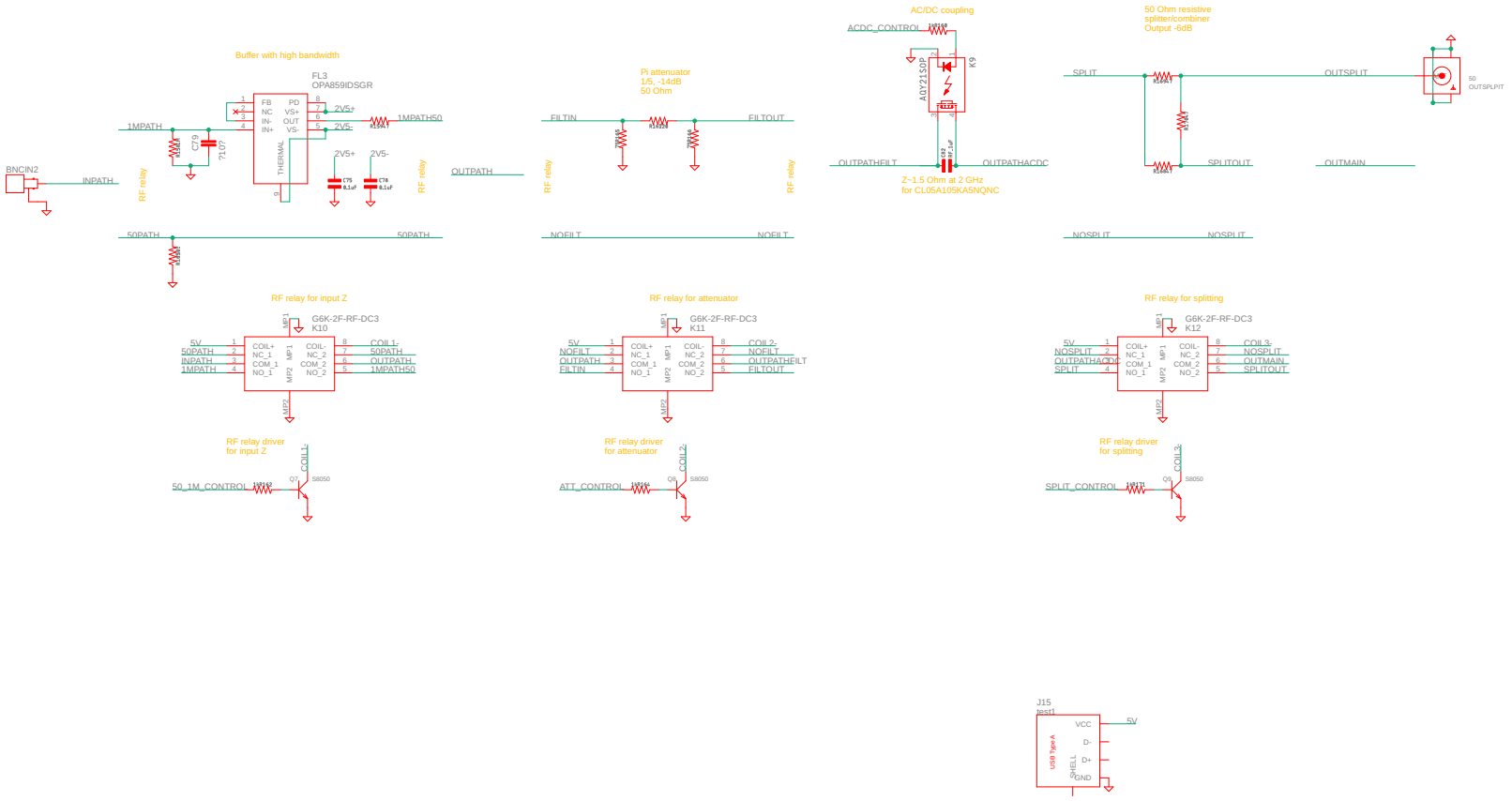
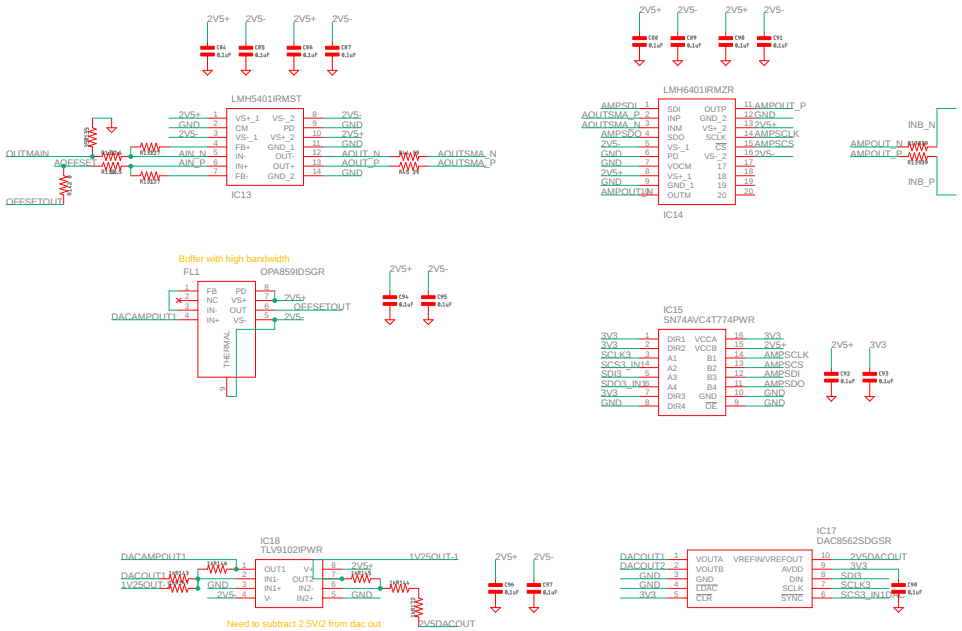
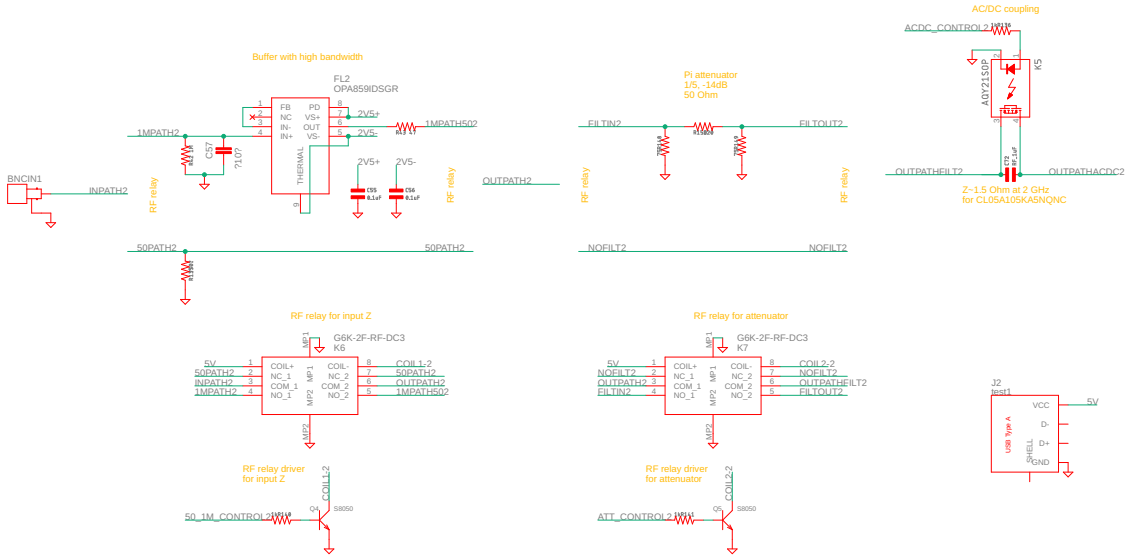
