

DIGITAL-LOGIC

smart embedded computers

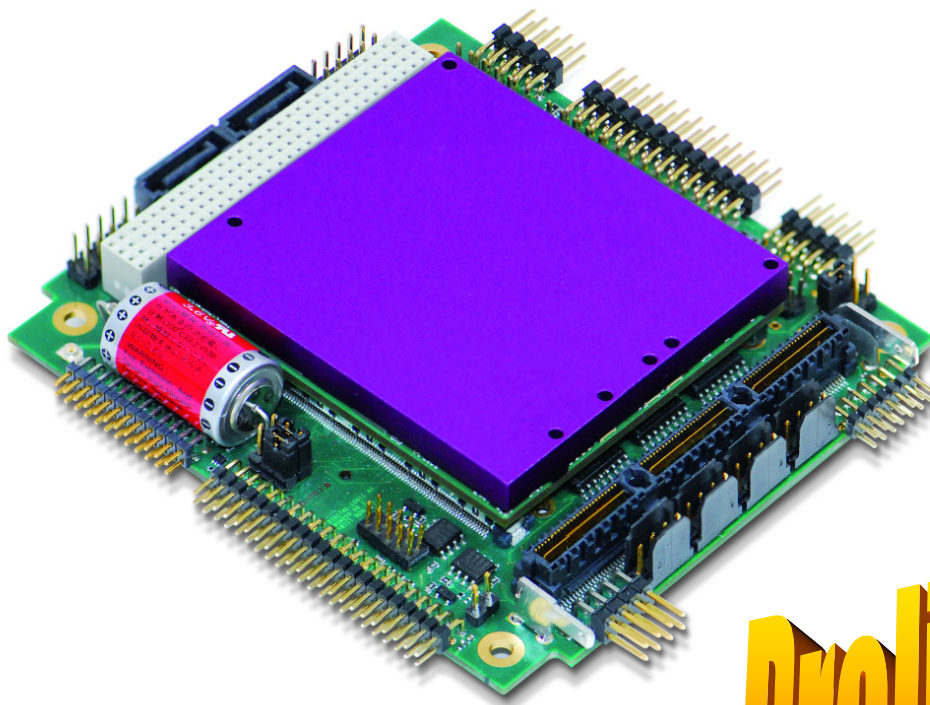
Detailed USER MANUAL FOR:

MICROSPACE[®]

PCI/104express

Based on the SmartCoreExpress200 (SMA200)

MSM200X/XP/XU



Preliminary

Nordstrasse 11/F
CH - 4542 Luterbach
Tel.: ++41 (0)32 681 58 00
Fax: ++41 (0)32 681 58 01
Email: support@digitallogic.com
Homepage: <http://www.digitallogic.com>



For internal use only:

File: MSM200X_Detailed_V0.7A_Preliminary.doc

Path: R:\HANDBUCH\MSM\cpu_boards\MSM200\MSM200X_Detailed_V0.7A_Preliminary.doc

COPYRIGHT © 2009 BY DIGITAL-LOGIC AG

This publication is protected by copyright and all rights are reserved. No part of this document may be reproduced, transmitted, transcribed or stored in a retrieval system, in any form or by any means, electronic, mechanical, optical, manual, or otherwise, without the prior written permission of DIGITAL-LOGIC AG.

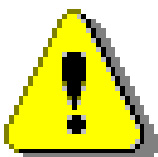
The software described herein, together with this document, are furnished under a license agreement and may be used or copied only in accordance with the terms of that agreement.

About this Manual and How to Use It

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.

REVISION HISTORY:

Document Version	Date/Initials:	Modification: Remarks, News, Attention:
V0.1	10.2008 KUF	Initial Version
V0.2	01.12.2008 SCM	Some changes
V0.3	03.2009 KUF	Div.changes
V0.4	03.2009 KUF	Productver 0.3 Partschema added
V0.5	04.2009 MEG	Video Controller Specification changed
V0.6	05.2009 SCM	SDIO Interface Connector added
V0.7	05.2009 MEG	Chapter 6.2.1. corrected
V0.7A	08.2009 MEG/WAS	PCI/104express board w/156pin connector included



Attention!

1. All information in this manual, and the product, are subject to change without prior notice.
2. Read this manual prior to installation of the product.
3. Read the security information carefully prior to installation of the product.

Table of Contents

1. PREFACE	5
1.1. Trademarks	5
1.2. Disclaimer	5
1.3. Environmental Protection Statement	5
1.4. Who should use this Product	5
1.5. Recycling Information.....	6
1.6. Technical Support	6
1.7. Limited Two Year Warranty	6
1.8. Explanation of Symbols.....	7
1.9. Applicable Documents and Standards	8
1.10. For Your Safety.....	9
1.11. RoHS Commitment.....	9
1.11.1. RoHS Compatible Product Design	10
1.11.2. RoHS Compliant Production Process	10
1.11.3. WEEE Application.....	10
1.12. Swiss Quality	11
1.13. The Swiss Association for Quality and Management Systems.....	11
2. OVERVIEW	12
2.1. Standard Features.....	12
2.2. Unique Features	13
2.3. Standards	13
2.4. Block Diagram	14
2.5. Specifications	15
2.6. Examples of Ordering Codes	18
2.7. Dimensions and Diagrams	19
2.7.1. Basic Board MSM200X	19
2.7.2. Assembled Board MSM200	21
2.7.3. 3-Dimensional Views MSM200.....	23
2.7.4. SMA200	24
2.8. Incompatibilities to a Standard PC/AT	25
2.9. Related Application Notes.....	25
2.10. High Frequency Radiation (to meet EN55022/EN61000)	25
2.11. Thermoscan	26
2.12. RTC Battery-Lifetime.....	27
2.12.1. External Battery Assembly	27
3. BUS SIGNALS	28
3.1. PC104+ Bus.....	28
3.2. Addressing PCI Devices	29
3.2.1. MSM200	29
3.3. Expansion Bus	30
3.3.1. Expansion Bus max. supply currents	30
4. DETAILED SYSTEM DESCRIPTION	31
4.1. Power Supply Requirements	31
4.1.1. Minimum Power-Off Time	31
4.2. Boot Time.....	31
4.3. Interfaces	32
4.3.1. PS/2 Keyboard and PS/2 Mouse.....	32
4.3.2. Line Printer Port LPT1	32
4.3.3. Serial Ports COM1-COM4	32
4.3.4. Floppy Disk Interface.....	33
4.3.5. Speaker Interface	33
4.3.6. Console Redirection	33
4.3.7. LAN.....	33
4.3.8. IDE.....	33
4.3.9. USB	33
4.3.10. VGA	33
4.4. Controllers	34
4.4.1. Interrupt Controllers.....	34

4.4.2.	Timers and Counters	34
4.4.3.	SATA Controller	35
4.4.4.	ROM-BIOS Sockets.....	35
4.5.	CMOS RAM Map	35
4.6.	EEPROM saved CMOS Setup.....	35
4.6.1.	EEPROM Memory for Setup	36
4.7.	Memory.....	37
5.	LVDS-DISPLAYS	37
6.	DESCRIPTION AND LOCATION OF THE CONNECTORS	38
6.1.	Connector Plan.....	39
6.2.	Connector Descriptions.....	41
6.2.1.	Power Supply Connectors	41
6.2.	Connector Descriptions (continued).....	42
7.	JUMPER LOCATIONS ON THE BOARD.....	51
7.1.	The Jumpers on MSM200	52
8.	CABLE INTERFACES	54
8.1.	The Hard Disk Cable 44pin.....	54
8.2.	The COM 1/2 Serial Cable.....	55
8.3.	VGA Cable.....	55
8.4.	The Printer Cable (P4).....	56
9.	DRIVER INSTALLATION.....	56
9.1.	Drivers	56
9.2.	CompactFlash (CF)	56
10.	THERMAL SPECIFICATIONS.....	57
10.1.	Thermal Analysis for Case Integration	57
10.2.	Assembly of the Passive / Active Heat Sink.....	57
11.	CORE BIOS SETUP	58
11.1.	CMOS-SETUP	58
12.	ASSEMBLY VIEWS OF VERS.0.2.....	59
12.1.	Top View V0.2	59
12.2.	Bottom View V0.2	60
13.	Q&A – QUESTIONS AND ANSWERS	61
14.	INDEX.....	62

1. PREFACE

The information contained in this manual has been carefully checked and is believed to be accurate; it is subject to change without notice. Product advances mean that some specifications may have changed. DIGITAL-LOGIC AG assumes no responsibility for any inaccuracies, or the consequences thereof, that may appear in this manual. Furthermore, DIGITAL-LOGIC AG does not accept any liability arising from the use or application of any circuit or product described herein.

1.1. Trademarks

DIGITAL-LOGIC, DIGITAL-LOGIC-Logo, MICROSPACE, and smartModule are registered trademarks owned worldwide by DIGITAL-LOGIC AG, Luterbach (Switzerland). In addition, this document may include names, company logos, and registered trademarks which are, therefore, proprietary to their respective owners.

1.2. Disclaimer

DIGITAL-LOGIC AG makes no representations or warranties with respect to the contents of this manual, and specifically disclaims any implied warranty of merchantability or fitness, for any particular purpose. DIGITAL-LOGIC AG shall, under no circumstances, be liable for incidental or consequential damages or related expenses resulting from the use of this product, even if it has been notified of the possibility of such damage.

1.3. 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.

1.4. Who should use this Product

- Electrical engineers with know-how in PC-technology.
- Because of the complexity and the variability of PC-technology, we cannot guarantee that the product will work in any particular situation or set-up. Our technical support will try to help you find a solution.
- Pay attention to electrostatic discharges; use a CMOS protected workplace.
- Power supply must be OFF when working on the board or connecting any cables or devices.

1.5. Recycling Information

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.

1.6. Technical Support

1. Contact your local DIGITAL-LOGIC Technical Support, in your country.
2. Use the Internet Support Request form at <http://support.digitallogic.ch/> → embedded products → New Support Request

Support requests are only accepted with detailed information about the product (i.e., BIOS-, Board-version)!

1.7. Limited Two Year Warranty

DIGITAL-LOGIC AG guarantees the hardware and software products it manufactures and produces to be free from defects in materials and workmanship for two years following the date of shipment from DIGITAL-LOGIC AG, Switzerland. This warranty is limited to the original purchaser of the product and is not transferable.

During the two year warranty period, DIGITAL-LOGIC AG will repair or replace, at its discretion, any defective product or part at no additional charge, provided that the product is returned, shipping prepaid, to DIGITAL-LOGIC AG. All replaced parts and products become property of DIGITAL-LOGIC AG.

Before returning any product for repair, direct customers of DIGITAL-LOGIC AG, Switzerland are required to register a RMA (Return Material Authorization) number in the Support Center at <http://support.digitallogic.ch/>

All other customers must contact their local distributors for returning defective materials.

This limited warranty does not extend to any product which has been damaged as a result of accident, misuse, abuse (such as use of incorrect input voltages, wrong cabling, wrong polarity, improper or insufficient ventilation, failure to follow the operating instructions that are provided by DIGITAL-LOGIC AG or other contingencies beyond the control of DIGITAL-LOGIC AG), wrong connection, wrong information or as a result of service or modification by anyone other than DIGITAL-LOGIC AG. Nor if the user has insufficient knowledge of these technologies or has not consulted the product manuals or the technical support of DIGITAL-LOGIC AG and therefore the product has been damaged.

Empty batteries (external and onboard), as well as all other battery failures, are not covered by this manufacturer's limited warranty.

Except, as directly set forth above, no other warranties are expressed or implied, including, but not limited to, any implied warranty of merchantability and fitness for a particular purpose, and DIGITAL-LOGIC AG expressly disclaims all warranties not stated herein. Under no circumstances will DIGITAL-LOGIC AG be liable to the purchaser or any user for any damage, including any incidental or consequential damage, expenses, lost profits, lost savings, or other damages arising out of the use or inability to use the product.

1.8. Explanation of Symbols



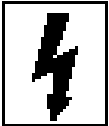
CE Conformity

This symbol indicates that the product described in this manual is in compliance with all applied CE standards.



Caution, Electric Shock!

This symbol and title warn of hazards due to electrical shocks (> 60V) when touching products or parts of them. Failure to observe the precautions indicated and/or prescribed by the law may endanger your life/health and/or result in damage to your equipment.



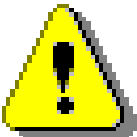
Caution, Electric Shock!

This symbol and title warn of hazards due to electrical shocks (> 32V) when touching products or parts of them. Failure to observe the precautions indicated and/or prescribed by the law may endanger your life/health and/or result in damage to your equipment.



Warning, ESD Sensitive Device!

This symbol and title inform that electronic boards and their components are sensitive to Electro Static Discharge (ESD). In order to ensure product integrity at all times, care must always be taken while handling and examining this product.



Attention!

This symbol and title emphasize points which, if not fully understood and taken into consideration by the reader, may endanger your health and/or result in damage to your equipment.



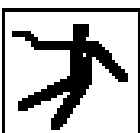
Note...

This symbol and title emphasize aspects the user should read through carefully for his, or her, own advantage.



Warning, Heat Sensitive Device!

This symbol indicates a heat sensitive component.



Safety Instructions

This symbol shows safety instructions for the operator to follow.



This symbol warns of general hazards from mechanical, electrical, and/or chemical failure. This may endanger your life/health and/or result in damage to your equipment.

1.9. Applicable Documents and Standards

The following publications are used in conjunction with this manual. When any of the referenced specifications are superseded by an approved revision, that revision shall apply. All documents may be obtained from their respective organizations.

