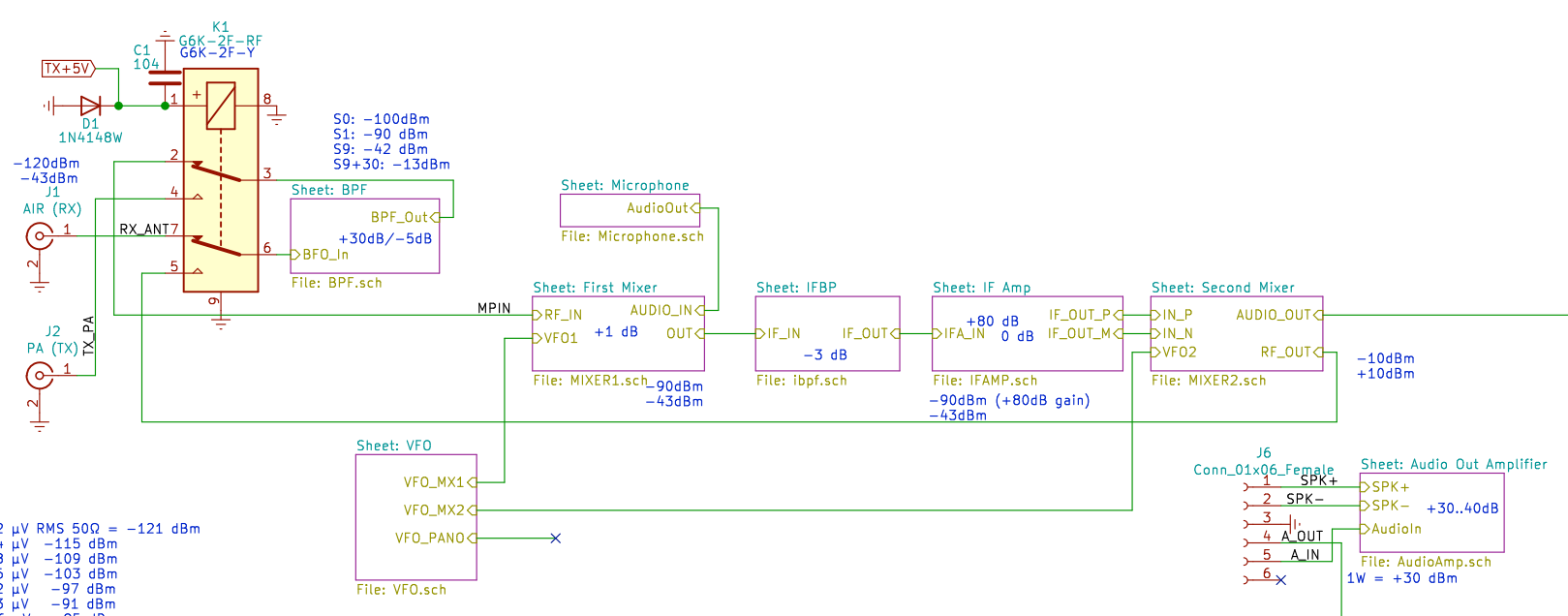
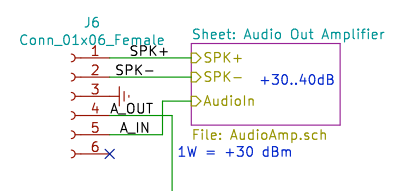


This project has been inspired by SSB6.1 Transceiver.

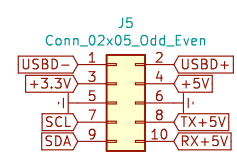
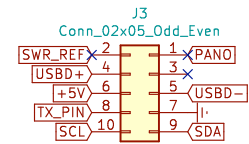


- S1 = 0.2  $\mu$ V RMS 50 $\Omega$  = -121 dBm
- S2 = 0.4  $\mu$ V -115 dBm
- S3 = 0.8  $\mu$ V -109 dBm
- S4 = 1.6  $\mu$ V -103 dBm
- S5 = 3.2  $\mu$ V -97 dBm
- S6 = 6.3  $\mu$ V -91 dBm
- S7 = 12.6  $\mu$ V -85 dBm
- S8 = 25.1  $\mu$ V -79 dBm
- S9 = 50.0  $\mu$ V -73 dBm
- S9+10 = 160.0  $\mu$ V -63 dBm
- S9+20 = 0.50 mV, -53 dBm
- S9+30 = 1.58 mV, -43 dBm

