# OpenRISC Alena
## Hardware Manual
### Edition: August 2008

The software described in this manual is furnished under a license agreement and may be used only in accordance with the terms of that agreement.

## Copyright Notice

## Trademarks

VScom is a trademark of Vision Systems GmbH. All other trademarks and brands are property of their rightful owners.

## Disclaimer

Vision Systems reserves the right to make changes and improvements to its product without providing notice.

Vision Systems provides this document "as is," without warranty of any kind, either expressed or implied, including, but not limited to, its particular purpose. Vision Systems reserves the right to make improvements and/or changes to this manual, or to the products and/or the programs described in this manual, at any time.

Information provided in this manual is intended to be accurate and reliable. However, Vision Systems assumes no responsibility for its use, or for any infringements on the rights of third parties that may result from its use.

This product might include unintentional technical or typographical errors. Changes are periodically made to the information herein to correct such errors, and these changes are incorporated into new editions of the publication.

# Contents

## List of Figures

## List of Tables

# 1 Overview

The OpenRISC Alena is an ARM9-based RISC industrial embedded computer. The great variety of interfaces like LAN, CAN, CF, USB, I²C, serial interface and digital I/O makes it easy to connect various industrial devices to the OpenRISC Alena.

Compact dimensions and DIN Rail mounting capability make the OpenRISC Alena to a space saving and flexible mounting industrial computer. It is feasible to be installed even in space limited environments.

Due to RISC based architecture the OpenRISC Alena has very small power consumption (6,5 Watt), so fanless heat dissipation is possible. Working in an extended temperature range from -10°C up to 65°C the OpenRISC Alena can be used under harsh industrial conditions. Therefore the OpenRISC Alena is downright designed for industrial automation.

## 1.1 Product Features

- ARM9 32-bit RISC CPU, 166MHz
- 64MB SDRAM on board
- 4MB Flash on board
- 2 x RS232/RS422/RS485 serial ports
- 2 x RS232 serial ports
- 1 x CAN port
- 4 independent digital I/O channels
- 2 optically isolated digital input channels
- 2 relays
- 1 x CF-Slot in True IDE mode (accepts MicroDrives)
- 1 x microSD-Slot
- 2 x USB 2.0 as Host
- MiniPCI-slot for expansion with WLAN, GPS etc.
- 2 x Ethernet interfaces for redundant networking or routing functions
- I²C bus with max. 330kHz clock
- RTC
- Ready-to-Run Debian Linux for ARM operating system
- DIN-Rail and wall-mount installation
- Robust, fanless design
- Wide temperature range -10 to 65°C
- Buzzer, Watch Dog Timer

## 1.2  Hardware Specifications

### 1.2.1  System

| | OpenRISC Alekto |
|---|---|
| CPU | ARM9 32-bit RISC CPU, 166MHz |
| RAM | 64MB SDRAM |
| Flash | 4MB |
| CF-Slot | True IDE mode (accepts MicroDrives) |
| microSD-Slot | 1 x internal |
| USB | 2 x 2.0 as Host |
| LAN | 10baseT/100baseTX Autodetect and Auto-MDI(X) |
| Serial Ports | 2 x RS232/RS422/RS485 up to 3.6Mbps |
| | 2 x RS232 up to 921,6Kbps |
| CAN ports | 1 x SJA1000 up to 1Mbps |
| Digital I/O | 4 x input/output signals (32 mA max.) |
| | 2 x optically isolated input channels |
| | 2 x relays |
| Console Port | RS232, up to 115200bps |
| I²C | max. 330kHz |
| RTC | yes |
| Buzzer | yes |
| Watch Dog Timer | yes |
| MiniPCI-Slot | yes |
| Reset Button | HW Reset, long hold to access BIOS via Telnet |
| Power Input | 9-30V DC |
| Power Consumption | max. 1.5A @ 12V |
| Dimensions (W x L x H) | 157 x 106 x 53 mm |
| | 157 x 112 x 53 mm with DB9 connector |

Table 1: Product Hardware Specifications

### 1.2.2  Serial Ports

Two serial ports are provided in RS232/422/485 modes that can be switched by software. For the detailed information about the supported modes refer to the Table 2.

|  | **RS232** | **RS422** | **RS485** |
|---|---|---|---|
| Modes | full duplex | full duplex | 2-wire: half duplex, with echo<br>2-wire: half duplex, without echo<br>4-wire: full duplex |
| Signals | TxD, RxD, RTS, CTS, DTR, DSR, DCD, RI, GND | Tx+/-, Rx+/-, GND | 2-wire: Data+/-, GND<br>4-wire: Tx+/-, Rx+/-, GND |
| Data Direction Control |  |  | by ART (Automatic Receive Transmit control) or by RTS |
| Speed | up to 921.6 Kbps | up to 3.6 Mbps | up to 3.6 Mbps |

Table 2: Serial Interface Specifications

### 1.2.3 Digital I/O

Four input/output signals at TTL level are provided. The signal direction is individually configurable. Each signal carries up to 32mA in both directions. For input mode the change of at least one input signal generates an interrupt.

