

Manual of ELMB_MB v.6.5.3A modifications for technicians.

B. Palan, A. Tikhonov

Date: 13 March 2007

bpalan@cern.ch

Pages: 11

Summary: This document describes the component changes of LVPS ELMB_MB from produced version 6.5 into new version 6.5.3A. All mentioned component names and values are referring to the scheme components designed by Ivan Hruska of ELMB_MB version 6.5.

The ELMB_MB version 6.5.3 (6.5.3A) has one new modification compared to v6.5.2: HV or DIG side group enable/ shutdown resistors are increased (see Part 4).

1. **Top side: Remove eight resistors R129 – R136. Solder zero ohm resistors in their places, see Fig.1.**

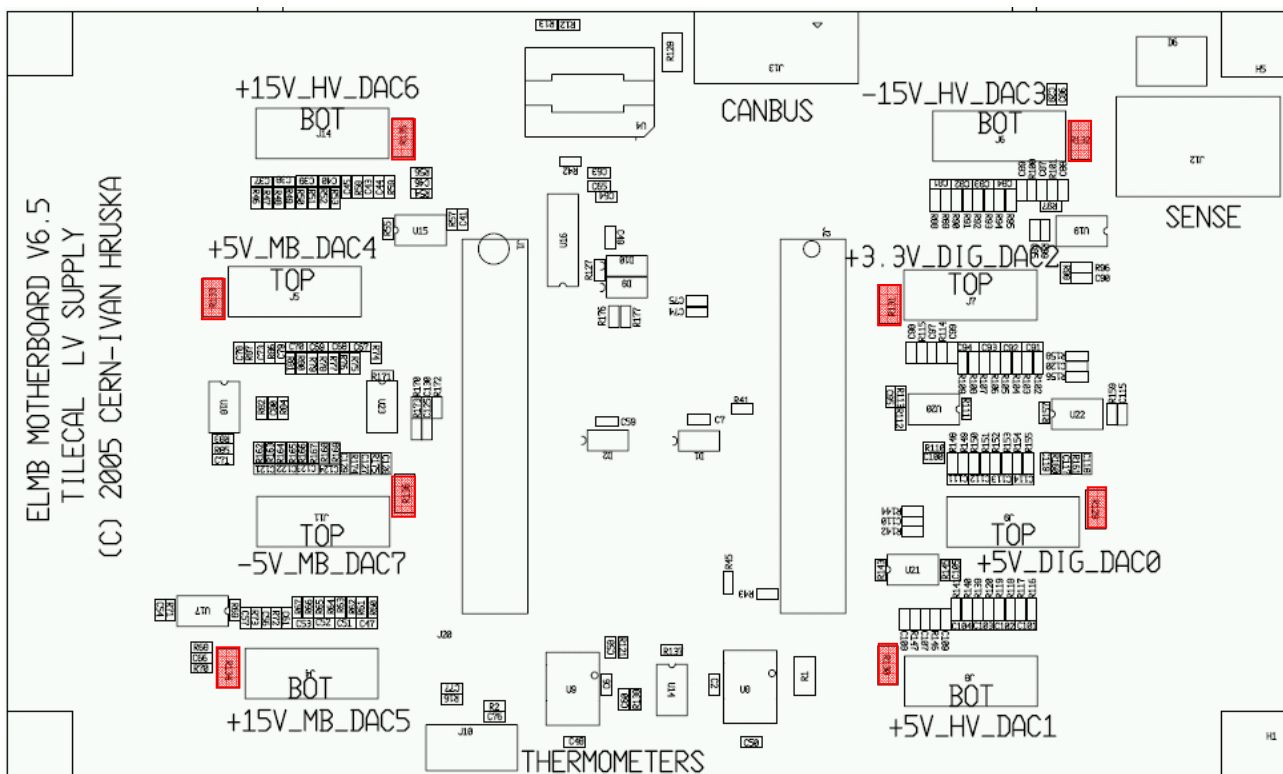


Fig.1: Top side photo of ELMB_MBv6.5. Remove 8x 100ohm resistors (R129 – R136 marked in red color), short-cut them by a piece of wire, or put zero ohm resistors (size 1206).

2. (a). Top side: Remove C119, C99, C109, C129, C89, C61, C45, C79 (size 0603), see Fig.2. Due to unconnected one temperature measurements of each brick the corresponding floating capacitors on the ELMB_MB are removed.
 (b) Top side: Unsolder transil diode D6 close to SENSE 10pin connector, see Fig.2.

