Schroff®
µTCA™

# MicroTCA System 4 slot

## User's Manual

**Product No.**

**21850-045**
**21850-046**
**21850-081**

Doc-No: 63972-272_R1.0

May 06, 2009

Pentair
Technical Products

| Rev. | Date updated | Change |
|---|---|---|
| R1.0 | May 06, 2009 | Initial Release |
| | | |

Impressum:

Schroff GmbH

D-75334 Straubenhardt, Germany

The details in this manual have been carefully compiled and checked - supported by certified Quality Management System to EN ISO 9001/2000

The company cannot accept any liability for errors or misprints. The company reserves the right to amendments of technical specifications due to further development and improvement of products.

# Table of Contents

**1 Safety ..... 3**
1.1 Intended Application ..... 3
1.2 Safety Symbols used in this document ..... 4
1.3 General Safety Precautions ..... 4
1.4 References and Architecture Specifications ..... 4
**2 Hardware Platform ..... 5**
2.1 Front and Rear Views ..... 6
**3 Backplane 23005-435 ..... 7**
3.1 Backplane Front View ..... 7
3.2 Backplane Topology ..... 8
3.3 Fabric Interface ..... 9
3.3.1 Common Options ..... 9
3.3.2 Fat Pipe ..... 9
3.4 Synchronization Clock Interface ..... 9
3.5 Intelligent Platform Management Bus (IPMB) ..... 9
3.5.1 IPMB-L ..... 9
3.6 Carrier FRU SEEPROM ..... 9
3.7 Carrier Number ..... 10
3.7.1 Electronic DIP Switch (Default setting) ..... 10
3.7.2 Mechanical DIP Switch ..... 11
3.8 Power Management ..... 12
3.8.1 Power Management Board (PMB) ..... 13
**4 Power Supply ..... 14**
**5 Thermals ..... 15**
**6 Technical Data ..... 16**
6.1 Mechanical Dimensions ..... 17

# 1 Safety

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

## 1.1 Intended Application

The MicroTCA System, described in this manual, is intended as a platform for a microcomputer system based on the MicroTCA Standard.
The MicroTCA System is designed for protection class IP 20 and can be used only in the resp. environments.

The MicroTCA Systems are not finished products, so there is no valid approval for these units. In order to enable stand-alone functionality, additional elements are required. An operational system is achieved only by way of appropriate AMC Modules.
The completion and final testing of the units have been carried out, or at least supervised, by qualified technicians. These instructions are directed exclusively to these qualified technicians i.e.engineers, trained and qualified electricians etc.

Make sure that:

- the assembled unit complies with the safety regulations currently applicable in the country it is going to be used.
- the overall unit complies with all other regulations and specifications at the place and country of use, e.g. interference limits, approval by the telecommunications authorities.

## 1.2 Safety Symbols used in this document

| | |
|---|---|
|  | **Hazardous voltage!**<br>*This is the electrical hazard symbol. It indicates that there are dangerous voltages inside the System.* |
|  | **Caution!**<br>*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!**<br>*The System contains static sensitive devices. To prevent static damage you must wear an ESD wrist strap.* |

## 1.3 General Safety Precautions

| | |
|---|---|
|  | **Warning!**<br>*Voltages over 60 VDC can be present in this equipment. 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 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 MicroTCA Specification (*www.picmg.com*).

## 1.4 References and Architecture Specifications

- PICMG® MicroTCA® Base Specification (*www.picmg.com*)
- PICMG® AMC® Base Specification (*www.picmg.com*)

# 2 Hardware Platform

- Compliant to PICMG MicroTCA Base specification
- RatiopacPro case (21850-045/-081)
- Subrack with wall mount provisions (21850-046)
- MicroTCA Backplane with radial IPMI from MCH Slot1# to all AMC slots, supporting:
  - 1 MCH Single Full-size slot
  - 1 AMC Single Full-size slot for a CPU Board
  - 2 AMC Single Full-size slots for HDD or PCIe Boards
  - 1 AMC Single Full-size slot for a HDD or CPU or PCIe Board
  - Onboard power management for all AMC slots
- Power management board on the backplane for PM emulation (21850-046/-081)
- Active cooling through 12 V fans.

  21850-045/-081: One fan under the card cage (170 m³/h (100 cfm)) and two fans (56m³/h (33 cfm) each) at the rear panel

  21850-046: One fan under the card cage (170 m³/h (100 cfm)) and one fan (17 m³/h (10 cfm)) for the power supply
- Integrated 250 W AC Power Supply with wide range input
- AC mains/line module with IEC 320-C14 connector, integrated mains/line fuses and line filter at the rear panel

