PSL-3604 – Hardware Upgrade

Boards rev. 1

1. There is an error in the schematic of the front panel – pins 11 and 12 of register U4 are mixed up.It is corrected by jumpers, the necessary vias are located next to it (Fig. 1). Pin tracks 11 and 12 are trimmed before jumpers are installed.

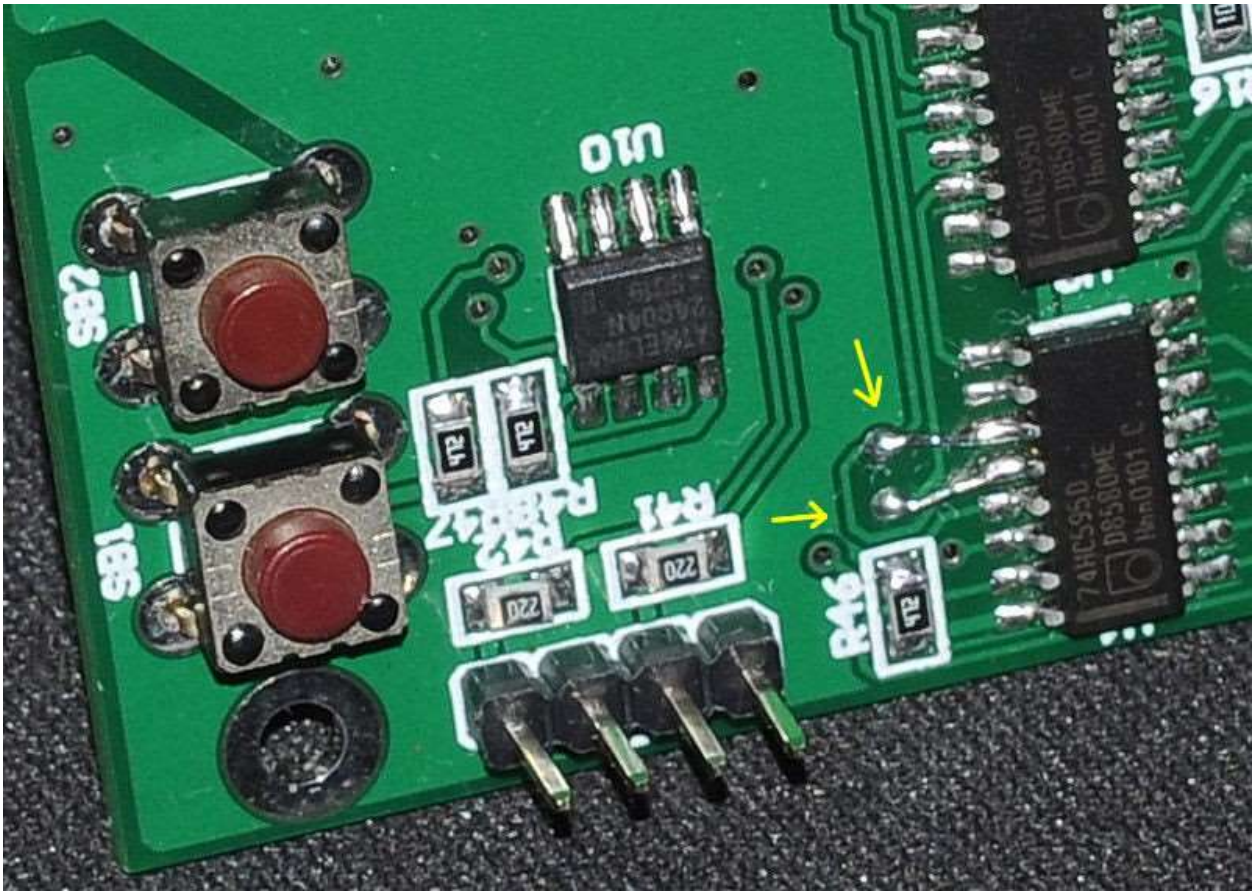

Fig. 1.

2. The processor has been replaced with STM32F100C8T6BB (Fig. 2).
3. There was an ADC error of several units. It is corrected by replacing the C2 and C4 capacities at the input of the ADC with 220 pF (Fig. 2).
   Explanation here: r e a d STM32 ISSUE

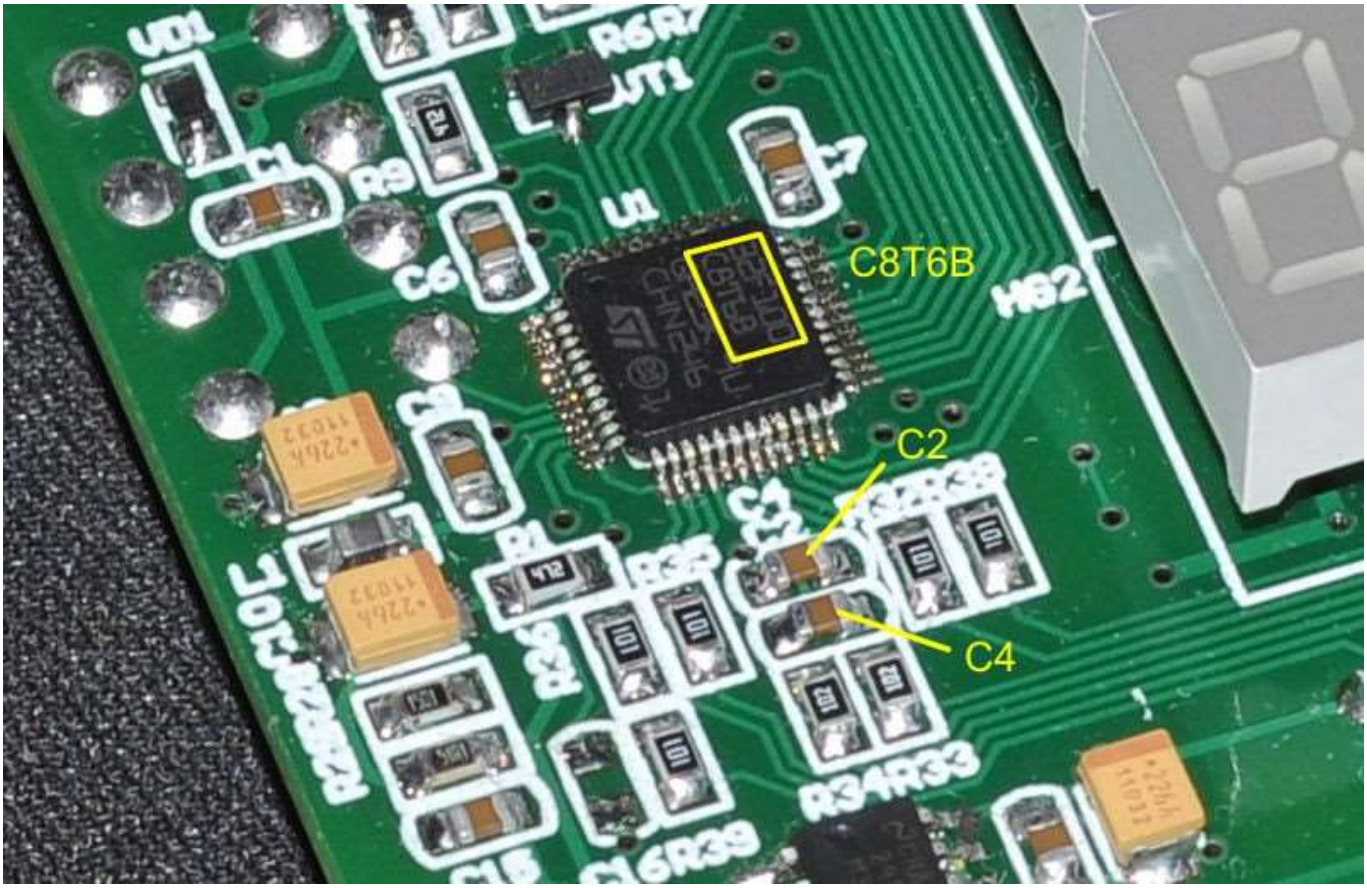

Fig. 2.