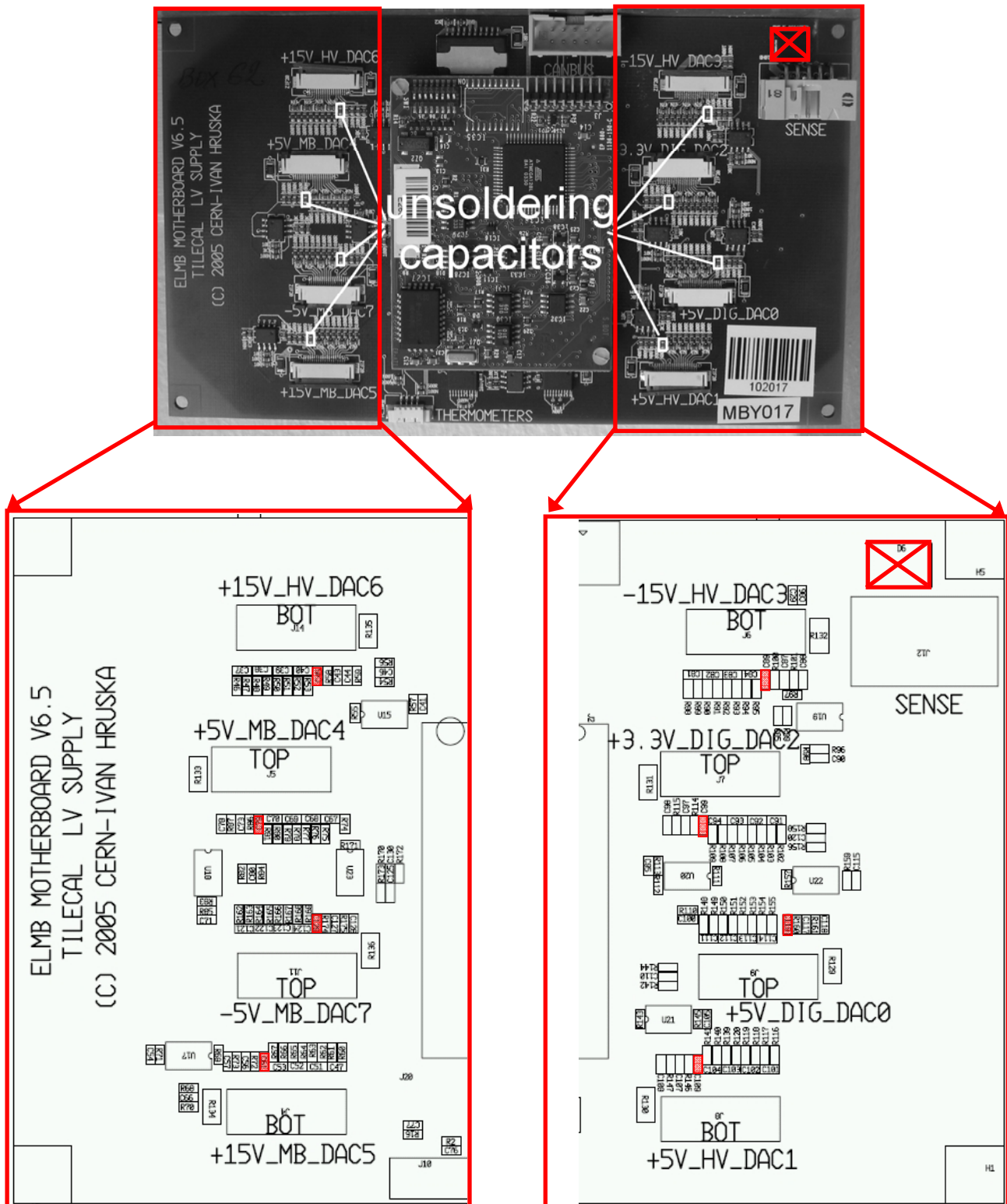


Fig.2: Top side photo and details of ELMB_MBv6.5. Remove 8x 100nF capacitors: C119, C99, C109, C129, C89, C61, C45, C79, marked in red color (size 0603). Remove transil diode D6 close to SENSE connector.

3. **Improvement of five drawer sense line measurements: +3VDIG, +5VDIG, -5VMB, +5VMB, +15VMB. See further ELMB_MB scheme detail on page 9, Fig.12 for more information.**

- (a) Cut +5VMB pcb trace from pin5 on connector J12 on the ELMB_MB bottom side, see Fig.3. The pcb trace is under the surface level, so a milling cutter has to be used.
- (b) Cut two traces, between R27 and pin1 of U7 isolation amplifier, and pcb path between R27 and pin8 of opamp U13, see Fig.3, 4.

