



SDRangel and more...

David Taylor – GM8ARV

DMR Breakfast

2019-July-20



Leo Bodnar GPSDO - £100



Configuring the GPSDO

The screenshot shows the 'mini GPS Clock Configuration' software window. It is divided into several sections:

- Device details:** Shows Serial Number (with a dropdown and 'Blink' button), Manufacturer (Leo Bodnar Electronics), Product (mini GPS Reference Clock), and Version (1.14).
- Settings:** Features an 'Output Hz' field set to 435000000, a 'Set Frequency' button, 'Factory Defaults' and 'Advanced <<<' buttons, and a bar chart at the bottom left.
- Advanced:** Includes an 'Output drive strength' dropdown set to 8mA, an 'Enable output' checkbox (checked), and a list of frequency-related parameters: GPS reference, Hz (181250); N31 (1); N2_HS (10); N2_LS (3360); N1_HS (7); NC1_LS (2); and BW (15). An 'Update DPLL' button is located at the bottom right of this section.
- Status:** Displays 'Position: 55.9, -3.2' and 'UTC: 2019.07.18 14:24:47'.

The bar chart in the Settings section shows a signal level with a red dashed line at the bottom. The y-axis is labeled from 10 to 50.



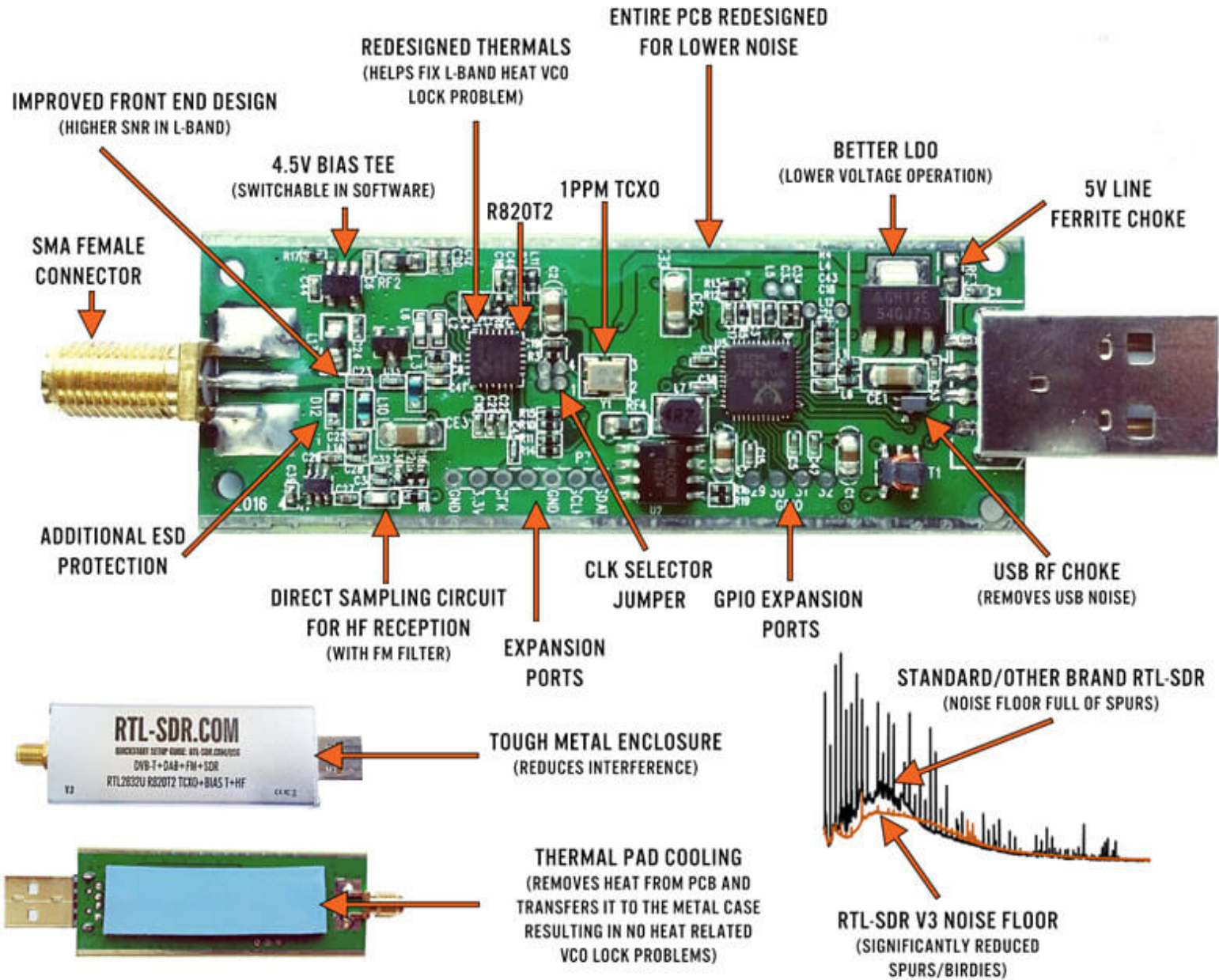
SDR Hardware Examples

- RTL-SDR V3 dongle – low cost
 - £26
- Airspy Mini – higher performance
 - £120
- Pluto – RX and TX
 - £140

SDR hardware - RTL-SDR



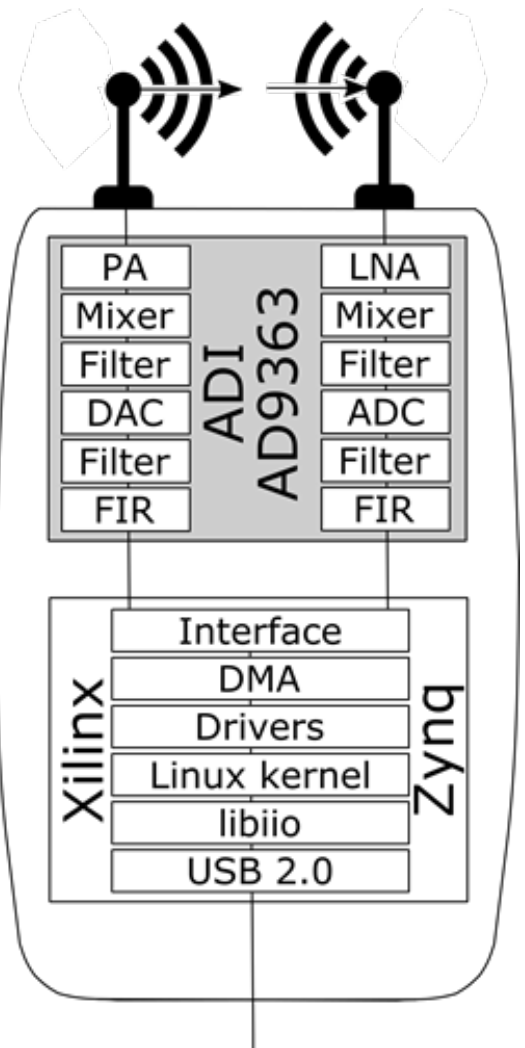
WHAT MAKES OUR RTL-SDR V3 BETTER THAN OTHERS?



SDR hardware – Airspy x 3!



