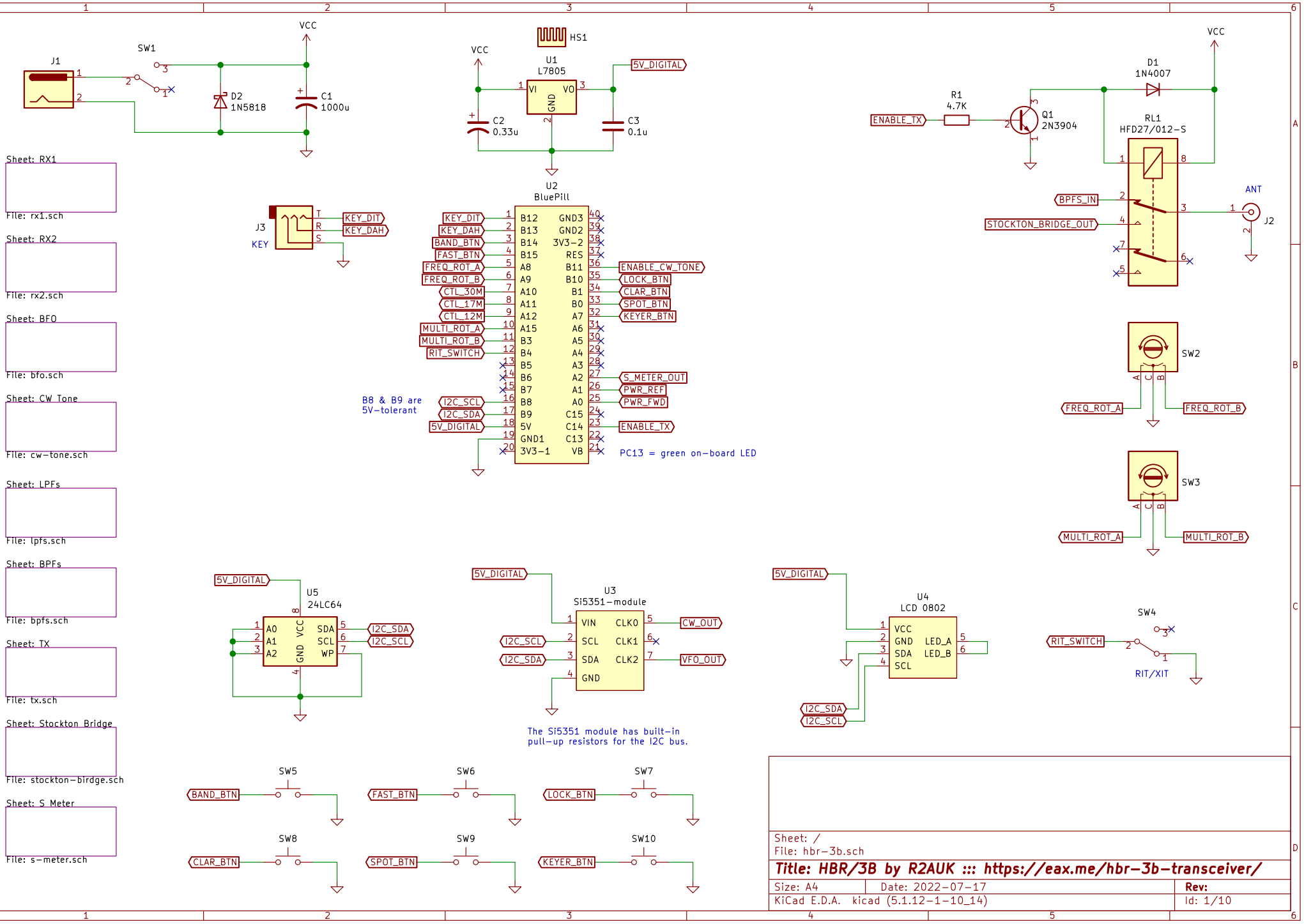
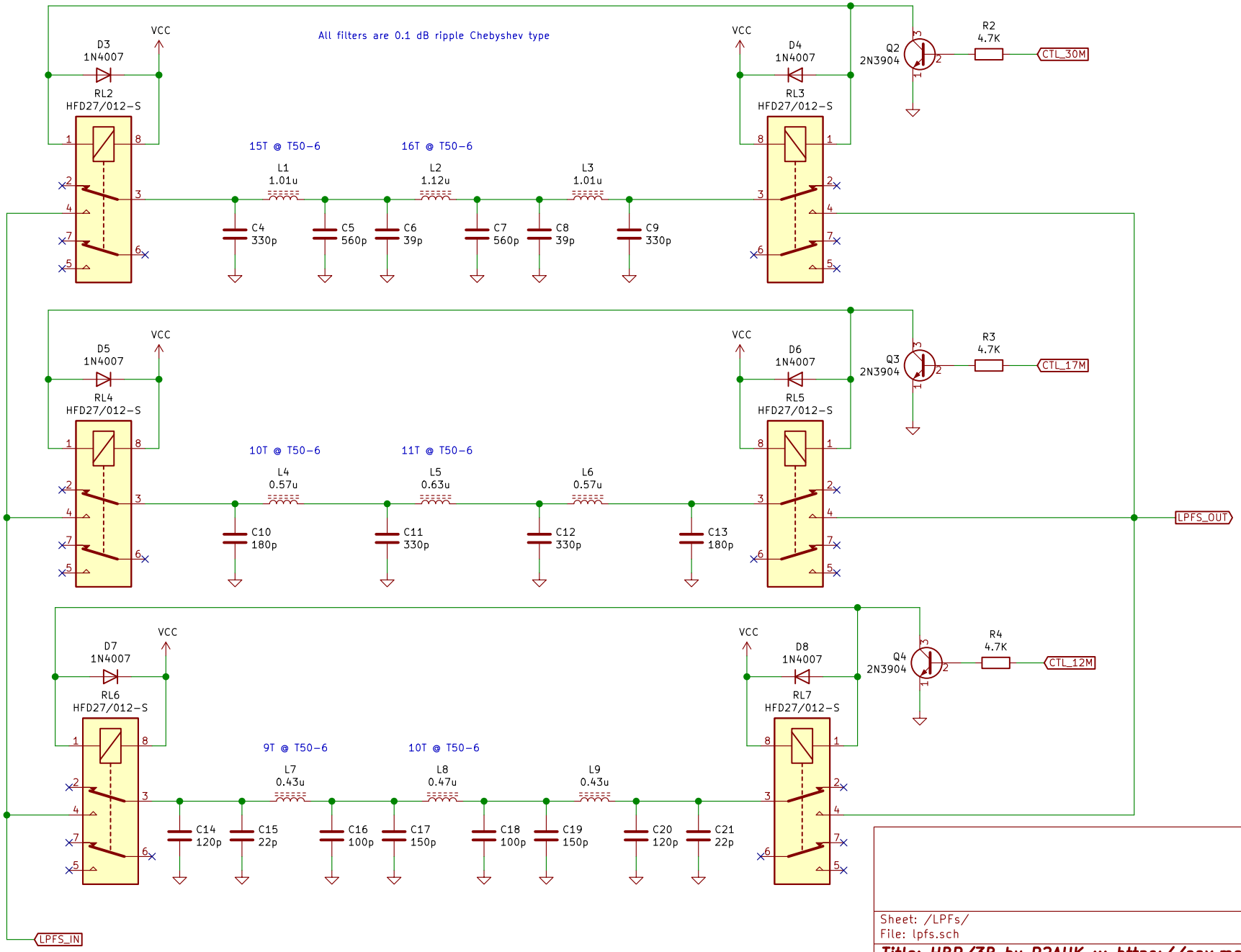


