EMITECH GROUPE

RR051-14-105547-5-A Ed. 1

This test report cancels and replaces test report RR051-14-105547-5-A Ed. 0

RADIO test report

According to the standard:
CFR47 FCC PART 15.247

Equipment under test:
LOOP LINK (LoRa Part)

MODEL: BU0211

FCCID:
2ADLABU0211

Company:
MYFOX

DISTRIBUTION: Mr CHAFIK **(Company: MYFOX)**

Number of pages: 54 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
1	21-May-2015	See vertical line	S. LOUIS	SL	DUMESNIL M.	

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:	**LOOP LINK**
Serial number (S/N):	BLINK-0000025
Reference / model (P/N):	BU0211
Software version:	1.0
MANUFACTURER:	MYFOX

COMPANY SUBMITTING THE PRODUCT:

Company:	MYFOX
Address:	RUE DU LAC 2460 L'OCCITANE REGENT PARK II 31670 LABEGE FRANCE
Responsible:	Mr CHAFIK
DATE(S) OF TEST:	From 04 February 2015 to 20 February 2015
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:	S. LOUIS

CONTENTS

1. INTRODUCTION

This document presents the result of Certification tests carried out on the following equipment: **LOOP LINK** , in accordance with normative reference.

The device under test integrates a modular approved WiFi module (FCC ID: COFWMNBM11).
The host device of certified module(s) shall be properly labeled to identify the module(s) within.

2. PRODUCT DESCRIPTION

Class:	B (residential)
Utilization:	Alarm system
Antenna type and gain:	Internal helicoidal antenna: gain not communicated
Operating frequency range:	from 902.5 MHz to 914.9 MHz
Number of channels:	64
Channel spacing:	200 KHz
Modulation:	LoRa
Power source:	120VAC / 60Hz

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.

Test frequencies:

Sample 1: TX 915MHz LoRa=> Limited tests (15.247)
Sample 2: TX 915MHz LoRa=> Limited tests (15.207+15.209+15.215)
Sample 3: RX 915MHz => Limited tests (15.107+15.109)

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	2009 Methods of measurement of Radio-Noise Emissions from low-voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz.
ANSI C63.10	2013 Testing Unlicensed Wireless Devices.
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 A –General
- Paragraph 19: labelling requirements
- Paragraph 21: information to user

Subpart B –Unintentional Radiators
- Paragraph 105: information to the user
- 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	/	/	/
1406	EMCO 6502	Loop antenna	26/06/2013	26/03/2015	26/05/2015
1922	Microwave DB C020180F-4B1	Low-noise amplifier	20/08/2014	20/08/2015	20/10/2015
2507	20dB	Attenuator	16/09/2014	16/09/2016	16/11/2016
4088	R&S FSP40	Spectrum Analyzer	22/08/2013	22/08/2015	22/10/2015
6609	Hewlett Packard HPM11630	High Pass Filter	24/02/2014	24/02/2016	24/04/2016
8508	California instruments 1251RP	Power source	22/08/2014	22/08/2015	22/10/2015
8511	HP 8447D	Low noise preamplifier	20/08/2014	20/08/2015	20/10/2015
8524	HP 8591EM	Test receiver	30/07/2013	30/07/2015	30/09/2015
8526	Schwarzbeck VHBB 9124	Biconical antenna	12/06/2012	12/06/2016	12/08/2016
8530	CHASE CBL6112A	Bi-log antenna	05/03/2013	05/03/2017	05/05/2017
8535	EMCO 3115	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
8556	30dB	Attenuator	24/02/2014	24/02/2016	24/04/2016
8593	SIDT Cage 2	Anechoic chamber	/	/	/
8635	R&S EZ-25	High-pass filter	05/08/2014	05/08/2016	05/10/2016
8675	AOIP MN5102B	Multimeter	15/01/2013	15/01/2015	15/03/2015
8707	R&S ESI7	Test receiver	11/12/2014	11/12/2016	11/02/2017
8719	Thurbly Thandar Instruments 1600	LISN	23/06/2014	23/06/2016	23/08/2016
8732	Emitech	OATS	23/08/2013	23/08/2016	23/10/2016
8750	La Crosse Technology WS-9232	Meteo station	03/09/2014	03/09/2016	03/11/2016
8864	Champ libre Juigné. V3.4	Software	/	/	/
8893	Emitech	Outside room Hors cage	/	/	/
8896	ACQUISYS GPS8	Satellite synchronized frequency standard	/	/	/
8972	K&L Microwave 500-1000MHz	Notch filter	/	/	/
10651	Absorber sheath current	Emitech	17/10/2013	17/10/2015	17/12/2015
/	GPIBShot V2.4	Software	/	/	/

6. TESTS AND CONCLUSIONS

6.1 general (subpart A)

Test procedure	Description of test	Respected criteria?				Comment
		Yes	No	NAp	NAs	
FCC Part 15.19	LABELLING REQUIREMENTS				X	*See certification documents*
FCC Part 15.21	INFORMATION TO USER				X	*See certification documents*

NAp: Not Applicable NAs: Not Asked

LABEL SHALL CONTAIN

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

§15.19: (can be placed in the user manual if the product is too small)
This device complies with Part 15 of the FCC Rules. Operation is subject to the following two 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.

USER NOTICE SHALL CONTAIN

The user notice, not provided during tests, shall include the following informations:

§15.21:
Any changes or modifications to this equipment not expressly approved by MYFOX may cause, harmful interference and void the FCC authorization to operate this equipment

6.2 unintentional radiator (subpart B)

Test procedure	Description of test	Respected criteria?				Comment
		Yes	No	NAp	NAs	
FCC Part 15.105	INFORMATION TO THE USER				X	*See certification documents*
FCC Part 15.107	CONDUCTED LIMITS	X				
FCC Part 15.109	RADIATED EMISSION LIMITS	X				*Class B*
FCC Part 15.111	ANTENNA POWER CONDUCTED LIMITS FOR RECEIVER			X		

NAp: Not Applicable NAs: Not Asked

USER NOTICE SHALL CONTAIN

The user notice, not provided during tests, shall include the following informations:

§ 15.105:

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.

6.3 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				

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 / 20 dB bandwidth of the hopping channel (169.36 kHz; see appendix 5 and 7).

The frequency hopping system uses 64 channels (see appendix 9).

The timing by channel is 378000 µs (see appendix 8).

During 20 s, any channel is used 1 times (see appendix 8), then 1 x378000 µs = 378 ms, thus the average time of occupancy on any channel is less than 400 ms within a period of 20 seconds

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

RF EXPOSURE:

Maximum measured power = 108.2 dBµV/m = 19.82 mW
with $P = (E \times d)^2 / (30 \times Gp)$ with $d = 3$ m and $Gp = 1$

In accordance with KDB 447498 D01 General RF Exposure Guidance v05r02

$PSD = EIRP/(4*\pi*R^{2)} = 1.403/(4*\pi*(20\ cm)^2) = 3.943 \times 10^{-3}$ 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.

7. MEASUREMENT OF THE CONDUCTED DISTURBANCES

Standard: FCC Part 15

Test procedure: Paragraph 15.107

Limits: Class B

Software used: BAT-EMC V3.6.0.32

Test set up:

The EUT is isolated and placed on a wooden table, 0.8 m over an horizontal reference plane and 0.4 m from a vertical reference plane. It is powered by an artificial main network placed on the ground reference plane.
The equipment is powered with the AC power operating voltage of 120 V / 60 Hz.

See photos in appendix 2

Frequency range: 150 kHz - 30 MHz

Detection mode: Peak

Bandwidth: 10 kHz

Equipment under test operating condition:

The equipment is blocked in reception mode.

Results:

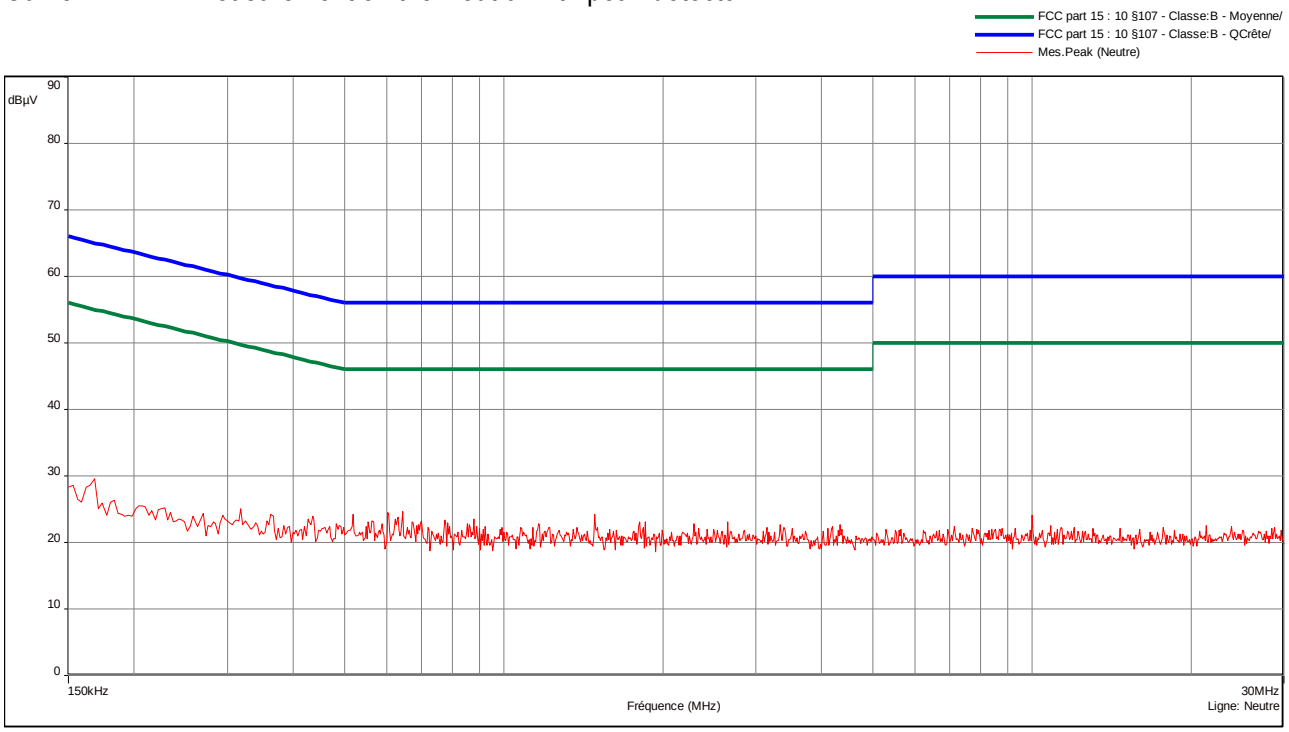
Ambient temperature (°C):	21
Relative humidity (%):	26

Sample N° 3:

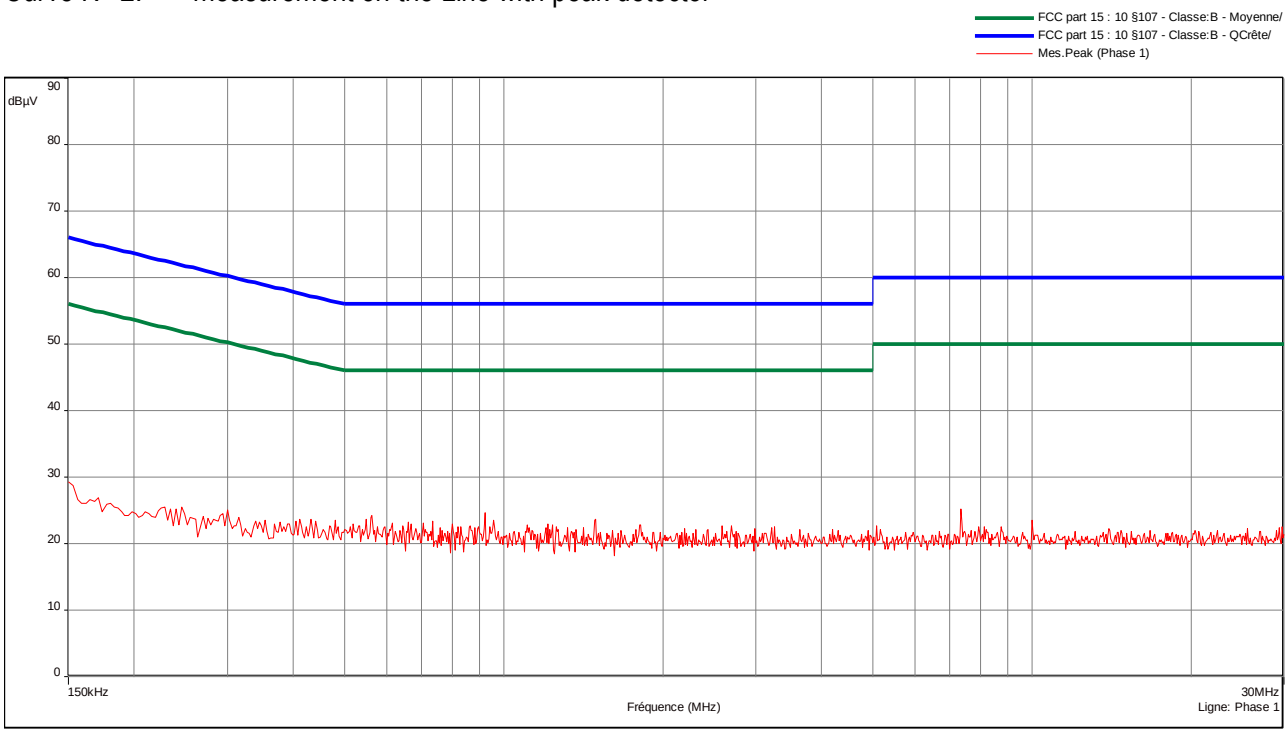
Measurement on the mains power supply:

The measurement is first realized with Peak detector.

Curve N° 1: measurement on the Neutral with peak detector



Curve N° 2: measurement on the Line with peak detector



Test conclusion:

RESPECTED STANDARD

8. RADIATED EMISSION LIMITS

Standard: FCC Part 15

Test procedure: paragraph 109

Limit class: Class B

Test set up:

First an exploratory radiated measurement was performed. During this phase the product is oriented in three orthogonal planes.

