aTCA-80302PA/PD

3U 2-slot Full-Mesh 40G AdvancedTCA® Shelf

User's Manual



Manual Rev.: 1.0
Revision Date: September 19, 2018
Part No.: 50-1G046-1000

LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000
Leading EDGE COMPUTING

Preface

Copyright 2018 ADLINK Technology, Inc.

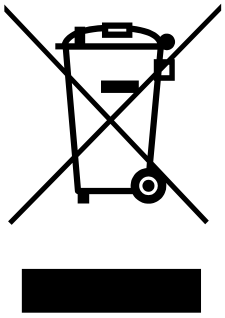
This document contains proprietary information protected by copyright. All rights are reserved. No part of this manual may be reproduced by any mechanical, electronic, or other means in any form without prior written permission of the manufacturer.

Disclaimer

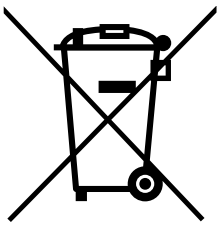
The information in this document is subject to change without prior notice in order to improve reliability, design, and function and does not represent a commitment on the part of the manufacturer.
In no event will the manufacturer be liable for direct, indirect, special, incidental, or consequential 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.

LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

Table of Contents

Preface **2**

1 Safety **5**

1.1 Safety Symbols used in this document 5

1.2 General Safety Precautions 5

1.3 References and Architecture Specifications 6

1.4 Terms and Acronyms 6

1.5 Hardware Platform 7

2 Shelf Front and Rear View **8**

3 ATCA Backplane **9**

3.1 Logical to Physical Slot Mapping 9

3.2 Interfaces 9

3.2.1 Fabric Interface 9

3.2.2 Synchronization Clock Interface 9

3.2.3 Update Channel Interface 9

3.2.4 Intelligent Platform Management Interface 9

3.2.5 Base Interface 10

3.3 Shelf FRU SEEPROM 11

3.4 Logic Ground 11

4 Air Filter **12**

4.1 Introduction 12

5 Shelf Ground Connection **13**

5.1 Specification for the Shelf Ground connection cable 13

6 Fan Trays **14**

6.1 IPM Controller and Fan Control 15

6.2 Fan Tray Indicators 16

6.3 Fan Tray Signals 17

6.4 Fan Tray Connector Pin Assignment 17

6.5 Fan Tray IPMB Addresses 18

6.6 Front Board Air Distribution 18

6.7 Rear Board Air Distribution 19

7 Power **20**

7.1 AC PEM 20

7.1.1 AC PEM Power Distribution 21

7.1.2 AC PEM Signals 22

7.1.3 AC PEM Indicators 22

7.1.4 AC PEM Connector PIN Assignment 23

7.2 DC PEM 23

7.2.1 DC PEM Power Distribution 25

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

7.2.2 DC PEM Signals 25
7.2.3 DC PEM Indicators 26
7.2.4 DC PEM Connector PIN Assignment 26
8 Shelf Management 23
8.1 Shelf Managers 24
8.2 Introduction 24
8.3 Front Panel Components 26
8.4 Hardware Address 26
9 Technical Data 27
9.1 Shelf Dimensions 30
Getting Service 32

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

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



Hazardous voltage!

This is the electrical hazard symbol. It indicates that there are dangerous voltages inside the Shelf.



Caution!

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.



Danger of electrostatic discharge!

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

1.2 General Safety Precautions



Warning!

Voltages over 60 VDC can be present in this equipment. As defined in the PICMG 3.0 Speci- fication, this equipment is intended to be accessed, to be installed and maintained by qualified and trained service personnel only.

- Service personnel must know the necessary electrical safety, wiring and connection prac- tices 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.com*).

LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

1.3 References and Architecture Specifications

- Pigeon Point Systems IPM Sentry Shelf-External Interface Reference (*www.pigeonpoint.com*)
- PICMG® 3.0 Revision 3.0 AdvancedTCA® Base Specification (*www.picmg.com*)

1.4 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

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

1.5 Hardware Platform

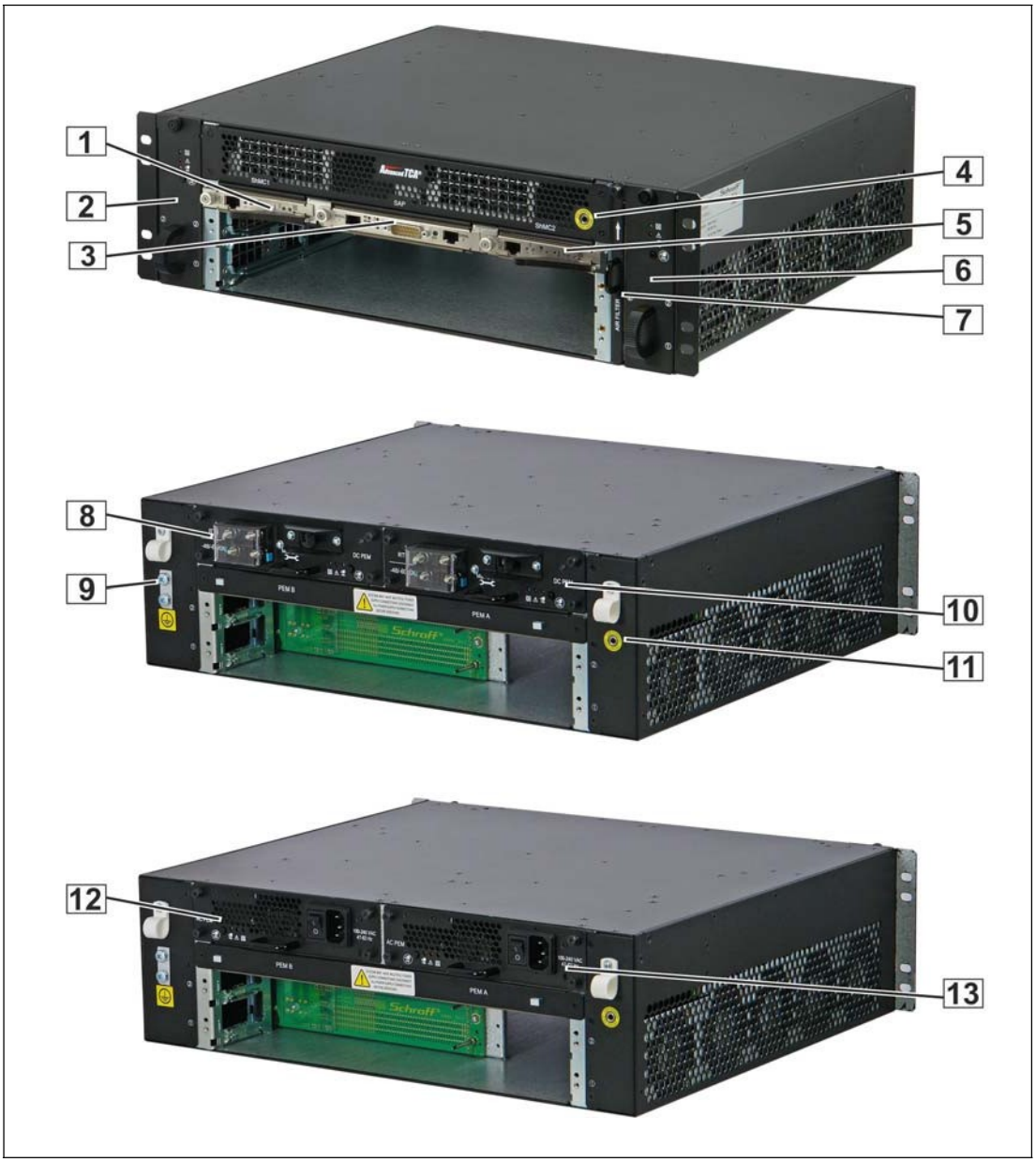
The Shelf is 3 U high and 19“ rack mountable. The chassis is designed for easy access of any Field Replaceable Units (FRU).

