



RiTCA: Rittal solutions for

Advanced TCA[®] **μTCA**[™] **Advanced MC**[™]

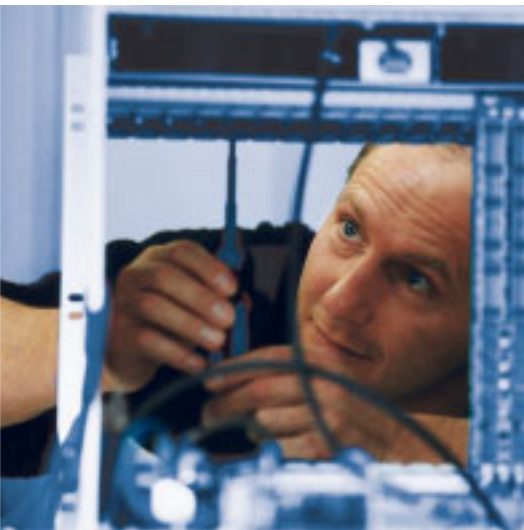


Rittal Electronic Systems
the complete know-how

Where high availability and maximum speed are the ultimate yardsticks!



The trend towards “**standardisation of computing platforms**” is becoming increasingly significant, not only in the telecommunications sector but also in industrial automation, medicine, traffic guidance and security systems. The benefits include: More cost-effective use, more flexible design of the components, independence from specific manufacturers, and a faster market launch. This requirement profile is met by the Advanced Telecom Computing Architecture Standard (ATCA) in every respect. ATCA is sure to impress with its **high availability of 99.999 percent, compatibility, maximum speed, consistent redundancy and high data throughput coupled with a high fail-safeness**. Enjoy the benefits of this standard!



Added benefits for you:

Rittal and its subsidiary Kaparel are members of the PCI Industrial Computer Manufacturers Group (PICMG) and were decisively involved in the development of the ATCA standard from the outset.

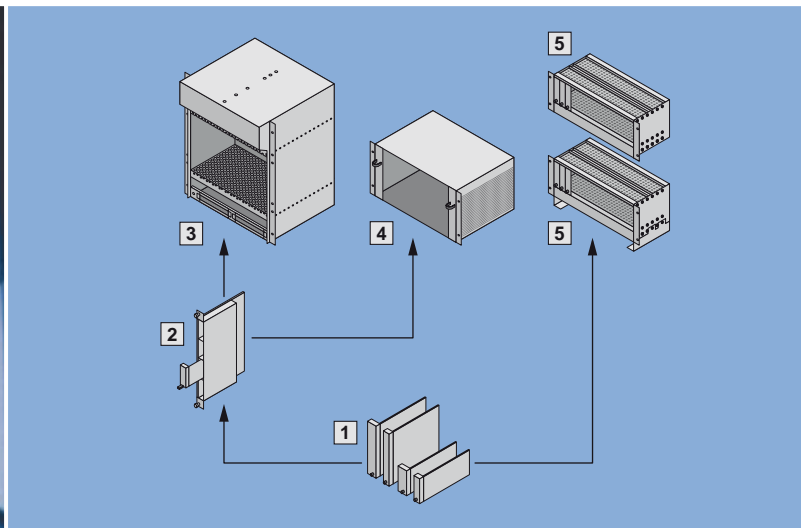
Rittal now offers a complete product range of standard ATCA systems in 5 U and 13 U.

All include a variable shelf management concept, Full Mesh or Dual Star backplanes and complex cooling concepts for reliable heat dissipation (up to 3.2 kW/shelf).

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- System solutions based on standardised components – **Easy to extend.**
- Full Mesh backplanes are already available with 10 Gbit/s instead of the specified 3.125 Gbit/s – **Enhanced performance and future reliability.**
- Comprehensive climate control concepts: From CPU cooling, to shelf cooling, to rack cooling – **Fail-safe enhancement through high heat losses.**
- Global availability and application engineering – **Global presence and on-site support.**



Benefit in several ways

Users will benefit in several ways from the optimum interaction between the Rittal components, thanks to absolute future-proofness, maximum speed, and optimum reliability. Worldwide, Rittal offers more than 150 distribution and logistics centres with a comprehensive range of services: From expert advice throughout every stage of your product, to the development of customised solutions, through to application-specific seminars.

Everything from a single source – direct from the manufacturers!

- 1 AdvancedMC modules
- 2 AdvancedMC carrier and module
- 3 + 4 AdvancedTCA shelves to accommodate AMC carriers
- 5 MicroTCA 482.6 mm (19") system and development system for the direct installation of AMC modules

The optimum service process

Complete – up to Level 5



Rittal's Electronics Division:

In order to offer reliable solutions, you need expertise in every detail, be it standard or customised.

As one of the leading system suppliers, Rittal Electronic Systems caters for all requirements in the field of electronic packaging.

For telecommunications, industrial automation, medicine, traffic guidance and security systems.

Centres of excellence ...

Rittal Electronic Systems utilises the worldwide Rittal distribution network with more than 150 distribution and logistics centres for a comprehensive service: Immediate availability, and an outstanding maintenance and spare parts service.

In addition, the specialists at our centres of excellence provide tailor-made advice, customised to your needs.



... in Europe

Eckental/Nuremberg (Germany)

- The headquarters of Rittal Electronic Systems
- Specialising in: Mechatronics, the development and production of prototypes and small series
- Development of electronic packaging systems, preparation of mass production
- State-of-the-art logistics centre for rapid access to our full range of products

Ertop in Joigny (France)

- This subsidiary is our mass production centre

... in Asia

Shanghai (China)

- Production engineering, production of electronic packaging components
- Complete customised electronic systems are produced in a special integration and assembly centre
- Support and central logistics coordination for the entire Asia-Pacific market

... in America

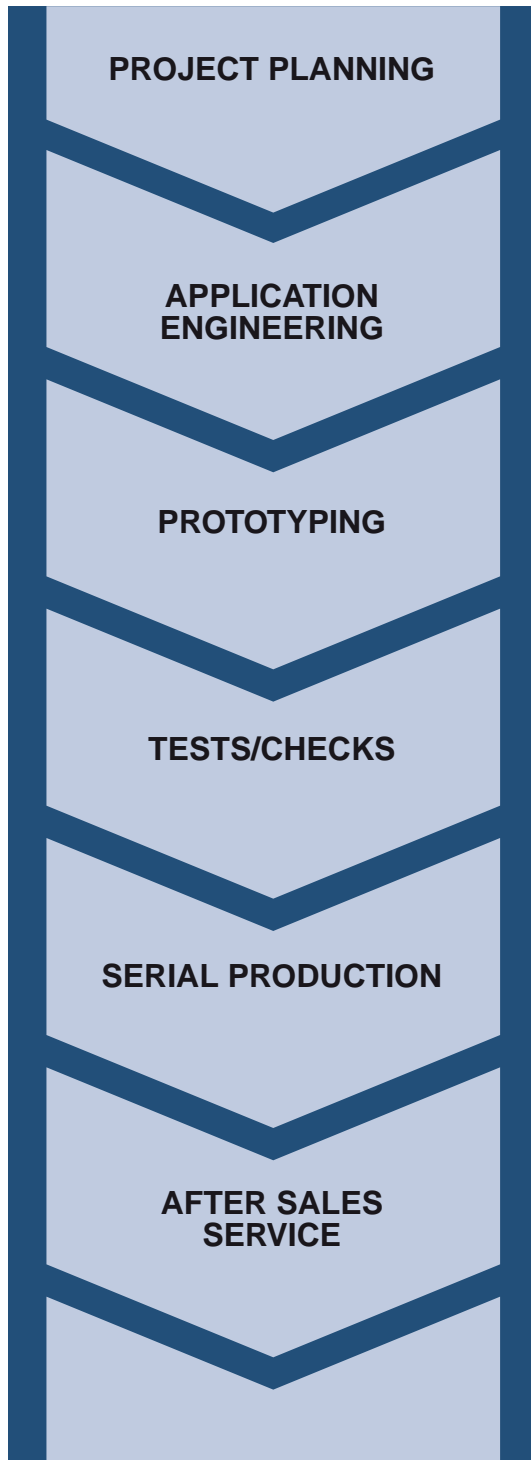
Waterloo/Toronto (Canada)

- Support for customers in the North American market
- Development of customised system solutions
- Mass production of systems, production of backplanes
- Design and layout of backplanes and PCBs by our subsidiary Jardon Engineering in Tustin, California

RITTAL ELECTRONIC SYSTEMS INTEGRATION SERVICES

- LEVEL 1:** Components (e.g. guide rails, connectors, etc.)
- LEVEL 2:** Pre-configuration, population (e.g. backplane, subrack etc.)
- LEVEL 3:** Integration (e. g. MPS systems including backplane, PSU), wiring of various components
- LEVEL 4:** Level 3 with integral boards, tested
- LEVEL 5:** Level 4 with I/O and application software, tested

Rather than individual components, there is a growing demand for **fully integrated plug & play system solutions**. In order to be able to achieve this in an individual, quality-focussed manner, Rittal subjects every product to a defined service process. Particularly during the development phase, the result is optimised through continuous contact and exchange.



1. PROJECT PLANNING

Precise analysis of requirements according to relevant factors such as location, function and technical status – the basis for sound advice.

