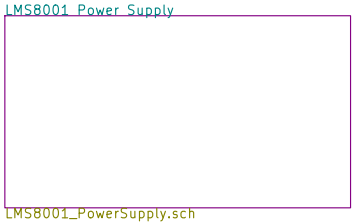
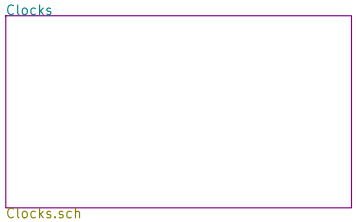
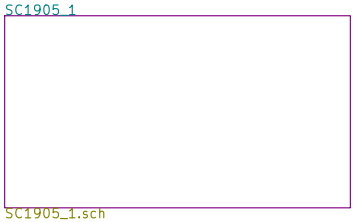
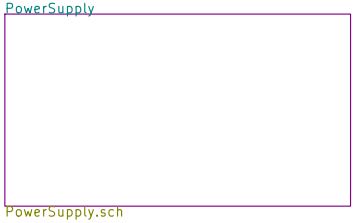
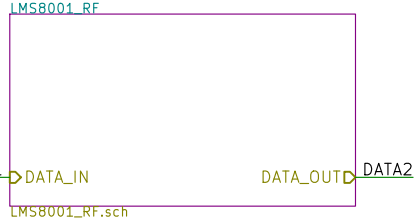
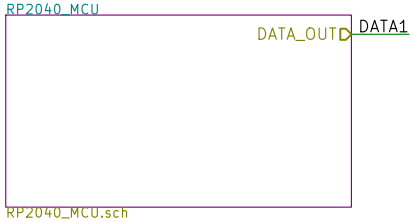


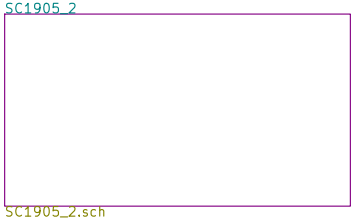










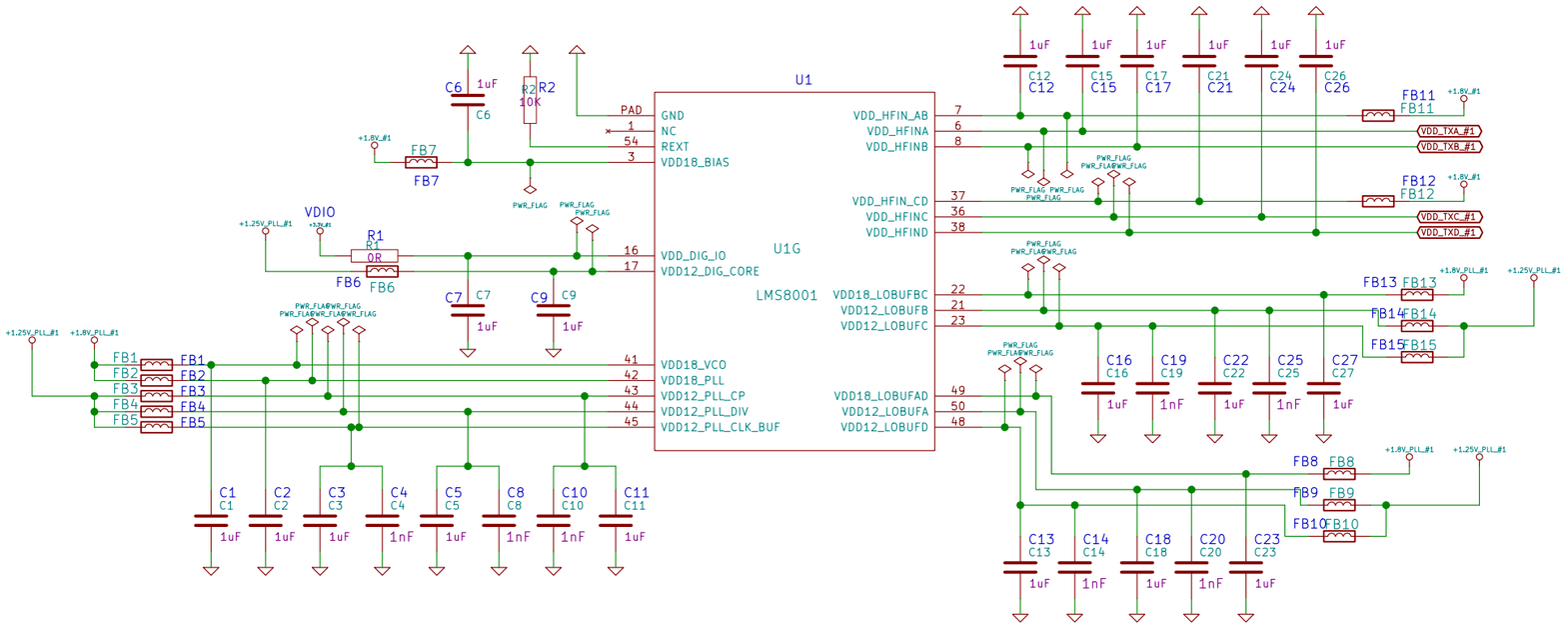


Lime Microsystems

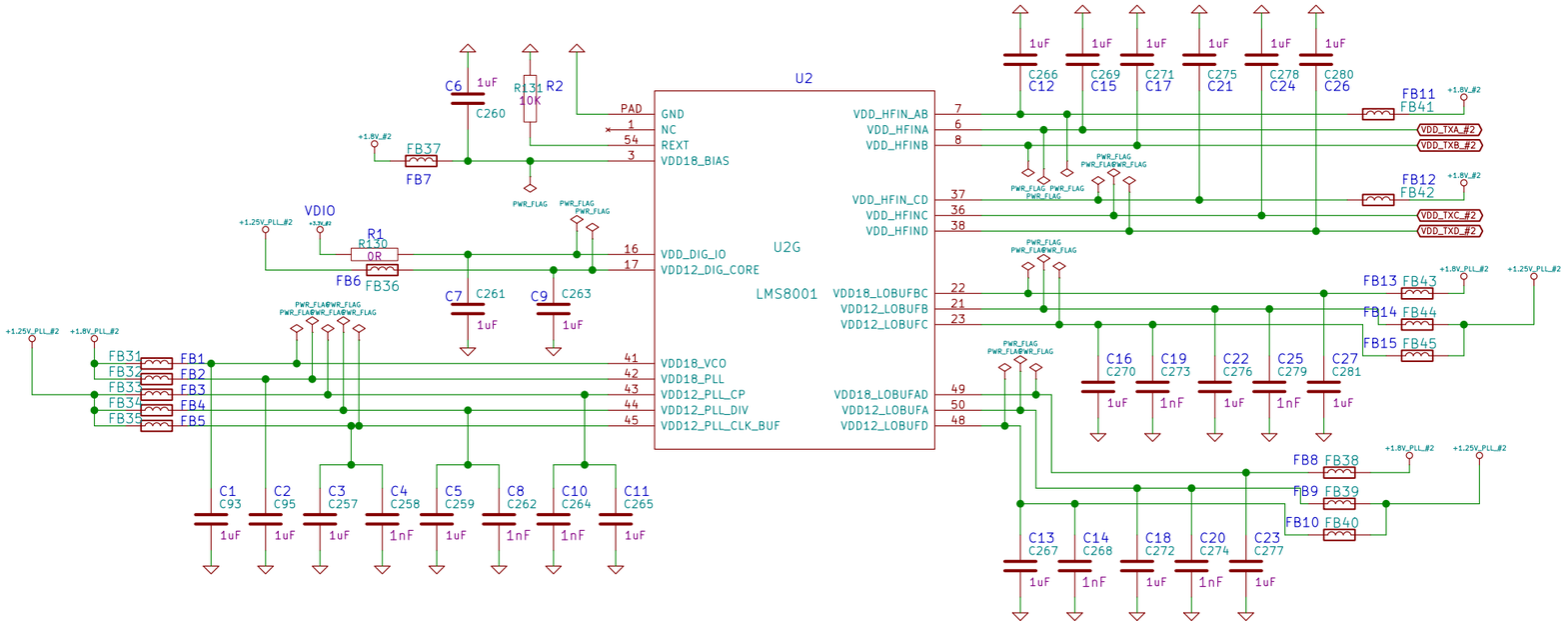
Sheet: /
File: FrontEnd_5G.sch

Title: FrontEnd_5G

Size: A4	Date: 10 Feb 2022	**Rev: 1v0**
KiCad E.D.A.	kicad 4.0.7-e2-637658ubuntu16.04.1	Id: 1/20



LMS8001 #1



LMS8001 #2

Lime Microsystems		
Sheet: /LMS8001 Power Supply/		
File: LMS8001_PowerSupply.sch		
Title: FrontEnd_5G		
Size: A3	Date: 10 Feb 2022	**Rev: 1v0**
KiCad E.D.A. kicad 4.0.7-e2-637658ubuntu16.04.1		Id: 2/20

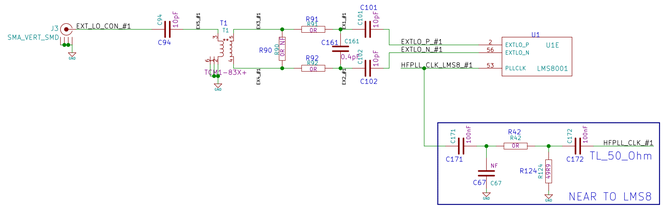
Lime Microsystems

Sheet: /PowerSupply/
File: PowerSupply.sch

Title: FrontEnd_5G

Size: A1	Date: 10 Feb 2022	**Rev: 1v0**
KiCad E.D.A. kicad 4.0.7-e2-6376~58ubuntu16.04.1		Id: 3/20

