Penguin Edge™ RTM-ATCA-F140 Series

Installation and Use
P/N: 6806800M97N
July 2022

PENGUIN™
EDGE

Legal Disclaimer*

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About this Manual

Overview of Contents

This manual is divided into the following chapters and appendices.

Safety Notes on page 15 summarizes the safety instructions in the manual.

Notice de Sécurité on page 23 is a European French translation of the Safety Notes section.

Sicherheitshinweise on page 31 is a German translation of the Safety Notes section.

Chapter 1, Introduction on page 39 describes the main features of the Product-ShortName.

Chapter 2, Hardware Preparation and Installation on page 43 describes the installation prerequisites and the installation itself.

Chapter 3, Controls, LEDs, and Connectors on page 51 describes external interfaces such as connectors and LEDs.

Chapter 4, Functional Description on page 53 contains a block diagram of the rear transition module (RTM) and provides information on the IPMI functionality of the RTM.

Appendix A, Ruggedized RTM-ATCA-F140 Information on page 71 contains information specific to the RTM-ATCA-F140-D.

Appendix B, Related Documentation on page 77 lists Penguin Solutions user manuals that are related to the RTM and the ATCA-F140.

Abbreviations

This document uses the following abbreviations:

Abbreviation	Definition
AMC	Advanced Mezzanine Card
ATCA	Advanced Telecom Computing Architecture
BIX	Base Interface Switch
EEPROM	Electrically Erasable Programmable Read-Only Memory
FET	Field-effect Transistor
FPGA	Field-programmable Gate Array
FRU	Field Replaceable Unit
FIX	Fabric Interface Switch
IPMC	Intelligent Platform Management Controller
LED	Light-emitting Diode

Abbreviation	Definition
MDC	Management Data Clock
MDIO	Management Data Input/Output
MMC	Module Management Controller
PHY	Physical Layer
PICMG	PCI Industrial Computer Manufacturers Group
PCI	Peripheral Component Interconnect
QSFP+	Quad Small Form-factor Pluggable Plus
RTM	Rear Transition Module
SFP	Small Form-factor Pluggable
SFP+	Small Form-factor Pluggable Plus
SPI	Serial Peripheral Interface
TOD	Time of Day
UART	Universal Asynchronous Receiver/Transmitter

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

Notation	Description
. . .	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
	Indicates a hazardous situation which, if not avoided, could result in death or serious injury
	Indicates a hazardous situation which, if not avoided, may result in minor or moderate injury
	Indicates a property damage message
	Indicates a hot surface that could result in moderate or serious injury
	Indicates an electrical situation that could result in moderate injury or death
	Indicates that when working in an ESD environment care should be taken to use proper ESD practices
	No danger encountered. Pay attention to important information

Summary of Changes

This manual has been revised and replaces all prior editions.

Part Number	Publication Date	Description
6806800M97N	July 2022	Rebrand to Penguin Solutions. Updated Section 1.1 Overview and Appendix A.
6806800M97M	December 2020	Update Safety Notes. Updated Table 1-1 for 62368-1 compliance and corrected 55022 to 55032.
6806800M97L	September 2019	Re-branded to SMART Embedded Computing. Applied new template to document and made light edits. Updated Overview information to include RTM-ATCA-F140-D. Updated Ordering and Support Information. Added Appendix for RTM-ATCA-F140-D. Updated Related Documentation to include data sheets. Updated safety notes and German translations. Added RoHS information in Standard Compliances table.
6806800M97K	March 2017	Updated Chapter 4, SFP+ Connection 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 with ELMA handle variant figure. Updated the section RTM Installation and Removal as per ELMA handle usage.
6806800M97F	July 2014	Updated Chapter 4, Functional Description.
6806800M97E	April 2014	Rebranded to Artesyn.
6806800M97D	May 2013	Corrected part number from 6806800M97C to 6806800M97B in the row 2 of this table.
6806800M97C	December 2012	Updated Standard Compliances
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.

Penguin Solutions™ 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 Penguin Solutions representative.

The product has been designed to meet the standard industrial safety requirements. It must not be used in safety critical components, life supporting devices, or on aircraft.

Only personnel trained by Penguin Solutions 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 Penguin Solutions representative for service and repair to make sure that all safety features are maintained.

EMC

The product has been tested in a standard Penguin Edge™ system and found to comply with the limits for a Class A digital device in this system, pursuant to part 15 of the FCC Rules, EN 55032 Class A respectively.

These limits are designed to provide reasonable protection against harmful interference when the product is operated in a commercial, business or industrial environment.

The product conducts, radiates and uses radio frequency energy and, if not installed properly and used in accordance with this user documentation, may cause harmful interference to radio communications.

Operating the product in a residential area is likely to cause harmful interference. If this occurs, the user will be required to correct the interference at the user's expense.

Changes or modifications not expressly approved by Penguin Solutions could void the user's regulatory compliance. 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 help assure that appropriate radio frequency emissions compliance is maintained. For proper EMC shielding, only operate the system with face plates installed and all vacant slots covered or populated with filler cards.

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

Grounding

If the product is not properly grounded, it may be damaged by electrostatic discharge.

The system contains EMI gaskets at the shelf and module level. Make sure that each of the system's parts contact the EMI gasket.

The shelf is also fitted with an ESD jack/snap for use with conductive wrist straps. Make sure the operator uses proper ESD protection.

Rear Transition Modules

Damage of the RTM

Incorrect installation of the RTM can cause damage to the RTM.

Use handles when installing/removing the RTM to avoid damage/deformation to the face plate and/or PCB.

Bent pins or loose components can cause damage to the RTM, the backplane, or other system components. Carefully inspect the RTM and the backplane for both pin and component integrity before installation.

Penguin Solutions 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 warranty for the backplane or blades.

Installation

Personal Injury

This product operates with dangerous voltages that can cause injury or death. Use extreme caution when handling, testing, and adjusting this equipment and its components.

Damage of Circuits

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

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

Data Loss

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

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

Restricted Access Area

This product is only to be installed in a restricted access area.

Damage of Blade and Additional Devices and Modules

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

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

Blade Damage

Use handles when installing/removing the blade to avoid damage/deformation to the face plate and/or PCB.

Damage to Blade/Backplane or System Components

Bent pins or loose components can cause damage to the blade, the backplane, or other system components. Carefully inspect the blade and the backplane for both pin and component integrity before installation.

Penguin Solutionsand our suppliers take significant steps to make sure that there are no bent pins on the backplane or connector damage to the blades prior to leaving the factory. Bent pins caused by improper installation or by inserting boards with damaged connectors could void the 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

Make sure that the display devices that are permanently connected to the VGA interface provide a fire enclosure according to the IEC/EN/UL/CSA 62368-1 and 60950-1 requirements.

All other devices that are only connected to the VGA interface for service purposes need supervision during operation and must be disconnected after maintenance.

Product Damage - Product Surface

High humidity and condensation on the product surface causes 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.

Overheating and Product Damage

When operating the product, make sure that forced air cooling is available in the shelf or enclosure.

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

When operating the product in areas of electromagnetic radiation, secure the product in the system using the front panel screws. Make sure the product is fully shielded by the enclosure.

Data Corruption

If power to the unit is removed while a firmware update is in progress to the product's flash memory, the changes will not be saved or the flash memory may be corrupted. In such case, the product is likely to remain in a non-operable state and will require reconditioning by qualified repair services.

Injuries or Short Circuits - Blade or Power Supply

In case the OR-ing diodes of the blade fail, the blade may trigger a short circuit between input line A and input line B so that input line A remains powered even if it is disconnected from the power supply circuit (and vice versa).

To avoid damage or injuries, always check that there is no voltage on the line that has been disconnected before continuing your work.

The EMI radiation compliancy of the product has been qualified in a reference system. Please note that the integrator needs to verify the EMI radiation compliancy of other configurations/settings.

Product Damage

High humidity and condensation on the product surface causes 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.

Switch Settings

Product Malfunction

Do not change settings of switches marked **Reserved**. Switches marked **Reserved** might carry production-related functions and can cause the product to malfunction if setting is changed.

Check and change the setting of any switch not marked **Reserved** before installing the product.

Product Damage

Check and change switch settings before you install the product.

Setting/resetting the switches during operation can cause product damage.

Use minimal force when pressing the reset switch. Too much force may damage the reset switch.

RJ-45 Connectors

System Damage

RJ-45 connectors on the front panel are either twisted-pair Ethernet (TPE) or E1/T1/J1 network interfaces. Connecting an E1/T1/J1 line to an Ethernet connector may damage your system.

- Make sure that TPE connectors near your working area are clearly marked as network connectors.
- Verify that the length of an Ethernet cable connected to a RJ-45 TPE connector does not exceed 100 meters or approximately 328 feet.
- Make sure the TPE connector of the system is connected only to Safety Extra Low Voltage (SELV) circuits.
- If in doubt, ask your system administrator.

