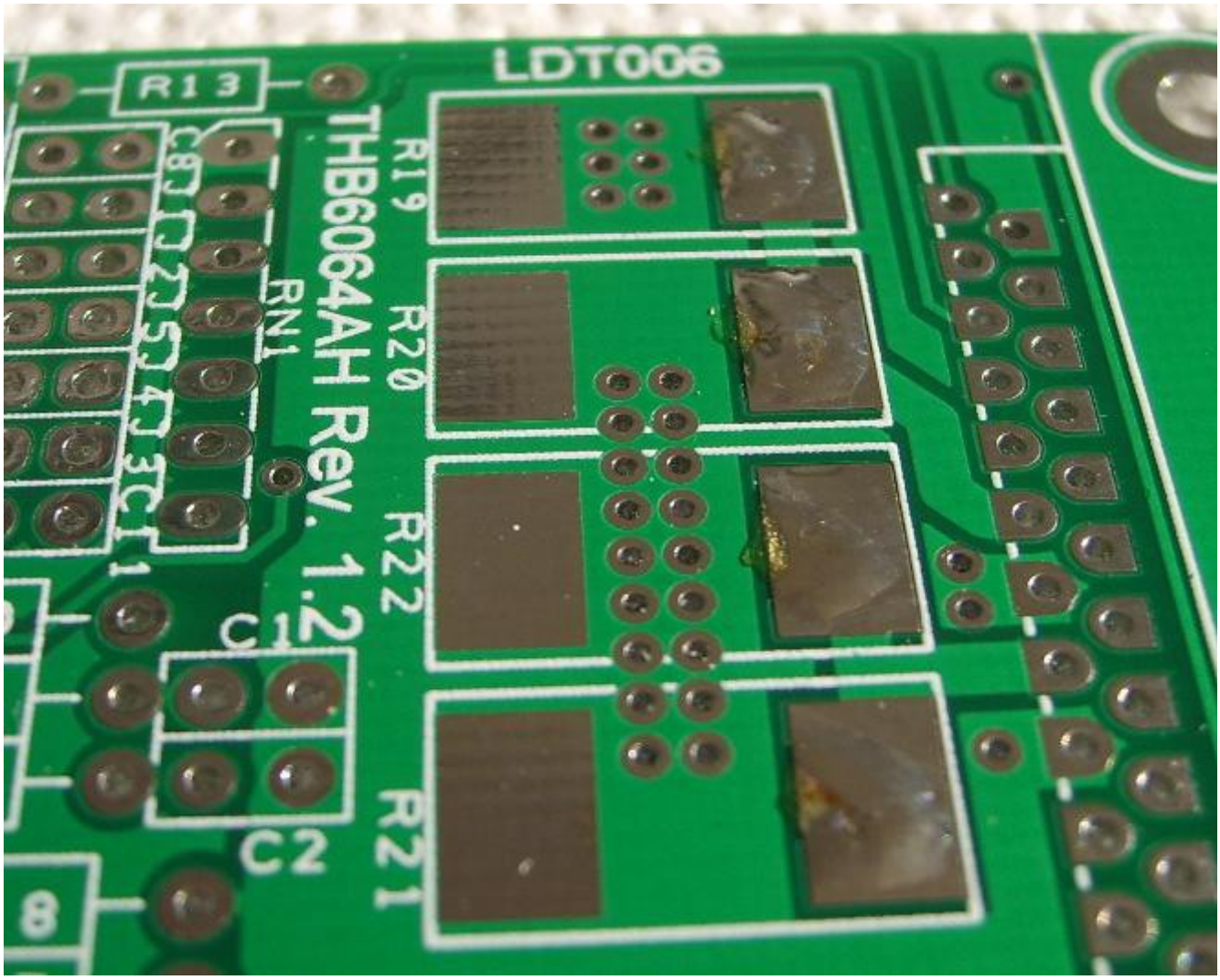
Assembly procedure for traditional version, Rev 1.2

