

» Kontron User's Guide «

Advanced TCA®

RTM8940

Document Revision 1.1
April 2013

Revision History

Rev. Index	Brief Description of Changes	Date of Issue
1.0	First Release	August 2011
1.1	Second Release	April 2013

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

© 2011 Kontron, an International Corporation. All rights reserved.

The information in this user's guide is provided for reference only. Kontron does not assume any liability arising out of the application or use of the information or products described herein. This user's guide may contain or reference information and products protected by copyrights or patents and does not convey any license under the patent rights of Kontron, nor the rights of others.

Kontron is a registered trademark of Kontron. All trademarks, registered trademarks, and trade names used in this user's guide are the property of their respective owners. All rights reserved. Printed in Canada. This user's guide contains information proprietary to Kontron. Customers may reprint and use this user's guide in other publications. Customers may alter this user's guide and publish it only after they remove the Kontron name, cover, and logo.

Kontron reserves the right to make changes without notice in product or component design as warranted by evolution in user needs or progress in engineering or manufacturing technology. Changes that affect the operation of the unit will be documented in the next revision of this user's guide.

Table of Contents

<i>Safety Instructions</i>	<i>vi</i>
Before You Begin	vi
Preventing Electrostatic Discharge	vii
<i>Preface</i>	<i>viii</i>
How to Use This Guide	viii
Customer Comments	ix
Advisory Conventions	ix
Unpacking	x
Powering Up the System	x
Adapter Cables	x
Storing Boards	x
Regulatory Compliance Statements	xi
Limited Warranty	xii
1. Product Description	2
1.1 Product Overview	2
1.2 What's Included	2
1.3 Board Specifications	3
1.4 Hot-Swap Capability	4
1.5 Interfacing with the Environment	4
1.5.1 RTM (rear transition module)	4
2. Board Features	6
2.1 Block Diagram	6
2.2 SFP	7
2.3 SFP+	7
2.4 QSFP+	7
2.5 E1 - T1 BITS	7
2.6 MMC Boot Block	8

2.7	Hardware Management Overview	8
2.7.1	Sensor Data Record (SDR)	8
2.7.2	Hardware Sensors	9
2.7.3	Field Replaceable Unit (FRU) Information	11
2.7.4	MMC Firmware Code	12
2.7.5	MMC Firmware Upgrade Procedure	12
2.7.6	Boot Block Upgrade Procedure	13
2.8	Face Plate Indicators	14
2.8.1	Hot Swap LED (LED0)	14
2.8.2	Out Of Service (LED1)	14
2.8.3	Healthy LED (LED2)	14
2.8.4	QSFP+, SFP+ and SFP LED	14
3.	Hot Swap and Installation	16
3.1	RTM Hot Swap and Installation	16
3.1.1	Installing the RTM in the chassis	16
3.1.2	Removing the RTM from the chassis	16
A.	Connector Pinouts	A-1
A.1	Connectors and Headers Summary	A-1
A.2	QSFP+ Connetors (X1, X2)	A-1
A.3	SFP+ Connetors (X3, X5)	A-2
A.4	SFP Connetor (X6)	A-2
A.5	E1/T1 Connector (J15, J16, J17 & J18)	A-2
B.	Software Update	B-1
B.1	MMC Firmware Update Procedure	B-1
C.	Getting Help	C-1
C.1	Returning Defective Merchandise	C-1
C.2	When Returning a Unit	C-2
D.	Glossary	D-1

List of Figures

Figure 2-1: Block Diagram6

List of Tables

Table 1-1 Board Specifications	3
Table 2-1 Possible Ports Mappings: AT8940 with RTM8940	7
Table 2-2 IPMI Hardware Sensors	9
Table 2-3 Board Information Area	11
Table 2-4 Product Information Area	11
Table 2-5 Type 16 Module Current Requirements Records	12
Table 2-6 Hot-Swap LED Description	13

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



WARNING

High voltages are present inside the chassis when the unit's power cord is plugged into an electrical outlet. Turn off system power, turn off the power supply, and then disconnect the power cord from its source before removing the chassis cover. Turning off the system power switch does not remove power to components.



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.
- When you want to remove the protective foil (if present), make sure you are properly grounded and that you touch a metallic part of the board.