Sheet: /
File: hbr-3b.sch

Title: HBR/3B by R2AUK ::: https://eax.me/hbr-3b-transceiver/

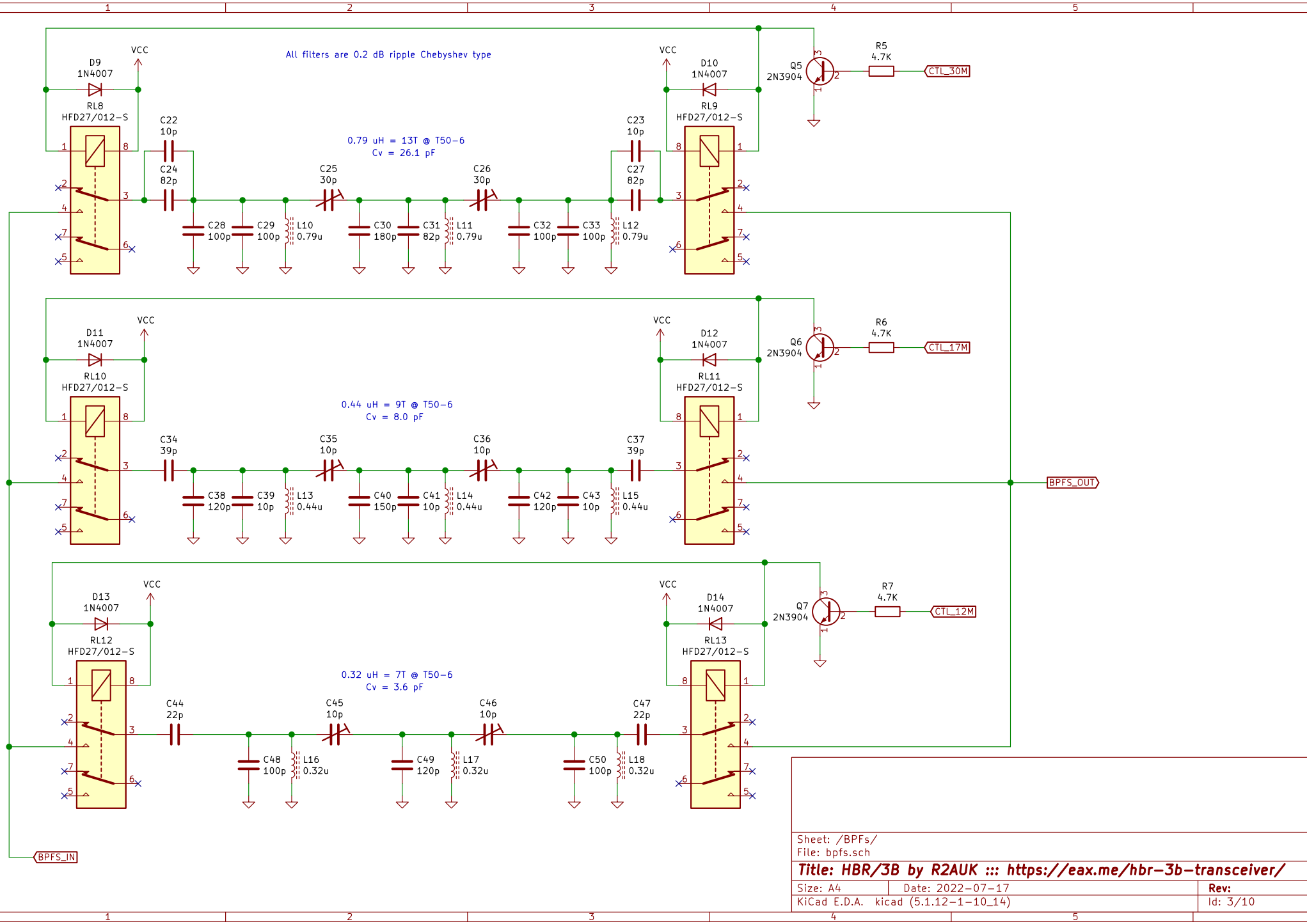
Size: A4	Date: 2022-07-17	Rev:
KiCad E.D.A. kicad (5.1.12-1-10_14)		Id: 1/10