For more information, see the documentation of the respective product.

SFP/SFP+ Modules

Personal Injury and Damage of the RTM and SFP/SFP+ Modules

Installing and using SFP/SFP+ modules that are not fully certified and 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 that are fully certified and 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 fibers 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.

Laser

Personal Injury

If a label with the words CLASS 1 LASER PRODUCT is affixed to your system, the unit is equipped with a laser device. These devices contain a laser system that produces visible or invisible laser radiation (or both) and can be harmful to the eyes.

Seek supplemental information (power, wavelength, visibility, pulse duration, applicable standards) prior to servicing equipment. Do not look at laser device with an optical instrument at any time.

Battery

Blade Damage

Incorrect battery installation may result in a hazardous explosion and blade damage.

Always use the same type of lithium battery as is installed and make sure the battery is installed as described in the manual.

Data Loss

Installing another battery type than the one mounted at product delivery may cause data loss.

PCB and Battery Holder Damage

Do not use a screw driver to remove the battery from its holder. Removing the battery with a screw driver may damage the PCB or the battery holder.

Environment

Environmental Damage

Improper disposal of used products may harm the environment.

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

Notice de Sécurité

Cette section présente, à travers ce manuel, des avertissements qui précèdent les procédures potentiellement dangereuses. Les instructions contenues dans les avertissements doivent être suivies durant toutes les phases d'opération, de service et de réparation de cet équipement. Vous devriez aussi employer toute autre précaution nécessaire pour l'utilisation de l'équipement dans l'environnement d'opération. Le défaut de se conformer à ces précautions ou aux avertissements spécifiques contenus ailleurs dans ce manuel, peut engendrer des lésions corporelles ou dommages à l'équipement.

Penguin Solutions™ prévoit dans ce manuel de fournir toute l'information nécessaire pour installer et manipuler le produit. En raison de la complexité de ce produit et de ses diverses utilisations, nous ne pouvons pas garantir que les informations fournies sont complètes. Si vous avez besoin d'information supplémentaire, contactez votre représentant Penguin Solutions.

Le produit a été conçu pour répondre aux exigences de sécurité standards de l'industrie. Il ne doit pas être utilisé dans des composantes critiques pour la sécurité, des appareils de maintien de vie ou sur un aéronef.

Seul le personnel formé par Penguin Solutions ou les personnes qualifiées dans le domaine de l'électronique ou du génie électrique sont autorisés à installer, retirer ou faire l'entretien du produit. Les informations contenues dans ce manuel sont destinées à compléter les connaissances d'un spécialiste et ne peuvent être utilisées en remplacement de personnel qualifié.

Ne touchez pas les circuits sous tension à l'intérieur de l'équipement. Le personnel d'opération ne doit pas enlever les couvercles de l'équipement. Seul le personnel de maintenance autorisé par l'usine ou autre personnel de maintenance qualifié peut retirer les couvercles des équipements pour le sous-assemblage interne ou pour le remplacement de composantes, ou pour tout réglage interne.

N'installez aucune pièce de remplacement et n'effectuez aucune modification non autorisée de l'équipement, sinon, la garantie pourrait être annulée. Contactez votre représentant Penguin Solutions local pour le service et la réparation, afin de vous assurer que toutes les fonctions de sécurité soient maintenues.

Compatibilité électromagnétique (CEM)

Le produit a été testé dans un système Penguin Edge™ standard et est déclaré conforme aux limites imposées à un appareil numérique de classe A dans ce système, conformément à la section 15 de la Réglementation FCC, EN 55032 classe A, respectivement.

Ces limites sont conçues pour offrir une protection raisonnable contre les interférences néfastes lorsque le produit est utilisé dans un environnement commercial ou industriel.

Le produit conduit, émet et utilise de l'énergie à radiofréquence et, s'il n'est pas installé correctement et utilisé conformément à cette documentation de l'utilisateur, il peut causer des interférences néfastes aux communications radio.

Opérer ce produit dans une région résidentielle est susceptible de causer des interférences néfastes. Si cela se produit, l'utilisateur devra corriger les interférences à ses frais.

Les changements ou les modifications qui ne sont pas expressément approuvés par Penguin Solutions pourraient annuler la conformité réglementaire de l'utilisateur. Les cartes sont testées dans un système représentatif pour démontrer la conformité aux exigences mentionnées ci-dessus. Une installation adéquate dans un système conforme maintiendra les performances requises.

Utilisez uniquement des câbles blindés lorsque vous connectez des périphériques pour vous assurer que la conformité aux normes d'émission de radiofréquences est respectée. Pour un blindage CEM adéquat, utilisez le système uniquement avec les plaques frontales installées et tous les ports d'extension vacants couverts ou équipés de cartes obturatrices.

Ceci est un produit de classe A basé sur la norme du Conseil volontaire de contrôle des interférences (VCCI) par Information Technology Interference (Interférence des technologies de l'information). Si cet équipement est utilisé dans un environnement domestique, des perturbations radio peuvent survenir. Lorsque de tels problèmes surviennent, l'utilisateur peut être amené à prendre des mesures correctrices.

L'équipement peut être installé dans un réseau de liaison équipotentielle (CBN) ou un réseau de liaison isolé (IBN).

Mise à la terre

Si le produit n'est pas adéquatement mis à la terre, il peut être endommagé par une décharge électrostatique.

Le système contient des joints EMI au niveau des étagères et des modules. Assurez-vous que chacune des pièces du système est en contact avec le joint EMI.

L'étagère est également équipée d'une prise/déclic ESD pour une utilisation avec des dragonnes conductrices. Assurez-vous que l'opérateur utilise la protection de décharge électrostatique ESD appropriée.

Modules de Transition Arriére (MTA)

Endommagement du MTA

Une installation inadéquate du MTA peut causer des dommages au MTA.

Utilisez les poignées lorsque vous installez/retirez le MTA pour éviter les dommages/déformation de la plaque frontale et/ou du PCB.

Des broches tordues ou des composants desserrés peuvent causer des dommages au MTA, au fond de panier ou autres composants du système. Inspectez soigneusement le MTA et le fond de panier pour vérifier l'intégrité des broches et des composantes avant l'installation.

Penguin Solutions et ses fournisseurs prennent des mesures significatives pour s'assurer qu'il n'y ait pas de broches tordues sur le fond de panier ou qu'il n'y ait pas de dommages de connecteur à la lame/MTA avant de quitter l'usine. Des broches tordues causées par une installation inadéquate ou par l'insertion de cartes avec des connecteurs endommagés pourraient annuler la garantie Penguin Solutions pour le fond de panier ou les lames.

Installation de la Carte

Lésions corporelles

Ce produit opère à des voltages dangereux qui peuvent causer des blessures ou la mort. Faites preuve de prudence lorsque vous manipulez, testez ou ajustez l'équipement et ses composantes.

Endommagement des circuits

Les décharges électrostatiques, ainsi que l'installation inadéquate et le retrait du produit peuvent endommager les circuits ou réduire leur durée de vie.

Avant de toucher le produit, assurez-vous que vous travaillez dans un environnement exempt de décharge électrostatique. Tenez le produit par ses extrémités et ne touchez aucune composante ou circuit.

Perte de données

Attendez jusqu'à ce que le DEL bleu soit illuminé de façon permanente avant de retirer la lame.

Retirer la lame lorsque le DEL bleu continue de clignoter peut causer une perte de données.

Zone à accès restreint

Ce produit peut seulement être installé dans les zones à accès restreint.

Endommagement de la lame et appareils ou modules supplémentaires

Avant d'installer ou de retirer un appareil ou un module supplémentaire, lisez la documentation appropriée.

Une installation inadéquate d'appareils ou modules supplémentaires peut endommager la lame ou les appareils ou modules supplémentaires.

Endommagement de la lame

Utilisez les poignées lorsque vous installez/retirez la lame pour éviter un dommage/déformation de la plaque frontale et/ou PCB.

Dommage à la lame/fond de panier ou aux composantes du système

Des broches tordues ou des composantes desserrées peuvent causer des dommages à la lame, au fond de panier ou à d'autres composantes du système. Inspectez soigneusement la lame et le fond de panier pour vérifier l'intégrité des broches et des composantes avant l'installation.

Penguin Solutions et ses fournisseurs prennent des mesures significatives pour s'assurer qu'il n'y ait pas de broches tordues sur le fond de panier ou qu'il n'y ait pas de dommages de connecteur à la lame avant de quitter l'usine. Des broches tordues causées par une installation inadéquate ou par l'insertion de cartes avec des connecteurs endommagés pourraient annuler la garantie pour le fond de panier ou les lames.

