

## OLIMEXINO-328 development board

### Users Manual



All boards produced by Olimex are ROHS compliant

Revision A, August 2011  
Designed by OLIMEX Ltd, 2011

## INTRODUCTION:

What is Arduino?

Arduino is an open-source electronics prototyping platform, designed to make the process of using electronics in multidisciplinary projects more accessible. The hardware consists of a simple open hardware design for the Arduino board with an Atmel AVR processor and on-board I/O support. The software consists of a standard programming language and the boot loader that runs on the board.

Arduino hardware is programmed using a Wiring-based language (syntax + libraries), similar to C++ with some simplifications and modifications, and a Processing-based IDE.

The project began in Ivrea, Italy in 2005 to make a device for controlling student-built interaction design projects less expensively than other prototyping systems available at the time. As of February 2010 more than 120,000 Arduino boards had been shipped. Founders Massimo Banzi and David Cuartielles named the project after a local bar named Arduino. The name is an Italian masculine first name, meaning "strong friend". The English pronunciation is "Hardwin", a namesake of Arduino of Ivrea

More information could be found at the creators web page <http://arduino.cc/> and in the Arduino Wiki <http://en.wikipedia.org/wiki/Arduino>

To make the story short - Arduino is easy for the beginners with lack of Electronics knowledge, but also do not restrict the professionals as they can program it in C++ or mix of Arduino/C++ language.

There are thousands of projects which makes the startup easy as there is barely no field where Arduino enthusiasts to have not been already.

## BOARD FEATURES:

We enter in Arduino field 5 years after the design was introduced, and this allowed us to see and skip all the errors the Arduino inventors did :-)

We had the possibility to read current customer feedback and to implement what they wanted to see in the original Arduino.

There are few things which we made better than the original Arduino design:

1. We allow the board to work at different frequencies with easily exchange of the quartz crystal.
2. Original Arduino uses linear power supply, this limits the input voltage range. We designed the power supply to accept power from 9 to 30V DC thus making possible to take virtually any power supply adapter on the market, also enable application which are in industrial power supply 24VDC.
3. We carefully selected all components to work reliable in INDUSTIRAL temperature range -25+85C so the board can be used in INDUSTIRAL applications while the original design is to Commercial 0-70C operating temperature.
4. The original Arduino design is not good for portable applications as consumes too much power with the linear vltage regulators, we put ULTRA LOW POWER voltage regulators and the consumption is only few microamps, which enables handheld and battery powered applications.
5. We add Li-Ion rechargeable battery power supply option with BUILD-IN on board charger, so when you attach battery it is automatically charged and kept in this state until the other power source (USB or external adapter) is removed and it AUTOMATICALLY will power the board - no jumpers, no switches!
6. Our design can work both on 3.3V and on 5V which is selectable with switch.
7. Our board have UEXT connector which allow many existing modules like RF, ZIGBEE, GSM, GPS to be connected.
8. Our desing allow RTC - Real Time Clock.
9. We made our design noise immune, there are number of threads on Arduino forum for problems with the RESET when board works with motors, this is because Atmel recommendations were omitted in the original design, we fixed this.
10. We use separate voltage regulator for the Analog part, which allow the ADC to be read correctly without the digital noise pickup.
11. Optionally if someone need higher precision and temperature stability in Analog reading we have provision on the board for Aref preciese source.
12. The LEDs and the BUTTONs are on the edge of the board so there is easy access even if the boards have shields on them.
13. All components are LOWER than the connectors, so the shields do not interference with them.

14. mini USB connector is used which is common and used in most cell phones, so you do not have to buy other cables
15. Original design had flaw and the connectors were not spaced at 0.1" this make perfo board use impossible, to keep the compatibility we have same spacing but we add next to this connector on 0.1" which customer can use with perforated boards.
16. All signals on the connectors are printed on top and on bottom of the board, so when you check with probe you know exactly which port you are measuring.
17. 4 mount holes make board attachment easier

