EMITECH GROUPE

RR051-16-107296-1A Ed. 0

Certification Radio test report

According to the standard:
CFR 47 FCC PART 15

Equipment under test:
TRANSMITTER RSEF

FCC ID: OQMRSEF

Company:
JAY ELECTRONIQUE

DISTRIBUTION: Mr VANREMOORTERE **(Company:** JAY ELECTRONIQUE**)**

Number of pages: 51 with 6 appendixes

Ed.	Date	Modified Page(s)	Technical Verification and Quality Approval Name and Function	Visa
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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:	**TRANSMITTER RSEF**
Serial number (S/N):	Proto 22
Reference / model (P/N):	RSEF
Software version:	EFS_07
MANUFACTURER:	JAY ELECTRONIQUE

COMPANY SUBMITTING THE PRODUCT:

Company:	JAY ELECTRONIQUE
Address:	ZAC LA BATIE 37, ALLEE CHAMPROND 38334 SAINT ISMIER CEDEX FRANCE
Responsible:	Mr VANREMOORTERE
DATES OF TEST:	From 27-FEB-2017 to 01-MAR-2017
TESTING LOCATION:	EMITECH ANGERS laboratory at JUIGNE SUR LOIRE (49) FRANCE EMITECH ANGERS open area test site in JUIGNE SUR LOIRE (49) FRANCE 21 rue de la Fuye 49610 Juigne sur Loire France FCC Accredited under US-EU MRA Designation Number: FR0009 Test Firm Registration Number: 873677
TESTED BY:	S. LOUIS ***VISA:***
WRITTEN BY:	S. LOUIS

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1. INTRODUCTION

This document presents the result of RADIO test carried out on the following equipment: **Transmitter RSEF** in accordance with normative reference.

2. PRODUCT DESCRIPTION

Class: B

Utilization: Wireless safety logic signal transmission system

Antenna type and gain: 4 antennas type certified in this report (according to RD019-16-101078-1 Ed. 0)

Model	Connector	Type	Polarization	Gain (dBi)	Frequencies (MHz)	Other
VUA10xBM	BNC - 50Ω	Tuned	Vertical	5	806-870	Ground plane required (60x60cm)
FLX-900/915-FME	FME femal - 50Ω	½ wave	Vertical	7*	820-960	
EDBS-PRO900-4-BNC	BNC male - 50Ω	¼ wave	Vertical	1.5	860-920	Ground plane required (16x16cm)
VUA001B	BNC - 50Ω	¼ wave	Vertical	2	890-960	

For the antennas described here after, since they are the same type as those listed above (provided the same manner to meet the manufacturer's specification in terms of minimum cable length and ground plane), they can be used.

Model	Connector	Type	Polarization	Gain (dBi)	Frequencies (MHz)	Other
EDBS-PRO900-2-BNC	BNC male - 50Ω	½ wave	Vertical	0	860-920	Ground plane required (20x20cm)
VUA002B	BNC - 50Ω	½ wave	Vertical	3	860-960	
VUA10xBH	BNC - 50Ω	½ wave	Vertical	4	860-960	
VUA10xBV	BNC - 50Ω	¼ wave	Vertical	2	900-920	

Operating frequency range:	band from 911.8 MHz to 918.2 MHz
Number of channels:	64
Channel spacing:	100 kHz
Frequency generation:	Integrated fractional synthesis rate in the radio chip
Modulation:	FSK
Power source:	24Vdc

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 (2017)	Radio Frequency Devices
ANSI C63.4	2014 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.

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 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

Emitech Number	Model	Type	Last verification	Next verification	Validity
0000	BAT-EMC V3.6.0.32	Software	/	/	/
1406	EMCO 6502	Loop antenna	27/01/2015	27/01/2017	27/03/2017
4088	R&S FSP40	Spectrum Analyzer	29/10/2015	29/10/2017	29/12/2017
7310	Filtek HP12/1200-5AA	High-pass filter	03/03/2016	03/03/2018	03/05/2018
8511	HP 8447D	Low-noise amplifier	28/11/2016	28/11/2017	28/01/2018
8526	Schwarzbeck VHBB 9124	Biconical antenna	12/06/2015	12/06/2018	12/08/2018
8528	Schwarzbeck VHA 9103	Biconical antenna	15/03/2016	15/03/2019	15/05/2019
8535	EMCO 3115	Antenna	10/02/2016	10/02/2020	10/04/2020
8543	Schwarzbeck UHALP 9108A	Log periodic antenna	12/06/2015	12/06/2018	12/08/2018
8593	SIDT Cage 2	Anechoic chamber	/	/	/
8676	ISOTECH IDM106N	Multimeter	21/05/2015	21/05/2017	21/07/2017
8707	R&S ESI7	Test receiver	07/06/2016	07/06/2018	07/08/2018
8732	Emitech	OATS	11/10/2016	11/10/2019	11/12/2019
8749	La Crosse Technology WS-9232	Meteo station	23/09/2016	23/09/2018	23/11/2018
8750	La Crosse Technology WS-9232	Meteo station	23/09/2016	23/09/2018	23/11/2018
8775	Fontaine FTN 2515B	Power source	/	/	/
8783	EMCO 3147	Log periodic antenna	15/03/2016	15/03/2019	15/05/2019
8864	Champ libre Juigné. V3.5	Software	/	/	/
8896	ACQUISYS GPS8	Satellite synchronized frequency standard	/	/	/
10739	LUCIX Corp S005180M3201	Low-noise amplifier	20/01/2016	20/01/2017	20/03/2017

6. TESTS AND CONCLUSIONS

6.1 general

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

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		*E.U.T supplied by 24Vdc*
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

6.3 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		*E.U.T supplied by 24Vdc*
FCC Part 15.209	RADIATED EMISSION LIMITS; general requirements	X				*Note 2*
FCC part 15.215	ADDITIONAL PROVISIONS TO THE GENERAL RADIATED EMISSION LIMITATIONS					
	(a) Alternative to general radiated emission limits	X				
	(b) Unwanted emissions outside of §15.249 frequency bands	X				*Note 3*
	(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: dedicated antenna. Professionally installed equipment.

Note 2: See FCC part 15.249 (d).

Note 3: See FCC part 15.209. Unwanted emissions levels are all below the fundamental emission field strength level.

RF EXPOSURE:

For fixed application :

Maximum measured power = 92.89 dBµV/m = 0.584 mW at 918.2 MHz
with $P = (E \times d)^2 / (30 \times Gp)$ *with d = 3 m and Gp = 1*

In accordance with KDB 447498 D01 General RF Exposure Guidance v06:

PSD = EIRP/(4*π*R2)
*PSD = 0.584/(4*π*(20 cm)²)=* ***0.116 x 10 -3 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.

7. MEASUREMENT UNCERTAINTY

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

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

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

8. ADDITIONAL PROVISIONS TO THE GENERAL RADIATED EMISSION LIMITATIONS

Standard: FCC Part 15

Test procedure: Paragraph 15.215, 15.209 and 15.249

Test set up:

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

Detection mode: Peak

Bandwidth: 100 kHz

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): 20.5
Relative humidity (%): 48

Power source: We used for power source the external power supply regulated to 24Vdc.

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

Sample N° 1: Channel 1: with **FLX-900/915-FME** antenna - Power Level adjusted= **-2**

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)
911.8	91.63	Peak	901.94	-55.6	36.03**	74	37.97

* *Marker-Delta method*
** *The peak level is lower than the average limit (54dBµV/m).*

Sample N° 1: Channel 64: with **VUA001B** antenna - Power Level adjusted= **-2**

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)
918.2	92.89	Peak	928.05	-59.7	33.19**	74	40.81

* *Marker-Delta method*
** *The peak level is lower than the average limit (54dBµV/m).*

The 20 dB bandwidth curves are given in appendix 5; 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.

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 (918.2MHz)

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

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

Results:

Power source: We used for power source the external power supply regulated to 24Vdc.

Sample N° 1: with **VUA001B** antenna

Ambient temperature (°C): 21.2
Relative humidity (%): 39

Channel 1:

Frequencies (MHz)	Detector P QP Av	Antenna height (cm)	Azimuth (degree)	RBW (kHz)	Polarization H: Horizontal V: Vertical	Field strength Measured at 10 m (dBµV/m)	Field strength Computed at 3 m (dBµV/m)	Limits (dBµV/m)	Margin (dB)
911.8	QP	227	36	120	V	78.51*	88.91	94	5.09
1824	P	150	—	100	H	—	45.2**	74	28.8
3648.5	P	150	—	100	H	—	43.4**	74	30.6

P= Peak, QP=Quasi-peak, Av=Average
** Fundamental emission*
***the peak level is lower than the average limit (54dBµV/m).*

Channel 32:

Frequencies (MHz)	Detector P QP Av	Antenna height (cm)	Azimuth (degree)	RBW (kHz)	Polarization H: Horizontal V: Vertical	Field strength Measured at 10 m (dBµV/m)	Field strength Computed at 3 m (dBµV/m)	Limits (dBµV/m)	Margin (dB)
915	QP	197	69	120	V	78.70*	89.1	94	4.9
1830	QP	—	100	H	—	—	44.5**	74	29.5

P= Peak, QP=Quasi-peak, Av=Average
** Fundamental emission*
***the peak level is lower than the average limit (54dBµV/m).*

Channel 64:

Frequencies (MHz)	Detector P QP Av	Antenna height (cm)	Azimuth (degree)	RBW (kHz)	Polarization H: Horizontal V: Vertical	Field strength Measured at 10 m (dBµV/m)	Field strength Computed at 3 m (dBµV/m)	Limits (dBµV/m)	Margin (dB)
918.2	QP	180	43	120	V	82.49*	92.89	94	1.11
1836.5	P	150	—	100	V	—	45.1**	74	28.9

P= Peak, QP=Quasi-peak, Av=Average
** Fundamental emission*
***the peak level is lower than the average limit (54dBµV/m).*

Sample 1: with **EDBS-PRO900-4-BNC** antenna mounted on ground plane - Power Level adjusted= **-2**

Ambient temperature (°C): 21.2
Relative humidity (%): 39

Channel 1

Frequencies (MHz)	Detector P QP Av	Antenna height (cm)	Azimuth (degree)	RBW (kHz)	Polarization H: Horizontal V: Vertical	Field strength Measured at 10 m (dBµV/m)	Field strength Computed at 3 m (dBµV/m)	Limits (dBµV/m)	Margin (dB)
911.8	QP	213	346	120	V	80.53*	90.93	94	3.07
1824	P	150	—	100	H	—	43.8**	74	30.2
3647	P	150	—	100	V	—	43.4**	74	30.6

P= Peak, QP=Quasi-peak, Av=Average
** Fundamental emission*
***the peak level is lower than the average limit (54dBµV/m).*

Channel 32

Frequencies (MHz)	Detector P QP Av	Antenna height (cm)	Azimuth (degree)	RBW (kHz)	Polarization H: Horizontal V: Vertical	Field strength Measured at 10 m (dBµV/m)	Field strength Computed at 3 m (dBµV/m)	Limits (dBµV/m)	Margin (dB)
915	QP	158	359	120	V	76.49*	86.89	94	7.11
1830	P	150	—	100	H	—	45.2**	74	28.8

P= Peak, QP=Quasi-peak, Av=Average
** Fundamental emission*
***the peak level is lower than the average limit (54dBµV/m).*

Channel 64

Frequencies (MHz)	Detector P QP Av	Antenna height (cm)	Azimuth (degree)	RBW (kHz)	Polarization H: Horizontal V: Vertical	Field strength Measured at 10 m (dBµV/m)	Field strength Computed at 3 m (dBµV/m)	Limits (dBµV/m)	Margin (dB)
918.2	QP	218	167	120	V	81.82*	92.22	94	1.78
1836.5	P	150	—	100	H	—	47**	74	27

P= Peak, QP=Quasi-peak, Av=Average
** Fundamental emission*
***the peak level is lower than the average limit (54dBµV/m).*

Sample 1: with **FLX-900/915-FME** antenna - Power Level adjusted= **-2**

Ambient temperature (°C): 21.2
Relative humidity (%): 39

Channel 1

Frequencies (MHz)	Detector P QP Av	Antenna height (cm)	Azimuth (degree)	RBW (kHz)	Polarization H: Horizontal V: Vertical	Field strength Measured at 10 m (dBµV/m)	Field strength Computed at 3 m (dBµV/m)	Limits (dBµV/m)	Margin (dB)
911.8	QP	117	281	120	H	81.23*	91.63	94	2.37
1824	P	150	—	100	H	—	43.5**	74	30.5

P= Peak, QP=Quasi-peak, Av=Average
** Fundamental emission*
***the peak level is lower than the average limit (54dBµV/m).*

Channel 32

Frequencies (MHz)	Detector P QP Av	Antenna height (cm)	Azimuth (degree)	RBW (kHz)	Polarization H: Horizontal V: Vertical	Field strength Measured at 10 m (dBµV/m)	Field strength Computed at 3 m (dBµV/m)	Limits (dBµV/m)	Margin (dB)
915	QP	166	0	120	V	76.50*	86.90	94	7.10
1830.5	P	150	165	100	H	—	44.2**	74	29.8

P= Peak, QP=Quasi-peak, Av=Average
** Fundamental emission*
***the peak level is lower than the average limit (54dBµV/m).*

Channel 64

Frequencies (MHz)	Detector P QP Av	Antenna height (cm)	Azimuth (degree)	RBW (kHz)	Polarization H: Horizontal V: Vertical	Field strength Measured at 10 m (dBµV/m)	Field strength Computed at 3 m (dBµV/m)	Limits (dBµV/m)	Margin (dB)
918.2	QP	158	152	120	V	82.16*	92.56	94	1.44
1836.5	P	150	165	100	H	—	44.1**	74	29.9

P= Peak, QP=Quasi-peak, Av=Average
** Fundamental emission*
***the peak level is lower than the average limit (54dBµV/m).*

Sample 1: with **VUA10xBM** antenna mounted on ground plane - Power Level adjusted= **-2**

Ambient temperature (°C): 21.2
Relative humidity (%): 39

Channel 1

Frequencies (MHz)	Detector P QP Av	Antenna height (cm)	Azimuth (degree)	RBW (kHz)	Polarization H: Horizontal V: Vertical	Field strength Measured at 10 m (dBµV/m)	Field strength Computed at 3 m (dBµV/m)	Limits (dBµV/m)	Margin (dB)
911.8	QP	131	25	120	H	78.58*	88.98	94	5.02
1824	P	150	—	100	H	—	44.8**	74	29.2

P= Peak, QP=Quasi-peak, Av=Average
* *Fundamental emission*
***the peak level is lower than the average limit (54dBµV/m).*

Channel 32

Frequencies (MHz)	Detector P QP Av	Antenna height (cm)	Azimuth (degree)	RBW (kHz)	Polarization H: Horizontal V: Vertical	Field strength Measured at 10 m (dBµV/m)	Field strength Computed at 3 m (dBµV/m)	Limits (dBµV/m)	Margin (dB)
915	QP	187	59	120	V	78.98*	89.38	94	4.62
1830.5	P	150	165	100	H	—	45.8**	74	28.2

P= Peak, QP=Quasi-peak, Av=Average
* *Fundamental emission*
***the peak level is lower than the average limit (54dBµV/m).*

Channel 64

Frequencies (MHz)	Detector P QP Av	Antenna height (cm)	Azimuth (degree)	RBW (kHz)	Polarization H: Horizontal V: Vertical	Field strength Measured at 10 m (dBµV/m)	Field strength Computed at 3 m (dBµV/m)	Limits (dBµV/m)	Margin (dB)
918.2	QP	157	47	120	V	80.49*	90.89	94	3.11
1836.5	P	150	165	100	H	—	47.3**	74	26.7

P= Peak, QP=Quasi-peak, Av=Average
* *Fundamental emission*
***the peak level is lower than the average limit (54dBµV/m).*

Applicable limits: table 15.249 a)

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 10th harmonic of the highest fundamental frequency (918.2MHz)

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

Bandwidth: 200Hz (9 kHz < F < 150kHz)
9 kHz (150 kHz < F < 30MHz)
120 kHz (30 MHz < F < 1 GHz)
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 transmission mode, modulated by internal data signal, at the highest output power level which the transmitter is intended to operate.

