EMITECH GROUPE

RR051-20-104233-6-A Ed. 0

Certification Radio test report

According to the standard:

CFR 47 FCC PART 15

RSS GEN – Issue 5
RSS 247 – Issue 3

Equipment under test:

S-LYNKS NODE

FCC ID: KQ9-0A00A

IC NUMBER: 1317A-0A00A

Company:

SERCEL Inc

Distribution: Mr TIJOU **(Company:** SERCEL NANTES**)**

Number of pages: 73 with 1 appendix

Ed.	Date	Modified Page(s)	Technical Verification and Quality Approval Name and Function / Visa
0	11-Mar-24	Creation	M. DUMESNIL, Radio Laboratory Manager

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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.

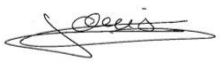
S51 RTY 000 INT 00015 [01]

DESIGNATION OF PRODUCT:	**S-LYNKS NODE**
Serial number (S/N):	EDE567C20251E0001
Reference / model (P/N):	NODE
Software version:	SLBB_ F V4 S36/20
MANUFACTURER:	SERCEL Inc

COMPANY CERTIFYING THE PRODUCT:

Company:	SERCEL Inc
Address:	17200 Park Row TEXAS 77084 UNITED STATES
Responsible:	Mr WENTZLER

COMPANY SUBMITTING THE PRODUCT:

Company:	SERCEL
Address:	16, RUE DU BEL AIR BP 30439 44470 CARQUEFOU FRANCE
Responsible:	Mr TIJOU
DATES OF TEST:	From 8-Dec-20 to 14-Dec-20
TESTING LOCATION:	EMITECH ANGERS laboratory at JUIGNE SUR LOIRE (49) FRANCE FCC Accredited under US-EU MRA Designation Number: FR0009 Test Firm Registration Number: 873677 ISED Accredited under CANADA-EU MRA Designation Number: FR0001 Industry Canada Registration Number: 4452A
TESTED BY:	S. LOUIS
VISA:	
WRITTEN BY:	S. LOUIS

CONTENTS

1. INTRODUCTION

This report presents the results of radio test carried out on the following radio equipment: **S-LYNKS NODE**, in accordance with normative reference.

The product integrates the followings radio functions:

- LoRa radio part not already certified,
- WiFi radio part not already certified,
- GNSS receiver.

This report concerns only WiFi radio part.

The host device of certified module(s) shall be properly labeled to identify the module(s) within.

2. PRODUCT DESCRIPTION

Category of equipment (ISED):	I
Class:	A
Utilization:	Industrial
Antenna type and gain:	For mode b and g the product emit on chains one (SISO), however the mode n the product can emit on the chain one (SISO) or chain one and two (MIMO).
Antenna type and gain:	integral antenna Antenna 1 Gain at 2412MHz => +1.53dBi Antenna 1 Gain at 2437MHz => +2.07dBi Antenna 1 Gain at 2462MHz => +2.20dBi Antenna 2 Gain at 2412MHz => +2.78dBi Antenna 2 Gain at 2437MHz => +2.28dBi Antenna 2 Gain at 2462MHz => +2.29dBi
Operating frequency range:	From 2400 MHz to 2483.5 MHz
Number of channels:	11
Channel spacing:	5MHz
Channel bandwidth:	20 MHz
Modulation:	DBPSK OFDM: BPSK OFDM: 64-QAM

Channel tested:	Channel 1: 2412 MHz Channel 6: 2437 MHz Channel 11: 2462 MHz
Mode tested:	802.11 b SISO 802.11 g SISO 802.11 n SISO and MIMO
Data rate:	For 802.11b: 1Mbit/s For 802.11g: 6Mbit/s For 802.11n: MCS0
Correlated signal:	For mode n the signals are considered as correlated, the mode cyclic delay diversity (CDD) is used. (IEEE 802.11) The product is not using spatial multiplexing or intentional beamforming.
Power source:	7.2Vdc Li-ion battery
Power setting	+16 dBm

Power level, frequency range and channels characteristics are not user adjustable.

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.

CFR 47 FCC Part 15 (2020)	Radio Frequency Devices
ANSI C63.10	2013 Procedures for ComplianceTesting of Unlicensed Wireless Devices.
558074 D01 DTS v05 r02	Guidance for compliance measurements on digital transmission system, frequency hopping spread spectrum system, and hybrid system devices operating under section 15.247 of the FCC rules.
662911 D01 Multiple Transmitter Output V02r01	Emissions Testing of Transmitters with Multiple Outputs in the Same Band
RSP-100	Issue 12, August 2019 Certification of Radio Apparatus
RSS-Gen	Issue 5, April 2018 General Requirements for Compliance of Radio Apparatus
RSS-247	Issue 3, August 2023 Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices

4. TEST METHODOLOGY

Radio performance tests procedures given in CFR 47 part 15:

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

Radio performance tests procedures given in RSS-Gen:

- Paragraph 2 - General
- Paragraph 3 - Normative publications and related documents
- Paragraph 4 - Labelling requirements
- Paragraph 6 - General administrative and technical requirements
- Paragraph 8 - Licence-exempt Radio Apparatus

Radio performance tests procedures given in RSS-247:

- Paragraph 3 - Certification requirements
- Paragraph 4 - Measurement method
- Paragraph 5 - Standard specifications for frequency hopping systems and digital transmission systems operating in the bands 902-928 MHz, 2400-2483.5 MHz and 5725-5850 MHz

5. TEST EQUIPMENT CALIBRATION DATES

Emitech Number	Model	Type	Last calibration	Calibration interval (years)	Next calibration due
0	BAT-EMC V3.18.0.26	Software	/	/	/
1406	EMCO 6502	Loop antenna	24/04/2020	1	24/04/2021
2507	20dB	Attenuator	21/03/2019	3	20/03/2022
4087	Filtek LP03/1000-7GH	Low Pass Filter	25/02/2020	3	24/02/2023
6796	R&S FSP7	Spectrum Analyzer	21/08/2019	2	20/08/2021
7124	A.H. Systems SAS-572	Antenna	05/01/2019	3	04/01/2022
7125	A.H. Systems SAS-572	Antenna	05/01/2019	3	04/01/2022
7279	SUCOFLEX SF104 N 1.5m	Cable	11/06/2020	2	11/06/2022
7299	Microtronics BRM50702	Reject band filter	04/09/2019	3	03/09/2022
8511	HP 8447D	Low-noise amplifier	25/02/2020	1	24/02/2021
8526	Schwarzbeck VHBB 9124	Biconical antenna	17/08/2018	3	16/08/2021
8535	EMCO 3115	Antenna	28/04/2020	3	28/04/2023
8543	Schwarzbeck UHALP 9108A	Log periodic antenna	17/08/2018	3	16/08/2021
8593	SIDT Cage 2	Anechoic chamber	/	/	/
8704	LUCIX Corp S180265L3201 LNA	Low-noise amplifier	08/09/2020	1	08/09/2021
8707	R&S ESI7	Test receiver	29/06/2020	1	29/06/2021
8732	Emitech	OATS	03/07/2019	3	02/07/2022
8750	La Crosse Technology WS-9232	Meteo station	22/09/2020	2	22/09/2022
8855	EMITECH	Turntable and mat controller	/	/	/
8864	Champ libre Juigné. V3.5	Software	/	/	/
8896	ACQUISYS GPS8	Satellite synchronized frequency standard	/	/	/
8974	STORM MICROWAE k-20cm	cable	14/11/2019	2	13/11/2021
8975	STORM MICROWAE k-20cm	cable	14/11/2019	2	13/11/2021
11592	R&S NRV-Z86	Power Sensor	27/08/2019	2	26/08/2021
12911	Huber + Suhner N-2m	cable	11/06/2020	2	11/06/2022

Emitech Number	Model	Type	Last calibration	Calibration interval (years)	Next calibration due
14474	Oregon Scientific BAR206	Meteo station	19/11/2019	2	18/11/2021
14736	MATURO	Turntable and mat controller MCU	/	/	/
14831	Fluke 177	Multimeter	25/02/2020	2	24/02/2022
15666	R&S FSV40	Spectrum Analyzer	24/09/2020	2	24/09/2022
15812	COMP-POWER PAM-118A	Low-noise amplifier 18GHz	05/08/2020	1	05/08/2021
15882	SUCOFLEX	cable N 5m	28/01/2019	2	27/01/2021
/	GPIBShot V2.4	Software	/	/	/
//	RS Commander	Software	/	/	/
///	R&S Power Viewer Plus V5.9	Software	/	/	/

6. TESTS RESULTS SUMMARY

6.1 CFR 47 part 15requirements

Test procedure	Description of test	Respected criteria?				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		*Supplied by battery*
FCC Part 15.209	RADIATED EMISSION LIMITS; general requirements	X				*Note 2*
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				*Note 3*
	(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				*Note 4*
	(b) Maximum peak output power	X				*Note 5*
	(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				

NAp: Not Applicable NAs: Not Asked

Note 1: Integral antenna without standard connector.

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 9975kHz for 802.11b modulation on channel 6..

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

6.2 RSS-Gen requirements

Test procedure	Description of test	Criteria respected ?				Comment
		Yes	No	NAp	NAs	
Paragraph 8	Licence-exempt radio apparatus					
§ 8.1	Measurement Bandwidths and Detector Functions	X				
§ 8.2	Pulsed operation	X				
§ 8.3	Prohibition of amplifiers	X				
§ 8.4	User manual notice	X				*see certification documents*
§ 8.5	Measurement of licence-exempt devices on-site (in-situ)			X		
§ 8.6	Operating frequency range of devices in master/slave networks	X				
§ 8.7	Radio frequency identification (RFID) devices			X		
§ 8.8	AC power line conducted emissions limits			X		*Supplied by battery*
§ 8.9	Transmitter emission limits	X				
§ 8.10	Restricted frequency bands	X				
§ 8.11	Frequency stability			X		

NAp: Not Applicable NAs: Not Asked

6.3 RSS-247 requirements

Test Procedure RSS-247	Description of test	Criteria respected ?				Comment
		Yes	No	NAp	NAs	
Paragraph 5	Standard specifications for frequency hopping system and digital transmission systems operating in the bands 902-928 MHz, 2400-2483.5 MHz and 5725-5850 MHz					
5.1	Frequency hopping systems (FHSS)			X		
5.2	Digital transmission systems	X				*Note*
5.3	Hybrid systems			X		
5.4	Transmitter output power and equivalent isotropically radiated power (e.i.r.p.) requirements	X				
5.5	Unwanted emissions	X				

NAp: Not Applicable NAs: Not Asked

Note: The minimum 6 dB bandwidth of the equipment is 9975kHz for 802.11b modulation on channel 6.

7. MEASUREMENT UNCERTAINTY

To declare, or not, the compliance with the specifications, it was not explicitly taken into account of uncertainty associated with the result(s)

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for normal distribution corresponds to a coverage probability of approximately 95%.

Parameter	Emitech Uncertainty
RF power, conducted	± 0.75dB
Radiated emission valid to 26 GHz F < 62.5 MHz: 62.5 MHz < F < 1 GHz: 1 GHz < F < 26 GHz:	 ± 5.14 dB ± 5.13 dB ± 5.16 dB
AC Power Lines conducted emissions	± 3.38 dB
Temperature	± 1 °C
Humidity	± 5 %

8. OCCUPIED BANDWIDTH

Temperature (°C) : 19.2 **Humidity (%HR):** 36 **Date :** December 9, 2020
Technician : S. LOUIS

Standard: FCC Part 15
RSS-247

Test procedure:
Method of paragraphs 11.8 of ANSI C63.10 (6dB Measurement)
Method of paragraphs 6.9.3 of ANSI C63.10 (99% Measurement)

Test set up:

Radiated test

Test realized in near field.

Setting:

Measure	**6dB**	**99%**
Center frequency	The centre frequency of the channel under test	
Detector	Peak	
Span	Large enough to capture all products of the modulation	1.5 to 5 times the OBW
RBW	100kHz	1% to 5% of the OBW
VBW	300kHz	3 x RBW
Trace	Max hold	
Sweep	Auto	

Test operating condition of the equipment:

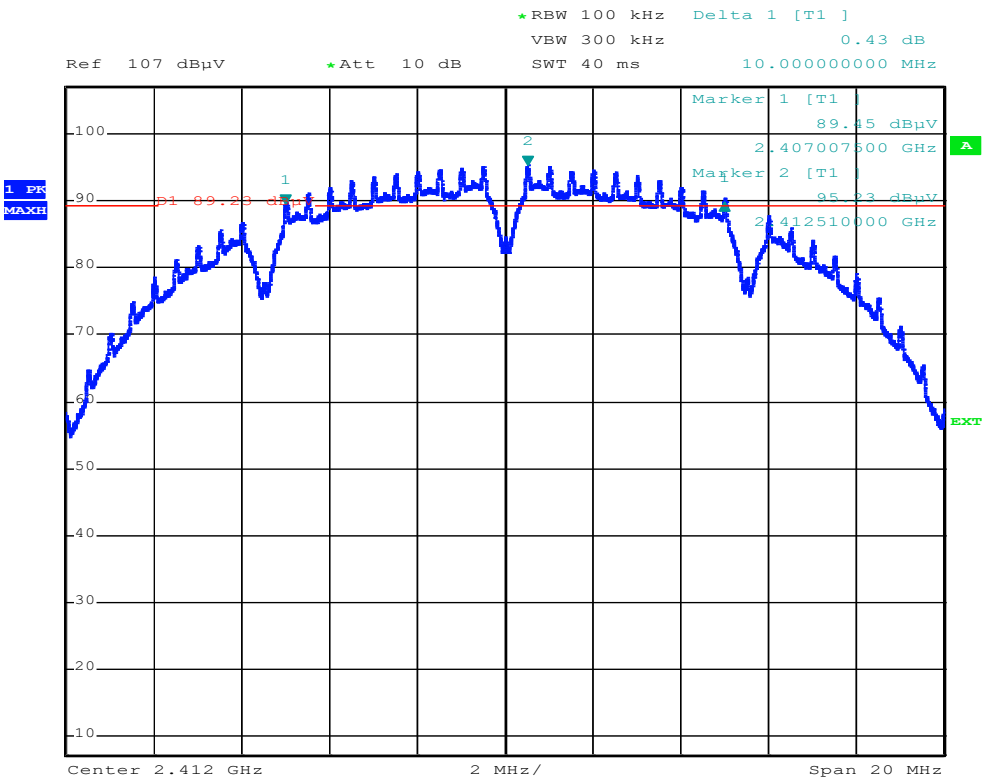
The equipment under test is blocked in continuous modulated transmission mode, at the highest output power level at which the transmitter is intended to operate.