## **ELECTROSTATIC WARNING:**

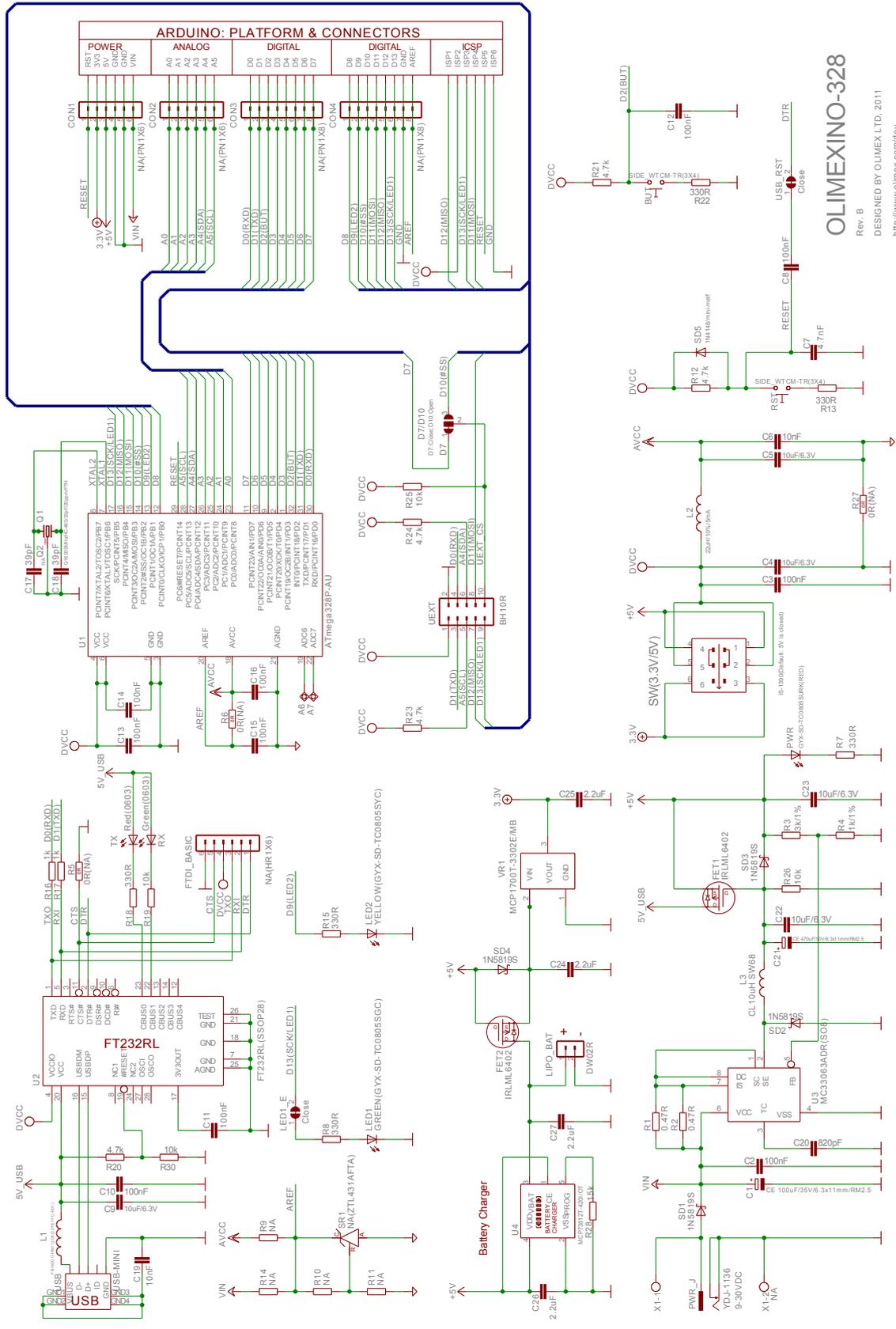
The OLIMEXINO-328 board is shipped in protective anti-static packaging. The board must not be subject to high electrostatic potentials. General practice for working with static sensitive devices should be applied when working with this board.

## **BOARD USE REQUIREMENTS:**

**Cables:** You will need mini USB cable for connecting the board to PC. For programming - the cable you will need depends on the programmer/debugger you use. If you use AVR-ISP500, AVR-ISP500-TINY or AVR-ISP500-ISO, you will need USB A-B cable.

