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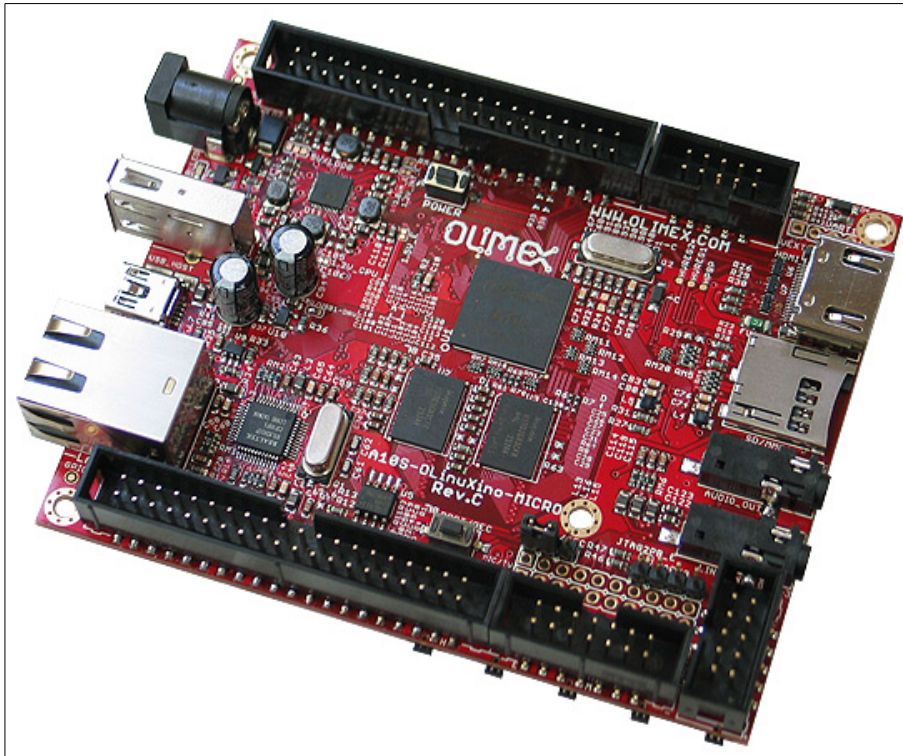
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## A10S-OLinuXino-MICRO

Open-source single-board  
Android/Linux mini-computer

## USER'S MANUAL

Revision C, September 2013  
Designed by OLIMEX Ltd, 2013



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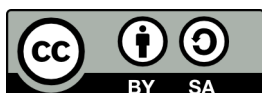
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## CHAPTER 1: OVERVIEW

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### 1. Introduction to the chapter

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Thank you for choosing this OLinuXino single board computer from Olimex! This document provides a user's guide for the A10S Olimex OLinuXino board. As an overview, this chapter gives the scope of this document and lists the board's features. The document's organization is then detailed.

The A10S-OLinuXino-MICRO development board enables code development of applications running on the A10s microcontroller, manufactured by Allwinner Technology from China.

OLinuXino is an open-source, open-hardware project and all documentation is available to the customer.

### 1.1 Features

---

The board has the following set of features (note about the difference between the two versions of the board):

- A10S Cortex-A8 processor at 1GHz, 3D Mali400 GPU, NEON
- 512MB DDR3 RAM
- **4GB NAND Flash (only in the A10S-OLinuXino-MICRO-4GB version; comes with built-in Android image – no SD card required)**
- USB High-speed host with power control and current limiter
- USB-OTG with power control and current limiter
- HDMI output with ESD protectors
- 100MBit native Ethernet
- Audio Line-input
- Audio Headphones output
- UEXT connector
- LCD connector to work with 4.3, 7.0, 10.1" LCD modules from Olimex
- 50 GPIOs on three GPIO connectors
- MicroSD card connector
- SD/MMC card connector
- DEBUG-UART connector for console debug with USB-SERIAL-CABLE-F
- STATUS LED
- Power LED
- 2KB EEPROM for MAC address and other storage
- 5 BUTTONS with ANDROID functionality + BOOT/REC and POWER buttons
- Microphone input on connector (not populated)
- Composite TV-output on connector (not populated)
- JTAG-DEBUG connector (not populated)
- UART1 connector (not populated)
- +5V input power supply, noise immune design
- 4 mounting holes

## 1.2 Target market and purpose of the board

---

The boards from the OLinuXino family are easy to setup and powerful. It is possible to use them in almost any application as a host board. They are suitable for embedded programming enthusiasts, Linux and Android gadget fans (they can just use the board as a media center or fully functional Linux-PC for instance) and also professionals (since its low cost makes it very good solution for application-orientated embedded systems). The main usage of the board is software embedded development without the urge of understanding perfectly the hardware.

The strong points of the boards are the processor speed, the small form factor and the low price-to-productivity ratio.

Customers have full access to the technical documentation of the board. The software is released under General Purpose License and the board is considered open-hardware – all schematics and board design files are available to the customer under the Creative Commons Attribution-ShareAlike 3.0 Unported License.

## 1.3 Board variants

---

There are two major board variants. According to the names: A10S-OLinuXino-MICRO-4GB and A10S-OLinuXino-MICRO. The 4GB version has a built-in NAND memory suitable for the storage of an operating system without the need of a SD card. The 4GB version comes with already programmed Android 4.2.2 image.

The other Olimex boards with close characteristics are the ones with A13 and A10/A20 microcontrollers. The A13 boards feature a generation older processor but since they have been longer on the market they have better Linux support. The A10 boards feature the bigger (than A10s) processor of the Allwinner A10 family. The A20 boards feature the new dual core processor and pack exceptional (for an embedded device) computing speed.

Additional Linux support and features are added overtime. The Linux support is a work in progress and you should not expect full Linux support after the initial volume of such boards have become available on the market. If you are in a hurry consider the older OLinuXino designs (which have almost everything supported, have examples available and so on).