CAUTION

Removing the protective foil from the top and bottom cover might create static. When you remove those protections, make sure you follow the proper ESD procedure.



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.

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, Software Update
- Appendix C, Getting Help
- Appendix D, 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, Jumpers Settings, 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.	
	Signal Path: Indicate the places where you can find the signal on the board.	
	Jumper Settings: Indicate the jumpers that are related to this sections.	
	BIOS Settings: Indicate where you can set this option in the BIOS.	
	Software Usage: Indicates how you can access this feature through software.	
	CAUTION	
	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".	
	CE Conformity: This symbol indicates that the product described in this manual is in compliance with all applied CE standards. Please refer also to the section "Regulatory Compliance Statements" in this manual.	

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.

Powering Up the System

Before any installation or setup, ensure that the board is unplugged from power sources or subsystems.

If you encounter a problem, verify the following items:

- Make sure that all connectors are properly connected.
- Verify your boot devices.
- If the system does not start properly, try booting without any other I/O peripherals attached, including AMC adapters.

Make sure your system provides the minimum DC voltages required at the board's slot, especially if DC power is carried by cables.

If you are still not able to get your board running, contact our Technical Support for assistance.

Adapter Cables

Because adapter cables come from various manufacturers, pinouts can differ. The direct crimp design offered by Kontron allows the simplest cable assembly. All cables are available from Kontron Sales Department.

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 IECCE CB Scheme. Please consult the "Kontron Safety Conformity Policy Guide" for more information. For Canada and USA input voltage must not exceed -60Vdc for safety compliance.

CE Certification

The product(s) described in this user's guide complies with all applicable European Union (CE) directives if it has a CE marking. 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.

Chapter 1

Product Description

1.1	Product Overview	2
1.2	What's Included	2
1.3	Board Specifications	3
1.4	Hot-Swap Capability	4
1.5	Interfacing with the Environment	4

1. Product Description

1.1 Product Overview

The RTM8940 is an ATCA Rear Transition Module for the AT8940 40GbE Fabric Interface Hub. Architectural features under consideration such as 40GbE interfaces are expected to deliver a high performance uplink capability. Some of the highlights are:

Up to 80Gbps uplink capability on Fabric Interface

- 2x QSFP for 40Gbps Active Copper Cables
- 4x SFP+ supporting SX, LX, SR, LR, LRM and Copper Modules

Support for 2x SFP 1 GbE uplinks on Base Interface

- 1000Base-SX/LX Optical Modules
- 10/100/1000Base-T Copper Module

Master Clock Generator with Stratum 3 accuracy and SyncE support

- 2 ETSI T3 E1/T1 BITS input/outputs
- 2 ETSI T4 E1/T1 Upstream/Downstream Chassis Clock Support.
- ATCA Synchronisation Clock Support CLK1 A/B, CLK2 A/B, CLK3 A/B
- Clock Synchronisation to MCG of redundant HUB/RTM.

1.2 What's Included

This board is shipped with the following items:

- One RTM8940 board
- One CD-ROM containing documentation and drivers.
- Cables that have been ordered

If any item is missing or damaged, contact the supplier.

1.3 Board Specifications

Table 1-1: Board Specifications

Features	Description
Compatible Products	<ul style="list-style-type: none"> AT8910 AT8940
Compliance	<ul style="list-style-type: none"> PICMG3.0 R3.0 PICMG3.1 R2.0 PICMG HPM.1
IPMI Features	<ul style="list-style-type: none"> Management Controller compliant to PICMG 3.0 and IPMI v2.0 . 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 (via IPMB). Management Controller self test which can detect failure under its code integrity and trigger an automatic rollback.
Supervisory	<ul style="list-style-type: none"> Hardware system monitor through IPMI (voltages, currents, temperature), temperature monitor/alarm; board temperature sensor, power failure.
Mechanical	<ul style="list-style-type: none"> 322.25 x 93.74 x 29 mm
Power Requirements	<ul style="list-style-type: none"> 10W Typical
Environmental Temperature*	Operating: 0-55°C/32-131°F with 30CFM airflow 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: 3G each axis Storage and Transit: 18G each axis
Environmental Vibration*	Operating: 5-200Hz. 0.2G, each axis Storage and Transit: 5Hz to 20Hz @ 1 m2/s3 (0.01g2 /Hz) (flat) 20Hz to 200Hz @ -3dB/oct (slope down)
Reliability	<ul style="list-style-type: none"> Whole board protected by active breaker USB voltage protected by active breaker
Safety / EMC	Meet or exceed: <ul style="list-style-type: none"> 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 B; CE Mark to EN55022/EN55024/EN300386
Warranty	Two years limited warranty

* Designed to meet or exceed

1.4 Hot-Swap Capability

The RTM8940 supports Full Hot Swap capability as per PICMG3.0 R3.0. 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 R3.0 specification for additional details.

