COMPUTING

RTM-ATCA-F140

Installation and Use

P/N: 6806800M97K

March 2017

ARTESYN™

EMBEDDED TECHNOLOGIES

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Overview of Contents

This manual is divided into the following chapters and appendices.

- *Introduction* describes the main features of the RTM.
- *Hardware Preparation and Installation* installation prerequisites and the installation itself.
- *Controls, LEDs, and Connectors* describes external interfaces such as connectors and LEDs.
- *Functional Description* contains a block diagram of the RTM and provides some information on the IPMI functionality of the RTM.
- *Related Documentation* lists further Artesyn user manuals that are related to the RTM and the ATCA-F140.
- *Safety Notes* summarizes the safety instructions in the manual.
- *Sicherheitshinweise* is a German translation of the Safety Notes chapter.

Abbreviations

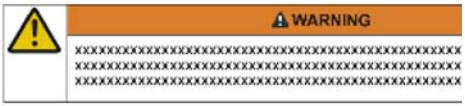
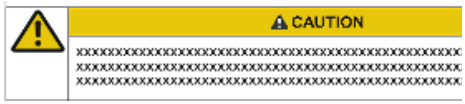
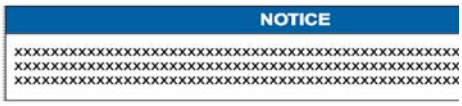
This document uses the following abbreviations:

Abbreviation	Definition
AMC	Alarm Management Controller
ARP	Address Resolution Protocol
ATCA	Advanced Telecom Computing Architecture
BIX	Base Interface Switch
CP-TA	Communications Platforms Trade Association
FIX	Fabric Interface Switch
PICMG	PCI Industrial Computer Manufacturers Group
PCI	Peripheral Component Interconnect
RTM	Rear Transition Module
SPI	Serial Peripheral 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)
bold	Used to emphasize a word
`Screen`	Used for on-screen output and code related elements or commands in body text
`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
. . .	Omission of information from example/command that is not necessary at the time being
..	Ranges, for example: 0..4 means one of the integers 0,1,2,3, and 4 (used in registers)
|	Logical OR

Notation	Description
	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
	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
6806800M97K	March 2017	Updated Chapter 4, *SFP+ Connection, on page 46* and Copyright page.
6806800M97J	May 2016	Removed *Declaration of Conformity*.
6806800M97H	September 2015	Added Hint table on page 19. Updated Safety Notes Summary, and Sicherheitshinweise.
6806800M97G	September 2014	Replaced Figure 3-1 on page 37 with ELMA handle variant figure. Updated the section *RTM Installation and Removal on page 32* as per ELMA handle usage.
6806800M97F	July 2014	Updated *Chapter 4, Functional Description.*
6806800M97E	April 2014	Re-branded to Artesyn.

Part Number	Publication Date	Description
6806800M97D	May 2013	Corrected part number from 6806800M97C to 6806800M97B in the row 2 of this table.
6806800M97C	December 2012	Updated *Standard Compliances* on page 25.
6806800M97B	April 2012	GA Release.
6806800M97A	August 2011	Initial Version.

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.

Artesyn 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 Artesyn 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 Artesyn 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 Artesyn representative for service and repair to make sure that all safety features are maintained.

Electrical Interference

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 Artesyn could void the user's authority to operate the equipment. Board products are tested in a 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

Damage of the RTM and Additional Devices and Modules
Incorrect installation or removal of additional devices or modules may damage the RTM or theadditional devices or modules.
Before installing or removing additional devices or modules, read the respective documentation.

Damage of Circuits
Electrostatic discharge and incorrect installation and removal of the RTM 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.

Damage of the RTM
Incorrect installation of the RTM can cause damage of the RTM.
Only use handles when installing/removing the RTM to avoid damage/deformation to the face plate and/or PCB.

Damage to RTM/Backplane or System Components
Bent pins or loose components can cause damage to the RTM, the backplane, or other system components.
Therefore, carefully inspect the RTM and the backplane for both pin and component integrity before installation.

Artesyn and our suppliers take significant steps to ensure there are no bent pins on the backplane or connector damage to the blades/RTMs prior to leaving the factory. Bent pins caused by improper installation or by inserting blades with damaged connectors could void the Artesyn warranty for the backplane or blades.

System Damage
Warning: The intra-building port (s) of the equipment or subassembly is suitable for connection to intra-building or unexposed wiring or cabling only. The intra-building port (s) of the equipment or subassembly MUST NOT be metallically connected to interfaces that connect to the outside plant (OSP) or its wiring. These interfaces are designed for use as intra-building interfaces only (Type 2 or Type 4 ports as described in GR-1089) and require isolation from the exposed OSP cabling. The addition of primary protectors is not sufficient protection in order to connect these interfaces metallically to OSP wiring.
The intra-building port(s) of the equipment or subassembly must use shielded intra-building cabling/wiring that is grounded at both ends.

Operation

Damage of the RTM
High humidity and condensation on the RTM surface causes short circuits.
Do not operate the RTM outside the specified environmental limits. Make sure the RTM is completely dry and there is no moisture on any surface before applying power.

Cabling and Connectors

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

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

Eye Damage
Optical SFP/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/SFP+ Module Damage
The optical port plug protects the optical fibres against dirt and damage. Dirt and damage can render the SFP/SFP+ module inoperable.
Only remove the optical plug when you are ready to connect a cable to the SFP/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.

Artesyn 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 Artesyn.

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 Artesyn 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 Artesyn. So stellen Sie sicher, dass alle sicherheitsrelevanten Aspekte beachtet werden.

EMV

Das Produkt wurde in einem Artesyn Standard system 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.

Das Produkt 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 des RTMs und von Zusatzmodulen
Fehlerhafte Installation von Zusatzmodulen, kann zur Beschädigung des RTMs und der Zusatzmodule führen.
Lesen Sie daher vor der Installation von Zusatzmodulen die zugehörige Dokumentation.

Beschädigung von Schaltkreisen
Elektrostatische Entladung und unsachgemäßer Ein- und Ausbau von Blades/RTMs kann Schaltkreise beschädigen oder ihre Lebensdauer verkürzen. Bevor Sie Blades/RTMs oder elektronische Komponenten berühren, vergewissern Sie sich, dass
Sie in einem ESD-geschützten Bereich arbeiten.

Beschädigung des RTMs
Fehlerhafte Installation des RTMs kann zu einer Beschädigung des RTMs führen.
Verwenden Sie die Handles, um das RTM zu installieren/deinstallieren. Auf diese Weise vermeiden Sie, dass das Face Plate oder die Platine deformiert oder zerstört wird.

Beschädigung des RTMs, der Backplane oder von System Komponenten
Verbogene Pins oder lose Komponenten können zu einer Beschädigung des RTMs, der Backplane oder von Systemkomponenten führen.
Überprüfen Sie daher das RTM sowie die Backplane vor der Installation sorgältig und stellen Sie sicher, dass sich beide in einwandfreien Zustand befinden und keine Pins verbogen sind.

