



R051-24-11-105713-3/A Ed. 0

RADIO test report

**according to standard:
CFR 47 - FCC Part 15**

**Equipment under test:
ZIGBIT 900 RECEIVER
Model: COFSFRECEPT02**

**FCC ID:
A29-REWCASEV**

**Company:
STANDARD INDUSTRIE**

DISTRIBUTION: Mr DUHAUTOIS

Company: STANDARD INDUSTRIE

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PRODUCT: Zigbit 900 Receiver

Reference / model: COFSFRECEPT02

Serial number: Not communicated

MANUFACTURER: STANDARD INDUSTRIE

COMPANY SUBMITTING THE PRODUCT:

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DATE(S) OF TEST: 25 and 30 November 2011
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 Receiver – Model: COFSFRECEPT02 in accordance with normative reference.

2. PRODUCT DESCRIPTION

ITU Emission code:	1M39G1D
Class:	B (residential environment)
Utilization:	receiving device plugged into airchocs in order to control then from the emitting device
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:	2x3.6 Vd.c. (2x Lithium battery)

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		
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	/	/
M05024	3115	Horn antenna 1-18GHz	March-11	March-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					
	<i>(a) Alternative to general radiated emission limits</i>	X				
	<i>(b) Unwanted emissions outside of §15.247 frequency bands</i>	X				<i>Note 3</i>
	<i>(c) 20 dB bandwidth and band-edge compliance</i>	X				
FCC Part 15.247	OPERATION WITHIN THE BANDS 902-928 MHZ, 2400-2483.5 MHz and 5725-5850 MHz					
	<i>(a) (1) Hopping systems</i>			X		
	<i>(a) (2) Digital modulation techniques</i>	X				<i>Note 4</i>
	<i>(b) Maximum peak output power</i>	X				<i>Note 5</i>
	<i>(c) Operation with directional antenna gains > 6 dBi</i>			X		
	<i>(d) Intentional radiator</i>	X				
	<i>(e) Peak power spectral density</i>	X				
	<i>(f) Hybrid system</i>			X		
	<i>(g) Frequency hopping requirements</i>			X		
	<i>(h) Frequency hopping intelligence</i>			X		
	<i>(i) RF exposure compliance</i>	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 523 kHz (see annex 1).

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

*Note 6: $PSD = EIRP / 4 * \pi * R^2 = 0.951 \text{ mW} / 4 * \pi * (20 \text{ cm})^2 = 0.189 \times 10^{-3} \text{ mW/cm}^2$ (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 Receiver – Model: COFSFRECEPT02 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
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: 2x 3.6 Vd.c (lithium batteries)

Not any spurious has been detected.

Applicable limits: from 30 MHz \leq F < 88 MHz: 40 dB μ /m
 from 88 MHz \leq F < 216 MHz: 43.5 dB μ /m
 from 216 MHz \leq F < 960 MHz: 46 dB μ /m
 above 960 MHz: 54 dB μ /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
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: 2x 3.6 Vd.c (lithium batteries)

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 (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	94.74	Peak	901.19	-46.63	48.11	73.84	25.73
915	94.74	Peak	928.53	-49.73	45.01	73.84	28.83

* *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
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): 20.4
Relative humidity (%): 52

Power source: 2 x 3.6 Vd.c (lithium batteries)

Sample n° 1

	Electro-magnetic field (dBμV/m):	Conducted power * (W)	Limit (W)
Normal test conditions	95.01	0.580×10^{-3}	1

Polarization of test antenna: horizontal (height: 105 cm)

Position of equipment: see photo in annex 5 (azimuth: 83 degrees)

* $P = (E \times d)^2 / (30 \times G_p)$ with $d = 3 \text{ m}$ and $G_p = 1.64$

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 ES17	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
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): 20.5
 Relative humidity (%): 53

Power source: 2 x 3.6 Vd.c (lithium batteries)

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 (dBµV/m)	Limits (dBµV/m)	Margin (dB)
1830	P	100	0	100	V	48.76	73.84	25.08
2745	P	100	0	1000	V	62.74	74*	11.26
2745	Av	100	0	1000	V	52.13	54*	1.87

* 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 93.84 dBµV/m.

