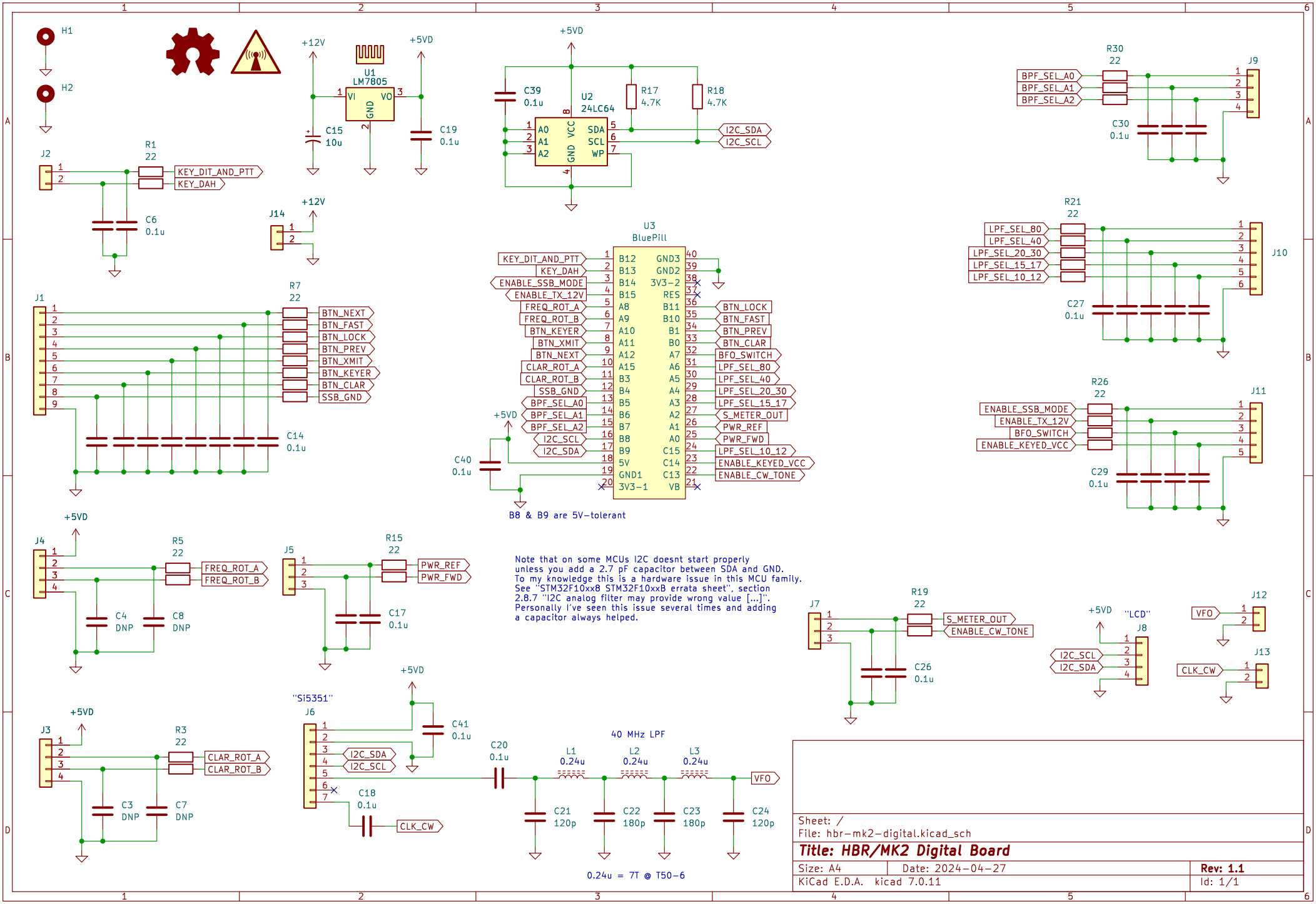
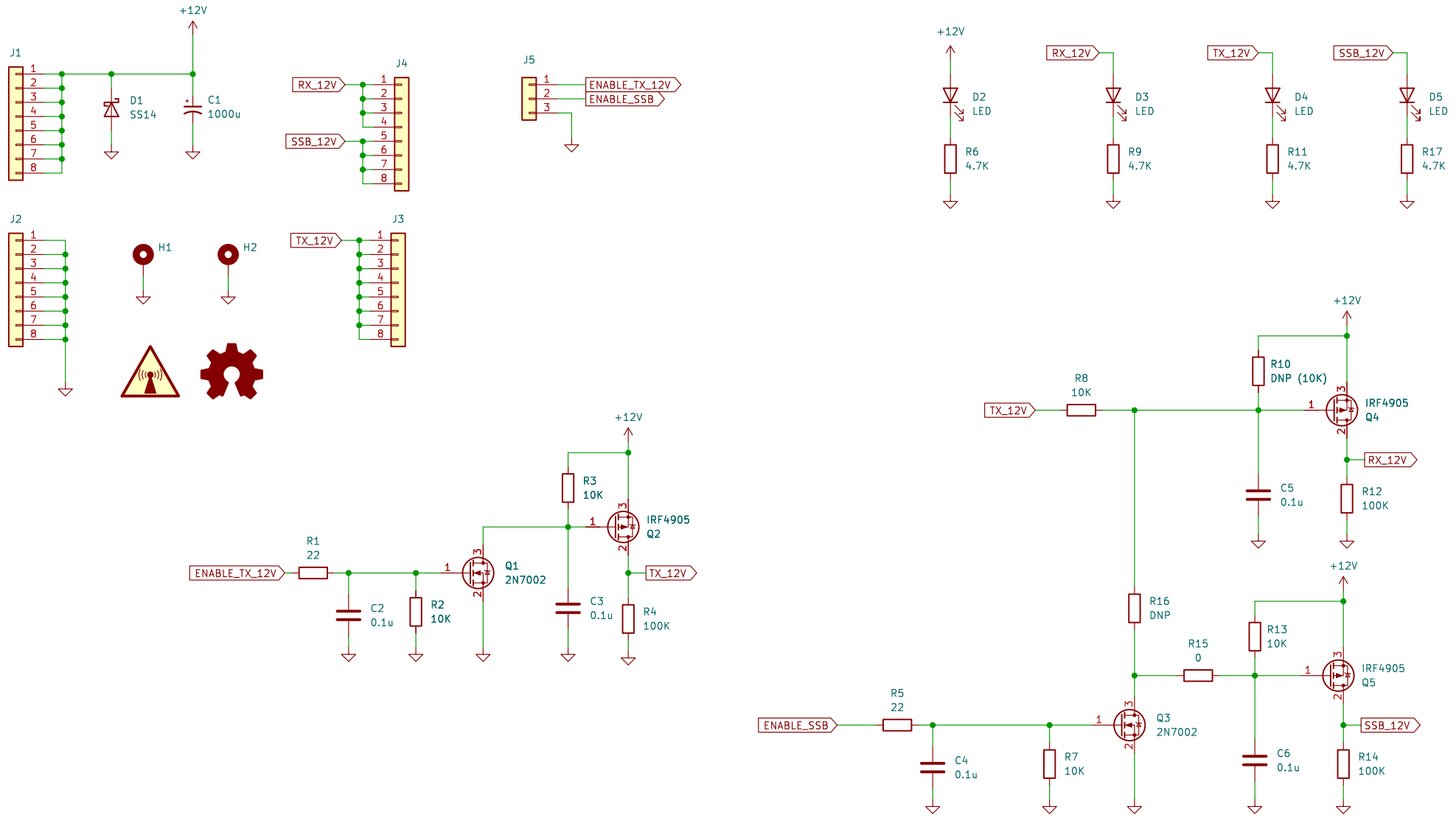
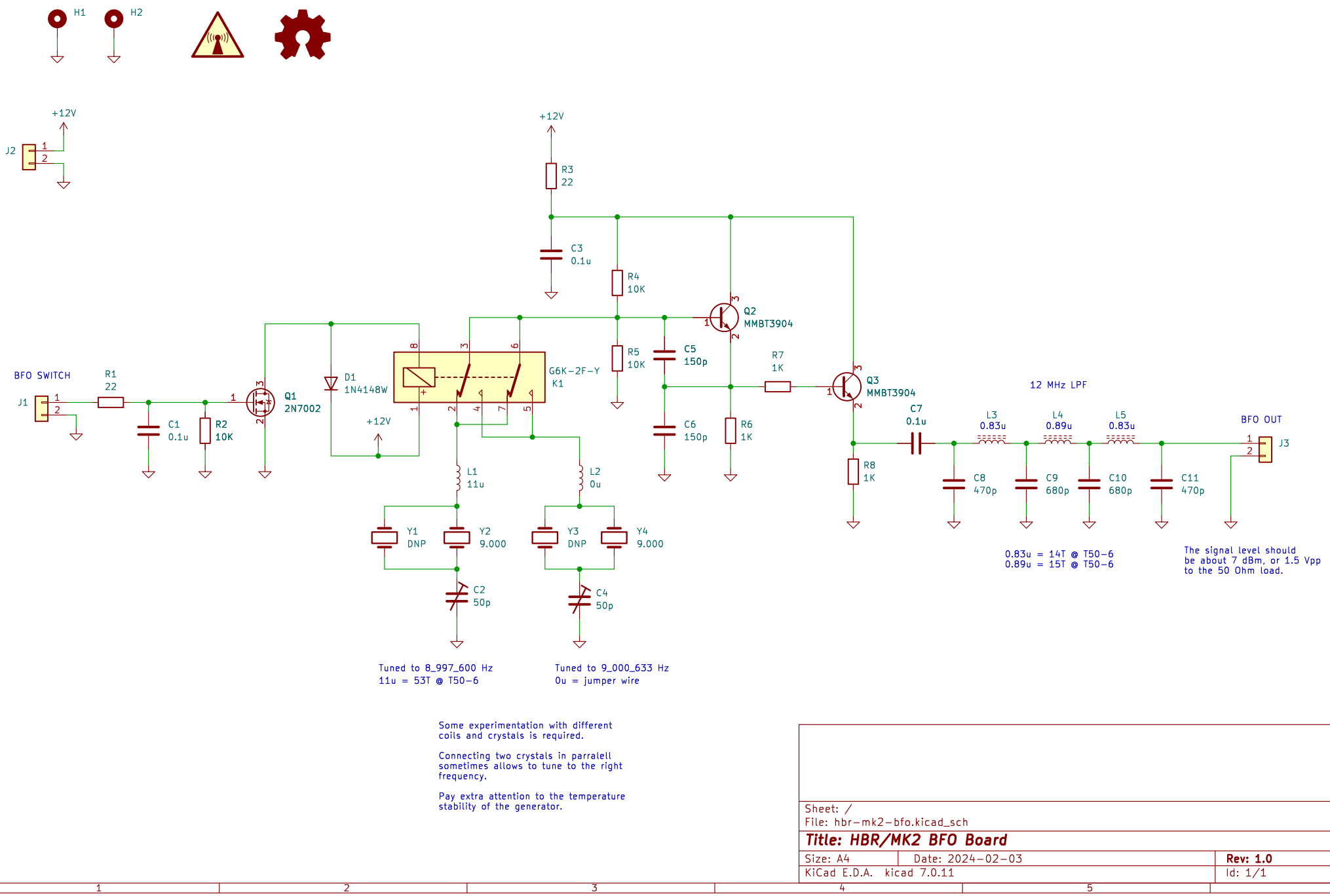

