EMITECH GROUPE

**RR051-14-105388-3-A Ed. 1**

This test report cancels and replaces test report RR051-14-105388-3-A Ed. 0

# Certification test report

**According to the standard:**
**CFR47 FCC PART 15**

**Equipment under test:**
**LOOP INTELLITAG 915MHz**

**Model: BU2002**

**FCCID:**
**2ADLABU2002**

**Company:**
**MYFOX**

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

**Number of pages: 25 with 6 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 INTELLITAG 915MHz** |
| **Serial number (S/N):** | BTAG2-0000001 |
| **Reference / model (P/N):** | BU2002 |
| **Software version:** | 1.0 |
| **MANUFACTURER:** | MYFOX |

**COMPANY SUBMITTING THE PRODUCT:**

| | |
|---|---|
| **Company:** | MYFOX |
| **Address:** | RUE DU LAC 2460 L'OCCITANE<br>REGENT PARK II<br>31670 LABEGE<br>FRANCE |
| **Responsible:** | Mr CHAFIK |
| **DATE(S) OF TEST:** | 12, 14, 17, 18, 25, 26 and 27 November 2014 |
| **TESTING LOCATION:** | EMITECH ANGERS laboratory at JUIGNE SUR LOIRE (49) FRANCE<br>EMITECH ANGERS open area test site in JUIGNE SUR LOIRE (49) FRANCE<br>21 rue de la Fuye<br>49610 Juigne sur Loire<br>France<br>FCC 2.948 Listed Site Registration Number: 90469<br>FCC Accredited under US-EU MRA Designation Number: FR0009<br>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 INTELLITAG 915MHz**, in accordance with normative reference.

## 2. PRODUCT DESCRIPTION

| | |
|---|---|
| ITU Emission code: | 68K5F1D |
| Class: | B (residential) / Utilization: Alarm system |
| Antenna type and gain: | Internal helicoidal antenna: gain not communicated |
| Operating frequency range: | from 902 MHz to 928 MHz |
| Number of channels: | 1 |
| Channel spacing: | Not concerned |
| Modulation: | FSK |
| Power source: | 1.5Vdc by internal lithium battery. type FR03 (AAA size) |

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.

5 samples were tested in emission to determine the maximum power level allowed by the standard:
Sample 1: TAG 0x14 => power level higher than the standard limit
Sample 2: TAG 0x0F => power level higher than the standard limit
Sample 3: TAG 0x0B => power level higher than the standard limit
Sample 4: TAG 0x09 => power level higher than the standard limit
Sample 5: TAG 0x07 => power level **lower** than the standard limit
Full tests described in this report were performed on sample 5 except “Radiated emission limits” tests performed on sample 6: TAG RX915

## 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 Electronics Equipment in the range of 9 kHz to 40 GHz. |

## 4. TEST METHODOLOGY

Radio performance tests procedures given in CFR 47 part 15:

Subpart B –Unintentional Radiators
Paragraph 109: Radiated emission limits

Subpart C – Intentional Radiators
Paragraph 203: Antenna requirement
Paragraph 205: Restricted bands of operation
Paragraph 209: Radiated emission limits; general requirements
Paragraph 215: Additional provisions to the general radiated emission limitations
Paragraph 249: Operation within the bands 902-928 MHZ, 2400-2483.5 MHz, 5725-5850 MHz and 24.0-24.25 GHz.

## 5. TEST EQUIPMENT CALIBRATION DATES

| Equipment | Model | Type | Last verification | Next verification | Validity |
|---|---|---|---|---|---|
| 0000 | BAT-EMC | Software | / | / | / |
| 1922 | Microwave DB C020180F-4B1 | Low-noise amplifier 1 to 18 GHz | 20/08/2014 | 20/08/2015 | 20/10/2015 |
| 4088 | R&S FSP40 | Spectrum Analyzer | 22/08/2013 | 22/08/2015 | 22/10/2015 |
| 6609 | MICRO-TRONICS HPM11630 | high-pass filter | 24/02/2014 | 24/02/2016 | 24/04/2016 |
| 8511 | Hewlett Packard 8447D | Low noise amplifier | 20/08/2014 | 20/08/2015 | 20/10/2015 |
| 8526 | Schwarzbeck VHBB 9124 | Biconical antenna | 12/06/2012 | 12/06/2016 | 12/08/2016 |
| 8530 | Bilog CBL5112A | Bilog antenna | 05/03/2013 | 05/03/2017 | 05/05/201 |
| 8533 | R&S HFH2-Z2 | Loop antenna | 11/02/2014 | 11/02/2016 | 11/04/2016 |
| 8535 | Emco 3115 | Horn antenna | 29/10/2012 | 29/10/2016 | 29/12/2016 |
| 8543 | Schwarzbeck UHALP 9108A | Log periodic antenna | 12/06/2012 | 12/06/2016 | 12/08/2016 |
| 8593 | SIDT Cage 2 | Full anechoic room | / | / | / |
| 8675 | AOIP MN5102B | Multimeter | 15/01/2013 | 15/01/2015 | 15/03/2015 |
| 8707 | R&S ESI7 | Test receiver | 03/10/2012 | 03/10/2014 | 03/12/2014 |
| 8732 | Emitech | OATS | 23/08/2013 | 23/08/2016 | 23/10/2016 |
| 8749 | La Crosse Technology WS-9232 | Meteo station | 03/09/2014 | 03/09/2016 | 03/11/2016 |
| 8750 | La Crosse Technology WS-9232 | Meteo station | 03/09/2014 | 03/09/2016 | 03/11/2016 |
| 8896 | ACQUISYS GPS8 | Satellite synchronized frequency standard | / | / | / |
| / | GPIBShot V2.4 | Software | / | / | / |

