

RR051-14-105547-3-A Ed. 1

This test report cancels and replaces test report RR051-14-105547-3-A Ed. 0

Certification test report

According to the standard:
CFR47 FCC PART 15.247

Equipment under test:
LOOP LINK (BLE Part)

MODEL: BU0211

FCCID:
2ADLABU0211

Company:
MYFOX

DISTRIBUTION: Mr CHAFIK

(Company: MYFOX)

Number of pages: 42 with 6 appendixes

Ed.	Date	Modified pages	Written by		Technical Verification and Quality Approval	
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1	21-May-2015	See vertical line	S. LOUIS	SL		

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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.



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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
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Responsible: Mr CHAFIK

DATE(S) OF TEST: 13 and 26 November 2014
2 and 3 December 2014
04 February 2015
13 February 2015

TESTING LOCATION: EMITECH ANGERS laboratory at JUIGNE SUR LOIRE (49) FRANCE
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FCC 2.948 Listed Site Registration Number: 90469
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Test Firm Registration Number: 873677

TESTED BY: S. LOUIS

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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 2400 MHz to 2483.5 MHz
Number of channels:	40
Channel spacing:	2MHz
Modulation:	Bluetooth Low Energy
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:

The EUT used can produce different test mode:

- Mode 1: RX BLE + RX 915MHz => Limited tests (15.107+15.109)
- Mode 2: RX WIFI => Limited tests (15.107+15.109)
- Mode 3: TX BLE (Low channel) + WIFI + TX 915MHz (Frame data)
- Mode 4: TX 915MHz
- Mode 7: TX BLE (Low channel) => Limited tests (15.207+15.209+15.215+15.247)
- Mode 8: TX BLE (Central channel) => Limited tests (15.209+15.215+15.247)
- Mode 9: TX BLE (High channel) => Limited tests (15.209+15.215+15.247)

In this report, only the Bluetooth Low Energy is evaluated.

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.
558074 D01 DTS v03r02	Guidance for Performing Compliance on Digital Transmission Systems Operating under §15.247

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
1939	IMC WR42	Antenna	20/04/2012	20/04/2016	20/06/2016
1940	IMC WR42	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 BR50702	Reject band filter	25/10/2013	25/10/2015	25/12/2015
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
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
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
8719	Thurbly Thandar Instruments 1600	LISN	23/06/2014	23/06/2016	23/08/2016
8750	La Crosse Technology WS-9232	Meteo station	03/09/2014	03/09/2016	03/11/2016
8893	Emitech	Outside room Hors cage	/	/	/
8896	ACQUISYS GPS8	Satellite synchronized frequency standard	/	/	/
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		
	(a) (2) Digital modulation techniques	X				Note 4
	(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 minimum 6 dB bandwidth of the equipment is 685.48 kHz (see appendix 4).

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

RF EXPOSURE:

Maximum measured power = 96.7 dB μ V/m = 1.403 mW

with $P = (E \times d)^2 / (30 \times G_p)$ with $d = 3$ m and $G_p = 1$

In accordance with KDB 447498 D01 General RF Exposure Guidance v05r02

$PSD = EIRP / (4 \times \pi \times R^2) = 1.403 / (4 \times \pi \times (20 \text{ cm})^2) = 279.16 \times 10^{-6} \text{ mW/cm}^2$ (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**Test procedure deviation:** Mode 1: Bluetooth Low energy + 915 MHz module in RX mode
Mode 2: WIFI RX mode**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 / Average**Bandwidth:** 10 kHz / 9kHz**Equipment under test operating condition:**

The equipment is blocked in reception mode.

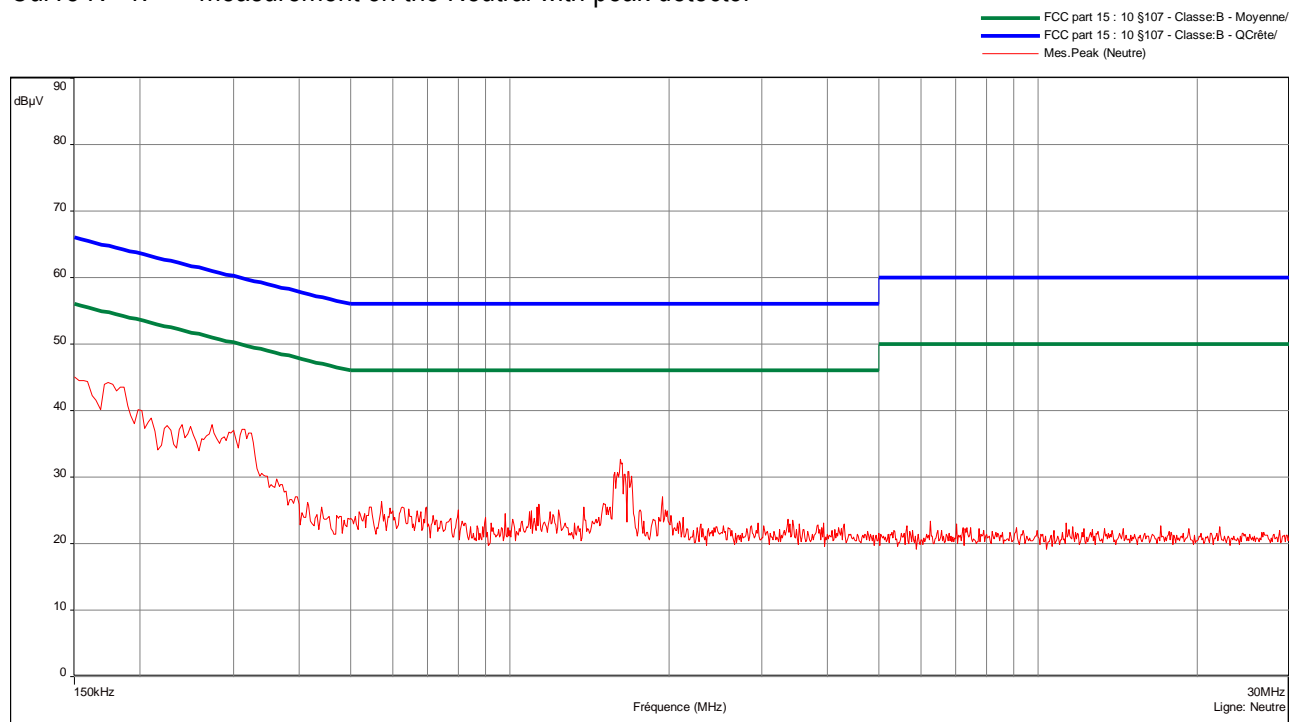
Results:

Ambient temperature (°C):	20.5
Relative humidity (%):	34

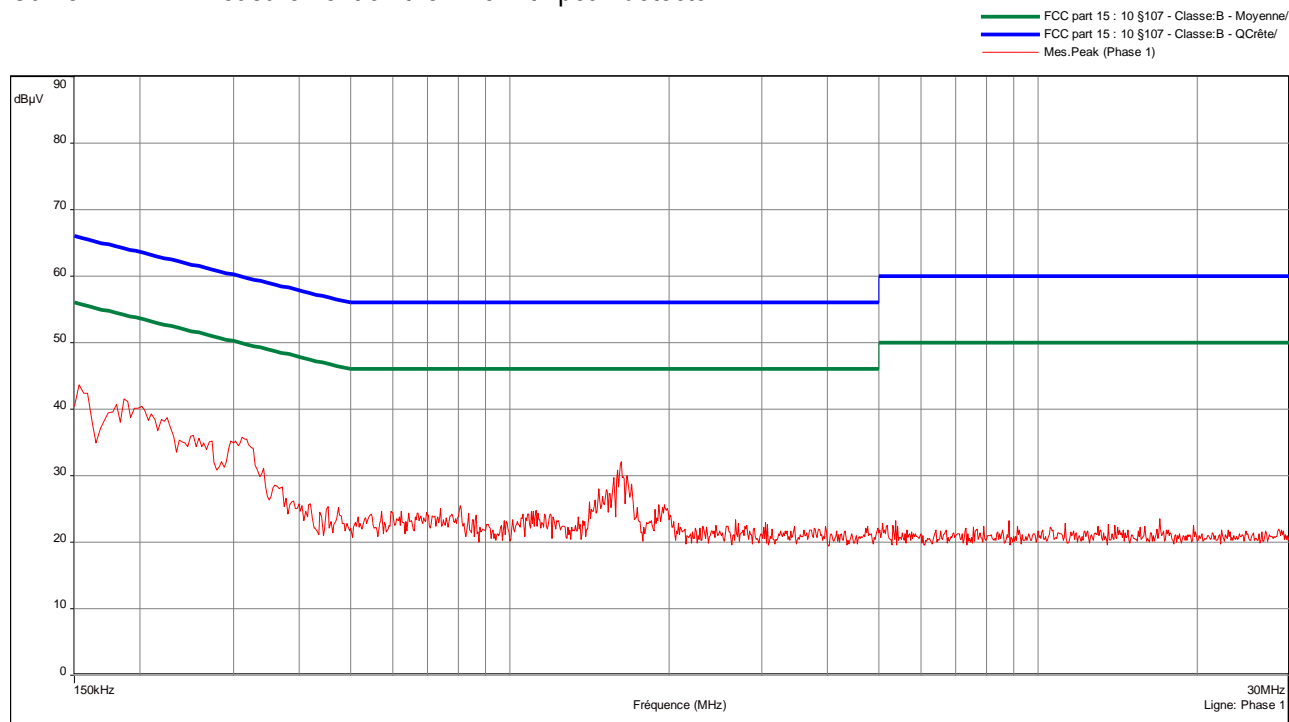
Measurement on the mains power supply: Mode 1: 915MHz radio Module + BLE in RX mode

The measurement is first realized with Peak detector.

