

Wireless communication teams (WICOMT)

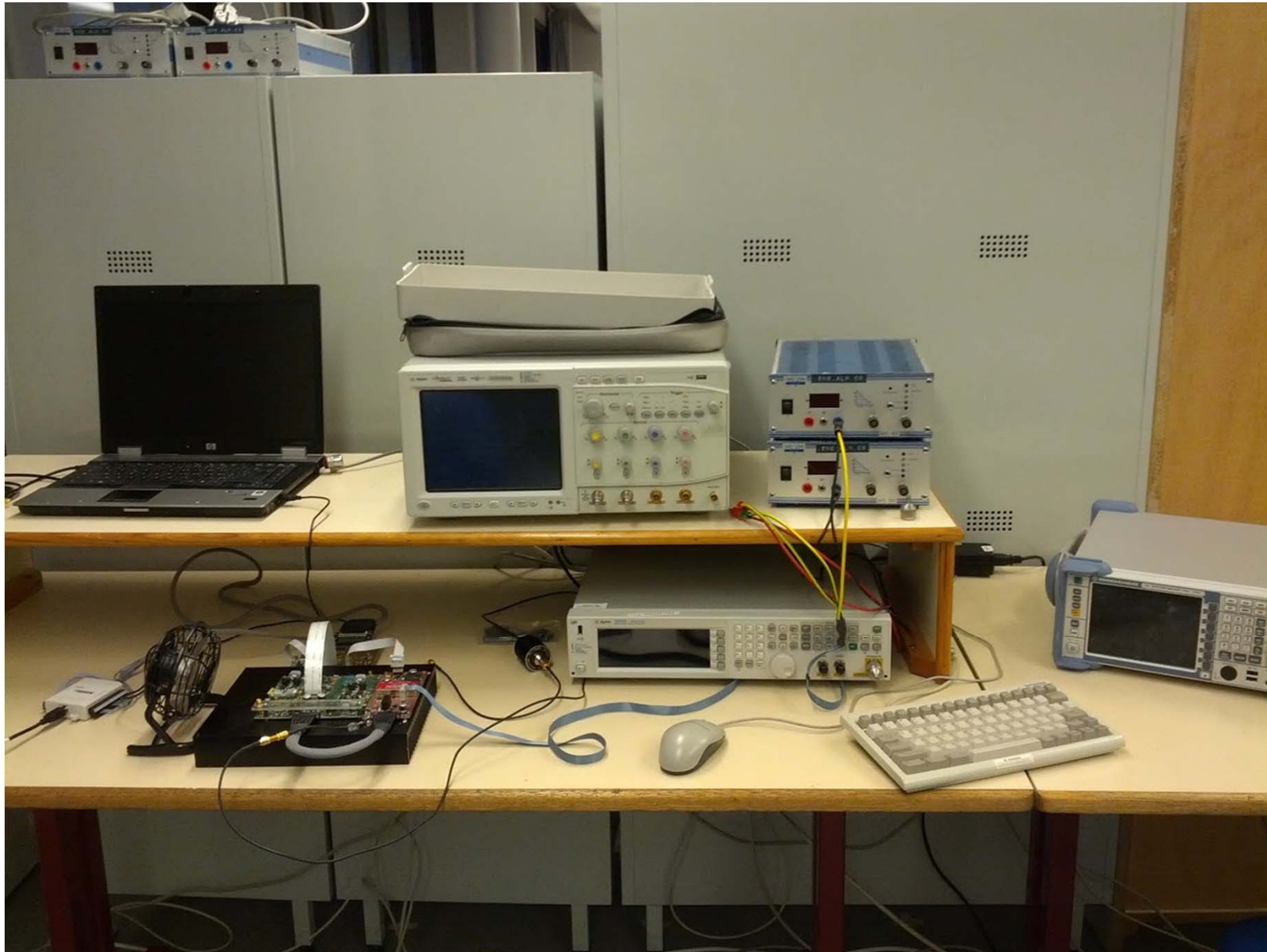
WICOMT 2013

Tomas Gotthans

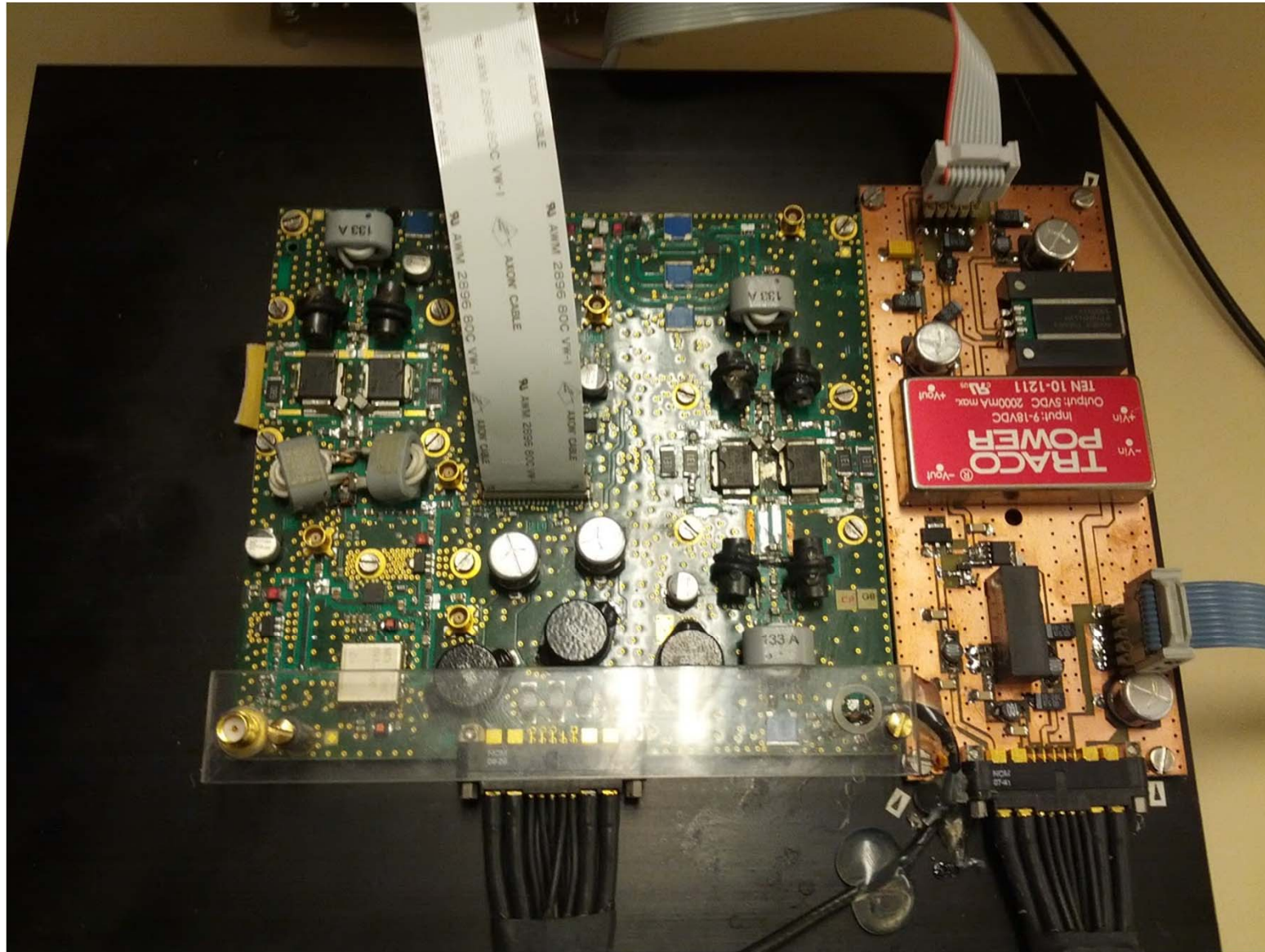


INVESTICE DO ROZVOJE VZDĚLÁVÁNÍ

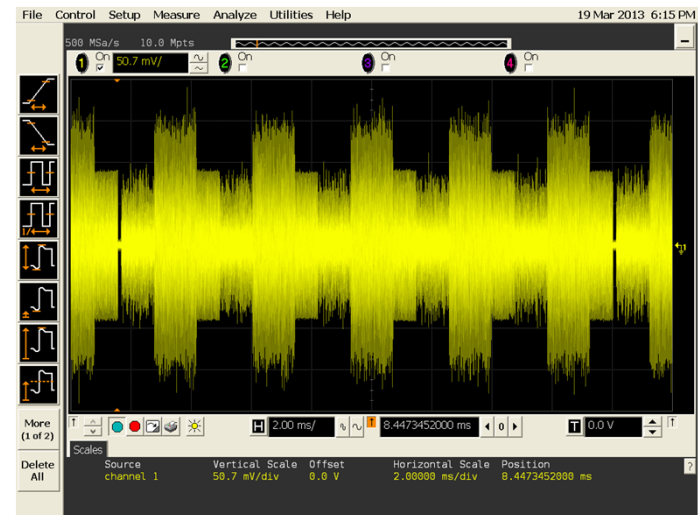
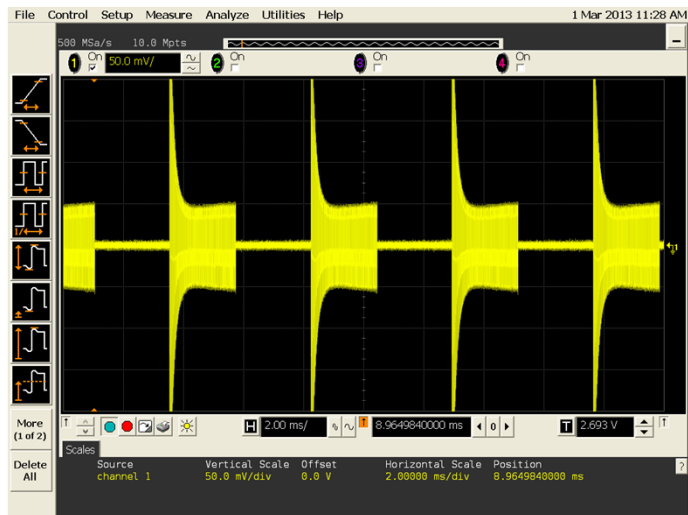
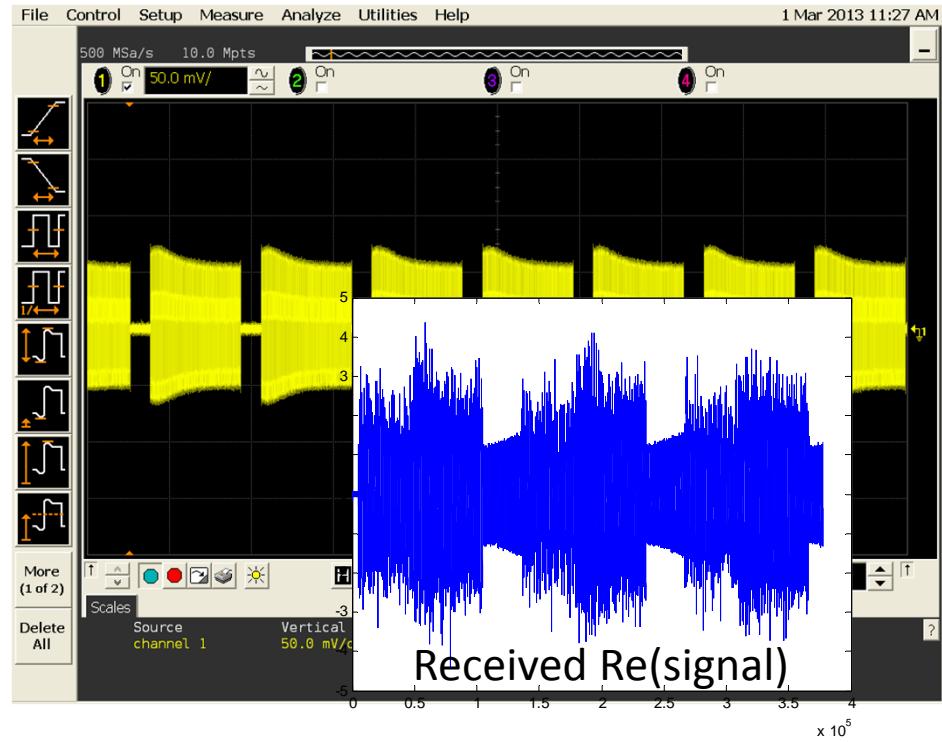
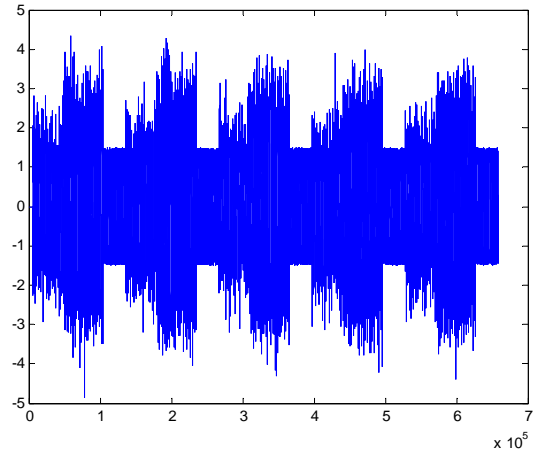
Experimental setup of the test bench



High power amplifier with controlled bias point



Send Re(signal)



CAUTION Incorrect ALC sampling can create a sudden unlevelled condition that may create a spike in the RF output, potentially damaging a DUT or connected instrument. To prevent this condition, ensure that you set markers to let the ALC sample over an amplitude that accounts for the higher power levels encountered within the signal.

