Sheet: LPFs
File: lpfs.sch

Sheet: BPF40
File: bpf40.sch

Sheet: BPF20
File: bpf20.sch

Sheet: RFAmp
File: rfamp.sch

Sheet: BPF30
File: bpf30.sch

Sheet: BPF17
File: bpf17.sch

Sheet: IF
File: if.sch

Sheet: AF Amplifier
File: af-amplifier.sch

Sheet: Power Amplifier
File: power-amplifier.sch

Sheet: SWR Bridge
File: swr-bridge.sch

Sheet: LPF 700 Hz
File: lpf-700hz.sch

Sheet: Analog BFO
File: analog-bfo.sch

== EXTERNAL COMPONENTS ==
- 0802 I2C LCD: connect to 5V_DIGITAL, GND and to the I2C bus
- "VOL" 10K pot, connec to to J5
- "EAR" socket: connect to J6 through 220u capacitors
- "KEY" socket: connect to KEY_DIT_B12, KEY_DAH_B13
- "FREQ" and "CLAR" rotary encoders
- "LOCK", "FAST", "NEXT", "KEYER", "CLAR" buttons
- "RFAMP" switch: connect to J7
- "BKLIGHT" switch (optional)
- ON/OFF switch
- DC socket
- Antenna connector

For more details see the schematic.

KEY_DIT_B12
KEY_DAH_B13
LOCK_BTN_B15
NEXT_BTN_C15
FAST_BTN_C14
KEYER_BTN_A7
FREQ_ROTA_A8
FREQ_ROTB_A9
CLAR_ROTA_A15
CLAR_ROTB_B3
CLAR_BTN_B4

+12V
J1
"VCC"
D14
SS14

<- Reverse polarity protection.
Use with an external fuse.

Also consider soldering the diode
to the DC jack instead so it would
be easier to replace if necessary.

+12V
R1
15K
R3
2.7K
C5
0.1u
VCC_SAMPLE_A2

Note: G6K-2F-Y is a full
equivalent of HFD4/12-S

+12V
D1
1N4148W
K1
G6K-2F-Y
ENABLE_TX
R2
4.7K
C26
0.1u
Q1
MMBT3904
LPFS_IN
BPFS_IN
PA_OUT

J3
BluePill_Left
J4
BluePill_Right

KEY_DIT_B12
KEY_DAH_B13
ENABLE_KEYED_VCC
LOCK_BTN_B15
FREQ_ROTA_A8
FREQ_ROTB_A9
CLAR_ROTA_A15
CLAR_ROTB_B3
CLAR_BTN_B4
CTL20
CTL17
CTL30
CTL40
5V_DIGITAL
I2C_SDA
I2C_SCL
PWM_700HZ
ENABLE_TX
KEYER_BTN_A7
CTL_LPFS_IN
CTL_LPFS_OUT
VCC_SAMPLE_A2
PWR_REF
PWR_FWD
NEXT_BTN_C15
FAST_BTN_C14

pin 19 == PC13,
green on-board LED

PB10/PB11 (SCL/SDA) are 5V-tolerant.

Note that on some MCUs I2C doesn't start properly
unless you add a 2.7 pF capacitor between SDA and GND.
To my knowledge this is a hardware issue in this MCU family.
See "STM32F10xx8 STM32F10xxB errata sheet", section
2.8.7 "I2C analog filter may provide wrong value [...]".
Personally I've seen this issue several times and adding
a capacitor always helped.

5V_DIGITAL
U2
24LC64
A0
A1
A2
GND
VCC
SDA
SCL
WP
I2C_SDA
I2C_SCL

J2
Si5351_Module
5V_DIGITAL
I2C_SDA
I2C_SCL
SI5351_CH2
SI5351_CH1
SI5351_CH0

CH0: VFO
CH1: CAL
CH2: CW

H1
H2
H3
H4

+12V
w/ heatsink
U11
L7805
IN
OUT
GND
5V_DIGITAL
C6
0.47u
C7
0.1u

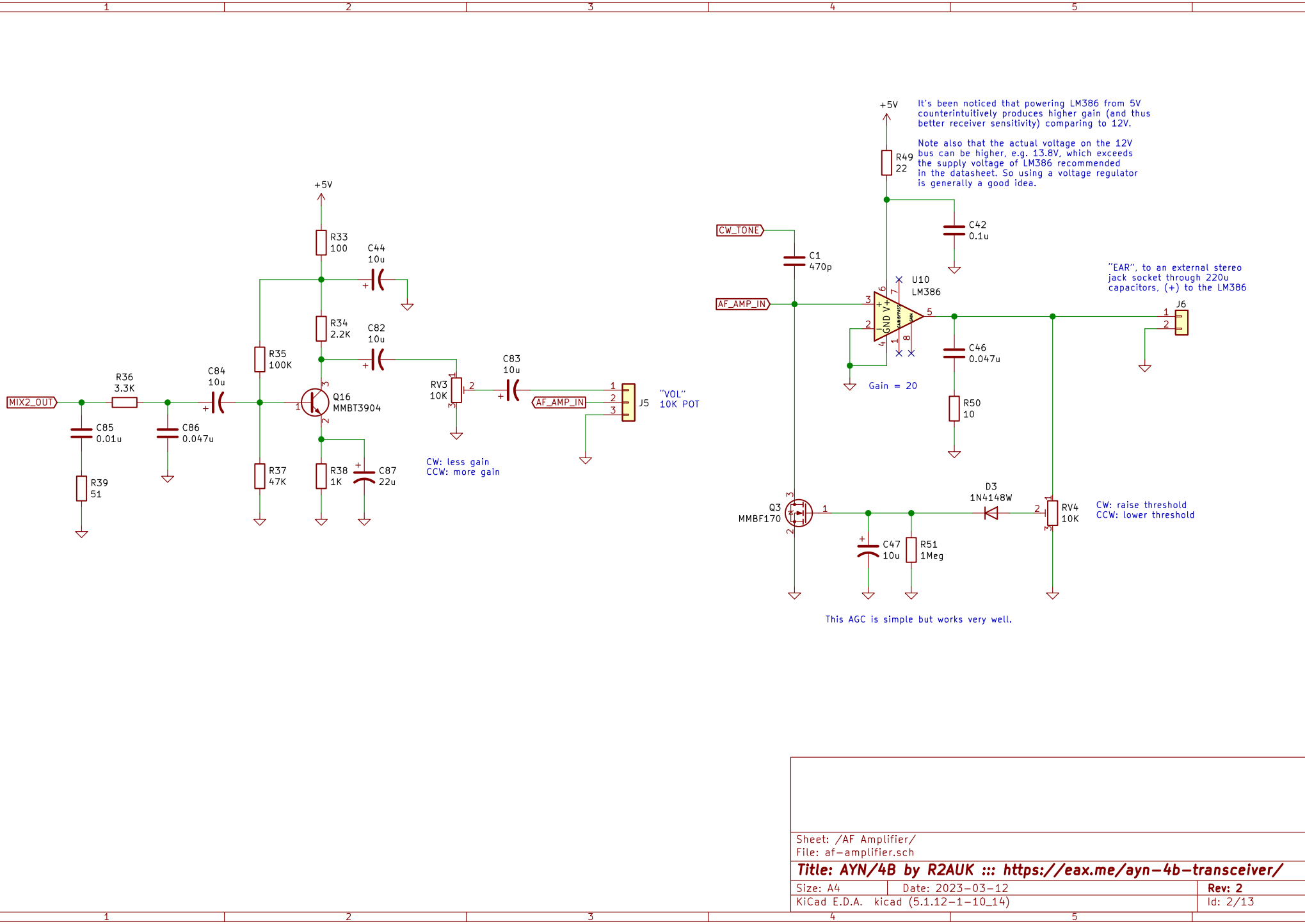
+12V
w/ heatsink
U1
L7805
+5V
C3
0.47u
C4
0.1u