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



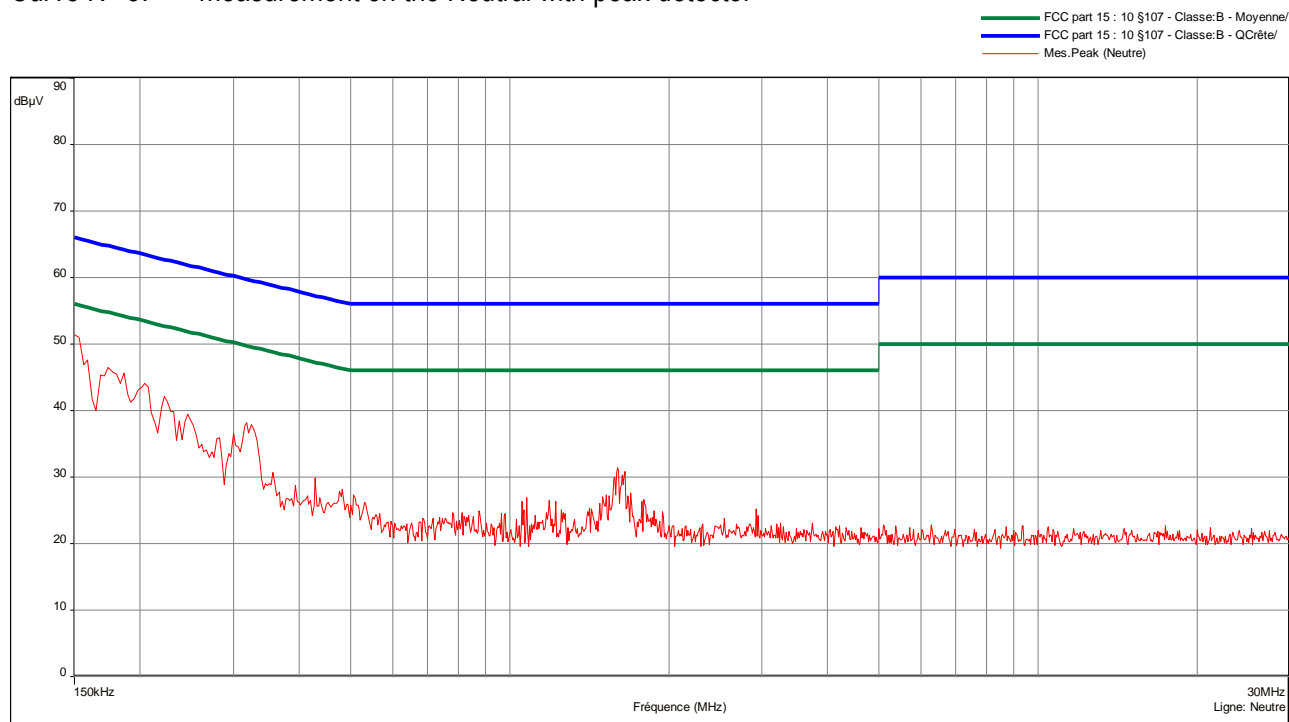
Curve N° 2: measurement on the Line with peak detector



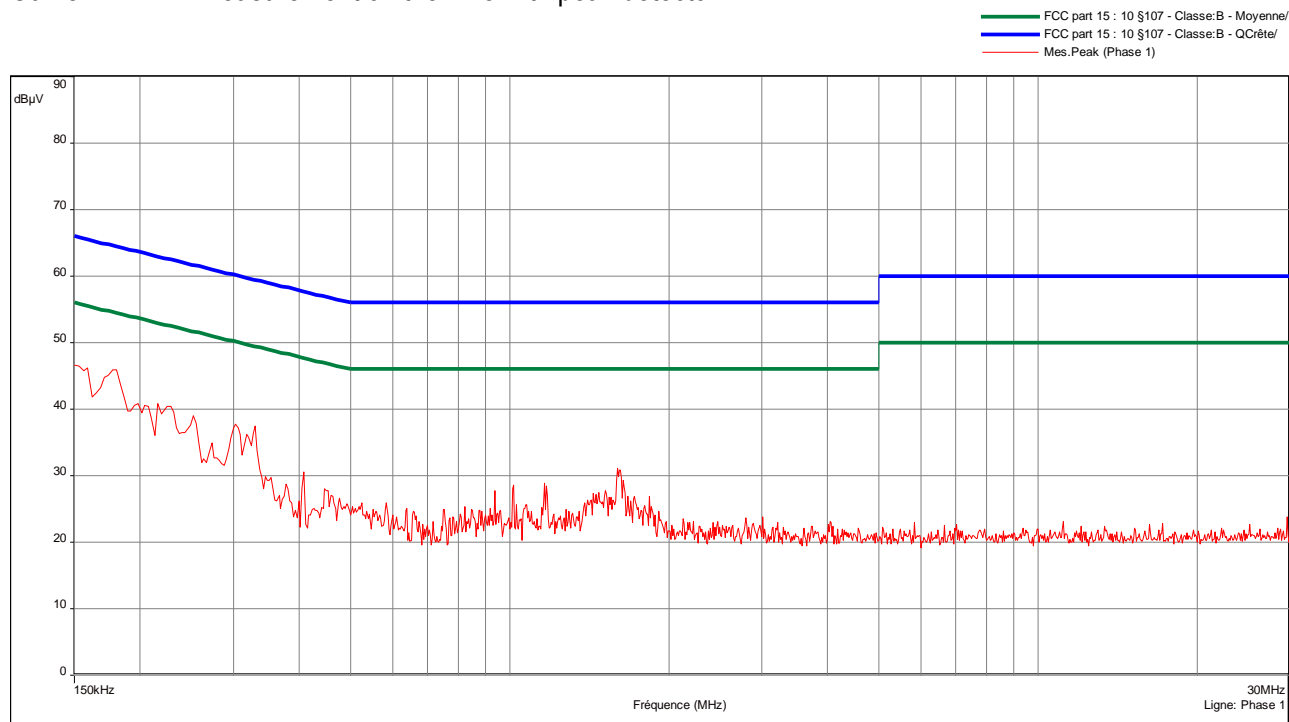
Measurement on the mains power supply: Mode 2 WIFI in RX mode

The measurement is first realized with Peak detector.

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

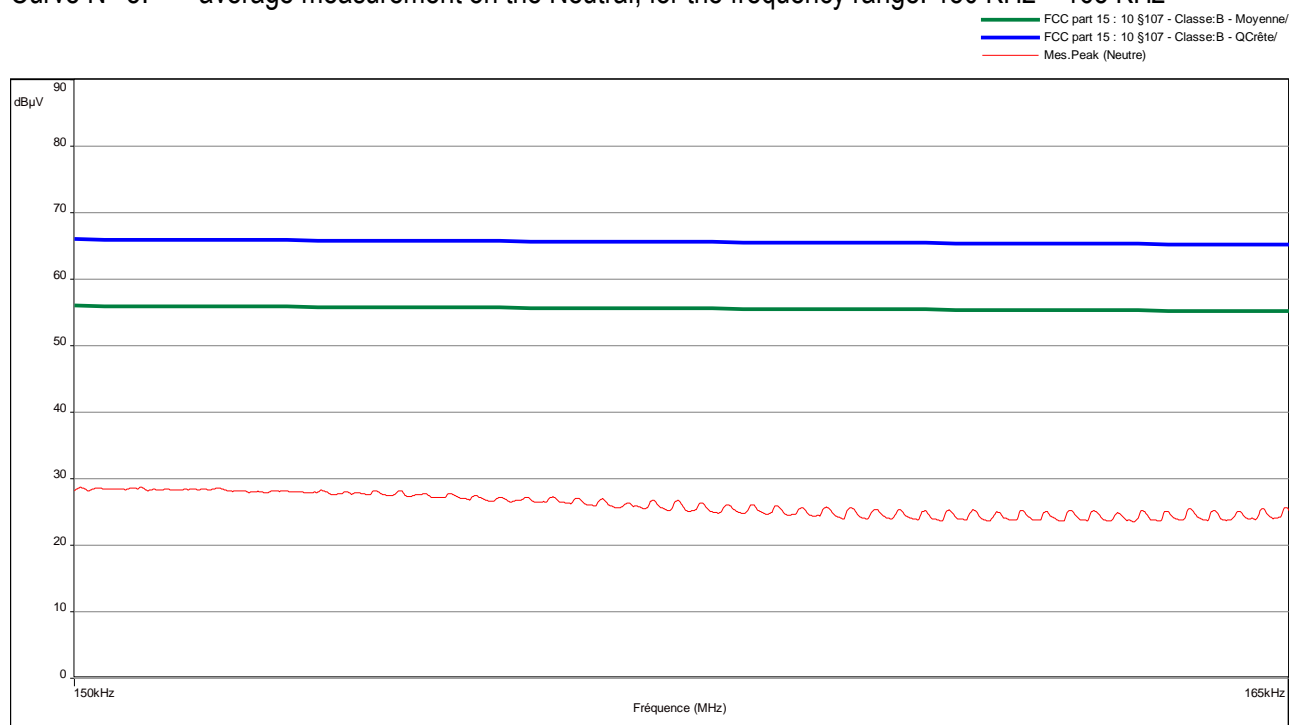


Curve N° 4: measurement on the Line with peak detector



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 – 165 KHz



Test conclusion:

RESPECTED STANDARD

8. RADIATED EMISSION LIMITS

Standard: FCC Part 15

Test procedure: paragraph 109

Test procedure deviation: Mode 1: Bluetooth Low energy + 915 MHz module in RX mode
Mode 2: WIFI RX mode

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 (2.48 GHz).