We used for power source the internal battery pack of the equipment and we noted:
Voltage at the beginning of test (Vdc): 7.48
Voltage at the end of test (Vdc): 7.46
Percentage of voltage drop during the test (%): 0.27

Results:

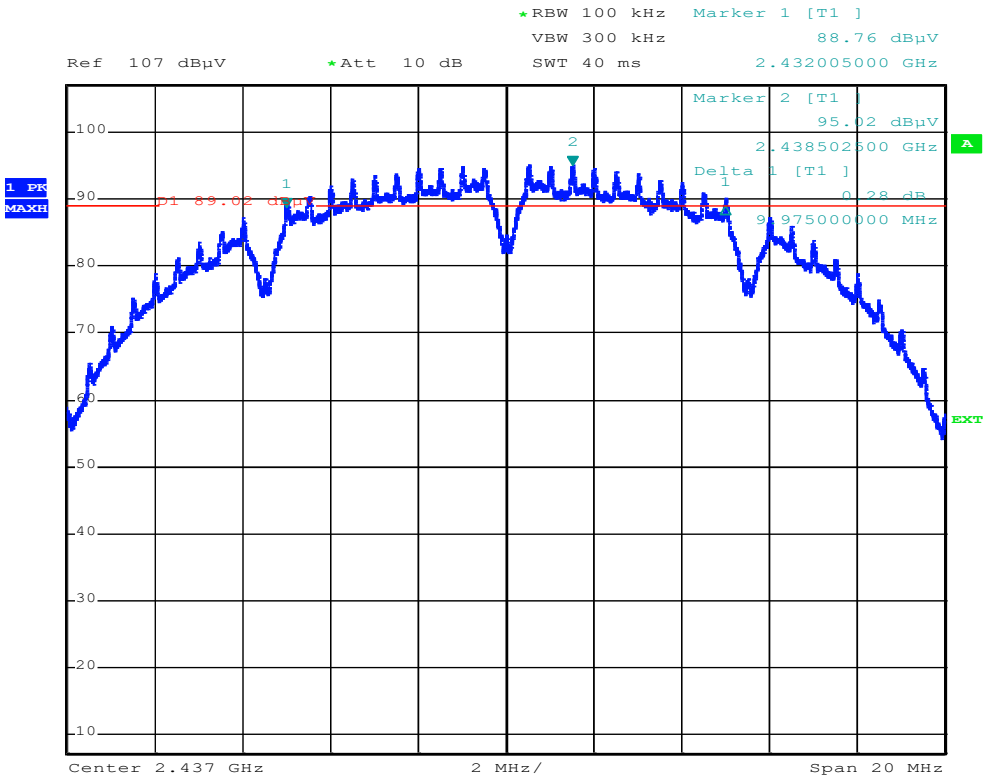
Sample N° 1

6dB Bandwidth - Low Channel – Mode 802.11.b - SISO



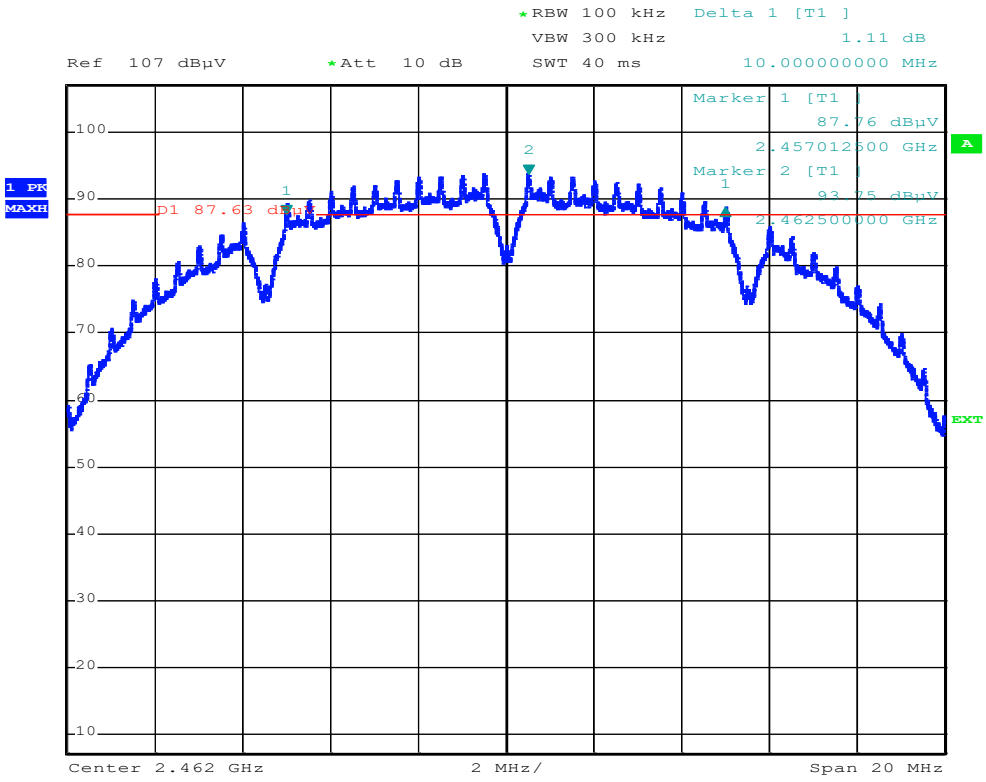
Measured bandwidth : 10.000 MHz

6dB Bandwidth - Central Channel – Mode 802.11.b - SISO



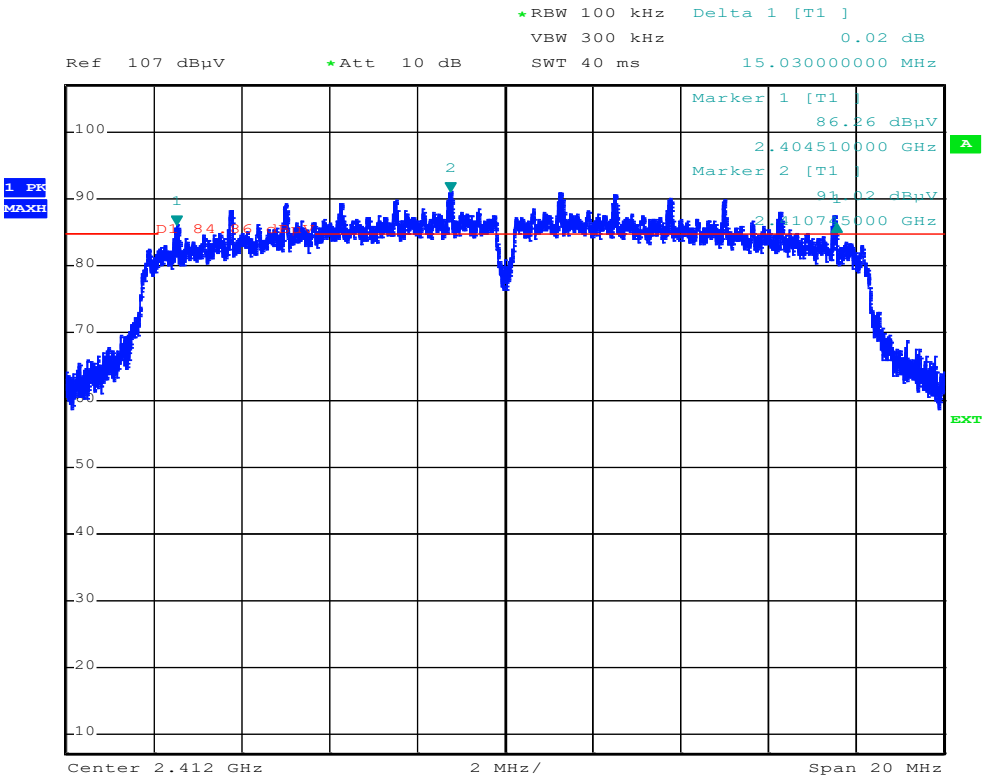
Measured bandwidth : 9.975 MHz

6dB Bandwidth - High Channel – Mode 802.11.b - SISO



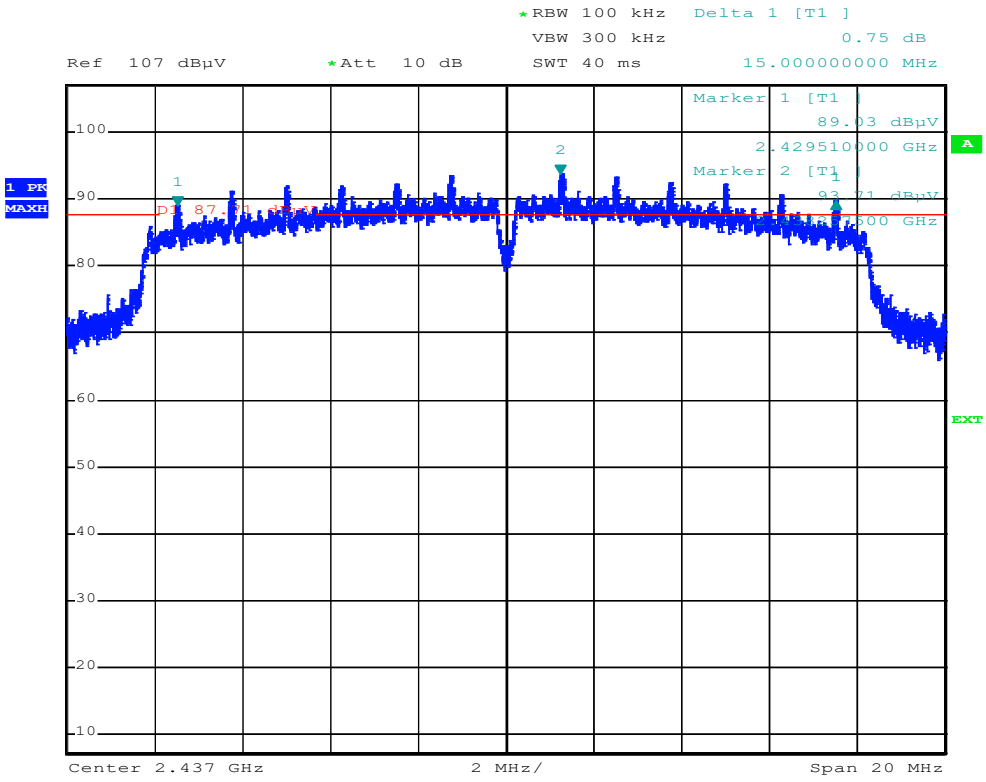
Measured bandwidth : 10.000 MHz

6dB Bandwidth - Low Channel – Mode 802.11.g - SISO



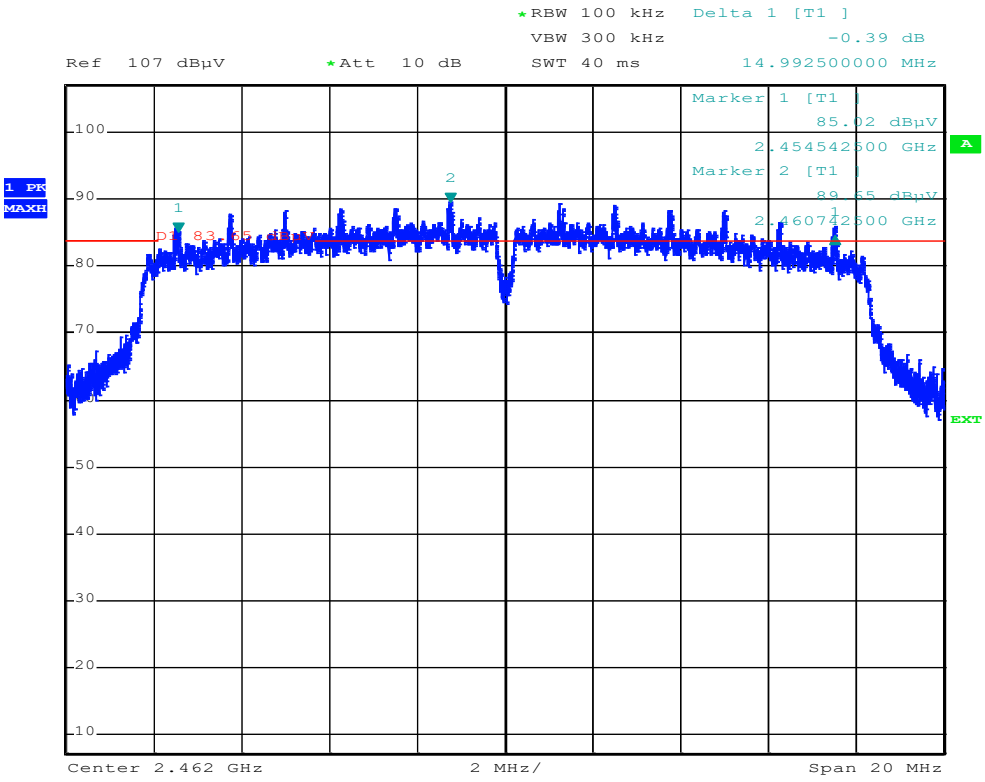
Measured bandwidth : 15.030 MHz

6dB Bandwidth - Central Channel – Mode 802.11.g - SISO



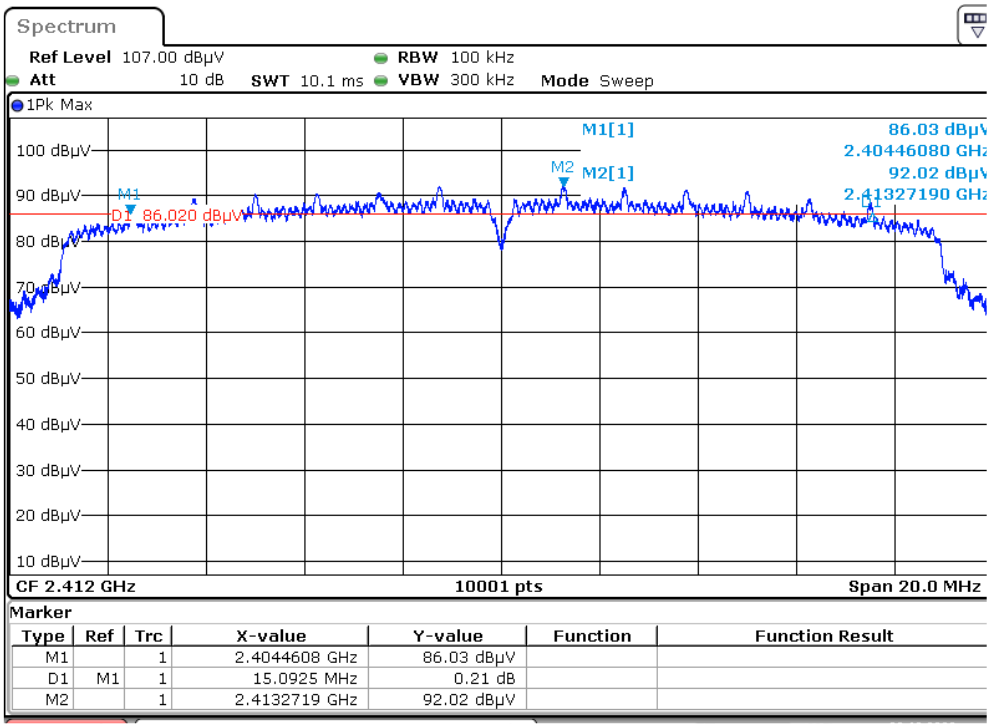
Measured bandwidth : 15.000 MHz

6dB Bandwidth - High Channel – Mode 802.11.g - SISO



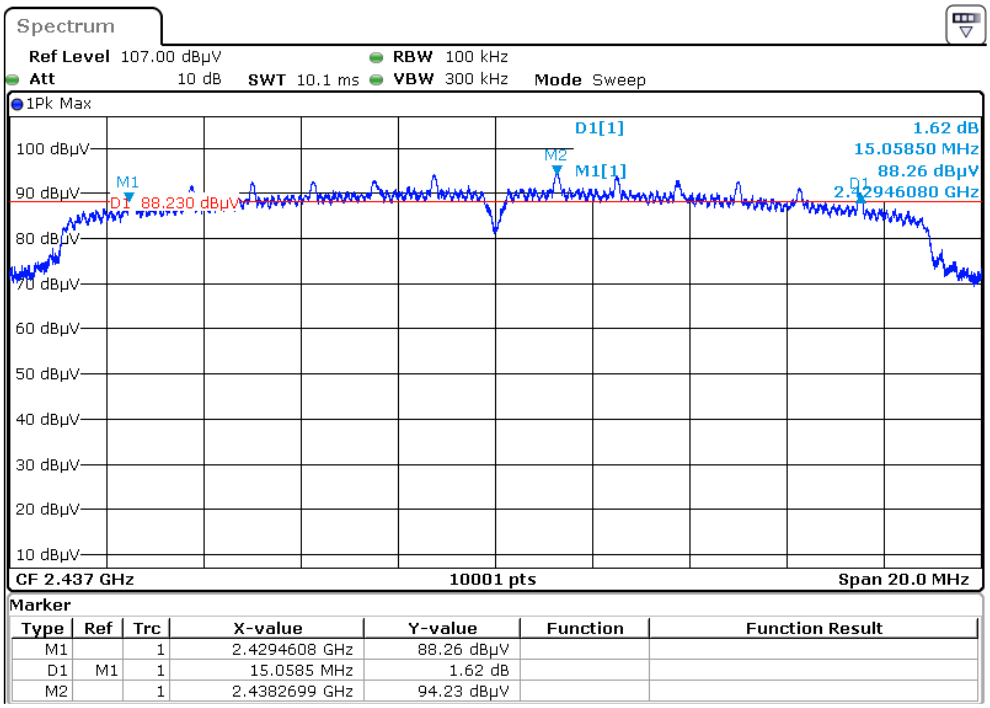
Measured bandwidth : 14.9925 MHz

6dB Bandwidth - Low Channel – Mode 802.11.n - SISO



