Hermes-Lite

ENTRY-LEVEL SDR? WELLICHT.

MAAR… MAXI-FUN HAM-RADIO VOOR EEN MINI-PRIJS ☺

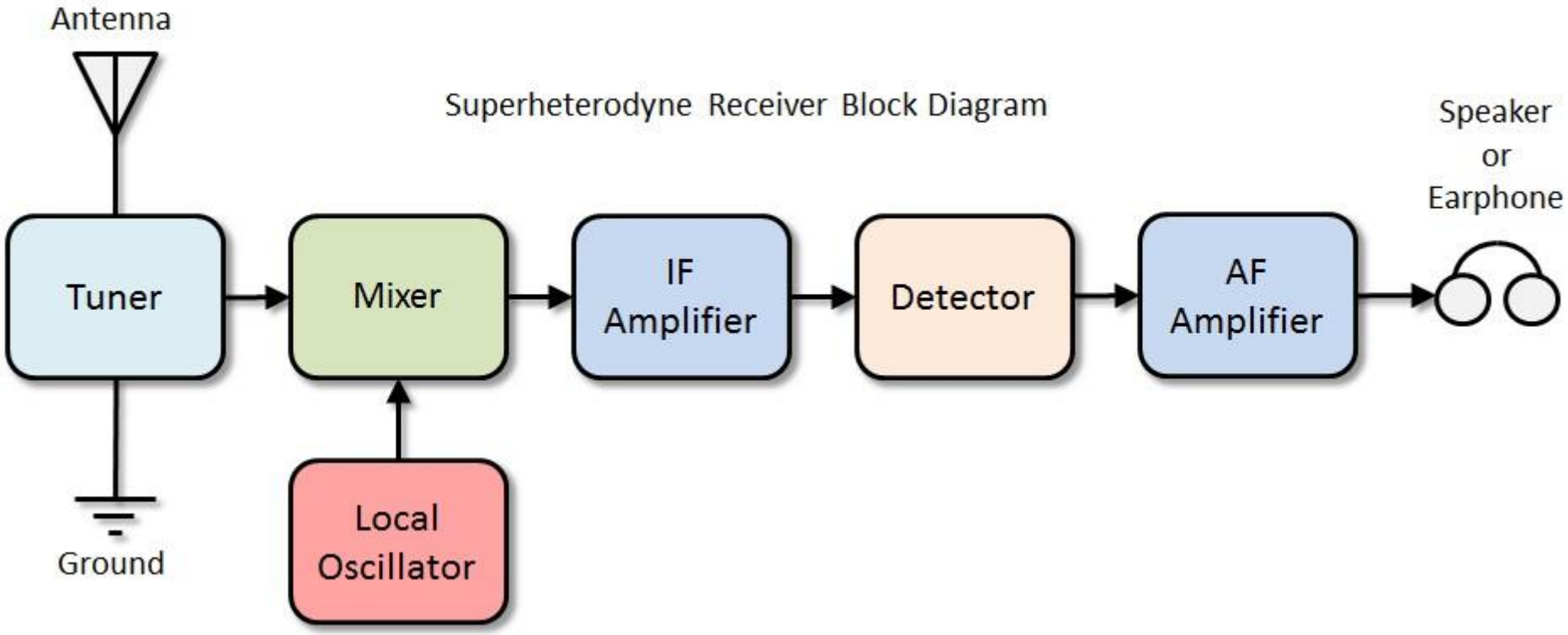
PRESENTATIE VOOR RF-WEBINARS DOOR C.J. ROSELAAR, PA3FUN. VERSIE 0.3

Hermes-Lite: agenda

Onderwerpen/agenda:

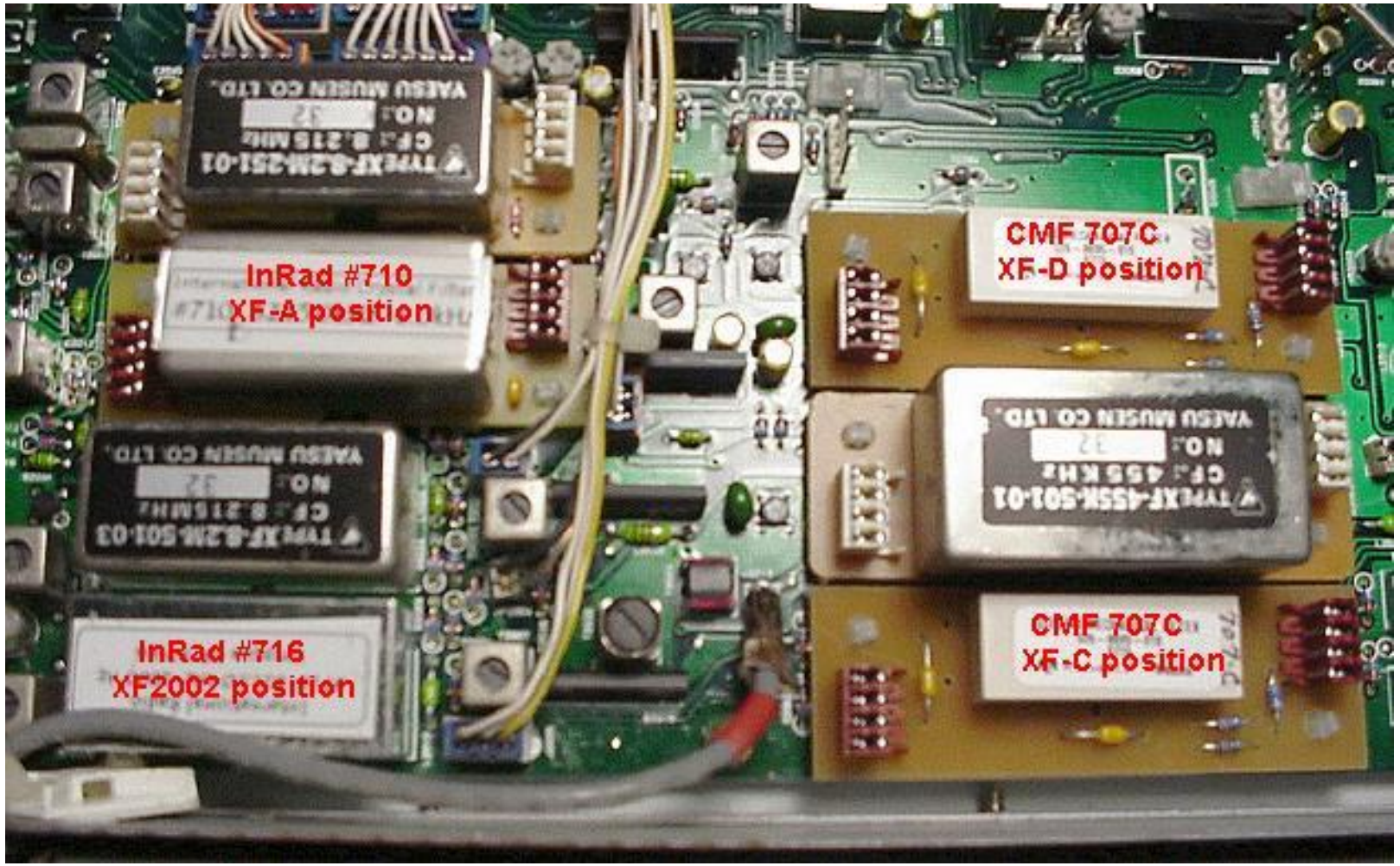
1. Software Defined Radio vs. Hardware Defined Radio
2. Hermes-Lite: hardware-ontwerp & interfaces
3. SDR software overzicht & demo
4. Naar de knoppen ..
5. CW & SDR
6. S9 of S9+: “Boots” voor de Hermes-Lite
7. Digimodes
8. Build your own station: key ingredients
9. Remote operation
10. Bestellen: hoe/waar?