## 2.1 Front and Rear Views

**Figure 1: 21850-046 Front and Rear View**


12909827

**Figure 2: 21850-046 Bottom View**

12807834

**Figure 3: 21850-045/-081 Front and Rear View**


12807831

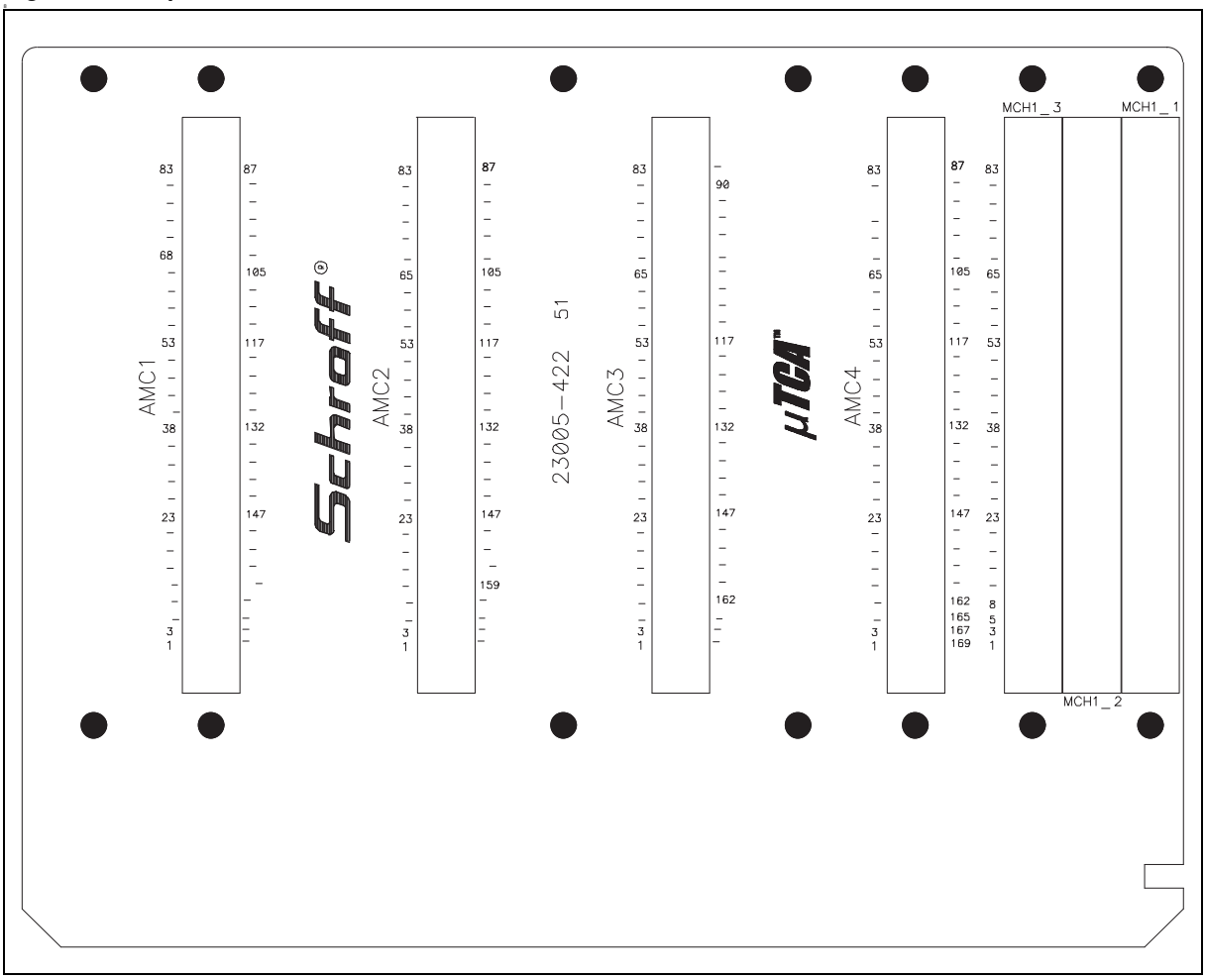
# 3 Backplane 23005-435

The 5 slot MicroTCA Backplane provides:

- 1 MCH Single Full-size slot
- 1 AMC Single Full-size slot for a CPU Board
- 2 AMC Single Full-size slots for HDD or PCIe Boards
- 1 AMC Single Full-size slot for a HDD or CPU or PCIe Board
- Onboard power management for all AMC slots

