TACNPR project

Tatu OH2EAT, Lasse OH3HZB & Tommi OH1GJV & SCOMS team
Special thanks to: Mikko OH2FLO & Vili OH5GE

Major changes since revA:
- revA: first release
- revB: integrated Ethernet
- revC: enhanced RF performance
- revD: Powerpole connector

SUBSHEETS (revision D):

cpu

MCU, SRAM, SERIAL

File: cpu-sheet.kicad_sch

radio

Si4463 & RF switching

File: radio-sheet.kicad_sch

RF-PA

RF LNA & PA

File: RF-PA-sheet.kicad_sch

tacbucks

DC/DC converters

File: tacbuck-sheet.kicad_sch

linear-regs

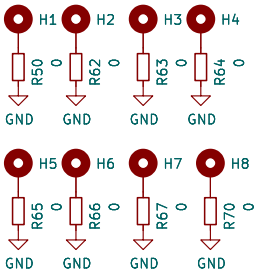
3V3 lin.reg. & terminals

File: linreg-sheet.kicad_sch

ethernet

W5500 Ethernet

File: ethernet-sheet.kicad_sch



TACNPR project

OH1GJV, OH2EAT, OH2FLO, OH3HZB, OH5GE

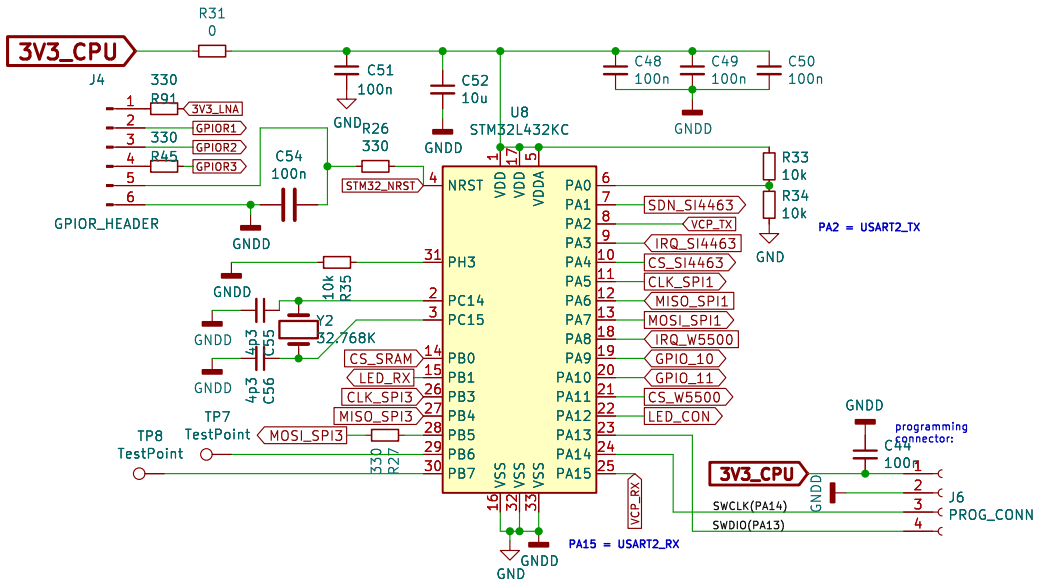
Sheet: /
File: TACNPR.kicad_sch

Title: TACNPR

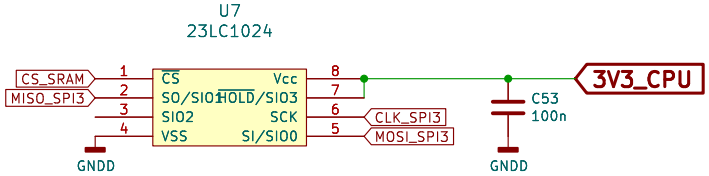
Size: A4 | Date: 2021-03-22 | Rev: D

KiCad E.D.A. 8.0.6 | Id: 1/7

MCU: STM32L432KC (256 kB Flash)

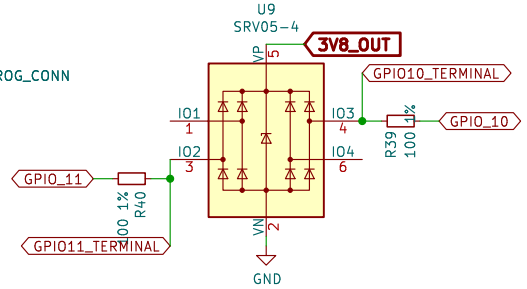


SRAM (23LC1024, 1Mbit)

