EMITECH GROUPE

RR051-17-106380-5-A Ed. 0

Certification Radio test report

According to the standard:
CFR 47 FCC PART 15

Equipment under test:
SCANFLEX AFX-110

FCC ID: NQY-30018

Company:
ALLFLEX USA, Inc

Distribution: Mr LANGOUET **(Company:** ALLFLEX USA, Inc**)**

Number of pages: 76 with 10 appendixes

Ed.	Date	Modified Page(s)	Technical Verification and Quality Approval Name and Function / Visa
0	16-Mar-18	Creation	M. DUMESNIL, Radio Technical Manager

Duplication of this document is only permitted for an integral photographic facsimile. It includes the number of pages referenced here above.
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S51 RTY 000 INT 00004 [00]

DESIGNATION OF PRODUCT:	**SCANFLEX AFX-110**
Serial number (S/N):	C135-00021
Reference (P/N) / model:	30018 / AFX-110
Software version:	1.20.00
MANUFACTURER:	ALLFLEX USA, Inc

COMPANY SUBMITTING THE PRODUCT:

Company:	ALLFLEX USA, Inc
Address:	2805 East 14th Street P.O. Box 612266 75261-2266 Dallas/Ft Worth Airport Texas USA
Responsible:	Mr LANGOUET
DATE(S) OF TEST:	From 12-Feb-18 to 23-Feb-18
TESTING LOCATION:	EMITECH ANGERS laboratory at JUIGNE SUR LOIRE (49) FRANCE FCC Accredited under US-EU MRA Designation Number: FR0009 Test Firm Registration Number: 873677
TESTED BY:	S. LOUIS ***VISA:***
WRITTEN BY:	S. LOUIS

CONTENTS

1. INTRODUCTION

This report presents the results of radio test carried out on the following radio equipment: **SCANFLEX AFX-110**, in accordance with normative reference.

The device under test integrates a Bluetooth module already certified (FCCID: X3ZBTMOD4).

This module was certified as limited modular approval because this module does not possess a shield.
That's why all tests were realized to certify this function directly with the product.

The E.U.T can be supplied by an adapter AC/USB or by 7.2Vdc batteries.

2. PRODUCT DESCRIPTION

Class:	B
Utilization:	Handheld control terminals
Antenna type and gain:	Integral antenna, gain unknown
Operating frequency range:	From 2402 MHz to 2480 MHz
Frequency tested:	2402 MHz (low channel) 2440 MHz (central channel) 2480 MHz (high channel)
Number of channels:	79
Channel spacing:	1MHz
Modulation:	Bluetooth
Frequency generation:	A microcontroller with its 24 MHz crystal and an oscillator circuitry with a 17.1776 MHz crystal
Power source:	AC / DC Adapter 120Vac/60Hz – 5Vdc 7.2 Vdc Ni-MH batteries

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 (2018)	Radio Frequency Devices
ANSI C63.10	2013 Procedures for ComplianceTesting of Unlicensed Wireless Devices.
Public Notice DA 00-705	Filing and Measurement Guideline for Frequency Hopping Spread Spectrum Systems.
447498 D01 General RF Exposure Guidance v06	RF Exposure procedures and equipment authorization policies for mobile and portable equipment

4. TEST METHODOLOGY

Radio performance tests procedures given in CFR 47 part 15:

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 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

Emitech Number	Model	Type	Last calibration	Calibration interval (years)	Next calibration due
0000	BAT-EMC V3.16.0.64	Software	/	/	/
1406	EMCO 6502	Loop antenna	13/06/2017	2	13/06/2019
4087	Filtek LP03/1000-7GH	Low Pass Filter	05/06/2016	2	05/06/2018
4088	R&S FSP40	Spectrum Analyzer	29/02/2016	2	29/02/2018
5625	BL Microwave BP2442-84-7CS	Band pass filter	04/05/2016	2	04/05/2018
6796	R&S FSP7	Spectrum Analyzer	12/11/2016	2	12/11/2018
6884	Suhner 1.5m	Cable	19/03/2016	2	19/03/2018
7190	R&S HL223	Antenna	15/05/2016	3	15/05/2019
7240	Emco 3110	Biconical antenna	15/05/2016	3	15/05/2019
7299	Microtronics BRM50702	Reject band filter	13/01/2018	2	13/01/2020
7566	Testo 608-Hi	Meteo station	15/04/2016	2	15/04/2018
8508	California instruments 1251RP	Power source	15/01/2018	1	15/01/2019
8511	HP 8447D	Low-noise amplifier	01/02/2018	1	01/02/2019
8526	Schwarzbeck VHBB 9124	Biconical antenna	12/08/2015	3	12/08/2018
8528	Schwarzbeck VHA 9103	Biconical antenna	15/05/2016	3	15/05/2019
8535	EMCO 3115	Antenna	10/04/2016	4	10/04/2020
8543	Schwarzbeck UHALP 9108A	Log periodic antenna	12/08/2015	3	12/08/2018
8590	N-5m	cable	05/06/2016	2	05/06/2018
8593	SIDT Cage 2	Anechoic chamber	/	/	/
8704	LUCIX Corp S180265L3201 LNA	Low-noise amplifier	02/07/2017	1	02/07/2018
8707	R&S ESI7	Test receiver	07/08/2016	2	07/08/2018
8719	Thurbly Thandar Instruments 1600	LISN	06/06/2016	2	06/06/2018
8732	Emitech	OATS	11/12/2016	3	11/12/2019
8749	La Crosse Technology WS-9232	Meteo station	23/11/2016	2	23/11/2018
8750	La Crosse Technology WS-9232	Meteo station	23/11/2016	2	23/11/2018
8786	ETS Lindgren 3160-09	Antenna	16/07/2016	3	16/07/2019

Emitech Number	Model	Type	Last calibration	Calibration interval (years)	Next calibration due
8855	EMITECH	Turntable and mat controller	/	/	/
8893	Emitech	Outside room Hors cage	/	/	/
8896	ACQUISYS GPS8	Satellite synchronized frequency standard	/	/	/
8958	1060C	turntable	/	/	/
8974	STORM MICROWAE k-20cm	cable	19/11/2017	2	19/11/2019
9398	N-1.5m	cable	09/05/2016	2	09/05/2018
9403	R&S ESU8	Spectrum Analyzer	11/10/2016	2	11/10/2018
10523	Absorber sheath current	Emitech	16/02/2016	2	27/02/2018
10730	Mini-circuit ZFL-1000LN	Low-noise amplifier	12/02/2018	1	12/02/2019
10739	LUCIX Corp S005180M3201	Low-noise amplifier	29/05/2017	1	29/05/2018
10759	SIDT Cage 3	Anechoic chamber	/	/	/
10771	EMCO 3117	Antenna	23/01/2017	3	23/01/2020
10789	MATURO	Turntable and mat controller NCD	/	/	/
11535	R&S EZ-25	High pass filter	13/02/2017	2	13/02/2019
12590	LUCIX Corp S005180M3201	Low-noise amplifier	22/10/2017	1	22/10/2018
12911	Huber + Suhner N-2m	cable	28/06/2016	2	28/06/2018
12912	Huber + Suhner N-5m	cable	28/06/2016	2	28/06/2018
12917	SUCOFLEX K-2m	cable	28/06/2016	2	28/06/2018
14302	SUCOFLEX N-1m	cable	28/11/2016	2	28/11/2018
14303	SUCOFLEX N-2m	cable	28/11/2016	2	28/11/2018
14304	SUCOFLEX N-2.5m	cable	28/11/2016	2	28/11/2018
14305	SUCOFLEX N-4m	cable	28/11/2016	2	28/11/2018
14476	Fluke 177	Multimeter	20/05/2017	1	20/05/2018
14539	R&S FSL18	Spectrum Analyzer	07/12/2017	1	07/12/2018

6. TESTS RESULTS SUMMARY

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 15.215	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	*Note 6*
	(h) Frequency hopping intelligence				X	*Note 6*
	(i) RF exposure compliance	X				

NAp: Not Applicable NAs: Not Asked

Note 1: Integral antenna

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 20 dB bandwidth of the hopping channel (see appendix 5 and 8).

The frequency hopping system uses 79 channels (see appendix 10).

The timing by channel is 333 µs (see appendix 9).

During 79 channels × 0.4 s = 31.6 s, any channel is used at maximum 27 times (see appendix 9), then 27 x 333 µs = 8.991 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.

Number of channels	Observation period (0.4s * Nbr of channel) (s)	Maximal Duration of each burst (µs)	Number of burst repetition during observation period	average time of occupancy on any channel (s)	Limits (s)
79	31.6	333	27	0.008991	0.4

For an example of hopping sequence refers to Bluetooth protocol.

Receivers have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and they shift frequencies in synchronization with the transmitted signals according Bluetooth protocol.

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

Note 6: For compliance with these functions refers to Bluetooth protocol

RF EXPOSURE:

Maximum measured power = 95.1 dBµV/m = 0.971 mW at 2480 MHz
with $P = (E \times d)^2 / (30 \times Gp)$ *with d = 3 m and Gp = 1*

The product must respect the exclusion limit for 10-g extremity SAR.
*[(max. power of channel, including tune-up tolerance, mW) / (min. test separation distance, mm)] * [√f(GHz)] ≤ 7.5*

According this formula:
*Min. test separation distance, mm ≥ [(max. power of channel, including tune-up tolerance, mW) * √f(GHz)] / 7.5*
Min. test separation distance, mm ≥ [0.971(mW) *√(2.48)] / 7.5
Min. test separation distance, mm ≥ 0.204 mm (with a minimum value of 5 mm)

The minimum distance between the user and the antenna is greater than 5 mm (see photos in appendix 1).

The equipment fulfils the requirements on maximum conducted or equivalent isotropically radiated power (e.i.r.p) for general population/uncontrolled exposure and therefore fulfils the requirements of 47 CFR §1.1310 at the distance greater than 5 mm between the user and the antenna

7. MEASUREMENT UNCERTAINTY

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

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for normal distribution corresponds to a coverage probability of approximately 95%.

Parameter	Emitech Uncertainty
RF power, conducted	± 0.75dB
Radiated emission valid to 26 GHz F < 62.5 MHz: 62.5 MHz < F < 1 GHz: 1 GHz < F < 26 GHz:	 ± 5.14 dB ± 5.13 dB ± 5.16 dB
AC Power Lines conducted emissions	± 3.38 dB
Temperature	± 1 °C
Humidity	± 5 %

8. CONDUCTED LIMITS

Temperature (°C) : 18.4 **Humidity (%HR):** 37 **Date :** February 15, 2018
Technician : S. LOUIS

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 / Quasi-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.
Worst case measurement performed with Bluetooth activated in hopping mode.

Ambient temperature (°C):	18.4
Relative humidity (%):	37

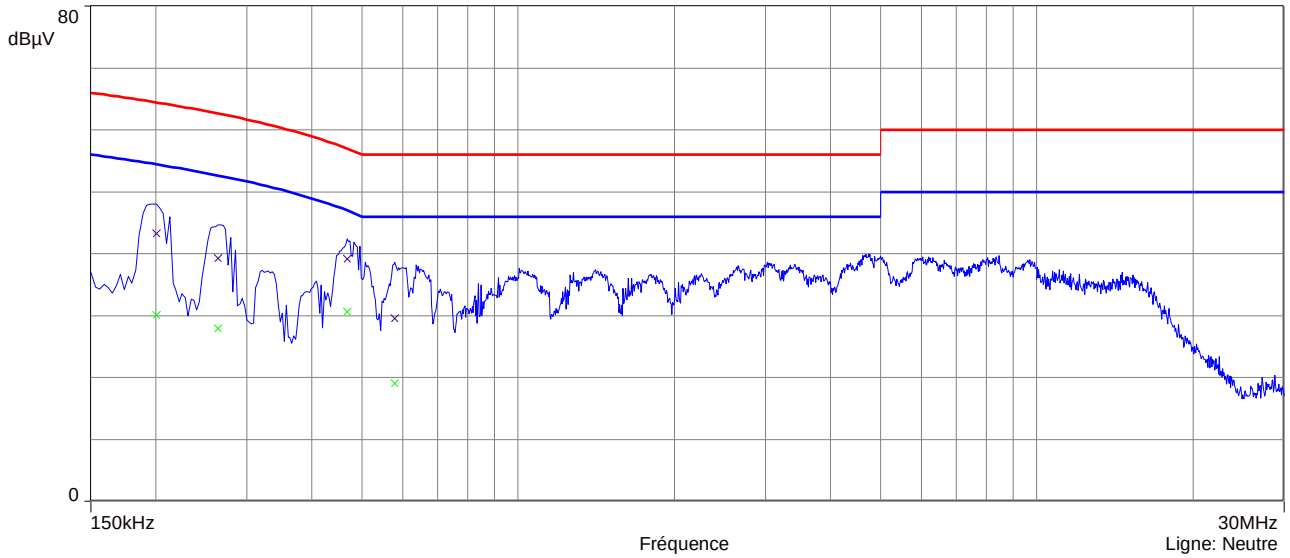
Results:

Sample N° 1:

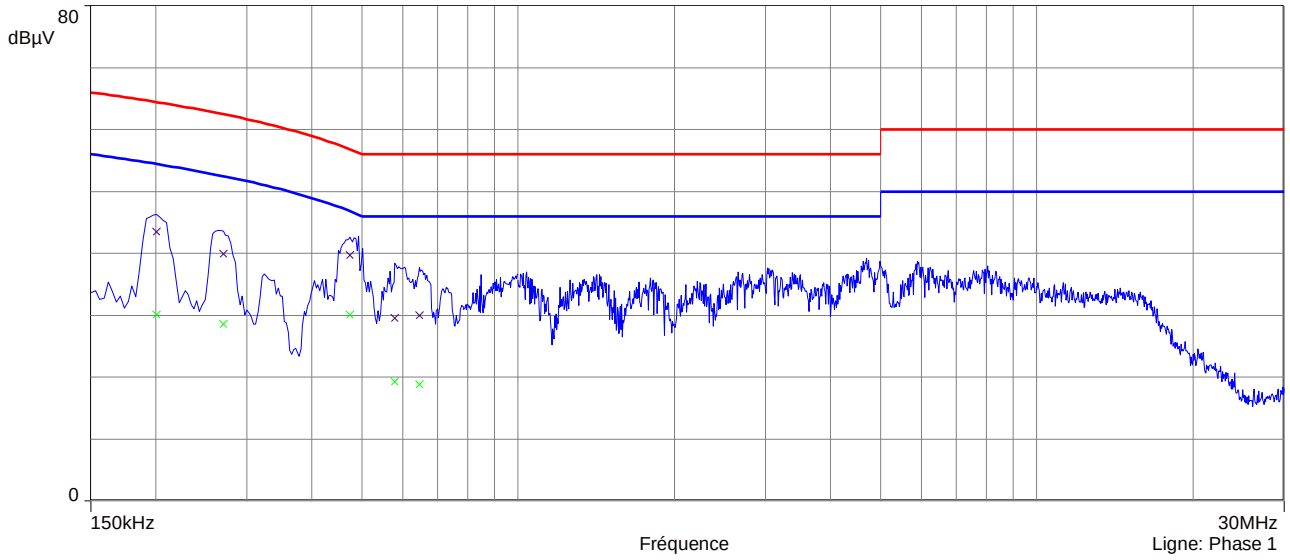
Measurement on the mains power supply:

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



The highest frequencies are then analyzed with Quasi-peak detector and Average detector

Table N° 1: measurement on the Neutral, for the frequency range:

Frequency (MHz)	Quasi-peak (dBµV)	QP Limit (dBµV)	QP margin (dB)
0.20	43.26	63.57	20.31
0.26	39.20	61.30	22.10
0.47	39.17	56.55	17.38
0.58	29.56	56.00	26.44

Frequency (MHz)	Average (dBµV)	Average Limit (dBµV)	Average margin (dB)
0.20	30.04	53.57	23.53
0.26	27.91	51.30	23.39
0.47	30.56	46.55	15.99
0.58	19.03	46.00	26.97

Table N° 2: measurement on the Line, for the frequency range:

Frequency (MHz)	Quasi-peak (dBµV)	QP Limit (dBµV)	QP margin (dB)
0.20	43.44	63.57	20.13
0.27	39.89	61.12	21.23
0.47	39.70	56.44	16.74
0.58	29.52	56.00	26.48
0.65	29.95	56.00	26.05

Frequency (MHz)	Average (dBµV)	Average Limit (dBµV)	Average margin (dB)
0.20	30.01	53.57	23.56
0.27	28.59	51.12	22.53
0.47	30.09	46.44	16.35
0.58	19.20	46.00	26.80
0.65	18.83	46.00	27.17

Test conclusion:

RESPECTED STANDARD

9. ADDITIONAL PROVISIONS TO THE GENERAL RADIATED EMISSION LIMITATIONS

Temperature (°C) : 18.4 **Humidity (%HR):** 37 **Date :** February 15, 2018
Technician : S. LOUIS

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

Measure was realized only with Bluetooth in hopping mode because we not possess test mode for activate only on frequency.

Ambient temperature (°C):	18.4
Relative humidity (%):	37

Power source: 7.2Vdc by internal battery fully charged.

Results:

Following FCC part 15.247:

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

Sample N° 1 with hopping mode on

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)
2402	88.5	PEAK	2399.89	-45.4	43.1	72.9	29.8
2480	95.1	PEAK	2485.14	-30.6	64.5	74	9.5
2480	92.9	AVERAGE	2483.54	-48.0	44.9	54	9.1

* *Marker-Delta method*

20 dB bandwidth curves are given in appendix 5; band-edge curves are given in appendix 7.

Test conclusion:

RESPECTED STANDARD

10. MAXIMUM PEAK OUTPUT POWER

Temperature (°C) : 21.1 **Humidity (%HR):** 31 **Date :** February 13, 2018
Technician : S. LOUIS

Standard: FCC Part 15

Test procedure: paragraph 15.247 (b)

Public Notice DA 00-705.

Test set up:

First an exploratory radiated measurement was performed. During this phase the product is oriented in three orthogonal planes supplied by AC/DC adapter regulated to 120VAC/60Hz then with 3.7Vdc internal battery.

Then the final measurement is realized with the product on the most critical orientation and the most critical power supply.
The measure is realized in anechoic chamber above 1 GHz.

When the system is tested in anechoic chamber, the EUT is placed on a rotating table, 1.65m 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 1MHz and video bandwidth at 3MHz.

Distance of antenna: 3 meters (in anechoic room)

Antenna height: 1.50 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 hopping transmission mode, modulated by internal data signal, at the highest output power level which the transmitter is intended to operate.

Ambient temperature (°C):	21.1
Relative humidity (%):	31

Power source: 7.2Vdc by internal battery fully charged. (Worst critical case).

Results:

Sample N° 1:

Low channel

	Radiated output power (dBµV/M)	Radiated power (W)	Limit (W)
Nominal supply voltage:	88.5	212 x 10^{-6}	1

Polarization of test antenna: Horizontal (height: 165 cm)
Position of equipment: Position 2 without AC/DC adapter, see appendix 2 (azimuth: 314 degrees)

with *Radiated power (W) = $(E \times d)^2 / (30 \times Gp)$ with d = 3 m and Gp = 1*

Central channel

	Radiated output power (dBµV/M)	Radiated power (W)	Limit (W)
Nominal supply voltage:	90.7	352 x 10^{-6}	1

Polarization of test antenna: Horizontal (height: 165 cm)
Position of equipment: Position 2 without AC/DC adapter, see appendix 2 (azimuth: 314 degrees)

with *Radiated power (W) = $(E \times d)^2 / (30 \times Gp)$ with d = 3 m and Gp = 1*

High channel

	Radiated output power (dBµV/M)	Radiated power (W)	Limit (W)
Nominal supply voltage:	95.1	971 x 10^{-6}	1

Polarization of test antenna: Horizontal (height: 165 cm)
Position of equipment: Position 2 without AC/DC adapter, see appendix 2 (azimuth: 314 degrees)

with *Radiated power (W) = $(E \times d)^2 / (30 \times Gp)$ with d = 3 m and Gp = 1*

Test conclusion:

RESPECTED STANDARD

11. INTENTIONAL RADIATOR

Temperature (°C) : 22 **Humidity (%HR):** 35 **Date :** February 12, 2018
Technician : S. LOUIS

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 supplied by AC/DC adapter regulated to 120VAC/60Hz then with 3.7Vdc internal battery.

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

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, 1.65 m 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 (2480MHz)

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) / 1.65 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 hopping transmission mode, modulated by internal data signal, at the highest output power level which the transmitter is intended to operate.

Results:

Low Frequencies: <1GHz

Power source: AC/DC Adapter by an external power source regulated to 120VAC/60Hz.

Sample N° 1

FREQUENCIES (MHz)	Detector P: Peak QP: Quasi-Peak	Antenna height (cm)	Position	Polarization H: Horizontal V: Vertical	Field strength measured at 10 m (dBµV/m)	Field strength correlated at 3m (dBµV/m)	Limits at 3m (dBµV/m)	Margin (dB)
52.3	QP	165	2	V	17.3	27.7	40	12.3
86.9	QP	165	3	V	13.7	24.1	40	15.9

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

Low Frequencies: <1GHz

Power source: 7.2 Vdc Ni-MH batteries

Sample N° 1

FREQUENCIES (MHz)	Detector P: Peak QP: Quasi-Peak	Antenna height (cm)	Position	Polarization H: Horizontal V: Vertical	Field strength measured at 10 m (dBµV/m)	Field strength correlated at 3m (dBµV/m)	Limits at 3m (dBµV/m)	Margin (dB)
63.4	QP	165	1	V	14.9	25.3	40.0	14.7
67.4	QP	165	1	V	15.4	26.0	40.0	14.0
100	QP	165	3	V	15.4	26.0	43.5	17.5
204	QP	165	3	V	22.2	32.6	43.5	10.9
292	QP	165	1	V	20.5	30.9	46.0	15.1

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

Position of the product: Position 1 with AC/DC adapter.

Sample N° 1 Low Channel (F=2402MHz)

FREQUENCIES (MHz)	Detector P: Peak QP: Quasi-Peak Av: Average	Antenna height (cm)	Resolution bandwidth (kHz)	Polarization H: Horizontal V: Vertical	Field strength (dBµV/m)	Limits (dBµV/m)	Margin (dB)
7206	P	165	100	V	61.1	75.1	14.0

P= Peak, QP=Quasi-peak, Av=Average

Sample N° 1 Central Channel (F=2440MHz)

FREQUENCIES (MHz)	Detector P: Peak QP: Quasi-Peak Av: Average	Antenna height (cm)	Resolution bandwidth (kHz)	Polarization H: Horizontal V: Vertical	Field strength (dBµV/m)	Limits (dBµV/m)	Margin (dB)
7320	P	165	1000	V	59.1	74	14.9
7320	Av	165	1000	V	41.9	54	12.1

P= Peak, QP=Quasi-peak, Av=Average

Sample N° 1 High Channel (F=2480MHz)

FREQUENCIES (MHz)	Detector P: Peak QP: Quasi-Peak Av: Average	Antenna height (cm)	Resolution bandwidth (kHz)	Polarization H: Horizontal V: Vertical	Field strength (dBµV/m)	Limits (dBµV/m)	Margin (dB)
7440.6	P	165	1000	V	61.2	74	12.8
7440.6	Av	165	1000	V	44	54	10.0

P= Peak, QP=Quasi-peak, Av=Average

Position of the product: Position 2 with AC/DC adapter.

Sample N° 1 Low Channel (F=2402MHz)

FREQUENCIES (MHz)	Detector P: Peak QP: Quasi-Peak Av: Average	Antenna height (cm)	Resolution bandwidth (kHz)	Polarization H: Horizontal V: Vertical	Field strength (dBµV/m)	Limits (dBµV/m)	Margin (dB)
7206	P	165	100	V	60	75.1	15.1

P= Peak, QP=Quasi-peak, Av=Average

Sample N° 1 Central Channel (F=2440MHz)

FREQUENCIES (MHz)	Detector P: Peak QP: Quasi-Peak Av: Average	Antenna height (cm)	Resolution bandwidth (kHz)	Polarization H: Horizontal V: Vertical	Field strength (dBµV/m)	Limits (dBµV/m)	Margin (dB)
7320	P	165	1000	V	59.5	74	14.5
7320	Av	165	1000	V	42.3	54	11.7

P= Peak, QP=Quasi-peak, Av=Average

Sample N° 1 High Channel (F=2480MHz)

FREQUENCIES (MHz)	Detector P: Peak QP: Quasi-Peak Av: Average	Antenna height (cm)	Resolution bandwidth (kHz)	Polarization H: Horizontal V: Vertical	Field strength (dBµV/m)	Limits (dBµV/m)	Margin (dB)
7440	P	165	1000	V	61.6	74	12.4
7440	Av	165	1000	V	44.4	54	9.6

P= Peak, QP=Quasi-peak, Av=Average

Position of the product: Position 3 with AC/DC adapter.