Using separate voltage regulators
for digital and analog parts of the
circuit prevents the noice when
updating text on the LCD, etc.

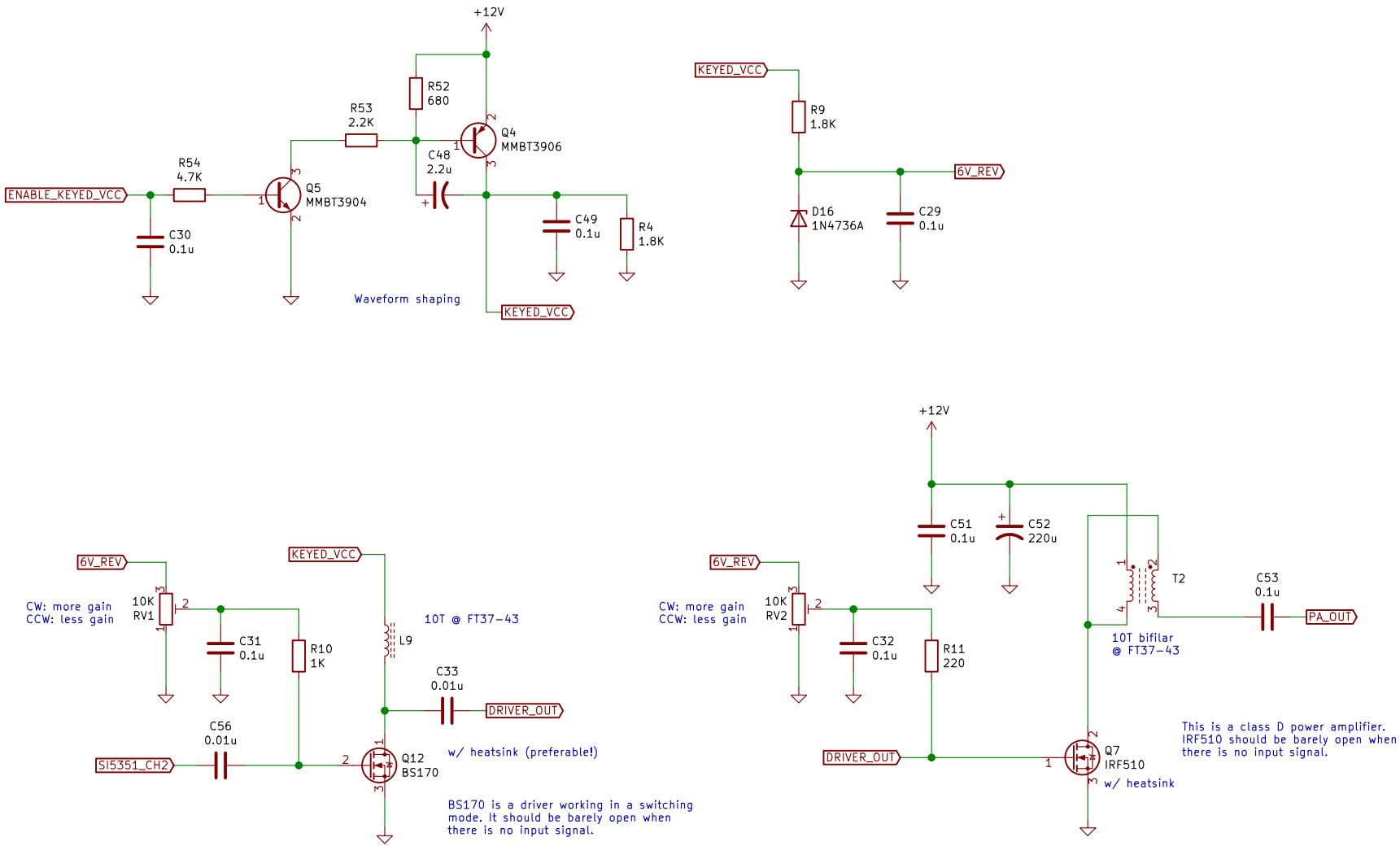
Sheet: /
File: ayn-4b.sch

Title: AYN/4B by R2AUK ::: https://eax.me/ayn-4b-transceiver/

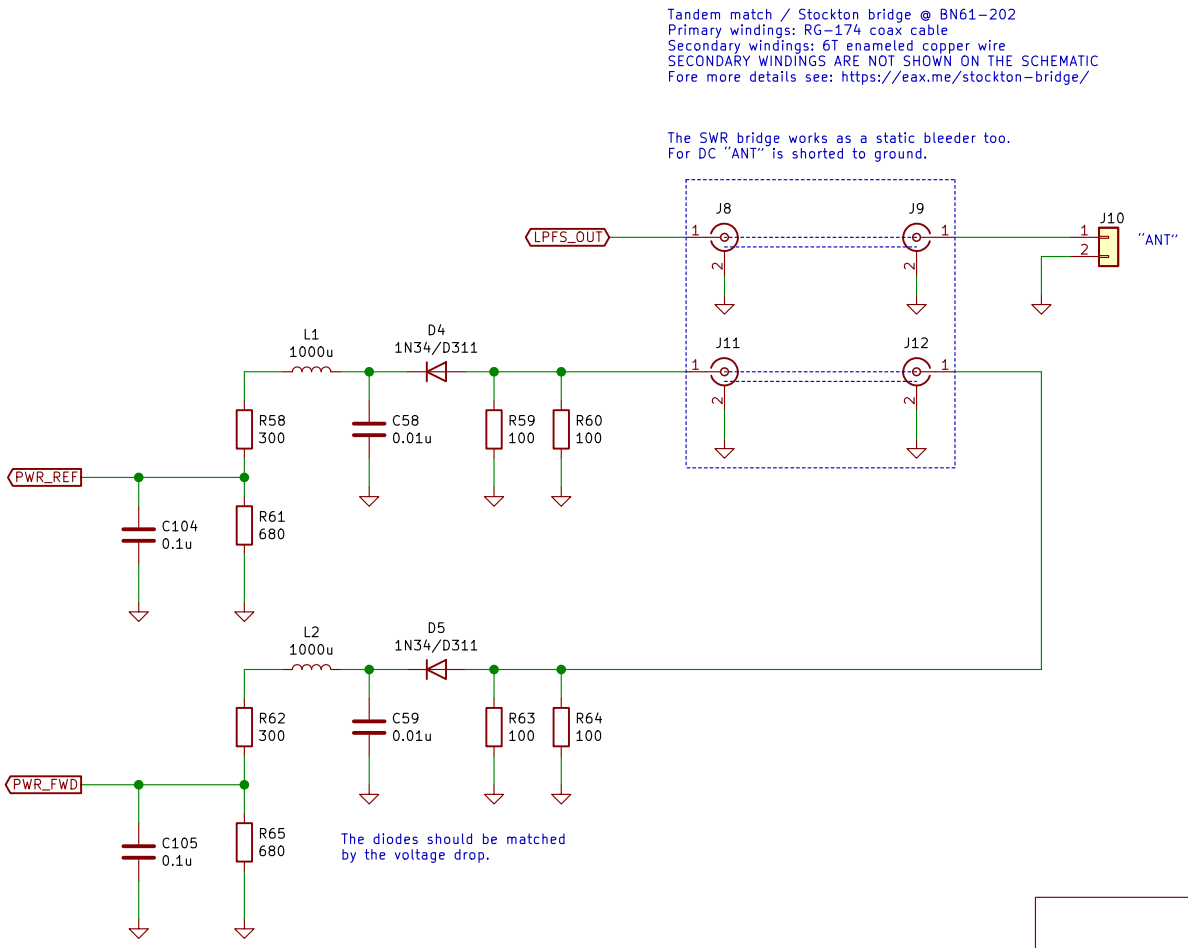