Artesyn und unsere Zulieferer unternehmen größte Anstrengungen um sicherzustellen, dass sich Pins und Stecker von Blades/RTMs vor dem Verlassen der Produktionsstätte in einwandfreiem Zustand befinden. Verbogene Pins, verursacht durch fehlerhafte Installation oder durch Installation von Blades/RTMs mit beschädigten Steckern kann die durch Artesyn gewährte Garantie für Blades und Backplanes erlöschen lassen.

Beschädigung des Systems
Warnung: Die intra-Gebäude Port (s) des Geräts oder Baugruppe ist für den Anschluss an den inner Gebäude oder unbelichteten Verdrahtung oder Verkabelung nur. Die intra-Gebäude Port (s) des Geräts oder Baugruppe muss nicht metallisch mit Schnittstellen, die an der Außenanlage (OSP) oder dessen Verkabelung anschließen angeschlossen werden. Diese Schnittstellen sind für die Verwendung als intra Gebäude Schnittstellen nur entworfen, (Typ 2 oder Typ 4 Ports wie in GR-1089 beschrieben) und erfordern Isolierung von der freiliegenden OSP-Verkabelung. Die Zugabe von primären Schutz nicht ausreichenden Schutz, um diese Schnittstellen metallisch mit OSP Verdrahtung verbinden.
Die intra-Gebäude Port (s) des Gerätes oder einer Unterbaugruppe müssen abgeschirmte innerGebäudeVerkabelung / Verdrahtung, die an beiden Enden geerdet ist zu verwenden.

Betrieb

Beschädigung des Blades
Die RJ-45-Stecker an der Frontblende sind für Anschlüsse vom Typ Twisted-Pair Ethernet (TPE) oder E1/T1/J1 vorgesehen. Der Anschluss eines E1/T1/J1-Interfaces an einen Ethernet-Stecker kann zur Zerstörung des Blades führen.

- Stellen Sie daher sicher, dass TPE-Stecker an Ihrem Arbeitsplatz eindeutig als Netzwerkstecker gekennzeichnet sind.
- Stellen Sie sicher, dass die Länge eines Kabels, welches an den RJ-45-Stecker angeschlossen ist, 100 m nicht überschreitet.

- Stellen Sie sicher, dass der TPE-Stecker ausschließlich mit einem Safety-Extra-Low-Voltage-Stromkreis (SELV) verbunden ist.
- Wenden Sie sich bei Fragen an ihren Systemadministrator

Beschädigung am Telefon
Die CH2und CH3 Stecker sind mit einem durchgestrichenem Telefonhörer markiert. Wenn Sie an diese Stecker ein Telefon anschließen, kann Ihr Telefon beschädigt werden. Benutzen Sie für diese Stecker ausschließlich das CABLE-8001-CLK-3/10 Kabel.

Umweltschutz

Entsorgen Sie alte Batterien und/oder Blades/Systemkomponenten/RTMs stets gemäß der in Ihrem Land gültigen Gesetzgebung.

SFP/SFP+ Modules

Gefahr von Verletzungen sowie von Beschädigung des RTMs und SFP/SFP+-Modulen
Die Installation und der Betrieb von SFP/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/SFP+-Modulen führen.
Verwenden Sie daher nur SFP/SFP+-Module, die zertifiziert sind und die den Sicherheitsstandards entsprechen.

Verletzungsgefahr
Optische SFP/SFP+-Module können als Laserprodukte klassifiziert sein. Wenn Sie solche SFP/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/SFP+-Module betreiben, die als Laserprodukte klassifiziert sind, stellen Sie sicher, dass die entsprechenden Bestimmungen für Laserprodukte eingehalten werden.

Verletzungsgefahr der Augen
Optische SFP/SFP+-Module können Laserstrahlen aussenden, wenn kein Kabel angeschlossen ist.
Blicken Sie daher nicht direkt in die Öffnung eines SFP/SFP+-Moduls, um Verletzungen der Augen zu vermeiden.

Beschädigung von SFP/SFP+-Modulen
Die Schutzkappe eines SFP/SFP+-Modules dient dazu, die sensible Optik des SFP/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/SFP+-Modul.

1.1 Features

The RTM-ATCA-F140 provides the I/O connection for the ATCA-F140 switch blade towards the back of the system. RTM-ATCA-F140 is directly connected to and powered by the front board.

The RTM-ATCA-F140 is a rear transition module (RTM) as defined in PICMG 3.0 Revision 3.0 AdvancedTCA Base Specification and PICMG 3.1 Revision 1.0 Specification Ethernet/Fiber Channel for AdvancedTCA Systems. It provides several Base and Fabric Channel Ethernet interfaces connected to the front board through the Zone 3 connector.

The main features of the RTM-ATCA-F140 are:

- Single slot RTM form factor (70mm x 322mm)
- 1x 40Gbit Ethernet uplink (FIX) according to IEEE 802.3ba with 1 QSFP+ type connector
- 4x 10Gbit Ethernet uplinks (FIX) according to IEEE 802.3ap with 4 SFP+ type connectors
- 2x 10Gbit Ethernet uplinks (BIX) according to IEEE 802.3ap with 2 SFP+ type connectors
- 4x 1Gbit Ethernet interfaces (BIX) with 4 SFP type connectors
- Serial EEPROM accessible by front-blade IPMC
- Four status LEDs and ejector handle switch accessible by front-blade IPMC

1.2 Standard Compliances

The product is designed to meet the following standards.

Table 1-1 Standard Compliance

Standard	Description
ANSI Fire Spread Criteria	The product is designed to pass the ANSI T1.319-2002 fire spread test method as well as the NEBS GR-63-CORE fire spread test method.
AS/NZS CISPR 22 Class A (Australia/New Zealand)	The product complies with AS/NZS CISPR 22 Class A (Australia/New Zealand), Limits and Methods of Measurement of Radio Disturbance Characteristics of Information Technology Equipment.