Sample N° 1 Low Channel (F=2402MHz)

FREQUENCIES (MHz)	Detector P: Peak QP: Quasi-Peak Av: Average	Antenna height (cm)	Resolution bandwidth (kHz)	Polarization H: Horizontal V: Vertical	Field strength (dBµV/m)	Limits (dBµV/m)	Margin (dB)
7206	P	165	100	H	60.7	75.1	14.4

P= Peak, QP=Quasi-peak, Av=Average

Sample N° 1 Central Channel (F=2440MHz)

FREQUENCIES (MHz)	Detector P: Peak QP: Quasi-Peak Av: Average	Antenna height (cm)	Resolution bandwidth (kHz)	Polarization H: Horizontal V: Vertical	Field strength (dBµV/m)	Limits (dBµV/m)	Margin (dB)
7320	P	165	1000	H	60.5	74	13.5
7320	Av	165	1000	H	43.3	54	10.7

P= Peak, QP=Quasi-peak, Av=Average

Sample N° 1 High Channel (F=2480MHz)

FREQUENCIES (MHz)	Detector P: Peak QP: Quasi-Peak Av: Average	Antenna height (cm)	Resolution bandwidth (kHz)	Polarization H: Horizontal V: Vertical	Field strength (dBµV/m)	Limits (dBµV/m)	Margin (dB)
7440	P	165	1000	H	64.4	74	9.6
7440	Av	165	1000	H	47.2	54	6.8

P= Peak, QP=Quasi-peak, Av=Average

Power source: Battery fully charged 7.2Vdc

Position of the product: Position 1 with battery

Sample N° 1 Low Channel (F=2402MHz)

FREQUENCIES (MHz)	Detector P: Peak QP: Quasi-Peak Av: Average	Antenna height (cm)	Resolution bandwidth (kHz)	Polarization H: Horizontal V: Vertical	Field strength (dBµV/m)	Limits (dBµV/m)	Margin (dB)
7206	P	165	100	V	58.5	75.1	16.6

P= Peak, QP=Quasi-peak, Av=Average

Sample N° 1 Central Channel (F=2440MHz)

FREQUENCIES (MHz)	Detector P: Peak QP: Quasi-Peak Av: Average	Antenna height (cm)	Resolution bandwidth (kHz)	Polarization H: Horizontal V: Vertical	Field strength (dBµV/m)	Limits (dBµV/m)	Margin (dB)
7320	P	165	1000	V	57.7	74	16.3
7320	Av	165	1000	V	40.5	54	13.5

P= Peak, QP=Quasi-peak, Av=Average

Sample N° 1 High Channel (F=2480MHz)

FREQUENCIES (MHz)	Detector P: Peak QP: Quasi-Peak Av: Average	Antenna height (cm)	Resolution bandwidth (kHz)	Polarization H: Horizontal V: Vertical	Field strength (dBµV/m)	Limits (dBµV/m)	Margin (dB)
7440	P	165	1000	V	61.2	74	12.8
7440	Av	165	1000	V	44	54	10

P= Peak, QP=Quasi-peak, Av=Average

Position of the product: Position 2 with battery

Sample N° 1 Low Channel (F=2402MHz)

FREQUENCIES (MHz)	Detector P: Peak QP: Quasi-Peak Av: Average	Antenna height (cm)	Resolution bandwidth (kHz)	Polarization H: Horizontal V: Vertical	Field strength (dBµV/m)	Limits (dBµV/m)	Margin (dB)
7206	P	165	100	H	60.7	75.1	14.4

P= Peak, QP=Quasi-peak, Av=Average

Sample N° 1 Central Channel (F=2440MHz)

FREQUENCIES (MHz)	Detector P: Peak QP: Quasi-Peak Av: Average	Antenna height (cm)	Resolution bandwidth (kHz)	Polarization H: Horizontal V: Vertical	Field strength (dBµV/m)	Limits (dBµV/m)	Margin (dB)
7320	P	165	1000	H	60.3	74	13.7
7320	Av	165	1000	H	43.1	54	10.9

P= Peak, QP=Quasi-peak, Av=Average

Sample N° 1 High Channel (F=2480MHz)

FREQUENCIES (MHz)	Detector P: Peak QP: Quasi-Peak Av: Average	Antenna height (cm)	Resolution bandwidth (kHz)	Polarization H: Horizontal V: Vertical	Field strength (dBµV/m)	Limits (dBµV/m)	Margin (dB)
7440	P	165	1000	H	63.3	74	10.7
7440	Av	165	1000	H	46.1	54	7.9

P= Peak, QP=Quasi-peak, Av=Average

Position of the product: Position 3 with battery

Sample N° 1 Low Channel (F=2402MHz)

FREQUENCIES (MHz)	Detector P: Peak QP: Quasi-Peak Av: Average	Antenna height (cm)	Resolution bandwidth (kHz)	Polarization H: Horizontal V: Vertical	Field strength (dBµV/m)	Limits (dBµV/m)	Margin (dB)
7206	P	165	100	H	59.9	75.1	15.2

P= Peak, QP=Quasi-peak, Av=Average

Sample N° 1 Central Channel (F=2440MHz)

FREQUENCIES (MHz)	Detector P: Peak QP: Quasi-Peak Av: Average	Antenna height (cm)	Resolution bandwidth (kHz)	Polarization H: Horizontal V: Vertical	Field strength (dBµV/m)	Limits (dBµV/m)	Margin (dB)
7320	P	165	1000	H	59.2	74	14.8
7320	Av	165	1000	H	42.0	54	12

P= Peak, QP=Quasi-peak, Av=Average

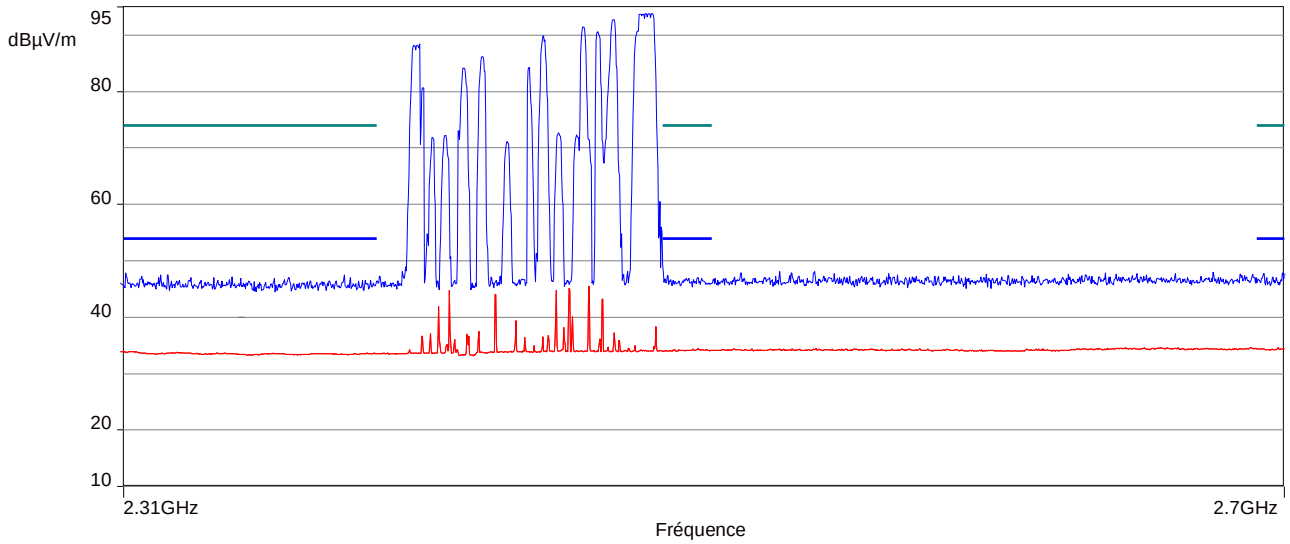
Sample N° 1 High Channel (F=2480MHz)

FREQUENCIES (MHz)	Detector P: Peak QP: Quasi-Peak Av: Average	Antenna height (cm)	Resolution bandwidth (kHz)	Polarization H: Horizontal V: Vertical	Field strength (dBµV/m)	Limits (dBµV/m)	Margin (dB)
7440	P	165	1000	H	63.2	74	10.8
7440	Av	165	1000	H	46.0	54	8.0

P= Peak, QP=Quasi-peak, Av=Average

Band edge worst case measurement (band 2.31GHz to 2.70GHz)

Hopping mode - Vertical Polarization – Charging Mode



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.

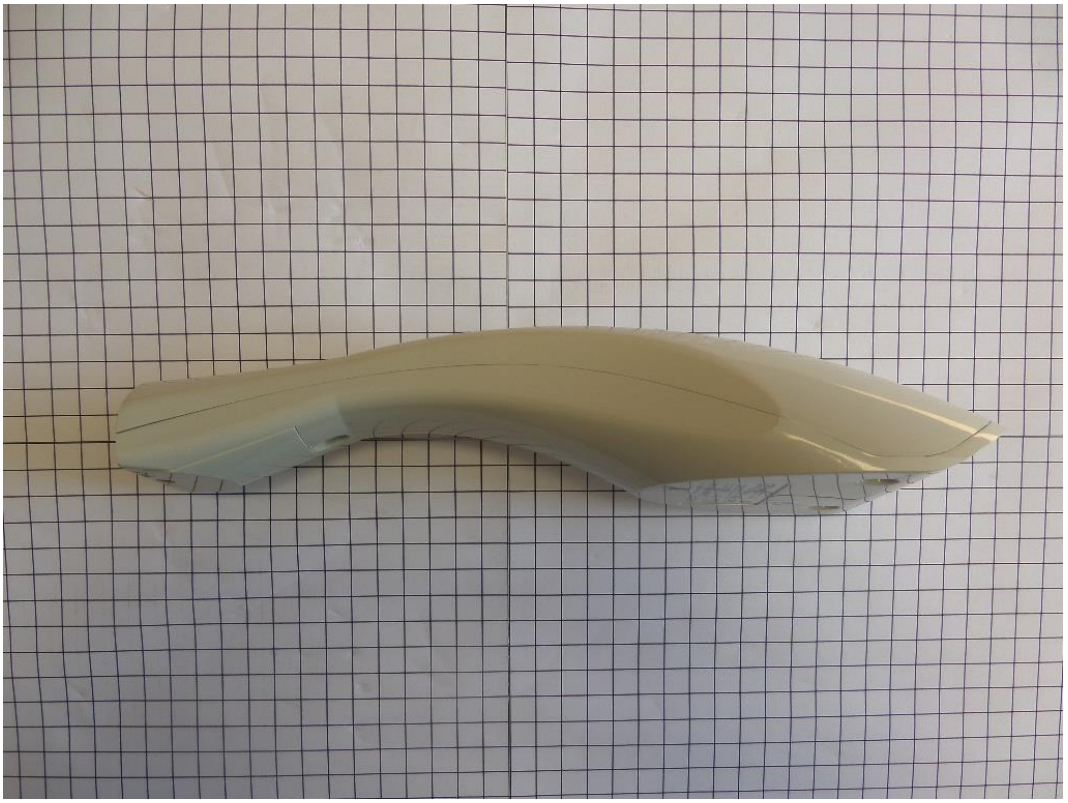
The highest level recorded in a 100 kHz bandwidth is 95.1 dBµV/m on High channel.
So the applicable limit is 75.1 dBµV/m.
In addition, radiated emissions which fall in the restricted band, as defined in section 15.205 (a), must also comply with the radiated emission limits specified in section 15.209 (a) (see section 15.205 (c)).

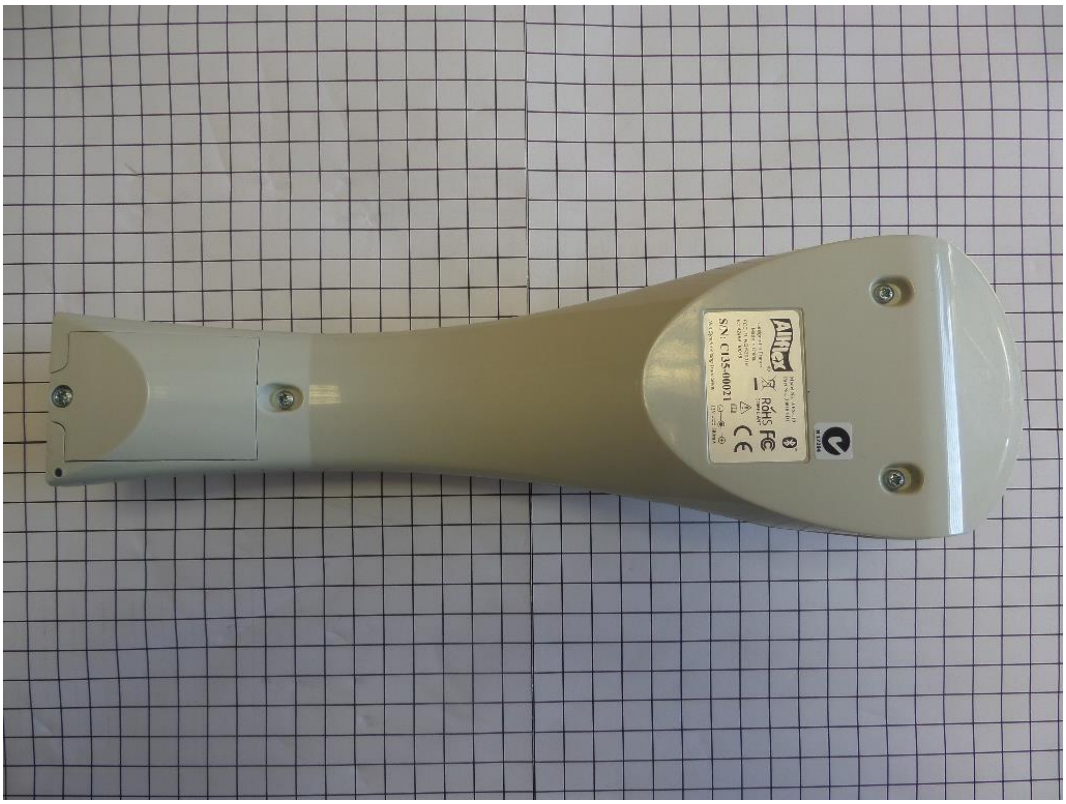
Test conclusion:

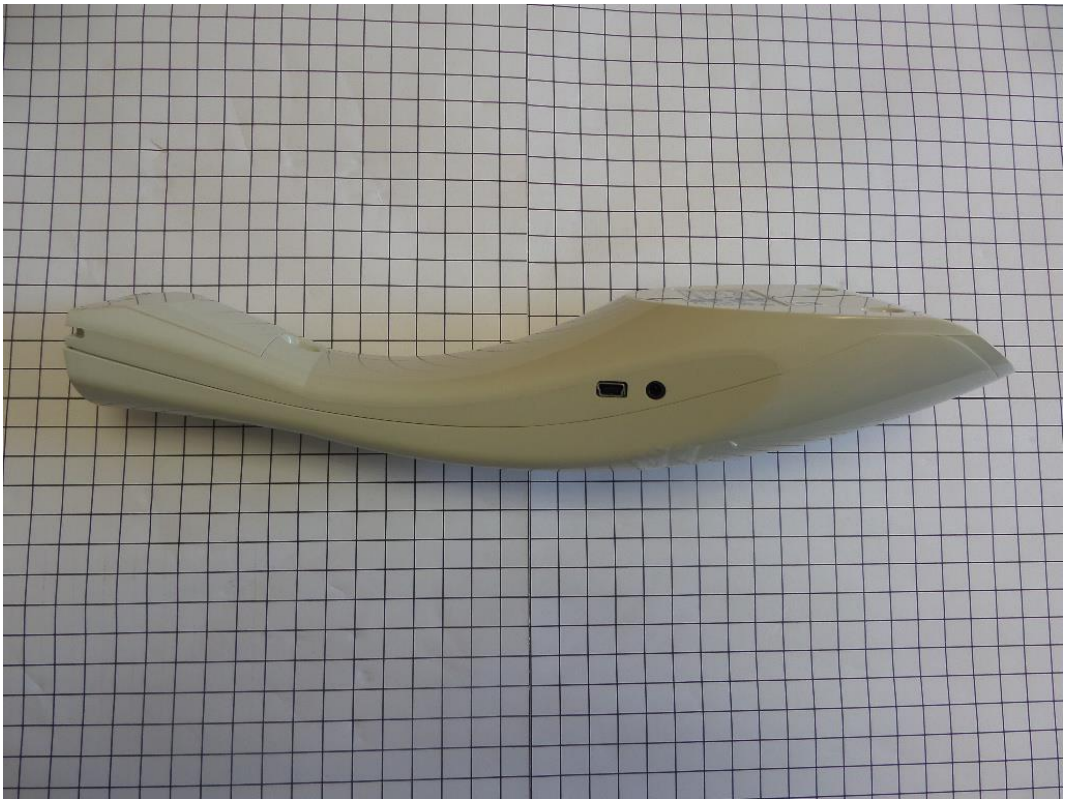
RESPECTED STANDARD

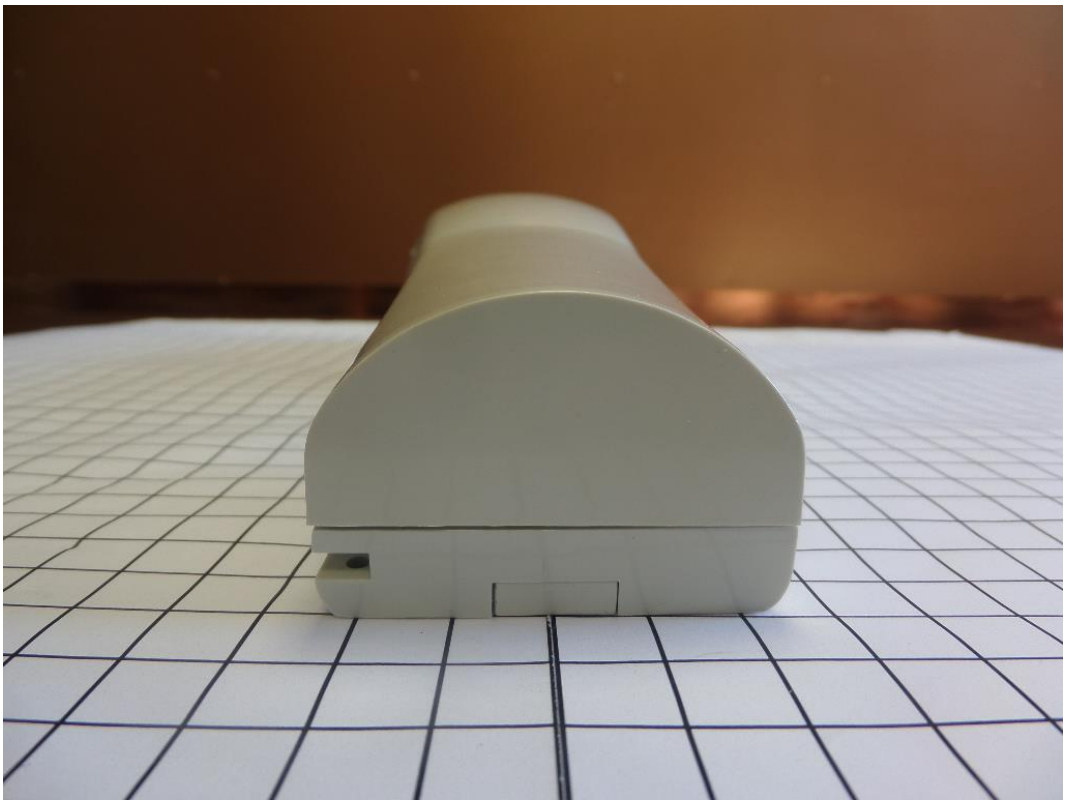
□□□ End of report, 10 appendixes to be forwarded □□□

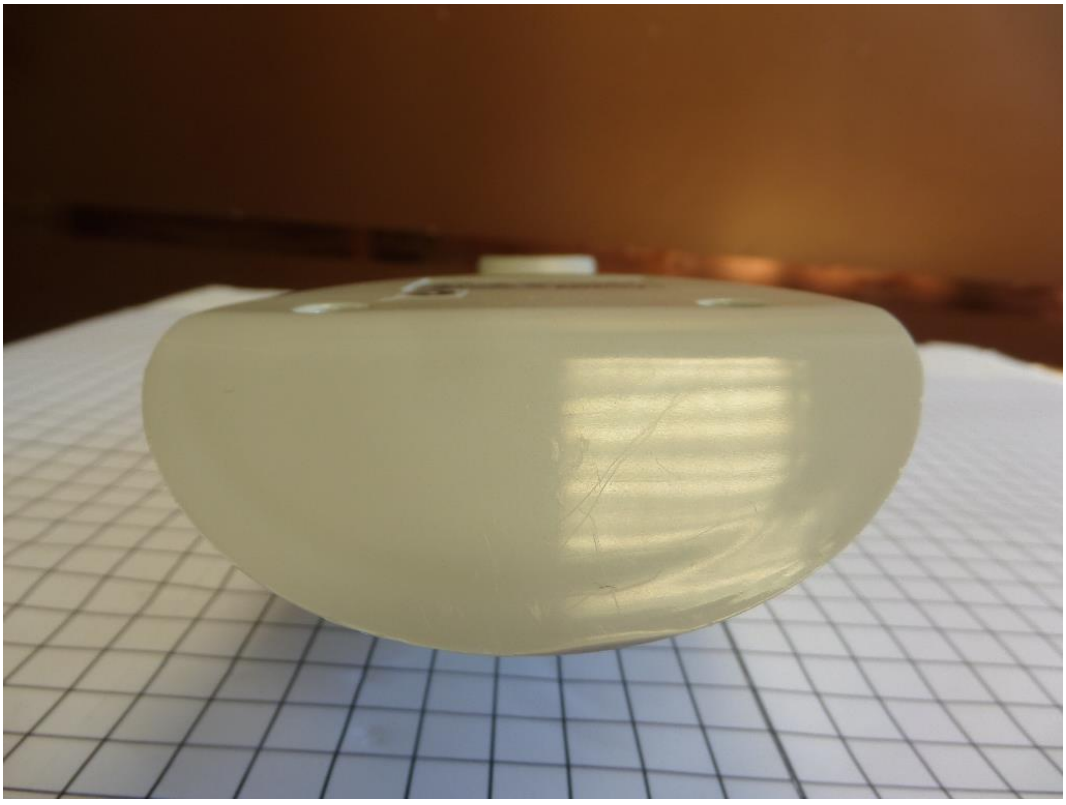
APPENDIX 1: Photos of the equipment under test