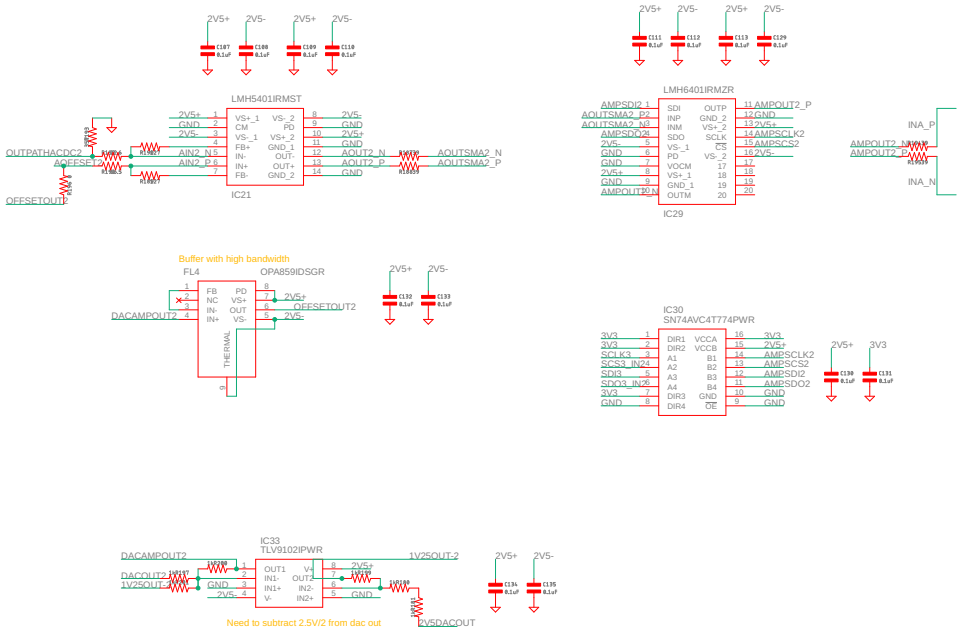
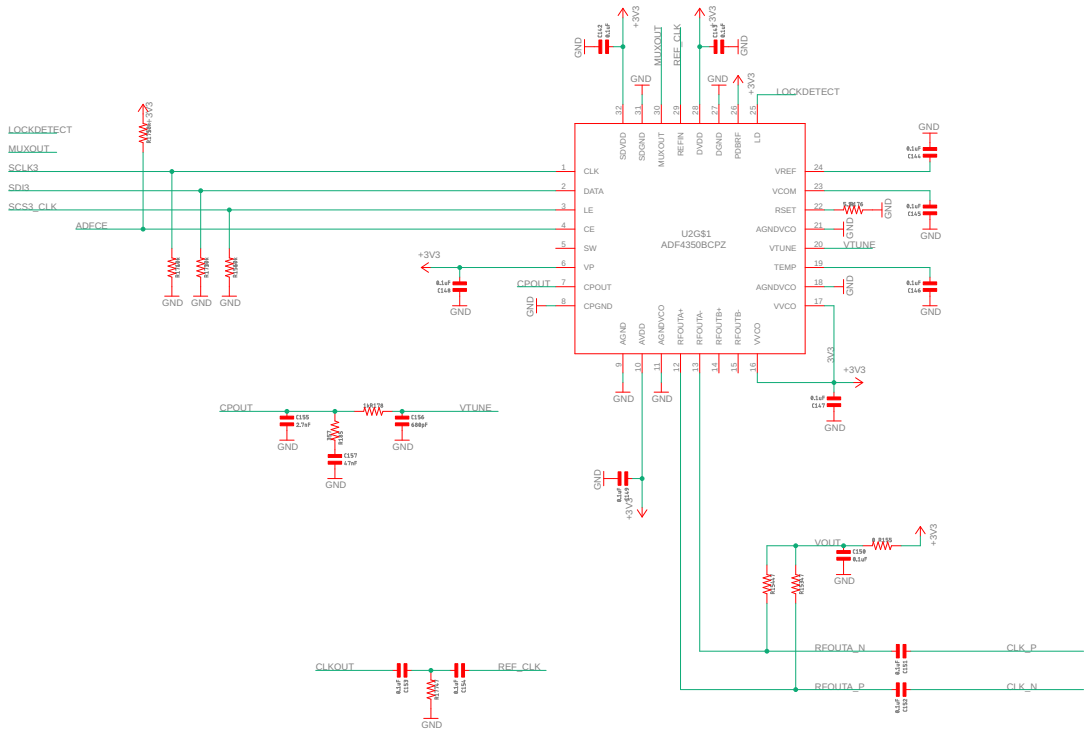
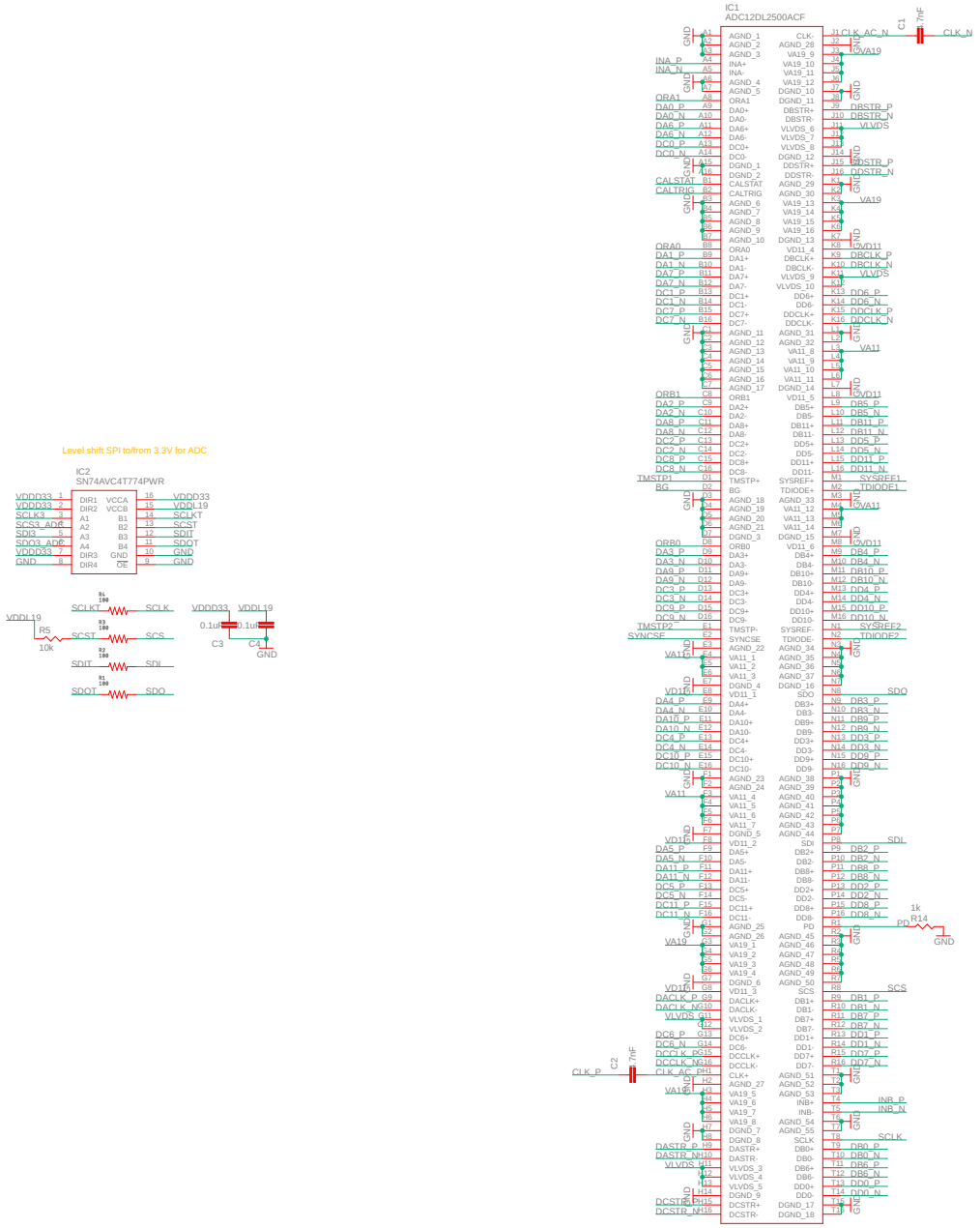

