



RA-24-08104513-2/A Ed. 0

FCC CERTIFICATION RADIO Measurement Technical Report

**Standard to apply:
FCC Part 15**

**Equipment under test:
MULTIMEDIA BLUETOOTH MODULE
CK5000NEW**

**FCC ID:
RKXCK5000NEA**

**Company:
PARROT**

DISTRIBUTION: Mr LEBLANC

Company: PARROT

Number of pages: 37 including 5 annexes

Ed.	Date	Modified pages	Written by		Technical Verification Quality Approval	
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0	21-Jan-09	Creation	M. DUMESNIL	M. D.		

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PRODUCT: MULTIMEDIA BLUETOOTH MODULE CK5000NEW

Reference / model: CK5000NEA - PI040154Ax

Trade mark: PARROT

Serial number: not communicated

MANUFACTURER: PARROT

COMPANY SUBMITTING THE PRODUCT:

Company: PARROT

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Responsible: Mr LEBLANC

DATE(S) OF TEST: 28 November 2008
6 December 2008

TESTING LOCATION: EMITECH ATLANTIQUE laboratory at ANGERS (49) FRANCE
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FRANCE

Registration Number by FCC: 101696/FRN: 0006 6490 08

TESTED BY: M. DUMESNIL

TUTOR: P. BONNENFANT

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1. INTRODUCTION

This document presents the result of RADIO test carried out on the following equipment: in MULTIMEDIA BLUETOOTH MODULE CK5000NEW accordance with normative reference.

2. PRODUCT DESCRIPTION

Class: B (residential environment)

Utilization: Bluetooth module

Antenna type: dedicated antenna with antenna connector AYU1-1P-02676-120 (LF) (SN) of JST factory

Antenna gain: 2.18 dBi (declared by the applicant)

Operating frequency range: from 2402 MHz to 2480 MHz

Number of channels: 79

Channel spacing: 1 MHz

Frequency generation: SAW Resonator Crystal Synthesizer

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

Power source: 3.3 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 107: conducted limits
- Paragraph 109: radiated emission limits
- 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 902-928 MHz, 2400-2483.5 MHz and 5725-5850 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

6.1 Intentional radiator (subpart C)

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 902-928 MHZ, 2400-2483.5 MHz and 5725-5850 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 part number of antenna connector is AYU1-IP-02676-120 (LF) (SN) of JST factory.

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 (812 kHz; see annex 1).

Note 4: the frequency hopping system uses 79 channels.

The timing by channel is 394 μs. During 79 channels × 0.4 s (part 15) = 31.6 s, any channel is used 146 times, then 146 × 394 μs = 57.52 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: conducted measurement is not possible (integral antenna), so 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).

6.2 Unintentional radiator (subpart B)

Test procedure	Description of test	Criterion respected ?				Comment
		Yes	No	NAp	NAs	
FCC Part 15.107	CONDUCTED DISTURBANCES MEASUREMENT			X		Class B
FCC Part 15.109	RADIATED INTERFERENCE	X				Class B
FCC Part 15.111	CONDUCTED ANTENNA PORT			X		Dedicated antenna

NAp: Not Applicable

NAs: Not Asked

Conclusion:

The sample of MULTIMEDIA BLUETOOTH MODULE CK5000NEW 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. MEASUREMENT OF RADIATED INTERFERENCE FIELD STRENGTH

Standard: FCC Part 15

Test procedure: FCC Part 15 Unintentional Radiators: Sec.15.109

Limits: Class B

Standard deviation: For $F > 1\text{GHz}$, the measurement is carried out at 3 m, instead of 10 m

Test equipment:

TYPE	BRAND	EMITECH NUMBER
Test receiver	Rohde & Schwarz ESVS 10	1219
Biconical antenna	Hewlet Packard 11966 C	728
Log periodic antenna	Rohde & Schwarz HL 223	1999
Double ridged guild antenna	Electrometrics EM 6961	1204
Spectrum analyzer	Rohde & Schwarz FSP40	4088
Open area test site	EMITECH	1274
Preamplifier	ALC ALN02	2648
High pass filter	MICROTRONICS HPM11630	1673
Spectrum analyser	ADVANTEST R3131	1628
Power source E3610A	Hewlett Packard	4195
Multimeter 77-2	Fluke	0812

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.

Cables disposition of unit under test:

See photos of the test unit configuration in annex 5.

Frequency range: The highest frequency generated in the device is $f = 2480$ MHz
 According the Sec.15.33 of the FCC Part 15 standard, the frequency range measured is indicated in the following table:

For unintentional radiator, including a digital device (Sec.15.33, §(b)(1) of the FCC Part 15 standard) :

Highest frequency generated or used in the device or on which the device operates or tunes (MHz)	Upper frequency of measurement range (MHz)
Above 1000	5 th harmonic of the highest frequency or 40GHz, whichever is lower

Detection mode: Quasi-peak for the range 30 MHz - 1 GHz
 Average for $f > 1$ GHz

Bandwidth: 120 kHz for the range 30 MHz - 1 GHz
 1 MHz for $f > 1$ GHz

Distance of antenna: class B: 3 meters

Antenna height: 1 to 4 m

Antenna polarization: vertical and horizontal

Equipment under test operating condition:

The equipment under test was powered in 4.8 Vd.c. by an external power source, regulated in 3.3 Vd.c. on the eval card.

The equipment under test was in continuous reception mode.

Results:

Not any unintentional radiator has been detected during this test.

Applicable limits: for $30 \text{ MHz} \leq F < 88 \text{ MHz}$: 40 dB μ V/m
 $88 \text{ MHz} \leq F < 216 \text{ MHz}$: 43.5 dB μ V/m
 $216 \text{ MHz} \leq F < 960 \text{ MHz}$: 46 dB μ V/m
 $F \geq 960 \text{ MHz}$: 54 dB μ V/m

Conclusion:

RESPECTED STANDARD

8. 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
Radio communication analyzer CMD55	Rohde & Schwarz	3591
Meteo station AB888	Oregon Scientific	1579

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.

The equipment under test was powered in 4.8 Vd.c. by an external power source, regulated in 3.3 Vd.c. on the eval card.

Results:

Ambient temperature (°C): 17.5

Relative humidity (%): 48

Power source: 4.8 Vd.c.

Sample n° 1 Channel 1

		Level dB μ V	Cable loss dB	Antenna factor dB	Electro-magnetic field (dB μ V/m):	P* (W)
Normal test conditions	Nominal power source (V): 4.8	62.42	4.97	28.61	96	723.83×10^{-6}

Polarization of test antenna: horizontal (height: 281 cm)

Position of equipment: horizontal antenna (azimuth: 276 degrees)

Sample n° 1 Channel 40

		Level dB μ V	Cable loss dB	Antenna factor dB	Electro-magnetic field (dB μ V/m):	P* (W)
Normal test conditions	Nominal power source (V): 4.8	62.42	5.01	28.72	96.15	749.27×10^{-6}

Polarization of test antenna: horizontal (height: 280 cm)

Position of equipment: horizontal antenna (azimuth: 274 degrees)

Sample n° 1 Channel 79

		Level dB μ V	Cable loss dB	Antenna factor dB	Electro-magnetic field (dB μ V/m):	P* (W)
Normal test conditions	Nominal power source (V): 4.8	61.10	5.06	28.84	95	574.96×10^{-6}

Polarization of test antenna: horizontal (height: 276 cm)

Position of equipment: horizontal antenna (azimuth: 273 degrees)

 * $P = (E \times d)^2 / (30 \times G_p)$ with $d = 3$ m and $G_p = 1.65$
Test conclusion:

RESPECTED STANDARD

9. 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
Test receiver ESH3	Rohde & Schwarz	1058
Test receiver ESVS 10	Rohde & Schwarz	1219
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
Low-noise amplifier 18 to 26 GHz	ALC	3036
Multimeter 77-2	Fluke	0812
Meteo station AB888	Oregon Scientific	1539
Radio communication analyzer CMD55	Rohde & Schwarz	3591

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 ($F_{\text{carrier}} \leq 10$ 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.

