Condition Module (Unica4)
Test and calibration procedure

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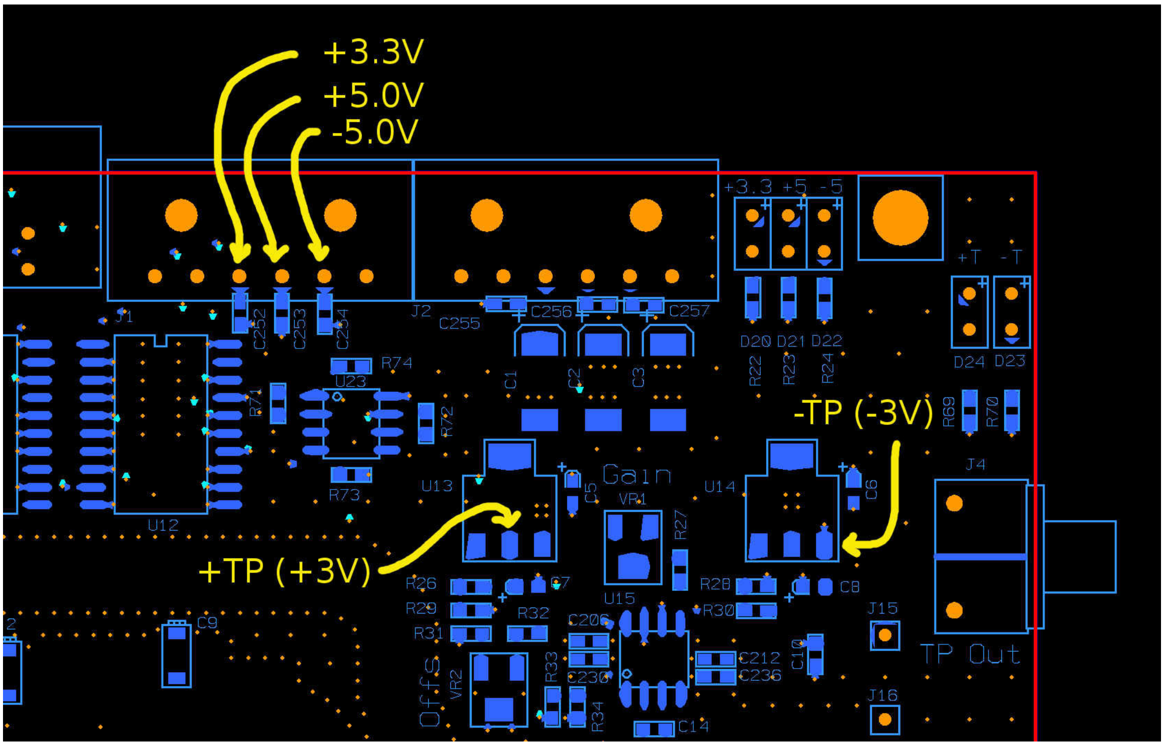
Last modification: 13Apr2013

Power supplies:

Connect power cable only. Check for the supply voltages on the power connectors. Check the on-board regulated voltages for the TP part. These should be +/- 3.0 V with a tolerance of +/- 0.1 V.



Read / Write / Address decode:

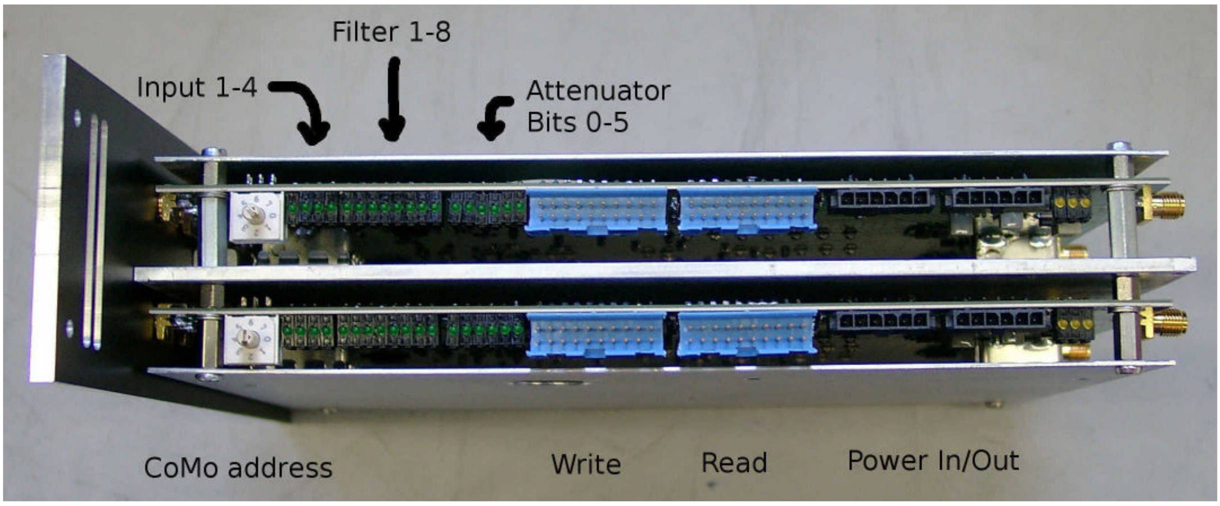
Connect Unica4 to DBBC with long control cables. Put board on the bench. Start the **AGC_IF4** software on the DBBC.

There is a translation table for the board address:

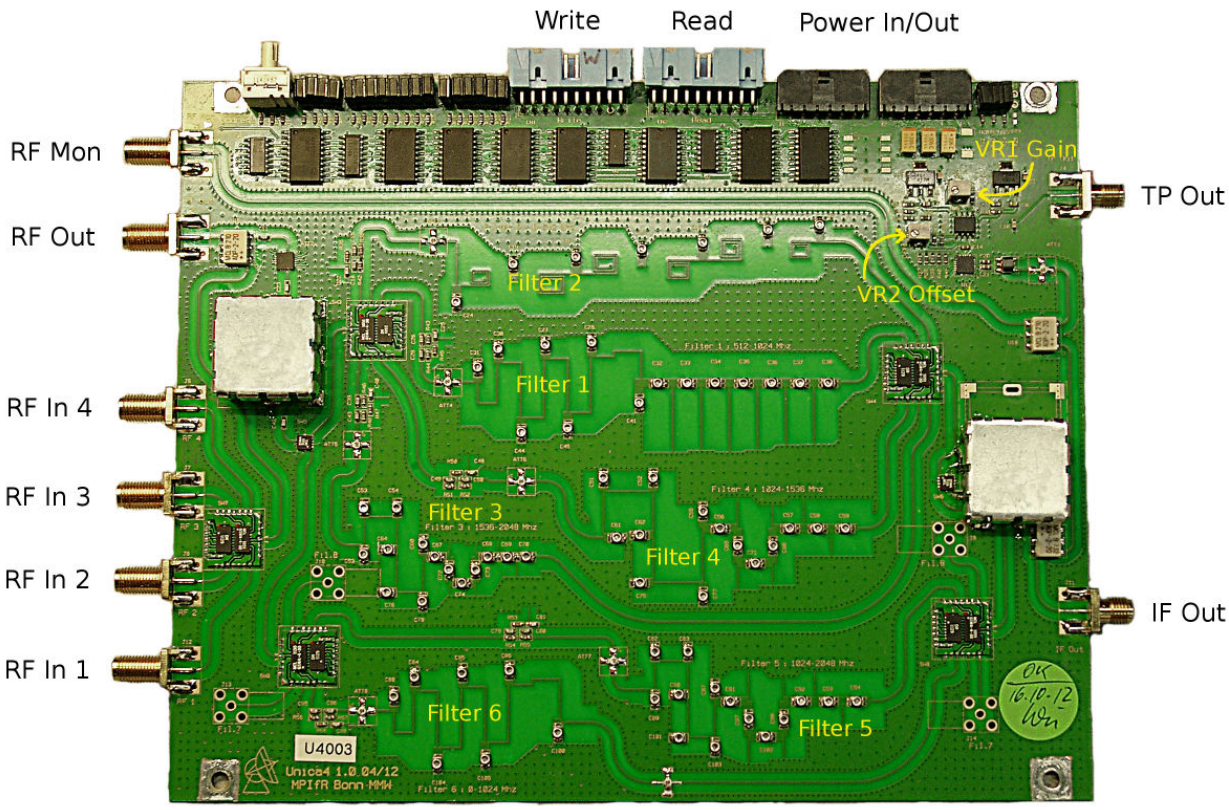
IF A – 7 (on the rotary switch)
IF B – 6
…
IF G – 1
IF H – 0