2. APPLICATION ENGINEERING

Our application consultants will guide you to the most efficient solution. All key questions relating to the system and components, as well as specific market conditions, are clarified.

Simulations for the areas of climate control, mechanics and backplane help to highlight any problem areas and enable their solution.

3. PROTOTYPING

Once the electronic packaging concept has been agreed, a prototype is prepared. In intensive dialogue with you, the prototype is optimised to your precise requirements.

4. TESTS/CHECKS

A comprehensive test and check programme is carried out at our accredited Rittal test laboratory. Mechanical load capacity, dust and humidity protection are exhaustively tested, as are other factors such as extreme climate conditions.

Your advisor will notify you immediately of the outcome of all these tests and checks. Any optimisation requirements are defined, implemented and then subjected to retesting.

5. SERIAL PRODUCTION

Once a suitably high level of functional reliability has been achieved, serial production can begin.

Prior to delivery, every system undergoes the full range of functional and safety checks. The test seal is a guarantee of Rittal quality.

6. AFTER SALES SERVICE

We continue to assist you with on-site advice and support. In this way, you can draw on our expertise, and we are happy to answer your questions at any time.

AdvancedTCA

Features



ATCA – Advanced Telecom Computing Architecture –

First cross-industry standard developed by PICMG (PCI Industrial Computer Manufacturers Group) for telecommunications applications that were previously developed on a proprietary basis. ATCA – The solution for high demands in terms of system availability and performance, in both telecommunications and industrial automation, traffic guidance technology and medical technology. Rittal's product spectrum includes a range of complete systems in various designs with the corresponding accessories.

System benefits

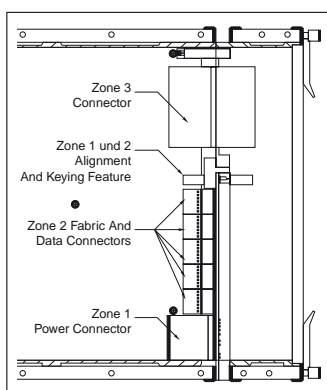


- System availability of at least 99.999 %
- Fail-safe maximised, thanks to redundancy
- Hot-swap capability ensures uninterrupted operation
- Transmission rates of up to 2.5 Tbit/s
- Large board formats: 8 U x 280 mm
- Switched fabric architecture
- By reducing proprietary platforms, the high cost of development and training is eliminated
- Available off the shelf
- Specified heat losses up to 200 W per board
- Support of different protocols (Ethernet, Infiniband, Rapid I/O, PCI-Express)
- Defined performance of at least 3.125 Gbit/s



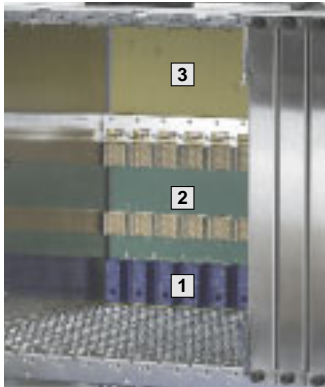
Requirements according to PICMG 3.0

- 1 x system rack (mechanical)
- Fans
- 48 V power entry modules (PEM)
- Installation space for 2 x Shelf Management Controllers
- 1 x backplane for Switched Fabric and electrical distribution
- A shelf has either 14 or 16 slots
- A shelf with 14 slots is based on 19"
- A shelf with 16 slots is based on 23" or ETSI
- The height of a shelf is N x U or N x 25 mm (ETSI)
- The depth of a shelf is suitable for installation in 600 mm deep enclosures



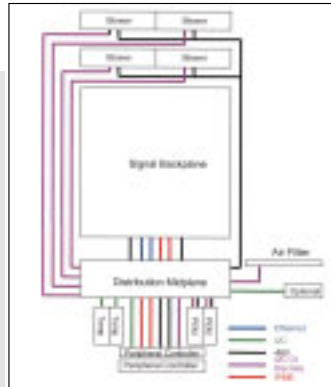
Boards

- Dimensions according to IEC 60 297-3 and specifications to PICMG 3.0
- The front boards (8 U x 6 HP and 280 mm depth) contain the electronic functions and the connectors. They are offset from the pitch line by 6.61 mm and are 1.6 to 2.4 mm thick
- ESD contact clip on the component side 1
- Attachment holes for the cover of component side 2
- Essentially, a board type plug-in unit consists of a front panel with centering pin, EMC seal, injector/extractor handles with optional micro-switch operation for hot swap and M3-knurled screws.
- A cover is obligatory for component side 2 (rear) to reinforce the PCB and/or for EMC protection
- Rear I/O boards (RTM): 8 U x 6 HP x 70 mm



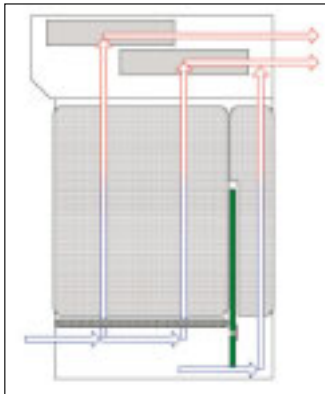
Connector zones

- Zone 1:**
Power supply and system management
 - Zone 2:**
Data communication
 - Zone 3:**
RTM (rear I/O)
- Zone 1 and Zone 2 are equipped with a special centering/keying device.



Shelf management

- Interfaces for the monitoring and control of:**
- Boards
 - PEMs (power entry modules)
 - Fans
 - Air inlet temperature
 - Remote alarm signals
 - Air filter available/not available

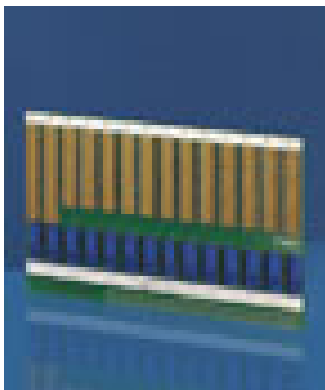


Side view, right

Shelf cooling

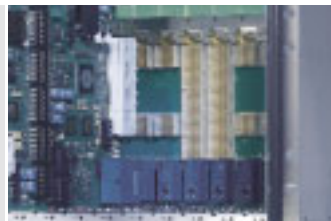


- ATCA specifies heat losses of up to 200 W per front board and 30 W per rear board, which translates into approximately 3 kW for a fully populated shelf with 14 boards.
- The four high-capacity RiCool fans from Rittal with 320 m³/h ensure optimum climatic conditions.
- Redundancy and hot-swap ensure reliability, even in the event of a fan failure.
- Replaceable dust filter in the air inlet zone.



Backplanes

- 3 times higher performance!**
- Full Mesh backplanes from Rittal with 10 Gbit/s (acc. to PICMG, 3.125 Gbit/s is required).



- Dual Intelligent Platform Management Interface (IPMI), bussed or radial (optional).
- Product range: Full Mesh, Dual Star, Dual Star also optionally available with additional Mesh performance.
- Thermal image of a Rittal backplane under full load.



AdvancedTCA solutions from Rittal

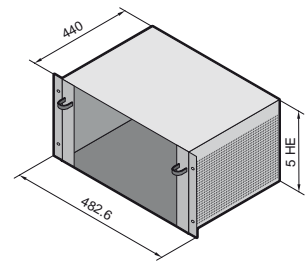
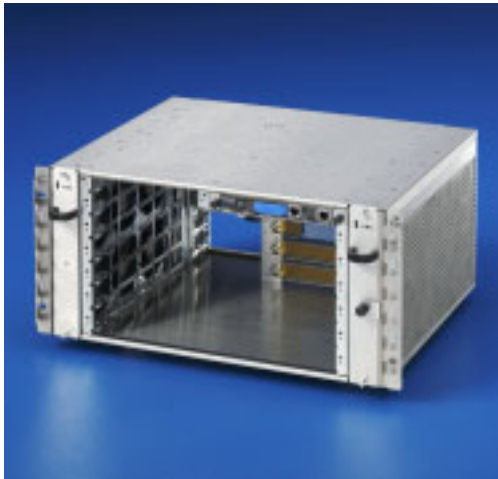
As a competent supplier of Electronic Packaging Solutions, Rittal and its subsidiary Kaparel have been actively involved in the development of the AdvancedTCA standard.

This knowledge and experience is incorporated into product development. Rittal offers complete solutions for ATCA applications. Upon request, these may also be tailored to specific requirements. There is a particular emphasis in the area of heat management.

Complex solutions, from direct cooling of the board via the shelf through to the enclosure, provide reliability, even with extreme requirements.

AdvancedTCA

AdvancedTCA Shelf HS1, 5 U, 6 slots, horizontal, AC version



Due to its compact design, the 5 U shelf version offers optimum application possibilities, e.g. as a test or development system, wherever high performance and a space-saving design is required.

