»Kontron User's Guide«

RTM8020

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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.

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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 metalic 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.

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 fin 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
Indicate potential damage to hardware and tells you how to avoid the problem.





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



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

Unpacking

Follow these recommendations while unpacking:

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

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 B Devices

This equipment has been tested and found to comply with the limits for a Class B 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 B product. If not installed in a properly shielded enclosure and used in accordance with this User's Guide, this product may cause radio interference in which case users may need to take additional measures at their own expense.



Safety Certification

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

1. Product Description

1.1 Product Overview

For additional connectivity, the AT8020 is available with the RTM8020, a single slot (6HP) AdvancedTCA rear transition module. The RTM8020 features one serial port, two 3Gbit/s SAS links and integrates an onboard SAS drive for either additional functionality or extended customization by saving an AdvancedMC slot on the processing blade for other IO or processing modules.

1.2 What's Included

This board is shipped with the following items:

- One RTM8020 board
- One CD-ROM containing documentations 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	• AT8020
Compliancy	• PICMG3.0 R2.0 • SAS1R10 • SFF-8470
IPMI Features	• Management Controller compliant to PICMG 3.0 and IPMI v1.5 rev 1.1. • Management Controller is run time field reprogrammable without payload impact. • Robust fail safe reprogramming implementation (which includes two firmware images) that could perform automatic or manual rollback if a problem occurs during critical reprogramming phase. • Remote upgrade capability from all IPMI interfaces (via IPMB). • Management Controller self test which can detect failure under its code integrity and trig an automatic rollback.
Supervisory	• Hardware system monitor through IPMI (voltages, currents, temperature), temperature monitor / alarm; board temperature sensor, power failure.
Mechanical	• 322.25 x 93.74 x 29 mm
Power Requirements	25W maximum
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: 30G, half-sine 11ms, each axis Storage and Transit: Bellcore GR-63-CORE Section 4.3
Environmental Vibration*	Operating: 1.0G, 5-500Hz each axis Storage and Transit: 2.0G, 5-50Hz; 3.0G, 50-500Hz each axis
Reliability	• Whole board protected by active breaker • USB voltage protected by an active breakers
Safety / EMC	Meet or exceed: Safety: UL 60950-1 1st Ed.; 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
Warranty	Two years limited warranty

* Designed to meet or exceed

1.4 Compliance

This product conforms to the following specifications:

- PICMG3.0 R2.0 ECN002 - Advanced Telecommunication Computing Architecture
- SAS1R10 - Serial Attached SCSI - 1.1 Revision 10. (SAS-1.1)
- SFF-8470 (T10 Technical Committee and SCSI Trade Association

1.5 Hot-Swap Capability

The RTM8020 supports Full Hot Swap capability as per PICMG3.0R2.0. It can be removed from or installed in the system while it is on (without powering-down the system). Please refer to the PICMG3.0R2.0 specification for additional details.

1.6 Interfacing with the Environment

1.6.1 RTM (rear transition module)

The RTM8020 is a single slot (6HP) ATCA Rear Transition Module. This module provides additional connectivity for AT8020 CPU front blade.

1.6.1.1 Standard Compliance

- PICMG3.0 R2.0 ECN002 - Advanced Telecommunication Computing Architecture
- SAS1R10 - Serial Attached SCSI - 1.1 Revision 10. (SAS-1.1)
- SFF-8470 (T10 Technical Committee and SCSI Trade Association)

1.6.1.2 SAS Feature

- Total of two (2) 3Gbit/s SAS ports available on the RTM face plate through one external SAS connector
- Compliant to SAS-1.1 Revision 10 / SFF-8470
- SAS signal integrity guarantee over a four meters cable

1.6.1.3 Serial Port Feature

- One (1) serial port available on the RTM face plate through one (1) RJ-45 connector.
- RS-232 signals level at RTM face plate connector.
- Serial port speed capability is: 9kbits/s to 115kbits/s.

1.6.1.4 Onboard SAS Drive

- Support one (1) 2.5" SAS Drive
- Support dual-port SAS Drive

1.6.1.5 FRU Data EEPROM

- FRU Data EEPROM size is 64Kbit (8K * 8 bit)

1.6.1.6 Hot Swap

The RTM8020 supports hot swapping by using the switch connected to the face plate lower ejector. This switch indicates the coming hot swap action. The insertion of the RTM to a slot is always done over a non powered connector. During the extraction procedure, the management power is disabled only when the RTM8020 is removed. This procedure meets the ATCA AMC behavior.

