RR051-14-103199-3-A Ed. 0

Certification / Verification test report

According to the standard:
CFR47 FCC part 15

Equipment under test:
DRONE EBEE

FCC ID:
2AC2VEBEE

Company:
SENSEFLY

DISTRIBUTION: Mr GILLE **(Company: SENSEFLY)**

Number of pages: 49 with 9 appendixes

Ed.	Date	Modified pages	Written by Name	Written by Visa	Technical Verification and Quality Approval Name	Technical Verification and Quality Approval Visa
0	18-DEC-2014	Creation	M. DUMESNIL	M. D.	O. ROY	

Duplication of this test report is only permitted for an integral photographic facsimile. It includes the number of pages referenced here above.
This document is the result of testing a specimen or a sample of the product submitted. It does not imply an assessment of the conformity of the whole manufactured products of the tested sample.

DESIGNATION OF PRODUCT:	**DRONE EBEE**
Serial number (S/N):	EB-02-687
Reference / model (P/N):	EBEE
Software version:	2.2.1
MANUFACTURER:	SENSEFLY
Company:	SENSEFLY
Address:	Route de Genève 38 1033 Cheseaux-Lausanne SWITZERLAND
Responsible:	Mr GILLE
DATE(S) OF TEST:	Between 04-AUG-2014 to 08-AUG-2014
TESTING LOCATION:	EMITECH ANGERS laboratory at JUIGNE SUR LOIRE (49) FRANCE EMITECH ANGERS open area test site in JUIGNE SUR LOIRE (49) FRANCE 21 rue de la Fuye 49610 Juigne sur Loire France FCC 2.948 Listed Site Registration Number: 90469 FCC Accredited under US-EU MRA Designation Number: FR0009 Test Firm Registration Number: 873677
TESTED BY:	M. DUMESNIL

CONTENTS

1. INTRODUCTION

This document presents the result of RADIO test carried out on the following equipment: **DRONE EBEE** in accordance with normative reference.

The equipment under test must integrate a camera. The camera device provided for test was IXUS 127 HS, serial number N° 513022522102.

The equipment integrates radio module already certified but the module's OEM manual is not respected.

2. PRODUCT DESCRIPTION

Class:	B
Utilization:	Drone
Antenna type and gain:	internal dipole antenna, 2.5 dBi (WCP2400-MMCX4 / Laird Technologies)
Operating frequency range:	from 2401.6 MHz to 2476.4 MHz
Number of channels:	76
Channel spacing:	minimum 277.75 kHz measured
Modulation:	type FHSS
Power source:	Battery LiPo, 11.1Vdc

Power level, frequency range and channels characteristics are not user adjustable.
The details pictures of the product and the circuit boards are joined with this file.

3. NORMATIVE REFERENCE

The standards and testing methods related throughout this report are those listed below.
They are applied on the whole test report even though the extensions (version, date and amendment) are not repeated.

CFR 47 FCC Part 15 (2014)	Radio Frequency Devices
ANSI C63.4 (2003)	Methods of Measurement of Radio-Noise Emissions from Low- voltage Electrical and Electronics Equipment in the range of 9 kHz to 40 GHz.
Public Notice DA 00-705	Filing and Measurement Guideline for Frequency Hopping Spread Spectrum Systems.

4. TEST METHODOLOGY

Radio performance tests procedures given in CFR 47 part 15:

Subpart B –Unintentional Radiators
- Paragraph 107: Conducted limits
- Paragraph 109: Radiated emission limits
- Paragraph 111: Antenna power conduction limits for receivers

Subpart C – Intentional Radiators
- Paragraph 203: Antenna requirement
- Paragraph 205: Restricted bands of operation
- Paragraph 207: Conducted limits
- Paragraph 209: Radiated emission limits; general requirements
- Paragraph 212: Modular transmitter
- Paragraph 215: Additional provisions to the general radiated emission limitations
- Paragraph 247: Operation within the bands 902-928 MHZ, 2400-2483.5 MHz and 5725-5850 MHz

5. TEST EQUIPMENT CALIBRATION DATES

Equipment	Model	Type	Last verification	Next verification	Validity
0000	BAT-EMC	Software	/	/	/
1922	Microwave DB C020180F-4B1	Low-noise amplifier 1 to 18 GHz	12/09/2013	12/09/2014	12/11/2014
1939	IMC WR42	Horn antenna	20/04/2012	20/04/2016	20/06/2016
1940	IMC WR42	Horn antenna	20/04/2012	20/04/2016	20/06/2016
3036	ALC Microwave ALN02-0102	Low-noise amplifier	14/05/2014	14/05/2015	14/07/2015
4088	R&S FSP40	Spectrum Analyzer	22/08/2013	22/08/2015	22/10/2015
7299	Microtronics BRM50702	reject band filter	25/10/2013	25/10/2015	25/12/2015
8511	HP 8447D	Low noise preamplifier	22/08/2013	22/08/2014	22/10/2014
8526	Schwarzbeck VHBB 9124	Biconical antenna	12/06/2012	12/06/2016	12/08/2016
8528	Schwarzbeck VHA 9103	Biconical antenna	24/09/2013	24/09/2017	24/11/2017
8533	R&S HFH2-Z2	Loop antenna	11/02/2014	11/02/2016	11/04/2016
8535	Emco 3115	Horn antenna	29/10/2012	29/10/2016	29/12/2016
8543	Schwarzbeck UHALP 9108A	Log periodic antenna	12/06/2012	12/06/2016	12/08/2016
8593	SIDT Cage 2	Full anechoic room	/	/	/
8707	R&S ESI7	Test receiver	03/10/2012	03/10/2014	03/12/2014
8732	Emitech	OATS	23/08/2013	23/08/2016	23/10/2016
8750	La Crosse Technology WS-9232	Meteo station	20/07/2012	20/07/2014	20/09/2014
8783	EMCO 3147	Log periodic antenna	24/09/2013	24/09/2017	24/11/2017
8896	ACQUISYS GPS8	Satellite synchronized frequency standard	/	/	/

6. TESTS AND CONCLUSIONS

6.1 unintentional radiator (subpart B)

Test	Description of test	Respected criteria?				Comment
procedure		Yes	No	NAp	NAs	
FCC Part 15.107	CONDUCTED LIMITS			X		
FCC Part 15.109	RADIATED EMISSION LIMITS	X				Discovery mode
FCC Part 15.111	ANTENNA POWER CONDUCTED LIMITS FOR RECEIVER			X		
FCC Part 15.19	LABELLING REQUIREMENTS	X				
FCC Part 15.21 FCC Part 105	INFORMATION TO THE USER	X				
FCC Part 15.212	MODULAR TRANSMITTER			X		

NAp: Not Applicable NAs: Not Asked

Test report acceptation

Responsible party	
Name	Visa

Information to user:

The user notice, “User Manual eBee and eBee Ag Revision 13 / November 2014 Copyright © 2010-2014 senseFly Ltd”, includes the following informations:

§ 15.105:

For a Class B digital device or peripheral, the instructions furnished the user shall include the following or similar statement, placed in a prominent location in the text of the manual:

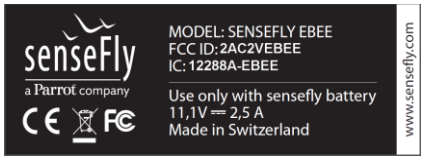
NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference's by one or more of the following measures:
-Reorient or relocate the receiving antenna.
-Increase the separation between the equipment and the receiver.
-Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
-Consult the dealer or an experienced radio/TV technician for help.

§15.21:

Any changes or modifications to this equipment not expressly approved by SENSEFLY may cause, harmful interference and void the FCC authorization to operate this equipment.

EQUIPEMENT LABELING REQUIREMENTS

Product Regulatory Label Drawing:



Product Regulatory Label Placement:

The label shall be located in a conspicuous location on the device
The label shall not be a stick-on, paper label. The label on these products shall be permanently affixed to the product and shall be readily visible to the purchaser at the time of purchase

6.2 intentional radiator (subpart C)

Test procedure	Description of test	Respected criteria?				Comment
		Yes	No	NAp	NAs	
FCC Part 15.203	ANTENNA REQUIREMENT	X				*Note 1*
FCC Part 15.205	RESTRICTED BANDS OF OPERATION	X				
FCC Part 15.207	CONDUCTED LIMITS			X		
FCC Part 15.209	RADIATED EMISSION LIMITS; general requirements	X				*Note 2*
FCC Part 15.212	MODULAR TRANSMITTERS			X		
FCC part 15.215	ADDITIONAL PROVISIONS TO THE GENERAL RADIATED EMISSION LIMITATIONS					
	(a) Alternative to general radiated emission limits	X				
	(b) Unwanted emissions outside of §15.247 frequency bands	X				*Note 3*
	(c) 20 dB bandwidth and band-edge compliance	X				
FCC Part 15.247	OPERATION WITHIN THE BANDS 902-928 MHZ, 2400-2483.5 MHz and 5725-5850 MHz					
	(a) (1) Hopping systems	X				*Note 4*
	(a) (2) Digital modulation techniques			X		
	(b) Maximum peak output power	X				*Note 5*
	(c) Operation with directional antenna gains > 6 dBi			X		
	(d) Intentional radiator	X				
	(e) Peak power spectral density			X		
	(f) Hybrid system			X		
	(g) Frequency hopping requirements	X				
	(h) Frequency hopping intelligence			X		
	(i) RF exposure compliance	X				*Note 6*

NAp: Not Applicable NAs: Not Asked

Note 1: Integral and dedicated antenna. Professionally installed equipment.

Note 2: See FCC part 15.247 (d).

Note 3: See FCC part 15.209. Unwanted emissions levels are all below the fundamental emission field strength level.

Note 4: The system hops to channel frequencies from a pseudo randomly ordered list of hopping frequencies. Each frequency is used equally on the average by the transmitter, and separated by a minimum of 25 kHz or 2/3 of 20 dB bandwidth of the hopping channel (see appendix 7).

The frequency hopping system uses 76 channels (see appendix 9).

The timing by channel is 1830 µs (see appendix 8).

During 76 channels × 0.4 s =30.4 s, any channel is used 34 times (see appendix 8), then 34x1830 µs = 62.22 ms, thus the average time of occupancy on any channel is less than 400 ms within a period of 0.4 seconds multiplied by the number of hopping channels employed, in normal operating mode.

Note 5 : Conducted measurement is not possible (integral antenna), so we used the radiated method in open field.

RF EXPOSURE:

Maximum measured power = 115.5 dBµV/m = 60 mW
($P = (E \times d)^2 / (30 \times Gp)$ with d = 3 m and Gp = 1.78)

$PSD = EIRP/4*\pi*R^2=60 / 4*\pi*(20\ cm)^2 = 11.9 \times 10^{-3}$ mW/cm² (limit= 1 mW/cm²).

The equipment fulfils the requirements on power density for general population/uncontrolled exposure and therefore fulfils the requirements of 47 CFR §1.1310.

« To declare, or not, the compliance with the specifications, it was not explicitly taken into account of uncertainty associated with the result(s) »

7. RADIATED EMISSION LIMITS

Standard: FCC Part 15

Test procedure: paragraph 109

Limit class: Class B

Test set up:

The measure is realized on open area test site under 1 GHz and in anechoic chamber above 1 GHz.

When the system is tested in an open area test site (OATS). The EUT is placed on a rotating table, 0.8m from a ground plane.
When the system is tested in anechoic chamber. The EUT is placed on a rotating table, 1.5m from a ground plane.
Zero degree azimuths correspond to the front of the device under test.

See photos in appendix 2.

Frequency range: From 30 MHz to 12.4GHz (5th harmonic of the highest frequency used)

Detection mode: Quasi-peak (F < 1 GHz) Average (F > 1 GHz)

Bandwidth: 120 kHz (F < 1 GHz) 1 MHz (F > 1 GHz)

Distance of antenna: 3 meters

Antenna height: 1 to 4 meters (in open area test site) / 1.5 meter (in anechoic room)

Antenna polarization: vertical and horizontal (only the highest level is recorded)

Equipment under test operating condition:

The equipment is blocked in discovery mode. The motor was activated.

Results:

Ambient temperature (°C): 27.4
Relative humidity (%): 45

Power source: we used for power source the internal battery fully charged

Sample N° 1

FREQUENCIES (MHz)	Detector P: Peak QP: Quasi-Peak	Antenna height (cm)	Azimuth (degree)	Polarization H: Horizontal V: Vertical	Field strength (dBµV/m)	Limits (dBµV/m)	Margin (dB)
168	QP	194	76	H	33.2	43.5	10.3
264	QP	150	0	H	26.5	46	19.5
336	QP	150	0	H	30.8	46	15.2
504.1	QP	150	0	H	28.7	46	17.3

Applicable limits: for 30 MHz ≤ F ≤ 88 MHz : 40 dBµV/m at 3 meters
for 88 MHz < F ≤ 216 MHz : 43.5 dBµV/m at 3 meters
for 216 MHz < F ≤ 960 MHz : 46 dBµV/m at 3 meters
Above 960 MHz : 54 dBµV/m at 3 meters

Note: any spurious which has more than 20 dB of margin compared to the applicable limit is not necessarily reported.

Test conclusion:

RESPECTED STANDARD

8. ADDITIONAL PROVISIONS TO THE GENERAL RADIATED EMISSION LIMITATIONS

Standard: FCC Part 15

Test procedure: Paragraph 15.215

Test set up:

Test realized in near field. All field strength measurements are correlated with the radiated maximum peak output power

Test operating condition of the equipment:

The equipment under test is blocked in continuous hopping transmission mode, modulated by internal data signal, at the highest output power level which the transmitter is intended to operate.