## 6. TESTS AND CONCLUSIONS

### 6.1 unintentional radiator (subpart B)

| Test procedure | Description of test | Respected criteria? | | | | Comment |
|---|---|---|---|---|---|---|
| | | Yes | No | NAp | NAs | |
| FCC Part 15.107 | CONDUCTED LIMITS | | | X | | |
| | | | | | | |
| FCC Part 15.109 | RADIATED EMISSION LIMITS | X | | | | |
| | | | | | | |
| FCC Part 15.111 | ANTENNA POWER CONDUCTED LIMITS FOR RECEIVER | | | X | | |

NAp: Not Applicable NAs: Not Asked

### 6.2 intentional radiator (subpart C)

| Test procedure | Description of test | Respected criteria? | | | | Comment |
|---|---|---|---|---|---|---|
| | | Yes | No | NAp | NAs | |
| FCC Part 15.203 | ANTENNA REQUIREMENT | X | | | | |
| | | | | | | |
| 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 1 |
| | | | | | | |
| 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 §15.249 frequency bands | X | | | | Note 2 |
| | (c) 20 dB bandwidth and band-edge compliance | X | | | | |
| | | | | | | |
| FCC Part 15.249 | OPERATION WITHIN THE BANDS 902-928 MHZ, 2400-2483.5 MHz, 5725-5850 MHz AND 24.0-24.25 GHz | | | | | |
| | (a) Fundamental and harmonics field strength | X | | | | |
| | (b) Fixed point-to-point operation | | X | | | |
| | (c) Measurement distance | X | | | | |
| | (d) Out-of-band emissions | X | | | | |
| | (e) Field strength limits above 1 GHz | X | | | | |

NAp: Not Applicable NAs: Not Asked

Note 1: See FCC part 15.249 (d).

Note 2: See FCC part 15.209. Unwanted emissions levels are all below the fundamental emission field strength level.

**RF EXPOSURE:**

Maximum measured power = 82.7 dBµV/m = 0.055 mW

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

*In accordance with KDB 447498 D01 General RF Exposure Guidance v05r02*

$PSD = EIRP/(4*\pi*R^{2)} = 0.055 / 4*\pi*(20\ cm)^2 = 44.4 \times 10^{-6}$ mW/cm² (limit= 0.612 mW/cm²).

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

To declare, or not, the compliance with the specifications, it was not explicitly taken into account of uncertainty associated with the results

## 7. 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 5$^{th}$ 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): | 22.3 |
| Relative humidity (%): | 50 |

Power source:
We used for power source the internal battery of the equipment and we noted:

| | |
|---|---|
| Voltage at the beginning of test (V): | 1.8V |
| Voltage at the end of test (V): | 1.77V |
| Percentage of voltage drop during the test (%): | 1.7 |

Sample N° 6

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

## 8. ADDITIONAL PROVISIONS TO THE GENERAL RADIATED EMISSION LIMITATIONS

**Standard:** FCC Part 15

**Test procedure:** Paragraph 15.215

**Test set up:**

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

**Test operating condition of the equipment:**

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

**Results:**

Ambient temperature (°C): 21.9
Relative humidity (%): 46

Power source: Lithium battery 1.5Vdc.

Lower Band Edge: band from 900 MHz to 902 MHz
Upper Band Edge: band from 928 MHz to 930 MHz

Sample N° 5:

| 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) |
|---|---|---|---|---|---|---|---|
| 915.02 | 82.90 | peak | 900.108 | -58.20 | 24.70 | 62.90 | 38.20 |
| 915.02 | 82.90 | peak | 929.844 | -59.33 | 23.57 | 62.90 | 39.33 |

* Marker-Delta method

The 20 dB bandwidth curves are given in appendix 6 ; band-edge curves are given in appendix 4.

**Test conclusion:**

RESPECTED STANDARD

## 9. FUNDAMENTAL AND HARMONICS FIELD STRENGTH

**Standard:** FCC Part 15

**Test procedure:** paragraph 15.249 (a)

**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.

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. Zero degree azimuth corresponds to the front of the device under test.

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

The measurement of the electro-magnetic field is realized, with a calibrated peak power responding power meter.