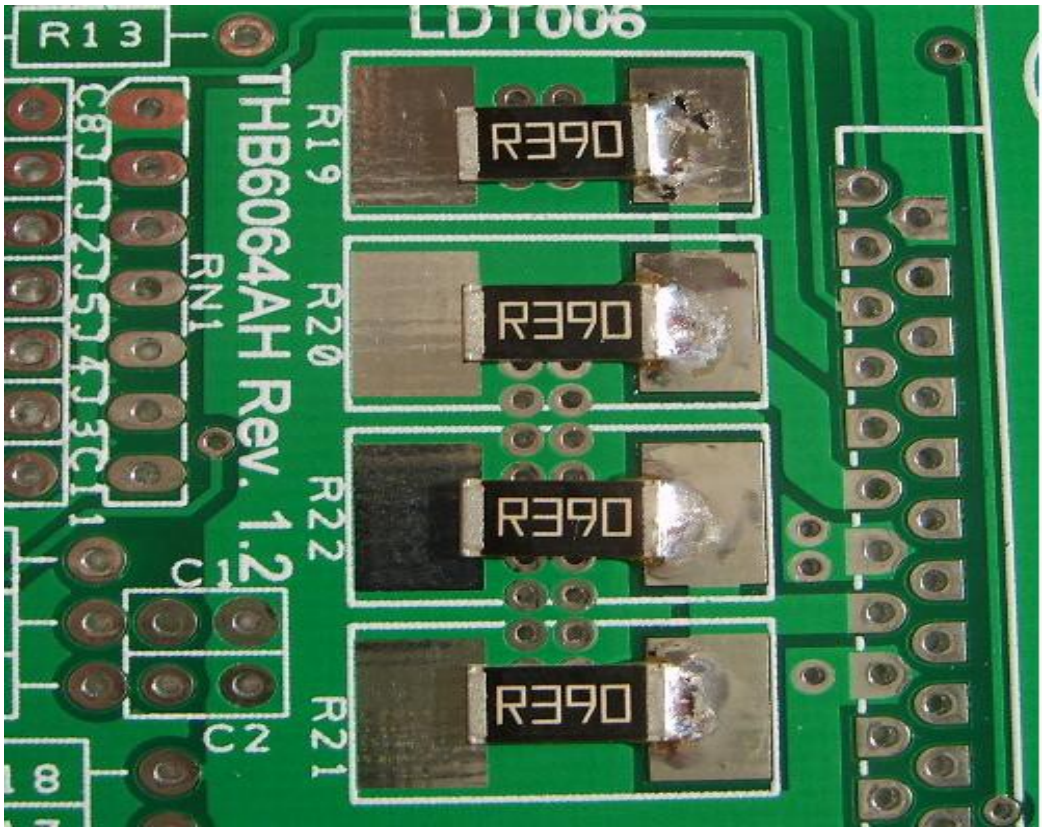
There are a few PDF's on my website: “Printer friendly PDF” (which shows part locations and indicates direction of polarized components) and a Bill of materials. These 2 are needed for assembly (to locate the position of each individual part), connection and testing.

Mount and solder the components with lowest height first and work gradually to the highest ones. When mounting connectors: solder a single pin (preferably one in the center) and then reflow the soldered pin whilst pushing the connector against the PCB, this will prevent mechanical stress on the solder connections.

