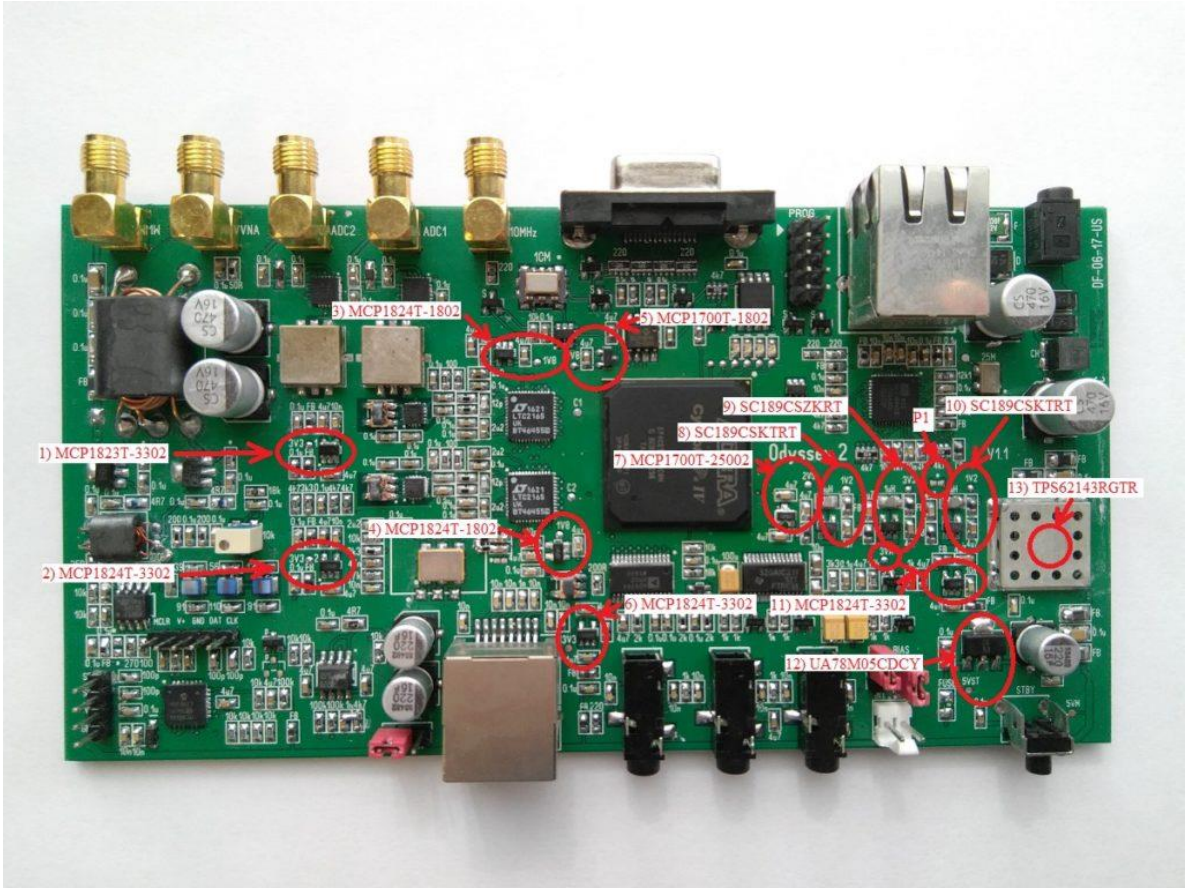
Location of the components on the Odyssey-2 transceiver board

The information in this article will help you with self-assembly or when you need to repair the transceiver.

In total, the board contains 13 different voltage regulators, the output bus of each of them has a pad for monitoring the output voltage.



Linear regulators 1 and 2 with an output voltage of 3.3 volts feed the input circuits of the receiving channels and the ADC. To power the ADC, regulators 3 and 4 reduce voltage to required 1.8 volts. If there is a desire to assemble a single-channel version of the transceiver, regulators 2, 4 may not be installed.

Regulator 5 generates a voltage of 1.8 volts for the operation of a digital data bus between the ADC and FPGA.

Regulator 6 powers the transmitter DAC and the master oscillator at 122.880 MHz.

Regulator 7 generates a voltage of 2.5 Volts to power some FPGA units.

A powerful switch regulator 8 for 1.2 Volts feeds the core of the FPGA.

A similar switch regulator 9 for 3.3 Volts feeds the FPGA data bus and also the digital power lines of all the other microcircuits.

