RA-24-07102787-2/A Ed. 0

FCC CERTIFICATION
Limited Modular Approval
RADIO Measurement
Technical Report

standard to apply:
FCC Part 15.247

Equipment under test:
CK5050+/Multimedia module
(Bluetooth, USB, Line In)

FCC ID :
RKXCK5050PEA

Company:
PARROT

DISTRIBUTION: M. LEBLANC **Company: PARROT**

Number of pages: 34 including 5 annexes

Ed.	Date	Modified pages	Written by Name	Written by Visa	Technical Verification Quality Approval Name	Technical Verification Quality Approval Visa
0	7-Apr-08	Creation	M. DUMESNIL	M. D.	P. BONNENFANT	

Duplication of this document 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.

PRODUCT:	**CK5050+/Multimedia module (Bluetooth, USB, Line In)**
Reference / model:	CK5050+
Trade mark:	PARROT
Serial number:	not communicated
MANUFACTURER:	PARROT

COMPANY SUBMITTING THE PRODUCT:

Company:	PARROT
Address:	174, quai de Jemmapes 75010 PARIS FRANCE
Responsible:	M. LEBLANC
DATE(S) OF TEST:	9 February 2008 14 March 2008
TESTING LOCATION:	EMITECH ATLANTIQUE laboratory at ANGERS (49) FRANCE EMITECH ATLANTIQUE open area test site in LA POUEZE (49) FRANCE Registration Number by FCC: 101696/FRN: 0006 6490 08
TESTED BY:	M. DUMESNIL
TUTOR:	P. BONNENFANT

CONTENTS

TITLE **PAGE**

1. INTRODUCTION

This report presents the results of radio test carried out on the following radio equipment: CK5050+/Multimedia module (Bluetooth, USB, Line In), in accordance with normative reference.

2. PRODUCT DESCRIPTION

Class: B (residential environment)

Utilization: it's a multimedia module which offers several functions like Bluetooth (Hands free, Audio Streaming), USB, line IN. It could be integrated in a lot of product, for examples: car radio, GPS…

Antenna type: PARROT PIFA ANTENNA

Operating frequency range: from 2402 MHz to 2480 MHz

Number of channels: 79

Channel spacing: 1 MHz

Frequency generation: O SAW Resonator O Crystal ⊙ Synthetizer

Modulation: Frequency Hopping Spread Spectrum (FHSS)
O Amplitude O Digital ⊙ Frequency O Phase

Power source: 3.4 Vd.c.

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.

FCC Part 15 (2007)	Code of Federal Regulations Title 47 - Telecommunication Chapter 1 - Federal Communications Commission Part 15 - Radio frequency devices Subpart C - Intentional Radiators
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.
Public Notice DA 00-705	Filing and Measurement Guideline for Frequency Hopping Spread Spectrum Systems.

4. TEST METHODOLOGY

Radio performance tests procedures given in part 15:

Paragraph 33: frequency range of radiated measurements
Paragraph 35: measurement detector functions and bandwidths
Paragraph 203: antenna requirement
Paragraph 205: restricted bands of operation
Paragraph 207: conducted limits
Paragraph 209: radiated emission limits; general requirements
Paragraph 247: operation within the bands 2400-2483.5 MHz

5. ADD ATTACHMENTS FILES

"Synoptic"
"Block diagram"
"External photos and Product labeling"
"Assembly of components"
"Internal photos"
"Layout pcb"
"Bil of materials"
"Schematics"
"Product description"
"User guide"

6. TESTS AND CONCLUSIONS

Test procedure	Description of test	Criteria respected ?				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		
FCC Part 15.209	RADIATED EMISSION LIMITS; general requirements	X				*Note 2*
FCC Part 15.247	OPERATION WITHIN THE BAND 2400-2483.5 MHz					
	(a) (1) *hopping systems*	X				*Note 3*
	(a) (1) (i) 902 – 928 MHz			X		
	(a) (1) (ii) 5725 – 5850 MHz			X		
	(a) (1) (iii) 2400 – 2483.5 MHz	X				*Note 4*
	(a) (2) *digital modulation techniques*			X		
	(b) *max output power*	X				*Note 5*
	(c) *operation with directional antenna gains > 6 dBi*			X		*Note 6*
	(d) *intentional radiator*	X				
	(e) *peak power spectral density*			X		
	(f) *hybrid system*			X		
	(g)			X		
	(h)			X		
	(i) *RF exposure compliance*				X	*Note 7*
DA 00-705	BAND EDGE COMPLIANCE	X				

NAp: Not Applicable NAs: Not Asked

Note 1: the antenna is connected to the module through a cable coaxial with a U-FL connector (see annex 4).

Note 2: see FCC part 15.247 (d).

Note 3: the system hops to channel frequencies from a pseudo randomly ordered list of hopping frequencies. Each frequency is used equally on the average by the transmitter, and separated by a minimum of 20 dB bandwidth of the hopping channel (798 kHz; see annex 1).

Note 4: the frequency hopping system uses 79 channels (See annex 3).
The timing by channel is 394 µs. During 79 channels × 0.4 s (part 15) = 31.6 s, any channel is used 108 times, then 108 x 394 µs = 42.55 ms, thus the average time of occupancy on any channel is less than 400 ms within a period of 0.4 s multiplied by the number of hopping channels employed, in normal operating mode (see annex 2).

Note 5: we used the radiated method in open field.

Note 6: the antenna gain is less than 6 dBi.

Note 7: this type of equipment uses less than 0.5 W of output power with a high signal transmitting duty factor (section 3 from Oet 65c).

Conclusion:

The sample CK5050+/Multimedia module (Bluetooth, USB, Line In) of submitted to the tests complies with the regulations of the standard FCC Part 15.247 in accordance with the limits or criteria defined in this report.
A limited Approval is requested due to the use of an antenna connector and a coaxial cable (see 15.203).

7. PEAK OUTPUT POWER

Standard: FCC Part 15

Test procedure: paragraph 15.247

Test equipment:

TYPE	BRAND	EMITECH NUMBER
Spectrum analyzer FSP 40	Rohde & Schwarz	4088
Antenna RGA60	Electrometrics	1204
Open site	EMITECH	1274
Power source E3610A	Hewlett Packard	4195
Multimeter 77-2	Fluke	0812
Meteo station AB888	Oregon Scientific	1539

Test set up:

The system is tested in an open area test site (OATS).
The test unit is placed on a rotating table, 0.8 m from a ground plane. Zero degree azimuth corresponds to the front of the equipment under test.
We use for this measure outdoor test site. The measuring distance between the equipment and the test antenna is 3 m. The test antenna has been oriented in the two polarizations, we have recorded only the highest level.

A measurement of the electro-magnetic field is realized, with a resolution bandwidth and video bandwidth adjusted at 1 MHz.

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 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
Relative humidity (%): 57

Power source: 4.8 Vd.c. by an external power source

Sample n° 1 Channel 1

		Level dBµV	Cable loss dB	Antenna factor dB	Electro-magnetic field (dBµV/m):	P* (W)
Normal test conditions	Nominal power source (V): 4.8	47.52	4.63	28.9	81.05	23.16×10^{-6}

Sample n° 1 Channel 40

		Level dBµV	Cable loss dB	Antenna factor dB	Electro-magnetic field (dBµV/m):	P* (W)
Normal test conditions	Nominal power source (V): 4.8	51.43	4.66	29.02	85.11	58.97×10^{-6}

Sample n° 1 Channel 79

		Level dBµV	Cable loss dB	Antenna factor dB	Electro-magnetic field (dBµV/m):	P* (W)
Normal test conditions	Nominal power source (V): 4.8	50.27	4.69	29.14	84.1	46.73×10^{-6}

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

Test conclusion:

RESPECTED STANDARD

8. RADIATED EMISSION OF TRANSMITTER

Standard: FCC Part 15

Test procedure: paragraph 15.205
paragraph 15.209
paragraph 15.247

Test equipment:

TYPE	BRAND	EMITECH NUMBER
Spectrum analyzer FSP 40	Rohde & Schwarz	4088
Loop antenna	EMCO	1406
Biconical antenna HP 11966C	Hewlett Packard	728
Log periodic antenna HL 223	Rohde & Schwarz	1999
Open site	Emitech	1274
Antenna RGA-60	Electrometrics	1204
Low-noise amplifier 2 to 18 GHz	Microwave DB	1922
High pass filter HP12/3200-5AA	Filtek	
Antenna WR42	IMC	1939
Power source E3610A	Hewlett Packard	4195
Multimeter 77-2	Fluke	0812
Meteo station AB888	Oregon Scientific	1539
Low-noise amplifier 18 to 26 GHz	ALC	3036

Test set up:

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

Frequency range: from 9 kHz to harmonic 10 ($F_{carrier} \leq 10$ GHz)

Bandwidth: 120 kHz (F < 1 GHz) or 100 kHz, following 15.205 or 15.247
1 MHz (F > 1 GHz) or 100 kHz, following 15.205 or 15.247

Distance of antenna: between 30 m and 3 m according the frequencies and the limits.

