

# » Kontron User's Guide «



## MPC21A

Document Revision 100



# » Table of Contents «

<b>1</b>	<b>User Information .....</b>	<b>5</b>
1.1	About this Document .....	5
1.2	Copyright Notice .....	5
1.3	Trademarks .....	5
1.4	Standards .....	5
1.5	Warranty .....	5
1.6	Technical Support .....	6
1.7	Environmental Protection Statement .....	6
1.8	RoHS Commitment .....	6
1.8.1	RoHS Compatible Product Design .....	7
1.8.2	RoHS Compliant Production Process .....	7
1.8.3	WEEE Application .....	7
1.9	The Swiss Association for Quality and Management Systems .....	8
1.10	Declaration of Conformity .....	9
1.11	EMV Certificate .....	10
1.11.1	EMV Test Diagram, Class A .....	11
1.11.2	EMV Test Diagram, Class B .....	11
<b>2</b>	<b>Overview .....</b>	<b>12</b>
2.1	Packing List .....	12
2.2	System Overview .....	12
2.3	Assembly Options .....	13
2.4	MICROSPACE® Documentation .....	13
2.5	Functional Block Diagram .....	14
<b>3</b>	<b>Specifications .....</b>	<b>15</b>
3.1	Incompatibilities to a Standard PC/AT .....	17
<b>4</b>	<b>Safety Regulations .....</b>	<b>18</b>
4.1	Safety: Power-On Indicator .....	18

4.2	Safety: Coded and Marked Connectors .....	18
4.3	Protection of the Supply Input Current.....	18
4.4	Safety: Wrong Polarization on the Power Input .....	18
4.5	Safety: Protection of the Output Currents .....	18
4.6	Safety: Load Dump Protection in 12V/24V systems.....	18
4.7	Ground Potential.....	19
4.8	Power On/Off Switch .....	19
4.9	Safety: Batteries inside the Device .....	19
4.10	Protection against Over-Heating .....	20
4.11	Mechanical Safety: Safe Assembly and Mounting .....	20
4.12	Environmental Safety: At 25°C No "Hot" Surfaces .....	20
4.13	Environmental Safety: No Release of Toxins .....	20
4.14	Environmental Safety: Laser Devices.....	20
4.15	Environmental Safety: Noise Emission.....	20
4.16	Environmental Safety: Hazardous Environs .....	21
4.17	Environmental Safety: Humidity and Water Spray .....	21
4.18	Safety: Independent Software.....	21
4.19	Safety: Recycling the Computer System .....	21
4.20	Safety: Static Electricity.....	21
4.21	Safety: Operator Security .....	21
<b>5</b>	<b>Functions .....</b>	<b>22</b>
5.1	Connectors .....	22
5.1.1	Front of the MPC21A .....	22
5.1.2	Rear of the MPC21A .....	23
5.1.3	Power Supply Connector .....	24
5.2	DC-Power Input Specifications .....	24
5.2.1	Nominal DC-Power Input Voltage .....	24
5.2.2	Minimal DC-Power Input Voltage Specification.....	24
5.2.3	IT-Power System .....	25
5.3	Hard Disk 2.5" .....	25
5.4	WLAN Option .....	26

<b>6</b>	<b>Prepare the Computer System.....</b>	<b>27</b>
6.1	Print Manuals from the Product CD .....	27
6.2	Jumpers .....	28
6.2.1	Opening the Device .....	28
6.2.2	Jumper Configuration .....	29
6.3	Connect the Peripherals to the System .....	30
6.4	Connect COM3/4 to the System.....	31
6.4.1	Pin Definitions .....	31
6.5	Connect the Digital I/O to the System .....	32
6.5.1	Pin Definitions .....	32
<b>7</b>	<b>Power On the System .....</b>	<b>33</b>
7.1	BIOS Setup .....	34
7.2	Boot Up the Operating System and Install the Drivers.....	34
7.3	FreeDOS, DSLinux und ELinOS Bootflash .....	34
7.3.1	Free DOS .....	34
7.3.2	SLAX LINUX.....	34
7.3.3	ELinOS Demo.....	34
<b>8</b>	<b>Dimensions and Diagrams .....</b>	<b>35</b>
8.1	Front View .....	35
8.2	Rear View .....	35
8.3	Top Views .....	36
8.4	Side View.....	36
8.5	Front Plate.....	37
8.6	Mounting Plate .....	38
8.7	Wall Mounting Kit.....	39
<b>9</b>	<b>Core BIOS .....</b>	<b>40</b>
9.1	BIOS History .....	40
9.2	Setup Menu Screens and Navigation .....	40
9.3	BIOS Setup .....	41
9.3.1	Main Menu.....	41

9.4	PXE Setup in the BIOS.....	42
9.5	PXE Boot and PXE Protocol .....	43
9.5.1	PXE License Order Form .....	44
10	Appendix A: Document Revision History .....	47
11	Index.....	48

# 1 User Information

## 1.1 About this Document

This document provides information about products from Kontron AG and/or its subsidiaries. No warranty of suitability, purpose, or fitness is implied. While every attempt has been made to ensure that the information in this document is accurate, the information contained within is supplied "as-is" and is subject to change without notice.

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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All rights reserved. No part of this document may be reproduced, transmitted, transcribed, stored in a retrieval system, or translated into any language or computer language, in any form or by any means (electronic, mechanical, photocopying, recording, or otherwise), without the express written permission of Kontron AG.

## 1.3 Trademarks

MICROSPACE®, smartModule®, smartCore®Express and DIGITAL-LOGIC® are trademarks or registered trademarks of Kontron Compact Computers AG. Kontron is a trademark or registered trademark of Kontron AG.

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

- » 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.

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

## 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.

For technical support, please consult our technical support department:

Web: <http://support.kcc-ag.ch>  
Tel.: +41 (0) 32 681-5848  
Fax: +41 (0) 32 681-5801

For the latest product documentation, utilities, drivers, additional tools and software please consult our website:

Web: <http://kontron.com>

## 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 standard products from Kontron Compact Computers (KCC) 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 standard products.

### 1.8.2 RoHS Compliant Production Process

KCC selects external suppliers that are capable of producing RoHS compliant devices 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. Users are nevertheless encouraged to properly recycle all electronic products that have reached the end of their life cycle.

## 1.9 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](http://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.

## 1.10 Declaration of Conformity



### Declaration of Conformity

The product/device described below:

**Type of Equipment:** Industrial Computer

**Model:** MPC20  
MPC21  
MPC21A  
MPC21C

complies to the European Council Directive on the approximation of the Laws of the member states relating to electromagnetic compatibility (2004/108/EC) and Low Voltage Directive (2006/95/EC) or the last Status thereof.

Following Standards are constitute part of the declaration:

EN 60950-1:2006  
EN 55022:2006-09 + A1:2007-10 Class B  
EN 55024:1998-09 + A1:2001-10 + A2:2003-10  
EN 61000-4-2:1995 + A1:1998 + A2:2001  
EN 61000-4-3:2006 + A1:2008  
EN 61000-4-4:2005  
EN 61000-4-5:1995 + A1:2001  
EN 61000-4-6:2003  
EN 61000-4-11:2005

The responsible party declares in the name of the producer that the equipment specified above conforms to the referenced rules, regulations and Standards.

Luterbach, 18.01.2011

Mr. P. Péquignot  
CEO & Director of Quality Management

Signature:

Kontron Compact Computers AG  
Nindstrasse 11/F  
4542 Luterbach, Switzerland

Phone +41 (0)32 861 5800 - Fax +41 (0)32 861 5801 - [www.kontron.com](http://www.kontron.com)

## 1.11 EMV Certificate

Berichts-Nr.: 08.015	Datum: 2. 4. 2008	<b>EMV-Testcenter</b>		<b>RUAG</b> <small>Aerospace Defence Technology</small>	
Version: 01	Seite: 4 von 30				

### 1 Durchgeführte Prüfungen und Ergebnisse

Basisnorm	Anschlüsse (Schnittstellen)		Offerierte bzw. vereinbarte Prüfungen u. Grenzwerte					Resultate
	Typ	N	FW	FI	P	Spez.	I	
<i>Störfestigkeit</i>								
61000-4-2, ESD	Gehäuse			X				erfüllt
61000-4-3, HF-Feld	Gehäuse			X				erfüllt
61000-4-4, „Burst“	AC/DC	1		X				erfüllt
	Signal	9		X				erfüllt
61000-4-5, „Surge“	AC/DC	1		X				erfüllt
	Signal							
61000-4-6, HF auf Kabel	AC/DC	1		X				erfüllt
	Signal	7		X				erfüllt
61000-4-11, Sp'gs'einbr.	AC	1		X				erfüllt
<i>Störaussendung</i>								
61000-3-2, Oberschwing.	AC							
61000-3-3, „Flicker“	AC							
55022 / 55011, Strahl'g	Gehäuse	1	X					erfüllt
55022 / 55011, HF Leitg.	AC	1	X					erfüllt

**Legende**

N Anzahl Schnittstellen, vorgesehen für die praktische Prüfung  
 FW Fachgrundnorm, Wohnbereich, Geschäfts- und Gewerbebereiche sowie Kleinbetriebe  
 (EN 61000-6-1:2001, EN 61000-6-3:2001)  
 FI Fachgrundnorm, Industriebereich (EN 61000-6-2:2005, EN 61000-6-4:2001)  
 P Produkt(familien)norm:  
 Spez. Spezialgrenzwerte

**Anmerkung:** Für die Störaussendung bzw. Störfestigkeit wurden jeweils die schärferen der beiden Grenzwerte für den Wohn- bzw. Industriebereich herangezogen.  
 Mitgeltende Unterlagen: EN 55024