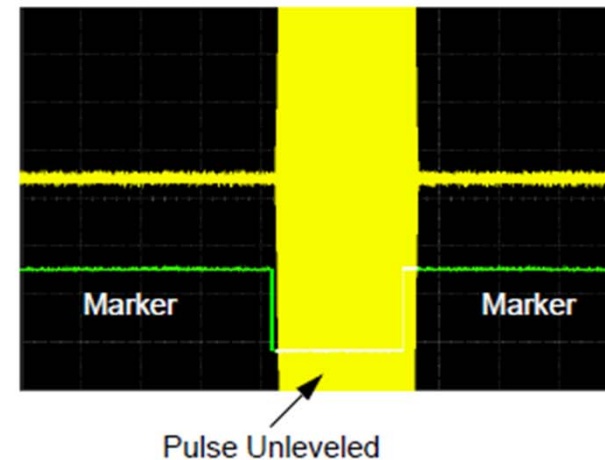
Example of Incorrect Use

Waveform: 1022 points

Marker range: 110-1022

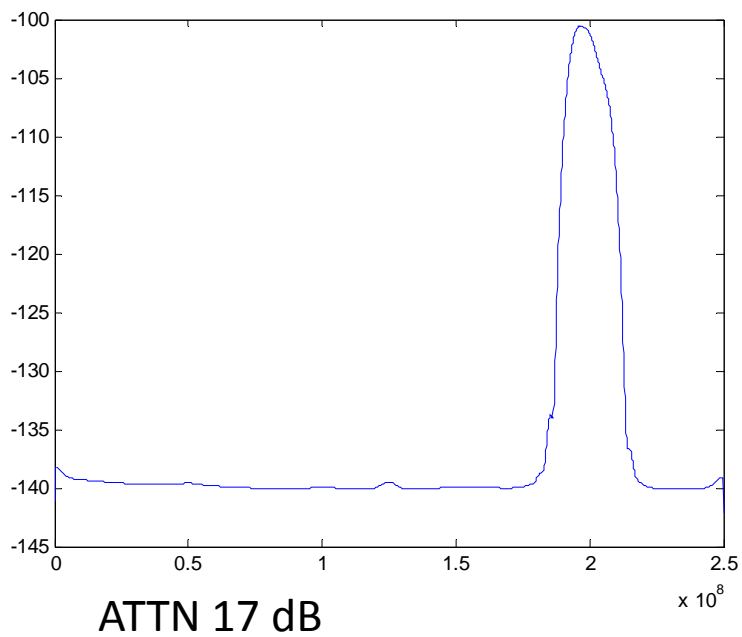
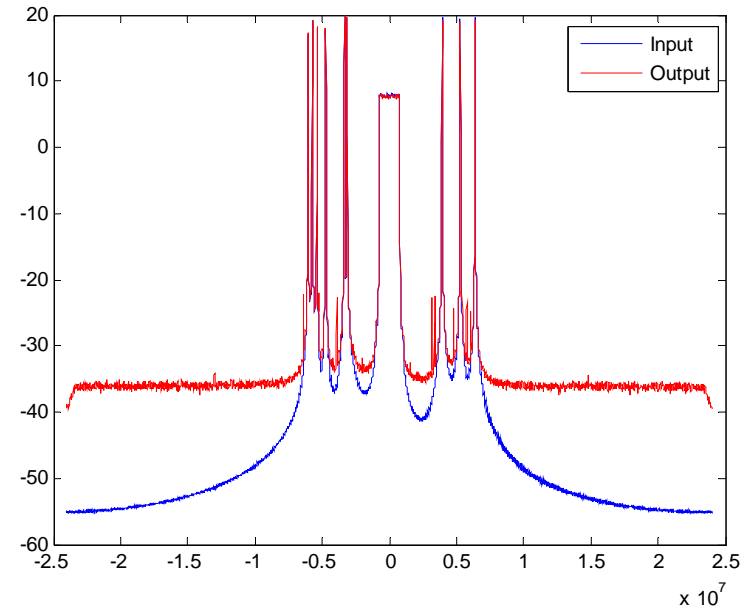
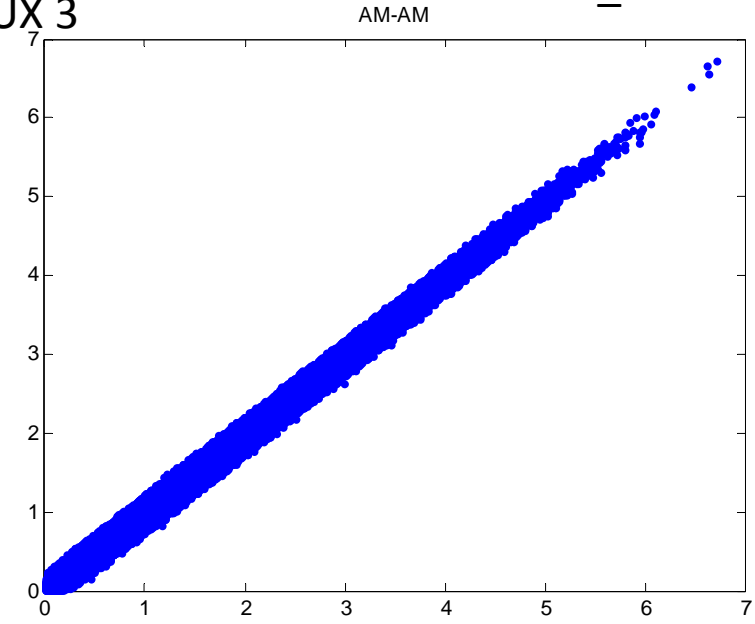
Marker polarity: Positive

This example shows a marker set to sample the low part of the same waveform, which sets the ALC modulator circuitry for that level; this usually results in an unlevelled condition for the signal generator when it encounters the high amplitude of the pulse.