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

Results:

Ambient temperature (°C): 16
Relative humidity (%): 56

Power source: 4.8 Vd.c. by an external power source

The polarity column refers to the antenna polarity at which the maximum emissions level is measured.

Not any spurious has been detected during this test, up to 25 GHz.

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 85.56 dBµV/m on channel 40.

So the applicable limit is **65.56 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

9. BAND EDGE COMPLIANCE

Standard: FCC Part 15.247

Test procedure: Public Notice DA 00-705, Delta Marker method

Test equipment used:

TYPE	MANUFACTURER	EMITECH NUMBER
Spectrum analyzer FSP 40	Rohde & Schwarz	4088
Antenna RGA-60	Electrometrics	1204
Power source E3610A	Hewlett Packard	4195
Multimeter 77-2	Fluke	0812
Radiocommunication analyzer CMD55	Rohde & Schwarz	3591
Meteo station	Bioclock Scientific Metestar	0943

Measured condition:

Requirements: Emissions that fall in the restricted bands (part 15.205). These emissions must be less than or equal to 500 µV/m (54 dBµV/m)/ Part 15.35b applies in the restricted bands.

Test procedure: An in band field strength measurement of the fundamental Emission using the RBw and detector function required by C63.4-2003 and FCC Rules.

Test operating condition of the equipment:

The equipment is blocked in frequency hopping mode.

Results:

Lower Band Edge: from 2310 MHz to 2390 MHz, CURVE n° 1
Upper Band Edge: from 2483.5 MHz to 2500 MHz, CURVE n° 2

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)
2402.002	81.05	Pk	2376.006	-59.54	21.51(1)	54	32.49
2480.002	84.1	Pk	2493.952	-62.37	21.73(1)	54	32.27

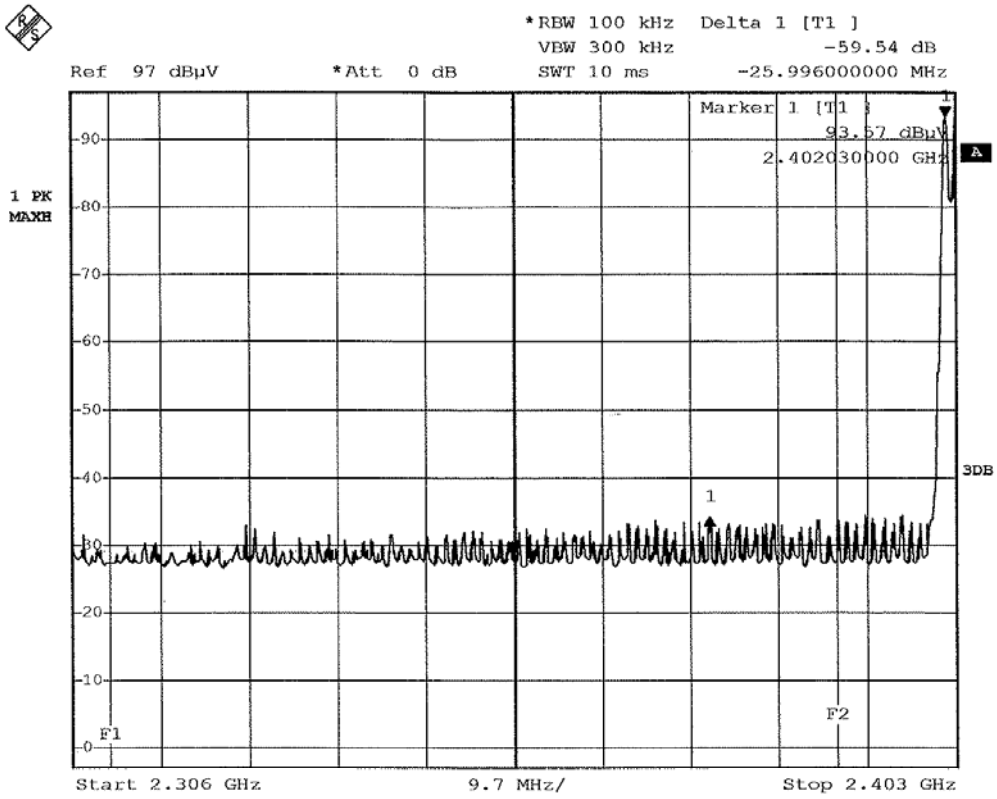
* according to step 2 of Marker-Delta Method DA 00-705.

** according to step 3 of Marker-Delta Method:
Calculated Emission Level = Field Strength Level – Delta Marker Level

(1) the peak level is lower than the average limit (53.98 dBµV/m).

Test conclusion: RESPECTED PUBLIC NOTICE

CURVE N°: 1.



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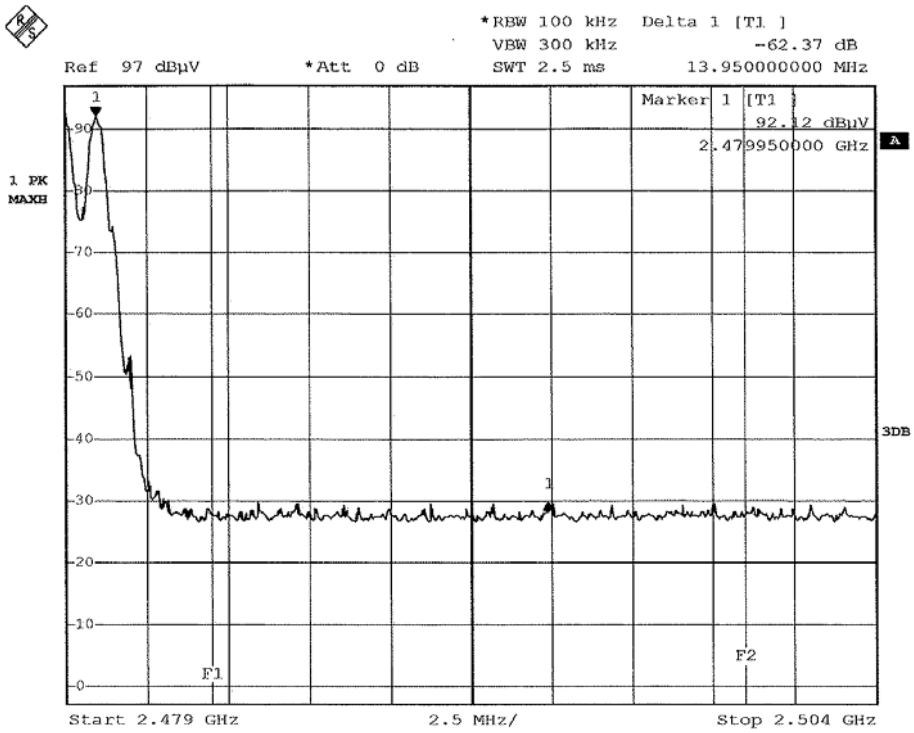

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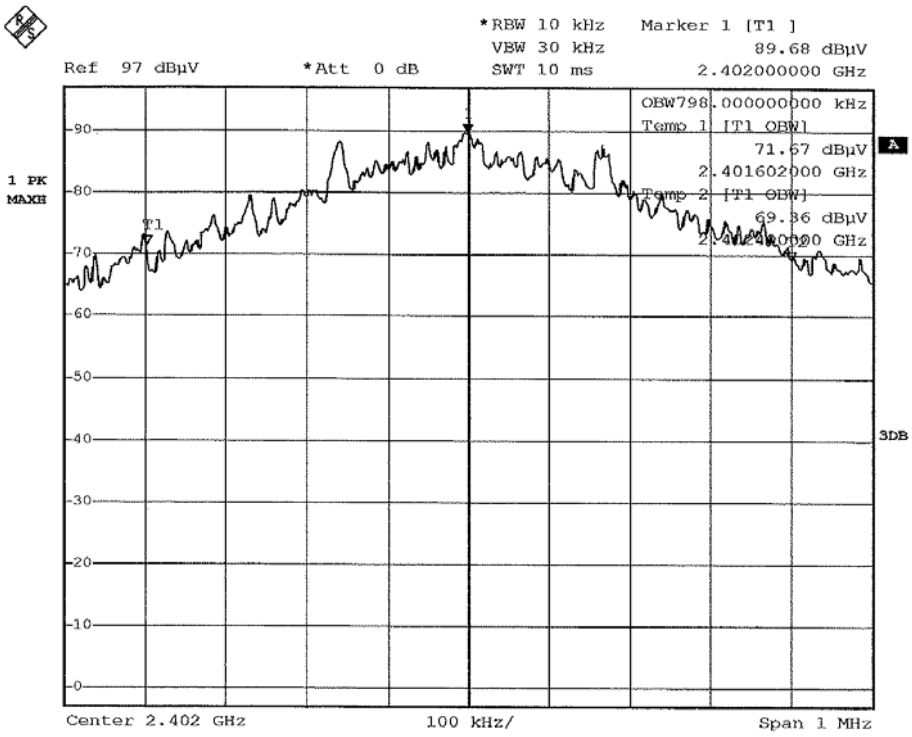
□□□ End of report, 5 annexes to be forwarded □□□