Endommagement du système

AVERTISSEMENT: le port intra-bâtiment de l'équipement ou du sous-ensemble convient uniquement pour la connexion à un câblage intra-bâtiment ou à un filage non exposé uniquement. Le port intra-bâtiment de l'équipement ou du sous-ensemble NE DOIT PAS être relié métalliquement à des interfaces qui se connectent à l'installation extérieure (OSP) ou à son filage. Ces interfaces sont conçues pour être utilisées uniquement comme interfaces intra-bâtiment (ports de type 2 ou de type 4 décrits dans le document GR-1089) et nécessitent une isolation du câblage OSP exposé. L'ajout de protecteurs primaires ne constitue pas une protection suffisante pour connecter ces interfaces de manière métallique au câblage OSP.

Le port intra-bâtiment de l'équipement ou du sous-ensemble doit utiliser un filage/câblage intra-bâtiment blindé mis à la terre aux deux extrémités.

Opération de la Carte

Assurez-vous que les appareils d'affichage qui sont connectés en permanence à l'interface VGA offrent un boîtier anti-incendie conforme aux exigences IEC/EN/UL/CSA 62368-1 et 60950-1.

Tous les autres appareils qui sont seulement connectés à l'interface VGA à des fins de maintenance doivent être surveillés durant l'opération et doivent être déconnectés après la maintenance.

Endommagement du produit – Surface du produit

Une humidité élevée ou la condensation sur la surface du produit cause des courts-circuits.

Ne pas opérer le produit en dehors des limites environnementales spécifiées. Assurez-vous que le produit soit complètement sec et qu'il n'y ait aucune humidité sur aucune surface avant de mettre en marche.

Surchauffe et endommagement du produit

Lorsque vous opérez le produit, assurez-vous qu'un refroidissement par air forcé est disponible dans l'étagère ou le boîtier.

Opérer le produit sans refroidissement par air forcé peut mener à une surchauffe et un endommagement du produit.

Lorsque vous opérez le produit dans des régions de rayonnement électromagnétique, sécurisez le produit dans le système en utilisant les vis du panneau avant. Assurez-vous que le produit soit entièrement protégé par le boîtier.

Corruption des données

Si l'appareil est mis hors tension alors qu'une mise à jour du microprogramme est en cours dans la mémoire flash du produit, les modifications ne seront pas enregistrées ou la mémoire flash pourrait être corrompue. Dans un tel cas, le produit restera probablement dans un état inutilisable et nécessitera un reconditionnement par des services de réparation qualifiés.

Blessures ou courts-circuits – Lame ou source de courant

Si les diodes O-Ring de la lame tombent en panne, la lame peut déclencher un court-circuit entre la ligne d'entrée A et la ligne d'entrée B, de sorte que la ligne A reste alimentée même si elle est déconnectée du circuit d'alimentation (et inversement).

Pour éviter tout dommage ou blessure, vérifiez toujours qu'il n'y ait aucun voltage sur la ligne qui a été déconnectée avant de continuer votre travail.

La conformité du produit aux rayonnements EMI a été qualifiée dans un système de référence. Veuillez noter que l'intégrateur doit vérifier la conformité aux rayonnements EMI d'autres configurations/réglages.

Modifier les Paramètres

Mauvais fonctionnement du produit

Ne modifiez pas les configurations des commutateurs marqués **Reserved**. Les commutateurs marqués **Reserved** peuvent comporter des fonctions liées à la production et entraîner un mauvais fonctionnement du produit si les paramètres sont modifiés.

Vérifiez et modifiez les paramètres de tout commutateur non marqué **Reserved** avant d'installer le produit.

Endommagement du produit

Vérifiez et modifiez les paramètres du commutateur avant d'installer le produit.

Le configuration/réinitialisation des commutateurs pendant le fonctionnement peut causer des dommages au produit.

Utilisez une force minimale lorsque vous appuyez sur le commutateur de réinitialisation. Une force excessive pourrait endommager le commutateur de réinitialisation.

Les Connecteurs RJ-45

Endommagement du système

Les connecteurs RJ-45 situés sur le panneau avant sont des interfaces réseau Ethernet à paire torsadée (TPE) ou E1/T1/J1. La connexion d'une ligne E1 / T1 / J1 à un connecteur Ethernet peut endommager votre système.

- Assurez-vous que les connecteurs TPE situés près de votre zone de travail soient clairement identifiés comme étant des connecteurs réseau.
- Vérifiez que la longueur d'un câble Ethernet connecté à un connecteur TPE ne dépasse pas 100 mètres (environ 328 pieds).
- Assurez-vous que le connecteur TPE du système soit uniquement connecté aux circuits de sécurité très basse tension (SELV).
- En cas de doute, demandez à votre administrateur de système.

Pour plus d'informations, voir la documentation du produit respectif.

Modules SFP/SFP+

Lésions corporelles et endommagement du MTA et des modules SFP/SFP+

L'installation et l'utilisation de modules SFP/SFP+ qui ne sont pas entièrement certifiés et qui ne répondent pas à toutes les normes de sécurité applicables peuvent endommager le MTA et les modules SFP/SFP+ et entraîner des lésions corporelles.

Utilisez et installez uniquement des modules SFP/SFP+ qui sont entièrement certifiés et qui rencontrent toutes les normes de sécurité applicables.

Lésions corporelles

Les modules optiques SFP/SFP+ peuvent être classés comme produit laser. Lors de l'installation et de l'utilisation de l'un de ces modules SFP/SFP+, les réglementations qui correspondent à la classe de laser correspondante s'appliquent à l'ensemble du MTA. Le non-respect de ces réglementations peut entraîner des lésions corporelles.

Lors de l'installation et de l'utilisation des modules optiques SFP/SFP+ classés comme produits laser, assurez-vous de respecter les réglementations en vigueur.

Dommages aux yeux

Les modules optiques SFP/SFP+ peuvent émettre un rayonnement laser lorsqu'aucun câble n'est connecté. Ce rayonnement laser est nocif pour vos yeux. Ne regardez jamais dans la lentille optique.

Endommagement du module SFP/SFP+

La fiche du port optique protège les fibres optiques contre la saleté et les dommages. Les saletés et les dommages peuvent rendre le module SFP/SFP+ inutilisable.

Ne retirez la fiche optique que lorsque vous êtes prêt à connecter un câble au module SFP/SFP+. Si aucun câble n'est connecté, couvrez le port avec une fiche de port optique.

Laser

Lésions corporelles

Si une étiquette avec les mots PRODUIT LASER DE CLASSE 1 est apposée sur votre système, l'unité est équipée d'un appareil laser. Ces appareils contiennent un système laser qui produit des rayonnements visibles ou invisibles (ou les deux) et peut être nocif pour les yeux.

Recherchez de l'information supplémentaire (puissance, longueur d'onde, visibilité, durée d'impulsion, normes applicables) avant de faire le maintien de l'équipement. Ne regardez jamais un appareil laser avec un instrument optique.

Batterie

Endommagement de la lame

Une installation inadéquate de la batterie peut causer un risque d'explosion ou d'endommagement de la lame.

Utilisez toujours le même type de batterie au lithium tel qu'installé et assurez-vous que la batterie soit installée tel que décrit dans le manuel.

Perte de données

L'installation d'un autre type de batterie que celle montée à la livraison du produit peut causer une perte de données.

Endommagement du PCB ou du support de batterie

N'utilisez pas de tournevis pour retirer la batterie de son support. Retirer la batterie avec un tournevis peut endommager le PCB ou le support de batterie.

Environnement

Dommage Environnemental

Une disposition impropre des produits usagés peut être nocif pour l'environnement.

Éliminez les produits usagés toujours conformément à la législation de votre pays et aux instructions du fabricant.

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 in 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.

Penguin Solutions™ ist darauf bedacht, alle notwendigen Informationen zum Einbau und zum Umgang mit dem Produkt in diesem Handbuch bereit zustellen. 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 Penguin Solutions.

Das Produkt wurde so entwickelt, dass es die Anforderungen für die von der Industrie geforderten Sicherheitsvorschriften erfüllt. Es darf nicht in sicherheitskritischen Komponenten, lebenserhaltenden Geräten oder in Flugzeugen verwendet werden.

Einbau, Wartung und Betrieb dürfen nur von durch Penguin Solutions 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 Penguin Solutions. So stellen Sie sicher, dass alle sicherheitsrelevanten Aspekte beachtet werden.

EMV

Das Produkt wurde in einem Penguin Edge™ 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 55032 Klasse A.

Diese Grenzwerte sollen einen angemessenen Schutz vor Störstrahlung beim Betrieb des Produktes in einer gewerblichen, geschäftlichen oder industriellen Umgebung gewährleisten.