The equipment under test was powered in 4.8 Vd.c. by an external power source, regulated in 3.3 Vd.c. on the eval card.

Results:

Ambient temperature (°C): 19.5
Relative humidity (%): 43

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

Not any unintentional radiator has been observed during this test.

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 96.05 dB μ V/m on channel 40.

So the applicable limit is **76.05 dB μ V/m**.

In addition, radiated emissions which fall in the restricted band, as defined in section 15.205 (a), must also comply with the radiated emission limits specified in section 15.209 (a) (see section 15.205 (c)).

Any spurious that has more than 20 dB of margin compared to the applicable limit is not necessary reported.

TEST CONCLUSION:

RESPECTED STANDARD

10. 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
Radio communication an analyzer CMD55	Rohde & Schwarz	3591

Measured condition:

Requirements: Emissions that fall in the restricted bands (part 15.205). These emissions must be less than or equal to 500 $\mu\text{V/m}$ (54 $\text{dB}\mu\text{V/m}$) 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 ($\text{dB}\mu\text{V/m}$)	Detector (Peak or Average)	Frequency of maximum Band-edges Emission (MHz)	Delta Marker (dB)*	Calculated Max Out of Band Emission Level ($\text{dB}\mu\text{V/m}$)**	Limit ($\text{dB}\mu\text{V/m}$)	Margin (dB)
2402	96	Peak	2361.2	-57.95	38.05 ⁽¹⁾	73.98	35.93
2479.968	95	Peak	2492.024	-60.84	34.16 ⁽¹⁾	73.98	39.82

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

** according to step 3 of Marker-Delta Method:

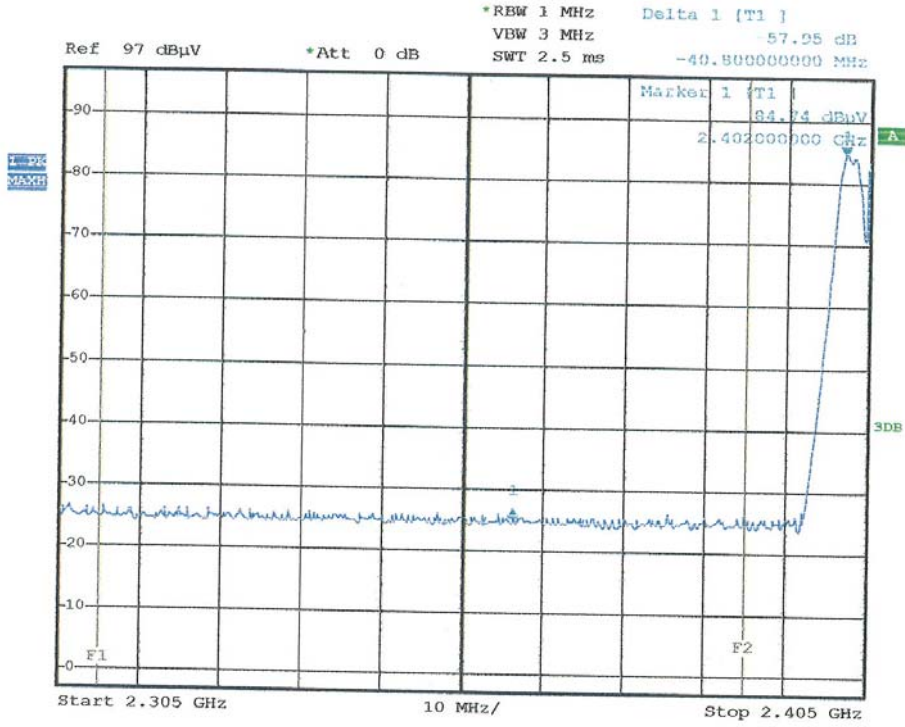
Calculated Emission Level = Field Strength Level – Delta Marker Level

⁽¹⁾ the peak level is lower than the average limit (53.98 $\text{dB}\mu\text{V/m}$).

Test conclusion:

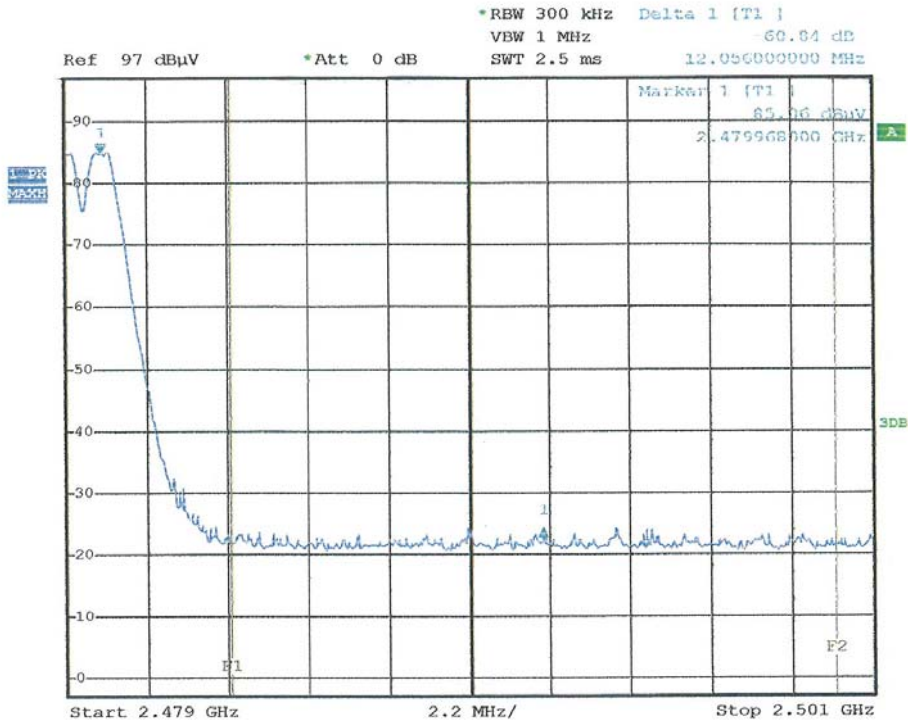
RESPECTED PUBLIC NOTICE

CURVE N°: 1.