So the applicable limit is 73.84 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

11. PEAK POWER DENSITY

Standard: FCC Part 15

Test procedure: paragraph 15.247 (e)

Test equipments:

TYPE	BRAND	GYL TECHNOLOGIE 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	GYL TECHNOLOGIES	M02093
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): 20.4
Relative humidity (%): 52

Power source: 2 x 3.6 Vd.c (lithium batteries)

Sample n° 1

	Peak power density at frequency: 915 MHz
Normal test conditions	-8.32 dBm
Limits	+8 dBm

Polarization of test antenna: horizontal (height: 105 cm)

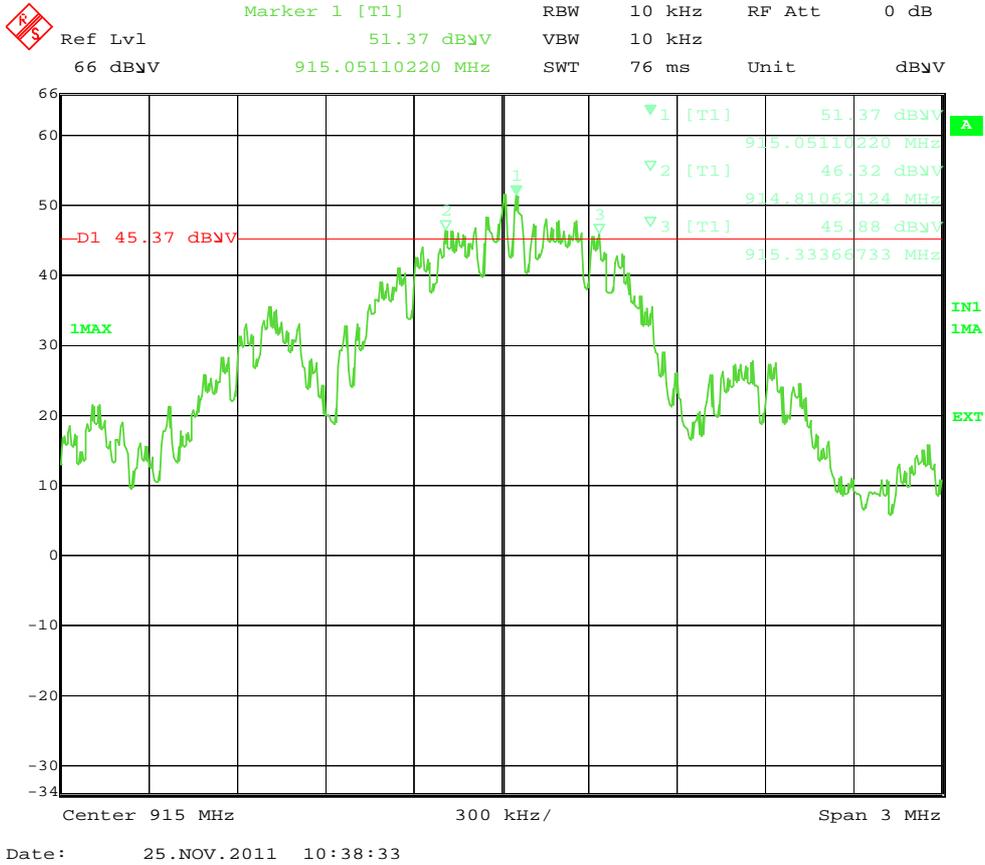
Position of equipment: see photo in annex 5 (azimuth: 83 degrees)

Test conclusion:

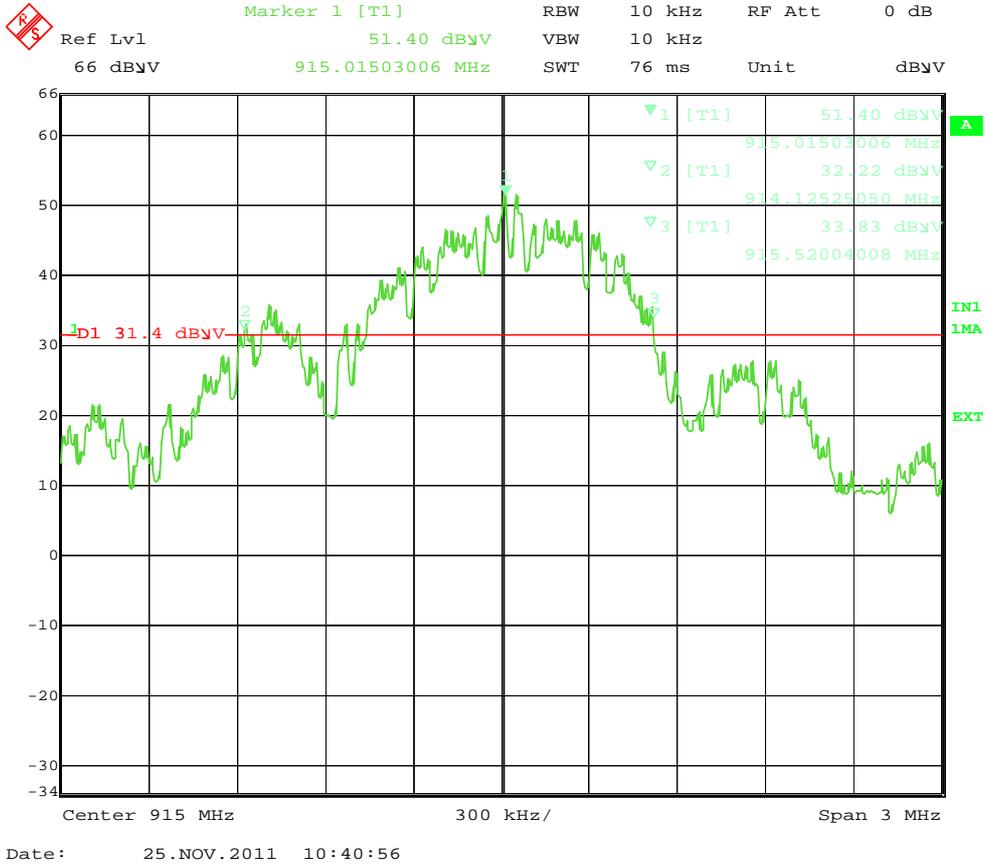
RESPECTED STANDARD

□□□ End of report, 5 annexes to be forwarded □□□

ANNEX 1: 6 dB BANDWIDTH

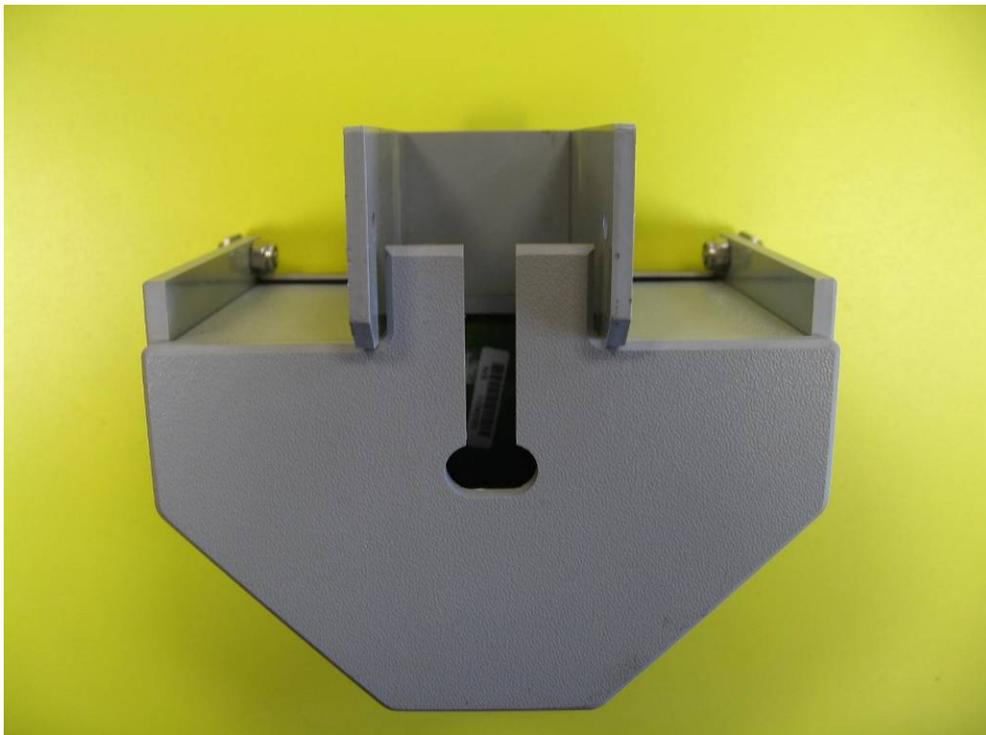


ANNEX 3: 20 dB BANDWIDTH

