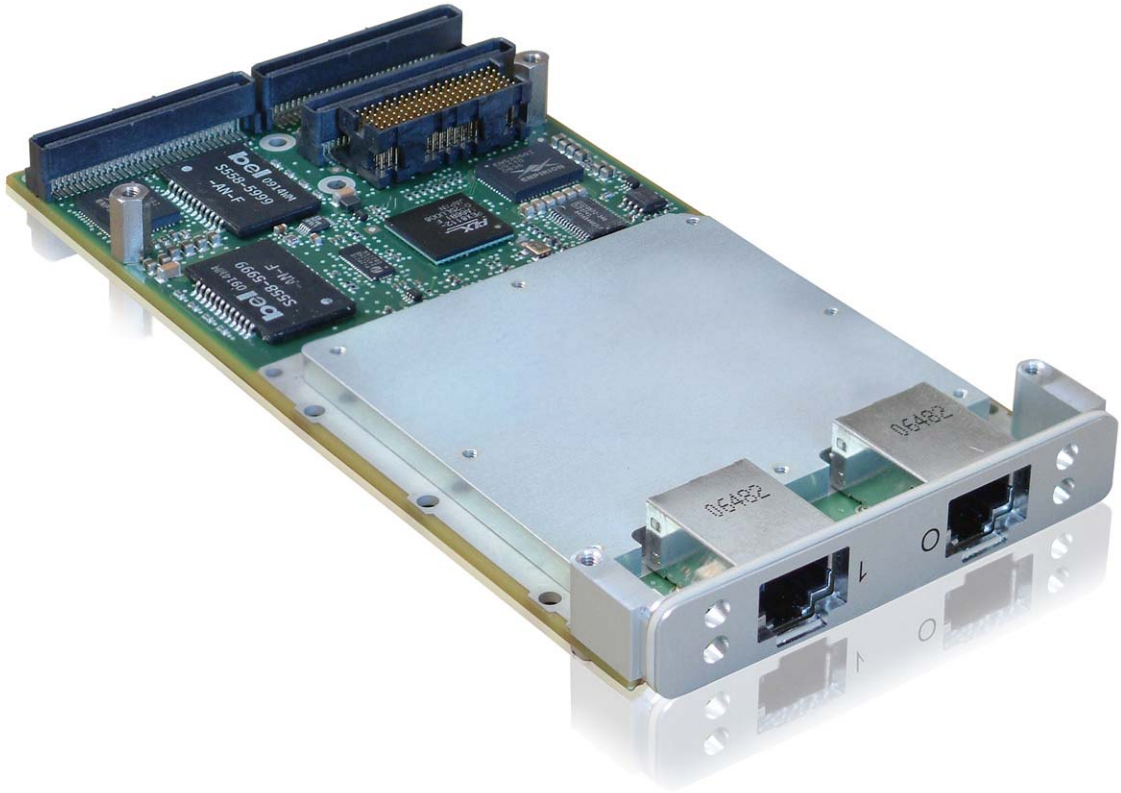
» XMC-ETH2 «



Dual Gigabit Ethernet Mezzanine Card
User's Guide

CA.DT.A69-3e - September 2010

Revision History

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Rev.	**Brief Description of Changes**	**Date of Issue**
3e	Update section 1.3.2 Ordering Information Update section 3.4 Electrical Requirements	09-2010
2e	Addition of PMC-ETH2-SA and PMC-ETH2-RA versions.	02-2010
1e	Update front panel pictures. Add Etherned LEDs information.	10-2009
0e	Initial Release.	07-2009

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- reduce waste arising from electrical and electronic equipment (EEE)
- make producers of EEE responsible for the environmental impact of their products, especially when they become waste
- encourage separate collection and subsequent treatment, reuse, recovery, recycling and sound environmental disposal of EEE
- improve the environmental performance of all those involved during the lifecycle of EEE

Conventions

This guide uses several types of notice: Note, Caution, ESD.

Note: this notice calls attention to important features or instructions.

Caution: this notice alert you to system damage, loss of data, or risk of personal injury.

ESD: This banner indicates an Electrostatic Sensitive Device.

All numbers are expressed in decimal, except addresses and memory or register data, which are expressed in hexadecimal. The prefix `0x' shows a hexadecimal number, following the `C' programming language convention.

The multipliers `k', `M' and `G' have their conventional scientific and engineering meanings of $*10^3$, $*10^6$ and $*10^9$ respectively. The only exception to this is in the description of the size of memory areas, when `K', `M' and `G' mean $*2^{10}$, $*2^{20}$ and $*2^{30}$ respectively.

When describing transfer rates, `k' `M' and `G' mean $*10^3$, $*10^6$ and $*10^9$ *not $*2^{10}$ $*2^{20}$ and $*2^{30}$.*

In PowerPC terminology, multiple bit fields are numbered from 0 to n, where 0 is the MSB and n is the LSB. PCI and CompactPCI terminology follows the more familiar convention that bit 0 is the LSB and n is the MSB.

Signal names ending with an asterisk (*) or a hash (#) denote active low signals; all other signals are active high.

Signal names follow the PICMG 2.0 R3.0 CompactPCI Specification and the PCI Local Bus 2.3 Specification.

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High Voltage Safety Instructions

Warning!
All operations on this device must be carried out by sufficiently skilled personnel only.

Caution, Electric Shock!
Before installing a not hot-swappable Kontron product into a system always ensure that your mains power is switched off. This applies also to the installation of piggybacks. Serious electrical shock hazards can exist during all installation, repair and maintenance operations with this product. Therefore, always unplug the power cable and any other cables which provide external voltages before performing work.

Special Handling and Unpacking Instructions

ESD Sensitive Device!
Electronic boards and their components are sensitive to static electricity. Therefore, care must be taken during all handling operations and inspections of this product, in order to ensure product integrity at all times

Do not handle this product out of its protective enclosure while it is not used for operational purposes unless it is otherwise protected.

Whenever possible, unpack or pack this product only at EOS/ESD safe work stations. Where a safe work station is not guaranteed, it is important for the user to be electrically discharged before touching the product with his/her hands or tools. This is most easily done by touching a metal part of your system housing.

It is particularly important to observe standard anti-static precautions when changing piggybacks, ROM devices, jumper settings etc. If the product contains batteries for RTC or memory backup, ensure that the board is not placed on conductive surfaces, including anti-static plastics or sponges. They can cause short circuits and damage the batteries or conductive circuits on the board.

General Instructions on Usage

In order to maintain Kontron's product warranty, this product must not be altered or modified in any way. Changes or modifications to the device, which are not explicitly approved by Kontron and described in this manual or received from Kontron's Technical Support as a special handling instruction, will void your warranty.

This device should only be installed in or connected to systems that fulfill all necessary technical and specific environmental requirements. This applies also to the operational temperature range of the specific board version, which must not be exceeded. If batteries are present, their temperature restrictions must be taken into account.

In performing all necessary installation and application operations, please follow only the instructions supplied by the present manual.

Keep all the original packaging material for future storage or warranty shipments. If it is necessary to store or ship the board, please re-pack it as nearly as possible in the manner in which it was delivered.

Special care is necessary when handling or unpacking the product. Please consult the special handling and unpacking instruction on the previous page of this manual.

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Chapter 1 - Introduction

1.1 Manual Overview

This manual describes the PMC/XMC Dual Gigabit Ethernet mezzanine card from Kontron.

Functional changes that differ from previous version of the document are identified by a vertical bar in the margin.