- 2 slot ATCA Backplane with 15 x interconnected Fabric Interface, Base Interface in HUB/HUB or NODE/NODE configuration, bused IPMB interface, supporting two 8U ATCA hub boards or node boards (depending on chassis/backplane type)
- Mounting brackets for 19“ racks
- ESD Wrist Strap Terminals at front and rear
- Two dedicated slots for a Shelf Manager based on Pigeon Point ShMM-700
- One dedicated slot for a Schroff Shelf Alarm Panel (SAP) that provides Telco Alarm inter- face, Alarm Status LEDs and serial interface for the Shelf Manager
- Two Front pluggable Fan Trays with 5 high speed fans per tray
- Removable air filter that meets the requirements of the Telcordia GR-78-CORE specifica- tion.
- Two rear pluggable AC- or DC-Power Entry Modules, the same interface in the subrack for AC PEM and DC PEM.
- Front pluggable air inlet filter

LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

2 Shelf Front and Rear View

Figure 1: Shelf Front View



1	Shelf Manager 1	8	DC PEM B
2	Fan Tray 1	9	Shelf Ground Terminal
3	Shelf Alarm Panel (SAP)	10	DC PEM A
4	ESD Wrist Strap Terminal	11	ESD Wrist Strap Terminal
5	Shelf Manager 2	12	AC PEM B
6	Fan Tray 2	13	AC PEM A
7	Air Filter		

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

3 ATCA Backplane

The 2-slot ATCA monolithic Backplane is completely passive and is not a field replaceable unit. The backplane provides 40Gb/s connectivity (4 lanes with 10Gb/s) and 2 ATCA slots in a:

- **Hub/Hub** configuration or
- **Node/Node** configuration

3.1 Logical to Physical Slot Mapping

The physical and logical slots are sequentially numbered from the lower to the upper slot.

Table 2: 2-Slot ATCA Backplane physical to logical slot mapping

Physical Slot #	Logical Slot #	HW-Address (Hex)	IPMB-Address (Hex)	Update Channel
2	2	42	84	
1	1	41	82	

3.2 Interfaces

3.2.1 Fabric Interface

All 15 Fabric Channels of slot 1 are routed to the respective Fabric Channels of slot 2.

3.2.2 Synchronization Clock Interface

6 pairs of synchronization clocks are bused between both ATCA slots and terminated at both ends.

3.2.3 Update Channel Interface

The Update Channels are wired between both ATCA slots. The Update Channel can be used to pass data or routing information between two redundant ATCA Boards.

3.2.4 Intelligent Platform Management Interface

The Shelf uses an Intelligent Platform Management Bus (IPMB) for management communications among all ATCA Boards. 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.

The IPMB-A and IPMB-B are routed between the ATCA slots.

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

3.2.5 Base Interface

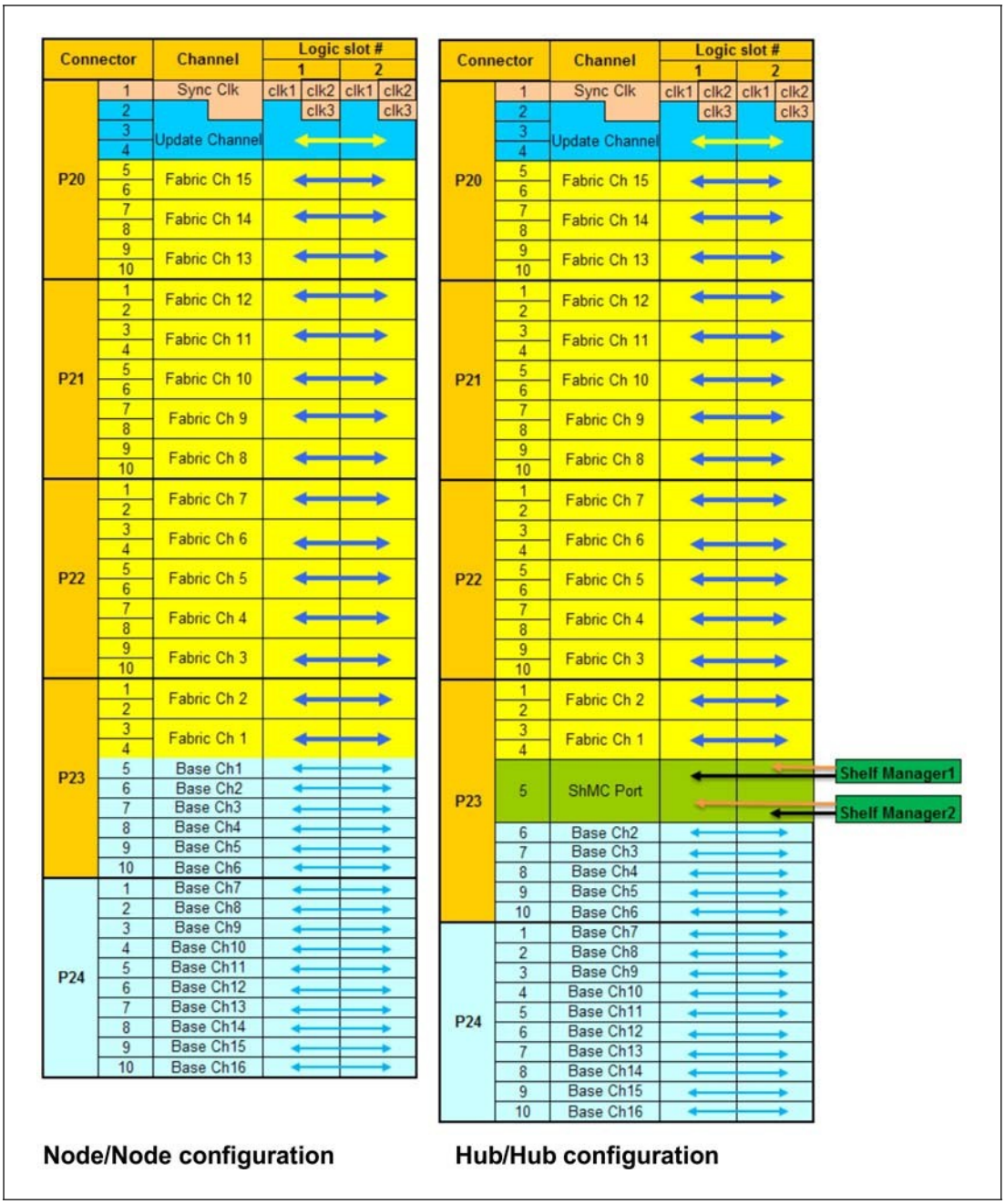
Node/Node configuration

All 16 Base Channels of slot 1 are routed to the respective Base Channels of slot 2.

Hub/Hub configuration

All Base Channels 2 - 16 of slot 1 are routed to the respective Base Channels of slot 2. Base Channel 1 (ShMC) of slot 1 and 2 is cross connected to both dedicated Shelf Manager slots.

Figure 2: Backplane Topology



Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

3.3 Shelf FRU SEEPROM

2 Shelf FRU SEEPROMS are located on the Backplane. The hardware address for these SEEPROMs is 0xA4.
The SEEPROMs are the repository of the shelf specific information capabilities of the system and other user configurable options. The SEEPROMs contain the 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, serial number of the shelf, backplane topology, etc. The Shelf Manager uses this information to provide functions such as electronic keying, controlling the power state of the system, etc.

The Shelf allows for 2 methods to access the chassis FRU data:

- An I2C connection from each Shelf Manager directly to the SEEPROMs on the backplane.
- SEEPROMs on the backplane exposed as a FRU of the Fan Tray.

3.4 Logic Ground

Figure 3: Logic Ground



The ATCA backplane provides a mechanism to connect Logic Ground and Shelf Ground. The backplane fixing screw (arrow) is isolated by a plastic washer. To connect Logic Ground and Shelf Ground remove the screw, remove the plastic washer and re-install the screw.

The default factory assembly isolates Logic Ground from Shelf Ground.