Buffer with high bandwidth
FL3
OPA859IDSGR
1MPATH
1MPATH50
2V5+
2V5-
BNCIN2
INPATH
RF relay
OUTPATH
50PATH
Pi attenuator
1/5, -14dB
50 Ohm
FILTIN
FILTOUT
NOFILT
AC/DC coupling
ACDC_CONTROL
K9
OUTPATHFILT
OUTPATHACDC
Z~1.5 Ohm at 2 GHz
for CL05A105KA5NQNC
50 Ohm resistive
splitter/combiner
Output -6dB
SPLIT
OUTSPLIT
SPLITOUT
OUTMAIN
NOSPLIT
RF relay for input Z
G6K-2F-RF-DC3
K10
5V
COIL+
COIL-
NC_1
NC_2
COM_1
COM_2
NO_1
NO_2
MP1
MP2
COIL1-
RF relay driver
for input Z
50_1M_CONTROL
Q7
S8050
RF relay for attenuator
K11
COIL2-
ATT_CONTROL
Q6
RF relay for splitting
K12
COIL3-
SPLIT_CONTROL
Q5
J15
test1
USB Type A
VCC
D-
D+
GND
SHELL

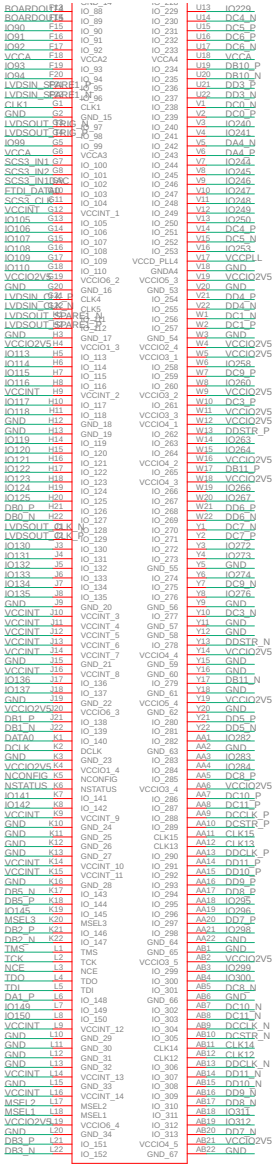

LMH5401IRMST
IC13
LMH6401IRMZR
IC14
OUTMAIN
OFFSET
OFFSETOUT
AIN_N
AIN_P
AOUTSMA_N
AOUTSMA_P
AMPOUT_N
AMPOUT_P
INB_N
INB_P
Buffer with high bandwidth
FL1
OPA859IDSGR
DACAMPOUT1
OFFSETOUT
IC15
SN74AVC4T774PWR
3V3
2V5+
2V5-
AMPSCLK
AMPSCS
AMPSDI
AMPSDO
SCLK3
SCS3_IN1
SDI3
SDO3_IN1
IC18
TLV9102IPWR
DACAMPOUT1
DACOUT1
1V25OUT-1
1V25OUT-
2V5DACOUT
Need to subtract 2.5V/2 from dac out
IC17
DAC8562SDGSR
DACOUT1
DACOUT2
2V5DACOUT