In this document, the term XMC-ETH2 applies both to:

- Mezznine boards fitted both with a PCI PMC interface and a PCI-E XMC interface (XMC-ETH2-SA)
- Mezzanine boards fitted only with the PCI-E XMC interface (XMC-ETH2-RC)
- Mezzanine boards fitted only with a PCI PMC interface (PMC-ETH2-SA/RA/RC)

This manual is divided in several Chapters and sub-sections:

- Chapter 1: This chapter: Related Documents, Board Overview and Block Diagram.
- Chapter 2: Unpacking, installation and identification instructions.
- Chapter 3: General, physical and environmental specifications, power requirements, EMC regulatory compliance and safety, flammability rating and MTBF data.
- Chapter 4: PMC/XMC and I/O connectors.
- Appendix A: List of Abbreviations.
- Appendix B: Tested Configurations.

1.2 Related Documents

This guide is written to cover a wide range of people; from installation technicians, operators, and system managers, to hardware and software engineers. To better understand how the PMC/XMC functions, these individuals should be familiar with the concepts of the following documents.

Document	Ordering Information
Standard Physical and Environmental Layers for PCI Mezzanine Cards (PMC) IEEE 1386.1-2001	IEEE Standards Department Order Department 445 Hoes Lane, P.O. Box 1331 Piscataway, NJ 08855-1331 www.ieee.org
Standard Mechanics for a Common Mezzanine Card Family (CMC) IEEE 1386-2001	
Standard for Mechanical Core Specifications for Conduction Cooled Euro-cards IEEE 1101.2-1992	
XMC Switched Mezzanine Card Auxiliary Standard VITA 42.0-2005	VITA Standards Organization P.O. Box 19658 Fountain Hills AZ 85269-1958 www.vita.com
XMC PCI Express Protocol Layer Standard VITA 42.3-2006	
Environments, Design and Construction, Safety, and Quality for Plug-In Units ANSI/VITA 47-2005	
Conduction Cooled PMC (CCPMC) ANSI/VITA 20-2001 (R2005)	
Reliability Models MIL HDBK 217F and CNET RDF93/CENT RDF2000	CNET www.vita.com

Table 1: Industry Specifications and User Documentation

1.3 Board Overview

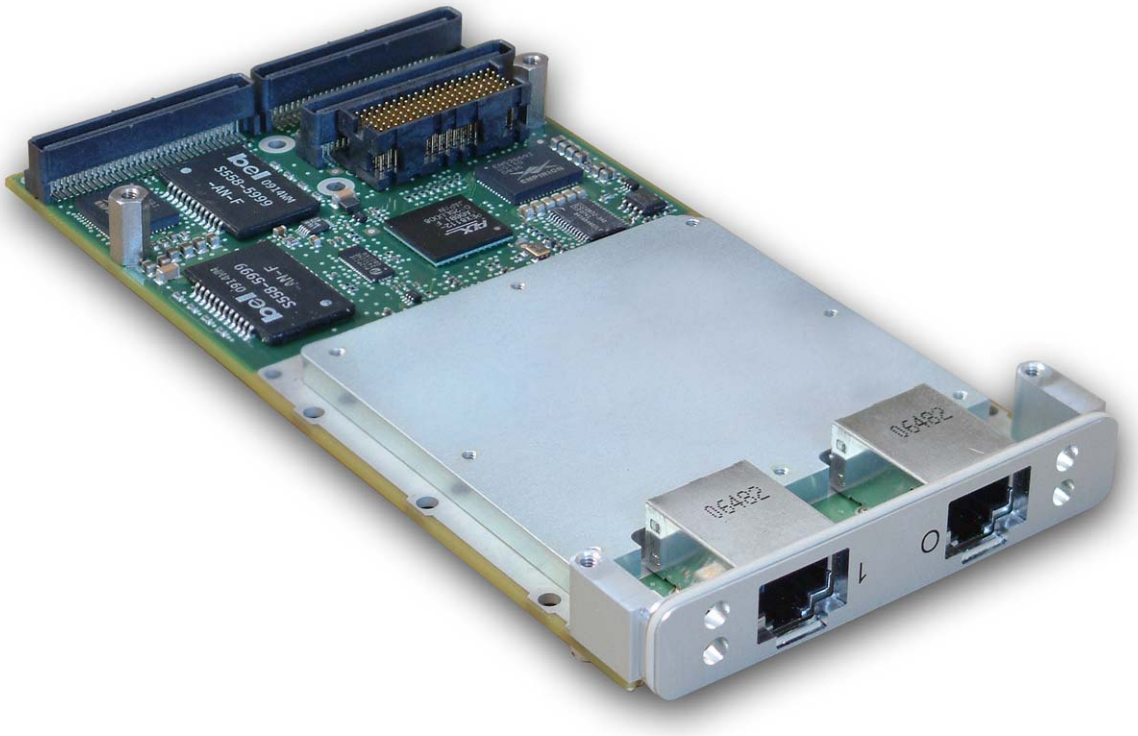


Figure 1: Board Overview

1.3.1 Features and Functions

The XMC-ETH2 is a NIC (Network Interface Card) designed to fit any Single-Board Computer and any bus system, VME, VPX or CompactPCI alike.

This Gigabit Ethernet mezzanine board provides two gigabit copper links, available in front or rear panel.

For each ethernet port, a micro-switch configuration allows the selection of the front or rear connectivity (refer to section 2.2 “Board Configuration” page 6).

When power on the P5 connector is detected, the bus interface (x4 PCI Express interface) comes from the XMC connector. Otherwise, the bus interface is selected to be the PCI 33 MHz or 66 MHz, 32-bit, comming from the PMC connectors (P1/P2 PMC connectors). This automatic selection can be overridden using a specific micro-switch configuration (refer to section 2.2 “Board Configuration” page 6).

The PMC PCI interface is compatible with 5V and 3.3V V(I/O) voltages. Rugged conduction-cooled buids feature a PMC version with PCI connection and a XMC version with PCI-E link.

The XMC-ETH2 is the ideal General Purpose Long Life Ethernet Mezzanine.

1.3.2 Ordering Information

Article	Order Number	Description
		Air-cooled commercial builds
XMC-ETH2-SA	XMC-ETH2-SA-000	Front and rear ethernet ports.PCI PMC and PCI-E XMC interface.
XMC-ETH2-SA	XMC-ETH2-SA-000V	Front and rear ethernet ports.PCI PMC and PCI-E XMC interface, coated version
PMC-ETH2-SA	PMC-ETH2-SA-000	Front and rear ethernet ports. PCI PMC interface only: no P5 XMC connector.
		Rugged air-cooled builds
PMC-ETH2-RA	PMC-ETH2-RA-000	Front and rear ethernet ports, PCI PMC interface only: no P5 XMC connector.
		Rugged conduction-cooled builds
XMC-ETH2-RC	XMC-ETH2-RC-000	Rear ethernet ports only. XMC configuration: no P1/P2 PMC connector.
PMC-ETH2-RC	PMC-ETH2-RC-000	Rear ethernet ports only. PCI PMC interface only: no P5 XMC connector.

