



## RA-24-08102396-2/A Ed. 1

“This report cancels and replaces the test report n° RA-24-08102396-2 Edition 0”

### FCC CERTIFICATION RADIO Measurement Technical Report

standard to apply:  
FCC Part 15.247

Equipment under test:  
MULTIMEDIA BLUETOOTH MODULE  
CK5050+WITH INTERNAL ANTENNA

FCC ID :  
RKXCK5050PIA

Company:  
PARROT

DISTRIBUTION: Mr GUERRAB

Company: PARROT

Number of pages: 34 including 5 annexes

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**PRODUCT:** MULTIMEDIA BLUETOOTH MODULE

1 | **Reference / model:** CK5050 + with internal antenna  
PI040123AA (software version: 1.60)

**MANUFACTURER:** PARROT

**COMPANY SUBMITTING THE PRODUCT:**

**Company:** PARROT

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**Responsible:** Mr GUERRAB

**DATE(S) OF TEST:** 05, 09 and 10 July 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: MULTIMEDIA BLUETOOTH MODULE CK5050 + with internal antenna in accordance with normative reference.

## 2. PRODUCT DESCRIPTION

Class: B (residential environment)

Utilization: Bluetooth module

Antenna type: incorporated antenna

Operating frequency range: from 2402 to 2480 MHz

Number of channels: 79

Channel spacing: 1 MHz

Frequency generation:  SAW Resonator  Crystal  Synthetiser

Modulation: Frequency Hopping Spread Spectrum (FHSS)

Amplitude  Digital  Frequency  Phase

Power source: 4.8 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 902-928 MHz, 2400-2483.5 MHz and 5725-5850 MHz

### 5. ADD ATTACHMENTS FILES

- “Synoptic “***
- “Block diagram “***
- “External photos and Product labelling “***
- “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 902-928 MHZ, 2400-2483.5 MHz and 5725-5850 MHz					
	(a) (1) <i>hopping systems</i>	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) <i>digital modulation techniques</i>			X		
	(b) <i>max output power</i>	X				Note 5
	(c) <i>operation with directional antenna gains &gt; 6 dBi</i>			X		Note 6
	(d) <i>intentional radiator</i>	X				
	(e) <i>peak power spectral density</i>			X		
	(f) <i>hybrid system</i>			X		
	(g)	X				
	(h)	X				
	(i) <i>RF exposure compliance</i>	X				Note 7
DA 00-705	BAND EDGE COMPLIANCE	X				

NAp: Not Applicable

NAs: Not Asked

Note 1: internal antenna (pcb antenna), see photos in 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 (778 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 190 times, then 190 × 394 μs = 74.86 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).

**Conclusion:**

The sample of MULTIMEDIA BLUETOOTH MODULE CK5050 + with internal antenna 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. PEAK OUTPUT POWER****Standard:** FCC Part 15**Test procedure:** paragraph 15.247**Test equipment:**

<b>TYPE</b>	<b>BRAND</b>	<b>EMITECH NUMBER</b>
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 azimuths correspond to the front of the equipment under test.

We use for this measure outdoor test site and substitution method. 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): 24

Relative humidity (%): 53

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

Sample n° 1 Channel 1 F = 2402.003 MHz

		Level dB $\mu$ V	Cable loss dB	Antenna factor dB	Electro-magnetic field (dB $\mu$ V/m):	P* (W)
<b>Normal test conditions</b>	Nominal power source (V): 4.8	55.94	4.97	28.61	89.52	162.79 x 10 <sup>-6</sup>

Polarization of test antenna: vertical (height: 217 cm)

Position of equipment: see photo in annex 5 (azimuth: 180 degrees)

Sample n° 1 Channel 40 F=2441.003 MHz

		Level dB $\mu$ V	Cable loss dB	Antenna factor dB	Electro-magnetic field (dB $\mu$ V/m):	P* (W)
<b>Normal test conditions</b>	Nominal power source (V): 4.8	56.23	5.01	28.72	89.96	180.15 x 10 <sup>-6</sup>

Polarization of test antenna: vertical (height: 219 cm)

Position of equipment: see photo in annex 5 (azimuth: 173 degrees)

Sample n° 1 Channel 79 F = 2480,003

		Level dB $\mu$ V	Cable loss dB	Antenna factor dB	Electro-magnetic field (dB $\mu$ V/m):	P* (W)
<b>Normal test conditions</b>	Nominal power source (V): 4.8	54.64	5.06	28.84	88.54	129.91 x 10 <sup>-6</sup>

Polarization of test antenna: vertical (height: 211 cm)

Position of equipment: see photo in annex 5 (azimuth: 179 degrees)

 \*  $P = (E \times d)^2 / (30 \times G_p)$  with  $d = 3$  m and  $G_p = 1.65$ 
**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
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
Low-noise amplifier 18 to 26 GHz	ALC	3036
Power source E3610A	Hewlett Packard	4195
Multimeter 77-2	Fluke	0812
Meteo station AB 888	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 azimuths correspond to the front of the equipment under test.

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

**Bandwidth:** 120 kHz ( $F < 1 \text{ GHz}$ ) or 100 kHz, following 15.205 or 15.247  
 1 MHz ( $F > 1 \text{ GHz}$ ) 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): 21

Relative humidity (%): 67

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.

**Channel 1**

FREQUENCIES (MHz)	Detector	Antenna height (cm)	Azimuth (degree)	resolution bandwidth (kHz)	Polarization H: Horizontal V: Vertical	Field strength (dBµV/m)	Limits (dBµV/m)	Margin (dB)
4804.008	Avg	238	25	1000	H	24.99	53.98 *	28.99
4804.008	Peak	238	25	1000	H	31.35 (1)	73.98 *	42.63

**Channel 40**

FREQUENCIES (MHz)	Detector	Antenna height (cm)	Azimuth (degree)	resolution bandwidth (kHz)	Polarization H: Horizontal V: Vertical	Field strength (dBµV/m)	Limits (dBµV/m)	Margin (dB)
4882.008	Avg	237	232	1000	V	16.61	53.98 *	37.37
4882.008	Peak	237	232	1000	V	29.30 (1)	73.98 *	44.68

**Channel 79**

FREQUENCIES (MHz)	detector	Antenna height (cm)	Azimuth (degree)	resolution bandwidth (kHz)	Polarization H: Horizontal V: Vertical	Field strength (dBµV/m)	Limits (dBµV/m)	Margin (dB)
4960.009	Avg	151	334	1000	V	17.80	53.98 *	36.18
4960.009	Peak	151	334	1000	V	29.20 (1)	73.98 *	44.78

\* restricted bands of operation in 15.205, this limit corresponding at the 15.209 section.

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

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 89.85 dBµV/m on channel 40.

So the applicable limit is 69.85 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)).

