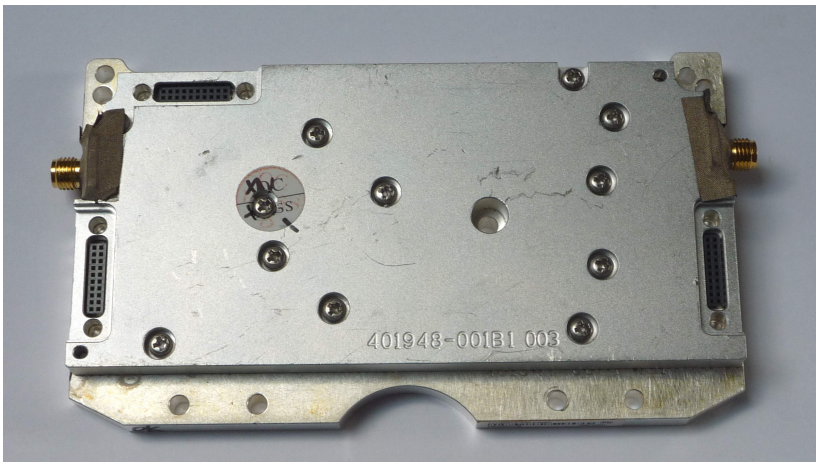
Modification the 23 GHz TRX module to 24 GHz power amplifier



This study is a concept of adaptation of TRX modules 23X1008XN and 23X1008XP to a power amplifier for the 24 GHz amateur band. Two modules have been converted as follows, 1.5 and 1.7 W of output power were obtained, with a gain of about 20 dB.

The 23X1008XN and 23X1008XP modules contain the K-Band Power Amplifier MMIC type SMM5845 in the final stage, allowing to obtain a typical power of 2 W in the 21.2 - 23.6 GHz band. Only this stage is used to build a 24 GHz power amplifier. Modification of the modules consists in bringing the signal directly to the SMM5845 input. This can be done in 2 ways.

Method one: the SMA socket of the RX part is used as the input of the amplifier (figure 1). In this case, the receiving converter HMC967 should be removed together with a piece of the board (to ground level). Similarly, the last driver should be also removed. Then, using the UT086 semi-rigid cable, connect the SMA socket (figure 2) with the SMM5845 input (figure 3). Only the central conductor is soldered, while the cable shield is pressed to the ground with clamps. You can try to solder the cable's shield, but then it is necessary to warm up the entire module, and this carries the risk of damaging the SMM5845. In addition, it is necessary to mill the cover for the UT086 cable (figure 4).