- Advanced Configuration and Power Interface Specification Revision 2.0c, August 25, 2003 Copyright © 1996-2003 Compaq Computer Corporation, Intel Corporation, Microsoft Corporation, Phoenix Technologies Ltd., Toshiba Corporation. All rights reserved. <http://www.acpi.info/>
- ANSI/TIA/EIA-644-A-2001: Electrical Characteristics of Low Voltage Differential Signaling (LVDS) Interface Circuits, January 1, 2001. <http://www.ansi.org/>
- ANSI INCITS 361-2002: AT Attachment with Packet Interface - 6 (ATA/ATAPI-6), November 1, 2002. <http://www.ansi.org/>
- ANSI INCITS 376-2003: American National Standard for Information Technology – Serial Attached SCSI (SAS), October 30, 2003. <http://www.ansi.org/>
- Audio Codec '97 Revision 2.3 Revision 1.0, April 2002 Copyright © 2002 Intel Corporation. All rights reserved. <http://www.intel.com/labs/media/audio/>
- Display Data Channel Command Interface (DDC/CI) Standard (formerly DDC2Bi) Version 1, August 14, 1998 Copyright © 1998 Video Electronics Standards Association. All rights reserved. <http://www.vesa.org/summary/sumddcci.htm>
- ExpressCard Standard Release 1.0, December 2003 Copyright © 2003 PCMCIA. All rights reserved. <http://www.expresscard.org/>
- IEEE 802.3-2002, IEEE Standard for Information technology, Telecommunications and information exchange between systems–Local and metropolitan area networks–Specific requirements – Part 3: Carrier Sense Multiple Access with Collision Detection (CSMA/CD) Access Method and Physical Layer Specifications. <http://www.ieee.org>
- IEEE 802.3ae (Amendment to IEEE 802.3-2002), Part 3: Carrier Sense Multiple Access with Collision Detection (CSMA/CD) Access Method and Physical Layer Specifications, Amendment: Media Access Control (MAC) Parameters, Physical Layers, and Management Parameters for 10 GB/s Operation. <http://www.ieee.org>
- Intel Low Pin Count (LPC) Interface Specification Revision 1.1, August 2002 Copyright © 2002 Intel Corporation. All rights reserved. <http://developer.intel.com/design/chipsets/industry/lpc.htm>
- PCI Express Base Specification Revision 1.1, March 28, 2005, Copyright © 2002-2005 PCI Special Interest Group. All rights reserved. <http://www.pcisig.com/>
- PCI Express Card Electromechanical Specification Revision 1.1, March 28, 2005, Copyright © 2002-2005 PCI Special Interest Group. All rights reserved. <http://www.pcisig.com/>
- PCI Local Bus Specification Revision 2.3, March 29, 2002 Copyright © 1992, 1993, 1995, 1998, 2002 PCI Special Interest Group. All rights reserved. <http://www.pcisig.com/>
- PCI-104 Specification, Version V1.0, November 2003. All rights reserved. <http://www.pc104.org>
- PICMG® Policies and Procedures for Specification Development, Revision 2.0, September 14, 2004, PCI Industrial Computer Manufacturers Group (PICMG®), 401 Edgewater Place, Suite 500, Wakefield, MA 01880, USA, Tel: 781.224.1100, Fax: 781.224.1239. <http://www.picmg.org/>
- Serial ATA: High Speed Serialized AT Attachment Revision 1.0a January 7, 2003 Copyright © 2000-2003, APT Technologies, Inc, Dell Computer Corporation, Intel Corporation, Maxtor Corporation, Seagate Technology LLC. All rights reserved. <http://www.sata-io.org/>

- Smart Battery Data Specification Revision 1.1, December 11, 1998. www.sbs-forum.org
- System Management Bus (SMBus) Specification Version 2.0, August 3, 2000 Copyright © 1994, 1995, 1998, 2000 Duracell, Inc., Energizer Power Systems, Inc., Fujitsu, Ltd., Intel Corporation, Linear Technology Inc., Maxim Integrated Products, Mitsubishi Electric Semiconductor Company, Power-Smart, Inc., Toshiba Battery Co. Ltd., Unitrode Corporation, USAR Systems, Inc. All rights reserved. <http://www.smbus.org/>
- Universal Serial Bus Specification Revision 2.0, April 27, 2000 Copyright © 2000 Compaq Computer Corporation, Hewlett-Packard Company, Intel Corporation, Lucent Technologies Inc., Microsoft Corporation, NEC Corporation, Koninklijke Philips Electronics N.V. All rights reserved. <http://www.usb.org/>

1.10. For Your Safety

Your new DIGITAL-LOGIC product was developed and tested carefully to provide all features necessary to ensure its compliance with electrical safety requirements. It was also designed for a long, fault-free life. However, this life expectancy can be drastically reduced by improper treatment during unpacking and installation. Therefore, in the interest of your own safety and for the correct operation of your new DIGITAL-LOGIC product, please comply with the following guidelines.



Attention!

All work on this device must only be carried out by sufficiently skilled personnel.



Caution, Electric Shock!

Before installing your new DIGITAL-LOGIC product, always ensure that your mains power is switched off. This applies also to the installation of piggybacks or peripherals. 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 voltage before performing work.



Warning, ESD Sensitive Device!

Electronic boards and their components are sensitive to static electricity. In order to ensure product integrity at all times, be careful during all handling and examinations of this product.

1.11. RoHS Commitment

DIGITAL-LOGIC AG 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.

1.11.1. RoHS Compatible Product Design

All DIGITAL-LOGIC 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 DIGITAL-LOGIC standard products.

1.11.2. RoHS Compliant Production Process

DIGITAL-LOGIC selects external suppliers that are capable of producing RoHS compliant devices. These capabilities are verified by:

1. A confirmation from the supplier indicating that their production processes and resulting devices are RoHS compliant.
2. 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.

1.11.3. WEEE Application

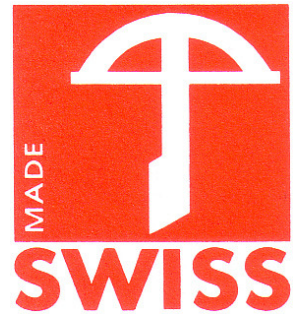
The WEEE directive is closely related to the RoHS directive and applies to the following devices:

- 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 DIGITAL-LOGIC does not deliver ready-made products to end users the WEEE directive is not applicable for DIGITAL-LOGIC. Users are nevertheless encouraged to properly recycle all electronic products that have reached the end of their life cycle.

1.12. Swiss Quality

- 100% Made in Switzerland
- DIGITAL-LOGIC is a member of "Swiss-Label"
- 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)



1.13. 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 DIGITAL-LOGIC AG, the entire company, 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. OVERVIEW

2.1. Standard Features

The MICROSPACE PCI/104express MSM200 is a miniaturized modular device incorporating the major elements of a PC/AT compatible computer. It includes standard PC/AT compatible elements, such as:

- Powerful Intel Atom Z510/30 processor up to 1.6GHz
- BIOS ROM
- Soldered DDR2 RAM 512-2048MByte
- 10248kByte second level cache
- Timers
- DMA
- Real-time clock with CMOS-RAM and 10-year battery buffer
- LPT1 parallel port
- COM1-, COM2- RS232 serial port 16C550 comp.
- Speaker interface
- PS/2-keyboard interface and PS/2-mouse interface
- AT-IDE hard disk interface
- 2x S-ATA 1.5GB/s hard disk interfaces
- Video interfaces: VGA
- 7.1 channel sound interface ALC882
- 100/10-Base T-LAN
- Optional: PCI/104 BUS
- PCI/104express Bus
- Power management functions APM and ACPI
- 8 channel USB V1.1 & V2.0

2.2. Unique Features

The MICROSPACE MSM200 includes all standard PC/AT functions plus unique DIGITAL-LOGIC AG enhancements, such as:

- Single 5V supply input
- Watchdog
- EEPROM for setup and configuration
- Optional: GPS (uses COM3)
- COM5 and COM4 (as RS232 or RS422/485)
- UL approved parts
- Console redirection

2.3. Standards

This MICROSPACE product meets all standards for personal computer architecture.

Standard	Contact to the organisation	Remarks
PC/104BUS	www.pc104.org	Use only for DIGITAL-LOGIC AG
USB	www.usb.org	
PCI	www.pcisig.com	
PCI Express	www.pcisig.com	
SMB	www.smbus.org	
WfM	www.intel.com/labs/manage/wfm	Wired for management baseline
ALC882	www.developer.intel.com/ial/scalableplatforms/audio	
LPC	www.developer.intel.com/design/chipsets/industry/lpc.htm	
ATA/ATAPI-6	www.t13.org	
ACPI	www.acpi.info	Power management

2.5. Specifications

CPU	Specification
CPU ATOM	INTEL Atom Z510 1.1GHz Atom Z530 1.6GHz
Compatibility	Carrierboard connector complies to COMexpress type 2
1 st Level Cache	32k data and 32k code
2 nd Level Cache	1024 kByte
Clock	The CPU Clock is defined with the ordered SMA200-xxxx
FSB	533 MHz
Power Management	Yes, APM2.1 and ACPI 1.2
FPU	Integrated

Chipset	Specification
Northbridge	US15W from INTEL
Southbridge	US15W
LAN	82C574 1GB/100MB
Audio	ALC882 7.1-Sound
Firewire IEEE1394	Not on board
Video	Intel extreme graphic DirectX-9 compatible

Memory	Specification
Main Memory	Soldered on the SMA200
Flash-BIOS	8MByte Flash
Setup EEPROM	2kByte for CMOS-backup
Flash-VideoBIOS:	Combined in the core BIOS
Video RAM	Variable UMA

Video Controller	Specification
Controller	Intel US15W graphic
Video Memory	t.b.d.
Channel 1	CRT UXGA up to 1600 x 1200 pixels
Channel 2	Not available
Bootup-Resolution	640 x 480 / 800 x 600 / 1024 x 768
2D-Graphics	Integrated accelerator
3D-Graphics	Integrated accelerator
Direct-X Version	9
PnP	Integrated

External Interface	Specification
Video Interfaces	CRT, LVDS
USB V1.1/2.0	5 channels
LPT1	IEEE1293 Printer
COM1	RS232
COM2	RS232
COM3	TTL or GPS
COM4	RS232 or RS422/485
COM5	RS232 or RS422/485
Keyboard	PS/2
Mouse	PS/2
Floppy	Not available
Parallel-Hard disk	44pin RM2.0mm PATA-IDE-cable
Serial-Hard disk	2 channel SATA300 with SIL3132 controller
Speaker	Not available onboard
ISA-Bus	Not available onboard
PCI-Bus	PC/104+, <i>optional</i>
PCIe	PCI/104express only on MSM200XP/XU available

Power Supply	Specification
Input voltage	Nom. 5V, maximum Ripple = 200mVpp
Input inrush current	Typical 6Amp over 100 μ s
Protection	None
Spec.	None
3.3Volt Power Output	PCI-Bus: 2Amp

Power Consumption	Specification
With 512MByte	With Atom Z510 typical 6-7W, With Atom Z530 typical 6-8W,
Standby	
Power off	Typical 35 mA

Physical Characteristics	Specification PC/104plus
Dimensions	Length: 96/99mm Depth: 90.17mm, Height: 33.5mm maximum with all options
Weight	250gr with SMA200 and all options

Operating Environment	Specification
Relative Humidity	5-90% non-condensing IEC68-2-30 at -20° to +50°C operating
Vibration operating	IEC68-2-6 10-50Hz, 0.075mm and 55-500Hz, 1.0G
Vibration non-operating	IEC68-2-6 10-50Hz, 0.15mm and 55-500Hz, 2.0G
Shock operating	IEC68-2-27 10G, 11ms ½ sine
Shock non-operating	IEC68-2-27 50G, 11ms, ½ sine
Altitude	IEC68-2-13 4571 meter operating
Temperature operating	IEC68-2-1, 2, 14: depends on the selected CPU performance
Extended Temp. Option	MIL-810-501/502 (see separate table below)
Temperature storage	IEC68-2-1 ,2, 14: -65°C to +125°C *

* The back-up battery is limited on
-40°C to +80°C operating and storage temperature!

Operating Temperature	Specification: MIL-810-501 MIL-810-502
Extended temperature range SMA200-xxxx	-25°C to +70°C

EMI / EMC Tests	Specification
EMC emission EN61000-6-2:2001	
Conducted Disturbance	EN55022 Class B
Radiated Disturbance	EN55022 Class B
EMC immunity EN61000-6-2	
Electrostatic discharge (ESD)	EN61000-4-2 Voltage = 4kV contact / 8kV air, Criteria A
Radiated RF-Field	EN61000-4-3 Level = 10V/m, Criteria A
Electrical fast transients (Burst)	EN61000-4-4 Grade 2: DC-Power lines = 1000V (5/50ns) Grade 2: AC-Power lines = 2000V (5/50ns) Grade 2: Signal lines = 500V (5/50ns) Criteria B
Surge	EN61000-4-5 Grade 2: DC-Power lines = 1kV, (1.2/50us) Grade 2: AC-Power lines = 2kV, (1.2/50us) Criteria B
Conducted Disturbance	EN61000-4-6 Voltage = 10V coupled by case, Criteria A

Security	Specification
e1	Not planned
UL	Not planned
ETS 301	Not planned
CE/SEV	Yes
Safety	AR385-16

All information is subject to change without notice.