Hardware Defined Radio

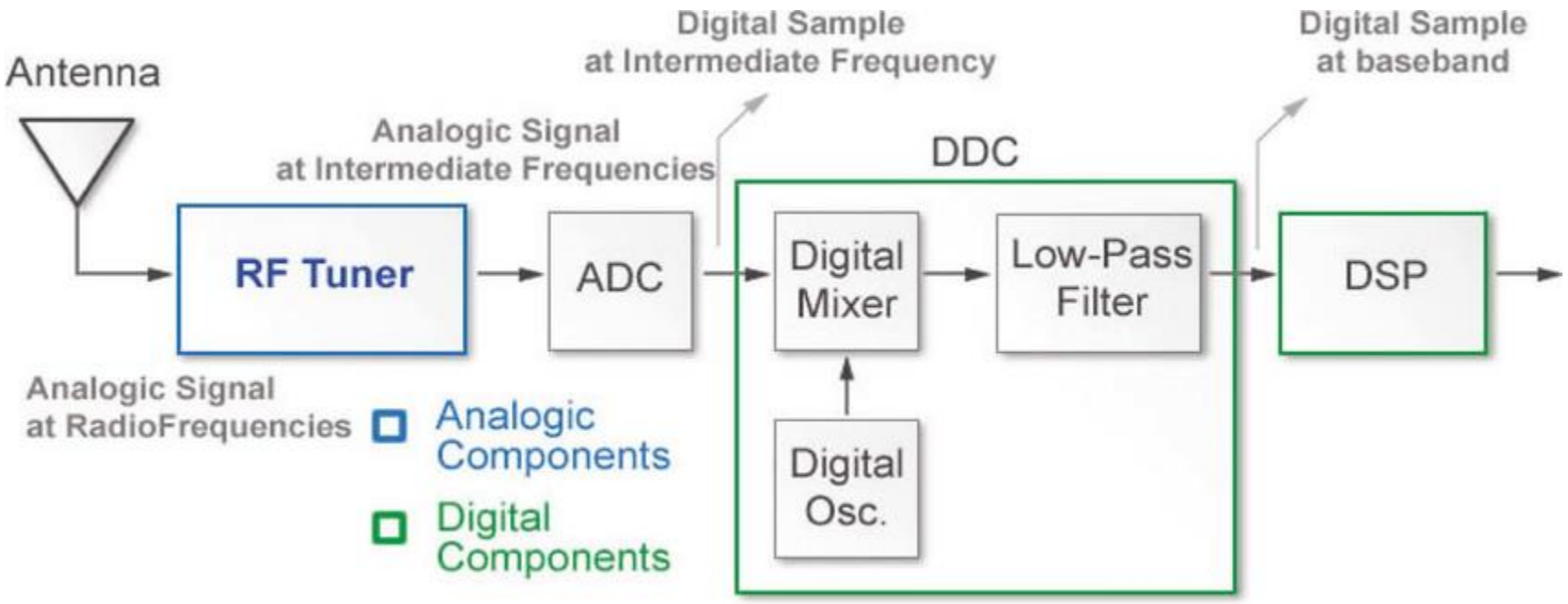


Hardware Defined Radio

Hardware Defined Radio



Software Defined Radio



Software Defined Radio #1

Elad FDM-DUO: €1.175

Software Defined Radio #2

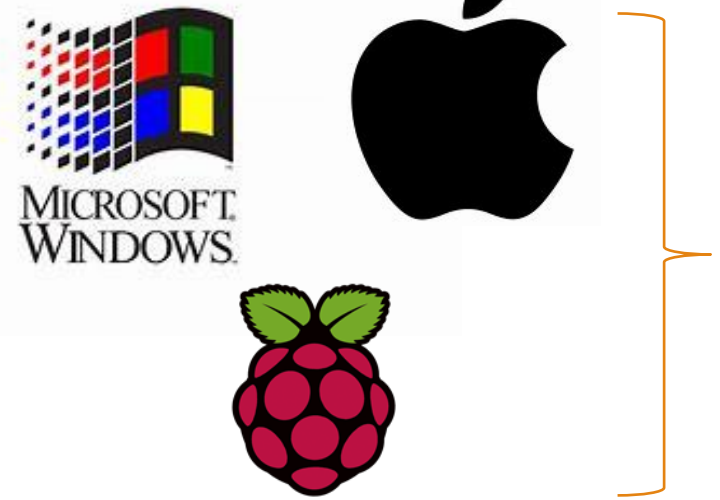
SunSDR MB1: €6.370

Software Defined Radio #3

Front End ⟺ Back End

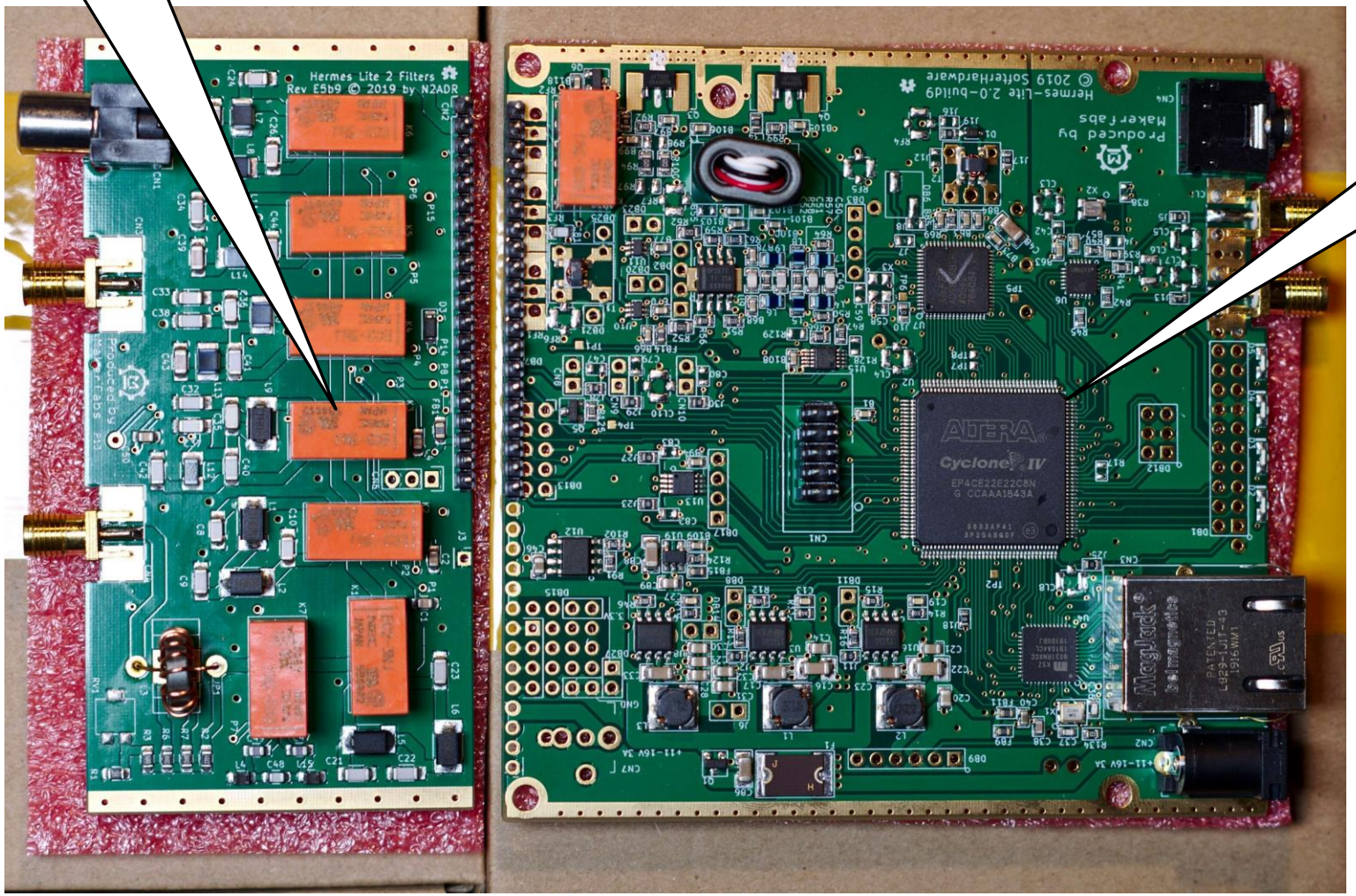
Hermes-Lite: € 350

€ 0 ?



Hermes-Lite 2

N2ADR
Filter board
US$ 52,70



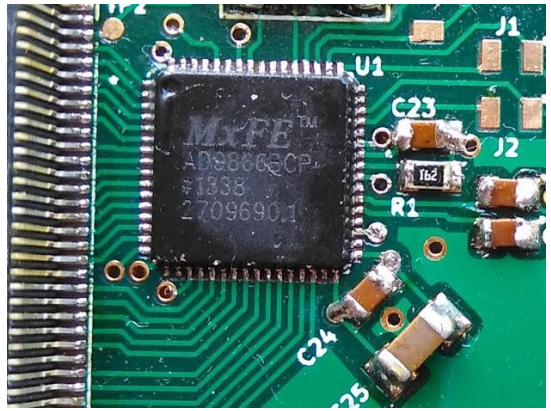
Hermes-Lite 2
Main board
US$ 225,70

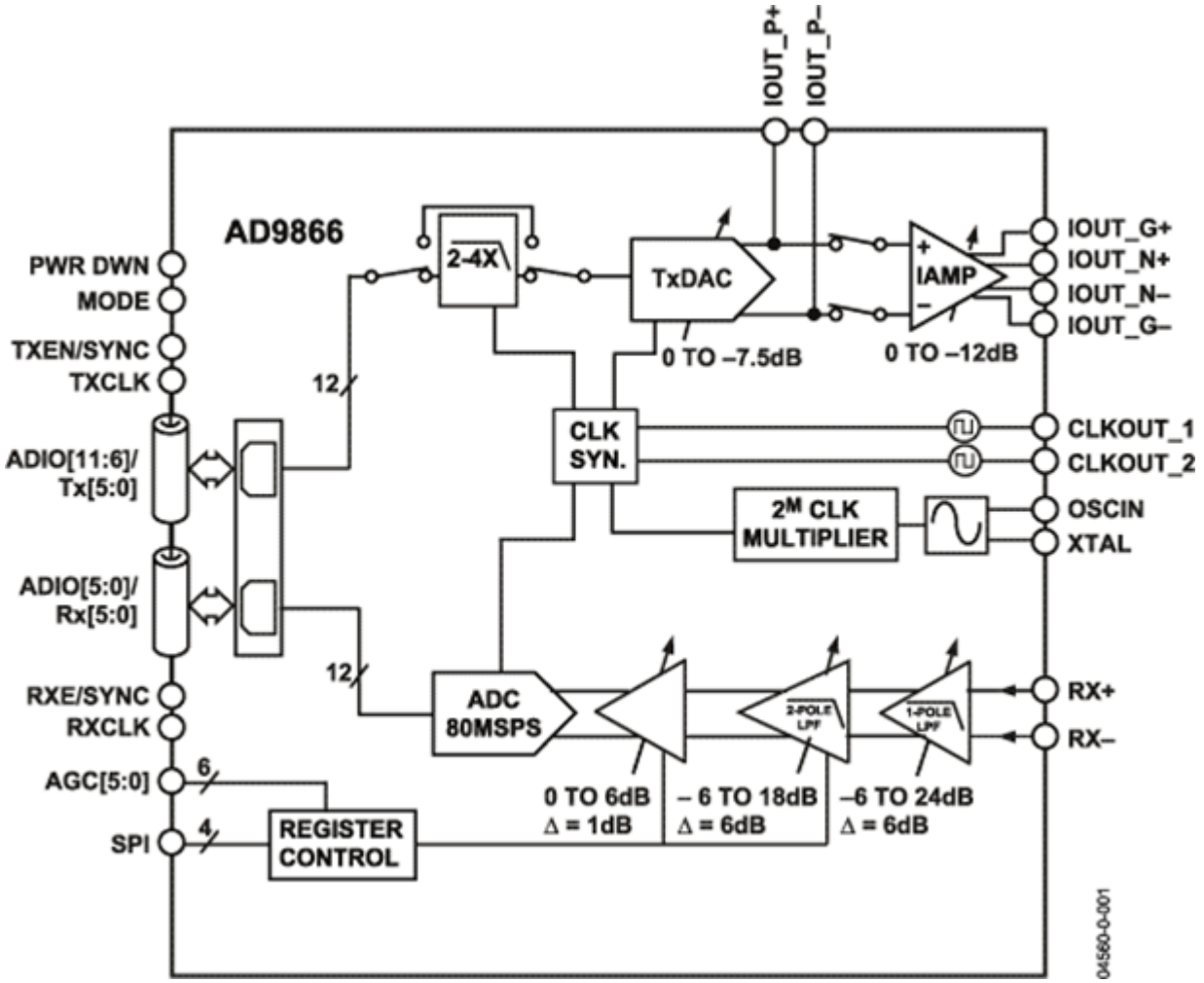
Behuizing
US$ 16,90

Hermes-Lite: A/D-koppelvlak

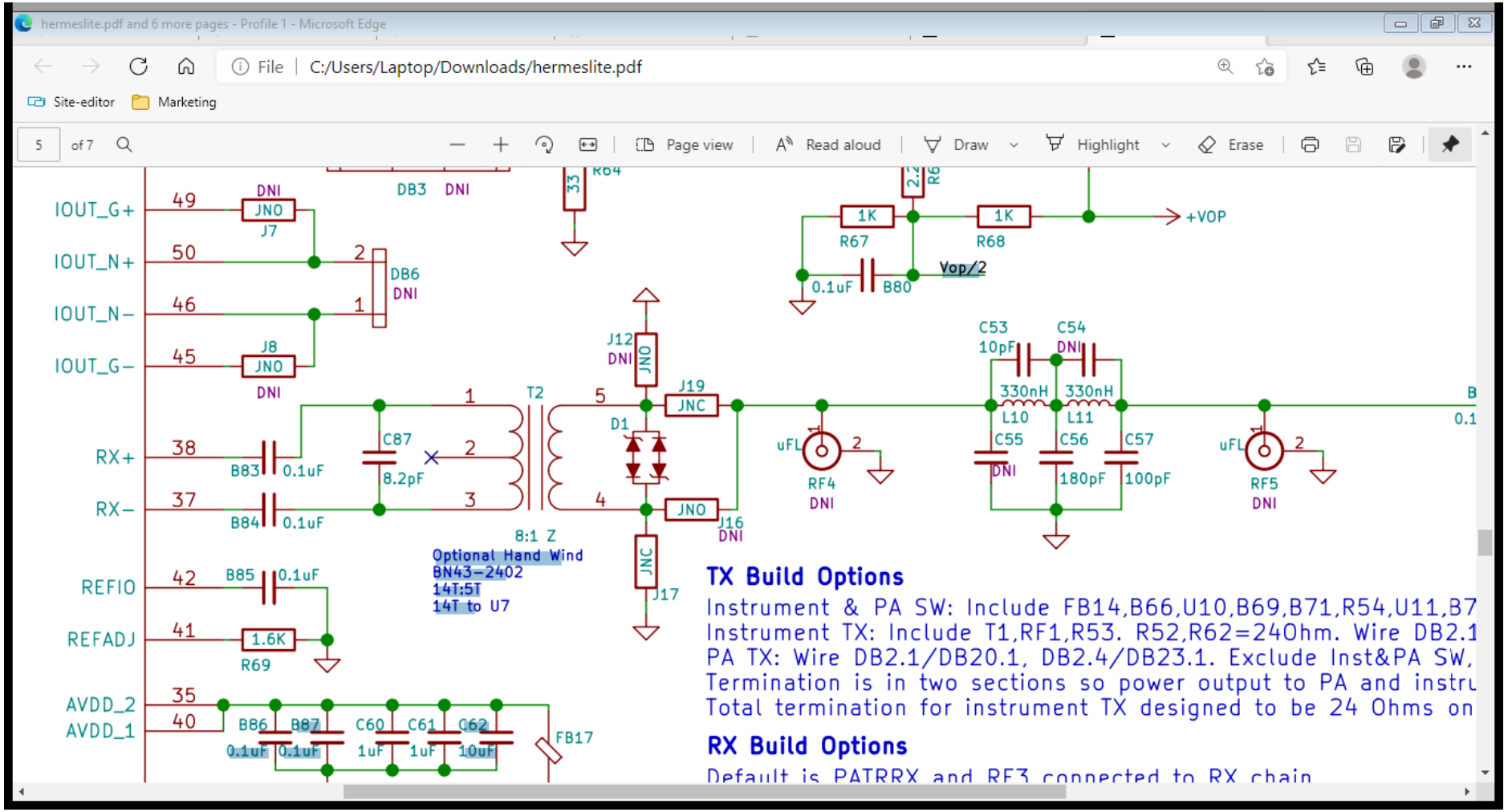
ADC/DAC:
Analog Devices AD9866
(Kabelmodem IC ….)

