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# **RTM-ATCA-748X**

Installation and Use

P/N: 6806800T16C

March 2020

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Embedded Computing

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# About this Manual

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## Overview of Contents

This manual is divided into the following chapters and appendix:

[Safety Notes on page 13](#), provides the safety notes that should be observed while operating the product.

[Sicherheitshinweise on page 17](#), provides the German translation of the Safety Notes.

[Chapter 1, Introduction on page 23](#), provides an overview of the features of the product, including mechanical, label, and ordering information.

[Chapter 2, Hardware Preparation and Installation on page 25](#), provides information about environmental and power requirements, as well as procedures for the installation and removal of the product.

[Chapter 3, Controls, Indicators, and Connectors on page 35](#), describes the LEDs and I/O interfaces located on Faceplate, as well as pin assignments.

[Chapter 4, Functional Description on page 41](#), describes the main components available on the board.

[Appendix A, Related Documentation on page 63](#), provides the list of manuals related to the product.

## Abbreviations

This document uses the following abbreviations:

Abbreviation	Definition
ATCA	Advanced Telecommunications Computing Architecture
CSA	Canadian Standards Association
EMC	Electromagnetic Compatibility
FCC	Feder Communications Commission
GPIO	General-Purpose Input/Output
IEC	International Electrotechnical Commission
IPMB	Intelligent Platform Management Bus
IPMC	Intelligent Platform Management Controller
IPMI	Intelligent Platform Management Interface
NEBS	Network Equipment-Building System

## About this Manual








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Abbreviation	Definition
NVM	Non-volatile Memory
PCH	Platform Controller Hub
PCIe	PCI Express
PICMG	PCI Industrial Computer Manufacturers Group
RoHS	Restriction of Hazardous Substances
RTM	Rear Transition Module
QSFP	Quad Small Form-Factor Pluggable
SGMII	Serial Gigabit Media Independent Interface
UL	Underwriters Laboratories Inc.
WEEE	Waste Electrical and Electronic Equipment
XAUI	10 GbE Attachment Unit Interface

## 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)
<b>bold</b>	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)
<b>Courier + Bold</b>	Used to characterize user input and to separate it from system output
<i>Reference</i>	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
<p data-bbox="272 1289 385 1340"><b>Use ESD protection</b></p> 	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

## About this Manual

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# Summary of Changes

This manual has been revised and replaces all prior editions.

<b>Part Number</b>	<b>Publication Date</b>	<b>Description</b>
6806800T16C	March 2020	Corrections to Section 4.2 per IR13028.
6806800T16B	November 2019	Rebrand to SMART Embedded Computing template. Updated ordering information and related documentation.
6806800T16A	October 2016	Initial Release

# Safety Notes

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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

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications.

Operation of this equipment 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. Changes or modifications not expressly approved by SMART Embedded Computing could void the user's authority to operate the equipment. Board products are tested in a

## Safety Notes

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representative system to show compliance with the above mentioned requirements. A proper installation in a compliant system will maintain the required performance. Use only shielded cables when connecting peripherals to assure that appropriate radio frequency emissions compliance is maintained.

## Installation

Before installing the board make sure the requirements listed in section "Board Exchange" are met.

Restricted access area - This board is only to be installed in a restricted access area.

### **Data Loss**

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

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

### **Damage of Circuits**

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

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

### **Board Malfunctioning**

Incorrect board installation and removal can result in board malfunctioning.

Make sure that the board is connected to the system backplane via all assembled connectors and that power is available on all zone 1 power pins.

### **Damage of the Product**

Incorrect installation of the product can cause damage of the product,

Only use handles when installing/removing the product to avoid damage/deformation to the faceplate and/or PCB.

### **Damage of the Product and Additional Devices and Modules**

Incorrect installation or removal of additional devices or modules may damage the product or the additional devices or modules.

Before installing or removing additional devices or modules, read the respective documentation.

### Operation

#### **Board Damage—Board Surface**

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

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

#### **Board Overheating and Board Damage**

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

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

### Hot Swap

Installing the board into or removing it from a powered system not supporting hot swap or high availability causes board damage and data loss. Therefore, only install it in or remove it from a powered system if the system itself supports hot swap or high availability and if the system documentation explicitly includes guidelines.

### QSFP Modules

#### **Personal Injury and Damage of the RTM and QSFP Modules**

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

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

#### **Personal Injury**

Optical QSFP modules may be classified as laser products. When installing and using any of these QSFP 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 QSFP modules which are classified as laser products, make sure to comply to the respective regulations.

#### **Eye Damage**

Optical QSFP 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.

## Safety Notes

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### QSFP Module Damage

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

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

## Replacement/Expansion

Only replace or expand components or system parts with those recommended by SMART Embedded Computing. Otherwise, you are fully responsible for the impact on EMC or any possible malfunction of the product.

Check the total power consumption of all components installed (see the technical specification of the respective components). Ensure that any individual output current of any source stays within its acceptable limits (see the technical specification of the respective source).

## Environment

Always dispose of used products according to your country's legislation and manufacturer's instructions.



# Sicherheitshinweise

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Dieses Kapitel enthält Hinweise, die potentiell gefährlichen Prozeduren innerhalb dieses Handbuchs vorangestellt 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 dieses Handbuchs enthalten sind, nicht beachten, kann das Verletzungen oder Schäden am Produkt zur Folge haben.

SMART EC ist darauf bedacht, alle notwendigen Informationen zum Einbau und zum Umgang mit dem Produkt in diesem Handbuch bereit zu stellen. Da es sich jedoch um ein komplexes Produkt mit vielfältigen Einsatzmöglichkeiten handelt, können wir die Vollständigkeit der im Handbuch enthaltenen Informationen nicht garantieren. Falls Sie weitere Informationen benötigen sollten, wenden Sie sich bitte an die für Sie zuständige Geschäftsstelle von SMART EC.

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 Produkt wurde in einem SMART Embedded Computing 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 Produktes in Gewerbe- sowie Industriegebieten gewährleisten.

## Sicherheitshinweise

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

Wird das Produkt in einem Wohngebiet betrieben, so kann dies mit großer Wahrscheinlichkeit zu starken Störungen führen, welche dann auf Kosten des Produkthanwenders beseitigt werden müssen. Änderungen oder Modifikationen am Produkt, welche ohne ausdrückliche Genehmigung von SMART Embedded Computing durchgeführt werden, können dazu führen, dass der Anwender die Genehmigung zum Betrieb des Produktes verliert. Boardprodukte werden in einem repräsentativen System getestet, um zu zeigen, dass das Board den oben aufgeführten EMV-Richtlinien entspricht. Eine ordnungsgemäße Installation in einem System, welches die EMV-Richtlinien erfüllt, stellt sicher, dass das Produkt gemäß den EMV-Richtlinien betrieben wird. Verwenden Sie nur abgeschirmte Kabel zum Anschluss von Zusatzmodulen. So ist sichergestellt, dass sich die Aussendung von Hochfrequenzstrahlung im Rahmen der erlaubten Grenzwerte bewegt.

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.

## Board Installation

Bevor Sie das Board in einem System installieren, überprüfen Sie, ob die im Kapitel "Board Exchange" aufgeführten Anforderungen erfüllt werden.

Bereich mit eingeschränktem Zugang - Installieren Sie das Board in ein System nur in Bereichen mit eingeschränktem Zugang.

### Datenverlust

Ziehen Sie das Board im laufenden Betrieb heraus, obwohl die Hot-Swap LED noch nicht leuchtet, führt das zu Datenverlust.

Warten Sie deshalb bis die Hot-Swap LED blau leuchtet, bevor Sie das Board herausziehen.

### Beschädigung von Schaltkreisen

Elektrostatische Entladung und unsachgemäßer Ein- und Ausbau des Produktes kann Schaltkreise beschädigen oder ihre Lebensdauer verkürzen.

Bevor Sie das Produkt oder elektronische Komponenten berühren, vergewissern Sie sich, dass Sie in einem ESD-geschützten Bereich arbeiten.

### **Fehlfunktion des Produktes**

Fehlerhafter Ein- und Ausbau des Produktes kann zur Beschädigung des Produktes führen.

Stellen Sie deshalb sicher, dass das Produkt mit allen Steckern mit der Systembackplane verbunden ist und über alle Zone-1-Anschlüsse mit Spannung versorgt wird.

### **Beschädigung des Produktes**

Fehlerhafte Installation des Produktes kann zu einer Beschädigung des Produktes führen.