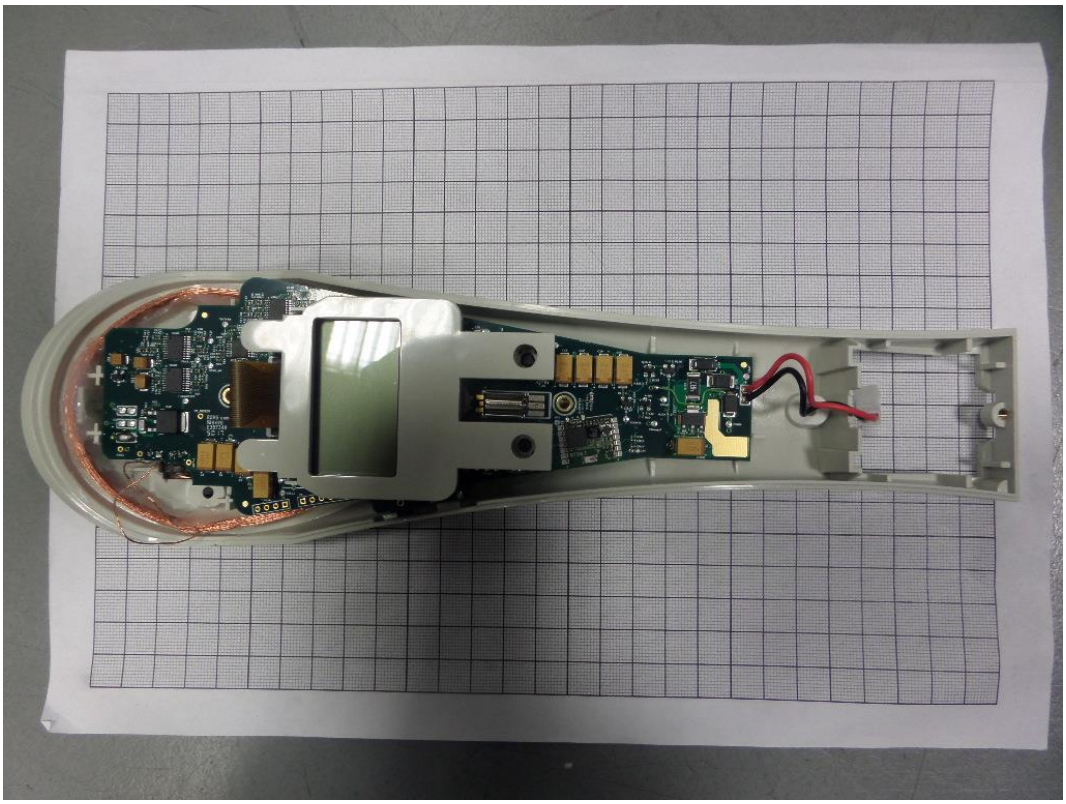


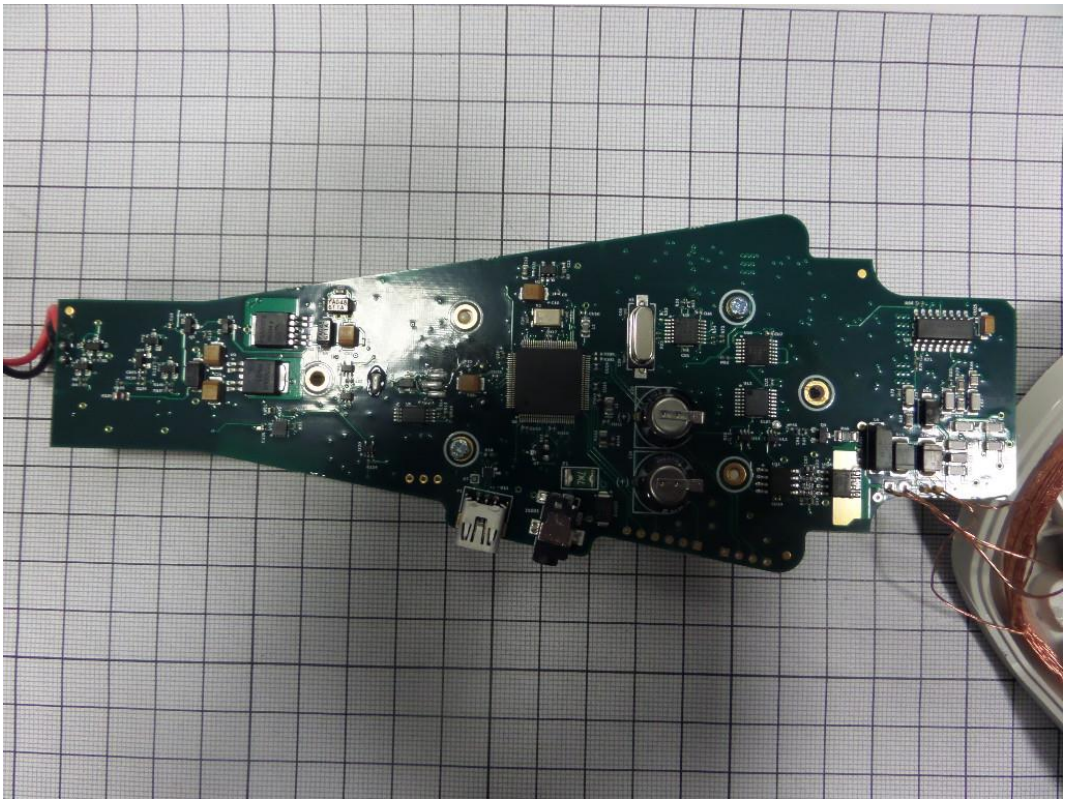


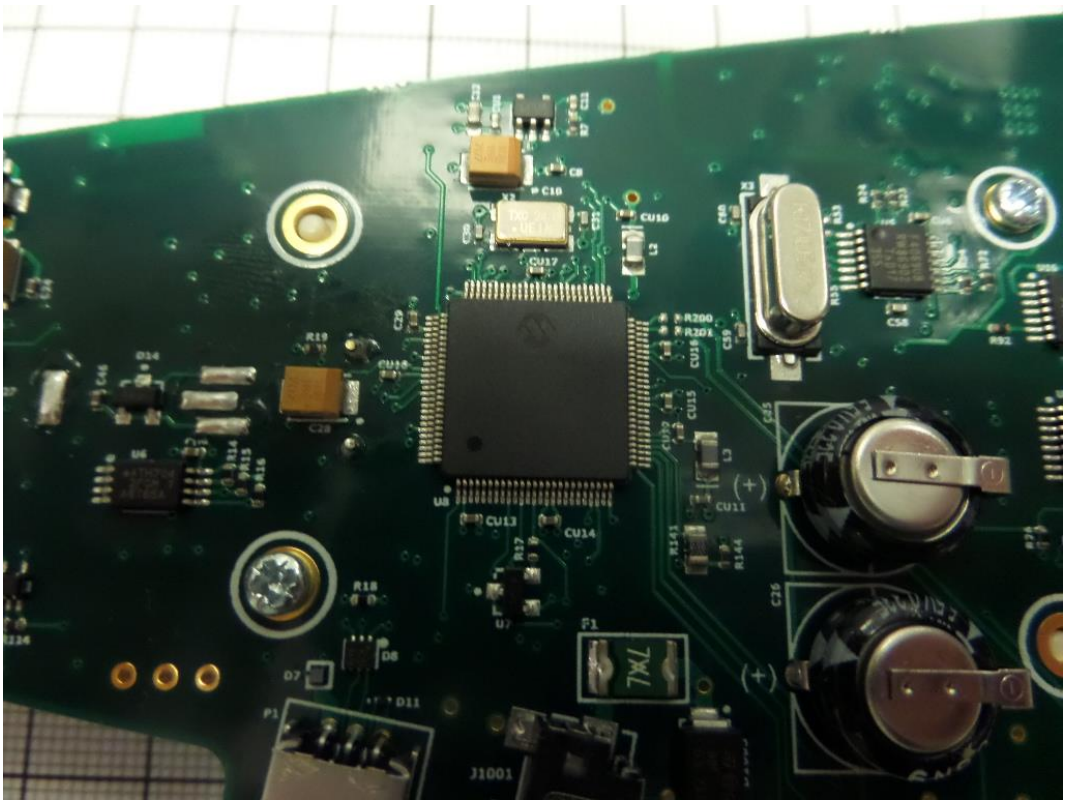


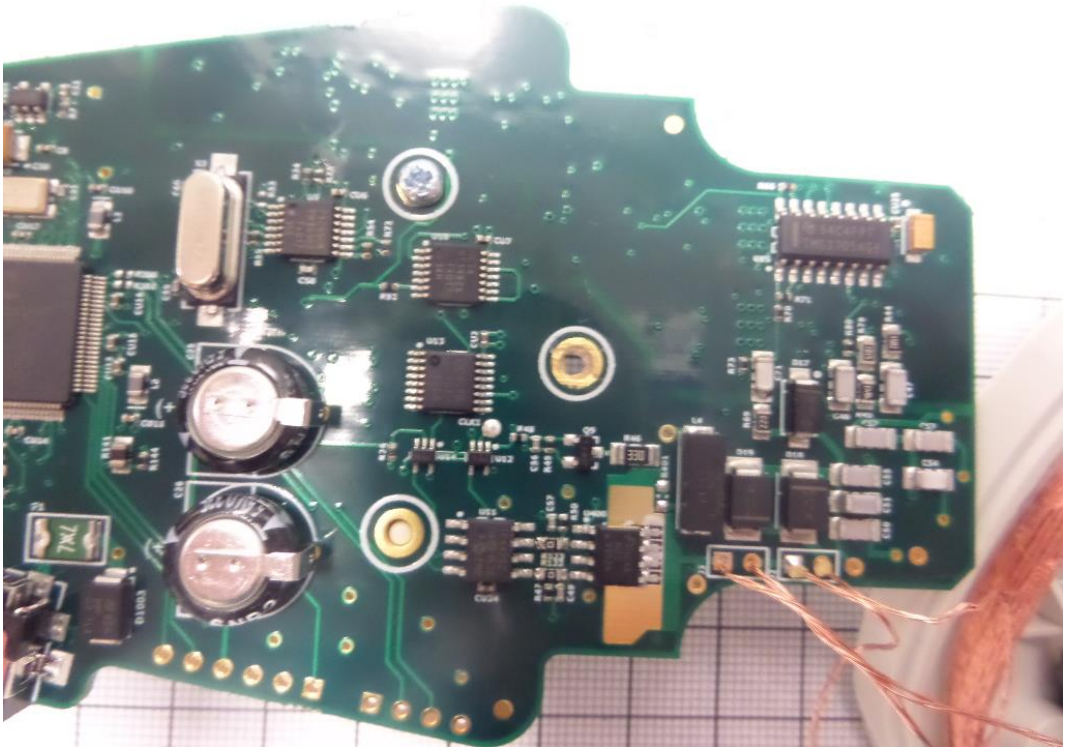


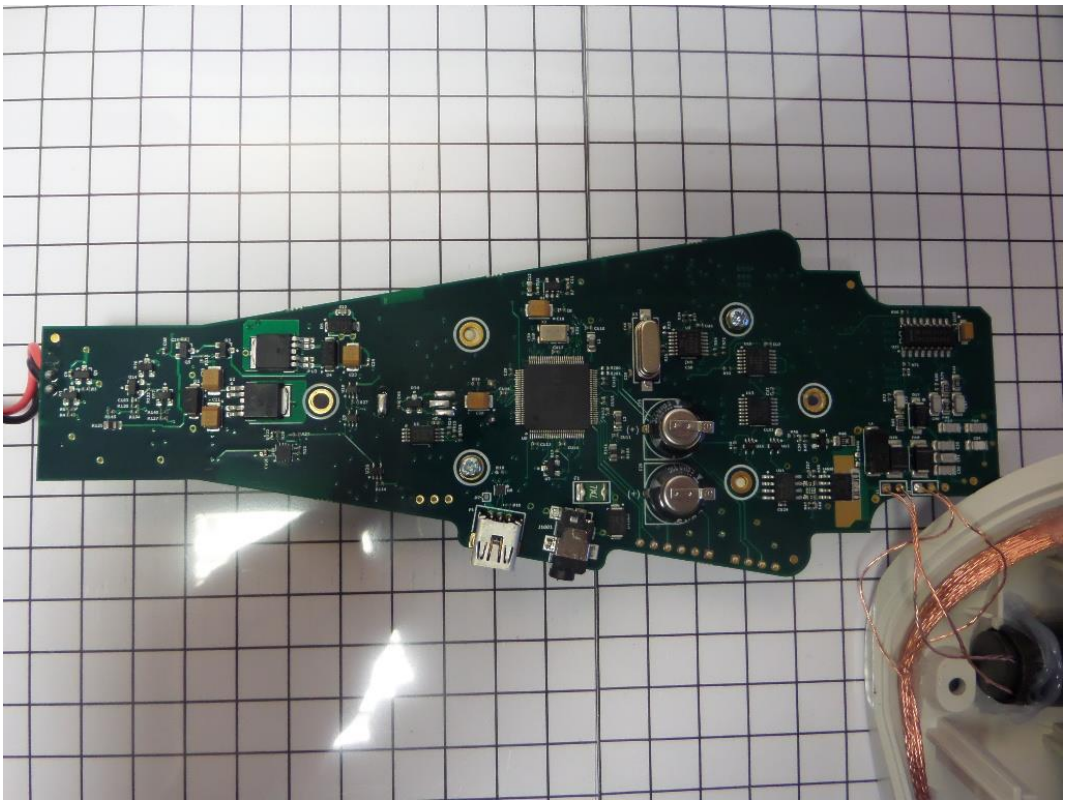


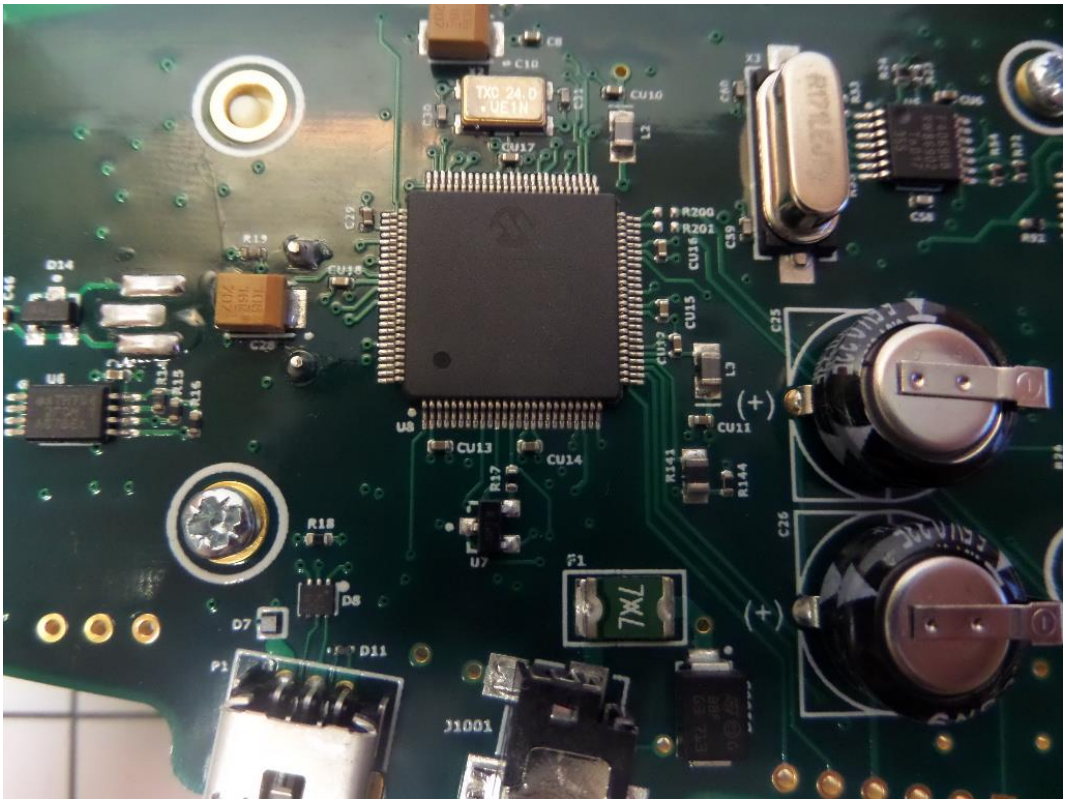


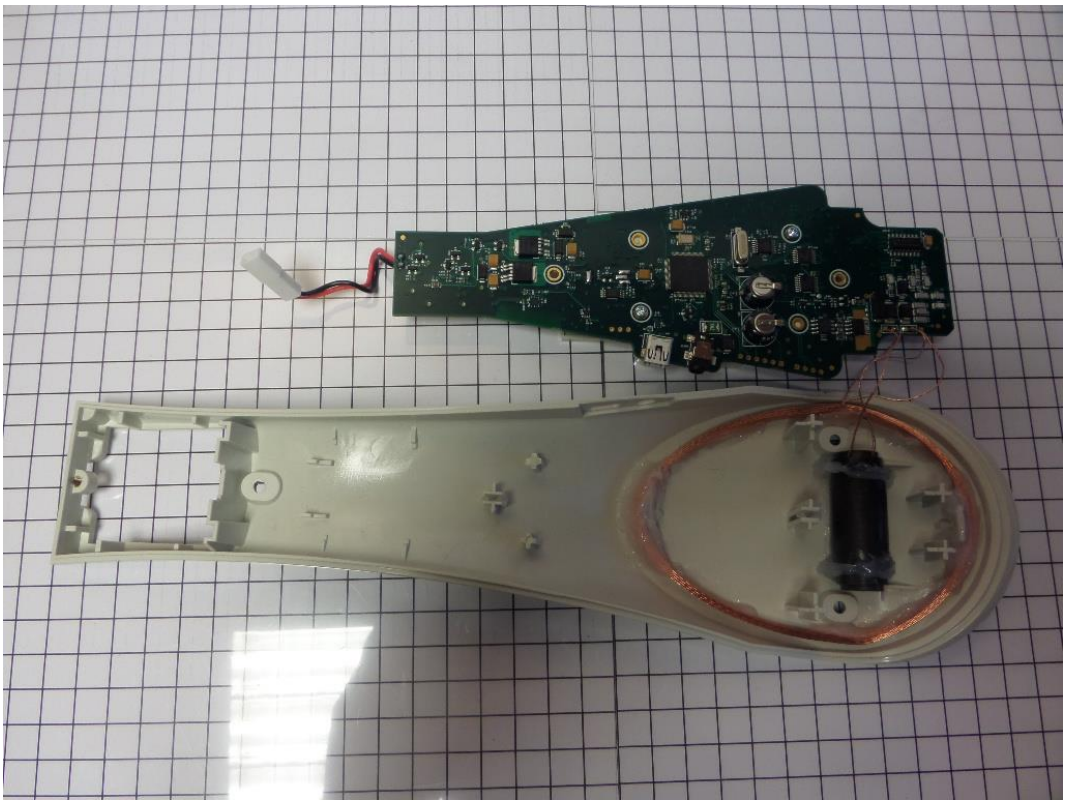


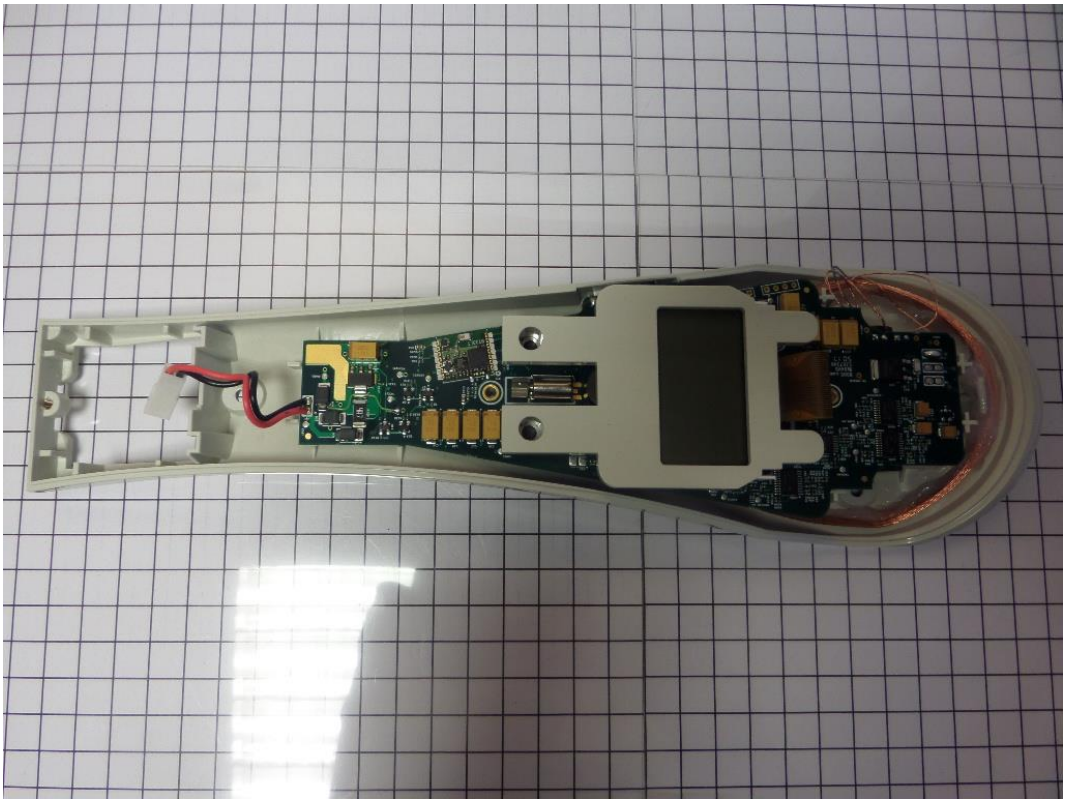


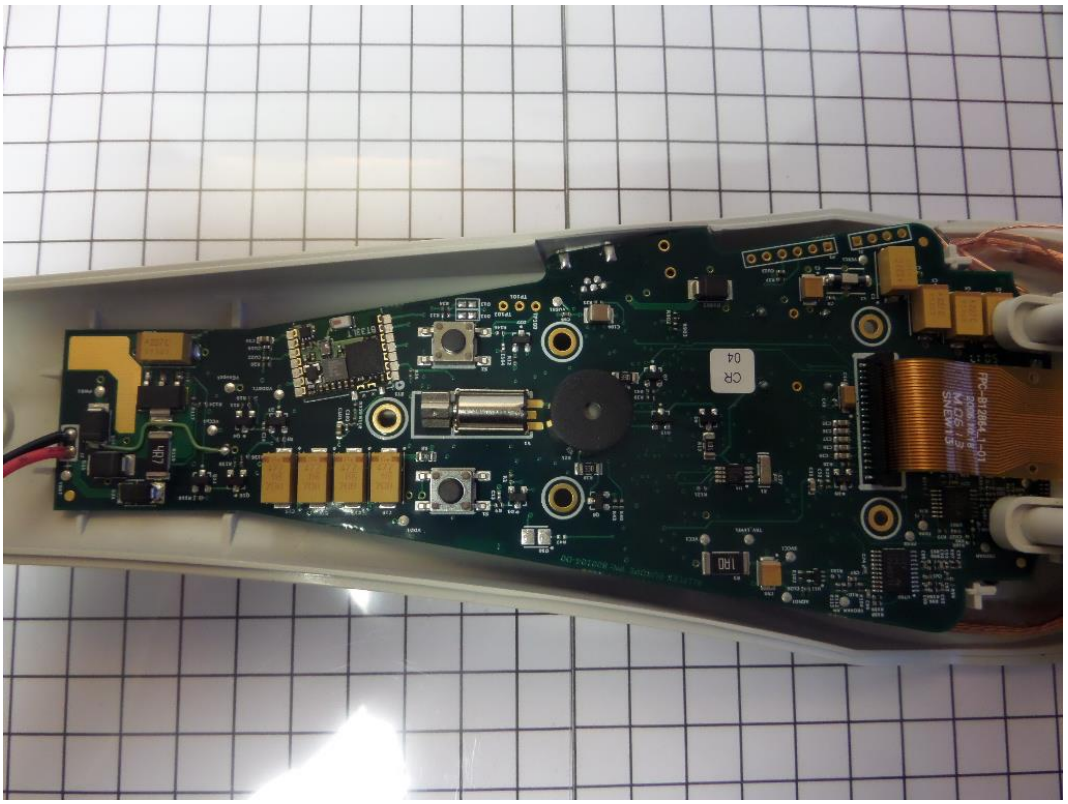


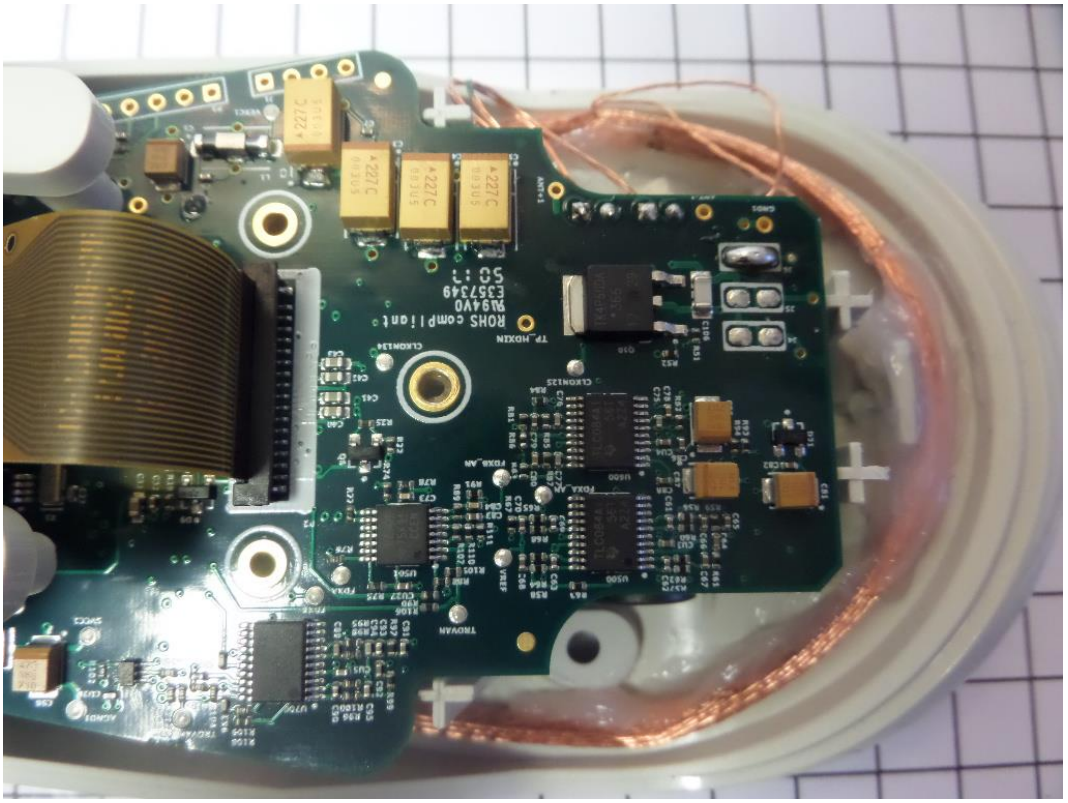


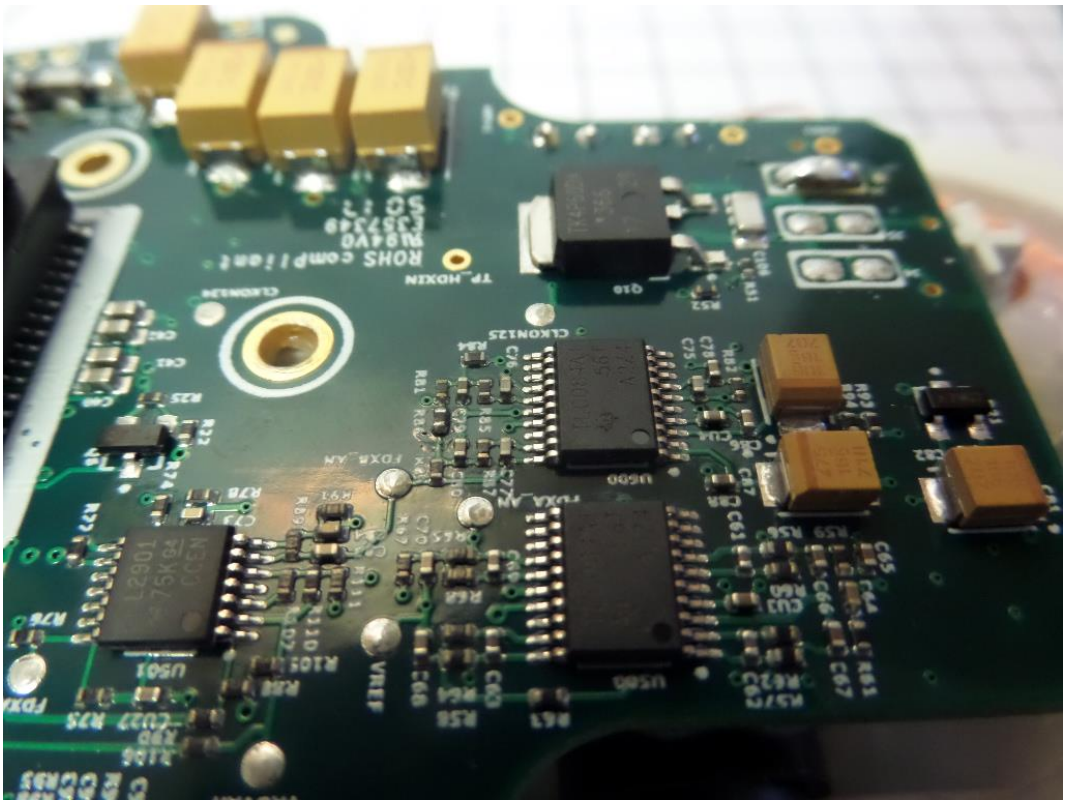

TXC 24.0
U8
CU13
CU14
CU11
F1
U7
R18
D8
D7
D11
P1
J1001

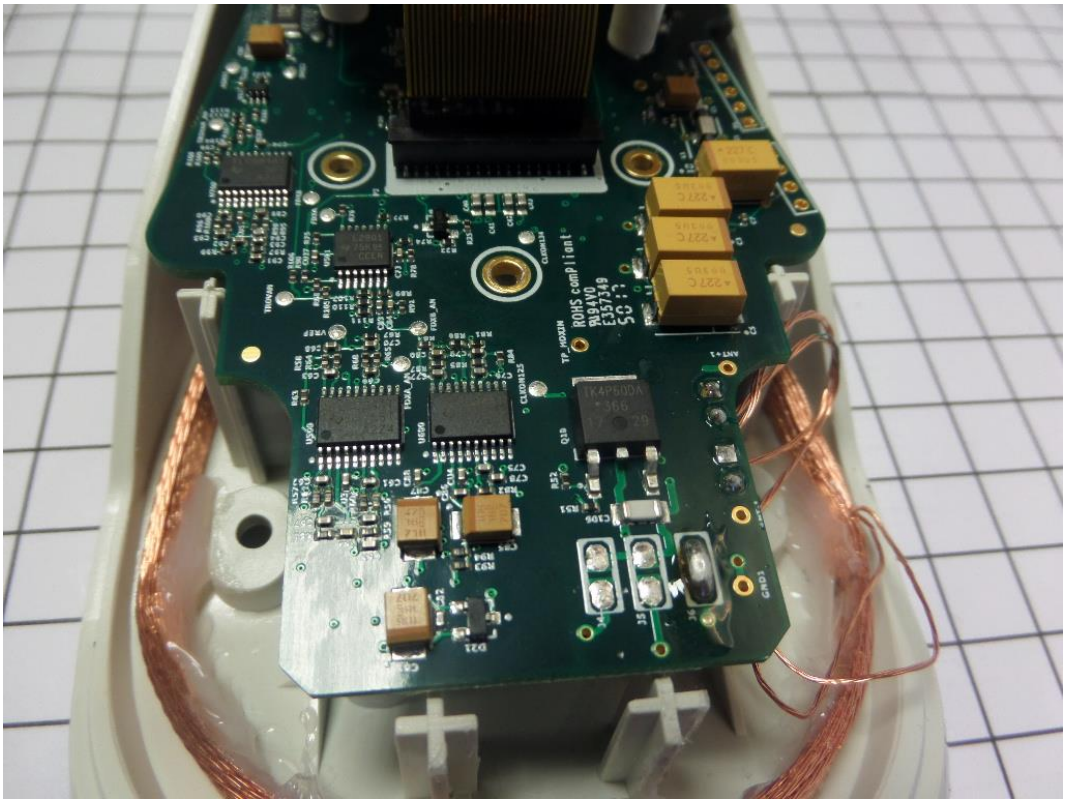








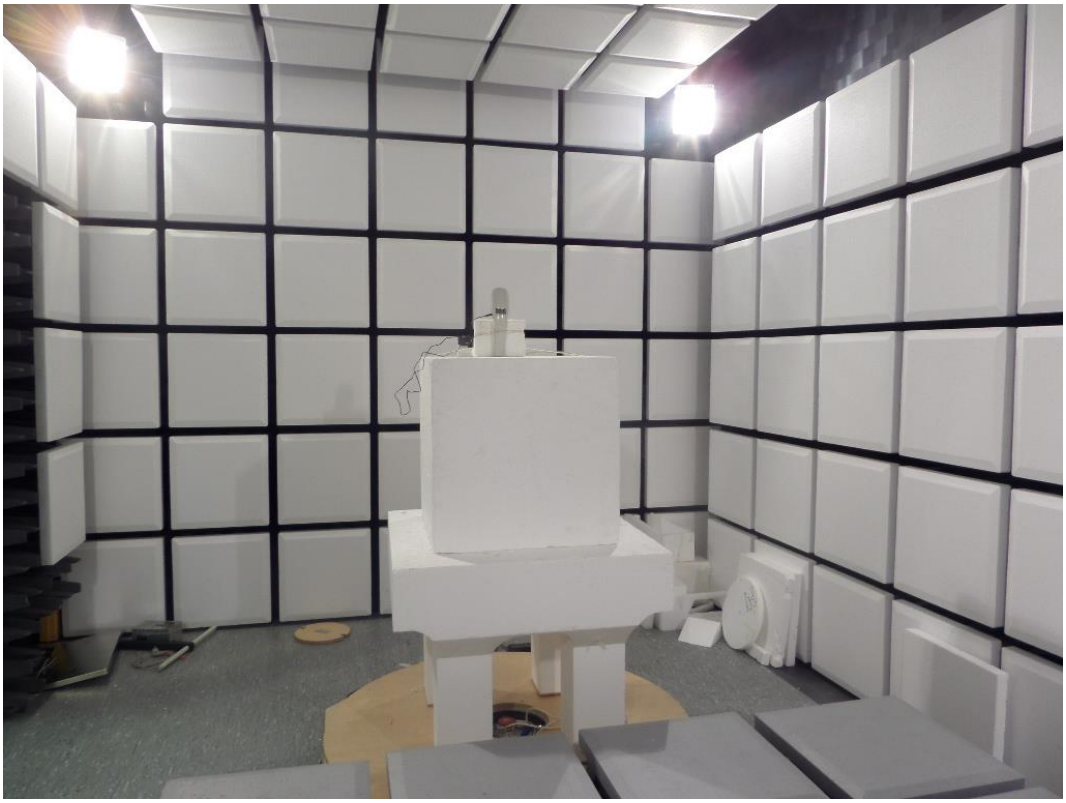


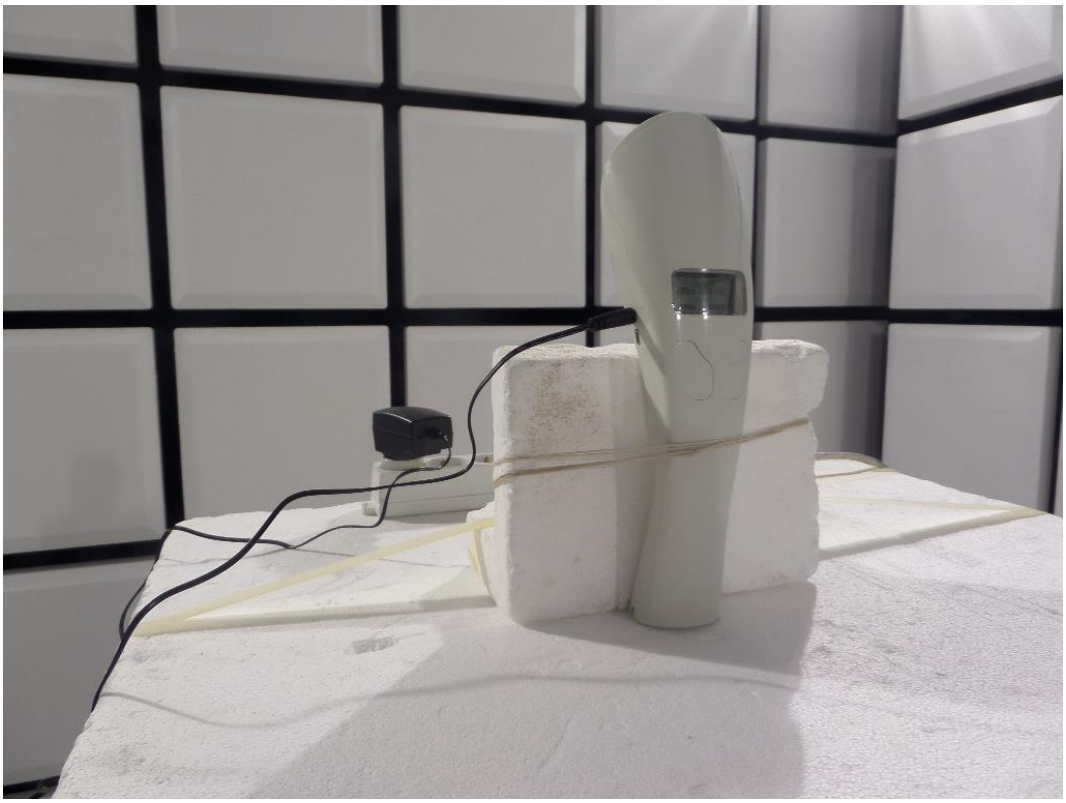



FORSEE
POWER
F000069 (FP750AAA08AA)
NI-MH HR11/45 7.2V
Sealed Rechargeable
Date Code : 118

