



R051-24-11-105713-1/A Ed. 0

RADIO test report

according to standard:
CFR 47- FCC Part 15

Equipment under test:
ZIGBIT 900 REMOTE CONTROL
Model: TELACWCA

FCC ID:
A29-TELACWCA

Company:
STANDARD INDUSTRIE

DISTRIBUTION: Mr DUHAUTOIS

Company: STANDARD INDUSTRIE

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Conseils & Ingénierie - Tests & Mesures - Formation

Z.I. Angers - Beauzoué - 15, rue de la Claié - 49070 BEAUZOUÉ - Siret : 344 545 645 00055
 Tél. : 02 41 73 26 27 - Fax : 02 41 73 26 40 - E-mail : atlantique@emitech.fr - URL : www.emitech.fr
 Siège Social : 3, rue des Coudriers - CAP 78 - ZA de l'Observatoire - 78180 MONTIGNY LE BX
 S.A. au capital de 1 560 000 € - R.C.S. VERSAILLES 344 545 645 - APE 7112B

PRODUCT: Zigbit 900 remote control

Reference / model: TELACWCA

Serial number: Not communicated

MANUFACTURER: STANDARD INDUSTRIE

COMPANY SUBMITTING THE PRODUCT:

Company: STANDARD INDUSTRIE

Address: 139-141 rue du Luxembourg
BP 50207
59054 ROUBAIX Cedex 01
FRANCE

Responsible: Mr DUHAUTOIS

TECHNICAL SUPPORT:

Company: SERSA

Address: 264 avenue de la Mauldre
78680 EPONE
FRANCE

Responsible: Mr OBERT

DATE(S) OF TEST: 25 and 30 November 2011
1, 2 and 9 December 2011

TESTING LOCATION: EMITECH ATLANTIQUE laboratory at JUIGNE SUR LOIRE (49)
FRANCE
EMITECH ATLANTIQUE open area test site in JUIGNE SUR
LOIRE (49) FRANCE
FCC Registration Number: 90469

TESTED BY: M. DUMESNIL

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1. INTRODUCTION

This document presents the result of RADIO test carried out on the following equipment : Zigbit 900 remote control – Model: TELACWCA in accordance with normative reference.

2. PRODUCT DESCRIPTION

ITU Emission code: 1M41G1D

Class: B (residential environment)

Utilization: remote control used to manually trigger airchocks

Antenna type and gain: dedicated integral antenna, unknown gain

Operating frequency range: 915 MHz

Number of channels: 1

Channel spacing: not concerned

Frequency generation: quartz 8 MHz and phase-locked loop

Modulation: BPSK (Binary Phase Shifting Key)

Power source: 1 x 6LR61 (battery 9V)

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 (2011) Radio Frequency Devices

ANSI C63.4 (2003) Methods of Measurement of Radio-Noise Emissions
from Low-voltage Electrical and Electronics
Equipment in the range
of 9 kHz to 40 GHz.

558074 D01 DTS Meas guidance v01 Guidance for performing Compliance Measurement on
Digital Transmission Systems (DTS) Operating under
§15.247

4. TEST METHODOLOGY

Radio performance tests procedures given in part 15:

Subpart B –Unintentional Radiators

Paragraph 107: Conducted limits

Paragraph 109: Radiated emission limits

Paragraph 111: Antenna power conduction limits for receivers

Subpart C – Intentional Radiators

Paragraph 203: Antenna requirement

Paragraph 205: Restricted bands of operation

Paragraph 207: Conducted limits

Paragraph 209: Radiated emission limits; general requirements

Paragraph 212: Modular transmitter

Paragraph 215: Additional provisions to the general radiated emission limitations

Paragraph 247: Operation within the bands 902-928 MHZ, 2400-2483.5 MHz and 5725-5850 MHz

5. TEST EQUIPMENT CALIBRATION DATES

| Equipment | Model | Type | Last verification | Validity |
|-----------|----------------------|--|-------------------|--------------|
| M01100 | / | Controller turn table open area | / | / |
| M01101 | / | Controller antenna positioning open area | / | / |
| M01128 | HFH2-Z2 | Magnetic field antenna | April-10 | April-12 |
| M02020 | ESI7 | EMI receiver | June-11 | June-12 |
| M02021 | FSEM30 | Spectrum analyser | May-11 | May-12 |
| M02031 | CBL 6112A | Antenna Bilog | June-11 | June-12 |
| M02032 | CBL 6112A | Antenna Bilog | June-11 | June-12 |
| M02093 | / | 10 m open area test site | June-11 | June-12 |
| M02094 | 8mx5mx4m | Cage 2 : semi-anéchoic 8mx5mx4m | September-11 | September-12 |
| M02098 | 11mx7mx5m | Cage 1 : semi-anechoic 11mx7mx5m | September-11 | September-12 |
| M02099 | 4.50 x 5.10 x 3.10 m | Cage 3 :4.50 x 7.50 x 3.10 m | / | / |
| M04028 | MN5102B | Multimeter | January-11 | January-12 |
| M05024 | 3115 | Horn antenna 1-18GHz | March-11 | March-12 |
| M07001 | IDM106N | Multimeter | January-11 | January-12 |
| M07002 | IDM106N | Multimeter | January-11 | January-12 |
| M08006 | WS9232 | Small meteorological station | April-10 | April-12 |
| M97002 | HUGER | Small meteorological station | April-10 | April-12 |