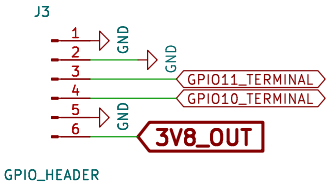


CONN LEDs

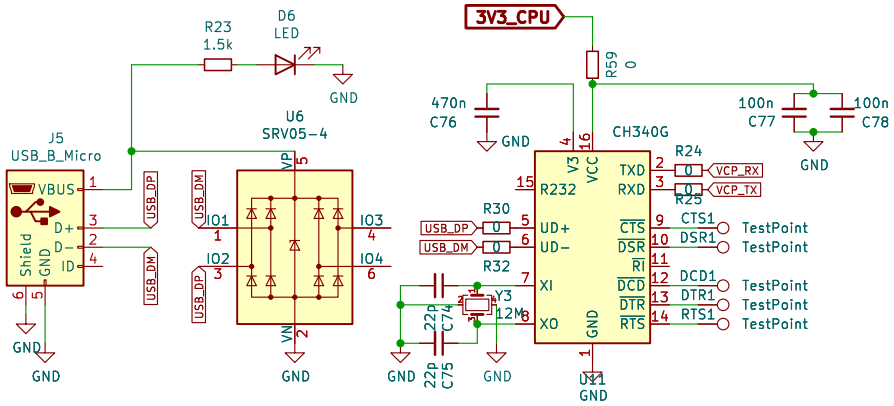
GPIO ESD protection



GPIO header



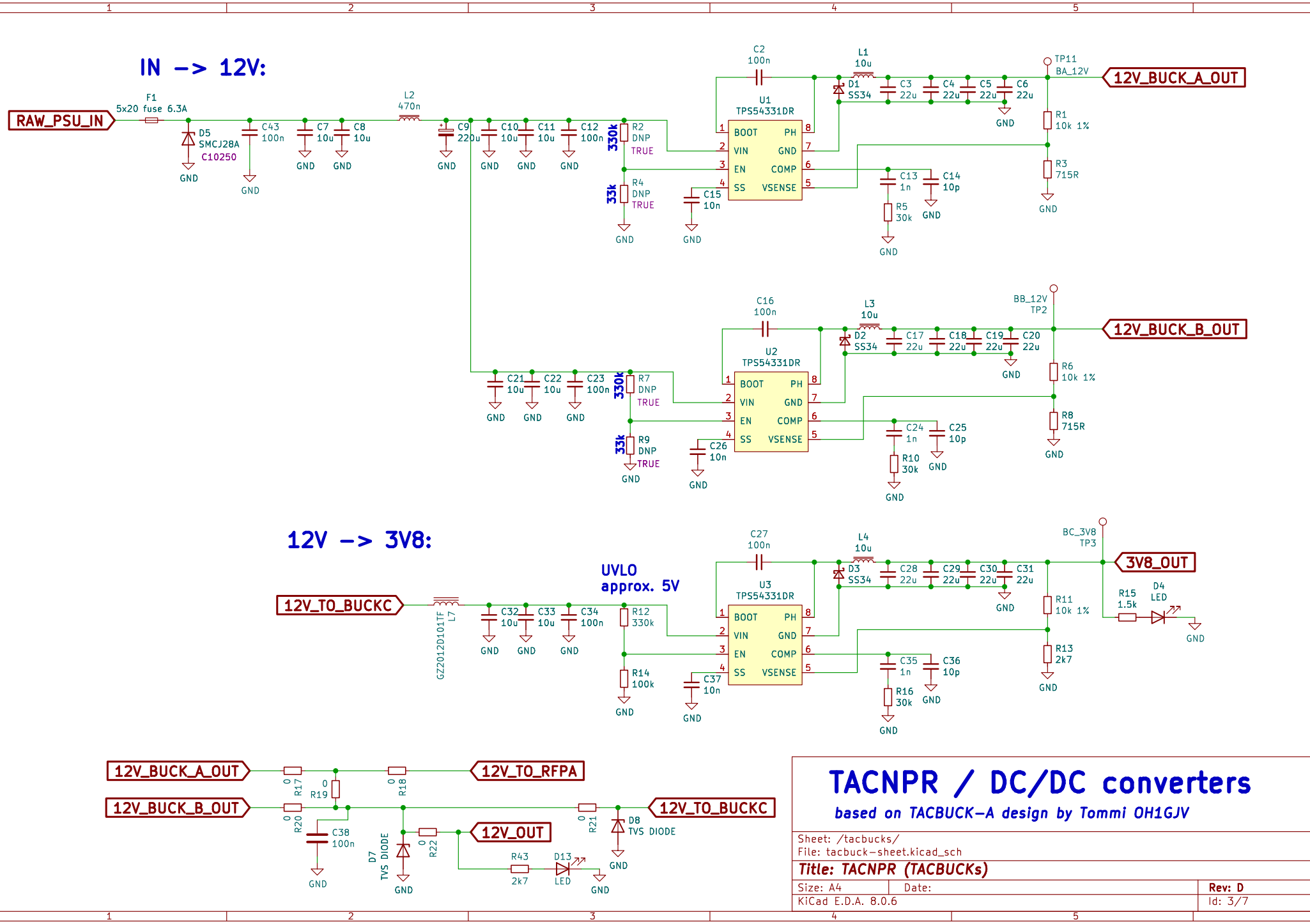
USB ESD PROTECTION & CH340G SERIAL

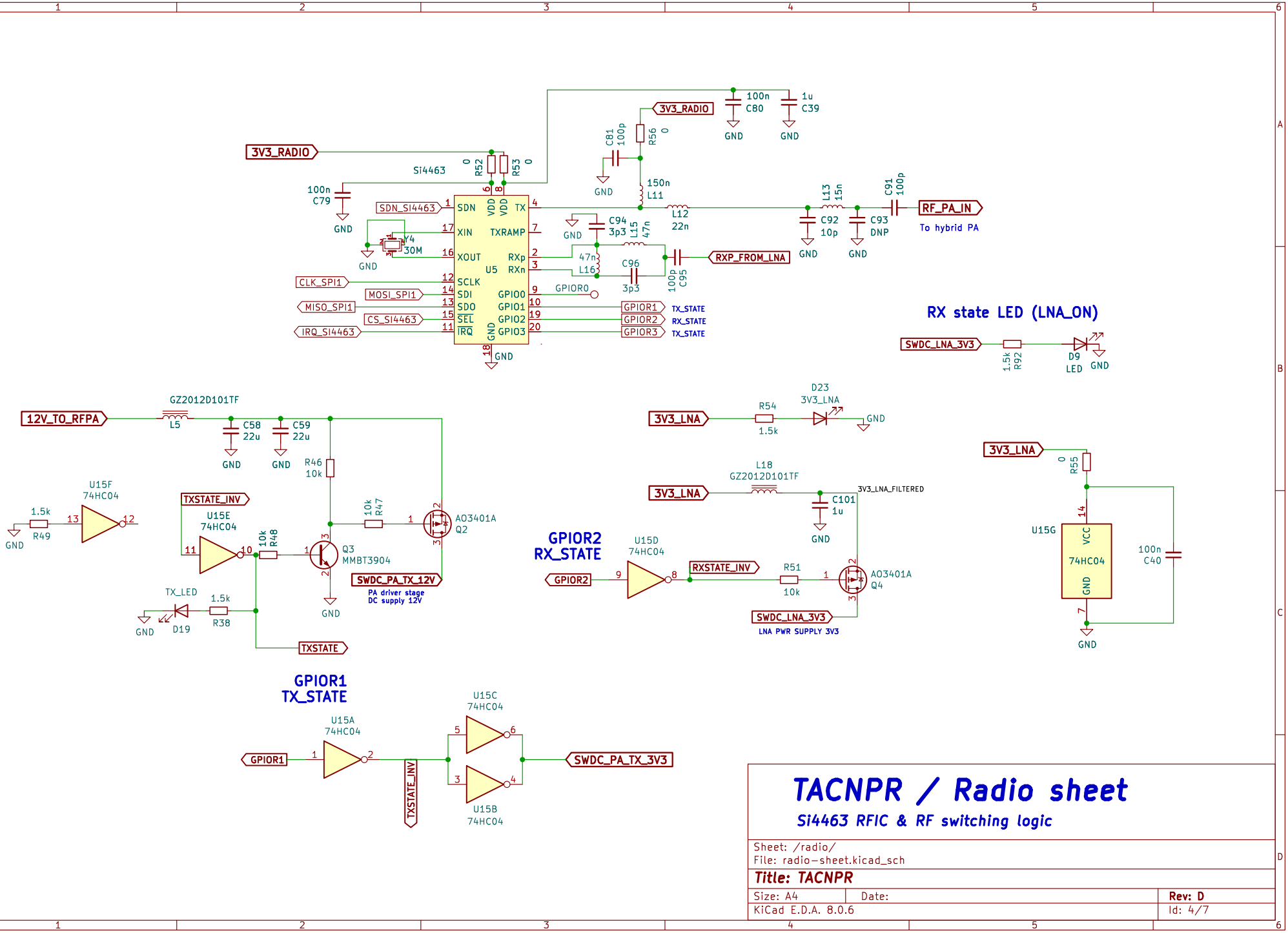


TACNPR / CPU sheet

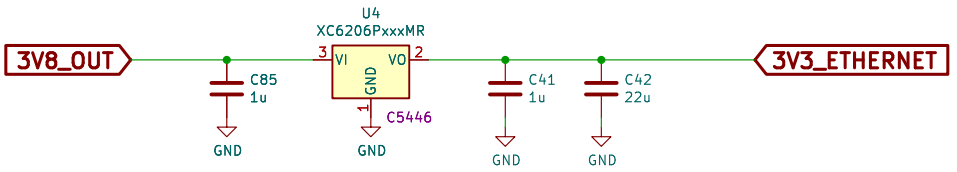
(CPU, SRAM, GPIO, ETHERNET, USB SERIAL)

Sheet: /cpu/		
File: cpu-sheet.kicad_sch		
Title: TACNPR (CPU sheet)		
Size: A4	Date:	**Rev: D**
KiCad E.D.A. 8.0.6		Id: 2/7

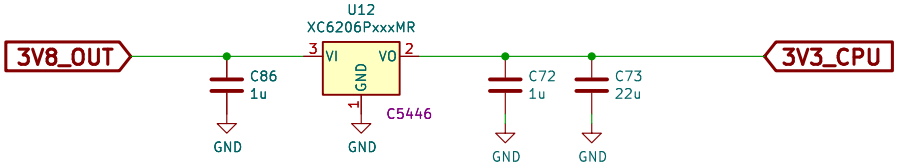

IN -> 12V:
RAW_PSU_IN
F1