## 2 Position of Connectors and Functions

### 2.1 LEDs

| **Name** | **Color** | **Description** |
|---|---|---|
| POWER | Red | Power is on |
| WLAN | Blue | WLAN card has a connection to AP |
| IDE | Yellow | CF is in use |
| USER | Green | Customizable |
| LAN1, LAN2 | Yellow<br>Green | Ethernet connection established, blinks with traffic<br>On if 100 Mbps link |
| TxD1, TxD2, TxD3 | Green | Transmit traffic |
| RxD1, RxD2, RxD3 | Yellow | Receive traffic |
| Data | Green | CAN traffic (shared with TxD4) |
| Error | Yellow | CAN errors (shared with RxD4) |

Table 3: LED Indicators

### 2.2 Reset Button

With Reset button you can restart the OpenRISC Alena without removing the power. It can be also used to get in BIOS via Telnet (see Table 1). For further information refer to the "OpenRISC User Manual" section "BIOS". The Reset button should be used only in situations, where reboot command is not available, to avoid filesystem integrity errors.
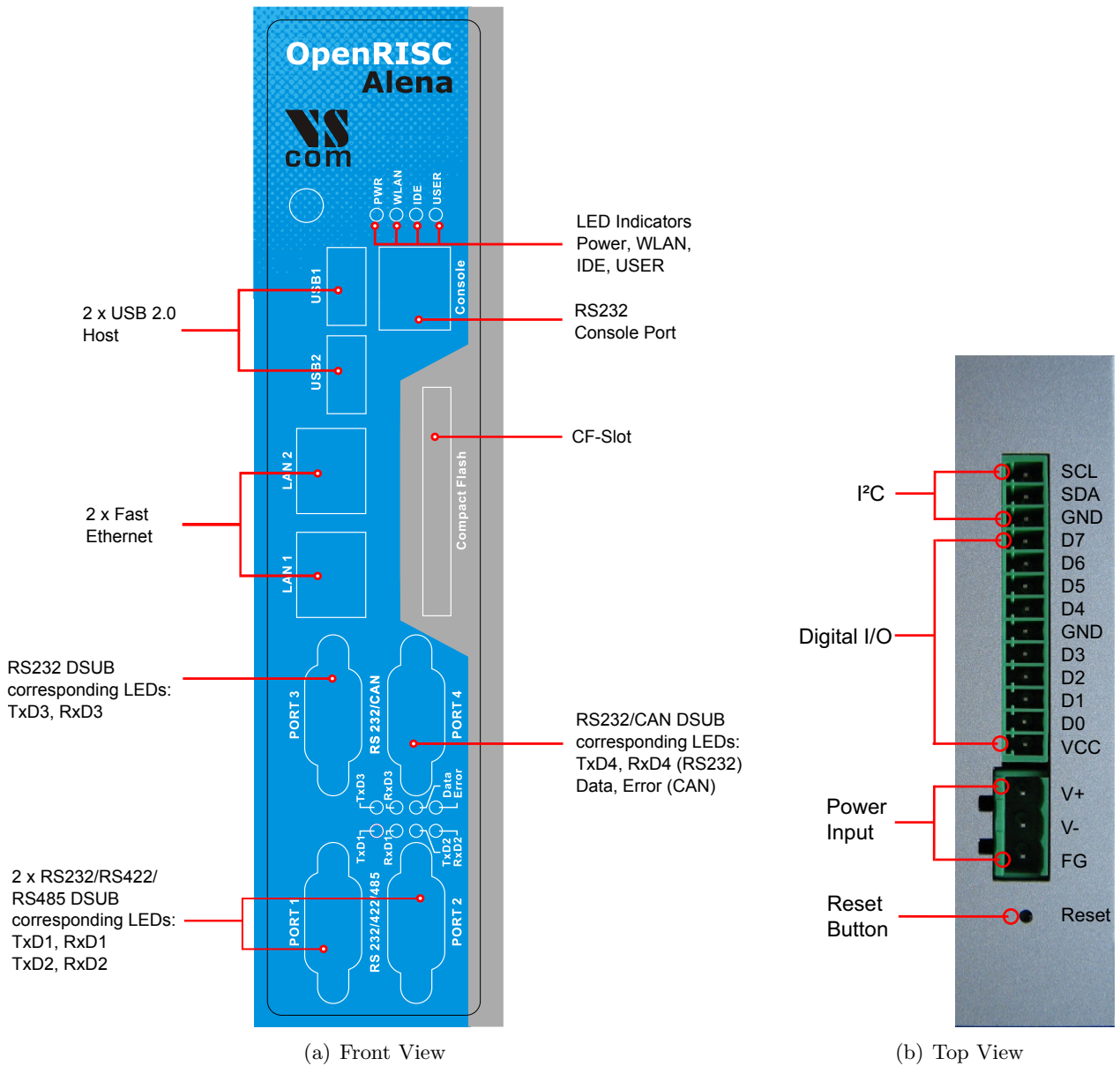
(a) Front View