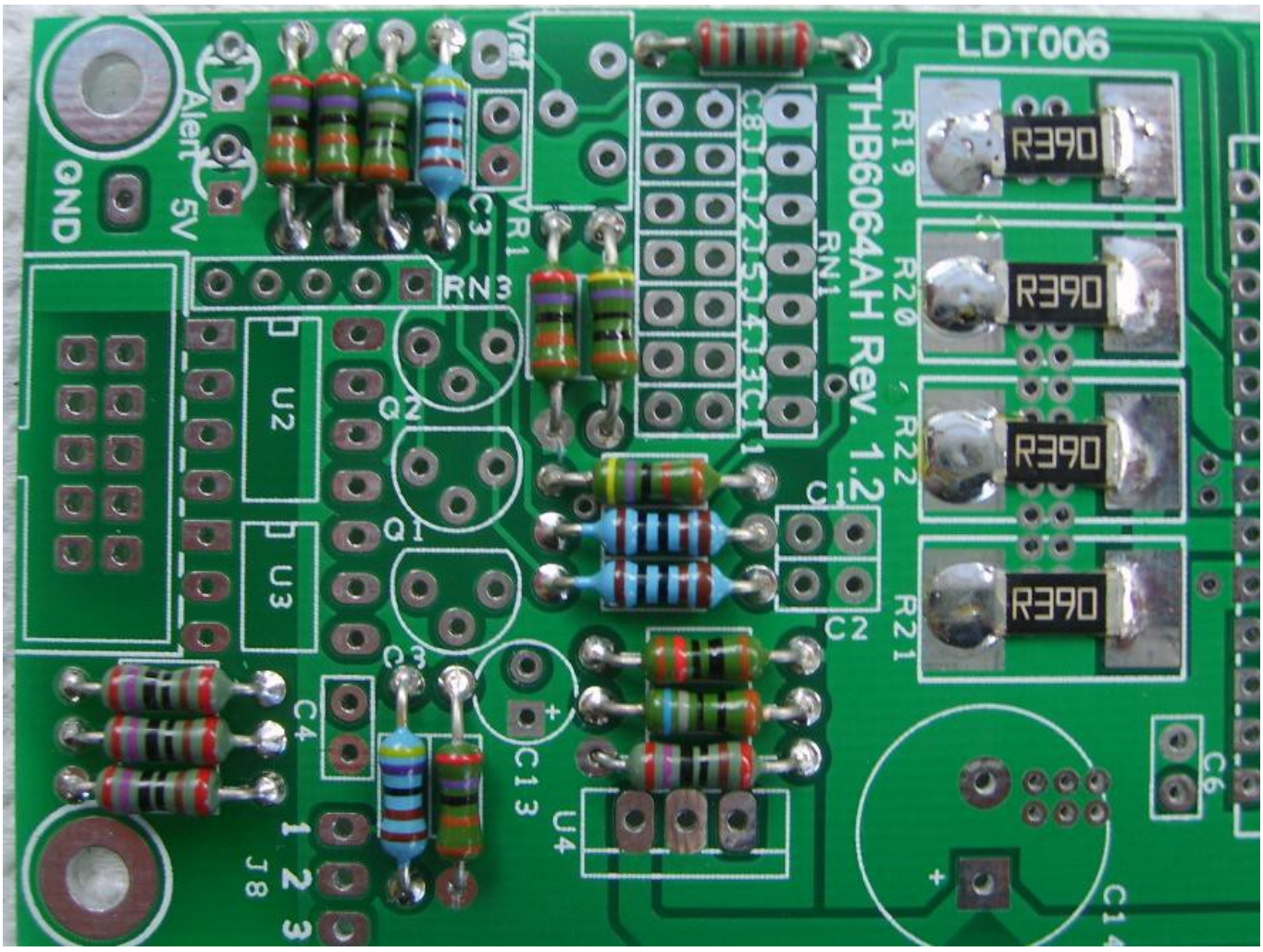
1. SMD resistors, you will need a fine tip on the soldering iron. Put a bit of solder on the top pads of R19, R20, R21 and R22 like in the picture below.



Place the resistor below the solderblob, reheat the solder and shift the resistor so that it is spaced correctly over the 2 pads, result should be like the picture below.