SSB min SNR = 6 dB  
 Desired SNR = 10 dB  
 For S1 readability RX should be capable to receive signals at -130 dBm (0.07uV)



- Power Consumption:
- LTC5562 - 40 mA @3.3V
  - Si5351 - 35 mA @3.3V
  - TCA9406 - 1 mA
  - BGA2866 - 17 mA
  - SSM2211 - 20 mA
  - LT5537 - 15 mA
  - AD8338 - 8 mA



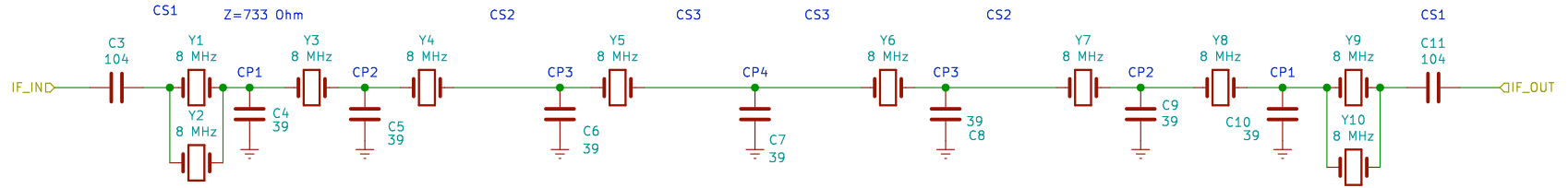
SSB85 Transceiver  
<https://www.zoonman.com/projects/ssb85/>

**Philipp Tkachev**  
 Sheet: /  
 File: ADIMB.sch

**Title: SSB85 Transceiver**

Size: A4	Date: 2021-09-17	<b>Rev: 5.0.2</b>
KiCad E.D.A. kicad (5.1.8-0-10_14)		Id: 1/9

\*Work in progress!



Best: <http://www.giangrandi.ch/electronics/crystalfilters/xtalfilters.shtml>  
 Alternative: [https://www.changpuak.ch/electronics/Quartz\\_Crystal\\_Filter\\_Designer\\_1.php](https://www.changpuak.ch/electronics/Quartz_Crystal_Filter_Designer_1.php)

fs = 7.99856 MHz  
 fp = 8.0081 Hz  
 Cs = 7.5 ff  
 BP ripple = 0.5 dB (Tchebycheff)  
 Poles = 8  
 Target bandwidth = 2.7 kHz  
 Maximum bandwidth: Bmax = 5.188 kHz  
 Center frequency: f0 = 8.000291 MHz  
 Ultimate attenuation: UAtt = 156.5 dB  
 Filter impedance: Z0 = 771.7 Ohm  
 CP1 = 21.9 pF  
 CP2 = 27.1 pF  
 CP3 = 28.1 pF  
 CP4 = 28.3 pF  
 CS1 = 27.1 pF  
 CS2 = 100.6 pF  
 CS3 = 86.9 pF

fs = 7.99856 MHz  
 fp = 8.0081 Hz  
 Cs = 7.5 ff  
 BP ripple = 0.1 dB (Tchebycheff)  
 Poles = 8  
 Target bandwidth = 2.7 kHz  
 Maximum bandwidth: Bmax = 4.631 kHz  
 Center frequency: f0 = 8.000469 MHz  
 Ultimate attenuation: UAtt = 149.7 dB  
 Filter impedance: Z0 = 1154.3 Ohm  
 CP1 = 18.9 pF  
 CP2 = 25.3 pF  
 CP3 = 26.7 pF  
 CP4 = 27 pF  
 CS1 = 25.3 pF  
 CS2 = 65.1 pF  
 CS3 = 55.8 pF

Z0=734  
 Target bandwidth = 2400  
 CS1 = 23.2 | 22  
 CS2 = 103. | 100  
 CS3 = 88.9 | 82

CP1 = 19.4 | 20  
 CP2 = 23.2 | 24  
 CP3 = 23.9 | 24  
 CP4 = 24.0 | 24

per  
<http://ra3rbe.r3r.ru/xfilter.htm>

SSB85 Transceiver  
<https://www.zoonman.com/projects/ssb85/>  
 Intermediate frequency band pass filter