4. The voltage across the C20 capacitor is about 48V, which is close to the maximum (50V). Replace the C20 capacitor with 2200 µF x 63 V (Fig. 3). Such a replacement is only required if the transformer used provides such a high voltage. For lower voltage versions of the PSU, replacement is not required.
5. The voltage at the input of the regulator is -5 V too high (about 20 V). Capacitors C1 and C3 need to be replaced with 47 µF x 100 V (Fig. 3). In this case, the voltage is reduced to about 13 V, which is normal.

Fig. 3.

6. Remove components VD20, R78 (number 1 in Figure 4). It is enough to remove one of the components, I did not remove the diode. In principle, they are not very disturbing, but there is not much benefit either. Components were introduced to reduce the downward surge that was observed when the voltage was abruptly reduced at some load capacitances. But the emission is very small (about 100 mV), there is no point in fighting.
7. Replace the R89 on the power board with 5.1 kΩ to correctly detect the status of the incoming output current (number 2 in Figure 4). Here there were disagreements with the simulator, he is too optimistic about the maximum range of voltage at the output of the op amp.
8. To detect the Unregulated status, the input of the U10 comparator (LM358) must be disconnected from the output of the current error amplifier by removing R80 (number 3 in Fig. 4). A hole is drilled on the R80 pad, through which the jumper connecting pin 2 U10 to the GNDA polygon is soldered.Modification is not mandatory, with it the PSU will signal a situation when it is unable to maintain the output voltage (for example, due to a network drawdown).

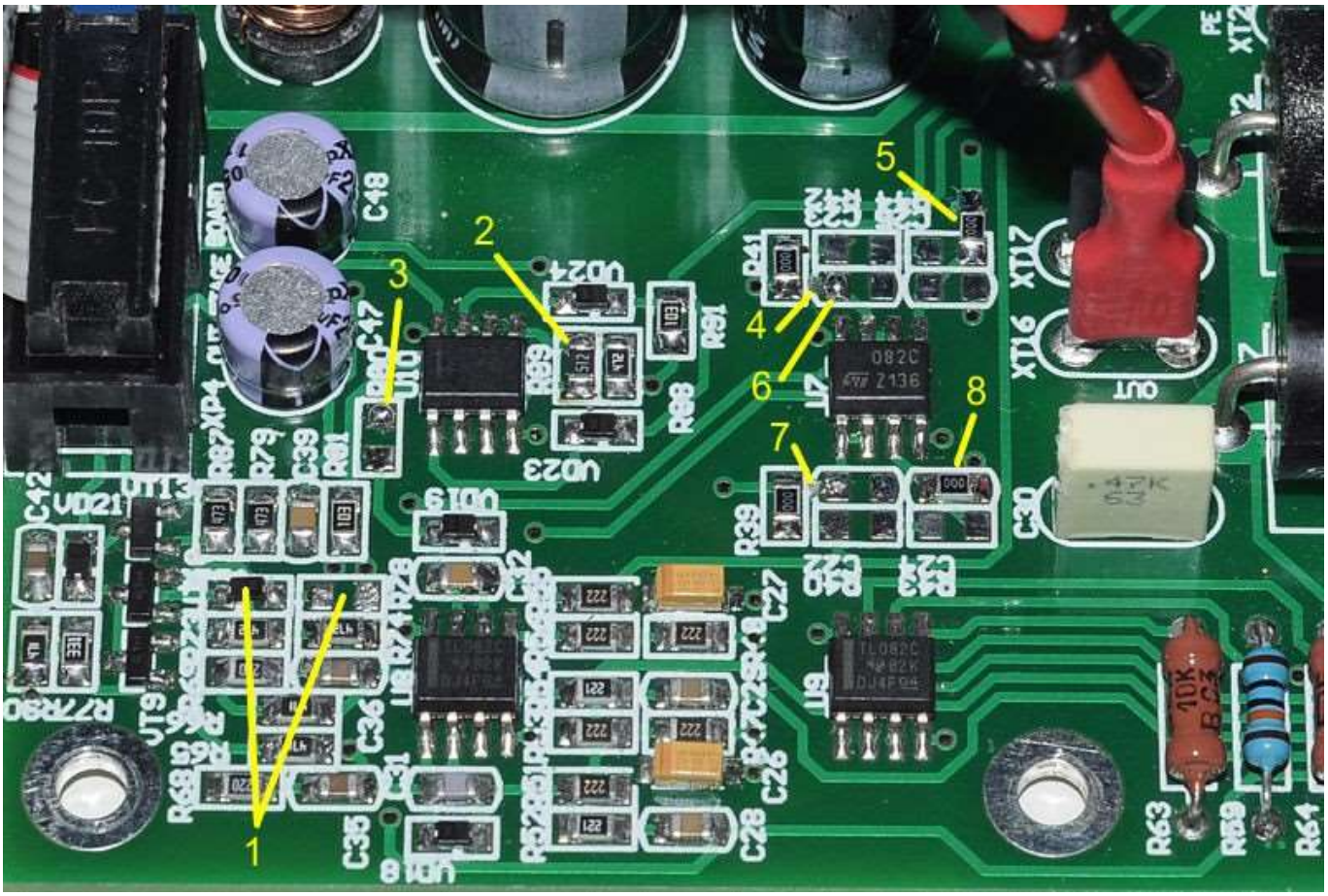

Fig. 4.

9. The COM voltage divider on the front panel board has too high an output impedance, so there is an error in measuring current and voltage. To fix the error, you need to add a repeater to the output of the op amp. To do this, you can use the DAC filter op amp. In this case, you don't need an active filter,

the passive RC chain that is present is sufficient. A lot of alterations are required: solder the R39 and R41 filter bypass jumpers provided for in the wiring; the conductors running from these jumpers to terminals 1 and 7 U7 should be cut off (numbers 4 and 7 in Fig. 4); filter elements R40, R42, R43, R44, C22, C23, C24, C25 should be deleted; connect pin 5 U7 with a jumper to a wide track (number 5 in Fig. 4); countersink the via on which the jumper terminal will be located on the back of the board (blue arrow in Fig. 5); Drill a hole on pad C23 through which the jumper will connect pin 7 U7 to the polygon on the other side of the board (number 6 in Fig. 4); Set the jumper from pin 5 U7 to COM (number 8 in Fig. 4). On the back of the board, cut the COM conductor (number 3 in Fig. 5); connect pin 7 of the connector to the polygon (number 4 in Fig. 5); install a jumper instead of the R49 resistor (number 5 in Fig. 5); cut the AGND polygon so that C26, C27 are connected to the COM, while C43, C44 should remain on the AGND (yellow arrows in Figure 5). The red arrows in Fig. 5 shows the soldering points of the jumpers through the holes made in the board.