SDR hardware – ADALM Pluto





SDR software

- Device-specific
 - Airspy
 - SDR#
 - Spectrum Spy



000.092.100.000

Source: AIRSPY

AIRSPY

Sensitivity Linearity Free

Gain 4

Sample rate 10 MSPS

Decimation None

Display **8 MHz**

Bias-Tee Tracking Filter

SpyVerter Enable HDR

PPM 0.00

Radio

NFM AM LSB USB

WFM DSB CW RAW

Shift 17

Filter Blackman-Harris 4

Bandwidth Order

180,000 250

Squelch CW Shift

50 1,000

FM Stereo Step Size

Snap to Grid 100 kHz

Lock Carrier Correct IQ

Anti-Fading Swap I & Q

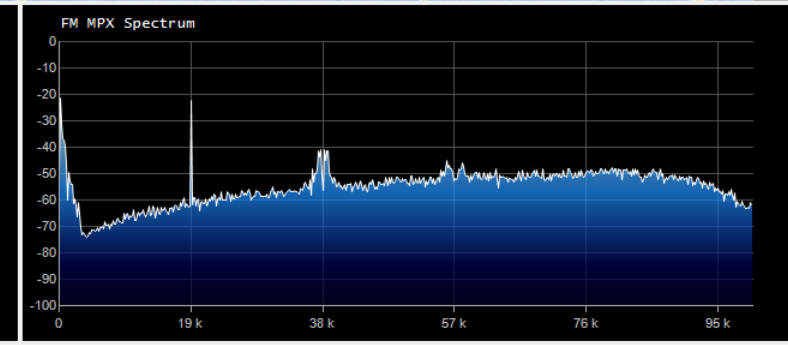
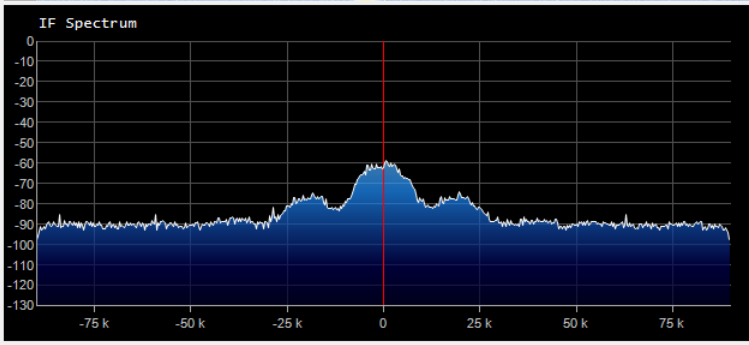
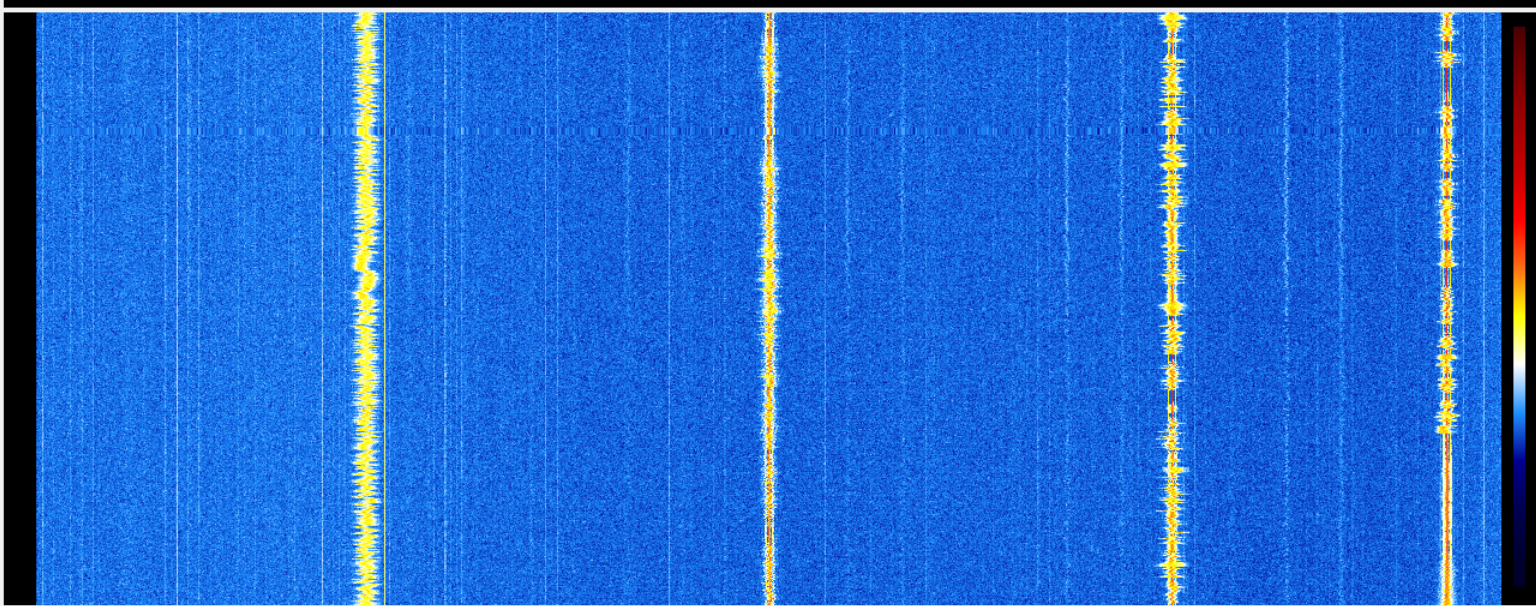
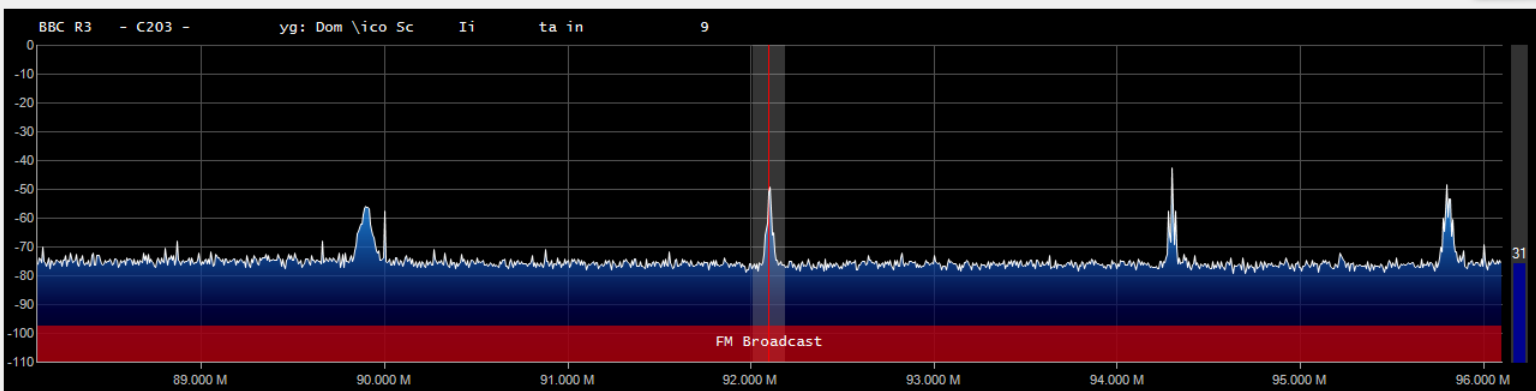
- ▶ Audio
- ▶ AGC
- ▶ FFT Display
- ▶ Audio Noise Reduction *
- ▶ IF Noise Reduction *
- ▶ Baseband Noise Blanker *
- ▶ Demodulator Noise Blanker *
- ▶ Recording *
- ▶ Zoom FFT *
- ▶ Band Plan *
- ▶ Frequency Manager *

New Edit Delete

Group: [All Groups]

Show on spectrum

Name	Frequency
Grimeton SAQ	17.2 kHz
MSF 60 kHz	60 kHz
DCF 77.5 kHz	77.5 kHz

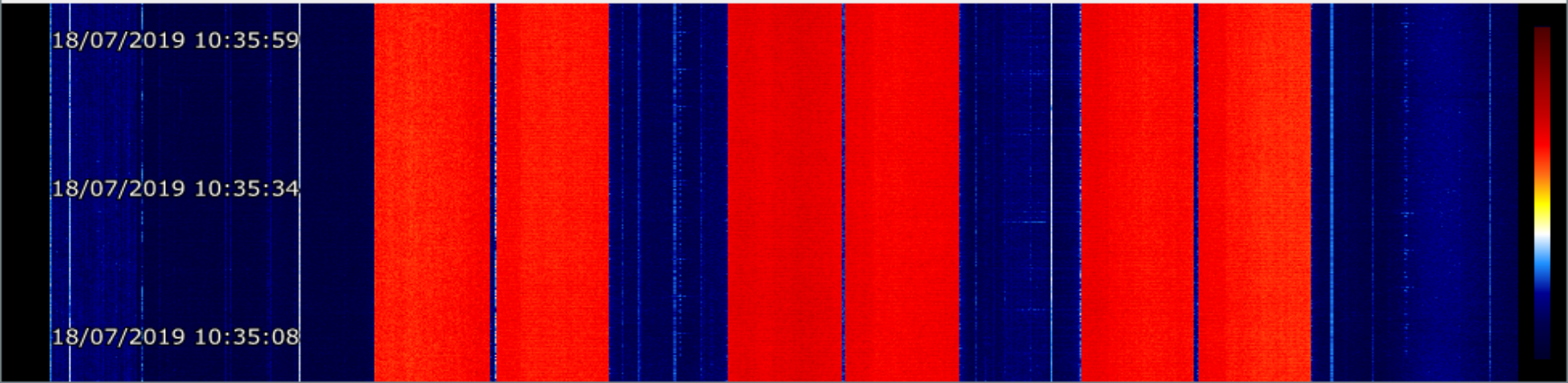
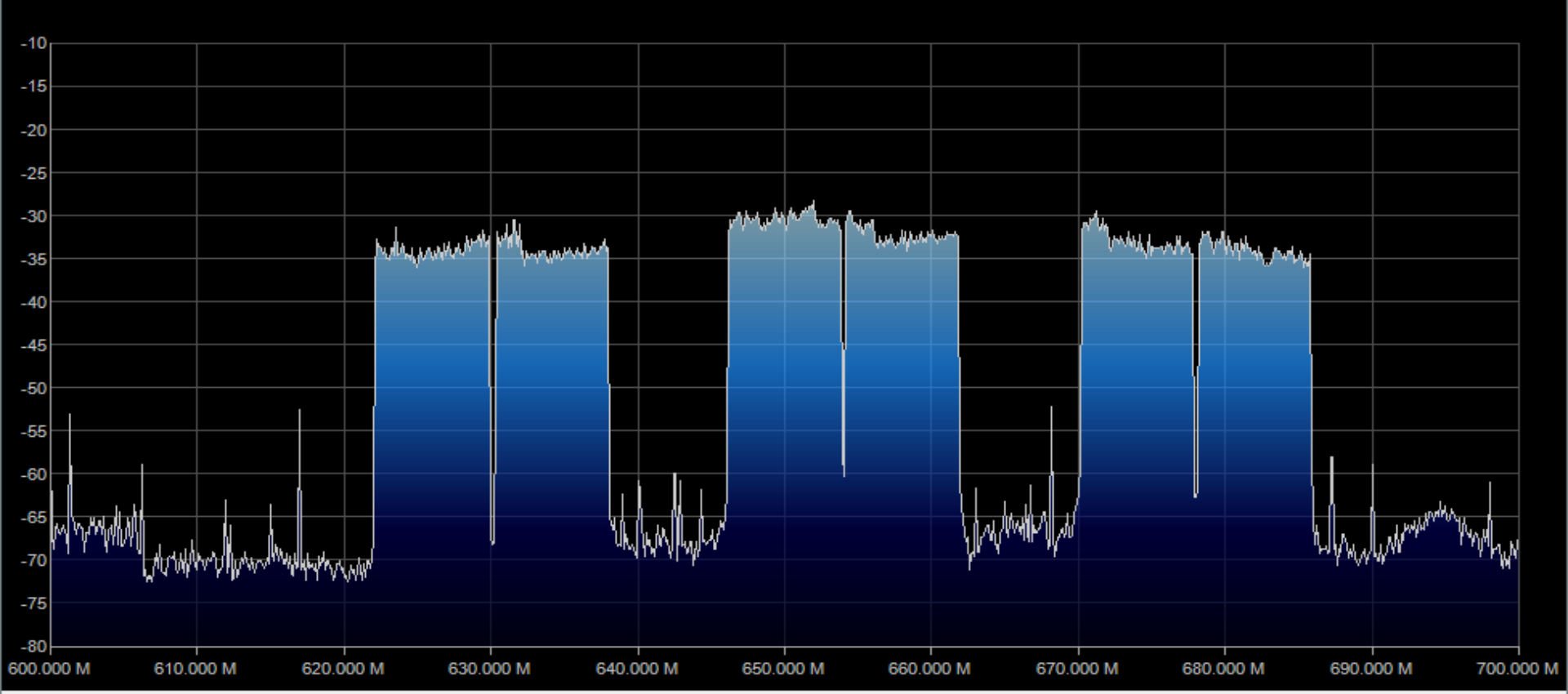