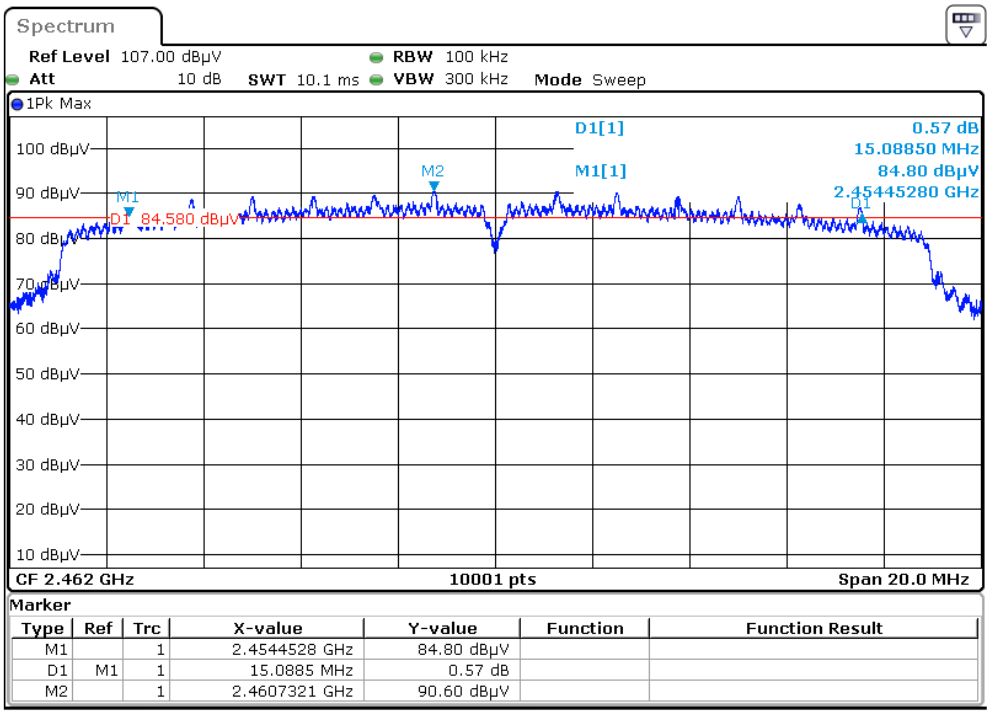
Measured bandwidth : 15.0925 MHz

6dB Bandwidth - Central Channel – Mode 802.11.n - SISO



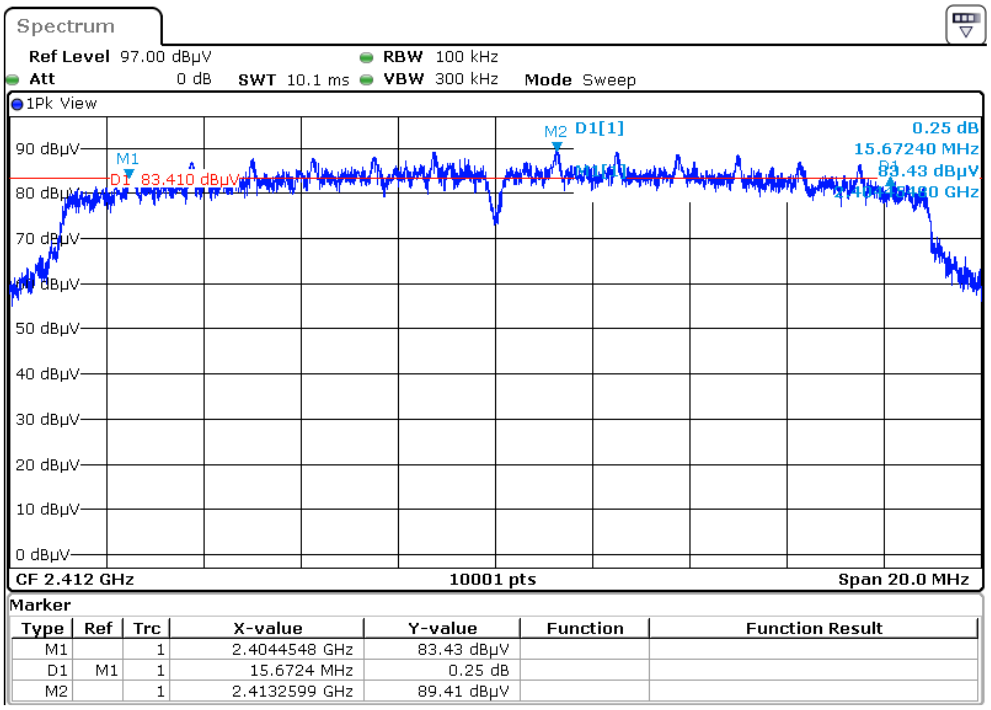
Measured bandwidth : 15.0585 MHz

6dB Bandwidth - High Channel – Mode 802.11.n - SISO



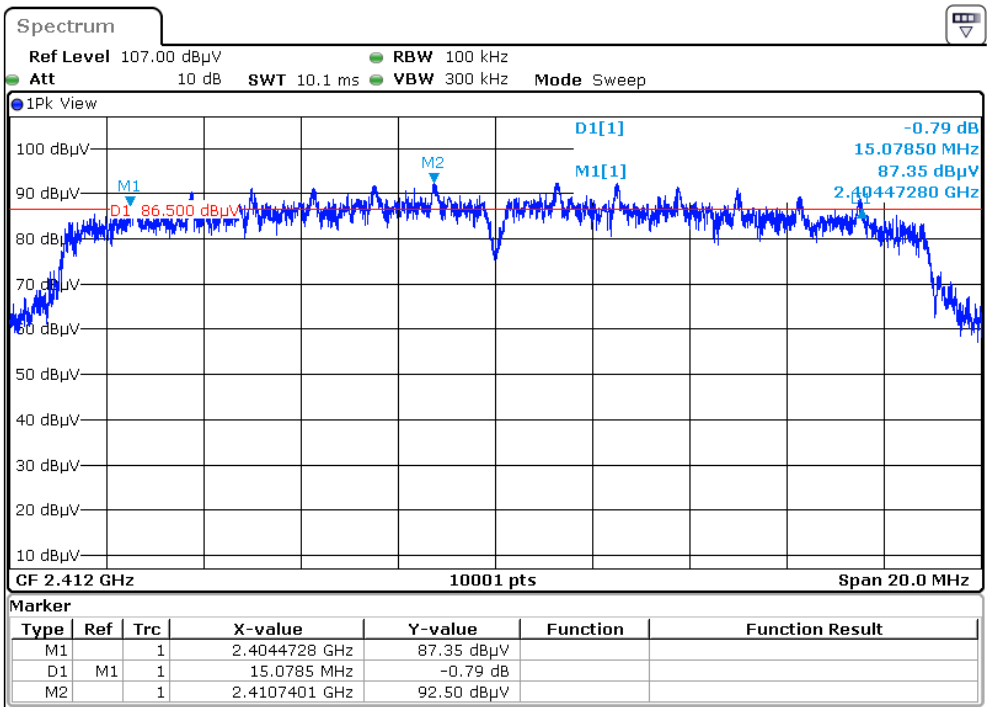
Measured bandwidth : 15.0885 MHz

6dB Bandwidth – Low Channel - RF1 – Mode 802.11.n - MIMO



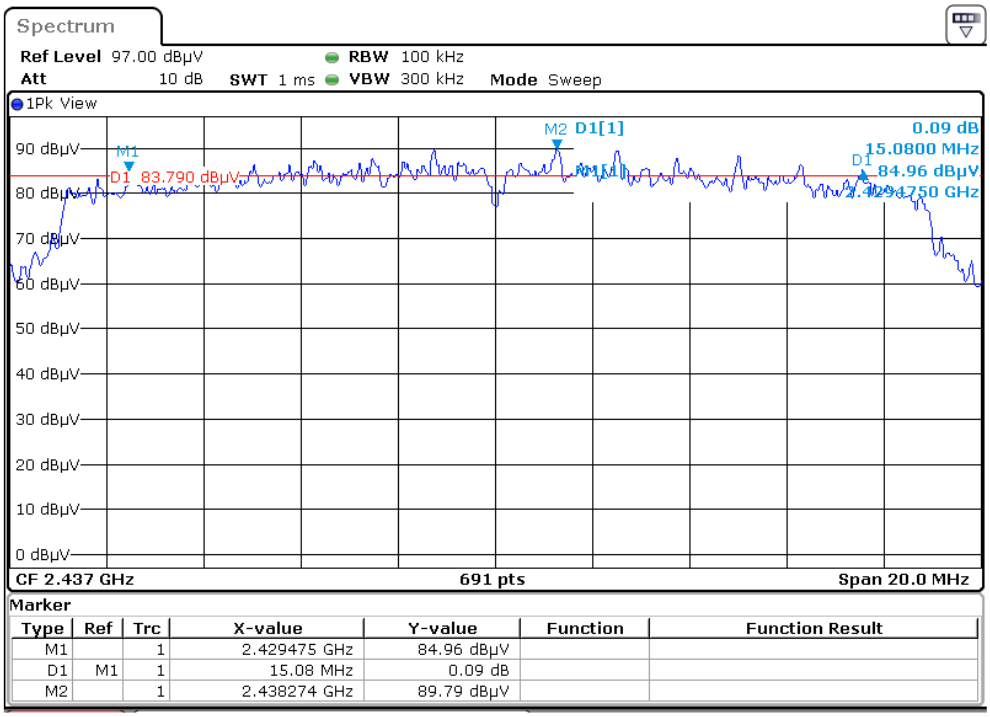
Measured bandwidth : 15.6724 MHz

6dB Bandwidth – Low Channel – RF2 – Mode 802.11.n - MIMO



Measured bandwidth : 15.0785 MHz

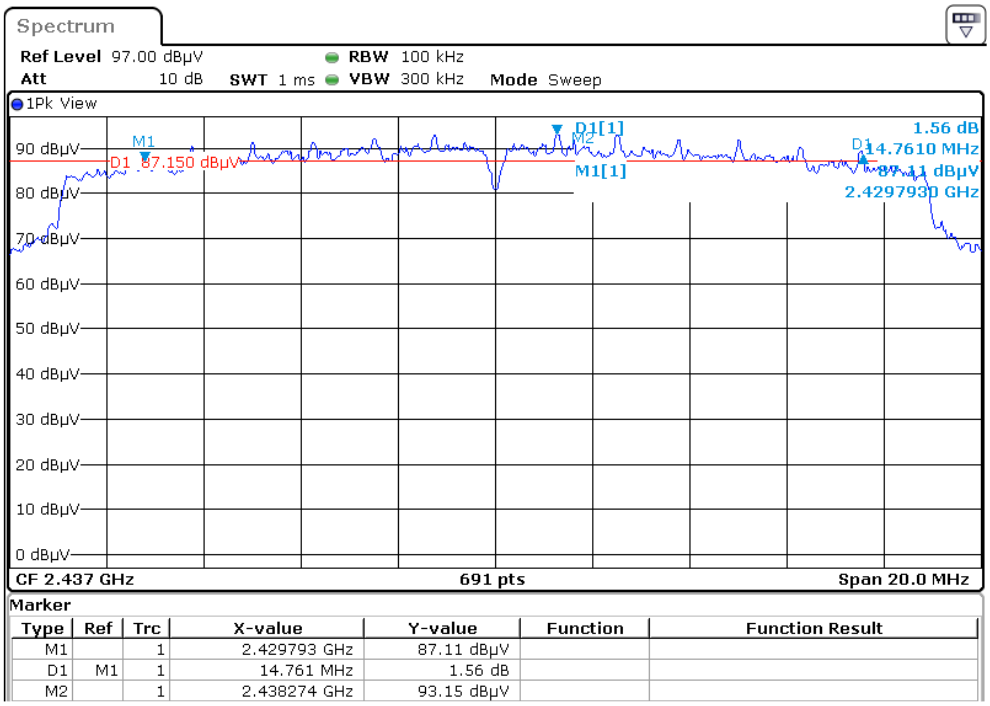
6dB Bandwidth – Central Channel – RF1 – Mode 802.11.n - MIMO



Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.429475 GHz	84.96 dBµV		
D1	M1	1	15.08 MHz	0.09 dB		
M2		1	2.438274 GHz	89.79 dBµV		

Measured bandwidth : 15.080 MHz

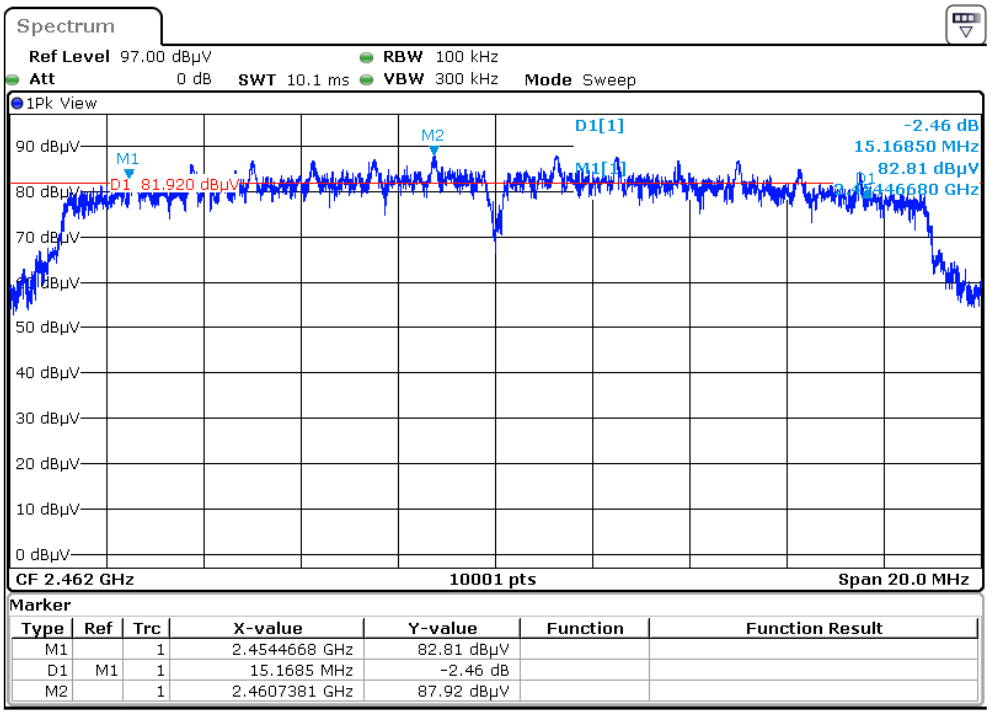
6dB Bandwidth – Central Channel – RF2 – Mode 802.11.n - MIMO



Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.429793 GHz	87.11 dBµV		
D1	M1	1	14.761 MHz	1.56 dB		
M2		1	2.438274 GHz	93.15 dBµV		