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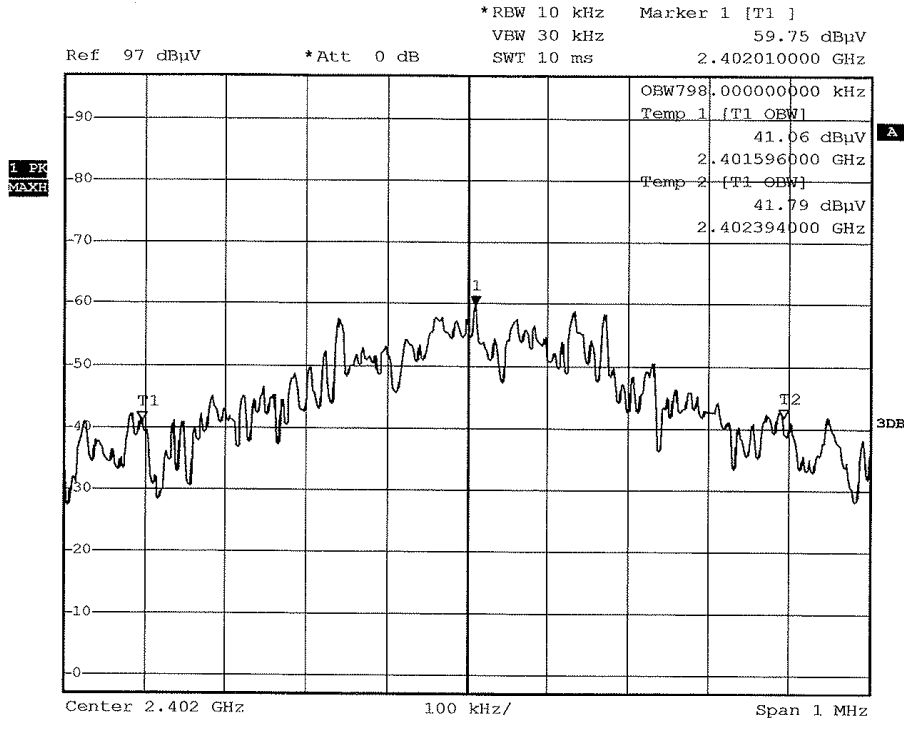
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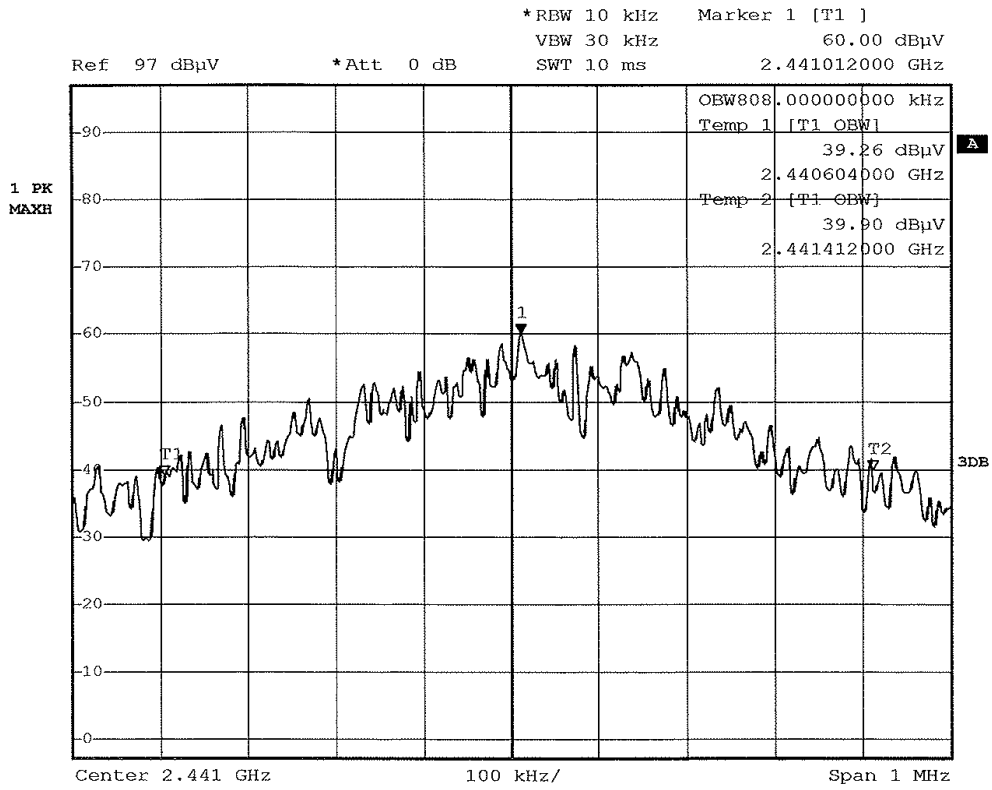
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ANNEX 1: POWER BANDWIDTH AND CHANNEL SEPARATION

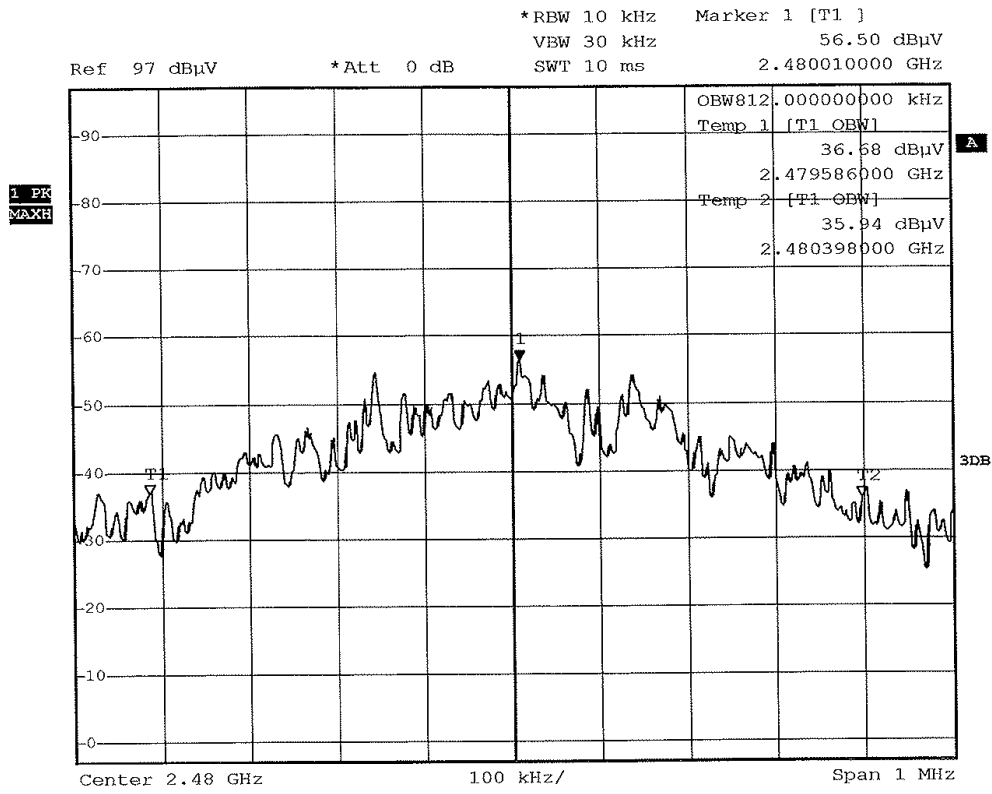


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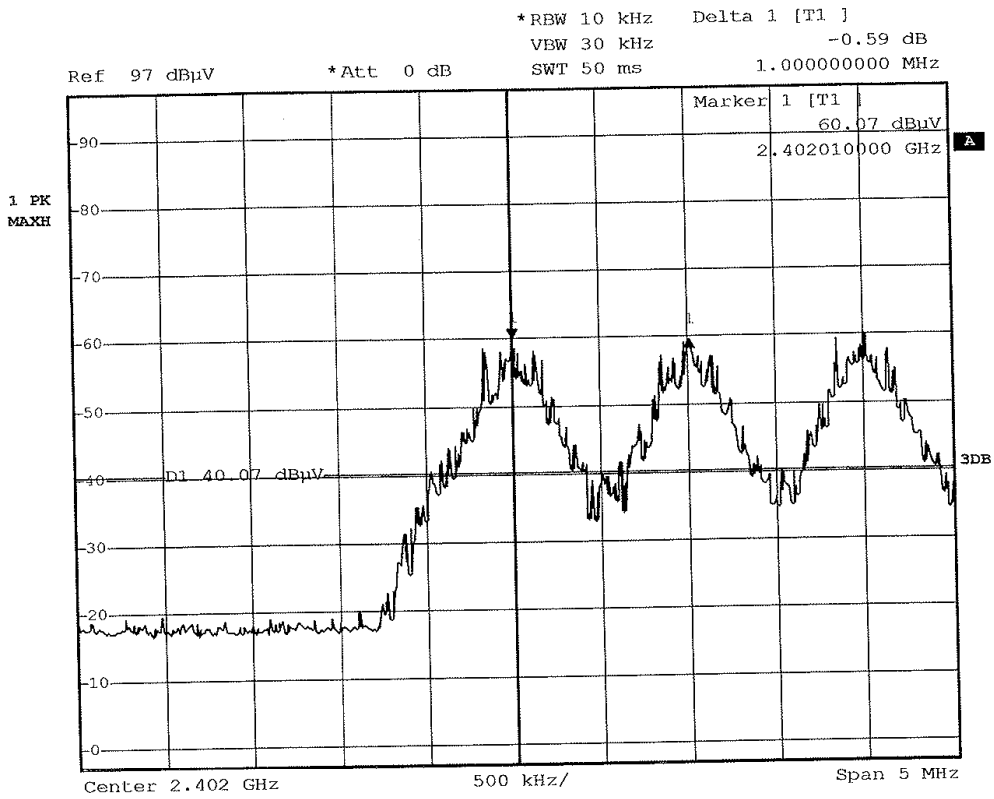