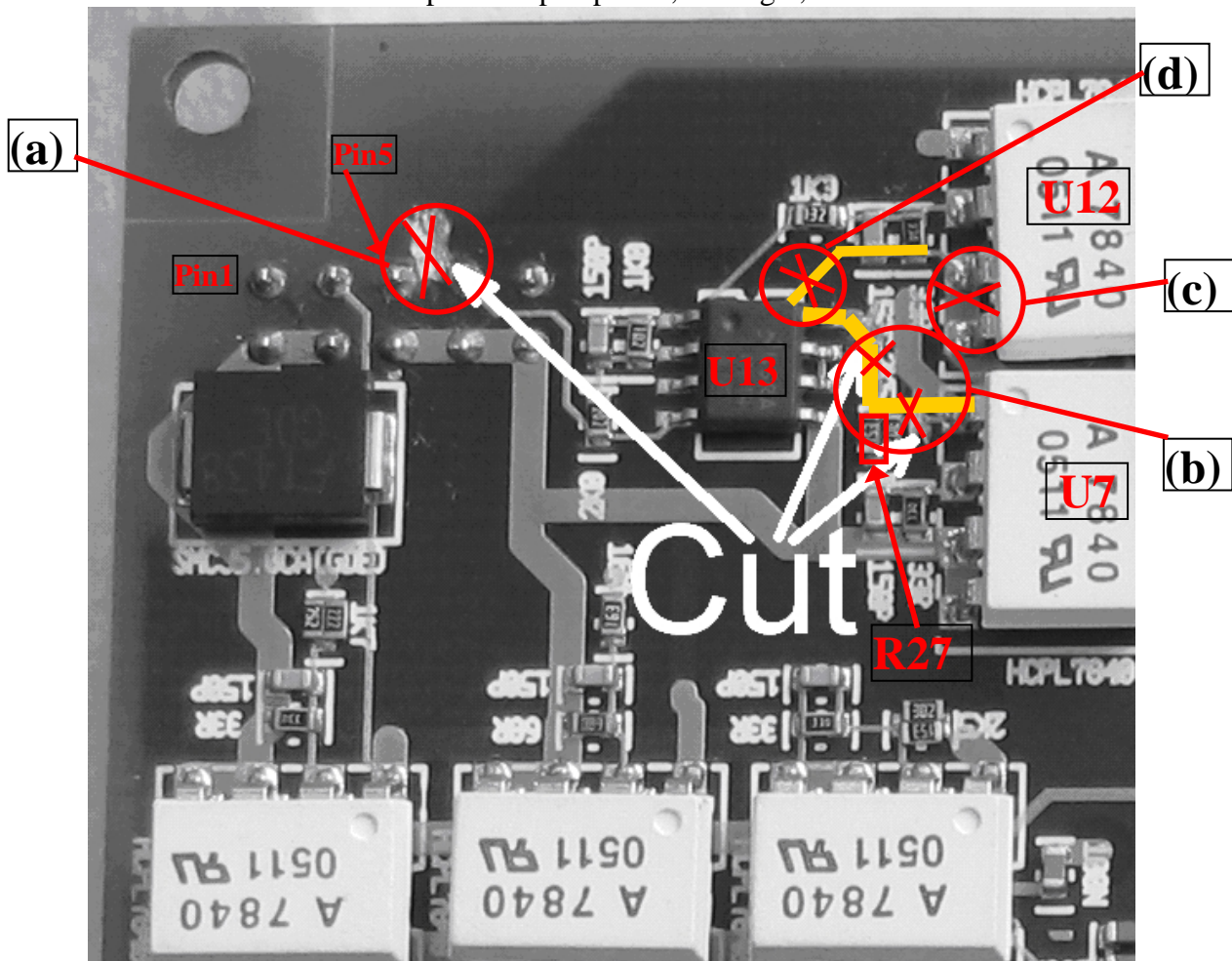


Fig.3: Bottom side photos of ELMB_MBv6.5. Cutting traces on bottom side.

- (c) Cut trace between pin3 and pin4 of U12 isolation amplifier, see Fig.3, 4.
- (d) Cut trace going to gnd from C22 and R38, see Fig.3, 4.

