

# **McHF UI board soldering Guide**

**v 0.4, 2 May 2014**

## Tools needed:

1. Temperature controlled soldering iron
2. Flux pen and some No Clean liquid flux refill
3. SMD scraper tool
4. Small tweezers
5. Desktop light
6. Magnifying glass
7. Some 60/40 solder wire
8. 0.8mm solder braid
9. Printed out UI board BOM and Schematics
10. Multimeter for continuity testing

The PCB has two layers – Top and Bottom, most parts are on the bottom layer, but LCD, encoders and buttons are on the Top layer.

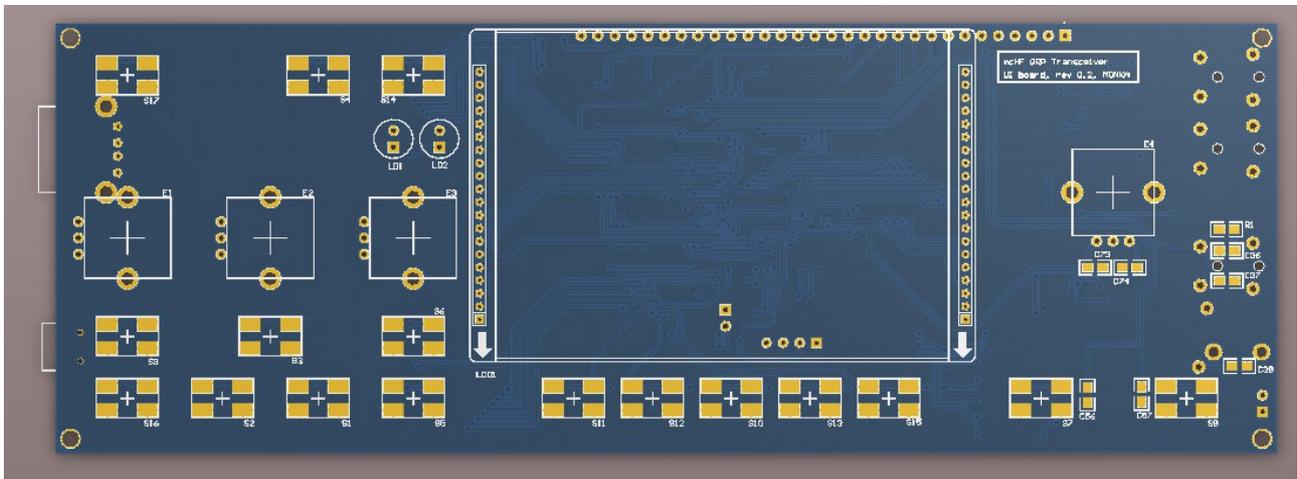


Fig1: Top Layer

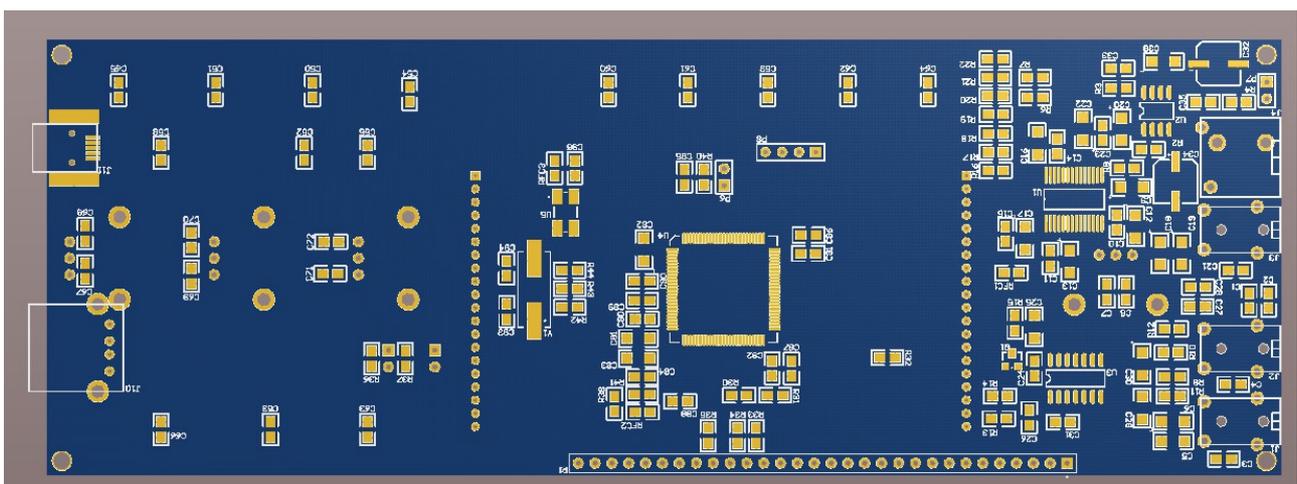


Fig2: Bottom Layer

Following the soldering procedure steps is very important and will minimize problems. I also have the habit of printing the BOM and schematics and using a pen, make notes, and for sure place a tick in the BOM table after soldering a component.

## Soldering procedure step by step:

1. CPU (bottom layer)
2. All small SMD components on bottom layer (capacitors and resistors)
3. Semiconductors on bottom layer(chips, transistor, txco)
4. All tantalum caps on bottom layer (except 220 uF ones)
5. Small SMD components on Top Layer(capacitors and resistors)
6. Clean extra flux (scrape if too much) with paint thinner/white spirit
7. Wash the board with hot soap water
8. Dry the board with hot air(hair drier or de-soldering station)
9. Solder all buttons on Top Layer
10. Solder all connectors on Bottom layer
11. Solder female 30 pin header on bottom layer
12. Solder encoders on top layer
13. Solder the LCD on top layer
14. Solder LEDs on top layer
15. Solder the two 220uF capacitors on bottom layer

## Soldering the Bottom Layer in detail

First solder the CPU using drag soldering method. Procedure:

- Lay the PCB on flat surface
- Apply a lot of flux on the CPU pads with the pen
- Carefully place the CPU with the tweezers, make sure you don't bent any pins
- Using the scraper tool carefully move each corner while it fits on the pads
- Hold the board and the CPU as a 'sandwich' in your left hand while inspecting with the magnifying glass with your right hand under the desk lamp
- Repeat alignment procedure if there is mismatch between the CPU pins and the footprint pads on the PCB
- If all ok, while holding with your left hand, using your right hand and the soldering iron, get some solder with the iron tip and drop it on each corner (pin 1, pin 16, pin 17...)
- Getting 4-5 points soldered is enough. Don't mind short circuits
- Lay the board flat on the table
- Then apply drag soldering procedure – apply flux on each side, then using solder wire apply solder, again don't care about shorts – it is part of the drag soldering routine. If not sure, check some Youtube videos how its done
- Inspect under the magnifying glass if there is enough solder one every pin
- Using solder braid, remove excess solder
- Apply more flux with the pen, do the drag soldering procedure again till the solder is equally distributed on all pins
- Inspect with magnifying glass – for equal amount of solder and shorts
- Repeat procedure as many times as needed, till you get perfect result

**Note:** It is very important to use very small force on the CPU pins while drag soldering. If you use too much force and bent a pin, the only way to fix the problem is to remove the CPU with hot air, straighten the pins, after cleaning them, then clean the CPU pads and start all over again. This is due to the very small, 5 mil clearance of the footprint.

