



R051-24-11-103569-3/A Ed. 0

<p>RADIO test report</p> <p>according to standard: FCC Part 15 2011</p> <p>Equipment under test: FLYING DRONE WITH WIFI LINK MODEL: AR DRONE 2.0</p> <p>FCC ID: RKXMYKONOS2</p> <p>Company: PARROT</p>

DISTRIBUTION: Mr BEN YACOUB

Company: PARROT

Number of pages: 42 including 5 annexes

Ed.	Date	Modified pages	Written by		Technical Verification Quality Approval	
			Name	Visa	Name	Visa
0	29-Nov-11	Creation	L. BERTHAUD	LB	<i>Under verification</i>	

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: FLYING DRONE WITH WIFI LINK

Reference / model: AR DRONE 2.0

Serial number: PF721000P11J000384

MANUFACTURER: PARROT

COMPANY SUBMITTING THE PRODUCT:

Company: PARROT

Address: 174 quai de Jemmapes
75010 PARIS
FRANCE

Responsible: Mr BEN YACOUB

DATE(S) OF TEST: 07, 08 and 09 November 2011

TESTING LOCATION: EMITECH ATLANTIQUE laboratory at ANGERS (49) FRANCE
EMITECH ATLANTIQUE open area test site in LA POUEZE (49)
FRANCE
FCC Registration Number: 101696 / FRN: 0006649008

TESTED BY: L. BERTHAUD

CONTENTS

TITLE	PAGE
1. INTRODUCTION.....	4
2. PRODUCT DESCRIPTION	4
3. NORMATIVE REFERENCE.....	5
4. TEST METHODOLOGY	5
5. TEST EQUIPMENT CALIBRATION DATES.....	6
6. TESTS AND CONCLUSIONS	7
6.1 unintentional radiator (subpart B)	7
6.2 intentional radiator (subpart C)	7
7. RADIATED EMISSION LIMITS.....	9
8. ADDITIONAL PROVISIONS TO THE GENERAL RADIATED EMISSION LIMITATIONS	11
9. MAXIMUM PEAK OUTPUT POWER	13
10. INTENTIONAL RADIATOR	17
11. PEAK POWER DENSITY.....	20
ANNEX 1: 6 dB BANDWIDTH.....	24
ANNEX 2: BAND-EDGE	29
ANNEX 3: 20 dB BANDWIDTH.....	35
ANNEX 4: TEST SET UP	40
ANNEX 5: PHOTOS OF THE EQUIPMENT UNDER TEST	41

1. INTRODUCTION

This document presents the result of RADIO test carried out on the following equipment: FLYING DRONE WITH WIFI LINK-MODEL: AR DRONE 2.0 in accordance with normative reference.

2. PRODUCT DESCRIPTION

ITU Emission code:	20M0F7D
Class:	B (residential environment)
Utilization:	Quadricopter for entertainment purpose
Antenna type and gain:	internal PCB antenna (-0.6 dBi)
Operating frequency range:	from 2412 MHz to 2472 MHz
Number of channels:	13
Channel spacing:	5 MHz
Frequency generation:	synthesizer
Modulation:	QPSK/OFDM
Power source:	11.1 V (LiPo dedicated battery)

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 (2011)	Radio Frequency Devices
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.
KDB Publication 558074 (2005)	Measurement of Digital Transmission Systems Operating under Section 15.247

4. TEST METHODOLOGY

Radio performance tests procedures given in part 15:

Subpart B –Unintentional Radiators

Paragraph 107: Conducted limits

Paragraph 109: Radiated emission limits

Paragraph 111: Antenna power conduction limits for receivers

Subpart C – Intentional Radiators

Paragraph 203: Antenna requirement

Paragraph 205: Restricted bands of operation

Paragraph 207: Conducted limits

Paragraph 209: Radiated emission limits; general requirements

Paragraph 212: Modular transmitter

Paragraph 215: Additional provisions to the general radiated emission limitations

Paragraph 247: Operation within the bands 902-928 MHz, 2400-2483.5 MHz and 5725-5850 MHz

5. TEST EQUIPMENT CALIBRATION DATES

Equipment	Model	Type	Last verification	Next verification	Validity
728	HP 11966C	Biconical antenna	18/11/2008	18/11/2012	17/01/2013
812	Fluke 77-2	Multimeter	22/03/2011	22/03/2013	21/05/2013
1058	R&S ESH3	Test receiver	24/01/2011	24/01/2013	25/03/2013
1204	Electrometrics EM-6961	Guide antenna	30/05/2008	30/05/2012	29/07/2012
1219	R&S ESVS10	Test receiver	14/06/2011	14/06/2013	13/08/2013
1274	Emitech	OATS	28/01/2010	28/01/2012	28/03/2012
1406	Emco 6502	Loop antenna	13/01/2011	13/01/2013	14/03/2013
1999	R&S HL223	Log periodic antenna	18/11/2008	18/11/2012	17/01/2013
2648	ALC ALN02-0032	Low-noise amplifier	19/07/2011	19/07/2012	17/09/2012
3182	Giga-Tronics 80401A	Power sensor	28/05/2010	28/05/2012	27/07/2012
3479	Giga-Tronics 8541	Power meter	28/05/2010	28/05/2012	27/07/2012
4088	R&S FSP40	Spectrum analyzer	16/12/2009	16/12/2011	14/02/2012
4195	HP E3610A	Power source	/	/	*
6609	Microtronics HPM11630	1 GHz high-pass filter	21/03/2011	21/03/2013	20/05/2013
8262	Filtek HP12/3200-5AA	3.2 GHz high-pass filter	11/05/2011	11/05/2013	10/07/2013

** The equipment is not verified; instead, the output voltage is checked before each measurement with the calibrated multimeter.*

DRAFT

6. TESTS AND CONCLUSIONS

6.1 unintentional radiator (subpart B)

Test procedure	Description of test	Respected criteria?				Comment
		Yes	No	NAp	NAs	
FCC Part 15.107	CONDUCTED LIMITS			X		
FCC Part 15.109	RADIATED EMISSION LIMITS	X				
FCC Part 15.111	ANTENNA POWER CONDUCTED LIMITS FOR RECEIVER			X		

NAp: Not Applicable

NAs: Not Asked

6.2 intentional radiator (subpart C)

Test procedure	Description of test	Respected criteria?				Comment
		Yes	No	NAp	NAs	
FCC Part 15.203	ANTENNA REQUIREMENT	X				<i>Note 1</i>
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				<i>Note 2</i>
FCC Part 15.212	MODULAR TRANSMITTERS			X		
FCC part 15.215	ADDITIONAL PROVISIONS TO THE GENERAL RADIATED EMISSION LIMITATIONS					
	(a) Alternative to general radiated emission limits	X				
	(b) Unwanted emissions outside of §15.247 frequency bands	X				<i>Note 3</i>
	(c) 20 dB bandwidth and band-edge compliance	X				
FCC Part 15.247	OPERATION WITHIN THE BANDS 902-928 MHZ, 2400-2483.5 MHz and 5725-5850 MHz					
	(a) (1) Hopping systems			X		
	(a) (2) Digital modulation techniques	X				<i>Note 4</i>
	(b) Maximum peak output power	X				<i>Note 5</i>
	(c) Operation with directional antenna gains > 6 dBi			X		
	(d) Intentional radiator	X				
	(e) Peak power spectral density	X				
	(f) Hybrid system			X		
	(g) Frequency hopping requirements			X		
	(h) Frequency hopping intelligence			X		
	(i) RF exposure compliance	X				<i>Note 6</i>

NAp: Not Applicable

NAs: Not Asked

Note 1: Integral antenna.

Note 2: See FCC part 15.247 (d).

Note 3: See FCC part 15.209. Unwanted emissions levels are all below the fundamental emission field strength level.

Note 4: The minimum 6 dB bandwidth of the equipment is 9500 kHz (see annex 1).

Note 5: Conducted measurement is not possible (integral antenna), so we used the radiated method in open field.

*Note 6: $PSD = E.I.R.P. / 4 * \pi * R^2 = 50.12 \text{ mW} / 4 * \pi * (20 \text{ cm})^2 = 0.2 \text{ mW/cm}^2$ (limit= 1 mW/cm²).
The equipment fulfils the requirements on power density for general population/uncontrolled exposure and therefore fulfils the requirements of 47 CFR §1.1310.*

Conclusion:

The sample of FLYING DRONE WITH WIFI LINK-MODEL: AR DRONE 2.0 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. RADIATED EMISSION LIMITS

Standard: FCC Part 15

Test procedure: paragraph 109

Limit class: Class B

Test equipments:

TYPE	BRAND	EMITECH NUMBER
Test receiver ESVS10	Rohde & Schwarz	1219
Spectrum analyzer FSP40	Rohde & Schwarz	4088
Loop antenna 6502	EMCO	1406
Biconical antenna 11966 C	Hewlett Packard	0728
Log periodic antenna HL 223	Rohde & Schwarz	1999
Double ridged guide antenna EM 6961	Electrometrics	1204
Preamplifier 1 to 18 GHz DB97-1852	DBS Microwave	2648
High pass filter HPM11630	Micro-tronics	6609
Open area test site	Emitech	1274
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, 0.8m from a ground plane. Zero degree azimuths correspond to the front of the device under test.

See photos in annex 4.

Frequency range: From 30 MHz to 5th harmonic of the highest frequency used (2472 MHz).

Detection mode: Quasi-peak (F < 1 GHz) Average (F > 1 GHz)

Bandwidth: 120 kHz (F < 1 GHz) 1 MHz (F > 1 GHz)

Distance of antenna: 3 / 10 meters

Antenna height: 1 to 4 meters

Antenna polarization: vertical and horizontal (only the highest level is recorded)

Equipment under test operating condition:

The equipment is blocked in standby / reception mode.
The 4 brushless motors are operating.

Results:

Ambient temperature (°C): 22
 Relative humidity (%): 69

Power source:

We used for power source the internal battery of the equipment and we noted:

Voltage at the beginning of test (V): 12.6
 Voltage at the end of test (V): 11.6
 Percentage of voltage drop during the test (%): 7.9

FREQUENCIES (MHz)	Detector P: Peak QP: Quasi-Peak	Antenna height (cm)	Azimuth (degree)	Polarization H: Horizontal V: Vertical	Field strength (dBµV/m)	Limits (dBµV/m)	Margin (dB)
265.93	QP	220	120	H	37.4	46	8.6
298.13	QP	215	0	H	37.3	46	8.7
314.68	QP	165	0	H	35.8	46	10.2
331.23	QP	160	0	H	36	46	10
547.86	QP	100	0	H	35.1	46	10.9

Note: any spurious which has more than 20 dB of margin compared to the applicable limit is not necessarily reported.

