EXP-ETH8

EPIC Express™ Add-on-Board

Technical Manual



TME-EXP-ETH8-1V3
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Technical Manual EXP-ETH8

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Acronyms

RxD	Received Data
TxD	Transmitted Data
USB	Universal Serial Bus

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1 Overview

1.1 Introduction

The EXP-ETH8 is an Add-on Module conforming to the EPIC Express™ Specification.

It comprises eight independent 10/100/1000 Mb/s ports that can be easily connected to RJ45 sockets mounted at the front of the module.
The state of link, speed and activity is show by two LEDs on every socket.

The EXP-ETH8 supports Stack-up and Stack-down to a CPU Module.

Furthermore the EXP-ETH8 uses the 5 Volt and 3.3 Volt power supplied from the PCI/104-Express connector. All other voltages are generated on the board itself.

The EXP-ETH8 runs with Linux and Windows operation systems.

Features

MAC

- Flow Control Support compliant with the 802.3x specification
- VLAN support compliant with the 802.1Q specification
- MAC address filters: perfect match unicast
- multicast hash filtering, broadcast filter
- Programmable host memory receive buffers and promiscuous mode
- Statistics for management
- MAC loopback

PCI Express

- 64-bit address master support
- Programmable host memory receive buffers (256 bytes to 16 KB)
- Intelligent interrupt generation features to enhance driver performance
- Descriptor ring management hardware for transmit and receive software controlled reset
- MSI/MSI-X compatible
- Configurable receive and transmit data FIFO, programmable in 1 KB increments

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PHY

- Compliant with the 1 Gb/s IEEE 802.3 802.3u 802.3ab specifications
- IEEE 802.3ab auto negotiation support
- Full duplex operation at 10/100/1000 Mb/s
- Half duplex at 10/100 Mb/s
- Auto MDI, MDI-X crossover at all speeds

