FCC LISTED, REGISTRATION NUMBER: 905266 **IC LISTED REGISTRATION NUMBER IC 4621**	**AT4 wireless, S.A.** Parque Tecnológico de Andalucía, c/ Severo Ochoa nº 2 29590 Campanillas/ Málaga/ España Tel. 952 61 91 00 - Fax 952 61 91 13 MÁLAGA, C.I.F. A29 507 456 Registro Mercantil de Málaga,Tomo 1169, Libro 82, Folio 133, Hoja MA3729

TEST REPORT

REFERENCE STANDARD:

USA FCC Part 15.225, 15.207 and Part 15.209

NIE ..... :	28384RET.005
Approved by (name / position & signature) ..... :	A. Llamas / RF Lab. Manager
Elaboration date ..... :	2009-06-19

Alejandro Llamas Rodríguez
Firmado digitalmente por Alejandro Llamas Rodríguez
Fecha: 2009.06.19 09:19:57 +02'00'

Identification of item tested ..... :	BLUETOOTH RFID BARCODE READER
Trademark ..... :	BARACODA
Model and/or type reference ..... :	BRRT
Serial number ..... :	PROTOTYPE
Other identification of the product ..... :	Commercial name: TAGRUNNERS FCC ID: QSHAIRRFI HW version: 3.1 / SW version: 1.37
Features ..... :	3.7 V Rechargeable Li-ion battery, SPP, Bluetooth EDR, PCB antenna, 13.56 MHz RFID
Description ..... :	BLUETOOTH RFID TAG (HF) READER/WRITER

Applicant ..... :	BARACODA
Address ..... :	36 rue de Turin, 75008 Paris, FRANCE
CIF/NIF/Passport ..... :	42876860000051
Contact person:	Thierry Fortune
Telephone / Fax ..... :	+33 1 30 08 89 00
e-mail: ..... :	thierry.fortune@baracoda.com

Test samples supplier ..... :	Same as applicant

Manufacturer ..... :	Same as applicant

Test method requested .....:	See Standard
Standard .....:	USA FCC Part 15.225: Operation within the band 13.110 -14.010. USA FCC Part 15.209: Radiated emission limits, general requirements USA FCC Part 15.207: Conducted limits
Test procedure .....:	PEET000: Medidas de equipos radioeléctricos en condiciones radiadas. PEET003: Medidas conducidas en equipos radioeléctricos. PEEM002: Medida de la emisión conducida según EN55022
Non-standardized test method .....:	N/A
Used instrumentation .....:	

Conducted Measurements

		Last Cal. date	Cal. due date
1.	Spectrum analyser Agilent PSA E4440A	2008/01	2010/01
2.	Climatic chamber HERAEUS VM 07/100	2006/12	2009/12
3.	Radiocommunication analyser R&S CMTA84	2006/02	2009/02
4.	DC power supply R&S NGPE 40/40	2008/11	2011/11
5.	EMI Test Receiver R&S ESIB26	2007/08	2009/08
6.	Transient limiter. HP 11947A	2007/01	2010/01
7.	Line Impedance Stabilization Network (L.I.S.N.) R&S. ESH2-Z5	2008/01	2010/01

Radiated Measurements

		Last Cal. date	Cal. due date
1.	Semianechoic Absorber Lined Chamber IR 11. BS	N.A.	N.A.
2.	Control Chamber IR 12.BC	N.A.	N.A.
3.	Bilog antenna CHASE CBL6111	2009/03	2012/03
4.	Antenna mast EM 1072 NMT	N.A.	N.A.
5.	Rotating table EM 1084-4. ON	N.A.	N.A.
6.	Loop antenna HP 1196 A.	2007/08	2009/08
7.	EMI Test Receiver R&S ESIB26	2007/08	2009/08
8.	Multi Device Controller EMCO 2090	N.A.	N.A.
9.	RF pre-amplifier Schaffner CPA 9231.	2009/03	2011/03
10.	Antenna tripod EMCO 11968C.	N.A.	N.A.

Report template No. .....: FDT08_11

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Competences and guarantees

AT4 wireless is a laboratory with a measurement facility in compliance with the requirements of Section 2.948 of the FCC rules and has been added to the list of facilities whose measurements data will be accepted in conjuction with applications for Certification under Parts 15 or 18 of the Commission's Rules. Registration Number: 905266.

AT4 wireless is a laboratory with a measurement site in compliance with the requirements of RSS 212, Issue 1 (Provisional) and has been added to the list of filed sites of the Canadian Certification and Engineering Bureau. Reference File Number: IC 4621.

In order to assure the traceability to other national and international laboratories, AT4 wireless has a calibration and maintenance programme for its measurement equipment.

AT4 wireless guarantees the reliability of the data presented in this report, which is the result of the measurements and the tests performed to the item under test on the date and under the conditions stated on the report and, it is based on the knowledge and technical facilities available at AT4 wireless at the time of performance of the test.

AT4 wireless is liable to the client for the maintenance of the confidentiality of all information related to the item under test and the results of the test.

General conditions

1. This report is only referred to the item that has undergone the test.
2. This report does not constitute or imply on its own an approval of the product by the Certification Bodies or competent Authorities.
3. This document is only valid if complete; no partial reproduction can be made without previous written permission of AT4 wireless.
4. This test report cannot be used partially or in full for publicity and/or promotional purposes without previous written permission of AT4 wireless and the Accreditation Bodies.

Uncertainty

Uncertainty (factor k=2) was calculated according to the AT4 wireless internal document:

PODT000: Procedimiento para el cálculo de incertidumbres de medida.

Usage of samples

Samples undergoing test have been selected by: **the client**.

Sample M/01 is composed of the following elements:

Control Nº	Description	Model	Serial Nº	Date of reception
28384/41	RFID device with integral antenna	BRRT	Prototype	25/11/2008

Sample M/02 is composed of the following elements:

Control Nº	Description	Model	Serial Nº	Date of reception
28384/05	RFID device with antenna connector	BRRT	Prototype	25/11/2008

Sample S/01 is composed of the following elements:

Control Nº	Description	Model	Serial Nº	Date of reception
28384/76	RFID device with integral antenna	BRRT	Prototype	05/03/2009
28384/78	Power Supply	3A-061WP05	---	05/03/2009

1. Sample M/01 has undergone following test(s).
   Radiated tests indicated in appendix A (field strength of emissions).
2. Sample M/02 has undergone following test(s).
   Conducted tests indicated in appendix A (Occupied bandwidth and frequency tolerance).
3. Samples S/01 has undergone the next test(s):
   Continuous conducted emission, power leads, in appendix B

Testing period

The performed test started on 2008-12-03 and finished on 2009-03-30.

The tests have been performed at AT4 wireless.

Environmental conditions

In the control chamber, the following limits were not exceeded during the test:

Temperature	Min. = 24 ºC Max. = 25 ºC
Relative humidity	Min. = 51 % Max. = 51 %
Shielding effectiveness	> 100 dB
Electric insulation	> 10 kΩ
Reference resistance to earth	< 0,5 Ω

In the semianechoic chamber (21 meters x 11 meters x 8 meters), the following limits were not exceeded during the test.

Temperature	Min. = 24 ºC Max. = 25 ºC
Relative humidity	Min. = 51 % Max. = 51 %
Air pressure	Min. = 1015 mbar Max. = 1015 mbar
Shielding effectiveness	> 100 dB
Electric insulation	> 10 kΩ
Reference resistance to earth	< 0,5 Ω
Normal site attenuation (NSA)	< ±4 dB at 10 m distance between item under test and receiver antenna, (30 MHz to 1000 MHz)
Field homogeneity	More than 75% of illuminated surface is between 0 and 6 dB (26 MHz to 1000 MHz).