**Frequency range:** From 9 kHz to 10$^{th}$ harmonic of the highest fundamental frequency (915 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

**Equipment under test operating condition:**

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): 21.9
Relative humidity (%): 46

Power source:
We used for power source the internal battery of the equipment and we noted:
Voltage at the beginning of test (V): 1.70
Voltage at the end of test (V): 1.66
Percentage of voltage drop during the test (%): 2.35

Sample N° 5

| FREQUENCIES (MHz) | Detector P: Peak QP: Quasi-Peak | Antenna height (cm) | Azimuth (degree) | Resolution bandwidth (kHz) | Polarization H: Horizontal V: Vertical | Field strength (dBµV/m) | Limits (dBµV/m) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|
| 915 | QP | 100 | 171 | 120 | H | 82.7* | 83.6 | 0.9 |
| 1829.5 | P | 150 | 275 | 1000 | H | 38.3** | 74 | 35.7 |
| 2745 | P | 150 | 157 | 1000 | H | 39.2** | 74 | 34.8 |

** Fundamental emission*
*** 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 limit is not necessarily reported.

**Test conclusion:**

RESPECTED STANDARD

## 10. OUT OF BAND EMISSIONS

**Standard:** FCC Part 15

**Test procedure:** paragraph 15.205
paragraph 15.209
paragraph 15.249 (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 10$^{th}$ harmonic of the highest fundamental frequency (915 MHz).

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

**Bandwidth:** 200Hz (9 kHz < F < 150kHz)
9 kHz (150 kHz < F < 30MHz)
120 kHz (30 MHz < 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 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): | 21.4 |
| Relative humidity (%): | 48 |

Power source:
We used for power source the internal battery of the equipment and we noted:

| | |
|---|---|
| Voltage at the beginning of test (V): | 1.57 |
| Voltage at the end of test (V): | 1.53 |
| Percentage of voltage drop during the test (%): | 2.55 |

Sample N° 5

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 |

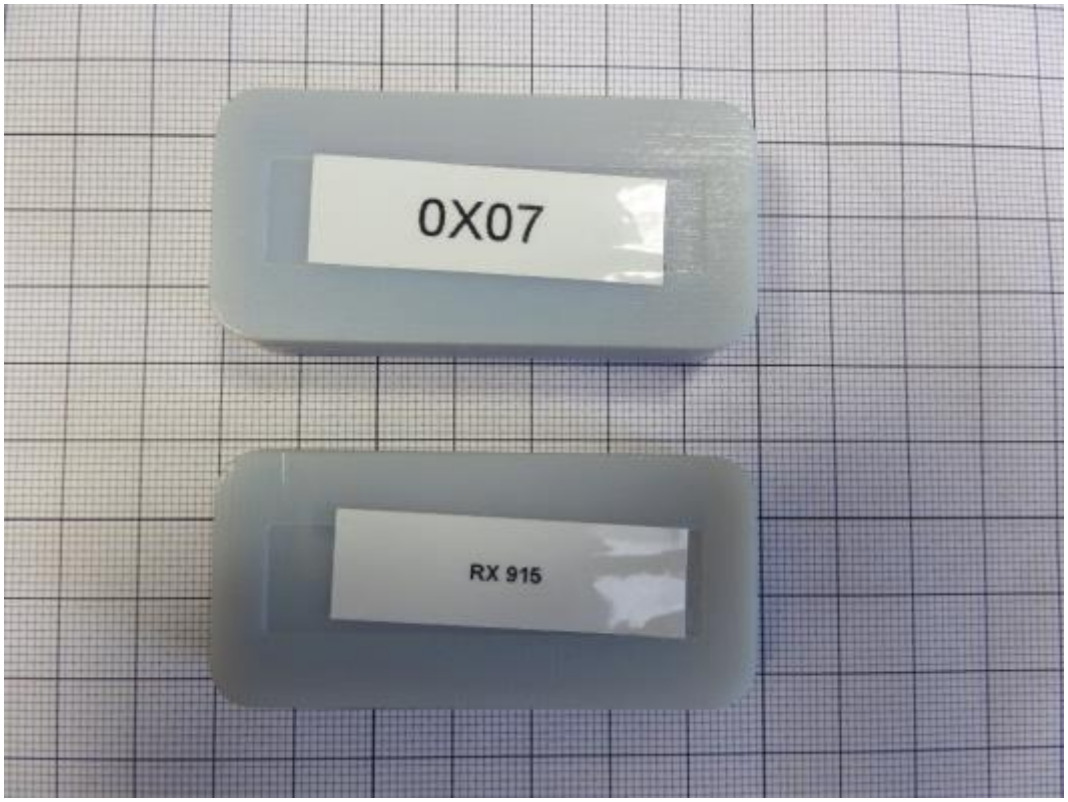
Note: any spurious which has more than 20 dB of margin compared to the applicable limit is not necessarily reported.