Verwenden Sie die Handles, um das Produkt zu installieren/deinstallieren. Auf diese Weise vermeiden Sie, dass das faceplate oder die Platine deformiert oder zerstört wird.

### **Beschädigung des Produktes und von Zusatzmodulen**

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

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

## **Betrieb**

### **Beschädigung des Boards**

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

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

### **Überhitzung und Beschädigung des Boards**

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

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

## **Hot Swap**

Wenn Sie das Board im laufenden Betrieb in ein System, das weder Hot Swap noch High Availability unterstützt, installieren bzw. herausziehen, wird das Board beschädigt und es gehen Daten verloren. Installieren/entfernen Sie das Board nur im laufenden Betrieb, wenn das System Hot Swap oder High-Availability unterstützt und wenn die Systembeschreibung dies ausdrücklich erlaubt.

### QSFP Modules

#### **Gefahr von Verletzungen sowie von Beschädigung des RTMs und QSFP Modulen**

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

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

#### **Verletzungsgefahr**

Optische QSFP Module können als Laserprodukte klassifiziert sein. Wenn Sie solche QSFP 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 QSFP Module betreiben, die als Laserprodukte klassifiziert sind, stellen Sie sicher, dass die entsprechenden Bestimmungen für Laserprodukte eingehalten werden.

#### **Verletzungsgefahr der Augen**

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

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

#### **Beschädigung von QSFP Modulen**

Die Schutzkappe eines QSFP Modules dient dazu, die sensible Optik des QSFP 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 QSFP Modul.

### Austausch/Erweiterung

Verwenden Sie bei Austausch oder Erweiterung nur von SMART Embedded Computing empfohlene Komponenten und Systemteile. Andernfalls sind Sie für mögliche Auswirkungen auf EMV oder Fehlfunktionen des Produktes voll verantwortlich.

Überprüfen Sie die gesamte aufgenommene Leistung aller eingebauten Komponenten (siehe die technischen Daten der entsprechenden Komponente). Stellen Sie sicher, dass die Stromaufnahme jedes Verbrauchers innerhalb der zulässigen Grenzwerte liegt (siehe die technischen Daten des entsprechenden Verbrauchers).

### Umweltschutz

Entsorgen Sie alte Batterien und/oder Produkte stets gemäß der in Ihrem Land gültigen Gesetzgebung und den Empfehlungen des Herstellers.



# Introduction

RTM-ATCA-748X is a rear transition module (RTM) specifically designed for the use in combination with the ATCA-7480 front board. The design of RTM-ATCA-748X follows the standards of PICMG 3.0 Revision 1.0 AdvancedTCA Base Specification and PICMG 3.1 Revision 1.0 Specification Ethernet/Fiber Channel for Advanced TCA Systems.

## 1.1 Features

The RTM-ATCA-748X has following variants:

- RTM-ATCA-748X-40G
  - Four 40Gb Ethernet interfaces via QSFP pluggable transceivers
- RTM-ATCA-748X-40G-HA
  - Four 40Gb Ethernet interfaces via QSFP pluggable transceivers
  - Two Intel Communications Chipset 8900 Series PCH with Integrated Accelerator
- RTM-ATCA-748X-HA
  - Two Intel Communications Chipset 8900 Series PCH with Integrated Accelerator

## 1.2 Standard Compliances

The product meets certain standards, which are listed in the table below.

*Table 1-1 Standard Compliances*

Standard	Description
UL 60950-1 EN 60950-1 IEC 60950-1 CAN/CSA C22.2 No 60950-1	Legal safety requirements
CISPR 22 CISPR 24 EN 55022 EN 55024 FCC Part 15 Industry Canada ICES-003 VCCI Japan AS/NZS CISPR 22 EN 300 386	EMC requirements (legal) on system level (predefined SMART Embedded Computing system)

### 1.3 Mechanical Data

This section provides the physical dimensions and weight information of RTM-ATCA-748X and its variants.

*Table 1-2 Mechanical Data*

Feature	Value
Dimensions (width x height x depth)	6HP wide, 8U high, 88.43 mm deep
Weight	RTM-ATCA-748X-40G: 0.8 Kg RTM-ATCA-748X-40G-HA: 0.9 Kg RTM-ATCA-748X-HA: 0.8 Kg (approximately)

### 1.4 Ordering Information

Refer to the ATCA-7480 data sheet for a complete list of available variants and accessories. Refer to [Appendix A, Related Documentation](#) or consult your local SMART Embedded Computing sales representative for the availability of other variants.

For technical assistance, documentation, or to report product damage or shortages, contact your local SMART Embedded Computing sales representative or visit <https://www.smartembedded.com/ec/support/>



# Hardware Preparation and Installation

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This chapter provides environmental and power requirements applicable for RTM-ATCA-748X, and also its installation and removal procedures.

## 2.1 Unpacking and Inspecting the Board

### NOTICE

#### Damage of Circuits

**Electrostatic discharge and incorrect installation and removal of the product can damage circuits or shorten their life.**

**Before touching the product make sure that you are working in an ESD-safe environment or wear an ESD wrist strap or ESD shoes. Hold the product by its edges and do not touch any components or circuits.**

1. Make sure that you have received all the items of your shipment.
2. Check for damage and report any damage or differences to the customer service.



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

3. Remove the desiccant bag that is shipped with the module, and then dispose it according to your country's legislation.

## 2.2 Environmental Requirements

When operated in your particular system configuration, make sure that environmental requirements of the board meet the values specified in [Table 2-1](#).

Operating temperatures refer to the temperature of the air circulating around the RTM, and not to the component temperatures.

If you integrate the RTM in your own non-SMART Embedded Computing system, contact your local sales representative for further safety information.

## Hardware Preparation and Installation

Requirement	Operating	Non-Operating (Storage and Transport)
Temperature	<p>Normal Operation: +5°C (41°F) to +40°C (104°F) according to Telcordia GR-63-CORE (NEBS) and ETSI EN 300 019-1-3, Class 3.1</p> <p>Exceptional Operation: -5°C (23°F) to +55°C (131°F) according to Telcordia GR-63-CORE (NEBS)</p> <p><b>Note:</b> This exceeds ETSI EN 300 019-1-3, Class 3.1E requirements (-5°C to +45°C)</p>	<p>-40°C (-40°F) to +70°C (158°F) according to Telcordia GR-63-CORE (NEBS) and ETSI EN 300 019-1-2, Class 2.3</p> <p><b>Note:</b> This exceeds ETSI EN 300 019-1-1, Class 1.2 requirements (storage from -25°C to +55°C).</p> <p><b>Note:</b> This may be further limited by installed accessories.</p>
Temperature Change	±0.25°C/min according to Telcordia GR-63-CORE	±0.25°C/min
Relative Humidity	<p>Normal Operation: 5%rH to 85%rh non-condensing</p> <p>Exceptional Operation: 5%rH to 90%rh non-condensing</p> <p>According to Telcordia GR-63-CORE (NEBS) and EN 300 019-1-3, Classes 3.1 and 3.1E</p>	<p>5% to 95% non-condensing</p> <p>According to Telcordia GR-63-CORE (NEBS) and EN 300 019-1-1, Classes 1.2 and 2.3</p>
Vibration (with HDD Installed)	1g from 5 to 200Hz and back to 5Hz at a rate of 0.25 octave/minute (according to Telcordia GR-63-core)	<p>5-20Hz at 0.01 g<sup>2</sup>/Hz (according to Telcordia GR-63-core and ETSI EN 300 019-2-2)</p> <p>20-200Hz at -3 dB/octave Hz (according to Telcordia GR-63-core and ETSI EN 300 019-2-2)</p> <p>Random 5-20Hz at 1 m<sup>2</sup>/s<sup>3</sup></p> <p>Random 20-200Hz at 3 m<sup>2</sup>/s<sup>3</sup></p>
Shock (with HDD Installed)	Half-sine, 11 ms at 30m/s <sup>2</sup>	<p>Blade level packaging</p> <p>Half-sine, 6ms at 180m/s<sup>2</sup></p>
Free Fall	-	<p>1.2 m/ packaged (according to ETSI 300 019-2-2)</p> <p>100 mm unpackaged (according to Telcordia GR-63-core)</p>

### NOTICE

**Product Damage**

High humidity and condensation on the surfaces cause short circuits.

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

## 2.3 Power Requirements

The following table details the power dissipation information of RTM-ATCA-748X and its variants.