2.6. Examples of Ordering Codes

The MSM200 system is combined from:

- Baseboard MSM200X
- SmartCoreExpress200 must be ordered separately
-

Article	Part. No.	Description
MSM200X	802370	PCI/104 board, without SMA200, 0MB RAM
MSM200XP	802372	PCI/104express board, without SMA200, 0MB RAM
MSM200XU	802371	PCI/104express board, without SMA200, 0MB RAM
		For 256 up to 2048MB DDR2-Memory
SMA200-1GB		SmartCoreExpress
Accessories	Part. No.	Description
MSFloppy	891001	3.5" Micro-Floppy drive (26Pin)
MSFDCK	802600	Micro-Floppy cable (26Pin)
MSM200-CKCON	803070	Cablekit
Options	Part. No.	Description
MSM200-GPS	803076	A1080 TYCO installed on COM3

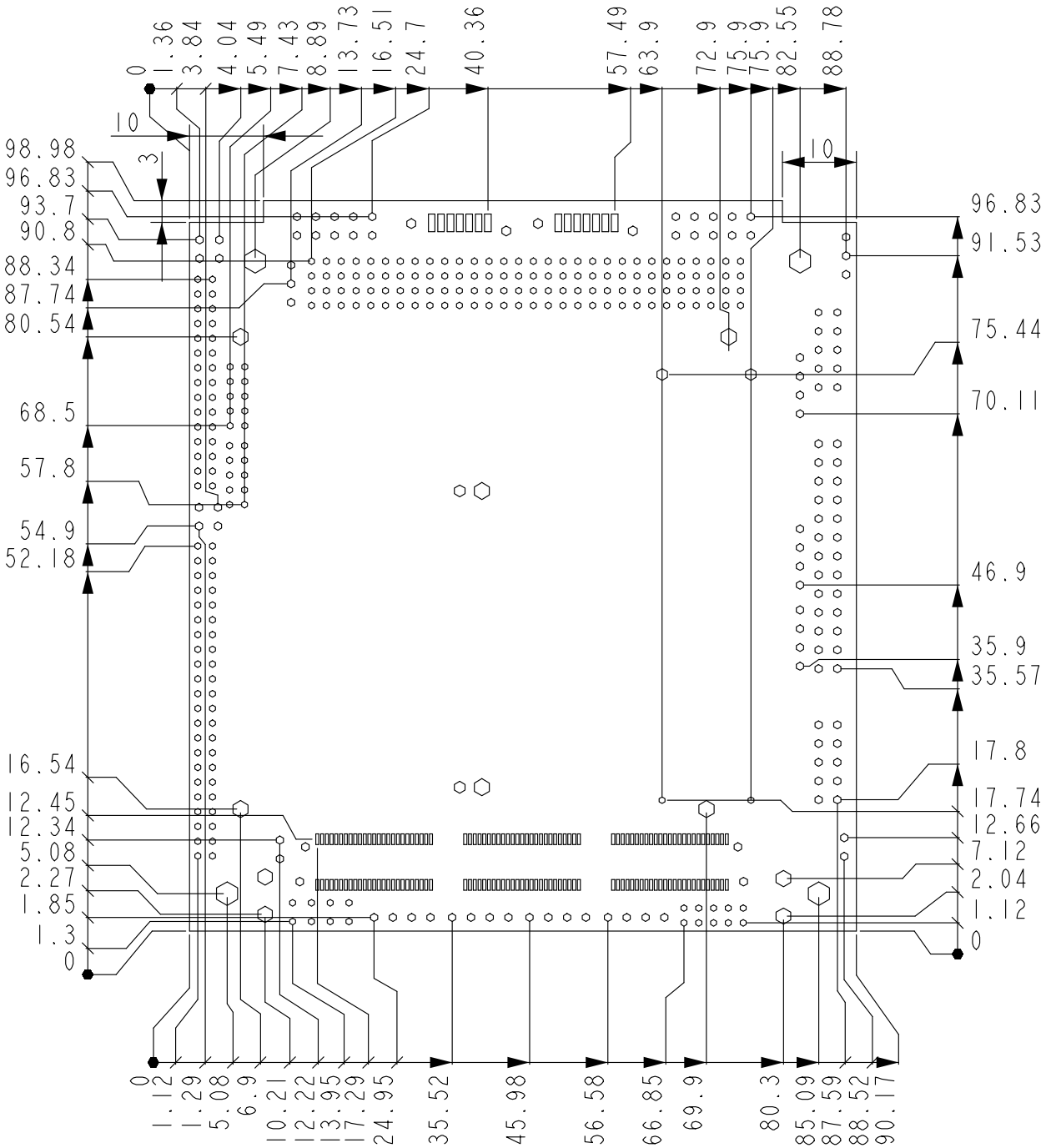
These are only examples; for current ordering codes, please see the current price list.

2.7. Dimensions and Diagrams

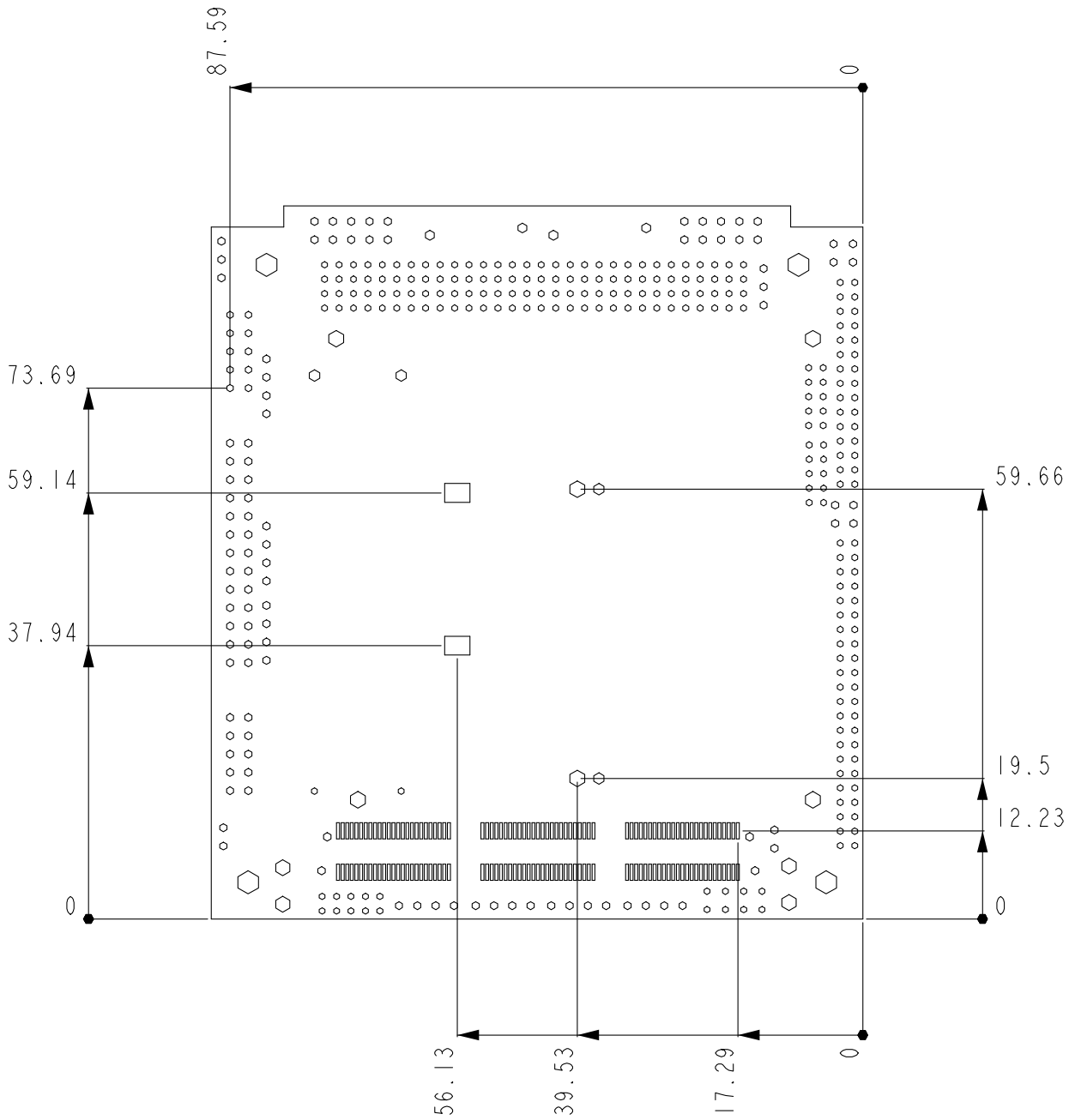
Unit	Tolerance
mm (millimeter)	+ / - 0.1mm