## Soldering the SMD resistors and capacitors

This is pretty straightforward, except that some components are not easy to identify, due to solder mask imperfections or bad placement on my part. Please check the next few pictures for details

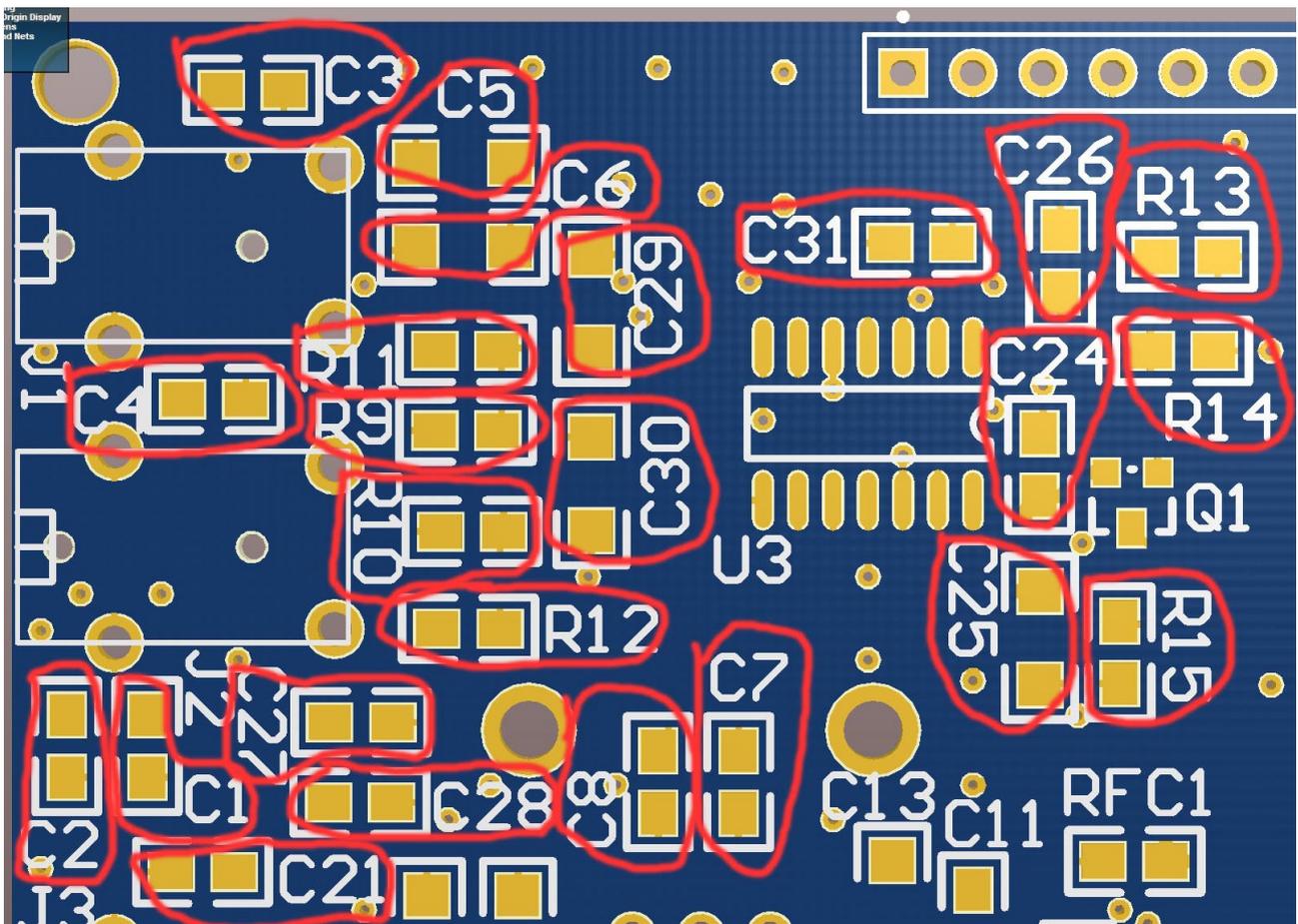


Fig3: Audio interface and switching (UI board rev 0.1):