ANNEX 1: OCCUPIED POWER BANDWIDTH AND CHANNEL SEPARATION



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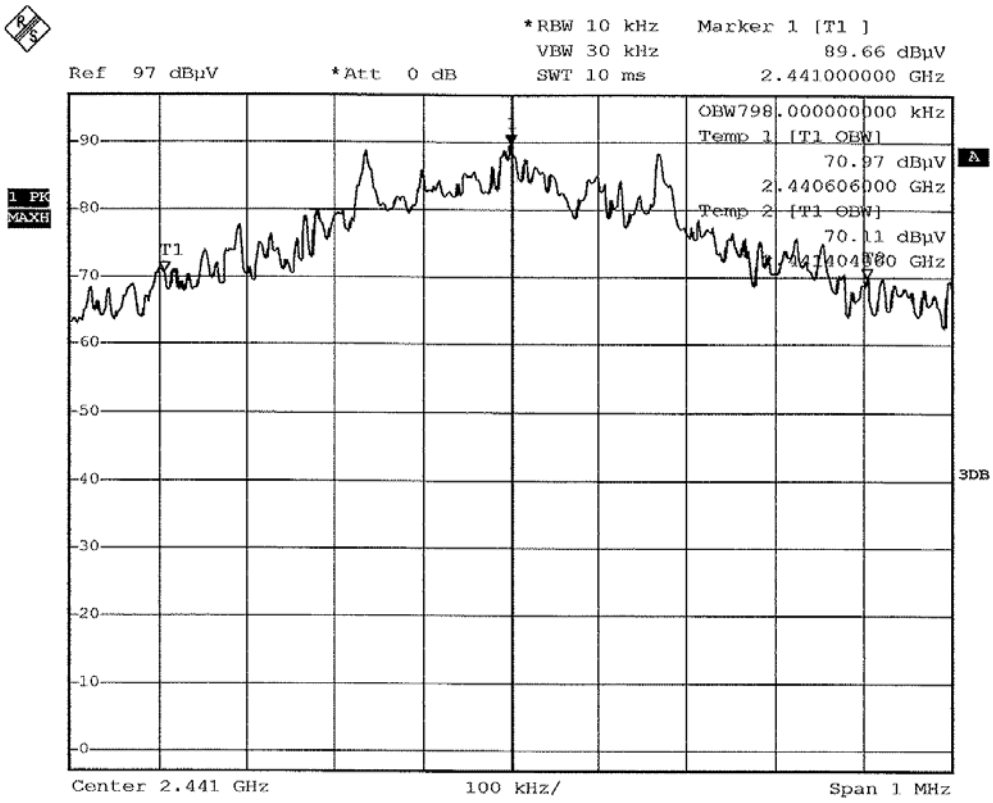

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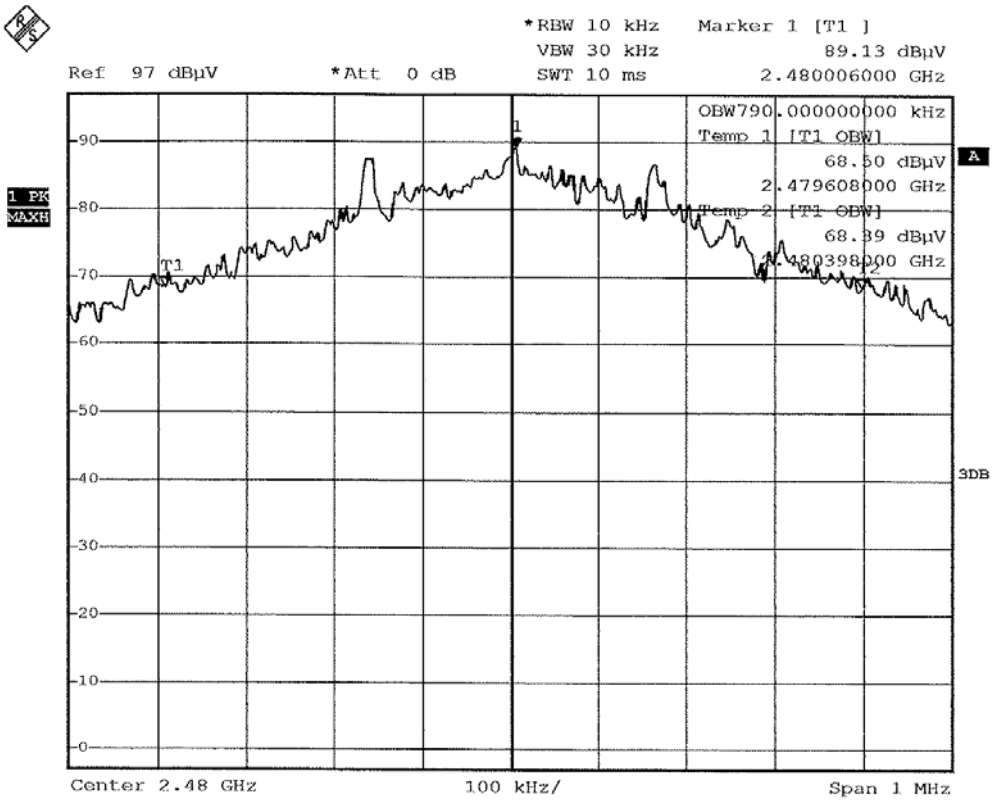

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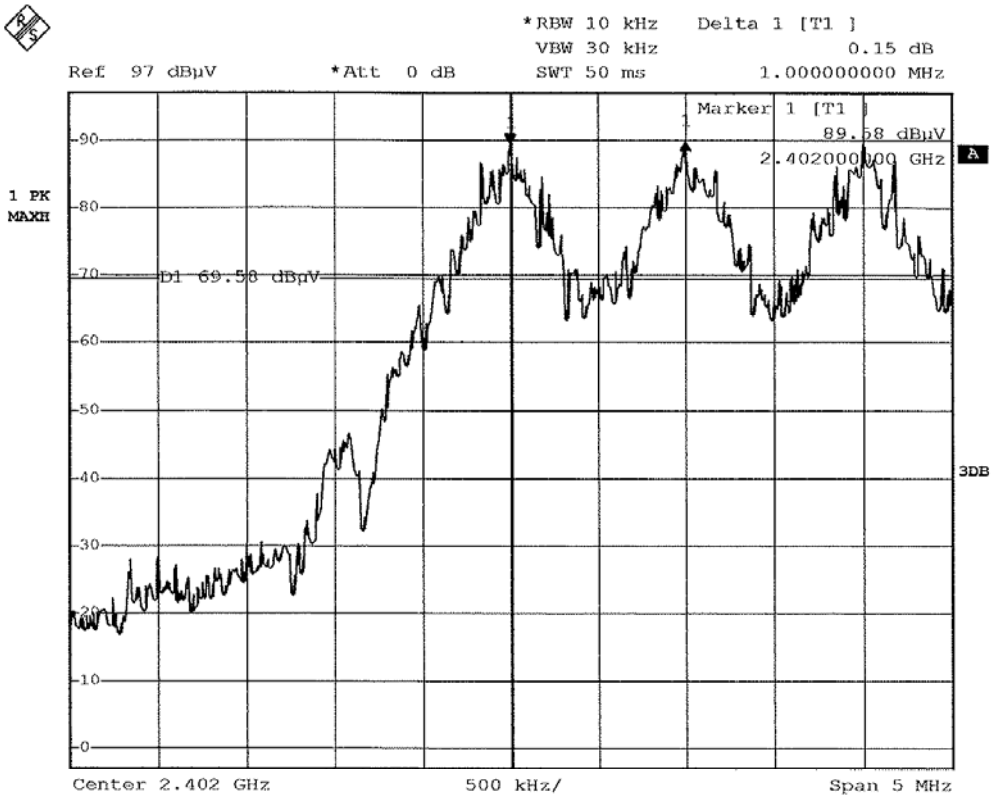