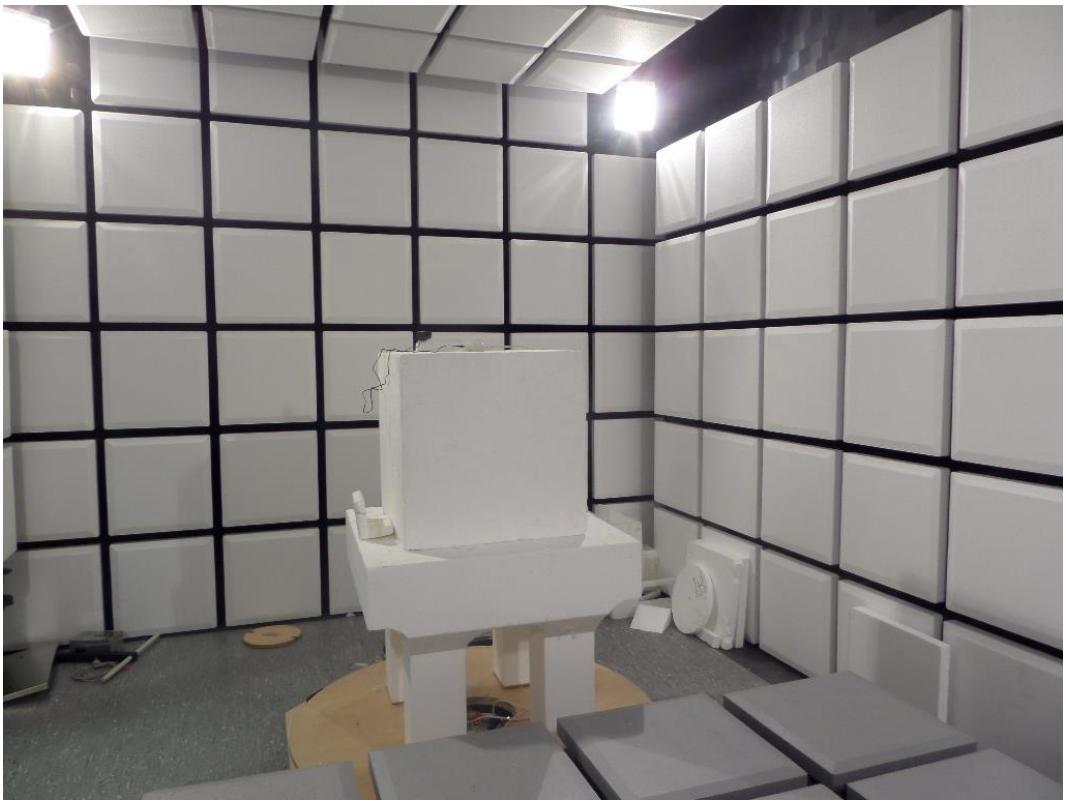
APPENDIX 2: Test set up

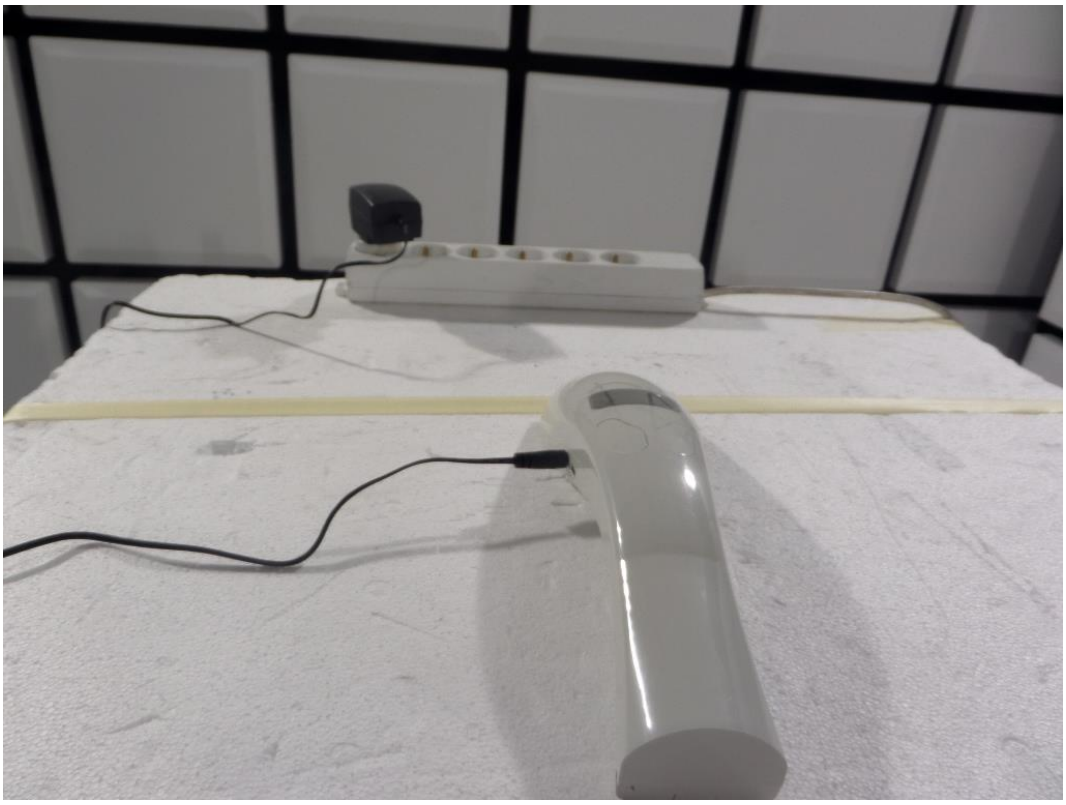
Position 1 in charging mode



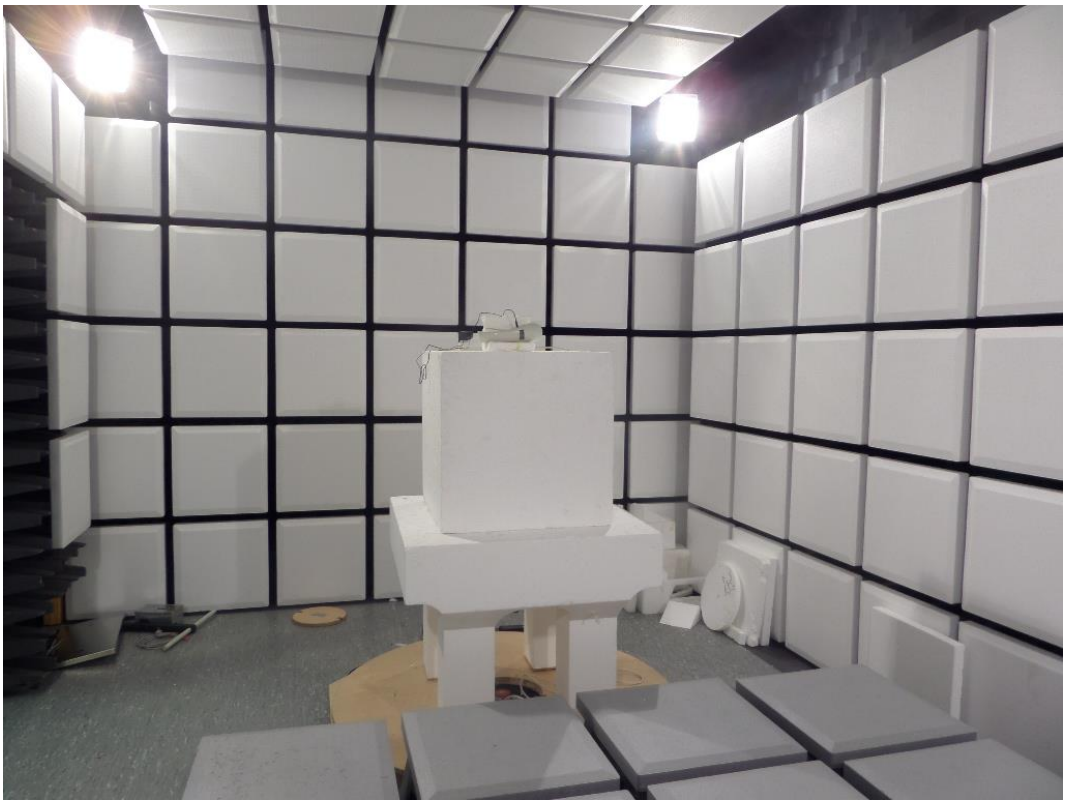


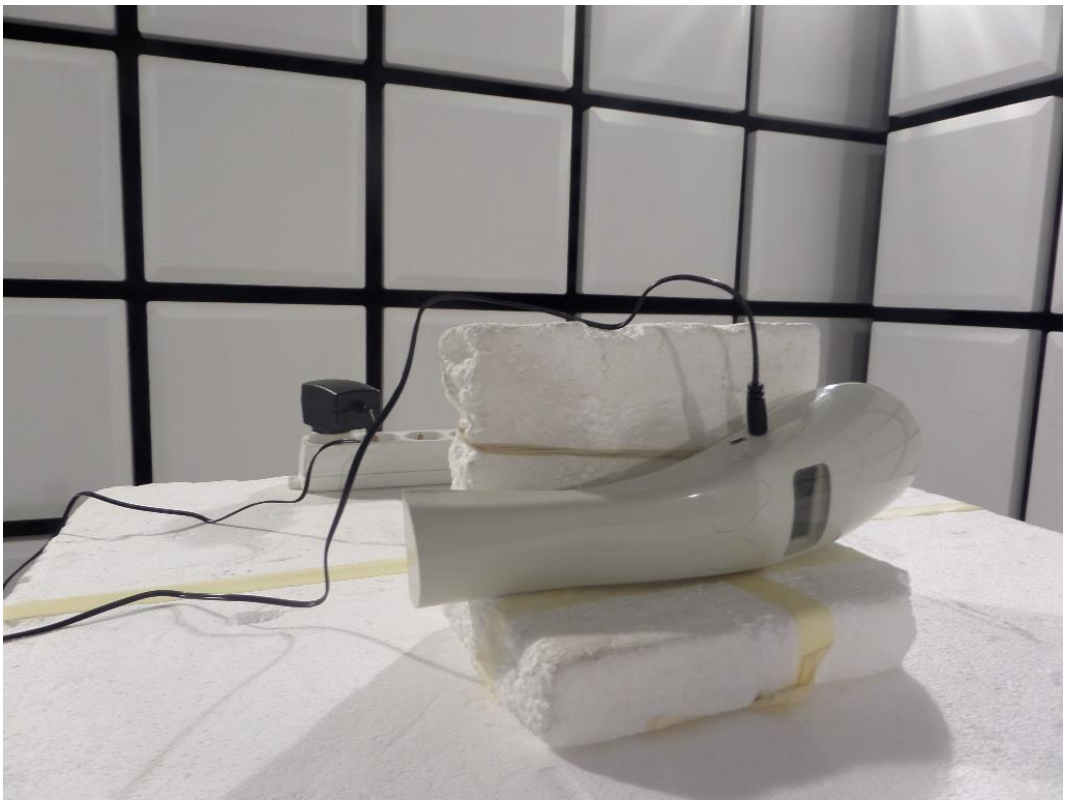
Position 2 in charging mode



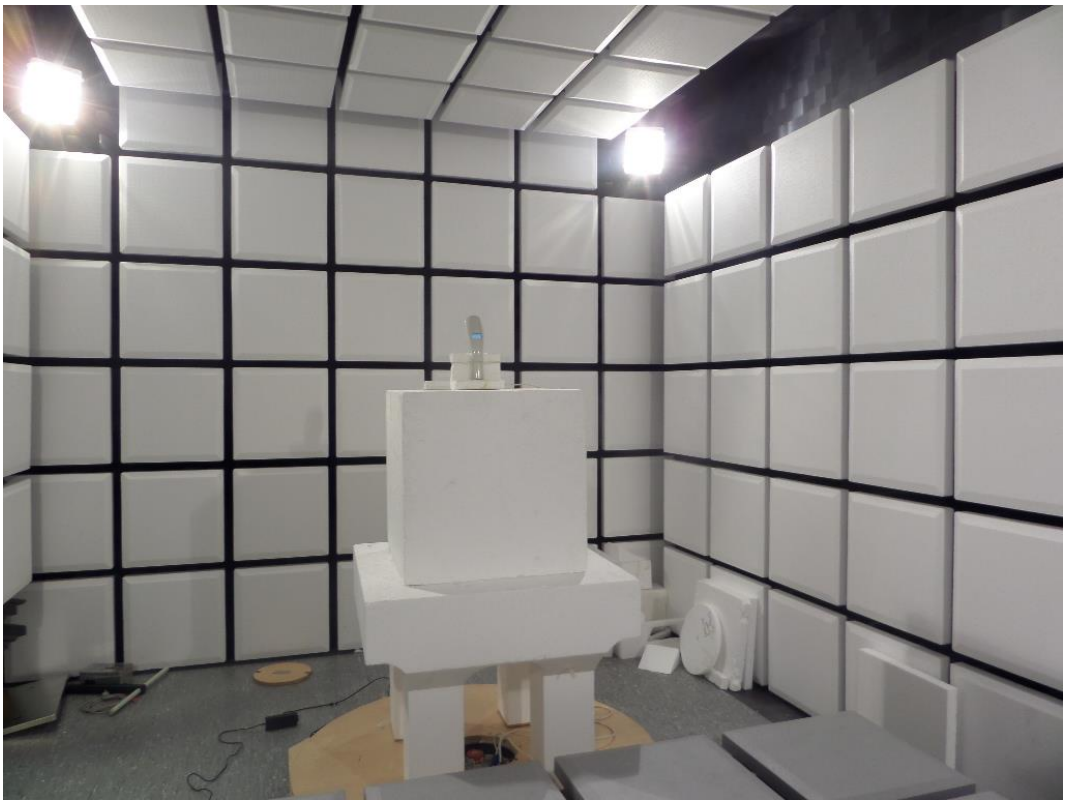


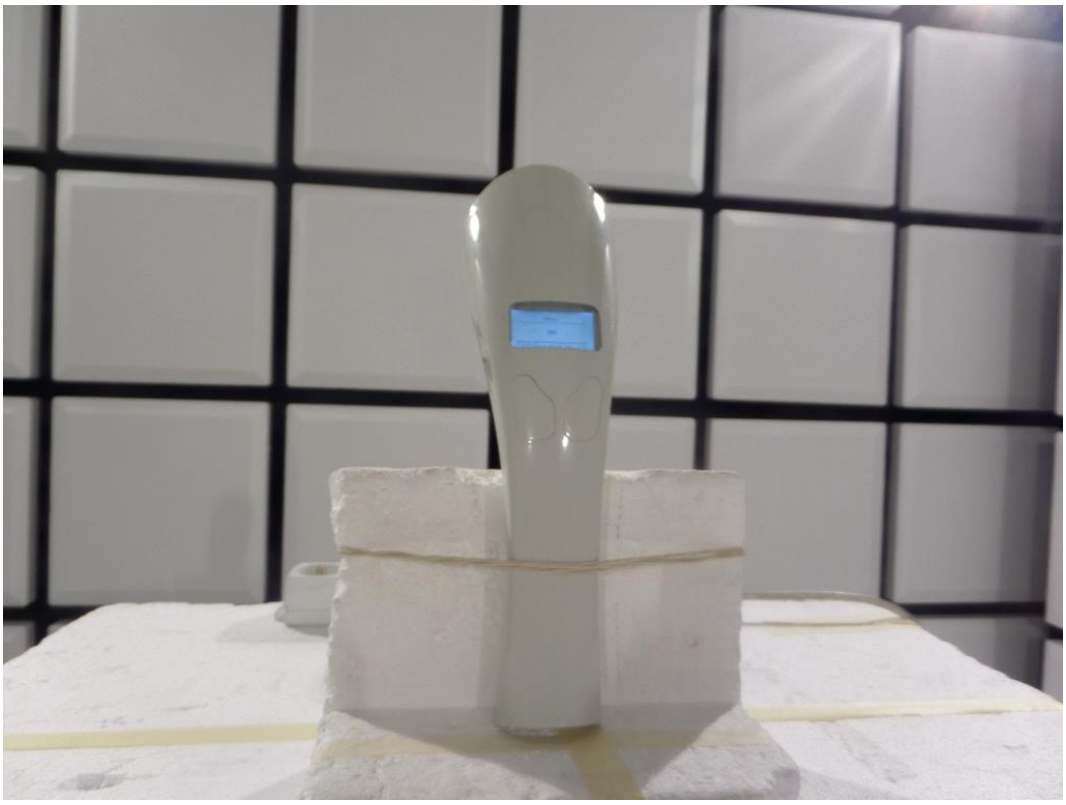
Position 3 in charging mode

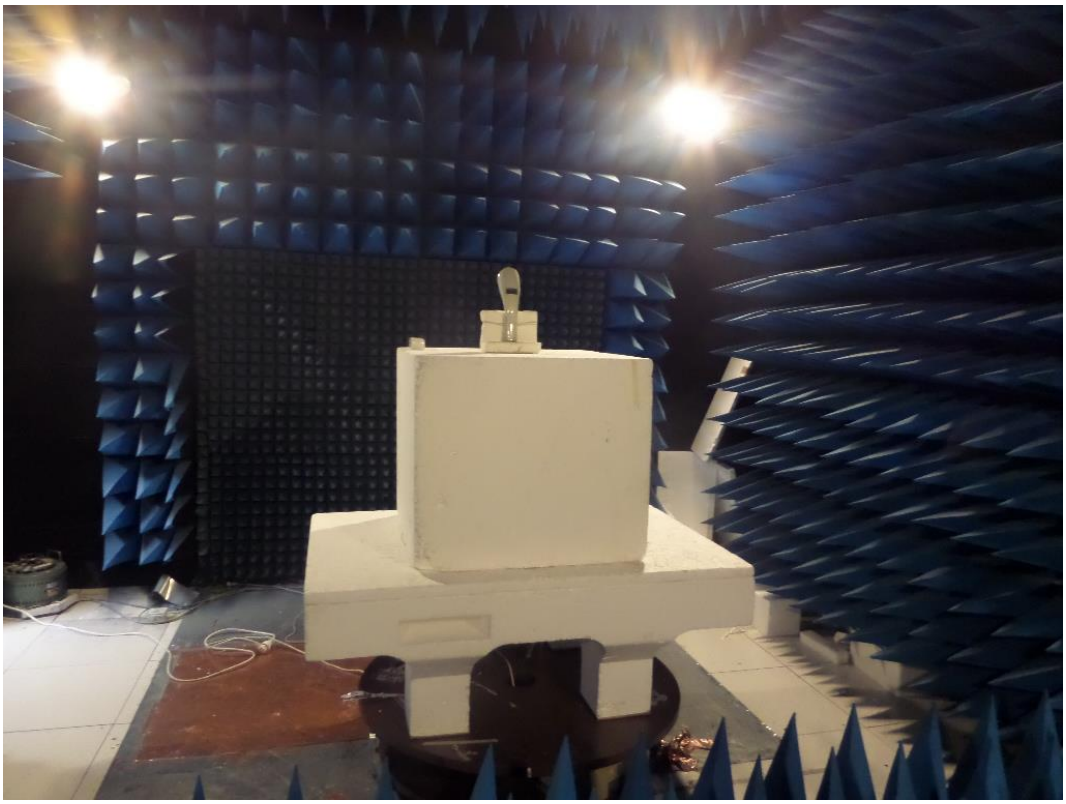


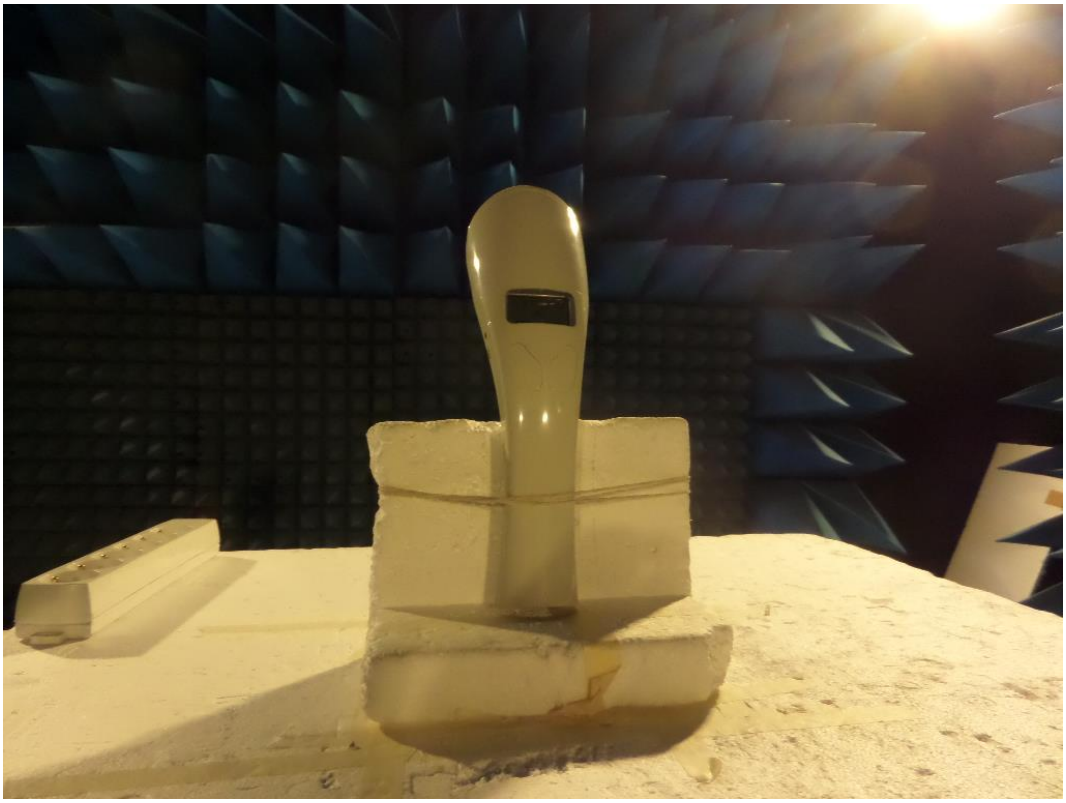


Position 1

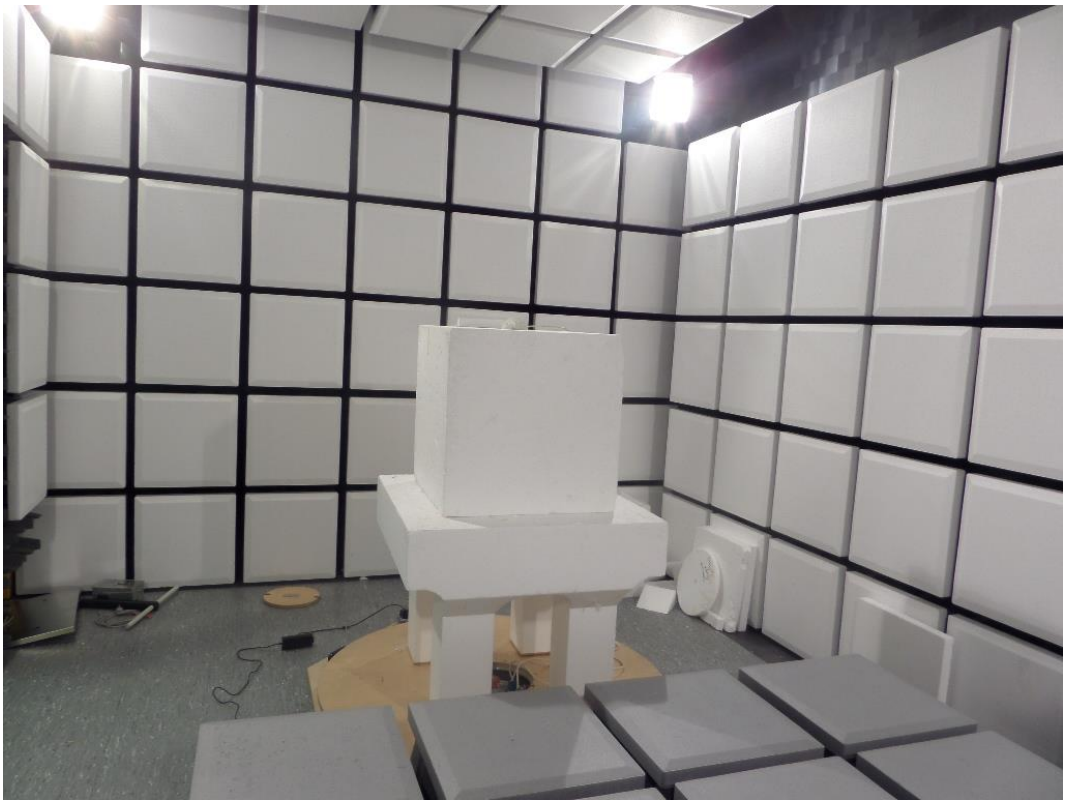


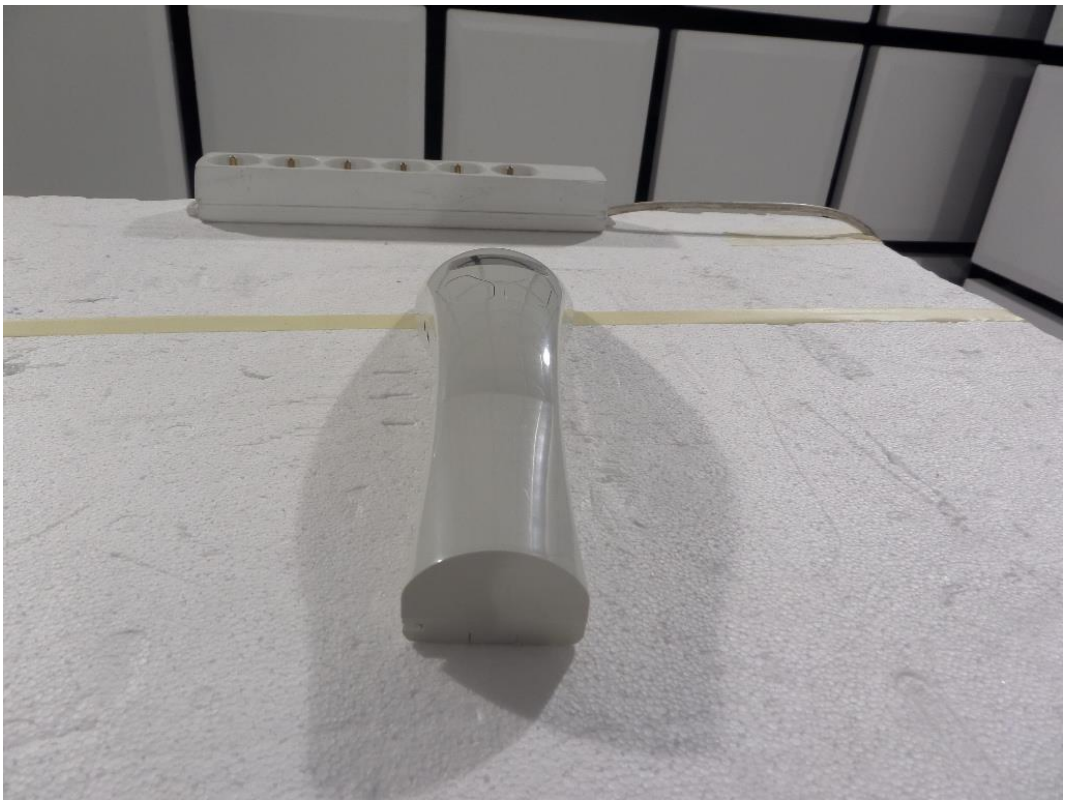


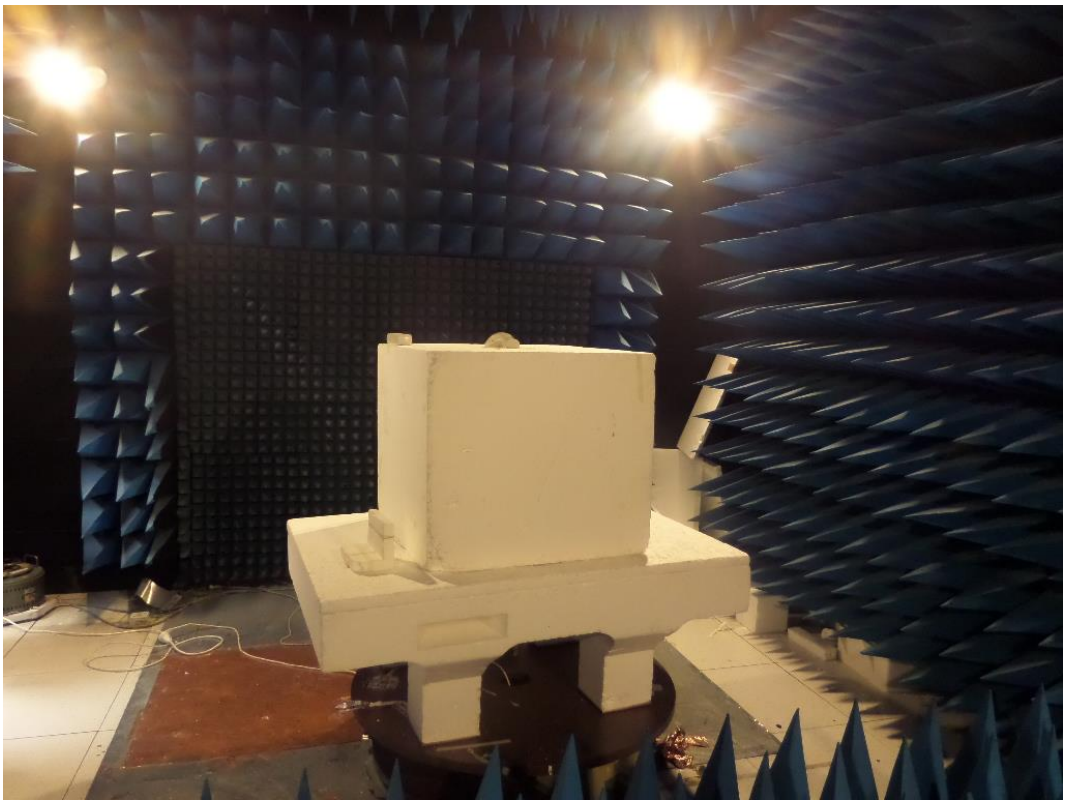


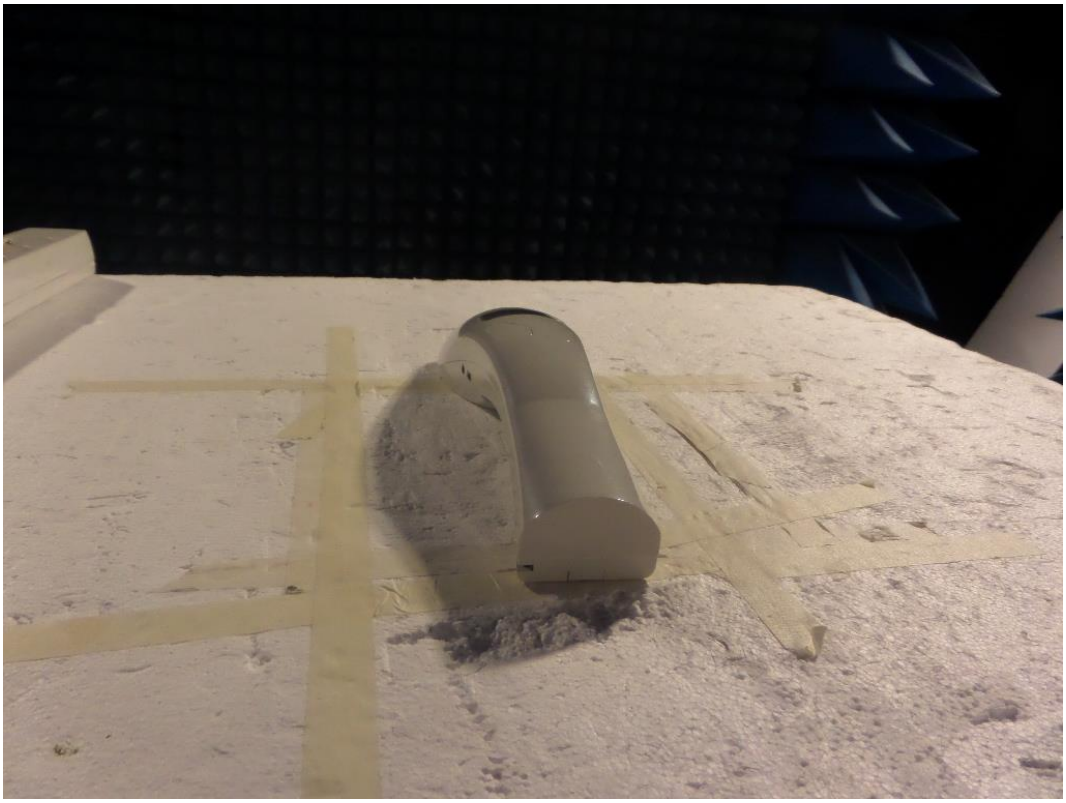


Position 2

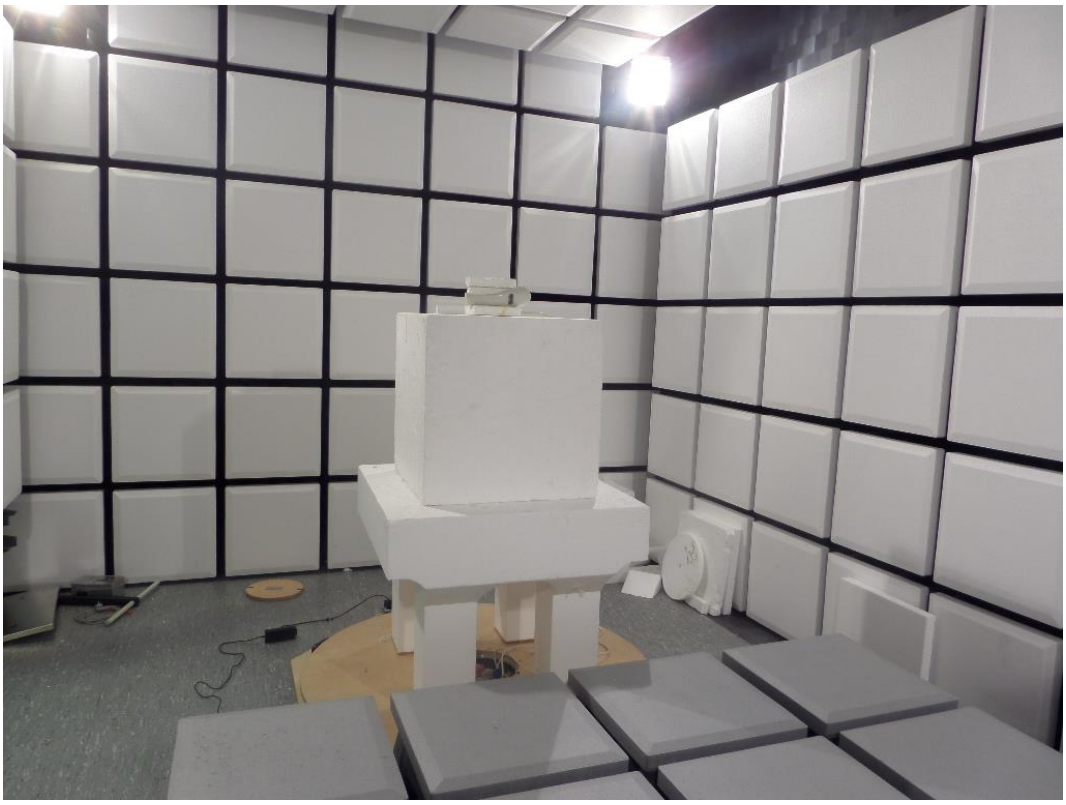


