

# **aTCA-81514PA**

**15U 14-Slot AdvancedTCA® Shelf**

## **User's Manual**



Manual Rev.: 1.0  
Revision Date: December 20, 2018  
Part No.: 50-1G050-1000

## Preface

Copyright © 2018 ADLINK Technology, Inc.

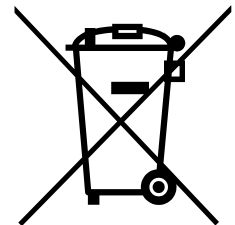
This document contains proprietary information protected by copyright. All rights are reserved. No part of this manual may be reproduced by any mechanical, electronic, or other means in any form without prior written permission of the manufacturer.

### Disclaimer

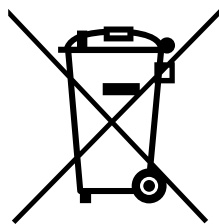
The information in this document is subject to change without prior notice in order to improve reliability, design, and function and does not represent a commitment on the part of the manufacturer. In no event will the manufacturer be liable for direct, indirect, special, incidental, or consequential damages arising out of the use or inability to use the product or documentation, even if advised of the possibility of such damages.

### Environmental Responsibility

ADLINK is committed to fulfill its social responsibility to global environmental preservation through compliance with the European Union's Restriction of Hazardous Substances (RoHS) directive and Waste Electrical and Electronic Equipment (WEEE) directive. Environmental protection is a top priority for ADLINK. We have enforced measures to ensure that our products, manufacturing processes, components, and raw materials have as little impact on the environment as possible. When products are at their end of life, our customers are encouraged to dispose of them in accordance with the product disposal and/or recovery programs prescribed by their nation or company.



### Battery Labels (for products with battery)



### California Proposition 65 Warning



**WARNING:** This product can expose you to chemicals including acrylamide, arsenic, benzene, cadmium, Tris(1,3-dichloro-2-propyl)phosphate (TDCPP), 1,4-Dioxane, formaldehyde, lead, DEHP, styrene, DINP, BBP, PVC, and vinyl materials, which are known to the State of California to cause cancer, and acrylamide, benzene, cadmium, lead, mercury, phthalates, toluene, DEHP, DIDP, DnHP, DBP, BBP, PVC, and vinyl materials, which are known to the State of California to cause birth defects or other reproductive harm. For more information go to [www.p65warnings.ca.gov](http://www.p65warnings.ca.gov).

# Table of Contents

|                                                         |           |
|---------------------------------------------------------|-----------|
| <b>Preface</b>                                          | <b>2</b>  |
| <b>1 Safety</b>                                         | <b>5</b>  |
| 1.1 Safety Symbols used in this document                | 5         |
| 1.2 General Safety Precautions                          | 5         |
| 1.3 References and Architecture Specifications          | 6         |
| 1.4 Product Definition                                  | 6         |
| 1.5 Terms and Acronyms                                  | 6         |
| 1.6 Hardware Platform                                   | 7         |
| 1.7 Shelf Front and Rear View                           | 8         |
| 1.8 ESD Wrist Strap Terminals                           | 9         |
| <b>2 ATCA Backplane</b>                                 | <b>10</b> |
| 2.1 Interfaces                                          | 10        |
| 2.1.1 Base Interface                                    | 10        |
| 2.1.2 Fabric Interface                                  | 10        |
| 2.1.3 Synchronization Clock Interface                   | 10        |
| 2.1.4 Power Interface                                   | 10        |
| 2.1.5 Update Channel Interface                          | 11        |
| 2.2 Intelligent Platform Management Bus (IPMB)          | 11        |
| 2.3 Shelf SEEPROM                                       | 12        |
| 2.3.1 Shelf SEEPROM Location                            | 12        |
| 2.3.2 Shelf SEEPROMs I <sup>2</sup> C Addresses         | 12        |
| 2.4 Shelf Manager Cross Connect                         | 13        |
| 2.5 Logic Ground                                        | 14        |
| <b>3 Air Filter</b>                                     | <b>15</b> |
| 3.1 Introduction                                        | 15        |
| 3.2 Air Filter Presence Switch                          | 15        |
| <b>4 Shelf Ground Connection</b>                        | <b>16</b> |
| 4.1 Specification for the Shelf Ground Connection Cable | 16        |
| <b>5 Fan Tray</b>                                       | <b>17</b> |
| 5.1 Introduction                                        | 17        |
| 5.2 Fan Tray Block Diagram                              | 18        |
| 5.3 Fan Tray Connectors and Indicators                  | 19        |
| 5.4 Fan Control                                         | 20        |
| 5.5 Sensor Table                                        | 22        |
| 5.6 RS-232 Serial Console Interfaces                    | 24        |
| <b>6 Power</b>                                          | <b>25</b> |
| 6.1 Introduction                                        | 25        |
| 6.2 Power Distribution                                  | 26        |
| 6.3 AC Power Supply Units (PSUs)                        | 27        |
| 6.4 Power Components                                    | 28        |
| 6.5 PMBus Interface                                     | 28        |
| 6.6 Power Branches                                      | 29        |

|          |                              |           |
|----------|------------------------------|-----------|
| <b>7</b> | <b>Shelf Management.....</b> | <b>30</b> |
| <b>8</b> | <b>Technical Data .....</b>  | <b>31</b> |
| 8.1      | Dimensions.....              | 32        |
|          | <b>Getting Service .....</b> | <b>33</b> |

# 1 Safety

The intended audience of this User's Manual is system integrators and hardware/software engineers.

## 1.1 Safety Symbols used in this document

|                                                                                   |                                                                                                                                                       |
|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <p><b>Hazardous voltage!</b></p> <p><i>This is the electrical hazard symbol. It indicates that there are dangerous voltages inside the Shelf.</i></p> |
|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|

|                                                                                   |                                                                                                                                                                                                                                                                    |
|-----------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <p><b>Caution!</b></p> <p><i>This is the user caution symbol. It indicates a condition where damage of the equipment or injury of the service personnel could occur. To reduce the risk of damage or injury, follow all steps or procedures as instructed.</i></p> |
|-----------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

|                                                                                    |                                                                                                                                                                      |
|------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <p><b>Risk of electrostatic discharge!</b></p> <p><i>The Shelf contains static sensitive devices. To prevent static damage you must wear an ESD wrist strap.</i></p> |
|------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## 1.2 General Safety Precautions

|                                                                                     |                                                                                                                                                                                                                                                                                             |
|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <p><b>Warning!</b></p> <p><i>Voltages over 42 V<sub>AC</sub> or 60 V<sub>DC</sub> can be present in this equipment. As defined in the PICMG 3.0 Specification, this equipment is intended to be accessed, installed and maintained by qualified and trained service personnel only.</i></p> |
|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

- Service personnel must know the necessary electrical safety, wiring and connection practices for installing this equipment.
- Install this equipment only in compliance with local and national electrical codes.
- For additional information about this equipment, see the PICMG 3.0 Specification ([www.picmg.org](http://www.picmg.org)).

## 1.3 References and Architecture Specifications

- Pigeon Point Systems IPM Sentry Shelf-External Interface Reference ([www.pigeonpoint.com](http://www.pigeonpoint.com))
- PICMG® 3.0 Revision 3.0 AdvancedTCA® Base Specification ([www.picmg.org](http://www.picmg.org))

## 1.4 Product Definition

The aTCA-81514PA is a 14-Slot AdvancedTCA® Shelf with 40G backplane connectivity.

- 40G Dual Star backplane, bussed IPM interface, dedicated slots for two Shelf Managers.

## 1.5 Terms and Acronyms

**Table 1: Terms and Acronyms**

| Term      | Definition                                                                                                                                          |
|-----------|-----------------------------------------------------------------------------------------------------------------------------------------------------|
| ATCA      | Advanced Telecom Computing Architecture                                                                                                             |
| Backplane | Passive circuit board providing the connectors for the front boards. Power distribution, management and auxiliary signal connections are supported. |
| CDM       | Shelf FRU Data Module                                                                                                                               |
| ECN       | Engineering Change Notice                                                                                                                           |
| ESD       | Electrostatic Discharge                                                                                                                             |
| ETSI      | European Telecommunications Standards Institute                                                                                                     |
| FRU       | Field Replaceable Unit                                                                                                                              |
| IPMB      | Intelligent Platform Management Bus                                                                                                                 |
| IPMC      | Intelligent Platform Management Controller                                                                                                          |
| IPMI      | Intelligent Platform Management Interface                                                                                                           |
| PCB       | Printed Circuit Board                                                                                                                               |
| PEM       | Power Entry Module                                                                                                                                  |
| RTC       | Real Time Clock                                                                                                                                     |
| RTM       | Rear Transition Module                                                                                                                              |
| Shelf     | Enclosure containing subrack, backplane, boards, cooling devices, PEMs and Fan Trays                                                                |
| VRTN      | Voltage Return                                                                                                                                      |
| PSU       | Power Supply Unit                                                                                                                                   |

