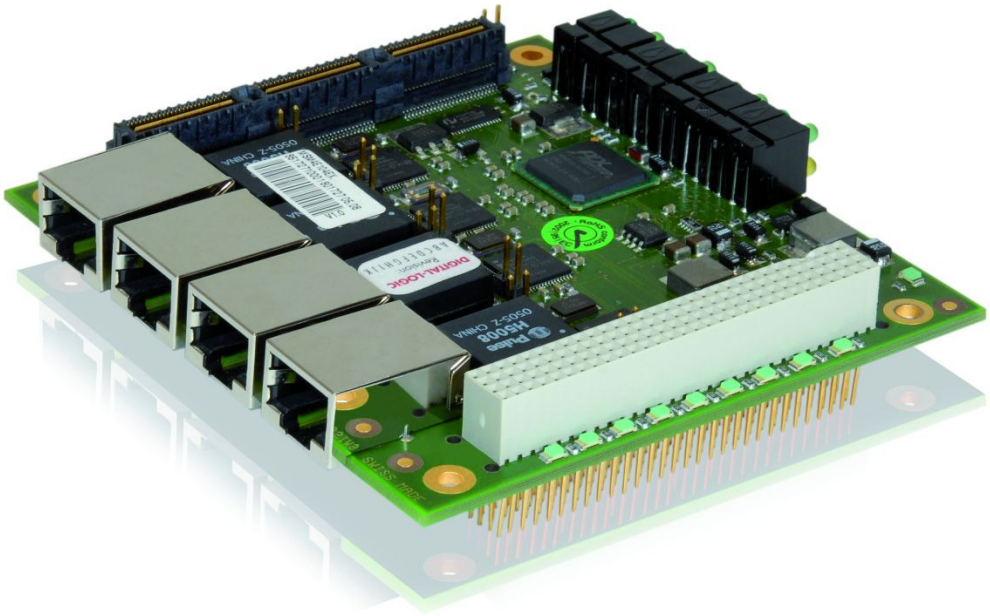
» Kontron User's Guide «



MSM4E104EX

Document Revision 101

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1 User Information

1.1 About this Document

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For the circuits, descriptions and tables indicated, Kontron assumes no responsibility as far as patents or other rights of third parties are concerned.

1.2 Copyright Notice

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1.3 Trademarks

The following lists the trademarks of components used in this board.

- IBM, XT, AT, PS/2 and Personal System/2 are trademarks of International Business Machines Corp.
- Microsoft is a registered trademark of Microsoft Corp.
- Intel is a registered trademark of Intel Corp.
- All other products and trademarks mentioned in this manual are trademarks of their respective owners.

1.4 Standards

Kontron AG is certified to ISO 9000 standards.

1.5 Warranty

This Kontron AG product is warranted against defects in material and workmanship for the warranty period from the date of shipment. During the warranty period, Kontron AG will, at its discretion, decide to repair or replace defective products.

Within the warranty period, the repair of products is free of charge as long as warranty conditions are observed.

The warranty does not apply to defects resulting from improper or inadequate maintenance or handling by the buyer, unauthorized modification or misuse, operation outside of the product's environmental specifications or improper installation or maintenance.

Kontron AG will not be responsible for any defects or damages to other products not supplied by Kontron AG that are caused by a faulty Kontron AG product.

1.6 Technical Support

Technicians and engineers from Kontron AG and/or its subsidiaries are available for technical support. We are committed to making our products easy to use and will help you use our products in your systems.

Please consult our Web site at http://www.kontron.com/support for the latest product documentation, utilities, drivers and support contacts. Consult our customer section http://emdcustomersection.kontron.com for the latest BIOS downloads, Product Change Notifications and additional tools and software. In any case, you can always contact your board supplier for technical support.

1.7 Environmental Protection Statement

This product has been manufactured to satisfy environmental protection requirements wherever possible. Many of the components used (structural parts, printed circuit boards, connectors, batteries, etc.) are capable of being recycled. Final disposal of this product after its service life must be accomplished in accordance with applicable country, state, or local laws or regulations. All components within this product fulfill the requirements of the RoHS (Restriction of Hazardous Substances Directive). The product is soldered with a lead free process.

1.8 RoHS Commitment

Kontron Compact Computers AG (Switzerland) is committed to develop and produce environmentally friendly products according to the Restriction of Hazardous Substances (RoHS) Directive (2002/95/EC) and the Waste Electrical and Electronic Equipment (WEEE) Directive (2002/96/EC) established by the European Union. The RoHS directive was adopted in February 2003 by the European Union and came into effect on July 1, 2006. It is not a law but a directive, which restricts the use of six hazardous materials in the manufacturing of various types of electronic and electrical equipment. It is closely linked with the Waste Electrical and Electronic Equipment Directive (WEEE) 2002/96/EC, which has set targets for collection, recycling and recovery of electrical goods and is part of a legislative initiative to solve the problem of huge amounts of toxic e-waste.

Each European Union member state is adopting its own enforcement and implementation policies using the directive as a guide. Therefore, there could be as many different versions of the law as there are states in the EU. Additionally, non-EU countries like China, Japan, or states in the U.S. such as California may have their own regulations for green products, which are similar, but not identical, to the RoHS directive.

