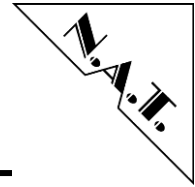


**NAMC-EXT-RTM-R  
RTM Extender Module  
Technical Reference Manual V1.1  
HW Revision 1.0**

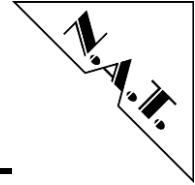


**The NAMC-EXT-RTM-R has been designed by:**

**N.A.T. GmbH  
Konrad-Zuse-Platz 9  
D-53227 Bonn-Oberkassel**

**Phone: +49 / 228 / 965 864 - 0  
Fax: +49 / 228 / 965 864 - 10**

**Internet: <http://www.nateurope.com>**



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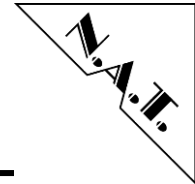
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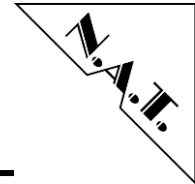
**Note:**

**The release of the Hardware Manual is related to a certain HW board revision given in the document title. For HW revisions earlier than the one given in the document title please contact N.A.T. for the corresponding older Hardware Manual release.**



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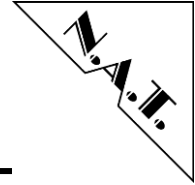
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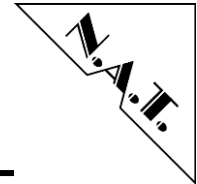
## Conventions

If not otherwise specified, addresses and memory maps are written in hexadecimal notation, identified by 0x.

The following table gives a list of the abbreviations used in this document.

**Table 1: List of used abbreviations**

<b>Abbreviation</b>	<b>Description</b>
AMC	Advanced Mezzanine Card
BUT	Board Under Test
GND	Ground
IPMB	Intelligent Platform Management Bus
μTCA/MTCA	Micro Telecommunications Computing Architecture
RTM	Rear Transition Module
SMD	Surface Mounted Device

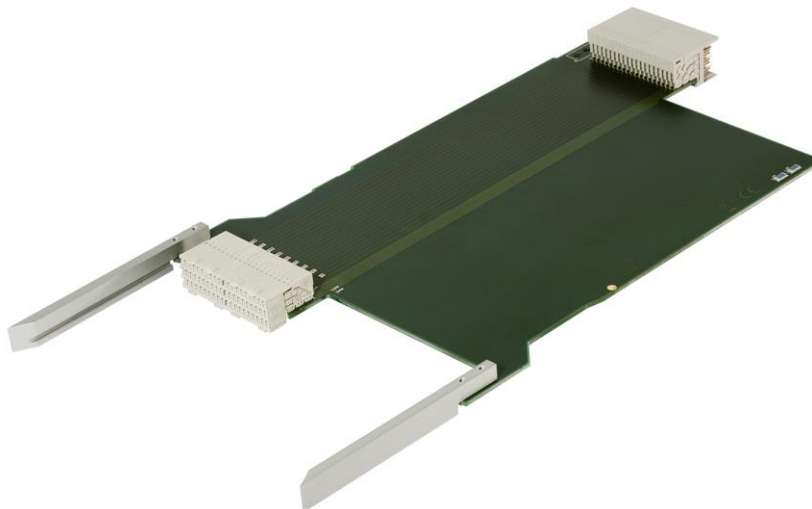


# 1 Introduction

The **NAMC-EXT-RTM-R** is a MTCA.4-based extender card for a Rear Transition Module, double width, double height. It eases debugging of  $\mu$ TCA-based AMC-RTM boards by enabling the user to access the module under test from both sides, install debug port cables, and it allows access for measurement of power supplies.