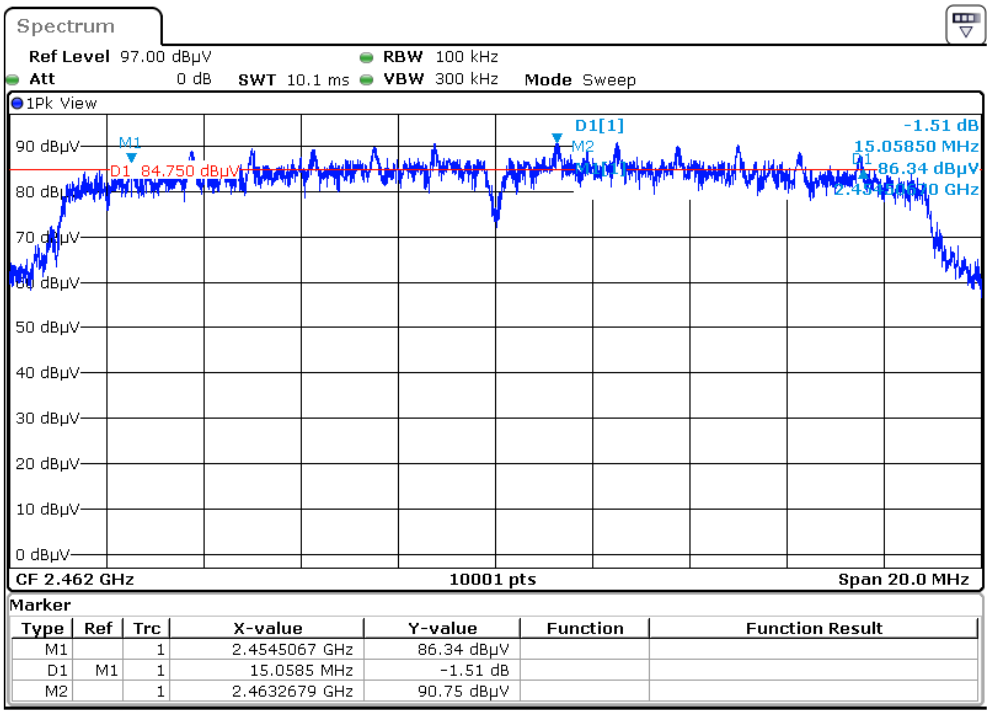
Measured bandwidth : 14.761 MHz

6dB Bandwidth – High Channel – RF1 – Mode 802.11.n - MIMO



Measured bandwidth : 15.1685 MHz

6dB Bandwidth – High Channel – RF2 – Mode 802.11.n - MIMO

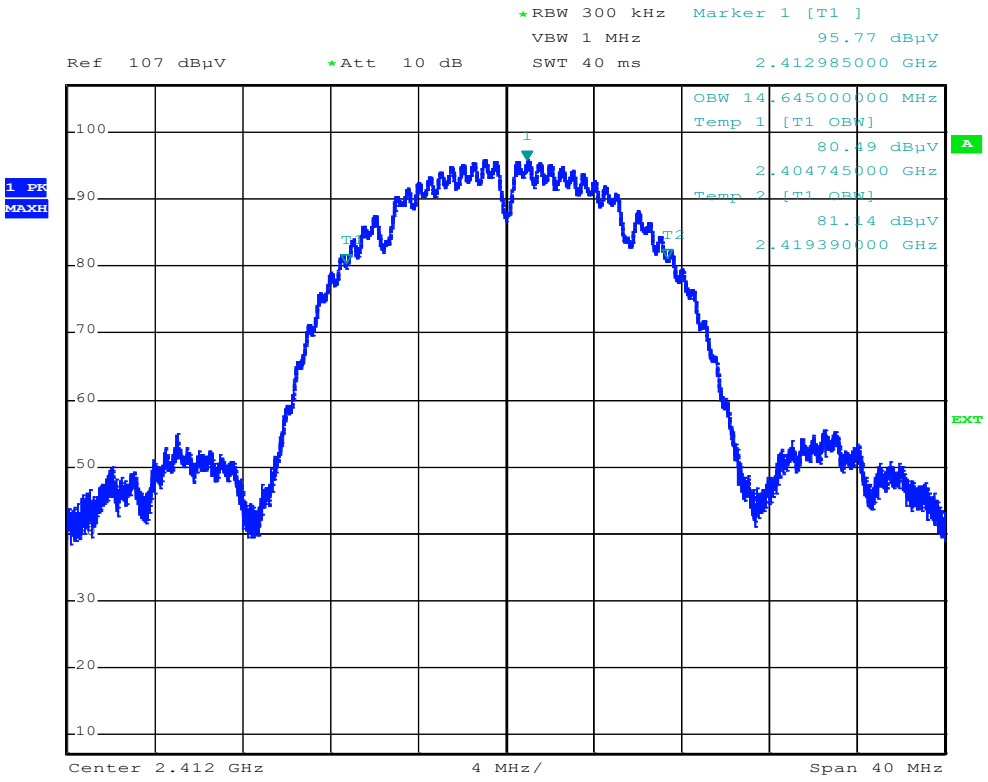


Measured bandwidth : 15.0585 MHz

Limit:

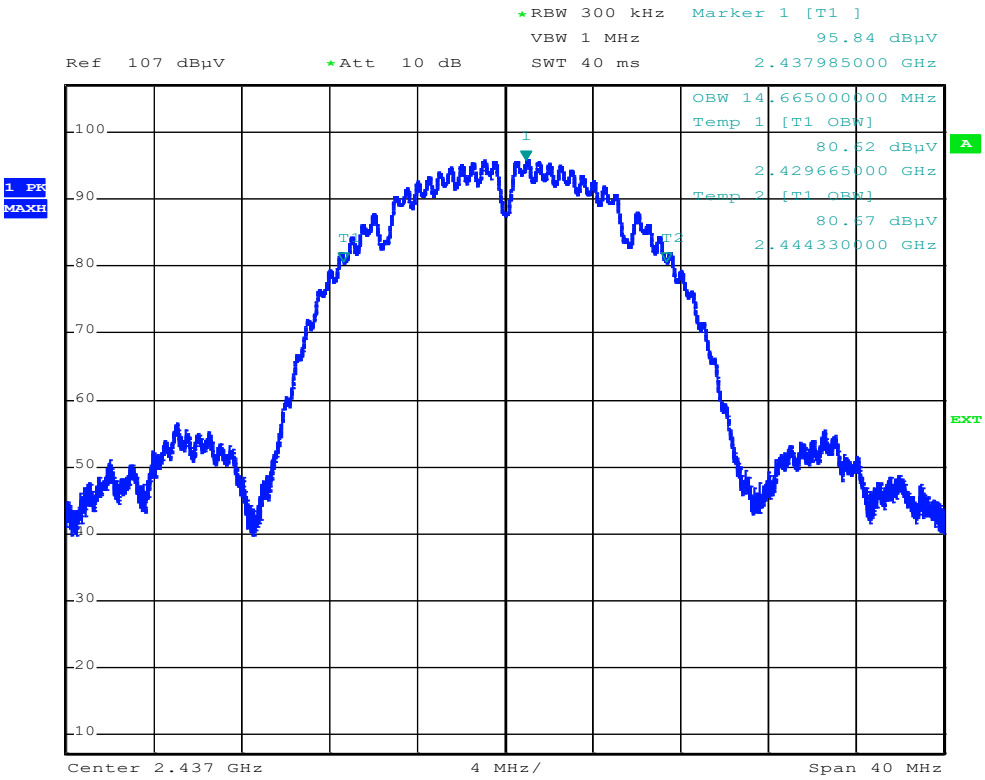
Shall be at least 500 kHz

99% bandwidth - Low Channel – Mode 802.11.b - SISO



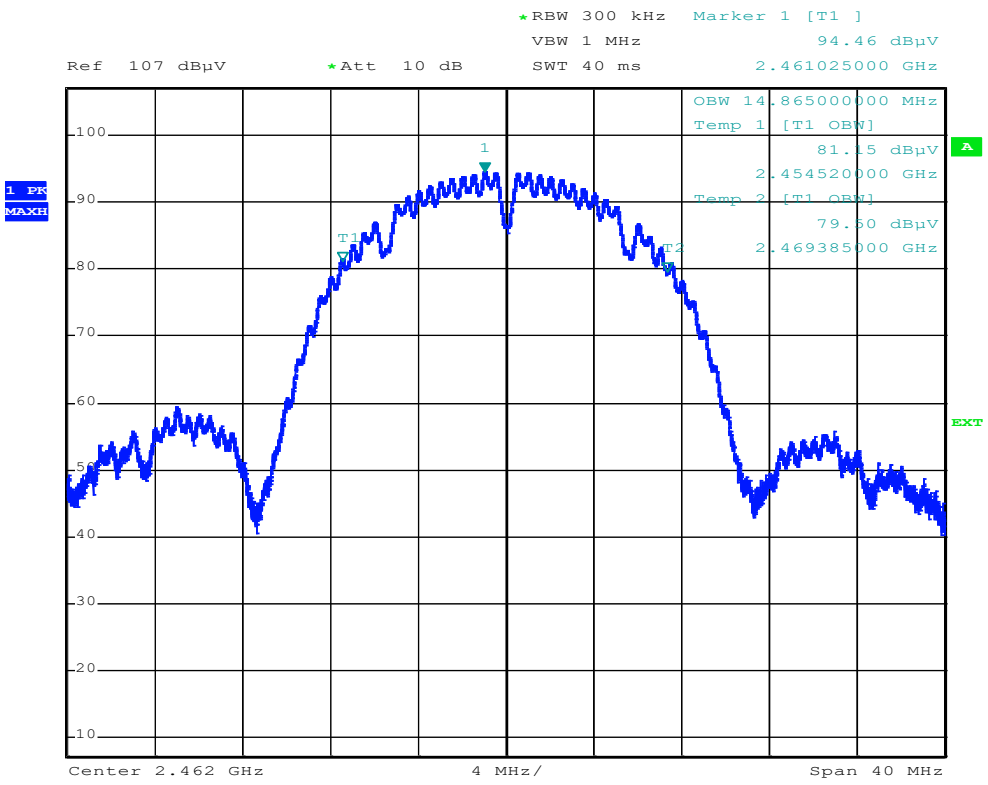
Measured bandwidth : 14.645 MHz

99% bandwidth - Central Channel – Mode 802.11.b - SISO



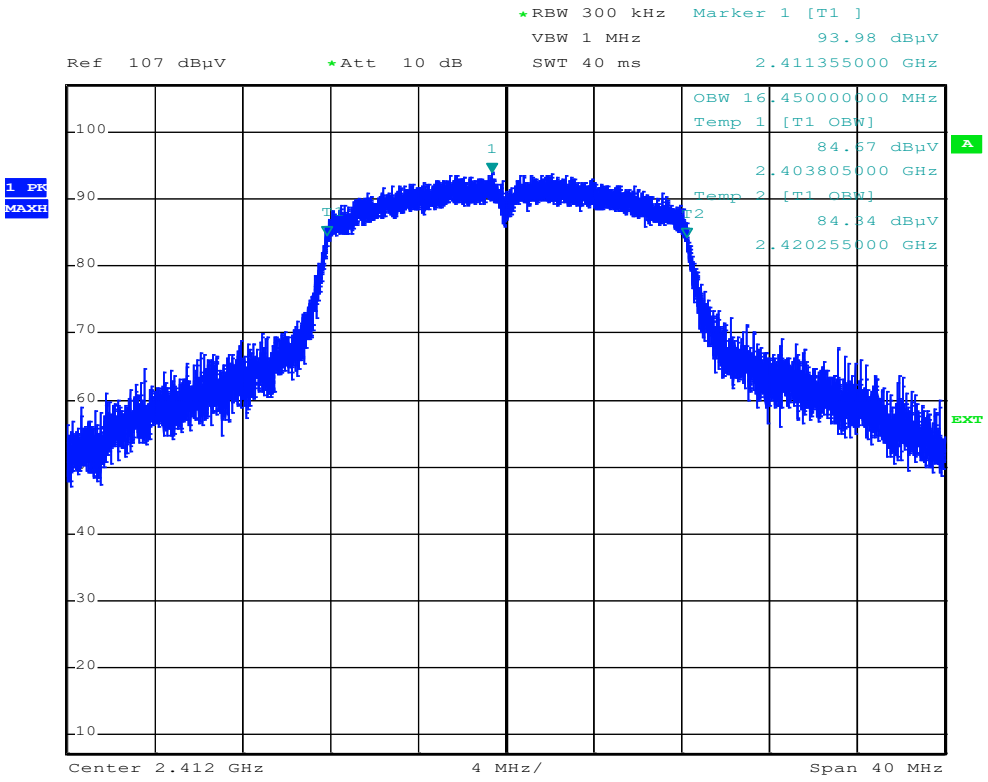
Measured bandwidth : 14.665 MHz

99% bandwidth - High Channel – Mode 802.11.b - SISO



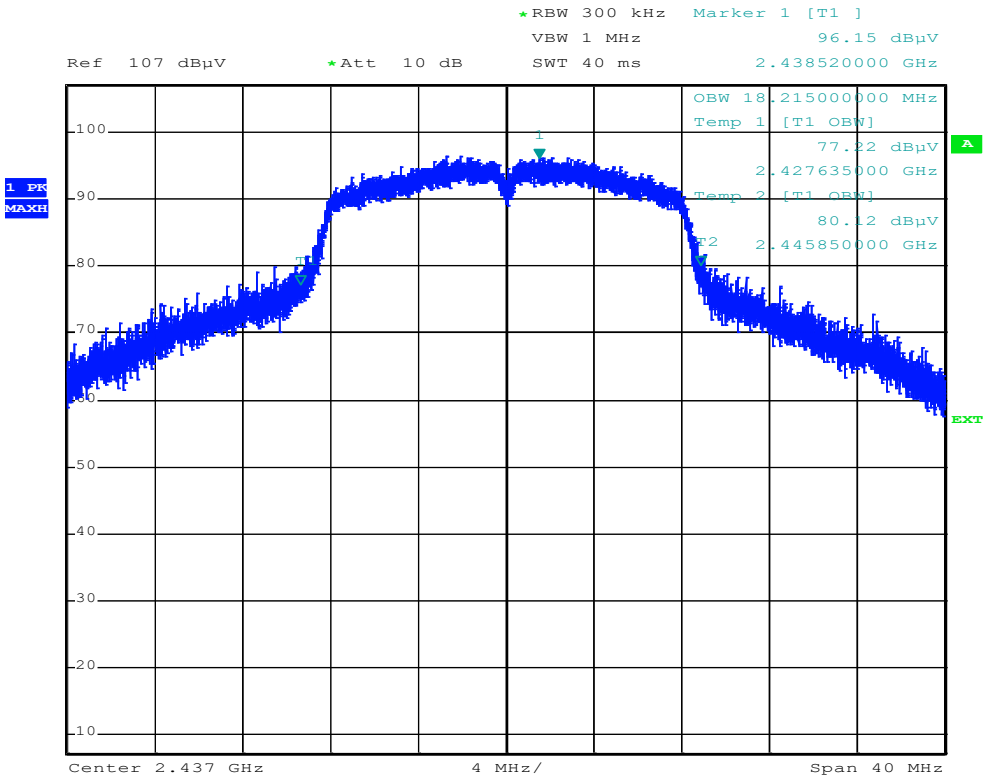
Measured bandwidth : 14.865 MHz

99% bandwidth - Low Channel – Mode 802.11.g - SISO



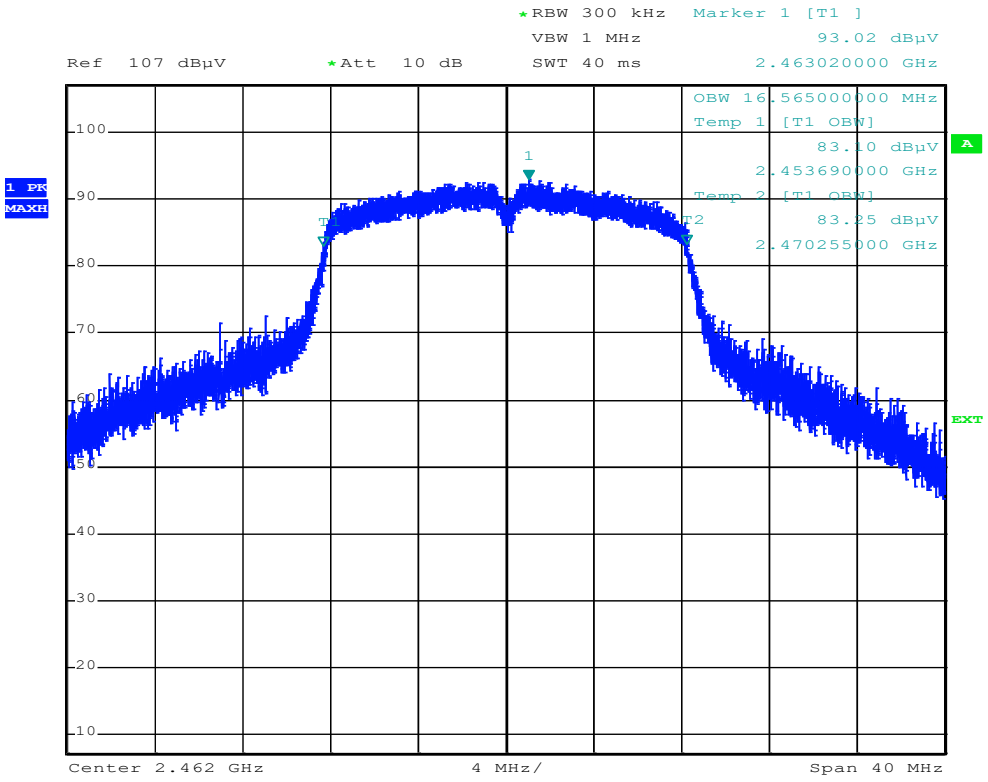
Measured bandwidth : 16.450 MHz

99% bandwidth - Central Channel – Mode 802.11.g - SISO



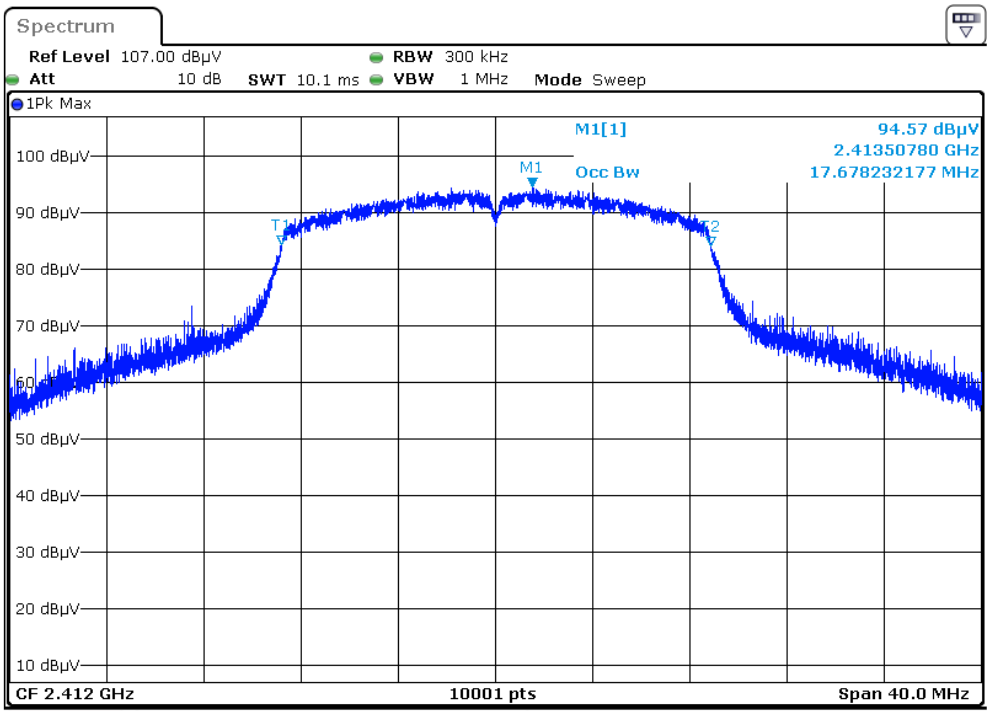
Measured bandwidth : 18.215 MHz

99% bandwidth - High Channel – Mode 802.11.g - SISO



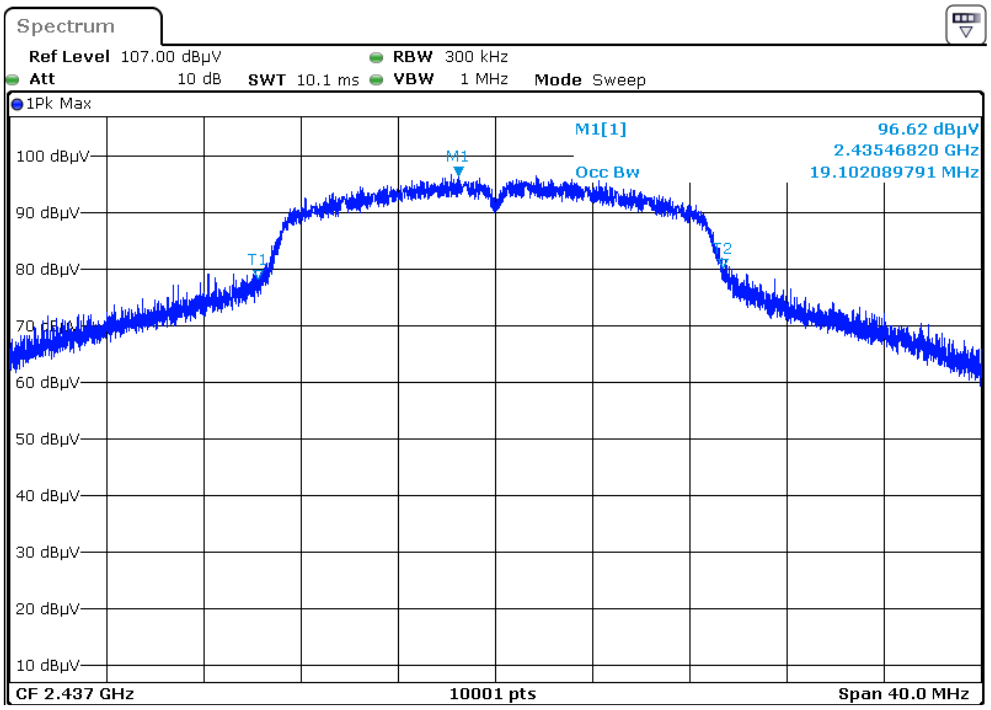
Measured bandwidth : 16.565 MHz

99% bandwidth - Low Channel – Mode 802.11.n - SISO



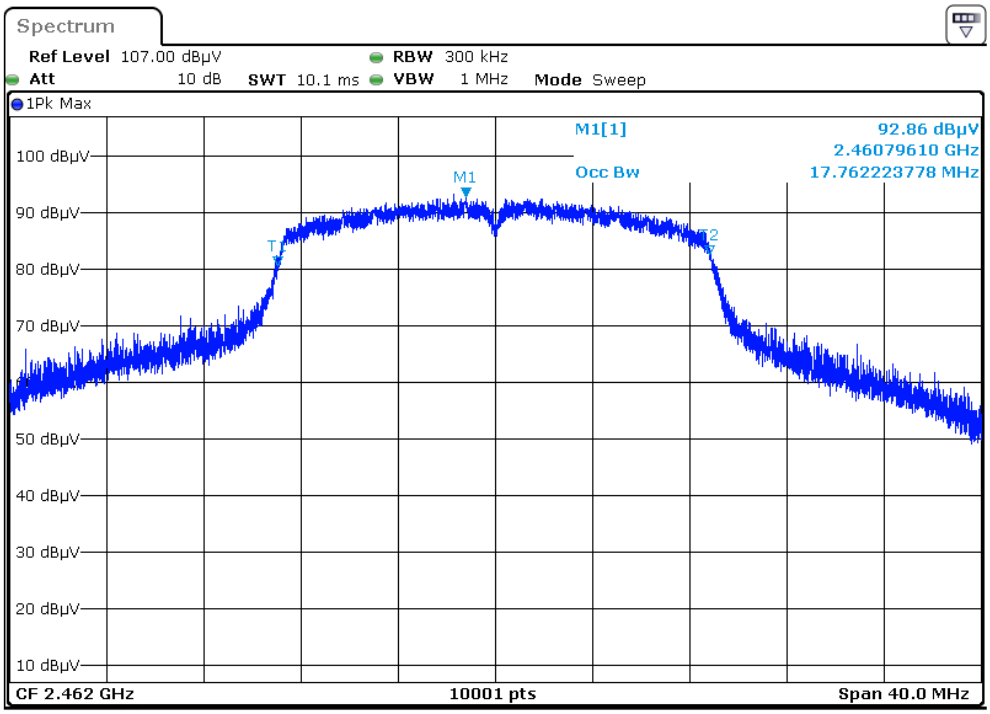
Measured bandwidth : 17.6782 MHz

99% bandwidth - Central Channel – Mode 802.11.n - SISO



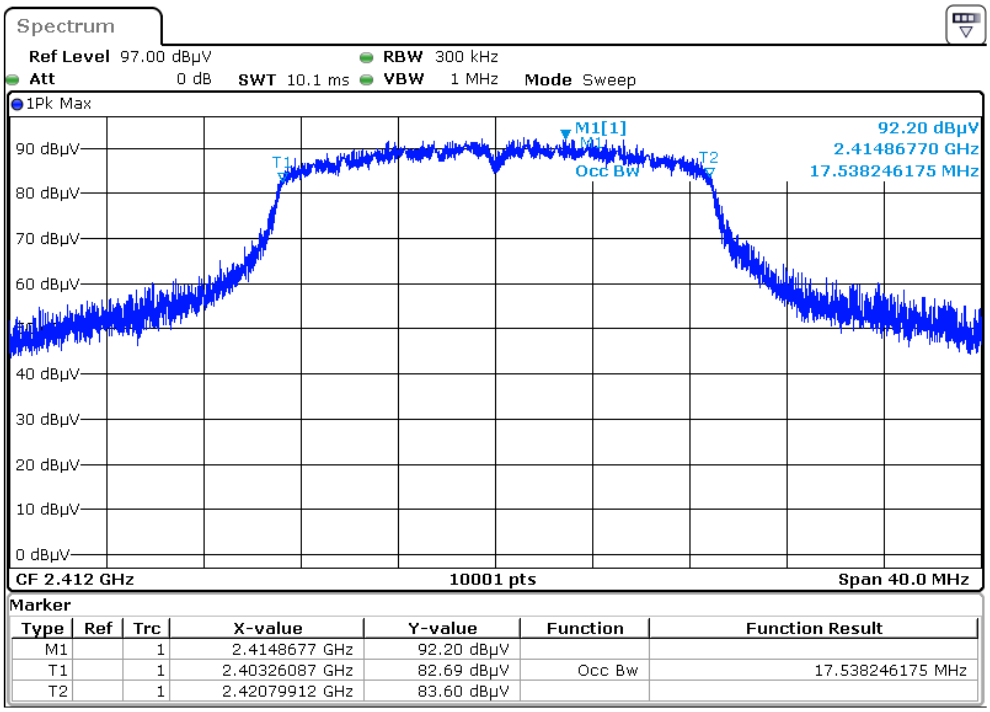
Measured bandwidth : 19.102 MHz

99% bandwidth - High Channel – Mode 802.11.n - SISO



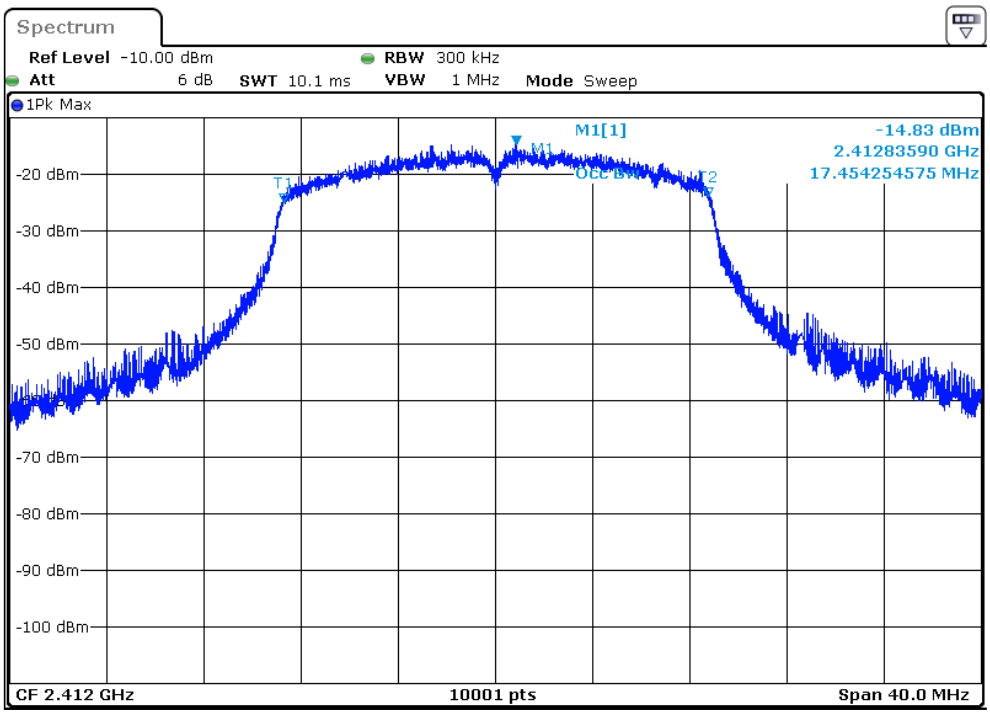
Measured bandwidth : 17.7622 MHz

99% bandwidth - Low Channel – RF1 – Mode 802.11.n - MIMO



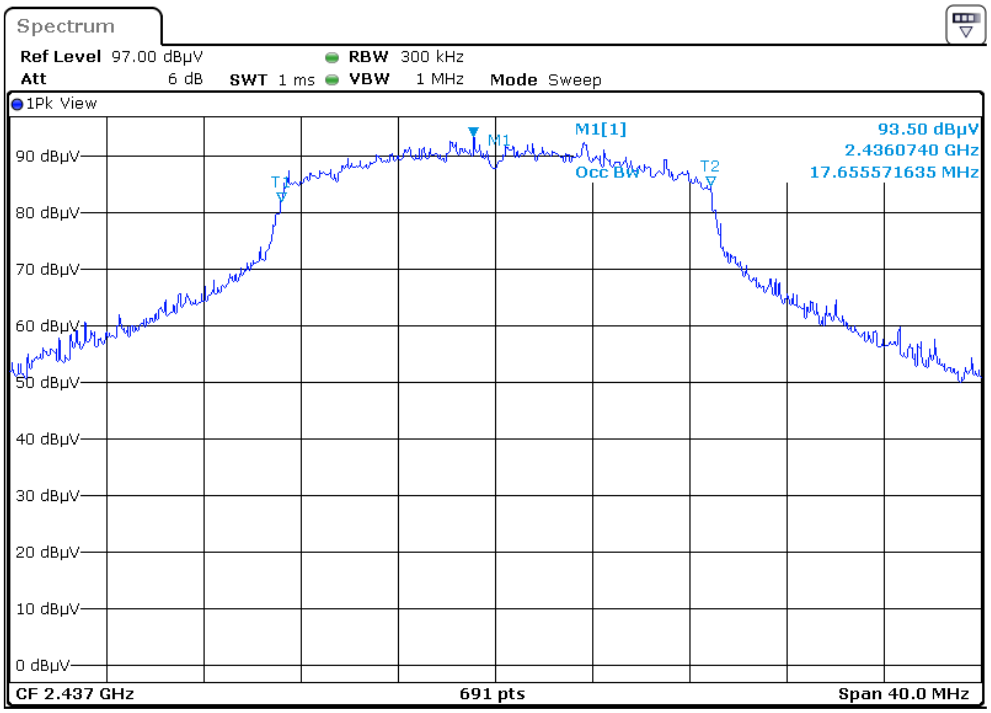
Measured bandwidth : 17.5382 MHz

99% bandwidth - Low Channel – RF2 – Mode 802.11.n - MIMO



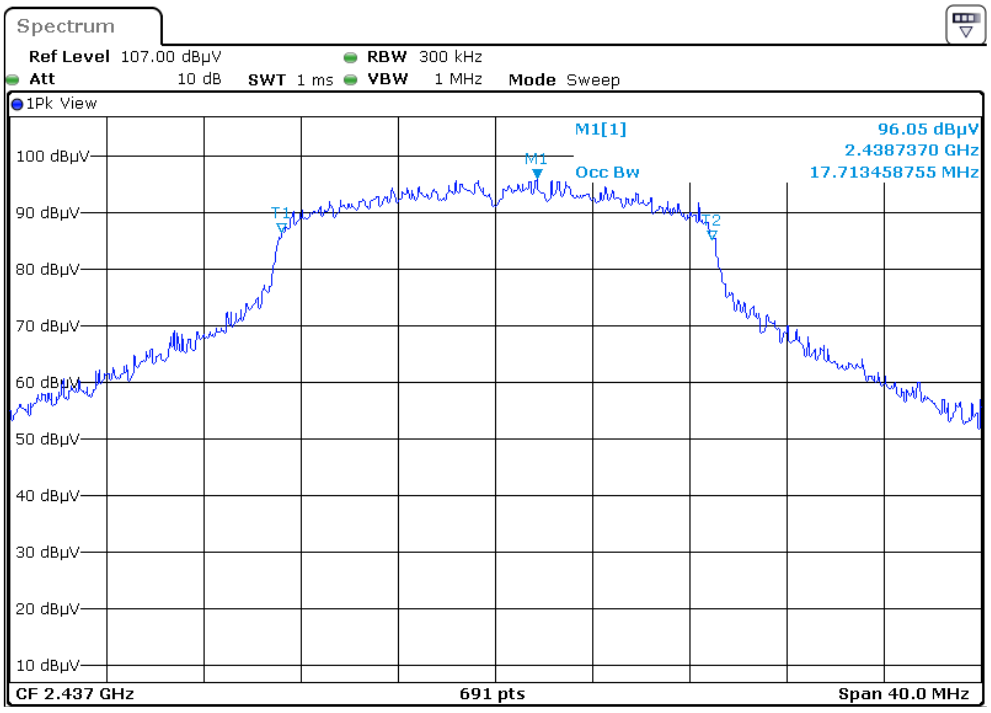
Measured bandwidth : 17.4542 MHz

99% bandwidth - Central Channel – RF1 – Mode 802.11.n - MIMO



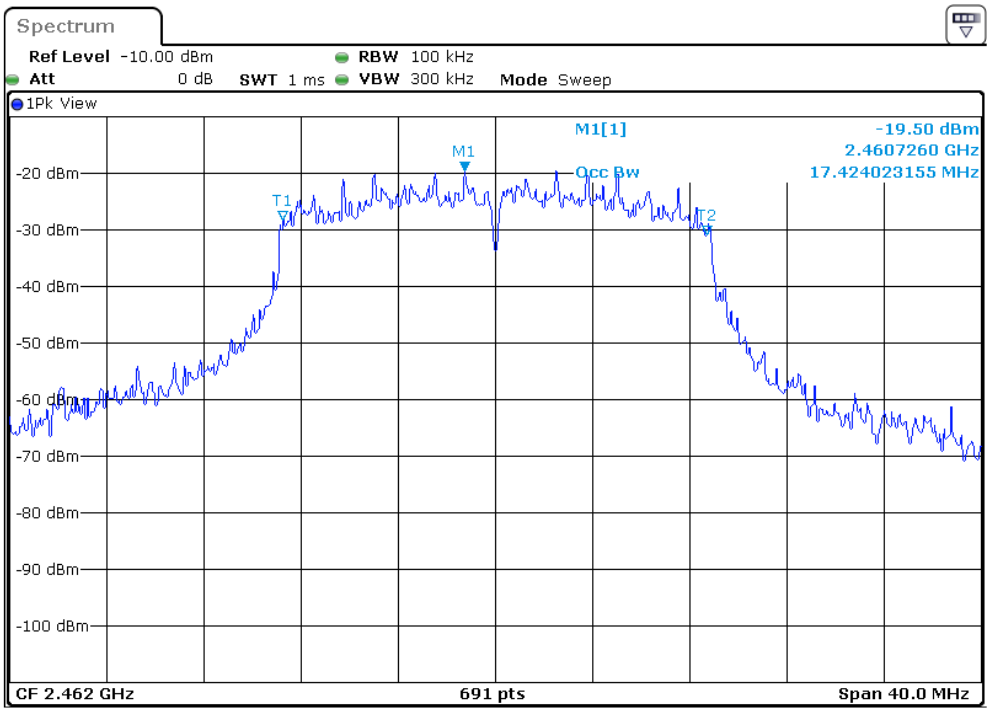
Measured bandwidth : 17.6555 MHz

99% bandwidth - Central Channel – RF2 – Mode 802.11.n - MIMO



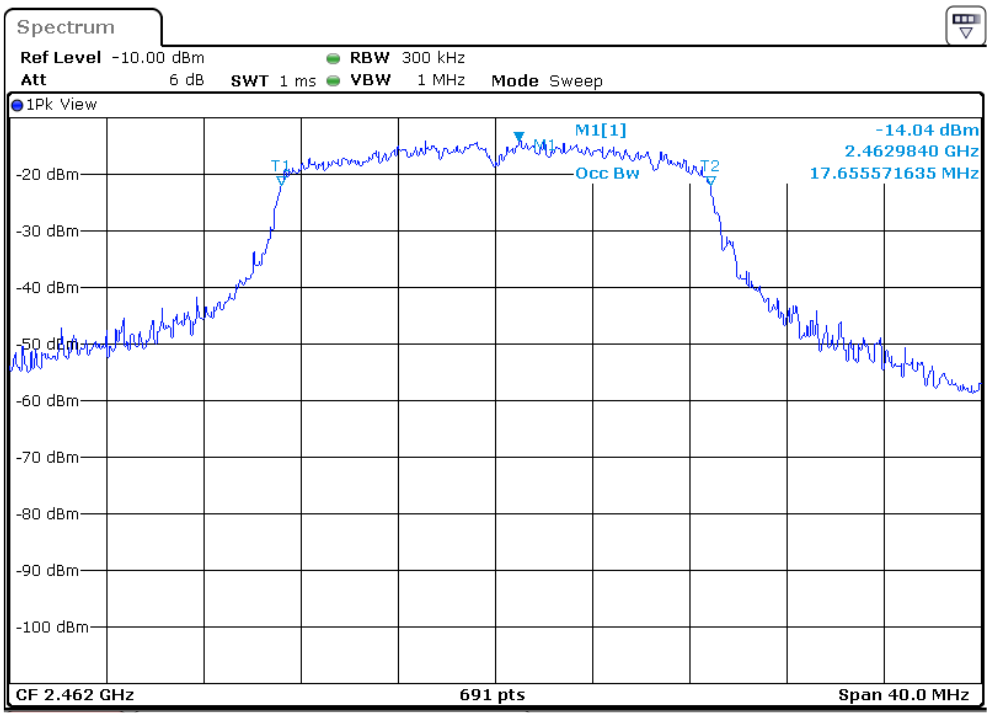
Measured bandwidth : 17.7134 MHz

99% bandwidth - High Channel – RF1 – Mode 802.11.n - MIMO



Measured bandwidth : 17.4240 MHz

99% bandwidth - High Channel – RF2 – Mode 802.11.n - MIMO



Measured bandwidth : 17.6555 MHz

Measure realized for reporting only

9. BAND EDGE

Temperature (°C) : 22 **Humidity (%HR):** 47 **Date :** December 11, 2020
Technician : S. LOUIS

Standard: FCC Part 15
RSS-247

Test procedure:
Method of paragraph 11.13 of ANSI C63.10

Test set up:

The measurement is realized with the product on the most critical orientation.

The measure is realized in anechoic chamber.

The EUT is placed on a rotating table at 1.50 m from a ground plane.

Distance of antenna: 3 m

Antenna height: 1.50 meter (in anechoic room)

Test operating condition of the equipment:

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.

We used for power source the internal fully charged battery

Results: WiFi mode 802.11.b - SISO

Lower Band Edge: From 2400 MHz to 2402 MHz
Upper Band Edge: From 2483.5 MHz to 2485.5 MHz

Sample N° 1

Fundamental frequency (MHz)	Field Strength Level of fundamental (dBµV/m at 3m)	RBW (kHz)	Detector (Peak or Average)	Frequency of maximum Band-edges Emission (MHz)	Delta Marker (dB) (1)	Calculated Max Out-of-Band Emission Level (dBµV/m at 3m)	Limit (dBµV/m at 3m)	Margin (dB)
2412	102.2	100	Peak	2398.01	46.47	56.33	82.2	25.87
2462	104.5	1000	Peak	2483.87	46.96	57.54	74	16.46
2462	104.5	1000	Average	2483.87	57.06	47.44	54	6.56

(1) Marker-Delta method

Results: WiFi mode 802.11.g - SISO

Lower Band Edge: From 2400 MHz to 2402 MHz
Upper Band Edge: From 2483.5 MHz to 2485.5 MHz

Sample N° 1

Fundamental frequency (MHz)	Field Strength Level of fundamental (dBµV/m at 3m)	RBW (kHz)	Detector (Peak or Average)	Frequency of maximum Band-edges Emission (MHz)	Delta Marker (dB) (1)	Calculated Max Out-of-Band Emission Level (dBµV/m at 3m)	Limit (dBµV/m at 3m)	Margin (dB)
2412	97.9	100	Peak	2398.87	27.35	70.55	77.9	7.35
2462	106.0	1000	Peak	2483.64	35.41	70.59	74	3.41
2462	106.0	1000	Average	2483.64	54.54	51.46	54	2.54

(1) Marker-Delta method

Results: WiFi mode 802.11.n - SISO

Lower Band Edge: From 2400 MHz to 2402 MHz
Upper Band Edge: From 2483.5 MHz to 2485.5 MHz

Sample N° 1

Fundamental frequency (MHz)	Field Strength Level of fundamental (dBµV/m at 3m)	RBW (kHz)	Detector (Peak or Average)	Frequency of maximum Band-edges Emission (MHz)	Delta Marker (dB) (1)	Calculated Max Out-of-Band Emission Level (dBµV/m at 3m)	Limit (dBµV/m at 3m)	Margin (dB)
2412	98.3	100	Peak	2399.73	28.13	70.17	78.3	7.13
2462	107.2	1000	Peak	2484.34	35.93	71.27	74	2.73
2462	107.2	1000	Average	2483.61	54.39	52.81	54	1.19

(1) Marker-Delta method

Results: WiFi mode 802.11.n – Mimo