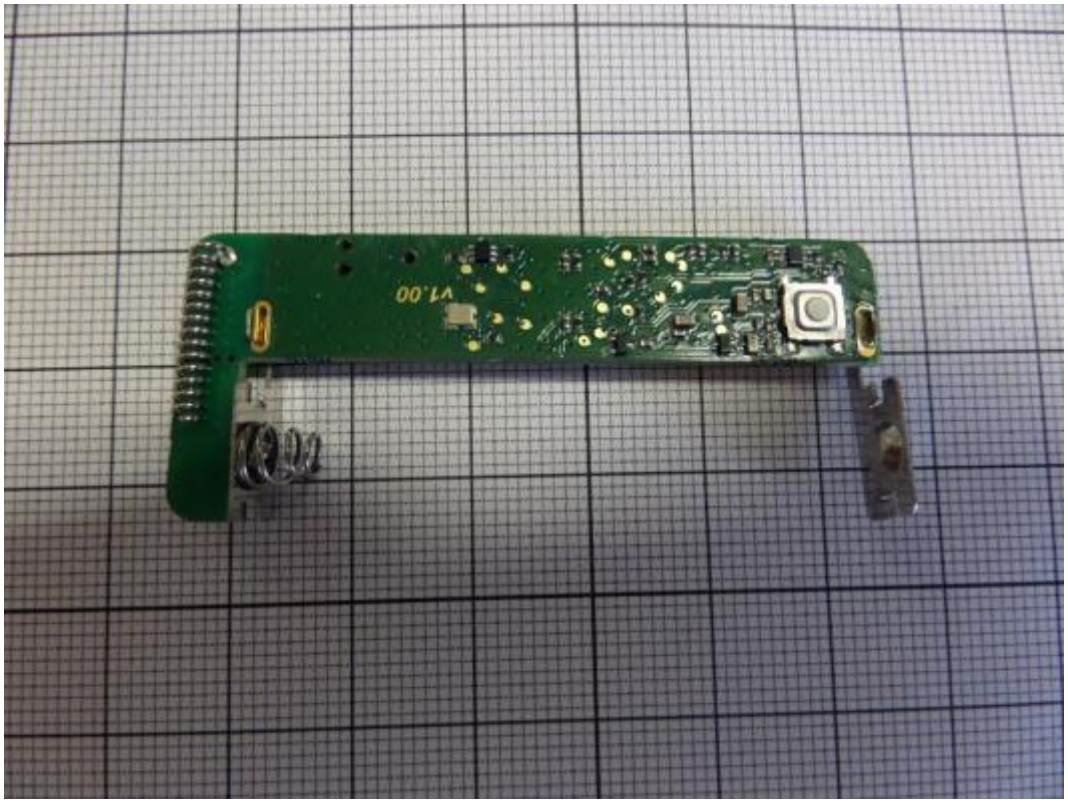
**Test conclusion:**

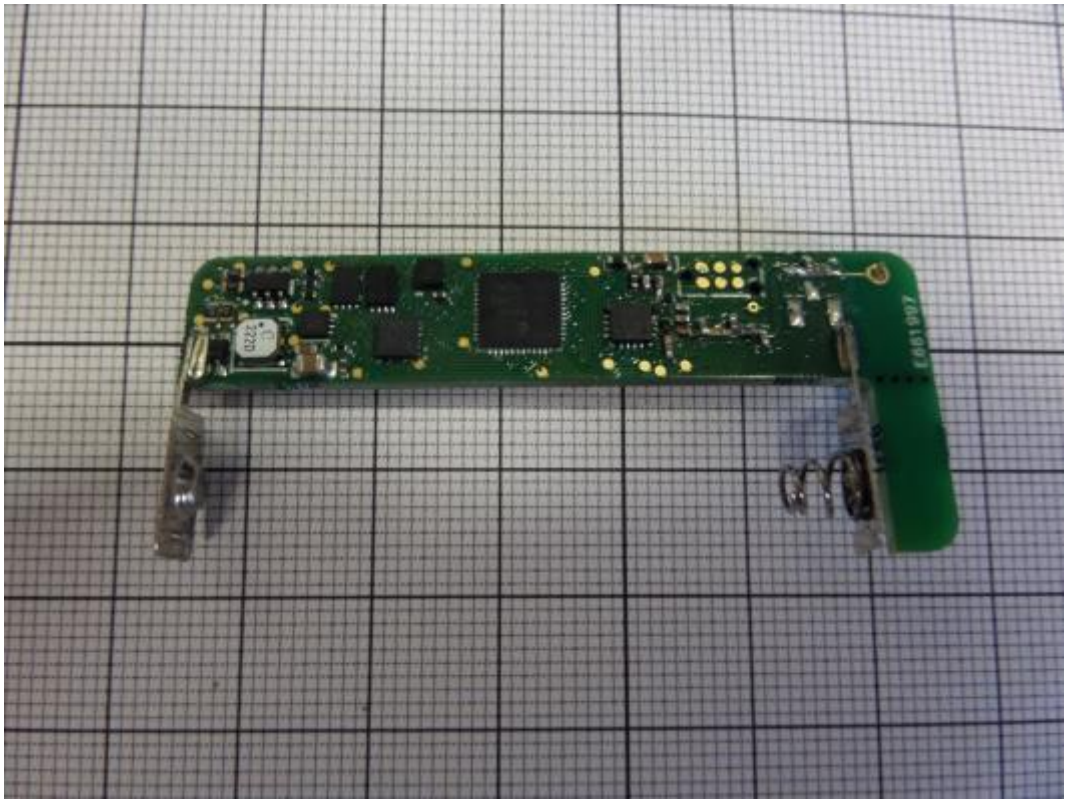
RESPECTED STANDARD

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

# APPENDIX 1: Photos of the equipment under test

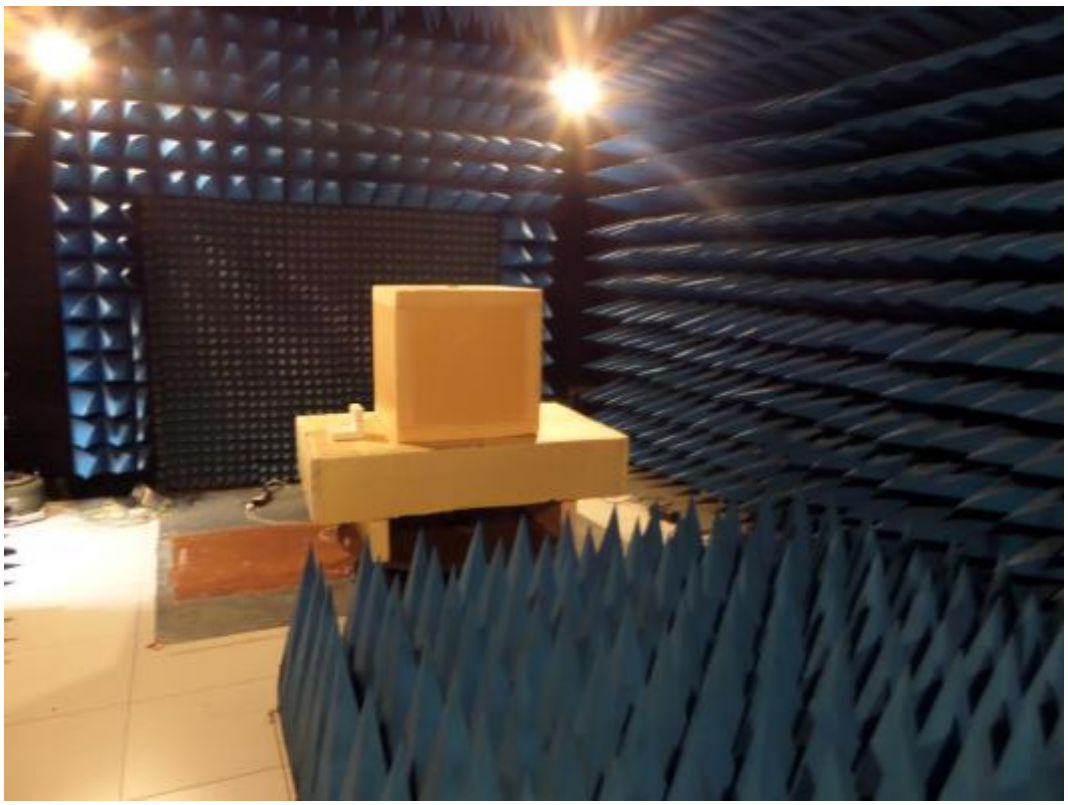


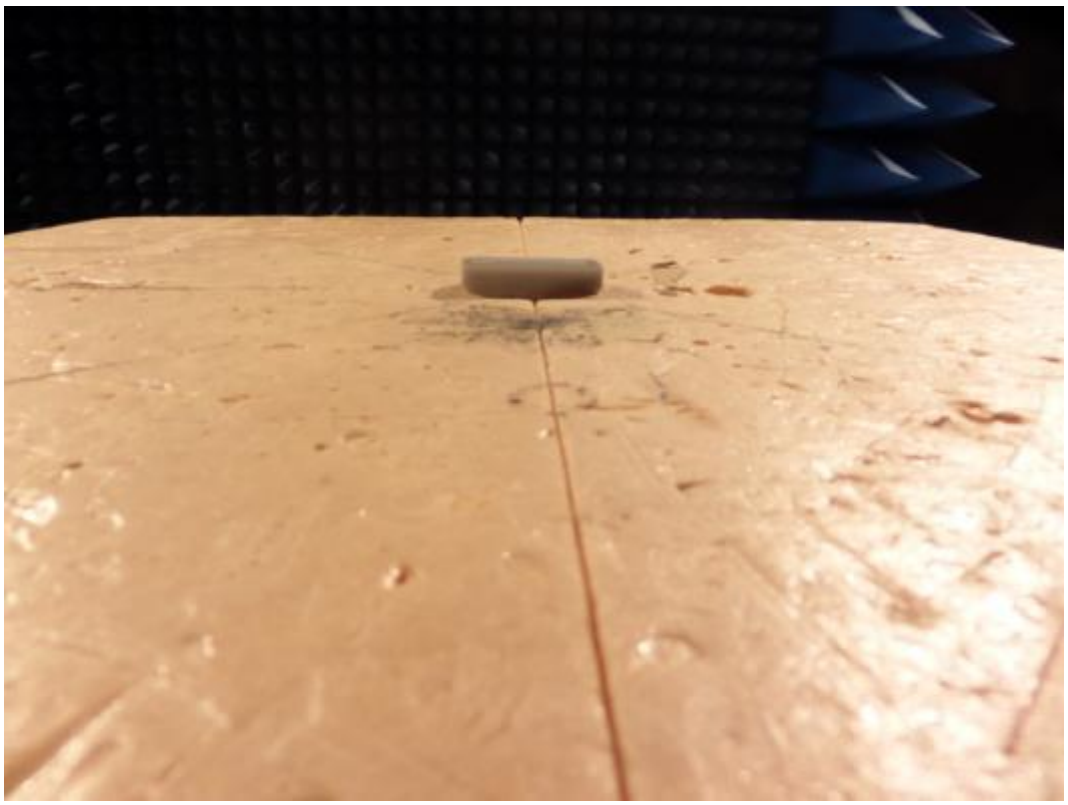





# APPENDIX 2: Test set up

Anechoic room





Open area test site

# APPENDIX 3: Test equipment list

**Radiated emission limits**

| TYPE | MANUFACTURER | EMITECH NUMBER |
|---|---|---|
| Open test site | EMITECH | 8732 |
| Anechoic Chamber | EMITECH | 8593 |
| Satellite synchronized frequency standard GPS8 | ACQUISYS | 8896 |
| Spectrum Analyzer FSP40 | Rohde & Schwarz | 4088 |
| Biconical antenna VHBB 9124 | Schwarzbeck | 8526 |