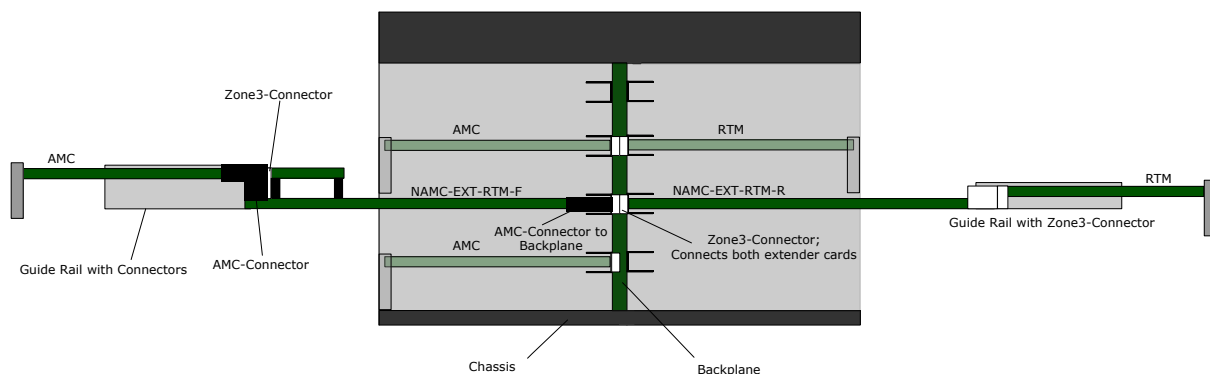
The following figure shows a photo of the **NAMC-EXT-RTM-R**. It is equipped with two Zone3-Connectors; one on the rear side to connect to a double wide AMC or an **NAMC-EXT-RTM-F** (Extender module for a front AMC) and the other one – surrounded by a guide rail – for insertion of the AMC-RTM.

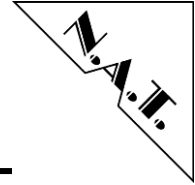
**Figure 1: NAMC-EXT-RTM-R**



Mechanical installation of the **NAMC-EXT-RTM-R** and the **NAMC-EXT-RTM-F** in a chassis is shown in the figure below. Both extender cards connect via the Zone3-Connector.