## 1.4 Organization

---

Each section in this document covers a separate topic, organized as follow:

- Chapter 1 is an overview of the board usage and features
- Chapter 2 provides a guide for quickly setting up the board and software notes
- Chapter 3 contains the general board diagram and layout
- Chapter 4 describes the component that is the heart of the board: the A10s – Allwinner processor
- Chapter 5 is an explanation of the control circuitry associated with the microcontroller
- Chapter 6 covers the connector pinout, peripherals and jumper description
- Chapter 7 provides the schematics and the dimensions of the board
- Chapter 8 contains the revision history, useful links and support information

## CHAPTER 2: SETTING UP THE OLINUXINO BOARD

---

### 2. Introduction to the chapter

---

This section helps you set up the OLinuXino development board for the first time. Please consider first the electrostatic warning to avoid damaging the board, then discover the hardware and software required to operate the board.

The procedure to power up the board is given, and a description of the default board behavior is detailed.

#### 2.1 Electrostatic warning

---

OLinuXino is shipped in a protective anti-static package. The board must not be exposed to high electrostatic potentials. A grounding strap or similar protective device should be worn when handling the board. Avoid touching the component pins or any other metallic element.

#### 2.2 Requirements

---

In order to set up the A10S-OLinuXino-MICRO optimally one or more additional items may be used. They might be generally placed in three categories:

**Required** - items that are needed in order to achieve minimum functionality;

**Recommended** – items that is good to have in order to be able to interact with the most important of the features of the board;

**Additional** – items that provide additional access or expand the features of the board.

**Required items:**

- USB type A to USB mini cable – to connect to a personal computer; used for powering the board and uploading new Android image to the NAND memory (if your board has 4GB NAND)
- Input device – either a mouse/keyboard or touchscreen LCD
- Output device – either HDMI cable + HDMI-enabled monitor/screen/projector; or OLIMEX LCD (TS) display + 40-pin CABLE-IDC40-15cm; or USB-SERIAL-CABLE-F + personal computer (for Linux and/or Android debugging)
- mini SD card with compatible image – if you have the board version with NO additional NAND memory you will to use one of the images available for download at the wiki article.

**Recommended items:**

- External USB hub – to split the USB\_HOST mounted on the board; you need that to connect more than one USB device
- External power supply unit – 5V DC, 5W required (5V @ 1A) – for optimal power
- USB-SERIAL-CABLE-F – for Android/Linux debugging on UART0
- CABLE-IDC40-15cm – LCD cable for LCD\_CON connector

**Additional items include:**

- Audio device for Audio\_OUT jack
  - Ethernet cable for wired Ethernet
  - A number of extension modules that can add functionality or interface to the board on the UEXT
-



connector; those can be explored here: <https://www.olimex.com/Products/Modules/>

Some of the above-suggested items can be purchased by Olimex, for instance:

**SY0605E** – reliable power supply adapter 50Hz (for EU) 5V/0.5A for A10S-OLinuXino-MICRO

**SY0605E-CHINA** – cheaper power supply adapter 50Hz (for EU) 5V/0.5A for A10S-OLinuXino-MICRO

**A10S-Android-SD** – a tested class 10 micro SD card with the latest (by the time of leaving the Olimex facilities) official Android release

**A10S-Debian-SD** – a tested class 10 micro SD card with the latest (by the time of leaving Olimex facilities) official Debian Linux release

**USB-SERIAL-CABLE-F** - USB serial console cable female

**USB-MINI-CABLE** – standard USB type A to USB type mini cable

**A13-LCD43TS** – low-cost 4.3" LCD display with touchscreen component - 480 x 272

**A13-LCD7** – low-cost 7" LCD display with optional touchscreen component - 800 x 480

**A13-LCD10** – low-cost 10" LCD display with optional touchscreen component – 1024 x 600

## 2.3 Powering the board

---

There are two possible ways of powering A10S-OLinuXino-MICRO-4GB – via external supply providing 5V DC (!) at the power jack or via the USB\_OTG connector. Note that the board consumes around 300mA of current at 5V when there are no peripherals connected to the USB host, so make sure the power supply is able to provide at least 500mA before plugging. Depending on your preferred way of powering you might need additional hardware.

The preferred way of powering board is via the PWR jack with 5V DC with a power of 5W (e.g. 5Vx1A). This will make the board fully powered and able to power all the peripherals connected to it.

Note that when powering the board from the USB\_OTG, the power provided might be insufficient to also power a bigger LCD connected to the LCD\_con. However, this power option is capable of driving the board when using external display connected to the VGA connector.

Note that there are no means provided to power the A10s board from a battery.

The typical consumption of A10S-OLinuXino-MICRO-4GB is between 200mA and 320mA depending on the current load. While the board is in stand-by mode it consumes 200-220mA.

If the board has entered power-down state you can bring it back without restart using the PWR\_BUT.

For the European customers we sell two power supply adapters, please check chapter 2.2. We also sell USB OTG to USB type A cables if you lack such.

The default username/password combination for the default Linux image on the SD card (if purchased) is: root/olimex.

Note that it is normal that when the board is powered some integrated circuits might appear hotter than others. This is perfectly normal for some chips – for instance – voltage regulators and the main

processor.

## 2.4 Button functions and NAND image restore in Android

---

The following buttons represent functions in the Android:

**PWR\_BUT** – used to perform software turn off, software turn on and

**HOME** – shows the home screen; note that HOME is also used to enter bootloader mode for firmware update

**ENTER** – to select a choice

**MENU** – brings up the main menu

**VOL+** – increases the volume

**VOL-** – lowers the volume

**BOOT/REC** – depending on the selection of UBOOT/REC jumper this button might serve either as the trigger used to enter bootloader mode (for NAND update via the USB\_OTG connector) OR as a recovery button (“wake up” in Android).

It is not recommended to disconnect the power supply (either the USB or the power jack) before turning off the Android from the either the menus or by holding POWER system written on the NAND.

## 2.5 Prebuilt software

---

The 4GB board-variant comes with Android 4.2.2 ready to use. The default settings of the software are followed. The Android installed has a built-in support for HDMI monitor and 7" display (like A13-LCD7).

How did we install the software? We have configured an Android image with settings suitable for A10S-OLinuXino-MICRO. Then using LiveSuit tools we uploaded the image to the board via the USB OTG. The image is available for users to try and tweak the settings. The images can be downloaded from the wiki article at: <https://www.olimex.com/wiki/A10S-OLinuXino-MICRO-4GB>

The board variant without NAND needs an SD card with bootable OS – Android or Linux. There are ready images available for download at the A10s wiki article at Olimex's web site.