Benefits at a glance:

- Conforms to PICMG 3.0 rev. 2.0
- Hot swap-compatible fan units
- Specified heat loss of at least 200 W/board
- System monitoring using Shelf Management Controllers (ShMC)
- Fully assembled, wired and tested
- Plug & play-compatible for ShMC, Intel WT or PP 500

Technical specifications:

- 19", 5 U, 440 mm deep
- 6 slots (horizontal) at the front, including 2 switch slots with RTM
- Cooling of up to 200 W/slot (front area)
- Cooling of up to 30 W/RTM
- Hot-swap fan unit
- Pull-out filter
- Voltage supply 90 – 264 V AC, 1000 W
- Including 1 Shelf Management Controller (ShMC) Pigeon Point 500 or Intel WT
- Full Mesh backplane (replicated Mesh) or Dual Star

Supply includes:

- 1 rack-mounted system 482.6 mm (19"), 5 U, 440 mm deep,
- 2 fan units each with 7 fans,
- 1 backplane, 6 slots,
- 1 ShMC Pigeon Point 500 or Intel WT,
- 1 AC/DC PSU.



Accessories:

Shelf manager, face plates, see page 11.

Standard AdvancedTCA Shelf HS1 (ShMC connectable from the front), available off the shelf

Shelf	U	Slots	Backplane	IPMI	ShMC	Switch Slots	PSU	Model No. RP
HS1	5	6	Dual Star	Bus topology	Pigeon Point 500	1 + 2	AC/DC, 1000 W	9910.732
HS1	5	6	Full Mesh	Bus topology	Pigeon Point 500	1 + 2	AC/DC, 1000 W	9911.713
HS1	5	6	Dual Star	Bus topology	Intel WT	1 + 2	AC/DC, 1000 W	9911.712
HS1	5	6	Full Mesh	Bus topology	Intel WT	1 + 2	AC/DC, 1000 W	9911.714

Accessories

	Country version	Voltage V	Model No. DK/RP
Mains connection cable C19/IEC320, up to 16 A	D / F / B	230	7200.216
	GB	230	9911.859
	USA / CDN	115	9911.860
	China	230	9911.861
IEC 320 extension C19/C20	Country-independent	115/230	7200.217

Example of possible customised applications available on request

Version	U	System housing	ShMC/ Intel WT	ShMC/ Pigeon Point 500	Filler panel	Fan unit	Backplane Full Mesh	Backplane Dual Star
1	5	■	■	–	■	1	■	–
2	5	■	■	–	■	1	–	■
3	5	■	–	■	■	1	■	–
4	5	■	–	■	■	1	–	■

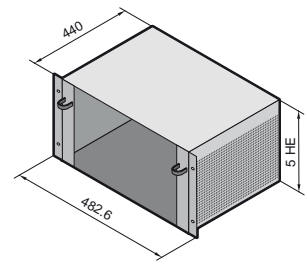
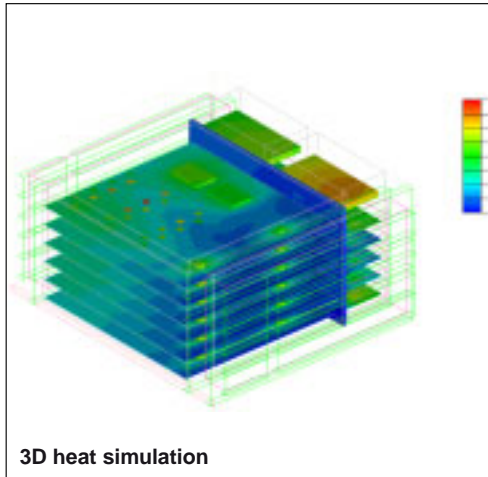
■ Included with the supply for this version.

Note:

The ATCA systems are based on standard components which may be individually combined in accordance with the modular principle.

The above matrix provides an overview of additional installation variants based on the described systems which may be implemented in a short lead time.

AdvancedTCA Shelf HS1, 5 U, 6 slots, horizontal, DC version



Due to its compact design, the 5 U shelf version offers optimum application possibilities, e.g. as a test or development system, wherever high performance coupled with a space-saving design is required.

Benefits at a glance:

- Conforms to PICMG 3.0 rev. 2.0
- Hot swap-compatible fan units
- Specified heat loss of at least 200 W/board
- System monitoring using Shelf Management Controllers (ShMC)
- Fully assembled, wired and tested
- Plug & play-compatible for ShMC, Intel WT or PP 500

Technical specifications:

- 19", 5 U, 440 mm deep
- 6 slots (horizontal) at the front, including 2 switch slots with RTM
- 5 slots (horizontal), RTM
- Cooling of up to 200 W/slot (front area)
- Cooling of up to 30 W/RTM
- Hot-swap fan unit
- Pull-out filter
- Including 1 Shelf Management Controller (ShMC) Pigeon Point 500 or Intel WT
- Full Mesh backplane (replicated Mesh) or Dual Star
- DC PEM 50 A with filter and controller

Supply includes:

- 1 rack-mounted system
- 482.6 mm (19"), 5 U, 440 mm deep,
- 2 fan units each with 7 fans,
- 1 backplane, 6 slots,
- 1 ShMC Pigeon Point 500 or Intel WT,
- 2 PEM 50 A.



Accessories:

Shelf manager, face plates, see page 11.

Standard AdvancedTCA Shelf HS1 (ShMC connectable from the front), available off the shelf

Shelf	U	Slots	Backplane	IPMI	ShMC	Switch Slots	PEM	Model No. RP
HS1	5	6	Dual Star	Bus topology	Pigeon Point 500	1 + 2	2 x 50 A	9911.715
HS1	5	6	Full Mesh	Bus topology	Pigeon Point 500	1 + 2	2 x 50 A	9911.717
HS1	5	6	Dual Star	Bus topology	Intel WT	1 + 2	2 x 50 A	9911.716
HS1	5	6	Full Mesh	Bus topology	Intel WT	1 + 2	2 x 50 A	9911.718

Example of possible customised applications available on request

Version	U	System housing	2 x DC PEM 50 A	2 x DC power connection with 50 A fuse switch	ShMC/ Intel WT	ShMC/ Pigeon Point 500	Filler panel	Fan unit	Backplane Full Mesh	Backplane Dual Star
1	5	■	■	-	■	-	■	1	■	-
2	5	■	■	-	■	-	■	1	-	■
3	5	■	■	-	-	■	■	1	■	-
4	5	■	■	-	-	■	■	1	-	■
5	5	■	-	■	■	-	-	2	■	-
6	5	■	-	■	■	-	■	1	■	-
7	5	■	-	■	■	-	-	2	-	■
8	5	■	-	■	■	-	■	1	-	■
9	5	■	-	■	-	■	-	2	■	-
10	5	■	-	■	-	■	■	1	■	-
11	5	■	-	■	-	■	-	2	-	■
12	5	■	-	■	-	■	■	1	-	■

■ Included with the supply for this version.

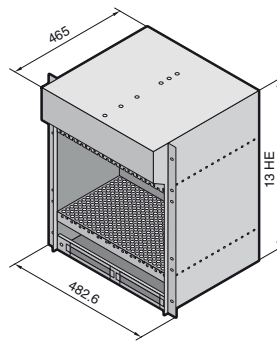
Note:

The ATCA systems are based on standard components which may be individually combined in accordance with the modular principle.

The above matrix provides an overview of additional installation variants based on the described systems which may be implemented in a short lead time.

AdvancedTCA

AdvancedTCA shelf VS1, 13 U, 14 slots



Benefits at a glance:

- Conforms to PICMG 3.0 rev. 2.0
- Hot swap-ready, redundant fan for cooling at least 200 W/board
- Plug & play-compatible for ShMC, Intel WT or PP 500
- Fully assembled, wired and tested
- System monitoring using Shelf Management Controllers (ShMC)

Technical specifications:

- 19" x 13 U x 465 mm (+ 40 mm projection at the rear for PEM) deep
- 14 x 6 HP slots for front boards and RTM
- 14 slots Dual Star or Full Mesh backplane with "bussed" IPMI (optionally radial)
- 4 x rear-connected PEM, 48 V DC, 50 A
- Prepared for 2 x front-connecting ShMC/Intel WT or Pigeon Point 500 (1 x ShMC is included with the supply)

- Space for rear telecom service connection
- RiCool fans connected at the front (4 fans each with 320 m³/h, dual IPMI)
- Filter frame connected at the front (with air baffle plate and filter mat)
- Optional cable ducts for front and rear

Supply includes:

- 1 rack-mounted system 482.6 mm (19"), 13 U, 465 mm deep,
- 4 RiCool fans,
- 1 backplane, 14 slots,
- 4 redundant power entry modules (PEM), 48 V,
- 1 Shelf Management Controller (ShMC).



Accessories:

see page 11.

Standard AdvancedTCA Shelf VS1 (ShMC connectable from the front), available off the shelf

Shelf	U	Slots	Backplane	IPMI	ShMC	Switch Slots	PEM	PEM-Amp	RiCool-2	Model No. RP
VS1	13	14	Dual Star	Bus topology	Pigeon Point 500	1 + 2	4 x	50 A	4 x 48 V-IPMI	9910.932
VS1	13	14	Full Mesh	Bus topology	Pigeon Point 500	1 + 2	4 x	50 A	4 x 48 V-IPMI	9910.933
VS1	13	14	Dual Star	Bus topology	Intel WT	1 + 2	4 x	50 A	4 x 48 V-IPMI	9910.940
VS1	13	14	Full Mesh	Bus topology	Intel WT	1 + 2	4 x	50 A	4 x 48 V-IPMI	9910.941

Example of possible customised applications available on request

Version	System housing	4 x PEM 50 A	2 x PEM 100 A	ShMC/Intel WT	ShMC/ Pigeon Point 500	Backplane Full Mesh	Backplane Dual Star
1	■	–	■	■	–	■	–
2	■	–	■	■	–	–	■
3	■	–	■	–	■	■	–
4	■	–	■	–	■	–	■

■ Included with the supply for this version.