Test conclusion:

RESPECTED STANDARD

8. ADDITIONAL PROVISIONS TO THE GENERAL RADIATED EMISSION LIMITATIONS

Standard: FCC Part 15

Test procedure: Paragraph 15.215

Test equipments:

TYPE	MANUFACTURER	EMITECH NUMBER
Spectrum analyzer FSP 40	Rohde & Schwarz	4088
Double ridged guide antenna EM 6961	Electrometrics	1204
Power source E3610A	Hewlett Packard	1495
Multimeter 77-2	Fluke	0812

Test set up:

Test realized in near field. All field strength measurements are correlated with the radiated maximum peak output power

Test operating condition of the equipment:

The equipment under test is blocked in continuous transmission mode, modulated by internal data signal, at the highest output power level at which the transmitter is intended to operate.

Results:

Ambient temperature (°C): 20
Relative humidity (%): 49

Lower Band Edge: 2390 MHz
Upper Band Edge: 2483.5 MHz

Sample n°1: 802.11b

Fundamental frequency (MHz)	Field Strength Level of fundamental (dB μ V/m)	Detector (Peak or Average)	Frequency of maximum Band-edges Emission (MHz)	Delta Marker (dB)*	Calculated Max Out-of-Band Emission Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
2412	92.7	P	2353.3	51.7	41**	74	33
2472	94.1	P	2487	39.7	54.4	74	19.6
2472	85.4	A	2485.5	40.8	44.6	54	9.4

Sample n°1: 802.11g

Fundamental frequency (MHz)	Field Strength Level of fundamental (dB μ V/m)	Detector (Peak or Average)	Frequency of maximum Band-edges Emission (MHz)	Delta Marker (dB)*	Calculated Max Out-of-Band Emission Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
2412	95.4	P	2389.2	52.7	42.7	74	31.3
2472	93.1	P	2483.8	30.7	62.4	74	11.6
2472	83.4	A	2483.7	29.7	53.7	54	0.3

Sample n°1: 802.11n

Fundamental frequency (MHz)	Field Strength Level of fundamental (dB μ V/m)	Detector (Peak or Average)	Frequency of maximum Band-edges Emission (MHz)	Delta Marker (dB)*	Calculated Max Out-of-Band Emission Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
2412	90.1	P	2388.4	53.5	36.6**	74	37.4
2472	87.8	P	2483.8	29.4	58.4	74	15.6
2472	78.2	A	2483.8	29.1	49.1	54	4.9

* Marker-Delta method

** The peak level is lower than the average limit (54 dB μ V/m).

The band-edge and 20 dB bandwidth plots are given in annexes 2 and 3.

Test conclusion:

RESPECTED STANDARD

9. MAXIMUM PEAK OUTPUT POWER

Standard: FCC Part 15

Test procedure: paragraph 15.247 (b)

Test equipments:

TYPE	BRAND	EMITECH NUMBER
Spectrum analyzer FSP40	Rohde & Schwarz	4088
Double ridged guide antenna EM 6961	Electrometrics	1204
Power meter 8541B	Gigatronics	3479
Power sensor 80401A	Gigatronics	3182
Open area test site	Emitech	1274
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, 0.8m from a ground plane. Zero degree azimuth corresponds to the front of the device under test.

The measurement of the electro-magnetic field is realized, with a calibrated peak power responding power meter (Power Output Option 2 of KDB Publication 558074).

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

Results:

Ambient temperature (°C): 21.5
 Relative humidity (%): 69

Power source:

We used for power source the internal battery of the equipment and we noted:

Voltage at the beginning of test (V): 12.6
 Voltage at the end of test (V): 12.1
 Percentage of voltage drop during the test (%): 4

Sample n° 1

802.11b highest data rate

Channel 1

	Level (dBµV)	Cable loss (dB)	Antenna factor (dB)	Electro-magnetic field (dBµV/m):	Conducted power * (W)	Limit (W)
Normal test conditions	70.7	28.9	5.5	105.1	11.16 x 10 ⁻³	1

Polarization of test antenna: vertical (height: 110 cm)

Position of equipment: see annex 4 (azimuth: 280 degrees)

Channel 6

	Level (dBµV)	Cable loss (dB)	Antenna factor (dB)	Electro-magnetic field (dBµV/m):	Conducted power * (W)	Limit (W)
Normal test conditions	71.7	28.9	5.5	106.1	14.05 x 10 ⁻³	1

Polarization of test antenna: vertical (height: 105 cm)

Position of equipment: see annex 4 (azimuth: 285 degrees)

Channel 13

	Level (dBµV)	Cable loss (dB)	Antenna factor (dB)	Electro-magnetic field (dBµV/m):	Conducted power * (W)	Limit (W)
Normal test conditions	71.5	28.9	5.5	105.9	13.42 x 10 ⁻³	1

Polarization of test antenna: vertical (height: 185 cm)

Position of equipment: see annex 4 (azimuth: 130 degrees)

802.11g highest data rate

Channel 1

	Level (dBμV)	Cable loss (dB)	Antenna factor (dB)	Electro-magnetic field (dBμV/m):	Conducted power * (W)	Limit (W)
Normal test conditions	78.1	28.9	5.5	112.5	61.32×10^{-3}	1

Polarization of test antenna: horizontal (height: 140 cm)

Position of equipment: see annex 4 (azimuth: 210 degrees)

Channel 6

	Level (dBμV)	Cable loss (dB)	Antenna factor (dB)	Electro-magnetic field (dBμV/m):	Conducted power * (W)	Limit (W)
Normal test conditions	76.9	28.9	5.5	111.3	46.52×10^{-3}	1

Polarization of test antenna: horizontal (height: 110 cm)

Position of equipment: see annex 4 (azimuth: 200 degrees)

Channel 13

	Level (dBμV)	Cable loss (dB)	Antenna factor (dB)	Electro-magnetic field (dBμV/m):	Conducted power * (W)	Limit (W)
Normal test conditions	76	28.9	5.5	110.4	37.81×10^{-3}	1

Polarization of test antenna: horizontal (height: 140 cm)

Position of equipment: see annex 4 (azimuth: 220 degrees)

802.11n highest data rate

Channel 1

	Level (dB μ V)	Cable loss (dB)	Antenna factor (dB)	Electro-magnetic field (dB μ V/m):	Conducted power * (W)	Limit (W)
Normal test conditions	74	28.9	5.5	108.4	23.86×10^{-3}	1

Polarization of test antenna: horizontal (height: 145 cm)

Position of equipment: see annex 4 (azimuth: 60 degrees)

Channel 6

	Level (dB μ V)	Cable loss (dB)	Antenna factor (dB)	Electro-magnetic field (dB μ V/m):	Conducted power * (W)	Limit (W)
Normal test conditions	73.7	28.9	5.5	108.1	22.26×10^{-3}	1

Polarization of test antenna: horizontal (height: 115 cm)

Position of equipment: see annex 4 (azimuth: 110 degrees)

Channel 13

	Level (dB μ V)	Cable loss (dB)	Antenna factor (dB)	Electro-magnetic field (dB μ V/m):	Conducted power * (W)	Limit (W)
Normal test conditions	72.9	28.9	5.5	107.3	18.52×10^{-3}	1

Polarization of test antenna: horizontal (height: 140 cm)

Position of equipment: see annex 4 (azimuth: 90 degrees)

* $P = (E \times d)^2 / (30 \times G_p)$ with $d = 3 \text{ m}$ and $G_p = -0.6 \text{ dBi}$ (declared by the applicant)

The measures have been repeated with the lowest data rate of each mode (b/g/n). No significant difference has been noticed (< 1 dB).

Test conclusion:

RESPECTED STANDARD

10. INTENTIONAL RADIATOR

Standard: FCC Part 15

Test procedure: paragraph 15.205, paragraph 15.209, paragraph 15.247 (d)

Test equipments:

TYPE	BRAND	EMITECH NUMBER
Test receiver ESH3	Rohde & Schwarz	1058
Test receiver ESVS10	Rohde & Schwarz	1219
Spectrum analyzer FSP40	Rohde & Schwarz	4088
Loop antenna 6502	EMCO	1406
Biconical antenna 11966 C	Hewlett Packard	0728
Log periodic antenna HL 223	Rohde & Schwarz	1999
Double ridged guide antenna EM 6961	Electrometrics	1204
Preamplifier 1 to 18 GHz DB97-1852	DBS Microwave	2648
High pass filter HP 12/3200-5AA	Filtek	8262
Open area test site	Emitech	1274
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, 0.8m from a ground plane. Zero degree azimuths correspond to the front of the device under test.

See photos in annex 4.

Frequency range: From 9 kHz to 10th harmonic of the highest fundamental frequency (2472 MHz).

Detection mode: Quasi-peak (F < 1 GHz) Peak / Average (F > 1 GHz)

Bandwidth: 120 kHz (F < 1 GHz) 100 kHz / 1 MHz (F > 1 GHz)

Distance of antenna: 3 / 10 meters

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

Results:

Ambient temperature (°C): 22
 Relative humidity (%): 69

Power source:

We used for power source the internal battery of the equipment and we noted:

Voltage at the beginning of test (V): 12.6
 Voltage at the end of test (V): 12.1
 Percentage of voltage drop during the test (%): 4

Sample n° 1

802.11b

Channel 1/ 6/ 13

FREQUENCIES (MHz)	Detector P: Peak QP: Quasi-Peak Av: Average	Antenna height (cm)	Azimuth (degree)	resolution bandwidth (kHz)	Polarization H: Horizontal V: Vertical	Field strength (dBµV/m)	Limits (dBµV/m)	Margin (dB)
265.93	QP	220	120	120	H	37.4	46*	8.6
298.13	QP	215	0	120	H	37.3	73.8	36.5
314.68	QP	165	0	120	H	35.8	73.8	38
331.23	QP	160	0	120	H	36	46*	10
547.86	QP	100	0	120	H	35.1	73.8	38.7

802.11g

Channel 1/ 6/ 13

FREQUENCIES (MHz)	Detector P: Peak QP: Quasi-Peak Av: Average	Antenna height (cm)	Azimuth (degree)	resolution bandwidth (kHz)	Polarization H: Horizontal V: Vertical	Field strength (dBµV/m)	Limits (dBµV/m)	Margin (dB)
265.93	QP	220	120	120	H	37.4	46*	8.6
298.13	QP	215	0	120	H	37.3	75.4	38.1
314.68	QP	165	0	120	H	35.8	75.4	39.6
331.23	QP	160	0	120	H	36	46*	10
547.86	QP	100	0	120	H	35.1	75.4	40.3

802.11n

Channel 1/ 6/ 13

FREQUENCIES (MHz)	Detector P: Peak QP: Quasi-Peak Av: Average	Antenna height (cm)	Azimuth (degree)	resolution bandwidth (kHz)	Polarization H: Horizontal V: Vertical	Field strength (dBμV/m)	Limits (dBμV/m)	Margin (dB)
265.93	QP	220	120	120	H	37.4	46*	8.6
298.13	QP	215	0	120	H	37.3	70.8	33.5
314.68	QP	165	0	120	H	35.8	70.8	35
331.23	QP	160	0	120	H	36	46*	10
547.86	QP	100	0	120	H	35.1	70.8	35.7

* restricted bands of operation in 15.205

Note: any spurious which has more than 20 dB of margin compared to the applicable limit is not necessarily reported.