2.7.1. Basic Board MSM200X

TOP-VIEW

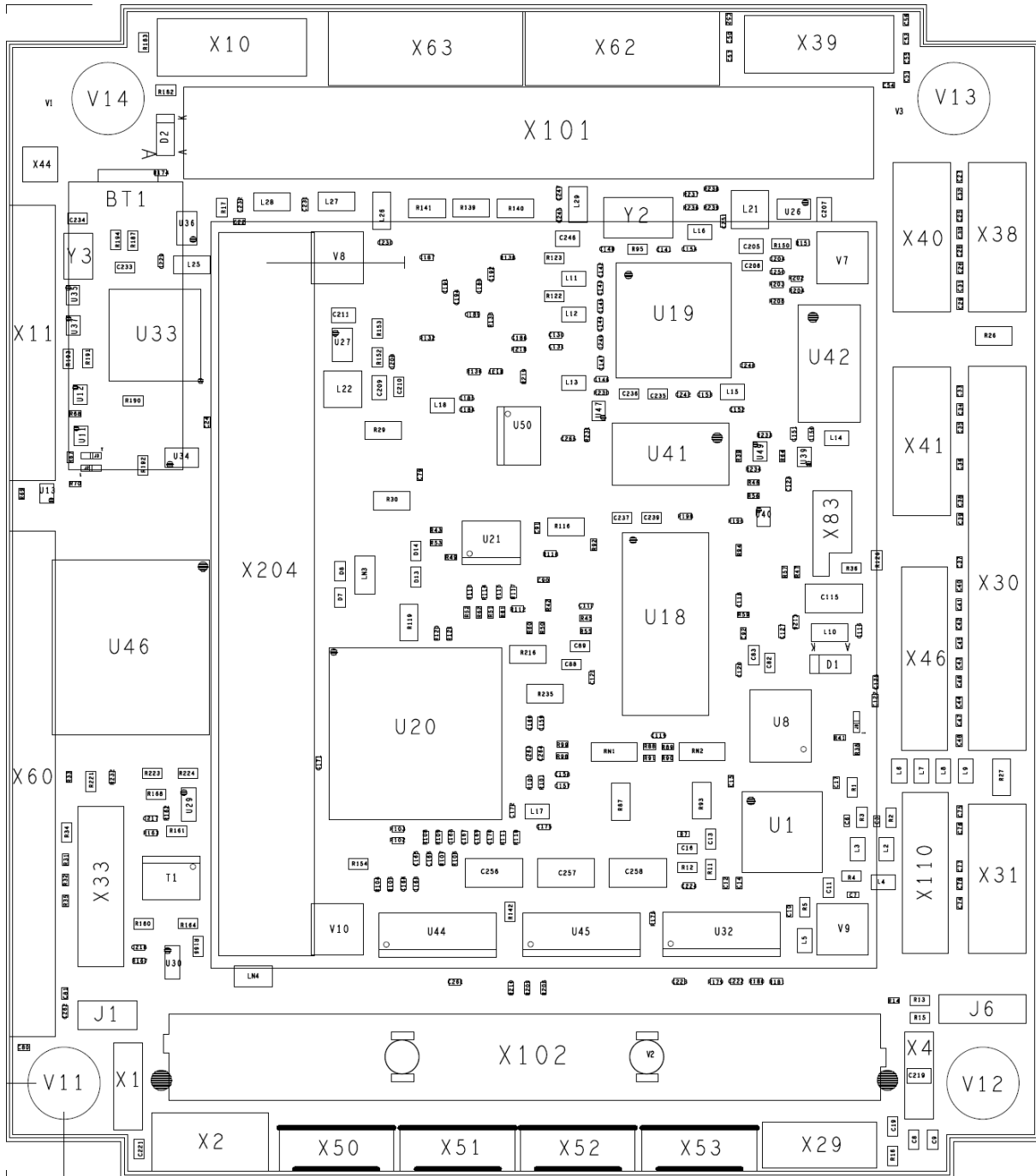


BOTTOM-VIEW

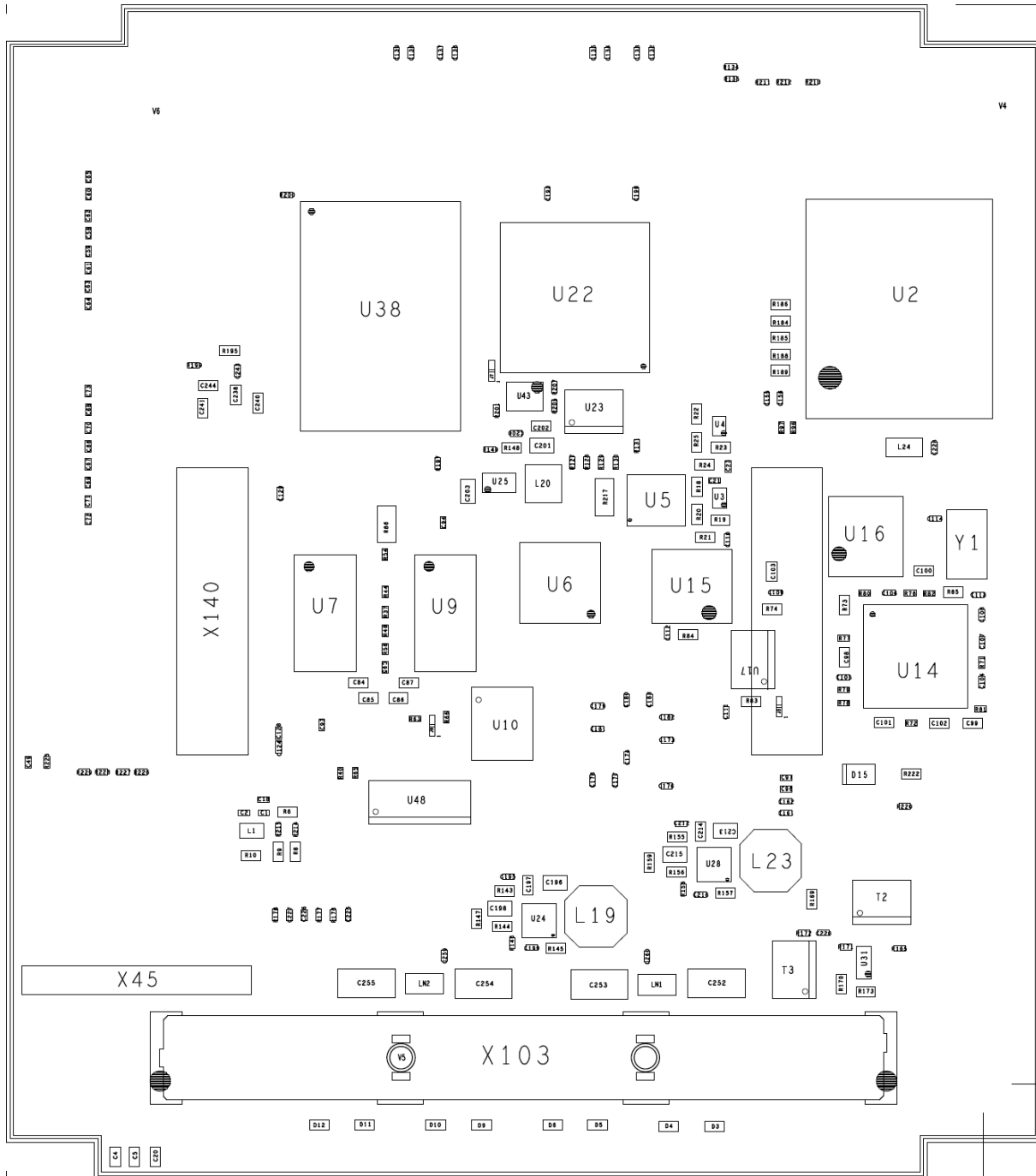


2.7.2. Assembled Board MSM200

Top View V0.3



Bottom View V0.3



2.7.3. 3-Dimensional Views MSM200

Top View

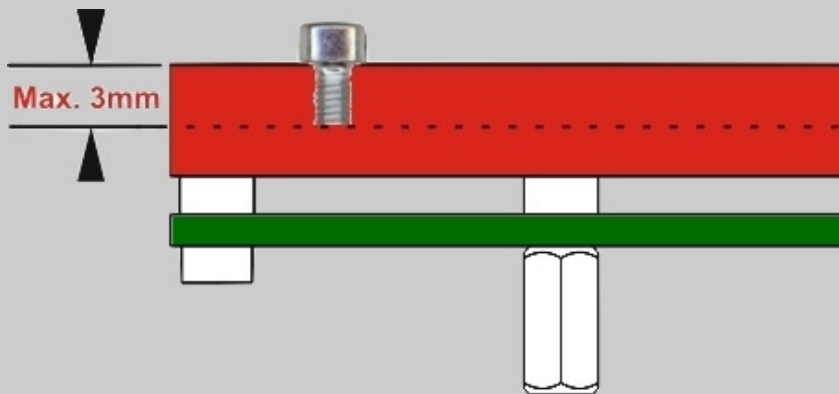
Bottom View

2.7.4. SMA200

**Attention!**

When using an active/passive heat sink that is **not** from DLAG, be very careful!

The maximum depth the screws can go into the product is 2.5mm +/-0.5mm or the smartCore will be destroyed!



2.8. Incompatibilities to a Standard PC/AT

None.



Note...

The ISA-Bus is not available on this product.

2.9. Related Application Notes

#	Description
80	High frequency Radiation (to meet EN55022)

- Application Notes are available at <http://www.digitallogic.com> ➤ support, or on any Application CD from DIGITAL-LOGIC.

2.10. High Frequency Radiation (to meet EN55022/EN61000)

All peripheral interfaces are filtered to meet the EMI/EMC standards EN55022.

The following filters are used:

Interface	3db-Frequency	Inductivity L and R	Capacitor to GND	Filter-Type	Protection
VGA-RGB		Ferrite	2x 10pF		0V/3V Diode
VGA-HS/VS		33ohms	33pF		0V/5V Diode
VGA-VCC		Ferrite	1nF		None
Video Input	-	-	-	-	None
USB		Inductors	none	DLP31D	Diode SRV05-4 GND/5V
IDE		33ohms series	-	-	None
Sound I/O		None	1nF		None
PS2-KB		None			None
PS2-MS		None			None
PS2-VCC		None			None
PS2-GND		None			None
COM1			None		MAX211E
COM2			None		MAX211E
COM3					GPS
COM4					MAX211E
COM5					MAX211E
LPT 1			None		none
LAN port A		Integrated	PULSE	J00-0065NL	Isolated 500V
SATA		none			none
PATA		none			None
All 33MHz-Clocks		33Ohms series	10pF		None

To optimize the filter effect, all connectors must be in contact with the front panel. Use a metal sheet material for the front panel and not anodized aluminium. In case anodized aluminium is used, it is recommended to add a metal sheet behind the aluminium, to give the best shielding contact.

2.11. Thermoscan

Product	Part Nr.	Serial Number	Version
MSM200			1.0
SMA200			1.0
		-	-
Software	Windows XP SP2 running desktop		

Top view, actively cooled:

Bottom view, actively cooled:

2.12. RTC Battery-Lifetime

An AT compatible date/time clock is located within the chipset. The device also contains a CMOS static RAM, compatible with that in standard ATs. System configuration data is normally stored in the clock chip's CMOS RAM in a manner consistent with the convention used in other AT compatible computers.

Battery specifications		Lowest temp. -40°C	Nominal temp. +20°C	Highest temp. +85°C
Manufacturer	MAXELL			
Type	ER3			
Capacity versus Temp	18uA	910mAh	910mAh	910mAh
Voltage versus Temp.	18uA	3.6V	3.6V	Ca. 3.6V
Nominal values	3.6V / 910mAh / -40°C...~+85°C			

Information taken from the datasheet of MAXELL ER3

PRODUCT	Temperature °C	Battery voltage V	VCC (+12V) switched ON µA	VCC (+12V) switched off µA
MSM200				
Battery current	+25°C	3.6	15	18
	-40°C	3.5	15	14
	+85°C	3.8	15	30
Battery lifetime	+25°C		>10 years	>10 year
	-40°C		>10 years	> 10 year
	+85°C		>10 years	6 year

2.12.1. External Battery Assembly

If the customer wants to connect an external battery, some precautions must be taken:

- The battery is protected from charging. Do not use a rechargeable battery.
- The RTC device defines a voltage level of 2.0V-3.6V, so use an external battery within this range (inclusive of the diode which is already assembled onboard).



Note...

Measure the discharging current in both System-OFF and System-ON cases to calculate the actual lifetime of the battery.



Attention!

If an external battery is to be connected:

1. Remove the onboard ER3 Li-battery.
2. Use any 3.6V lithium battery connected on the X31 connector.

3. BUS SIGNALS

3.1. PC104+ Bus

For further information about the PC/104plus, please refer to the PC/104 Specification Manual which is available on the internet: <http://www.digitallogic.com> (manuals).

AD[31:00]

Address and Data are multiplexed. A bus transaction consists of an address cycle followed by one or more data cycles.

C/BE[3:0]*

Bus Command/Byte Enables are multiplexed. During the address cycle, the command is defined. During the Data cycle, they define the byte enables.

PAR

Parity is even on AD[31:00] and C/BE[3:0]* and is required.

FRAME*

Frame is driven by the current master to indicate the start of a transaction and will remain active until the final data cycle.

TRDY*

Target Ready indicates the selected device's ability to complete the current data cycle of the transaction. Both IRDY* and TRDY* must be asserted to terminate a data cycle.

IRDY*

Initiator Ready indicates the master's ability to complete the current data cycle of the transaction.

STOP*

Stop indicates the current selected device is requesting the master to stop the current transaction.

DEVSEL*

Device Select is driven by the target device when its address is decoded.

IDSEL

Initialization Device Select is used as a chip-select during configuration.

LOCK*

Lock indicates an operation that may require multiple transactions to complete.

PERR*

Parity Error is for reporting data parity errors.

SERR*

System Error is for reporting address parity errors.

REQ*

Request indicates to the arbitrator that this device desires use of the bus.

GNT*

Grant indicates to the requesting device that access has been granted.

CLK

Clock provides timing for all transactions on the PCI bus.

RST*

Reset is used to bring PCI-specific registers to a known state.

INTA*

Interrupt A is used to request Interrupts.

INTB*

Interrupt B is used to request Interrupts only for multi-function devices.

INTC*

Interrupt C is used to request Interrupts only for multi-function devices.

INTD*

Interrupt D is used to request Interrupts only for multi-function devices.

3.2. Addressing PCI Devices

DEVICE	IDSEL	PIRQ	#REQ	#GNT	Remarks
Internal Chipset PCI devices and resources					
GMCH	Internal	A / B / C / D	---	---	PCI Bus 0
AGP Controller	Internal	A / B	---	---	PCI Bus 0
Graphics Controller	Internal	A / B	---	---	PCI Bus 0
ICH7_USB Controller	Internal	A / D / C / H	---	---	PCI Bus 0 Func 0 = USB0 mapped to PIRQA Func 1 = USB1 mapped to PIRQD Func 2 = USB2 mapped to PIRQC Func 7 = USB3 mapped to PIRQH
ICH7_PCI Controller	Internal	A / B / C / D	---	---	PCI Bus 0
ICH7_LPC Controller		C / B	---	---	PCI Bus 0 IDE mapped to PIRQC SMB mapped to PIRQB AC97 Audio mapped to PIRQB AC97 Modem mapped to PIRQB

3.2.1. MSM200

External PCI slots:

DEVICE	IDSEL	PIRQ	#REQ	#GNT	Remarks
PC/104+ Slot 1	AD20	E	0	0	PCI Bus
PC/104+ Slot 2	AD21	F	1	1	PCI Bus
PC/104+ Slot 3	AD22	G	2	2	PCI Bus
PC/104+ Slot 4	AD23	H	3	3	PCI Bus

Separate PCI Controller onboard:

DEVICE	IDSEL	PIRQ	#REQ	#GNT	Remarks
None	-	-	-	-	-

3.3. Expansion Bus

The bus currents and maximum lengths are as follows:

Output Signals	Voltage / Current	Maximum Length
PCI-BUS (33MHz)	3.3V	30cm
LPC-Bus	3.3V 2mA	5cm
PATA-HD (33 Ohm termination onboard)	3.3V	20cm
SATA-HD	Differential	50cm
USB	3.3V	6meter

For bus lengths > 10cm, an AC-Bus termination is required.

3.3.1. Expansion Bus max. supply currents

The different bus expansions may drive the following supply currents:

At 5Volt the total maximum system current is rated at 6 Amp.

At 3.3Volt the total maximum system current is rated at 3 Amp.

Output Signals	Voltage / Current	Maximum Current
PCI-BUS (PC/104plus)	3.3V	3Amp
All cards counted together	5.0V	2Amp
USB per connector	5.0V	0.5Amp
All USBs together		2Amp ¹⁾
Hard disk parallel ATA (PATA)	3.3V	0.6Amp per HD
Total over all hard disks (SATA and PATA)		1.5Amp maximum ^{1) 2)}
Hard disk serial ATA (SATA)	5.0V	0.75Amp per HD
Total over all hard disks (SATA and PATA)		1.5Amp maximum ^{1) 2)}

- 1) The current may be increased, if other peripherals are consuming less (for example, when no PC/104express peripherals are connected).
- 2) The hard disk may be powered externally if the total 5Volt supply is overloaded.

4. DETAILED SYSTEM DESCRIPTION

This system configuration is based on the ISA and PCI architecture. Please read all the information carefully as this product uses very new computer technology.

4.1. Power Supply Requirements



ATTENTION!

The Pentium-M is a high performance processor with a very fast changing performance. The input current is a direct function of the selected performance. The power supply **must** be able to deliver the maximum possible current (approx. 10Amp). Furthermore, the supply must be able to deliver the inrush current at the power-on phase. The inrush current is, with 8Amp, very high but short (only a few milliseconds). The power cord **must** be able to supply the current!

4.1.1. Minimum Power-Off Time



ATTENTION!

If the power is switched off, it must be for a minimum of 10 seconds!
All capacitors must be fully discharged before a new power-on is performed.

4.2. Boot Time

System Boot-Times

Definitions/Boot-Medium	Quick Boot*	Normal Boot
MSM200 with RTC-Backup Battery Memory 1024MB	time [s]	
From Floppy disk		
Boot from Setup-Disk1 MS-DOS v6.22 to "Starting MS-DOS" Prompt	22	22
Boot from Setup-Disk1 MS-DOS v6.22 to "Welcome Setup Screen" Prompt	39	39
Boot from "(Sys a:)-Disk" to "A:>"-Prompt	27	27
From Hard disk-Toshiba MK2110MAF		
Boot from Hard disk to "Starting MS-DOS" Prompt	19	19
Boot from Hard disk to "Win2000: Windows-Login" Prompt	105	105
From CompactFlash SanDisk SDCFB-64-101-00 64MB		
Boot from CF to "Starting MS-DOS" Prompt	17	17
Boot from CF to "C:\>"-Prompt	19	19

4.3. Interfaces

4.3.1. PS/2 Keyboard and PS/2 Mouse

A standard PS/2 keyboard and mouse may be adapted to this connector.



Note...

To provide full PnP-support, it is recommended to use a USB keyboard and mouse.

4.3.2. Line Printer Port LPT1

A standard bi-directional LPT port is integrated into the MICROSPACE PC.

Further information about these signals is available in numerous publications, including the IBM technical reference manuals for the PC and AT computers and from other reference documents.

The current is: IOH = 12 mA IOL = 24mA

The W83627HF may be programmed via software commands.

4.3.3. Serial Ports COM1-COM4

The serial channels are fully compatible with 16C550 UARTS. COM1 is the primary serial port and is supported by the board's ROM-BIOS as the PC-DOS 'COM1' device. The secondary serial port is COM2; it is supported as the 'COM2' device.