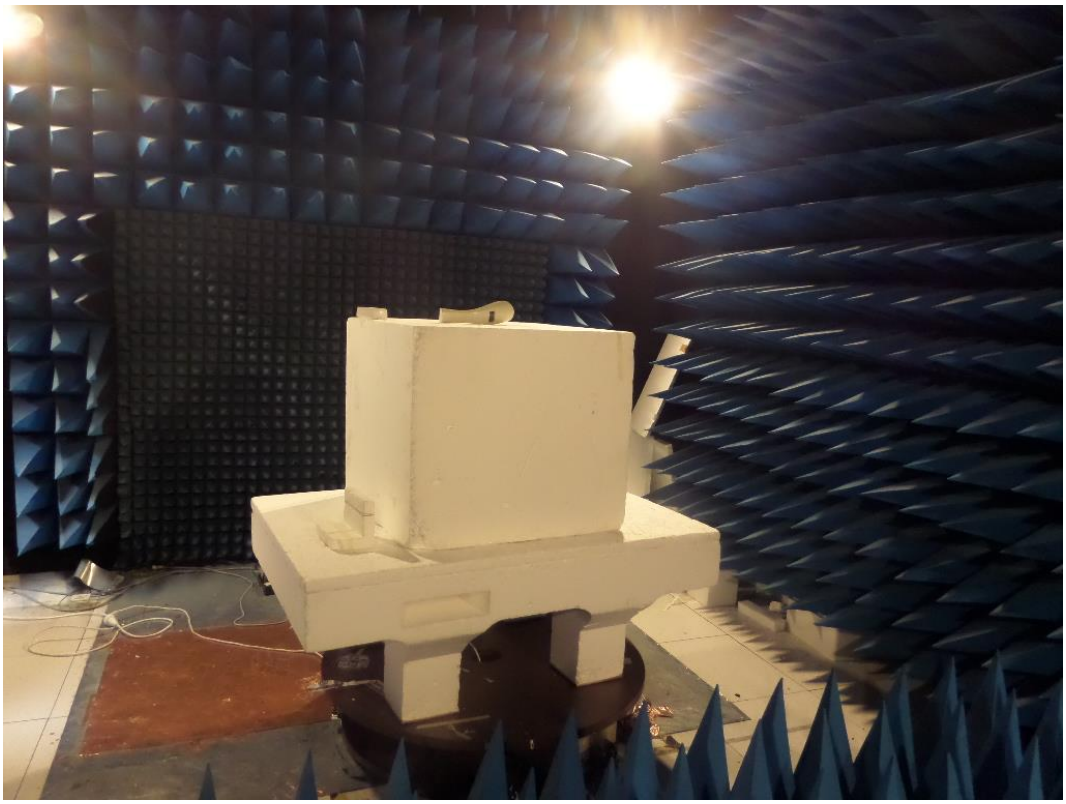


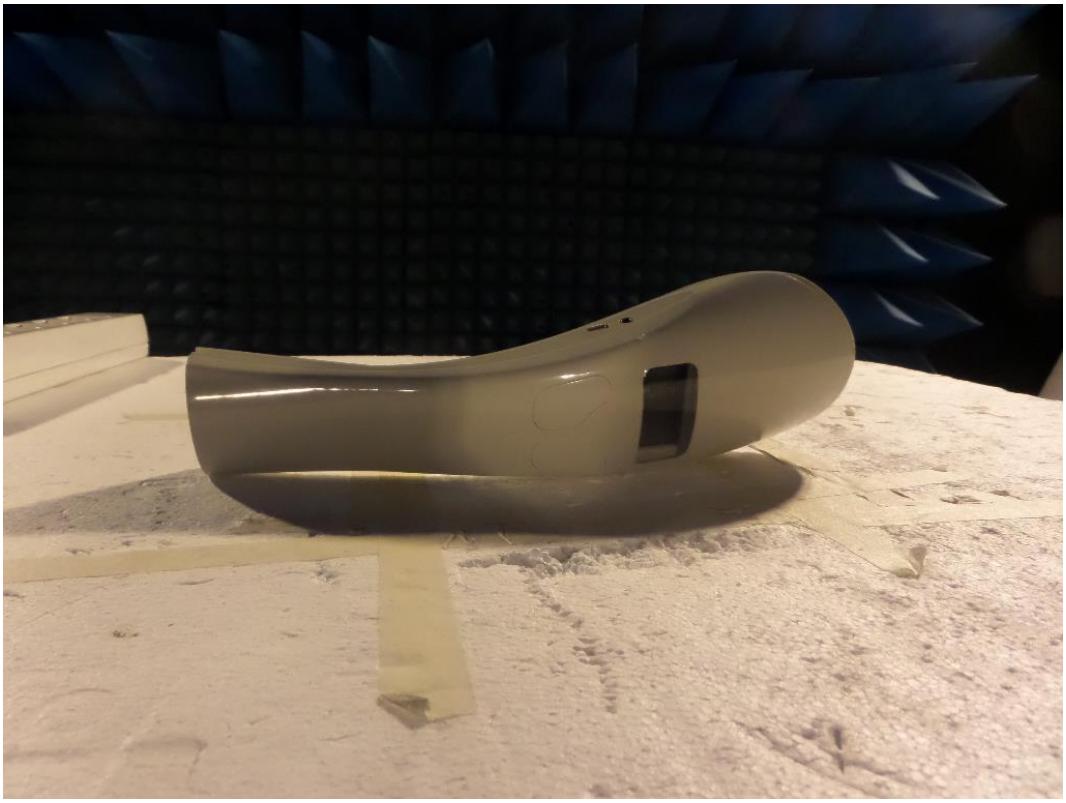


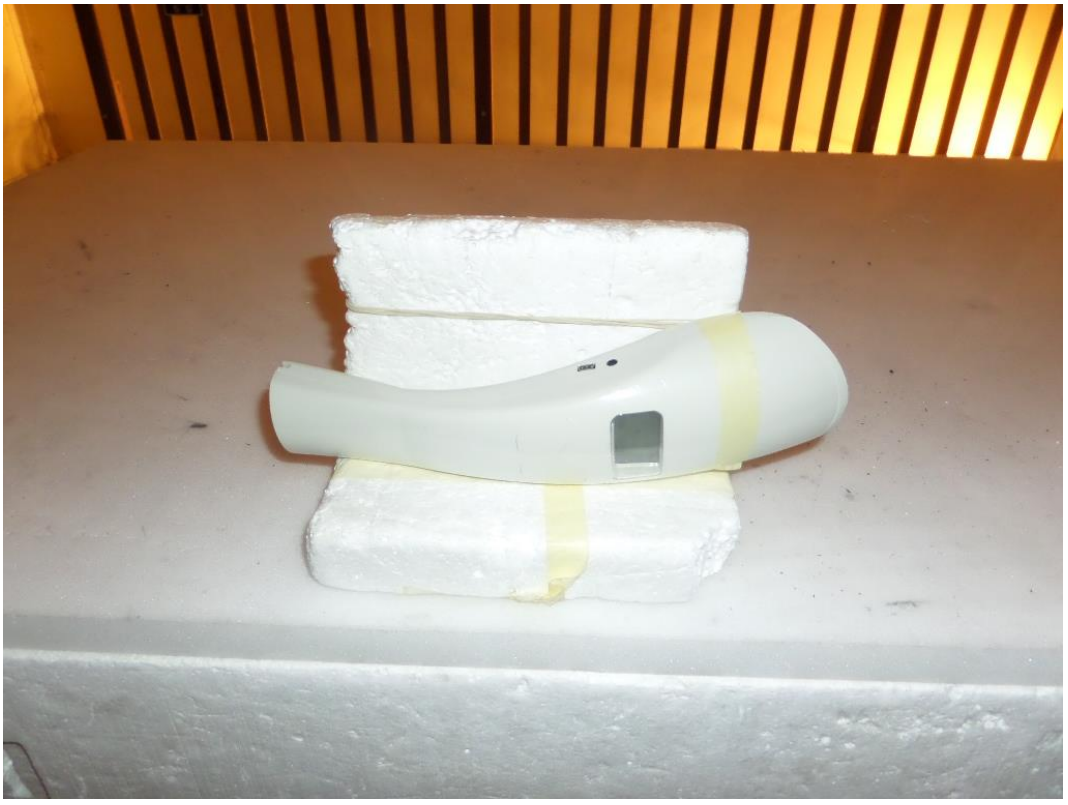


Position 3

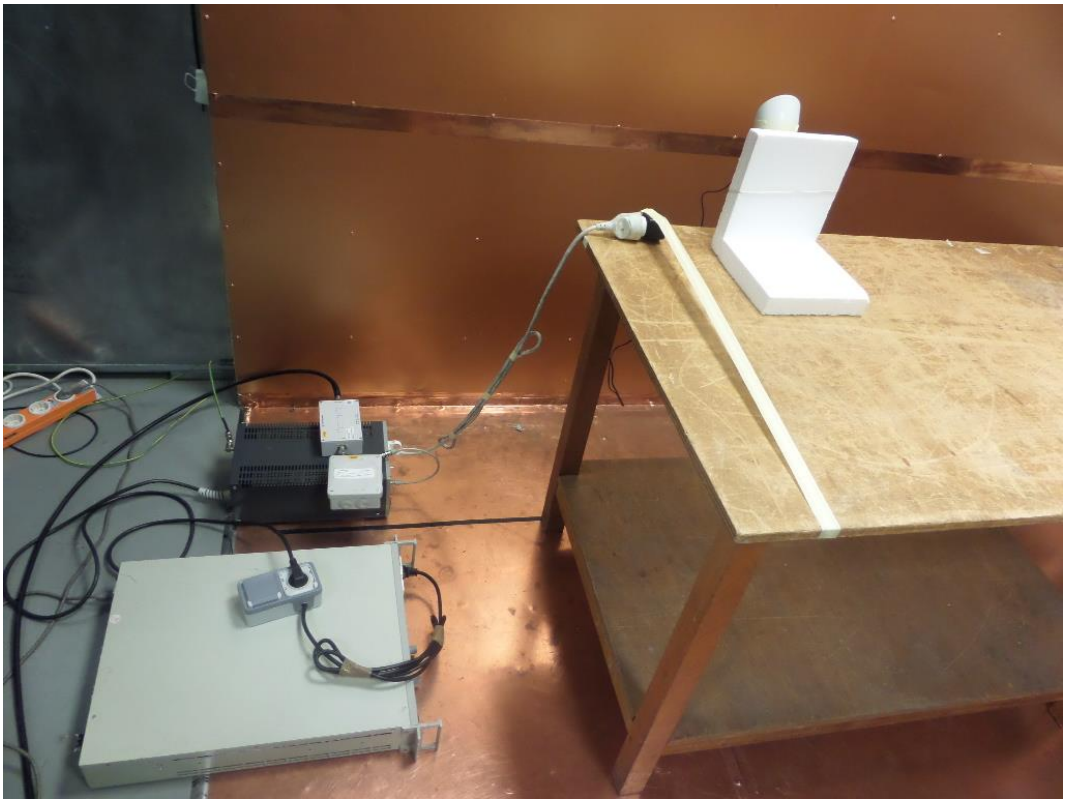








Conducted Emissions



APPENDIX 3: Test equipment list

Conducted limits

TYPE	MANUFACTURER	EMITECH NUMBER
Outside room Hors cage	Emitech	8893
Satellite synchronized frequency standard GPS8	ACQUISYS	8896
Spectrum Analyzer ESU8	Rohde & Schwarz	9403
LISN 1600	Thurbly Thandar Instruments	8719
High-pass filter EZ25	R&S	11535
Cable N-5m	—	8590
Absorber sheath current	Emitech	10523
Power source 1251RP	California instruments	8508
Multimeter 177	Fluke	14476
Meteo station WS-9232	La Crosse Technology	8750
Software	BAT-EMC V3.6.0.32	0000