## 3.1 Backplane Front View

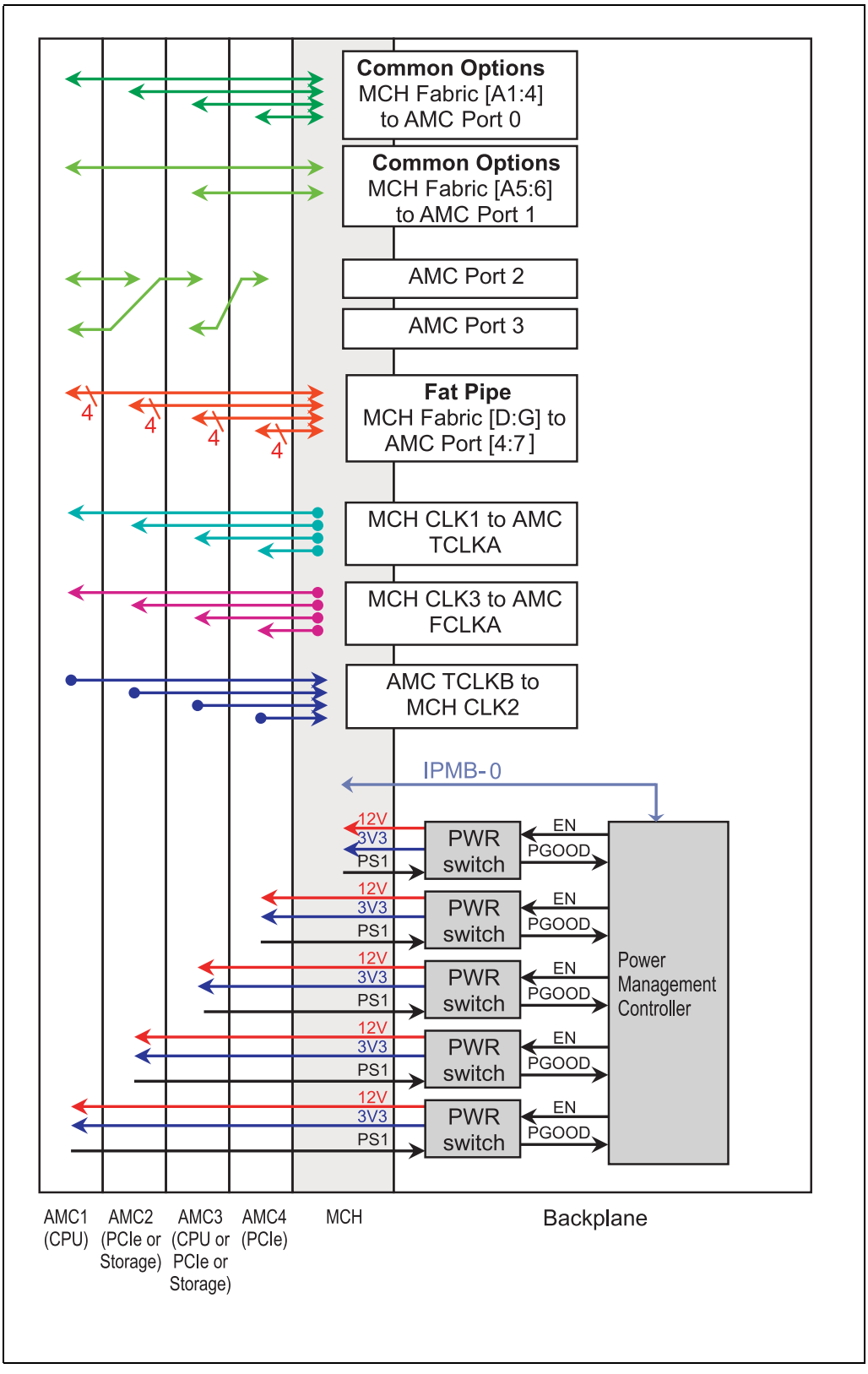
**Figure 4: Backplane Front View**




12807832

## 3.2 Backplane Topology

**Figure 5: Backplane Topology**




12909828

## 3.3 Fabric Interface

### 3.3.1 Common Options

MCH1 Fabric Port A is routed to all AMC slots Port 0 in a radial configuration.

MCH1 Fabric “Port A to AMC5“ is routed to AMC1 Port 1.
MCH1 Fabric “Port A to AMC6“ is routed to AMC3 Port 1.

AMC Ports 2 and 3 are direct slot to slot connections to support HDD (SATA/SAS) configurations.

### 3.3.2 Fat Pipe

MCH1 Ports [D:G] are routed to all AMC slots Port [4:7] in a radial configuration.

## 3.4 Synchronization Clock Interface

CLK1 is routed in a radial topology from Slot1# (MCH) to all AMC slots TCLKA.

TCLKB is routed in a radial topology from all AMC slots to Slot1# (MCH).

CLK3 is routed in a radial topology from Slot1# (MCH) to all AMC slots FCLKA.

CLK3 can be used as a spread spectrum clock for PCIe.

## 3.5 Intelligent Platform Management Bus (IPMB)

MicroTCA uses an Intelligent Platform Management Bus (IPMB) for management communications.

### 3.5.1 IPMB-L

The IPMB-L is routed in a radial topology from Slot1# (Switch) to AMC2#, AMC3#, AMC4# and AMC5#.

## 3.6 Carrier FRU SEEPROM

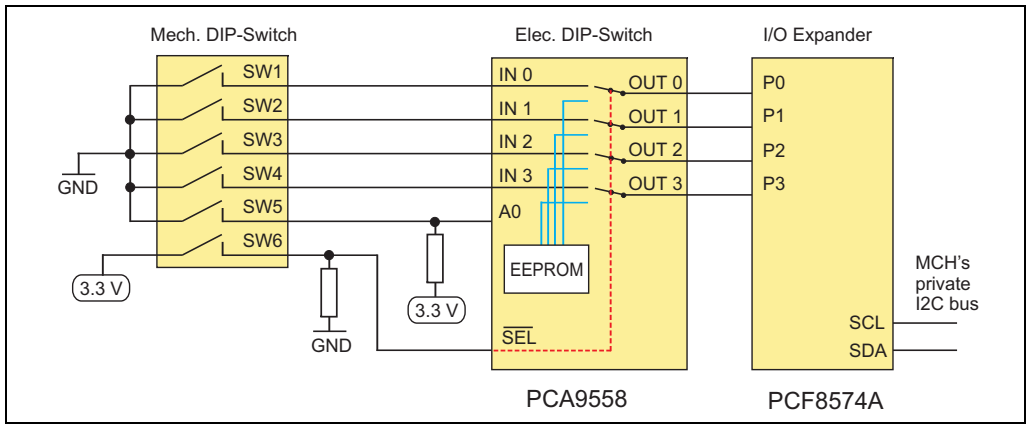
A SEEPROM is located at the Backplane. The SEEPROM is connected to Slot1# (MCH) through I²C-bus.