1.6.1.6.1 Inserting the RTM8020 into the slot

The presence of the RTM is indicated by two signals. The front blade IPMC recognizes the RTM insertion when the two signals are low (lower ejector handle closed). After recognizing the RTM, the MMC turns the blue LED ON and enables the 3.3V_SUS to the RTM. Once the I2C link is working, the MMC accesses the serial EEPROM to retrieve FRU data. After knowing the type of RTM inserted, the MMC negotiates with System Manager in order to activate the +12V payload power. After RTM local voltages have been ramped up, the MMC enables the RTM Link.

After this the IPMC informs the CPU SW there is a functional RTM blade present.

1.6.1.6.2 Removing the RTM8020 from the slot

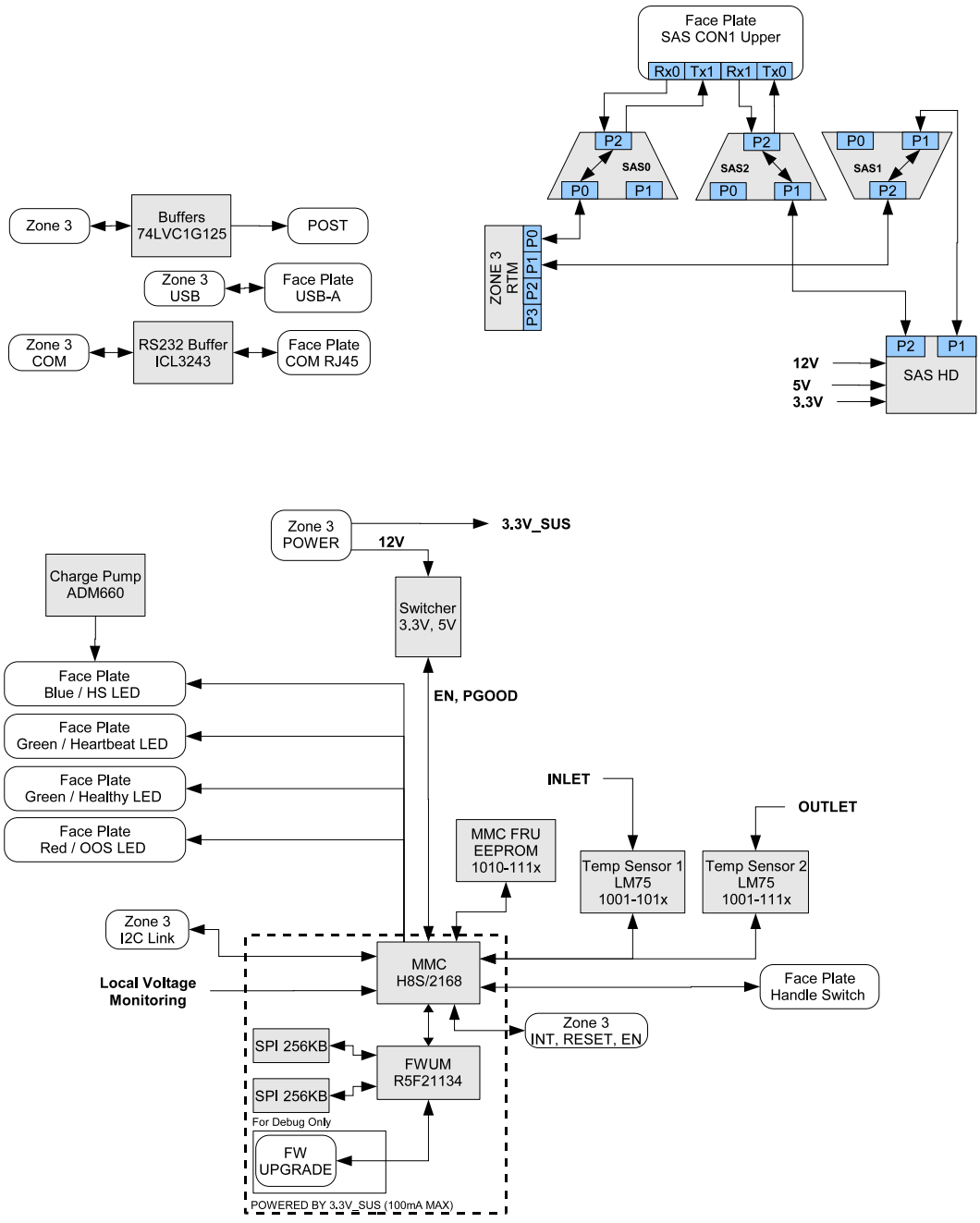
The RTM_EJECT signal goes HIGH by opening the RTM lower ejector handle. This indicates to the front blade IPMC that a hot swap action is going to take place. The MMC then negotiates the removal with the System manager and if it is granted, it proceeds with the removal process.

