



RA-24-08102812-6/A Ed. 0

**FCC CERTIFICATION
RADIO Measurement
Technical Report**

**standards to apply:
FCC Part 15
SUBPART B AND C**

**Equipment under test:
WIRELESS STEREO SPEAKERS
PARROT BY STARCK**

**FCC ID :
RXXOPAL**

**Company:
PARROT**

DISTRIBUTION: Mr GUERRAB

Company: PARROT

Number of pages: 56 including 5 annexes

Ed.	Date	Modified pages	Written by		Technical Verification Quality Approval	
			Name	Visa	Name	Visa
0	8-Oct-08	Creation	M. DUMESNIL	M. D.		

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.



PRODUCT: WIRELESS STEREO SPEAKERS

Reference / model: Parrot by starck

Serial number: not communicated

MANUFACTURER: PARROT

COMPANY SUBMITTING THE PRODUCT:

Company: PARROT

Address: 174 quai de Jemmapes
75010 PARIS
FRANCE

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DATE(S) OF TEST: 30 August 2008
23, 26 and 29 September 2008

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

This document presents the result of RADIO test carried out on the following equipment: WIRELESS STEREO SPEAKERS in accordance with normative reference.

2. PRODUCT DESCRIPTION

ITU Emission code: 1M00G7E

Class: B (residential)

Utilization: wireless stereo speakers

Antenna type: incorporated antenna

Operating frequency range: from 2402 MHz 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: 115 V.a.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 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 SUBPART B

Note: this trial has been realized on the speaker without 433 MHz receiver inside and on the speaker with 433 MHz receiver inside.

Test procedure	Description of test	Criteria respected?				Comment
		Yes	No	NAp	NAs	
FCC Part 15-107	CONDUCTED LIMITS	X				
FCC Part 15.109	RADIATED EMISSION LIMITS	X				

NAp: Not Applicable

NAs: Not Asked

Remark: *The equipment under test has been tested without RCA cable connected.*

Conclusion:

The sample of WIRELESS STEREO SPEAKERS –PARROT BY STARCK 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. TESTS AND CONCLUSIONS SUBPART C

Note: these trials have been realized on the speaker with 433 MHz receiver inside.

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 > 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 (813.627 kHz; see annex 1).

Note 4: the frequency hopping system uses 79 channels.

The timing by channel is 142.48 μ s. During 79 channels \times 0.4 s (part 15) = 31.6 s, any channel is used 170 times, then 170 \times 142.48 μ s = 24.22 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).

Remark: The equipment under test has been tested without RCA cable connected.

Conclusion:

The sample of WIRELESS STEREO SPEAKERS – PARROT BY STARCK 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.

8. MEASUREMENT OF RADIATED INTERFERENCE FIELD STRENGTH

Standard: FCC Part 15

Test procedure: FCC Part 15 Sec.15.109

Limits: Class B

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 analyser variac	Dereix R213	1419
Open area test site	EMITECH	1274
Preamplifier	ALC ALN02	2648
Hight pass filter	Microtronics HPM11630	1673
multimeter	Fluke 77-2	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 being $F = 2480$ MHz
the frequency range is
30MHz – 5th harmonic of the highest frequency generated in the device.
(See FCC Part 15 Sec.15.33)

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: 3 meters

Antenna height: 1 to 4 meters

Antenna polarization: vertical and horizontal

Equipment under test operating condition:

The equipment under test has been tested without RCA cable connected.

A Bluetooth connection between the equipment under test and a mobile phone was established.

The equipment under test was powered in 115 Va.c through a variac.

Results:

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

Speaker without 433 MHz receiver inside

FREQUENCIES (MHz)	Antenna height (cm)	Polarization H: Horizontal V: Vertical	Azimuth (degrees)	Field strength (dBµV/m)	Limits (dBµV/m)
129	100	V	302	32.3	43.52
135.47	100	V	288	35.8	43.52
141.12	100	V	324	37	43.52
143.95	100	V	343	34.2	43.52
146.75	100	V	70	40.6	43.52
152.40	100	V	292	39.4	43.52
158.04	100	V	113	35.6	43.52
163.70	100	V	130	32.5	43.52
169.34	100	V	164	31.7	43.52
174.98	100	V	191	31.2	43.52
180.62	188	H	248	31	43.52
203.21	215	V	317	35.5	46.02
220.15	130	H	115	37.6	46.02
225.80	100	H	133	40.7	46.02
242.71	100	H	144	37.3	46.02
248.37	125	H	160	38.8	46.02
254	100	H	181	38.2	46.02
259.65	100	H	212	36.4	46.02

Speaker with 433 MHz receiver inside

FREQUENCIES (MHz)	Antenna height (cm)	Polarization H: Horizontal V: Vertical	Azimuth (degrees)	Field strength (dB μ V/m)	Limits (dB μ V/m)
169.34	195	H	71	34.3	43.52
174.99	100	V	133	34.2	43.52
180.63	100	V	117	35.2	43.52
234.4	208	V	108	36.8	46.02
265.6	187	V	248	46	46.02

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9. MEASUREMENT OF THE CONDUCTED DISTURBANCES**Standard:** FCC Part 15**Test procedure:** Paragraph 15.107 / 15.207**Limits:** Class B**Test equipment:**

TYPE	BRAND	EMITECH NUMBER
Test receiver ESH3	Rohde & Schwarz	4112
Pulse limiter ESH3-Z2	Rohde & Schwarz	976
Artificial main network L3-25	PMM	834
Spectrum analyzer FSBS	Rohde & Schwarz	3133
Power source ALT 2000	K. SERRAS	2441
Transient limiter 11947A	Hewlett Packard	2565

Software used: BAT-EMC V3.1.7.1**Test set up:**

The test unit is placed on a wooden table, 0.8 m over an horizontal reference plane and 0.4 m from a vertical reference plane. It is powered by an artificial main network placed on the ground reference plane (see photos in annex 5).

Equipment under test operating condition:

The equipment under test has been tested without RCA cable connected.

The equipment under test was the speaker with 433 MHz receiver inside.

The equipment is powered with the AC power operating voltage of 115 V / 60 Hz.

This trial has been realized in two mode: standby/ reception mode and transmission mode.

Frequency range: 150 kHz - 30 MHz**Detection mode:** Peak / Average**Bandwidth:** 9 kHz

Results:**Measurement on the mains power supply: standby / reception mode, paragraph 15.107**

The measurement is made with peak detector.

Curve N° 1: measurement on the Neutral with peak detector

Curve N° 2: measurement on the Line with peak detector

The spectrum line which are less than 6 dB of the limit are analyzed with average detector.

Curve N° 3 measurement on the Neutral with average detector

Curve N° 4 measurement on the Line with average detector

Measurement on the mains power supply: transmission mode, paragraph 15.207

The measurement is made with peak detector.

Curve N° 5: measurement on the Neutral with peak detector

Curve N° 6: measurement on the Line with peak detector

The spectrum line which are less than 6 dB of the limit are analyzed with average detector.

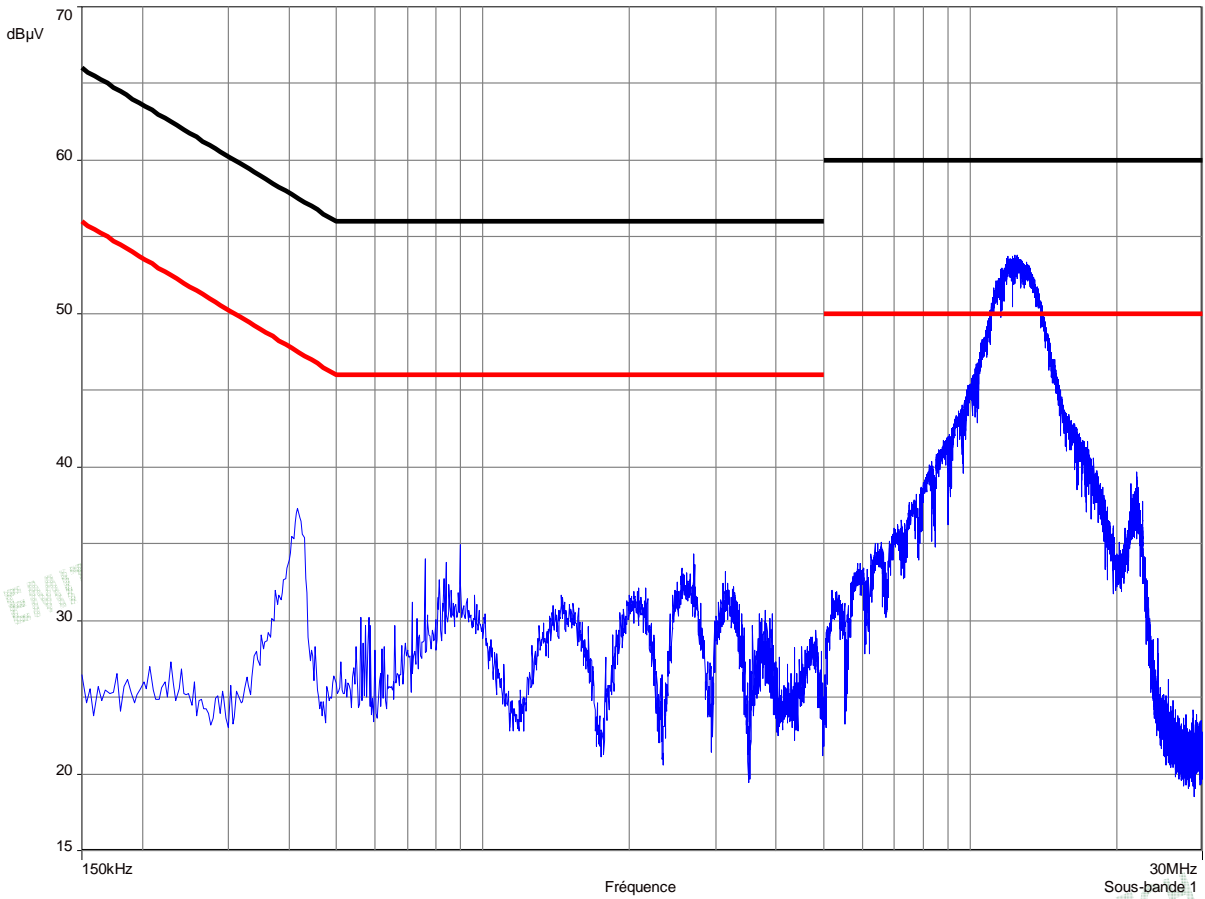
Curve N° 7 measurement on the Neutral with average detector

Curve N° 8 measurement on the Line with average detector

CURVE N°1.:

Standby / reception mode

Masurement on the neutral with peak detection

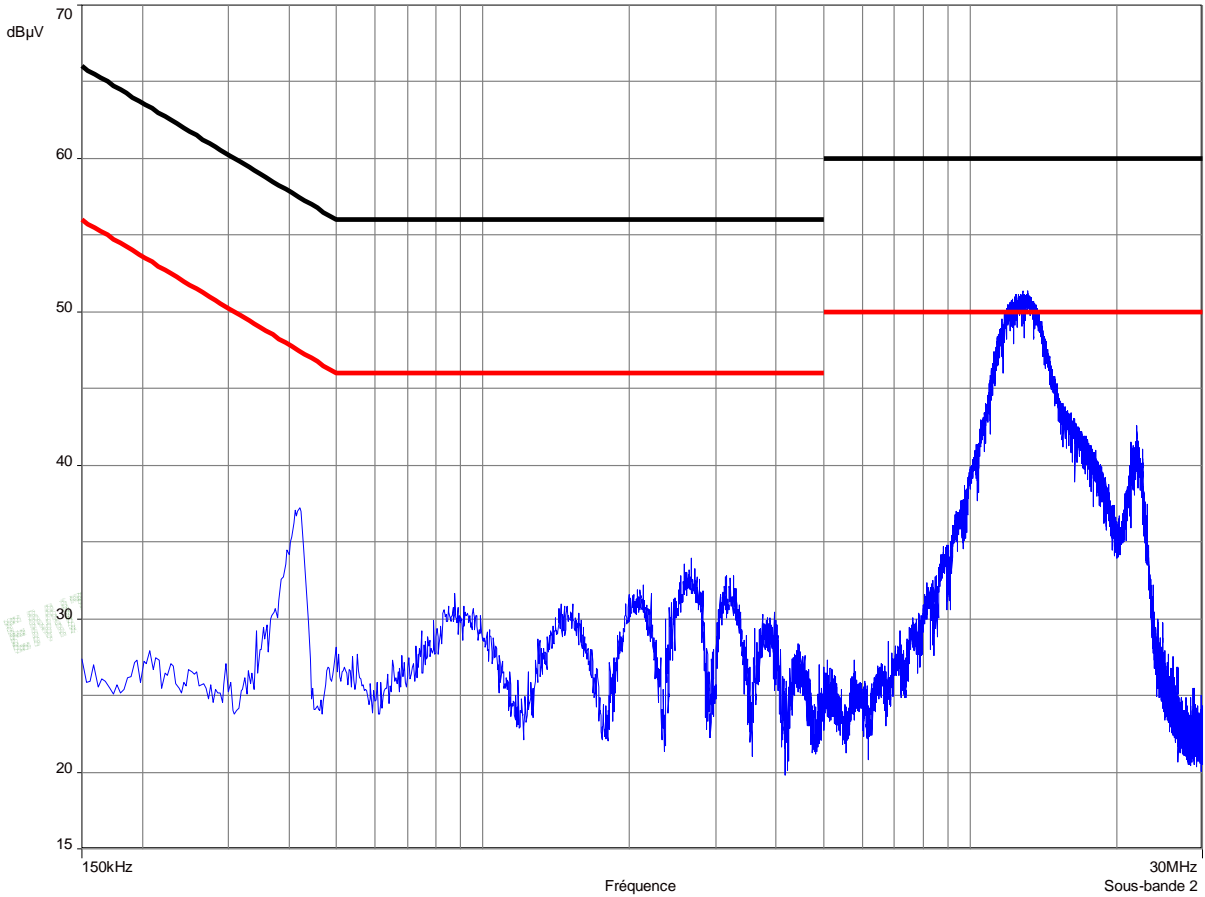


RBW filter: 10 kHz
VBW filter: 10 kHz
Sweep time: 500 ms/MHz

CURVE N°2.:

Standby / reception mode

Measurement on the line with peak detection

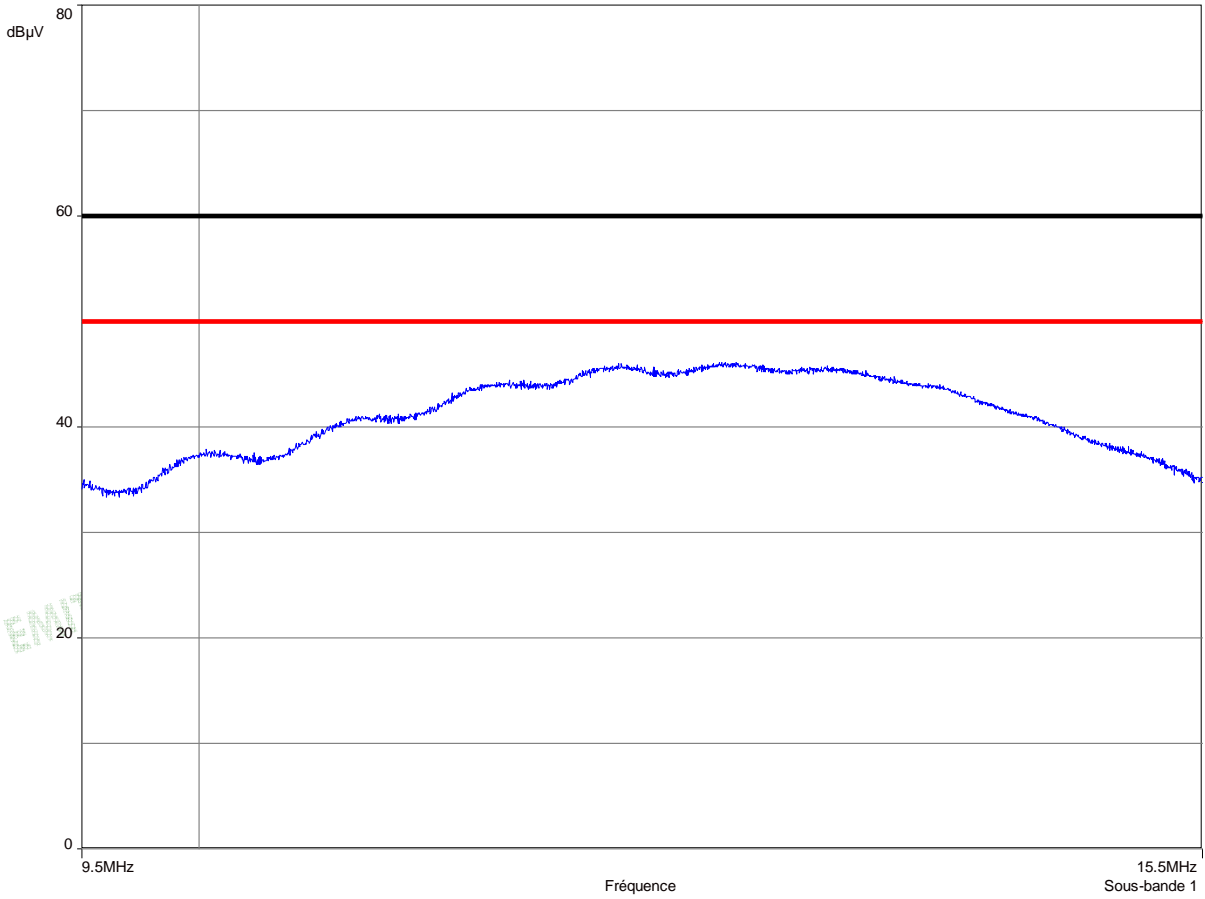


RBW filter: 10 kHz
VBW filter: 10 kHz
Sweep time: 500 ms/MHz

CURVE N°3.:

Standby / reception mode

Measurement on the Neutral with average detection



RBW filter: 9 kHz
Sweep time: 500 ms/MHz

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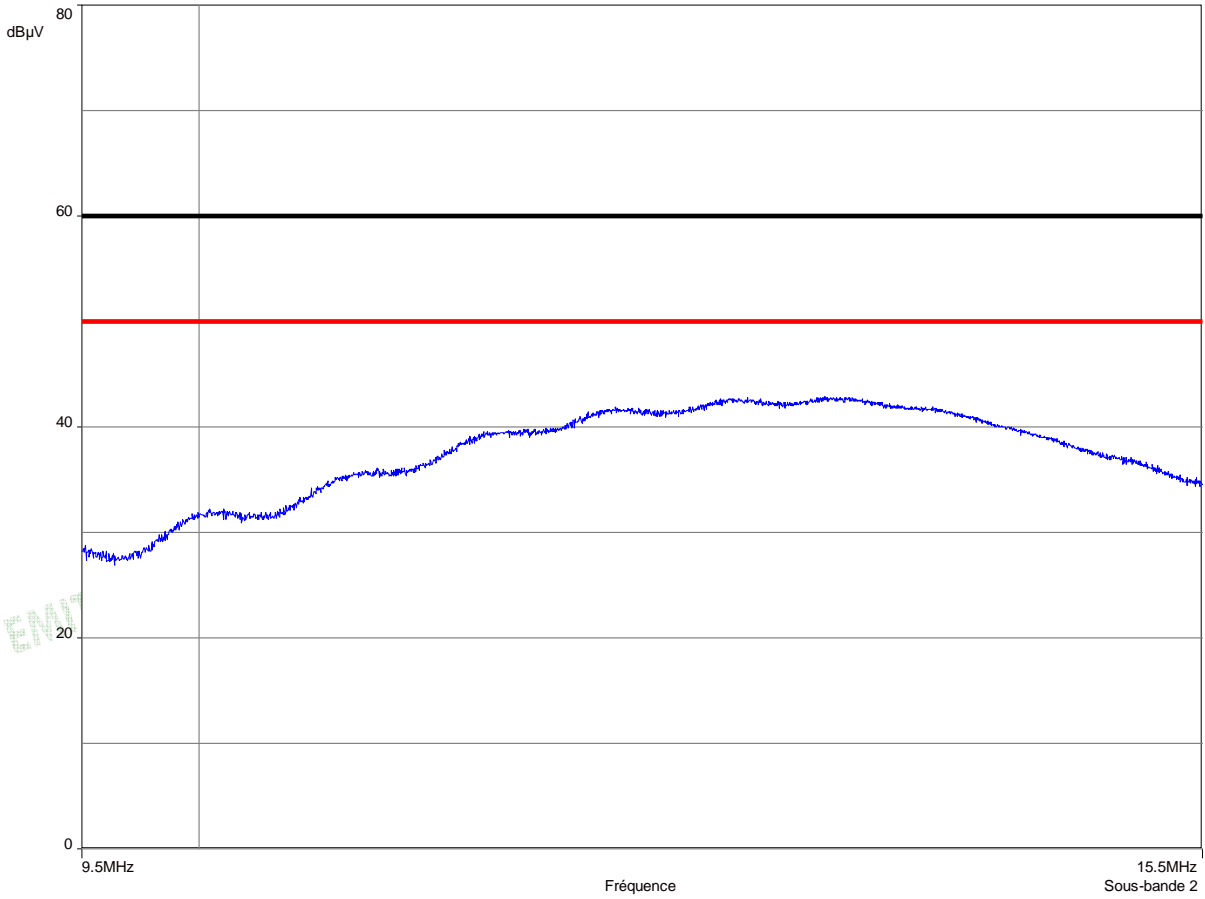
EMITECH

EMITECH

CURVE N°4.:

Standby / reception mode

Measurement on the Line with average detection

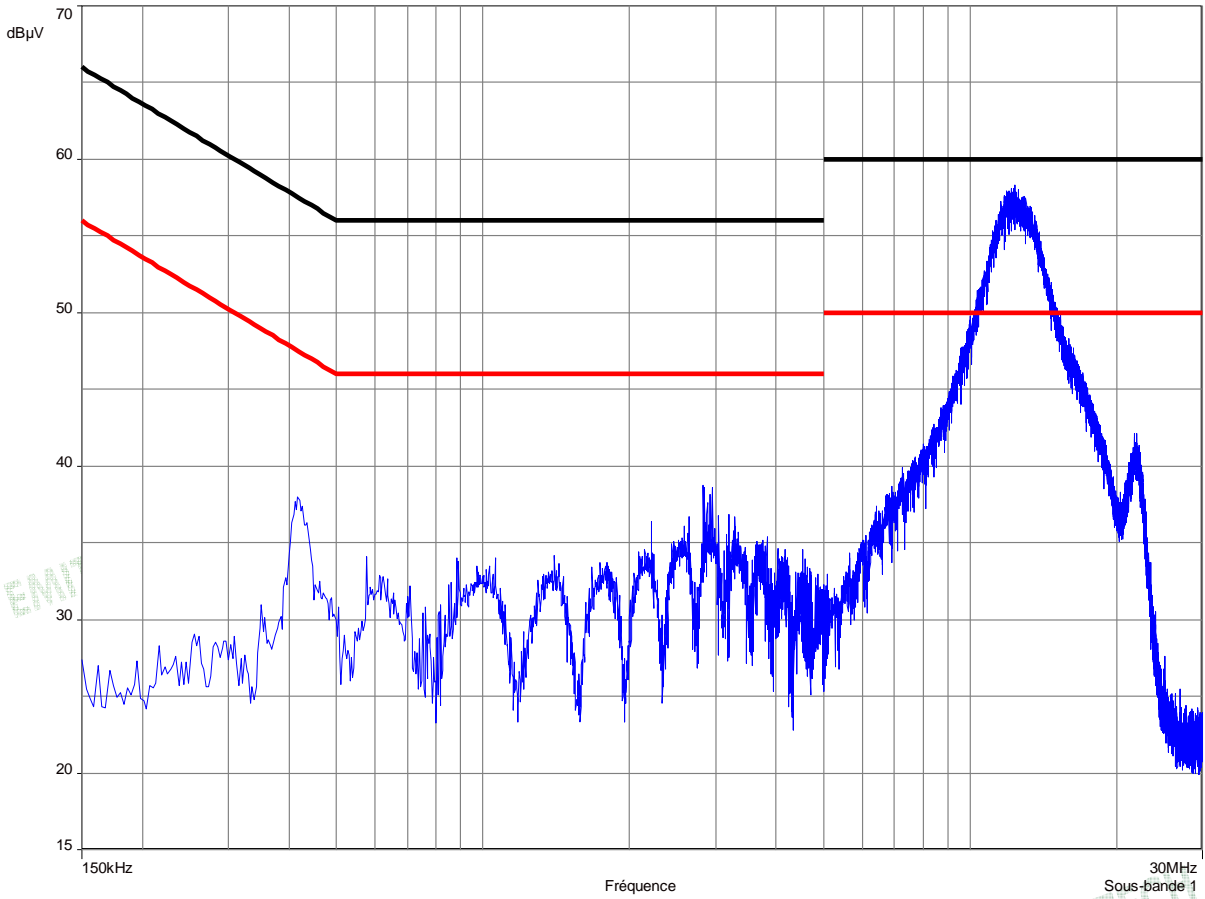


RBW filter: 9 kHz
Sweep time: 500 ms/MHz

CURVE N°5.:

Transmission mode

Measurement on the neutral with peak detection

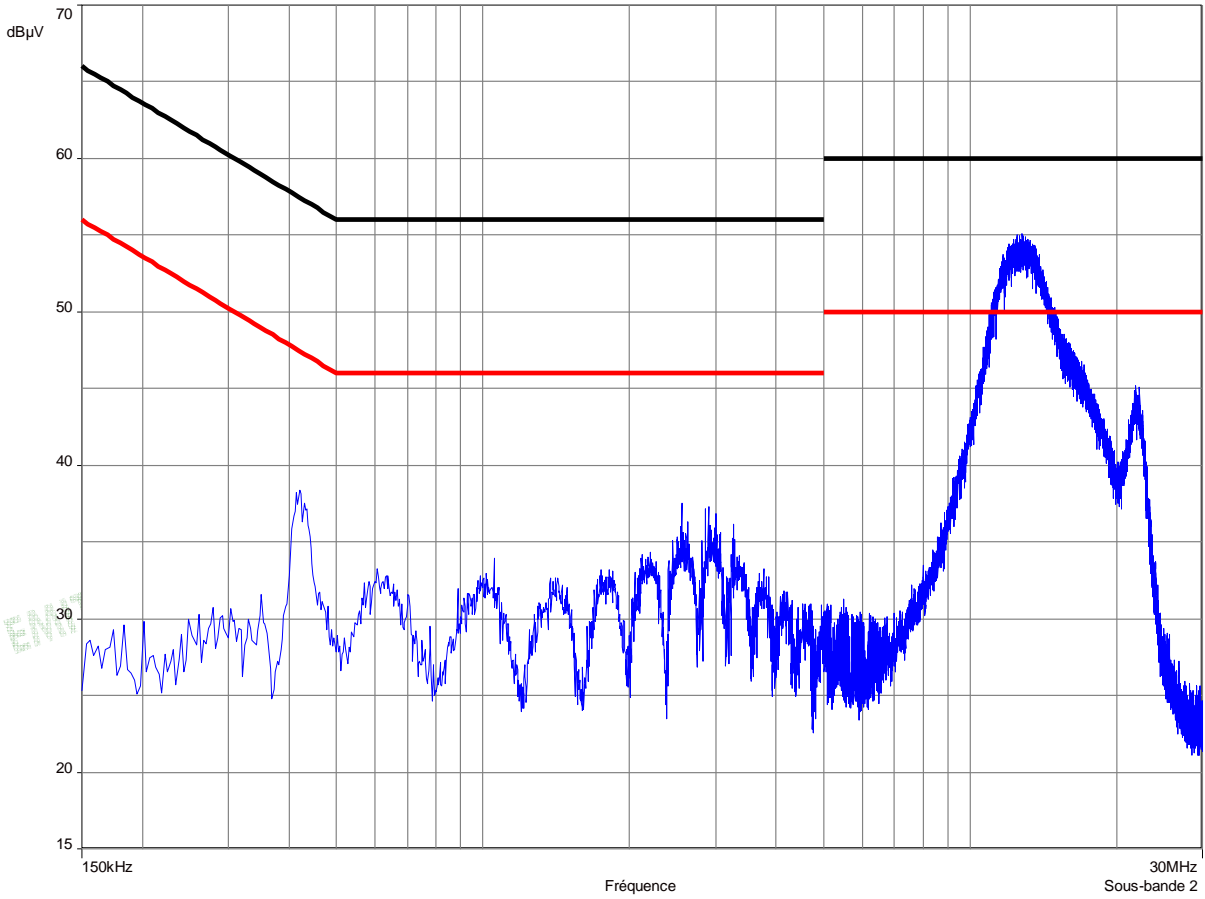


RBW filter: 10 kHz
VBW filter: 10 kHz
Sweep time: 500 ms/MHz

CURVE N°6.:

Transmission mode

Measurement on the line with peak detection

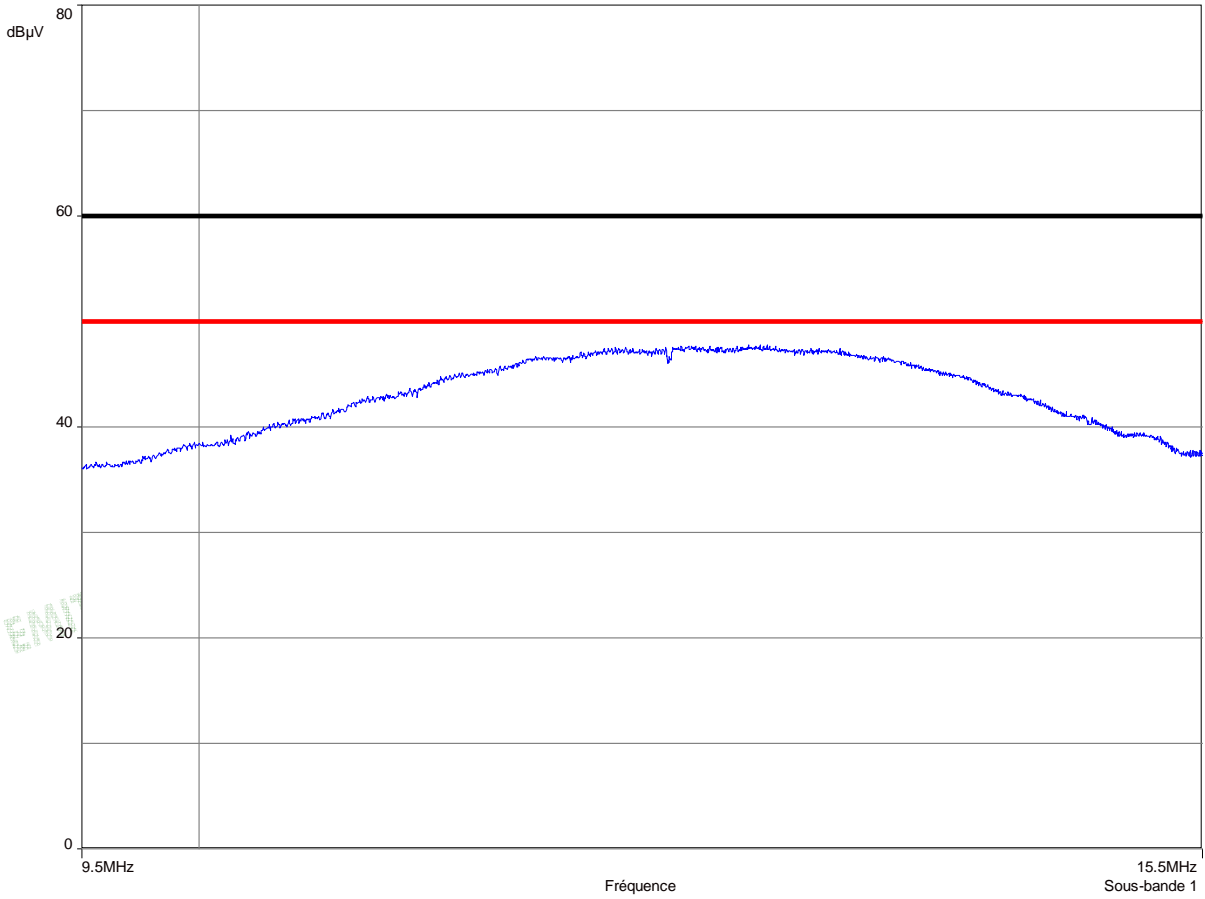


RBW filter: 10 kHz
VBW filter: 10 kHz
Sweep time: 500 ms/MHz

CURVE N°7.:

Transmission mode

Measurement on the Neutral with average detection

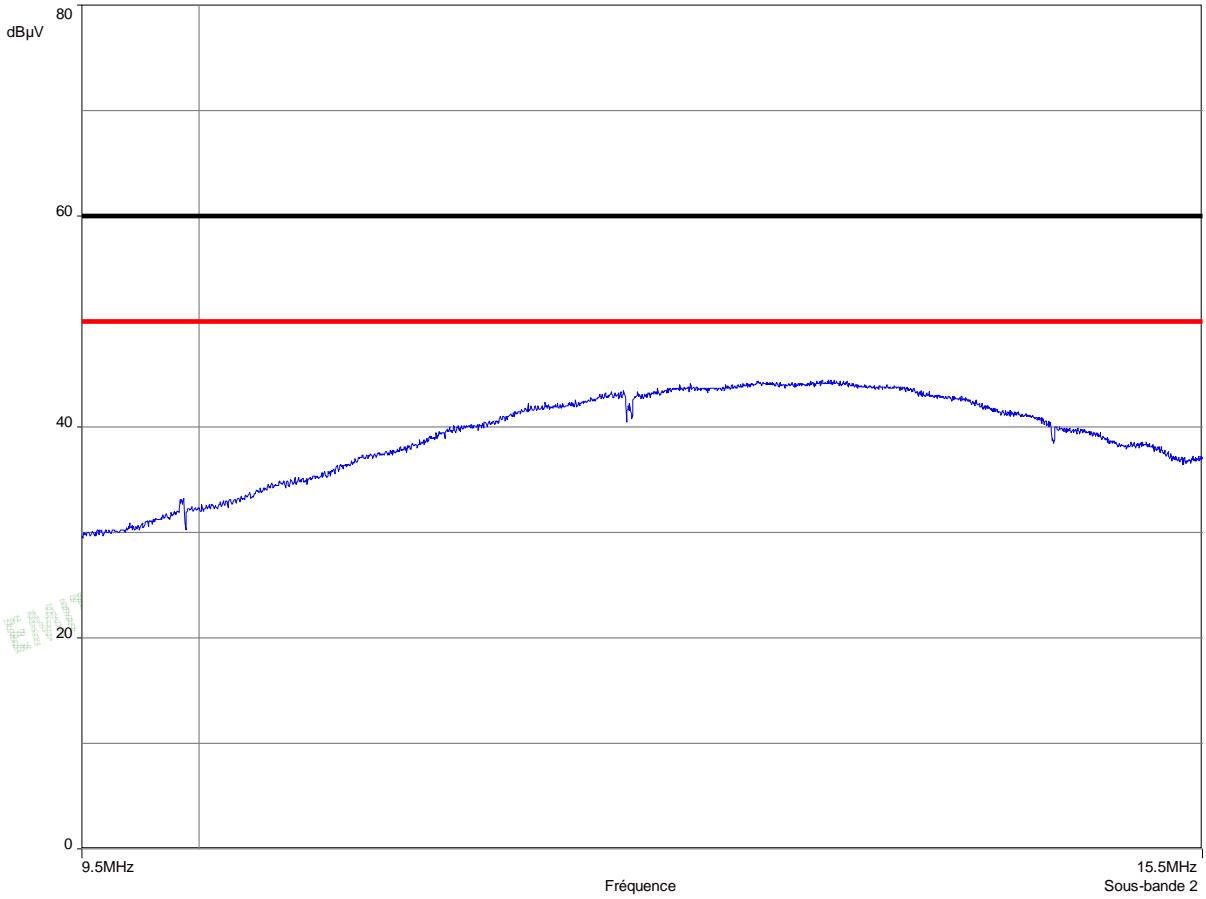


RBW filter: 9 kHz
Sweep time: 500 ms/MHz

CURVE N°8.:

Transmission mode

Measurement on the Line with average detection



RBW filter: 9 kHz
Sweep time: 500 ms/MHz

10. 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
Variac R213	Dereix	1419
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.