The I²C-addresses of the SEEPROMs is 0xa4.

## 3.7 Carrier Number

Each MicroTCA Carrier shall have a unique Carrier Number, ranging from 1 to 16 in its MicroTCA Shelf. To provide the Carrier Number, a mechanical and electronic (PCA9558) DIP switch and a PCF8574A I²C I/O expander is located on the Backplane.

**Figure 6: Carrier Number Switches**




12807826

The customer can use either the mechanical or the electronic DIP switch to set the carrier number.

### 3.7.1 Electronic DIP Switch (Default setting)

The electronic DIP switch is connected to the lower four bits of the I/O lines of the PCF8574A I²C I/O expander. The I/O expander connects to the MCMC's private I²C bus. The MCMC reads the DIP switch setting from the I/O expander, **adds one**, and uses the result as its Carrier Number.

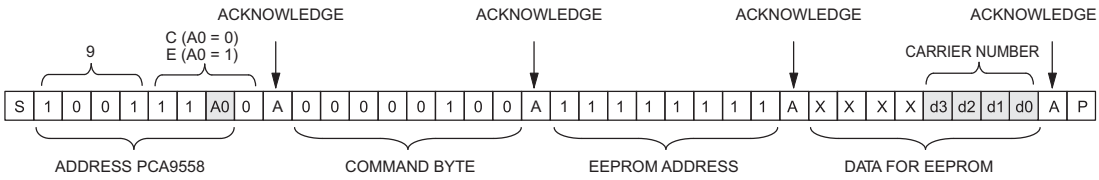
*In the default factory setting the electronical DIP switch is active at the address 0x9E (SW5 and SW6 at the mechanical DIP switch = OFF)*

*Default carrier address = 1 (Data content EEPROM = 0000)*

**Table 1: I²C Addresses**

| | |
|---|---|
| PCA 9558 DIP switch | 0x9e (default) or 0x9c |
| PCF8574A I/O expander | 0x3e |

To change the carrier number with the electronic DIP switch you have to send the following I2C command to the electronic DIP switch's EEPROM:




Further information in the PCA9558 Data sheet.

***Please note: Carrier address = DIP switch setting +1***

### 3.7.2 Mechanical DIP Switch

*To access the mechanical DIP switch you have to open the case/subrack.*

The mechanical DIP switch is a 6-position switch.

- Switch 1 to 4 are used to set the carrier number (Switch 1 = Bit 0).
- Switch 5 is used to change the I2C-address of the electronical DIP switch.
  - Switch 5 ON: address = 9C
  - Switch 5 OFF: address = 9E (default)
- With switch 6 you can select between mechanical or electronic DIP switch to set the carrier number.
  - Switch 6 ON: Mechanical DIP switch
  - Switch 6 OFF: Electronic DIP switch

*When setting the carrier number with the **mechanical** DIP switch please note:*

*Switch ON = logic 0*
*Switch OFF = logic 1*

The mechanical DIP switch is connected to the input of the electronic DIP switch. When the SEL signal is a logic 0, the electronic DIP switch will select the data from the internal EEPROM to drive the output pins, when the SEL signal is a logic 1, the electronic DIP switch will select the signal from the mechanical DIP switch to drive on the output pins.