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

4 Air Filter

Figure 4: Air Filter



1 Air Filter 2 Filter Element

4.1 Introduction

The ATCA Shelf provides a front replaceable air filter. The filter element is an open cell polyurethane foam specially coated to provide improved fire retardation and fungi resistance. It features deep loading, large dust holding capacity, low air resistance, and complies with NEBS-GR-63-CORE.

There is a switch to detect whether an air filter is installed. This switch is exposed to the Shelf manager as a presence sensor on the Fan Tray.

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

5 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 (M5) with a 16 mm spacing between thread centers to connect a double-lug Shelf ground terminal cable.

Figure 5: Shelf Ground Terminal



12713815

Please note, that in a typical telecom environment, the VRTN path of the -48V supply is grounded to Protective Earth (PE) of the building.

5.1 Specification for the Shelf Ground connection cable

Required wire size: AWG8

Required terminals: Use only double lug terminals (Terminal Used: PANDUIT part no. LCD8- 14A-L).

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

6 Fan Trays

The 2 Slot ATCA Shelf contains two interchangeable Fan Trays arranged in a side to side configuration for maximum air flow. The Fan Trays are intelligent FRUs and plugged-in at the left and right front of the Shelf.

Each Fan Tray contains five 60 mm fans (110 m³/h (64 CFM) each). The Fan Tray is controlled via an on-board IPM controller.

Figure 6: Fan Tray



1	Green Fan Tray OK LED	4	Hot Swap push button
2	Red Fan Tray Alarm LED	5	DIP Switch
3	Blue Hot Swap LED		

LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

6.1 IPM Controller and Fan Control

The on-board IPM controller is located on the Fan Tray and has 2 operation modes:

1. Shelf Manager Mode

As soon as a Shelf Manager is plugged-in and becomes active, the IPM controller switches automatically into the Shelf Manager mode. The Shelf Manager performs management of the Fan Tray through the two independent bussed IPMB connections.

When the Fan Tray is first inserted into the system, the fans start at full speed and then decrease to specified speed by Shelf Manager. The circuitry on-board the Fan Tray uses a PWM signal to control the speed of all the fans. Lower speeds reduce acoustic noise and power consumption and increase the lifetime of the fans.

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 increased to full speed. The Fan Tray has sufficient cooling capacity to keep the Shelf cooled with a single fan failure.

2. Autonomous Mode

When no Shelf Manager is present, the Fans are controlled by the IPM controller. The fan speed depends on the setting of DIP switch on the controller board. With a Micro DIP switch you can select either the exhaust temperature from the left Fan Tray as reference to control the fan speed or fixed fan speed.

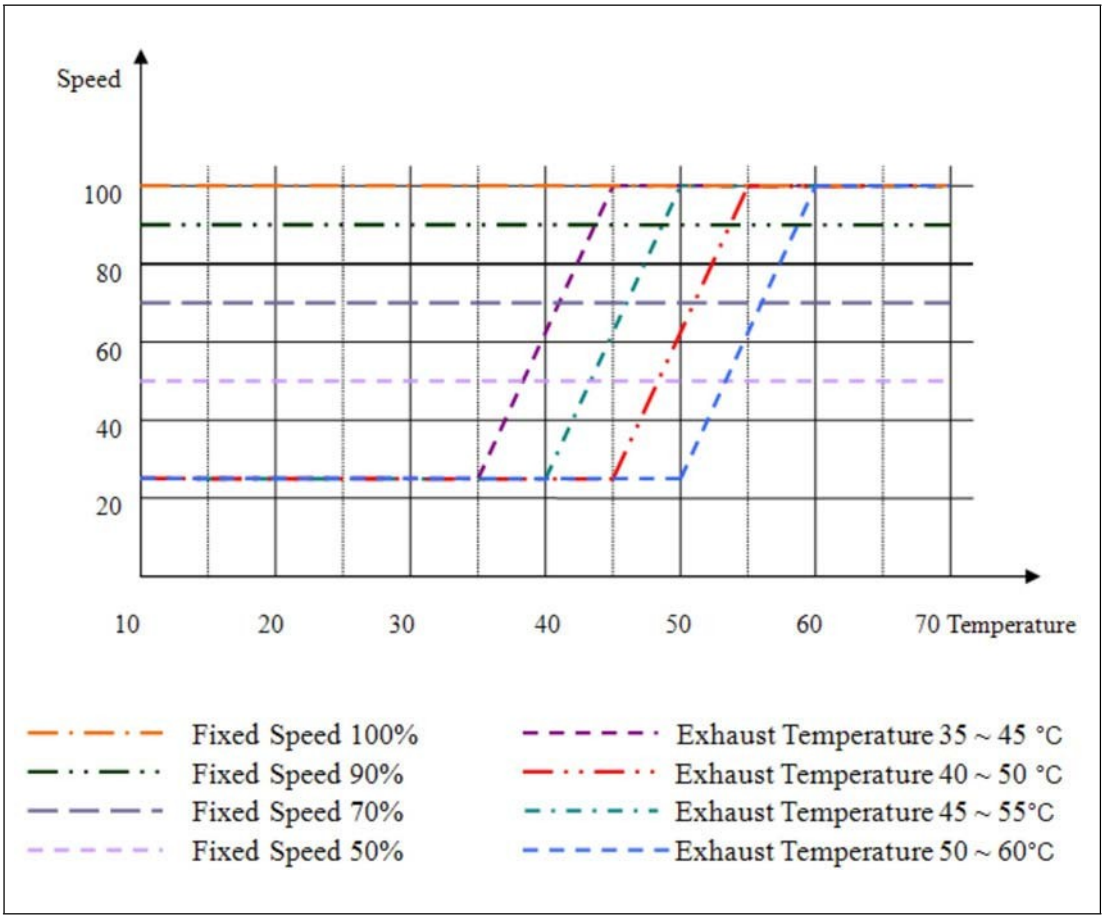
Table 3: Micro DIP switch settings

Bit 1	Bit 2	Bit 3	Description
0	0	0	Fixed Speed, 50% of Full Speed
0	0	1	Fixed Speed, 70% of Full Speed
0	1	0	Fixed Speed, 90% of Full Speed
0	1	1	Fixed Speed, 100% of Full Speed
1	0	0	Exhaust Temperature 35 ~ 45 °C
1	0	1	Exhaust Temperature 40 ~ 50 °C
1	1	0	Exhaust Temperature 45 ~ 55 °C
1	1	1	Exhaust Temperature 50 ~60 °C

The default setting is 50% of full speed.

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

Figure 7: Fan Control curves



6.2 Fan Tray Indicators

The front panel includes a green and red status 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 4: LEDs on Fan Tray front panel

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

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

6.3 Fan Tray Signals

The Fan Tray provides signals for:

- Voltage monitoring
- Status of the Hot Swap Controller
- Fan Speed
- Temperature

These signals are controlled by the IPM Controller on the PCB. The Shelf Manager has access to these signals via IPMB.