Size: A4	Date: 2023-03-12	Rev: 2
KiCad E.D.A. kicad (5.1.12-1-10_14)		Id: 1/13



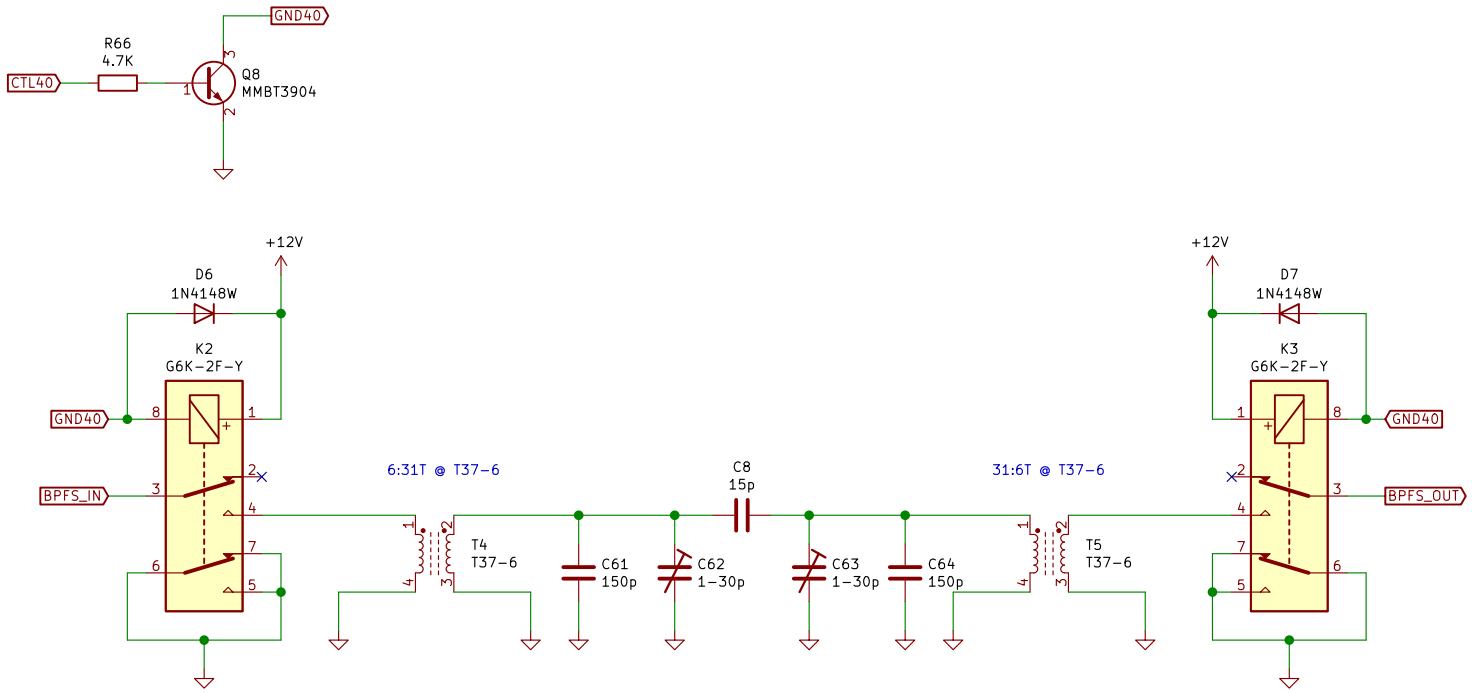
Sheet: /AF Amplifier/		
File: af-amplifier.sch		
Title: AYN/4B by R2AUK ::: https://eax.me/ayn-4b-transceiver/		
Size: A4	Date: 2023-03-12	**Rev: 2**
KiCad E.D.A. kicad (5.1.12-1-10_14)		Id: 2/13



