CentiPad Break Out Board Documentation

For CentiPad205 und CentiBOB202

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Notes:

List of changes:
- 070522 first English draft

Inhaltsverzeichnis

1 Introduction

1.1 Preface to the English version

This document is a draft translation of the central chapters of the "CentiPad BOB documentation". It should guide the user through system setup and initial development. Chapter in orange writing will be translated when required and time permits.

1.2 Focus

CentiPad is a most compact universal Embedded Linux System. Unlike so called CPU modules it allready contains buffer circuitry for several industrial standard interfaces. The CentiPad beak-out-board – short CentiBOB – is the ideal means to get familiar with CentiPad.
This script shall give a functional overview and guideline for application in different hardware environments.
Please familiarize yourself with this document, as a result it will speed up your follow up work.

1.3 additional documentation

- CentiPad Hardware Documentation
- CentiPad Breakout Board Documentation with Quickstart Guide
- CentiPad Breakout Board Schematic
- CentiPad Programming Model
- CentiPad Application Handbook
- The latest documentation is available at www.centipad.com

1.4 Safety guidelines

For your own safety and correct operation please follow all of these safety guidelines.
Warranty will be void for damage resulting from disregarding this manual.
No responsibility will be taken by the manufacturer for secondary damages!
No responsibility will be taken for material or personal damage resulting from disregarding this manual.

Only use in dry environment with no flammable gases.

When changing the environmental conditions let the equipment acclimate.

Don't modify the device.

Don't operate devices showing visible damage, no response, or after long storage in an unfavorable environment.

Supply sufficient cooling.

Remove power supply before accessing internals of a device.

Handle with care.

Avoid storage or operation in high humidity conditions.

1.5 Life support policy

HAREROD does not authorize or warrant any of its products for use in life support systems, without the specific written consent of Marcus Hasenstab Ingenieurdienstleitungen.
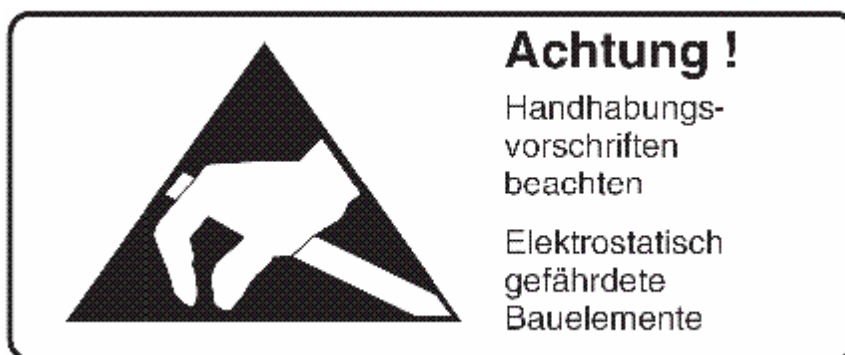
Life support systems are equipment intended to support or sustain life, and whose failure to perform, when properly used in accordance with instructions provided, can be reasonably expected to result in personal injury or death.

1.6   Protection against electrostatic discharge (ESD)

This device contains components sensitive to electrostatic discharge. Even a discharge too small to notice may result in destruction or reduced performance.

Use the following precutions against ESD:
-   use a properly installed anti-ESD-mat
-   wear ESD-bracelets
-   follow ESD grounding techniques
-   leave the device in its ESD-shielding package until installation. When outside its shielding lay the device on a grounded surface
-   don't touch components in the device
-   hold PCB at the edges

1.7   operational safety

All devices are submitted to extensive functional tests before leaving the factory. But even with very reliable devices defects are possible.
A defect in the device may result in consequential damages. It's the users responsibility to provide protection accordingly. The manufacturer denies responsibility for an kind of defects.

