RTM-ATCA-737x-C01

Installation and Use

P/N: 6806800N24N

November 2020

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About this Manual

Overview of Contents

This Reference Guide is intended for users qualified in electronics or electrical engineering. Users must have a working understanding of Peripheral Component Interconnect (PCI), AdvancedTCA®, and telecommunications.

The manual contains the following chapters and appendices:

About this Manual on page 11 lists all conventions and abbreviations used in this manual and outlines the revision history.

Safety Notes on page 17 lists safety notes applicable to the blade.

Sicherheitshinweise on page 21 provides the German translation of the safety notes section.

Chapter 1, Introduction on page 25 describes the main features of the blade.

Chapter 2, Hardware Preparation and Installation on page 29 outlines the installation requirements, hardware accessories, switch settings, installation and removal procedures.

Chapter 3, Controls, LEDs and Connectors on page 45 describes external interfaces of the blade. This includes connectors and LEDs.

Chapter 4, Functional Description on page 53 describes the functionalities provided on the RTM.

Chapter 5, Supported IPMI Commands on page 65 describes supported IPMI commands and PICMG 3.0 commands.

Chapter 6, FRU Information on page 79 describes FRU information and power configuration.

Chapter 7, Sensor Data Records on page 81 describes data records of all the sensors on the blade.

Appendix A, Related Documentation on page 103 provides links to further blade-related documentation.

Abbreviations

This document uses the following abbreviations:

Abbreviation	Definition
ATCA	Advanced Telecom Compute Architecture
BBS	Basic Blade Services

Abbreviation	Definition
BGA	Ball Grid Array
BIOS	Basic Input/Output System
DDR3	Double Data Rate 3 synchronous dynamic random access memory
DRAM	Dynamic Random Access Memory
ECC	Error Correction Code
EEPROM	Electrically Erasable Programmable Read Only Memory
FRU	Field Replaceable Unit
GPIO	General Purpose Input/Output
I2C	Inter Integrated-Circuit Bus (2-wire serial bus and protocol)
ICH	I/O Control Hub (also called "South Bridge")
IMC	Integrated Memory Controller
IPMB	Intelligent Platform Management Bus
IPMC	Intelligent Platform Management Controller
IPMI	Intelligent Platform Management Interface
JTAG	Joint Test Action Group
L2	Level 2 (as in "L2 Cache")
LVDS	Low Voltage Differential Signaling
MAC	Medium Access Controller
MCH	Memory Controller Hub (also called "North Bridge")
MMC	Module Management Controller
NEBS	Network Equipment Building System
NVRAM	Non-volatile Random Access Memory
OEM	Original Equipment Manufacturer
PCI-E	PCI-Express
PHY	Physical layer device (for ethernet)
PICMG	PCI Industrial Computer Manufacturers Group
POST	Power-on Self Test

Abbreviation	Definition
RC	Root Complex
RoHS	Restriction of Hazardous Substances
RTC	Real-Time Clock
SATA	Serial AT Attachment (high-speed serial interface standard for storage devices)
SDR	Sensor Data Record
SDRAM	Synchronous Dynamic Random Access Memory
SELV	Safety Extra Low Voltage
SerDes	Serializer-Deserializer
SMBus	System Management Bus

Conventions

The following table describes the conventions used throughout this manual..

Notation	Description
`0x00000000`	Typical notation for hexadecimal numbers (digits are 0 through F), for example used for addresses and offsets
`0b0000`	Same for binary numbers (digits are 0 and 1)
bold	Used to emphasize a word
`Screen`	Used for on-screen output and code related elements or commands. `Sample of Programming used in a table (9pt)`
`Courier + Bold`	Used to characterize user input and to separate it from system output
Reference	Used for references and for table and figure descriptions
File > Exit	Notation for selecting a submenu
<text>	Notation for variables and keys
[text]	Notation for software buttons to click on the screen and parameter description
...	Repeated item for example node 1, node 2, ..., node 12

Notation	Description
. . .	Omission of information from example/command that is not necessary at the time
..	Ranges, for example: 0..4 means one of the integers 0,1,2,3, and 4 (used in registers)
|	Logical OR
	Indicates a hazardous situation which, if not avoided, could result in death or serious injury
	Indicates a hazardous situation which, if not avoided, may result in minor or moderate injury
	Indicates a property damage message
	Indicates a hot surface that could result in moderate or serious injury
	Indicates an electrical situation that could result in moderate injury or death
	Indicates that when working in an ESD environment care should be taken to use proper ESD practices
	No danger encountered, pay attention to important information

Summary of Changes

This manual has been revised and replaces all prior editions.

Part Number	Publication Date	Description
6806800N24N	November 2020	Updated for 62368-1 compliance.
6806800N24M	October 2019	Rebranded to SMART Embedded Computing template. Removed Declaration of Conformity.
6806800N24L	November 2017	Updated *Table 3-1 on page 46*.
6806800N24K	March 2015	Changed sensor numbers from Hex Value to Decimal Value from *Table 7-3* to *Table 7-19*.
6806800N24J	January 2015	Added *Table 5-16* and *Table 5-17*. Updated *Table 5-6*.
6806800N24H	December 2014	Updated *Chapter Sensor Data Records* and *Table 7-1.*
6806800N24G	June 2014	Re-branded to Artesyn template and Updated *Figure 1-1 Declaration of Conformity.*
6806800N24F	January 2014	Updated *Table 3-1 on page 46*.
6806800N24E	January 2014	Updated *Table 3-1 on page 46*.
6806800N24D	August 2013	Updated *Table 2-1 on page 30* and added RJ-45 and SFP/SFP+ sections to the English and German safety notes.
6806800N24C	July 2013	Added *Get Sensor Reading (OEM Sensors) on page 101*.
6806800N24B	April 2012	Final version.
6806800N24A	January 2012	First edition.

Safety Notes

This section provides warnings that precede potentially dangerous procedures throughout this manual. Instructions contained in the warnings must be followed during all phases of operation, service, and repair of this equipment. You should also employ all other safety precautions necessary for the operation of the equipment in your operating environment. Failure to comply with these precautions or with specific warnings elsewhere in this manual could result in personal injury or damage to the equipment.

SMART Embedded Computing intends to provide all necessary information to install and handle the product in this manual. Because of the complexity of this product and its various uses, we do not guarantee that the given information is complete. If you need additional information, ask your SMART EC representative.

The product has been designed to meet the standard industrial safety requirements. It must not be used except in its specific area of office telecommunication industry and industrial control.

Only personnel trained by SMART EC or persons qualified in electronics or electrical engineering are authorized to install, remove or maintain the product.

The information given in this manual is meant to complete the knowledge of a specialist and must not be used as replacement for qualified personnel.

Keep away from live circuits inside the equipment. Operating personnel must not remove equipment covers. Only factory authorized service personnel or other qualified service personnel may remove equipment covers for internal subassembly or component replacement or any internal adjustment.

Do not install substitute parts or perform any unauthorized modification of the equipment or the warranty may be voided. Contact your local SMART EC representative for service and repair to make sure that all safety features are maintained.

EMC

The blade has been tested in a standard SMART EC system and found to comply with the limits for a Class A digital device in this system, pursuant to part 15 of the FCC Rules, EN 55022 Class A respectively. These limits are designed to provide reasonable protection against harmful interference when the system is operated in a commercial environment.

This is a Class A product based on the standard of the Voluntary Control Council for Interference by Information Technology Interference (VCCI). If this equipment is used in a domestic environment, radio disturbance may arise. When such trouble occurs, the user may be required to take corrective actions.

The blade generates and uses radio frequency energy and, if not installed properly and used in accordance with this guide, may cause harmful interference to radio communications. Operating the system in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

Installation

Damage of Circuits

Electrostatic discharge and incorrect blade installation and removal can damage circuits or shorten their life.

Before touching the blade or electronic components, make sure that you are working in an ESD-safe environment.

Data Loss

Removing the blade with the blue LED still blinking causes data loss.

Wait until the blue LED is permanently illuminated, before removing the blade.

Damage of Blade and Additional Devices and Modules

Incorrect installation of additional devices or modules may damage the blade or the additional devices or modules.

Before installing or removing an additional device or module, read the respective documentation

Operation

Blade Damage - Blade Surface

High humidity and condensation on the blade surface causes short circuits.

Do not operate the blade outside the specified environmental limits. Make sure the blade is completely dry and there is no moisture on any surface before applying power.

Blade Overheating and Blade Damage

Operating the blade without forced air cooling may lead to blade overheating and thus blade damage.

When operating the blade, make sure that forced air cooling is available in the shelf.

When operating the blade in areas of electromagnetic radiation ensure that the blade is bolted on the system and the system is shielded by enclosure.

RJ-45 Connectors

The RJ-45 connectors on the face plate must only be used for twisted-pair Ethernet (TPE) and serial console connections (according to face plate marking). TPE and serial connections are considered SELV circuits. Connecting a telephone line (TNV circuit) to such a connector may destroy your telephone as well as your board. Therefore:x

- Clearly mark TPE connectors near your working area as network connectors.
- Only connect TPE bushing of the system to safety extra low voltage (SELV) circuits.
- Make sure that the length of the electric cable connected to a TPE bushing does not exceed 100 m.

If you have further questions, ask your system administrator.

Environment

Always dispose of used blades, system components and RTMs according to your country's legislation and manufacturer's instructions.

SFP / SFP+ Modules

Personal Injury and Damage of the RTM and SFP Modules

Installing and using SFP modules which are not fully certified and which do not meet all relevant safety standards may damage the RTM and the SFP modules and may lead to personal injury.

Only use and install SFP modules which are fully certified and which meet all relevant safety standards.

Personal Injury

Optical SFP modules may be classified as laser products. When installing and using any of these SFP modules, the regulations which correspond to the respective laser class apply to the whole RTM. Not complying to these regulations may lead to personal injury.

When installing and using optical SFP modules which are classified as laser products, make sure to comply to the respective regulations.

Eye Damage

Optical SFP modules may emit laser radiation when no cable is connected. This laser radiation is harmful to your eyes.

Do not look into the optical lens at any time.

SFP Module Damage

The optical port plug protects the optical fibres against dirt and damage. Dirt and damage can render the SFP module inoperable.

Only remove the optical plug when you are ready to connect a cable to the SFP module. When no cable is connected, cover the port with an optical port plug.

Sicherheitshinweise

Dieses Kapitel enthält Hinweise, die potentiell gefährlichen Prozeduren innerhalb dieses Handbuchs vorrangestellt sind. Beachten Sie unbedingt in allen Phasen des Betriebs, der Wartung und der Reparatur des Systems die Anweisungen, die diesen Hinweisen enthalten sind. Sie sollten außerdem alle anderen Vorsichtsmaßnahmen treffen, die für den Betrieb des Produktes innerhalb Ihrer Betriebsumgebung notwendig sind. Wenn Sie diese Vorsichtsmaßnahmen oder Sicherheitshinweise, die an anderer Stelle diese Handbuchs enthalten sind, nicht beachten, kann das Verletzungen oder Schäden am Produkt zur Folge haben.

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Das System erfüllt die für die Industrie geforderten Sicherheitsvorschriften und darf ausschließlich für Anwendungen in der Telekommunikationsindustrie und im Zusammenhang mit Industriesteuerungen verwendet werden.

Einbau, Wartung und Betrieb dürfen nur von durch SMART EC ausgebildetem oder im Bereich Elektronik oder Elektrotechnik qualifiziertem Personal durchgeführt werden. Die in diesem Handbuch enthaltenen Informationen dienen ausschließlich dazu, das Wissen von Fachpersonal zu ergänzen, können dieses jedoch nicht ersetzen.

Halten Sie sich von stromführenden Leitungen innerhalb des Produktes fern. Entfernen Sie auf keinen Fall Abdeckungen am Produkt. Nur werksseitig zugelassenes Wartungspersonal oder anderweitig qualifiziertes Wartungspersonal darf Abdeckungen entfernen, um Komponenten zu ersetzen oder andere Anpassungen vorzunehmen.

Installieren Sie keine Ersatzteile oder führen Sie keine unerlaubten Veränderungen am Produkt durch, sonst verfällt die Garantie. Wenden Sie sich für Wartung oder Reparatur bitte an die für Sie zuständige Geschäftsstelle von SMART EC. So stellen Sie sicher, dass alle sicherheitsrelevanten Aspekte beachtet werden.

EMV

Das Blade wurde in einem SMART EC Standardsystem getestet. Es erfüllt die für digitale Geräte der Klasse A gültigen Grenzwerte in einem solchen System gemäß den FCC-Richtlinien Abschnitt 15 bzw. EN 55022 Klasse A. Diese Grenzwerte sollen einen angemessenen Schutz vor Störstrahlung beim Betrieb des Blades in Gewerbe- sowie Industriegebieten gewährleisten.

Das Blade arbeitet im Hochfrequenzbereich und erzeugt Störstrahlung. Bei unsachgemäßem Einbau und anderem als in diesem Handbuch beschriebenen Betrieb können Störungen im Hochfrequenzbereich auftreten.

Warnung! Dies ist eine Einrichtung der Klasse A. Diese Einrichtung kann im Wohnbereich Funkstörungen verursachen. In diesem Fall kann vom Betreiber verlangt werden, angemessene Maßnahmen durchzuführen.

Installation

Beschädigung von Schaltkreisen

Elektrostatische Entladung und unsachgemäßer Ein- und Ausbau von Blades kann Schaltkreise beschädigen oder ihre Lebensdauer verkürzen.

Bevor Sie Blades oder elektronische Komponenten berühren, vergewissern Sie sich, daß Sie in einem ESD-geschützten Bereich arbeiten.

Datenverlust

Wenn Sie das Blade aus dem Shelf herausziehen, und die blaue LED blinkt noch, gehen Daten verloren.

Warten Sie bis die blaue LED durchgehend leuchtet, bevor Sie das Blade herausziehen.

Beschädigung des Blades und von Zusatzmodulen

Fehlerhafte Installation von Zusatzmodulen, kann zur Beschädigung des Blades und der Zusatzmodule führen.

Lesen Sie daher vor der Installation von Zusatzmodulen die zugehörige Dokumentation.

RJ-45 Stecker

Die RJ-45 Stecker auf der Frontblende dürfen nur für Twisted-Pair-Ethernet (TPE) oder für Serielle Konsole Verbindungen verwendet werden (entsprechend der Markierung an der Frontblende). TPE und Serielle Verbindungen sind SELV Kreise. Beachten Sie, dass ein versehentliches Anschließen einer Telefonleitung (TNV Kreis) an einen solchen TPE Stecker sowohl das Telefon als auch das Board zerstören kann. Beachten Sie deshalb die folgenden Hinweise:

- Kennzeichnen Sie TPE-Anschlüsse in der Nähe Ihres Arbeitsplatzes deutlich als Netzwerkanschlüsse.
- Schließen Sie an TPE-Buchsen ausschließlich SELV-Kreise (Sicherheitskleinspannungsstromkreise) an.
- Die Länge des mit dem Board verbundenen Twisted-Pair Ethernet-Kabels darf 100 m nicht überschreiten.

Betrieb

Beschädigung des Blades

Hohe Luftfeuchtigkeit und Kondensat auf der Oberfläche des Blades können zu Kurzschlüssen führen.