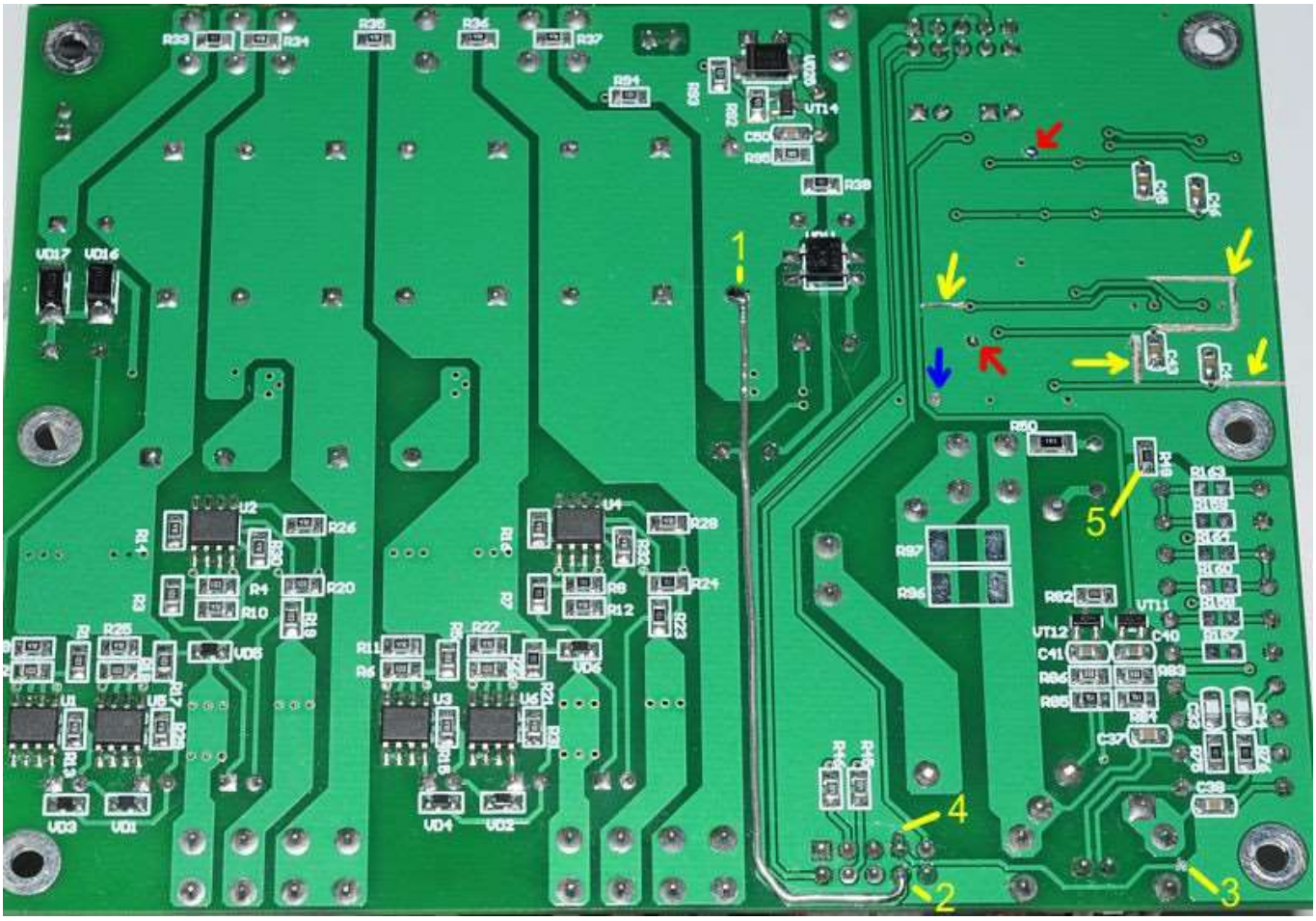

Fig. 5.

10. To reduce interference from the dynamic indication to the noise level, a jumper of 0.8 mm diameter copper wire can be added between pin 8 of the connector (GNDD) and the negative terminal of the C18 capacitor (points 1 and 2 in Figure 5).

11. When there is a transition between the two levels of current stabilization, a surge is observed. To eliminate it, you need to add a chain of R98 10 kΩ and C51 1 nF. First, an R98 resistor of size 1206 (shown in red in Fig. 6) is mounted on the board above the C32, C51 of size 0805 is soldered to it (shown in blue in Fig. 6), which is soldered to the R78 pad with the second pin.