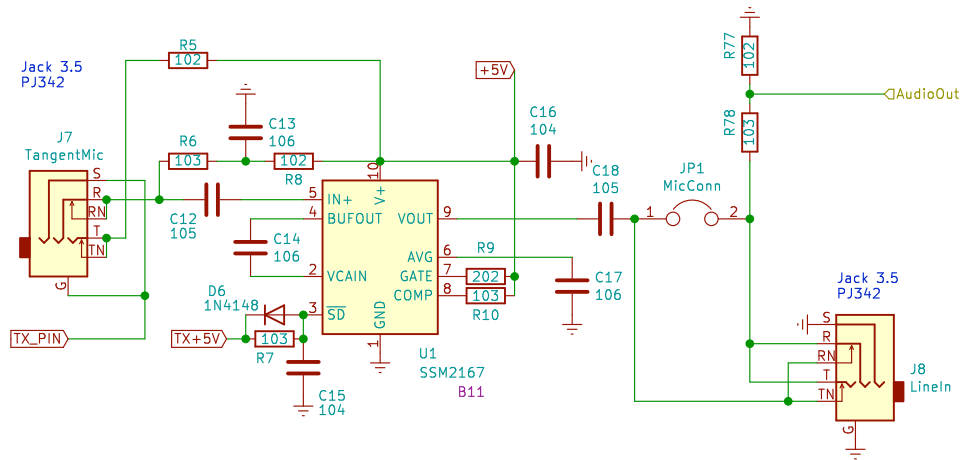
**Philipp Tkachev**

Sheet: /IFBP/  
 File: ibpf.sch

**Title: SSB85 Transceiver: IF BPF**

Size: A4 Date: 2021-09-17  
 KiCad E.D.A. kicad (5.1.8-0-10\_14)

**Rev: 5.0.2**  
 Id: 2/9



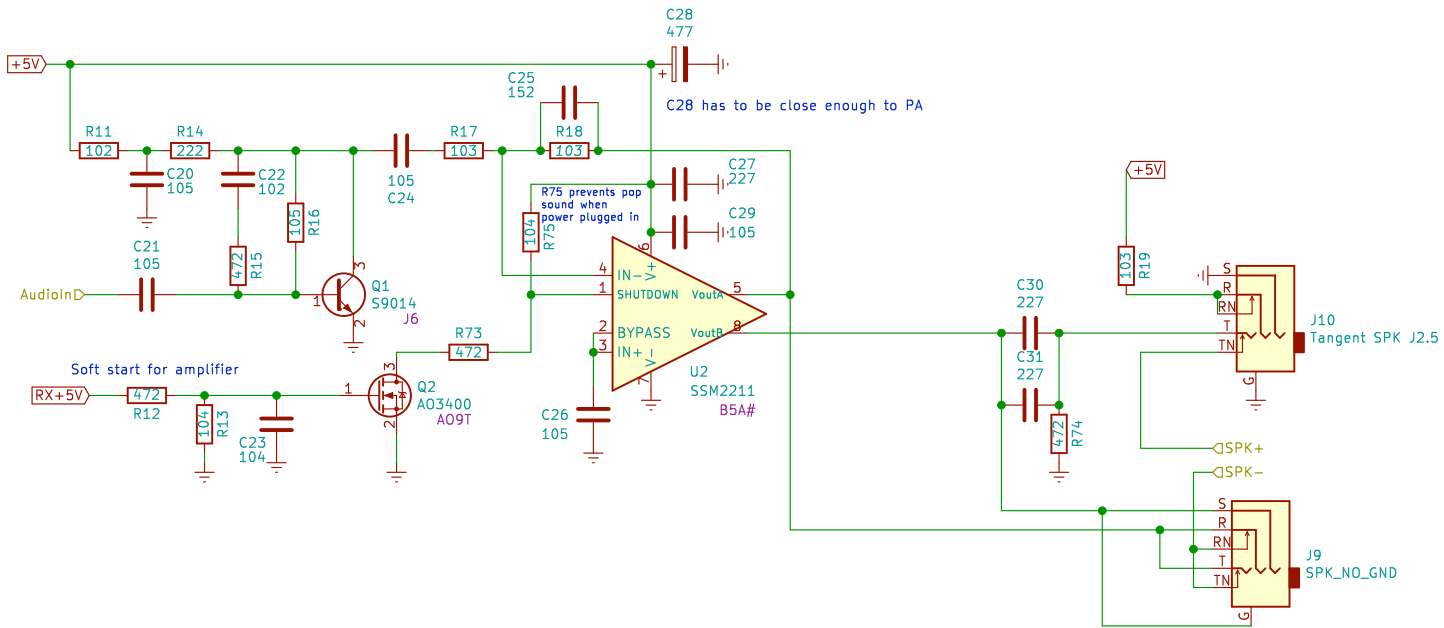
SSB85 Transceiver  
<https://www.zoonman.com/projects/ssb85/>