Note:

The ATCA systems are based on standard components which may be individually combined in accordance with the modular principle.

The above matrix provides an overview of additional installation variants based on the described systems which may be implemented in a short lead time.



Shelf Management Controller (ShMC)

- Up to 2 Shelf Managers may be used per system
- Technology: Intel Wagonfire or Pigeon Point 500

Design	Packs of	Model No. RP
Pigeon Point 500	1	9910.570
Intel Wagonfire	1	9910.942



ATCA face plate kit

- With integral cover for the component side and for board attachment
- Including foam EMC seal (stick-on)
- Incl. hot-swap injector/extractor handles
- Customer-specific machining available on request

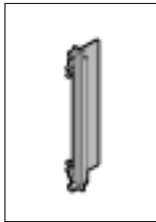
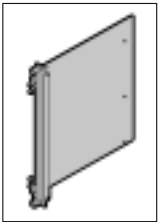
Material:
Stainless steel

Supply includes:
1 face plate, 2 handles, EMC seal, mounting screws.

Description	U	HP	Packs of	Model No. RP
1 Face plate, front	8	6	1	9906.693
2 Face plate, rear	8	6	1	9910.379

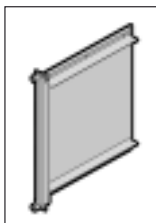
EMC

1



1

2



ATCA filler panel kit

- To conceal unused slots
- Optionally with or without air routing
- Including foam EMC seal (stick-on)

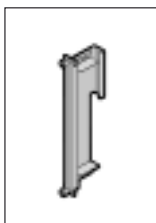
Material:
Stainless steel

Supply includes:
1 face plate, EMC seal, mounting screws.

Description	U	HP	Packs of	Model No. RP
1 Face plate, front with air routing	8	6	1	9906.694
2 Face plate, rear with air routing	8	6	1	9910.185
3 Face plate, front/rear without air routing	8	6	1	9910.380

EMC

1



2



3



AdvancedMC – Hot plug-ready, modular, scalable!

The module specification AdvancedMC (Advance Mezzanine Card) was developed by PICMG, based on the technology of top-mounted modules (mezzanines) which have proven so popular with the VMEbus. The basic components of AdvancedMC are the AMC modules and the AMC carrier. The original aim was to define mezzanine cards for the ATCA platform which would satisfy the requirements of the telecommunications industry in respect of modularity and scalability. The AMC modules are plugged into an ATCA system via a so-called ATCA carrier. The advantage of this is that cards can be exchanged while the system is operational (hot plug). Up to 4 single, full-size AMC modules may be plugged into one ATCA/AMC carrier blade.

The MicroTCA standard emerged as part of the endeavour to utilise AMC cards in a conventional way as “regular” plug-in cards for applications outside the telecommunications sector. Here, the AMC modules are plugged directly onto the passive backplane without the ATCA/AMC carrier blade.

Benefits at a glance:

Hot swap capabilities

AMC modules may be exchanged in situ (field-replaceable unit, FRU) without needing to remove the ATCA carrier from the system,

Management capabilities

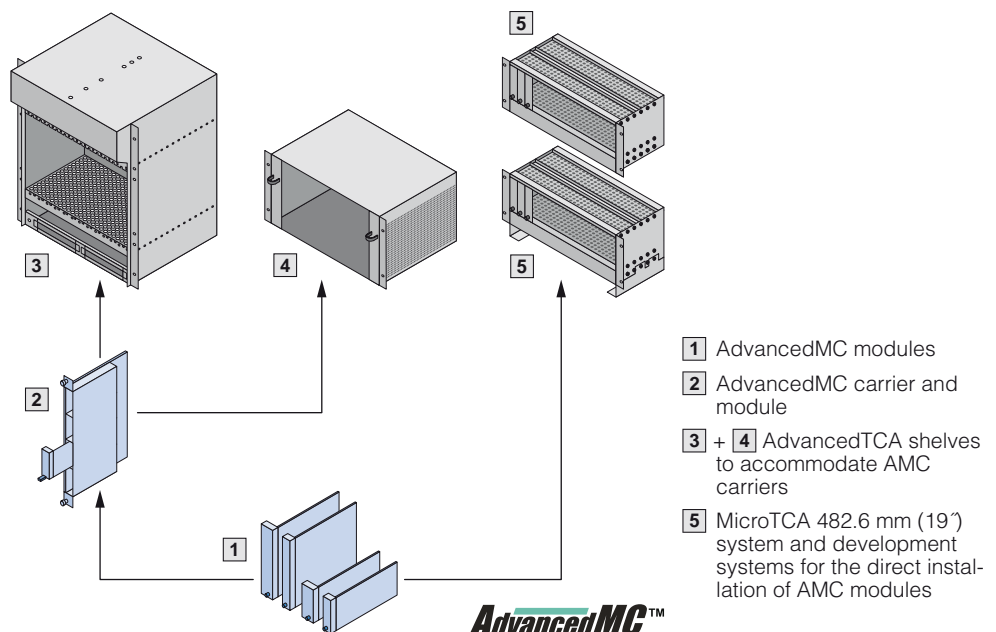
The AMC specification supports IPMI (Intelligent Platform Management Interface) and electronic keying as standard, to enable dynamic configuration.

Form factor

The specification supports a variety of AMC form factor benefits so as to offer plenty of flexibility for a broad spectrum of computer and I/O applications.

Serial connection

Designed for high-speed applications up to 12.5 Gbit/s.





ATCA/AMC carrier blade

Carrier blades are used to accommodate AMC modules and are plugged into ATCA systems. Depending on the design, up to 8 AMC modules may be installed. The dimensions of 8 U, 6 HP match those of an ATCA assembly. Handles at the top and bottom allow locking as well as easy insertion and withdrawal.

There are three distinct types which differ according to the design of the motherboard:

Conventional carrier

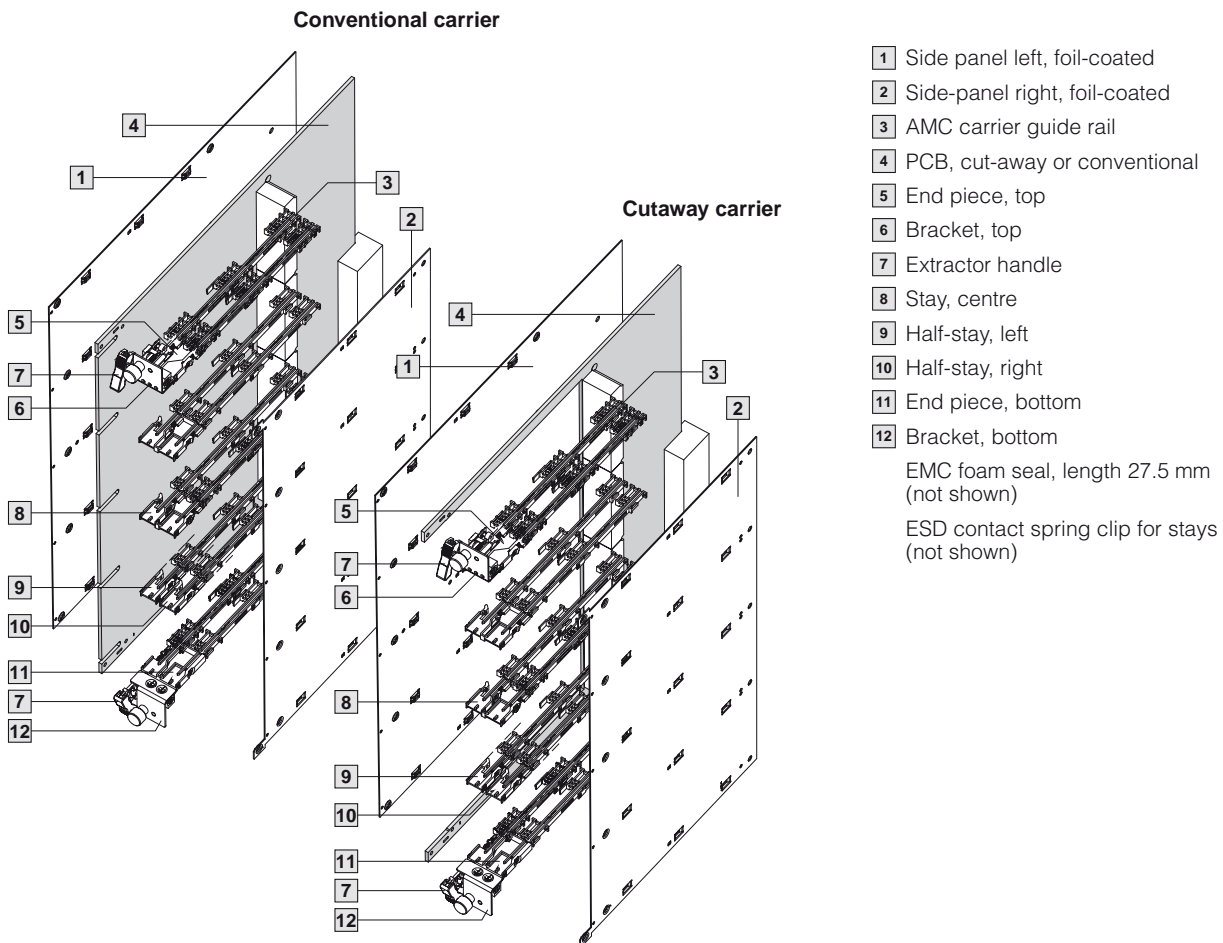
Integrated board for complete configuration with components. Installation space for a maximum of 4 single full-size AMC modules.