In the chamber for conducted measurements the following limits were not exceeded during the test:

Temperature	Min. = 22 ºC Max. = 23 ºC
Relative humidity	Min. = 41 % Max. = 42 %
Air pressure	Min. = 1020 mbar Max. = 1020 mbar
Shielding effectiveness	> 100 dB
Electric insulation	> 10 kΩ
Reference resistance to earth	< 0,5 Ω

Summary

Considering the results of the performed test according to standard USA FCC Parts 15.225, 15.207 and 15.209, the item under test is **IN COMPLIANCE** with the requested specifications specified in the standard.

NOTE: The results presented in this Test Report apply only to the particular item under test established in page 1 of this document, as presented for test on the date(s) shown in section, "USAGE OF SAMPLES, TESTING PERIOD AND ENVIRONMENTAL CONDITIONS".

Remarks and comments

None.

Testing verdicts

Not applicable ..... : NA

Pass..... : P

Fail ..... : F

Not measured..... : NM

FCC PART 15 PARAGRAPH	VERDICT			
	NA	P	F	NM
15.225 Subclause (a). Field strength of emissions within the band 13.553 MHz - 13.567 MHz		P		
15.225 Subclause (b). Field strength of emissions within the band 13.410 - 13.553 MHz and 13.567 – 13.710 MHz		P		
15.225 Subclause (c). Field strength of emissions within the band 13.110 - 13.410 MHz and 13.710 – 14.010 MHz		P		
15.225 Subclause (d). Field strength of emissions outside of the band 13.110 MHz -14.010 MHz		P		
15.225 Subclause (e). Frequency tolerance of the carrier signal		P		
15.207. Conducted limits		P		

APPENDIX A: Test result

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TEST CONDITIONS

Power supply (V):

$V_{nominal}$ = 3.7 Vdc

Type of power supply = DC voltage from rechargeable Li-Ion battery.

Type of antenna = Integral antenna

Operating Temperature Range (ºC):

T_n = +15 to + 35

TEST FREQUENCIES:

Nominal Operating frequency: 13.56 MHz

The test set-up was made in accordance to the general provisions of ANSI C63.4: 2003.

CONDUCTED MEASUREMENTS

The equipment under test was set up in a shielded room and it is connected to the spectrum analyser or Radiocommunication analyser with a frequency counter.

RADIATED MEASUREMENTS

All radiated tests were performed in a semi-anechoic chamber. The measurement antenna (Loop antenna for the range between 9 kHz to 30 MHz and Bilog antenna for the range between 30 MHz to 200 MHz) is situated at a distance of 3 m.

For radiated emissions in the range 9 kHz to 30 MHz that is performed at a distance closer than the specified distance, an inverse proportionality factor of 40 dB per decade is used to normalize the measured data for determining compliance.

The equipment under test was set up on a non-conductive (wooden) platform one meter above the ground plane and the situation and orientation was varied to find the maximum radiated emission. It was also rotated 360º and in the range between 30 MHz and 200 MHz the antenna height was varied from 1 to 4 meters to find the maximum radiated emission.

In the range between 9 kHz and 30 MHz the measurements were made in the three different orientation planes of the loop antenna to determine the maximum received field.

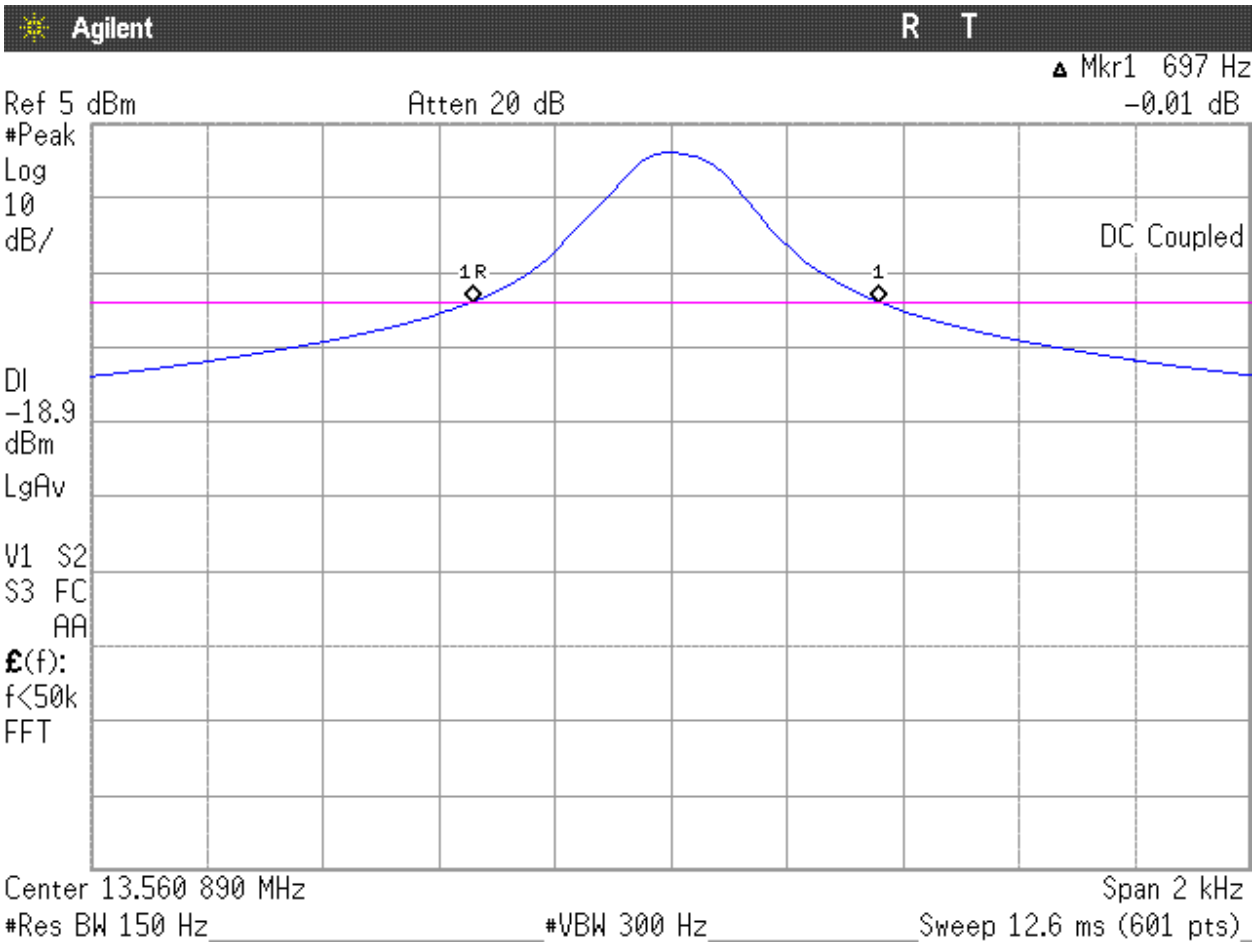
In the range between 30 MHz and 200 MHz the measurements were made in both horizontal and vertical planes of polarization.

Section 15.215 Subclause (c) (1). 20 dB Bandwidth

RESULTS

20 dB Bandwidth (see next plot).