Table 2: Ordering Information

1.4 Block Diagram

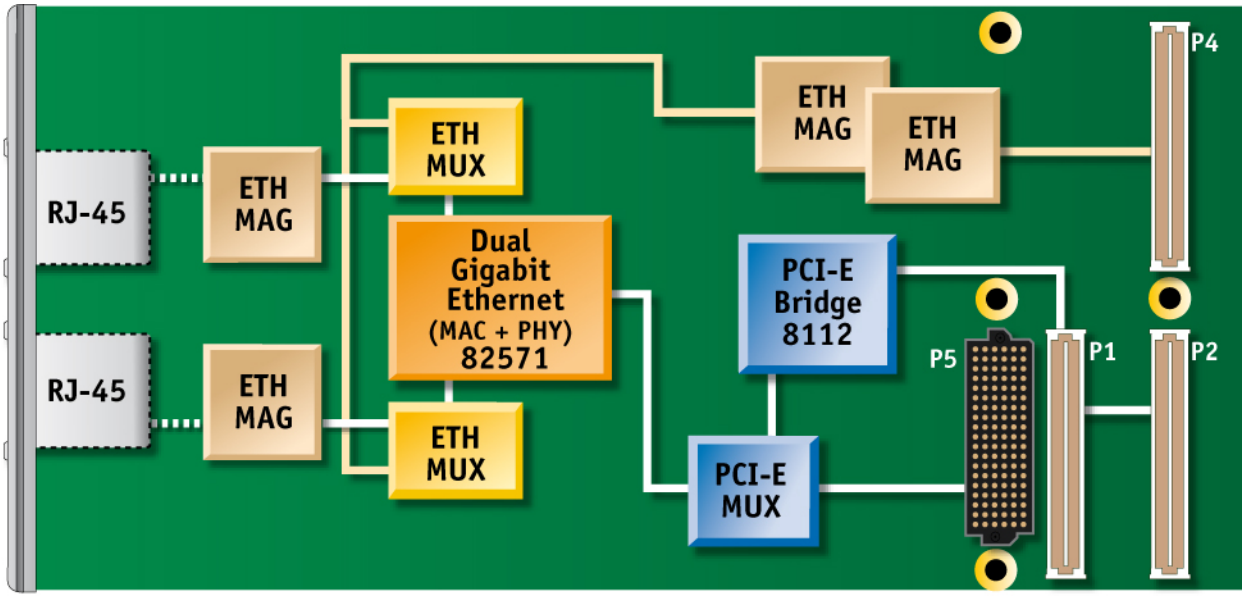


Figure 2: Block Diagram

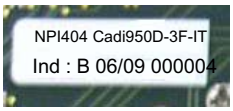
Chapter 2 - Preparing Before Using

2.1 Board Identification

XMC-ETH2 boards are identified by labels fitted to the bottom side of the board.

» Labels fitted to the bottom side of the board:

> Identification label

Ⓐ Board revision 

E.C. Level

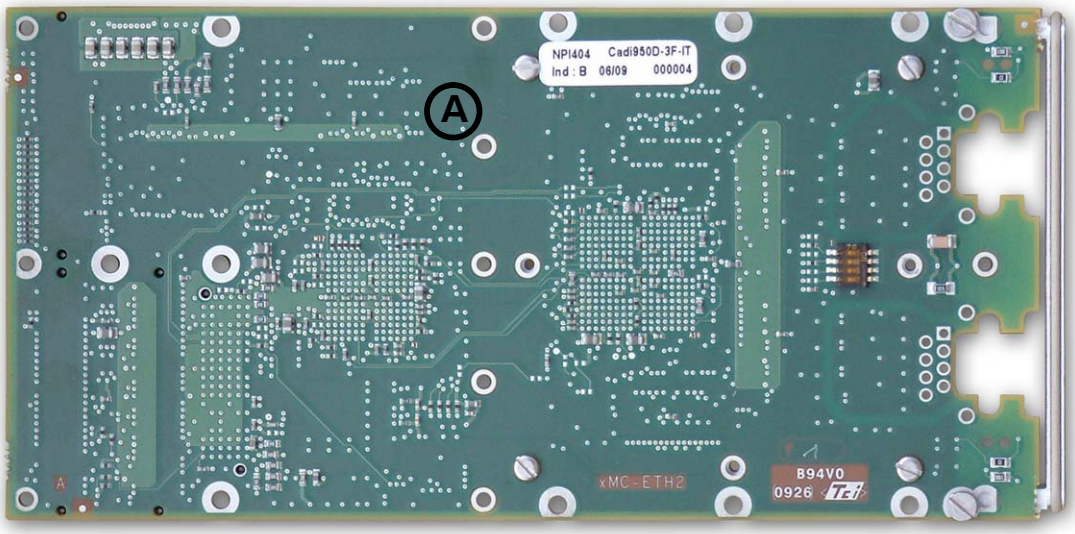


Figure 3: Bottom Side Identification Labels

2.2 Board Configuration

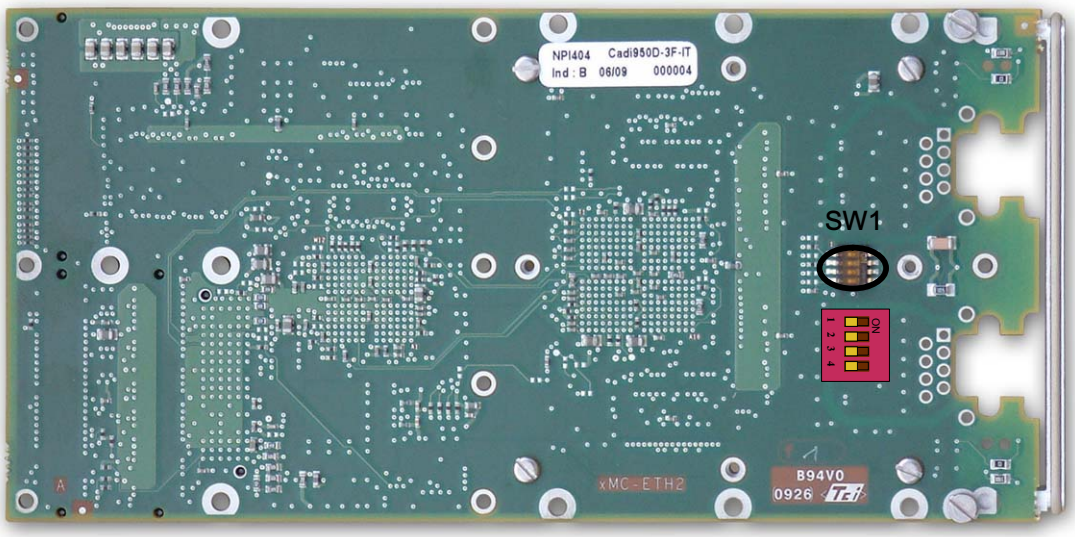


Figure 4: Board Configuration

One 4-bit micro-switch is available on the XMC-ETH2 mezzanine board (bottom face) on SA and RA builds: SW1.

For RC builds, the micro-switch is not present and the card operates with all OFF default settings.

Micro-Switch SW1 Description

Micro-Switch SW1	Function	Description
SW1.1 LAN_FRONT#0	LAN0 output selection	OFF (default) LAN0 output on the rear ON LAN0 output on the front
SW1.2 LAN_FRONT#1	LAN1 output selection	OFF (default) LAN1 output on the rear ON LAN1 output on the front
SW1.3 PCIE_XMC	XMC/PMC interface selection	OFF (default) Automatic selection of the XMC/PMC interface based on the availability of VPWR supply from the XMC connector. ON Force interface to be PCI PMC (1)
SW1.4 M66EN	66 MHz Enable	OFF (default) Allow 66 MHz operation on PMC PCI bus. ON Force PMC PCI interface to 33 MHz

Table 3: Micro-Switch Description

(1) It is recommended to leave SW1.3 PCIE_XMC switch in its defaut mode which is automatic bus interface selection. Activating this switch is only meaningful when the motherboard features both XMC and PMC interfaces, to force operation from the PMC interface, although it will be slower. In this scenario, care must be taken to perform the PCI discovery process and/or PCIe training only from the interface that is selected. The PMC presence signal (BusMode1, pin 7 of P1, 0 if PMC interface selected) can help the software and the hardware of the motherboard to determine which interface is actually selected.
In addition, when the XMC connector is not present, the default setting shall be used.

2.3 Board Installation

The XMC-ETH2 is shipped in an individual, reusable shipping box closed by an ESD stick-on label.

Closely inspect the board for any signs of shipment-related damages such as loose components or bent pins. If any evidence of damage is discovered, please notify the carrier and Kontron immediately.

The XMC-ETH2 board attaches to a host board. The attaching hardware for the XMC-ETH2 board is included with your order.