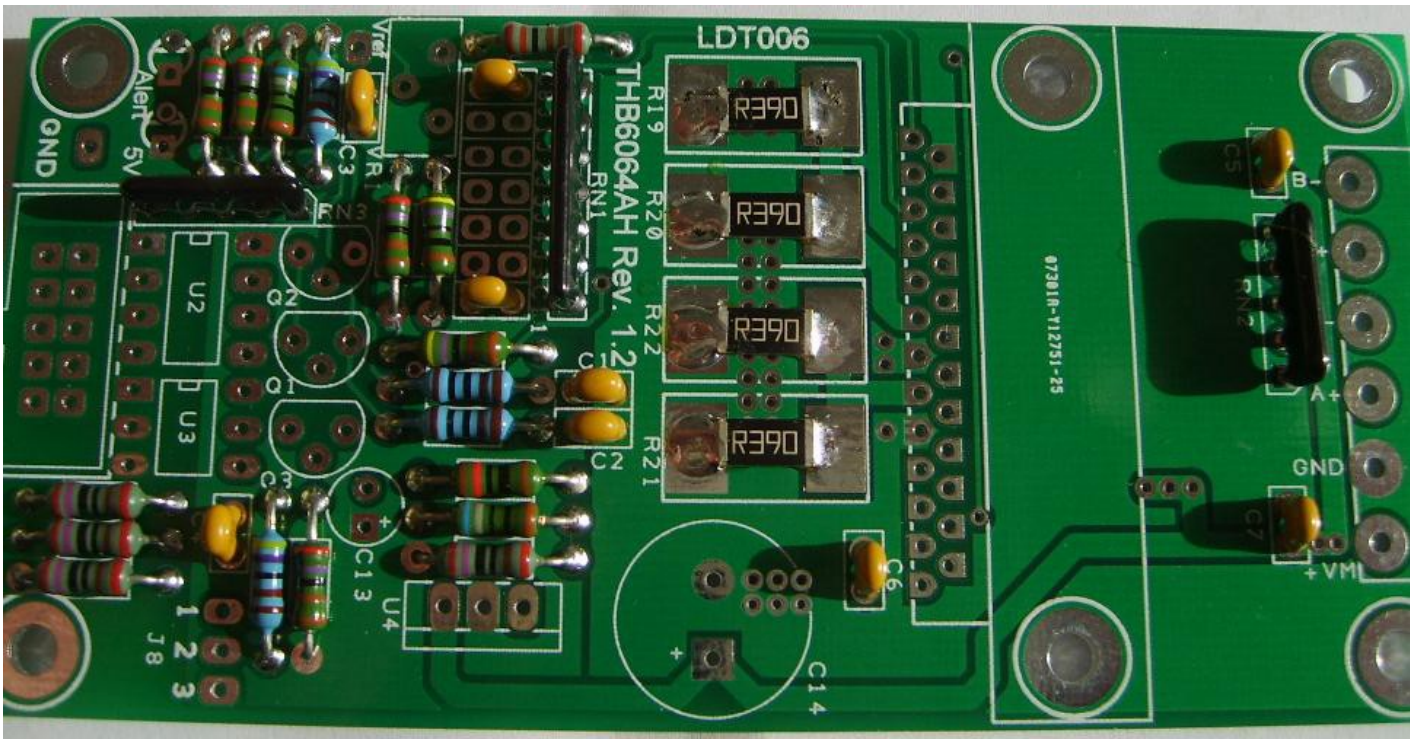


Solder the other sides of the 4 resistors. It should be like the picture below.