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.

Then 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 has been tested without RCA cable connected.

The equipment under test was the speaker with 433 MHz receiver inside.

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): 24.5

Relative humidity (%): 60

Power source: 115 Va.c through a variac

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): 115	63.13	4.97	28.61	96.71	0.852 x 10 ⁻³

Polarization of test antenna: vertical (height: 100 cm)

Position of equipment: up right position (azimuth: 348 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): 115	63.64	5.01	28.72	97.37	0.992 x 10 ⁻³

Polarization of test antenna: vertical (height: 100 cm)

Position of equipment: up right position (azimuth: 348 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): 115	61.80	5.06	28.84	95.70	0.676 x 10 ⁻³

Polarization of test antenna: vertical (height: 100 cm)

Position of equipment: up right position (azimuth: 348 degrees)

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

RESPECTED STANDARD

11. 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
Variac R213	Dereix	1419
Low-noise amplifier 18 to 26 GHz	ALC	3036
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 azimuth corresponds 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 has been tested without RCA cable connected.

The equipment under test was the speaker with 433 MHz receiver inside.

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): 28

Relative humidity (%): 54

Power source: 115 Va.c. through a variac

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

Not any intentional radiation 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 97.37 dB μ V/m on channel 40.

So the applicable limit is **77.37 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

12. 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
Variac R213	Dereix	1419
Multimeter 77-2	Fluke	0812

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 under test has been tested without RCA cable connected.
 The equipment under test was the speaker with 433 MHz receiver inside.
 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	96.71	Peak	2359.11	-43.70	53.01 (1)	73.98	20.97
2480	95.70	peak	2483.96	-42.61	53.09 (1)	73.98	20.89

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

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

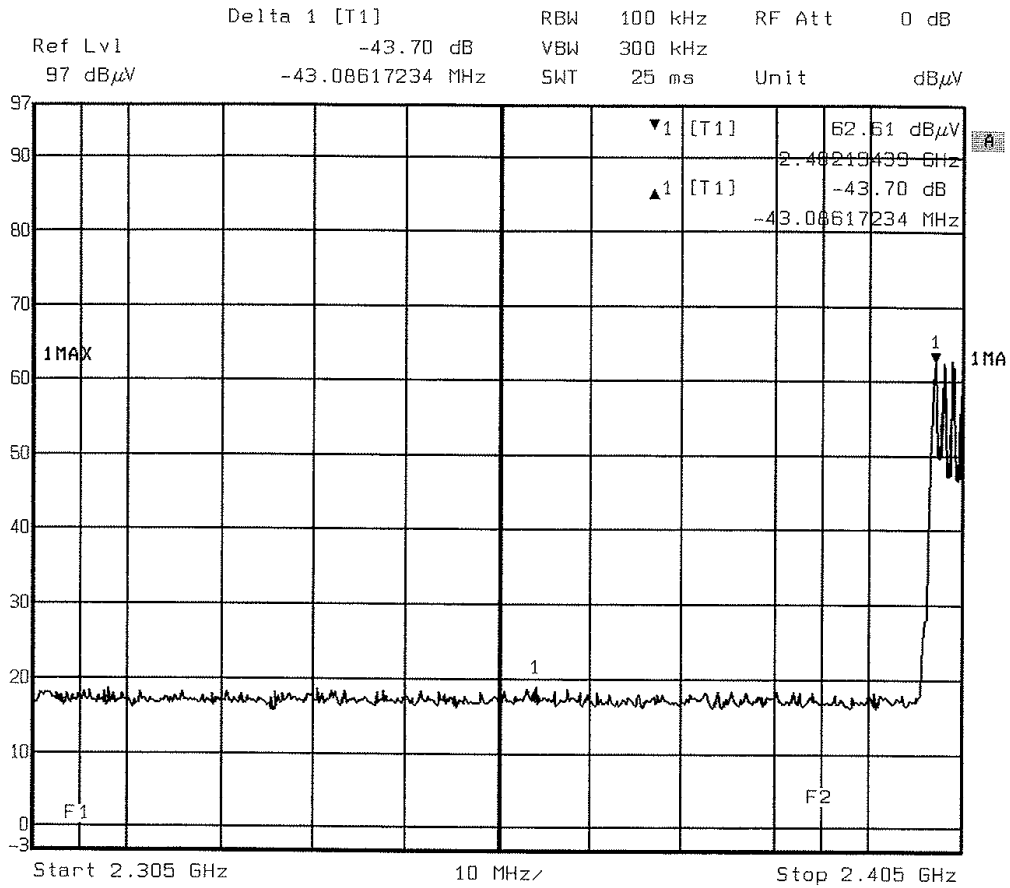
$$\text{Calculated Emission Level} = \text{Field Strength Level} - \text{Delta Marker Level}$$

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

Test conclusion:

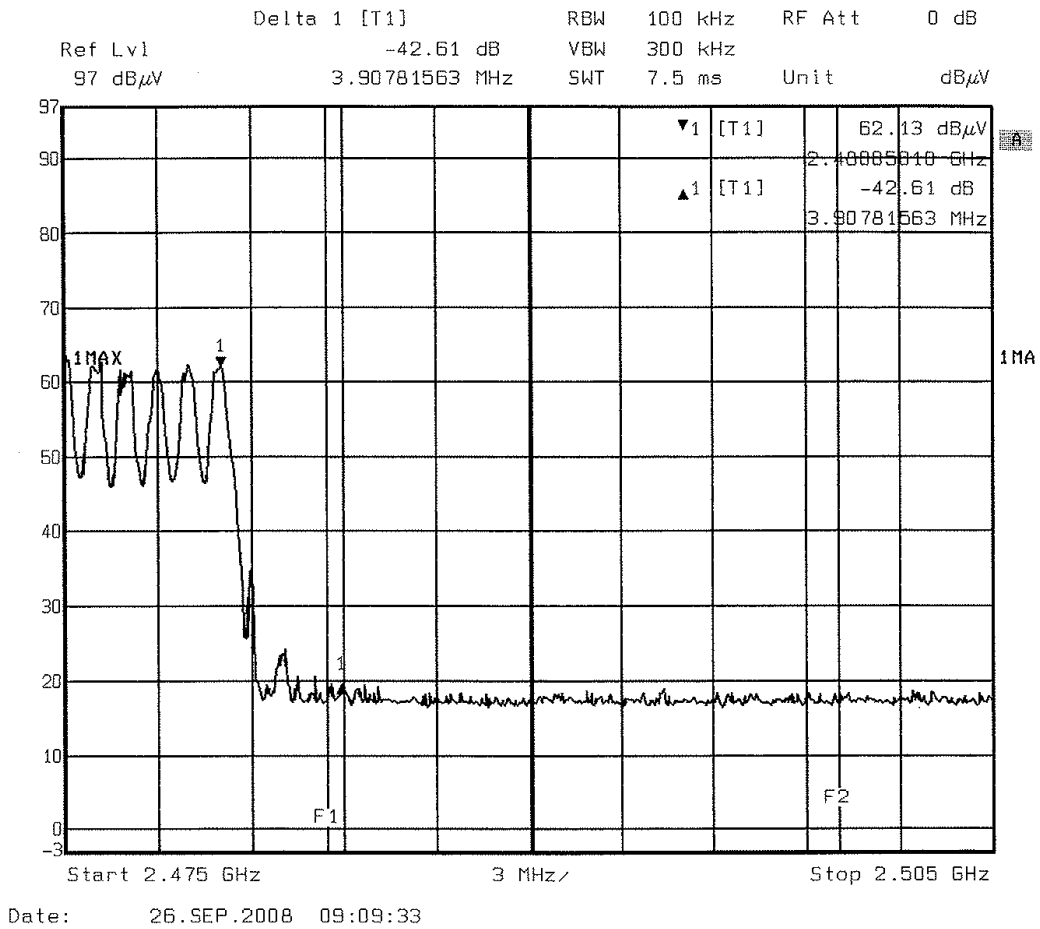
RESPECTED PUBLIC NOTICE

CURVE N°1:



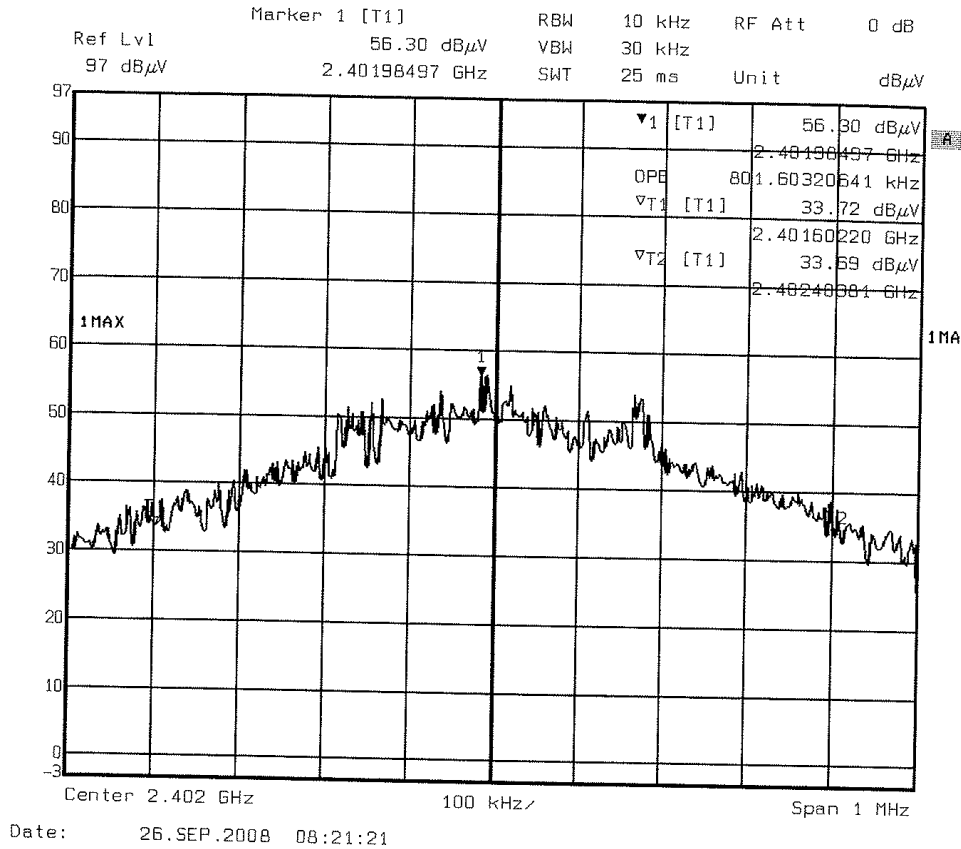
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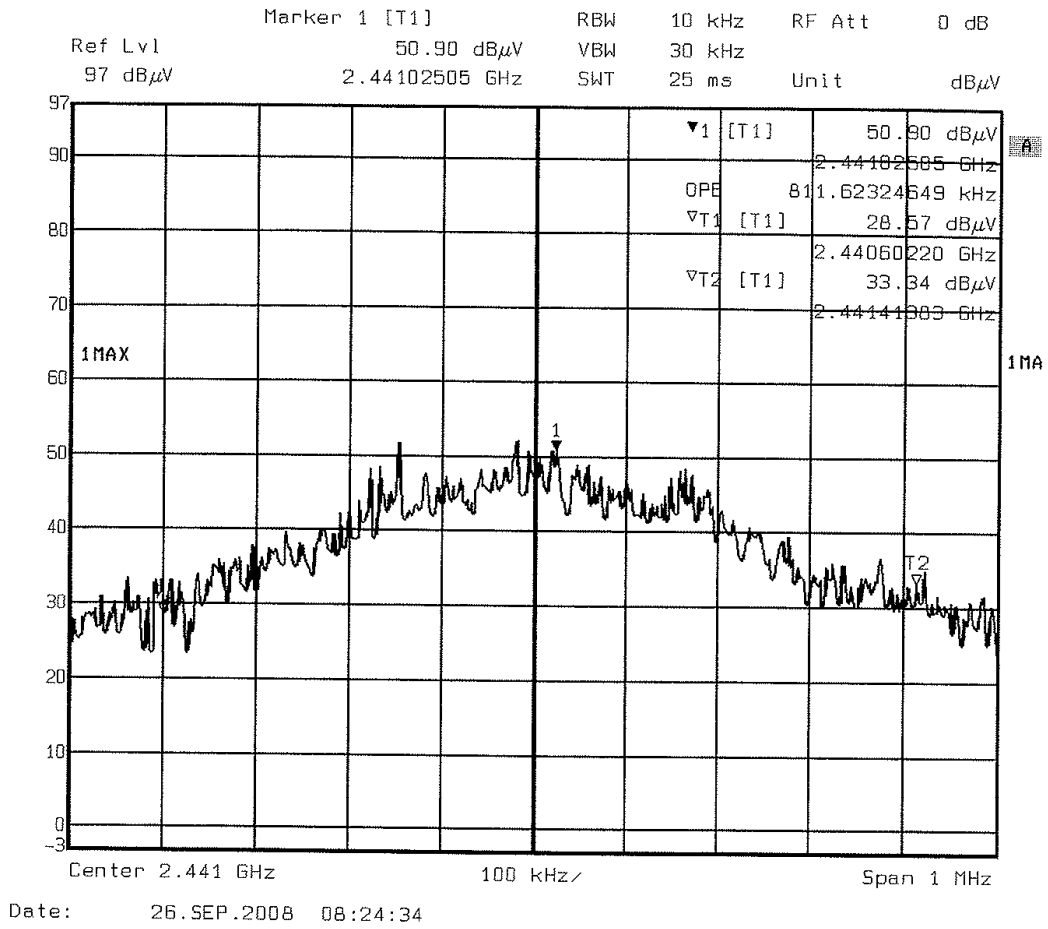
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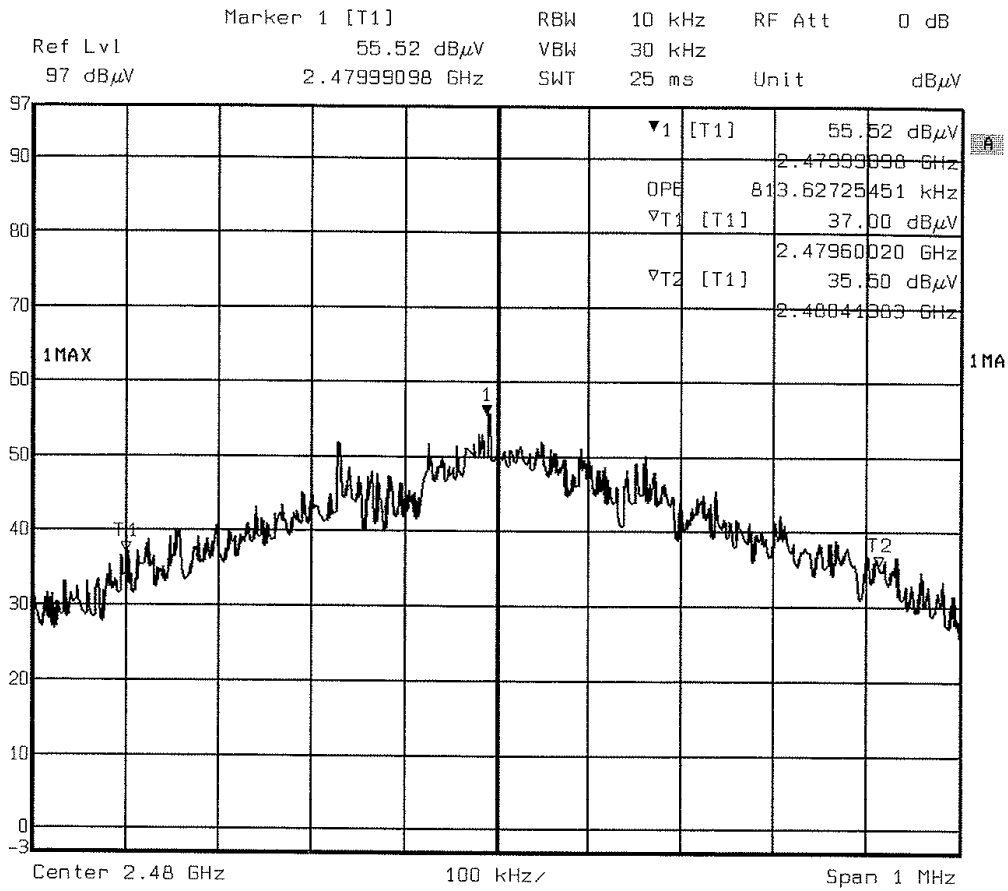


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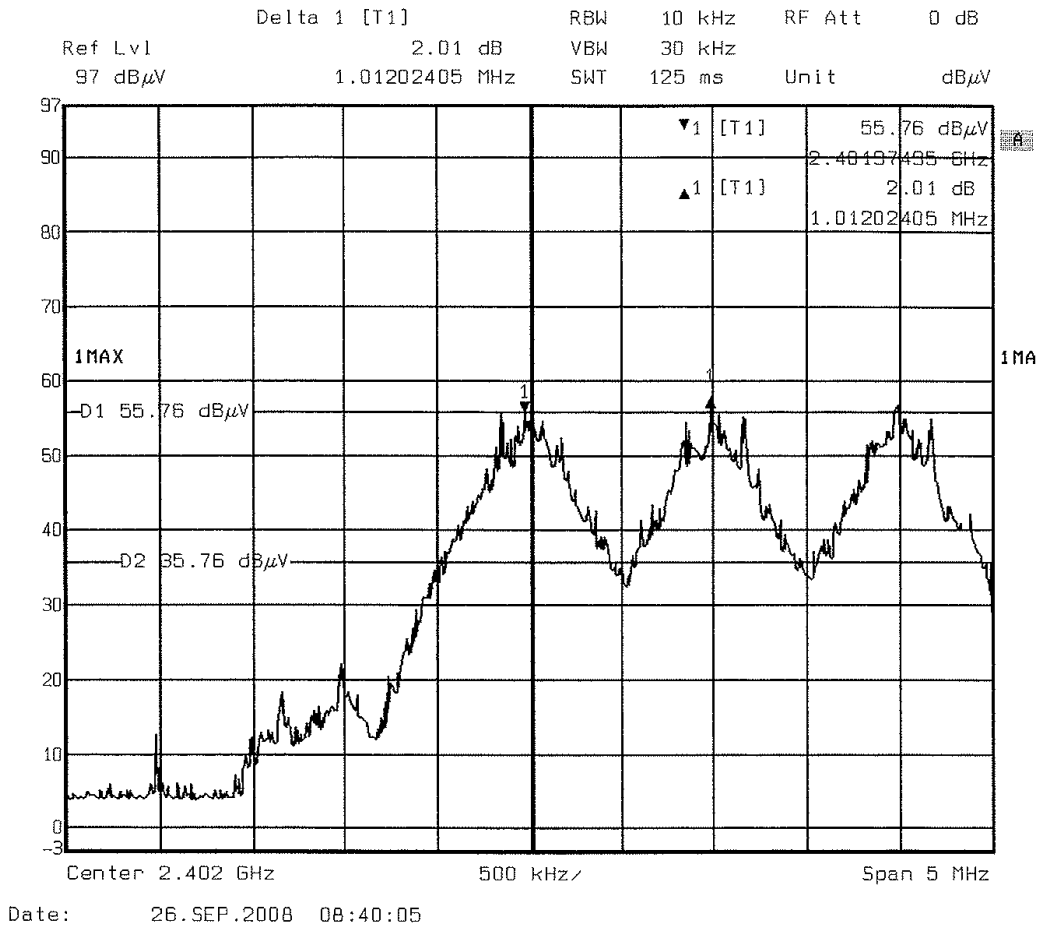
ANNEX 1: OCCUPIED BANDWIDTH AND CHANNEL SEPARATION