1.5 Interfacing with the Environment

1.5.1 RTM (rear transition module)

The RTM8940 is a single slot (6HP) AdvancedTCA Rear Transition Module. This module provides additional connectivity for AT8940 Hub front boards.

1.5.1.1 *FRU Data EEPROM*

- FRU Data EEPROM size is 32Kbit and it includes board identification and serial number information.

1.5.1.2 *Hot Swap*

As a Hot Swappable Intelligent Managed FRU, the RTM8940 (FRU2) includes a Management Controller, the AdvancedTCA Hot Swap indicator (Blue LED) and the standard AdvancedTCA handle switch.

1.5.1.2.1 *Insertion and Removal of the Managed FRUs*

After insertion, the front board detects and activates the management components of the FRU. When the handle is closed, the power budget and the e-keying negotiations start. Then, the front board's IPMC activates the payload components of the FRU.

Opening the RTM handle switch on the RTM FRU and will start the deactivation process, which deactivates the RTM8940.

The operational state of the FRU is reported through the management subsystem FRU Hot Swap sensors. The BLUE LED is 100% off when a FRU is operational and unsafe for extraction. An always on(100%) indicates that a FRU can safely be extracted; transitional states are identified through blinking patterns. Additional details on the standard FRU Hot Swap sensor and the BLUE LED usage can be found in the AdvancedTCA specifications.