Cutaway carrier

This board has a cutout in the vicinity of the modules. Installation of a maximum of 8 single compact AMC modules or full-size and compact-size combined.

Hybrid Carrier

Combination of a conventional and cutaway carrier. Installation of the AMC modules depends on the size of the board.



AdvancedMC

ATCA/AMC carrier blade

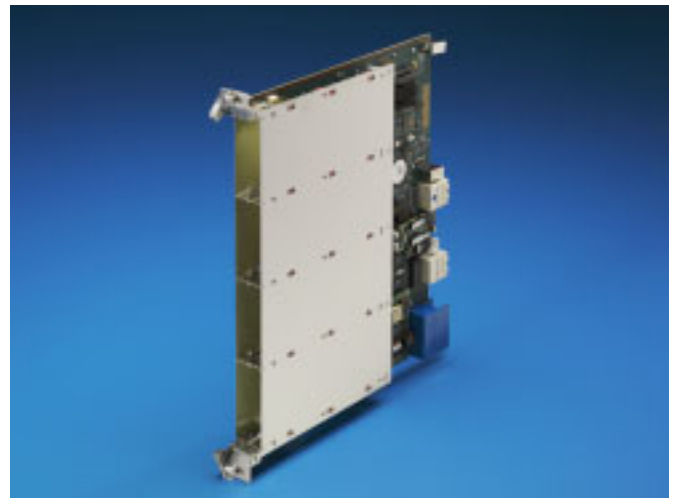
ATCA/AMC.1 and 2 from Rittal are ATCA carrier blades with 2 – 4 AMC slots depending on the required AMC form factor. With carrier blades, the emphasis is on giving users the maximum possible flexibility with the use of AMC technology. Depending on the required application, various processor AMCs may be combined with memory AMCs and interface AMCs in order to develop and configure individual systems based on the ATCA standard from the various standard AMCs using ATCA/AMC carriers.

AdvancedMC Carrier ATCA/AMC.1

The serial interfaces for all AMC slots meet the specifications of AMC.2 type E2 (GbE for the Common Option Region) and AMC.1 Type 4 (PCIe for the Fatpipe Region), whereby 1 AMC slot additionally conforms to AMC.1 Type 8. The 2 GbE ports for the Common Region (AMC.2 Type E2) are used for control functions and data transfer, as well as for backup requirements. Each PCIe and GbE port in the AMCs is connected to a non-blocking switch for maximum performance. Additionally, all AMC slots are likewise AMC.3 compatible (port 2 and 3) to support applications requiring storage media such as SAS/SATA. The ATCA-AMC.1 Carrier is designed for CARRIER GRADE SERVICES.

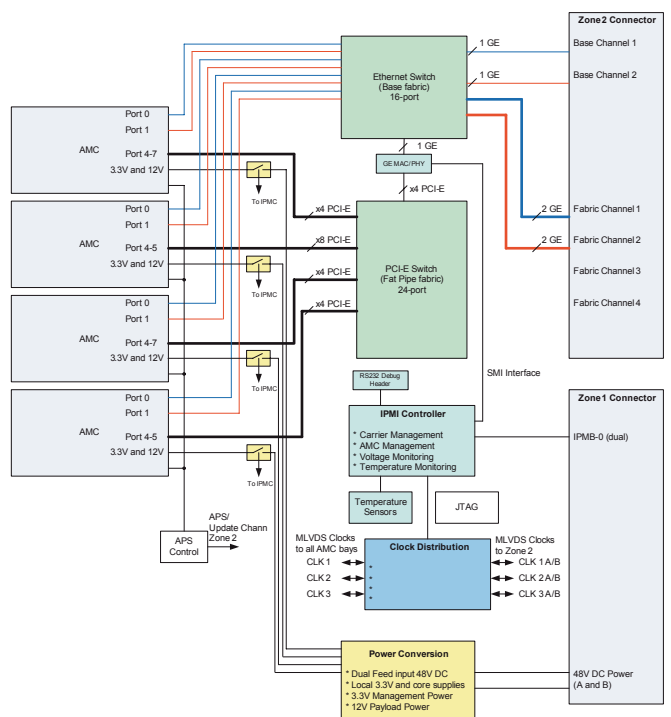
IPMI (Intelligent Platform Management Interface & hot swap functionality)

The Management Controller on the ATCA-AMC carrier blade supports IPMI functions to Version 1.5 including e-keying, modular power management and distribution, system clocks and hot swap functionality. E-keying allows the carrier to identify which AMC slots are assigned in order to configure the fabric interfaces accordingly. The ATCA-AMC.1 carrier is hot swap-compatible to PICMG 3.0 and may be exchanged with the system operational.



ATCA/AMC.1 carrier

Model No. RP	9908.499
Form factor	PICMG 3.0
AMC slots	4 x AMC single full-size to AMC.0 R2
AMC protocol support	AMC.1 type 4 (Port 4 – 7) AMC.1 type 8 on slot 2 (Port 4 – 11) AMC.2 type E2 (Port 0 – 1) AMC.3 (Port 2 – 3)
IPMI support	IPMI V1.5 upgradeable
ATCA protocol support	2 Port GbE base interfaces 4 Port GbE fabric interfaces
Electricity consumption	max. 160 W for AMCs bays max. 40 W for carrier max. 30 W for RTM
Weight	1.6 kg
Operating temperature	-5°C to +55°C
Storage temperature	-40°C to +85°C
Humidity	5 – 95 %
Approvals	CE



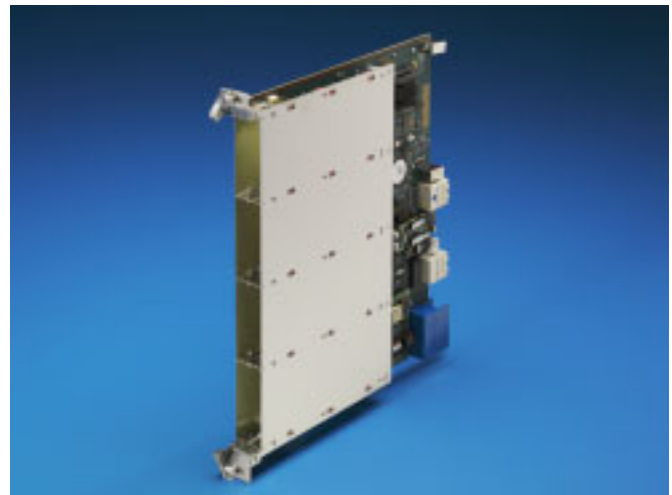
2 standard ATCA/AMC carrier blades have been developed for the various applications in telecommunications and the IT industry which support the most widespread communication protocols GbE (AMC.2) and PCIe (AMC.1). The carriers meet the specifications of PICMG 3.0/3.1.

AdvancedMC carrier ATCA/AMC.2

The serial interfaces for all AMC slots conform to the specification AMC.2 Type E2 (GbE for the Common Option Region) as well as AMC.2 Type 4 (Port 4-7 for the Fatpipe Region). The 2 GbE ports for the Common Region (AMC.2 Type E2) are used for control functions and data transfer, as well as for backup requirements. Each GbE port in the AMCs is connected to a non-blocking switch for maximum performance. Additionally, all AMC slots are likewise AMC.3 compatible (Ports 2 and 3) to support applications requiring storage media such as SAS/SATA. The ATCA-AMC.2 Carrier is designed for CARRIER GRADE SERVICES.

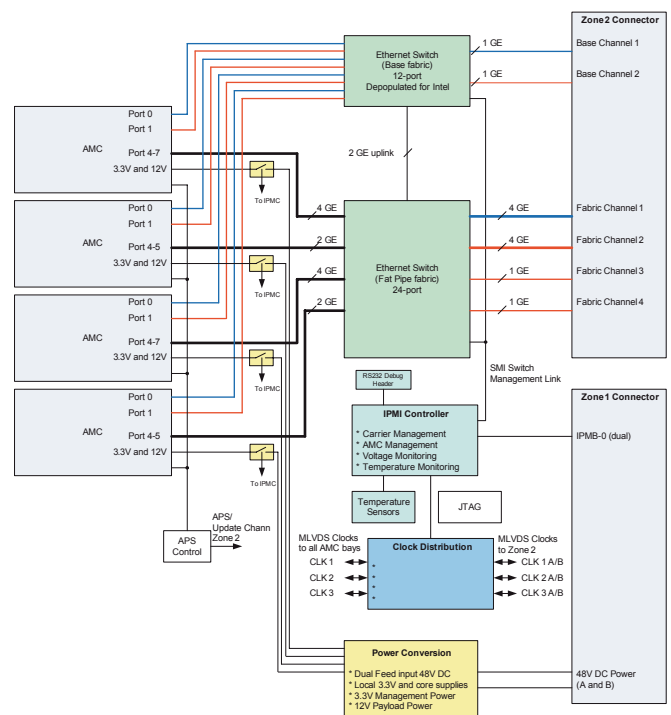
IPMI (Intelligent Platform Management Interface & hot swap functionality)

The Management Controller on the ATCA-AMC carrier blade supports IPMI functions to Version 1.5 including e-keying, modular power management and distribution, system clocks and hot swap functionality. E-keying allows the carrier to identify which AMC slots are assigned in order to configure the fabric interfaces accordingly. The ATCA-AMC.2 carrier blade is hot swap-compatible to PICMG 3.0 and may be exchanged with the system operational.