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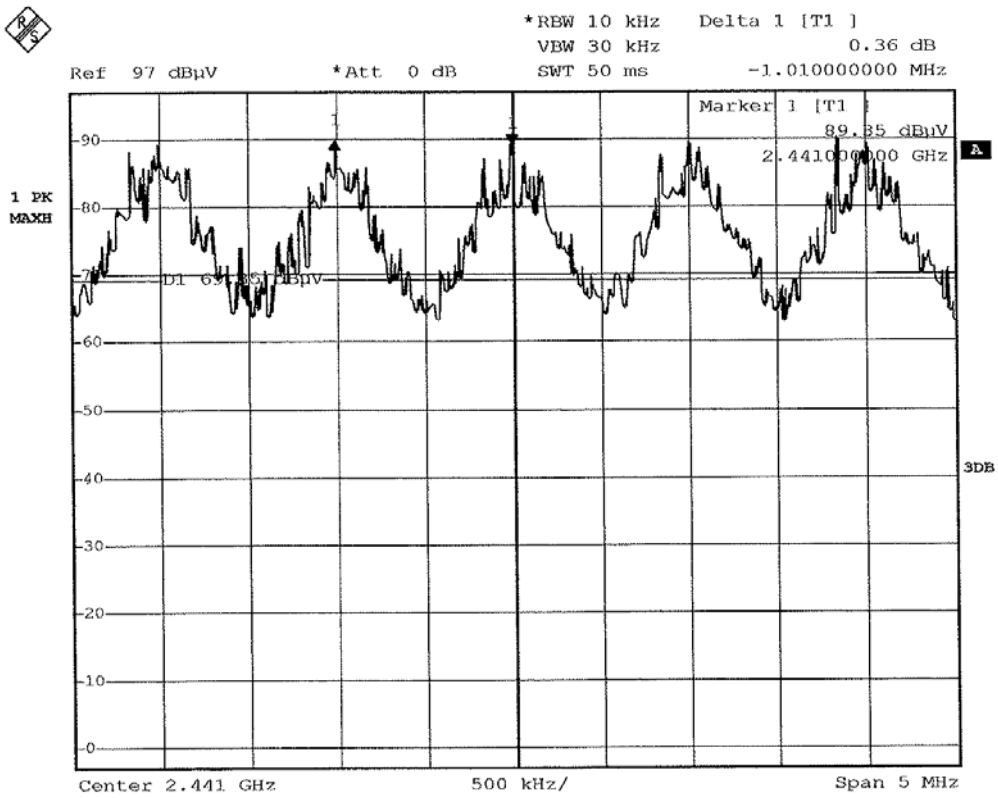

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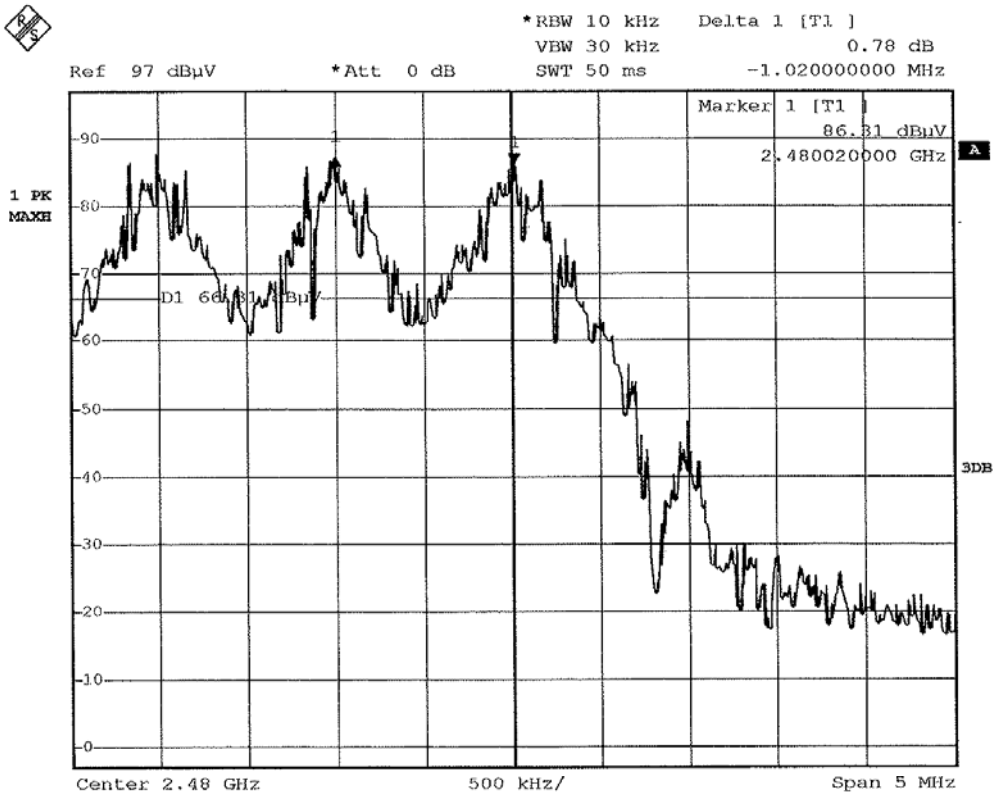

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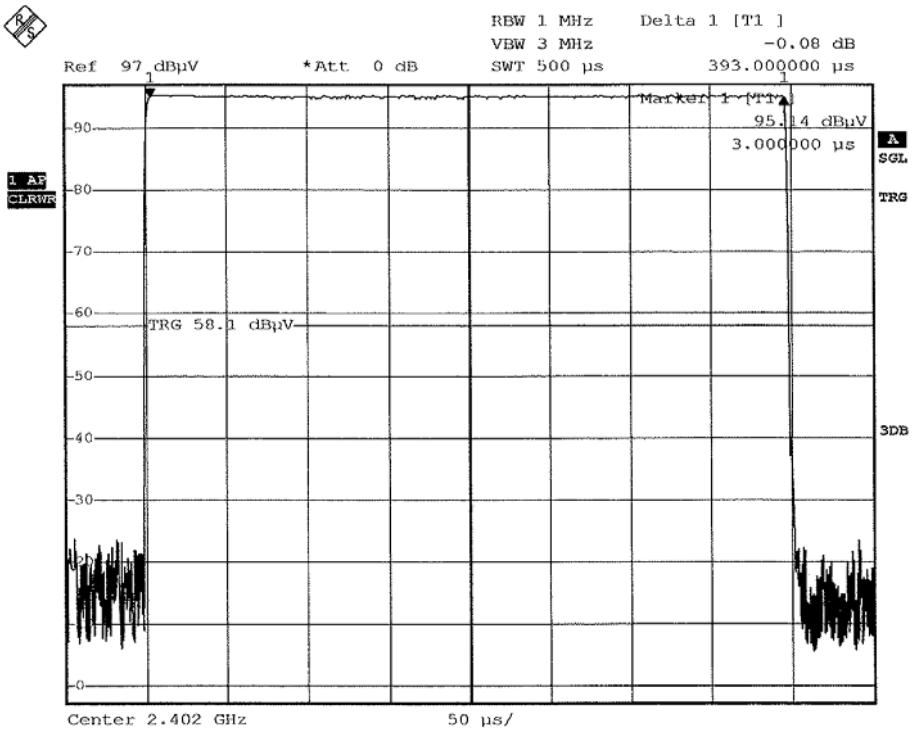
ANNEX 2: AVERAGE TIME OF OCCUPANCY ON ANY FREQUENCY



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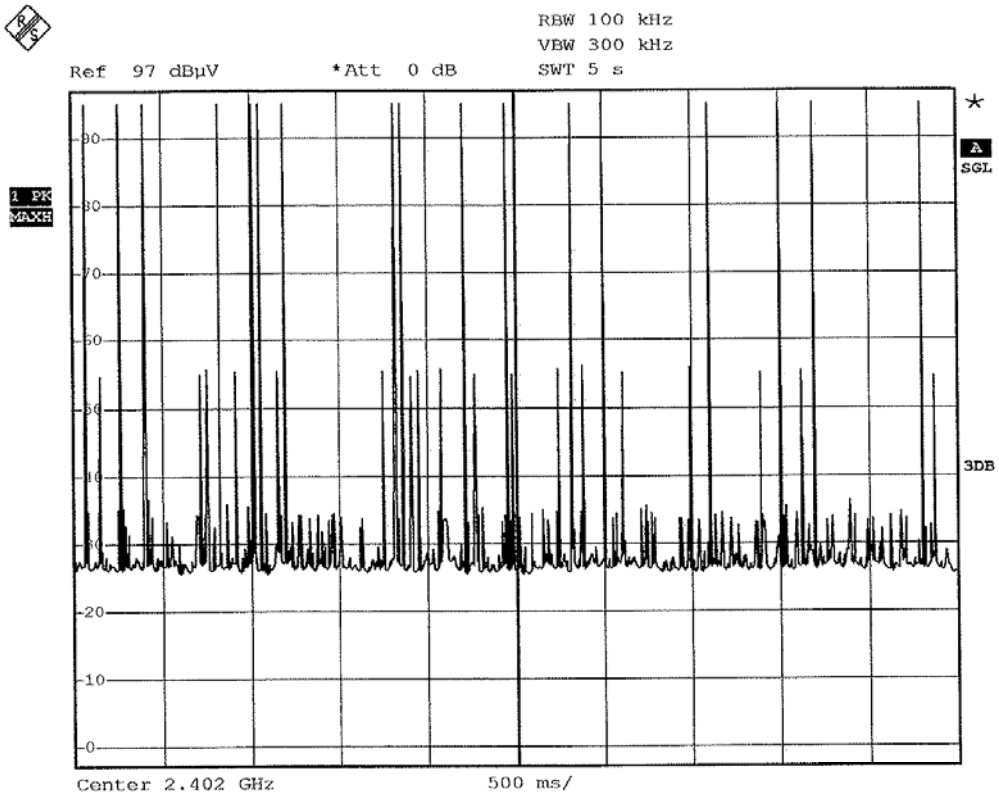