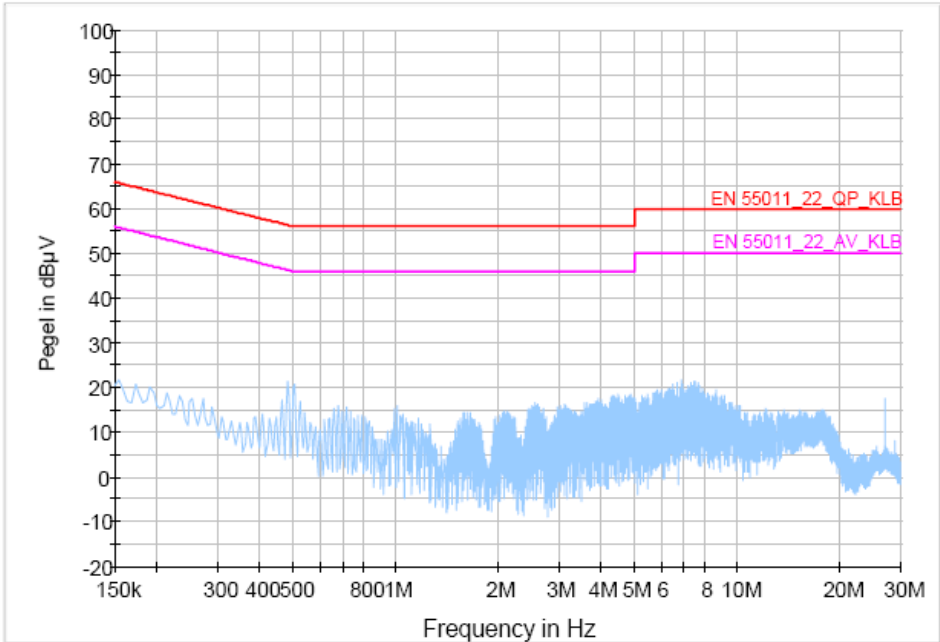
  

Dieser Bericht darf nicht ohne schriftliche Genehmigung des EMV-Testcenters STS 470 auszugswise vervielfältigt werden.
--

● RUAG Land Systems, CH-Thun

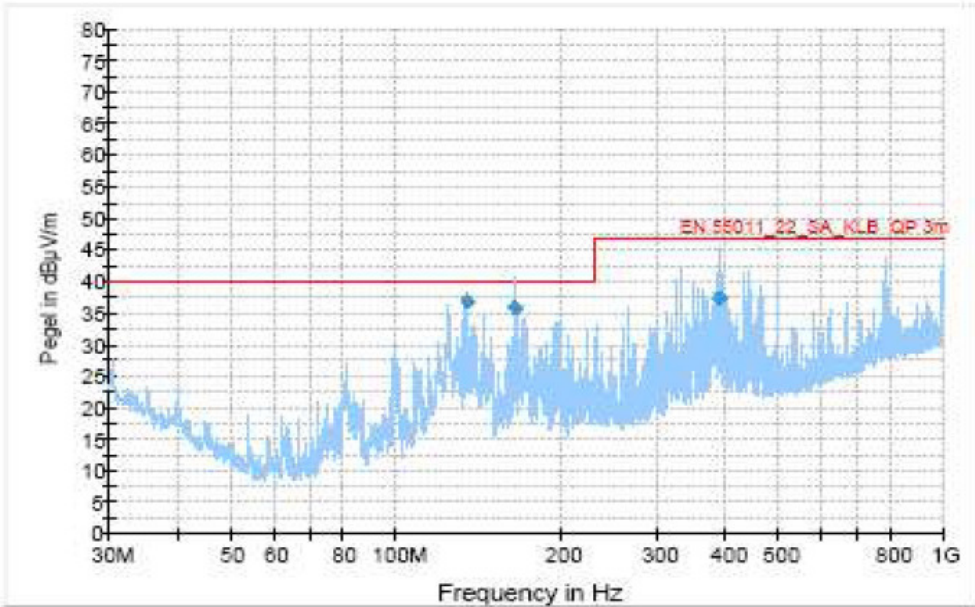
1.11.1 EMV Test Diagram, Class A

EN 55011\_22\_LA\_KLB LISN PMM\_L1+N



1.11.2 EMV Test Diagram, Class B

EN 55011 22 SA KLB ESS 90° 3m



## 2 Overview

### 2.1 Packing List

After opening the box, check that the following items from the packing list are included:

- » MICROSPACE-PC21A
- » Technical User Manual
- » CD with drivers and documentation

### 2.2 System Overview

The MICROSPACE-PC21A is a miniaturized PC system incorporating the major elements of a PC/AT compatible computer. It includes standard PC/AT compatible elements, such as:

- » AMD Geode LX800 with 500MHz clock
- » 128k L2 Cache
- » DDR-RAM Memory 256-1024MByte (SODIMM200)
- » Option: hard disk: 40GByte
- » CompactFlash Type II socket
- » Direct-X compatible video controller XVGA with up to 16MByte video memory
- » VGA video
- » USB controller with up to 4 channels (3x external – 1x internal [not assembled])
- » Audio stereo Mic in and stereo line out
- » First LAN 100/10Base-T controller, Intel 82551ER, boot from LAN (PXE) and Wake on LAN support
- » Second LAN 100/10Base-T controller, Intel 82551ER
- » 10-30V DC supply input
- » Fan-less low power system
- » MINI-PCI socket
- » COM1, COM2, COM3, COM4 and LPT
- » 4x digital output with galvanic isolated relays
- » 4x digital input, opto-galvanic isolated
- » Video input

## 2.3 Assembly Options

The product has different assembly options. Ask the manufacturer/distributor for detailed information about the options and combination of options currently available.

Option	Part No.		Comments
Hard disk drive 40GB	807460	0	Option
Hard disk drive 40GB ext.	807462	0	Optional hard drive with extended temperature range -25°C to +70°C
Power supply adapter	812029	0	60Watt power supply
Wireless LAN	812028	0	Mini-PCI WLAN module

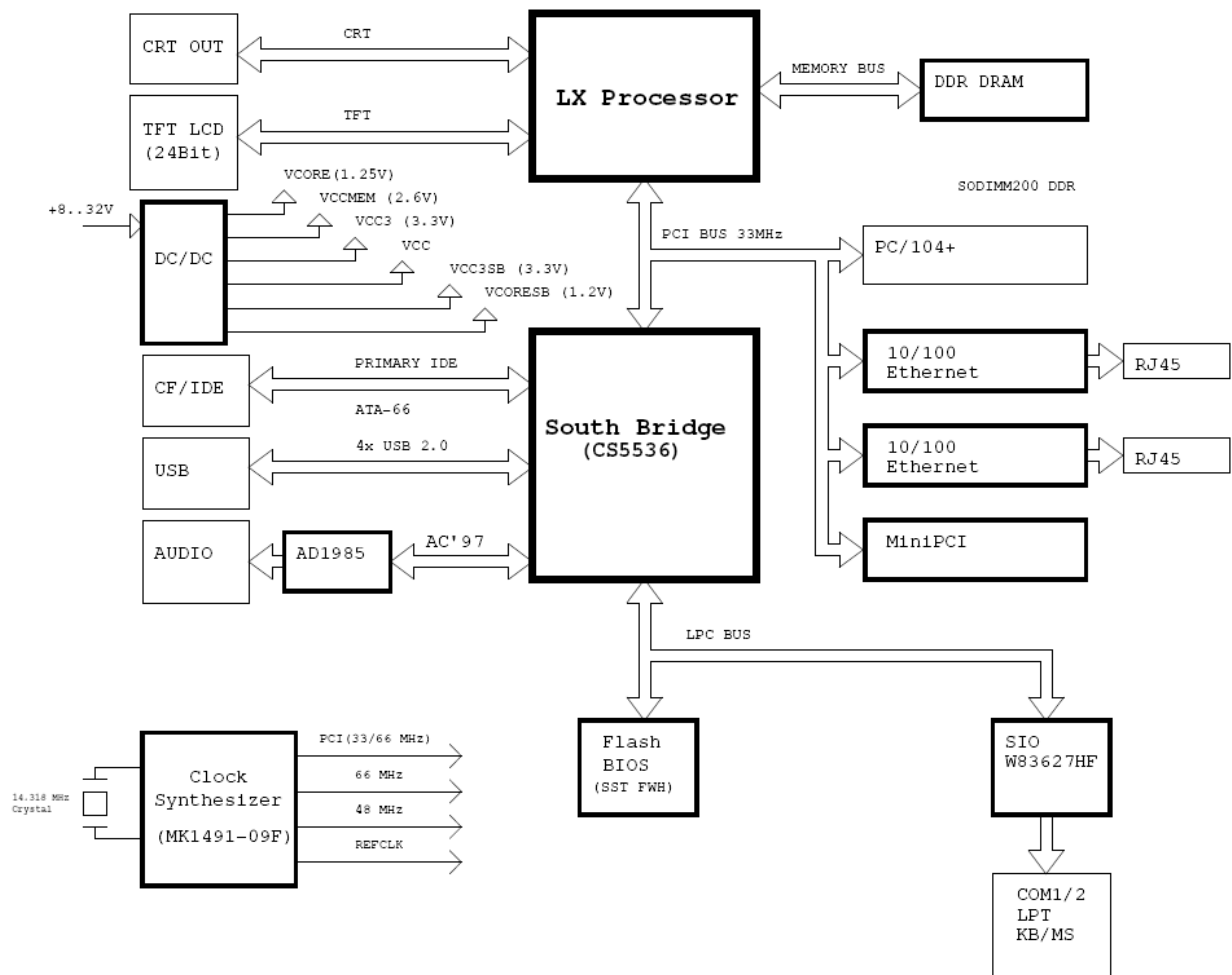
U = Upgrade, D = Downgrade, 0 = Option

Note: There is no space in the MPC21A for a PCI/104 expansion board.

## 2.4 MICROSPACE® Documentation

This manual is written for the end user / system integrator who plans to install computer systems based on the MICROSPACE-PC. It is for integrators and programmers of systems based on the MICROSPACE-Computer family. This manual describes the system and setup requirements; it provides instructions for installing and configuring the system. 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.