Chapter 2

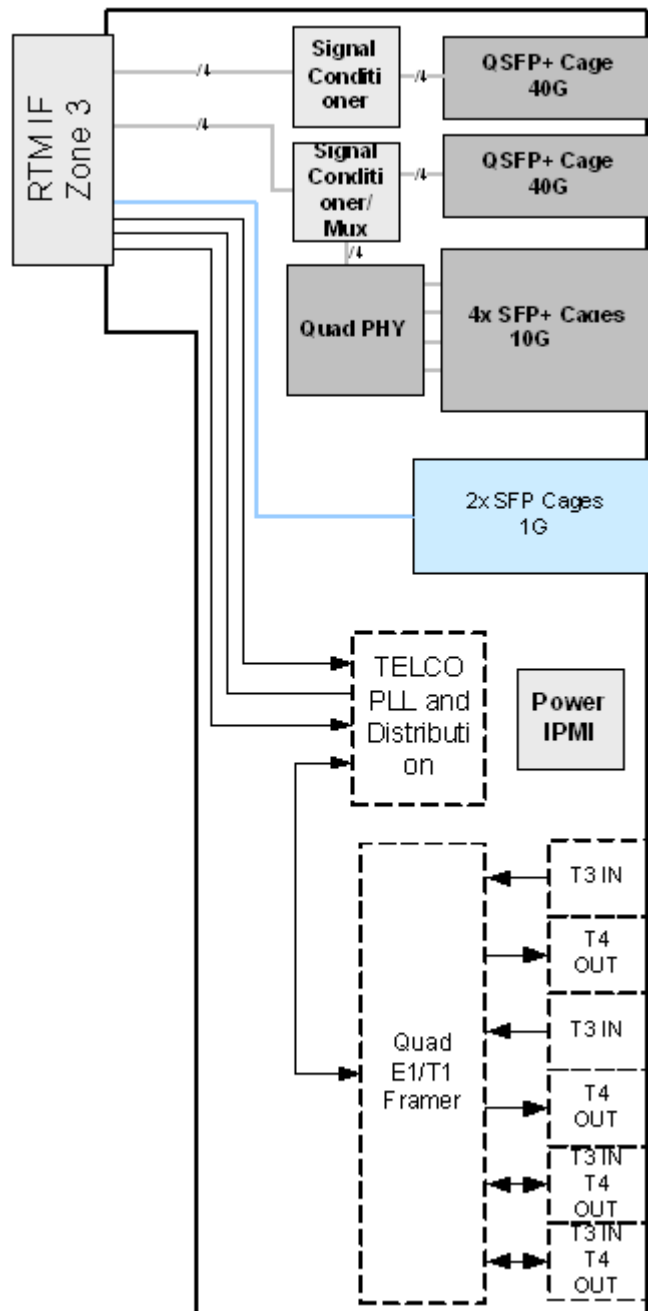
Board Features

2.1	Block Diagram	6
2.2	SFP.....	7
2.3	SFP+	7
2.4	QSFP+	7
2.5	E1 - T1 BITS.....	7
2.6	MMC Boot Block	8
2.7	Hardware Management Overview	8
2.8	Face Plate Indicators.....	14

2. Board Features

2.1 Block Diagram

Figure 2-1:Block Diagram



The configuration of the RTM8940 supports enabling up to 2 out of the following 3 sets of ports simultaneously: RTM 4x SFP+, RTM QSFP+(#1) and RTM QSFP+(#2).

See the table below for the possible configuration with the AT8940:

Table 2-1: Possible Ports Mappings: AT8940 with RTM8940

Port- MAP- Number	Front	RTM		
	4x SFP+	4x SFP+	QSFP+(#1)	QSFP+(#2)
1	0/1-0/4	0/19-0/22	0/18	Disabled
2	0/1-0/4	Disabled	0/18	0/19
3	0/1-0/4	Disabled	Disabled	Disabled
4	0/1-0/4	0/20-0/23	0/19	Disabled
5	0/1-0/4	Disabled	0/19	0/20

NOTE:

- Port configurations will be set by using the cli command: set board port-map Port-Map-number
- Configurations 1 and 2 are for a 6 and 14-slot ATCA chassis
- Configurations 3-4-5 are for a 16-slot ATCA chassis

For the AT8910 the fixed configurations is 4x Front SFP+ ports on 0/1-0/4 and 4x RTM SFP+ ports on 0/20-0/23. QSFP+ ports are not supported by the RTM8940 when used with the AT8910.

2.2 SFP

The RTM8940 has one dual SFP module connector available on the RTM face plate. The SFP module signals are coming from the front board at 1Gb through zone 3 connector.

2.3 SFP+

The RTM8940 has two dual SFP+ module connectors available on the RTM face plate. The SFP+ module signals are coming from the front board at 10G through zone 3 connector.

2.4 QSFP+

The RTM8940 has two QSFP module connectors available on the RTM face plate. The QSFP module signals are coming from the front board at 40Gb through zone 3 connector.

2.5 E1 - T1 BITS

The RTM8940 has four E1 - T1 BITS connectors available on the RTM face plate. The clock signals are coming from the front board or from an external source. It supports:

-
- 2 ETSI T3 E1/T1 BITS input/outputs
 - 2 ETSI T4 E1/T1 Upstream/Downstream Chassis Clock Support.

2.6 MMC Boot Block

The MMC runs a firmware from its internal 256KB flash. It is programmed by an additional 8K boot block. It keeps the last two copies of the MMC firmware in dedicated flash memories. The boot block activates the MMC image and can rollback a firmware update in the MMC in case of problems.

2.7 Hardware Management Overview

The RTM communicates with the front board using the IPMB-L channel. Kontron Intelligent RTM address on the IPMB-L is fixed and has a value of 0xA6.

The memory subsystem of the MMC consists of an integrated flash memory to hold the MMC operation code and integrated RAM for data. The field replacement unit (FRU) inventory information is stored in the nonvolatile memory on an EEPROM connected via a local I2C interface to the MMC. It is possible to store up to 4 KBytes within the FRU inventory information. Event generation over IPMB-L bus to reach the front board that forward it to the SHMC ensure that 'post-mortem' logging information is available even if the power of the RTM is disabled.

The onboard DC voltages and temperature are monitored by the MMC device. The MMC will send an event to the front board if any of the thresholds are exceeded.

To increase the reliability of the RTM8940 management subsystem, an external watchdog supervisor for the MMC is implemented. The MMC must strobe the external watchdog at 500 µsec. intervals to ensure continuity of operation of the board's management subsystem. If the MMC ceases to strobe the watchdog supervisor, the watchdog resets the MMC. The watchdog timeout expires after one second if strobes are not received. The external watchdog supervisor is not configurable and must not be confused with the IPMI v1.5 watchdog timer commands. This external watchdog of the MMC is implemented in a separate chip.