**Figure 2: Mechanical Installation in a Chassis**





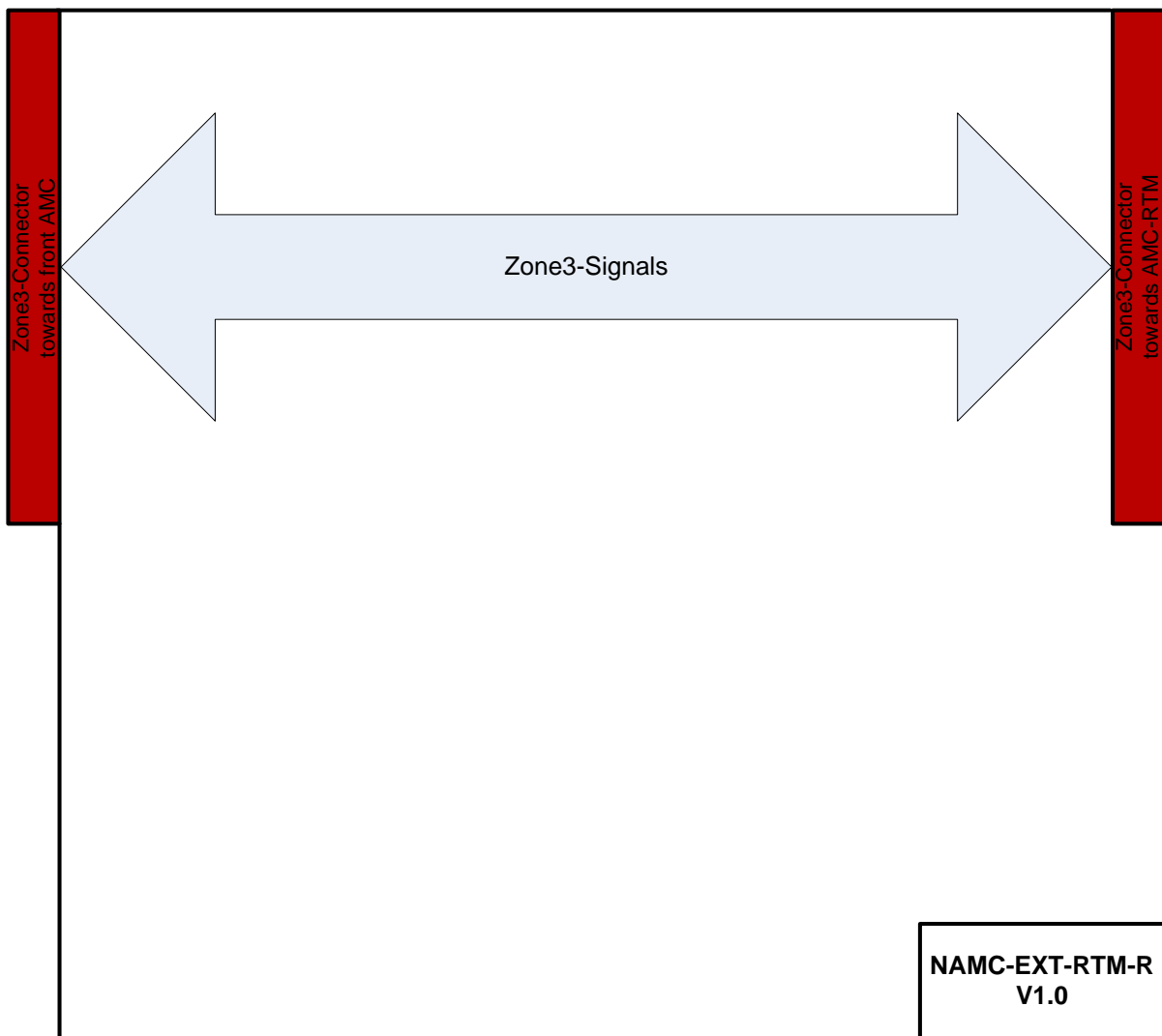
## 2 Overview

The **NAMC-EXT-RTM-R** is a passive extender board, it does not contain any circuitry.

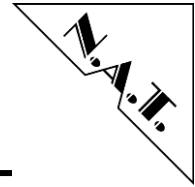
### 2.1 Block Diagram

The following figure shows a block diagram of the **NAMC-EXT-RTM-R**.

**Figure 3: NAMC-EXT-RTM-R – Block Diagram**



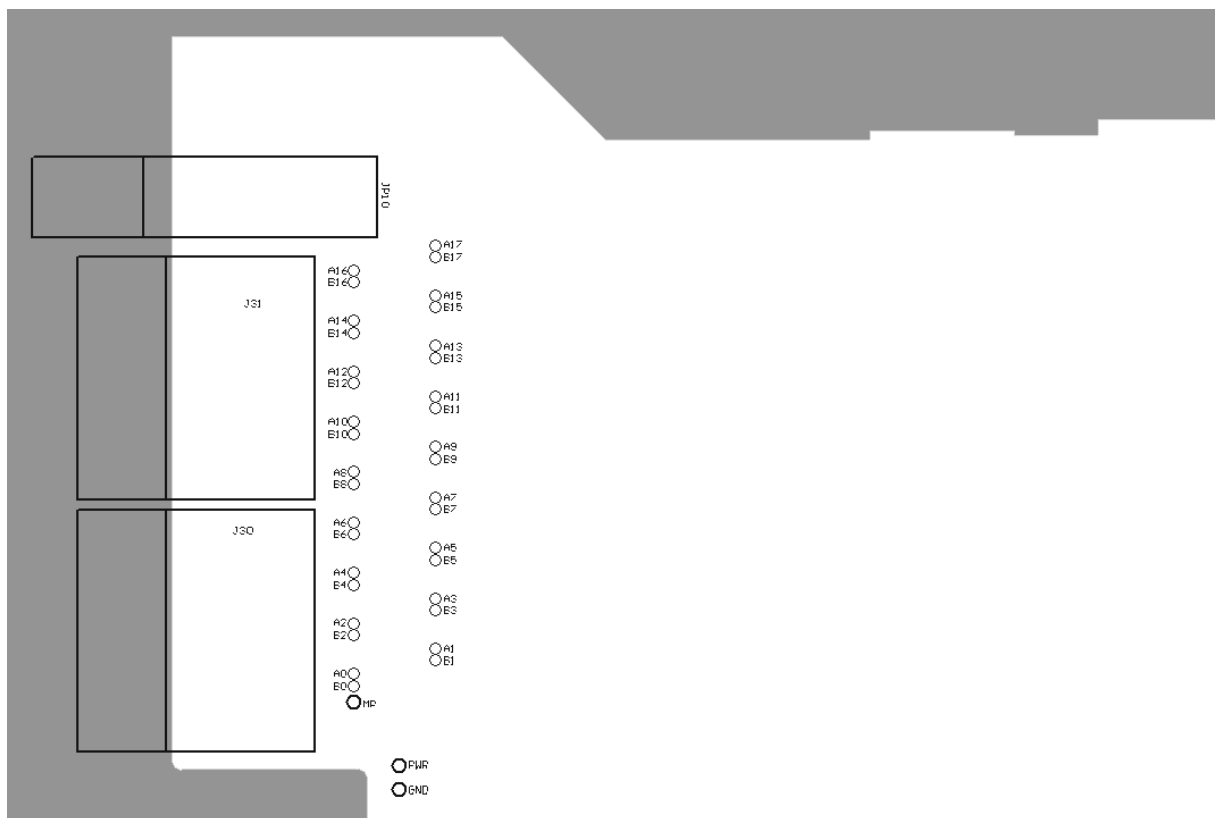




## 2.2 Location Diagram

The following figures highlight the position of the important components. Depending on the board type it might be that the board does not include all components named in the location diagrams.