LMS8001 #1



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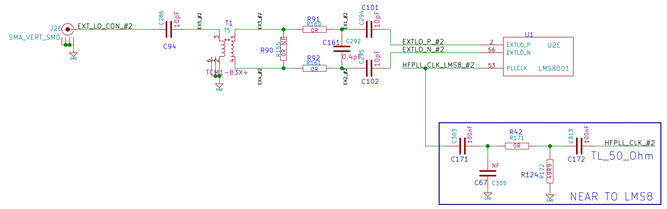

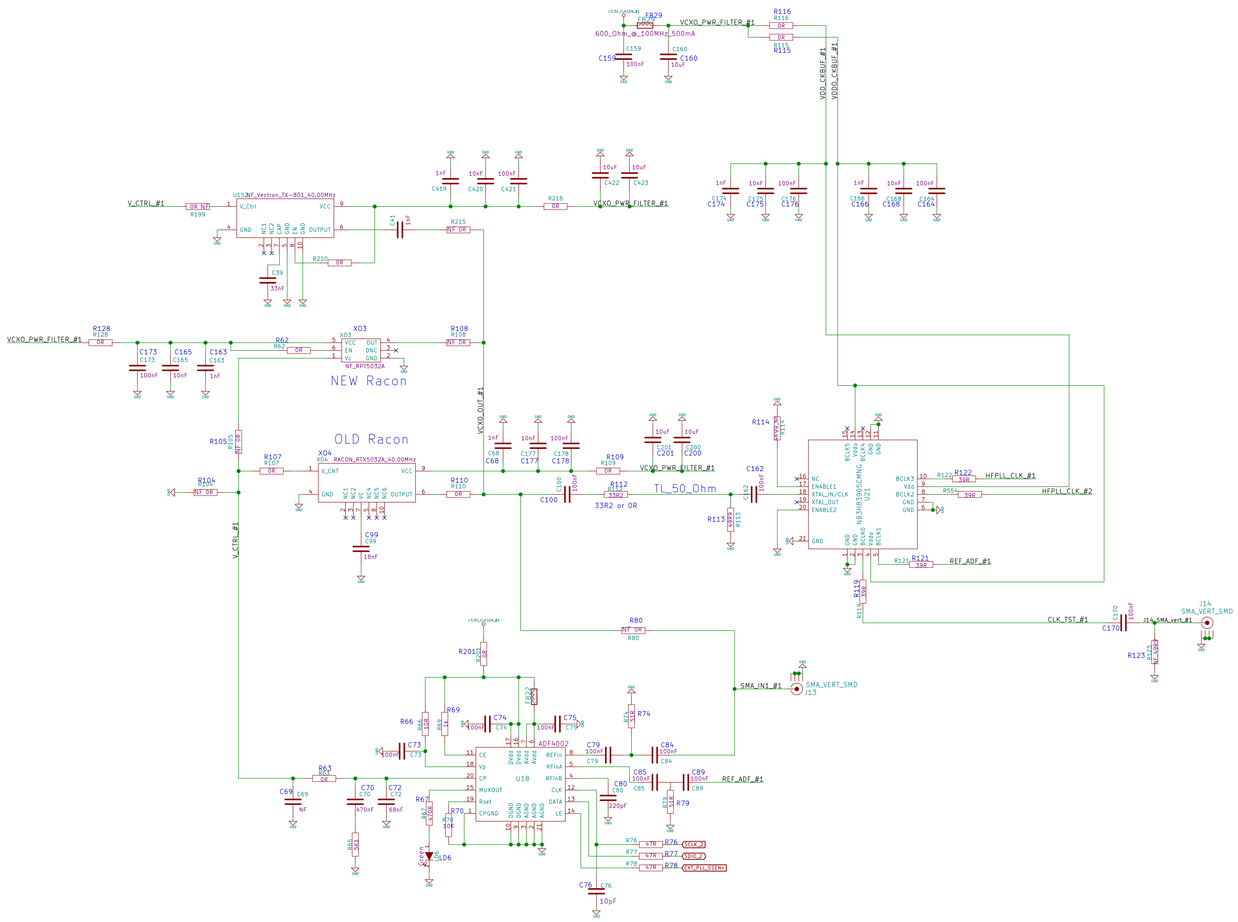

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Lime Microsystems
Sheet: /Clocks/
File: Clocks.sch

Title: FrontEnd_5G

Size: A1	Date: 10 Feb 2022	Rev: 1v0
KiCad E.D.A. kicad 4.0.7-e2-6376058~ubuntu16.04.1		Id: 4/20