5x20 fuse 6.3A
D5
SMCJ28A
C10250
C43
100n
C7
10u
C8
10u
L2
470n
C9
220u
C10
10u
C11
10u
C12
100n
R2
DNP
TRUE
330k
R4
DNP
TRUE
33k
C15
10n
U1
TPS54331DR
BOOT
PH
VIN
GND
EN
COMP
SS
VSENSE
C2
100n
L1
10u
D1
SS34
C3
22u
C4
22u
C5
22u
C6
22u
TP11
BA_12V
12V_BUCK_A_OUT
R1
10k 1%
R3
715R
C13
1n
C14
10p
R5
30k
C16
100n
L3
10u
D2
SS34
C17
22u
C18
22u
C19
22u
C20
22u
BB_12V
TP2
12V_BUCK_B_OUT
R6
10k 1%
R8
715R
C21
10u
C22
10u
C23
100n
R7
DNP
TRUE
330k
R9
DNP
TRUE
33k
C26
10n
U2
TPS54331DR
C24
1n
C25
10p
R10
30k
12V -> 3V8:
UVLO
approx. 5V
12V_TO_BUCKC
GZ2012D101TF
L7
C32
10u
C33
10u
C34
100n
R12
330k
R14
100k
C37
10n
U3
TPS54331DR
C27
100n
L4
10u
D3
SS34
C28
22u
C29
22u
C30
22u
C31
22u
BC_3V8
TP3
3V8_OUT
R15
1.5k
D4
LED
R11
10k 1%
R13
2k7
C35
1n
C36
10p
R16
30k
12V_BUCK_A_OUT
12V_BUCK_B_OUT
R17
0
R19
0
R20
0
C38
100n
R18
0
12V_TO_RFPA
12V_TO_BUCKC
R21
0
D8
TVS DIODE
D7
TVS DIODE
R22
0
12V_OUT
R43
2k7
D13
LED
GND
TACNPR / DC/DC converters
based on TACBUCK-A design by Tommi OH1GJV
Sheet: /tacbucks/
File: tacbuck-sheet.kicad_sch
Title: TACNPR (TACBUCKs)
Size: A4
Date:
Rev: D
KiCad E.D.A. 8.0.6
Id: 3/7