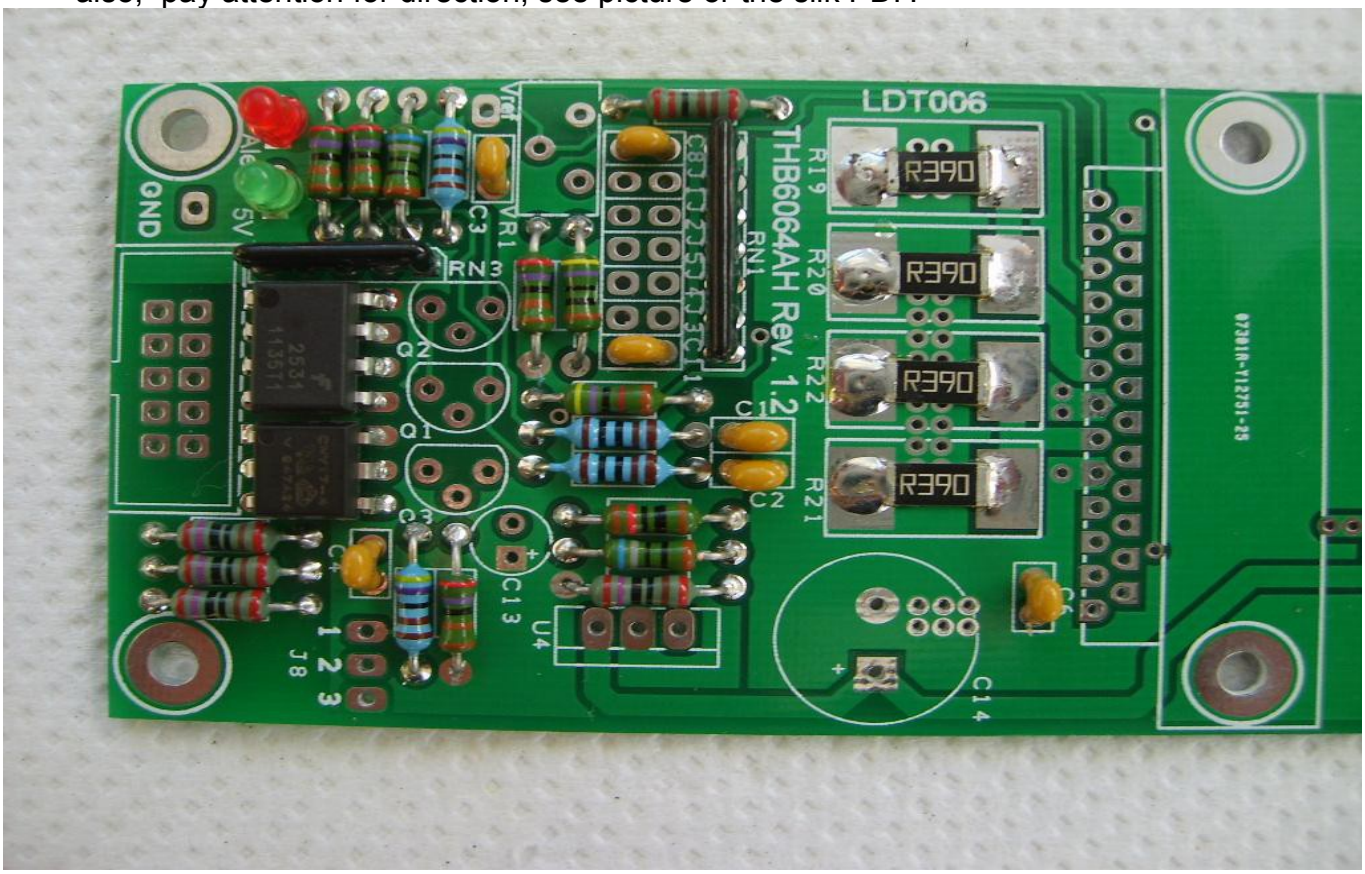


2. Resistors laying flat, see picture above.

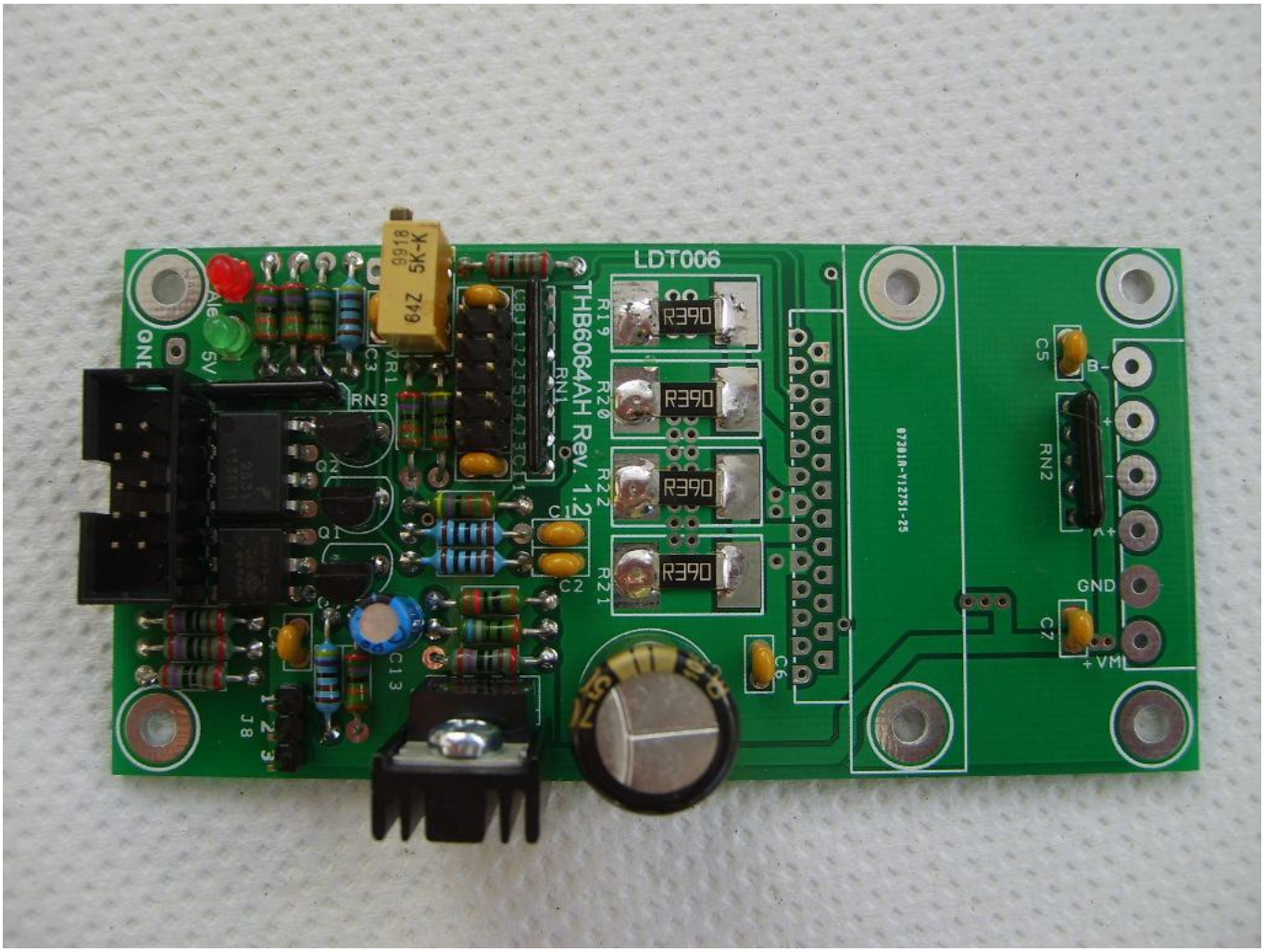
3. Now install the 7 pcs 100n (marked 104) and 2 x 100p (marked 101) ceramic cap's, see picture below. Then the resistor arrays, pay attention for pin1, marked with a dot on the array. Pin 1 must go in the square pad and the silk also has a fillet on the corner where pin 1 must go.



4. Mount the LED's, the longest wire must be in the square hole. Mount the 2 optocouplers also, pay attention for direction, see picture or the silk PDF.



