [A] to AMC Receive+ | AMC | 118 | IPMBL-SCL-2 | IPMB-L to AMC | IPMI Agent |
| 54 | RxFA-10- | Fabric [A] to AMC Receive- | AMC | 117 | IPMBL-SDA-2 | IPMB-L to AMC | IPMI Agent |
| 55 | GND | Logic Ground | - | 116 | GND | Logic Ground | - |
| 56 | SCL_L | IPMB-L cross-over Clock | IPMI Agent | 115 | IPMBL-SCL-3 | IPMB-L to AMC | IPMI Agent |
| 57 | PWR | Payload Power | BACKPL | 114 | IPMBL-SDA-3 | IPMB-L to AMC | IPMI Agent |
| 58 | GND | Logic Ground | - | 113 | GND | Logic Ground | - |
| 59 | TxFA-11+ | Fabric [A] to AMC Transmit+ | MCH | 112 | IPMBL-SCL-4 | IPMB-L to AMC | IPMI Agent |
| 60 | TxFA-11- | Fabric [A] to AMC Transmit- | MCH | 111 | IPMBL-SDA-4 | IPMB-L to AMC | IPMI Agent |
| 61 | GND | Logic Ground | - | 110 | GND | Logic Ground | - |
| 62 | RxFA-11+ | Fabric [A] to AMC Receive+ | AMC | 109 | IPMBL-SCL-5 | IPMB-L to AMC | IPMI Agent |
| 63 | RxFA-11+ | Fabric [A] to AMC Receive+ | AMC | 108 | IPMBL-SDA-5 | IPMB-L to AMC | IPMI Agent |
| 64 | GND | Logic Ground | - | 107 | GND | Logic Ground | - |
| 65 | TxFA-12+ | Fabric [A] to AMC Transmit+ | MCH | 106 | IPMBL-SCL-6 | IPMB-L to AMC | IPMI Agent |
| 66 | TxFA-12- | Fabric [A] to AMC Transmit- | MCH | 105 | IPMBL-SDA-6 | IPMB-L to AMC | IPMI Agent |
| 67 | GND | Logic Ground | - | 104 | GND | Logic Ground | - |

**Table 2-9: Pinout of MCH Card-edge Connector J1 (Continued)**

| BASIC SIDE (COMPONENT SIDE 1) | | | | EXTENDED SIDE (COMPONENT SIDE 2) | | | |
|---|---|---|---|---|---|---|---|
| PIN | SIGNAL | FUNCTION | DRIVEN BY | PIN | SIGNAL | FUNCTION | DRIVEN BY |
| 68 | RxFA-12+ | Fabric [A] to AMC Receive+ | AMC | 103 | IPMBL-SCL-7 | IPMB-L to AMC | IPMI Agent |
| 69 | RxFA-12- | Fabric [A] to AMC Receive- | AMC | 102 | IPMBL-SDA-7 | IPMB-L to AMC | IPMI Agent |
| 70 | GND | Logic Ground | - | 101 | GND | Logic Ground | - |
| 71 | SDA_L | IPMB-L cross-over Data | MCH-Other MCH | 100 | IPMBL-SCL-8 | IPMB-L to AMC | IPMI Agent |
| 72 | PWR | Payload Power | BACKPL | 99 | IPMBL-SDA-8 | IPMB-L to AMC | IPMI Agent |
| 73 | GND | Logic Ground | - | 98 | GND | Logic Ground | - |
| 74 | XOVER0+ | Cross-over Interface0+ | MCH | 97 | IPMBL-SCL-9 | IPMB-L to AMC | IPMI Agent |
| 75 | XOVER0- | Cross-over Interface0- | MCH | 96 | IPMBL-SDA-9 | IPMB-L to AMC | IPMI Agent |
| 76 | GND | Logic Ground | - | 95 | GND | Logic Ground | - |
| 77 | XOVER1+ | Cross-over Interface1+ | MCH | 94 | IPMBL-SCL-10 | IPMB-L to AMC | IPMI Agent |
| 78 | XOVER1- | Cross-over Interface1- | MCH | 93 | IPMBL-SDA-10 | IPMB-L to AMC | IPMI Agent |
| 79 | GND | Logic Ground | - | 92 | GND | Logic Ground | - |
| 80 | XOVER2+ | Cross-over Interface2+ | MCH | 91 | IPMBL-SCL-11 | IPMB-L to AMC | IPMI Agent |
| 81 | XOVER2- | Cross-over Interface2- | MCH | 90 | IPMBL-SDA-11 | IPMB-L to AMC | IPMI Agent |
| 82 | GND | Logic Ground | - | 89 | GND | Logic Ground | - |
| 83 | PS0# | MCH Presence 0 | BACKPL | 88 | IPMBL-SCL12 | IPMB-L to AMC | IPMI Agent |
| 84 | PWR | Payload Power | BACKPL | 87 | IPMBL-SDA-12 | IPMB-L to AMC | IPMI Agent |
| 85 | GND | Logic Ground | - | 86 | GND | Logic Ground | - |

***Warning!***

When handling the board, take care not to touch the gold conductive fingers of the MCH Card-edge connector.