Then the final measurement is realized with the product on the most critical orientation.

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 5th harmonic of the highest frequency used (915 MHz).

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: 10 meters (in open area test site) / 3 meters (in anechoic room)

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 reception mode.

Results:

Ambient temperature (°C):	21.5
Relative humidity (%):	36

Power source:
We used for power source an external power supply regulated to 120VAC / 60Hz.

Sample N° 3:

Not any spurious has been detected.

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

9. MEASUREMENT OF THE CONDUCTED DISTURBANCES

Standard: FCC Part 15

Test procedure: Paragraph 15.207

Software used: BAT-EMC V3.6.0.32

Test set up:

The EUT is isolated and placed on a wooden table, 0.8 m over an horizontal reference plane and 0.4 m from a vertical reference plane. It is powered by an artificial main network placed on the ground reference plane.
The equipment is powered with the AC power operating voltage of 120 V / 60 Hz.

See photos in appendix 2

Frequency range: 150 kHz - 30 MHz

Detection mode: Peak / Average

Bandwidth: 10 kHz / 9 kHz

Equipment under test operating condition:

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

Results:

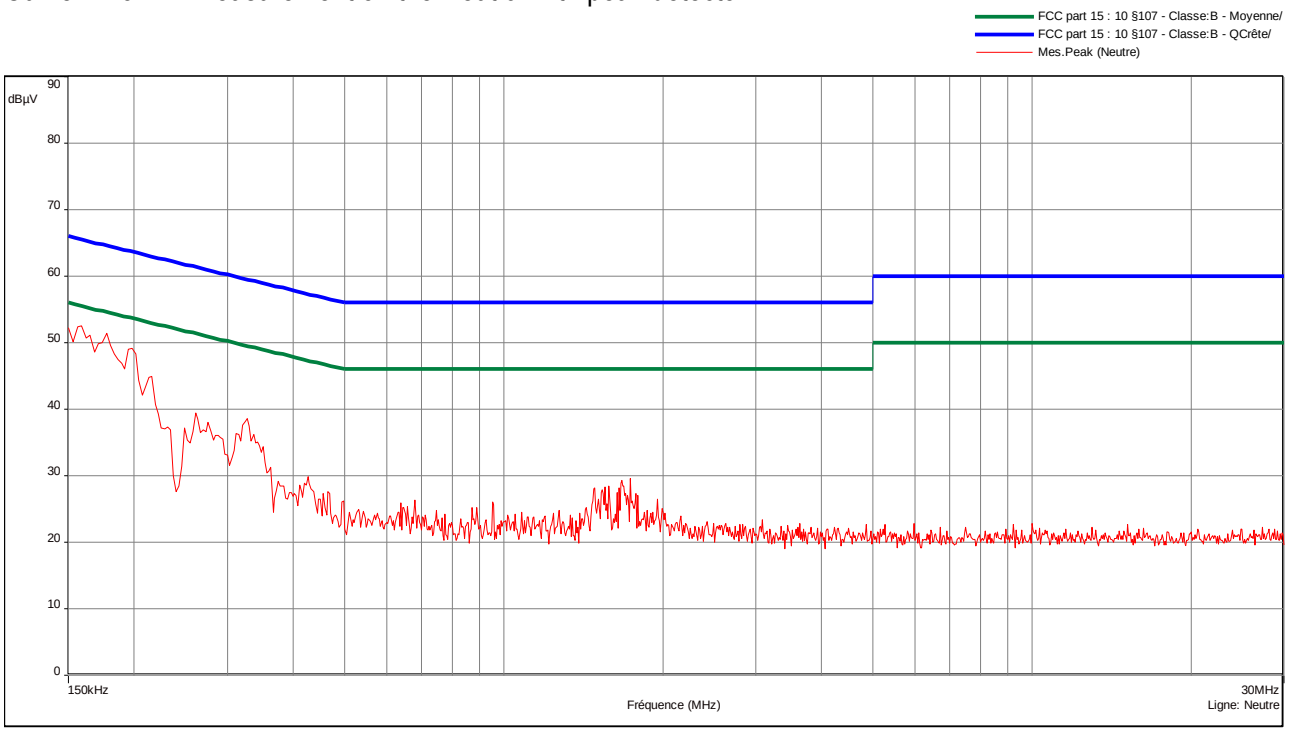
Ambient temperature (°C):	21
Relative humidity (%):	26

Sample N° 2:

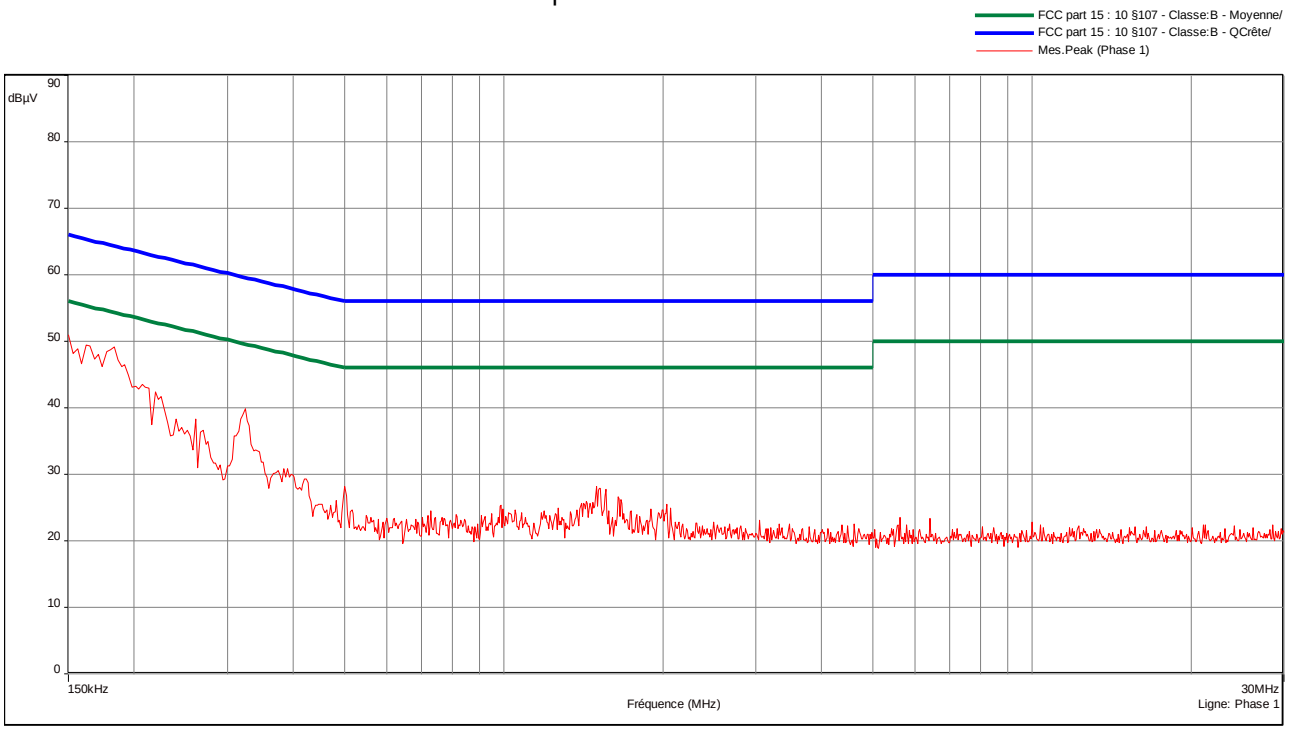
Measurement on the mains power supply:

The measurement is first realized with Peak detector.

Curve N° 3: measurement on the Neutral with peak detector

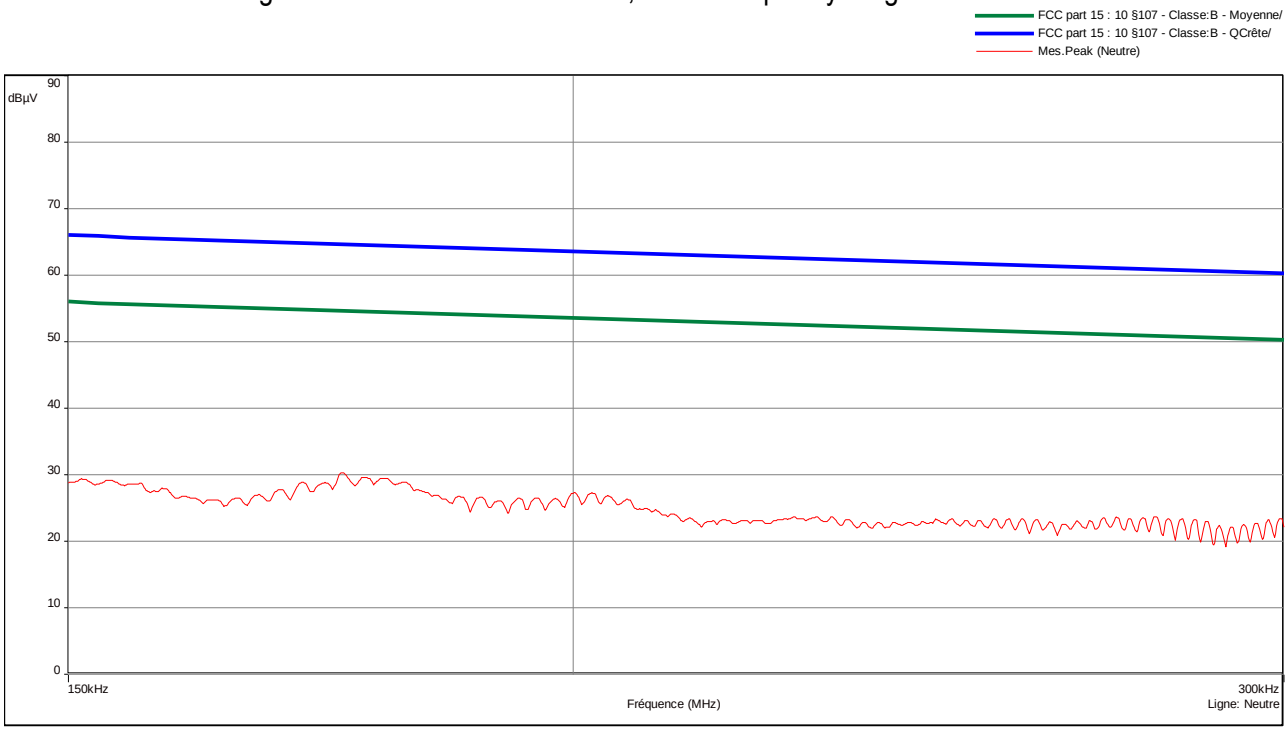


Curve N° 4: measurement on the Line with peak detector

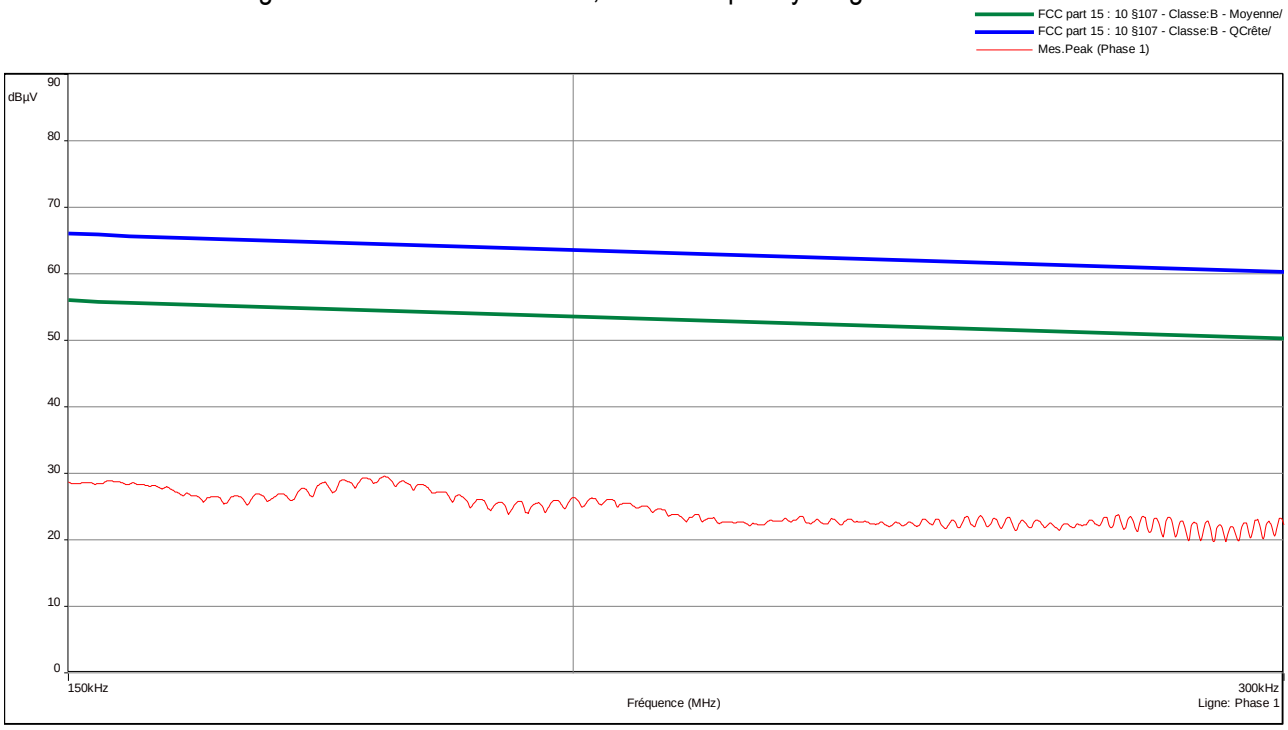


The frequencies which are not 6 dB under the Average limit are then analyzed with Average detector.

Curve N° 5: average measurement on the Neutral, for the frequency range: 150 KHz – 300 KHz



Curve N° 6: average measurement on the Line, for the frequency range: 150 KHz – 300 KHz



Test conclusion:

RESPECTED STANDARD

10. 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 transmission mode, modulated by internal data signal, at the highest output power level which the transmitter is intended to operate.

Results:

Ambient temperature (°C): 21.5
Relative humidity (%): 36

Power source:
We used for power source an external power supply regulated to 120VAC / 60Hz.

