USB-uLiPo

battery charger

USER'S MANUAL

Revision B, May 2014
**Designed by OLIMEX Ltd, 2013**

DISCLAIMER

© 2013 Olimex Ltd. Olimex®, logo and combinations thereof, are registered trademarks of Olimex Ltd. Other product names may be trademarks of others and the rights belong to their respective owners.

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.

This work is licensed under the Creative Commons Attribution-ShareAlike 3.0 Unported License. To view a copy of this license, visit http://www.creativecommons.org/licenses/by-sa/3.0/.
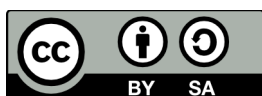
This hardware design by Olimex LTD is licensed under a Creative Commons Attribution-ShareAlike 3.0 Unported License.

The software is released under GPL.

It is possible that the pictures in this manual differ from the latest revision of the board.

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.

This evaluation board/kit is intended for use for engineering development, demonstration, or evaluation purposes only and is not considered by OLIMEX to be a finished end-product fit for general consumer use. Persons handling the product must have electronics training and observe good engineering practice standards. As such, the goods being provided are not intended to be complete in terms of required design-, marketing-, and/or manufacturing-related protective considerations, including product safety and environmental measures typically found in end products that incorporate such semiconductor components or circuit boards.

Olimex currently deals with a variety of customers for products, and therefore our arrangement with the user is not exclusive. Olimex assumes no liability for applications assistance, customer product design, software performance, or infringement of patents or services described herein.

THERE IS NO WARRANTY FOR THE DESIGN MATERIALS AND THE COMPONENTS USED TO CREATE USB-uLiPo. THEY ARE CONSIDERED SUITABLE ONLY FOR USB-uLiPo.

Table of Contents

CHAPTER 1: OVERVIEW

1. Introduction to the chapter

Thank you for choosing the USB-uLiPo from Olimex! This document provides a user's guide for the Olimex USB-uLiPo 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.

USB-uLiPo development board allows you to charge your lithium polymer batteries easily. It is also suitable for powering small boards with 3.7V.

USB-uLiPo is an open-source, open-hardware project and all documentation is available to the customer – you have the needed to make the board yourself.

1.1 Features

- Mini USB connector
- MCP73833 charger
- Mini USB connector
- JST 2.0 mm connector for our BATTERY-LIPO1400mAh
- Three status LEDs
- Selectable two charge currents 100/470mA
- Dimensions: (29 x 13) mm ~ (1.14 x 0.51)"

1.2 Target market and purpose of the board

The board is suitable for charging rechargeable lithium polymer (LiPo, LiPol) batteries. It is powered via the standard mini USB and is capable of providing 470mA @ 3.7V output per hour.

The strong points of the boards are the small form factor, the high compatibility and the convenience to use.

Customers have full access to the technical documentation of the board. The software is released under General Purpose License and the schematic and board design (made with Eagle) are released under Creative Commons Attribution-ShareAlike 3.0 Unported License. To view a copy of this license, visit http://www.creativecommons.org/licenses/by-sa/3.0/.

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 covers the connector pinout, peripherals and jumper description

- Chapter 4 provides the schematics
- Chapter 5 contains the revision history, useful links and support information

CHAPTER 2: SETTING UP THE USB-PWR

2. Introduction to the chapter

This section helps you set up the USB-uLiPo 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

USB-uLiPo 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 charger optimally, the following items are required:

- a LiPo battery or a board that can be powered by 3.7V

- a mini USB cable

Additional items include:

- jumper wires – might provide useful if using the pads instead of the JST battery connector

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

BATTERY-LIPO1400mAh – a rechargeable electronics battery with JST connector, the battery is suitable for all Olimex boards with BAT connector (like OLIMEXINO-STM32, PIC32-PINGUINO, OLIMEXINO-328, etc); there are also bigger battery variants of 3000mAh; 4000mAh and 6600mAh.