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): 21.2
Relative humidity (%): 39

Power source:

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

Sample N° 1 Mode 1: 915MHz radio Module + BLE in RX mode

Not any spurious has been detected.

Applicable limits:	for $30 \text{ MHz} \leq F \leq 88 \text{ MHz}$:	40 dB μ V/m at 3 meters
	for $88 \text{ MHz} < F \leq 216 \text{ MHz}$:	43.5 dB μ V/m at 3 meters
	for $216 \text{ MHz} < F \leq 960 \text{ MHz}$:	46 dB μ V/m at 3 meters
	Above 960 MHz :	54 dB μ V/m at 3 meters

Sample N° 1 Mode 2: WIFI in RX mode

Not any spurious has been detected.

Applicable limits:	for $30 \text{ MHz} \leq F \leq 88 \text{ MHz}$:	40 dB μ V/m at 3 meters
	for $88 \text{ MHz} < F \leq 216 \text{ MHz}$:	43.5 dB μ V/m at 3 meters
	for $216 \text{ MHz} < F \leq 960 \text{ MHz}$:	46 dB μ V/m at 3 meters
	Above 960 MHz :	54 dB μ V/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**Bandwidth:** 10 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.

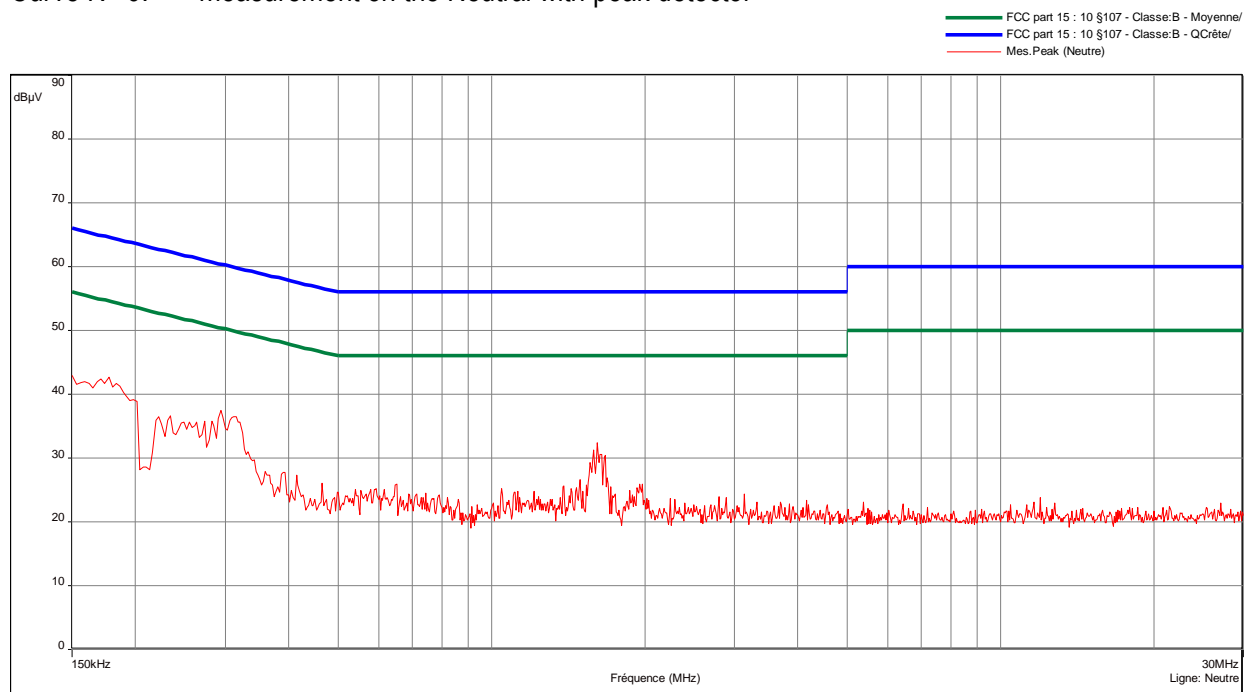
Results:

Ambient temperature (°C):	20.5
Relative humidity (%):	34

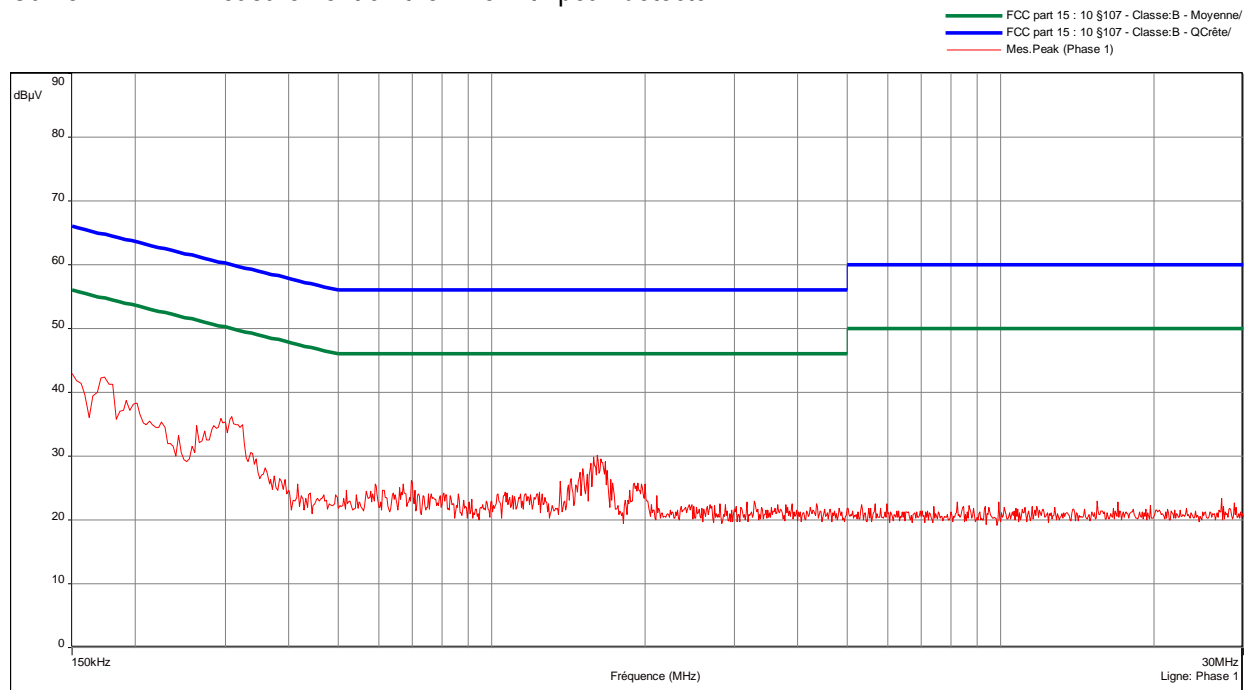
Measurement on the mains power supply: Mode 7 BLE in TX mode on low channel

The measurement is first realized with Peak detector.