Table 1-1 Standard Compliance (continued)

Standard	Description
AT&T Document ATT-TP-76200	The product is designed to comply with the latest version of the AT&T Document ATT-TP-76200: Network Equipment Power, Grounding, Environmental, And Physical Design Requirements.
EN 55024 (EU)	The product complies with EN55024 (EU) Information Technology Equipment - Immunity Characteristics - Limits and Methods of Measurements.
EN 60950-1	This product complies with EN 60950-1 Safety of Information Technology Equipment.
EN55022 Class A (EU)	The product complies with EN55022 Class A (EU), Information Technology Equipment - Radio Disturbance Characteristics - Limits and Methods of Measurements.
ETSI Acoustic Noise ETS 300 753 Class 3.1	The product will not prevent the system from complying with the ETSI acoustic noise requirements per Class 3.1 of ETSI ETS 300 753, Equipment Engineering (EE); Acoustic noise emitted by telecommunications equipment.
ETSI Stationary Use: EN 300 019-2-3 Class 3.1	The product is designed to comply with ETSI Stationary Use: EN 300 019-2-3, Class 3.1 equipment (temperature controlled locations).
ETSI Storage EN 300 019-2-1 Class 1.2	The product is designed to comply with ETSI Storage: EN 300 019-2-1, Class 1.2 equipment (not temperature controlled storage locations).
ETSI Transportation: EN 300 019-2-2 Class 2.3	The product is designed to comply with ETSI Transportation: EN 300 019-2-2, Class 2.3 equipment (public transportation).
FCC 47 CFR Part 15 Subpart B (US), Class A	The product complies with FCC 47 CFR Part 15 Subpart B (US), Class A.
GR-1089 - Ports and Intra-building Lightning	All externally accessible ports shall be designed to comply with the applicable GR-1089 requirements for Telecommunication Ports.
GR-1089-CORE	Products are designed to comply with all applicable requirements for Type 2 Equipment referenced in Telcordia Document GR-1089-CORE.
GR63-CORE	The product is designed to comply with all applicable requirements of Telcordia GR-63-CORE, NEBS Requirements: Physical Protection.

Table 1-1 Standard Compliance (continued)

Standard	Description
IEC 60950-1 CB Scheme	The product complies with IEC 60950-1 CB Scheme including all National Deviations Safety of Information Technology Equipment. Testing shall be by an accredited lab.
NEBS Level 3	Module is designed to pass all testing to Criteria Level 3 per Telcordia SR-3580.
Safety Mark for U.S. and Canada	The product is designed to certify to UL/CSA No. 60950-1 with no deviations and shall bear the Recognition Mark of an NRTL for US and Canada.
UL/CSA No. 60950-1	The product complies with UL/CSA 60950-1Safety of Information Technology Equipment.
VCCI Class A (Japan)	The product complies with VCCI Class A (Japan), Voluntary Control Council for Interference by Information Technology Equipment.
Verizon CHECKLIST	The product is designed to comply with the latest version of the Verizon Document VZ.NEBS.TE.NPI.2004.015: NEBS Checklist.

The product has been designed to meet the directive on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS) Directive 2011/65/EU.

1.3 Mechanical Data

Table 1-2 RTM-ATCA-F140 Mechanical Data

Data	Value
Dimensions	8U x 6 HP form factor - 30 mm x 351 mm x 143 mm (including face plate handles and alignment posts)

Table 1-2 RTM-ATCA-F140 Mechanical Data (continued)

Data	Value
Weight	0.725 Kg

1.4 Ordering Information

The following table lists the blade variants that were available as of the time of writing this manual. Consult your local Artesyn sales representative for the availability of further variants.

Table 1-3 Blade Variants - Ordering Information

Part Number	Description
RTM-ATCA-F140	RTM FOR THE ATCA-F140 WITH SFP AND SFPP SOCKETS

2.1 Overview

- Inspect the shipment and unpack the RTM.
- Make sure environmental and power requirements are met.
- Install the RTM.

2.2 Unpacking and Inspecting the RTM

NOTICE

Damage of Circuits

- Electrostatic discharge and incorrect installation and removal of the blade 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.

The shelf should provide minimum airflow to the RTM slot according to the class B.4 requirements of the CP-TA Inter-operability document AdvancedTCA Book 1.1. This includes the following:

- 2.0 cfm at 25 °C ambient temperature
- 2.8 cfm at 40 °C ambient temperature
- 4.4 cfm at 55 °C ambient temperature

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-F140

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 RTM is thoroughly inspected before shipment. If damage has occurred or items missing during transportation, contact our customer's service immediately.
- Remove the desiccant bag shipped together with the blade and dispose of it according to your country's legislation.

2.3 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.

2.3.1 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

- 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 Conditions

Requirement	Operating	Non-Operating
Temperature and airflow per CP-TA B.4	The RTM shall require no more than 2.2 CFM at the inlet ambient of 25°C (77°F).	
	Under abnormal Short Term operating conditions such as an air mover failure, an RTM shall require no more than 3.0 CFM at the inlet ambient of 40°C (104°F).	
	The RTM shall require no more than 3.2 CFM at the inlet ambient of 40°C (104°F) under normal operating conditions.	
	Under abnormal Short Term operating conditions such as an HVAC failure the RTM shall require no more than 5.0 CFM at the inlet ambient of 55°C (131°F).	

Table 2-1 Environmental Conditions (continued)

Requirement	Operating	Non-Operating
Airflow Impedance	An ATCA RTM shall present less than 0.1 inches water back-pressure at 5 CFM airflow at sea level.	
Temperature	25°C when cooled by an even airflow of 2.2 CFM	-40°C to 85°C
	0°C to 40°C when cooled by an even airflow of 3.0 CFM	
	-5°C to 55°C when cooled by an even airflow of 5.0 CFM	
Temperature change	+/- 0.5°C/min	+/- 1°C/min
Relative humidity	5% to 95% non-condensing at 40°C	5% to 95% non-condensing at 40°C
Altitude	-300m to 1,800m at 40°C	-300m to 13,000m
	1,800m to 4,000m at 30°C	
	Between 106 Kpa and 70 Kpa air pressure	

2.4 RTM Installation and Removal

The RTM is fully compatible to the AdvancedTCA standard and is designed to be used in AdvancedTCA shelves.

The RTM must only be installed into the slot associated with the proper companion front blade.

NOTICE

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.

Damage of the RTM

- Incorrect installation of the RTM can cause damage of the RTM.
- Only use handles when installing or removing the RTM to avoid damage/deformation to the face plate and/or the PCB.

2.4.1 Installing the RTM

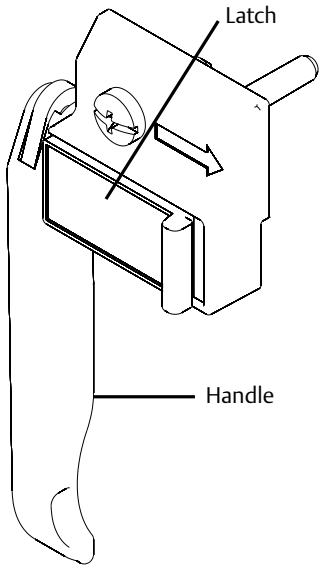
To install the RTM into an AdvancedTCA Shelf, proceed as follows.

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.

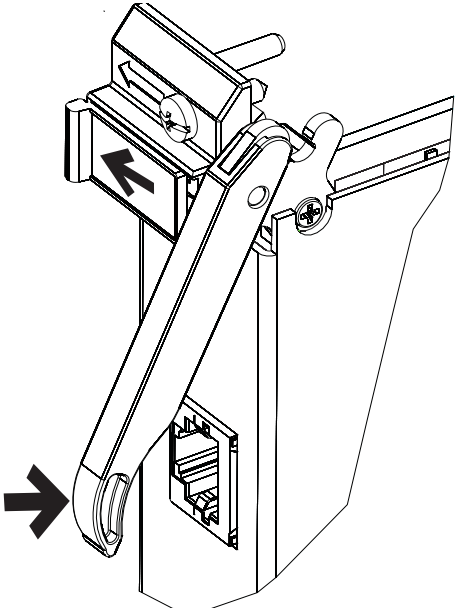
Slow down and give blade insertion your full attention! If there are Rear Transition Modules (RTMs) to install, install/secure the RTMs first, then install the front blades.