Results:

Ambient temperature (°C): 21.2
Relative humidity (%): 37

Power source: We used for power source the external power supply regulated to 24Vdc.

Sample N° 1 with VUA001B Antenna

Channel 1, 32 and 64

Frequencies (MHz)	Detector P QP Av	Antenna height (cm)	Azimuth (degree)	RBW (kHz)	Polarization H: Horizontal V: Vertical	Field strength Measured at 10 m (dBµV/m)	Field strength Computed at 3 m (dBµV/m)	Limits (dBµV/m) or (dBm)	Margin (dB)
40	QP	100	309	120	V	16.59	26.99	40	13.01
50	QP	100	109	120	V	16.17	26.57	40	13.43
60	QP	107	63	120	V	13.63	24.03	40	15.97
80	QP	113	45	120	V	18.78	29.18	40	10.88
110	QP	144	126	120	V	23.35	33.75	43.5	9.75

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

Sample N° 1 with EDBS-PRO900-4-BNC Antenna

Channel 1, 32 and 64

Frequencies (MHz)	Detector P QP Av	Antenna height (cm)	Azimuth (degree)	RBW (kHz)	Polarization H: Horizontal V: Vertical	Field strength Measured at 10 m (dBµV/m)	Field strength Computed at 3 m (dBµV/m)	Limits (dBµV/m) or (dBm)	Margin (dB)
30	QP	400	136	120	H	16.38	26.78	40	13.22
40	QP	148	233	120	V	16.80	27.20	40	12.80
55	QP	359	301	120	V	12.29	22.69	40	17.31
60	QP	100	245	120	V	20.72	31.12	40	8.88
70	QP	400	166	120	V	13.83	24.23	40	15.67
80	QP	155	56	120	V	22.90	33.30	40	6.70
110	QP	100	103	120	V	25.43	35.83	43.5	7.67

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

Sample N° 1 with FLX-900/915-FME Antenna

Channel 1, 32 and 64

Frequencies (MHz)	Detector P QP Av	Antenna height (cm)	Azimuth (degree)	RBW (kHz)	Polarization H: Horizontal V: Vertical	Field strength Measured at 10 m (dBµV/m)	Field strength Computed at 3 m (dBµV/m)	Limits (dBµV/m) or (dBm)	Margin (dB)
40	QP	204	248	120	V	14.70	25.10	40	14.90
60	QP	114	156	120	V	13.16	23.56	40	16.44
80	QP	129	0	120	V	20.54	30.94	40	9.06
110	QP	100	114	120	V	25.18	35.58	43.5	7.92

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

Sample N° 1 with VUA10xBM Antenna

Channel 1, 32 and 64

Frequencies (MHz)	Detector P QP Av	Antenna height (cm)	Azimuth (degree)	RBW (kHz)	Polarization H: Horizontal V: Vertical	Field strength Measured at 10 m (dBµV/m)	Field strength Computed at 3 m (dBµV/m)	Limits (dBµV/m) or (dBm)	Margin (dB)
30.57	QP	349	195	120	V	15.86	26.26	40	13.74
33.6	QP	315	9	120	V	14.22	24.62	40	15.38
40	QP	240	0	120	V	14.75	25.15	40	14.85
60	QP	219	174	120	V	14.97	25.37	40	14.63
70	QP	400	0	120	V	18.29	28.69	40	11.31
80	QP	156	23	120	V	27.46	37.96	40	2.04
110	QP	100	101	120	V	27.76	38.16	43.5	5.34

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

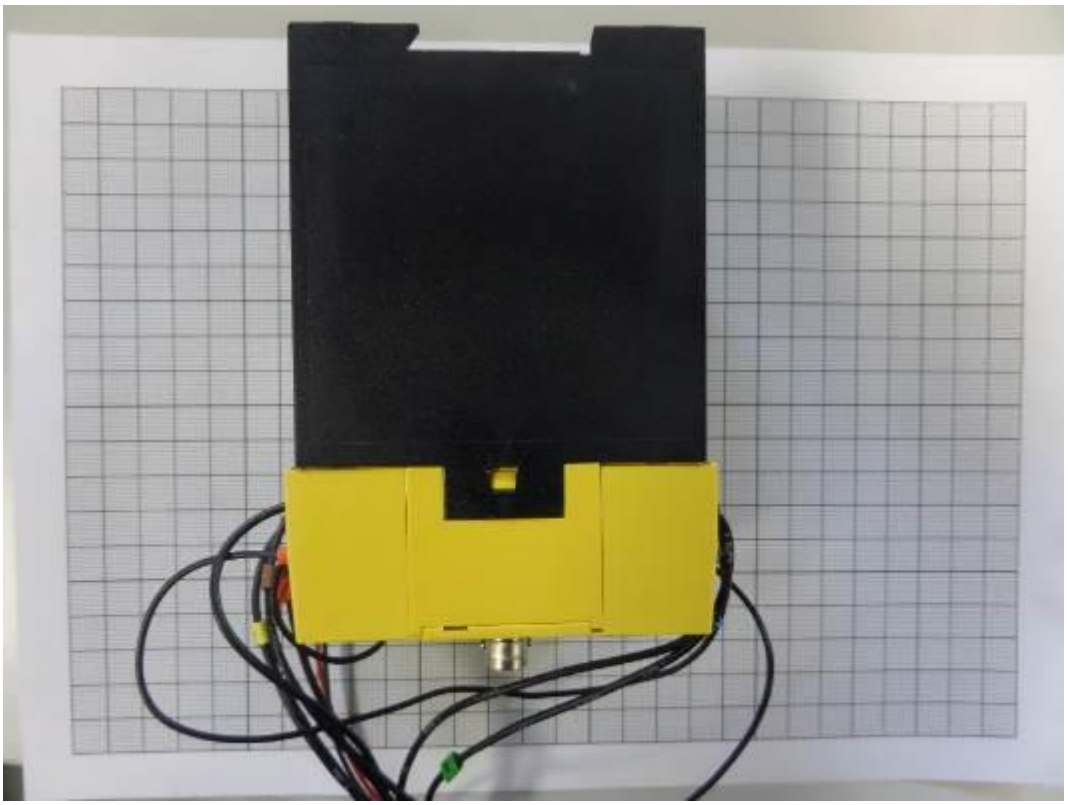
Applicable limits: for 9 kHz ≤ F ≤ 490 kHz : 2400/F(kHz) at 300 meters
for 490 kHz < F ≤ 1.705 MHz : 24000/F(kHz) at 30 meters
for 1.705 MHz < F ≤ 30 MHz : 29.5 dBµV/m at 30 meters
for 30 MHz < F ≤ 88 MHz : 40 dBµV/m at 3 meters
for 88 MHz < F ≤ 216 MHz : 43.5 dBµV/m at 3 meters
for 216 MHz < F ≤ 960 MHz : 46 dBµV/m at 3 meters
Above 960 MHz : 54 dBµV/m at 3 meters

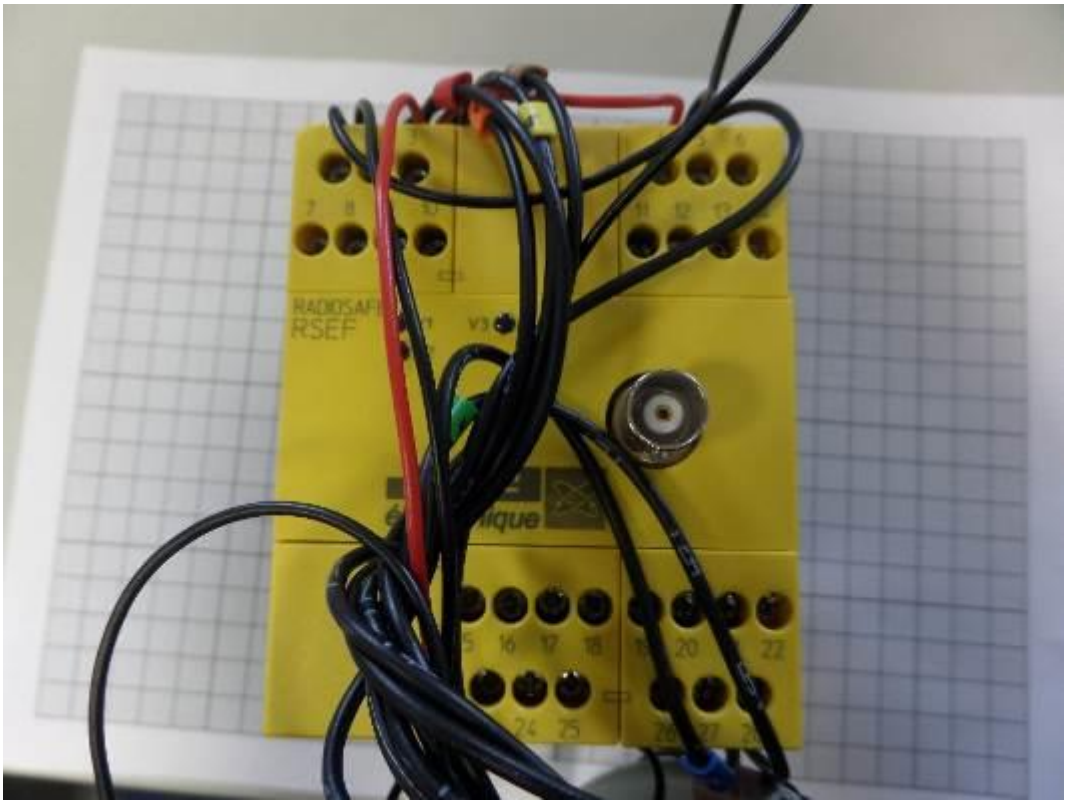
Test conclusion:

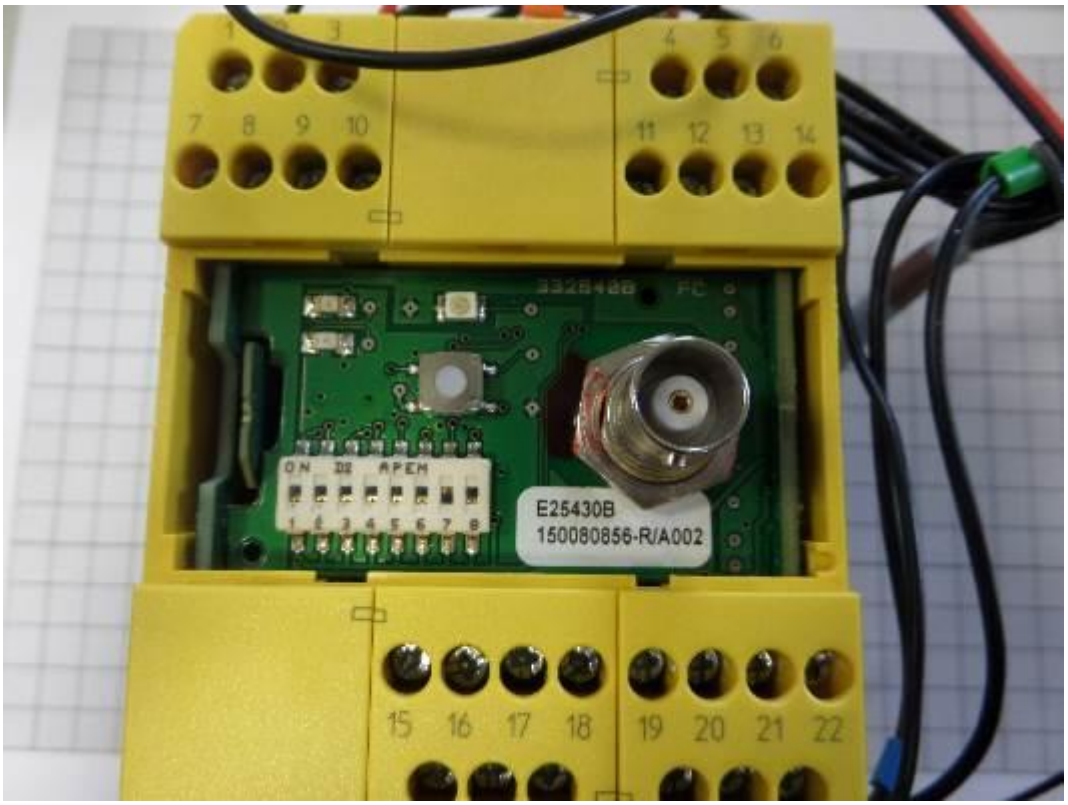
RESPECTED STANDARD

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

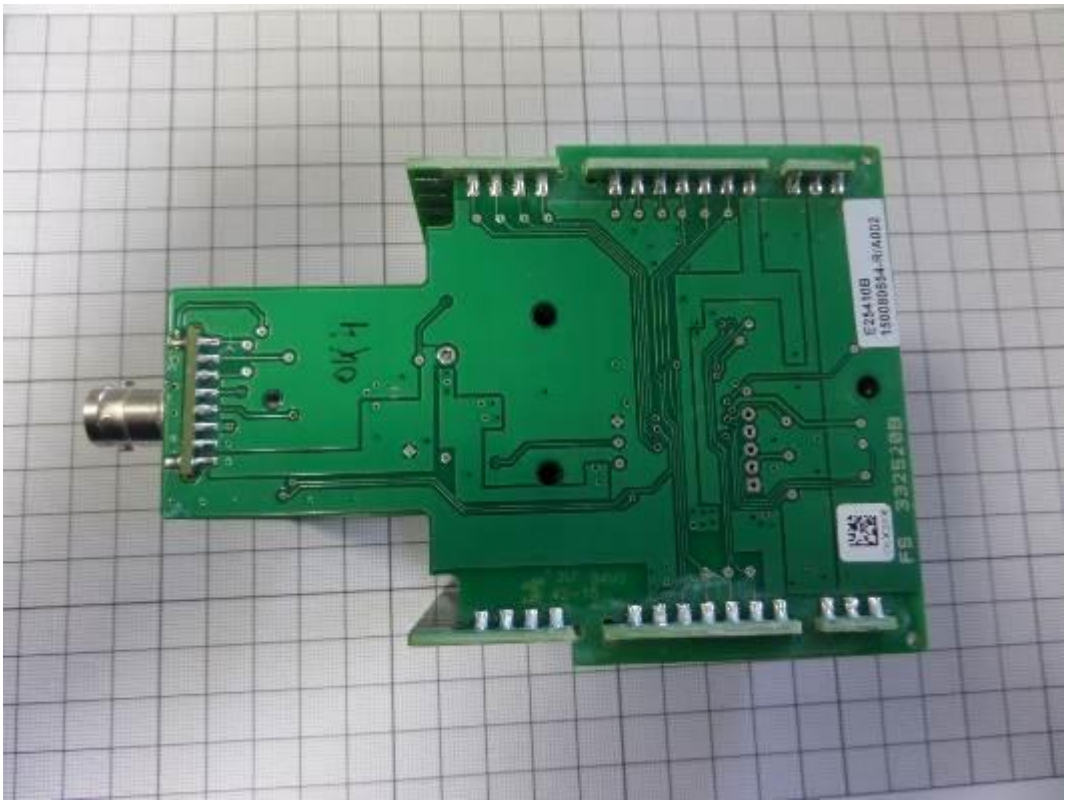
APPENDIX 1: Photos of the equipment under test