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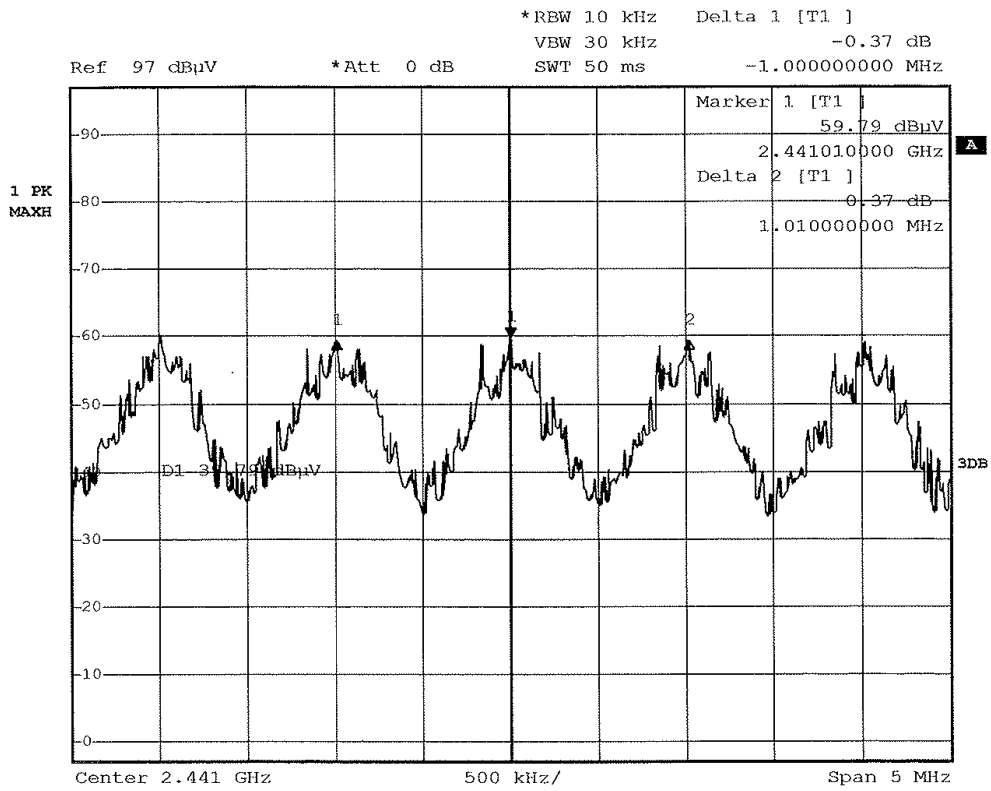
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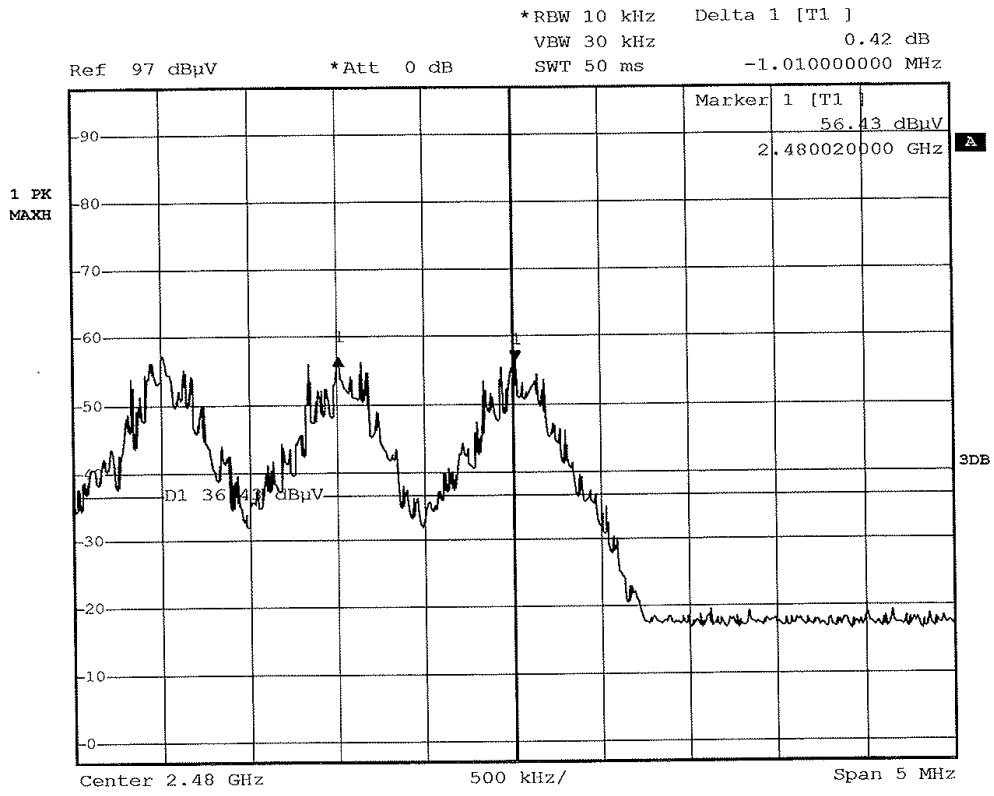