Don't throw out the shipping box, it should be used to store or ship the board.

2.3.1 Installation of the Air-Cooled Model (SA or RA)

Attach the XMC-ETH2 (SA or RA) board to the XMC host board according to the following steps.

1. Remove the XMC host board from the chassis.
2. Unscrew the four screws on the bottom of the XMC-ETH2 as described below:

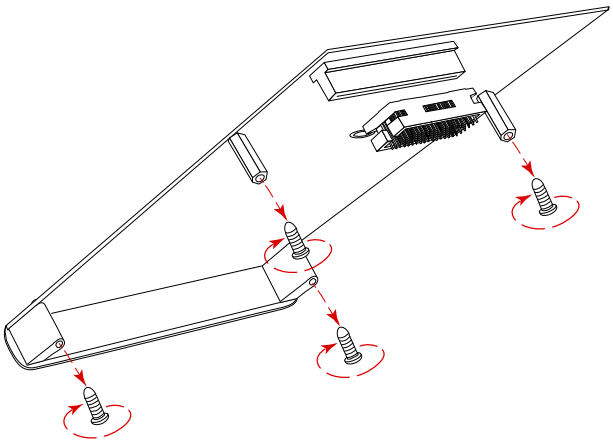
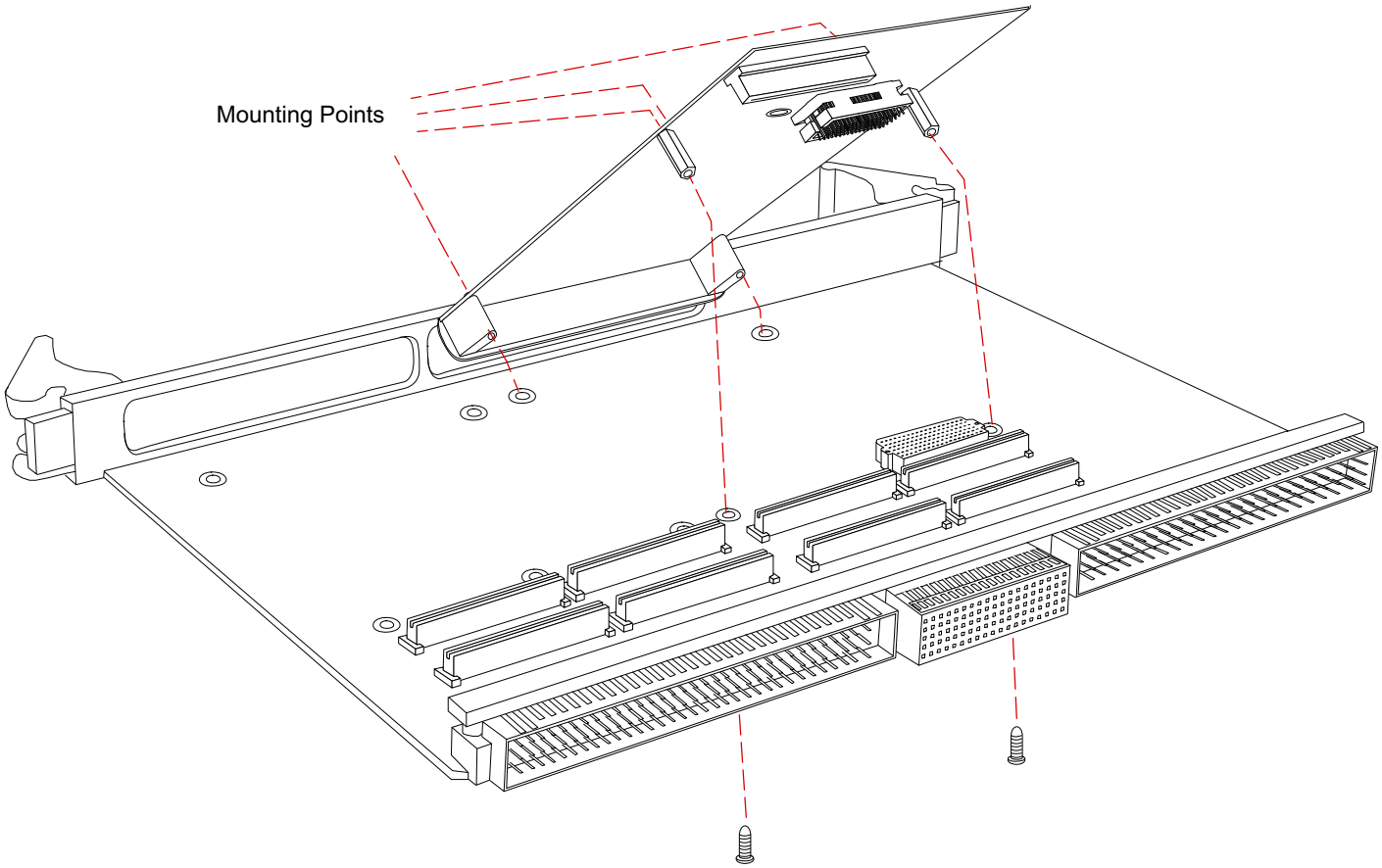


Figure 5: Preparing the XMC-ETH2

3. Install the XMC-ETH2, component-side down, aligning the connectors with their mating connectors on the host board. Press them together so that the friction from the pins holds them together. Insert the standoff plug mounted on the host board into the keyhole. The module's bezel will fill the slot and provide a connection to the module.
   Figure 6 page 8 gives an example of the XMC-ETH2 installation on a PENTXM2 or PENTXM4 board from Kontron.
4. Secure the XMC-ETH2 board to the host board by inserting the 4 screws supplied with the mezzanine board through the bottom of the host board and into the standoffs and front panel holes attached to the mezzanine board.
5. Insert the host board back into the chassis making sure it is plugged into the backplane.
6. The XMC-ETH2 board attachment is now complete.



Tighten with a torque of 0.383 Nm (0.233 lbf/ft)

Figure 6: Installation of a XMC-ETH2 (SA or RA) on a PENTXM2 or PENTXM4 Board

2.3.2 Installation of the Conduction-Cooled Model (RC)

Attach the XMC-ETH2 (Ruuged Conduction-Cooled) board to the XMC host board (PENTXM2/RC for example) according to the following steps.

1. Check that the standoffs are attached to the XMC-ETH2. Align the standoffs and the holes at the front and the middle of the PMC with the matching holes on the PENTXM2/RC.

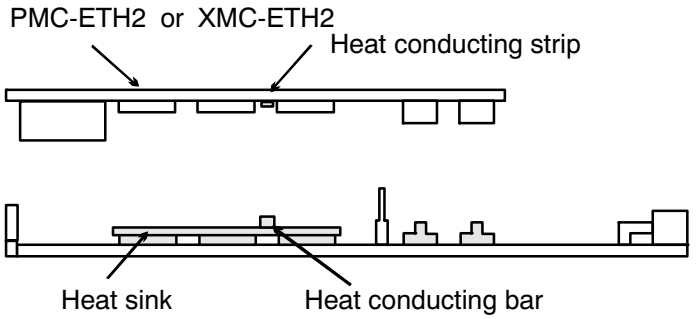


Figure 7: Installation of a XMC-ETH2 (RC) on a PENTXM2 (RC) Board (stage 1/4)

2. Lower the XMC-ETH2 component side down, fitting the mezzanine board connectors into their mating connectors on the PENTXM2/RC. Press them together so that the friction from the pins holds the mezzanine board in place.