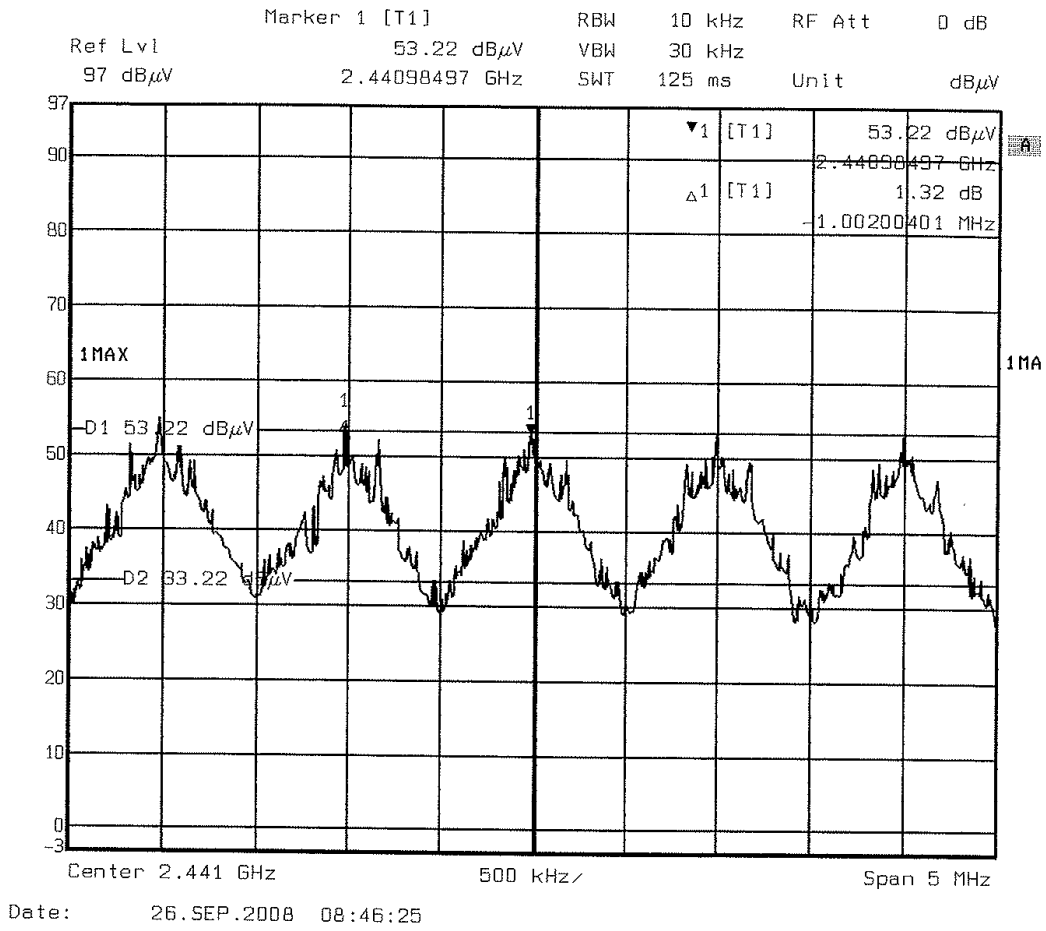


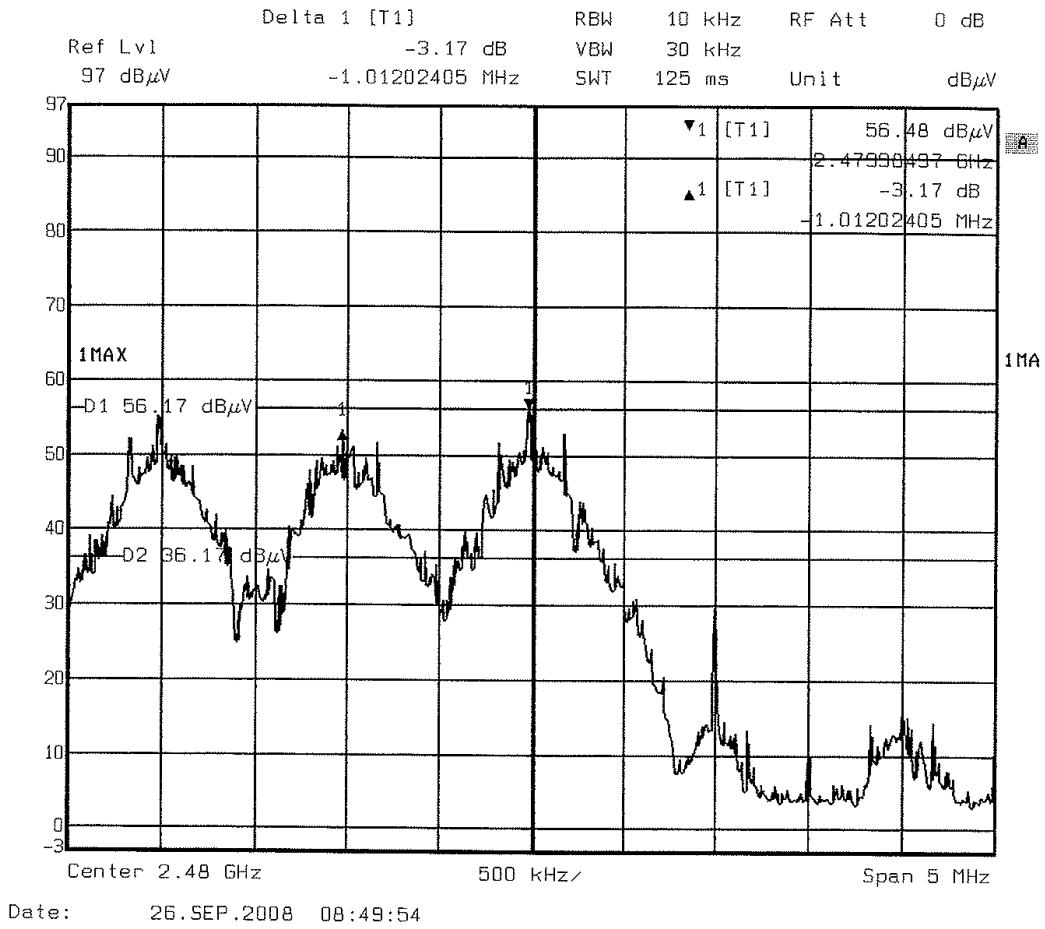




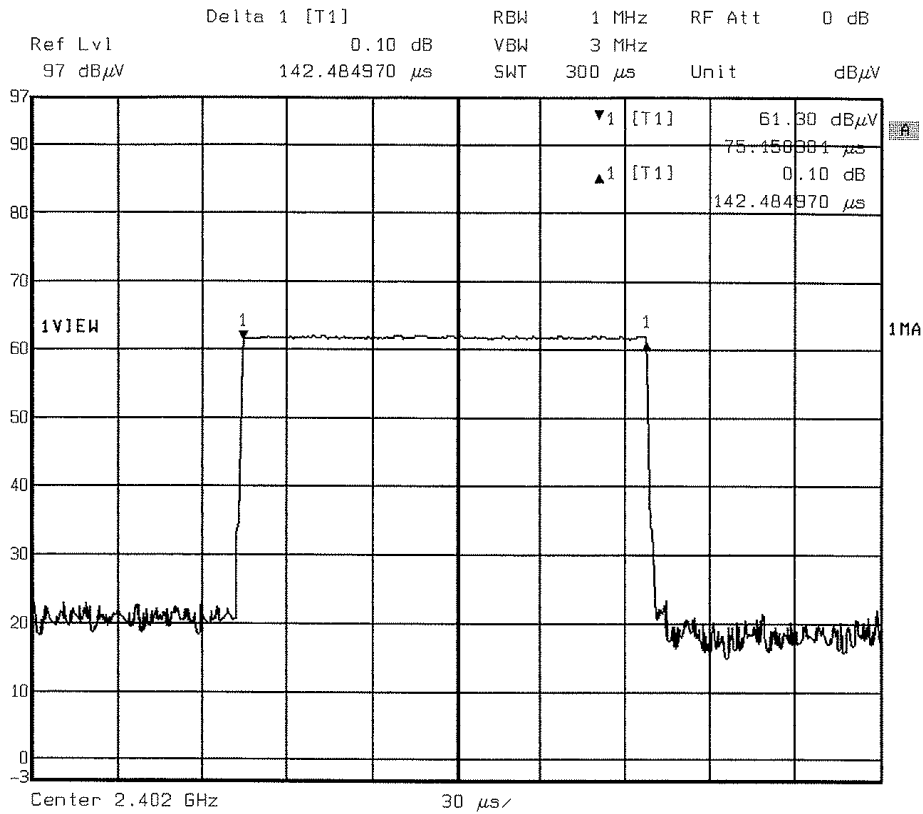
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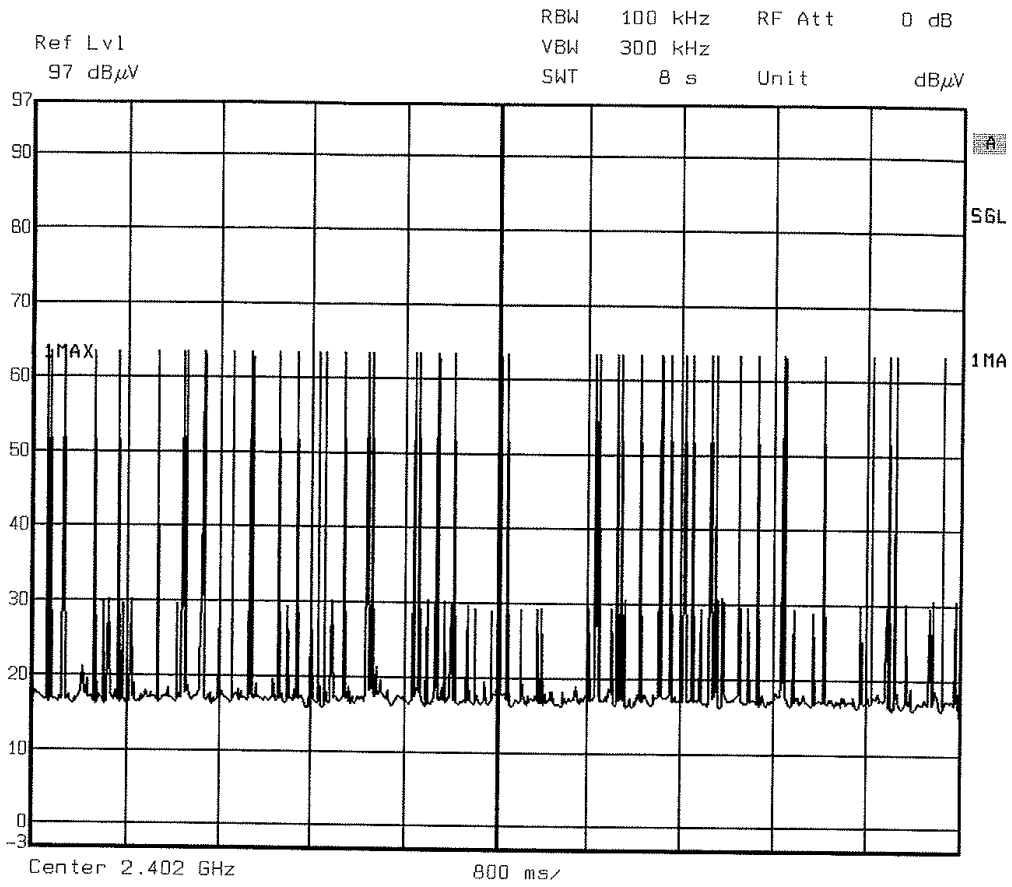




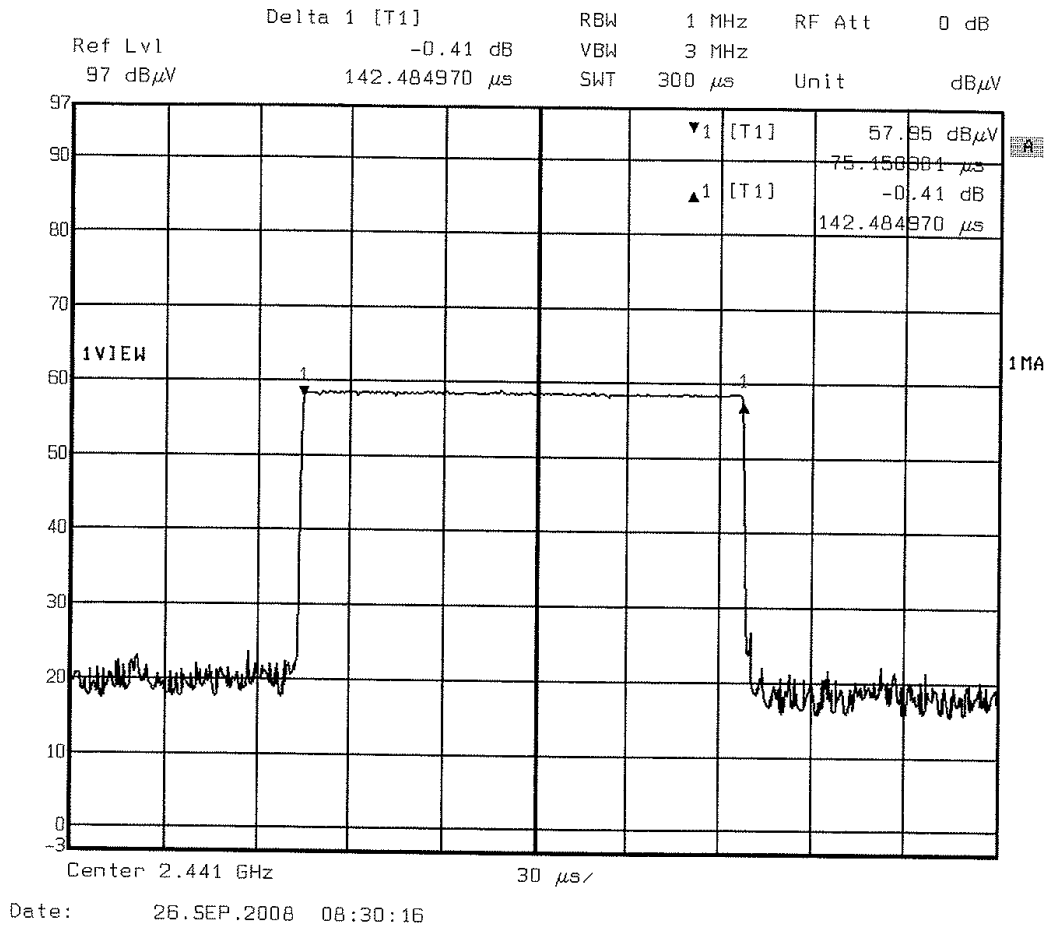
ANNEX 2: AVERAGE TIME OF OCCUPANCY ON ANY FREQUENCY