ATCA/AMC.2 Carrier

Model No. RP	9911.705
Form factor	PICMG 3.0
AMC slots	4 x AMC single full-size to AMC.0 R2, APS and Zone 3 RTM
AMC protocol support	AMC.2 type 4 (Port 4 – 7) AMC.2 type E2 (Port 0 – 1) AMC.3 (Port 2 – 3)
IPMI support	IPMI V1.5 upgradable
ATCA protocol support	2 Port GbE base interfaces 4 Port GbE fabric interfaces
Electricity consumption	max. 160 W for AMCs bays max. 40 W for carrier max. 30 W for RTM
Weight	1.6 kg (3.5 lbs)
Operating temperature	-5°C to +55°C
Storage temperature	-40°C to +85°C
Humidity	5 – 95 %
Approvals	CE





AMC modules – for flexible ATCA and μ TCA architecture

AMC modules extend the flexibility and modularity of ATCA architecture. They are an integral component of μ TCA systems. They may function as simple I/O cards, memory cards or processor cards. Instead of connectors, they are equipped with gold-plated contact strips as contact pins. The AdvancedMC.0 specification describes 6 module sizes:

Height:

Single height: Single (73.8 mm)
Double height: Double (148.8 mm)

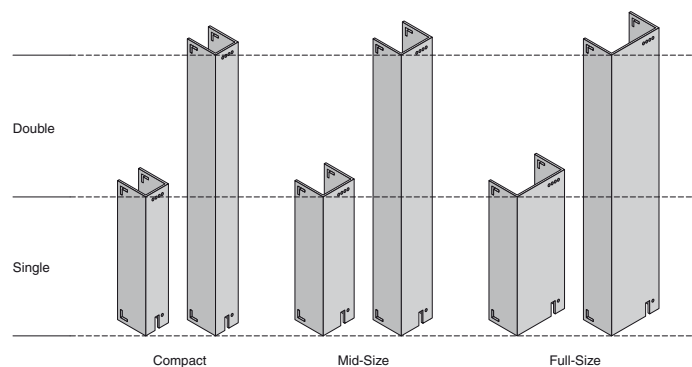
Width:

Compact: 3 HP (13.88 mm)
Mid-Size : 4 HP (18.96 mm)
Full-Size: 6 HP (28.95 mm)

(View of module dimensions in their installed state)

The individual components of the module mechanics are precisely defined in the specification:

- U-channel face plate
- Die-cast piece to accommodate a light pipe
- Injector/extractor mechanism for actuating the microswitch and as a card holder
- EMC seal





AdvancedMC face plate kits

These are used as face plates for AMC cards and ATCA carriers, or as filler panels in MicroTCA systems.

- Installation in μ TCA systems or AMC carriers
- Conforms to AMC.0 R2.0
- Height: Single & Double
- Widths: Compact, Mid-Size, Full-Size
- Simple handling when locking and unlocking (no screws)
- Hot swap-compatible injector/extractor handles
- Customer-specific face plates available with a short lead time
- Upgradable with filler sheets and air baffle plates
- Double to Single conversion module (accessory)

Material:

Face plate made from aluminium, clear chromated (stainless steel available on request)
 Holder for light pipe and PCB, die-cast Zn
 Light pipe, polycarbonate
 Handle, die-cast Zn, spray-finished
 EMC seal, foam with metal fabric (UL94 VO)

Supply includes:

- 1 U-channel face plate
- 1 holder to accommodate a light pipe and PCB
- 1 handle for microswitch
- 1 light pipe (for 2 LEDs)
- 1 EMC gasket, left side and bottom

Design (H x W)	Packs of	Model No. RP
Single x Compact	1	9911.885
Single x Mid-Size	1	9911.889
Single x Full-Size	1	9911.886
Double x Compact	1	9911.887
Double x Mid-Size	1	9911.890
Double x Full-Size	1	9911.888

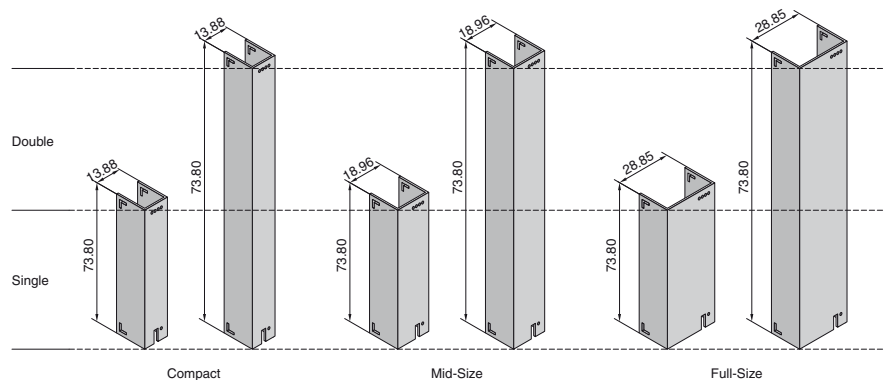
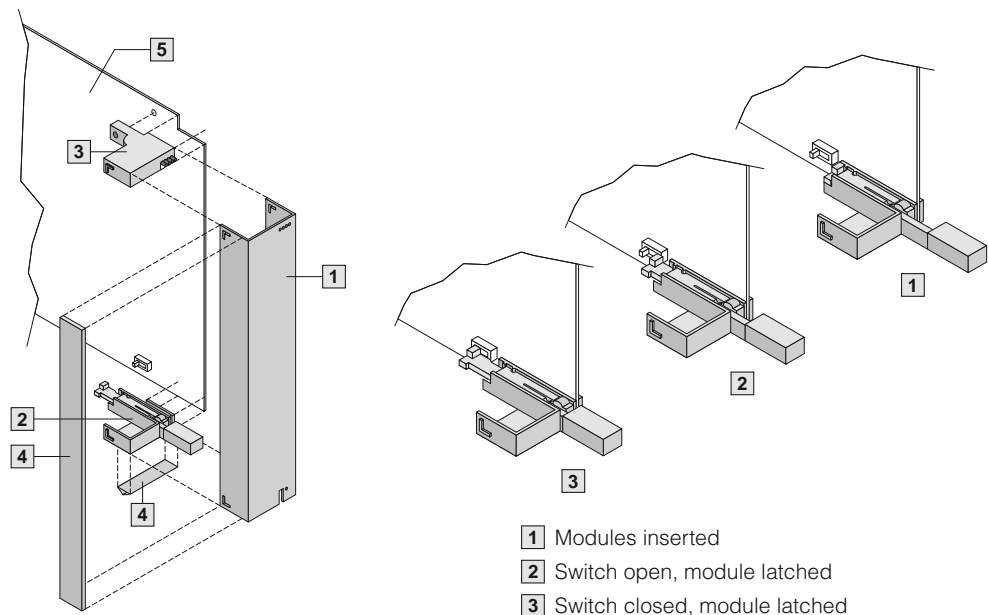
Face plates with 4 LEDs in aluminium and stainless steel available on request (to AMC.0 Spec. R1.0).



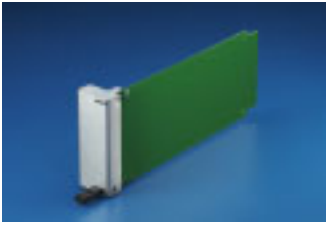
Accessories:

AMC Filler Sheets, air baffle plates, conversion module, see page 18.

- 1 Front panel
- 2 Handle and locator for PCB
- 3 Holder with LED light pipe and locator for PCB
- 4 EMC gaskets
- 5 Filler sheet



Filler Sheets



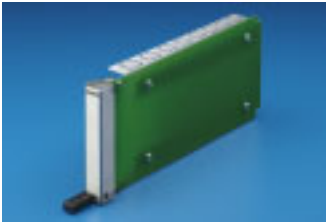
AMC filler sheets

Filler sheets are mounted on the AMC face plates and are used to route the airflow in ATCA carriers and MicroTCA systems. They may additionally be equipped with air baffle plates to create suitable air resistance with an empty slot.

Material:
FR4



Design	Packs of	Model No. RP
Single	1	9911.570
Double	1	9911.571



Air baffle plates

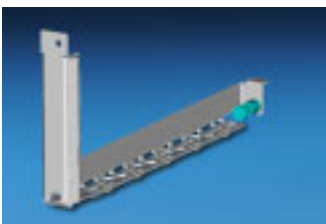
AMC slots must be populated with an empty card in order to ensure adequate air resistance. The air resistance should be adapted to the requirements of the overall system by the user. In all cases, it should be sufficiently large to ensure that the air is forced to flow over active cards into adjacent slots and does not flow unhindered through empty slots. The air baffle plate is used to adjust the air resistance. Up to 2 air baffle plates may be mounted on one filler sheet. Adjustable air resistance from 80 – 50 % thanks to removable membranes.