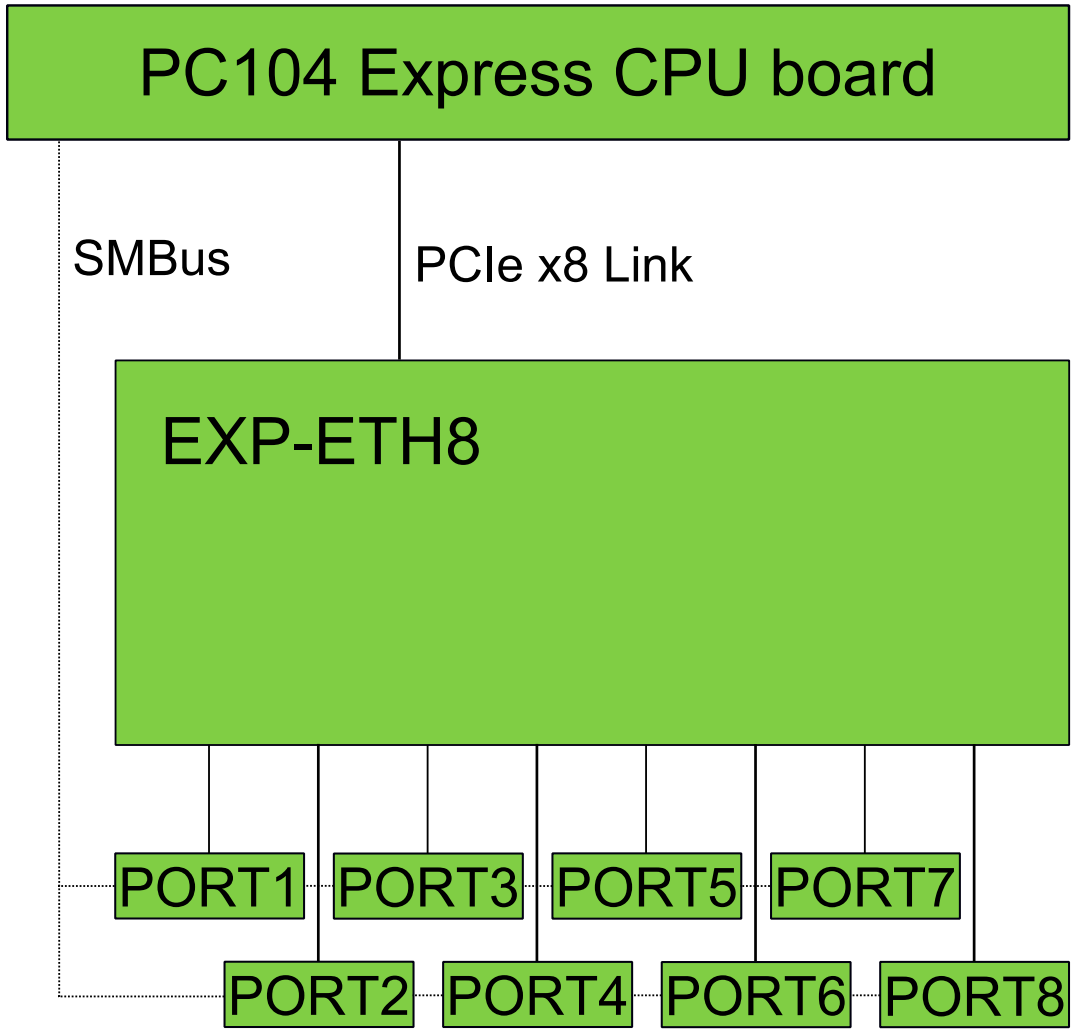
Manageability

- SMBus advanced pass through interface

High Performance

- TCP segmentation capability with Large Send offloading features
- Support up to 256 KB TCP segmentation (TSOv2)
- Fragmented UDP checksum offload support
- Split header support
- Receive Side Scaling with two hardware receive queues
- 9 KB jumbo frame support
- 32 KB packet buffer size

Block Diagram



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1.2 Ordering Information

EXP-ETH8 Models

Order number	Description
714-0004-10	EXP-ETH8 with eight galvanic isolated 10/100/1000 MBit/s Operating temp. range: 0°C...+60°C
814-0004-10	EXP-ETH8 with eight galvanic isolated 10/100/1000 MBit/s Operating temp. range: -20°C...+60°C
914-0004-10	EXP-ETH8 with eight galvanic isolated 10/100/1000 MBit/s Operating temp. range: -45°C...+85°C

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1.3 Specifications

Electrical Specifications

Supply voltage	+3.3V DC and +5 V DC (via PCI/104-Express Bus)
Rise time	< 10 ms
Supply voltage tolerance	± 5% *
Power consumption	maximum (with transfer on all 8 ports at the same time) +V5S_IN: 2.2A +V3.3S_IN: 0.4A typical (with transfer on 4 ports at the same time) +V5S_IN: 1.47A +V3.3S_IN: 0.37A minimum (with no transfer) +V5S_IN: 0.9A +V3.3S_IN: 0.33A

Environmental Specifications

Operating:

Temperature range	0 … 60 °C (commercial version) -20 … 60 °C (industrial version) -40 … 85 °C (extended version)
Temperature change	max. 10K / 30 minutes
Humidity (relative)	10 … 90 % (non-condensing)
Pressure	450 … 1100 hPa

Non-Operating/Storage/Transport:

Temperature range	-40 … 85 °C
Temperature change	max. 10K / 30 minutes
Humidity (relative)	5 … 95 % (non-condensing)
Pressure	450 … 1100 hPa

Mean Time Between Failures

MTBF at 25°C	673.613 hours

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1.4 Mechanical

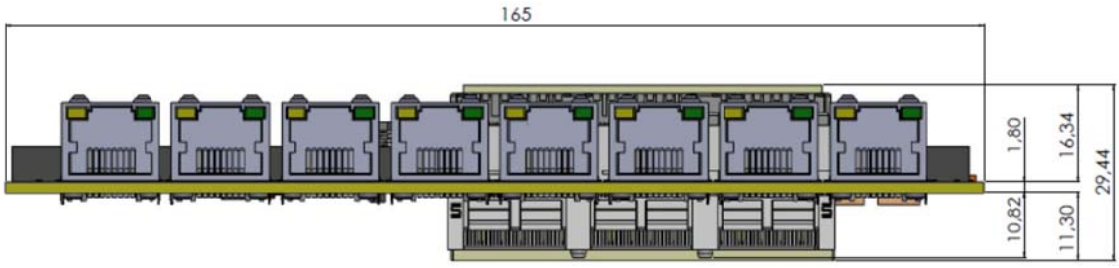
Dimensions (L x W)	165 mm x 115 mm
Height	max. 17 mm on top side above PCB max. 12 mm on bottom side above PCB
Weight	168 g
Mounting	4 mounting holes
Board-to-Board Stacking height	22 mm

Note: *It is strongly recommend using plastic spacers instead of metal spacers to mount the board. With metal spacers, there is a possible danger to create a short circuit with the components located around the mounting holes.*
This can damage the board!