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

**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

**Measured condition:**

Requirements: Emissions that fall in the restricted bands (part 15.205). These emissions must be less than or equal to 500  $\mu$ V/m (54 dB $\mu$ 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 (dB $\mu$ V/m)	Detector (Peak or Average)	Frequency of maximum Band-edges Emission (MHz)	Delta Marker (dB)*	Calculated Max Out of Band Emission Level (dB $\mu$ V/m)**	Limit (dB $\mu$ V/m)	Margin (dB)
2402.400	89.52	Peak	2333	-44.76	44.76 <sup>(1)</sup>	73.98	29.22
2480.012	88.54	Peak	2490.66	-46.89	41.65 <sup>(1)</sup>	73.98	32.33

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

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

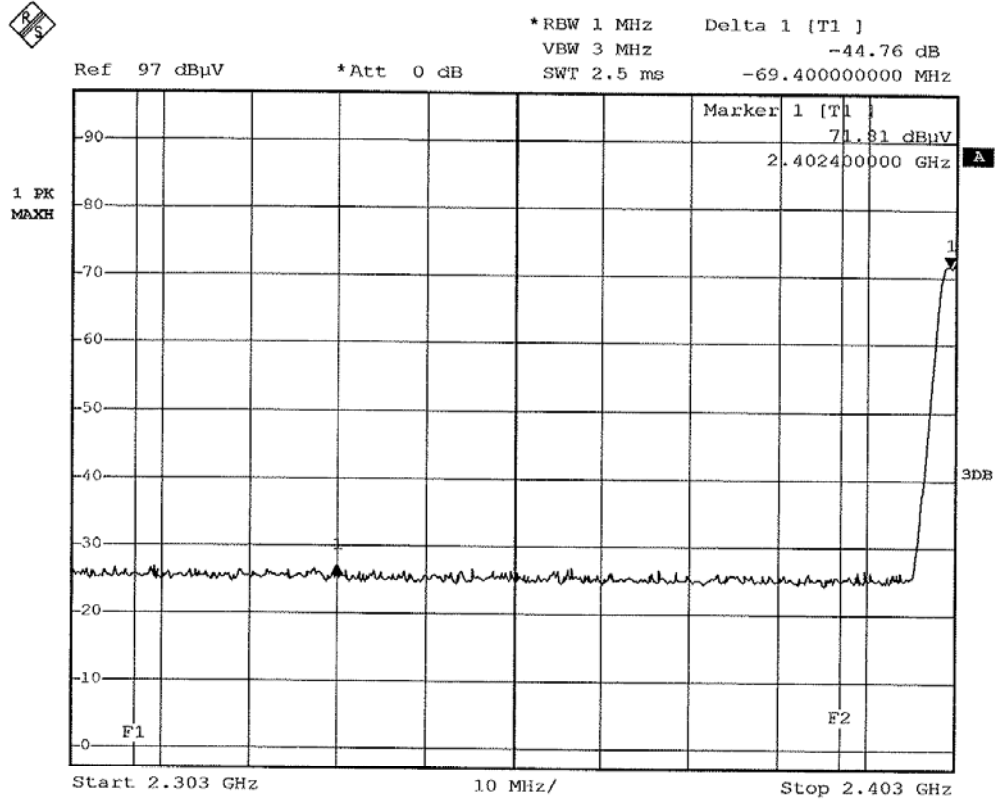
Calculated Emission Level = Field Strength Level – Delta Marker Level

<sup>(1)</sup> the peak level is lower than the average limit (53.98 dB $\mu$ V/m).

**Test conclusion:**

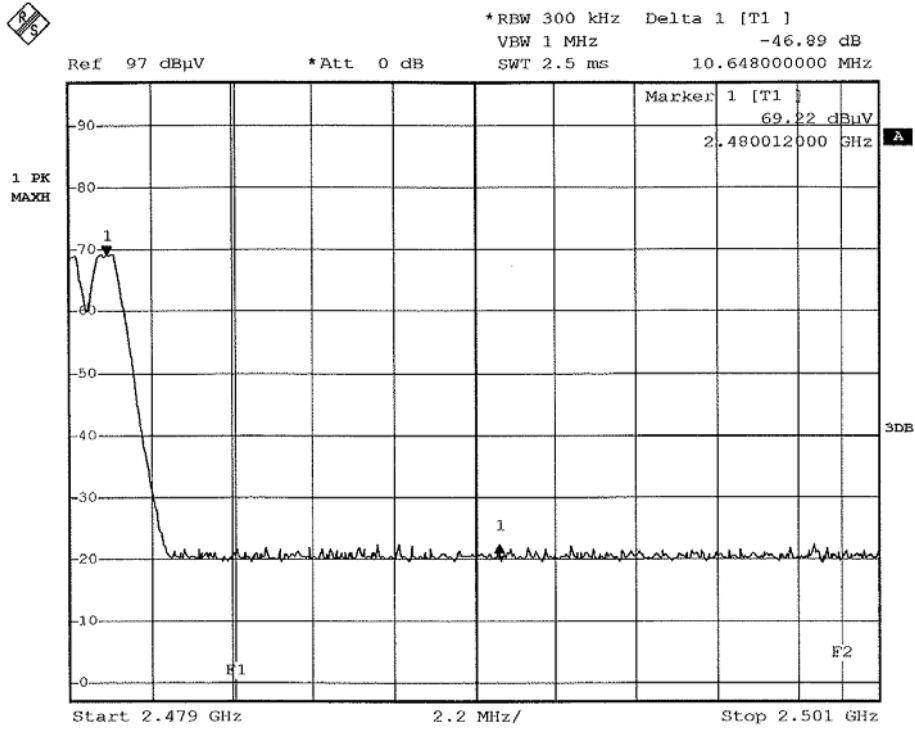
RESPECTED PUBLIC NOTICE

CURVE N°: 1.



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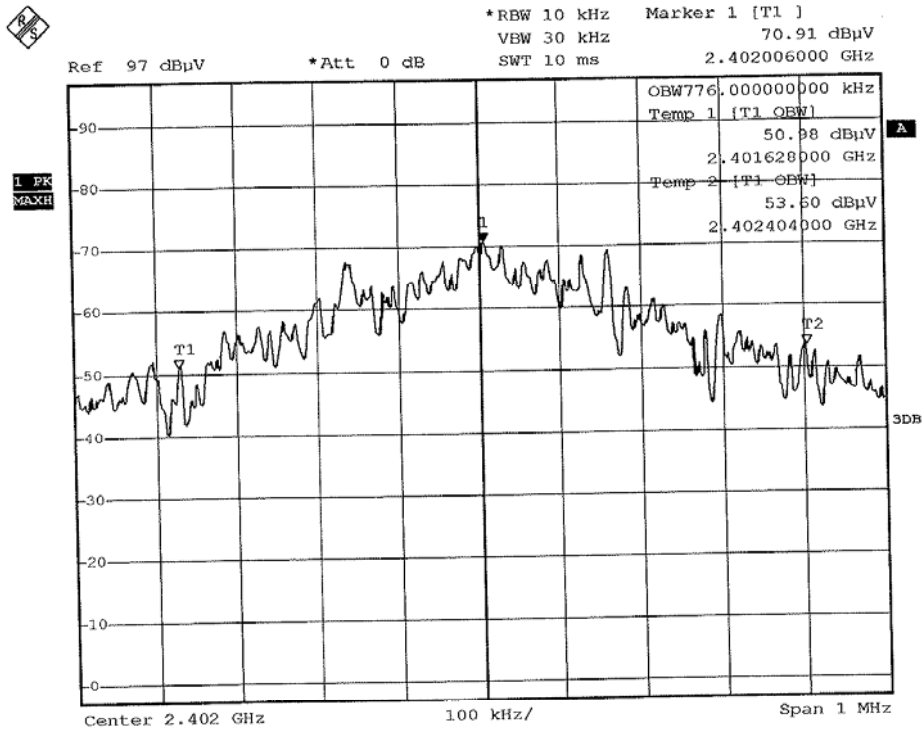
CURVE N°: 2.