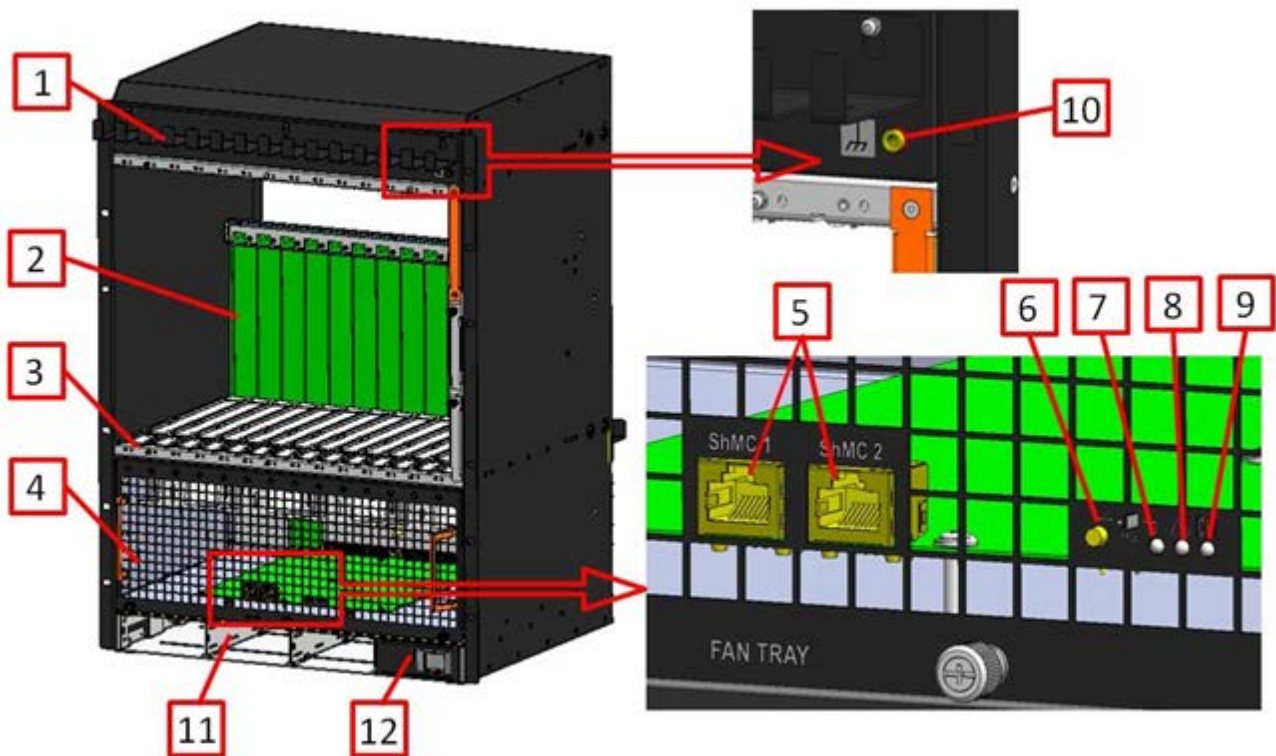
## 1.6 Hardware Platform

The Shelf is 15 U high and 19" rack mountable. The chassis is designed for easy access of any Field-Replaceable Units (FRU).

- Powder-coated 15U / 19" chassis with front card cage for ATCA boards and rear card cage for ATCA RTM boards
- 14 slot 40G ATCA Dual Star Backplane, Dual Star Base Interface, bussed IPM interface, supporting twelve 8U node board slots and two 8U hub slots
- Mounting brackets for 19" racks and rear fixing point
- ESD Wrist Strap Terminals at the front and the rear
- Two dedicated Shelf Manager bays accepting Shelf Managers
- Front-pluggable, hot-swappable Fan Tray
- Air inlet filter with presence monitoring
- Four IEC320-C20 AC inputs
- 3 kW front-pluggable AC Power Supplies with wide range input in a redundant 3 + 1 configuration.
- Four switches for the AC power supplies

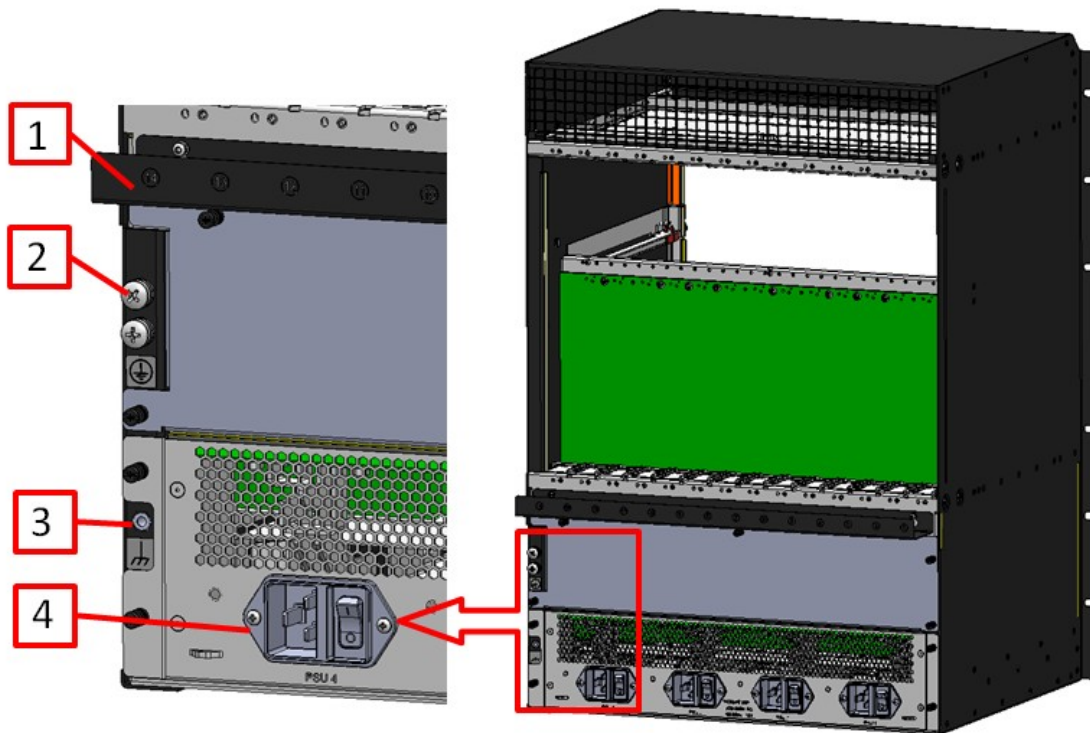
## 1.7 Shelf Front and Rear View

Figure 1: Shelf Front View



- |   |                            |    |                    |
|---|----------------------------|----|--------------------|
| 1 | Cable Tray                 | 7  | Hot Swap LED       |
| 2 | Backplane                  | 8  | Fan Tray Fault LED |
| 3 | Front Card Cage            | 9  | Fan Tray OK LED    |
| 4 | Fan Tray                   | 10 | ESD Wrist Strap    |
| 5 | Serial Interfaces for ShMC | 11 | Slot for PSU       |
| 6 | Hot Swap Push Button       | 12 | Filler panel       |

Figure 2: Shelf Rear View



- 1 Cable Tray  
2 Ground Terminal

- 3 ESD Wrist Strap Terminal  
4 Power Input and Switches

## 1.8 ESD Wrist Strap Terminals



### **Risk of electrostatic discharge!**

*The Shelf contains static sensitive devices. To prevent static damage you must wear an ESD wrist strap.*

One ESD Wrist Strap Terminal is located at the Shelf's upper front side, one ESD Wrist Strap Terminal is located at the left rear side of the Shelf.

## 2 ATCA Backplane

The 14-slot ATCA monolithic Backplane provides:

- 40 Gb/s connectivity (4 lanes with 10 Gb/s)
- 12 ATCA Node slots
- ATCA Hub slots
- Two dedicated Shelf Manager slots
- PEM Slots
- Fan Tray slot
- SEEPROMs

### 2.1 Interfaces

#### 2.1.1 Base Interface

Logical slots 1 and 2 are the hub slots for the Dual Star Base Interface. Base Interface Channel 1 (ShMC) of logical slot 1 and 2 is cross connected to both dedicated Shelf Manager slots on the ATCA Backplane.

#### 2.1.2 Fabric Interface

The Fabric Interface is wired as Dual Star, supporting four ports (8 pairs) per channel. See PICMG® 3.0 AdvancedTCA® Base Specification for details.

#### 2.1.3 Synchronization Clock Interface

Six differential pairs of synchronization clocks are bused between all 14 ATCA slots and terminated at both ends with 80.6 Ohms between each differential pair.

#### 2.1.4 Power Interface

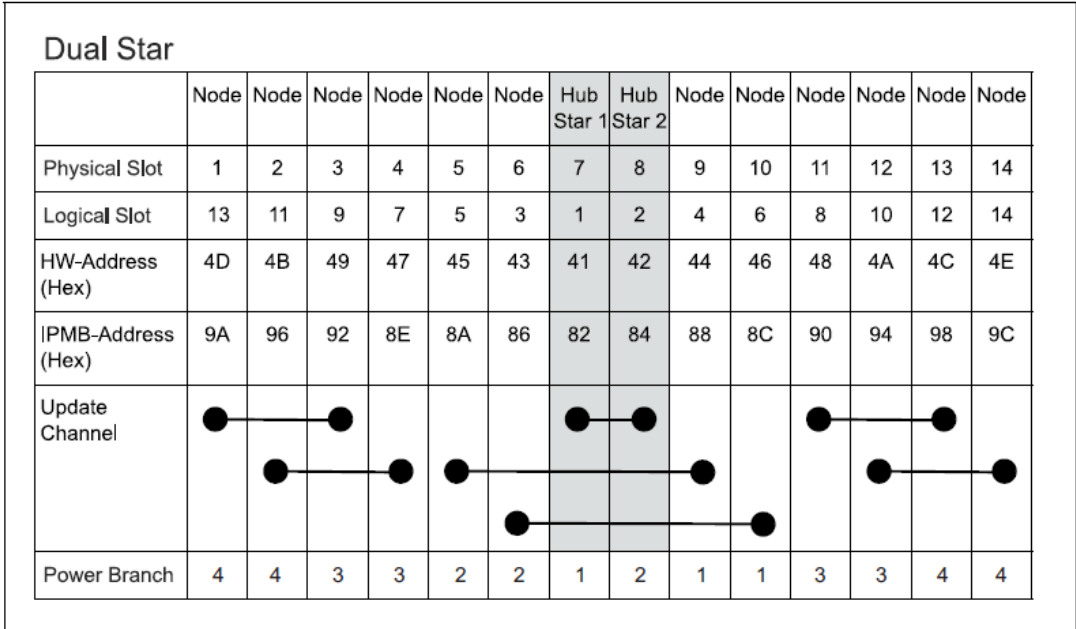
Power distribution within the ATCA Backplane is divided into 4 Power Branches. This topology is used for safety reasons to keep the max. current per branch less than 50 A. Slots connected by update ports, are on separate power branches as well as both hub slots, the Shelf Manager slots and the Fan Trays.