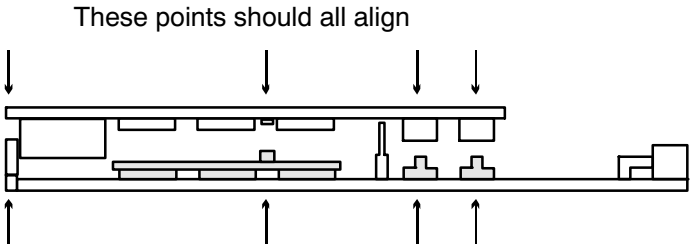


Figure 8: Installation of a XMC-ETH2 (RC) on a PENTXM2 (RC) Board (stage 2/4)

3. Screw the XMC-ETH2 in place using 4 mounting screws in the top of the front panel, 5 along the conduction strip. Screws dimension: M2x6mm. Tighten with a torque of 0.383 Nm (0.233 lbf ft).

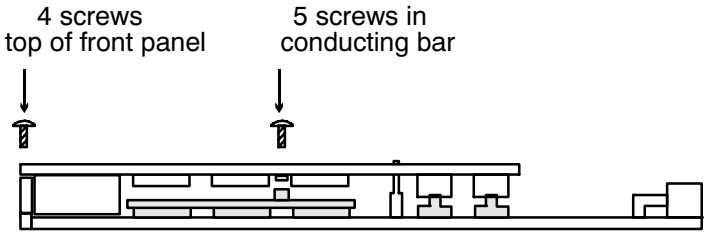


Figure 9: Installation of a XMC-ETH2 (RC) on a PENTXM2 (RC) Board (stage 3/4)

4. Mount 6 screws on the optional secondary thermal interface ribs. These screws are provided by the host board manufacturer. Tighten with a torque of 0.383 Nm (0.233 lbf ft).

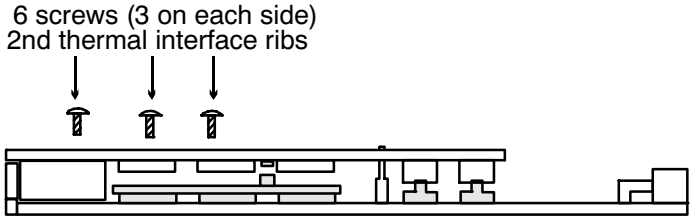


Figure 10: Installation of a XMC-ETH2 (RC) on a PENTXM2 (RC) Board (stage 4/4)

The two optional secondary thermal interface ribs should be used to get the specified module thermal performance.

In order to satisfy the shock and vibration specifications, foresee an additional anchorage point that could either be the 3.3V keying pin hole (1), or the central hole of the line of optional holes behind the P4 connector (2). Figure 11 shows the possible locations (1) and (2) for an additional anchorage point on the XMC-ETH2 (RC) board. Figure 12 shows the location (1) for an additional anchorage point on an PENTXM2/RC board.

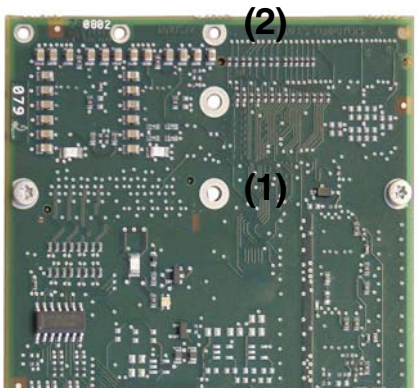


Figure 11: Additional Anchorage Point on a XMC-ETH2 (RC) Board

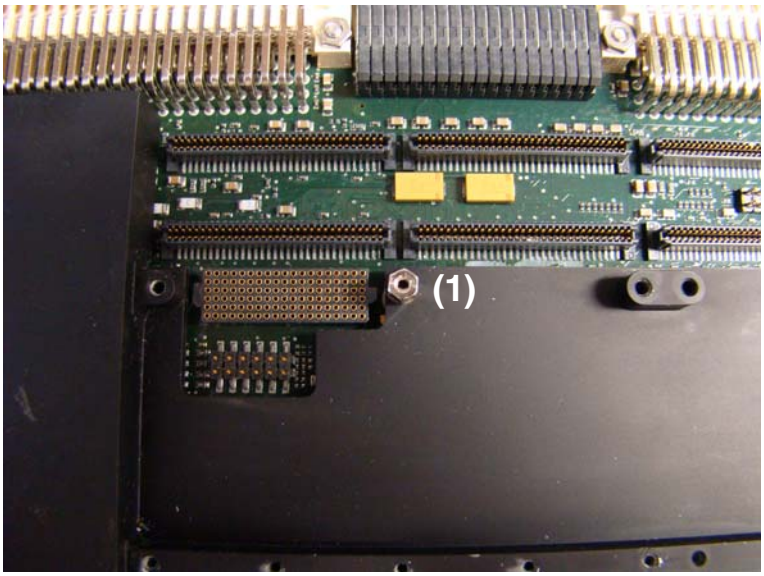


Figure 12: Additional Anchorage Point on a PENTXM2/RC Board

Chapter 3 - Specifications

This chapter lists the general, physical and environmental specifications. It also covers items such as power requirements, EMC regulatory compliance and safety, and flammability rating.

3.1 General Specifications

- Model XMC-ETH2 Mezzanine Card
- Certification Designed to meet FCC Class A, CE, UL 1950
- V(I/O) Electrical PCI V(I/O) Voltage: 3.3V or 5V
- Power Supply: 3.3 V. When operated through the XMC PCI-E interface, the VPWR XMC power (+5V or +12V) should be present so that PCI-E interface detection is done.

3.2 Physical Specifications

- Dimension 74 mm x 149 mm x 8.2 mm
- Weight 90 g with heatsink (SA and RC build)
- Form Factor IEEE P1386 - Standard Air
  VITA 20 - Conduction Cooled

3.3 Environmental Specifications

	SA Standard Commercial	RA Air Conduction-Cooled	RC Rugged Conduction-Cooled
Conformal Coating	Optional	Standard	Standard
Temperature	VITA 47 - Class AC1	VITA 47 - Class AC3	VITA 47 - Class CC4
Cooling Method	Convection	Convection	Conduction
Operating	0°C to +55°C	-40°C to +70°C	-40°C to +85°C
Airflow	1.5 m/s	1.6 m/s	Not applicable
Storage	-45°C to +85°C	-45°C to +100°C	-45°C to +100°C
Vibration Sine (Operating)	20/500 Hz: 2g	20/2,000 Hz: 3g	20/2,000 Hz: 5g
Random	VITA 47 - Class V1	VITA 47 - Class V2	VITA 47 - Class V3
Shock (Operating)	20g/11 ms Half Sine	40g/20 ms Half Sine	40g/20 ms Half Sine
Altitude (Operating)	-1,640 to 15,000 ft	-1,640 to 33,000 ft	-1,640 to 50,000 ft
Relative Humidity	90 % without condensation	95% without condensation	95% without condensation

Table 4: Environmental Specifications

For SA - Standard commercial Air cooled version, a heasink temperature of 75°C must not be exceeded as measured on the center on the XMC-ETH2 board heatsink.

For RA - Rugged Air-cooled version, a heasink temperature of 85°C must not be exceeded as measured on the center on the XMC-ETH2 board heatsink.

For RC - Rugged Conduction-cooled version, a heasink temperature of 95°C must not be exceeded as measured on the center on the XMC-ETH2 board heatsink.

3.4 Electrical Requirements

- Only +3.3V input voltage used, plus presence of VPWR on XMC connector for automatic detection of PCI or PCI-E interface to host (for models having the XMC connector present).
- The +3.3V voltage rise must be monotonic and should not last for more than 25 ms.
- Maximal Power Requirement: 5 Watts
- Reset: the board is held in reset state whenever a reset is applied from the PMC connector or from the XMC connector, independently of which interface is used. For mother boards featuring both interfaces and XMC-ETH2 models equipped with both XMC and PMC connectors, care must be taken not to activate the reset signal of the unused XMC/PMC interface.