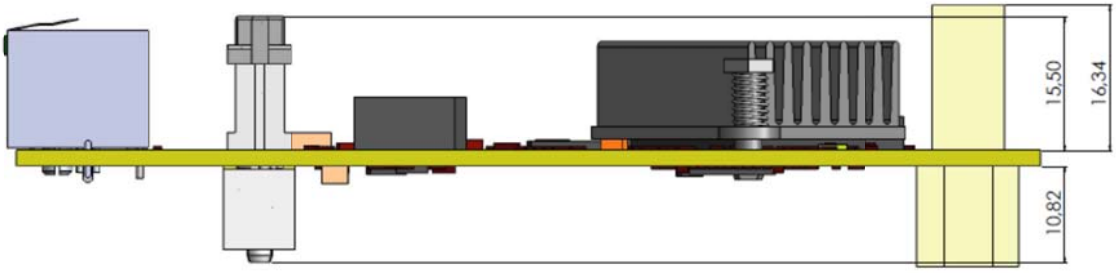
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Mechanical view

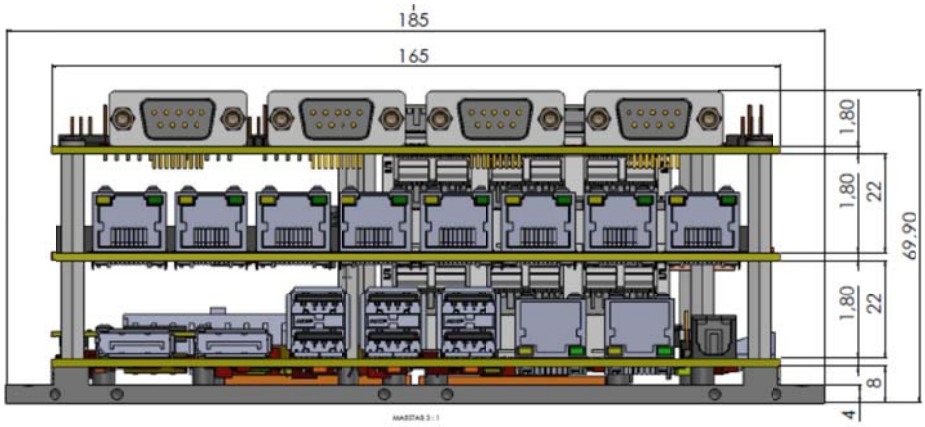
Front view

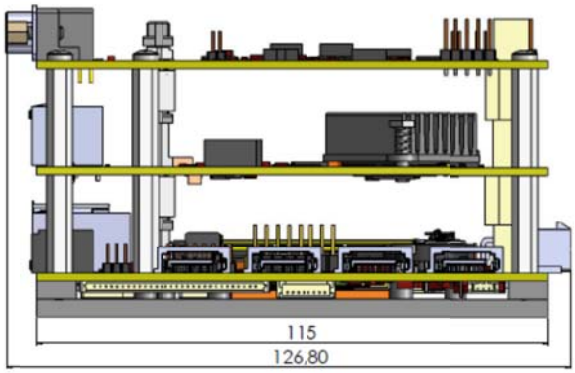