DAISY CHAIN IN OUT SIGNALS

DATA_IN

DATA_OUT

U108 SN74HC595QPWRQ1

SD_AMP1_3V3

BP_AMP2_3V3

SD_AMP2_3V3

BP_AMP1_3V3

DATA_OUT_RSTn

DATA_OUT_EN

DATA_OUT_SER_CLK

DATA_OUT_RSTn

LMS8001 #1

VDDTX_#1

BPF 1580 to 2200 MHz
IL = 2 dB

5400BL15B050

TX_IF

IF_IN_C_#1

Unbalanced

Balanced

LMS8001

U1C

TX_RF

RF_OUT_C_#1

NOT USED
UP CONVERSION

IF_IN_A_#1

UMC_SMD

RF_OUT_A_#1

ORX_RF

RF_IN_D_#1

IF_OUT_D_#1

BPF 1580 to 2200 MHz
IL = 2 dB

RX_RF

RF_IN_B_#1

BPF 1805-2025 MHz
IL = 1.8 dB

RX_IF

IF_OUT_B_#1

50 Ohm TL

IF_TX1

BPF 1805-2025 MHz
IL = 1.8 dB

OP1dB = 16 dBm
OIP3dB = 25 dBm
Gain = 17 dB

AMP1

BP_AMP1_3V3

SD_AMP1_3V3

close together

SC1905

SC1905_IN_#1

SC1905_OUT_#1

PAT1220-C-3DB-T5

NF_PAT1220-C-10DB-T5

NF_PAT1220-C-6DB-T5

TX_IF

IF_IN_C_#1

ORX_IF

IF_OUT_D_#1

SC1905_FB_#1

BPF 1580 to 2200 MHz
IL = 2 dB

IF_ORX1

RX_IF

IF_OUT_B_#1

BPF 1805-2025 MHz
IL = 1.8 dB

IF_RX1

LMS8001 #2

VDDTX_#2

BPF 1580 to 2200 MHz
IL = 2 dB

5400BL15B050

TX_IF

IF_IN_C_#2

Unbalanced

Balanced

LMS8001

U2C

TX_RF

RF_OUT_C_#2

NOT USED
DOWN CONVERSION

IF_IN_A_#2

UMC_SMD

RF_OUT_A_#2

OTX_RF

RF_IN_D_#2

IF_OUT_D_#2

BPF 1580 to 2200 MHz
IL = 2 dB

RX_RF

RF_IN_B_#2

BPF 1805-2025 MHz
IL = 1.8 dB

RX_IF

IF_OUT_B_#2

50 Ohm TL

IF_TX2

BPF 1805-2025 MHz
IL = 1.8 dB

OP1dB = 16 dBm
OIP3dB = 25 dBm
Gain = 17 dB

AMP2

BP_AMP2_3V3

SD_AMP2_3V3

close together

SC1905

SC1905_IN_#2

SC1905_OUT_#2

PAT1220-C-3DB-T5

NF_PAT1220-C-10DB-T5

NF_PAT1220-C-6DB-T5

TX_IF

IF_IN_C_#2

OTX_IF

IF_OUT_D_#2

SC1905_FB_#2

BPF 1580 to 2200 MHz
IL = 2 dB

IF_ORX2

RX_IF

IF_OUT_B_#2

BPF 1805-2025 MHz
IL = 1.8 dB

IF_RX2

Lime Microsystems

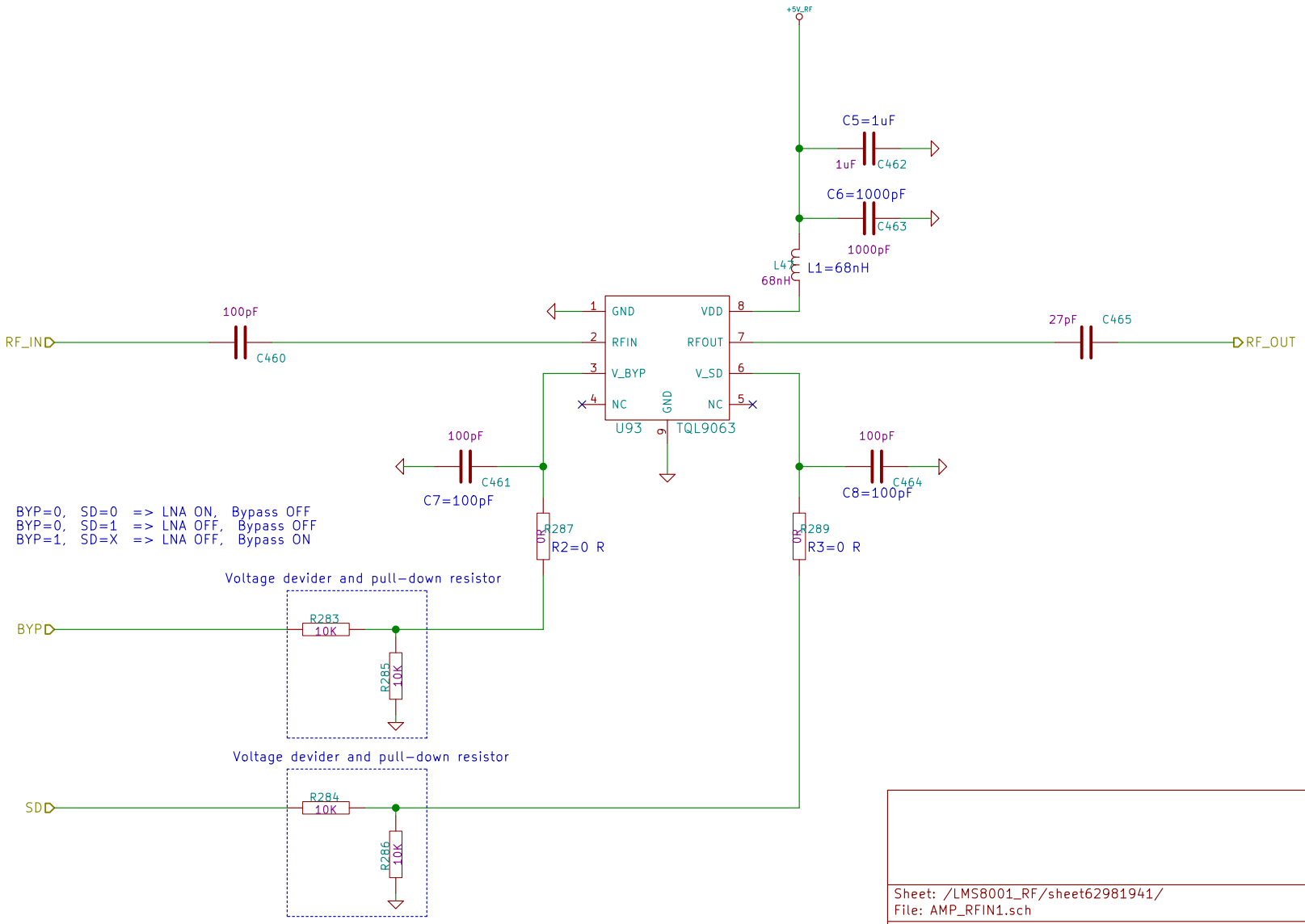
Sheet: /LMS8001_RF/

File: LMS8001_RF.sch

Title: FrontEnd_5G

Size: A1 | Date: 10 Feb 2022 | Rev: 1v0

KiCad E.D.A. kicad 4.0.7-e2-6376588ubuntu16.04.1 | Id: 5/20



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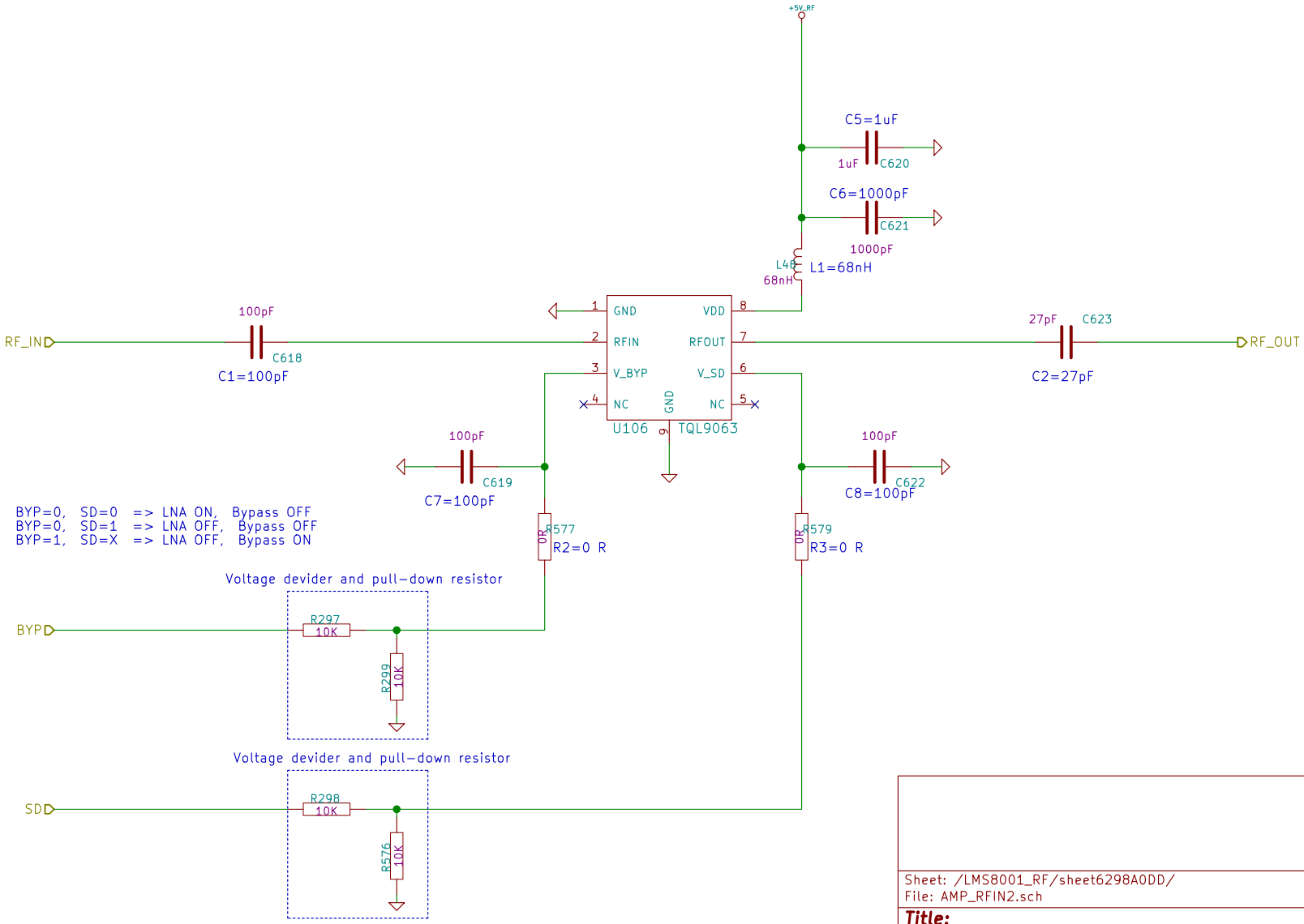
File: AMP_RFIN1.sch

Title:

Size: A4	Date:	**Rev:**
KiCad E.D.A. kicad 4.0.7-e2-637658ubuntu16.04.1		Id: 6/20



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File: AMP_RFIN2.sch

Title:

Size: A4	Date:	**Rev:**
KiCad E.D.A. kicad 4.0.7-e2-637658ubuntu16.04.1		Id: 7/20

TVS_protection

USB_CONN

RESET

Free MCU pins to out connector

I2C connector for front panel communication

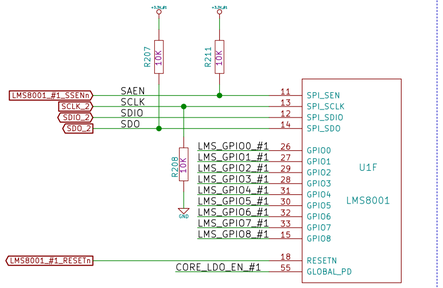
SPI_1 connector from 5G board

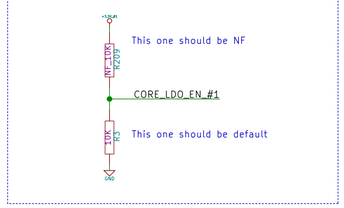
SPI_SOFT CON

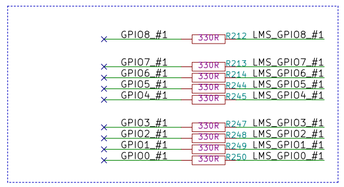
Daisy Chain

SDIO signal to MISO and MOSI

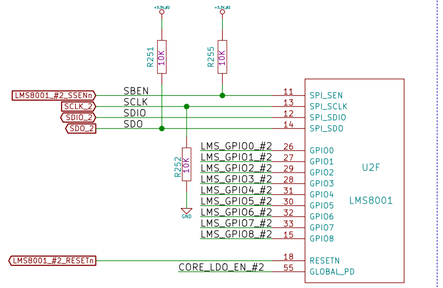
LMS8001 #1

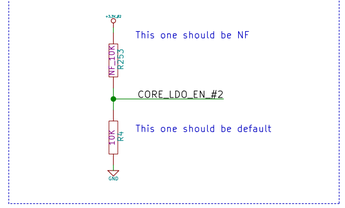


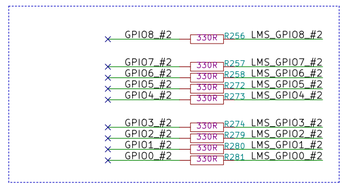




LMS8001 #2







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Title:

Size: A2	Date:	**Rev:**
KiCad E.D.A. kicad 4.0.7-e2-637658ubuntu16.04.1		Id: 9/20

Sheet: /SC1905_1/
File: SC1905_1.sch
Title:
Size: A1 Date:
KiCad E.D.A. kicad 4.0.7-e2-6376~58~ubuntu16.04.1
Rev:
Id: 10/20

Buffers for MGPOUT 0-3
Not Fitted

U128 NF_LMV5224DRG4

U9

C531 NF_10pF · C536 NF_10pF · C532 NF_10pF · C538 NF_10pF · C35 NF_10pF · C34 NF_1nF · C39 NF_10pF · C37 NF_10pF

R51 R418 NF_10K · R54 R419 NF_10K · R53 R420 NF_10K · R57 R421 NF_10K · R58 R422 NF_10K · R49 R423 NF_10K

R437 R52 NF_10K · R438 R55 NF_10K · R439 R56 NF_10K · R440 R60 NF_10K · R441 R59 NF_10K · R442 R50 NF_10K

VG3 · VG2 · VG1 · VG0 · MGPO1(P38) · MGPO2(P37) · MGPO1(P35) · MGPO0(P34)

+3.3V_SC1905_#2

Master Board → EVK1900 board

Master Board	EVK1900 board	
STATO(P16)	STATO	CONNECTED TO Q4
RESETN(P25)	RESETN	
SSN(P24)	SSN	
SDI(P18)	SDI	
SDO(P26)	SDO	
SCLK(P23)	SCLK	
WDTENB(P22)	WDTENB	CONNECTED TO R494
LOADENB(P27)	LOADENB	
DGPIN1(P17)		NOT CONNECTED!
DGPIN0(P15)		NOT CONNECTED!

