amplifier

File: amplifier.kicad_sch

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File: odyssey2.kicad_sch

Title:

Size: A4 | Date: | **Rev:**
KiCad E.D.A. kicad 7.0.4 | Id: 1/2

The right OPA26677 configuration

U3A Opamp_Dual
NG=5

R23 65
R24 215
R3 422
R4 50
C29 100nF
50 Ohm load
50 Ohm input with splitter

GND

Thetis PA Coefficient
for 30 dBm in output:
160: 50.9
80m: 51.2
60m: not tested
40m: 50.9
30m: 49.7
20m: 49.1
17m: 47.5
15m: 46.6
12m: 45.5
10m: 43.8
6m: useless
use capacitor on feedback

OPA2677 Rf and Rg calc
Ri = 22 Ohm
Zi = Rg || Rm
Rgg = (Zl || Rm) + Rg
NG = 1 + Rf/Rgg
Rf = 490 - NG*Ri
Rf=better from graph

use only +12V
not 13.8V.
seems there is
no improvement
on IMD tests;
The output is
well below the
distortion voltage

FB2 FerriteBead_Small
+5V

C25 100nF
GND

VNA

C23 100nF
R14 10K
R12 270
C24 100nF
R15 10K
R13 100
GND GND GND

IC1 OPA2677U
1 OUTA   +VS 8
2 -INA   OUTB 7
3 +INA   -INB 6
4 -VS   +INB 5
inverting: 22 Ohm input

I use 2500hm 0dBm out at 14MHz

GND

TODO:
maybe use as push-pull to attenuate IMD

DAC_TX_FILTERED

C11 100nF
GND

T2 4BN43-24023
2 turns
3+3 turns
I use: 4 - 6+6 turns with 0.2mm wire

R6 25
I use 50 Ohm a lot less harmonics

R9 270
I use 510 Ohm High PA attenuation value.

R10 100

C12 100nF
L2 100 pH
C1 100nF

Q1 PD85004
GND

C9 100nF
L1 100 pH
C2 100nF

Q2 PD85004
GND

DUMP high frequency oscillation when start TX
MY TEST: not noted use ~1-3 Ohm resistor

R7 2K
R5 2K
C13 100nF
C10 100nF
GND GND

RV1 10K
R8 18K
TH1 100K
GND GND

Instead of R8 and TH1
I use 1N4148W with 3.96V of bias.
Very linear current and stable RF power

PIC VREF enable at PTT
+5V
C14 100nF
NOTE:
to improve the IMD we need to bias the two LDMOS separately
GND

FB1 FerriteBead_Small
I used BN43-2402 8 turns
+12V

GND GND GND GND
C6 100nF C5 100nF C4 470uF 16V C3 470uF 16V

R1 1K
TEMPERATURE:
connect the PCB to the case !!

R2 1K
GND

T1 BN43-202
1   5
2
3   4
6 turns
2+2 turns

R17 340
C7 100nF
Avoid LDMOS failure with HIGH SWR
GND

C8 100nF
J1 TX
- Bettter to stay lower than ~27dBm
- 50Mhz useless high IMD low power
GND

IM3 test using Thetis
with bias 4.2V. Use 3.96V!
TX @30dBm 14.1 MHz
|-> 46dBm attenuator
|-> RX1 with DUP active
IM3: -45.5 dBc
TX @27dBm 14.1 MHz
IM3: -51 dBc

R16 50
C26 100nF
VNA
J2 VNA
GND

C19 39 pF
C18 56 pF
C17 12 pF
L5 120 pH
L4 100 pH
L3 150 pH
DAC_TX_FILTERED
C22 75 pF
C21 91 pF
C20 110 pF
C16 91 pF
GND GND GND GND

T3 4MABAES00613
C15 100nF
2
5   1
TC4-1T
GND
GND

a bit better (-2dB IM3)
using TC1-1T
and 50 Ohm for R11

R11 200
DAC_IOUTA
DAC_IOUTB

R20 10K
FPGA_K22-DAC_ALC
C30 100 nF
R21 18K
GND GND

U1 MCP6001-OT
3 + 5
2 - V+ 1
4 V-

R18 2K
R19 2K
C27 100 nF
C28 4.7 uF
DAC_REFIO
GND GND

U2 AD9744
14 D0
13 D1
12 D2
11 D3
10 D4
9 D5
8 D6
7 D7
6 D8
5 D9
4 D10
3 D11
2 D12
1 D13

27 DVDD
24 AVDD

22 IOUTA   DAC_IOUTA
21 IOUTB   DAC_IOUTB
15 SLEEP   GND
25 MODE   GND
18 FS_ADJ   Straight binary
R22 2K Angelia uses 1.8K
17 REFIO   DAC_REFIO
16 REFLO
GND

FPGA_Y22
FPGA_Y21
FPGA_W22
FPGA_W21
FPGA_V22
FPGA_V21
FPGA_U22
FPGA_U21
FPGA_R21
FPGA_R22
FPGA_P21
FPGA_P22
FPGA_N21
FPGA_N22

28 CLK
FPGA_T22-T21-T20

20 AGND
26 DGND
GNDGND