Curve N° 6: measurement on the Neutral with peak detector



Curve N° 7: measurement on the Line with peak detector



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): 19.8
Relative humidity (%): 38

Power source:

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

Lower Band Edge: band from 2398 MHz to 2400 MHz
Upper Band Edge: band 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)
2402	96.3	peak	2399.82	-33.88	62.42	69.8	7.38
2480	92.4	peak	2483.51	-25.54	66.86	74	7.14
2480	92.4	average	2483.56	-41.83	50.57	54	3.43

*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 3 MHz and video bandwidth at 10 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): 21.2
Relative humidity (%): 39

Power source:

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

Sample N° 1 Low Channel

	Electro-magnetic field (dBµV/m):	Conducted power *(W)	Limit (W)
Nominal supply voltage:	96.7	0.001403	0.125

Polarization of test antenna: Vertical (height: 150 cm)

Position of equipment: See photos in appendix 2 (azimuth: 39 degrees)

$$* P = (E \times d)^2 / (30 \times G_p) \text{ with } d = 3 \text{ m and } G_p = 1$$

Sample N° 1 Central Channel

	Electro-magnetic field (dBµV/m):	Conducted power *(W)	Limit (W)
Nominal supply voltage:	95.1	0.000971	0.125

Polarization of test antenna: Vertical (height: 150 cm)

Position of equipment: See photos in appendix 2 (azimuth: 14 degrees)

$$* P = (E \times d)^2 / (30 \times G_p) \text{ with } d = 3 \text{ m and } G_p = 1$$

Sample N° 1 High Channel

	Electro-magnetic field (dBµV/m):	Conducted power *(W)	Limit (W)
Nominal supply voltage:	92.4	0.000521	0.125

Polarization of test antenna: Vertical (height: 150 cm)

Position of equipment: See photos in appendix 2 (azimuth: 16 degrees)

$$* P = (E \times d)^2 / (30 \times G_p) \text{ with } d = 3 \text{ m and } G_p = 1$$

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 (2.48GHz).

Detection mode: Quasi-peak ($F < 1 \text{ GHz}$)

Peak / Average ($F > 1 \text{ GHz}$)

Bandwidth: 200Hz ($9 \text{ kHz} < F < 150\text{kHz}$)
9 kHz ($150 \text{ kHz} < F < 30\text{MHz}$)
120 kHz ($30 \text{ MHz} < F < 1 \text{ GHz}$)
100 kHz / 1 MHz ($F > 1 \text{ GHz}$)

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): 21.5
Relative humidity (%): 35

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)
4804.5(*)	P	150	—	1000	V	47.3**	74	26.7
7206	P	150	276	100	H	51.2	76.3	25.1

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)
4881(*)	P	150	—	1000	V	46.1**	74	27.9
7320.6(*)	P	150	343	1000	H	53.1**	74	20.9

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)
7440.6(*)	P	150	330	1000	H	55.8	74	18.2
7439.6(*)	Av	150	330	1000	H	50.6	54	3.4

* 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 96.3 dB μ V/m on lower channel.

So the applicable limit is 76.3 dB μ V/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

13. PEAK POWER DENSITY

Standard: FCC Part 15

Test procedure: paragraph 15.247 (e)

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 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 measuring distance between the equipment and the test antenna is 3 m. The test antenna has been oriented in two polarizations (Vertical and Horizontal) and raised and lowered from 1m to 4m above the ground level. Only the highest level of each measurement is reported.

We used the same method of the peak output power measurement, but the equipment under test power level is recorded with the spectrum analyzer.

Resolution bandwidth: 3 kHz

Video bandwidth: 10 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): 21.2
Relative humidity (%): 39

Power source:

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

Sample N° 1 Low Channel:

	Peak power density at frequency: 2402 MHz
Normal test conditions	-0.43 dBm
Limits	+8 dBm

Polarization of test antenna: Vertical (height: 150 cm)

Position of equipment: See photos in appendix 2 (azimuth: 39 degrees)

Sample N° 1 Central Channel:

	Peak power density at frequency: 2440 MHz
Normal test conditions	-1.93 dBm
Limits	+8 dBm

Polarization of test antenna: Vertical (height: 150 cm)

Position of equipment: See photos in appendix 2 (azimuth: 14 degrees)

Sample N° 1 High Channel:

	Peak power density at frequency: 2480 MHz
Normal test conditions	-2.83
Limits	+8 dBm

Polarization of test antenna: Vertical (height: 150 cm)

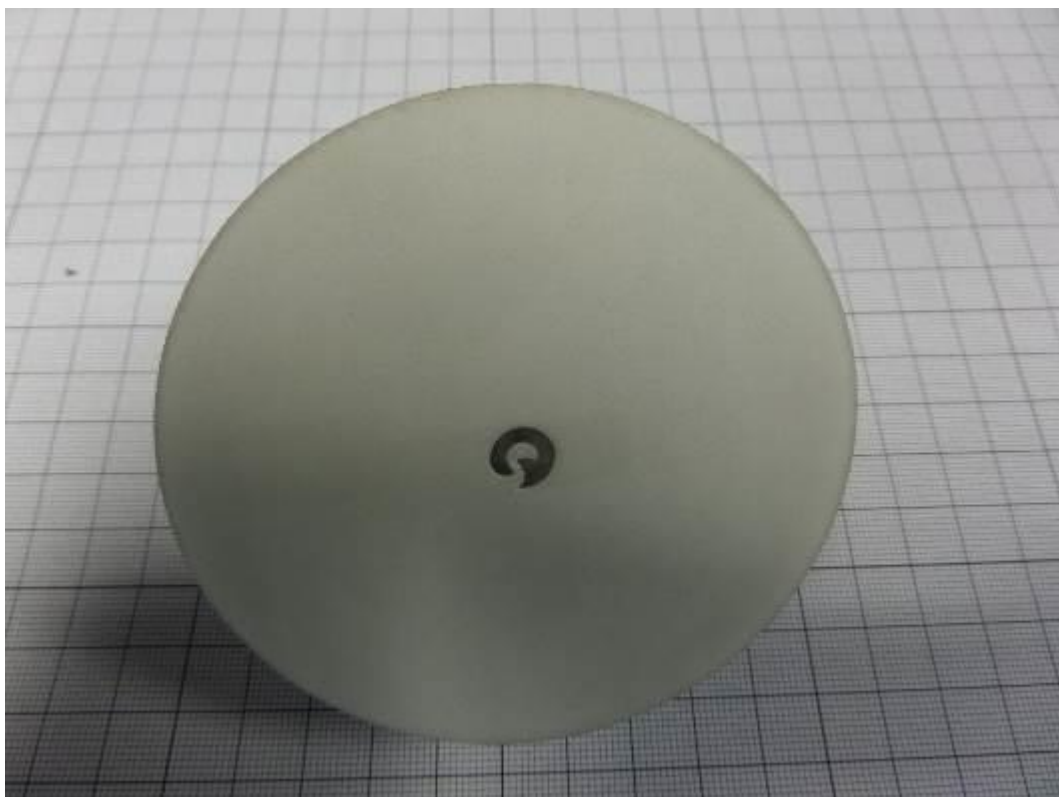
Position of equipment: See photos in appendix 2 (azimuth: 16 degrees)

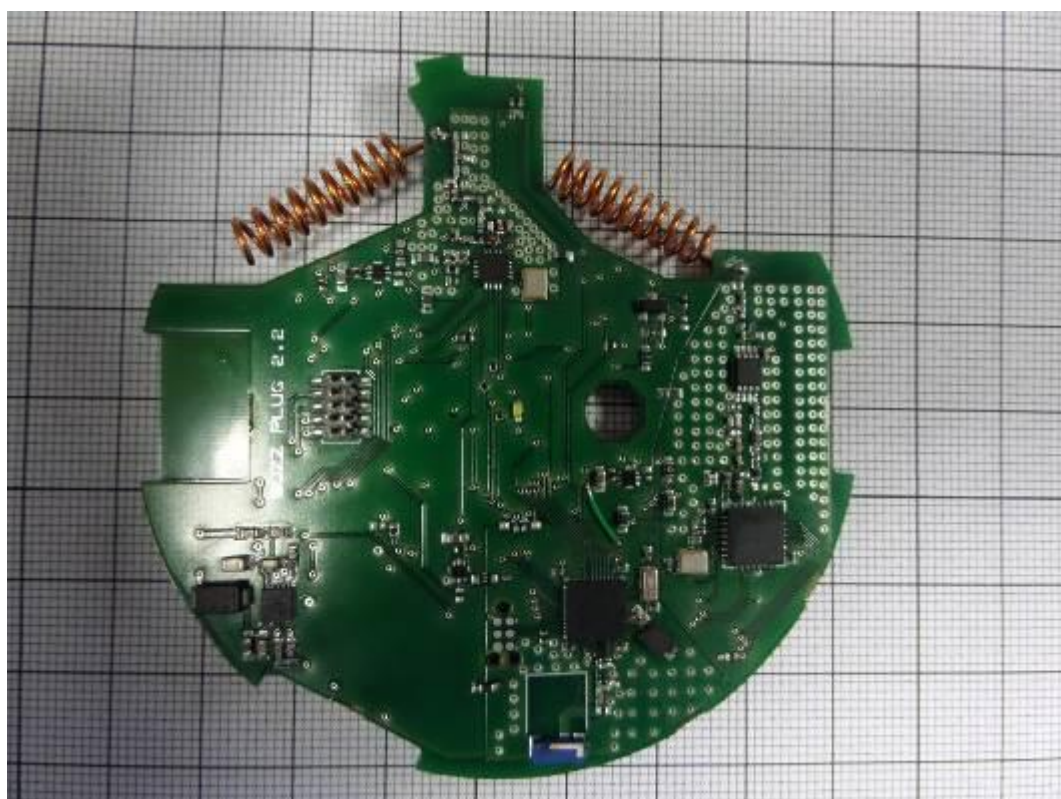
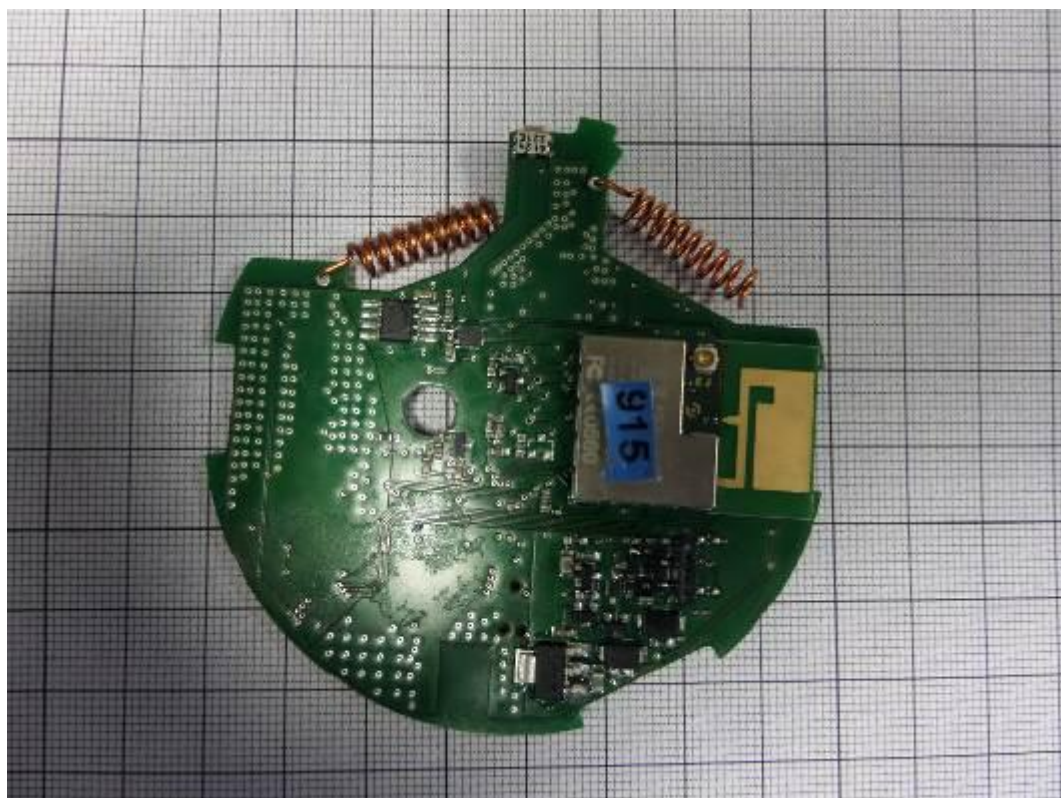
Test conclusion:

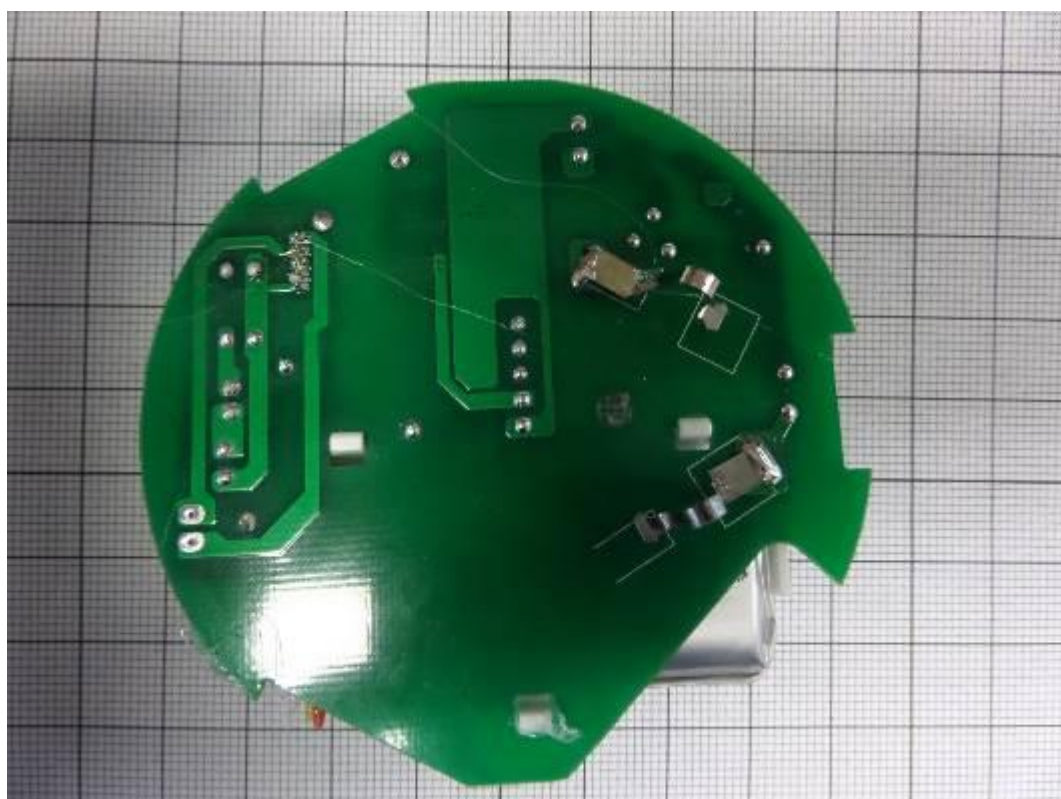
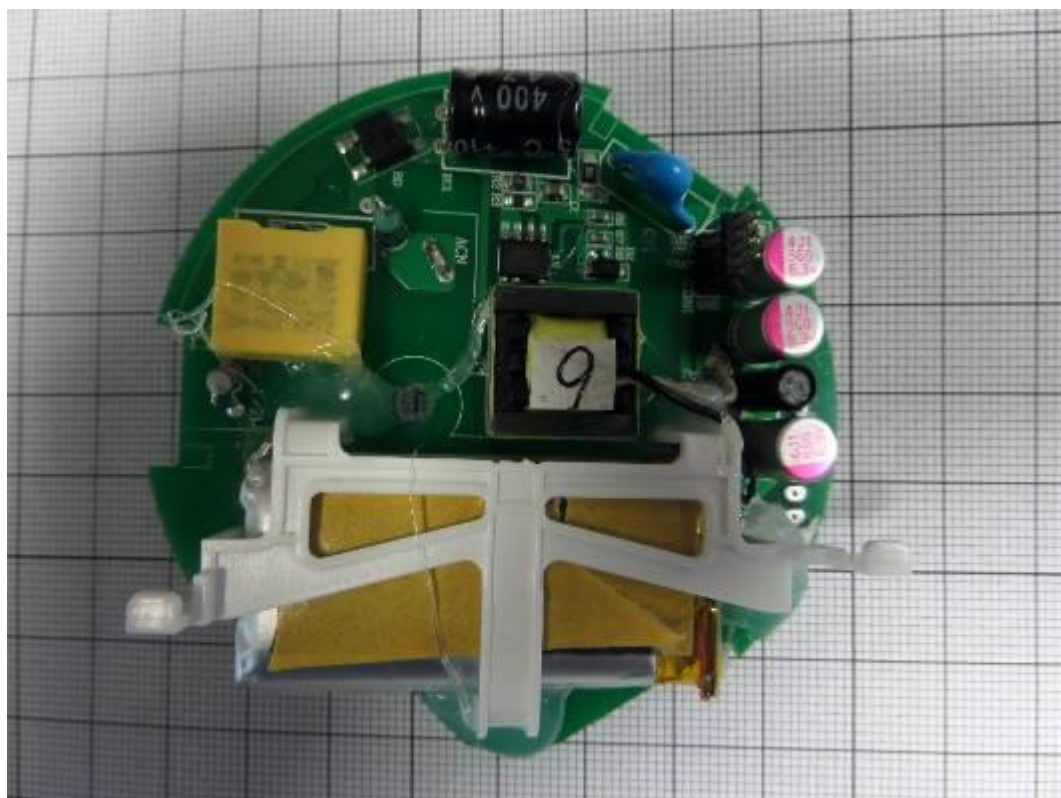
RESPECTED STANDARD