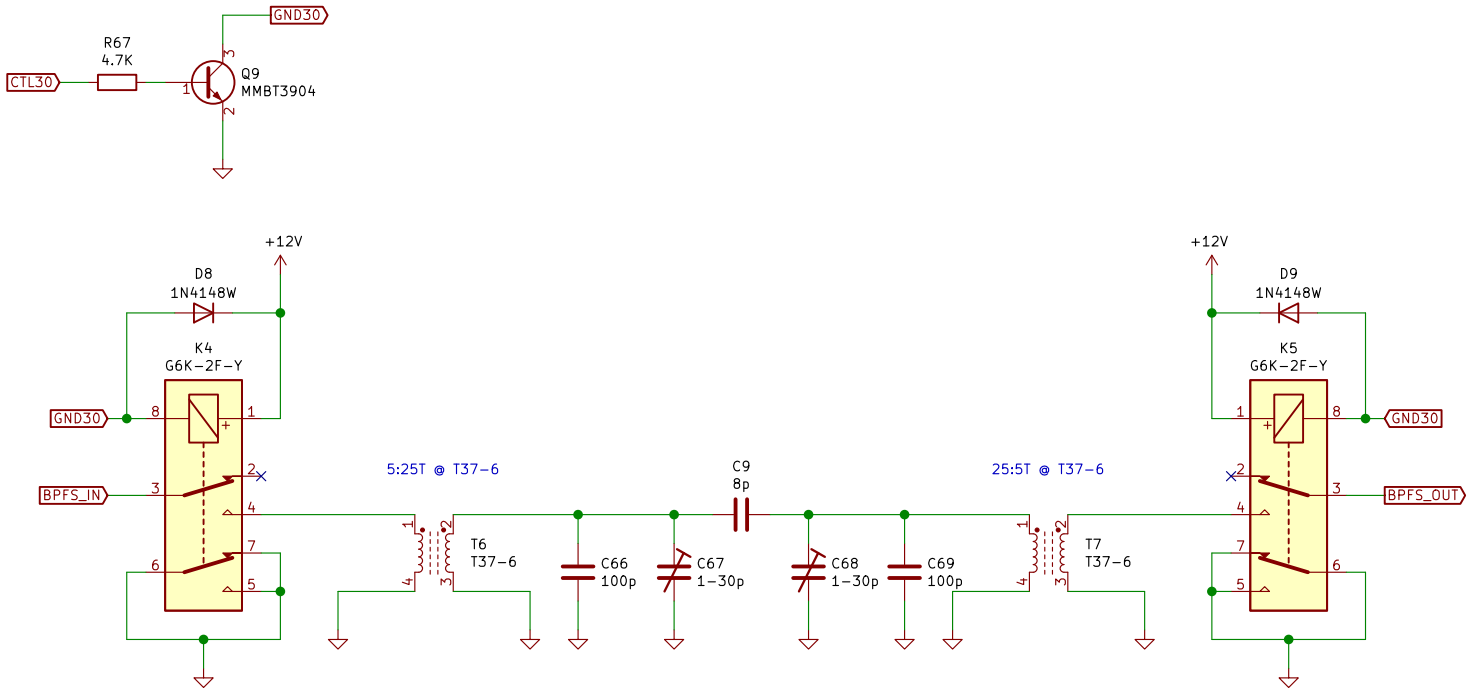
Sheet: /Power Amplifier/		
File: power-amplifier.sch		
Title: AYN/4B by R2AUK ::: https://eax.me/ayn-4b-transceiver/		
Size: A4	Date: 2023-03-12	**Rev: 2**
KiCad E.D.A. kicad (5.1.12-1-10_14)		Id: 3/13