Side view



System stack-up view with Hurricane-QM57 and heat spreader

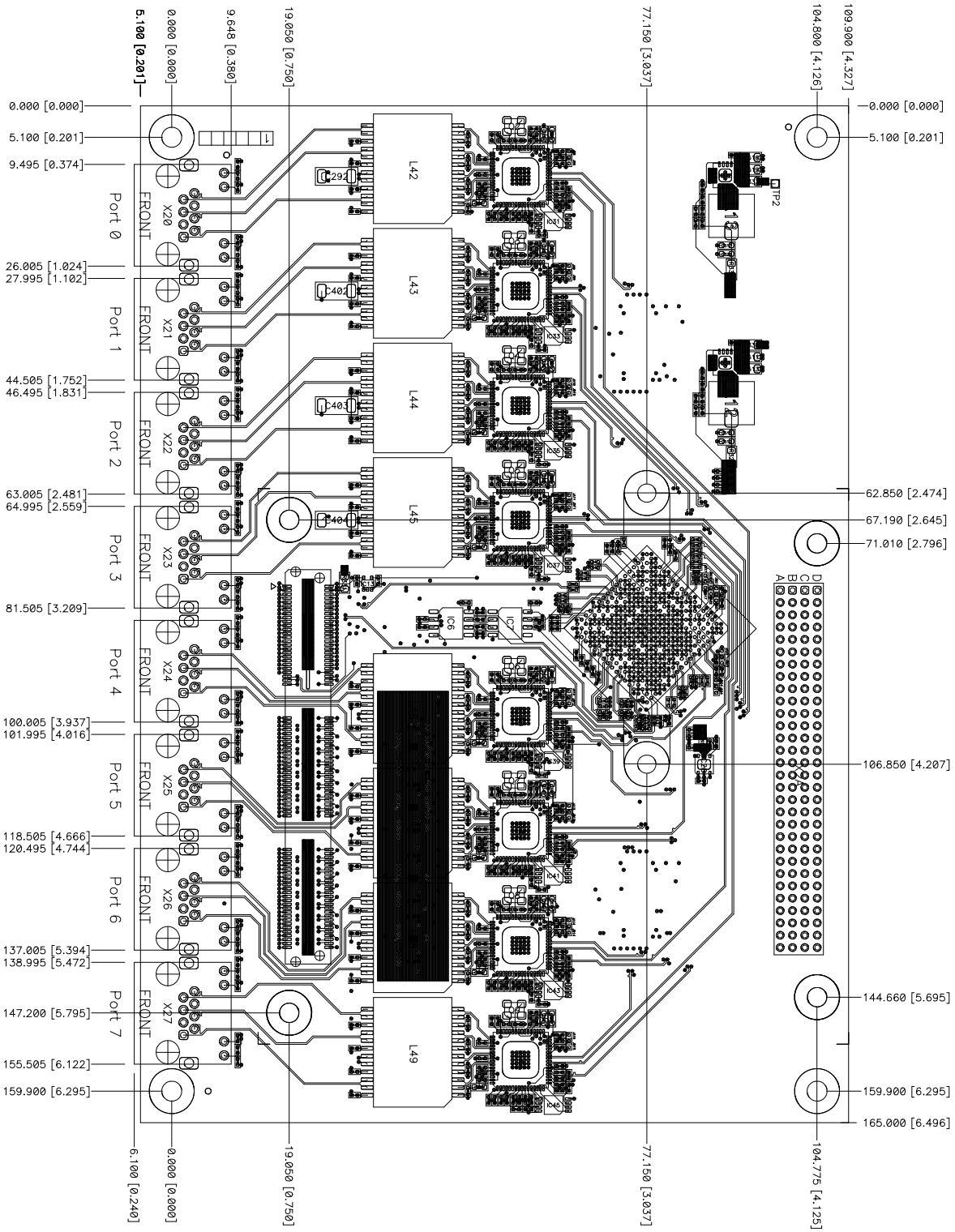




Note *For detailed mechanical drawings or step files please contact our support department.*

