

» Kontron User's Guide «



MPC21B

Document Revision 100

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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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1.3 Trademarks

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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

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
 MPC21B
 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 55022:2009 Class B
 EN 61000-4-2:2001
 EN 61000-4-3:2003
 EN 61000-4-4:2005
 EN 61000-4-5:2001
 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, 04.08.2010

Mr. P. Péquignot
 CEO & Director of Quality Management

Signature:

Kontron Compact Computers AG
 Nordstrasse 11/F
 4512 Luterbach, Switzerland

Phone: +41 (0)52 681 5800 · Fax: +41 (0)52 681 5801 · www.kontron.com

1.11 EMV Certificate

| | | | | | |
|----------------------|-------------------|-----------------------|--|--|--|
| Berichts-Nr.: 08.015 | Datum: 2. 4. 2008 | EMV-Testcenter | | RUAG <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, Geschäftsbereich 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

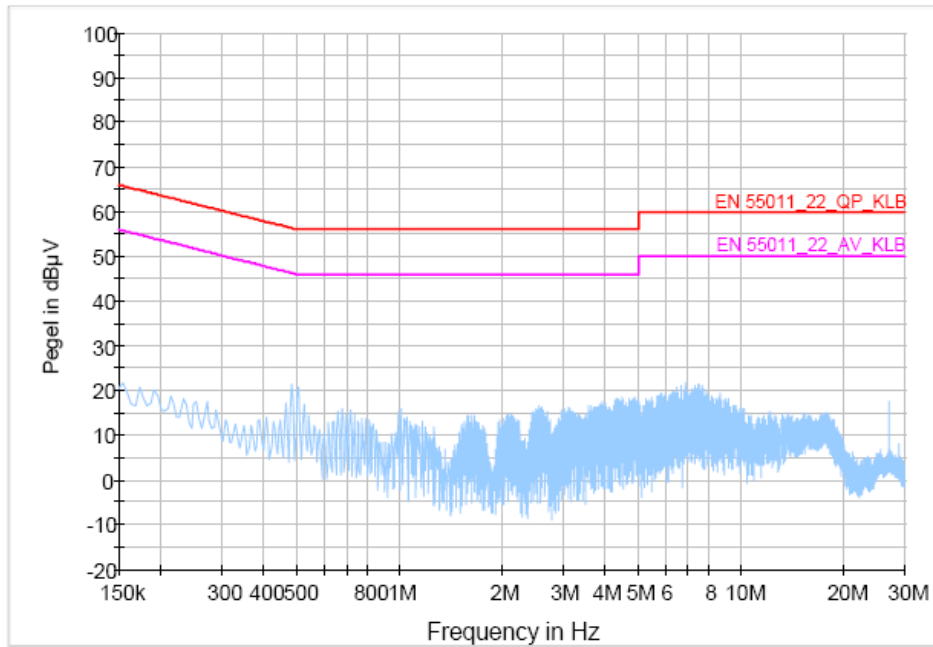
Anmerkung: Für die Störaussendung bzw. Störfestigkeit wurden jeweils die schärferen der beiden Grenzwerte für den Wohn- bzw. Industriebereich herangezogen.
 Mitgeltende Unterlagen: EN 55024

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

© RUAG Land Systems, CH-Thun

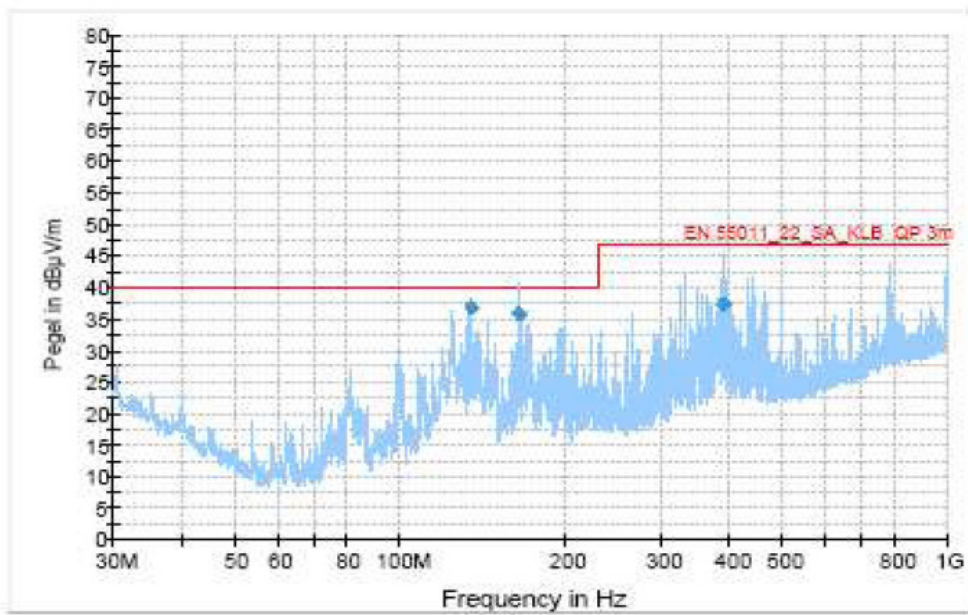
1.11.1 EMV Test Diagram, Class A

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-PC21B
- » Technical User Manual
- » CD with drivers and documentation

2.2 System Overview

The MICROSPACE-PC21B 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 (RS232C), COM2 (RS232C), 2x CAN-Port
- » LPT1
- » 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.