Zoom

Contrast

Range

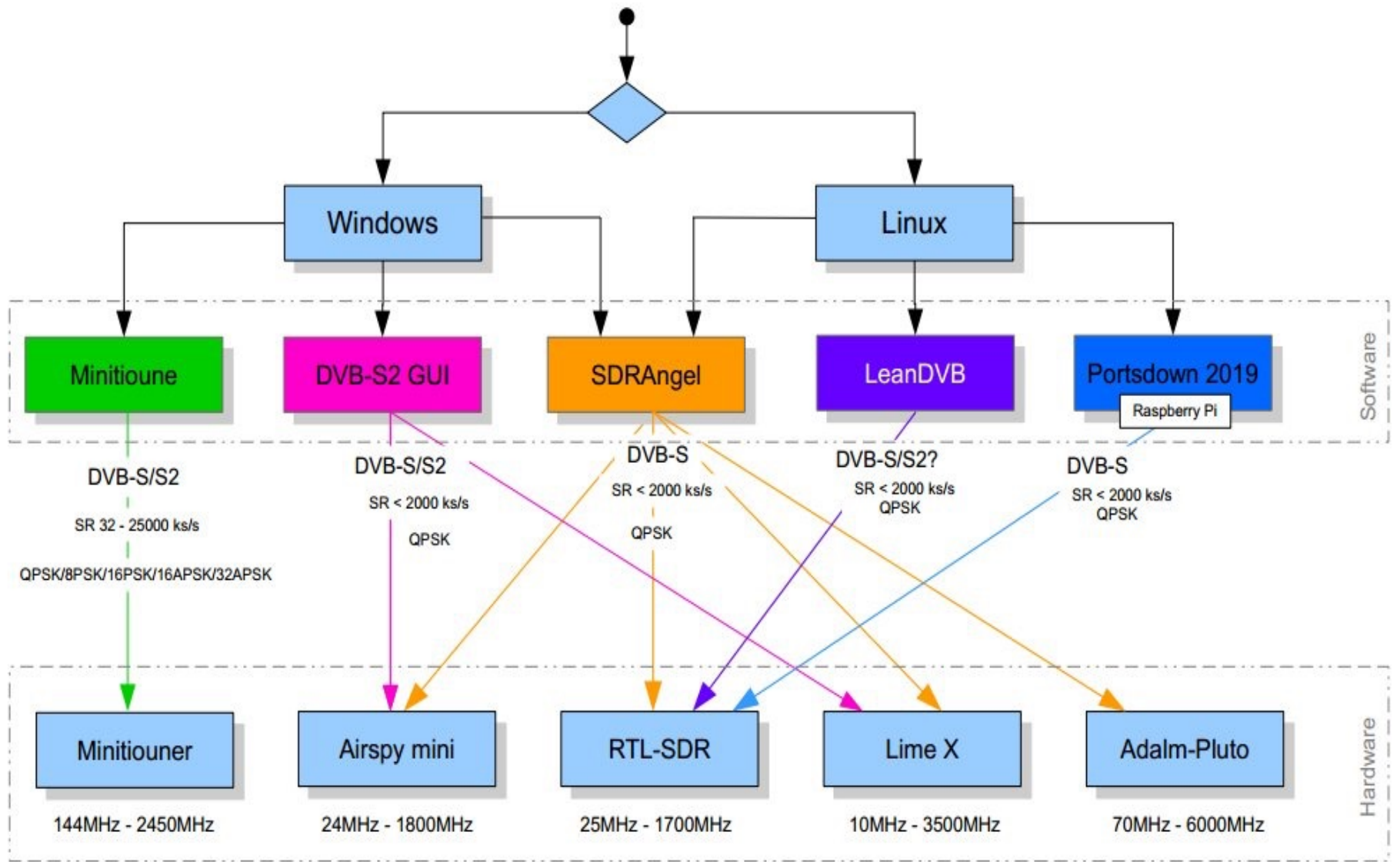
Offset



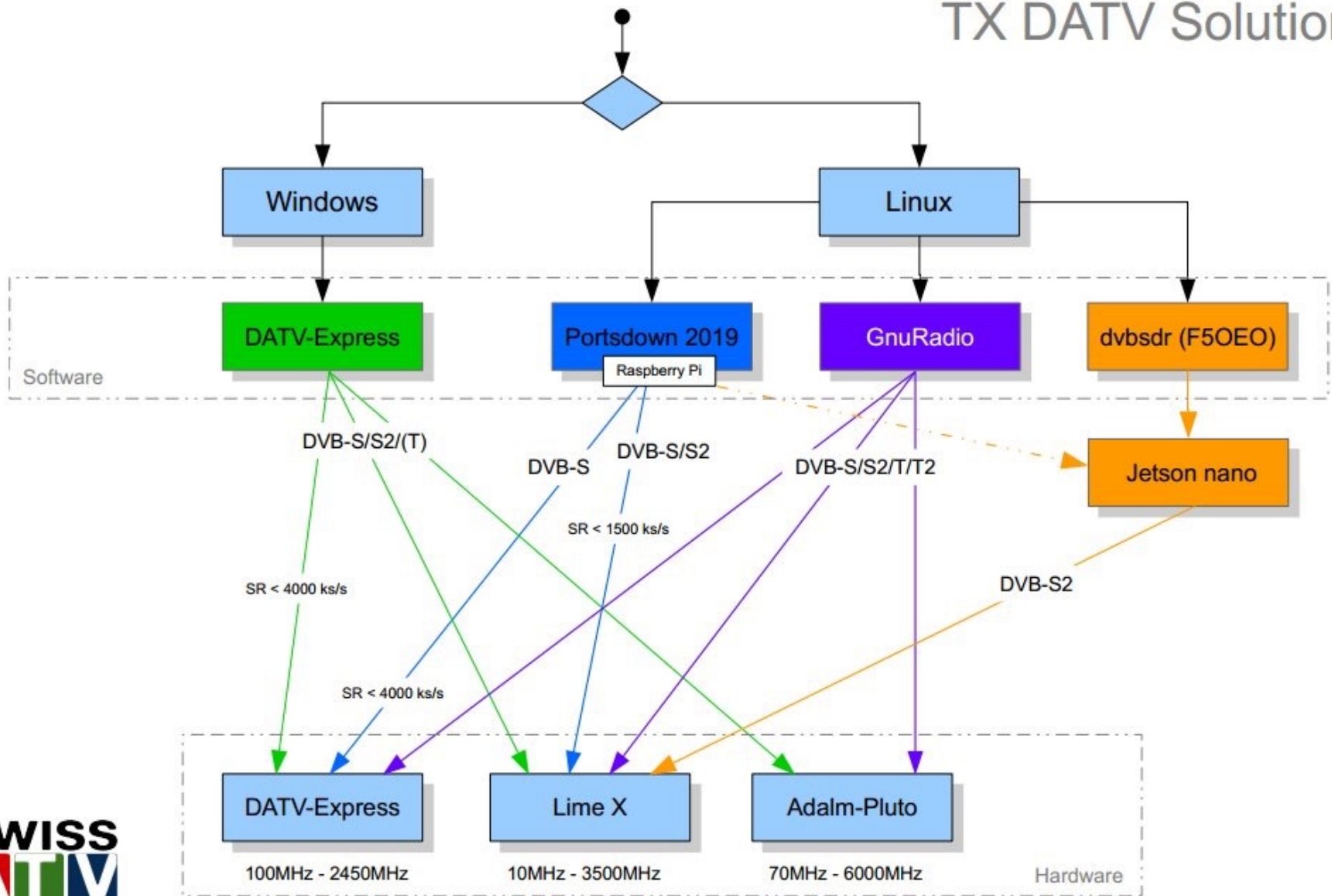


SDR software

- Non-specific
 - SDRangel
 - RX and TX



TX DATV Solutions



SDRangel device control

The screenshot displays the SDRangel software interface. At the top, the title bar reads "SDRangel". Below it is a menu bar with options: File, View, DeviceSets, Window, Preferences, and Help. The main window is titled "Sampling devices" and contains a control panel for device "R0".