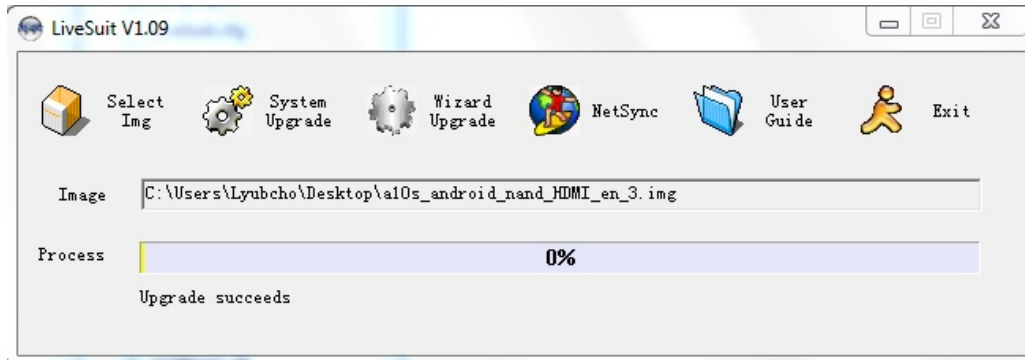
To repair the image on NAND re-upload it following these easy steps:

1. Run LiveSuit (can be found in the wiki article for A10s and A13)
2. Disconnect the power supply and USB cable.
3. Place jumper BOOT/REC in BOOT position.
4. Press and hold BOOT/REC button, apply power supply, attach USB cable and release the BOOT/REC button.
5. You will be asked for drivers for the bootloader. Navigate to the folder where you extracted the LiveSuit and install the drivers from the respective executables (or manually point the installer to

the drivers folder in the LiveSuit installation path).

6. LiveSuit will detect the bootloader and will ask which file to program to the NAND flash.

7. Wait till upgrade succeeds as shown below:



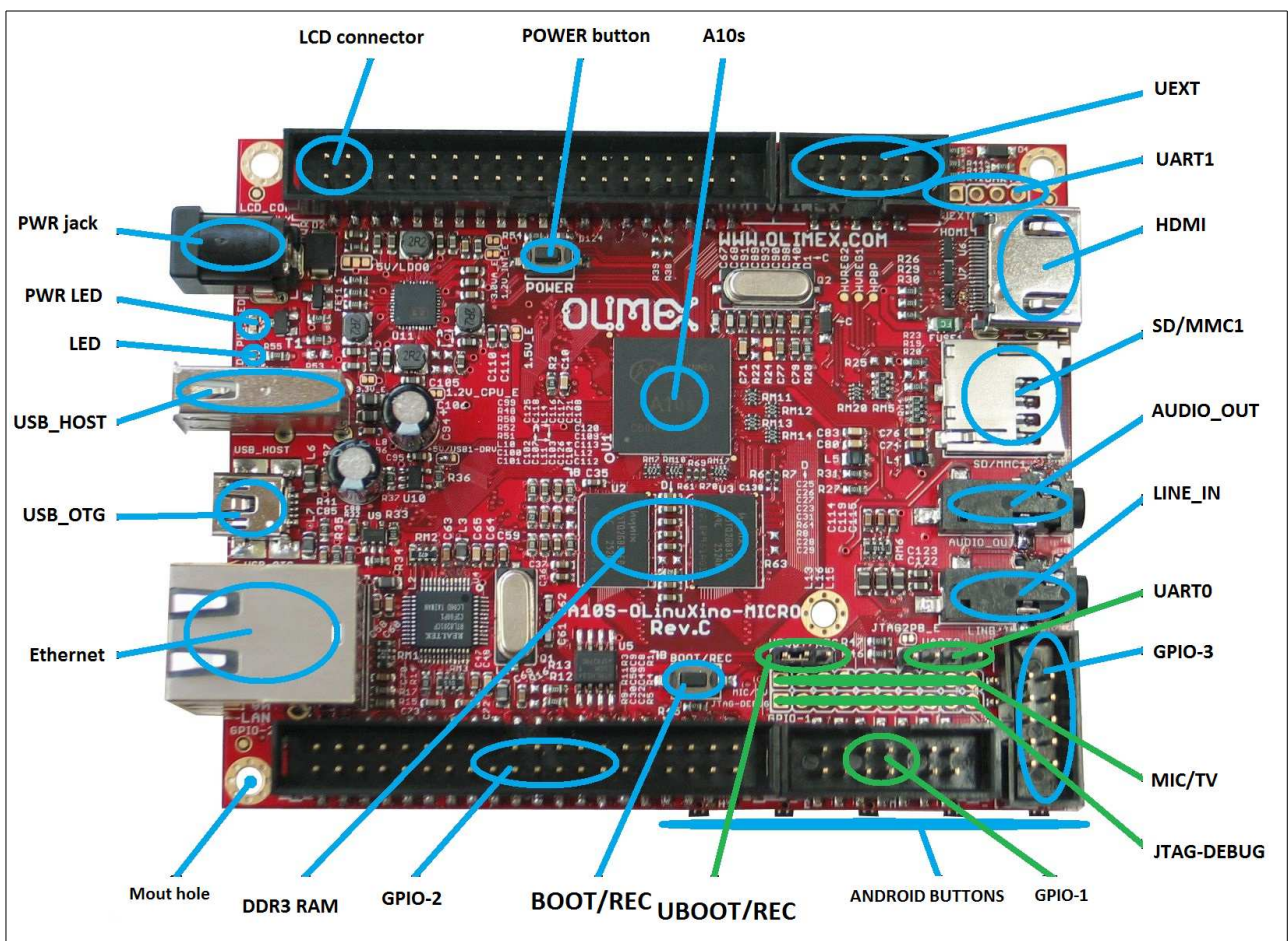
## CHAPTER 3: A10S-OLinuXino-MICRO BOARD DESCRIPTION