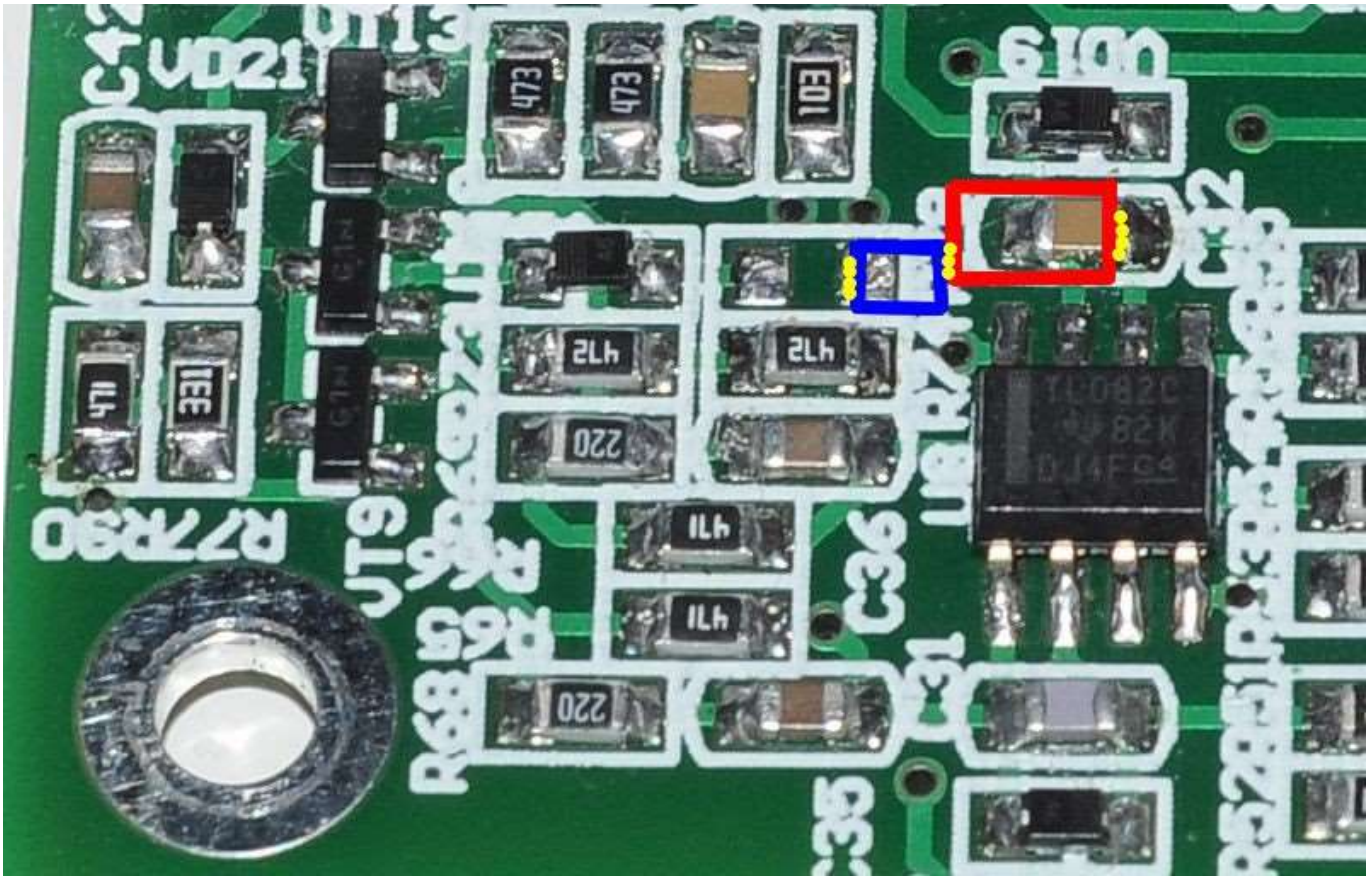

Fig. 6.

12. When the mains plug is pulled out, up to 10 V is ejected at the output . To eliminate this, you need to reduce the rating of the R32 resistor on the output stage board to 47 kΩ (Fig. 7).

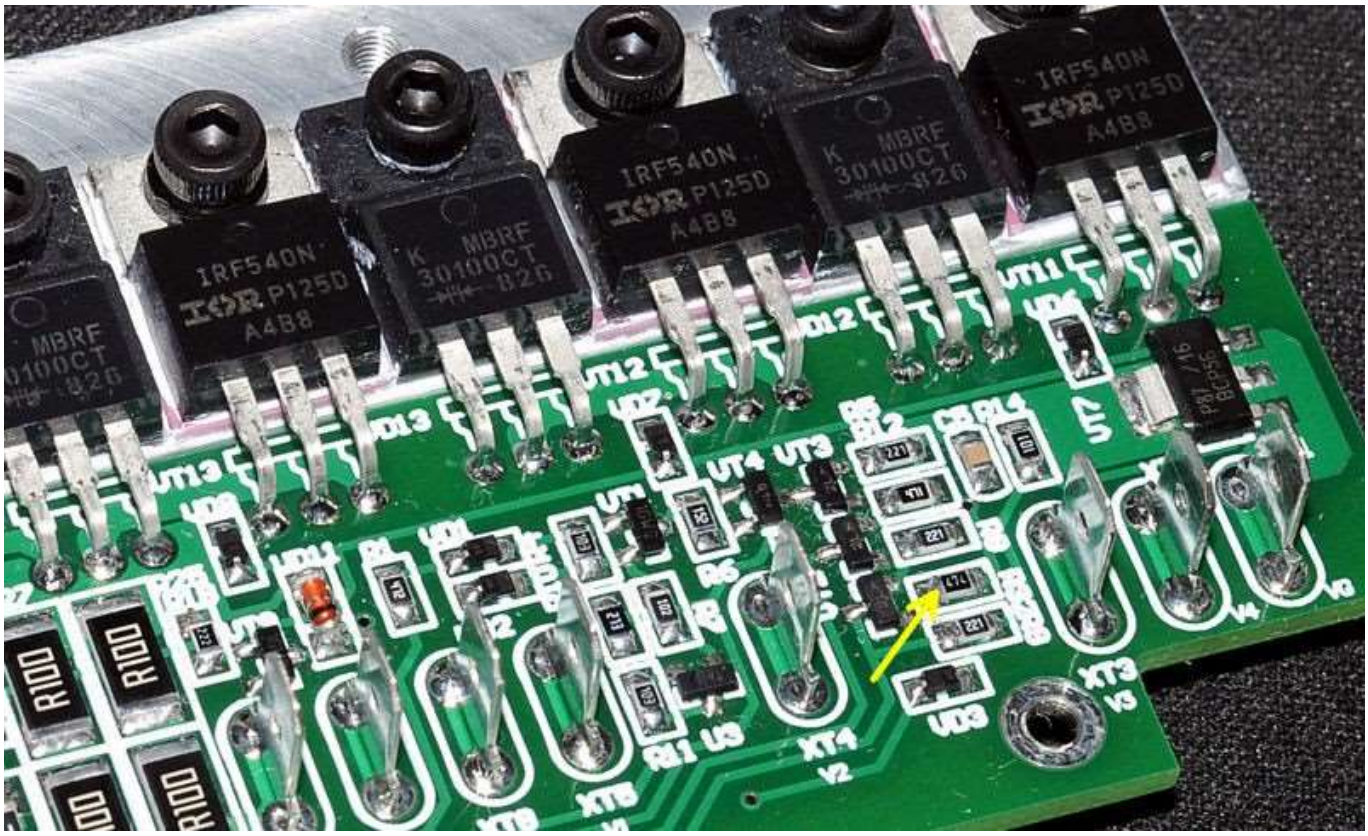

Fig. 7.

Boards rev. 1 and rev. 2

13. Under some conditions, low-level generation (tens of mV) is observed at the output of the PSU.To eliminate it, you need to add 0.1 µF 100 V capacitance (size 1206) to the output stage board from power levels V1, V2, V3, V4 to the ground (Fig. 8).