Sheet: /LPFs/
File: lpfs.sch

Title: HBR/3B by R2AUK ::: https://eax.me/hbr-3b-transceiver/

Size: A4	Date: 2022-07-17	Rev:
KiCad E.D.A. kicad (5.1.12-1-10_14)		Id: 2/10



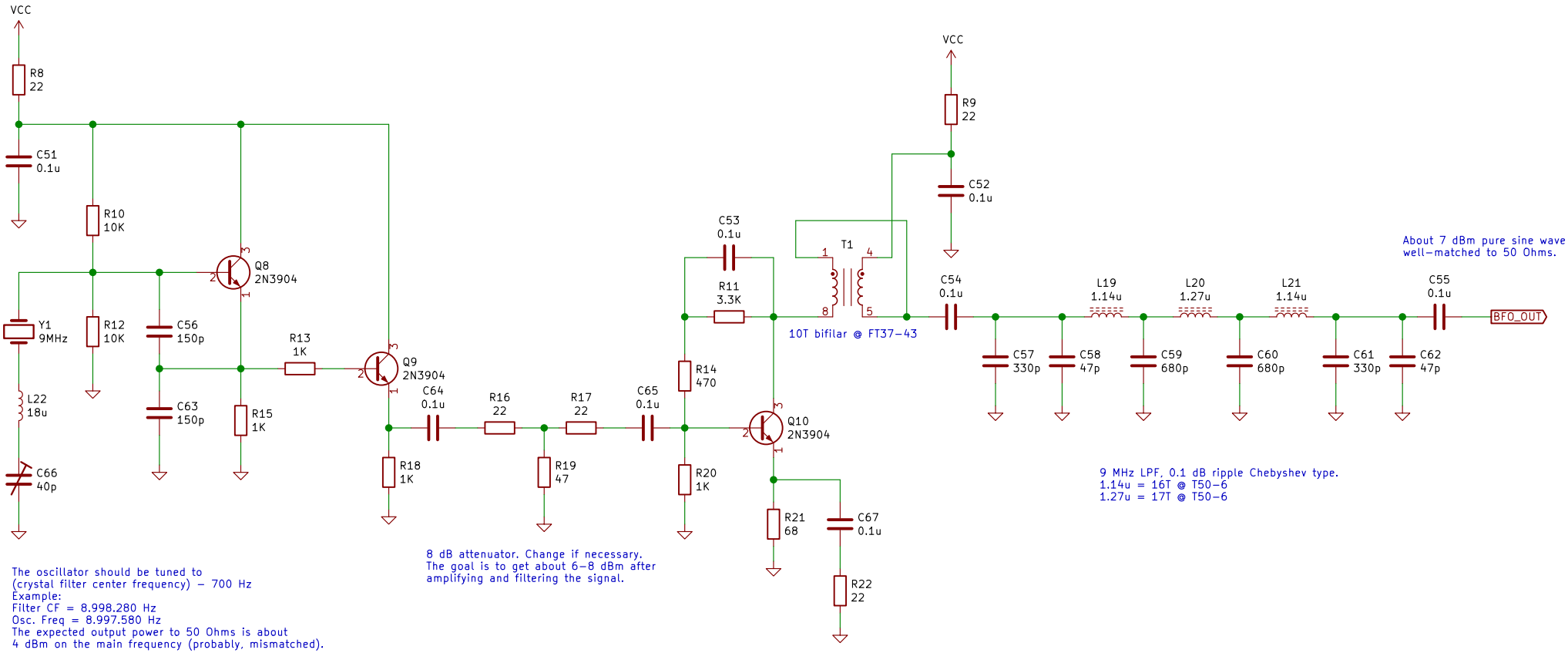
Sheet: /BPFs/
File: bpfs.sch

Title: HBR/3B by R2AUK ::: https://eax.me/hbr-3b-transceiver/

Size: A4	Date: 2022-07-17	**Rev:**
KiCad E.D.A. kicad (5.1.12-1-10_14)		Id: 3/10

The secret of a superheterodyne receiver free of spurious signals is a clean BFO. The signal of Si5351 is way too dirty and can't be used as a BFO. Trust me, I've tried many times.

