



(National Communications Authority)

Report

Measurement performed by: Johnny Høvik, Nkom Jon Ivar Øren, Nkom
Report Written by: Jon Ivar Øren, Nkom Client: Avinor v / Trond Arvid Jensen
Date of measurements: Friday, September 15, 2017
Report Date: Monday, September 18, 2017
Amended October 5, 2017: The report of September 18th was except publicity, but the basis for this is no longer present. The only change is that "EXCLUSIVE PUBLICITY" has been removed.

Background for the check

Avinor reports that GPS signals have been detected throughout the east of Finnmark. Avinor reports that on the Alta - Kirkenes route, the planes indicate that the GPS signal is disturbed at altitudes above 2000-3000 feet. Avinor has contacted Nkom with request to perform measurements.

Information about the check

Johnny Høvik and Jon Ivar Øren go to Kirkenes on September 15th. There we meet representatives of Avinor. We are driving to the tower while waiting for the helicopter. The two airline controllers can confirm that the aircraft still report problems with GPS reception.

We set ourselves in the helicopter, see figure 1, with each of our instruments and antennas: Høvik has the horn antenna and Fieldfox, see Figure 2, while the ears have the horn antenna and PR100. We do not see any disturbing signals on the GPS L1 (1575.42 MHz) frequency at ground level. But after a few tens of meters in the air we see a noise signal. The time now is 13:09. The noise signal gets stronger the higher up in the air we come. The noise signal is on GPS L1 (1575.42 MHz) with 1 MHz bandwidth, see Figure 3-5.

We ask the pilots to rotate 360 degrees with the helicopter and we will look at the noise signal to the east. We then fly further, the route can be seen in Figure 6. We repeat the rotation with 360 degrees of the helicopter three times, see figure 7. In all cases, we get direction towards the east. We also observe that the noise signal becomes stronger the closer to the limit we are.

Result of the check

Nkom has carried out measurements in the air space around Kirkenes by helicopter. Noise signals were recorded on GPS L1 (1575,42 MHz) and GPS L2 (1227.60 MHz). From different positions, the noise signals were peeled to the east and the strength increased the closer to the Russian helicopter wing.

Place	Date	Checker
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Attachments, images and measurements



Figur 1. The helicopter used during the measurements.



Figur 2. Picture of horn antenna and measuring instrument.