The MMC first notifies the CPU SW of coming hot removal. After the CPU SW has disabled SAS links, it notifies the MMC that the RTM blade can be removed. The MMC then activates reset to the RTM blade (via the Expander), disables the RTM Link and turns OFF the payload +12V power. When it is safe to remove the RTM blade from the slot, the MMC turns the Blue / Hot Swap LED ON. Front Blade IPMC turns OFF the management power only when their is no RTM detected. (RTM8020 removed from the slot)

2. Board Features

2.1 Block Diagram

Figure 2-1: Block Diagram



2.2 USB 2.0 Interfaces

USB features include:

- Capability to daisy chain as many as 127 devices per interface
- Fast bi-directional
- Isochronous/asynchronous interface
- 480 Mb/s transfer rate
- Standardization of peripheral interfaces into a single format
- Backward compatible with USB 1.1 devices

USB supports Plug and Play and hot-swapping operations (OS level). These features allow USB devices to be automatically attached, configured and detached, without reboot or running setup.

Table 2-1: USB Connector Pinout

Pin	Signal
1	VCC
2	DATA-
3	DATA+
4	GND



Signal Path:
The USB Port is available through the RTM front plate (J2).

2.3 SAS Link

The RTM8020 has two (2) 3Gbit/s SAS links available on the face plate through one (1) SAS connector. These links are coming from the front blade through the zone 3 connector. A SAS signal conditioner is needed to guarantee SAS signal integrity over the cable between two RTM blades. The maximum SAS cable length between two RTM blades is 4m.

2.4 SAS Hard Drive Option

Kontron offers the option of adding a SAS hard drive on the RTM8020. This hard drive is located on the component side of the PCB, in the lower part of the RTM8020.

2.5 Serial Port

The RTM8020 has one serial port available on the RTM face plate. Serial port signals are coming from the front blade through zone 3 connector. Serial Port on this RTM is COM2 from the AT8020. A RS232 buffer is used on the RTM to convert signal TTL level from zone 3 to RS232 signal level at the face plate connector. Serial port works from 9kbits/s to 115kbits/s.

Table 2-2: Serial Port (RJ45) Connector Pinout

Pin	Signal
1	RTS
2	DTR
3	TX#
4	GND/DCD
5	GND
6	RX#
7	DSR
8	CTS



Note:
Standard product uses a RJ-45 8 pins connector. RI (ring indicator) and DCD (data carrier detect) signals are not available.
The pinout is a custom one, not the same as RS-232D TIA/EIA-561.

2.6 Redundant MMC Flash & FWUM

The MMC microcontroller runs a firmware from its internal 256KB flash. It is programmed by another microcontroller named FWUM (FirmWare Update Manager). The FWUM keeps the last two copies of the MMC firmware in dedicated flash memories. The FWUM act as a watchdog to the MMC and can rollback a firmware update in the MMC in case of problems.

The FWUM itself is a microcontroller with internal flash to store MMC firmware image. This microcontroller is also an external watchdog for the MMC. Functions of this microntroller are kept to a minimum. The FWUM firmware is field updatable.



Note:
The MMC and the FWUM have an internal hardware watchdog.

2.7 Hardware Management Overview

The RTM communicates with the Module Management Controller (MMC) using the IPMB_L channel.

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 microcontroller. It is possible to store up to 4 KBytes within the FRU inventory information. Event generation over IPMB-L bus to reach the RTM 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 microcontroller device. The MMC will send an event to the RTM if any of the thresholds are exceeded.