H1
H2
+12V
U1
LM7805
VI
VO
GND
+5VD
C15
10u
C19
0.1u
J2
R1
22
KEY_DIT_AND_PTT
KEY_DAH
C6
0.1u
J14
+12V
+5VD
C39
0.1u
U2
24LC64
R17
4.7K
R18
4.7K
A0
A1
A2
GND
VCC
SDA
SCL
WP
I2C_SDA
I2C_SCL
R30
22
J9
BPF_SEL_A0
BPF_SEL_A1
BPF_SEL_A2
C30
0.1u
R21
22
J10
LPF_SEL_80
LPF_SEL_40
LPF_SEL_20_30
LPF_SEL_15_17
LPF_SEL_10_12
C27
0.1u
U3
BluePill
B8 & B9 are 5V-tolerant
J1
R7
22
BTN_NEXT
BTN_FAST
BTN_LOCK
BTN_PREV
BTN_XMIT
BTN_KEYER
BTN_CLAR
SSB_GND
C14
0.1u
C40
0.1u
R26
22
J11
ENABLE_SSB_MODE
ENABLE_TX_12V
BFO_SWITCH
ENABLE_KEYED_VCC
C29
0.1u
J4
R5
22
FREQ_ROT_A
FREQ_ROT_B
C4
DNP
C8
DNP
J5
R15
22
PWR_REF
PWR_FWD
C17
0.1u
Note that on some MCUs I2C doesnt 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.
J7
R19
22
S_METER_OUT
ENABLE_CW_TONE
C26
0.1u
"LCD"
J8
J12
VFO
J13
CLK_CW
J3
R3
22
CLAR_ROT_A
CLAR_ROT_B
C3
DNP
C7
DNP
"SI5351"
J6
C41
0.1u
C18
0.1u
C20
0.1u
40 MHz LPF
L1
0.24u
L2
0.24u
L3
0.24u
C21
120p
C22
180p
C23
180p
C24
120p
0.24u = 7T @ T50-6
Sheet: /
File: hbr-mk2-digital.kicad_sch
Title: HBR/MK2 Digital Board
Size: A4
Date: 2024-04-27
Rev: 1.1
KiCad E.D.A. kicad 7.0.11
Id: 1/1



Sheet: /
File: hbr-mk2-power.kicad_sch

Title: HBR/MK2 Power Board

Size: A4	Date: 2024-02-03	**Rev: 1.0**
KiCad E.D.A. kicad 7.0.11		Id: 1/1

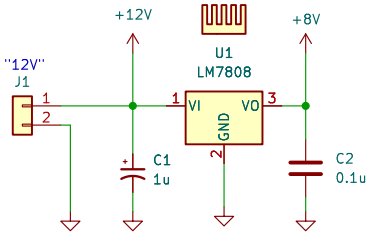


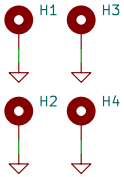
Sheet: /	
File: hbr-mk2-bfo.kicad_sch	
Title: HBR/MK2 BFO Board	
Size: A4	Date: 2024-02-03
KiCad E.D.A. kicad 7.0.11	Id: 1/1