The regulator 10 for 1.2 volts supplies the core of the Gigabit LAN KSZ9031. If KSZ9031 with reduced current consumption is used, this stabilizer may not be installed. Jumper P1 should be closed for powering from

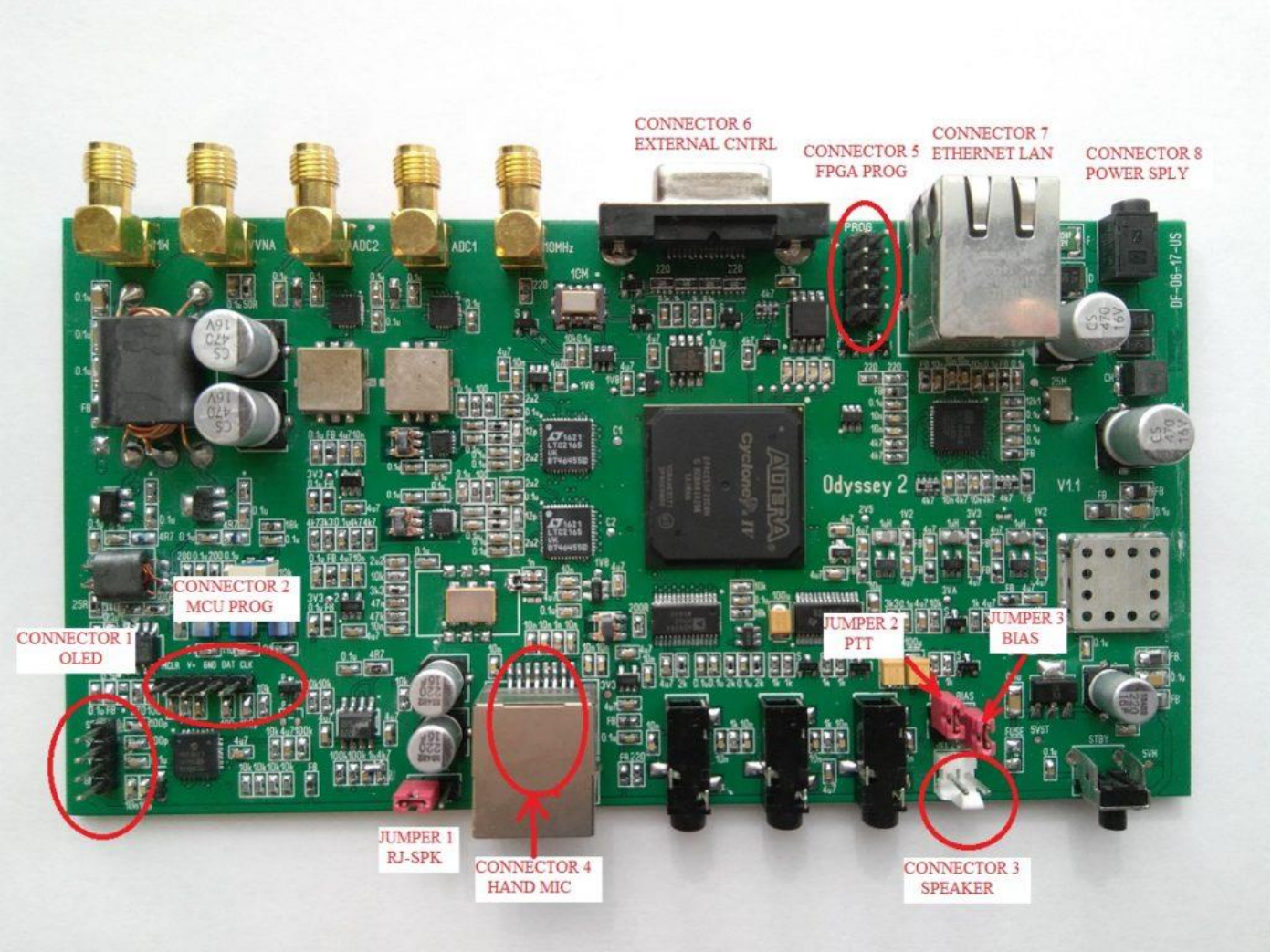
regulator 8. When using the old version KSZ9021, using a separate regulator 10 for its power supply is necessary.

Linear regulator 11 generates a voltage of 3.3 Volts to power the audio codec.

Regultor 12 generates a voltage of 5 volts to power the microcontroller. This standby voltage is present even if the transceiver is turned off by the button. Typical current consumption of the transceiver in the standby mode is 7 mA from the 12 V source. The input circuit of this regulator is protected by a separate low-current fuse.

The regulator 13 is the main stabilizer of the transceiver power supply, which delivers 5 Volts to all the above mentioned stabilizers (except 12). The operation of the stabilizer is controlled by the microcontroller, in stand-by mode it turns off and all the circuits of the transceiver are de-energized (except for the standby voltage from regulator 12).