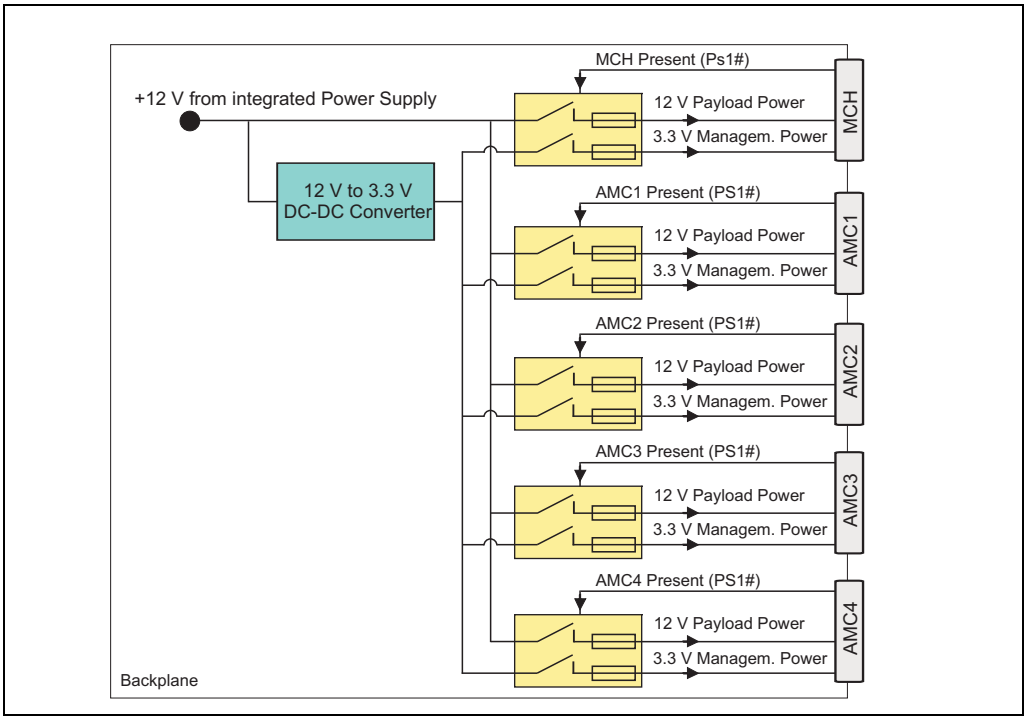
## 3.8 Power Management

The integrated Power Management circuitry on the Backplane provides 12 V Payload Power distribution branches to the MCH Slot and the AMC Slots. It also generates the 3.3 V management power and distributes it to all slots.

*Without the Power Management Board (PMB) the MCH do not manage and control the power-up sequence of the payload AMCs!*

*The PMB is fitted only in the systems 21850-046/-081, but can be upgraded to the system 21580-045*

**Figure 7: Power Distribution (Without Power Management Board)**




12807825

### 3.8.1 Power Management Board (PMB)

The Power Management Board (PMB) is a small adapter board which is attached to the backside of the backplane by two PCB-to-PCB connectors (See *Figure 8*). The PMB provides the management functionality according to PICMG specification MTCA.0, R1.0, whereas the active power switching circuitry resides on the backplane.

It enables a central management instance like an MCH to individually control payload power supply the AMC slots and the MCH.

It provides the following functionality:

- Detection of insertion or removal of AMC modules
- Managed payload power switching
- Payload power fault detection
- 3.3 V Management power fault detection

The management part of the PMB acts as a MicroTCA conformant power management module. The signals PS1#, PWR_ON, PGOOD, EN_PP are reflected in the respective bits of the Power Channel Status message [MTCA.0 R1.0, table 3-29] or Power Channel Notification Event message [MTCA.0 R1.0, table 3-30].

The PMB manages the payload power of the connected AMC modules and the MCH. After power up, the PBM starts in autonomous mode and applies payload power to the MCH. As soon as the MCH has taken over control of the PMB by applying the heartbeat signal, the PMB changes to normal mode and reacts to power commands from the MCH.

**IPMI Command Support**

The PMB supports the standard MMC command set according to [AMC.0 V2.0] specification as far as applicable for power modules and the EMMC extensions for power modules.

**IPMI Sensor Data Records**

The PMB provides the following sensor data records:

- Device Locator Record (record type 0x12)
- Hot Swap sensor (compact sensor type 0x02)

**Note:** The hot swap sensor is implemented for compliance reasons only. It has no real function as the PMB is not hot swappable. The respective sensor always return “closed”.

**IPMI FRU Information**

The PMB FRU record contains the following information:

- Product Information
- Power Module Capability Record [MTCA.0 R1.0, table 3-27].

**Event messages generated by the PMB**

The PMB generates Power Channel notification event messages (MTCA.0 R1.0, table 3-30) on any change of the status of the power channels, i.e:

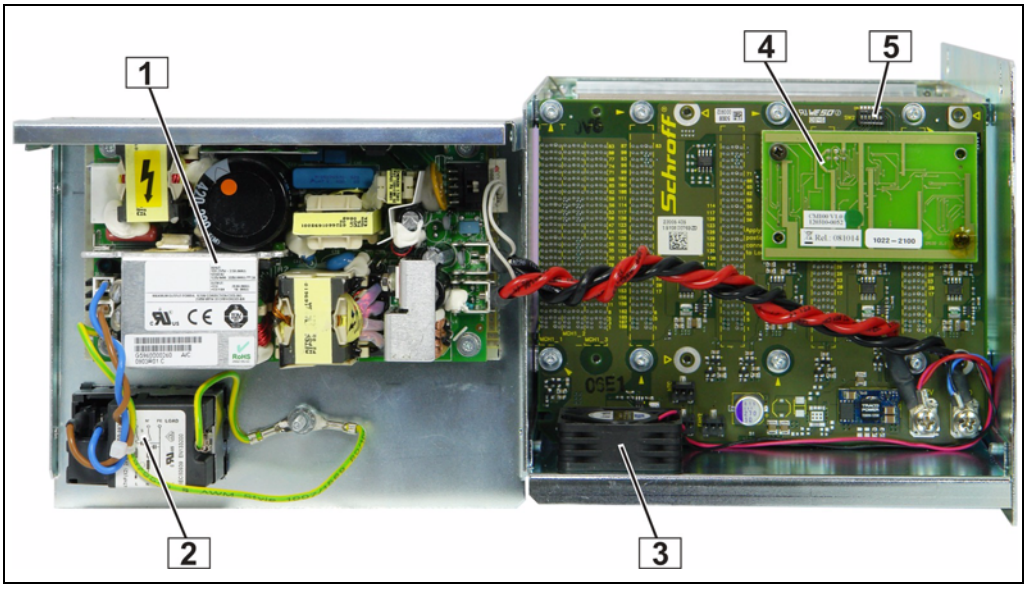
- PS1# signal assertion /de-assertion
- PWR_ON signal assertion/de-assertion, Payload on/off
- PGood signal change.