Betreiben Sie das Blade nur innerhalb der angegebenen Grenzwerte für die relative Luftfeuchtigkeit und Temperatur. Stellen Sie vor dem Einschalten des Stroms sicher, dass sich auf dem Blade kein Kondensat befindet.

Überhitzung und Beschädigung des Blades

Betreiben Sie das Blade ohne Zwangsbelüftung, kann das Blade überhitzt und schließlich beschädigt werden.

Bevor Sie das Blade betreiben, müssen Sie sicher stellen, dass das Shelf über eine Zwangskühlung verfügt.

Wenn Sie das Blade in Gebieten mit starker elektromagnetischer Strahlung betreiben, stellen Sie sicher, dass das Blade mit dem System verschraubt ist und das System durch ein Gehäuse abgeschirmt wird.

SFP / SFP+ Modules

Gefahr von Verletzungen sowie von Beschädigung des RTMs und SFP-Modulen

Die Installation und der Betrieb von SFP-Modulen, welche nicht zertifiziert sind und welche nicht den Sicherheitsstandards entsprechen, kann Verletzungen zur Folge haben sowie zur Beschädigung des RTMs und von SFP-Modulen führen.

Verwenden Sie daher nur SFP-Module, die zertifiziert sind und die den Sicherheitsstandards entsprechen.

Verletzungsgefahr

Optische SFP-Module können als Laserprodukte klassifiziert sein. Wenn Sie solche SFP-Module installieren und betreiben, so gelten die entsprechenden Bestimmungen für Laserprodukte für das gesamte RTM. Werden diese Bestimmungen nicht eingehalten, so können Verletzungen die Folge sein.

Wenn Sie SFP-Module betreiben, die als Laserprodukte klassifiziert sind, stellen Sie sicher, dass die entsprechenden Bestimmungen für Laserprodukte eingehalten werden.

Verletzungsgefahr der Augen

Optische SFP-Module können Laserstrahlen aussenden, wenn kein Kabel angeschlossen ist.

Blicken Sie daher nicht direkt in die Öffnung eines SFP-Moduls, um Verletzungen der Augen zu vermeiden.

Beschädigung von SFP-Modulen

Die Schutzkappe eines SFP-Modules dient dazu, die sensible Optik des SFP-Modules gegen Staub und Schmutz zu schützen.

Entfernen Sie die Schutzkappe nur dann, wenn Sie beabsichtigen, ein Kabel anzuschließen. Andernfalls belassen Sie die Schutzkappe auf dem SFP-Modul.

Introduction

1.1 Features

The RTM-ATCA-737x-C01 is a high performance AdvancedTCA Rear Transition Module designed according to the PICMG 3.0 Revision 3.0 AdvancedTCA Base Specification.The RTM-ATCA-737x-C01 connects directly to the front board ATCA-7370. It offers dual GbE SFP ports, two hot-plug SAS HDDs, one USB 2.0 port and one SAS SFF-8088 connector.

The following lists the main features of the RTM-ATCA-737x-C01:

- Single slot RTM (70mm x 322mm) form factor
- AMC-like RTM behavior according to AMC.0 specification
- Supports one Ethernet controller: Intel Powerville PCI-E to 2-port MDI and SerDes/SGMII controller
- The following are the RTM interfaces on the front panel:
  - 2x GbE SFP ports
  - 1x USB port
  - 1x SFF-8088 SAS connector
- Two HDD bays supporting 2.5 inch SAS HDD hot-plug
- On-board Module Management Controller (MMC)

1.2 Standard Compliances

The product is designed to meet the following standards.

Table 1-1 Standard Compliances

Standard	Description
SN29500/8, MIL-HDBK-217F, SR-332, TR-NWT-000357	Reliability requirements
IEC 60068-2-1/2/3/13/14	Climatic environmental requirements. The project can only be used in a restricted temperature range.
IEC 60068-2-27/32/35	Mechanical environmental requirements

Table 1-1 Standard Compliances (continued)

Standard	Description
EN/UL/IEC 62368-1 and 60950 (in predefined system) CAN/CSA C22.2 No 62368-1 and 60950-1	Legal requirements, safety
UL 94V-0/1, Oxygen index for PCBs below 28%	Flammability
EN 55022 EN55024 EN 300 385 (v1.4.1): 2008 FCC Part 15, Subpart B ICES-003: 2004 VCCI V-3/2011.04 AS/NZS CISPR22: 2009	EMC requirements on system level Attention: ATCA boards require CISPR 22 Class A on conducted emissions EMC immunity requirements industrial EMC for telecom equipment
ANSI/IPC-A-610 Rev.B Class 2 ANSI/IPC-R-700B, ANSI-J-001...003	Manufacturing Requirements
ISO 8601	Y2K compliance
NEBS Standard GR-63-CORE NEBS Standard GR-1089 CORE	NEBS level three Project is designed to support NEBS level three. The compliance tests must be done with the customer target system.

1.3 Mechanical Data

The following table provides details about the blade's mechanical data, such as dimensions and weight.

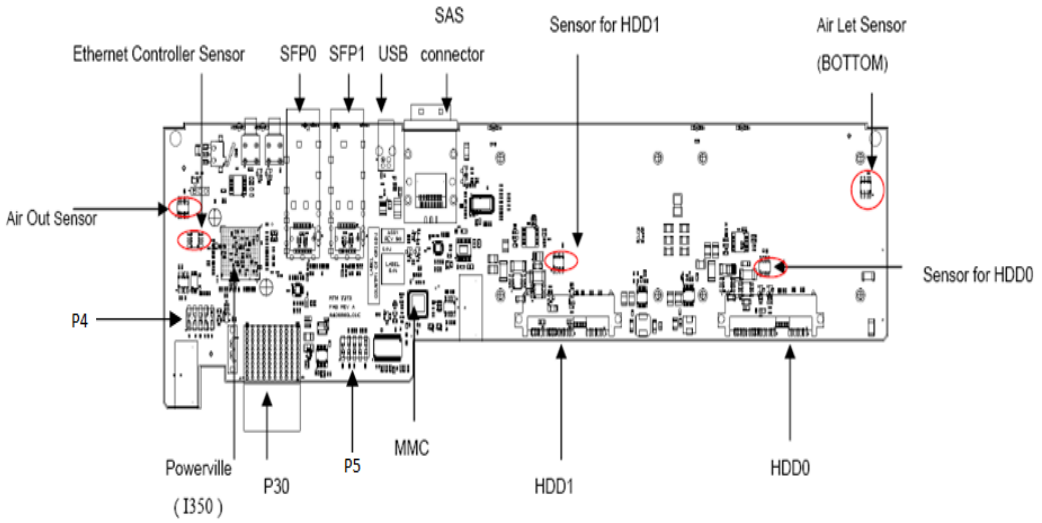
Table 1-2 Mechanical Data

Feature	Value
Dimensions (width x height x depth)	30mm x 351mm x 178mm
Net weight	866g (without HDD), 1308g (with two HDDs)
Weight (including standard packaging)	1619g (without DIMMs), 2061g with two HDDs)

1.4 Mechanical Layout

The following figure shows the placement of the components on the RTM-ATCA-737x-C01.

Figure 1-1 RTM-ATCA-737x-C01 Components



1.5 Ordering Information

The following table lists the product variants and accessories that are available upon release of this publication. Consult your local SMART EC sales representative for the availability of other variants and accessories.

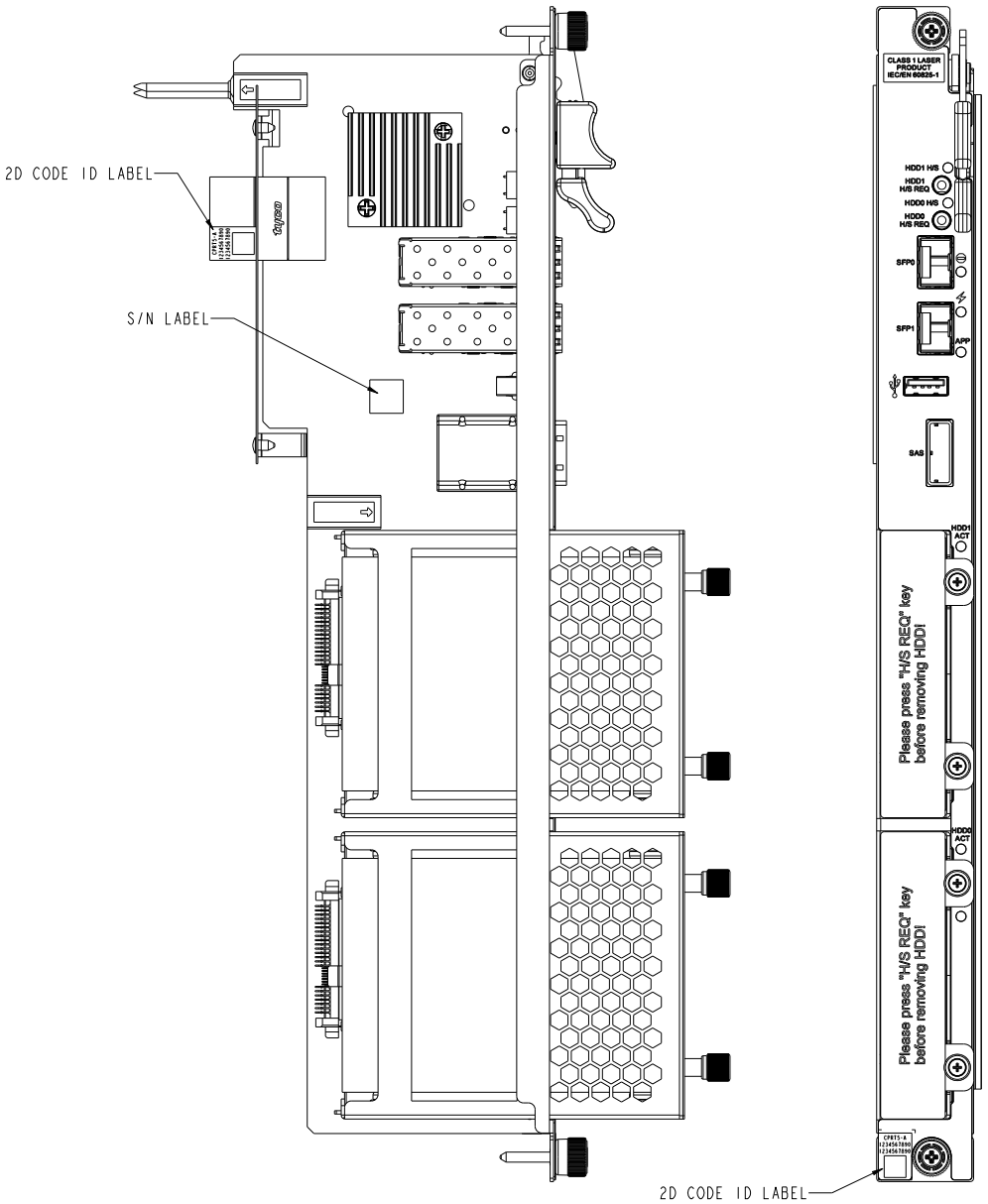
Table 1-3 Product Variants and Accessories

Product Number	Description
RTM-ATCA-737x-C01	CPRT5-A, RTM for the ATCA-737x product series, 2X GbE (SFP), 2X slot for optional HDD, NSN variant.

1.6 Product Identification

The following graphic shows the location of the serial number label.

Figure 1-2 Serial Number Location



Hardware Preparation and Installation

2.1 Unpacking and Inspecting the Module

NOTICE

Damage of Circuits

Electrostatic discharge and incorrect blade installation and removal can damage circuits or shorten its life.

Before touching the blade or electronic components, make sure that you are working in an ESD-safe environment.

Shipment Inspection

To inspect the shipment, perform the following steps:

1. Verify that you have received all items of your shipment:
   - Printed *Quick Start Guide* and *Safety Notes Summary*
   - RTM-ATCA-737x-C01
   - Any optional items ordered
2. Check for damage and report any damage or differences to the customer service.
3. Remove the desiccant bag shipped together with the blade and dispose of it according to your country's legislation.

The blade is thoroughly inspected before shipment. If any damage occurred during transportation or any items are missing, please contact our customer service immediately.

2.2 Environmental and Power Requirements

In order to meet the environmental requirements, the blade has to be tested in the system in which it is to be installed.

Before you power up the blade, calculate the power needed according to your combination of blade upgrades and accessories.

2.2.1 Environmental Requirements

The environmental conditions must be tested and proven in the shelf configuration used. The conditions refer to the surrounding of the blade within the user environment.

The environmental requirements of the blade may be further limited down due to installed accessories, such as hard disks or PMC modules, with more restrictive environmental requirements.

Operating temperatures refer to the temperature of the air circulating around the blade and not to the actual component temperature.

NOTICE

Blade Damage - Blade Surface

High humidity and condensation on the blade surface causes short circuits.

Do not operate the blade outside the specified environmental limits. Make sure the blade is completely dry and there is no moisture on any surface before applying power.

Blade Overheating and Blade Damage

Operating the blade without forced air cooling may lead to blade overheating and thus blade damage.

When operating the blade, make sure that forced air cooling is available in the shelf

Table 2-1 Environmental Requirements

Requirement	Operating	Non-Operating
Temperature	+5°C (41°F) to +40°C (104°F) (normal operation) according to NEBS Standard GR-63-CORE -5°C (23°F) to +55°C (131°F) (exceptional operation) according to NEBS Standard GR-63-CORE	-40°C (-40°F) to +70°C (158°F) (may be further limited by installed accessories)
Temp. Change	±0.25°C/min according to NEBS Standard GR-63-CORE	± 0.25°C/min
Rel. Humidity	5% to 90% non-condensing according to SMART Embedded Computing internal environmental requirements	5% to 95% non-condensing according to SMART Embedded Computing internal environmental requirements

Table 2-1 Environmental Requirements (continued)

Requirement	Operating	Non-Operating
Vibration	0.1g from 5 to 100 z and back to 5Hz at a rate of 0.1 octave/minute	5-20Hz at $0.01g^2$/Hz 20-200Hz at -3.0dB/octave Random 5-20Hz at $1m^2/Sec^3$ Random 20-200Hz at $-3m/Sec^2$
Shock	Half-sine, 11m/Sec, $30mSec/Sec^2$	Blade level packaging Half-sine, 6mSec at $180m/Sec^2$
Free Fall	-	1,200 mm/all edges and corners 1.0m (packaged) per ETSI 300 019-2-2 (blade level packaging) 100mm (unpacked) per GR-63-CORE

If you integrate the blade in your own system please contact your local sales representative for further safety information.

2.3 Installing the Hard Disk Module

The RTM provides a hot swappable SAS hard disk module. In this section you can find information on how to install the hard disk module.

NOTICE

Damage of Circuits

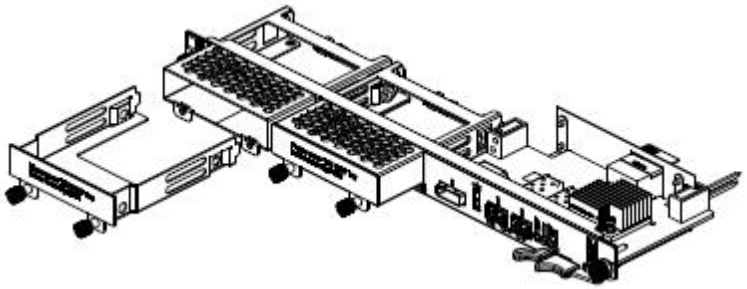
Electrostatic discharge and incorrect RTM installation and removal can damage circuits or shorten their life.