The following figure shows the location of the connectors and switches.



Connector 1 is for connecting an OLED display. Please note that due to the absence of a connected display or its malfunction, the microcontroller may not turn on the power of the transceiver. To solve this problem, it is necessary to completely de-energize the transceiver, plug in a working OLED display to the connector and reconnect to the power supply, thus ensuring the reset of the microcontroller.

Connector 2 is used to change the firmware of the microcontroller using an external programmer. Note that programming should be done exclusively in LVP mode. The line / MCLR of the microcontroller is also connected to the FPGA pin, which means that applying a voltage of more than 5 volts is very likely to damage the FPGA. As a protection against such situations, be sure to install a protective zener diode at 4.7 volts (the lower left corner of the MCU body).

Connector 3 is for connecting small speakers only if you want to provide such functionality in your transceiver. The power of the amplifier built into the transceiver is small. therefore, to provide an acceptable volume to the connector, you must connect 4-ohm speakers with good sensitivity or two 8-ohm speakers connected in parallel.

Connector 4 is used to connect a hand-held microphone (tangents). The recommended model is YAESU MH31-A8J. If you want, you can connect any headset you like. Pin Assignment (left to right) —
1) DOWN_BUTTON,
2) UP_BUTTON,
3) 5_VOLT,
4) MIC_GND,
5) MIC,
6) PTT,
7) BUTTON_GND (YAESU) OR AUDIO (OTHER),
8) FAST_BUTTON

Pin 7, if the recommended YAESU headset is used, must be connected to ground, otherwise the buttons will not work. When using other headsets, this pin may be used to transfer an audio signal from a sound power amplifier.

The assignment of pin 7 is depended to switch 1 (RJ-SPK). In the OFF position, pin 7 is connected to the ground line, which ensures compatibility with the YAESU tangents. In the ON position, the signal from the audio power amplifier is output to pin 7.

The voltage of 5 volts from connector 3 can be used to power the electret condenser microphones of the tangent.

Note that the buttons can be very important when using the transceiver. A long hold on the DOWN_BUTTON button turns on and off the 1-watt output driver, the UP_BUTTON button turns on and off the built-in audio amplifier and the FAST_BUTTON button is used as a duplicate power button.

Switch 2 determines the possibility of using the free pin of the 3.5mm MIC jack to control the transmission of the transceiver (PTT). If this functionality is not used, you should disable this feature, because when the microphone connector is connecting / disconnecting, this contact may accidentally close and the transceiver can go uncontrollably to the transmit mode.

Switch 3 (BIAS) supplies power to the electret microphone connected to the 3.5mm MIC connector. When using dynamic type microphones, the power can be turned off.

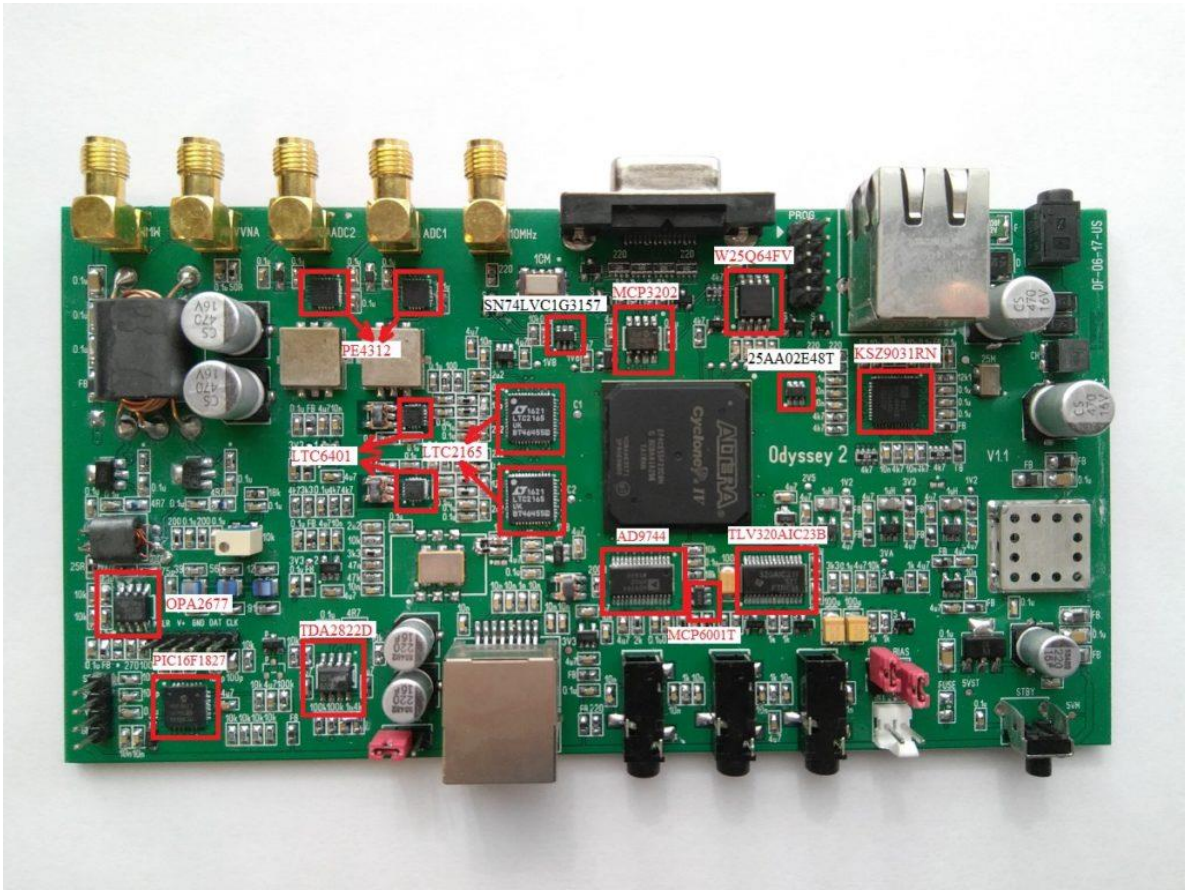
Connector 5 is used to program the FPGA memory with an external programmer.