1. 12bits AD/DA converters
2. 80MHz sample rate

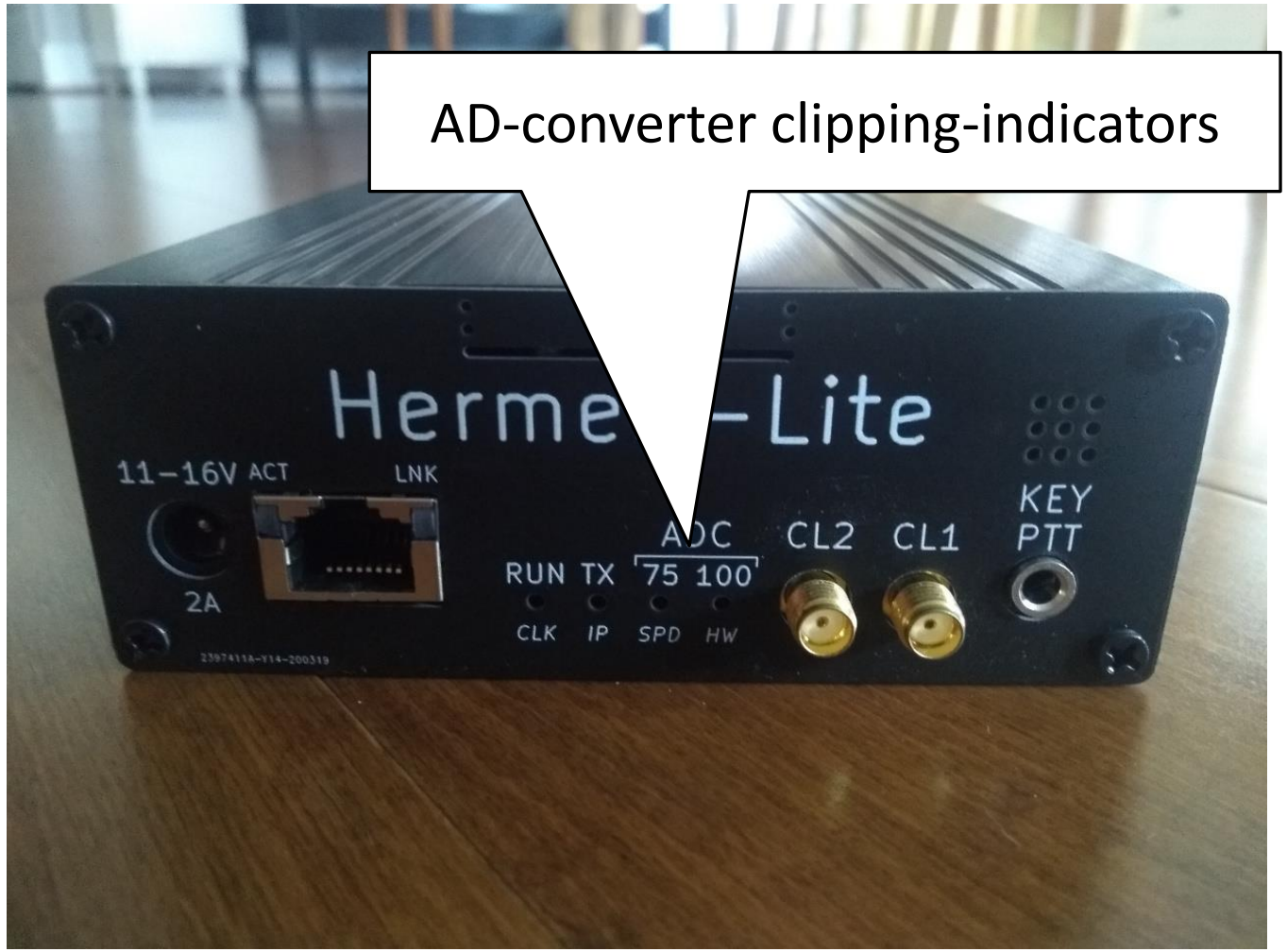




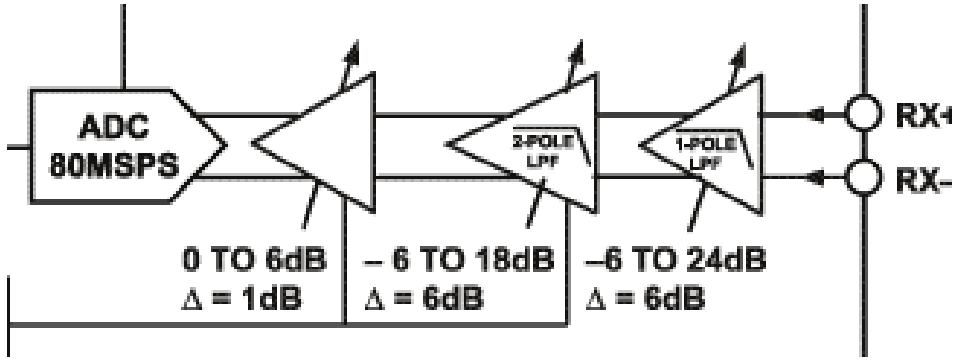
Hermes-Lite: RX Front End



Hermes-Lite: RX Front End

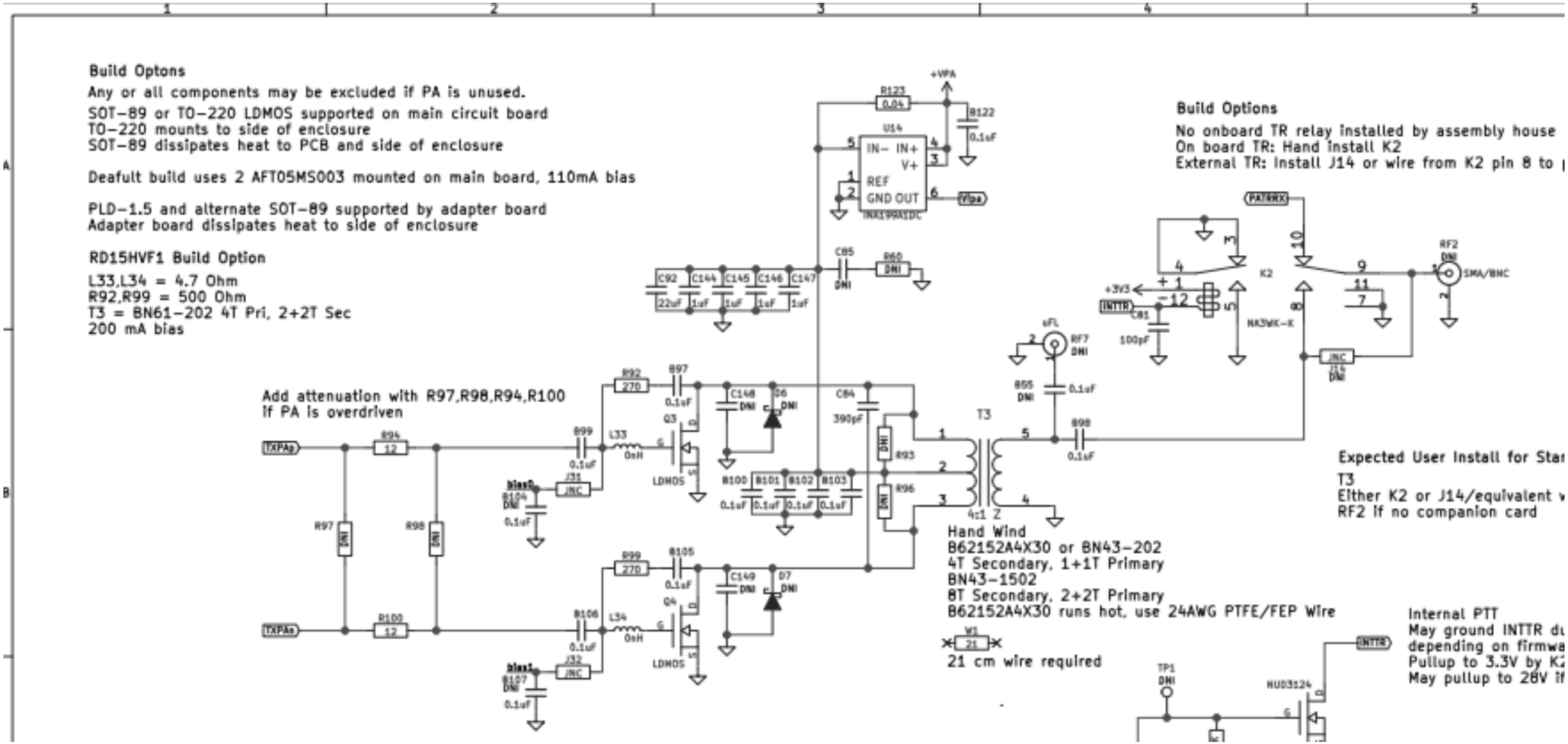


AD9866 Analog Input



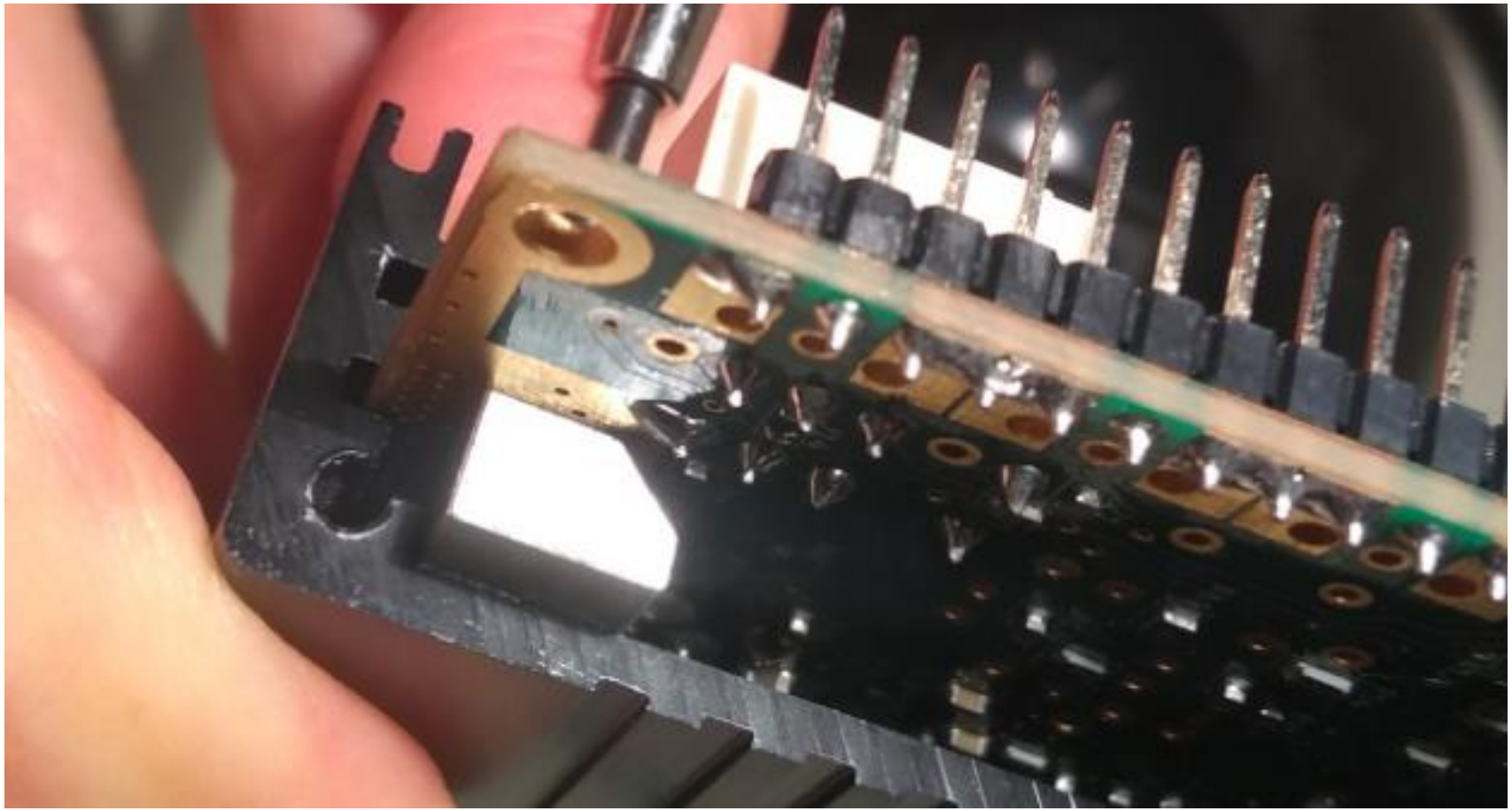
Regelbereik: 60dB
(-12dB tot +48dB)