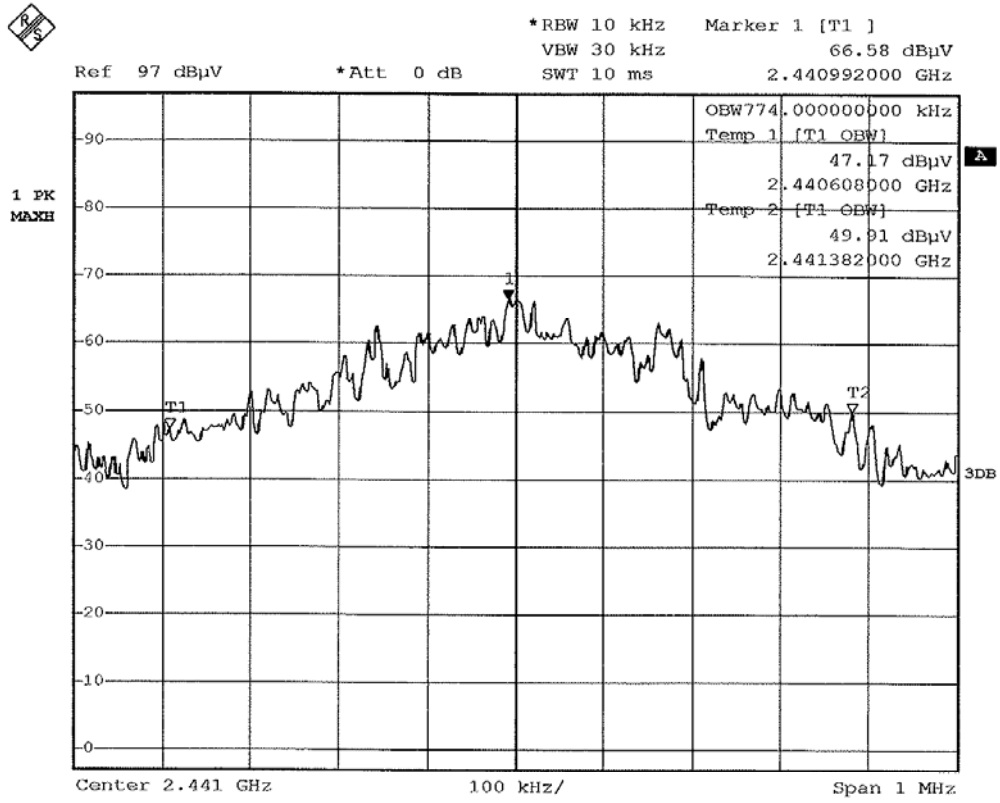
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□□□ End of report, 5 annexes to be forwarded □□□

# ANNEX 1: OCCUPIED POWER BANDWIDTH AND CHANNEL SEPARATION

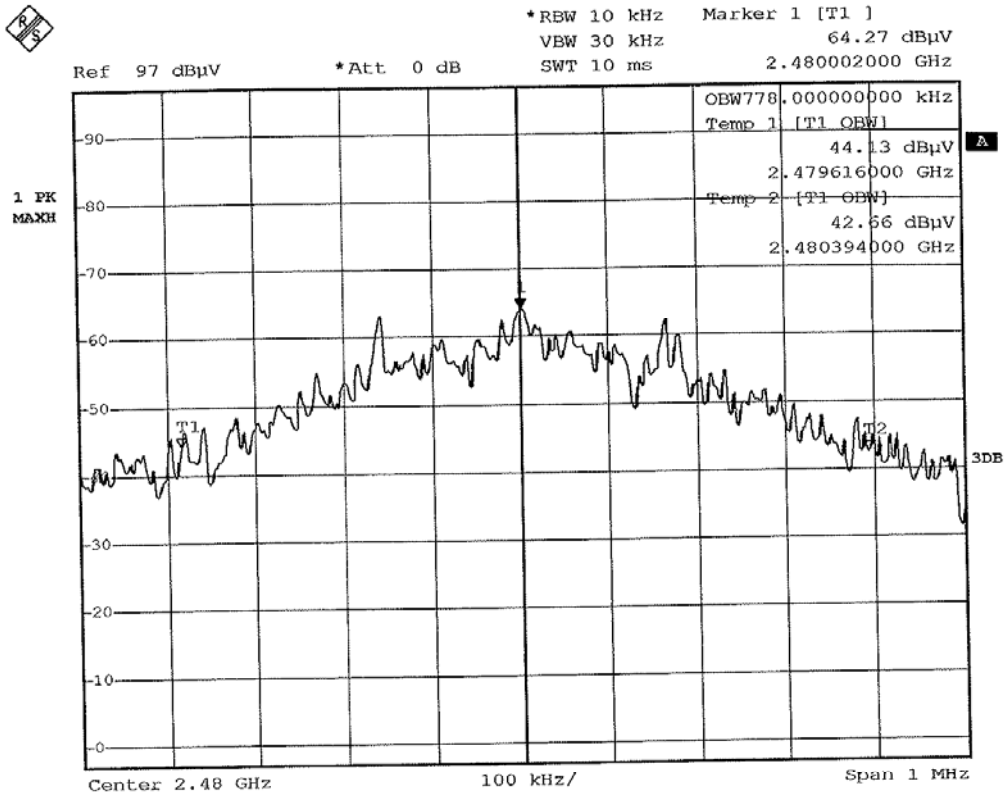


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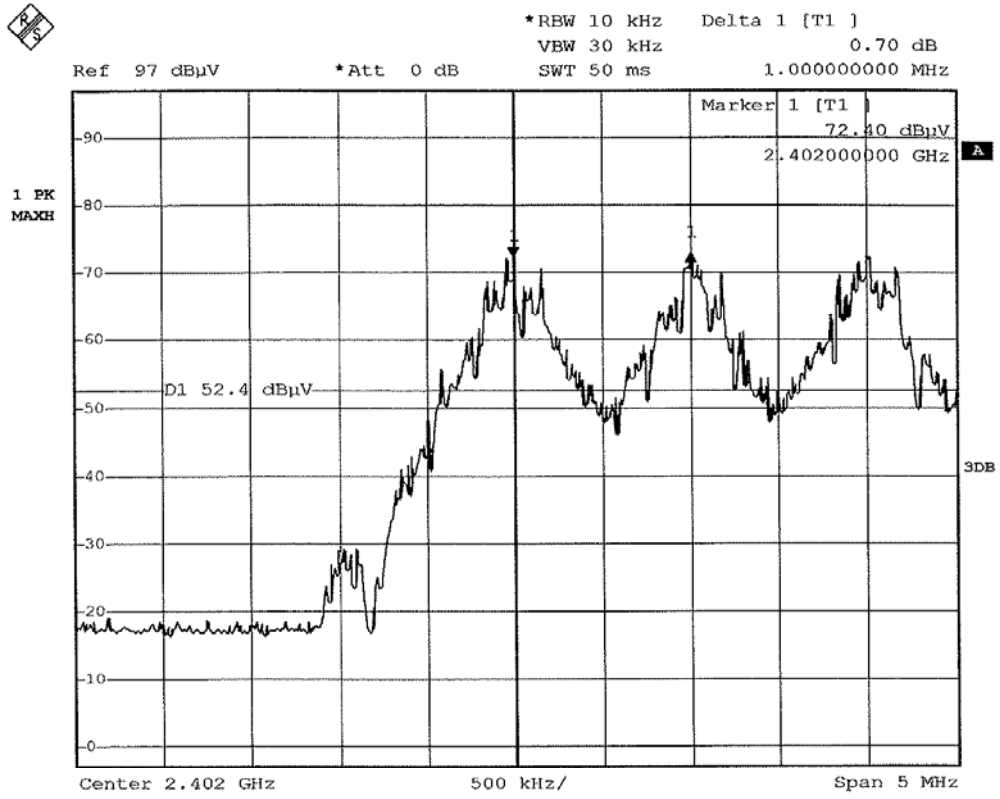