Connector 6 is used to control external devices, the purpose of its outputs was described earlier in previous articles. The purpose of some of the outputs may vary depending on the firmware.

Connector 7 is designed to connect an Ethernet cable and connect with a computer, router, router or other devices. The cable can be any modern CAT5, straight or crossover, if it has all 8 wires inside. This is the main requirement for successful operation in Gigabit mode. It is desirable to use short thin unshielded cables. For longer distances, a shielded Category 7 cable may be required.

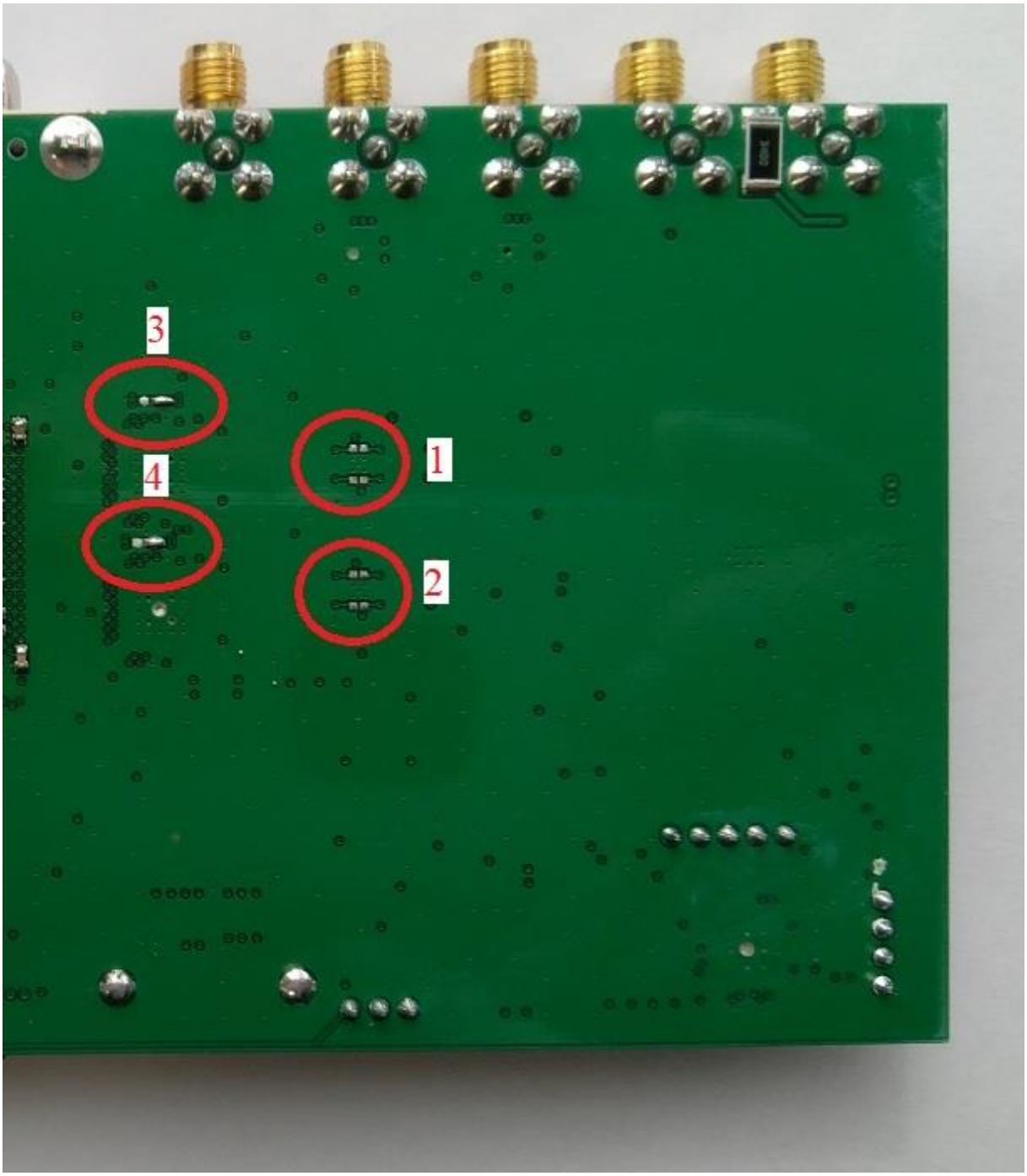
Connector 8 is designed to power 12 volts with a current of at least 1 ampere, if a 1-watt output driver is used. if it is not used, a source with a nominal current of 500 mA is sufficient.