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 | | | | <i>Note 1</i> |
| 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 | | | | <i>Note 2</i> |
| 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 | | | | <i>Note 3</i> |
| | (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 | | | | <i>Note 4</i> |
| | (b) Maximum peak output power | X | | | | <i>Note 5</i> |
| | (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 | | | | <i>Note 6</i> |

NAp: Not Applicable

NAs: Not Asked

Note 1: Dedicated 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 minimum 6 dB bandwidth of the equipment is 547 kHz (see annex 1).

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

Note 6: $PSD = EIRP/4*\pi*R^2 = 0.191\text{ mW}/4*\pi*(20\text{ cm})^2 = 38 * 10^{-6}\text{ mW/cm}^2$ (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.

Conclusion:

The sample of Zigbit 900 remote control – Model: TELACWCA submitted to the tests complies with the regulations of the standard FCC Part 15 in accordance with the limits or criteria defined in this report.

7. RADIATED EMISSION LIMITS**Standard:** FCC Part 15**Test procedure:** paragraph 109**Limit class:** Class B**Test equipments:**

| TYPE | BRAND | EMITECH NUMBER |
|--|----------------------|----------------|
| EMI receiver ESI7 | Rohde & Schwarz | M02020 |
| Spectrum analyzer FSEM30 | Rohde & Schwarz | M02021 |
| Antenna bilog CBL 6112A | CHASE | M02031 |
| Antenna bilog CBL 6112A | CHASE | M02032 |
| Horn antenna 1-18 GHz 3115 | EMCO | M05024 |
| Controller antenna positioning open area | EMCO | M01101 |
| Controller turntable open area | EMCO | M01100 |
| Cage 1: semi anechoic 11mx7mx5m | SIDT | M02098 |
| Cage 2: semi anechoic 8mx5mx4m | SIDT | M02094 |
| 10m open area test site | EMITECH | M02093 |
| Multimeter IDM106N | ISO-TECH | M07001 |
| Multimeter IDM106N | ISO-TECH | M07002 |
| Multimeter MN5102B | AOIP | M04028 |
| Small meteorological station WS9232 | La Crosse technology | M08006 |
| Small meteorological station | HUGER | M97002 |

Test set up:

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

See photo in annex 5.

Frequency range: From 30 MHz to 5th harmonic of the highest frequency used (915 MHz).**Detection mode:** Quasi-peak (F < 1 GHz) Average (F > 1 GHz)**Bandwidth:** 120 kHz (F < 1 GHz) 1 MHz (F > 1 GHz)**Distance of antenna:** 3 meters**Antenna height:** 1 to 4 meters**Antenna polarization:** vertical and horizontal (only the highest level is recorded)**Equipment under test operating condition:**

The equipment is blocked in standby / reception mode.

Results:

Ambient temperature (°C): 20.8
Relative humidity (%): 53

Power source:

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

Two batteries have been necessary for this test:

| | Battery 1 | Battery 2 |
|---|-----------|-----------|
| Voltage at the beginning of test (V): | 9.08 | 9 |
| Voltage at the end of test (V): | 8.70 | 8.56 |
| Percentage of voltage drop during the test (%): | 4.19 | 4.89 |

Not any spurious has been detected.

Applicable limits: from $30 \text{ MHz} \leq F < 88 \text{ MHz}$: $40 \text{ dB}\mu/\text{m}$
from $88 \text{ MHz} \leq F < 216 \text{ MHz}$: $43.5 \text{ dB}\mu/\text{m}$
from $216 \text{ MHz} \leq F < 960 \text{ MHz}$: $46 \text{ dB}\mu/\text{m}$
above 960 MHz : $54 \text{ dB}\mu/\text{m}$

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 equipments:**

| TYPE | BRAND | EMITECH NUMBER |
|-------------------------------------|----------------------|----------------|
| EMI receiver ESI7 | Rohde & Schwarz | M02020 |
| Spectrum analyzer FSEM30 | Rohde & Schwarz | M02021 |
| Antenna bilog CBL 6112A | CHASE | M02032 |
| Cage 1: semi anechoic 11mx7mx5m | SIDT | M02098 |
| Cage 3: semi anechoic 4.5mx7.5mx10m | SGDT | M02099 |
| Multimeter IDM106N | ISO-TECH | M07002 |
| Multimeter MN5102B | AOIP | M04028 |
| Small meteorological station WS9232 | La Crosse technology | M08006 |
| Small meteorological station | HUGER | M97002 |