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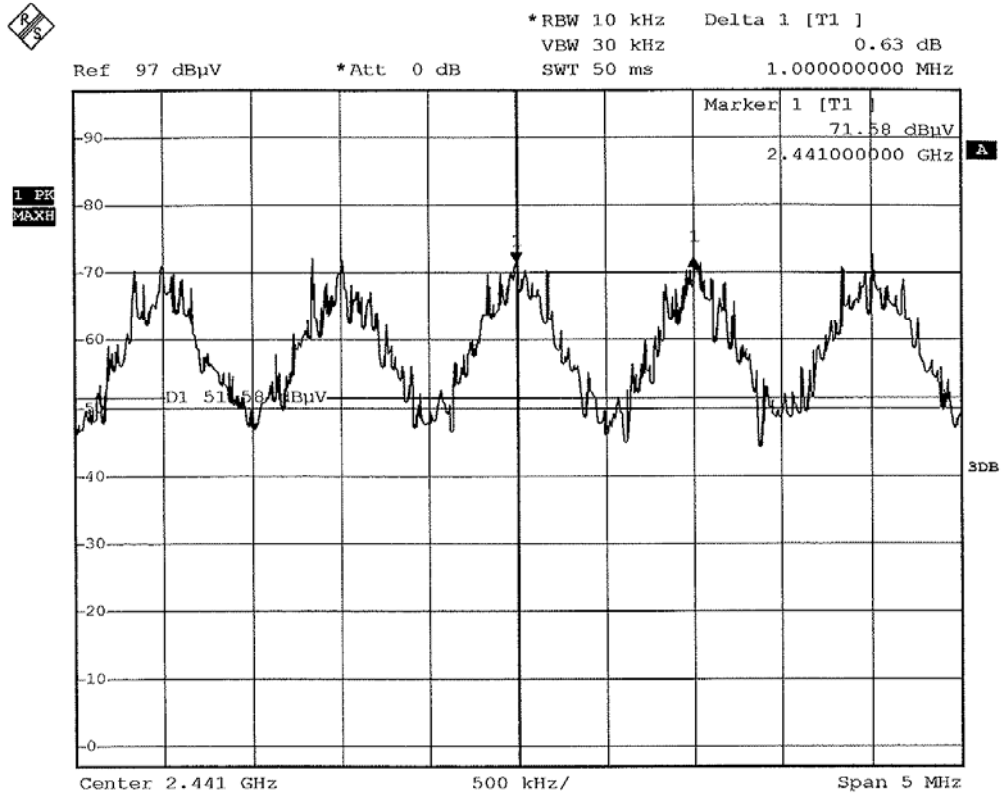




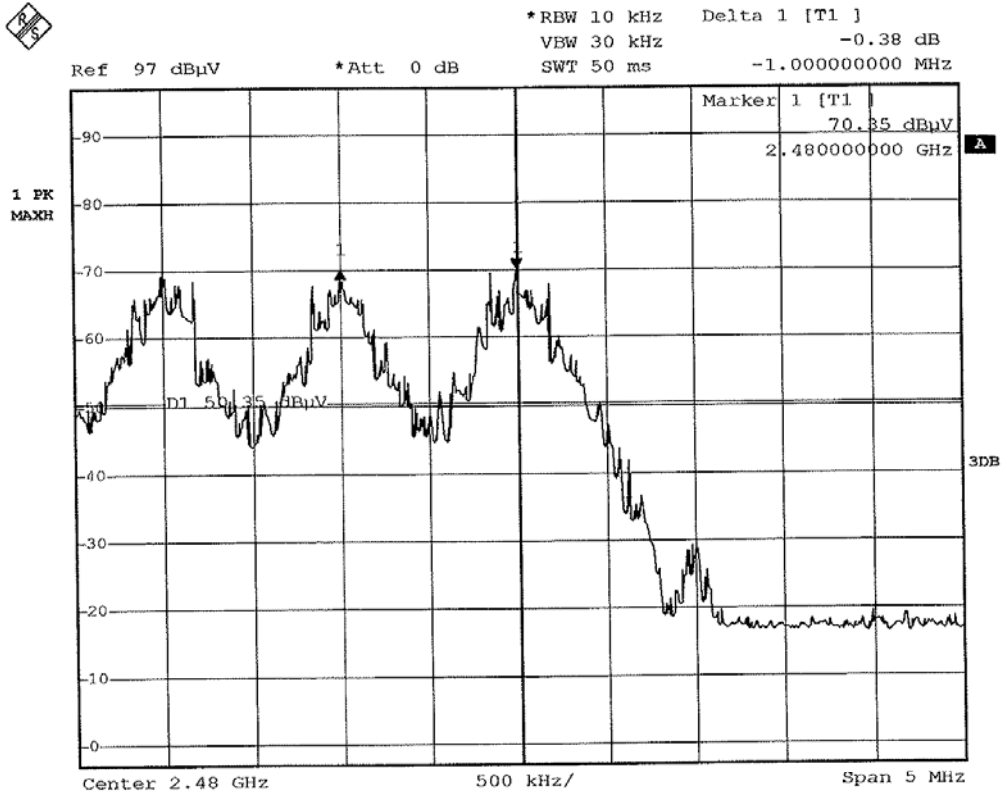
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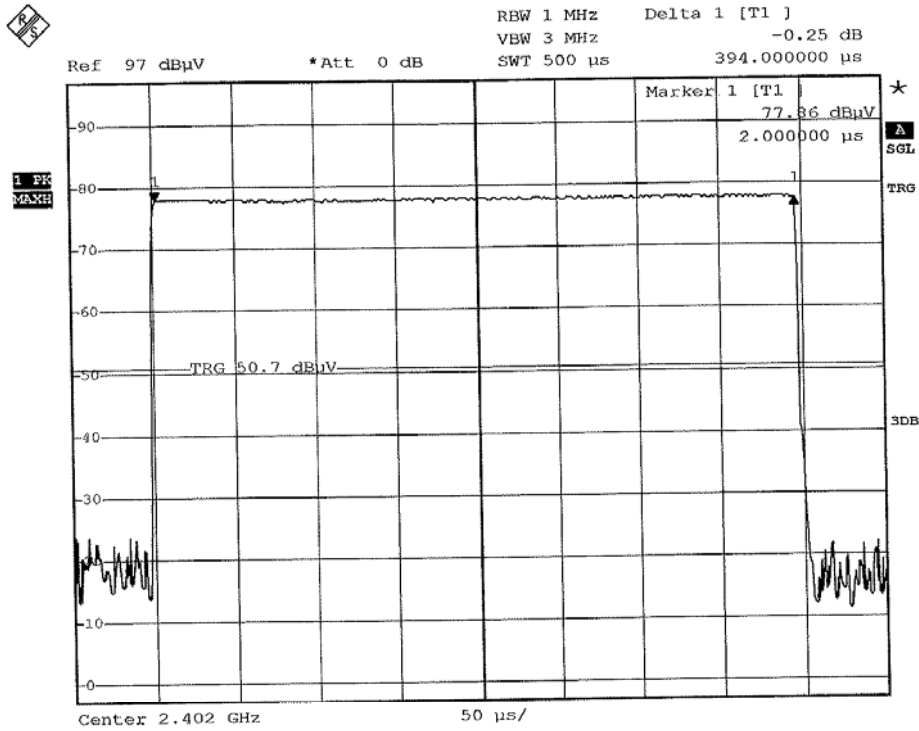