# 4 Power Supply

In order to be independent from an external power source, the MicroTCA system provides an AC Power Supply with wide range 90 VAC - 264 VAC input and 12 VDC output.

The power input is provided by an AC mains/line module with IEC 320-C14 connector, integrated mains/line fuses line filter and mains/line switch.

**Figure 8: Power Supply and PMB (shown at 21850-046)**




12909826

| | | | |
|---|---|---|---|
| 1 | Power Supply | 4 | Power Management Board (PMB) |
| 2 | AC mains/line module | 5 | Mechanical switch carrier number |
| 3 | Fan for cooling the Power Supply | | |

**Table 2: Data AC Power Supply**

| | |
|---|---|
| Input voltage nominal | 90 - 264 Vac |
| Mains Frequency | 50 / 60 Hz |
| Output (max.) | 20.8 A / 250 W |
| Output voltage | 12 Vdc |
| Overvoltage protection | 15-50% above nominal output |
| Overcurrent protection | Current limited |
| Hold-up time | 16 ms @ 250 W load, 120 Vac input |
| Operating Temperature | 0° C - +50° C<br>50° C - +70° C: Derate linearly to 50% load |
| Safety approvals | EN60950-1, 60601-1 |

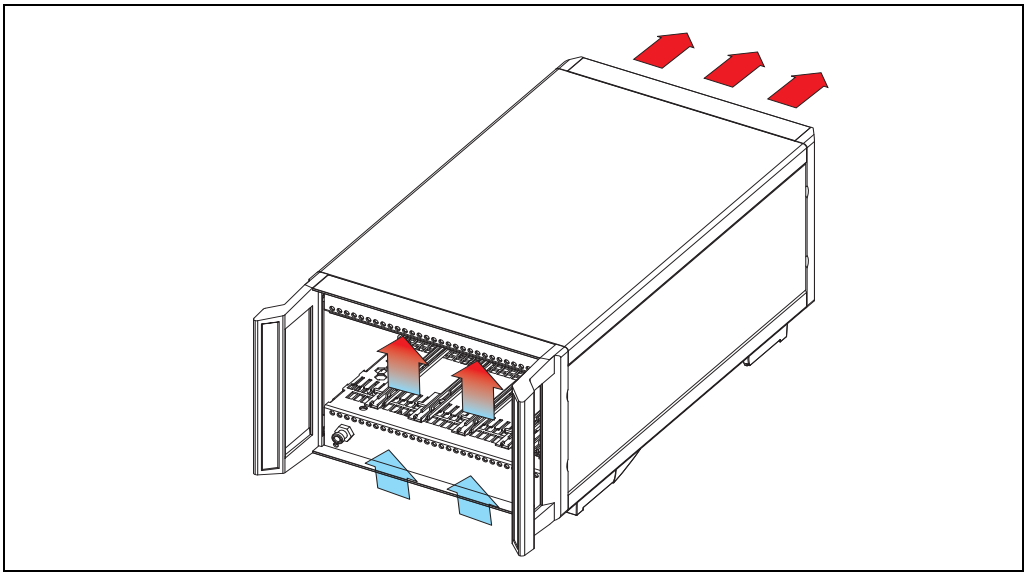
# 5 Thermals

The boards and the power supply are cooled by forced air convection through 12 VDC axial fans. The fans are not speed controlled.

**21850-045/-081:** At this system one fan (170 m³/h (100 cfm) is located under the card cage and two fans (56 m³/h (33 cfm) each) at the rear panel. The air enters the subrack through the perforated bottom panel. As the air passes across the hot components on the MicroTCA boards, heat is carried away by forced convection. The air exits the subrack at the top, is drawn into the upper plenum, turns 90°, and is exhausted out the rear of the subrack by the 2 rear fans.

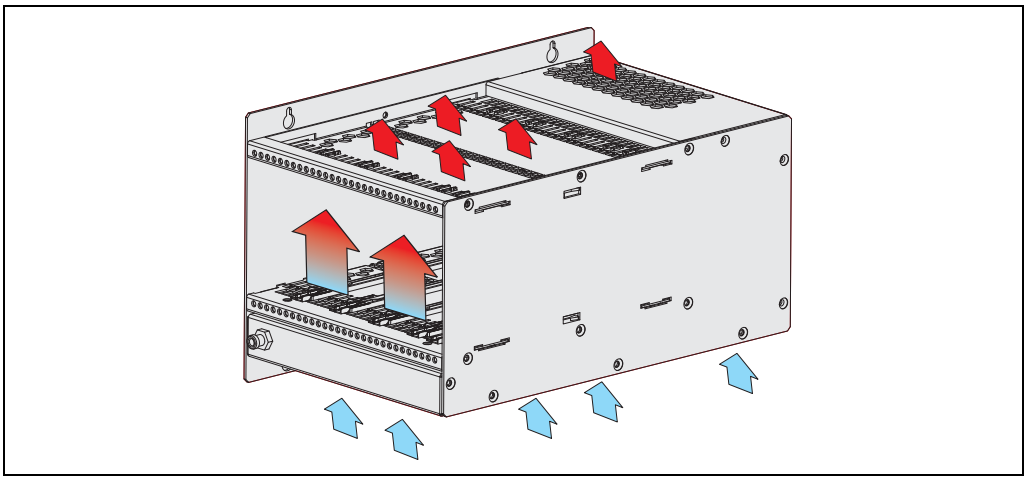
**21850-046:** At this system one fan (170 m³/h (100 cfm) is located under the card cage and one fan (17 m³/h (10 cfm) in the rear section under the power supply. The air enters the subrack at the bottom. As the air passes across the hot components on the MicroTCA boards, heat is carried away by forced convection. The air exits the subrack at the top.