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 93.8 dBμV/m (802.11b), 95.4 dBμV/m (802.11g) and 90.8 dBμV/m (802.11n).

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

11. PEAK POWER DENSITY

Standard: FCC Part 15

Test procedure: paragraph 15.247 (e)

Test equipments:

TYPE	MANUFACTURER	EMITECH NUMBER
Spectrum analyzer FSP40	Rohde & Schwarz	4088
Double ridged guide antenna EM 6961	Electrometrics	1204
Power meter 8541B	Gigatronics	3479
Power sensor 80401A	Gigatronics	3182
Open area test site	Emitech	1274
Multimeter 77-2	Fluke	0812

Test set up:

We used the same method of the peak output power measurement, but the equipment under test power level is recorded with the spectrum analyzer.

Resolution bandwidth: 3 kHz
Video bandwidth: 10 kHz

Equipment under test operating condition:

The equipment under test is blocked in continuous modulated transmission mode, at the highest output power level at which the transmitter is intended to operate.

Results:

Ambient temperature (°C): 21.5
 Relative humidity (%): 69

Power source:

We used for power source the internal battery of the equipment and we noted:

Voltage at the beginning of test (V): 12.6
 Voltage at the end of test (V): 12.1
 Percentage of voltage drop during the test (%): 4

Sample n° 1

802.11b highest data rate

Channel 1

	Peak power density at frequency: 2412 MHz
Normal test conditions	-16.6 dBm
Limits	+8 dBm

Channel 6

	Peak power density at frequency: 2437 MHz
Normal test conditions	-15.8 dBm
Limits	+8 dBm

Channel 13

	Peak power density at frequency: 2472 MHz
Normal test conditions	-15.2 dBm
Limits	+8 dBm

802.11g highest data rate

Channel 1

	Peak power density at frequency: 2412 MHz
Normal test conditions	-16.8 dBm
Limits	+8 dBm

Channel 6

	Peak power density at frequency: 2437 MHz
Normal test conditions	-15.8 dBm
Limits	+8 dBm

Channel 13

	Peak power density at frequency: 2472 MHz
Normal test conditions	-17.1 dBm
Limits	+8 dBm

DRAFT

802.11n highest data rate

Channel 1

	Peak power density at frequency: 2412 MHz
Normal test conditions	-20.5 dBm
Limits	+8 dBm

Channel 6

	Peak power density at frequency: 2437 MHz
Normal test conditions	-19.2 dBm
Limits	+8 dBm

Channel 13

	Peak power density at frequency: 2472 MHz
Normal test conditions	-21.9 dBm
Limits	+8 dBm

The measures have been repeated with the lowest data rate of each mode (b/ g/ n). No significant difference has been noticed (<1 dB).

Test conclusion:

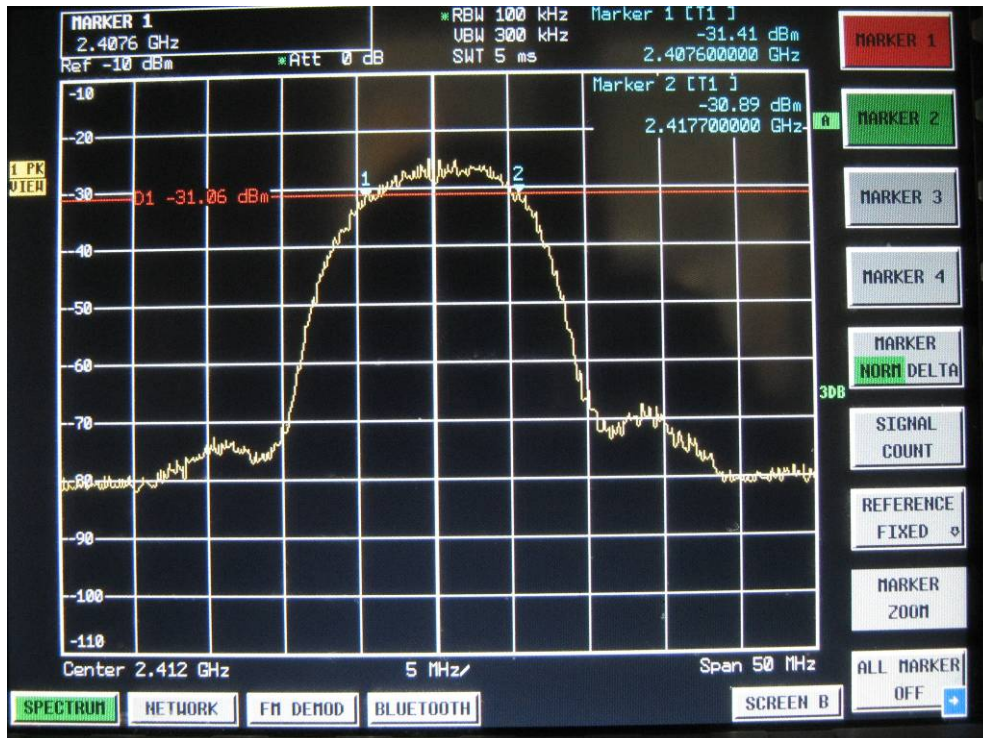
RESPECTED STANDARD

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

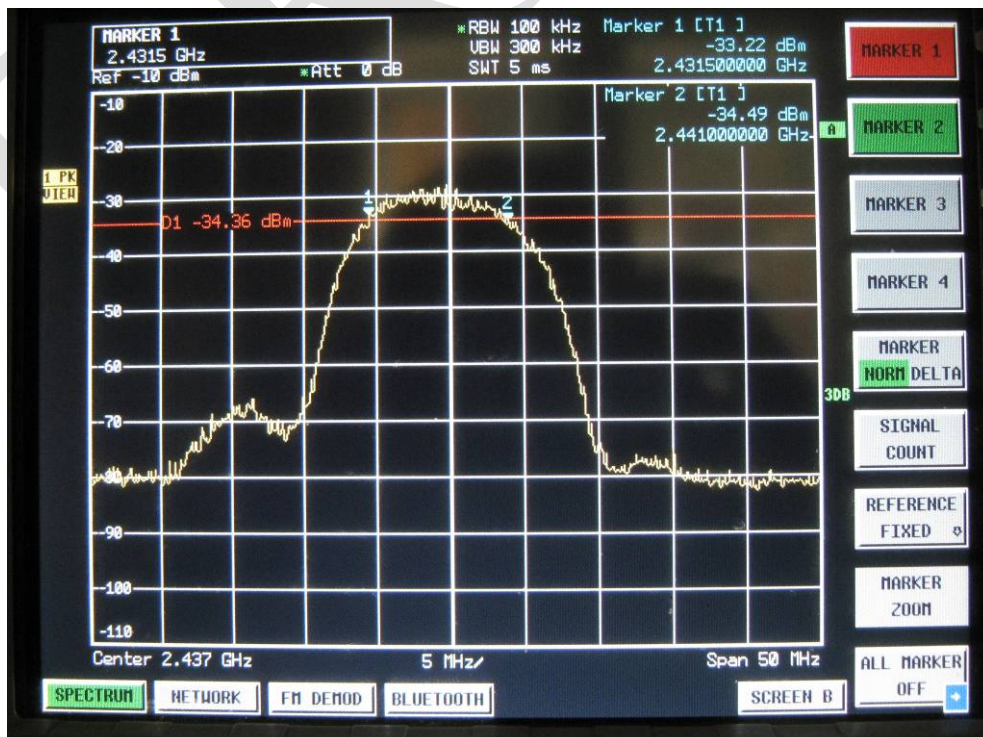
ANNEX 1: 6 dB BANDWIDTH

802.11b

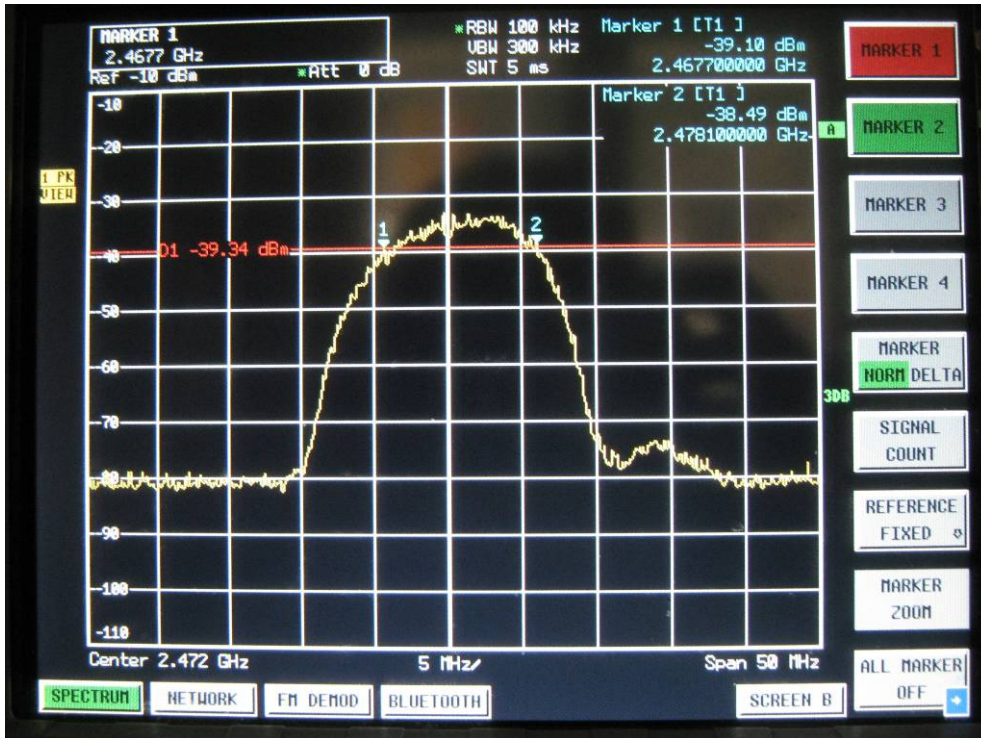
CANAL 1



CANAL 6



CANAL 13

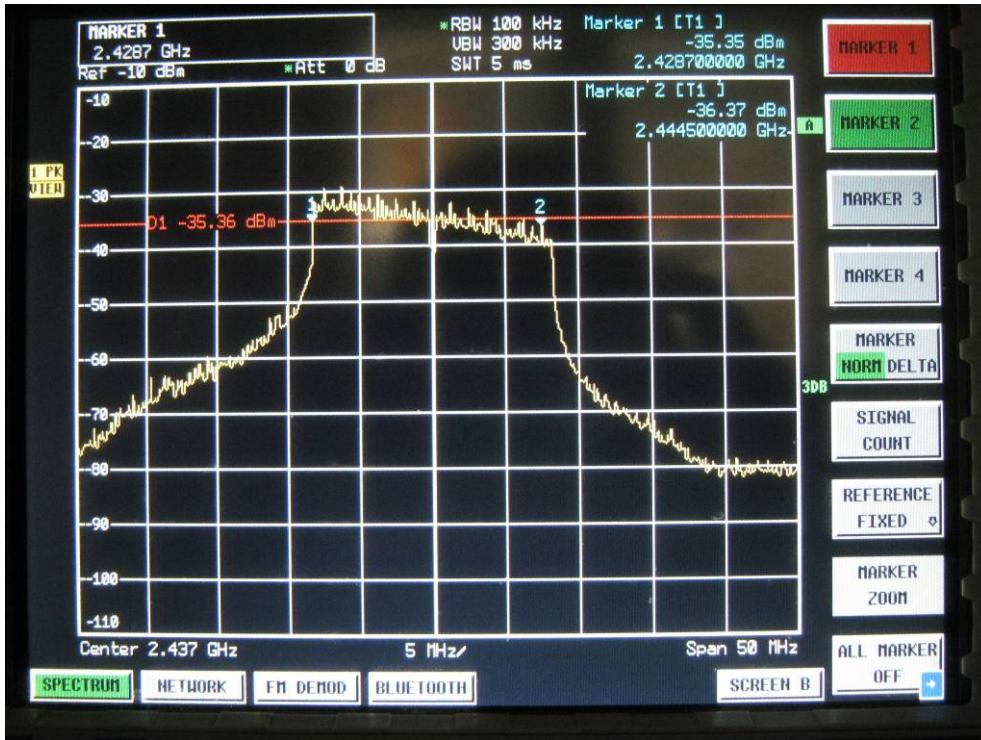


802.11g

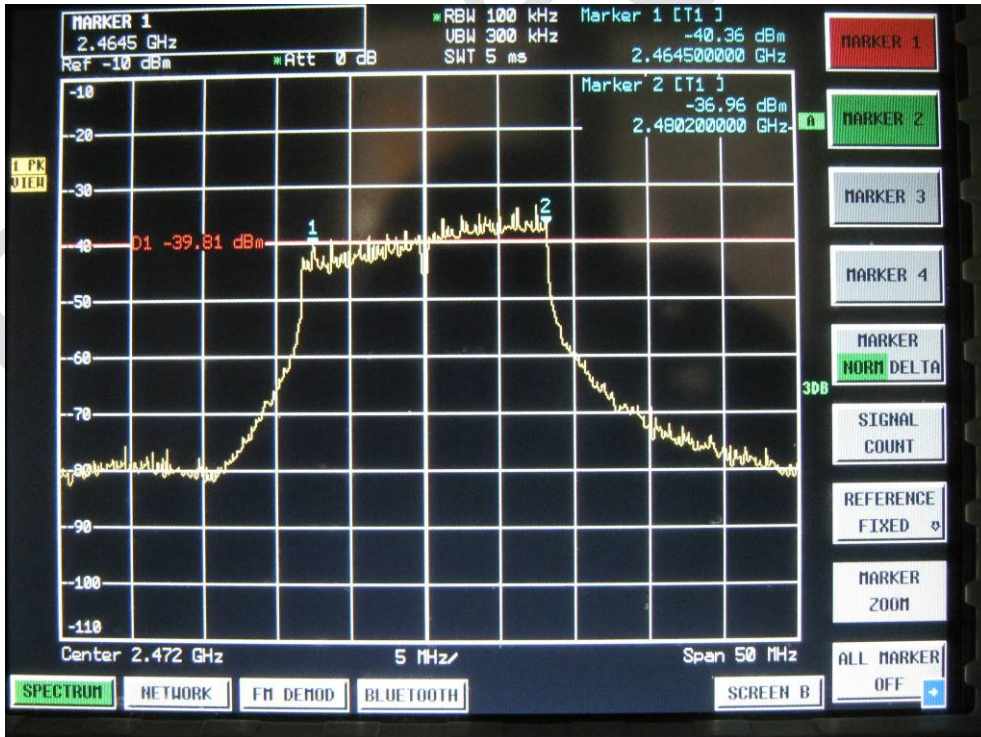
CANAL 1



CANAL 6