RoHS is often referred to as the "lead-free" directive but it restricts the use of the following substances:

- Lead
- Mercury
- Cadmium
- Chromium VI
- PBB and PBDE

The maximum allowable concentration of any of the above mentioned substances is 0.1% (except for Cadmium, which is limited to 0.01%) by weight of homogeneous material. This means that the limits do not apply to the weight of the finished product, or even to a component but to any single substance that could (theoretically) be separated mechanically.

1.8.1 RoHS Compatible Product Design

All Kontron Compact Computers (KCC) AG standard products comply with RoHS legislation.

Since July 1, 2006, there has been a strict adherence to the use of RoHS compliant electronic and mechanical components during the design-in phase of all KCC AG standard products.

1.8.2 RoHS Compliant Production Process

Kontron Compact Computers AG selects external suppliers that are capable of producing RoHS compliant devices. These capabilities are verified by:

- A confirmation from the supplier indicating that their production processes and resulting devices are RoHS compliant.
- If there is any doubt of the RoHS compliancy, the concentration of the previously mentioned substances in a produced device will be measured. These measurements are carried out by an accredited laboratory.

1.8.3 WEEE Application

The WEEE directive is closely related to the RoHS directive and applies to the following devices:

- Large and small household appliances
- IT equipment
- Telecommunications equipment (although infrastructure equipment is exempt in some countries)
- Consumer equipment
- Lighting equipment – including light bulbs
- Electronic and electrical tools
- Toys, leisure and sports equipment
- Automatic dispensers

It does not apply to fixed industrial plants and tools. The compliance is the responsibility of the company that brings the product to market, as defined in the directive. Components and sub-assemblies are not subject to product compliance. In other words, since Kontron Compact Computers AG does not deliver ready-made products to end users the WEEE directive is not applicable for KCC AG. Users are nevertheless encouraged to properly recycle all electronic products that have reached the end of their life cycle.

1.9 Swiss Quality

- 100% Made in Switzerland
- This product was not manufactured by employees earning piecework wages
- This product was manufactured in humane work conditions
- All employees who worked on this product are paid customary Swiss market wages and are insured
- ISO 9000:2001 (quality management system)

1.10 The Swiss Association for Quality and Management Systems

The Swiss Association for Quality and Management Systems (SQS) provides certification and assessment services for all types of industries and services. SQS certificates are accepted worldwide thanks to accreditation by the Swiss Accreditation Service (SAS), active membership in the International Certification Network, IQNet, and co-operation contracts/agreements with accredited partners.

www.sqs.ch

The SQS Certificate ISO 9001:2000 has been issued to Kontron Compact Computers AG in the field of development, manufacturing and sales of embedded computer boards, embedded computer modules and computer systems. The certification is valid for three years at which time an audit is performed for recertification.

2 Introduction

2.1 MSM4E104EX Ordering Information

Part / Option	Part Number	Description
MSM4E104ex	801727	4x 1GE-LAN with PCIe

Attention: The MSM4E104ex should always be the top/bottom of a stack.
The first generations of this product (V1.0, 1.1 and 1.1A) do not allow USB pass-through. Later generations allow this capability (V1.2 and higher).

2.2 Understanding MSM4E104EX Functionality

The MICROSPACE® PCI/104-*Express* expansion card MSM4E contains four 1 GB LAN controllers (825745L PCIe) which are connected over a PCIe switch to the Express bus lane of the PCI 104 bus.

- 4x 1 Gb/s LAN
- 4x RJ45 interface
- PCI104: pass-through
- The MSM4E104EX is PCI/104-Express, version 1.0, compliant.

2.3 MICROSPACE® Documentation

This manual is written for the original equipment manufacturer (OEM) who plans to build computer systems based on the single board MICROSPACE-PC. It is for integrators and programmers of systems based on the MICROSPACE-Computer family. This manual provides instructions for installing and configuring the board and describes the system and setup requirements. This document contains information on hardware requirements, interconnections, and details of how to program the system. Please check the Product CD for further information and manuals.

2.4 MSM4E104EX Benefits

MICROSPACE PCI/104-*Express* embedded computer boards comply with the PC/104 Consortium form factor 3.55 × 3.775 inches (90.17 × 95.89 mm) and are available in "stack through" versions.

3 Specifications

Note:	All information is subject to change without notice.

3.1 Functional Specifications

Bus

» Standard: PC/104express

» Size & Type: 32 bit PCIe

3.2 Dimensions

» Length: 90 mm

» Width: 96 mm

» Height: 15 mm

3.3 Electrical Specifications

Power Supply

» Working: 5 Volt / 1W

3.4 Environmental Specifications

Temperature

» Operating, standard version: -25°C to +70°C

» Operating, industrial version: -25°C to +85°C (ask Kontron Compact Computers AG)

» Non-operating (storage): -55°C to +85°C

Vibration

» 5 to 2000 Hz

Humidity

» 5% to 90% (non-condensing)

Shock

» 10 g

3.5 LAN 1000BASE-T

- » Controller 4x Intel® 82574L, from Intel
- » Enhanced BIOS Yes
- » Memory None
- » Interface 4x RJ45 LAN

4 Detailed System Description

4.1 DOS 1000 Ethernet LAN 82574L

Required programs and drivers are located in the directory \DRIVERS\MSM4E104ex\MSDOS.

Create a directory C:\LAN1000 on your hard disk.