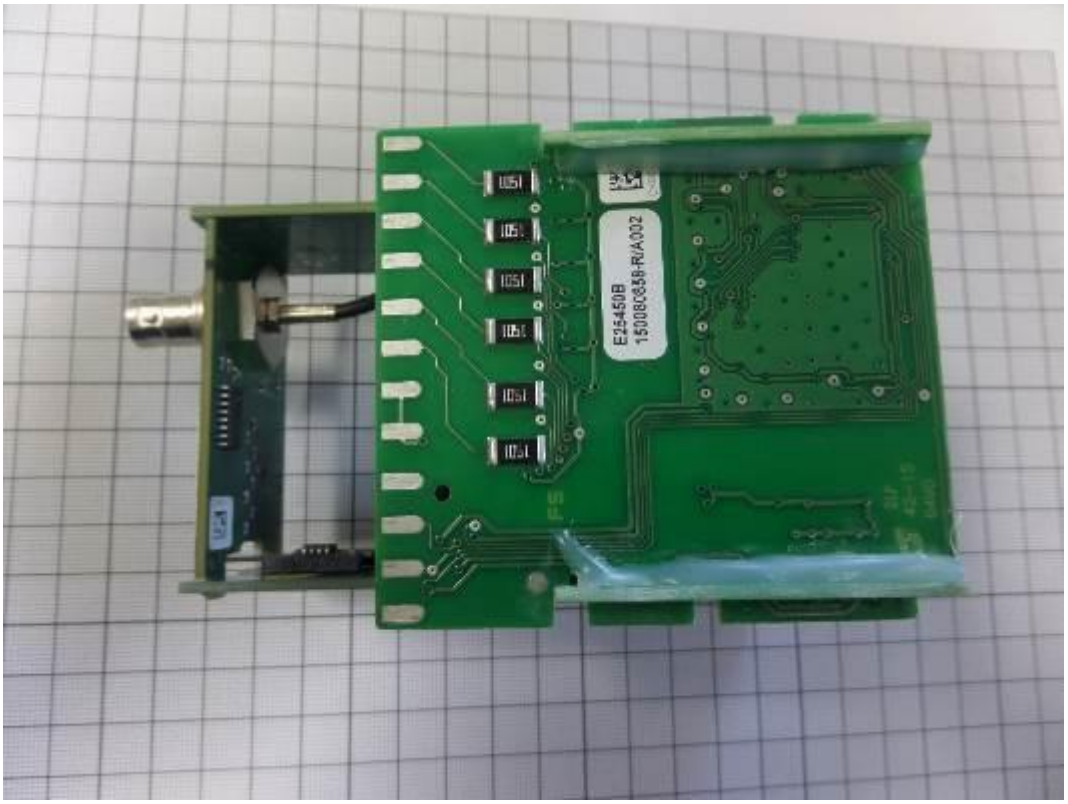


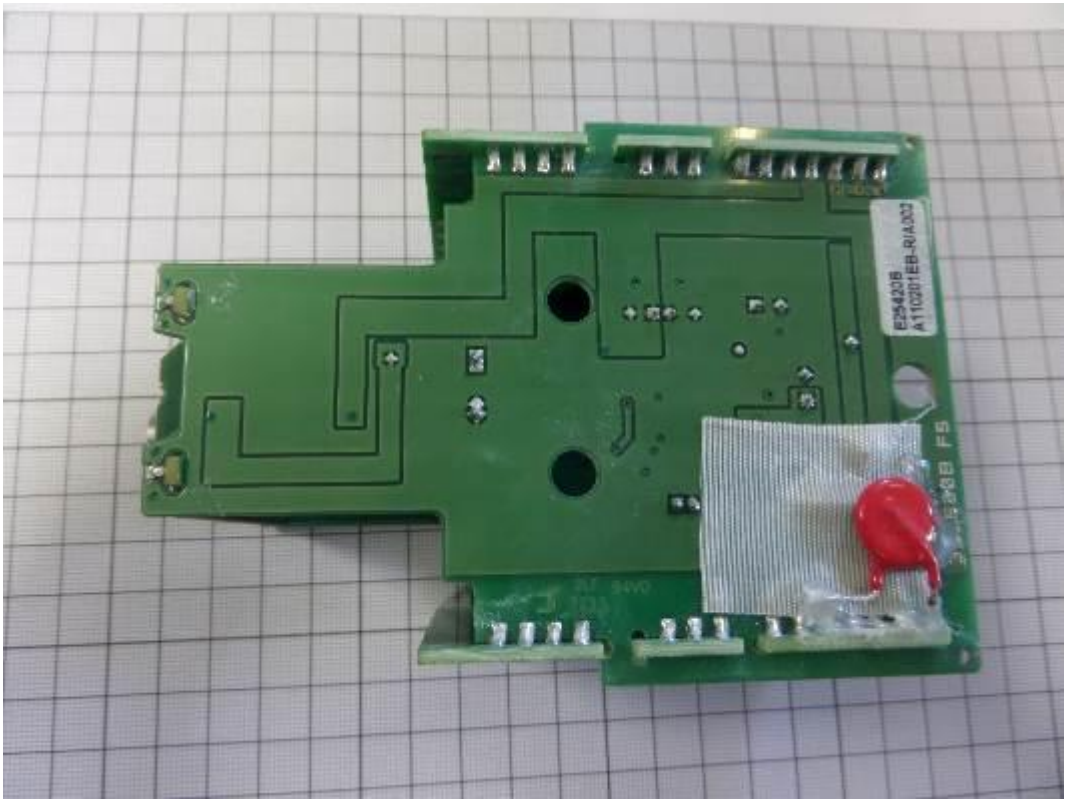

RSEF

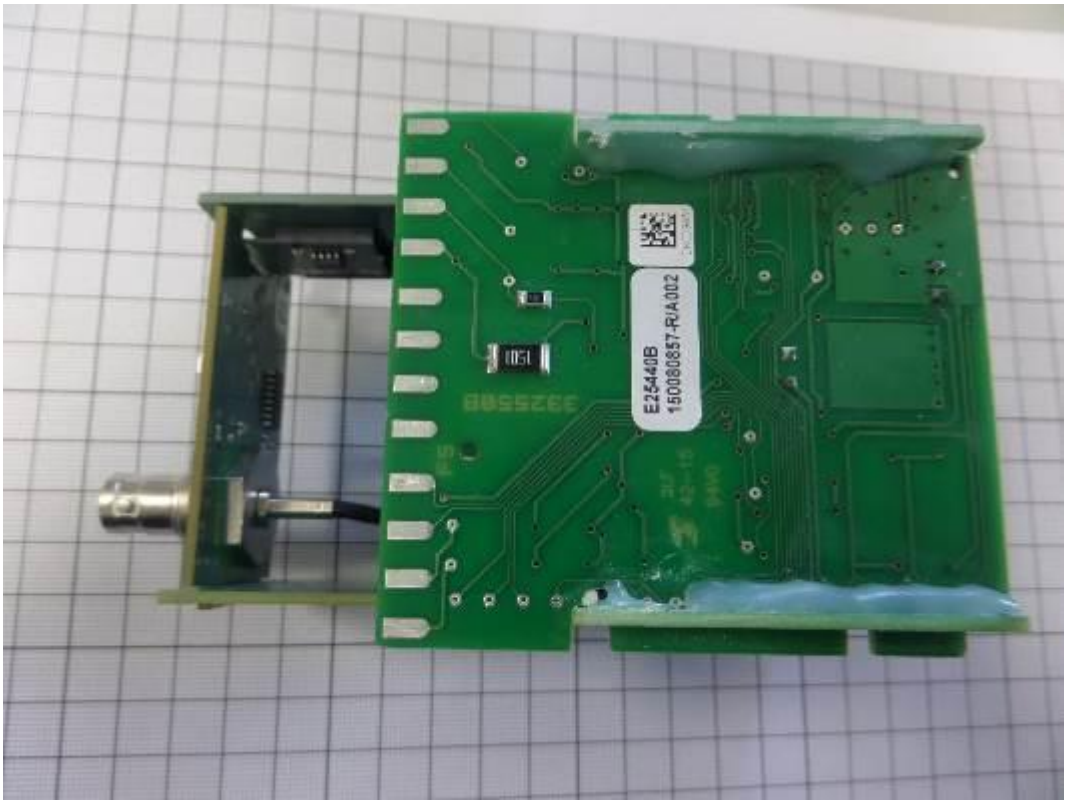

E25430B
150080856-R/A002

E25430B
150080856-R/A002




E254508
150080858-R/A302


E254308
A110301EB-R/A302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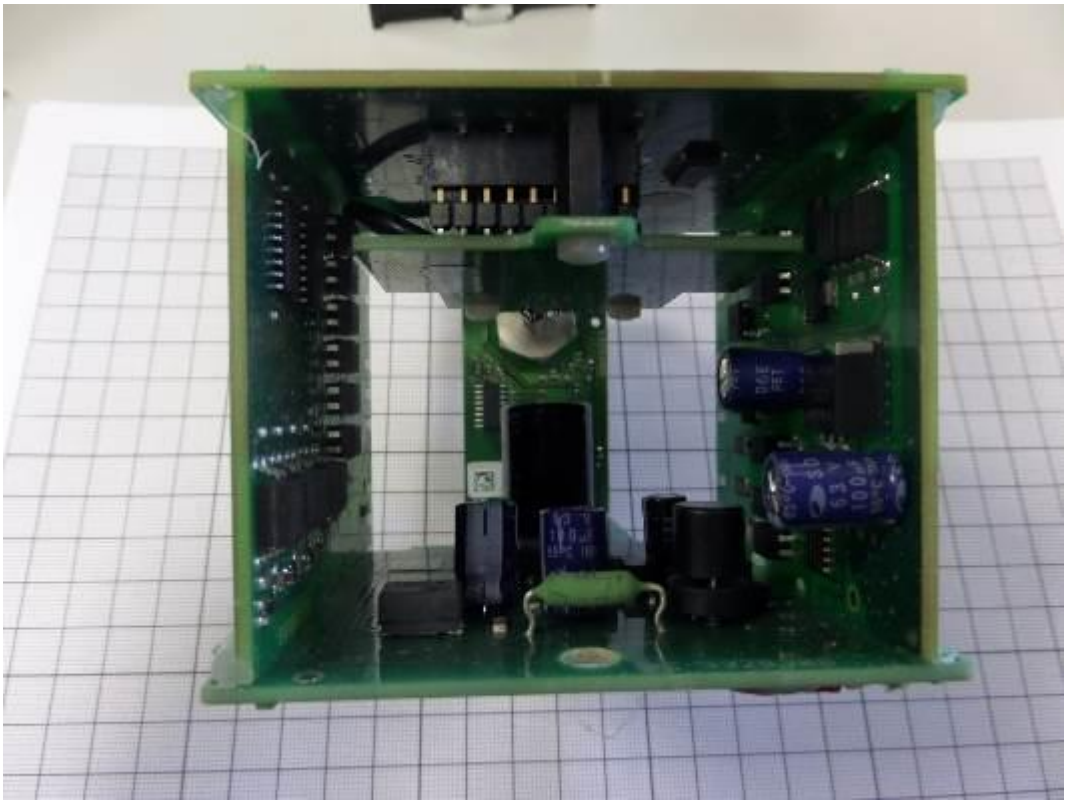
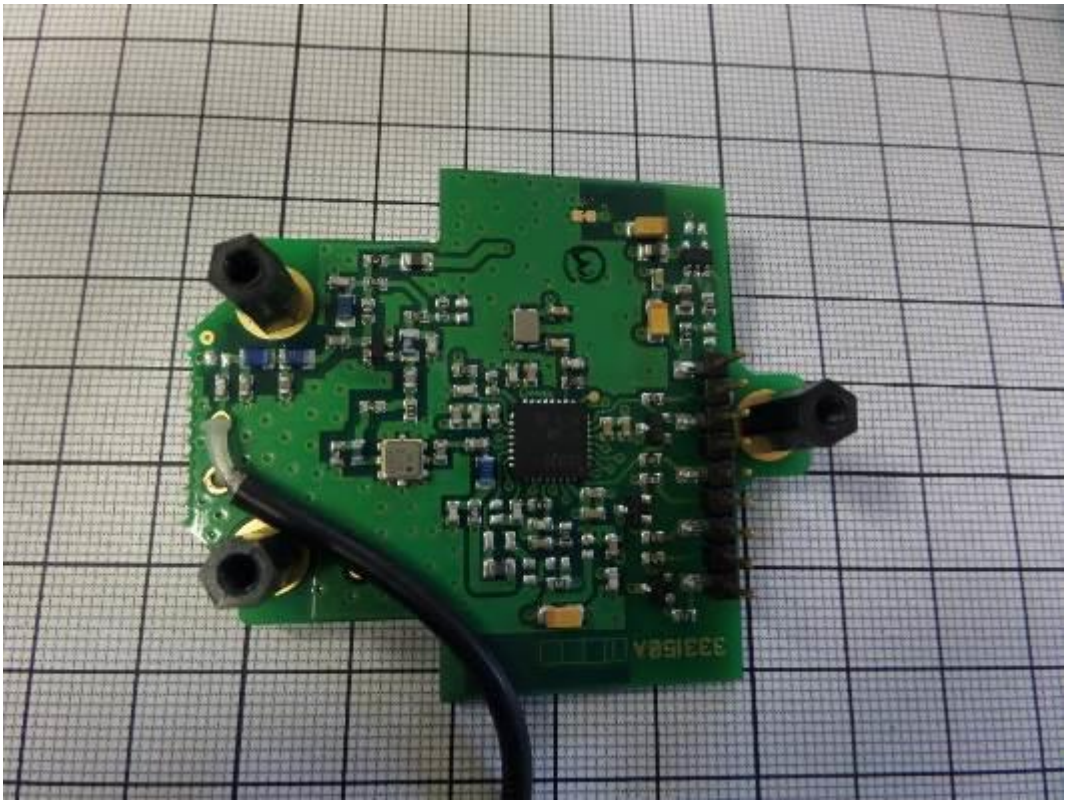
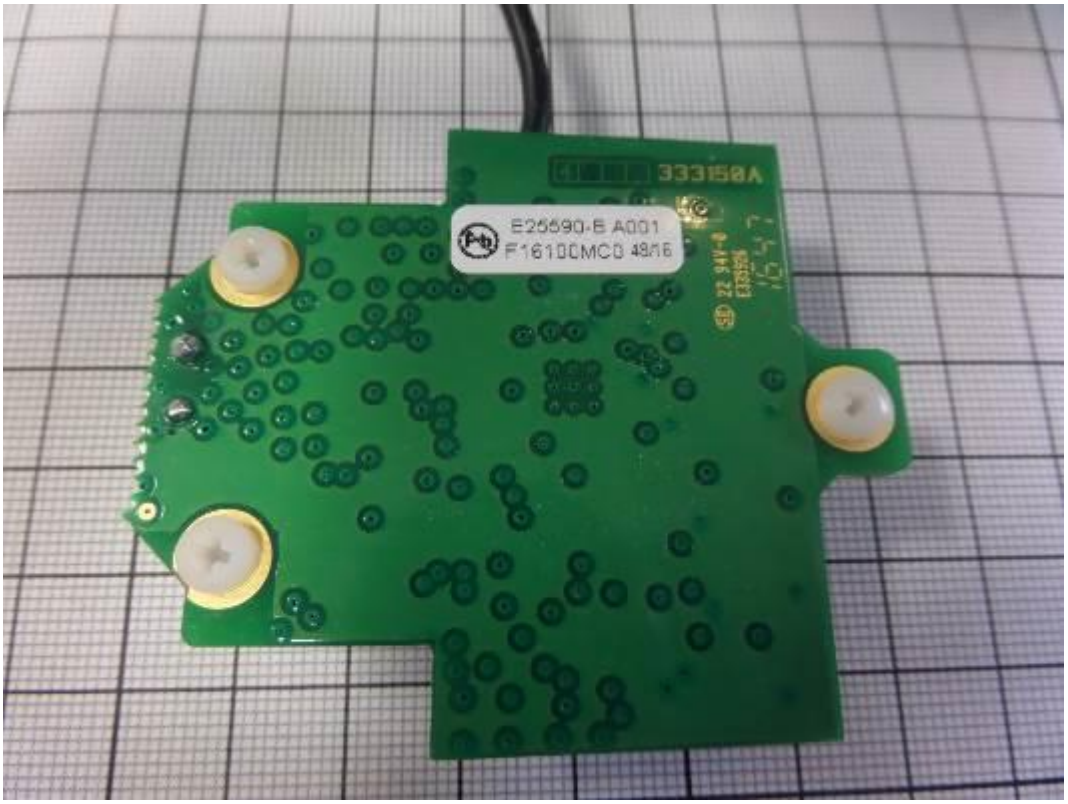


