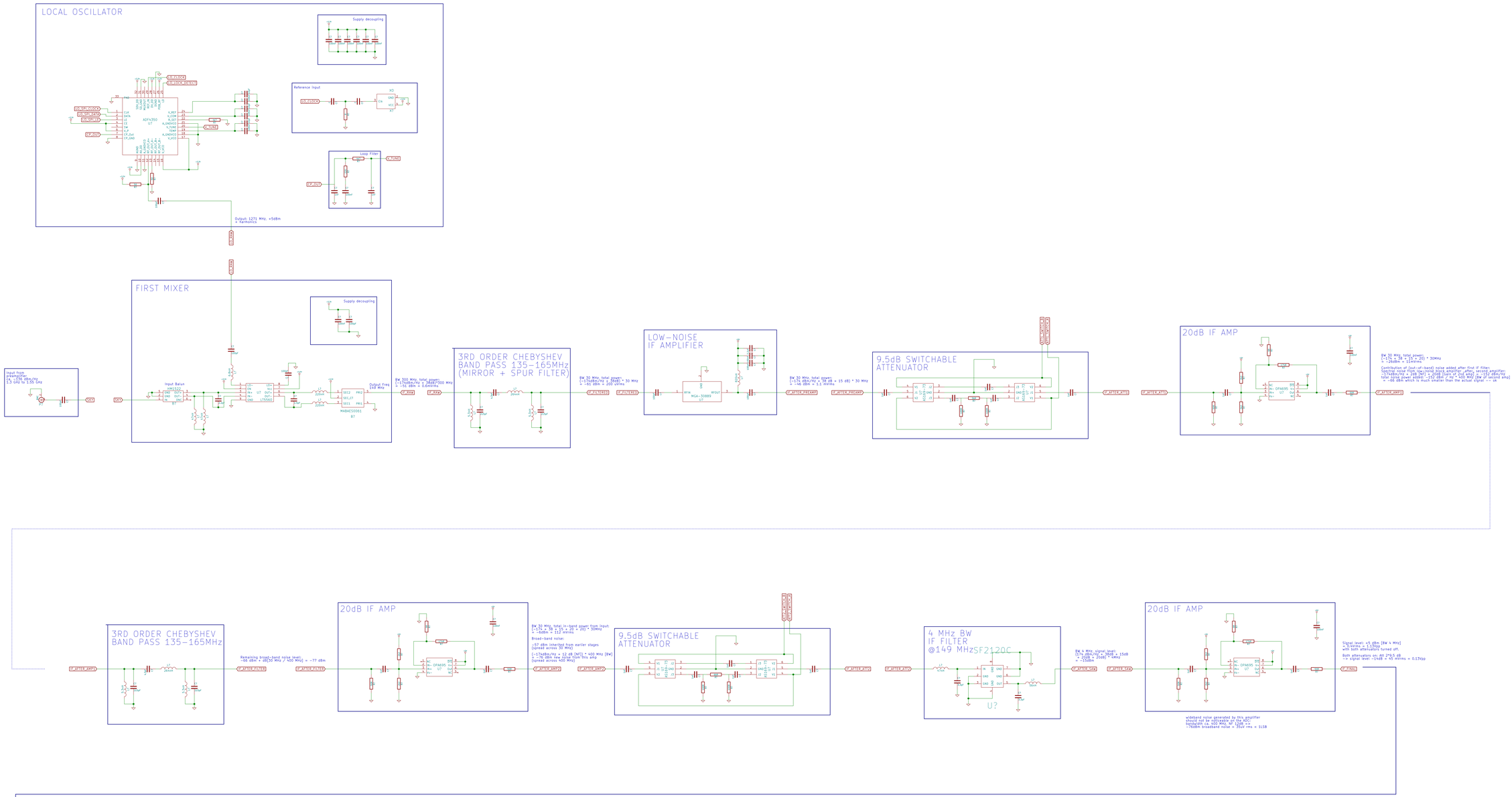
LOCAL OSCILLATOR
Supply decoupling
Reference input
Loop Filter
ADF4350
U?
Output: 1271 MHz, +5dBm
+ harmonics
FIRST MIXER
Input Balun
HM1522
MABAES0061
B7
Output freq
149 MHz
Input from
antenna
(e.g. 750 dBm/Hz
1.3 GHz to 1.50 GHz
BW 300 MHz, total power:
(-174dBm/Hz + 58dB) * 300 MHz
= -51 dBm = 0.6mVrms
3RD ORDER CHEBYSHEV
BAND PASS 135-165MHz
(MIRROR + SPUR FILTER)
BW 30 MHz, total power:
(-174dBm/Hz + 58dB) * 30 MHz
= -61 dBm = 200 uVrms
LOW-NOISE
IF AMPLIFIER
MGA-30889
U?
BW 30 MHz, total power:
(-174 dBm/Hz + 58 dB + 15 dB) * 30 MHz
= -46 dBm = 1.1 mVrms
9.5dB SWITCHABLE
ATTENUATOR
20dB IF AMP
OPA695
U?
BW 30 MHz, total power:
(-174 dBm/Hz + 20dB) * 30MHz
= -104dBm = 11mVrms
Contribution of (out-of-band) noise added after first IF filter:
Spectral noise from low-noise block amplifier after second amplifier:
(-174dBm/Hz + 20 [NF] + 20dB [gain of 2nd amp] = -132 dBm/Hz
(-132dBm/Hz + 20dB [gain of 3rd amp] = -112 dBm/Hz [noise of second amp]
--> 60 dBm which is much smaller than the actual signal --> OK
3RD ORDER CHEBYSHEV
BAND PASS 135-165MHz
Remaining broad-band noise level:
-66 dBm + dB[30 MHz / 400 MHz] = -77 dBm
20dB IF AMP
BW 30 MHz, total in-band power from input:
(-174 + 58 + 15 + 20 + 20) * 30MHz
= -68dBm = 112 mVrms
Broad-band noise:
-57 dBm inherited from earlier stages
(spread across 30 MHz)
(-174dBm/Hz + 12 dB [NF]) * 400 MHz [BW]
= -76 dBm new noise from this amp
(spread across 400 MHz)
9.5dB SWITCHABLE
ATTENUATOR
4 MHz BW
IF FILTER
@149 MHz
SF2120C
U?
BW 4 MHz, signal level:
(174 dBm/Hz + 58dB + 15dB
+ 20dB + 20dB) * 4MHz
= -150dBm
20dB IF AMP
OPA695
U?
Signal level: +5 dBm [BW 4 MHz]
with both attenuators
with both attenuators turned off.
Both attenuators on: AH 2*9.5 dB
--> signal level -154dB = 45 mVrms = 0.13Vpp
wideband noise generated by this amplifier
(-174dBm/Hz + 20dB [NF] * 150MHz
bandwidth (a 400 MHz NF 12dB -->
-76dBm broadband noise = 350uV rms < 1LSB
14 MSPS
ADC
(DIGITAL
BASE-BAND
CONVERSION)
AD9283
TODO:
Limiter diode?
LPC4330
LQFP144
LPC4330FBD144
LO control
clock generated by software
4 MHz reference
crystal oscillator
SDC
Sheet: /
File: board.sch
Title:
Size: A3
Date:
Rev:
KiCad E.D.A. kicad (2014-08-31 BZR 5107)-product
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