**Philipp Tkachev**  
 Sheet: /Microphone/  
 File: Microphone.sch

**Title: SSB85 Transceiver: Microphone amplifier & compressor**

Size: A4 Date: 2021-09-17  
 KiCad E.D.A. kicad (5.1.8-0-10\_14)

**Rev: 5.0.2**  
 Id: 3/9



SSB85 Transceiver  
<https://www.zoonman.com/projects/ssb85/>

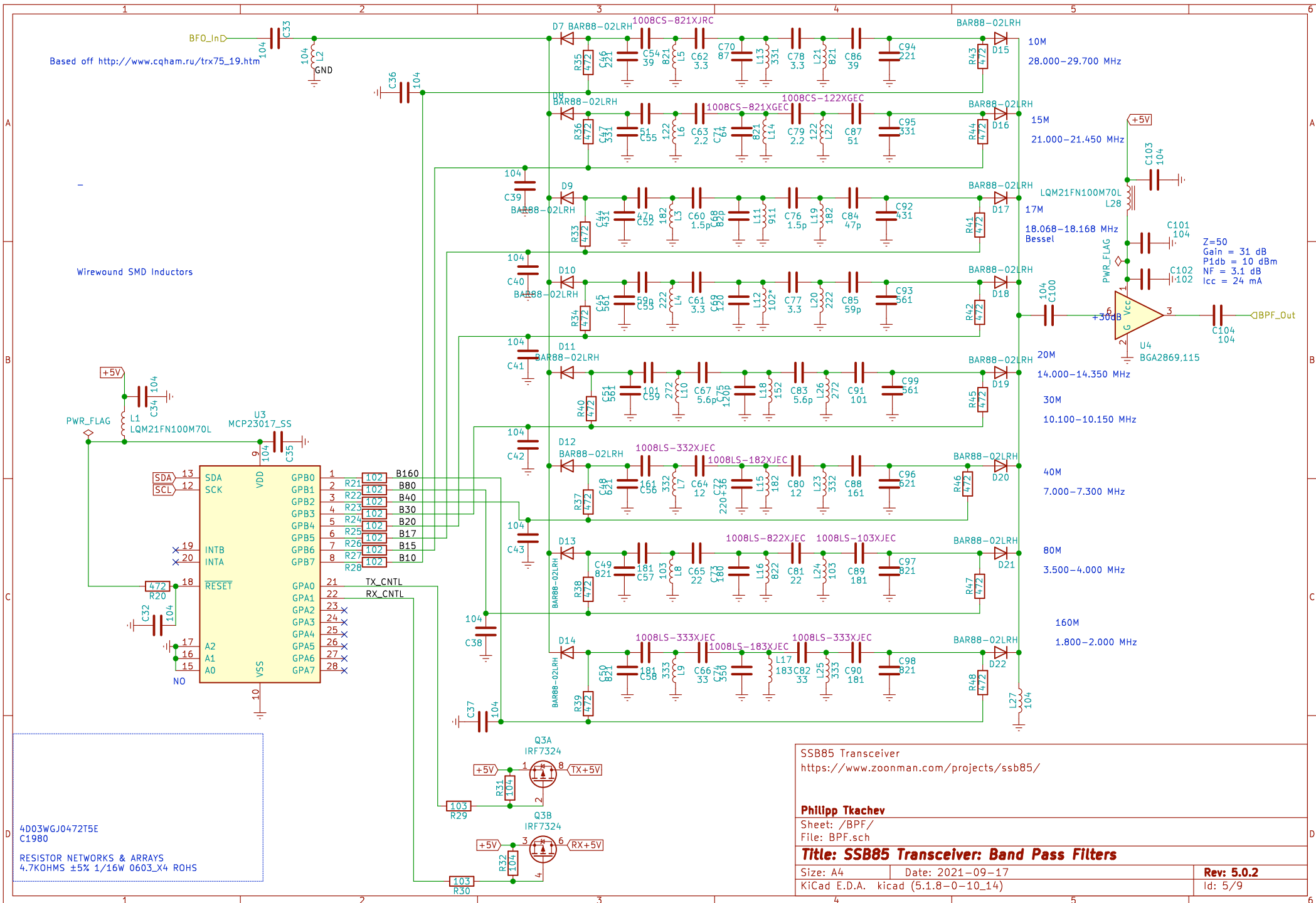
**Philipp Tkachev**  
 Sheet: /Audio Out Amplifier/  
 File: AudioAmp.sch