MUX 3

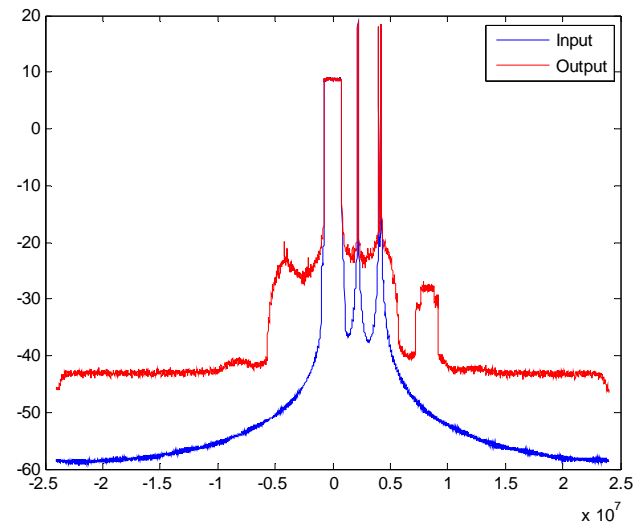
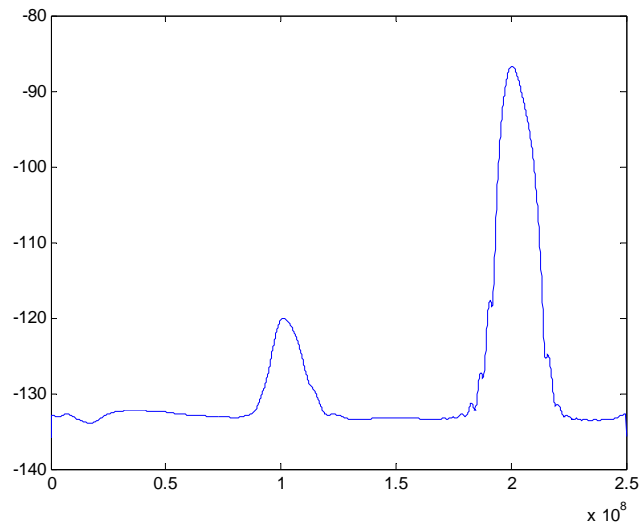
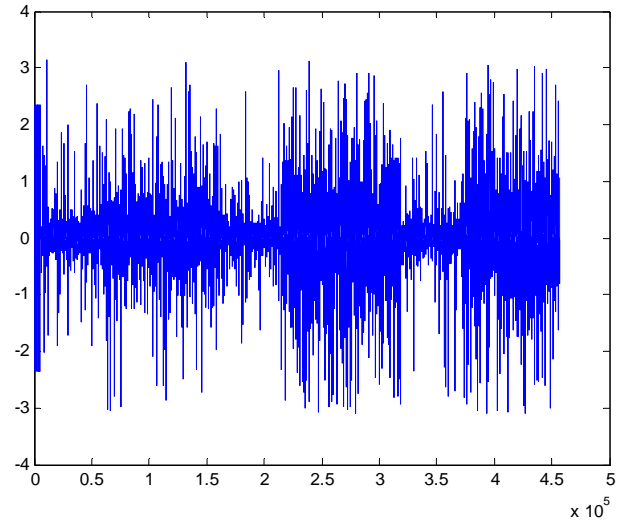
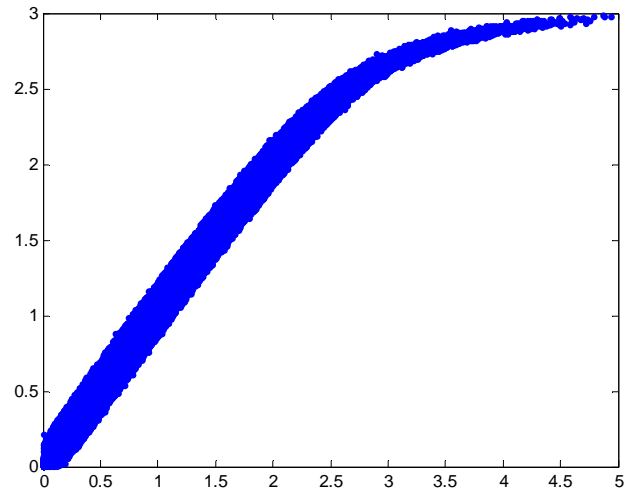
MUX3_ATTEN17.mat



ATTN 17 dB



Multiplex 3 High power of PA, Pin=-12dBm

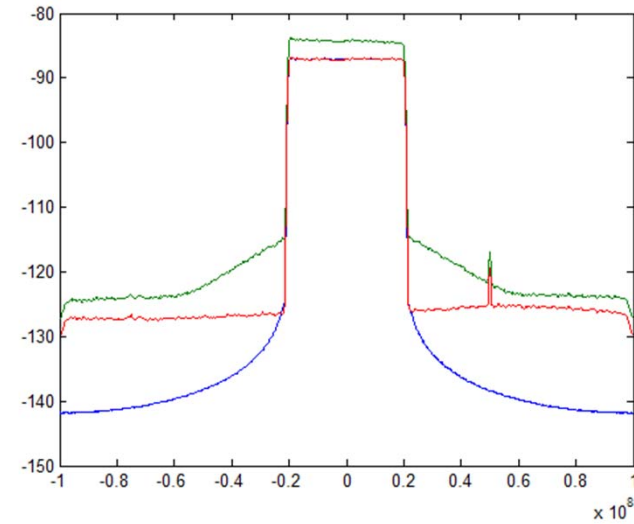
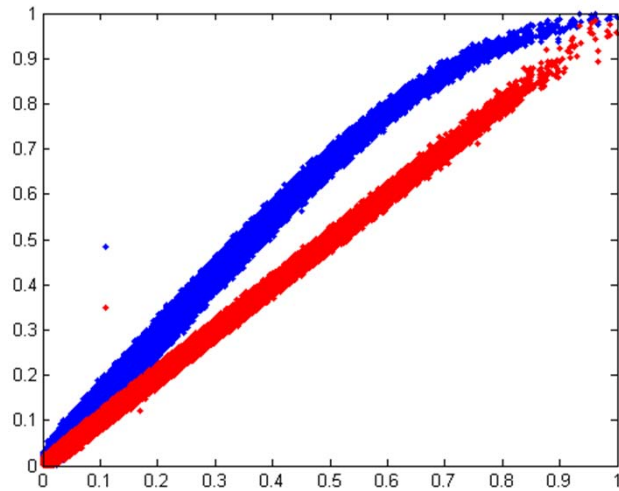