Copy the programs and drivers of \DRIVERS\MSM4E104ex\MSDOS onto your HD.

```
CD \LAN1000
LSL
E1000BODI
IPXODI
NETX
CD \
```

Table 82574L.EEP:

```
8888 8888 8887 0B30 F746 0057 FFFF FFFF
FFFF FFFF 026B 0000 8086 109A 8086 80DF
0000 2000 7E54 0000 0014 00DA 0004 2700
6CC9 3150 0732 040B 2984 0000 F000 0706
1008 0000 0F04 7FFF 4D01 FFFF FFFF FFFF
0014 001D 0014 001D AAAF 001E 0000 001D
0100 4000 121C 4007 FFFF FFFF FFFF FFFF
FFFF FFFF FFFF FFFF FFFF FFFF FFFF FFFF
```

Test the transfer with HDTEST using a disk drive on your server!

4.1.1 EEPROM Update

Attention: Do ***not*** use this function, if the EEPROM is ***not*** corrupted.

To download the data in the EEPROM, use the following steps:

- » Copy the folder "x:\ DRIVERS\MSM4E104ex\EEPROM" to a floppy disk.
- » Start MSDOS
- » Type the following string:

Load data into EEPROM. Load with the command:

" EEUPDATE –NIC=x –MAC=y –d z "

x = LAN interface to program

y = MAC address

z = EEPROM map file (82573L.EEP for MSM4E104ex)

The EEPROM is now updated again.

4.2 Driver Installation Windows XP

Driver: x:\drivers\MSM4E104ex\XP-W2K

Double click on PRO2KXP.EXE and follow the instructions:



4.2.1 Useful Websites

Working with the MSM4E104ex peripheral board, you might need some information regarding the Intel Boot Agent software. This information can be found on the following websites:

http://support.intel.com

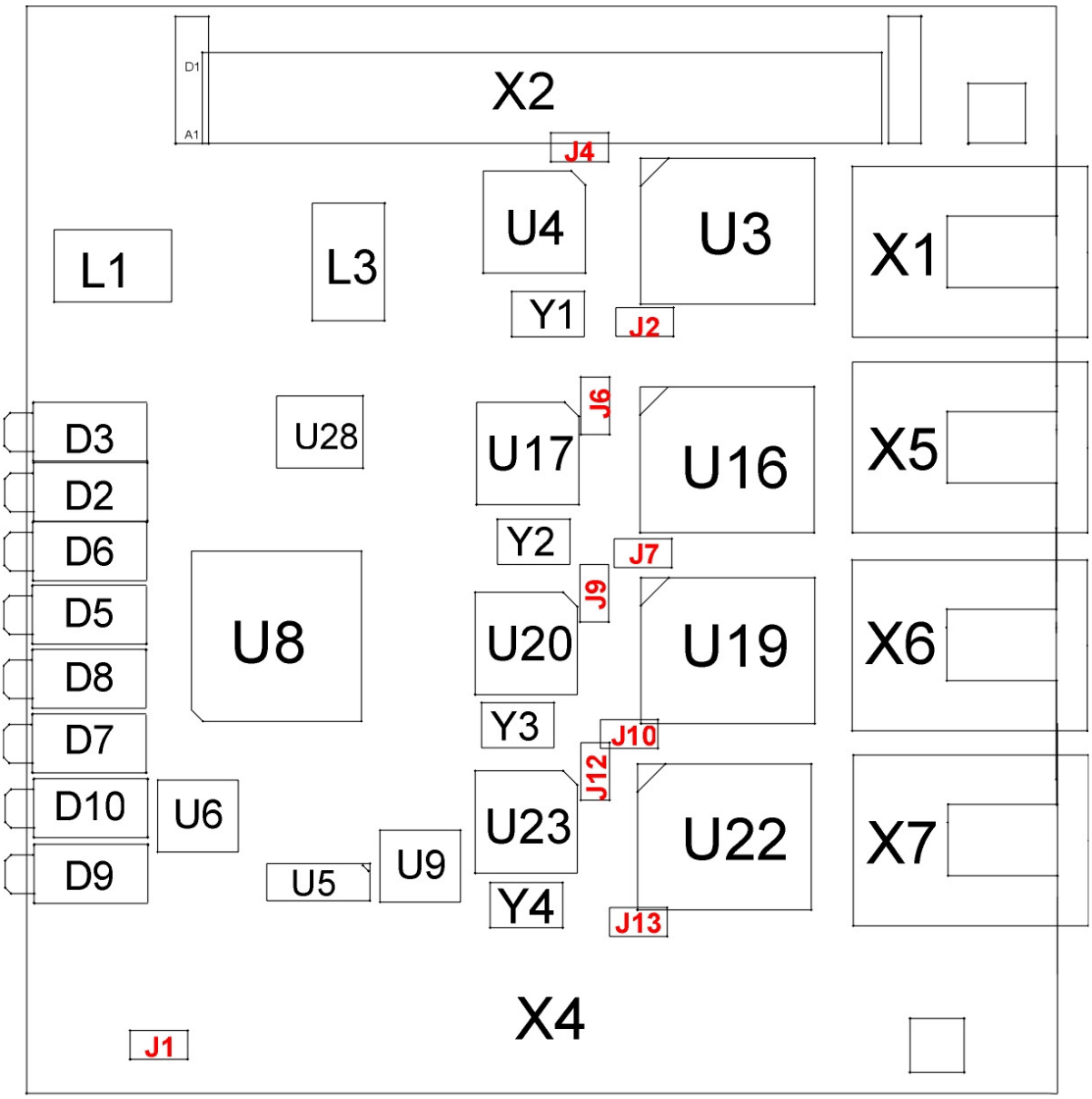
http://www.intel.com/network

http://developer.intel.com

5 MSM4E104EX Connectors & Jumpers

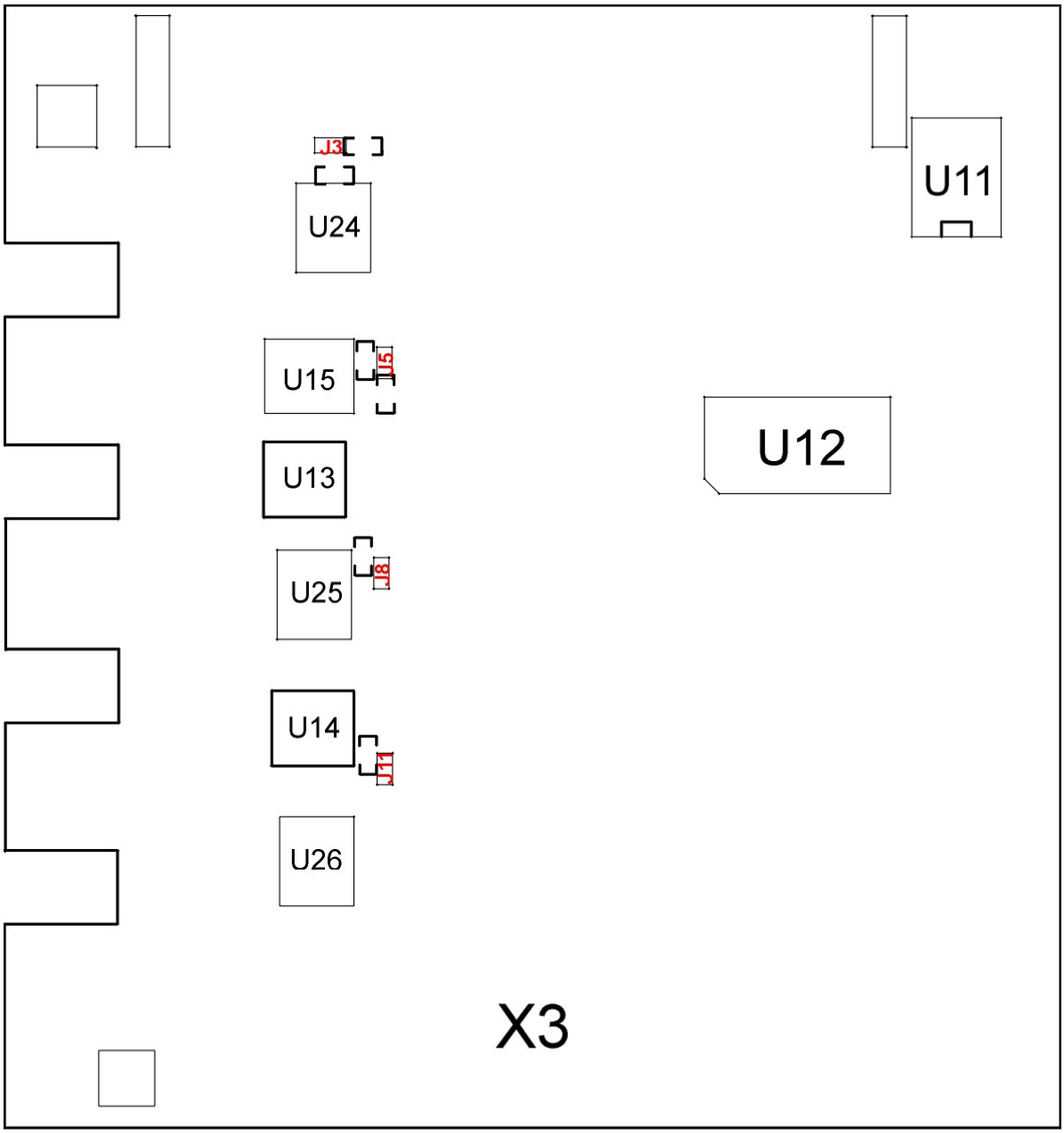
5.1 Connector & Jumper Locations

5.1.1 Top View



MSM4E104EX V1.2A Top Connectors & Jumpers

5.1.2 Bottom View



MSM4E104EX V1.2 Bottom
Connectors & Jumpers

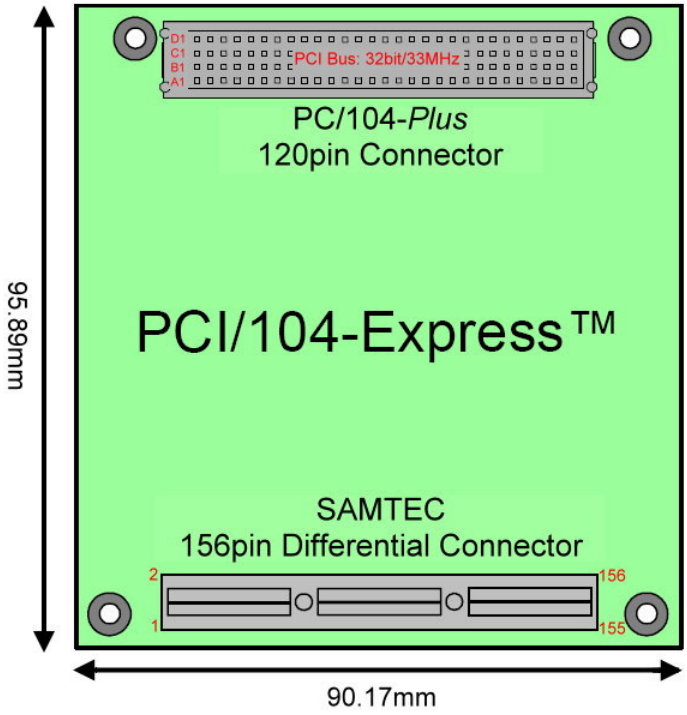
5.2 Connector References

5.2.1 X3 PCI/104-Express Bus (Bottom View Signal Assignment)

Pin	Signal		Signal	Pin
2	PE_RST#	+5 Volts	Reserved (GPIO0)	1
4	3.3V		3.3V	3
6	USB0+ ★		USB1+ ★	5
8	USB0- ★		USB1- ★	7
10	GND		GND	9
12	PEx1_0T+		PEx1_1T+	11
14	PEx1_0T-		PEx1_1T-	13
16	GND		GND	15
18	PEx1_3T+		PEx1_2T+	17
20	PEx1_3T-		PEx1_2T-	19
22	GND		GND	21
24	PEx1_0R+		PEx1_1R+	23
26	PEx1_0R-		PEx1_1R-	25
28	GND		GND	27
30	PEx1_3R+		PEx1_2R+	29
32	PEx1_3R-		PEx1_1R-	31
34	GND		GND	33
36	PEx1_0Clk+		PEx1_1Clk+	35
38	PEx1_0Clk-		PEx1_1Clk-	37
40	5V_Always		5V_Always	39
42	PEx1_3Clkp+		PEx1_2Clk+	41
44	PEx1_3Clk-		PEx1_2Clk-	43
46	PWRGOOD		CPU_DIR	45
48	PEx16_x8_x4_Clk+		SMB_DAT	47
50	PEx16_x8_x4_Clk-		SMB_CLK	49
52	PSON#		SMB_ALERT	51
54	PEG_ENA#		Reserved / Wake#	53
56	GND		GND	55
58	PEx16_0T(0)+ / SDVO0R+		PEx16_0T(8)+	57
60	PEx16_0T(0)- / SDVO0R-		PEx16_0T(8)-	59
62	GND		GND	61
64	PEx16_0T(1)+ / SDVO1G+		PEx16_0T(9)+	63
66	PEx16_0T(1)- / SDVO1G-		PEx16_0T(9)n-	65
68	GND		GND	67
70	PEx16_0T(2)+ / SDVO0B+		PEx16_0T(10)+	69
72	PEx16_0T(2)- / SDVO0B-		PEx16_0T(10)-	71
74	GND		GND	73