□□□ End of report, 6 appendixes to be forwarded □□□

APPENDIX 1: Photos of the equipment under test

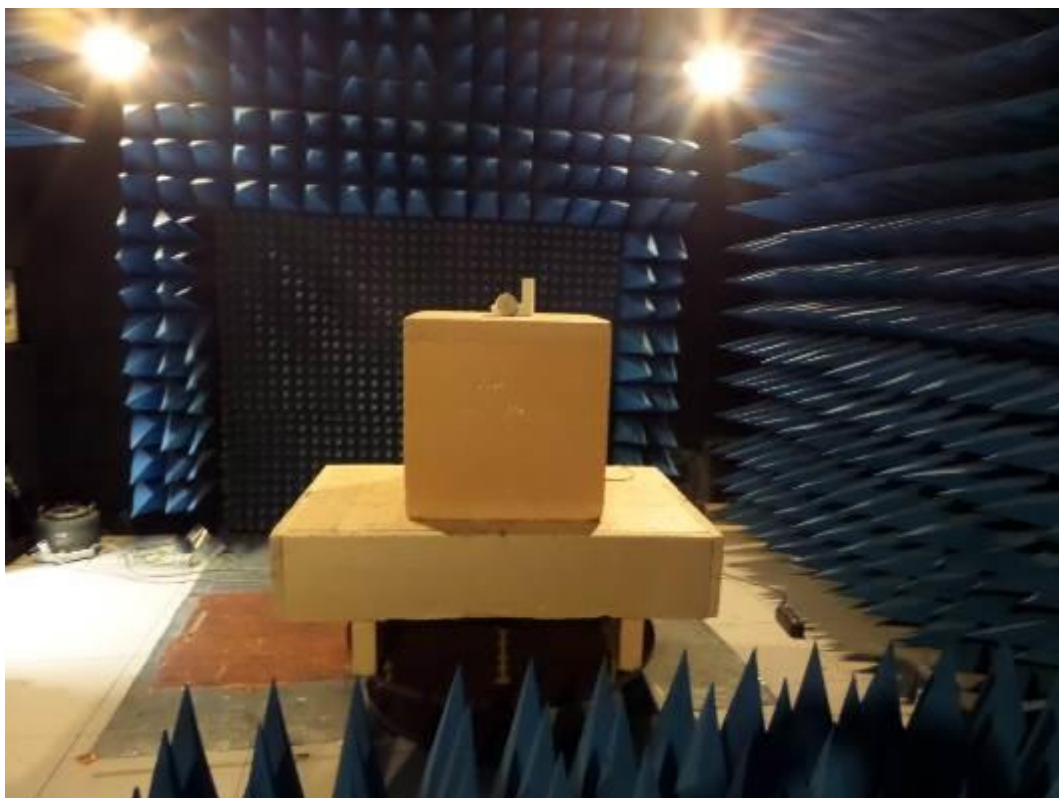




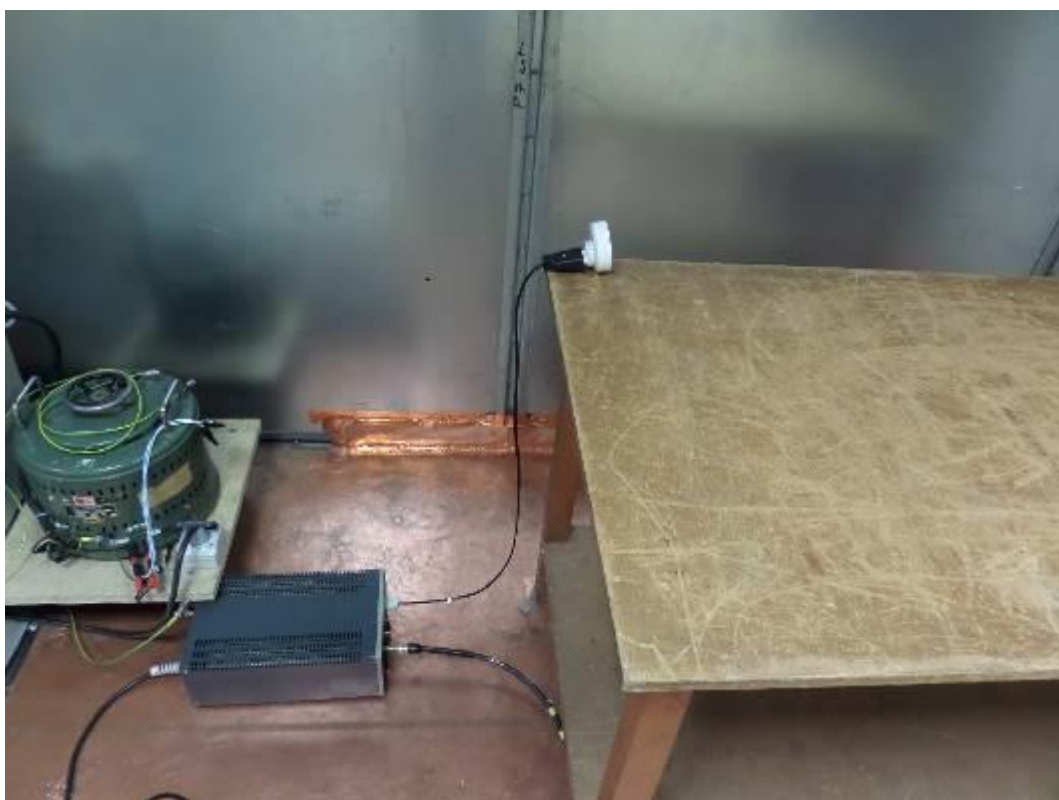


APPENDIX 2: Test set up

Radiated 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
Antenna 3115	EMCO	8535
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
Anechoic Chamber	EMITECH	8593
Satellite synchronized frequency standard GPS8	ACQUISYS	8896
Spectrum Analyzer FSP40	Rohde & Schwarz	4088
Antenna 3115	EMCO	8535
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

Intentional radiator

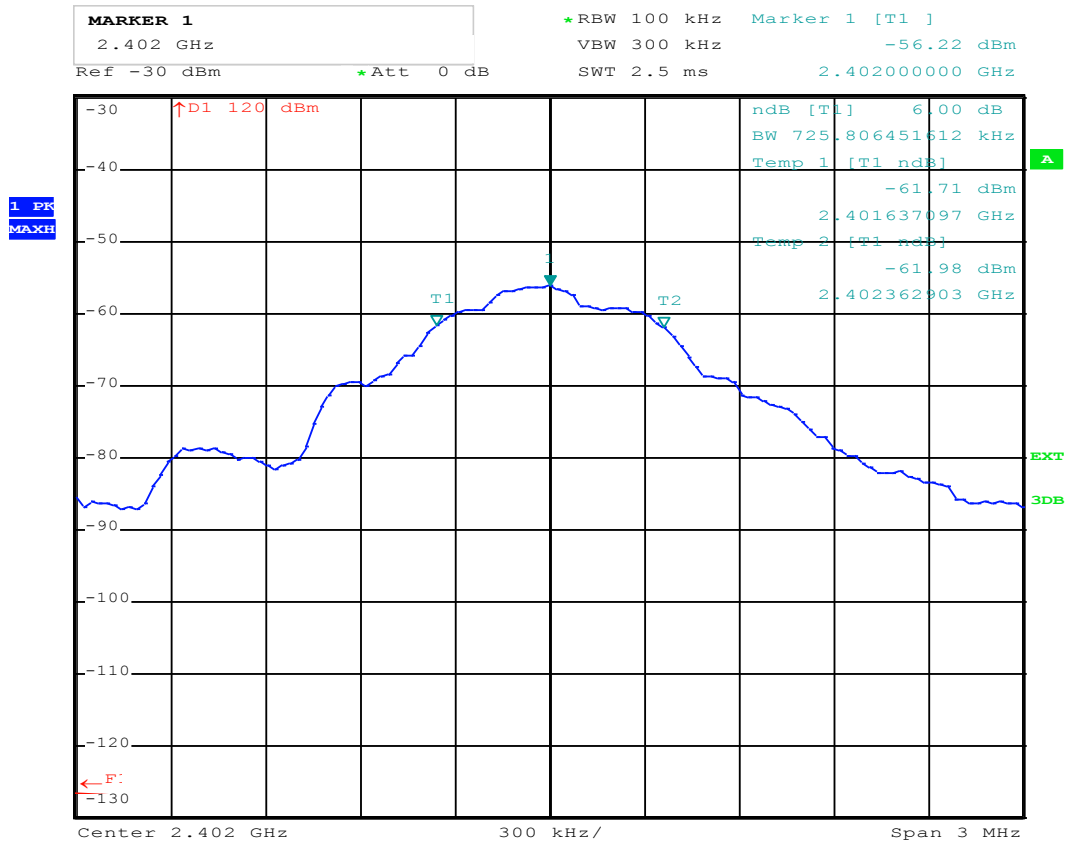
TYPE	MANUFACTURER	EMITECH NUMBER
Anechoic Chamber	EMITECH	8593
Satellite synchronized frequency standard GPS8	ACQUISYS	8896
Spectrum Analyzer FSP40	Rohde & Schwarz	4088
Loop antenna 6502	EMCO	1406
Biconical antenna VHBB 9124	Schwarzbeck	8526
Log periodic antenna UHALP 9108A	Schwarzbeck	8543
Antenna 3115	EMCO	8535
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
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