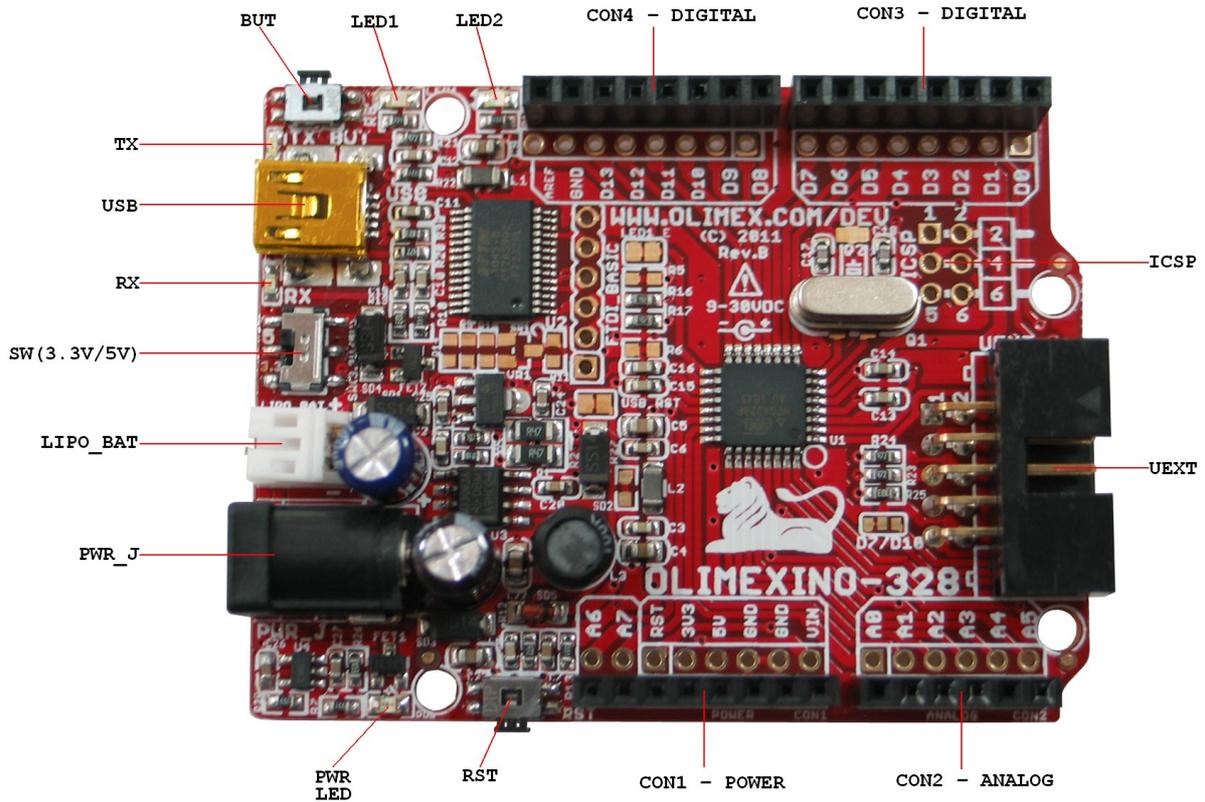
**Hardware:** Programmer/Debugger [AVR-ISP500](#), [AVR-ISP500-TINY](#), [AVR-ISP500-ISO](#) or other compatible programming/debugging tool.

# SCHEMATIC:



**OLIMEXINO-328**  
 Rev. B  
 DESIGNED BY OLIMEX LTD. 2011  
<http://www.olimex.com/dev>

## BOARD LAYOUT:



## POWER SUPPLY CIRCUIT:

OLIMEXINO-328 can take power supply from:

- external power supply (9-30) VDC.
- +5V from USB
- 3.7 V Li-ion battery

The programmed board power consumption is about 20 mA with all peripherals enabled

## RESET CIRCUIT:

OLIMEXINO-328 reset circuit includes R12 (4.7k $\Omega$ ), R13 (330 $\Omega$ ), SD5 (1N4148), C7 (4.7nF), C8(100nF), jumper USB\_RST, ATmega328P pin29 (PC6/3RESET/PCINT14) and RST button.

## CLOCK CIRCUIT:

Quartz crystal Q1 16 MHz is connected to ATmega328P pin 7 (XTAL1) and pin 8 (XTAL2). Note that the crystal is on socket and can be changed to any value.

## JUMPER DESCRIPTION:

### USB\_RST



This jumper, when closed, enables USB autoreset function. After reset the bootloader is started and loads the program into the Flash.