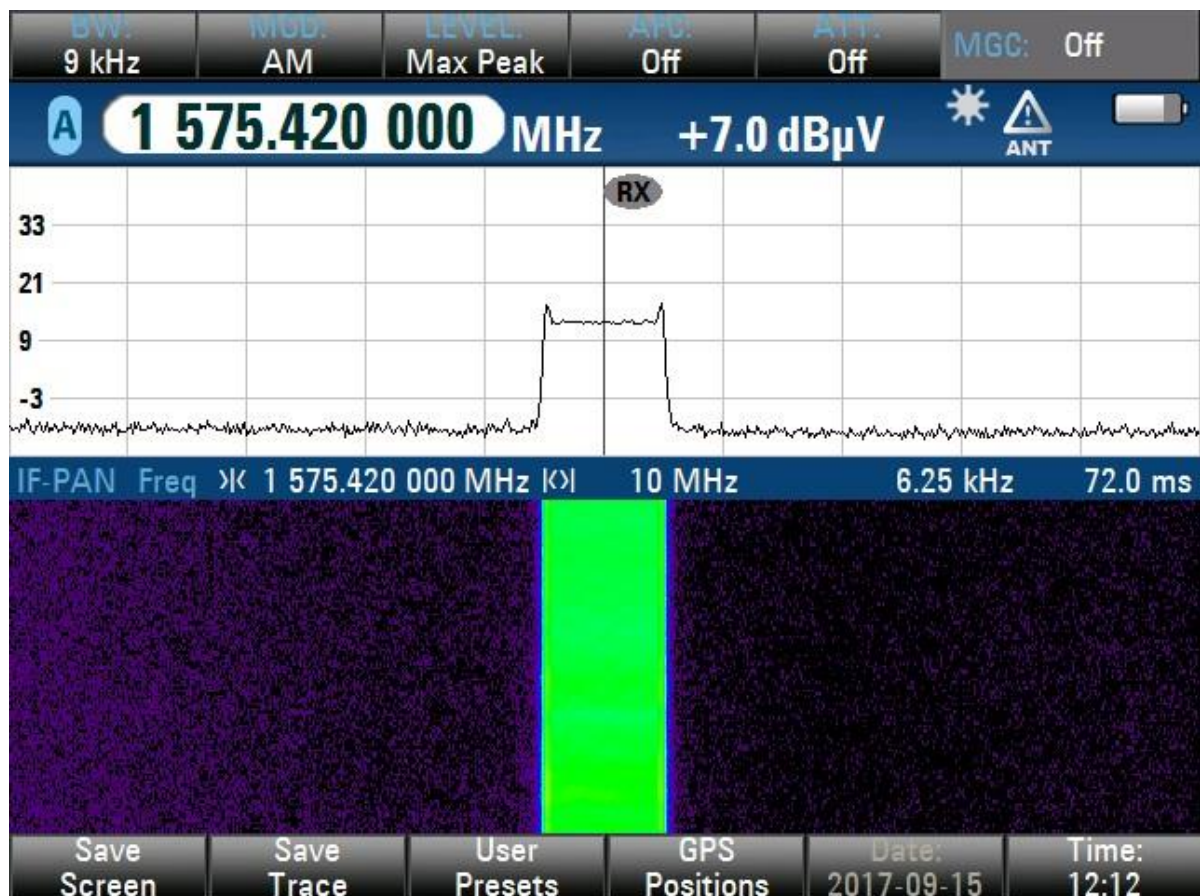


Figure 3. Plot of the noise signal of 1575,420 MHz. Measured with Rohde & Schwarz PR100. The time of The instrument is 1 hour after local time.