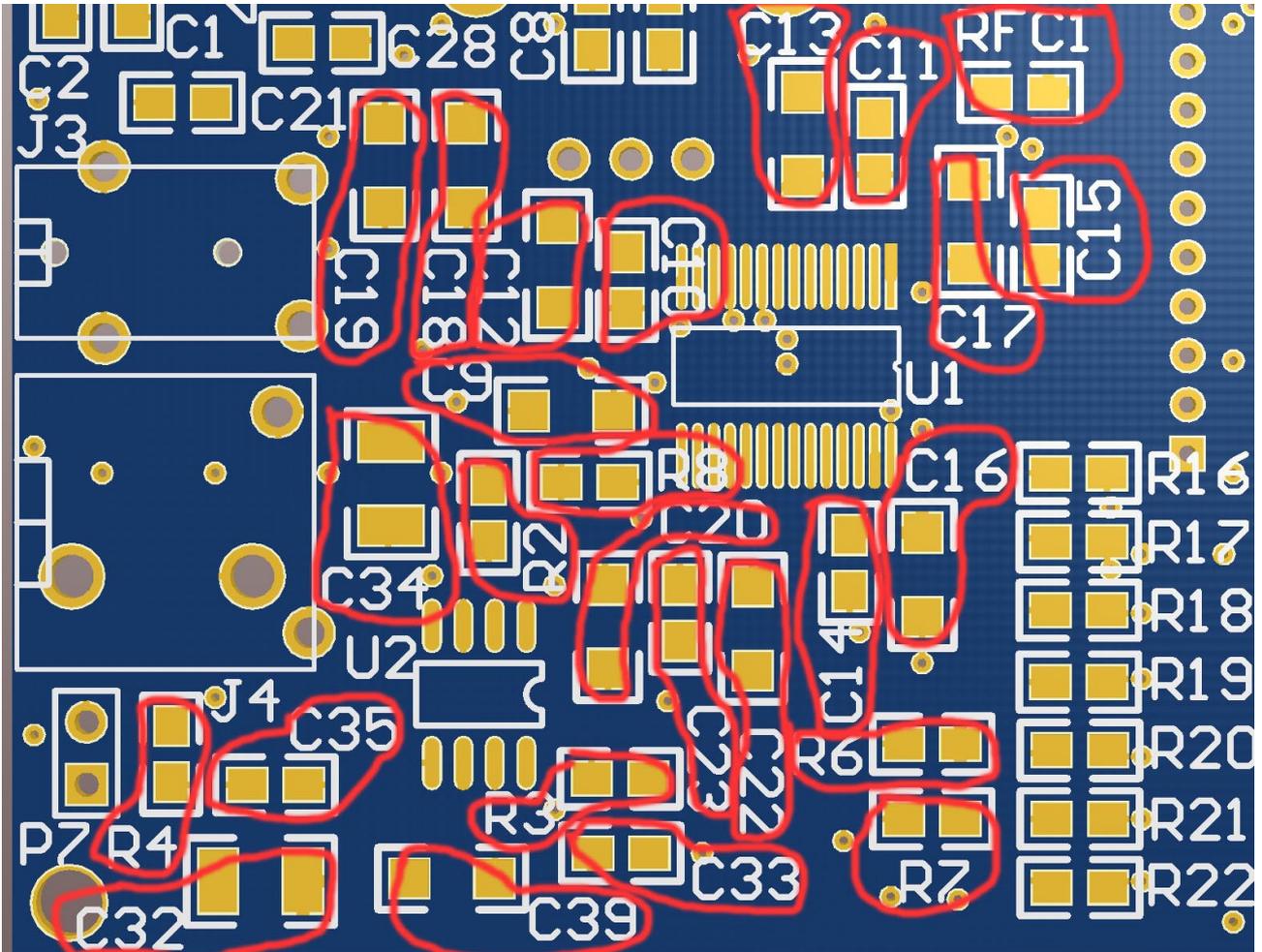


Fig4: Codec and Speaker Amp(UI board rev 0.1)