Das Produkt leitet, strahlt und verwendet Hochfrequenzenergie und kann, wenn es nicht ordnungsgemäß installiert und in Übereinstimmung mit dieser Bediehnungsanweisung verwendet wird, schädliche Störungen des Funkverkehrs verursachen.

Der Betrieb des Produkts in einem Wohnbereich verursacht wahrscheinlich schädliche Interferenzen. In diesem Fall muss der Benutzer die Störung auf seine Kosten beheben.

Änderungen oder Modifikationen, die nicht ausdrücklich von Penguin Solutions genehmigt wurden, können einzuhaltene Normen oder Vorschriften verletzen. Board Produkte werden in einem repräsentativen System getestet, um die Einhaltung der oben genannten Anfordernungen zu gewährleisten. Um die Leistungsfähigkeit zu erhalten is eine ordungsgemäße Installation in einem konformen System erforderlich.

Um sicherzustellen, dass die entsprechenden Vorschriften für die Funkfrequenzen einghalten werden, verwenden Sie beim Anschließen von Peripheriegeräten nur abgeschirmte Kabel. Zur ordnungsgemäßen EMV-Abschirmung, ist das System nur mit installierten Frontblenden zu betreiben und alle freien Steckplätze sind abzudecken oder mit Steckkarten zu fuellen.

Dies ist ein Klasse A Produkt, basierend auf dem Standard des „Voluntary Control Council for Interference" (VCCI) von der „Information Technology Interference". Wenn dieses Gerät in einem häuslichen Umfeld verwendet wird, können Funkstörungen auftreten. Wenn solche Probleme auftreten, muss der Benutzer möglicherweise Korrekturmaßnahmen ergreifen.

Erdung

Wenn das Produkt nicht richtig geerdet ist, kann es es durch elektrostatische Entladungen beschädigt werden.

Das System enthält EMI-Dichtungen sowohl am System als auch an den einzelnen Modulen. Stellen Sie sicher, dass alle Systemteile die EMV-Dichtung berühren.

Am System befinden sich auch ESD-Kontakte fuer ESD-Bändern. Stellen Sie sicher, dass jede Person, die mit dem System arbeitet, diese als ESD-Schutz benutzt.

RTMs

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 die Frontblende oder die Platine deformiert oder zerstört werden.

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 das RTM und die Rückwandplatine vor der Installation sorgfältig auf Pin- und Komponentenintegrität.

Penguin Solutions 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 gewährte Garantie für Blades und Backplanes erlöschen lassen.

Installation

Verletzungsgefahr

Dieses Produkt wird mit gefährlichen Spannungen betrieben, die zu Verletzungen und Tod führen können. Seien Sie äußerst vorsichtig, wenn Sie dieses Gerät und seine Komponenten handhaben, testen und einstellen.

Beschädigung von Schaltkreise

Elektrostatische Entladungen und falsche Installation und Entfernung des Produkts können die Schaltkreise beschädigen oder ihre Lebensdauer verkürzen.

Bevor Sie das Produkt, vergewissern Sie sich, dass Sie in einem ESD-geschützten Bereich arbeiten. Fassen Sie das Produkt nur an den Kanten an und berühren Sie keine Komponenten oder Schaltkreise.

Datenverlust

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

Es wird Datenverlust geben, wenn das Bord aus dem System gezogen wird und die blaue LED blinkt noch.

Bereich mit eingeschränktem Zugang

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

Beschädigung des Blade und von Zusatzmodulen

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

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

Beschädigung des Blades

Verwenden Sie die Handles, um das Blade zu installieren/deinstallieren. Auf diese Weise vermeiden Sie, dass die Frontblende oder die Platine deformiert oder zerstört werden.

Beschädigung des Blades, der Backplane oder von System Komponenten

Verbogene Pins oder lose Komponenten können zu einer Beschädigung des Blades, der Backplane oder von Systemkomponenten führen. Überprüfen Sie das Blades und die Rückwandplatine vor der Installation sorgfältig auf Pin- und Komponentenintegrität.

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

Beschädigung des Systems

WARNUG: Die Gebäude-internen Schnittstellen ("intra-building ports"" per GR-1089-CORE) der Geräte oder Baugruppen sind nur für gebäudeinterne Verkabelung vorgesehen. Die Schnittstellen sind als Typ 2 oder Typ 4 definiert (wie in GR-1089-Core beschrieben) und erfordern eine Isolation zu Leitungen außerhalb des Gebäudes. Die Gebäude-internen Schnittstellen dürfen keine elektrisch leitende Verbindung zu Leitungen außerhalb des Gebäudes haben. Ein "Primary Protector" (wie in GR-1089-CORE beschrieben) ist keine ausreichende Absicherung, um die Gebäude-internen Schnittstellen mit Leitungen außerhalb des Gebäudes zu verbinden.

Die Gebäude-internen Schnittstellen ("intra-building ports" per GR-1089-CORE) der Geräte oder Baugruppen müssen abgeschirmte Gebäude-interne Verkabelungen verwenden, die an beiden Enden geerdet ist.

Betrieb

Stellen Sie sicher, dass die Anzeigegeräte, die dauerhaft an die VGA-Schnittstelle angeschlossen sind, ein Brandgehäuse gemäß den Anforderungen von IEC/EN/UL/CSA 62368-1 und 60950-1 bereitstellen.

Alle anderen Geräte, die nur zu Servicezwecken mit der VGA-Schnittstelle verbunden sind, müssen während des Betriebs überwacht werden und müssen nach den Wartungsarbeiten getrennt werden.

Beschädigung des Produktes - Oberflaeche

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

Betreiben Sie das Produkt nicht außerhalb der angegebenen Grenzwerte. Stellen Sie sicher, dass das Produkt vollständig trocken ist und keine Feuchtigkeit auf der Oberfläche ist, bevor Sie den Strom einschalten.

Überhitzung und Beschädigung des Produktes

Stellen Sie beim Betrieb des Produkts sicher, dass das Shelf oder Gehaeuse über eine Zwangsbelüftung verfügt.

Betreiben Sie das Produkt ohne Zwangsbelüftung, kann dies zur Überhitzung und Beschädigung des Produktes führen.

Wenn das Produkt in Bereichen mit elektromagnetischer Strahlung betrieben wird, sichern Sie das Produkt mit den Schrauben an der Frontblende im System. Stellen Sie sicher, dass das Produkt vollständig vom Gehäuse abgeschirmt ist.

Datenschaden

Wenn die Stromversorgung des Geräts während eines Firmware-Updates des Flash Memory des Geräts unterbrochen wird, werden die Änderungen nicht gespeichert oder der Flash Memory kann beschädigt werden. In diesem Fall bleibt das Produkt wahrscheinlich in einem nicht betriebsbereiten Zustand und muss von qualifizierten Reparaturdiensten überholt werden.

Verletzungen oder Kurzschlüsse — Blade oder Stromversorgung

Falls die OR-ing Dioden des Blades durchbrennen, kann das Blade einen Kurzschluss zwischen den Eingangsleitungen A und B verursachen. In diesem Fall ist Leitung A immer noch unter Spannung, auch wenn sie vom Versorgungskreislauf getrennt ist (und umgekehrt).

Um Schäden oder Verletzungen zu vermeiden, überprüfen Sie vor dem Fortsetzen Ihrer Arbeit immer, dass keine Spannung an der Leitung anliegt.

Die Messung der EMV Abstrahlung wurde in einem Referenzsystem . Beachten Sie, dass der Betreiber die EMVAbstrahlungsanforderung von anderer Anforderungen / Einstellungen überprüfen muss.

Schaltereinstellungen

Fehlfunktion des Produkt

Ändern Sie nicht die Schaltereinstellungen, die als **Reserved** gekennzeichnet sind. Schalter, die mit **Reserved** gekennzeichnet sind, können produktionsbedingte Funktionen enthalten und zu einer Fehlfunktion des Produktes führen, wenn die Einstellungen geändert werden.

Überprüfen und ändern Sie die Schaltereinstellung, die nicht mit **Reserved** gekennzeichnet sind, bevor Sie das Blade installieren.

Beschädigung des Produkt

Überprüfen und ändern Sie die Schaltereinstellung, bevor Sie das Produkt installieren.

Das Verstellen von Schaltern während des laufenden Betriebes kann zur Beschädigung des Produkt führenn.

Drücken Sie den Reset Schalter nur leicht. Zu viel Druck kann den Reset Schalter beschädigen.

RJ-45 Stecker

Beschädigung des Produkt

Bei den RJ-45-Anschlüssen an der Vorderseite handelt es sich entweder um Twisted-Pair-Ethernet- (TPE) oder E1 / T1 / J1-Netzwerkschnittstellen. Wenn Sie eine E1 / T1 / J1-Leitung an einen Ethernet-Anschluss anschließen, kann Ihr System beschädigt werden.