The following picture shows the location of the integrated circuits, except the power regulators.



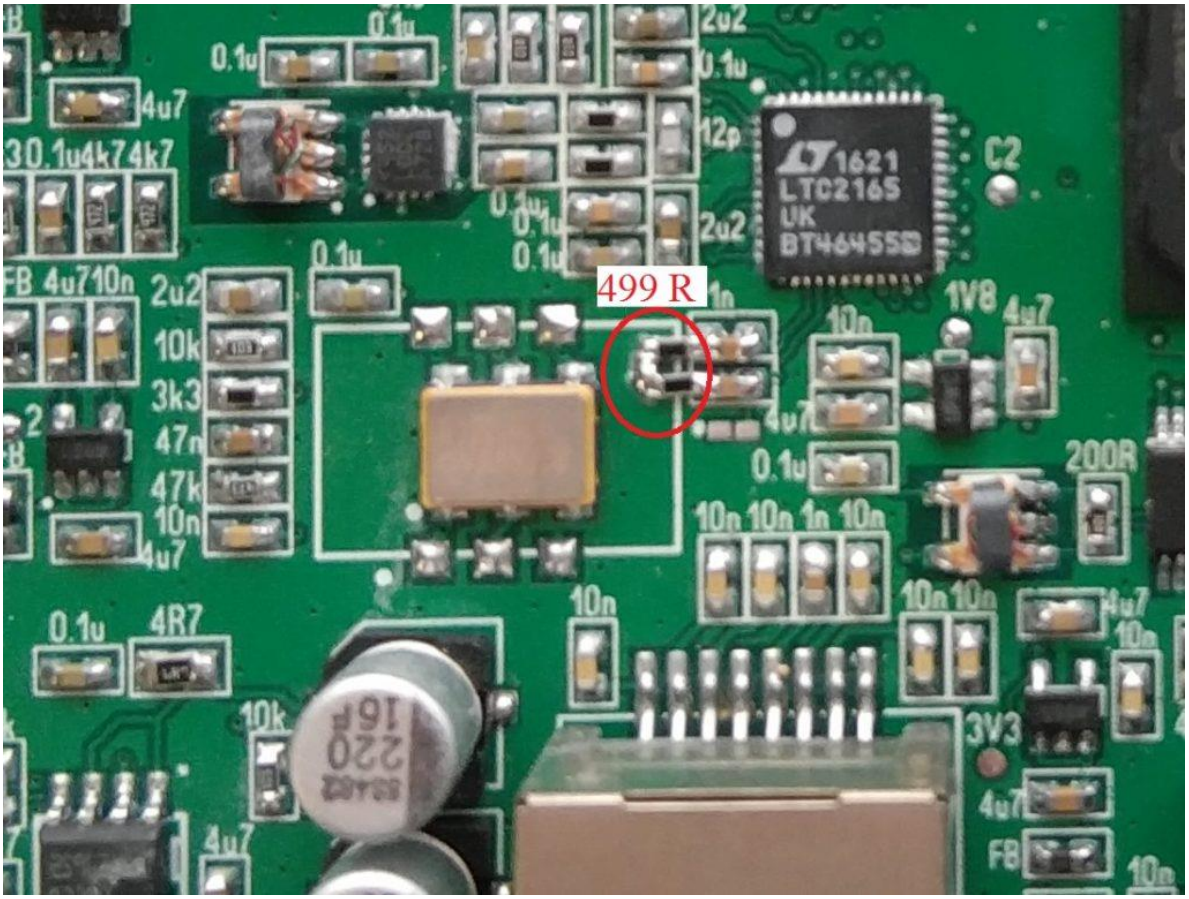
The OPA2677 is an analog of the known OPA2674 and unlike it can be powered by a voltage of 5 volts. If desired, OPA2674 can also be used in this transceiver if the ferrite bead FB is re-soldered to the empty space on the right marked as *.
In this case, the power supply to the chip will be supplied by 12 volts from the connector for external power supply and it will be powered even if the transceiver is in standby mode. The current consumption in this case will be about 22mA.