### 3. Introduction to the chapter

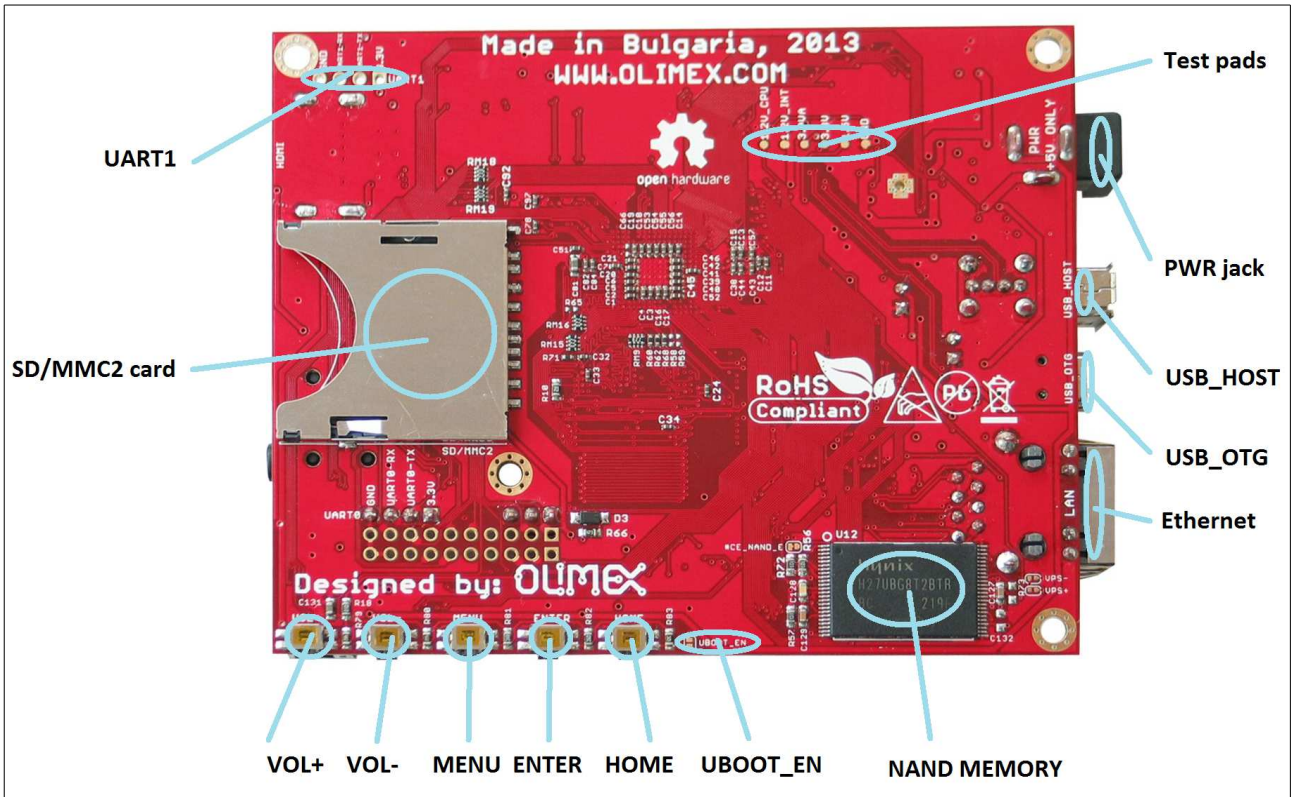
Here you get acquainted with the main parts of the board. Note the names used on the board might differ from the names used below to describe them. For the actual names check the A10S-OLinuXino-MICRO board itself.

#### 3.1 Layout (top view)

The picture below shows the initial revision of A10S-OLinuXino-MICRO.



### 3.2 Layout (bottom view)



Please note that the NAND memory is present only in the 4GB version of the board.

## CHAPTER 4: THE ALLWINNER A10s MICROCONTROLLER

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### 4. Introduction to the chapter

---

In this chapter is located the information about the heart of OLinuXino – its microcontroller. The information is a modified version of the datasheet provided by its manufacturers.

#### 4.1 The microcontroller

---

- **CPU/GPU**
  - [ARM Cortex-A8](#)
  - 256KB [L2 cache](#)
- Graphics
  - [Mali 400](#) GPU
  - [1080p](#) HD video decoding
  - H.264 HP video encoding [1080p@30fps](#)
- HDMI
  - HDMI 1.4
  - 1080p output
- Memory
  - 16/32-bit DDR2/DDR3
  - MLC/TLC/SLC/EF-NAND
  - 64-bit ECC
- Boot Devices
  - NAND Flash
  - SPI Nor Flash
  - SD card
  - USB
- Connectivity
  - USB 2.0 OTG
  - USB 2.0 HOST (OHCI/EHCI)
  - SD Card v3.0, eMMC V4.2
  - SPI, TWI, UART
  - TS
  - EMAC
  - IIS
- Package