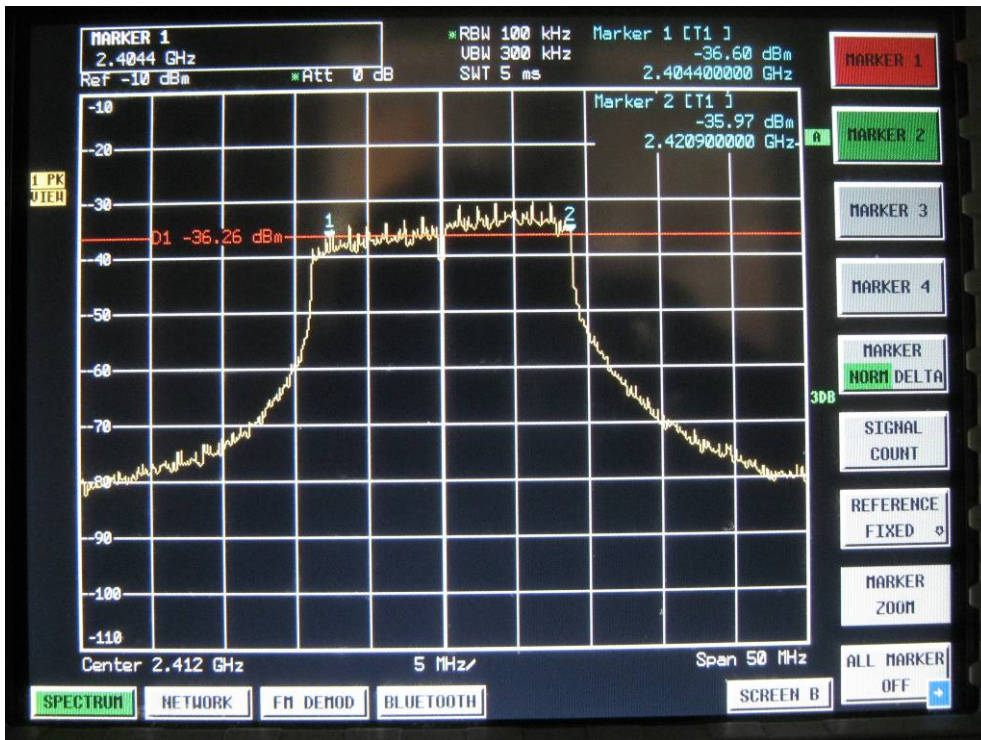


CANAL 13

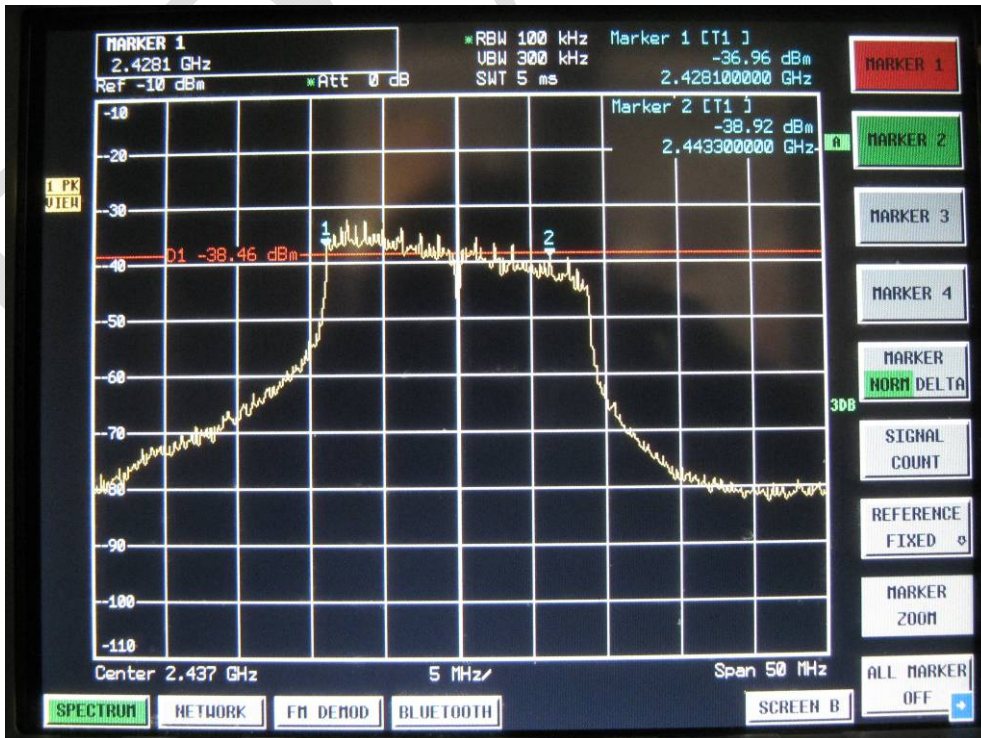


802.11n

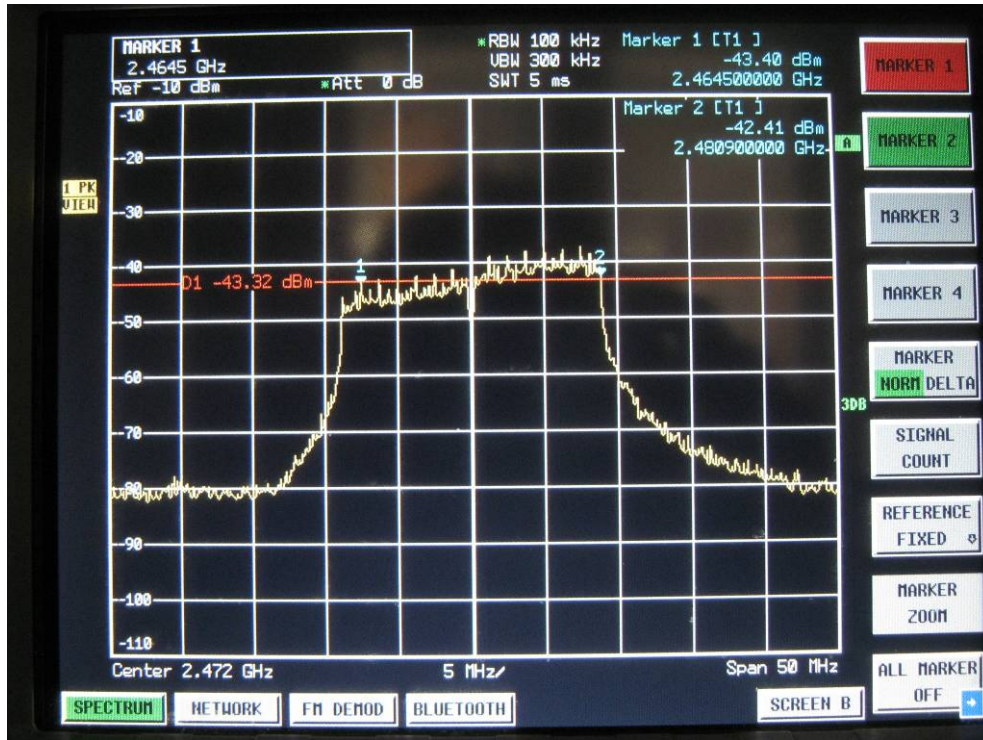
CANAL 1



CANAL 6



CANAL 13

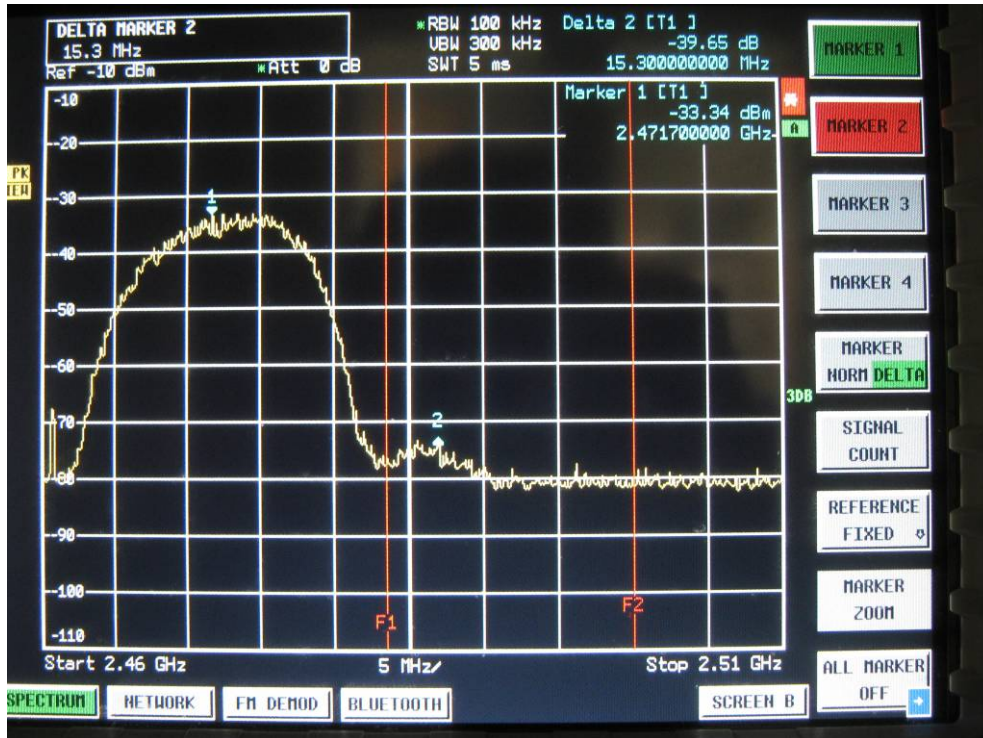


DRAFT

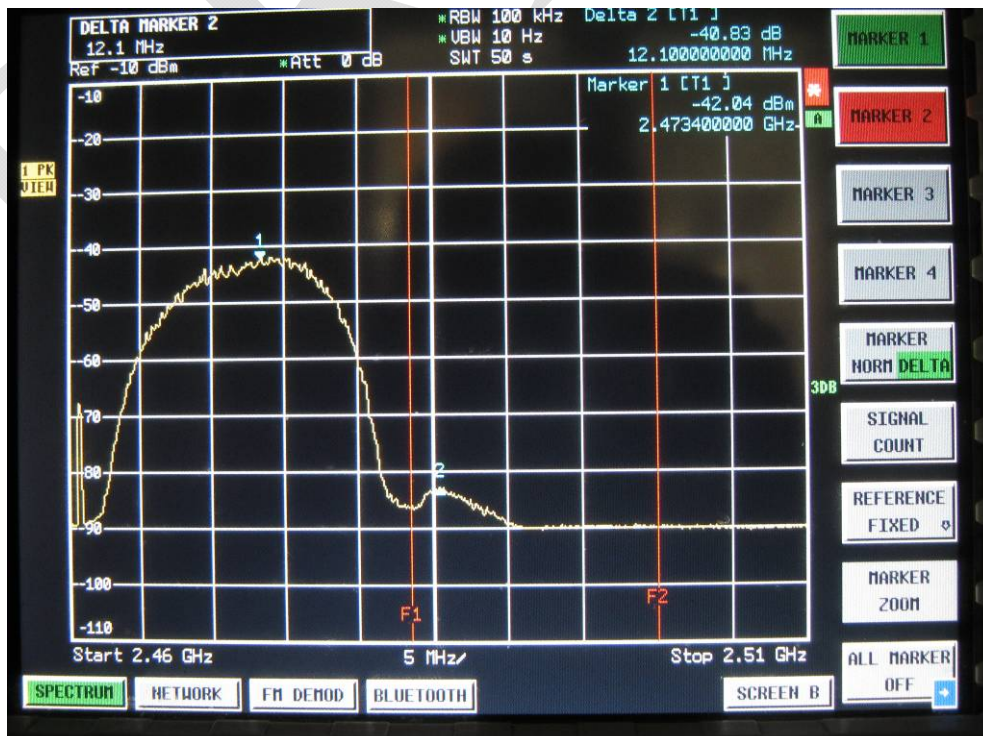
ANNEX 2: BAND-EDGE

802.11b

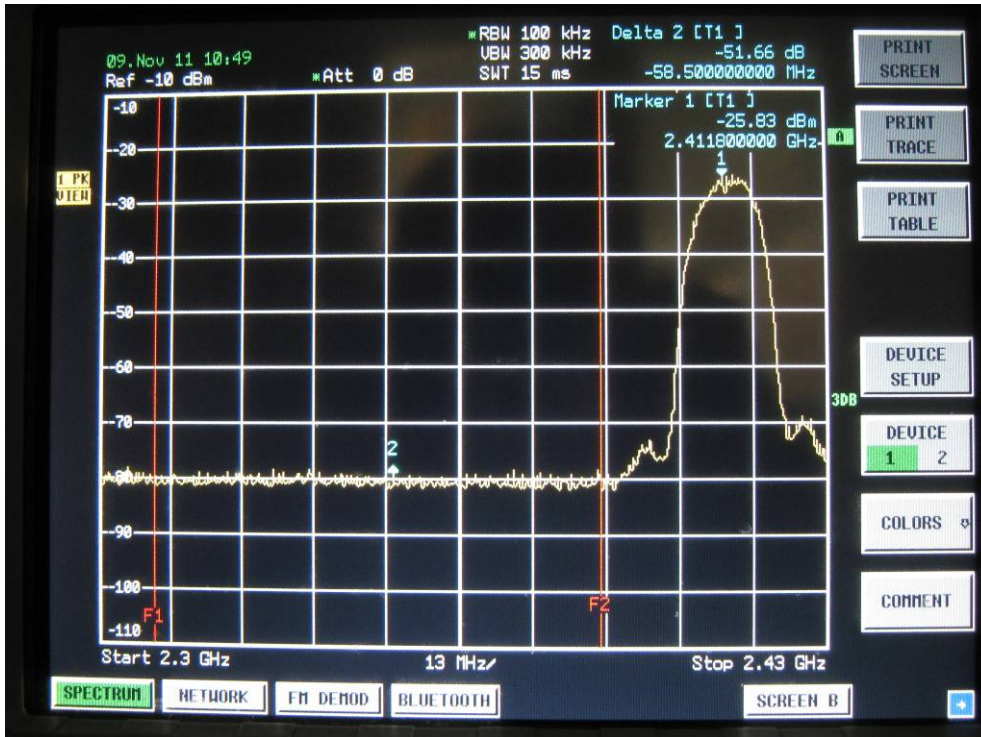
UPPER BAND-EDGE : PEAK



UPPER BAND-EDGE : AVERAGE