LNA chips LTC6401 may not be installed. In this case, it is necessary to correctly configure the board by jumpers on the reverse side of board.



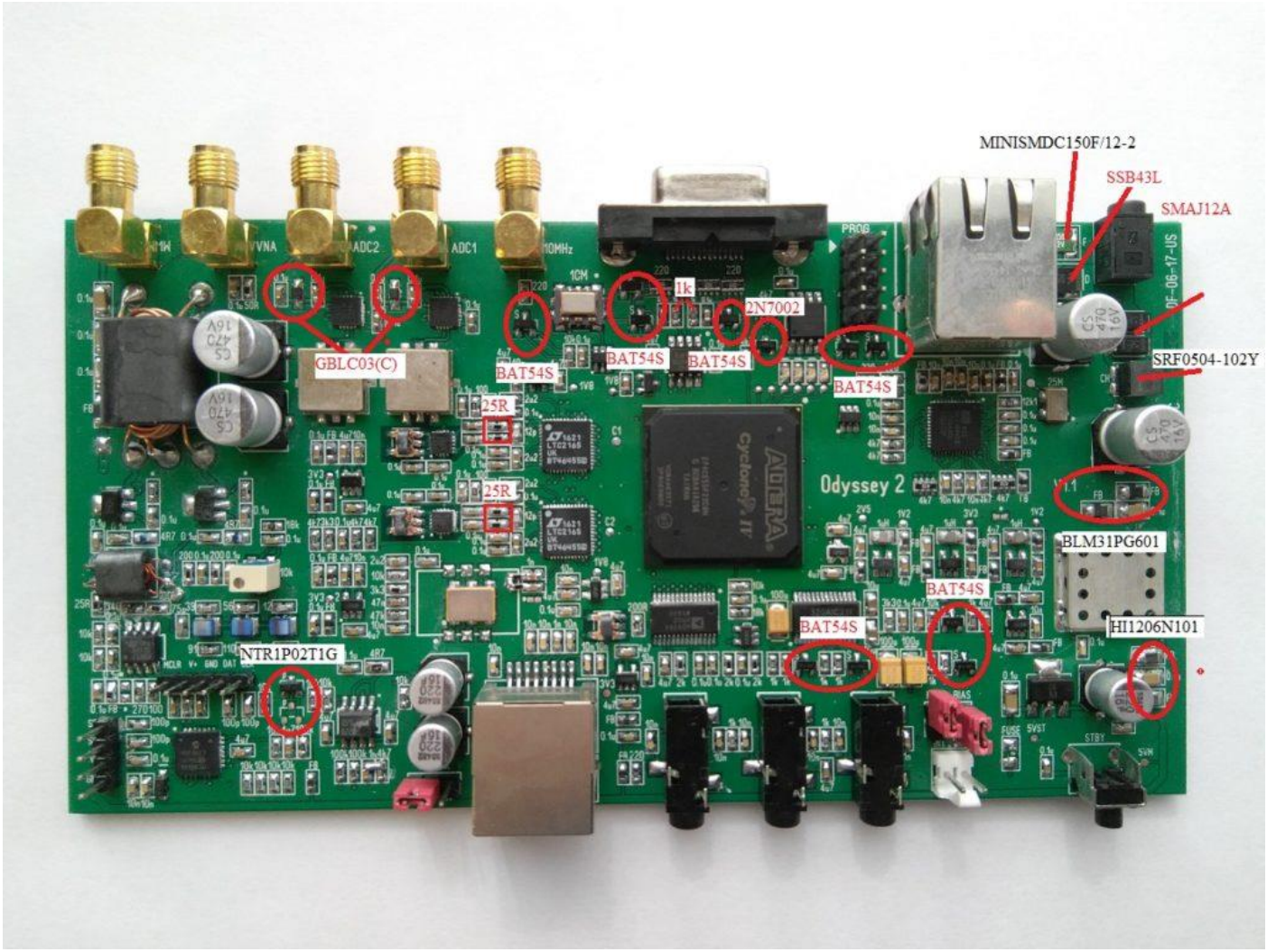
When amplifiers are installed, jumpers 1 and 2 must be open, and jumpers 3 and 4 are set to position 0 (dB of ADC gain). If there are no amplifiers, jumpers 1 and 2 should be closed to ensure that the signal passes, and jumpers 3 and 4 should be set to position 6 (dB of ADC gain). The picture shows the configuration with the amplifiers installed.