Lower Band Edge: band from 900 MHz to 902 MHz

Upper Band Edge: band from 928 MHz to 930 MHz

Sample N° 2:

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)
902.28	109.8	peak	901.99	-31.40	78.5	89.8	11.3
914.92	107.1	peak	928.16	-35.70	71.4	87.1	15.7

*Marker-Delta method

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

Test conclusion:

RESPECTED STANDARD

11. MAXIMUM PEAK OUTPUT POWER

Standard: FCC Part 15

Test procedure: paragraph 15.247 (b)

Test set up:

First an exploratory radiated measurement was performed. During this phase the product is oriented in three orthogonal planes.

Then the final measurement is realized with the product on the most critical orientation.

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.

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: 10 meters (in open area test site) / 3 meters (in anechoic room)

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 modulated transmission mode, at the highest output power level at which the transmitter is intended to operate.

Results:

Ambient temperature (°C): 21.5
Relative humidity (%): 40

Power source:
We used for power source an external power supply regulated to 120VAC / 60Hz.

Sample N° 1 Low Channel: 902.28MHz

	Electro-magnetic field (dBµV/m):	Conducted power *(W)	Limit (W)
Nominal supply voltage:	108.2	0.0198	0.125

Polarization of test antenna: Horizontal (height: 100 cm)
Position of equipment: See photos in appendix 2 (azimuth: 347 degrees)

** P = (E×d)² / (30×Gp) with d = 3 m and Gp =*

Sample N° 1 Central Channel: 908.62 MHz

	Electro-magnetic field (dBµV/m):	Conducted power *(W)	Limit (W)
Nominal supply voltage:	106.3	0.0128	0.125

Polarization of test antenna: Horizontal (height: 100 cm)
Position of equipment: See photos in appendix 2 (azimuth: 359 degrees)

** P = (E×d)² / (30×Gp) with d = 3 m and Gp =*

Sample N° 1 High Channel : 914.92MHz

	Electro-magnetic field (dBµV/m):	Conducted power *(W)	Limit (W)
Nominal supply voltage:	106.2	0.0125	0.125

Polarization of test antenna: Horizontal (height: 100 cm)
Position of equipment: See photos in appendix 2 (azimuth: 157 degrees)

** P = (E×d)² / (30×Gp) with d = 3 m and Gp =*

Test conclusion:

RESPECTED STANDARD

12. INTENTIONAL RADIATOR

Standard: FCC Part 15

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

Test set up:

First an exploratory radiated measurement was performed. During this phase the product is oriented in three orthogonal planes.

Then the final measurement is realized with the product on the most critical orientation.

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 10th harmonic of the highest fundamental frequency (915 MHz).

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: 10 meters (in open area test site) / 3 meters (in anechoic room)

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 modulated transmission mode, at the highest output power level at which the transmitter is intended to operate.

Results:

Ambient temperature (°C): 20.3
Relative humidity (%): 39

Power source:
We used for power source an external power supply regulated to 120VAC / 60Hz.

Sample N° 1 Low Channel

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)
1805.80	P	150	120	100	V	48.5	89.8	41.3
2708.70(*)	P	150	62	1000	V	46.5**	74	27.5
3611.60(*)	P	150	0	1000	V	51.1**	74	22.9
4514.50(*)	P	150	45	1000	V	49.1**	74	24.9
5417.40(*)	P	150	52	1000	V	56.4	74	17.6
5417.40(*)	Av	150	52	1000	V	53.7	54	0.3
6320.30	P	150	30	100	V	45.2	89.8	44.6
7223.20	P	150	9	100	V	46	89.8	43.8
8126.10(*)	P	150	169	1000	V	53.1**	74	20.9

Sample N° 1 Central Channel

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)
1817.20	P	150	120	100	V	48.7	89.8	41.1
2725.80(*)	P	150	62	1000	V	46.8**	74	27.2
3634.40(*)	P	150	0	1000	V	52.5**	74	21.5
4543.00(*)	P	150	45	1000	V	50.1**	74	23.9
5451.60(*)	P	150	52	1000	V	56.9	74	17.1
5451.60(*)	Av	150	52	1000	V	53.7	54	0.3
6360.20	P	150	30	100	V	45.3	89.8	44.5
7268.80(*)	P	150	9	1000	V	50.7**	74	23.3
8177.40(*)	P	150	169	1000	V	53.2**	74	20.8

Sample N° 1 High Channel

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)
1829.80	P	150	120	100	V	47.8	89.8	42
2744.70(*)	P	150	62	1000	V	45.9**	74	28.1
3659.60(*)	P	150	0	1000	V	52.6**	74	21.4
4574.50(*)	P	150	45	1000	V	51.3**	74	22.7
5489.40(*)	P	150	52	1000	V	53.2	89.8	36.6
6404.30	P	150	30	100	V	46.3	89.8	43.5
7319.20(*)	P	150	9	1000	V	48.5**	74	25.5
8234.10(*)	P	150	169	1000	V	52.6**	74	21.4

(*) 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.

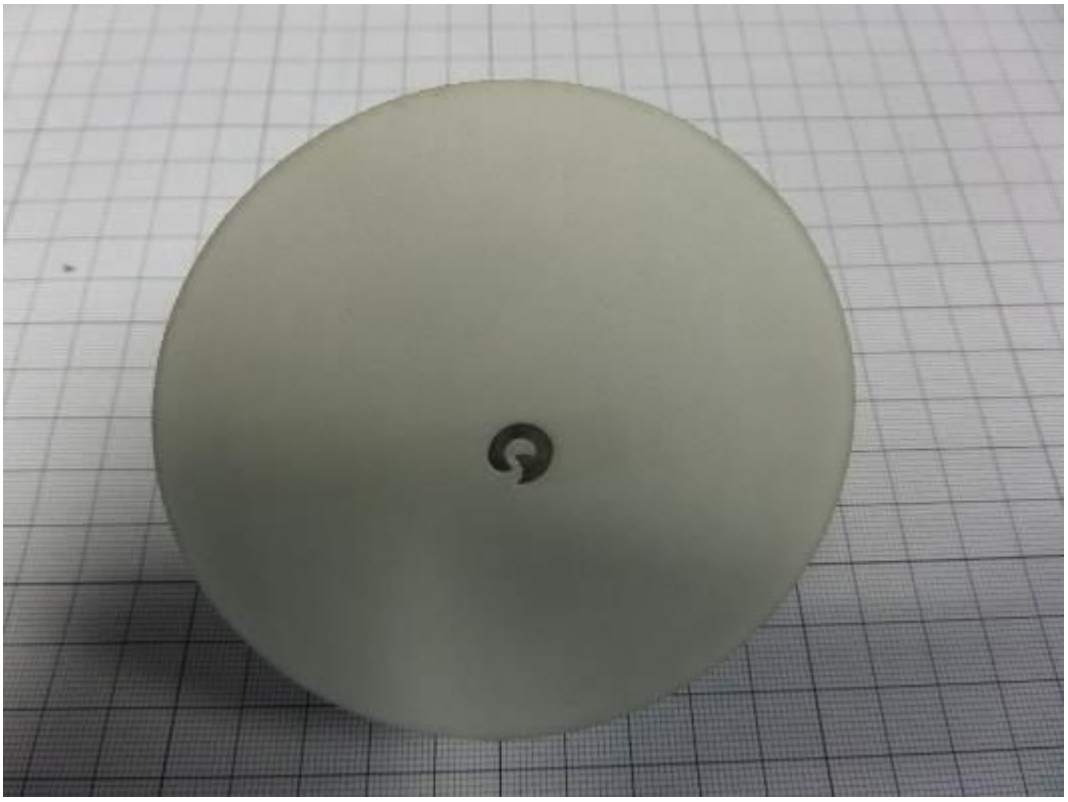
The highest level recorded in a 100 kHz bandwidth is 109.8 dBµV/m on lower channel.
So the applicable limit is 89.8 dBµV/m.
In addition, radiated emissions which fall in the restricted band, as defined in section 15.205 (a), must also comply with the radiated emission limits specified in section 15.209 (a) (see section 15.205 (c)).

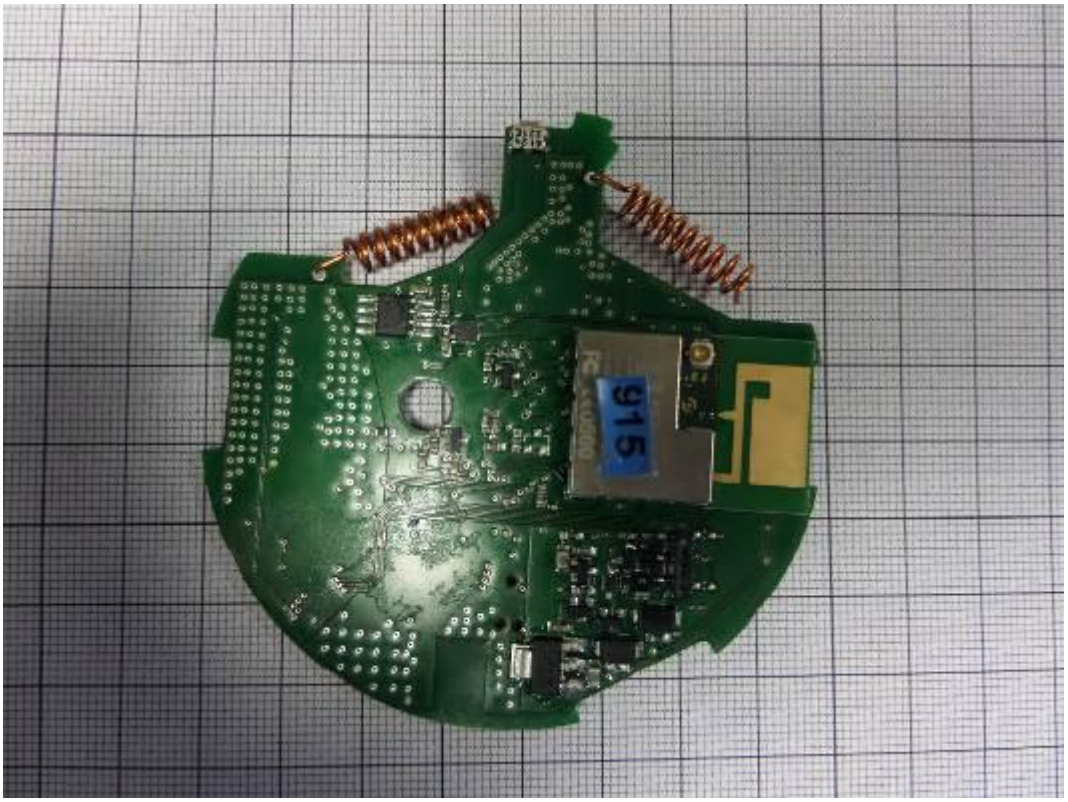
Test conclusion:

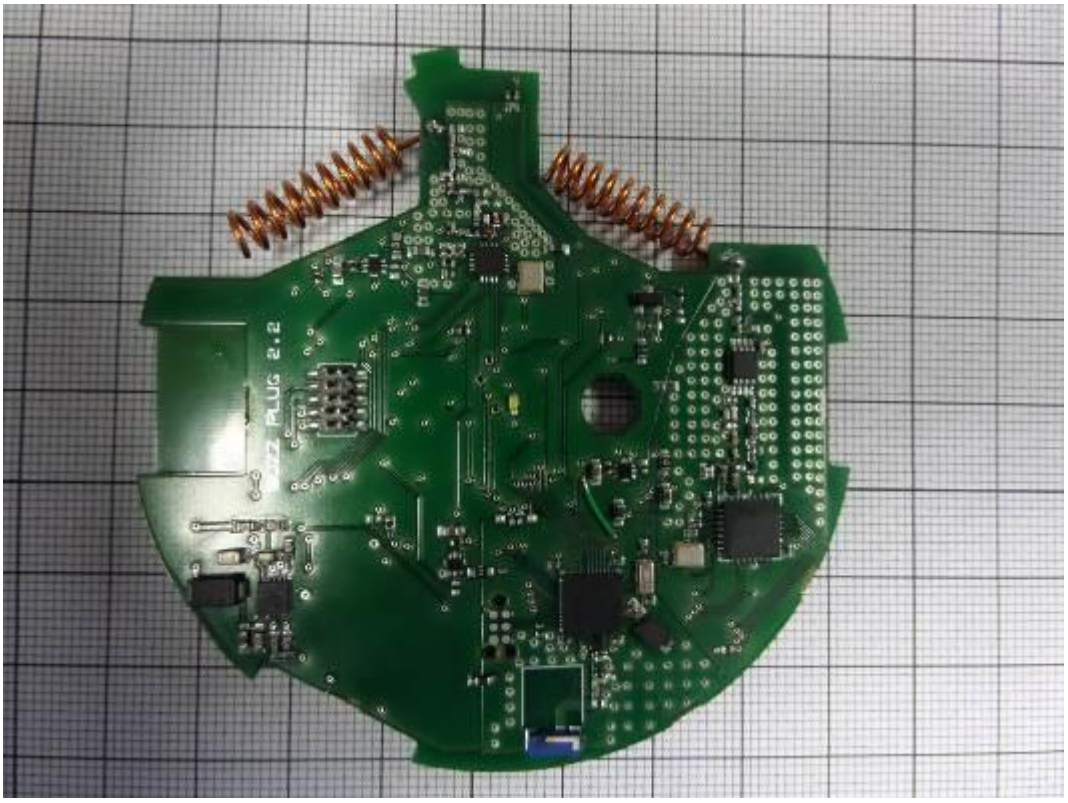
RESPECTED STANDARD

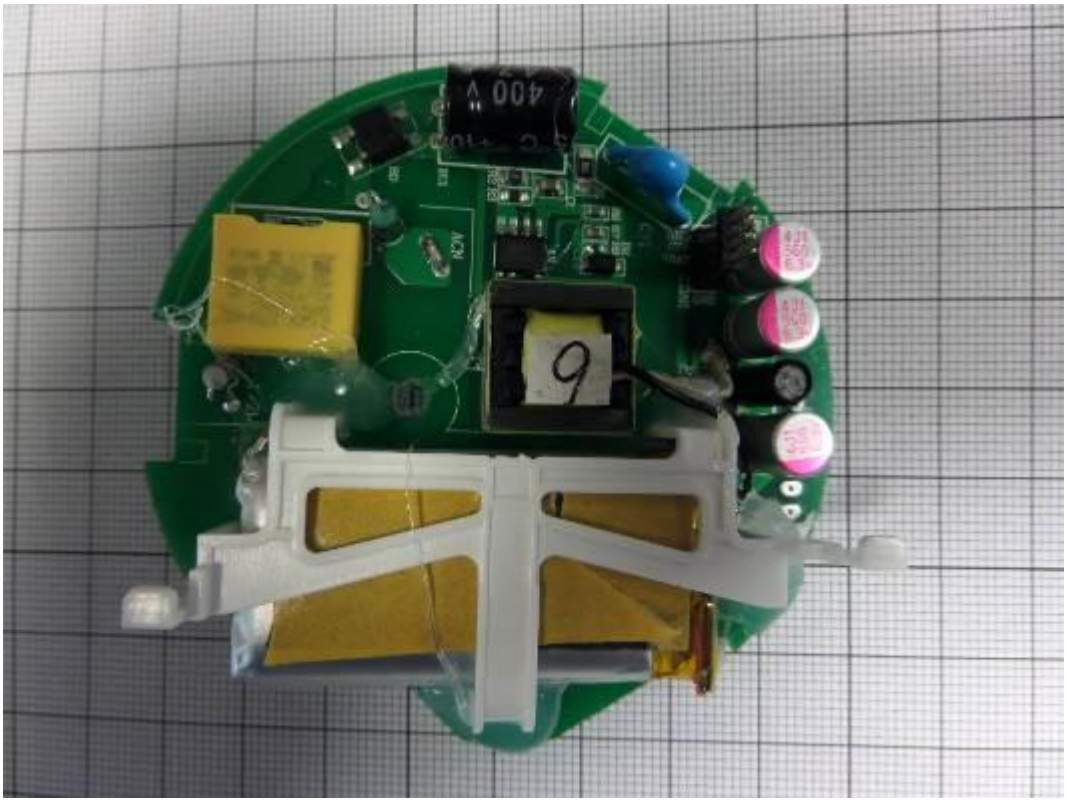
□□□ End of report, 9 appendixes to be forwarded □□□

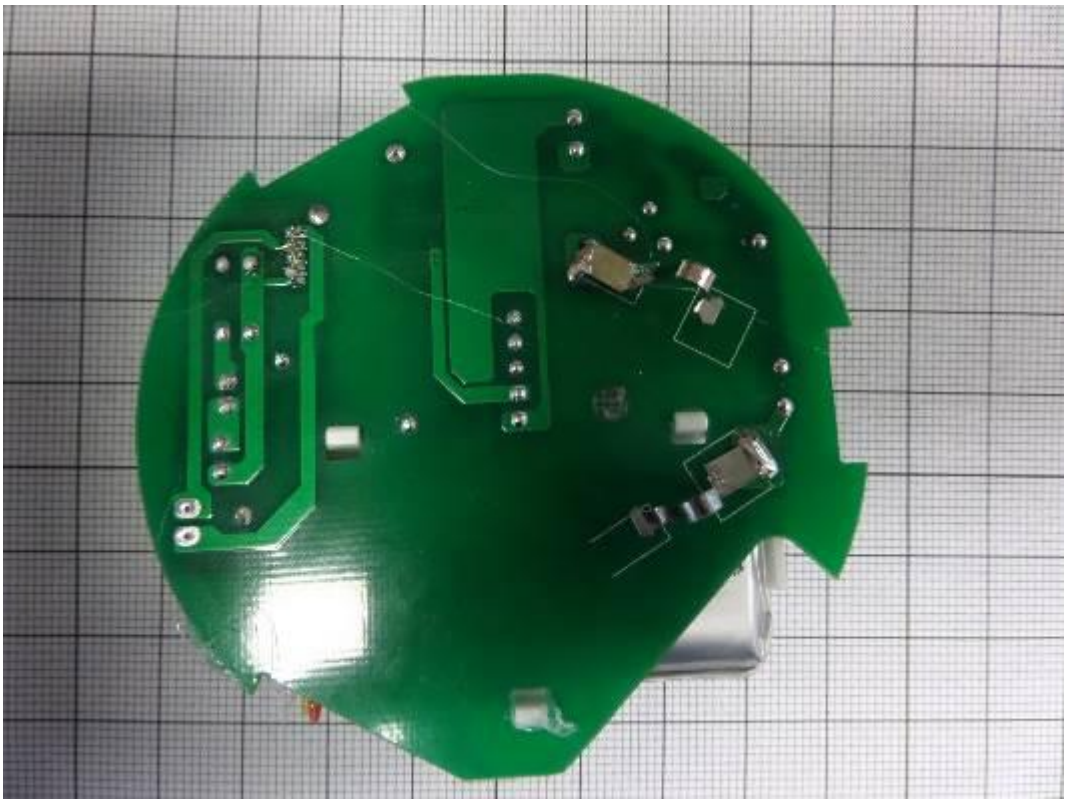
APPENDIX 1: Photos of the equipment under test




915

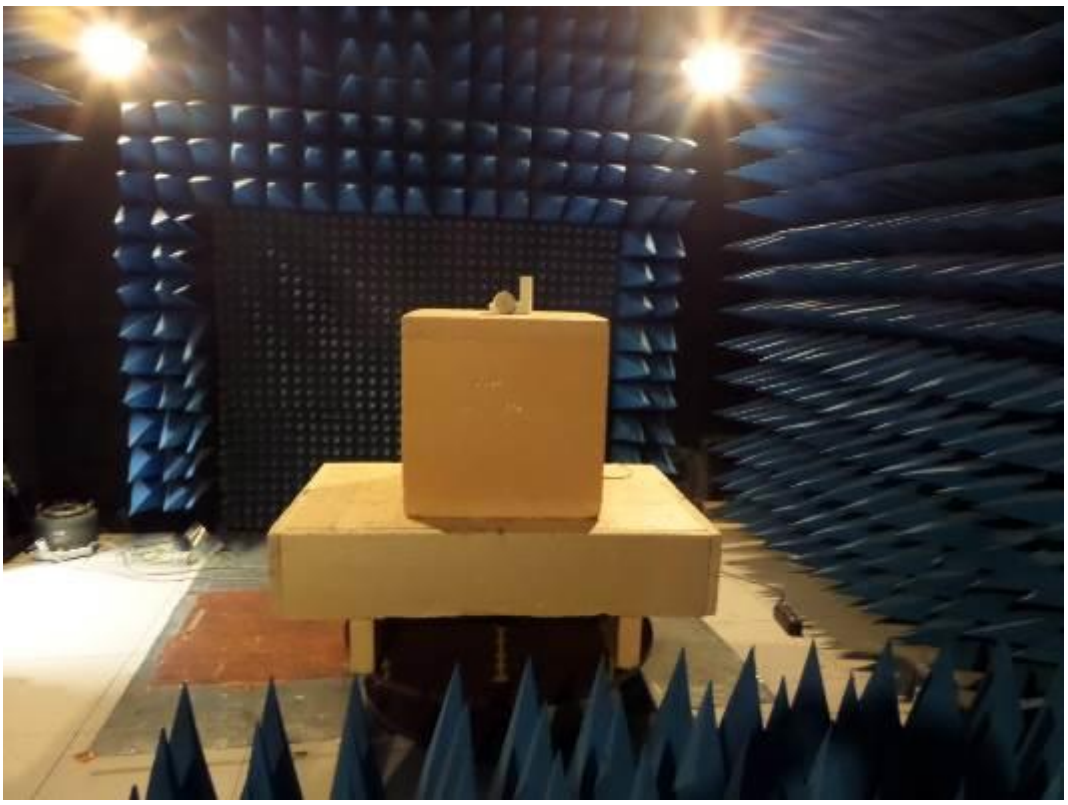

PLUG 2.2


400 V
9



APPENDIX 2: Test set up

Radiated measurements



Open area test site measurements

Conducted measurements

APPENDIX 3: Test equipment list

Measurement of the conducted disturbances

TYPE	MANUFACTURER	EMITECH NUMBER
Outside room Hors cage	Emitech	8893
Satellite synchronized frequency standard GPS8	ACQUISYS	8896
Test receiver HP 8591EM	Hewlett Packard	8524
LISN 1600	Thurbly Thandar Instruments	8719
High-pass filter EZ-25	Rohde & Schwarz	8635
Absorber sheath current	Emitech	10651
Power source 1251RP	California instruments	8508
Multimeter MN5102B	AOIP	8675
Meteo station WS-9232	La Crosse Technology	8750
Software	BAT-EMC V3.6.0.32	0000

Radiated emission limits

TYPE	MANUFACTURER	EMITECH NUMBER
Anechoic Chamber	EMITECH	8593
Satellite synchronized frequency standard GPS8	ACQUISYS	8896
Spectrum Analyzer FSP40	Rohde & Schwarz	4088
Biconical antenna VHBB 9124	Schwarzbeck	8526
Log periodic antenna UHALP 9108A	Schwarzbeck	8543
Antenna 3115	EMCO	8535
Low-noise amplifier 8447D	Hewlett Packard	8511
Low-noise amplifier C020180F-4B1	Microwave DB	1922
Power source 1251RP	California instruments	8508
Multimeter MN5102B	AOIP	8675
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
Outside room Hors cage	Emitech	8893
Satellite synchronized frequency standard GPS8	ACQUISYS	8896
Spectrum Analyzer FSP40	Rohde & Schwarz	4088
Log periodic antenna UHALP 9108A	Schwarzbeck	8543
Power source 1251RP	California instruments	8508
Multimeter MN5102B	AOIP	8675
Meteo station WS-9232	La Crosse Technology	8750
Software	GPIBShot V2.4	-

Maximum peak output power

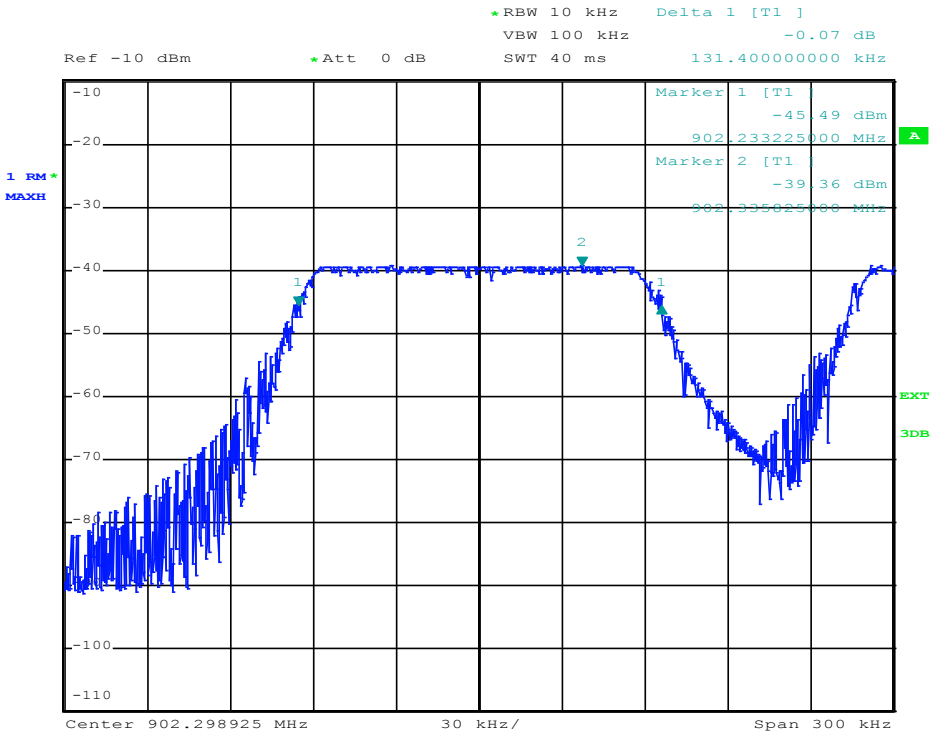
TYPE	MANUFACTURER	EMITECH NUMBER
Open test site	EMITECH	8732
Satellite synchronized frequency standard GPS8	ACQUISYS	8896
Test receiver ESI7	Rohde & Schwarz	8707
20 dB	Attenuator	2507
30 dB	Attenuator	8556
Bi-log antennaCBL6112A	CHASE	8530
Power source 1251RP	California instruments	8508
Multimeter MN5102B	AOIP	8675
Meteo station WS-9232	La Crosse Technology	8750
Software	Champ libre Juigné. V3.4	8864

Intentional radiator

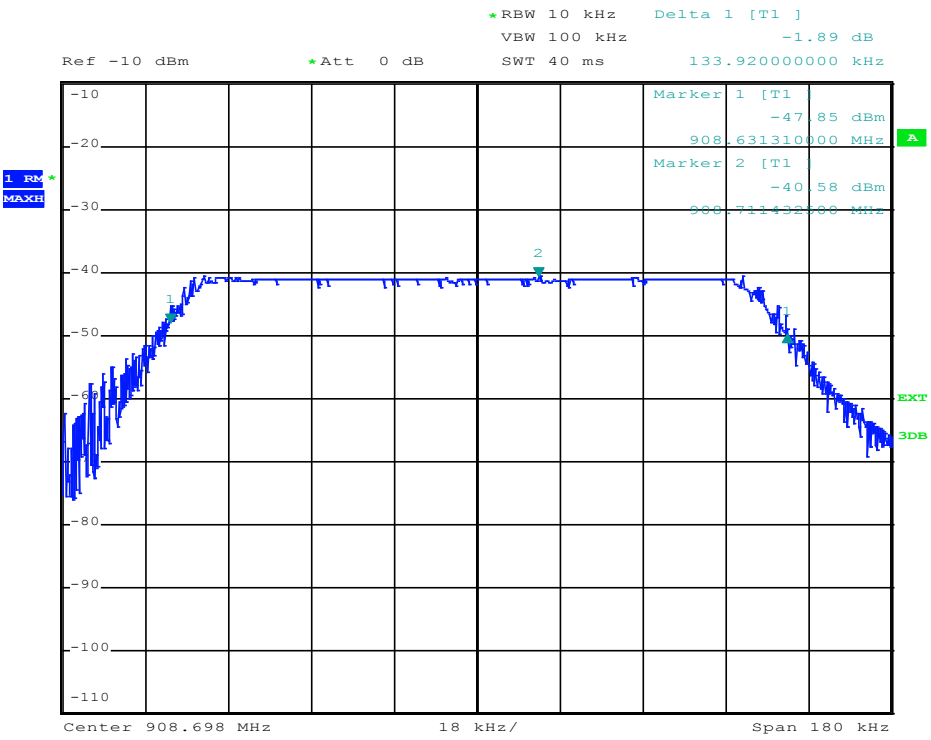
TYPE	MANUFACTURER	EMITECH NUMBER
Anechoic Chamber	EMITECH	8593
Satellite synchronized frequency standard GPS8	ACQUISYS	8896
Spectrum Analyzer FSP40	Rohde & Schwarz	4088
Loop antenna 6502	EMCO	1406
Biconical antenna VHBB 9124	Schwarzbeck	8526
Log periodic antenna UHALP 9108A	Schwarzbeck	8543
Antenna 3115	EMCO	8535
Low-noise amplifier 8447D	Hewlett Packard	8511
Low-noise amplifier C020180F-4B1	Microwave DB	1922
Notch filter 500-1000MHz	K&L Microwave	8972
High pass filter HPM11630	Hewlett Packard	6609
Power source 1251RP	California instruments	8508
Multimeter MN5102B	AOIP	8675
Meteo station WS-9232	La Crosse Technology	8750
Software	BAT-EMC V3.6.0.32	0000