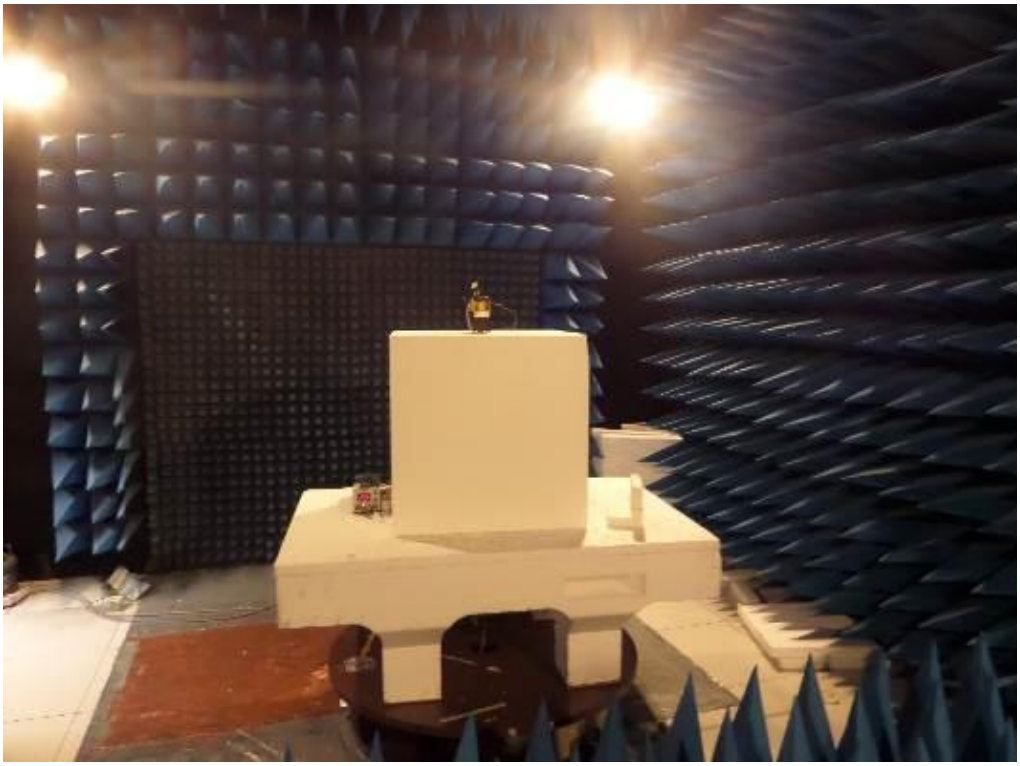



333150A
E25590-B A001
F16100MC0 49/16

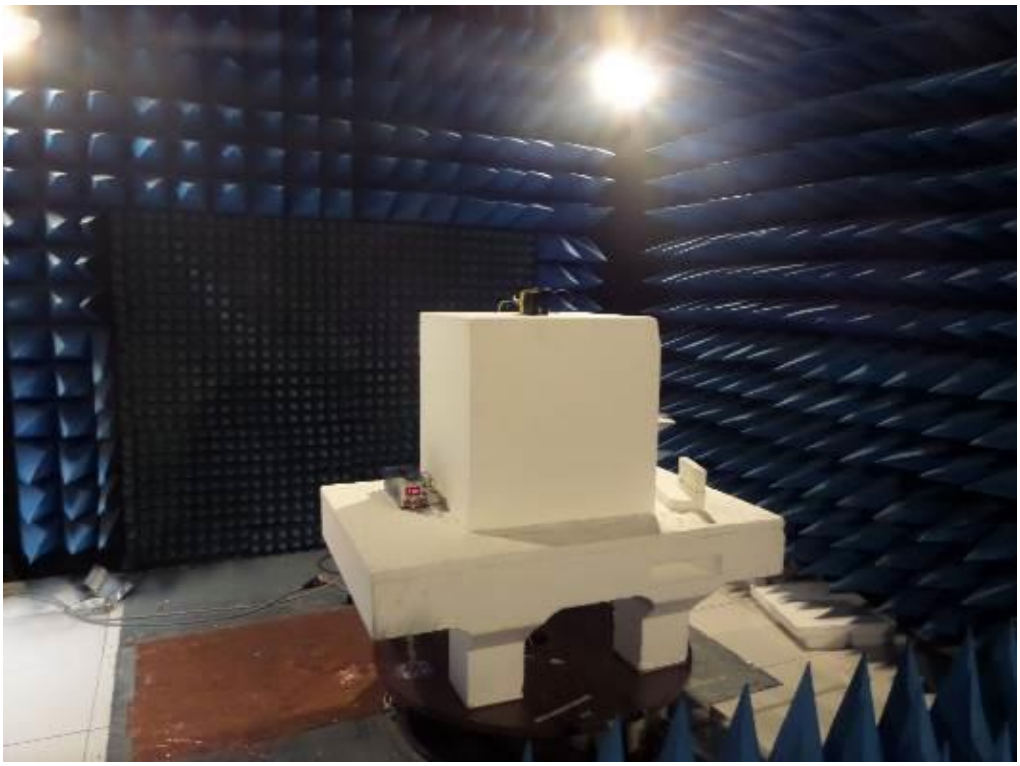
APPENDIX 2: Test set up

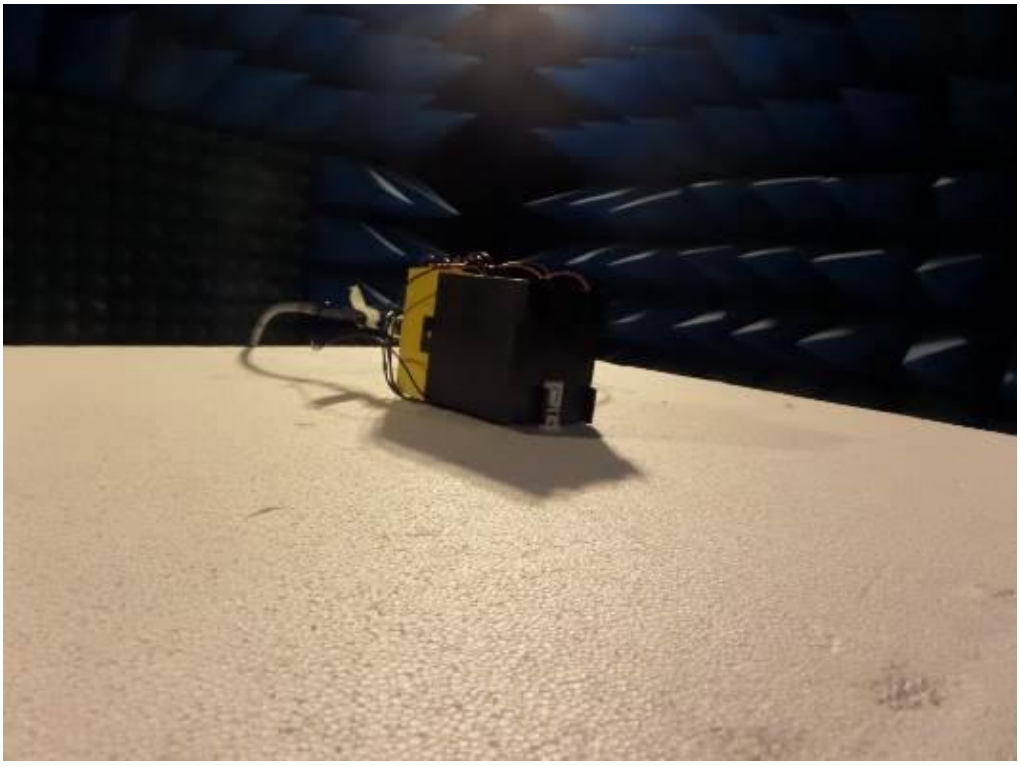
Anechoic room

VUA001B Antenna position 1

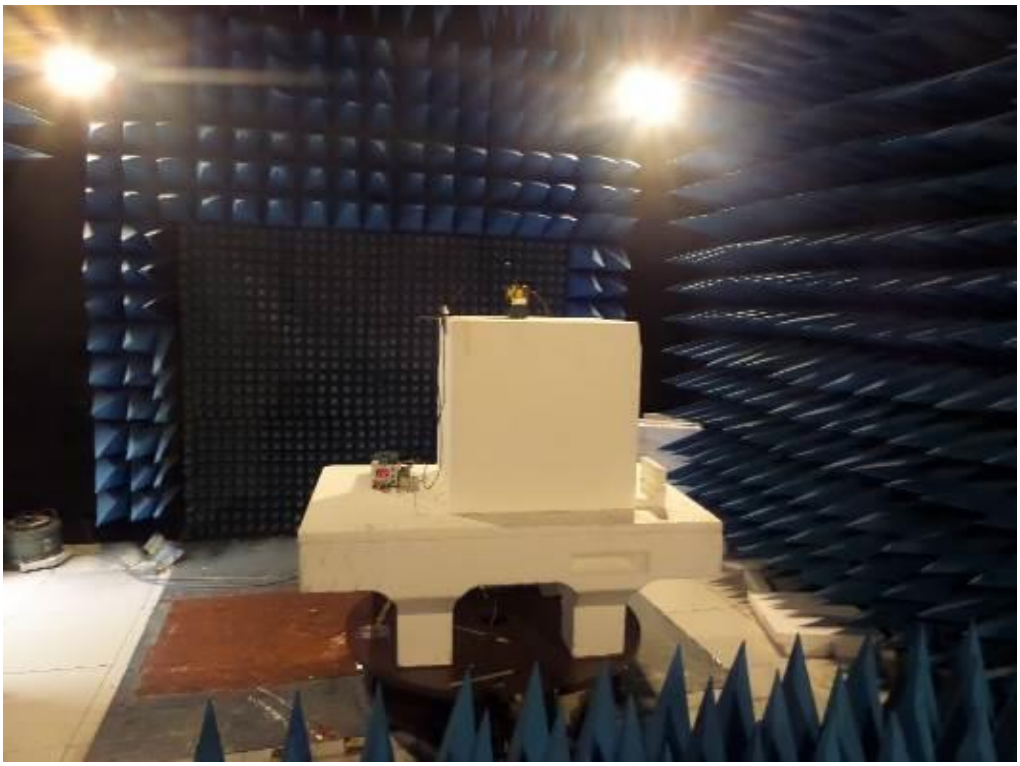


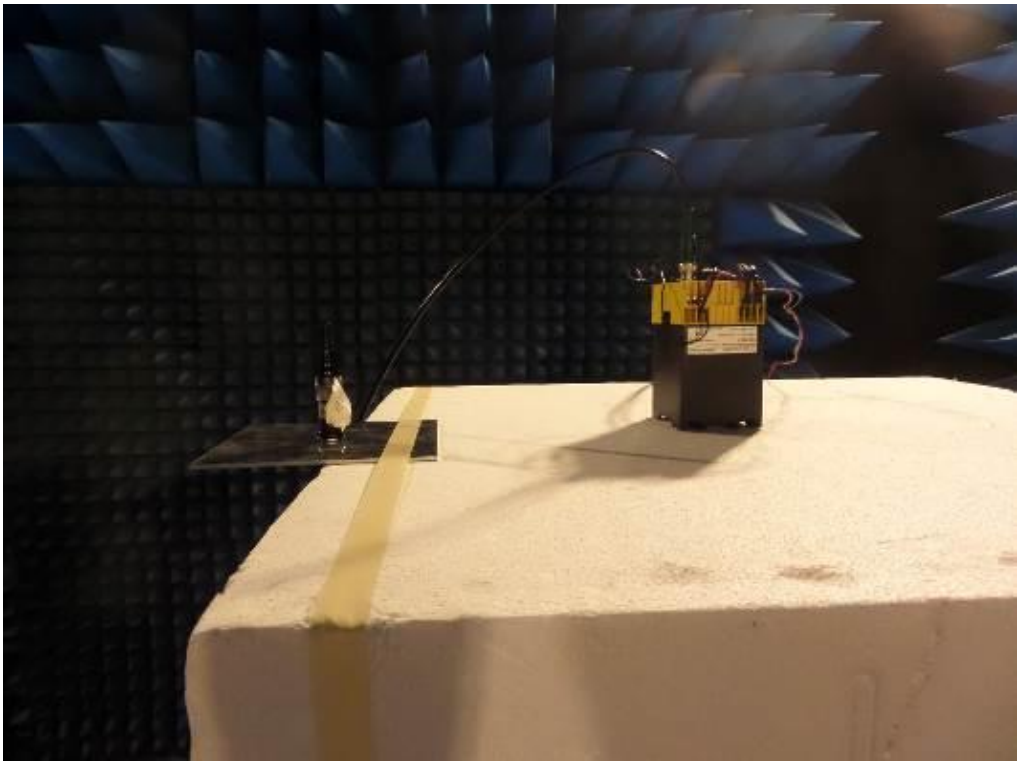
VUA001B Antenna position 2



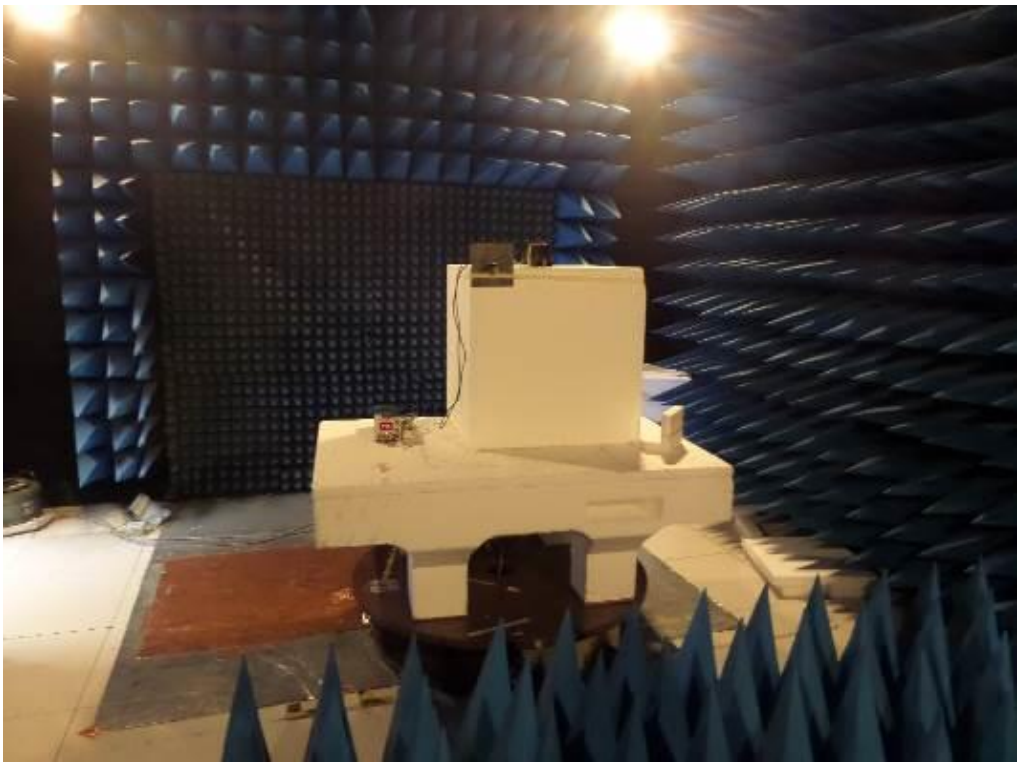


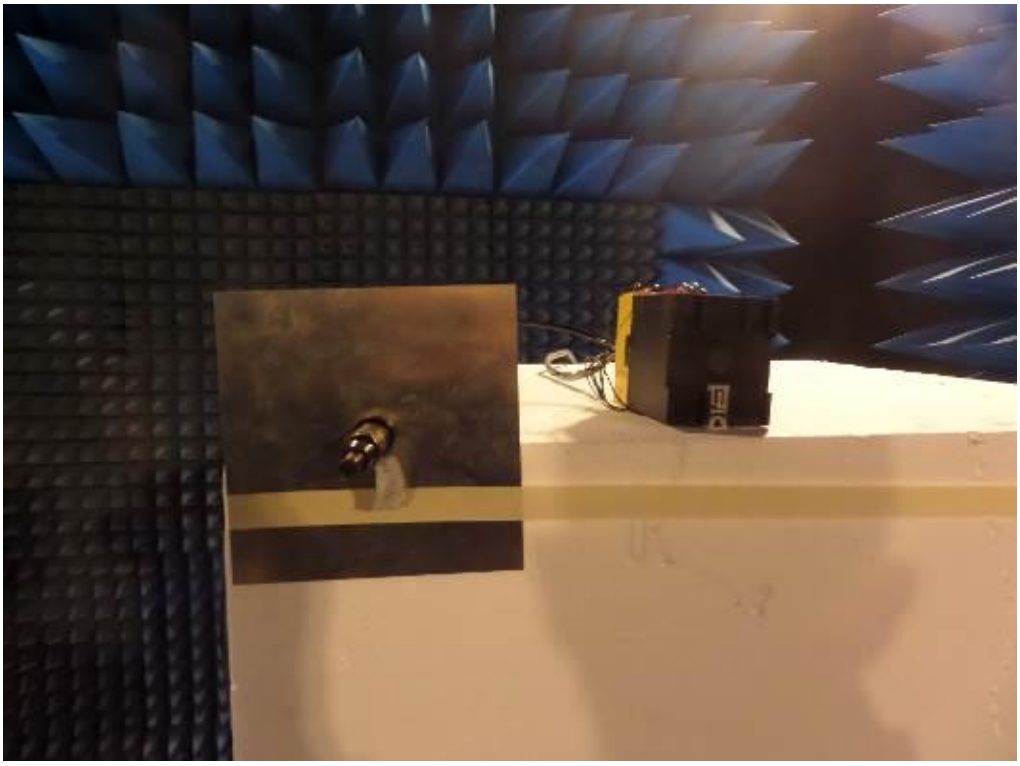
EDBSPRO900-4-BNC Antenna position 1



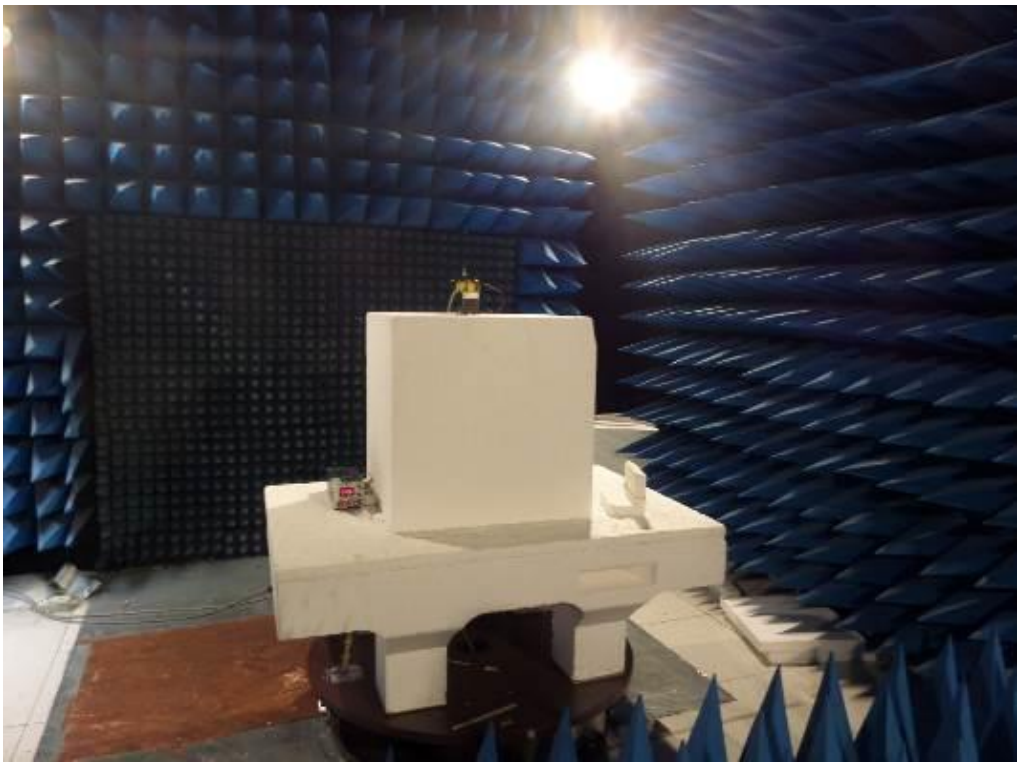


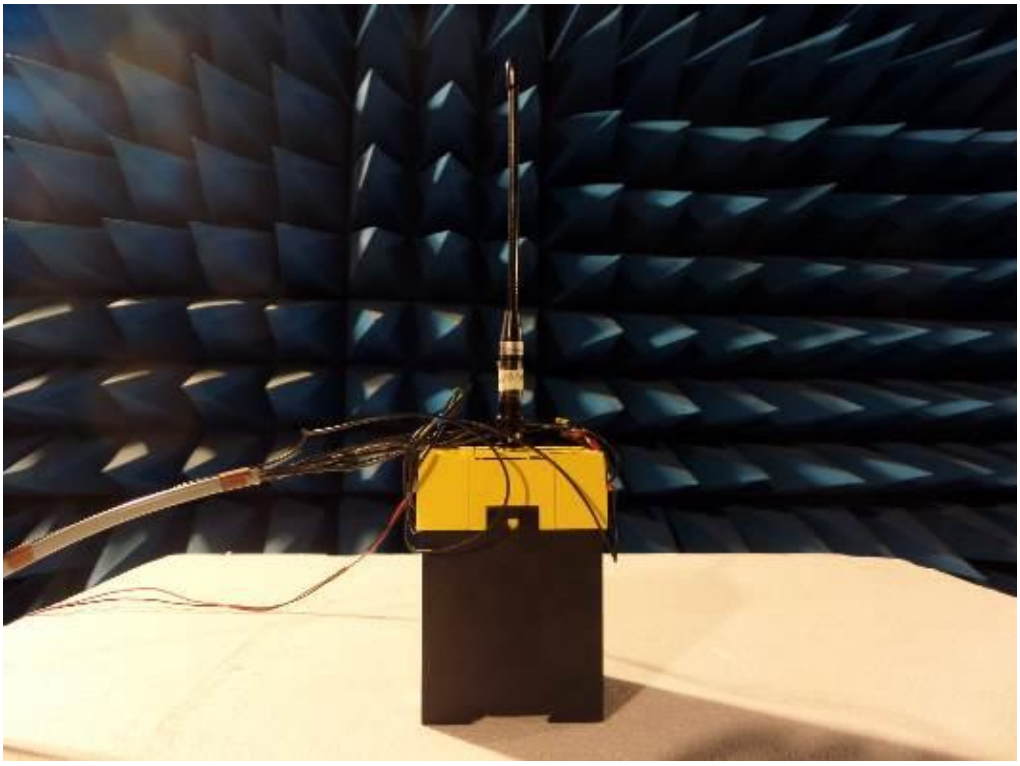
EDBSPRO900-4-BNC Antenna position 2



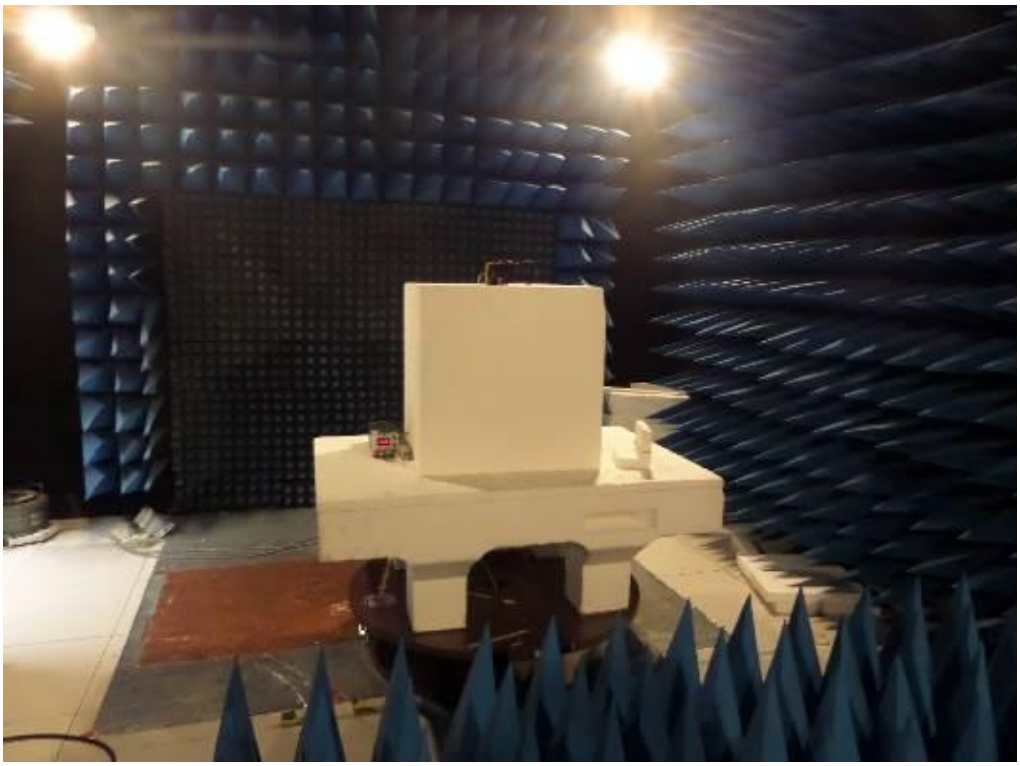


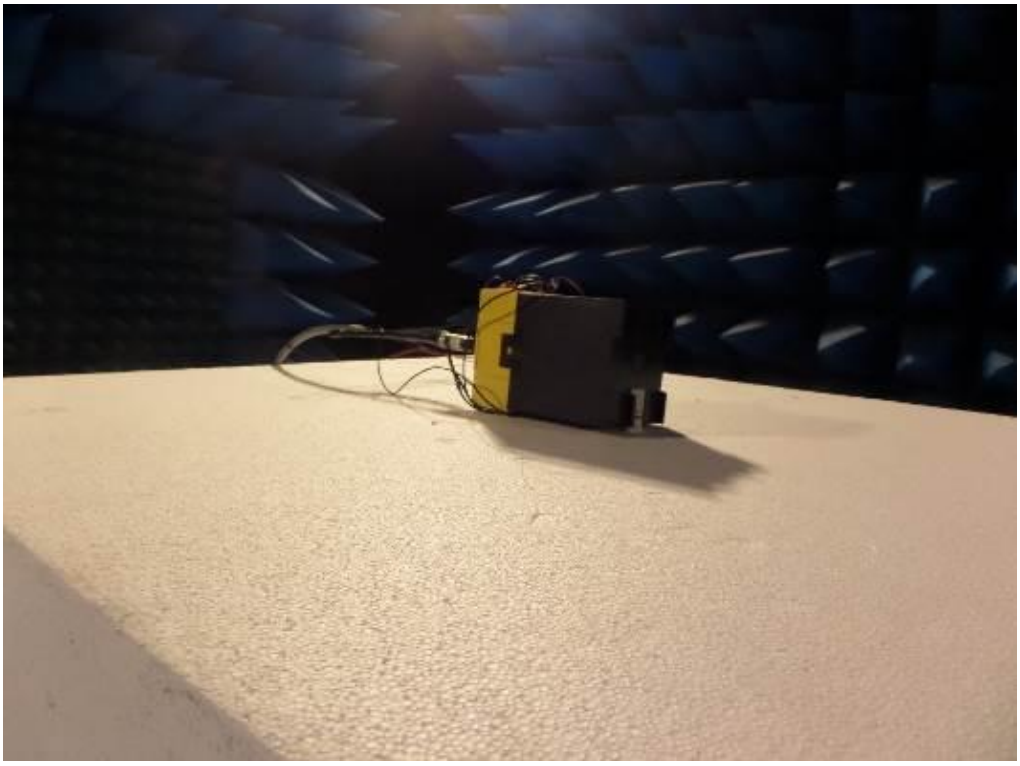
FLX 900/915 FME Antenna position 1



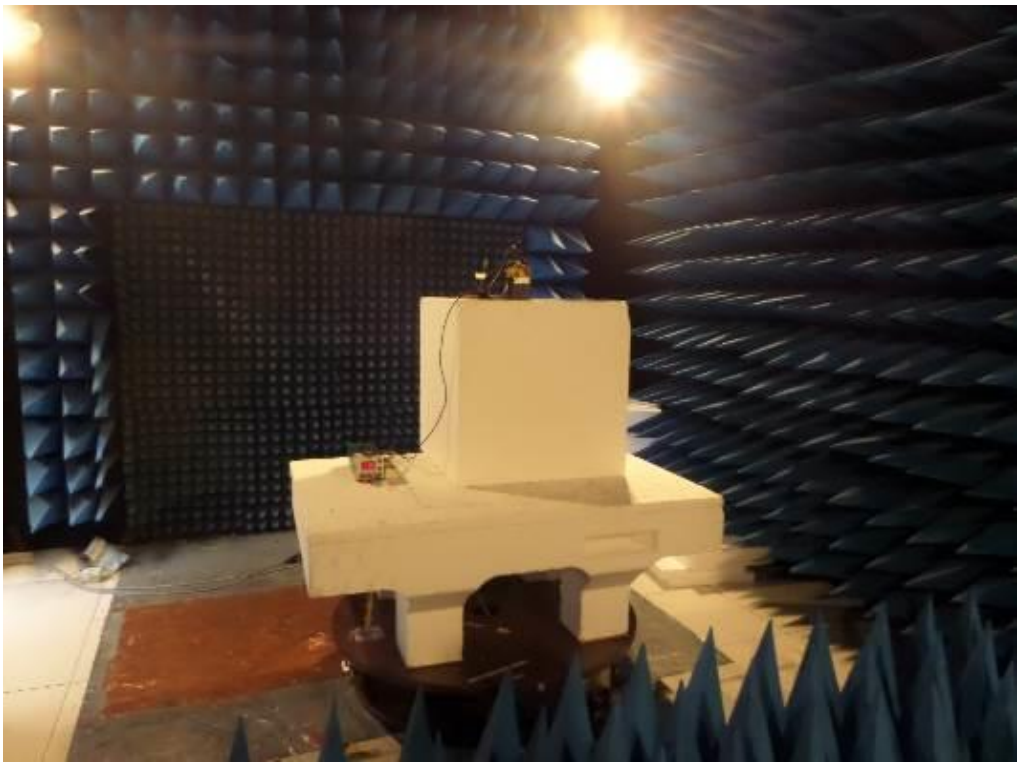


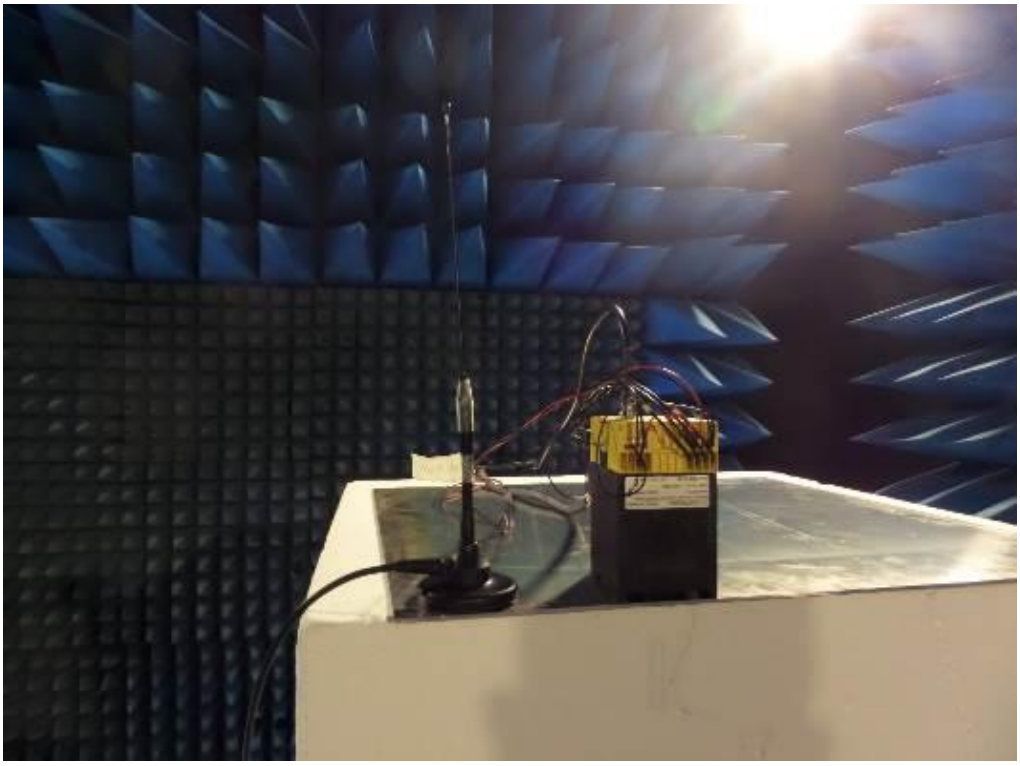
FLX 900/915 FME Antenna position 2