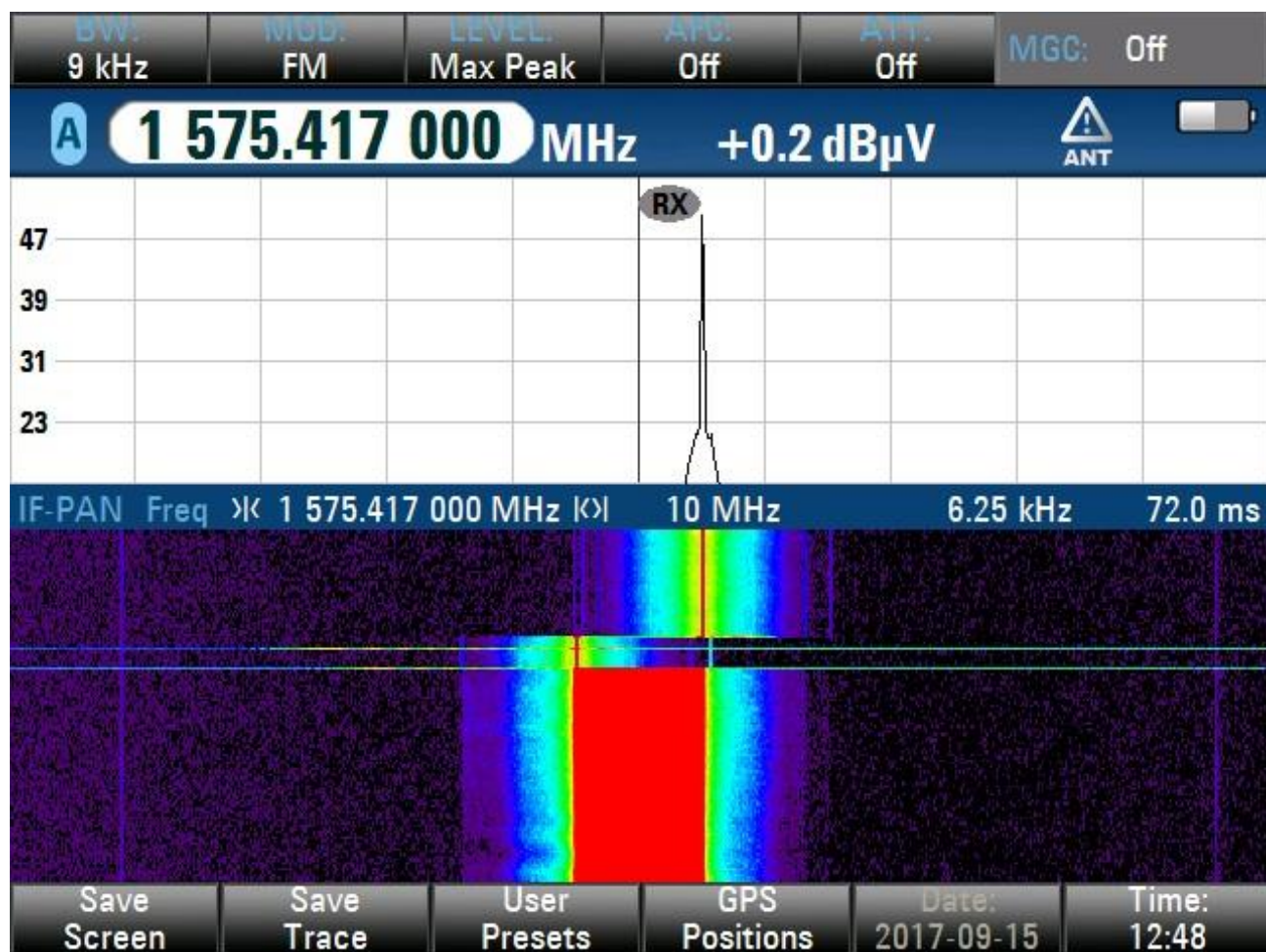


Figure 4. Plot of noise signal at 1575.42 MHz. Measured with Rohde & Schwarz PR100. The signal swept between the external frequencies, but sometimes for short periods of seconds, it was only transmitted at a frequency as shown above.