RESETN · R487 NF_10K · SW1 SW_PUSH

R10 4K99 · R8 430R · D2 SML-LX1414IC · D1 SML-LX1406 · Q3 2N7002 · STATO

RFOUT(P40) · C48 NF_10pF · C534 · U124 BDCN-7-25+ DC2 · R10 0R NF · R8 R428 obrisan

R102 0R NF · R9 0R NF · U120 XCL13-2-2025 · Optional RF Thru Path without Delay Line

R17 0R NF · R11 0R NF

Thru Path Attenuator: R432 0R NF · R13 · R14 0R NF R432 · R433 0R NF · R15

R16 470R R5 · DC1 · U127 · ovo se ne slaze sa gerberima!

Gerber:
Pin1 -> RFIN (P2)
Pin2 -> RFIN att
Pin3 -> GND
Pin4 -> GND
Pin5 -> R16
Pin6 -> Thru Path Att

Sch:
Pin1 -> Thru Path Att
Pin2 -> R16
Pin3 -> GND
Pin4 -> GND
Pin5 -> RFIN att
Pin6 -> RFIN (P2)

RFIN(P2) · C47 NF_10pF · C536

RFOUT Attenuator: R26 0R NF R443 · R27 0R NF · R448 0R NF · R25

RFIN Attenuator: R24 NF_0R R445 · R22 0R NF R446 · R21 0R NF R443 · R23 0R NF R435

T1 BD1722J50100AHF · C28 C541 15pF · C18 C544 0.9pF · L5 L22 1.2nH · L6 L23 1.2nH · L4 L24 · C37 C545 2.2uF · C9 C547 1nF · C6 C546 1nF

MGPO0(P34) · MGPO1(P35) · MGPO2(P37) · MGPO3(P38) · 0R NF R453 · 0R NF R454 · 0R NF R455 · 0R NF R456

L2 L66 5.6nH · L1 L67 5.6nH · L3 · C11 C542 0.2pF · FT3 L65 · C26 C540 470R · C31 C543 1nF · C537 NF_10pF

R12 12K7 NF_0R1 · R12 must have 1% tolerance and 100ppm/C temperature coefficient!

C33 C549 1nF

U131 SC1905

DVDD18 · MGPOUT0 · MGPOUT1 · AVDD18 · AVDD33 · GND · GND · RFOUTP · RFOUTN · GND · AVDD18 · AVDD18 · MGPOUT2 · MGPOUT3 · GND · BGRES

DVDD18 · AVDD18 · XTALO · XTALI · FLTCAP3N · FLTCAP3P · AVDD18 · AVDD18 · FLTCAP2N · FLTCAP2P · FLTCAP1N · FLTCAP1P · AVDD18 · AVDD18 · FLTCAP0N · FLTCAP0P

AVDD33 · GND · RFBP · RFBN · AVDD18 · AVDD33 · ADCINP · ADCINN · ADCINP · ADCINN · GND · RFFP · RFFN · GND

DGPIN0(P15) · LOADENB(P27) · STATO(P16) · DGPIN1(P17) · SDO(P26) · SCLK(P23) · SDI(P18) · SSN(P24) · WDTENB(P22) · RESETN(P25)

ADCIN0P(P6) · ADCIN0N(P7) · ADCIN1P(P9) · ADCIN1N(P10)

C3 C550 1nF · R1 R435 4K99 · R64 NF_0R · R2 NF_0R · C563 1nF · C29 1nF · C30 2.2uF · C568 · FT1 120R

C560 C8 1nF · C571 10pF · X2 · Y1 20MHz · C572 10pF · C15 NF_10pF · EXTCLKIN(P20) · C574

C13 C554 1nF · C26 C555 1nF · C27 C556 1nF · C32 C557 1nF · C562 1nF · C564 2.2uF · C30 C565 · FT2 L76 120R

C34 C551 1nF · C35 C552 1nF · C20 C561 0.5pF · L8 L72 2.2nH · L9 L73 2.2nH · L7 L74 8.2nH

T3 BD1722J50100AHF · C36 C567 15pF · C45 NF_10pF · C573 · RFFB(P12) · U135

U130 T2 BD1722J50100AHF

External Connections with SC1905

Direct Connection to MCU

- RFOUT(P40) — SC1905_OUT_#2 — RF Connections
- RFIN(P2) — SC1905_IN_#2
- RFFB(P12) — SC1905_FB_#2
- RESETN — SC1905_#2_RESETn — Chip Reset
- SCLK — SCLK_2 — SPI Connections
- SDO — MISO_2
- SDI — MOSI_2
- SSN — SC1905_#2_SSENn
- LOADENB — SC1905_#2_LOADENB — EEPROM update

Temperature Sensor
Not Fitted

R451 NF_10K ADCIN0N(P7) · R44 · R452 NF_0R R40 ADCIN0P(P6)

R424 NF_0R · NF_TMP36GRTZ-REEL7 · U6 U126 · TEMP_SENS · SHDWN · GND · VOUT · VS · NC

NF_1uF C528 · NF_2.2uF C529 · NF_1nF C530 · NF_1nF C536 · R436 NF_10K · R46 · R47 NF_100K R31 · R65 NF_10K R449 · Q2 NF_MMBT3904

Power Detector
Not Fitted

ADCIN1P(P9) · R459 0R NF · J49 SMA_vert_SMD

20dB Attenuator: R458 NF_249R · NF_470R R438 · NF_470R R442 · NF_604R R437 · NF_5903 R436

NF_47nF C553 · NF_47nF C558 · NF_47nF C559

C582 NF_1nF · ADCIN1N(P10)

NF_100nF C565 · NF_100nF C569 · NF_100nF C566 · NF_100nF C570

IC2 NF_AD5513 · VPOS · INHI · INLO · VGET · COMM · TADJ · CLPF · NC

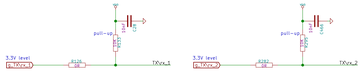
Vadj = +0.84V · R457 4K99 · R503 NF_10K

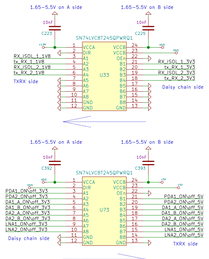
EXTCLKIN(P20) · R502 0R NF · J50 SMA_vert_SMD · R501 NF_10K

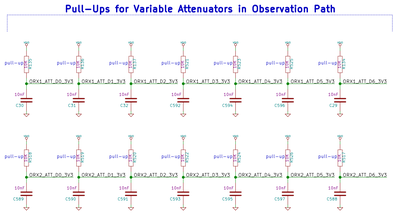
Sheet: /SC1905_2/
File: SC1905_2.sch

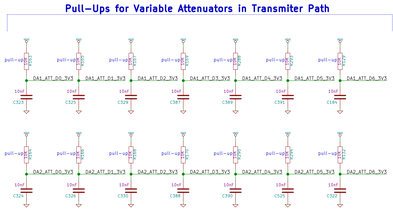
Title:

Size: A1 | Date: | Rev:
KiCad E.D.A. kicad 4.0.7-e2-6376~ubuntu16.04.1 | Id: 11/20

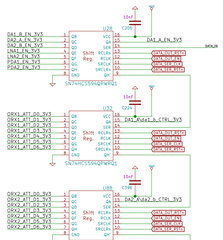

3.3V level
TxVx_1
R126
0R
pull-up
10nF
C126
TxVx_1
3.3V level
TxVx_2
R220
0R
pull-up
10nF
C240
TxVx_2


1.65~5.5V on A side
1.65~5.5V on B side
SN74LVC8T245QPWRQ1
U33
RX_ISOL_1_1V8
Tx_RX_1_1V8
RX_ISOL_2_1V8
Tx_RX_2_1V8
TxRX side
Daisy chain side
RX_ISOL_1_3V3
Tx_RX_1_3V3
RX_ISOL_2_3V3
Tx_RX_2_3V3
PDA1_ONoff_3V3
PDA2_ONoff_3V3
DA1_A_ONoff_3V3
DA1_B_ONoff_3V3
DA2_A_ONoff_3V3
DA2_B_ONoff_3V3
LNA1_ONoff_3V3
LNA2_ONoff_3V3
Daisy chain side
TxRX side


Pull-Ups for Variable Attenuators in Observation Path
ORX1_ATT_D0_3V3
ORX1_ATT_D1_3V3
ORX1_ATT_D2_3V3
ORX1_ATT_D3_3V3
ORX1_ATT_D4_3V3
ORX1_ATT_D5_3V3
ORX1_ATT_D6_3V3
ORX2_ATT_D0_3V3
ORX2_ATT_D1_3V3
ORX2_ATT_D2_3V3
ORX2_ATT_D3_3V3
ORX2_ATT_D4_3V3
ORX2_ATT_D5_3V3
ORX2_ATT_D6_3V3


Pull-Ups for Variable Attenuators in Transmiter Path
DA1_ATT_D0_3V3
DA1_ATT_D1_3V3
DA1_ATT_D2_3V3
DA1_ATT_D3_3V3
DA1_ATT_D4_3V3
DA1_ATT_D5_3V3
DA1_ATT_D6_3V3
DA2_ATT_D0_3V3
DA2_ATT_D1_3V3
DA2_ATT_D2_3V3
DA2_ATT_D3_3V3
DA2_ATT_D4_3V3
DA2_ATT_D5_3V3
DA2_ATT_D6_3V3