Standard: COM 1/2: W83627HF: 2 x 16C550 compatible serial interfaces

Serial Port Connectors COM1, COM2

Pin	Signal Name	Function	in/out	DB25 Pin	DB9 Pin
1	CD	Data Carrier Detect	in	8	1
2	DSR	Data Set Ready	in	6	6
3	RXD	Receive Data	in	3	2
4	RTS	Request To Send	out	4	7
5	TXD	Transmit Data	out	2	3
6	CTS	Clear to Send	in	5	8
7	DTR	Data Terminal Ready	out	20	4
8	RI	Ring Indicator	in	22	9
9	GND	Signal Ground	Power	7	5
10	VCC	+5Volt	Power	-	-

The serial port signals are compatible with the RS232C specifications.

4.3.4. Floppy Disk Interface

Disabled on this product.

4.3.5. Speaker Interface

One of the board's CPU devices provides the logic for a PC compatible speaker port. The speaker logic signal is buffered by a transistor amplifier, and provides approximately 0.1Watt of audio power to an external 8 Ohm speaker.

4.3.6. Console Redirection

Refer to the driver/software/BIOS manual SMA200 BIOS on the Product CD.

4.3.7. LAN

** Will follow in a later version of this document.

4.3.8. IDE

** Will follow in a later version of this document.

4.3.9. USB

** Will follow in a later version of this document.

4.3.10. VGA

** Will follow in a later version of this document.

4.4. Controllers

4.4.1. Interrupt Controllers

An 8259A compatible interrupt controller, within the chipset, provides seven prioritized interrupt levels. Of these, several are normally associated with the board's onboard device interfaces and controllers, and several are available on the AT expansion bus.

Interrupt	Sources	Used Onboard
IRQ0	ROM-BIOS clock tick function, from timer 0	Yes
IRQ1	Keyboard controller output buffer full	Yes
IRQ2	Used for cascade 2. 8259	Yes
IRQ3	COM2 serial port	Yes
IRQ4	COM1 serial port	Yes
IRQ5	LPT2 parallel printer (if present)	No
IRQ6	Floppy controller	No
IRQ7	LPT1 parallel printer	Yes
IRQ8	Battery backed clock	Yes
IRQ9	Free for user	No
IRQ10	Free for user	No
IRQ11	Free for user	No
IRQ12	PS/2 mouse	Yes
IRQ13	Math. coprocessor	Yes
IRQ14	Hard disk IDE / PATA	Yes
IRQ15	Free for user	No

4.4.2. Timers and Counters

4.4.2.1. Programmable Timers

An 8253 compatible timer/counter device is also included in the board's ASIC device. This device is utilized in precisely the same manner as in a standard AT implementation. Each channel of the 8253 is driven by a 1.190MHz clock, derived from a 14.318MHz oscillator, which can be internally divided in order to provide a variety of frequencies.

Timer 2 can also be used as a general purpose timer if the speaker function is not required.

Timer Assignment:

Timer	Function
0	ROM-BIOS clock tick (18.2Hz)
1	DRAM refresh request timing (15 μ s)
2	Speaker tone generation time base

4.4.2.2. RTC (Real Time Clock)

An AT compatible date/time clock is located within the chipset. The device also contains a CMOS static RAM, compatible with that in standard ATs. System configuration data is normally stored in the clock chip's CMOS RAM in a manner consistent with the convention used in other AT compatible computers.

The battery-backed clock can be set by using the DIGITAL-LOGIC AG SETUP at boot-time.

4.4.2.3. Watchdog

The watchdog timer detects a system crash and performs a hardware reset. After power up, the watchdog is always disabled as the BIOS does not send strobes to the watchdog. In case the user wants to take advantage of the watchdog, the application must produce a strobe at least every 800 ms. If no strobe occurs within the 800 ms, the watchdog resets the system.

4.4.3. SATA Controller

SATA port 0 and 1 are assembled by default on the MSM200 board. These two ports are integrated in a host controller of the SIL3132 that supports two independent DMA operations and supports data transfer rates of up to 3.0Gb/s (300MB/s).

4.4.4. ROM-BIOS Sockets

An EPROM socket with 8bit wide data access normally contains the board's AT compatible ROM-BIOS. The socket takes an E82802AC8 EPROM (or equivalent) device. The board's wait-state control logic automatically inserts four memory wait states in all CPU accesses to this socket. The ROM-BIOS sockets occupy the memory area from C0000H through FFFFFh; however, the board's ASIC logic reserves the entire area from C0000h through FFFFFh for onboard devices, so that this area is already usable for ROM-DOS and BIOS expansion modules. Consult the appropriate address map for the MICROSPACE MSM200 ROM-BIOS sockets.

4.5. CMOS RAM Map

Refer to the driver/software/BIOS manual SMA200 BIOS on the Product CD.

4.6. EEPROM saved CMOS Setup

The EEPROM has different functions, as listed below:

- Backup of the CMOS-Setup values.
- Storing system information (i.e., version, production date, customization of the board, CPU type).
- Storing user/application values.

The EEPROM will be updated automatically after exiting the BIOS setup menu. The system will also operate without any CMOS battery. While booting, the CMOS is automatically updated with the EEPROM values.

Press the Esc-key while powering on the system *before* the video shows the BIOS message and the CMOS will **not** be updated. This would be helpful, if wrong parameters are stored in the EEPROM and the setup of the BIOS does not start.

If the system hangs or a problem appears, the following steps must be performed:

1. Reset the CMOS-Setup (disconnect the battery for at least 10 minutes).
2. Press **Esc** until the system starts up.
3. Enter the BIOS Setup:
 - a. load DEFAULT values
 - b. enter the settings for the environment
 - c. exit the setup
4. Restart the system.

The user may access the EEPROM through the INT15 special functions. Refer to that chapter in the SMA200 Driver/Software/BIOS manual on the Product CD.

The system information is read-only and uses the SFI functions. Refer to the SMA200 Driver/Software BIOS manual.

4.6.1. EEPROM Memory for Setup

The EEPROM is used for setup and configuration data, stored as an alternative to the CMOS-RTC. Optionally, the EEPROM setup driver may update the CMOS RTC, if the battery is running down and the checksum error would appear and stop the system. The capacity of the EEPROM is 2 kByte.

Organization of the 2048Byte EEPROMs:

Address MAP:	Function:
0000h	CMOS-Setup valid (01=valid)
0001h	Reserved
0003h	Flag for DLAG-Message (FF=no message)
0010h-007Fh	Copy of CMOS-Setup data
0080h-00FFh	Reserved for AUX-CMOS-Setup
0100h-010Fh	Serial-Number
0110h-0113h	Production date (year/day/month)
0114h-0117h	1. Service date (year/day/month)
0118h-011Bh	2. Service date (year/day/month)
011Ch-011Fh	3. Service date (year/day/month)
0120h-0122h	Boot errors (Auto incremented if any boot error occurs)
0123h-0125h	Setup Entries (Auto incremented on every Setup entry)
0126h-0128h	Low Battery (Auto incremented every time the battery is low, EEPROM -> CMOS)
0129h-012Bh	Startup (Auto incremented on every power-on start)
0130h	Reserved
0131h	Reserved
0132h/0133h	BIOS Version (V1.4 => [0132h]:= 4, [0133h]:=1)
0134h/0135h	BOARD Version (V1.5 => [0124h]:=5, [0125h]:=1)
0136h	BOARD TYPE: (‘M’=PC/104, ‘E’=Euro, ‘W’=MSWS, ‘S’=Slot, ‘C’=Custom, ‘X’= smartCore or smartModule)
0137h	CPU TYPE: (01h=ELAN300/310, 02h=ELAN400, 05h=P5, 08h=P3, 09h=ELAN520, 10h=P-M)
0200h-03FFh	Reserved
0200h-027Fh	Reserved
0400h-07FFh	Free for Customer use

4.7. Memory

The SMA200 offers soldered memory from 0.5GB up to 2GB.

For details, please refer to the driver/software/BIOS manual SMA200 BIOS on the Product CD.

5. LVDS-DISPLAYS

There are different LCD-Panels available with a 18bit-LVDS interface; they can be adapted directly to the LVDS-Interface of the US15W video controller.

The LVDS interface is composed of:

3x2 LVDS Data lines (differential)

1x2 LVDS Clock line (differential)

Backlight Power = 5V / DCMain

LCD Power = 3.3V / 5V

A list of LVDS-Panels:

Display Part No.	Size	Resolution	Colors	Luminance	Power	Remarks
LVDS 18Bit						
Toshiba LTM10C306L	10.4"	1024x768	262k	200cd/m3	3W	Tested
SIEMENS I-SFT G23916-B65-H068	10.4"	1024x768	262k	1000cd/m3	20W	

6. DESCRIPTION AND LOCATION OF THE CONNECTORS

Top Side:

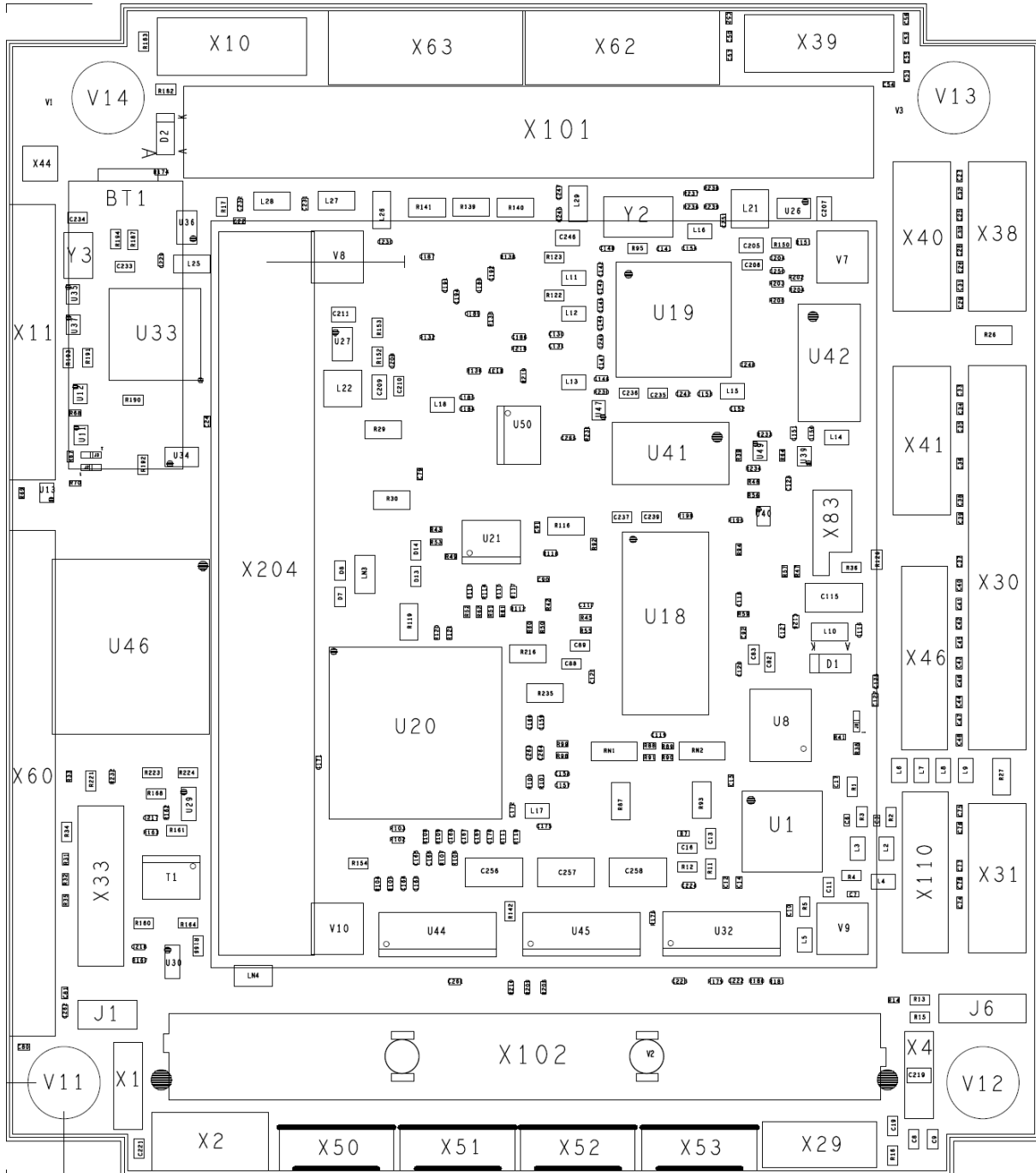
Connector	Structure	Pin	Remarks
X1	Power Input 5V		
X2	Power Connector	2 x 4	2.54mm
X4	Power Input GND		
X10	VGA Connector	5 x 2	2.54mm
X11	LVDS Interface 6/8bit	15 x 2	2mm
X29	Sound Port	5 x 2	2mm
X30	Printer (LPT1)	13 x 2	2.54mm
X31	Utility / Keyboard & Mouse (PS2)	5 x 2	2.54mm
X33	LAN	5 x 2	2mm
X38	COM1	5 x 2	2.54mm
X39	COM2	5 x 2	2.54mm
X40	COM4	5 x 2	2.54mm
X41	COM5	5 x 2	2.54mm
X45	Simhalter	1 x 8	2.54mm
X46	SDIO	2 x 8	2mm
X50	USB Port 0		
X51	USB Port 1		
X52	USB Port 2		
X53	USB Port 3		
X60	PATA-IDE	2 x 22	2mm
X62	SATA Port 0	SATA	
X63	SATA Port 1	SATA	
X84	LPC POD	2 x 7	2mm
X101	PC/104 BUS (PCI Signals)		
X102	PC/104express Connector Top		
X103	PC/104express Connector Bottom		
X140	PCIe Minicard		

Remarks:

6.1. Connector Plan

MSM200XP V0.3

Top View



6.2. Connector Descriptions

6.2.1. Power Supply Connectors

6.2.1.1. Supply the MSM200 with 5V

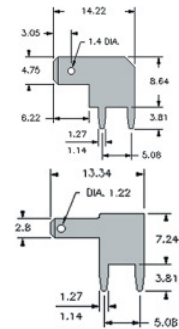
Recommended:

X4 Power Supply GND (mounting tab 4.75mm)

Pin	Signal	Information
1	GND	www.compona.ch Part Nr. 236 713-1

X1 Power Supply VCC 5V (mounting tab 2.8mm)

Pin	Signal	Information
1	Main supply +5V	www.compona.ch Part Nr. 236 712-1
PSU Recommendation: MSMPS104A or 5V/90W		



Alternative:

X2 Power Input

Pin	Signal	Pin	Signal
1	GND	2	VCC +5V input
3	MAIN Switch input ★	4	VDC +12V input ★★
5	SMB-DAT	6	SMB_CLK
7	GND	8	VCC +5V input

★ = see also X80

★★ = The VDC input is also connected directly to the PCI/104e bus.