2.1.5 Update Channel Interface

The Update Channels are wired between two redundant ATCA Backplane slots as 10 differential pairs.

The Update Channel is intended to pass information between two redundant ATCA Boards.

Figure 3: Update Channels

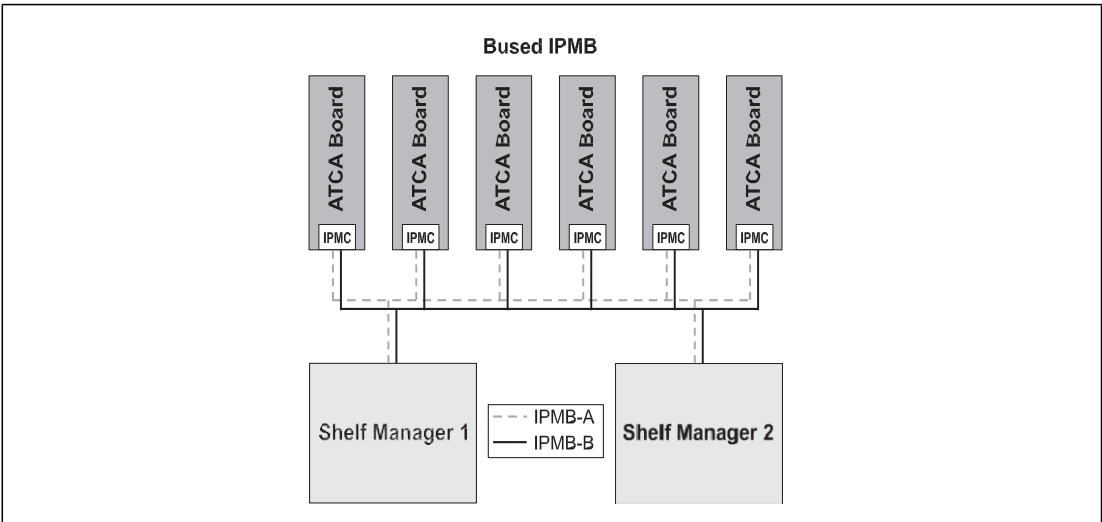


2.2 Intelligent Platform Management Bus (IPMB)

The Shelf uses an Intelligent Platform Management Bus (IPMB) for management communications among all ATCA Boards, the Fan Trays and the Shelf Managers. The reliability of the IPMB is improved by the addition of a second IPMB, with the two IPMBs referenced as IPMB-A and IPMB-B.

IPMB-A and IPMB-B are routed to the ATCA slots in a bussed configuration.

Figure 4: IPMB



## 2.3 Shelf SEEPROM

The Shelf SEEPROM is a repository of the shelf-specific information, capabilities of the system and other user-configurable options.

The SEEPROM contains as example:

- a list of which slots are connected together
- how the update channels are routed
- how many slots are in the system
- what the maximum power is to each slot
- the serial number of the Shelf
- the backplane topology etc.

The Shelf Managers use this information to provide functions such as electronic keying, controlling the power state of the system, etc.

The Shelf Managers cache the information that is stored in the SEEPROMs so that the SEEPROM is only needed when the Shelf Managers are first inserted or when the Shelf is first turned on.

The redundant SEEPROMs ensure that if one is corrupt or non-functional, the second can provide the necessary information. The Shelf Manager selects what set of information is correct and then synchronizes the two SEEPROMs from the internally cached copy of the SEEPROM information.

### 2.3.1 Shelf SEEPROM Location

The SEEPROMs are located at the rear side of the backplane.

### 2.3.2 Shelf SEEPROMs I<sup>2</sup>C Addresses



*The SEEPROMs are managed by the IPM Controller of the fan tray, they have different address and are attached to the fan tray Local I2C channel!*

| CDM      | I <sup>2</sup> C Channel | I <sup>2</sup> C Bus Address (7/8 bit) |
|----------|--------------------------|----------------------------------------|
| SEEPROM1 | Fan Tray Local Channel   | 0xa4/52                                |
| SEEPROM2 | Fan Tray Local Channel   | 0xa6/53                                |

## 2.4 Shelf Manager Cross Connect

The ATCA Backplane provides cross connect traces between the Base Hubs and the Shelf Managers.

Figure 5: Shelf Manager Cross Connect

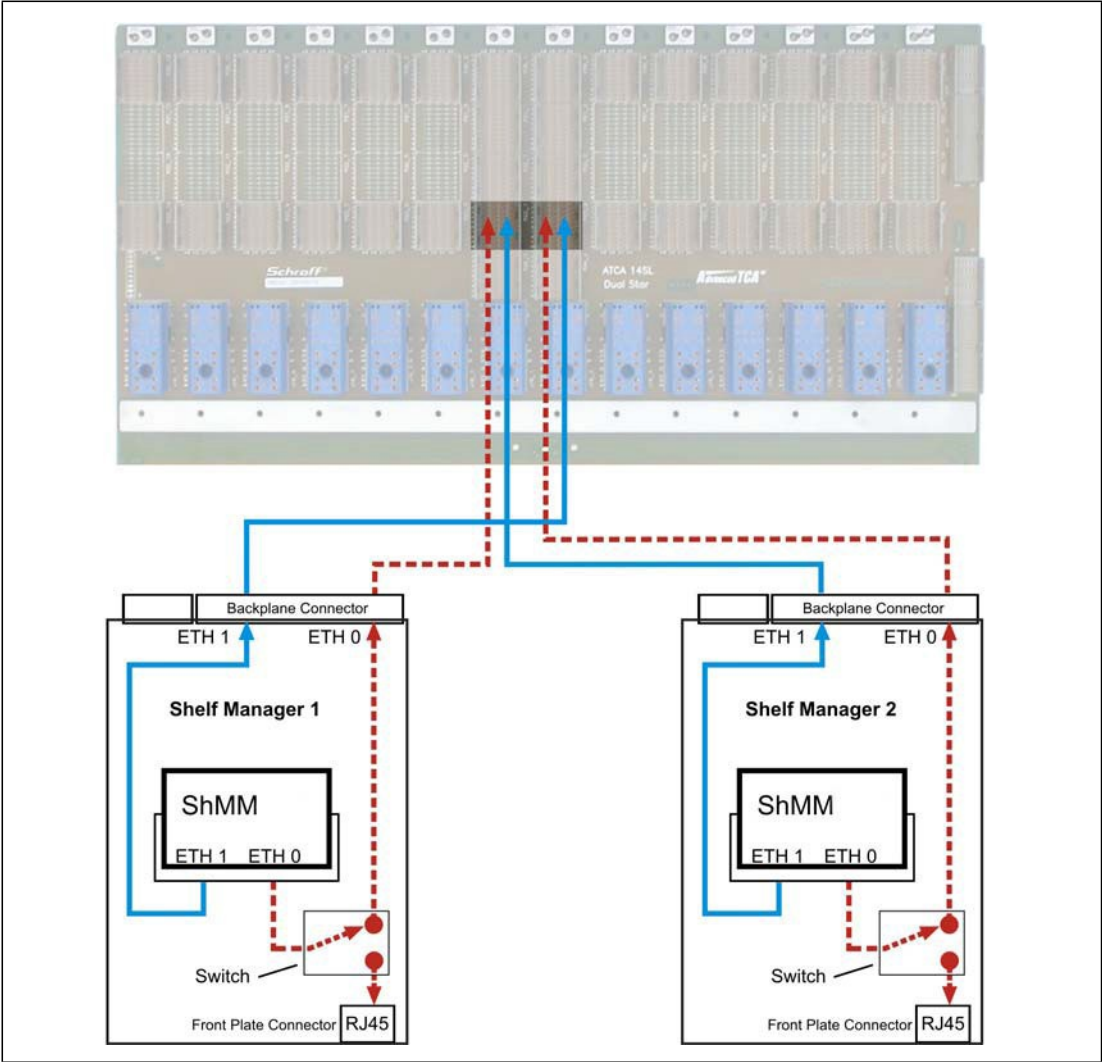
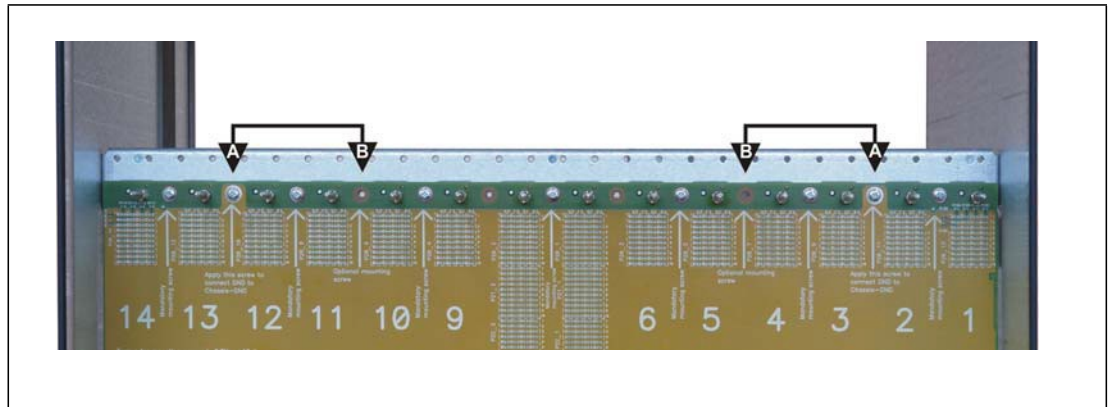


Table 2: Connector (P23) pin assignments for Shelf Manager Cross Connect

| Row | Designation                                          | ab                            |      | cd   |      | ef                            |      | gh   |      |
|-----|------------------------------------------------------|-------------------------------|------|------|------|-------------------------------|------|------|------|
| 5   | Shelf Manager Port with Shelf Manager Cross Connects | Tx1+                          | Tx1- | Rx1+ | Rx1- | Tx2+                          | Tx2- | Rx2+ | Rx2- |
|     |                                                      | Shelf Manager Cross Connect 1 |      |      |      | Shelf Manager Cross Connect 2 |      |      |      |

## 2.5 Logic Ground

Figure 6: Logic Ground



The ATCA Backplane provides a mechanism to connect Logic Ground (GND) and Shelf Ground (Shelf\_GND). You can connect/isolate Logic Ground by swapping two screws from position (A) to position (B).