76	PEx16_0T(3)+ / SDVO0CLK+	+5 Volts	PEx16_0T(11)+	75
78	PEx16_0T(3)- / SDVO0CLK-		PEx16_0T(11)-	77
80	GND		GND	79
82	PEx16_0T(4)+ / SDVO1R+		PEx16_0T(12)+	81
84	PEx16_0T(4)- / SDVO1R-		PEx16_0T(12)-	83
86	GND		GND	85
88	PEx16_0T(5)+ / SDVO1G+		PEx16_0T(13)+	87
90	PEx16_0T(5)- / SDVO1G-		PEx16_0T(13)-	89
92	GND		GND	91
94	PEx16_0T(6)+ / SDVO1B+		PEx16_0T(14)+	93
96	PEx16_0T(6)- / SDVO1B-		PEx16_0T(14)-	95
98	GND		GND	97
100	PEx16_0T(7)+ / SDVO1CLK+		PEx16_0T(15)+	99
102	PEx16_0T(7)- / SDVO1CLK+		PEx16_0T(15)-	101
104	GND		GND	103

★ Not pass-through older than product version 1.2.

Pin	Signal		Signal	Pin
106	SDVO_CLK	+12 Volts	SDVO_DAT (PENA#)	105
108	GND		GND	107
110	PEx16_0R(0)+ / SDVO_TVCI+		PEx16_0R(8)+	109
112	PEx16_0R(0)- / SDVO_TVCI-		PEx16_0R(8)-	111
114	GND		GND	113
116	PEx16_0R(1)+ / SDVO_INT+		PEx16_0R(9)+	115
118	PEx16_0R(1)- / SDVO_INT-		PEx16_0R(9)-	117
120	GND		GND	119
122	PEx16_0R(2)+ / SDVO_STALL+		PEx16_0R(10)+	121
124	PEx16_0R(2)- / SDVO_STALL-		PEx16_0R(10)-	123
126	GND		GND	125
128	PEx16_0R(3)+		PEx16_0R(11)	127
130	PEx16_0R(3)-		PEx16_0R(11)-	129
132	GND		GND	131
134	PEx16_0R(4)+		PEx16_0R(12)+	133
136	PEx16_0R(4)-		PEx16_0R(12)-	135
138	GND		GND	137
140	PEx16_0R(5)+ / SDVO1_INT+		PEx16_0R(13)+	139
142	PEx16_0R(5)- / SDVO1_INT-		PEx16_0R(13)-	141
144	GND		GND	143
146	PEx16_0R(6)+		PEx16_0R(14)p	145
148	PEx16_0R(6)-		PEx16_0R(14)n	147
150	GND		GND	149
152	PEx16_0R(7)+		PEx16_0R(15)+	151
154	PEx16_0R(7)-		PEx16_0R(15)-	153
156	GND		GND	155