Before touching the RTM or electronic components, make sure that you are working in an ESD-safe environment

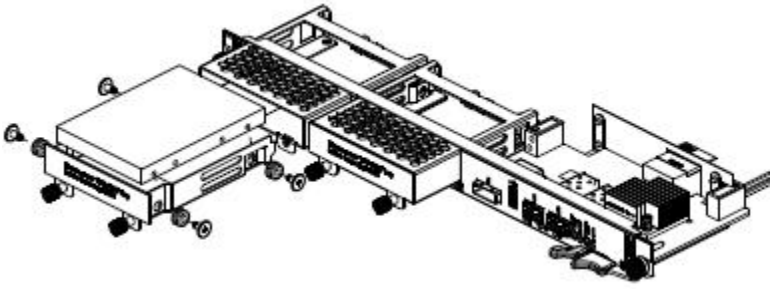
The RTM is shipped with two HDD slots.

Installation procedure

1. Remove the SAS/SATA HDD bracket of the RTM by loosening the two thumb screws that attach the bracket to the HDD guide slot.

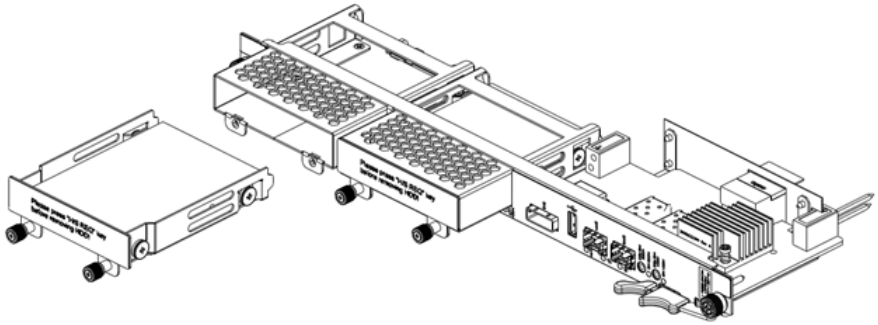


2. Install the 4pcs anti-vibrate grommets to the HDD bracket.
3. Insert the SAS/SATA hard disk module into the bracket, so that the module's mounting holes fit in the anti-vibrate grommets (installed in the previous step).
4. Fasten the SAS/SATA hard disk module to the bracket using the 4pcs anti-vibrate screws.



5. Insert the bracket with SAS/SATA hard disk module into the HDD guide slot.
6. Tighten the two thumb screws of the SAS/SATA HDD bracket.

7. Execute all the steps required to make the SAS/SATA hard disk operable in your Operating System (the steps depend on the Operating System that you are using).



2.4 Replacing the Hard Disk Module

In this section you can find information on how to replace the hard disk module.

If the hot swap feature is not supported on your RTM, you cannot replace the hard disk module yourself. Please send the RTM to your local support representative to have the hard disk module replaced.

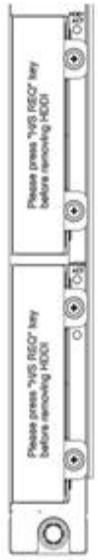
NOTICE
Damage of Circuits Electrostatic discharge and incorrect RTM installation and removal can damage circuits or shorten their life. Before touching the RTM or electronic components, make sure that you are working in an ESD-safe environment.

Replacement procedure

To replace the hard disk, proceed as follows.

1. Make sure a replacement hard disk module is available.
2. Take all necessary steps in your operating system to make the hard disk module ready for removal (the steps depend on the OS you are using).

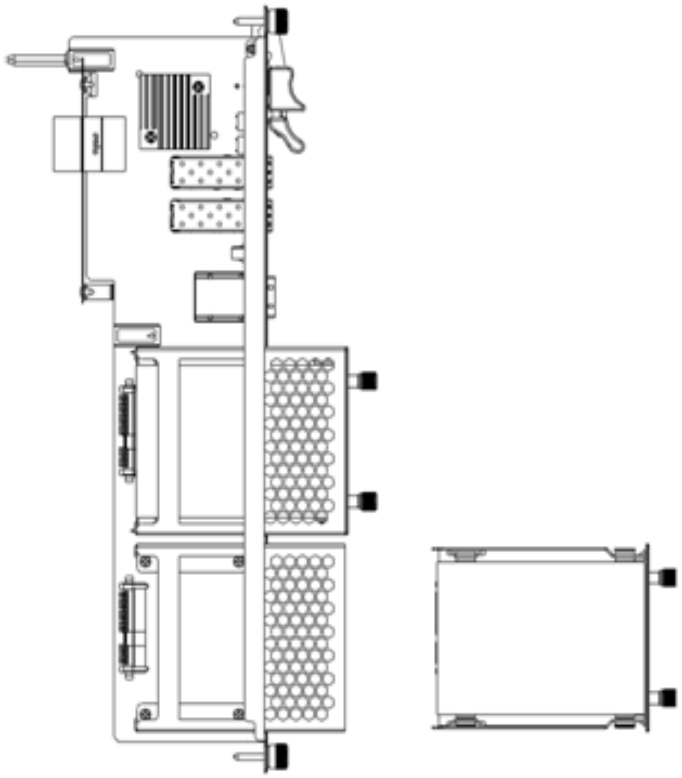
3. Loosen the two thump screws of the hard disk module.



4. Pull the hard disk module outward by holding both screws and exerting equal force to keep it straight.
5. Align the replacement hard disk module to the guiding rails of the hard disk slot.

6. Insert the hard disk module into the slot until it is firmly in place.

Figure 2-1 Replacing the Hard Disk Module



7. Tighten the two thumb screws of the hard disk module.
8. Take all necessary steps in your operating system to make the hard disk operable (the step depend on the OS you are using).

2.5 Installing and Removing the RTM

The RTM must be installed into a ATCA system without a Zone 3 midplane.

The RTM provides support for basic hot swap, that means it can be installed, removed and replaced in a powered system.

NOTICE

RTM Damage

Installing the RTM with other blades than the Product-ShortName may damage the RTM and the front blade.

Only install the RTM with the Product-ShortName blade.

Damage of Circuits

Electrostatic discharge and incorrect RTM installation and removal can damage circuits or shorten its life.

Before touching the RTM or electronic components, make sure that you are working in an ESD-safe environment.

Data Loss

If you remove the RTM from a powered system, data that is in the process of being written to the hard disk located on the RTM may be lost.

Disconnect the RTM hard disk from OS services before removing the RTM from a powered system.

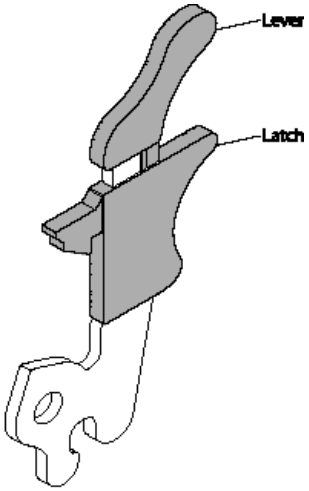
2.5.1 Installing the RTM

Installation Procedure

The following procedure describes the installation of the RTM. It assumes that your system is powered. If your system is unpowered, you can disregard the blue LED and thus skip the respective step. In this case it is a purely mechanical installation.

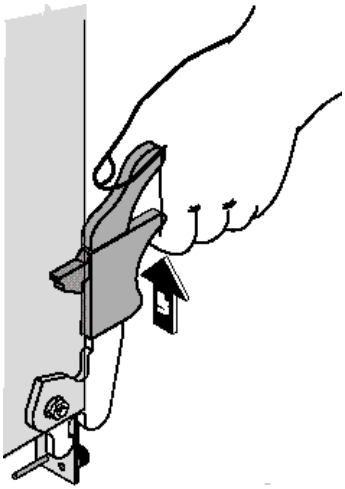
1. Locate the slot the RTM is to be installed into the shelf's rear which must be the same as that of the front blade.

2. Ensure that the top handle of the RTM is in an outward position by squeezing the lever and the latch together.



3. Insert the RTM into the shelf by placing the top and bottom edges in the card guides of the slot.
4. Slide the RTM into the slot.
5. Apply equal and steady pressure to the RTM to carefully slide the RTM into the shelf until you feel resistance. Continue to gently push the RTM until the RTM connectors engage.
6. Squeeze the lever and the latch together and hook the upper handle into the shelf rail recesses.

7. Fully insert the RTM and lock it to the shelf by pressing the two components of the upper handle together and turning the handles toward the face plate.



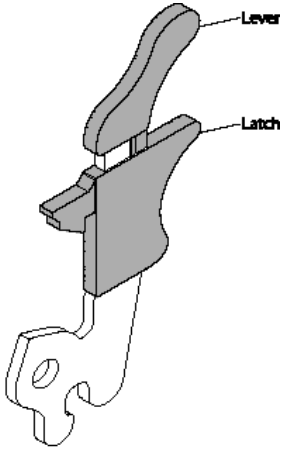
8. Tighten both face plate screws on the RTM.
9. Wait until the blue LED on the RTM is OFF.
   A switched off blue LED indicates that the payload of the RTM has become active.
10. Plug interface cable into face plate connectors, if applicable.
11. Reboot the front blade.
    This is necessary so that the OS of the front blade can recognize the SAS controller or any other PCI device located on the RTM.

2.5.2 Removing the RTM

Removal Procedure

The following procedure describes the removal of the RTM. It assumes that your system is powered. If your system is unpowered, you can disregard the blue LED and thus skip the respective step. In this case it is a purely mechanical procedure.

1. Unlatch the upper handle outward by squeezing the lever and the latch together and turning the handle outward only enough to unlatch the handle from the face plate, that means until you feel a resistance. Do not rotate the handle fully outward.
   The blue LED blinks indicating that the shelf manager is informed about the desire of the blade to power down the payload of both the front blade and the RTM and the power-down process is ongoing.



2. Wait until the blue LED of the RTM is permanently ON.
   A permanently switched ON LED indicates that the payload of the RTM has been powered down.
3. Remove interface cables from face plate connectors, if applicable.
4. Loosen the two RTM face plate screws.
5. Unlatch the upper handle and rotate both handles fully outward.
6. Remove the RTM from the slot.

2.6 Installing and Removing SFP Modules

This section describes how to install and remove SFP modules.

Eye Damage

Optical SFP modules may emit laser radiation when no cable is connected.

Avoid staring into open apertures to avoid damage to your eyes.

Personal Injury and Damage of the RTM and SFP Modules

Installing and using SFP modules which are not fully certified and which do not meet all relevant safety standards may damage the RTM and the SFP modules and may lead to personal injury.

Only use and install SFP modules which are fully certified and which meet all relevant safety standards.

Personal Injury

Optical SFP modules may be classified as laser products. When installing and using any of these SFP modules, the regulations which correspond to the respective laser class apply to the whole RTM. Not complying to these regulations, may lead to personal injury.

When installing and using optical SFP modules which are classified as laser products, make sure to comply to the respective regulations.

SFP modules can be installed/removed both while the RTM is powered and nonpowered. The presence and also the type of SFP modules is automatically detected.

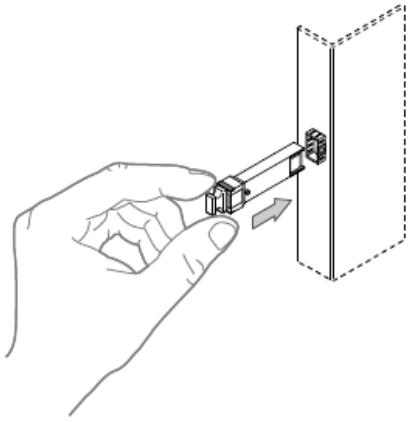
The maximum power consumption of all installed SFP modules must not exceed 1.2W.

2.6.1 Installing an SFP Module

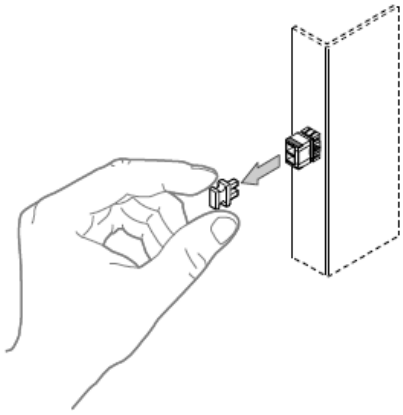
Procedure

In order to install an SFP module, proceed as follows:

1. Slide the SFP module into the slot until it locks into position.



2. Remove the optical port plug.



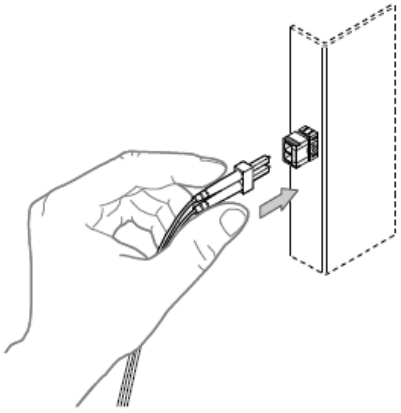
NOTICE

SFP Module Damage

The optical port plug protects the sensitive optical fibres against dirt and damage. Dirt and damage can render the SFP module inoperable.

Only remove the optical plug when you are ready to connect a cable to the SFP module. When no cable is connected, cover the port with an optical port plug.

3. Connect the network cable to the SFP module

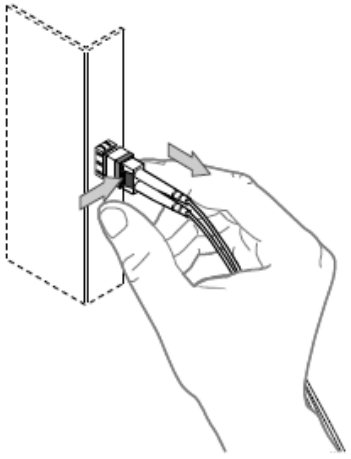


2.6.2 Removing an SFP Module

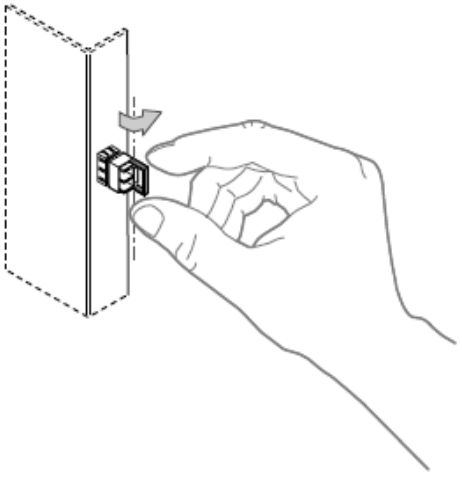
Procedure

In order to remove an SFP module, proceed as follows.

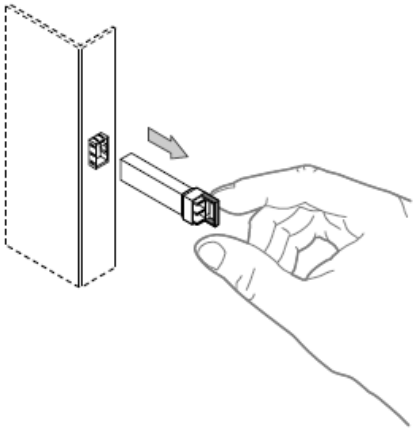
1. Remove any connected cable from the SFP module.