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

The following table lists the JTAG pins.

**Table 2-10: JTAG Pins Description**

| MCH PIN | SIGNAL | FUNCTION | I/O | SIGNALING VOLTAGE |
|---|---|---|---|---|
| 169 | TDI | JTAG Test Data Input | I | 3.3V TTL level |
| 168 | TDO | JTAG Test Data Output | O | 3.3V TTL level |
| 167 | TRST# | JTAG Test Reset Input | I | 3.3V TTL level |
| 166 | TMS | JTAG Test Mode Select Input | I | 3.3V TTL level |
| 165 | TCK | JTAG Test Clock Input | I | 3.3V TTL level |

***Note ...***

The JTAG pins are connected to the onboard PLD logic and can be used to update the onboard logic. For further information, please contact Kontron.

Chapter 3

# Installation

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# 3. Installation

The AM4901 has been designed for easy installation. However, the following standard precautions, installation procedures, and general information must be observed to ensure proper installation and to preclude damage to the board, other system components, or injury to personnel.

## 3.1 Safety Requirements

The following safety precautions must be observed when installing or operating the AM4901. Kontron assumes no responsibility for any damage resulting from failure to comply with these requirements.

***Warning!***

MCH modules require, by design, a considerable amount of force in order to (dis)engage the module from/in the MicroTCA™ backplane connector. For this reason, when inserting or extracting the module, apply only as much force as required to preclude damage to either the module's handle or the front panel.

**DO NOT** push on the module handle to seat the module in the backplane connector. Do not use the module handle as a grip to handle the board outside of the chassis slot.

Use of excessive force, bending or rotation of the module handle will result in damage to the handle or the module's locking mechanism. Kontron disclaims all liability for damage to the module or the system as a result of failure to comply with this warning.

***ESD Equipment!***

This MCH module contains electrostatically sensitive devices. Please observe the necessary precautions to avoid damage to your board:

- Discharge your clothing before touching the assembly. Tools must be discharged before use.
- Do not touch components, connector-pins or traces.
- If working at an anti-static workbench with professional discharging equipment, please do not omit to use it.

***Warning!***

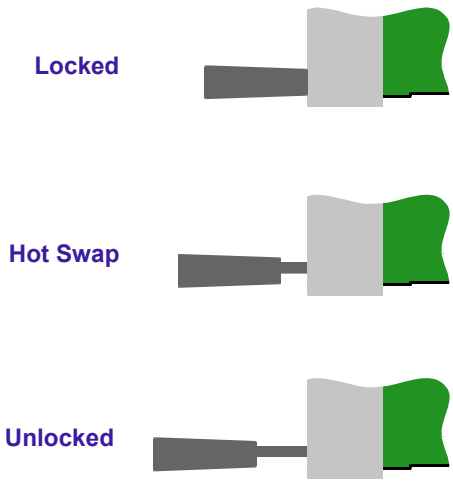
This product has gold conductive fingers which are susceptible to contamination. Take care not to touch the gold conductive fingers of the MCH Card-edge connector when handling the board.

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

## 3.2 Module Handle Positions

The module handle supports a three-position operation.

**Figure 3-1: Module Handle Positions**




***Note ...***

For normal operation, the module handle must be in the “Locked” position.

## 3.3 Hot Swap Procedures

The AM4901 is designed for hot swap operation. Hot swapping allows the coordinated insertion and extraction of modules without disrupting other operational elements within the system.

The procedures contained in this section are also applicable for “non-operating systems” with the exception of indications and functions which require power to be applied.

### 3.3.1 Hot Swap Insertion

To insert the MCH module proceed as follows:

1. Ensure that the safety requirements indicated section 3.1 are observed.

***Warning!***

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

2. Ensure that the module is properly configured for operation in accordance with the application requirements before installation. For information regarding the configuration of the AM4901 refer to Chapter 4.

***Warning!***

Care must be taken when applying the procedures below to ensure that neither the AM4901 nor other system boards are physically damaged by the application of these procedures.