Hermes-Lite: TX “Front” End

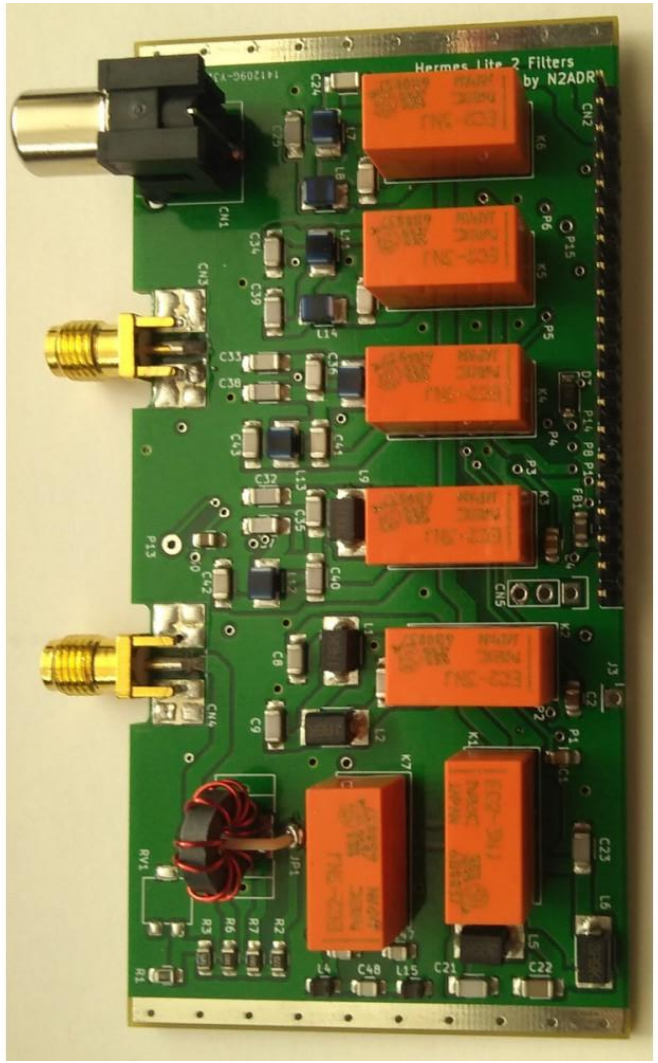


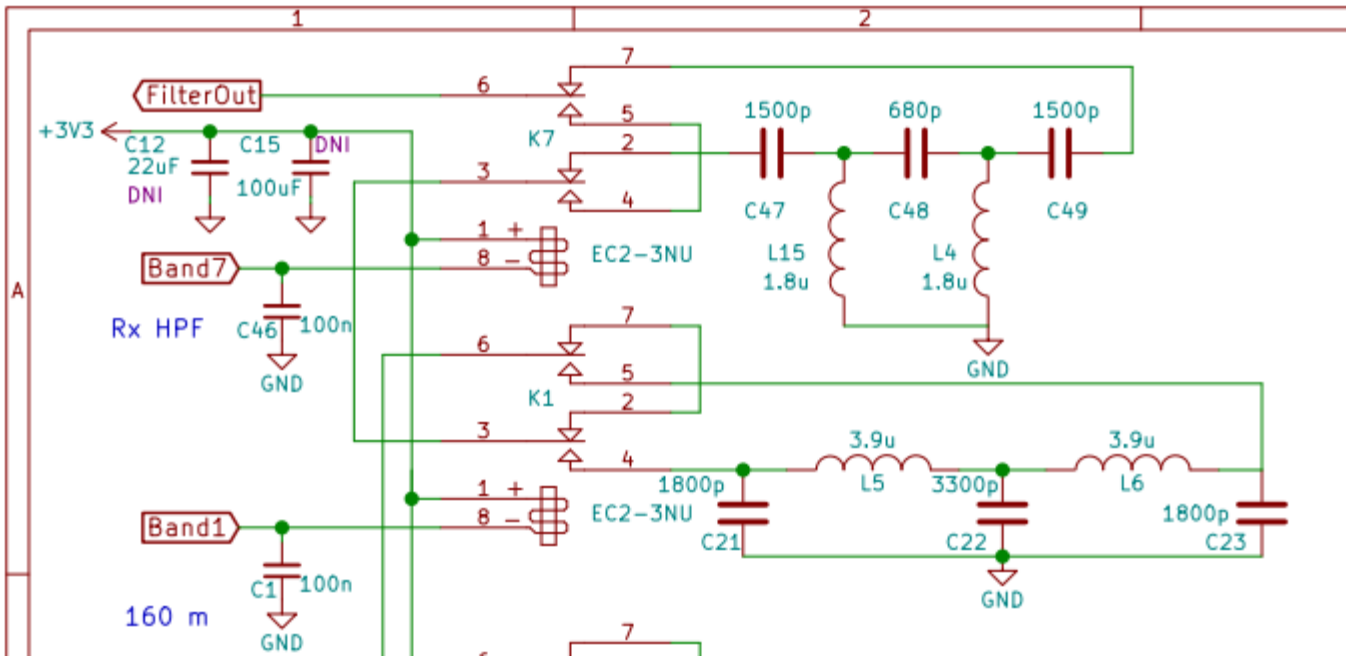
Hermes-Lite: PA (5 Watt)

Hermes-Lite: PA koeling

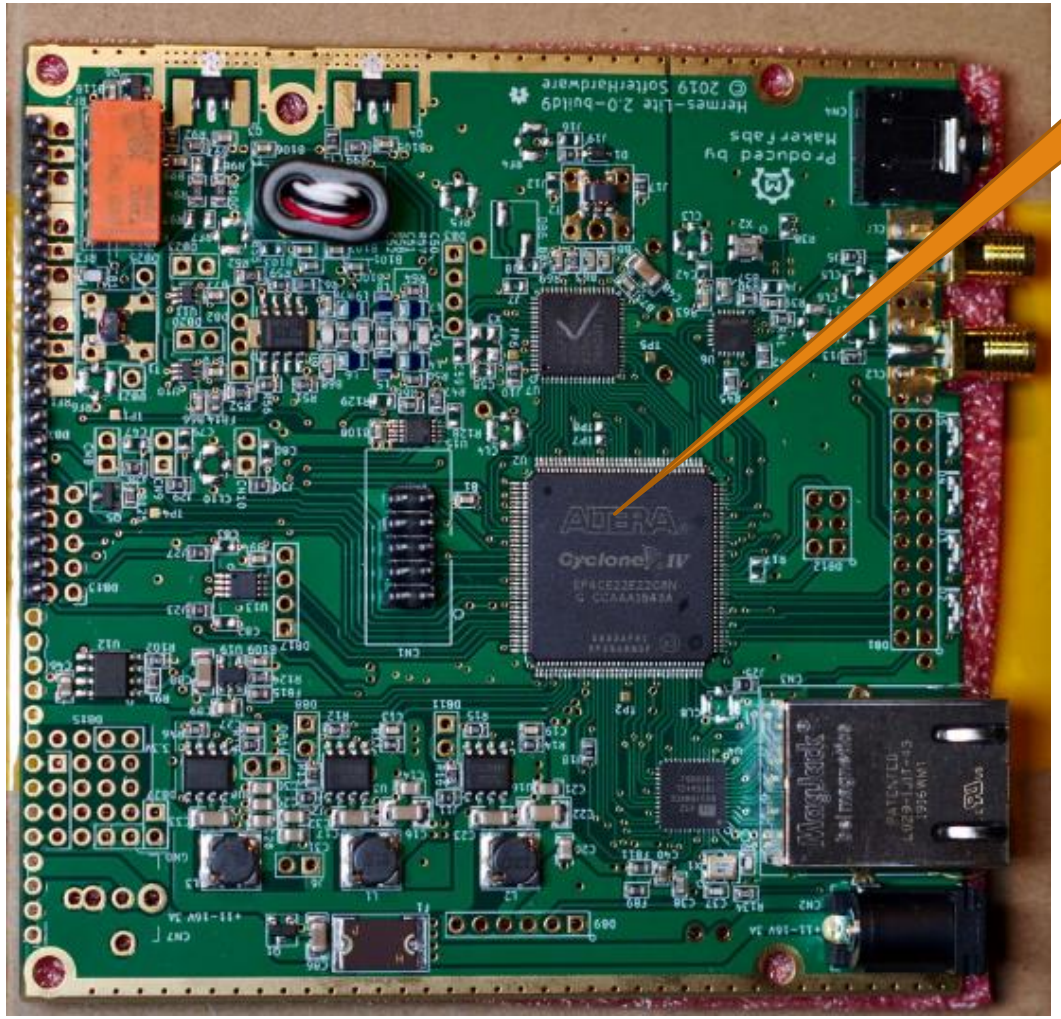


Hermes-Lite: N2ADR filter board



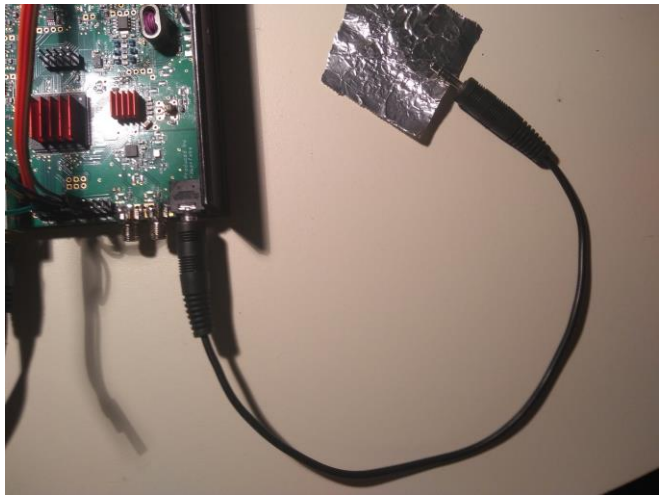


Hermes-Lite: “Gateware”



“Gateware”: de software in de FPGA

- Af fabriek versie 70p0
- Te flashen m.b.v. Quisk&SparkSDR
- Altijd fall back mogelijk!