**Title: SSB85 Transceiver: Audio Amplifier**

Size: A4  
 KiCad E.D.A. kicad (5.1.8-0-10\_14)

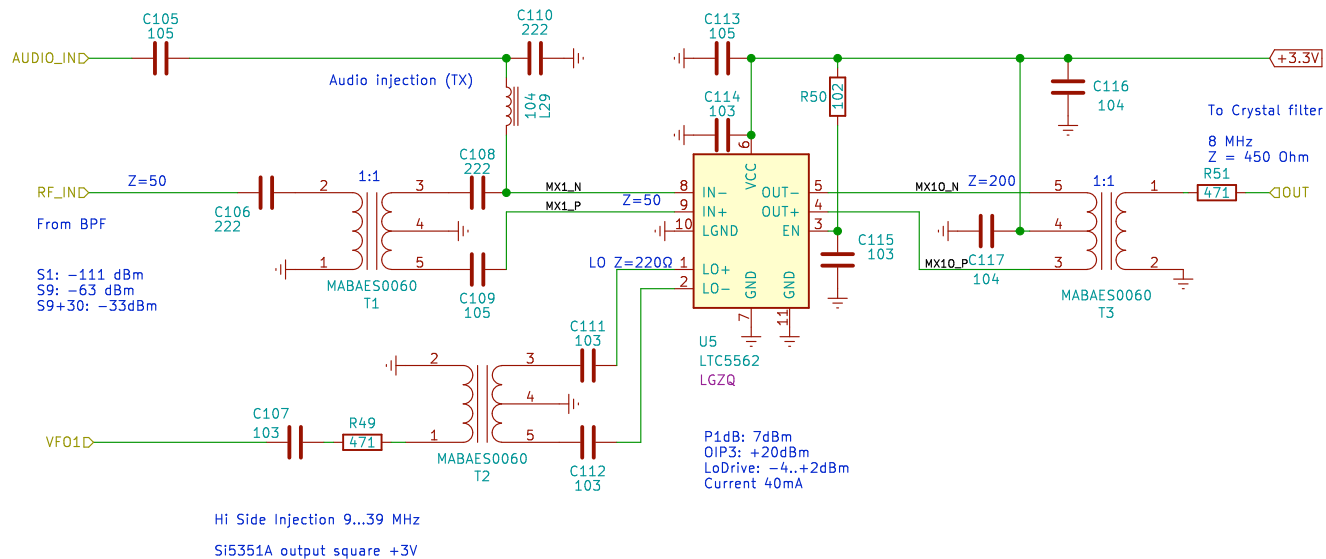
Date: 2021-09-17

Rev: 5.0.2  
 Id: 4/9



Z=50  
Gain = 31 dB  
P1db = 10 dBm  
NF = 3.1 dB  
Icc = 24 mA

## First Mixer



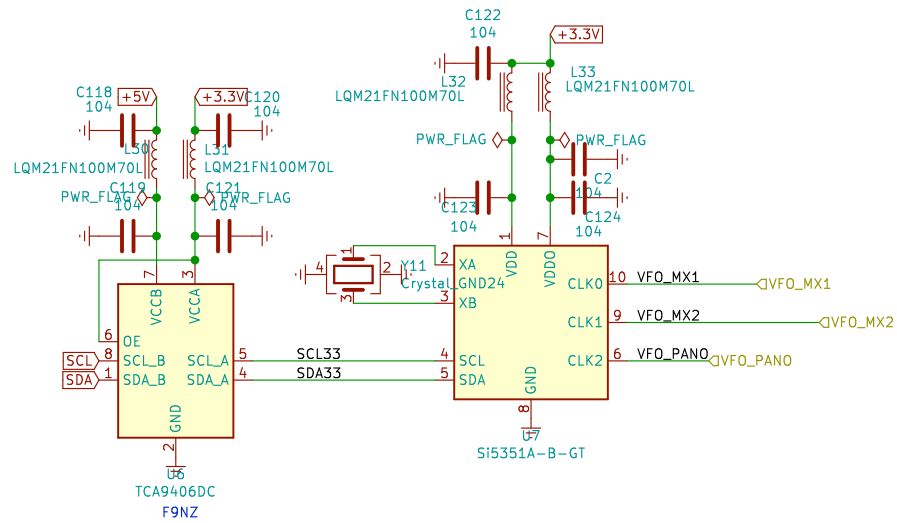
SSB85 Transceiver  
<https://www.zoonman.com/projects/ssb85/>

**Philipp Tkachev**  
 Sheet: /First Mixer/  