2. Open the SFP latch. Note that the latch mechanism of your SFP module may be slightly different compared to the latch shown in the following figure.



3. Grasp the SFP module and carefully slide it out of the slot.



4. Cover the optical port with the optical port plug.

NOTICE

SFP Module Damage

The optical port plug protects the sensitive optical fibers against dirt and damage. Dirt and damage can render the SFP module inoperable.

Only remove the optical plug when you are ready to connect a cable to the SFP module. When no cable is connected, cover the port with an optical port plug.

Controls, LEDs and Connectors

3.1 Face Plate

Figure 3-1 illustrates the RTM-ATCA-737x face plate.

Figure 3-1 Face Plate

The RTM-ATCA-737x-C01 face plate features the following interfaces and control elements:

- One USB 2.0 port
- One SFF-8088 SAS connector
- Two 2.5 inch SAS HDD bay panels
- Out of Service, Power Good, Application (APP), Hot Swap and HDD Hot plug LEDs (MMC control)
- Two GbE SFP SerDes ports
- Two press buttons for HDD Hot plug

The blade design provides a feature where the unused faceplate elements such as the LEDs or push buttons be covered behind a custom overlay foil.

3.1.1 LEDs

The following LEDs are featured in the RTM-ATCA-737x-C01.

Table 3-1 RTM-ATCA-737x-C01 Face Plate LEDs

Indicator	Color	Description
LED1 Out of Service (OOS) 	Red	Out Of Service This LED is controlled by MMC. MMC turns this LED OFF when FRU moves from M1 to M4. MMC turns this LED ON when FRU moves from M4 to M1.
LED2 Power Good 	Green	Power Good This LED is Controlled by MMC. MMC turns this LED ON at M4, if power (payload power /MMC power) is OK; otherwise keeps it OFF. MMC turns this LED OFF in case of any critical events raise in power sensors (payload power / MMC power). MMC turns this LED OFF when FRU moves from M4 to M1.
LED3 Application APP	Amber	Application (APP) This LED is controlled by MMC. OFF at M4. MMC ensures it is shut down when FRU moves from M4 to M1.

Table 3-1 RTM-ATCA-737x-C01 Face Plate LEDs (continued)

Indicator	Color	Description
LED H/S Hot Swap 	Blue	FRU State Machine During blade installation: Permanently blue: On-board MMC powers up Blinking blue: Blade communicates with shelf manager OFF: Blade is active During blade removal: Blinking blue: Blade notifies shelf manager of its desire to deactivate Permanently blue: Blade is ready to be extracted
HDD0 H/S (HDD0 Hot-plug)	Blue	HDD0 H/S This LED is controlled by MMC. Off: After power up and lamp test finished. Blinking Blue: MMC sends HDD hotswap request to higher layer software Permanently blue: The HDD is ready to be extracted.
HDD1 H/S (HDD1 Hot-plug)	Blue	HDD1 H/S This LED is controlled by MMC. Off: After power up and lamp test finished. Blinking blue: MMC sends HDD hotswap request to higher layer software Permanently blue: The HDD is ready to be extracted.
HDD0 ACT (HDD0-LED)	Green	HDD0 ACT This LED is controlled by HDD0. Green: HDD is available, Off: Not available Blink: HDD is in R/W active
HDD1 ACT (HDD1-LED)	Green	HDD1 ACT This LED is controlled by HDD1. Green: HDD is available, Off: Not available Blink: HDD is in R/W active

3.2 Connectors

3.2.1 Face Plate Connectors

The blade provides the following connectors at its face plate:

- Two GbE SFP SerDes port
- One USB 2.0 port
- One Mini SAS SFF-8088 connector

The pinout of each SFP is shown in the following table:

Table 3-2 SFP0/1 Connector Pinout

Pin	Signal	Pin	Signal
1	GND	11	GND
2	SFPx_TXFAULT	12	SFPx_RX-
3	SFPx_TXDIS	13	SFPx_RX+
4	SFPx_I2C_DATA	14	GND
5	SFPx_I2C_CLK	15	VCCR
6	SFPx_DETECT-	16	VCCT
7	NC	17	GND
8	SFPx_LOS	18	SFPx_TX+
9	GND	19	SFPx_TX-
10	GND	20	GND

The pinout of the USB connector is shown in the following table

Table 3-3 USB Connector Pinout

Pin	Signal
1	VP5_USB
2	USB_N
3	USB_P
4	GND

The pinout of the SAS connector is shown in the following table.

Table 3-4 Mini SAS SFF-8088 Connector Pinout

Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
A1	GND	A4	GND	A7	GND	A10	GND	A13	GND
A2	SAS2_TX_P	A8	SAS2_CON_RX_P	B12	SAS3_RX_N	B6	SAS3_CON_TX_N		
A3	SAS2_TX_N-	A9	SAS2_CON_RX_N	B11	SAS3_RX_P	B5	SAS3_CON_TX_P		
B1	GND	B4	GND	B7	GND	B10	GND	A13	GND
A5	SAS3_TX_P	A11	SAS3_CON_RX_P	B9	SAS2_RX_N	B3	SAS2_CON_TX_N		
A6	SAS3_TX_N	A12	SAS3_CON_RX_N	B8	SAS2_RX_P	B2	SAS2_CON_TX_P		

3.2.2 Backplane Connectors

Table 3-5 Zone 3 Connector P30 Pin Assignment

P30									
Row	**Interface**	**Col AB**		**Col CD**		**Col EF**		**Col GH**	
1	MISC	NC	NC	NC	NC	NC	NC	RTM_PRESENT_N	RTM_PG
2		SAS2_TX_P	SAS2_TX_N	SAS2_RX_P	SAS2_RX_N	SAS3_TX_P	SAS3_TX_N	SAS3_RX_P	SAS3_RX_N
3		SAS0_TX_P	SAS0_TX_N	SAS0_RX_P	SAS0_RX_N	SAS1_TX_P	SAS1_TX_N	SAS1_RX_P	SAS1_RX_N
4		USB_P	USB_N	NC	NC	SATA1_TX_P	SATA1_TX_N	SATA1_RX_P	SATA1_RX_N
5		NC	NC	NC	NC	NC	NC	NC	NC
6	PICE2.0 x4 Port10	PCI-E10_RP[0]	PCI-E10_RN[0]	PCI-E10_TP[0]	PCI-E10_TN[0]	PCI-E10_RP[1]	PCI-E10_RN[1]	PCI-E10_TP[1]	PCI-E10_TN[1]
7		PCI-E10_RP[2]	PCI-E10_RN[2]	PCI-E10_TP[2]	PCI-E10_TN[2]	PCI-E10_RP[3]	PCI-E10_RN[3]	PCI-E10_TP[3]	PCI-E10_TN[3]
8	PCI-E CLOCK	PCI-E10_CLKP	PCI-E10_CLKN	PCI-E_RST	NC	NC	NC	NC	NC
9	MISC	IPMB_L_SCL	IPMB_L_SDA	V3P3_M	NC	NC	RTM_PRESENT_N	NC	NC
10		V12P	V12P	V12P(RESVERD)	NC	NC	RTM_ENABLE_N	RTM_SMB_CLK	RTM_SMB_DAT

3.2.3 On-board Connectors

Table 3-6 SATA Connector Pinout

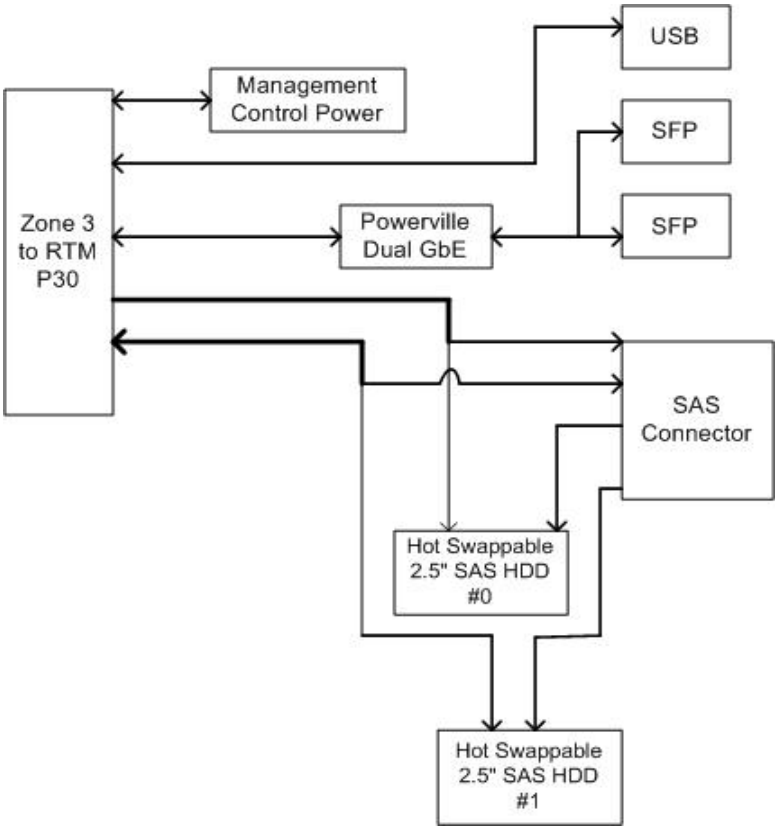
Pin	Signal
1	GND
2	SATA1_TX_P
3	SATA_TX_N
4	GND
5	SATA_RX_N
6	SATA_RX_P
7	GND

Functional Description

4.1 Block Diagram

The following figure shows the block diagram of the RTM-ATCA-737x-C01.

Figure 4-1 Block Diagram



4.2 AMC-Like Rear Transition Module

The RTM-ATCA-737x-C01 is treated as an independent FRU and is capable of hot-swap technology. To simplify the design, the RTM-ATCA-737x-C01 behaves like an AMC module in relation to the hot-swap and reset features, based on the interface requirement of PICMG AMC specification. All signals related to hot-swap are also defined according to this specification.

For power, the RTM power (3.3 V management and +12 V) is controlled by a hot-swap controller on the front board. The IPMC on the front board will control the power up and power down, based on the AMC specification.

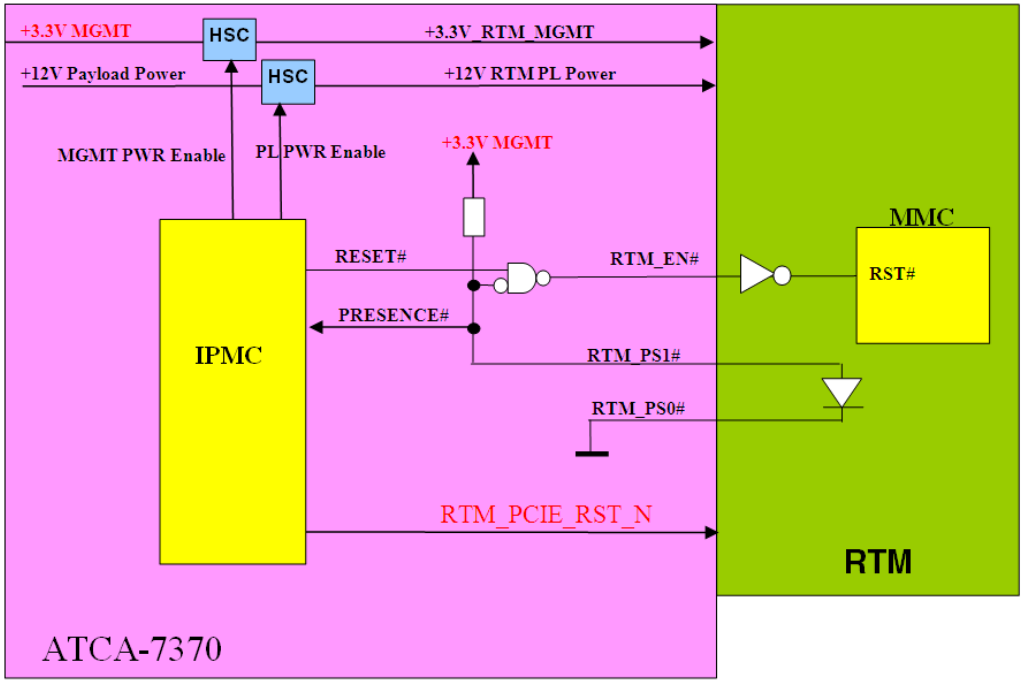
The IPMC on the ATCA-7370 is responsible for resetting the RTM. It initiates a reset cycle after an AMC module is plugged in or if the payload power of the ATCA-7370 carrier board is in the process of power cycling. The IPMC drives the RTM_EN# signal active low as an input to the RTM.

PS0# and PS1# signals are used as RTM insertion detection by IPMC on the front board. This function is the same as the behavior of an AMC.

RTM_PCIE_RST_N is a copy of the platform reset signal of the Intel © platform and is used to reset all PCI-E devices on the RTM board.

4.3 RTM Hot Swap Support

Figure 4-2 RTM Hot Swap Support



The RTM-ATCA-737x-C01 supports hot swapping. The basic hot-plug behavior is followed according to the PICMG AMC specification. This is done through the separation of the RTM power supply with hot swap controllers. The powering of the RTM payload power and management power is under the control of the main board's IPMC controller.

Miscellanous signals such as I^2C, GPIO, JTAG and USB are connected between the main board and the RTM-ATCA-737x-C01. They must remain tri-stated/disconnected until enabled by the IPMC. Because of this, these signals are buffered on front boards.

PCI-E signals are AC coupling and are hot swap capable hardware-wise. There is no need to use hot swap buffer to support hot swap.

4.4 Storage Subsystem

The RTM-ATCA-737x-C01 supports the following storage subsystems.

4.4.1 SAS Connections

The RTM-ATCA-737x-C01 supports the following types of SAS connections:

- External SAS connection with SFF-8088 connector
- On-board 2.5 inch SAS HDD with hot-plug capability.

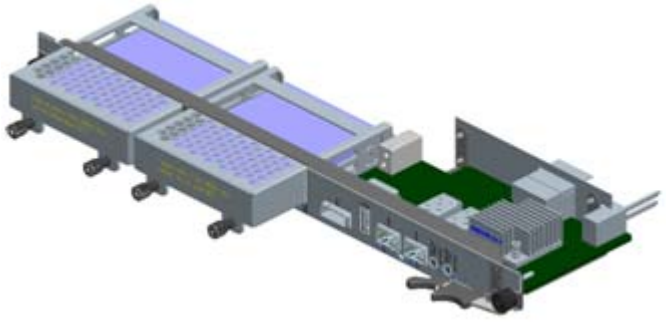
The SAS HDD has a primary and secondary SAS ports. With external SAS cable connection, the HDD on one RTM can be accessed by two main boards.

4.4.2 HDD Bay with Hot-plug Capacity

The RTM-ATCA-737x-C01 has two HDD bays that can fit two 2.5" inch HDDs. The HDD module can be plugged and removed from the RTM without powering off the RTM.

The thermal design of the RTM-ATCA-737x-C01 optimizes the thermal performance of the two HDDs through a perforated cage. It allows both HDDs to be directly cooled by the air outside the module in order to maintain similar temperature. Two thermal sensors can detect the real-time temperature of the two HDDs.