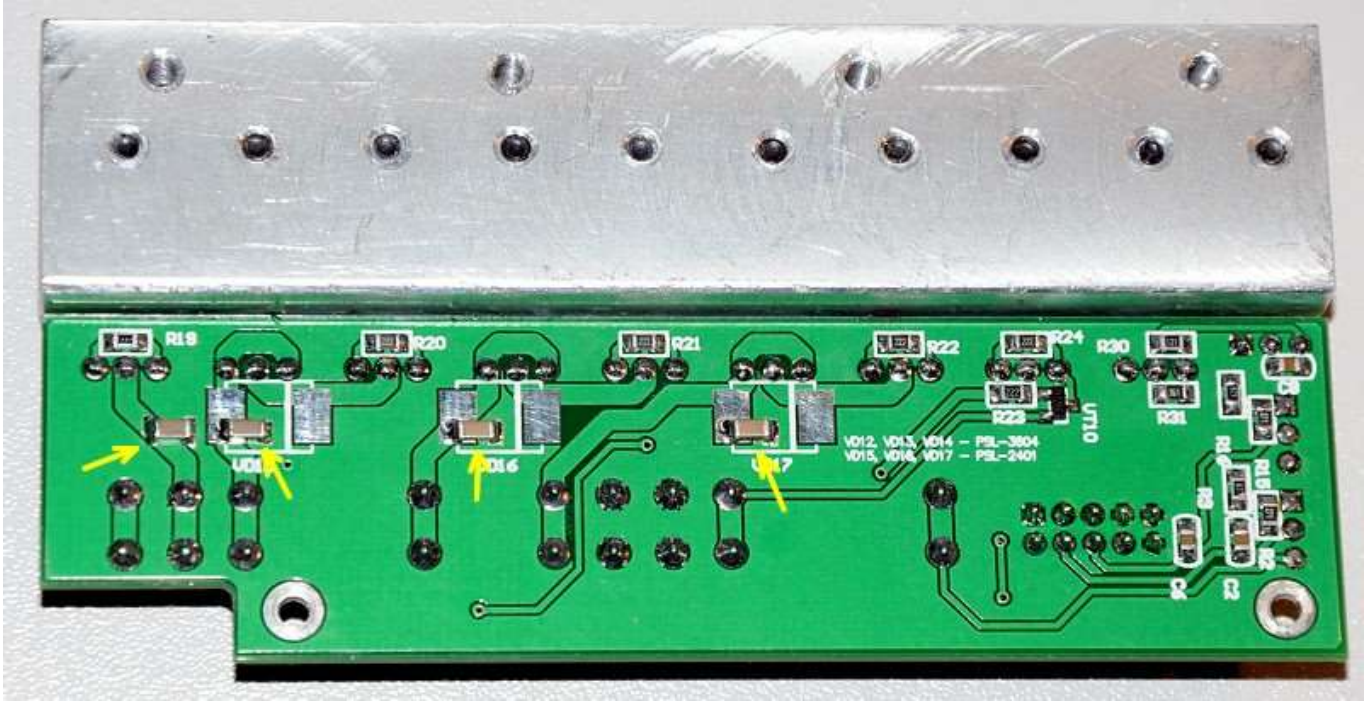

Fig. 8.

14. In parallel with the resistors R25 – R28 on the output stage board, I installed another resistor of the same kind in parallel (Fig. 9). As a result, the scattering power was reduced to an acceptable value.

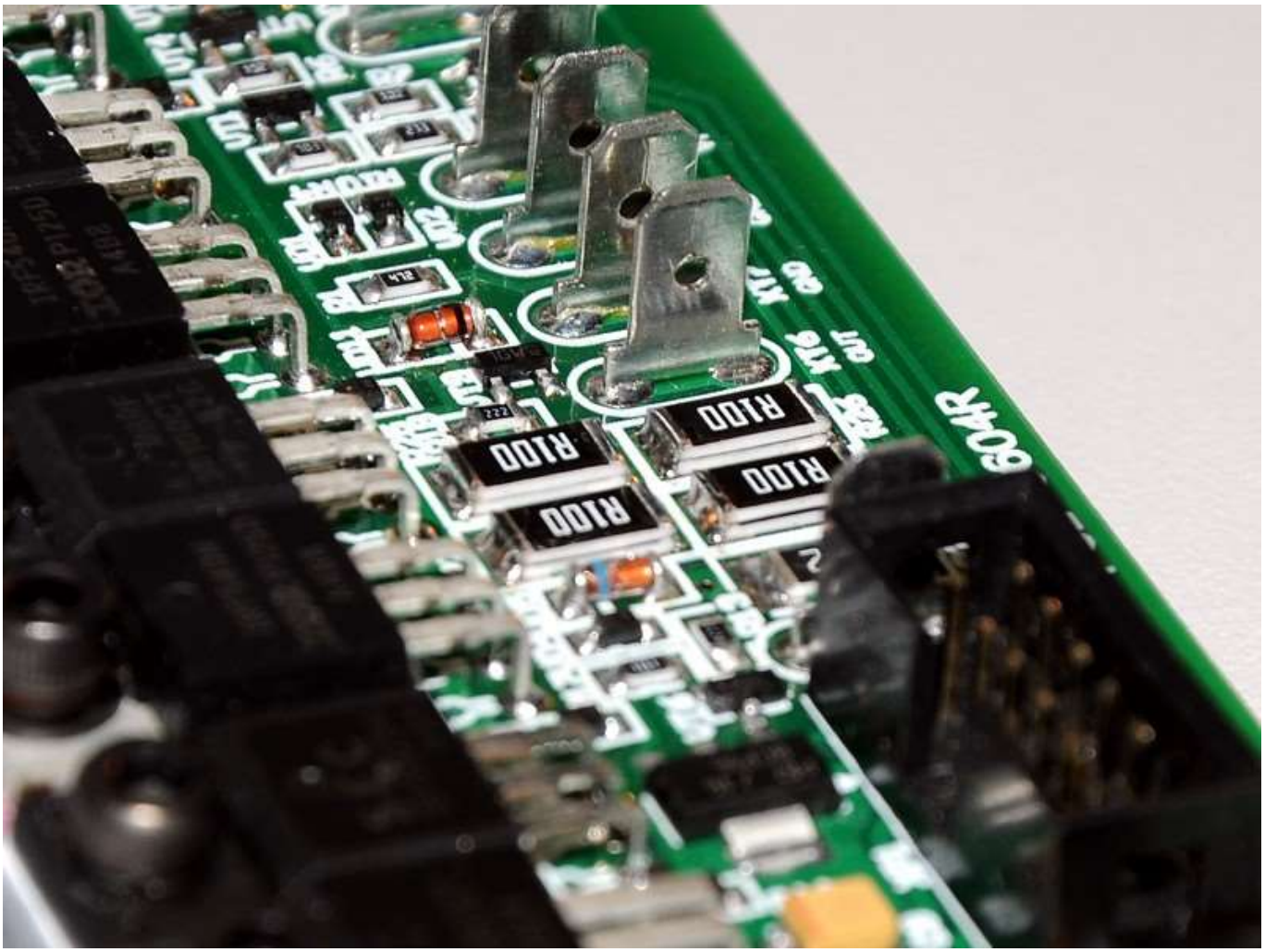

Fig. 9.

15. **Modification is not necessary** - to reduce the interference voltage on the COM signal relative to GND, connect the XT17 terminal (GND) on the main board to the power ground polygon (minus the C18 capacitor) (Fig. 10).