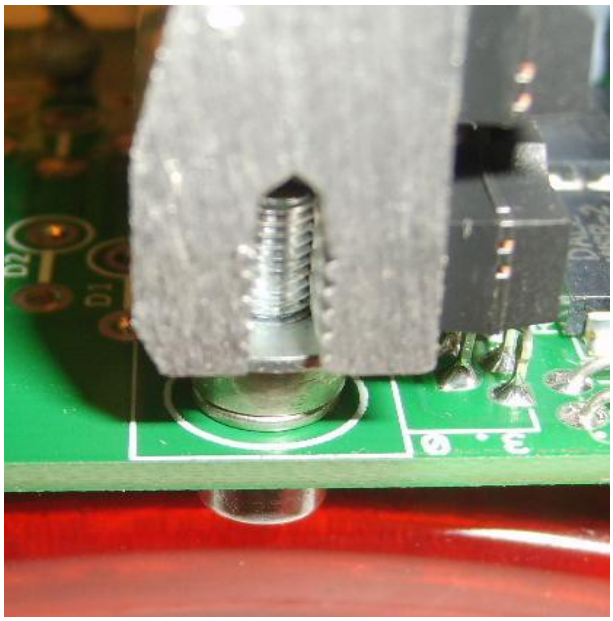
5. Next are the 3 transistors, the jumper header and block, the 6 pin motor connector (not visible on the picture below) and the flat-cable header, see pic's for it's direction.
   There are now 4 components left to install in this sequence:
   - Small electrolytic capacitor, long wire goes in the square hole and marked “+” on the silk.
   - The 5K trimpot.
   - Voltage regulator with a small heat sink, see silk for direction.
   - Big electrolytic capacitor, long wire goes in the square hole and marked “+ “on the silk.

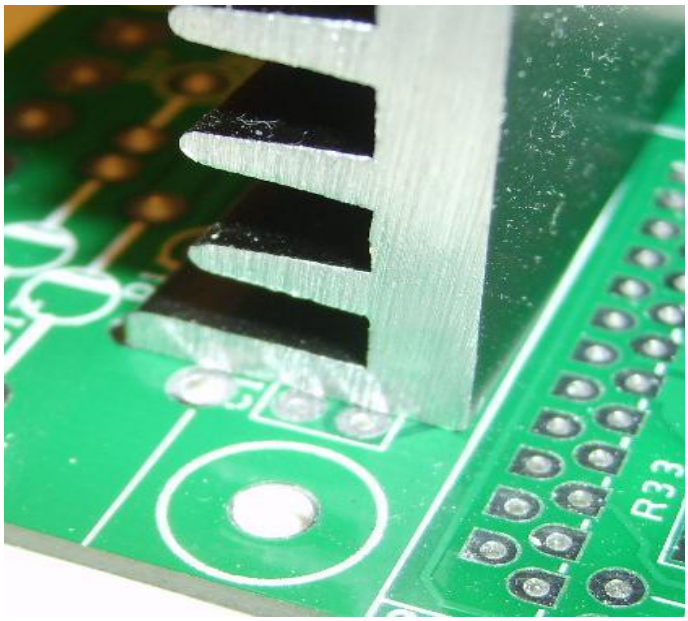


The assembly is now complete except for the chip and it's heatsink.