Characteristic	Variants	Value
Maximum power dissipation	RTM-ATCA-748X-40G	35W
	RTM-ATCA-748X-40G-HA	Less than 100W (approximately)
	RTM-ATCA-748X-HA	Less than 75W (approximately)

## 2.4 Installing and Removing the RTM

### **NOTICE**

#### **Damage of RTM and Front Blade**

The RTM can be installed into a powered or non-powered system.

Installing the RTM with other than ATCA-7480 blade may damage the RTM and the front blade. Install the RTM with only SMART Embedded Computing ATCA-7480 blade.

#### **Damage of Circuits**

Electrostatic discharge and incorrect installation and removal of the product can damage circuits or shorten their life.

Before touching the product, make sure that you are working in an ESD-safe environment or wear an ESD wrist strap or ESD shoes. Hold the product with its edges and do not touch any components or circuits.

### 2.4.1 Installing the RTM

You can install the RTM even if the front blade is installed or not.

#### 2.4.1.1 Front Blade is Installed

Use the following procedure to install the RTM, when the front blade is installed.

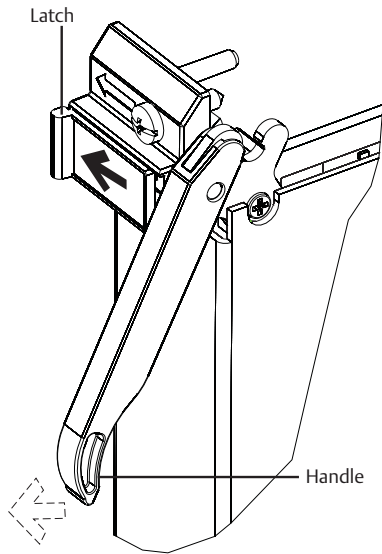
This procedure assumes that your system is powered ON. If your system is not powered, disregard the blue LED and skip the respective step.

1. Locate the slot where the RTM has to be installed in the shelf's rear side, which must be the same as that of the front blade.
2. Open the lower handle of the front blade to power down its payload. The blue LED on the front blade starts to flash. This indicates that the front blade is informing the shelf manager that it wants to power down its payload.
3. Wait until the blue LED on the front blade is lit. When the blue LED is lit, the payload is powered down.

## Hardware Preparation and Installation

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- Slide the latch on the RTM blade to the release position, the handle automatically raises outwards.

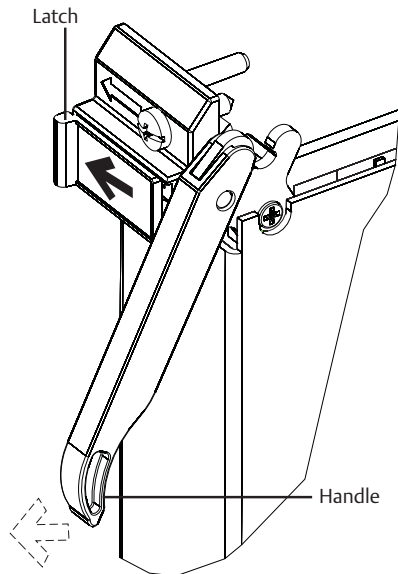


- Insert the RTM into the slot by placing the top and bottom edges in the card guides of the slot.
- Slide the RTM into the slot.
- Apply equal and steady pressure to the RTM to carefully slide it into the shelf until you feel resistance.
- Continue to gently push the RTM until the RTM connectors engage.

## Hardware Preparation and Installation

---

9. Fully insert the blade and then push the handle inwards. The latch automatically locks the handle.  
If your shelf is powered, as soon as the RTM is connected to the front blade, the blue LED lights up and remains lit until the lower handle of the RTM and the lower handle of the front blade are closed.

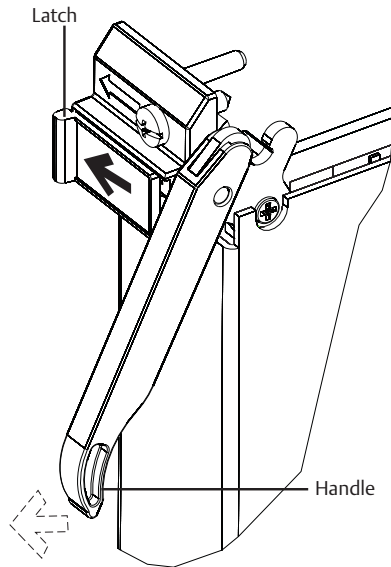


10. Close the lower handle of the front blade so that the payloads of the RTM and front blade are powered up. The blue LEDs on both the front blade and RTM start flashing. This indicates that the front blade is informing the shelf manager that it wants to power up the payload of front blade and RTM.
11. Tighten the faceplate screws on the RTM.
12. Wait until the blue LEDs on the front blade and the RTM are not lit. A blue LED that is not lit indicates that the payload of the front blade and the RTM has been powered up and is active.
13. Plug the interface cable into the faceplate connectors, if applicable.

### 2.4.1.2 Front Blade is not Installed

Use this procedure to install the RTM when the front blade is not installed.

1. Locate the slot where the RTM is to be installed into the shelf's rear side, which must be same as that of the front blade.
2. Slide the latch on the RTM blade to the release position, the handle automatically raises outwards.

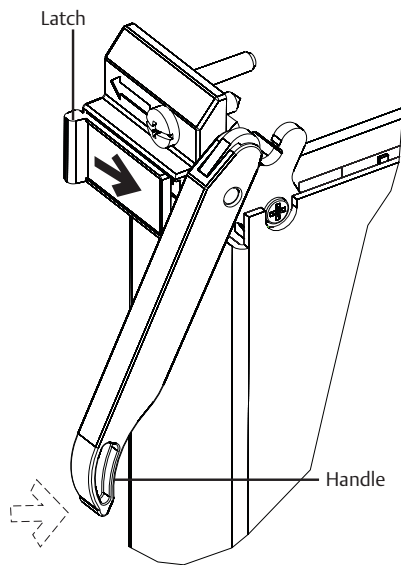


3. Insert the RTM into the shelf by placing the top and bottom edges in the card guides of the slot.
4. Slide the RTM into the slot.
5. Apply equal and steady pressure to the RTM to carefully slide it into the shelf until you feel resistance.
6. Continue to gently push the RTM until the RTM connectors engage.

## Hardware Preparation and Installation

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7. Fully insert the blade and then push the handle inwards. The latch automatically locks the handle.



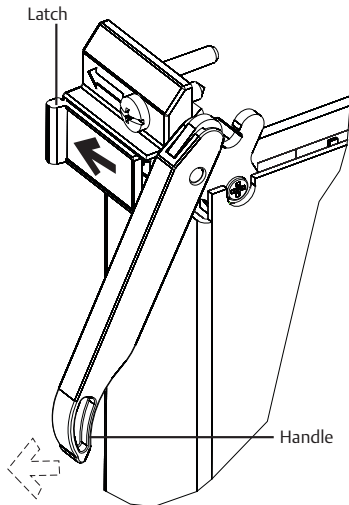
8. Tighten the faceplate screws on the RTM.
9. Insert the front blade on the front side of the shelf, into the same number where the RTM is installed.  
For more information on installing the front blade, see ATCA-7480 Installation and Use manual.  
As soon as the front blade is connected to the backplane, the blue LEDs on the front blade and the RTM lit up permanently. This indicates that the IPMC of the front blade and the MMC of the RTM are powered up.
10. Close the handles of the front blade.  
The blue LEDs on the front blade and the RTM start flashing. This indicates that the front blade is informing the shelf manager that it wants to power up the payload of both the front blade and the RTM.
11. Tighten the faceplate screws on the front blade.
12. Wait until the blue LEDs on the front blade and the RTM are unlit.  
The blue LED when it is unlit indicates that the payload of the front blade and the RTM are powered up and are active.
13. Plug the interface cable into the faceplate connectors, if applicable.



### 2.4.2 Removing the RTM

This procedure assumes that your system is powered up. If your system is not powered, disregard the blue LED and skip the respective step.

1. On the front blade, slide the latch to the release position, the handle automatically raises outwards.



2. The blue LED blinks indicating that the front blade has informed the shelf manager to power down the payload of both the front blade and RTM, and that the power-down process is going-on.
3. Wait until the blue LEDs on the front blade and RTM are permanently lit. A permanently lit LED indicates that the payload of both the front blade and RTM has been powered down.

### NOTICE

#### Data Loss

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

Wait until the blue LED is permanently illuminated before removing the product.

#### Product Damage

Installing or removing the product while power is applied damages the product.