NOTE...

If you supply the MSM200 with 5V, it is **not** necessary to also supply 12V to the board, unless you want to supply a peripheral board on the PCI/104e bus with 12V.

6.2.1.2. Main & Power Button

X2 Main Button / Automatically Power ON

Pin	Signal	Pin	Signal
1	GND	3	Main Button

If you want to push a button to start the system:

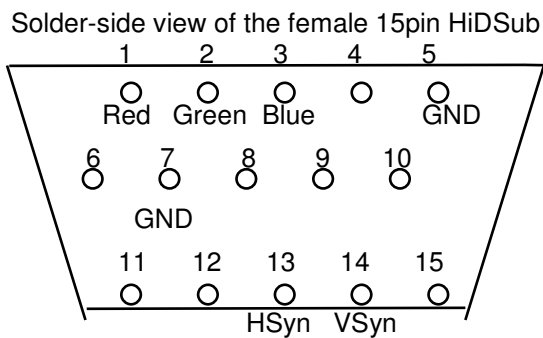
- You must connect a push button (Main button) to X2 pin 1/3.
- After pushing the Main button, the board will start.
- If you press the Main button for more than 4 seconds, the power will be switched off.

6.2. Connector Descriptions (continued)

X10 VGA Monitor (CRT Signals)

X10 Header		15 pins HiDensity DSUB	
10 Pin -M	Signal	Pin	Signal
2	VGA red	1	Red
4	VGA green	2	Green
6	VGA blue	3	Blue
8	Horizontal Synch	13	H-Synch
9	Vertical Synch	14	V-Synch
		5 + 11	Bridged
1	Ground	5, 6, 7, 8	Ground
3	NC		
5	NC		
7	DDC-Data	12	DDC-Data
10	DDC-Clock	15	DDC-Clock

The VGA-CRT signals from J15 must be wired to a standard VGA HiDensity DSub connector (female):
The LCD signals must be wired panel specific.



X11 LVDS

Terminated: 100 Ohm on each differential pair

EMI-Protection: None

Pin	Signal	Pin	Signal
1	LVDS_DATA0-	2	LVDS_DATA0+
3	LVDS_DATA1-	4	LVDS_DATA1+
5	LVDS_DATA2-	6	LVDS_DATA2+
7	LVDS_DATA3-	8	LVDS_DATA3+
9	GND	10	GND
11	LVDS_CLK-	12	LVDS_CLK+
13	5.0Volt Output	14	3.3Volt Output
15	LVDS_DDC_CLK	16	LVDS_DDC_DATA
17	PCIE_RST#	18	LVDS_Backlight_Enable
19	LVDS_Backlight_Control	20	LVDS_VDD-Enable
21	+12Volt (VDC) Output	22	+12Volt (VDC) Output
23	USB_D-	24	USB_D+

Detailed signal description:

Signal	LVDS_CLK+/-]
Description	Output, LVDS, voltage: 1.25V±225mV Channel x differential clock pair output (compliment): 245-800 MHz.
Signal	LVDS_Backlight_Control
Description	Output, CMOS LVDS LCD Flat Panel Backlight Brightness Control: This signal is used as the Pulse Width Modulated (PWM) control signal to control the backlight inverter.
Signal	LVDS_Backlight_Enable
Description	Output, CMOS LVDS LCD Flat Panel Backlight Enable: This signal is used to enable the backlight inverter (BLI).
Signal	LVDS_VDD_ENABLE
Description	Output, CMOS LVDS LCD Flat Panel Power Control: This signal is used to enable power to the panel interface.
Signal	LVDS_DATA[0..2]+/-
Description	Output, LVDS, voltage: 1.25V±225mV Channel x differential data pair 2:0 output (true): 245-800MHz.

X29 Sound Interface Connector

Pin	Signal	Pin	Signal
1	Line_IN_L	2	Line_IN_R
3	Line_Jacksense	4	GND (digital)
5	MIC_Input_L	6	MIC_Input_R
7	MIC_Jacksense	8	GND (digital)
9	SPDIF Input	10	SPDIF Output

X30 Printer Port (Centronics)

The printer connector provides an interface for 8bit Centronics printers.

Protection: None

Header onboard	D-SUB connector	Signal
Pin 1	Pin 1	Strobe
Pin 3	Pin 2	Data 0
Pin 5	Pin 3	Data 1
Pin 7	Pin 4	Data 2
Pin 9	Pin 5	Data 3
Pin 11	Pin 6	Data 4
Pin 13	Pin 7	Data 5
Pin 15	Pin 8	Data 6
Pin 17	Pin 9	Data 7
Pin 19	Pin 10	Acknowledge
Pin 21	Pin 11	Busy
Pin 23	Pin 12	Paper end
Pin 25	Pin 13	Select
Pin 2	Pin 14	Autofeed
Pin 4	Pin 15	Error
Pin 6	Pin 16	Init printer
Pin 8	Pin 17	Shift in (SI)
Pin 10, 12, 14, 16, 18, 26	Pins 18-22	Left open
Pin 20, 22, 24	Pins 23-25	GND

X31 PS/2 Keyboard & Mouse Utility Connector

The speaker must be connected to VCC to have a low inactive current in the speaker.

Pin	Signal	Pin	Signal
1	Speaker Out	2	Ground
3	Reset In	4	VCC
5	Keyboard Data	6	Keyboard Clock
7	Ground	8	Ext. 3.6V Lithium Battery
9	PS/2 Mouse Clock	10	PS/2 Mouse Data

X33 LAN Interface Connector

Termination: 1000Base-T compliant

EMI-Protection: None

Overvoltage Protection: None

Pin	Signal	Pin	Signal
1	MDI_A+	2	MDI_A-
3	MDI_B+	4	MDI_B-
5	MDI_C+	6	MDI_C-
7	MDI_D+	8	MDI_D-
9	LED0	10	LED1
11	LED2	12	VCC3 (+3.3V)
13	GND	14	GND

Remarks:

- Pin 1-4 must be connected to a RJ45 LAN Connector.
- Pins 9, 10, 11 and 12 are used to connect 3pc LAN LED's.
Each LAN-LED-signal must be terminated with a 330 Ohm resistor.

X38 Serial Port COM1

Protection: None

Header onboard	D-SUB connector	Signal
Pin 1	Pin 1	DCD
Pin 2	Pin 6	DSR
Pin 3	Pin 2	RxD
Pin 4	Pin 7	RTS
Pin 5	Pin 3	TxD
Pin 6	Pin 8	CTS
Pin 7	Pin 4	DTR
Pin 8	Pin 9	RI
Pin 9	Pin 5	GND
Pin10	-	Open

X39 Serial Port COM2

Protection: None

Header onboard	D-SUB connector	Signal
Pin 1	Pin 1	DCD
Pin 2	Pin 6	DSR
Pin 3	Pin 2	RxD
Pin 4	Pin 7	RTS
Pin 5	Pin 3	TxD
Pin 6	Pin 8	CTS
Pin 7	Pin 4	DTR
Pin 8	Pin 9	RI
Pin 9	Pin 5	GND
Pin10	-	Open

X46 SDIO Interface Connector

Pin	Signal	Pin	Signal
1	DATA 0	2	3.3V Out
3	DATA 1	4	GND
5	DATA 2	6	CMD
7	DATA 3	8	CLK
9	DATA 4	10	GND
11	DATA 5	12	CD#
13	DATA 6	14	WP
15	DATA 7	16	GND

X50 USB 0 Connector**X51 (USB1), X52 (USB2), X53 (USB3), X54 (USB4), X55 (USB5)**

Terminated: None
 EMI-filtered: Yes, with bifilar chocke
 Overvoltage protection: Suppress or diode to GND

Pin	Signal
1	VCC5
2	USB-Px-
3	USB-Px+
4	GND

Remarks: Use twisted pair USB cables for USB V2.0 compatibility.

Components assembled on MSM200 Dubox 4 pole no. 246 562
 Cable Dubox 4 pole no. 246 552
 Crimp Contacts Dubox no. 246 513

Contact: www.compona.ch

X60 IDE Interface

Pin	Signal	Pin	Signal
1	Reset (active low)	2	GND
3	D7	4	D8
5	D6	6	D9
7	D5	8	D10
9	D4	10	D11
11	D3	12	D12
13	D2	14	D13
15	D1	16	D14
17	D0	18	D15
19	GND	20	(keypin) NC
21	NC	22	GND
23	IOW (active low)	24	GND
25	IOR (active low)	26	GND
27	IORDY	28	ALE / Master-Slave
29	DACK	30	GND
31	IRQ14	32	IOCS16 (active low) NC
33	ADR1	34	NC
35	ADR0	36	ADR2
37	CS0 (active low)	38	CS1 (active low)
39	LED (active low)	40	GND
41	VCC Logic	42	VCC Motor
43	GND	44	NC

X62 / X63 SATA 0 / 1 Connectors

Terminated: None
 EMI-filtered: None
 Overvoltage protection: None

Pin	Signal	Pin	Signal
1	GND	2	TX_Data+
3	TX_Data-	4	GND
5	RX_Data-	6	RX_Data+
7	GND		

Remarks:

Use SATA cables specified for 150MByte transfer rate.

X101 PC/104+ BUS Interface

Pin	A:	B:	C:	D:
1	GND/5.0V KEY2	Reserved	+5Volt	AD00
2	VI/O	AD02	AD01	+5Volt
3	AD05	GND	AD04	AD03
4	C/BE0★	AD07	GND	AD06
5	GND	AD09	AD08	GND
6	AD11	VI/O	AD10	M66EN
7	AD14	AD13	GND	AD12
8	+3.3Volt	C/BE1★	AD15	+3.3Volt
9	SERR★	GND	SB0★	PAR
10	GND	PERR★	+3.3Volt	SDONE
11	STOP★	+3.3Volt	LOCK★	GND
12	+3.3Volt	TRDY★	GND	DEVSEL*
13	FRAME★	GND	IRDY★	+3.3Volt
14	GND	AD16	+3.3Volt	C/BE2★
15	AD18	+3.3Volt	AD17	GND
16	AD21	AD20	GND	AD19
17	+3.3Volt	AD23	AD22	+3.3Volt
18	IDSEL0	GND	IDSEL1	IDSEL2
19	AD24	C/BE3★	VI/O	IDSEL3
20	GND	AD26	AD25	GND
21	AD29	+5Volt	AD28	AD27
22	+5Volt	AD30	GND	AD31
23	REQ0★	GND	REQ1★	VI/O
24	GND	REQ2★	+5Volt	GNT0★
25	GNT1★	VI/O	GNT2★	GND
26	+5Volt	CLK0	GND	CLK1
27	CLK2	+5Volt	CLK3	GND
28	GND	INTD★	+5Volt	RST★
29	+12Volt	INTA★	INTB★	INTC★
30	-12Volt	REQ3★	GNT3★	GND/3.3V KEY2

★ Denotes active low signals.

**Note...**

The KEY pins are to guarantee proper module installation. Pin-A1 will be removed and the female side plugged for 5.0V I/O signals and Pin-D30 will be modified in the same manner for 3.3V I/O. We recommend that both KEY pins (A1 and D30) be electrically connected to GND for shielding. DLAG boards have them as NC.

Signals Used Onboard (only for use by the manufacturer)

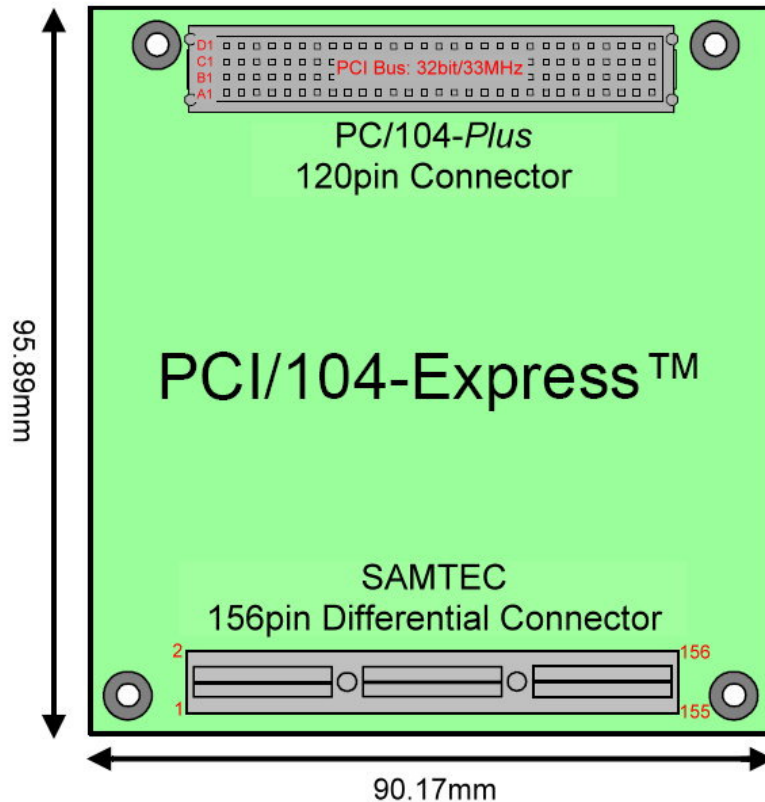
IRQ3, IRQ4	COM1 /2
IRQ7	LPT1
IRQ6	FD
IRQ14	HD
IRQ12	PS/2 Mouse
IRQ13	Coprocessor
TC	FD
DACK2 and DRQ2	FD

X103 PCI/104express 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_3Clk+		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	PSOEN#		SMB_ALERT	51

Pin	Signal		Signal	Pin
54	PEG_ENA#	+5 Volts	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+		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

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



X84 LPC Port

Protection: None

Pin	Signal	Pin	Signal
1	+3.3V Output	2	LAD0
3	LFRAME#	4	LAD1
5	PCIRESET#	6	LAD2
7	FWH_TBL#	8	LAD3
9	+5.0V Output	10	FWH_INIT#
11	LPC_Clock (33MHz)	12	FWH_onmod-select (1k to GND)
13	GND	14	NC

7. JUMPER LOCATIONS ON THE BOARD

The diagram shows the location of all jumper blocks on the MSM200 board. The numbers shown are silk screened on the board so that the pins may be easily located. This chapter refers to the individual pins for these jumpers.