Several variants of master oscillators can be installed on the board.

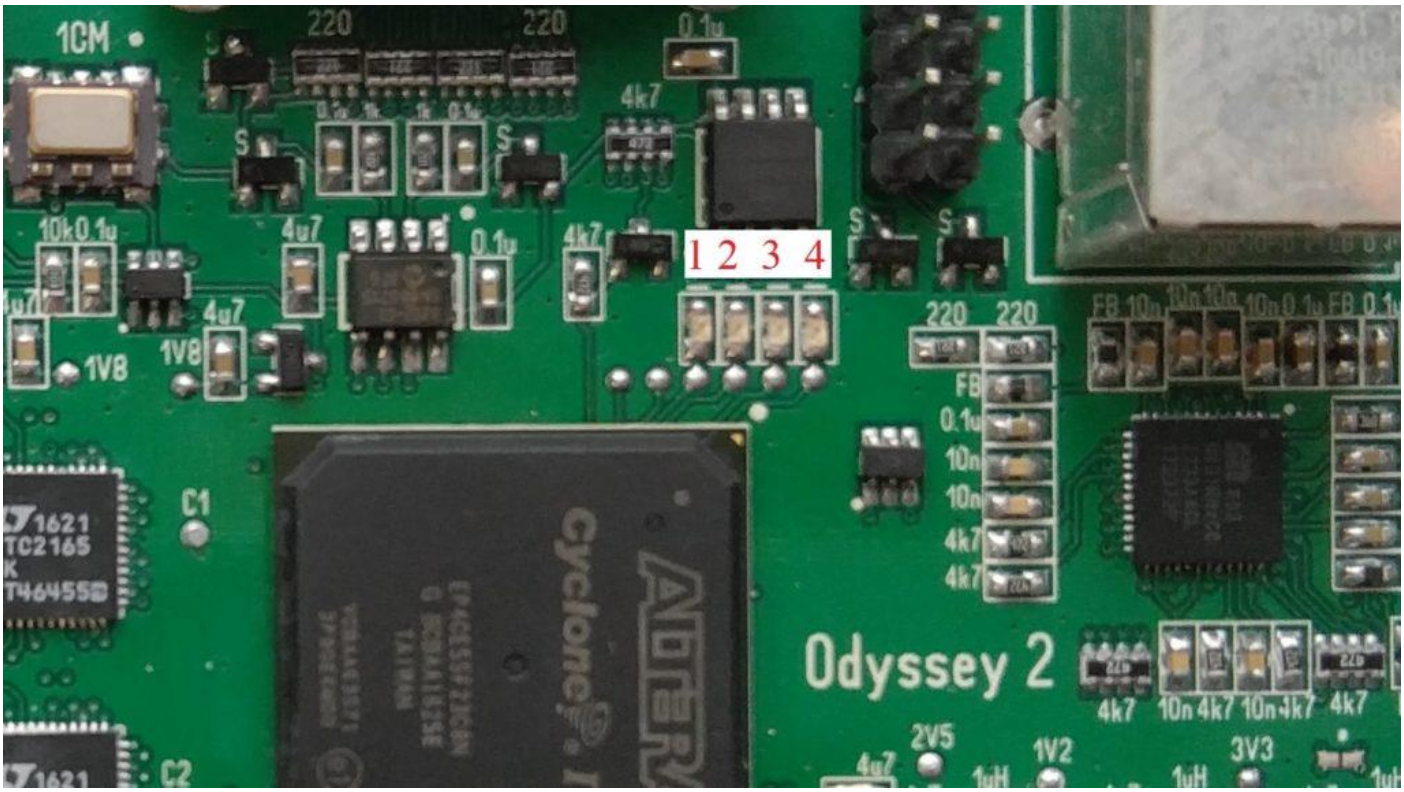


When installing a VG-4513CA oscillator with a symmetrical PECL output, you should also install 499 ohm resistors. If a CMOS type oscillator like ABLNO is used, you do not need to set theese resistors, but you need to close the jumper located below the 1nF capacitors. The oscillator signal can be monitored using the C1 and C2 control points located to the right of the ADC.