DAISY CHAIN IN OUT SIGNALS
DATA_IN
DATA_OUT
SHIFT_IN
SHIFT_OUT


DA1_B_EN_3V3
DA1_A_EN_3V3
LNA1_EN_3V3
LNA2_EN_3V3
PDA1_EN_3V3
PDA2_EN_3V3
SN74HC595QPWRQ1
U28
U32
U55
U72
DA1_A_EN_3V3
DA1_B_EN_3V3
LNA1_EN_3V3
LNA2_EN_3V3
PDA1_EN_3V3
PDA2_EN_3V3
SHIFT_IN
SHIFT_OUT
ORX1_ATT_D0_3V3
ORX1_ATT_D1_3V3
ORX1_ATT_D2_3V3
ORX1_ATT_D3_3V3
ORX1_ATT_D4_3V3
ORX1_ATT_D5_3V3
ORX1_ATT_D6_3V3
DA1_ATT_D0_3V3
DA1_ATT_D1_3V3
DA1_ATT_D2_3V3
DA1_ATT_D3_3V3
DA1_ATT_D4_3V3
DA1_ATT_D5_3V3
DA1_ATT_D6_3V3
DA2_ATT_D0_3V3
DA2_ATT_D1_3V3
DA2_ATT_D2_3V3
DA2_ATT_D3_3V3
DA2_ATT_D4_3V3
DA2_ATT_D5_3V3
DA2_ATT_D6_3V3
SHIFT_OUT

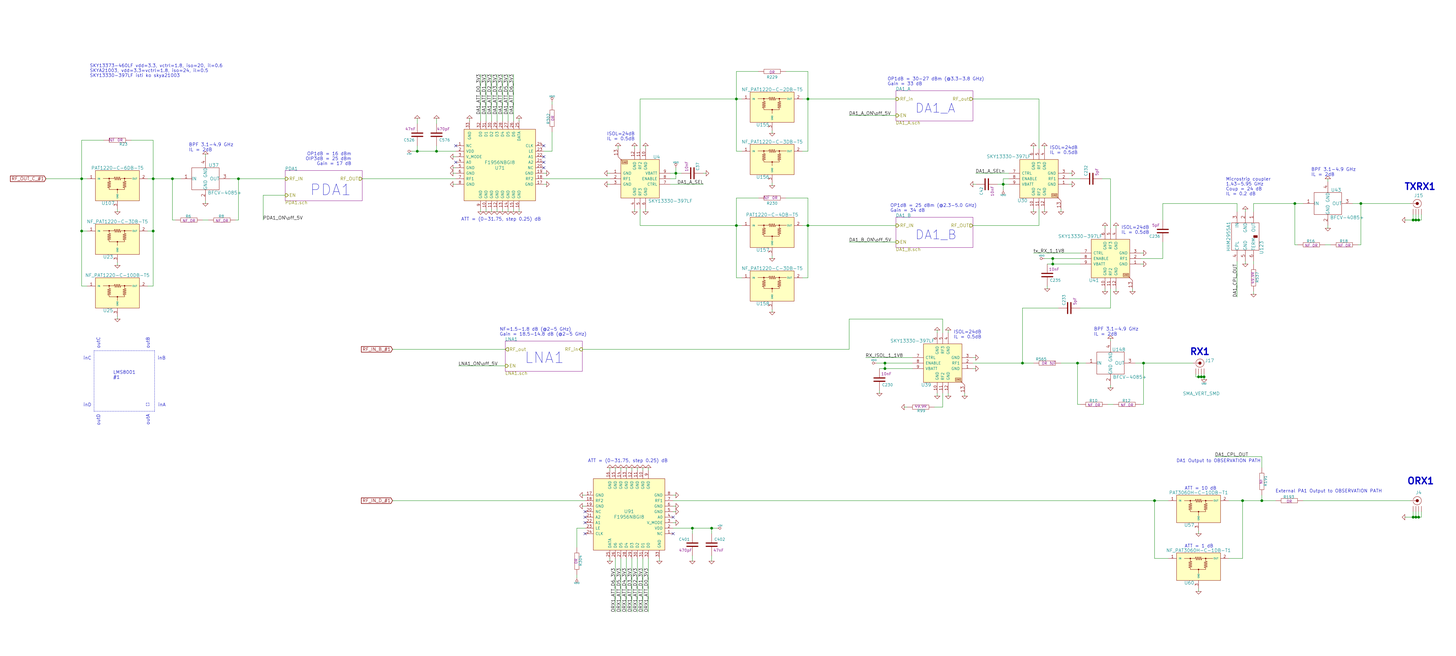
TDD SWITCHES control
SN74LV1T04
U34
U110
U36
U111
TxVx_1
TxVx_2
Tx_RX_1_3V3
Tx_RX_2_3V3
s_RX_ISOL_1_3V3
s_RX_ISOL_2_3V3

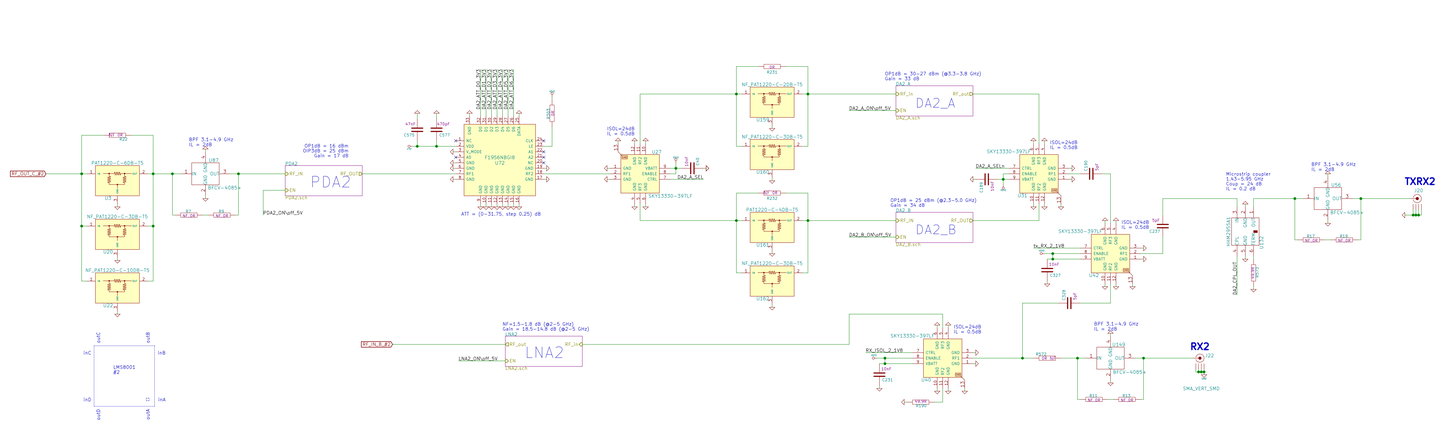
DAs control
MC74VHC1G08DTT1G
DA1_A_EN_3V3
DA1_B_EN_3V3
DA2_A_EN_3V3
DA2_B_EN_3V3
DA1_A_ONoff_3V3
DA1_B_ONoff_3V3
DA2_A_ONoff_3V3
DA2_B_ONoff_3V3

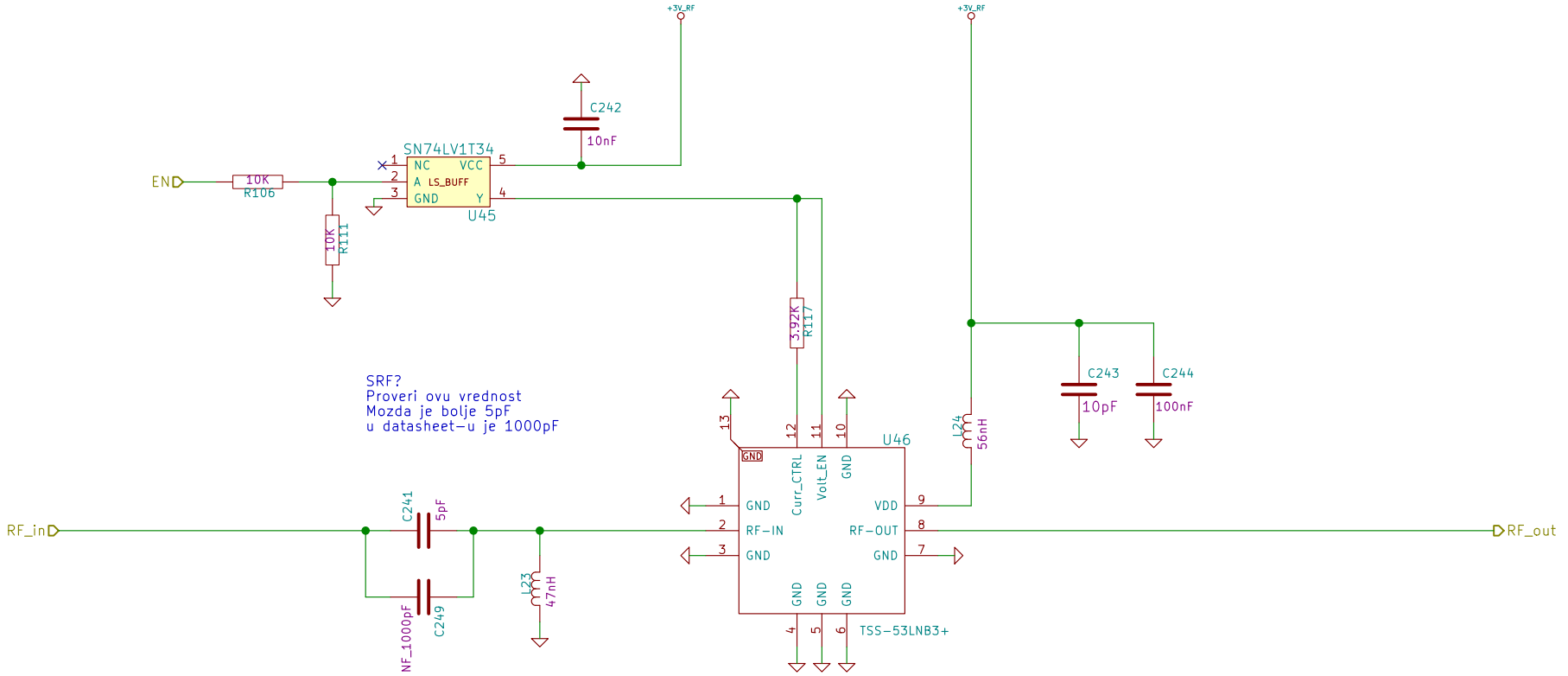

PDAs control
SN74LV1T04
MC74VHC1G08DTT1G
PDA1_EN_3V3
PDA2_EN_3V3
PDA1_ONoff_3V3
PDA2_ONoff_3V3