20 dB Spectrum bandwidth (Hz)	697
Measurement uncertainty (Hz)	±16



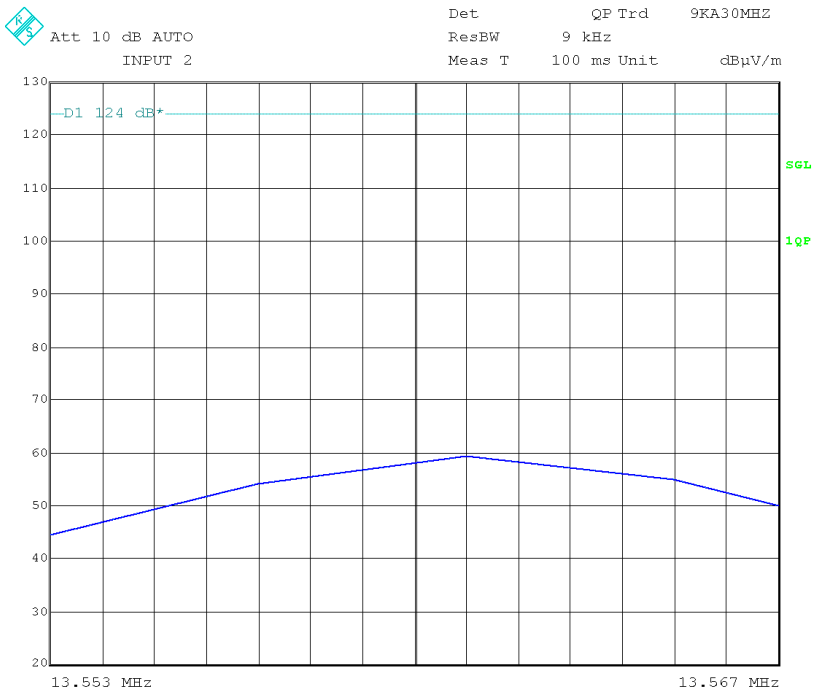
Section 15.225 Subclause (a). Field strength of emissions within the band 13.553 MHz -13.567 MHz

SPECIFICATION

The field strength of any emissions within the band 13.553 – 13.567 MHz shall not exceed 15,848 microvolts/meter (84 dBµV/m) at 30 meters.

RESULTS

Measurement distance: 3 meters



Note: The limit shown in the above plot is extrapolated to 3 meters

Frequency (MHz)	Maximum field strength (dBµV/m) measured at 3 m (quasi-peak detector)	Maximum field strength (dBµV/m) extrapolated to 30 m (40 dB/decade)
13.561	59.79	19.79
Measurement uncertainty (dB)	±3.2	

Verdict: PASS

Section 15.225 Subclause (b). Field strength of emissions within the band 13.410 MHz -13.553 MHz and 13.567 MHz -13.710 MHz

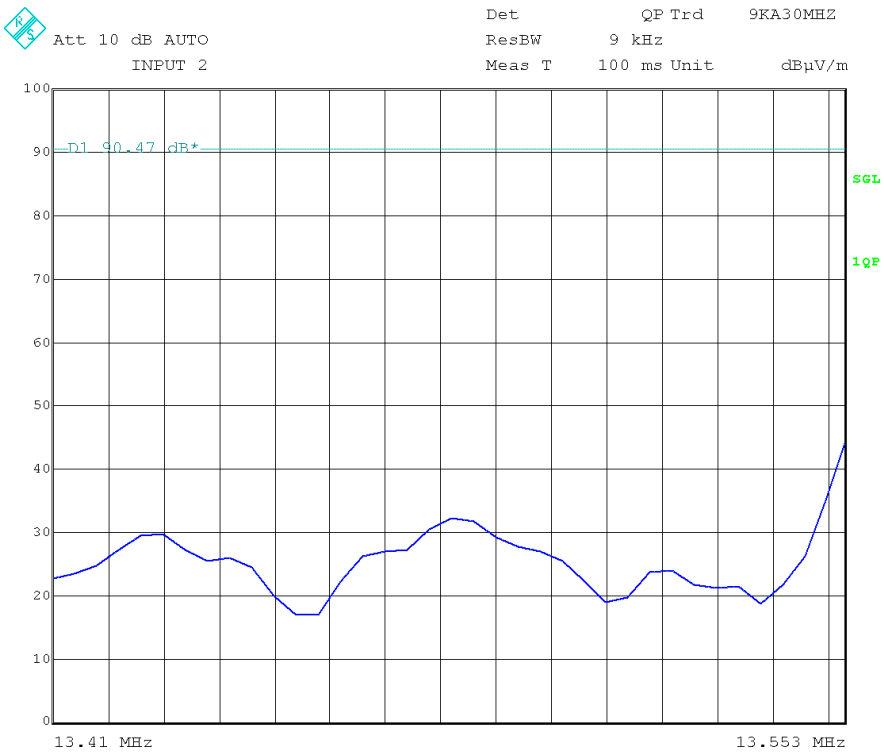
SPECIFICATION

Within the bands 13.410-13.553 MHz and 13.567-13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter (50.47 dBµV/m) at 30 meters.

RESULTS

Band 13.410-13.553 MHz

Measurement distance: 3 meters



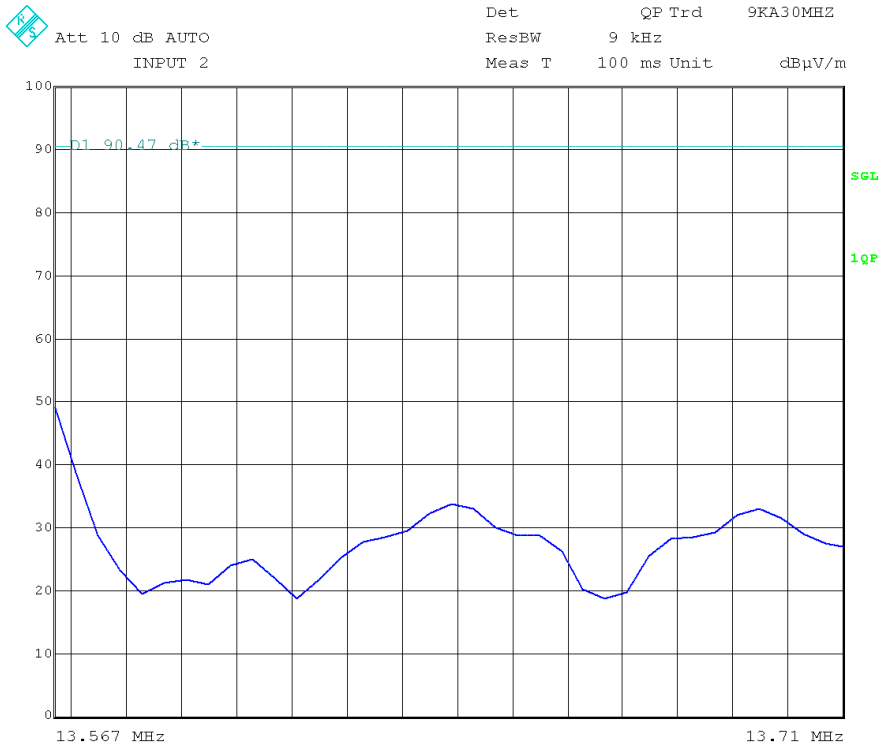
Note: The limit shown in the above plot is extrapolated to 3 meters

Frequency (MHz)	Maximum field strength (dBµV/m) measured at 3 m (quasi-peak detector)	Maximum field strength (dBµV/m) extrapolated to 30 m (40 dB/decade)
13.431	29.92	-10.08
13.484	32.54	-7.46
13.553	44.41	4.41
Measurement uncertainty (dB)	±3.2	