APPENDIX 4: 6 dB bandwidth

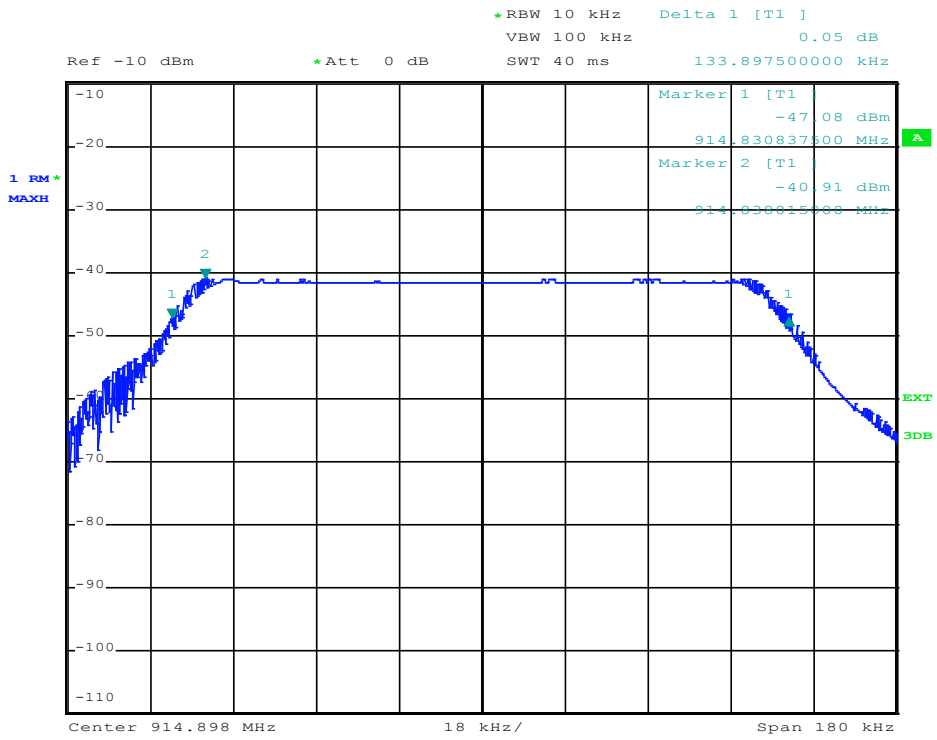
Low Channel



Central Channel

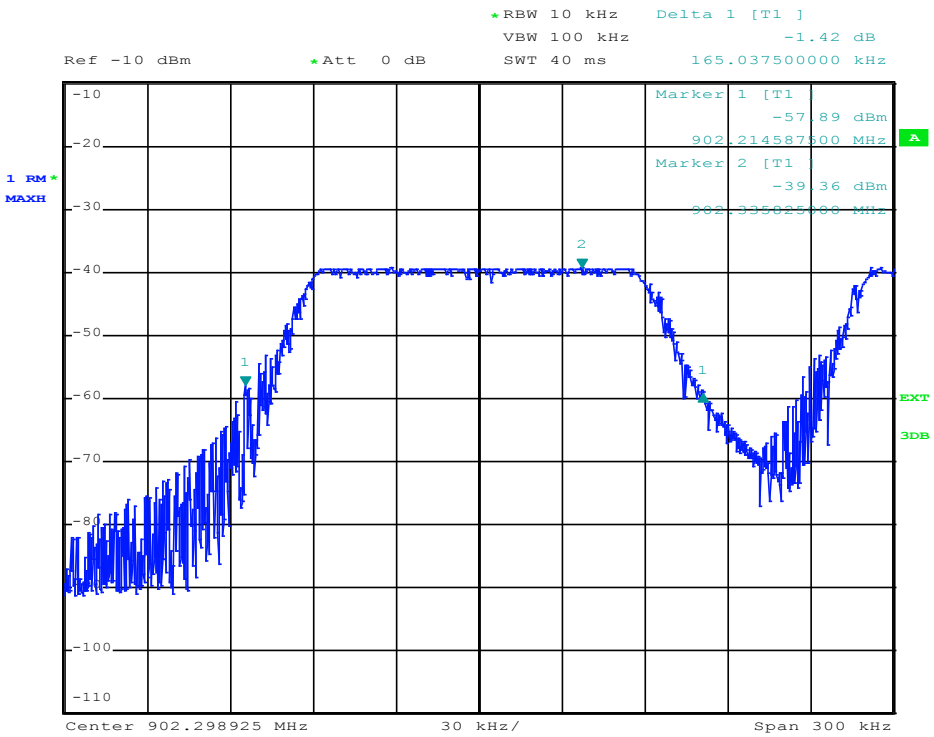


High Channel

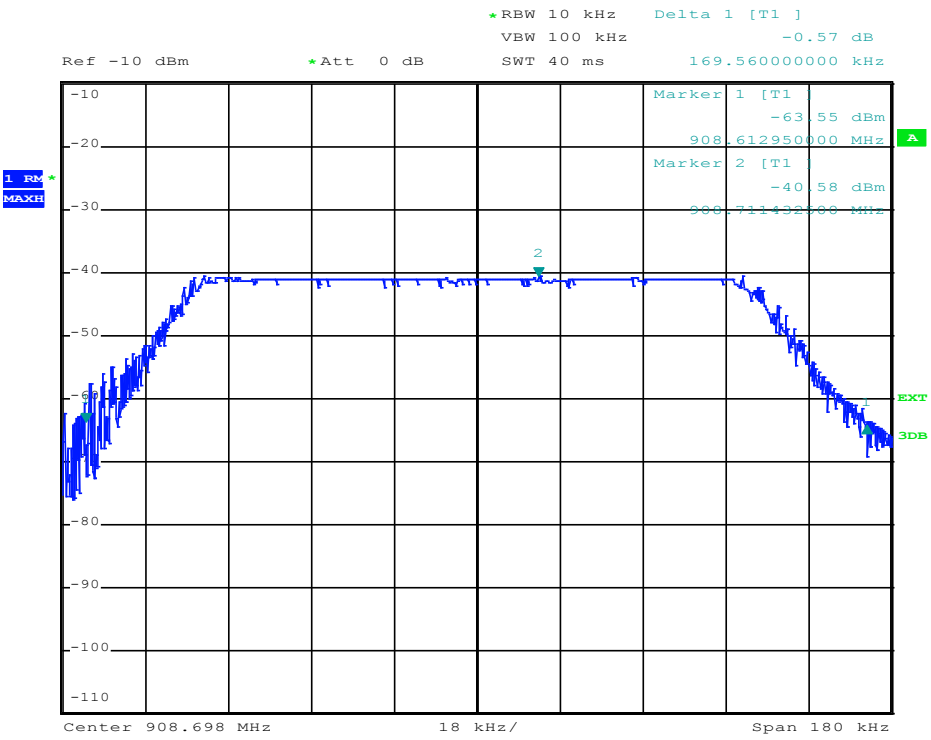


APPENDIX 5: 20 dB bandwidth

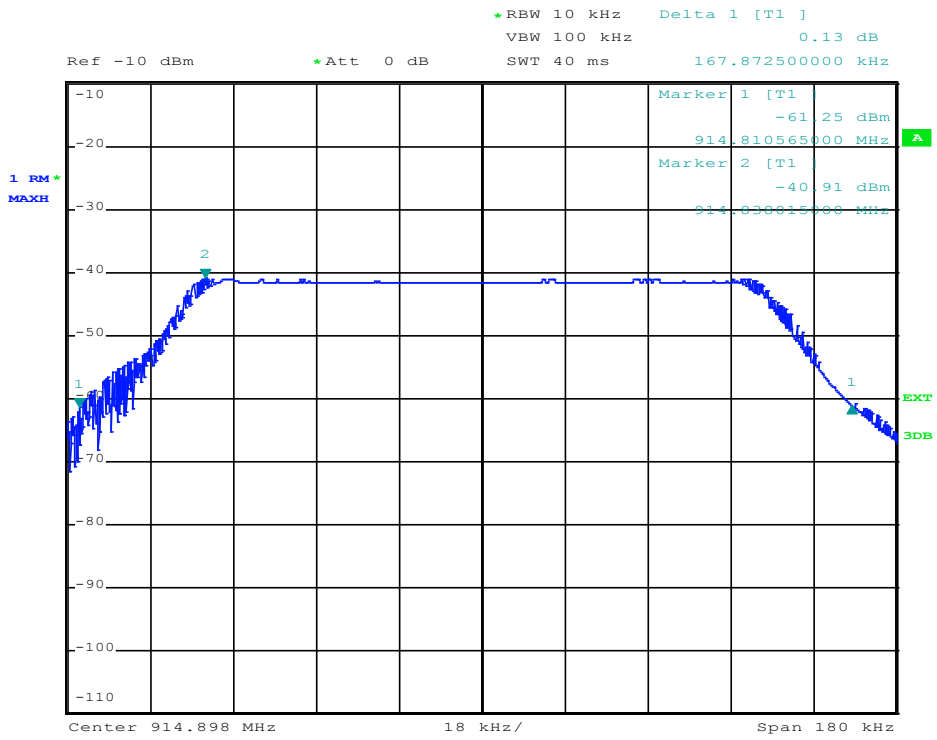
Low Channel



Central Channel

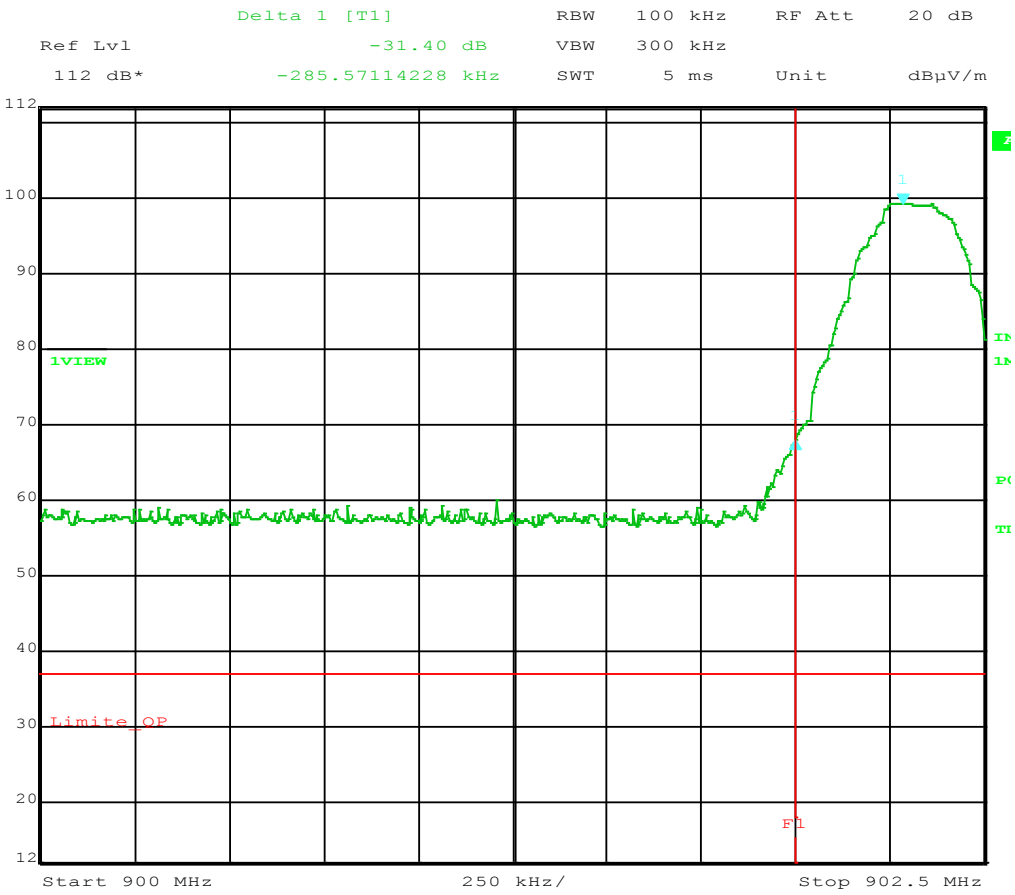


High Channel

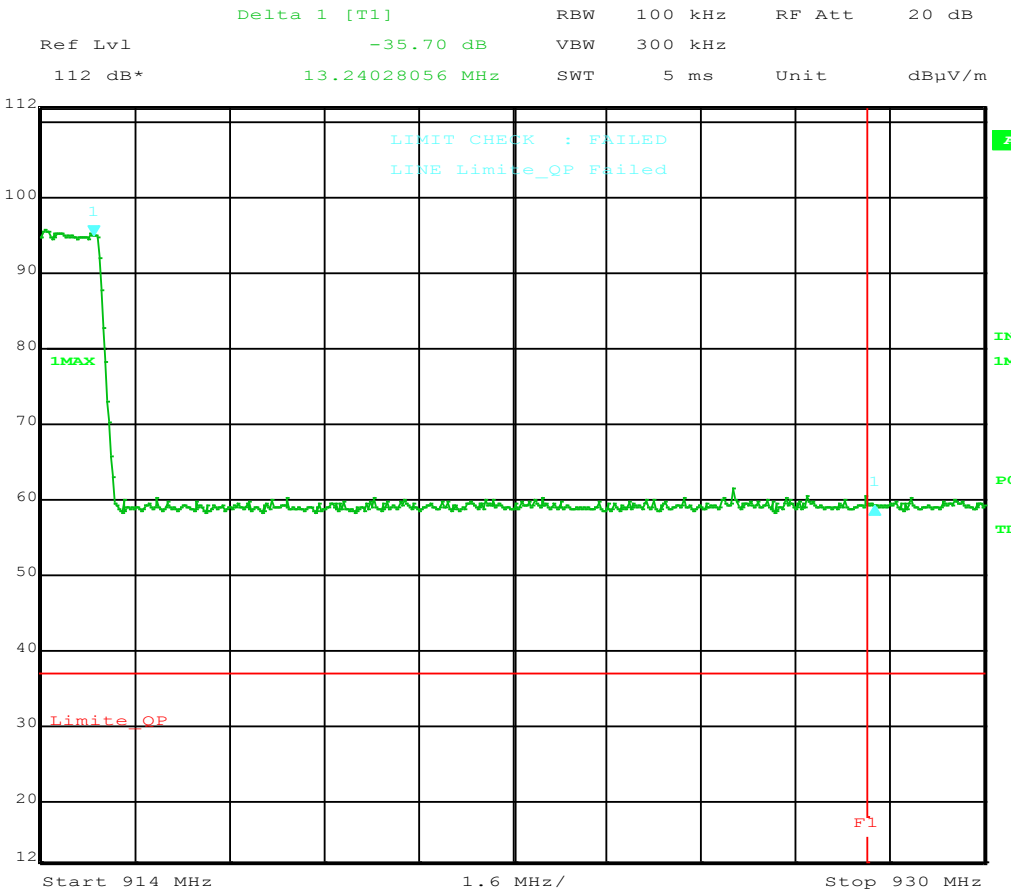