2.7.1 Sensor Data Record (SDR)

Every sensor on the RTM is associated with a Sensor Data Record (SDR). Sensor Data Records contain information about the sensors identification such as sensor type, sensor name and sensor unit. The SDR also contains the configuration of a specific sensor such as threshold/hysteresis and event generation capabilities that specifies sensor behaviour. Some fields of the SDR are configurable through IPMI v1.5 command and are set with built-in initial values. Finally, one field which is the sensor owner must reflect the module addresses that allows a system management software to identify the owner of the SDR when it is scanned from the front board IPMC and merged within the IPMC Device SDR repository.

From IPMI perspective, the RTM8940 management controller is set up as a satellite management controller (SMC). It does support sensor devices, and use the IPMI static sensor population feature of IPMI v1.5 to merge the hot swapped RTM sensor with the front board sensors population. The usual way the SHMC is

informed about an RTM insertion is through the RTM Module Hot Swap sensor and a radial presence line on the RTM connector. All SDRs can be queried using Device SDR commands. Module sensors that have been implemented are listed below.

2.7.2 Hardware Sensors

Table 2-2:IPMI Hardware Sensors

IPMI sensor ID	Sensor Name	Description (Sensor Type, Event trigger)	Scanning Enabled under Power State	Health LED (Green to Amber)
0	RTM8940	NA (Management Controller Locator Record)		
1	RTM:Module HS	FOh (PICMG Hot Swap) Event Type: 6Fh (Sensor-specific discrete)	*	N
2	RTM:Temp Board	01h (Temperature) Event Type: 01h (Threshold)	*	X
3	RTM:Temp Outlet	01h (Temperature) Event Type: 01h (Threshold)	*	X
4	RTM:Vcc +3.3VSUS	02h (Voltage) Event Type: 01h (Threshold)	-	X
5	RTM:Vcc +3.3V	02h (Voltage) Event Type: 01h (Threshold)	-	X
6	RTM:Vcc +5V	02h (Voltage) Event Type: 01h (Threshold)	-	X
7	RTM:Vcc +1.8V	02h (Voltage) Event Type: 01h (Threshold)	-	X
8	RTM:Vcc +1.0V	02h (Voltage) Event Type: 01h (Threshold)	-	X
9	RTM:Vcc +12V	02h (Voltage) Event Type: 01h (Threshold)	-	X
10	RTM:Power State	08h (Power Supply) Event Type: 6Fh (Sensor-specific discrete)	*	N
11	RTM:Power Good	08h (Power Supply) Event Type: 6Fh (Sensor-specific discrete)	*	N
12	RTM:Pwr Good Ev	08h (Power Supply) Event Type: 6Fh (Sensor-specific discrete)	*	N
13	RTM:Health Error	24h (Platform Alert) Event Type: 03h (digital discrete)	*	N
14	RTM:Ver Change	2Bh (Version Change) Event Type: 6Fh (Sensor-specific discrete)	*	N
15	RTM:IPMBL State	C3h (OEM IPMB-L Link State) Event Type: 6Fh (Sensor-specific discrete)	*	N
16	RTM:MMC Reboot	24h (Platform Alert) Event Type: 6Fh (Sensor-specific discrete)	*	N

IPMI sensor ID	Sensor Name	Description (Sensor Type, Event trigger)	Scanning Enabled under Power State	Health LED (Green to Amber)
17	RTM:MMC FwUp	C7h (OEM IPMC Firmware Upgrade) Event Type: 6Fh (Sensor-specific discrete)	*	N
18	RTM:MMC Stor Err	28h (Management Subsystem Health) Event Type: 6Fh (Sensor-specific discrete)	*	N
19	RTM:IPMI Info-1	C0h (OEM Firmware Info) Event Type: 70h (OEM)	*	N
20	RTM:IPMI Info-2	C0h (OEM Firmware Info) Event Type: 70h (OEM)	*	N

- X Exceed critical threshold / Error Assertion
- * Power On/Off
- Power On
- N No change

2.7.3 Field Replaceable Unit (FRU) Information

The FRU Information provides inventory data about the boards where the FRU Information Device is located. The part number or version number can be read through software.