Peak power density

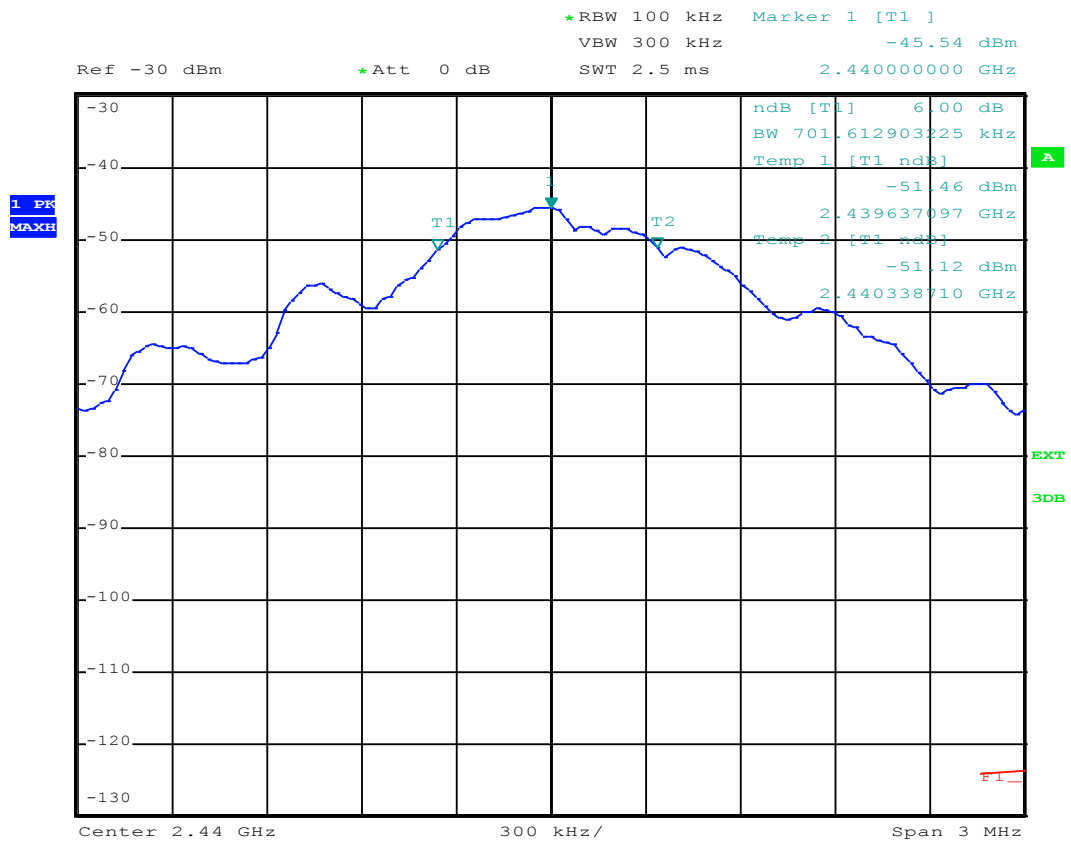
TYPE	MANUFACTURER	EMITECH NUMBER
Anechoic Chamber	EMITECH	8593
Satellite synchronized frequency standard GPS8	ACQUISYS	8896
Spectrum Analyzer FSP40	Rohde & Schwarz	4088
Antenna 3115	EMCO	8535
Power source 1251RP	California instruments	8508
Multimeter MN5102B	AOIP	8675
Meteo station WS-9232	La Crosse Technology	8750
Software	BAT-EMC V3.6.0.32	0000