- Screws at position (A): Logic Ground and Shelf Ground connected.
- Screws at position (B): Logic Ground and Shelf Ground isolated.



*By default, Logic Ground and Shelf Ground are isolated.*

**Torque for the screws: 0.7 Nm +10%**

### 3 Air Filter

Figure 7: Air Filter



#### 3.1 Introduction

The ATCA Shelf provides a replaceable air filter located on top of the fan tray. The filter element is an open cell polyurethane foam special coating to provide improved fire retardation and fungi resistance.

The filter meets the requirements of the Telcordia Technologies Generic Requirements GR- 78-CORE specification.

#### 3.2 Air Filter Presence Switch

The air filter presence is detected by a sensor on the backplane. The signal is routed to the IPM controller of the fan tray.

## 4 Shelf Ground Connection

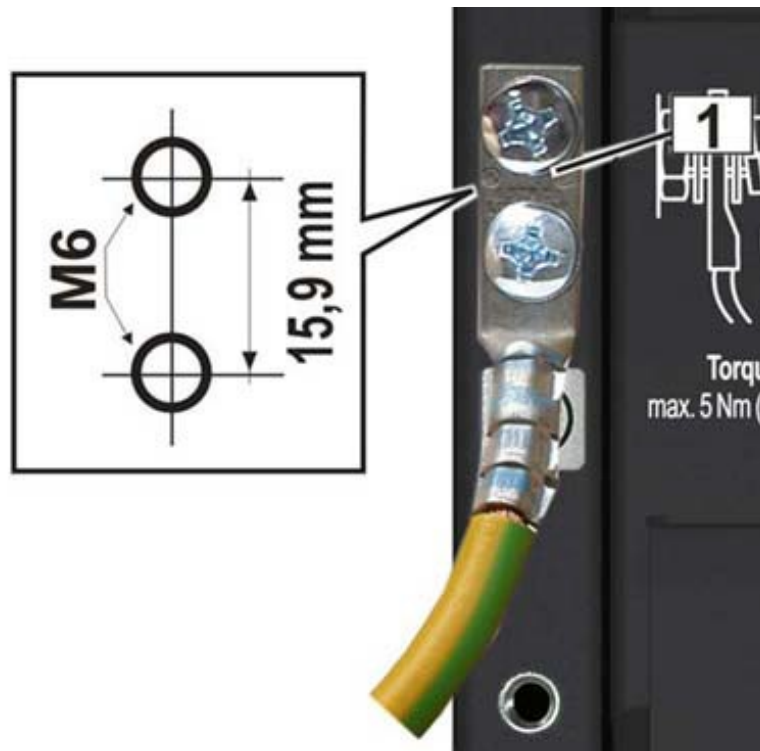


### **Hazardous voltage!**

*Before powering-up the Shelf, make sure that the Shelf Ground terminals are connected to Protective Earth (PE) of the building.*

The ATCA Shelf provides a Shelf ground terminal at the left rear side. The Shelf ground terminal provides two threads (M6) with a 15.88 mm (5/8") spacing between thread centers to connect a two hole lug Shelf ground terminal cable.

**Figure 8: Shelf Ground Terminal**



1 Ground Terminal

### 4.1 Specification for the Shelf Ground Connection Cable

**Required wire size:** #3 AWG or #2 AWG, maximum length 3 m.

**Required terminals:** Use only two hole lug terminals. (For example PANDUIT LCC2-14AHQ or LCD2-14AHQ with 45° angle)

## 5 Fan Tray

### 5.1 Introduction

The Fan Tray is an intelligent FRU controlled by the ShMCs via IPMB.

The interchangeable Fan Tray is equipped with 8 high speed / high air flow fans controlled as a group by the IPM Controller in the Fan Tray.

The Fan Tray is locked into the Shelf with captive screws. A Hot Swap push button is used to provide hot-swap functionality.

The Fan Tray provides:

- A blue Hot Swap LED
- A red Fan Tray Fault LED
- A green Fan Tray OK LED
- A Hot Swap push button

The Fan Tray is controlled via an on-board IPM controller. The Shelf Manager performs management of the Fan Tray through the two independent bussed IPMB connections.

With optional on-blade shelf management, the SEEPROM on the backplane are connected to the internal I<sup>2</sup>C bus on the Fan Trays. The on-blade Shelf Manager has access to these components via the IPM controller of the Fan Trays.

The speed of each individual fan is monitored. If any of the fan speeds drops below the desired fan speed, a System Event Log (SEL) entry is logged by the Shelf Manager. The Shelf Manager then generates alerts and sets alarm conditions as necessary.

The system is designed to run indefinitely with any single fan failure. When one fan fails, all other fans are set to full speed.

**Caution!**

*The fan tray is not redundant. Depending on the operation temperature and the load state a fan tray swap must be carried out within a maximum of 30 seconds.*

## 5.2 Fan Tray Block Diagram

Figure 9: Fan Tray Block Diagram

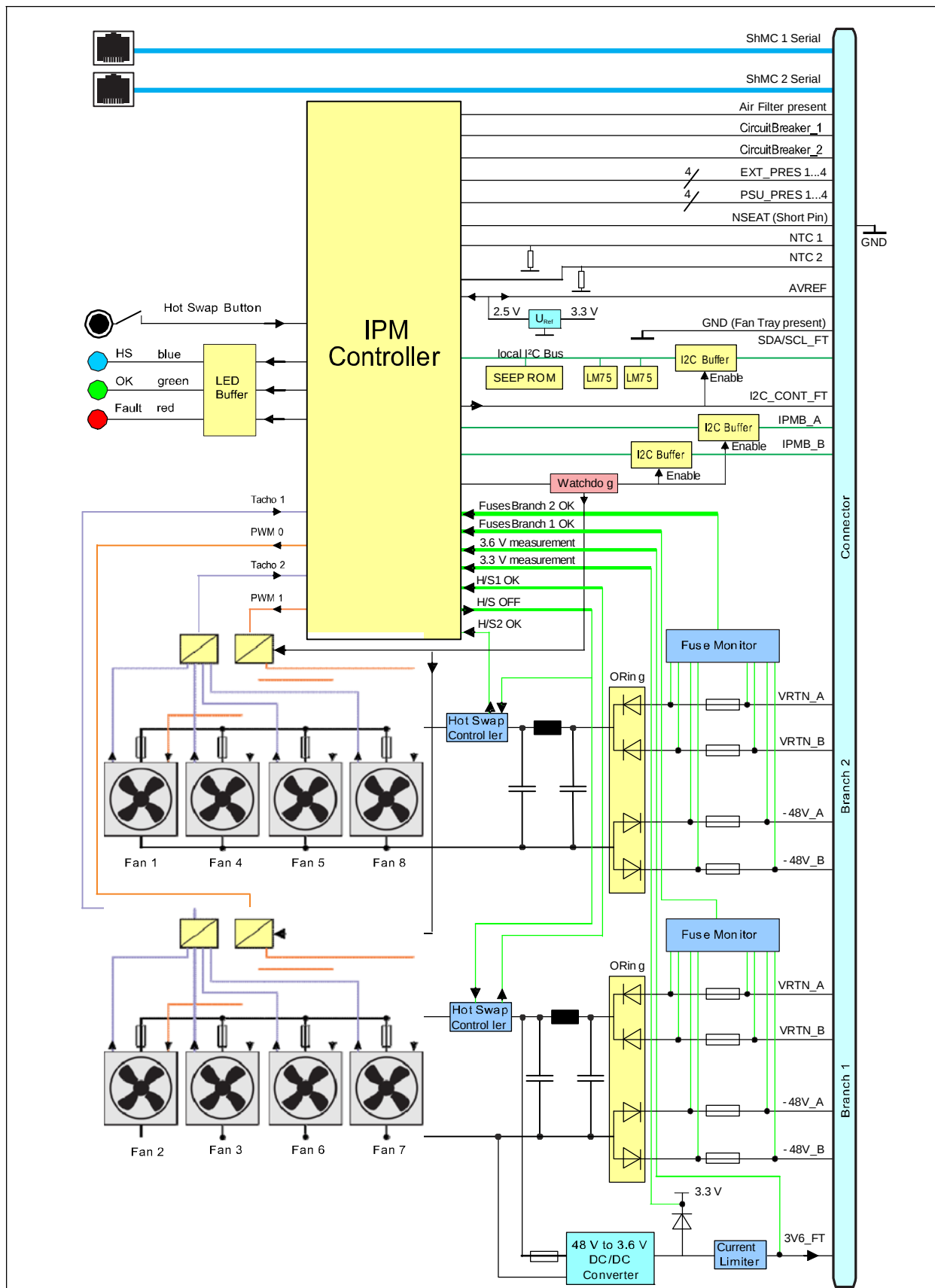


Figure 10: Fan Tray



5.3 Fan Tray Connectors and Indicators

The front panel includes a green Fan Tray OK LED, a red Fan Tray Fault LED, and a blue Hot Swap LED.

The Hot Swap push button indicates to the Shelf Managers that the Fan Tray is about to be removed. Its use is optional, but it is provided so that service personnel can be trained to look for a blue LED to be illuminated on any active component before removing it from the system. Once the operator pushes the Hot Swap button, the Shelf Manager is informed of the pending extraction. When the Shelf Manager feels it is “safe” to remove the Fan Tray, the blue Hot Swap LED illuminates solid.