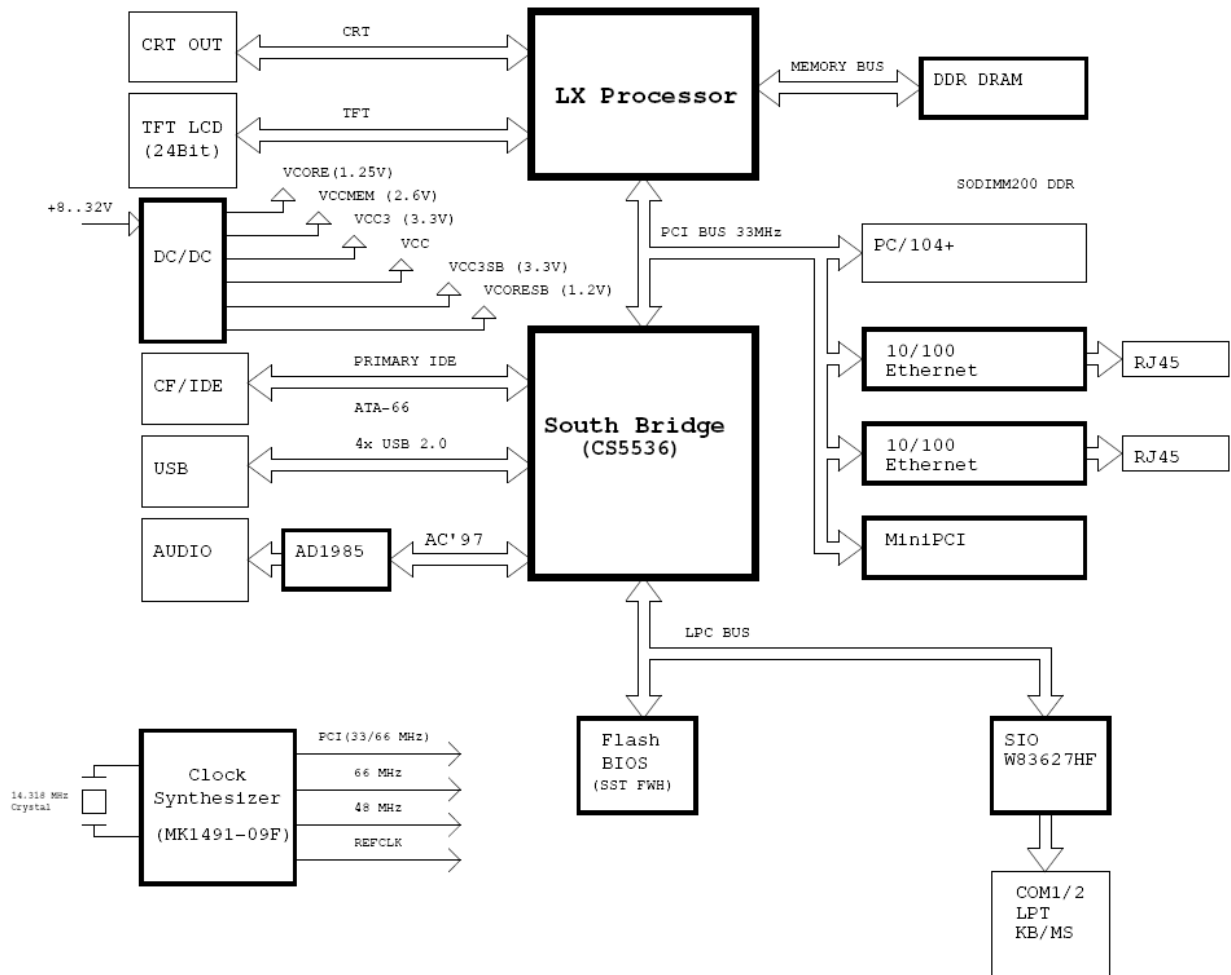
| Option | Part No. | | Comments |
|---------------------------|----------|---|--|
| Hard disk drive 40GB | 807460 | 0 | Option |
| Hard disk drive 40GB ext. | 807462 | 0 | Optional hard drive with extended temperature range -25°C to +70°C |
| Power supply adapter | 812029 | 0 | 60Watt power supply |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