1. Visually inspect the RTM and zone 3 connectors on the front blade for damage or bent pins before attempting to insert a board. If any connector damage or pin damage is observed, stop before inserting the RTM and send the damaged item through proper repair channels.
2. If the corresponding front blade is already installed, perform the following steps.
   - On the front blade, verify the face plate screws that secure the blade to the shelf are tight.
   - Deactivate the front blade. Slide the latch into the release position and pull out the handle outward to unlatch the handle from the face plate. Do not rotate the handle fully outward.



   - When the blue LED on the front blade is permanently illuminated, proceed to the next step.
3. Insert the RTM into the shelf by placing the top and bottom edges of the RTM in the card guides of the shelf. Ensure that the guiding module of the front blade and RTM are aligned properly.
4. 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 connectors engage.

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



6. Tighten the face plate screws which secure the RTM to the shelf.
7. If the front blade has already been installed (as in step 2), activate the front blade by pressing it back into the face plate.
8. If the front blade has not been installed, proceed with the installation instructions in the front blade installation and use manual.

Make sure that the handles of both the RTM and the front blade are closed in order to power up the blade and RTM payload.

When the RTM's blue LED is switched OFF and the green LED "OK" is switched ON, this indicates that the RTM’s payload has been powered up and that the RTM is active.

9. Connect cables to the face plate, if applicable.

2.4.2 Removing the RTM

This section describes how to remove the RTM from an AdvancedTCA system.

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. On the front blade, slide the latch into the release position and pull out the handle outward to unlatch the handle from the face plate. Do not rotate the handle fully outward.
   The front board blue LED blinks indicating that the blade power-down process is ongoing.

NOTICE

Data Loss

- Removing the blade, with the blue LED still blinking, will cause data loss. Wait until the blue LED is permanently illuminated, before removing the blade.

2. Wait until the front board blue LED is illuminated permanently.

If the LED continues to blink, a possible reason may be that upper layer software rejects the blade extraction request

3. Remove face plate cables, if applicable.
4. Unfasten the screws of the RTM face plate until the RTM is detached from the shelf.
5. Unlatch the RTM handle and rotate fully outward.
6. Remove the blade from the shelf.

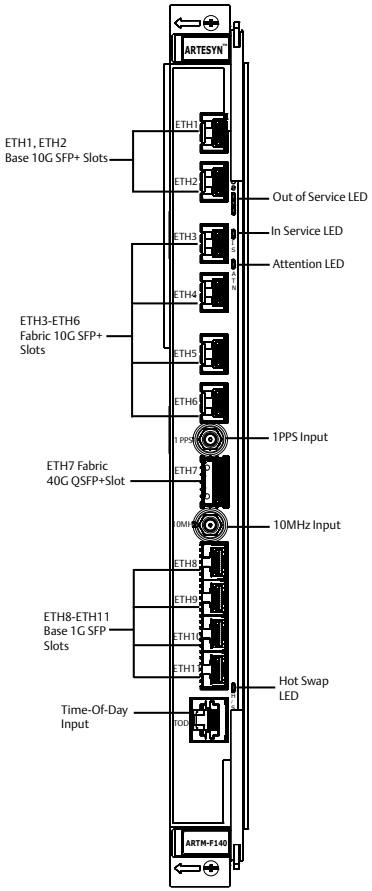
3.1 Overview

This chapter describes about Face plate connectors and Face plate LED.

3.2 Face Plate Connectors and LEDs

The following figure shows the face plate of the RTM.

Figure 3-1 Face Plate



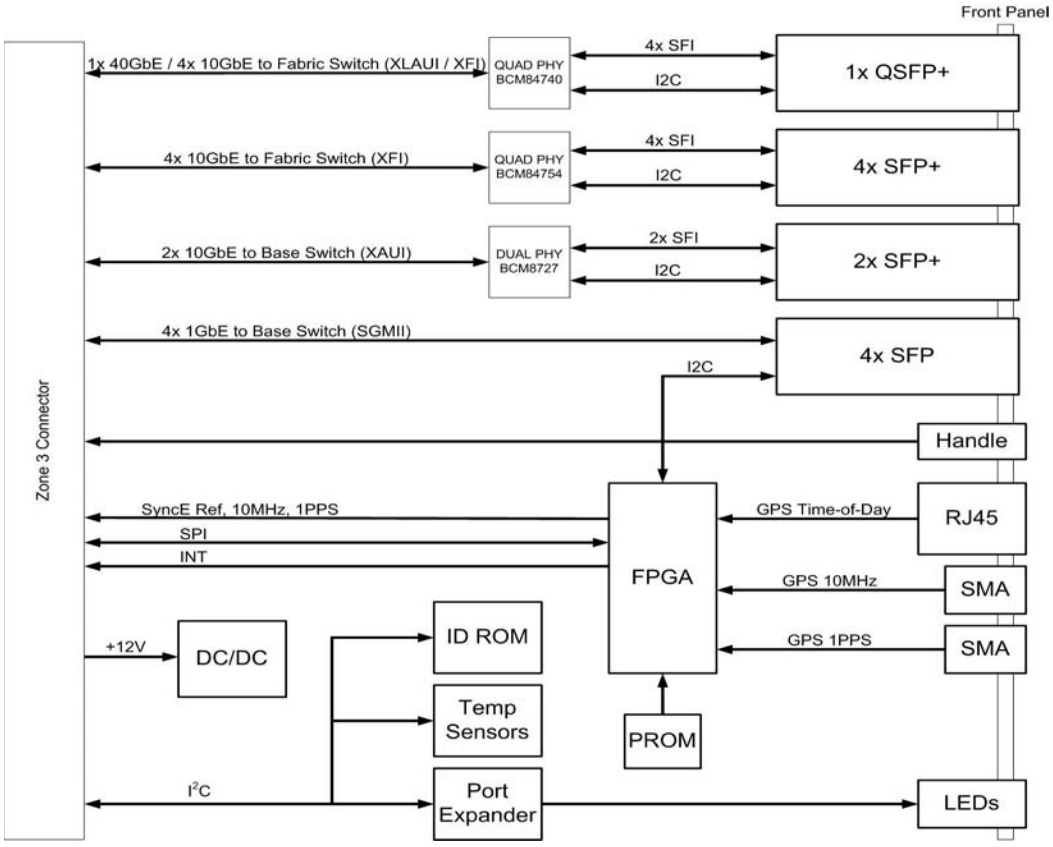
3.2.1 LEDs

RTM-ATCA-F140 provides four panel-visible LEDs that provide the standard ATCA management LED functions:

- Red (out of service)
- Green (in service)
- Blue (hot-swap initializing/ shutting down)
- Amber (attention)

4.1 Block Diagram

Figure 4-1 Block Diagram



4.2 Management Resources

The RTM-ATCA-F140 does not include its own management controller (MMC) and cannot independently support the ATCA hot-swap protocol. However, it does support hot-plugging. The RTM-ATCA-F140 provides the necessary resources to allow management by the front-blade IPMC. These resources are associated with a dedicated I2C port connected to the front-blade IPMC.