Figure 4-3 HDD Bays



The table below lists the basic hot-plug hardware elements.

Table 4-1 Basic Hot-Plug Hardware Elements

Element	Description
Indicator (Blue LED)	Show hot-plug status: • Blinking - Hot-plug is in progress • On - Allow removal • Off - Normal
Attention Button	Allows user to request a hot removal operation
Hot-swap controller	Controls the power delivery to HDD module

4.5 PCI-E Bus Connections

4.5.1 On-board PCI-E Bus Connection

The following table shows the PCI-E connection from Front IOH to RTM PCI-E devices.

Table 4-2 Overall PCI-E Assignment

Source	Port	Lane	Version	Target	Usage
ATCA-7370 CPU0	2a	x4	3.0	RTM-ATCA-737X	Powerville Ethernet Controller

4.5.2 PCI-E Bus Device

The Powerville Dual GbE Controller is a single, compact and low-power component that supports dual port gigabit Ethernet designs. The device offers two fully-integrated gigabit Ethernet media access control (MAC), physical layer (PHY) ports and two SGMII/SerDes ports that can be connected to an external PHY. The device supports PCI Express PCIe v2.1 (2.5GT/s and 5GT/s) and has the following features:

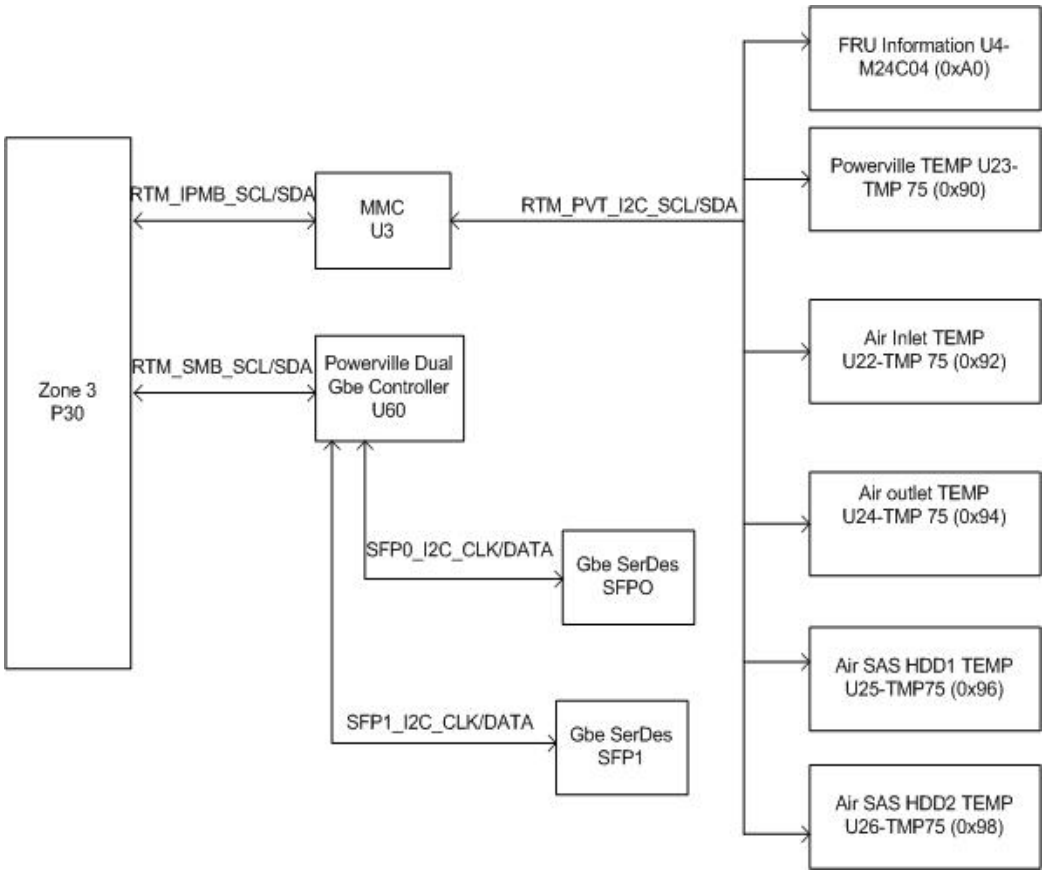
- Host interface: PCIe v2.1 (2.5GT/s and 5GT/s) x4/x2/x1
- MDI (Copper) standard IEEE 802.3 Ethernet interface for 1000BASE-T, 100BASE-TX, and 10BASE-T applications (802.3, 802.3u, and 802.3ab)
- Serializer-Deserializer (SERDES) to support 1000BASE-SX/ LX (optical fiber - IEEE802.3)
- Serializer-Deserializer (SERDES) to support 1000BASE-KX (802.3ap) and 1000BASE-BX (PICMIG 3.1) for Gigabit backplane applications
- Serial-GMII Specification (SGMII) interface for SFP (SFP MSA INF-8074i)/external PHY connections
- NC-SI (DMTF NC-SI) or SMBus for Manageability connection to BMC
- IEEE 1149.6 JTAG
- Support Virtualization Technology, 8VF for PCI-SIG SR-IOV
- Package: 17mm x 17mm, PBGA 256
- Power: 2.8W(max)

The Powerville media interface is configured as SERDES and can be directly connected to the SFP module.

4.6 SMBus Connections

The following figure shows the overall SMBus connections of the RTM-ATCA-737x-C01.

Figure 4-4 Overall SMBus Connections



The TMP57 is the thermal sensor.The RTM_SMB_SCL/SDA is from PCH (Patsburg) to Powerville Dual GbE Controller, and RTM_IPMB_SCL/SDA is from IPMC to MMC.

4.7 GbE SFP Connections

4.7.1 Face Plate SFP Port

The RTM-ATCA-737x has a dedicated Powerville-I350 LAN controller and supports two SFP ports.

The selection between the various configurations is programmable through each MAC's extended device control register (CTRL_EXT.LINK_MODE bits) and the default is set through the EEPROM settings. The following table lists the encoding on the LINK_MODE field for each of the modes.

Table 4-3 LINK_MODE Field and Description

Link Mode	I350 Mode
00b	Internal PHY
01b	1000BASE-KX
10b	SGMII
11b	SerDes/1000Base-BX

SerDes link mode configuration only supports 1000Mbps mode. SGMII link mode configuration can support 10/100/1000Mbps mode. All kinds of optical SFP always operates in 1000Mbps. For copper SFP modules, some of them may be SGMII interface capable and can support 10/100/1000Mbps auto-negotiation. In the current BIOS implementation of the Product-ShortName, SerDes is the only interface and SGMII is not supported. All optical/copper SFP modules will be 1000Mbps only.

The following SFP modules are tested and work with the product:

- Avago: AFCT-5715LZ, Optical
- Avago: AFBR-57M5APZ, Optical
- Finisar: FCLF-8521-3, Copper

The SFP module has an internal EEPROM that stores the SFP module information. Its interface is I2C and has the address 0xA0. The I2C of Intel© Powerville is connected to the SFP modules, making the processor on the front board capable or reading the SFP information.

4.8 MMC Controller

4.8.1 IPMC Controller

The RTM-ATCA-737x-C01 is using the Atmel ATMEGA128L-8MU IPMC building block from Pigeon Point Systems.

Characteristic	Value
Device Type	Atmel ATMEGA128L-8MU

4.8.2 Private I2C Bus

The IPMI interface of the RTM-ATCA-737x-C01 has a private I2C bus which connects to the FRU EEPROM and five temperature sensors. The I2C address is shown in the following table.

Table 4-4 IPMI I2C Bus Address Map (Private I2C Bus)

Device Name	Device Type	Location	Address
FRU-EEPROM	M24C02	RTM	0xA0
Temp Sens#1	TMP75	RTM	0X90
Temp Sens#2	TMP75	RTM	0X92
Temp Sens#3	TMP75	RTM	0X94
Temp Sens#4	TMP75	RTM	0X96
Temp Sens#5	TMP75	RTM	0X98

4.8.3 FRU Data Storage

Characteristic	Value
Device Type	M24C02

ATCA-7370 contains a 256Byte EEPROM. It contains the FRU data and board specific information such as the serial number of the board and some additional information defined in the FRU Storage Information Specification. The EEPROM has an I2C interface and is connected to the onboard Private I2C interface of IPMC building block. The I2C address is 0xA0.

4.8.4 IPMB-L

IPMB-L is a physically independent I2C bus from the IPMC controller on front board through an I2C hot-plug buffer, LTC4300A-1. From functionality, this IPMB-L is just like the IPMB-L of AMC, because this intelligent RTM design is following AMC.0 specification.

The IPMB-L pull-up resistors are located on RTM.

The RTM MMC I2C address is 0x72.

Module	AMC	RTM	PCH
I2C Address	0x7a	0x72	-

4.9 Power Management

4.9.1 Power Domains

The power supply of the RTM-ATCA-737x-C01 is split into two independent power domains.

4.9.1.1 +3.3V Management Power

The management power is used for the MMC subsystem. It is the supply voltage of the IPMC controller logic domain. An IPMC controlled HS controller also connects the management power to the RTM through Zone 3.

4.9.1.2 +12V Payload Power

The payload power is used for backend logic such as HDD and Intel© Powerville. It is the source for all the needed on-board voltages on the RTM-ATCA-737x-C01. This is generated through point-of-load DC/DC converters. The RTM-ATCA-737x-C01 12V payload power is separated by the HS controller that is controlled by the main board IPMC controller.

All needed power rails such as 3.3V, 5V and 1.0V are generated from this 12V power.

4.9.2 RTM Power Specification

The RTM-ATCA-737x-C01 sources all supply voltage through the Zone3 connector. The following table shows the RTM power requirements.

Table 4-5 RTM Power Specification

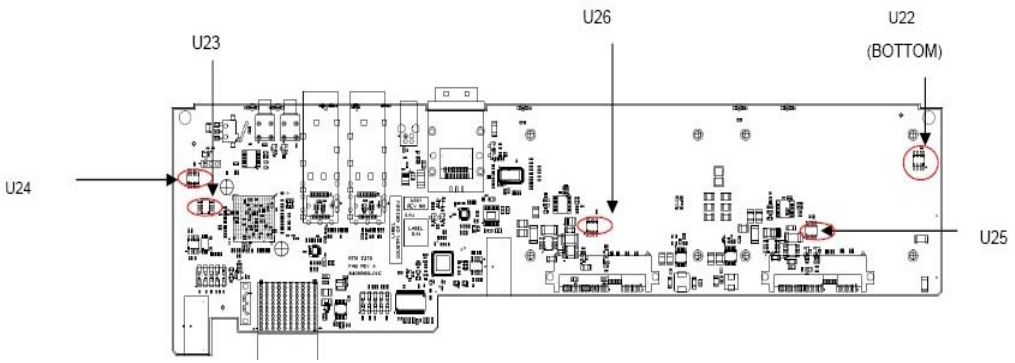
RTM supply voltage	Current	Power
3.3V RTM Management Power	0.15A	0.5 W
12V RTM Payload Power	2.25A	27W
	3.82A	45.88W spin up peak
	4.42A	53.08W spin up peak < 100us

4.10 Thermal Sensors

4.10.1 Thermal Sensors Location

The following figure shows the components placement with thermal sensors location:

Figure 4-5 Thermal Sensors Location



The following table lists the thermal sensors:

Table 4-6 Thermal Sensors

Device Name	Device Type	Location	Address
Ethernet controller temp	TMP75	U23	0X90
Air inlet temp	TMP75	U22	0X92

Table 4-6 Thermal Sensors (continued)

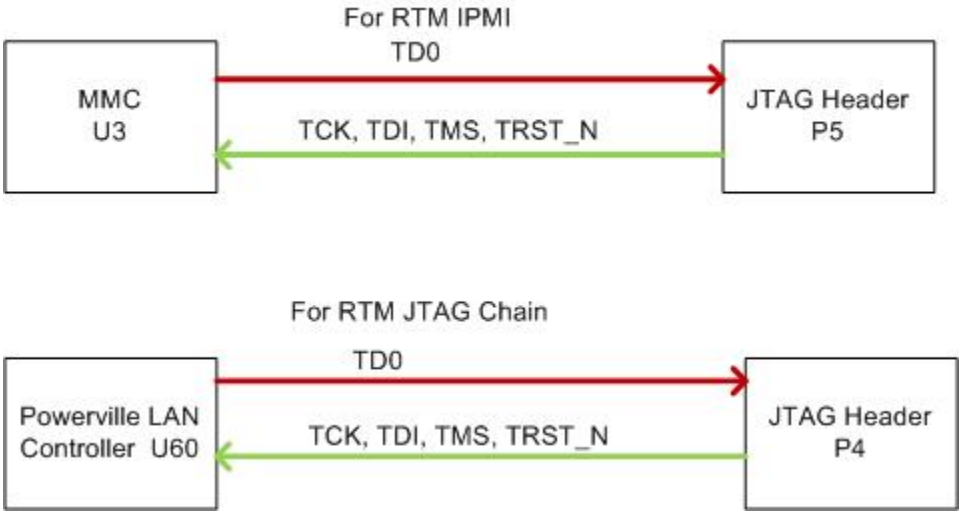
Device Name	Device Type	Location	Address
Air Outlet Temp	TMP75	U24	0X94
SAS HDD0 Temp	TMP75	U25	0X96
SAS HDD1 Temp	TMP75	U26	0X98

4.11 JTAG Support

There are two available JTAG chains on the RTM-ATCA-737x-C01.

- JTAG header for MMC firmware programming and debugging
- JTAG header for Intel Powerville LAN controller chain

Figure 4-6 RTM-ATCA-737x-C01 JTAG Chains



For more information, refer *Mechanical Layout* on page 28.

Supported IPMI Commands

5.1 Standard IPMI Commands

The MMC is fully compliant to the Intelligent Platform Management Interface v1.5. This section provides information about the supported IPMI commands.

5.1.1 Global IPMI Commands

The MMC supports the following global IPMI commands.

Table 5-1 Supported Global IPMI Commands

Command	NetFn (Request/Response)	CMD	Comments
Get Device ID	0x06/0x07	0x01	-
Cold Reset	0x06/0x07	0x02	-
Warm Reset	0x06/0x07	0x03	-
Master Write-Read	0x06/0x07	0x52	Only for accessing private I2C buses.

5.1.2 System Interface Commands

The IPMC supports the following IPMI commands to support the system messaging interfaces.