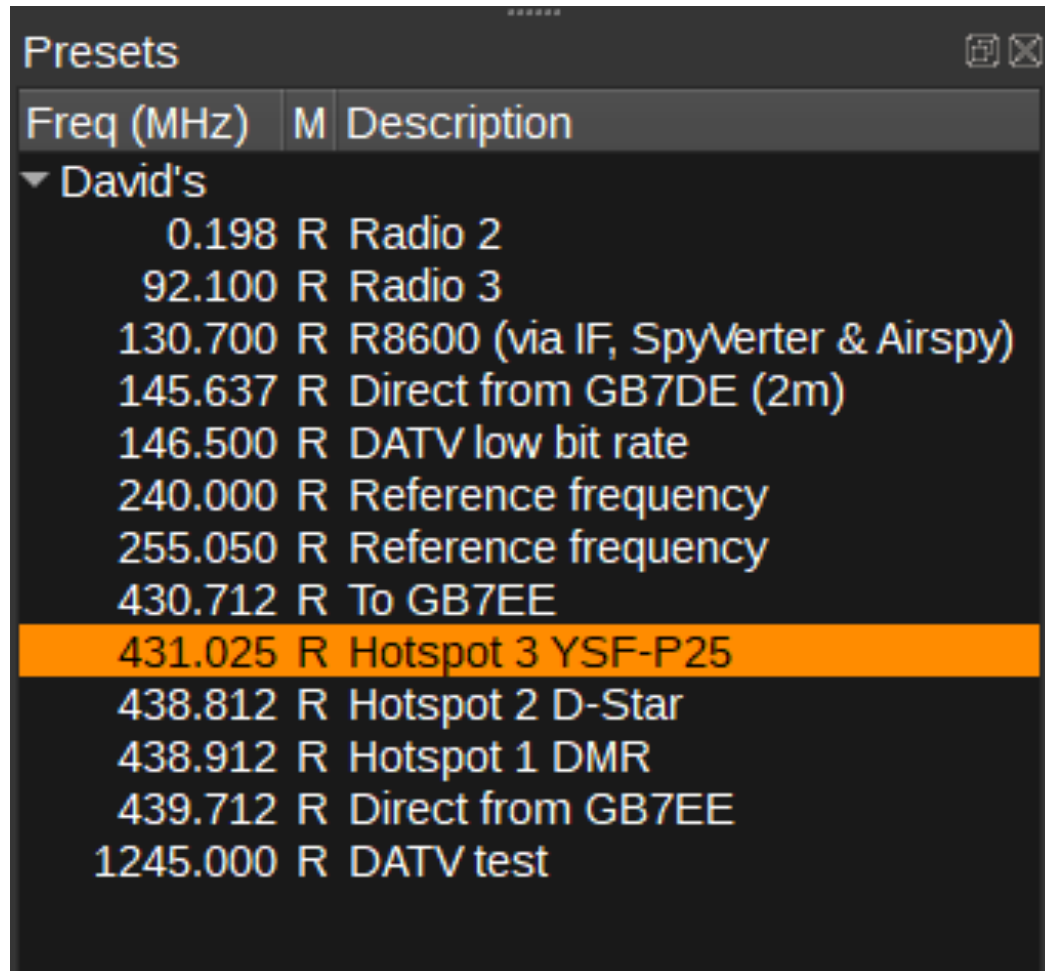
The control panel for "R0" includes the following elements:

- A play button and a refresh icon.
- A frequency display showing "0,431,025 kHz" with a "187.5k" label below it.
- A "LO ppm" slider set to "0.0".
- Buttons for "Auto", "DC", "IQ", "Bias T", and "X".
- Rate settings: "3.0 M" and "Dec 16".
- Filters: "Fp" and "Cer".
- Gain stages: "LNA" (7dB), "Mixer" (4dB), and "VGA" (6dB), each with a slider and an "AGC" checkbox.

Below the main control panel is a section titled "Sampling devices control" for device "R0". It shows the device name "Airspy[0] 4a464c8360e440b" with a refresh icon and a button with a hand icon. Below this is a dropdown menu set to "AM Demodulator" and a "+" button.



SDRangel presets



Freq (MHz)	M	Description
▼ David's		
0.198	R	Radio 2
92.100	R	Radio 3
130.700	R	R8600 (via IF, SpyVerter & Airspy)
145.637	R	Direct from GB7DE (2m)
146.500	R	DATV low bit rate
240.000	R	Reference frequency
255.050	R	Reference frequency
430.712	R	To GB7EE
431.025	R	Hotspot 3 YSF-P25
438.812	R	Hotspot 2 D-Star
438.912	R	Hotspot 1 DMR
439.712	R	Direct from GB7EE
1245.000	R	DATV test

R0

375k **0,094,300** kHz

LO ppm 0.0

Auto DC IQ Bias T X

Rate M Dec Fp

LNA 8dB AGC

Mixer 8dB AGC

Sampling devices control

R0

Airspy[0] 26a464dc28933a93

AM Demodulator

Spectrum Display

R0

Ham

Presets

Freq (MHz)	M	Description
David's		
0.198	R	BBC Radio 2 long-wave
92.100	R	BBC Radio 3 FM
130.700	R	R8600 (via IF, SpyWerter & Airspy)
145.525	R	2m NBFM 12.5 kHz channels
145.600	R	2m GB3FF 12.5 kHz channels
145.637	R	Direct from GB7DE (2m)
146.500	R	DATV (low bit rate)

