



Vysílání DATV

- Zdroj video signálu
- Modulátor
- Zesilovač výkonu
- Ozařovač
- Parabola

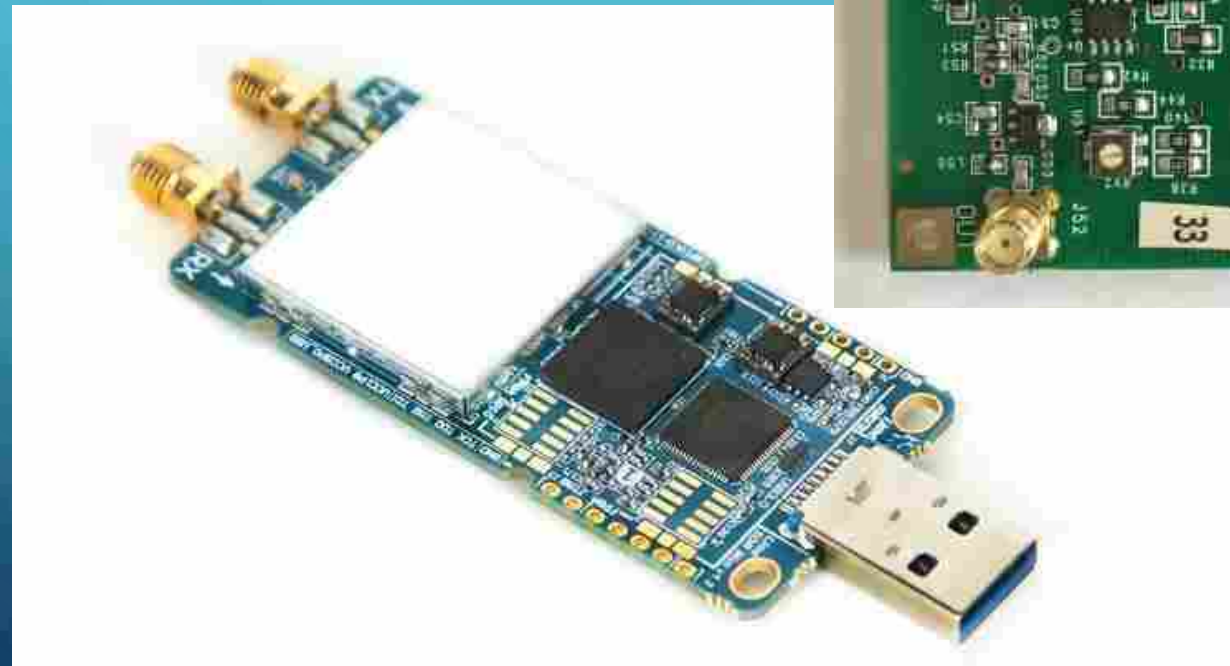
Zdroj video signálu

- Kamera
- Mobilní aplikace
- Video soubor
- Studiový software
 - OBS
 - vMix
- Streamovací HW (H265/264 koder)