Verdict: PASS

Band 13.567-13.710 MHz

Measurement distance: 3 meters



Note: The limit shown in the above plot is extrapolated to 3 meters

Frequency (MHz)	Maximum field strength (dBµV/m) measured at 3 m (quasi-peak detector)	Maximum field strength (dBµV/m) extrapolated to 30 m (40 dB/decade)
13.567	49.91	9.91
13.642	32.33	-7.67
13.695	32.11	-7.89
Measurement uncertainty (dB)	±3.2	

Verdict: PASS

Section 15.225 Subclause (c). Field strength of emissions within the band 13.110 MHz -13.410 MHz and 13.710 MHz -14.010 MHz

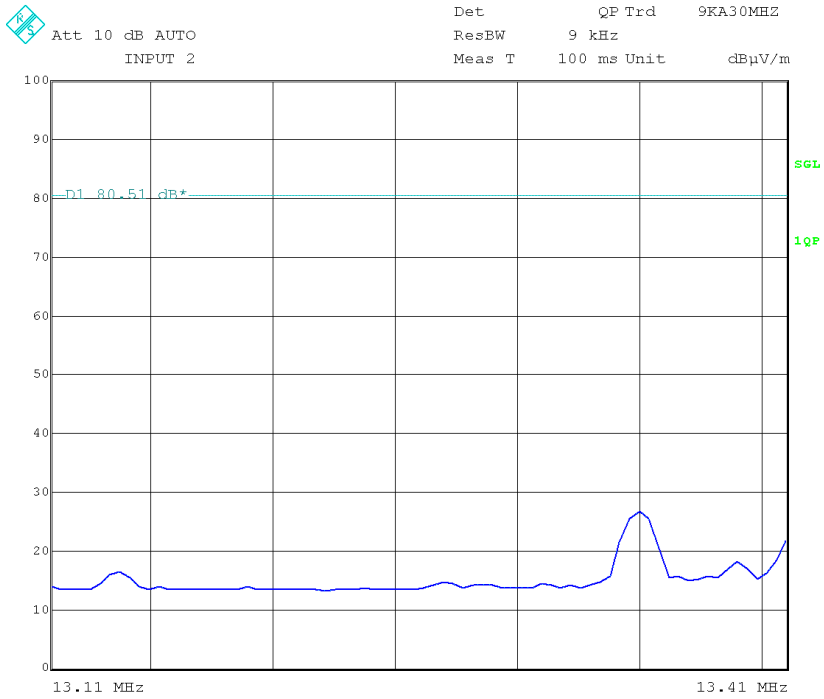
SPECIFICATION

Within the bands 13.110-13.410 MHz and 13.710-14.010 MHz, the field strength of any emissions shall not exceed 106 microvolts/meter (40.51 dBµV/m) at 30 meters.

RESULTS

Band 13.110-13.410 MHz

Measurement distance: 3 meters



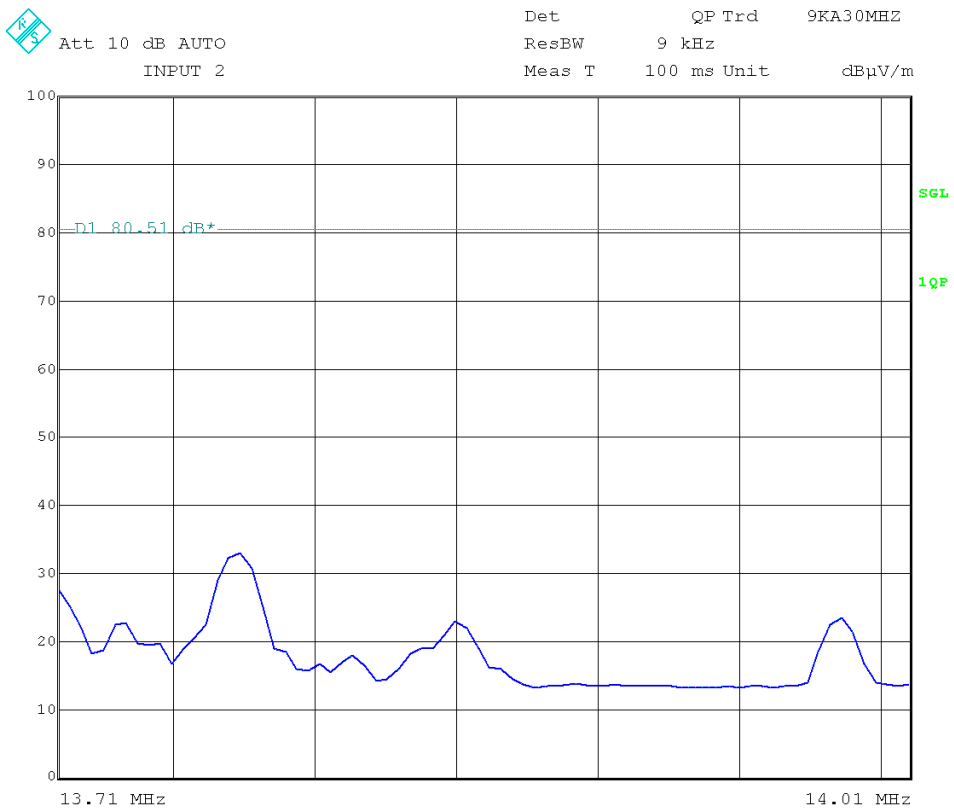
Note: The limit shown in the above plot is extrapolated to 3 meters

Frequency (MHz)	Maximum field strength (dBµV/m) measured at 3 m (quasi-peak detector)	Maximum field strength (dBµV/m) extrapolated to 30 m (40 dB/decade)
13.135	17.22	-22.78
13.345	27.71	-12.29
13.410	21.15	-18.85
Measurement uncertainty (dB)	±3.2	

Verdict: PASS

Band 13.710-14.010 MHz

Measurement distance: 3 meters



Note: The limit shown in the above plot is extrapolated to 3 meters

Frequency (MHz)	Maximum field strength (dBµV/m) measured at 3 m (quasi-peak detector)	Maximum field strength (dBµV/m) extrapolated to 30 m (40 dB/decade)
13.710	28.11	-11.89
13.756	33.32	-6.68
13.845	22.21	-17.79
13.981	23.48	-16.52
Measurement uncertainty (dB)	±3.2	

Verdict: PASS

Section 15.225 Subclause (d). Field strength of emissions outside of the band 13.110 MHz -14.010 MHz

SPECIFICATION

Field strength of any emissions appearing outside of the band 13.110 MHz - 14.010 MHz band shall not exceed the general radiated emission limits in 15.209:

Frequency Range (MHz)	Field strength (µV/m)	Field strength (dBµV/m)	Measurement distance (m)
0.009-0.490	2400/F(kHz)	-	300
0.490-1.705	24000/F(kHz)	-	300
1.705 - 30.0	30	29.54	30
30 - 88	100	40	3
88 - 216	150	43.5	3
216 - 960	200	46	3
Above 960	500	54	3

RESULTS:

All tests were performed in a semi-anechoic chamber at a distance of 3 m.

The spectrum was inspected from 9 kHz to 200 MHz searching for spurious signals.

The field strength is calculated by adding correction factor to the measured level from the spectrum analyser. This correction factor includes antenna factor, cable loss and pre-amplifier gain.

Frequency range 9 kHz-30 MHz.