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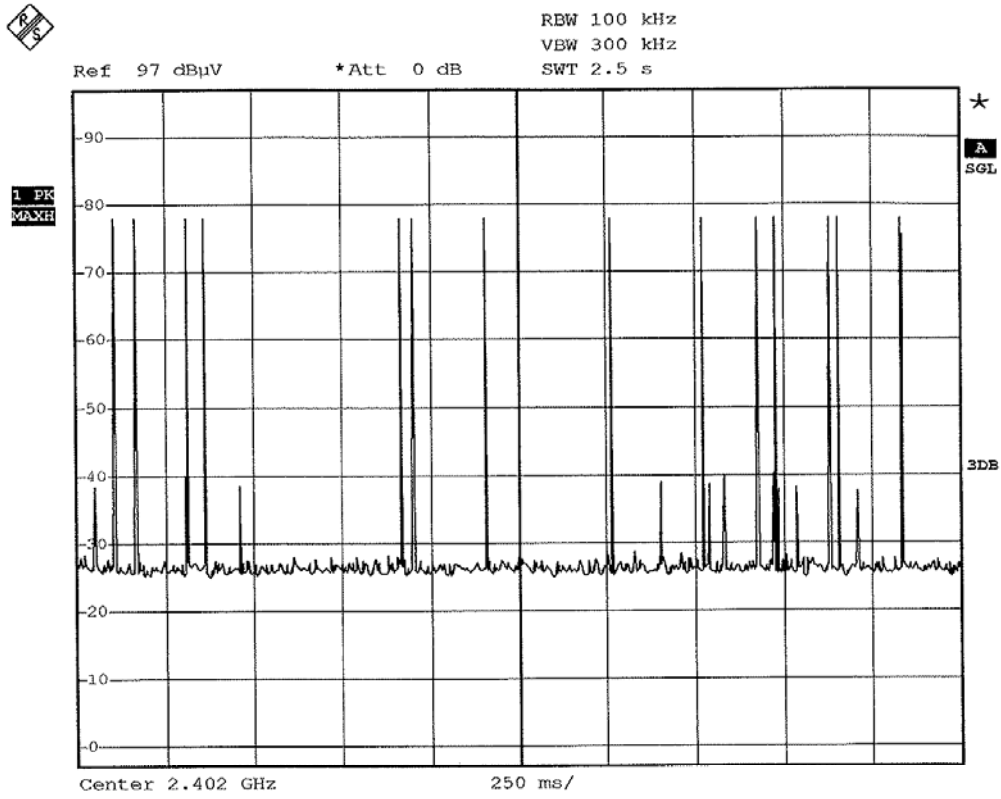


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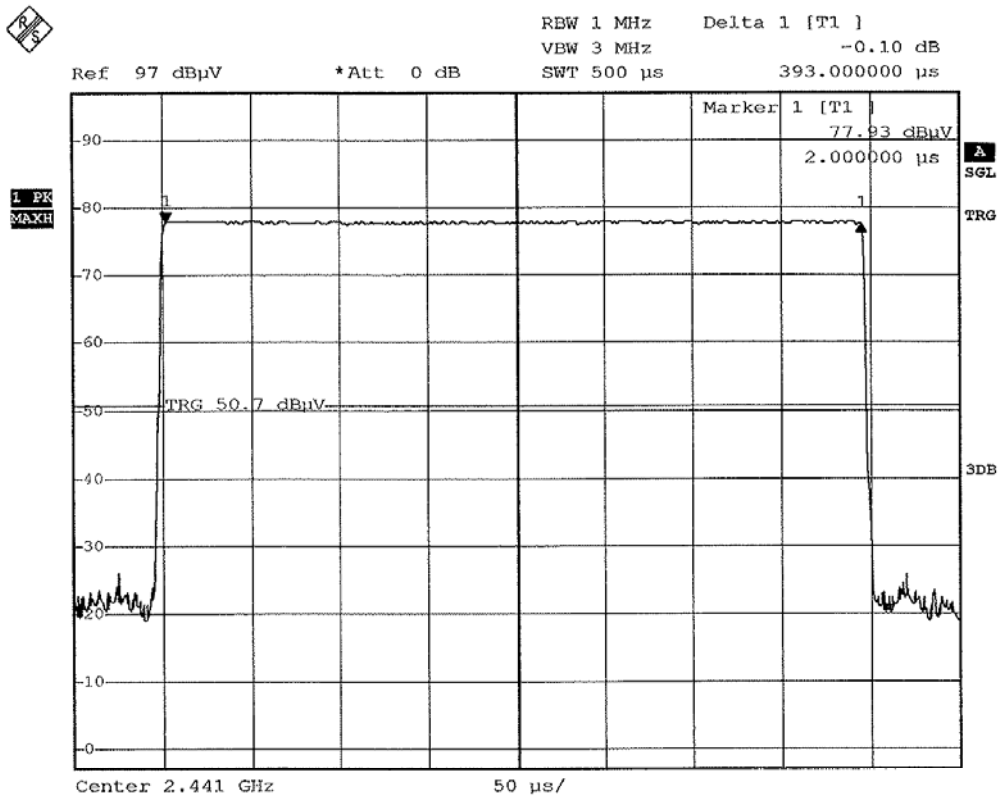
# ANNEX 2: AVERAGE TIME OF OCCUPANCY ON ANY FREQUENCY



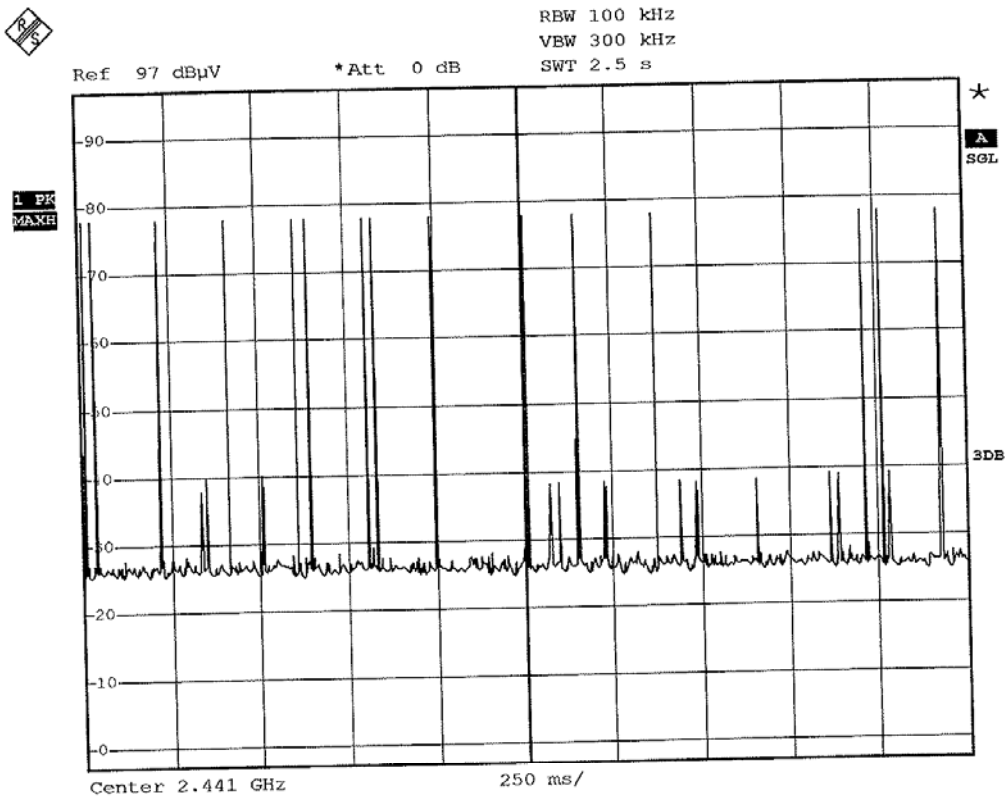
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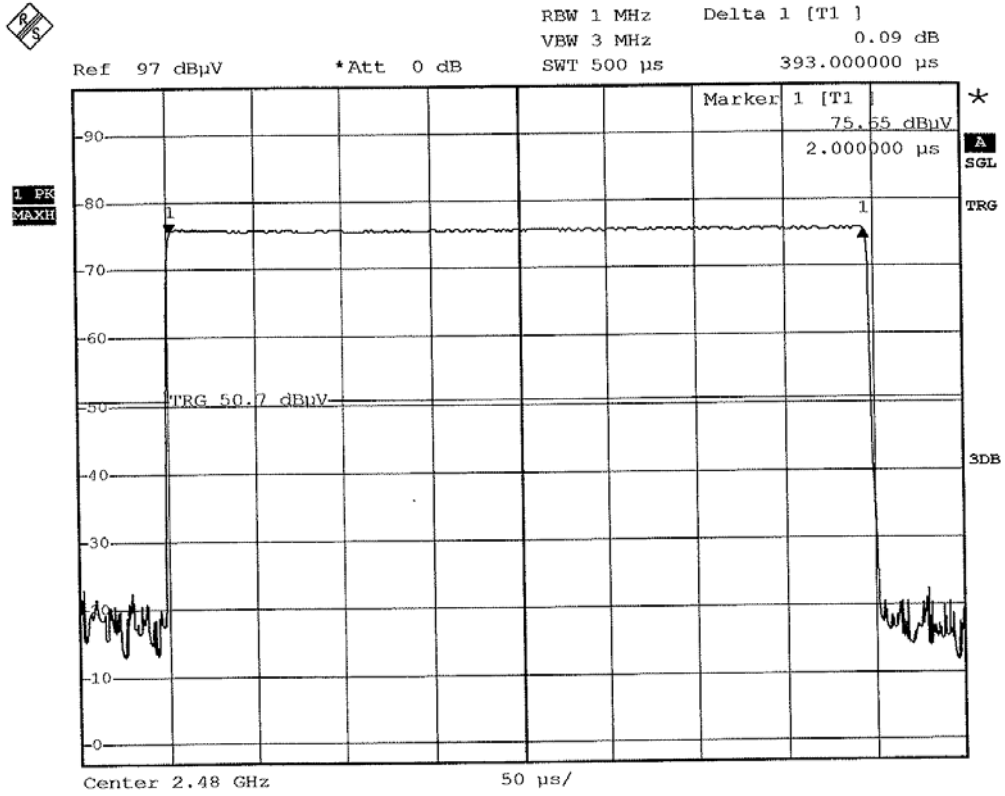