Modulátor

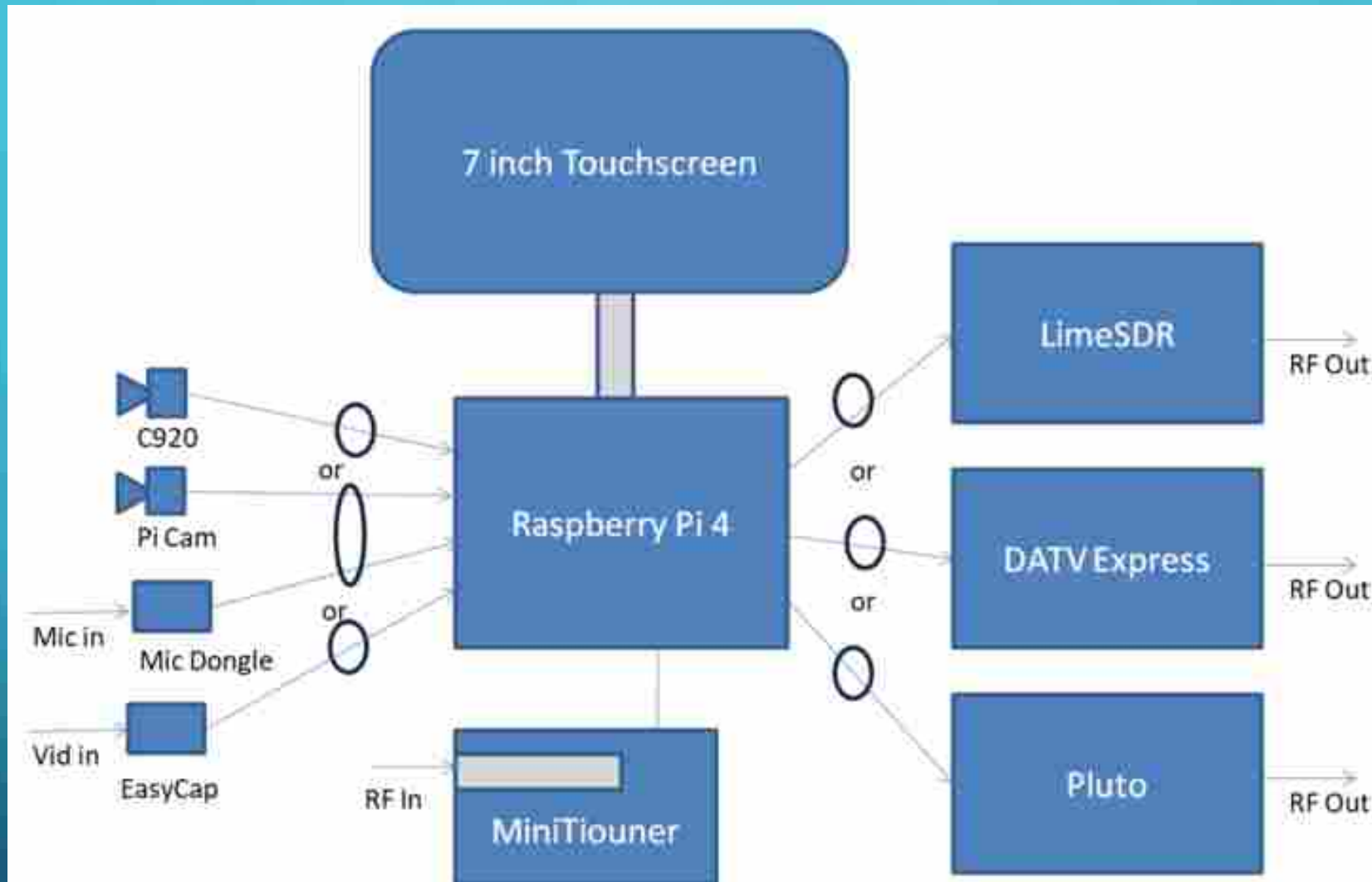
- Hardware
 - AD8345
 - DATV Express
 - BATC Filter & modulator board
- SDR
 - ADALM PLUTO
 - Lime SDR Mini



Modulátor

- Dvě používaná řešení:
 - **Portsdown (BATC)**
 - Raspberry Pi (4)
 - LCD dotykový display
 - SDR Pluto a/nebo Lime mini
 - Příjem pomocí HW Minitiouner
 - Funkce pro měření a kontrolu
 - Integrovaný VHF/UHF transceiver Langstone
 - Síťová komunikace

TX		RX	M2	M3
Modulation	Encoder	Output to	Format	Source
52QPSK	H264	Lime Mini	4:3	PiScreen
Freq	Sym Rate	FEC	Band/Tvtr	Lime Gain
437 MHz	333	9/10	70_cm	88
EasyCap	Caption	Audio	Atten	Att Level
Comp Vid	On	Auto	NONE	-10.00
Preset 1	Preset 2	Preset 3	Preset 4	Store
146.5_333	437_Lime	1255_HD	437-Pluto	Preset



Portsdown 4 – Simplified Block Diagram

Modulátor

- ADALM PLUTO + alternativní firmware F50EO
 - Ovládání přes webové rozhraní
 - RTMP nebo UDP
 - Zobrazení spektra transpondéru - kontrola a ladění
 - Ovládání H265 kodéru
 - Vazba na OBS studio
 - Analýza generovaného signálu
 - Možnost analýzy přijímaného signálu (z externího zdroje)