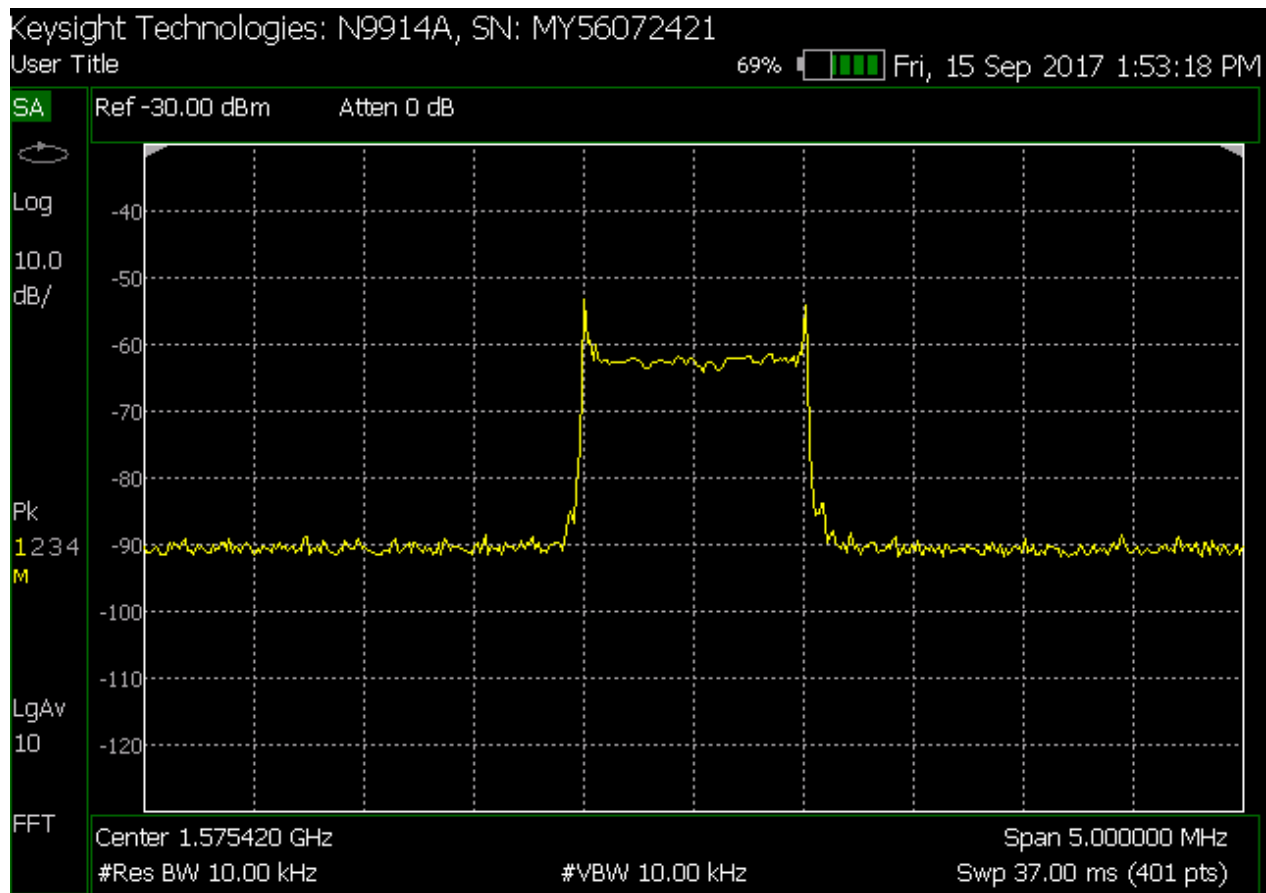


Figure 5. Plot of noise signal at 1575.42 MHz. Measured with Keysight Fieldfox N9914A. The bandwidth of the noise signal is 1 MHz.