Table 3: LEDs on Fan Tray front panel

| Color | Description        | Status      | Condition                                                   |
|-------|--------------------|-------------|-------------------------------------------------------------|
| Green | Fan Tray OK LED    | Off         | No Power to the Fan Tray                                    |
|       |                    | Solid green | Normal Operation                                            |
| Red   | Fan Tray Fault LED | Solid red   | Attention Status (error condition)                          |
| Blue  | Hot Swap LED       | Off         | No Power to the Fan Tray, or not OK to extract the Fan Tray |
|       |                    | Short blink | Preparing for extraction                                    |
|       |                    | Solid blue  | Ready to remove                                             |

## 5.4 Fan Control

The Fan Tray's on-board IPM controller has three operation modes:

### Shelf Manager Mode:

The Shelf Manager performs management of the Fan Tray through the two independent bussed IPMB connections.

### Board Control Mode:

The fan tray is controlled by the board in any of the 14 board slots using the PICMG extended IPMI commands. If the fan tray does not receive the "Set Fan Level Command" for more than 65 seconds, the fan tray will exit the Board Control Mode.

### Autonomous Mode:

When the connection to the Shelf Manager is lost, or the Shelf Manager is absent, and the fan tray is not working in Board Control Mode, the fan controller takes over the fan control after 65 seconds.

Four different control behaviours are user-selectable by a DIP switch located at the fan tray's rear side.

- (1) Full speed  
Fan level is set to maximum (15)
- (2) Outlet temperature based control  
The fan level depends on the maximum reading of the two NTC sensors above the card cage and the selected curve.
- (3) Intake temperature based control  
The fan level depends on the reading of the LM75 temperature on the fan tray PCB and the selected curve.
- (4) Fixed speed based control  
The fan controller set the fans in a fixed speed.

Figure 11: DIP Switch

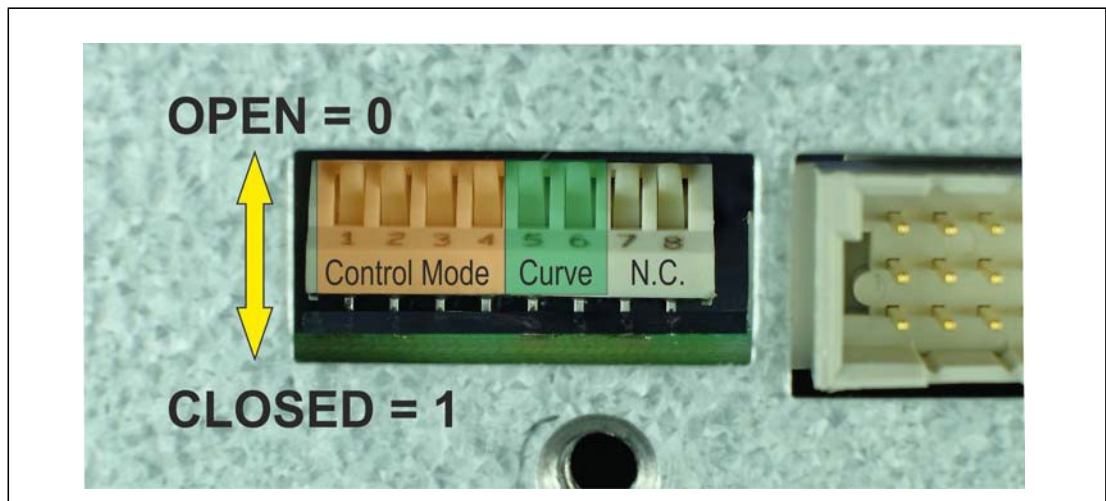
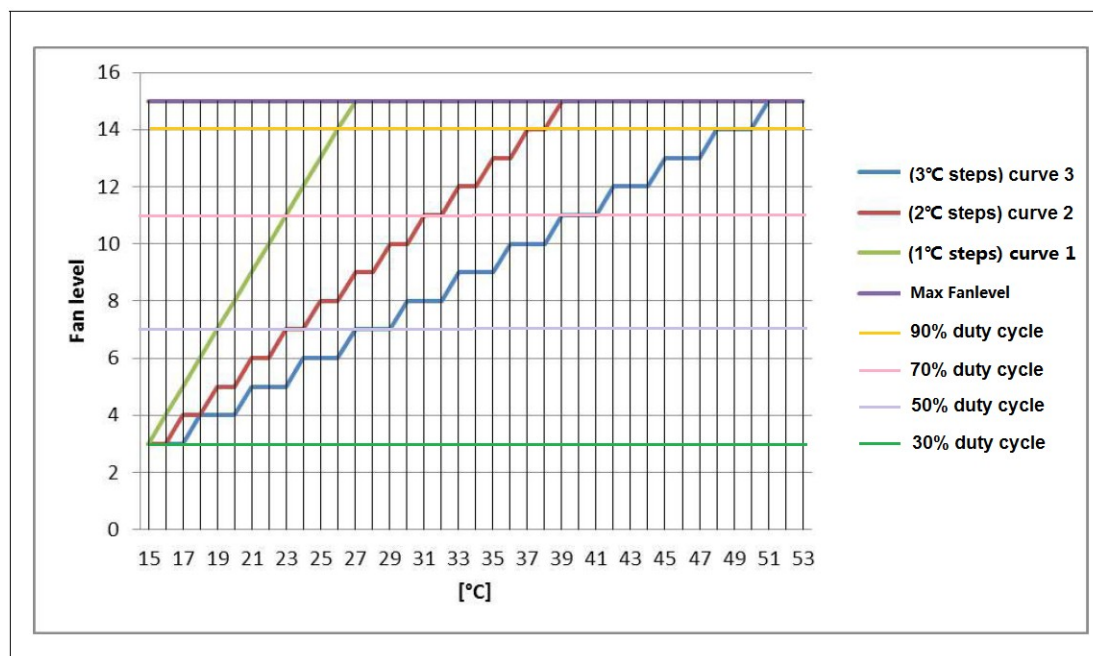


Table 4: DIP Switch Settings

| Switch No |   |   |   |   |   | Control Mode                          |
|-----------|---|---|---|---|---|---------------------------------------|
| 1         | 2 | 3 | 4 | 5 | 6 |                                       |
| 0         | 0 | 0 | 0 | 0 | 0 | Full Speed                            |
| 1         | 0 | 0 | 0 | 0 | 0 | Full Speed                            |
| 1         | 1 | 1 | 1 | 1 | 1 | Full Speed                            |
| 0         | 1 | 0 | 0 | 1 | 0 | Outlet Temperature Curve 2            |
| 0         | 1 | 0 | 0 | 0 | 1 | Outlet Temperature Curve 3            |
| 0         | 1 | 0 | 0 | 0 | 0 | Outlet Temperature Curve 1            |
| 0         | 1 | 0 | 0 | 1 | 1 | Outlet Temperature Curve 1            |
| 0         | 0 | 1 | 0 | 1 | 0 | Intake Temperature curve 2            |
| 0         | 0 | 1 | 0 | 0 | 1 | Intake Temperature curve 3            |
| 0         | 0 | 1 | 0 | 0 | 0 | Intake Temperature curve 1            |
| 0         | 0 | 1 | 0 | 1 | 1 | Intake Temperature curve 1            |
| 0         | 0 | 0 | 1 | 1 | 1 | Fixed speed, Level 14, 90% duty cycle |
| 0         | 0 | 0 | 1 | 1 | 0 | Fixed speed, Level 11, 70% duty cycle |
| 0         | 0 | 0 | 1 | 0 | 1 | Fixed speed, Level 7, 50% duty cycle  |
| 0         | 0 | 0 | 1 | 0 | 0 | Fixed speed, Level 3, 30% duty cycle  |

Figure 12: Curves Fan Control



## 5.5 Sensor Table

Table 5: Sensor Table

| IPMC | No. | LUN | Name               | Type           | Type-Code | Class     | Description                                                                             |
|------|-----|-----|--------------------|----------------|-----------|-----------|-----------------------------------------------------------------------------------------|
| 5a   | 0   | 0   | Hot Swap           | Hot Swap       | 0xf0      | Discrete  | This sensor returns the Fan Tray hot-swap states.                                       |
| 5a   | 1   | 0   | ShelfFRU HotSwap   | Hot Swap       | 0xf0      | Discrete  | This sensor returns the Shelf FRU hot-swap states.                                      |
| 5a   | 2   | 0   | ShelfFRU 2 HotSwap | Hot Swap       | 0xf0      | Discrete  | This sensor returns the Shelf FRU 2 hot-swap states.                                    |
| 5a   | 3   | 0   | PSU 1 HotSwap      | Hot Swap       | 0xf0      | Discrete  | This sensor returns the PSU 1 hot-swap states.                                          |
| 5a   | 4   | 0   | PSU 2 HotSwap      | Hot Swap       | 0xf0      | Discrete  | This sensor returns the PSU 2 hot-swap states.                                          |
| 5a   | 5   | 0   | PSU 3 HotWap       | Hot Swap       | 0xf0      | Discrete  | This sensor returns the PSU 3 hot-swap states.                                          |
| 5a   | 6   | 0   | Version Change     | Version Change | 0x2b      | Discrete  | This sensor indicates a hardware or software change.                                    |
| 5a   | 7   | 0   | IPMB Physical      | IPMB LINK      | 0xf1      | Discrete  | This sensor returns the IPMB link state.                                                |
| 5a   | 8   | 0   | FT +3.3V           | Voltage        | 0x02      | Threshold | This sensor measures the local 3.3 V voltage in volts.                                  |
| 5a   | 9   | 0   | FT +3.6V External  | Voltage        | 0x02      | Threshold | This sensor measures the external 3.6 V voltage in volts.                               |
| 5a   | 10  | 0   | Temp Out Left      | Temperature    | 0x01      | Threshold | This sensor measures the left outlet temperature                                        |
| 5a   | 11  | 0   | Temp Out Right     | Temperature    | 0x01      | Threshold | This sensor measures the right outlet temperature                                       |
| 5a   | 12  | 0   | Temp FT uC         | Temperature    | 0x01      | Threshold | This sensor measures the temperature of the fan tray IPM controller.                    |
| 5a   | 13  | 0   | Temp IN            | Temperature    | 0x01      | Threshold | This sensor measures the inlet temperature.                                             |
| 5a   | 14  | 0   | Fan Tach 1         | Fan            | 0x04      | Threshold | This sensor indicates the speed of the fan 1 (RPM).                                     |
| 5a   | 15  | 0   | Fan Tach 2         | Fan            | 0x04      | Threshold | This sensor indicates the speed of the fan 2 (RPM).                                     |
| 5a   | 16  | 0   | Fan Tach 3         | Fan            | 0x04      | Threshold | This sensor indicates the speed of the fan 3 (RPM).                                     |
| 5a   | 17  | 0   | Fan Tach 4         | Fan            | 0x04      | Threshold | This sensor indicates the speed of the fan 4 (RPM).                                     |
| 5a   | 18  | 0   | Fan Tach 5         | Fan            | 0x04      | Threshold | This sensor indicates the speed of the fan 5 (RPM).                                     |
| 5a   | 19  | 0   | Fan Tach 6         | Fan            | 0x04      | Threshold | This sensor indicates the speed of the fan 6 (RPM).                                     |
| 5a   | 20  | 0   | Fan Tach 7         | Fan            | 0x04      | Threshold | This sensor indicates the speed of the fan 7 (RPM).                                     |
| 5a   | 21  | 0   | Fan Tach 8         | Fan            | 0x04      | Threshold | This sensor indicates the speed of the fan 8 (RPM).                                     |
| 5a   | 22  | 0   | Air Filter         | OEM reserved   | 0xc0      | Discrete  | This sensor checks the presence of the air filter.                                      |
| 5a   | 23  | 0   | FT -48V B2         | OEM reserved   | 0xc0      | Discrete  | This sensor indicates the presence of the – 48 V_B branch 2 at the fan tray connector.  |
| 5a   | 24  | 0   | FT -48V B2 Fused   | OEM reserved   | 0xc0      | Discrete  | This sensor indicates the presence of the – 48 V_B branch 2 after fan tray's main fuse. |
| 5a   | 25  | 0   | FT -48V A2         | OEM reserved   | 0xc0      | Discrete  | This sensor indicates the presence of the – 48 V_A branch 2 at the fan tray connector.  |
| 5a   | 26  | 0   | FT -48V A2 Fused   | OEM reserved   | 0xc0      | Discrete  | This sensor indicates the presence of the – 48 V_A branch 2 after fan tray's main fuse. |
| 5a   | 27  | 0   | FT -48V B1         | OEM reserved   | 0xc0      | Discrete  | This sensor indicates the presence of the – 48 V_B branch 1 at the fan tray connector.  |