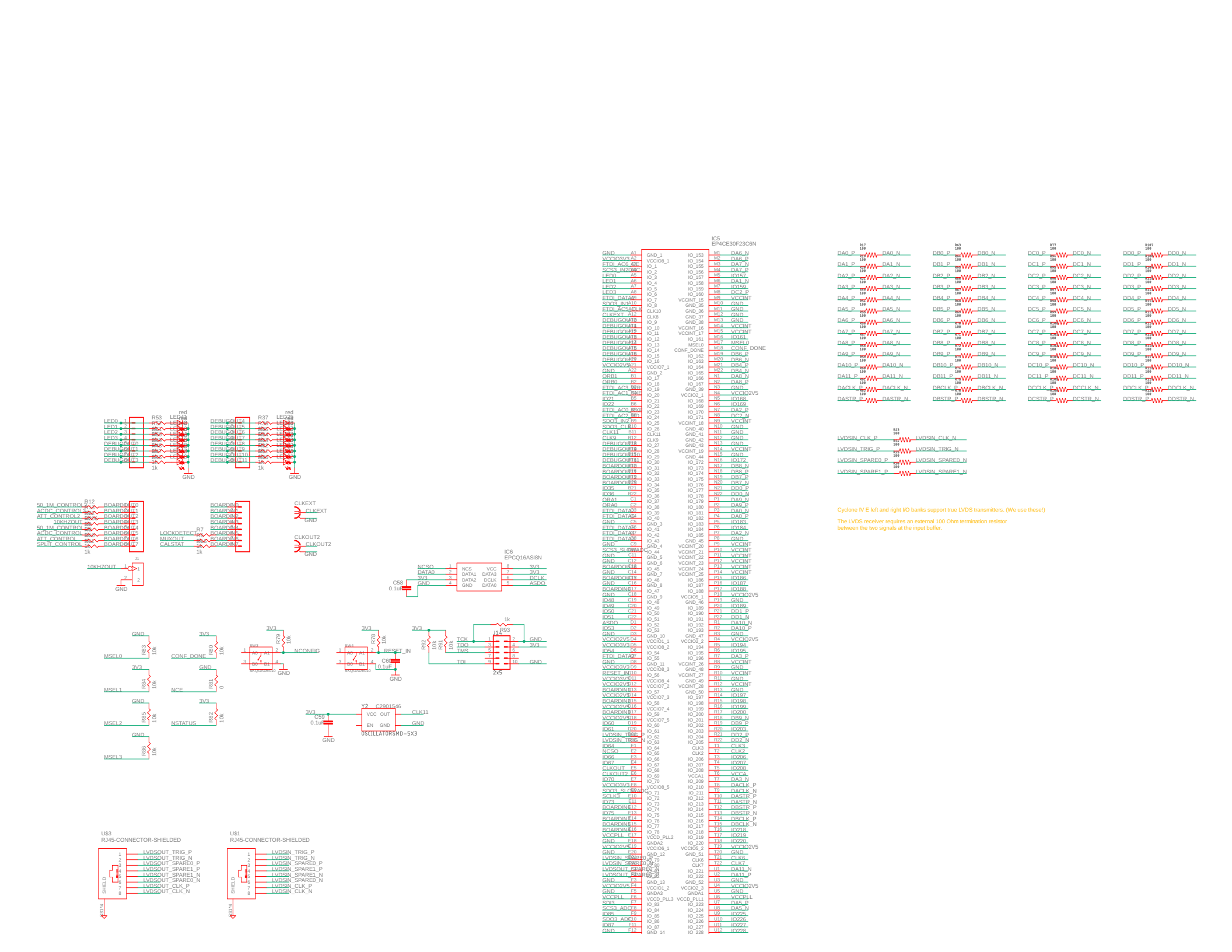

Buffer with high bandwidth
FL2
OPA859IDSGR
1MPATH2
1MPATH50?
2V5+
2V5-
BNCIN1
INPATH2
RF relay
OUTPATH2
50PATH2
Pi attenuator
1/5, -14dB
50 Ohm
FILTIN2
FILTOUT2
NOFILT2
AC/DC coupling
ACDC_CONTROL2
K5
OUTPATHEILT2
OUTPATHACDC2
Z~1.5 Ohm at 2 GHz
for CL05A105KA5NQNC
RF relay for input Z
G6K-2F-RF-DC3
K6
5V
INPATH2
COIL1-2
OUTPATH2
1MPATH50?
RF relay for attenuator
K7
NOFILT2
OUTPATHEILT2
COIL2-2
RF relay driver
for input Z
50_1M_CONTROL2
RF relay driver
for attenuator
ATT_CONTROL2
J2
test1
USB Type A
VCC
D-
D+
GND
SHELL