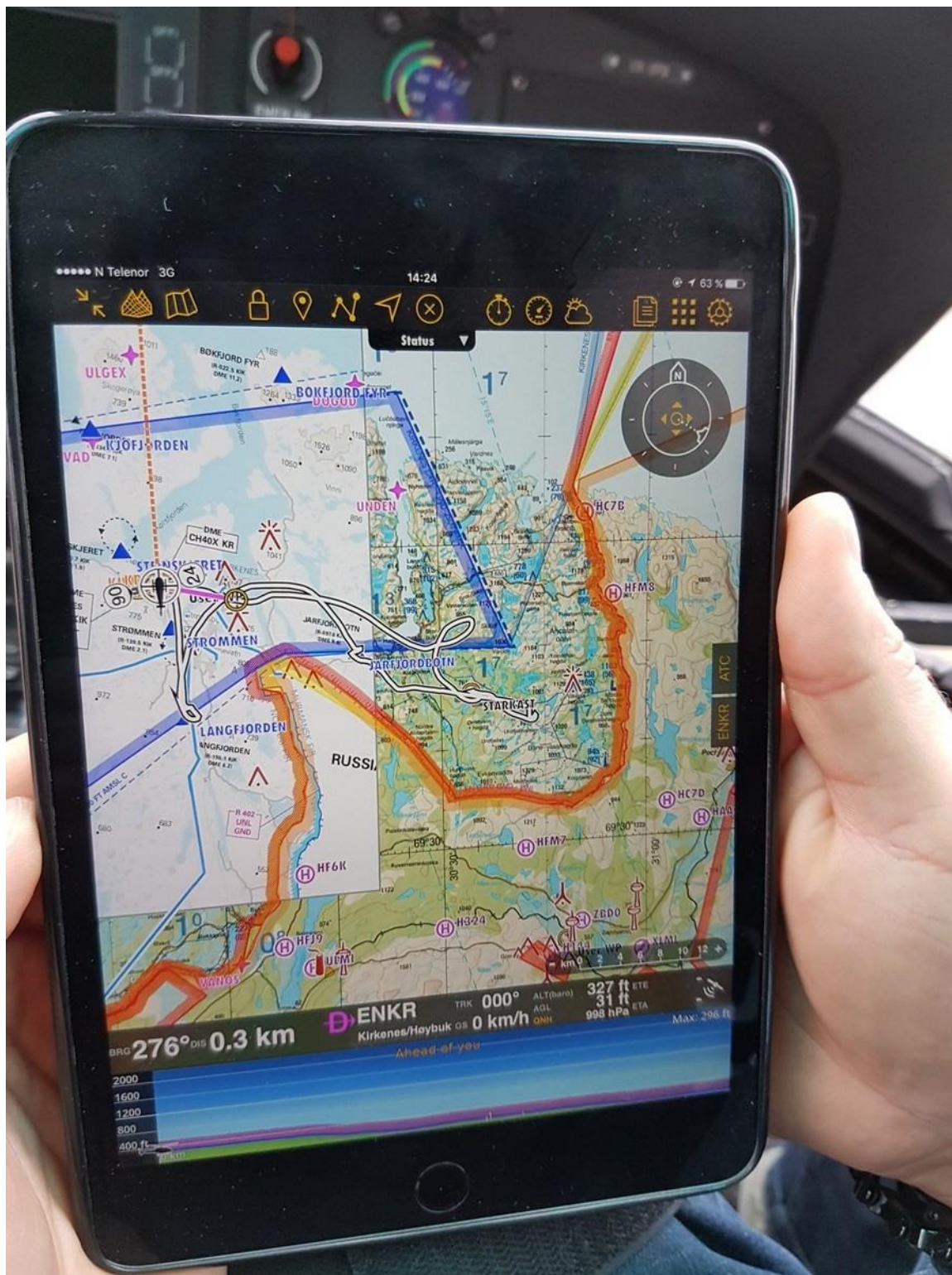


Figure 6. Picture of the Apple tablet to the pilot. The picture shows the entire route. Because of low cloud cover was maximum flown up to 1400 feet. The pilots could report that the helicopter lost GPS track during the flight, but the tablet did not. Probably, the tablet uses GLONASS.