Lower Band Edge: From 2400 MHz to 2402 MHz
Upper Band Edge: From 2483.5 MHz to 2485.5 MHz

Sample N° 1

Fundamental frequency (MHz)	Field Strength Level of fundamental (dBµV/m at 3m)	RBW (kHz)	Detector (Peak or Average)	Frequency of maximum Band-edges Emission (MHz)	Delta Marker (dB) (1)	Calculated Max Out-of-Band Emission Level (dBµV/m at 3m)	Limit (dBµV/m at 3m)	Margin (dB)
2412	96.8	100	Peak	2398.30	34.13	62.67	76.8	14.13
2462	105.8	1000	Peak	2483.83	38.37	67.43	74	6.57
2462	105.8	1000	Average	2483.70	53.60	52.20	54	1.80

(1) Marker-Delta method

Test conclusion:

RESPECTED STANDARD

10. PEAK CONDUCTED OUTPUT POWER

Temperature (°C) : 19.2 **Humidity (%HR):** 36 **Date :** December 9, 2020
Technician : S. LOUIS

Standard: FCC Part 15
RSS-247

Test procedure:
For FCC Part 15: paragraph 15.247 (b)
For RSS-247: paragraph 5.4

PKPM1 Peak power meter method of paragraph 11.9.1.3 of ANSI C63.10

Test set up:

First an exploratory radiated measurement was performed.

During this phase the product is oriented in these two normal positions.

Then the final measurement is realized with the product on the most critical orientation.

The system is tested in anechoic chamber, the EUT is placed on a rotating table, 1.5 m from a ground plane.

Zero degree azimuths correspond to the front of the device under test.

See photos in appendix 2.

Distance of antenna: 3 meters

Antenna height: 1.5 meter

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

The measurement of the radiated electro-magnetic field is realized in radiated mode with a calibrated peak power reading power meter. (11.9.1.3 of ANSI C63.10).

Finally the radiated electro-magnetic field is converted in dBm with the following formula:
EIRP(dBm) = E (dBµV/m) + 20log(D) - 104.8; where D is the measurement distance in meters and antenna with a Gain (unit in dBi) different following the frequencies used.

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 in 802.11b, 802.11g and 802.11n modes (SISO) and 802.11.n mode (MIMO).

We used for power source the internal fully charged battery

Results:

Sample N° 1 : Low Channel – Mode 802.11.b - SISO

	Electro-magnetic field (dBµV/m at 3m):	Maximum Peak conducted output power (1)		Limit
		(dBm)	(W)	(W)
Nominal supply voltage:	115.30	18.51	0.071	1

Polarization of test antenna: Vertical (height: 150 cm)
Position of equipment: Position 2 (azimuth: 320 degrees)

Maximum Peak conducted output power:
EIRP(dBm) = E (dBµV/m) + 20log(D) - 104.8; where D is the measurement distance in meters and antenna Gain = +1.53dBi.

Sample N° 1 : Central Channel – Mode 802.11.b - SISO

	Electro-magnetic field (dBµV/m at 3m):	Maximum Peak conducted output power (1)		Limit
		(dBm)	(W)	(W)
Nominal supply voltage:	115.24	17.91	0.062	1

Polarization of test antenna: Vertical (height: 150 cm)
Position of equipment: Position 2 (azimuth: 320 degrees)

Maximum Peak conducted output power:
EIRP(dBm) = E (dBµV/m) + 20log(D) - 104.8; where D is the measurement distance in meters and antenna Gain = +2.07dBi.

Sample N° 1 : High Channel – Mode 802.11.b - SISO

	Electro-magnetic field (dBµV/m at 3m):	Maximum Peak conducted output power (1)		Limit
		(dBm)	(W)	(W)
Nominal supply voltage:	113.86	16.40	0.044	1

Polarization of test antenna: Vertical (height: 150 cm)
Position of equipment: Position 2 (azimuth: 320 degrees)

Maximum Peak conducted output power:
EIRP(dBm) = E (dBµV/m) + 20log(D) - 104.8; where D is the measurement distance in meters and antenna Gain = +2.20dBi.

Sample N° 1 : Low Channel – Mode 802.11.g - SISO

	Electro-magnetic field (dBµV/m at 3m):	Maximum Peak conducted output power (1)		Limit
		(dBm)	(W)	(W)
Nominal supply voltage:	117.02	20.23	0.105	1

Polarization of test antenna: Vertical (height: 150 cm)
Position of equipment: Position 2 (azimuth: 320 degrees)

Maximum Peak conducted output power:
EIRP(dBm) = E (dBµV/m) + 20log(D) - 104.8; where D is the measurement distance in meters and antenna Gain = +1.53dBi.

Sample N° 1 : Central Channel – Mode 802.11.g - SISO

	Electro-magnetic field (dBµV/m at 3m):	Maximum Peak conducted output power (1)		Limit
		(dBm)	(W)	(W)
Nominal supply voltage:	117.23	19.90	0.098	1

Polarization of test antenna: Vertical (height: 150 cm)
Position of equipment: Position 2 (azimuth: 320 degrees)

Maximum Peak conducted output power:
EIRP(dBm) = E (dBµV/m) + 20log(D) - 104.8; where D is the measurement distance in meters and antenna Gain = +2.07dBi.