The location of the protective diodes, transistors and some other components is shown in the following picture.



Four LEDs allow you to monitor the operation of a network connection.



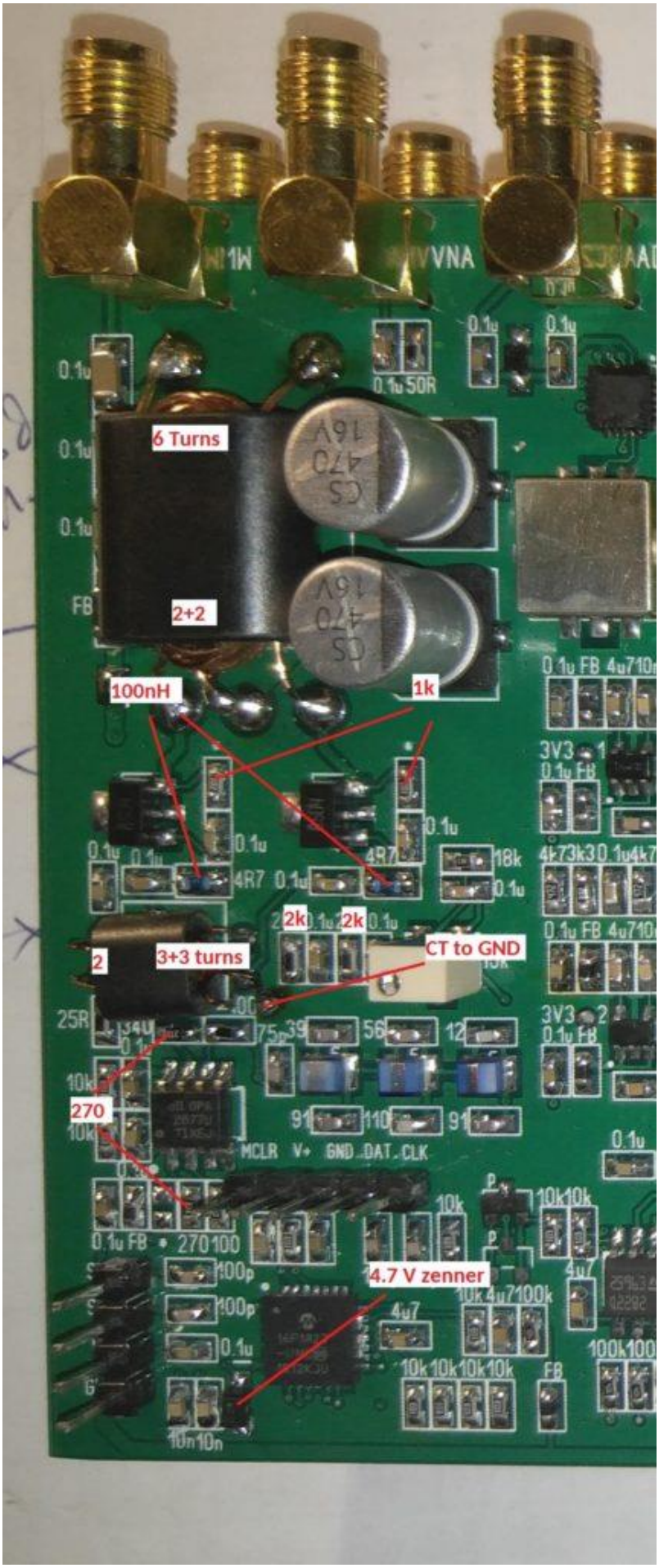
LED 1 flashes with a period of 1 second, which means the arrival of the 125 MHz clock signal from the KSZ9031 chip.

LED 2 shows the status of the network connection. A quick flashing means there is no connection. Slow blinking means the connection is set to 100Mbps. Constant light means that a connection is established at a speed of 1 Gigabit.

LED 3 flashes when the transceiver successfully receives the network packet from the computer. With enough incoming packets the LED lights continuously.

LED 4 flashes when the transceiver sends a network packet to the computer. When the packets are sent often enough, the LED lights up continuously.

Amplifier 1 Watt output power can be configured in different ways. The figure below shows the values of the elements of a successful configuration , in my opinion.



Note that the 4.7 ohm resistors in the gates of the transistors are replaced here with inductors of 100 nH. This is due to the fact that sometimes when the transceiver was turned on the amplifier was excited at a high frequency.

On the back of the board near the 1W connector, a 340 Ohm resistor is slocated, which prevents the transistor failure at a high SWR.

On all amateur bands the amplifier outputs at least 10 Volts peak (50 Ω load) but in the 50 MHz band the output voltage drops to 5 Volts Peak.