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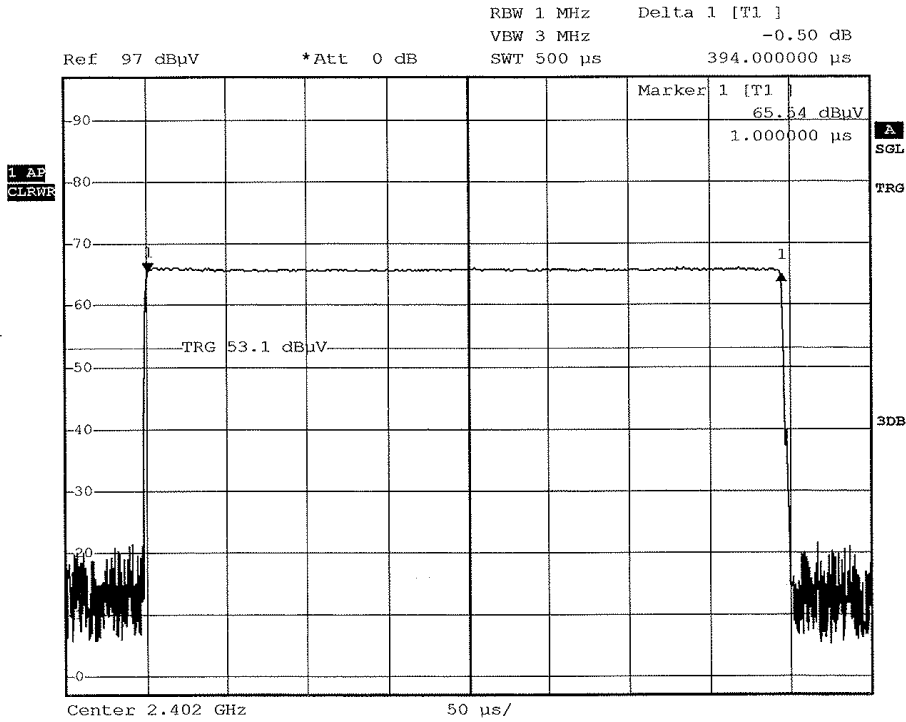
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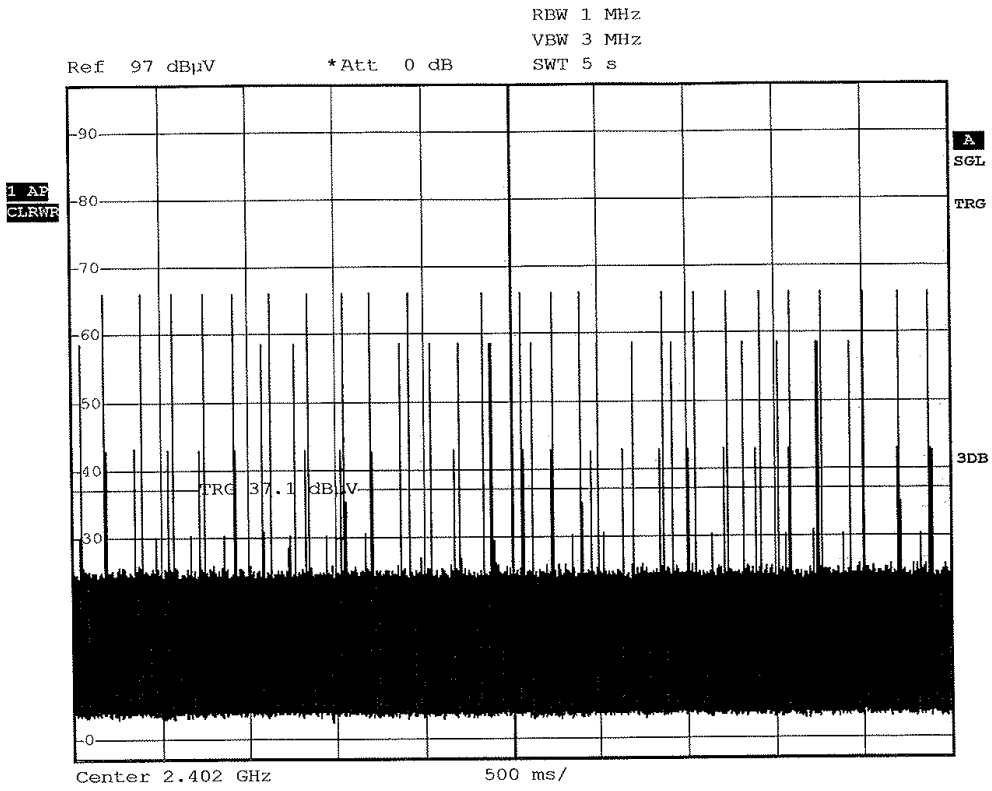
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ANNEX 2: AVERAGE TIME OF OCCUPANCY ON ANY FREQUENCY