PlutoDVB General setup

Main mode selection

DATV Passthrough (SDR Console,...) Transverter Signal generator

DATV operating mode

RTMP UDP Pattern Repeater

Apply Settings

DATV transmission settings

General use

Call sign: DVB Provider Name:

Transmission permitted at start-up: no enabled Conversion gain to display the real power (approximate absolute output level) (dB):

Maximum adjustable power (dB): Minimum adjustable power (dB):

OBS Studio steering

Activation of OBS Studio steering: no enabled OBS Studio IP address: ✕

OBS websocket port: OBS websocket password:

H264/H265 box

Use of a H264/H265 box: yes enabled IP address: ✓

Administrator login: Password:

Apply Settings

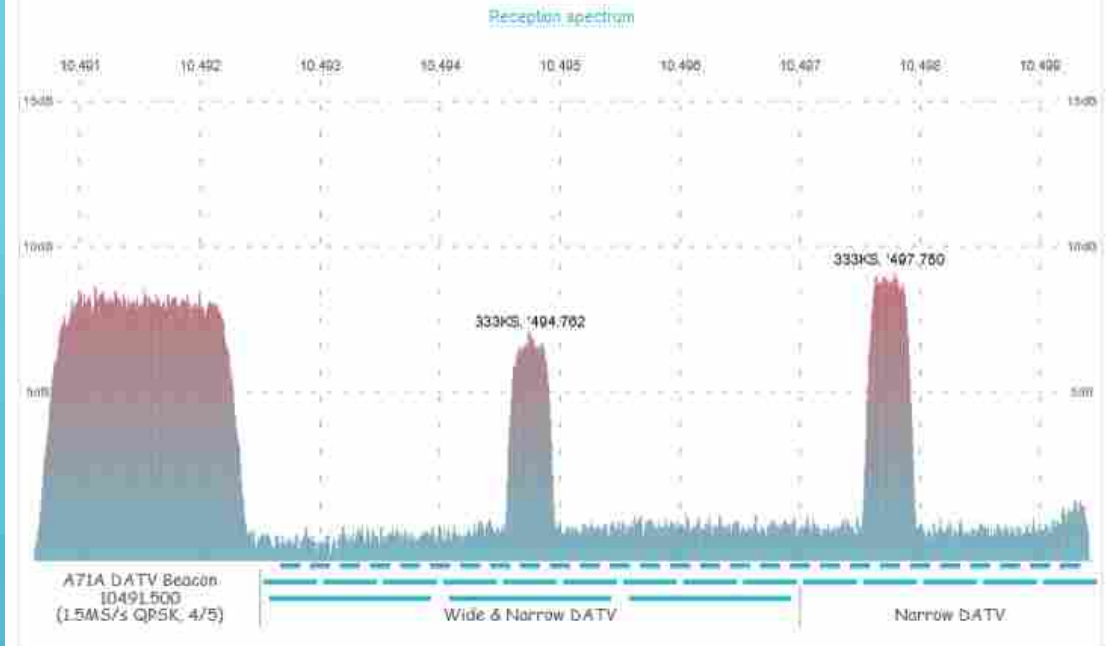
Strategy Setting table

This modifiable table makes it easy to set the parameters of the H264/265 encoder automatically according to the stream transport rate (depending on the transmitted signal characteristics).

Attention, in this version the editable cells are not verified at all.

Priority	Total bitrate available	Audio channels	Audio Bitrate (kb/s)	GOP	Video Width	Video Height	FPS	Video Rate (kb/s)	PCR/PTS (ms)	PAT period (ms)
1	5000	2	84	200	1920	1080	30	1000	800	200
2	1200	2	64	50	1520	1080	25	999	900	200
3	400	2	32	50	768	432	25	300	800	200
4	250	1	32	30	768	324	15	200	800	200
5	200	1	32	30	384	216	15	120	800	200
6	100	1	32	20	384	216	10	64	800	200

ADALM-PLUTO DATV Controller



PTT (F10)

Apply mod. settings (F9)