Set the rotary switch to IF A (7). Use the software to change the input of IF A. The LEDs on the board edge should change. Set the filters 1-8. The LEDs should change accordingly. The same should be done with the attenuation. The positon of all the LEDs is shown in the next picture.

Set the rotary switch to IF B (6). Test inputs and filters again. Repeat everything for all board addresses. After that, set the board to IF A (7) for further testing.



Picture of the assembled (prototype) board:



Input selector:

Set the network analyzer to 10 MHz to 2.5 GHz, output level -2 dBm. Connect output of network analyzer to RF In 1. Connect input of network analyzer to RF Out. Use software to select input 1. You should see more or less a straight line, since RF Out is just a copy of the unmodified input. There is some degrading from 2.5 GHz on due to the switches and power splitters.
Select input 2 with software. There should be low level noise only. Connect cable to RF In 2 to check for the input signal. Repeat this procedure for inputs 3 and 4. After that, reconnect the cable to RF In 1.

Filters and filter selectors:

Connect input of network analyzer to IF Out. Use software to select filters 1-8.
There should be some sort of response in the filters range. Filters 7 and 8 are external. A test cable between outputs and inputs will at least show that the signal path is working.
Select Filter 1 again. There should be some filter curve, even when not calibrated.

A similar output must be visible on RF Mon. It is a copy of IF Out, but about 6dB less in power.

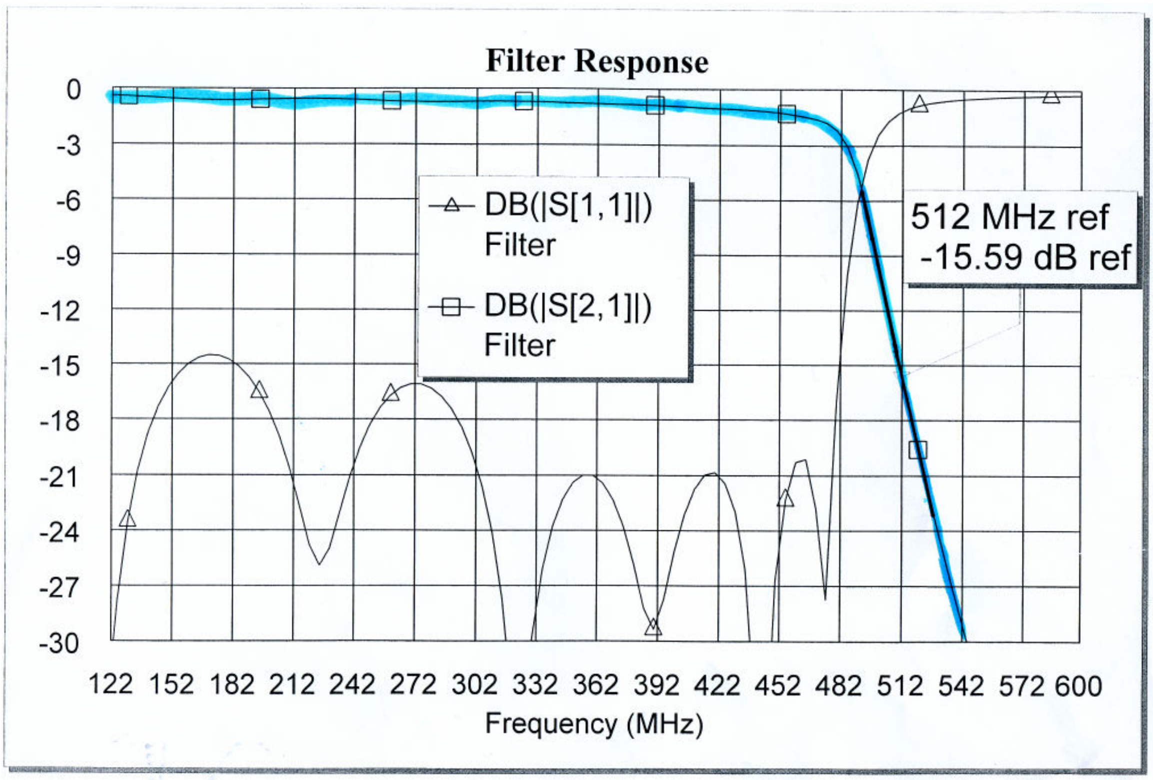
Attenuator:

Use software to set AGC off, Attn. 0. There should be a big increase in level.Change attenuation from 0 to 1, 2, 4, 8, 16, 32, 63. You should see the level change in respect to the settings. This makes sure that every control bit for the attenuator is working. After that, set the attenuation to 31. Attention: these are steps of 0.5dB, a setting of 31 means an attenuation of 15.5dB.

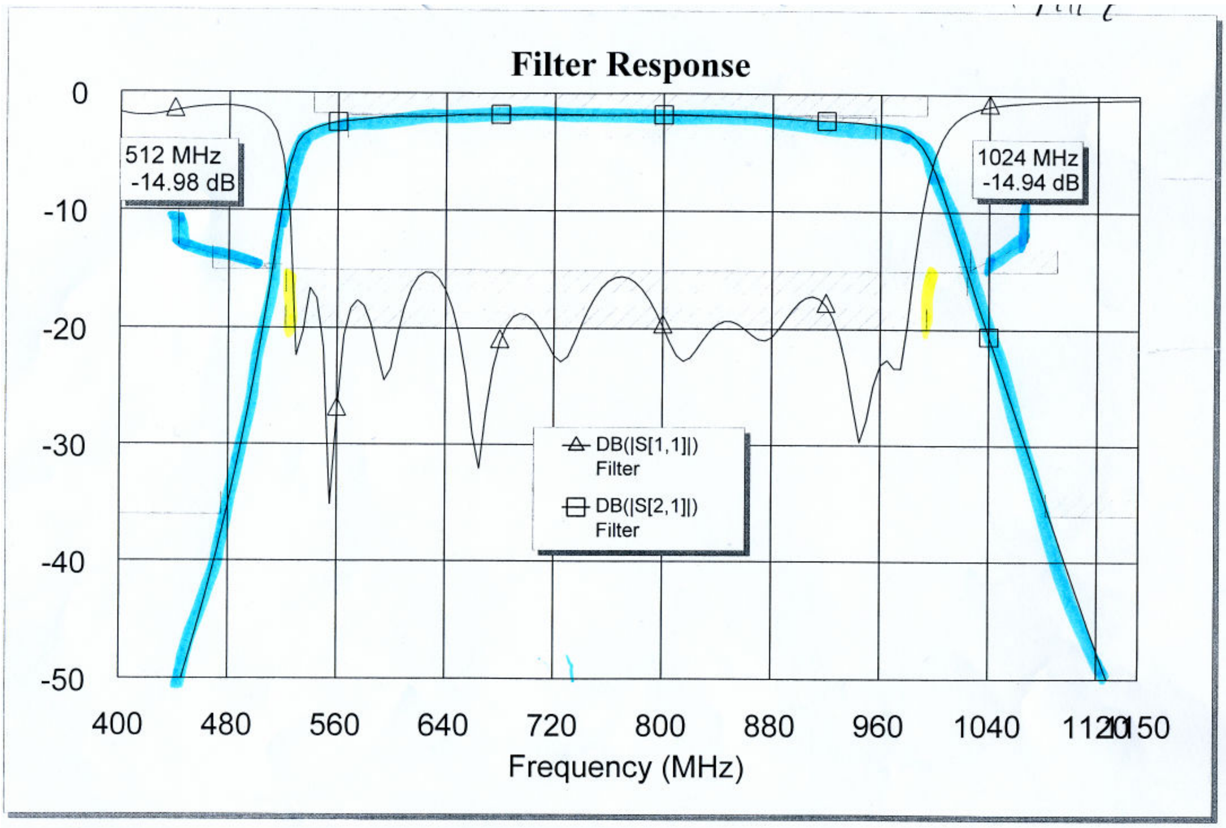
Filter calibration:

Use software to select the filter and calibrate like in the following (ideal) filter curves. It is very helpful to pre-adjust the capacitors after soldering. There are sketches in Appendix A.

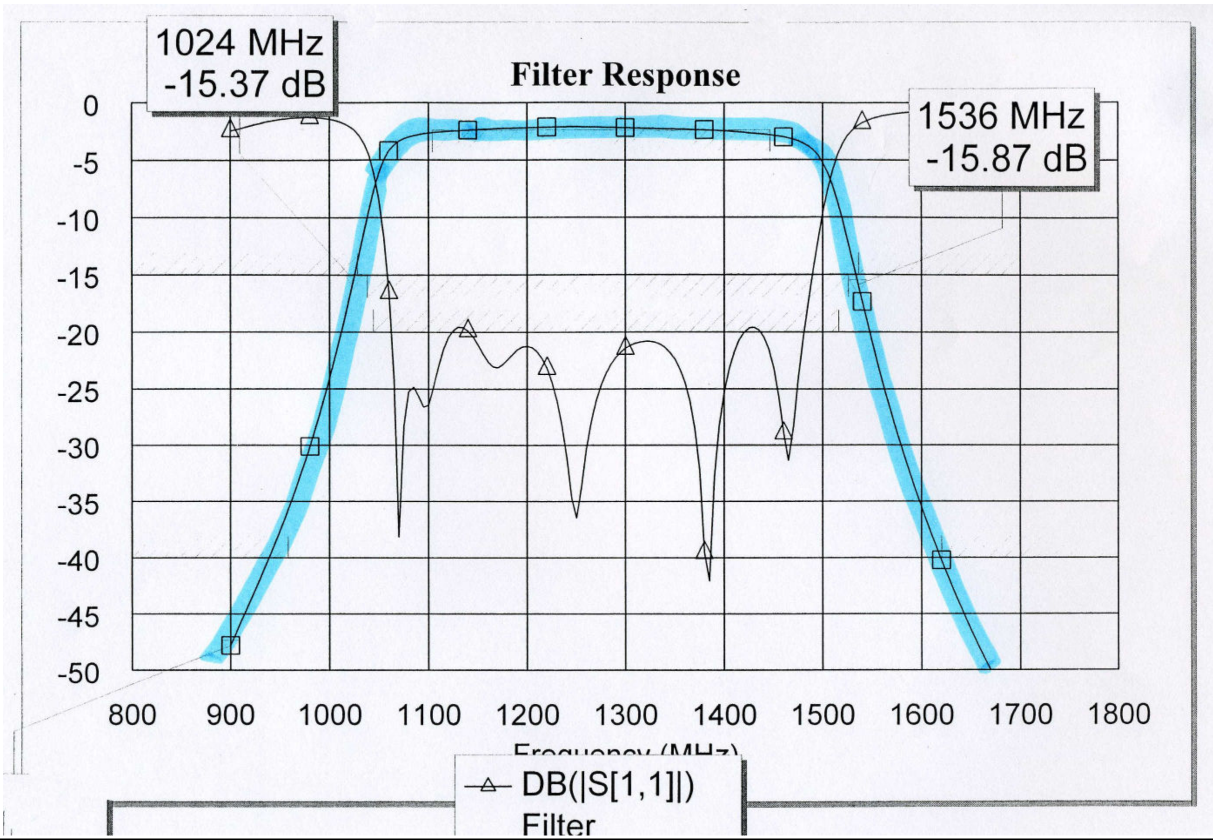
Filter 2: 0 – 512 MHz



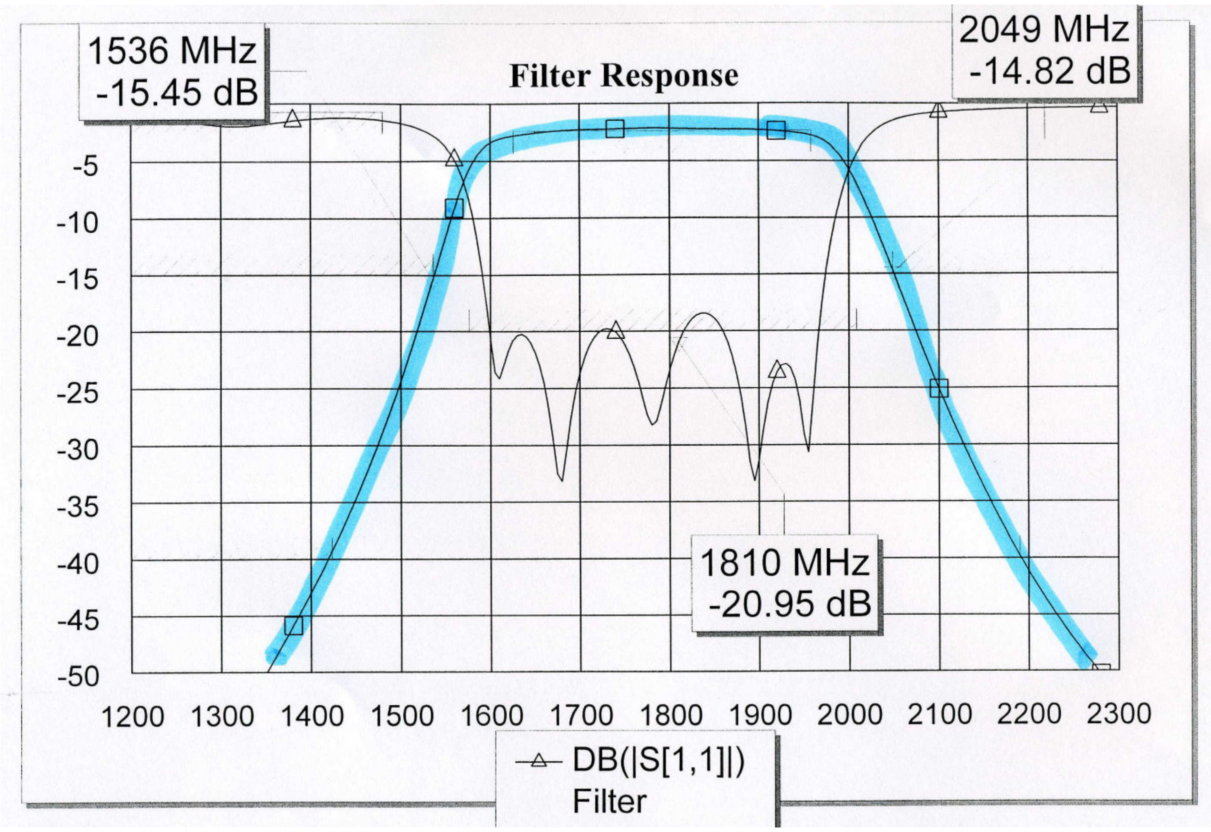
Filter 1: 512 – 1024 MHz



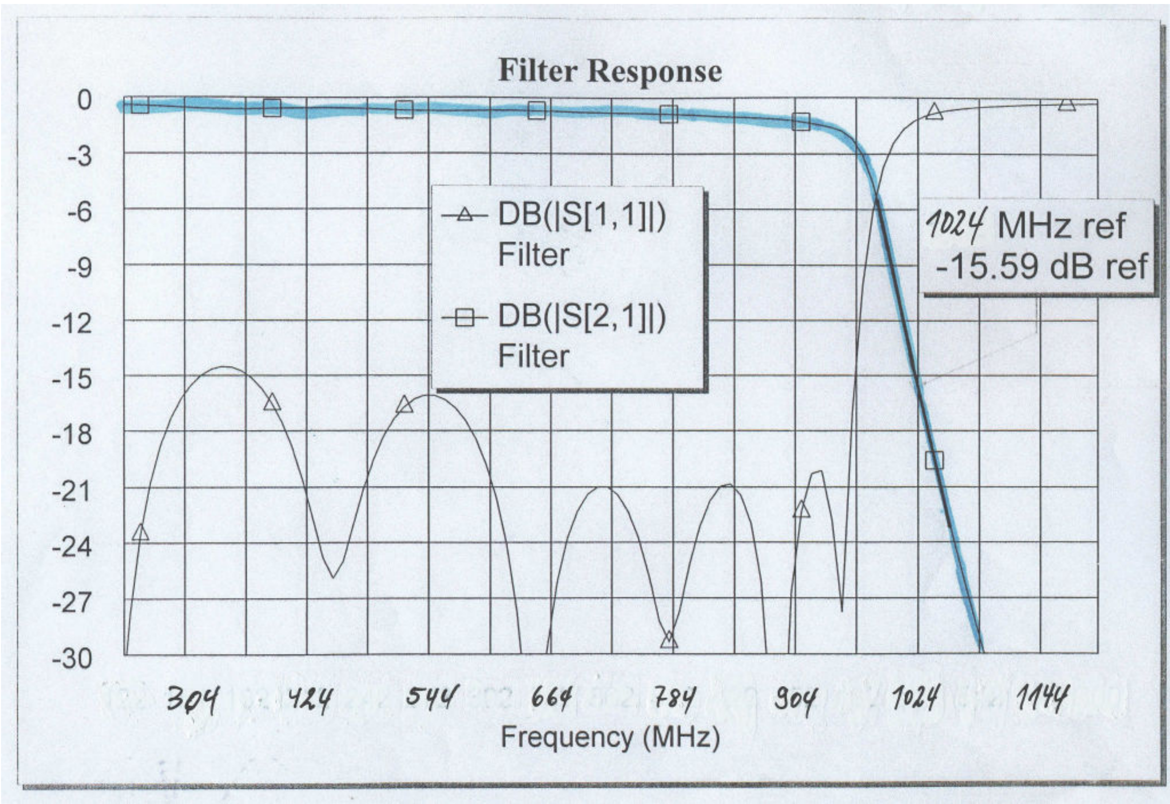
Filter 4: 1024 – 1536 MHz



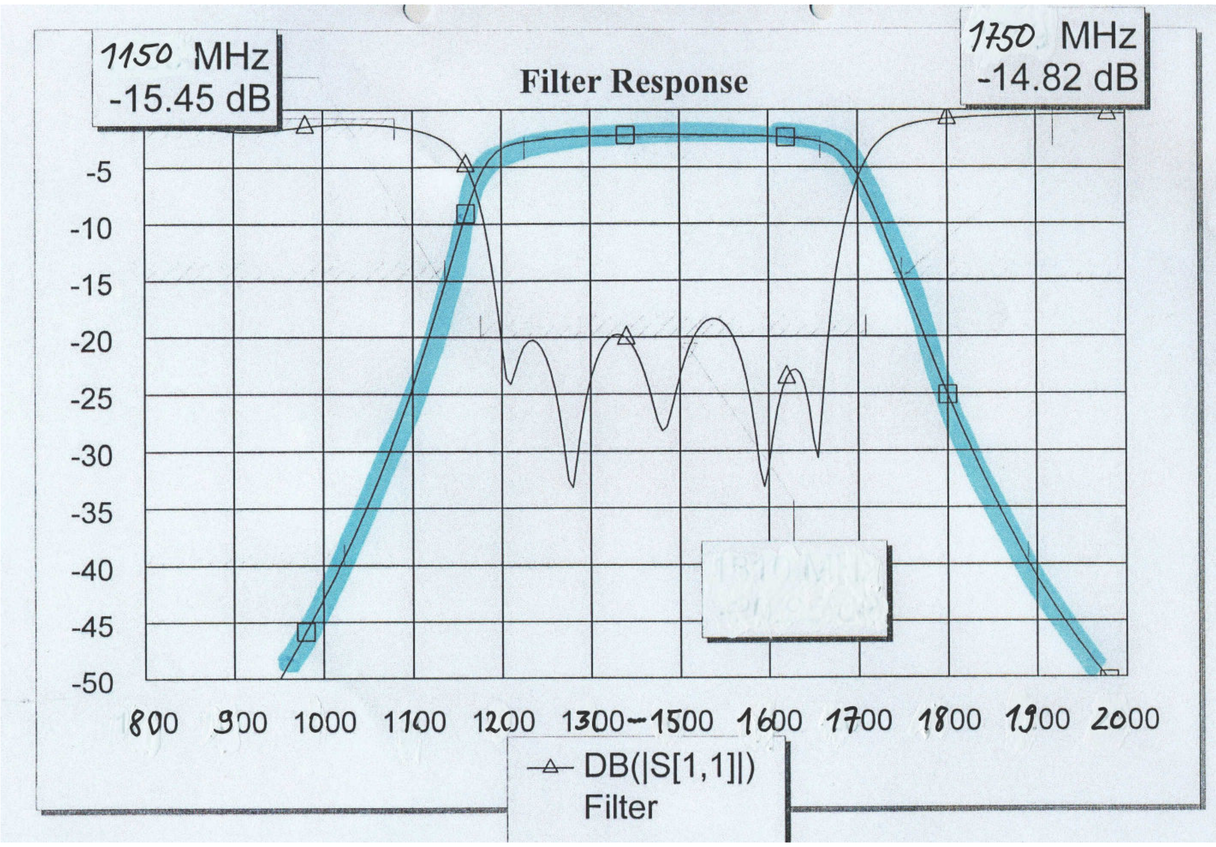
Filter 3: 1536 – 2048 MHz



Filter 6: 0 -1024 MHz

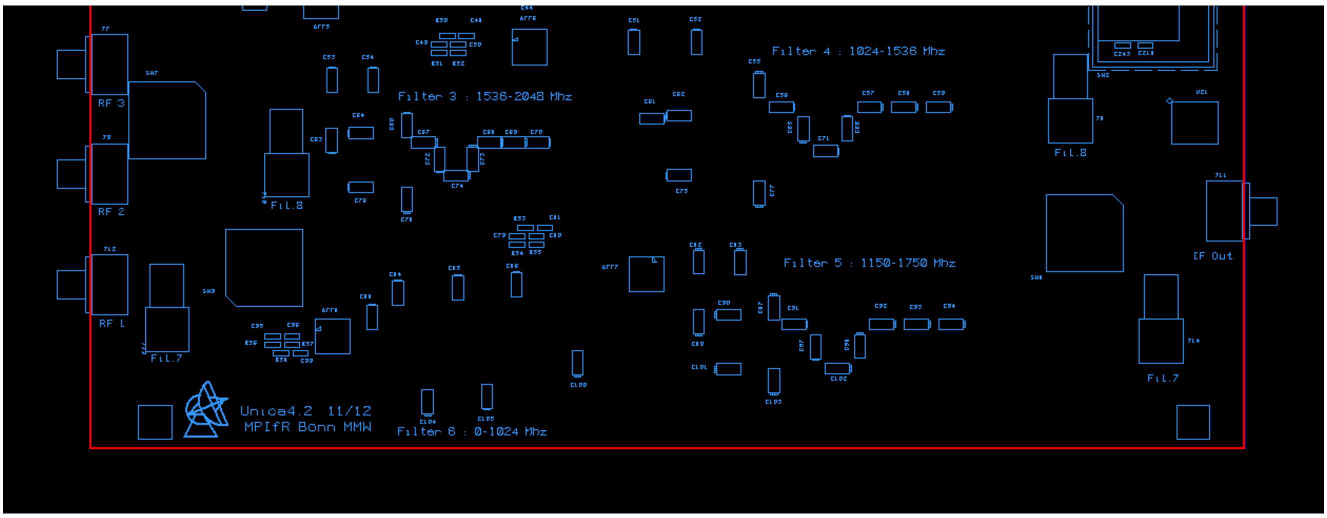


Filter 5: 1150 – 1750 MHz



External filters:

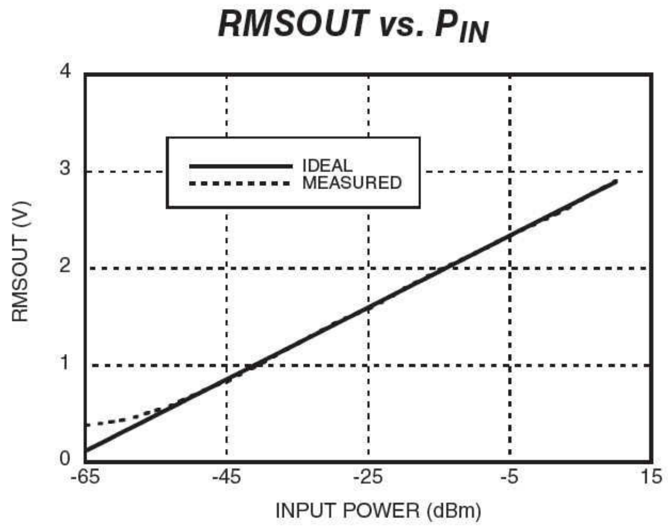
Filters 7 and 8 are external. The connectors, as shown on the picture, are not soldered. The filters could be made as a piggy-back board on the Unica4 or really external, connected with SMA cables. If you intend to use this feature, contact us.



Total power calibration:

We use a power detector from Hittite, it is the HMC1010LP4. Unfortunately the output voltage is not in a range the DBBC PC can measure directely. For compatibility reasons with Unica2 and 3 we limit the measuring range to -48 dBm to -3 dBm. Therefore it has to be converted on the board. The raw voltage in a range from 0.8 to 2.4 Volts is shifted to a range of about -2.45V to +2.45V and then converted to digital, producing 500 to 64000 counts.

Some users are interested to monitor the raw voltage continuosly. For that reason the latest revision (Unica 4.2) has a buffered output to provide that. The prototype boards (Unica4 and 4.1) can be upgraded. There is a procedure in Appendix B.