(b) Top View

Figure 1: Appearance

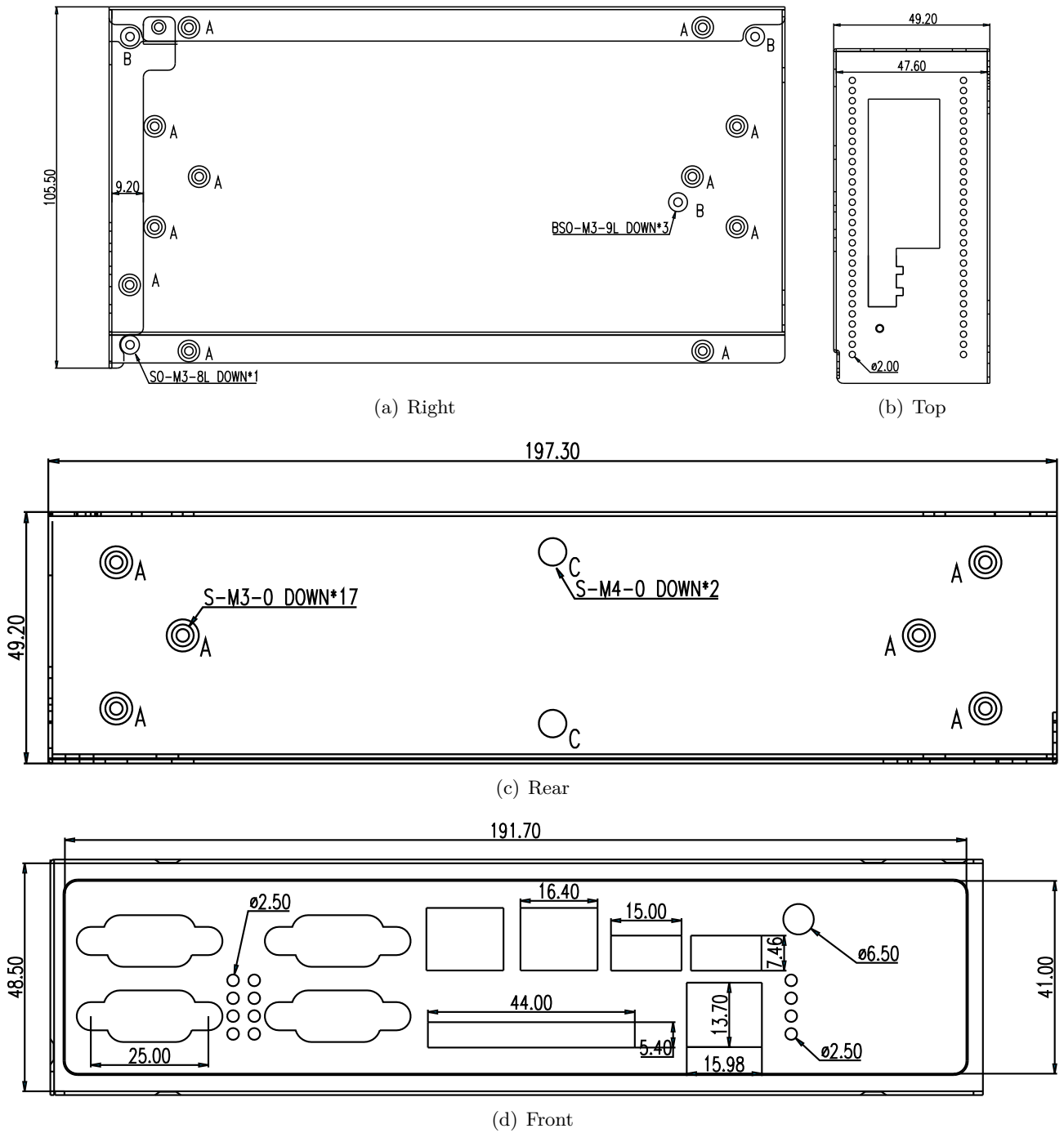# 3 Dimensions


(a) Right


(b) Top


(c) Rear


(d) Front

Figure 2: Case

# 4 Connectors

## 4.1 Power

The OpenRISC Alena device is powered by a single power supply in a wide range from 9V DC to 30V DC. A suitable power supply adapter is part of the packaging list. Connect the cable to the power jack at the top side of OpenRISC Alena, and put the adapter into the socket. The Power LED (red) on OpenRISC Alena will light. You can connect a power supply of your choice, providing the technical requirements are met.

