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# OnRISC Baltos iR 2110 Hardware Manual

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## 1. Overview

The OnRISC Baltos iR 2110 is a RISC industrial embedded computer, based on the TISitara AM3352 ARM Cortex-A8 processor and System-On-Chip. As a companion to Baltos iR 5221 and Baltos iR 3220 it is tailored for small size, and thus provides the interfaces like LAN (optional WLAN), USB and serial interface. The size and low power demand makes it easy to install Baltos iR 2110 in many industrial applications. Linux operating system is provided, it can boot from a microSD-Card, or from internal Flash Memory.

Very compact dimensions and DIN Rail mounting capability make the Baltos to a space saving and flexible mounting industrial computer. It is feasible to be installed even in space limited environments. Direct Wall mounting is an option as well.

With RISC based architecture the Baltos has 2.5 Watt min. power consumption, and needs no fans. Working in the temperature range from -20°C up to 75°C the Baltos can be used under harsh industrial conditions. Therefore the Baltos is downright designed for industrial automation.

This manual covers Baltos iR 2110, there is a separate manual for Baltos iR 5221 and Baltos iR 3220.



Figure 1: Baltos iR 2110 on DIN Rail

## 1.1. Product Features

	<b>OnRISC Baltos</b>
CPU	TI Sitara AM3352 ARM Cortex-A8 RISC CPU, 600MHz
RAM	256 MB DDR3 RAM
Flash	256 MB NAND Flash for boot Linux OS
SD-Slot	1 x external, size microSD
USB	1 x 2.0 High Speed as Host
LAN	1 x 10/100 Fast Ethernet
WAN	1 x 10/100/1000 Gigabit Ethernet
WLAN	optional, IEEE 802.11b/g/n
Serial Ports	1 x RS232/RS422/RS485 up to 3.7Mbps
Console Port	TTL internal, up to 115200bps adapter to USB available
RTC	yes
Watch Dog Timer	yes
Reset Button	HW Reset
Power Input	9-54V DC
Power Consumption	0.2A @ 12V min.
Dimensions (W x L x H)	115 x 73 x 25 mm
Antenna	The case provides two positions for an antenna socket

Table 1: Product Hardware Specifications

### 1.1.1. Ethernet

Two independent ports for Ethernet are available in Baltos, with separate MAC Addresses. One port is implemented as GigaLAN for 10/100/1000 Mbit/s, the other provides Fast Ethernet function 10/100 Mbit/s.

### 1.1.2. USB

One USB Host port for USB 2.0 High Speed allows to connect any devices. Support for certain WLAN and 3G/4G adapters is available.

### 1.1.3. WLAN

The OnRISC Baltos is available with an optional built-in WLAN function as of IEEE 802.11b/g/n for wireless connection. An external adapter for the USB port is available as well.

### 1.1.4. Serial Port

One serial port is provided in RS232/422/485 modes that is configured 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, without echo 4-wire: full duplex
Signals	TxD, RxD, RTS, CTS, DTR, DSR, DCD, RI, GND	Tx+/-, Rx+/-, GND	2-wire: Data+/-, GND 4-wire: Tx+/-, Rx+/-, GND
Data Direction			by driver, via RTS
Speed	up to 921.6 / 1000 kbps	up to 3.7 Mbps	up to 3.7 Mbps

Table 2: Serial Interface Specifications

## 2. Appearance

### 2.1. Baltos iR 2110 Front and Rear



(a) Front View



(b) Rear View

Figure 2: Appearance Baltos iR 2110

The front side has the Gigabit WAN port and USB. Then there is the serial port and the Fast Ethernet LAN port. Small on the lower right is the slot for a microSD card.

The rear side provides the socket for the terminal block power connector. On this side also a DIN Rail clamp may be mounted. The DIP switches define the operation mode of the serial port. There is a possible location for a WLAN antenna. The Reset button is pushed by a small prick.