APPENDIX 6: Band edge

Lower Band edge

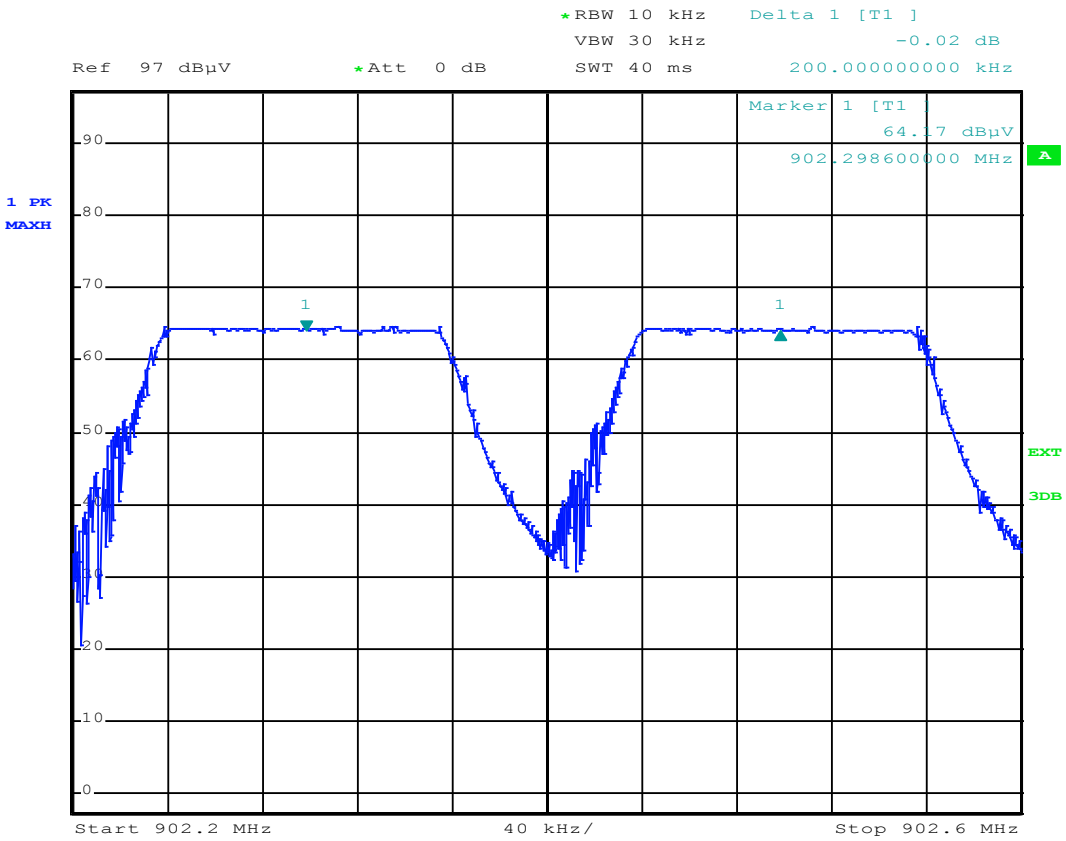


Upper Band edge

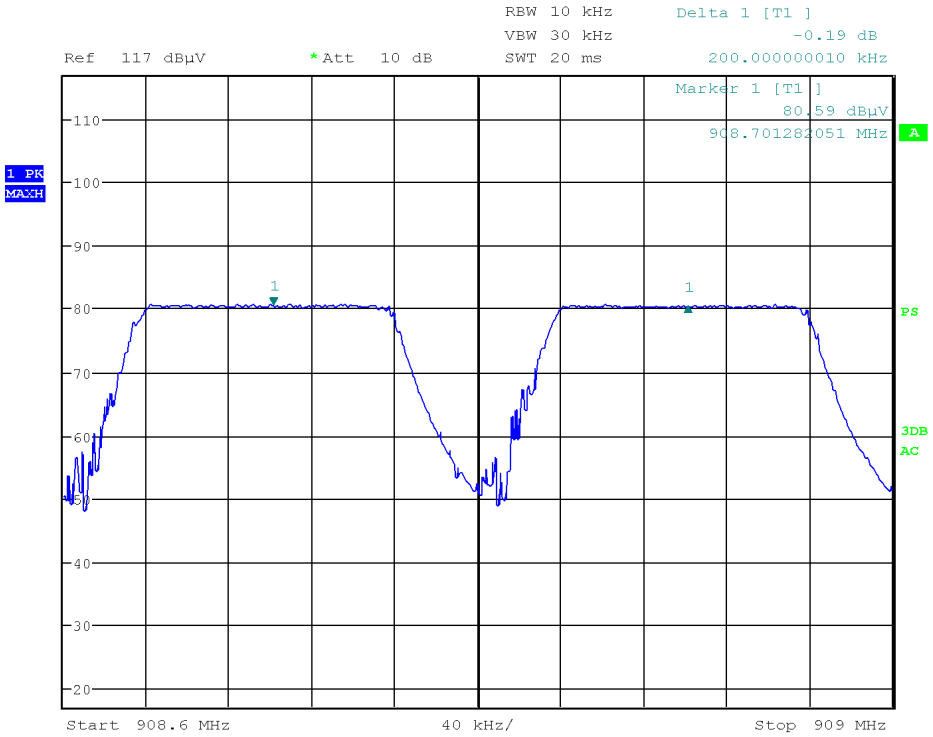


APPENDIX 7: Channel Spacing

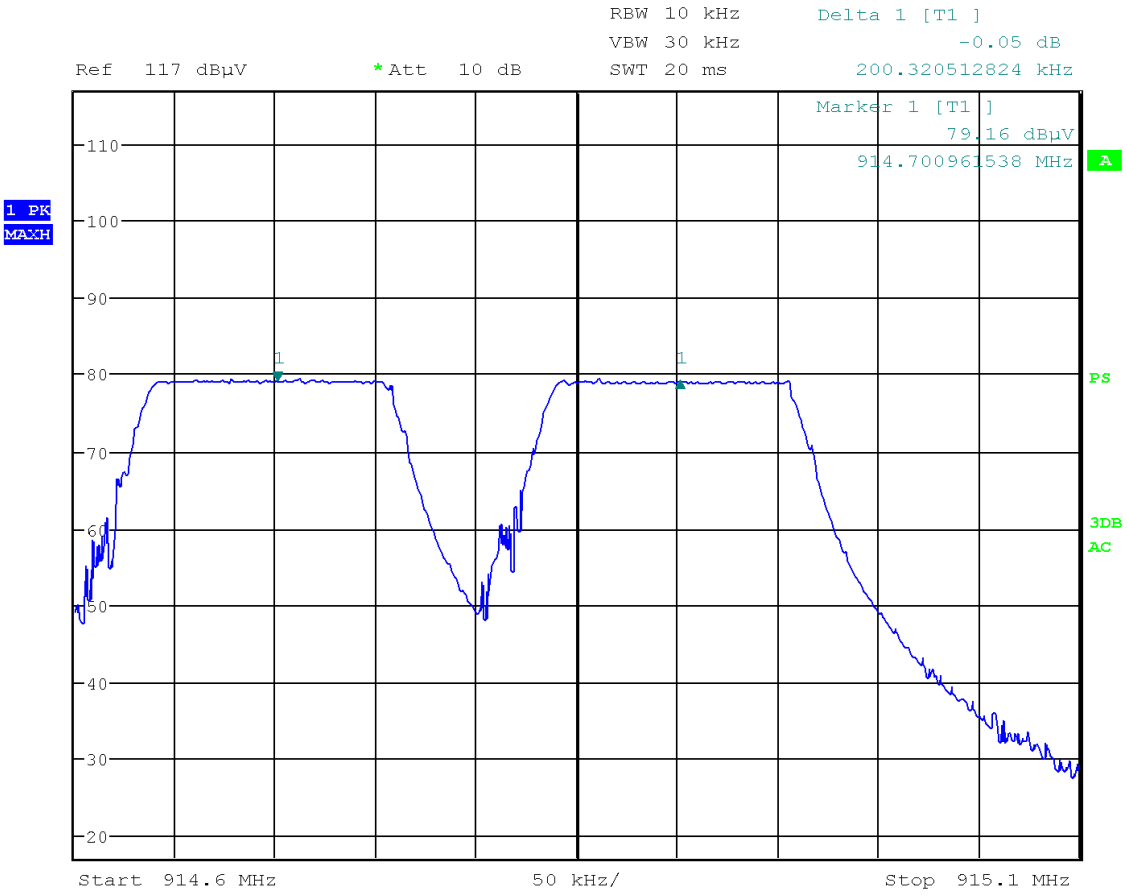
Low Channel



Central Channel

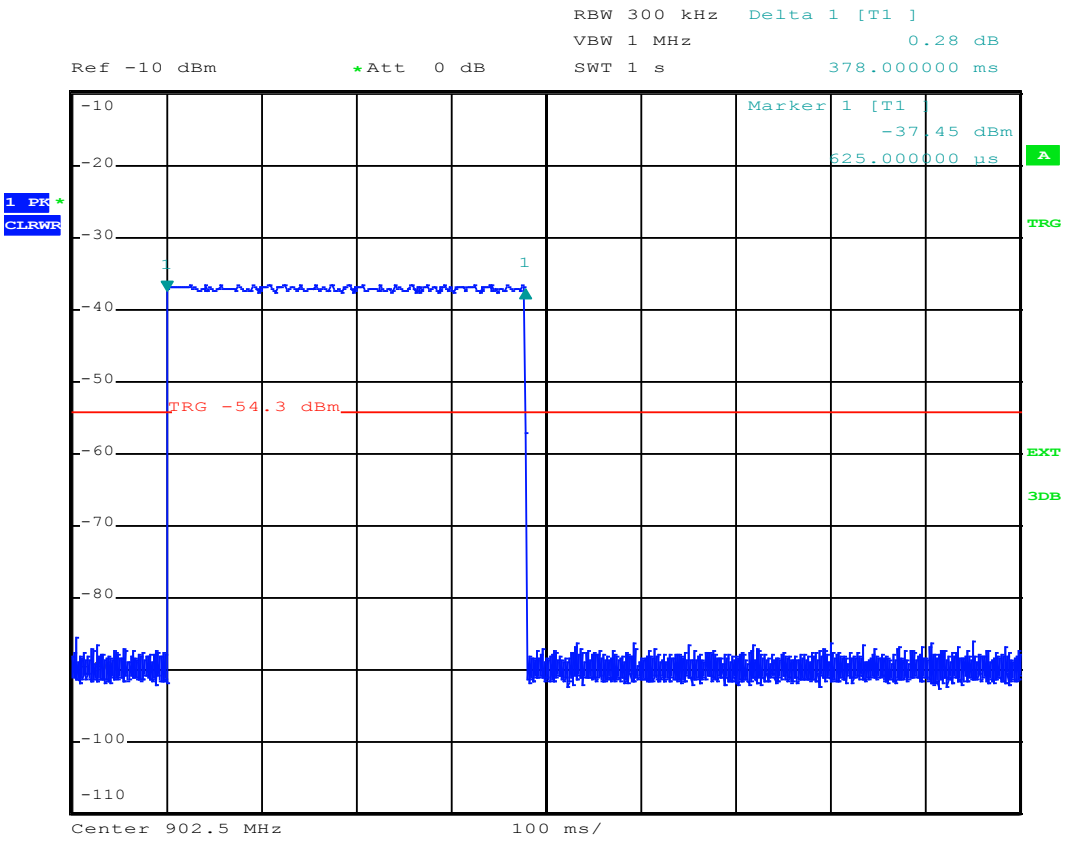


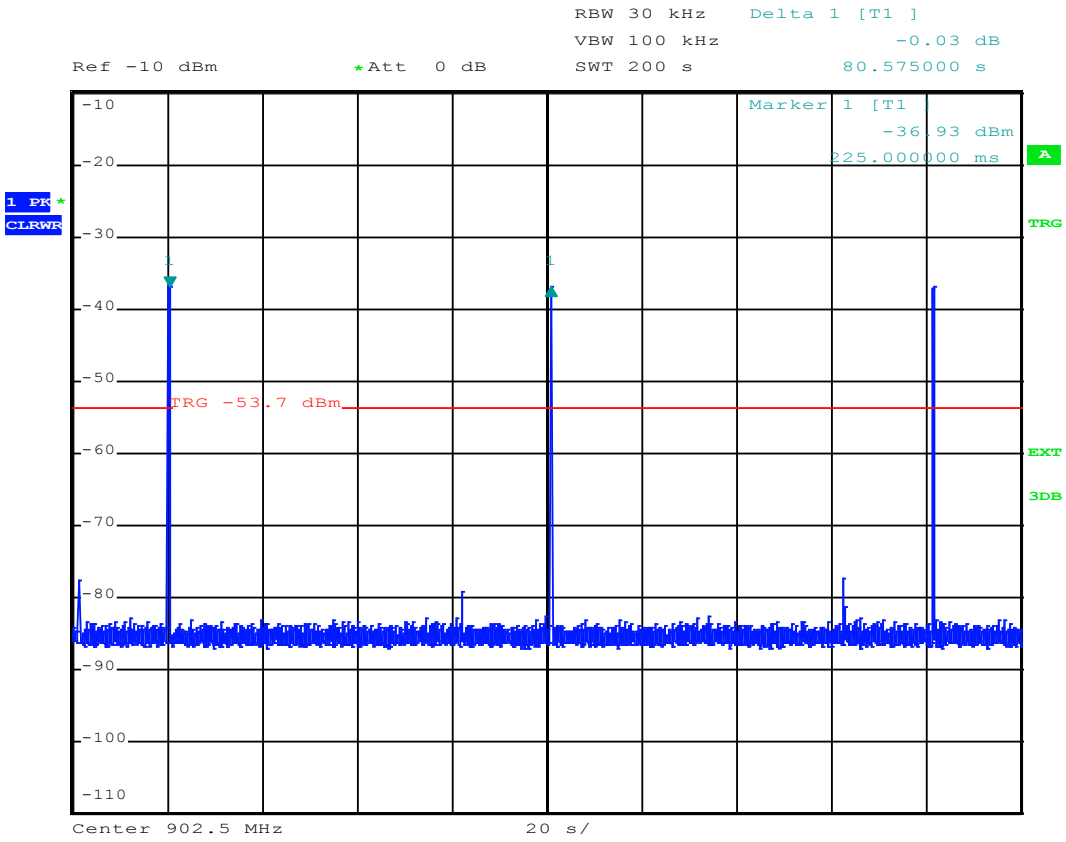
High Channel



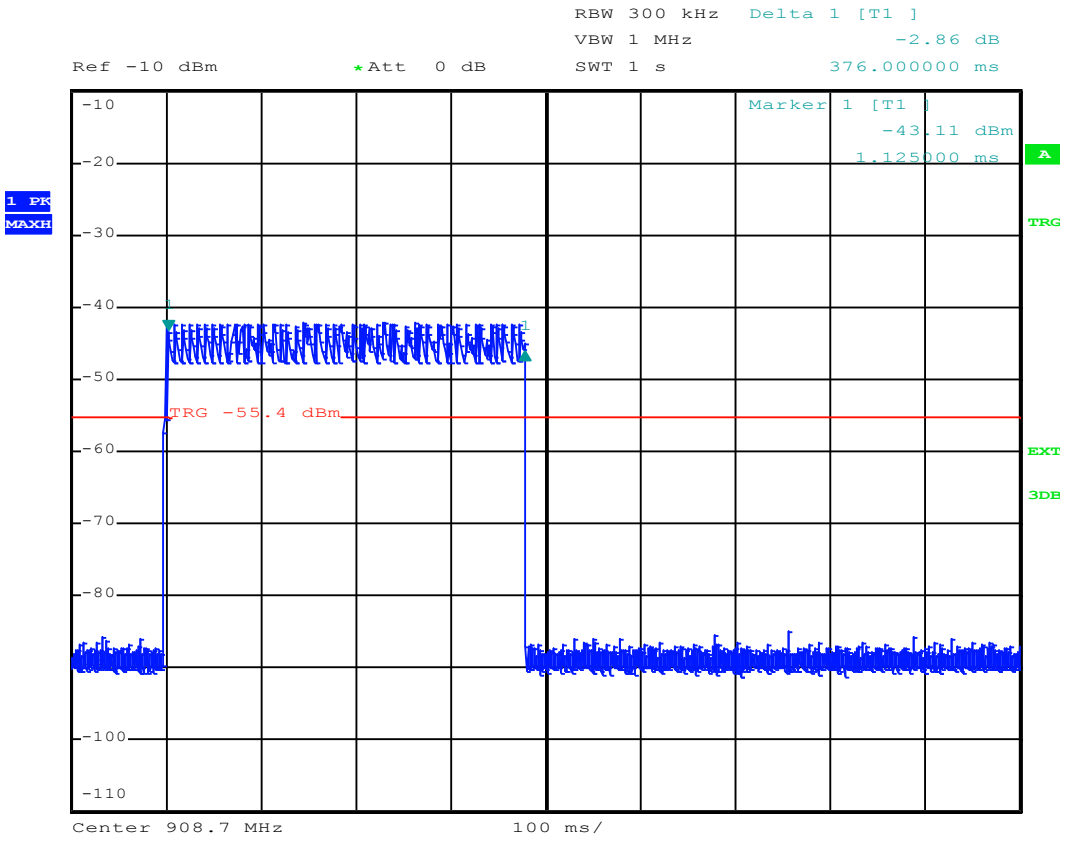