1.8   Warrenty regulations / product liability

Warranty and product liability claims are void even during the legal warranty period
-   if the device is not operated according to the manuals.
-   If the device is opened
-   If the device is modified
-   If the device is improperly operated

Components which are inherently subject to wear (e.g. batteries, connectors) are exempt from warranty.

1.9   Legend

Verdana Bold	subtitle, highlighted text
`Courier New bold`	command, command result, programm code
`Courier New bold italic`	path or local directory
`Courier New`	captures the readers attention
Under Construction	passage under construction

1.10 Legal stuff

This manual and all its parts are copyright. All rights reserved, especially right of translation, lecture, reproduction or storage on electronic media.

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The right to make technical changes is reserved!

2 Quickstart Guide

To facilitate your entry into the new environment, each CentiPad has a pre-installed Linux. This documentation assumes a „CentiPad pro" on a CentiBOB.
Please set aside some time to read this Quickstart Guide.

2.1 Requirements

The following items are required to startup your CentiPad Development System:
- CentiPad
- CentiBOB
- CentiDev CD

- Ethernet cable
- RS232-Nullmodem-cable
- USB-cable (optional)
- Power supply

- X86 development computer, running Linux or Windows XP and ca. 3GB free hardisk space
- Ethernet interface to connect the Host to CentiPad (via Switch, Hub, Router or direct)

- Free space on your desk
- Some quietude

For your planned configuration please note the chapters „Setup on Linux" or „Setup on Windows" in the „CentiPad Linux Handbook". Both variants essentially use the same development system CentiDev and the same crosscompiler and CentiPad-Linux-Platform. Important differences are in hardware/driver-interfacing, the developemnt workflow and the backup concept.
Even if you're planning development on Windows XP, please read the chapter „devlopment on Linux", since the basic system structure is explained there.

2.2 Connecting

The following cables must be connected to begin the first tests:
- RS232-cable from Debug socket X11 to Host,
- Power supply
- Ethernet-cable (CentiPad and Host must be in the same network segment)

2.3 Host Setup

Install the CentiDev on your selected host-operating system as described in the „CentiPad Linux Handbook".

2.4 Checklist

- Insert CentiPad into the BOB! Check direction and 1 marker!
- Connect power supply
- Start a terminal program on your host system. Please ensure a connection between the debug interface X11 and the selected terminal interface. Set the terminal interface to115200-8-N-1, no Hardware-Handshake.
- Ensure that the power supply is set to 12V. connect the power supply to X4. The green LED3 lights up.

2.5 Switching on

Start CentiPad by pressing S2 shortly (ca.200ms). During this the Power-LED on the CentiPad glows and then lights up on button release (internal reset cycle)

```
Please press Enter to activate this console.


BusyBox v1.1.1 (2006.04.07-07:35+0000) Built-in shell (ash)
Enter 'help' for a list of built-in commands.

 .####.  .####.     CentiPad Embedded Linux Module
 #####' .######.
 ##(    ##'  )##    Development Environment (c) maintech GmbH 2006
 #####. ## .###'
 `####' ## `##'     Support and sources for GPL covered code can be
        ##          obtained on http://www.centipad.com
        `'
root@:/#
```