## 2.2. Mechanics for Mounting

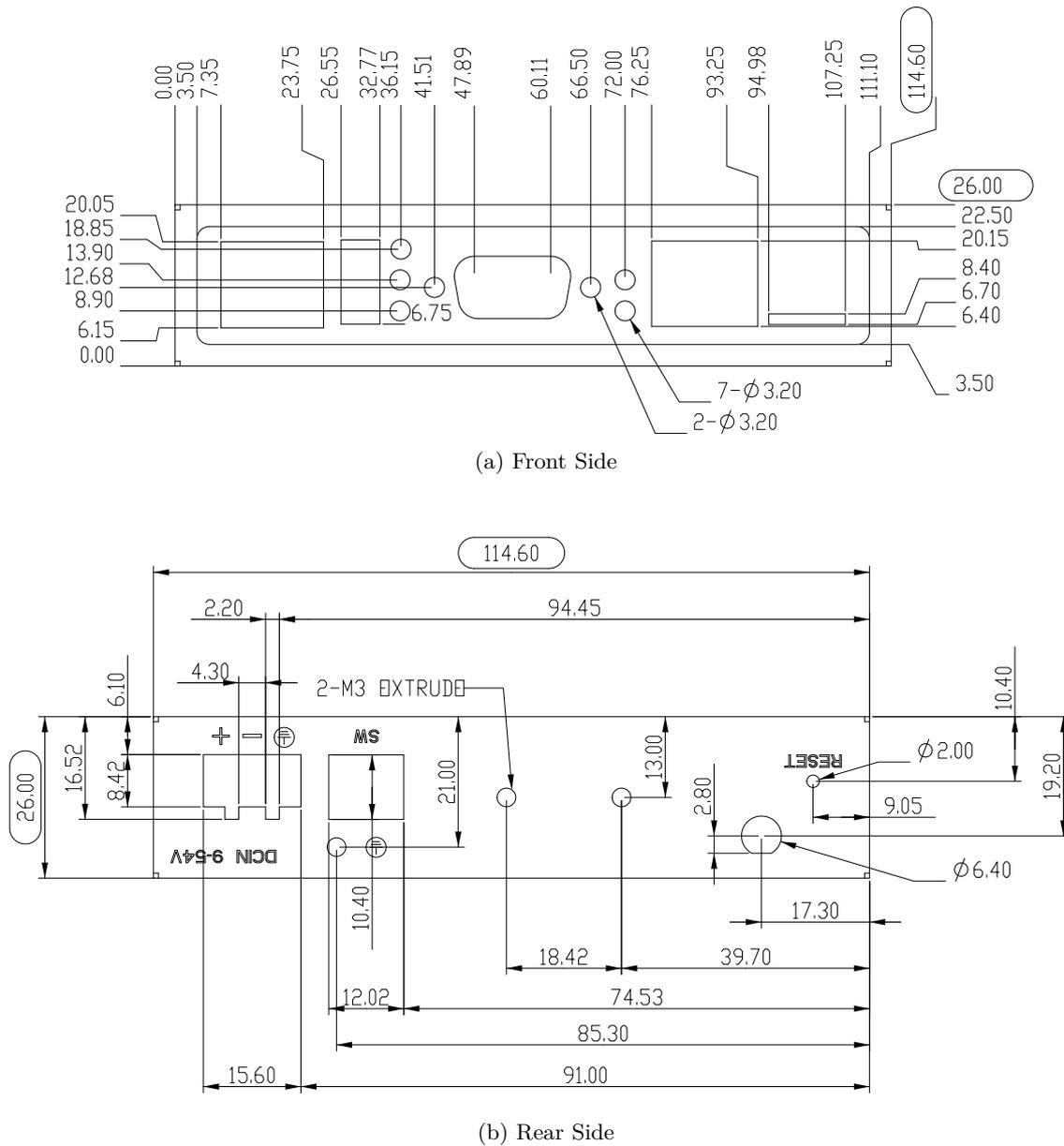


Figure 3: Mounting Positions Baltos iR 2110

Figure 3a is a reference for the positions of front side connectors. It is for demonstration only.