APPENDIX 8: Time of occupancy on any frequency

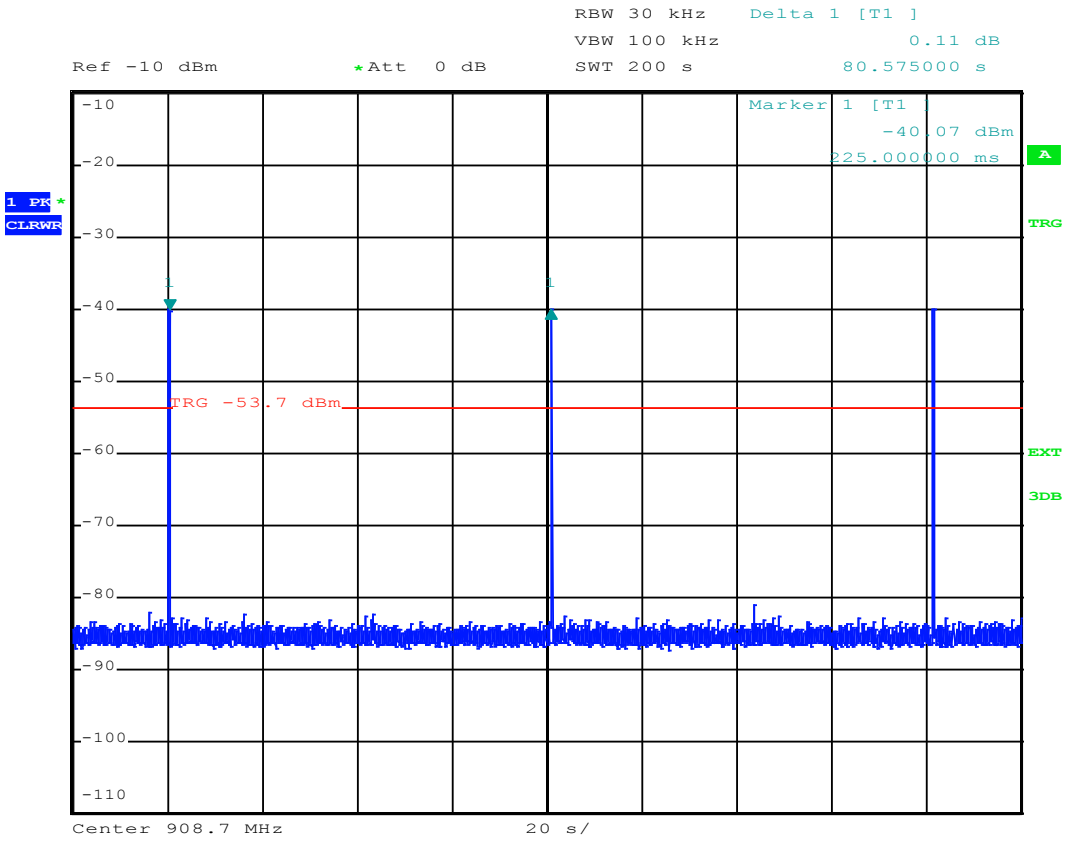
Low Channel



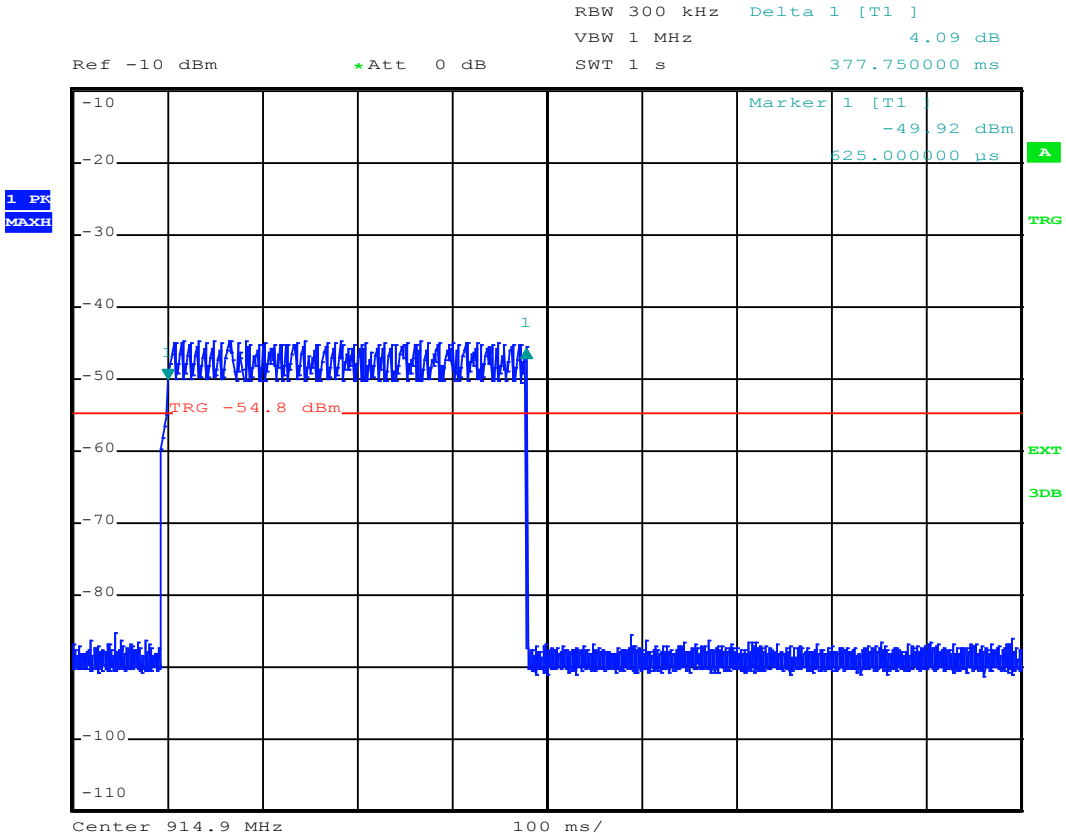

RBW 30 kHz
Delta 1 [T1]
VBW 100 kHz
-0.03 dB
Ref -10 dBm
*Att 0 dB
SWT 200 s
80.575000 s
Marker 1 [T1]
-36.93 dBm
225.000000 ms
1 PK*
CLRWR
A
TRG
EXT
3DB
TRG -53.7 dBm
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
-110
Center 902.5 MHz
20 s/