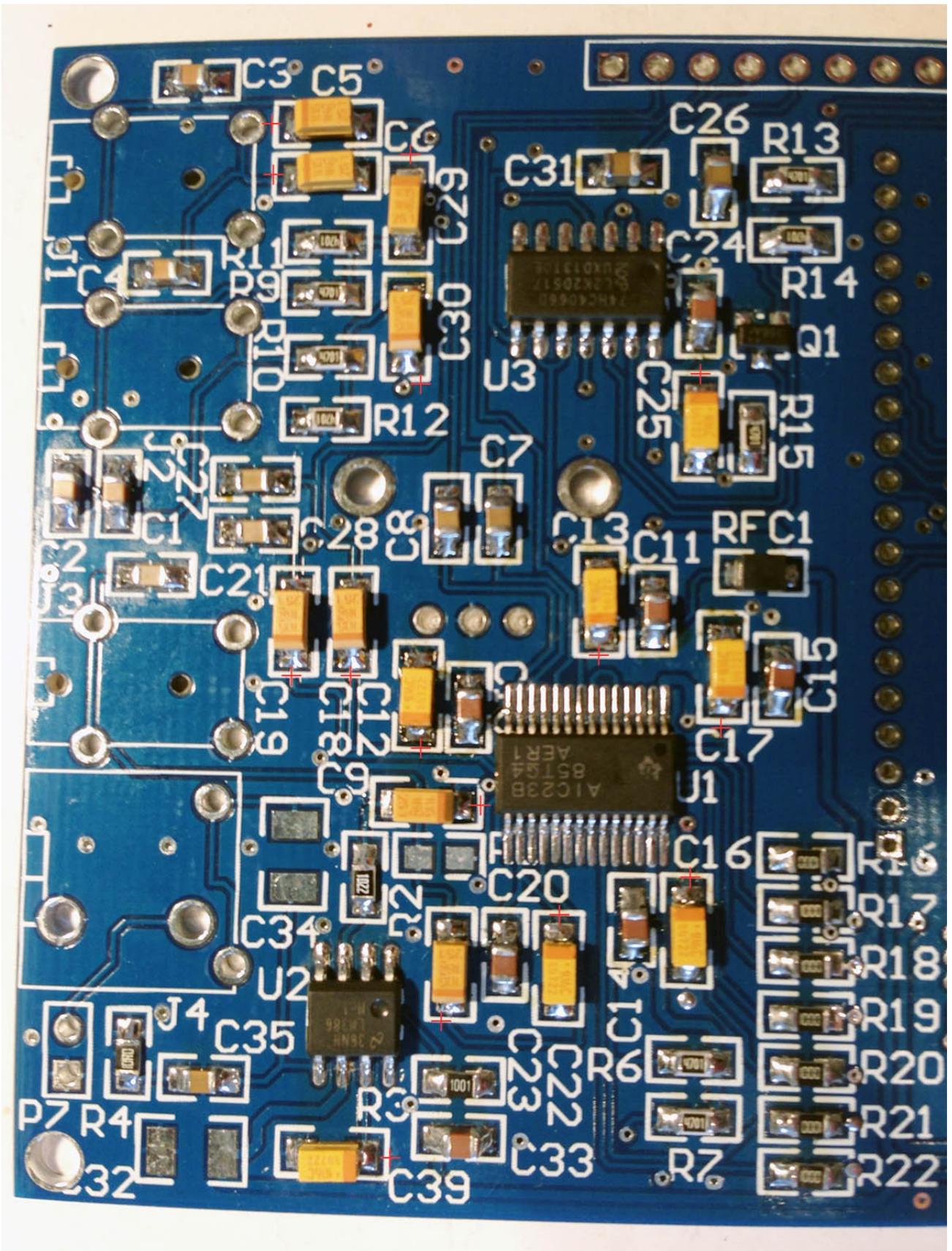


Fig5: All SMD parts done(UI board rev 0.1):