4.2.1 FRU Serial EEPROM

The RTM-ATCA-F140 provides a 128Kb (16K byte) I2C serial EEPROM. This is a 24LC128T-type device. The EEPROM resides at I2C address 0xA0. It is supplied with +3.3V management power and thus is available regardless of payload power.

This serial EEPROM is intended to hold FRU data and any additional parameters that are required.

4.2.2 Temperature Sensors

The RTM-ATCA-F140 has provision for three temperature sensors that are located on the primary side of the board close to the top, middle and bottom of the RTM. These sensors are I2C-based LM75-type devices.

The over-temperature outputs from the three sensors are connected to the RTM FPGA to allow an interrupt to the service processor to be generated in the event of an over-temperature condition.

Table 4-1 Temperature Sensor Thresholds

Sensor	Non-Critical Threshold / C	Critical Threshold / C	Non-recoverable Threshold / C
Upper	58	69	85
Middle	56	65	81
Lower	54	61	72

The I2C addresses for these devices are 0x90 (upper), 0x92 (middle) and 0x94 (lower).

4.2.3 LEDs

The RTM-ATCA-F140 provides four panel-visible LEDs that provide the standard ATCA management LED functions:

- Red - Out of Service
- Green - In Service
- Blue - Hot swap (initializing / shutting down)
- Amber - Attention

The LEDs are controlled by a PCF8574-type I2C parallel I/O expander. The ports of this are connected as shown below.

Table 4-2 PCF 8574 Port Usage

Port	Direction	Connection
0	Output	H/S LED (Blue)
1	Output	OOS LED (Red)
2	Output	IS LED (Green)
3	Output	ATTN LED (Amber)
4	Output	OOS LED (Amber)
5	Output	FPGA PROM select
6	N/A	(not connected)
7	Input	FPGA DONE

The I/O expander interrupt line is not connected.

For the red, green and amber LEDs the cathodes are connected directly to the I/O expander pins and the anodes are connected to the management 3.3V supply through current limiting resistors selected to limit the LED current to 15mA. Since the I/Os power-up in the high state, this ensures that the LEDs will remain off until explicitly turned on by the IPMC.

For the blue LED an external FET inverter is used to ensure the LED is on at power-up and a charge pump is used to provide adequate forward voltage in the case the LED cannot be operated directly from 3.3V.

The I/O expander resides at I2C address 0x40.

4.2.4 I2C Address Map

Table 4-3 summarizes the I2C address assignments.

Table 4-3 I2C Bus Address Map

Address	Device
0x40	I/O Expander (LED control)
0x90	Temperature sensor (top)
0x92	Temperature sensor (middle)
0x94	Temperature sensor (bottom)
0xA0	Serial EEPROM

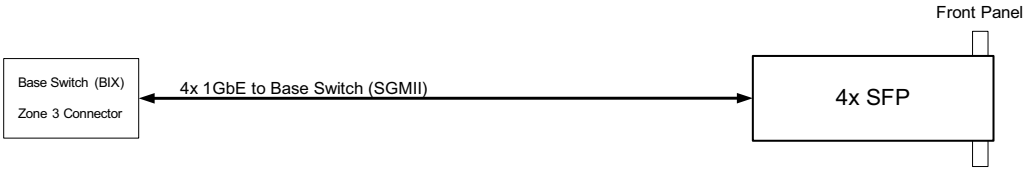
4.3 1 Gbps SFP Ports

The RTM-ATCA-F140 provides four 1 Gbps SFP module sites which are connected to the front-blade base switch.

4.3.1 Connectivity

Four 1000Base-BX serdes connections from the front-blade are routed directly from the zone 3 connectors to four SFP sites as shown in Figure 4-2. These are all dedicated ports on the front blade base switch. The RTM-ATCA-F140 does not include AC-coupling capacitors on the inputs from the front blade since they are provided by the SFP module.

Figure 4-2 1GB Base Channel Interconnect



4.3.2 Front-Blade Port Mapping

The four SFP sites are connected to the front-blade base switch according to the table below.

Table 4-4 Front-Blade Port Mapping

RTM Port	Front Blade Base Switch Port
ETH1	ge20
ETH2	ge21
ETH3	ge22
ETH4	ge23

4.3.3 SFP Connection

The SFP sites allow the fitting of a wide range of third-party SFP modules to support 1000Base-T, long and short range optical connection. Refer to the ATCA-F140 Installation and Use Manual for a list of SFP devices tested with this product.

The following table shows the SFP connector pin assignments.

Table 4-5 SFP Connector Pin Assignment

Pin	Signal	Pin	Signal
1	GND	11	GND
2	TX_FAULT	12	RX-
3	TX_DISABLE	13	RX+
4	I2C_SDA	14	GND
5	I2C_SCL	15	VCCr (+3.3V)
6	MOD_ABS	16	VCCt (+3.3V)
7	RATE_SEL	17	GND
8	LOS	18	TX+
9	GND	19	TX-
10	GND	20	GND

4.3.3.1 I2C Bus

The SFP I2C bus signals (I2C_SDA and I2C_SCL) from each SFP site are individually connected to the RTM FPGA. An I2C controller within the FPGA allows the front-blade service processor to access these ports to obtain SFP status and diagnostic information. Refer to the Chapter 4, *FPGA, on page 54* for details.

4.3.3.2 SFP Status Signals

The SFP status signals, MOD_ABS, TX_FAULT and LOS, are individually connected to the RTM FPGA to allow monitoring by the service processor. Refer to the Chapter 4, *FPGA, on page 54* for details.

4.3.3.3 SFP Control Signals

The SFP control signals, TX_DISABLE and RATE_SEL, are individually connected to the RTM FPGA to allow control by the service processor. Refer to the Chapter 4, *FPGA, on page 54* for details.

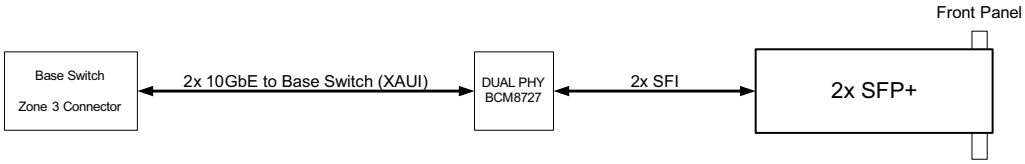
4.4 10 Gbps SFP+ Ports

The RTM-ATCA-F140 provides a two 10Gbps SFP+ module sites connected to the base switch on the front blade.