| IPMC | No. | LUN | Name             | Type                     | Type-Code | Class     | Description                                                                             |
|------|-----|-----|------------------|--------------------------|-----------|-----------|-----------------------------------------------------------------------------------------|
| 5a   | 28  | 0   | FT -48V B1 Fused | OEM reserved             | 0xc0      | Discrete  | This sensor indicates the presence of the – 48 V_B branch 1 after fan tray's main fuse. |
| 5a   | 29  | 0   | FT -48V A1       | OEM reserved             | 0xc0      | Discrete  | This sensor indicates the presence of the – 48 V_A branch 1 at the fan tray connector.  |
| 5a   | 30  | 0   | FT -48V A1 Fused | OEM reserved             | 0xc0      | Discrete  | This sensor indicates the presence of the – 48 V_A branch 1 after fan tray's main fuse. |
| 5a   | 31  | 0   | PSU1 presence    | OEM reserved             | 0xc0      | Discrete  | This sensor indicates the presence of the PSU 1                                         |
| 5a   | 32  | 0   | PSU1 Fault       | OEM reserved             | 0xc0      | Discrete  | This sensor indicates the presence of the fault state of the PSU 1                      |
| 5a   | 33  | 0   | PSU1 Temp Err    | OEM reserved             | 0xc0      | Discrete  | This sensor indicates the presence of the temperature error state of the PSU 1          |
| 5a   | 34  | 0   | PSU1 Fan Err     | OEM reserved             | 0xc0      | Discrete  | This sensor indicates the presence of the fan error state of the PSU 1                  |
| 5a   | 35  | 0   | PSU1 Inlet Temp  | Temperature              | 0x01      | Threshold | This sensor measures the inlet temperature of the PSU 1                                 |
| 5a   | 36  | 0   | PSU1 Voltage Out | Voltage                  | 0x02      | Threshold | This sensor measures the output voltage of the PSU 1                                    |
| 5a   | 37  | 0   | PSU1 Current Out | Current                  | 0x03      | Threshold | This sensor measures the output current of the PSU 1                                    |
| 5a   | 38  | 0   | PSU1 Power Out   | Other Units-based Sensor | 0x0b      | Threshold | This sensor measures the output power of the PSU 1                                      |
| 5a   | 39  | 0   | PSU1 Voltage In  | Voltage                  | 0x02      | Threshold | This sensor measures the input voltage of the PSU 1                                     |
| 5a   | 40  | 0   | PSU1 Current In  | Current                  | 0x03      | Threshold | This sensor measures the input voltage of the PSU 1                                     |
| 5a   | 41  | 0   | PSU1 Power In    | Other Units-based Sensor | 0x0b      | Threshold | This sensor measures the input current of the PSU 1                                     |
| 5a   | 42  | 0   | PSU2 presence    | OEM reserved             | 0xc0      | Discrete  | This sensor indicates the presence of the PSU 2                                         |
| 5a   | 43  | 0   | PSU1 Fault       | OEM reserved             | 0xc0      | Discrete  | This sensor indicates the presence of the fault state of the PSU 2                      |
| 5a   | 44  | 0   | PSU2 Temp Err    | OEM reserved             | 0xc0      | Discrete  | This sensor indicates the presence of the temperature error state of the PSU 2          |
| 5a   | 45  | 0   | PSU2 Fan Err     | OEM reserved             | 0xc0      | Discrete  | This sensor indicates the presence of the fan error state of the PSU 2                  |
| 5a   | 46  | 0   | PSU2 Inlet Temp  | Temperature              | 0x01      | Threshold | This sensor measures the inlet temperature of the PSU 2                                 |
| 5a   | 47  | 0   | PSU2 Voltage Out | Voltage                  | 0x02      | Threshold | This sensor measures the output voltage of the PSU 2                                    |
| 5a   | 48  | 0   | PSU2 Current Out | Current                  | 0x03      | Threshold | This sensor measures the output current of the PSU 2                                    |
| 5a   | 49  | 0   | PSU2 Power Out   | Other Units-based Sensor | 0x0b      | Threshold | This sensor measures the output power of the PSU 2                                      |
| 5a   | 50  | 0   | PSU2 Voltage In  | Voltage                  | 0x02      | Threshold | This sensor measures the input voltage of the PSU 2                                     |
| 5a   | 51  | 0   | PSU2 Current In  | Current                  | 0x03      | Threshold | This sensor measures the input voltage of the PSU 2                                     |
| 5a   | 52  | 0   | PSU2 Power In    | Other Units-based Sensor | 0x0b      | Threshold | This sensor measures the input current of the PSU 2                                     |
| 5a   | 53  | 0   | PSU3 presence    | OEM reserved             | 0xc0      | Discrete  | This sensor indicates the presence of the PSU 3                                         |
| 5a   | 54  | 0   | PSU3 Fault       | OEM reserved             | 0xc0      | Discrete  | This sensor indicates the presence of the fault state of the PSU 3                      |
| 5a   | 55  | 0   | PSU3 Temp Err    | OEM reserved             | 0xc0      | Discrete  | This sensor indicates the presence of the temperature error state of the PSU 3          |
| 5a   | 56  | 0   | PSU3 Fan Err     | OEM reserved             | 0xc0      | Discrete  | This sensor indicates the presence of the fan error state of the PSU 3                  |

| IPMC | No. | LUN | Name             | Type                     | Type-Code | Class     | Description                                             |
|------|-----|-----|------------------|--------------------------|-----------|-----------|---------------------------------------------------------|
| 5a   | 57  | 0   | PSU3 Inlet Temp  | Temperature              | 0x01      | Threshold | This sensor measures the inlet temperature of the PSU 3 |
| 5a   | 58  | 0   | PSU3 Voltage Out | Voltage                  | 0x02      | Threshold | This sensor measures the output voltage of the PSU 3    |
| 5a   | 59  | 0   | PSU3 Current Out | Current                  | 0x03      | Threshold | This sensor measures the output current of the PSU 3    |
| 5a   | 60  | 0   | PSU3 Power Out   | Other Units-based Sensor | 0x0b      | Threshold | This sensor measures the output power of the PSU 3      |
| 5a   | 61  | 0   | PSU3 Voltage In  | Voltage                  | 0x02      | Threshold | This sensor measures the input voltage of the PSU 3     |
| 5a   | 62  | 0   | PSU3 Current In  | Current                  | 0x03      | Threshold | This sensor measures the input voltage of the PSU 3     |
| 5a   | 63  | 0   | PSU3 Power In    | Other Units-based Sensor | 0x0b      | Threshold | This sensor measures the input current of the PSU 3     |

## 5.6 RS-232 Serial Console Interfaces

The Fan Tray provides two RS-232 serial console connectors for Shelf Manager 1 and 2. The connectors are 8-pin RJ45 modular receptacles.

A full set of RS-232 signals, including modem control is provided.

**Table 6: RS-232 Serial Console Interface Pin assignment**

| RJ45 Pin | RS-232 Signal | Type | Description         |
|----------|---------------|------|---------------------|
| 1        | RTS           | Out  | Request To Send     |
| 2        | DTR           | Out  | Data Terminal Ready |
| 3        | TxD           | Out  | Transmit Data       |
| 4        | GND           | ---  | Logic Ground        |
| 5        | GND           | ---  | Logic Ground        |
| 6        | RxD           | In   | Receive Data        |
| 7        | DSR           | In   | Data Set Ready      |
| 8        | CTS           | In   | Clear To Send       |



*The serial console default configuration is:*

*115200 baud*

*no parity*

*8 data*

*bits 1*

*stop bit*

## 6 Power



### **Hazardous voltage!**

*Before working ensure that the power is removed from the power connection cables.*



### **Warning!**

*The Power lines must be protected on site level with 16A breakers or 16A fuses.*



***The Power Supplies are not included with the Shelf.***

*The Shelf accepts Huawei R4850xx series power supplies.*



*The Shelf can be powered with 230 VAC line voltage or 240HVDC input depending on PSU type.*

### 6.1 Introduction

3 pluggable AC power supplies are located at the bottom side of the Shelf. The power supplies are lugged-in from the front side and are hot-swappable. To provide a redundancy, they are arranged in a 2+1 configuration. It can also support a redundant 3 + 1 configuration by removing the filler panel in front of the shelf.