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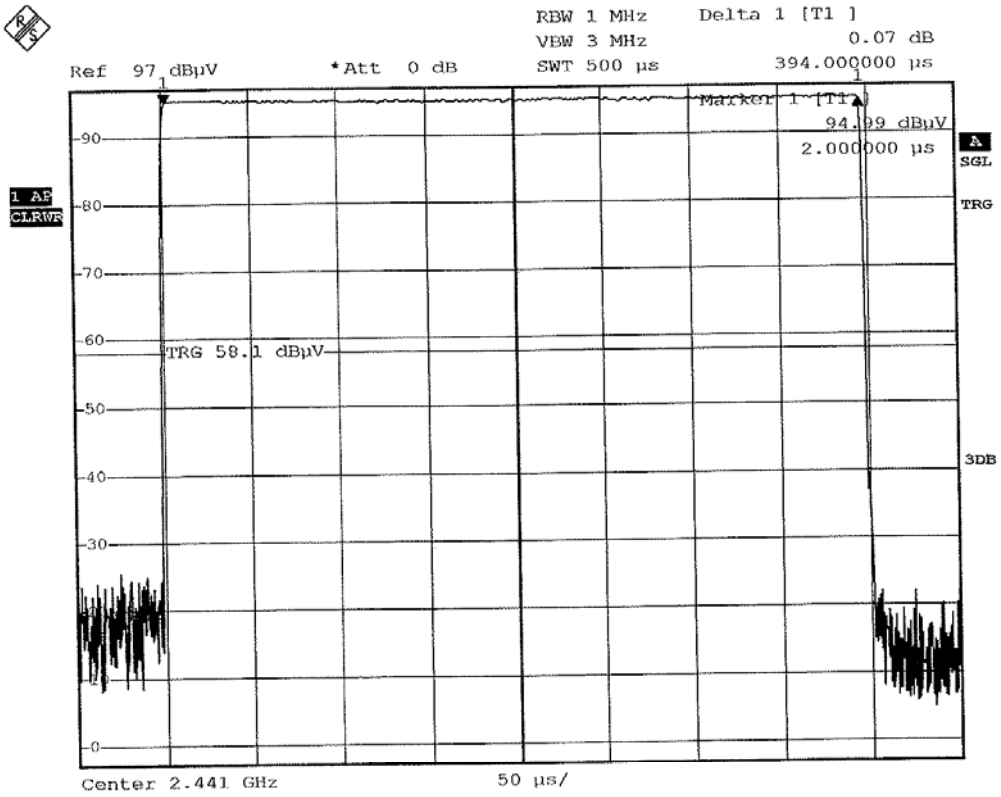

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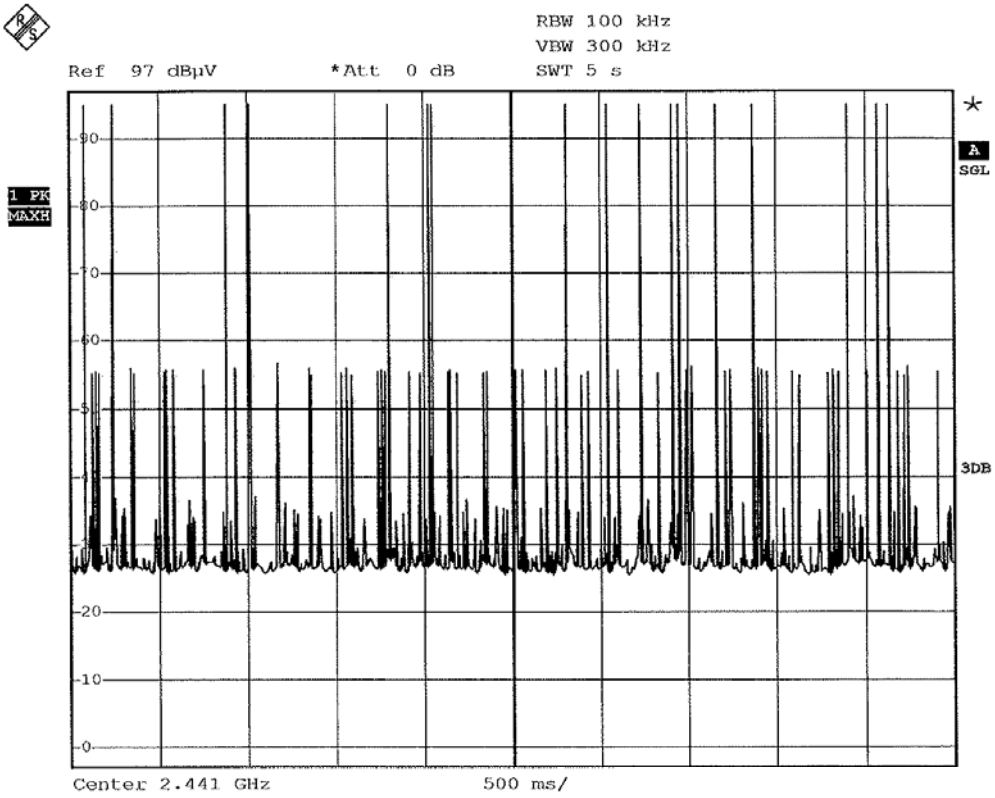

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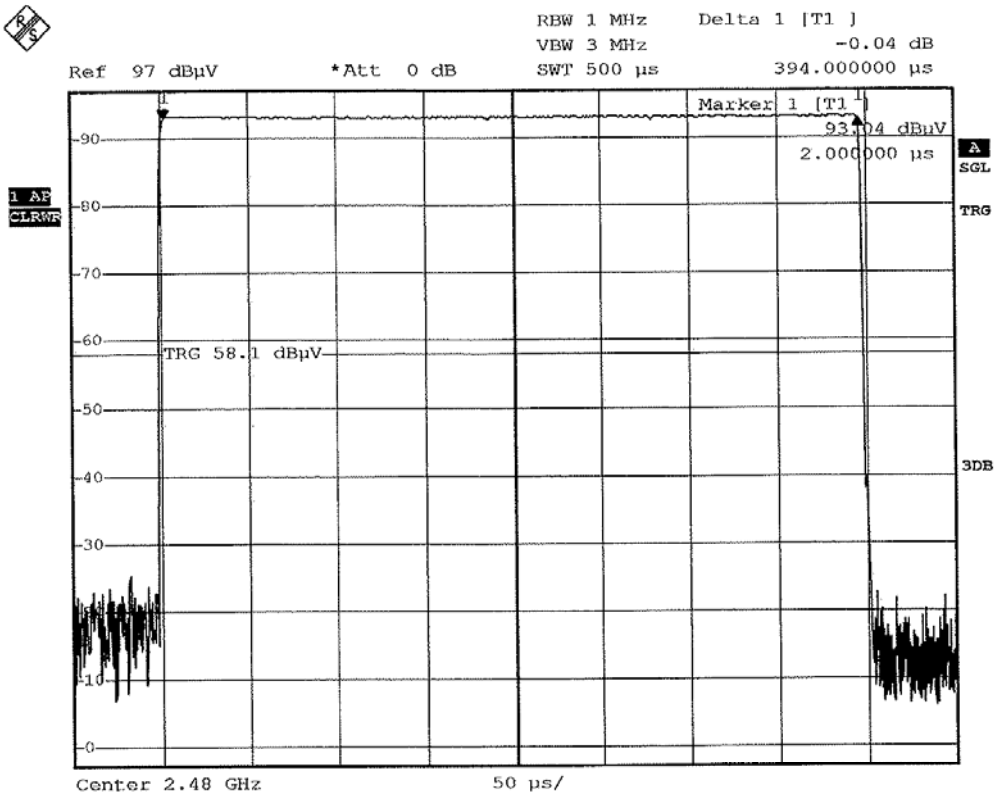