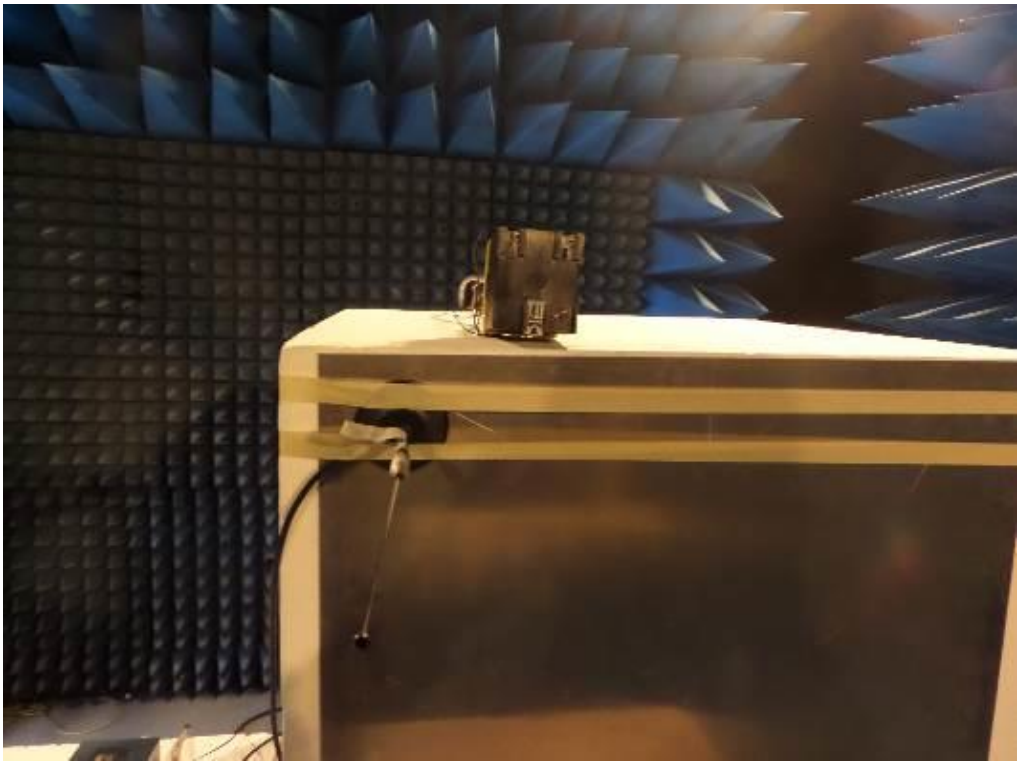


VUA10xBM Antenna position 1



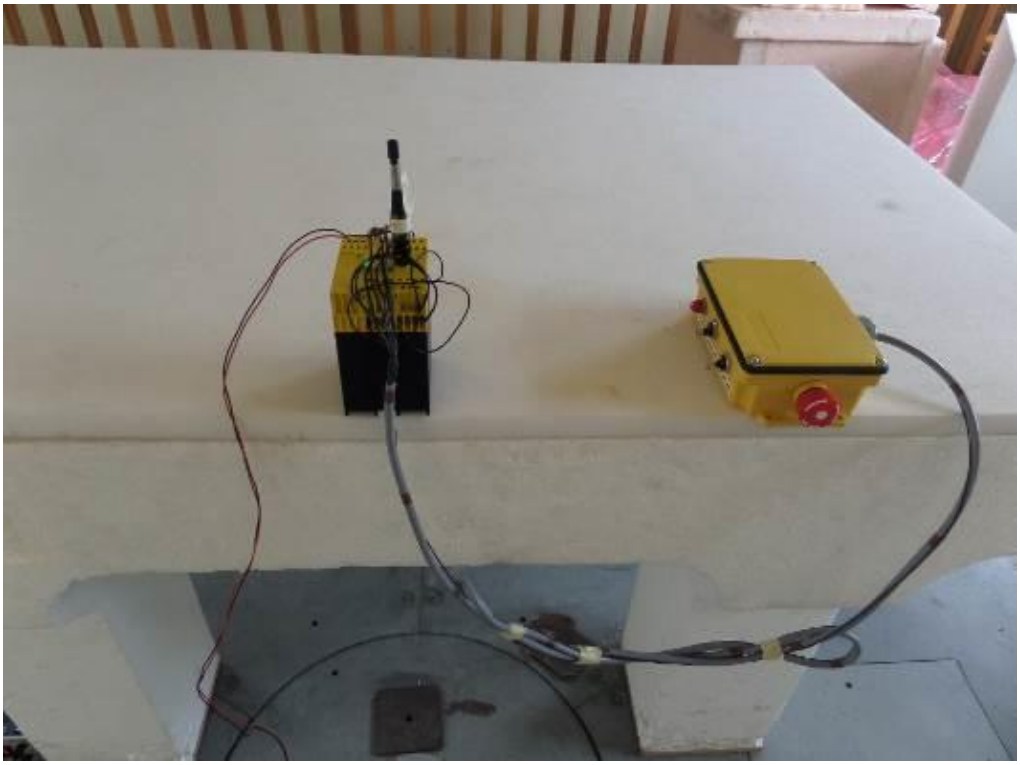


VUA10xBM Antenna position 2

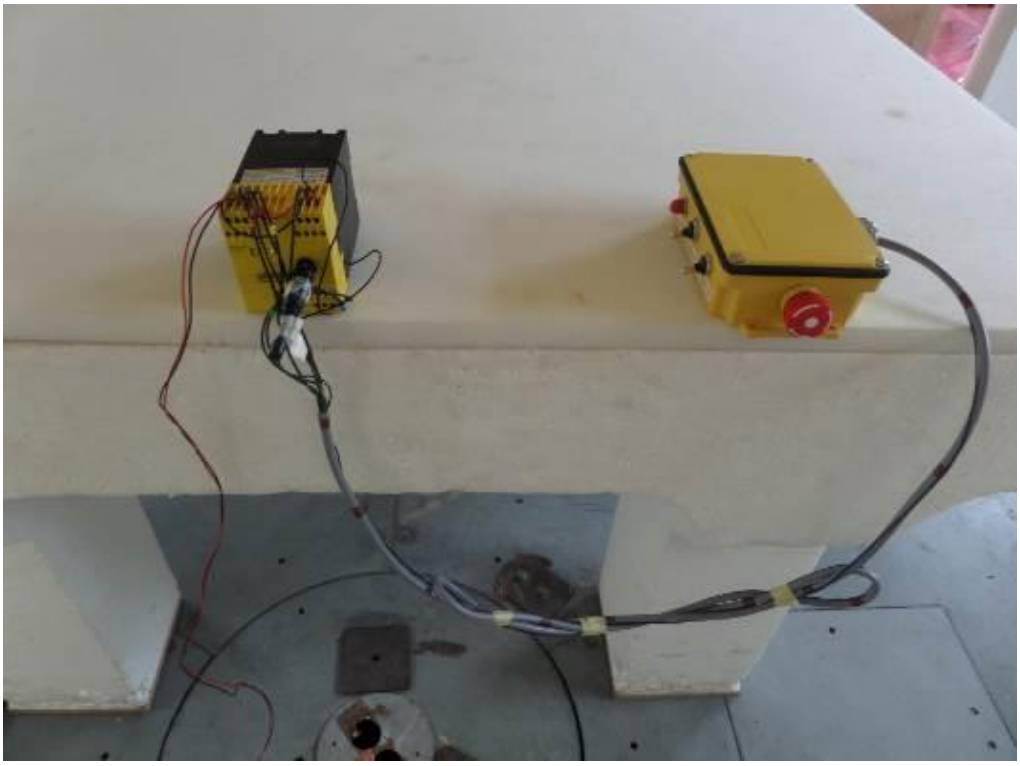


Open test site area

VUA001B Antenna position 1



VUA001B Antenna position 2

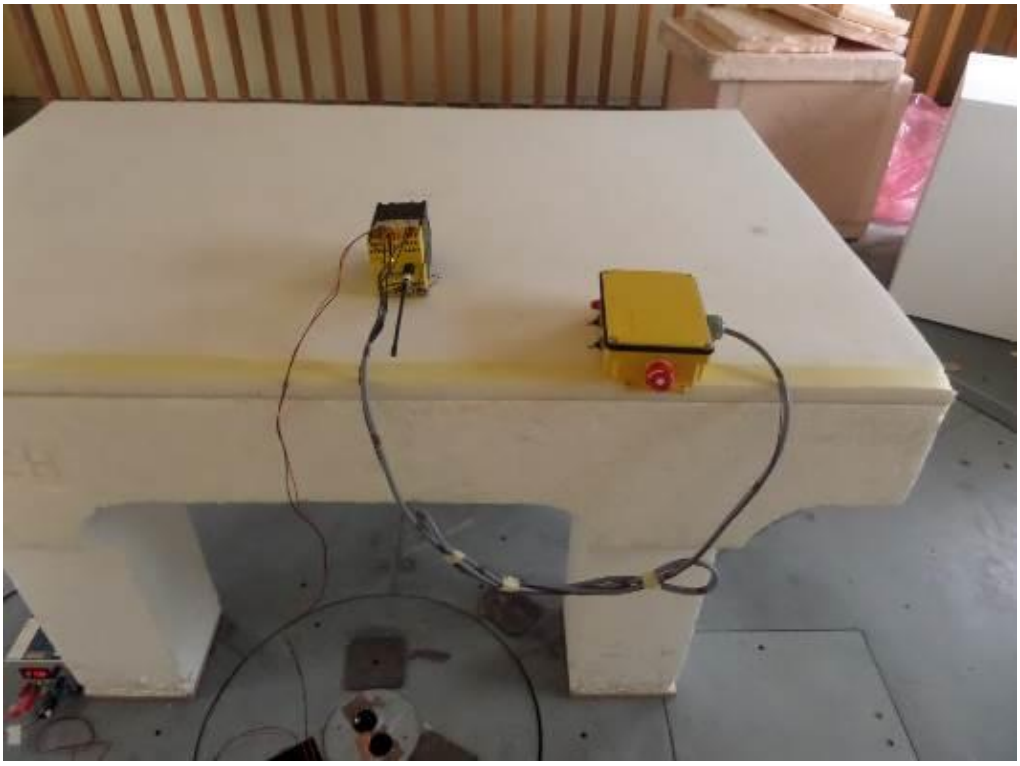


EDBSPRO900-4-BNC Antenna position 1

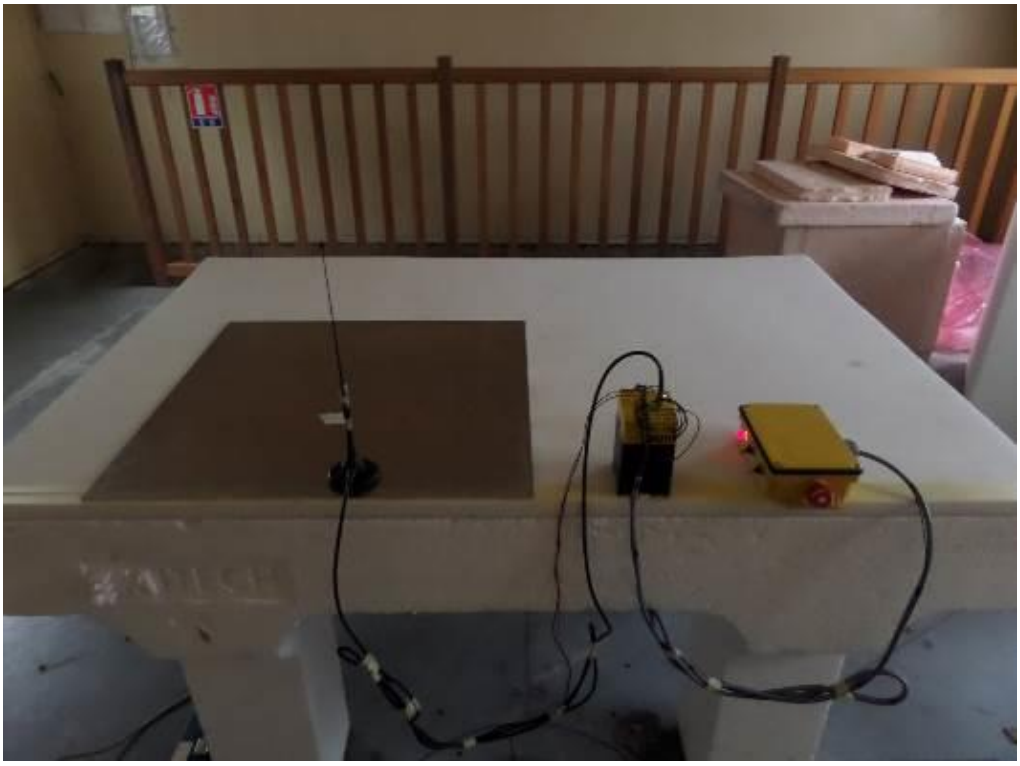
EDBSPRO900-4-BNC Antenna position 2

FLX 900/915 FME Antenna position 1

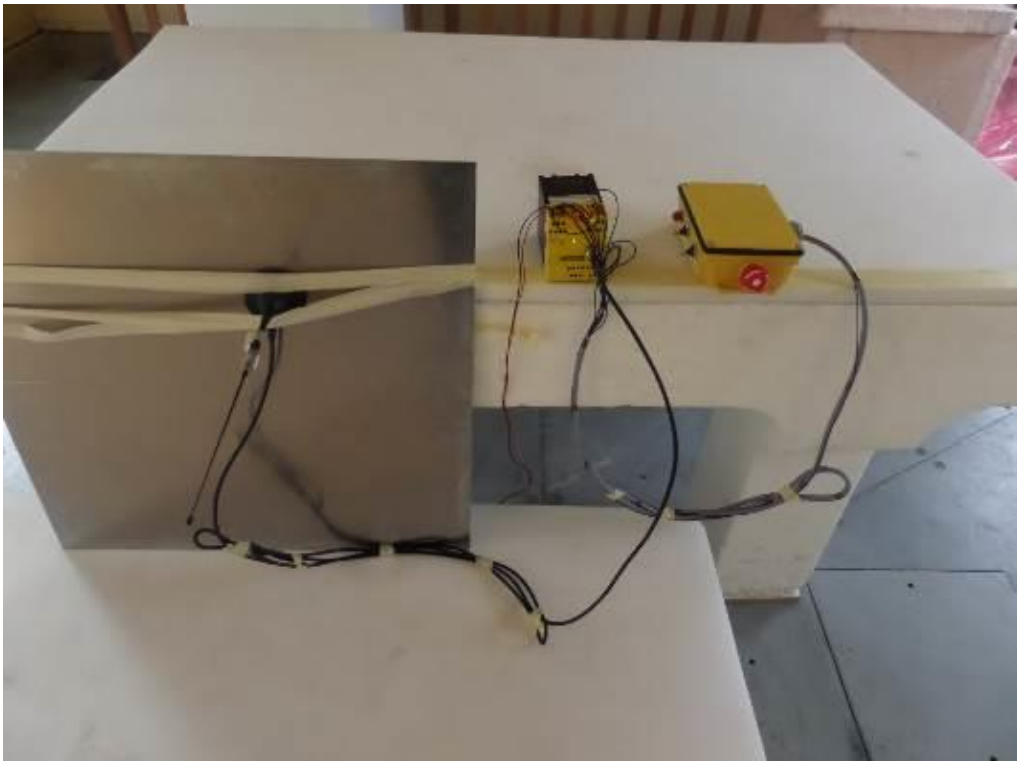
FLX 900/915 FME Antenna position 2



VUA10xBM Antenna position 1



VUA10xBM Antenna position 2



APPENDIX 3: Test equipment list

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
Power source FTN 2515B	Fontaine	8775
Multimeter IDM106N	ISOTECH	8676
Meteo station WS-9232	La Crosse Technology	8750