Presets Commands

Broadcast FM Demod

Settings

Δf **0,000,000** Hz

dB -90 -80 -70 -60 -50 -40 -30 -20 -10

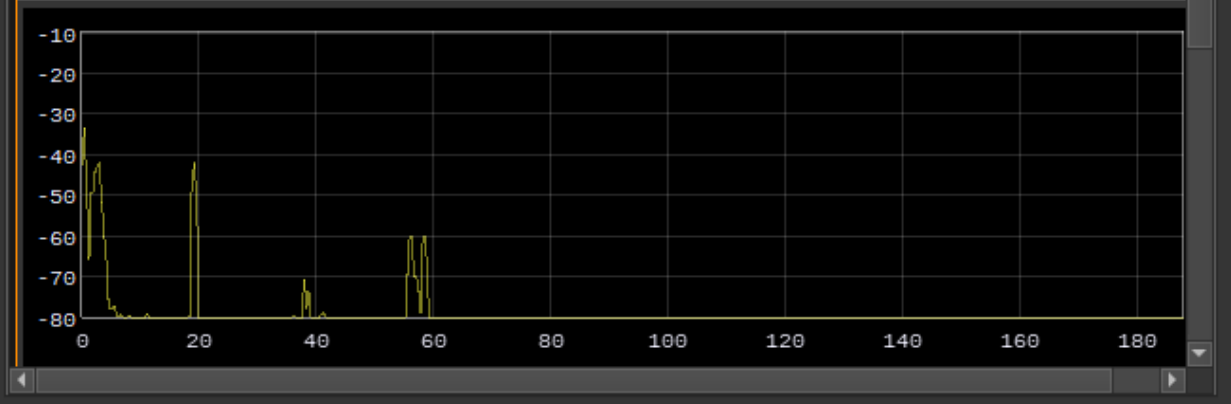
RF BW 250

AF BW 15

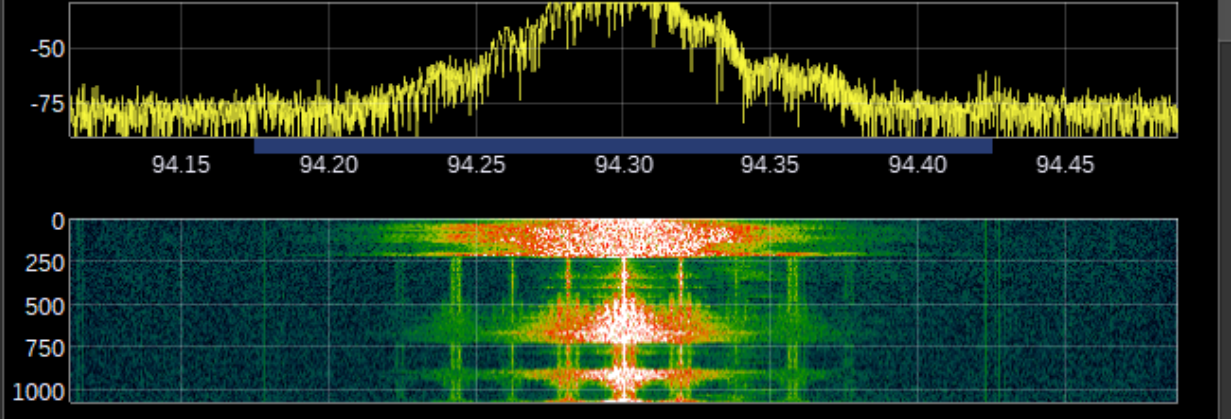
Vol

Sq -60

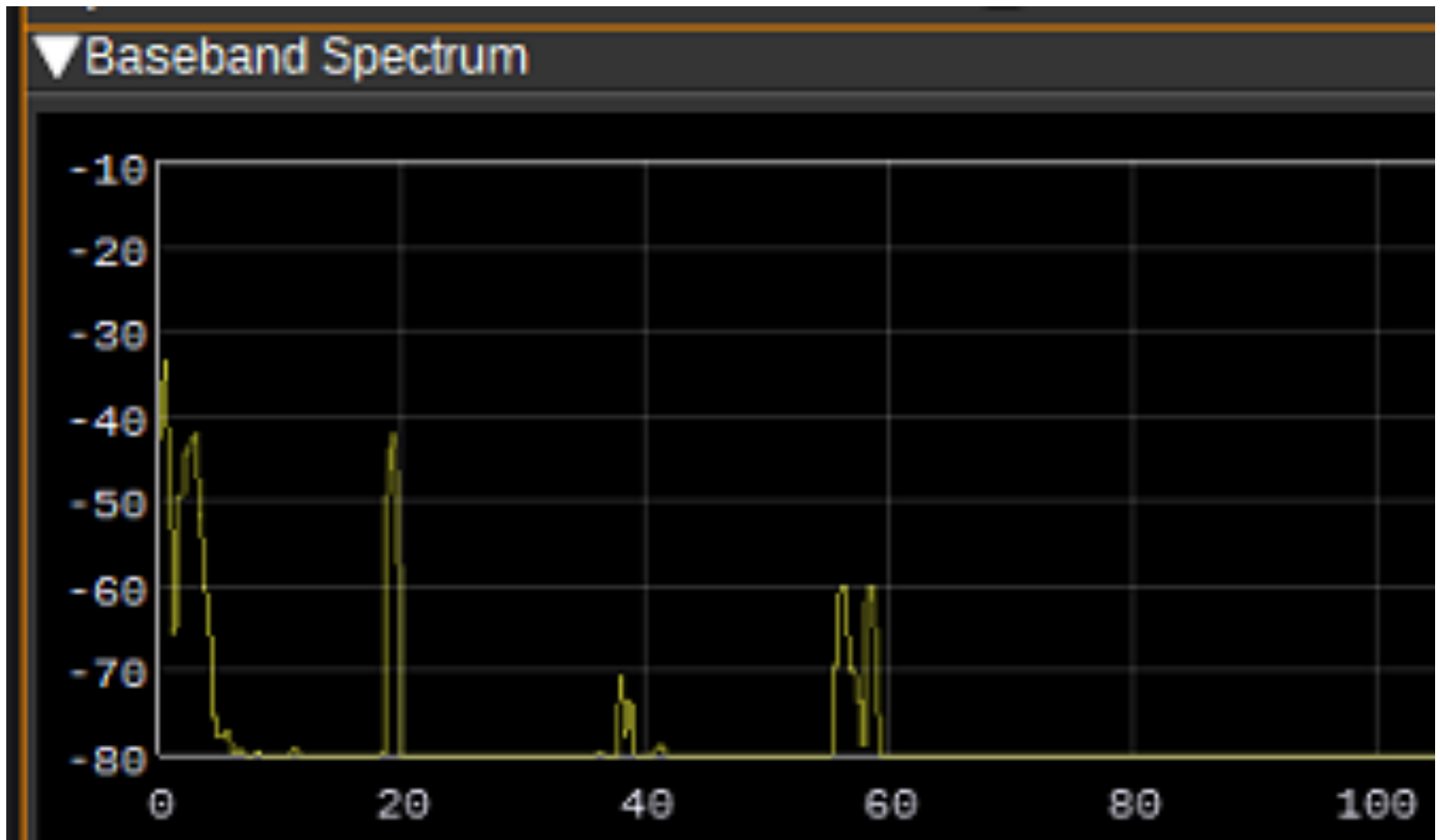
Baseband Spectrum



R0



SDRangel – FM baseband



R0

93.75k **0,438,812** kHz

LO ppm

Auto DC IQ Bias T X

Rate 3.0 M Dec 32 Fp Cer

LNA AGC

Mixer AGC

Sampling devices control

R0

Airspy[0] 4a464c8360e440b

AM Demodulator

Spectrum Display

R0

Har 4k -25 65 No 1

Presets

Freq (MHz)	M	Description
David's		
0.198	R	Radio 2
92.100	R	Radio 3
130.700	R	R8600 (via IF, SpyVerter & Airspy)
145.637	R	Direct from GB7DE (2m)
146.500	R	DATV low bit rate
240.000	R	Reference frequency
255.050	R	Reference frequency
430.712	R	To GB7EE
431.025	R	Hotspot 3 YSF-P25
438.812	R	Hotspot 2 D-Star
438.912	R	Hotspot 1 DMR
439.712	R	Direct from GB7EE
1245.000	R	DATV test

Presets Commands

DSD Demodulator

Settings

Δf +0,000,500 Hz RFBW 14.0k -23.4 dB

dB

Vol 4.0 Sq -55 10

G7USP /2820>CQCQCQ |GM8ARV G>GM8ARV B|Steve Lowestoft UK

Digital

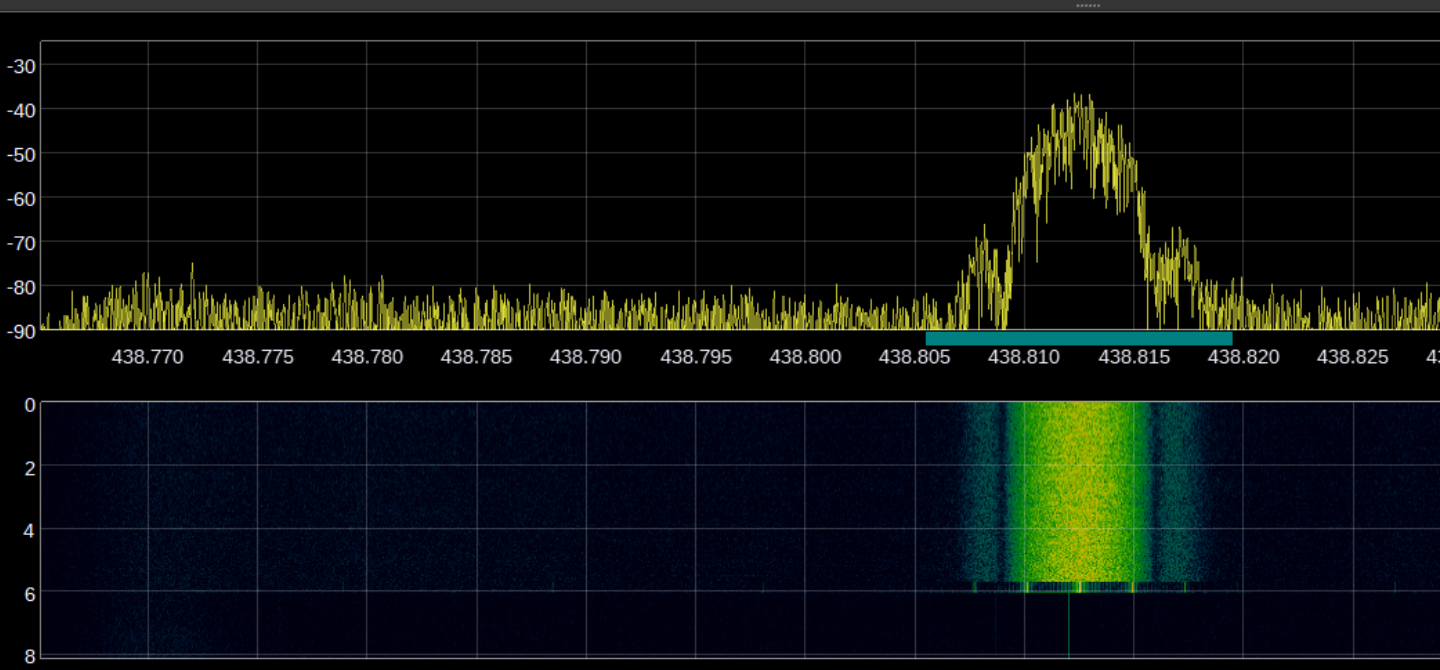
4.8k -D-STAR_HD

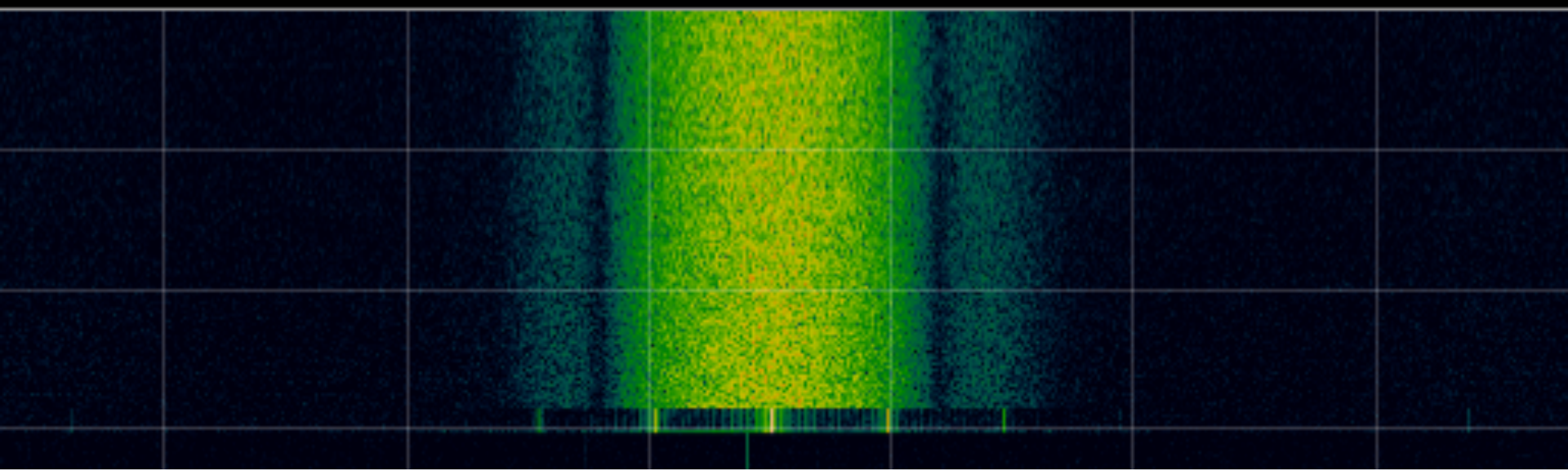
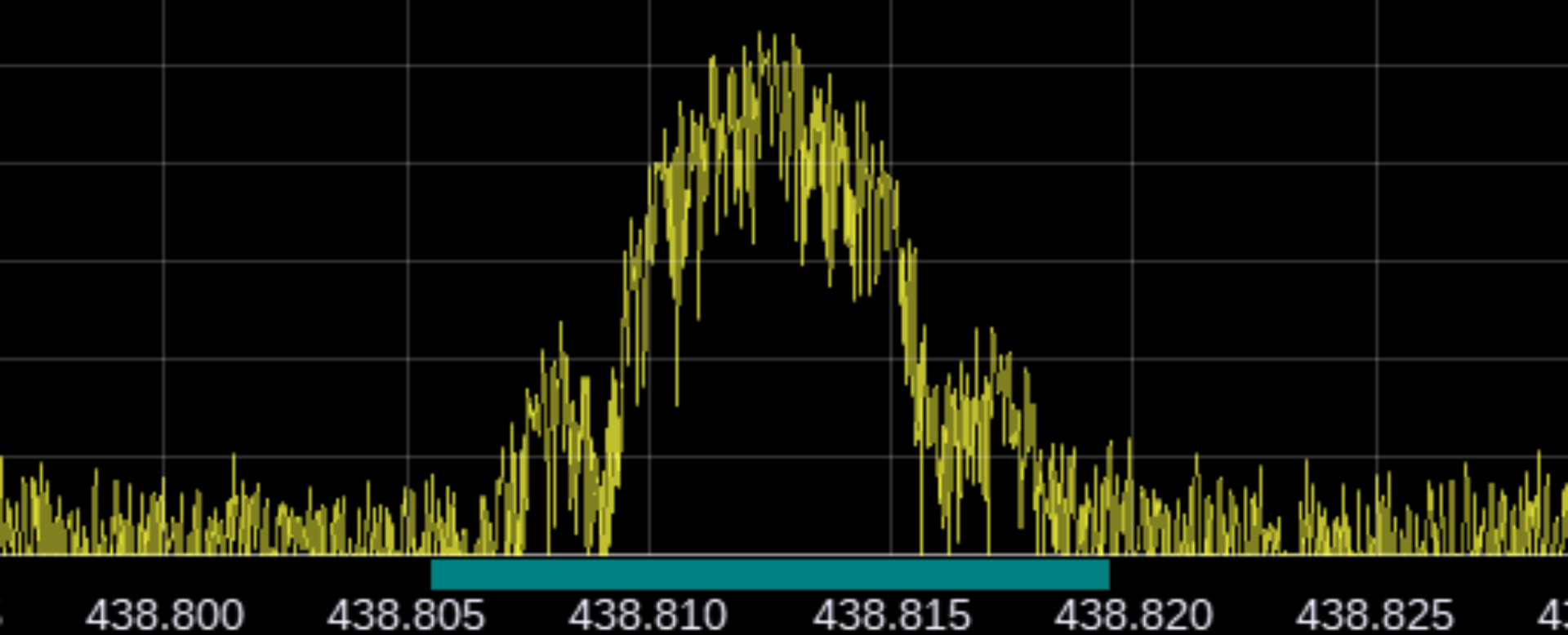
100 0 0 85 1 2