Wideband signals Posdistortion

HIGH Power polarization of PA

Input power = -13 dBm

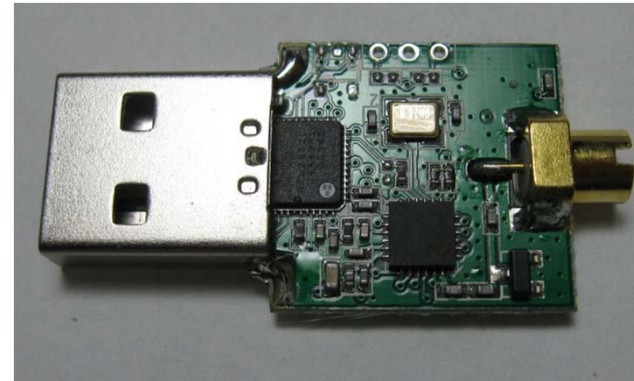
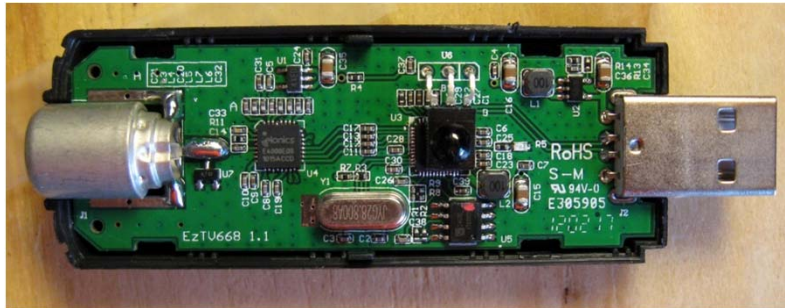
Orthogonal polynomials K=9, M=2, NMSE= -28.85dB



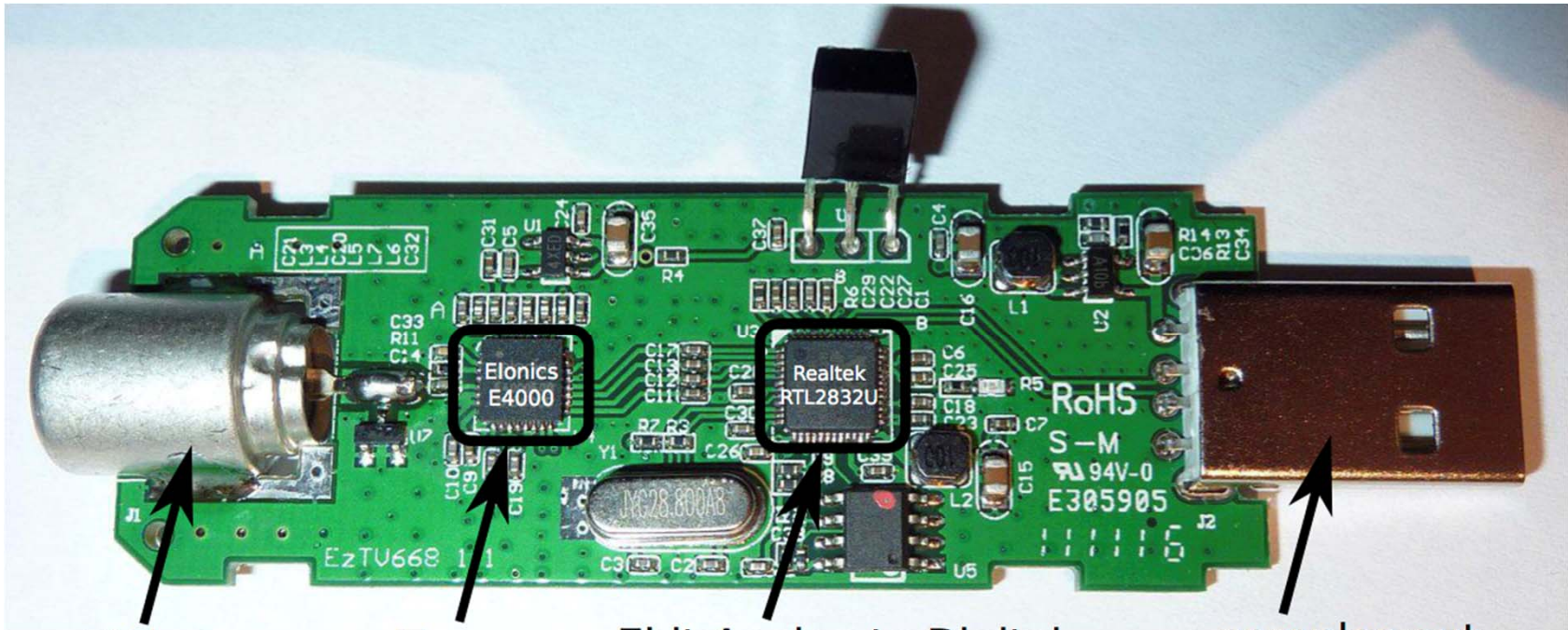
File name: OFDM_Wideband40MHZ_HIGH_pinM13_120MHz_1GSps

SDR from USB DVB-T Dongle, RTL-SDR: Inexpensive Software Defined Radio

- V4L/DVB kernel developer Antti Palosaari
- unsigned 8bit I/Q samples at ~ 2.8 MS/s



Tuner	Frequency range
Elonics E4000	52 - 2200 MHz with a gap from 1100 MHz to 1250 MHz (varies)
Rafael Micro R820T	24 - 1766 MHz
Fitipower FC0013	22 - 1100 MHz (FC0013B/C, FC0013G has a separate L-band input, which is unconnected on most sticks)
Fitipower FC0012	22 - 948.6 MHz
FCI FC2580	146 - 308 MHz and 438 - 924 MHz (gap in between)