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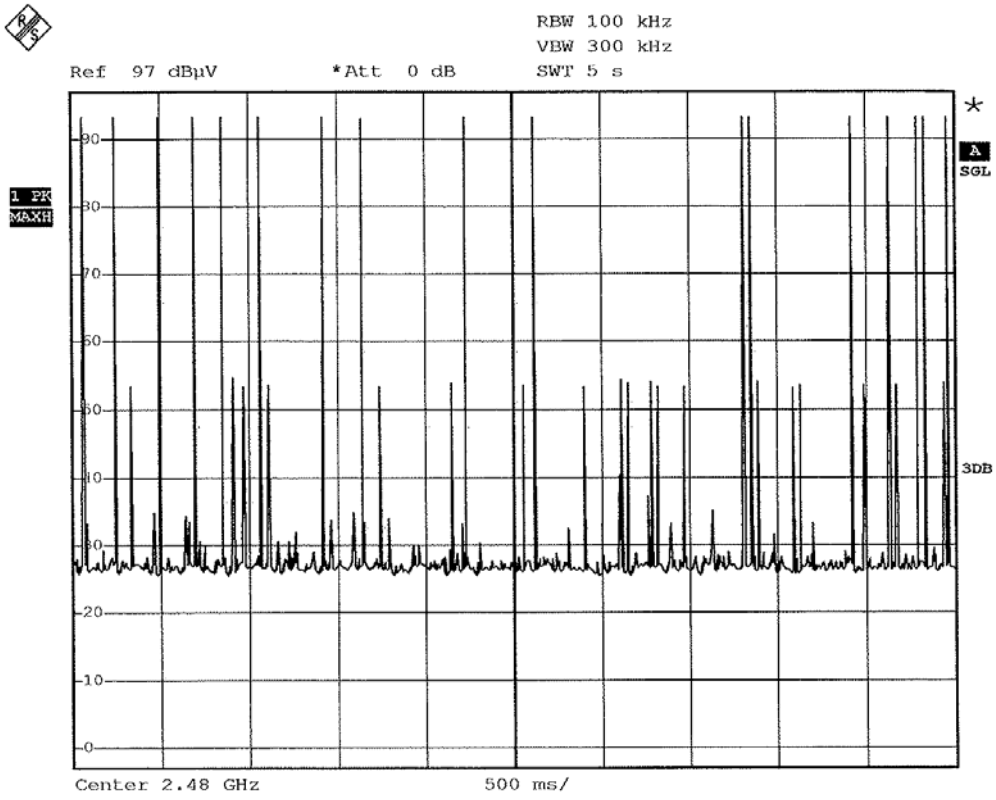

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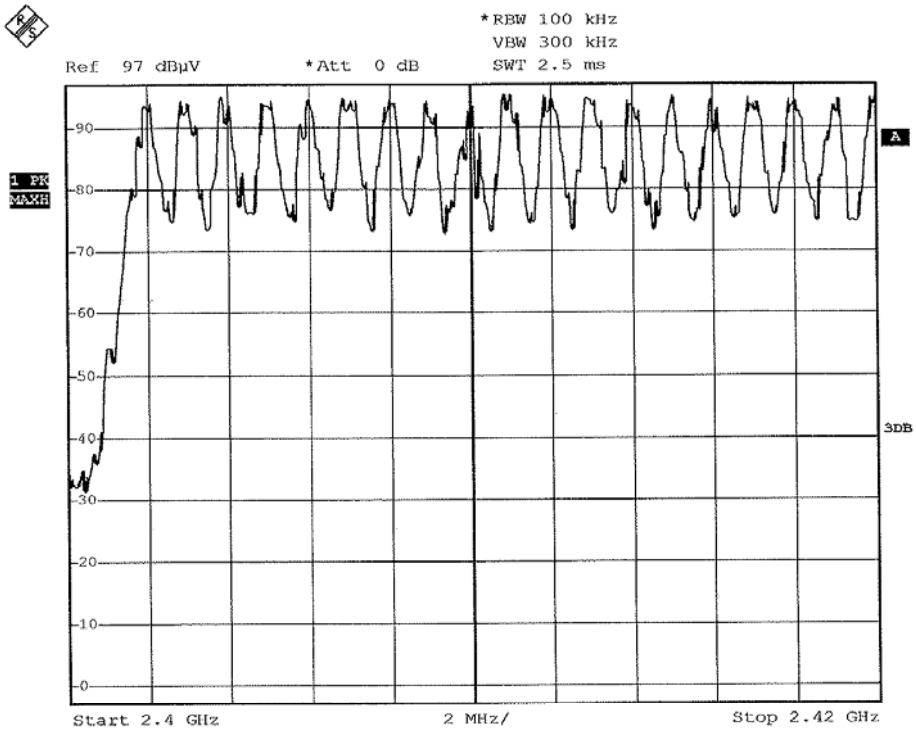
ANNEX 3: NUMBER OF HOPPING FREQUENCIES



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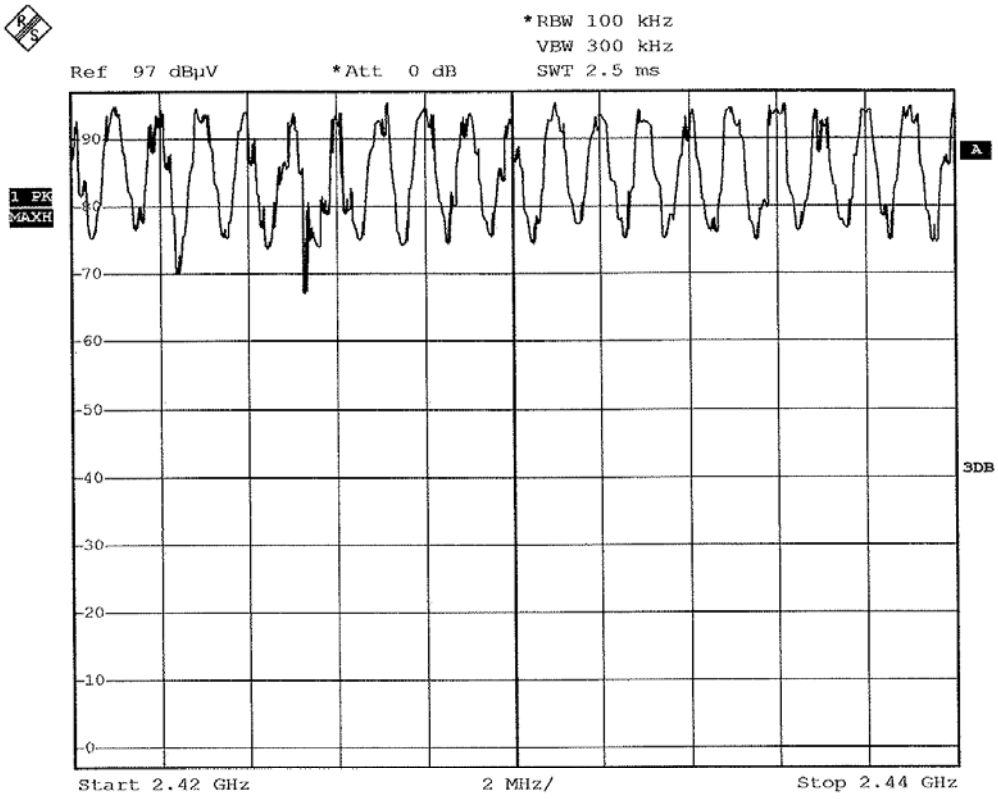