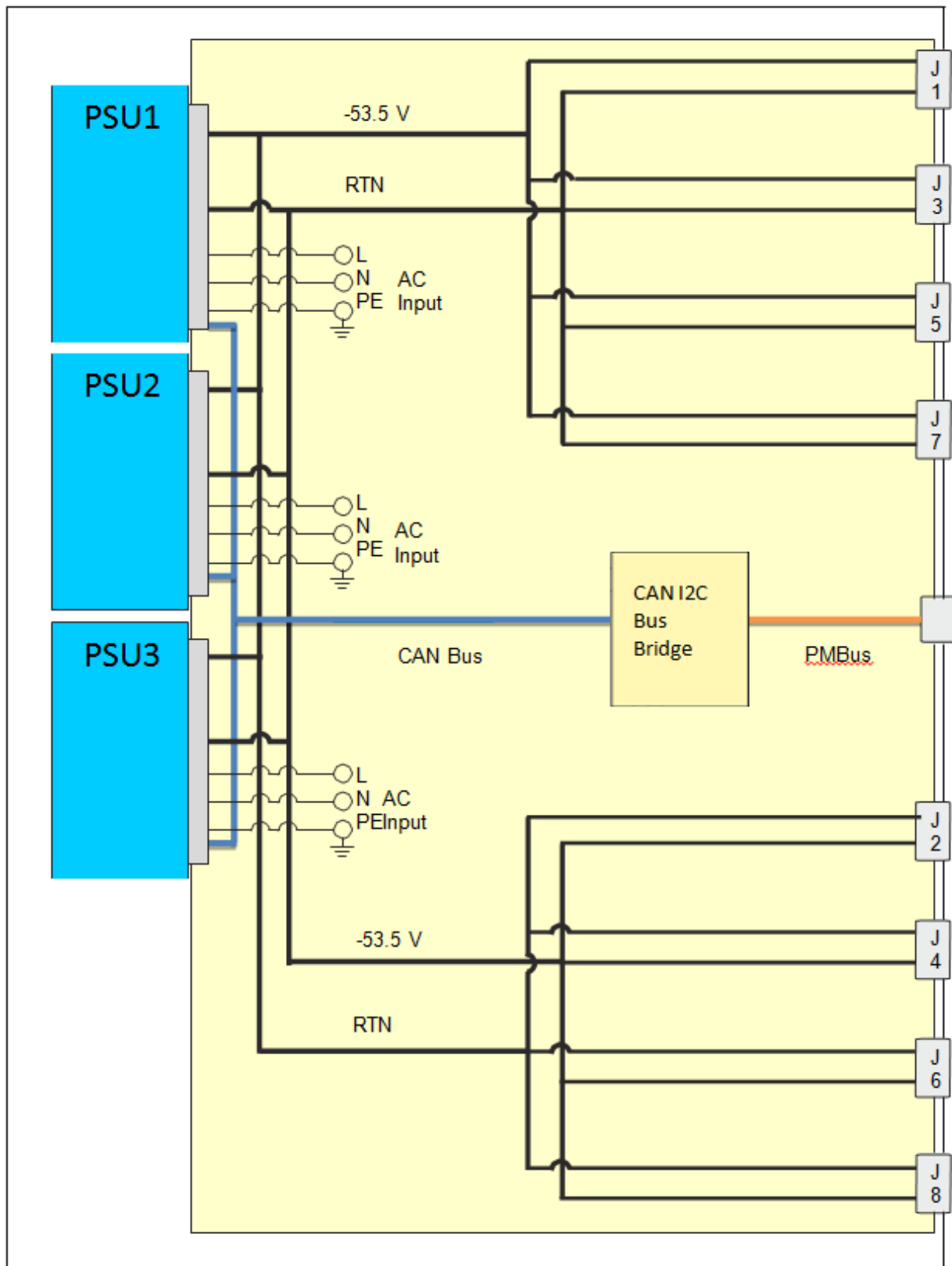
*The output voltage of the PSUs is 53.5 VDC. Because the nominal supply voltage for ATCA systems acc. to the PICMG specification is 48VDC, all signal names in this Manual with exception of this chapter are related to 48 VDC.*

The PSUs are plugged into a Power Distribution Board (PDB) where the power is divided in four output branches towards the backplane.

The R4850xx series PSU only support communication on the CAN bus, but not support communication on the I2C bus, on the Power Distribution Board, there is one functional modular to implement the CAN bus to I2C bus bride, so that the R4850xx series PSU can be managed through the I2C bus.

## 6.2 Power Distribution

Figure 12: Power Distribution



## 6.3 AC Power Supply Units (PSUs)

The AC PSUs with front-to-back airflow are hot pluggable from the front side. The Shelf Manager can monitor the PSUs through the IPMC of the fan tray. The fan tray access the PSUs through an I2C bus to CAN bus bridge on the Power Distribution Board, since the PSUs only support CAN bus communication.

**Table 7: Basic Specifications for the PSUs**

| 230 V Operation          |                   |
|--------------------------|-------------------|
| Input Voltage nominal    | 230 VAC           |
| Input Voltage Range max. | 176 VAC - 290 VAC |
| Input Frequency Range    | 45 Hz - 66 Hz     |
| Output Voltage           | 53.5 VDC          |
| Output Current           | <17 A             |
| Output Power             | 3000 W            |
| 115 V Operation          |                   |
| Input Voltage nominal    | 115 VAC           |
| Input Voltage Range max. | 85 VAC - 175 VAC  |
| Input Frequency Range    | 45 Hz - 66 Hz     |
| Output Voltage           | 53.5 VDC          |
| Output Current           | <17 A             |
| Output Power             | 1250 W            |



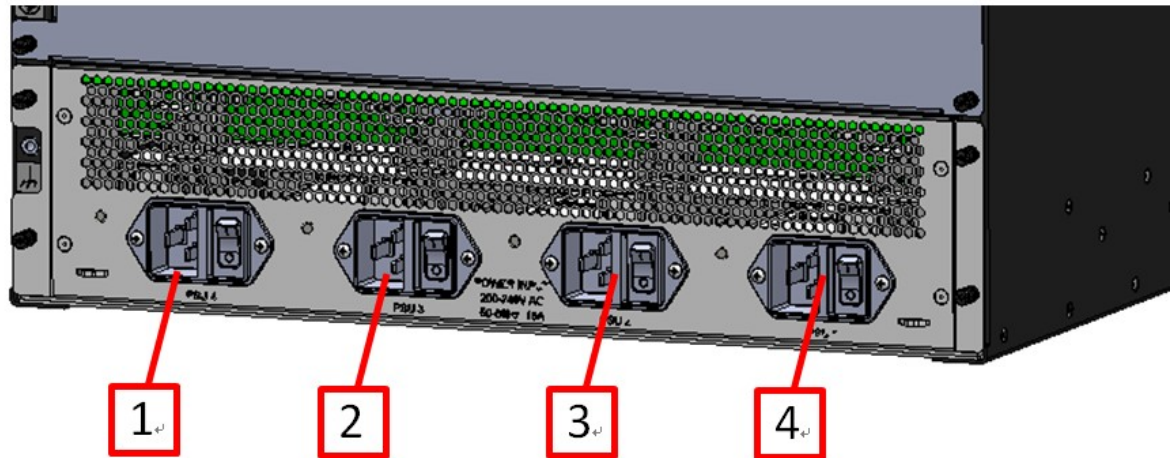
See Huawei R4850xx Series PSU Data Sheet for detailed information.

**Figure 13: Power Supplies Unit**



## 6.4 Power Components

Figure 14: Power Input



- |   |                |
|---|----------------|
| 1 | AC Input PSU 4 |
| 2 | AC Input PSU 3 |
| 3 | AC Input PSU 2 |
| 4 | AC Input PSU 1 |

AC power input is provided by 4 IEC 320-C20 connectors at the rear side of the Shelf.

The Power Distribution Board (PDB) is located behind the AC PSUs. It provides 4 connectors for the PSUs and a connector for the PMbus interface to the CAN to I2C bridge function modular.

## 6.5 PMBus Interface

The Huawei R4850xx series PSU only support communication on the CAN bus, there is a function modular to implement the bridge from CAN bus to I2C bus on the Power Distribution Board. The PMBus is routed from the CAN to I2C bus bridge to the local I2C bus of the fan tray, so that the PSUs can be managed by the IPM controller of the fan tray.