Results:

Ambient temperature (°C): 27.2
Relative humidity (%): 57

Power source: we used for power source the internal battery fully charged

Lower Band Edge: from 2398 MHz to 2400 MHz
Upper Band Edge: from 2483.5 MHz to 2485.5 MHz

Sample N° 1:

FUNDAMENTAL FREQUENCY (MHZ)	*FIELD STRENGTH LEVEL OF FUNDAMENTAL (DBµV/M)*	*DETECTOR (PEAK OR AVERAGE)*	*FREQUENCY OF MAXIMUM BAND-EDGES EMISSION (MHZ)*	*DELTA MARKER (DB)**	*CALCULATED MAX OUT-OF-BAND EMISSION LEVEL (DBµV/M)*	*LIMIT (DBµV/M)*	*MARGIN (DB)*
2401.658	115.5	PEAK	2399.893	-49.15	66.35	95.6	29.25
2476.439**	114.4	PEAK	2484.426	-50.84	63.56	74	10.44
2476.439**	114.4	AVERAGE	2483.595	-64.05	50.35	54	3.65

* *Marker-Delta method* ** restricted bands of operation in 15.205

20 dB bandwidth curves are given in appendix 5; band-edge curves are given in appendix 6.

Test conclusion:

RESPECTED STANDARD

9. MAXIMUM PEAK OUTPUT POWER

Standard: FCC Part 15

Test procedure: paragraph 15.247 (b)

Test set up:

The system is tested in anechoic chamber. The EUT is placed on a rotating table, 1.5m from a ground plane. Zero degree azimuth corresponds to the front of the device under test.

The measurement of the electro-magnetic field is realized, with a resolution bandwidth adjusted at 1 MHz and video bandwidth at 3 MHz

Distance of antenna: 3 meters

Antenna height: 1.5 meter

Antenna polarization: vertical and horizontal

Equipment under test operating condition:

The equipment under test is blocked in continuous hopping modulated transmission mode, at the highest output power level at which the transmitter is intended to operate.

Results:

Ambient temperature (°C): 26.6
Relative humidity (%): 45

Power source: we used for power source the internal battery fully charged

Sample N° 1 Low channel (F=2401.6 MHz)

	Electro-magnetic field (dBµV/m):	Conducted power * (W)	Limit (W)
Nominal supply voltage:	115.5	0.060	1

Polarization of test antenna: Vertical (height: 150 cm)
Position of equipment: See photos in appendix 2 (azimuth: 347 degrees)

Sample N° 1 Central channel (F=2440.8 MHz)

	Electro-magnetic field (dBµV/m):	Conducted power * (W)	Limit (W)
Nominal supply voltage:	114.9	0.052	1

Polarization of test antenna: Vertical (height: 150 cm)
Position of equipment: See photos in appendix 2 (azimuth: 347 degrees)

Sample N° 1 High channel (F=2476.35 MHz)

	Electro-magnetic field (dBµV/m):	Conducted power * (W)	Limit (W)
Nominal supply voltage:	114.4	0.046	1

Polarization of test antenna: Vertical (height: 150 cm)
Position of equipment: See photos in appendix 2 (azimuth: 347 degrees)

** $P = (E \times d)^2 / (30 \times Gp)$ with d = 3 m and Gp = 1.78*

Antenna gain: 2.5 dBi

Test conclusion:

RESPECTED STANDARD

10. INTENTIONAL RADIATOR

Standard: FCC Part 15

Test procedure: paragraph 15.205, paragraph 15.209, paragraph 15.247 (d)

Test set up:

The measure is realized on open area test site under 1 GHz and in anechoic chamber above 1 GHz.

When the system is tested in an open area test site (OATS). The EUT is placed on a rotating table, 0.8m from a ground plane.
When the system is tested in anechoic chamber. The EUT is placed on a rotating table, 1.5m from a ground plane.
Zero degree azimuths correspond to the front of the device under test.

See photos in appendix 2.

Frequency range: From 9 kHz to 25GHz (10th harmonic of the highest fundamental frequency)

Detection mode: Quasi-peak (F < 1 GHz) Peak / Average (F > 1 GHz)

Bandwidth: 200Hz (9 kHz < F < 150kHz)
9 kHz (150 kHz < F < 30MHz)
120 kHz (30 MHz < F < 1 GHz)
100 kHz / 1 MHz (F > 1 GHz)

Distance of antenna: 3 meters

Antenna height: 1 to 4 meters (in open area test site) / 1.5 meter (in anechoic room)

Antenna polarization: vertical and horizontal (only the highest level is recorded)

Equipment under test operating condition:

The equipment under test is blocked in continuous hopping modulated transmission mode, at the highest output power level at which the transmitter is intended to operate.

Results:

Ambient temperature (°C): 27.4
Relative humidity (%): 45

Power source: we used for power source the internal battery fully charged

Sample N° 1 Low channel (F=2401.6 MHz)

FREQUENCIES (MHz)	Detector P: Peak QP: Quasi-Peak Av: Average	Antenna height (cm)	Azimuth (degree)	Resolution bandwidth (kHz)	Polarization H: Horizontal V: Vertical	Field strength (dBµV/m)	Limits (dBµV/m)	Margin (dB)
168	QP	194	76	120	H	33.2	43.5	10.3
264	QP	150	0	120	H	26.5	46	19.5
336	QP	150	0	120	H	30.8	46	15.2
504.1	QP	150	0	120	H	28.7	46	17.3
4803.2*	P	150	40	1000	V	53.4**	74	20.6
7204.8	P	150	327	100	V	56.7	95.5	38.8
9606.4	P	150	45	100	V	55.2	95.5	40.3
12008*	P	150	153	1000	H	59.9	74	14.1
12008*	Av	150	153	1000	H	49.44	54	4.56

Sample N° 1 Central channel (F=2440.8 MHz)

FREQUENCIES (MHz)	Detector P: Peak QP: Quasi-Peak Av: Average	Antenna height (cm)	Azimuth (degree)	Resolution bandwidth (kHz)	Polarization H: Horizontal V: Vertical	Field strength (dBµV/m)	Limits (dBµV/m)	Margin (dB)
168	QP	194	76	120	H	33.2	43.5	10.3
264	QP	150	0	120	H	26.5	46	19.5
336	QP	150	0	120	H	30.8	46	15.2
504.1	QP	150	0	120	H	28.7	46	17.3
4881.6*	P	150	54	1000	V	54	74	20
4881.6*	Av	150	54	1000	V	37.42	54	16.58
7322.4*	P	150	0	1000	V	54	74	20
7322.4*	Av	150	0	1000	V	35.83	54	18.17
9763.2	P	150	60	100	V	55.1	95.5	40.4
12204*	P	150	30	1000	V	56.5	74	17.5
12204*	Av	150	30	1000	V	41.81	54	12.19

Sample N° 1 High channel (F=2476.35 MHz)

FREQUENCIES (MHz)	Detector P: Peak QP: Quasi-Peak Av: Average	Antenna height (cm)	Azimuth (degree)	Resolution bandwidth (kHz)	Polarization H: Horizontal V: Vertical	Field strength (dBµV/m)	Limits (dBµV/m)	Margin (dB)
168	QP	194	76	120	H	33.2	43.5	10.3
264	QP	150	0	120	H	26.5	46	19.5
336	QP	150	0	120	H	30.8	46	15.2
504.1	QP	150	0	120	H	28.7	46	17.3
4952.7*	P	150	158	1000	H	61.7	74	12.3
4952.7*	Av	150	158	1000	H	48.39	54	5.61
7429.05*	P	150	337	1000	V	51**	74	23
9905.4	P	150	340	100	V	54.3	95.5	41.2
12381.75*	P	150	243	1000	V	58.8	74	15.2
12381.75*	Av	150	243	1000	V	47.66	54	6.34

* restricted bands of operation in 15.205
***the peak level is lower than the average limit (54 dBµV/m).*

Note: *any spurious which has more than 20 dB of margin compared to the applicable limit is not necessarily reported.*

Applicable limits: In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power.

The highest level recorded in a 100 kHz bandwidth is 115.5 dBµV/m on low channel .
So the applicable limit is 95.5 dBµV/m.
In addition, radiated emissions which fall in the restricted band, as defined in section 15.205 (a), must also comply with the radiated emission limits specified in section 15.209 (a) (see section 15.205 (c)).

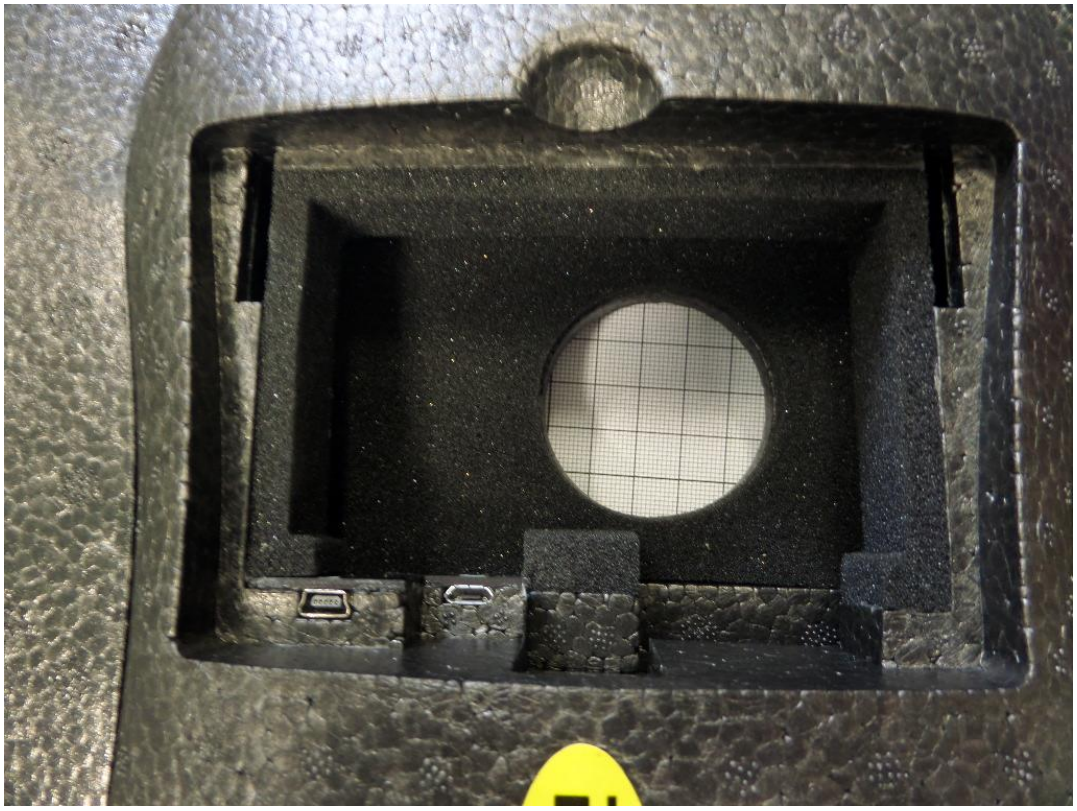
Test conclusion:

RESPECTED STANDARD

End of report, 9 appendixes to be forwarded

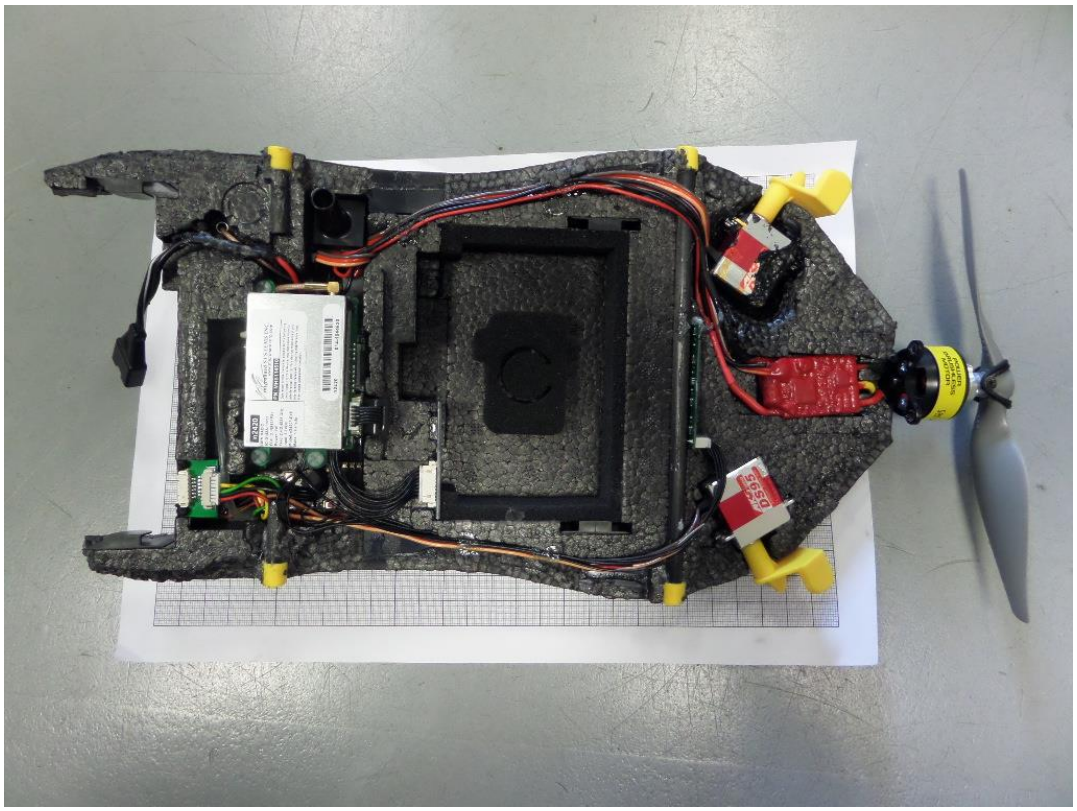
APPENDIX 1: Photos of the equipment under test