Test set up:

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

Test operating condition of the equipment:

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

Results:

Ambient temperature (°C): 21.5
Relative humidity (%): 49

Power source:

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

Voltage at the beginning of test (V): 9.00
Voltage at the end of test (V): 8.70
Percentage of voltage drop during the test (%): 3.33

Lower Band Edge: From 900 MHz to 902 MHz

Upper Band Edge: From 928 MHz to 930 MHz

Sample n°1:

| Fundamental frequency (MHz) | Field Strength Level of fundamental (dB μ V/m) | Detector (Peak or Average) | Frequency of maximum Band-edges Emission (MHz) | Delta Marker (dB)* | Calculated Max Out-of-Band Emission Level (dB μ V/m) | Limit (dB μ V/m) | Margin (dB) |
|-----------------------------|--|----------------------------|--|--------------------|--|----------------------|-------------|
| 915 | 89.42 | Peak | 901.28 | -50.18 | 39.24 | 68.65 | 29.41 |
| 915 | 89.42 | peak | 928.91 | -49.22 | 40.20 | 68.65 | 28.45 |

* *Marker-Delta method*

The band edge and 20 dB bandwidth plots are given in annex 2 and 3

Test conclusion:

RESPECTED STANDARD

9. MAXIMUM PEAK OUTPUT POWER**Standard:** FCC Part 15**Test procedure:** paragraph 15.247 (b)**Test equipments:**

| TYPE | BRAND | EMITECH NUMBER |
|--|----------------------|----------------|
| Spectrum analyzer FSEM30 | Rohde & Schwarz | M02021 |
| Antenna bilog CBL 6112A | CHASE | M02031 |
| Controller antenna positioning open area | EMCO | M01101 |
| Controller turntable open area | EMCO | M01100 |
| 10m open area test site | EMITECH | M02093 |
| Multimeter IDM106N | ISO-TECH | M07002 |
| Small meteorological station WS9232 | La Crosse technology | M08006 |

Test set up:

The system is tested in an open area test site (OATS). The test unit 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 measurement of the electro-magnetic field is realized, with a resolution bandwidth and video bandwidth adjusted at 10 MHz.

Measurement procedure PK1 of 558074 D01 DTS Meas guidance v01.

Distance of antenna: 3 meters**Antenna height:** 1 to 4 meters**Antenna polarization:** vertical and horizontal**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 (%): 49

Power source:

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

Voltage at the beginning of test (V): 9.62
Voltage at the end of test (V): 8.73
Percentage of voltage drop during the test (%): 9.25

Sample n° 1

| | Electro-magnetic field (dBμV/m): | Conducted power * (W) | Limit (W) |
|-----------------------------------|--|--------------------------------------|----------------------|
| Normal test conditions | 90.19 | 0.191 x 10 ⁻³ | 1 |

Polarization of test antenna: vertical (height: 124 cm)

Position of equipment: see photo in annex 5 (azimuth: 46 degrees)

* $P = (E \times d)^2 / (30 \times Gp)$ with $d = 3$ m and $Gp = 1.64$

Test conclusion:

RESPECTED STANDARD

10. INTENTIONAL RADIATOR

Standard: FCC Part 15

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

Test equipments:

| TYPE | BRAND | EMITECH NUMBER |
|--|----------------------|----------------|
| EMI receiver ESI7 | Rohde & Schwarz | M02020 |
| Spectrum analyzer FSEM30 | Rohde & Schwarz | M02021 |
| Magnetic field antenna HFH2-Z2 | Rohde & Schwarz | M01128 |
| Antenna bilog CBL 6112A | CHASE | M02031 |
| Antenna bilog CBL 6112A | CHASE | M02032 |
| Horn antenna 1-18 GHz 3115 | EMCO | M05024 |
| Controller antenna positioning open area | EMCO | M01101 |
| Controller turntable open area | EMCO | M01100 |
| 10m open area test site | EMITECH | M02093 |
| Cage 1: semi anechoic 11mx7mx5m | SIDT | M02098 |
| Cage 2: semi anechoic 8mx5mx4m | SIDT | M02094 |
| Multimeter IDM106N | ISO-TECH | M07001 |
| Multimeter IDM106N | ISO-TECH | M07002 |
| Multimeter MN5102B | AOIP | M04028 |
| Small meteorological station WS9232 | La Crosse technology | M08006 |
| Small meteorological station | HUGER | M97002 |

Test set up:

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

See photo in annex 5.

Frequency range: From 9 kHz to 10th harmonic of the highest fundamental frequency (915 MHz).