3. Ensure that the module handle is in the “Unlocked” position.
4. Using the front panel as a grip, carefully insert the module into the slot designated by the application requirements until it makes contact with the backplane connector.
5. Apply pressure to the front panel until the module is properly seated in the backplane connector. This may require a considerable amount of force. Apply pressure only to the front panel, not the module handle. During seating in the connector, there is a noticeable “snapping” of the board into the connector. When the board is seated it should be flush with the system front panel.

   In the case of a running system, the following occurs:

   - The BLUE HS LED turns on.

     When the module is seated, the module management power is applied and the BLUE HS LED turns on. (No payload power is applied at this time).
6. Connect all external interfacing cables to the module as required and ensure that they are properly secured.
7. Push the module handle in the “Locked” position.

   When the module handle is in the “Locked” position, the module is locked and the hot swap switch is actuated.

In the case of a running system, the following occurs:

- The BLUE HS LED turns off.

  The power module now enables the payload power for the MCH.

8. The MCH module is now operating.

### 3.3.2 Hot Swap Extraction

To extract the MCH module proceed as follows:

1. Ensure that the safety requirements indicated in section 3.1 are observed.
2. Pull the module handle in the “Hot Swap” position.

   When the module handle is in the “Hot Swap” position, the extraction process of the module is initiated and the following occurs:

   - The BLUE HS LED displays short blinks.

     When the power module IPMI controller receives the handle opened event, it sends a command to the MCMC with a request to perform short blinks of the BLUE HS LED. This indicates that the MCH is waiting to be deactivated.

     Once the MCH receives the permission to continue the deactivation, all used ports are disabled.

   - The BLUE HS LED turns on.

     The Intelligent Platform Management Controller on the power module disables the module's payload power and the BLUE HS LED is turned on.

     Now the module is ready to be safely extracted.

3. Pull the module handle in the “Unlocked” position.
3. Disconnect any interfacing cables that may be connected to the module.
4. Disengage the module from the backplane connector by pulling on the module handle. This may require a considerable amount of force.
5. Using the front panel as a grip, remove the module from the chassis.
6. Dispose of the module as required.

Chapter 4

# Configuration / Power / Thermal

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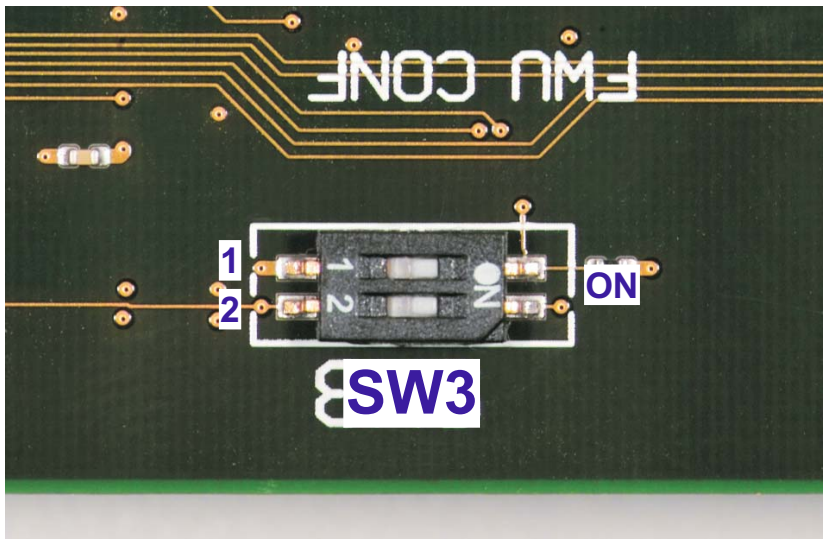
# 4. Configuration / Power / Thermal

## 4.1 Configuration

### 4.1.1 DIP Switch Configuration

The DIP switch consists of two switches, one switch for Firmware update configuration (switch 1) and one switch reserved for further use (switch 2).

**Figure 4-1: DIP Switch**




The following table indicates the functions of the two switches integrated in the DIP switch.

**Table 4-1: DIP Switch Functions**

| SWITCH | FUNCTION |
|---|---|
| 1 | Firmware update configuration |
| 2 | Reserved |

#### 4.1.1.1 Firmware Update Configuration

The Firmware of the AM4901 can be updated via the management Ethernet port or the management serial port. If neither of these interfaces is functional, switch 1 can be used to establish a direct serial interface to the MCMC in order to update the Firmware.