> **Warning:** disconnect the OpenRISC Alena before performing installation or wiring. The wire size must follow the maximum current specifications. The maximum possible current in the power wires as well as in the common wires must be taken under consideration. If the current rises above the maximum ratings, the wiring can overheat, causing serious damage to your equipment. When powered, the OpenRISC Alena's internal components generate heat, and consequently the outer case may feel warm to the touch.

## 4.2 Grounding

Grounding and wire routing help limit the effects of noise due to electromagnetic interference (EMI). Run the ground connection from the ground screw to the grounding surface prior to connecting devices.

## 4.3 LAN

The connectors for Ethernet are the usual RJ45. Simply connect them to your switch or hub. When the connect is done the Link LED on RJ45 (yellow) will light. When data traffic occurs on the network, this LED will blink. It depends on your network whether a 100Mbit or a 10Mbit connect will be established. A 100Mbit net causes the Speed LED on RJ45 (green) to light, otherwise it will remain dark. Both Ethernet interfaces support Auto-MDI(X) feature.

## 4.4 Serial

The OpenRISC Alena has four DSUB 9 male connectors. All three modes of operating RS232, RS422 or RS485 are entirely configured by software. For the pinout refer to the Table 4.

Please note the function of the GND signal in RS422 and RS485 modes: this signal must also be connected between the serial devices. So in reality a 2-wire and a 4-wire connection need 3 wire and 5 wire respectively. With the exception of very special configurations, a serial connection in RS422/RS485 mode without GND connection violates the specifications for RS422 and RS485 standards.

## 4.5 CAN

The OpenRISC Alena provides one CAN interface with a DSUB 9 male connector (PORT4) that is shared with the fourth serial port (see Table 4 for pinout). The physical drivers will be switched between CAN and RS232 per software.

| Pin | RS232 | RS422 | RS485 2wire | CAN |
|-----|-------|-------|-------------|------|
| 1 | DCD | Tx- (A) | Data- (A) | |
| 2 | RxD | Tx+ (B) | Data+ (B) | CANL |
| 3 | TxD | Rx+ (B) | | GND |
| 4 | DTR | Rx- (A) | | |
| 5 | GND | GND | GND | |
| 6 | DSR | | | |
| 7 | RTS | | | CANH |
| 8 | CTS | | | |
| 9 | RI | | | |

Table 4: DSUB Pinout

## 4.6  Console Port

The console port (RS232) has an RJ45 connector. An adapter cable to DB9 male is provided. The pinout of the DB9 male connector is the same as PORT1-4 in RS232 mode, without signal RI.

## 4.7  CF-Slot

The CF-slot supports True IDE mode for storage expansion. The memory size of the CF-Card is not limited. For use with the prepared Debian Linux image it is recommended to use at least 1GB CompactFlash. MicroDrives can be also used.

## 4.8  microSD-Slot

The OpenRISC Alena provides one microSD-Slot inside the case so it is not accessible from outside. This slot can be used in the same way as CF-Slot to store the system or it can be used as extra storage device.

## 4.9  USB

The OpenRISC Alena provides two USB 2.0 Host interfaces. They can be used for Mass Storage Devices, like Flash- or Hard Drive, Bluetooth and WLAN adapters etc.

## 4.10  Digital I/O

The OpenRISC Alena provides 4 digital input/output channels, 2 optically isolated digital input channels and 2 relays. The data direction for each I/O channel can be independently set to input or output. An interrupt for an input channel can also be independently enabled to detect signal level changes. The physical driver operates with 32mA for both high and low level.

## 4.11  I²C

The I²C interface operates at the maximum frequency of 330 KHz. The connector for I²C is located on the terminal digital I/O block and has three pins: SCL, SDA and GND. When required the I²C device can be powered with the VCC output of the digital I/O terminal block.

# 5 Product Support Information

The following services are provided on www.vscom.de and www.visionsystems.de for the customers to support our products:

- driver updates

- product information

- user's manual updates

For special technical support issues please use service@visionsystems.de.