Table 5-2 Supported System Interface Commands

Command	NetFn (Request/Response)	CMD
Set BMC Global Enables	0x06/0x07	0x2E
Get BMC Global Enables	0x06/0x07	0x2F
Clear Message Flags	0x06/0x07	0x30
Get Message Flags	0x06/0x07	0x31
Get Message	0x06/0x07	0x33
Send Message	0x06/0x07	0x34

5.1.3 FRU Inventory Commands

Table 5-3 Supported FRU Inventory Commands

Command	NetFn (Request/Response)	CMD
Get FRU Inventory Area Info	0x0A/0x0B	0x10
Read FRU Data	0x0A/0x0B	0x11
Write FRU Data	0x0A/0x0B	0x12

5.1.4 Sensor Device Commands

Table 5-4 Supported Sensor Device Commands

Command	NetFn (Request/Response)	CMD	Comments
Get Device SDR Info	0x04/0x05	0x20	-
Get Device SDR	0x04/0x05	0x21	-
Reserve Device SDR Repository	0x04/0x05	0x22	-
Get Sensor Reading Factors	0x04/0x05	0x23	-
Set Sensor Hysteresis	0x04/0x05	0x24	-
Get Sensor Hysteresis	0x04/0x05	0x25	-
Set Sensor Threshold	0x04/0x05	0x26	Most of the threshold-based sensors have fixed thresholds. Before using this command, check whether threshold setting is supported by using the Get Device SDR command.
Get Sensor Threshold	0x04/0x05	0x27	-
Set Sensor Event Enable	0x04/0x05	0x28	-
Get Sensor Event Enable	0x04/0x05	0x29	-
Get Sensor Event Status	0x04/0x05	0x2B	-
Get Sensor Reading	0x04/0x05	0x2D	-
Get Sensor Type	0x04/0x05	0x2F	-

Table 5-4 Supported Sensor Device Commands (continued)

Command	NetFn (Request/Response)	CMD	Comments
Set Event Receiver	0x04/0x05	0x00	-
Get Event receiver	0x04/0x05	0x01	-
Platform Event	0x04/0x05	0x02	-

5.2 PICMG 3.0 Commands

The SMART Embedded Computing MMC is a fully compliant AdvancedTCA intelligent Platform Management Controller. It supports all required and mandatory AdvancedTCA commands as defined in the PICMG 3.0 and AMC.0 R2.0 specifications.

Table 5-5 Supported PICMG 3.0 Commands

Command	NetFn (Request/Response)	CMD	Comments
Get PICMG Properties	0x2C/0x2D	0x00	-
Get Address Info	0x2C/0x2D	0x01	-
FRU Control	0x2C/0x2D	0x04	-
Get FRU LED Properties	0x2C/0x2D	0x05	-
Get FRU LED Color Capabilities	0x2C/0x2D	0x06	-
Set FRU LED State	0x2C/0x2D	0x07	-
Get FRU LED State	0x2C/0x2D	0x08	-
Get Device Locator Record ID	0x2C/0x2D	0x0D	The SMART Embedded Computing MMCs support the standard PICMG 3.0 and the extended AMC.0 R2.0 versions of this command.
Set AMC Port State	0x2C/0x2D	0x19	-
Get AMC Port State	0x2C/0x2D	0x1A	-
Get FRU Control Capabilities	0x2C/0x2D	0x1E	-
Get target upgrade capabilities	0x2C/0x2D	0x2E	-
Get component properties	0x2C/0x2D	0x2F	-

Table 5-5 Supported PICMG 3.0 Commands (continued)

Command	NetFn (Request/Response)	CMD	Comments
Abort firmware upgrade	0x2C/0x2D	0x30	-
Initiate upgrade action	0x2C/0x2D	0x31	-
Upload firmware block	0x2C/0x2D	0x32	-
Finish firmware upload	0x2C/0x2D	0x33	-
Get upgrade status	0x2C/0x2D	0x34	-
Activate firmware	0x2C/0x2D	0x35	-
Query rollback status	0x2C/0x2D	0x37	-
Initiate manual rollback	0x2C/0x2D	0x38	-

The firmware upgrade commands supported by the RTM-ATCA-737X are implemented according to the PICMG HPM.1 Revision 1.0 specification.

5.3 Pigeon Point Specific Commands

The IPMC supports additional IPMI commands that are specific to Pigeon Point. This section provides detailed descriptions of those extensions:

Table 5-6 Pigeon Point Extension Commands

Command	NetFn (Request/Response)	CMD
Get Status *Table 5-7 on page 69*	0x2E/0x2F	0x00
Get Serial Interface Properties *Table 5-8 on page 72*	0x2E/0x2F	0x01
Set Serial Interface Properties *Table 5-9 on page 73*	0x2E/0x2F	0x02
Get Debug Level *Table 5-10 on page 74*	0x2E/0x2F	0x03
Set Debug Level *Table 5-11 on page 75*	0x2E/0x2F	0x04
Get Handle Switch *Table 5-12 on page 76*	0x2E/0x2F	0x07
Set Handle Switch *Table 5-13 on page 76*	0x2E/0x2F	0x08
Reset IPMC *Table 5-14 on page 77*	0x2E/0x2F	0x0D
Hang IPMC *Table 5-15 on page 77*	0x2E/0x2F	0x0E
Get Payload Shutdown Timeout *Table 5-16 on page 78*	0X2E/0X2F	0x15
Set Payload Shutdown Timeout *Table 5-17 on page 78*	0X2E/0X2F	0x16

5.3.1 Get Status Command

The Get Status command can be used by the payload software to retrieve the status of the IPMC.

Table 5-7 Get Status Command Description

Type	Byte	Data Field
Request Data	1:3	PPS IANA Private Enterprise ID 0x00400A = 16394 (Pigeon Point Systems) LSB Byte first: byte 1 = 0A, byte 2 = 40, byte 3 = 00
Response Data	1	Completion Code
	2:4	PPS IANA Private Enterprise ID 0x00400A = 16394 (Pigeon Point Systems) LSB Byte first: byte 2 = 0A, byte 3 = 40, byte 4 = 00

Table 5-7 Get Status Command Description (continued)

Type	Byte	Data Field
	5	Bit [7] Graceful Reboot Request If set to 1, indicates that the payload is requested to initiate the graceful reboot sequence. Bit [6] Diagnostic Interrupt Request If set to 1, indicates that a payload diagnostic interrupt request has arrived. Bit [5] Shutdown Alert If set to 1, indicates that the payload is going to be shutdown. Bit [4] Reset Alert If set to 1, indicates that the payload is going to be reset. Bit [3] Sensor Alert If set to 1, indicates that at least one of the IPMC sensors detects a threshold crossing. Bits [2:1] Mode The current IPMC modes are defined as: 0: Normal 1: Standalone 2: Manual Standalone Bit [0] Control If set to 0, the IPMC control over the payload is disabled.
	6	Bits [4:7] Metallic Bus 2 Events These bits indicate pending Metallic Bus 2 requests arrived from the shelf manager: 0: Metallic Bus 2 Query 1: Metallic Bus 2 Release 2: Metallic Bus 2 Force 3: Metallic Bus 2 Free Bits [0:3] Metallic Bus 1 Events These bits indicate pending Metallic Bus 1 requests arrived from the shelf manager: 0: Metallic Bus 1 Query 1: Metallic Bus 1 Release 2: Metallic Bus 1 Force 3: Metallic Bus 1 Free

Table 5-7 Get Status Command Description (continued)

Type	Byte	Data Field
	7	Bits [4:7] Clock Bus 2 Events These bits indicate pending Clock Bus 2 requests arrived from the shelf manager: 0: Clock Bus 2 Query 1: Clock Bus 2 Release 2: Clock Bus 2 Force 3: Clock Bus 2 Free Bits [0:3] Clock Bus 1 Events These bits indicate pending Clock Bus 1 requests arrived from the shelf manager: 0: Clock Bus 1 Query 1: Clock Bus 1 Release 2: Clock Bus 1 Force 3: Clock Bus 1 Free
	8	Bits [4:7] Reserved Bits [0:3] Clock Bus 3 Events These bits indicate pending Clock Bus 3 requests arrived from the shelf manager: 0: Clock Bus 3 Query 1: Clock Bus 3 Release 2: Clock Bus 3 Force 3: Clock Bus 3 Free

5.3.2 Get Serial Interface Properties Command

The Get Serial Interface Properties command is used to get the properties of a particular serial interface.

Table 5-8 Get Serial Interface Properties Command Description

Type	Byte	Data Field
Request Data	1:3	PPS IANA Private Enterprise ID 0x00400A = 16394 (Pigeon Point Systems) LSB Byte first: byte 1 = 0A, byte 2 = 40, byte 3 = 00
	4	Interface ID 0: Serial Debug Interface
Response Data	1	Completion Code
	2:4	PPS IANA Private Enterprise ID 0x00400A = 16394 (Pigeon Point Systems) LSB Byte first: byte 2 = 0A, byte 3 = 40, byte 4 = 00
	5	Bit [7] Echo On If this bit is set, the IPMC enables echo for the given serial interface. Bits [6:4] Reserved Bits [3:0] Baud Rate ID The baud rate ID defines the interface baud rate as follows: 0: 9600 bps 1: 19200 bps 2: 38400 bps 3: 57600 bps (unsupported) 4: 115200 bps (unsupported)

5.3.3 Set Serial Interface Properties Command

The Set Serial Interface Properties command is used to set the properties of a particular serial interface.

Table 5-9 Set Serial Interface Properties Command Description

Type	Byte	Data Field
Request Data	1:3	PPS IANA Private Enterprise ID 0x00400A = 16394 (Pigeon Point Systems) LSB Byte first: byte 1 = 0A, byte 2 = 40, byte 3 = 00
	4	Interface ID 0: Serial Debug Interface
	5	Bit [7] Echo On If this bit is set, the IPMC enables echo for the given serial interface. Bits [6:4] Reserved Bits [3:0] Baud Rate ID The baud rate ID defines the interface baud rate as follows: 0: 9600 bps 1: 19200 bps 2: 38400 bps 3: 57600 bps (unsupported) 4: 115200 bps (unsupported)
Response Data	1	Completion Code
	2:4	PPS IANA Private Enterprise ID 0x00400A = 16394 (Pigeon Point Systems) LSB Byte first: byte 2 = 0A, byte 3 = 40, byte 4 = 00

5.3.4 Get Debug Level Command

The Get Debug Level command gets the current debug level of the IPMC firmware.

Table 5-10 Get Debug Level Command Description

Type	Byte	Data Field
Request Data	1:3	PPS IANA Private Enterprise ID 0x00400A = 16394 (Pigeon Point Systems) LSB Byte first: byte 1 = 0A, byte 2 = 40, byte 3 = 00
Response Data	1	Completion Code
	2:4	PPS IANA Private Enterprise ID 0x00400A = 16394 (Pigeon Point Systems) LSB Byte first: byte 2 = 0A, byte 3 = 40, byte 4 = 00
	5	Bit [7] IPMB-L Dump Enable If set to 1, the IPMC provides a trace of IPMB-L messages that are arriving to/going from the IPMC via IPMB-L. Bit [6] n/a Bit [5] KCS Dump Enable If set to 1, the IPMC provides a trace of KCS messages that are arriving to/going from the IPMC via KCS. Bit [4] IPMB Dump Enable If set to 1, the IPMC provides a trace of IPMB messages that are arriving to/going from the IPMC via IPMB-O. Bit [3] n/a Bit [2] Alert Logging Enable If set to 1, the IPMC outputs important alert messages onto the serial debug interface. Bit [1] Low-level Error Logging Enable If set to 1, the IPMC outputs low-level error/diagnostic messages onto the serial debug interface. Bit [0] Error Logging Enable If set to 1, the IPMC outputs error/diagnostic messages onto the serial debug interface.

5.3.5 Set Debug Level Command

The Set Debug Level command sets the current debug level of the IPMC firmware.

Table 5-11 Set Debug Level Command Description

Type	Byte	Data Field
Request Data	1:3	PPS IANA Private Enterprise ID 0x00400A = 16394 (Pigeon Point Systems) LSB byte first: byte 1 = 0A, byte 2 = 40, byte 3 = 00
	4	Bit [7] IPMB-L Dump Enable If set to 1, the IPMC provides a trace of IPMB-L messages that are arriving to/going from the IPMC via IPMB-L. Bit [6] n/a Bit [5] KCS Dump Enable If set to 1, the IPMC provides a trace of KCS messages that are arriving to/going from the IPMC via KCS. Bit [4] IPMB Dump Enable If set to 1, the IPMC provides a trace of IPMB messages that are arriving to/going from the IPMC via IPMB-O. Bit [3] n/a Bit [2] Alert Logging Enable If set to 1, the IPMC outputs important alert messages onto the serial debug interface. Bit [1] Low-level Error Logging Enable If set to 1, the IPMC outputs low-level error/diagnostic messages onto the serial debug interface. Bit [0] Error Logging Enable If set to 1, the IPMC outputs error/diagnostic messages onto the serial debug interface.
Response Data	1	Completion Code
	2:4	PPS IANA Private Enterprise ID 0x00400A = 16394 (Pigeon Point Systems) LSB byte first: byte 2 = 0A, byte 3 = 40, byte 4 = 00

5.3.6 Get Handle Switch Command

The Get Handle Switch command reads the state of the hot-swap handle of the IPMC. Overriding of the handle switch state is allowed only if the IPMC operates in (manual) standalone mode.

Table 5-12 Get Handle Switch Command Description

Type	Byte	Data Field
Request Data	1:3	PPS IANA Private Enterprise ID 0x00400A = 16394 (Pigeon Point Systems) LSB Byte first: byte 1 = 0A, byte 2 = 40, byte 3 = 00
Response Data	1	Completion Code
	2:4	PPS IANA Private Enterprise ID 0x00400A = 16394 (Pigeon Point Systems) LSB Byte first: byte 2 = 0A, byte 3 = 40, byte 4 = 00
	5	Handle Switch Status 0x00: The handle switch is open. 0x01: The handle switch is closed. 0x02: The handle switch state is read from hardware.

5.3.7 Set Handle Switch Command

The Set Handle Switch command sets the state of the hot-swap handle switch in (manual) standalone mode.

Table 5-13 Set Handle Switch Command Description

Type	Byte	Data Field
Request Data	1:3	PPS IANA Private Enterprise ID 0x00400A = 16394 (Pigeon Point Systems) LSB Byte first: byte 1 = 0A, byte 2 = 40, byte 3 = 00
	4	Handle Switch Status 0x00: The handle switch is open. 0x01: The handle switch is closed. 0x02: The handle switch state is read from hardware.
Response Data	1	Completion Code
	2:4	PPS IANA Private Enterprise ID 0x00400A = 16394 (Pigeon Point Systems) LSB Byte first: byte 2 = 0A, byte 3 = 40, byte 4 = 00

5.3.8 Reset IPMC Command

The Reset IPMC command allows the payload to reset the IPMC over the KCS host interface.

Table 5-14 Reset IPMC Command Description

Type	Byte	Data Field
Request Data	1:3	PPS IANA Private Enterprise ID 0x00400A = 16394 (Pigeon Point Systems) LSB Byte first: byte 1 = 0A, byte 2 = 40, byte 3 = 00
	4	Reset Type Code 0x00: Cold IPMC reset to the current mode 0x01: Cold IPMC reset to the Normal mode 0x02: Cold IPMC reset to the Standalone mode 0x03: Cold IPMC reset to the Manual Standalone mode 0x04: Reset the IPMC and enter Upgrade mode
Response Data	1	Completion Code
	2:4	PPS IANA Private Enterprise ID 0x00400A = 16394 (Pigeon Point Systems) LSB Byte first: byte 2 = 0A, byte 3 = 40, byte 4 = 00

5.3.9 Hang IPMC Command

The IPMC provides a way to test the watchdog timer support by implementing the Hang IPMC command, which simulates firmware hanging by entering an endless loop.