U = Upgrade, D = Downgrade, 0 = Option

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"> » S1 Sleep with CPU content. » S4 Hibernation (LED★ is blinking) with transition to S5. » S5-G2 Power Off (LED★ is blinking). The device can be switched on by the Main Button (or with WOL if available). » S5-G3 Power Off (mechanically) <p>★ = if available</p> |

| External Interfaces | Specifications |
|---------------------|---|
| Video Interfaces | CRT1 |
| TV Interfaces | None |
| USB 2.0 | 2 front, 2 rear, 1 internal (not assembled) |
| IEEE1394 | None |
| LPT1 | |
| COM1 | RS232C |
| COM2 | RS232C |
| CAN-Port A | PEAK CAN V2.0 controller |
| CAN-Port B | PEAK CAN V2.0 controller |
| 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 MPC21B

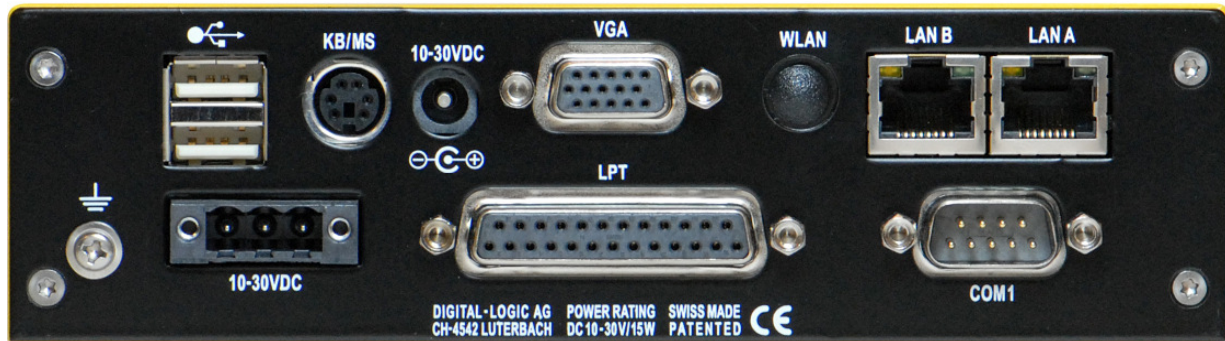



| Connector | Description |
|---------------------|---|
| 1 st Row | |
| MIC | Stereo input for microphone |
| SPEAKER | Stereo speaker out |
| USB | 2.0 USB |
| HD-LED (red) | Hard disk/CompactFlash activity indicator |
| POWER-LED (green) | OFF: No power available, system is not running Flashing: Power 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 |
| 2 nd Row | |
| SPARE | (Digital I/O is not assembled on the MPC21B) |
| COM2 | RS232C interface |
| COM3/CAN-A | CAN-Port A (series 9pin DSub) |
| COM4/CAN-B | CAN-Port B (series 9pin DSub) |

Danger: Do *not* connect the wrong cable into the SPARE connector.

5.1.2 Rear of the MPC21A

Versions 0.3/1.0/1.1



| Connector | Description |
|---|---|
| 1 st Row | |
| 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 |
| 2 nd Row | |
|  | 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 SPARE 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 .

Signal Definitions

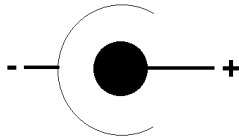
| | |
|---------|--|
| + Power | 10-32V power supply |
| GND | 0V or the ground from the power supply |
| Shield | Grounding of the MPC21B |



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



DC IN



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

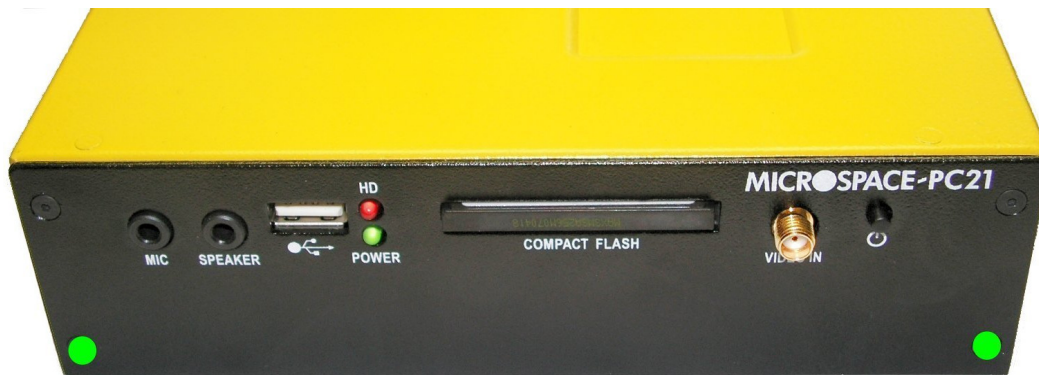
6.2 Jumpers

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 | Master | |
| 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.