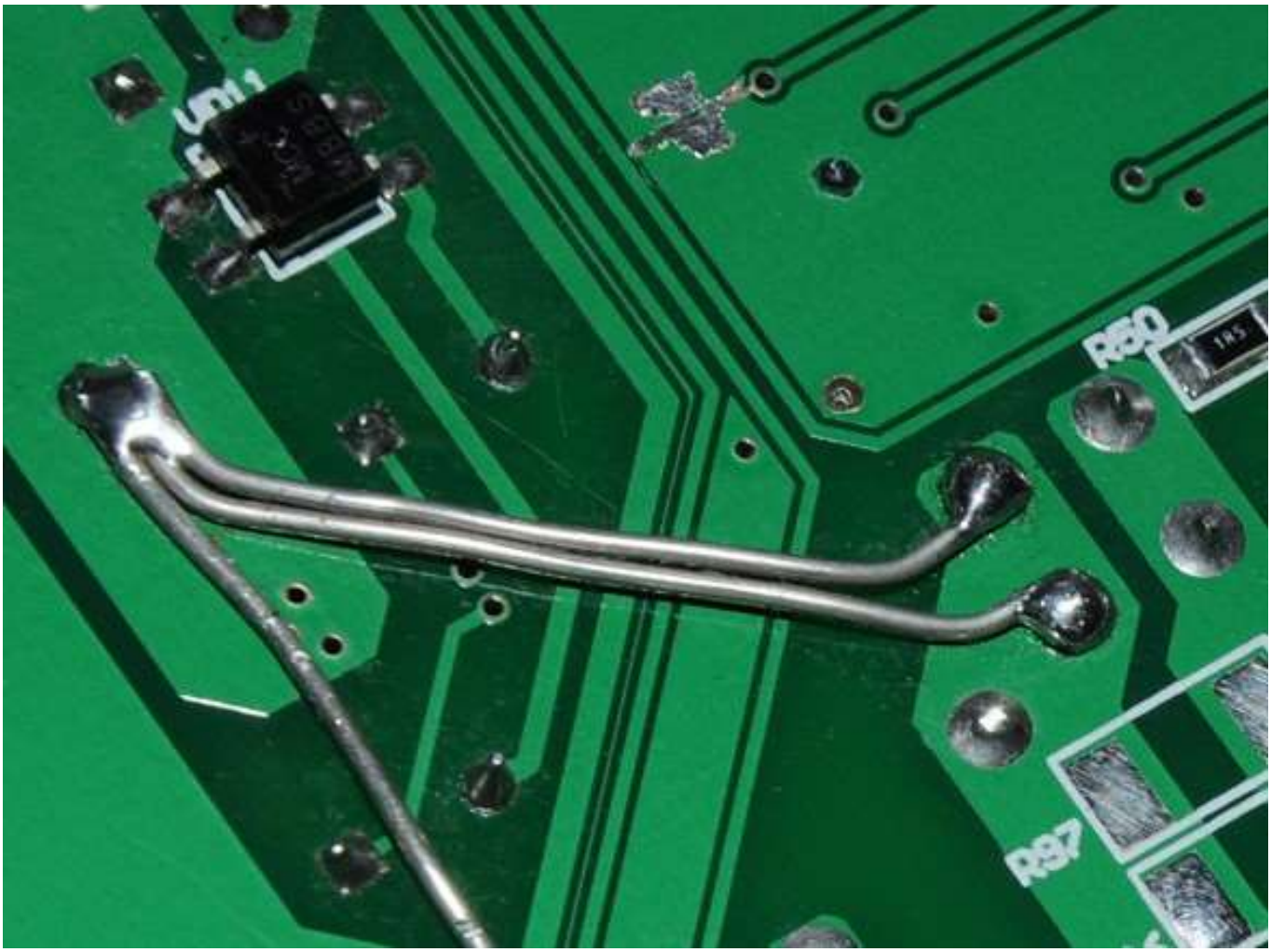

Fig. 10.

16. **Modification is not necessary** - when the power is turned off, all sorts of unnecessary values flash on the display, the sound emitter beeps. To fix the problem, you need to add a power detector circuit (see Figure 11). The circuit can be assembled by any method of mounting on the main board (Fig. 12). The output of this circuit is wound onto the pin, then connected to the pin on the front panel board with a wire (Fig. 14). It is pressed into a hole with a diameter of 0.7 mm drilled at the point marked in Fig. 13. The pin is connected by a jumper to pin 33 (PA12) of the controller (Fig. 15).

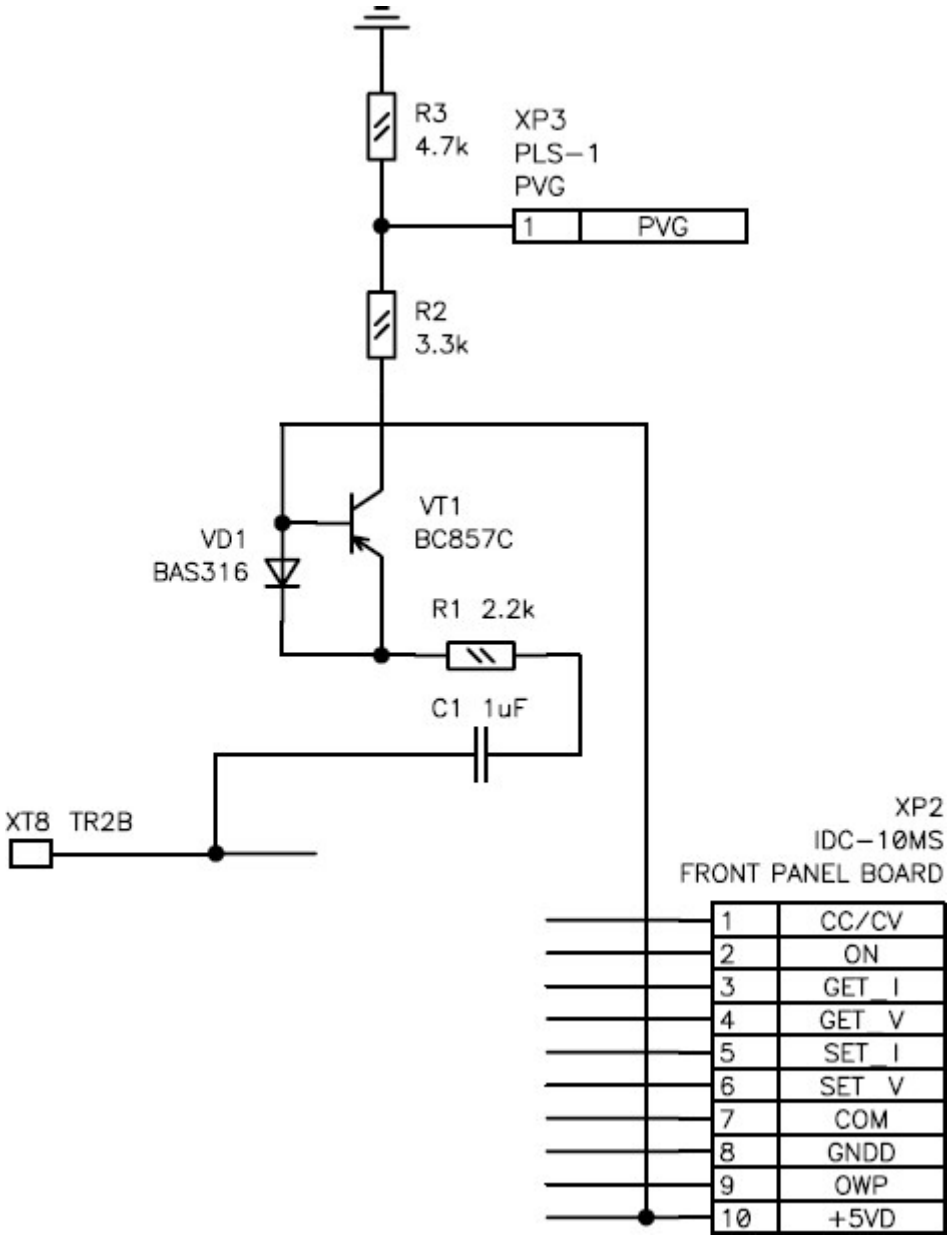

Fig. 11.