5.2.2 X1/X5/X6/X7 LAN 1000 Connector

Pin	Signal	Pin	Signal
1	MDX0P	5	MDX2N
2	MDX0N	6	MDX1N
3	MDX1P	7	MDX3P
4	MDX2P	8	MDX3N

5.3 LED Descriptions

LED	Color	Signal	State		Connector
D3	Green	100Mbit	Off when **X1** NC or 1Gbit connected	On when **X1** connected with 100Mbit	X1
	Yellow	Activity	On when **X1** NC	Flashing when **X1** connected	
D2	Green	Power	Off when not powered	On when powered	
	Green	1000Mbit	Off when **X1** NC or 100Mbit connected	On when **X1** connected with 1Gbit	
D6	Green	100Mbit	Off when **X5** NC or 1Gbit connected	On when **X5** connected with 100Mbit	X5
	Yellow	Activity	On when **X5** NC	Flashing when **X5** connected	
D5	Green	Power	Off when not powered	On when powered	
	Green	1000Mbit	Off when **X5** NC or 100Mbit connected	On when **X5** connected with 1Gbit	
D8	Green	100Mbit	Off when **X6** NC or 1Gbit connected	On when **X6** connected with 100Mbit	X6
	Yellow	Activity	On when **X6** NC	Flashing when **X6** connected	
D7	Green	Power	Off when not powered	On when powered	
	Green	1000Mbit	Off when **X6** NC or 100Mbit connected	On when **X6** connected with 1Gbit	
D10	Green	100Mbit	Off when **X7** NC or 1Gbit connected	On when **X7** connected with 100Mbit	X7
	Yellow	Activity	On when **X7** NC	Flashing when **X7** connected	
D9	Green	Power	Off when not powered	On when powered	
	Green	1000Mbit	Off when **X7** NC or 100Mbit connected	On when **X7** connected with 1Gbit	

5.4 Jumpers

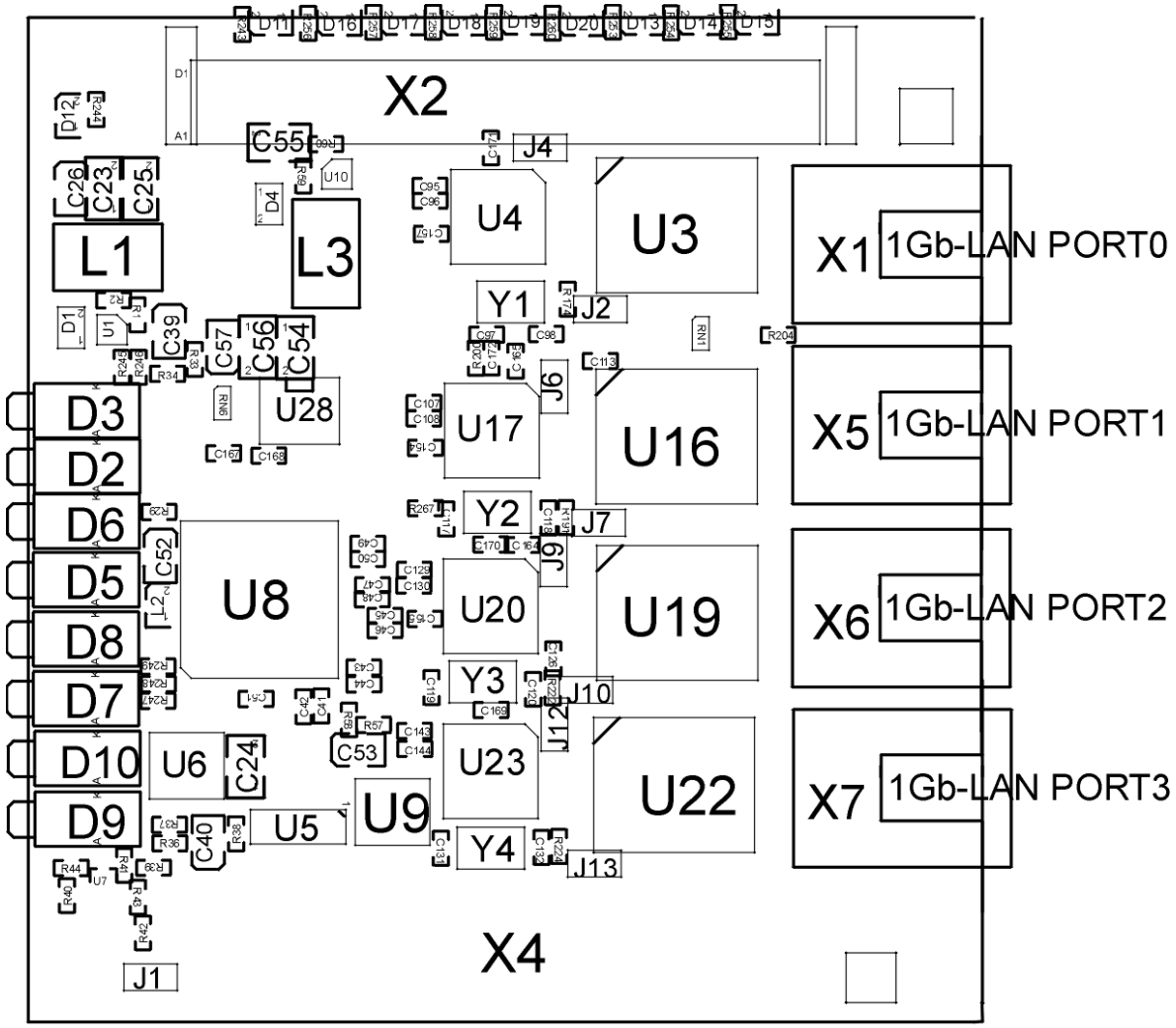
The jumpers for the LAN1000 circuit on this product:

Default settings in bold!

Jumper	Structure	Open / 1-2 Bottom side connection	Closed / 2-3 Top side connection
J1	SIDE_DETECT 2	**Open**	
J2	AT input	**Open**	-
J3	DIS_REG10	Disable	**Closed / Enable**
J4	CTRL in external DC/DC	**Open**	-
J5	DIS_REG10	-	**Closed / Enable**
J6	CTRL in external DC/DC	**Open**	-
J7	AT input	**Open**	-
J8	DIS_REG10	Disable	**Closed / Enable**
J9	CTRL in external DC/DC	**Open**	-
J10	AT input	**Open**	-
J11	DIS_REG10	Disable	**Closed / Enable**
J12	CTRL in external DC/DC	**Open**	-
J13	AT input	**Open**	-

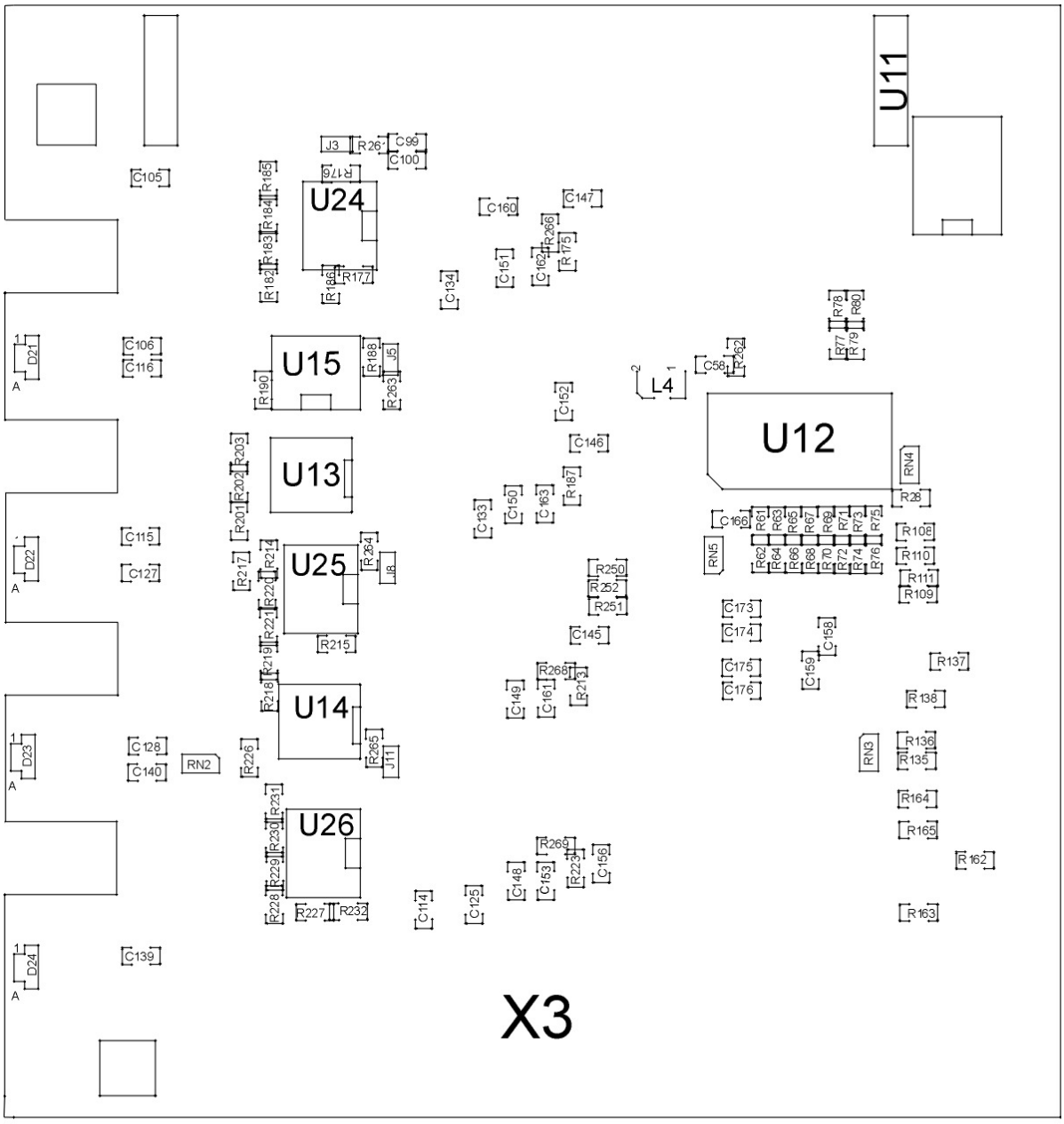
6 Assembly Views

6.1 Top Side



MSM4E104EX V1.2A Top

6.2 Bottom Side



MSM4E104EX V1.2 Bottom

7 Appendix A: Architecture Information

The following sources of information can help you better understand PC architecture.