6.4 Fan Tray Connector Pin Assignment

Pin#	Signal	Description	Pin#	Signal	Description
A1	-48V_A	-48VDC Feed A	D1	VRTN_A	RTN Feed A
A2	-48V_A	-48VDC Feed A	D2	VRTN_A	RTN Feed A
A3			D3		
A4	I2C_B CONTROL	I2C B Line Busy Signal	D4	PEM_PRESENT_R	Presence Signal of Right PEM
A5	SCL_A	IPMB A Clock	D5	GND	Fan Tray Presence,connected to GND
A6	SDA_A	IPMB A Data	D6	FAN_PRSENT	Presence Signal of Fan Tray
A7	SCL_B	IPMB BClock	D7	I2C_SCL_A	I2C A Clock
A8	SDA_B	IPMB B Data	D8	I2C_A CONTROL	I2C A Line Busy Signal
A9			D9		
A10	VRTN_B	RTNFeed B	D10	-48V_B	-48VDC Feed B
A11	VRTN_B	RTNFeed B	D11	-48V_B	-48VDC Feed B
B1	-48V_A	-48VDCFeed A	E1	VRTN_A	RTNFeed A
B2	-48V_A	-48VDCFeed A	E2	VRTN_A	RTNFeed A
B3			E3		
B4	H2		E4	SHELF_PRESENT	Presence Signal of Shelf Manager
B5	GND	Logic Ground	E5	I2C_SCL_B	I2C B Clock
B6	INT_I2C_A	Interrupt Signal of I2C A Line	E6	I2C_SDA_B	I2C B Data
B7	GND	Logic Ground	E7	+3.6V	
B8	INT_I2C_B	Interrupt Signal of I2C B Line	E8	I2C_SDA_A	I2C A Data
B9			E9		
B10	VRTN_B	RTNFeed B	E10	-48V_B	-48VDC Feed B
B11	VRTN_B	RTNFeed B	E11	-48V_B	-48VDC Feed B
C1					
C2					
C3					
C4					
C5					
C6					
C7					
C8					
C9					
C10					
C11					

LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

6.5 Fan Tray IPMB Addresses

Geographic address pins H2 at the Fan Tray Backplane connector determine the hardware addresses of the devices.

Table 5: Fan Tray IPMB Addresses

	HW-Addr.	IPMB Addr.
Fan Tray 1 (left)	0x2E	0x5C
Fan Tray 2 (right)	0x2D	0x5A

6.6 Front Board Air Distribution

The airflow is measured with impedance boards acc. to the PICMG 3.0 R3.0

specification. Front board pressure drop: 37 Pa at 0,85 m³/min

Figure 8: Front Board Air Distribution

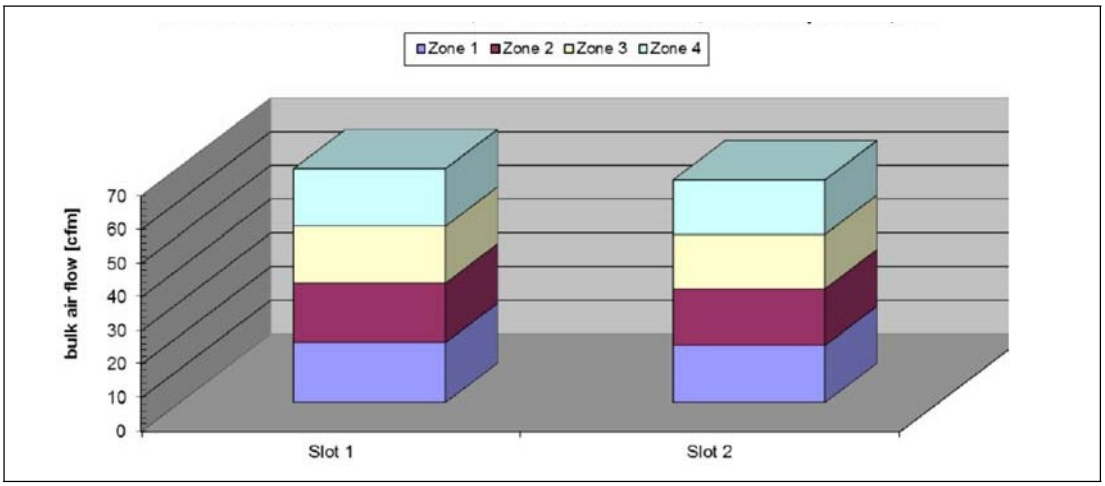


Table 6: Front Air Flow

	Zone 1 [CFM]	Zone 2 [CFM]	Zone 3 [CFM]	Zone 4 [CFM]	∑ [CFM]
Slot 1	17,9 (30,5 m³/h)	17,7 (30,1 m³/h)	16,8 (28,5 m³/h)	17,1 (29,0 m³/h)	69,4 (30,5 m³/h)
Slot 2	17,0 (28,9 m³/h)	16,8 (28,5 m³/h)	16,1 (27,4 m³/h)	16,1 (27,4 m³/h)	66,1 (28,9 m³/h)
∑	34,9 (59,3 m³/h)	34,5 (58,6 m³/h)	32,9 (59,9 m³/h)	33,2 (58,4 m³/h)	135,5 (230 m³/h)

LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

6.7 Rear Board Air Distribution

The airflow is measured with impedance boards acc. to the PICMG 3.0 R3.0 specification. Rear board pressure drop: 24 Pa at 0,14 m³/min

Figure 9: Rear Board Air Distribution

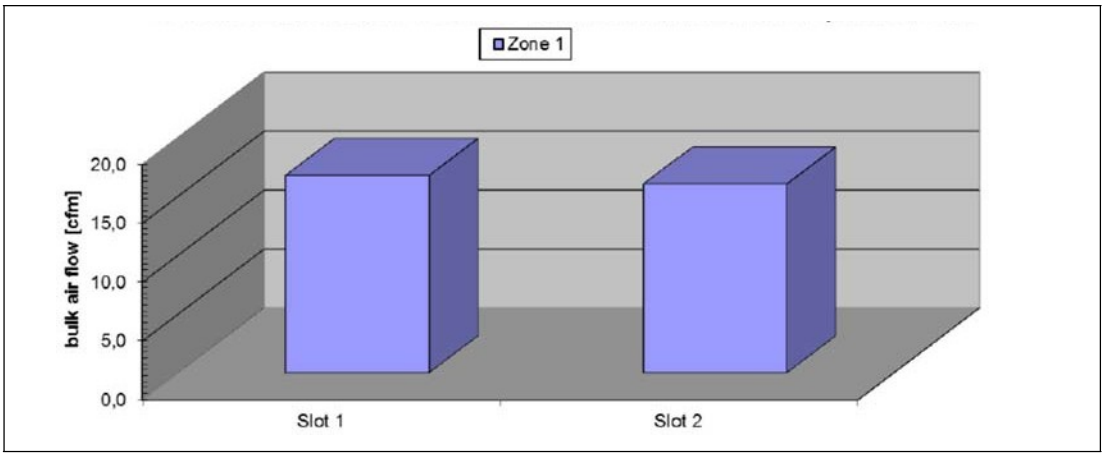


Table 7: Rear Air Flow

	[CFM]
Slot 1	16,7 (28,4 m³/h)
Slot 2	16,0 (27,2 m³/h)
∑	32,7 (55,6 m³/h)

LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

7 Power

Hazardous voltage!

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

The shelf supports AC- and DC-Power Entry Modules (PEMs). Both PEMs have the same interface to the shelf.

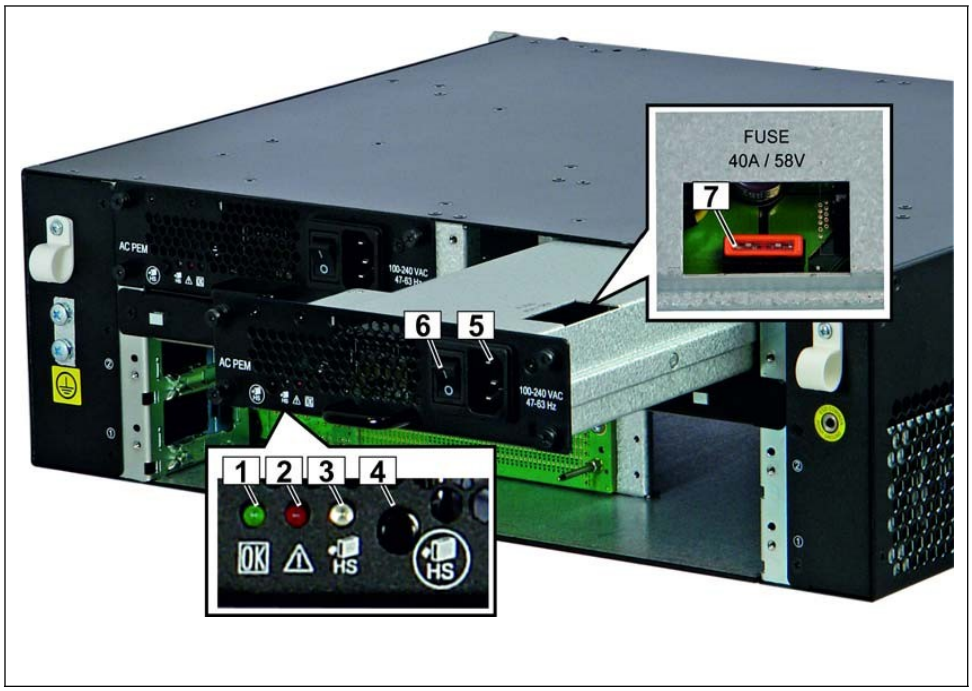
The AC-PEM can be powered with 230 VAC line voltage. The specified voltage range is from 180 VAC to 265 VAC .The Shelf supports redundant power inputs but the two in- puts should be independently powered.