Be careful when changing jumpers because some are soldering bridges; a miniature soldering station with a vacuum pump will be needed.

The Jumpers (Top Side)

Jumper	Structure	Open or (1-2)	Closed or (2-3)	Remarks
JP1	TB_IDE_CSEL#		TB_Slave	
JP2	LVDS_ENAVCC	+V5S	+V3.3S	
JP3	BCK_ENA	+V12	+V5S	
JP4	LAN_DEV_OFF#		LAN_DEV_OFF	
JP5	LAN_POWER	+V3.3A	+V3.3S	

Settings written in bold are defaults!

* *Please refer to Section Fehler! Verweisquelle konnte nicht gefunden werden..*

** *Please refer to Section 6.2.1.2.*

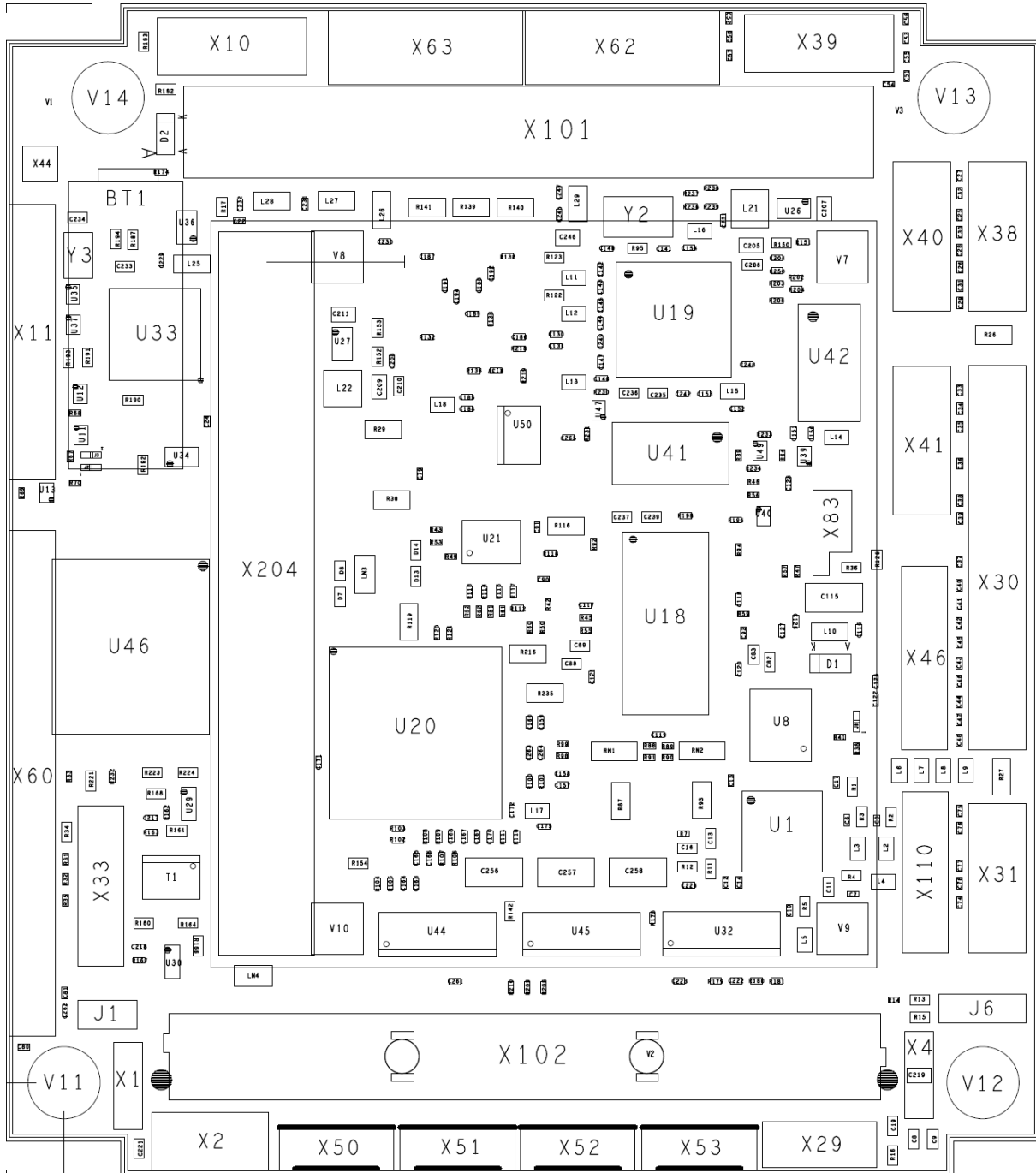
To use all 6 PEG lines in single mode, the R143 & R144 must be removed.

To use a MSMMX104ex you can install R143 & R144 (4.7k), the PEG0-3 lines are in parallel mode

7.1. The Jumpers on MSM200

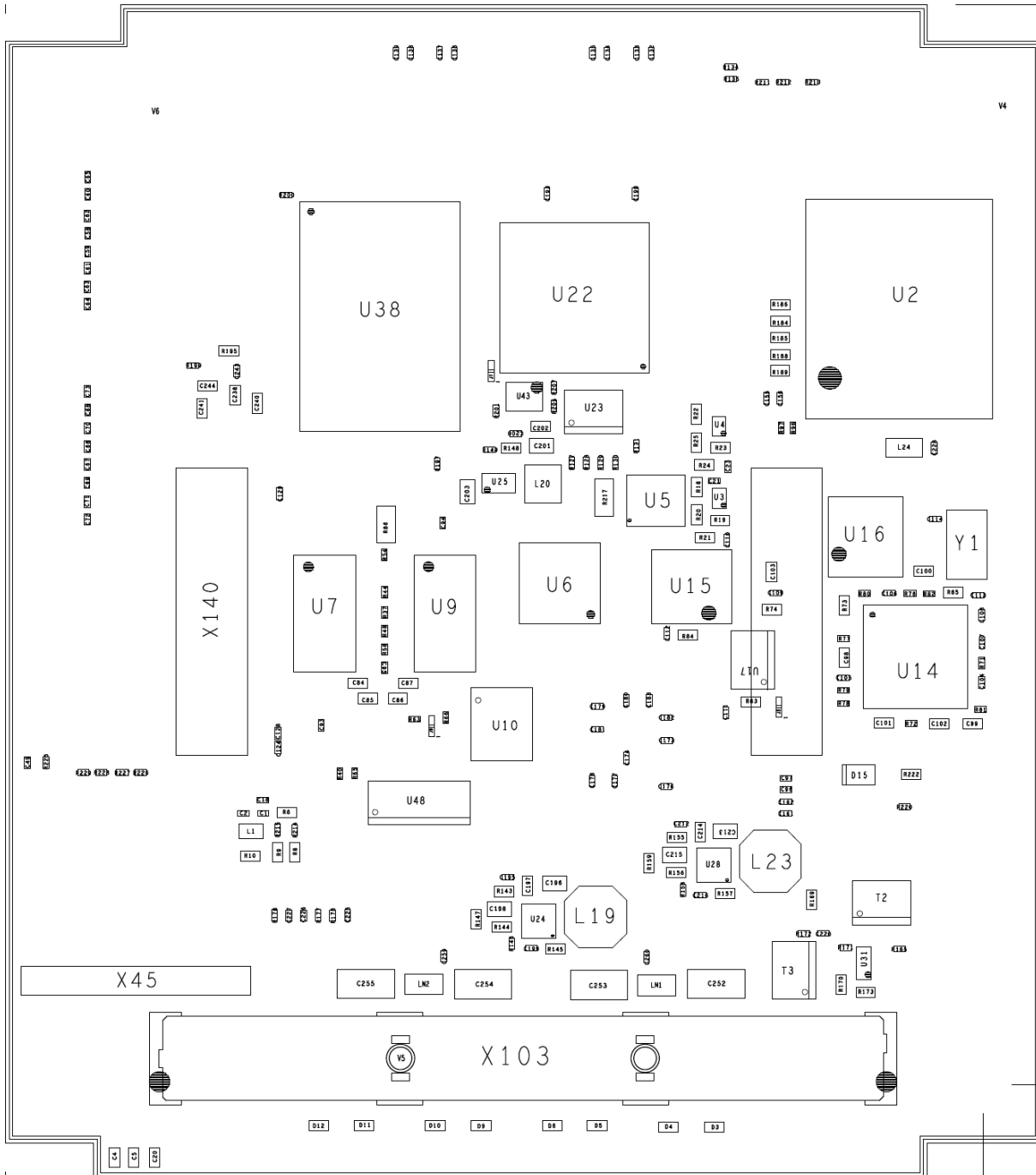
MSM200XP V0.3

Top View



MSM200XP V0.3

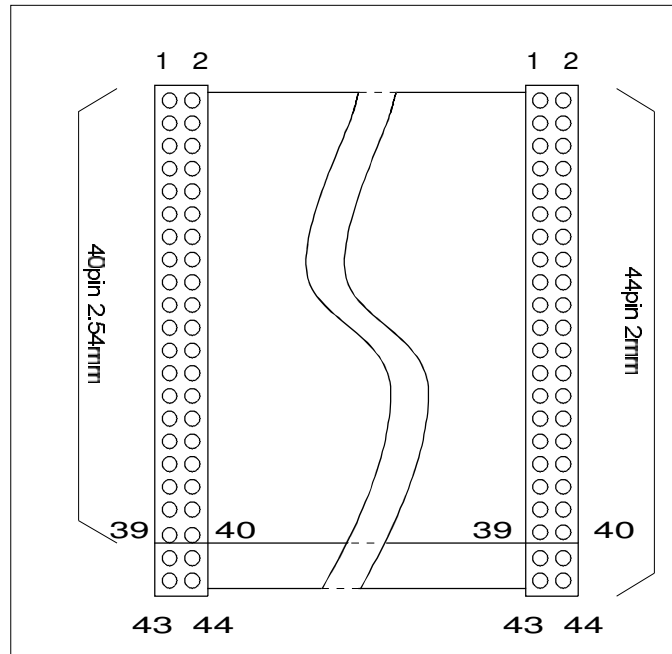
Bottom View



8. CABLE INTERFACES

8.1. The Hard Disk Cable 44pin

IDT Terminal for Dual Row (2.00mm grid) and 1.00mm flat cable; 44pins = 40pins signal and 4pins power.



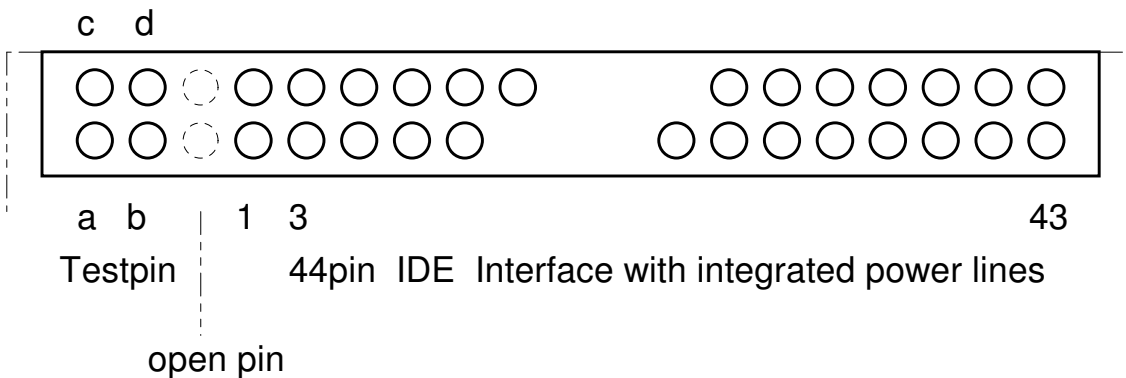
Maximum length for the IDE cable is 30cm.



Attention!