Before removing the RTM from a powered system, power down the slot and the front blade's payload by opening the lower handle of the front blade and wait until the blue LED is permanently ON.

## Hardware Preparation and Installation

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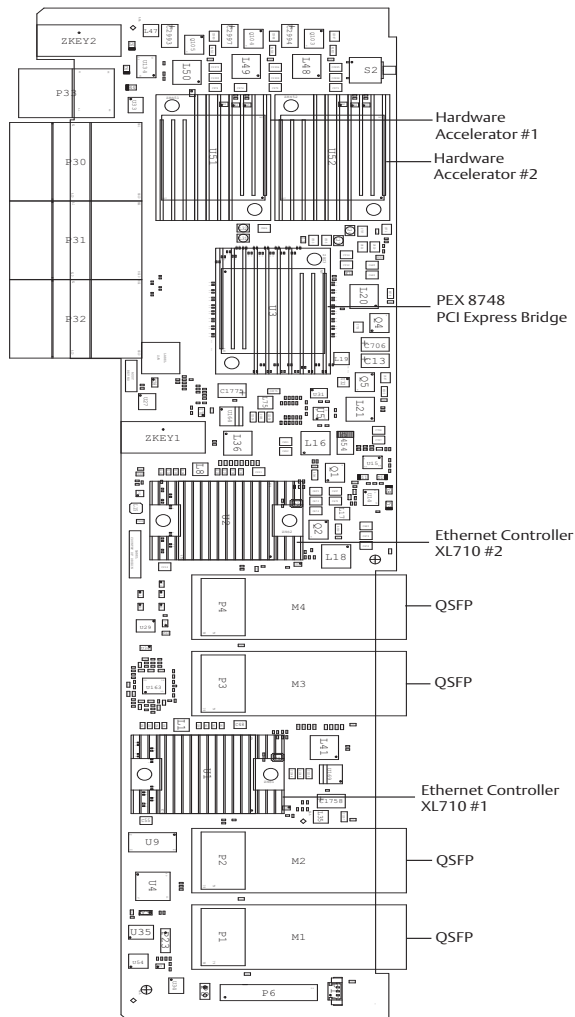
4. Unlatch the upper handle, and then rotate both handles fully outward.
5. Remove the interface cables from the faceplate connectors, if applicable.
6. Loosen the screws on the RTM faceplate.
7. Remove the RTM from the slot.

# Controls, Indicators, and Connectors

## 3.1 RTM-ATCA-748X Top View

The following figure shows the top view of the RTM-ATCA-748X blade.

*Figure 3-1 RTM-ATCA-748X - Top View*

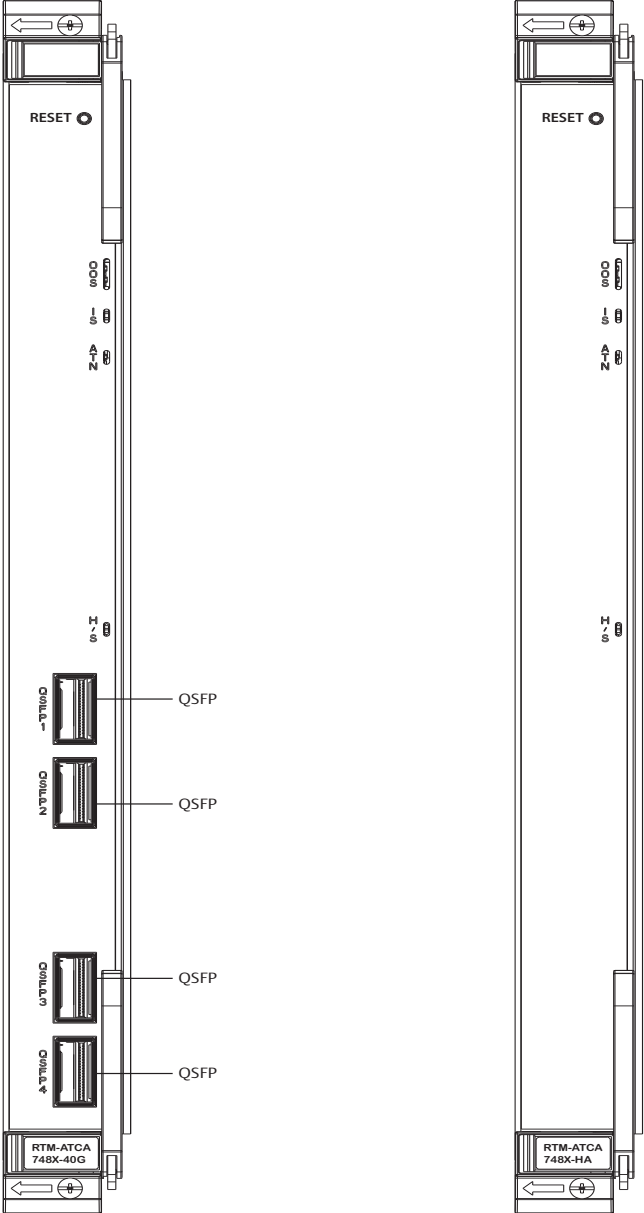


**NOTES:** The Ethernet Controllers XL710 #1 and XL710 #2 are assembled only on the RTM-ATCA-748X-40G-xx variants.  
PEX8748, HW Accelerator #1, and HW Accelerator #2 are assembled only on RTM-ATCA-748X-xxx-HA variants.

### 3.2 Face Plate

The following figure depicts the RTM-ATCA-748X blade's face plate view.

Figure 3-2 Face Plate



The face plate of the RTM provides the following interfaces and control elements:

- Four QSFP Bays (only on RTM-ATCA-748X-40G-xx variants)
- Status LEDs according to PICMG3.0
- Recessed Push Button Reset

The RTM design provides the possibility to cover unused face plate elements like LEDs or push buttons behind a custom overlay foil.

### 3.2.1 QSFP Connector

The following table contains the QSFP Connector pin assignments.

*Table 3-1 QSFP Connector Pin Assignments*

Pin	Signal
1	GND
2	Tx2n
3	Tx2p
4	GND
5	Tx4n
6	Tx4p
7	GND
8	ModSetL
9	ResetL
10	Vcc Rx
11	SCL
12	SDA
13	GND
14	Rx3p
15	Rx3n
16	GND
17	Rx1p
18	Rx1n
19	GND
20	GND

## Controls, Indicators, and Connectors

Table 3-1 QSFP Connector Pin Assignments (continued)

Pin	Signal
21	Rx2n
22	Rx2p
23	GND
24	Rx4n
25	Rx4p
26	GND
27	ModPrsL
28	INTL
29	Vcc Tx
30	Vcc1
31	LPMode
32	GND
33	Tx3p
34	Tx3n
35	GND
36	Tx1p
37	Tx1n
38	GND

### 3.2.2 Status LEDs

This table describes the status indicated by the LEDs.

Table 3-2 Status LEDs

LED Color	Signal Description
Blue	Hot Swap (H/S)
Red	Out of Service (OOS)
Green	In Service (IS)
Amber	Attention (ATN)

### 3.3 Keying

Mechanical keying is provided according to ATCA 3.0 Base specification.

### 3.4 Heat Sinks

Passive heat sinks are required for the two Intel XL710 and the four QSFP interfaces. Heat sinks are also available on PEX8748 and on the two Hardware Accelerators.

# Controls, Indicators, and Connectors

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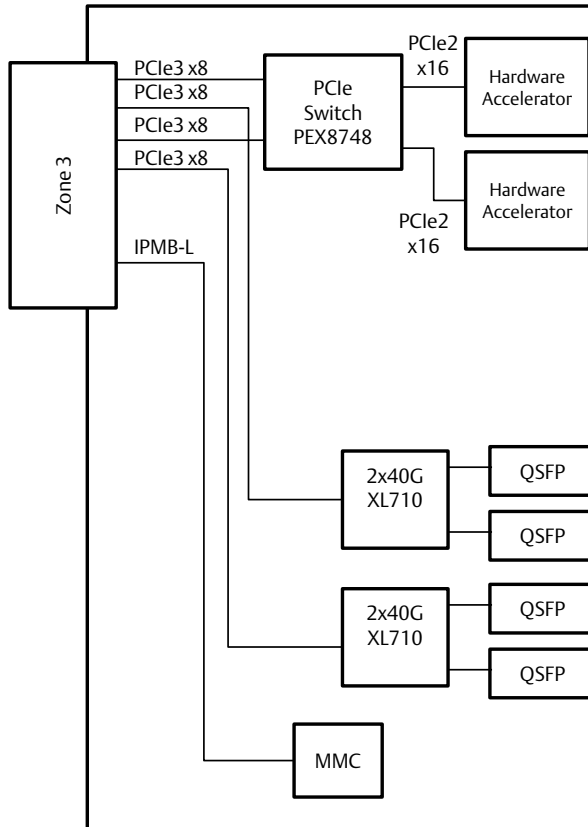


# Functional Description

## 4.1 RTM-ATCA-748X Block Diagram

The following figure shows the block diagram of RTM-ATCA-748X.