Sample N° 1 : High Channel – Mode 802.11.g - SISO

	Electro-magnetic field (dBµV/m at 3m):	Maximum Peak conducted output power (1)		Limit
		(dBm)	(W)	(W)
Nominal supply voltage:	115.74	18.28	0.067	1

Polarization of test antenna: Vertical (height: 150 cm)
Position of equipment: Position 2 (azimuth: 320 degrees)

Maximum Peak conducted output power:
EIRP(dBm) = E (dBµV/m) + 20log(D) - 104.8; where D is the measurement distance in meters and antenna Gain = +2.20dBi.

Sample N° 1 : Low Channel – Mode 802.11.n - SISO

	Electro-magnetic field (dBµV/m at 3m):	Maximum Peak conducted output power (1)		Limit (W)
		(dBm)	(W)	
Nominal supply voltage:	116.97	20.18	0.104	1

Polarization of test antenna: Vertical (height: 150 cm)
Position of equipment: Position 2 (azimuth: 320 degrees)

Maximum Peak conducted output power:
EIRP(dBm) = E (dBµV/m) + 20log(D) - 104.8; where D is the measurement distance in meters and antenna Gain = +1.53dBi.

Sample N° 1 : Central Channel – Mode 802.11.n - SISO

	Electro-magnetic field (dBµV/m at 3m):	Maximum Peak conducted output power (1)		Limit (W)
		(dBm)	(W)	
Nominal supply voltage:	117.09	19.76	0.095	1

Polarization of test antenna: Vertical (height: 150 cm)
Position of equipment: Position 2 (azimuth: 320 degrees)

Maximum Peak conducted output power:
EIRP(dBm) = E (dBµV/m) + 20log(D) - 104.8; where D is the measurement distance in meters and antenna Gain = +2.07dBi.

Sample N° 1 : High Channel – Mode 802.11.n - SISO

	Electro-magnetic field (dBµV/m at 3m):	Maximum Peak conducted output power (1)		Limit (W)
		(dBm)	(W)	
Nominal supply voltage:	116.25	18.79	0.076	1

Polarization of test antenna: Vertical (height: 150 cm)
Position of equipment: Position 2 (azimuth: 320 degrees)

Maximum Peak conducted output power:
EIRP(dBm) = E (dBµV/m) + 20log(D) - 104.8; where D is the measurement distance in meters and antenna Gain = +2.20dBi.

Sample N° 1 : Low Channel / Mode 802.11.n - MIMO

Electro-magnetic field (dBµV/m at 3m):		Conducted Power (dBm):		Conducted Power (W):		Total Conducted Power (W):	Limit (W) (1)
Chain 1	Chain 2	Chain 1	Chain 2	Chain 1	Chain 2		
115.62	119.78	18.83	21.74	0.076	0.149	0.226	1

Polarization of test antenna: Vertical (height: 150 cm)
Position of equipment: Position 2 (azimuth: 320 degrees for antenna 1 / 165 degrees for antenna 2)

Maximum Peak conducted output power:
EIRP(dBm) = E (dBµV/m) + 20log(D) - 104.8; where D is the measurement distance in meters and antenna Gain = +1.53dBi for antenna 1 and +2.78dBi for antenna 2.

Sample N° 1 : Central Channel / Mode 802.11.n - MIMO

Electro-magnetic field (dBµV/m at 3m):		Conducted Power (dBm):		Conducted Power (W):		Total Conducted Power (W):	Limit (W) (1)
Chain 1	Chain 2	Chain 1	Chain 2	Chain 1	Chain 2		
116.70	119.69	19.37	22.15	0.087	0.164	0.251	1

Polarization of test antenna: Vertical (height: 150 cm)
Position of equipment: Position 2 (azimuth: 320 degrees for antenna 1 / 165 degrees for antenna 2)

Maximum Peak conducted output power:
EIRP(dBm) = E (dBµV/m) + 20log(D) - 104.8; where D is the measurement distance in meters and antenna Gain = +2.07dBi for antenna 1 and +2.28dBi for antenna 2.

Sample N° 1 : High Channel / Mode 802.11.n - MIMO

Electro-magnetic field (dBµV/m at 3m):		Conducted Power (dBm):		Conducted Power (W):		Total Conducted Power (W):	Limit (W) (1)
Chain 1	Chain 2	Chain 1	Chain 2	Chain 1	Chain 2		
115.53	118.25	18.07	20.70	0.064	0.118	0.182	1

Polarization of test antenna: Vertical (height: 150 cm)
Position of equipment: Position 2 (azimuth: 320 degrees for antenna 1 / 165 degrees for antenna 2)

Maximum Peak conducted output power:
EIRP(dBm) = E (dBµV/m) + 20log(D) - 104.8; where D is the measurement distance in meters and antenna Gain = +2.20dBi for antenna 1 and +2.29dBi for antenna 2.

Test conclusion:

RESPECTED STANDARD

11. RADIATED SPURIOUS EMISSIONS

Temperature (°C) : 19.2 **Humidity (%HR):** 46 **Date :** December 10, 2020
Technician : S. LOUIS

Standard: FCC Part 15
RSS-247

Test procedure:
For FCC Part 15: paragraph 15.205, paragraph 15.209, paragraph 15.247 (d)
For RSS-247: paragraph 5.5

Emissions in non-restricted frequency bands method of paragraph 11.11 of ANSI C63.10
Emissions in restricted frequency bands method of paragraph 11.12 of ANSI C63.10

Test set up:

First an exploratory radiated measurement was performed.

During this phase the product is oriented in these two normal positions.

Then the final measurement is realized with the product on the most critical orientation.

The measure is realized on open area test site under 1 GHz and in anechoic chamber above 1 GHz.

When the system is tested in an open area test site (OATS), the EUT is placed on a rotating table, 0.8m from a ground plane.
When the system is tested in anechoic chamber, the EUT is placed on a rotating table, 1.5 m from a ground plane.

Zero degree azimuths correspond to the front of the device under test.

See photos in appendix 2.

Frequency range: From 9 kHz to 25GHz - 10th harmonic of the highest fundamental frequency (2480MHz)

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

Bandwidth: 200Hz (9 kHz < F < 150kHz)
9 kHz (150 kHz < F < 30MHz)
120 kHz (30 MHz < F < 1 GHz)
100 kHz / 1 MHz (F > 1 GHz)

Distance of antenna: 10 m below 1 GHz
3 m between 1 GHz and 18 GHz
1 m between 18 GHz and 25 GHz

Antenna height: 1 to 4 meters (in open area test site) / 1.5 meter (in anechoic room)

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 in 802.11b, 802.11g and 802.11n modes and MIMO 802.11.n mode.

We used for power source the internal fully charged battery

Duty cycle factor for average measurement is then added. (Correction= 10 log (1/X))

This factor is already included on the results (tables and graphs)

For detailed results at ±2 MHz of the edge of the band see §9.

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.

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)).
In addition, radiated emissions which fall in the restricted band, as defined in Table 6 of RSS-Gen, must also comply with the radiated emission limits specified in Table 4 and Table 5 of RSS-Gen.

Results:

Sample N° 1 Channel 1 (F = 2412 MHz) – Mode 802.11.b - SISO

Frequencies (MHz)	Detector P QP Av	Antenna height (cm)	RBW (kHz)	Position	Polarization H: Horizontal V: Vertical	Field strength Measured at 3 m (dBµV/m)	Limits at 3 m (dBµV/m)	Margin (dB)
4824 (1)	P	150	1000	1	H	51.4 (2)	74	22.6

P= Peak, QP=Quasi-peak, Av=Average
(1) Restricted bands of operation in 15.205
(1) Restricted bands of operation as defined in Table 6 of RSS-Gen
(2) The peak level is lower than the average limit (54 dBµV/m)

Sample N° 1 Channel 6 (F = 2437 MHz) – Mode 802.11.b - SISO

Frequencies (MHz)	Detector P QP Av	Antenna height (cm)	RBW (kHz)	Position	Polarization H: Horizontal V: Vertical	Field strength Measured at 3 m (dBµV/m)	Limits at 3 m (dBµV/m)	Margin (dB)
4874 (1)	P	150	1000	2	V	54.9	74	19.1
4874 (1)	Av	150	1000	2	V	49.4	54	4.6

P= Peak, QP=Quasi-peak, Av=Average
(1) Restricted bands of operation in 15.205
(1) Restricted bands of operation as defined in Table 6 of RSS-Gen

Sample N° 1 Channel 11 (F = 2462 MHz) – Mode 802.11.b - SISO

Frequencies (MHz)	Detector P QP Av	Antenna height (cm)	RBW (kHz)	Position	Polarization H: Horizontal V: Vertical	Field strength Measured at 3 m (dBµV/m)	Limits at 3 m (dBµV/m)	Margin (dB)
4924 (1)	P	150	1000	2	V	55.5	74	18.5
4924 (1)	Av	150	1000	2	V	50.0	54	4.0

P= Peak, QP=Quasi-peak, Av=Average
(1) Restricted bands of operation in 15.205
(1) Restricted bands of operation as defined in Table 6 of RSS-Gen

Sample N° 1 Channel 1 (F = 2412 MHz) – Mode 802.11.g - SISO

Frequencies (MHz)	Detector P QP Av	Antenna height (cm)	RBW (kHz)	Position	Polarization H: Horizontal V: Vertical	Field strength Measured at 3 m (dBµV/m)	Limits at 3 m (dBµV/m)	Margin (dB)
4824 (1)	P	150	1000	2	V	51.0 (2)	74	23.0

P= Peak, QP=Quasi-peak, Av=Average
(1) Restricted bands of operation in 15.205
(1) Restricted bands of operation as defined in Table 6 of RSS-Gen
(2) The peak level is lower than the average limit (54 dBµV/m)

Sample N° 1 Channel 6 (F = 2437 MHz) – Mode 802.11.g - SISO

Frequencies (MHz)	Detector P QP Av	Antenna height (cm)	RBW (kHz)	Position	Polarization H: Horizontal V: Vertical	Field strength Measured at 3 m (dBµV/m)	Limits at 3 m (dBµV/m)	Margin (dB)
4874 (1)	P	150	1000	2	V	52.9 (2)	74	21.1

P= Peak, QP=Quasi-peak, Av=Average
(1) Restricted bands of operation in 15.205
(1) Restricted bands of operation as defined in Table 6 of RSS-Gen
(2) The peak level is lower than the average limit (54 dBµV/m)

Sample N° 1 Channel 11 (F = 2462 MHz) – Mode 802.11.g - SISO

Frequencies (MHz)	Detector P QP Av	Antenna height (cm)	RBW (kHz)	Position	Polarization H: Horizontal V: Vertical	Field strength Measured at 3 m (dBµV/m)	Limits at 3 m (dBµV/m)	Margin (dB)
4924 (1)	P	150	1000	2	V	51.3 (2)	74	22.7

P= Peak, QP=Quasi-peak, Av=Average
(1) Restricted bands of operation in 15.205
(1) Restricted bands of operation as defined in Table 6 of RSS-Gen
(2) The peak level is lower than the average limit (54 dBµV/m)

Sample N° 1 Channel 1 (F = 2412 MHz) – Mode 802.11.n - SISO

Frequencies (MHz)	Detector P QP Av	Antenna height (cm)	RBW (kHz)	Position	Polarization H: Horizontal V: Vertical	Field strength Measured at 3 m (dBµV/m)	Limits at 3 m (dBµV/m)	Margin (dB)
4824 (1)	P	150	1000	1	H	47.8 (2)	74	26.2

P= Peak, QP=Quasi-peak, Av=Average
(1) Restricted bands of operation in 15.205
(1) Restricted bands of operation as defined in Table 6 of RSS-Gen
(2) The peak level is lower than the average limit (54 dBµV/m)

Sample N° 1 Channel 6 (F = 2437 MHz) – Mode 802.11.n - SISO

Frequencies (MHz)	Detector P QP Av	Antenna height (cm)	RBW (kHz)	Position	Polarization H: Horizontal V: Vertical	Field strength Measured at 3 m (dBµV/m)	Limits at 3 m (dBµV/m)	Margin (dB)
4874 (1)	P	150	1000	2	V	52.3 (2)	74	21.7

P= Peak, QP=Quasi-peak, Av=Average
(1) Restricted bands of operation in 15.205
(1) Restricted bands of operation as defined in Table 6 of RSS-Gen
(2) The peak level is lower than the average limit (54 dBµV/m)

Sample N° 1 Channel 11 (F = 2462 MHz) – Mode 802.11.n - SISO

Frequencies (MHz)	Detector P QP Av	Antenna height (cm)	RBW (kHz)	Position	Polarization H: Horizontal V: Vertical	Field strength Measured at 3 m (dBµV/m)	Limits at 3 m (dBµV/m)	Margin (dB)
4924 (1)	P	150	1000	2	V	50.8 (2)	74	23.2

P= Peak, QP=Quasi-peak, Av=Average
(1) Restricted bands of operation in 15.205
(1) Restricted bands of operation as defined in Table 6 of RSS-Gen
(2) The peak level is lower than the average limit (54 dBµV/m)

Sample N° 1 Channel 1 (F = 2412 MHz) – Mode 802.11.n - MIMO

Frequencies (MHz)	Detector P QP Av	Antenna height (cm)	RBW (kHz)	Position	Polarization H: Horizontal V: Vertical	Field strength Measured at 3 m (dBµV/m)	Limits at 3 m (dBµV/m)	Margin (dB)
4824 (1)	P	150	1000	1	H	44.8 (2)	74	19.2

P= Peak, QP=Quasi-peak, Av=Average
(1) Restricted bands of operation in 15.205
(1) Restricted bands of operation as defined in Table 6 of RSS-Gen
(2) The peak level is lower than the average limit (54 dBµV/m)

Sample N° 1 Channel 6 (F = 2437 MHz) – Mode 802.11.n - MIMO

Frequencies (MHz)	Detector P QP Av	Antenna height (cm)	RBW (kHz)	Position	Polarization H: Horizontal V: Vertical	Field strength Measured at 3 m (dBµV/m)	Limits at 3 m (dBµV/m)	Margin (dB)
4874 (1)	P	150	1000	2	V	44.8 (2)	74	19.2

P= Peak, QP=Quasi-peak, Av=Average
(1) Restricted bands of operation in 15.205
(1) Restricted bands of operation as defined in Table 6 of RSS-Gen
(2) The peak level is lower than the average limit (54 dBµV/m)

Sample N° 1 Channel 11 (F = 2462 MHz) – Mode 802.11.n - MIMO

Frequencies (MHz)	Detector P QP Av	Antenna height (cm)	RBW (kHz)	Position	Polarization H: Horizontal V: Vertical	Field strength Measured at 3 m (dBµV/m)	Limits at 3 m (dBµV/m)	Margin (dB)
4924 (1)	P	150	1000	1	H	45.4 (2)	74	18.6

P= Peak, QP=Quasi-peak, Av=Average
(1) Restricted bands of operation in 15.205
(1) Restricted bands of operation as defined in Table 6 of RSS-Gen
(2) The peak level is lower than the average limit (54 dBµV/m)

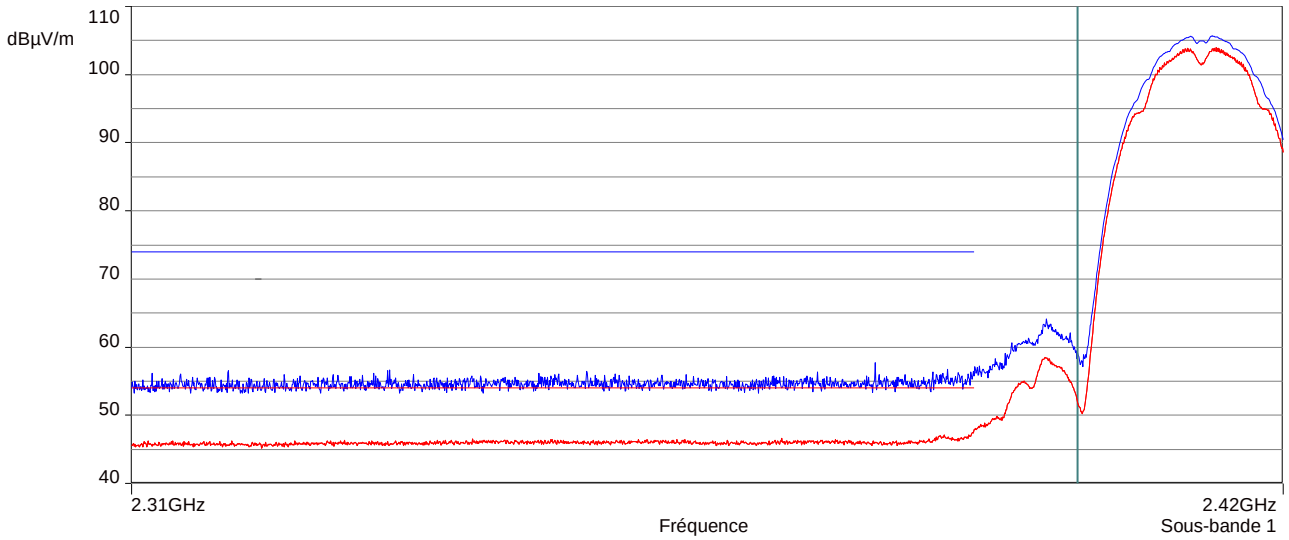
Radiated measurement

Band edge worst case measurement on worst critical positions.