Hermes-Lite based SDR

Front End

Back End

I/Q samples

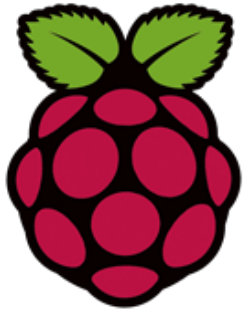
Commands: Frequency Sample rate

UTP/10Mb/100Mb/1Gb Ethernet

OpenHPSDR protocol

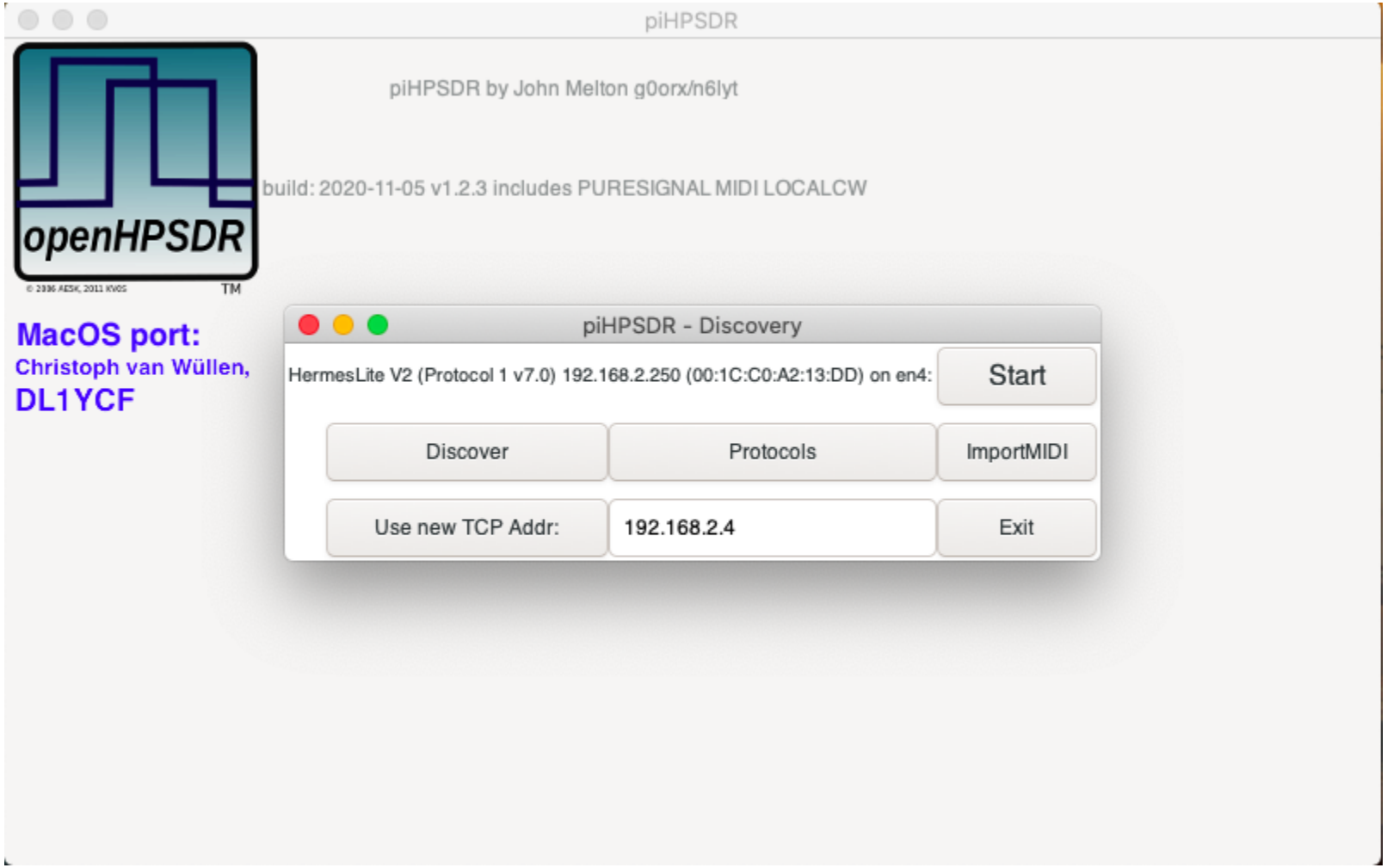
CC BY NC

SDR software

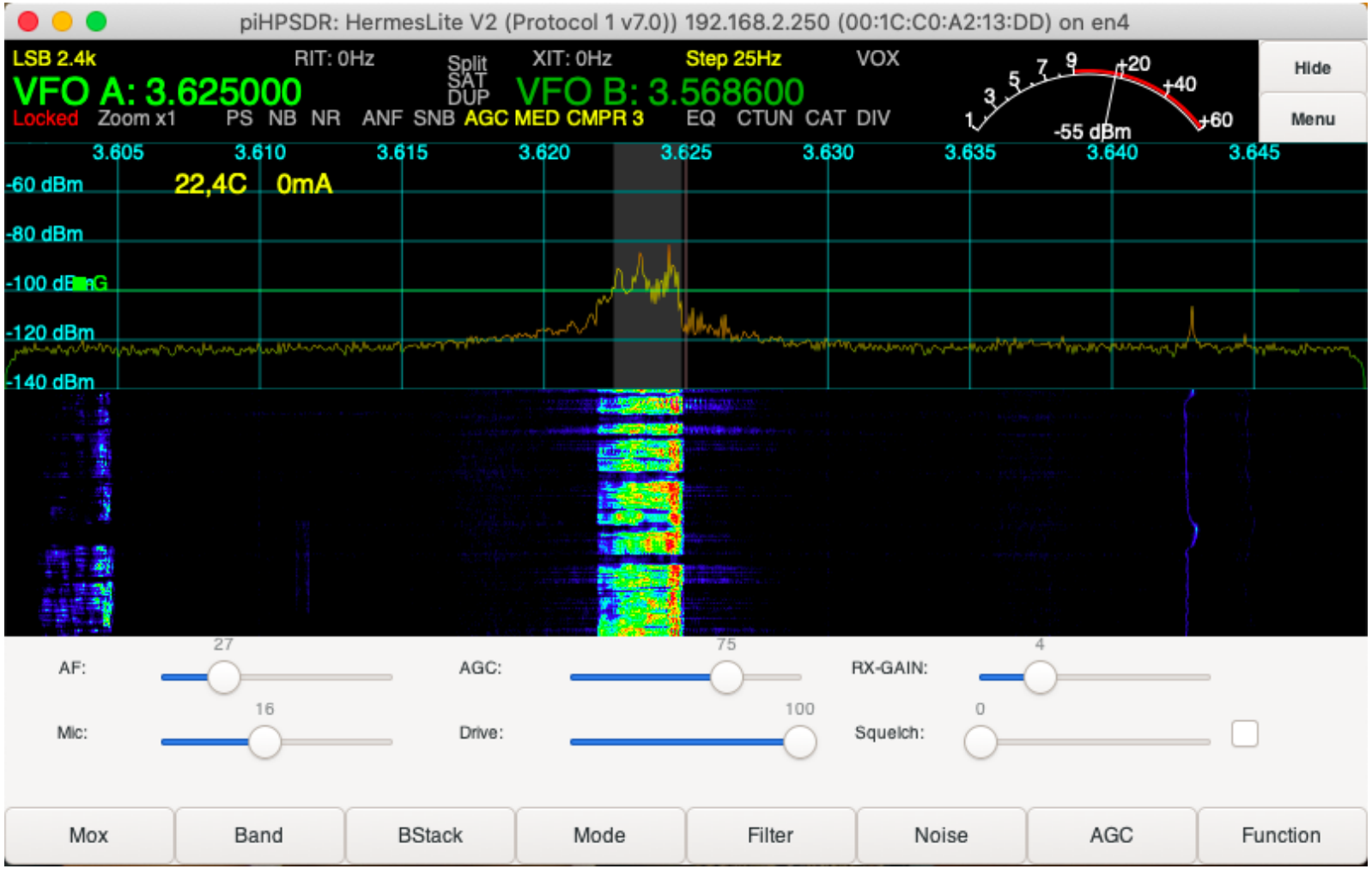


Windows	Raspberry Pi	MacOS(/Linux)
Thetis	piHPSDR	piHPSDR
PowerSDR	Quisk?	SparkSDR
SDR Console	LinHPSDR?	LinHPSDR
SDR#		GNU Radio
GNU Radio		Quisk?
Quisk		