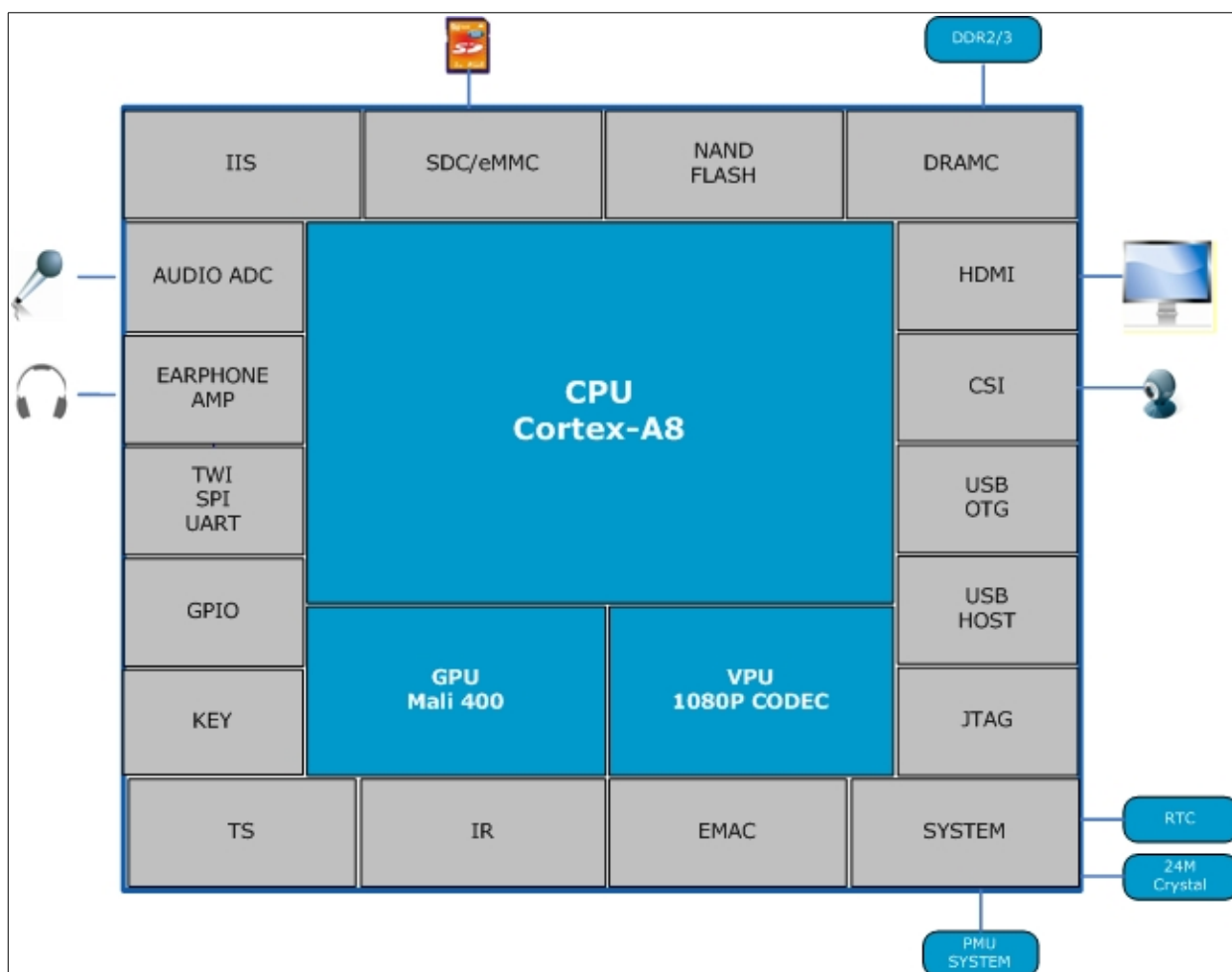
- BGA336
- 14mm\*14mm

More information can be found on Allwinner's web site at the following web-address:

<http://www.allwinnertech.com/en/product/A10s.html>

## 4.2 Block diagram

The block diagram is taken from Allwinner's web-site.



## CHAPTER 5: CONTROL CIRCUITY

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### 5. Introduction to the chapter

---

Here you can find information about reset circuit and quartz crystals locations, the power supply circuit is discussed.

#### 5.1 Reset

---

The board has no hardware reset. The reason behind that is the memory problems using such a strategy causes. When the NAND memory performs read/write operation and the user resets the board this might cause NAND corruption.

The board should be turned off the standard OS menu (that might be invoked by holding POWER button) and after the choice is confirmed it is safe to be disconnected from the power supply unit.

#### 5.2 Clocks

---

25 MHz quartz crystal Q1 is connected to pins 46 and 47 of the RTL8201CP chip (the same chip controls the Ethernet).

24 MHz quartz crystal Q2 is found at pins U20 and V20 of the A10s microcontroller.

#### 5.3 Power supply circuit

---

The power supply is handled mainly by AXP152 power management system, an Allwinner chip that goes together with the A10s processor. It is mounted on the board but since it is relatively hard to find we also sell it separately.

The power supply circuit of A10S-OLinuXino-MICRO requires input supply of 5V. The minimum amperage suggested is 1A, and this threshold may raise if using a lot of devices on the USB-HOST (via external hub), a lot of GPIOs and the LCD\_CON.



## CHAPTER 6: CONNECTORS AND PINOUT

---

### 6. Introduction to the chapter

---

In this chapter are presented the connectors that can be found on the board all together with their pinout and notes about them. Jumpers functions are described. Notes and info on specific peripherals are presented. Notes regarding the interfaces are given.

#### 6.1 Communication with the A10s

---

The chip has a built-in bootloader for communication with computer systems via a USB cable – suitable only for connection with LiveSuit program for firmware update. There is a second option to connect to the board which is the male UART0 connector capable of delivering some information on the COM port of your computer – and then use your favorite terminal program (puTTY, teraterm, etc) to receive the data/send commands. You can use USB-SERIAL-CABLE-F with the UART0 interface allowing you to connect to an USB port.

##### 6.1.1 USB-OTG communication (NAND firmware repair/update)

---

The main way of changing the firmware image located on the NAND of A10S-OLinuXino-MICRO-4GB is via the USB-OTG connector.

You will need a software tool “LiveSuit” and a newer firmware image if you wish to upgrade/repair the firmware. The simple steps for upgrading/repair the firmware via the bootloader are:

1. Download, install and start LiveSuit
2. Hold down “BOOT/REC” button on the board
3. Connect the board to the computer via the USB-OTG
5. Release “BOOT/REC” button
6. You will be asked for drivers for the bootloader. Navigate to the folder where you extracted the LiveSuit and install the drivers from the respective executables (or manually point the installer to the drivers folder in the LiveSuit installation path).
7. Choose the image you have prepared or downloaded
8. Update and don't disconnect the board until the LiveSuit program confirms the update is complete

There are different flavors of the Android and Linux distributions depending on whether you want to use 50Hz HDMI or 60Hz HDMI or 7" display or 10" display etc. You might need to change the configuration files inside (depending on your current setup) the SD card (explore the SD card and make sure the correct, corresponding your needs, “script.bin” is placed in the first SD card partition;

overwrite the original one).

Those images , the software required and further instructions might be found at the wiki page:  
<https://www.olimex.com/wiki/A10S-OLinuXino-MICRO>.

### 6.1.2 UART0, UART1, UEXT interface

The UART0 might be used for COM communication without any modification. UART1 and UEXT interfaces might also be configured for such a communication. However, the UEXT is typically used for connecting additional modules.

Note that by default only UART0 is defined as a port suitable for serial debug. You can use our USB-SERIAL-CABLE-F for debugging. UEXT and UART1 are NOT defined by default.