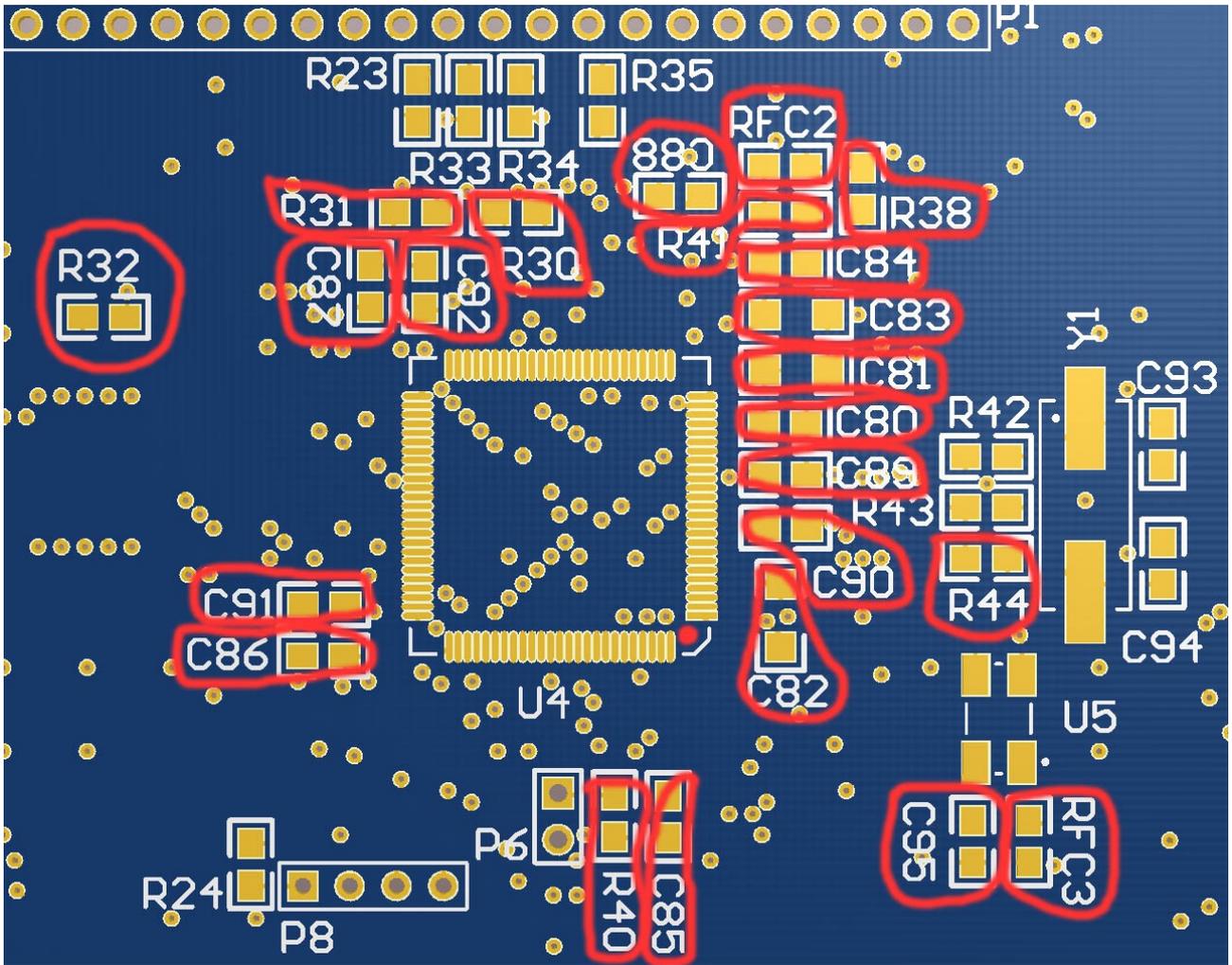


Fig6: CPU, clock and power(UI board rev 0.1):