| Log periodic antenna UHALP 9108A | Schwarzbeck | 8543 |
| Bi-log antenna CBL6112A | Chase | 8530 |
| Antenna 3115 | Electrometrics | 8535 |
| Low-noise amplifier 8447D | Hewlett Packard | 8511 |
| Low-noise amplifier C020180F-4B1 | Microwave DB | 1922 |
| High pass filter HPM11630 | Hewlett Packard | 6609 |
| 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 |
|---|---|---|
| Anechoic Chamber | EMITECH | 8593 |
| Satellite synchronized frequency standard GPS8 | ACQUISYS | 8896 |
| Spectrum Analyzer FSP40 | Rohde & Schwarz | 4088 |
| Log periodic antenna UHALP 9108A | Schwarzbeck | 8543 |
| Multimeter MN5102B | AOIP | 8675 |
| Meteo station WS-9232 | La Crosse Technology | 8750 |
| Software | GPIBShot V2.4 | - |

**Fundamental and harmonics field strength**

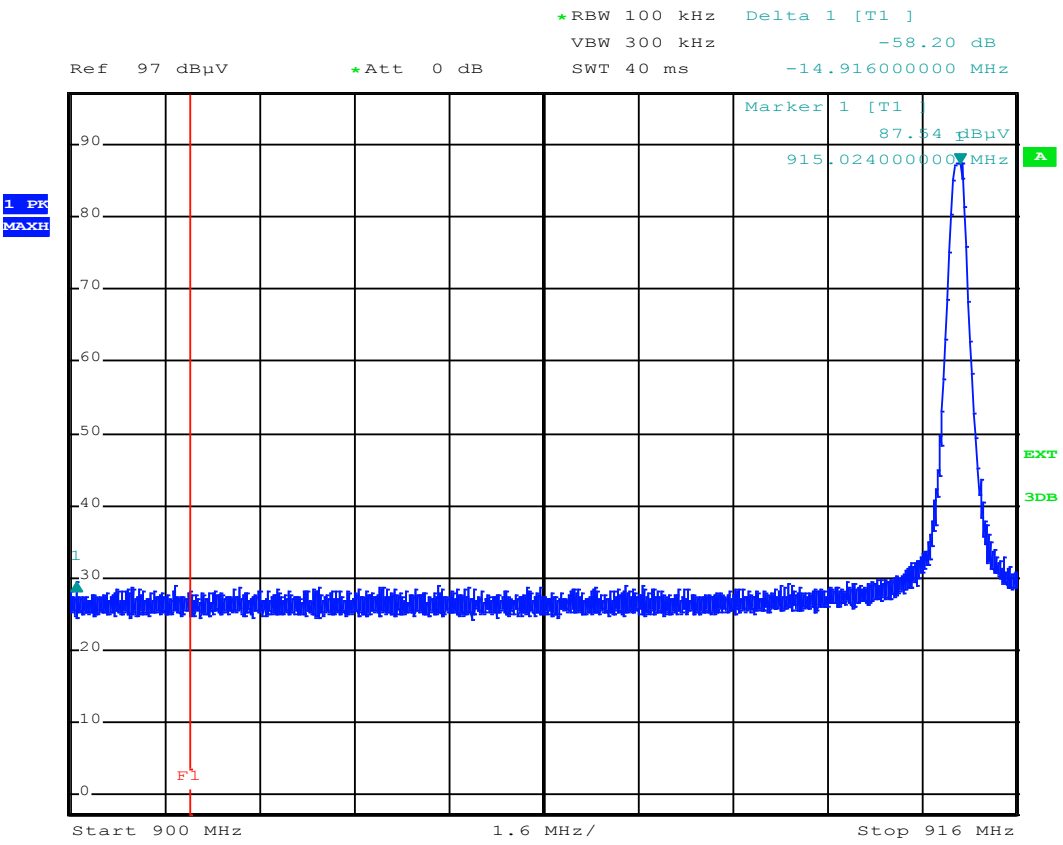
| TYPE | MANUFACTURER | EMITECH NUMBER |
|---|---|---|
| Open test site | EMITECH | 8732 |
| Anechoic Chamber | EMITECH | 8593 |
| Satellite synchronized frequency standard GPS8 | ACQUISYS | 8896 |
| Test receiver ESI7 | Rohde & Schwarz | 8707 |
| Spectrum Analyzer FSP40 | Rohde & Schwarz | 4088 |
| Bi-log antenna CBL6112A | Chase | 8530 |
| Antenna 3115 | Electrometrics | 8535 |
| Low-noise amplifier C020180F-4B1 | Microwave DB | 1922 |
| High pass filter HPM11630 | Hewlett Packard | 6609 |
| Multimeter MN5102B | AOIP | 8675 |
| Meteo station WS-9232 | La Crosse Technology | 8749 |
| Meteo station WS-9232 | La Crosse Technology | 8750 |
| Software | BAT-EMC V3.6.0.32 | 0000 |