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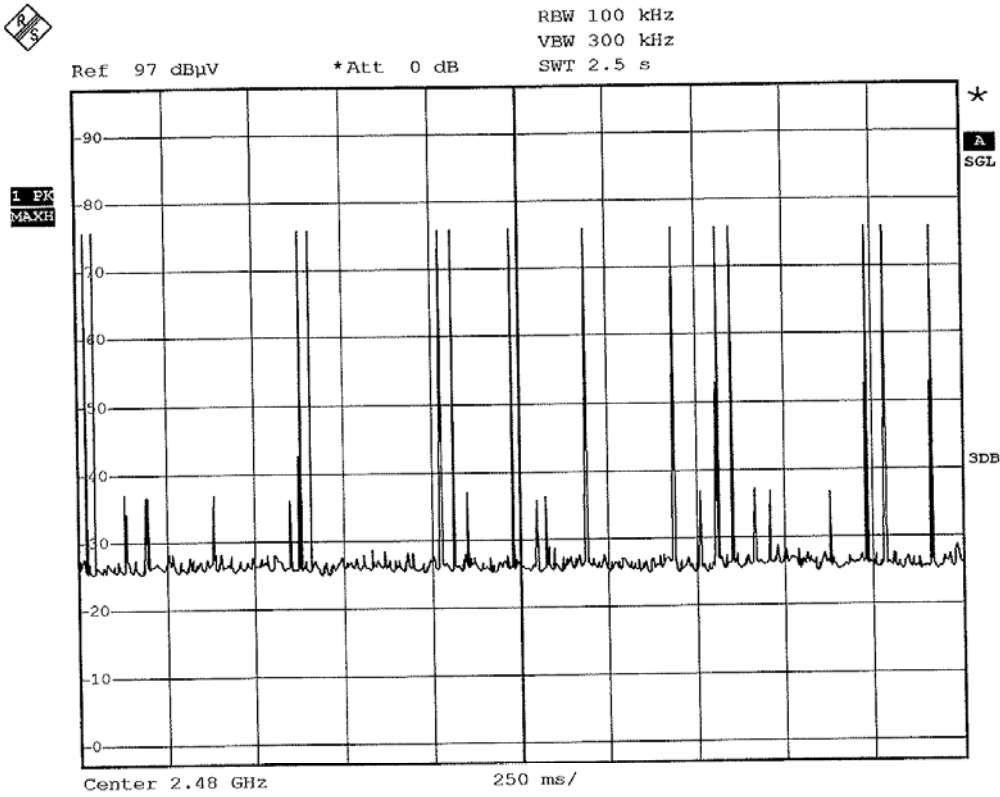


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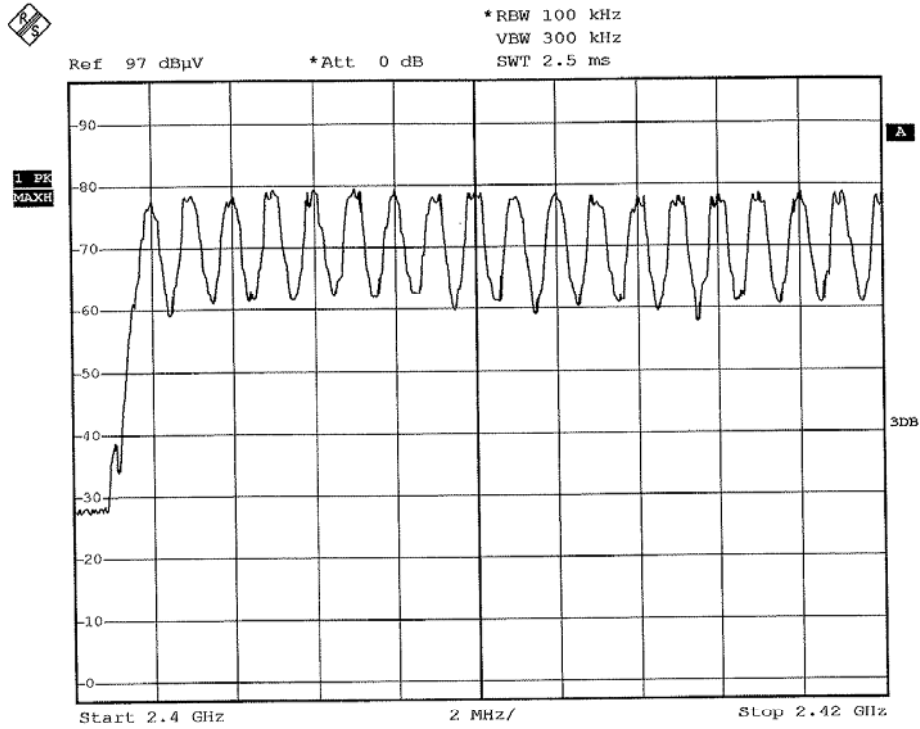