500 100 20

FMc

Gair

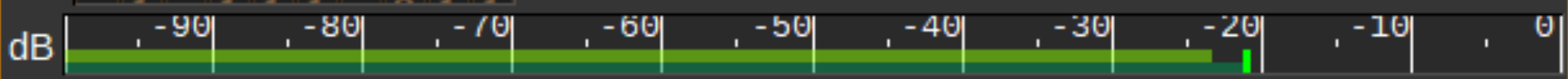




DSD Demodulator

Settings

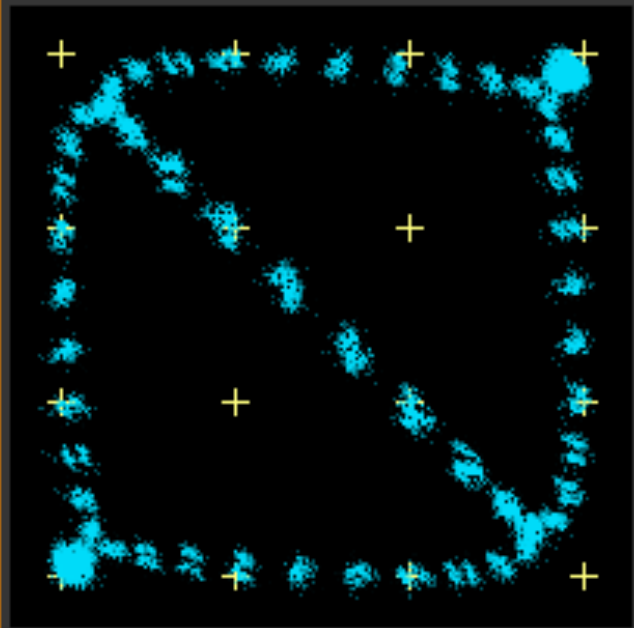
Δf + 0, 000, 500 Hz RFBW 14.0k -23.4 dB



Vol 4.0 Sq -55 10

G7USP /2820>CQCQCQ |GM8ARV G>GM8ARV B|Steve Lowestoft UK |

Digital



4.8k -D-STAR_HD 100 0 0 85 500 100 20 FMc ±3.1k Gain 1.00

R0

187.5k **0,431,025** kHz

LO ppm

Auto DC IQ Bias T X

Rate 3.0 M Dec 16 Fp Cer

LNA AGC

Mixer AGC

VGA

Sampling devices control

R0

Airspy[0] 4a464c8360e440b

AM Demodulator

Spectrum Display

R0

Har 4k -25 65 No 1

Presets

Freq (MHz)	M	Description
David's		
0.198	R	Radio 2
92.100	R	Radio 3
130.700	R	R8600 (via IF, SpyVerter & Airspy)
145.637	R	Direct from GB7DE (2m)
146.500	R	DATV low bit rate
240.000	R	Reference frequency
255.050	R	Reference frequency
430.712	R	To GB7EE
431.025	R	Hotspot 3 YSF-P25
438.812	R	Hotspot 2 D-Star
438.912	R	Hotspot 1 DMR
439.712	R	Direct from GB7EE
1245.000	R	DATV test