Software	BAT-EMC V3.6.0.32	0000

Fundamental and harmonics field strength

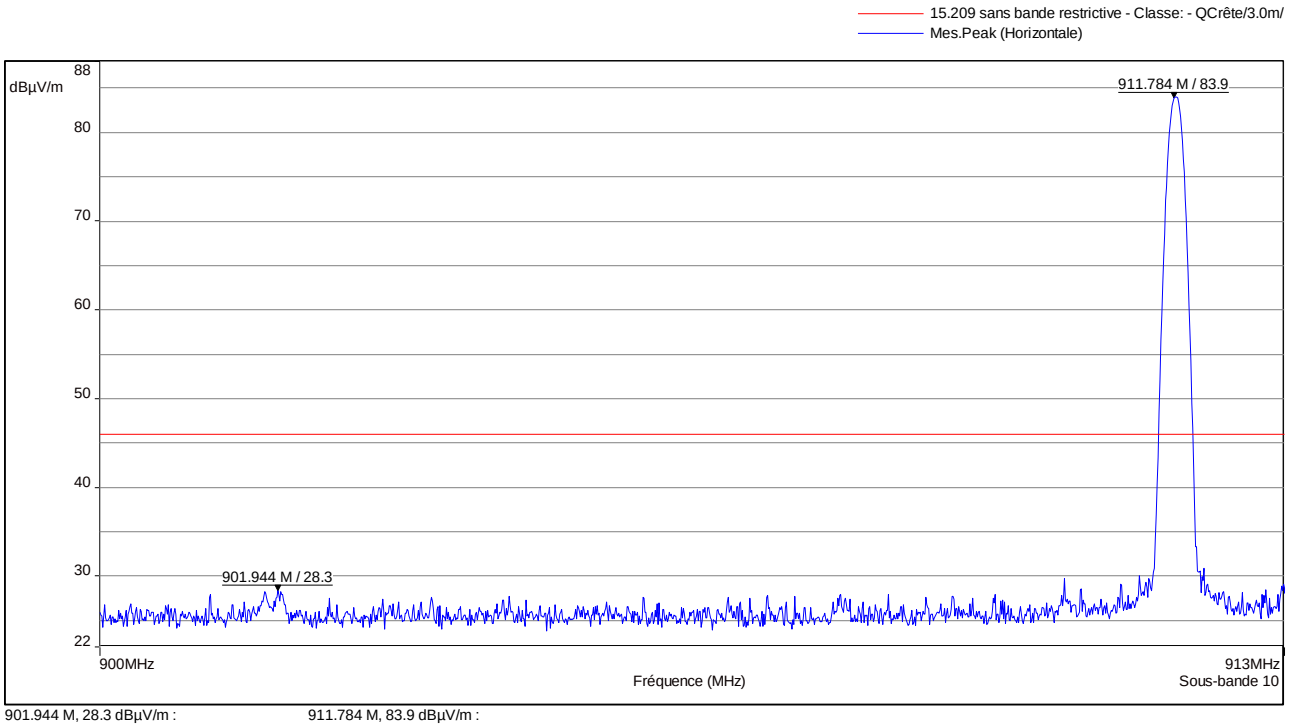
TYPE	MANUFACTURER	EMITECH NUMBER
Open test site	EMITECH	8732
Anechoic Chamber	EMITECH	8593
Satellite synchronized frequency standard GPS8	ACQUISYS	8896
Test receiver ESI7	Rohde & Schwarz	8707
Spectrum Analyzer FSP40	Rohde & Schwarz	4088
Log periodic antenna 3147	EMCO	8783
Antenna 3115	EMCO	8535
Low-noise amplifier S005180M3201	LUCIX Corp.	10739
High pass filter HP12/1200-5AA	Filtek	7310
Power source FTN 2515B	Fontaine	8775
Multimeter IDM106N	ISOTECH	8676
Meteo station WS-9232	La Crosse Technology	8749
Meteo station WS-9232	La Crosse Technology	8750
Software	BAT-EMC V3.6.0.32	0000
Software	Champ libre Juigné. V3.4	8864

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 6502	EMCO	1406
