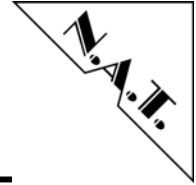


**NAMC-Extender
AMC Extender Module
Technical Reference Manual V1.4
HW Revision 1.5**



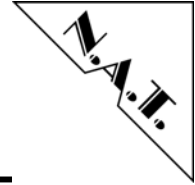
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Note:

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.

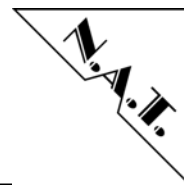
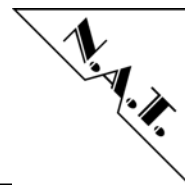


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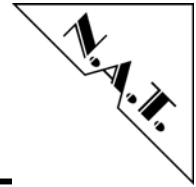


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1 Introduction

The **NAMC-Extender** is an extender card for standard Advanced Mezzanine Cards, single width, double height. It can be plugged onto any ATCA carrier board supporting AMC standards. It is also designed to meet the requirements of μ TCA systems.

It eases debugging of AMC boards by enabling the user to access the module under test from both sides, install debug port cables, and allow access for measurement of power supplies.

2 Technical Specifications

2.1 Bus Interface

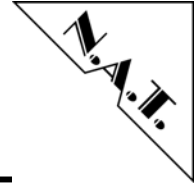
- All AMC ports connected

2.2 Power Supply

- The NAMC-Extender draws very little power from the carrier supplies. Current drawn from +3.3V, and +12V is less than 10mA each.
- Power planes for GND, payload power and management power.
- Both power supplies drive signalling LEDs.
- Both power supplies may be cut by opening wire bridges for current measurements.
- +3.3V Management power may either be taken from the backplane, or generated locally from Payload Power.
- Payload Power may either be taken from the backplane, or a +12V power supply may be connected to wire bridge BR1.

2.3 Environment

- Temperature: -40 – +85°C operating and storage
- Humidity: 5 – 90% rh not condensing



3 Installation

3.1 Safety Note

To ensure proper functioning of the **NAMC-Extender** 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-Extender** read this installation section
- Before installing or uninstalling the **NAMC-Extender** 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.

3.2 Installation Requirements

3.2.1 Requirements

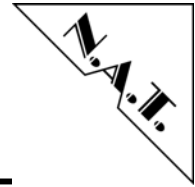
The installation requires only

- an AMC backplane for connecting the **NAMC-Extender**.
This can be either an ATCA carrier board, or a μ TCA backplane
- a power supply

3.2.2 Power supply

The power supply for the **NAMC-Extender** must meet the following specifications:

- required for the extender board:
 - +3.3V / 0.01A typical
 - +12V / 0.01A typical
- required for the board under test:
 - refer to the BUT power specification



3.3 Statement on Environmental Protection

3.3.1 Compliance to RoHS Directive

Directive 2002/95/EC of the European Commission 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.

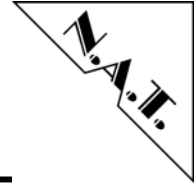
As these hazardous substances are currently used with semiconductors, plastics (i.e. semiconductor packages, connectors) and soldering tin any hardware product is affected by the RoHS directive if it does not belong to one of the groups of products exempted from the RoHS directive.

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 paid to the production cycle, so that wherever and whenever possible RoHS components are used with N.A.T. hardware products already.

3.3.2 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.

If you have any questions on the policy of N.A.T. regarding 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) 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.

3.3.3 Compliance to CE Directive

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

3.3.4 Product Safety

The board complies to EN60950 and UL1950.