- Kennzeichnen Sie deshalb TPE-Anschlüsse in der Nähe Ihres Arbeitsplatzes deutlich als Netzwerkanschlüsse.
- Stellen Sie sicher, dass die Länge eines Ethernet Kabels, das mit Ihrem System verbundenen ist, 100 m oder 328 feet nicht überschreitet.
- Stellen Sie sicher, dass der TPE-Anschluss des Systems nur mit einem Sicherheits-Kleinspannungs- Stromkreis (SELV - Safety Extra Low Voltage) verbunden werden.
- Bei Fragen wenden Sie sich an Ihren Systemverwalter.

Weitere Informationen finden Sie in der Dokumentation des jeweiligen Produkt.

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.

Ziehen Sie den optischen Stecker erst dann ab, wenn Sie zum Anschließen eines Kabels an das SFP / SFP + -Modul bereit sind. Wenn kein Kabel angeschlossen ist, verdecken Sie den Anschluss mit einem optischen Anschlussstecker.

Laser

Verletzungsgefahr

Wenn ein Etikett mit der Aufschrift CLASS 1 LASER PRODUCT auf Ihrem System angebracht ist, ist das Gerät mit einem Lasergerät ausgestattet. Diese Geräte enthalten ein Lasersystem, das sichtbare oder unsichtbare Laserstrahlung (oder beides) erzeugt und für die Augen schädlich sein kann.

Suchen Sie zusätzliche Informationen (Leistung, Wellenlänge, Sichtbarkeit, Impulsdauer, anwendbare Normen), bevor Sie Geräte warten. Blicken Sie niemals mit einem optischen Gerät auf das Lasergeräte.

Batterie

Beschädigung des Blades

Unsachgemäßer Einbau der Batterie kann gefährliche Explosionen und Beschädigungen des Blades zur Folge haben.

Verwenden Sie deshalb nur den Batterietyp, der auch bereits eingesetzt wurde und befolgen Sie die Installationsanleitung.

Datenverlust

Wenn Sie einen anderen Batterietyp installieren als den, der bei Lieferung des Produkts montiert wurde, kann dies zu Datenverlust führen.

Beschädigung des PCBs und der Batteriehalterung

Benutzen Sie keinesfalls einen Schraubenzieher, um die Batterie aus der Halterung zu nehmen. Wenn Sie die Batterie mit einem Schraubenzieher ausbauen, können das PCB und die Batteriehalterung beschädigt werden.

Umweltschutz

Umweltschäden

Unsachgemäße Entsorgung von gebrauchten Produkten kann die Umwelt schädigen.

Entsorgen Sie gebrauchte Produkte stets gemäß der in Ihrem Land gültigen Gesetzgebung und den Empfehlungen des Herstellers.

Introduction

1.1   Overview

The Penguin Edge™ 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 blade through the Zone 3 connector. The RTM-ATCA-F140 provides the I/O connection for the ATCA-F140 switch blade at the back of the system. RTM-ATCA-F140 is directly connected to and powered by the front blade.

The ruggedized configuration of the RTM-ATCA-F140 features a specially designed block to guide a captive screw to securely attach it to a special attachment block on the ruggedized ATCA-F140. The ruggedized configuration of the RTM-ATCA-F140 is electrically identical to the non-ruggedized RTM-ATCA-F140. References to the RTM-ATCA-F140 throughout this manual also apply to the ruggedized configuration of the RTM-ATCA-F140. Specific information to the ruggedized configuration of the RTM-ATCA-F140 can be found in *Appendix A, Ruggedized RTM-ATCA-F140 Information on page 71*.

> **Important Information**
>
> **SMART Embedded Computing company branding has changed to Penguin Solutions™. The SMART Embedded Computing product line has been rebranded as Penguin Edge™. No changes were made to the ATCA-F140 product line through this rebranding of the company and product line in April of 2022.**

1.2   Features

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 four SFP type connectors
- Serial EEPROM accessible by front blade IPMC
- Four status LEDs and ejector handle switch accessible by front blade IPMC

1.3   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.
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 62368-1 and 60950-1	This product complies with EN 62368-1 and 60950-1 Safety of Information Technology Equipment.
EN55032 Class A (EU)	The product complies with EN55032 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).
Directive (EU) 2015/863 (amending Annex II to Directive 2011/65/EU)	Directive on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS).

Table 1-1   Standard Compliance (continued)

Standard	Description
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.
IEC 62368-1 and 60950-1 CB Scheme	The product complies with IEC 62368-1 and 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. 62368-1 and 60950-1 with no deviations and shall bear the Recognition Mark of an NRTL for US and Canada.
UL/CSA No. 62368-1 and 60950-1	The product complies with UL/CSA 62368-1 and 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.

1.4   Mechanical Data

Table 1-2   RTM-ATCA-F140 Mechanical Data

Data	Value
Dimensions	8U x 6 HP form factor - 3mm x 351mm x 143mm (including face plate handles and alignment posts)
Weight	0.725Kg

1.5   Ordering and Support Information

Refer to the data sheet for the ATCA-F140 for a complete list of available RTM variants and accessories. Refer to *Appendix B, Related Documentation on page 77* or consult your local Penguin Solutions sales representative for the availability of other variants.

For technical assistance, documentation, or to report product damage or shortages, contact your local Penguin Solutions sales representative or visit *https://www.penguinsolutions.com/edge/support/*.

Hardware Preparation and Installation

2.1 Overview

This chapter provides information on unpacking the RTM-ATCA-F140, safety precautions, and requirements for the product. Included are the environmental and power requirements, cooling considerations, and installation and removal procedures.

2.2 Unpacking and Inspecting the RTM

Use ESD protection	**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 PICMG 3.7 R1 Class B.4 requirements. This includes the following:

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

Shipment Inspection Procedure

The RTM is thoroughly inspected before shipment. Make sure you receive all items of your shipment:

- Printed *Quick Start Guide*
- Safety Notes Summary
- RTM-ATCA-F140

1. Carefully inspect the product and all shipped components.

2. Request an RMA for product return at *https://www.penguinsolutions.com/edge/support/* if any damage or discrepancies are observed with the items.

3. Remove the desiccant bag delivered with the system and dispose according to your country's legislation.

2.3 Environmental and Power Requirements

To meet the environmental requirements the blade must 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 surroundings 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.**

> **Blade Damage**
>
> **Do not operate the blade outside of the specified environmental limits. Before applying power, make sure the blade is completely dry and there is no moisture on any surface.**
>
> **Operating the blade without forced air cooling may lead to blade overheating resulting in blade damage.**
>
> **When operating the blade make sure that forced air cooling is available in the shelf.**

Table 2-1   Environmental Requirements

Requirement	Operating	Non-Operating
Temperature and airflow per PICMG 3.7 R1 Class B.4	The RTM shall require no more than 2.2CFM 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 3.0CFM at the inlet ambient of 40°C (104°F).	
	The RTM shall require no more than 3.2CFM 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 5.0CFM at the inlet ambient of 55°C (131°F).	
Airflow Impedance	An ATCA RTM shall present less than 0.1 inches water back-pressure at 5CFM airflow at sea level.	
Temperature	25°C when cooled by an even airflow of 2.2CFM	-40°C to 85°C
	0°C to 40°C when cooled by an even airflow of 3.0CFM	
	-5°C to 55°C when cooled by an even airflow of 5.0CFM	
Temperature change	±0.5°C/min	±1°C/min
Relative humidity	5% to 95% noncondensing at 40°C	5% to 95% noncondensing at 40°C
Altitude	-300m to 1,800m at 40°C	-300m to 13,000m
	1,800m to 4,000m at 30°C	
	Between 106kPa and 70kPa 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.

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

⚠	**Damage of Circuits**
	Electrostatic discharge and incorrect RTM installation and removal can damage circuits or shorten its life.
	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.

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

2.4.1 Installing the RTM

The following procedure describes the installation of the RTM. It assumes that your system is powered. If your system is not powered, you can disregard the blue LED information and proceed to the next step. In this case it is a purely mechanical installation.To install the RTM into an AdvancedTCA shelf, proceed as follows.

Installation Procedure

1. Visually inspect the RTM and Zone 3 connectors on the front blade for damage or bent pins before attempting to insert a blade. If any connector damage or pin damage is observed do not insert the RTM and send the damaged product through proper repair channels.

If the corresponding front blade is already installed, perform the following steps. If the front blade has not been installed, refer to the installation instructions for the front blade in the blade's Installation and Use manual. Then proceed with the following procedure.