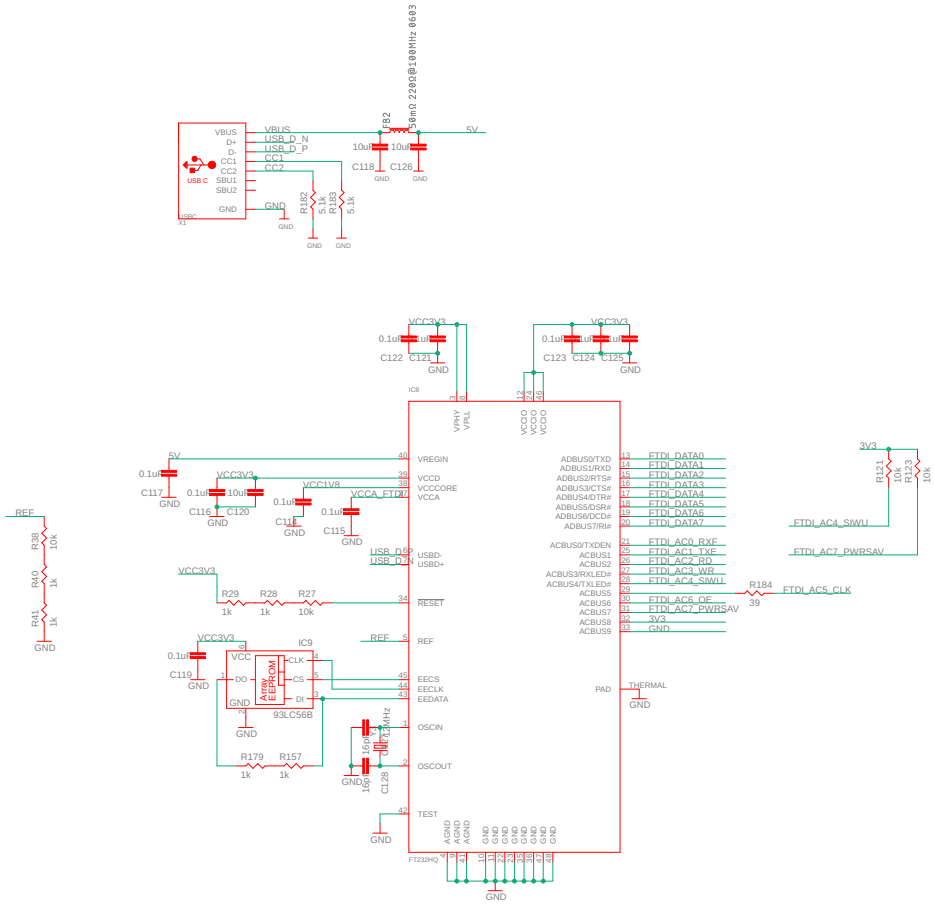

LMH5401IRMST
IC21
LMH6401IRMZR
IC29
Buffer with high bandwidth
FL4
OPA859IDSGR
IC30
SN74AVC4T774PWR
IC33
TLV9102IPWR
Need to subtract 2.5V/2 from dac out

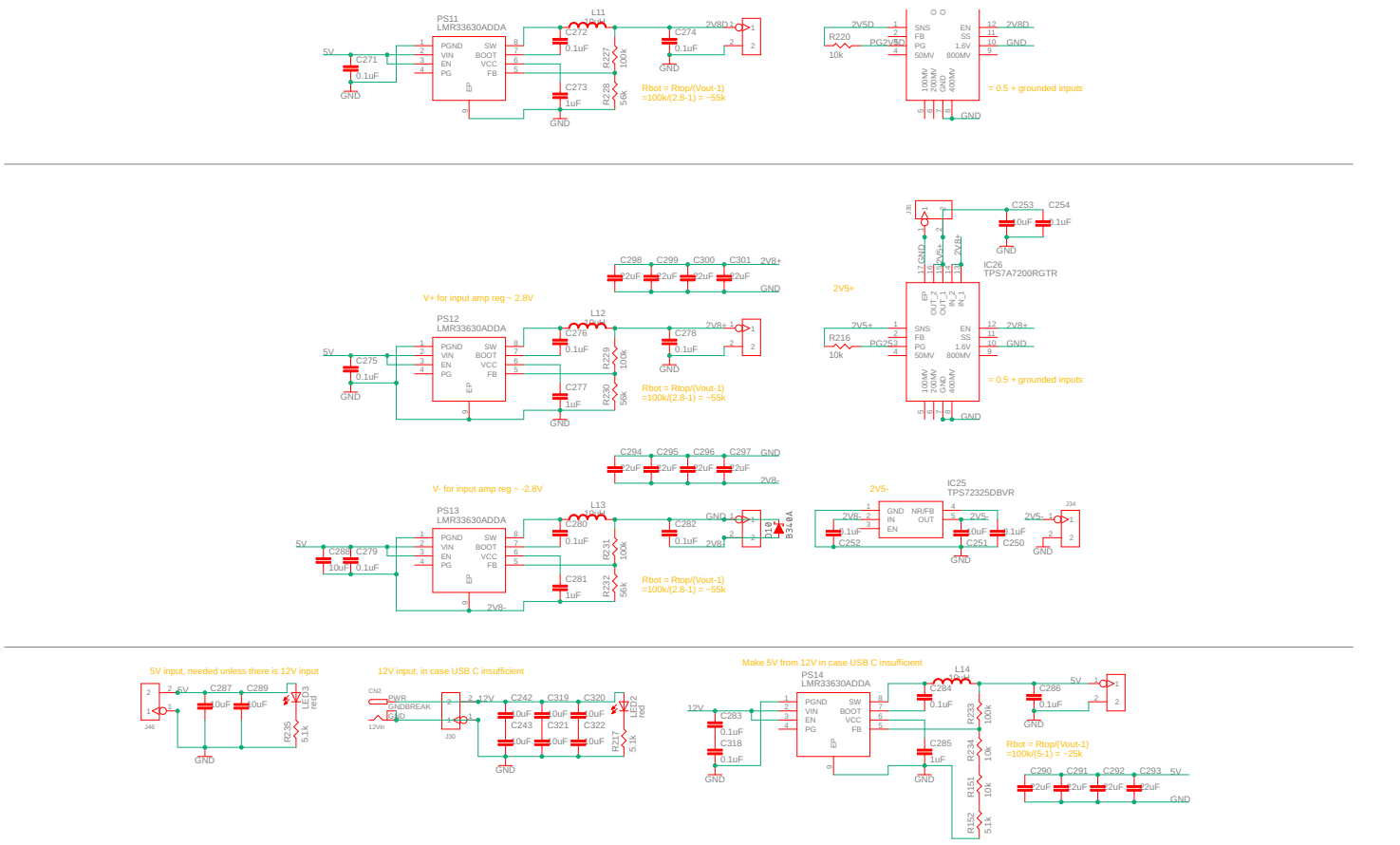

LOCKDETECT
MUXOUT
SCLK3
SDI3
SCS3_CLK
ADFCE
U2G$1
ADF4350BCPZ
CLK
DATA
LE
CE
SW
VP
CPOUT
CPGND
VREF
VCOM
RSET
AGNDVCO
VTUNE
TEMP
AGNDVCO
VVCO
SDVDD
SDGND
MUXOUT
REFIN
DVDD
DGND
PDBRF
LD
AGND
AVDD
AGNDVCO
RFOUTA+
RFOUTA-
RFOUTB+
RFOUTB-
VVCO
+3V3
GND
CPOUT
VTUNE
VOUT
CLKOUT
REF_CLK
REFOUTA_N
REFOUTA_P
CLK_P
CLK_N