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Metrics on Top

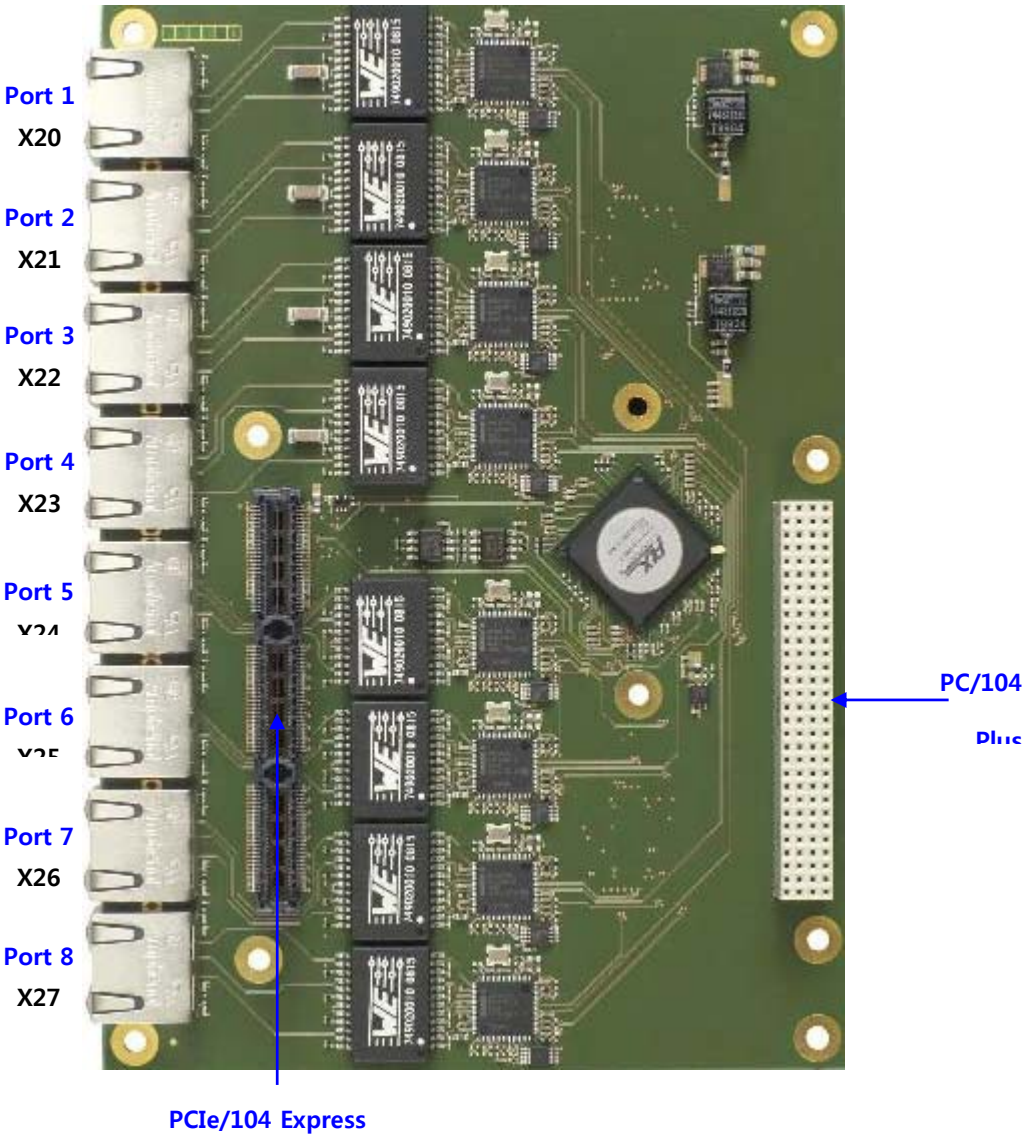


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2 Getting Started

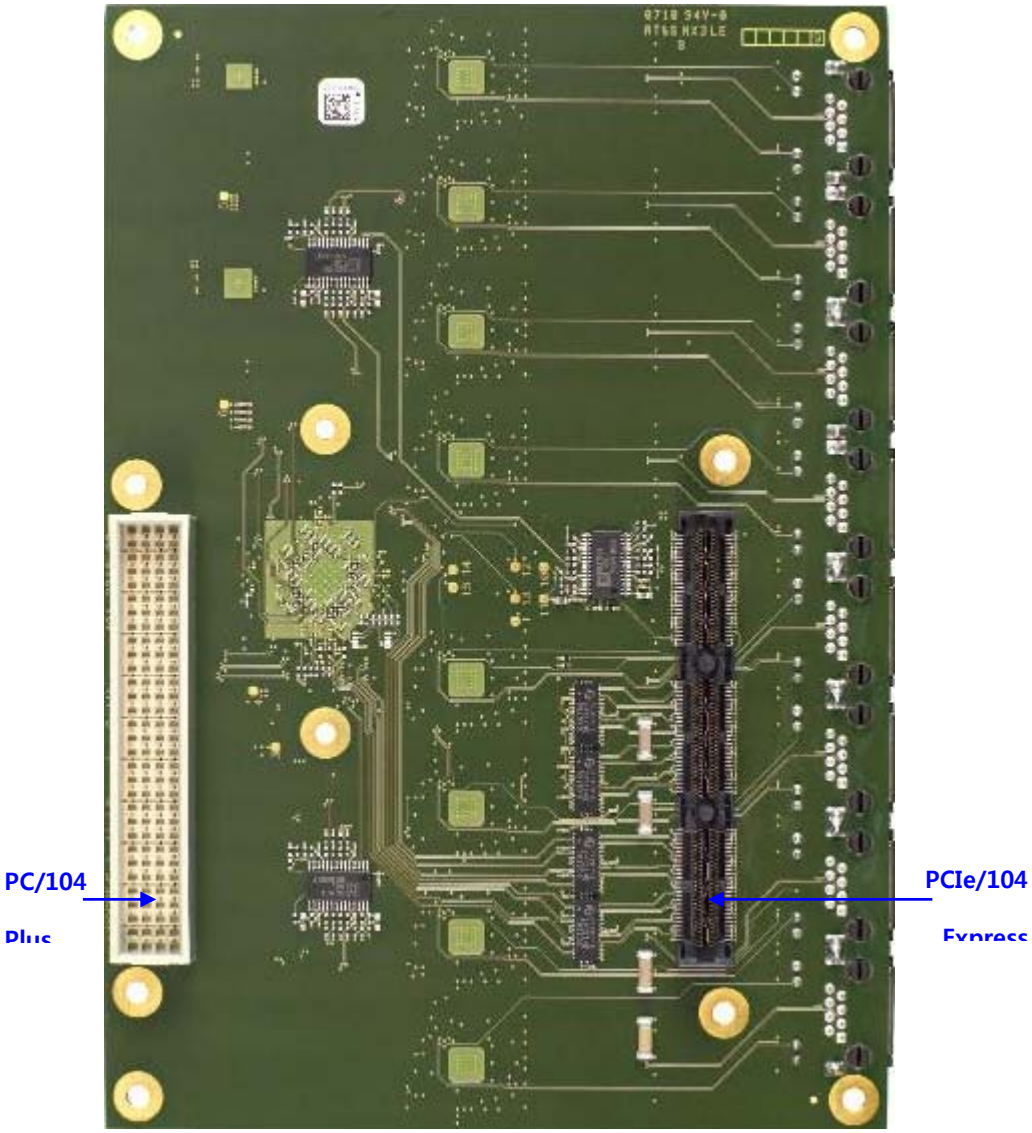
2.1 Connector Locations

Top



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Bottom



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2.2 Hardware Setup



Caution Be sure to observe the EMC security measures. Make sure you are always at the same potential as the module.



Caution Do never connect or disconnect the EXP-ISO-COM8 Add-on Module with a CPU board while that is running.

Be sure that your power supply is able to provide enough current to your system. An insufficient power supply leads to an instable system.

The EXP-ETH8 need an extra heat sink for standard environment temperatures from –20 °C ... +60 °C as well as the extended range of -40 °C ... +85 °C.

2.3 Software Setup

Driver packages are available for all the common operating systems:

Please contact our support department at http://askanexpert.adlinktech.com or have a look at the website www.adlinktech.com or http://downloadcenter.intel.com for downloading the necessary drivers. Installation guide and all necessary information is provided in the driver package.

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3 Module Description

3.1 Gigabit Ethernet Controller

On board there are eight gigabit Ethernet controller mounted, all are from the same type INTEL 82574.

The 82574IT is a single, compact, low power component that offers a fully-integrated Gigabit Ethernet Media Access Control (MAC) and Physical Layer (PHY) port.

The 82574 uses the PCI Express architecture.

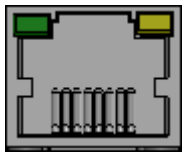
Ethernet Connector

Connector type: RJ45

PIN	Signal (Port A)
1	D1+
2	D1-
3	D2+
4	D3+
5	D3-
6	D2-
7	D4+
8	D4-



3.2 LED Indicators

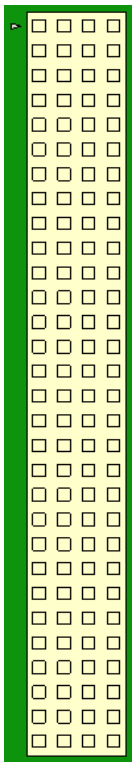
Link and Activity		Speed
Link The green LED indicates that a link to another device has been established. Activity During transmission the green LED starts flashing.		100 Mbit/s A green LED indicates that a established connection uses that data rate. 1 Gbit/s A yellow LED indicates that a established connection uses that data rate.