Biconical antenna VHBB 9124	Schwarzbeck	8526
Biconical antenna VHA 9103	Schwarzbeck	8528
Antenna 3115	EMCO	8535
Log periodic antenna UHALP 9108A	Schwarzbeck	8543
Log periodic antenna 3147	EMCO	8783
Low-noise amplifier 8447D	Hewlett Packard	8511
Low-noise amplifier S005180M3201	LUCIX Corp.	10739
High pass filter HP12/1200-5AA	Filtek	7310
Power source FTN 2515B	Fontaine	8775
Multimeter IDM106N	ISOTECH	8676
Meteo station WS-9232	La Crosse Technology	8749
Meteo station WS-9232	La Crosse Technology	8750
Software	BAT-EMC V3.6.0.32	0000
Software	Champ libre Juigné. V3.4	8864

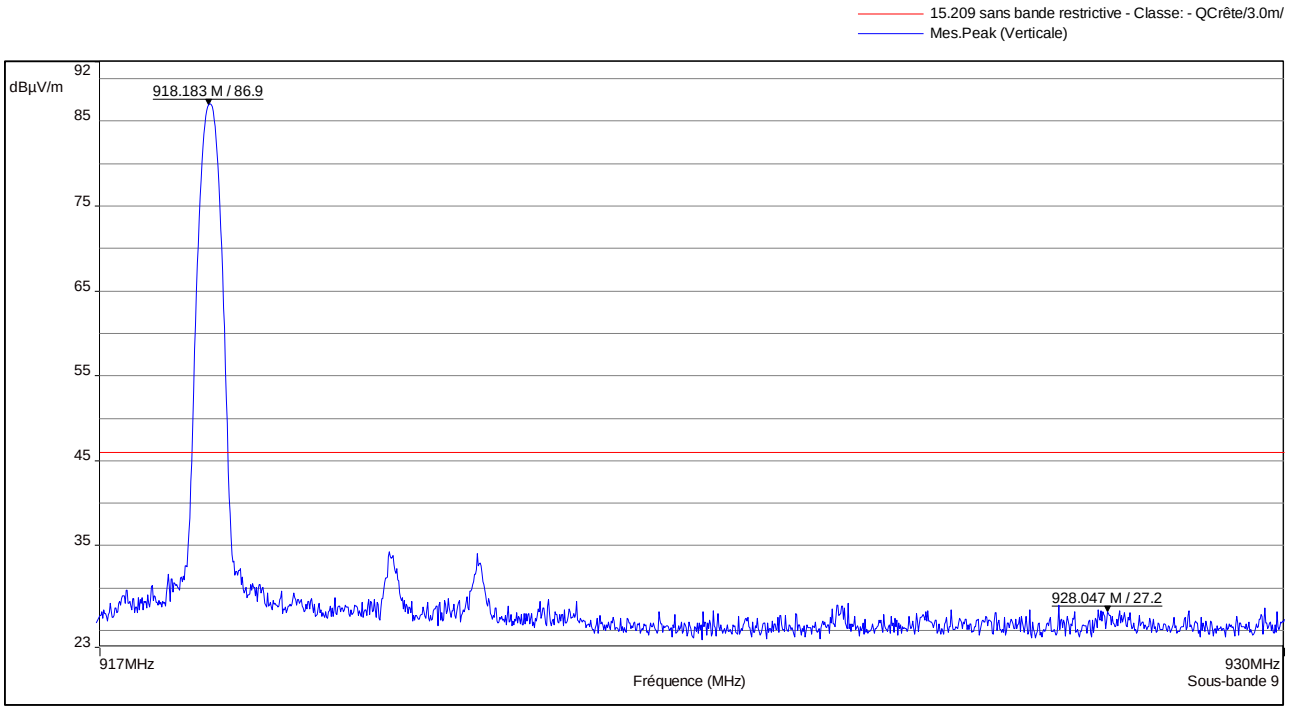
APPENDIX 4: Band edge

Lower Band Edge – Worst case measurement



901.944 M, 28.3 dBµV/m : 911.784 M, 83.9 dBµV/m :

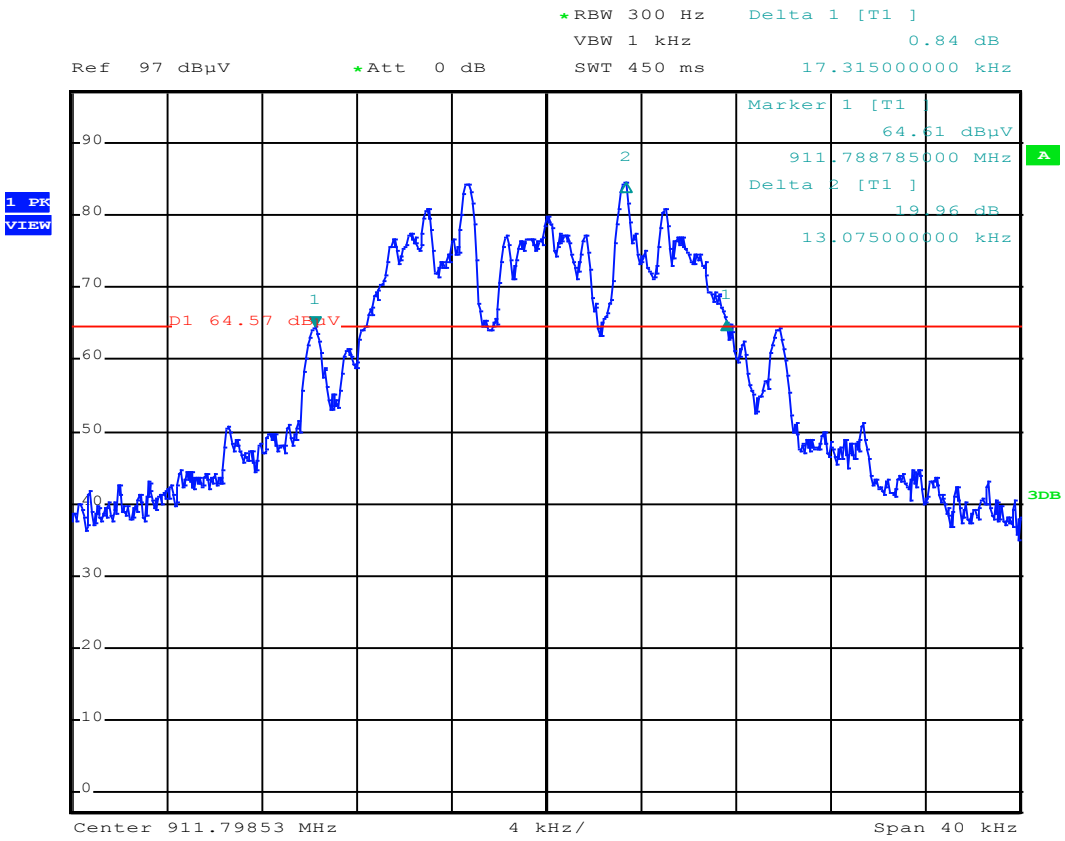
Upper Band Edge – Worst case measurement