Default state is closed.

### LED1\_E



This jumper, when closed, connects LED1 to D13(SCK) line.

Default state is closed.

### D7/D10



When this jumper is closed in position D7 - UEXT pin 10 (UEXT\_CS) is connected to Atmega328P pin 11 (PD7) - signal D7, when this jumper is closed in position D10 - - UEXT pin 10 (UEXT\_CS) is connected to Atmega328P pin 14 (PB2/#SS) - signal D10(3SS).

Default state is closed in position D7.

## INPUT/OUTPUT:

**Status Led** with name **LED1 (green)** connected via jumper LED1\_E to ATmega328P pin 17 (SCK/PCINT5/PB5) - signal D13(SCK/LED1).

**Status Led** with name **LED2 (yellow)** connected to ATmega328P pin 13 (PCINT1/OC1A/PB1) - signal D9(LED2).

**Status Led** with name **TX (red)** indicates that there is transfer in the FTDI.

**Status Led** with name **RX (green)** indicates that there is transfer in the FTDI.

**Power-on LED (red)** with name **PWR** - this LED shows that the board is power supplied.

**User button** with name **BUT** connected to ATmega328P pin 32 (INT0/PCINT18/PD2) - signal D2(BUT).

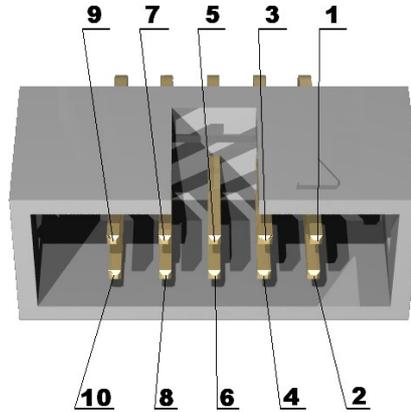
**User button** with name **RST** connected to ATmega328P pin 29 (PC6/#RESET).

**Switch** with name **SW(3.3V/5V)** - selects between 3.3V and 5V power supply of the board.

## EXTERNAL CONNECTORS DESCRIPTION:

### UEXT:

Pin #	Signal Name
1	VCC
2	GND
3	D1(TXD)
4	D0(RXD)
5	A5(SCL)
6	A4(SDA)
7	D12(MISO)
8	D11(MOSI)
9	D13(SCK/LED1)
10	UEXT_#CS

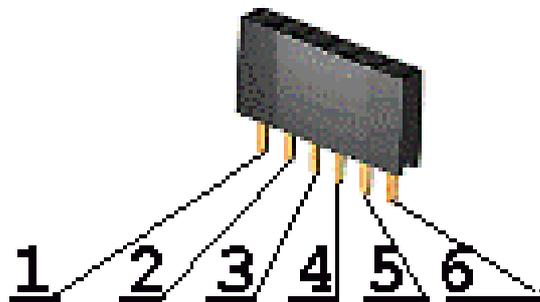


### PWR\_J:

Pin #	Signal Name
1	Power Input
2	GND

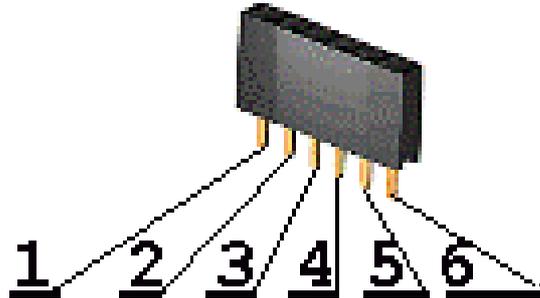
### CON1 - POWER:

Pin #	Signal Name
1	RESET
2	+3.3V
3	+5V
4	GND
5	GND
6	VIN



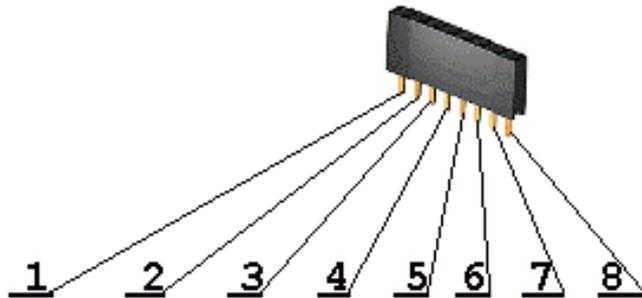
### CON2 - ANALOG:

Pin #	Signal Name
1	A0
2	A1
3	A2
4	A3
5	A4(SDA)
6	A5(SCL)



### CON3 - DIGITAL:

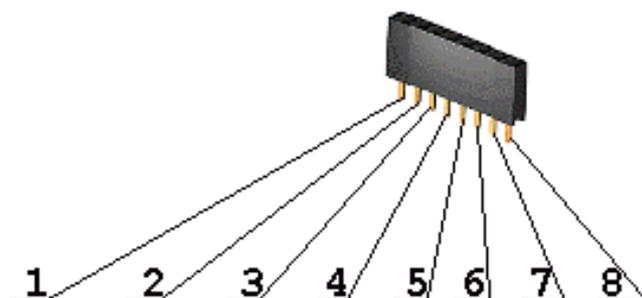
Pin #	Signal Name
1	D0(RXD)
2	D1(TXD)
3	D2(BUT)
4	D3
5	D4
6	D5
7	D6
8	D7



**Note:** There is a capacitor C12 connected to D2 and in parallel to BUT (for filtering bounces of the BUT) but it can cause interference (and unwanted filtering of signals) if you want to connect for instance RF module to D2, remove C12.

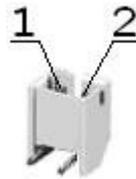
### CON4 - DIGITAL:

Pin #	Signal Name
1	D8
2	D9
3	D10(#SS)
4	D11(MOSI)
5	D12(MISO)
6	D13(SCK/LED1)
7	GND
8	AREF



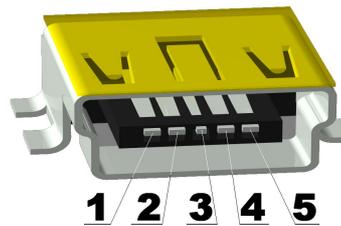
## LIPO BAT:

Pin #	Signal Name
1	VBAT
2	GND



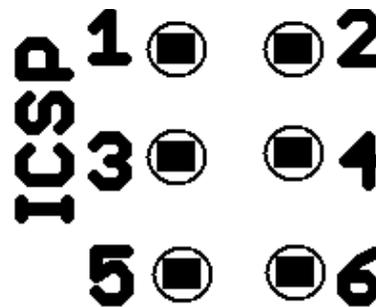
## USB:

Pin #	Signal Name
1	+5V_VBUS (VCCINT)
2	USBDM
3	USBDP
4	Not connected
5	GND



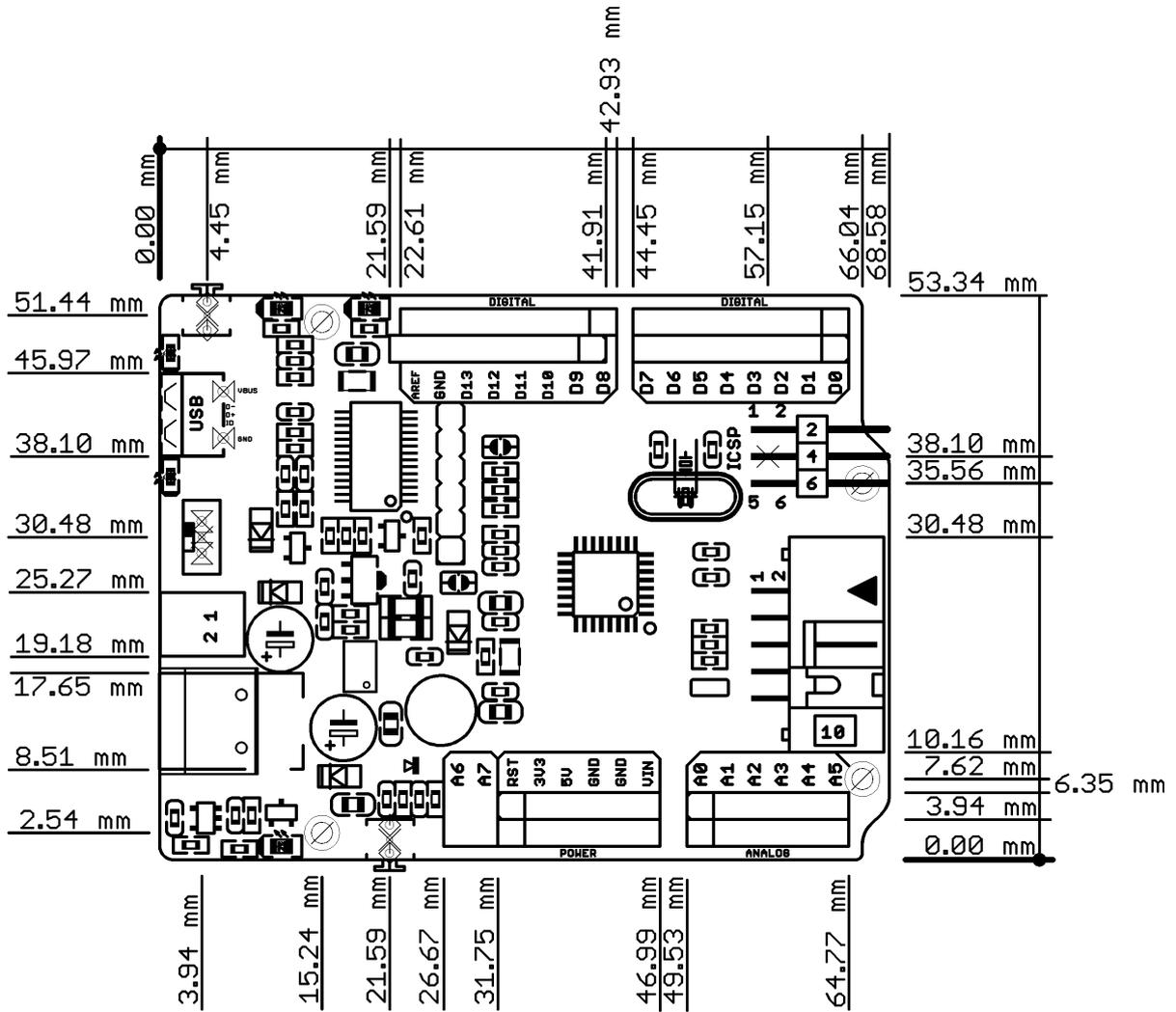
## ICSP:

Pin #	Signal Name
1	D12(MISO)
2	VCC
3	D13(SCK/LED1)
4	D11(MOSI)
5	RESET
6	GND



Note, that there is no component mounted for this connector.

# MECHANICAL DIMENSIONS:



## **AVAILABLE DEMO SOFTWARE:**

The software consists of boot loader that runs on the board and a simple blinking led project.

## **ORDER CODE:**

**OLIMEXINO-328** - assembled and tested board

### **How to order?**

You can order to us directly or by any of our distributors.  
Check our web [www.olimex.com/dev](http://www.olimex.com/dev) for more info.

## **Revision history:**

Board's revision	- Rev. B, March 2011
Manual's revision	- Rev. A, August 2011 - At first page "Copyright(c) 2011, OLIMEX Ltd, All rights reserved" is replaces with "Designed by OLIMEX Ltd., 2011" - In schematic "COPYRIGHT(C) 2011, OLIMEX Ltd." replaced with "DESIGNED BY OLIMEX LTD, 2011"  -Rev .B January 2012 – Page 9 – CON3 Important note for compatibility of RF modules connected to D2 port

**Disclaimer:**

© 2011 Olimex Ltd. Olimex®, logo and combinations thereof, are registered trademarks of Olimex Ltd. Other terms and product names may be trademarks of others.

The information in this document is provided in connection with Olimex products. No license, express or implied or otherwise, to any intellectual property right is granted by this document or in connection with the sale of Olimex products.

Neither the whole nor any part of the information contained in or the product described in this document may be adapted or reproduced in any material from except with the prior written permission of the copyright holder.

The product described in this document is subject to continuous development and improvements. All particulars of the product and its use contained in this document are given by OLIMEX in good faith. However all warranties implied or expressed including but not limited to implied warranties of merchantability or fitness for purpose are excluded.

This document is intended only to assist the reader in the use of the product. OLIMEX Ltd. shall not be liable for any loss or damage arising from the use of any information in this document or any error or omission in such information or any incorrect use of the product.