Switch ON

STANDBY

00:00:00

33.4°C - 33.4°C

Modulator

+ Add Preset

Main

Power (0.1 dB steps): +15.2dB

PCR/PTS: 180ms PAT period: 200ms

Freq-Manual (70 MHz - 6 GHz): 2408.250
Fine tune (+/- 150 kHz): 0kHz

Freq-Channel (SR channel Up/Link / Down/Link): 2000Ks2 (2405.25 / 10494.75)

Mode: DVB-S2 Mod: QPSK

SR (KSymbols): 333Ks FEC: 3/4

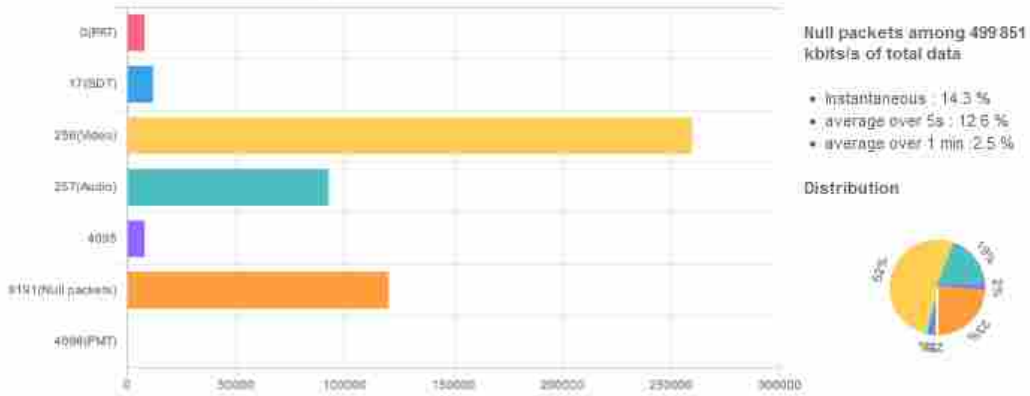
Pilots: Off Frame: LongFrame

Roll-off: 0.25 Transverter LO (MHz): 0 (No TRV/UpConv)

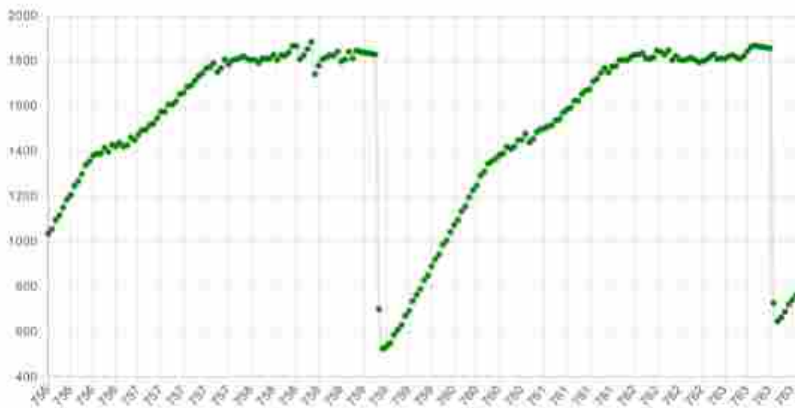
Receiver analysis (J) no UDP source

Transport stream analysis

Name : OK2UUJ Provider : 0303_OK2UUJ_



Video buffer analysis



Zesilovač výkonu

- Linearita
- Výkon



How much power?

Dish Diameter	Power Required for 250Ks
2.4m	7.5W
2.0m	11W
1.8m	13W
1.5m	19W
1.2m	30W
1m	43W
90cm	53W
80cm	67W
60cm	120W

Power required to achieve same MER as the beacon at a receiving station – eg 8dB MER on 1.2mt dish