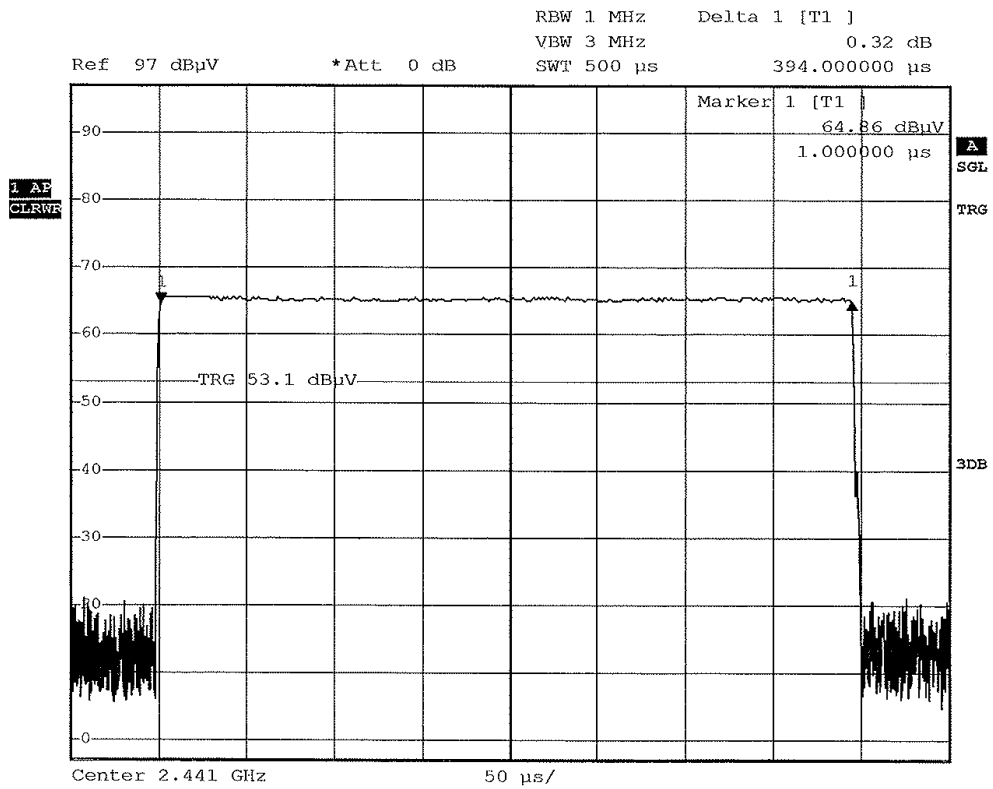


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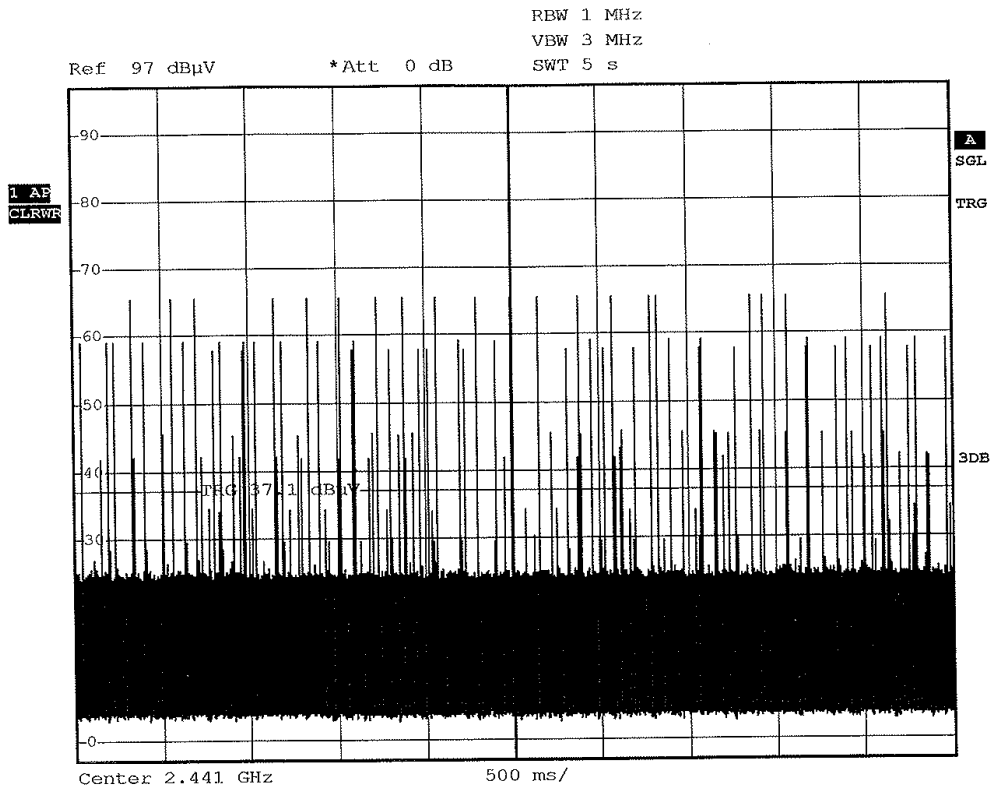
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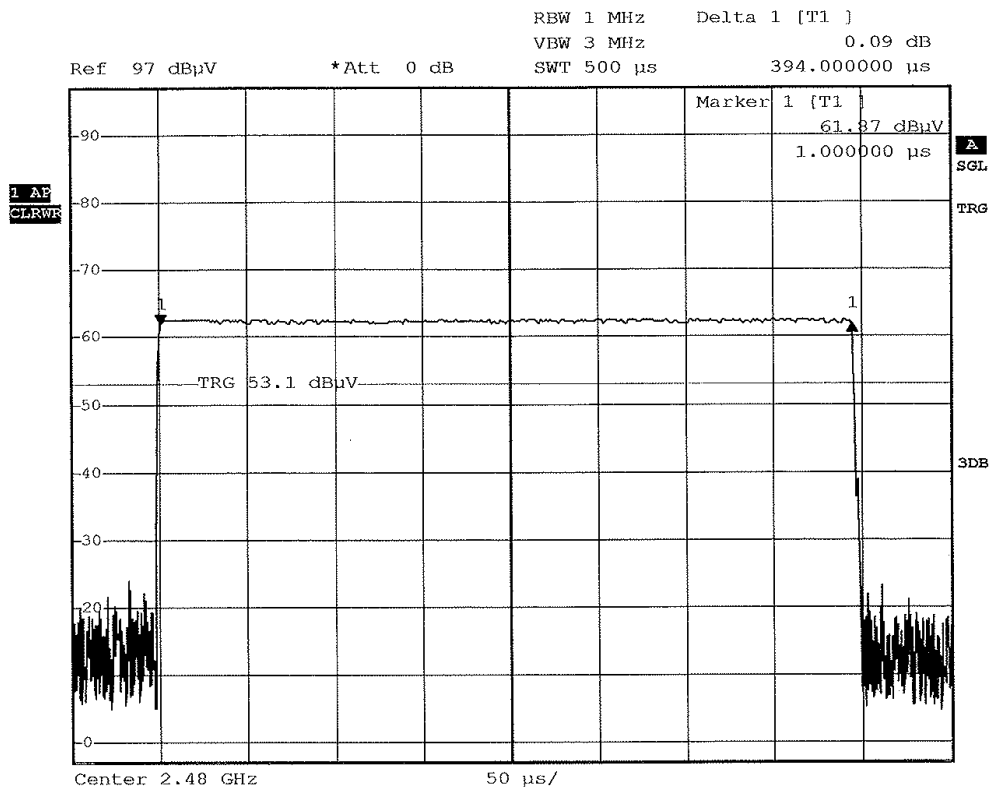
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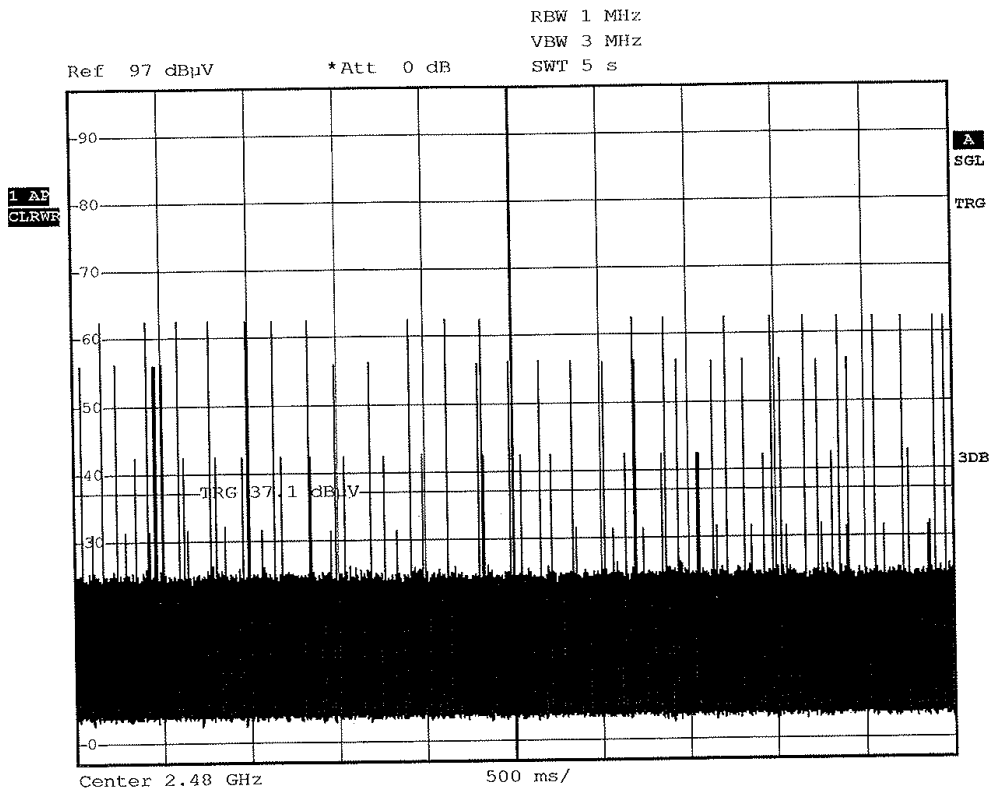