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

Bandwidth: 120 kHz ($F < 1$ GHz) 100 kHz / 1 MHz ($F > 1$ GHz)

Distance of antenna: 3 meters

Antenna height: 1 to 4 meters

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): 22.6
 Relative humidity (%): 58

Power source:

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

Three batteries have been necessary for this test:

| | Battery 1 | Battery 2 | Battery 3 |
|---|-----------|-----------|-----------|
| Voltage at the beginning of test (V): | 9.63 | 9.06 | 9.00 |
| Voltage at the end of test (V): | 8.78 | 8.70 | 8.56 |
| Percentage of voltage drop during the test (%): | 8.83 | 3.97 | 4.89 |

Sample n° 1

| 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 (dB μ V/m) | Limits (dB μ V/m) | Margin (dB) |
|-------------------|--|---------------------|------------------|----------------------------|--|-------------------------------|-----------------------|-------------|
| 947.16 | QP | 100 | 0 | 120 | V | 34.15 | 68.65 | 34.50 |
| 1830 | P | 100 | 0 | 100 | H | 46.78 | 68.65 | 21.87 |
| 2745 | P | 100 | 0 | 1000 | V | 61.56 | 74* | 12.44 |
| 2745 | Av | 100 | 0 | 1000 | V | 50.25 | 54* | 3.75 |

* restricted bands of operation in 15.205

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 88.65 dB μ V/m so the applicable limit is 68.65 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

11. PEAK POWER DENSITY**Standard:** FCC Part 15**Test procedure:** paragraph 15.247 (e)**Test equipments:**

| TYPE | BRAND | EMITECH NUMBER |
|--|----------------------|----------------|
| Spectrum analyzer FSEM30 | Rohde & Schwarz | M02021 |
| Antenna bilog CBL 6112A | CHASE | M02031 |
| Controller antenna positioning open area | EMCO | M01101 |
| Controller turntable open area | EMCO | M01100 |
| 10m open area test site | EMITECH | M02093 |
| Multimeter IDM106N | ISO-TECH | M07002 |
| Small meteorological station WS9232 | La Crosse technology | M08006 |

Test set up:

We used the same method test set-up as the peak output power measurement.

Resolution bandwidth: 100 kHz

Video bandwidth: 300 kHz

Measurement procedure PKPSD of 558074 D01 DTS Meas guidance v01.

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 (%): 49

Power source:

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

Voltage at the beginning of test (V): 9.62
Voltage at the end of test (V): 8.73
Percentage of voltage drop during the test (%): 9.25

Sample n° 1

| Peak power density at frequency: 915 MHz | |
|---|------------|
| Normal test conditions | -14.03 dBm |
| Limits | +8 dBm |

Polarization of test antenna: vertical (height: 124 cm)

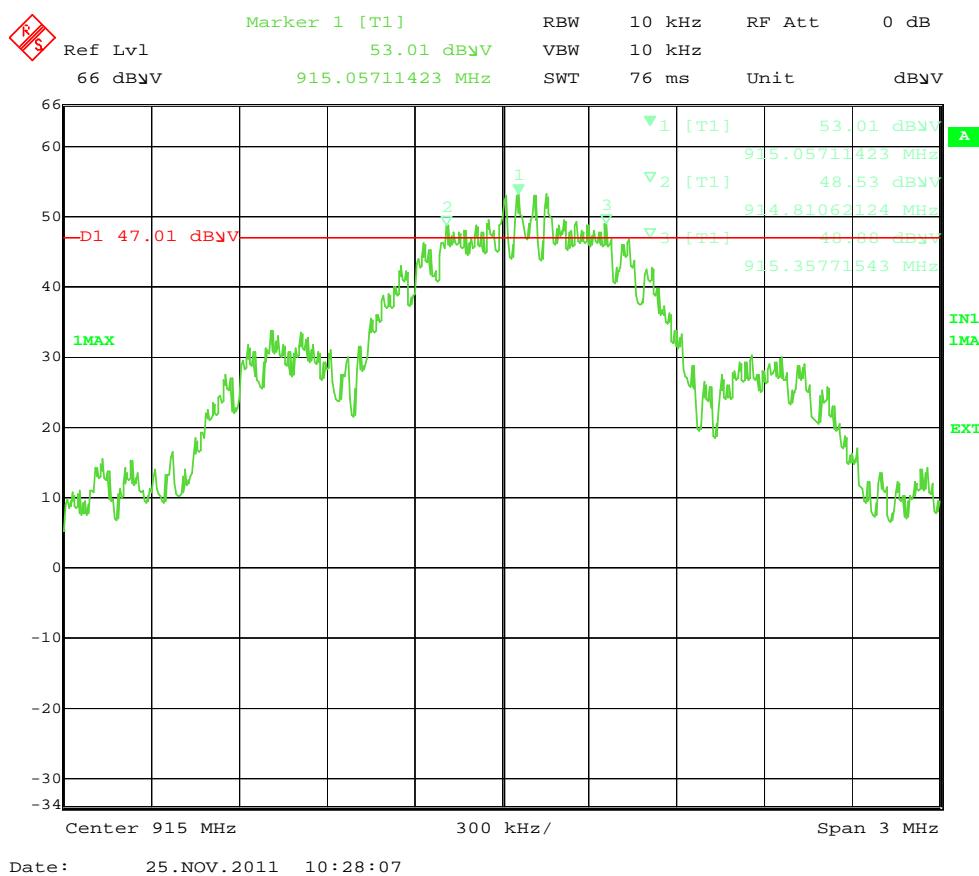
Position of equipment: see photo in annex 5 (azimuth: 46 degrees)