For this project I wanted a clean, well-matched to 50 Ohm, 7 dBm BFO. However, if space is limited, try removing the attenuator and the amplifier, and then - the filter. Chances are everything will work adequately without them.



About 7 dBm pure sine wave well-matched to 50 Ohms.

9 MHz LPF, 0.1 dB ripple Chebyshev type.
1.14u = 16T @ T50-6
1.27u = 17T @ T50-6

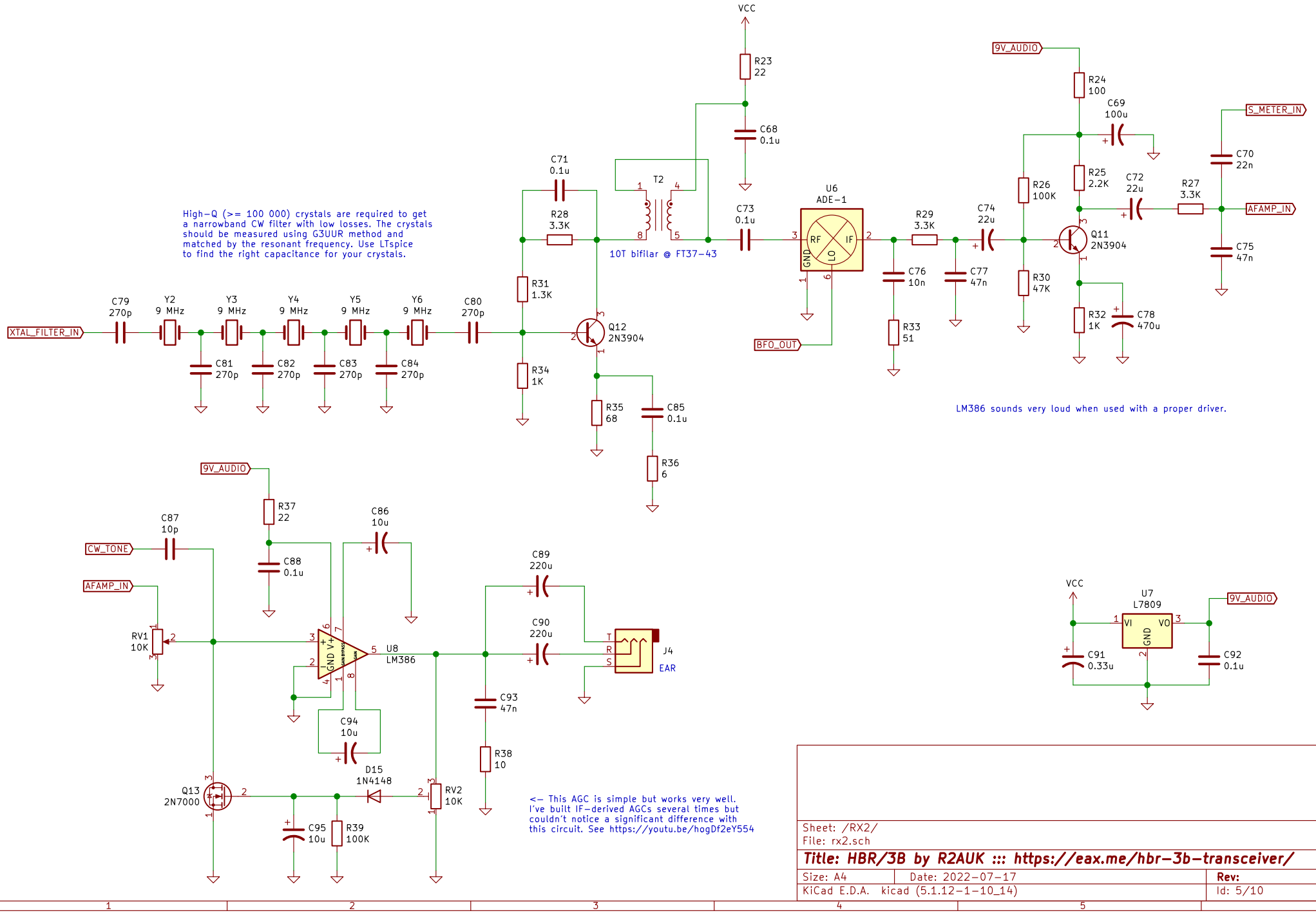
8 dB attenuator. Change if necessary. The goal is to get about 6-8 dBm after amplifying and filtering the signal.