2.6 How to continue

You've just setup your new CentiPad. The rest of the documentation helps you to get familiar with CentiPad and CentiDev.
The **CentiPad Linux Handbuch** shows the CentiDev installation and development workflow for beginners and advanced users.
The **CentiPad Hardware Documentation** describes the configuration of the CentiPad and provides the basis for customized applications.
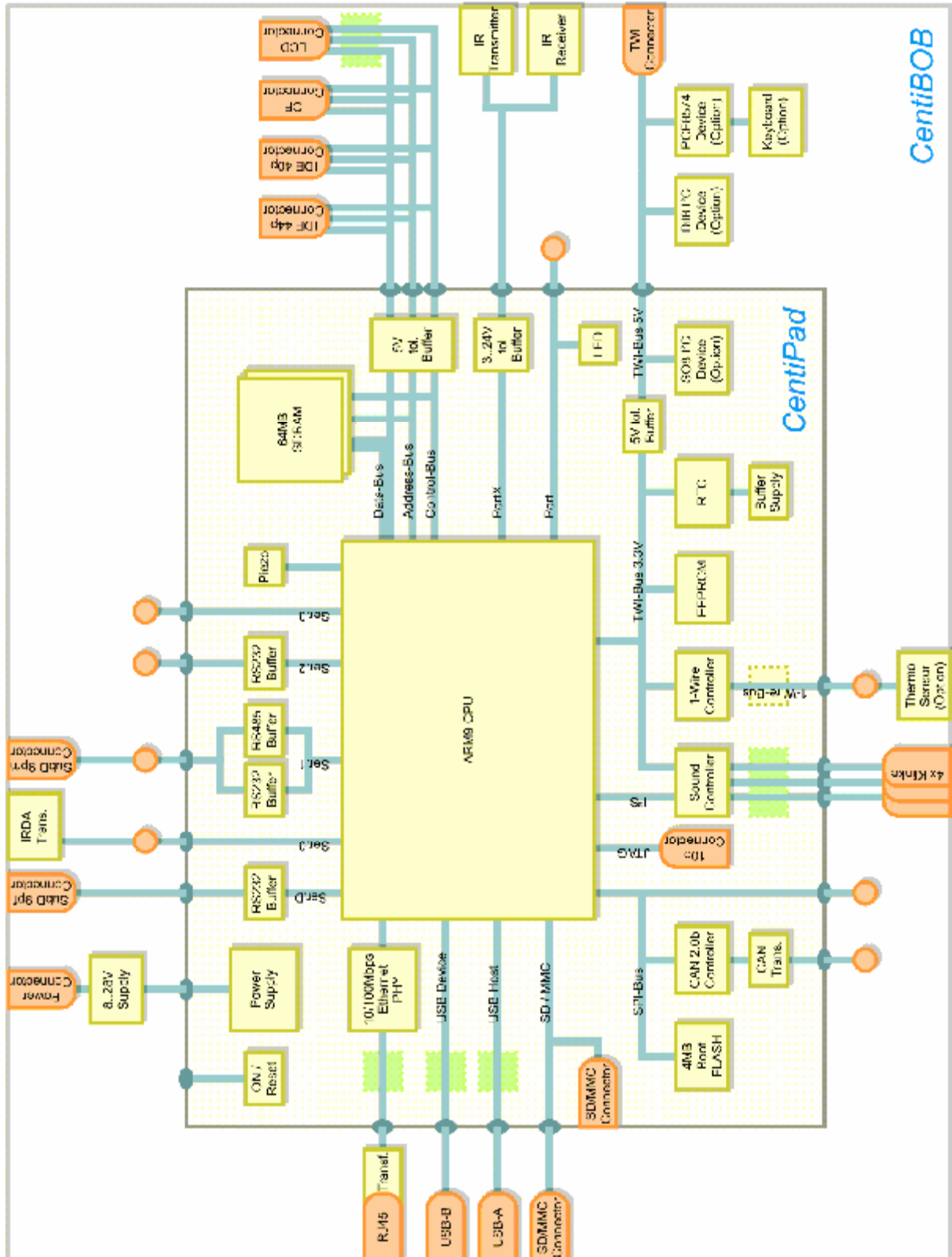**The CentiPad Applications Handbook** shows several application examples for the CentiPad.
The **CentiPad FAQ** is a Questions/Answers collection around the CentiPad.