3.5 EMC Regulatory Compliance and Safety

The XMC-ETH2 is designed for use in systems meeting:

- EMC qualifications EN55082 (Ed. 09/95)
- EN55022 (Ed. 22/94) class A

3.6 Flammability Rating

The boards are manufactured by UL approuved manufacturers and have a flammability rating of 94V-0.

3.7 MTBF Data

Calculations are made according to the standard MIL-HDBK217F-2 for seven types of environment:

- Ground Benign (GB),
- Air Inhabited Cargo (AIC),
- Air Uninhabited Cargo (AUC),
- Ground Fixed (GF),
- Naval Sheltered (NS),
- Air Rotary Wing (ARW),
- Air Uninhabited Fighter (AUF),
- Ground Mobile (GM).

Order Number	GB 25°C	GB 40°C	AIC 40°C	AUC 40°C	GF 30°C	GF 55°C
XMC-ETH2-SA-000 PMC-ETH2-SA-000 PMC-ETH2-RA-000	383 790 h	254 412 h	86 070 h	55 500 h	203 828 h	114 675 h
XMC-ETH2-RC-000	498 092 h	315 169 h	158 260 h	140 974 h	654 626 h	422 840 h
PMC-ETH2-RC-000	484 700 h	308 118 h	152 986 h	101 522 h	304 412 h	157 850 h

Order Number	NS 25°C	NS 40°C	ARW 55°C	AUF 40°C	GM 30°C
XMC-ETH2-SA-000 PMC-ETH2-SA-000 PMC-ETH2-RA-000	124 046 h	100 121 h	27 207 h	41 218 h	82 113 h
XMC-ETH2-RC-000	234 662 h	174 745 h	57 368 h	102 301 h	230 540 h
PMC-ETH2-RC-000	220 323 h	164 320 h	52 104 h	78 928 h	158 040 h

Table 5: MTBF Data

Chapter 4 - Connectors

4.1 Front Panel Connectors

These connectors are available only in SA, standard air-cooled commercial build configuration and RA, rugged air-cooled build configuration.

4.1.1 Location

- PETH0 - RJ-45 Connector
- PETH1 - RJ-45 Connector

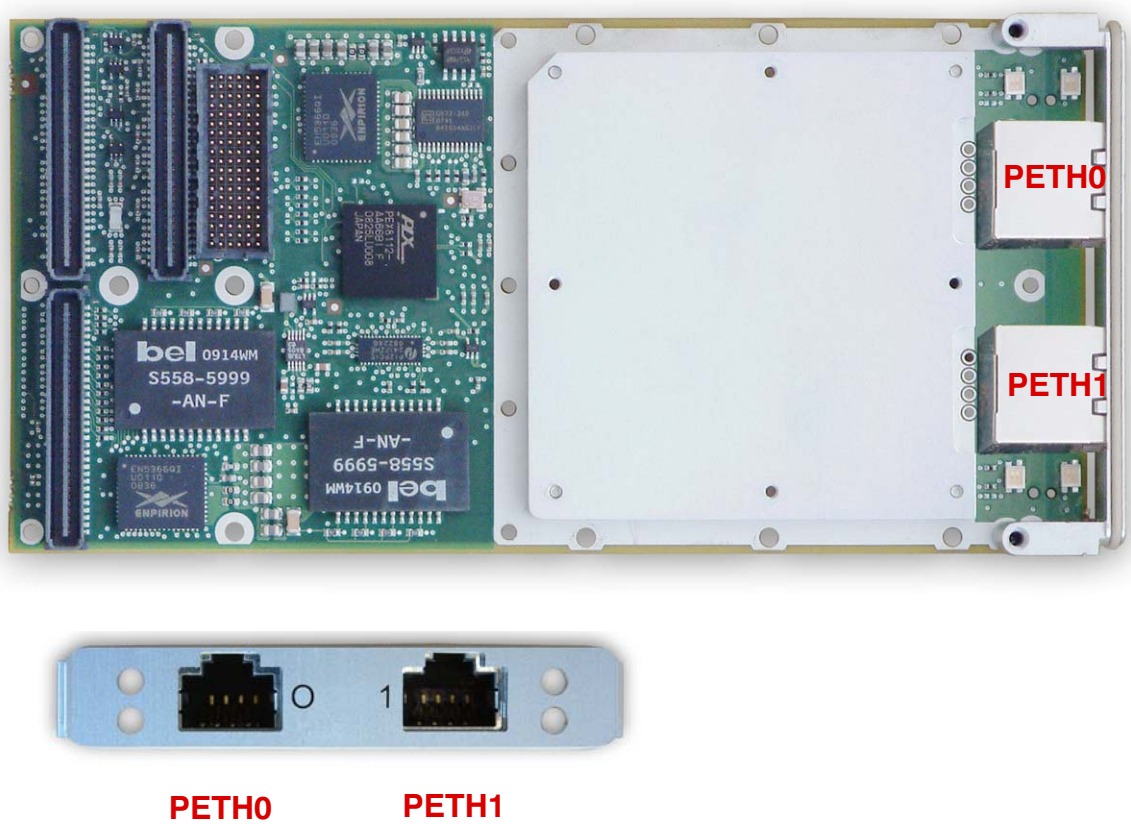


Figure 13: Front Panel Connectors Location

4.1.2 PETH0 and PETH1 - RJ-45 Ethernet Connectors

Connector Overview

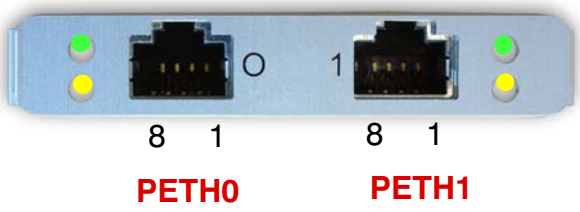


Figure 14: Ethernet Connector

The Ethernet transmission can operate effectively using a CAT5e cable with a maximum length of 100 m.

The Ethernet connectors are realized as RJ-45 connectors. The interfaces provide automatic detection and switching between 10Base-T, 100Base-TX and 1000Base-T data transmission (Auto-Negotiation). Auto-wire switching for crossed cables is also supported (Auto-MDI/X).

Pin Assignment

The PETH0 / PETH1 connectors supply the 10Base-T, 100Base-TX and 1000Base-T interfaces to the Ethernet controller.

PIN	10BASE-T		100BASE-TX		1000BASE-T	
	I/O	SIGNAL	I/O	SIGNAL	I/O	SIGNAL
1	O	TX+	O	TX+	I/O	BI_DA+
2	O	TX-	O	TX-	I/O	BI_DA-
3	I	RX+	I	RX+	I/O	BI_DB+
4	-	-	-	-	I/O	BI_DC+
5	-	-	-	-	I/O	BI_DC-
6	I	RX-	I	RX-	I/O	BI_DB-
7	-	-	-	-	I/O	BI_DD+
8	-	-	-	-	I/O	BI_DD-

Table 6: Gigabit Ethernet Connectors PETH0 and PETH1 Pinout

Ethernet LEDs Status

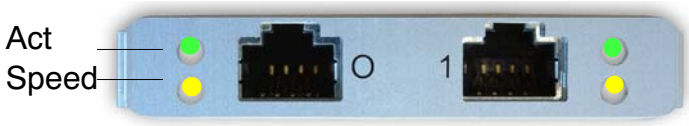


Figure 15: Ethernet LEDs Location

The front Ethernet status LEDs are not available when an ethernet channel is used from the rear P4 connector. In such a case, the ethernet status signal on P4 connector may be used to get rear ethernet indicators.

ACT (green)

This LED monitors network connection and activity. The LED lights up when a valid link (cable connection) has been established. The LED goes temporarily off if network packets are being sent or received through the RJ-45 port. When this LED remains off, a valid link has not been established due to a missing or a faulty cable connection.