*Figure 4-1 RTM-ATCA-748X Block Diagram*



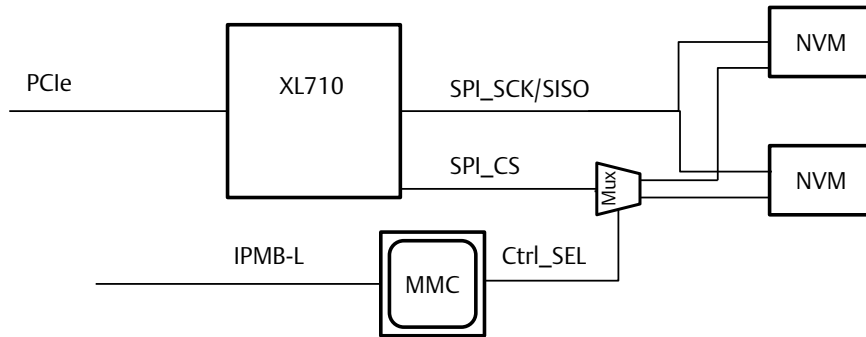
**NOTES:**The Ethernet Controllers XL710 #1 and XL710 #2 are assembled only on the RTM-ATCA-748X-40G-xx variants.

PEX8748, HW Accelerator #1 and HW Accelerator #2 are assembled only on the RTM-ATCA-748X-xxx-HA variants.

## 4.2 Ethernet Interfaces

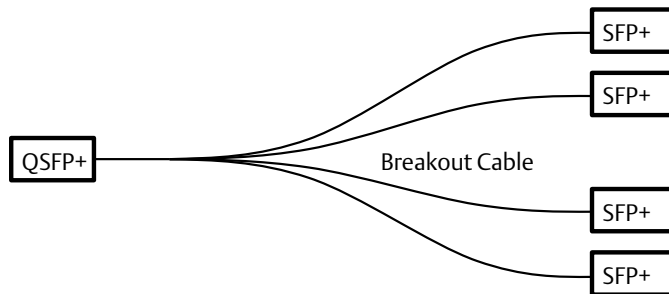
The RTM-ATCA-748X-40G utilizes two Intel XL710 Dual 40GB Ethernet controllers to provide four QSFP+ interfaces. The XL710 can be configured as two 40G or one 4x10G through the selectable NVM configuration loaded after reset de-assertion. The NVM configuration can be selected through the MMC.

Figure 4-2 NVM Selection



The RTM-ATCA-748X-40G supports QSFP+ Breakout Cable (QSFP+ to (4) SFP+) for 4x10G at QSFP2 and QSFP4. The following figures shows the Breakout Cable (QSFP+ to (4) SFP+).

Figure 4-3 Breakout Cable



## 4.3 MMC

The RTM-ATCA-748X contains the Atmel ATmega128L to support IPMI.

### 4.3.1 I<sup>2</sup>C Bus

The RTM-ATCA-748X contains a MMC controller I<sup>2</sup>C Bus. It is also called as Private I<sup>2</sup>C Bus, which is connected to the temperature sensors. The following table contains the I<sup>2</sup>C Bus Address Map information.

*Table 4-1 I<sup>2</sup>C Bus Address Map*

Bus	Address	Device
RTM_PVT_I2C_0	0xA0	EEPROM containing FRU (by default, not assembled)
RTM_PVT_I2C_0	0x90	Temperature Sensor #1 (LM75)
RTM_PVT_I2C_0	0x92	Temperature Sensor #2 (LM75)
RTM_PVT_I2C_0	0x98	Temperature Sensor XL710 #1 (with PCB rev.1.1)
RTM_PVT_I2C_1	0x98	Temperature Sensor PCIE Switch

### 4.3.2 FRU Data

The FRU data and board specific information are stored in MMC, for example, serial number of the board and MAC addresses of network interfaces.

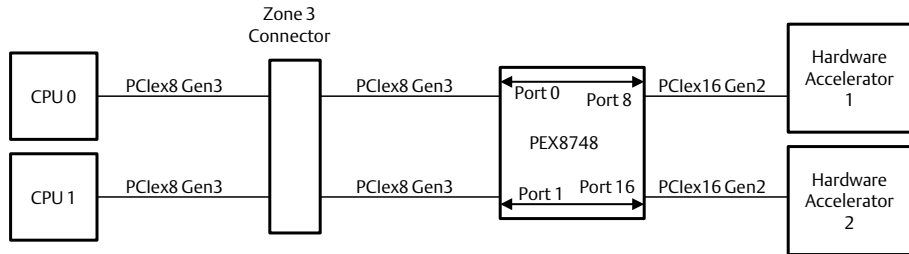
## 4.4 PCIe Switch

The RTM-ATCA-748X-xxx-HA contains a PLX PEX8748 PCIe Switch to convert the two x16 wide PCIe Gen2 interfaces of the two Hardware Accelerators to two x8 wide PCIe Gen3 interfaces connected to Zone3.

The following figure shows the PCIe Switch configuration.

# Functional Description

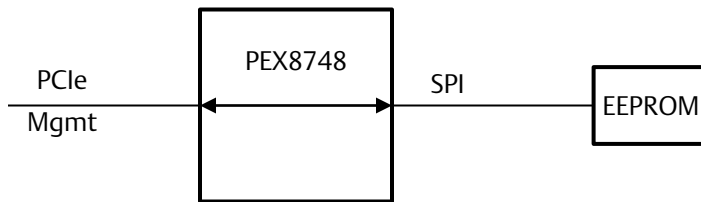
Figure 4-4 PCIe Switch



## 4.4.1 Serial EEPROM

The PEX8748 will be configured by an external SPI EEPROM after reset de-assertion. The PCIe switch automatically detects if an EEPROM is available and contains any valid configuration data. For upgrade purposes, the external EEPROM can be written via the PCIe management port.

Figure 4-5 PEX8748 EEPROM



## 4.4.2 I<sup>2</sup>C Slave Interface

The PEX8748 supports an I<sup>2</sup>C interface connected to the Zone3. The I<sup>2</sup>C Slave Device address is 0111\_000b.

## 4.4.3 Management Interface

The Port 0 of the PEX8748 is configured as management port. The serial EEPROM is accessible through the management port.

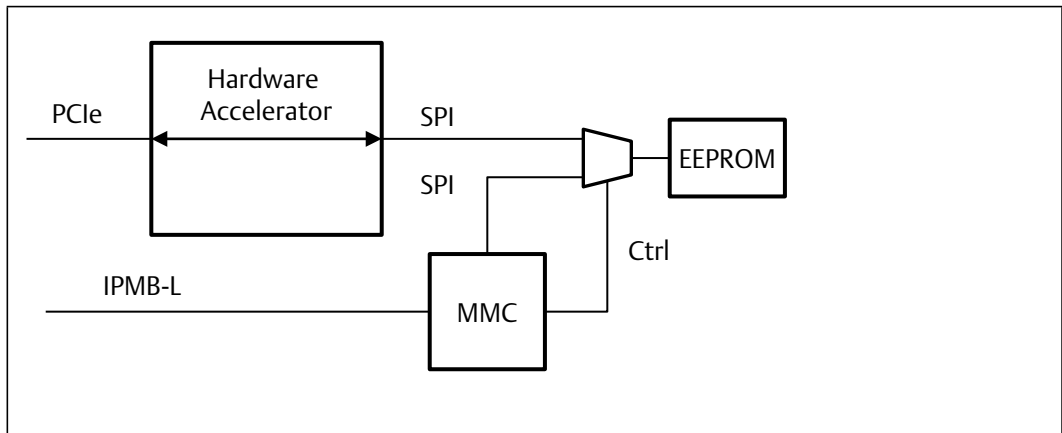
## 4.5 Hardware Accelerator

The RTM-ATCA-748X-xxx-HA contains two Intel Communication Chipsets 8900 Hardware Accelerators with Integrated Accelerator. The Hardware Accelerator provides x16 PCIe Gen2 target interfaces.