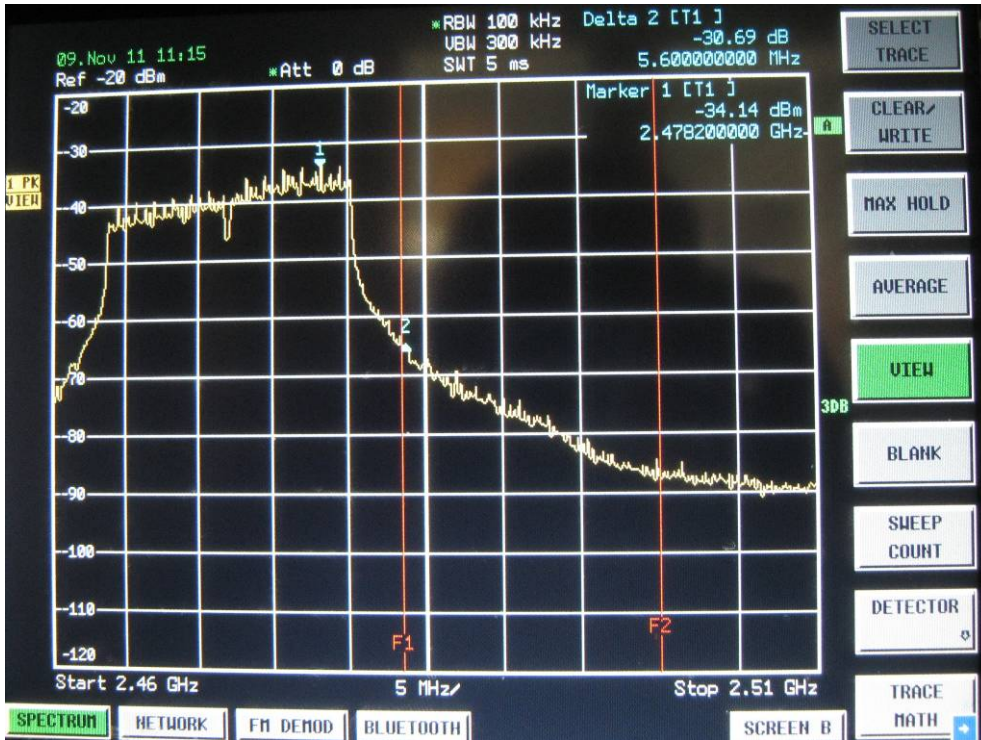
LOWER BAND-EDGE : PEAK



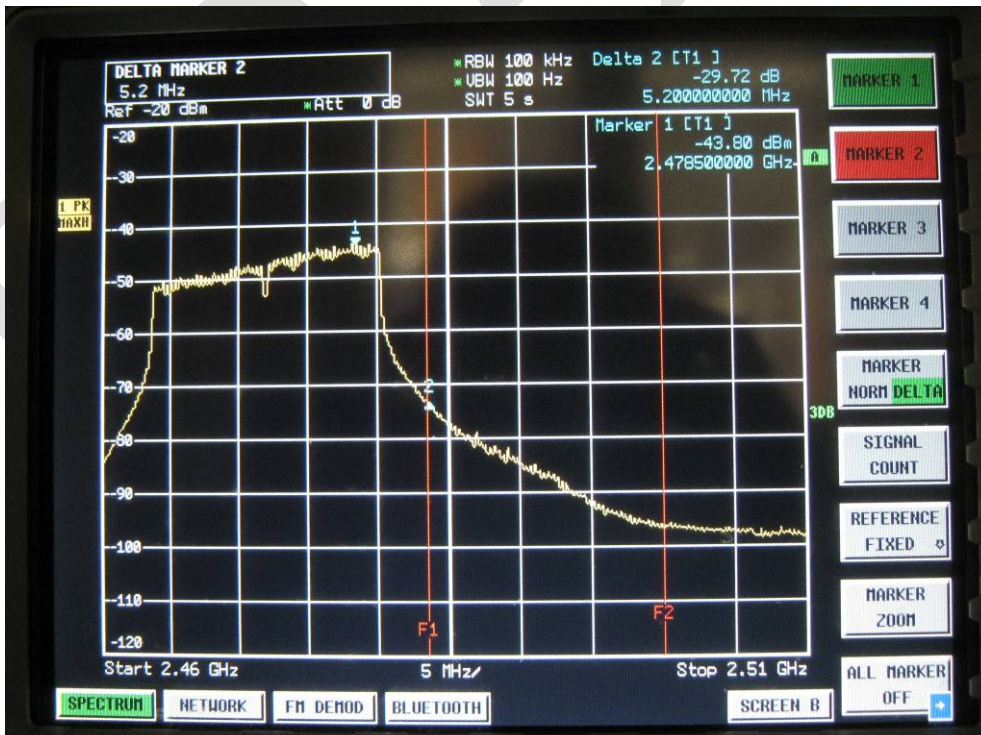
DRAFT

802.11g

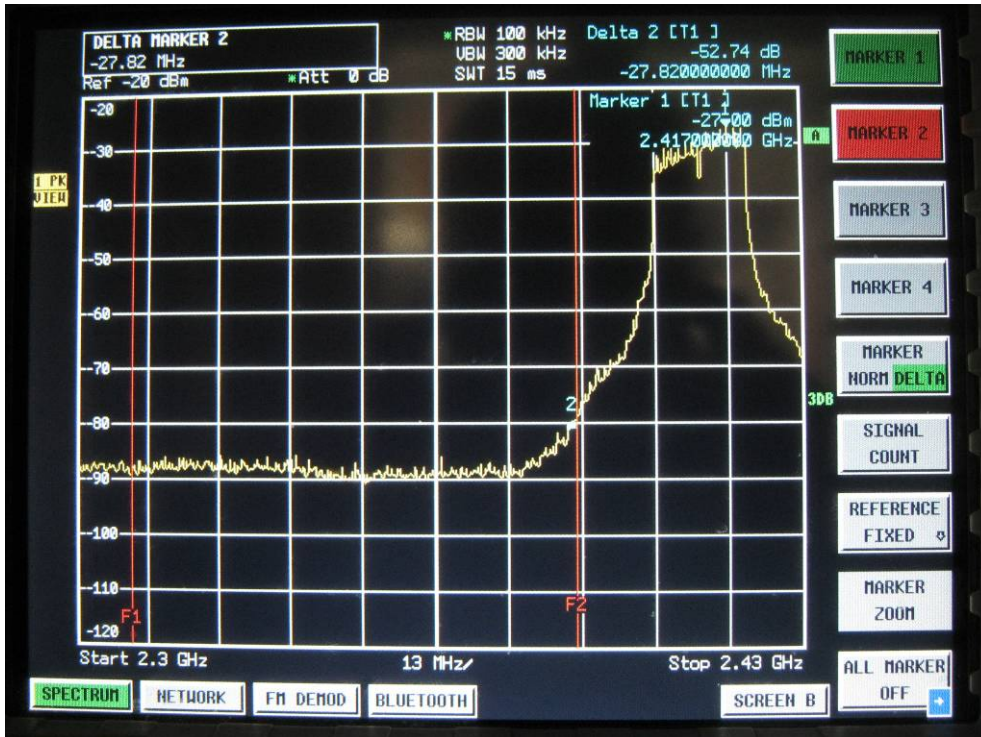
UPPER BAND-EDGE : PEAK



UPPER BAND-EDGE : AVERAGE



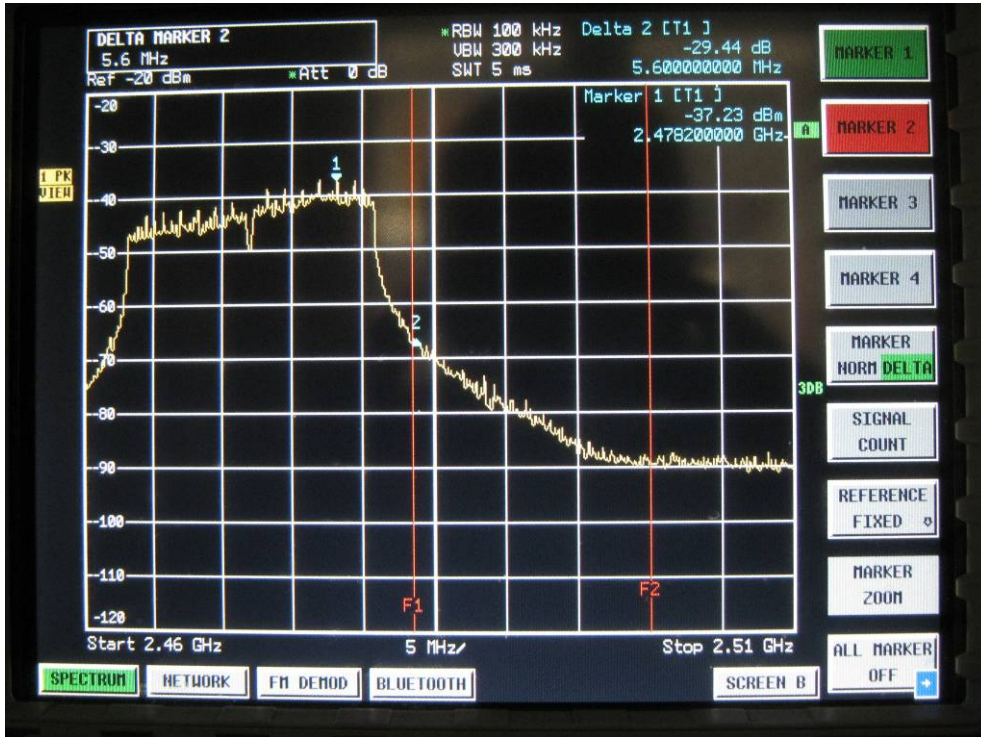
LOWER BAND-EDGE : PEAK



DRAFT

802.11n

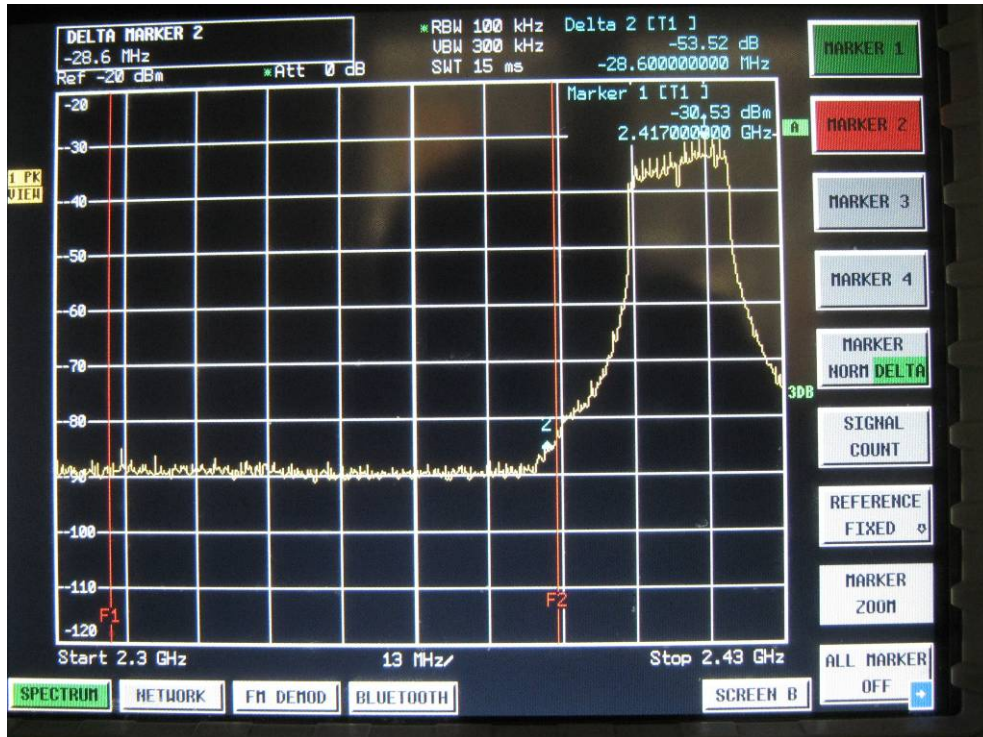
UPPER BAND-EDGE : PEAK



UPPER BAND-EDGE : AVERAGE