LNAs control
SN74LV1T04
MC74VHC1G08DTT1G
TxVx_1
TxVx_2
LNA1_EN_3V3
LNA2_EN_3V3
LNA1_ONoff_3V3
LNA2_ONoff_3V3

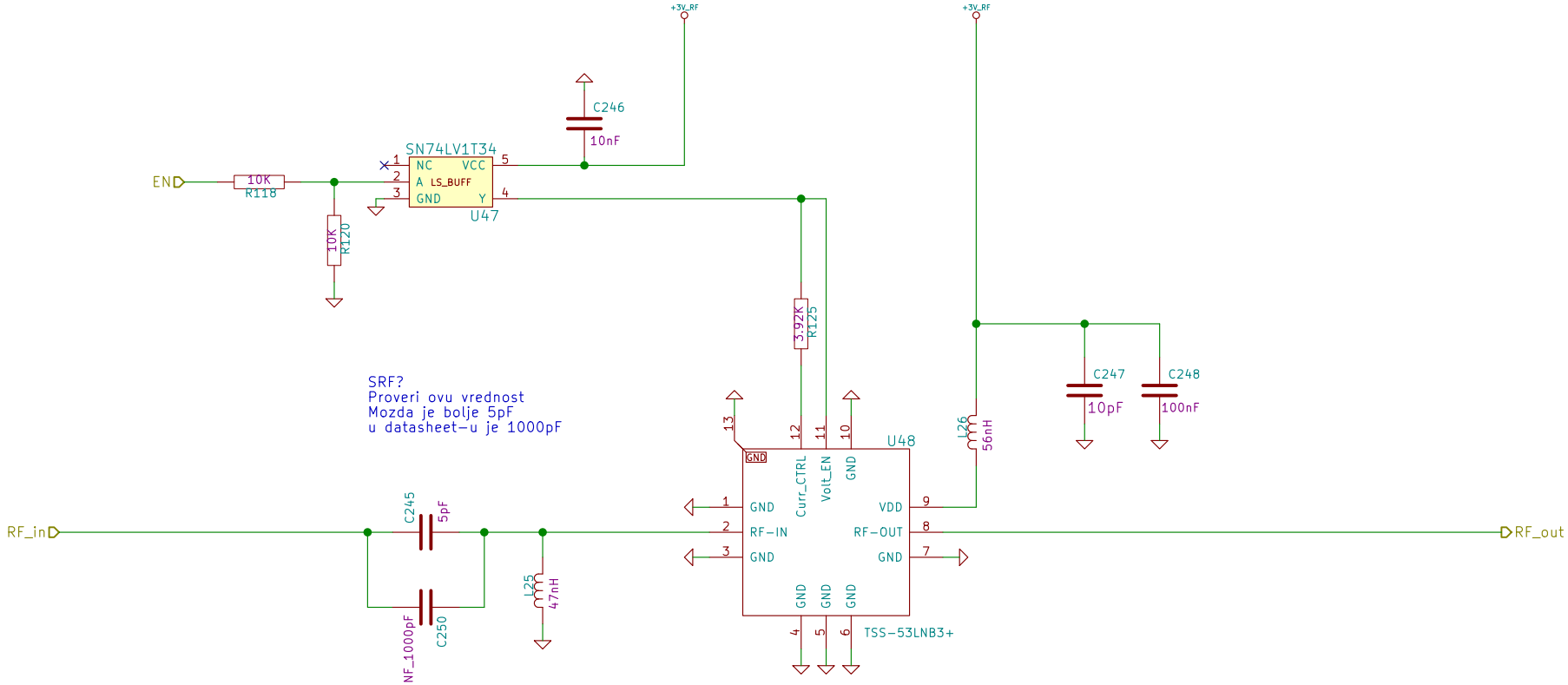
DA A or B Selection Switches Control
DA1_Vctrl_3_CTRL_3V3
DA2_Vctrl_3_CTRL_3V3
SN74LV1T04
DA1_A_SELn
DA1_A_SEL
DA2_A_SELn
DA2_A_SEL


RF_OUT_A_P1
RF_OUT_A_P2
RF_IN_B_P1
RF_IN_B_P2
PDA1
PDA2
LNA1
LNA2
DA1_A
DA1_B
DA2_A
DA2_B
F1956NBGUB
U71
SKY13330-397LF
DA1_A_SEL
DA1_B_SEL
DA2_A_SEL
DA2_B_SEL
PDA1_ONoff_5V
PDA2_ONoff_5V
LNA1_ONoff_5V
LNA2_ONoff_5V
DA1_A_ONoff_5V
DA1_B_ONoff_5V
DA2_A_ONoff_5V
DA2_B_ONoff_5V
LMS8001
#1
#2
ATT = (0~31.75, step 0.25) dB
TXRX1
TXRX2
RX1
RX2
ORX1
ORX2
DA1_CPL_OUT
DA2_CPL_OUT
External PA1 Output to OBSERVATION PATH
External PA2 Output to OBSERVATION PATH


SKY13773-460LF vdd=3.3, vctl=1.8, Ioa=20, Il=0.6
SKYA21003 vdd=3.3v~vctl=1.8, Ioa=24, Il=0.5
SKY13330-397LF (alt ko skya21003
DP16B = 16 dBm
DP16B = 23 dBm
Gain = 17 dB
DP16B = 30~27 dBm (@3.3~3.8 GHz)
Gain = 33 dB
DP16B = 25 dBm (@2.5~5.0 GHz)
Gain = 24 dB
BPF 3.1~4.9 GHz
IL = 2dB
ISOL=24dB
IL = 0.5dB
NF=1.5~1.8 dB (@2~5 GHz)
Gain = 18.5~14.9 dB (@2~5 GHz)
Microstrip coupler
1.5~5.95 GHz
Cfwp = 2k dB
IL = 0.2 dB



Lime Microsystems		
Sheet: /RF/LNA1/		
File: LNA1.sch		
Title: FrontEnd_5G		
Size: A4	Date: 10 Feb 2022	**Rev: 1v0**
KiCad E.D.A. kicad 4.0.7-e2-637658ubuntu16.04.1		Id: 13/20



Lime Microsystems		
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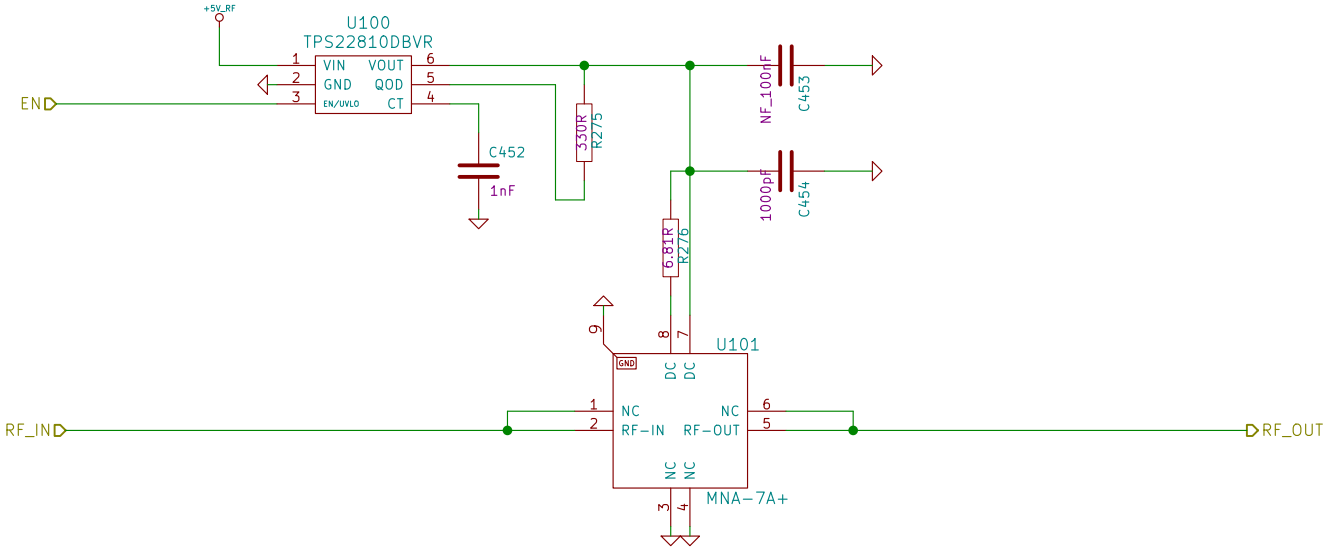
Title: FrontEnd_5G		
Size: A4	Date: 10 Feb 2022	**Rev: 1v0**
KiCad E.D.A. kicad 4.0.7-e2-637658ubuntu16.04.1		Id: 14/20