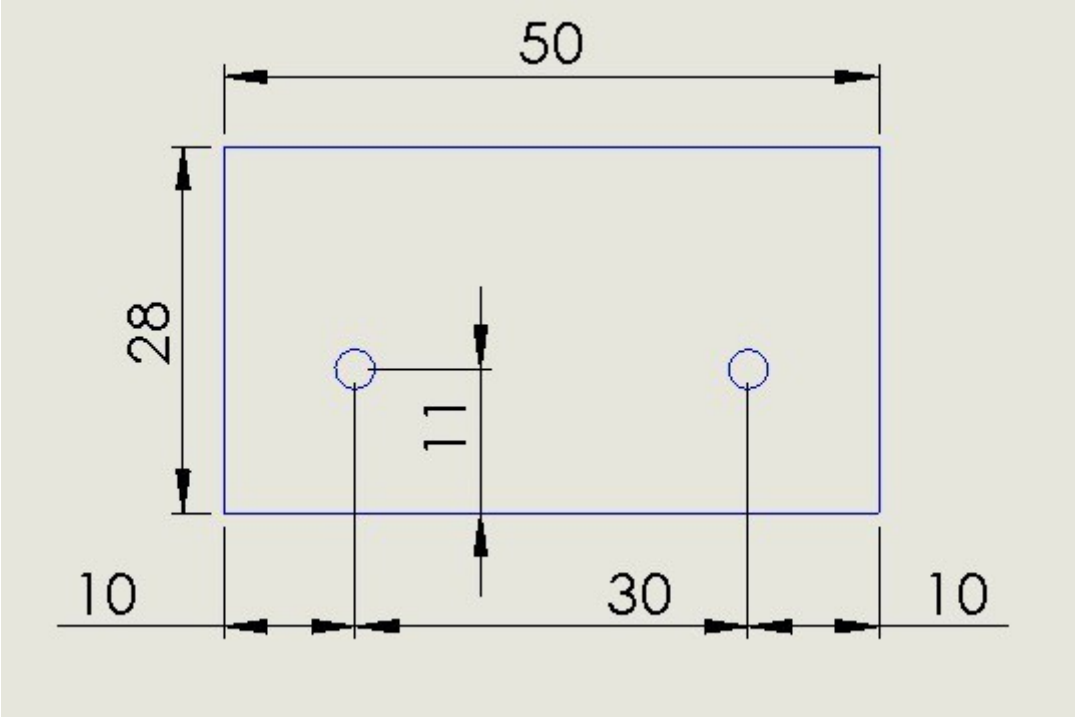
At this point, without the chip installed, do a visual inspection preferably with a magnifying glass. Then apply power, 12-18VDC from a small adapter or a real power supply (40VDC max) but with a 1A fuse in the +VM line.
Now the 5V can be checked, the +5v led should be on and the Vref can be measured and adjusted to a low value: 0.4-0.5V. Use the GND hole for the ground and the Vref hole for measuring.

There are several models of heat-sinks which can be used, below are 2 pictures of commercially available ones. The original design was made for these but they are rather expensive.





Recently I found a cheap and nice one, the **FISCHER ELEKTRONIK SK 125/50 SA** and the PCB is now adapted for this one.
Prepare the heatsink by drilling and tapping 2 M3 holes, see picture below.



Use some heat conductive paste and mount the chip onto the heat-sink.

Mount this assembly firmly to the PCB, only solder the pins when everything is aligned properly so that no mechanical stress is introduced.
Final result should be like this, a great looking and performant drive:

It's best to do a second inspection now for shorts and eventually do some measurements on the drive power and motor connector, use a multimeter in diode setting and measure all possible combinations on the connector, none should indicate a short, it takes a bit of time but will prevent smoke or a big bang.

Place jumpers to select your preferred settings and it's ready for testing,

Connect a motor and the power supply, not yet the signal cable. This drive is not enabled when there's no current through the enable optocoupler.
Power up and the motor should not lock-up.
If all seems normal you can now increase the Vref setting to approx 30% of the motor rating, why only 30%? Because the drive is in standby mode.
Be very careful when adjusting VR1, use a matching screwdriver and avoid it to slip away, it might create a short somewhere.
Leave it on for a while and check if nothing becomes too hot.

Power down and connect the signal cable to a BOB, use whatever program to enable and spin the motor. You can now adjust the current to the motor rating while the motor is running.

Revision history:

1.0 Original version
1.1 Modified for new heatsink