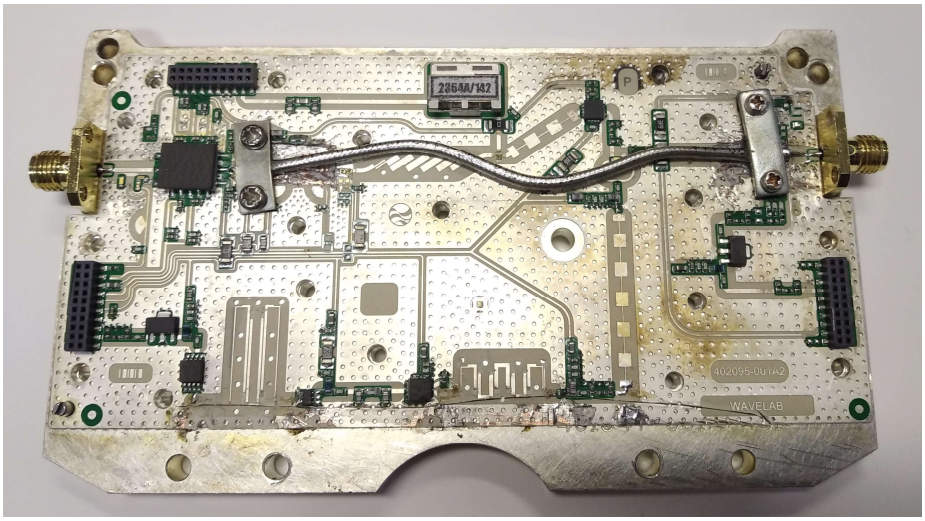


Figure 1. RX socked used as the PA input

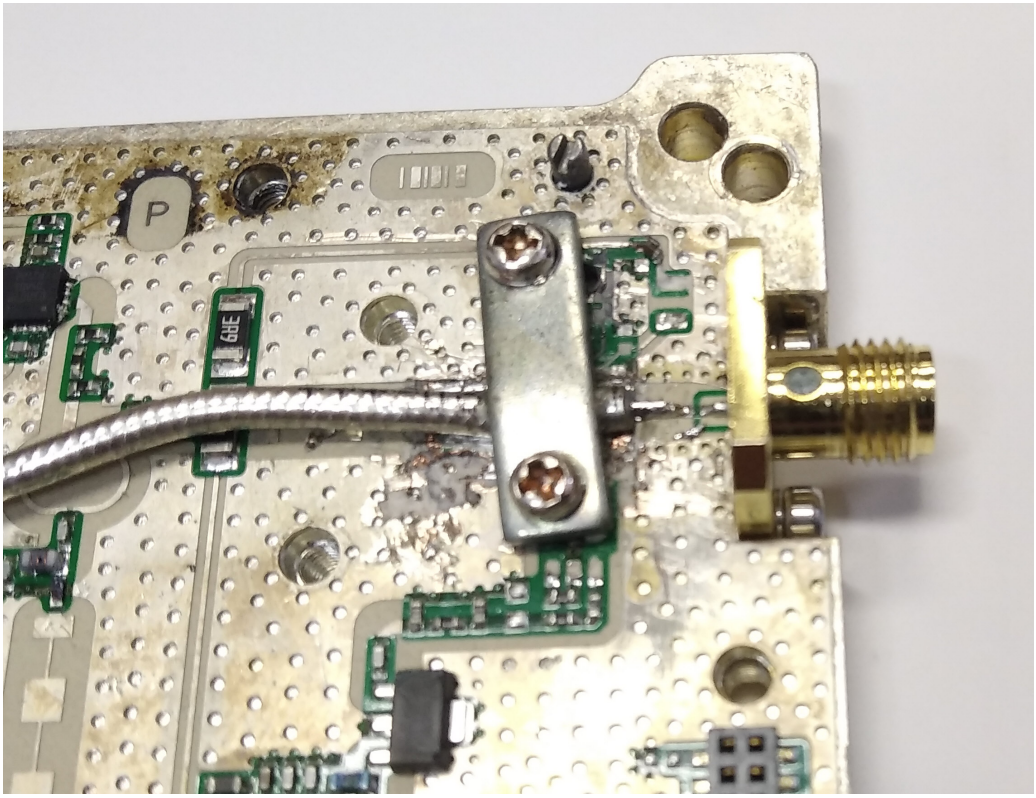


Figure 2. Details of connecting the UT086 cable to the SMA socket

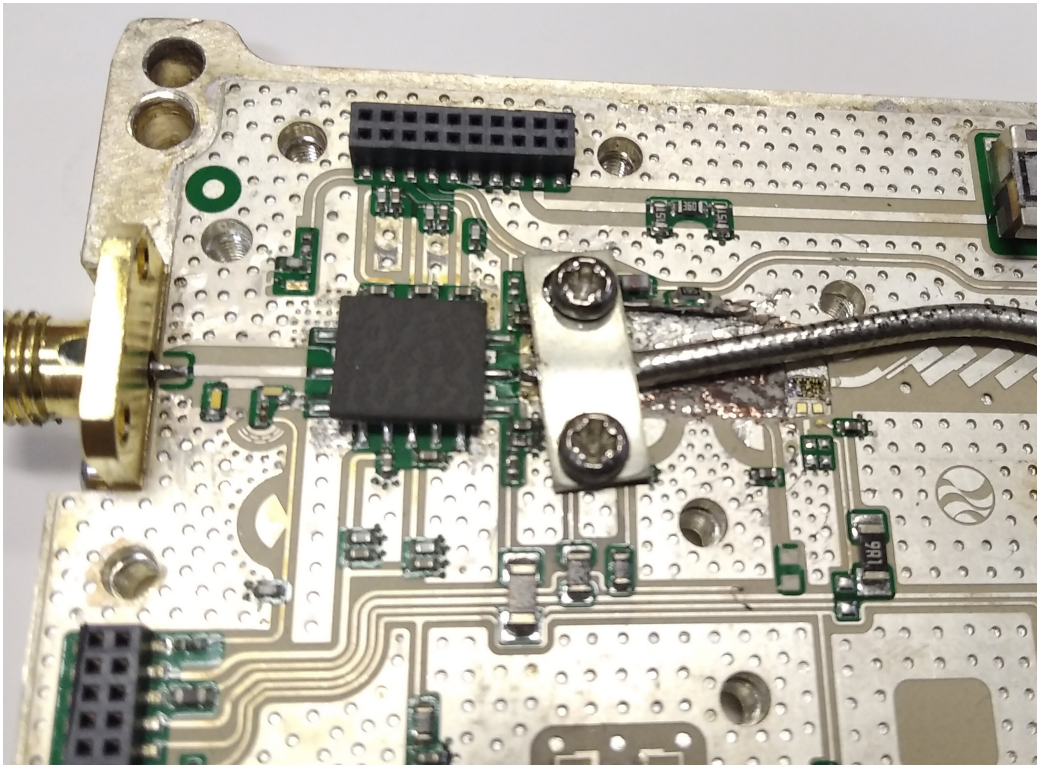


Figure 3. Details of connecting the UT086 cable to the SMM5845 input