To increase the reliability of the RTM8020 management subsystem, an external watchdog supervisor only for the MMC is implemented. The MMC must strobe the external watchdog at two-second intervals to ensure continuity of operation of the board's management subsystem. If the MMC ceases to strobe the watchdog supervisor, the watchdog isolates the MMC from the IPMBs and resets the MMC. The watchdog supervisor does not reset the payload power and the restart of the MMC will not affect the payload and will restore the previous Module Hot Swap state. The watchdog timeout expires after six seconds if strobes are not generated. 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 second microcontroller. This microcontroller is responsible to monitor the MMC and to manage MMC fail safe firmware upgrade process. The name of this second microcontroller is the Firmware Upgrade Manager (FWUM). The FWUM can handle two Firmware code that are stored in two external SEPROM memories. If a failure occurs during firmware upgrade, the FWUM will automatically rollback to the redundant MMC firmware image.

2.7.1 Sensor Data Record (SDR)

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

From IPMI prespective, the RTM8020 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 swaped AMC sensor with the carrier board sensors population. The usual way the RTM 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 to the firmware. Module sensors that have been implemented are listed below.

2.7.2 Hardware Sensors

Table 2-3: Hardware Sensors

Sensor Name	Voltage/Signals Monitored	Scanning Enabled under Power State	Health LED (Green to Red)
IPMI Info-1	Internal IPMC firmware diagnostic	*	N
IPMI Info-2	Internal IPMC firmware diagnostic	*	N
FRU Agent	Board FRU Data agent that verify FRU Data validity	*	N
Module HS	RTM HS State	*	N
IPMBL State	Operational state of IPMB-L	*	N
Storage Err	Management sub-system health: non volatile memory error.	*	N
Board 3.3V	3.3 V	-	X
Board 3.3VSUS	3.3 V Suspend	*	X
Board 5V	5.0V	-	X
Board 12.0v	12.0 V	-	X
Board BlueLed	6.6 V	*	X
Temp AirInlet	Board Inlet Temperature	-	X
Temp Exhaust	Board Outlet Temperature	*	X
Health Error	Board health sensors (aggregation of other sensors)	*	Asserted / Desserted
MMC Reboot	IPMC reboot detection	*	N
Ver change	IPMC firmware upgrade detection	*	N
Power Good	Power Good detection	*	N

X Exceed critical threshold

* Power On/Off

- Power On

N No change

2.7.2.1 IPMB-L Link Sensor

The RTM8020 has an IPMB-L links to communicate with the processor board and other devices in the chassis chassis IPMB-0 bus. MMC monitors the bus for any link failure and sends the bus failure event to the RTM upon the recovery occurs.

2.7.2.2 Module Hot Swap

The hot-swap event message conveys the current state of the module, the previous state and a cause of the state change as can be determined by the MMC. Refer to AMC.0 R2.0 specifications for further details on the module hot-swap state.

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 RTM8020 includes data describing the RTM8020 board as per AMC.0 R1.0 specification requirements. This information is retrieved by the RTM, enabling reporting of board-specific information through a standardized mechanism.

Following are the definitions for the multirecord implemented by the firmware as part of Module data.

2.7.4 E-Keying

E-Keying has been defined in the AMC.0 R1.0 Specification to prevent module damage and prevent misoperation and also to verify bay connection compatibility. The FRU data contains the RTM point-to-point connectivity record as described in Section 3.9.2 of the AMC.0 R1.0 specification.

The Set/Get AMC Port State IPMI commands defined by the AMC.0 specification are used for either granting or rejecting the E-keys.

2.7.5 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. Communicates with the Firmware Upgrade Manager (FWUM) in order to inform the MMC watchdog that the actual MMC firmware is suitable for execution.

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

2.7.6 MMC Firmware Upgrade Procedure

It is important to use compatible MMC and FWUM versions. Since all these software and hardware solutions are exchanging information, they must be in synch. Please always follow Kontron documentation for all your upgrades.

The recommended upgrade sequence must be FWUM first, then MMC.

MMC Firmware upgrades can be done by using IPMITOOL from the AMC Carrier or remotely on the chassis. It has been designed to upgrade through any IPMI interface without payload impact

2.7.7 FWUM Firmware Upgrade Procedure

It is important to use compatible MMC and FWUM versions. Since all these software and hardware solutions are exchanging information, they must be in synch. Please always follow Kontron documentation for all your upgrades.

The recommended upgrade sequence must be FWUM first, then MMC.

FWUM Firmware upgrade is done using IPMIFWU utility. This is a Linux utility developed by Kontron that uses the serial port of any computer to exchange with the FirmWare Upgrade Manager (FWUM) in order to upgrade the FWUM or the MMC firmware. This tool doesn't require the KCS driver to run over the Carrier AMC (it doesn't use the IPMI interfaces) but requires a serial cable hook on the AMC module.