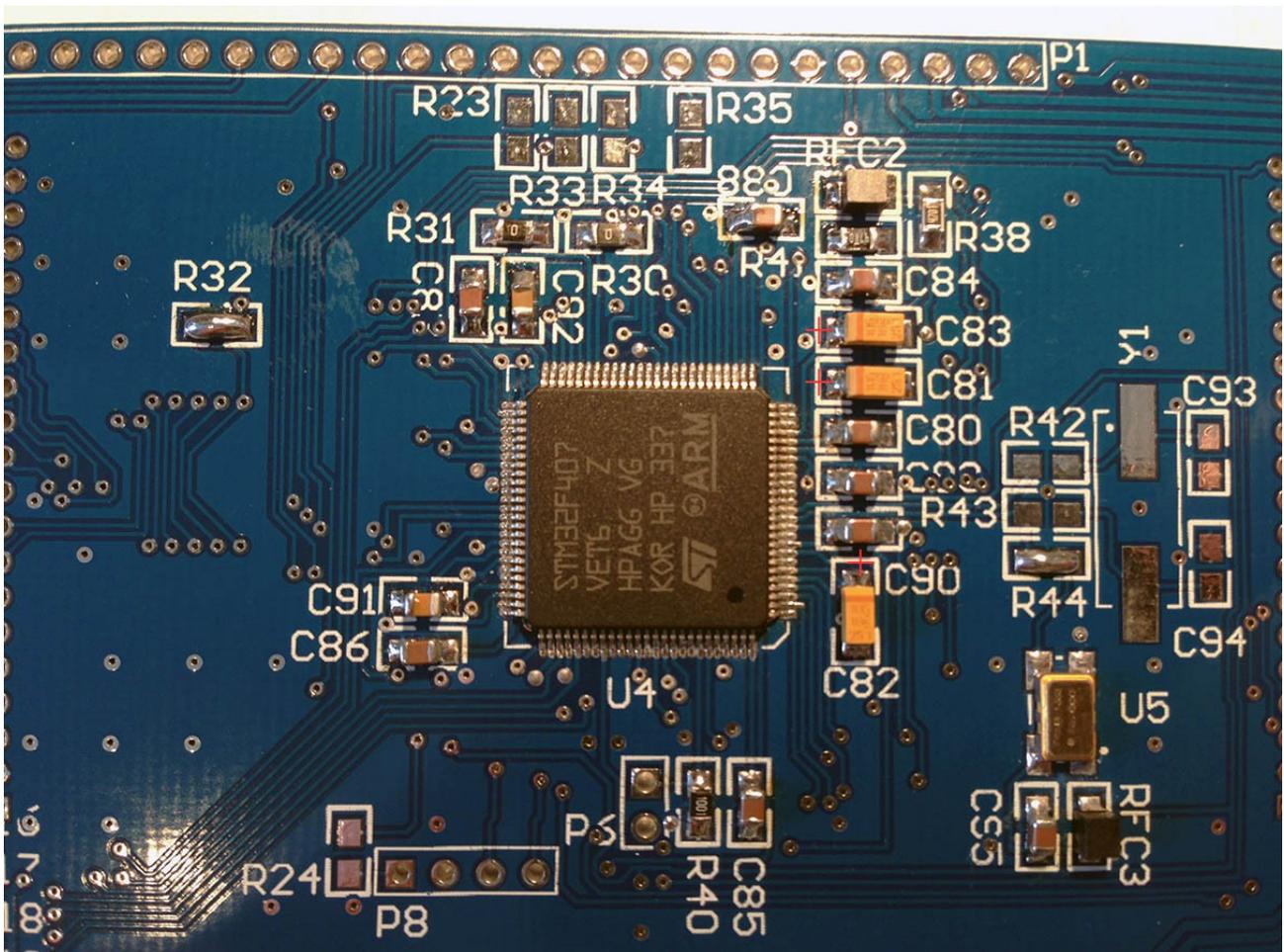


Fig7: All done(UI board rev 0.1):

### Soldering the tantalum capacitors

This unfortunately is tricky as well, as I used some library footprint for those, that doesn't reflect the positive terminal. So it is a good idea to consult the schematics and maybe use a multimeter before soldering or use Fig3 as reference. The orange line on the side of the yellow tantalum capacitors is the positive terminal.

### Soldering the LCD

The most important step here is not to put it the wrong way, there are two white arrows – on the UI PCB and the LCD PCB, those need to match exactly. The pins of the LCD sticks a bit to much, it is a good idea to trim them, but not before the board was tested to be fully working.