Consider table below when connecting the USB-SERIAL-CABLE-F according to the wire color code. The RX line of the cable (GREEN wire) should go to TX line of the target board; the TX line of the cable (RED wire) should go to the RX line of the target board. The BLUE wire should go to the target's GND line.

UART0			UART1		
Pin #	Signal name	Processor pin	Pin #	Signal name	Processor pin
1	3.3V	-	1	3.3V	-
2	UART0-TX	G3	2	SD1-CMD/UART1_TX	A11
3	UART0-RX	G4	3	SD1-CLK/UART1_RX	B12
4	GND	-	4	GND	-

UEXT					
Pin #	Signal name	Pin #	Signal name	Pin #	Signal name
1	3.3V	6	TWI2-SDA	7	SPI2-MISO/JTAG-DI0
2	GND	8	SPI2-MOSI/JTAG-DO0	9	SPI2-CLK/JTAG-CKO
3	UART2-TX	10	SPI2-CS0/JTAG-MS0		
4	UART2-RX				
5	TWI2-SCK				

The UEXT connector is used for the Olimex's UEXT modules (usually boards with MOD- prefix in their commercial names).

For more information on UEXT please visit:

<https://www.olimex.com/Products/Modules/UEXT/resources/UEXT.pdf>

### 6.1.3 JTAG DEBUG

There is JTAG layout available at the top of the board. The signals are multiplexed with the SPI that is located on the UEXT connector. Refer to the signals below:

JTAG-DEBUG			
Pin #	Signal name	Pin #	Signal name
1	3.3V	6	JTAG_SEL0_N
2	SPI2-MISO/JTAG-MS0	7	JTAG_SEL1_N
3	SPI2-MISO/JTAG-CK0	8	RESET_N
4	SPI2-MISO/JTAG-DO0	9	GND
5	SPI2-MISO/JTAG-DI0	10	GND

The JTAG debug connector and options haven't been thoroughly tested – you are welcome to send us feedback and your experience with this interface.

## 6.2 SD card connectors

There are two SD card connectors on this A10s board. The now common microSD card connector is located on the top of the board, near the HDMI connector.

Note that by default only the micro SD card slot might be used for booting the OS.

However, due to popular demand, there is also an SD/MMC card connector located on the bottom of the board.

Both SD slots might be used simultaneously – there is no data multiplexing lines. For instance – one of them might be used for booting the OS, the other – for saving data.

As a general precaution be careful with the SD cards you purchase. There is a big percentage of fake cards due to the low effort required to counterfeit popular brands and the big demand for SD cards worldwide. When in doubt – try the same operation with another card from another brand.

Olimex sells microSD cards with Linux or Android images, that have been tested – please refer to chapter “2.2 Requirements”. Of course, if you already have a big enough microSD card you can download the official Linux image from the wiki pages: <https://www.olimex.com/wiki/A10S-OLinuXino-MICRO>.

When removing the card, please make sure that you release it from the connector by pushing and NOT by pulling the card directly (this can damage both the connector and the microSD card).

### 6.2.1 SD/MMC1 slot

SD/MMC1 slot is the “smaller” microSD card slot, located on the top of the board.

This slot is typically used for booting the OS, due to the larger capacities of the microSD cards (compared to SD or MMC cards). It is suggested to have an SD card with a proper Linux/Android image especially if you have ordered a version of the board without NAND memory. It is also recommended to use Class 10 (10MByte/sec) card for faster read/write operations, lower class cards (especially higher capacity ones) might slow down the whole system.

microSD card connector		
Pin #	Connector signal name	Wire name (processor pin)
1	DAT2/RES	SD0-D2 (J17)
2	CD/DAT3/CS	SD0-D3 (J18)
3	CMD/DI	-
4	VDD	-
5	CLK/SCLK	SD0-CLK(K18)
6	VSS2	-
7	DAT0/DO	SD0-D0(L17)
8	DAT1/RES	SD0-D1(L18)

## 6.2.2 SD/MMC2 slot

The SD/MMC2 slot is located on the back of the PCB and works with the “physically larger” SD and MMC cards. The connector was mounted to to popular demand.

Note that by default this connector is not suitable for booting OS. Such support is possible but not implemented in the official software releases.

SD/MMC card connector		
Pin #	Connector signal name	Wire name (processor pin)
1	CD/DAT3/CS	SD1-D3 (B14)
2	CMD/DI	SD1-CMD/UART1_TX (A11)
3	VSS1	-
4	VDD	-
5	CLK/SCLK	SD1-CLK/UART1_RX (B12)
6	VSS2	-
7	DAT0/DO	SD1-D0 (A12)
8	DAT1/RES	SD1-D1 (B13)
9	DAT2/RES	SD1-D2 (A13)

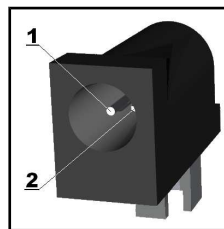
Additionally, there are the WP and CP switches that are responsible, respectively, for sensing whether the card is locked for reading and whether there is a card inserted.

Note that there is multiplexing on pins A11 and B12 of the A10s processor. The SD/MMC1 and the UART1 share the same data pins. This means it is not correct to use the UART1 interface and the SD/MMC1 interface at the same time.

### 6.3 PWR jack

The power jack used is the typical 2.5mm one used by Olimex in most of our products. You should provide 5 volts and the required current may vary depending on the peripherals connected to the board. The power supply you use should be capable of providing at least 500mA of current.