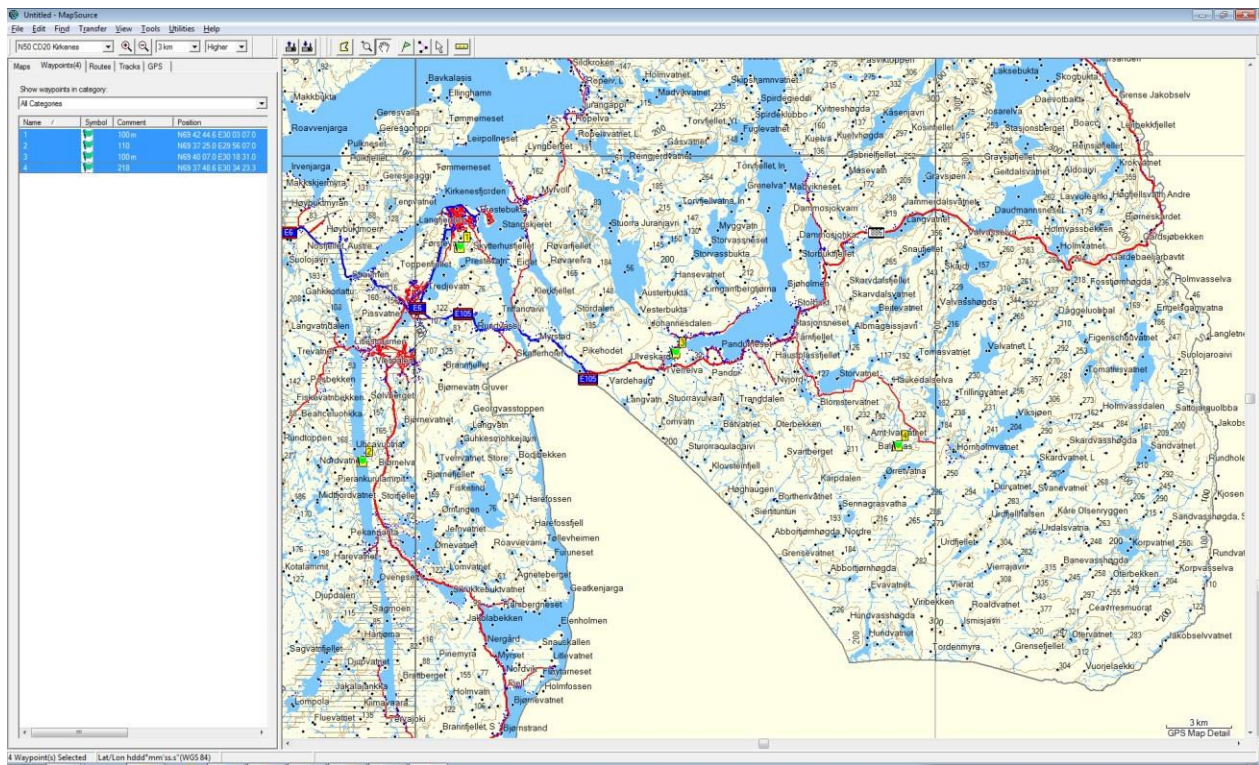


Figure 7. Map with mark and position over the 4 places the helicopter rotated 360 degrees.

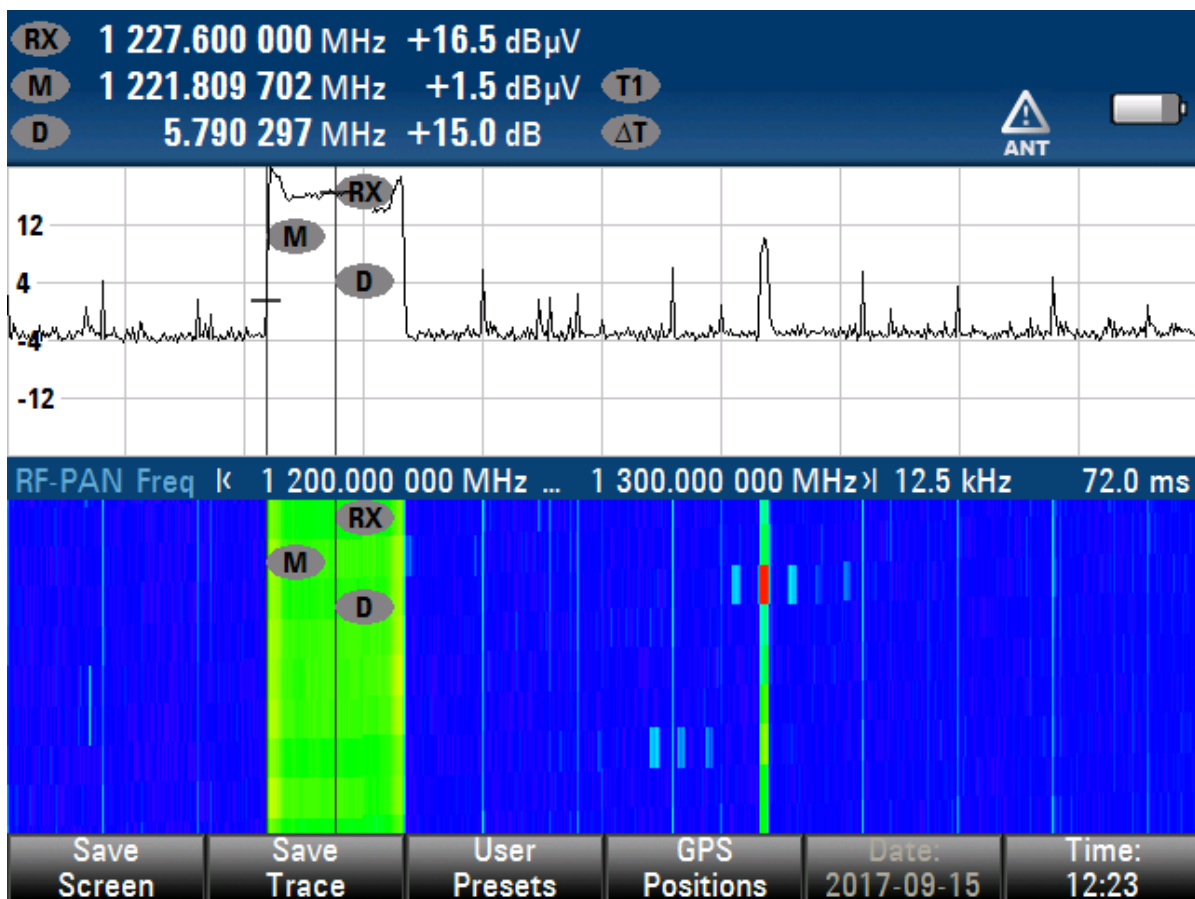


Figure 8. Plot of noise at 1227 MHz. Measured with Rohde & Schwarz PR100. The lower limit of the noise signal is 1221.8 MHz.