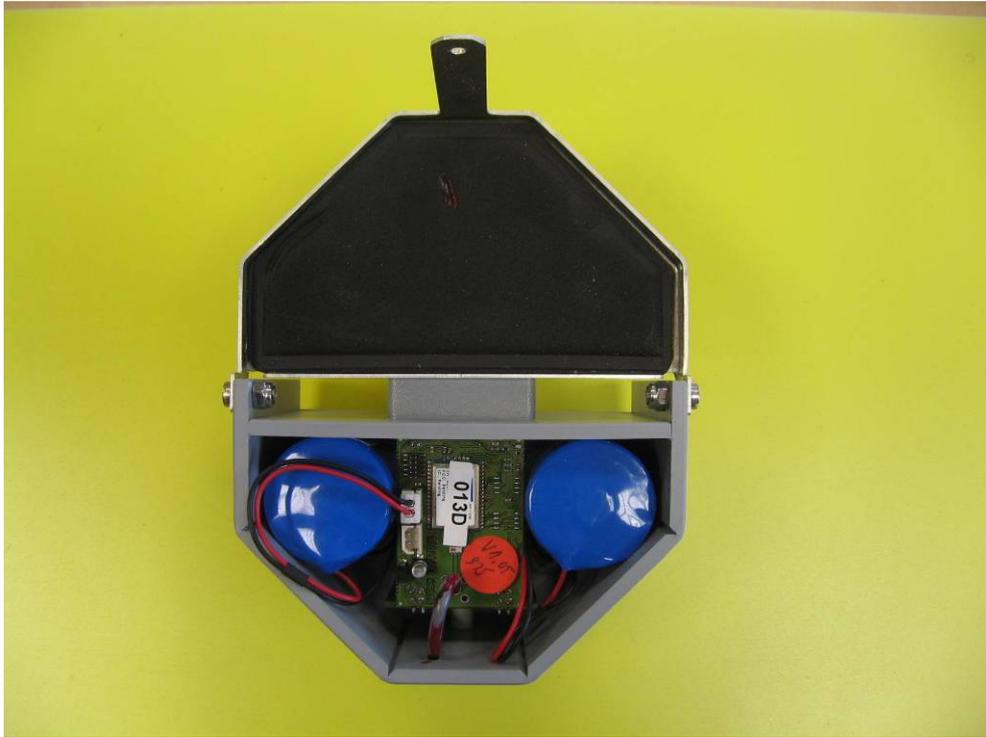


ANNEX 4: PHOTOS OF THE EQUIPMENT UNDER TEST

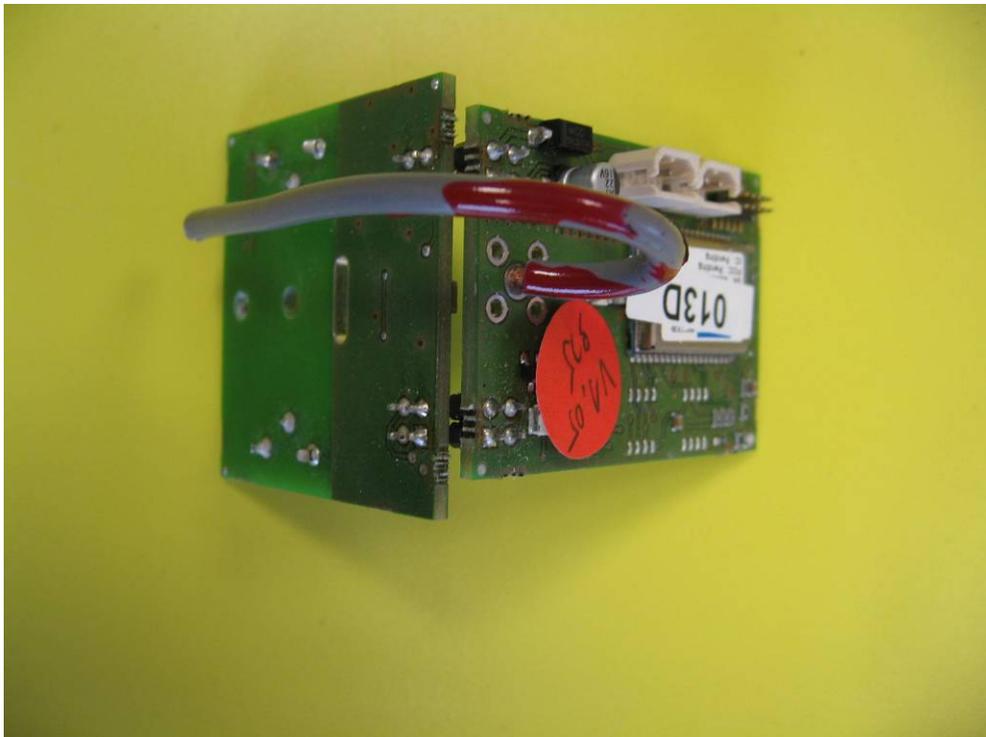
GENERAL VIEW



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