Type the following to perform MMC firmware upgrade

```
ipmifwu -p -f <file> -m -T <ENTER>
```

Please note that during FWUM firmware upgrade the MMC is held in reset.

2.7.7.1 Hot-Swap Process

The RTM8020 has the ability to be hot-swapped in and out of a carrier. 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 RTM Carrier. The corresponding M state of RTM Carrier moves from M4-> M5.

3 RTM Carrier moves from M5 -> M6 if the SHMC grants the request and then sends the FRU Control requesting quiesced state to the RTM.

4 The firmware deasserts payload power and sends "Module Quiesced" event message to the RTM Carrier where it transitions from M6 to M1 state.

2.7.7.2 Hot-Swap LED

The RTM8020 supports a blue Hot Swap LED mounted on the front panel. This LED indicates when it is safe to remove the RTM from the Carrier. The on-board MMC drives this LED to indicate the hot-swap state. The following states are possible:

Table 2-4: Hot-Swap LED State

LED state	Description
OFF	RTM is in M4 state, normal state when board is in operation.
ON	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 RTM which moves from the M4 state to the M5 state. At the M5 state, the RTM Carrier will ask the SHMC (or

Shelf Manager) for permission to move the RTM to the M6 state. Then the RTM 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 RTM carrier 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 returns 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 through the RTM handle latch, the MMC communicates to the RTM Carrier 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.

Table 2-5: Hot-Swap LED Status

LED Status	Meaning
Off	Normal status
Blinking Blue	Preparing for removal/insertion: Long blink indicates activation is in progress, short blink when deactivation is in progress.
Solid Blue	Ready for hot swap

2.8 Debugging Features

2.8.1 IPMI controlled LED (LED3)

The green Management LED represents the MMC heart beat when it blinks slowly.

The blinking amber or yellow Management LED represents MMC communication over IPMB-L when pulsing.

2.8.2 RTM Health (LED2)

The green LED indicates that the RTM is working properly.

The amber LED indicates that the RTM is in fault.

2.8.3 Out of service (LED1)

When this LED is off, it indicates that the board is working properly.

When this LED is on, it indicates a major fault or an RTM malfunction.

3. Installing the Board

3.1 Board 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 board to/from a backplane:

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

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

3 Screw the frontplate to the enclosure to firmly attach the board to its enclosure.

4 Use extractor handles to disconnect and extract the board from its enclosure.

WARNING

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

3.1.1 Installing the RTM in the chassis

To install the RTM:

1 Remove the filler panel of the slot.

2 Ensure the board is configured properly.

3 Carefully align the PCB edges in the bottom and top card guide.

4 Insert the board in the system until it makes contact with the CPU board.

5 Using both ejector handles, engage the board in the CPU 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 board removal.

4 Use both ejectors to disengage the board from the CPU board.

5 Pull the board out of the chassis.

A. Connector Pinouts

A.1 Connectors and Headers Summary

Connector	Description
P30	RTM Connector
J2	USB 2.0 Connector
J3	SAS Faceplate Connector
J5	Serial Port Connector
J7	POST Code Connector
J10	SAS Hard Drive Connector

A.2 ATCA I/O RTM Connector (P30)

Pin	ROW A	ROW B	ROW C	ROW D	ROW E	ROW F
1	V_12V_1	V_12V_5	V_12V_2	V_3V2_SUS	RTM_EJECT	RTM_PRSNT#
2	V_12V_3	V_12V_6	V_12V_4	IPMC_INT#	IPMC_SCL	IPMC_SDA
3	SP_TX	SP_RX	SP_DTR	SP_RTS	SP_CTS	SP_DSR
4	SOCA	SOCB	INT_0	INT_1	RTML_TX	RTML_RX
5	N.C.	N.C.	N.C.	N.C.	N.C.	N.C.
6	N.C.	N.C.	N.C.	N.C.	N.C.	N.C.
7	N.C.	N.C.	N.C.	N.C.	N.C.	N.C.
8	N.C.	N.C.	N.C.	N.C.	N.C.	N.C.
9	P0_TX+	P0_TX-	P0_RX+	P0_RX-	P1_TX+	P1_TX-
10	P2_TX+	P2_TX-	P2_RX+	P2_RX-	P3_TX+	P3_TX-