FRU information in the RTM8940 includes data describing the RTM8940 board according to AMC.0 R2.0 specification requirements. This information is retrieved from the RTM, enabling reporting of board-specific information through a standardized mechanism.

Table 2-3:Board Information Area

Board Information Area	
Field Description	Value (hex)
Format Version	0x01
Board Area Length	*Calculated
Language code	0x00
Manufacturing Date / Time	*Based on mfg. date
Board Manufacturer type/length	*Calculated
Board Manufacturer	"Kontron"
Board Product Name type/length	*Calculated
Board Product Name	"RTM8940"
Board Serial Number type/length	*Calculated
Board Serial Number	Manufacturer S/N
Board Part Number type/length	*Calculated
Board Customer Part Number	"T5706"
FRU File ID type/length	*Calculated
FRU File ID	"T5706-XPX-00"
No more fields	0xC0
Padding	0x00
Board Area Checksum	*Calculated

Table 2-4:Product Information Area

Product Information Area	
Field Description	Value (hex)
Format Version	0x01
Product Area Length	*Calculated
Language Code	0x00
Manufacturer Name type/length	*Calculated
Manufacturer Name	"Kontron"
Product Name type/length	*Calculated
Product Name	"RTM8940"
Product Part/Model Number type/length	*Calculated
Product Part/Model Number	"T5706"

Product Information Area	
Product Version type/length	*Calculated
Product Version	"XX" *
Product Serial Number type/length	*Calculated
Product Serial Number	Manufacturer S/N
Asset Tag type/length	0xC0
Asset Tag	
FRU File ID type/length	*Calculated
FRU File ID bytes	"T5706-XPX-00"
No more fields	0xC0
Padding	0x00
Product Info Area Checksum	*Calculated

Table 2-5: Type 16 Module Current Requirements Records

Type 16 – Module Current Requirements Record	
Record Type ID	C0h
Record format version	02h
Manufacturer ID	00315Ah (PICMG Record ID)
PICMG Record ID	16h (Module Power Descriptor table)
Record Format Version	00h
Current Draw	0Ah (1.0 Amps at 12 V => 12.0 Watts)

2.7.4 MMC Firmware Code

MMC firmware code is organized into boot code and operational code, both of which are stored in a flash module. Upon an MMC reset, the MMC executes the boot code and performs the following:

- 1 Self test to verify the status of its hardware and memory.
- 2 Performs a checksum of the operational code.
- 3 Set operational state that tells the boot block the firmware operate correctly.

Upon successful verification of the operational code checksum, the firmware will jump to the operational code.

2.7.5 MMC Firmware Upgrade Procedure

The upgrade procedure is compliant to PICMG HPM.1. MMC Firmware upgrades can be done by using IPMITOOL from [sourceforge](https://sourceforge.net) from the front board or remotely on the chassis. It has been designed to be upgradable through any IPMI interface without payload impact.

2.7.6 Boot Block Upgrade Procedure

Type the following to perform MMC firmware upgrade

```
ipmifwu -fb <file> -P /dev/ttyS1 -M rtm -p <ENTER>
```



Note:

During boot block firmware upgrade the MMC is held in reset

2.7.6.1 Hot-Swap Process

The RTM8940 has the ability to be hot-swapped in and out of the front board. The onboard MMC manages the RTM's power-up and power-down transitions. The list below illustrates this process for power down request.

- 1 Ejector latch is opened. HOT_SWAP_PB# assertion. MMC firmware detects the assertion of this signal.
- 2 MMC sends "Module Handle Open" event message to the front board. The corresponding M state of the front board moves from M4-> M5.
- 3 The front board moves from M5 -> M6 if the SHMC grants the request. The front board IPMC sends the FRU control requesting quiesced state to the RTM.
- 4 The firmware deasserts payload power and sends "Module Quiesced" event message to the front board where it transitions from M6 to M1 state.



Note:

Depending on your BIOS configuration, a hot-swap process might turn off the front board. Please refer to the BIOS section "**Managed FRU Deactivation Policies**" of the AT8940.