**Figure 4: NAMC-EXT-RTM-R – Location Diagram (top left side)**



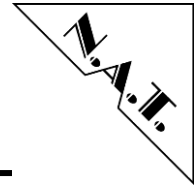
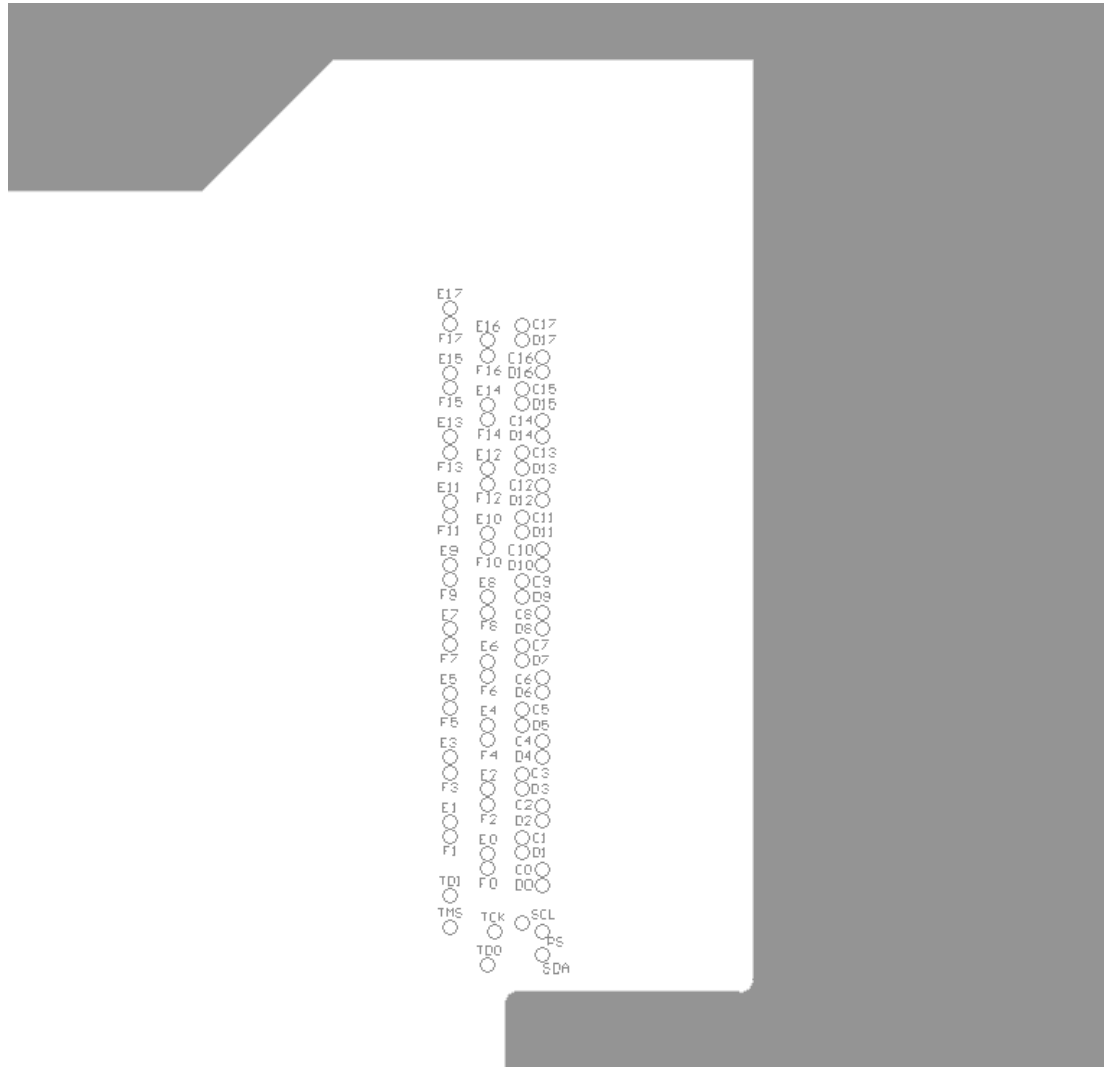