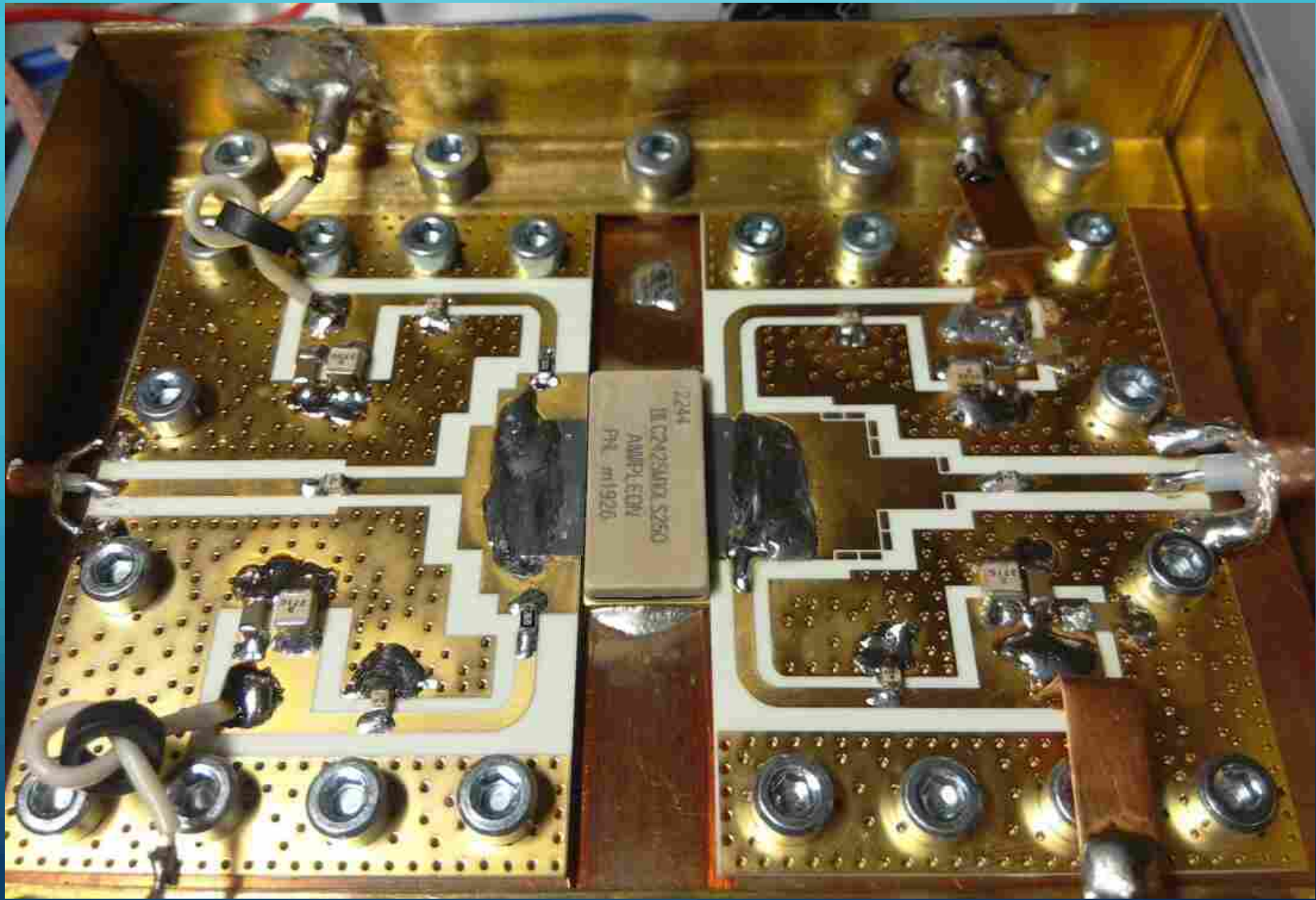
SR	Factor
66 KS	0.26
125 KS	0.5
250 KS	1.0
333 KS	1.33
500 KS	2.0
1000 KS	4.0
1500 KS	6.0

125Ks = 15 watts with 1.2mt dish for 8db MER

Relative Power	Received MER
100%	8 dB
80%	7 dB
63%	6 dB
50%	5 dB
40%	4 dB
31%	3 dB
25%	2 dB
20%	1 dB
16%	0 dB
13%	-1 dB
10%	-2 dB