2. On the front blade, verify the face plate screws that secure the blade to the shelf are tight.

3. Deactivate the front blade and slide the latch into the release position.

4. Pull the handle outward to unlatch the handle from the face plate. Do not rotate the handle fully outward.
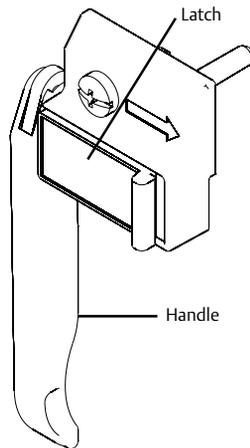
When the blue LED on the front blade is permanently illuminated (power off), proceed to the next step.

5. Insert the RTM into the shelf by aligning the top and bottom edges of the RTM in the shelf's card guides.

6. Apply equal and steady pressure to the RTM while carefully sliding the RTM into the shelf until you feel resistance.

7. Continue to gently push the RTM until the connectors engage with the front blade.

8. Fully insert the blade and then push the handle inwards. The latch automatically locks the handle.
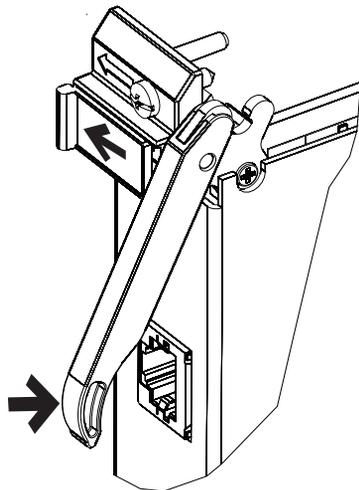
9. Tighten the face plate screws that secure the RTM to the shelf.

NOTE: If the front blade has already been installed (as in *Step 2.*), activate the front blade by pressing the handle back into the face plate.

10. Make sure that the handles of both the RTM and the front blade are closed to power up the blade and RTM payload. The RTM's payload is powered up and the RTM is active when the blue LED is OFF and the green LED **OK** is ON.

11. Connect cables to the face plate if needed.

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 information and skip the respective step. In this case it is a purely mechanical procedure.

> ⚠️ **Data Loss**
>
> **Removing the blade with the blue LED still blinking causes data loss. Wait until the blue LED is permanently illuminated before removing the blade.**

1. On the front blade, slide the latch into the release position and pull the handle outward to unlatch the handle from the face plate. Do not rotate the handle fully outward.

   The front blade blue LED blinks indicating that the blade is powering down. Wait until the front blade blue LED is illuminated permanently.

Important Information

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

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

Controls, LEDs, and Connectors

3.1 Overview

This chapter describes the face plate connectors and face plate LEDs.

3.2 Face Plate Connectors and LEDs

The following figure shows the face plate of the RTM-ATCA-F140.

Figure 3-1   Face Plate
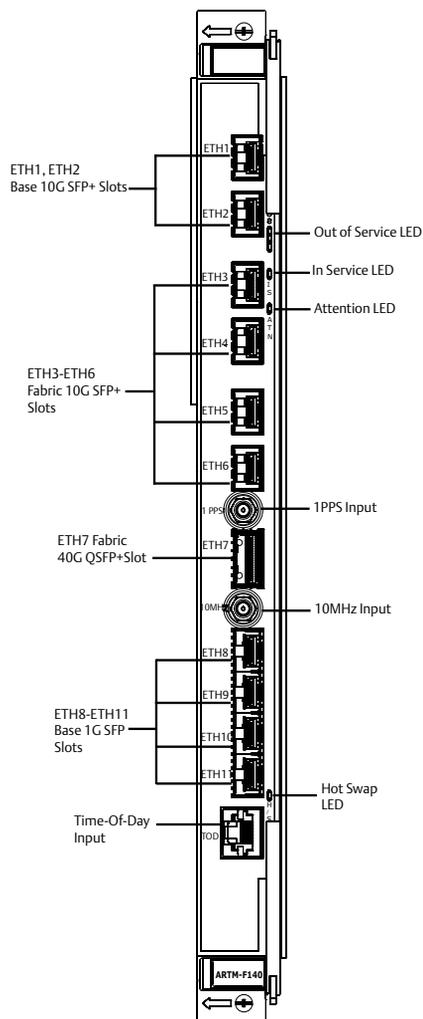
3.2.1 LEDs

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

Functional Description

4.1 Block Diagram

Figure 4-1 Block Diagram
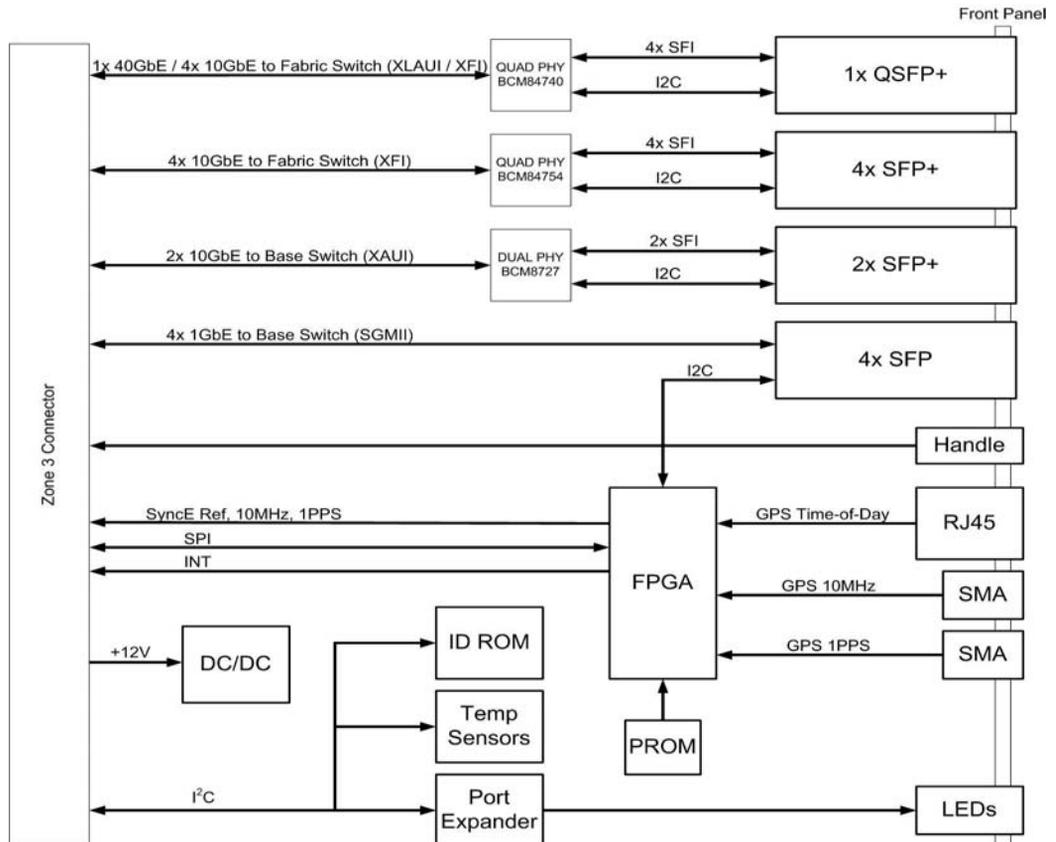
4.2 Management Resources

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 I^2C port connected to the front blade IPMC.

4.2.1 FRU Serial EEPROM

The RTM-ATCA-F140 provides a 128Kb (16Kbyte) I^{2}C serial EEPROM. This is a 24LC128T-type device. The EEPROM resides at I^{2}C 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 RTM close to the top, middle and bottom. These sensors are I^{2}C-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	Noncritical Threshold/C	Critical Threshold/C	Nonrecoverable Threshold/C
Upper	58	69	85
Middle	56	65	81
Lower	54	61	72

The I^{2}C 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 I^{2}C 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. 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 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. A charge pump is used to provide adequate forward voltage if the LED cannot be operated directly from 3.3V.

The I/O expander resides at I^{2}C address 0x40.

4.2.4   I^{2}C Address Map

The next table summarizes the I^{2}C address assignments.

Table 4-3   I^{2}C 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   1Gbps SFP Ports

The RTM-ATCA-F140 provides four 1Gbps 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
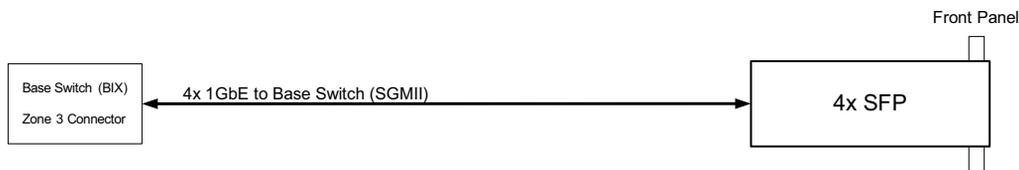
4.3.2   Front Blade Port Mapping

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   I^{2}C Bus

The SFP I^{2}C bus signals (I2C_SDA and I2C_SCL) from each SFP site are individually connected to the RTM FPGA. An I^{2}C controller within the FPGA allows the front blade service processor to access these ports to obtain SFP status and diagnostic information. Refer to the *FPGA on page 67* 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 *FPGA on page 67* 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 *FPGA on page 67* for details.