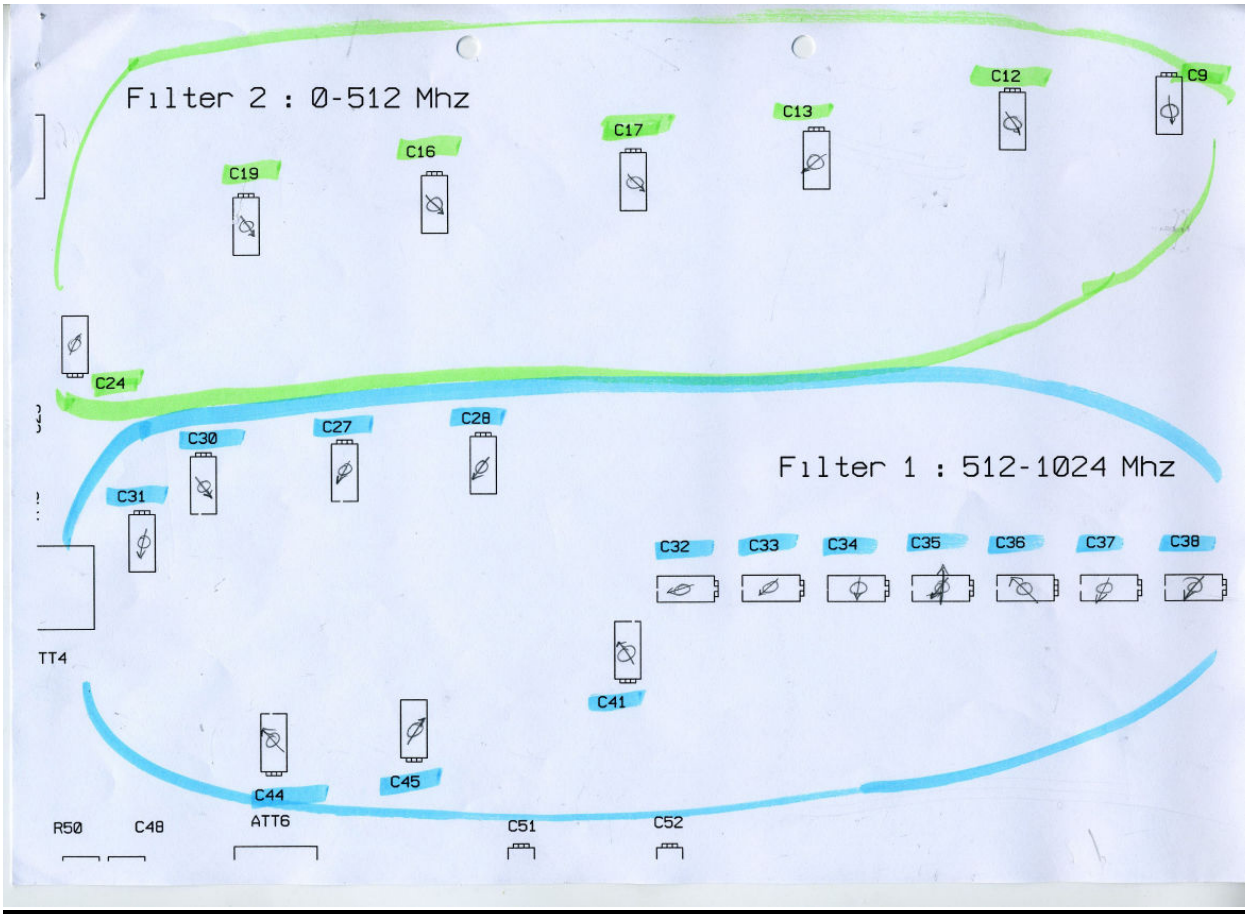


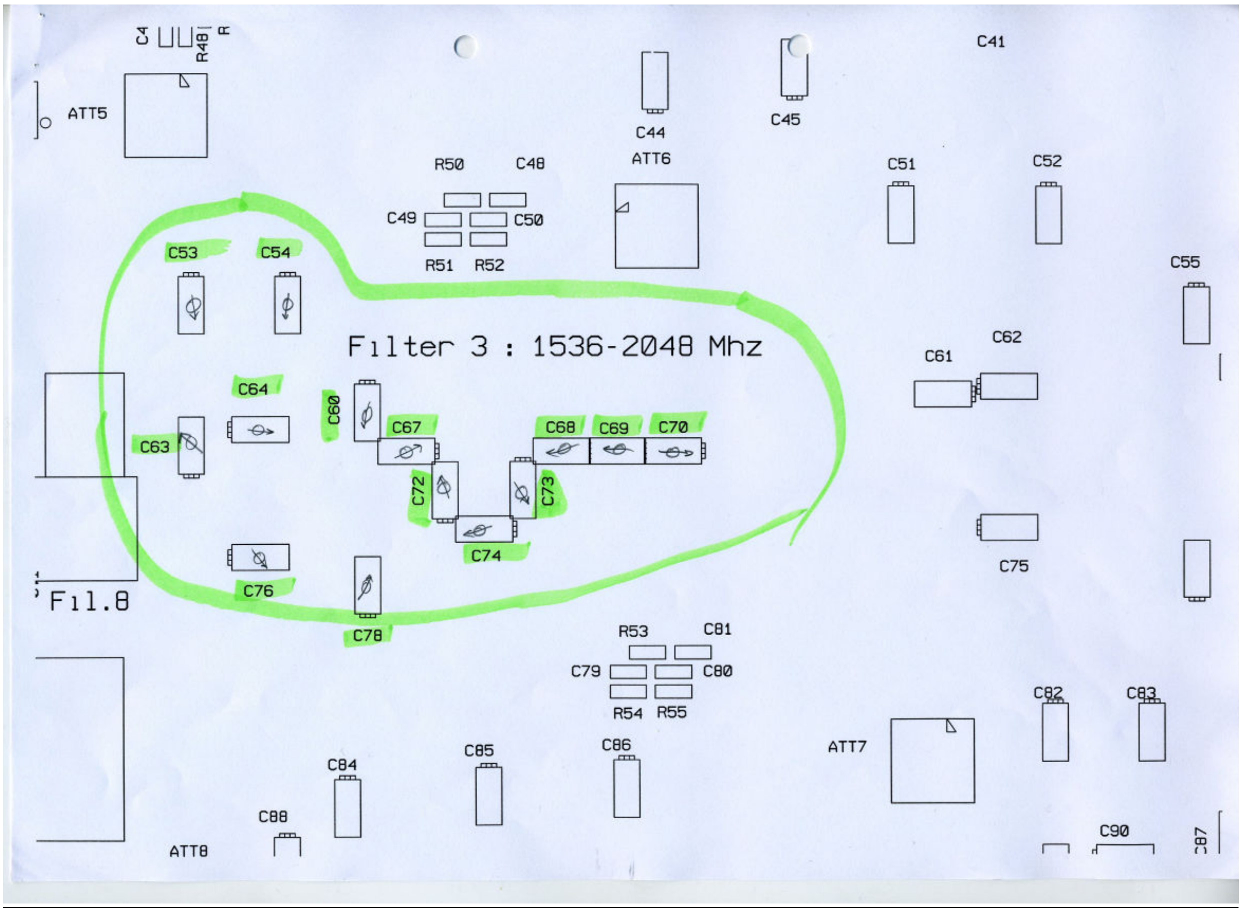
- Connect a synthesizer to RF IN 1. Set it to **755 MHz, -23 dBm**.
- Use software to select input 1, filter 1. Set attenuation manually to 31 (15.5dB).
- Connect voltmeter to TP Out (or the test point nearby).