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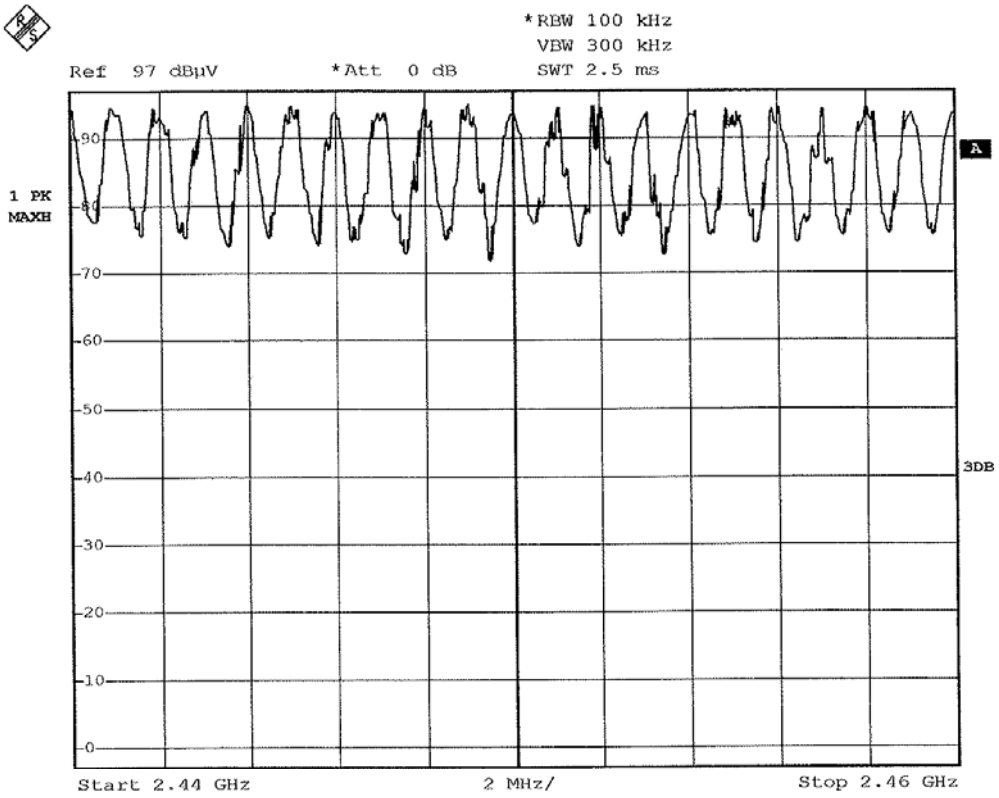

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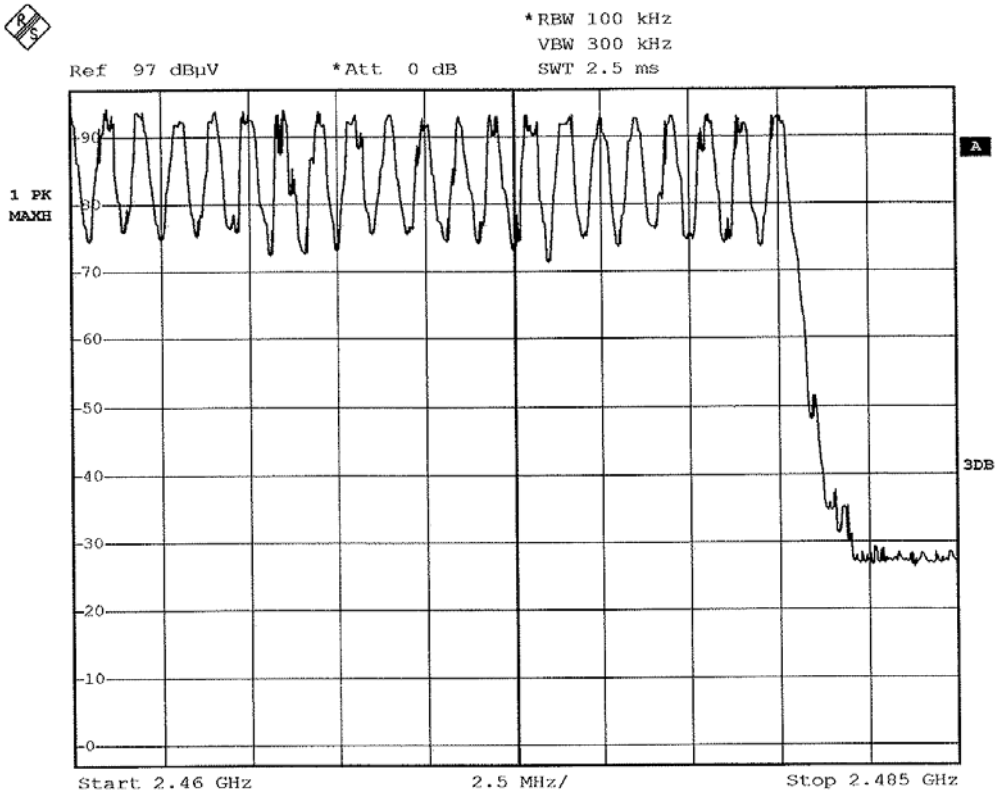

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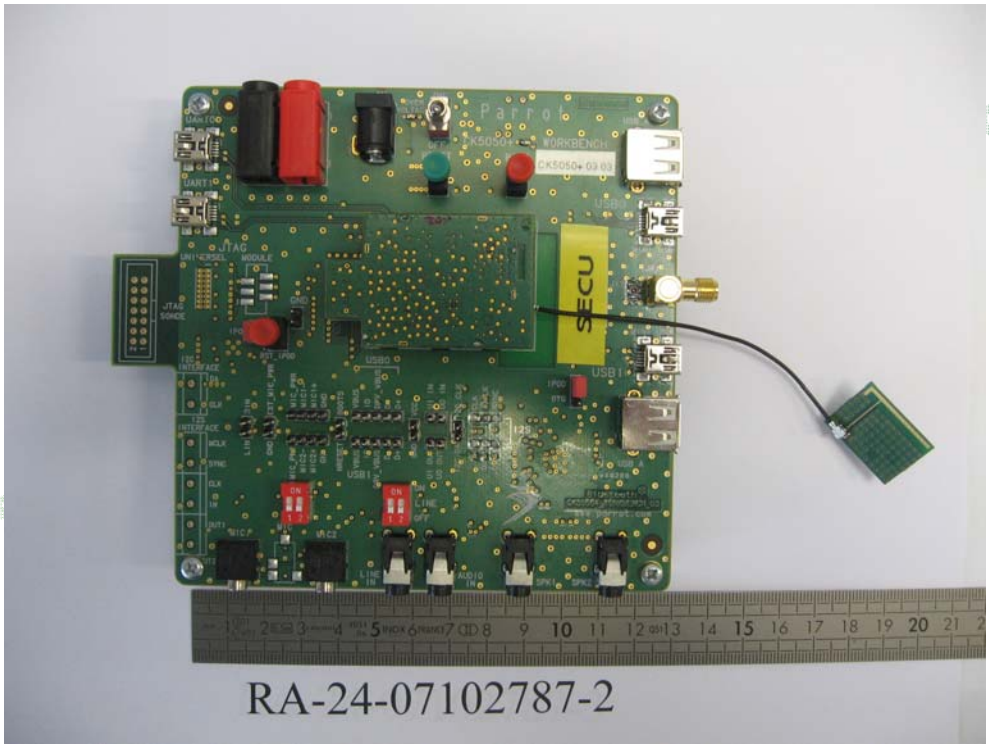
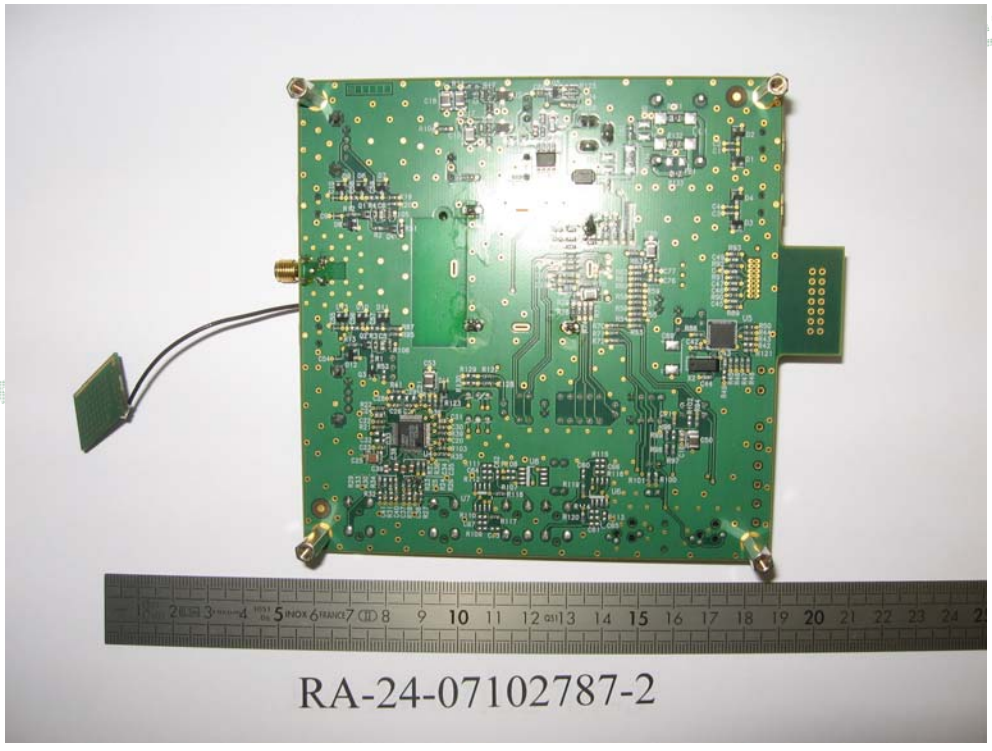
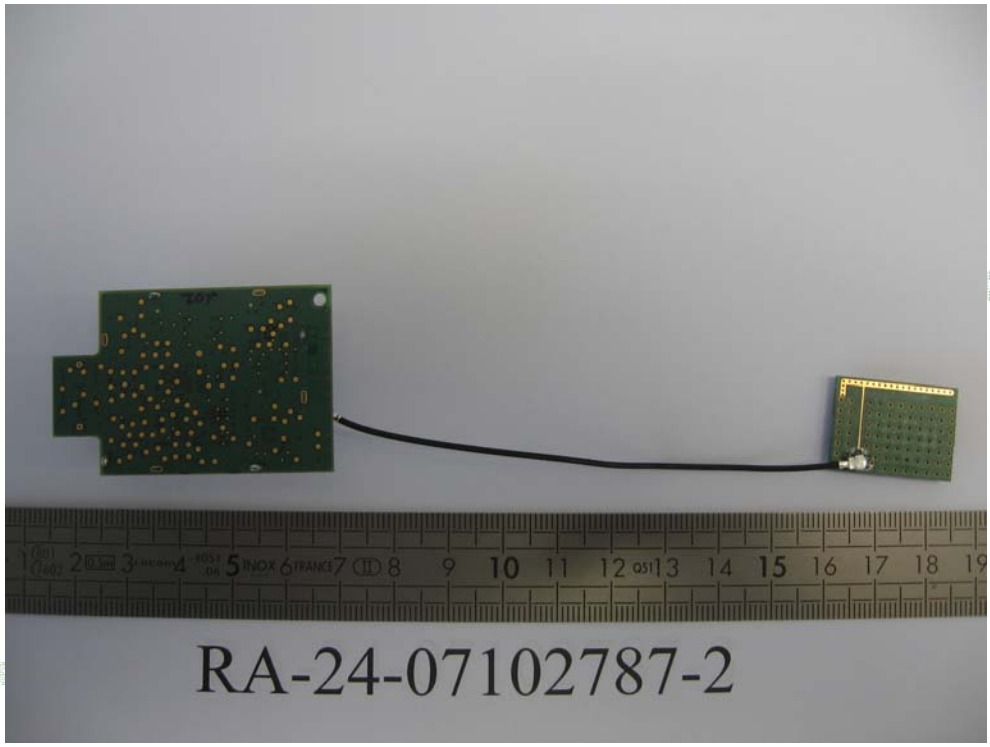
ANNEX 4: PHOTOS OF THE EQUIPMENT UNDER TEST