General view

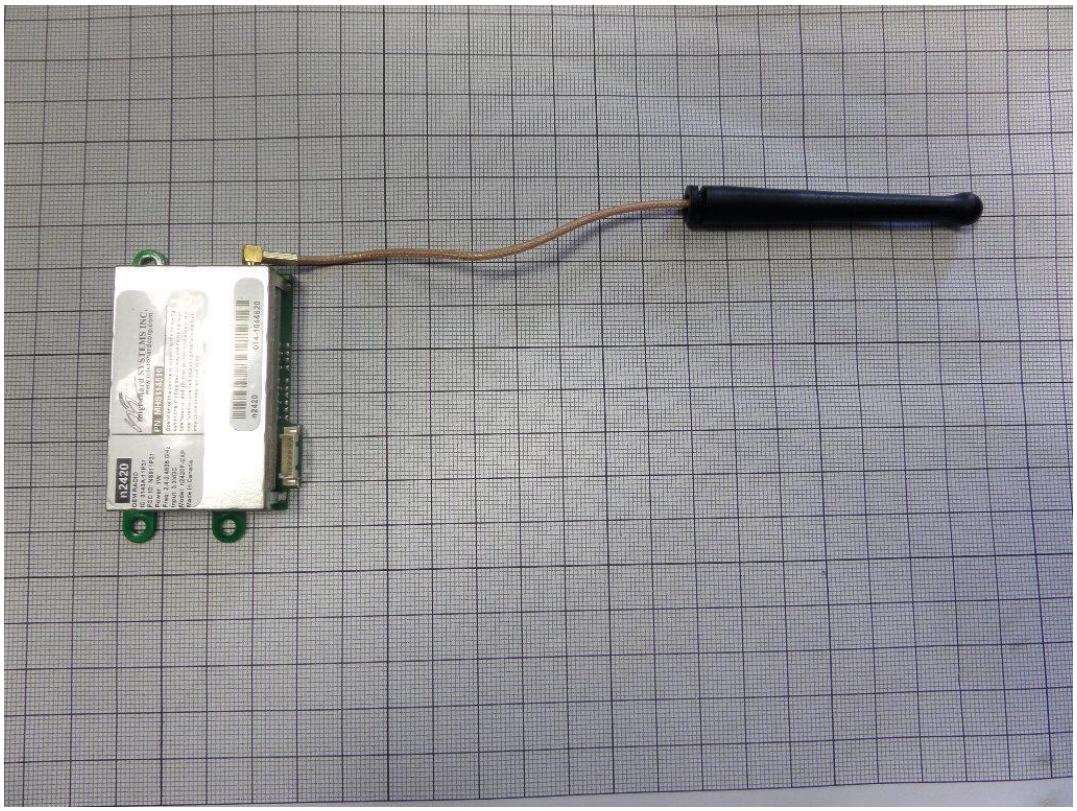


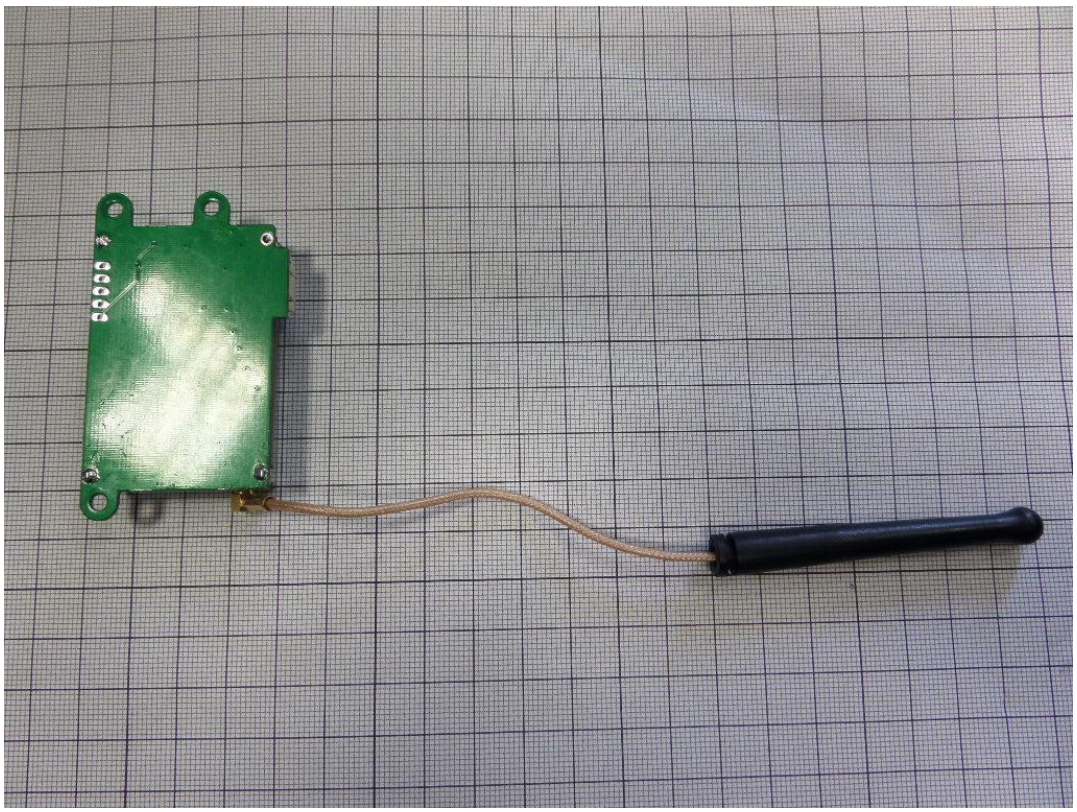

EB-02-687
with sensefly battery
2,5 A
Switzerland

Internal view



Radio part

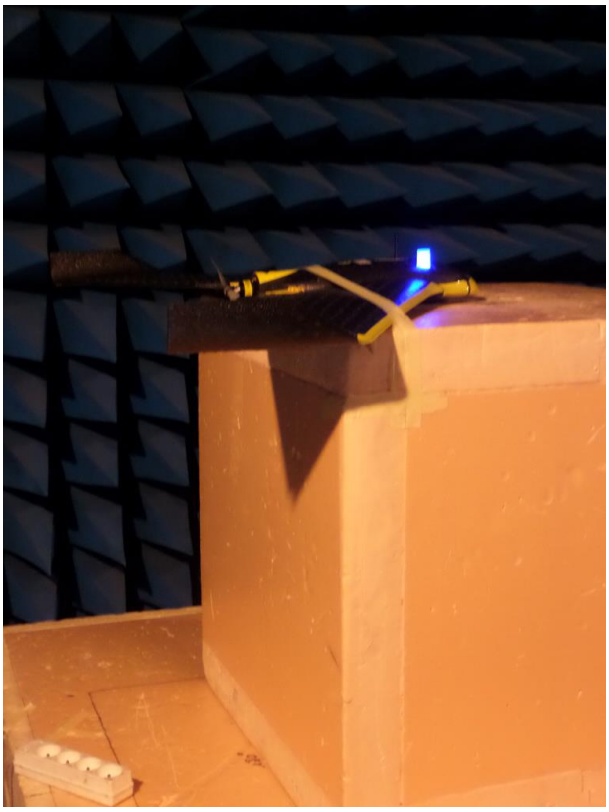




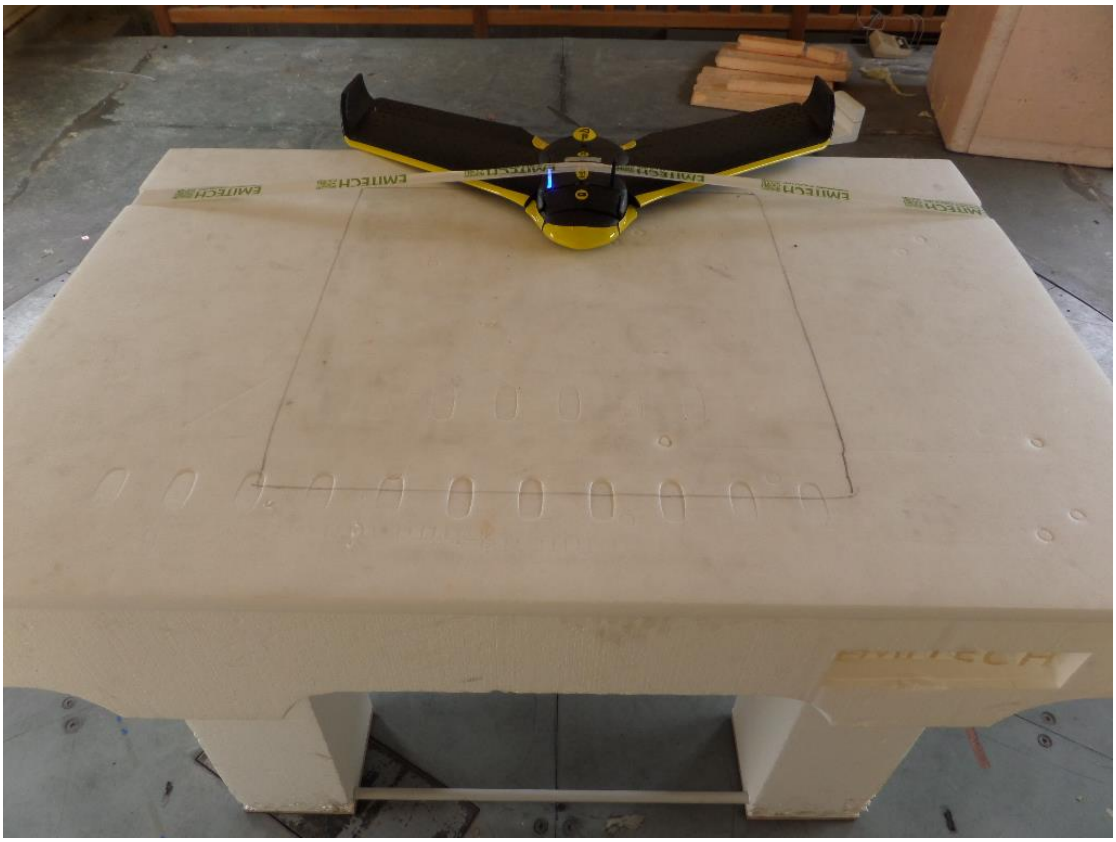

n2420
OEM RADIO
IC: 3143A-11P31
FCC ID: NS911P31
Power: 1W
Freq: 2.4-2.4835 GHz
Input: 3.3VDC
Model: n2420F-EXP
Made in Canada
microhard SYSTEMS INC.
www.microhardcorp.com
PN: MHS114510
Operation of this device is subject to the following conditions: (1) This device may not cause harmful interference, and, (2) This device must accept any interference received, including interference that may cause undesired operation.
n2420
014-1044620

APPENDIX 2: Test set up

In anechoic room



In open area test site



APPENDIX 3: Test equipment list

Radiated emission limits

TYPE	MANUFACTURER	EMITECH NUMBER
Open test site	EMITECH	8732
Anechoic Chamber	EMITECH	8593
Satellite synchronized frequency standard GPS8	ACQUISYS	8896
Test receiver ESI7	Rohde & Schwarz	8707
Spectrum Analyzer FSP40	Rohde & Schwarz	4088
Biconical antenna VHBB 9124	Schwarzbeck	8526
Biconical antenna VHA 9103	Schwarzbeck	8528
Log periodic antenna UHALP 9108A	Schwarzbeck	8543
Log periodic antenna 3147	EMCO	8783
Antenna 3115	Electrometrics	8535
Low-noise amplifier 8447D	Hewlett Packard	8511
Low-noise amplifier C020180F-4B1	Microwave DB	1922
Meteo station WS-9232	La Crosse Technology	8750
Software	BAT-EMC V3.6.0.32	0000

Additional provisions to the general radiated emission limitations

TYPE	MANUFACTURER	EMITECH NUMBER
Anechoic Chamber	EMITECH	8593
Satellite synchronized frequency standard GPS8	ACQUISYS	8896
Spectrum Analyzer FSP40	Rohde & Schwarz	4088
Antenna 3115	Electrometrics	8535
Meteo station WS-9232	La Crosse Technology	8750