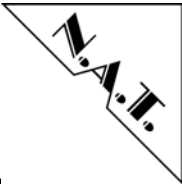
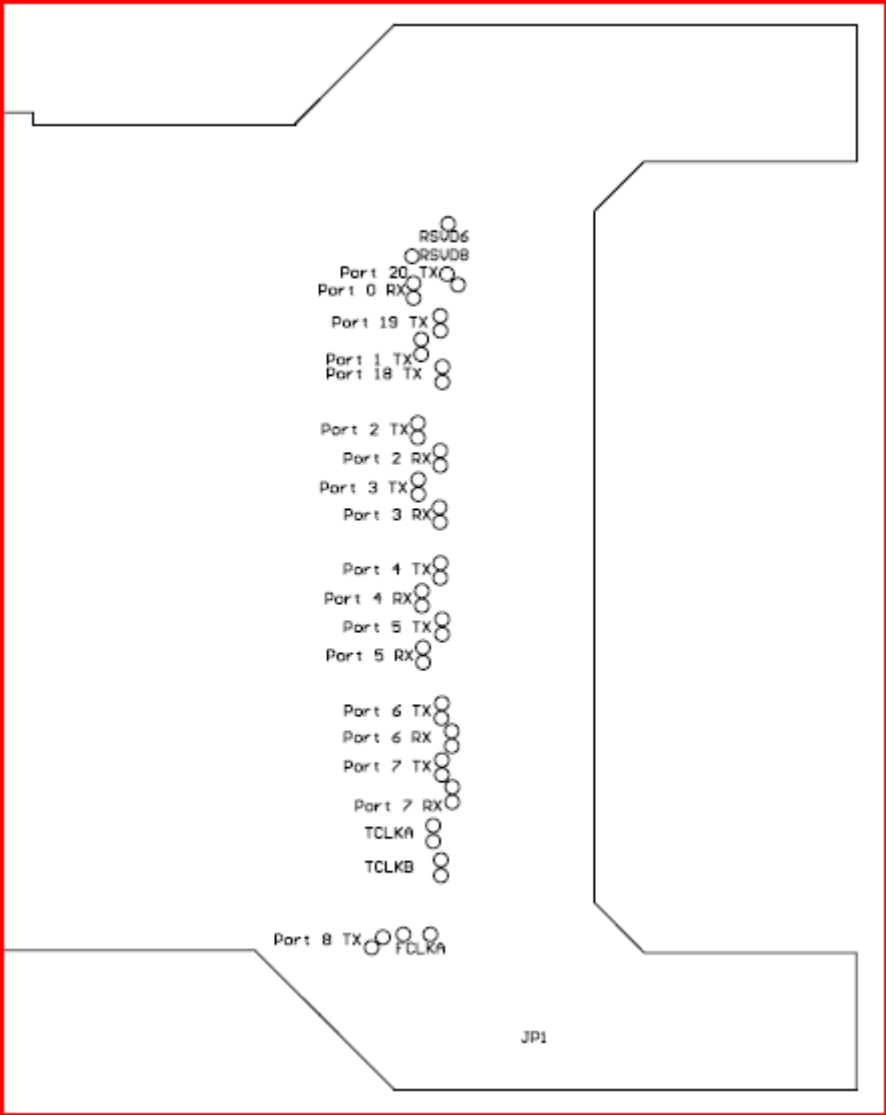
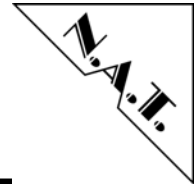


Figure 2: Location diagram of the NAMC-Extender (bottom left side)

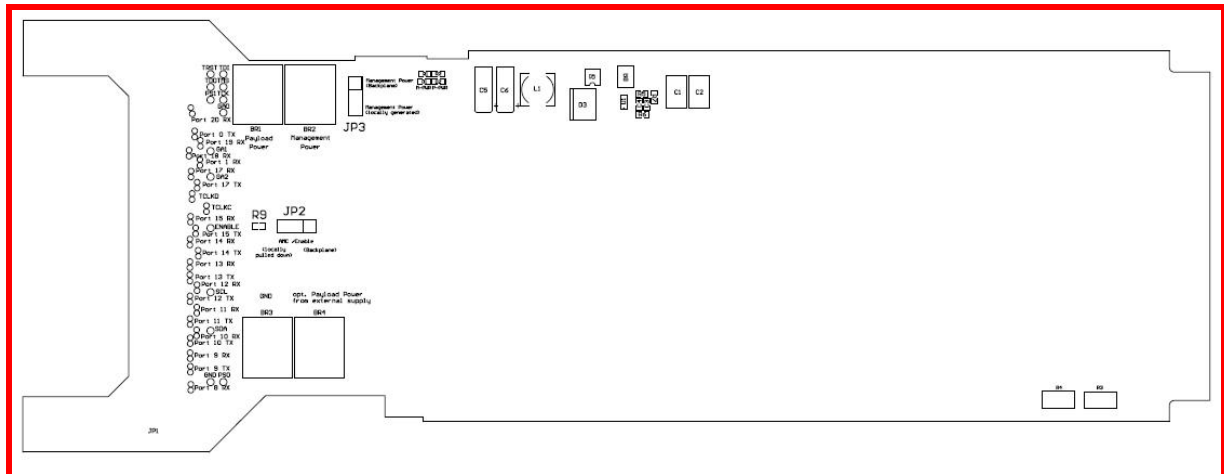




4.2 Connectors, Switch and Wire Bridges

There are 2 connectors and 3 wire bridges on the NAMC-Extender. Connector J1 is a direct connector and fits into the ATCA or μ TCA AMC slot. Connector JP1 is the socket into which the device under test is plugged. Figure 3 shows the connectors, as well as the wire bridges:

Figure 3: Connectors of the NAMC-Extender



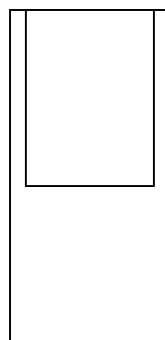
4.2.1 Jumper JP2

The setting of jumper JP2 defines the source for /AMC_ENABLE signal. The default position (right aligned) means the signal is connected to the backplane. In the left aligned position the signal is pulled down locally on the extender board.

4.2.2 Jumper JP3

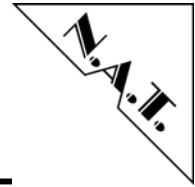
The setting of jumper JP3 defines the source of Management Power. By default, Management Power is taken from the backplane (jumper JP3 in the upper position). In case there is no Management Power available (e.g. a test assembly with just a +12V supply), Management Power can be generated onboard from the +12V Payload Power. In order to make use of this feature, set switch JP3 to the lower position.

Jumper JP3



upper position:
Management Power taken
from backplane

lower position:
Management Power
locally generated



4.2.3 Wire Bridges

By means of the wire bridges BR1 and BR2 the supply voltages are connected. By placing an ampere-meter between the contacts of one of these wire bridge, the supply current of the respective power supply can be measured. Table 1 shows these wire bridges, and which supply they connect:

Table 1: Wire Bridges

Supply	Wire Bridge
+12V Payload Power	BR1
+3.3V Management Power	BR2
GND (reference point or external supply)	BR3
+12V Payload Power (external supply)	BR4

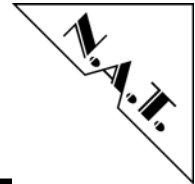
Both contacts of BR3 are connected to GND, hence GND cannot be disconnected from the device under test by opening this wire bridge. BR3 serves 2 purposes:

- GND can easily be accessed, e.g. as a reference contact for measuring purposes
- by means of these GND contacts an external power supply may be connected

Both contacts of BR4 are connected to Payload Power, hence +12V cannot be disconnected from the device under test by opening this wire bridge. BR4 may be used to connect an external power supply to the extender board, e.g. when there is no backplane available.

4.3 Testpoints

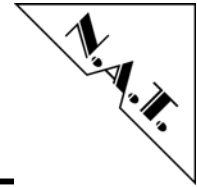
There are a number of testpoints available on the NAMC-Extender. Due to layout reasons (differential trace routing for signals with up to 2.5 GHz frequency is somewhat critical), there are only small SMD testpoints for the differential signals. All other signals (e.g. geographical address, IPMB signals, etc.) are routed to standard testpoints, into which standard 100 mil header connectors may be assembled. By default, there are no headers assembled. The signals testpoints carry are printed on the silkscreen.



5 AMC Port Definition

Table 2: AMC Port Definition for N.A.T. AMC Modules

	Port No.	AMC Port Mapping Strategy	Ports used as
Basic Connector	CLK1	Clocks	Reference Clock TCLKA
	CLK2		Reference Clock TCLKB
	CLK3		Reference Clock FCLKA
	0	Common Options Region	1000Base-BX Ethernet Channel 1
	1		1000Base-BX Ethernet Channel 2
	2		unassigned
	3		unassigned
	4	Fat Pipes	Fat Pipe Lane 0
	5		Fat Pipe Lane 1
	6		Fat Pipe Lane 2
7	Fat Pipe Lane 3		
Extended Connector	8	Region	Fat Pipe Lane 4
	9		Fat Pipe Lane 5
	10		Fat Pipe Lane 6
	11		Fat Pipe Lane 7
	12	Extended Options Region	TDM Bus D0-3 (H.110 extended)
	13		TDM Bus D4-7 (H.110 extended)
	14		optional clock lines (H.110 extended)/ unassigned
	15		Unassigned
	16		TCLKC / TCLKD
	17		Unassigned
	18		optional clock lines (Rear I/O)/ unassigned
	19		Rear I/O (TDM P2P/E1 Framers)
	20		Rear I/O (SPI)