Table 5-15 Hang IPMC Command Description

Type	Byte	Data Field
Request Data	1:3	PPS IANA Private Enterprise ID 0x00400A = 16394 (Pigeon Point Systems) LSB Byte first: byte 1 = 0A, byte 2 = 40, byte 3 = 00
	4:5	Timeout measured in hundreds of milliseconds, LSB first
Response Data	1	Completion Code
	2:4	PPS IANA Private Enterprise ID 0x00400A = 16394 (Pigeon Point Systems) LSB Byte first: byte 2 = 0A, byte 3 = 40, byte 4 = 00

5.3.10 Get Payload Shutdown Timeout Command

The IPMC supports reading of the payload shutdown timeout using the Get Payload Shutdown Timeout command.

Gets the payload Shutdown timeout which is configured using the Set Payload shutdown timeout command.

Table 5-16 Get Payload Shutdown Timeout Command Description

Type	Byte	Data Field
Request Data	1:3	PPS IANA Private Enterprise ID 0x00400A = 16394 (Pigeon Point Systems) LSB Byte first: byte 1 = 0A, byte 2 = 40, byte 3 = 00
Response Data	1	Completion Code
	2:4	PPS IANA Private Enterprise ID 0x00400A = 16394 (Pigeon Point Systems) LSB Byte first: byte 2 = 0A, byte 3 = 40, byte 4 = 00
	5:6	Timeout measured in hundreds of milliseconds, LSB first

5.3.11 Set Payload Shutdown Timeout Command

To change the payload shutdown timeout, the Set Payload Shutdown Timeout command is used.

The command sets the front board's payload shutdown timeout (SHUTDOWN_TIMEOUT).

When MMC receives the FRUCONTROL(QUIESCE) request from the carrier board on RTM deactivation, the MMC starts the timeout timer of SHUTDOWN_TIMEOUT milliseconds. Once the timer expires, the MMC begins shutdown of HDDs, and it's payload power.

Table 5-17 Set Payload Shutdown Timeout Command Description

Type	Byte	Data Field
Request Data	1:3	PPS IANA Private Enterprise ID 0x00400A = 16394 (Pigeon Point Systems) LSB Byte first: byte 1 = 0A, byte 2 = 40, byte 3 = 00
	4:5	Timeout measured in hundreds of milliseconds, LSB first
Response Data	1	Completion Code
	2:4	PPS IANA Private Enterprise ID 0x00400A = 16394 (Pigeon Point Systems) LSB Byte first: byte 2 = 0A, byte 3 = 40, byte 4 = 00

FRU Information

6.1 FRU Information

The blade provides the following FRU information in FRU ID 1.

Table 6-1 FRU Information

Area	Description	Value	Access
Internal use area	Not used		
Board info area	Mfg date / time	According to Platform Management FRU information Storage Definition v1.0	r
	Board manufacturer	SMART EC	r
	Board product name	CPRT5-A	r
	Board serial number	Defined by NSN	r
	Board part number	Defined by NSN	r
Product info area	Product manufacturer	SMART EC	r
	Product name	CPRT5-A	r/w
	Product part number	Defined by SMART EC	r
	Product serial number	Defined by SMART EC	r
Multi record info area	Module Current	PICMG record ID 0x16	r
	AMC point-to-point connectivity	PICMG record ID 0x19	r
	SW and FW Version Information Record	OEM	r
	Disk Drive Information Record	OEM	

6.2 Power Configuration

Table 6-2 Power Configuration

Item	Value	Description
Dynamic power reconfiguration support	No	While the blade is powered, it supports only one power level.
Dynamic power configuration	No	The power level is fixed and does not change.
Number of power draw levels	1	The amount of possible power levels
Early Power Draw Levels, Watt	-	Complete early power level including IPMC
Steady state Power Draw Levels, Watt	1	Complete steady power consumption including IPMC
Transition from early to steady levels, sec	0s	-

Sensor Data Records

7.1 Sensor Data Records

The sensors available on the blades are shown in the table below.

Table 7-1 IPMI Sensors Overview

Sensor Name	Sensor Type	Sensor Number	Sensor Type Code	SDR Type Code	Detailed SDR Description
CPRT5-C	Management Controller Locator Record	/	/	12h	This sensor type is provided for high level system software, no sensor number is associated to it.
RT5 HS RTM	PICMG AMC.0:FRU HotSwap	0	0xF2	01h	Refer *Table 7-3*
RT5 3.3V	Voltage	1	0x02	01h	Refer *Table 7-4*
RT5 12V	Voltage	2	0x02	01h	Refer *Table 7-5*
RT5 1.8V	Voltage	3	0x02	01h	Refer *Table 7-6*
RT5 1.0V	Voltage	4	0x02	01h	Refer *Table 7-7*
RT5 Inlet Temp	Temperature	5	0x01	01h	Refer *Table 7-8*
RT5 Outlet Temp	Temperature	6	0x01	01h	Refer *Table 7-9*
RT5 HDD0 Temp	Temperature	7	0x01	01h	Refer *Table 7-10*
RT5 HDD1 Temp	Temperature	8	0x01	01h	Refer *Table 7-11*
RT5 ETH Temp	Temperature	9	0x01	01h	Refer *Table 7-12*
RT5 HDD0 State	OEM Hotswap HDD	10	0xE1	01h	Refer *Table 7-13*
RT5 HDD1 State	OEM Hotswap HDD	11	0xE1	01h	Refer *Table 7-14*
RT5 SFP0 Pres	Other FRU	12	0x1A	01h	Refer *Table 7-15*
RT5 SFP1 Pres	Other FRU	13	0x1A	01h	Refer *Table 7-16*

Table 7-1 IPMI Sensors Overview (continued)

Sensor Name	Sensor Type	Sensor Number	Sensor Type Code	SDR Type Code	Detailed SDR Description
RT5 SFP0 TxFault	Other FRU	14	0x1A	01h	Refer *Table 7-17*
RT5 SFP1 TxFault	Other FRU	15	0x1A	01h	Refer *Table 7-18*
RT5 Ver Change	Version Change	16	0x2B	01h	Refer *Table 7-19*

The following figure shows the locations of all temperature sensors available on-board.

Figure 7-1 Location of Temperature Sensors

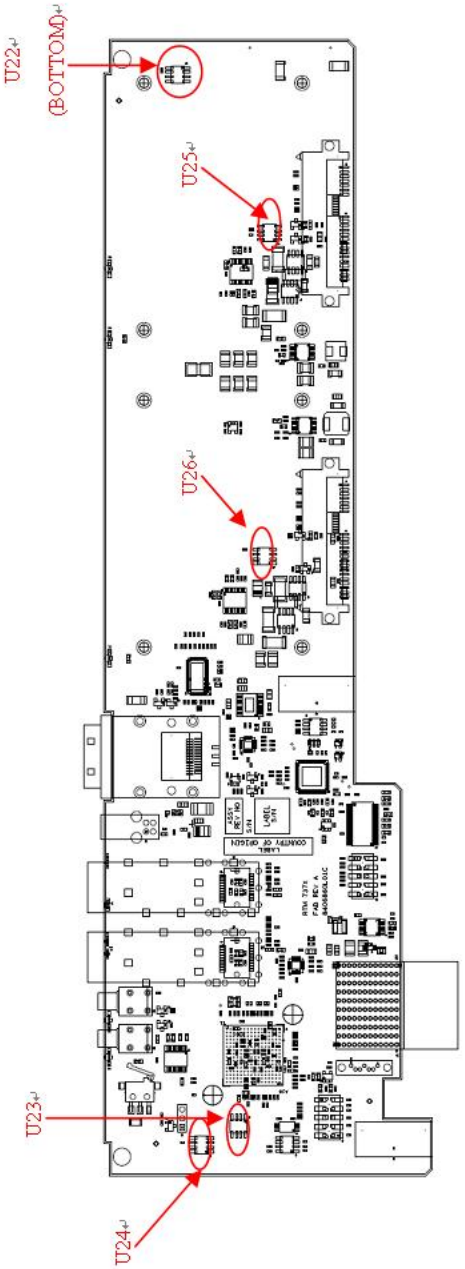


Table 7-2 Temperature Sensors List

Device Name	Device Type	Location	Address
Ethernet Controller Temp	TMP75	U23	0X90
Air Inlet Temp	TMP75	U22	0X92
Air Outlet Temp	TMP75	U23	0X94
SAS HDD0 Temp	TMP75	U25	0X96
SAS HDD1 Temp	TMP75	U26	0X98

Table 7-3 RT5 HS RTM

Feature	Raw Value	Description
Sensor Name	RT5 HS RTM	-
Sensor LUN	0x00	-
Sensor Number	0	-
Entity ID	0xC0	PICMG Rear Transition Module
Sensor Type	0xF2	PICMG AMC.0: Module HotSwap
Event/Reading Type	0x6F	Discrete (sensor-specific)
Assertion Event Mask (Byte 15)	0xFF	-
Assertion Event Mask (Byte 16)	0x00	-
Deassertion Event Mask (Byte 17)	0x00	-
Deassertion Event Mask (Byte 18)	0x00	-
Threshold Mask (Byte 19)	0xFF	-
Threshold Mask (Byte 20)	0x00	-
Base Unit	0x00	(unspecified)
Rearm mode	0x01	Auto
Hysteresis Support	0x00	No Hysteresis or unspecified
Threshold Access Support	0x00	No Thresholds
Event Message Control	0x01	Entire Sensor only
Reading Definition	-	See PICMG 3.0 Specification, chapter "Reading the FRU Hot-Swap Sensor"

Table 7-4 RT5 3.3V

Feature	Raw Value	Description
Sensor Name	RT5 3.3V	-
Sensor LUN	0x00	-
Sensor Number	1	-
Entity ID	0xC0	PICMG Rear Transition Module
Sensor Type	0x02	Voltage
Event/Reading Type	0x01	Threshold
Assertion Event Mask (Byte 15)	0x14	-
Assertion Event Mask (Byte 16)	0x6A	-
Deassertion Event Mask (Byte 17)	0x14	-
Deassertion Event Mask (Byte 18)	0x6A	-
Threshold Mask (Byte 19)	0x36	-
Threshold Mask (Byte 20)	0x36	-
Base Unit	0x04	Volts
Nominal Reading	0xAA	3.3
Upper non-recoverable threshold	0xBC	3.66
Upper critical threshold	0xB4	3.5
Upper non-critical threshold	0x00	(unspecified)
Lower non-recoverable threshold	0x97	2.94
Lower critical threshold	0x9F	3.1
Lower non-critical threshold	0x00	(unspecified)
Rearm mode	0x01	Auto
Hysteresis Support	0x02	Readable and settable
Threshold Access Support	0x02	Readable and settable
Event Message Control	0x00	Per Threshold / Discrete State
Reading Definition	Analog reading byte	Analog sensor reading

Table 7-5 RT5 12V

Feature	Raw Value	Description
Sensor Name	RT5 12V	-
Sensor LUN	0x00	-
Sensor Number	2	-
Entity ID	0xC0	PICMG Rear Transition Module
Sensor Type	0x02	Voltage
Event/Reading Type	0x01	Threshold
Assertion Event Mask (Byte 15)	0x14	-
Assertion Event Mask (Byte 16)	0x6A	-
Deassertion Event Mask (Byte 17)	0x14	-
Deassertion Event Mask (Byte 18)	0x6A	-
Threshold Mask (Byte 19)	0x36	-
Threshold Mask (Byte 20)	0x36	-
Base Unit	0x04	Volts
Nominal Reading	0xCC	12
Upper non-recoverable threshold	0xED	13.96
Upper critical threshold	0xE3	13.37
Upper non-critical threshold	0x00	(unspecified)
Lower non-recoverable threshold	0xAC	10.12
Lower critical threshold	0xB6	10.7
Lower non-critical threshold	0x00	(unspecified)
Rearm mode	0x01	Auto
Hysteresis Support	0x02	Readable and settable
Threshold Access Support	0x02	Readable and settable
Event Message Control	0x00	Per Threshold / Discrete State
Reading Definition	Analog reading byte	Analog sensor reading

Table 7-6 RT5 1.8V

Feature	Raw Value	Description
Sensor Name	RT5 1.8V	-
Sensor LUN	0x00	-
Sensor Number	3	-
Entity ID	0xC0	PICMG Rear Transition Module
Sensor Type	0x02	Voltage
Event/Reading Type	0x01	Threshold
Assertion Event Mask (Byte 15)	0x14	-
Assertion Event Mask (Byte 16)	0x6A	-
Deassertion Event Mask (Byte 17)	0x14	-
Deassertion Event Mask (Byte 18)	0x6A	-
Threshold Mask (Byte 19)	0x36	-
Threshold Mask (Byte 20)	0x36	-
Base Unit	0x04	Volts
Nominal Reading	0xB8	1.8
Upper non-recoverable threshold	0xCD	2.0
Upper critical threshold	0xC3	1.9
Upper non-critical threshold	0x00	(unspecified)
Lower non-recoverable threshold	0xA4	1.6
Lower critical threshold	0xAD	1.7
Lower non-critical threshold	0x00	(unspecified)
Rearm mode	0x01	Auto
Hysteresis Support	0x02	Readable and settable
Threshold Access Support	0x02	Readable and settable
Event Message Control	0x00	Per Threshold / Discrete State
Reading Definition	Analog reading byte	Analog sensor reading

Table 7-7 RT5 1.0V

Feature	Raw Value	Description
Sensor Name	RT5 1.0V	-
Sensor LUN	0x00	-
Sensor Number	4	-
Entity ID	0xC0	PICMG Rear Transition Module
Sensor Type	0x02	Voltage
Event/Reading Type	0x01	Threshold
Assertion Event Mask (Byte 15)	0x14	-
Assertion Event Mask (Byte 16)	0x6A	-
Deassertion Event Mask (Byte 17)	0x14	-
Deassertion Event Mask (Byte 18)	0x6A	-
Threshold Mask (Byte 19)	0x36	-
Threshold Mask (Byte 20)	0x36	-
Base Unit	0x04	Volts
Nominal Reading	0x66	1.0
Upper non-recoverable threshold	0x72	1.1
Upper critical threshold	0x6D	1.07
Upper non-critical threshold	0x00	(unspecified)
Lower non-recoverable threshold	0x5B	0.89
Lower critical threshold	0x60	0.94
Lower non-critical threshold	0x00	(unspecified)
Rearm mode	0x01	Auto
Hysteresis Support	0x02	Readable and settable
Threshold Access Support	0x02	Readable and settable
Event Message Control	0x00	Per Threshold / Discrete State
Reading Definition	Analog reading byte	Analog sensor reading

Table 7-8 RT5 Inlet Temp

Feature	Raw Value	Description
Sensor Name	RT5 Inlet Temp	-
Sensor LUN	0x00	-
Sensor Number	5	-
Entity ID	0xC0	-
Sensor Type	0x01	PICMG Rear Transition Module
Event/Reading Type	0x01	Temperature
Assertion Event Mask (Byte 15)	0x80	Threshold
Assertion Event Mask (Byte 16)	0x0A	-
Deassertion Event Mask (Byte 17)	0x80	-
Deassertion Event Mask (Byte 18)	0x7A	-
Threshold Mask (Byte 19)	0x38	-
Threshold Mask (Byte 20)	0x38	-
Base Unit	0x01	deg. C
Nominal Reading	0x23	35
Upper non-recoverable threshold	0x46	70
Upper critical threshold	0x3C	60
Upper non-critical threshold	0x2D	45
Lower non-recoverable threshold	0x00	(unspecified)
Lower critical threshold	0x00	(unspecified)
Lower non-critical threshold	0x00	(unspecified)
Rearm mode	0x01	Auto
Hysteresis Support	0x02	Readable and settable
Threshold Access Support	0x02	Readable and settable
Event Message Control	0x00	Per Threshold / Discrete State
Reading Definition	Analog reading byte	Analog sensor reading