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3.3 PC/104-Plus Bus Connector

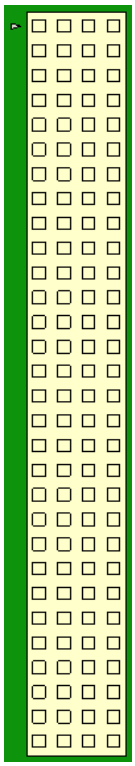
The PC/104-plus bus is not used on that module. The mounted connector forwards the signal through.

Pin	A	B	C	D
1	GND	n.c.	n.c.	n.c.
2	n.c.	n.c.	n.c.	n.c.
3	n.c.	GND	n.c.	n.c.
4	n.c.	n.c.	GND	n.c.
5	GND	n.c.	n.c.	GND
6	n.c.	n.c.	n.c.	n.c.
7	n.c.	n.c.	GND	n.c.
8	n.c.	n.c.	n.c.	n.c.
9	n.c.	GND	n.c.	n.c.
10	GND	n.c.	n.c.	n.c.
11	n.c.	n.c.	n.c.	GND
12	n.c.	n.c.	GND	n.c.
13	n.c.	GND	n.c.	n.c.
14	GND	n.c.	n.c.	n.c.
15	n.c.	n.c.	n.c.	GND
16	n.c.	n.c.	GND	n.c.
17	n.c.	n.c.	n.c.	n.c.
18	n.c.	GND	n.c.	n.c.
19	n.c.	n.c.	n.c.	n.c.
20	GND	n.c.	n.c.	GND
21	n.c.	n.c.	n.c.	n.c.
22	n.c.	n.c.	GND	n.c.
23	n.c.	GND	n.c.	n.c.
24	GND	n.c.	n.c.	n.c.
25	n.c.	n.c.	n.c.	GND



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Pin	A	B	C	D
26	n.c.	n.c.	GND	n.c.
27	n.c.	n.c.	n.c.	GND
28	GND	n.c.	n.c.	n.c.
29	n.c.	n.c.	n.c.	n.c.
30	n.c.	n.c.	n.c.	GND



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3.4 PCI/104 Express Bus Interface

The EXP-ETH8 uses x16 link of the PCI/104-Express bus. Which link is used depends if the board is stacked-up or stacked -down.
On the module there is a PCI Express switch that detects the type of connection and forwards the other links according to the specification.

The EXP-ETH8 can be used with the Hurricane-QM57.

At the Hurricane-QM57 you can stack-up one EXP-ETH8. Theoretical could be connected two EXP-ETH8, but then they are limited to 4 Ethernet Ports at each add-on. The reason for this is the limitation of the I/O space (and also therefore the devices) in the PCI-to-PCI bridge specification.



Top PCI/104-Express Connector

Connector Type: Samtec ASP-142781-05

Bottom PCI/104-Express Connector

Connector Type: Samtec ASP-129646-03

Pin	Signal		Pin	Signal
1	GPIO0		2	PE_RST#
3	+3.3V		4	+3.3V
5	USB_1+		6	USB_0+
7	USB_1-		8	USB_0-
9	GND		10	GND
11	Pex1_1Tp		12	Pex1_0 Tp
13	Pex1_1Tn		14	Pex1_0 Tn
15	GND	+5V	16	GND
17	Pex1_2 Tp		18	Pex1_3 Tp
19	Pex1_2 Tn		20	Pex1_3 Tn
21	GND		22	GND
23	Pex1_1Rp		24	Pex1_0 Rp
25	Pex1_1Rn		26	Pex1_0 Rn
27	GND		28	GND
29	Pex1_2 Rp		30	Pex1_3 Rp

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31	Pex1_2 Rn		32	Pex1_3 Rn
33	GND		34	GND
35	Pex1_1Clkp		36	Pex1_0Clkp
37	Pex1_1Clkn		38	Pex1_0Clkn
39	+5V_Always		40	+5V_Always
41	Pex1_2Clkp		42	Pex1_3Clkp
43	Pex1_2Clkn		44	Pex1_3Clkn
45	CPU_DIR		46	PWRGOOD
47	SMB_DAT		48	Pex16_Clkp
49	SMB_CLK		50	Pex16_Clkn
51	SMB_ALERT		52	PSON#