Material:
Stainless steel

Supply includes:
1 baffle plate,
assembly parts



Design	Packs of	Model No. RP
Compact	1	9911.891
Mid-Size	1	9911.892
Full-Size	1	9911.893

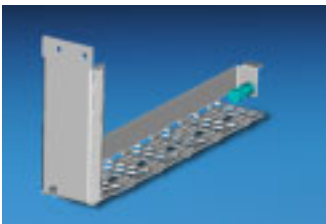


Conversion module

The conversion module allows 1 x Double to be converted into 1 x Single slot. Option of installing Compact or Full-Size modules.

Material:
Stainless steel, partially spray-finished

Supply includes:
1 conversion module



Design	Packs of	Model No. RP
Compact	1	9907.699
Full-Size	1	9911.220



μTCA – Compact design, extended range of applications

μTCA specification μTCA.0 R1.0 was ratified by PICMG (PCI Industrial Computer Manufacturers Group) in July 2006. Supplementary to the ATCA standard, MicroTCA (Micro Telecommunications Computing Architecture) was devised as a compact solution for cost-critical applications in the low-end range. AdvancedMC modules are connected directly onto the backplane without a carrier card. The modules may be installed either vertically or horizontally. MicroTCA is distinguished by its very compact design as well as its high level of scalability and significantly reduced system costs. The compact design with a depth of just 200 mm facilitates installation in 300 mm deep enclosures, on the wall, or in cases. The benefits of MicroTCA extend the usage spectrum to other application areas outside telecommunications, such as medicine, safety technology or industrial automation.

Shelf management

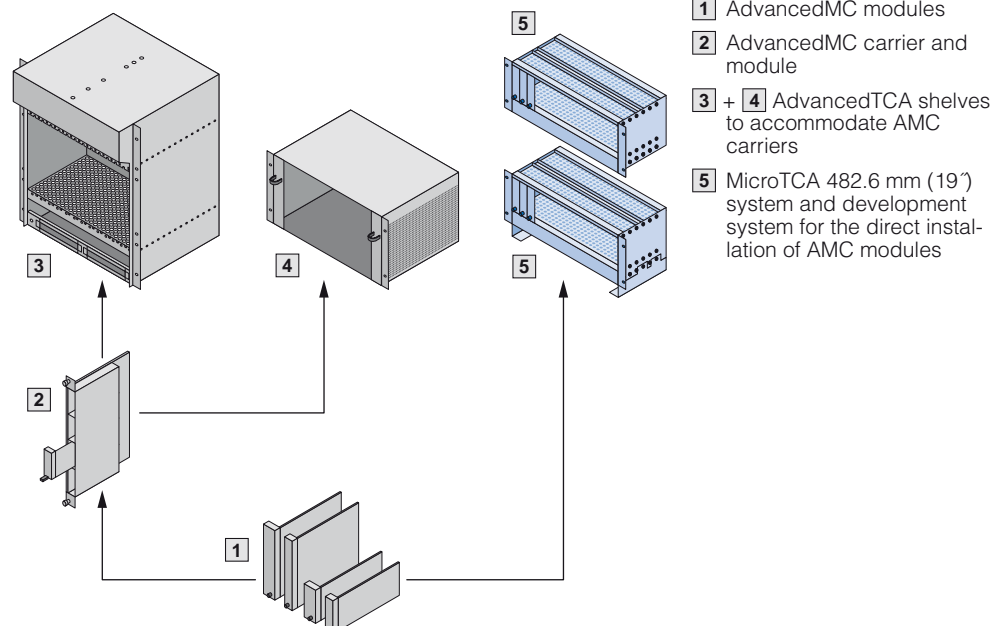
In an μTCA system, central control is performed by the MCH (MicroTCA Carrier Hub). This performs similar functions to the ATCA carrier in conjunction with the Shelf Manager in an ATCA system. This includes the shelf management functions with IPMI (Intelligent Platform Management Interface), including temperature monitoring and error handling. Additionally, the MCH also performs switch functions for the serial data lines present on the AMC cards.

Climate control

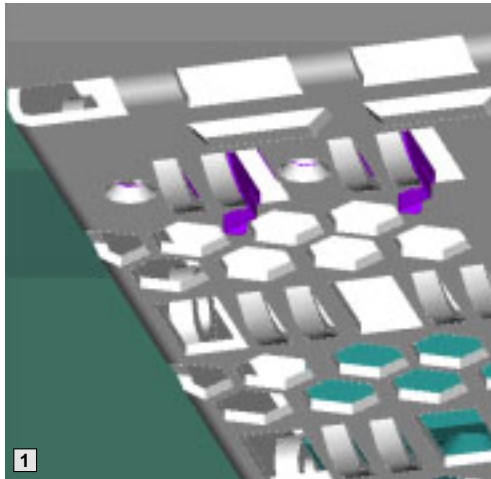
The μTCA specification defines a heat loss of 20 to 80 W respectively per AMC module. Accordingly, a heat loss of up to 600 W per system is to be expected. As a general principle, the climate control units are not integrated into the systems, but are supplied separately.

Benefits at a glance:

- Direct connection of the MCH, AMC modules and PMs onto the backplane without a carrier card
- Compact design with a maximum depth of 200 mm
- Scalable functional reliability and bandwidth
- Hot swap-compatible
- Modular and serviceable
- Defined heat loss of 20 – 80 W/module
- System availability of at least 99.999 % – 99.99999 %
- Reduced system costs
- Separate climate control and power supply units



Development systems



MicroTCA development systems for hardware and software development or testing of AMC modules

Technical specifications:

- Complies with PICMG MicroTCA.0 R1.0 and AMC.0 R1.0
- 482.6 mm (19") rack-mounted systems in 3 and 5 U, 200 mm deep for installing Single or Double AdvancedMC modules
- Integral fan unit for cooling up to 40 W/slot
- Including backplane, 14 slot (to μ TCA.0 R1.0)
- Integral power adaptor
- Fully wired and tested

Material:

Rack-mounted system of stainless steel

Supply includes:

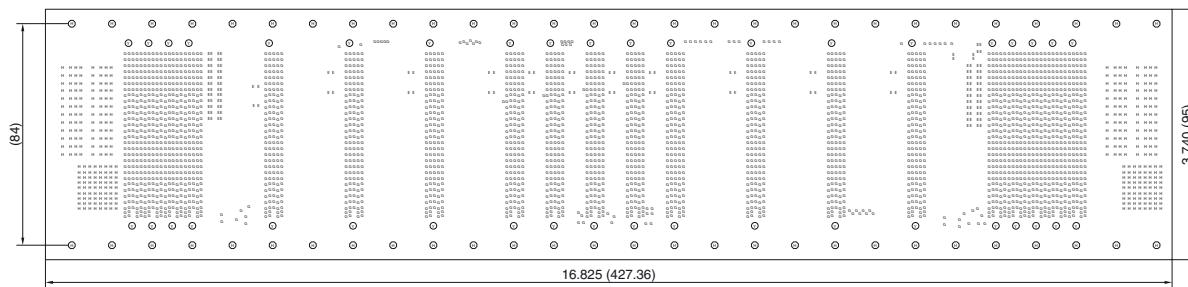
- 1 rack-mounted system 482.6 mm (19"), 200 mm deep
- 1 backplane
- 1 fan unit
- 1 power adaptor
- 2 support brackets

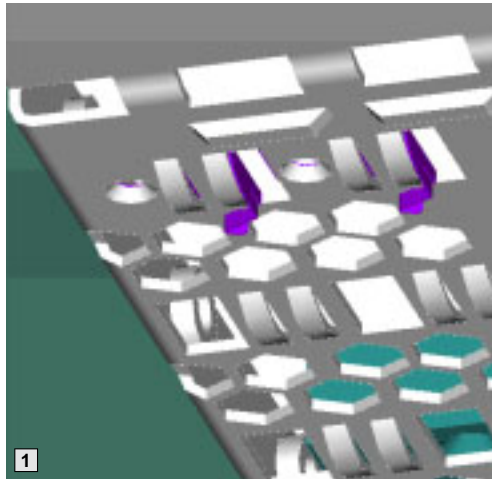
1 ESD contact to AMC assembly

MicroTCA development systems

μ TCA system	U	Slots	MCH slots	Power adaptor	Model No. RP
VP 1	3	12	2	1	9911.297
VP 1	5	12	2	1	9911.298

Power modules available on request





MicroTCA rack-mounted system for applications in the low-end telecommunications and industry sectors.