LOWER BAND-EDGE : PEAK

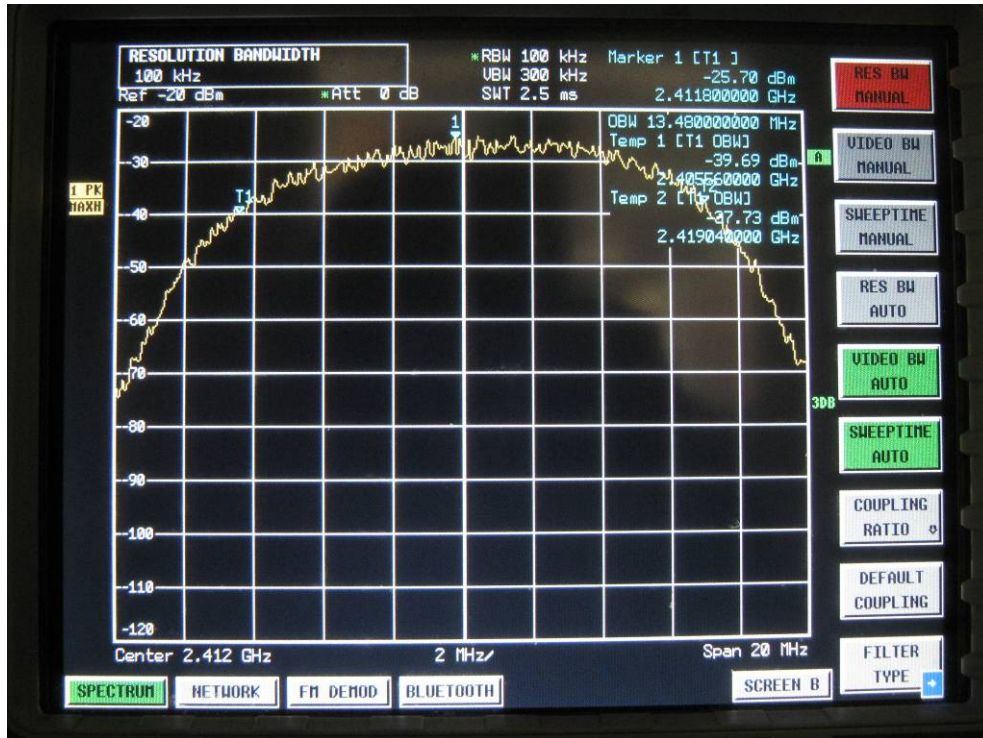


DRAFT

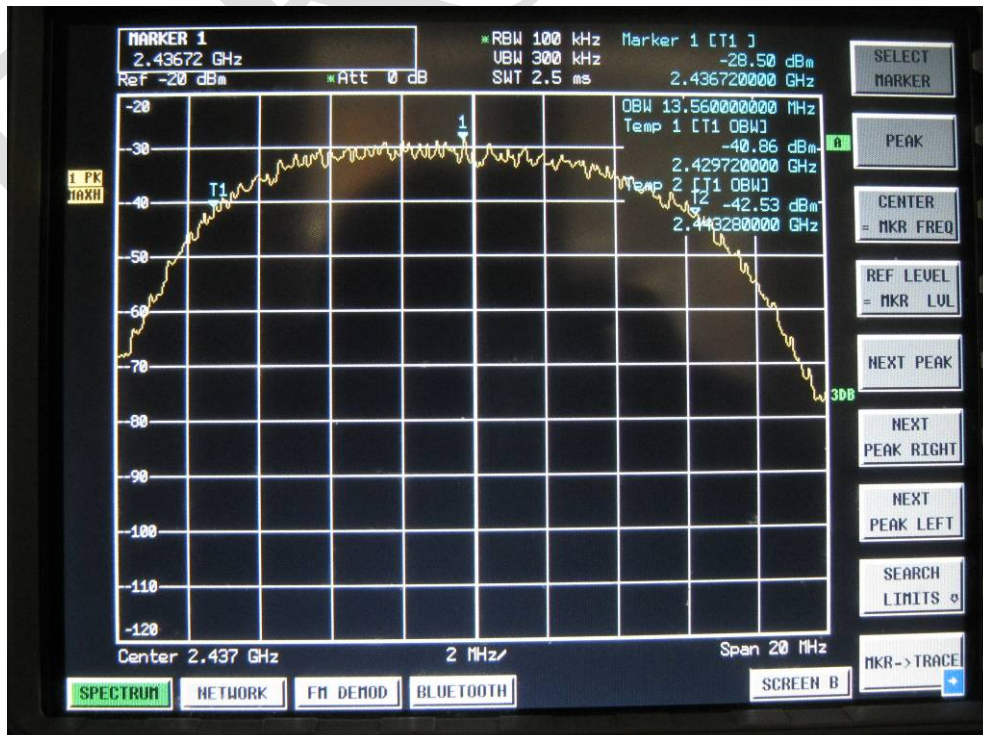
ANNEX 3: 20 dB BANDWIDTH

802.11b

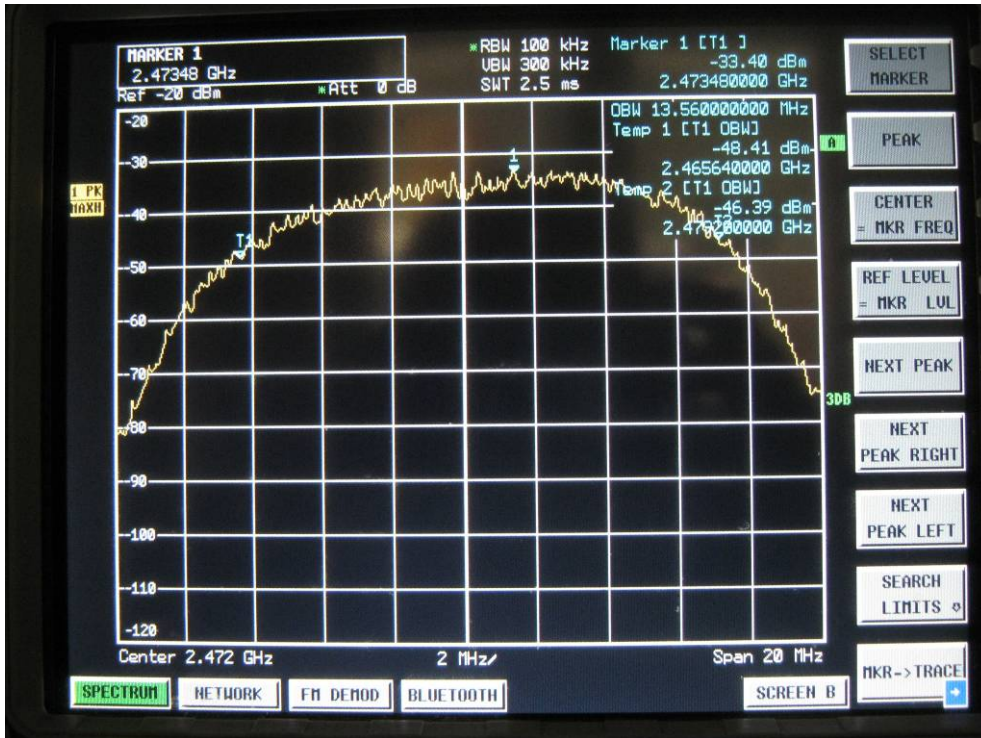
CANAL 1



CANAL 6

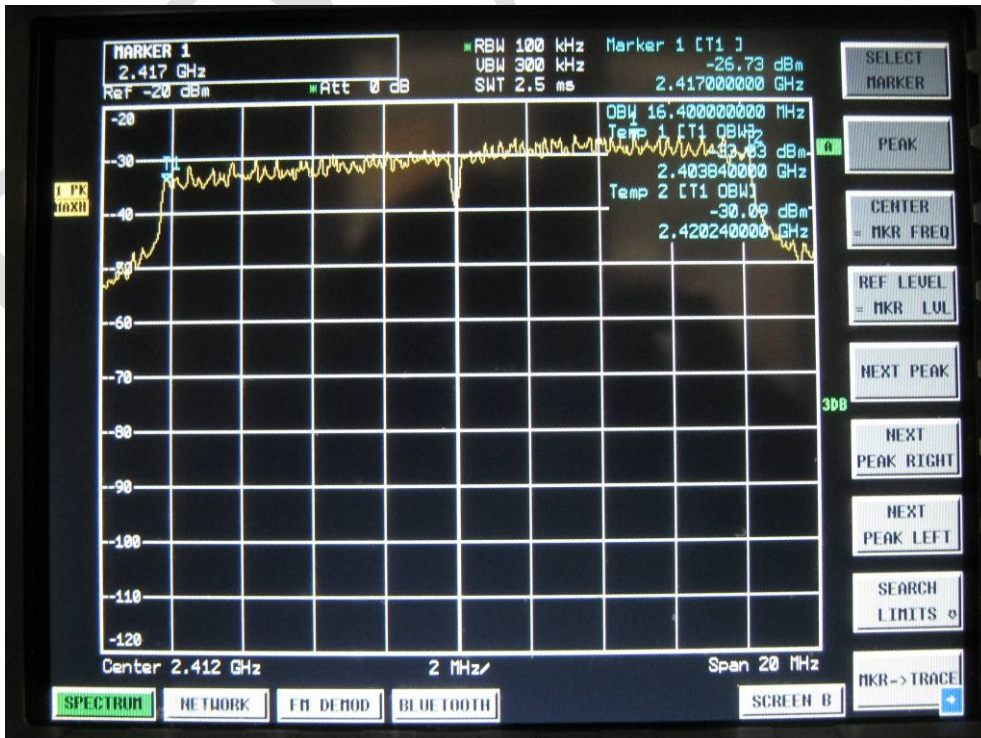


CANAL 13

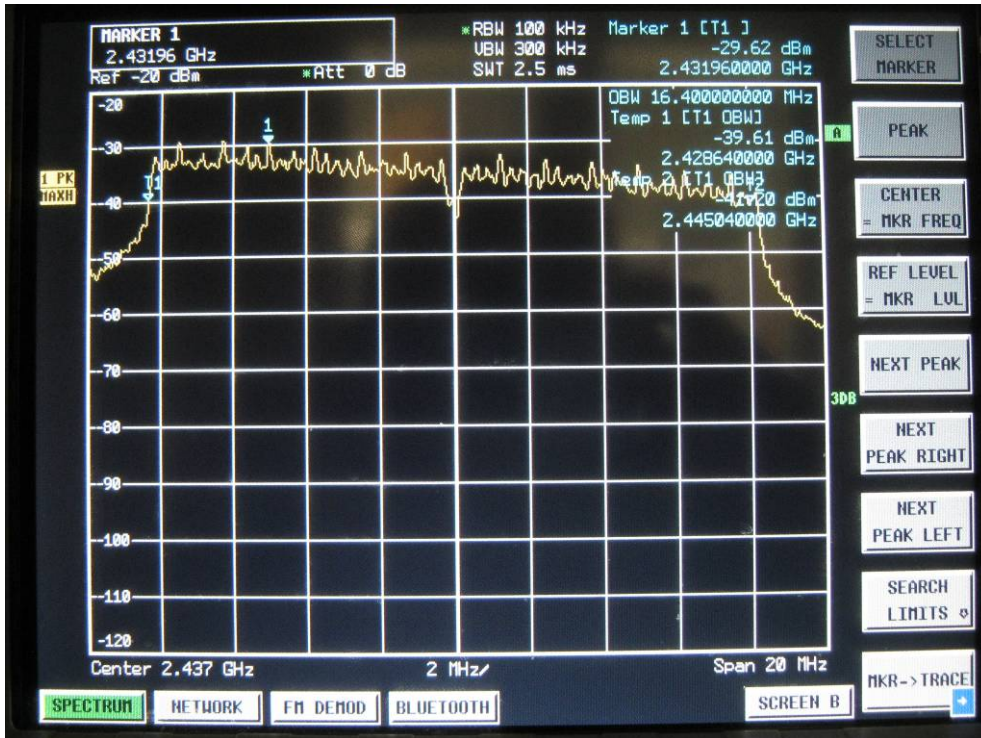


802.11g

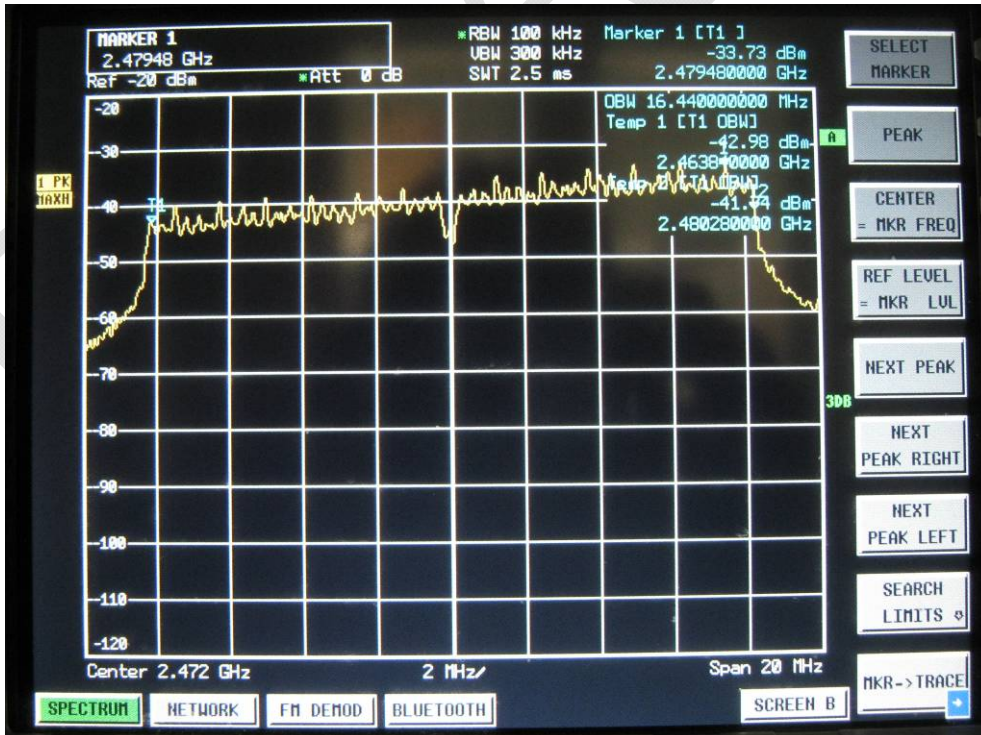
CANAL 1



CANAL 6