Test conclusion:

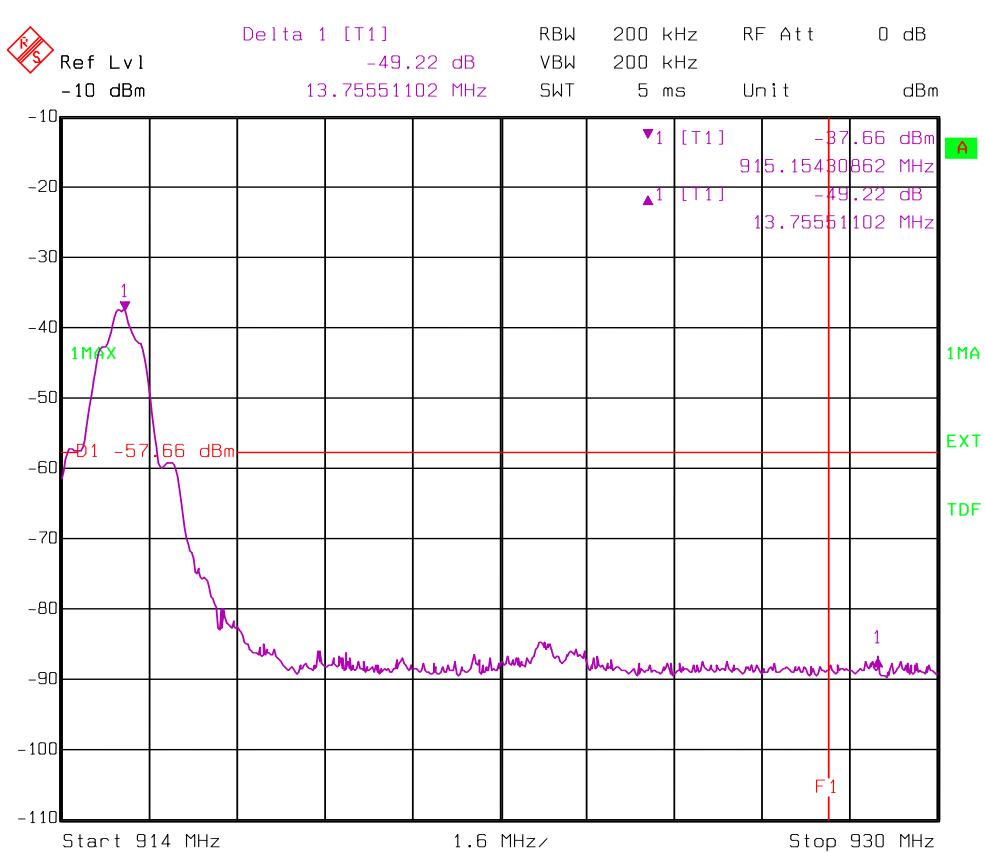
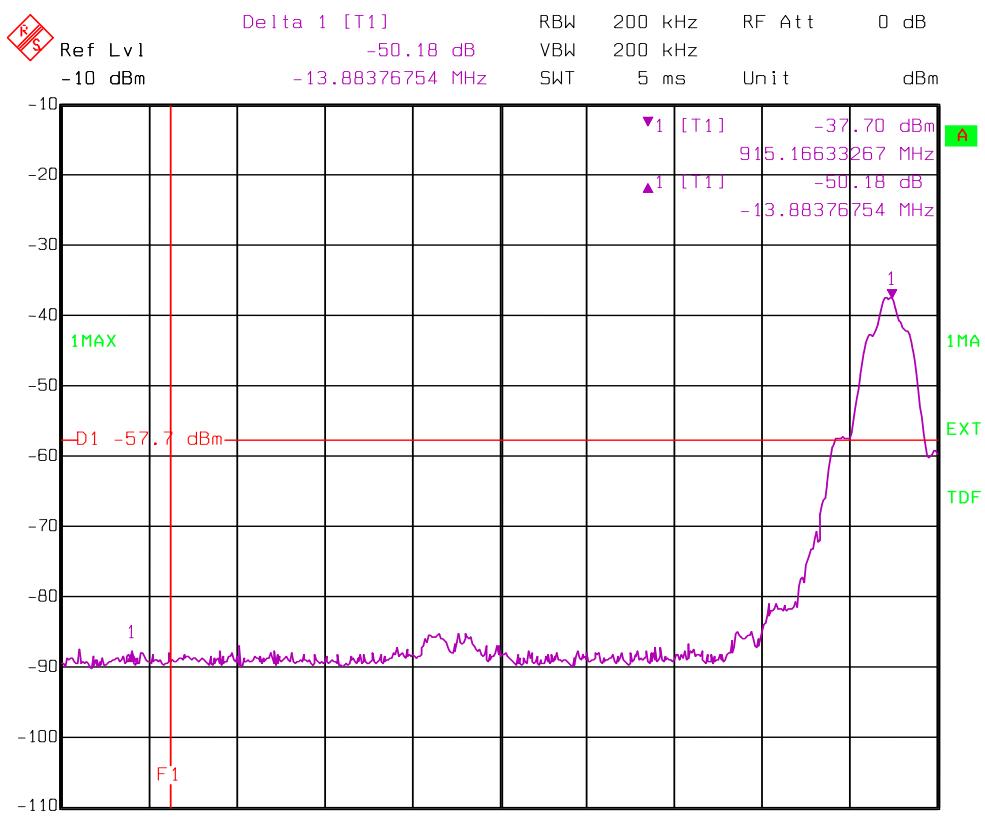
RESPECTED STANDARD