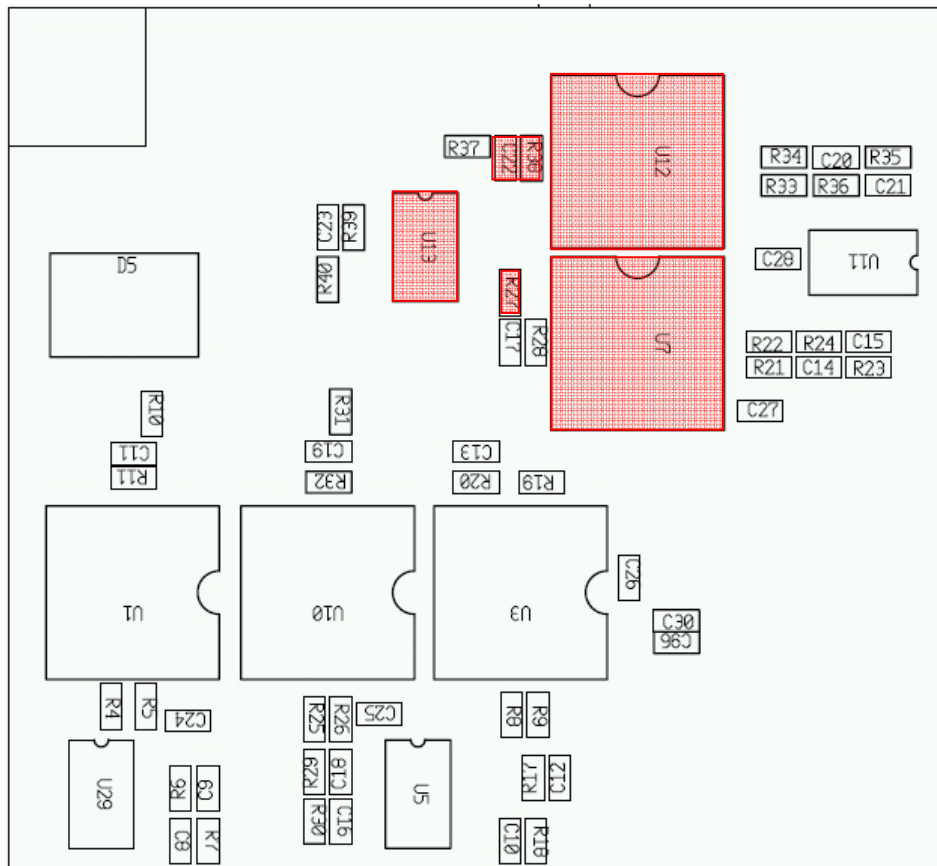


Fig.4: Bottom side component placement detail of ELMB_MB_v6.5, as shown as a photo in Fig 3. Marked components related to procedure 3 a – d are in red color: U13, C22, R38, R27, U12, and U7.

Verify cut traces (3 a - d) by measuring 3 points, see Fig.5.

- (I) Check non-zero resistance between pin5 (J12) and pin1 of U12.
- (II) Measure non-zero resistance between pin8 of U13 and R27.
- (III) Measure non-zero resistance between R27 and pin1 of U7.
- (IV) Measure non-zero resistance between pin3 and pin4 of U12.

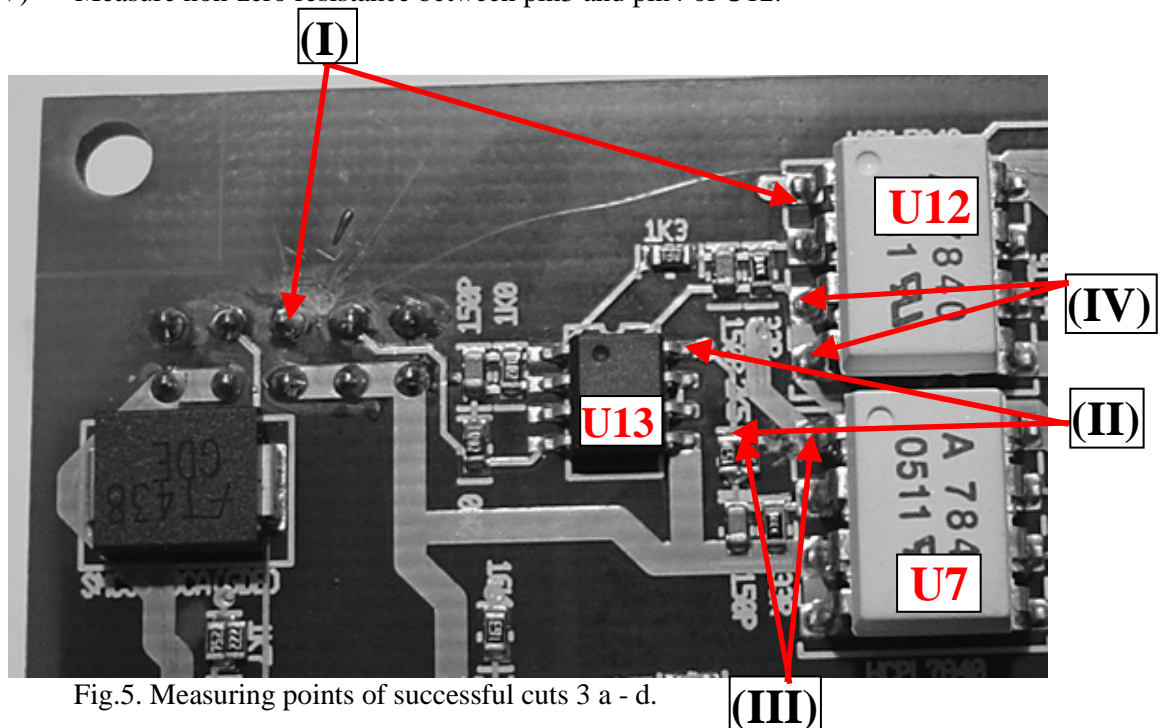


Fig.5. Measuring points of successful cuts 3 a - d.

- (e) Unsolder opamp U13, resistor R39, R40, and capacitor C23. Unsolder also Transil D5, see **Fig.6**.