The DC-PEM can be powered using a regular telecommunication power supply of -48/-60 VDC with a VDC return. The specified voltage range is from -40.5 VDC to -72 VDC. The Shelf supports redundant power inputs but the two inputs should be in- dependently powered.

7.1 AC PEM

Two pluggable redundant AC Power Entry Modules (PEM) are located at the rear top side of the Shelf. The power input is provided by an AC mains/line module with IEC 320-C14 connector and mains switch. The output voltage of the AC PEM is 48 VDC. Overcurrent protection is provided by a 40 A fuse in the output branch.

Figure 10: AC PEM



1 Green Fan Tray OK LED
2 Red Fan Tray Alarm LED
3 Blue Hot Swap LED
4 Hot Swap push button
5 IEC 320-C14 connector
6 Mains switch
7 Fuse

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

7.1.1 AC PEM Power Distribution

Power distribution within the Shelf originates from each AC PEM and powers all the blades, the Shelf Managers, the Fan Trays and the SAP. For maximum fault tolerance, the two AC PEMs should be independently powered by a separate Feed A and Feed B.

A single AC PEM is capable of supplying the 450 watts of power to each blade slot and the necessary power for the PEMs, Fan Trays, and Shelf Managers.

If two AC PEMs are in service, each AC PEM is hot-swappable after removing the power cables from the AC PEM.

Figure 11: Power Distribution

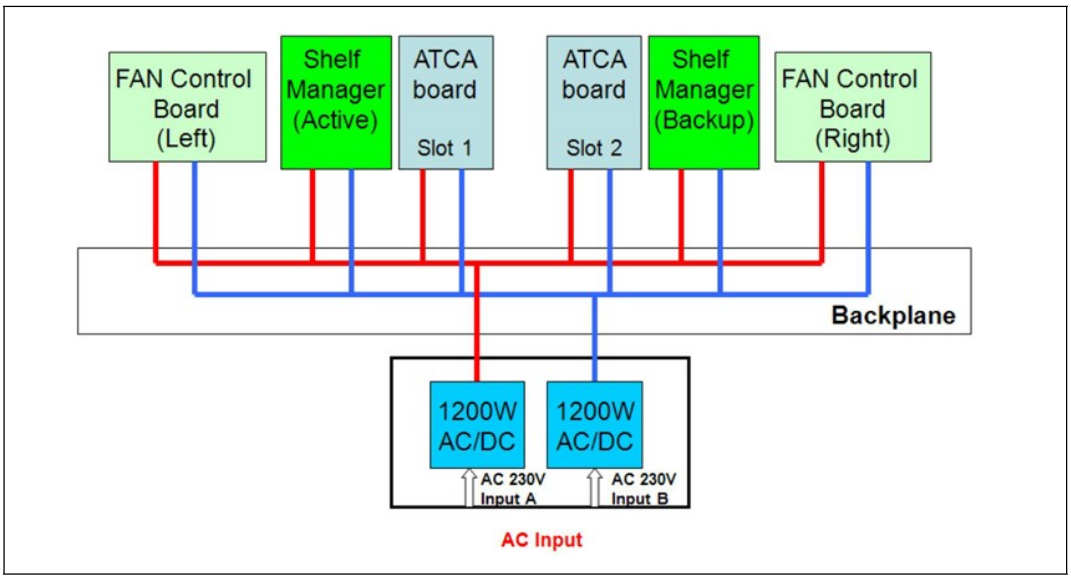


Table 8: Basic Specifications for the PSUs

230 V Operation	
Input Voltage nominal	230 VAC
Input Voltage Range max.	180 VAC - 265 VAC
Input Frequency Range	47 Hz - 63 Hz
Output Voltage	48 VDC
Output Current	25 A
Output Power	1200 W with 48 VDC Output Voltage
115 V Operation	
Input Voltage nominal	115 VAC
Input Voltage Range max.	90 VAC - 180 VAC
Input Frequency Range	47 Hz - 63 Hz
Output Voltage	48 VDC
Output Current	20,8 A
Output Power	1000 W with 48 VDC Output Voltage

See GE Energy Power CAR1248 Data Sheet for detailed information.

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

7.1.2 AC PEM Signals

The AC PEM provides signals for:

- PSU output Voltage monitoring
- PSU output Current monitoring (Min.100W loading for each AC PSU)
- Fuse Monitoring
- Status of the Hot Swap Controller
- Temperature

The I2C devices on the PSU and AC PEM board are connected to Master-Only I2C-bus of the Fan controller board. The Shelf Manager has access to these signals via IPM-Bus of the Fan Tray.

7.1.3 AC PEM Indicators

The front panel includes a green and red status LED and a blue hot-swap LED.

Table 9: LEDs on AC PEM

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

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

7.1.4 AC PEM Connector PIN Assignment

Pin#	Signal	Description	Pin#	Signal	Description
P1A1	VRTN	RTN	P1C1	VRTN	RTN
P1A2	VRTN	RTN	P1C2	VRTN	RTN
A1			C1		
A2	+3.3V		C2		
A3	SCL	I2CClock	C3		
A4	SDA	I2CData	C4		
A5			C5	GND	LogicGround
A6			C6		
P2A1	-48V	-48VDC	P2C1	-48V	-48VDC
P2A2	-48V	-48VDC	P2C2	-48V	-48VDC
P1B1	VRTN	RTN	P1D1	VRTN	RTN
P1B2	VRTN	RTN	P1D2	VRTN	RTN
B1			D1		
B2	+3.3V		D2	H1	
B3			D3		
B4	GND	PEMPresence,connected to GND	D4		
B5	GND	LogicGround	D5	GND	LogicGround
B6			D6		
P2B1	-48V	-48VDC	P2D1	-48V	-48VDC
P2B2	-48V	-48VDC	P2D2	-48V	-48VDC

7.2 DC PEM

Two pluggable redundant DC Power Entry Modules (PEM) are located at the rear top side of the Shelf. Each PEM provides power terminals for 35A power feed. Each power feed consists of a –48 VDC cable and its corresponding return cable. The feed is protected by a 35 A fused switch.

The power filtering consists of filtered power terminals and a discrete line-filter for each power branch. The input voltage range for the Shelf is from -40VDC to -72VDC.In each power feed, voltage measurement is implemented, by means of a dedicated voltage monitor device.

The PEM (together with all shelf related FRUs) are protected against wrong polarity up to +57 VDC, but it does not block wrong polarity voltage being applied to shelf related FRUs and to Zone 1 power wiring of payload slots.

Suppressor diodes are included in the feed chain that provide protection against a K.20 pulse of 500 V being applied to its input (K.20 surge pulse, "Basic level", Table 7, pulse type 7.3, 500 V applied to -48 V and RTN branches at the same time against shelf ground) so that PEM itself and other shelf related FRUs can sustain this level of pulse.

LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

Figure 12: DC PEM



1 Green Fan Tray OK LED
2 Red Fan Tray Alarm LED
3 Blue Hot Swap LED
4 Hot Swap push button
5 RTN Input
6 -48 V Input
7 Fused switch

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

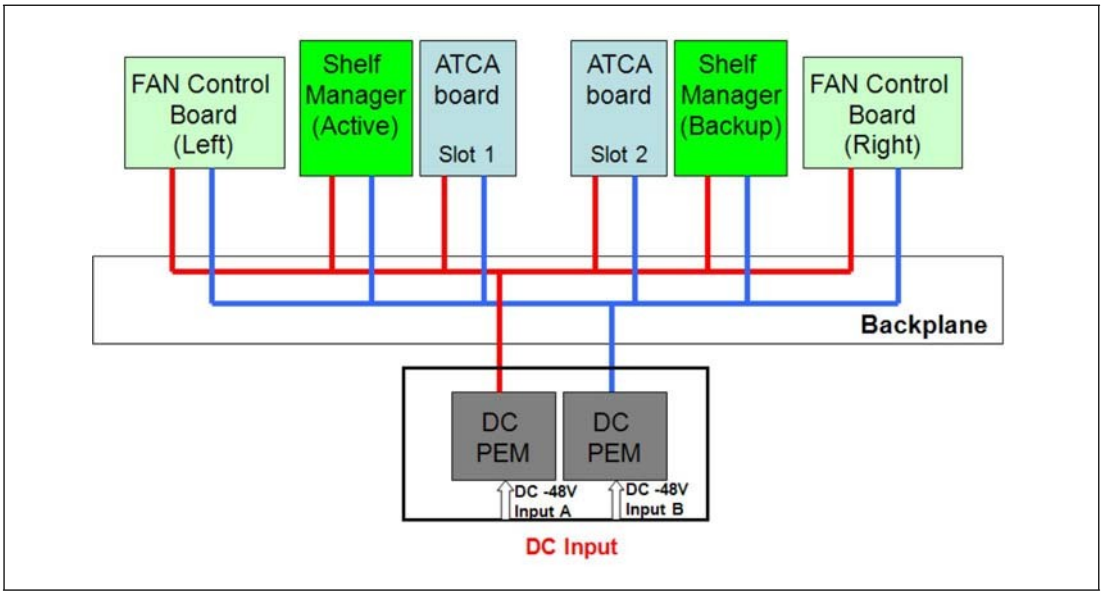
7.2.1 DC PEM Power Distribution

Power distribution within the Shelf originates from each DC PEM and powers all the blades, the Shelf Managers, the Fan Trays and the SAP. For maximum fault tolerance, the two DC PEMs should be independently powered by a separate Feed A and Feed B.

A single DC PEM is capable of supplying the 450 watts of power to each blade slot and the necessary power for the PEMs, Fan Trays, and Shelf Managers.

If two DC PEMs are in service, each DC PEM is hot-swappable after removing the power input cables from the DC PEM.

Figure 13: Power Distribution



7.2.2 DC PEM Signals

The DC PEM provides signals for:

- Voltage monitoring
- Current monitoring
- Fuse Monitoring
- Status of the Hot Swap Controller
- Temperature

The I2C devices on the DC PEM board are connected to Master-Only I2C-bus of the Fan controller board. The Shelf Manager has access to these signals via IPM-Bus of the Fan Tray.

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

7.2.3 DC PEM Indicators

The front panel includes a green and red status LED and a blue hot-swap LED.

Table 10: LEDs on DC PEM

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

7.2.4 DC PEM Connector PIN Assignment

Pin#	Signal	Description	Pin#	Signal	Description
P1A1	VRTN	RTN	P1C1	VRTN	RTN
P1A2	VRTN	RTN	P1C2	VRTN	RTN
A1			C1		
A2	+3.3V		C2		
A3	SCL	I2CClock	C3		
A4	SDA	I2CData	C4		
A5			C5	GND	LogicGround
A6			C6		
P2A1	-48V	-48VDC	P2C1	-48V	-48VDC
P2A2	-48V	-48VDC	P2C2	-48V	-48VDC
P1B1	VRTN	RTN	P1D1	VRTN	RTN
P1B2	VRTN	RTN	P1D2	VRTN	RTN
B1			D1		
B2	+3.3V		D2	H1	
B3			D3		
B4	GND	PEMPresence,connected to GND	D4		
B5	GND	LogicGround	D5	GND	LogicGround
B6			D6		
P2B1	-48V	-48VDC	P2D1	-48V	-48VDC
P2B2	-48V	-48VDC	P2D2	-48V	-48VDC

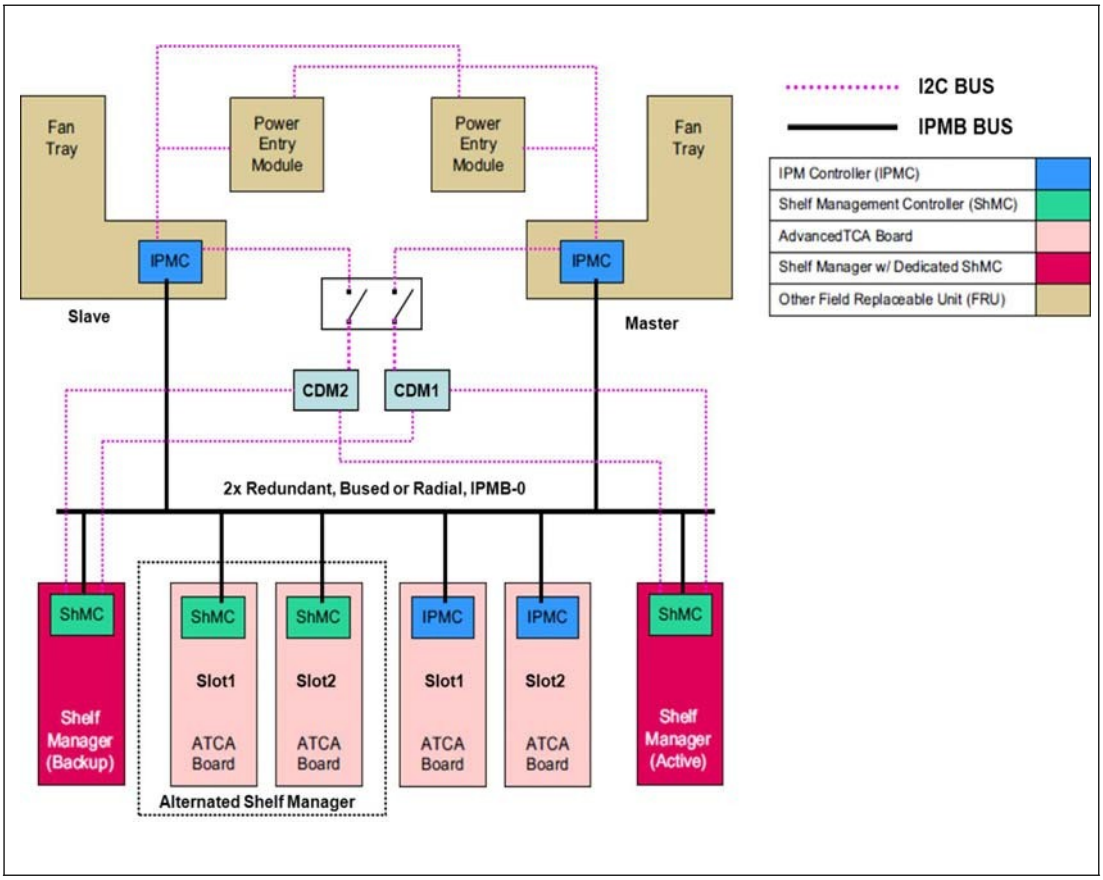
LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

8 Shelf Management

The ATCA Shelves are designed to work with two redundant Shelf Managers in dedicated Shelf Manager slots.

Upon request is also a version with on-blade shelf management available. With on-blade shelf management, the I²C components of the PEMs and the SEEPROM are connected to the internal I²C bus on the Fan Trays. The on-blade Shelf Manager has access to these components via the IPM controller of the Fan Trays.