Maximum peak output power

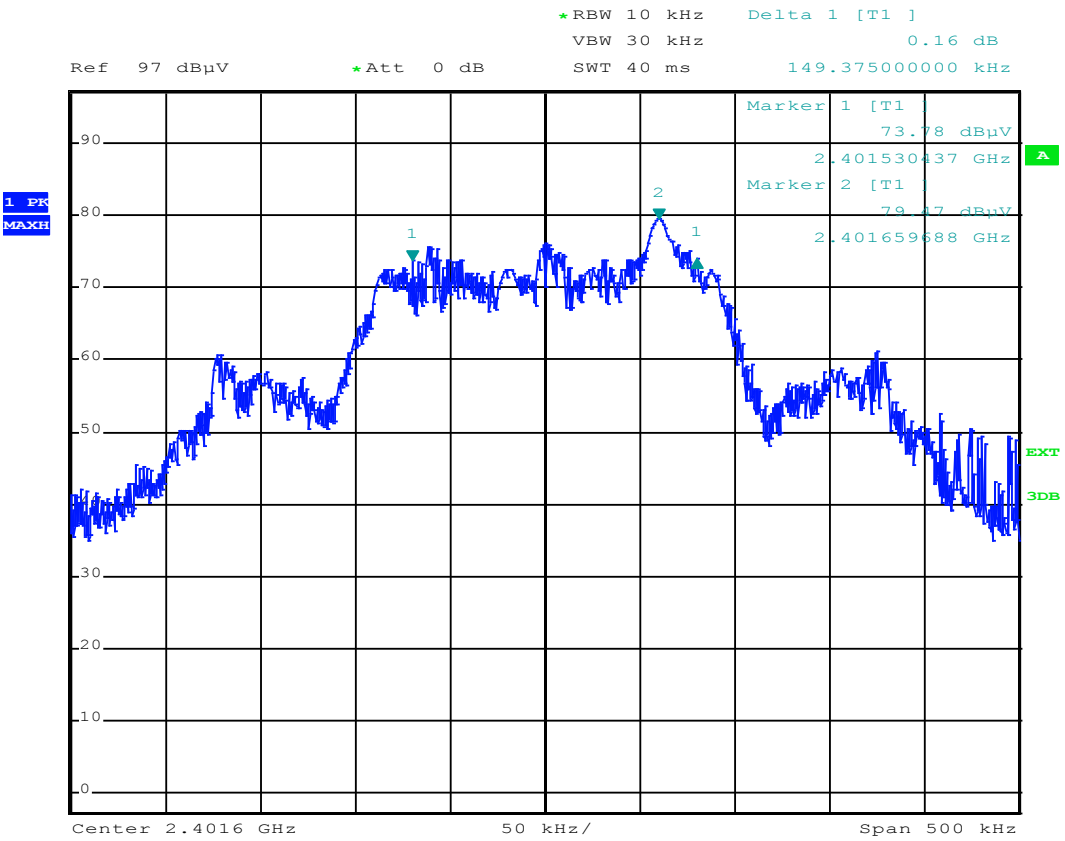
TYPE	MANUFACTURER	EMITECH NUMBER
Anechoic Chamber	EMITECH	8593
Satellite synchronized frequency standard GPS8	ACQUISYS	8896
Spectrum Analyzer FSP40	Rohde & Schwarz	4088
Antenna 3115	Electrometrics	8535
Meteo station WS-9232	La Crosse Technology	8750
Software	BAT-EMC V3.6.0.32	0000

Intentional radiator

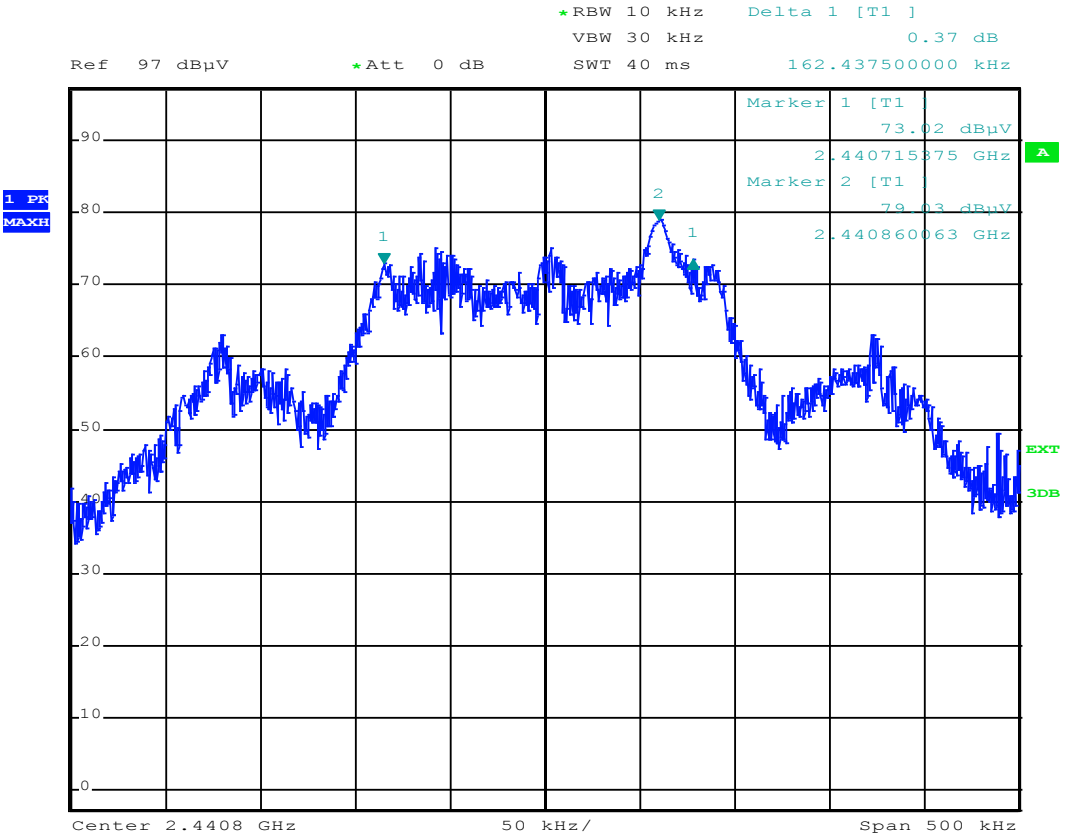
TYPE	MANUFACTURER	EMITECH NUMBER
Open test site	EMITECH	8732
Anechoic Chamber	EMITECH	8593
Satellite synchronized frequency standard GPS8	ACQUISYS	8896
Test receiver ESI7	Rohde & Schwarz	8707
Spectrum Analyzer FSP40	Rohde & Schwarz	4088
Loop antenna HFH2-Z2	Rohde & Schwarz	8533
Biconical antenna VHBB 9124	Schwarzbeck	8526
Biconical antenna VHA 9103	Schwarzbeck	8528
Log periodic antenna UHALP 9108A	Schwarzbeck	8543
Log periodic antenna 3147	EMCO	8783
Antenna 3115	Electrometrics	8535
Antenna WR42	IMC	1939
Antenna WR42	IMC	1940
Low-noise amplifier 8447D	Hewlett Packard	8511
Low-noise amplifier C020180F-4B1	Microwave DB	1922
Low-noise amplifier ALN02-0102	ALC Microwave	3036
Reject band filter BRM50702	Microtronics	7299
Meteo station WS-9232	La Crosse Technology	8750
Software	BAT-EMC V3.6.0.32	0000