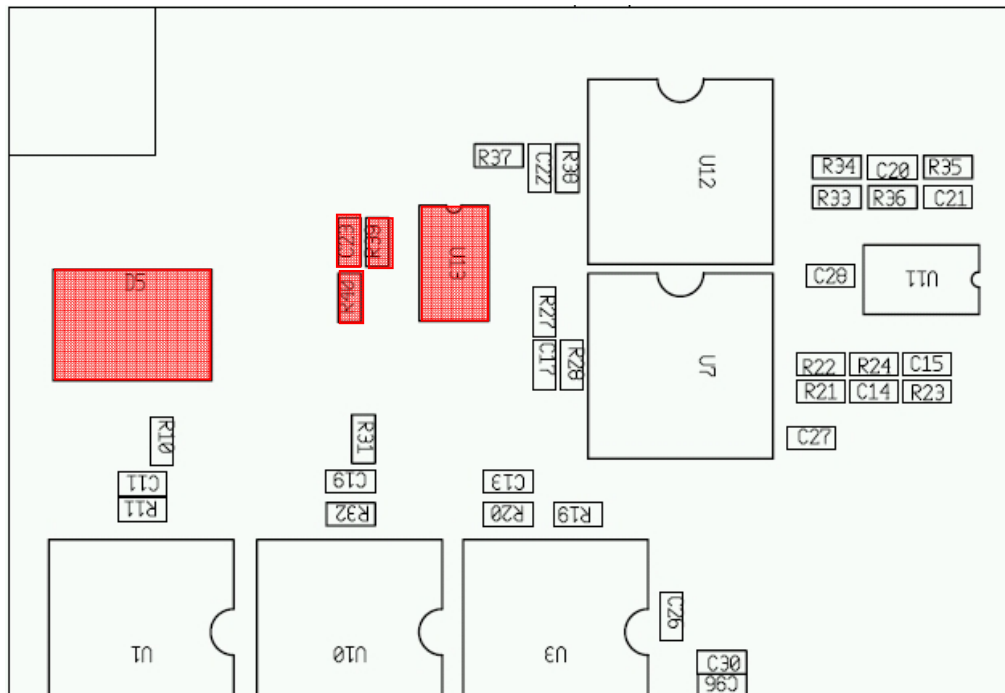


Fig.6. Unsoldered components from bottom side ELMB_MBv6.5 related to point 3-e.

- (f) Nominal resistor values of ELMB_MB input sense line dividers have been changed, see next **Fig.7**. (see also scheme on page 9, Fig.12). New resistor values are:
- R11, R20, R28, R32, R38 = 200 ohm
 - R10 = 10k,
 - R19 = 16k,
 - R27 = 15k,
 - R31 = 47k,
 - R37 = 15k, soldered in diagonal to other end of C22 capacitor, see detail in Fig 8.

These modifications were applied to reduce the influence of 1kOhm (1%) separating resistors (inside Drawer) on the ELMB_MB sense lines measurements.

Resistor R37 is soldered in new position in diagonal way to the other end of C22 capacitor, see Fig.8 on next page.

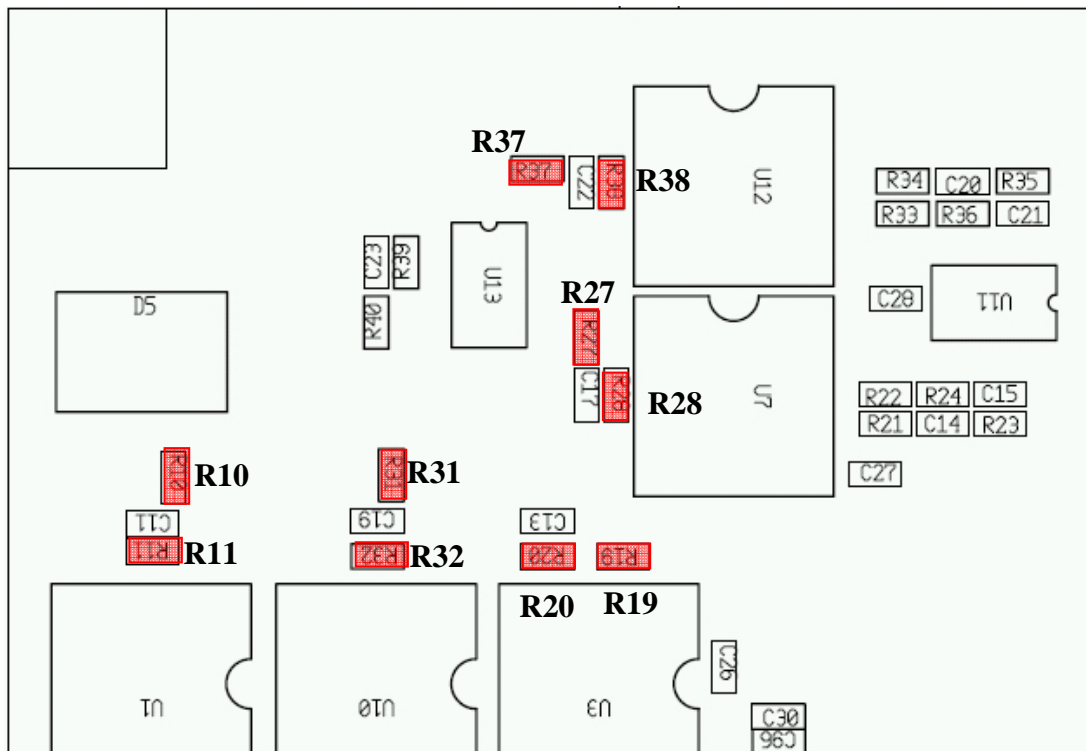


Fig.7. Resistor dividers to be changed on ELMB_MB bottom side related to point 3-f.