Pin #	Signal name
1	Power input
2	GND

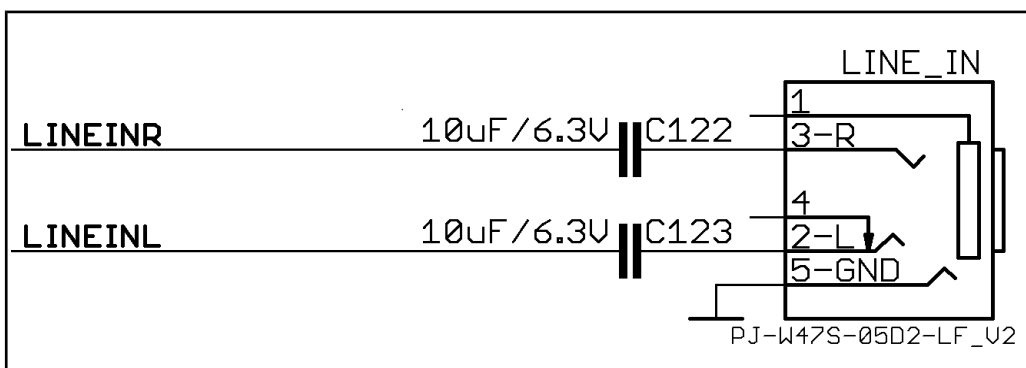
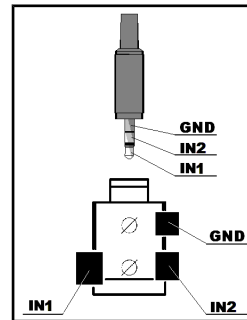


More info about the power supply can be found in chapter 5 of this manual.

### 6.4 LINE\_IN socket connector

Standard LINE\_IN jack is mounted for audio input to the board. The signal is a stereo input.

LINE_IN connector		
Pin #	Signal name	Processor pin
2	LINEINL	U17
3	LINEINR	V18
5	GND	-

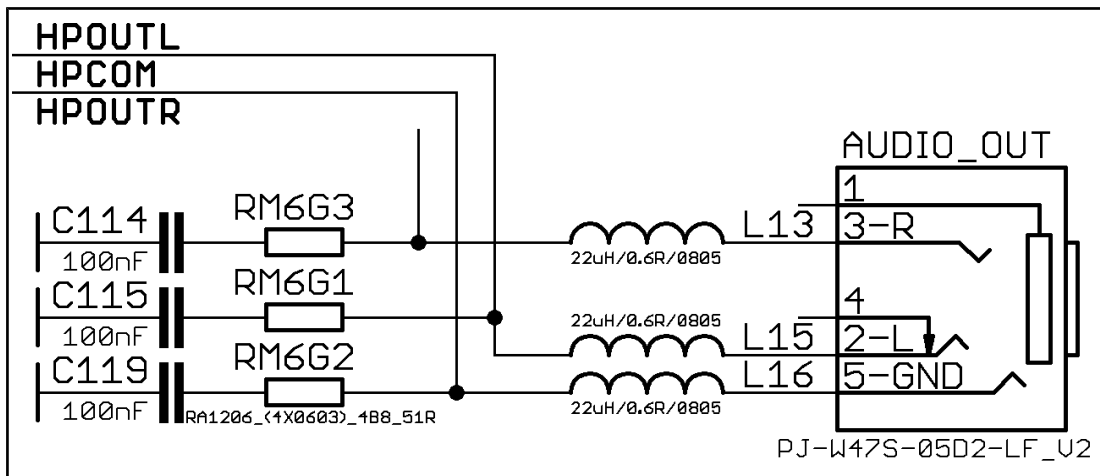


The socket can interface standard 3.5 mm phone connector (also known stereo plug or audio plug).

## 6.5 AUDIO\_OUT socket connector

Standard audio jack and phone jack are mounted for the audio interfacing.

Audio_out connector		
Pin #	Signal name	Processor pin
2	HPOUTL	Y13
3	HPOUTR	Y14
5	HPCOM (GND)	W13, V13

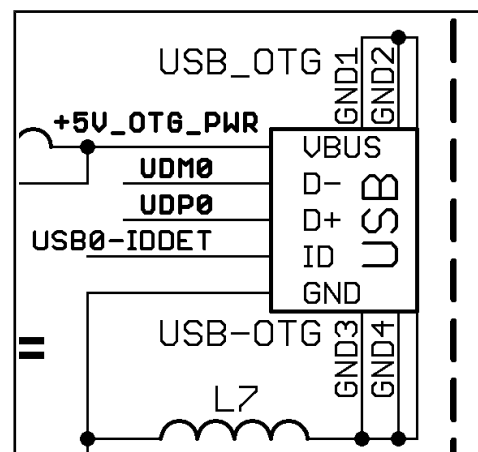


The connector can interface standard 3.5 mm phone connector (also known stereo plug or audio plug).

## 6.6 USB\_OTG

The USB\_OTG features Low Loss Power Distribution Switch SY6280 which protects the board in case the devices you have plugged to the USB\_OTG attempt to draw more current than 523mA combined. The maximum current available on the 5V USB\_OTG is exactly 523mA. The SY6280 controlling the USB\_OTG is enabled by USB0-DRV (processor pin H1).

USB_OTG connector		
Pin #	Signal name	Processor pin
1	+5V_OTG_PWR	Y13
2	UDM0	Y14
3	UDP0	P17
4	USB0-IDDET	W13, V13
5	GND	-



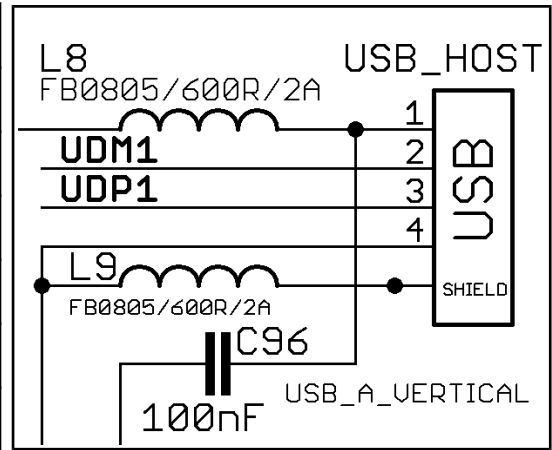
The connector case is also grounded.

## 6.7 USB\_HOST

The USB\_HOST also features Low Loss Power Distribution Switch SY6280 which protects the board in case the devices you have plugged to the USB\_HOST try to draw more current than 523mA combined. The maximum current available on the 5V USB\_HOST is exactly 523mA.

The SY6280 controlling the USB\_HOST is enabled by USB1-DRV (processor pin D3). Via the jumper named “+5V/USB1-DRV” (SMT one) this USB1-DRV signal might be freed connecting the SY6280 directly to 5V (high position).