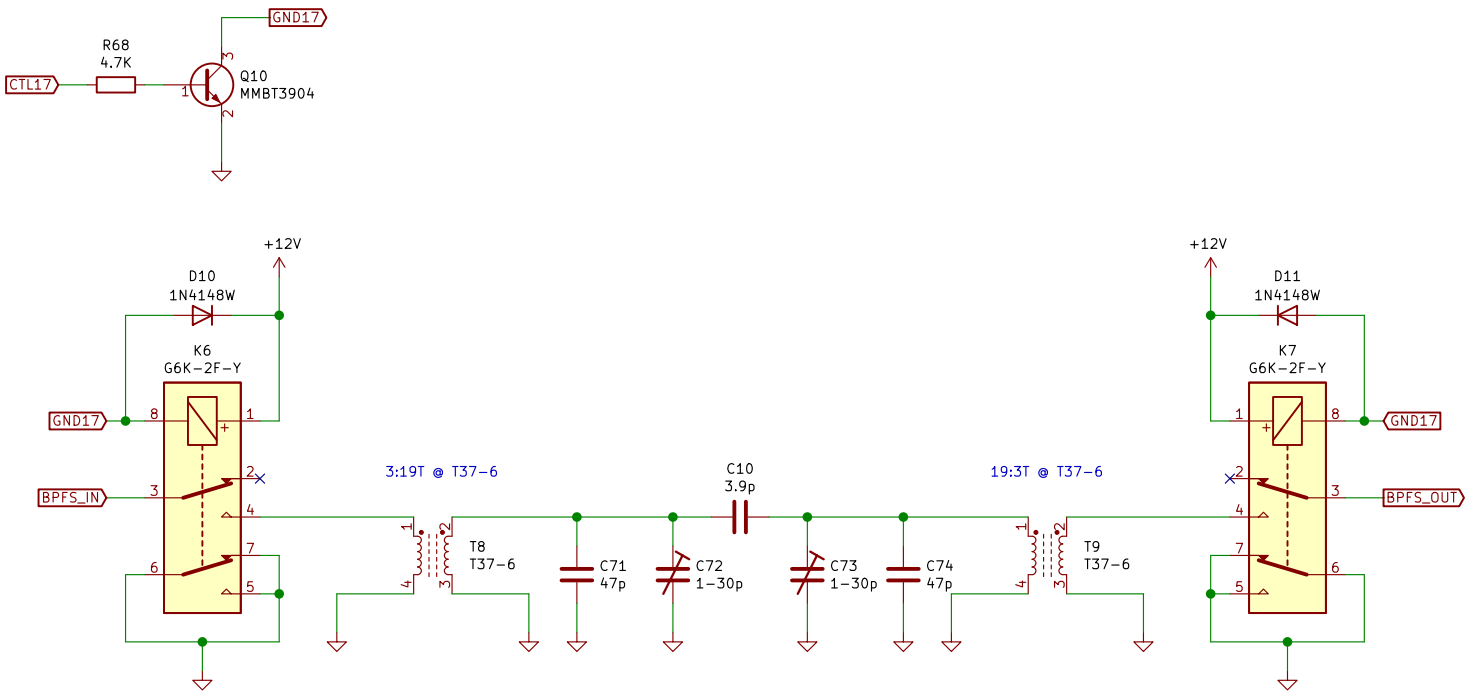
Sheet: /SWR Bridge/		
File: swr-bridge.sch		
Title: AYN/4B by R2AUK ::: https://eax.me/ayn-4b-transceiver/		
Size: A4	Date: 2023-03-12	**Rev: 2**
KiCad E.D.A. kicad (5.1.12-1-10_14)		Id: 4/13



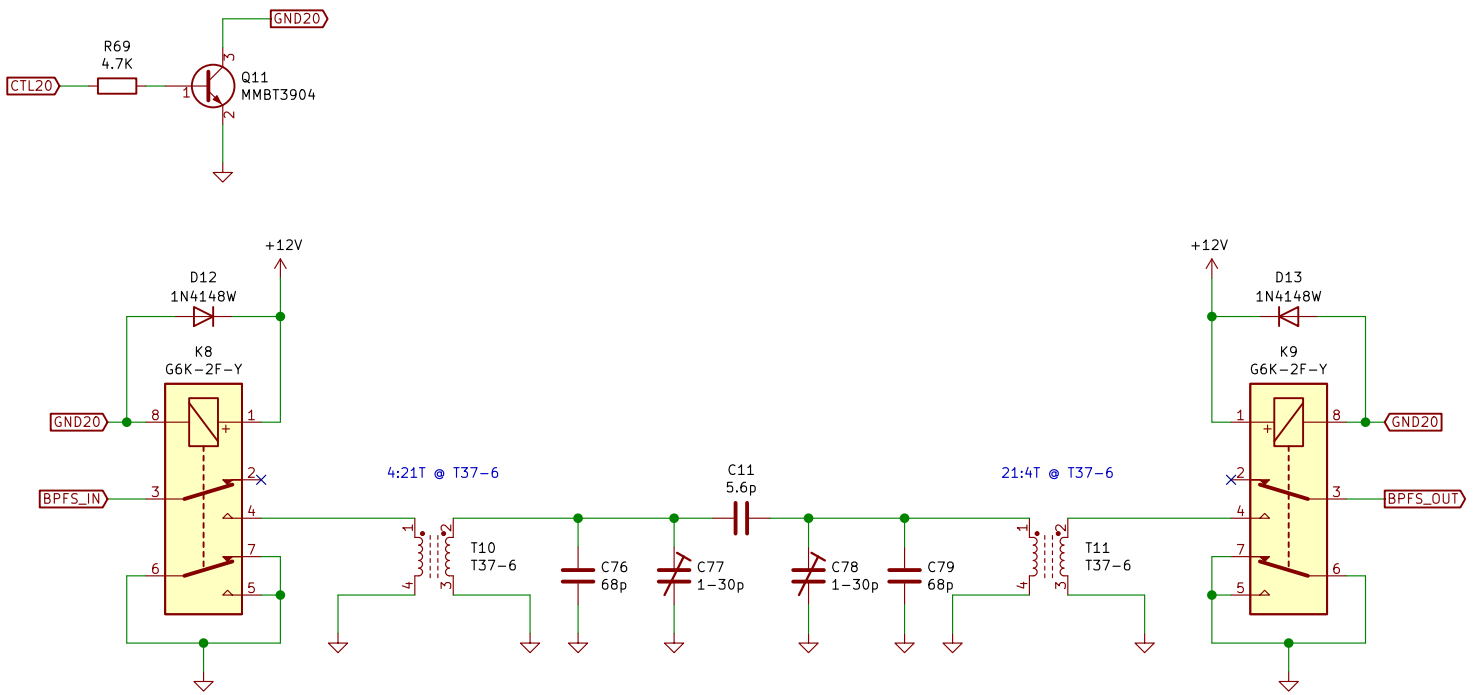
Sheet: /BPF40/		
File: bpf40.sch		
Title: AYN/4B by R2AUK ::: https://eax.me/ayn-4b-transceiver/		
Size: A4	Date: 2023-03-12	**Rev: 2**
KiCad E.D.A. kicad (5.1.12-1-10_14)		Id: 5/13