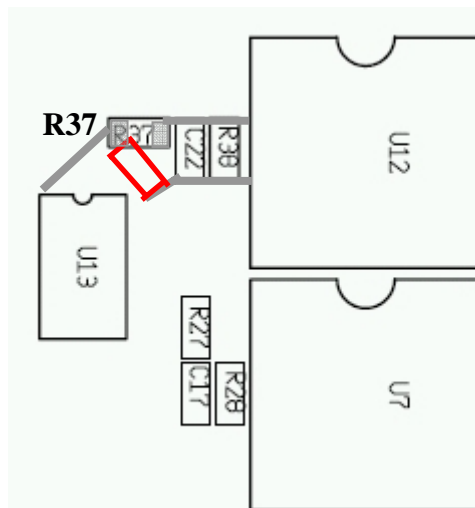


Fig.8. Detailed picture how to solder resistor R37 in diagonal to the opposite end of C22 capacitor.

- (g) **Wire connection.** Connect resistor R27 (part of +5VMB sense line divider) directly to pin5 of J12 connector by a 30mm piece of insulated wire, see Fig.9 on next page.

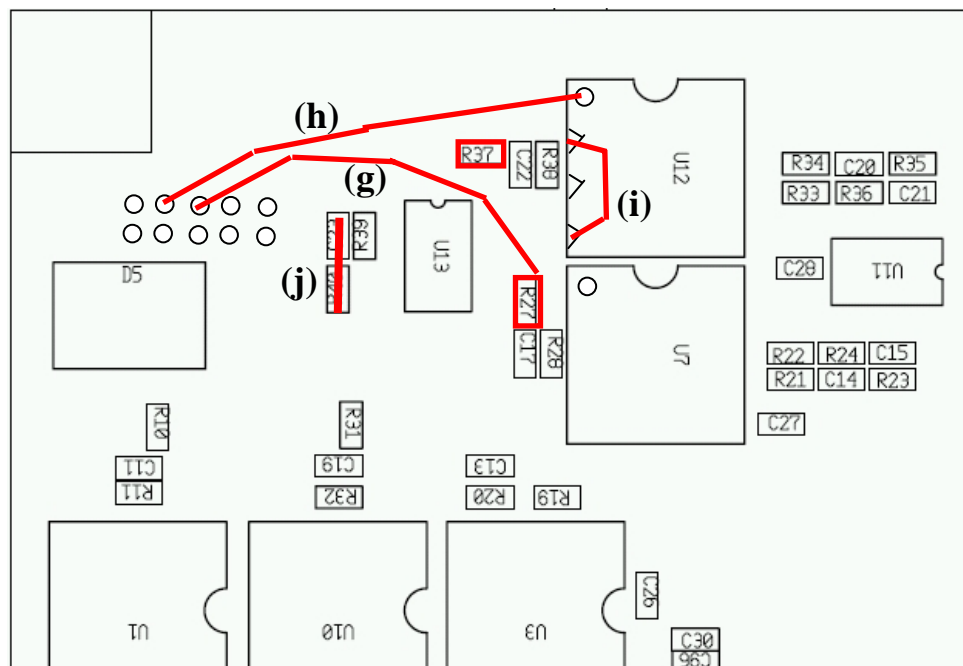


Fig.9. Wire connections on bottom side 3-g, h, i, j.

- (h) **Connect** pin3 of J12 with pin1 of U12 by using a wire, see Fig.9. This operation will connect +5V DIG with power supplies of all five isolation amplifiers (HCPL7840).
- (i) Make a short connection between pin4 and pin 2 of U12, see Fig.9.
- (j) Connect resistor R37 directly to pin7 of the connector J12 (-5VMB sense lines) by means of short-cut through unsoldered components C23, R40, see Fig.9. Verify good connection between pin7 of J12 and resistor R37.
- (k) Solder ceramic capacitors 10uF (size 1210) between pin2 and pin3 of all isolation amplifiers on bottom side of U1, U3, U7, U10, U12, to increase the nominal filtering capacitor values of C11, C13, C17, C19, C22, see Fig.10.