Figure 5: NAMC-EXT-RTM-R – Location Diagram (bottom left side)



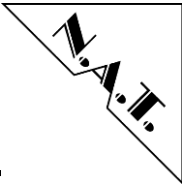
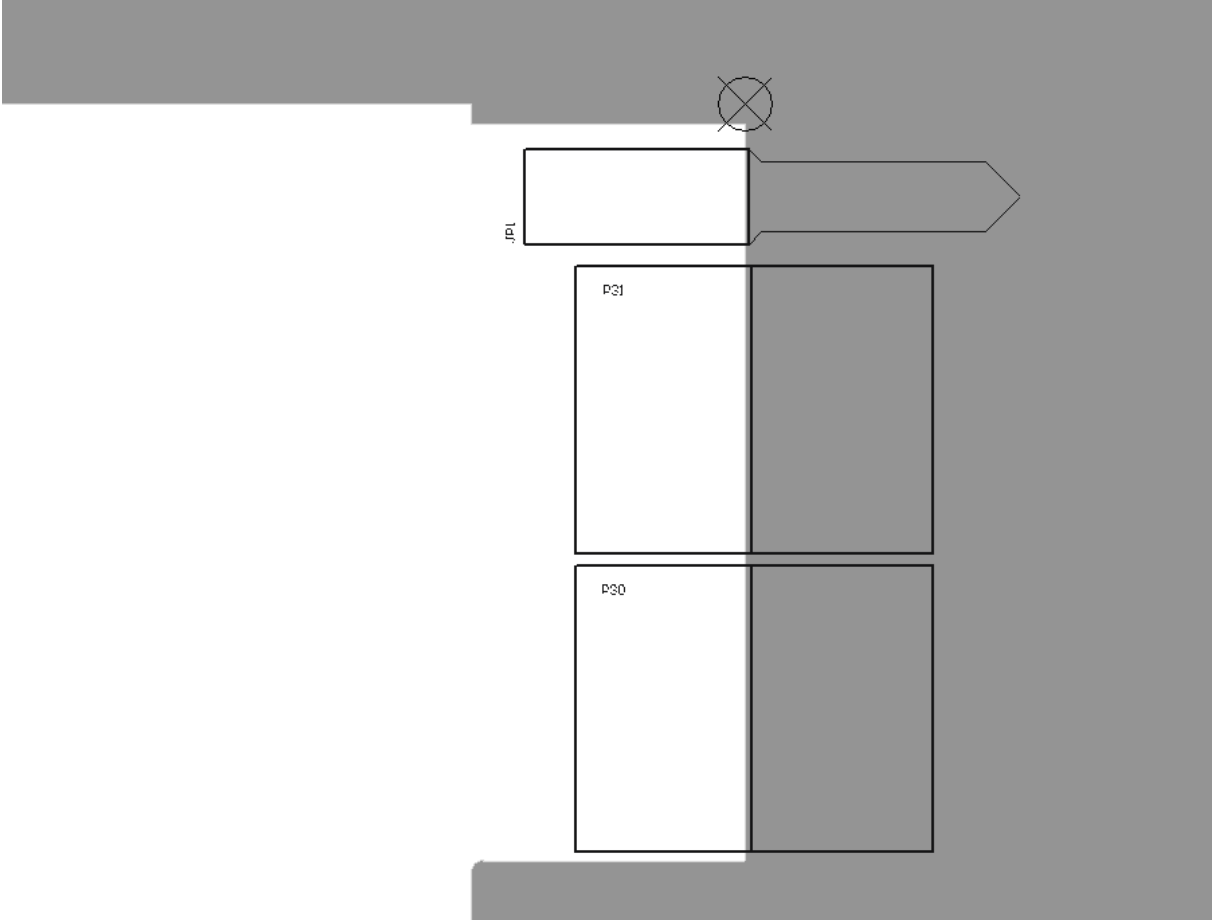
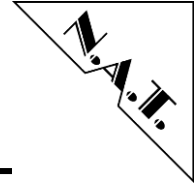


Figure 6: NAMC-EXT-RTM-R – Location Diagram (top right side)





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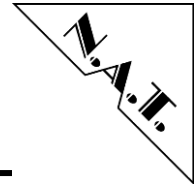
## 3 Board Features

### 3.1 Bus Interface

- All RTM ports connected

### 3.2 Power Supply

- Power planes for GND and payload power.