APPENDIX 4: 6 dB bandwidth

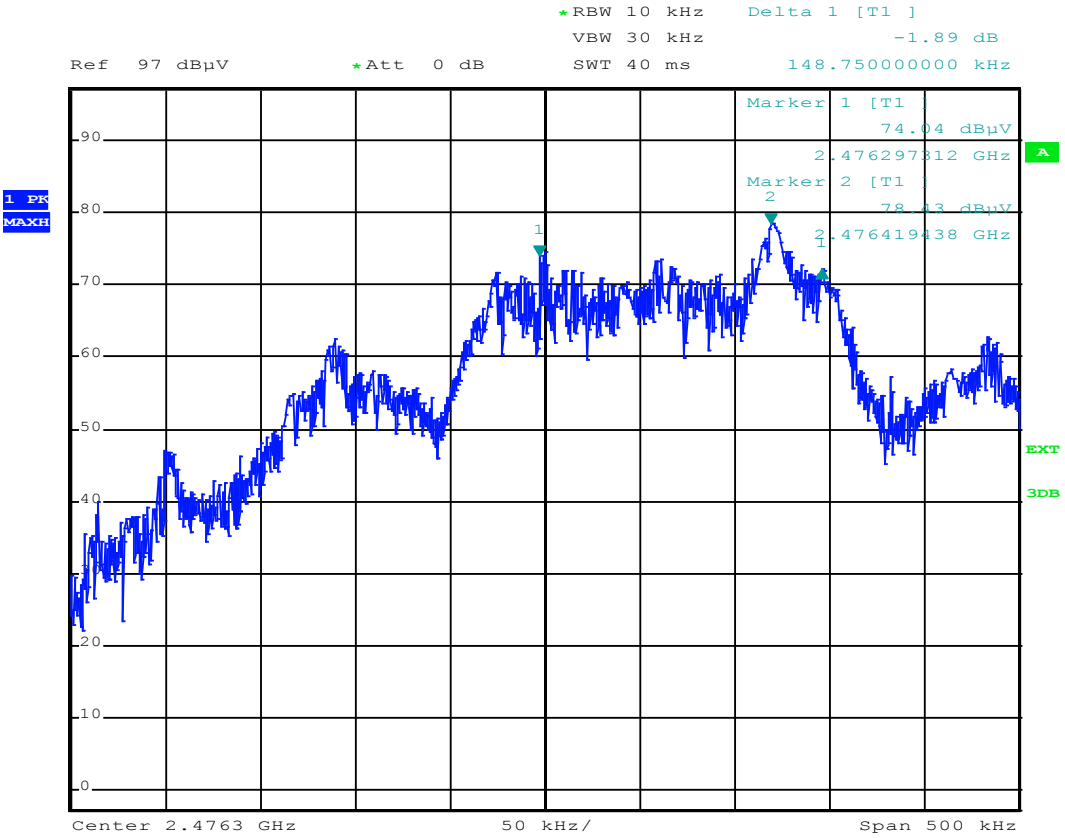
Low channel



Central channel

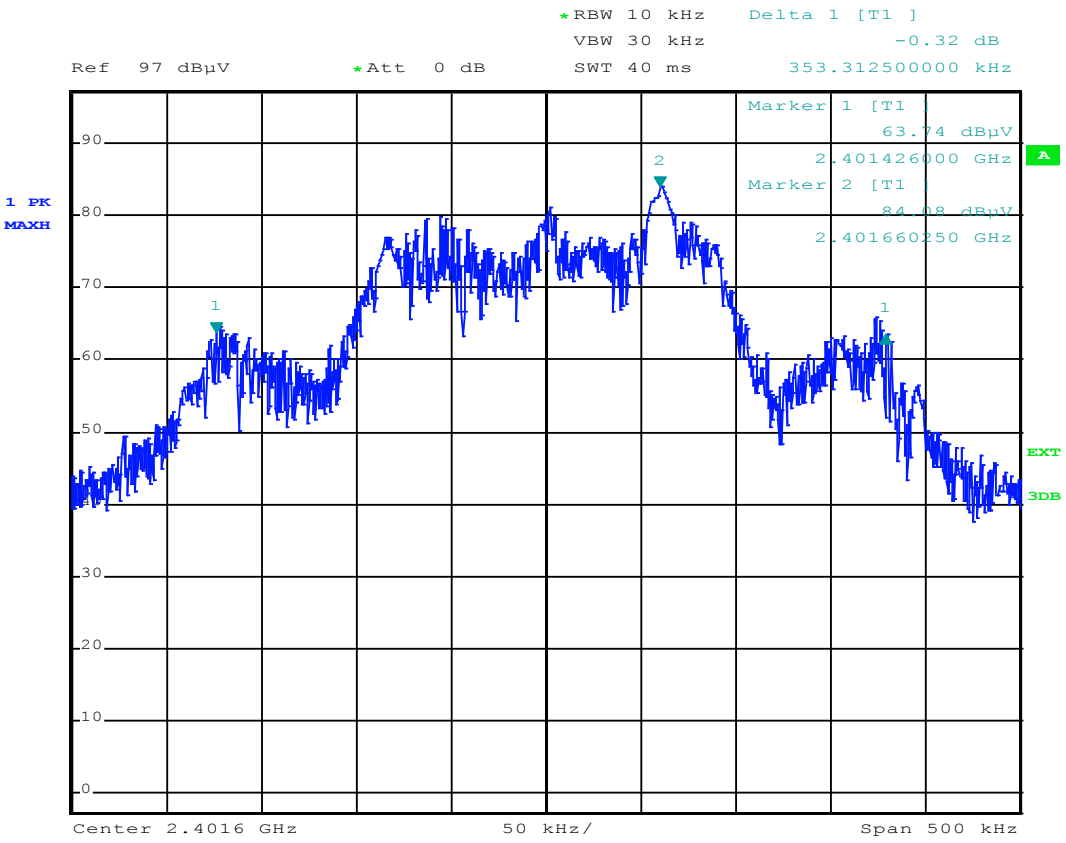


High channel

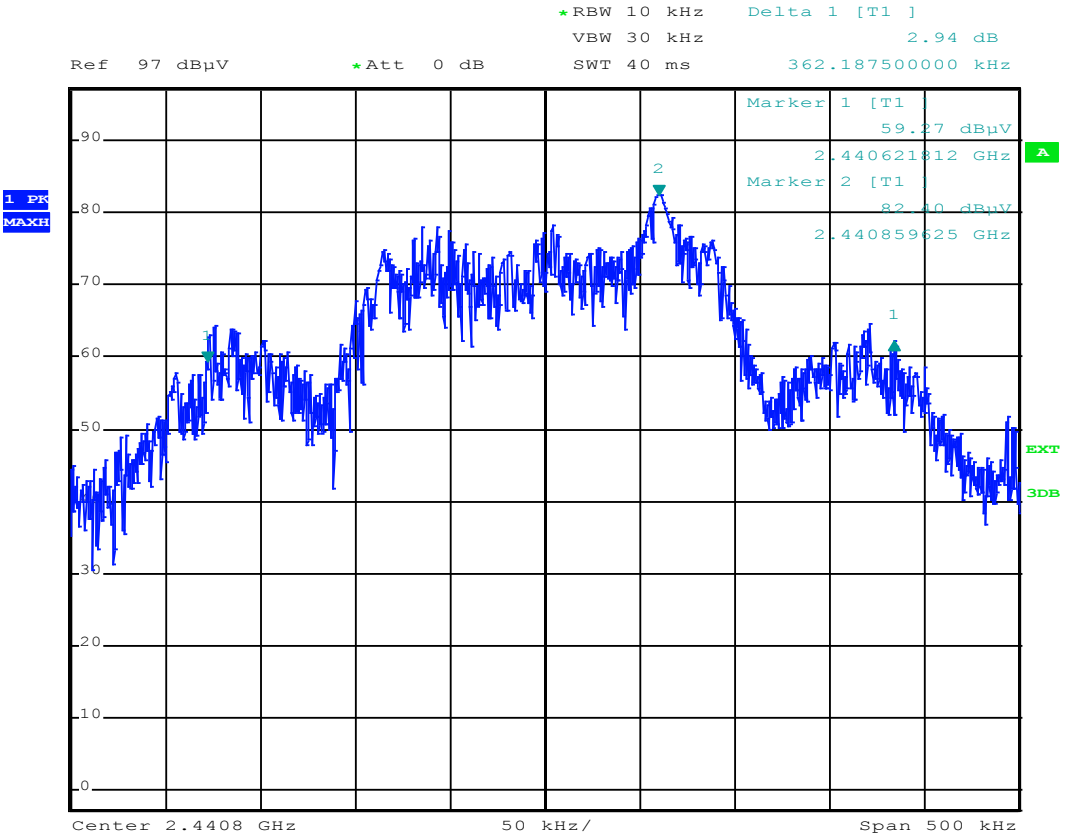


APPENDIX 5: 20 dB bandwidth

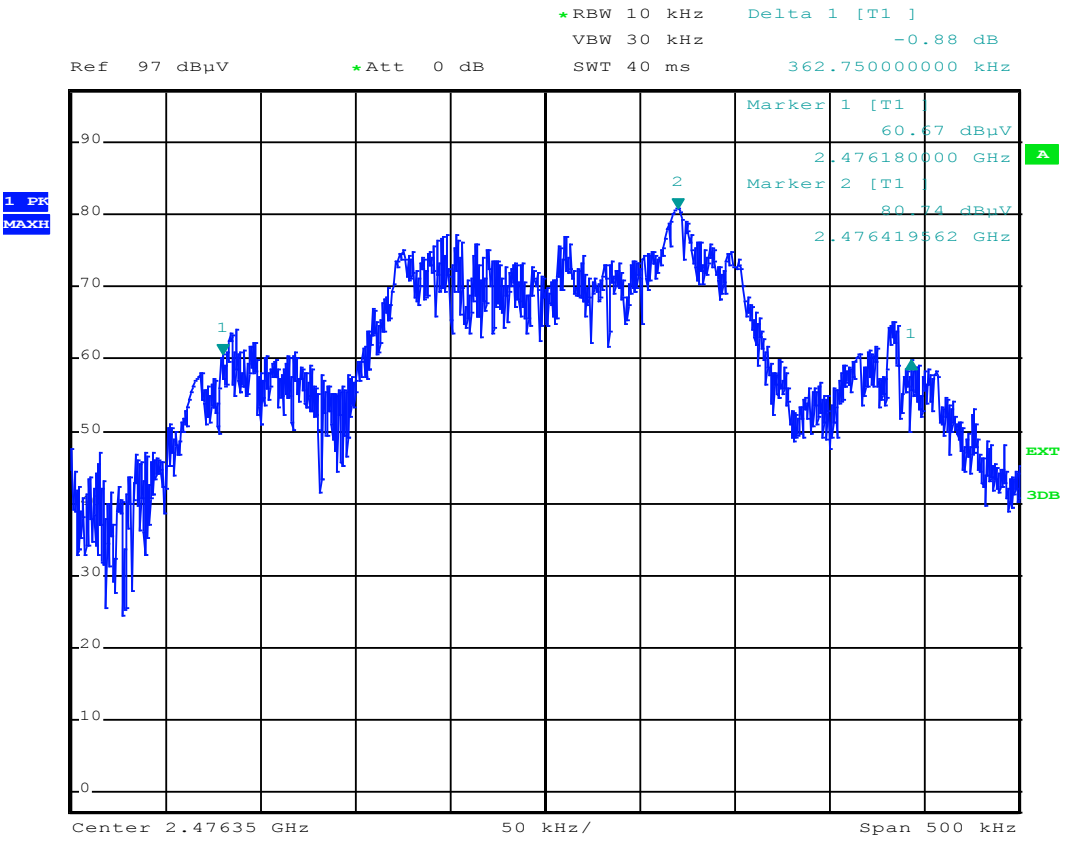
Low channel



Central channel

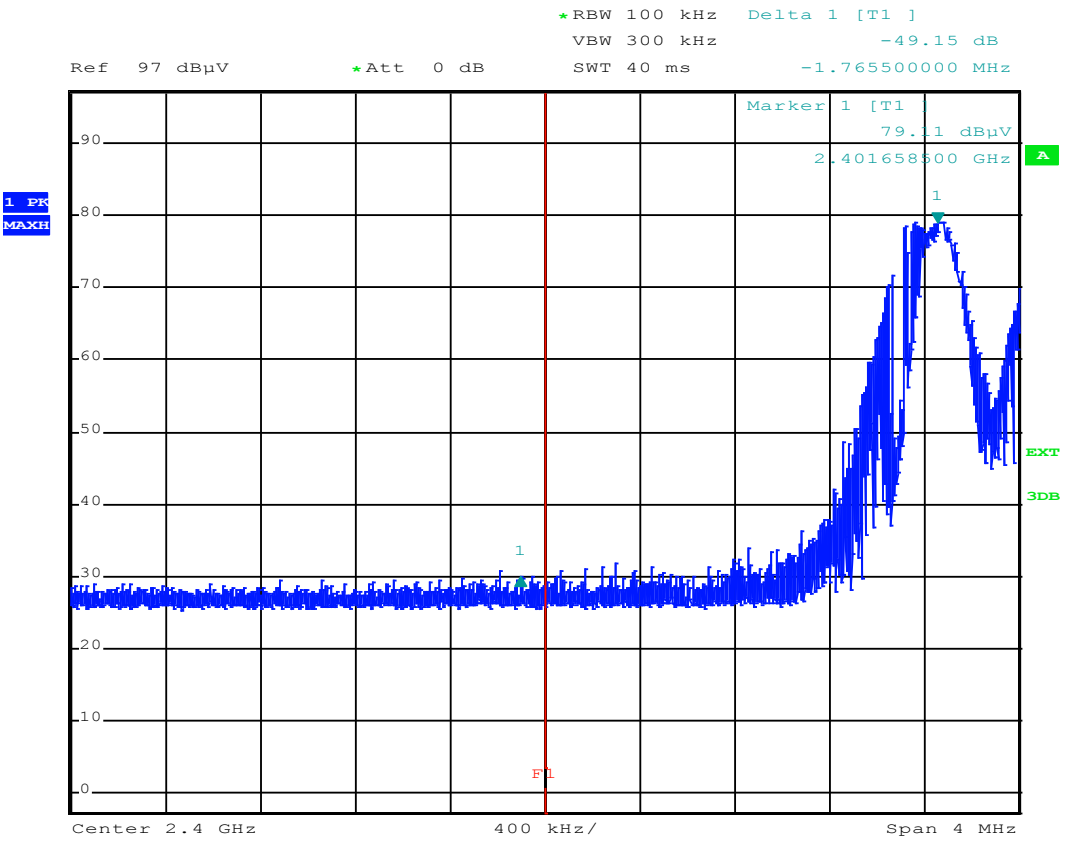


High channel

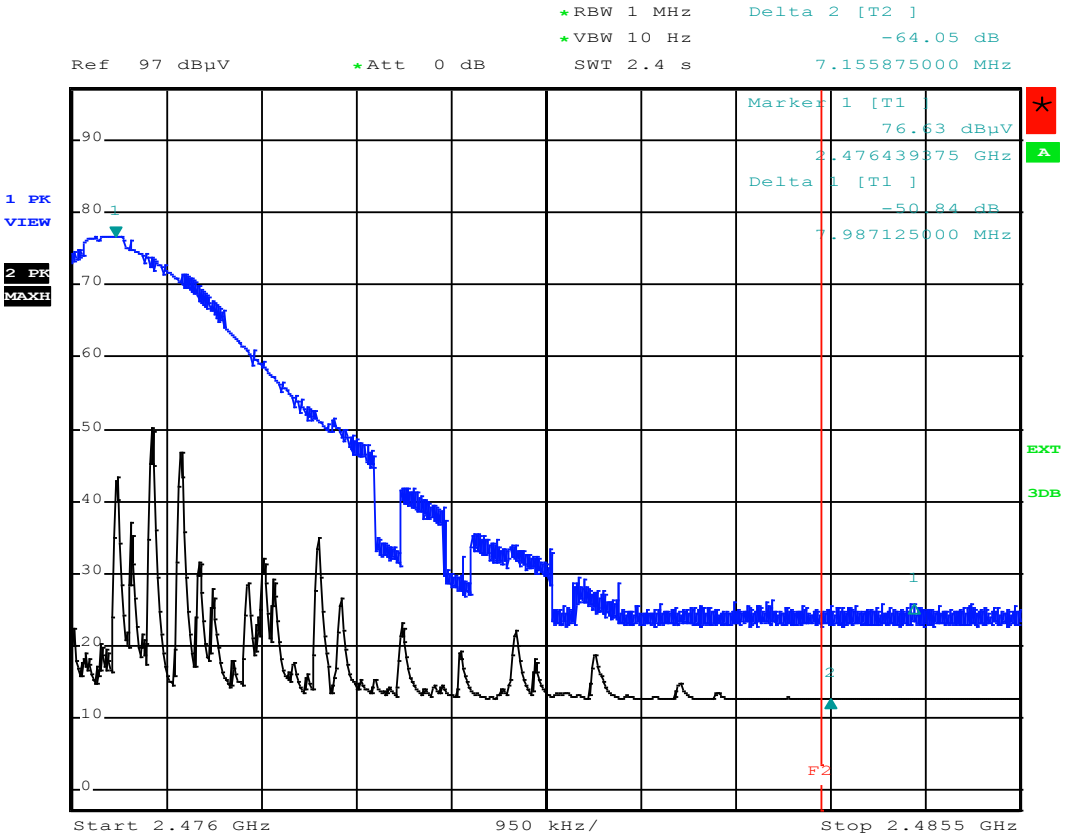