Maximum peak output power

TYPE	MANUFACTURER	EMITECH NUMBER
Anechoic Chamber	EMITECH	8593
Turntable controller 1060C	EMCO	8958
Satellite synchronized frequency standard GPS8	ACQUISYS	8896
Spectrum Analyzer FSP7	Rohde & Schwarz	6796
Band pass filter BP2442-84-7CS	BL Microwave	5625
Antenna 3115	EMCO	8535
Low-noise amplifier S005180M3201	LUCIX Corp.	10739
Cable N-2m	Huber + Suhner	12911
Cable N-5m	Huber + Suhner	12912
Cable N-1.5m	Suhner	6884
Power source 1251RP	California instruments	8508
Multimeter 177	Fluke	14476
Meteo station WS-9232	La Crosse Technology	8750
Software	BAT-EMC V3.6.0.32	0000

Additional provisions to the general radiated emission limitations

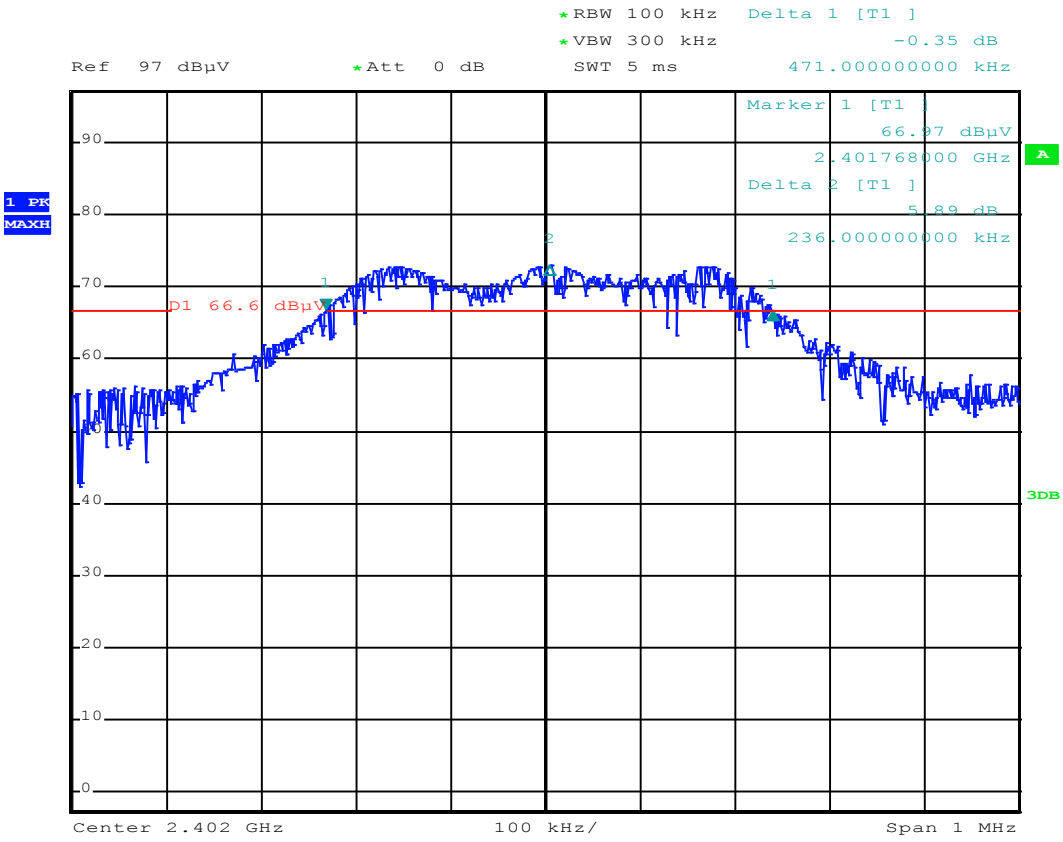
TYPE	MANUFACTURER	EMITECH NUMBER
Outside room Hors cage	Emitech	8893
Full anechoic chamber	EMITECH	10759
Satellite synchronized frequency standard GPS8	ACQUISYS	8896
Spectrum Analyzer FSP7	Rohde & Schwarz	6796
Antenna 3117	ETS-Lindgren	10771
Cable N-2m	SUCOFLEX	14303
Cable N-2.5m	SUCOFLEX	14304
Cable N-4m	SUCOFLEX	14305
Multimeter 177	Fluke	14476
Meteo station 608-H1	Testo	7566
Software	GPIBShot V2.4	-

Intentional radiator

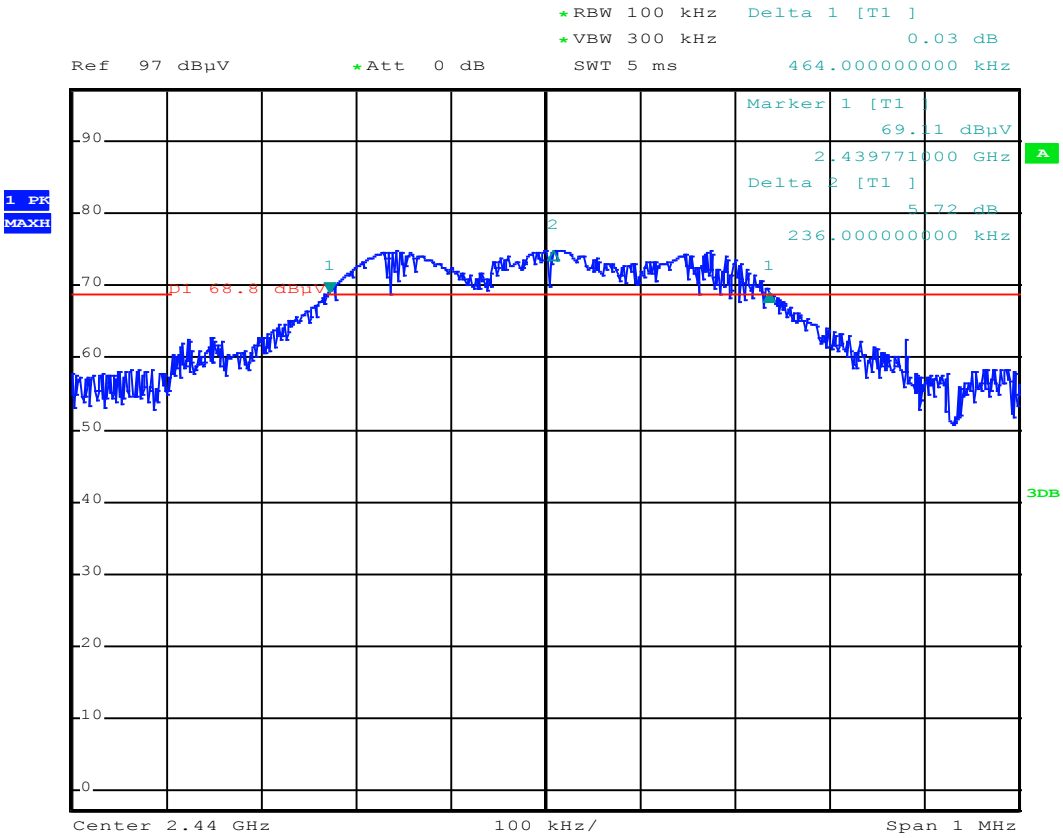
TYPE	MANUFACTURER	EMITECH NUMBER
Open test site	EMITECH	8732
Turntable and mat controller	EMITECH	8855
Anechoic Chamber	EMITECH	8593
Turntable controller 1060C	EMCO	8958
Full anechoic chamber	EMITECH	10759
Turntable and mat controller NCD	MATURO	10789
Satellite synchronized frequency standard GPS8	ACQUISYS	8896
Test receiver ESI7	Rohde & Schwarz	8707
Spectrum Analyzer FSP7	Rohde & Schwarz	6796
Spectrum Analyzer FSL18	Rohde & Schwarz	14539
Spectrum Analyzer FSP40	Rohde & Schwarz	4088
Loop antenna 6502	EMCO	1406
Biconical antenna 3110	Emco	7240
Biconical antenna VHBB 9124	Schwarzbeck	8526
Biconical antenna VHA 9103	Schwarzbeck	8528
Log periodic antenna HL223	Rohde & Schwarz	7190
Log periodic antenna UHALP 9108A	Schwarzbeck	8543
Antenna 3115	EMCO	8535
Antenna 3117	ETS-Lindgren	10771
Antenna 3160-09	ETS Lindgren	8786
Low-noise amplifier ZFL-1000LN	Mini-circuit	10730
Low-noise amplifier 8447D	Hewlett Packard	8511
Low-noise amplifier S005180M3201	LUCIX Corp.	10739
Low-noise amplifier S005180M3201	LUCIX Corp.	12590
Low-noise amplifier S180265L3201	LUCIX Corp.	8704
Low pass filter LP03/1000-7GH	Filtek	4087
Reject band filter BRM50702	Microtronics	7299
Cable open area test site	—	8578
Cable N-2m	Huber + Suhner	12911
Cable N-5m	Huber + Suhner	12912
Cable N-1.5m	Suhner	6884
Cable k-20cm	STORM MICROWAE	8974
Cable N-1.5m	-	9398
Cable K-2m	SUCOFLEX	12917
Cable N-1m	SUCOFLEX	14302
Cable N-2m	SUCOFLEX	14303
Cable N-2.5m	SUCOFLEX	14304
Cable N-4m	SUCOFLEX	14305
Multimeter 177	Fluke	14476
Meteo station 608-H1	Testo	7566
Meteo station WS-9232	La Crosse Technology	8749
Meteo station WS-9232	La Crosse Technology	8750
Software	BAT-EMC V3.6.0.32	0000