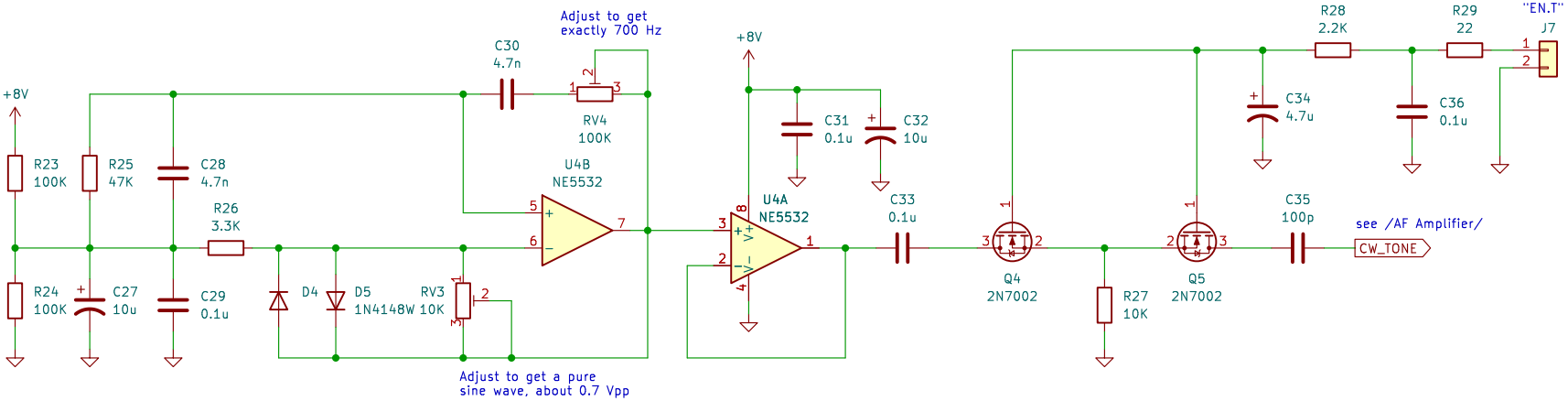
Rev: 1.0

AF Amplifier

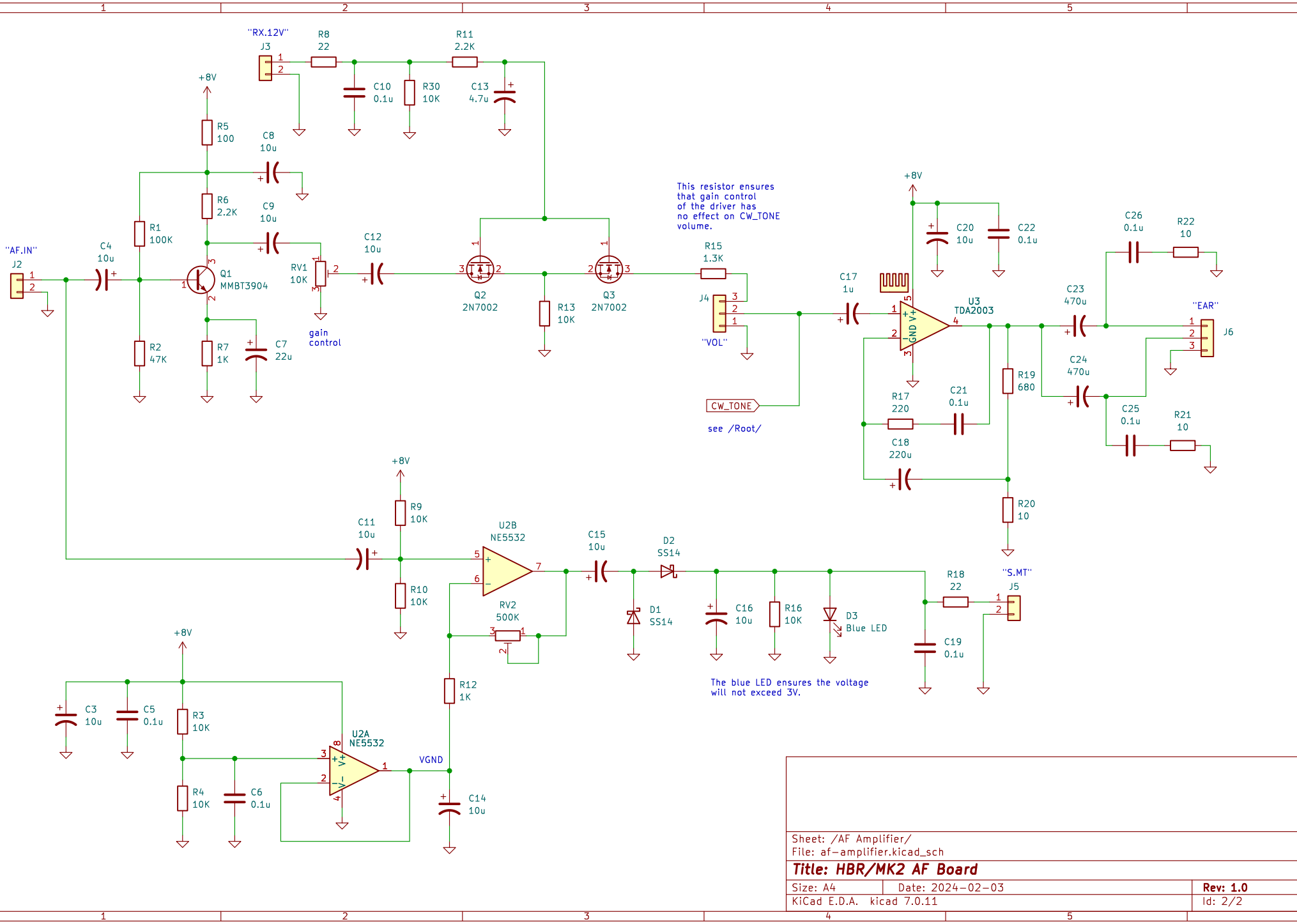
File: af-amplifier.kicad_sch







Sheet: /		
File: hbr-mk2-af.kicad_sch		
Title: HBR/MK2 AF Board		
Size: A4	Date: 2024-02-03	**Rev: 1.0**
KiCad E.D.A. kicad 7.0.11		Id: 1/2


"RX.12V"
J3
R8
22
R11
2.2K
C10
0.1u
R30
10K
C13
4.7u
+8V
R5
100
C8
10u
R6
2.2K
C9
10u
R1
100K
"AF.IN"
J2
C4
10u
Q1
MMBT3904
R2
47K
R7
1K
C7
22u
RV1
10K
gain
control
C12
10u
Q2
2N7002
Q3
2N7002
R13
10K
This resistor ensures
that gain control
of the driver has
no effect on CW_TONE
volume.
R15
1.3K
J4
"VOL"
CW_TONE
see /Root/
+8V
C20
10u
C22
0.1u
C17
1u
U3
TDA2003
GND
V+
C26
0.1u
R22
10
C23
470u
"EAR"
J6
C24
470u
C25
0.1u
R21
10
R17
220
C21
0.1u
R19
680
C18
220u
R20
10
+8V
R9
10K
C11
10u
U2B
NE5532
R10
10K
RV2
500K
C15
10u
D2
SS14
D1
SS14
C16
10u
R16
10K
D3
Blue LED
R18
22
"S.MT"
J5
C19
0.1u
The blue LED ensures the voltage
will not exceed 3V.
R12
1K
+8V
C3
10u
C5
0.1u
R3
10K
U2A
NE5532
R4
10K
C6
0.1u
VGND
C14
10u
Sheet: /AF Amplifier/
File: af-amplifier.kicad_sch
Title: HBR/MK2 AF Board
Size: A4
Date: 2024-02-03
Rev: 1.0
KiCad E.D.A. kicad 7.0.11
Id: 2/2

AGC

File: agc.kicad_sch

RX

File: rx.kicad_sch

TX SSB

File: tx-ssb.kicad_sch

TX Common

File: tx-common.kicad_sch

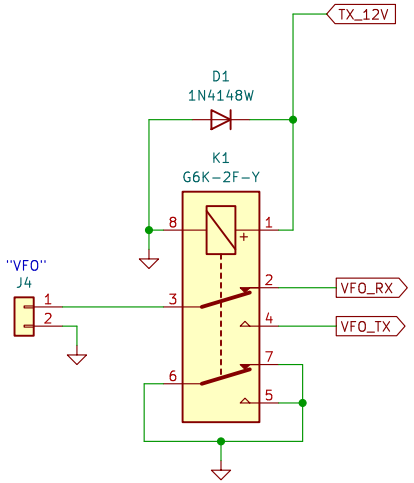
== General notes ==
- HFD4/12 relay is a full equivalent of G6K-2F-Y
- KT3142A transistor is a full equivalent of 2N2369A
- KT3142A can be replaced with another transistor with fT >= 500 Mhz
- ADE-6 mixers can be replaced with ADE-1, ADE-2, etc