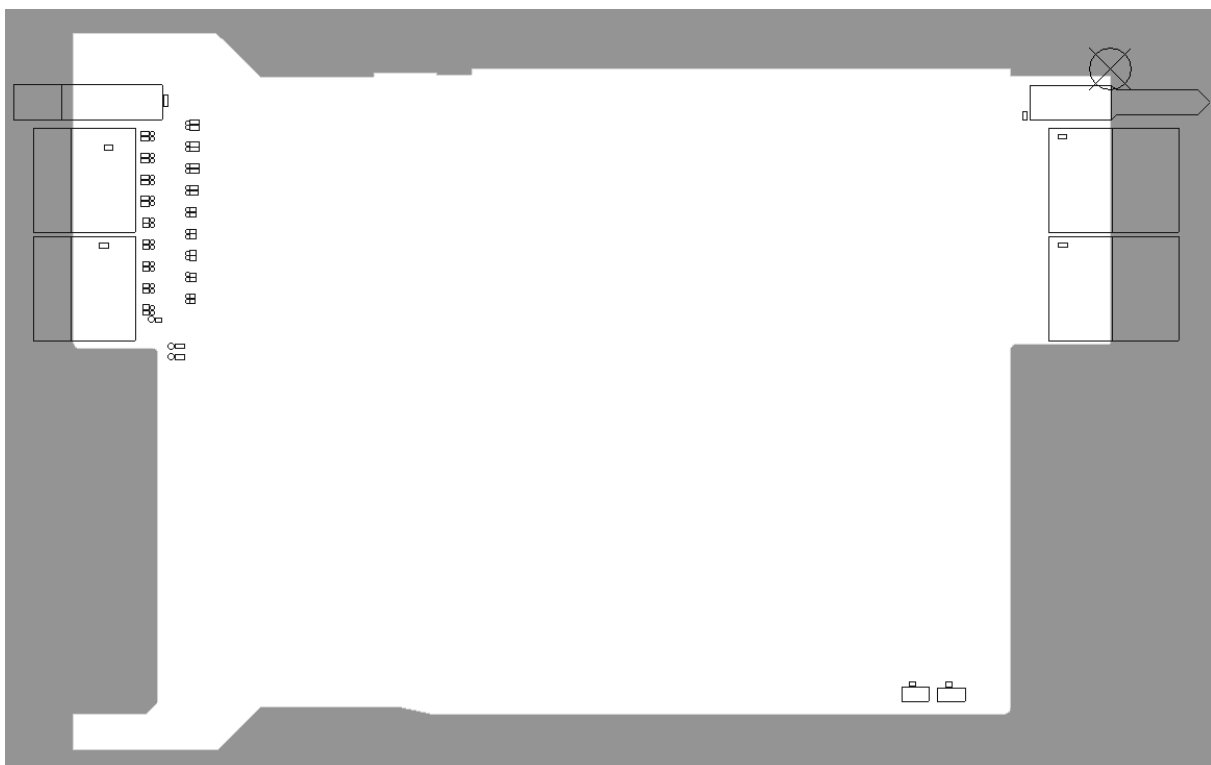


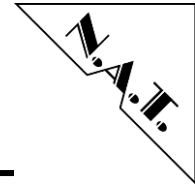
## 4 Hardware – Connectors

### 4.1 Connectors

There are several connectors on the **NAMC-EXT-RTM-R** board. Connector P30 and P31 are the socket into which the device under test is plugged. J30 and J31 enable the connection to the front AMC. The following figure shows the connectors:

**Figure 7: NAMC-EXT-RTM-R – Connectors**

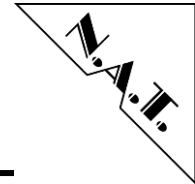




**4.1.1 J30/P30: RTM Connector**

**Table 2: J30 / P30: RTM Connector – Pin Assignment**

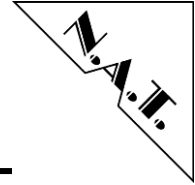
Pin #	RTM-Signal	RTM-Signal	Pin #
1	RTM_PWR	C3	46
2	RTM_PWR	D3	47
3	GND	GND	48
4	RTM_PWR	C4	49
5	RTM_PWR	D4	50
6	GND	GND	51
7	A0	C5	52
8	B0	D5	53
9	GND	GND	54
10	A1	C6	55
11	B1	D6	56
12	GND	GND	57
13	A2	C7	58
14	B2	D7	59
15	GND	GND	60
16	A3	RTM_TCK	61
17	B3	RTM_TDO	62
18	GND	GND	63
19	A4	RTM_TDI	64
20	B4	RTM_TMS	65
21	GND	GND	66
22	A5	E0	67
23	B5	F0	68
24	GND	GND	69
25	A6	E1	70
26	B6	F1	71
27	GND	GND	72
28	A7	E2	73
29	B7	F2	74
30	GND	GND	75
31	RTM_PS	E3	76
32	RTM_SDA	F3	77
33	GND	GND	78
34	RTM_MP	E4	79
35	RTM_SCL	F4	80
36	GND	GND	81
37	C0	E5	82
38	D0	F5	83
39	GND	GND	84
40	C1	E6	85
41	D1	F6	86
42	GND	GND	87
43	C2	E7	88
44	D2	F7	89
45	GND	GND	90



**4.1.2 J31/P31: RTM Connector**

**Table 3: J31 / P31: RTM Connector – Pin Assignment**

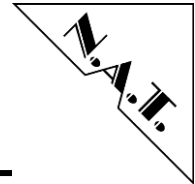
Pin #	RTM-Signal	RTM-Signal	Pin #
1	A8	C13	46
2	B8	D13	47
3	GND	GND	48
4	A9	C14	49
5	B9	D14	50
6	GND	GND	51
7	A10	C15	52
8	B10	D15	53
9	GND	GND	54
10	A11	C16	55
11	B11	D16	56
12	GND	GND	57
13	A12	C17	58
14	B12	D17	59
15	GND	GND	60
16	A13	E8	61
17	B13	F8	62
18	GND	GND	63
19	A14	E9	64
20	B14	F9	65
21	GND	GND	66
22	A15	E10	67
23	B15	F10	68
24	GND	GND	69
25	A16	E11	70
26	B16	F11	71
27	GND	GND	72
28	A17	E12	73
29	B17	F12	74
30	GND	GND	75
31	C8	E13	76
32	D8	F13	77
33	GND	GND	78
34	C9	E14	79
35	D9	F14	80
36	GND	GND	81
37	C10	E15	82
38	D10	F15	83
39	GND	GND	84
40	C11	E16	85
41	D11	F16	86
42	GND	GND	87
43	C12	E17	88
44	D12	F17	89
45	GND	GND	90



## **4.2 Test points**

There are a number of test points available on the **NAMC-EXT-RTM-R**. Due to layout reasons there are only small SMD test points for the differential signals. All other signals (e.g. geographical address, IPMB signals, etc.) are routed to standard test points, into which standard 100 mil header connectors may be assembled. By default, there are no headers assembled. The names of the signals carried by the test points are printed on the silkscreen.

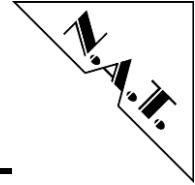




## 5 Board Specifications

**Table 4: NAMC-EXT-RTM-R: Board Specifications**

<b>RTM-Module</b>	Extender for Advanced Mezzanine Card Rear Transition Modules, double width, double height
<b>Power Consumption (NAMC-EXT-RTM-R only)</b>	none
<b>Operating Temperature</b>	-40°C - +85°C
<b>Storage Temperature</b>	-40°C - +85°C
<b>Humidity</b>	5% - 90% rh non-condensing



---

## 6 Installation

### 6.1 Safety Note

To ensure proper functioning of the **NAMC-EXT-RTM-R** during its usual lifetime take the following precautions before handling the board.

#### **CAUTION**

Electrostatic discharge and incorrect board installation and uninstallation can damage circuits or shorten their lifetime.

- Before installing or uninstalling the **NAMC-EXT-RTM-R** read this installation section
- Before installing or uninstalling the **NAMC-EXT-RTM-R** in a rack:
  - Check all installed boards and modules for steps that you have to take before turning on or off the power.
  - Take those steps.
  - Finally turn on or off the power.
- Before touching integrated circuits ensure to take all require precautions for handling electrostatic devices.

### 6.2 Installation Requirements

#### **IMPORTANT**

Before powering up check this section for installation prerequisites and requirements!