APPENDIX 6: Band edge

Low channel

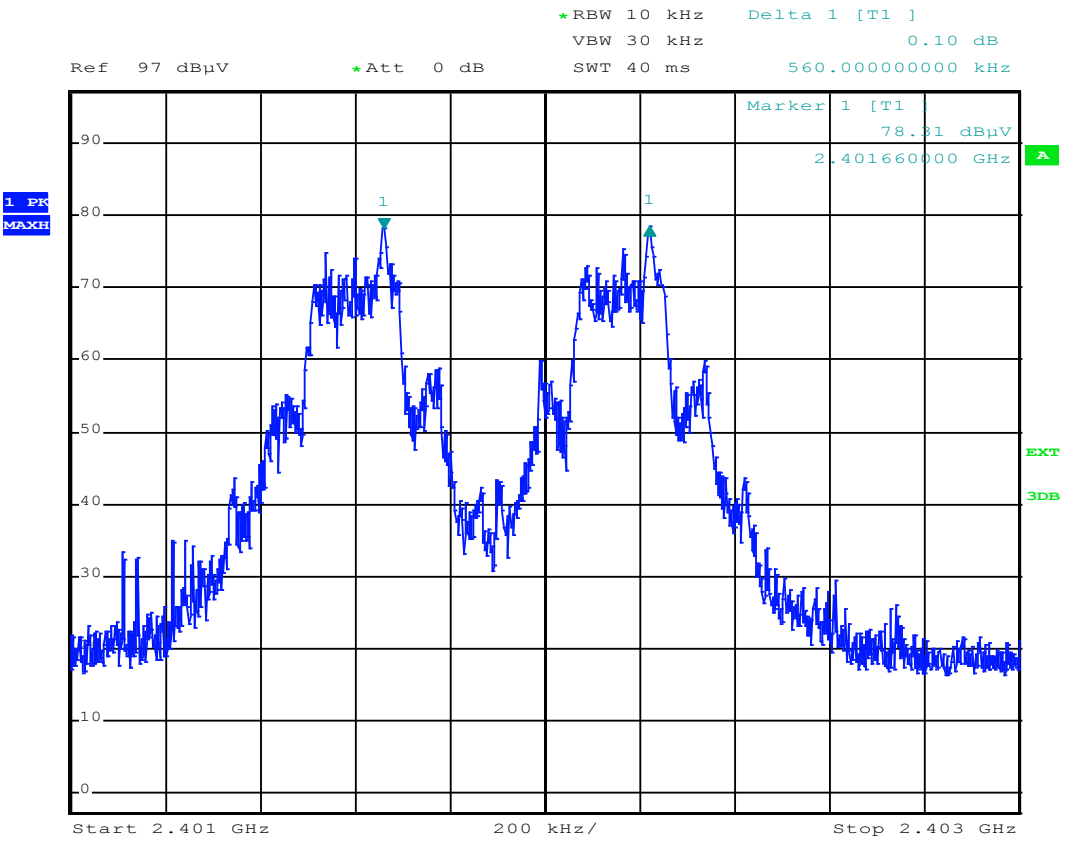


High channel

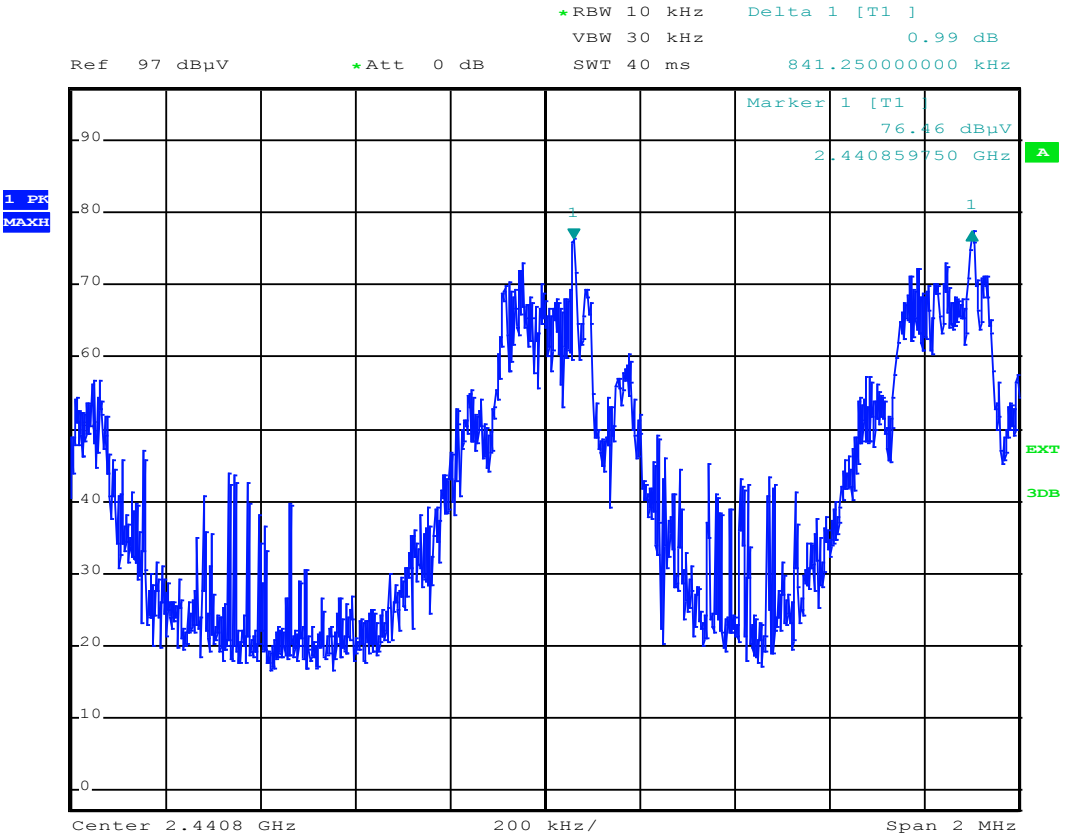


APPENDIX 7: Channel spacing

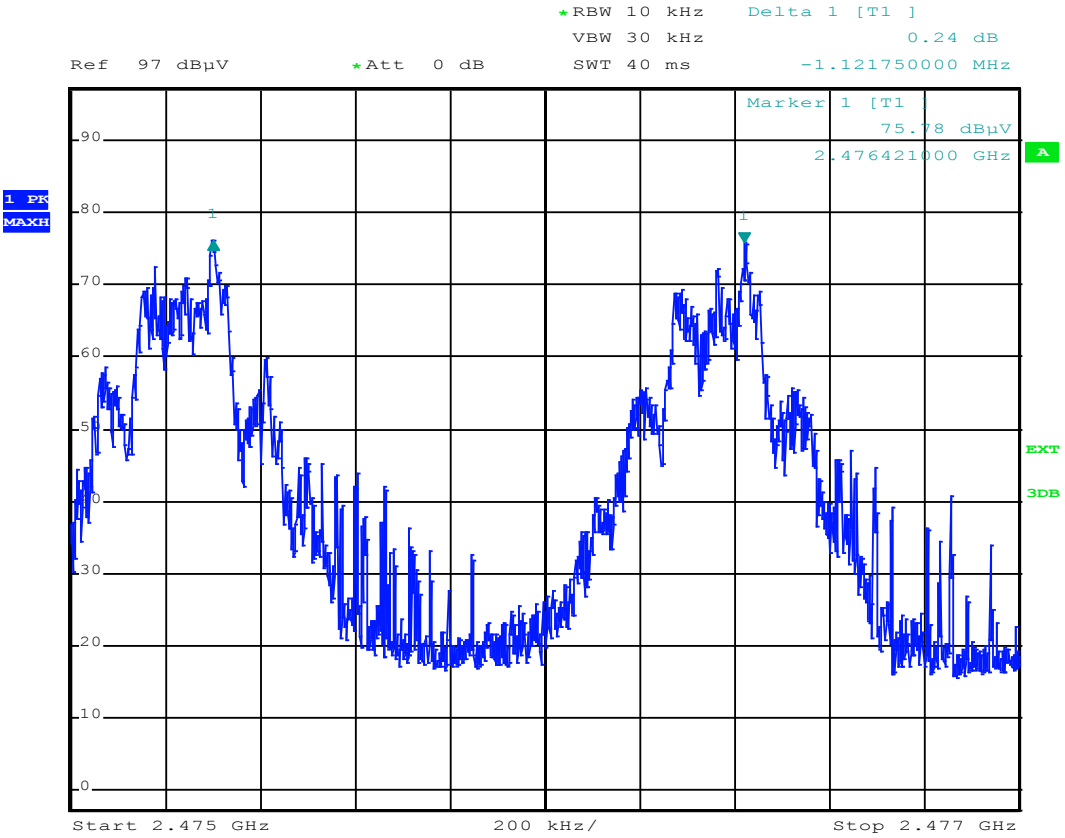
Low channel



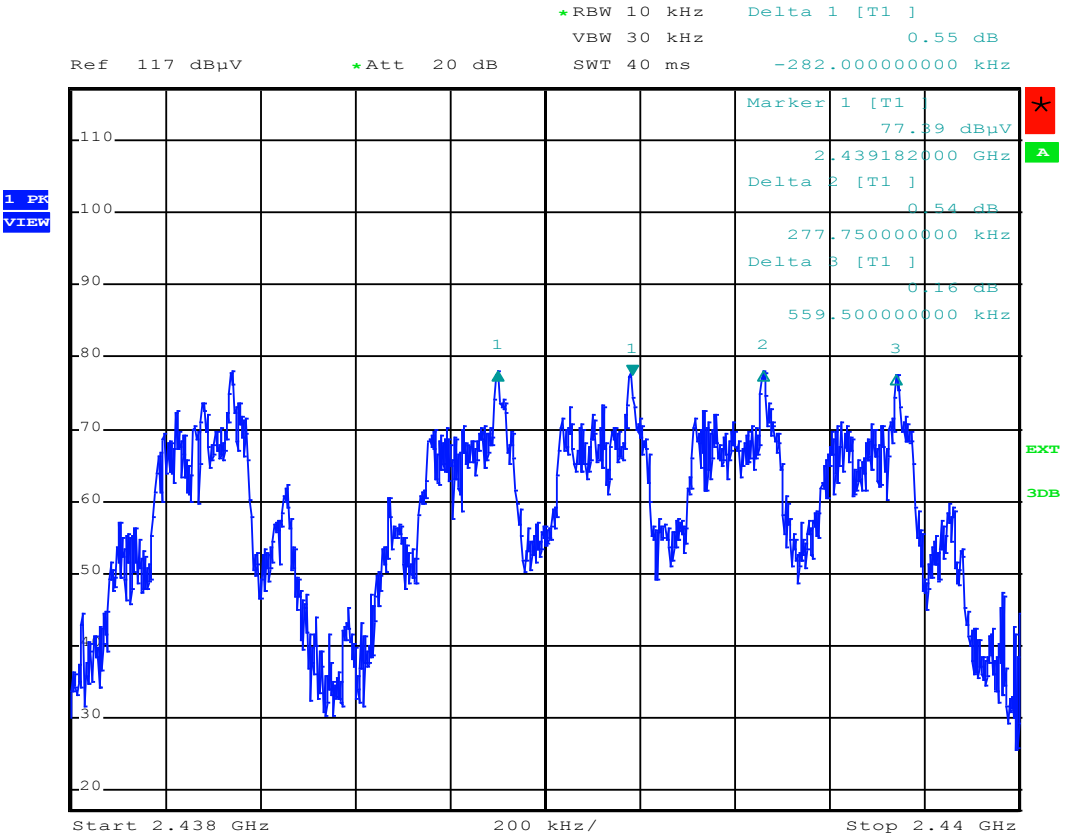
Central channel



High channel

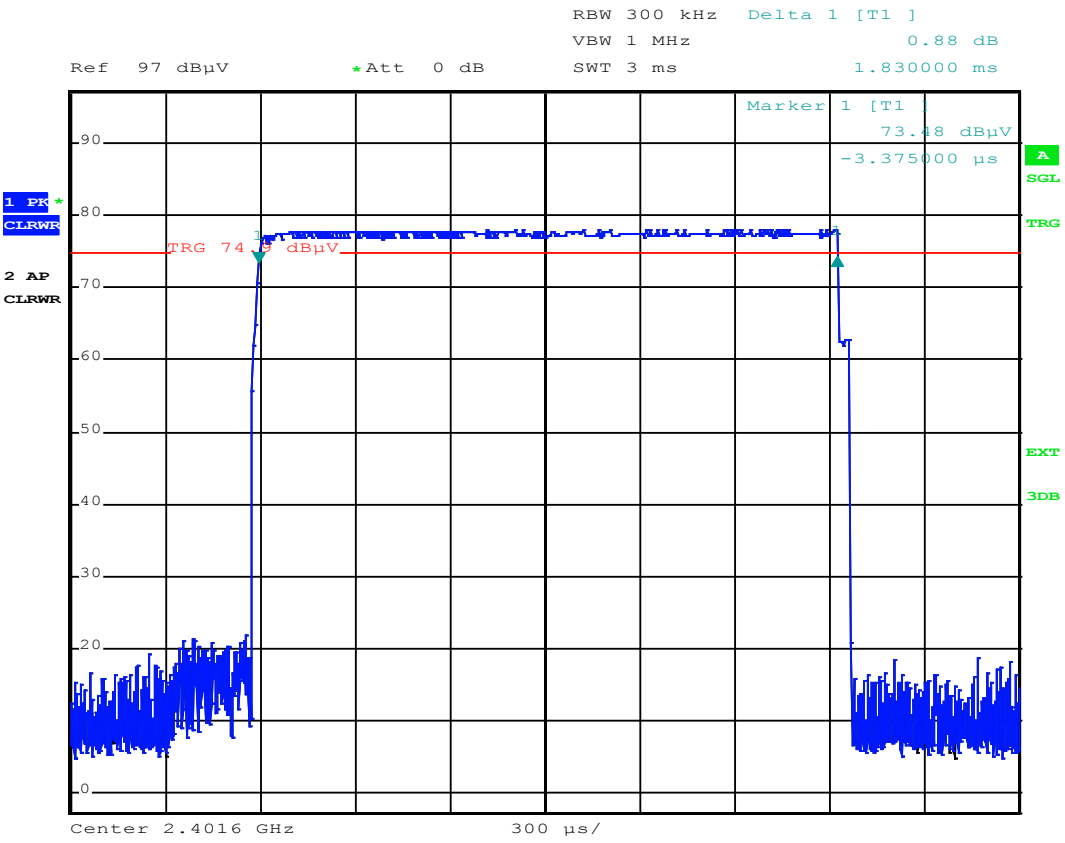


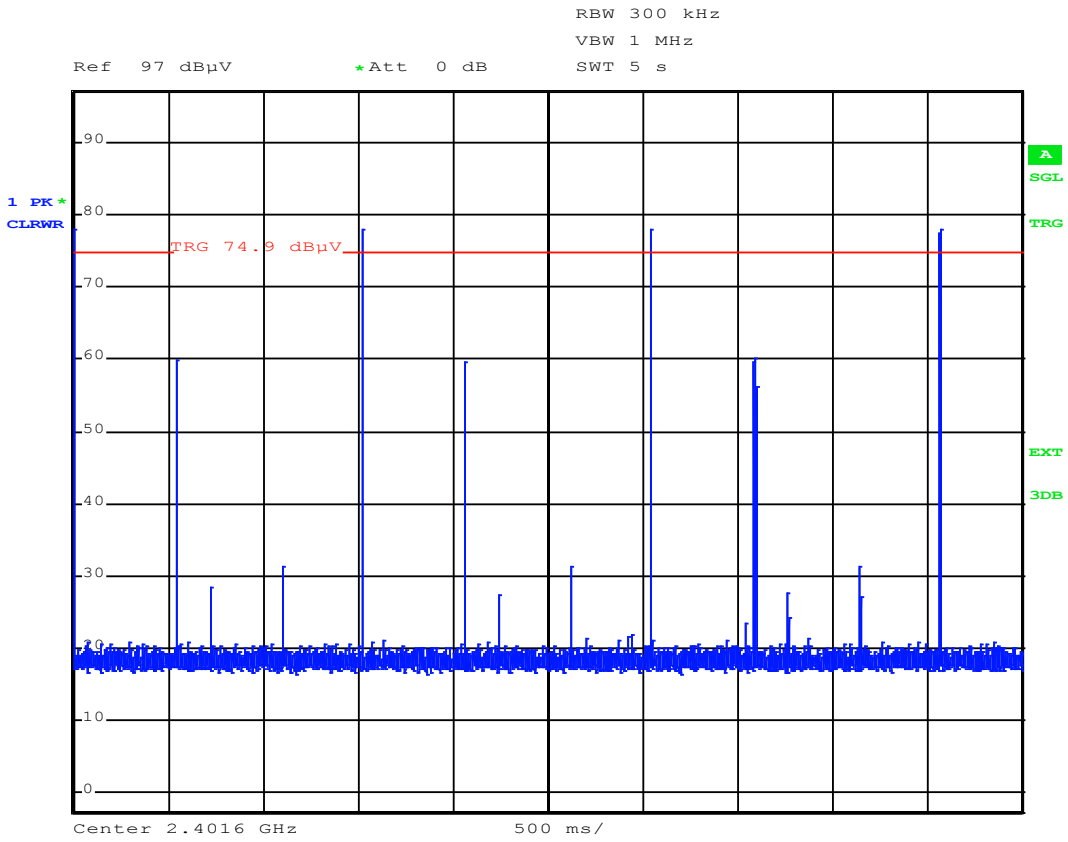