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

JUMPER WIRES – in different lengths and different male-female variants

2.3 Powering the board

The installation is pretty straightforward – you plug a mini USB cable to a computer (or to other power source in rare instances) and then to the USB-uLiPo. Then you connect the USB-uLiPo to a battery via the JST connector or to a target board using the PCB pads (next to the JST connector, marked as 1 and 2).

Note that some cheap mini USB cables might have high inner capacity. Some others might be too long (or having thick wires) leading again to inner resistiveness higher than optimal. Make sure the mini USB cable you use meets the recommendations.

Another problem that might occur is a faulty USB computer port or, even worse, USB hub. Please try another USB port and if possible another computer.

2.4 Modes of operation

The LiPo charger may work in either 470mA or 100mA mode. By default the SMT jumper is set in 470mA mode – this will charge a typical 1400mA battery in about 3 hours if the USB is capable of providing 470mA. However, for some smaller batteries or weaker USB ports/hubs (unable to provide 470mA) it might be a good idea to use 100mA mode. It would require basic soldering and cutting skills to set the jumper to 100mA mode.

2.5 Status LEDs description

The LEDs have the following meaning and behavior:

Red LED on – means there is an active and properly working USB mini connection

Yellow LED on – means that the battery is currently charging (board is drawing power)

Green LED on – means that the battery is fully charged and overcurrent protection is on (connected board does not draw power)

CHAPTER 3: CONNECTORS AND PINOUT

3. Introduction to the chapter

In this chapter jumpers functions are described. Notes and info on specific peripherals are presented.

3.1 Battery connector

The battery connector is JST 2.0 mm. If your batteries use 2.54mm step there are a number of cheap adapter-cables for 2.0 ↔ 2.54 available.

3.2 External power pads

There are a couple of pads provided near the JST 2.0mm battery connector which might be used to power another board or PCB that can handle 3.7V.

3.2 Jumper description

Please note that the jumper on the board is SMT type and to configure it you would need basic cutting/soldering skills. You have to cut the PCB solder between the pads with a cutter knife. If you want to set it to default position you have to solder the pads together again.

3.2.1 470mA_E

This is a jumper that sets the output current. The bigger the current the faster the recharge of the battery. By default 470mA_E is closed, meaning the target battery or board would receive 470mA of current per hour.

If you decide to cut the jumper pads, the board will provide 100mA of current to the target battery/board.