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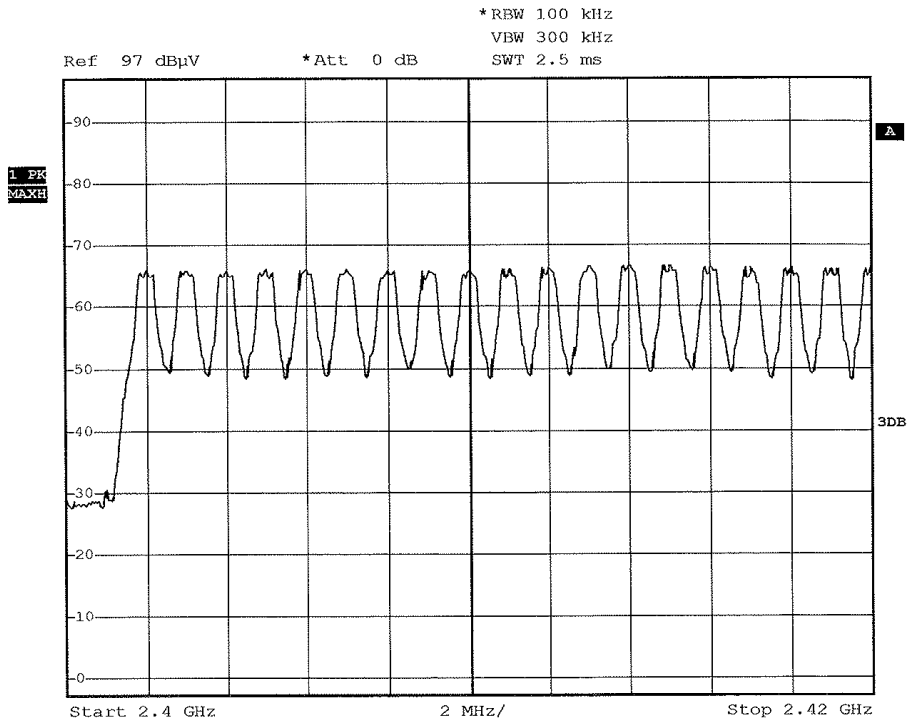
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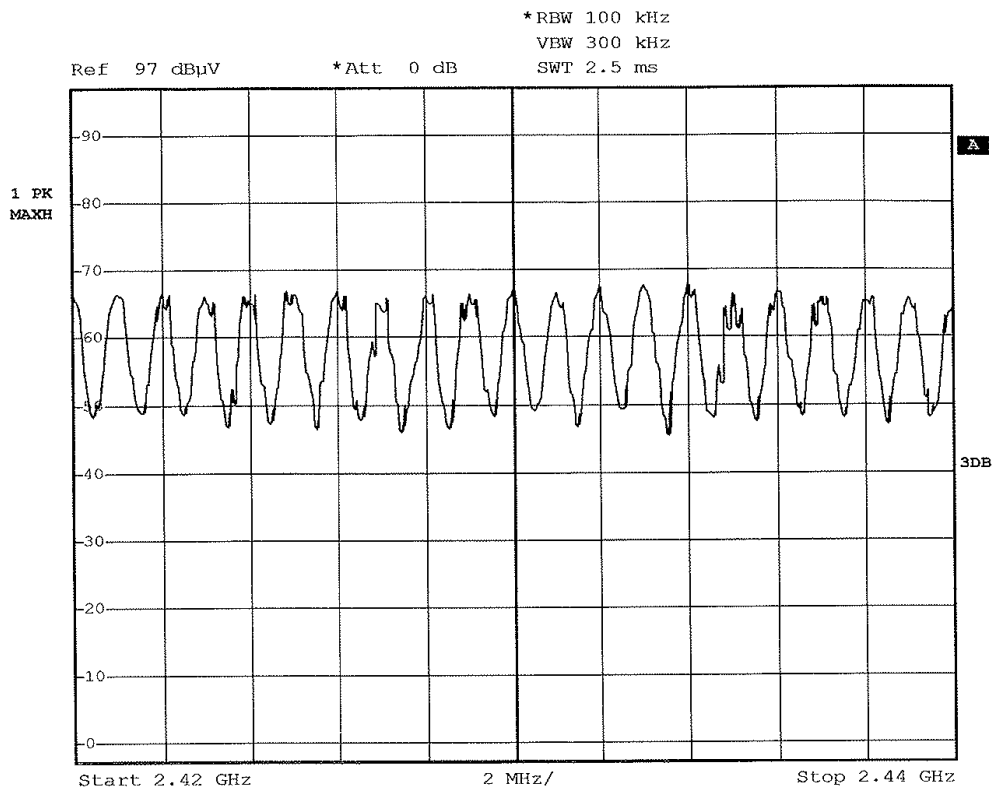
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ANNEX 3: NUMBER OF HOPPING FREQUENCIES

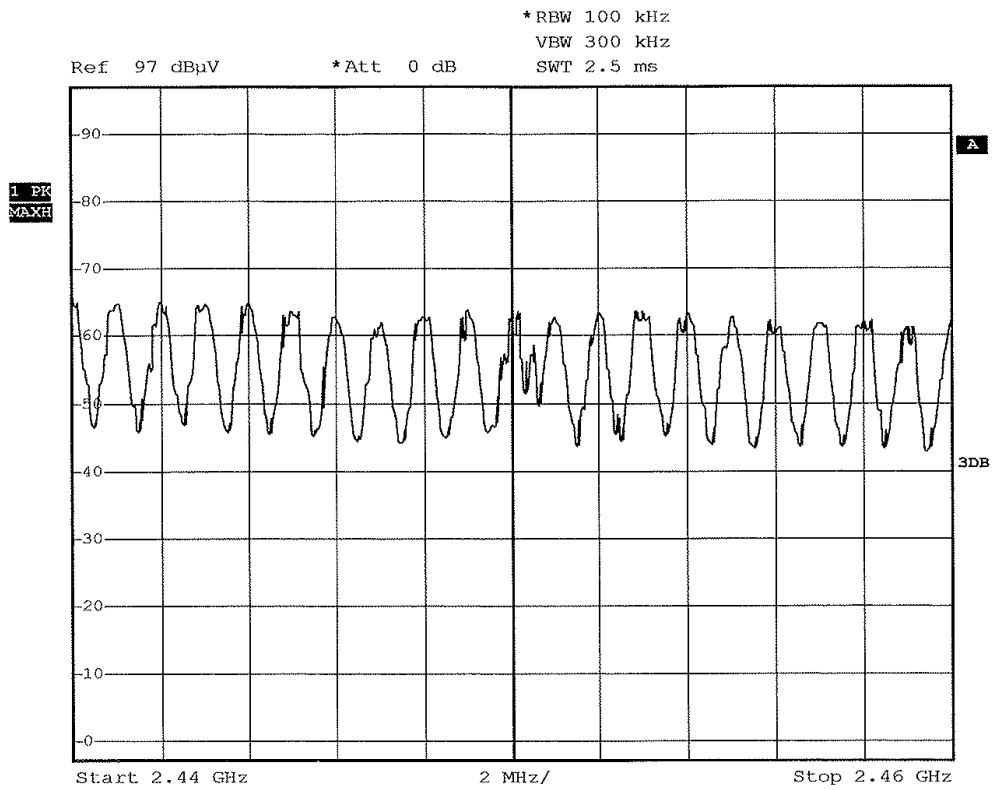


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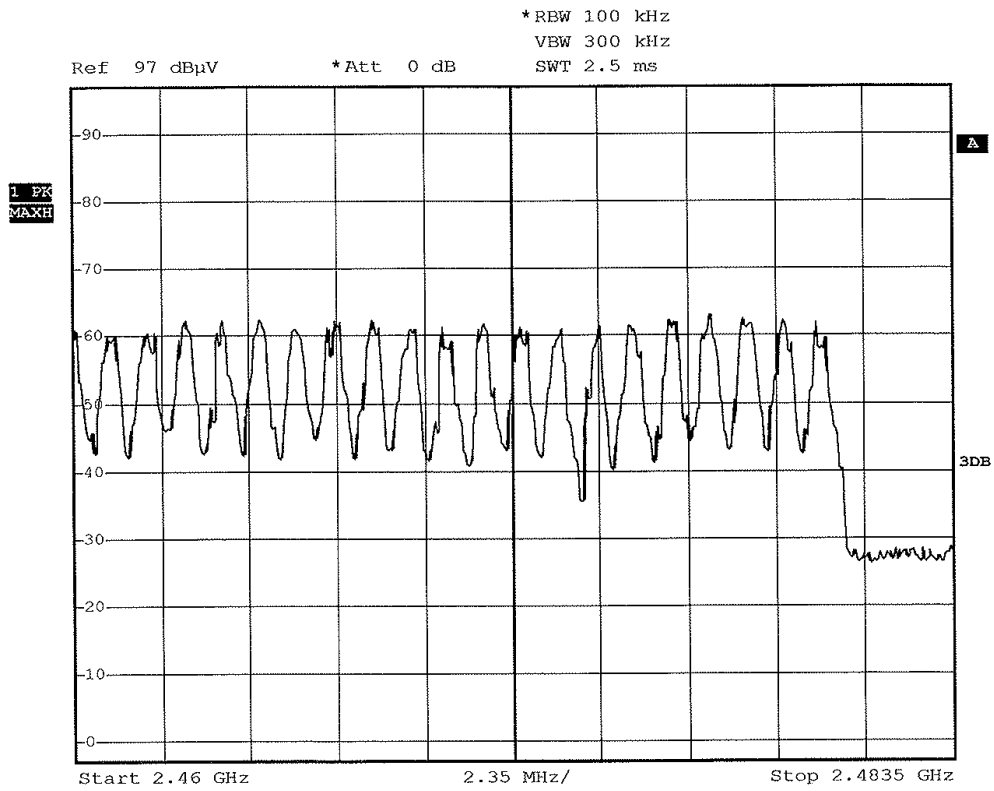