Table 7-9 RT5 Outlet Temp

Feature	Raw Value	Description
Sensor Name	RT5 Outlet Temp	-
Sensor LUN	0x00	-
Sensor Number	6	-
Entity ID	0xC0	PICMG Rear Transition Module
Sensor Type	0x01	Temperature
Event/Reading Type	0x01	Threshold
Assertion Event Mask (Byte 15)	0x80	-
Assertion Event Mask (Byte 16)	0x0A	-
Deassertion Event Mask (Byte 17)	0x80	-
Deassertion Event Mask (Byte 18)	0x7A	-
Threshold Mask (Byte 19)	0x38	-
Threshold Mask (Byte 20)	0x38	-
Base Unit	0x01	deg. C
Nominal Reading	0x19	25
Upper non-recoverable threshold	0x50	80
Upper critical threshold	0x46	70
Upper non-critical threshold	0x37	55
Lower non-recoverable threshold	0x00	(unspecified)
Lower critical threshold	0x00	(unspecified)
Lower non-critical threshold	0x00	(unspecified)
Rearm mode	0x01	Auto
Hysteresis Support	0x02	Readable and settable
Threshold Access Support	0x02	Readable and settable
Event Message Control	0x00	Per Threshold / Discrete State
Reading Definition	Analog reading byte	Analog sensor reading

Table 7-10 RT5 HDD0 Temp

Feature	Raw Value	Description
Sensor Name	RT5 HDD1 Temp	-
Sensor LUN	0x00	-
Sensor Number	7	-
Entity ID	0xC0	PICMG Rear Transition Module
Sensor Type	0x01	Temperature
Event/Reading Type	0x01	Threshold
Assertion Event Mask (Byte 15)	0x80	-
Assertion Event Mask (Byte 16)	0x0A	-
Deassertion Event Mask (Byte 17)	0x80	-
Deassertion Event Mask (Byte 18)	0x7A	-
Threshold Mask (Byte 19)	0x38	-
Threshold Mask (Byte 20)	0x38	-
Base Unit	0x01	deg. C
Nominal Reading	0x19	25
Upper non-recoverable threshold	0x41	65
Upper critical threshold	0x37	55
Upper non-critical threshold	0x28	40
Lower non-recoverable threshold	0x00	(unspecified)
Lower critical threshold	0x00	(unspecified)
Lower non-critical threshold	0x00	(unspecified)
Rearm mode	0x01	Auto
Hysteresis Support	0x02	Readable and settable
Threshold Access Support	0x02	Readable and settable
Event Message Control	0x00	Per Threshold / Discrete State
Reading Definition	Analog reading byte	Analog sensor reading

Table 7-11 RT5 HDD1 Temp

Feature	Raw Value	Description
Sensor Name	RT5 HDD2 Temp	-
Sensor LUN	0x00	-
Sensor Number	8	-
Entity ID	0xC0	PICMG Rear Transition Module
Sensor Type	0x01	Temperature
Event/Reading Type	0x01	Threshold
Assertion Event Mask (Byte 15)	0x80	-
Assertion Event Mask (Byte 16)	0x0A	-
Deassertion Event Mask (Byte 17)	0x80	-
Deassertion Event Mask (Byte 18)	0x7A	-
Threshold Mask (Byte 19)	0x38	-
Threshold Mask (Byte 20)	0x38	-
Base Unit	0x01	deg. C
Nominal Reading	0x19	25
Upper non-recoverable threshold	0x41	65
Upper critical threshold	0x37	55
Upper non-critical threshold	0x28	40
Lower non-recoverable threshold	0x00	(unspecified)
Lower critical threshold	0x00	(unspecified)
Lower non-critical threshold	0x00	(unspecified)
Rearm mode	0x01	Auto
Hysteresis Support	0x02	Readable and settable
Threshold Access Support	0x02	Readable and settable
Event Message Control	0x00	Per Threshold / Discrete State
Reading Definition	Analog reading byte	Analog sensor reading

Table 7-12 RT5 ETH Temp

Feature	Raw Value	Description
Sensor Name	RT5 ETH Temp	-
Sensor LUN	0x00	-
Sensor Number	9	-
Entity ID	0xC0	PICMG Rear Transition Module
Sensor Type	0x01	Temperature
Event/Reading Type	0x01	Threshold
Assertion Event Mask (Byte 15)	0x80	-
Assertion Event Mask (Byte 16)	0x0A	-
Deassertion Event Mask (Byte 17)	0x80	-
Deassertion Event Mask (Byte 18)	0x7A	-
Threshold Mask (Byte 19)	0x38	-
Threshold Mask (Byte 20)	0x38	-
Base Unit	0x01	deg. C
Nominal Reading	0x19	25
Upper non-recoverable threshold	0x4B	75
Upper critical threshold	0x41	65
Upper non-critical threshold	0x32	50
Lower non-recoverable threshold	0x00	(unspecified)
Lower critical threshold	0x00	(unspecified)
Lower non-critical threshold	0x00	(unspecified)
Rearm mode	0x01	Auto
Hysteresis Support	0x02	Readable and settable
Threshold Access Support	0x02	Readable and settable
Event Message Control	0x00	Per Threshold / Discrete State
Reading Definition	Analog reading byte	Analog sensor reading

Table 7-13 RT5 HDD0 State

Feature	Raw Value	Description
Sensor Name	RT5 HDD1 State	-
Sensor LUN	0x00	-
Sensor Number	10	-
Entity ID	0xC0	PICMG Rear Transition Module
Sensor Type	0xE1	SMART EC OEM
Event/Reading Type	0x6F	Sensor-specific
Assertion Event Mask (Byte 15)	0x0F	-
Assertion Event Mask (Byte 16)	0x00	-
Deassertion Event Mask (Byte 17)	0x00	-
Deassertion Event Mask (Byte 18)	0x00	-
Threshold Mask (Byte 19)	0x1F	-
Threshold Mask (Byte 20)	0x00	-
Base Unit	0x00	(unspecified)
Rearm mode	0x01	Auto
Hysteresis Support	0x00	No Hysteresis or unspecified
Threshold Access Support	0x00	No Thresholds
Event Message Control	0x01	Entire Sensor only
Reading Definition	-	Event Data Byte 1 [7:4] : 0x0A [3:0] : 0x0 : M0 0x1 : M1 0x2 : M2 0x3 : M3 Event Data Byte 2 [7:4] - hot swap state cause [3:0] - Previous state Event Data Byte 3 HDD ID

Table 7-14 RT5 HDD1 State

Feature	Raw Value	Description
Sensor Name	RT5 HDD2 State	-
Sensor LUN	0x00	-
Sensor Number	11	-
Entity ID	0xC0	PICMG Rear Transition Module
Sensor Type	0xE1	SMART Embedded Computing - OEM
Event/Reading Type	0x6F	Sensor-specific
Assertion Event Mask (Byte 15)	0x0F	-
Assertion Event Mask (Byte 16)	0x00	-
Deassertion Event Mask (Byte 17)	0x00	-
Deassertion Event Mask (Byte 18)	0x00	-
Threshold Mask (Byte 19)	0x1F	-
Threshold Mask (Byte 20)	0x00	-
Base Unit	0x00	(unspecified)
Rearm mode	0x01	Auto
Hysteresis Support	0x00	No Hysteresis or unspecified
Threshold Access Support	0x00	No Thresholds
Event Message Control	0x01	Entire Sensor only
Reading Definition	-	Event Data Byte 1 [7:4] : 0x0A [3:0] : 0x0 : M0 0x1 : M1 0x2 : M2 0x3 : M3 Event Data Byte 2 [7:4] - hot swap state cause [3:0] - Previous state Event Data Byte 3 HDD ID

Table 7-15 RT5 SFP0 Pres

Feature	Raw Value	Description
Sensor Name	RT5 SFP1 Pres	-
Sensor LUN	0x00	-
Sensor Number	12	-
Entity ID	0xC0	PICMG Rear Transition Module
Sensor Type	0x1A	Other FRU
Event/Reading Type	0x08	Digital Discrete
Assertion Event Mask (Byte 15)	0x03	-
Assertion Event Mask (Byte 16)	0x00	-
Deassertion Event Mask (Byte 17)	0x00	-
Deassertion Event Mask (Byte 18)	0x00	-
Threshold Mask (Byte 19)	0x03	-
Threshold Mask (Byte 20)	0x00	-
Base Unit	0x00	(unspecified)
Rearm mode	0x01	Auto
Hysteresis Support	0x00	No Hysteresis or unspecified
Threshold Access Support	0x00	No Thresholds
Event Message Control	0x01	Entire Sensor only
Reading Definition	-	Sensor specific Offset 00h: Device Removed 01h: Device Inserted **Event data byte 2** 0xFF Event data byte 3 0xFF

Table 7-16 RT5 SFP1 Pres

Feature	Raw Value	Description
Sensor Name	RT5 SFP2 Pres	-
Sensor LUN	0x00	-
Sensor Number	13	-
Entity ID	0xC0	PICMG Rear Transition Module
Sensor Type	0x1A	Other FRU
Event/Reading Type	0x08	Digital Discrete
Assertion Event Mask (Byte 15)	0x03	-
Assertion Event Mask (Byte 16)	0x00	-
Deassertion Event Mask (Byte 17)	0x00	-
Deassertion Event Mask (Byte 18)	0x00	-
Threshold Mask (Byte 19)	0x03	-
Threshold Mask (Byte 20)	0x00	-
Base Unit	0x00	(unspecified)
Rearm mode	0x01	Auto
Hysteresis Support	0x00	No Hysteresis or unspecified
Threshold Access Support	0x00	No Thresholds
Event Message Control	0x01	Entire Sensor only
Reading Definition	-	Sensor specific Offset 00h: Device Removed 01h: Device Inserted **Event data byte 2** 0xFF Event data byte 3 0xFF

Table 7-17 RT5 SFP0 TxFault

Feature	Raw Value	Description
Sensor Name	RT5 SFP1 TxFault	-
Sensor LUN	0x00	-
Sensor Number	14	-
Entity ID	0xC0	PICMG Rear Transition Module
Sensor Type	0x1A	Other FRU
Event/Reading Type	0x04	Digital Discrete
Assertion Event Mask (Byte 15)	0x03	-
Assertion Event Mask (Byte 16)	0x00	-
Deassertion Event Mask (Byte 17)	0x00	-
Deassertion Event Mask (Byte 18)	0x00	-
Threshold Mask (Byte 19)	0x03	-
Threshold Mask (Byte 20)	0x00	-
Base Unit	0x00	(unspecified)
Rearm mode	0x01	Auto
Hysteresis Support	0x00	No Hysteresis or unspecified
Threshold Access Support	0x00	No Thresholds
Event Message Control	0x01	Entire Sensor only
Reading Definition	-	Sensor specific Offset 00h: Predictive failure de-asserted 01h: Predictive failure asserted **Event data byte 2** 0xFF Event data byte 3 0xFF

Table 7-18 RT5 SFP1 TxFault

Feature	Raw Value	Description
Sensor Name	RT5 SFP2 TxFault	-
Sensor LUN	0x00	-
Sensor Number	15	-
Entity ID	0xC0	PICMG Rear Transition Module
Sensor Type	0x1A	Other FRU
Event/Reading Type	0x04	Digital Discrete
Assertion Event Mask (Byte 15)	0x03	-
Assertion Event Mask (Byte 16)	0x00	-
Deassertion Event Mask (Byte 17)	0x00	-
Deassertion Event Mask (Byte 18)	0x00	-
Threshold Mask (Byte 19)	0x03	-
Threshold Mask (Byte 20)	0x00	-
Base Unit	0x00	(unspecified)
Rearm mode	0x01	Auto
Hysteresis Support	0x00	No Hysteresis or unspecified
Threshold Access Support	0x00	No Thresholds
Event Message Control	0x01	Entire Sensor only
Reading Definition	-	Sensor specific Offset 00h: Predictive failure de-asserted 01h: Predictive failure asserted **Event data byte 2** 0xFF Event data byte 3 0xFF

Table 7-19 RT5 Ver Change

Feature	Raw Value	Description
Sensor Name	RT5 Ver Change	-
Sensor LUN	0x00	-
Sensor Number	16	-
Entity ID	0xC0	PICMG Rear Transition Module
Sensor Type	0x2B	Version Change
Event/Reading Type	0x6F	Discrete (sensor-specific)
Assertion Event Mask (Byte 15)	0xFF	-
Assertion Event Mask (Byte 16)	0x00	-
Deassertion Event Mask (Byte 17)	0x00	-
Deassertion Event Mask (Byte 18)	0x00	-
Threshold Mask (Byte 19)	0xFF	-
Threshold Mask (Byte 20)	0x00	-
Base Unit	0x00	(unspecified)
Rearm mode	0x01	Auto
Hysteresis Support	0x00	No Hysteresis or unspecified
Threshold Access Support	0x00	No Thresholds
Event Message Control	0x01	Entire Sensor only
Reading Definition	-	-

7.1.1 Get Sensor Reading (OEM Sensors)

7.1.1.1 Sensor RT5 HDD State

Table 7-20 Sensor RT5 HDD State

Byte	Request Data Field	Response Data Field
1	Sensor number (0x0A/0x0B)	Completion Code
2		Not Used (00h)
3		Standard IPMI byte (See "Get sensor reading" in IPMI specification)
4		Current Reading - [7:4] - HDD hot swap state cause code 1h - HDD insert 2h - HDD removed 3h - HDD eject button pushed 4h - HDD eject by OEM command 5h - HDD eject ignored by OEM command 6h - HDD approved by OEM command 7h - HDD activated by OEM command 8h - HDD eject approve command expired 9h - HDD eject forced by payload power off [3:0] - HDD hot swap states 0h - M0 [HDD absent, LED off, power off] 1h - M1 [HDD present, LED off, power on] 2h - M2 [HDD present, LED blinking, power on] 3h - M3 [HDD present, LED on, power off]
5		00h

7.1.1.2 Sensor RT5 SFP Pres

Table 7-21 Sensor RT5 SFP Pres

Byte	Request Data Field	Response Data Field
1	Sensor number (0x0C/0x0D)	Completion Code
2		Not Used (00h)
3		Standard IPMI byte (See "Get sensor reading" in IPMI specification)
4		Current Reading - 01h - Device Removed 02h - Device Inserted
5		00h

7.1.1.3 Sensor RT5 SFP TxFault

Table 7-22 Sensor RT5 SFP TxFault

Byte	Request Data Field	Response Data Field
1	Sensor Number (0x0E/0x0F)	Completion Code
2		Not Used (00)
3		Standard IPMI byte (See "Get sensor reading" in IPMI specification)
4		Current Reading - 01h - Predictive failure de-asserted 02h - Predictive failure asserted
5		00h

Related Documentation

A.1 SMART Embedded Computing Documentation

The documentation listed is referenced in this manual. Technical documentation can be found by using the Documentation Search at *https://www.smartembedded.com/ec/support/* or you can obtain electronic copies of SMART EC documentation by contacting your local sales representative.

Table A-1 SMART EC Documentation

Document Title	Publication Number
ATCA-7370 Installation and Use Guide	6806800N15