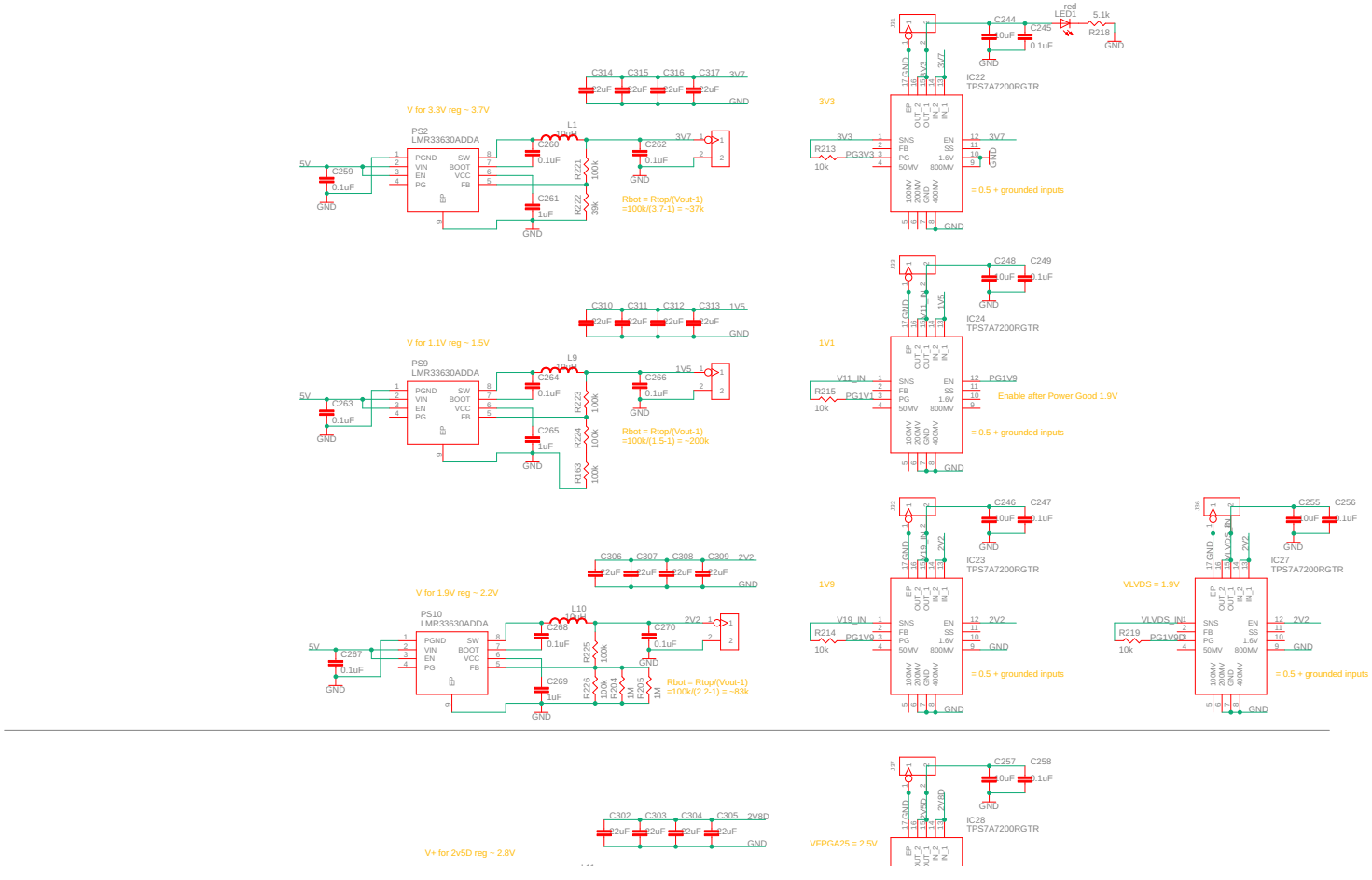

IC1
ADC12DL2500ACF
Level shift SPI to/from 3.3V for ADC
IC2
SN74AVC4T774PWR
C1
7nF
C2
7nF
C3
0.1uF
C4
0.1uF
R5
10k
R14
1k
VDDI19
VDDD33
VA19
VA11
GND
SCLK
SCS
SDI
SDO
SDIT
SDOT
SCLKT
SCST
CLK_AC_N
CLK_N
CLK_P
INA_P
INA_N
ORA0
ORA1
DA0_P
DA0_N
DA6_P
DA6_N
DC0_P
DC0_N
CALSTAT
CALTRIG
DA1_P
DA1_N
DA7_P
DA7_N
DC1_P
DC1_N
DC7_P
DC7_N
ORB0
ORB1
DA2_P
DA2_N
DA8_P
DA8_N
DC2_P
DC2_N
DC8_P
DC8_N
TMSTP1
TMSTP2
SYNCSE
BG
DA3_P
DA3_N
DA9_P
DA9_N
DC3_P
DC3_N
DC9_P
DC9_N
DA4_P
DA4_N
DA10_P
DA10_N
DC4_P
DC4_N
DC10_P
DC10_N
DA5_P
DA5_N
DA11_P
DA11_N
DC5_P
DC5_N
DC11_P
DC11_N
DACLK_P
DACLK_N
VLVDS
DC6_P
DC6_N
DCCLK_P
DCCLK_N
DASTR_P
DASTR_N
VLVDS
DCSTR_P
DCSTR_N
DBSTR_P
DBSTR_N
VLVDS
DD6_P
DD6_N
DDCLK_P
DDCLK_N
DB5_P
DB5_N
DB11_P
DB11_N
DD5_P
DD5_N
DD11_P
DD11_N
SYSREF1
TDIODE1
SYSREF2
TDIODE2
DB4_P
DB4_N
DB10_P
DB10_N
DD4_P
DD4_N
DD10_P
DD10_N
DB3_P
DB3_N
DB9_P
DB9_N
DD3_P
DD3_N
DD9_P
DD9_N
DB2_P
DB2_N
DB8_P
DB8_N
DD2_P
DD2_N
DD8_P
DD8_N
PD
DB1_P
DB1_N
DB7_P
DB7_N
DD1_P
DD1_N
DD7_P
DD7_N
DB0_P
DB0_N
DB6_P
DB6_N
DD0_P
DD0_N
INB_P
INB_N