Figure 14: Shelf Management



Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

8.1 Shelf Managers

This Chapter describes the Shelf Manager hardware. For explicit software documentation see:

- Pigeon Point Shelf Manager User Guide
- Pigeon Point Shelf Manager External Interface Reference

8.2 Introduction

The Shelf Manager is a 78 mm x 280 mm board that fits into a dedicated Shelf Manager slot in a ATCA Shelf.

The Shelf Manager has two main responsibilities:

1 Manage/track the FRU population and common infrastructure of a Shelf, especially the power, cooling and interconnect resources and their usage.

2 Enable the overall System Manager to join in that management/tracking through the System Manager Interface, which is typically implemented over Ethernet.

The Shelf management is based on the Pigeon Point Shelf management solution for AdvancedTCA products. The Shelf management software executes on the Pigeon Point **Sh**elf **M**anagement **M**ezzanine 700 (**ShMM-700**), a compact SO-DIMM form-factor module, installed on the carrier board.

The carrier board includes several on-board devices that enable different aspects of Shelf management based on the ShMM-500. These facilities include I²C-based hardware monitoring/control and GPIO expander devices.

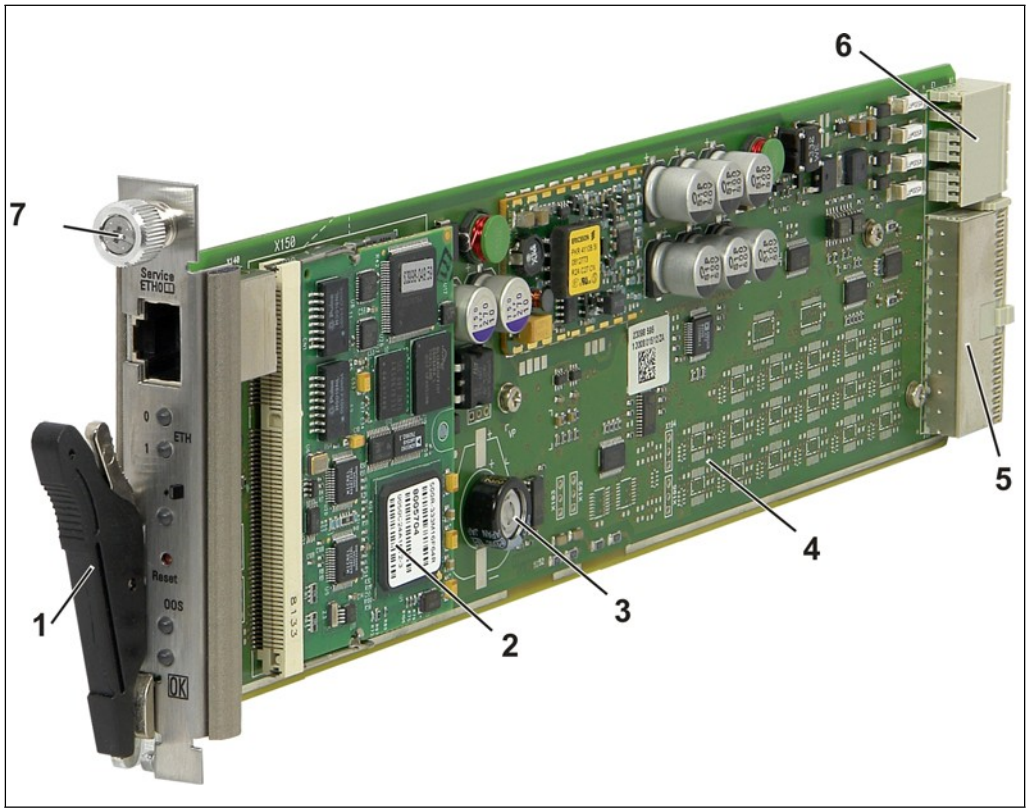
The Shelf Manager provides the Fan Controller for up to 9 fans and individual Ethernet connections to both Base Hubs (ShMC cross connect).

The Shelf Manager also provides an IPMB interface for the non-intelligent FRUs in a Shelf. The Shelf Manager communicates with the non-intelligent FRUs over I²C busses and expose the sensors for these FRUs at IPMB address 0x20.

To maximize availability, the ATCA Shelves are designed to work with two redundant ShMM-Shelf Managers.

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

Figure 15: Shelf Manager Front Panel Components

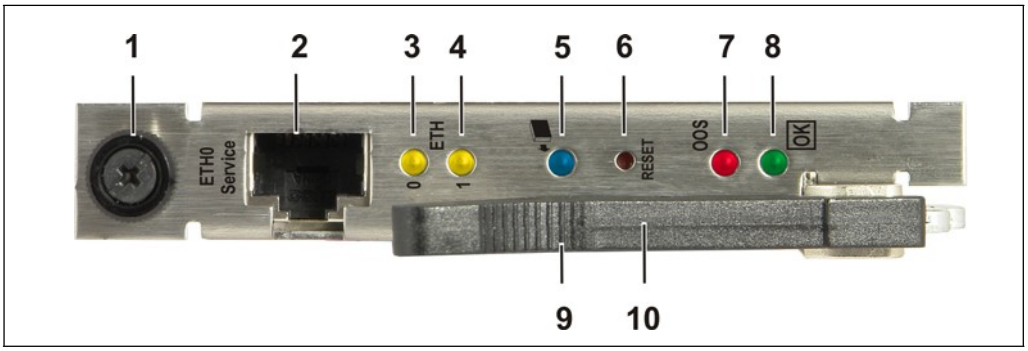


1	Extraction handle	5	Backplane Connector (J2)
2	ShMM-700	6	Backplane Connector (J1)
3	RTC Backup Capacitor	7	Fixing screw
4	Carrier Board		

LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

8.3 Front Panel Components

Figure 16: Shelf Manager Front Panel Components



1	Fixing screw	6	RESET push button
2	ETH 0 Ethernet Service Connector (RJ45)	7	Shelf Manager Status LED (red) - Red = Out of Service (OOS)
3	ETH 0 Link/Activity LED (yellow) - On = Link - Off = No Link - Blinking = Activity	8	Shelf Manager Status LED (green) - Solid Green = in Service, active Shelf Manager - Blinking = in Service, Backup Shelf Manager
4	ETH 1 Link/Activity LED (yellow) - On = Link - Off = No Link - Blinking = Activity	9	Hot Swap Switch - Activated by extraction handle
5	Hot Swap LED (blue) - Solid Blue = ready to remove - Blinking = Hot Swap is requested - Off = No Hot Swap possible	10	Extraction handle

8.4 Hardware Address

The Shelf Manager reads the hardware address and parity bit from the backplane connector of the Dedicated Shelf Manager slot. Geographic address pins (HA[0], HA7) at the Backplane connector determine bit 0 and bit 7, bit 1...6 are hardware-coded on the Shelf Manager PCB.

	HW-Addr.	IPMB-Addr.
Primary Shelf Manager (left)	0x08	0x10
Secondary Shelf Manager (right)	0x09	0x12