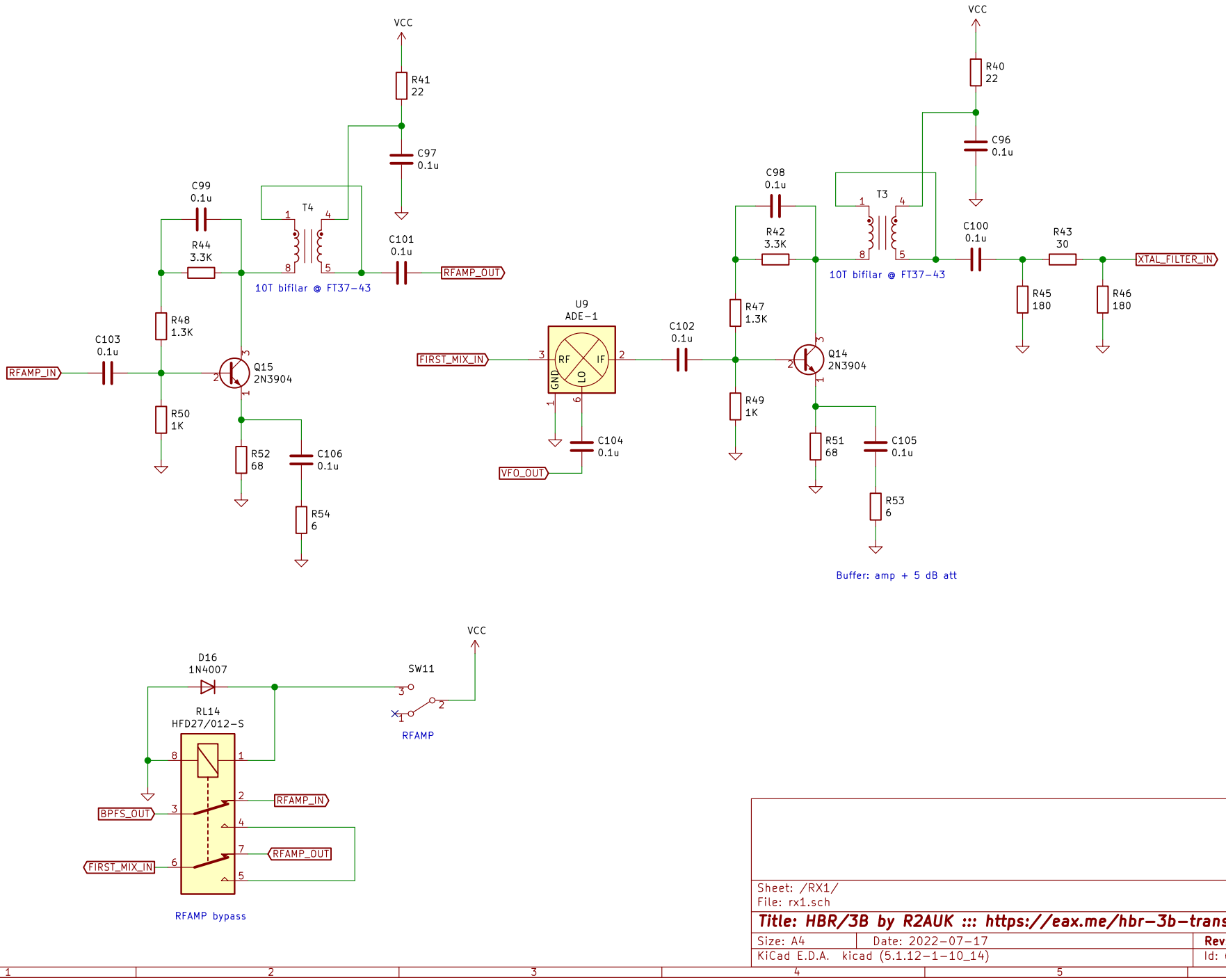
This feedback amplifier gives 10..12 dB of gain at 9 Mhz depending on the specific transistor.

The oscillator should be tuned to (crystal filter center frequency) - 700 Hz
Example:
Filter CF = 8.998.280 Hz
Osc. Freq = 8.997.580 Hz
The expected output power to 50 Ohms is about 4 dBm on the main frequency (probably, mismatched).