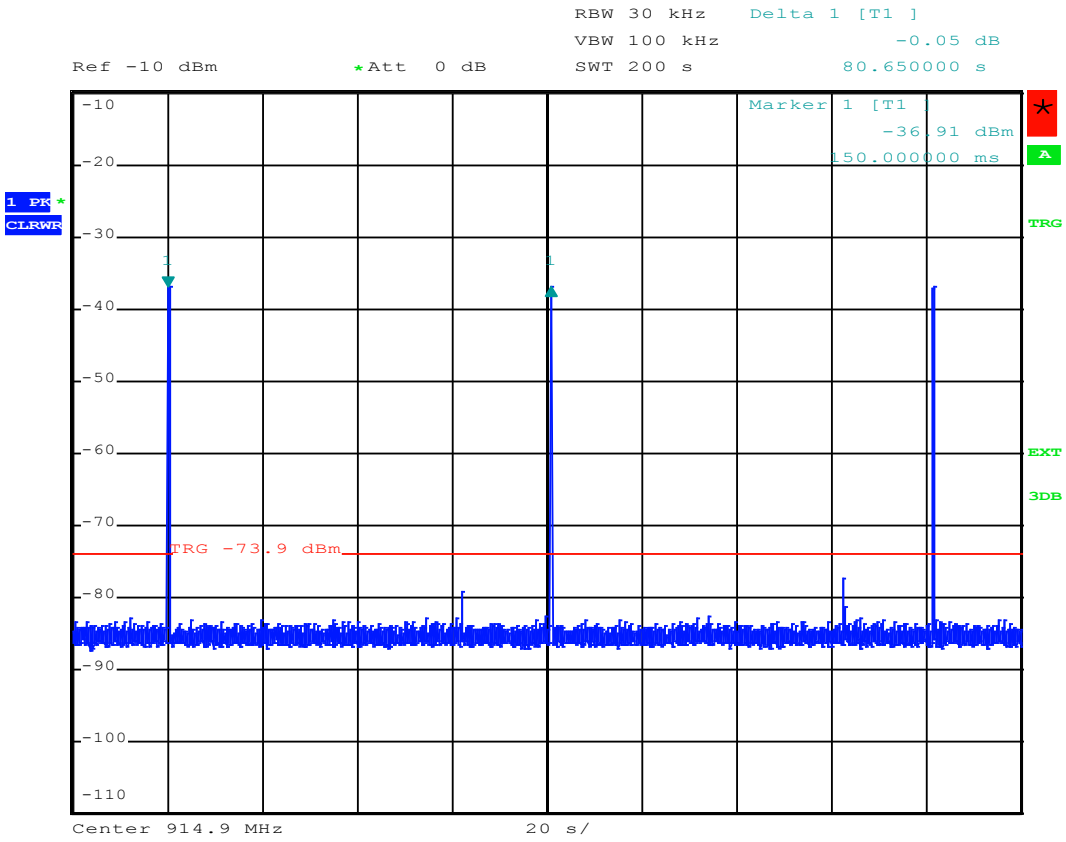
Central Channel



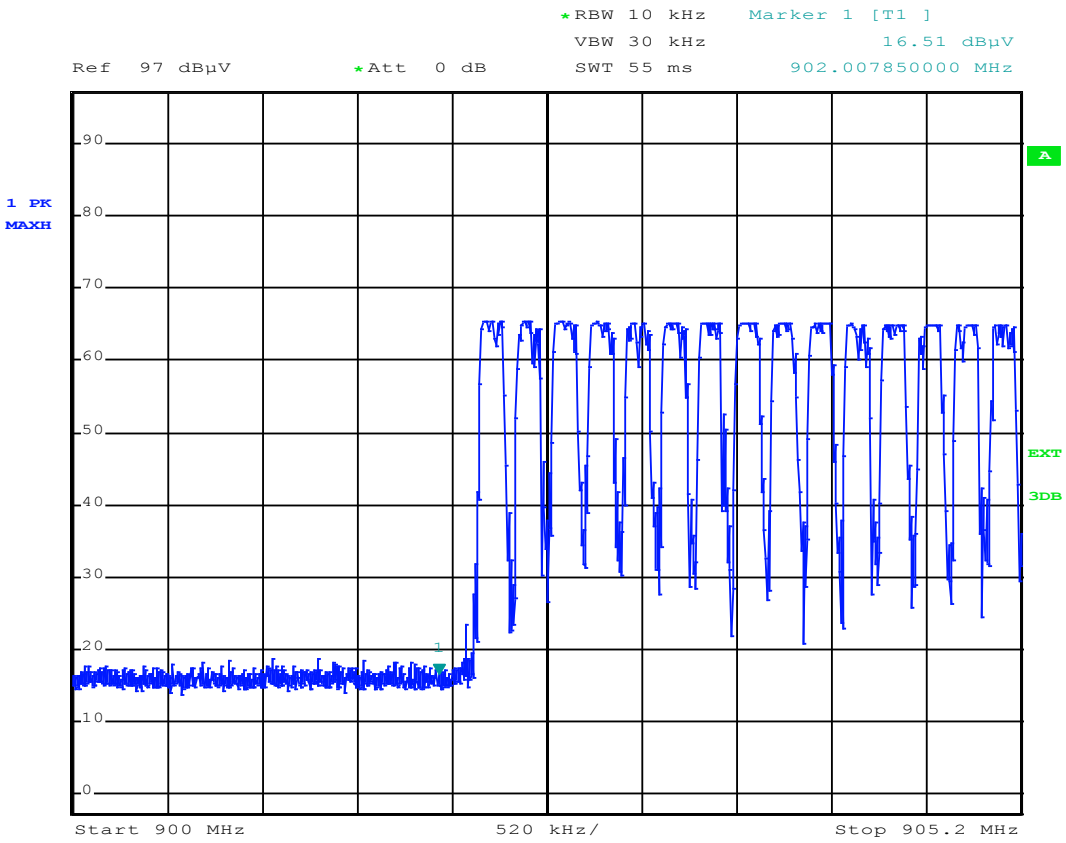

RBW 30 kHz
VBW 100 kHz
SWT 200 s
Delta 1 [T1]
0.11 dB
80.575000 s
Ref -10 dBm
*Att 0 dB
Marker 1 [T1]
-40.07 dBm
225.000000 ms
1 PK*
CLRWR
A
TRG
EXT
3DB
TRG -53.7 dBm
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
-110
Center 908.7 MHz
20 s/

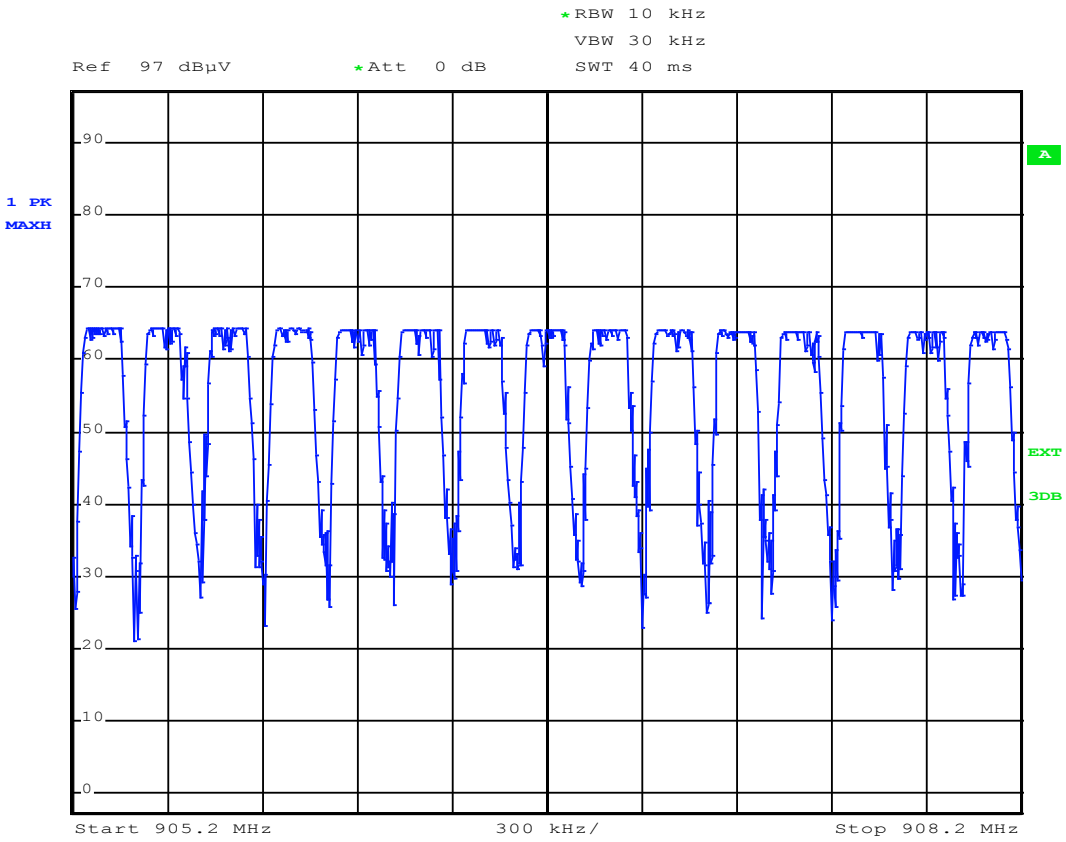
High Channel

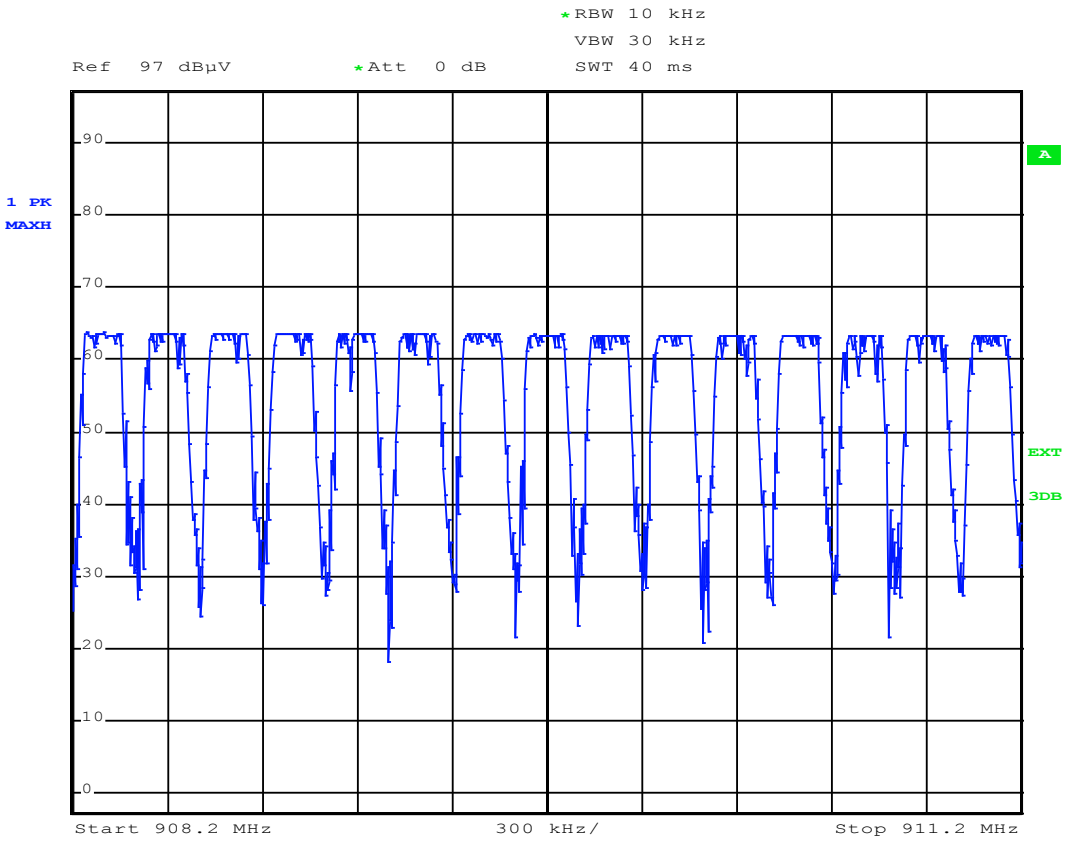


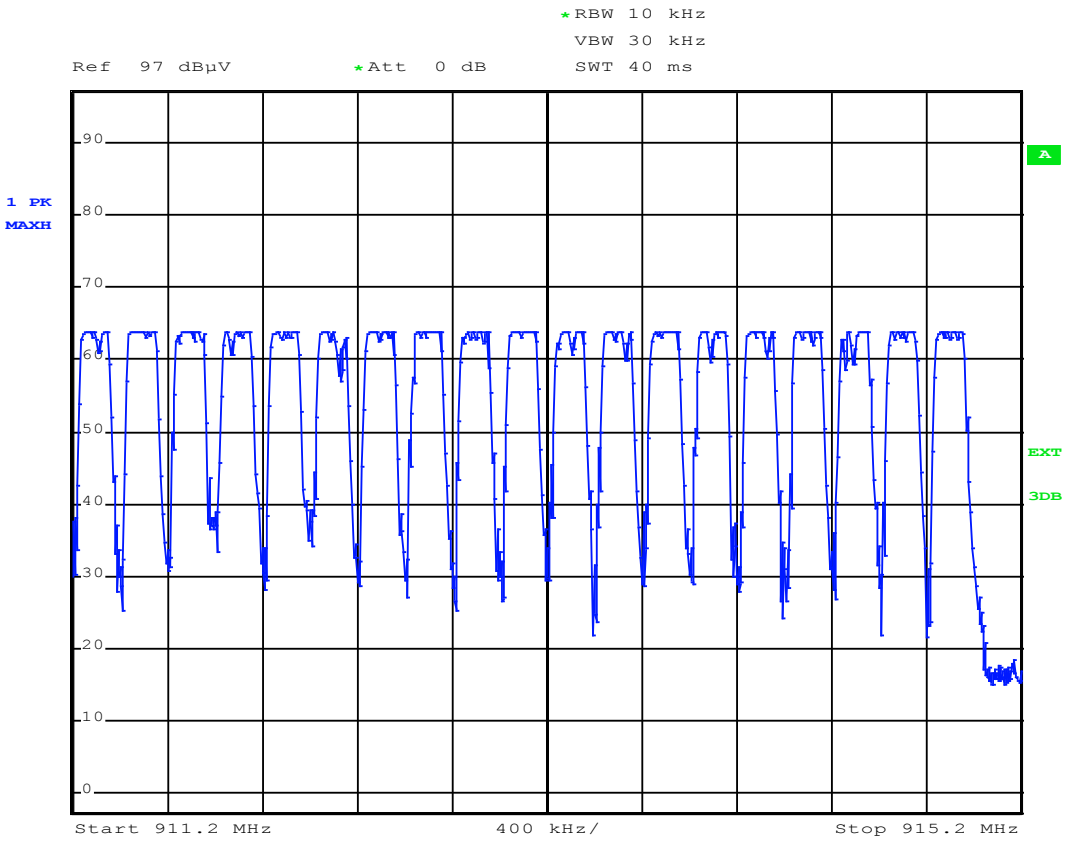

RBW 30 kHz
VBW 100 kHz
SWT 200 s
Delta 1 [T1]
-0.05 dB
80.650000 s
Ref -10 dBm
*Att 0 dB
Marker 1 [T1]
-36.91 dBm
150.000000 ms
1 PK
CLRWR
TRG
EXT
3DB
TRG -73.9 dBm
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
-110
Center 914.9 MHz
20 s/

APPENDIX 9: Number of hopping channel




*RBW 10 kHz
VBW 30 kHz
Ref 97 dBµV
*Att 0 dB
SWT 40 ms
1 PK
MAXH
A
EXT
3DB
90
80
70
60
50
40
30
20
10
0
Start 905.2 MHz
300 kHz/
Stop 908.2 MHz


*RBW 10 kHz
VBW 30 kHz
Ref 97 dBµV
*Att 0 dB
SWT 40 ms
1 PK
MAXH
A
EXT
3DB
90
80
70
60
50
40
30
20
10
0
Start 908.2 MHz
300 kHz/
Stop 911.2 MHz


*RBW 10 kHz
VBW 30 kHz
SWT 40 ms
Ref 97 dBµV
*Att 0 dB
1 PK
MAXH
A
EXT
3DB
90
80
70
60
50
40
30
20
10
0
Start 911.2 MHz
400 kHz/
Stop 915.2 MHz