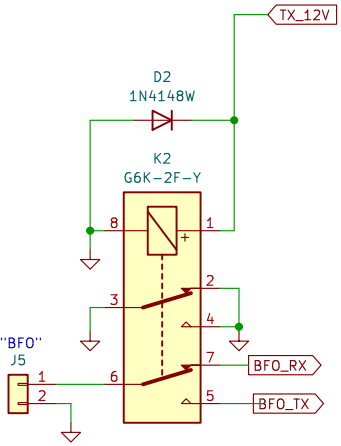
H1 H2 H3 H4

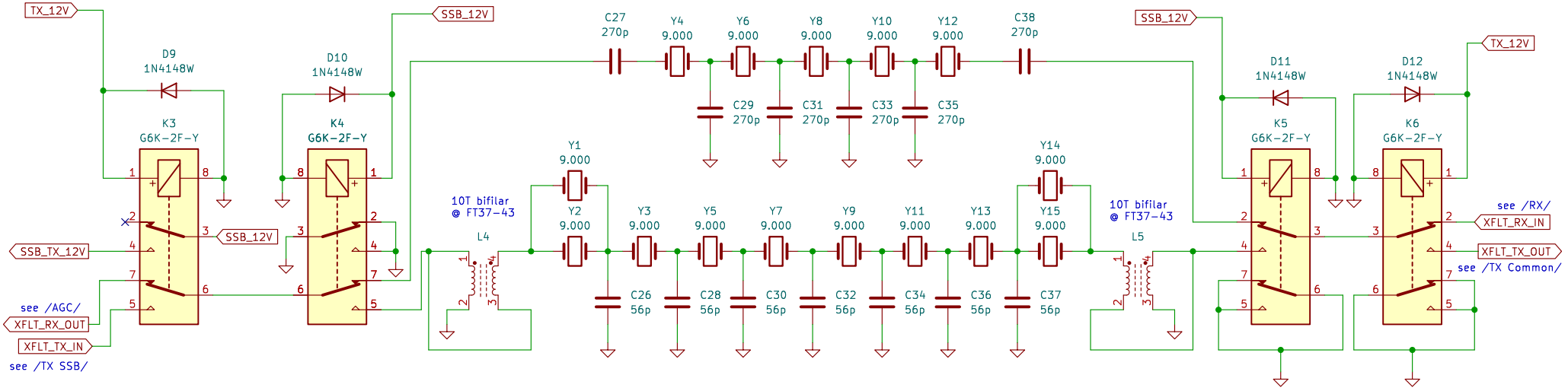
J1 RX_12V

J2 TX_12V

J3 SSB_12V







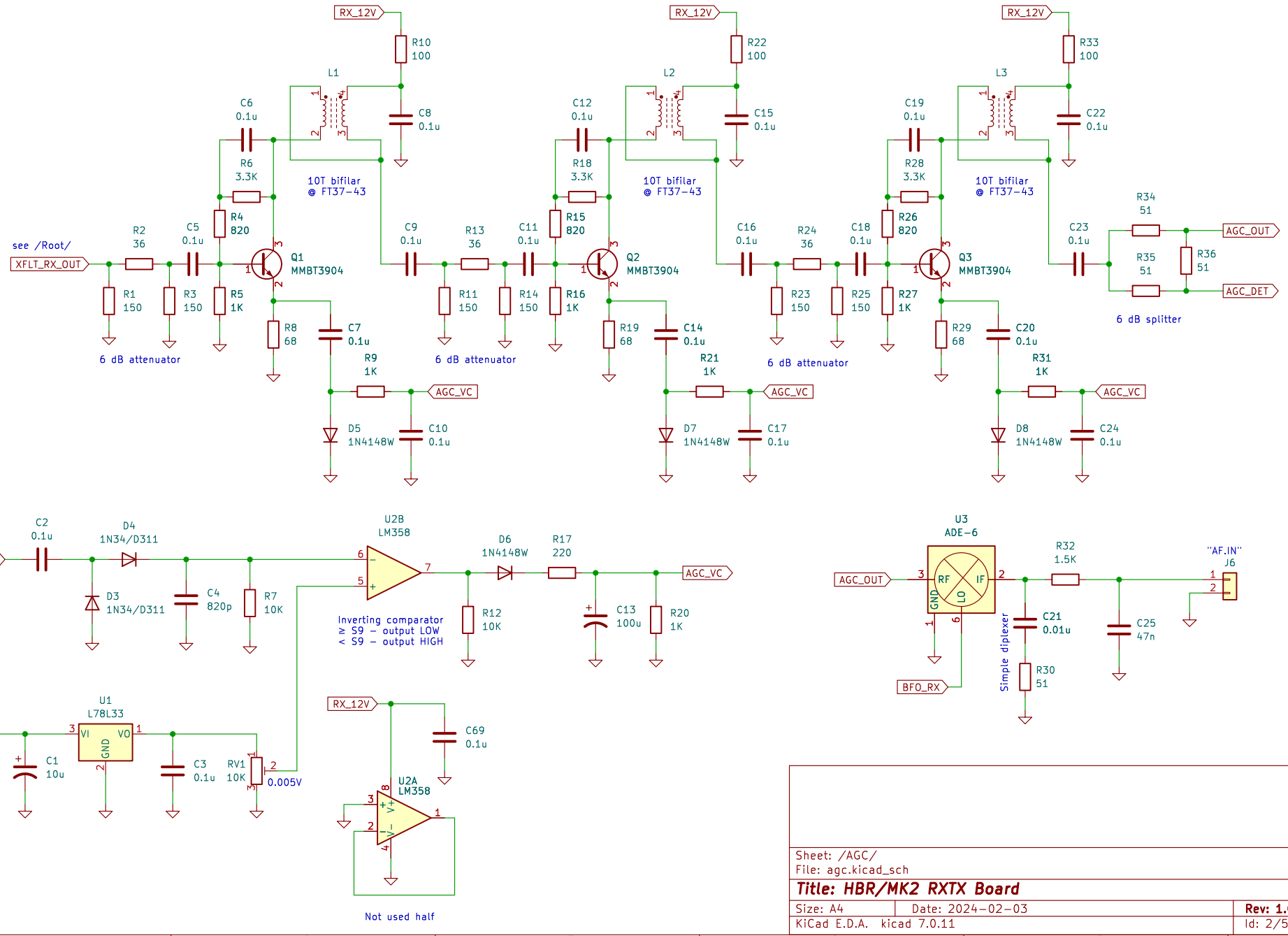
High-Q (>= 100 000) crystals are required to get narrowband filters with low losses. The crystals should be measured using G3UUR method and matched by the resonant frequency. Use LTspice to find the right capacitance for your crystals.