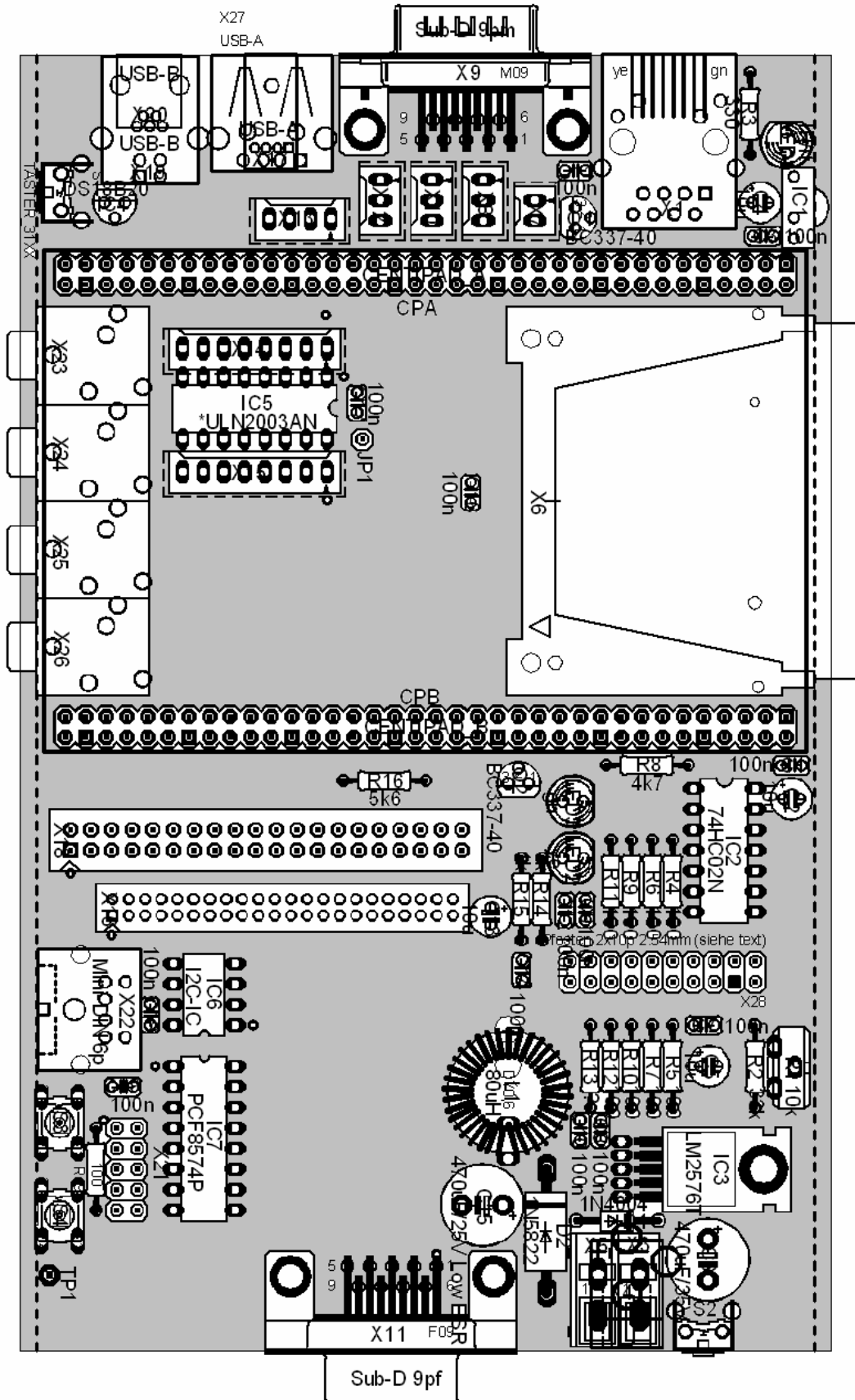**Important:** the standard user on CentiPad is **root**, the