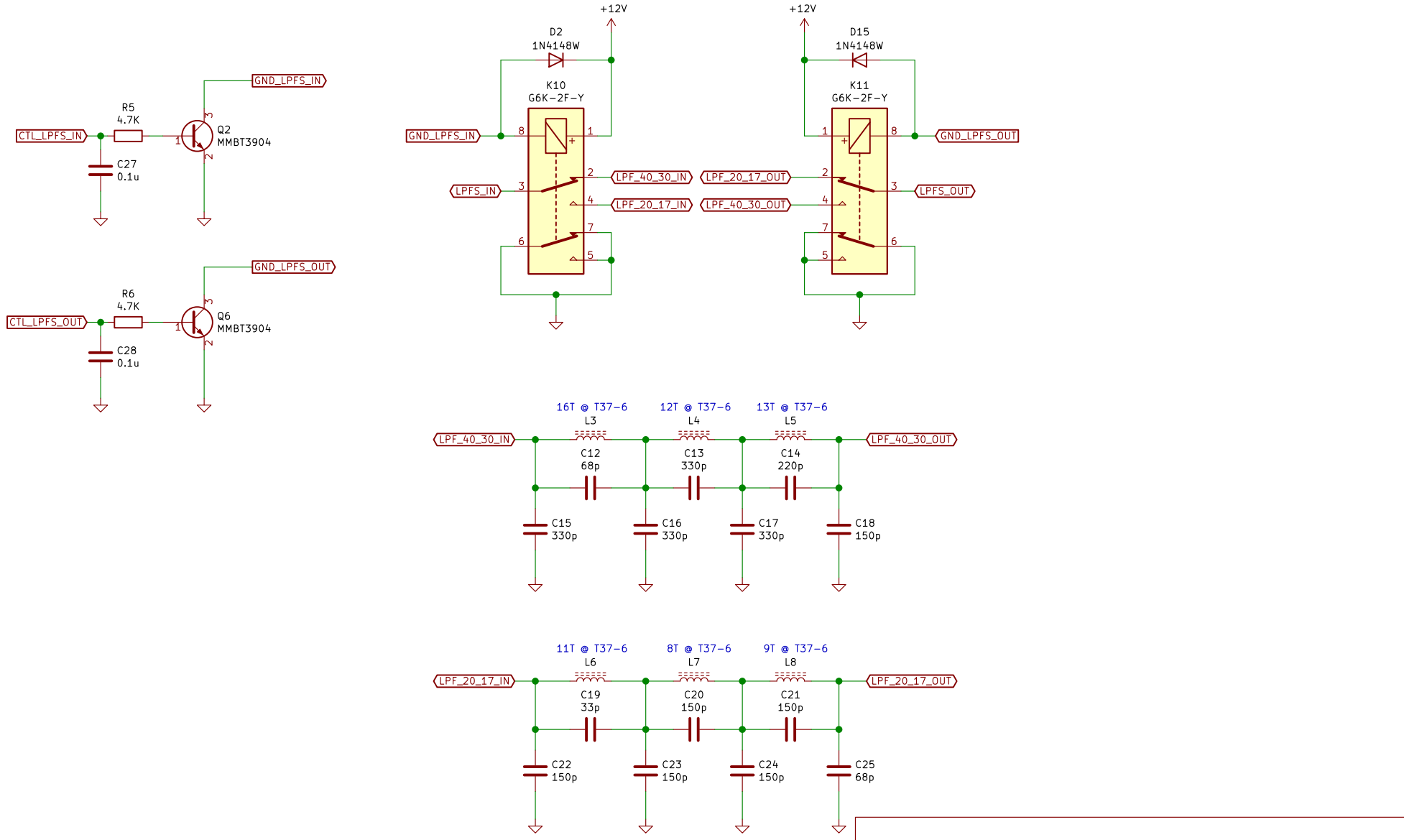
Sheet: /BPF30/		
File: bpf30.sch		
Title: AYN/4B by R2AUK ::: https://eax.me/ayn-4b-transceiver/		
Size: A4	Date: 2023-03-12	**Rev: 2**
KiCad E.D.A. kicad (5.1.12-1-10_14)		Id: 6/13



Sheet: /BPF17/		
File: bpf17.sch		
Title: AYN/4B by R2AUK ::: https://eax.me/ayn-4b-transceiver/		
Size: A4	Date: 2023-03-12	**Rev: 2**
KiCad E.D.A. kicad (5.1.12-1-10_14)		Id: 7/13



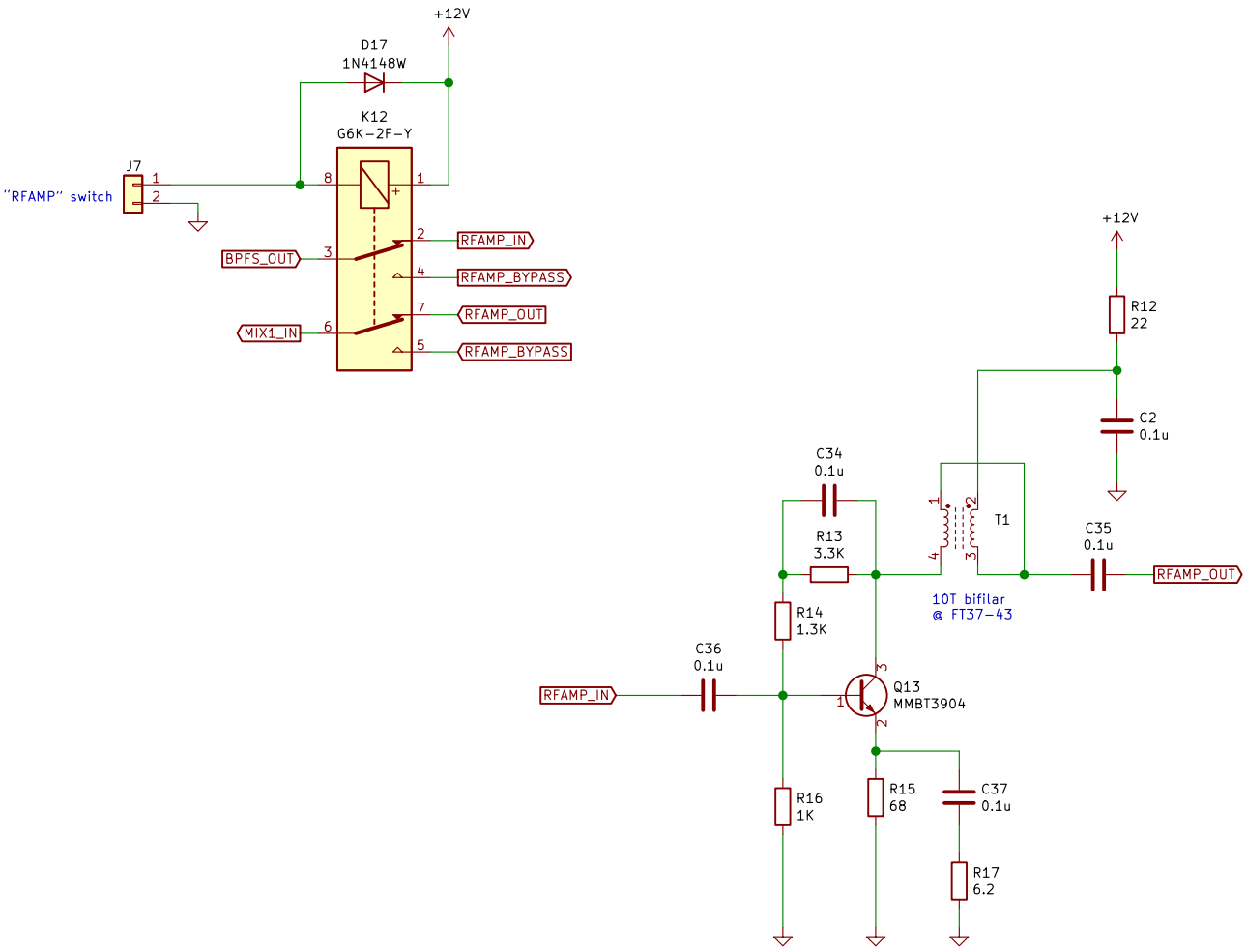
Sheet: /BPF20/		
File: bpf20.sch		
Title: AYN/4B by R2AUK ::: https://eax.me/ayn-4b-transceiver/		
Size: A4	Date: 2023-03-12	**Rev: 2**
KiCad E.D.A. kicad (5.1.12-1-10_14)		Id: 8/13