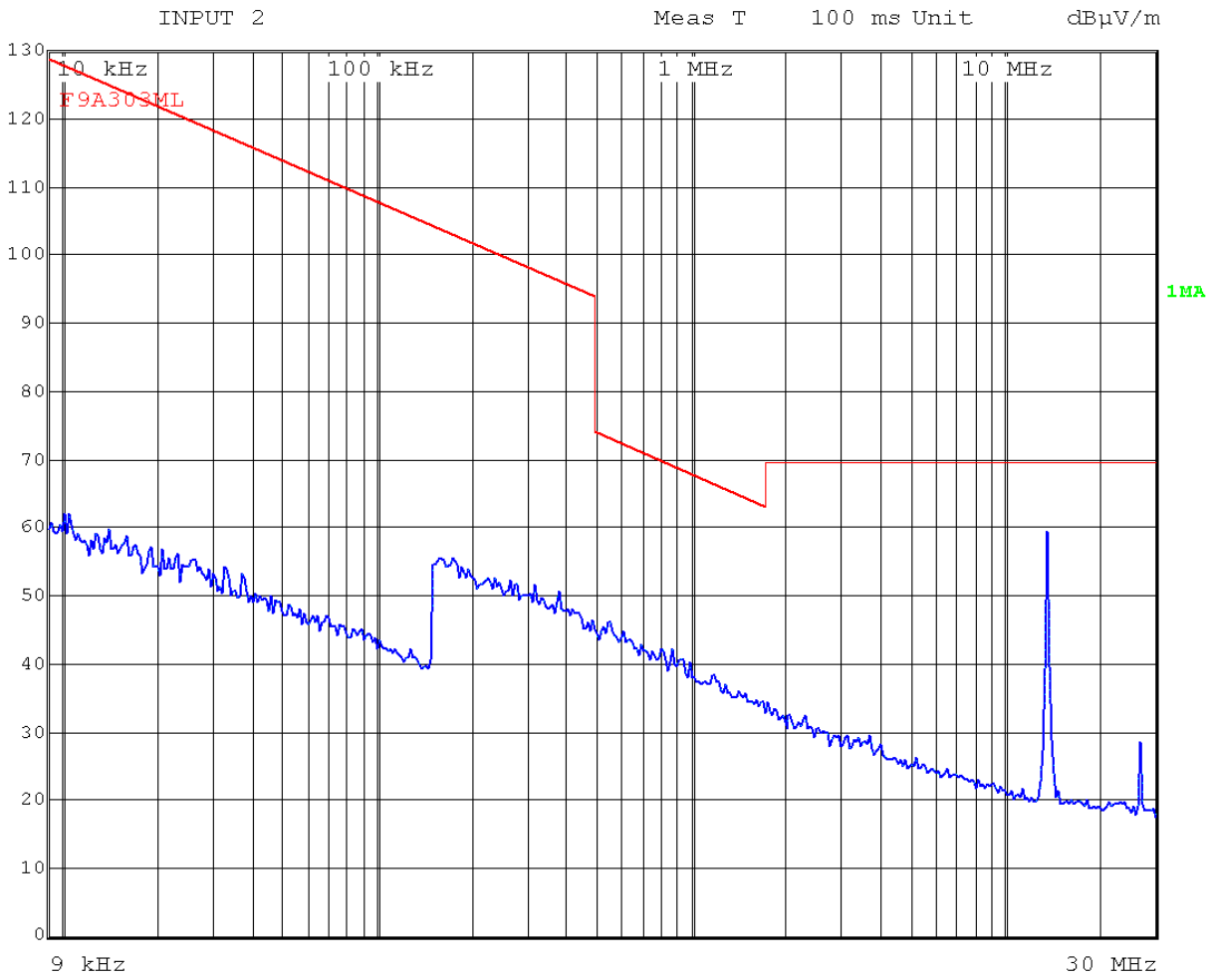
Spurious frequency (MHz)	Loop antenna orientation	Detector	Emission Level (dBµV/m) 3 m	Emission Level (dBµV/m) extrapolated to 30 m (40 dB/decade)	Measurement Uncertainty (dB)
27.12004	Faced to E.U.T.	Quasi-Peak	26.13	-13.87	± 3.2

Frequency range 30 MHz-200 MHz

Spurious frequency (MHz)	Polarization	Detector	Emission Level (dBµV/m)	Measurement Uncertainty (dB)
135.61122	V	Quasi-Peak	24.96	± 3.8
149.23848	V	Quasi-Peak	24.52	± 3.8
162.86573	V	Quasi-Peak	23.14	± 3.8
176.49298	V	Quasi-Peak	27.05	± 3.8
190.12024	V	Quasi-Peak	23.86	± 3.8

Verdict: PASS

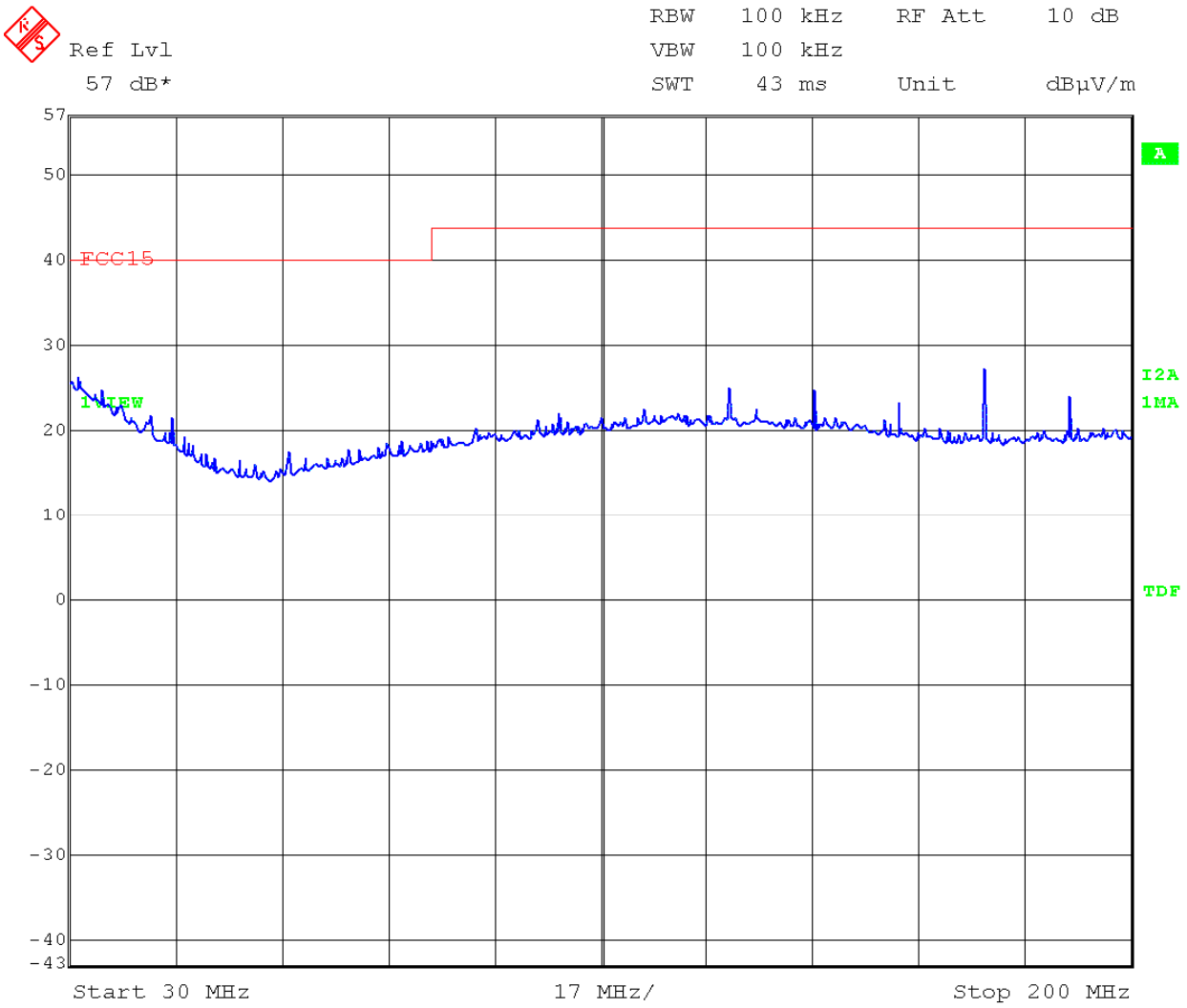
FREQUENCY RANGE 9 kHz-30 MHz.