3V3_RADIO
Si4463
SDN_SI4463
CLK_SPI1
MOSI_SPI1
MISO_SPI1
CS_SI4463
IRQ_SI4463
SDN
XIN
XOUT
SCLK
SDI
SDO
SEL
IRQ
VDD
TX
TXRAMP
RXp
RXn
GPIO0
GPIO1
GPIO2
GPIO3
U5
GPIOR0
GPIOR1
GPIOR2
GPIOR3
TX_STATE
RX_STATE
RXP_FROM_LNA
RF_PA_IN
To hybrid PA
RX state LED (LNA_ON)
SWDC_LNA_3V3
D9
LED
12V_TO_RFPA
GZ2012D101TF
L5
TXSTATE_INV
SWDC_PA_TX_12V
PA driver stage
DC supply 12V
TX_LED
D19
TXSTATE
3V3_LNA
D23
3V3_LNA
3V3_LNA_FILTERED
L18
GZ2012D101TF
GPIOR2
RX_STATE
RXSTATE_INV
SWDC_LNA_3V3
LNA PWR SUPPLY 3V3
GPIOR1
TX_STATE
SWDC_PA_TX_3V3
TXSTATE_INV
TACNPR / Radio sheet
Si4463 RFIC & RF switching logic
Sheet: /radio/
File: radio-sheet.kicad_sch
Title: TACNPR
Size: A4
Date:
Rev: D
KiCad E.D.A. 8.0.6
Id: 4/7

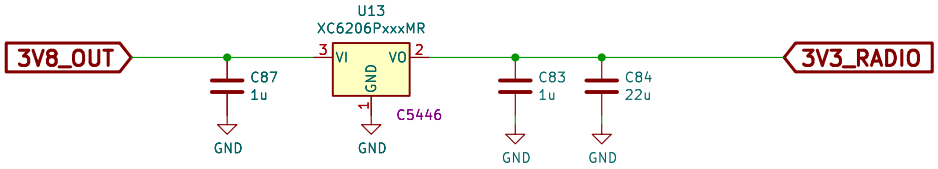
3V3 for Ethernet transceiver



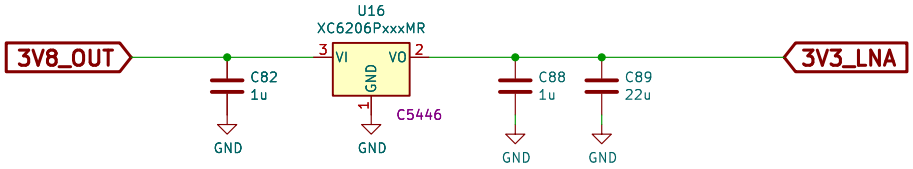
3V3 for STM32 CPU



3V3 for Si4463 radio chip

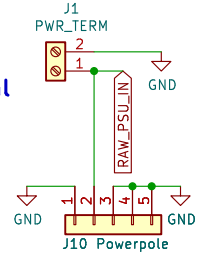


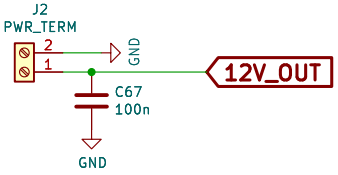
3V3 for LNA



Screw terminals (power in and 12V DC out)

DC power can be fed either using screw terminal or Anderson Powerpole connector (7,9mm pitch)





Powerpole strain relief options:
1) solder a wire around it into GND pads 3 and 4
2) use the mounting hole (machine screw and nut)