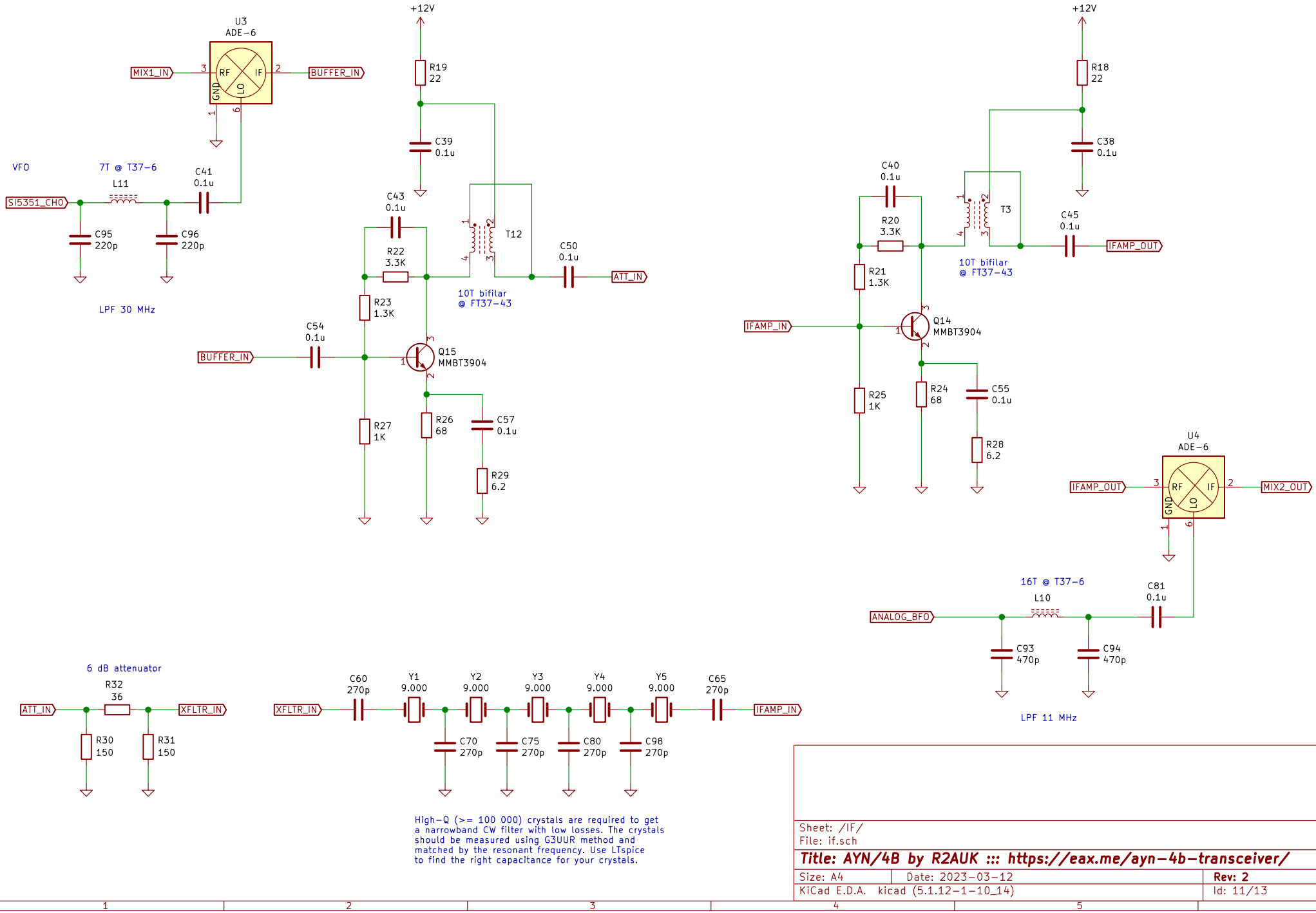
Sheet: /LPFs/
File: lpfs.sch

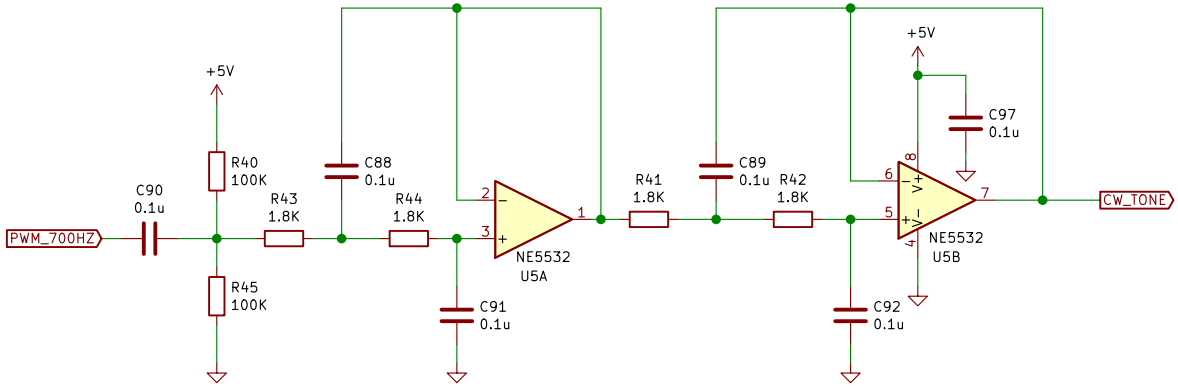
Title: AYN/4B by R2AUK ::: https://eax.me/ayn-4b-transceiver/

Size: A4	Date: 2023-03-12	**Rev: 2**
KiCad E.D.A. kicad (5.1.12-1-10_14)		Id: 9/13



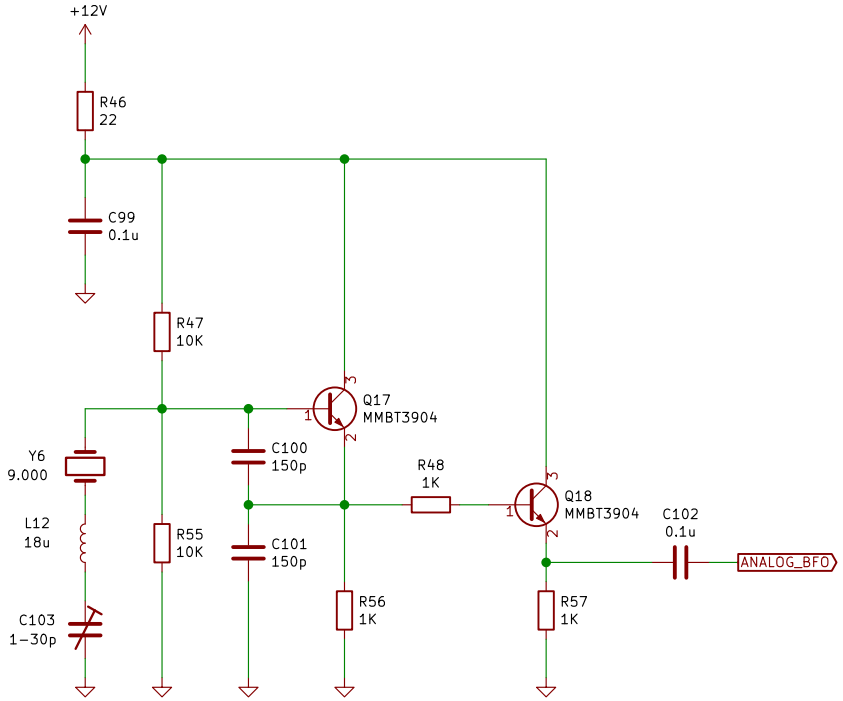
Sheet: /RFAmp/		
File: rfamp.sch		
Title: AYN/4B by R2AUK ::: https://eax.me/ayn-4b-transceiver/		
Size: A4	Date: 2023-03-12	**Rev: 2**
KiCad E.D.A. kicad (5.1.12-1-10_14)		Id: 10/13


U3
ADE-6
MIX1_IN
BUFFER_IN
RF
IF
LO
GND
+12V
R19
22
C39
0.1u
VFO
7T @ T37-6
L11
C41
0.1u
SI5351_CH0
C95
220p
C96
220p
LPF 30 MHz
C43
0.1u
R22
3.3K
T12
C50
0.1u
ATT_IN
10T bifilar
@ FT37-43
R23
1.3K
C54
0.1u
BUFFER_IN
Q15
MMBT3904
R27
1K
R26
68
C57
0.1u
R29
6.2
+12V
R18
22
C38
0.1u
C40
0.1u
R20
3.3K
T3
C45
0.1u
IFAMP_OUT
10T bifilar
@ FT37-43
R21
1.3K
IFAMP_IN
Q14
MMBT3904
R25
1K
R24
68
C55
0.1u
R28
6.2
U4
ADE-6
IFAMP_OUT
MIX2_OUT
16T @ T37-6
L10
C81
0.1u
ANALOG_BFO
C93
470p
C94
470p
LPF 11 MHz
6 dB attenuator
R32
36
ATT_IN
XFLTR_IN
R30
150