Pin	ROW G	ROW H	ROW AB	ROW CD	ROW EF	ROW GH
1	RTM_HS_LED	RTM_EN#	GND	GND	GND	GND
2	USB0_DP	USB0_DN	GND	GND	GND	GND
3	SP_DCD#	N.C.	GND	GND	GND	GND
4	RTML_CLK	FWPROG_EN	GND	GND	GND	GND
5	N.C.	N.C.	GND	GND	GND	GND
6	N.C.	N.C.	GND	GND	GND	GND
7	N.C.	N.C.	GND	GND	GND	GND
8	N.C.	N.C.	GND	GND	GND	GND
9	P1_RX+	P1_RX-	GND	GND	GND	GND
10	P3_RX+	P3_RX-	GND	GND	GND	GND

A.3 USB Port (J2)

Pin	Signal
1	VCC
2	DATA-
3	DATA+
4	GND

A.4 SAS Faceplate Connector (J3)

Pin	Signal	Pin	Signal
S1	RX_0+	G1	GND
S2	RX_0-	G2	GND
S3	RX_1+	G3	GND
S4	RX_1-	G4	GND
S5	N.C.	G5	GND
S6	N.C.	G6	GND
S7	N.C.	G7	GND
S8	N.C.	G8	GND
S9	N.C.	G9	GND
S10	N.C.		
S11	N.C.	MTG1	CGND_1
S12	N.C.	MTG2	CGND_2
S13	TX_1-		
S14	TX_1+		
S15	TX_0-		
S16	TX_0+		

A.5 Serial Port(J5)

Pin	Signal
1	RTS
2	DTR
3	TX#
4	GND/DCD
5	GND
6	RX#
7	DSR
8	CTS

A.6 POST Code Connector (J7)

Pin	Signal
1	3V3
2	Data
3	Clock
4	GND

A.7 SAS Hard Drive Connector (J10)

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

B. Software Update

B.1 IPMC Firmware Update Procedure

The IPMC Firmware update procedure is detailed in a ReadMe file included with the IPMC Firmware package as well as the update utility. This package can be downloaded from our website http://www.kontron.com or from our FTP site ftp://ftp.kontron.ca/Support

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).
ANSI	American National Standards Institute
API	Application Programming Interface
APIC	Advanced Programmable Interrupt Controller
ASCII	American Standard Code for Information Interchange. ASCII codes represent text in computers, communications equipment, and other devices that work with text.
ATA	Advanced Technology Attachment
ATAPI	Advanced Technology Attachment Packet Interface
ATCA	Advanced Telecommunications Computing Architecture
BBS	BIOS Boot Specification
BI	Base Interface. Backplane connectivity defined by the ATCA.
BIOS	Basic Input/Output System
BMC	Base Management Controller
CD	Compact Disk
CDROM	(Same as CD-ROM). Compact Disk Read-Only Memory.
CD-ROM	(Same as CDROM). Compact Disk Read-Only Memory.
CFM	Cubic Foot per Minute
CLI	Command-Line Interface
CLK1	AdvancedTCA bused resource Synch clock group 1
CLK1A	AdvancedTCA bused resource Synch clock group 1, bus A
CLK1B	AdvancedTCA bused resource Synch clock group 1, bus A
CLK2	AdvancedTCA bused resource Synch clock group 2
CLK2A	AdvancedTCA bused resource Synch clock group 2, bus A
CLK2B	AdvancedTCA bused resource Synch clock group 2, bus B
CLK3	AdvancedTCA bused resource Synch clock group 3
CLK3A	AdvancedTCA bused resource Synch clock group 3 , bus A
CLK3B	AdvancedTCA bused resource Synch clock group 3 , bus B
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.
CPLD	Complex Programmable Logic Device
CP-TA	Communications Platforms Trade Association
CPU	Central Processing Unit. This sometimes refers to a whole blade, not just a processor component.