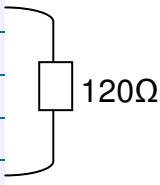
6.4 Connect the CAN Bus to the System

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

6.4.1 Pin Definitions

9Pin CAN DSub

| Pin | Signal | Level and Directions |
|-----|--------|----------------------|
| 1 | NA | NA |
| 2 | CAN | Low Signal |
| 3 | CAN | GND |
| 4 | NA | NA |
| 5 | CAN | 120 Ohm Terminator |
| 6 | CAN | GND |
| 7 | CAN | High Signal |
| 8 | NA | NA |
| 9 | CAN | 120 Ohm Terminator |



Note: Between Pins 5 and 9 is an internal 120 Ohm terminator which can be used to terminate the data links.
(Pin 5 → Pin 2 Pin 9 → Pin 7)

6.5 CAN Driver for Windows XP/2000

The Windows driver can be found on the Product CD:

```
X:\drivers\can\PCI\Peak\Drivers\W2k-XP\PeakOemDrv.exe
```

Or download the latest driver from:

<http://www.peak-system.com/files/pci.zip>

(Downloads / Disk PCAN-PCI Disk incl. PCAN-Light Windows® driver and PCAN-View)

Execute the PeakOemDrv.exe and follow the instructions of the setup program.

6.6 CAN Driver for LINUX

The LINUX driver can be found on the Product CD:

```
X:\drivers\can\PCI\Peak\Drivers\Linux:
peak-linux-driver.3.28.tar.gz
peak-linux-driver-20060302-3.28.src.rpm
```

6.7 CAN Software

The software tools on the Product CD:

X:\drivers\can\PCI\Peak\Tools...

6.8 PCAN-View for Windows 2000 / XP

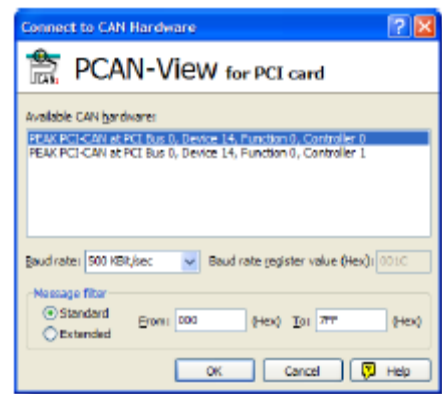
X:\drivers\can\PCI\Peak\Tools\PCAN-View\PcanViewPci.exe

PCAN-View for Windows is a simple CAN monitor.

After installing the PcanViewPci.exe, in the Start menu of the Windows desktop find the entry "PCAN Hardware" and from there execute the program PCAN-View. A dialog for the selection of the CAN hardware, as well as the setting of the CAN parameters, appears after the program start.

From the list "Available CAN hardware" select the CAN channel to be used (with dual-channel version only). As a rule you can use the (remaining) preset values and confirm the dialog box directly.

If you need further help after the program start, use the online help provided with the program (key **F1**).



6.9 Linking Own Programs with PCAN-Light

X:\drivers\can\PCI\Peak\Tools\PcanLightSmasher.exe

On the supplied CD-ROM are files provided for software development (x:\drivers\can\PCI\Peak\Develop\Windows). They can be accessed with the navigation program (Programming button).

The files are used exclusively to link one's own programs to the hardware by PEAK-System with the help of the installed device driver under Windows.

Furthermore, the CD-ROM contains header files and examples for creating one's own applications in conjunction with the Light drivers. Please read the detailed documentation of the interface (API) in each header file.

Note: You can find further information in the file PCANLight_enu.chm (Windows Help file) on the CD-ROM.

Notes about the License

Device drivers, the interface DLL and further files needed for linking are the property of PEAK-System Technik GmbH (PEAK-System) and may only be used in connection with this hardware component purchased from Kontron Compact Computers AG or one of its partners. KCC has a valid license agreement with PEAK-System.

If a CAN hardware component of third party suppliers should be compatible with one from KCC, it is forbidden to use or to pass on the driver software of PEAK-System.

PEAK-System and Kontron Compact Computers AG assume no liability and no support for the PCAN-Light driver software and the necessary interface files. If third party suppliers develop software based on the PCAN Light driver and problems occur during use of this software, please consult the software provider. To obtain development support, you need to own a PCAN Developer or PCAN Evaluation version.

6.10 Miscellaneous Tools

More tools can be found on the Product CD:

\drivers\can\PCI\Peak\Tools\PCAN-LIN\PCANLINConfig.EXE

\drivers\can\PCI\Peak\Tools\PCAN-MicroMod

\drivers\can\PCI\Peak\Tools\PCAN-SysInfo\PcanSysInfo.exe

\drivers\can\PCI\Peak\Tools\BRCAN.exe

\drivers\can\PCI\Peak\Tools\PcanLightSmasher.exe

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      CPUDIV: 15 GLDIV: 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.