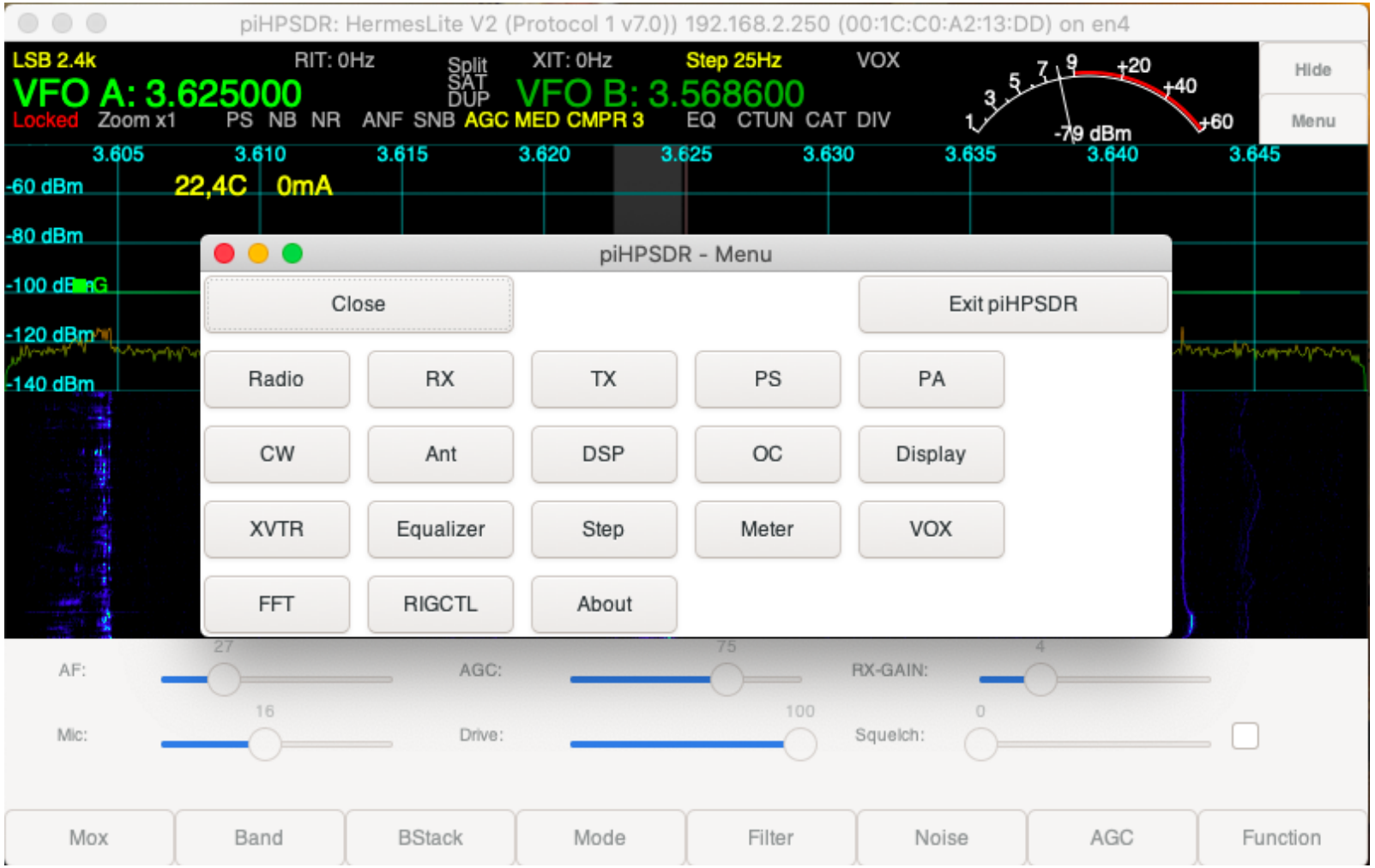
SDR software: piHPSDR #1

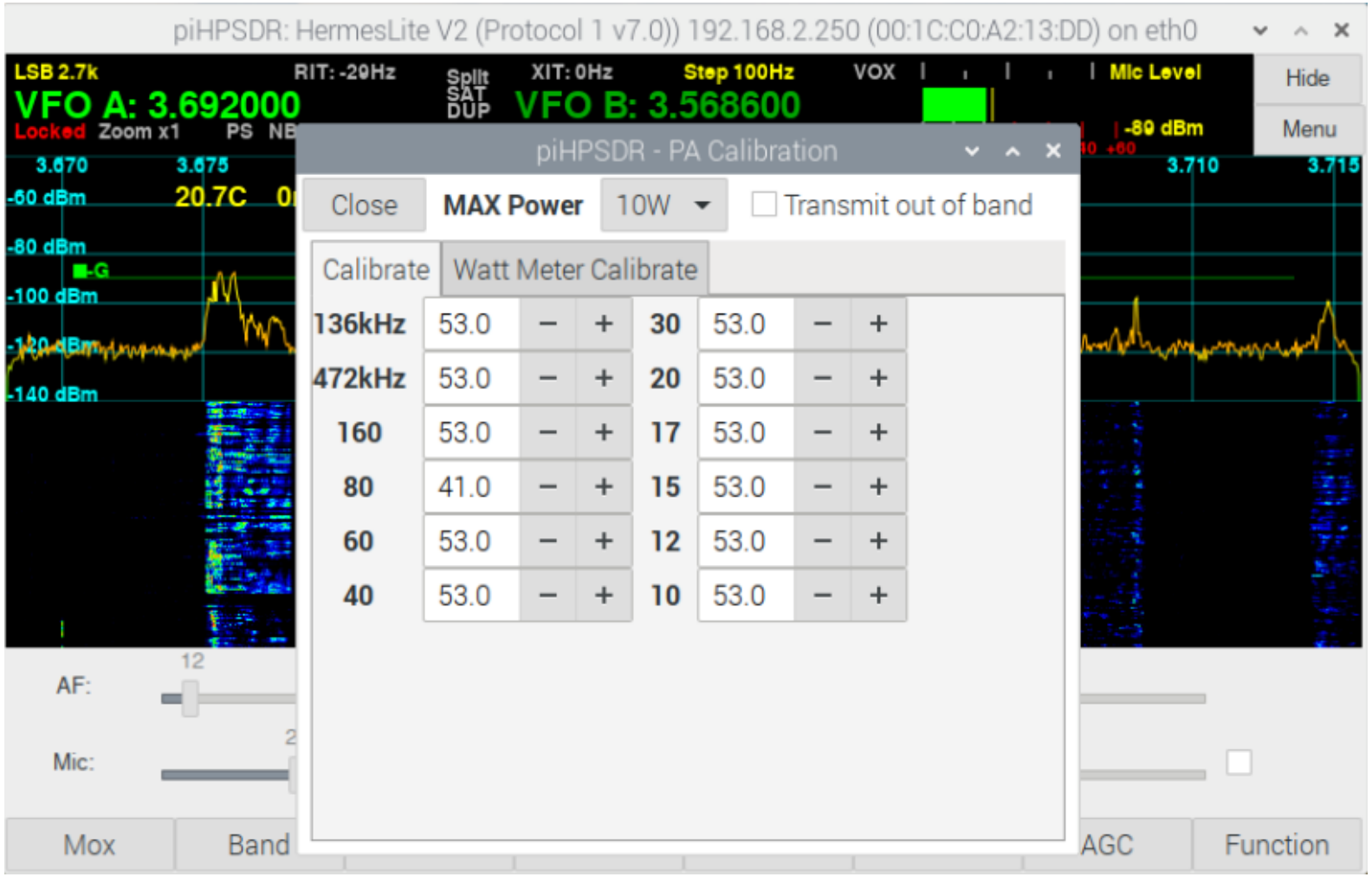


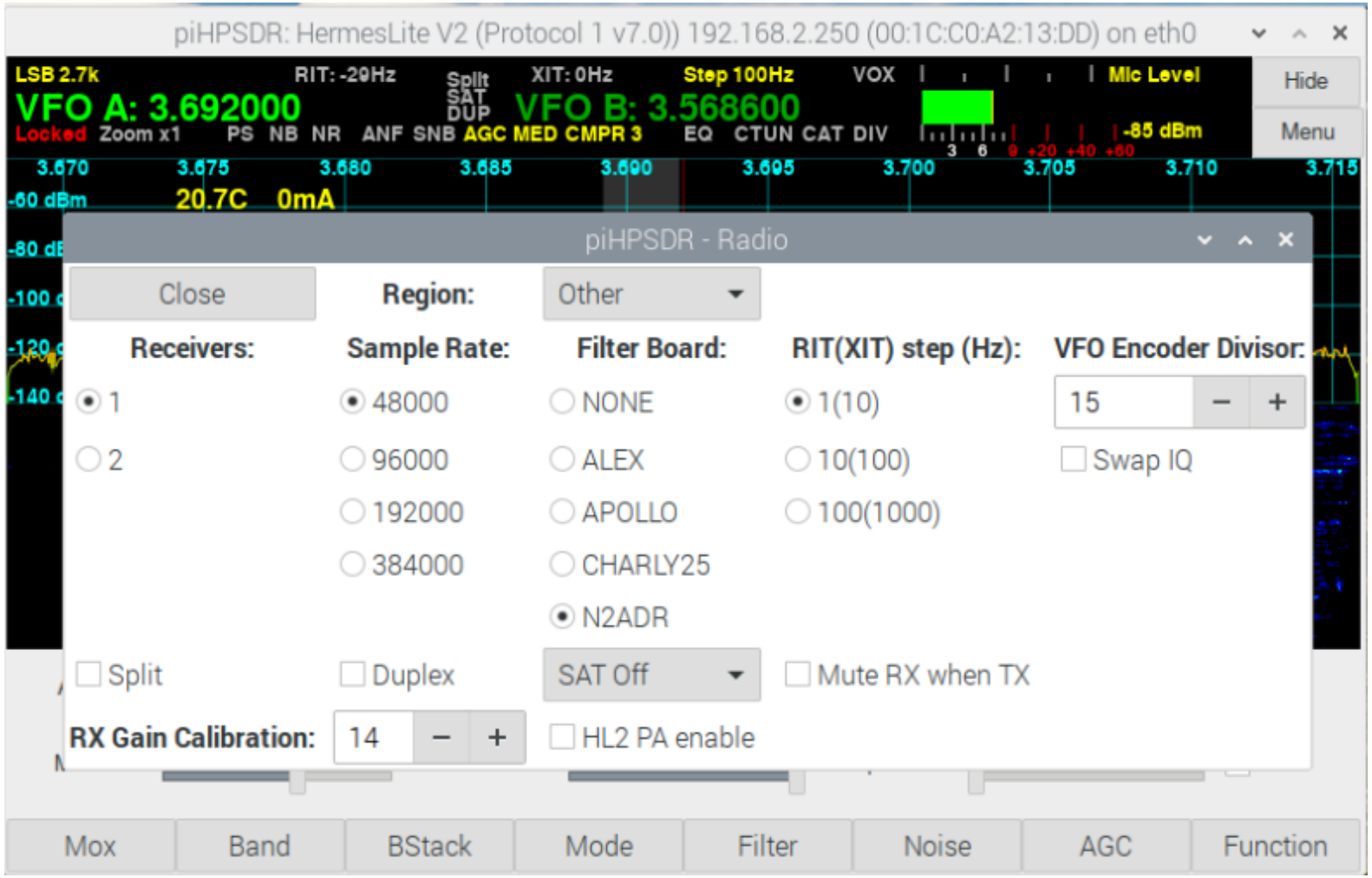
SDR software: piHPSDR #2

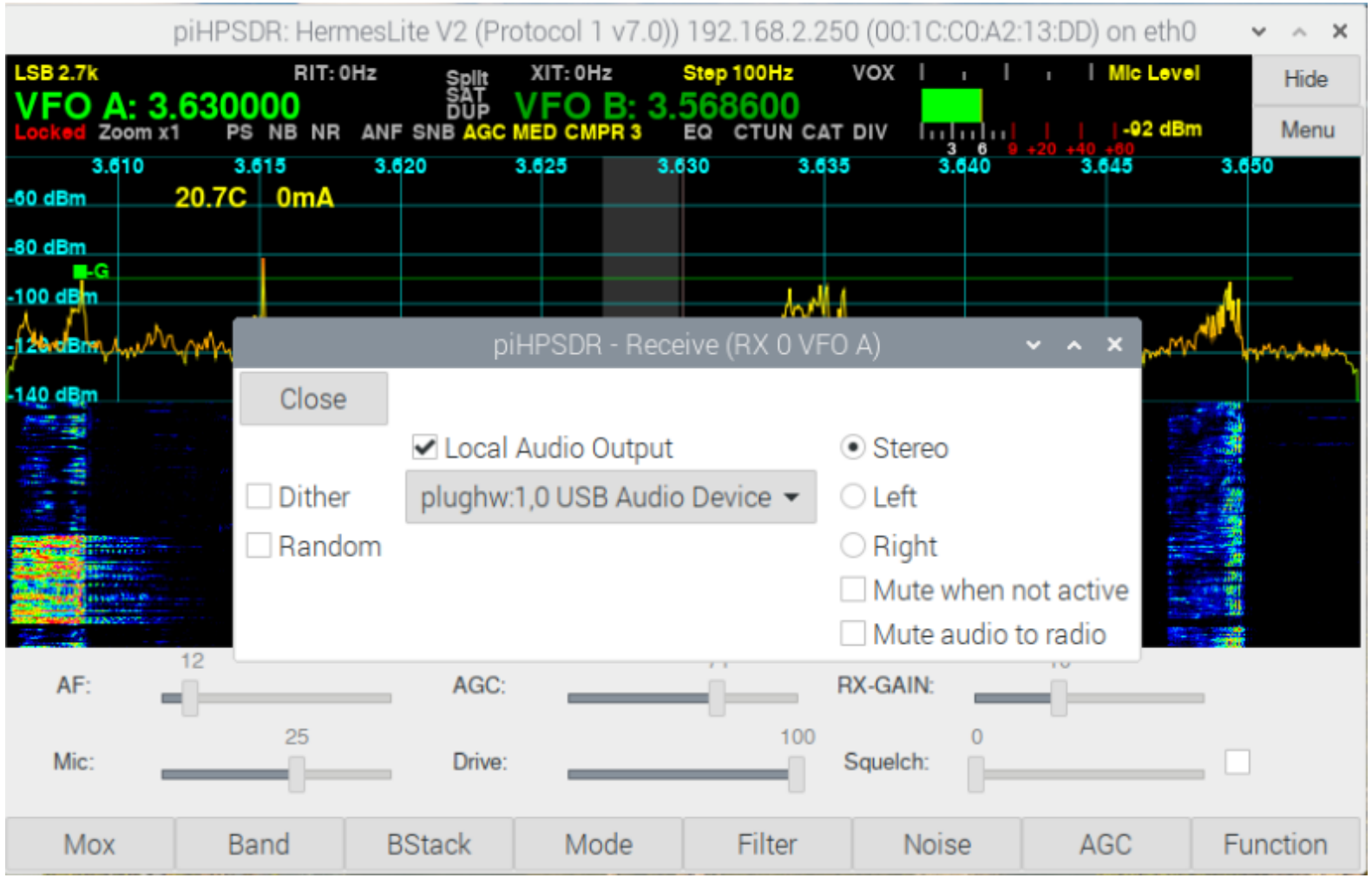


SDR software: piHPSDR #3




piHPSDR: HermesLite V2 (Protocol 1 v7.0)) 192.168.2.250 (00:1C:C0:A2:13:DD) on eth0
LSB 2.7k
RIT: -20Hz
Split
SAT
DUP
XIT: 0Hz
Step 100Hz
VOX
Mic Level
VFO A: 3.692000
VFO B: 3.568600
Locked
Zoom x1
PS
Hide
Menu
-80 dBm
3.670
3.675
3.710
3.715
20.7C
-60 dBm
-80 dBm
-100 dBm
-140 dBm
piHPSDR - PA Calibration
Close
MAX Power
10W
Transmit out of band
Calibrate
Watt Meter Calibrate
136kHz 53.0
472kHz 53.0
160 53.0
80 41.0
60 53.0
40 53.0
30 53.0
20 53.0
17 53.0
15 53.0
12 53.0
10 53.0
AF:
Mic:
Mox
Band
AGC
Function

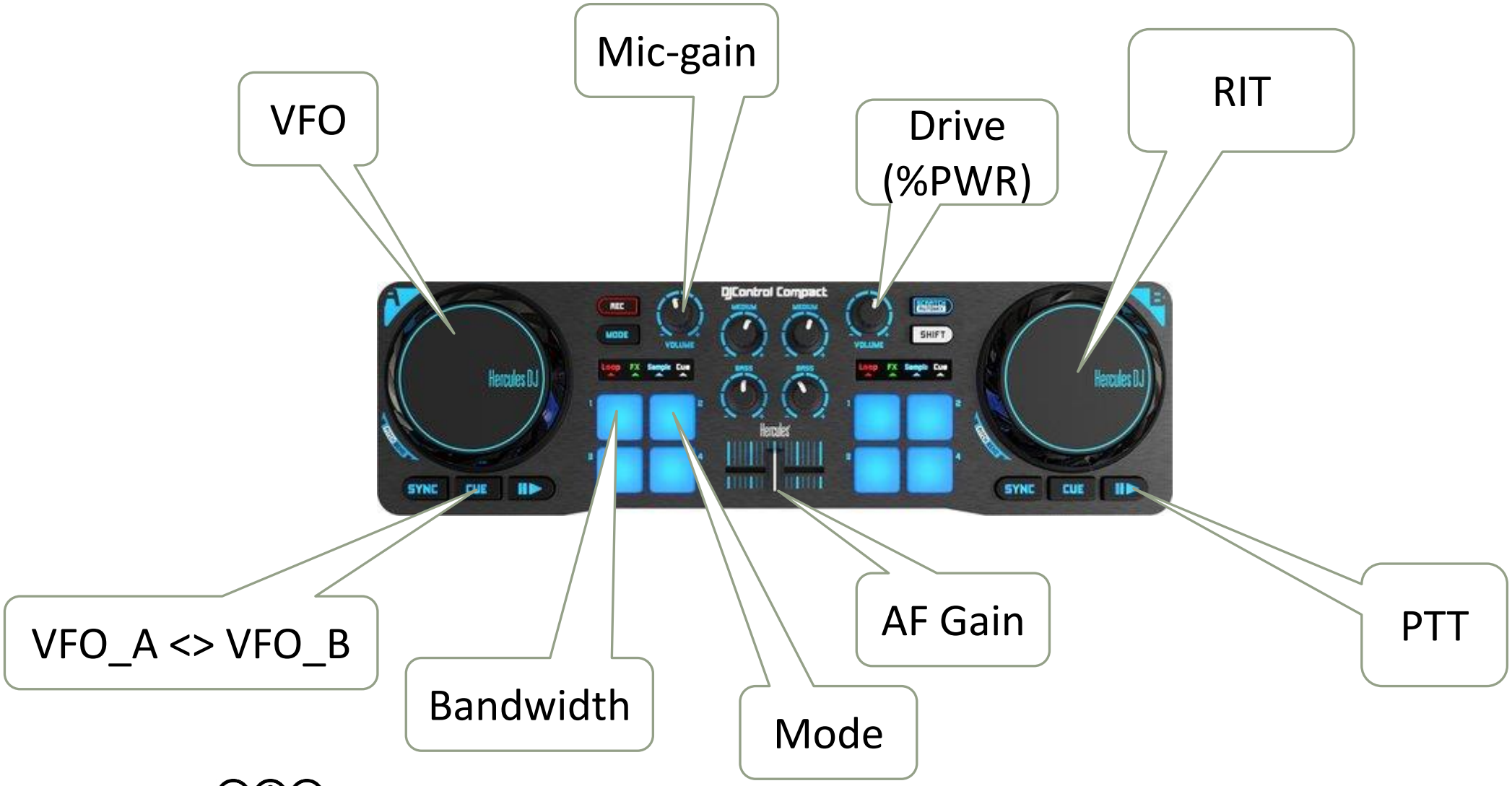

piHPSDR: HermesLite V2 (Protocol 1 v7.0)) 192.168.2.250 (00:1C:C0:A2:13:DD) on eth0
LSB 2.7k
RIT: -20Hz
Split
SAT
DUP
XIT: 0Hz
Step 100Hz
VOX
Mic Level
Hide
VFO A: 3.692000
VFO B: 3.568600
Locked
Zoom x1
PS NB NR ANF SNB AGC MED CMPR 3 EQ CTUN CAT DIV
-85 dBm
Menu
3.670
3.675
3.680
3.685
3.690
3.695
3.700
3.705
3.710
3.715
-60 dBm
20.7C 0mA
piHPSDR - Radio
Close
Region:
Other
Receivers:
Sample Rate:
Filter Board:
RIT(XIT) step (Hz):
VFO Encoder Divisor:
1
2
48000
96000
192000
384000
NONE
ALEX
APOLLO
CHARLY25
N2ADR
1(10)
10(100)
100(1000)
15
Swap IQ
Split
Duplex
SAT Off
Mute RX when TX
RX Gain Calibration:
14
HL2 PA enable
Mox
Band
BStack
Mode
Filter
Noise
AGC
Function


piHPSDR: HermesLite V2 (Protocol 1 v7.0)) 192.168.2.250 (00:1C:C0:A2:13:DD) on eth0
LSB 2.7k
RIT: 0Hz
Split
SAT
DUP
XIT: 0Hz
Step 100Hz
VOX
Mic Level
Hide
VFO A: 3.630000
VFO B: 3.568600
Locked Zoom x1 PS NB NR ANF SNB AGC MED CMPR 3 EQ CTUN CAT DIV
-02 dBm
Menu
3.610 3.615 3.620 3.625 3.630 3.635 3.640 3.645 3.650
20.7C 0mA
-60 dBm
-80 dBm
-100 dBm
-140 dBm
piHPSDR - Receive (RX 0 VFO A)
Close
Local Audio Output
Dither
Random
plughw:1,0 USB Audio Device
Stereo
Left
Right
Mute when not active
Mute audio to radio
AF:
AGC:
RX-GAIN:
Mic:
Drive:
Squelch:
Mox
Band
BStack
Mode
Filter
Noise
AGC
Function

SDR software: piHPSDR demo

piHPSDR “naar de knoppen”

piHPSDR “naar de knoppen”



Hermes-Lite & CW

3.5mm 3-pins:

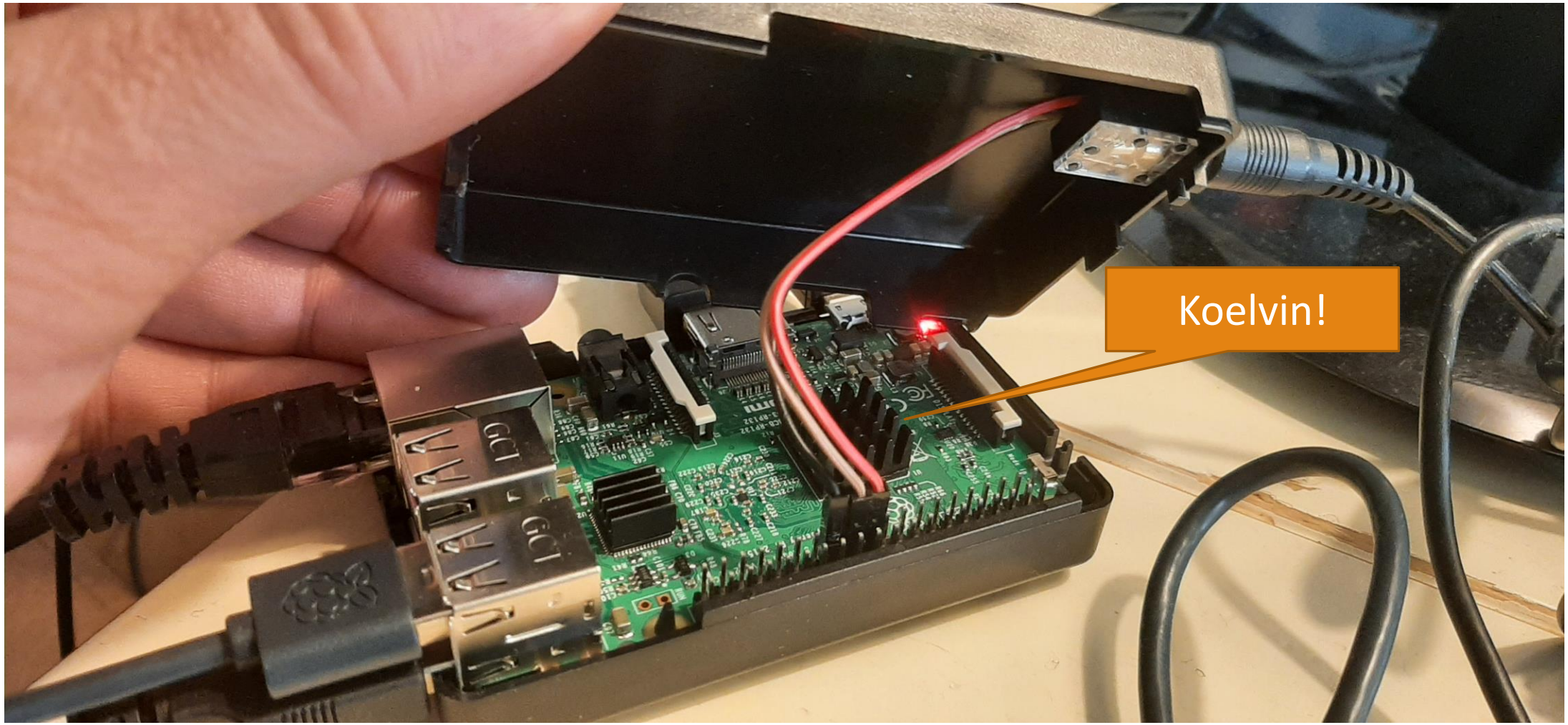
- GND
- PTT
- CW

- ❑Straight key support only!
- ❑No side tone in Front End

piHPSDR CW #1

IF RaspberryPi THEN

piHPSDR CW #1

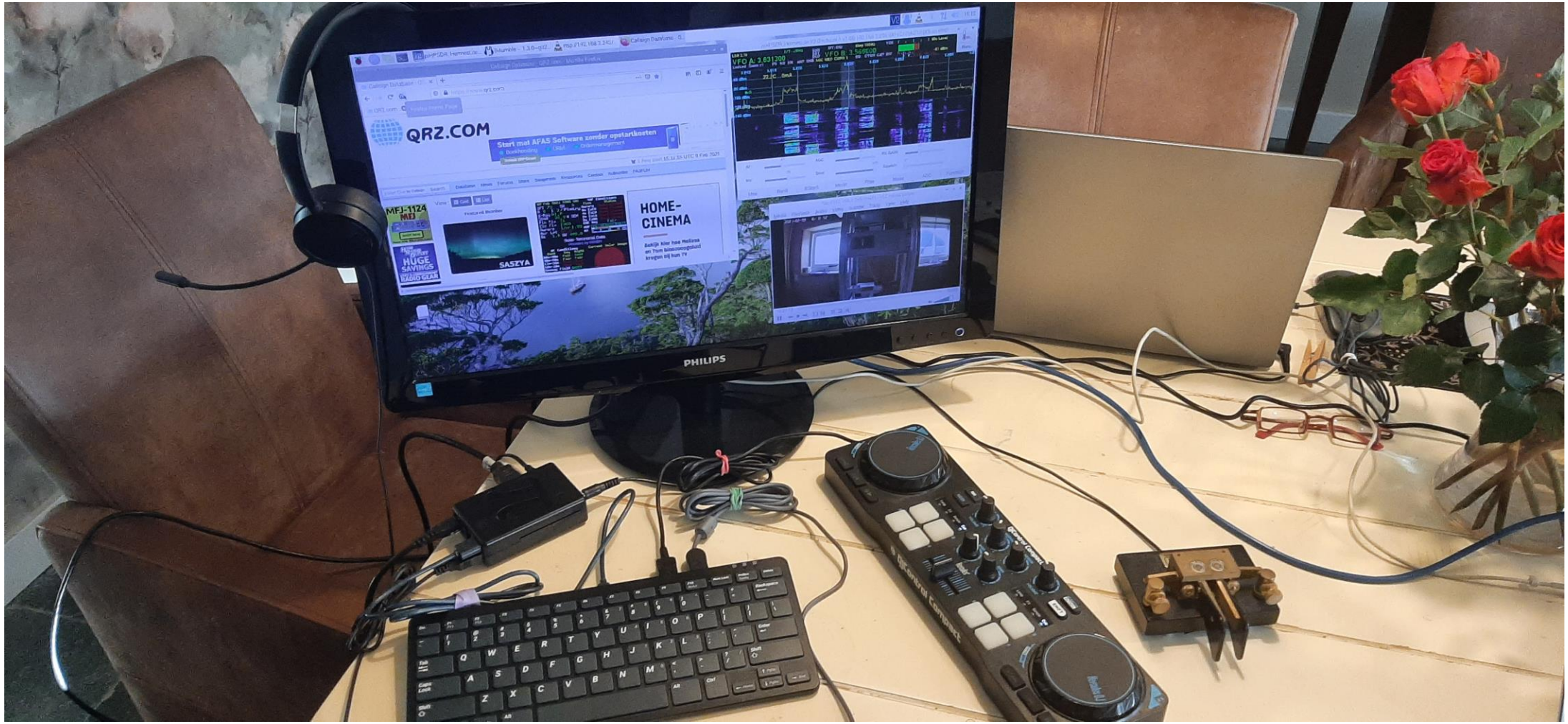


“remote” operation (LAN)

Keuken voor in de boerderij (warm/gezellig)

Shack, achter in de boerderij (KOUD!!)

“remote” operation (LAN)



“remote” operation (LAN)

Arduino Uno CW- Interface

“Boots” voor de Hermes-Lite

Pure Signal (Optional)

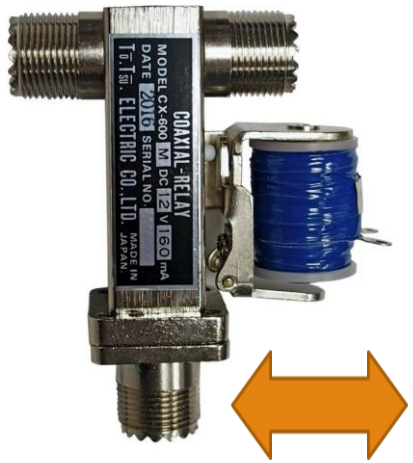
DB15 (PA-interface)

PA_KEY_DOWN (<28V, <100mA)

TX: Pout = 17dBm (max)

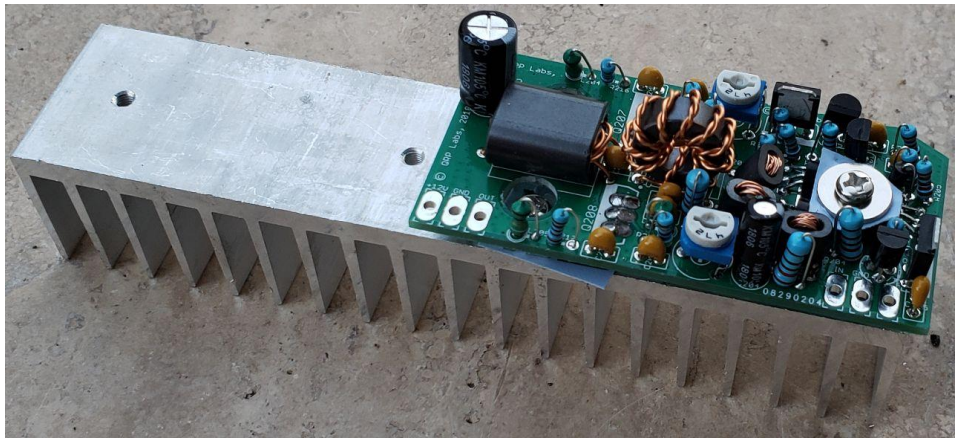
TX/RX: Pout = 37dBm (max)

“2nd hand Boots”



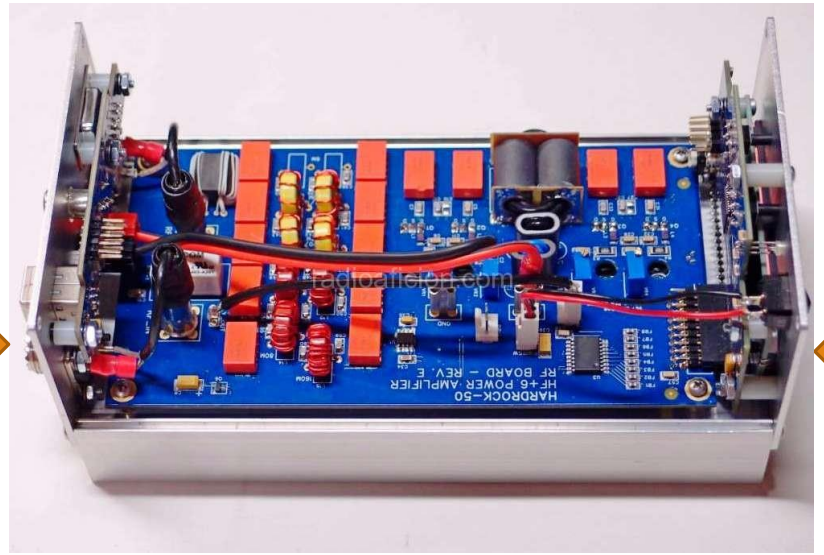
Rohde&Schwarz VK-213
50mWatt + 33dB => 100Watt
(www.vebeg.de)

“new Boots” #1



QRP-Labs 10W HF Linear PA
50mWatt + 26dB => 20Watt
(US$26, no LPF…)

“new Boots” #2



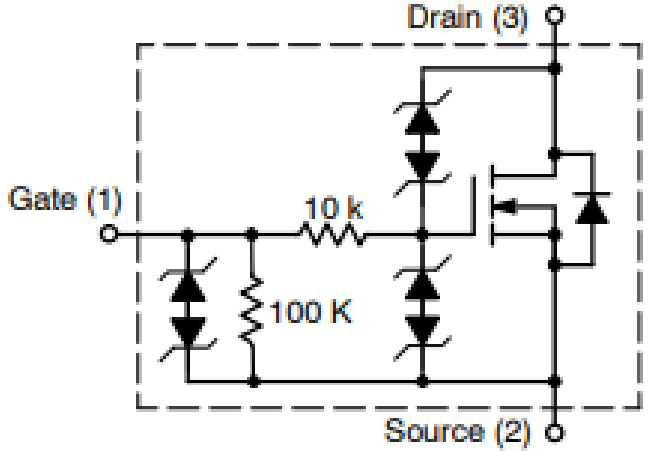
Hardrock-50 Linear PA
5Watt + ~10dB => 50Watt
(US$299)