## 2.5 Functional Block Diagram





### 3 Specifications

**Note:** All information is subject to change without notice.

CPU	Specifications
MPC20/21	AMD GEODE LX800
Compatibility	80x86 CPU
1st Level Cache	16k data and 16k code
2nd Level Cache	128kByte
Socket	Soldered directly
Clock	500MHz
Performance	500MHz
FSB (GeodeLink)	33MHz
FPU	Integrated

Chipset	Specifications
Northbridge	AMD GEODE LX800
Southbridge	AMD CS5536
LAN 100Mbit	Intel 82551QM
LAN 100Mbit	Intel 82551ER
Audio	Integrated AC97
Firewire IEEE1394	-
Video	Integrated video
Frame Grabber / Video Input	Digital video input 16bit
COM3/4, Digital IO Controller	EXAR XR17D154

Memory	Specifications
Main Memory	DDR-SDRAM, 64bit, up to 1024MByte in DDR-SODIMM200 socket
Flash BIOS	256kByte Flash
Setup EEPROM	2kByte for CMOS backup in battery-less applications
Flash Video BIOS	Serial flash
Video RAM	16MByte

Video Controller	Specifications
Controller	GEODE internal video controller
Video Memory	2-16MByte
Channel 1	CRT VGA 320x240 up to 1920x1440 pixels
Boot-up Resolution	640x480 / 800x600 / 1024x768 selectable
2D Graphics	Integrated accelerator

Power Management	Specifications
	<p>The LX800 supports ACPI and APM Version 1.2.            The following ACPI Sleep States are supported:</p> <ul style="list-style-type: none"> <li>» S1 Sleep with CPU content.</li> <li>» S4 Hibernation (LED★ is blinking) with transition to S5.</li> <li>» S5-G2 Power Off (LED★ is blinking).                The device can be switched on by the Main Button                (or with WOL if available).</li> <li>» S5-G3 Power Off (mechanically)</li> </ul> <p>★ = if available</p>

External Interfaces	Specifications
Video Interfaces	CRT1
TV Interfaces	None
USB 2.0	1 front, 2 rear, 1 internal (not assembled)
IEEE1394	None
LPT1	
COM1	RS232C
COM2	RS232C
COM3	RS232C, optional RS422/485
COM4	RS232C, optional RS422/485
COM5	Internal: RS232C on header X42
COM6	Internal: TTL-level on header X43
Keyboard	PS/2
Mouse	PS/2
Audio	Stereo I/O

Power Supply	Specifications
Input	Nom. 12V / 24VDC (range 10V to 32VDC)
Protection	Load dump resistant, wrong polarity resistant, EMI filtered
Specification	MIL-STD-1275 compliant
Insulation	The power supply must have double or reinforced insulation!

Power Consumption @ 12V	
Running	Typical 0.8A
Standby	Typical 0.4A
Power OFF	Typical 25mA

Physical Characteristics	Specifications
Dimensions	Length: 165mm
	Depth: 110mm
	Height: 46mm
Weight	0.7kg

Operating Environment	Specifications
Relative Humidity	5-90% non-condensing IEC68-2-30 at -+5 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 4571meter operating
Temperature, operating	IEC68-2-1, 2, 14 (see separate table below)
Temperature, storage	IEC68-2-1, 2, 14 -40°C to +70°C

Operating Temperature	Specifications
Without Hard Drive	-25°C to +70°C
With Standard Hard Drive	0°C to +50°C
With Extended Temperature Hard Drive	-25°C to +70°C

Security	
e1	Not planned
UL	Not planned
ETL 301	Not planned
SEV	
Safety	AR385-16

EMI / EMC Tests	Specifications
EMC Emission EN61000-6-2:2001	
Conducted disturbance	EN55022 Class B
Radiated disturbance	EN55022 Class B
EMC Immunity EN61000-6-2	
Electro-Static 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 Disturbances	EN61000-4-6 Voltage = 10V coupled by case Criteria A

Note: All information is subject to change without notice.

### 3.1 Incompatibilities to a Standard PC/AT

#### Keyboard versus NUM-Lock

Without a connected keyboard, the NUM-Lock ON field in the BIOS-setup **must not be** activated. Otherwise the time-out noticeably slows down the reaction speed of the computer as soon as the keyboard is not connected. **The PS2 peripherals (KB and MS) are not hot-plug compatible.**

## 4 Safety Regulations

Safety verifications follow the guidelines adapted from the US Army Communication and Electronics Command Supplement (1992 version) 1 to AR385-16.

### 4.1 Safety: Power-On Indicator

The green power indicator is located in the front of the computer system. [MIL-STD-1472D]

### 4.2 Safety: Coded and Marked Connectors

All connectors (plugs and receptacles) are coded and marked to prevent insertion of the wrong plug into a receptacle or other mating unit [MIL-STD-1472D]. Depending on the mounted replicator unit, the connectors are PC-Style, DSUB or MIL versions. The male connectors are de-energized when disconnected. [MIL-STD-454M]

### 4.3 Protection of the Supply Input Current

**Note:** The computer system has no internal fuse. To protect the supply input from overcurrent, an external fuse or a current-limited power supply should be used.

### 4.4 Safety: Wrong Polarization on the Power Input

**Attention:** The supply input is protected against wrong polarization with a serial diode. This diode withstands voltage up to 28Volts.

### 4.5 Safety: Protection of the Output Currents

There is no overcurrent protection on any peripheral port. The following table shows the maximum available current at each peripheral connector:

Connector	Nominal maximum current
USB	0.5 Amp. @ 5V
KB/MS	0.1 Amp. @ 5V
VGA	0.1 Amp. @ 5V

### 4.6 Safety: Load Dump Protection in 12V/24V systems

**Danger:** There is no integrated protection against load dump!

If the computer system is to be installed in a vehicle (car, truck, train), an external, overvoltage protection must be attached. Connecting a zinc oxide based metal oxide varistor (MOV) directly at the supply input connector is recommended. Use a typical 28V clamp voltage for the 12/24V systems.

**Example:** Varistor: B72220S300K (Infineon) Vbreak=30V

## 4.7 Ground Potential

The shields of all interface connectors are grounded to the chassis. The user then has the option to ground the system with a ground wire.



Pin	Left	Middle	Right	
Signal	GND	Chassis ground	Power 10-30V	Chassis ground

## 4.8 Power On/Off Switch

The power switch is clearly identified and located on the front panel. [MIL-STD-545M]

The power on/off switch does **not** cut all electricity to the system. In the "off" position, a microcontroller is still working, to supervise wakeup events (switch, Wake on LAN). [MIL STD 454M] In this state, the system is consuming approximately 300mW.

To turn on the system, the power switch must be pressed for at least one second. While running, the system can be forced to shut off by pressing the on/off switch for 4 seconds.

To completely power off the system, all power must be disconnected from the device by either removing the cords from the device or from the power sources. All connectors must always be easily accessible.

Be sure to disconnect the power supply before opening the system.

## 4.9 Safety: Batteries inside the Device

Caution: Electric Shock!

The system has an integrated backup lithium battery (RTC). The battery compartment is not vented. The system casing protects the operator from a possible exploding battery cell.

***The lithium battery can only be replaced by the manufacturer!***



If anyone other than the manufacturer changes the lithium battery, there is the danger of an **explosion**! The replacement lithium battery must be UL approved.

Lithium batteries cannot simply be thrown away as domestic waste. Local regulations concerning the disposal of hazardous waste materials must be followed (e.g., by taking to specially designated collection areas).

## 4.10 Protection against Over-Heating

The computer system integrates temperature-sensitive components such as:

- » Hard disk (max. 55°C)
- » The CPU with a max. junction temperature of 105°C

Do not cover the device with paper, textiles or other objects. The minimum space between the housing and the next object is 50mm on each side. Make sure to allow enough airflow to the computer system when the device is assembled.

Protect the computer system from solar radiation or other thermal energy exposure.

Never place the functioning computer system in a closed case or box; or the inside air will heat above the maximum temperature and the system will be destroyed.

Keep the surface of the computer system free of dust, oil and other isolating materials, to prevent a reduction of the cooling efficiency.

## 4.11 Mechanical Safety: Safe Assembly and Mounting

**Danger:** The computer system must be fixed with a minimum of 4 screws using the mounting holes. It is very dangerous to place the device on the seat of a vehicle (car, truck, train, boat), while driving. In case of an accident, the device may hit a passenger or window.

Never drill new mounting holes into the chassis of the computer system because the internal electronics or hard disk may be damaged. Use only the mounting holes for assembly.

## 4.12 Environmental Safety: At 25°C No "Hot" Surfaces

**Note:** When the system runs at +25°C ambient temperature, no surfaces or other operating elements will have temperatures above +60°C. [MIL-STD-454M]

## 4.13 Environmental Safety: No Release of Toxins

**Note:** As long as the computer system is used in the specified operating temperature range, no toxic, corrosive, or explosive fumes or vapors are exposed. [MIL-STD-454M]

## 4.14 Environmental Safety: Laser Devices

**Note:** No assembled CD/DVD-Drive included.

## 4.15 Environmental Safety: Noise Emission

**Note:** This computer system is a low noise system; the level is less than 15 dbA.

## 4.16 Environmental Safety: Hazardous Environs

**Danger:** The computer system must not be used in a hazardous area because there is nothing to prevent spontaneous combustion. Never use the system in explosive gas or vapor, flammable dusts or ignitable fibers and filings.

## 4.17 Environmental Safety: Humidity and Water Spray

**Danger:** The computer system is not protected from splashing water. The protection is IP40.

## 4.18 Safety: Independent Software

**Note:** The system is divided into 2 different software parts, each running on its own microcontroller or CPU. Both parts communicate with a dedicated link.

1. Power management CPU and software are always running, even when the system's power is off.
2. The Geode LX800-CPU main processor is controlled from the power management CPU.

## 4.19 Safety: Recycling the Computer System

**Disposal:** Never dispose of old batteries or the entire computer system as domestic waste. Return it to the manufacturer for proper disposal.



## 4.20 Safety: Static Electricity

**Warning:** ESD Sensitive Device!

Excessive static electricity can damage the system. Before you handle the chassis or its components, make sure you are well grounded.

Handle the components by the grips or the front panel to help prevent accidental damage caused by static discharge.

## 4.21 Safety: Operator Security

### Safety Instructions

It is important to protect yourself and your equipment before you perform any of the procedures outlined in this manual.

Before handling the equipment or when making changes to the configuration, power-off the system and disconnect all power cords from their source.

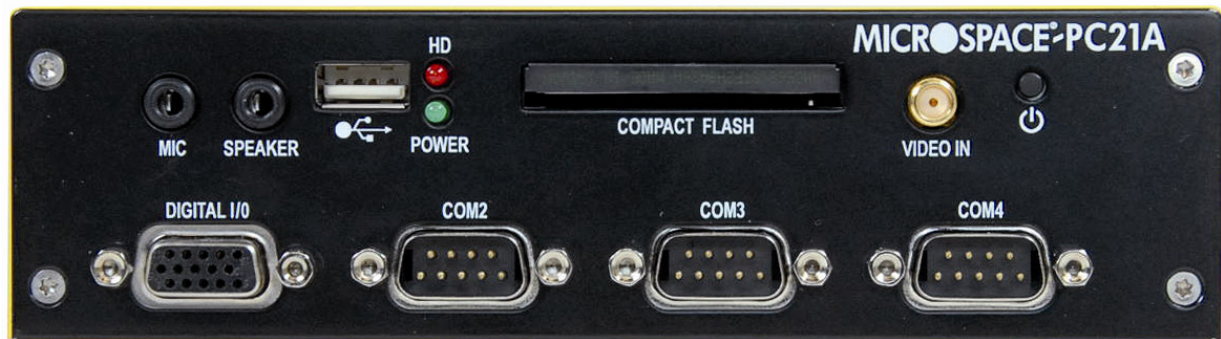
Use a grounding wrist strap or other static-dissipating device to prevent accidental damage caused by static discharge.