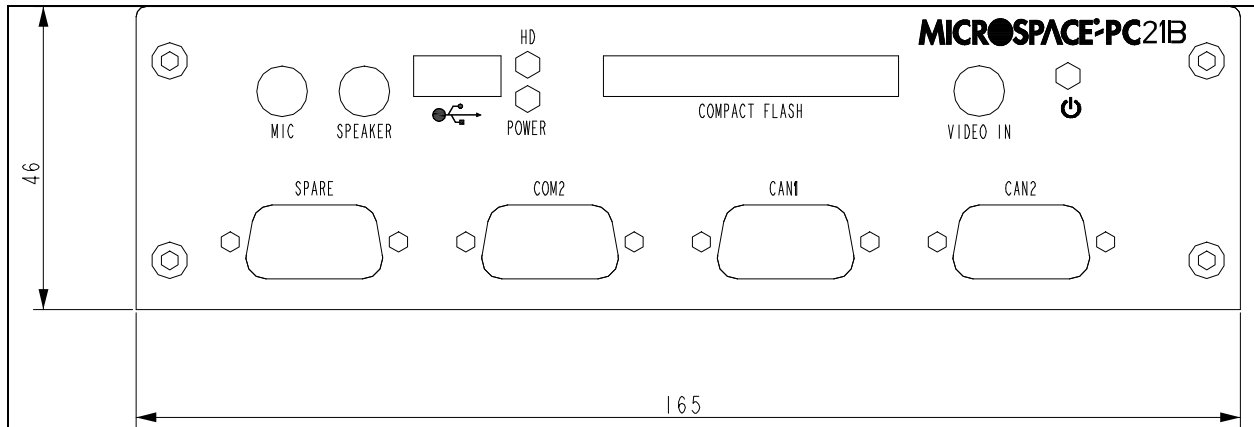
7.3.3 ELinOS Demo

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

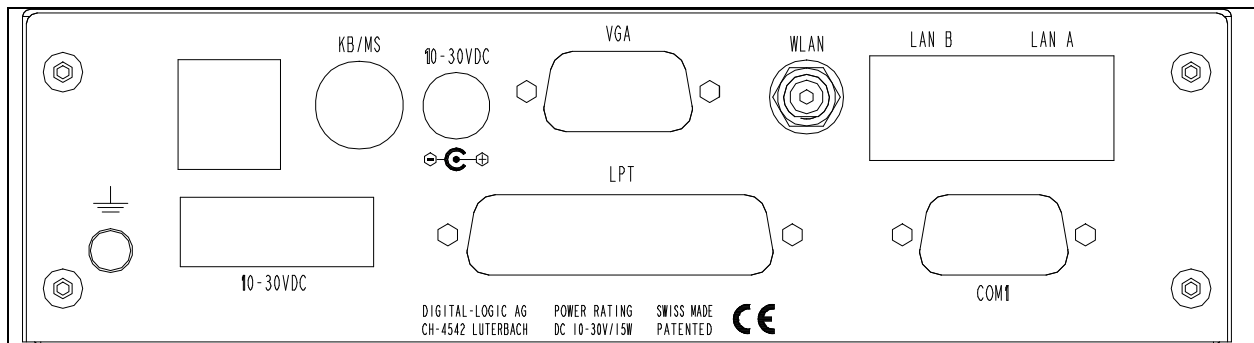
8.1 Front View

MPC21B (Version 1.0)