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Pin	Signal		Pin	Signal
53	WAKE#	+5V	54	PEG_EN#
55	GND		56	GND
57	Pex16_0T(8)p		58	Pex16_0T(0)p
59	Pex16_0T(8)n		60	Pex16_0T(0)n
61	GND		62	GND
63	Pex16_0T(9)p		64	Pex16_0T(1)p
65	Pex16_0T(9)n		66	Pex16_0T(1)n
67	GND		68	GND
69	Pex16_0T(10)p		70	Pex16_0T(2)p
71	Pex16_0T(10)n		72	Pex16_0T(2)n
73	GND		74	GND
75	Pex16_0T(11)p		76	Pex16_0T(3)p
77	Pex16_0T(11)n		78	Pex16_0T(3)n
79	GND		80	GND
81	Pex16_0T(12)p		82	Pex16_0T(4)p
83	Pex16_0T(12)n		84	Pex16_0T(4)n
85	GND		86	GND
87	Pex16_0T(13)p		88	Pex16_0T(5)p
89	Pex16_0T(13)n		90	Pex16_0T(5)n
91	GND		92	GND
93	Pex16_0T(14)p		94	Pex16_0T(6)p
95	Pex16_0T(14)n		96	Pex16_0T(6)n
97	GND		98	GND
99	Pex16_0T(15)p		100	Pex16_0T(7)p
101	Pex16_0T(15)n		102	Pex16_0T(7)n
103	GND		104	GND

PIN	Signal		PIN	Signal
105	SDVO_DAT	+12V	106	SDVO_CLK
107	GND		108	GND
109	Pex16_0R(8)p		110	Pex16_0R(0)p
111	Pex16_0R(8)n		112	Pex16_0R(0)n
113	GND		114	GND
115	Pex16_0R(9)p		116	Pex16_0R(1)p
117	Pex16_0R(9)n		118	Pex16_0R(1)n
119	GND		120	GND
121	Pex16_0R(10)p		122	Pex16_0R(2)p
123	Pex16_0R(10)n		124	Pex16_0R(2)n
125	GND		126	GND

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127	Pex16_0R(11)p		128	Pex16_0R(3)p
129	Pex16_0R(11)n		130	Pex16_0R(3)n
131	GND		132	GND
133	Pex16_0R(12)p		134	Pex16_0R(4)p
135	Pex16_0R(12)n		136	Pex16_0R(4)n
137	GND		138	GND
139	Pex16_0R(13)p		140	Pex16_0R(5)p
141	Pex16_0R(13)n		142	Pex16_0R(5)n
143	GND		144	GND
145	Pex16_0R(14)p		146	Pex16_0R(6)p
147	Pex16_0R(14)n		148	Pex16_0R(6)n
149	GND		150	GND
151	Pex16_0R(15)p		152	Pex16_0R(7)p
153	Pex16_0R(15)n		154	Pex16_0R(7)n
155	GND		156	GND

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Appendix A, Contact Information

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Website http://www.adlinktech.com/rugged/index.php

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Appendix B, Additional Information

B.1 Additional Reading

Datasheet of the PEX8618 at http://www.plxtech.com

B.2 PCI/104 Express™

A copy of the latest PCI/104 Express and can be obtained from the PC/104 Consortium's website at www.pc104.org

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Appendix C, Getting Help

Should you have technical questions that are not covered by the respective manuals, please contact our support department at http://askanexpert.adlinktech.com .

Please allow one working day for an answer.

Returning Products for Repair

To return a product to ADLINK Technology GmbH for repair, you need to get a Return Material Authorization (RMA) number first.

Please print the RMA Request Form from http://www.adlinktech.com/lippert/rma.php
fill in the blanks and fax it to +49 621 4321430. We'll return it to you with the RMA number.

For further RMA requests use this RMA email: RMA.EMEA@adlinktech.com

Caution: Deliveries without a valid RMA number are returned to sender at his or her own cost.

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Appendix D, Revision History

Filename	Date	Edited by	Change
TME-EXP-ISO-COM8-R0V0.doc	2009-12-10	CS	Draft
TME-EXP-ISO-COM8-R1V0.doc	2011-01-12	UW	Updates for Rev1V0
TME-EXP-ISO-COM8-R1V1.doc	2011-01-19	MF	1.3 MTBF value added 2.3 Software Setup added
TME-EXP-ISO-COM8-R1V2.doc	2011-02-22	MF	1.4 mechanical dimensions corrected Appendix A new US address
TME-EXP-ISO-COM8-R1V3.doc	2014-02-03	MF	Ch. 1.4 clarified stacking height 22m, mechanical view added Ch. 3.4 SAMTEC part number corrected

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