**Table 4-2: Firmware Update Configuration**

| SWITCH 1 | DESCRIPTION |
|---|---|
| ***OFF*** | ***MCMC has control of the Firmware updating*** |
| ON | Enable hard-wired Firmware updating via the management serial port (J2) |

The default setting is indicated by using italic bold.

## 4.2 Power Considerations

### 4.2.1 AM4901 Input Voltage Ranges

The AM4901 board has been designed for optimal power input and distribution. Still it is necessary to observe certain criteria essential for application stability and reliability.

The AM4901 requires at least one power supply which generates two power sources, the module management power for the MMC (nominal: 3.3V DC) and a single payload power (nominal: 12V DC) for the module components.

The following table specifies the ranges for the different input power voltages within which the board is functional. The AM4901 is not guaranteed to function if the board is not operated within the operating range.

**Table 4-3: DC Operational Input Voltage Ranges**

| INPUT SUPPLY VOLTAGE | ABSOLUTE RANGE | OPERATING RANGE |
|---|---|---|
| Payload Power (nominal: 12V DC) | 10.0 V min. to 14.0 V max. | 10.8 V min. to 13.2 V max. |
| Module Management Power (nominal: 3.3V DC) | 2.97 V min. to 3.63 V. max. (±10%) | 3.135 V min. to 3.465 V max. (±5%) |

***Warning!***

The AM4901 must not be operated beyond the absolute range indicated in the table above. Failure to comply with the above may result in damage to the board.

### 4.2.2 Power Requirements

#### 4.2.2.1 Payload Power

Payload power is the power provided to the module from the backplane for the main function of the module. The payload power voltage should be selected at the higher end of the specified voltage range.

The payload power voltage shall be at least 10.8 V and not more than 13.2 V at the module contacts during normal conditions under all loads (see Table 4-3, “DC Operational Input Voltage Ranges”). The bandwidth-limited periodic noise due to switching power supplies or any other source shall not exceed 200 mV peak to peak.

#### 4.2.2.2 Payload and Management Voltage Ramp

Power supplies must comply with the following guidelines, in order to be used with the AM4901:

- Beginning at 10% of the nominal output voltage, the voltage must rise within > 0.1 ms to < 20 ms to the specified regulation range of the voltage. Typically: > 5 ms to < 15 ms.
- There must be a smooth and continuous ramp of each DC output voltage from 10% to 90% of the regulation band.

The slope of the turn-on waveform shall be a positive, almost linear voltage increase and have a value from 0 V to nominal Vout.

#### 4.2.2.3 Management Power Consumption

The AM4901's management power is used not only for the MCMC, but also for the serial console interface and the management Ethernet port, which has a very low power consumption. The management power voltage measured on the MCH at the connector shall be 3.3 V ± 5% and the maximum current is 225 mA (see Table 4-3, "DC Operational Input Voltage Ranges").

### 4.2.3 Payload Power Consumption of the AM4901

The goal of this description is to provide a method to calculate the payload power consumption for the AM4901 board with different configurations and applications. The Fabric [A] switch and the uplink PHY dissipate the majority of the payload power.

The payload power consumption table below lists the voltage and power specifications for the AM4901 board. All measurements were conducted at a temperature of 25°C with a payload power of 12 V.

**Table 4-4: AM4901 Payload Power Consumption**

| UPLINK CHANNEL | FABRIC [A] | PAYLOAD POWER CONSUMPTION AT 12 V |
|---|---|---|
| NC | NC | 4.0 W |
| 1 GbE Link | NC | 5.3 W |
| 1 GbE Link | 12 AMCs | 5.3 W |

***Note ...***

The power consumption values indicated in the table above can vary depending on the ambient temperature. This can result in deviations of the power consumption values of up to 10%.

### 4.2.4 IPMI FRU Payload Power Consumption

The AM4901's IPMI FRU payload power consumption is 0.5 A (6 W).

### 4.2.5 Payload Start-Up Current of the AM4901

The payload start-up current of the AM4901 during the first 2-3 seconds after the payload power has been applied is 1.8 A.

For further information on the start-up current, please contact Kontron.

## 4.3 Thermal Considerations

### 4.3.1 Thermal Monitoring

To ensure optimal operation and long-term reliability of the AM4901, all onboard components must remain within the maximum temperature specifications. The most critical components on the AM4901 are the Fabric [A] and the uplink PHY. Operating the AM4901 above the maximum operating limits will result in permanent damage to the board. The AM4901 includes one temperature sensor that is accessible via the MCMC and is available for shelf management.

#### 4.3.1.1 Placement of the Temperature Sensor

**Figure 4-2: Board Temperature Sensor Placement (AM4901 Top View)**