**Out of band emissions**

| TYPE | MANUFACTURER | EMITECH NUMBER |
|---|---|---|
| Open test site | EMITECH | 8732 |
| Anechoic Chamber | EMITECH | 8593 |
| Satellite synchronized frequency standard GPS8 | ACQUISYS | 8896 |
| Test receiver ESI7 | Rohde & Schwarz | 8707 |
| Spectrum Analyzer FSP40 | Rohde & Schwarz | 4088 |
| Loop antenna HFH2-Z2 | Rohde & Schwarz | 8533 |
| Biconical antenna VHBB 9124 | Schwarzbeck | 8526 |
| Log periodic antenna UHALP 9108A | Schwarzbeck | 8543 |
| Bi-log antenna CBL6112A | Chase | 8530 |
| Antenna 3115 | Electrometrics | 8535 |
| Low-noise amplifier 8447D | Hewlett Packard | 8511 |
| Low-noise amplifier C020180F-4B1 | Microwave DB | 1922 |
| High pass filter HPM11630 | Hewlett Packard | 6609 |
| Multimeter MN5102B | AOIP | 8675 |
| Meteo station WS-9232 | La Crosse Technology | 8750 |
| Software | BAT-EMC V3.6.0.32 | 0000 |

# APPENDIX 4: Band edge

Lower band edge

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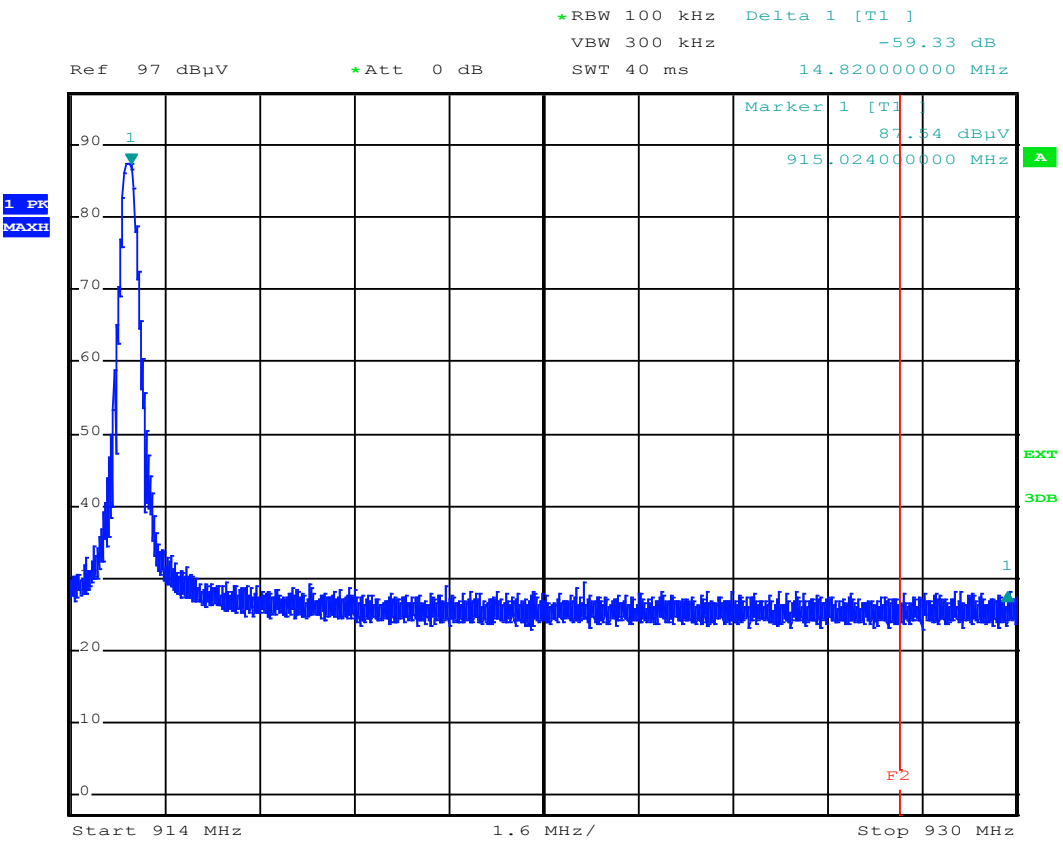
Upper band edge