Resolution bandwidth:
200 Hz for 9 kHz ≤ f ≤ 150 kHz
9 kHz for 150 kHz ≤ f ≤ 30 MHz

Note: The limits shown in the above plot are extrapolated to 3 meters. The highest peak corresponds to the carrier level.

FREQUENCY RANGE 30 MHz to 200 MHz.



Section 15.225 Subclause (e). Frequency tolerance of the carrier signal

SPECIFICATION

The frequency tolerance of the carrier signal shall be maintained within +/- 0.01% of the operating frequency over a temperature variation of –20 degrees to +50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C.

RESULTS

Nominal operating frequency: 13.56 MHz

Frequency stability over temperature variations.

Temperature (ºC)	Frequency Error (Hz)	Frequency Error (%)
+50	1015	0.00748525
+40	1013	0.00747050
+30	1022	0.00753687
+20	1035	0.00763274
+10	1050	0.00774336
0	1098	0.00809735
-10	1140	0.00840708
-20	1150	0.00848083

Frequency stability over voltage variations.

Battery Supply voltage	Voltage (V)	Frequency Error (Hz)	Frequency Error (%)
Vmax	4.25	1079	0.00795723
Vmin	3.14	1055	0.00778024

Verdict: PASS

APPENDIX B: Measuring results for electromagnetic conducted emission

CONTENT:

Description of the operation modes

The operation modes described in this paragraph constitute a functionality of the sample under test for itself. Every operation mode takes a failure criteria for the immunity test that they were applying to it and a monitoring to guarantee performance of the same ones.

In the following table appears the operation modes used by the samples tested to that it refers the present test report.

OPERATION MODE	DESCRIPTION
OM#02	EUT ON. RFID communication mode. EUT power supplied with an AC voltage of 110 Vac / 60 Hz.

CONTINUOUS CONDUCTED EMISSION ON POWER LEADS

LIMITS:	Product standard :	FCC RULES AND REGULATIONS 47 CFR PART 15, SUBPART C.
	Test standard :	Part 15, Subpart C section 15.207 of FCC Rules

CLASS B

The applied limit for continuous conducted emissions in power leads, according with the requirements of FCC Rules and Regulations 47 CFR Part 15, Subpart C, section 15.207 in the frequency range 0,15 to 30 MHz, for Class B equipment was:

Frequency range (MHz)	**Limit (dBµV)**	
	Quasi-peak	**Average**
0,15 to 0,5	66-56	56-46
0,5 to 5	56	46
5 to 30	60	50

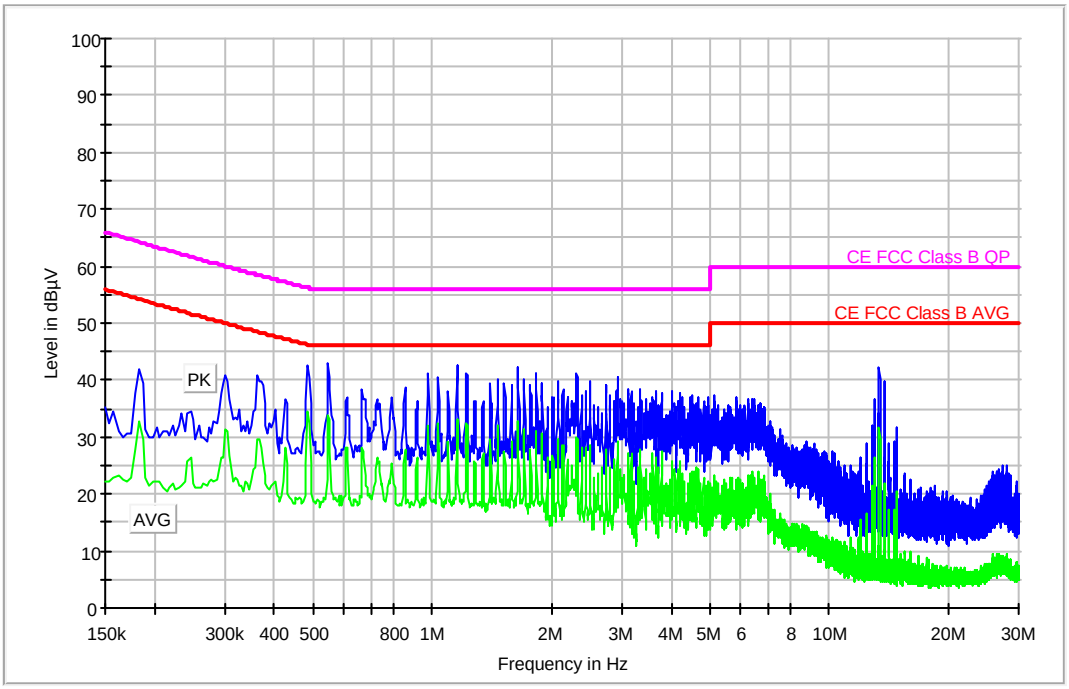
TESTED SAMPLES:	S/01
TESTED OPERATION MODES:	OM#02
TEST RESULTS :	CCmmnnhh: CC, Conducted Condition; mm: Sample number; nn: Operation mode; hh: wire

CCmmnnhh	**Description**	**Result**
CC0102L1	Positive wire noise	P
CC01020N	Negative wire noise	P

Continuous Conducted emission : CC0102L1	Detector : Peak / Average / Cuasi-peak

Project: 28384iem.007
Company: BARACODA
Sample: S/01
Operation Mode: OM#02
Date: 2009-03-30 15:14
Setup: EMI conducted
Mode: EUT ON. BT communication mode. Phase noise.