Only qualified, experienced electronics service personnel should access and handle the equipment.

## 5 Functions

### 5.1 Connectors

#### 5.1.1 Front of the MPC21A

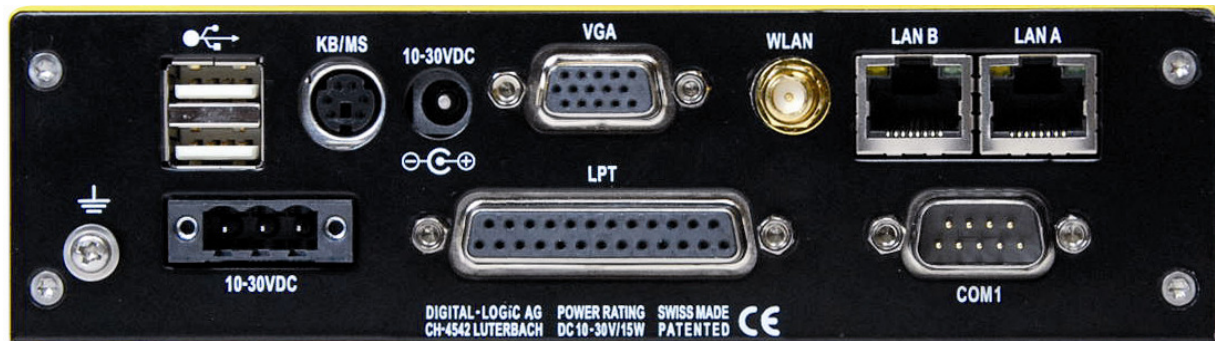



Connector	Description
<b>1<sup>st</sup> Row</b>	
MIC	Stereo input for microphone
SPEAKER	Stereo speaker out
USB	2.0 USB
HD-LED (red)	Hard disk/CompactFlash activity indicator
POWER-LED (green)	OFF: No power available, system is not running Flashing: Power is applied, but computer is in the "off" state On: Computer is running
COMPACT FLASH	Socket for CF Type 1 and Type 2
VIDEO IN	CVBS video input
On/Off-Switch	Power switch
<b>2<sup>nd</sup> Row</b>	
DIGITAL I/O	4bit digital input and 4x relay switch output
COM2	RS232C interface
COM3	RS232C (optional RS422/485) interface
COM4	RS232C (optional RS422/485) interface

**Danger:** Do *not* connect the wrong cable into the 15 pin I/O connector; specifically, the high voltages on the Digital I/O would destroy the VGA and COM3/4 interfaces.



### 5.1.2 Rear of the MPC21A



Connector	Description
<b>1<sup>st</sup> Row</b>	
Dual-USB	USB 2.0
KB/MS	PS/2 keyboard; with a Y-cable a PS/2 mouse also
DC-Input	Power input
VGA	Video output for RGB-CRT/LCD
WLAN	Option WLAN: antenna
LAN-Port B	100MB / with activity / link – LED
LAN-Port A	100MB / with activity / link – LED
<b>2<sup>nd</sup> Row</b>	
	GND / shield
Power Input	10-30VDC power input
LPT	Printer interface
COM1	Serial interface RS232C

**Danger:** Do *not* connect the wrong cable into the 15 pin I/O connector. Be particularly careful that the monitor cable is always connected into the VGA-connector on the rear side.

### 5.1.3 Power Supply Connector

BLZ 5.08/3F SN SW (Part number: 1803050000) available from [www.weidmueller.com](http://www.weidmueller.com) .

#### Signal Definitions

+ Power	10-32V power supply
GND	0V or the ground from the power supply
Shield	Grounding of the MPC21A



Pin	Left	Middle	Right
Signal	GND	Chassis ground	Power 10-30V

--	--

## 5.2 DC-Power Input Specifications

### 5.2.1 Nominal DC-Power Input Voltage

The nominal DC-power input is within the 10Volt to 30Volt range. This means the device may be used with 12V or 24V batteries, usually found in boats, cars and trucks.

### 5.2.2 Minimal DC-Power Input Voltage Specification

The MPC runs with a minimal power of 7.2V, measured at the input of the rear connector. If installed in a vehicle that is starting its motor, the power supply voltage may drop under 8V for a moment.

The following limits are specified:

DC-Input Voltage	Duration	Comments
32V	Highest static input voltage	
12/24V	Always: nominal operation	
8V	Lowest static voltage	

### 5.2.3 IT-Power System

The product is suitable for use in IT-power systems.

## 5.3 Hard Disk 2.5"

The internal hard disk is mounted.

Technical Specifications (without the shock absorbers)	
Capacity	40-160GByte
Manufacturer	IBM Travelstar Model: IC25N160ATCS04 (160GB) IBM Travelstar Model: IC25N040ATCS04 (40GB)
Sector size	512Byte
Data heads	16
Disks	2 or 4
Rotation speed	4200 RPM
Latency	7ms
Operating temperature	+5°C to +55°C
Relative humidity	8% to 90%
Power-on hours	333h / month
Maximum read/write duty cycles	20%
Vibration, operating	0.67G (5-500Hz) random
Shock, non-operating	800G / 1ms
Vibration, non-operating	3G ( 5-500Hz)

## 5.4 WLAN Option

A MiniPCI wireless LAN module can be installed. Option MPC2x WLAN MiniPCI consists of Intel's PRO/Wireless 2915ABG Network Connection MiniPCI card and a HF connector cable.

### Intel PRO/Wireless 2915ABG Network Connection MiniPCI Card Specifications

- » Form Factor Mini PCI Type 3A
- » Dimensions: width 2.85 in x length 1.75 in x height 0.20 in (59.75 mm x 50.95 mm x 5 mm)
- » Weight: 0.7 oz. (12.90 g)
- » Antenna Interface Connector: Hirose U.FL-R-SMT mates with cable connector U.FL-LP-066
- » Dual Diversity Antenna: on-board dual diversity switching
- » Connector Interface: 124pin SODIMM edge connector
- » Voltage: 3.3Volt
- » Operating Temperature: 0 to +70 degrees Celsius
- » Humidity: 50 to 85% non-condensing

### Frequency Modulation: 5 GHz (802.11a) 2.4 GHz (802.11b/g)

- » Frequency Band: 5.15 - 5.85 GHz, 2.400 - 2.472 GHz (dependent on country)
- » Modulation: BPSK, QPSK, 16 QAM, 64 QAM CCK, DQPSK, DBPSK
- » Wireless Medium: 5 GHz UNII: Orthogonal Frequency Division Multiplexing (OFDM)  
2.4 GHz ISM: Orthogonal Frequency Division Multiplexing (OFDM)
- » Channels: 4 to 12 non-overlapping, dependent on country  
Channel 1-11 (US only); Channel 1-13 (Japan & Europe)
- » Data Rates: 54, 48, 36, 24, 18, 12, 9, 6 Mbps / 11, 5.5, 2, 1 Mbps

### General

- » Operating Systems: Microsoft Windows XP, Microsoft Windows 2000
- » Wi-Fi® Alliance Certification for 802.11b, 802.11g, 802.11a, WPA, WPA2, WMM, EAP-SIM, LEAP, PEAP, TKIP, EAP-FAST, EAP-TLS, EAP-TTLS, MD5
- » Cisco Compatible Extensions Certification v3.0
- » WLAN Standard IEEE 802.11g, 802.11b, 802.11a
- » Product Safety: UL, C-UL, CB (IEC 60590)

## 6 Prepare the Computer System

**Warning:** ESD Sensitive Device! Place the embedded computer board on an isolated, ESD-protected surface. Ensure that all equipment, tools and people are fully protected against ESD.

### 6.1 Print Manuals from the Product CD

- » Place the Product-CD into a personal computer that is connected to a printer.
- » Open the CD; open the directory MPC20/21.

**Note:** Since the internal computer board is the MSB800 embedded computer, the corresponding manuals must be used for detailed information.

#### Printout the following detailed manuals:

1. The Technical/Hardware manual: MSB800\_Detailed.pdf
2. The BIOS/Driver/Software manual: GEODE\_LX800.pdf

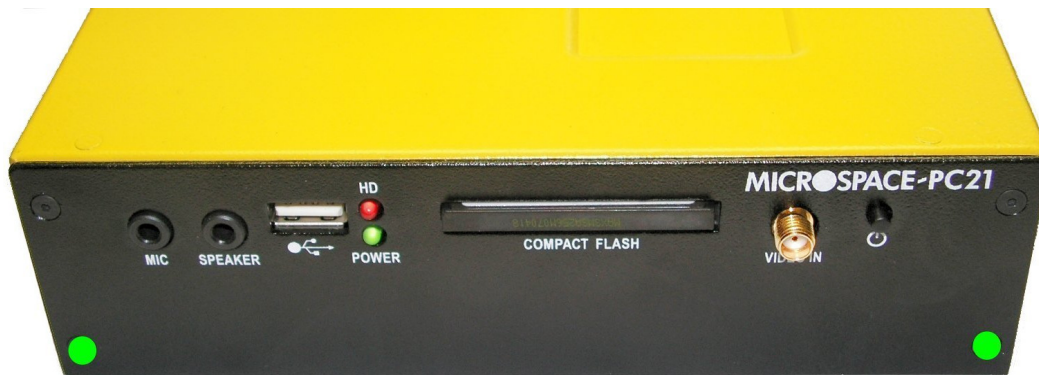
## 6.2 Jumpers

### 6.2.1 Opening the Device

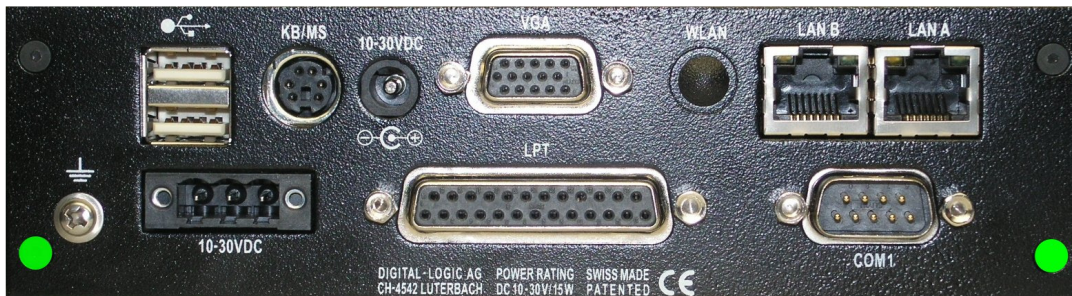
Open the device using a **star TX8** screwdriver:

1. Remove the lower screws marked in **green**:

**2** on the **front plate**



and **2** on the **back plate**

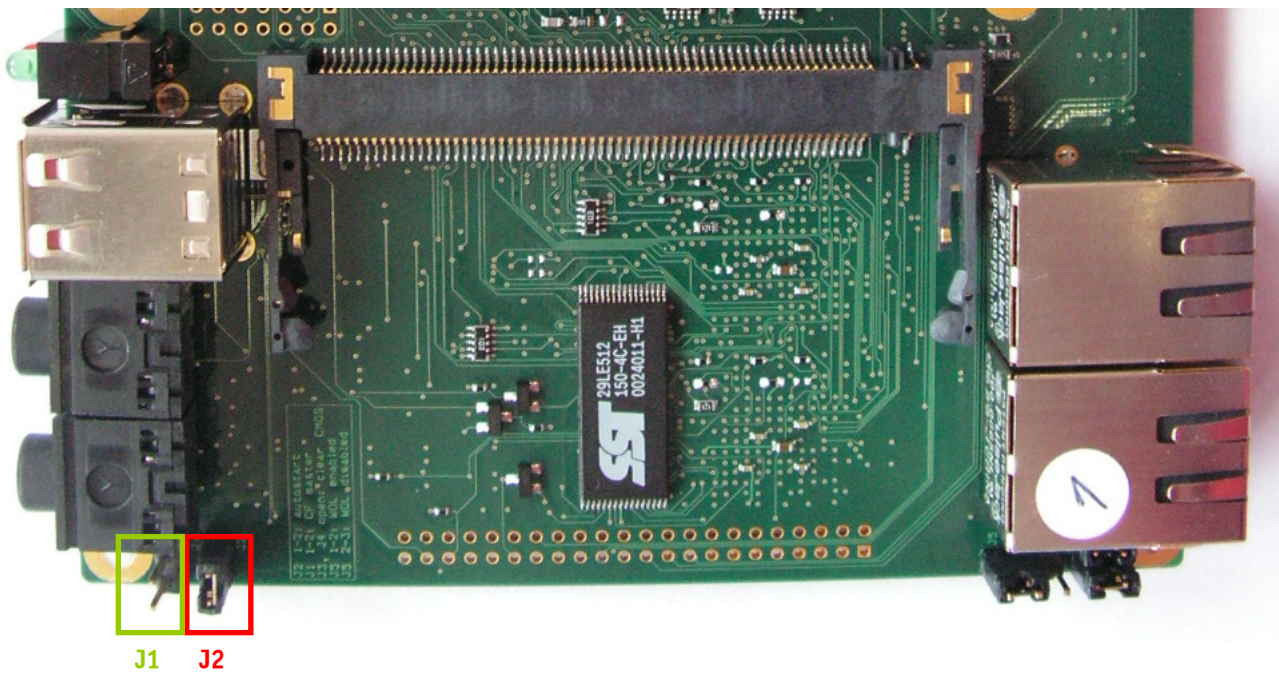


2. Carefully turn over the device and remove the bottom.

## 6.2.2 Jumper Configuration

Jumper	Structure	Open	Closed	Remarks
J1	CompactFlash master / slave	Slave	<b>Master</b>	
J2	Auto-start function	Enabled	N/A	

Settings written in bold are defaults.



## 6.3 Connect the Peripherals to the System

Prepare the following peripherals:

- » VGA monitor (LCD or CRT) with a resolution up to 1024x768 pixel
- » PS/2 keyboard
- » USB mouse
- » LAN cable, if available
- » USB CD drive or floppy drive
- » Power supply with 12Volts and minimum 30Watts

1. Connect the VGA monitor to the 15pin high density Subconnector.
2. Connect the keyboard to the PS/2 connector.
3. Connect the USB mouse to one of the USB connectors.
4. Connect a USB CD-drive or a USB floppy drive to one of the USB connectors.
5. Connect the 12Volt power supply to the power input of the system.

**Danger:** The polarity must be correct or the electronic board may be destroyed.

6. Insert a boot device: USB stick, floppy or bootable CompactFlash or use a PXE/RPL server to boot from LAN A.





## 6.4 Connect COM3/4 to the System

On the computer system, the DSub-connector is a 9pin male; a female connector is needed on the cable.

The RS422 and RS485 need an installed option. Only one interface can be used at the same time. The isolation voltage is 50V DC or 1.6kV over 60sec.

The order numbers for the options are:

Part No.	Connector	Description
812041	COM3	RS422 as replacement of the RS232C
812042	COM3	RS485 as replacement of the RS232C
812043	COM4	RS422 as replacement of the RS232C
812044	COM4	RS485 as replacement of the RS232C

### 6.4.1 Pin Definitions

#### RS232

Pin	Signal
1	DCD
2	RXD
3	TXD
4	DTR
5	GND
6	DSR
7	RTS
8	CTS
9	RI

#### RS422

DSub Pin	Signal
2	B
3	A

#### RS485

DSub Pin	Signal
1	A
2	B
3	4
4	2

## 6.5 Connect the Digital I/O to the System

On the computer system, the DSub-connector is a 9pin male: a female connector is needed on the cable side. All inputs and outputs are fully isolated.

### 6.5.1 Pin Definitions

Pin	Signal	Level and Direction
1	Relay 0 Passive contact	Active with logic 'L' or Reset state
2	Relay 1 Active contact	Active with logic 'H'
3	Relay 1 Common contact	50V / 1Amp
4	Relay 2 Active contact	50V / 1Amp
5	Relay 3 Active contact	50V / 1Amp
6	Relay 0 Active contact	Active with logic 'H'
7	Relay 0 Common contact	50V / 1Amp
8	Relay 1 Passive contact	Active with logic 'L' or Reset state
9	Relay 2 Active contact	Active with logic 'H'
10	Relay 3 Active contact	Active with logic 'H'
11	Common ground for digital input	0V
12	Digital input 3	High = 5V – 28V, 2mA
13	Digital input 2	High = 5V – 28V, 2mA
14	Digital input 1	High = 5V – 28V, 2mA
15	Digital input 0	High = 5V – 28V, 2mA

Relays 1 and 0: Changing contacts between passive and active (3 wires).

Relays 2 and 3: Only active contacts (2 wires).

The digital opto-isolated inputs are supplied with a common ground.

## 7 Power On the System

**Attention:** Check that the voltage is regulated to +12Volts and that the polarity is correct.  
The supply voltage must be in the range of 8Volts to maximum 32Volts.

**Note:** Jumper **J2** determines the behavior after power-on. The auto-start function is enabled by default from the factory (to set **J2**, refer to Section 6.2.2).

Switch on the external 12V power supply. Depending on the setting of Jumper **J2**, the following occurs:

- » In *auto-start mode* the board automatically enters the boot sequence and the green "Power LED" lights up.
- » In *non-autostart mode* the board will remain in standby until the power button is pressed. The green "Power LED" will light up when the power button is pressed.

After a few seconds the screen should display the initial BIOS messages:



```

LX DB800
Rev: Kontron AG LX800_1.36(BRM)          Built: 04/13/2010 10:00:41
Geode LX Rev: C3 @ 500MHz                5536 Rev: B1
Memory: 237248k @ 333MHz/DDR             CAS: 2.5      CPUDIIV: 15 GLDIIV: 10
Floppy A: 1.44M                          COM1: 03F8   LPT1: 0378   GeodeROM: 4.52.36
RTC: Present                              COM2: 02F8   USA: 03B0    VideoBIOS: 060C
USB: Legacy
PM: Disabled
CPU Temp: 66°C

(c) 1999-2005 Copyright Advanced Micro Devices

Attempting to boot a Floppy...

```

## 7.1 BIOS Setup

Since the BIOS auto-configures during the start-up procedure, the user normally does not enter the BIOS setup. Manual setup is only needed to change the default settings. Refer to the BIOS/Driver/Software manual on the Product CD for the BIOS setup details.

## 7.2 Boot Up the Operating System and Install the Drivers

Depending on which boot drive is available, boot up the operating system from the CompactFlash or hard disk (if installed as an option).

To install the drivers, see the BIOS/Driver/Software/ manual on the Product CD.

## 7.3 FreeDOS, DSLinux und ELinOS Bootflash

### 7.3.1 Free DOS

FreeDOS (<http://www.freedos.org/>) is available on the boot device and contains a variety of useful programs for configuring a computer system. With these tools partitions can be manipulated and data transferred.

The most important of these programs are: Fdisk, Format, Sys, XCOPY, Edit, Dos Navigator (dn) and UnZip.

### 7.3.2 SLAX LINUX

The Linux installed on the boot device is based on SLAX Linux (<http://www.slax.org/?lang=en>). It boots with a graphical interface and includes many useful applications.

The most important of these are: Web browser, xine, Mplayer (Multimedia Player) and PDF-Viewer.

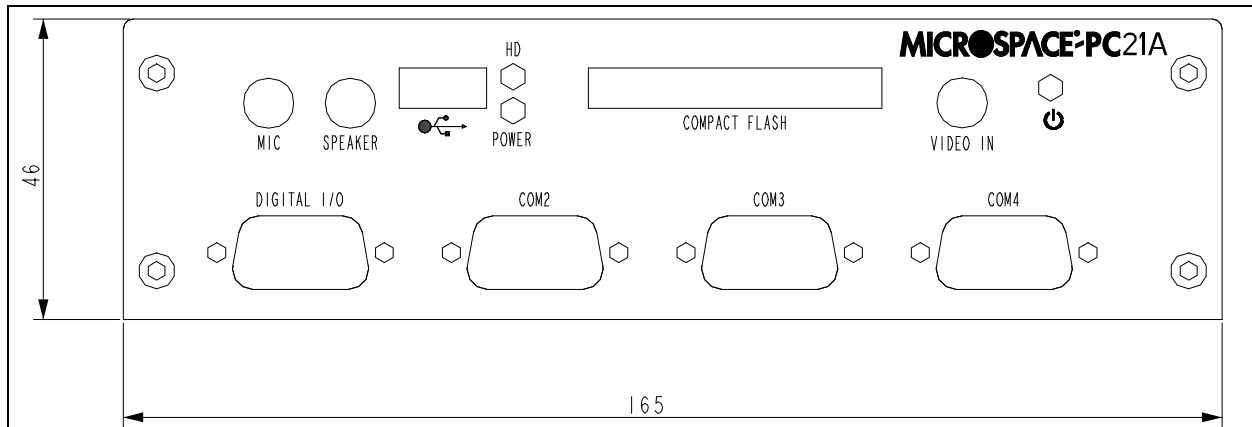
### 7.3.3 ELinOS Demo

This demo is a Linux Tetris game generated with ELinOS 4.0 (<http://www.sysgo.com/>). It shows how fast embedded Linux can boot up and how little storage space it requires.