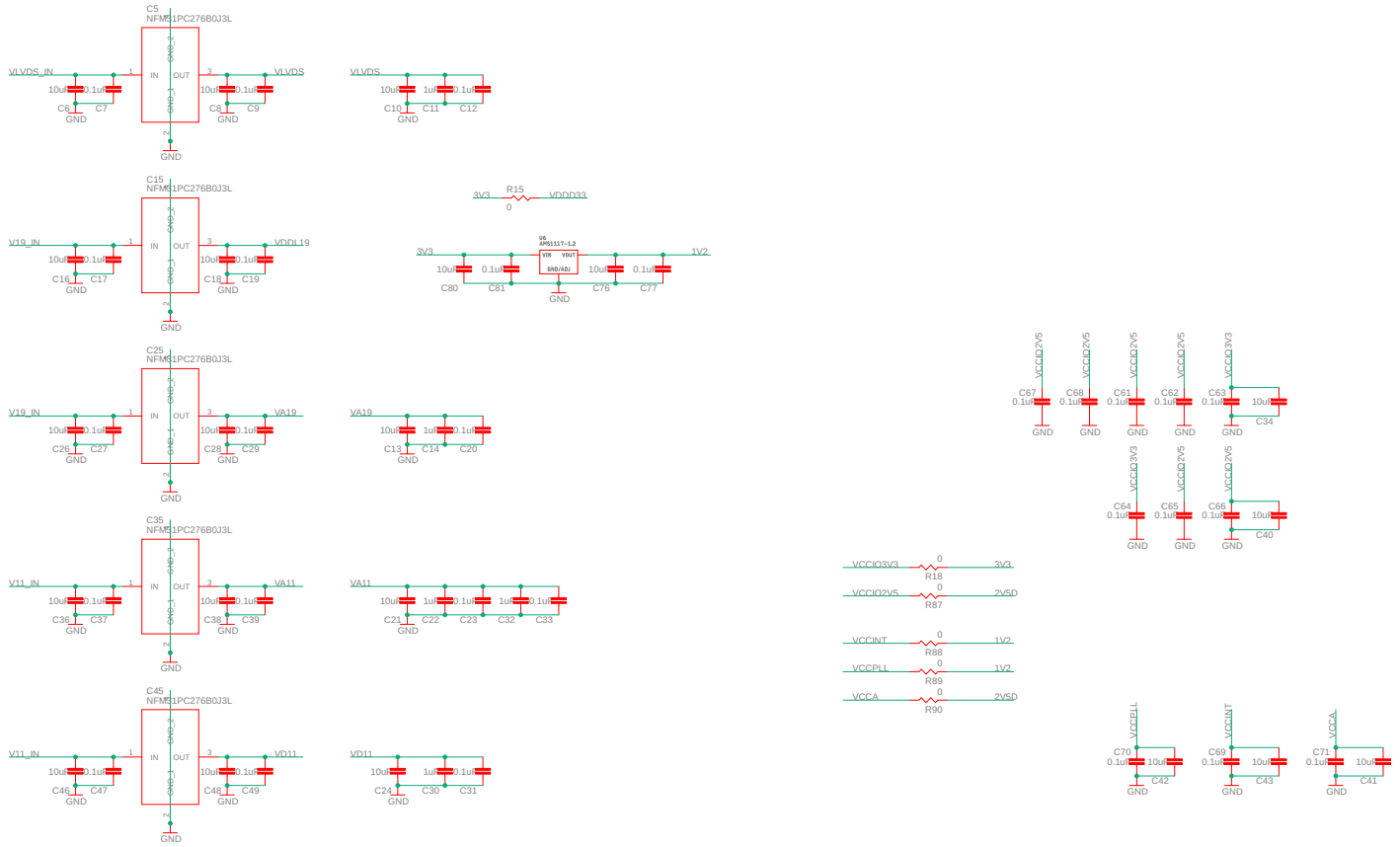


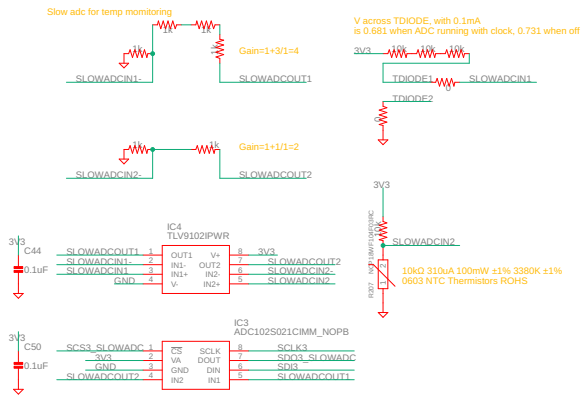

IC5
EP4CE30F23C6N
Cyclone IV E left and right I/O banks support true LVDS transmitters. (We use these!)
The LVDS receiver requires an external 100 Ohm termination resistor between the two signals at the input buffer.
IC6
EPCQ16ASI8N
US3
RJ45-CONNECTOR-SHIELDED
US1
RJ45-CONNECTOR-SHIELDED
Y2 C2901546
OSCILLATORSMD-5X3


USB C
VBUS
USB_D_N
USB_D_P
CC1
CC2
GND
5V
FB2
600ohm 2200@100MHz 0603
10uF
C118
C126
R182
5.1k
R183
5.1k
VCC3V3
0.1uF
C122
C121
C123
C124
C125
IC8
VPHY
VPLL
VCCIO
VREGIN
VCCD
VCCCORE
VCCA
VCC1V8
VCCA_FTDI
C117
C116
C120
C114
C115
USB_D60
USB_D70
USBD-
USBD+
RESET
REF
EECS
EECLK
EEDATA
OSCIN
OSCOUT
TEST
PAD
THERMAL
ADBUS0/TXD
ADBUS1/RXD
ADBUS2/RTS#
ADBUS3/CTS#
ADBUS4/DTR#
ADBUS5/DSR#
ADBUS6/DCD#
ADBUS7/RI#
ACBUS0/TXDEN
ACBUS1
ACBUS2
ACBUS3/RXLED#
ACBUS4/TXLED#
ACBUS5
ACBUS6
ACBUS7
ACBUS8
ACBUS9
FTDI_DATA0
FTDI_DATA1
FTDI_DATA2
FTDI_DATA3
FTDI_DATA4
FTDI_DATA5
FTDI_DATA6
FTDI_DATA7
FTDI_AC0_RXF
FTDI_AC1_TXE
FTDI_AC2_RD
FTDI_AC3_WR
FTDI_AC4_SWU
FTDI_AC6_OE
FTDI_AC7_PWRSAV
FTDI_AC5_CLK
R184
39
3V3
R121
R122
R123
10k
FTDI_AC4_SWU
FTDI_AC7_PWRSAV
R29
R28
R27
1k
10k
IC9
93LC56B
R179
R157
1k
R38
10k
R40
1k
R41
1k
REF
FT232HQ