4.4   10Gbps SFP+ Ports

The RTM-ATCA-F140 provides 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 blade SFI interface.

Figure 4-3   Fabric 10GB Interconnect
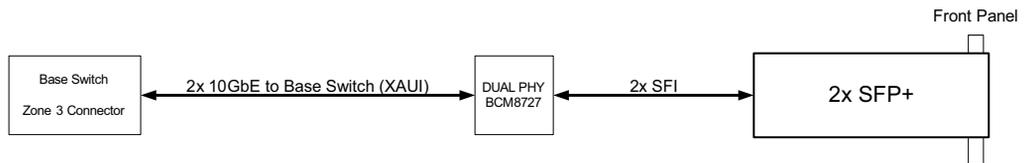
4.4.2   Front Blade Port Mapping

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 *FPGA on page 67* for further details.

4.4.6 SFP+ Connection

The SFP+ module receptacles are designed to support standard SFP+ modules and direct attach copper SFP+ modules less than 10m in length. The SFP+ cage is backwards compatible with 1GB 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 10Gbps 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 (+3.3V)
6	MOD_ABS	16	VCCt (+3.3V)
7	RS0	17	GND
8	LOS	18	TX+
9	RS1	19	TX-
10	GND	20	GND

4.4.6.1 I^2C Bus

The SFP+ I^2C 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 *FPGA on page 67* 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 *FPGA on page 67* 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. The next table shows the address allocation and management port definition for each channel.

Table 4-7   BCM8727 PHY Addressing

| PHY Addr High Bits	Channel	Source	PHY Addr Low Bits	PHY Addr	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 blade SFI interface.

Figure 4-4   Fabric 10Gb Interconnect
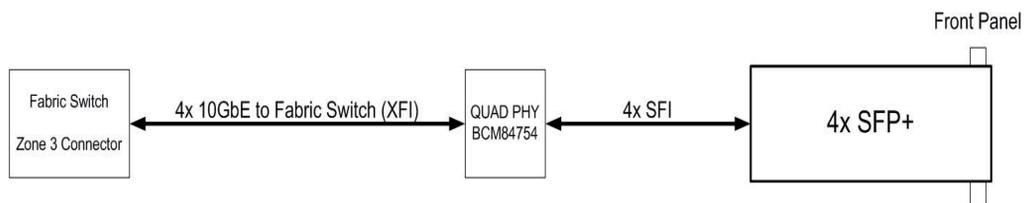
4.5.2 Fabric Front Blade Port Mapping

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 *GPS Connectors on page 67* for further details.

4.5.6　Fabric SFP+ Connection

This is the same as the base SFP+ connection. Refer to *SFP+ Connection on page 59*.

4.5.6.1　SFP+ I^{2}C Bus

The SFP+ I^{2}C 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 *GPS Connectors on page 67* 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 *GPS Connectors on page 67* 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. The next table shows the address allocation and management port definition for each channel.

Table 4-8   BCM84754 PHY Addressing

PHY Addr High Bits	Channel	Source	PHY Addr Low Bits	PHY Addr	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 4-5*. 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 blade SFI interface.

Figure 4-5   Fabric 40Gb Interconnect
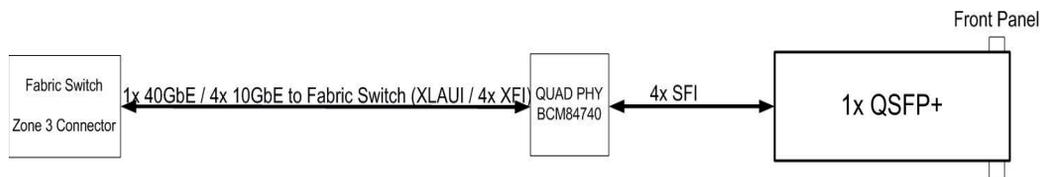
4.6.2   Fabric Front Blade Port Mapping

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 causes 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 *GPS Connectors on page 67* 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*.

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
17	RX1+	22	RX2+

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

Pin	Signal	Pin	Signal
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 *GPS Connectors on page 67* 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. The next table shows the address allocation and management port definition for each channel.

Table 4-10   BCM84740 PHY Addressing

PHY Addr High Bits	Channel	Source	PHY Addr Low Bits	PHY Addr	Switch Port	QSFP+ Port	Management Channel
b000	0	Fabric	b00	0	FIX_P14 Lane 0	Fabric QSFP+	FIX_XG_MDC2/ MDIO2

Table 4-10   BCM84740 PHY Addressing (continued)

PHY Addr High Bits	Channel	Source	PHY Addr Low Bits	PHY Addr	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.

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 and 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 *Transmitter Control on page 64*. 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 in 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:

- +3.3V management power – one pin
- +12V 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 I^2C bus, namely for serial EEPROM, temperature sensors and I/O extender device.

+12V payload power is the source for the on-board 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

Ruggedized RTM-ATCA-F140 Information

A.1 Ruggedized RTM-ATCA-F140 Overview

The ruggedized configuration of the RTM-ATCA-F140 is a rear transition module (RTM) used with the ruggedized configuration of the ATCA-F140 blade. The RTM features a Zone 3 attachment block and captive screw specifically designed to securely attach the RTM to the front blade for operation in rugged environments.

A.2 Mechanical

The following figure shows the location of the Zone 3 attachment block and the captive screw, which secures the RTM to the front blade.

Figure A-1   Location of Zone 3 Attachment Block and Captive Screw
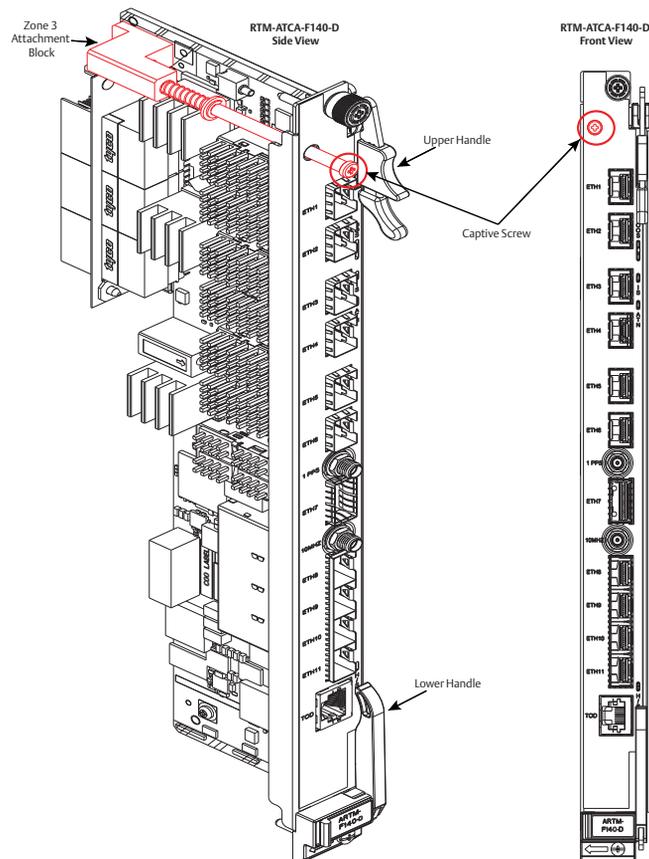
Ruggedized RTM-ATCA-F140 Information

The following figure shows the face plate with LEDs, ports, and inputs identified.

Figure A-2   Face Plate of the RTM-ATCA-F140-D
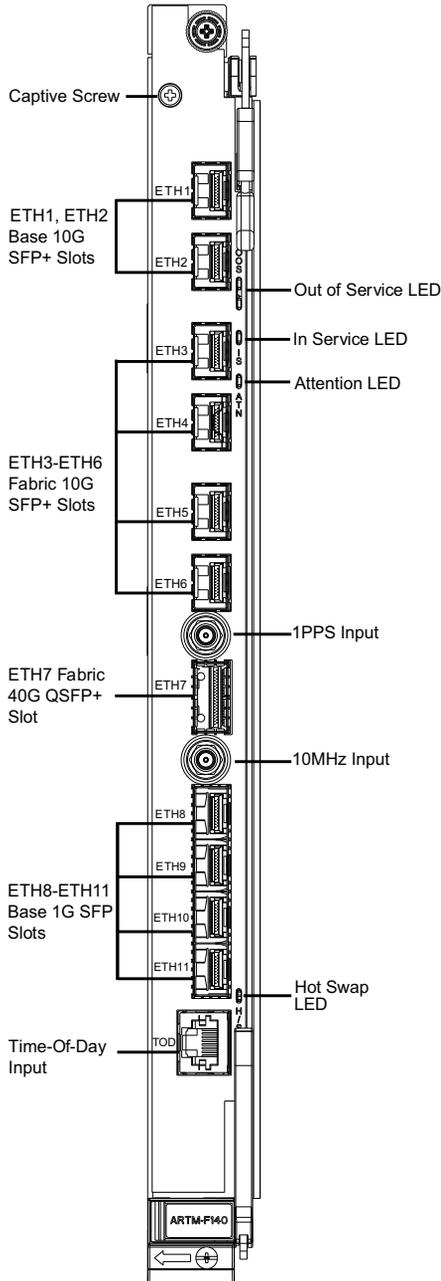
A.2.1   RTM Installation

Care should be taken when installing the ruggedized RTM-ATCA-F140. The upper and lower handles are different due to the location of the captive screw on the front panel of the RTM.