## 8 Dimensions and Diagrams

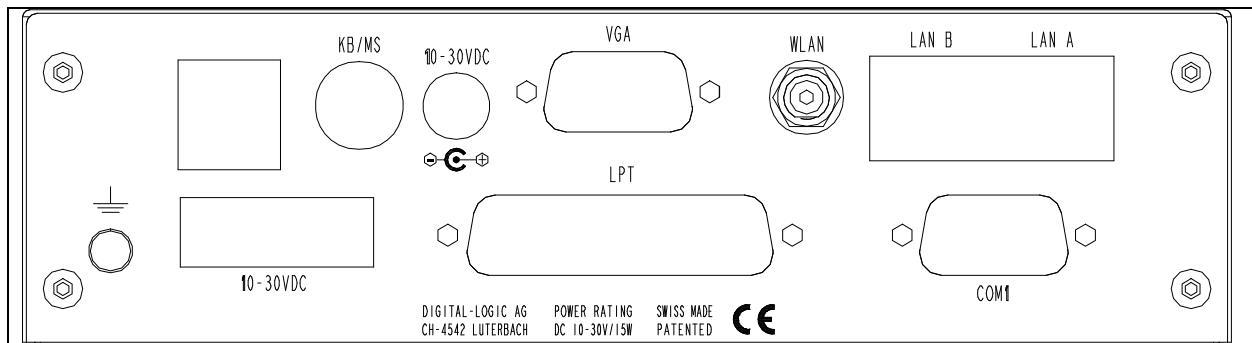
### 8.1 Front View

MPC21A (Version 1.0)

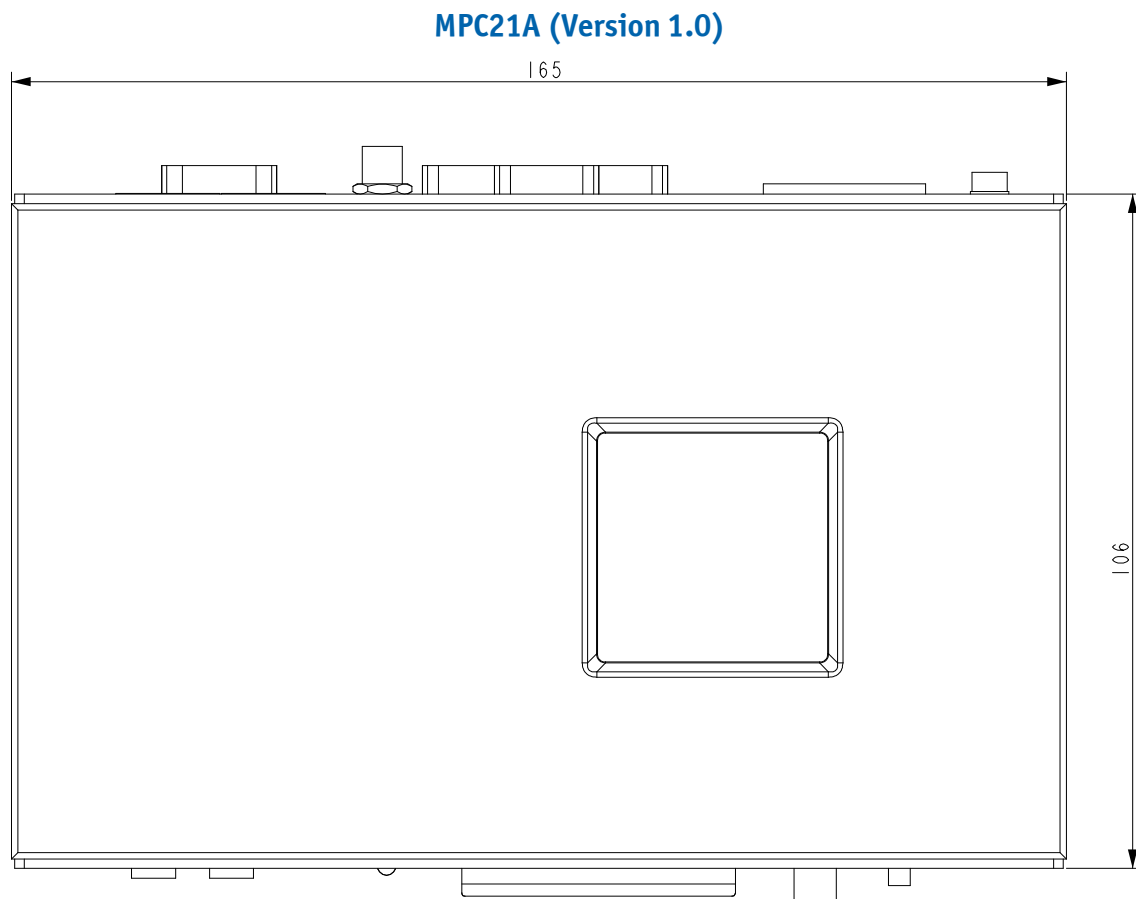


### 8.2 Rear View

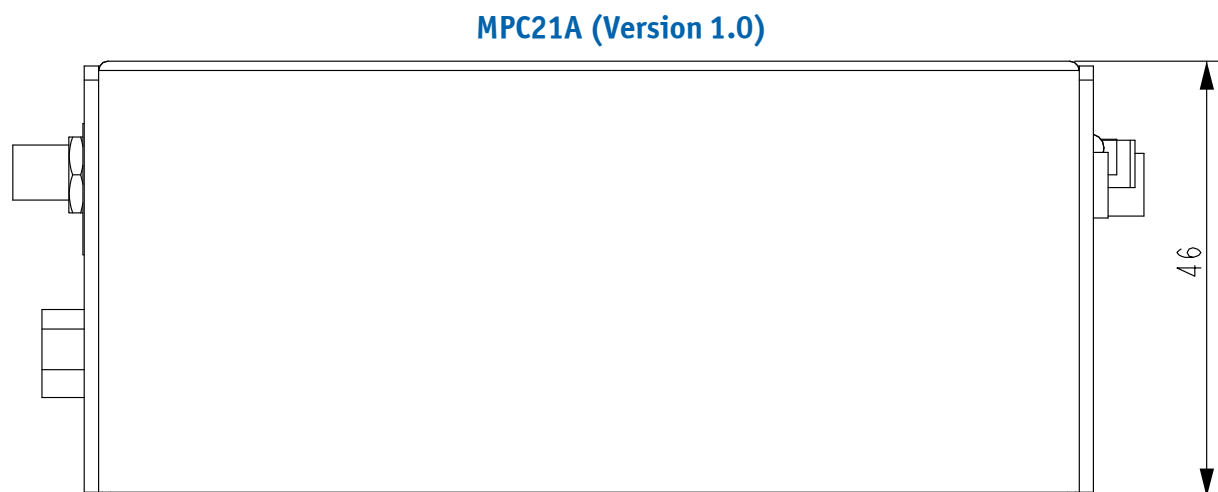
MPC21A (Version 1.0)