USB_HOST connector		
Pin #	Signal names	Processor pin
1	5V	Connected to SY628
2	UDM1	N18
3	UDP1	N17
4	GND	-
5	GND	-

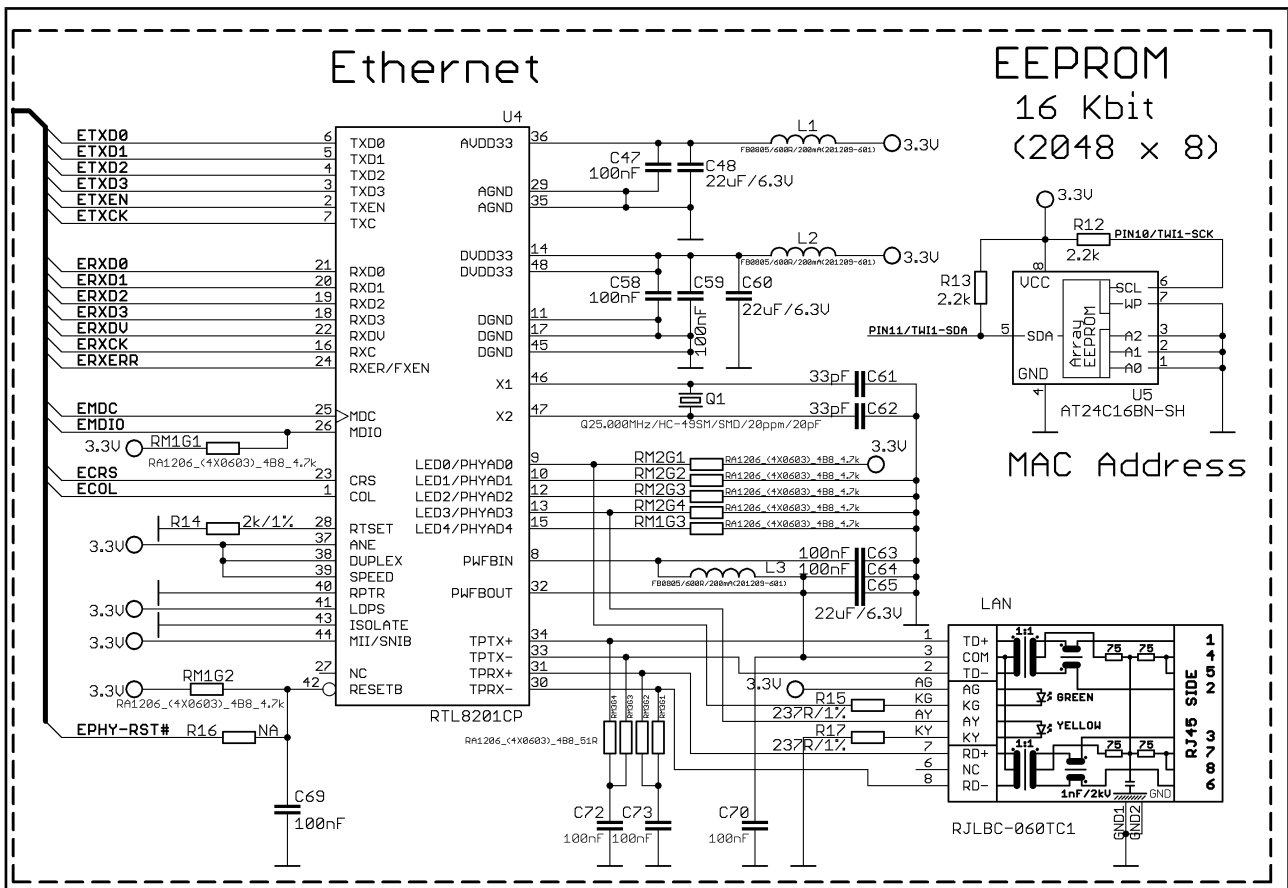


## 6.9 Ethernet

The LAN connectivity is handled by Realtek's RTL8201CP. Some of the features of this 10/100Mbit controller are:

- 10/100Mbps operation
- Full/half duplex operation
- Supports auto crossover detection
- Adaptive equalization
- IEEE 802.3/802.3u compliant
- Supports IEEE 802.3u clause 28; 1.8V
- Operation with 3.3V IO signal tolerance and much more

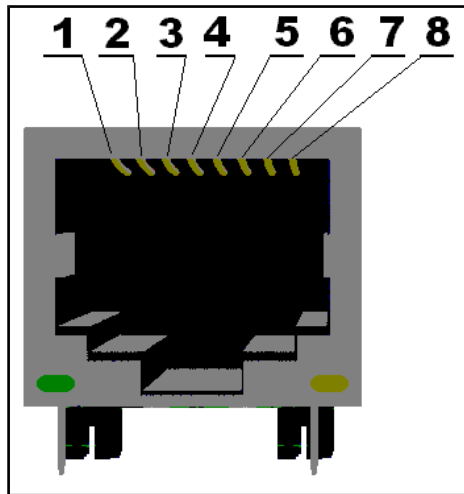
The Ethernet connector is grounded according to the standard (check GND1 and GND2 lines on the schematics)



The EEPROM memory may be used to store the MAC address.



Ethernet	
Pin #	Signal name
1	TD+
2	TD-
3	VDD
4	NC
5	NC
6	VDD
7	RD+
8	RD-



LED	Color	Usage
Right	Green	Link status
Left	Yellow	Activity status

### 6.10 HDMI connector

Note that there are different Linux images depending whether the HDMI TV works at 50Hz or 60Hz refresh rate

HDMI connector					
Pin #	Signal name	Processor pin	Pin #	Signal name	Processor pin
1	HTX2P	N20	11	GND	-
2	GND	-	12	HTXCN	T19
3	HTX2N	N19	13	HCEC	R17
4	HTX1P	P20	14	NA*	NA
5	GND	-	15	HSCL	R18
6	HTX1N	P19	16	HSDA	T18
7	HTX0P	R20	17	GND	-
8	GND	-	18	+5V	-
9	HTX0N	R19	19	HHPD	T17
10	HTXCP	T20			

\*Pin 14 of the HDMI is not mandatory. In HDMI 1.0-1.3c it is reserved pin; in HDMI 1.4+ it is optional.