#### **6.2.1 Requirements**

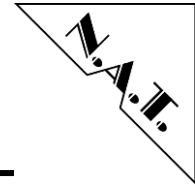
The installation requires only

- an AMC backplane for connecting the **NAMC-EXT-RTM-R**.
- a power supply

#### **6.2.2 Power supply**

The power supply for the **NAMC-EXT-RTM-R** must meet the following specifications:

- required for the board under test:
  - refer to the BUT power specification



---

## 6.3 Statement on Environmental Protection

### 6.3.1 Compliance to RoHS Directive

Directive 2011/65/EU of the European Parliament and of the Council of 8 June 2011 on the "Restriction of the use of certain Hazardous Substances in Electrical and Electronic Equipment" (RoHS) predicts that all electrical and electronic equipment being put on the European market after June 30th, 2006 must contain lead, mercury, hexavalent chromium, polybrominated biphenyls (PBB) and polybrominated diphenyl ethers (PBDE) and cadmium in maximum concentration values of 0.1% respective 0.01% by weight in homogenous materials only.

As these hazardous substances are currently used with semiconductors, plastics (i.e. semiconductor packages, connectors) and soldering tin any hardware product is affected by the RoHS directive if it does not belong to one of the groups of products exempted from the RoHS directive.

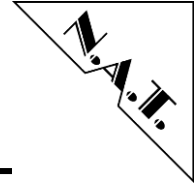
Although many of hardware products of N.A.T. are exempted from the RoHS directive it is a declared policy of N.A.T. to provide all products fully compliant to the RoHS directive as soon as possible. For this purpose since January 31st, 2005 N.A.T. is requesting RoHS compliant deliveries from its suppliers. Special attention and care has been payed to the production cycle, so that wherever and whenever possible RoHS components are used with N.A.T. hardware products already.

### 6.3.2 Compliance to WEEE Directive

Directive 2002/95/EC of the European Commission on "Waste Electrical and Electronic Equipment" (WEEE) predicts that every manufacturer of electrical and electronic equipment which is put on the European market has to contribute to the reuse, recycling and other forms of recovery of such waste so as to reduce disposal. Moreover this directive refers to the Directive 2002/95/EC of the European Commission on the "Restriction of the use of certain Hazardous Substances in Electrical and Electronic Equipment" (RoHS).

Having its main focus on private persons and households using such electrical and electronic equipment the directive also affects business-to-business relationships. The directive is quite restrictive on how such waste of private persons and households has to be handled by the supplier/manufacturer, however, it allows a greater flexibility in business-to-business relationships. This pays tribute to the fact with industrial use electrical and electronic products are commonly integrated into larger and more complex environments or systems that cannot easily be split up again when it comes to their disposal at the end of their life cycles.

As N.A.T. products are solely sold to industrial customers, by special arrangement at time of purchase the customer agreed to take the responsibility for a WEEE compliant disposal of the used N.A.T. product. Moreover, all N.A.T. products are marked according to the directive with a crossed out bin to indicate that these products within the European Community must not be disposed with regular waste.



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If you have any questions on the policy of N.A.T. regarding the Directive 2011/65/EU of the European Parliament and of the Council of 8 June 2011 on the "Restriction of the use of certain Hazardous Substances in Electrical and Electronic Equipment" (RoHS) or the Directive 2002/95/EC of the European Commission on "Waste Electrical and Electronic Equipment" (WEEE) please contact N.A.T. by phone or e-mail.

**6.3.3 Compliance to CE Directive**

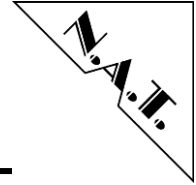
Compliance to the CE Directive is declared. A 'CE' sign can be found on the PCB.

**6.3.4 Product Safety**

The board complies to EN60950 and UL1950.

**6.3.5 Compliance to REACH**

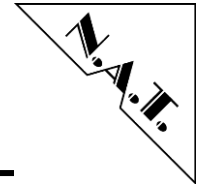
The REACH EU regulation (Regulation (EC) No 1907/2006) is known to N.A.T. GmbH. N.A.T. did not receive information from their European suppliers of substances of very high concern of the ECHA candidate list. Article 7(2) of REACH is notable as no substances are intentionally being released by NAT products and as no hazardous substances are contained. Information remains in effect or will be otherwise stated immediately to our customers.



---

## 7 Known Bugs / Restrictions

none




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## Appendix A: Document's History

Revision	Date	Description	Author
1.0	08.07.2010	initial revision	rm
1.1	17.05.2013	Address, Phone and fax updated, words updated	fh
	26.08.2014	Adaption to new layout incl. renaming of headings Minor changes, typo correction Updated chapter 6.3 RoHS-Directive / REACH	Se
	23.09.2014	Added Block Diagram	se