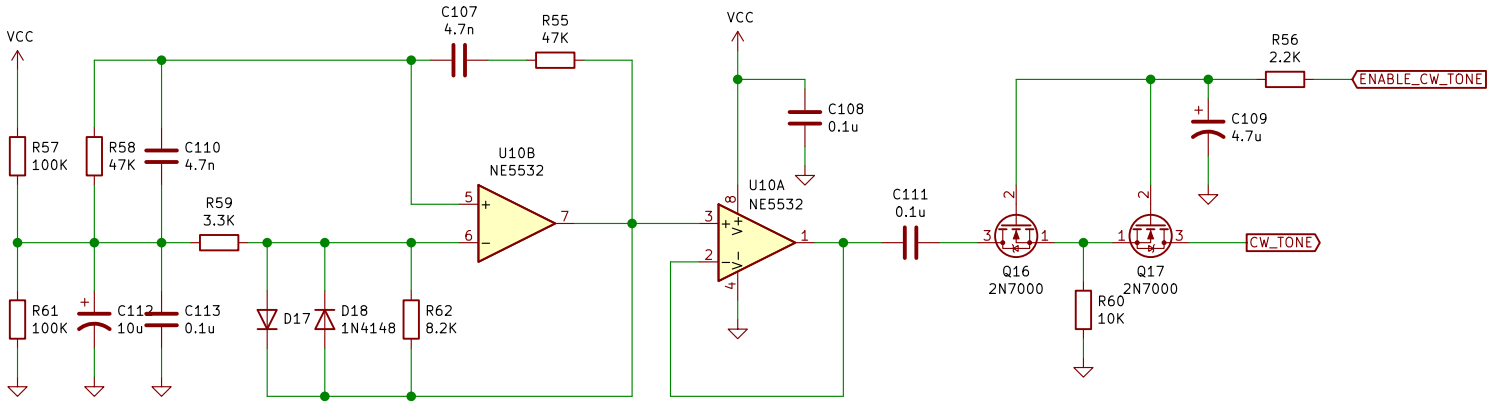
Some experimentation may be required.
Try different coils and crystals if the oscillator doesn't tune to the required frequency.
Low Q crystals are preferable in this circuit.

Sheet: /BFO/		
File: bfo.sch		
Title: HBR/3B by R2AUK ::: https://eax.me/hbr-3b-transceiver/		
Size: A4	Date: 2022-07-17	**Rev:**
KiCad E.D.A. kicad (5.1.12-1-10_14)		Id: 4/10


VCC
R23
22
C68
0.1u
C71
0.1u
T2
R28
3.3K
10T bifilar @ FT37-43
C73
0.1u
U6
ADE-1
RF
IF
LO
GND
R29
3.3K
C74
22u
9V_AUDIO
R24
100
C69
100u
R25
2.2K
R26
100K
C72
22u
R27
3.3K
S_METER_IN
C70
22n
AFAMP_IN
C75
47n
Q11
2N3904
R30
47K
R32
1K
C78
470u
C76
10n
C77
47n
R33
51
BFO_OUT
High-Q (>= 100 000) crystals are required to get a narrowband CW filter with low losses. The crystals should be measured using G3UUR method and matched by the resonant frequency. Use LTspice to find the right capacitance for your crystals.
XTAL_FILTER_IN
C79
270p
Y2
9 MHz
Y3
9 MHz
Y4
9 MHz
Y5
9 MHz
Y6
9 MHz
C80
270p
C81
270p
C82
270p
C83
270p
C84
270p
R31
1.3K
R34
1K
Q12
2N3904
R35
68
C85
0.1u
R36
6
LM386 sounds very loud when used with a proper driver.
9V_AUDIO
R37
22
C87
10p
C86
10u
CW_TONE
C88
0.1u
AFAMP_IN
RV1
10K
U8
LM386
GND
V+
C89
220u
C90
220u
J4
EAR
T
R
S
C93
47n
R38
10
C94
10u
D15
1N4148
Q13
2N7000
RV2
10K
C95
10u
R39
100K
<- This AGC is simple but works very well. I've built IF-derived AGCs several times but couldn't notice a significant difference with this circuit. See https://youtu.be/hogDf2eY554
VCC
U7
L7809
VI
VO
GND
9V_AUDIO
C91
0.33u
C92
0.1u
Sheet: /RX2/
File: rx2.sch
Title: HBR/3B by R2AUK ::: https://eax.me/hbr-3b-transceiver/
Size: A4
Date: 2022-07-17
Rev:
KiCad E.D.A. kicad (5.1.12-1-10_14)
Id: 5/10