APPENDIX 4: 6 dB bandwidth

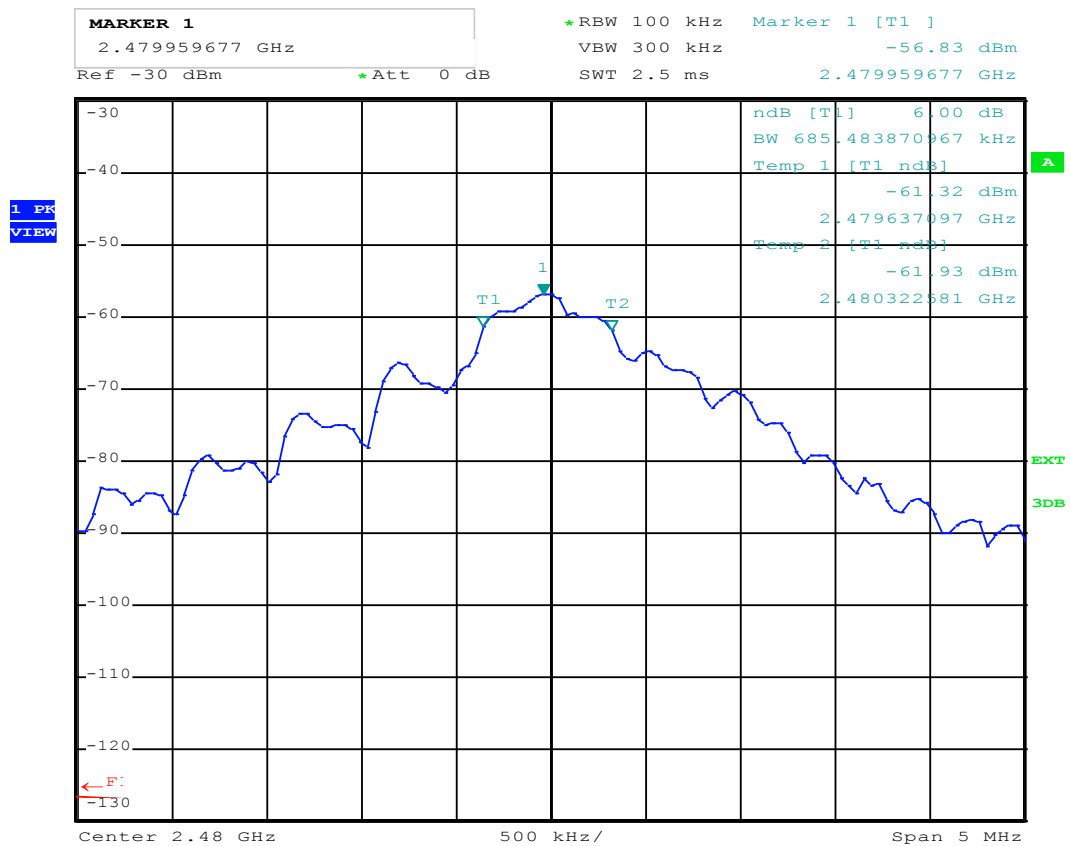
Low Channel



Central Channel

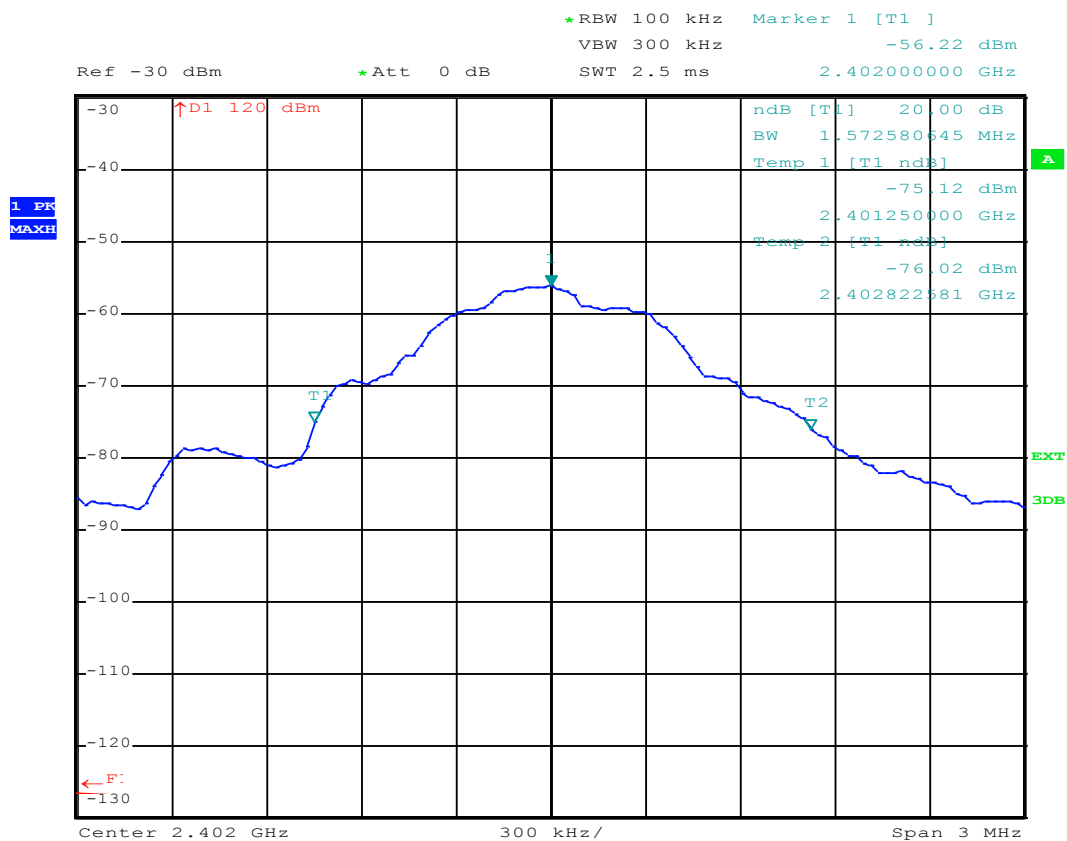


High Channel

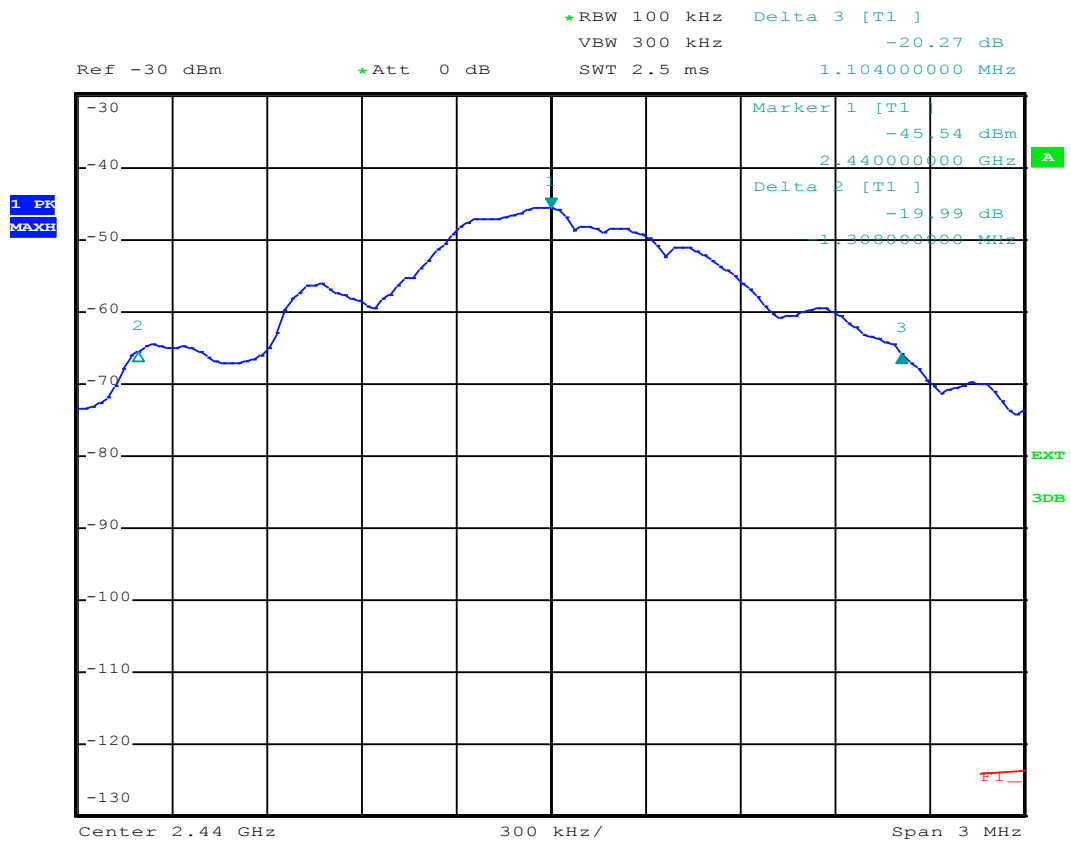


APPENDIX 5: 20 dB bandwidth

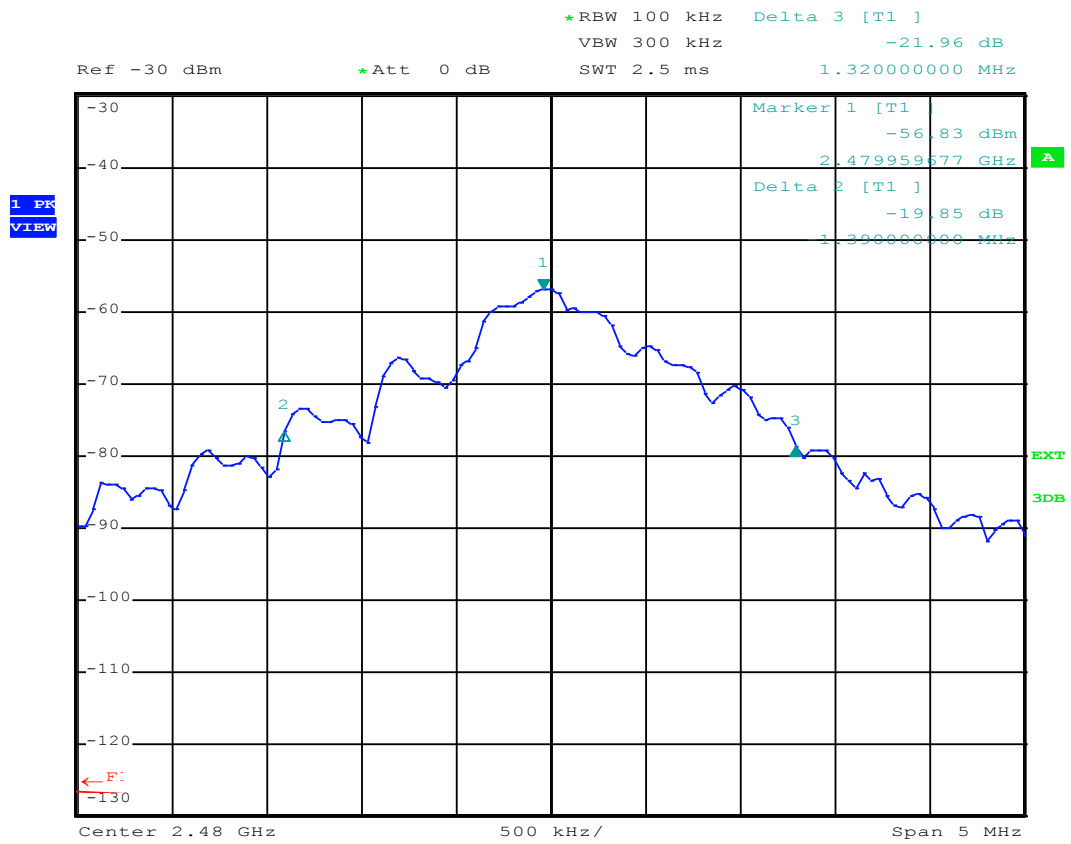
Low Channel



Central Channel

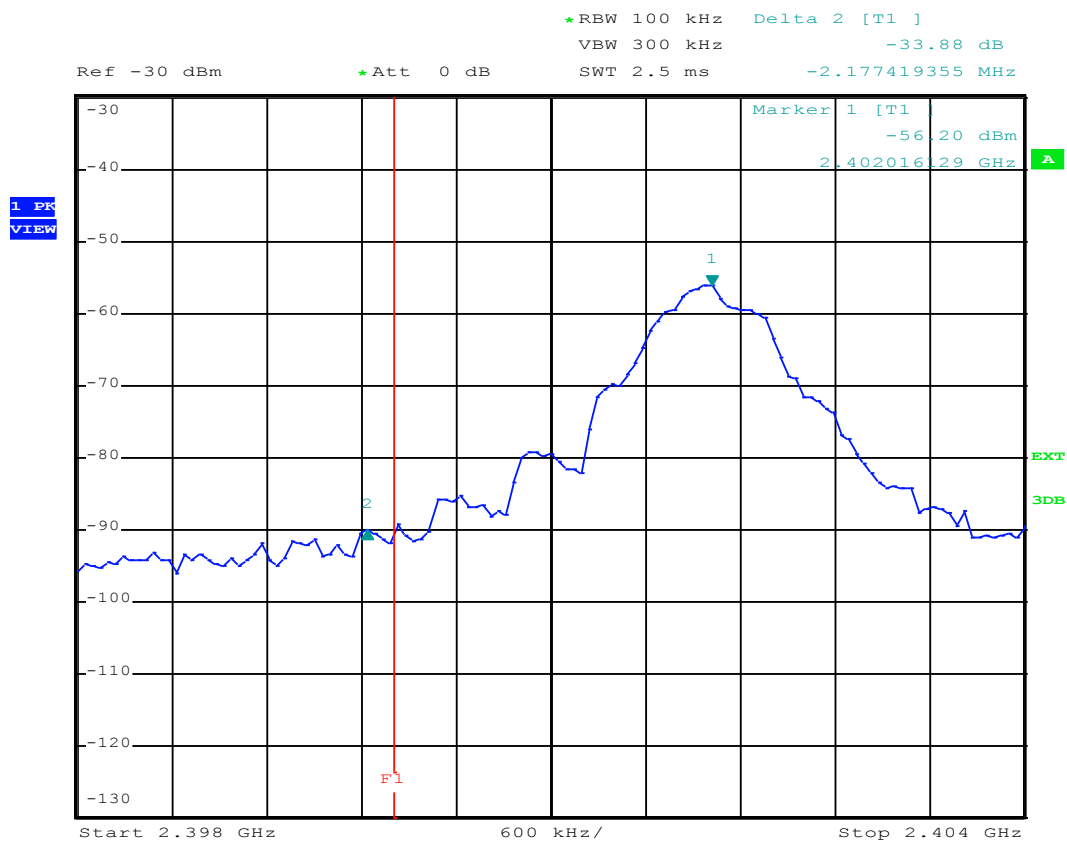


High Channel



APPENDIX 6: Band edge

Lower Band edge



Upper Band edge