EC FCC Clase B ESPI CC



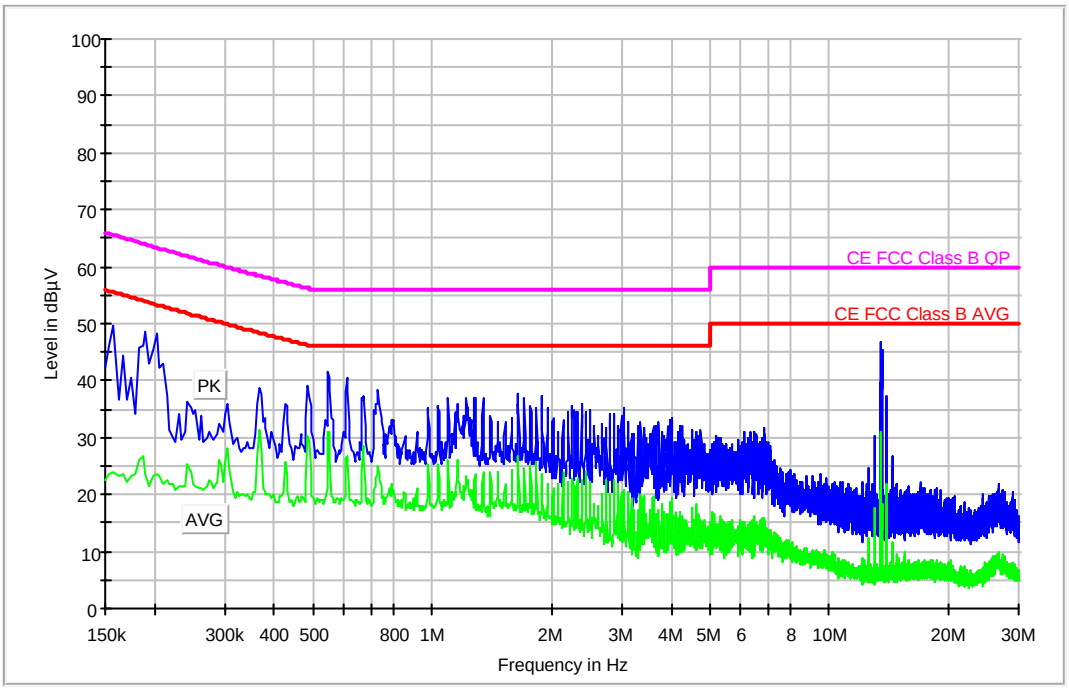
Max PK-AVG

Frequency (MHz)	MaxPeak-ClearWrite (dBµV)	Average-ClearWrite (dBµV)
0.546000	42.9	33.6
0.550000	40.6	33.0
0.978000	41.3	32.2
1.154000	40.8	29.8
1.158000	42.6	33.2
1.218000	41.0	32.2
1.222000	40.7	31.9
1.646000	42.2	32.8
1.826000	40.8	30.4
1.830000	41.2	31.1
2.314000	41.1	29.8
13.378000	42.4	31.7

Continuous Conducted emission : CC01020N	Detector : Peak / Average / Cuasi-peak

Project: 28384iem.007
Company: BARACODA
Sample: S/01
Operation Mode: OM#02
Date: 2009-03-30 15:09
Setup: EMI conducted
Mode: EUT ON. BT communication mode. Neutral noise.

EC FCC Clase B ESPI CC



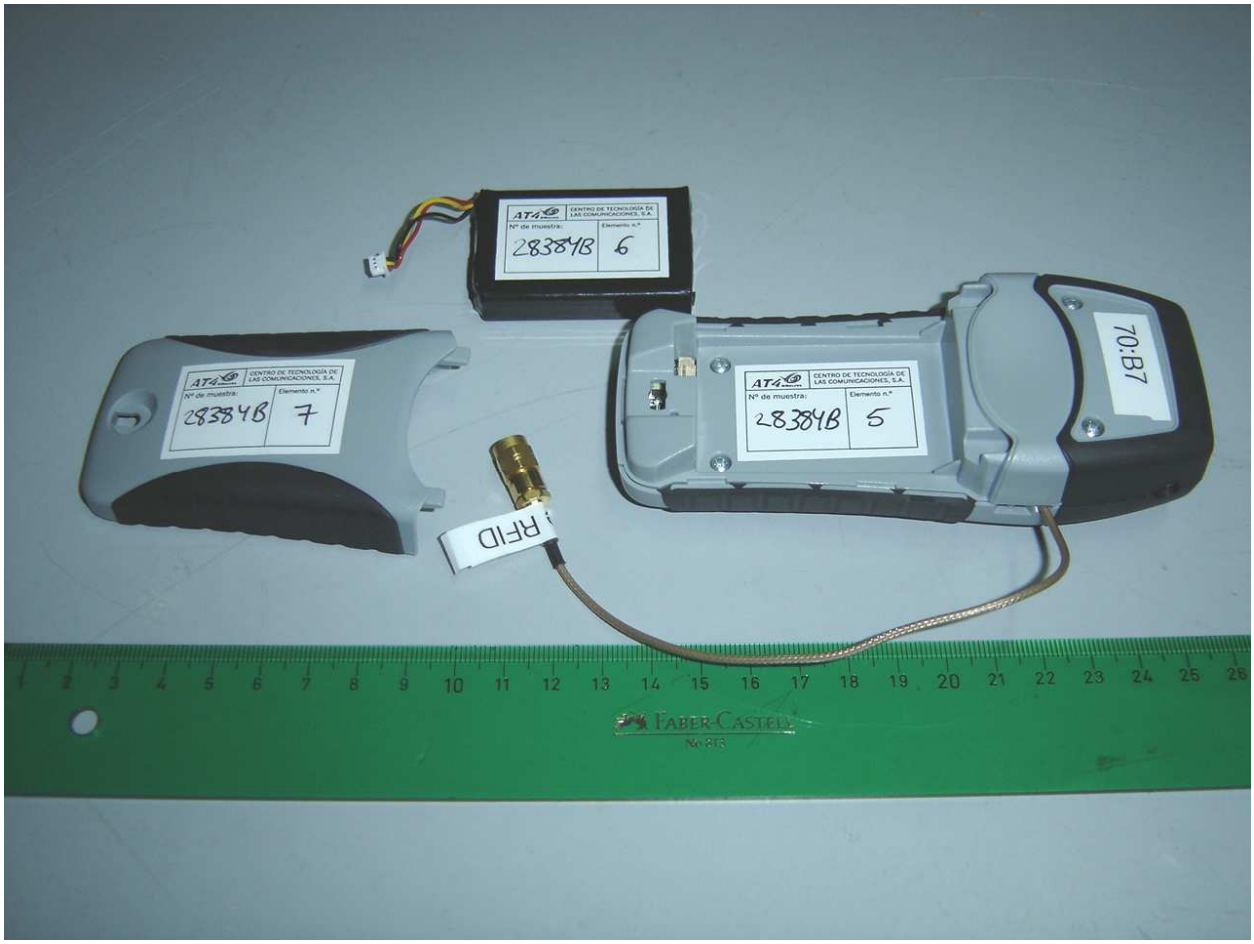
Max PK-AVG

Frequency (MHz)	MaxPeak-ClearWrite (dBµV)	Average-ClearWrite (dBµV)	Comment
0.154000	46.2	23.4	
0.158000	49.8	24.0	
0.186000	46.0	26.6	
0.190000	48.6	23.7	
0.202000	48.1	23.4	
0.546000	41.4	30.9	
0.550000	40.6	31.0	
0.610000	40.5	26.6	
13.502000	46.9	30.8	
13.538000	39.9	14.3	
13.542000	42.9	16.7	
13.546000	45.4	18.2	