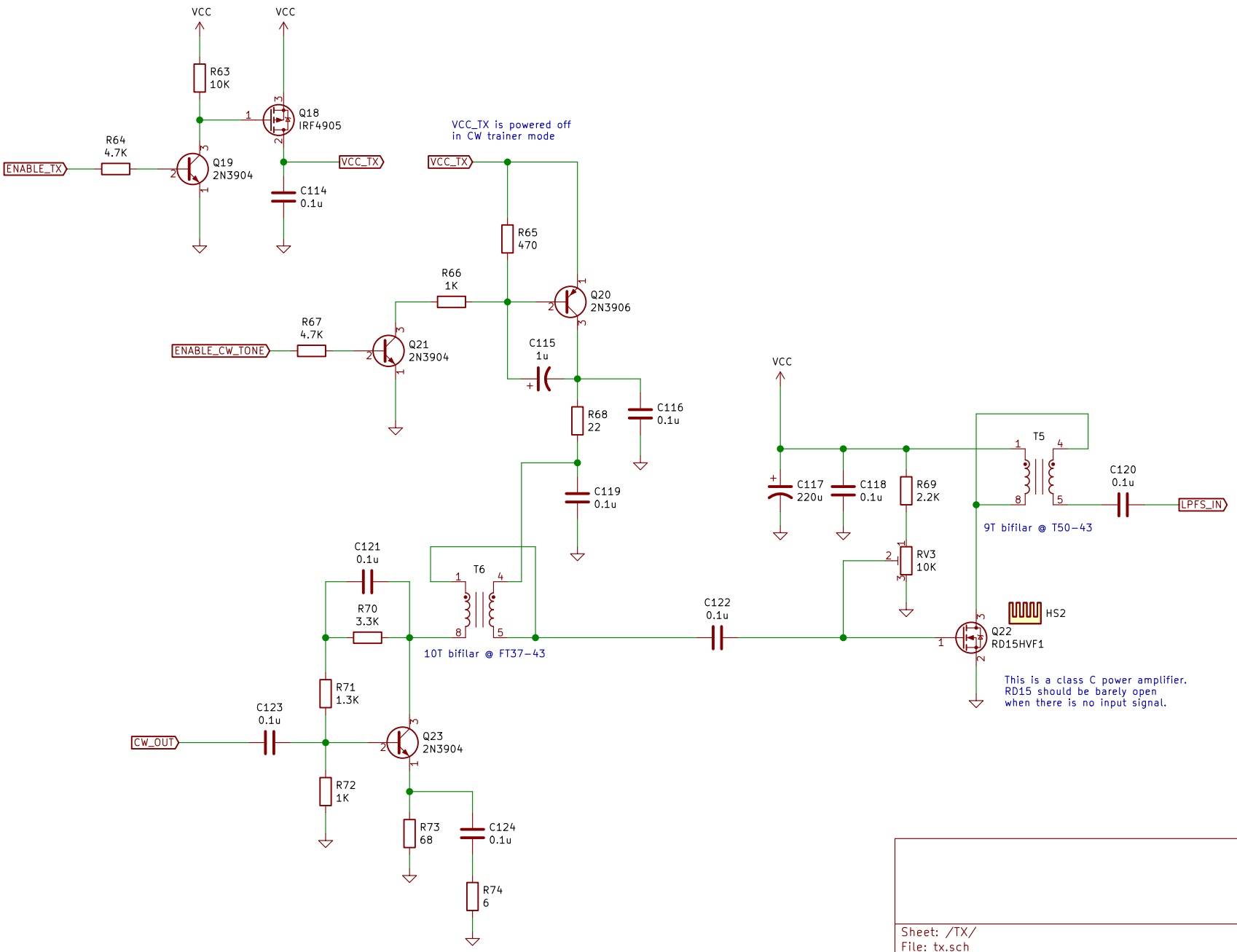


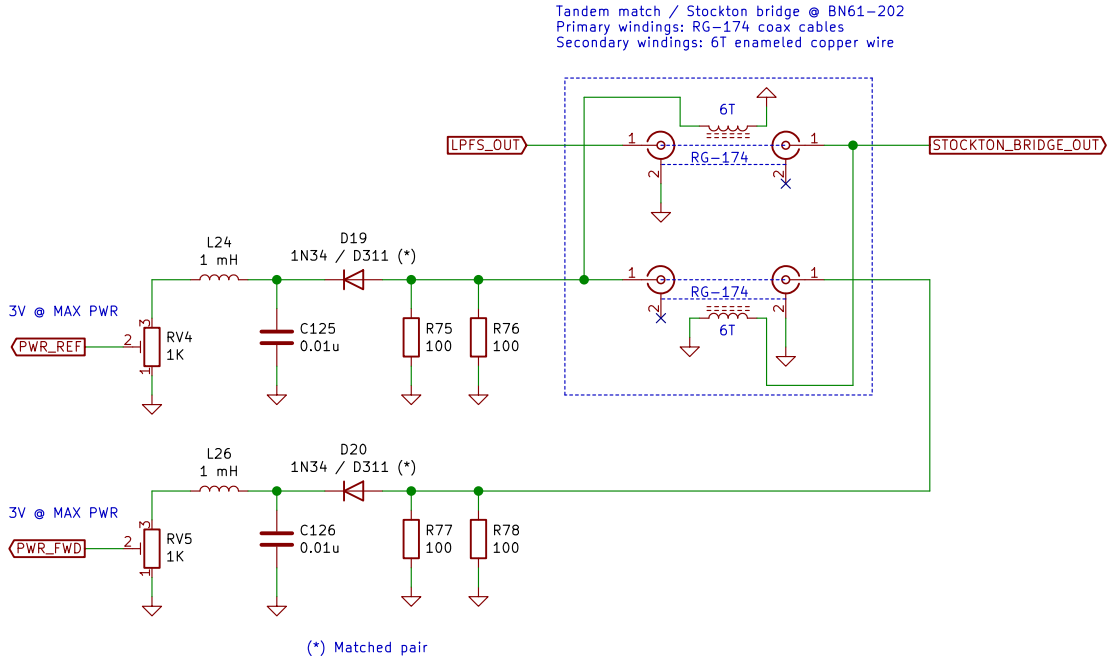
Sheet: /RX1/		
File: rx1.sch		
Title: HBR/3B by R2AUK ::: https://eax.me/hbr-3b-transceiver/		
Size: A4	Date: 2022-07-17	**Rev:**
KiCad E.D.A. kicad (5.1.12-1-10_14)		Id: 6/10