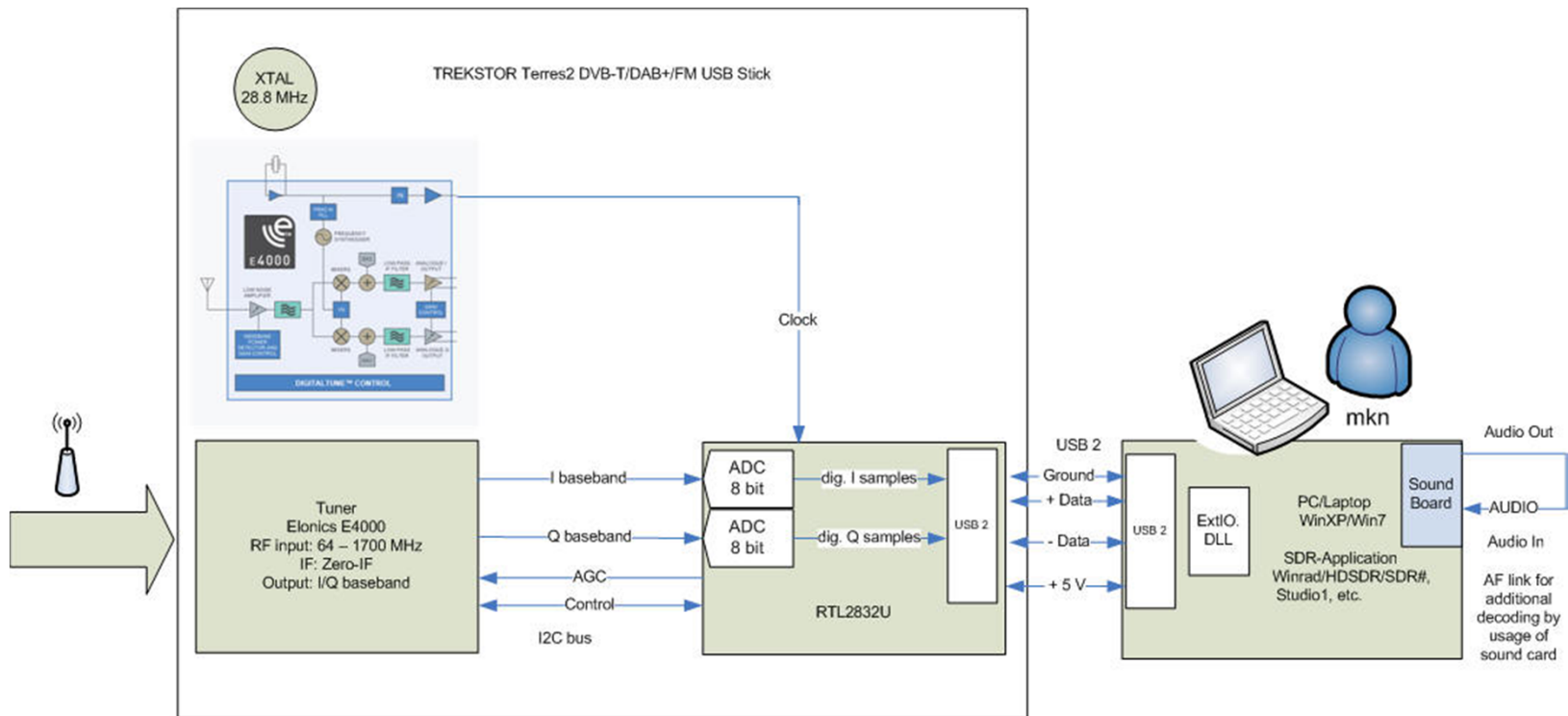


RF in

Tuner

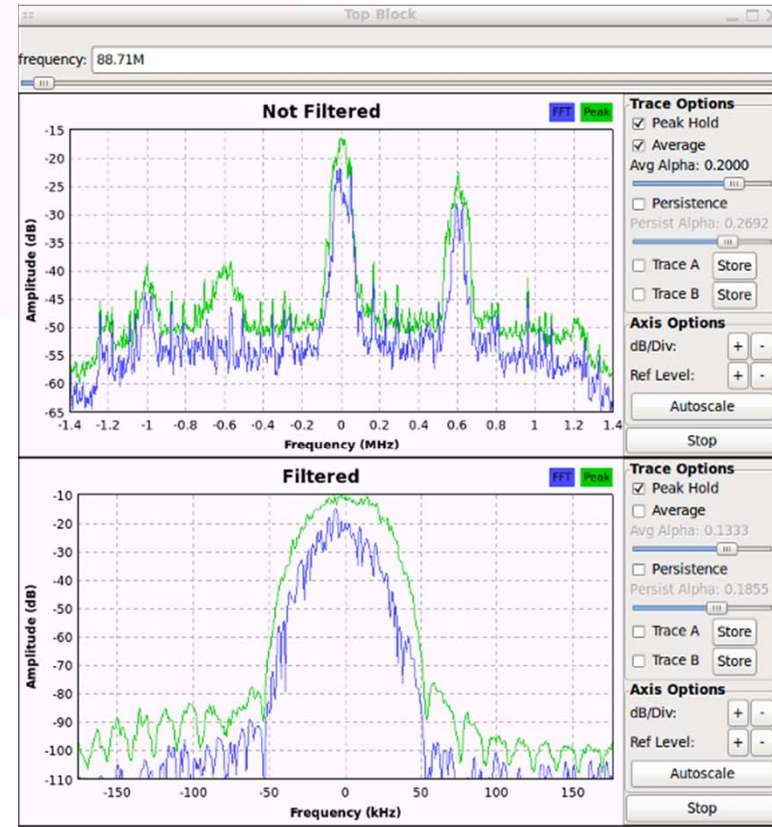
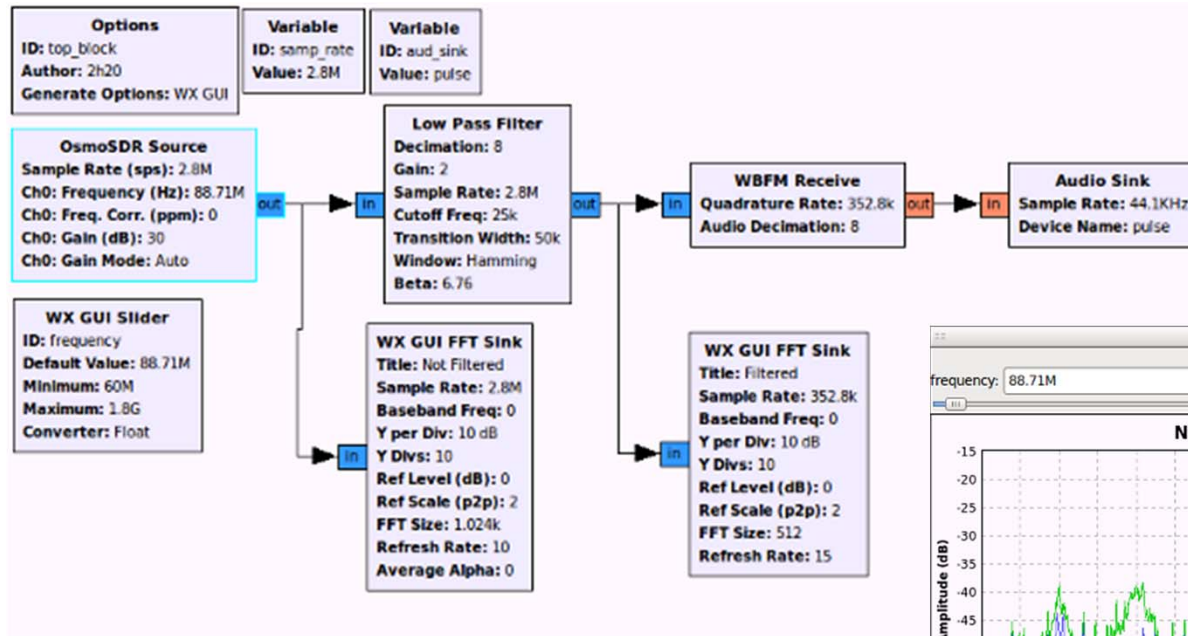
7bit Analog to Digital