Figure 3b shows the positions of screws for fixing. Note, this is upside down with respect to the front side. The two M3 screw positions in the middle allow to fix an DIN Rail clamp. There is also the position of a possible antenna socket near the Reset button.

## 3. Position of Connectors and Functions

### 3.1. Power

The OnRISC Baltos device is powered by a single power supply in a wide range from 9 V to 54 V DC. The socket for a terminal block clamp is on the rear side. A suitable power supply adapter is available as an add-on component, and part of the Starter Kit package. Connect the cable to the power jack, and plug the adapter into the socket. The Power LED (red) on Baltos will light. You can connect a power supply of your choice, providing the technical requirements are met.

**Warning:** disconnect the Baltos from power supply 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 Baltos internal components generate heat, and consequently the outer case may feel warm to the touch.

#### 3.1.1. Connection and Polarity

Power is connected via three clamps on a terminal block, located on the rear side of Baltos.

Clamp	3	2	1
Function	PE	V-	V+

Table 3: Power Connector

V+ and V- are clamps for DC voltage supply. PE is the clamp to connect the case and shields of connection cables to Protective Earth. PE is internally connected to logic ground, which is on the level of V-supply line.



Figure 4: Power Connector

**Attention:** Never connect the Terminal block for power supply in reversed direction, i.e. turned by 180°. This would connect the power between V- (logic ground) and case/protective ground. High current is the result, causing damage inside the system.

#### 3.1.2. 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.

In noisy environments the case of Baltos shall be directly connected to Protective Earth. This is the purpose of the dedicated PE Screw on the case rear side.



Figure 5: PE Screw

### 3.2. DIP Switches

The rear side of the case holds a group of four DIP switches. There is no special purpose coupled to the switches. Customers software can read the configuration, and evaluate for own intentions.

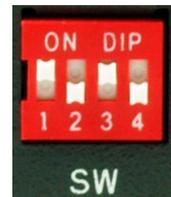


Figure 6: DIP Switches

### 3.3. Antenna Locations

The OnRISC Baltos is prepared for adding one antenna socket of the usual SMA type. Possible locations are on the rear and on the left side (top wide when mounted on a DIN Rail). Both are covered by plastic caps.



Figure 7: Antenna location

### 3.4. Reset

The Reset button is on the rear side of Baltos. Push it by using a small prick.

With Reset button you can restart the OnRISC Baltos without removing the power. The Reset button should be used only in situations, where reboot command is not available, to avoid file system integrity errors.



Figure 8: Reset Button

### 3.5. WAN

The WAN Ethernet port in Baltos is for 10/100/1000 Mbps Gigabit Ethernet. When the connect is done the Link LED on RJ45 (green, left) will light. When data traffic occurs on the network, this LED will blink. It depends on your network or devices whether a 1000 Mbit, a 100 Mbit or a 10 Mbit connect will be established. The Speed LED (yellow, right) lights for 10 and 100 Mbps connections.

This Ethernet interface supports Auto-MDI(X) feature.

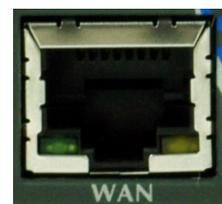


Figure 9: WAN Port

### 3.6. USB

The OnRISC Baltos iR 2110 provides a USB 2.0 Host interface. This can be used for Mass Storage Devices, like Flash- or Hard Drive, Bluetooth and WLAN adapters etc.



Figure 10: USB Connector

### 3.7. LED

The front side holds a group of three LEDs.

**PWR** (Red) lights when power is applied to the Baltos. System software may generate short blinks for certain events.

**WIFI** (Blue) signals operation status of WLAN function.

**APP** (Green) is free to use by customers application, e.g. as some ready light.



Figure 11: Front LED

### 3.8. Serial

The OnRISC Baltos provides one DSub-9 male connector. All three modes of operating RS232, RS422 or RS485 are entirely configured by software. For the pinout refer to the Table 4.

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

Table 4: Serial DSub-9 Pinout



Figure 12: COM Port

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.