Presets Commands

DSD Demodulator

Settings

Δf +0,000,000 Hz RFBW 25.0k -17.2 dB

dB

Vol 10.0 Sq -55 10

C V2 GC 0:7 WI000|HUBNET >*****| >GM8ARV |

Digital

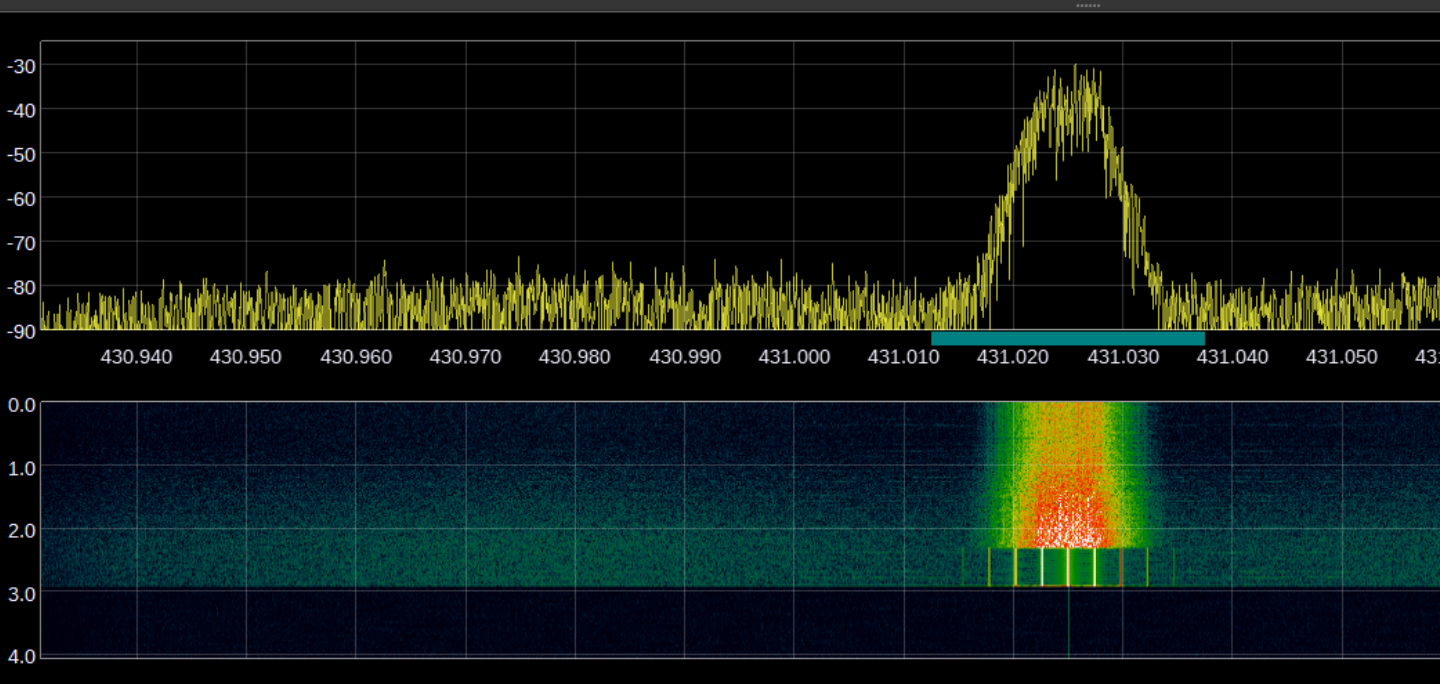
4.8k +YSF

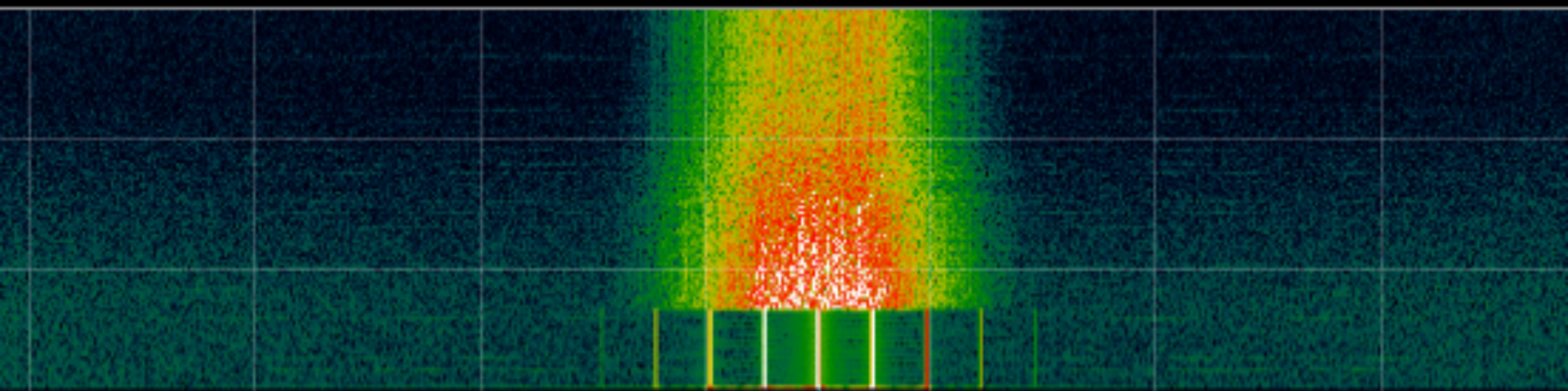
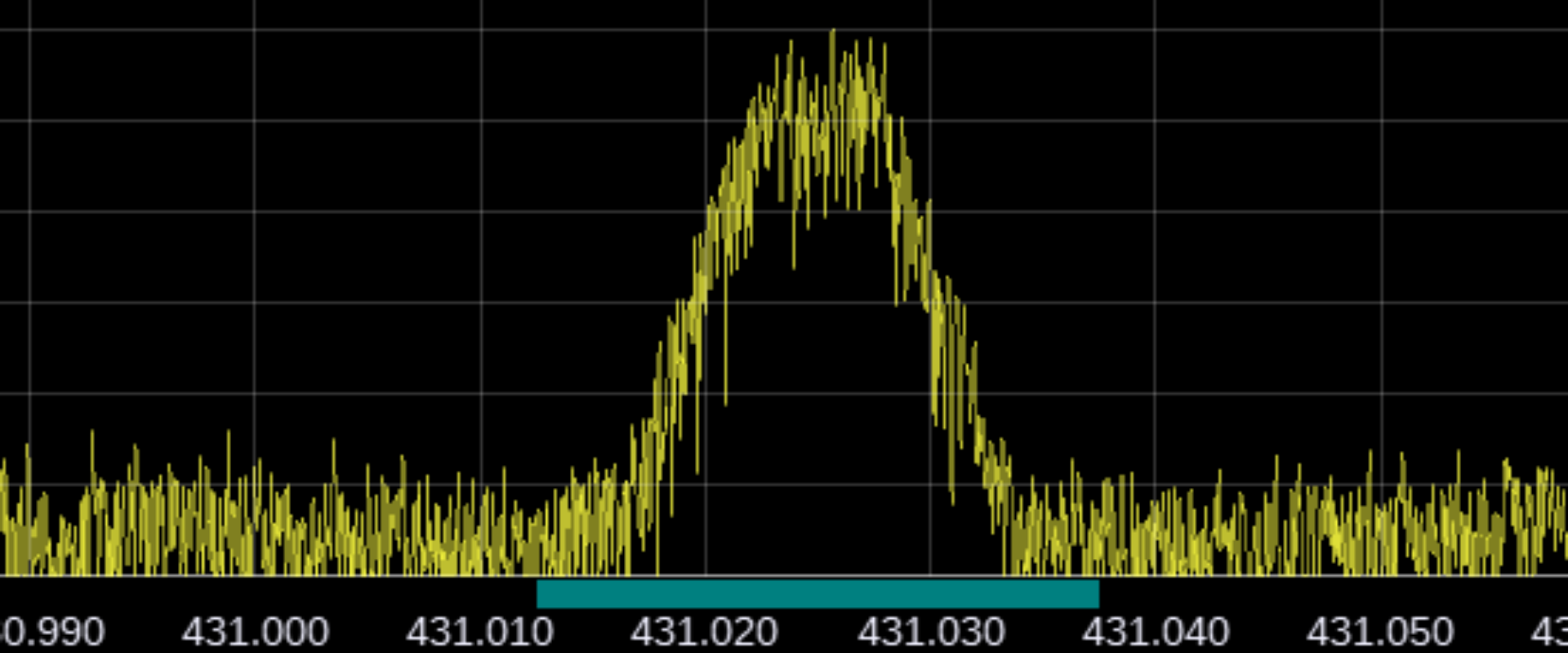
100 0 -5 105 1 2

500 100 38

FMc

Gair

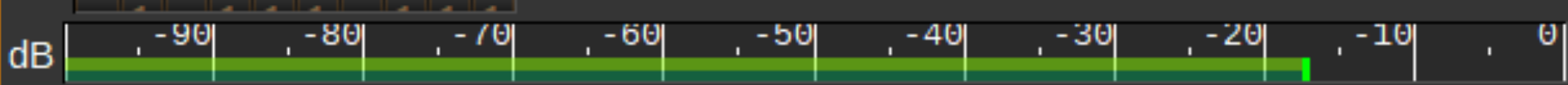




DSD Demodulator

Settings

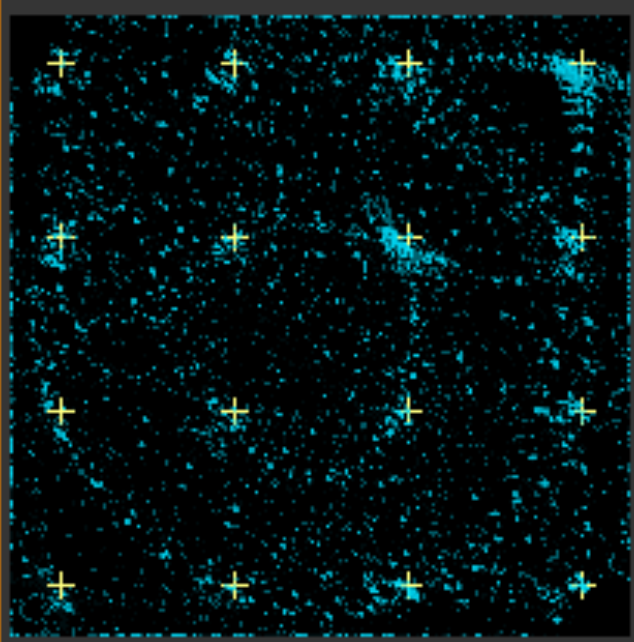
Δf Hz RFBW -17.2 dB



Vol | Sq 10

C V2 GC 0:7 WI000 | HUBNET >***** | >GM8ARV |

Digital



4.8k

100 0 -5 105

500 100 38

FMc

Gain

R0

187.5k **0,438,912** kHz

LO ppm

Auto DC IQ Bias T X

Rate 3.0 M Dec 16 Fp Cer

LNA AGC

Mixer AGC

Sampling devices control

R0

Airspy[0] 4a464c8360e440b

AM Demodulator

Spectrum Display

R0

Ha 4k -25 65 No 1

Presets

Freq (MHz)	M	Description
David's		
0.198	R	Radio 2
92.100	R	Radio 3
130.700	R	R8600 (via IF, SpyVerter & Airspy)
145.637	R	Direct from GB7DE (2m)
146.500	R	DATV low bit rate
240.000	R	Reference frequency
255.050	R	Reference frequency
430.712	R	To GB7EE
431.025	R	Hotspot 3 YSF-P25
438.812	R	Hotspot 2 D-Star
438.912	R	Hotspot 1 DMR
439.712	R	Direct from GB7EE
1245.000	R	DATV test