CHAPTER 4: SCHEMATICS
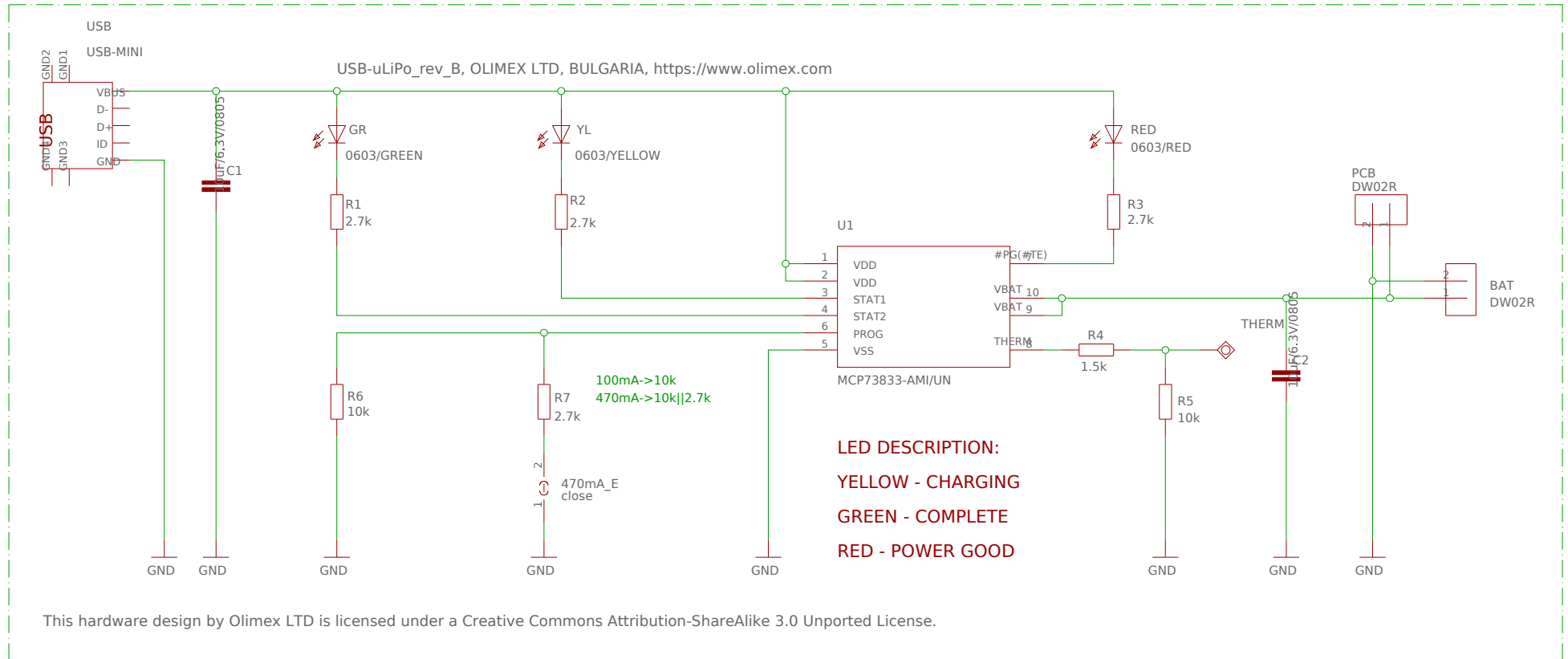
4. Introduction to the chapter

In this chapter are located the schematics describing logically and physically USB-uLiPo.

4.1 Eagle schematic

OLinuXino schematic is visible only for reference here. You can view high resolution .pdf version at https://www.olimex.com/Products/Power/USB-uLiPo/. It is located in HARDWARE section. Note that the Eagle schematic and board files are also available at the mentioned section.

This hardware design by Olimex LTD is licensed under a Creative Commons Attribution-ShareAlike 3.0 Unported License.

The latest EAGLE schematic is situated on the next page for quicker reference. If you are looking for a schematic of an older revision of the board and it isn't available at our web site you may request it by the support e-mail.

USB-uLiPo_rev_B, OLIMEX LTD, BULGARIA, https://www.olimex.com

USB
USB-MINI

GR
0603/GREEN

YL
0603/YELLOW

RED
0603/RED

R1
2.7k

R2
2.7k

R3
2.7k

U1

VDD
VDD
STAT1
STAT2
PROG
VSS

#PG(#TE)
VBAT
VBAT
THERM

MCP73833-AMI/UN

R6
10k

R7
2.7k

100mA->10k
470mA->10k||2.7k

470mA_E
close

R4
1.5k

R5
10k

PCB
DW02R

BAT
DW02R

THERM

LED DESCRIPTION:

YELLOW - CHARGING

GREEN - COMPLETE

RED - POWER GOOD

This hardware design by Olimex LTD is licensed under a Creative Commons Attribution-ShareAlike 3.0 Unported License.