NOTE: The ruggedized ATCA-F140 front blade must be installed in the system before the RTM installation so that the captive screw can be engaged with the Zone 3 attachment block on the front blade.

Refer to the following procedures and figures for the ruggedized RTM-ATCA-F140 installation. Refer to *Section 2.4.2, on page 48* for additional RTM installation and removal procedures. More detailed installation instructions can be found in the *AXP1440-C06 Installation and Use* manual. Refer to *Appendix B, Related Documentation on page 77*.

> ⚠️ **To prevent damage when installing an RTM and an AdvancedTCA blade in a ruggedized system, first install the AdvancedTCA blade, then install the matching RTM.**

Installation Procedure

1. Make sure that the upper handle is in the outward position by squeezing the lever and the latch together. Check that the lower handle is in the open position.

Figure A-3   Upper and Lower Handles

Latch

Lever
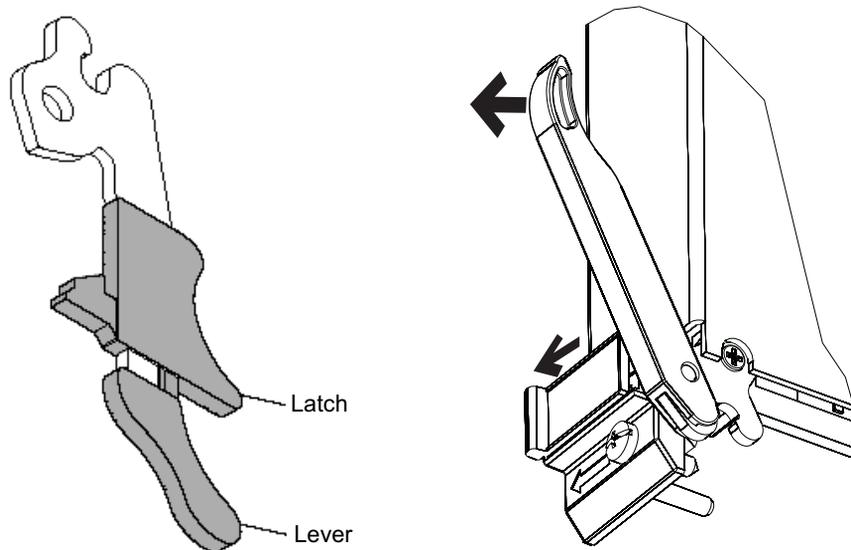
2. Insert the RTM into the shelf by aligning the top and bottom edges of the RTM in the shelf's card guides.

3. Apply equal and steady pressure to the RTM while carefully sliding the RTM into the shelf until you feel resistance.

4. Continue to gently push the RTM until the connectors engage with the front blade.

5. Squeeze the upper handle's lever and latch together and hook the upper handle into the shelf rail recess. Turn the handle toward the face plate to lock it to the shelf. Refer to *Figure A-4*.

6. Push the lower handle's lever inward to automatically lock the handle latch. Refer to *Figure A-4*.

Figure A-4   Upper and Lower Handle Locking Mechanisms
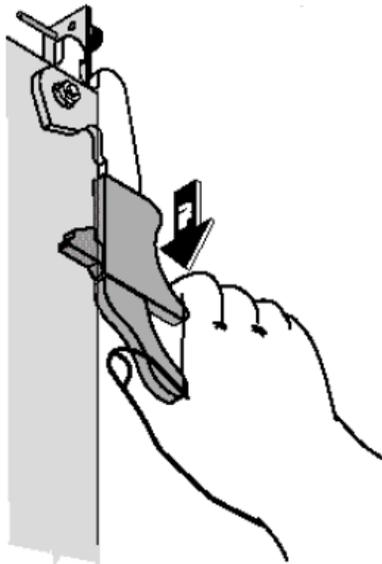

Upper Handle Locking Mechanism   Lower Handle Locking Mechanism
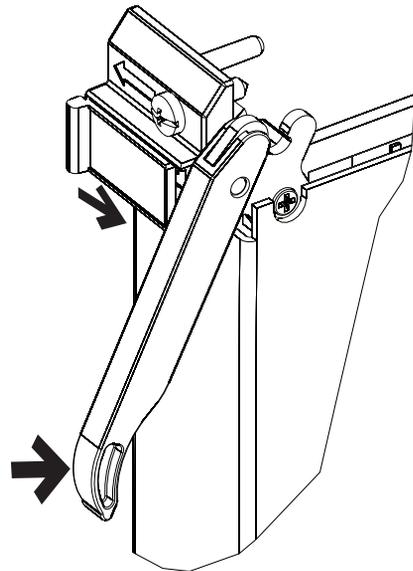
7. Secure the RTM to the front blade with the captive screw as shown in the following figure.

Figure A-5   Captive Screw from the Ruggedized RTM-ATCA-F140
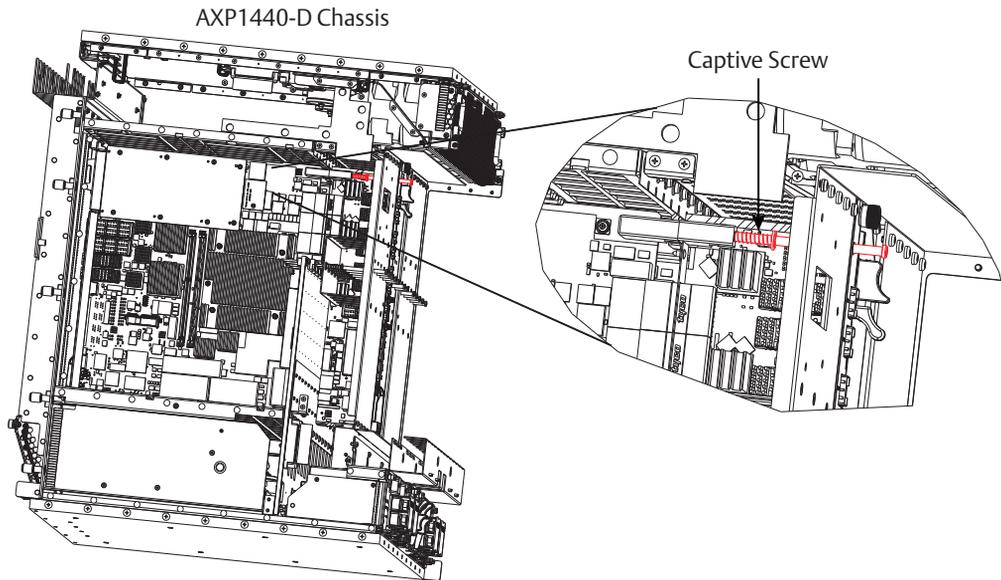
AXP1440-D Chassis

Captive Screw

8. Tighten the face plate screws that secure the RTM to the shelf.

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

10. Connect cables to the face plate if needed.

A.3   Ordering and Support Information

The data sheet for the ATCA-F140 contains a complete list of available RTM variants and accessories. Refer to *Appendix B, Related Documentation on page 77* or consult your local Penguin Solutions sales representative for the availability of other variants.

For technical assistance, documentation, or to report product damage or shortages, contact your local Penguin Solutions sales representative or visit *https://www.penguinsolutions.com/edge/support/*.

Related Documentation

B.1   Penguin Edge Documentation

Technical documentation can be found by using the Documentation Search at
https://www.penguinsolutions.com/edge/support/ or you can obtain electronic copies of
documentation by contacting your local sales representative..

Table B-1   Penguin Edge Documents

Document Title	Document Number
ATCA-F140 Data Sheet	ATCA-F140 DS
ATCA-F140 Series Installation and Use	6806800M67
ATCA-F140 Quick Start Guide	6806800M68
AXP1440-C06 Installation and Use	6806800U21

Related Documentation

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