Presets Commands

DSD Demodulator

Settings

Δf +0,000,500 Hz RFBW 19.0k -27.5 dB

dB

Vol 7.5 Sq -55 10

Sta: MS S1: *-- VOX 02354040>G00000009 S2: 01 UNK

Digital

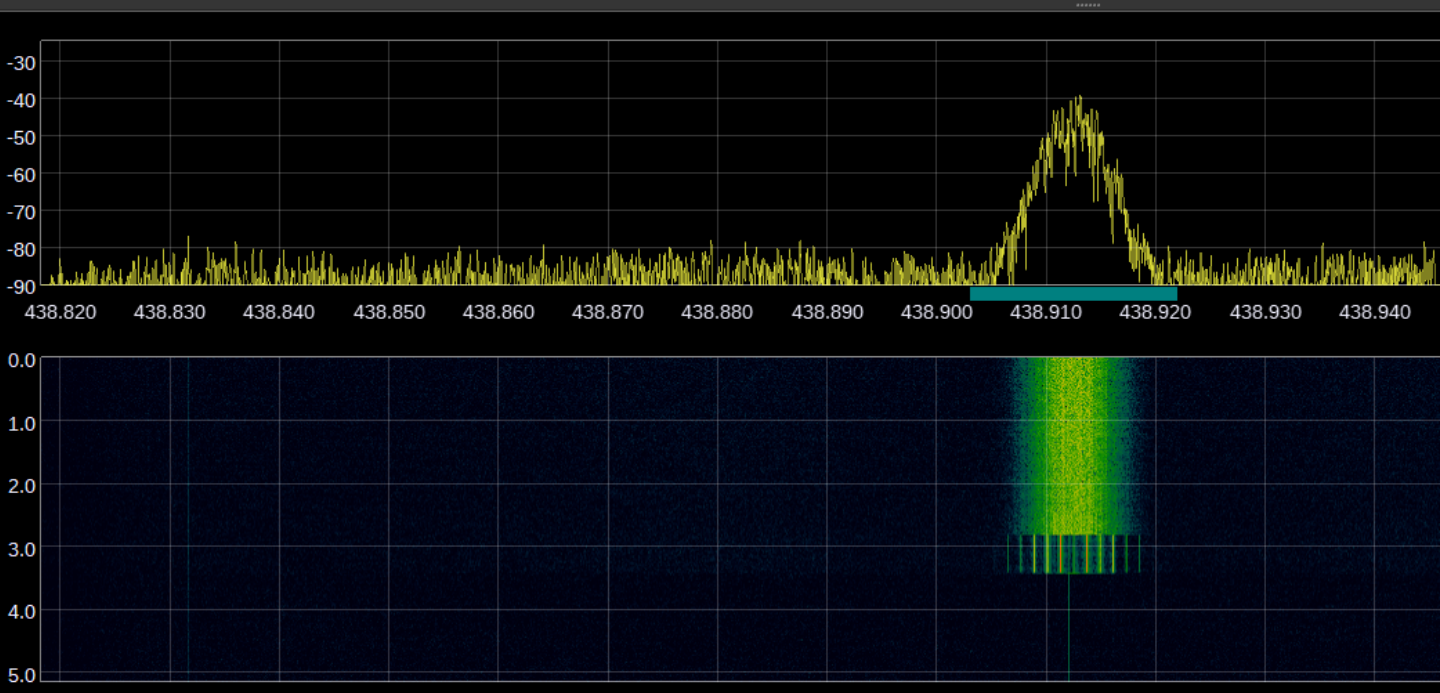
4.8k +DMRv

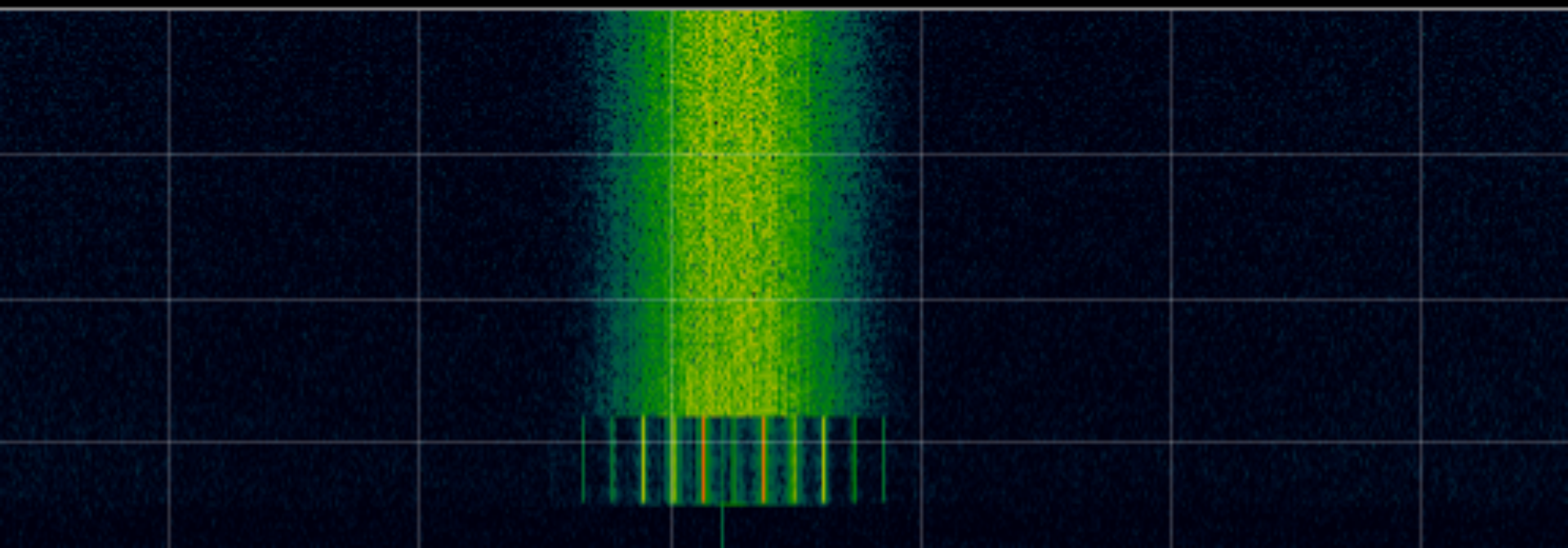
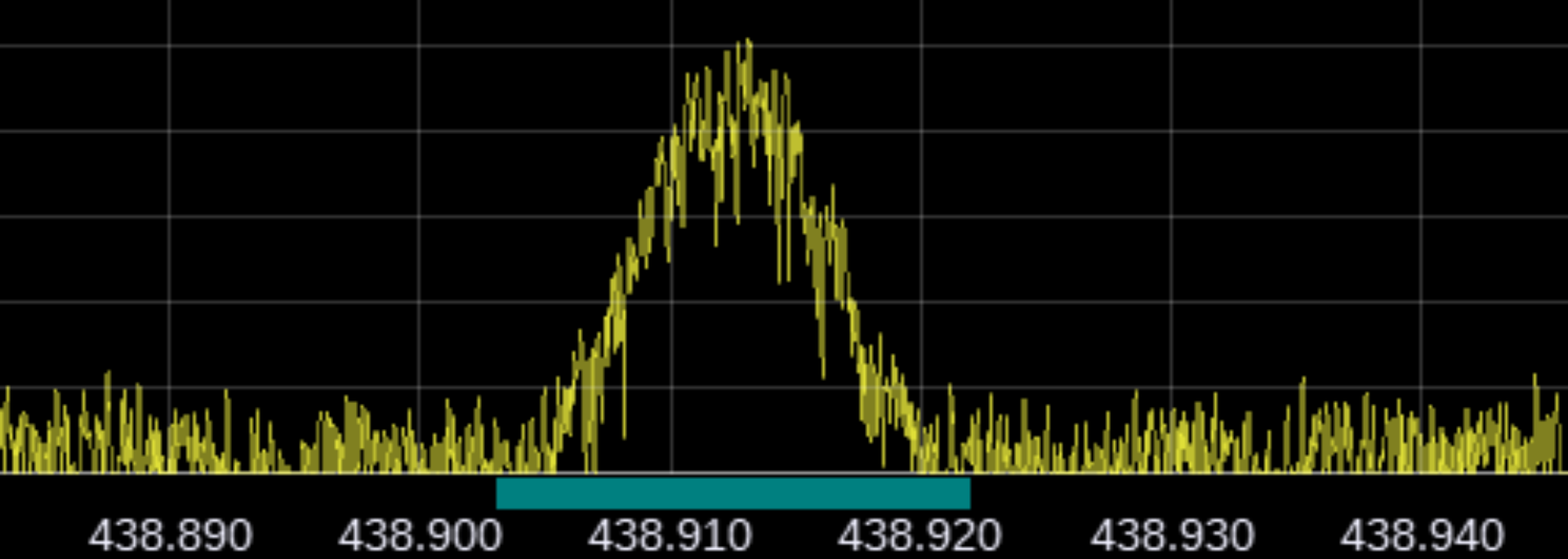
100 0 -5 100

300 100 20

FMc $\pm 4.6k$

Gair 1.00

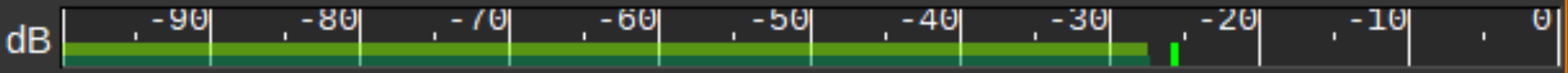








DSD Demodulator ✕

▼ Settings

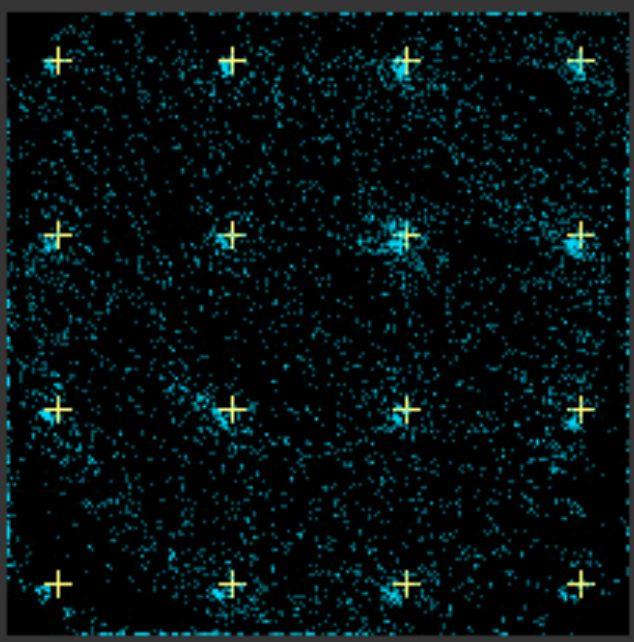
Δf + 0 , 0 0 0 , 5 0 0 Hz RFBW  19.0k -27.5 dB






 Vol  7.5 Sq  -55 10  





Sta: MS S1: * - - VOX 02354040>G000000009 S2: 01 UNK


▼ Digital




4.8k ▾ +DMRv  

100 0 -5 100 1 2 

  300  100  20

FMc  ±4.6k

Gain  1.00



SDRangel and more...

- Programmable precise frequency source
- SDR hardware – £20 to £100
- Free software
 - Spectrum analysis
 - Signal analysis
 - Receiving signals
- YOU can get on frequency