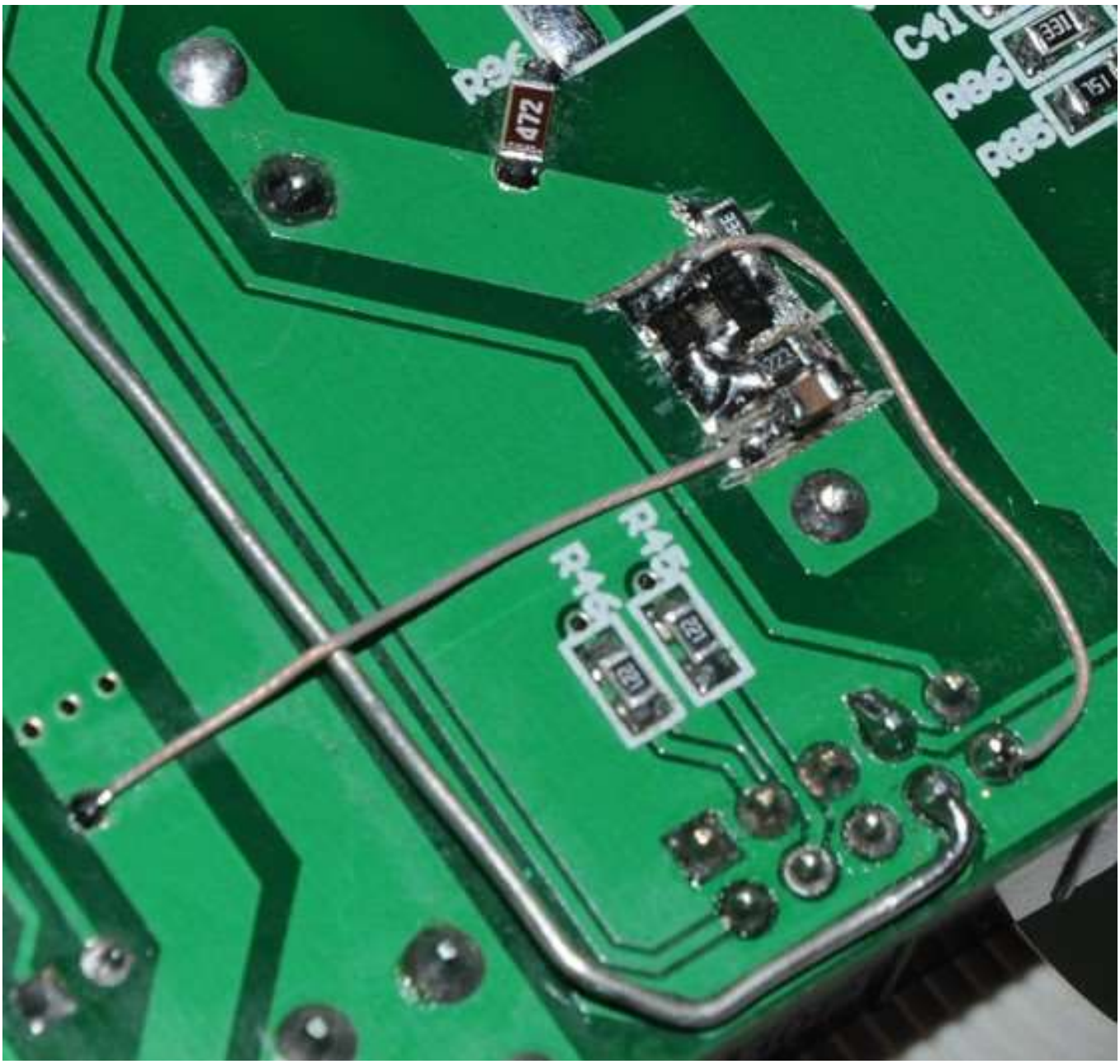

Fig. 12.

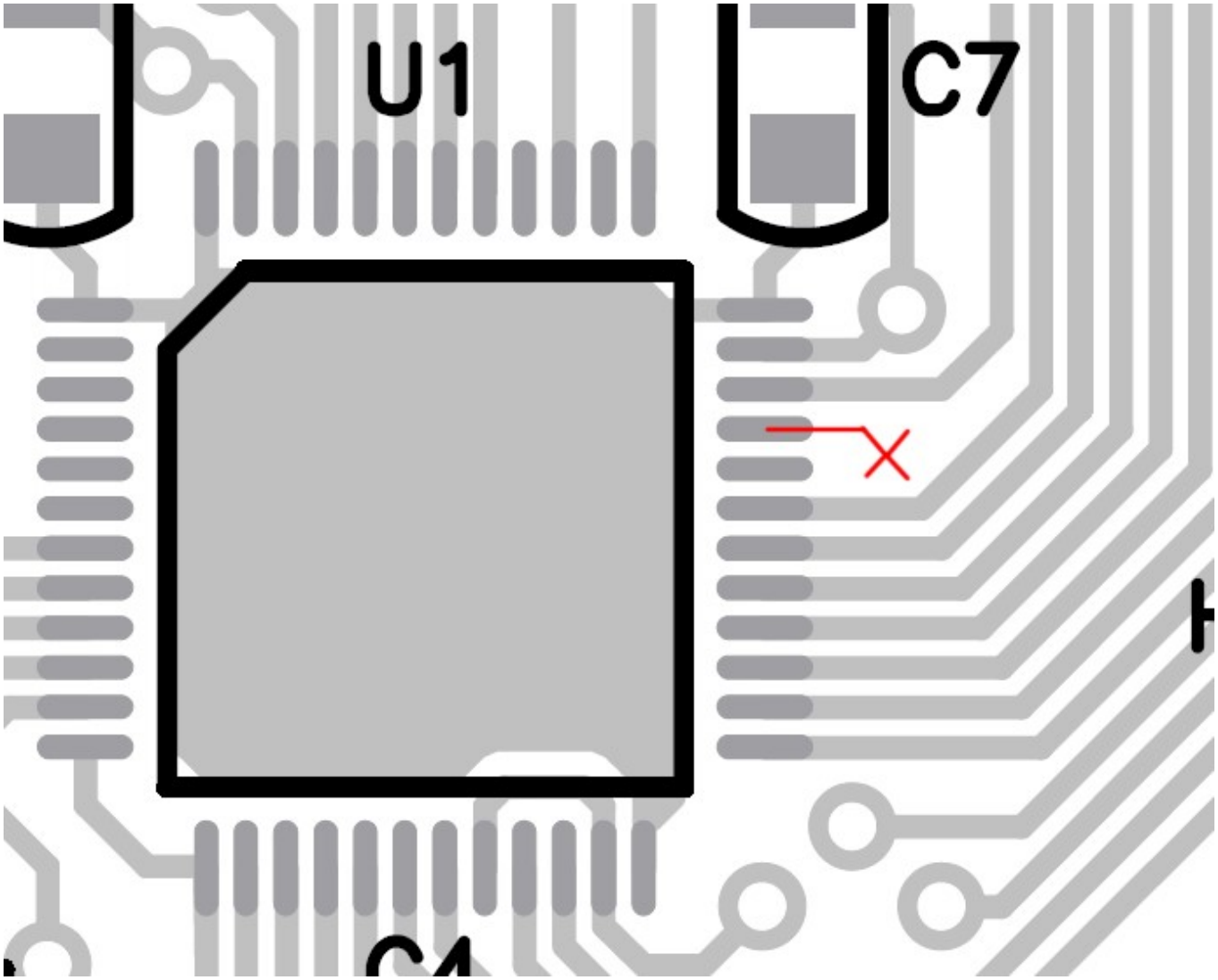

Fig. 13.