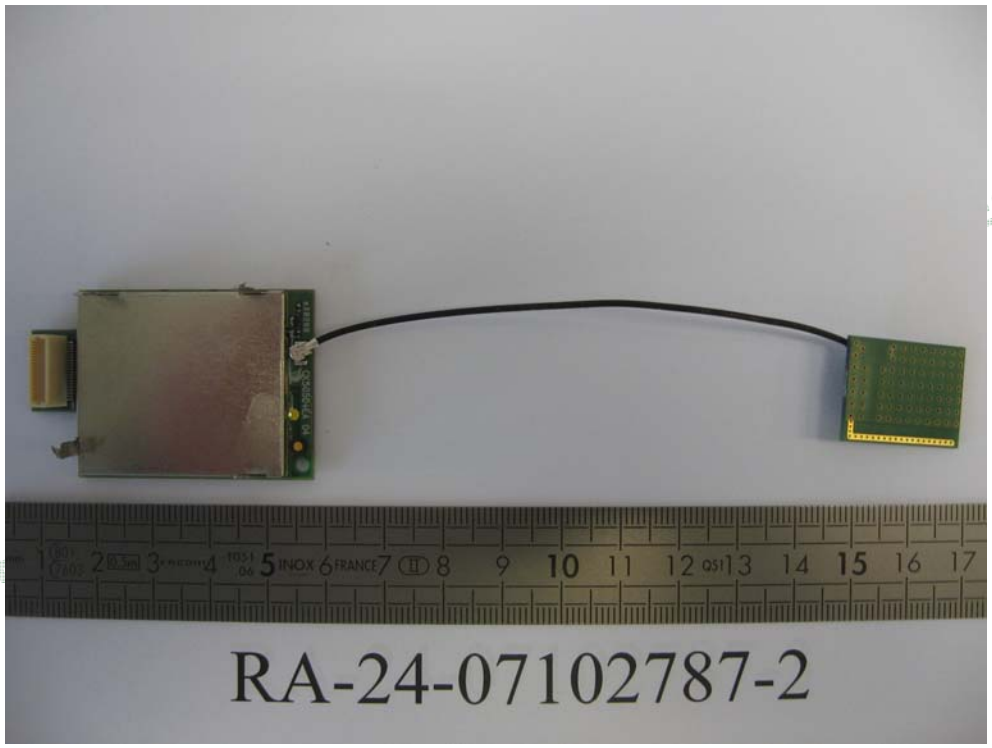
GENERAL VIEW (module with its emulator)





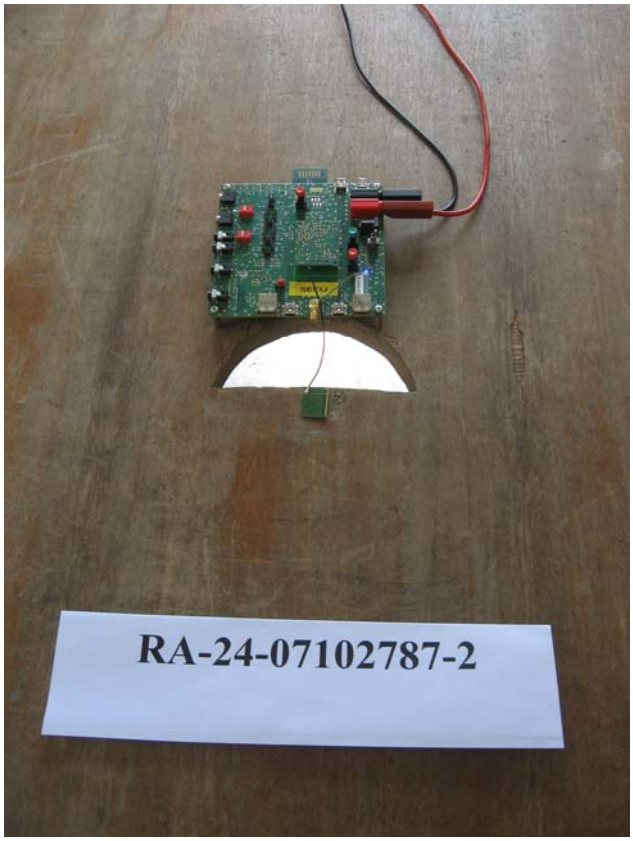
Radio module with antenna



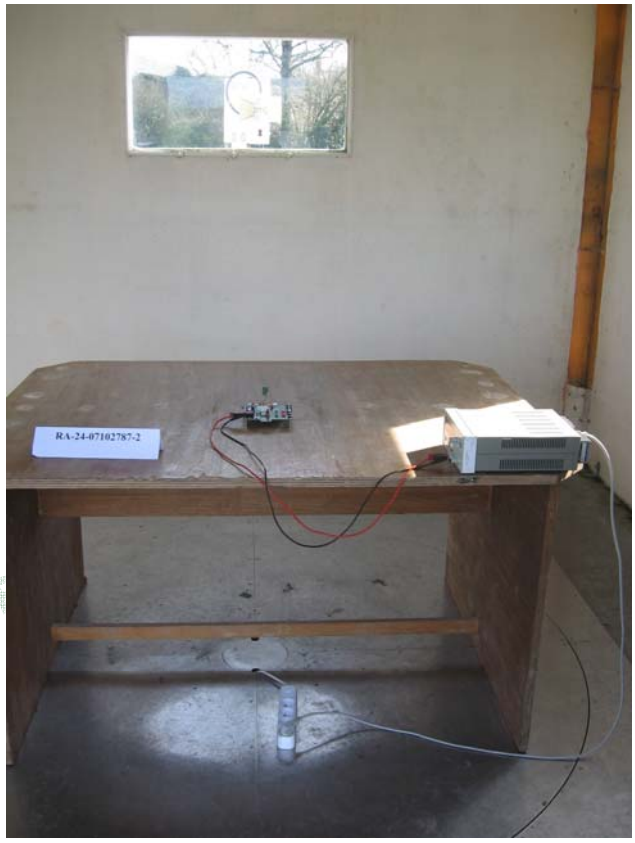


ANNEX 5: TEST SET UP AND OPEN AREA TEST SITE

Test set up for radiated measurement with antenna in flat position



Test set up for radiated measurement with antenna in up right position



OPEN AREA TEST SITE