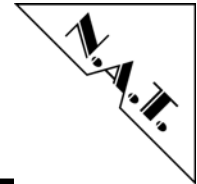


6 Connectors

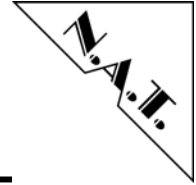
6.1 AMC Connectors J1 / JP1

Table 3: AMC Connectors J1 / JP1

Pin No.	AMC-Signal	AMC-Signal	Pin No.
1	GND	GND	170
2	PWR	TDI	169
3	/PS1	TDO	168
4	PWR_IPMB	/TRST	167
5	GA0	TMS	166
6	RESVD	TCK	165
7	GND	GND	164
8	RESVD	Tx20+	163
9	PWR	Tx20-	162
10	GND	GND	161
11	Tx0+	Rx20+	160
12	Tx0-	Rx20-	159
13	GND	GND	158
14	Rx0+	Tx19+	157
15	Rx0-	Tx19-	156
16	GND	GND	155
17	GA1	Rx19+	154
18	PWR	Rx19-	153
19	GND	GND	152
20	Tx1+	Tx18+	151
21	Tx1-	Tx18-	150
22	GND	GND	149
23	RLINK2_P	Rx18+	148
24	RLINK2_N	Rx18-	147
25	GND	GND	146
26	GA2	Tx17+	145
27	PWR	Tx17-	144
28	GND	GND	143
29	Tx2+	Rx17+	142
30	Tx2-	Rx17-	141
31	GND	GND	140
32	Rx2+	Tx16+	139
33	Rx2-	Tx16-	138



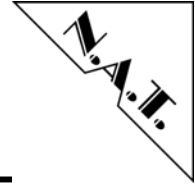
Pin No.	AMC-Signal	AMC-Signal	Pin No.
34	GND	GND	137
35	Tx3+	Rx16+	136
36	Tx3-	Rx16-	135
37	GND	GND	134
38	Rx3+	Tx15+	133
39	Rx3-	Tx15-	132
40	GND	GND	131
41	/ENABLE	Rx15+	130
42	PWR	Rx15-	129
43	GND	GND	128
44	Tx4+	Tx14+	127
45	Tx4-	Tx14-	126
46	GND	GND	125
47	Rx4+	Rx14+	124
48	Rx4-	Rx14-	123
49	GND	GND	122
50	Tx5+	Tx13+	121
51	Tx5-	Tx13-	120
52	GND	GND	119
53	Rx5+	Rx13+	118
54	Rx5-	Rx13-	117
55	GND	GND	116
56	IPMB_SCL	Tx12+	115
57	PWR	Tx12-	114
58	GND	GND	113
59	Tx6+	Rx12+	112
60	Tx6-	Rx12-	111
61	GND	GND	110
62	Rx6+	Tx11+	109
63	Rx6-	Tx11-	108
64	GND	GND	107
65	Tx7+	Rx11+	106
66	Tx7-	Rx11-	105
67	GND	GND	104
68	Rx7+	Tx10+	103
69	Rx7-	Tx10-	102
70	GND	GND	101
71	IPMB_SDA	Rx10+	100
72	PWR	Rx10-	99
73	GND	GND	98
74	TCLKA+	Tx9+	97



Pin No.	AMC-Signal	AMC-Signal	Pin No.
75	TCLKA-	Tx9-	96
76	GND	GND	95
77	TCLKB+	Rx9+	94
78	TCLKB-	Rx9-	93
79	GND	GND	92
80	FCLKA+	Tx8+	91
81	FCLKA-	Tx8-	90
82	GND	GND	89
83	/PS0	Rx8+	88
84	PWR	Rx8-	87
85	GND	GND	86

7 Known Bugs / Restrictions

none



Appendix A: Document's History

Revision	Date	Description	Author
1.0	05.01.2007	initial revision	ga
1.1	14.03.2007	adapted to HW Release 1.3 and to AMC Spec R. 2.0	ga
1.2	02.05.2007	adapted to HW Release 1.4	ga
1.3	26.06.2007	altered naming of signals to be board-independent	te
1.4	10.06.2008	adapted to HW Release 1.5	te