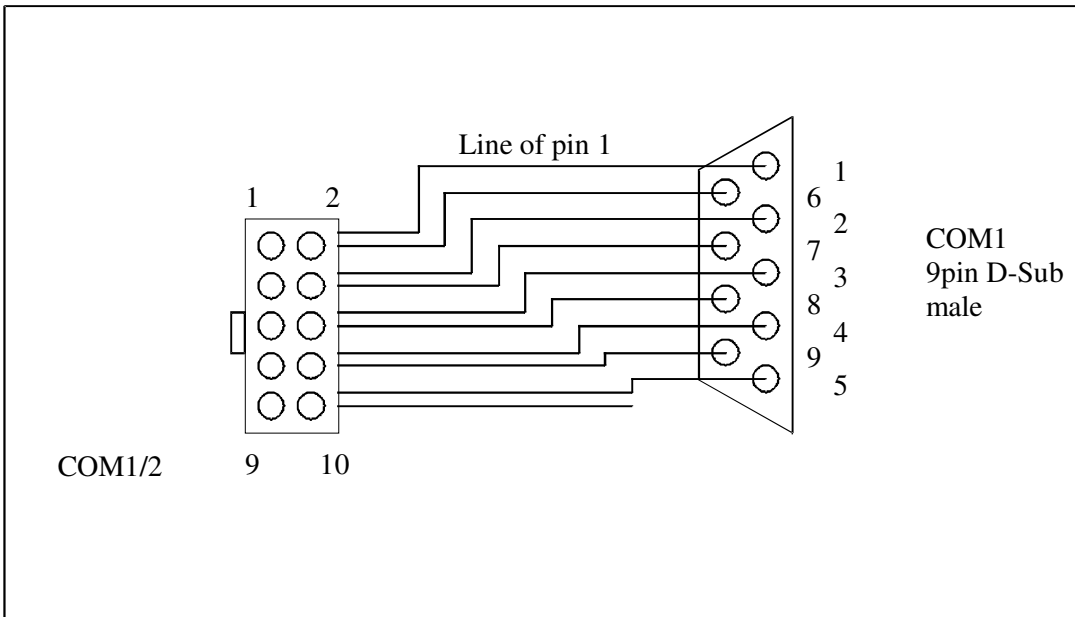
Check the Pin 1 marker of the cable and the connector before you power-on. Refer to the technical manual of the installed drives because a wrong cable will immediately destroy the drive and/or the MICROSPACE MSM200 board. In this case the warranty is void! Without the technical manual you may not connect this type of drive.

The 44pin IDE connector on the drives is normally composed of the 44 pins, 2 open pins and 4 test pins, 50 pins in total. Leave the 4 test pins unconnected.



8.2. The COM 1/2 Serial Cable

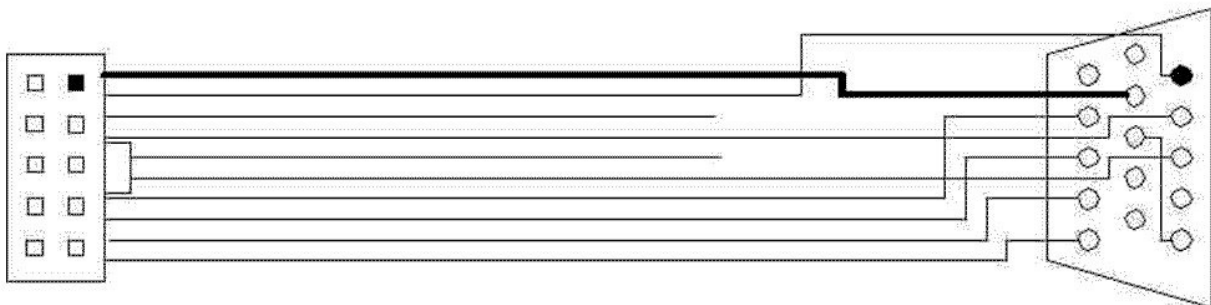
DT terminal for dual row 0.1" (2.54 mm grid) and 1.27 mm flat cable.



Attention!

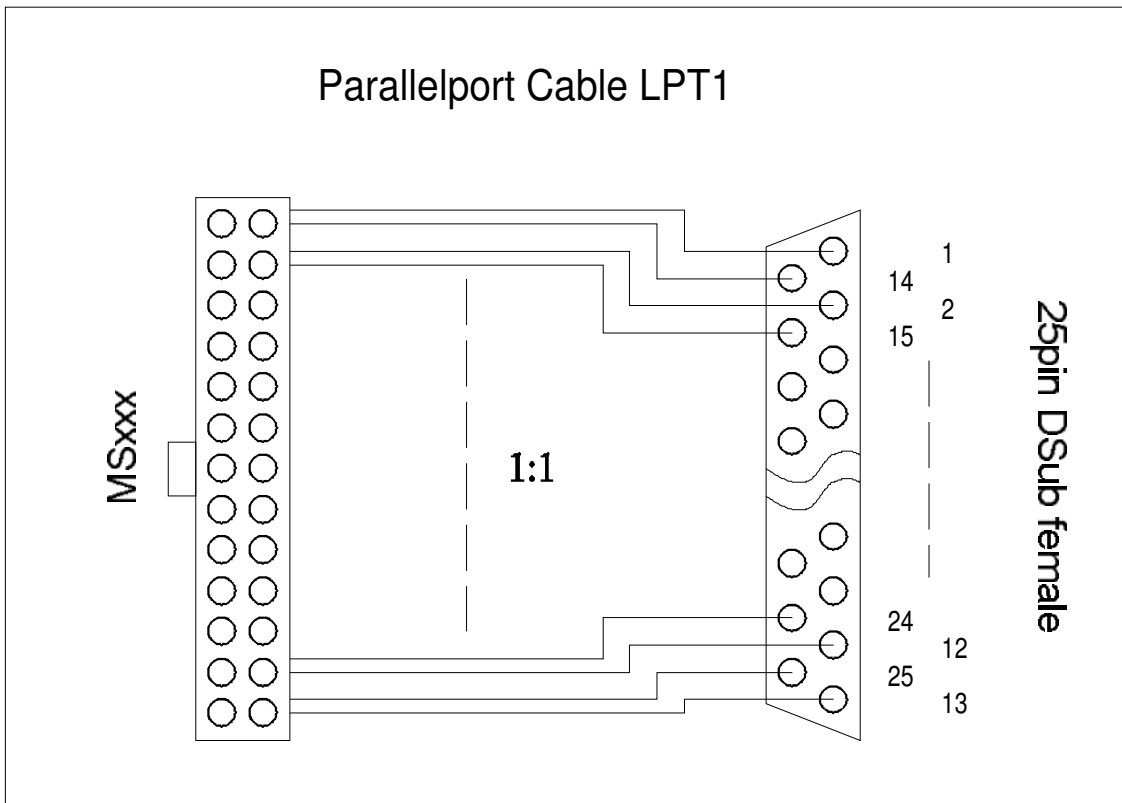
- Do not short circuit these signal lines.
- Never connect any pins on the same plug or to any other plug on the MICROSPACE MSM200. The +/- 10Volts will destroy the MICROSPACE core logic immediately. **In this case the warranty is void!**
- Do not overload the output; the maximum output current converters: 10mA

8.3. VGA Cable



8.4. The Printer Cable (P4)

IDT terminal for dual row 0.1" (2.54mm grid) and 1.27 mm flat cable



Attention!

- Maximum length of this cable is 6 meters.
- Prevent short-circuits.
- **Never apply power to these signals, the MICROSPACE MSM200 will be destroyed.**

9. DRIVER INSTALLATION

9.1. Drivers

Please refer to the Driver/Software/BIOS manual "SMA200 BIOS" on the Product CD.

9.2. CompactFlash (CF)

Supported as a normal hard disk.

10. THERMAL SPECIFICATIONS

10.1. Thermal Analysis for Case Integration

Since the integrated heatsink is unidirectional, the airflow must be exactly in the direction of the heatrails. If possible, mount the board vertically, so that the heatrails run up/down. In this case, the self-produced airflow is around 3m/second.

Pay particular attention when mounting the PC-product in a fully enclosed case/box. The thermal energy will be stored in the interior of this environment.

If the case has a fan:

1. The hot air must be exchanged with cool air from outside using a filtered fan.
2. The hot air must be cooled with a heat exchanger.

If the case has no fan or opening to exchange the hot air:

1. The heat sink of the CPU must be mounted directly to a heat sink integrated in the case. The heat does not dissipate through the air but will be conducted directly through the alloy of the heat sink to the outside.
2. Diminish the thermal energy production by reducing the CPU performance.
For example, use the 800MHz clock only.

10.2. Assembly of the Passive / Active Heat Sink

Please refer to the SMA200_Detailed manual on the Product CD.

11. CORE BIOS SETUP

Power-up the system and wait for the BIOS to show the BIOS activity on the screen. The BIOS diagnoses the system and displays the size of the memory being tested. Note: depending on the BIOS producer, you cannot bypass the memory test.

11.1. CMOS-SETUP

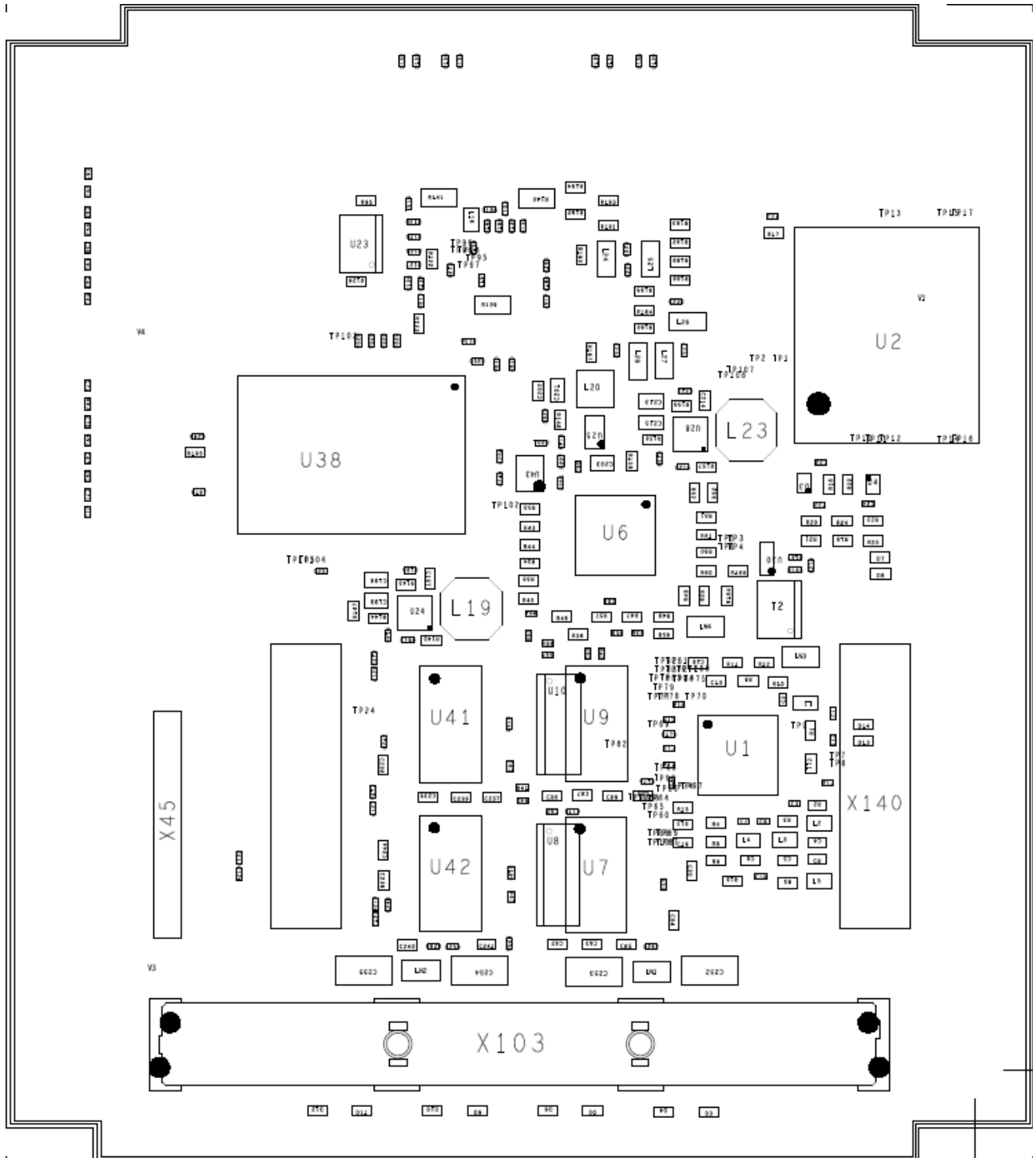
If the CMOS configuration is incorrect, the BIOS tells you to enter the setup screen by pressing a key. Select the correct options with the arrow keys and save them.

Function	Key
BIOS setup	DEL
Change values	SPACE / ENTER
Jump	ARROWS
Save	F10
Back / exit	ESC

12.2. Bottom View V0.2

MSM200XP V0.2

Bottom View



13.Q&A – QUESTIONS AND ANSWERS

Problem	Solution

14. INDEX

1

10/100/1000 BASE-T interface 44

A

Addressing PCI devices 29

B

Block Diagram 14
 Bus Currents 30
 Bus Signals 28

C

Cable Interfaces 54
 CMOS RAM Map 35
 CMOS-SETUP 58
 COM 1/2 Serial Cable 55
 Connectors 38
 Controllers 34
 Core BIOS 58

D

Disclaimer 5

E

EEPROM Memory for Setup 36
 EEPROM saved CMOS Setup 35
 EMI / EMC 17
 Environmental Protection Statement 5
 External Battery Assembly 27

F

Features, Standard 12
 Features, Unique 13
 Floppy Disk Interface 33

H

Hard Disk Cable 54
 Heat Sink 57

I

IDE interface 46
 Interrupt Controllers 34
 ISO 9001:2000 11

J

Jumper Locations 51

K

Keyboard PS/2 32, 44

L

LPT1 32

M

Manual, How to Use It 2
 Mouse Utility connector 44

O

Ordering Codes 18

P

PC/104+ BUS interface 47
 PC104+ Bus 28
 Printer 32
 Printer Cable 56
 Printer Port 44

Q

Q&A 61
 Questions and Answers 61

R

Recycling Information 6
 RoHS Commitment 9
 ROM-BIOS 35
 RTC 34
 RTC Battery-Lifetime 27

S

Safety Precautions 9
 Security 17
 Serial Port COM1 RS232 45
 Serial Port COM2 RS232 45
 Serial Ports 32
 Speaker Interface 33
 Specifications 15
 SQS 11
 Standards 8, 13
 Swiss Association for Quality and Management
 Systems 11
 Swiss Quality 11
 Symbols 7

T

Technical Support 6

Thermal Specifications..... 57
Timers and Counters..... 34
Timers, Programmable..... 34
Trademarks..... 5

U

USB..... 46

V

VGA monitor..... 42

W

Warranty..... 6
Watchdog..... 35