samples out

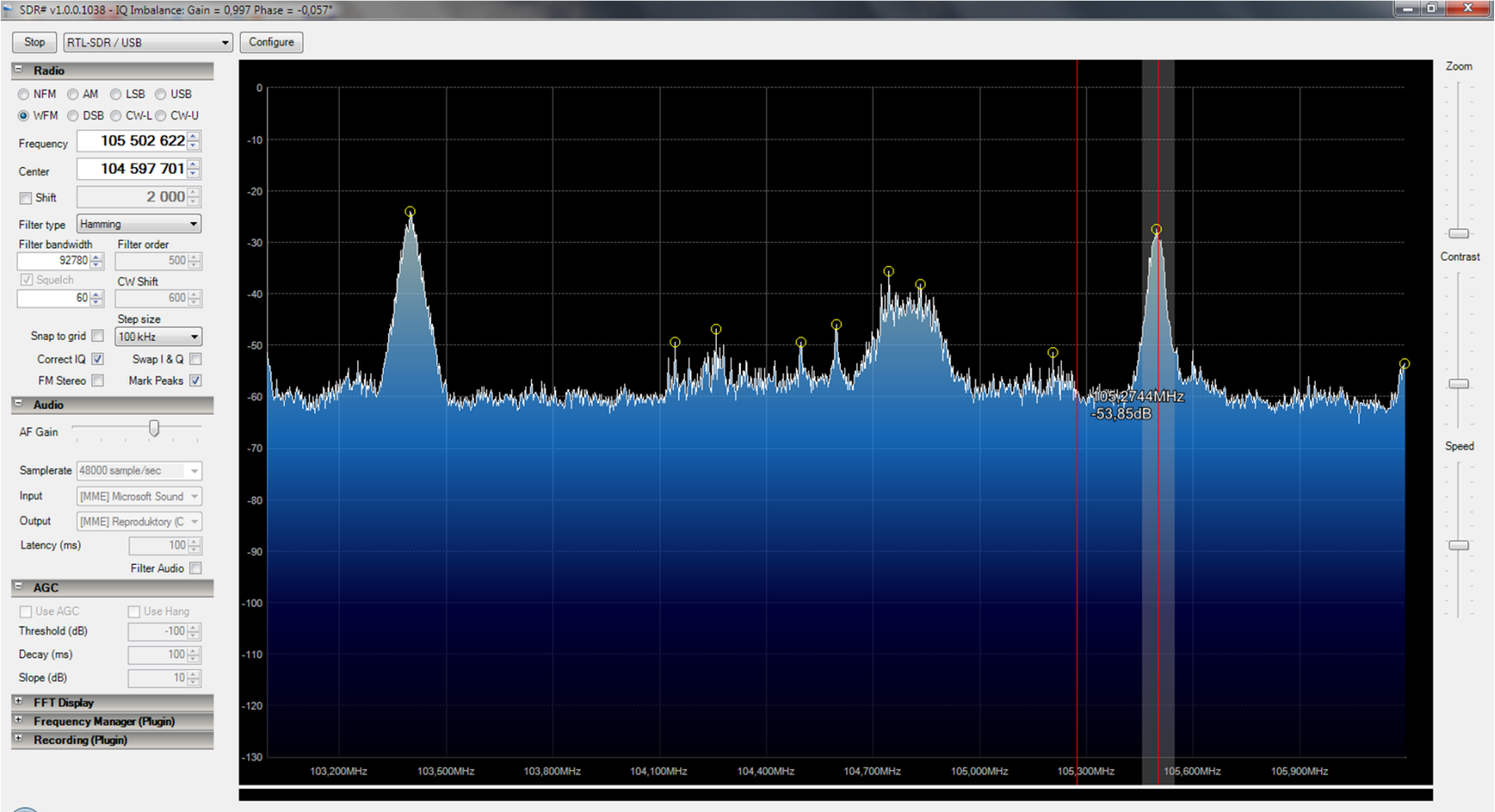


Simplified block diagram RTL2832U based SDR Software Defined Radio

GNU RADIO



SDR Sharp

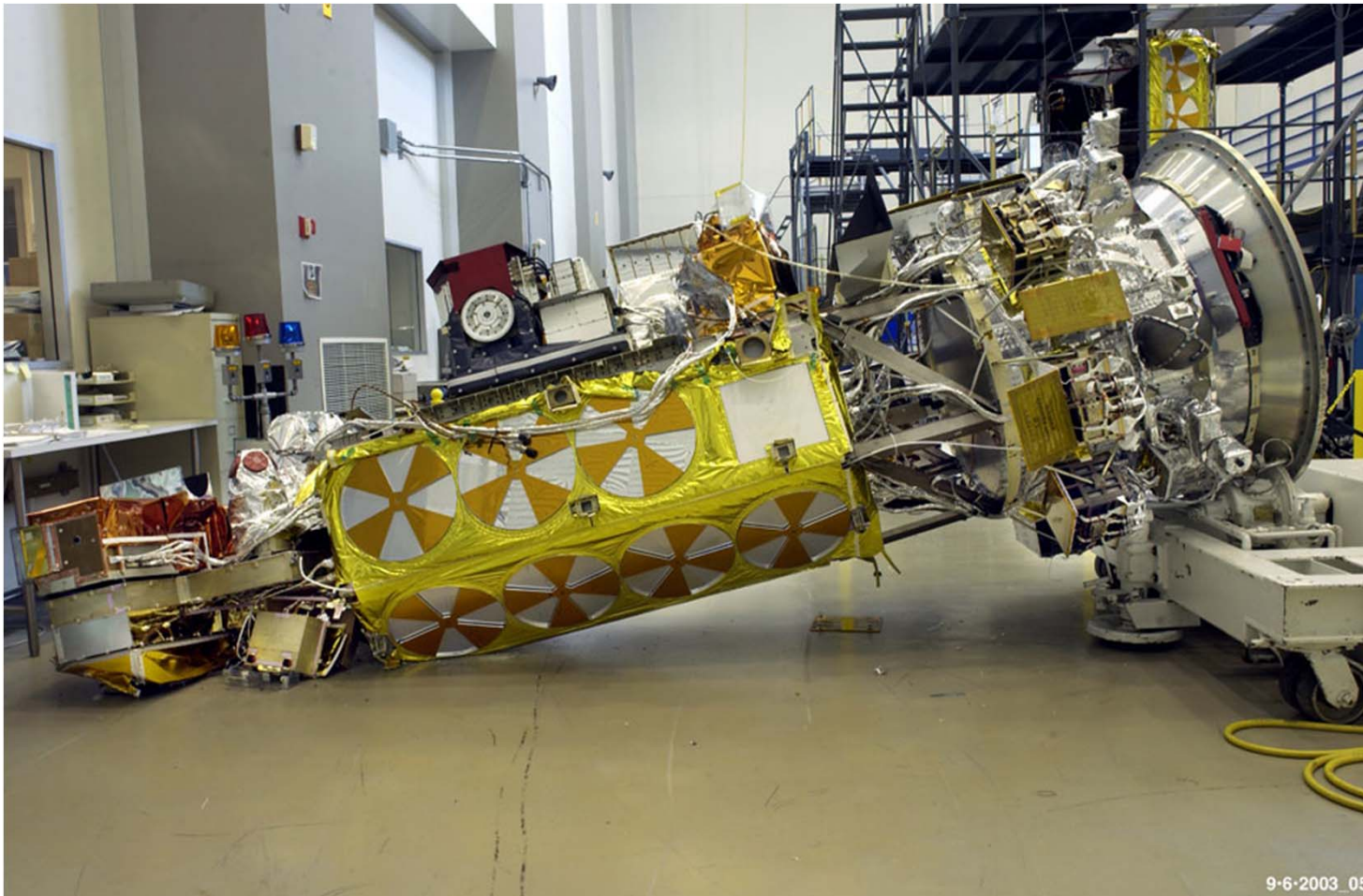


NOAA - National Oceanic and Atmospheric Administration

The screenshot displays the SDRSharp software interface. On the left, the 'Radio' panel shows the frequency set to 137 620 000 Hz, with a center frequency of 136 711 501 Hz and a shift of 1 536 Hz. The filter type is Blackman-Harris, and the filter bandwidth is 36000 Hz. The 'Audio' panel shows a samplerate of 48000 Hz and an output of [MME] Line 2 (Virtual A...). The main window shows a world map with satellite tracks for NOAA 15, 17, and 19. A satellite data list on the right includes NOAA 15, 16, 17, 18, and 19, with NOAA 15 selected. A digital clock shows 16:14:36 on 2012-07-22. A small inset window shows a satellite image of the Earth's surface.

SDRSharp, V1.0.0.1000 (Windows; simple netbook)WFM,
bandwidth 40 kHz
1024 bps
AGC Off (RTL and Tuner)
Gain set to max. (47 dB)
Recording: 16 bits PCM, Audio

NOAA-19 Satellite 2003



Repairs \$135 million

Automatic dependent surveillance-broadcast (ADS-B)

- 1090 MHz
- is a surveillance technology for tracking aircraft as part of the Next Generation Air Transportation System (NextGen).