 File: MIXER1.sch

**Title: Mixer 1**

Size: A4 Date: 2021-09-17  
 KiCad E.D.A. kicad (5.1.8-0-10\_14)

**Rev: 5.0.2**  
 Id: 6/9



SSB85 Transceiver  
<https://www.zoonman.com/projects/ssb85/>

**Philipp Tkachev**

Sheet: /VFO/  
 File: VFO.sch

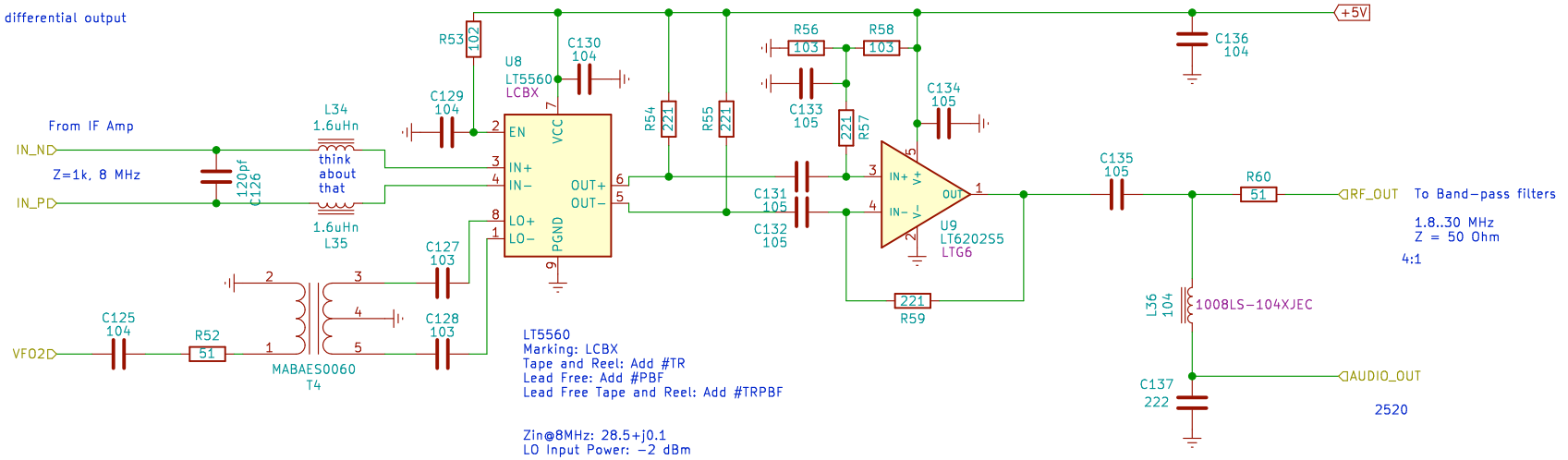
**Title: SSB85: VFO**

Size: A4 Date: 2021-09-17  
 KiCad E.D.A. kicad (5.1.8-0-10\_14)