Acronyms	Descriptions
CTS	Clear To Send
DDR3	DDR3 SDRAM or Double-Data-Rate three (3) Synchronous Dynamic Random Access Memory.
DHCP	Dynamic Host Configuration Protocol
DIMM	Dual In-line Memory Module
DMA	Direct Memory Access
DMI	Desktop Management Interface
DTC	Data Transfer Controller
DTR	Data Terminal Ready
DTS	Digital Thermal Sensor in IA32 processors.
DVD	Digital Video Disk
ECC	Error Checking and Correction
EMI	ElectroMagnetic Interference
ETH	Same as Ethernet.
FC	Fibre Channel
FCC	Federal Communications Commission
FI	Fabric Interface. Backplane connectivity defined by the ATCA.
FIFO	First In First Out
FPGA	Field-Programmable Gate Array
FRU	Field Replaceable Unit. Any entity that can be replaced by a user in the field. Not all FRUs are hot swappable.
FWH	FirmWare Hub. Boot flash connected to the LPC bus containing BIOS FW.
Gb	Gigabit
GB	(Same as GByte) GigaByte.
GByte	(Same as GB) GigaByte.
GbE	Gigabit Ethernet
GHz	GigaHertz
GND	GrouND
HDD	Hard Disc Drive
HPM	PICMG Hardware Platform Management specification family
HPM.1	Hardware Platform Management IPM Controller Firmware Upgrade Specification
HW	HardWare
I2C	Inter Integrated Circuit bus
ICH	I/O Controller Hub
ICT	In-Circuit Test
ID	IDentification
IEEE	Institute of Electrical and Electronics Engineers
IMVP-6	Intel Mobile Voltage Positioning. The Intel Mobile Voltage Positioning specification for the Intel® Core™ Duo Processor. It is a DC-DC converter module that supplies the required voltage and current to a single processor.
IO	(Same as I/O). Input Output
IOH	I/O Hub
IOL	IPMI-Over-LAN
IP	Internet Protocol

Acronyms	Descriptions
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
IPv6	Internet Protocol version 6
IRQ	Interrupt ReQuest
JTAG	Joint Test Action Group
KHz	KiloHertz
LAN	Local Area Network
LED	Light-Emitting Diode
LFM	Low Frequency Mode. The lowest operating speed for the processor.
LPC	Low Pin Count port
MAC	Media Access Controller address of a computer networking device.
MB	MegaByte
MCH	Memory Controller Hub
MHz	MegaHertz
MMC	Module Management Controller. MMCs are linked to the IPMC.
NC	Not Connected
OOS	Out Of Service
OS	Operating System
PHY	PHYsical layer. Generic electronics term referring to a special electronic integrated circuit or functional block of a circuit that takes care of encoding and decoding between a pure digital domain (on-off) and a modulation in the analog domain.
PICMG	PCI Industrial Computer Manufacturers Group
PICMG®	PCI Industrial Computer Manufacturers Group
POST	Power-On Self-Test
prAMC	Processor AMC
RAID	Redundant Array of Independent Disks / Redundant Array of Inexpensive Disks.
RAM	Random Access Memory
RHEL	Red Hat Enterprise Linux
RoHS	Restriction of the Use of Certain Hazardous Substances
RS-232	(Same as RS232). Recommended Standard 232.
RS232	(Same as RS-232). Recommended Standard 232.
RTC	Real Time Clock
RTM	Rear Transition Module
RTM-Link	Rear Transition Module Link. Kontron 3-wire protocol.
RTS	Request To Send

Acronyms	Descriptions
SAS	Serial Attached SCSI
SATA	Serial ATA
SEL	System Event Log
SFP	Small Form-factor Pluggable
ShMC	Shelf Management Controller
SMB	(Same as SMBus/SMBUS). System Management Bus.
SMBIOS	System Management BIOS
SMBUS	(Same as SMB/SMBus). System Management Bus.
SMBus	(Same as SMB/SMBUS). System Management Bus.
SOL	Serial Over LAN
SPI	Serial Peripheral Interface
SpeedStep	(Same as EIST). Enhanced Intel SpeedStep Technology.
SSE2	Streaming SIMD Extension 2. SIMD is "Single Instruction, Multiple Data".
SSE3	Streaming SIMD Extension 3. SIMD is "Single Instruction, Multiple Data".
SSH	Secure SHell. A network protocol that allows data to be exchanged over a secure channel between two computers.
TCLKA	Telecom CLocK A. AMC Clock Interface.
TCLKB	Telecom CLocK B. AMC Clock Interface.
TCLKC	Telecom CLocK C. AMC Clock Interface.
TCLKD	Telecom CLocK D. AMC Clock Interface.
TX	Transmit
TXD	Transmit
UART	Universal Asynchronous Receiver Transmitter
USB	Universal Serial Bus
VCC	Power supply
VLAN	Virtual Local Area Network
XAUI	X (meaning ten) Attachement Unit Interface. A standard for connecting 10 Gigabit Ethernet (10GbE) ports.