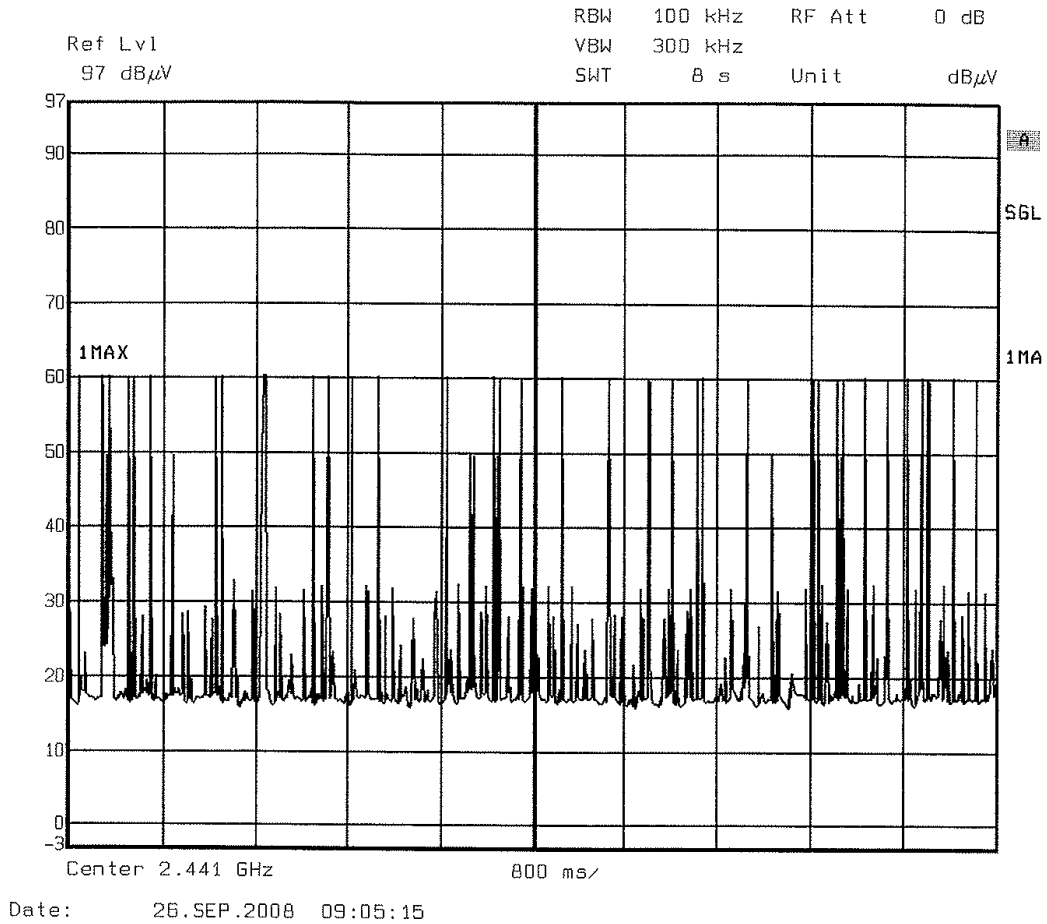


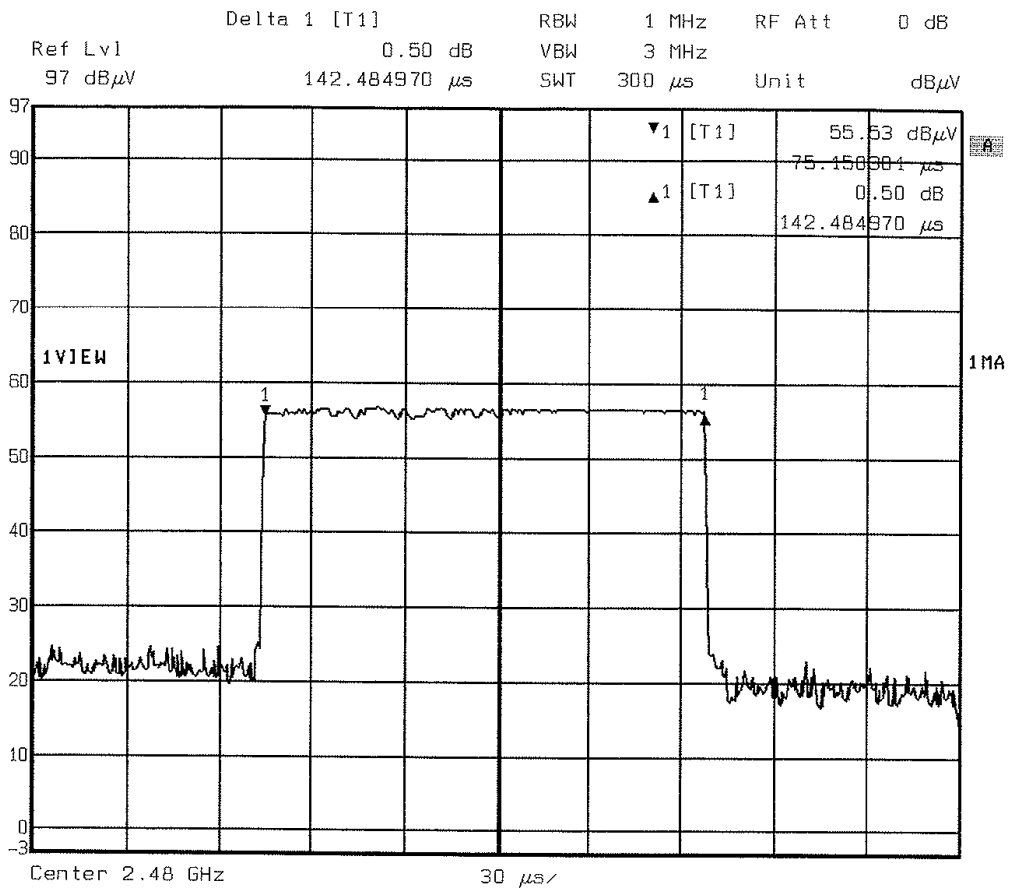
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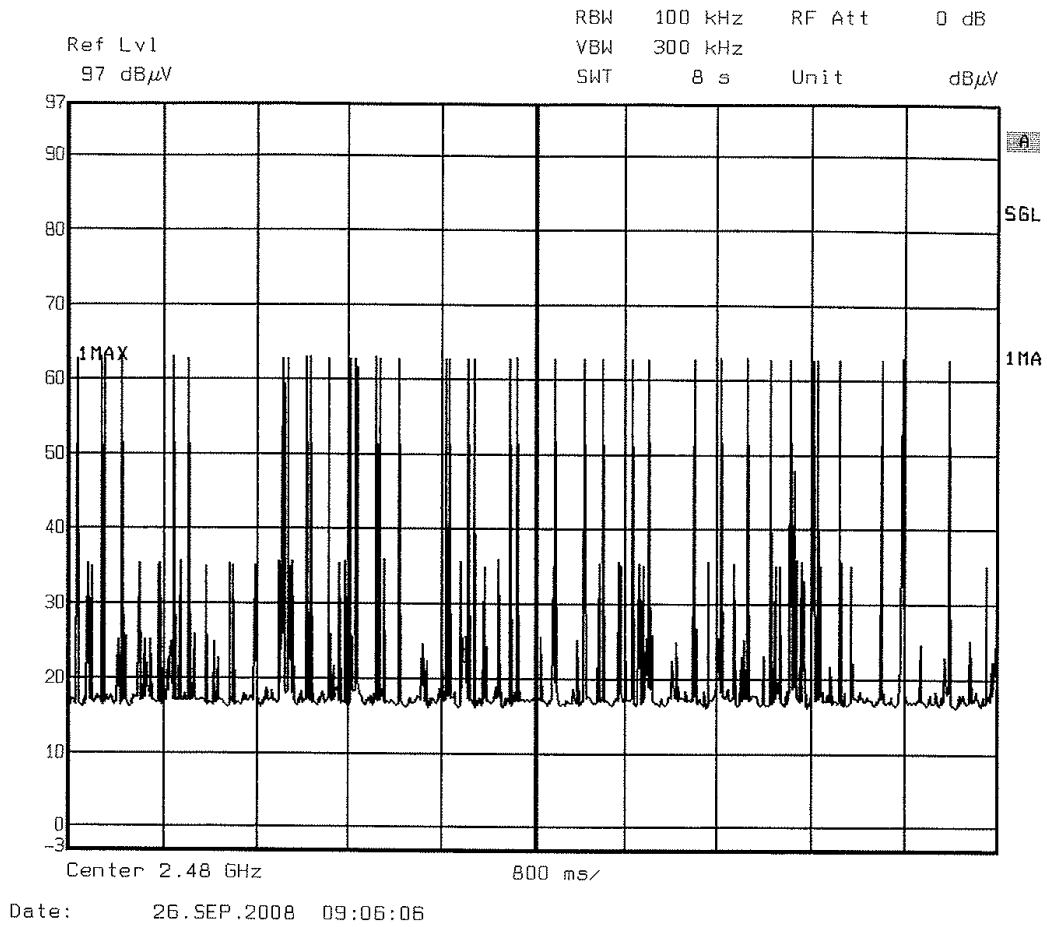
Date: 26.SEP.2008 09:04:21