2.7.6.2 Hot-Swap LED

The RTM8940 and RTMDISK supports a blue Hot Swap LED mounted on the front panel. This LED indicates when it is safe to remove the RTM from the front board. The on-board MMC drives this LED to indicate the hot-swap state. The following states are possible:

Table 2-6:Hot-Swap LED Description

LED state	Description
OFF	M4 state; normal state when board is in operation.
ON	M1 state; ready for hot swap.
Short blink	M5 state; deactivation request
Long blink	M2 state; activation request.

When the RTM latch is disengaged from the faceplate, the hot swap switch embedded in the PCB will assert a "HOT_SWAP_PB#" signal to the MMC, and the MMC will send "Module Handle Open" event message to the front board which moves from the M4 state to the M5 state. Once in the M5 state, the front board will ask the SHMC (or Shelf Manager) for permission to move the RTM to the M6 state. Then the IPMC of the front board, through IPMB-L, will set the RTM Hot Swap LED to indicate this state with a short blink. Once permission is received from the SHMC or higher-level software, the front board will move to the M6 state.

The SHMC or higher level software can reject the request to move to the M6 state. If this occurs, the RTM will return the Hot Swap LED to a solid off condition, indicating that the RTM has returned to M4 state.

If the RTM reaches the M6 state through an extraction request from the RTM handle latch, the MMC communicates to the front board that the module must discontinue operation in preparation for removal. The Hot Swap LED continues to flash during this preparation time, just like it does at the M5 state. When main RTM payload power is successfully removed from the RTM slot, the Hot Swap LED remains lit, indicating it is safe to remove the RTM from the chassis or the hard disk from the RTM.

Refer to the AT8940 manual for information on "Managed FRU Deactivation Policies" affecting the FRU deactivation process.

2.8 Face Plate Indicators

All LEDs can be overridden with standard PICMG LED APIs

2.8.1 Hot Swap LED (LED0)

The Blue / Hot Swap LED indicates the hot swap status of the RTM. The LED is ON when it is safe to remove the RTM from the slot. During normal operation, this LED is OFF.

2.8.2 Out Of Service (LED1)

The AdvancedTCA LED1 is red or amber and indicates an Out-of-Service (OOS) condition. During normal operation, the OOS LED is OFF. This LED is ON during firmware upgrade and is user configurable if needed by a customer application.

2.8.3 Healthy LED (LED2)

The AdvancedTCA LED2 is green or amber and indicates a healthy condition. The healthy LED indicates if the blade is powered up and all voltages and temperatures are within specifications. During normal operation, this LED is ON (green). This LED is also ON (amber) when one of the RTM8940 voltage or temperature sensor pass a threshold.

2.8.4 QSFP+, SFP+ and SFP LED

The Green LEDs indicate the link status of the connection. The LED is ON when there is a link otherwise, it's OFF.

Chapter 3

Hot Swap and Installation

3.1	RTM Hot Swap and Installation.....	16
-----	------------------------------------	----

3. Hot Swap and Installation

3.1 RTM Hot Swap and Installation

Because of the high-density pinout of the hard-metric connector, some precautions must be taken when connecting or disconnecting a RTM to/from an AT8940:

- 1 Rail guides must be installed on the enclosure to slide the RTM to the AT8940.
- 2 Do not force the RTM if there is mechanical resistance while inserting it.
- 3 Screw the faceplate to the enclosure to firmly attach the RTM to its enclosure.
- 4 Use extractor handles to disconnect and extract the RTM from its enclosure.



WARNING

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



3.1.1 Installing the RTM in the chassis

To install the RTM:

- 1 Remove the filler panel from the slot.
- 2 Ensure the RTM is configured properly.
- 3 Carefully align the PCB edges at the bottom and top card guide.
- 4 Insert the RTM in the system until it makes contact with the CPU board.
- 5 Using both ejector handles, engage the RTM in the front board connectors until both ejectors are locked.
- 6 Fasten screws at the top and bottom of the faceplate.

3.1.2 Removing the RTM from the chassis

To remove the RTM:

- 1 Unscrew the top and the bottom screw of the faceplate.
- 2 Unlock the lower handle latch.
- 3 Wait until the blue LED is fully ON, this mean that the hot swap sequence is ready for RTM removal.
- 4 Use both ejectors to disengage the RTM from the front board.
- 5 Pull the RTM out of the chassis.