**Figure 9: Airflow (21850-045/-081)**



12807828

**Figure 10: Airflow (21850-046)**



12807836

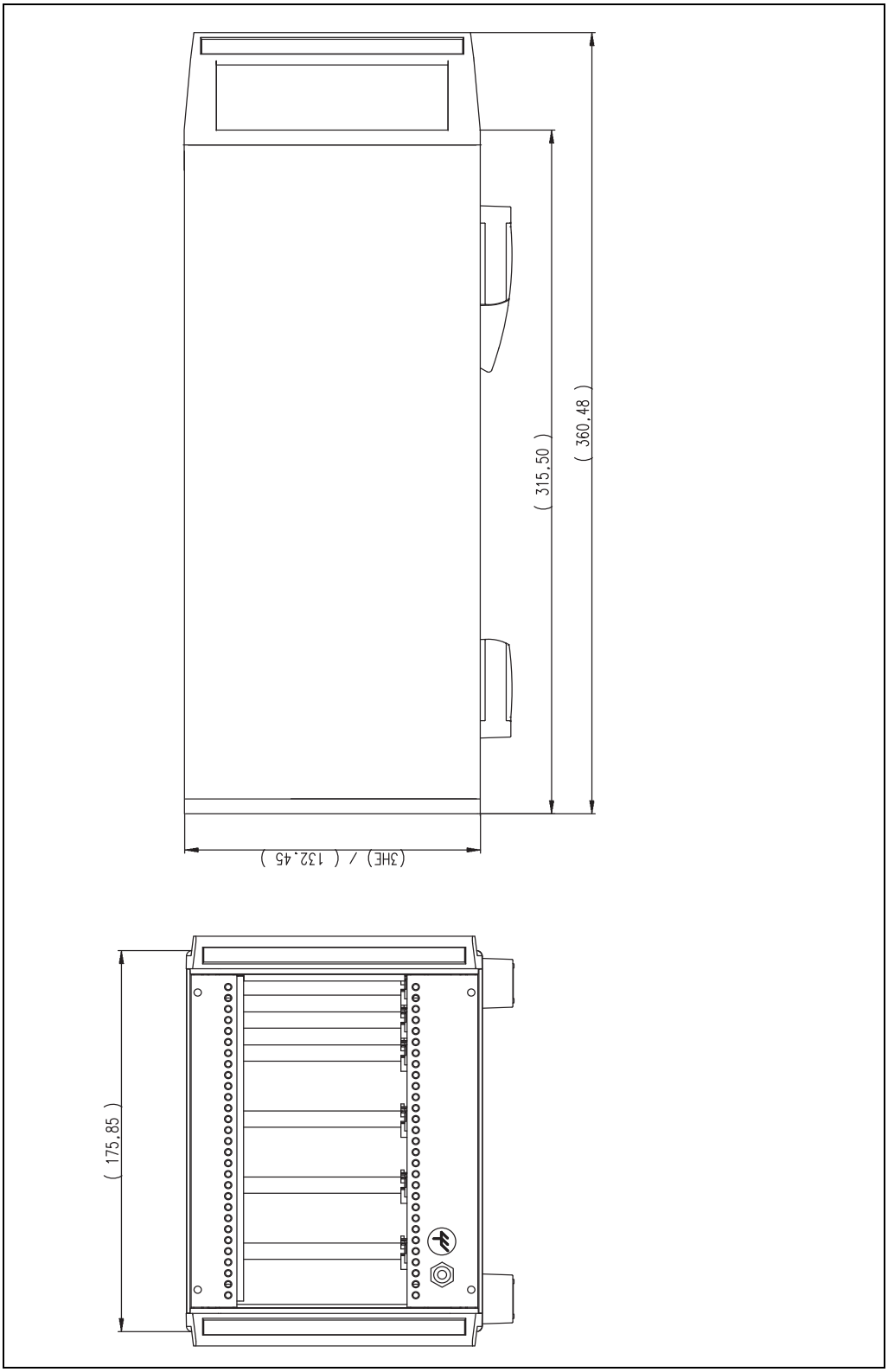
# 6 Technical Data

**Table 3: Technical Data**

| **Physical Dimensions** | **21850-045/-081** | **21850-046** |
|---|---|---|
| Height (w/o feet) | 132.45 mm (3 U) | 150 mm |
| Width | 175.85 mm | 156.76 mm |
| Depth | 360.48 mm (with handles) | 250 mm |
| **Weight** | | |
| Weight completely assembled | approx. 5 Kg | approx. 5 Kg |
| **Power** | | |
| Input voltage | 100 VAC to 240 VAC | 100 VAC to 240 VAC |
| Overcurrent Protection | 2 Fuses 3.15 A slow blow | 2 Fuses 3.15 A slow blow |
| **Cooling** | | |
| | 2 axial fans 56 m³/h (33 cfm) each, 1 axial fan 170 m³/h (100cfm) | 1 axial fan 17 m³/h (10 cfm), 1 axial fan 170 m³/h (100cfm) |
| **Environmental** | | |