4.2 Physical dimensions

Note that all dimensions are in millimeters (mm).
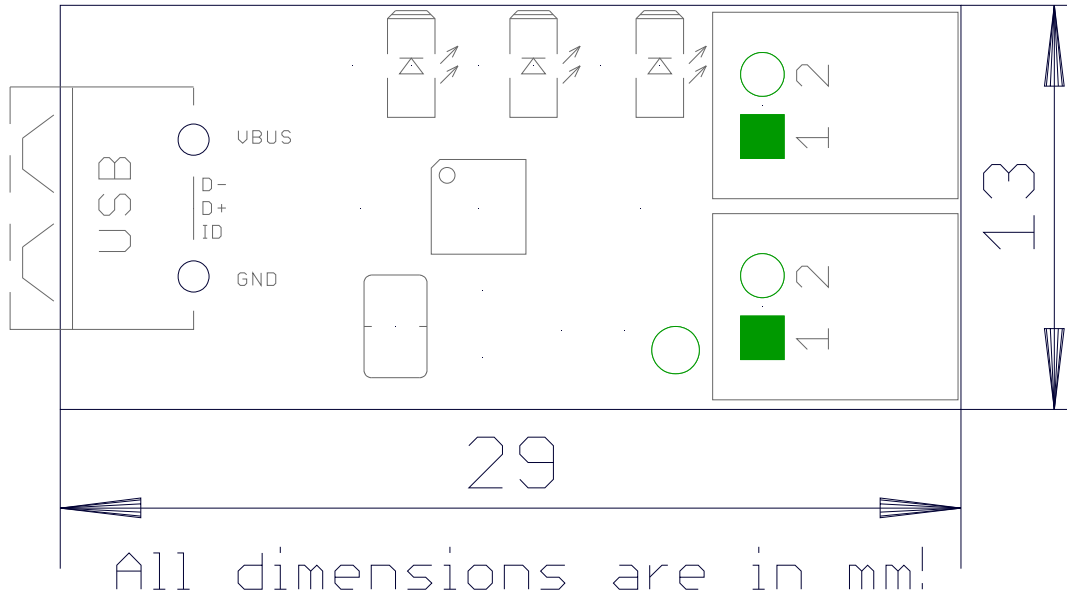
CHAPTER 5: REVISION HISTORY AND SUPPORT

5. Introduction to the chapter

In this chapter you will find the current and the previous version of the document you are reading. Also the web-page for your device is listed. Be sure to check it after a purchase for the latest available updates and examples.

5.1 Document revision

Revision	Changes	Modified page#
A, 02.04.13	Initial creation	All
B, 26.05.14	Removed leftover "OlinuXino" mention; fixed incorrect information about the default measurement units	6; 11

5.2 Board revision

Remember to check the schematics and the board design files to compare the differences.

Revision	Notable changes
B	Initial release of the board

5.3 Useful web links and purchase info

The web page you can visit for more info on your device is
https://www.olimex.com/Products/Power/USB-uLiPo/.

A place for general questions, FAQ or friendly talk check our forums:
https://www.olimex.com/forum/

How to purchase?

You can purchase directly from our online shop or from any of our distributors. List of distributors:
https://www.olimex.com/Distributors.

Check https://www.olimex.com/ for more info.

5.4 Product support

For product support, hardware information and error reports mail to: support@olimex.com. Note that we are primarily a hardware company and our software support is limited.

Please consider reading the paragraph below about the warranty of Olimex products.

```
Warranty and returns:


Our boards have lifetime warranty against manufacturing defects and
components.

During development work it is not unlikely that you can burn your programmer
or development board. This is normal, we also do development work and we have
damaged A LOT of programmers and boards during our daily job so we know how it
works. If our board/programmer has worked fine then stopped, please check if
you didn't apply over voltage by mistake, or shorted something in your target
board where the programmer was connected etc. Sometimes boards might get
damaged by ESD shock voltage or if you spill coffee on them during your work
when they are powered.

Please note that warranty do not cover problems caused by improper use,
shorts, over-voltages, ESD shock etc.


If the board has warranty label it should be not broken. Broken labels void
the warranty, same applies for boards modified by the customer, for instance
soldering additional components or removing components – such boards will be
not be a subject of our warranty.


If you are positive that the problem is due to manufacturing defect or
component you can return the board back to us for inspection.

When we receive the board we will check and if the problem is caused due to
our fault and we will repair/replace the faulty hardware free of charge,
otherwise we can quote price of the repair.


Note that all shipping back and forth have to be covered by the customer.
Before you ship anything back you need to ask for RMA. When you ship back
please attach to it your shipping address, phone, e-mail, RMA# and brief
description of the problem. All boards should be sent back in antistatic
package and well packed to prevent damages during the transport.
```