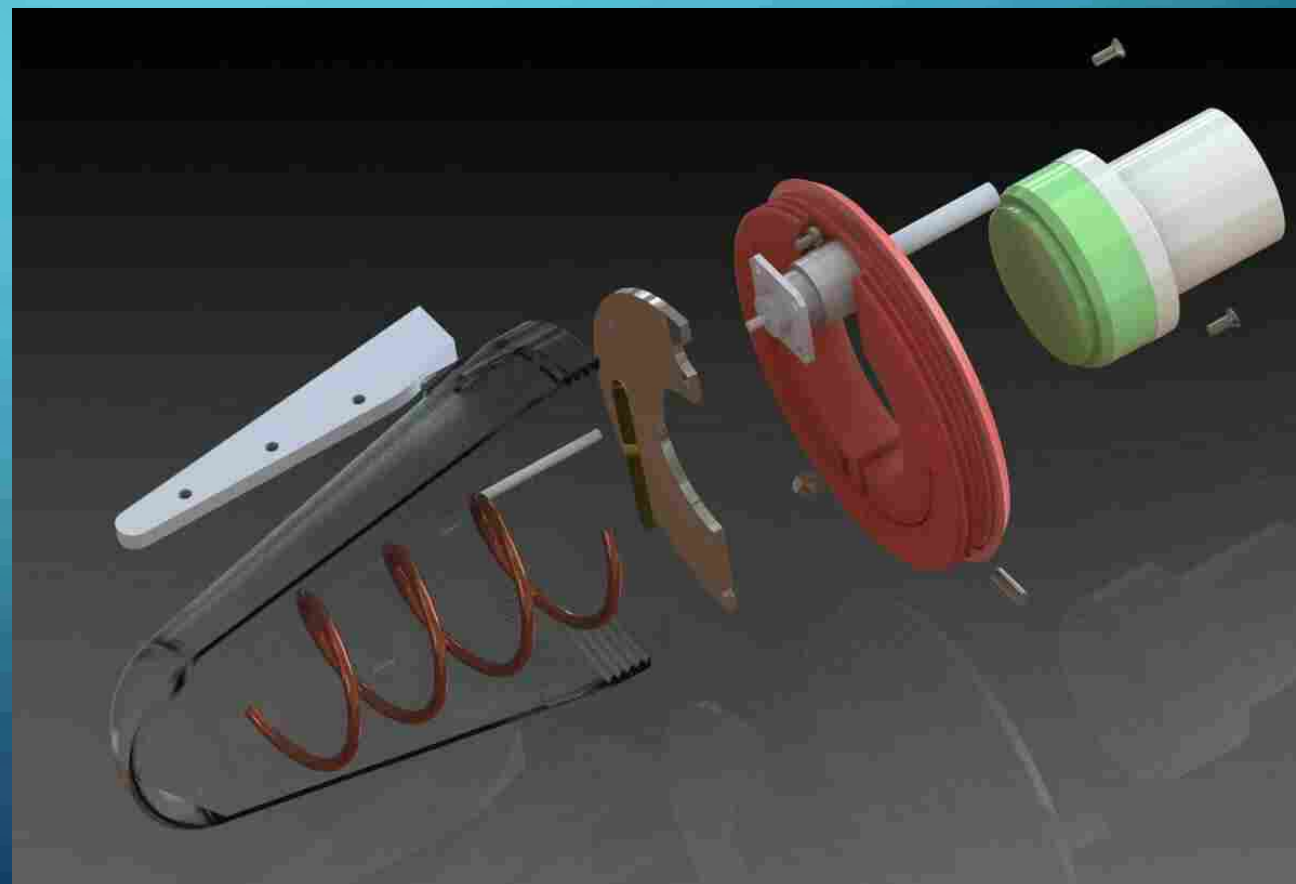
7.5 watts, 1.2mt dish = 125Ks at 5dB MER





Ozařovač

- Kruhová polarizace RHCP
- Nejčastěji používaná řešení:
 - Patch feed – POTY
 - HELIX feed



Parabola





Zdroje informací

- https://wiki.batc.org.uk/BATC_Wiki
- <https://amsat-dl.org/eshail-2-amsat-phase-4-a-qatar-oscar-100/>
- <https://www.f5uii.net/en/patch-plutodvb/>
- <https://www.qrz.com/db/DC8PAT>
- https://uhf-satcom.com/blog/patch_antenna
- <https://eshail.batc.org.uk/wb/>
- <http://www.vivadatv.org/>



Děkuji za pozornost