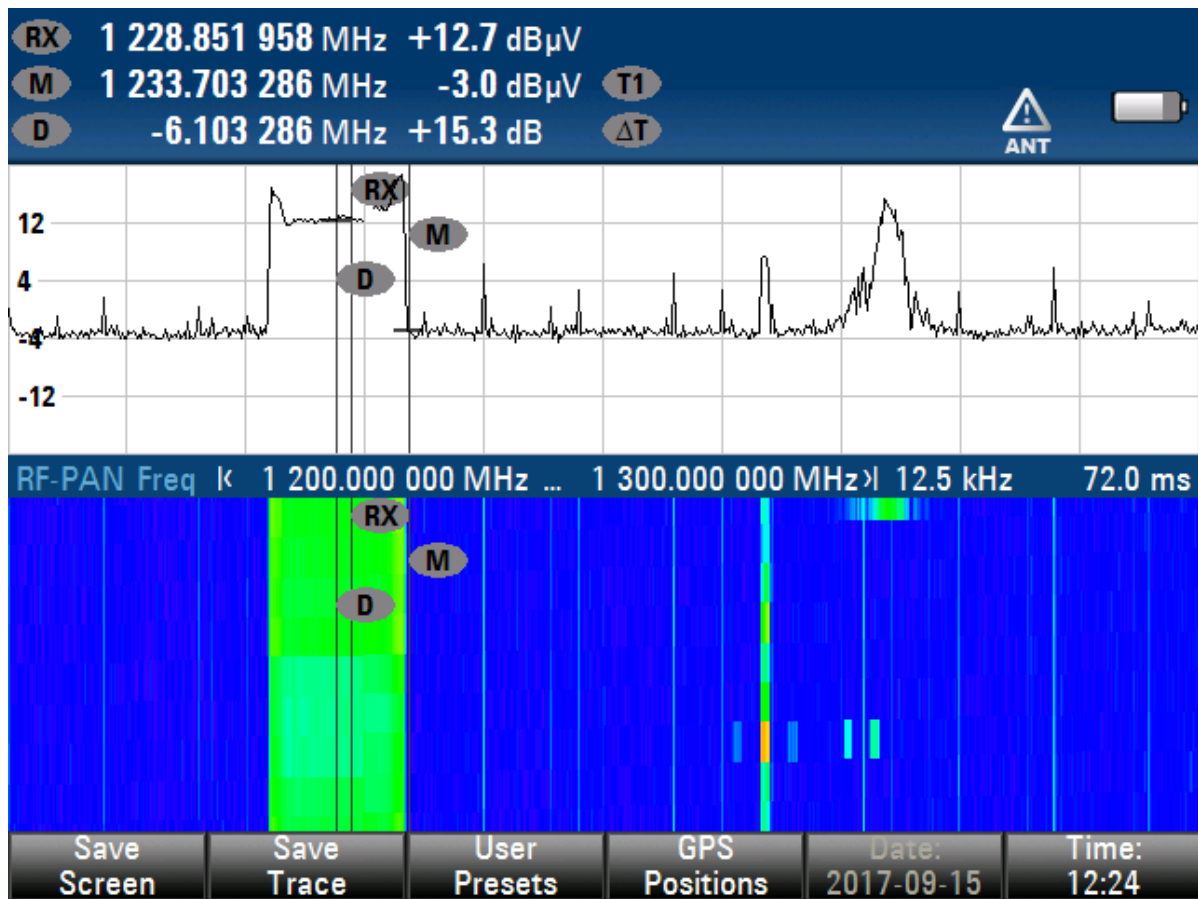


Figure 9. Plot of noise at 1227 MHz. Measured with Rohde & Schwarz PR100. The upper limit of the noise signal is 1233.7 MHz.