Technical specifications:

- Complies with PICMG MicroTCA.0 R1.0 and AMC.0 R1.0
- 482.6 mm (19") rack-mounted systems in 2 and 4 U, 200 mm deep for installing Single or Double AdvancedMC modules
- Including backplane, 14 slot (to μ TCA.0 R1.0)
- Fully wired and tested
- Order climate control units separately

Material:

Rack-mounted system of stainless steel

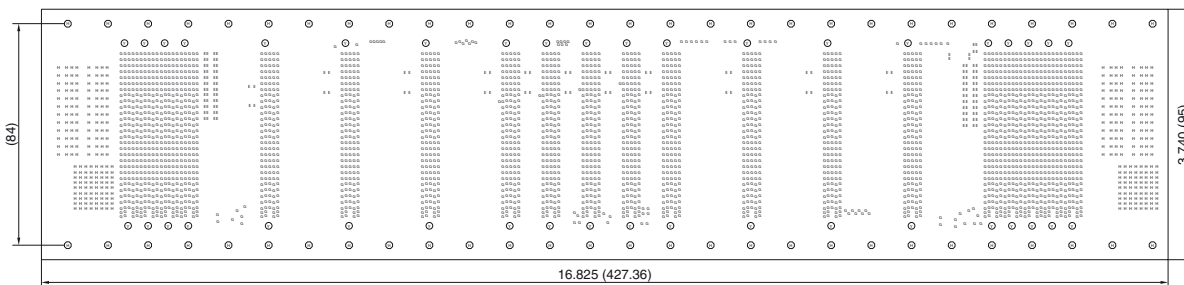
Supply includes:

- 1 rack-mounted system 482.6 mm (19"), 200 mm deep
- 1 backplane

1 ESD contact to AMC assembly

MicroTCA rack-mounted systems

μ TCA system	U	Slots	MCH slots	Model No. RP
VP 1	2	12	2	on request
VP 1	2 + 10 mm	12	2	9911.758
VP 1	4	12	2	9911.760



Power adaptor

For commissioning or testing μ TCA systems, including front connection terminal. Power adaptors may be installed directly in 2 and 3 U μ TCA systems. For installation in 4 and 5 U systems, a conversion module is also required.

Technical specifications:

- 12 V input
- 12 V output
- 3.3 V output

Packs of	Model No. RP
1	9911.380¹⁾

1) For 4 and 5 U MicroTCA you will additionally need to order a conversion module Model No. 911.220, see page 18

AdvancedTCA climate control solutions

Features



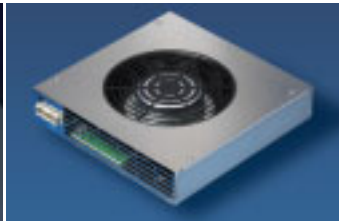
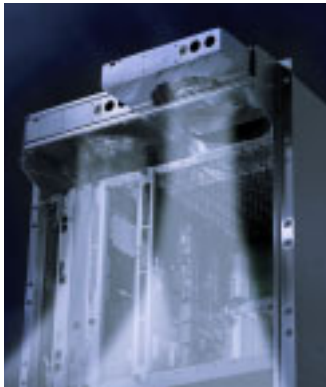
One of the major challenges posed by AdvancedTCA systems is heat management. The ATCA specification defines a heat loss of 200 W per slot. This means that a single ATCA shelf with 14 populated slots already has a maximum total heat loss of 2.8 kW, and the heat loss in an enclosure with three populated systems may therefore rise to more than 10 kW. Moreover, with clock frequencies likely to rise to the upper two-figure GHz range in the near future, current methods of air cooling will struggle or even be completely unable to deal with the heat loss arising. In order to find a suitable solution, we need to face up to this situation now.

As one of the leading manufacturers of climate control solutions, Rittal offers holistic concepts, from CPU cooling, to shelf cooling, through to complete rack cooling with an output of up to 12 kW.

Shelf cooling

For the majority of applications, air cooling is the preferred option. A distinction is made between push cooling and pull cooling. In push cooling, axial or diagonal fans press cold air into the system. In pull cooling, fans draw hot air out of the system. Due to the confined space and integration density, the pressure losses caused by ATCA

cards are very high. Standard axial fans in a push or pull configuration are less suitable, because they can cave in as the back-pressure rises. By contrast, radial fans specialise in these types of applications, although the throughput is slightly lower in free air.



ATCA specifies heat losses of up to 200 W per front board and 30 W per rear board, which translates into approximately 3 kW for a fully populated shelf with 14 boards.



The four high-capacity RiCool fans from Rittal with 320 m³/h ensure optimum climatic conditions. Including IPMB interface.

The redundancy and hot-swap features ensure reliability, even in the event of a fan failure (FRU). Replaceable dust filter in the air inlet zone.

CPU cooling

Cooling fluids benefit from the physical property of having a specific thermal capacity several times higher than air. As a result, it is possible to design very small cooling systems with a maximum cooling

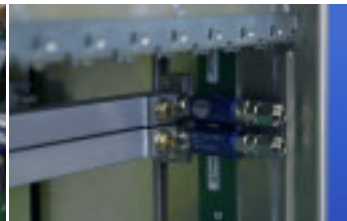
capacity and position them directly at the point of origination (e.g. processors). This helps to minimise the threat of hot spots which dramatically shorten the service life of electronics.



Liquid connection – via simple insertion. When the card is inserted, board cooling is automatically integrated into the cooling circuit.



Reliable discharge of 70 % of heat loss. Up to 250 W per cm² at the hot spot.



Rapid board exchange without hose couplings. Horizontal distributor integrated into the shelf.

Rack cooling

For the climate control of fully configured enclosures, there are several factors which need to be taken into account: The even distribution of chilled air, full accessibility to the 482.6 mm (19") level, plus the investment safeguards of on-demand expandability and remote

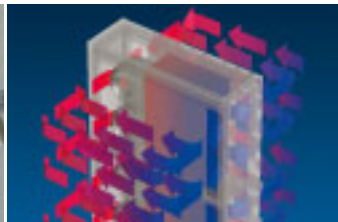
monitoring facilities. It should be possible to optimise the cooling output to the actual demand. Fully configured enclosures with ATCA systems can often push air cooling systems to their limits. Instead, complex air/water solutions are needed.



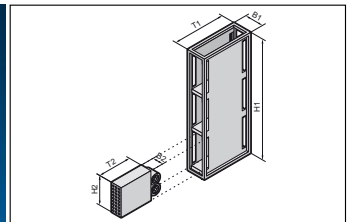
LCP (Liquid Cooling Package)



The Rittal LCP (Liquid Cooling Package) solves the problem of high heat losses with scalable cooling via air/water heat exchangers as a climate control enclosure on the side panel of a rack.



Individual ATCA shelves, as well as fully configured enclosures, can be cooled according to output.



Modular, upgradable and temperature-neutral cooling concept. 12 kW cooling output, with three cooling modules supported per cooling rack.



1U air/water heat exchanger

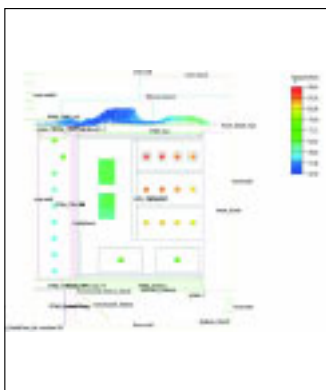


The 1 U air/water heat exchanger, in conjunction with a 482.6 mm (19") rack-mounted fan, offers reliable cooling up to 1.2 kW in enclosures with vertically installed systems.

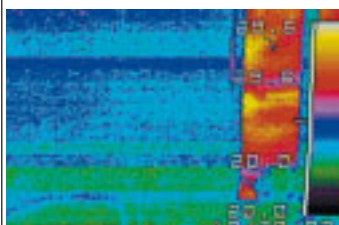


The compact depth of just 240 mm (approx.) also supports installation in 300 mm deep telecoms enclosures.

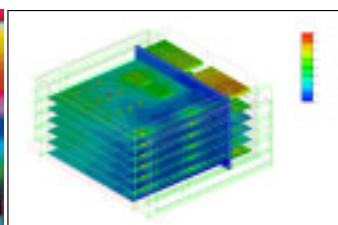
Greater reliability thanks to controller support and networking capabilities.



CFD (Computational Fluid Dynamics)



With the aid of CFD, climate control solutions may be optimised even before the first prototype has been built. Particularly in the development of AdvancedTCA solutions where high heat losses arise, developers need to be able to locate potential hot spots.



With this service, Rittal offers its clients comprehensive support during the planning phase.

Our portfolio of services includes:

- Visualisation of temperature variations
- Visualisation of air flows
- Localisation and elimination of hot spots

- Targeted optimisation of climate control
- Positioning of temperature sensors and smoke alarms

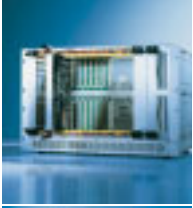
All in all – solutions from Rittal



Industrial enclosures



Power distribution



Electronic packaging

Microcomputer packaging systems for VME, VME64x, CompactPCI, AdvancedTCA and MicroTCA · Subracks
Instrument cases · Industrial PCs · Electronic wall-mounted enclosures · Electronic enclosure systems



System Climate Control



IT Solutions



Communication Systems

Rittal has one of the largest ranges of enclosures available for immediate delivery. However, Rittal also supplies integrated solutions – up to Level 4. This comprises mechanical installation, power supply, electronic components, climate control and central monitoring. For all of your requirements.

Fully assembled and functional. Wherever in the world you develop and implement solutions for yourself and your customers, we are close at hand. The global alliance between production, distribution and service guarantees closeness to the customer. Worldwide!

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