### 4.5.1 Serial EEPROM

The Hardware Accelerator will be configured by an external SPI EEPROM after reset de-assertion. The Hardware Accelerator automatically detects if an EEPROM is available and contains valid configuration data. For upgrade purposes, the external EEPROM can be written via the MMC. The MMC can bypass the SPI interface of the Hardware Accelerator and has the direct read and write access to the EEPROM.

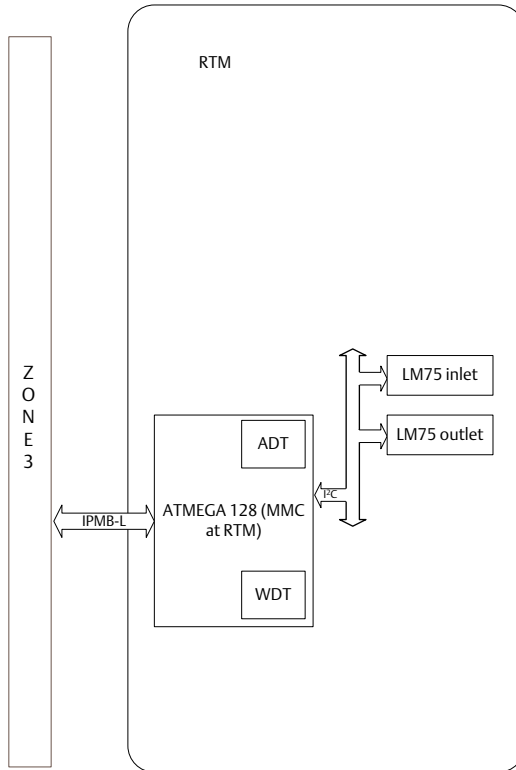
*Figure 4-6 Hardware Accelerator EEPROM*



## 4.6 IPMC Firmware

The RTM-ATCA-748X provides an intelligent hardware management system, as defined in the AdvancedTCA® Base Specification (PICMG® 3.0; AMC.0). This RTM incorporates a Module Management Controller (MMC) based on the BMR-AVR-AMCm® reference design from Pigeon Point Systems. The functional block diagram of RTM-ATCA-748X system is shown below.

Figure 4-7 MMC Block Diagram of RTM-ATCA-748X



The RTM-ATCA-748X implements all the standard Intelligent Platform Management Interface (IPMI) commands and provides hardware interfaces for other system management features such as Hot Swap control, LED control, power control, as well as temperature and voltage monitoring.

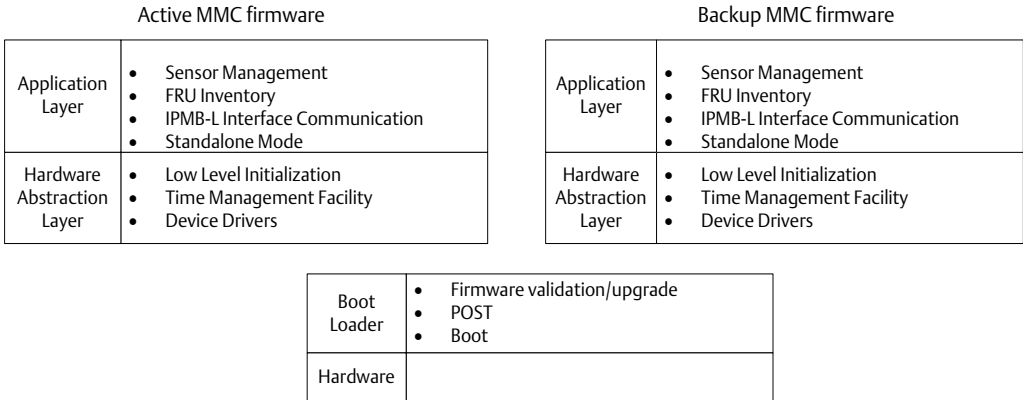
Pigeon Point Systems IPM Sentry products are consistent with all current PICMG specifications as well as IPMI v1.5 compliant with specific 2.0 extensions.

### 4.6.1 Firmware Architecture

The IPMC and MMC firmware basically consists of three major parts. They are:

- BootLoader
- Hardware Abstraction Layer (HAL)
- Application Layer

Figure 4-8 Firmware Architecture



The Bootloader maintains redundant copies of the firmware in flash. Each time the IPMI firmware is upgraded, a redundant copy of the current IPMI firmware is created in flash.

The Hardware Abstraction Layer (HAL) is responsible for initializing the ATMEL and making all preparations necessary for running code (written using C language). The time management facility of the HAL is responsible for providing a means for measuring time and detecting timeout conditions. The device drivers are responsible for implementing high-level interfaces to the hardware.

The Application layer is implemented as a multi threaded application. The main thread reads incoming messages/events from various inbound queues, processes these messages/events, and produces outgoing traffic to appropriate hardware interfaces.

The Application layer can also operate in standalone mode intended to debug the payload without requiring a shelf manager.

## Functional Description

### 4.6.2 HPM.1 Components

All embedded software images can be upgraded via HPM.1 protocol.

- IPMI bootloader
- IPMI firmware
- IPMI FRU information
- PCH SPI flashes

The PCH SPI flashes can be programmed via IPMI only. SMART EC provides HPM.1 components, which can be used with *fcu/ipmitool*. The OEM command, *Set GPIO State* is used to select the SPI flashes before programming and deselect the SPI flashes after programming.

The HPM.1 component IPMI firmware stores its active and backup image within one physical flash. A small bootloader is used to jump either to the active or to the backup image depending on the boot flags indicating successful boot. The bootloader is implemented as HPM.1 component as well; however there is no backup image.

The following table provides an overview about the HPM.1 components.

*Table 4-2 Power Configuration*

	ID	Payload cold reset required	Deferred activation support	Comparison support	Preparation support	Rollback/ backup support
IPMI firmware	0	Yes	Yes	No	Yes	Supported without backup command
IPMI bootloader	1	No	No	No	Yes	No
IPMI FRU information	2	Yes	No	No	Yes	Supported without backup command
Optional component to upgrade PCH SPI flashes	4	Yes (even power cycle)	No	No	Yes	Supported without backup command



### 4.6.3 HPM.1 Firmware Upgrade and Crisis Recovery

The IPMI firmware of the MMC is fully HPM.1 compliant and provides the following components:

- BootLoader
- Active IPMI firmware
- Backup IPMI firmware

The bootloader maintains redundant copies of the firmware in flash. Each time the IPMI firmware is upgraded, a redundant copy of the current IPMI firmware is created in flash. Once the new IPMI firmware is programmed, the IPMI controller will reset itself to boot from the new image. The bootloader also validates new IPMI firmware images. The provided IPMI controller can power up successfully and the actual image is made active and the previously active image is made backup. In case power-up fails, the bootloader will automatically recover from crisis and boots from the image before.

The MMC can be upgraded via JTAG or via its IPMB-L interface. To ensure that the payload is not interrupted during IPMI firmware upgrade, the IPMI controller stores all operational information (e-keying, hot-swap state, last events to be queued, graceful shutdown timeout, latest pin setting and so on) in non-volatile storage.

### 4.6.4 Sensors

This section provides a description of all analog and discrete Sensors available on RTM-ATCA-748X.

The following table lists the sensor identification numbers and information regarding the sensor type, name, supported thresholds, assertion and de-assertion information, and a brief description of the sensor purpose. The following table contains RTM-ATCA-748X Sensors information.