- Adjust OFFSET to about 0V with VR2 (lower potentiometer)
- Set synthesizer to **-48 dBm**.
- Adjust GAIN to about -2.45V with VR1 (upper potentiometer)

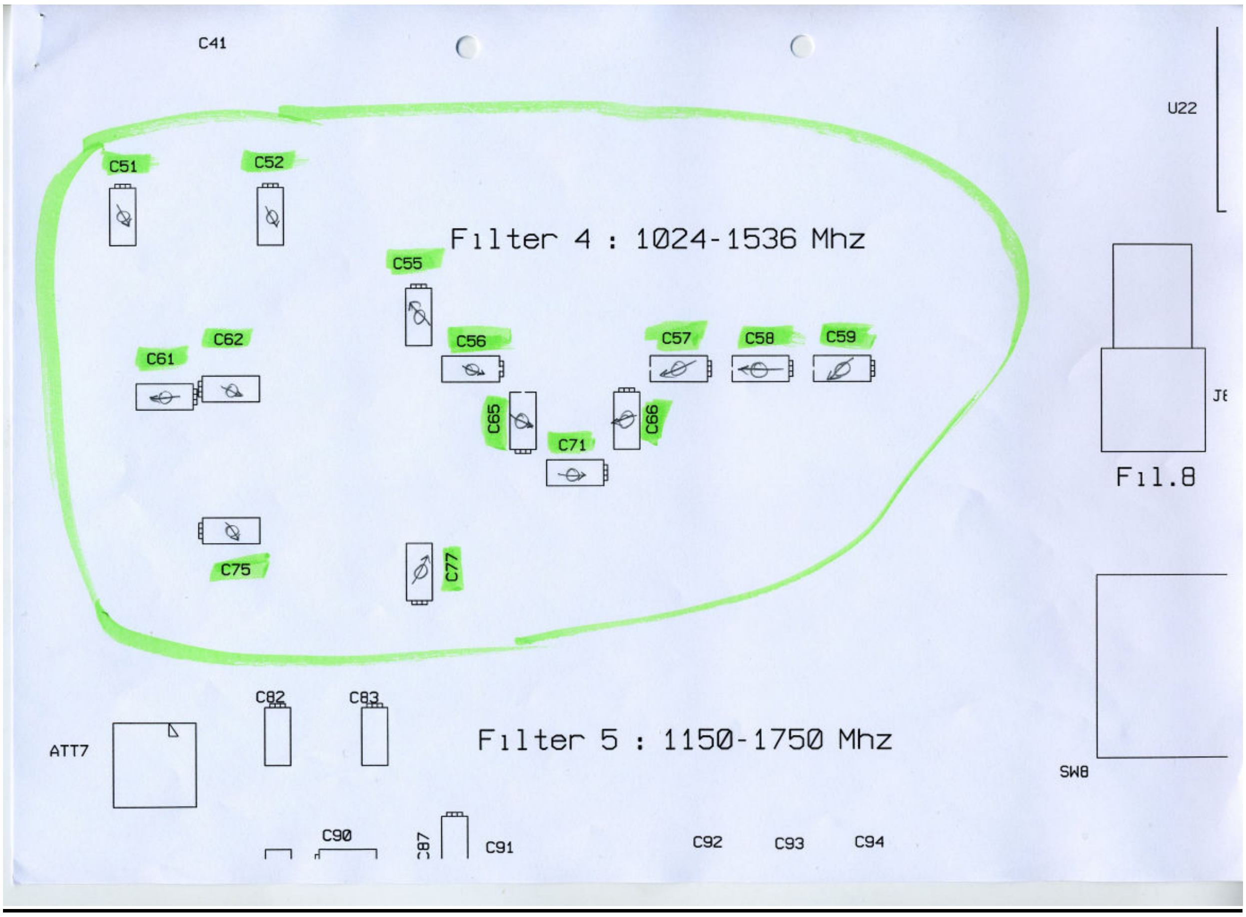
-..Connect TP Out to TP cable of your DBBC.