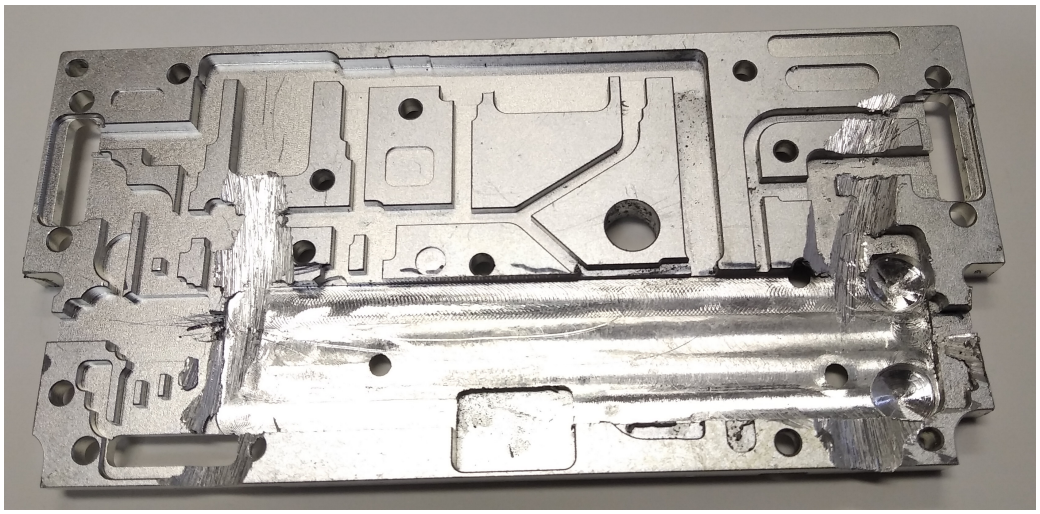


Figure 4. Milled cover for the UT086 cable

The second method of the adaptation requires drilling a hole in the board and pedestal near the input of the SMM5845 and mounting the SMA socket on the opposite side (figures 5 and 6). In this method it is not necessary to mill the cover.