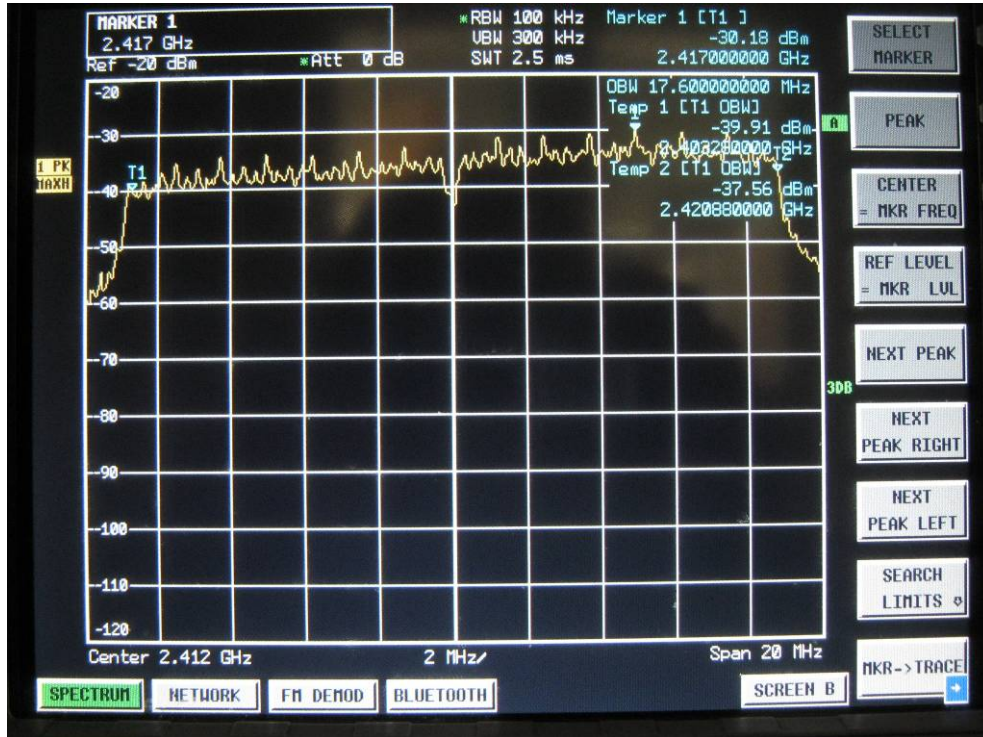


CANAL 13

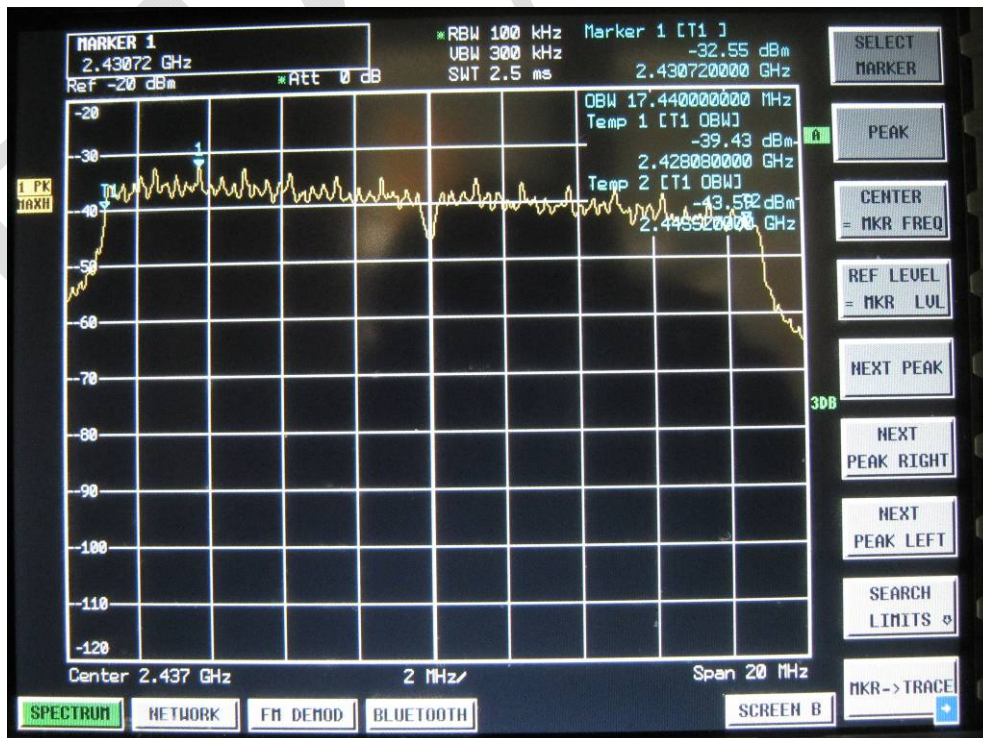


802.11n

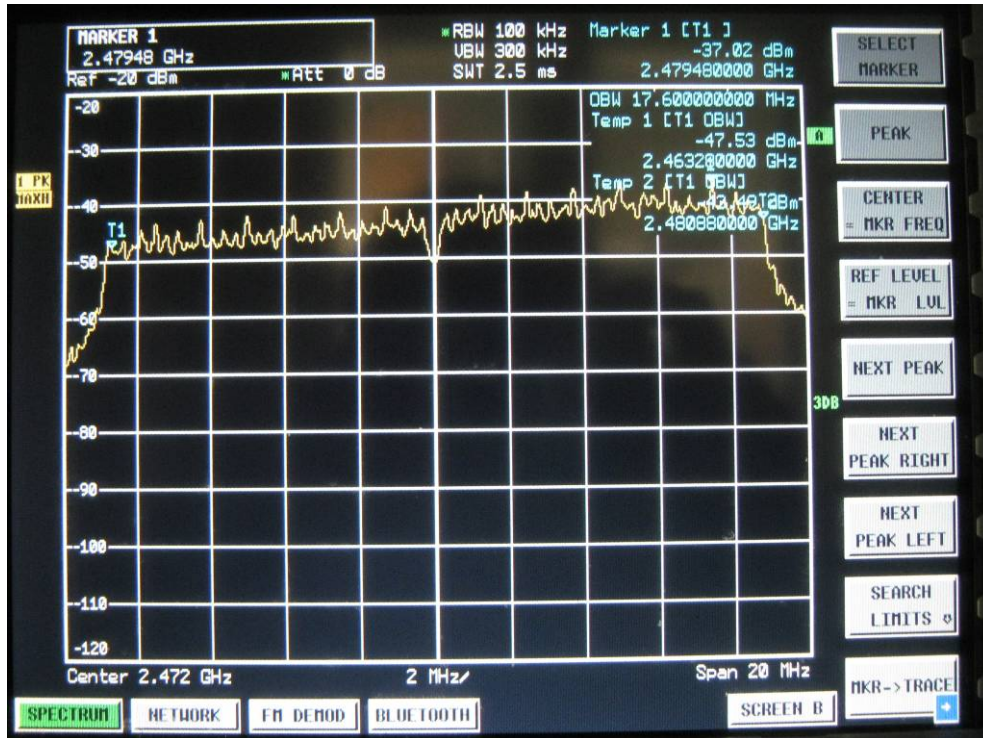
CANAL 1



CANAL 6



CANAL 13



DRAFT

ANNEX 4: TEST SET UP

RADIATED MEASUREMENT



ANNEX 5: PHOTOS OF THE EQUIPMENT UNDER TEST

GENERAL VIEW

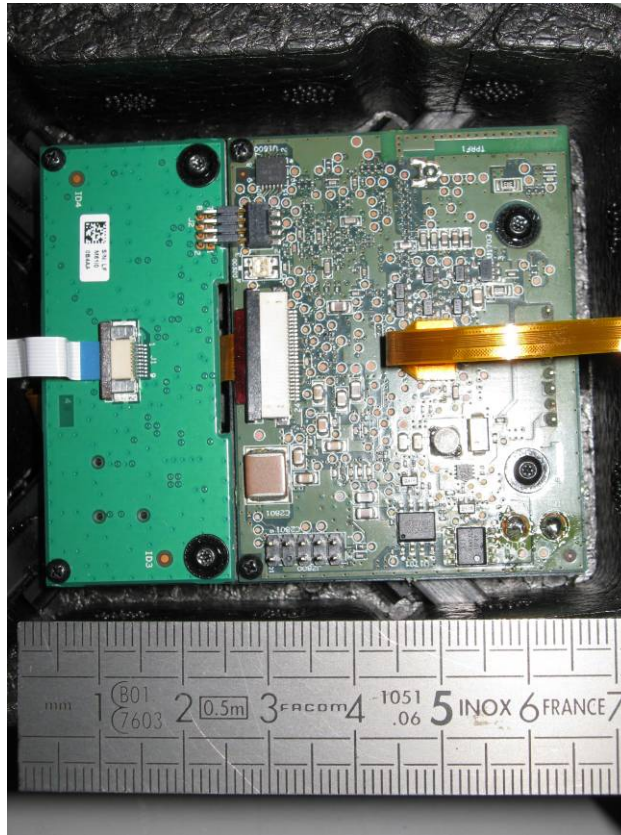
INDOOR HULL



OUTDOOR HULL



PRINTED CIRCUIT BOARD



ANTENNA DETAIL