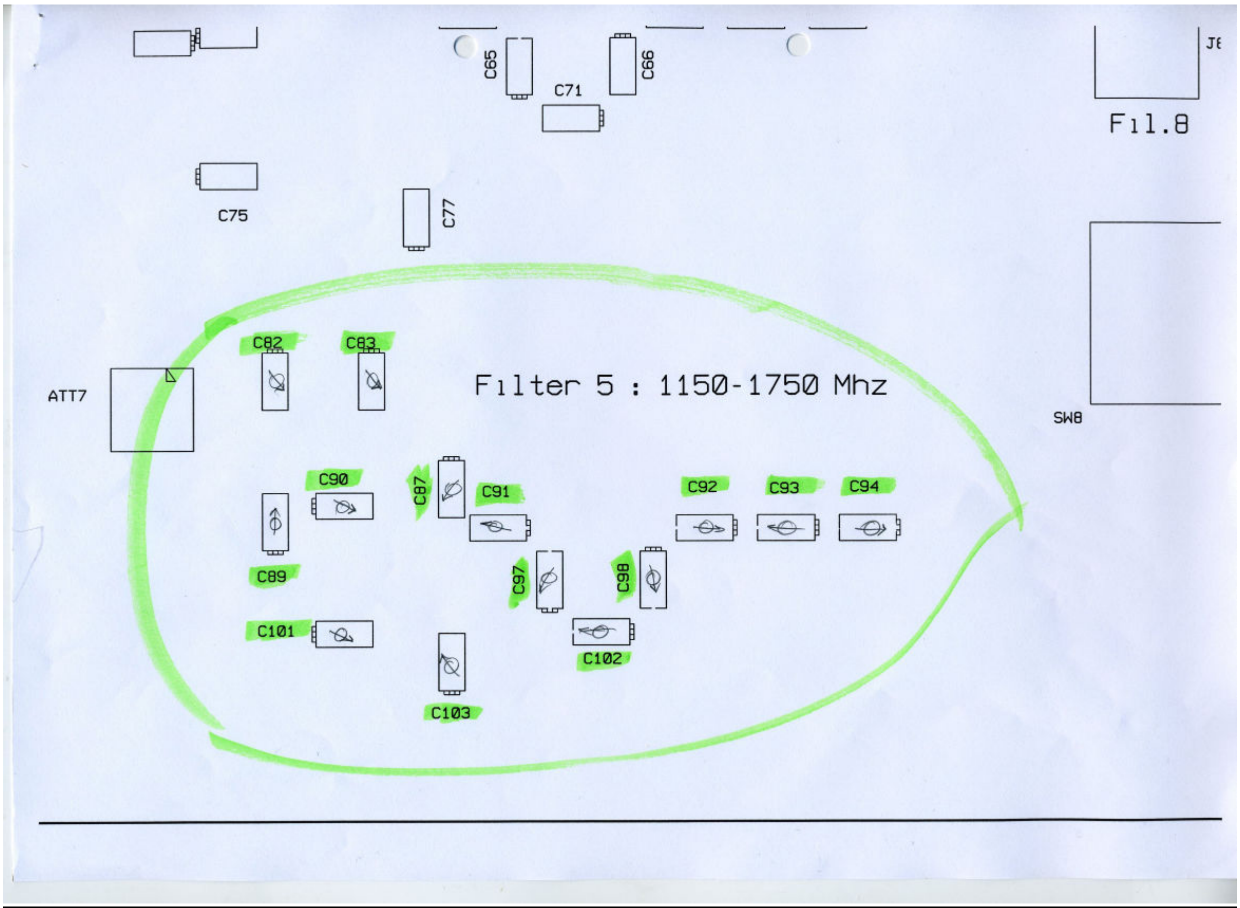
- Set the synthesizer to **-3 dBm**. Software will show about 58000 counts.
- Adjust Gain (VR1) to about 62000 counts.
- Adjust Offset (VR2) to about 64000 counts.
- Repeat adjustments until **-48 dBm** shows about **500 counts** and **-3 dBm** shows about **64000 counts**.

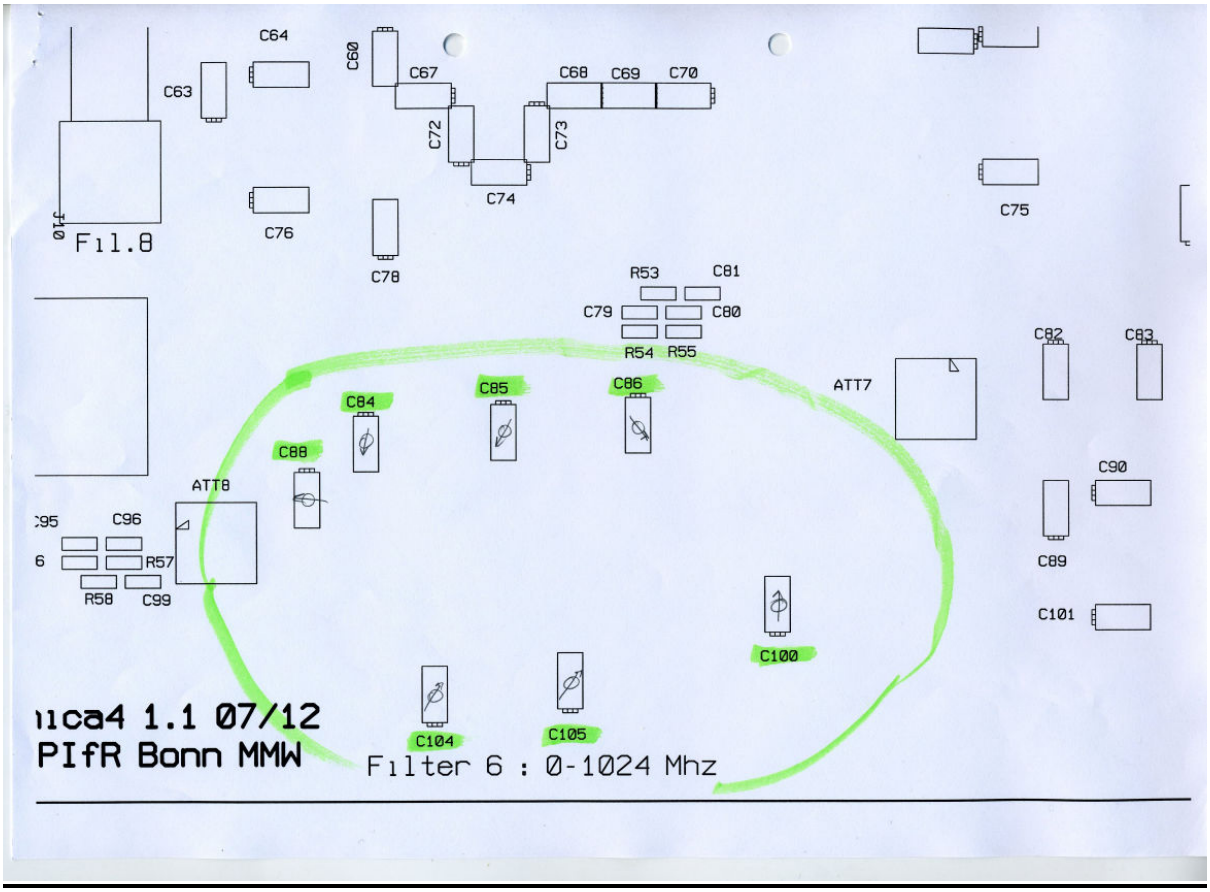
Appendix A: Pre-adjustment of the filter capacitors