In RS232 and RS422 Mode data may be received while transmitting. This also applies to RS485 Full Duplex Mode, which is also referred to as 4-wire connection (same signal assignment as the RS422).

The RS485 Standard Mode is alternatively referred to as Half Duplex Mode, 2-wire connection or Bus Mode. It uses the same two wires for transmit and receive. So it would be possible to simultaneously receive the same data the port just transmitted, this is often named an Echo. The serial port in Baltos intentionally suppresses this Echo. In the rare situations where this Echo is required, the port should be set as this:

- Configure the port for RS485 Full Duplex Mode
- Connect Tx+ with Rx+ in the cable
- Connect Tx- with Rx- in the cable

#### 3.9. LAN

The LAN Ethernet port in Baltos is for 10/100 Mbps Fast Ethernet. When the connect is done the Link LED on RJ45 (right) will light. When data traffic occurs on the network, this LED will blink. It depends on your network or devices whether a 100 Mbit or a 10 Mbit connect will be established. The Speed LED (left) lights for 100Mbps connections.

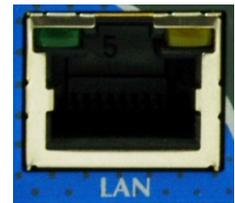


Figure 13: LAN Port

#### 3.10. SD-Slot

The OnRISC Baltos provides an SD-Slot on the front side of the case, for cards in microSD size. The slot supports cards as SD 2.0 or SDHC type, to allow up to 32 GB of capacity. Class 10 cards are supported as well. If an operating system is installed on the SD Card, the OnRISC Baltos will boot this software.

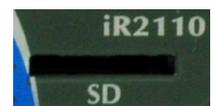


Figure 14: SD Slot

## 4. Internal Components

Basically components inside the case of OnRISC Baltos are not for service by the user. It is encouraged not to open the case unless specifically instructed to do so. The important exception is the serial Console port, which is intended to be attached to a special adapter cable for a USB port.

The following information of location and function are for reference only. The case is closed with a single screw.