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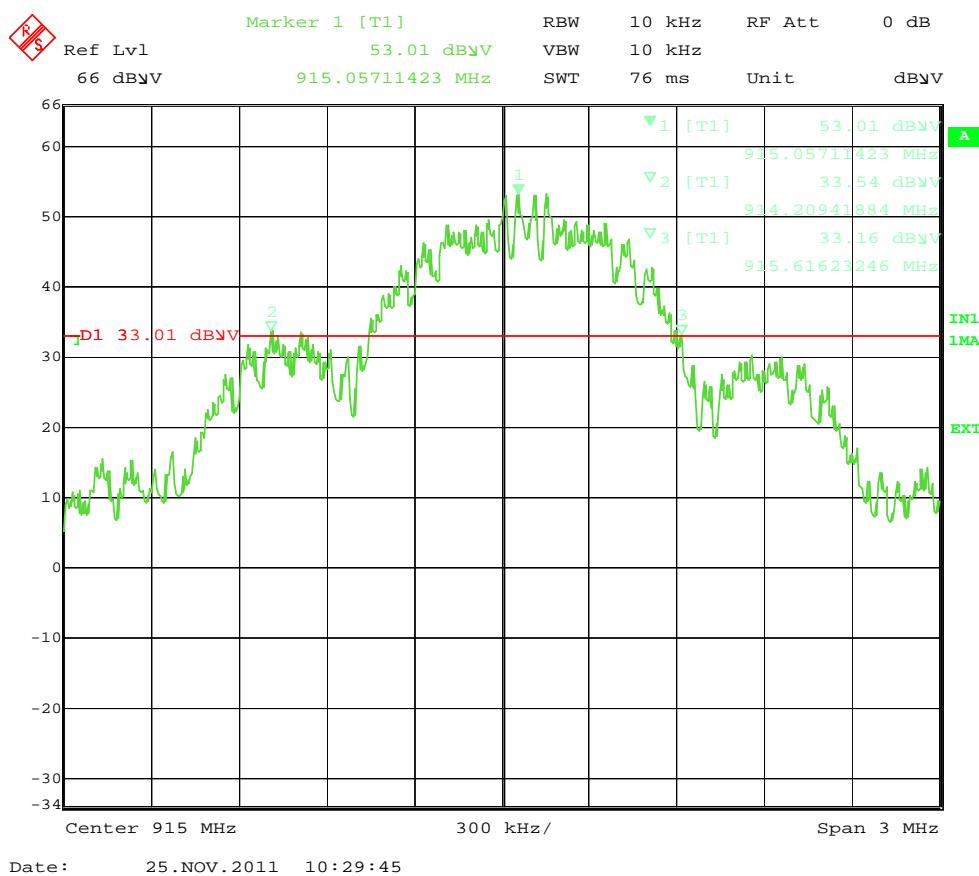
ANNEX 1: 6 dB BANDWIDTH