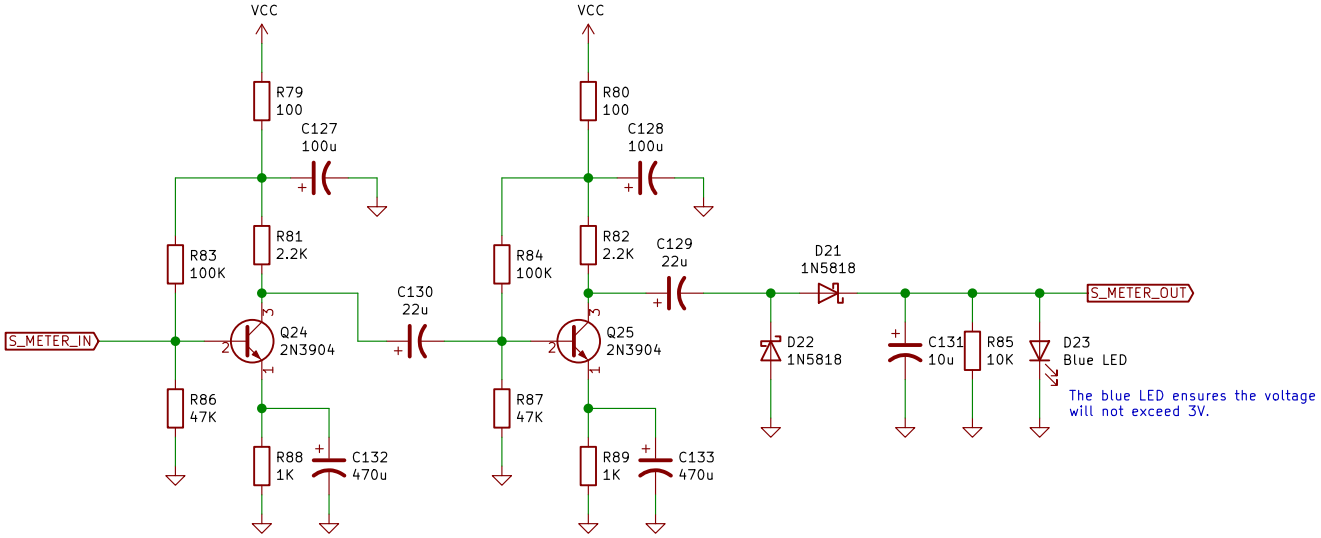
700 Hz Wien bridge oscillator + buffer

Sheet: /CW Tone/		
File: cw-tone.sch		
Title: HBR/3B by R2AUK ::: https://eax.me/hbr-3b-transceiver/		
Size: A4	Date: 2022-07-17	**Rev:**
KiCad E.D.A. kicad (5.1.12-1-10_14)		Id: 7/10


VCC
VCC
R63
10K
Q18
IRF4905
R64
4.7K
ENABLE_TX
Q19
2N3904
VCC_TX
C114
0.1u
VCC_TX is powered off
in CW trainer mode
VCC_TX
R65
470
R66
1K
Q20
2N3906
R67
4.7K
ENABLE_CW_TONE
Q21
2N3904
C115
1u
R68
22
C116
0.1u
C119
0.1u
VCC
C117
220u
C118
0.1u
R69
2.2K
T5
C120
0.1u
LPFS_IN
9T bifilar @ T50-43
RV3
10K
C121
0.1u
T6
R70
3.3K
10T bifilar @ FT37-43
C122
0.1u
HS2
Q22
RD15HVF1
This is a class C power amplifier.
RD15 should be barely open
when there is no input signal.
R71
1.3K
C123
0.1u
CW_OUT
Q23
2N3904
R72
1K
R73
68
C124
0.1u
R74
6
Sheet: /TX/
File: tx.sch
Title: HBR/3B by R2AUK ::: https://eax.me/hbr-3b-transceiver/
Size: A4
Date: 2022-07-17
Rev:
KiCad E.D.A. kicad (5.1.12-1-10_14)
Id: 8/10



Sheet: /Stockton Bridge/		
File: stockton-birdge.sch		
Title: HBR/3B by R2AUK ::: https://eax.me/hbr-3b-transceiver/		
Size: A4	Date: 2022-07-17	**Rev:**
KiCad E.D.A. kicad (5.1.12-1-10_14)		Id: 9/10



Sheet: /S Meter/		
File: s-meter.sch		
Title: HBR/3B by R2AUK ::: https://eax.me/hbr-3b-transceiver/		
Size: A4	Date: 2022-07-17	**Rev:**
KiCad E.D.A. kicad (5.1.12-1-10_14)		Id: 10/10