**Note:** Important to check what type of LCD you have. The HY28 LCD so far has three versions – serial only, parallel only and the latest model – dual support (interface select via 0 ohm resistors). The first two are named the same (HY28A), the difference is that the interface that is not in use is not connected on top layer. The dual version is named HY28B, it needs to be used in 16 bit parallel mode. As of firmware 0.169 all three types are supported, but the parallel versions have their panel installed upside down, this causes mismatch between the function buttons on screen and actual switches on PCB.

## Soldering the LEDs

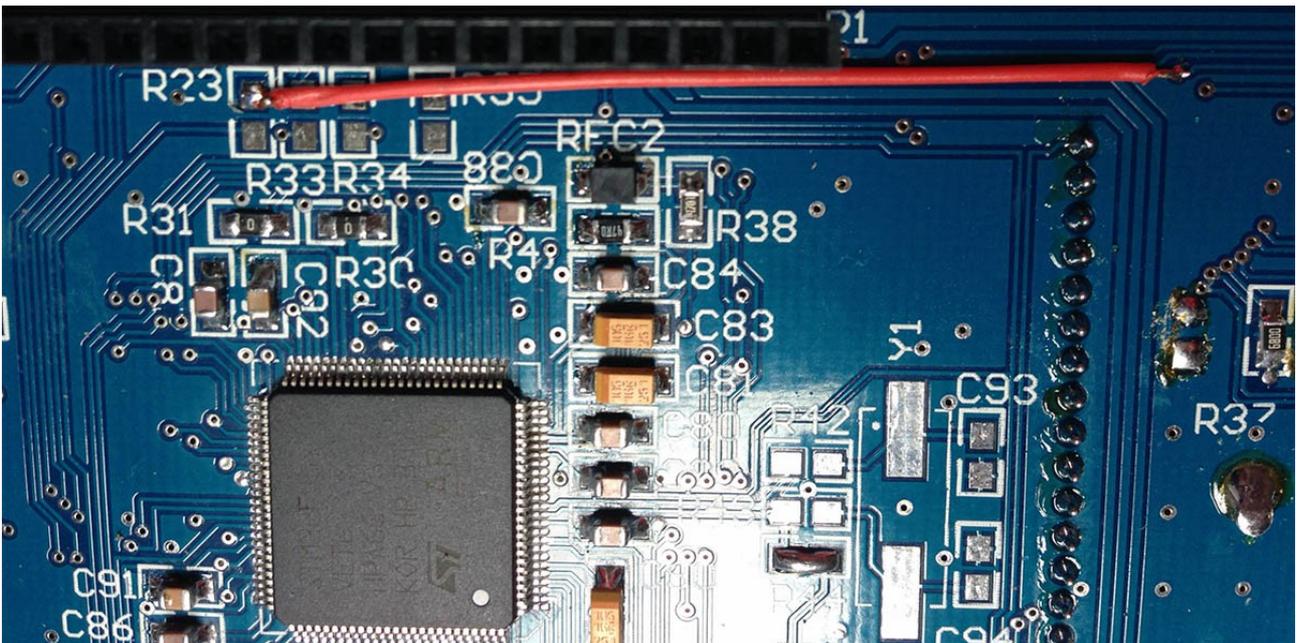
It is a good idea to have the front panel handy when deciding how deep to insert and solder the LEDs.

## Soldering the aluminium 220uF capacitors

The footprint for those is completely wrong, so the plastic bottom insulator needs to be removed and the capacitor soldered upright with a blob of solder on the pads. But make sure it doesn't stick up too much, as it will have problem fitting into the middle part of the enclosure. The black line on those capacitors is the negative terminal. Finally – put some hot glue in the base, to prevent breaking of the pins during experiments and testing.

## UI board revision 0.1 power supply mod

This mod require a small wire between R23 pad (closest to the 30 pin header female connector) and a via that routes the power button terminal to the CPU. Vias in this UI revision are exposed,so no problem to solder to it.



73, Chris  
MONKA