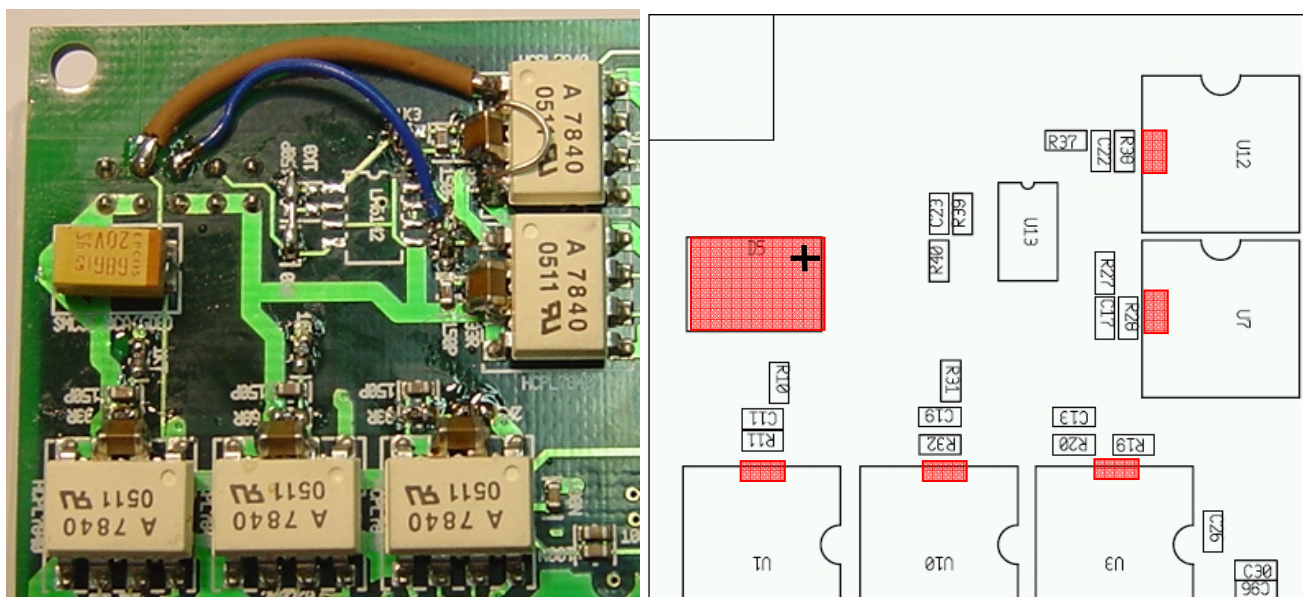
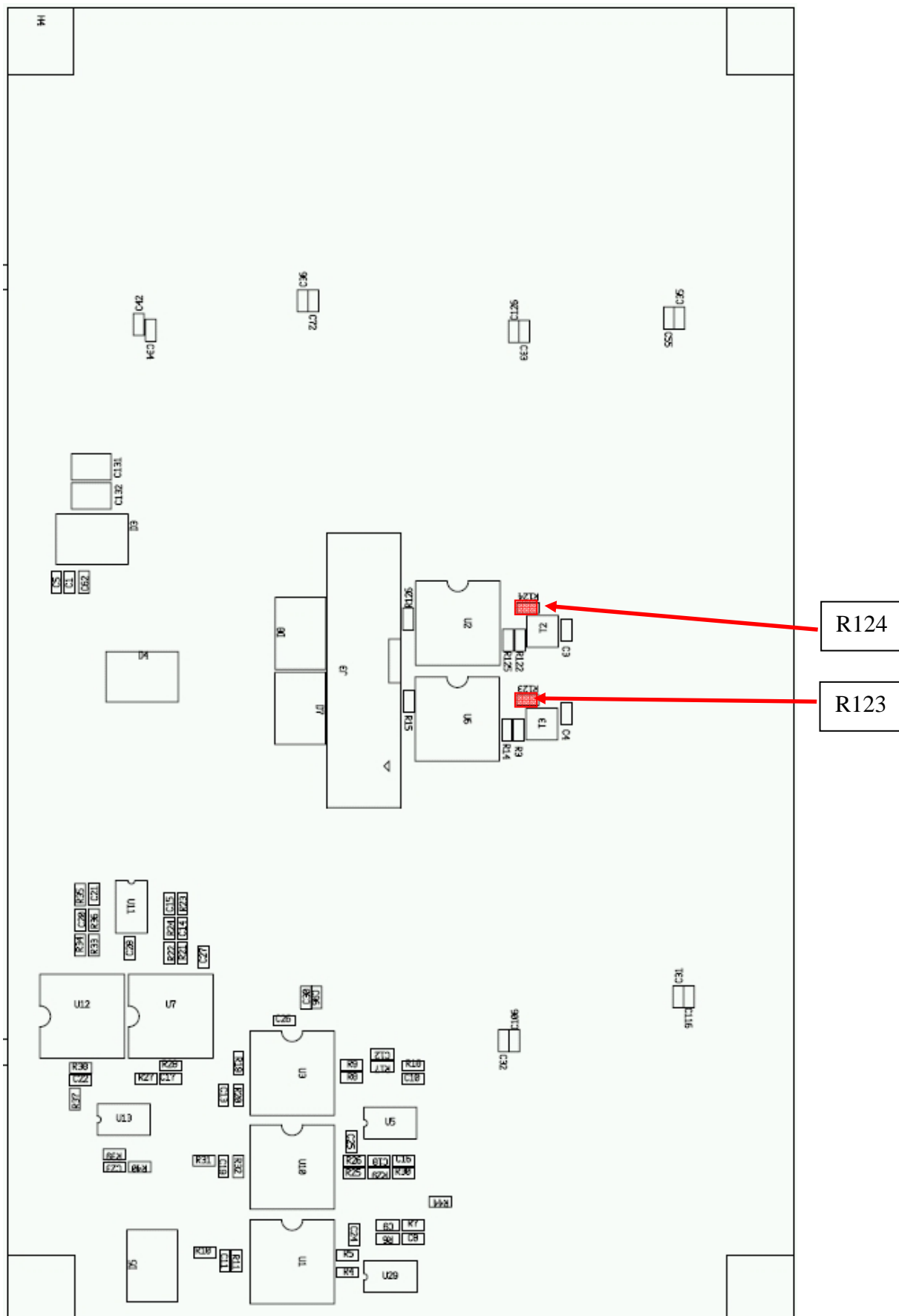


Fig.10. Ceramic capacitors on U1, U3, U7, U10, U12, and capacitor 68uF/20V in place of D5 transil.