For more details see https://eax.me/crystal-filters-part-4/

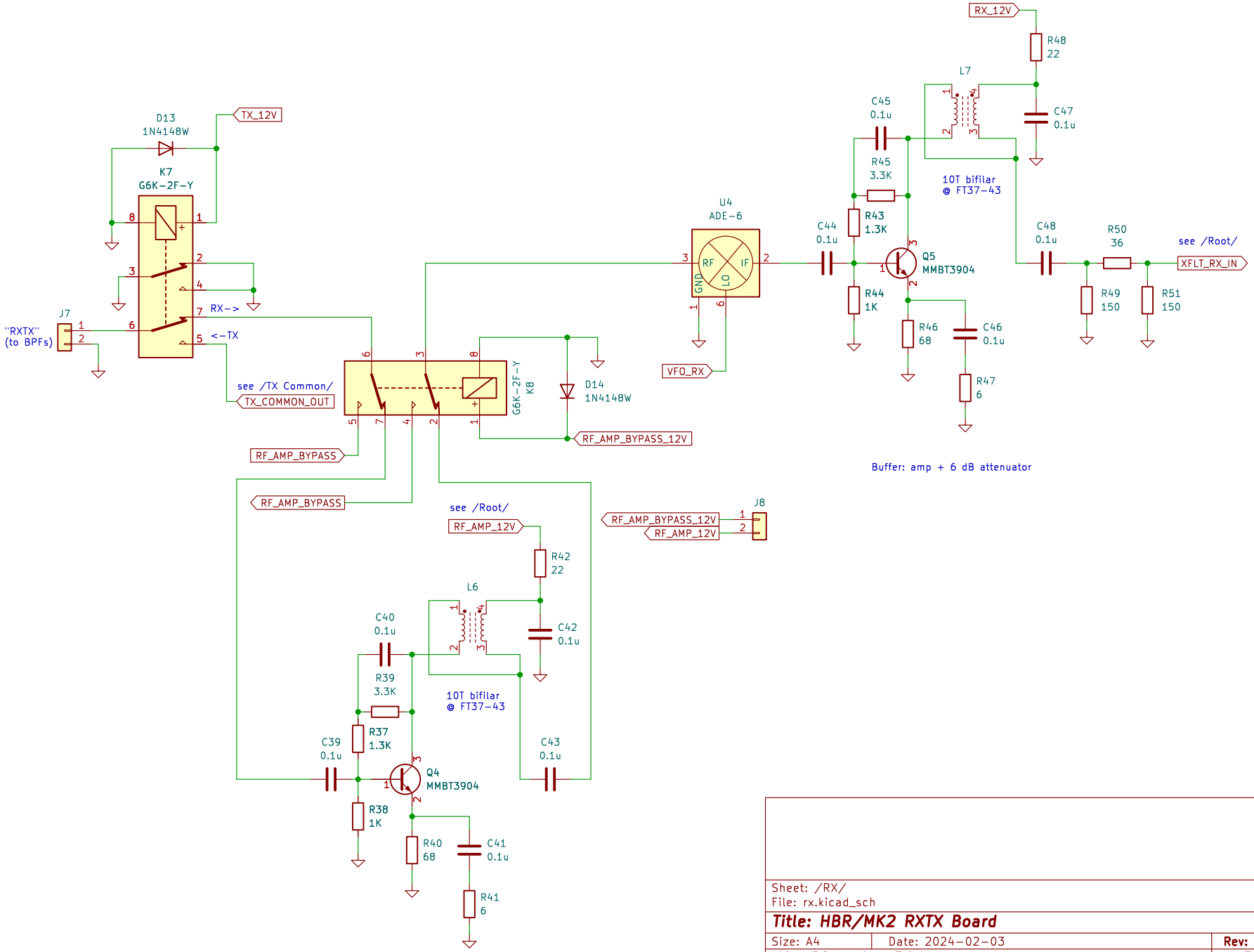
Sheet: /
File: hbr-mk2-rxtx.kicad_sch

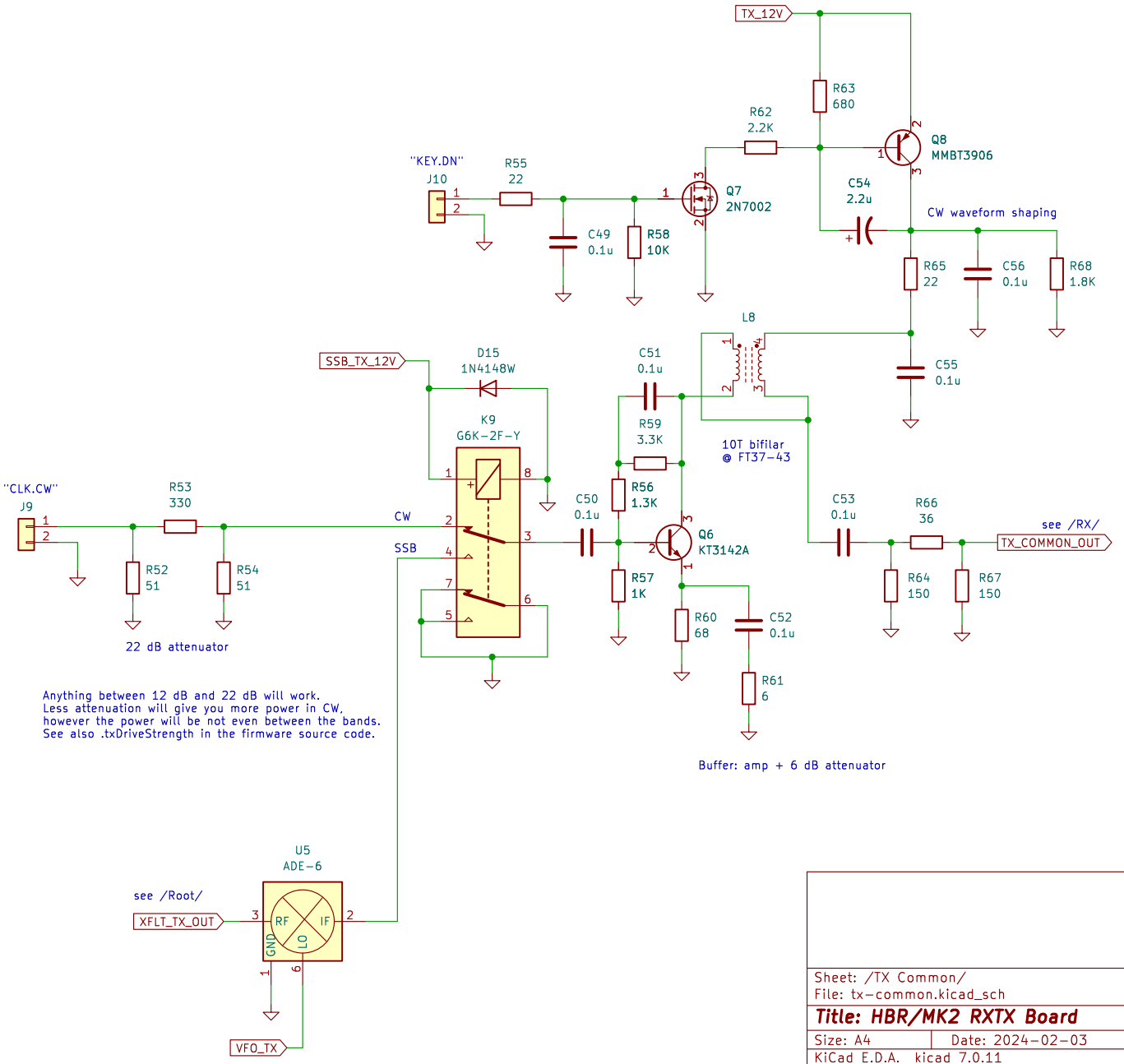
Title: HBR/MK2 RXTX Board

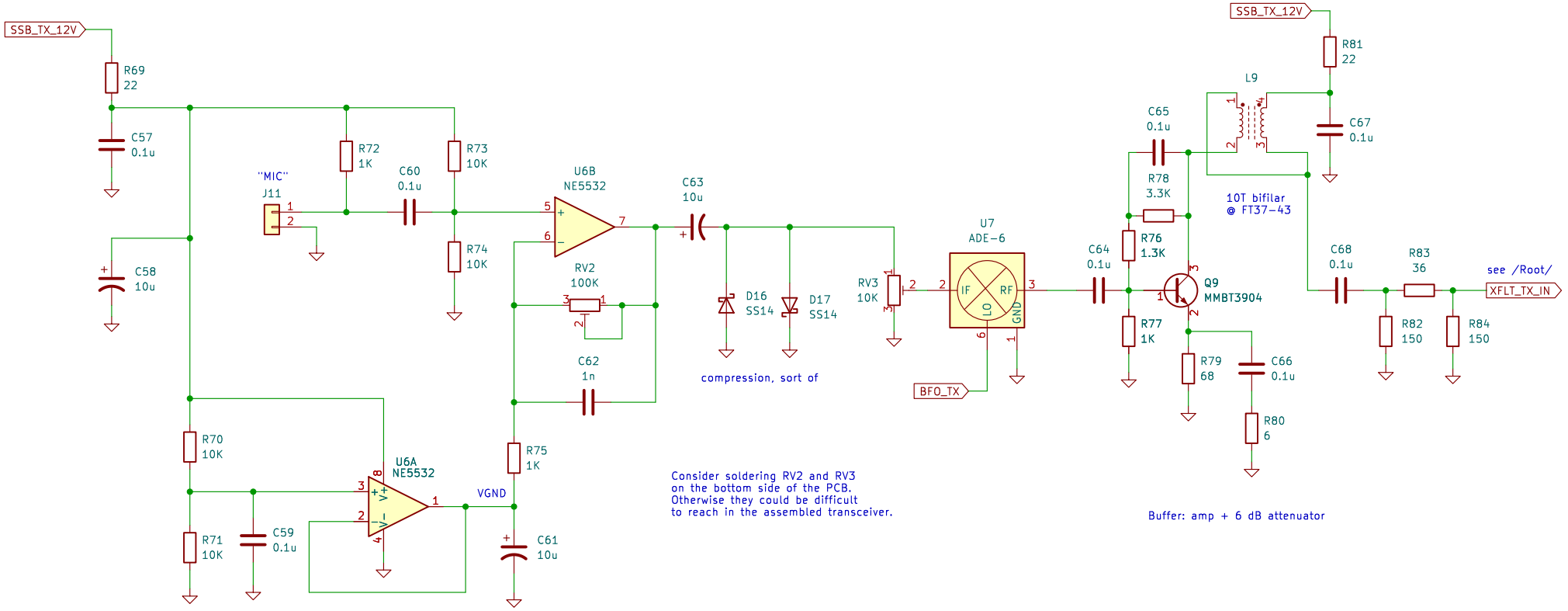
Size: A4	Date: 2024-02-03	**Rev: 1.0**
KiCad E.D.A. kicad 7.0.11		Id: 1/5



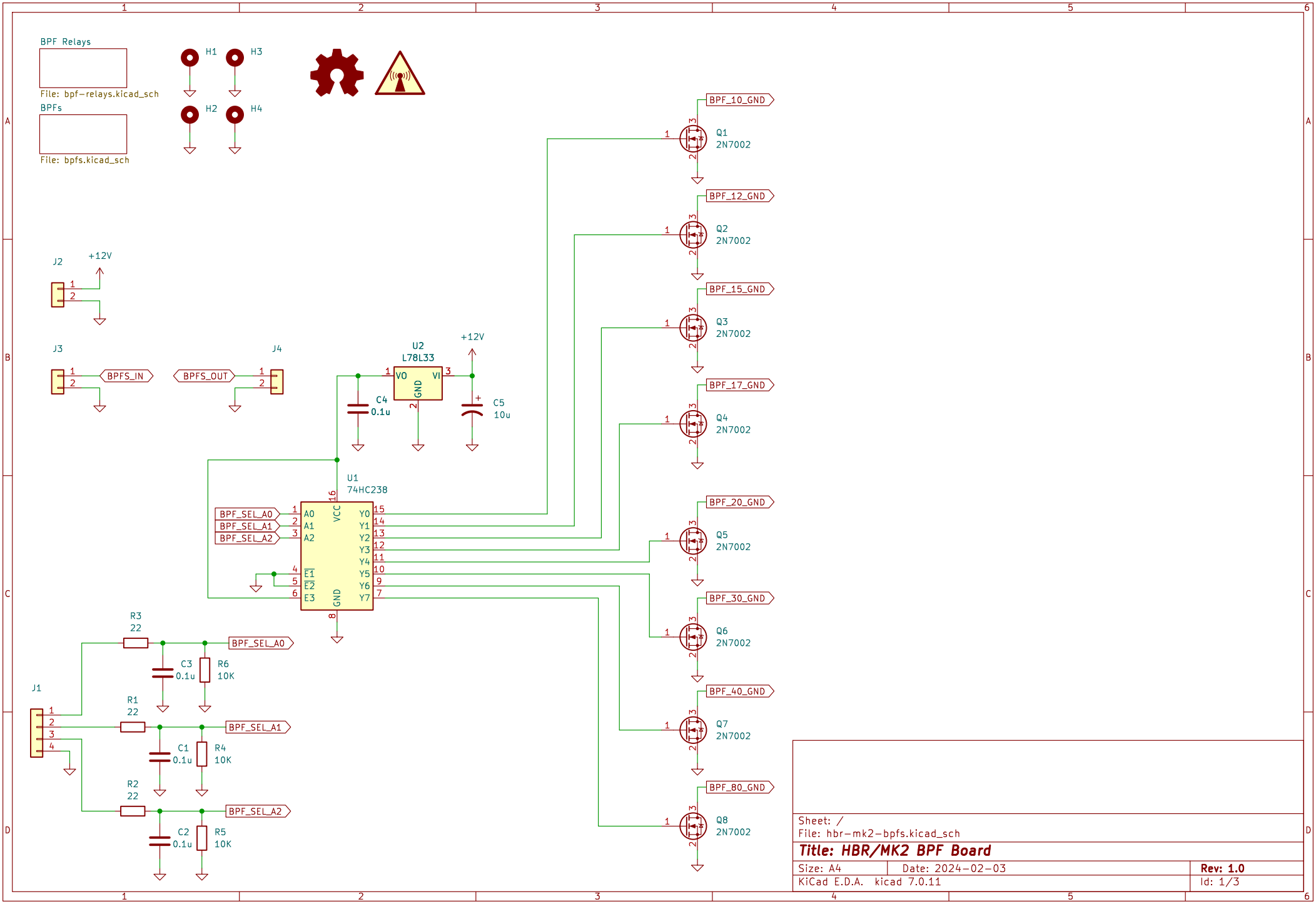
Sheet: /AGC/		
File: agc.kicad_sch		
Title: HBR/MK2 RXTX Board		
Size: A4	Date: 2024-02-03	**Rev: 1.0**
KiCad E.D.A. kicad 7.0.11		Id: 2/5