## Functional Description

Table 4-3 RTM-ATCA-748X Specific Sensors

Nr	Sensor Name	Sensor Type	Event/ Reading Type	Event Data Byte 1	Event Data Byte 2	Event Data Byte 3	Event Threshold/ Description	Assertion Deassertion	Rearm
66	+12V RTM	Voltage 0x02	Threshold 0x01		Reading	Threshold	No Thresholds		Auto
68	0.8V RTM	Voltage 0x02	Threshold 0x01		Reading	Threshold	unr uc lnr lc	Assertion/ Deassertion	Auto
69	+3.3V RTM	Voltage 0x02	Threshold 0x01		Reading	Threshold	unr uc lnr lc	Assertion/ Deassertion	Auto
70	INLET temp RTM	Temp 0x01	Threshold 0x01		Reading	Threshold	unr uc unc	Assertion/ Deassertion	Auto
71	OUTLET temp RTM	Temp 0x01	Threshold 0x01		Reading	Threshold	unr uc unc	Assertion/ Deassertion	Auto

Table 4-3 RTM-ATCA-748X Specific Sensors (continued)

Nr	Sensor Name	Sensor Type	Event/ Reading Type	Event Data Byte 1	Event Data Byte 2	Event Data Byte 3	Event Threshold/ Description	Assertion Deassertion	Rearm
72	Version change	Version change 0x2B	Sensor-specific discrete 0x6F	0x0 0x1 0x2 0x3 0x4 0x5 0x6 0x7	Change type	0xFF	0x0: Hardware change 0x1: Firmware or software change 0x2: Hardware incompatibility 0x3: Firmware or software incompatibility 0x4: Entity is of an invalid hardware version 0x5: Entity contains invalid F/W,software 0x6: Hardware Change successful 0x7: Software or F/W change successful	Assertion	Auto
73	ADT7461 #L3 temp	Temp 0x01	Threshold 0x01		Reading	Threshold	unr uc unc	Assertion/ Deassertion	Auto
74	ADT7461 #R3 temp	Temp 0x01	Threshold 0x01		Reading	Threshold	unr uc unc	Assertion/ Deassertion	Auto

## Functional Description

### 4.6.5 FRU Inventory

The following table provides the RTM's FRU information.

*Table 4-4 RTM Base FRU Information Overview*

Area	Description	Value	Access
Internal use area	Not used		r/w
Board info area	Mfg date/time	According to [FRU, V1.0]	r/w
	Board manufacturer	SMART EC	r/w
	Board product name	Defined by SMART EC	r/w
	Board serial number	Defined by SMART EC	r/w
	Board part number	Defined by SMART EC	r/w
Product info area	Product Manufacturer	SMART EC	r/w
	Product name	RTM-ATCA-748X	r/w
	Product serial number	Defined by SMART EC	r/w
	Product part number	Defined by SMART EC	r/w
Multi record info area	User Info Area	SMART EC OEM user info area	r/w

The MAC addresses of a FRU are stored within the multi-record area of the FRU information. SMART EC has defined a MAC address multi-record for this purpose. For details, refer to section [MAC Address FRU OEM Records on page 52](#).

#### 4.6.5.1 MAC Address FRU OEM Records

The SMART EC MAC Address record is specified in the following table.

*Table 4-5 SMART EC MAC Address Record*

Offset	Length	Description
0	1	Record Type ID. A value of C0h (OEM) is used for SMART Embedded Computing OEM records.
1	1	End of List/Version [7] End of List. Set to 1b for the last record [6:4] Reserved. Write as 000b. [3:0] Record format version. Write as 2h.
2	1	Record Length

*Table 4-5 SMART EC MAC Address Record (continued)*

Offset	Length	Description
3	1	Record Checksum (zero checksum)
4	1	Header Checksum (zero checksum)
5	1	LSB of Manufacturer ID. Write as CDh.
6	1	Second Byte of Manufacturer ID. Write as 65h.
7	1	MSB of Manufacturer ID. Write as 00h.
8	1	Motorola Record ID. 01h for SMART EC MAC Address Record.
9	1	Record Format Version. 01h for this specification.
10	1	Number of MAC Address Descriptors (N).
11	N*9	SMART EC MAC Address Descriptors. For details, refer to <a href="#">SMART EC MAC Address Descriptor on page 53</a>

*Table 4-6 SMART EC MAC Address Descriptor*

Offset	Length	Description
0	1	Interface Type.
1	1	Length Identifier (for example: 6 = 48 bit MAC, 8 = WWPN)
2	1	MAC Address Count (M) (specifying a continuous pool of MAC addresses starting with the MAC address specified in this descriptor) M = 1: this descriptor specifies one MAC address M > 1: this descriptor specifies a pool of MAC addresses with M count
3	6	MAC Address. (Canonical form, the LSB (least significant bit) first.

*Table 4-7 Interface Type Assignments*

Interface Type	Description
01h	ATCA Base Interface
02h	ATCA Fabric Interface
03h	Front/Rear Panel
04h	Mezzanine Module
05h	Serial over LAN (SOL)
06h	Fibre Channel / WWPN

## Functional Description

Table 4-7 Interface Type Assignments (continued)

Interface Type	Description
07h	AMC/MicroTCA Common Options Region
08h	AMC/MicroTCA Fat Pipe Region
09h	AMC/MicroTCA Extended Fat Pipe Region
10h	ATCA Update Channel
11h	Multi-type (Base, Fabric, and Update channel (or two types of it) are connected to a on-board switch)
11h-FFh	Reserved

The MMC will provide 8 MAC addresses in its FRU information.

### 4.6.6 Ejector Handle De-Bounce

The handle switch de-bouncing algorithm is used to configure a programmable delay. The IPMC is waits, before ejector handle state changes are accepted. This is provided to avoid accidental FRU extraction caused by service-teams during servicing other FRUs.

The Ejector Handle De-bounce function can be enabled, disabled and configured with the use of the OEM command, `Set/Get Feature Configuration`, for more details, refer the section, [Set Feature Configuration on page 60](#).

### 4.6.7 PMI Hardware Watchdog

For crisis recovery purpose, the IPMI building block provides an internal hardware watchdog. If the watchdog does not trigger anymore, the IPMI firmware is reset.

### 4.6.8 Power Configuration

The following table contains the power configuration details.

Table 4-8 Power Configuration

Item	Value	Description
Dynamic power reconfiguration	No	While the RTM is powered, it supports only one power level.
Dynamic power configuration	No	The power level is fixed and does not change.

Table 4-8 Power Configuration (continued)

Item	Value	Description
Number of power draw levels	1	The amount of possible power levels.
Early Power Draw Levels, Watt	-	Complete early power level including MMC.
Steady state Power Draw Levels, Watt	33.6W/84W( HA version)	Complete steady power consumption including IPMC and RTM.
Transition from early to steady levels, sec	0s	-

### 4.6.9 SMART EC Extensions on Standard Commands

IPMI specification reserves some fields or data ranges of some commands for OEM usage, which allows an OEM manufacturer to extend the features or functionalities of the standard IPMI interface.

Applications or system manager will retrieve the manufacturer's IANA enterprise number via the IPMI `Get Device ID` command and then interpret the OEM field extensions accordingly.

#### 4.6.9.1 Set/Get System Boot Options Commands

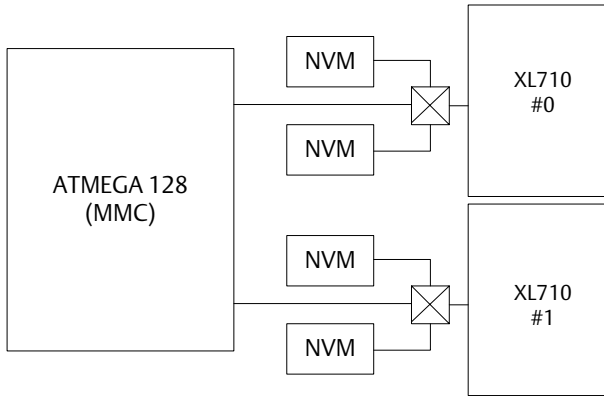
The RTM-ATCA-748X-40G-xx uses two XL710 NICs. Each can be configured to support either up to two XLPP1 or up to four SFI interfaces.

Due to the fact that the NIC configuration is stored in an external Non-volatile Memory (NVM). The RTM-ATCA-748X-40G-xx provides two NVM flashes; these can be selected via MMC.

# Functional Description

The IPMI command, *Set/Get System Boot Options* provides a means to persistently set/retrieve the XL710 NVM boot options. The IPMI specification defines a set of standard boot option parameters. The IPMI specification also leaves a range (96 – 127) of boot options for OEM extensions.

*Figure 4-9 XL710 NVM Selection*



SMART EC utilizes this OEM range for OEM function extensions such as XL710 NVM Bank Selection. The command, *Set System Boot Options* selects the XL710 NVM for next boot. Without a power-cycle, this setting will not get active (switching the NVMs shall happen only when payload is off).

Remember that XL710 #0 connects to QSFP3 and QSFP4 and XL710 #1 connects to QSFP1 and QSFP2.

*Table 4-9 OEM Parameter for Set/Get System Boot Options*

Parameter	#	Parameter Data (non-volatile unless otherwise noted)
Boot Bank (non-volatile)	96	data 1 – Set Selector. This is the XL710 ID for which the boot option is to be set [0] NIC 0 [1] NIC 1 data 2 – NVM Bank Selector. This parameter is used to indicate the NVM bank the XL710 shall boot from [0] NVM A [1] NVM B



### 4.6.10 SMART EC OEM Command Set

In addition to standard commands defined by IPMI and PICMG specifications, SMART EC defines a set of OEM commands to extend the features that SMART EC products may have.