- (l) Solder tantalum capacitor 68uF/20V in the place of removed transil diode D5. Positive polarity has to be towards pin3 of J12 connector, see Fig.10.

4. HV and DIG side enable/shutdown resistors replacement.

- (a) Replace SMD resistors R123, R124 (both 680ohm, size 0603) on ELMB_MB bottom part, see Fig.11, by new resistors of 47kOhm.



Appendix1: Sense line part with isolation amplifiers of the ELMB_MBv6.5 electrical scheme discussed in Part 3. Changed components marked in red color.

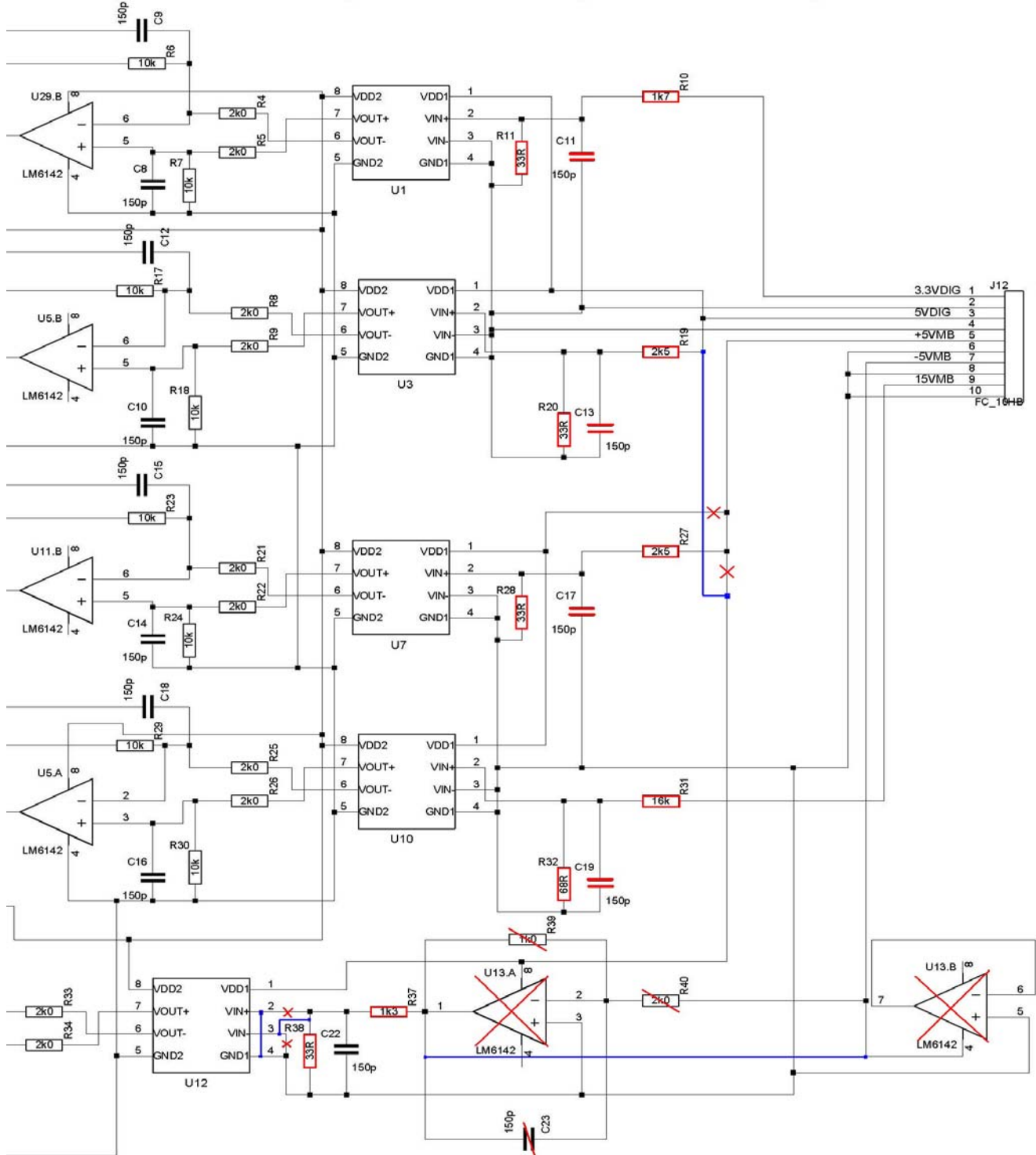


Fig.12: Part of the MB_ELMB V6.5 schematic documentation. Changes of sense line optocouplers powering do +5VDIG line, changing of resistor dividers for all sense lines. All changes are drawn in red color.

Appendix2: Component placement on the ELMB_M Bv6.5, top pcb side and bottom side.