The screenshot displays the adsbSCOPE 2.6 f3 software interface. The main window shows a map of Central Europe with several aircraft tracked and labeled. The interface includes a menu bar (File, View, Colors, load Maps, Cnfig, Navigation, other, decoder), a toolbar with navigation and display controls, and a status panel on the right. The status panel shows the number of points loaded (46273) and the current decoder mode (0 - OFF). Below the status panel is a table of tracked aircraft.

Nr.	ICAO24	Regist.	Ident	Alt	Lat	Long	Speed	Head	Climb	Type	T-out
4	3C49E2	D-ABOB	CFG716	35000	49.22	16.69	514	140		B753	0
3	4BCDC7	TC-SNG	SXS4TQ	40000	48.92	17.64	392	315		B738	0
2	4BD184	TC-TLD	TWIS67	32000	49.07	16.98	353	292	-64	B734	0
1	3CSEF6	Germany		16925				384	179	-2496	67 M
0	49F0D0	Czech Rep	00000000	ground							0

Additional information from the interface:

- U-signal =
- U-ref =
- Status:
- Framerate: 2656 Frames/min (664)
- Data-Quality: 90 %
- Time: 07:57:47

SDR + MATLAB

EE123: Digital Signal Processing

Michael (Miki) Lustig

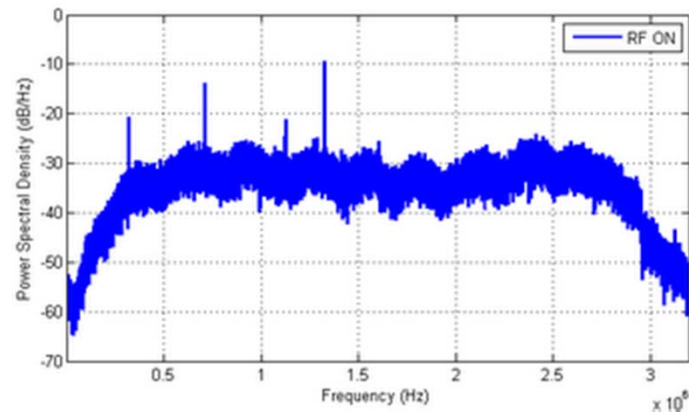
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UC Berkeley

506 Cory Hall

(510) 643-9338

mlustig@eecs.berkeley.edu

Using rtl_tcp to capture and control the device directly from Matlab (Octave) over java sockets



Wireless communication teams (WICOMT)

Thank you for your attention.

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