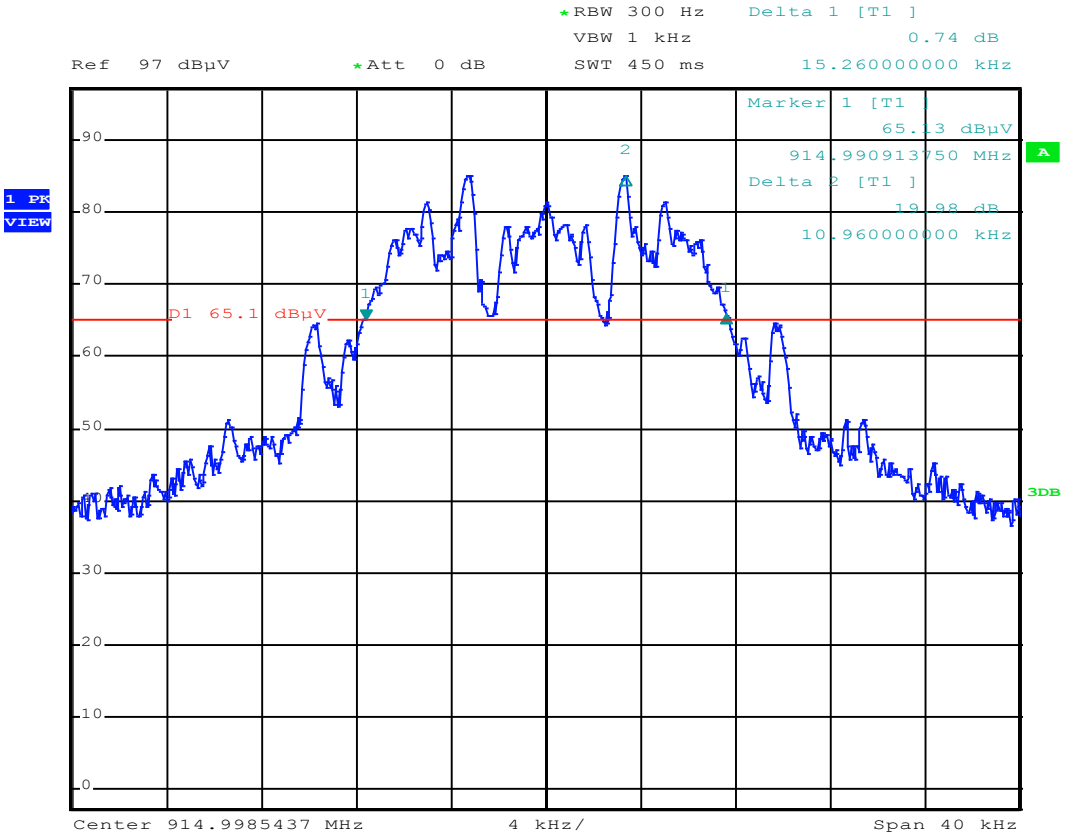
918.183 M, 86.9 dBµV/m : 928.047 M, 27.2 dBµV/m :

APPENDIX 5: 20 dB bandwidth

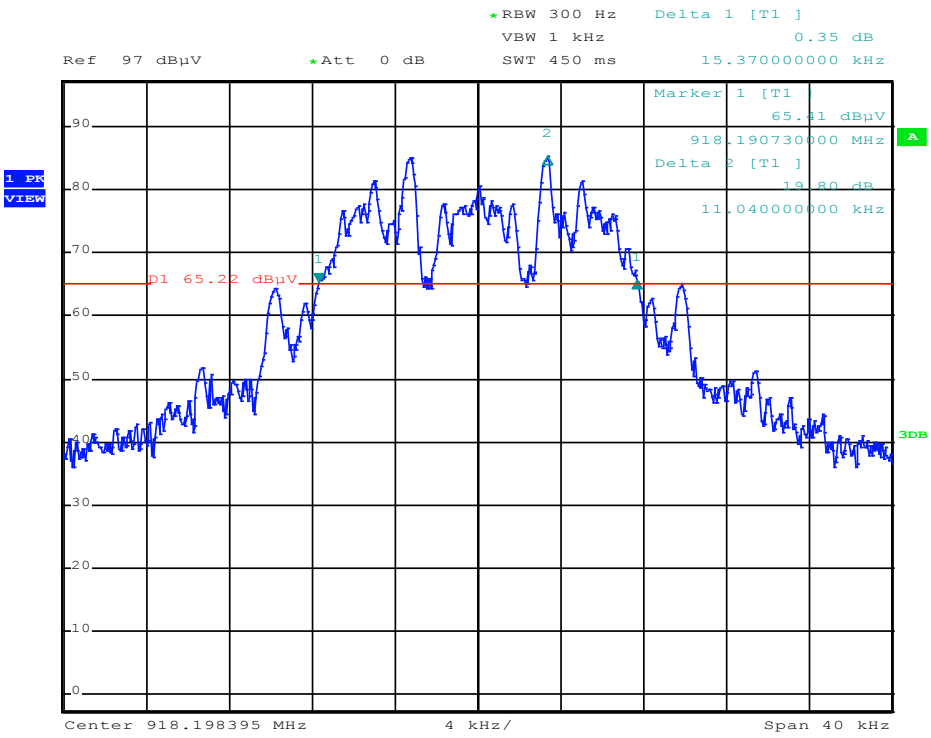
Channel 1



Channel 32

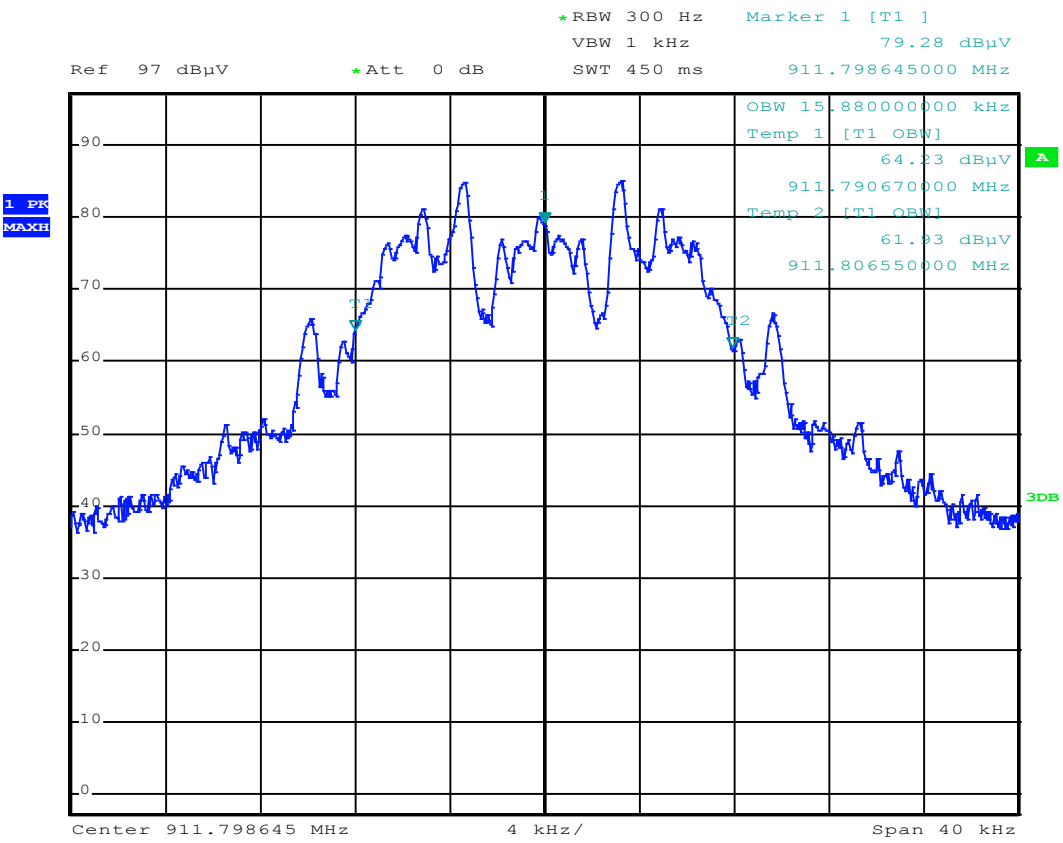

*RBW 300 Hz
VBW 1 kHz
SWT 450 ms
Delta 1 [T1]
0.74 dB
15.260000000 kHz
Ref 97 dBµV
*Att 0 dB
Marker 1 [T1]
65.13 dBµV
914.990913750 MHz
Delta 2 [T1]
19.98 dB
10.960000000 kHz
1 PK
VIEW
A
3DB
D1 65.1 dBµV
90
80
70
60
50
40
30
20
10
0
Center 914.9985437 MHz
4 kHz/
Span 40 kHz

Channel 64

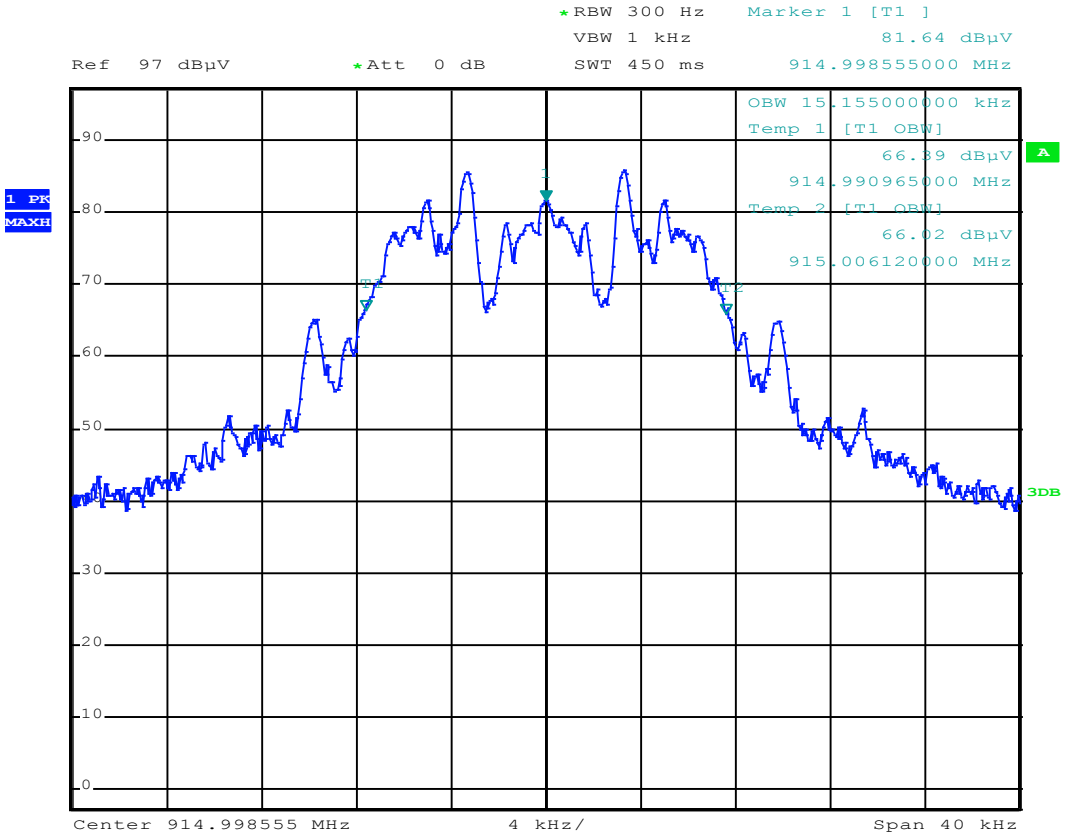

RBW 300 Hz
VBW 1 kHz
SWT 450 ms
Delta 1 [T1]
0.35 dB
15.370000000 kHz
Ref 97 dBµV
Att 0 dB
Marker 1 [T1]
65.41 dBµV
918.190730000 MHz
Delta 2 [T1]
19.80 dB
11.040000000 kHz
1 PK
VIEW
A
3DB
D1 65.22 dBµV
90
80
70
60
50
40
30
20
10
0
Center 918.198395 MHz
4 kHz/
Span 40 kHz

APPENDIX 6: 99% bandwidth

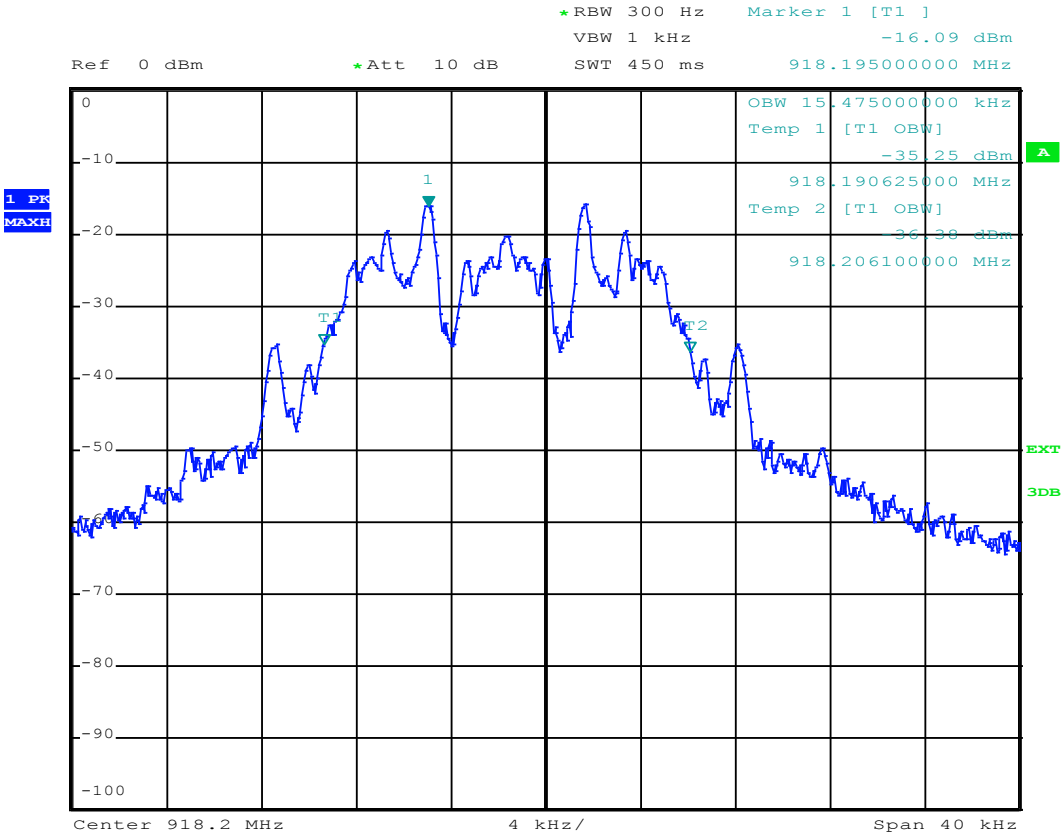
Channel 1



Channel 32


*RBW 300 Hz
VBW 1 kHz
SWT 450 ms
Marker 1 [T1]
81.64 dBµV
914.998555000 MHz
Ref 97 dBµV
*Att 0 dB
OBW 15.155000000 kHz
Temp 1 [T1 OBW]
66.39 dBµV
914.990965000 MHz
Temp 2 [T1 OBW]
66.02 dBµV
915.006120000 MHz
1 PK
MAXH
A
3DB
90
80
70
60
50
30
20
10
0
Center 914.998555 MHz
4 kHz/
Span 40 kHz

Channel 64


*RBW 300 Hz
VBW 1 kHz
SWT 450 ms
Marker 1 [T1]
-16.09 dBm
918.195000000 MHz
Ref 0 dBm
*Att 10 dB
OBW 15.475000000 kHz
Temp 1 [T1 OBW]
-35.25 dBm
918.190625000 MHz
Temp 2 [T1 OBW]
-36.38 dBm
918.206100000 MHz
1 PK
MAXH
A
EXT
3DB
0
-10
-20
-30
-40
-50
-70
-80
-90
-100
Center 918.2 MHz
4 kHz/
Span 40 kHz