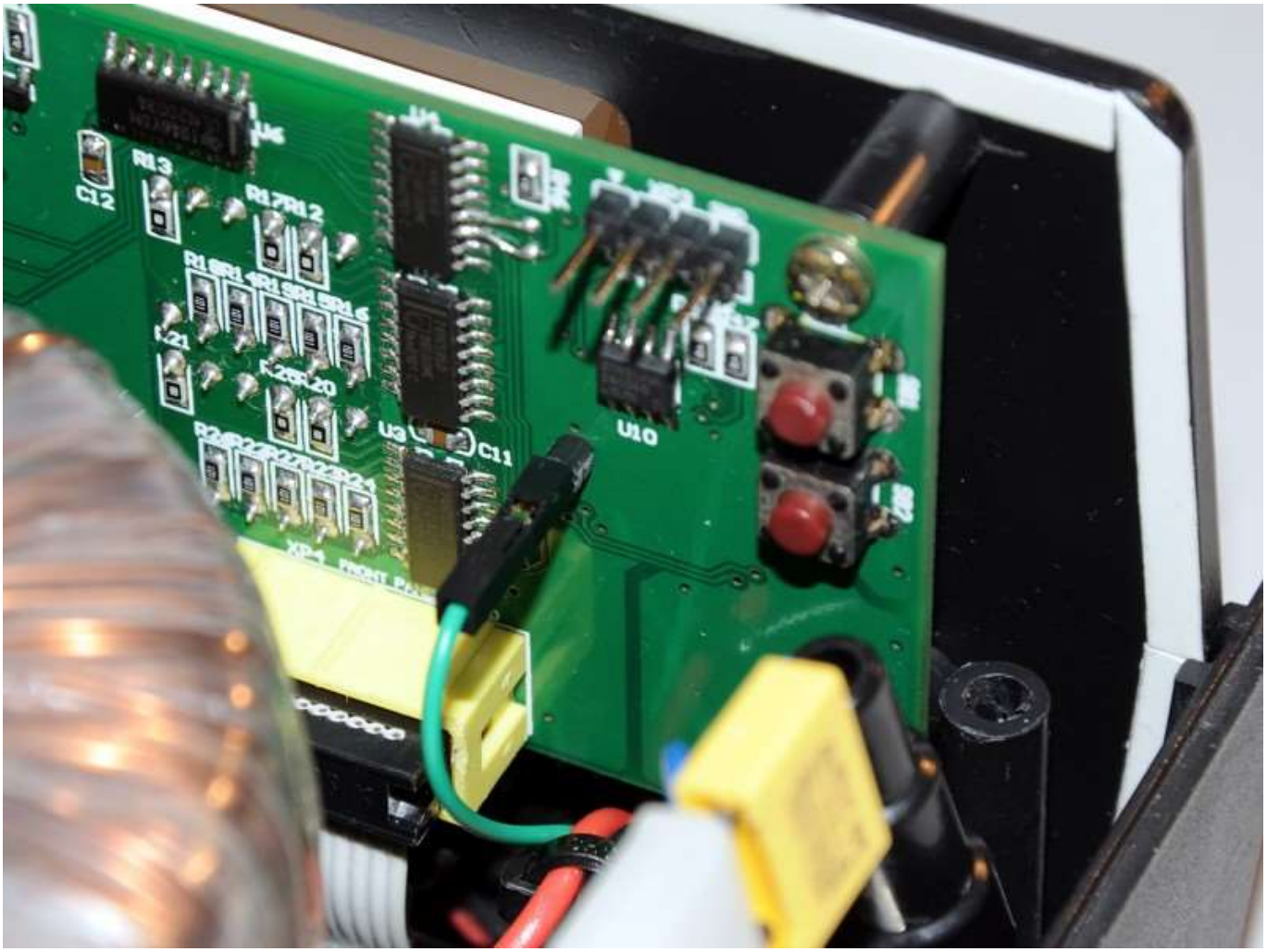

Fig. 14.

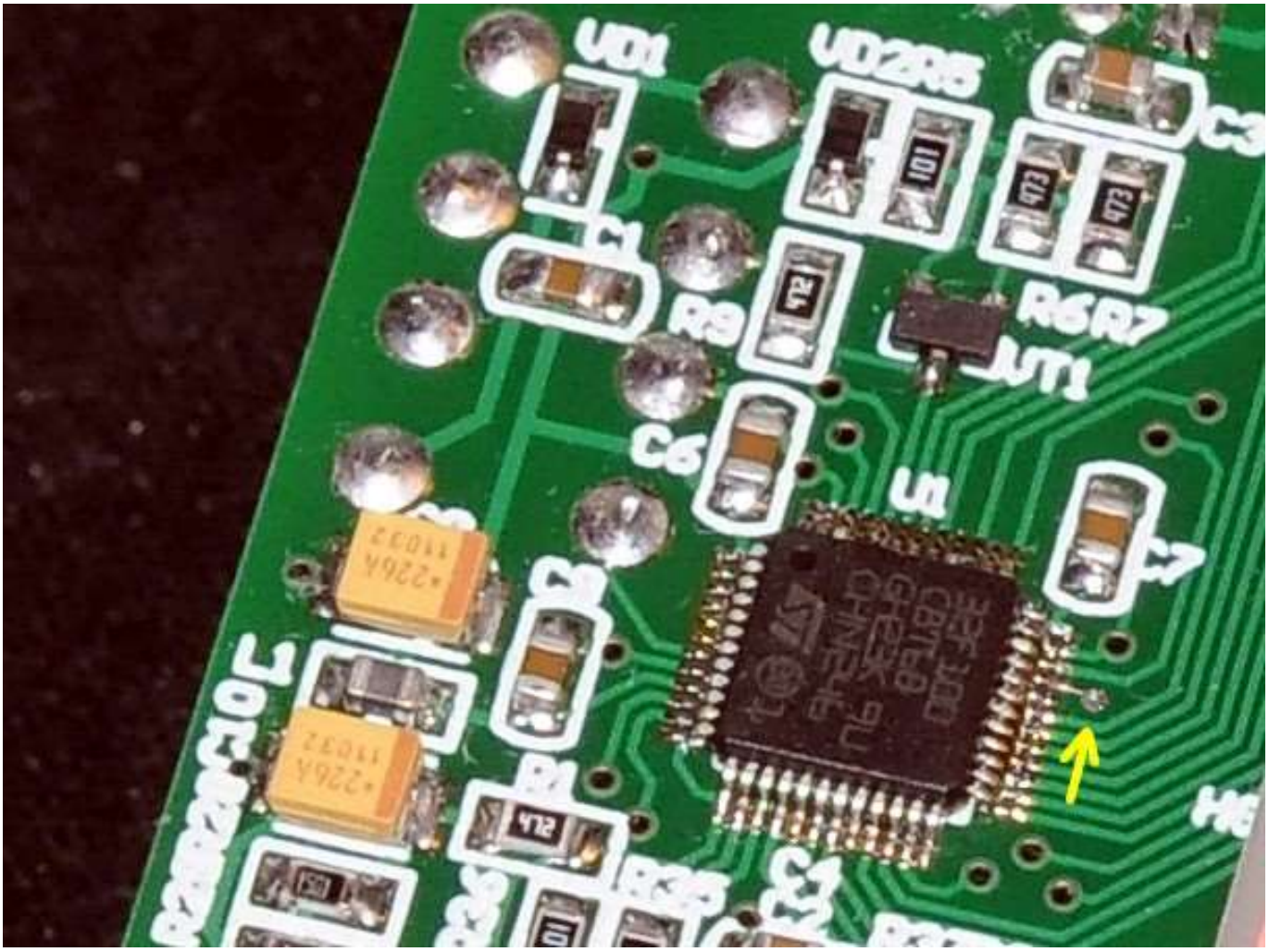

Fig. 15.