SPEED (yellow/green)

STATUS		SPEED LED yellow/green	ACT LED green
Ethernet link is not established		OFF	OFF
10/100 Mbps	Ethernet link establisehd	ON (green)	ON
	Ethernet Link Activity	ON (green)	BLINK
1000 Mbps	Ethernet link establisehd	ON (yellow)	ON
	Ethernet Link Activity	ON (yellow)	BLINK

Table 7: Ethernet LEDs Status Definition

4.2 Onboard Connectors

4.2.1 Location

- P1 - PMC I/O Connector
- P2 - PMC I/O Connector
- P4 - PMC I/O Connector
- P5 - XMC Connector

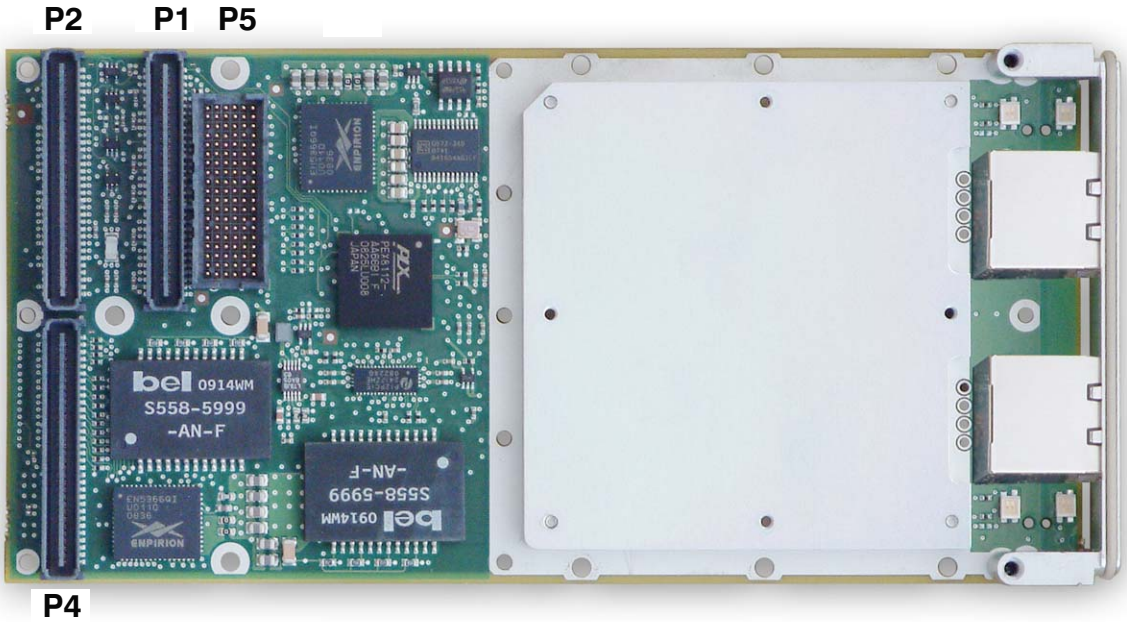


Figure 16: Onboard Connectors Location

4.2.2 P1 - PMC Connector Pin Assignment

Pin	Signal	Pin	Signal
1	N.C.	2	N.C.
3	GND	4	INTA#
5	INTB#	6	INTC#
7	BUSMODE1#	8	+5V - Not Used
9	INTD#	10	N.C.
11	GND	12	N.C.
13	CLK	14	GND
15	GND	16	GNT#
17	REQ#	18	+5V - Not Used
19	V(I/0)	20	AD[31]
21	AD[28]	22	AD[27]
23	AD[25]	24	GND
25	GND	26	C/BE3#
27	AD[22]	28	AD[21]
29	AD[19]	30	+5V - Not Used
31	V(I/0)	32	AD[17]
33	FRAME#	34	GND
35	GND	36	IRDY#
27	DEVSEL#	38	+5V - Not Used
39	GND	40	LOCK#
41	N.C.	42	N.C.
43	PAR	44	GND
45	V(I/0)	46	AD[15]
47	AD[12]	48	AD[11]
49	AD[09]	50	+5V - Not Used
51	GND	52	C/BE0#
53	AD[06]	54	AD[05]
55	AD[04]	56	GND
57	V(I/0)	58	AD[03]
59	AD[02]	60	AD[01]
61	AD[00]	62	+5V - Not Used
63	GND	64	N.C.

Signals active when low.

4.2.3 P2 - PMC Connector Pin Assignment

Pin	Signal	Pin	Signal
1	N.C.	2	N.C.
3	N.C.	4	N.C.
5	N.C.	6	GND
7	GND	8	N.C.
9	N.C.	10	N.C.
11	N.C.	12	+3.3V
13	RST#	14	N.C.
15	+3.3V	16	N.C.
17	PME#	18	GND
19	AD[30]	20	AD[29]
21	GND	22	AD[26]
23	AD[24]	24	+3.3V
25	IDSEL	26	AD[23]
27	+3.3V	28	AD[20]
29	AD[18]	30	GND
31	AD[16]	32	C/BE2#
33	GND	34	N.C.
35	TRDY#	36	+3.3V
27	GND	38	STOP#
39	PERR#	40	GND
41	+3.3V	42	SERR#
43	C/BE1#	44	GND
45	AD[14]	46	AD[13]
47	M66EN	48	AD[10]
49	AD[08]	50	+3.3V
51	AD[07]	52	N.C.
53	+3.3V	54	N.C.
55	N.C.	56	GND
57	N.C.	58	N.C.
59	GND	60	N.C.
61	N.C.	62	+3.3V
63	GND	64	N.C.

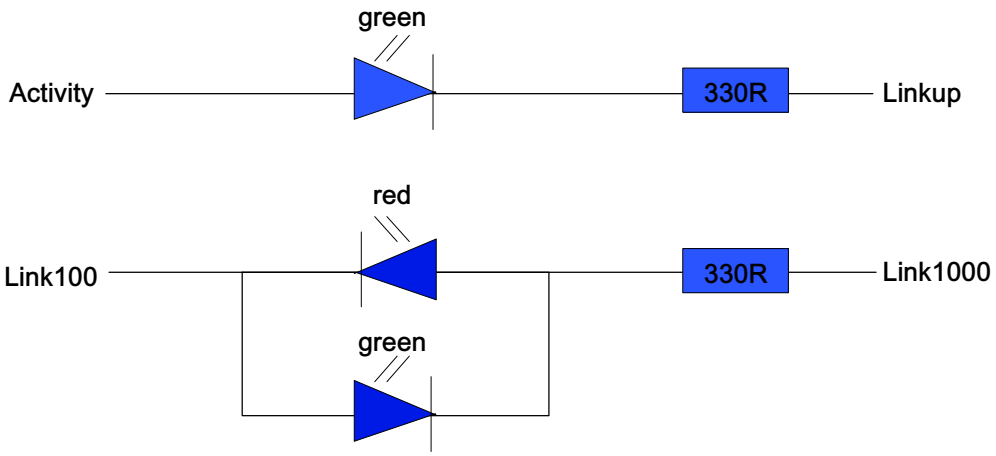
Signals active when low.