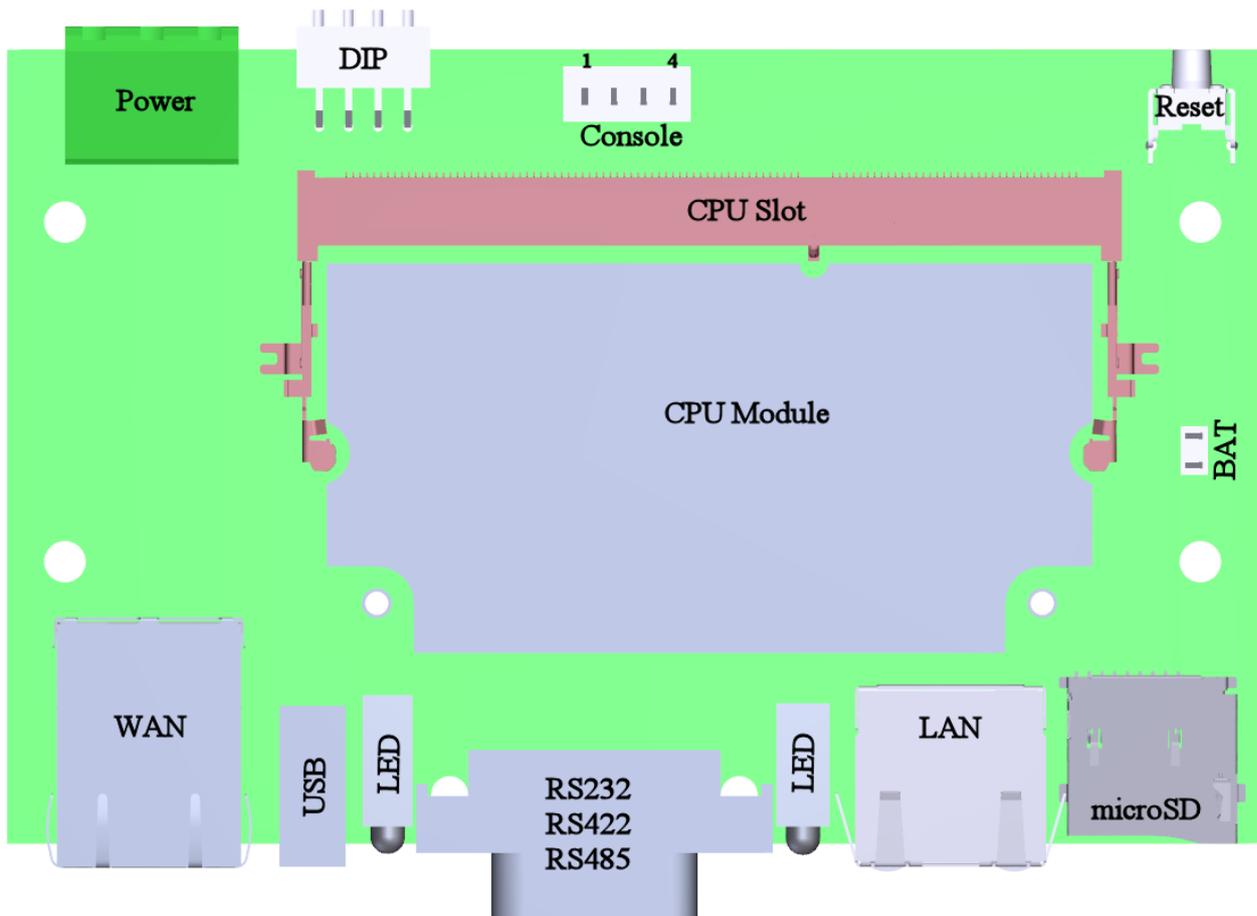


Figure 15: System Board

Figure 15 shows schematically how the interior of Baltos iR.2110 looks like, when the case is opened.

### 4.1. CPU Module

This module looks similar to a DRAM card, but in fact this is where all the computation takes place. Also the NAND Flash memory to boot the system is located here, with the DRAM.

If your Baltos provides WLAN function, the cable from the antenna socket ends here also.

## 4.2. Console Port

The Console port signals operate on TTL level, i.e. 3V for logic One, and 0V for logic Zero. The auxiliary power output of 3.3V might be used to drive an adapter circuit for RS232 levels.

This is not required with the adapter cable to USB, which is available as part of the Starter Kit (5.2). Connect the cable in this way:

- Black wire to Pin 4
- Yellow wire to Pin 3
- Orange wire to Pin 2
- No wire to Pin 1

When the USB connector is plugged into the PC, the driver to create the virtual serial port (Windows: COMx; Linux: /dev/ttyUSBx) will install automatically.

1	2	3	4
3.3V	RxD	TxD	GND

Table 5: Console Port signals

## 4.3. Battery

The small connector labeled as BAT (BT3) on the right side connects a so called BIOS battery pack. It consists of a CR2032 type Lithium battery with cable. This battery provides the backup power for the Real Time Clock.

# 5. Product Support Information

The following services are provided on [www.vscom.de](http://www.vscom.de) and [www.visionsystems.de](http://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 our FAQ system [faq.visionsystems.de](http://faq.visionsystems.de).

## 5.1. Accessories in Package

The OnRISC Baltos systems are accompanied by some accessories in a plastic bag.

### 5.1.1. Power Supply

There is one terminal block with 3 clamps, intended for the rear side (figure 4 on page 9).

### 5.1.2. Rubber Feet

Also four rubber feet are enclosed. For desktop operation users may stick them to the bottom side of the case.

### 5.2. Starter Kit

Option: For easy start of developing software applications VS Vision Systems GmbH provides a Ready-to-Run or Starter kit. This consists of:

- 4 GB SD microcard with Linux operating system
- Power adapter 12V @ 1.5A, 18W
- Adapter cable for serial console port
- Development software on DVD
- Documentation on DVD

## A. History

**October 2015** Release of Hardware Manual