C41
U22
Filter 4 : 1024-1536 Mhz
C51
C52
C55
C56
C57
C58
C59
C61
C62
C65
C66
C71
C75
C77
J8
Fil.8
C82
C83
ATT7
Filter 5 : 1150-1750 Mhz
SW8
C90
C87
C91
C92
C93
C94


C65
C66
C71
J8
Fil.8
C75
C77
C82
C83
ATT7
Filter 5 : 1150-1750 Mhz
SW8
C90
C87
C91
C92
C93
C94
C89
C97
C98
C101
C102
C103

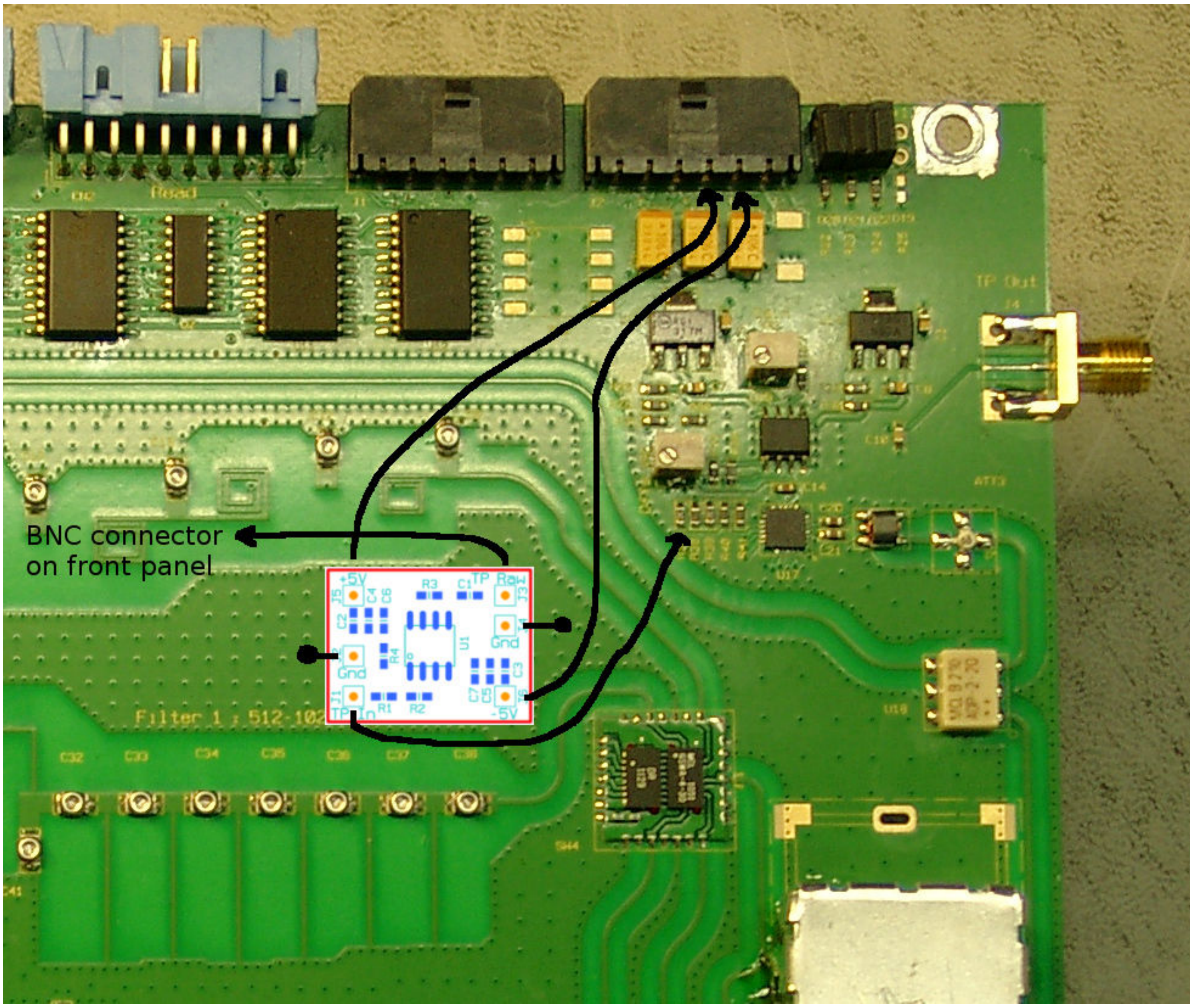


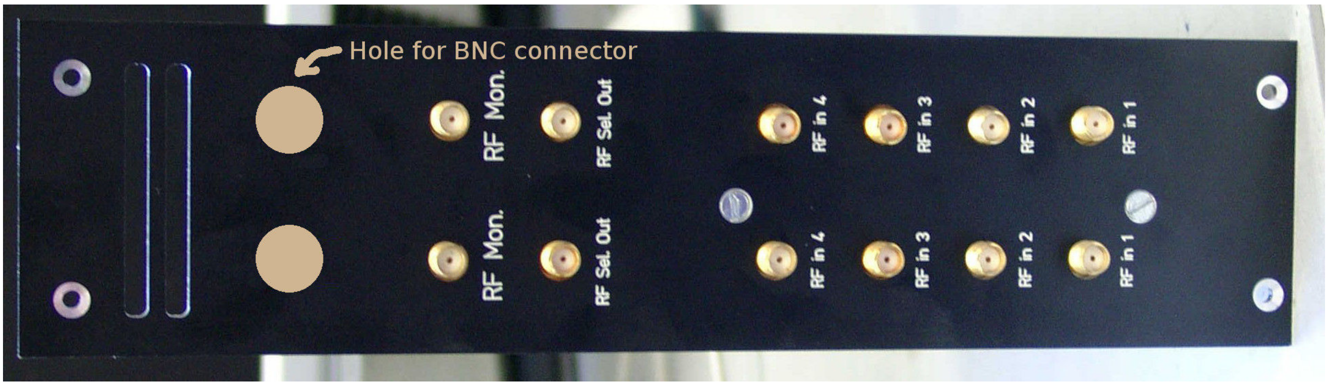
C64
C60
C63
C67
C68
C69
C70
C72
C73
C74
C75
C76
C78
J10
Fil.8
R53
C81
C79
C80
R54
R55
C82
C83
ATT7
C84
C85
C86
C88
ATT8
C90
C95
C96
R57
R58
C99
C89
C101
C100
C104
C105
ica4 1.1 07/12
PIfR Bonn MMW
Filter 6 : 0-1024 Mhz

Appendix B: upgrade to continuos TP monitoring

One way to do this could be to just solder a wire to the appropriate pin and use an external connector, like a BNC socket. The voltage would be unbuffered and some short in the external cables would disable the TP monitoring in the DBBC.

We suggest to use a simple buffer on a very small PCB which is available through us. This board can be placed and glued on the Unica4 and connected with a handful of cables.





For further information please contact us.