4.2.4 P4 - PMC Connector Pin Assignment

Pin	Signal	Pin	Signal
1	ETH0 BI_DA- / TX-	2	ETH0 BI_DB- / RX-
3	ETH0 BI_DA+ / TX+	4	ETH0 BI_DB+ / RX+
5	ETH0 BI_DC-	6	ETH0 BI_DD-
7	ETH0 BI_DC+	8	ETH0 BI_DD+
9	GND	10	GND
11	N.C.	12	N.C.
13	ETH1 BI_DA- / TX-	14	ETH1 BI_DB- / RX-
15	ETH1 BI_DA+ / TX+	16	ETH1 BI_DB+ / RX+
17	ETH1 BI_DC-	18	ETH1 BI_DD-
19	ETH1 BI_DC+	20	ETH1 BI_DD+
21	ETH0 LINK_UP#	22	ETH0 LINK_UP_100#
23	ETH0 ACTIVITY#	24	ETH0 LINK_UP_1000#
25	ETH0 REAR	26	ETH1 REAR
27	ETH1 LINK_UP#	28	ETH1 LINK_UP_100#
29	ETH1 ACTIVITY#	30	ETH1 LINK_UP_1000#
31	GND	32	GND
33	N.C.	34	N.C.
...	N.C.	...	N.C.
63	N.C.	64	N.C.

Table 8: P4 I/O Signals

When implementing rear I/O LED indicators, the following wiring is recommended:



4.2.5 PMC Signal Description

Mnemonic	Signal Description
AD[00] to AD[63]	Address/Data bits. Multiplexed address and data bus. AD[32] to AD[63] are specifics to 64-bit bus extension.
BUSMODE1#	Bus Mode 1. Driven low by a PMC module to indicate that it supports the current bus mode
C/BE0# to C/BE3#	Command/Byte Enables. During the address phase, these signals specify the type of cycle to carry out on the PCI bus. During the data phase the signals are byte enables that specify the active bytes on the bus.
CLK	Clock. Except RST*, the 64-bit PCI bus signals are synchronous to 33 or 66 MHz clock.
DEVSEL#	Device Select. Driven low by a PCI agent to signal that it has decoded its address as the target of the current access.
FRAME#	Frame. Driven low by the current master to signal the start and duration of an access.
GNT#	Grant. Driven low by the arbiter to grant PCI bus ownership to a PCI agent. GNT B# is provided for use by dual-function PMC modules or processor-PMC modules.
IDSEL	Initialization Device Select. Device chip select during configuration cycles. IDSEL B is provided for use by dual-function PMC modules or processor-PMC modules.
INTA# to INTD#	Interrupt lines. Level-sensitive, active-low interrupt requests.
IRDY#	Initiator Ready. Driven low by the initiator to signal its ability to complete the current data phase.
LOCK#	Lock. Driven low to indicate an atomic operation that may require multiple transactions to complete.
M66EN	66 MHz Enable. Indicates to a device if the bus segment is operating at 66 or 33 MHz. If it is high then the bus speed is 66 MHz and if it is low then the bus speed is 33 MHz.
N.C.	This pin is not connected.
PAR	Parity. Parity protection bit for AD[00] to AD[31] and C/BE0# to C/BE3#.
PERR#	Parity Error. Driven low by a PCI agent to signal a parity error.
REQ#	Request. Driven low by a PCI agent to request ownership of the PCI bus. REQ B# is provided for use by dual-function PMC modules or processor-PMC modules.
RST#	Reset. Driven low to reset the PCI bus.
SERR#	System Error. Driven low by a PCI agent to signal a system error.
STOP#	Stop. Driven low by a PCI target to signal a disconnect or target-abort.
V(I/O)	Power supply delivered by the board. On the PCI 64 PMC slots, +3.3V or 5V power is supplied. Contact Kontron for more information.
+3.3V	+3.3 Volts DC power
+5V	+5 Volts DC power

Table 9: PMC Signal Description

4.2.6 P5 - XMC Connector

P5 Connector Pin Assignment

Pin	Row A	Row B	Row C	Row D	Row E	Row F
1	PET0p0	PET0n0	+3.3V	PET0p1	PET0n1	VPWR (1)
2	GND	GND	N.C.	GND	GND	MRSTI#
3	PET0p2	PET0n2	+3.3V	PET0p3	PET0n3	VPWR (1)
4	GND	GND	N.C.	GND	GND	N.C.
5	N.C.	N.C.	+3.3V	N.C.	N.C.	VPWR (1)
6	GND	GND	N.C.	GND	GND	N.C.
7	N.C.	N.C.	3.3V	N.C.	N.C.	VPWR (1)
8	GND	GND	N.C.	GND	GND	N.C.
9	N.C.	N.C.	N.C.	N.C.	N.C.	VPWR (1)
10	GND	GND	N.C.	GND	GND	N.C.
11	PER0p0	PER0n0	N.C.	PER0p1	PER0n1	VPWR (1)
12	GND	GND	N.C.	GND	GND	N.C.
13	PER0p2	PER0n2	N.C.	PER0p3	PER0n3	VPWR (1)
14	GND	GND	N.C.	GND	GND	N.C.
15	N.C.	N.C.	N.C.	N.C.	N.C.	VPWR (1)
16	GND	GND	N.C.	GND	GND	N.C.
17	N.C.	N.C.	N.C.	N.C.	N.C.	N.C.
18	GND	GND	N.C.	GND	GND	N.C.
19	REFCLK+0	REFCLK-0	N.C.	WAKE0#	N.C.	N.C.

(1) VPWR may be +12V or +5V from the host. Only used to detect preference pf XMC versus PMC for host interface.

Signals active when low.

Table 10: XMC Connector Pin Assignment

P5 Signal Description

Mnemonic	Signal Description
+3.3V	+3.3 Volts DC power
GND	Ground
N.C.	Not Connected
PER0p/n[0..7]	**Link 0 Differential Receive.** These signals are used by the XMC to receive high-speed protocol-specific data FROM the carrier over the PCI Express interface.
PET0p/n[0..7]	**Link 0 Differential Transmit.** These signals are used by the XMC to receive high-speed protocol-specific data TO the carrier over the PCI Express interface.
REFCLK+/-0	Differential reference clock for Link 0 PCI Express interface.
VPWR	**Power pins.** These signals carry either +12V or +5V power from the carrier to the XMC.
WAKE0	An optional open-drain, active low signal that is driven low by an XMC PCI Express function to reactivate the link's main power rails and reference clocks. It is required on any mezzanine card that supports wakeup functionality compliant with the PCI Express specification.

Table 11: XMC Signal Description

Appendix A - List of Abbreviations

AC	Alternating Current
ANSI	American National Standards Institute
ESD	Electrostatic Sensitive Device
FLASH	Bulk Electrically Erasable Programmable Read Only Memory
IEEE	Institute of Electrical and Electronic Engineers
MTBF	Mean Time Between Failures
NIC	Network Interface Card
PCI	Peripheral Component Interface
PICMG	PCI Industrial Computer Manufacturers Group
PIM	PCI Interface Module
PMC	PCI Mezzanine Card
RHEL	Red Hat Enterprise Linux
WEEE	Waste Electrical and Electronics Equipment
XMC	Express Mezzanine Card (VITA)

Appendix B - Tested Configurations

At the time of the product introduction, the XMC-ETH2 has been successfully tested with the following motherboard hardware and software:

- Kontron PENTXM2/4 6U VME single board computer based on Intel Core duo processors, PMC, XMC and V2PMC2 slot, operated under Linux Red Hat Enterprise 4 U4 release 2.6.9-42.1.1.Elsmp; e1000 driver for RHEL4 U4: version 7.3.15
- Kontron VME6250 6U VME single board computer based on Freescale 8641d PowerPC processor, PMC and XMC slot, operated under Linux FEDORA 9 2.6.25-vm6250.rc3; e1000e driver for FEDORA 9: version 0.2.0
- Kontron VX3230 3U VPX single board computer based on Freescale 8544 PowerPC processor, PMC and XMC slot, operated under Linux FEDORA 9 2.6.25-09153; e1000e driver for FEDORA 9: version 0.2.0
- Kontron VCE405 6U VME single board computer based on AMCC 405GP/r PowerPC processor, PMC slot, operated under Linux LTIB (Linux Target Image Builder) reference 2557 ID09218, kernel version 2.6.1.6; e1000 driver v6.3.9-k4

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