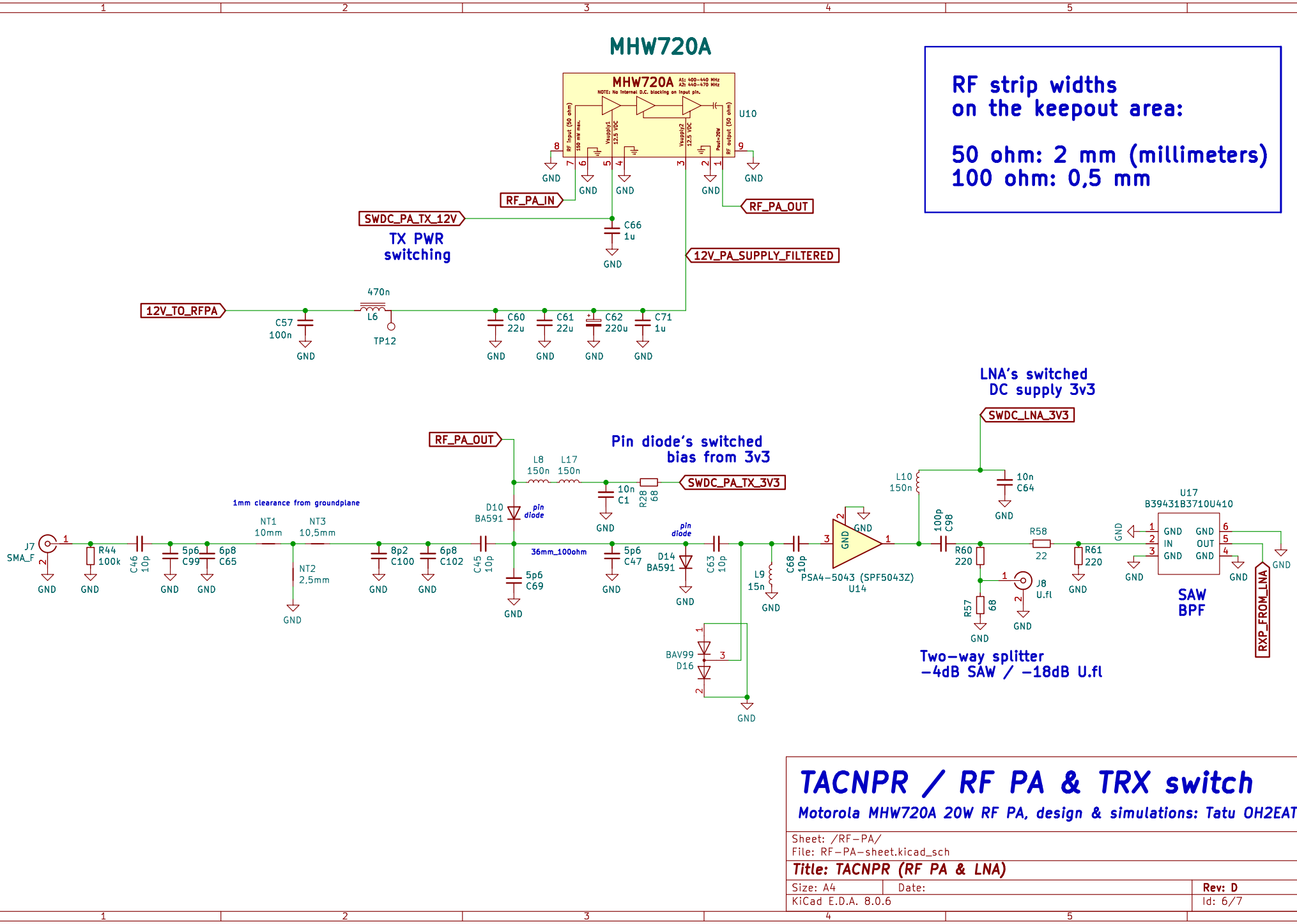
TACNPR / regulators & terminals

3V8 -> 3V3 LDO linear regulators & screw terminals

Sheet: /linear-regs/
File: linreg-sheet.kicad_sch

Title: TACNPR (linear regulators)