R31
150
C60
270p
Y1
9.000
Y2
9.000
Y3
9.000
Y4
9.000
Y5
9.000
C65
270p
XFLTR_IN
IFAMP_IN
C70
270p
C75
270p
C80
270p
C98
270p
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.
Sheet: /IF/
File: if.sch
Title: AYN/4B by R2AUK ::: https://eax.me/ayn-4b-transceiver/
Size: A4
Date: 2023-03-12
Rev: 2
KiCad E.D.A. kicad (5.1.12-1-10_14)
Id: 11/13



Sheet: /LPF 700 Hz/		
File: lpf-700hz.sch		
Title: AYN/4B by R2AUK ::: https://eax.me/ayn-4b-transceiver/		
Size: A4	Date: 2023-03-12	**Rev: 2**
KiCad E.D.A. kicad (5.1.12-1-10_14)		Id: 12/13

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.



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).

This is not exactly 7 dBm typically required for a double balanced diode ring mixer, but quite enought for ADE-6, see the datasheet.

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: /Analog BFO/		
File: analog-bfo.sch		
Title: AYN/4B by R2AUK ::: https://eax.me/ayn-4b-transceiver/		
Size: A4	Date: 2023-03-12	**Rev: 2**
KiCad E.D.A. kicad (5.1.12-1-10_14)		Id: 13/13