7.1 Buses

7.1.1 ISA, Standard PS/2 – Connectors

- AT Bus Design: Eight and Sixteen-Bit ISA, E-ISA and EISA Design, Edward Solari, Annabooks, 1990, ISBN 0-929392-08-6
- AT IBM Technical Reference, Volumes 1&2, 1985
- ISA & EISA Theory and Operation, Edward Solari, Annabooks, 1992, ISBN 0929392159
- ISA Bus Specifications and Application Notes, Jan. 30, 1990, Intel
- ISA System Architecture, Third Edition, Tom Shanley and Don Anderson, Addison-Wesley Publishing Company, 1995, ISBN 0-201-40996-8
- Personal Computer Bus Standard P996, Draft D2.00, Jan. 18, 1990, IEEE Inc
- Technical Reference Guide, Extended Industry Standard Architecture Expansion Bus, Compaq 1989

7.1.2 PCI/104

- Embedded PC 104 Consortium
- The consortium provides information about PC/104 and PC/104-Plus technology. You can search for information about the consortium on the Web.
- PCI SIG
- The PCI-SIG provides a forum for its ~900 member companies, who develop PCI products based on the specifications that are created by the PCI-SIG. You can search for information about the SIG on the Web.
- PCI & PCI-X Hardware and Software Architecture & Design, Fifth Edition, Edward Solari and George Willse, Annabooks, 2001, ISBN 0-929392-63-9.
- PCI System Architecture, Tom Shanley and Don Anderson, Addison-Wesley, 2000, ISBN 0-201-30974-2.

7.2 General PC Architecture

- Embedded PCs, Markt&Technik GmbH, ISBN 3-8272-5314-4 (German)
- Hardware Bible, Winn L. Rosch, SAMS, 1997, 0-672-30954-8
- Interfacing to the IBM Personal Computer, Second Edition, Lewis C. Eggebrecht, SAMS, 1990, ISBN 0-672-22722-3
- The Indispensable PC Hardware Book, Hans-Peter Messmer, Addison-Wesley, 1994, ISBN 0-201-62424-9
- The PC Handbook: For Engineers, Programmers, and Other Serious PC Users, Sixth Edition, John P. Choisser and John O. Foster, Annabooks, 1997, ISBN 0-929392-36-1

7.3 Ports

7.3.1 RS-232 Serial

» EIA-232-E standard

» The EIA-232-E standard specifies the interface between (for example) a modem and a computer so that they can exchange data. The computer can then send data to the modem, which then sends the data over a telephone line. The data that the modem receives from the telephone line can then be sent to the computer. You can search for information about the standard on the Web.

» RS-232 Made Easy: Connecting Computers, Printers, Terminals, and Modems, Martin D. Seyer, Prentice Hall, 1991, ISBN 0-13-749854-3

» National Semiconductor: The Interface Data Book includes application notes. Type “232” as search criteria to obtain a list of application notes. You can search for information about the data book on National Semiconductor’s Web site.

7.3.2 Serial ATA

Serial AT Attachment (ATA) Working Group. This X3T10 standard defines an integrated bus interface between disk drives and host processors. It provides a common point of attachment for systems manufacturers and the system. You can search for information about the working group on the Web. We recommend you also search the Web for information on 4.2 I/O cables, if you use hard disks in a DMA3 or PIO4 mode.

7.3.3 USB

USB Specification

USB Implementers Forum, Inc. is a non-profit corporation founded by the group of companies that developed the Universal Serial Bus specification. The USB-IF was formed to provide a support organization and forum for the advancement and adoption of Universal Serial Bus technology. You can search for information about the standard on the Web.

7.4 Programming

» C Programmer’s Guide to Serial Communications, Second Edition, Joe Campbell, SAMS, 1987, ISBN 0-672-22584-0

» Programmer’s Guide to the EGA, VGA, and Super VGA Cards, Third Edition, Richard Ferraro, Addison-Wesley, 1990, ISBN 0-201-57025-4

» The Programmer’s PC Sourcebook, Second Edition, Thom Hogan, Microsoft Press, 1991, ISBN 1-55615-321-X

» Undocumented PC, A Programmer’s Guide to I/O, CPUs, and Fixed Memory Areas, Frank van Gilluwe, Second Edition, Addison-Wesley, 1997, ISBN 0-201-47950-8

8 Appendix B: Document Revision History

Revision	Date	Edited by	Changes
100	05.Feb.2010	WAS	Changed to new Kontron Corporate Design from DLAG V1.0A including title photo.
101	02.Sep.2010	MEG/WAS	LED descriptions added.

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