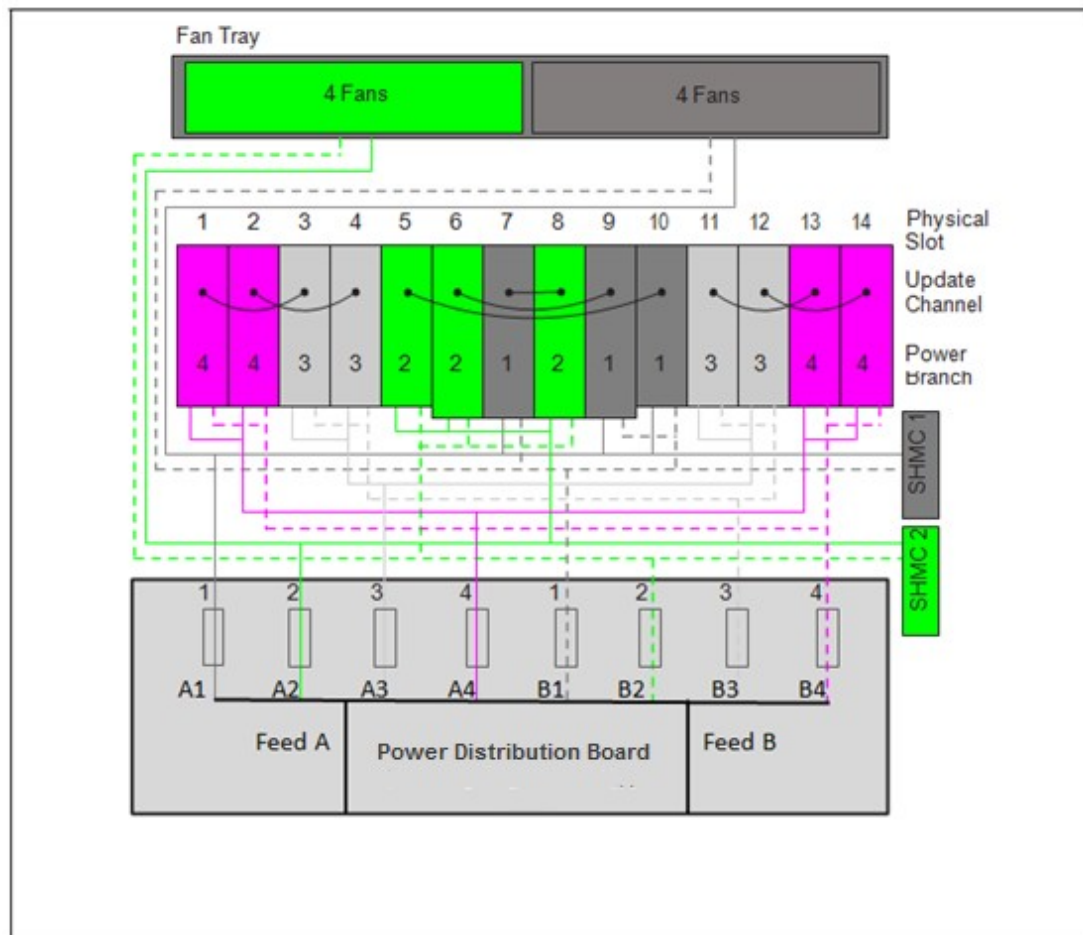
## 6.6 Power Branches

Power branches within the Shelf originate from the PEM and powers all the blades, the Shelf Managers and the Fan Trays. The power is divided in four output branches towards the backplane.



*If the joint power capability of all ATCA boards assigned to a branch is greater than the calculated branch power, the Shelf Manager will not power-on all boards. (The last plugged-in or the last in the power-up sequence.)*

Figure 15: Power Branches



## 7 Shelf Management

The aTCA-81514PA is designed to work with two redundant Shelf Managers in dedicated Shelf Manager slots.

Upon request a version with on-blade shelf management is available. With on-blade shelf management, the SEEPROMs on the backplane are connected to the internal I<sup>2</sup>C bus on the Fan Trays. The on-blade Shelf Manager has access to these components via the IPM controller of the Fan Trays.

## 8 Technical Data

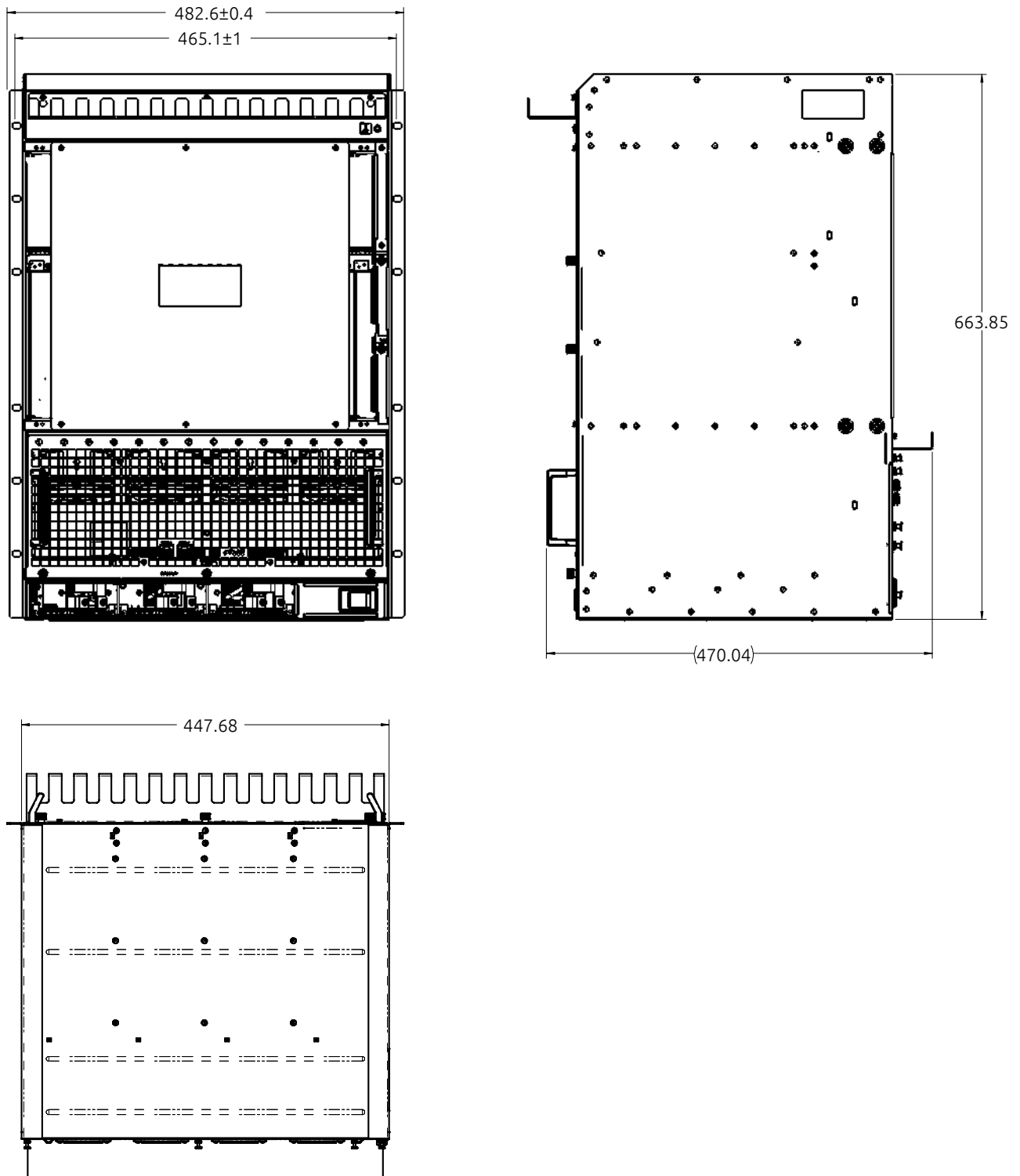
**Table 8: Technical Data**

|                                    |                                                  |
|------------------------------------|--------------------------------------------------|
| <b>Physical Dimensions</b>         |                                                  |
| Height                             | 15U                                              |
| Width                              | 482.6 mm                                         |
| Depth (with handles)               | 470 mm                                           |
| <b>Weight</b>                      |                                                  |
| Net Weight                         | 30 kg                                            |
| Gross Weight (including packaging) | 65 kg                                            |
| <b>Power AC</b>                    |                                                  |
| Input voltage nom.                 | 115V AC / 230V AC                                |
| Input frequency                    | 50/60 Hz                                         |
| Input voltage range                | 85....175V AC / 176....290V AC                   |
| Input power protection             | < 17 A                                           |
| <b>Cooling Capacity</b>            |                                                  |
| Front Boards                       | 300 W / Board                                    |
| RTM                                | 35 W / Board                                     |
| <b>Environmental</b>               |                                                  |
| Ambient temperature (long term)    | +5°C...+40°C (41°F to 104°F)                     |
| Ambient temperature (short term)   | -5°C...+55°C (23°F to 131°F)                     |
| Humidity                           | +5%...+85%, no condensation                      |
| <b>EMI</b>                         |                                                  |
| Conducted Emissions                | EN 55022 Class A                                 |
| Radiated Emissions                 | EN 55022 Class A                                 |
| <b>Safety</b>                      |                                                  |
| Protected Earth Test               | EN50514, test current 25 A, resistance <100 mOhm |

## 8.1 Dimensions

All dimensions below are in mm.

Figure 16: Dimensions



## Getting Service

**Ask an Expert:** <http://askanexpert.adlinktech.com>

**ADLINK Technology, Inc.**

Address: 9F, No.166 Jian Yi Road, Zhonghe District  
New Taipei City 235, Taiwan  
新北市中和區建一路166號9樓

Tel: +886-2-8226-5877  
Fax: +886-2-8226-5717  
Email: [service@adlinktech.com](mailto:service@adlinktech.com)

**Ampro ADLINK Technology, Inc.**

Address: 5215 Hellyer Avenue, #110, San Jose, CA 95138, USA  
Tel: +1-408-360-0200  
Toll Free: +1-800-966-5200 (USA only)  
Fax: +1-408-360-0222  
Email: [info@adlinktech.com](mailto:info@adlinktech.com)

**ADLINK Technology (China) Co., Ltd.**

Address: 300 Fang Chun Rd., Zhangjiang Hi-Tech Park, Pudong New Area  
Shanghai, 201203 China  
上海市浦东新区张江高科技园区芳春路300号 (201203)

Tel: +86-21-5132-8988  
Fax: +86-21-5132-3588  
Email: [market@adlinktech.com](mailto:market@adlinktech.com)

**ADLINK Technology GmbH**

Address: Hans-Thoma-Straße 11, D-68163, Mannheim, Germany  
Tel: +49-621-43214-0  
Fax: +49-621-43214-30  
Email: [emea@adlinktech.com](mailto:emea@adlinktech.com)

Please visit the Contact page at [www.adlinktech.com](http://www.adlinktech.com) for information on how to contact the ADLINK regional office nearest you.