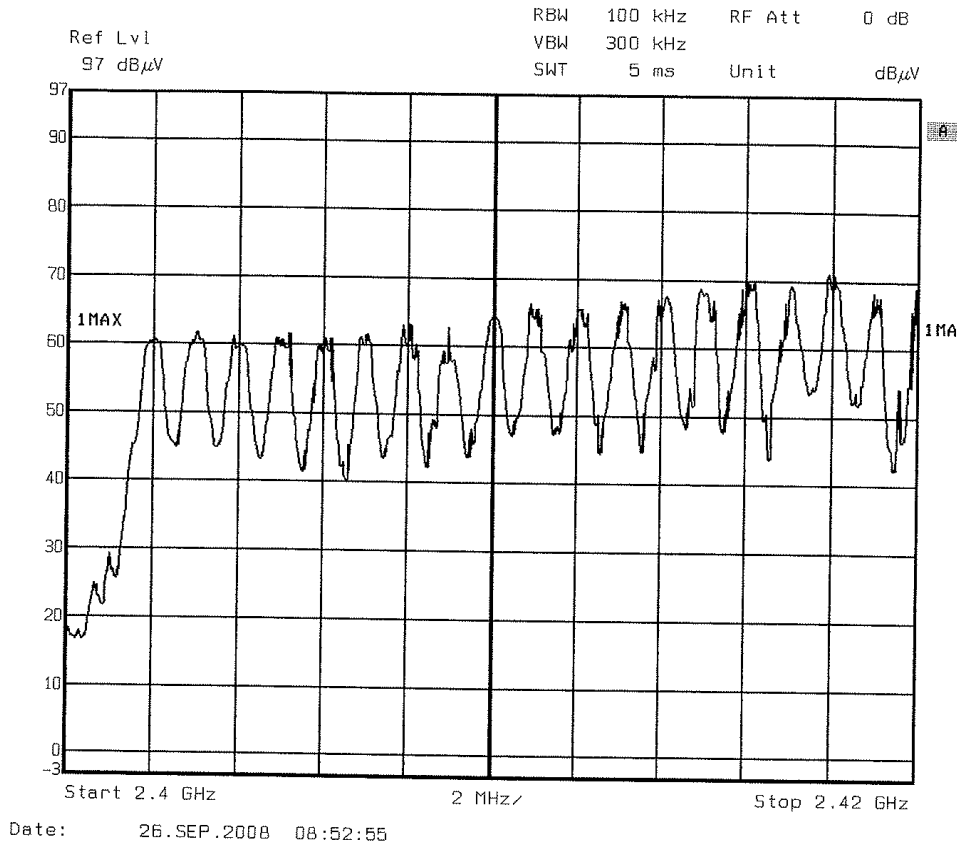


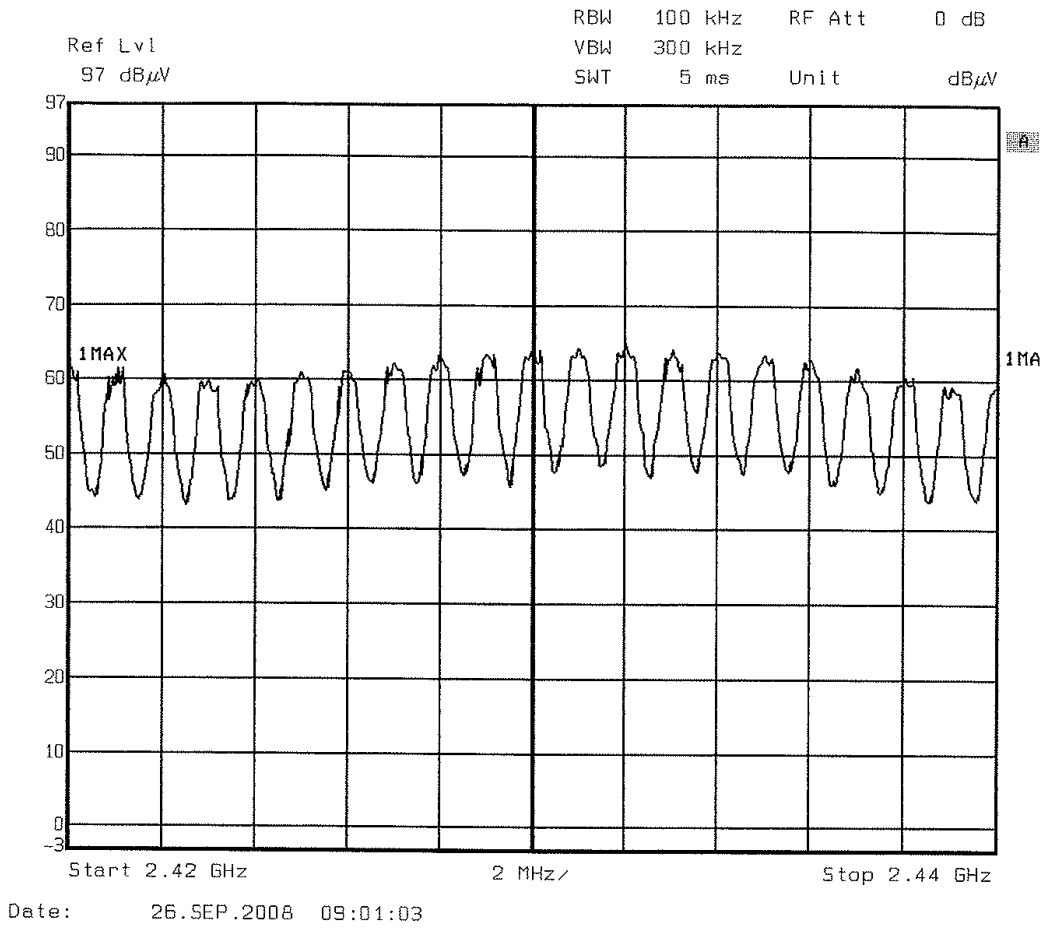


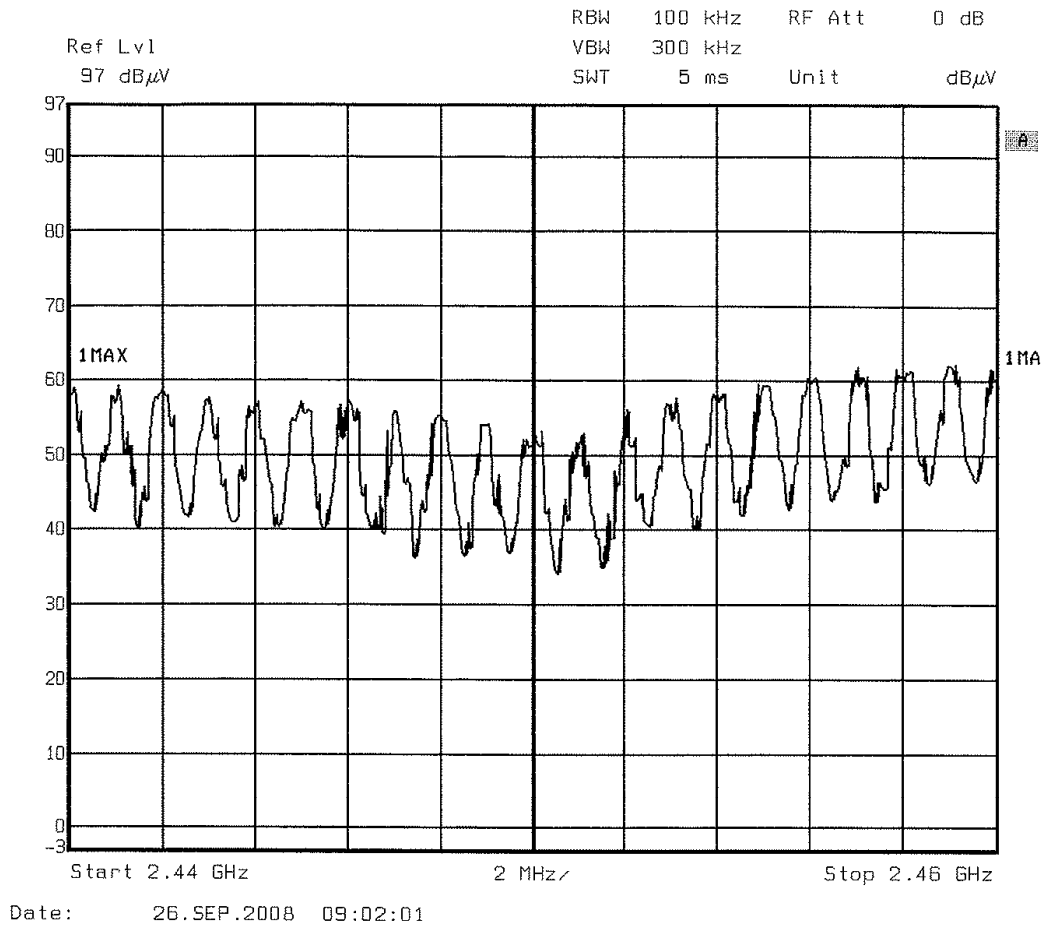
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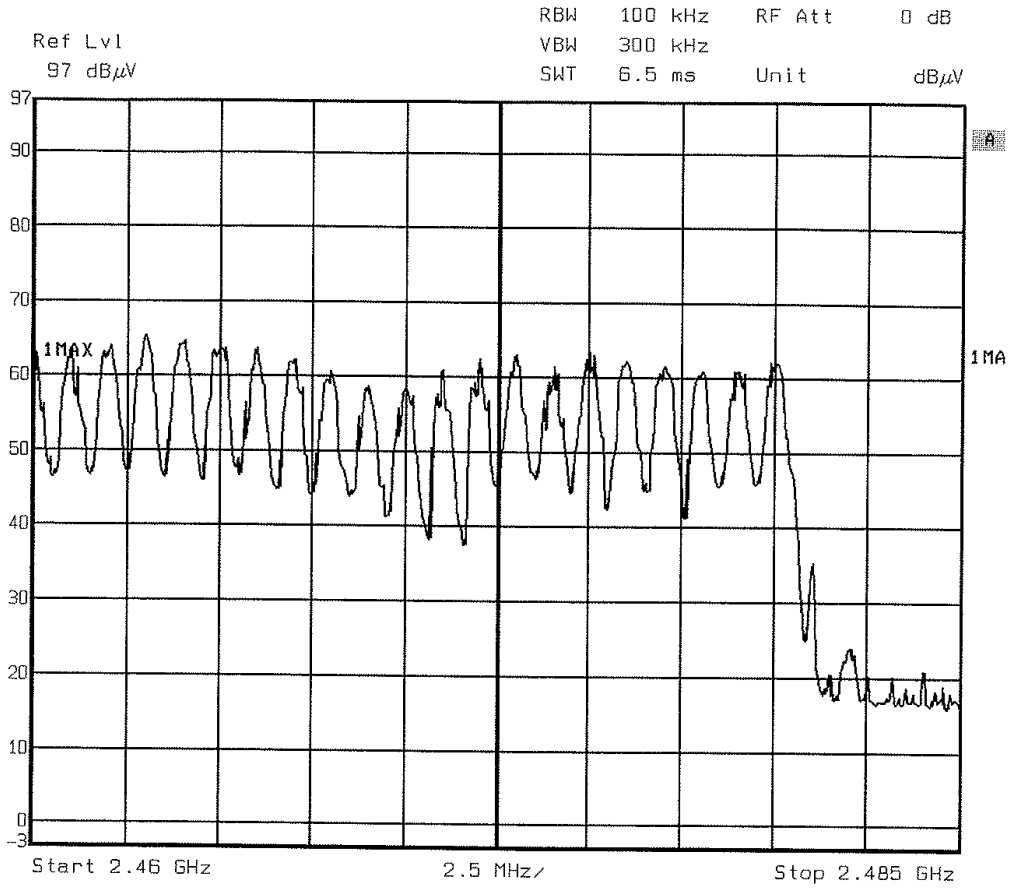


ANNEX 3: NUMBER OF HOPPING FREQUENCIES









Date: 26.SEP.2008 09:03:00

ANNEX 4: PHOTOS OF THE EQUIPMENT UNDER TEST

SPEAKER WITH 433 MHz RECEIVER INSIDE

GENERAL VIEW





EMITECH

EMITECH



EMITECH

CH

RA-24-08102812-6

INTERNAL VIEW



RA-24-08102812-6

Printed circuit board: face 1



Printed circuit board: face 2



SPEAKER WITH 433 MHz RECEIVER INSIDE

GENERAL VIEW



EMITECH

EMITECH

EMITECH

EMITECH

EMITECH

EMITECH

EMITECH

EMITECH



INTERNAL VIEW



EMITECH

EMITECH

EMITECH

EMITECH

EMITECH

EMITECH

Printed circuit board: face 1



Printed circuit board: face 2



ANNEX 5: TEST SET UP AND OPEN AREA TEST SITE

TEST SET UP FOR RADIATED MEASUREMENT (SPEAKER WITH 433 MHz RECEIVER INSIDE)



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EMITECH

TEST SET UP FOR CONDUCTED MEASUREMENT



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EMITECH

EMITECH

EMITECH

EMITECH

TEST SET UP FOR RADIATED MEASUREMENT (SPEAKER WITHOUT 433 MHz RECEIVER INSIDE)



OPEN AREA TEST SITE