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

9 Technical Data

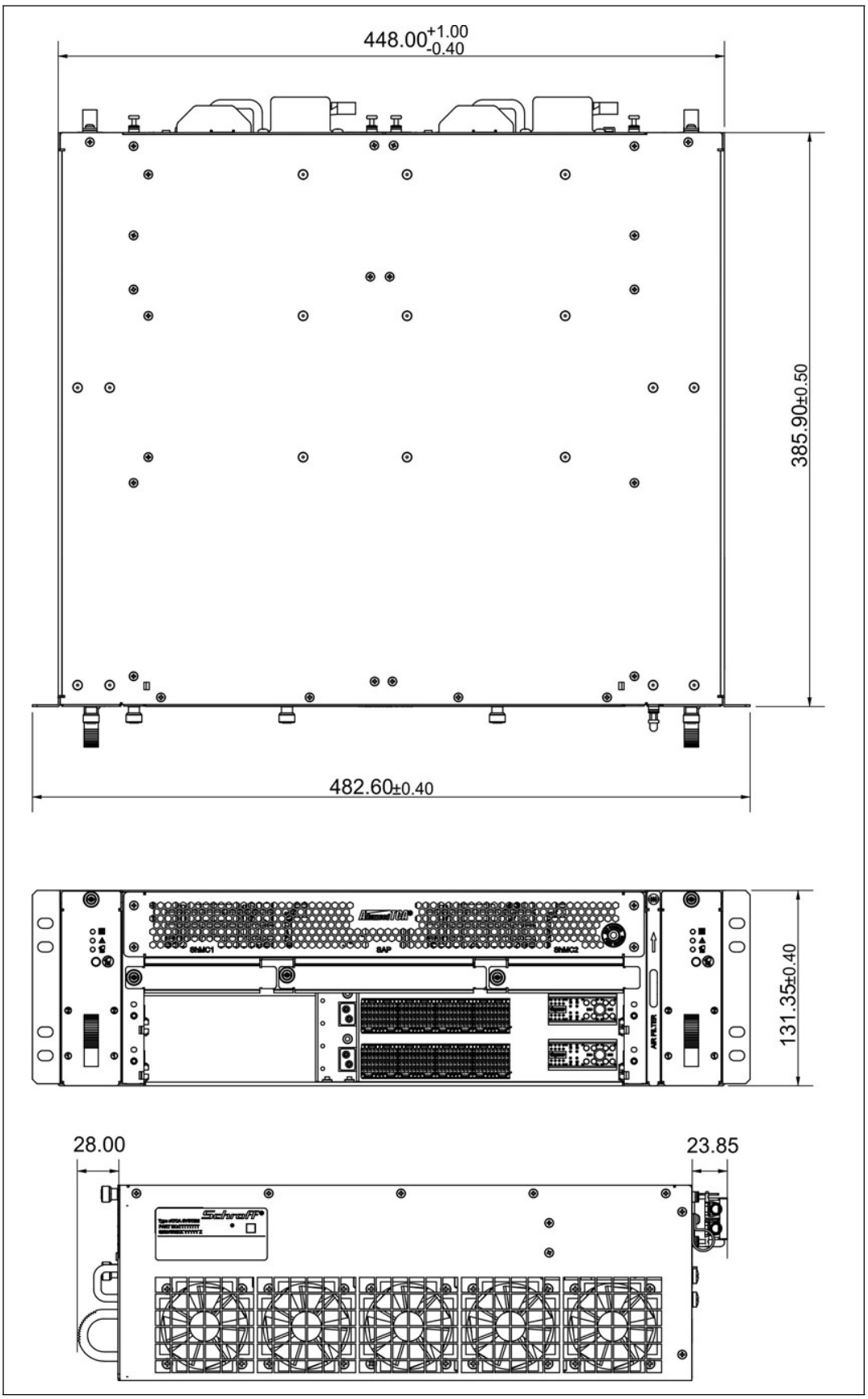
Table 11: Technical Data

Physical Dimensions	
Height	3 U
Width	482,6 mm
Depth (with handles)	384,7 mm
Power AC	
Input voltage nom.	115 VAC/230 VAC
Input voltage range	90....140 VAC / 170…. 264 VAC
Input Power	10 A per PEM
Overcurrent Protection	40 A fuses for each branch
Power DC	
Input voltage nom.	-48 VDC
Input voltage range	40,5 ... 72 VDC
Input Power Protection	35 A
Cooling Capacity	
Front Boards	400 W / Board
RTM	50 W / Board
Environmental	
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
EMI	
Conducted Emissions	EN 55022 Class A
Radiated Emissions	EN 55022 Class A
Safety	
Protected Earth Test	EN50514, test current 25 A, resistance <100 mOhm
Hipot Test (AC system)	EN50116 Mains Input primary - PE: 2200 V_{DC} -48 V/RTN - PE: 700 V_{DC}
Hipot Test (DC system)	EN60950-1 1000 V_{DC}

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

9.1 Shelf Dimensions

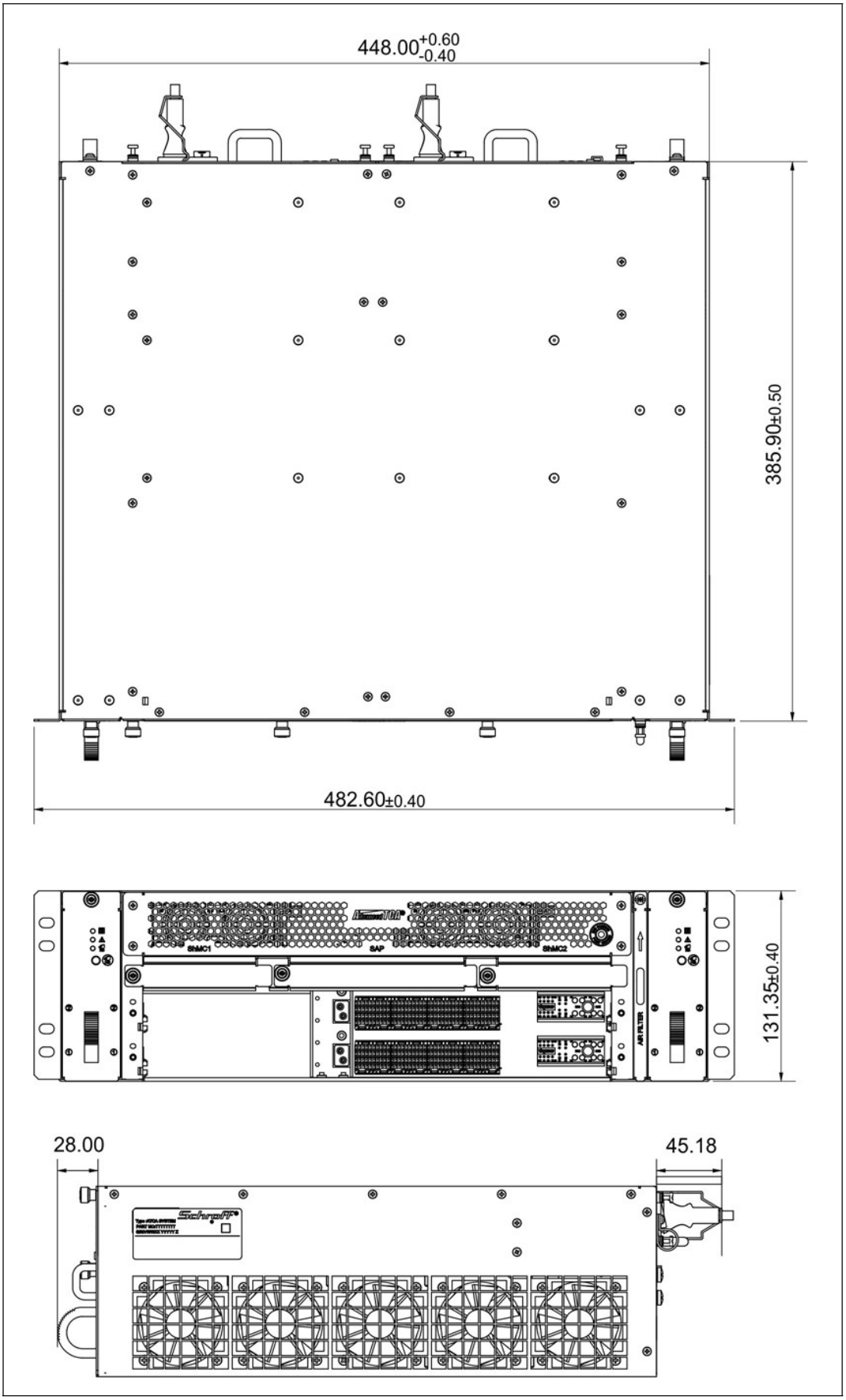
Figure 17: DC-System



Dimensions in mm

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

Figure 18: AC-System



Dimensions in mm

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

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

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

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

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

Please visit the Contact page at www.adlinktech.com for information on how to contact the ADLINK regional office nearest you.

LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000