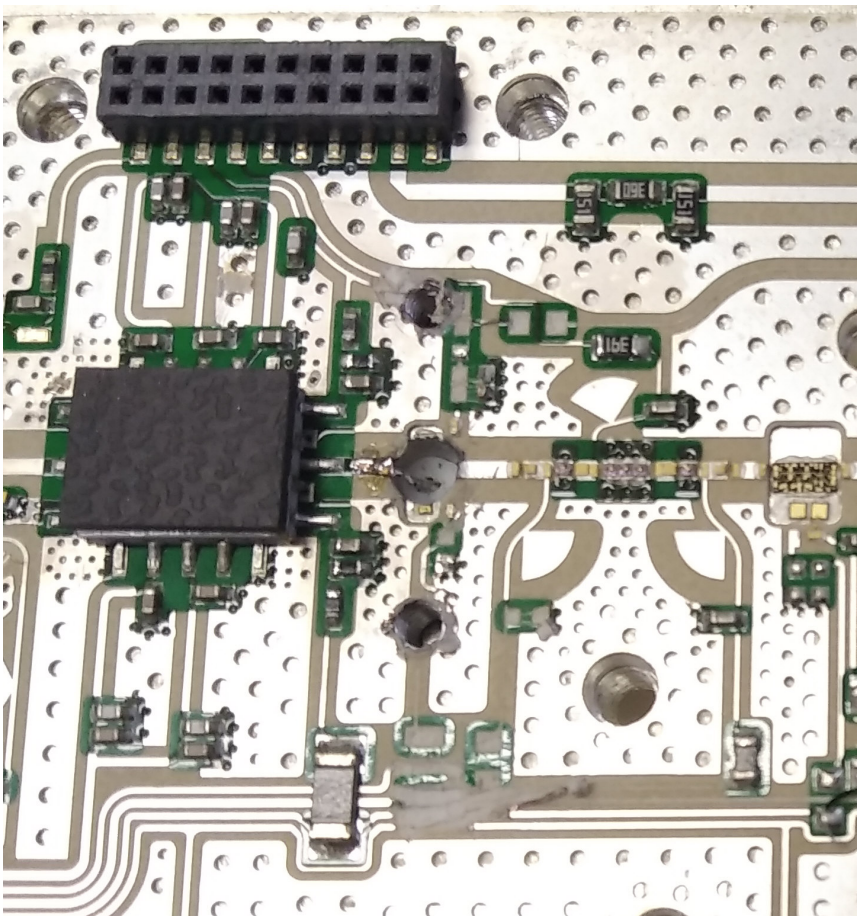


Figure 5. Mounting of the input SMA socket, PCB side

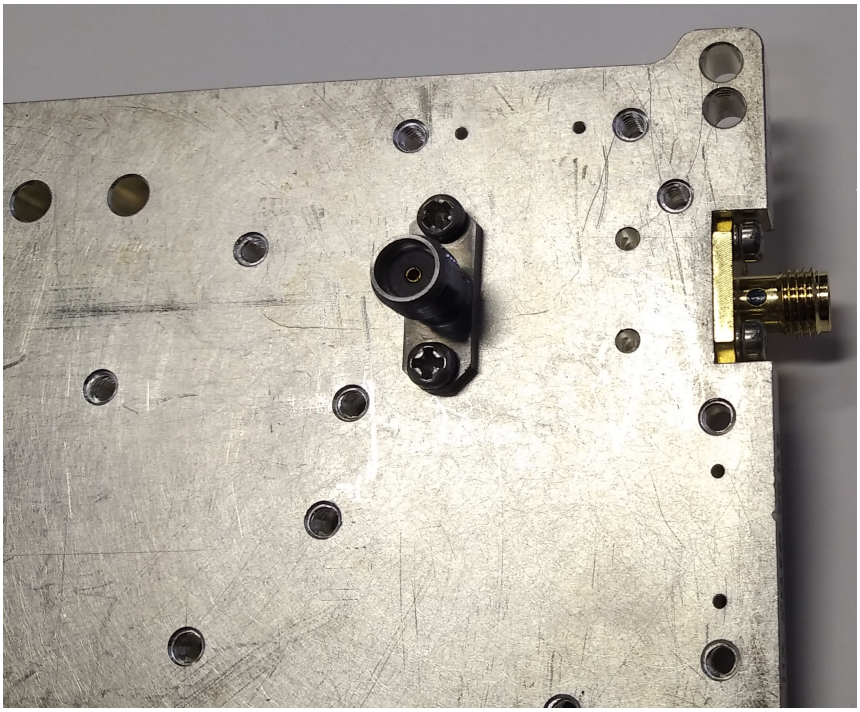


Figure 6. Mounting of the input SMA socket, the other side (pedestal)

Only 2 voltages are required to power the modules converted to PA: -5 V and +6 V.

Schematics of the modules can be found on the forum: http://mikrofale.cafe/showthread.php?tid=197&page=2

The required supply voltages are indicated in the diagram as +6V_TX_A, +6V_TX_B, -5V_A and -5V_B.