4.4.1 Connectivity

The two 10Gbps XAUI ports from the front blade base switch connect to a BCM8727 dual XAUI-to-SFI PHY which then connect to two individual SFP+ connectors using an SFI interface as shown in Figure 4-3. The RTM-ATCA-F140 includes 0.1µF AC-coupling capacitors on the XAUI inputs from the front blade. Similarly, capacitors are expected to be provided on the front blade for signals from the RTM. The SFP+ specification requires AC-coupling capacitors in the module so they are not needed on the board SFI interface.

Figure 4-3 Fabric 10 GB Interconnect



4.4.2 Front-Blade Port Mapping

The two base channel ports connect to the front blade ports BIX_XG0 and BIX_XG1. These ports connect directly to dedicated ports on the ATCA-F140 front blade base switch. BIX_XG0 is connected to BCM8727 channel 2 while BIX_XG1 is connected to BCM8727 channel 1.

4.4.3 BCM8727 Configuration Flash

The BCM8727 requires an external SPI Flash to store microcode for the internal microcontroller. A single SPI Flash is connected to the FPGA and the SPI bus from the BCM8727 is similarly connected to the FPGA. Register settings in the FPGA allow the BCM8727 to connect to the SPI Flash as well as provide a programming port.

4.4.4 Transmitter Control

The TXONOFF signals on the BCM8727 are individually connected to the RTM FPGA which allows them to be driven under software control. This enables software to enable and disable the SFP+ optical outputs.

4.4.5 BCM8727 Status

The PCMULK, PCDRLK, PLOSB and LASI signals from each BCM8727 port are connected to the RTM FPGA to allow them to be monitored by software. The PLOSB and LASI signals can also generate an interrupt to the front-blade. Refer to Chapter 4, *FPGA, on page 54* for further details.

4.4.6 SFP+ Connection

The SFP+ module receptacles are designed to support standard SFP+ modules as well as direct attach copper SFP+ modules less than 10m in length. The SFP+ cage is backwards compatible with 1 GB optical or copper SFP modules. Refer to the ATCA-F140 Installation and Use Manual for a list of SFP devices tested with this product. The SFP+ connector assignment for the 10 Gbps serial interface is described in Table 4-6.

Table 4-6 SFP+ Connector Pin Assignment

Pin	Signal	Pin	Signal
1	GND	11	GND
2	TX_FAULT	12	RX-
3	TX_DISABLE	13	RX+
4	I2C_SDA	14	GND
5	I2C_SCL	15	VCCr (+3.3 V)
6	MOD_ABS	16	VCCt (+3.3 V)
7	RS0	17	GND
8	LOS	18	TX+
9	RS1	19	TX-
10	GND	20	GND

4.4.6.1 I2C Bus

The SFP+ I2C bus signals (I2C_SDA and I2C_SCL) from each SFP+ site are individually connected to the corresponding BCM8727 which includes a mechanism to allow access to the port through the phy management channel.

4.4.6.2 SFP+ Status Signals

The SFP+ status signals, MOD_ABS, TX_FAULT and LOS, are individually connected to the corresponding BCM8727 which monitors them. The signals are also connected to the RTM FPGA to allow fast detection of a loss of signal condition. Refer to Chapter 4, *FPGA, on page 54* for further details.

4.4.6.3 SFP Control Signals

The SFP+ TX_DISABLE signals are individually connected to the corresponding BCM8727 which drives them under software control.

The RS0 and RS1 rate select signals from each SFP+ are individually connected to the RTM FPGA that allows them to be controlled by software. Refer to Chapter 4, *FPGA, on page 54* for further details.

4.4.6.4 PHY Management Interfaces

The BCM8727 provides a single MDC/MDIO management port to access both channels and allows bit 0 of the PHY address for each channel to be individually programmed, with bits 1 - 4 being common. Table 4-7 shows the address allocation and management port definition for each channel.

Table 4-7 BCM8727 PHY Addressing

PHY Address High Bits	Channel	Source	PHY Address Low Bits	PHY Address	Switch Port	SFP+ Port	Management Channel
b1011	1	Base	b0	22	BIX_XG1	Base SFP+ 2	BIX_XG_MDC/ MDIO
	2	Base	b1	23	BIX_XG0	Base SFP+ 1	

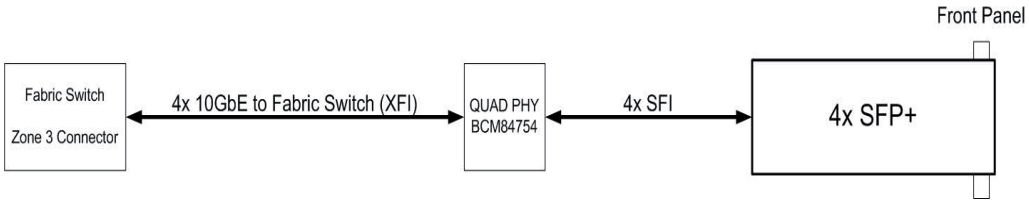
4.5 10Gbps Fabric Ports

The RTM-ATCA-F140 provides four 10Gbps SFP+ module sites connected to the fabric switch on the front blade.

4.5.1 Fabric Connectivity

Four 10GbE ports (configured for XFI mode) from the front blade fabric switch connect to a BCM84754 quad XFI-to-SFI PHY which then connects to four individual SFP+ connectors using an SFI interface as shown in Figure 4-4. The RTM-ATCA-F140 includes 0.1µF AC-coupling capacitors on the XFI inputs from the front blade. Similarly, capacitors are expected to be provided on the front blade for signals from the RTM. The SFP+ specification requires AC-coupling capacitors in the module so they are not needed on the board SFI interface.

Figure 4-4 Fabric 10Gb Interconnect



4.5.2 Fabric Front Blade Port Mapping

Each fabric switch port on the front blade consists of four SERDES pairs. The four fabric channel XFI ports connect to front blade port FIX_P15. This is a dedicated port on the ATCA-F140 front blade fabric switch.

4.5.3 BCM84754 Configuration Flash

The BCM84754 requires an external SPI Flash to store microcode for the internal microcontroller. A single SPI Flash is connected to the FPGA and the SPI bus from the BCM84754 is similarly connected to the FPGA. Register settings in the FPGA allow the BCM84754 to connect to the SPI Flash as well as provide a programming port.

4.5.4 Transmitter Control

The TXONOFF signals on the BCM84754 are individually connected to the RTM FPGA which allows them to be driven under software control. This enables software to enable and disable the SFP+ optical outputs.

4.5.5 BCM84754 Status

The LASI signals from each BCM84754 port are individually connected to the RTM FPGA to allow them to be monitored by software. The LASI signals can also generate an interrupt to the front blade. Refer to Chapter 4, *GPS Connectors, on page 54* for further details.

4.5.6 Fabric SFP+ Connection

This is the same as the base SFP+ connection. Refer to Chapter 4, *SFP+ Connection, on page 46*.