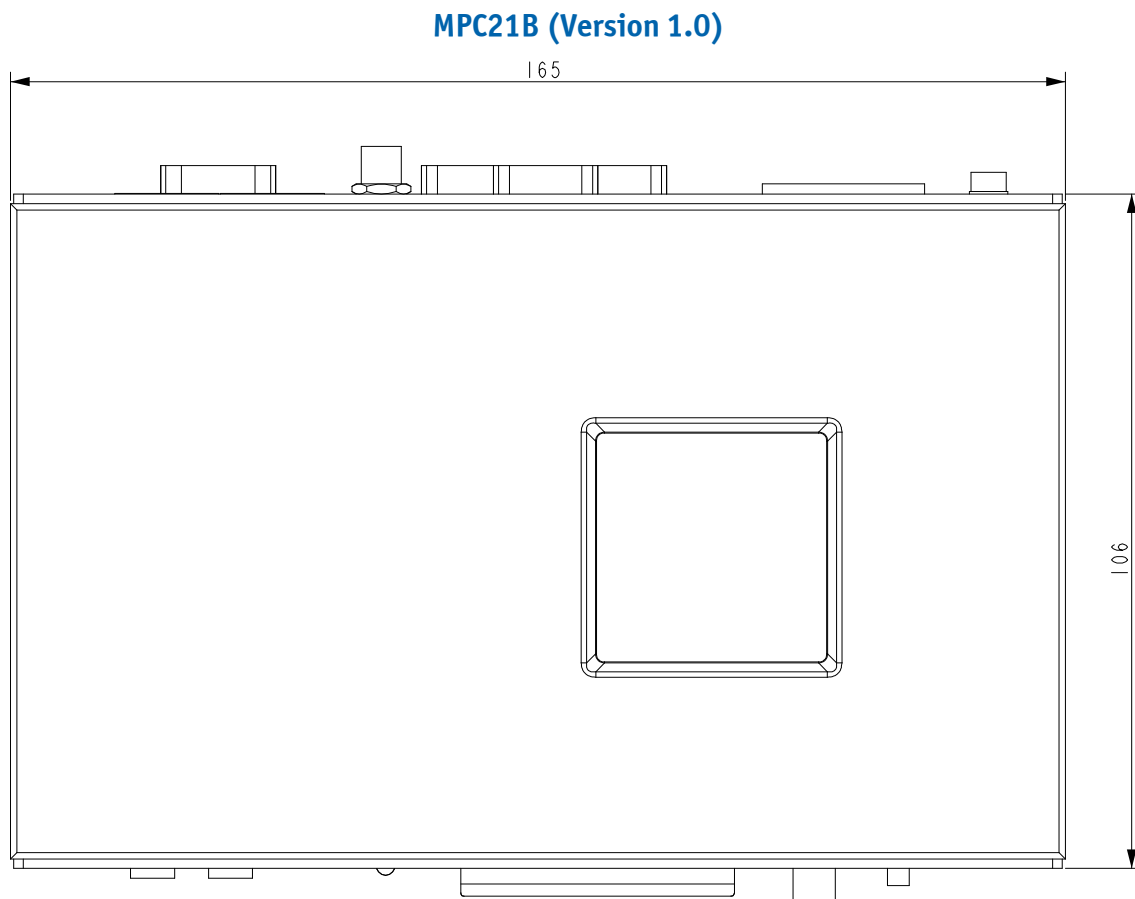


8.2 Rear View

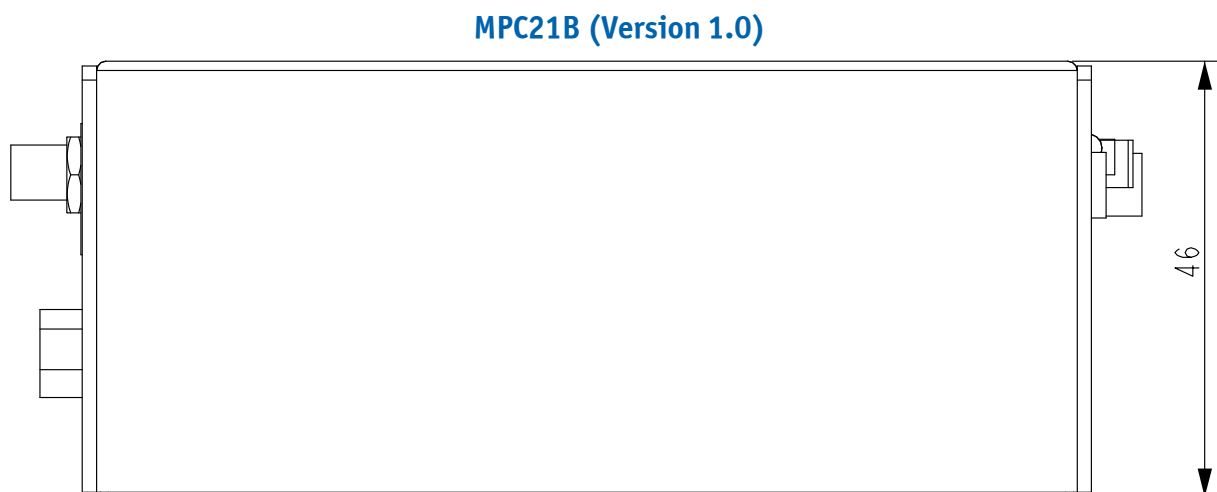
MPC21B (Version 1.0)