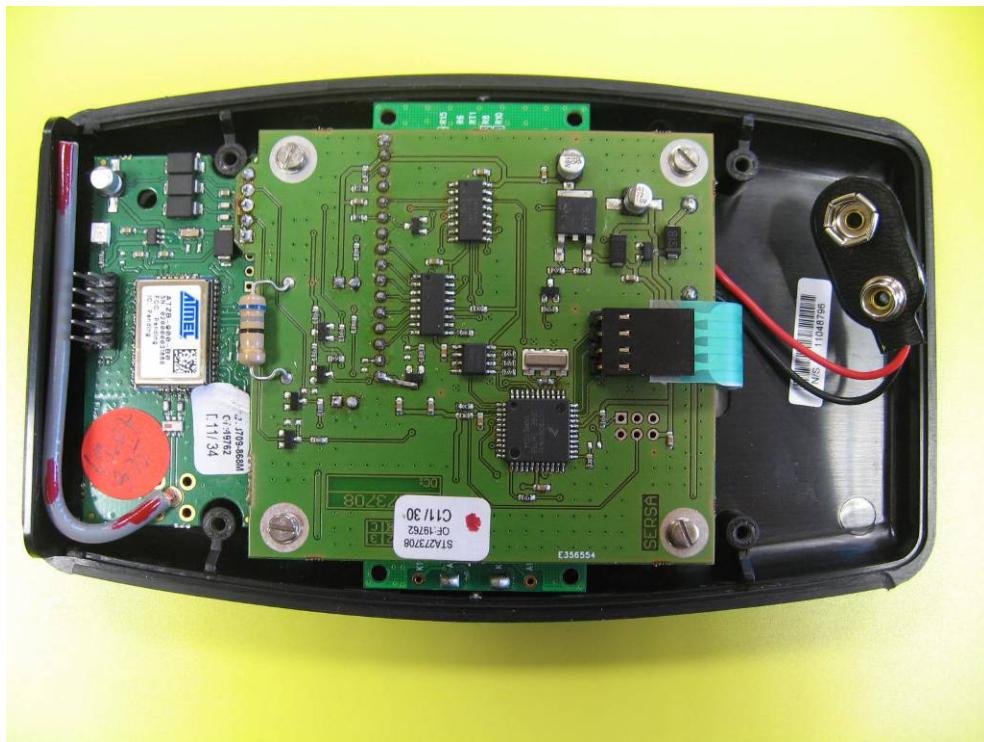
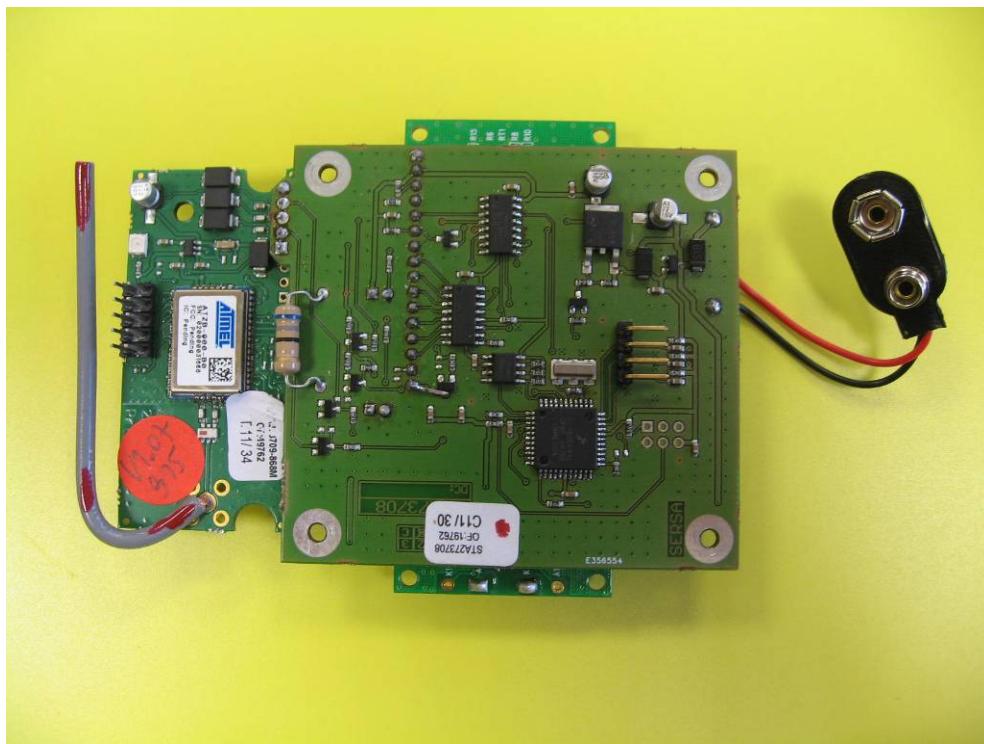
ANNEX 2: BANDE EDGE