Size: A4	Date:	**Rev: D**
KiCad E.D.A. 8.0.6		Id: 5/7

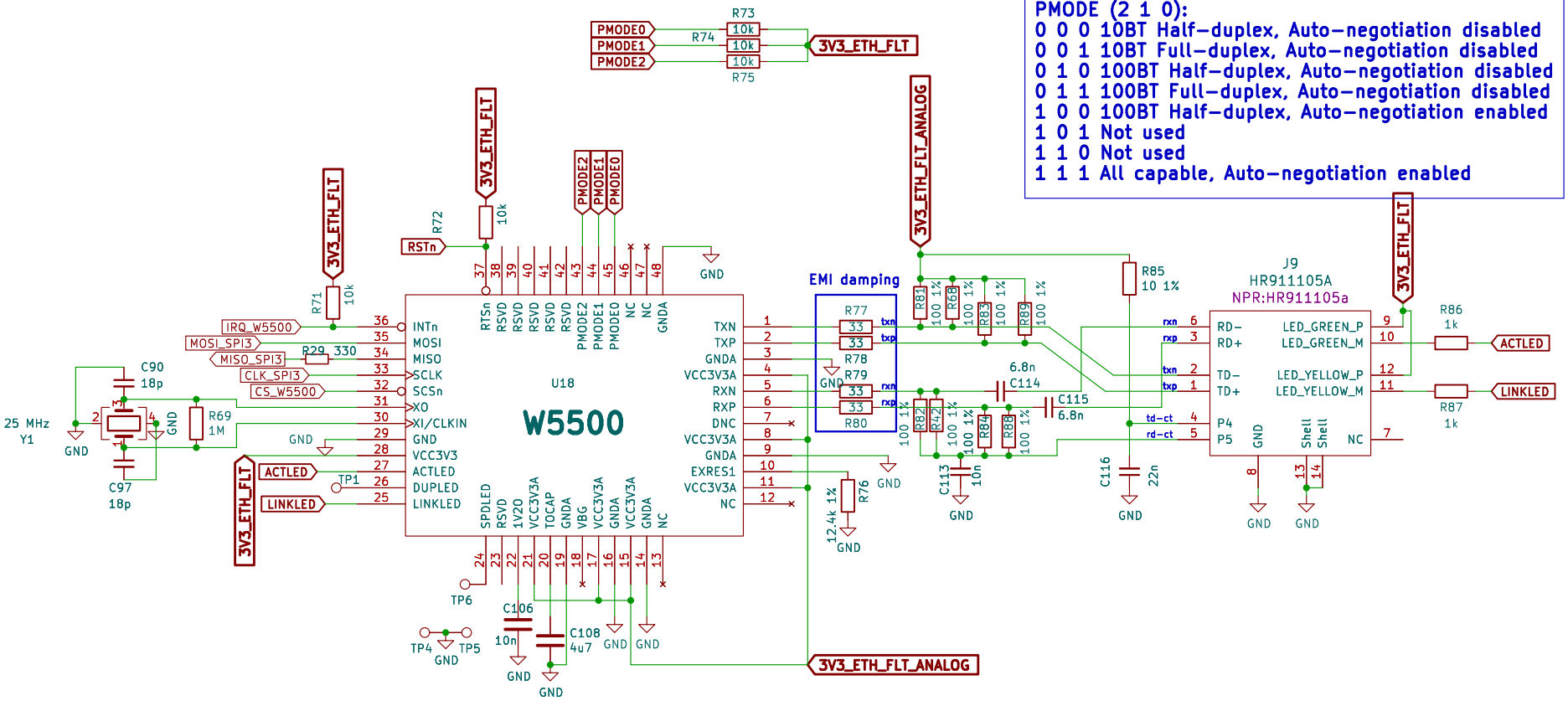


TACNPR / RF PA & TRX switch

Motorola MHW720A 20W RF PA, design & simulations: Tatu OH2EAT

Sheet: /RF-PA/	
File: RF-PA-sheet.kicad_sch	
Title: TACNPR (RF PA & LNA)	
Size: A4	Date:
KiCad E.D.A. 8.0.6	Id: 6/7

Rev: D



W5500 reference schematic:
https://docs.wiznet.io/Product/iEthernet/W5500/ref-schematic
W5500 Ref.Schematic – RJ45 with Transformer

See also the HR911105A datasheet.
On page 1 (REV A/2): "Connect CHS GND to PCB ground".
The connector is equipped with an internal 1nF 2kV CAP (P8).

Reviewed by OH2EAT 2023
Drawn by OH3HZB 2022-2023
Scoms

TACNPR Ethernet

Sheet: /ethernet/
File: ethernet-sheet.kicad_sch

Title: TACNPR (Ethernet)

Size: A4	Date:	**Rev: D**
KiCad E.D.A. 8.0.6		Id: 7/7