4.5.6.1 SFP+ I2C Bus

The SFP+ I2C bus signals (I2C_SDA and I2C_SCL) from each SFP+ site are individually connected to the BCM84754 which includes a mechanism to allow access to the port through the PHY management channel.

4.5.6.2 SFP+ Status Signals

The SFP+ status signals, MOD_ABS, TX_FAULT and LOS, are individually connected to the BCM84754 which monitors them. The signals are also connected to the RTM FPGA to allow fast detection of a loss of signal condition. Refer to Chapter 4, *GPS Connectors, on page 54* for further details.

4.5.6.3 SFP+ Control Signals

The SFP+ TX_DISABLE signal is individually connected to the BCM84754 which drives it under software control.

The RS0 and RS1 rate select signals from each SFP+ that are tied together and connected to the RTM FPGA that allows them to be controlled by software. Refer to Chapter 4, *GPS Connectors, on page 54* for further detail.

4.5.7 PHY Management Interfaces

The BCM84754 provides a single MDC/MDIO management port to access all four channels and allows bits 0 and 1 of the PHY address for each channel to be individually programmed, with bits 2 - 4 being common.Table 9 shows the address allocation and management port definition for each channel.

Table 4-8 BCM84754 PHY Addressing

PHY Address High Bits	Channel	Source	PHY Address Low Bits	PHY Address	Switch Port	SFP+ Port	Management Channel
b001	0	Fabric	b00	4	FIX_P15 Lane 0	Fabric SFP+ 4	FIX_XG_MDC2/ MDIO2
	1	Fabric	b01	5	FIX_P15 Lane 1	Fabric SFP+ 3	
	2	Fabric	b10	6	FIX_P15 Lane 2	Fabric SFP+ 2	
	3	Fabric	b11	7	FIX_P15 Lane 3	Fabric SFP+ 1	

4.6 40Gbps Fabric Ports

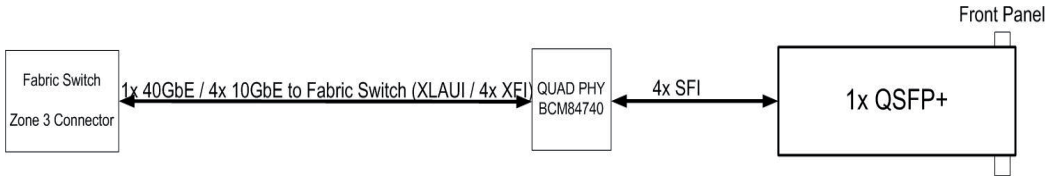
The RTM-ATCA-F140 provides a 40Gbps capable QSFP+ module site connected to the fabric switch on the front blade.

4.6.1 Fabric Connectivity

One 40GbE port from the front blade fabric switch connects to a BCM84740 quad XLAUI-to-SFI PHY which then connects to a single QSFP+ connector using an SFI interface as shown in Figure 4-5Fabric 40Gb Interconnect. When the fabric switch is configured for XLAUI mode, the QSFP+ slot supports a single 40GbE logical connection. When the fabric switch is configured for 4x XFI mode, the QSFP+ slot supports four 10GbE connections. This mode assumes the use of a fiber breakout cable on the QSFP+ module (MPO to 4x LC cable). The RTM-ATCA-F140 includes

0.1µF AC-coupling capacitors on the XLAUI inputs from the front blade. Similarly capacitors are expected to be provided on the front blade for signals from the RTM. The QSFP+ specification requires AC-coupling capacitors in the module so they are not needed on the board SFI interface.

Figure 4-5 Fabric 40Gb Interconnect



4.6.2 Fabric Front Blade Port Mapping

Each fabric switch port on the front blade consists of four SERDES pairs. The four fabric channel XLAUI pairs connect to front blade port FIX_P14. This is a dedicated port on the ATCA-F140 front blade fabric switch.

4.6.3 BCM84740 Configuration Flash

The BCM84740 requires an external SPI Flash to store microcode for the internal microcontroller. A single SPI Flash is connected to the FPGA and the SPI bus from the BCM84740 is similarly connected to the FPGA. Register settings in the FPGA allow the BCM84740 to connect to the SPI Flash as well as provide a programming port.

4.6.4 Transmitter Control

QSFP+ does not define a hardware signal for transmitter control. Software controls the transmitter via byte 86 in the QSFP+ memory map. Refer to the QSFP+ Specification for further detail.

The TXONOFF signal on the BCM84740 is connected to the RTM FPGA which allows it to be driven under software control. When asserted, this signal will cause the PHY to drive LPMODE to the QSFP+ site. This places the PHY and QSFP+ module into low-power mode but may not actually disable the QSFP+ transmitters, according to the QSFP+ specification. Transmitter control should be performed through the software method detailed above.

4.6.5 BCM84740 Status

The LASI signal from the BCM84740 is individually connected to the RTM FPGA to allow it to be monitored by software. The LASI signal can also generate an interrupt to the front blade. Refer to Chapter 4, *GPS Connectors, on page 54* for further details.

4.6.6 Fabric QSFP+ Connection

The QSFP+ cage accepts industry standard QSFP+ optical modules. It also accepts QSFP+ copper and optical direct-attach cables. The site is designed to support power level 2 modules which are rated up to 2W (Refer to the ATCA-F140 Installation and Use Manual for a list of QSFP+ devices tested with this product). The QSFP+ connector assignment for the 40Gbps serial interface is described in Table 4-9"QSFP+ Connector Pin Assignment".

Table 4-9 QSFP+ Connector Pin Assignment

Pin	Signal	Pin	Signal
1	GND	38	GND
2	TX2-	37	TX1-
3	TX2+	36	TX1+
4	GND	35	GND
5	TX4-	34	TX3-
6	TX4+	33	TX3+
7	GND	32	GND
8	MODSEL#	31	LPMODE
9	RESET#	30	VCC1 (+3.3V)
10	VCCR (+3.3V)	29	VCCT (+3.3V)
11	I2C_SCL	28	INT#
12	I2C_SDA	27	MODPRS#
13	GND	26	GND
14	RX3+	25	RX4+
15	RX3-	24	RX4-
16	GND	23	GND

Table 4-9 QSFP+ Connector Pin Assignment (continued)

Pin	Signal	Pin	Signal
17	RX1+	22	RX2+
18	RX1-	21	RX2-
19	GND	20	GND

4.6.6.1 QSFP+ I2C Bus

The QSFP+ I2C bus signals (I2C_SDA and I2C_SCL) from each SFP+ site are individually connected to the BCM84740 which includes a mechanism to allow access to the port through the PHY management channel.

4.6.6.2 QSFP+ Status Signals

The QSFP+ status signals, MODPRS#, and INT#, are individually connected to the BCM84740 which monitors them. The signals are also connected to the RTM FPGA to allow fast detection of a loss of signal condition. Refer to Chapter 4, *GPS Connectors, on page 54* for further details.

4.6.6.3 QSFP+ Control Signals

The QSFP+ LPMODE signal is connected to the BCM84740. This allows software control of the power mode, or hardware control through deassertion of the TXONOFF signal.