Minimum channel spacing



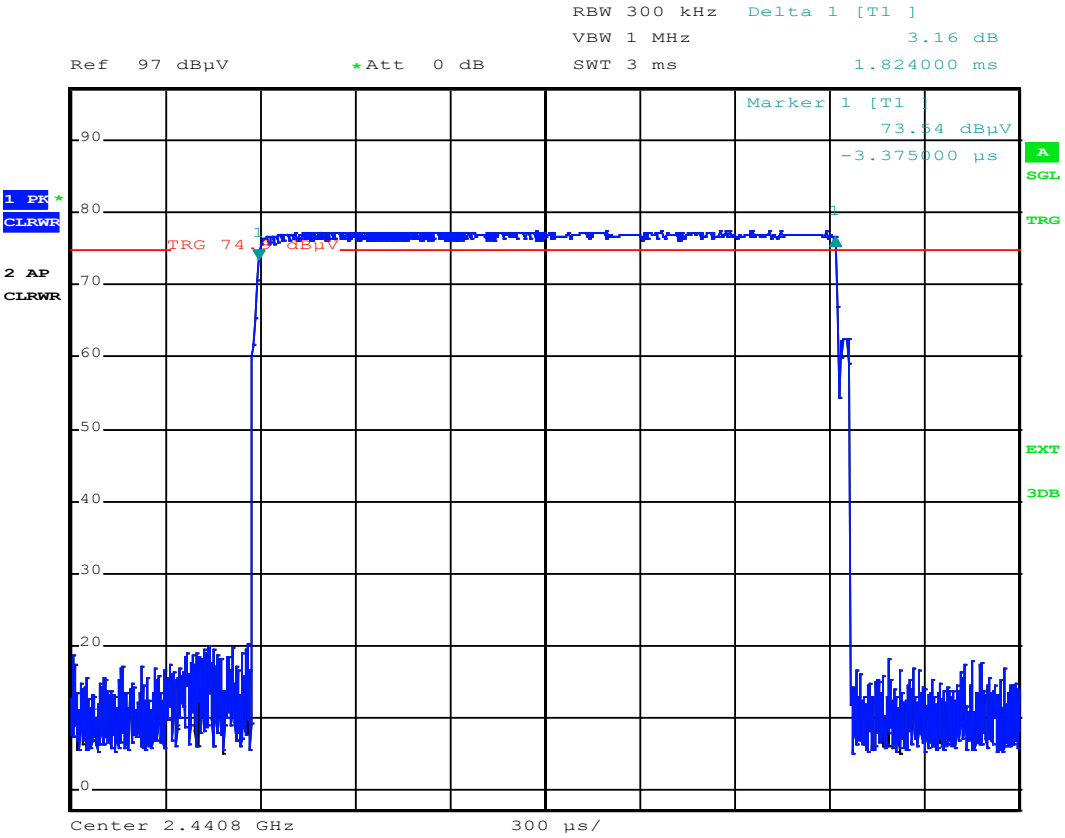
APPENDIX 8: Time of occupancy on any frequency

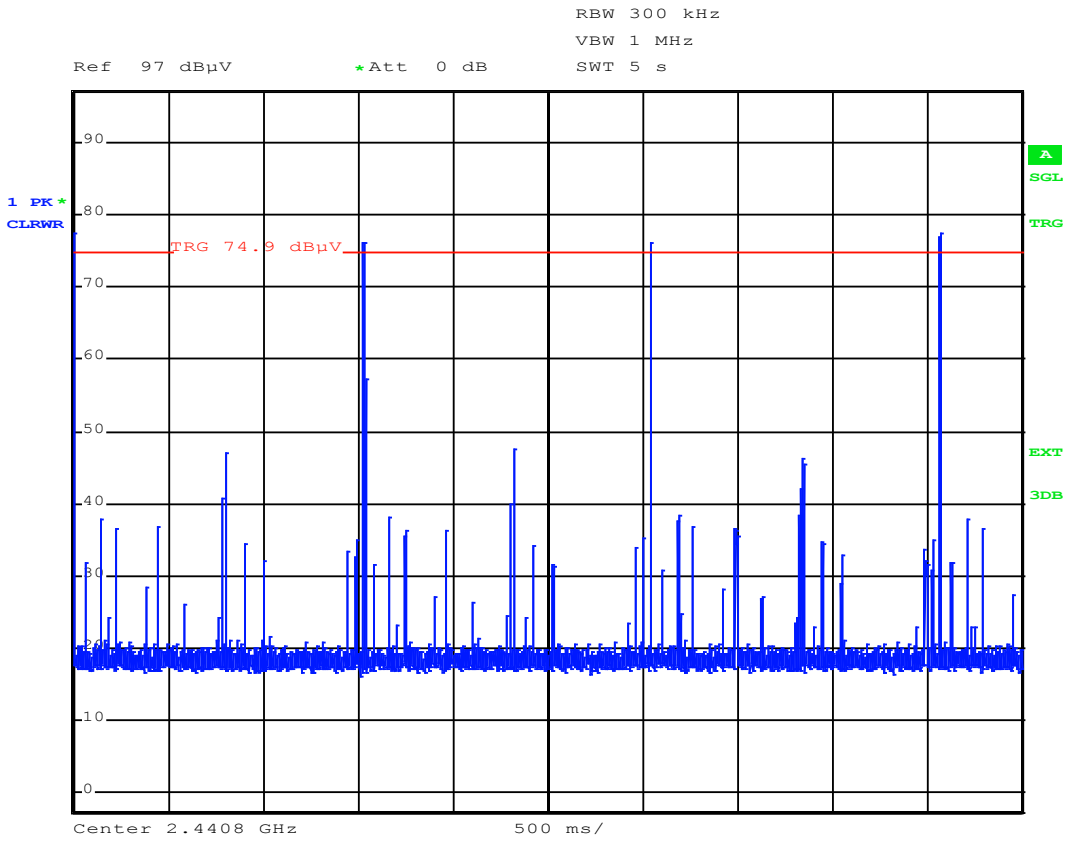
Low channel



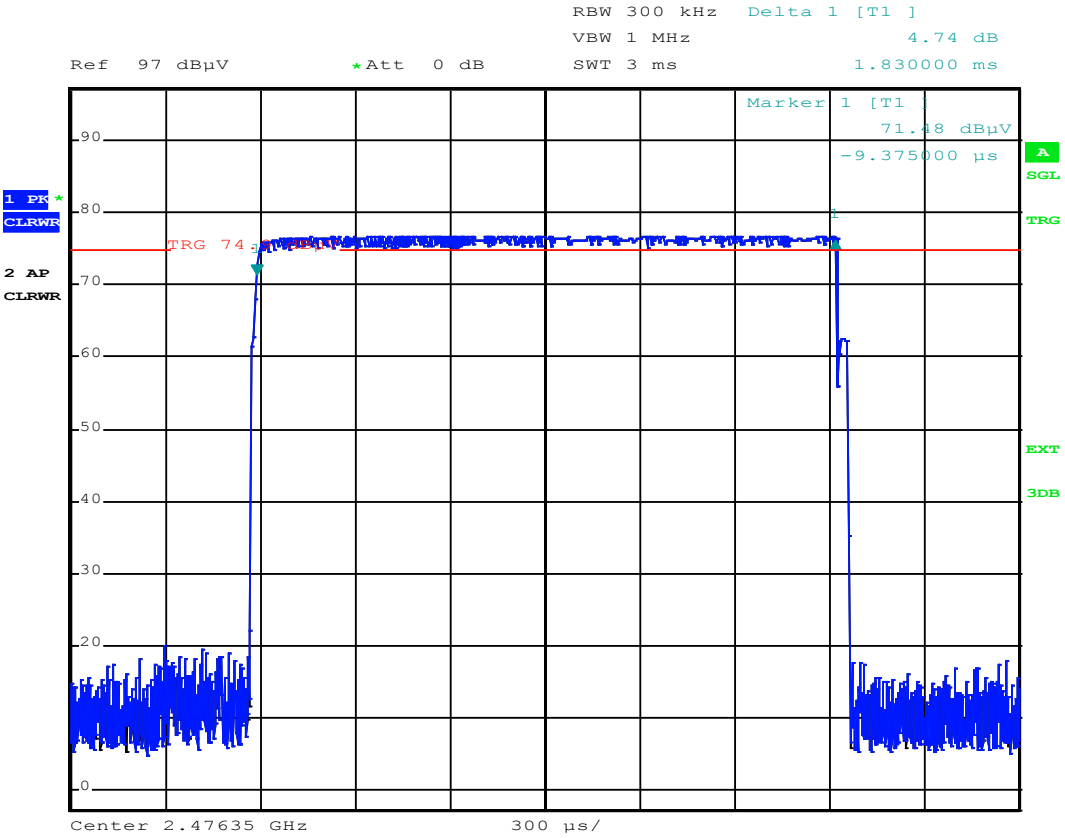

RBW 300 kHz
VBW 1 MHz
SWT 5 s
Ref 97 dBµV
*Att 0 dB
1 PK*
CLRWR
TRG 74.9 dBµV
A
SGL
TRG
EXT
3DB
90
80
70
60
50
40
30
20
10
0
Center 2.4016 GHz
500 ms/