APPENDIX 4: 6 dB bandwidth

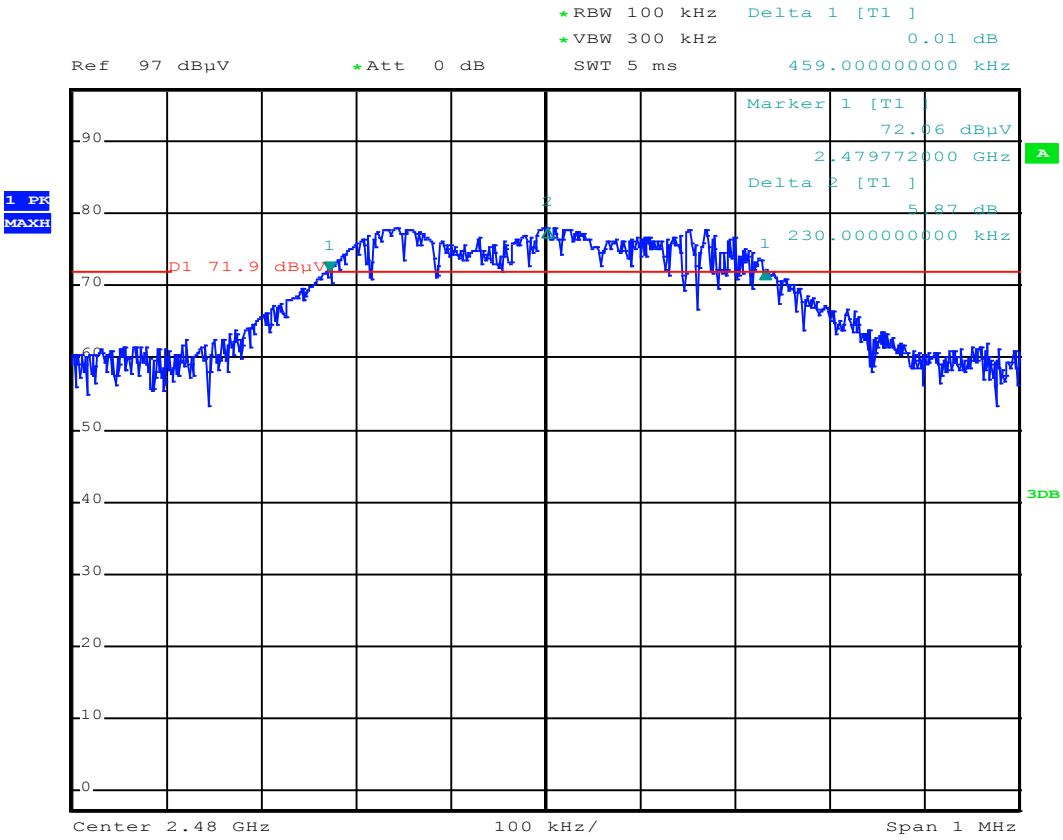
Low channel



Central channel

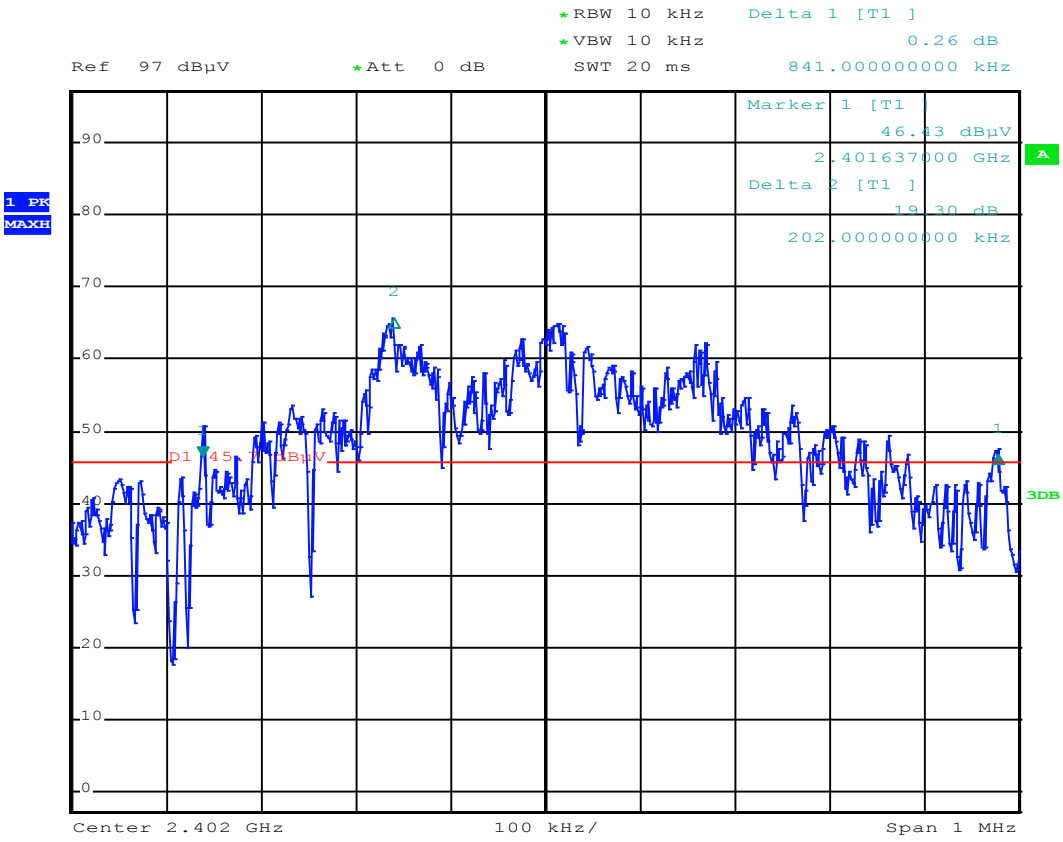


High channel

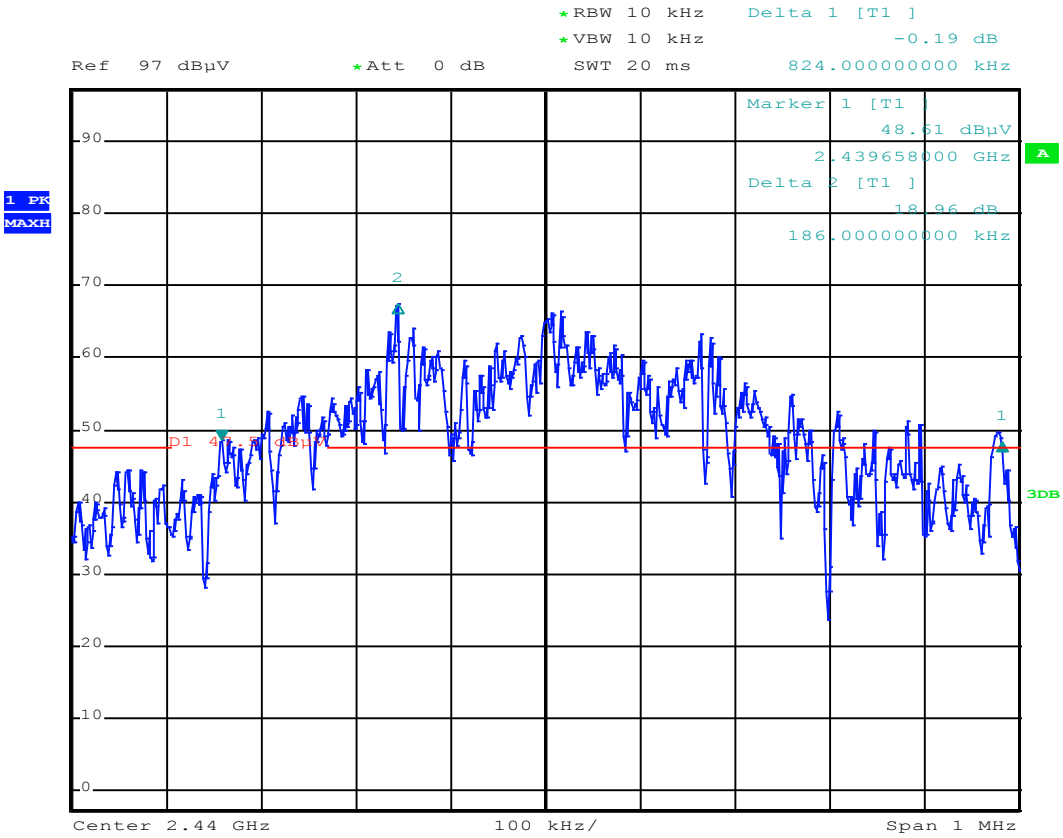


APPENDIX 5: 20 dB bandwidth

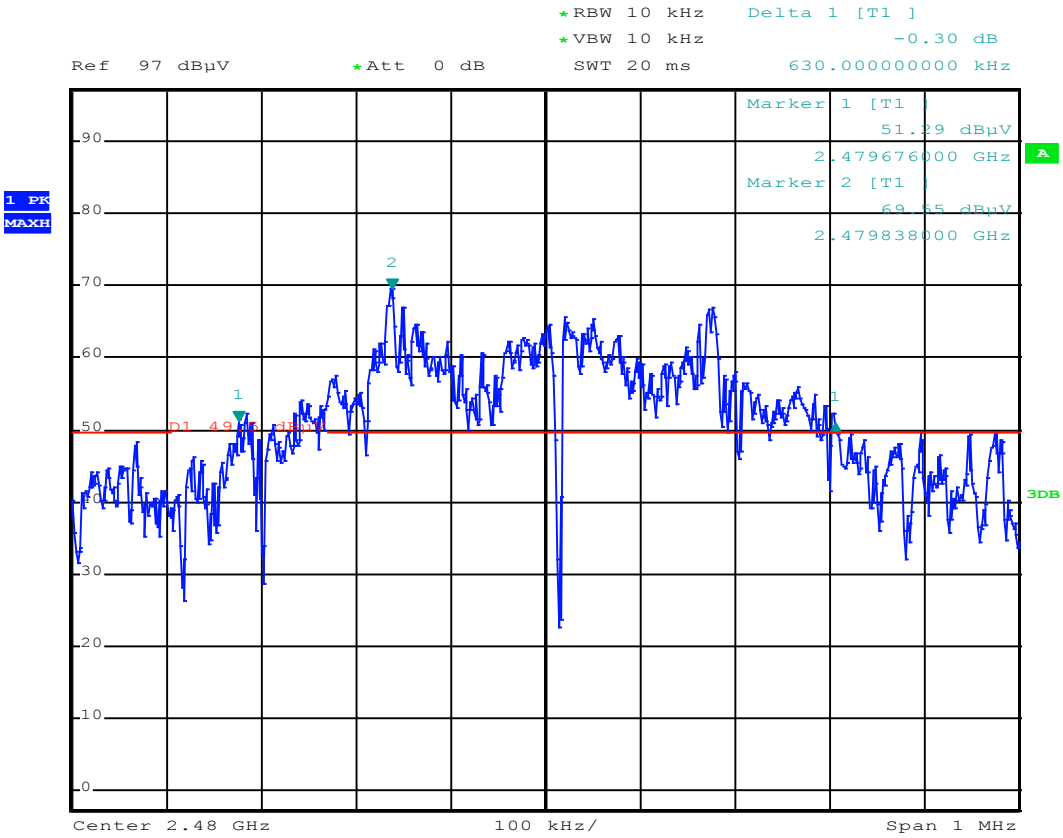
Low channel



Central channel

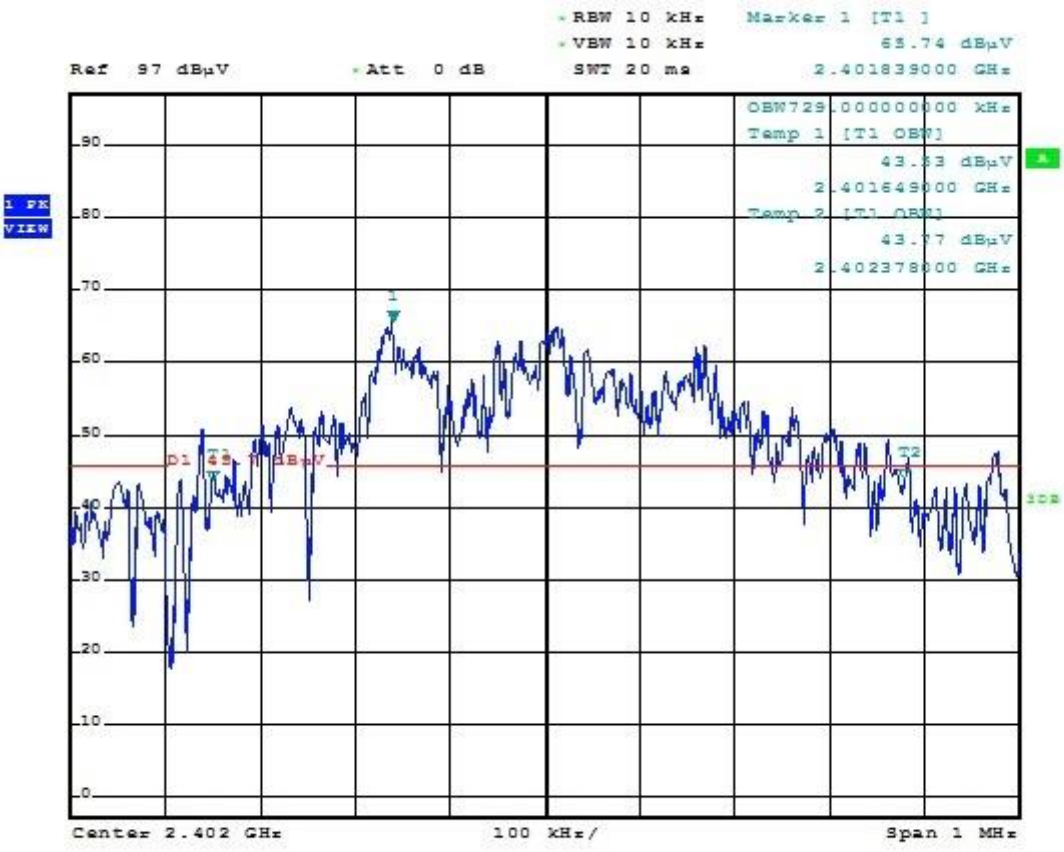


High channel

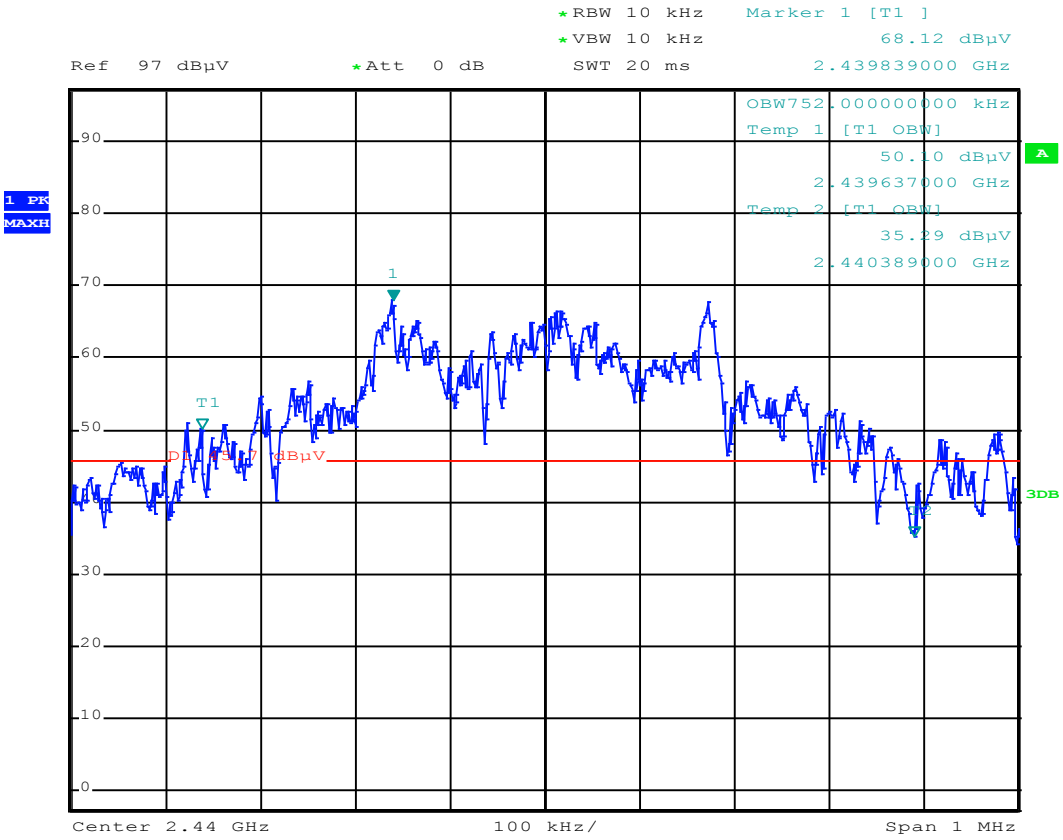


APPENDIX 6: 99% bandwidth

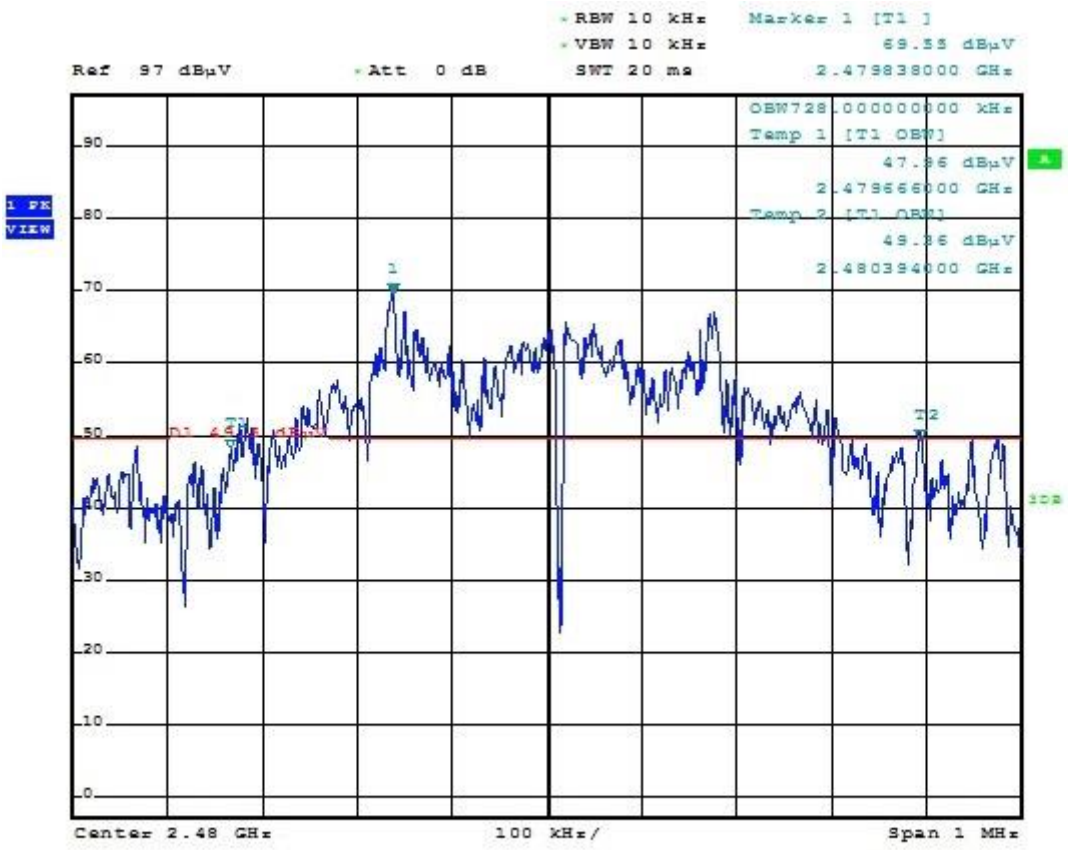
Low channel



Central channel

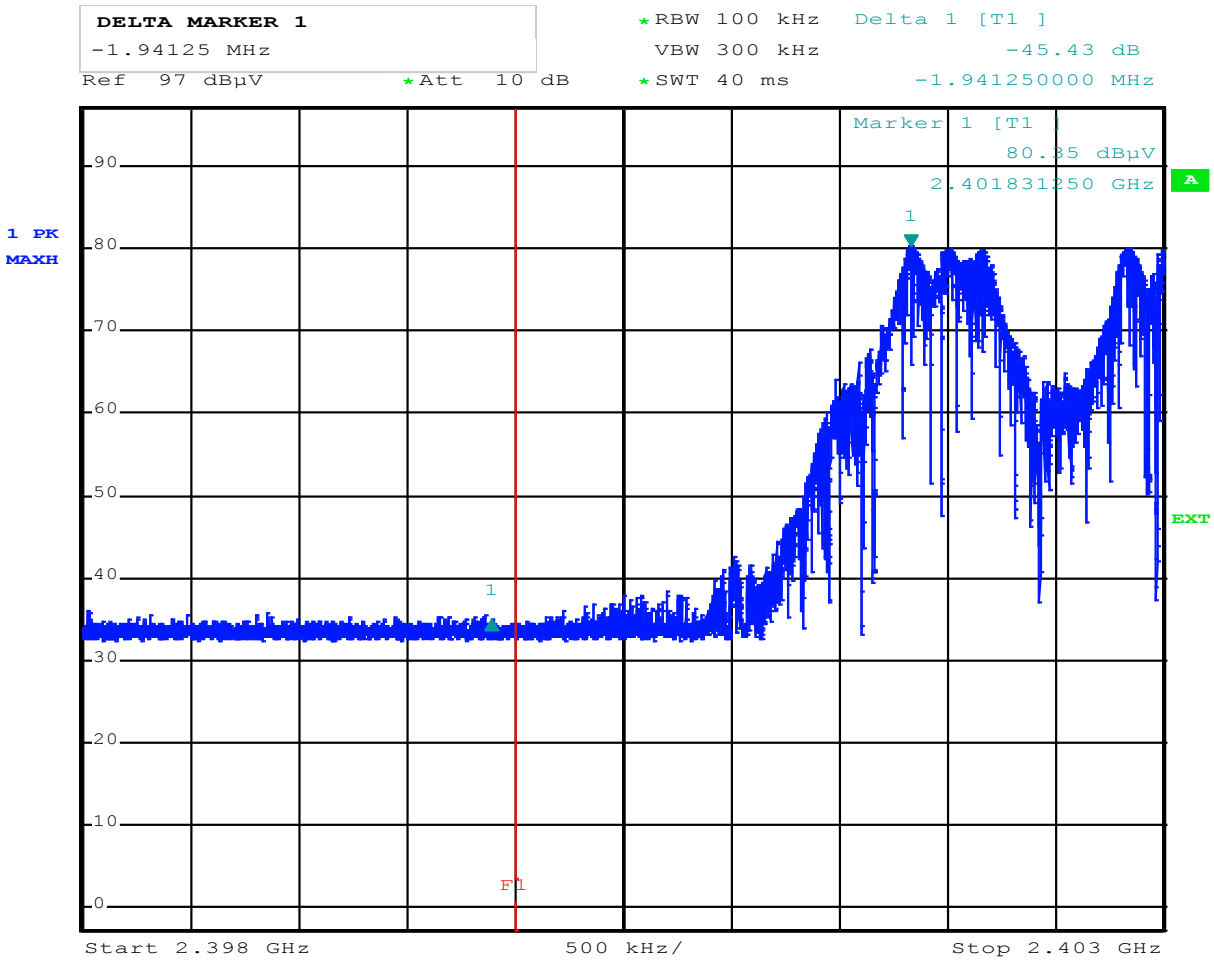


High channel

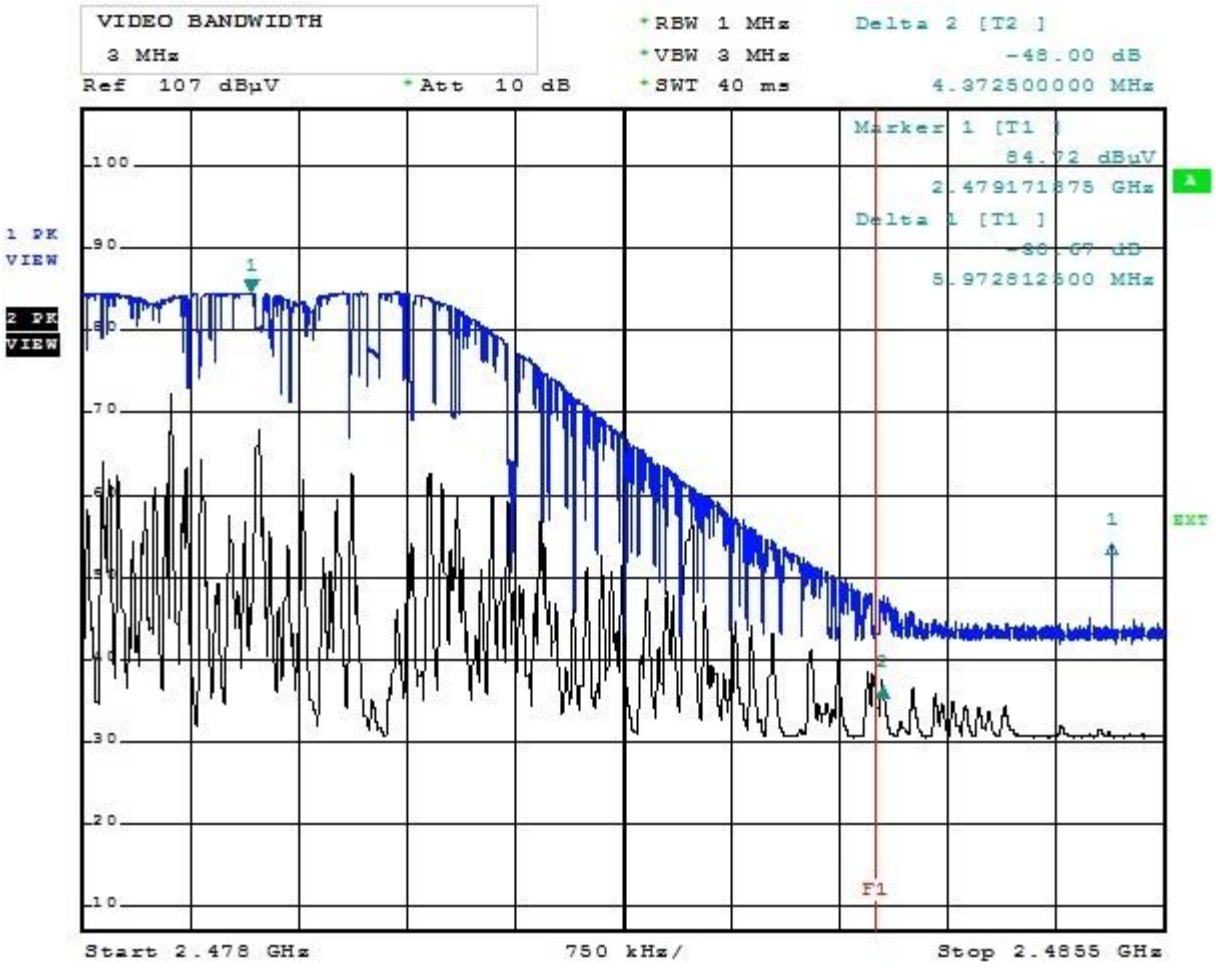


APPENDIX 7: Band edge

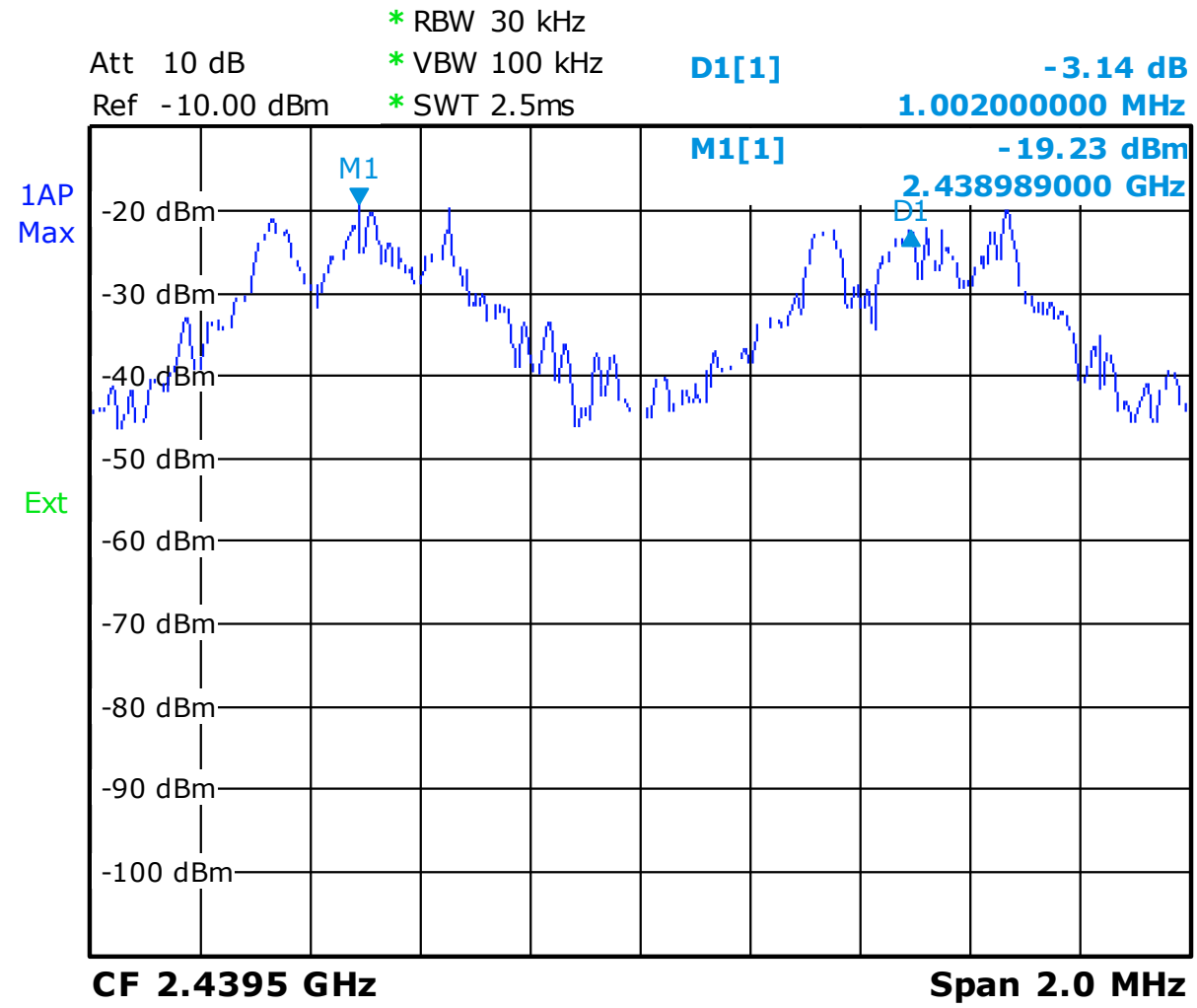
Low channel with hopping mode on



High channel with hopping mode on

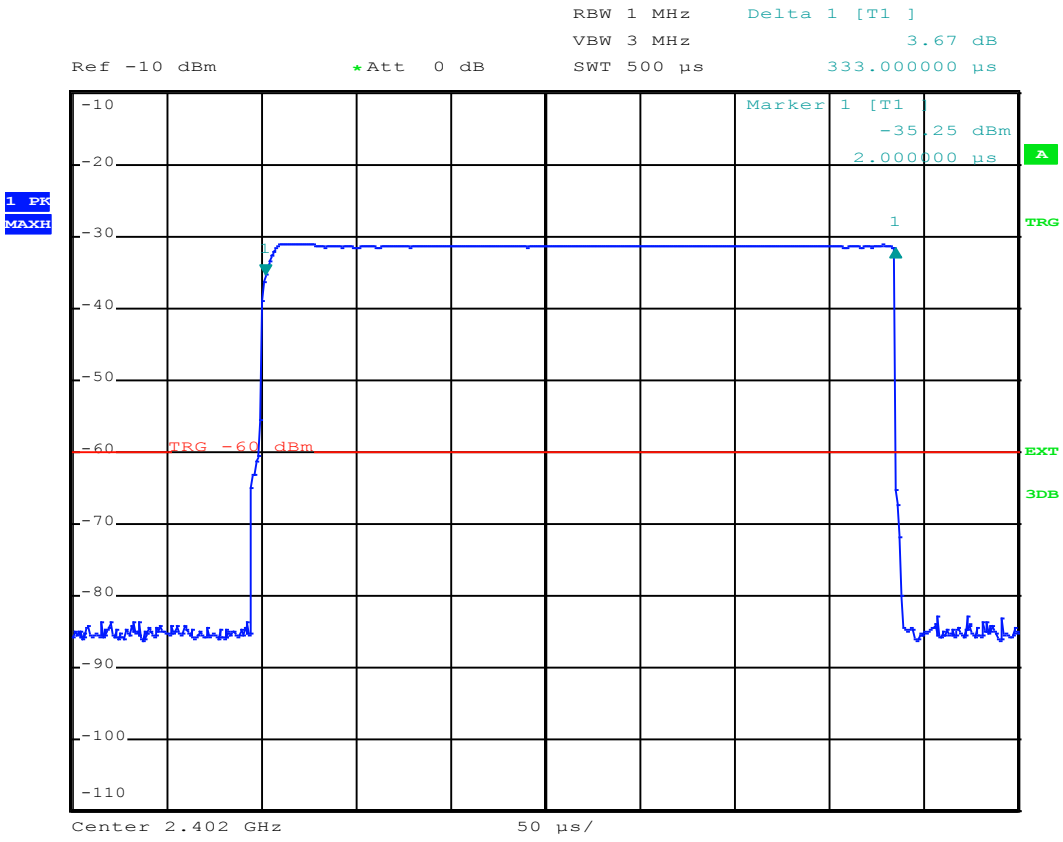


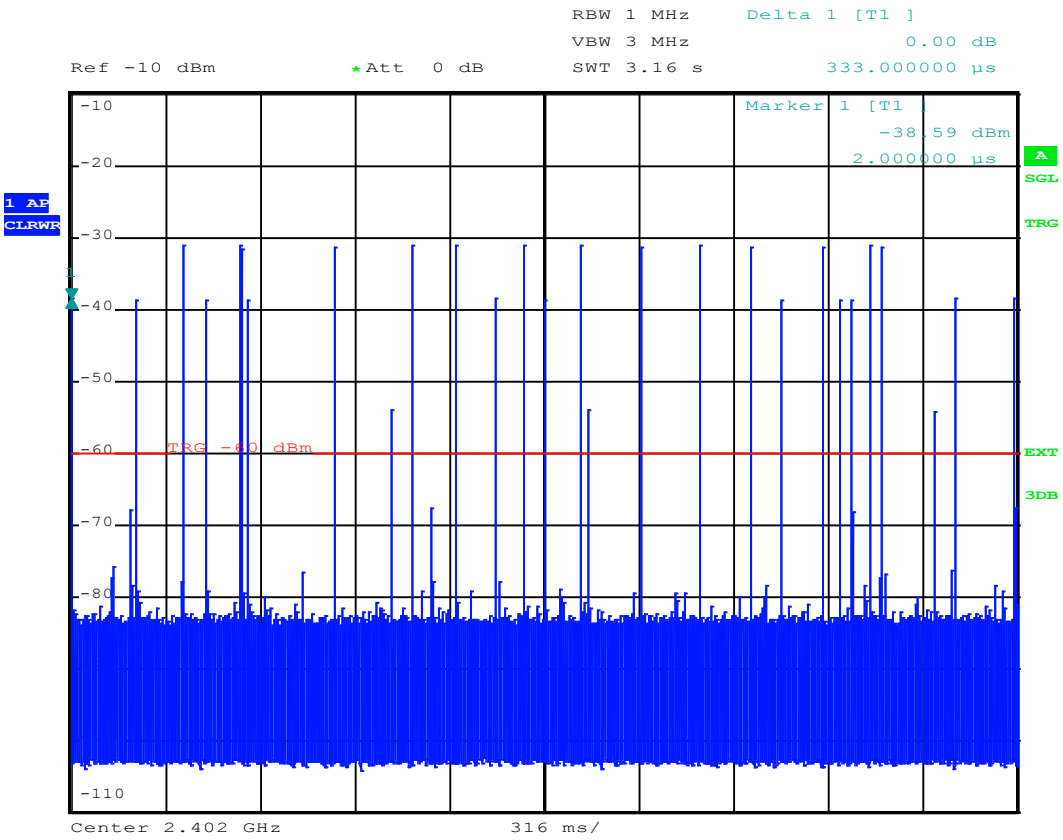
APPENDIX 8: Channel spacing



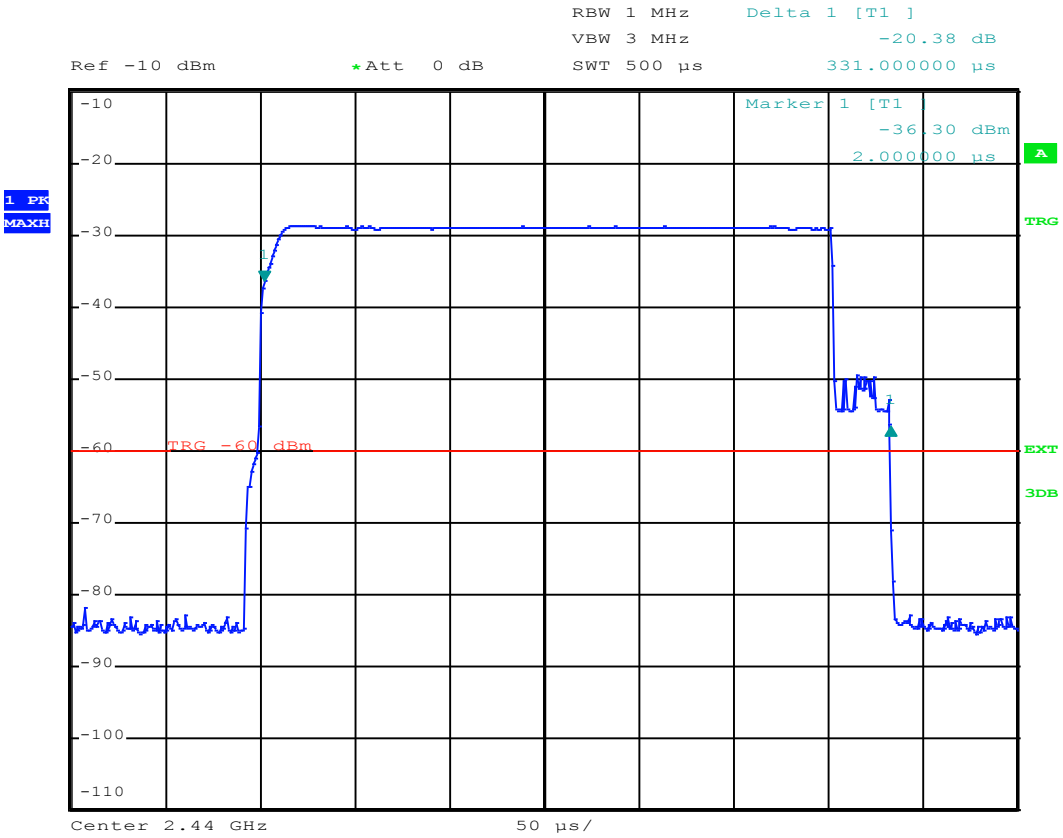
APPENDIX 9: Time of occupancy on any frequency