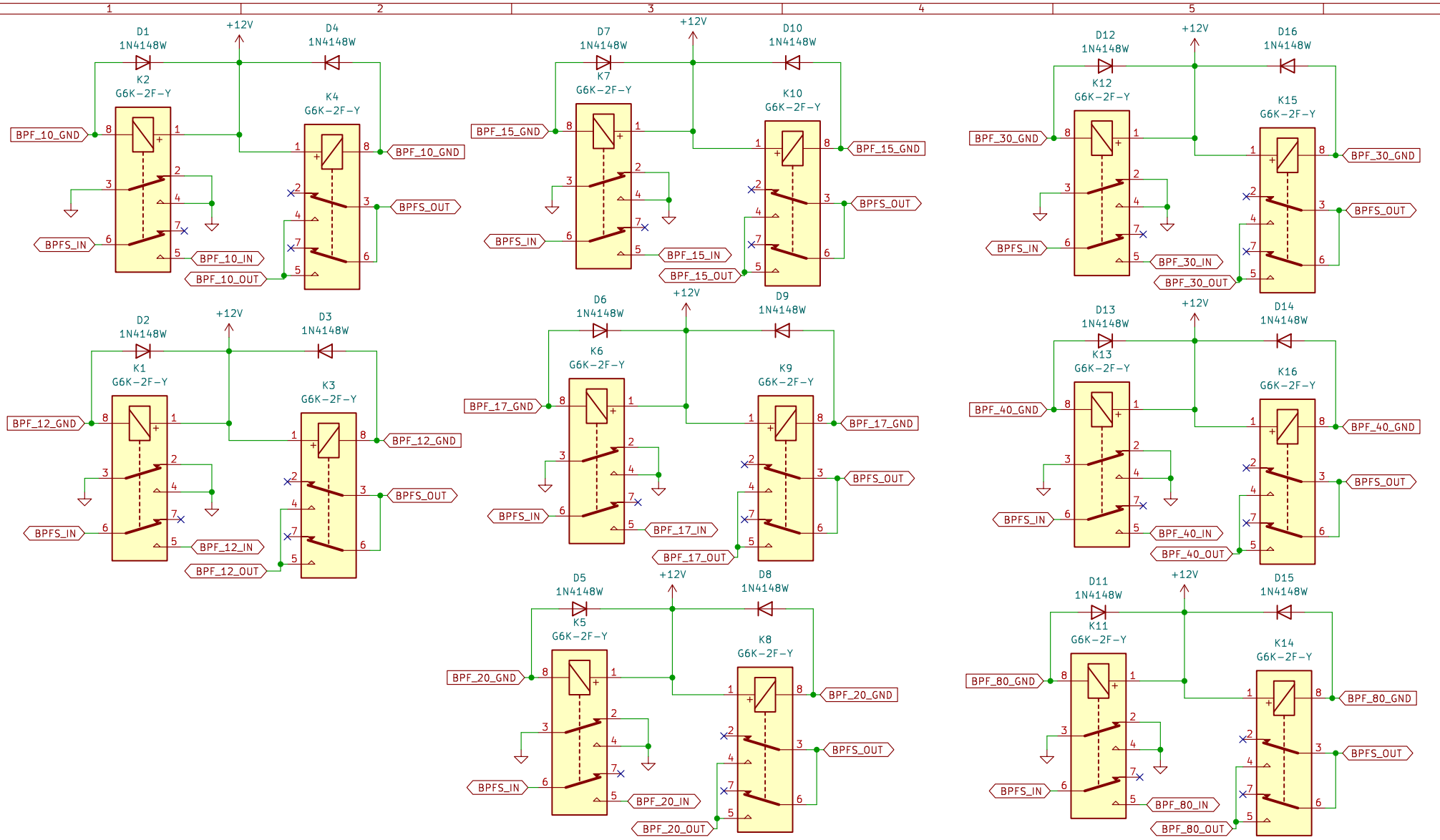

D13
1N4148W
TX_12V
K7
G6K-2F-Y
J7
"RXTX"
(to BPFs)
RX->
<-TX
see /TX Common/
TX_COMMON_OUT
RF_AMP_BYPASS
RF_AMP_BYPASS
K8
G6K-2F-Y
D14
1N4148W
RF_AMP_BYPASS_12V
U4
ADE-6
RF
IF
LO
GND
VFO_RX
RX_12V
R48
22
L7
C45
0.1u
C47
0.1u
10T bifilar
@ FT37-43
R45
3.3K
R43
1.3K
C44
0.1u
Q5
MMBT3904
R44
1K
R46
68
C46
0.1u
R47
6
C48
0.1u
R50
36
see /Root/
XFLT_RX_IN
R49
150
R51
150
Buffer: amp + 6 dB attenuator
J8
RF_AMP_BYPASS_12V
RF_AMP_12V
see /Root/
RF_AMP_12V
R42
22
L6
C40
0.1u
C42
0.1u
R39
3.3K
10T bifilar
@ FT37-43
C43
0.1u
C39
0.1u
R37
1.3K
Q4
MMBT3904
R38
1K
R40
68
C41
0.1u
R41
6
Sheet: /RX/
File: rx.kicad_sch
Title: HBR/MK2 RXTX Board
Size: A4
Date: 2024-02-03
Rev: 1.0
KiCad E.D.A. kicad 7.0.11
Id: 3/5


TX_12V
R63
680
R62
2.2K
Q8
MMBT3906
"KEY.DN"
J10
R55
22
Q7
2N7002
C54
2.2u
CW waveform shaping
C49
0.1u
R58
10K
R65
22
C56
0.1u
R68
1.8K
L8
C55
0.1u
SSB_TX_12V
D15
1N4148W
C51
0.1u
K9
G6K-2F-Y
R59
3.3K
10T bifilar
@ FT37-43
"CLK.CW"
J9
R53
330
CW
SSB
C50
0.1u
R56
1.3K
Q6
KT3142A
C53
0.1u
R66
36
see /RX/
TX_COMMON_OUT
R52
51
R54
51
R57
1K
R60
68
C52
0.1u
R64
150
R67
150
R61
6
22 dB attenuator
Anything between 12 dB and 22 dB will work.
Less attenuation will give you more power in CW,
however the power will be not even between the bands.
See also .txDriveStrength in the firmware source code.
Buffer: amp + 6 dB attenuator
U5
ADE-6
see /Root/
XFLT_TX_OUT
RF
IF
LO
GND
VFO_TX
Sheet: /TX Common/
File: tx-common.kicad_sch
Title: HBR/MK2 RXTX Board
Size: A4
Date: 2024-02-03
Rev: 1.0
KiCad E.D.A. kicad 7.0.11
Id: 4/5



Sheet: /TX SSB/		
File: tx-ssb.kicad_sch		
Title: HBR/MK2 RXTX Board		
Size: A4	Date: 2024-02-03	**Rev: 1.0**
KiCad E.D.A. kicad 7.0.11		Id: 5/5