A. Connector Pinouts

A.1 Connectors and Headers Summary

Connector	Description
P30	RTM Connector
X1, X2	QSFP+ Connectors
X3, X5	SFP+ Connectors
X6	SFP Connectors
J15, J16, J17 & J18	E1/T1 Connectors

A.2 QSFP+ Connectors (X1, X2)

Pin	Signal	Pin	Signal
1	GND	20	GND
2	TX2-	21	RX2-
3	TX2+	22	RX2+
4	GND	23	GND
5	TX4-	24	RX4-
6	TX4+	25	RX4+
7	GND	26	GND
8	MODSEL#	27	MODPRS#
9	RESET#	28	INT#
10	VCC RX	29	VCC TX
11	SCL	30	VCC
12	SDA	31	LPMODE
13	GND	32	GND
14	RX3+	33	TX3+
15	RX3-	34	TX3-
16	GND	35	GND
17	RX1+	36	TX1+
18	RX1-	37	TX1-
19	GND	38	GND

A.3 SFP+ Conneters (X3, X5)

Pin	Signal	Pin	Signal
1	VeeT	11	VeeR
2	TX_Fault	12	RD-
3	TX_Disable	13	RD+
4	SDA	14	VeeR
5	SCL	15	VccR
6	MOD-ABS	16	VccT
7	Rate_Select 0	17	VeeT
8	RX_LOS	18	TD+
9	Rate_Select 1	19	TD-
10	VeeR	20	VeeT

A.4 SFP Connector (X6)

Pin	Signal	Pin	Signal
1	VeeT	11	VeeR
2	TX_Fault	12	RD-
3	TX_Disable	13	RD+
4	SDA	14	VeeR
5	SCL	15	VccR
6	MOD-ABS	16	VccT
7	Rate_Select 0	17	VeeT
8	RX_LOS	18	TD+
9	Rate_Select 1	19	TD-
10	VeeR	20	VeeT

A.5 E1/T1 Connector (J15, J16, J17 & J18)

Pin	Signal	Pin	Signal
1	RING_RX-	5	TIP_TX+
2	TIP_RX+	6	N.C.
3	N.C.	7	N.C.
4	RING_TX+	8	N.C.

B. Software Update

B.1 MMC Firmware Update Procedure

To update the software of your board, it is recommended to use the update CD. Please contact your local technical support department for the proper procedure to follow.

C. 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

C.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.

C.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

D. Glossary

Acronyms	Descriptions
ACPI	Advanced Configuration & Power Interface
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).
ATCA	Advanced Telecommunications Computing Architecture
BIOS	Basic Input/Output System
CMOS	Complementary Metal Oxide Semiconductor. Also refers to the small amount of battery (or capacitor) powered CMOS memory to hold the date, time, and system setup parameters.
CPU	Central Processing Unit. This sometimes refers to a whole blade, not just a processor component.
CTS	Clear To Send
DTR	Data Terminal Ready
EMI	ElectroMagnetic Interference
FCC	Federal Communications Commission
FRU	Field Replaceable Unit. Any entity that can be replaced by a user in the field. Not all FRUs are hot swappable.
GND	GrouND
HDD	Hard Disc Drive
HPM	PICMG Hardware Platform Management specification family
HPM.1	Hardware Platform Management IPM Controller Firmware Upgrade Specification
I2C	Inter Integrated Circuit bus
ID	IDentification
IEEE	Institute of Electrical and Electronics Engineers
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
IPMIFWU	Intelligent Platform Management Interface FirmWare Update
LED	Light-Emitting Diode
MMC	Module Management Controller. MMCs are linked to the IPMC.
NC	Not Connected
OOS	Out Of Service

Acronyms	Descriptions
OS	Operating System
PICMG	PCI Industrial Computer Manufacturers Group
PICMG®	PCI Industrial Computer Manufacturers Group
POST	Power-On Self-Test
RAM	Random Access Memory
RS-232	(Same as RS232). Recommended Standard 232.
RS232	(Same as RS-232). Recommended Standard 232.
RTM	Rear Transition Module
RTS	Request To Send
SAS	Serial Attached SCSI
SFP	Small Form-factor Pluggable
ShMC	Shelf Management Controller
TX	Transmit
TXD	Transmit
USB	Universal Serial Bus
VCC	Power supply