Lime Microsystems		
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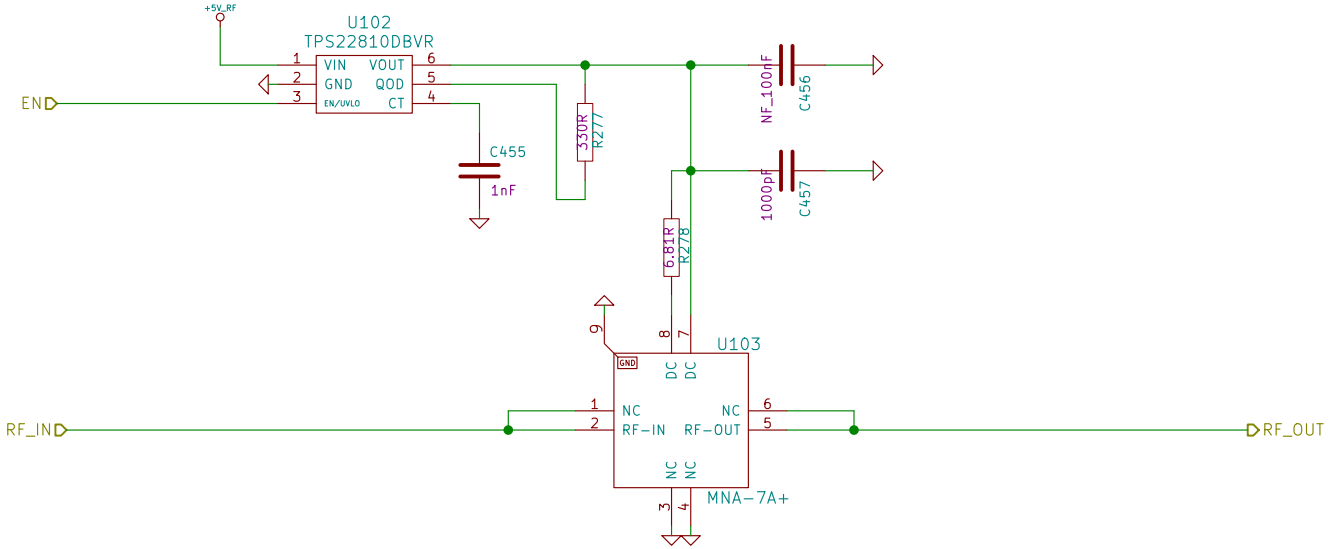
Title: FrontEnd_5G		
Size: A4	Date: 10 Feb 2022	**Rev: 1v0**
KiCad E.D.A. kicad 4.0.7-e2-637658ubuntu16.04.1		Id: 15/20



Lime Microsystems		
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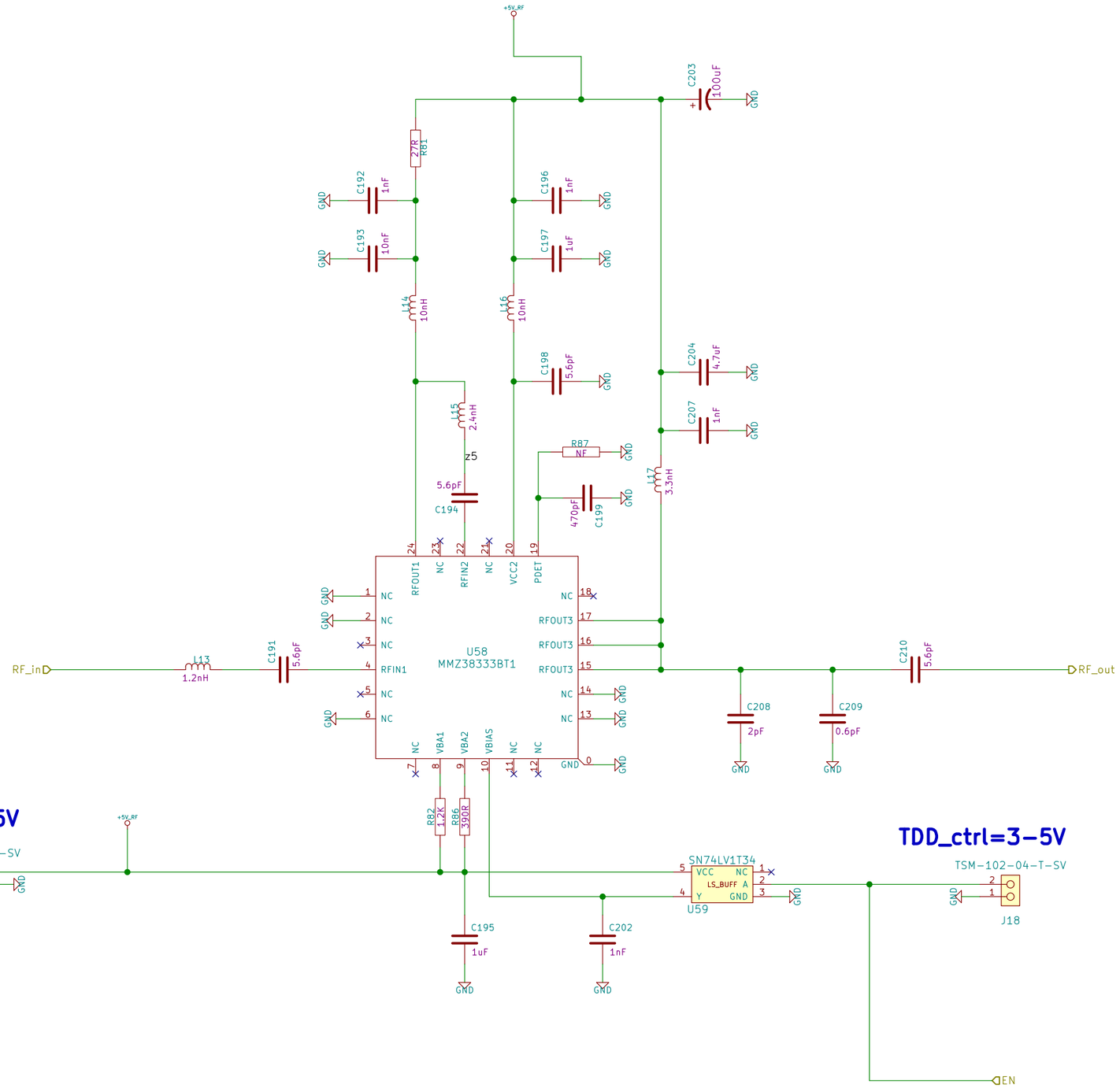
Title: FrontEnd_5G		
Size: A4	Date: 10 Feb 2022	**Rev: 1v0**
KiCad E.D.A. kicad 4.0.7-e2-637658ubuntu16.04.1		Id: 16/20

Vcc=5V

Datasheet Substrate:
Rogers4350B, Er=3.66, tickness = 254 um (10mil)
PCB was modified for substrate:
Rogers4350B, Er=3.66, tickness = 508 um (20mil)



Lime Microsystems		
Sheet: /RF/DA1_A/		
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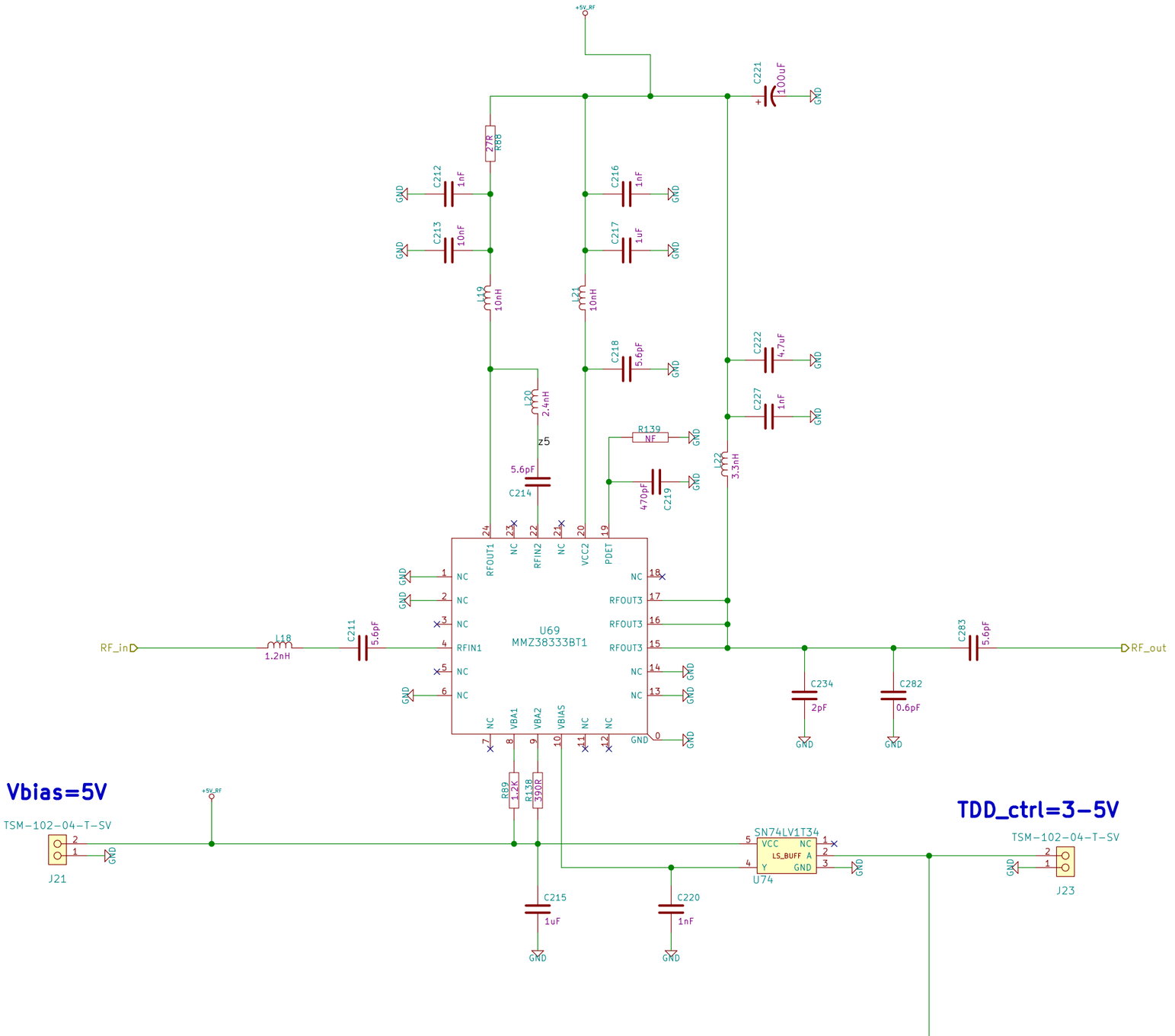
Title: FrontEnd_5G		
Size: A3	Date: 10 Feb 2022	**Rev: 1v0**
KiCad E.D.A. kicad 4.0.7-e2-637658ubuntu16.04.1		Id: 17/20