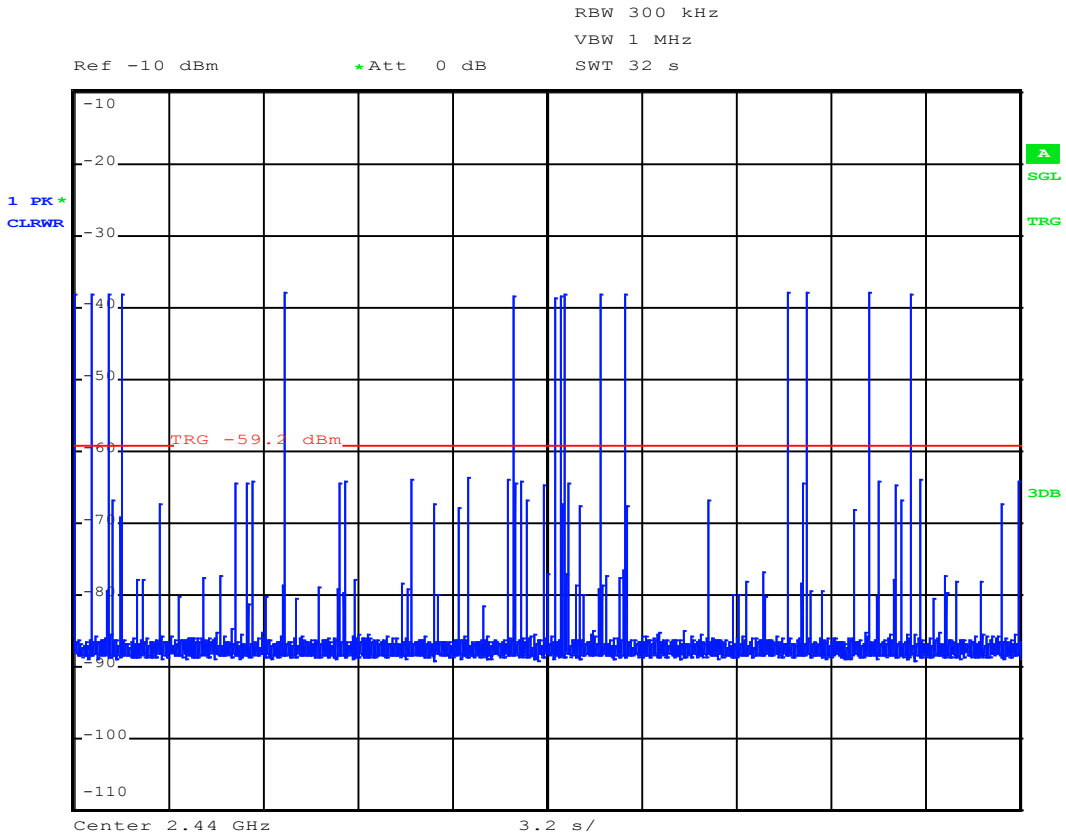
Low Channel



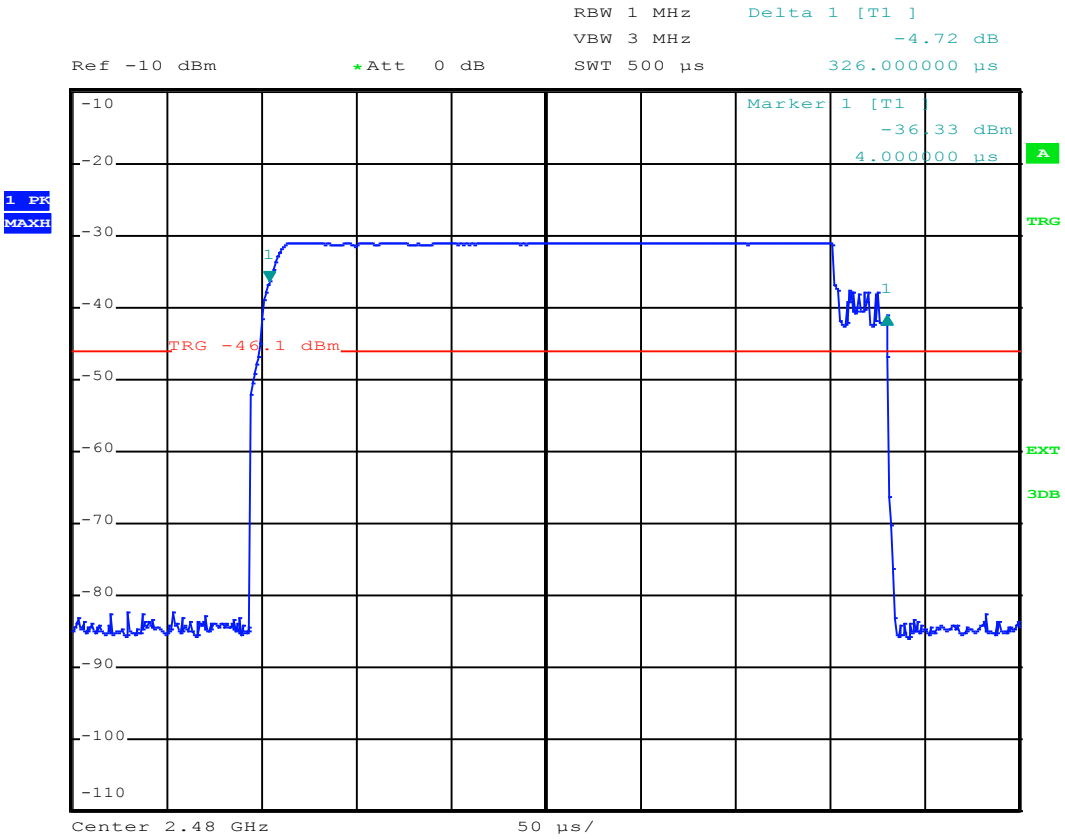

RBW 1 MHz
VBW 3 MHz
SWT 3.16 s
Delta 1 [T1]
0.00 dB
333.000000 µs
Ref -10 dBm
Att 0 dB
Marker 1 [T1]
-38.59 dBm
2.000000 µs
1 AP
CLRWR
A
SGL
TRG
EXT
3DB
TRG -60 dBm
-10
-20
-30
-40
-50
-60
-70
-80
-110
Center 2.402 GHz
316 ms/

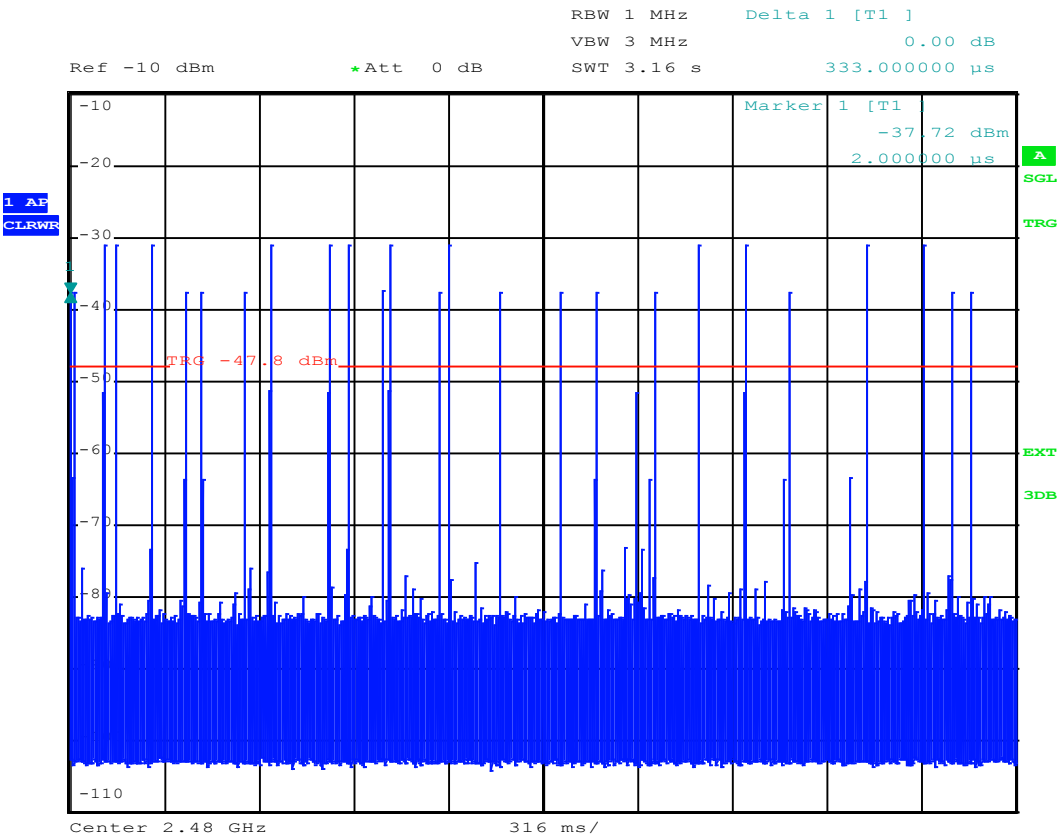
Central Channel



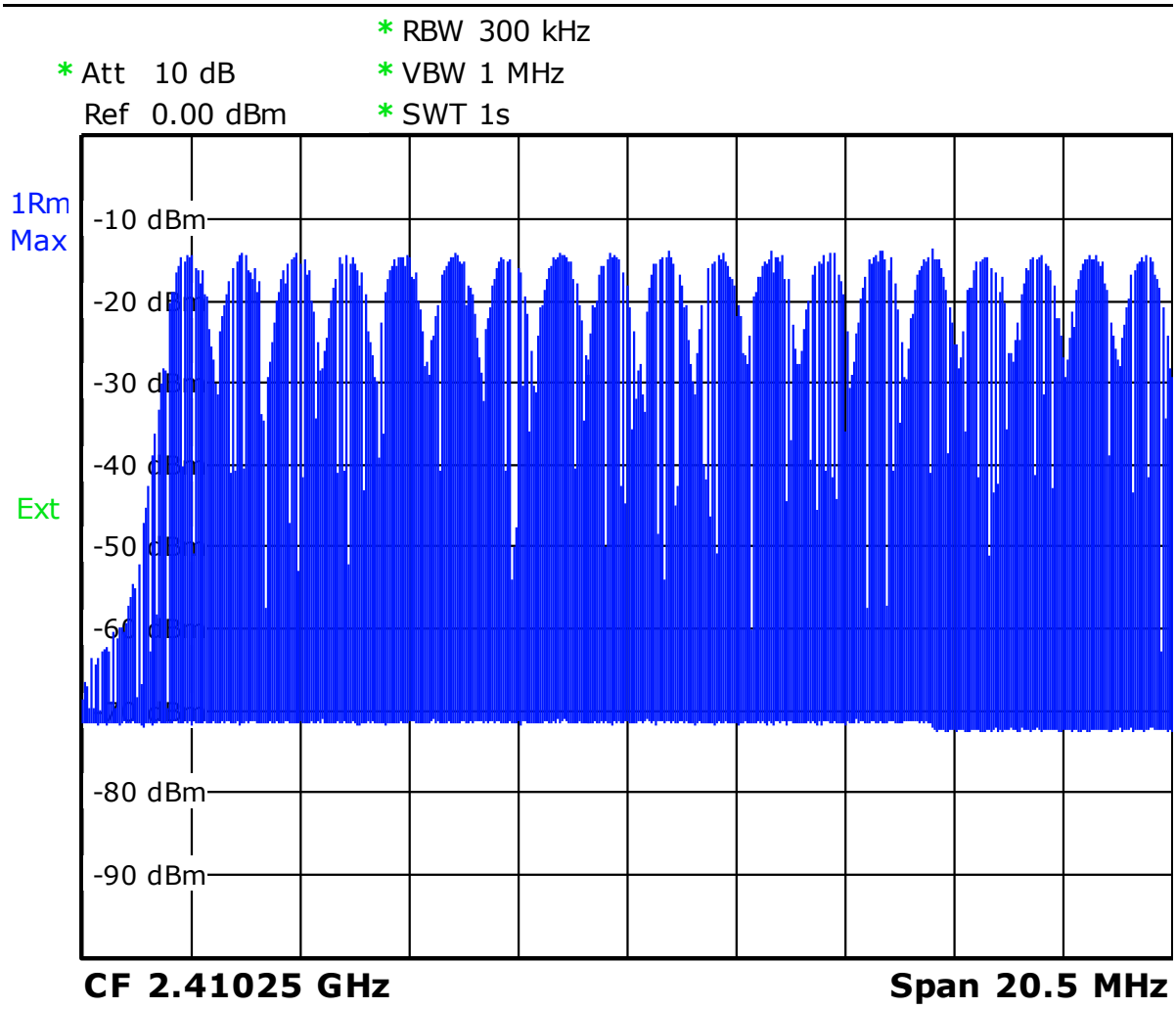

RBW 300 kHz
VBW 1 MHz
Ref -10 dBm
*Att 0 dB
SWT 32 s
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
-110
1 PK*
CLRWR
A
SGL
TRG
TRG -59.2 dBm
3DB
Center 2.44 GHz
3.2 s/

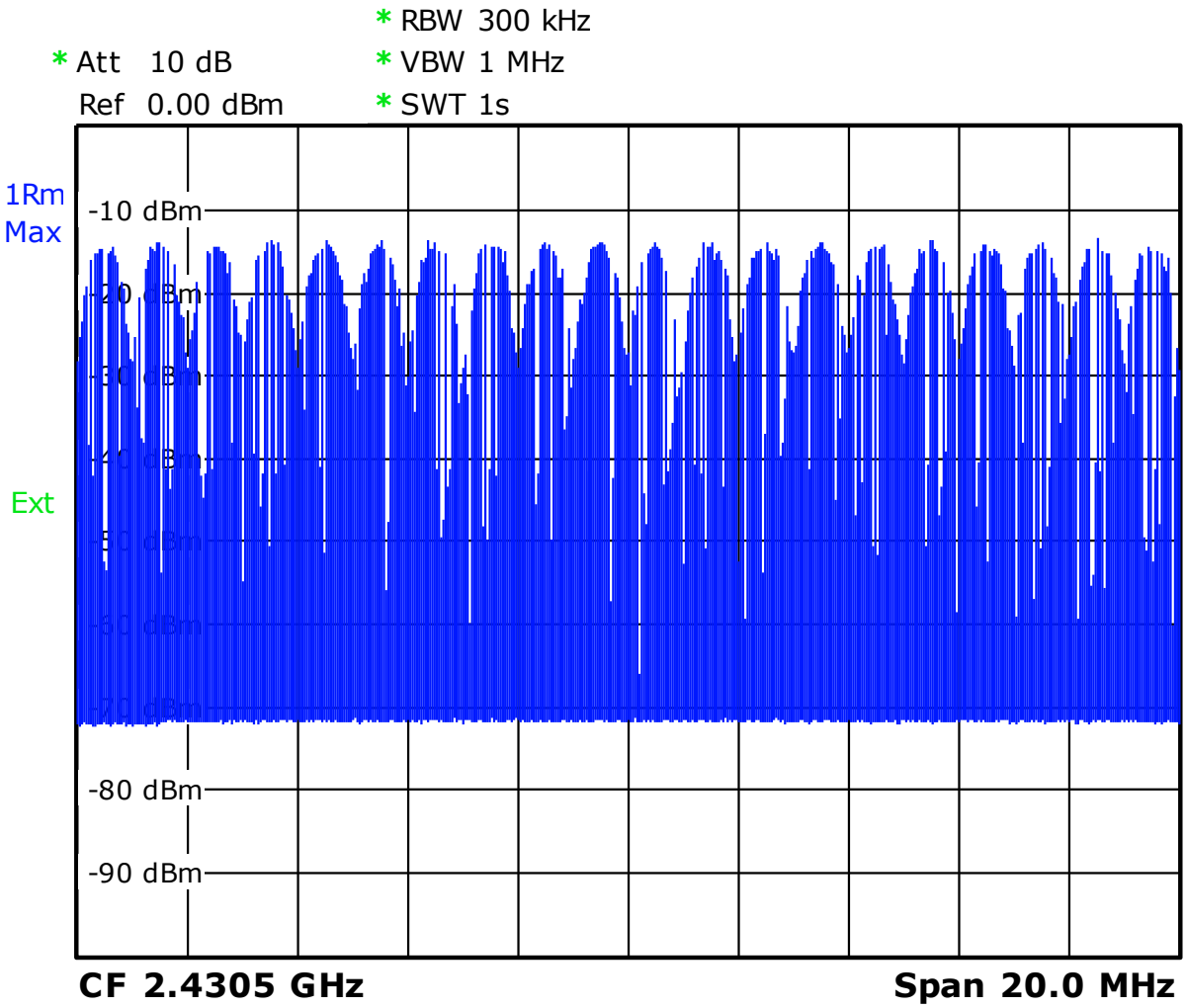
High Channel

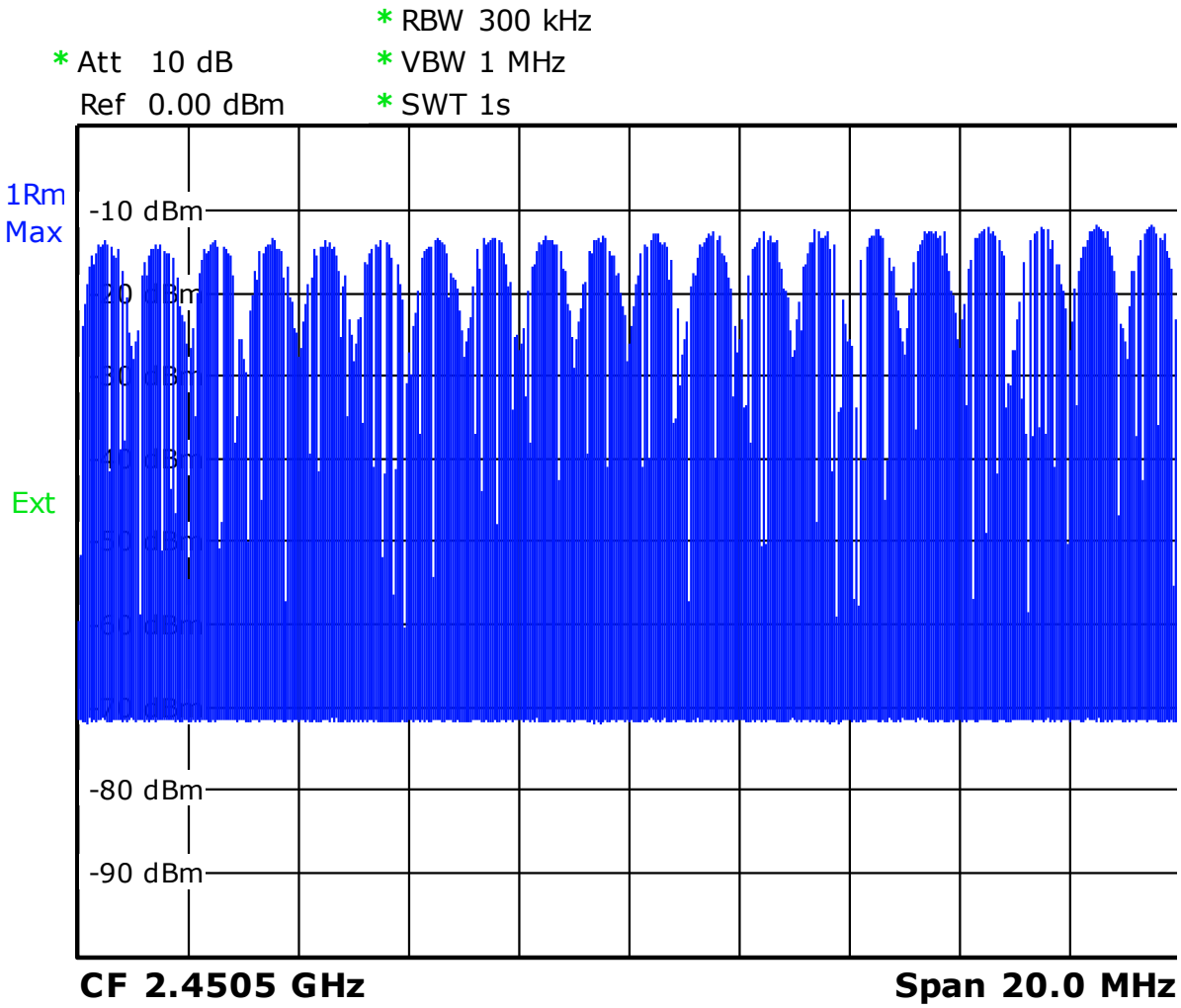


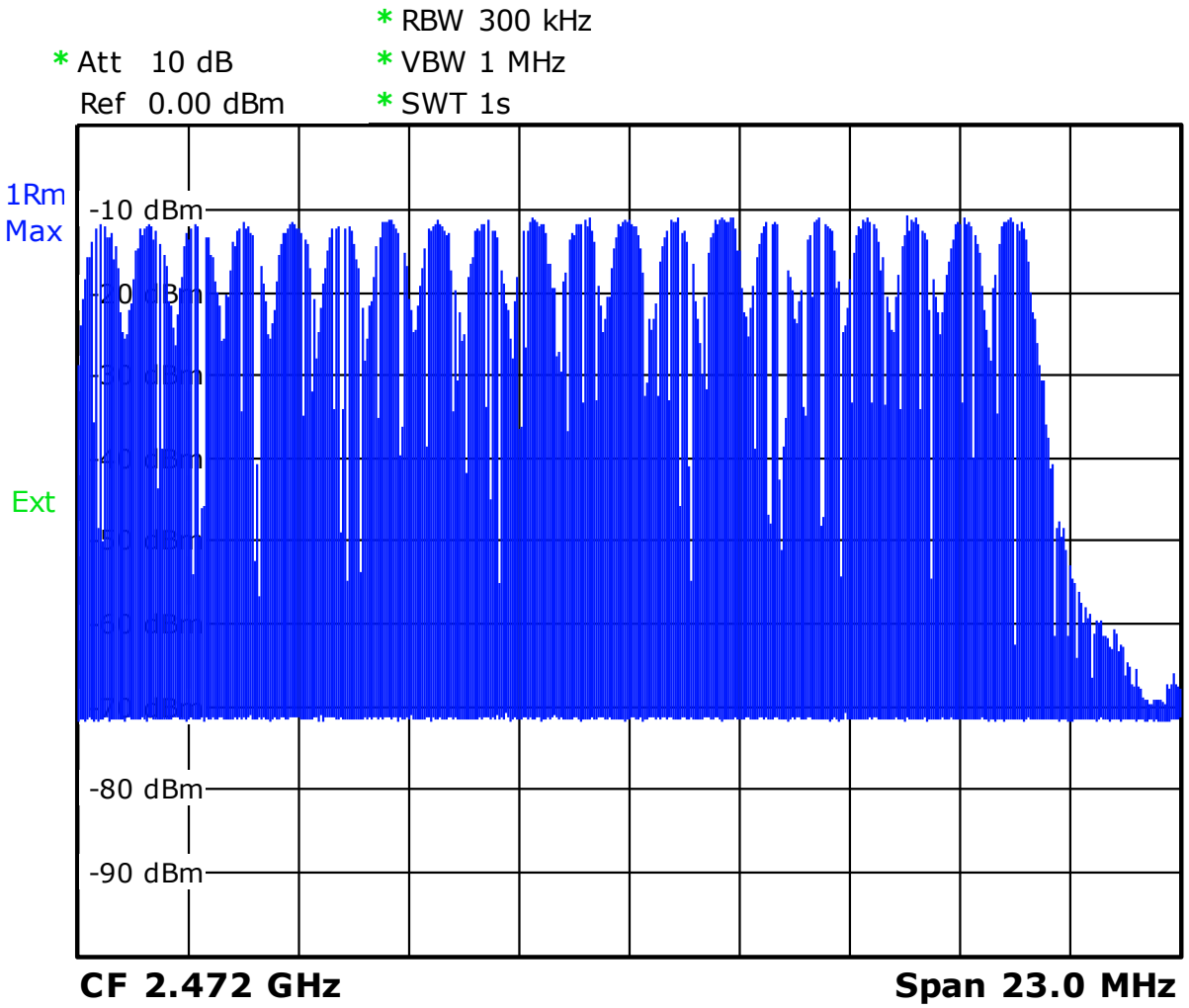

RBW 1 MHz
VBW 3 MHz
SWT 3.16 s
Delta 1 [T1]
0.00 dB
333.000000 µs
Ref -10 dBm
Att 0 dB
Marker 1 [T1]
-37.72 dBm
2.000000 µs
TRG -47.8 dBm
-10
-20
-30
-40
-50
-60
-70
-80
-110
Center 2.48 GHz
316 ms/
1 AP
CLRWR
A
SGL
TRG
EXT
3DB

APPENDIX 10: Number of hopping channels




* RBW 300 kHz
* Att 10 dB
* VBW 1 MHz
Ref 0.00 dBm
* SWT 1s
1Rm
Max
-10 dBm
Ext
-80 dBm
-90 dBm
CF 2.4305 GHz
Span 20.0 MHz


* RBW 300 kHz
* Att 10 dB
* VBW 1 MHz
Ref 0.00 dBm
* SWT 1s
1Rm
Max
-10 dBm
-80 dBm
-90 dBm
Ext
CF 2.4505 GHz
Span 20.0 MHz


* RBW 300 kHz
* Att 10 dB
* VBW 1 MHz
Ref 0.00 dBm
* SWT 1s
1Rm
Max
-10 dBm
Ext
-80 dBm
-90 dBm
CF 2.472 GHz
Span 23.0 MHz