4.6.7 PHY Management Interfaces

The BCM84740 provides a single MDC/MDIO management port to access all four channels and allows bits 0 and 1 of the PHY address for each channel to be individually programmed, with bits 2 - 4 being common. Table 4-10"BCM84740 PHY Addressing" shows the address allocation and management port definition for each channel.

Table 4-10 BCM84740 PHY Addressing

PHY Address High Bits	Channel	Source	PHY Address Low Bits	PHY Address	Switch Port	QSFP+ Port	Management Channel
b000	0	Fabric	b00	0	FIX_P14 Lane 0	Fabric QSFP+	FIX_XG_MDC 2/ MDIO2

Table 4-10 BCM84740 PHY Addressing (continued)

PHY Address High Bits	Channel	Source	PHY Address Low Bits	PHY Address	Switch Port	QSFP+ Port	Management Channel
	1	Fabric	b01	1	FIX_P14 Lane 1		
	2	Fabric	b10	2	FIX_P14 Lane 2		
	3	Fabric	b11	3	FIX_P14 Lane 3		

4.7 GPS Connectors

The 1PPS, 10MHz, and TOD inputs for connection to an external GPS receiver are not supported currently.

4.8 FPGA

The RTM-ATCA-F140 includes a Xilinx XC3S200A-4 FPGA that which performs the following functions:

- Access to control and status signals on SFP, SFP+, and QSFP+
- Access to control and status signals on the BCM8727, BCM84754, and BCM84740
- Reset handling
- SPI Flash programmer and multiplexing for BCM8727, BCM84754, and BCM84740 configuration
- UART with selectable outputs for the optional GPS receiver (functionality not initially implemented)

4.8.1 Front-blade Interface

The RTM-ATCA-F140 includes an SPI interface between the front-blade service processor and the RTM FPGA. There is also an active low interrupt line to the front-blade to request service.

4.8.2 SFP/SFP+/QSFP+ Control and Status

The RTM FPGA provides register access to control the following SFP and SFP+ signals:

- SFP TX_DISABLE
- SFP RATE_SEL
- SFP+ RS0/1 (tied together)

The RTM FPGA provides access to the following SFP, SFP+, and QSFP+ signals:

- SFP MOD_ABS
- SFP TX_FAULT
- SFP LOS
- SFP+ MOD_ABS
- SFP+ TX_FAULT
- SFP+ LOS
- QSFP+ MODPRS#
- QSFP+ INT#
- QSFP+ LPMODE

Each signal can be programmed to cause an interrupt when its state changes.

4.8.3 BCM8727 Control and Status

The RTM FPGA provides register access to the BCM8727 TXONOFF signals which allow the SFP+ transmitters to be disabled as well as putting the phys into a low-power mode.

The RTM FGPA provides access to the following BCM8727 status signals:

- PCMULK
- PCDRLK
- PLOSB
- LASI

Each signal can be programmed to cause an interrupt when its state changes.

4.8.4 BCM84754 Control and Status

The RTM FPGA provides register access to the BCM84754 TXONOFF signals. This allows the PHYs to be placed into low-power mode and disables the associated SFP+ transmitters. The RTM FGPA provides access to the LASI status signals of the BCM84754s. Each signal can be programmed to cause an interrupt when its state changes.

4.8.5 BCM84740 Control and Status

The RTM FPGA provides register access to the BCM84740 TXONOFF signal. This allows the PHY to be placed into low-power mode also drives LPMODE to the QSFP+ site. According to the QSFP+ spec, assertion of LPMODE may or may not cause the transmitter to be disabled. More detail can be found in section 3.5.6. The RTM FGPA provides access to the LASI status signal of the BCM84740. This signal can be programmed to cause an interrupt when its state changes.

4.8.6 Reset Handling

The RTM FPGA provides register control of the reset inputs to the BCM8727, BCM84754, BCM84740, and the QSFP+ port. This allows the front blade control processor to reset the PHYs and QSFP+. At system reset, as indicated by the zone 3 RTM_RST# signal, the PHYs and QSFP+ are forced into reset until this is cleared by a register write. This is to ensure that the PHYs are in reset until the telecom clock subsystem has been programmed if necessary to provide the PHY reference clocks.

4.8.7 SPI Flash

The SPI ports from the BCM8727, BCM84754, and BCM84740 connect to the FPGA along with three SPI Flash devices, one for each type. Register settings allow access to be granted to any of the PHYs and also provide a programming port.

4.8.8 FPGA Configuration

The RTM FPGA configuration is loaded at power-up from one of two SPI Flash devices. One device is writable/upgradeable and the other is non-writable/golden for recovery purposes. The selection is which device is used is controlled by switch S1 position 1, according to the following table.

Table 4-11 FPGA Configuration Controls

Switch Setting	FPGA Flash
S1.1 = Off	Writable Bank (default)
S1.1 = On	Non-writable (golden)

The configuration Flash devices can be field upgraded using a SPI-controlled Flash programmer in the FPGA.

4.9 Reset Scheme

The front blade provides a single reset signal, RTM_RST#, over the zone 3 connectors. This signal is asserted when a master reset of the front blade occurs.

RTM_RST# directly resets the RTM FPGA. The BCM8727, BCM84754, BCM84740, and QSFP+ slot are reset from a secondary reset generated by the RTM FPGA. This allows software control of the PHY and QSFP+ resets in addition to hardware control via the RTM_RST# signal. After the hardware reset, the PHYs and QSFP+ are held in reset until released by software.

4.10 Power Management

The front-blade provides two separate power supplies using the Zone 3 connectors:

- +3.3 V management power – one pin
- +12 V payload power – four pins

The maximum current draw, which is limited by the pin's current handling capability, is 0.8A for the management power and 3.2A for the payload power.

The management power is used to directly power the devices connected to the front blade I2C bus, namely for serial EEPROM, temperature sensors and I/O extender device.

+12V payload power is the source for the onboard DC to DC converters needed for the RTM payload.

4.10.1 Power Requirements

The table below summarizes the power requirements of the RTM-ATCA-F140.

Table 4-12 Power Requirements

Voltage	Maximum Current
+3.3V Management	0.2A
+12V Payload	2.1A

A.1 Artesyn Embedded Technologies - Embedded Computing Documentation

The publications listed below are referenced in this manual. You can obtain electronic copies of Artesyn Embedded Technologies - Embedded Computing publications by contacting your local Artesyn sales office. For released products, you can also visit our Web site for the latest copies of our product documentation.

1. Go to www.artesyn.com/computing/support/product/technical-documentation.php.
2. Under FILTER OPTIONS, click the Document types drop-down list box to select the type of document you are looking for.
3. In the **Search** text box, type the product name and click GO.

Table A-1 Artesyn Embedded Technologies - Embedded Computing Publications

Document Title	Publication Number
ATCA-F140 Installation and Use	6806800M67
ATCA-F140 Quick Start Guide	6806800M68

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