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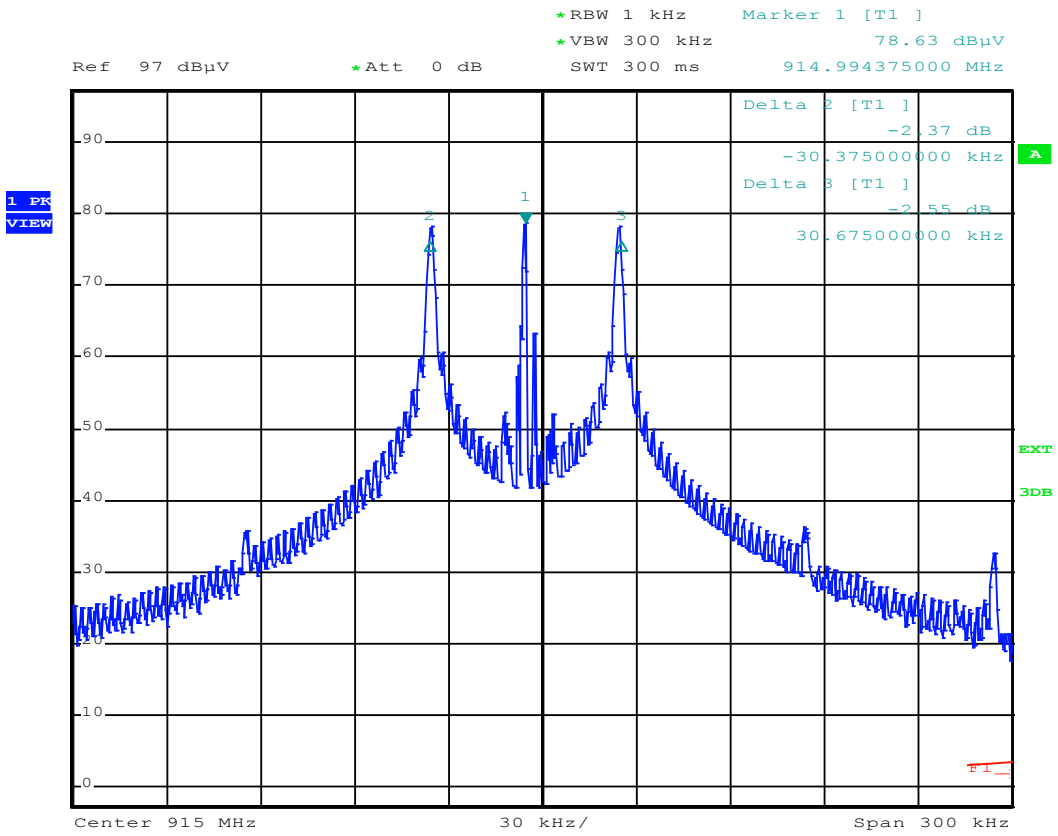
# APPENDIX 5: 6 dB bandwidth

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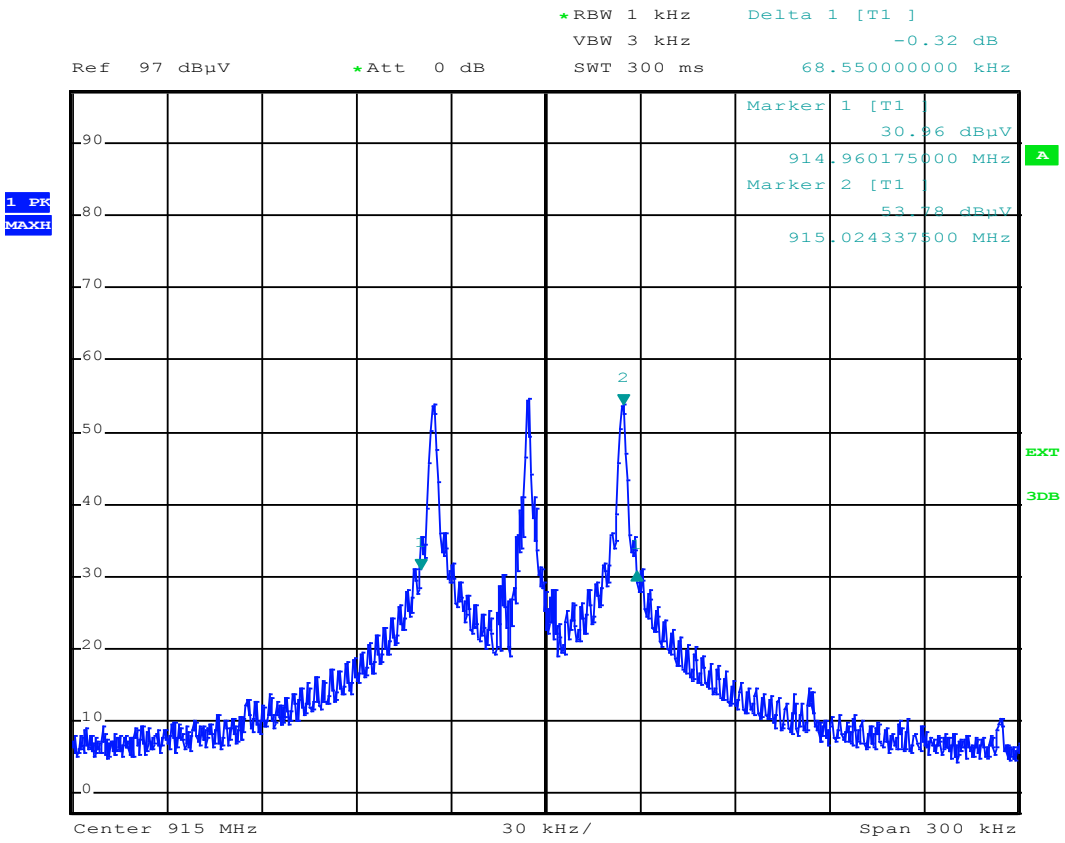
# APPENDIX 6: 20 dB bandwidth

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