Datasheet Substrate:
Rogers4350B, Er=3.66, tickness = 254 um (10mil)
PCB was modified for substrate:
Rogers4350B, Er=3.66, tickness = 508 um (20mil)



Lime Microsystems		
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Title: FrontEnd_5G		
Size: A3	Date: 10 Feb 2022	**Rev: 1v0**
KiCad E.D.A. kicad 4.0.7-e2-637658ubuntu16.04.1		Id: 18/20

Roger 4350B, Er = 3.66, tickness = 508 um (20 mil)

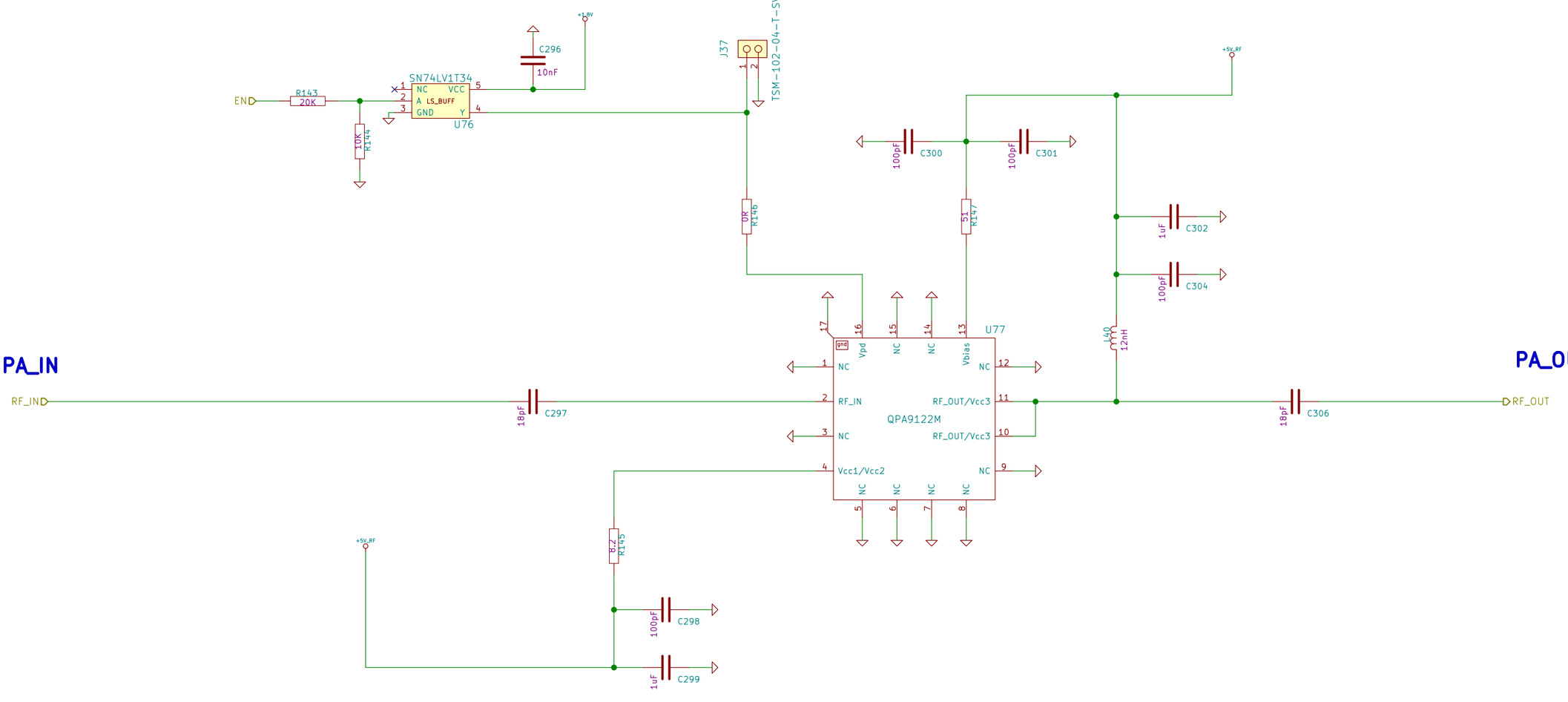
Vpd=1.8V

Vcc3/Vbias=5V

PA_IN

PA_OUT

Vcc1/Vcc2=5V



Lime Microsystems	
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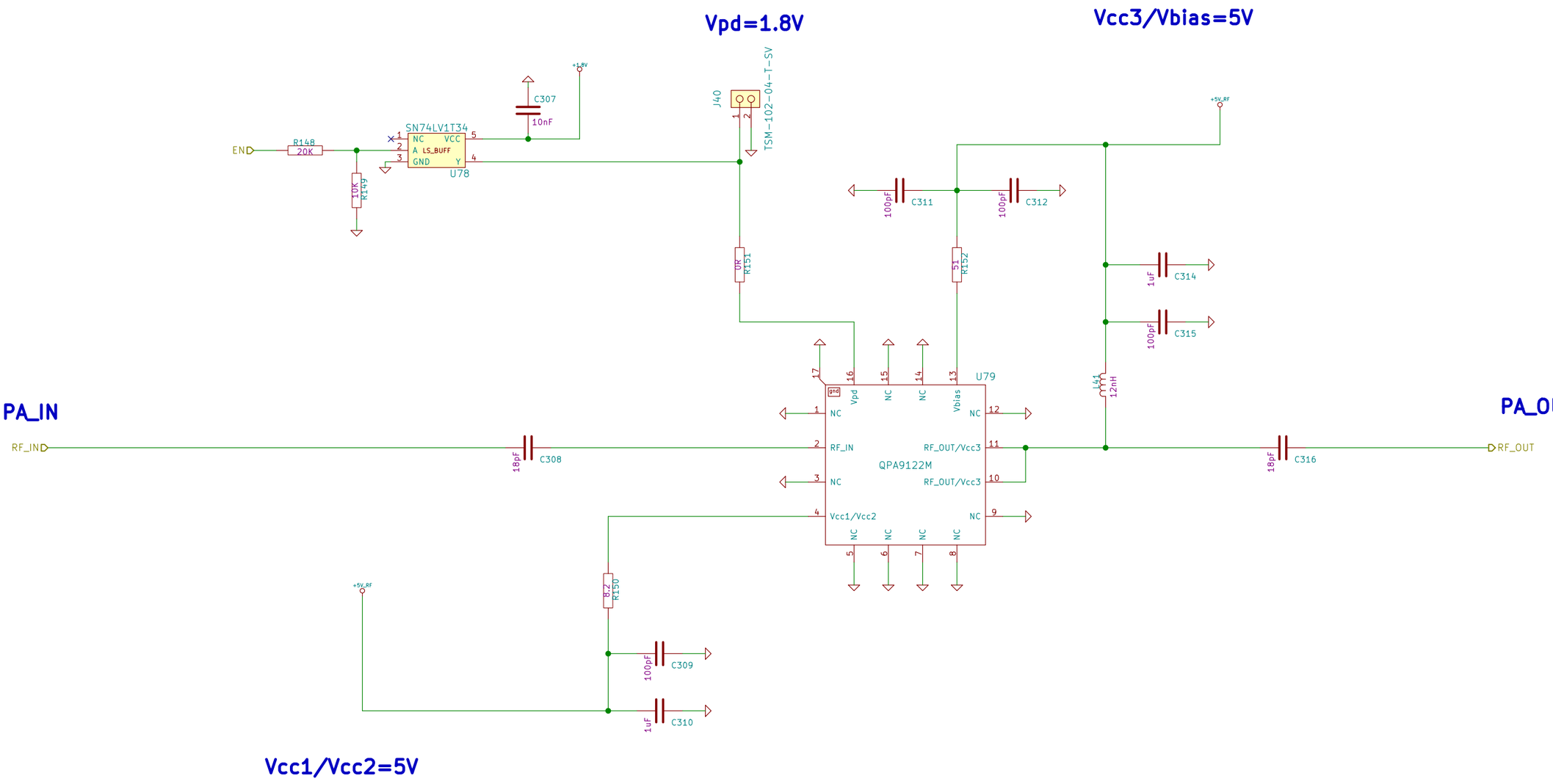
Title: FrontEnd_5G	
Size: A3	Date: 10 Feb 2022 — **Rev: 1v0**
KiCad E.D.A. kicad 4.0.7-e2-637658ubuntu16.04.1	Id: 19/20

Roger 4350B, Er = 3.66, tickness = 508 um (20 mil)



Lime Microsystems		
Sheet: /RF/DA2_B/		
File: DA2_B.sch		
Title: FrontEnd_5G		
Size: A3	Date: 10 Feb 2022	**Rev: 1v0**
KiCad E.D.A. kicad 4.0.7-e2-637658ubuntu16.04.1		Id: 20/20