**Rev: 5.0.2**  
 Id: 7/9

## Second Mixer

Impedance Matching for differential output  
 $Z_0: 1000 \Omega$   
 $F_0: 8 \text{ MHz}$   
 $R_L: 28.5 \Omega$   
 $X_L: 0.1 \Omega$   
 Outputs  
 $L1: 1.654 \mu\text{H}$   
 $C1: 116.153 \text{ pF}$   
 $Z1: 28.50 + j0.10 \Omega$   
 $C2: 238.977 \text{ pF}$   
 $L2: 3.407 \mu\text{H}$



RX: 8MHz  
 TX: Hi Side Injection 9...39 MHz

From SI5351A

I don't like this design, thinking about balanced input

<https://www.analog.com/en/design-center/interactive-design-tools/rf-impedance-matching-calculator.html#>

SSB85 Transceiver  
<https://www.zoonman.com/projects/ssb85/>

Philipp Tkachev

Sheet: /Second Mixer/  
 File: MIXER2.sch

**Title: SSB85 Transceiver: Mixer 2**

Size: A4  
 KiCad E.D.A. kicad (5.1.8-0-10\_14)

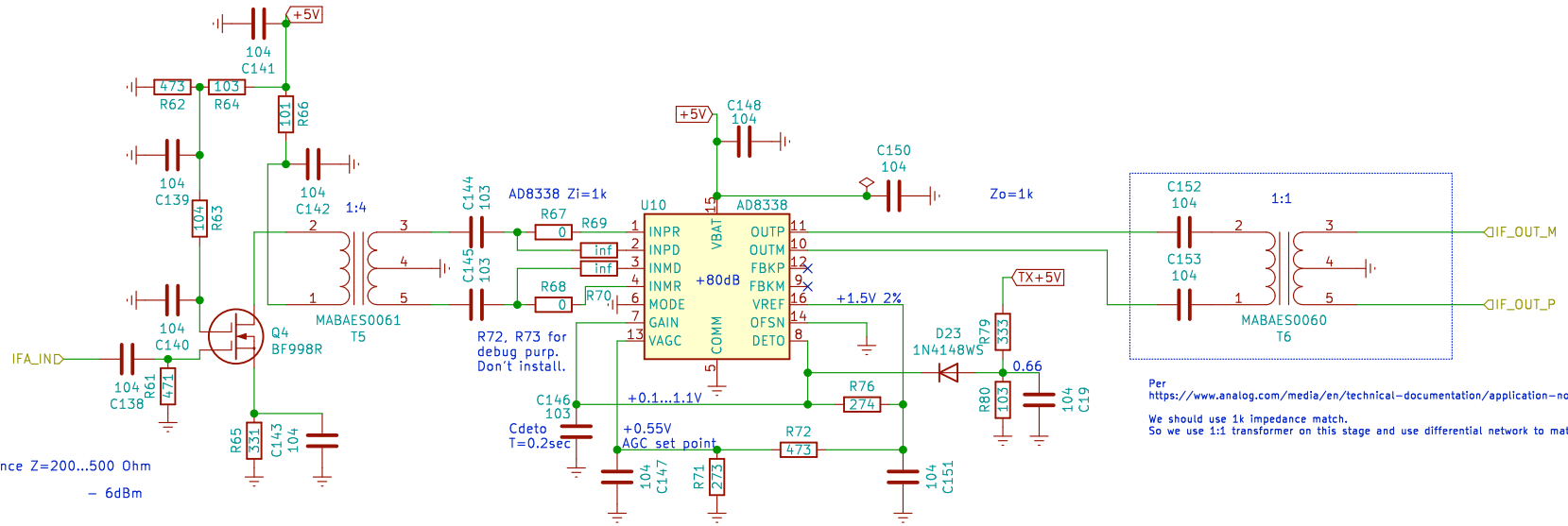
Date: 2021-09-17

Rev: 5.0.2

Id: 8/9



# IF Amplifier + Detector



SSB85 Transceiver  
<https://www.zoonman.com/projects/ssb85/>

**Philipp Tkachev**

Sheet: /IF Amp/  
 File: IFAMP.sch

**Title: IF Amplifier + Detector**

Size: A4 | Date: 2021-09-17  
 KiCad E.D.A. kicad (5.1.8-0-10\_14)

**Rev: 5.0.2**  
 Id: 9/9