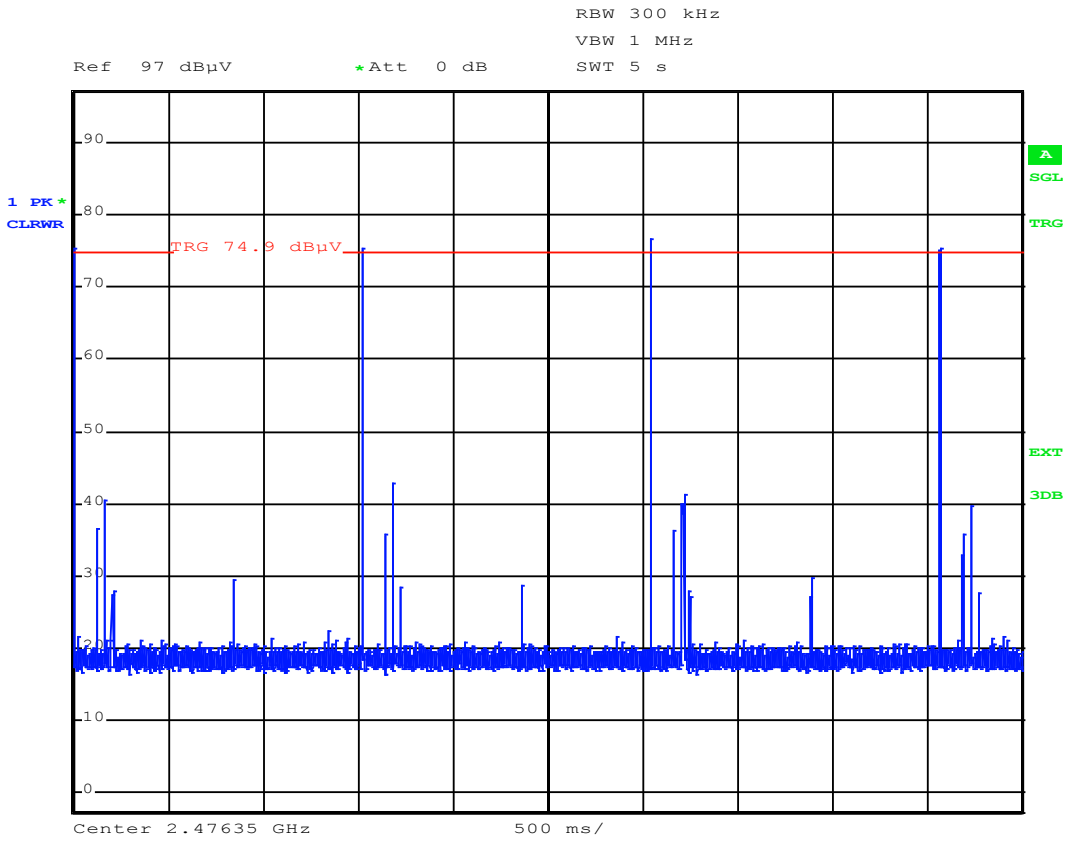
Central channel



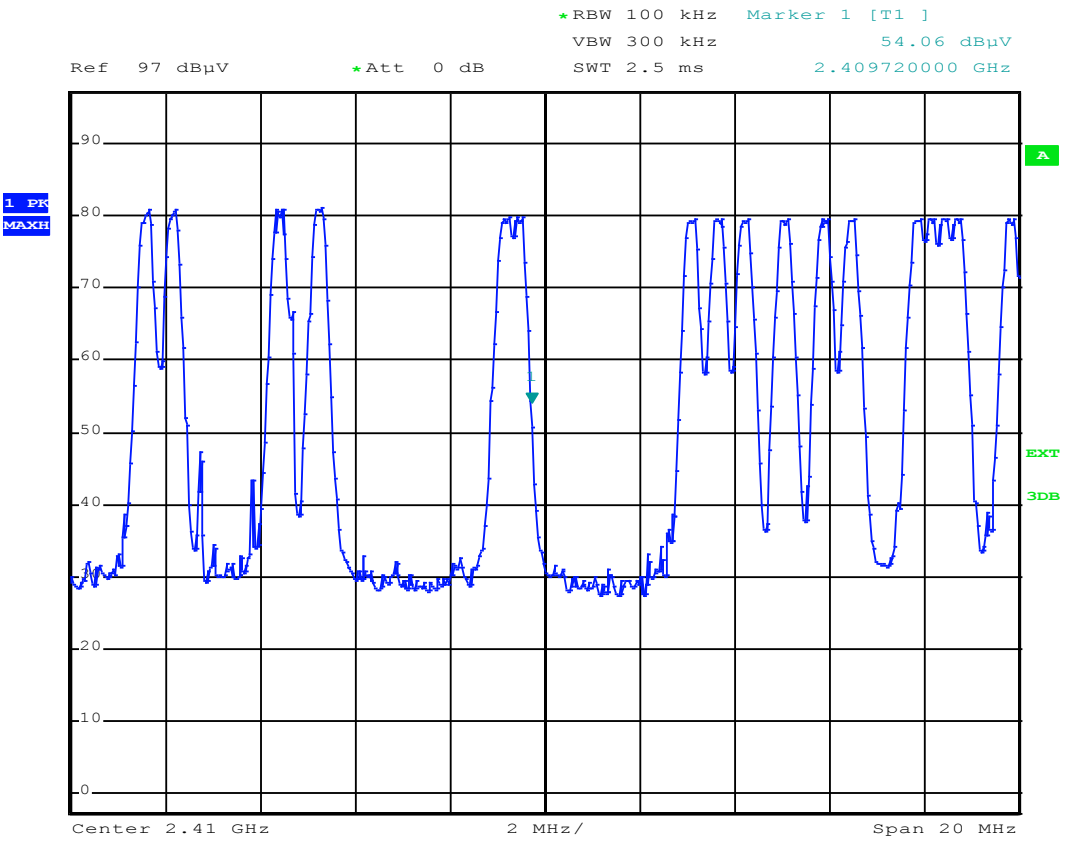

RBW 300 kHz
VBW 1 MHz
SWT 5 s
Ref 97 dBµV
*Att 0 dB
1 PK*
CLRWR
TRG 74.9 dBµV
A
SGL
TRG
EXT
3DB
90
80
70
60
50
40
30
20
10
0
Center 2.4408 GHz
500 ms/

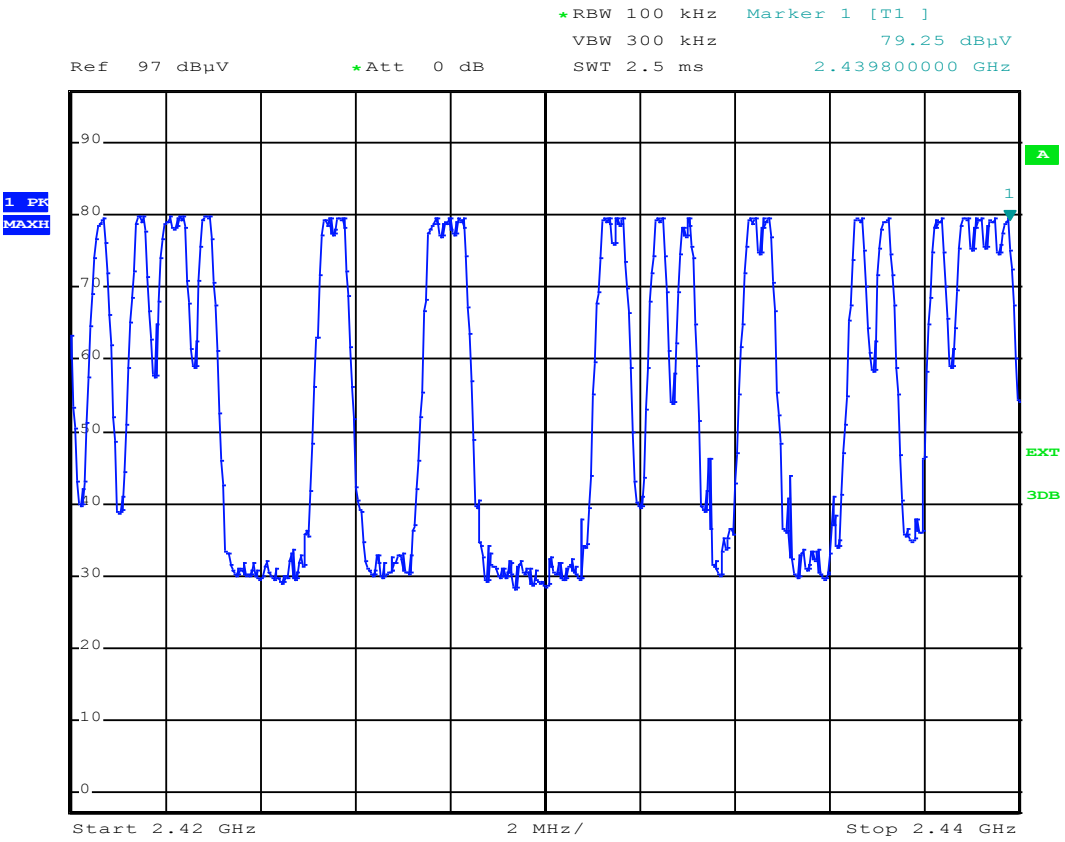
High channel

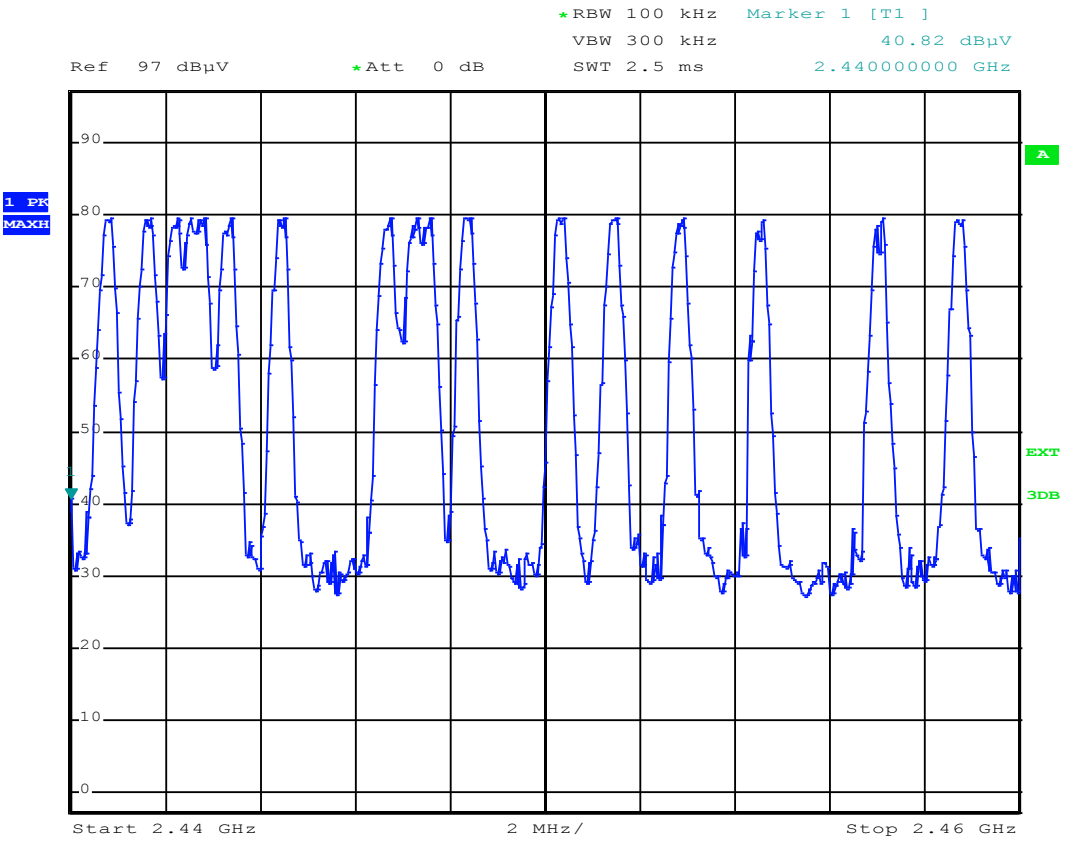


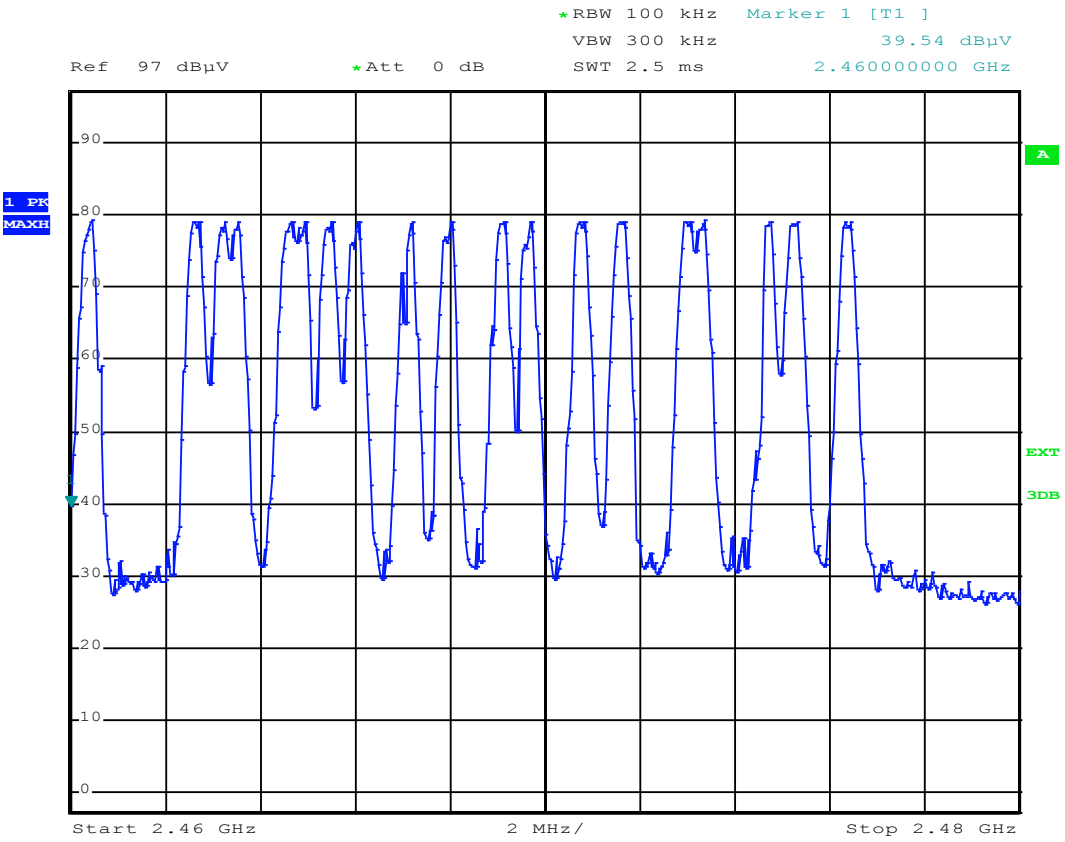

RBW 300 kHz
VBW 1 MHz
SWT 5 s
Ref 97 dBµV
*Att 0 dB
1 PK*
CLRWR
TRG 74.9 dBµV
A
SGL
TRG
EXT
3DB
90
80
70
60
50
40
30
20
10
0
Center 2.47635 GHz
500 ms/

APPENDIX 9: Number of hopping channels




*RBW 100 kHz
Marker 1 [T1]
VBW 300 kHz
79.25 dBµV
Ref 97 dBµV
*Att 0 dB
SWT 2.5 ms
2.439800000 GHz
1 PK
MAXH
A
1
EXT
3DB
90
80
70
60
50
40
30
20
10
0
Start 2.42 GHz
2 MHz/
Stop 2.44 GHz


*RBW 100 kHz
Marker 1 [T1]
VBW 300 kHz
40.82 dBµV
Ref 97 dBµV
*Att 0 dB
SWT 2.5 ms
2.440000000 GHz
1 PK
MAXH
A
EXT
3DB
90
80
70
60
50
40
30
20
10
0
Start 2.44 GHz
2 MHz/
Stop 2.46 GHz


*RBW 100 kHz
Marker 1 [T1]
VBW 300 kHz
39.54 dBµV
Ref 97 dBµV
*Att 0 dB
SWT 2.5 ms
2.460000000 GHz
1 PK
MAXH
A
EXT
3DB
90
80
70
60
50
40
30
20
10
0
Start 2.46 GHz
2 MHz/
Stop 2.48 GHz