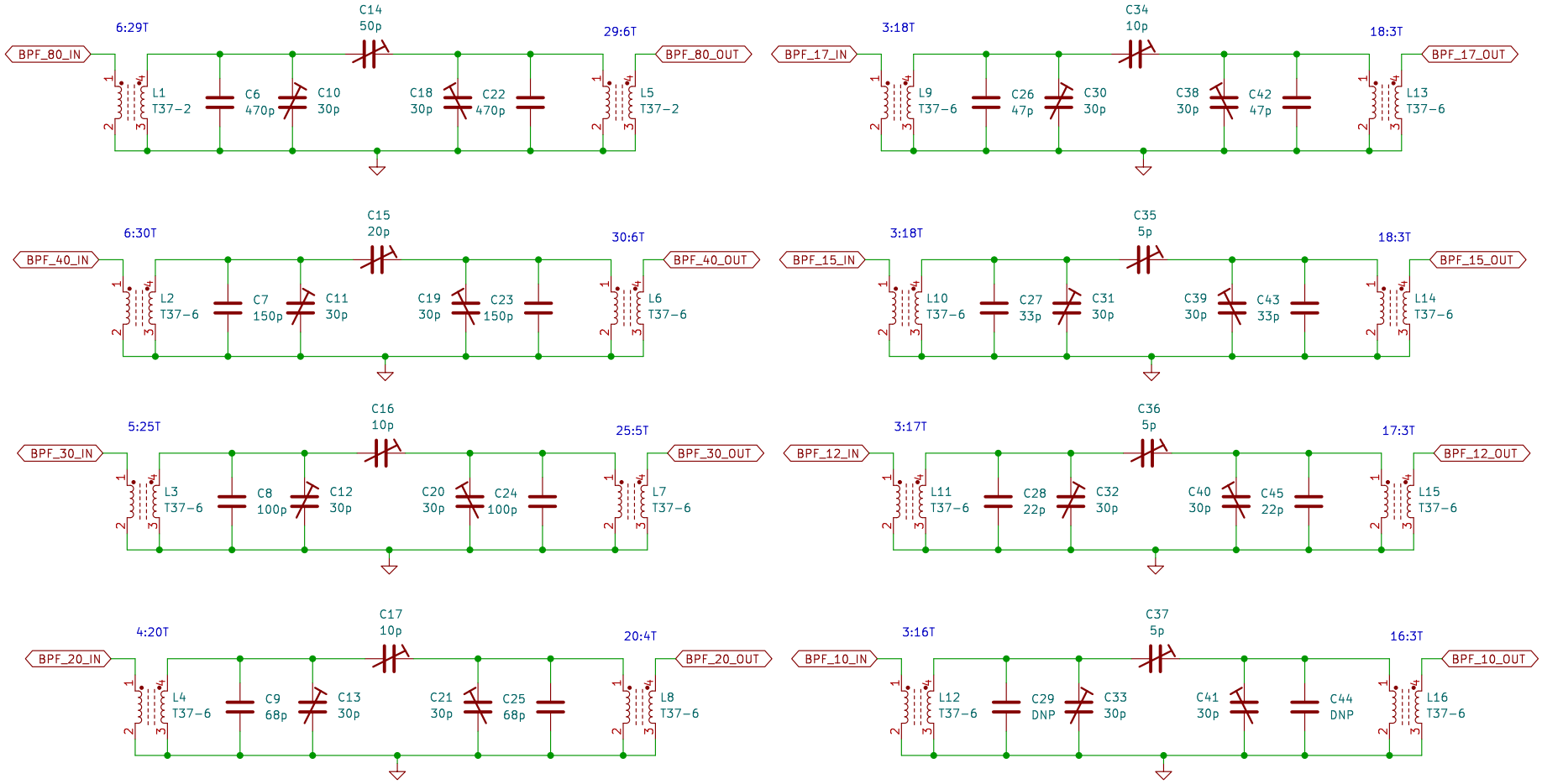

BPF Relays
File: bpf-relays.kicad_sch
BPFs
File: bpfs.kicad_sch
H1
H2
H3
H4
J1
J2
+12V
J3
BPFS_IN
J4
BPFS_OUT
U2
L78L33
VO
VI
GND
C4
0.1u
C5
10u
U1
74HC238
A0
A1
A2
E1
E2
E3
VCC
GND
Y0
Y1
Y2
Y3
Y4
Y5
Y6
Y7
BPF_SEL_A0
BPF_SEL_A1
BPF_SEL_A2
R1
22
R2
22
R3
22
C1
0.1u
C2
0.1u
C3
0.1u
R4
10K
R5
10K
R6
10K
BPF_10_GND
BPF_12_GND
BPF_15_GND
BPF_17_GND
BPF_20_GND
BPF_30_GND
BPF_40_GND
BPF_80_GND
Q1
2N7002
Q2
2N7002
Q3
2N7002
Q4
2N7002
Q5
2N7002
Q6
2N7002
Q7
2N7002
Q8
2N7002
Sheet: /
File: hbr-mk2-bpfs.kicad_sch
Title: HBR/MK2 BPF Board
Size: A4
Date: 2024-02-03
Rev: 1.0
KiCad E.D.A. kicad 7.0.11
Id: 1/3



Sheet: /BPF Relays/
File: bpf-relays.kicad_sch

Title: HBR/MK2 BPF Board

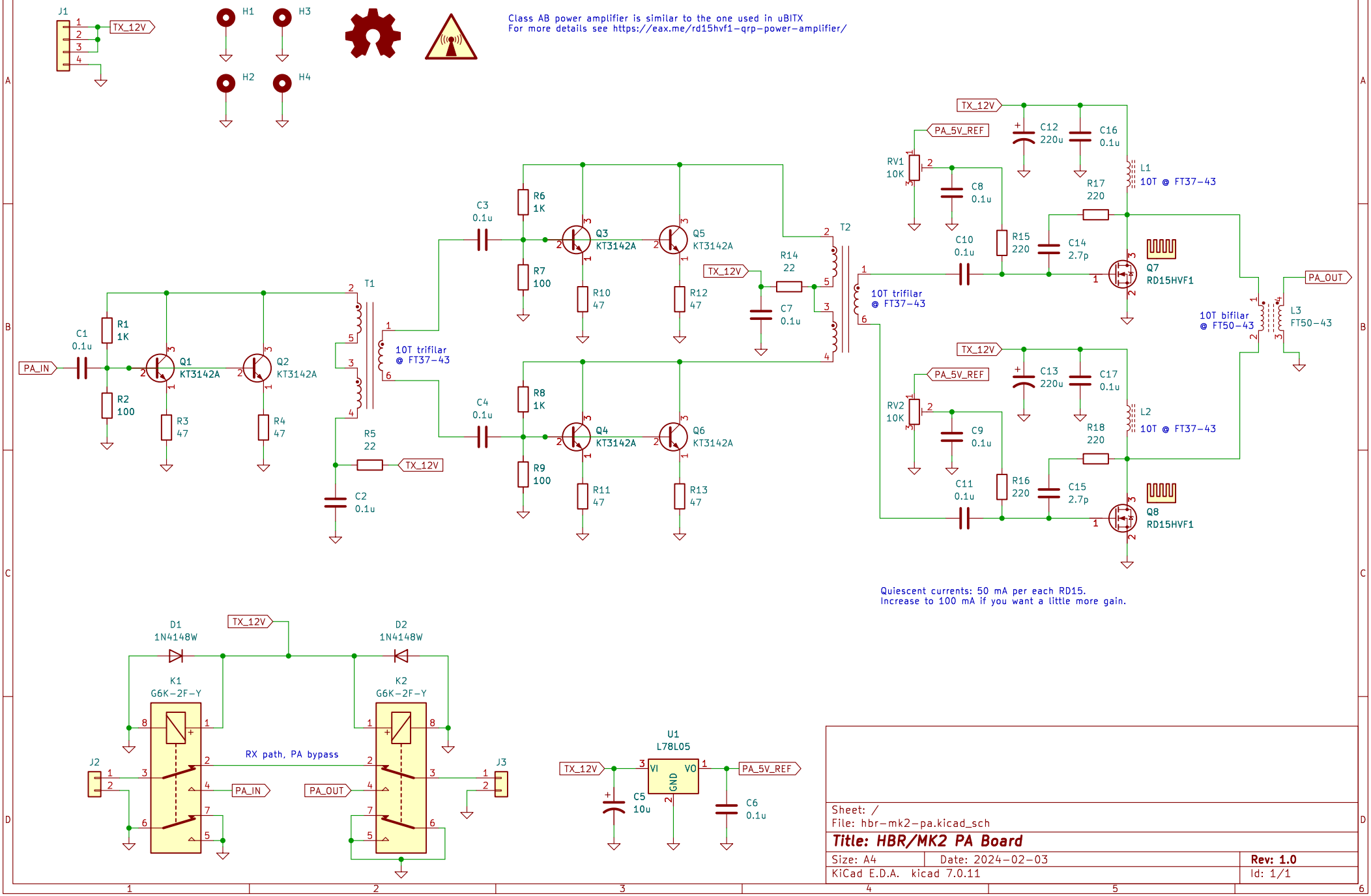
Size: A4	Date: 2024-02-03	**Rev: 1.0**
KiCad E.D.A. kicad 7.0.11		Id: 2/3