| Ambient temperature normal operating | +5°C…+45°C (41°F to 113°F) | +5°C…+45°C (41°F to 113°F) |
| Ambient temperature transient operating | +5°C…+55°C (41°F to 131°F) | +5°C…+55°C (41°F to 131°F) |
| Humidity | +5%...+85%, no condensation | +5%...+85%, no condensation |
| **EMI** | | |
| Conducted Emissions | EN 55022 Class B | EN 55022 Class B |
| Radiated Emissions | EN 55022 Class B | EN 55022 Class B |

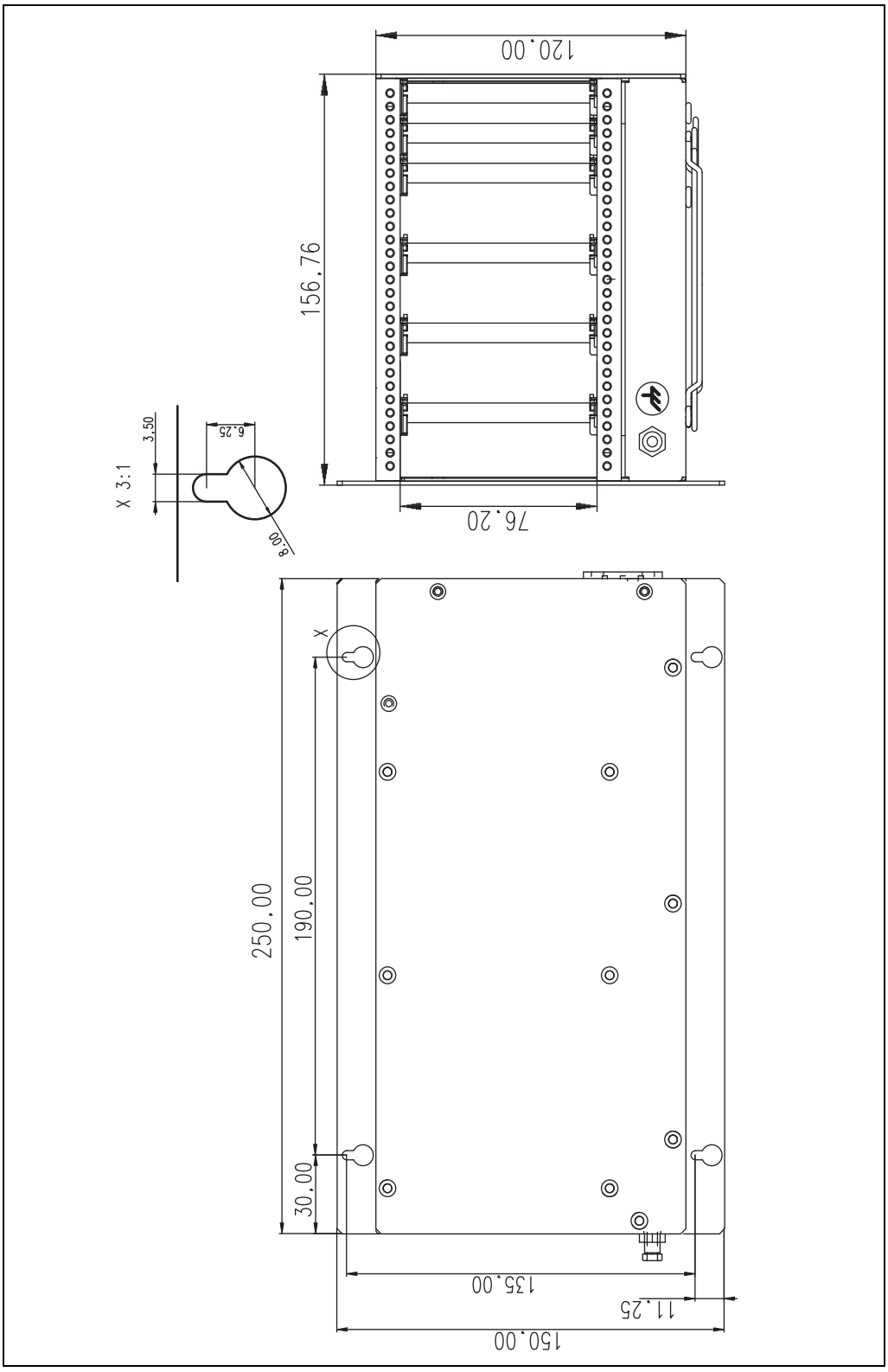
## 6.1 Mechanical Dimensions

**Figure 11: Mechanical Dimensions 21850-045/-081**




12807829

**Figure 12: Mechanical Dimensions 21850-046**




12807836

All dimensions are in millimeters (mm).

SCHROFF GMBH

Langenalberstr. 96-100
D-75334 Straubenhardt

www.schroff.biz
www.a-tca.com
Tel.: + 49 (0) 7082 794-0

Fax: +49 (0) 7082 794-200