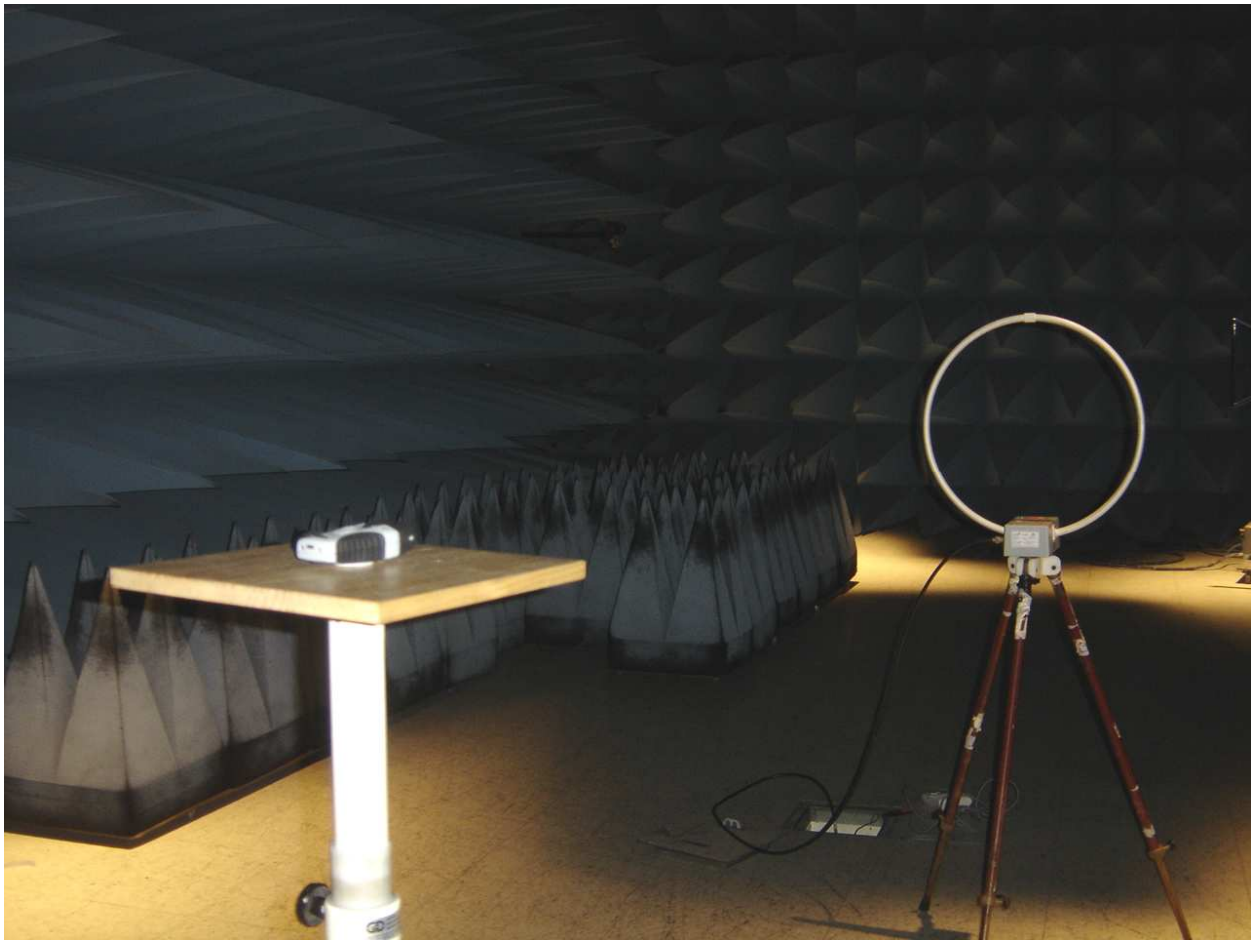
APPENDIX C: Photographs


TAGRUNNERS
REF.27
FABER-CASTELL

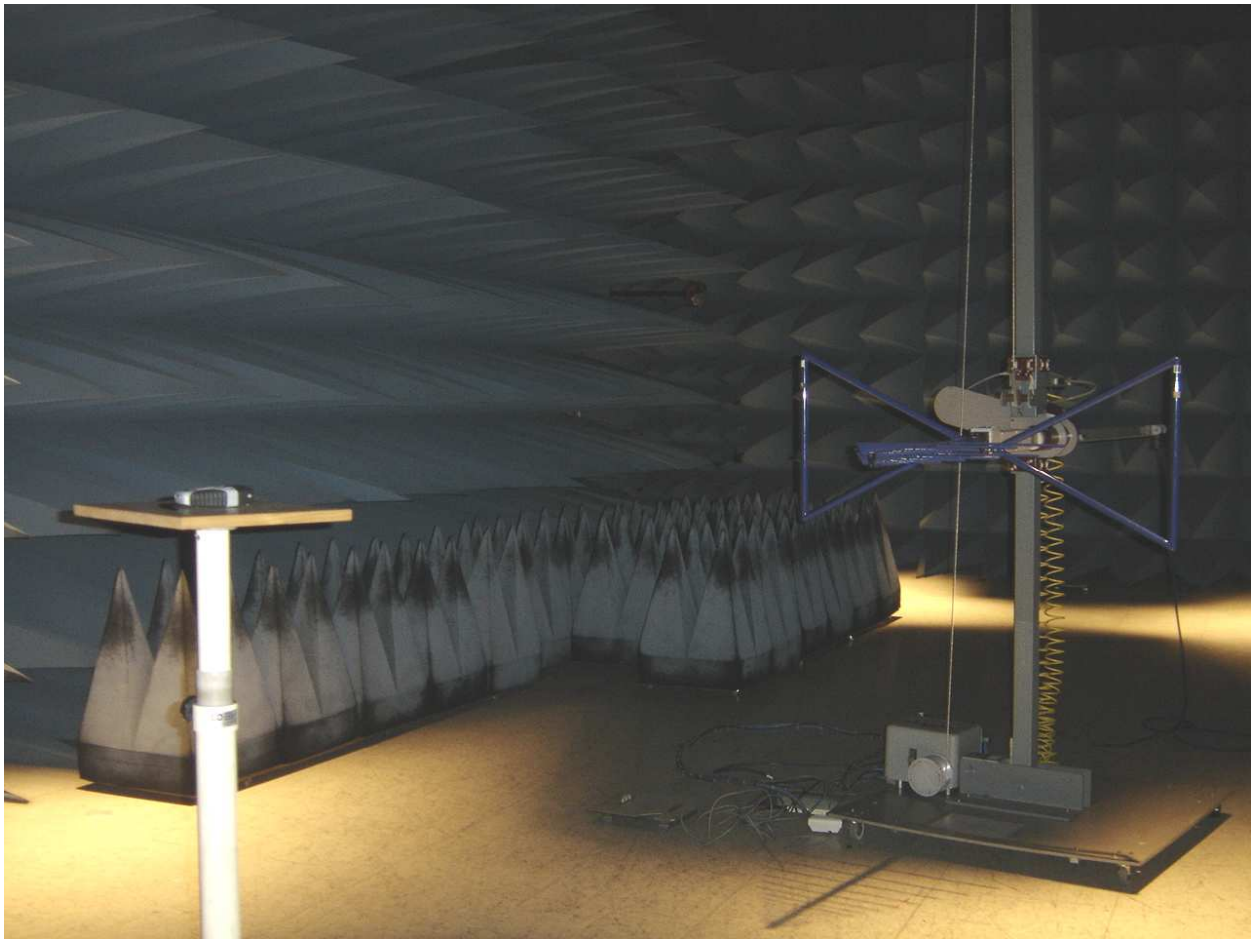

RRNA-RFID
6F.F2
FABER-CASTELL


28384B 6
28384B 7
28384B 5
70:B7
RFID
FABER-CASTELL

TEST SET-UP FOR RADIATED MEASUREMENTS BELOW 30 MHz



TEST SET-UP FOR RADIATED MEASUREMENTS ABOVE 30MHz



TEST SET-UP FOR CONDUCTED MEASUREMENTS