Hermes-Lite / Boots / Key Down

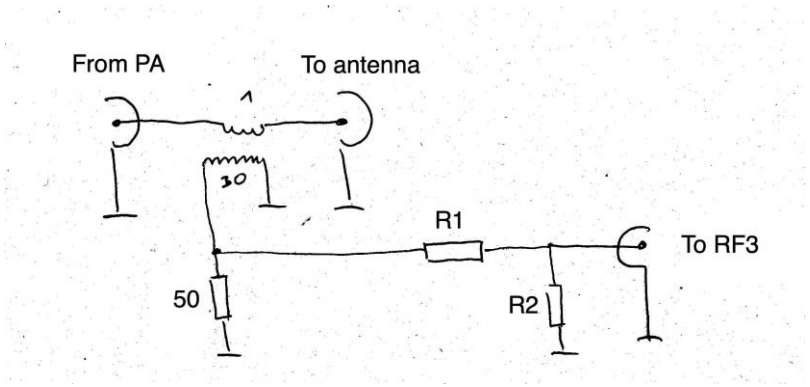
NUD3124, SZNUD3124

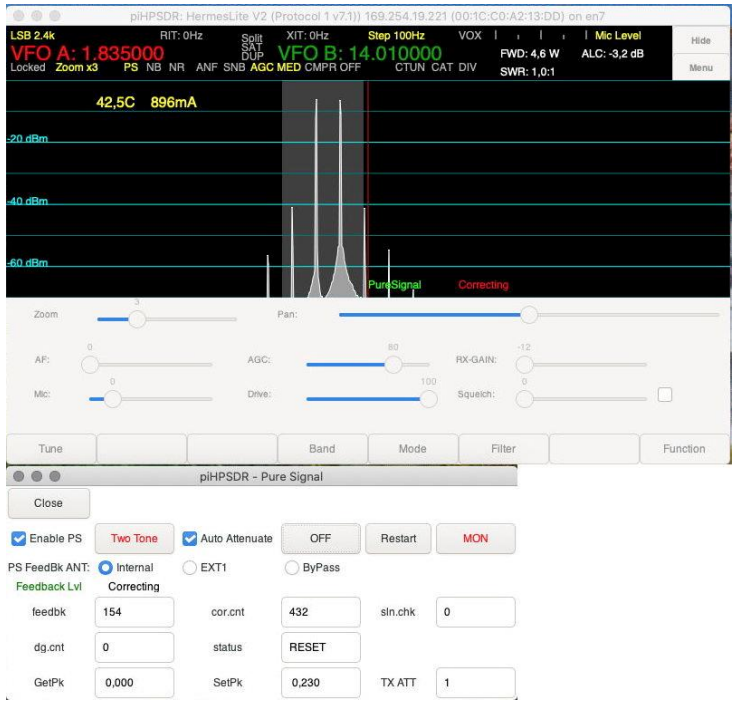
Automotive Inductive Load Driver

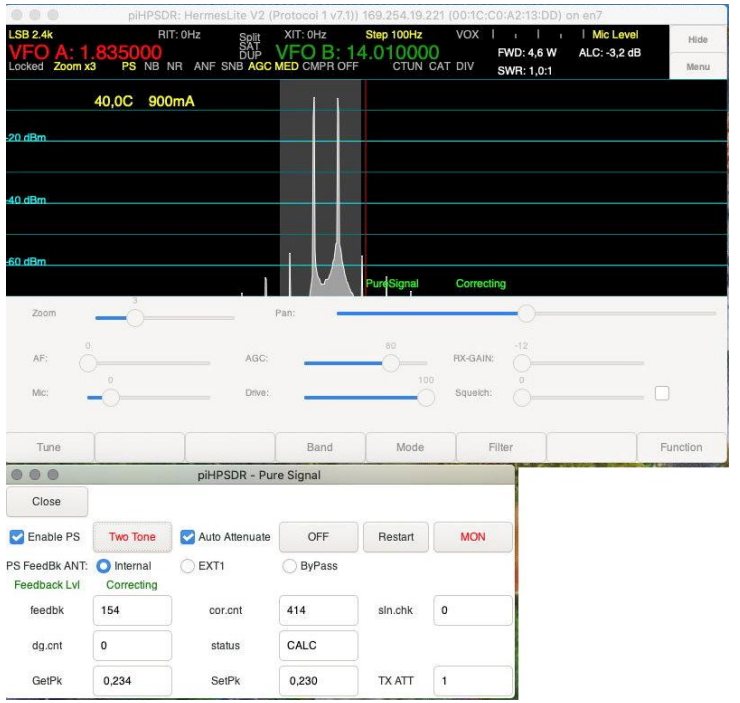
This micro−integrated part provides a single component solution to switch inductive loads such as relays, solenoids, and small DC motors without the need of a free−wheeling diode. It accepts logic level inputs, thus allowing it to be driven by a large variety of devices including logic gates, inverters, and microcontrollers.



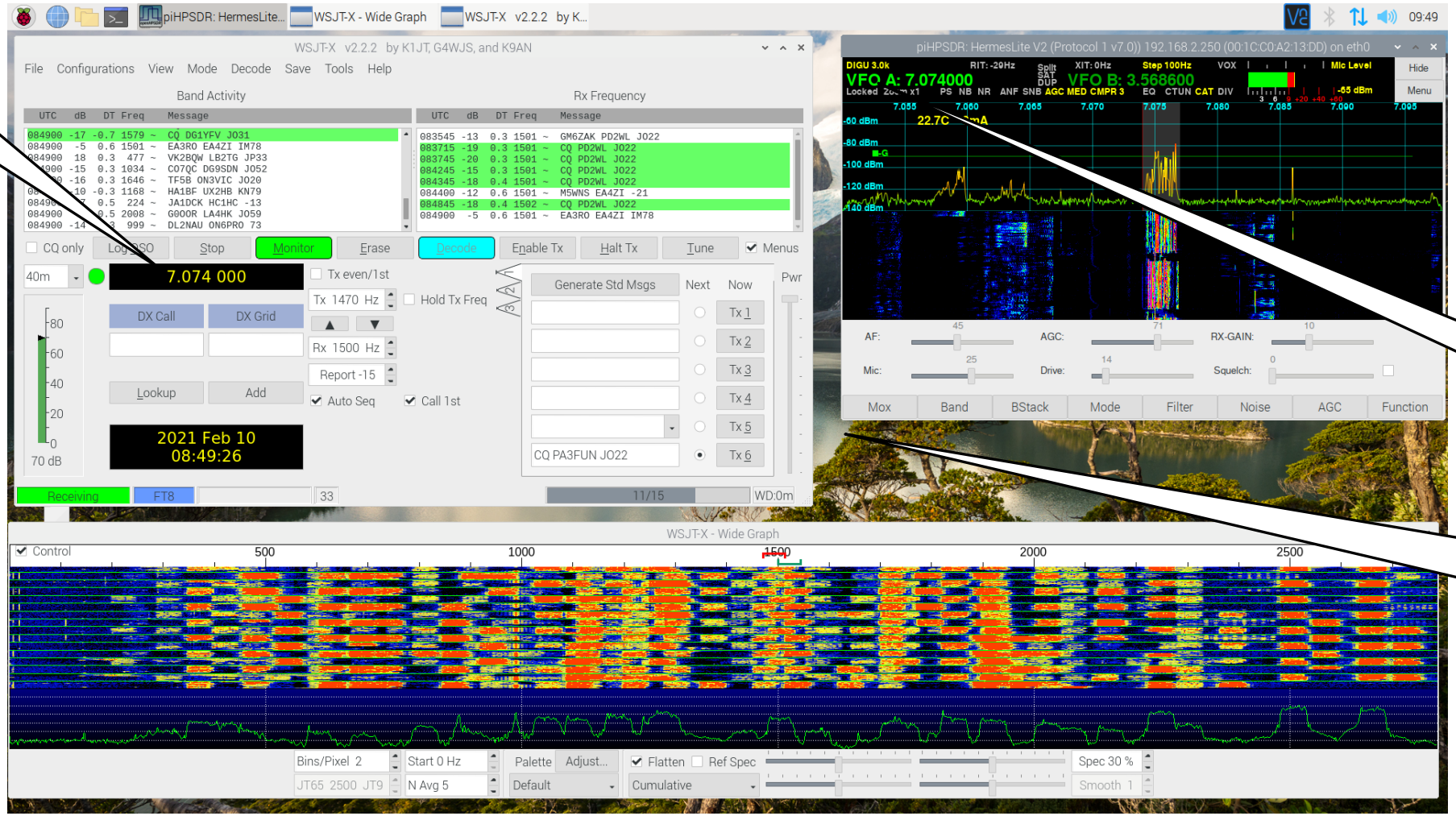
Hermes-Lite / Boots / Pure Signal







piHPSDR & Digimodes



HL2-station ingredients …

SD-card met:

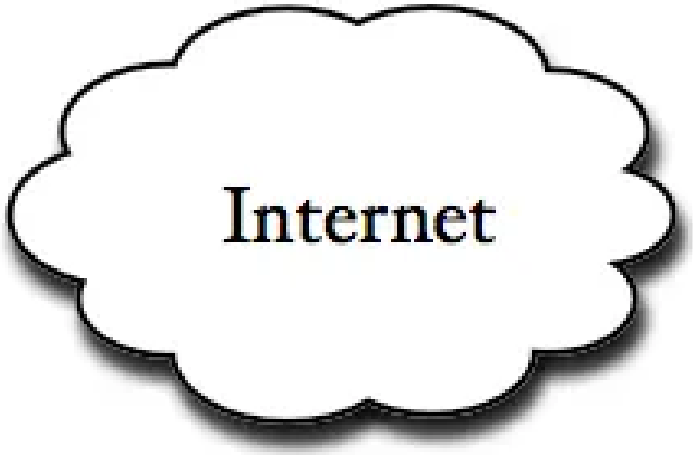
- OS (Raspbian)
- piHPSDR
- WSJT-X
- Mumble (client)
- VNC

N7DDC A.T.U.

Remote Operation (Internet)

Thuis S9+ storing? Geen plek voor een antenne? Werk remote!

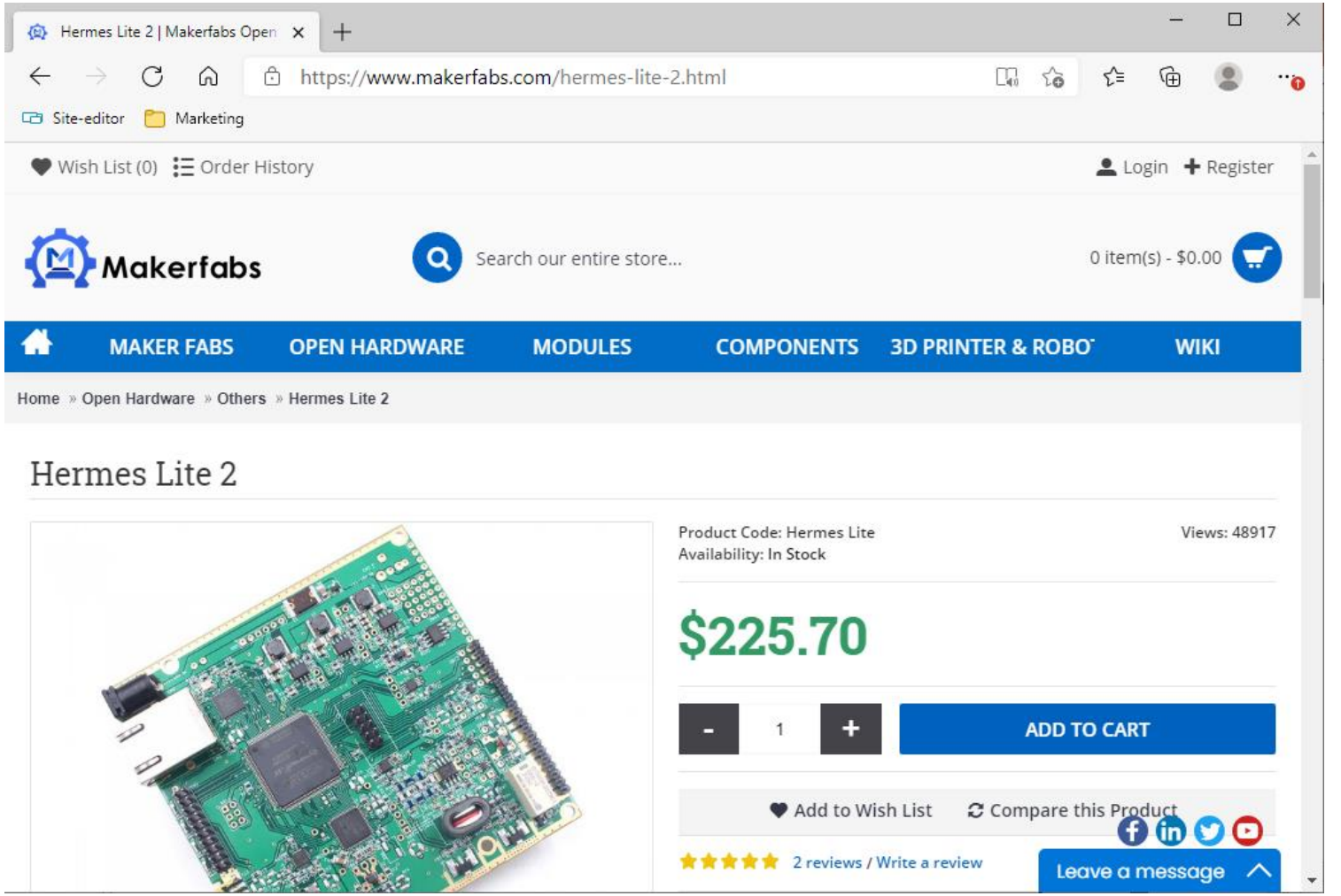
Thuis:
PC/Mac/Raspberry Pi
Headset



Remote station (< €400!):

- Hermes-Lite
- Raspberry Pi (headless)
- Lin. Amplifier (opt.)
- Antenne tuner (opt.)
- IP camera (opt.)
- Antenne!

Bestellen: hoe/waar?



Hermes-Lite: Pointers of Interest

- Hermes-Lite website: www.hermeslite.com
- Hermes-Lite Google group: https://groups.google.com/g/hermes-lite?pli=1
- Hermes-Lite Wiki: https://github.com/softerhardware/Hermes-Lite2/wiki
- piHPSDR: https://github.com/dl1ycf/pihpsdr
- CW (midi) interface: http://dl1ycf.darc.de/midicw.htm
- Leverancier: https://www.makerfabs.com/hermes-lite-2.html
- Pure Signal: http://dl1ycf.darc.de/hl2.htm
- Updating Gateware: https://github.com/softerhardware/Hermes-Lite2/wiki/Updating-Gateware
- Mumble audio: https://www.mumble.info/
- RealVNC: https://www.realvnc.com/en/
- Understanding dBs: https://www.ab4oj.com/test/docs/rs_db.pdf
- A new look at SDR-testing: https://www.ab4oj.com/sdr/sdrtest2.pdf
- (AD/DA)Bit-to-dB conversion: https://hbfs.wordpress.com/2008/12/09/deriving-the-1-bit-6-db-rule-of-thumb/
- OpenHPSDR, High Performance Software Defined Radio: http://openhpsdr.org/

Verantwoording

1. De afbeeldingen/illustraties, gebruikt in sheets 7, 8, 18, 28, 29, 44 en 45 zijn afkomstig van openbare bronnen van waarop mogelijk **copyright en/of andere rechten** berusten. De overige afbeeldingen in deze presentatie zijn **privé** opnames.
2. De in deze presentatie opgenomen teksten geven mijn **privé mening** over het bedoelde onderwerp weer. Hieruit mag zonder mijn schriftelijke toestemming **NIET** geciteerd worden.
3. Ik verklaar géén financiële en/of anderzins belangen te hebben bij de in deze presentatie vermelde merken/organisaties.

Nieuwe Niedorp, 14 februari 2021

Christiaan Roselaar PA3FUN