Table 4-10 SMART EC OEM Commands

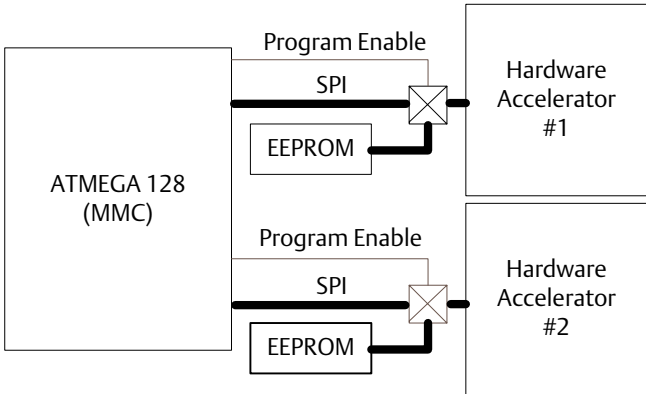
Command	CMD	Defined in
Set GPIO State	E2h	2.10.1
Get GPIO State	E3h	2.10.2
Set Feature Configuration	1Eh	2.10.3
Get Feature Configuration	1Fh	2.10.4

SMART EC OEM request messages use NetFn 2Eh, and the response messages use NetFn 2Fh.

#### 4.6.10.1 Set GPIO State

In general, this command sets the specified General-Purpose Input/Output (GPIO) pin to the given state. If the GPIO pin is not able to set or is not implemented, a completion code of 80h (parameter not supported) is returned. In particular, it is used to select the Hardware Accelerator SPI EEPROM instance for programming.

Figure 4-10 Hardware Accelerator EEPROM Program Enable



# Functional Description

*Table 4-11 Set GPIO State*

	Byte	Data Field
Request data	1	LSB of SMART EC IANA Enterprise Number. A value of CDh is used.
	2	2nd byte of SMART EC IANA Enterprise Number. A value of 65h is used
	3	MSB of SMART EC IANA Enterprise Number. A value of 00h is used.
	4	The GPIO pin selector. The selectors are defined in <a href="#">Table 4-12 on page 58</a> .
	5	The GPIO pin state to be set to. 00h = active /asserted 01h = inactive / de-asserted 02h – FFh reserved
Response Data	1	Completion Code. Generic plus the following command-specific completion codes: 80h = parameter not supported.
	2	LSB of SMART EC IANA Enterprise Number. A value of CDh is used.
	3	2nd byte of SMART EC IANA Enterprise Number. A value of 65h is used.
	4	MSB of SMART EC IANA Enterprise Number. A value of 00h is used.

Following table defines the GPIO pin selector assignments. Actual supported GPIO pin selector varies between products or even firmware revisions of a same product.

*Table 4-12 GPIO Pin Selector Assignments*

GPIO Function	GPIO Pin Selector
Hardware Accelerator #1	00h
Hardware Accelerator #2	01h

4.6.10.2 Get GPIO State

In general this command returns the current state of the specified GPIO. If the GPIO pin is not supported, a completion code 80h (parameter not supported) is returned. In particular, it is used to retrieve the instance of the Hardware Accelerator SPI EEPROM selected for programming.

Table 4-13 Set GPIO State

	Byte	Data Field
Request data	1	LSB of SMART EC IANA Enterprise Number. A value of CDh is used.
	2	2nd byte of SMART EC IANA Enterprise Number. A value of 65h is used.
	3	MSB of SMART EC IANA Enterprise Number. A value of 00h is used.
	4	The GPIO pin selector. The selectors are defined in <a href="#">Table 4-12 on page 58</a> .
Response Data	1	Completion Code. Generic plus the following command-specific completion codes: 80h = parameter not supported.
	2	LSB of SMART EC IANA Enterprise Number. A value of CDh is used.
	3	2nd byte of SMART EC IANA Enterprise Number. A value of 65h is used
	4	MSB of SMART EC IANA Enterprise Number. A value of 00h is used.
	5	The GPIO pin state 00h = inactive / de-asserted 01h = active / asserted 02h – FFh reserved.

## Functional Description

### 4.6.10.3 Set Feature Configuration

This command is used to enable/disable features within the IPMC during runtime.

*Table 4-14 Set Feature Configuration Command*

	Byte	Data Field
Request data	1	LSB of SMART EC IANA Enterprise Number. A value of CDh is used.
	2	2nd byte of SMART EC IANA Enterprise Number. A value of 65h is used.
	3	MSB of SMART EC IANA Enterprise Number. A value of 00h is used.
	4	The GPIO pin selector. The selectors are defined in <a href="#">Table 4-12 on page 58</a> .
	5	Feature Configuration. 00h–FFh: Debounce timer timeout value in 100ms
	6	Persistency / Duration 00h = volatile. Actual duration depends on implementation. 01h – FFh = reserved
Response Data	1	Completion Code. Generic plus the following command-specific completion codes: 80h = parameter not supported.
	2	LSB of SMART EC IANA Enterprise Number. A value of CDh is used.
	3	2nd byte of SMART EC IANA Enterprise Number. A value of 65h is used
	4	MSB of SMART EC IANA Enterprise Number. A value of 00h is used.

The following table provides the feature set supported with ATCA-7480.

*Table 4-15 Feature Selector Assignments*

Feature Selector	Description
(3) 03h	Handle Debounce

#### 4.6.10.4 Get Feature Configuration

This command can be used to retrieve the IPMI feature set being configured.

*Table 4-16 Set Feature Configuration Command*

	Byte	Data Field
Request data	1	LSB of SMART EC IANA Enterprise Number. A value of CDh is used.
	2	2nd byte of SMART EC IANA Enterprise Number. A value of 65h is used.
	3	MSB of SMART EC IANA Enterprise Number. A value of 00h is used.
	4	Feature Selector, for more details refer <a href="#">Table 4-15 on page 60</a> .
Response Data	1	Completion Code. Generic plus the following command-specific completion codes: 80h = parameter not supported.
	2	LSB of SMART EC IANA Enterprise Number. A value of CDh is used.
	3	2nd byte of SMART EC IANA Enterprise Number. A value of 65h is used
	4	MSB of SMART EC IANA Enterprise Number. A value of 00h is used.
	5	Feature Configuration 00h – FFh: De-bounce timer timeout value in 100ms
	6	Persistency / Duration

# Functional Description

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# 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-7480 Installation and Use	6806800T17
RTM-ATCA-748X-40G Quick Start Guide	6806800T36
RTM-ATCA-748X-40G Safety Notes Summary	6806800T26

## A.2 Technical References

Further information on basic operation and programming of the RTM-ATCA-748X components can be found in documents listed below.

*Table A-2 Technical References*

Device / Interface	Document <sup>1</sup>
ATCA	<p><i>AdvancedTCA® Base Specification</i> (PICMG® 3.0 Revision 2.0 March 18, 2005)  <i>Engineering Change Notice 3.0-1.0-001</i>(PICMG 3.0 R2.0: ECN 3.0-2.0-001 June 15, 2005)  <i>Ethernet/Fibre Channel for AdvancedTCA™ Systems</i> (PICMG 3.1 Revision 1.0 January 22, 2003)  <a href="http://www.picmg.org">http://www.picmg.org</a></p>
IPMI	<p><i>IPMI – Intelligent Platform Management Interface Specification v2.0</i> (Intel Hewlett-Packard NEC Dell, Rev. 1.0, Feb. 12, 2004)  <i>IPMI – Intelligent Platform Management Bus Communications Protocol Specification v1.0</i> (Intel Hewlett-Packard NEC Dell, Rev. 1.0, November 15, 1999)  <i>IPMI – Platform Management FRU Storage Definition v1.0</i> (Intel Hewlett-Packard NEC Dell, Rev. 1.1, September 27, 1999)  <a href="http://www.intel.com/design/servers/ipmi/">http://www.intel.com/design/servers/ipmi/</a>  <i>Hardware Platform Management IPM Controller Firmware Upgrade Specification v1.0</i> (PICMG HPM.1 R1.0 May 4, 2007)  <a href="http://www.picmg.org">http://www.picmg.org</a></p>

1. Frequently, the most current information regarding addenda/errata for specific documents may be found on the corresponding web site.