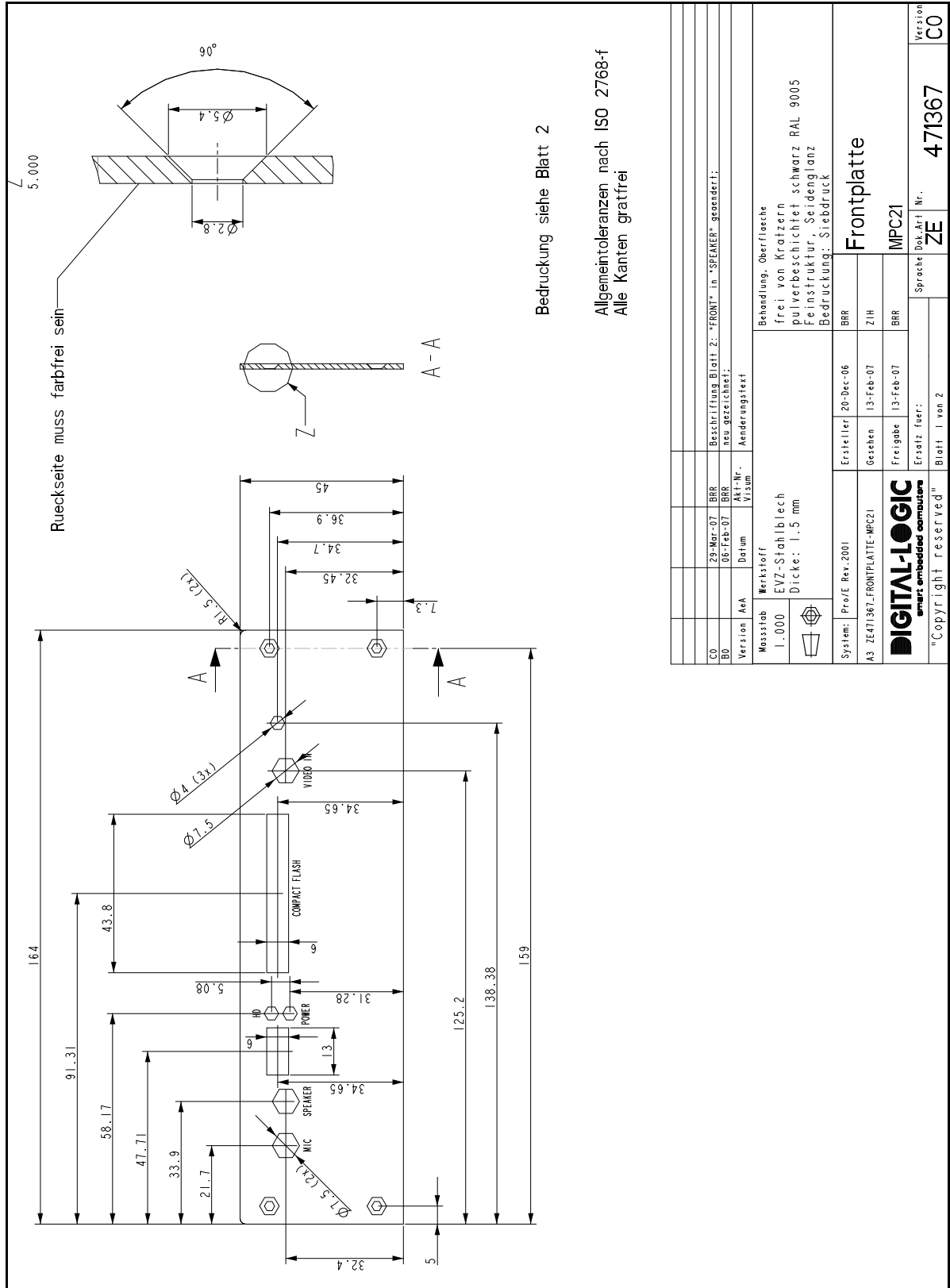
### 8.3 Top Views



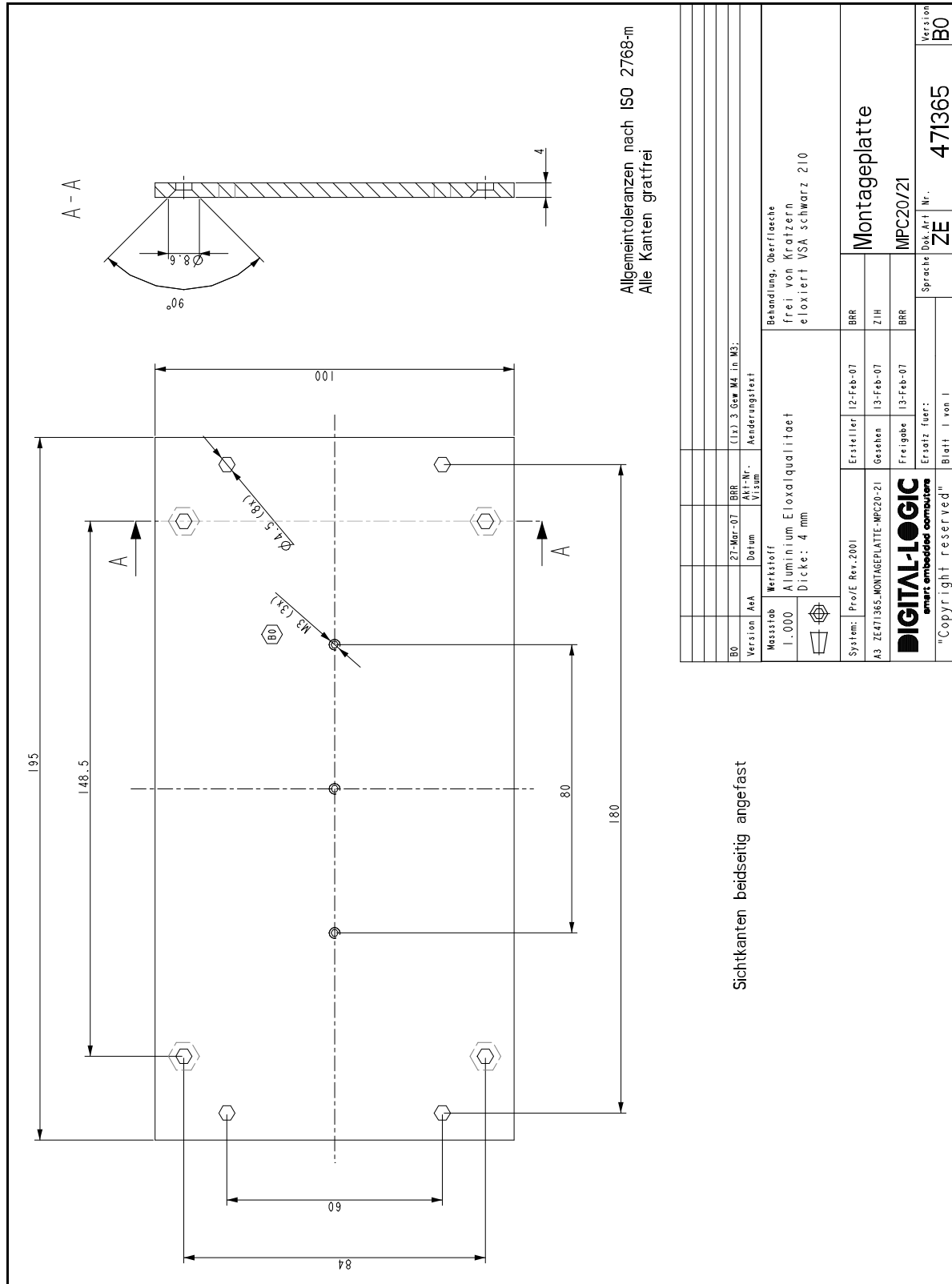
### 8.4 Side View



### 8.5 Front Plate



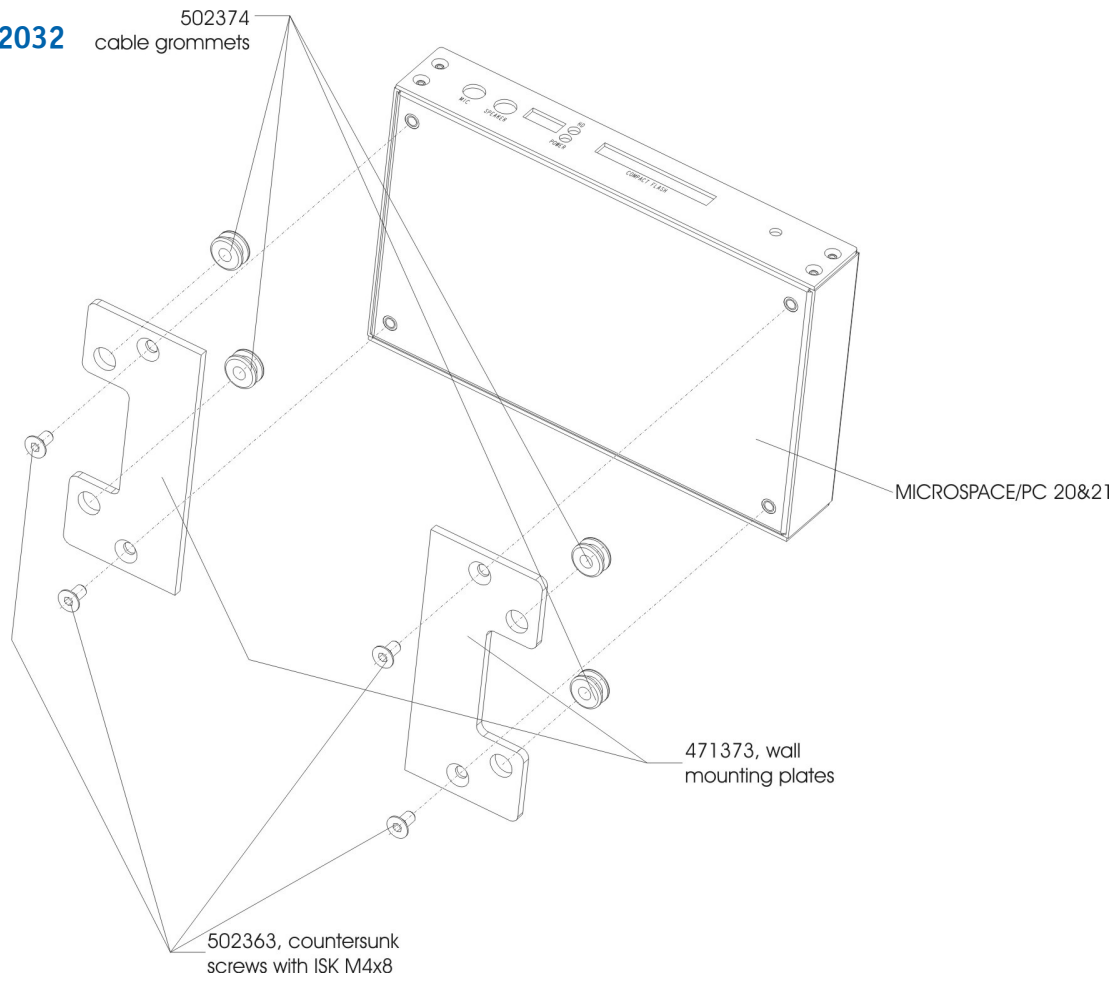
### 8.6 Mounting Plate



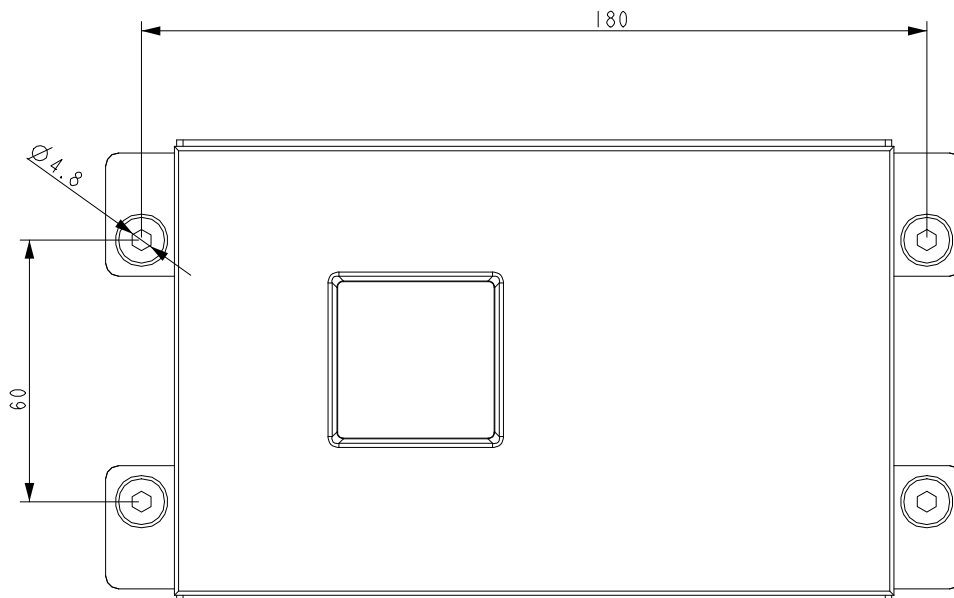


## 8.7 Wall Mounting Kit

Article 812032



### Drilling Plan



## 9 Core BIOS

### 9.1 BIOS History

Version	Date	Status	Modifications
1.23	02.2008		Memory problem solved
1.24	10.2008		<p><b>SelfTest BIOS Extension Ultra-X included. Enter with &lt; ALT - D &gt; during the boot up.</b></p> <hr/> <p><b>ATTENTION:</b> <b>Since BIOS version V1.24, the BIOS size is 512kB instead of 256kB. To download the BIOS, use one of the following commands:</b></p> <p>BIOS V1.23 and earlier: flashrom /sFFFC0000 filename.cor BIOS V1.24 and later: flashrom /sFFF80000 filename.cor</p>
1.25	01.2010		Kontron logo added / Ultra-X removed

### 9.2 Setup Menu Screens and Navigation

The XpressROM™ Setup Menu contains a number of features and options. It is advisable to evaluate the menu options prior to the shipment of your platform to ensure the removal of options that could have negative consequences if users change them.