PS11
LMR33630ADDA
L11
C271
C272
C273
C274
R227
R228
2V8D
5V
GND
Rbot = Rtop/(Vout-1)
=100k/(2.8-1) = ~55k
R220
10k
PG2V8D
2V5D
= 0.5 + grounded inputs
V+ for input amp reg ~ 2.8V
PS12
LMR33630ADDA
L12
C275
C276
C277
C278
R229
R230
2V8+
C298
C299
C300
C301
22uF
2uF
IC26
TPS7A7200RGTR
C253
C254
10uF
0.1uF
R216
10k
PG253
2V5+
V- for input amp reg ~ -2.8V
PS13
LMR33630ADDA
L13
C279
C280
C281
C282
R231
R232
D10
B340A
2V8-
C294
C295
C296
C297
IC25
TPS72325DBVR
C252
C251
C250
2V5-
5V input, needed unless there is 12V input
J46
C287
C289
LED3
red
R235
5.1k
12V input, in case USB C insufficient
CN2
PWR
GNDBREAK
SDA
12Vin
J30
C242
C319
C320
C243
C321
C322
LED2
red
R217
5.1k
Make 5V from 12V in case USB C insufficient
PS14
LMR33630ADDA
L14
C283
C284
C285
C318
R233
R234
R151
R152
100k
10k
5.1k
Rbot = Rtop/(Vout-1)
=100k/(5-1) = ~25k
C286
C290
C291
C292
C293


V for 3.3V reg ~ 3.7V
PS2
LMR33630ADDA
L1
C260
0.1uF
C262
0.1uF
C259
0.1uF
C261
1uF
R221
100k
R222
39k
Rbot = Rtop/(Vout-1)
=100k/(3.7-1) = ~37k
C314
C315
C316
C317
2uF
3V7
GND
5V
IC22
TPS7A7200RGTR
C244
C245
0uF
0.1uF
R218
5.1k
LED1
red
R213
10k
PG3V3
3V3
= 0.5 + grounded inputs
V for 1.1V reg ~ 1.5V
PS9
LMR33630ADDA
L9
C264
0.1uF
C266
0.1uF
C263
0.1uF
C265
1uF
R223
100k
R224
100k
R163
100k
Rbot = Rtop/(Vout-1)
=100k/(1.5-1) = ~200k
C310
C311
C312
C313
1V5
IC24
TPS7A7200RGTR
C248
C249
R215
10k
PG1V1
V11_IN
1V1
Enable after Power Good 1.9V
V for 1.9V reg ~ 2.2V
PS10
LMR33630ADDA
L10
C268
0.1uF
C270
0.1uF
C267
0.1uF
C269
1uF
R225
100k
R226
100k
R204
1M
R205
1M
Rbot = Rtop/(Vout-1)
=100k/(2.2-1) = ~83k
C306
C307
C308
C309
2V2
IC23
TPS7A7200RGTR
C246
C247
R214
10k
PG1V9
V19_IN
1V9
C255
C256
IC27
TPS7A7200RGTR
R219
10k
PG1V9
VLVDS_IN1
VLVDS = 1.9V
V+ for 2v5D reg ~ 2.8V
C302
C303
C304
C305
2V8D
IC28
TPS7A7200RGTR
C257
C258
VFPGA25 = 2.5V


C5
NFM61PC276B0J3L
VLVDS_IN
VLVDS
C6
C7
C8
C9
C10
C11
C12
GND
C15
NFM61PC276B0J3L
V19_IN
VDDL19
C16
C17
C18
C19
R15
3V3
VDDD33
0
U6
AMS1117-1.2
VIN
VOUT
GND/ADJ
C80
C81
C76
C77
1V2
C25
NFM61PC276B0J3L
V19_IN
VA19
C26
C27
C28
C29
C13
C14
C20
C35
NFM61PC276B0J3L
V11_IN
VA11
C36
C37
C38
C39
C21
C22
C23
C32
C33
C45
NFM61PC276B0J3L
V11_IN
VD11
C46
C47
C48
C49
C24
C30
C31
VCCIO2V5
VCCIO3V3
C67
C68
C61
C62
C63
C34
C64
C65
C66
C40
VCCIO3V3
3V3
R18
VCCIO2V5
2V5D
R87
VCCINT
1V2
R88
VCCPLL
1V2
R89
VCCA
2V5D
R90
C70
C42
C69
C43
C71
C41


Slow adc for temp momitoring
1k
1k
1k
Gain=1+3/1=4
SLOWADCIN1-
SLOWADCOUT1
1k
1k
Gain=1+1/1=2
SLOWADCIN2-
SLOWADCOUT2
V across TDIODE, with 0.1mA
is 0.681 when ADC running with clock, 0.731 when off
3V3
10k
10k
10k
TDIODE1
SLOWADCIN1
0
TDIODE2
1k
3V3
SLOWADCIN2
10kΩ 310uA 100mW ±1% 3380K ±1%
0603 NTC Thermistors ROHS
IC4
TLV9102IPWR
3V3
C44
0.1uF
SLOWADCOUT1
SLOWADCIN1-
SLOWADCIN1
GND
OUT1
IN1-
IN1+
V-
V+
OUT2
IN2-
IN2+
3V3
SLOWADCOUT2
SLOWADCIN2-
SLOWADCIN2
IC3
ADC102S021CIMM_NOPB
3V3
C50
0.1uF
SCS3_SLOWADC
3V3
GND
SLOWADCOUT2
CS
VA
GND
IN2
SCLK
DOUT
DIN
IN1
SCLK3
SDO3_SLOWADC
SDI3
SLOWADCOUT1