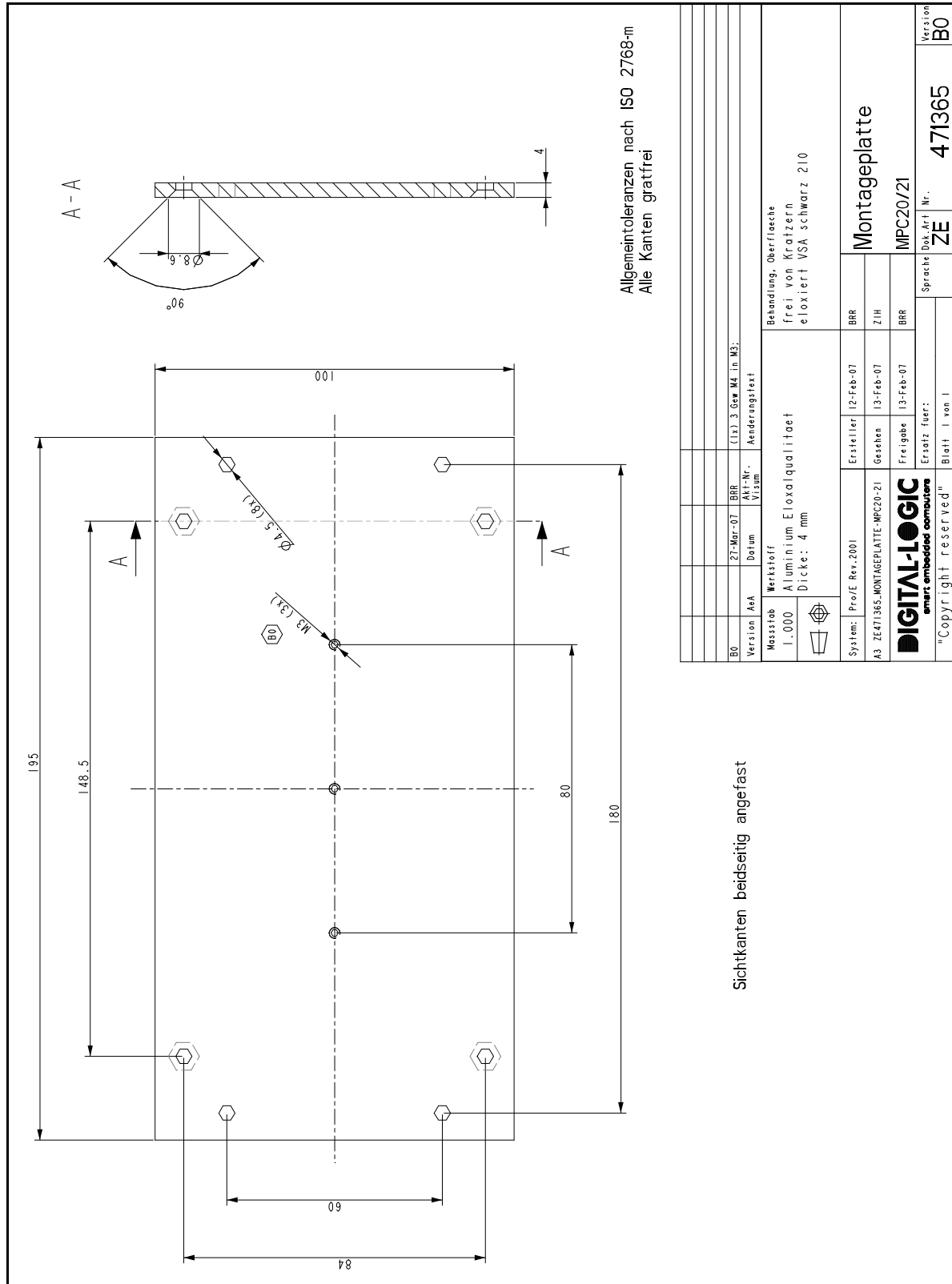
8.3 Top Views



8.4 Side View

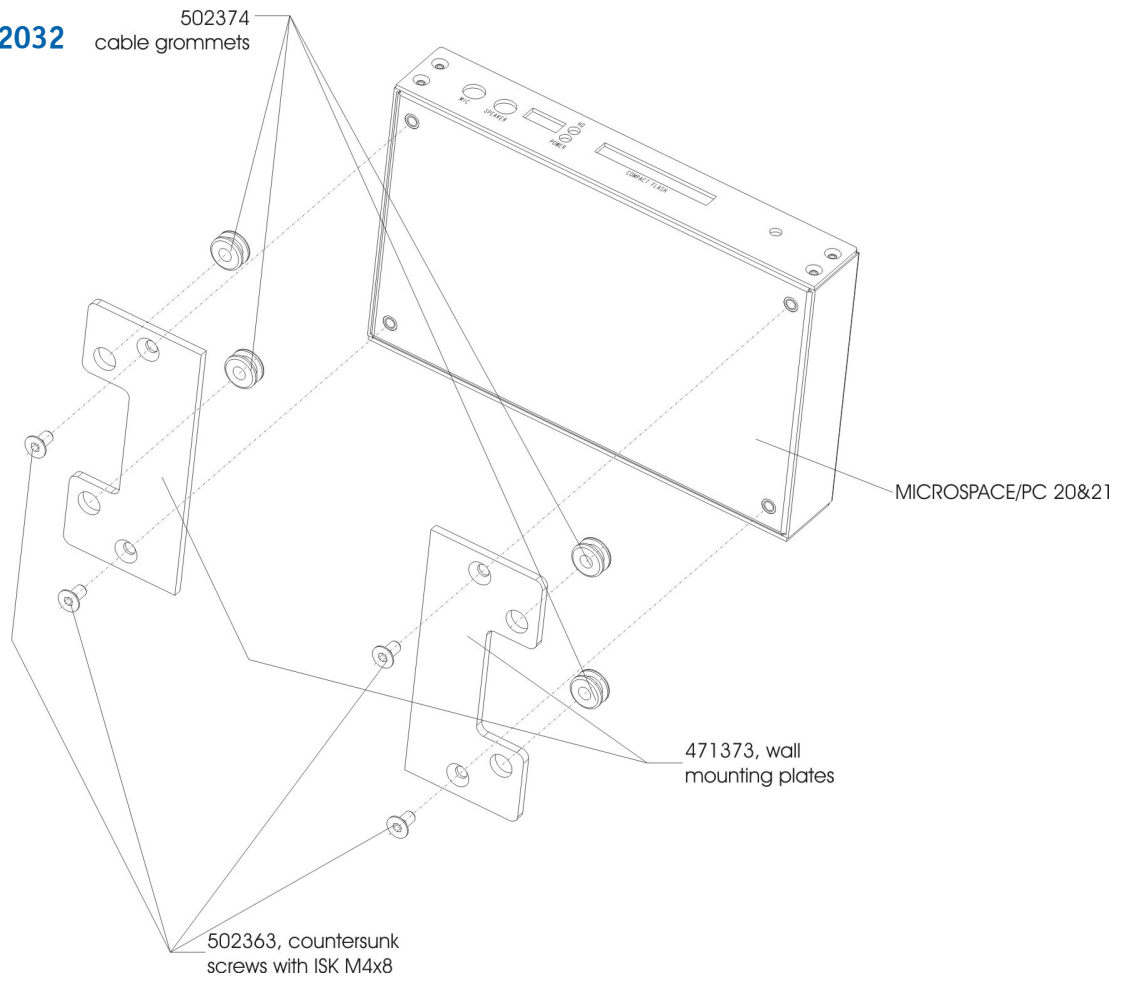


8.6 Mounting Plate

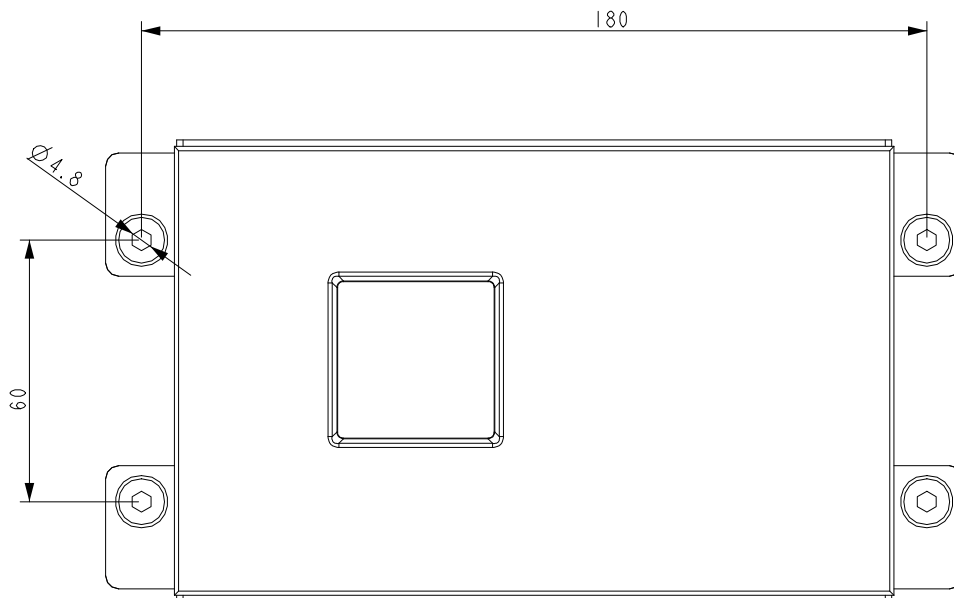


8.7 Wall Mounting Kit

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>SelfTest BIOS Extension Ultra-X included. Enter with < ALT - D > during the boot up.</p> <hr/> <p>ATTENTION: Since BIOS version V1.24, the BIOS size is 512kB instead of 256kB. To download the BIOS, use one of the following commands:</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.

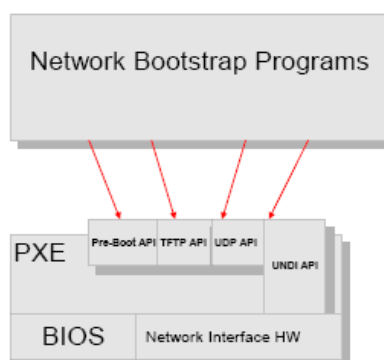
PXE redirection servers (Proxy DHCP servers) are added to the existing network environment. They respond only to PXE-enabled clients, and provide only redirection to Boot Servers. Each PXE Boot Server must have one or more executables appropriate to the clients that it serves.

Preboot Execution Environment (PXE) Specification 11

Version 2.1 September 20, 1999

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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

PXE Boot from LAN, BootManager License Agreement

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10 Appendix A: Document Revision History

| Revision | Date | Edited by | Changes |
|----------|-------------|-----------|---|
| 100 | 13.Dec.2011 | WAS | Converted to Kontron CI from DLAG V2.0. |

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Corporate Offices

Europe, Middle East & Africa

Kontron AG
Oskar-von-Miller-Strasse 1
85386 Eching/Munich
Germany
Tel.: +49 (0)8165/ 77 777
Fax: +49 (0)8165/ 77 219
info@kontron.com

Switzerland

Kontron Compact Computers AG
Nordstrasse 11/F
CH – 4542 Luterbach
Switzerland
Tel.: +41 (0)32 681 58 00
Fax: +41 (0)32 681 58 01
infokcc@kontron.com