password is **admin**.
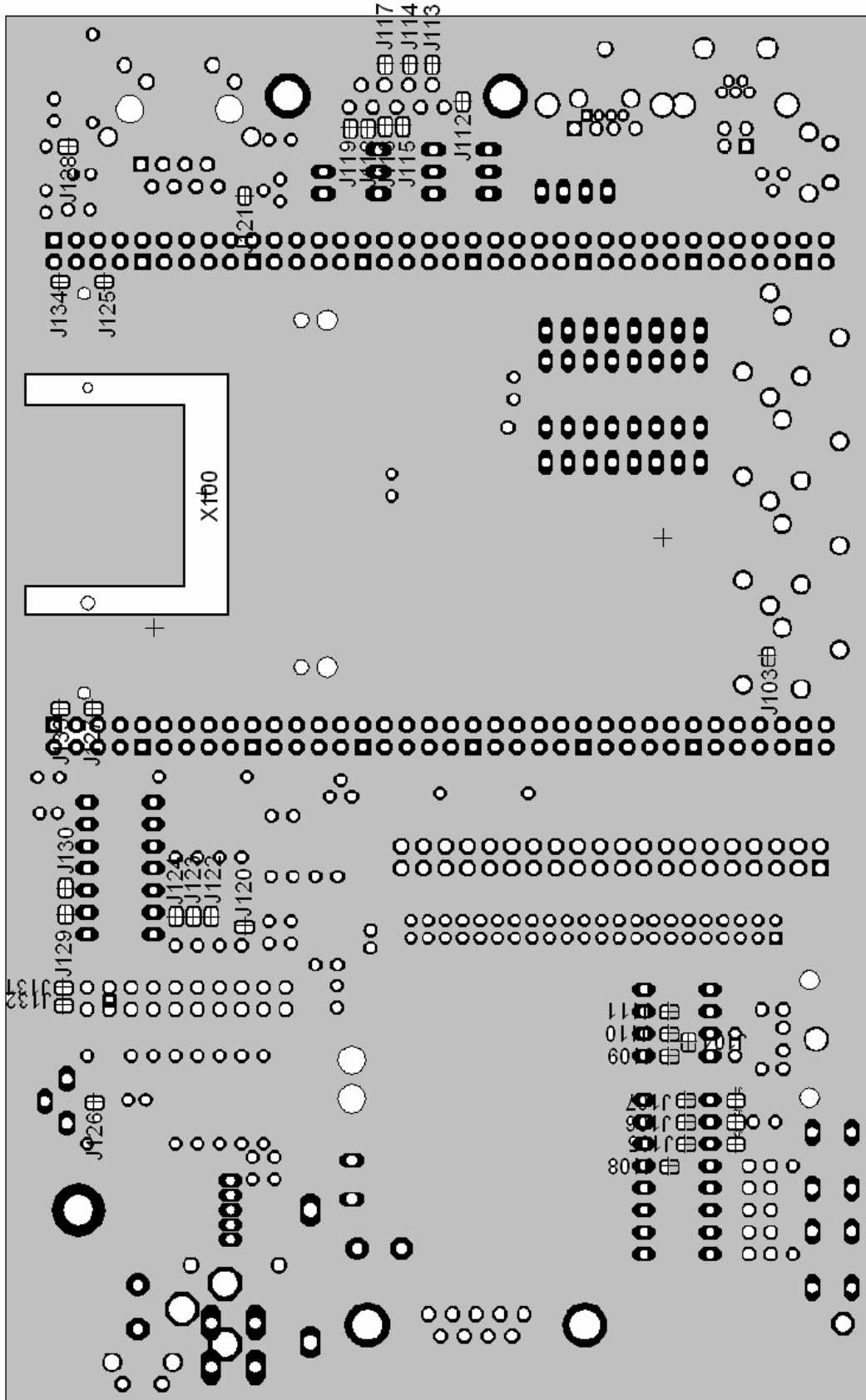
3 hardware configuration