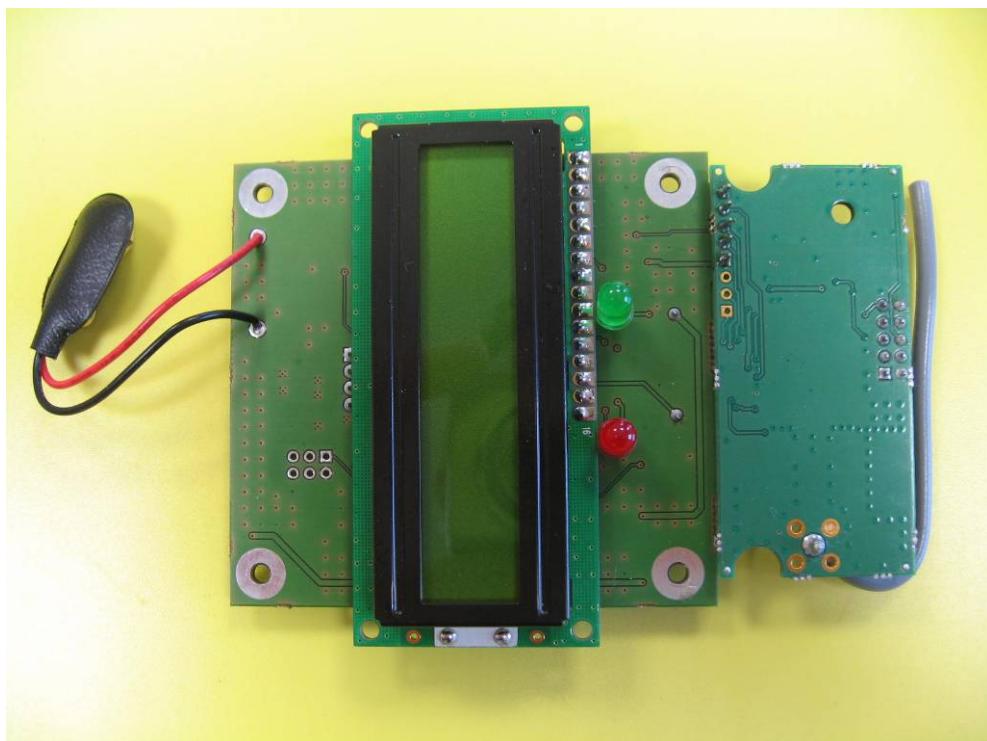


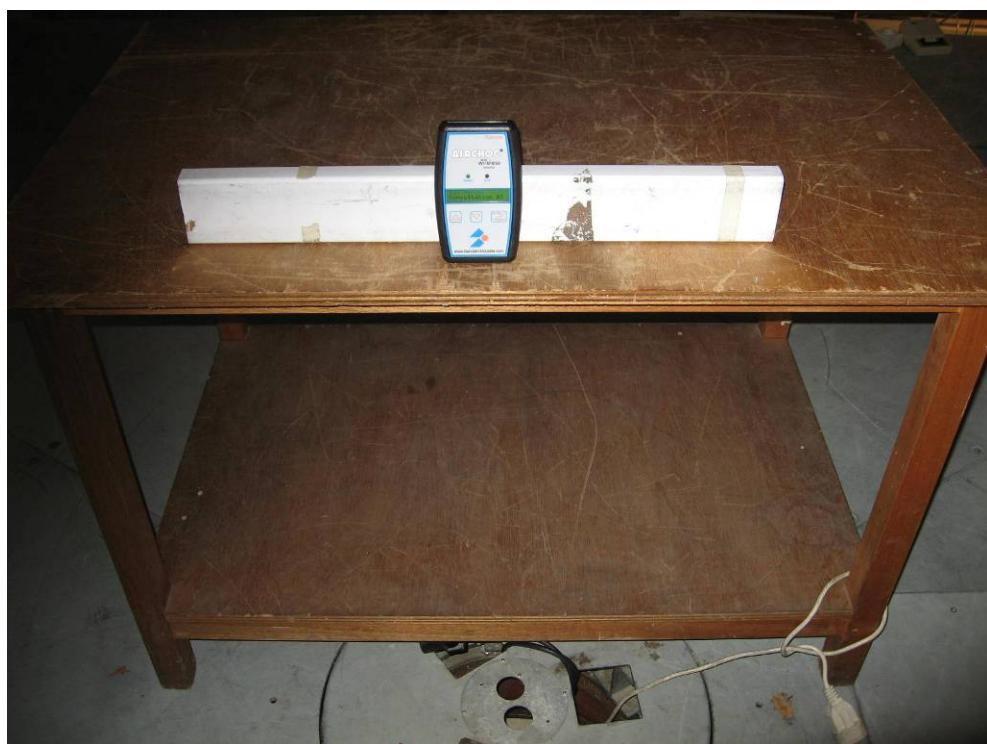
ANNEX 3: 20 dB BANDWIDTH



ANNEX 4: PHOTOS OF THE EQUIPMENT UNDER TEST**GENERAL VIEW**

INTERNAL VIEW**PRINTED CIRCUIT BOARD: FACE 1**

PRINTED CIRCUIT BOARD: FACE 2**RADIO MODULE**

ANNEX 5: TEST SET UP AND OPEN AREA TEST SITE**OPEN AREA TEST SITE**