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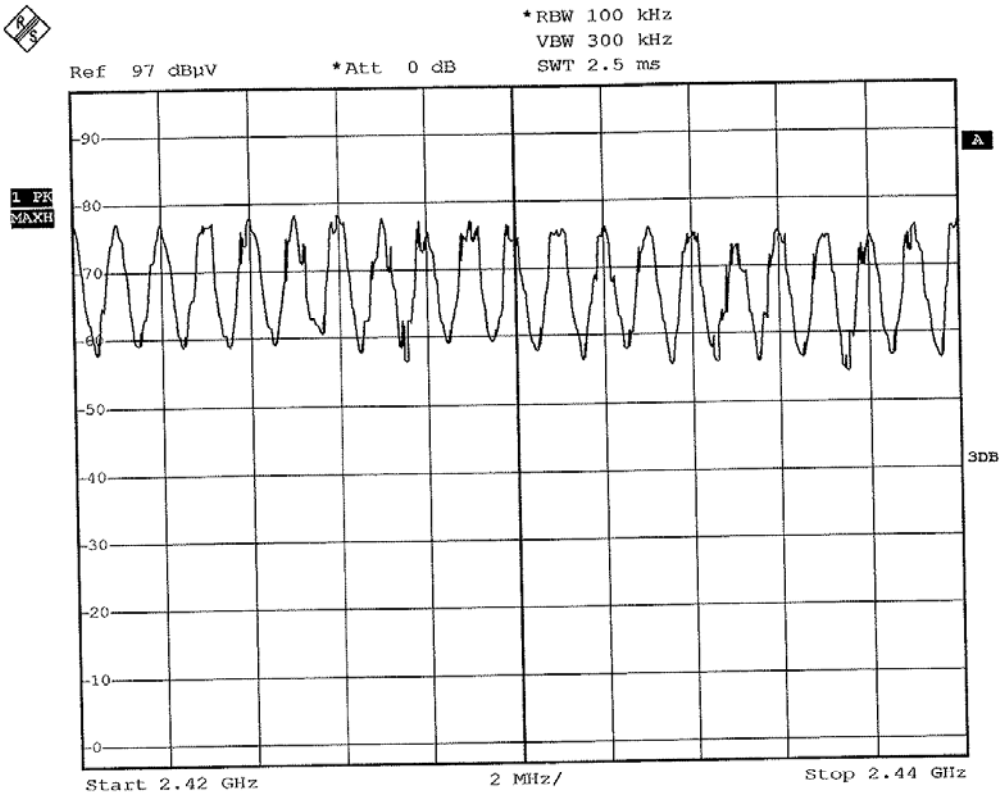


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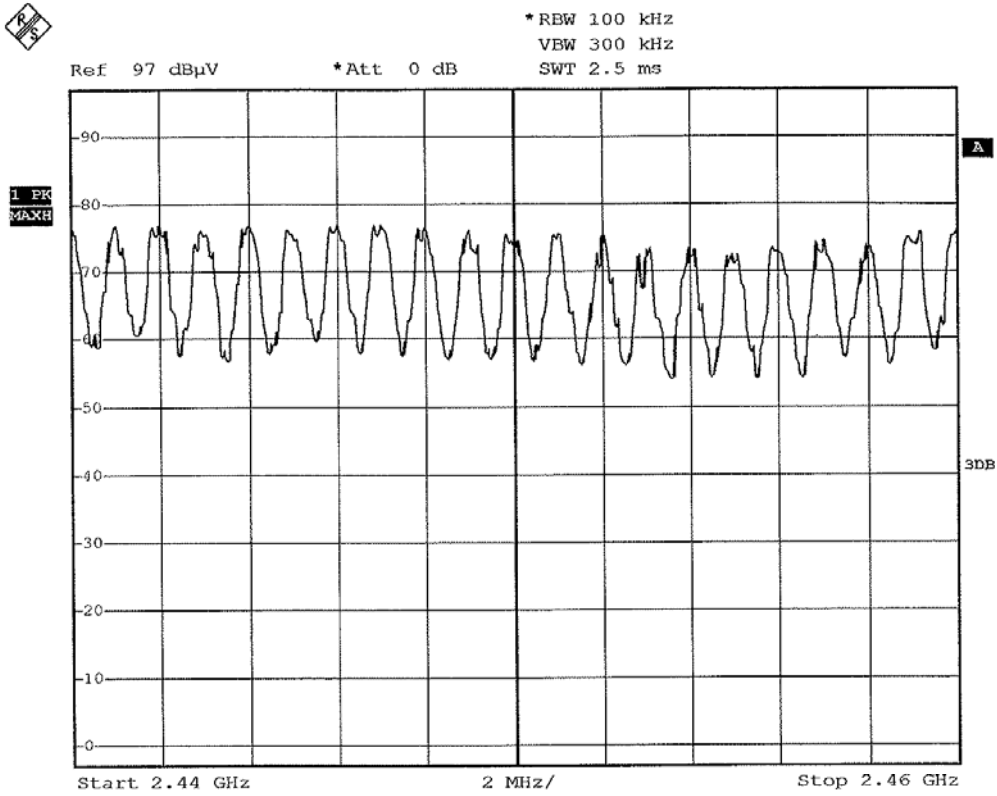
# ANNEX 3: NUMBER OF HOPPING FREQUENCIES



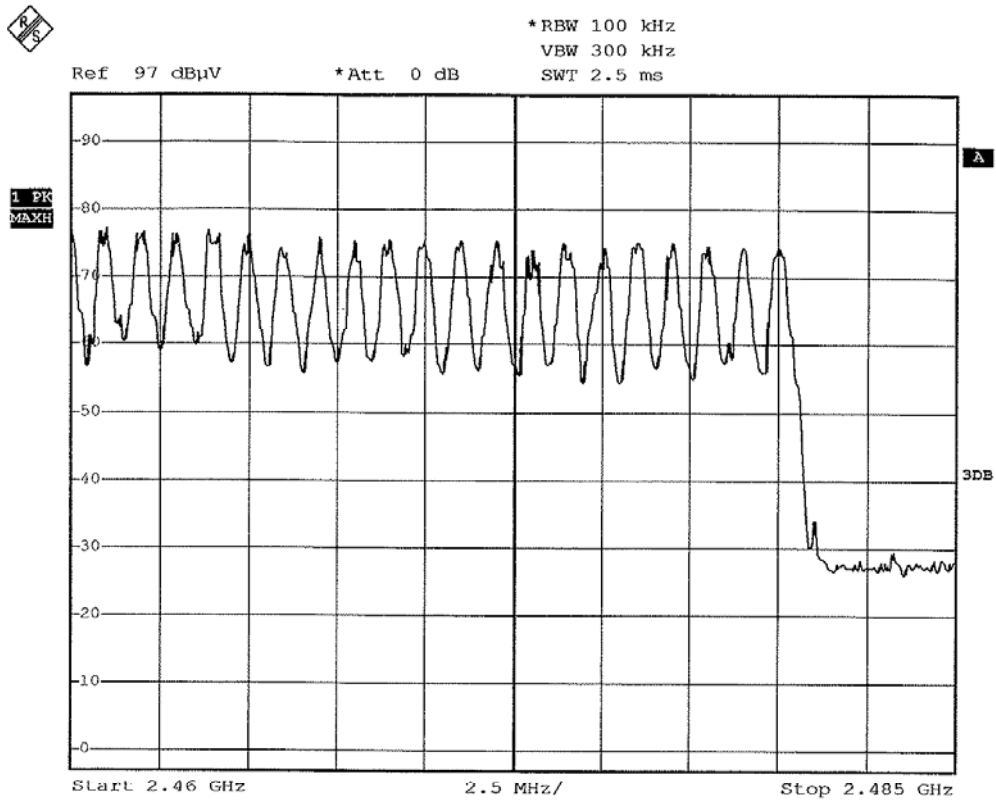
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Date: 10.JUL.2008 06:08:05