3.1 Block diagram

3.2 Assembly diagram CentiPad on CentiBOB

3.3 Assembly diagram CentiBOB top

3.4 Assembly diagram CentiBOB bottom

3.5 Solder jumpers

board revision CentiBOB202:

Name	Standard	Description
J119,J116	closed	connects Ser2 RXD/TXD to X9
J118,J115	-	connects Ser1 RXD/TXD to X9
		Alternativ RS485 TX+/TX-
J114,J117	-	connects Ser1 RTS/CTS to X9
		Alternativ RS485 RX+/RX-
J112	closed	connects X9-5 to GND
J113	-	connects X9-9 to +5V
J100,J101,J102	-	connects TFDX4500 to Ser0
J120	-	LCD backlight cathode to GND
J122,J123,J124	J123	LCD_E1 Decoder
J129,J130	J130	LCD_E2 Decoder
J132	closed	LCD contrast Poti to GND
J131	-	LCD config
J126	closed	LCD contrast
J121	-	connects PX0 to Infrared transmitter LED1
J125	-	PortX 3,3V reference voltage
J127	-	TWI 3,3V reference voltage
J133	-	TWI 5V reference voltage
J128	-	connects PX0 to infrared receiver IC1
J134	-	PortX 5V reference voltage
J104	-	TWI write protect IC6
J108	-	Interrupt IC7 to IRQ0
J109,J110,J111	-	TWI address IC6
J105,J106,J107	-	TWI address IC7

3.5.1 Testpoints

Board revision CentiBOB202:

Name	Name	Description
TP1	GND	power supply ground

3.6 Parts / assembly options

Platinenrevision CentiBOB202:
Während der Entwicklung des CentiBOB wurde eine Vielzahl von möglichen Anwendungen anvisiert. Je nach Bedarf des Anwenders sind verschiedene Bestückungsvarianten denkbar. Dieser Absatz gibt einen Überblick möglicher Varianten:

Name	Standard	Beschreibung
IC1	-	IR receiver diode
IC4	-	1wire temperature sensor
IC5	-	GPIO power driver ULN2003
IC6	-	I^2C-EEPROM
IC7	-	I^2C-Port expander
JP1	-	clock output PCK0
LED1	-	IR transmitter diode
LED2	populated	IDE active LED
LED3	populated	Power Indicator
R1	populated	LCD contrast poti
S1	populated	Reset
S2	populated	On switch
S3	populated	IC7 P6
S4	populated	IC7 P7
X1	populated	RJ45 Ethernet jack
X2	populated	LCD connector
X3	-	additional ground connector
X4	populated	power supply jack
X5	-	alternative supply input
X6	-	Compact Flash connector
X7	populated	1-Wire PSK connector
X8	-	PX0 PSK connector
X9	Ser1	Ser1/Ser2 – RS232 interface jack
X10	-	PX1 PSK connector
X11	populated	SerD – Debug interface jack
X12	-	Ser2 – 2,54mm PSK connectorr
X13	populated	CAN PSK04 connector
X14	-	GPIO0..5 connector
X15	-	GPIO0..5 after ULN2003 connector
X16	populated	ATA 44p, IDE connector 2,00mm
X17	populated	USB host jack
X18	populated	ATA 40p, IDE connector 2,54mm
X19	populated	USB Device jack
X20	-	alternative USB Device connector
X21	-	IC7 keyboard connector
X22	-	I^2C connector
X23	populated	Stereo Headphone Out – jack 3,5mm
X24	populated	Stereo Line Out – jack 3,5mm
X25	populated	Stereo Line In – jack 3,5mm
X26	populated	Microphone In – jack 3,5mm
X100	-	alternative/additional SD/MMC Card connector
X101	-	alternative LCD connector

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4 Errata

- CF-Devices: currently only Memory Devices are supported by the CF-Connector. So called CF+ Devices need additional decoder/driver logic
- Address selction of I2C-Devices
  - Two different variations of the PCF8574 are available. Only one type has internal pullups
  - I^2C-EEPROM: same issue as above
  - Use J1,2,3 and J105,106,107

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