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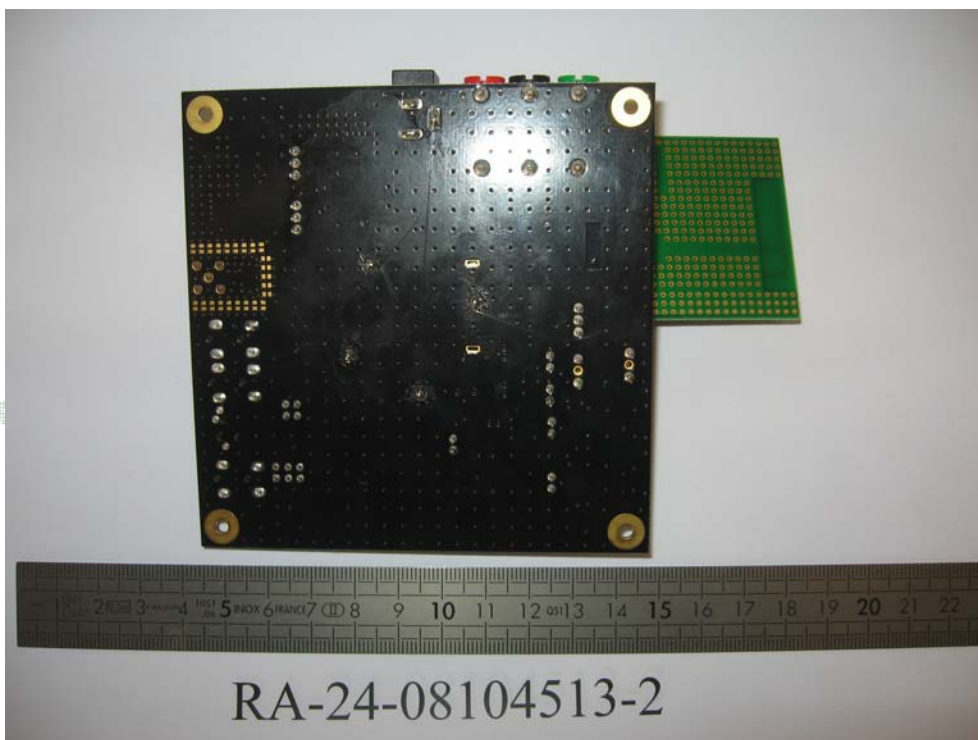


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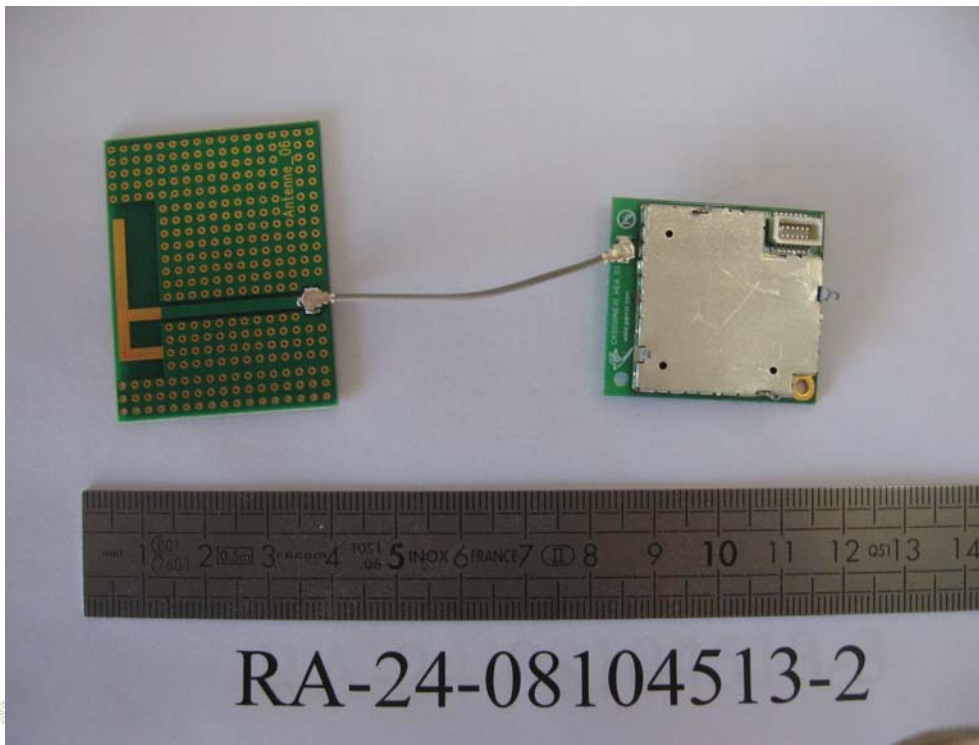
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ANNEX 4: PHOTOS OF THE EQUIPMENT UNDER TEST

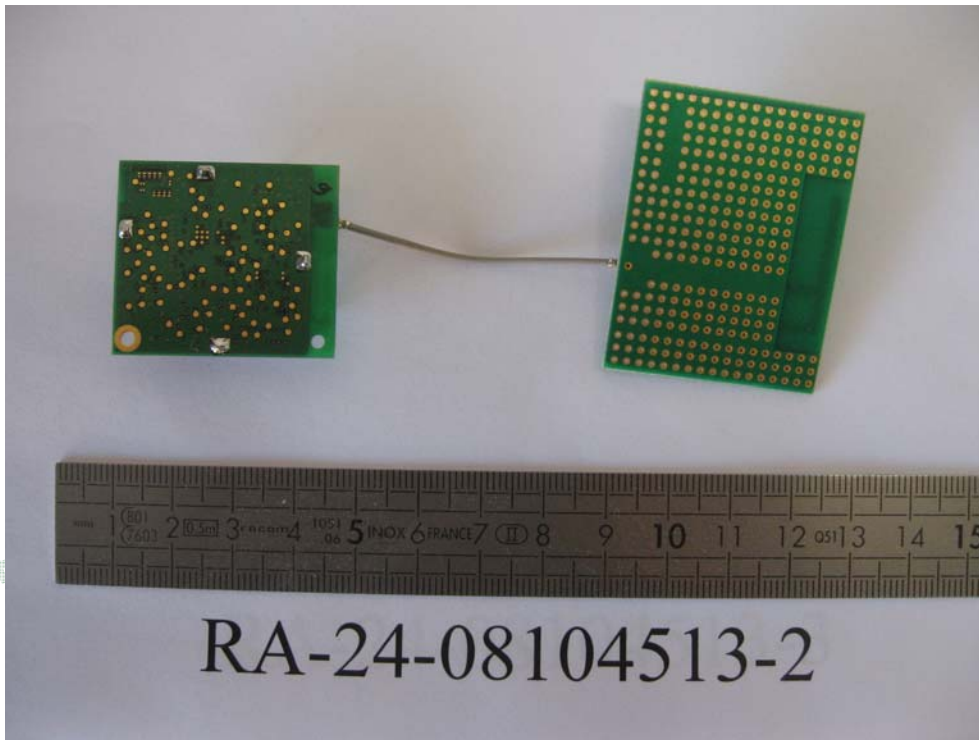
GENERAL VIEW



Radio module with antenna: face 1



Radio module with antenna: face 2



ANNEX 5: TEST SET UP AND OPEN AREA TEST SITE

TEST SET UP FOR RADIATED MEASUREMENTS

Vertical antenna



TEST SET UP FOR RADIATED MEASUREMENTS

Horizontal antenna



Open area test site