The controls for the setup menu are:

Function	Key
BIOS setup	F1
Change values	ENTER
Jump	ARROWS / SPACE
Save	X
Back / exit	ESC

## 9.3 BIOS Setup

### 9.3.1 Main Menu

The main menu is the first screen that appears when a user selects **F1** during the boot process. Below is a screen shot of the main menu. Press the letter or use the arrow keys (↑↓) to select an option.

```

Main Menu
A. Time 01:38:31
B. Date 02/20/2007

C. Motherboard Device Configuration
D. Memory and Cache Optimization
E. System Clock/PLL Configuration
F. Power Management
H. Miscellaneous Configuration
I. ISA I/O and Memory Configuration
O. Boot Order

L. Load Defaults

S. Save Values Without Exit
Q. Exit Without Save
X. Save values and Exit

Set the current time in the RTC

```

### Changing the Time

To change the time select **A** from the main menu. The following submenu prompt appears:

```

Main Menu/A. Time
Time:
TIME as HH:MM:SS (Seconds are optional)

```

Enter the time in the format listed. For example: 11:30:01 then hit **<enter>**.

### Changing the Date

To change the date, select **B** from the main menu. The following submenu prompt appears:

```

Main Menu/B. Date
Date: _
Date as MM/DD/YYYY

```

Enter the date in the format listed. For example: 12/16/2011 then hit **<enter>**.

## 9.4 PXE Setup in the BIOS

BIOS-Setup Screen with the LAN-BOOT (PXE) Disable / Enable menu:

```

XpressROM Setup
Version: Digital-Logic AG LX800_1.22MSB800(BRM)      Built: 04/24/2007 10:54:59
----- LPC CARD I/O Device Configuration -----

FDC controller enable: Disabled
Serial Port 1: 0x3f8 IRQ 4
Serial Port 2: 0x2f8 IRQ 3

Parallel Port: 0x378
  MODE: Compatible
  IRQ:  IRQ 7
  DMA:  None

LAN 0 device enable: Enabled
LAN 0 boot enable:  Disabled
LAN 1 device enable: Enabled

IRQ3  on LPC/ISA: Disabled      IRQ9  on LPC/ISA: Disabled
IRQ4  on LPC/ISA: Disabled      IRQ10 on LPC/ISA: Disabled
IRQ5  on LPC/ISA: Disabled      IRQ11 on LPC/ISA: Disabled
IRQ6  on LPC/ISA: Disabled      IRQ15 on LPC/ISA: Disabled
IRQ7  on LPC/ISA: Disabled

```

After ENABLING the LAN-Boot, the Password must be entered.

```

XpressROM Setup
Version: Digital-Logic AG LX800_1.22MSB800(BRM)      Built: 04/24/2007 10:54:59
----- LPC CARD I/O Device Configuration -----

FDC controller enable: Disabled
Serial Port 1: 0x3f8 IRQ 4
Serial Port 2: 0x2f8 IRQ 3

Parallel Port: 0x378
  MODE: Compatible
  IRQ:  IRQ 7
  DMA:  None

LAN 0 device enable: En
LAN 0 boot enable:  Disabled
LAN 1 device enable: Enabled

IRQ3  on LPC/ISA: Disabled      IRQ9  on LPC/ISA: Disabled
IRQ4  on LPC/ISA: Disabled      IRQ10 on LPC/ISA: Disabled
IRQ5  on LPC/ISA: Disabled      IRQ11 on LPC/ISA: Disabled
IRQ6  on LPC/ISA: Disabled      IRQ15 on LPC/ISA: Disabled
IRQ7  on LPC/ISA: Disabled

```

Enter PASSWORD: \_

The Password must be requested with the PXE license order form in Section 9.5.1.

## 9.5 PXE Boot and PXE Protocol

PXE is defined on a foundation of industry-standard Internet protocols and services that are widely deployed in the industry, namely TCP/IP, DHCP, and TFTP. These standardize the *form* of the interactions between clients and servers. To ensure that the *meaning* of the client-server interaction is standardized as well, certain vendor option fields in DHCP protocol are used, which are allowed by the DHCP standard. The operations of standard DHCP and/or BOOTP servers (that serve up IP addresses and/or NBPs) will not be disrupted by the use of the extended protocol. Clients and servers that are aware of these extensions will recognize and use this information, and those that do not recognize the extensions will ignore them.

In brief, the PXE protocol operates as follows. The client initiates the protocol by broadcasting a DHCPDISCOVER containing an extension that identifies the request as coming from a client that implements the PXE protocol. Assuming that a DHCP server or a Proxy DHCP server implementing this extended protocol is available, after several intermediate steps, the server sends the client a list of appropriate Boot Servers. The client then discovers a Boot Server of the type selected and receives the name of an executable file on the chosen Boot Server. The client uses TFTP to download the executable from the Boot Server. Finally, the client initiates execution of the downloaded image. At this point, the client's state must meet certain requirements that provide a predictable execution environment for the image. Important aspects of this environment include the availability of certain areas of the client's main memory, and the availability of basic network I/O services.

### Deployment of servers

On the server end of the client-server interaction there must be available services that are responsible for providing redirection of the client to an appropriate Boot Server. These redirection services may be deployed in two ways:

- 1. Combined standard DHCP and redirection services.**

The DHCP servers that are supplying IP addresses to clients are modified to become, or are replaced by servers that serve up IP addresses for all clients and redirect PXE-enabled clients to Boot Servers as requested.

- 2. Separate standard DHCP and redirection services.**

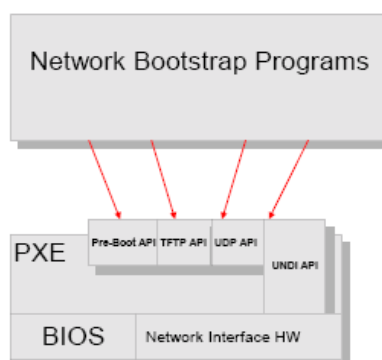
PXE redirection servers (Proxy DHCP servers) are added to the existing network environment. They respond only to PXE-enabled clients, and provide only redirection to Boot Servers. Each PXE Boot Server must have one or more executables appropriate to the clients that it serves.

### *Preboot Execution Environment (PXE) Specification 11*

Version 2.1 September 20, 1999

Copyright © 1998, 1999 Intel Corporation. All rights reserved.

This diagram illustrates the relationship between the NBP (the remote boot program) and the PXE APIs.



### 9.5.1 PXE License Order Form

The PXE function **must be** licensed before it can be enabled. To order, fill out and sign this form; return it to the fax number below. This form may be printed out separately from the digital copy of this manual on the Product CD.

Note: **Each** computer system requires an individual, one-time royalty payment for the PXE-license. After receipt of payment, you will be emailed the password necessary to enable the PXE function (see Section 9.4).

#### Customer Information:

Company Name:

---

Your Name:

---

Street Address:

---

ZIP / City:

---

Email:

---

#### Information for the PXE-License:

Product	Number of Licenses	KCC Part Nr. 809108
---------	--------------------	---------------------

MPC20x	<input type="checkbox"/>	_____
--------	--------------------------	-------

MPC21x	<input type="checkbox"/>	_____
--------	--------------------------	-------

Price per license: 17 Euro

Contact your Sales Manager for more information, price in USD/CHF, or if you have any questions.

Date: \_\_\_\_\_  
dd / mm / yyyy

Signature: \_\_\_\_\_

Fax this form to your Kontron Sales Manager:

\_\_\_\_\_  
(please write in his/her name)

Fax: +0041 32 681 58 01

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## 10 Appendix A: Document Revision History

Revision	Date	Edited by	Changes
100	08.Dec.2011	WAS	Converted to Kontron CI from DLAG V2.0.

## 11 Index

### A

Assembly Options..... 13

### B

BIOS History ..... 40

BIOS Setup ..... 34, 41

Block Diagram ..... 14

Boot Up the OS ..... 34

### C

COM3/4 ..... 31

Connectors ..... 22

Copyright ..... 5

Core BIOS ..... 40

Corporate Offices ..... 50

### D

Declaration of Conformity ..... 9

Digital I/O ..... 32

#### Dimensions and Diagrams

Front ..... 35

Front Plate ..... 37

Mounting Plate ..... 38

Rear ..... 35

Side ..... 36

Top ..... 36

Wall Mounting Kit ..... 39

Document Revision History ..... 47

Documentation ..... 5, 13

Driver Installation ..... 34

### E

ELinOS Demo ..... 34

EMV Certificate ..... 10

EMV Test Diagrams ..... 11

Environmental Protection ..... 6

### F

Free DOS ..... 34

Functions ..... 22

### G

Ground Potential ..... 19

### H

Hard Disk 2.5" ..... 25

### I

Incompatibilities ..... 17

IT-Power System ..... 25

### J

Jumper Configuration ..... 29

Jumper J2 ..... 33

Jumpers ..... 28

### M

Manuals ..... 27

**O**

Operator Security .....	21
Output Currents .....	18
Over-Heating .....	20

**P**

Packing List .....	12
Peripherals .....	30
Pin Definitions, COM .....	31
Pin Definitions, Digital I/O .....	32
Power .....	33
Power Consumption .....	16
Power Input Specifications .....	24
Power Supply Connector .....	24
Power Switch .....	19
Prepare the System .....	27
PXE Boot .....	43
PXE License .....	44
PXE Setup .....	42

**R**

RoHS .....	6
------------	---

**S**

Safety Regulations .....	18
--------------------------	----

Security .....	17
SLAX LINUX .....	34
Specifications	
Chipset .....	15
CPU .....	15
EMI / EMC Tests .....	17
External Interfaces .....	16
Memory .....	15
Operating Environment .....	16
Operating Temperature .....	16
Physical Characteristics .....	16
Power Management .....	15
Power Supply .....	16
Video Controller .....	15
SQS .....	8
Standards .....	5
Swiss Association for Quality and Management	
Systems .....	8
System Overview .....	12

**T**

Technical Support .....	6
Trademarks .....	5

**W**

Warranty .....	5
WEEE .....	7
WLAN Option .....	26

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