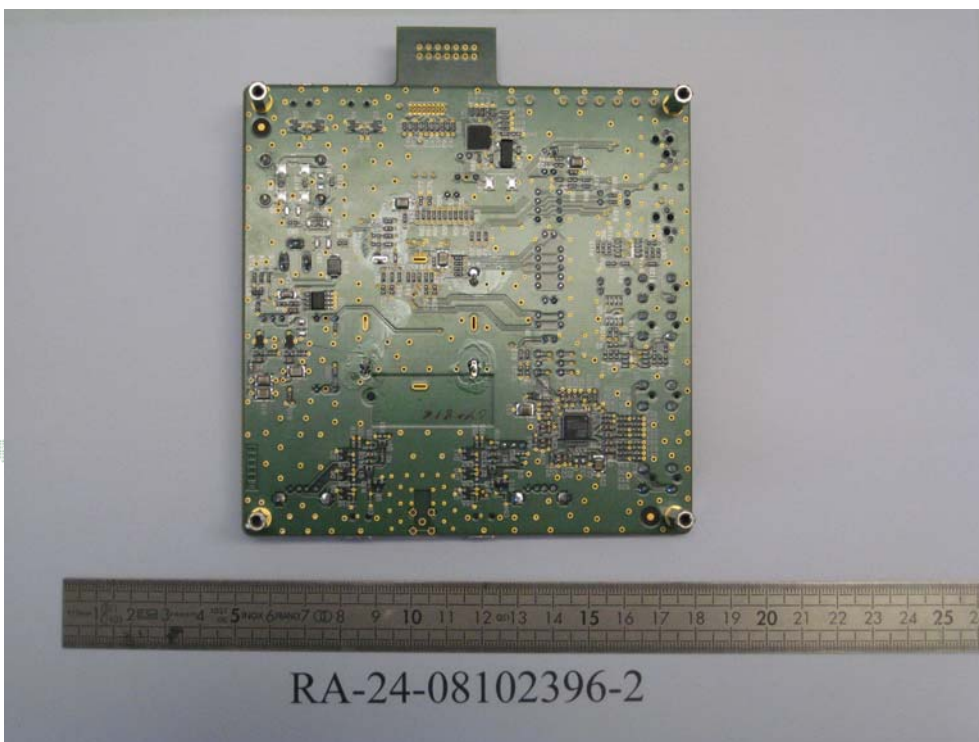
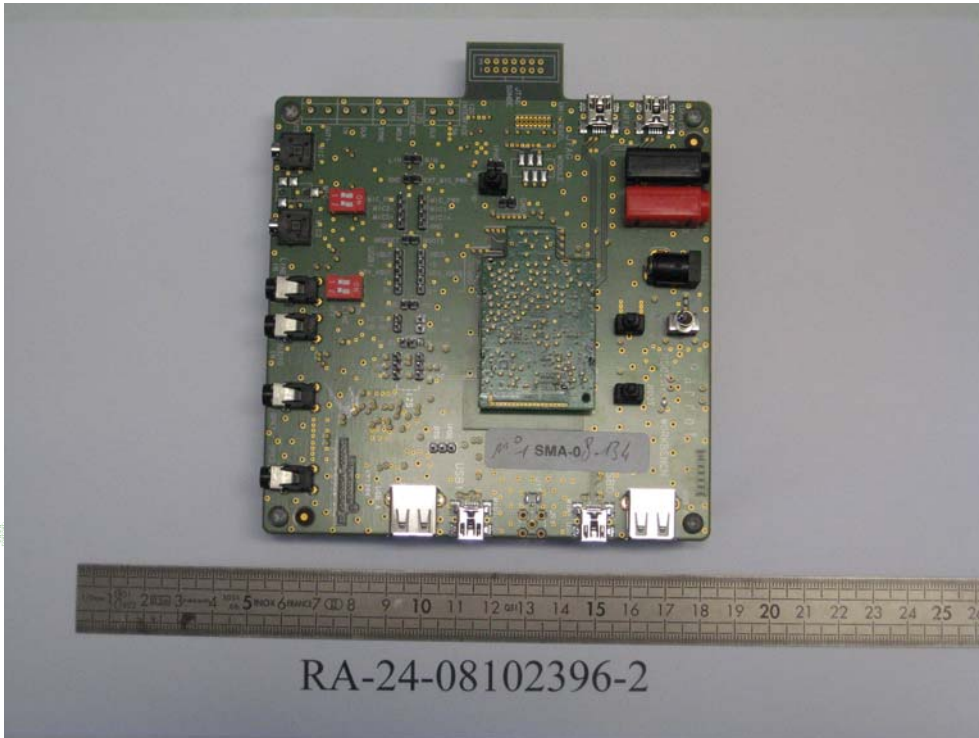
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Date: 10.JUL.2008 06:14:05

# ANNEX 4: PHOTOS OF THE EQUIPMENT UNDER TEST

## GENERAL VIEW

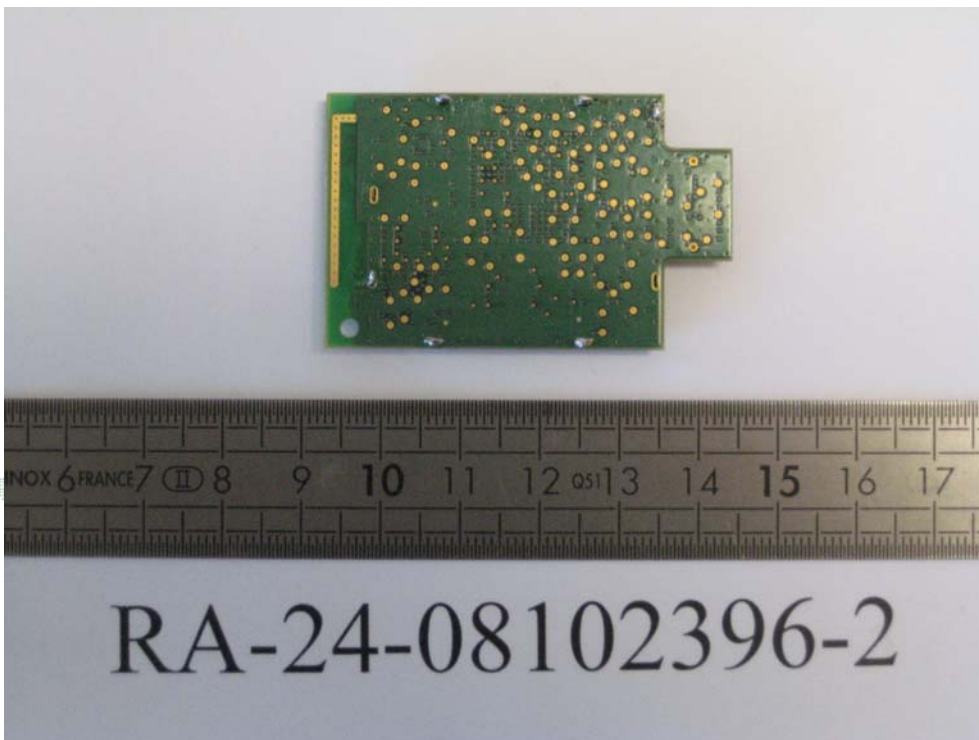


**RADIO MODULE WITH ANTENNA:**

**FACE 1**



**FACE 2**





# ANNEX 5: TEST SET UP AND OPEN AREA TEST SITE

## TEST SET UP FOR RADIATED MEASUREMENT



EMITECH

EMITECH

EMITECH

EMITECH

EMITECH



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