Sheet: /BPFs/
File: bpfs.kicad_sch

Title: HBR/MK2 BPF Board

Size: A4	Date: 2024-02-03	**Rev: 1.0**
KiCad E.D.A. kicad 7.0.11		Id: 3/3


J1
TX_12V
H1
H2
H3
H4
Class AB power amplifier is similar to the one used in uBITX
For more details see https://eax.me/rd15hvf1-qrp-power-amplifier/
PA_IN
C1
0.1u
R1
1K
R2
100
R3
47
R4
47
Q1
KT3142A
Q2
KT3142A
T1
10T trifilar
@ FT37-43
R5
22
C2
0.1u
C3
0.1u
C4
0.1u
R6
1K
R7
100
R8
1K
R9
100
Q3
KT3142A
Q5
KT3142A
Q4
KT3142A
Q6
KT3142A
R10
47
R11
47
R12
47
R13
47
R14
22
C7
0.1u
T2
10T trifilar
@ FT37-43
PA_5V_REF
RV1
10K
RV2
10K
C8
0.1u
C9
0.1u
C10
0.1u
C11
0.1u
C12
220u
C13
220u
C16
0.1u
C17
0.1u
R15
220
R16
220
R17
220
R18
220
C14
2.7p
C15
2.7p
L1
10T @ FT37-43
L2
10T @ FT37-43
Q7
RD15HVF1
Q8
RD15HVF1
10T bifilar
@ FT50-43
L3
FT50-43
PA_OUT
Quiescent currents: 50 mA per each RD15.
Increase to 100 mA if you want a little more gain.
D1
1N4148W
D2
1N4148W
K1
G6K-2F-Y
K2
G6K-2F-Y
RX path, PA bypass
J2
J3
U1
L78L05
VI
GND
VO
C5
10u
C6
0.1u
Sheet: /
File: hbr-mk2-pa.kicad_sch
Title: HBR/MK2 PA Board
Size: A4
Date: 2024-02-03
Rev: 1.0
KiCad E.D.A. kicad 7.0.11
Id: 1/1

LPFs

File: lpfs.kicad_sch

H1 H2 H3 H4

J1
PWR_REF
PWR_FWD

J2
LPFS_OUT

<– Hint: solder a 22p capacitor here if you encounter UHF oscillations during transmit (it looks like high current consumption when nothing is tranmitted). Don't worry, this will not affect the sensitivity.

J3
LPF_SEL_10_12
LPF_SEL_15_17
LPF_SEL_20_30
LPF_SEL_40
LPF_SEL_80

J4
+12V

Tandem match / Stockton bridge @ BN61-202
Primary windings: RG-174 coax cables
Secondary windings: 6T enameled copper wire

see /LPFs/
LPFS_IN
ANT
J6 J7 J8 J9 J10
L18 6T
L19 6T
J5

PWR_REF
R13 220
L16 1 mH
D11 1N34 / D311 (*)
R11 510
C41 0.01u
R15 100
R17 100

PWR_FWD
R14 220
L17 1 mH
D12 1N34 / D311 (*)
R12 510
C42 0.01u
R16 100
R18 100

(*) Matched pair

LPF_SEL_10_12
R3 22
R10 10K
C5 0.1u
Q5 2N7002
LPF_10_12_GND

LPF_SEL_15_17
R1 22
R6 10K
C1 0.1u
Q1 2N7002
LPF_15_17_GND

LPF_SEL_20_30
R5 22
R7 10K
C2 0.1u
Q2 2N7002
LPF_20_30_GND

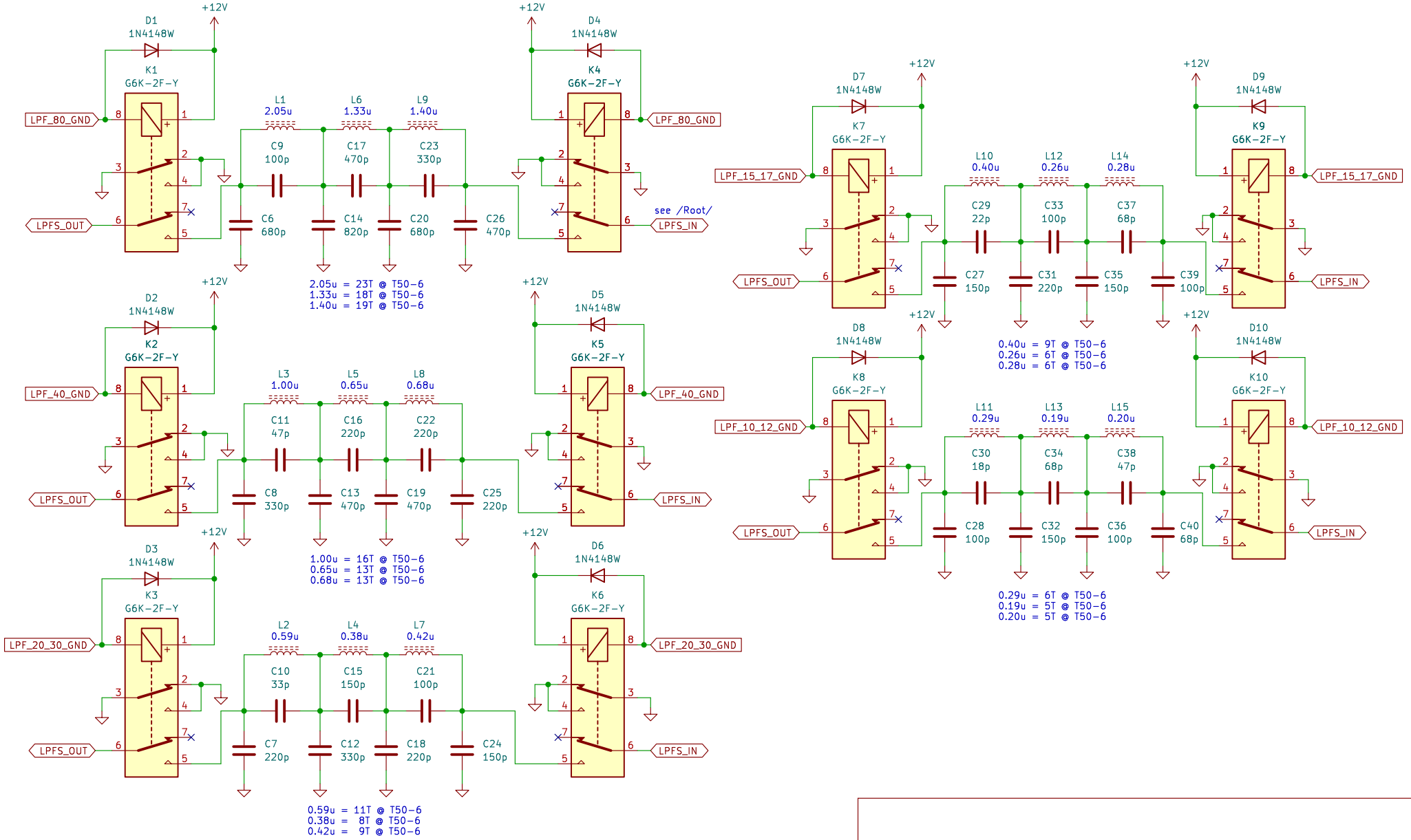
LPF_SEL_40
R4 22
R8 10K
C3 0.1u
Q3 2N7002
LPF_40_GND

LPF_SEL_80
R2 22
R9 10K
C4 0.1u
Q4 2N7002
LPF_80_GND

Sheet: /
File: hbr-mk2-lpfs.kicad_sch

Title: HBR/MK2 LPF Board

Size: A4	Date: 2024-02-03	**Rev: 1.0**
KiCad E.D.A. kicad 7.0.11		Id: 1/2



Sheet: /LPFs/		
File: lpfs.kicad_sch		
Title: HBR/MK2 LPF Board		
Size: A4	Date: 2024-02-03	**Rev: 1.0**
KiCad E.D.A. kicad 7.0.11		Id: 2/2