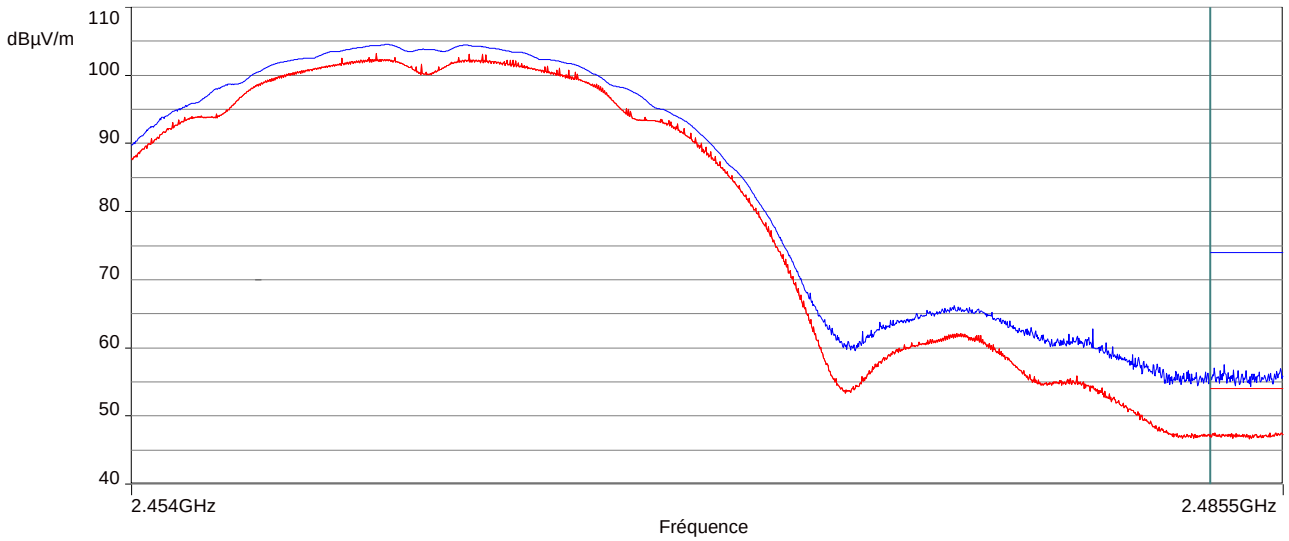
LEGEND:

- Results obtained with 1 MHz RBW
- Blue curve represent measure and limit with a peak detector
- Red curve with average detector.
- Green curve are the limit of the band.

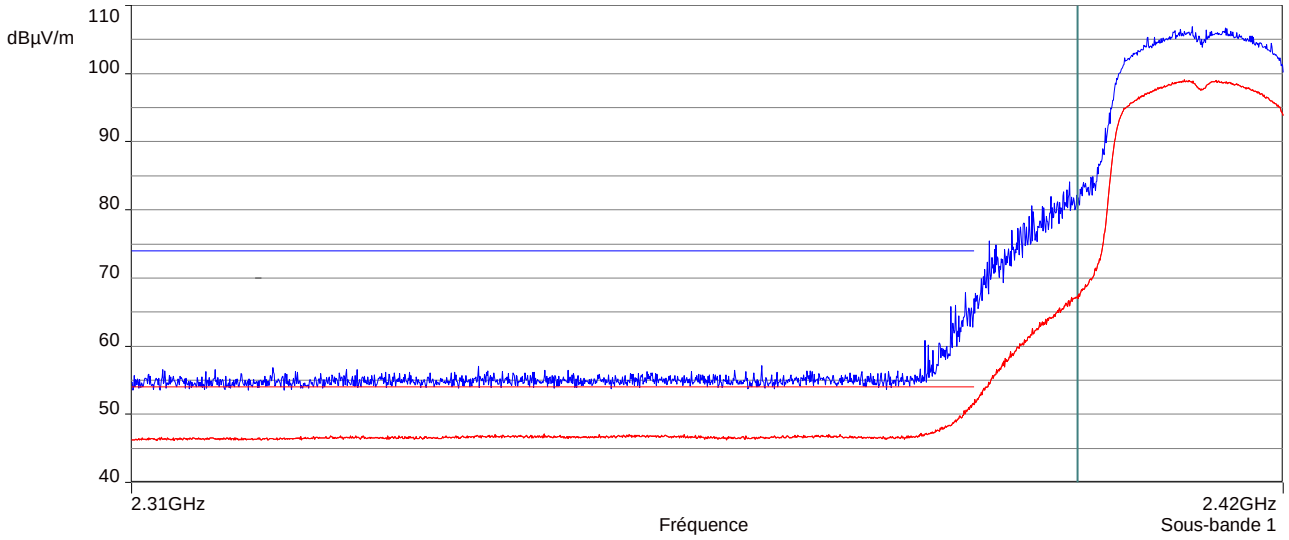
Low Channel – Mode 802.11.b



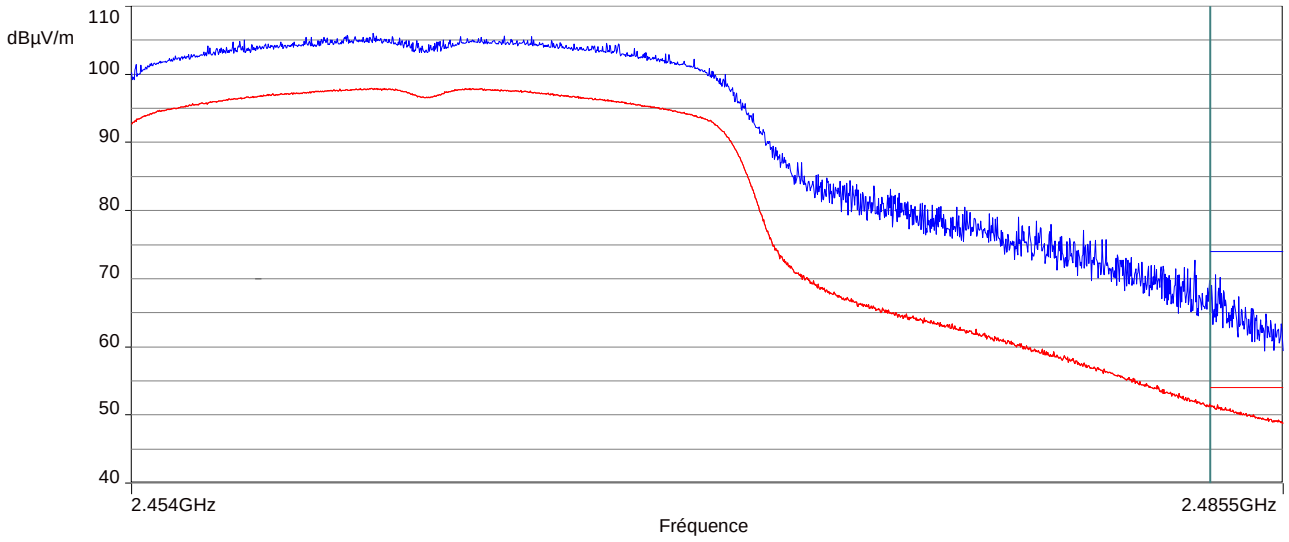
High Channel – Mode 802.11.b



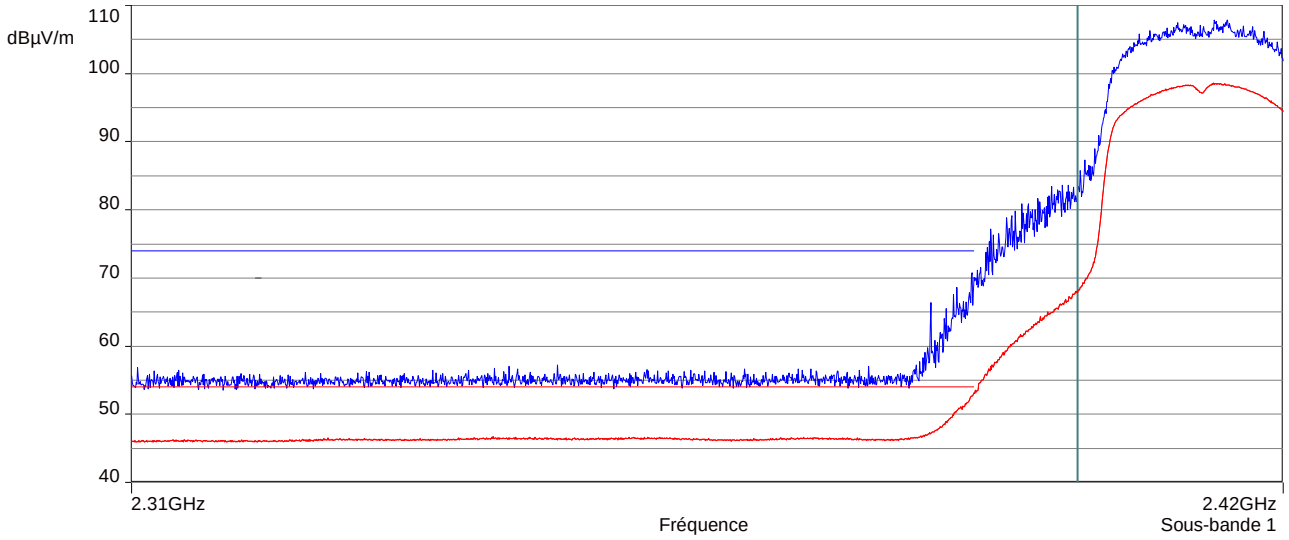
Low Channel – Mode 802.11.g



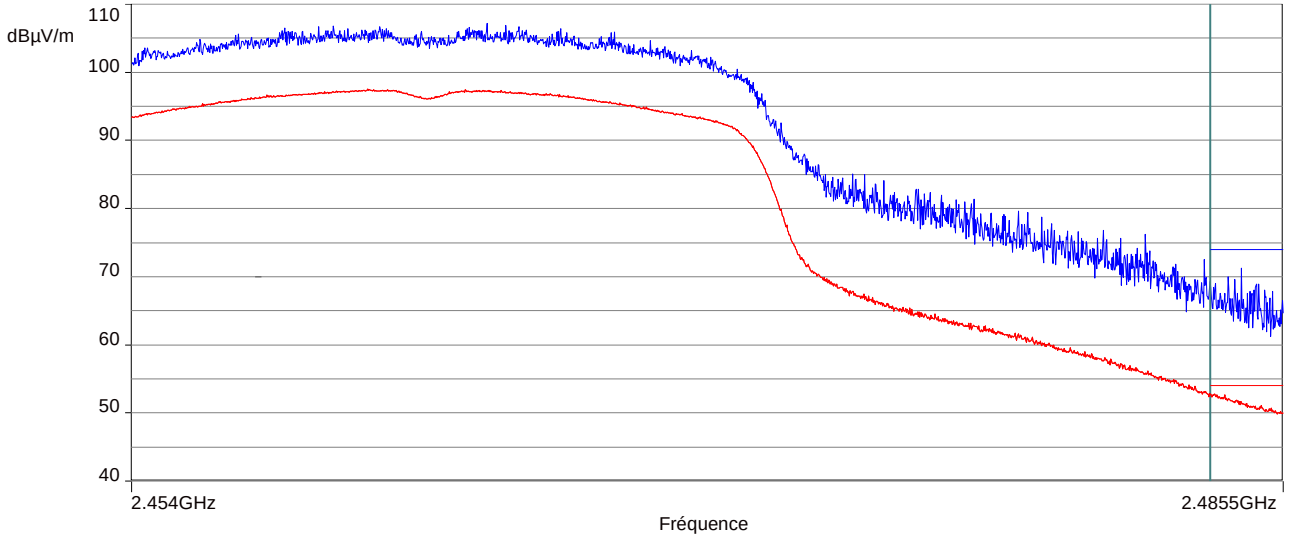
High Channel – Mode 802.11.g



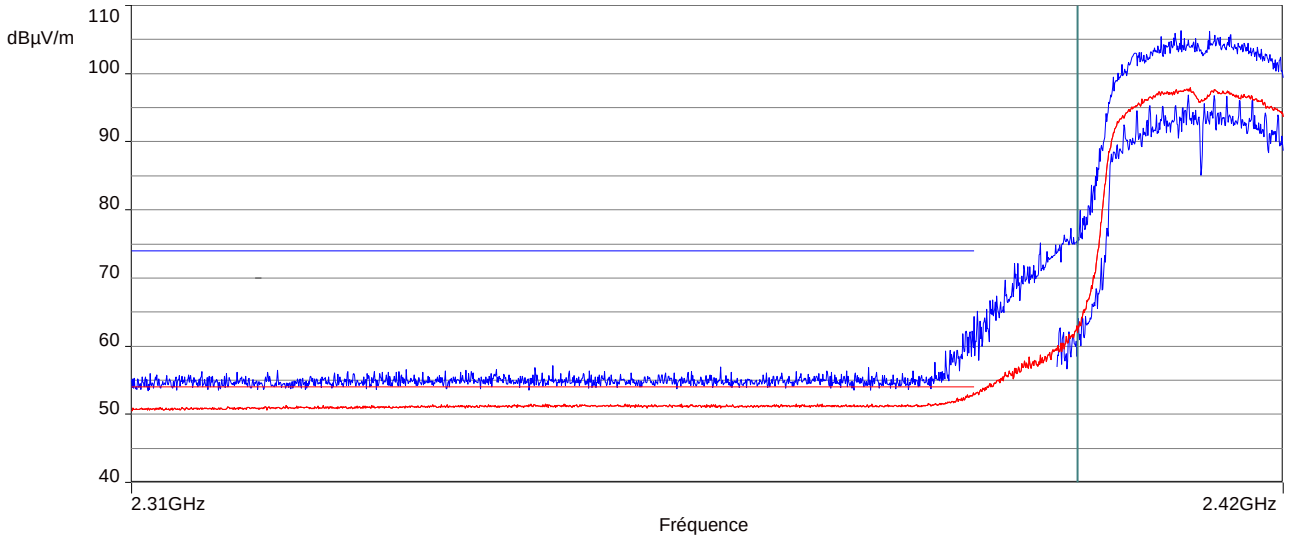
Low Channel – Mode 802.11.n



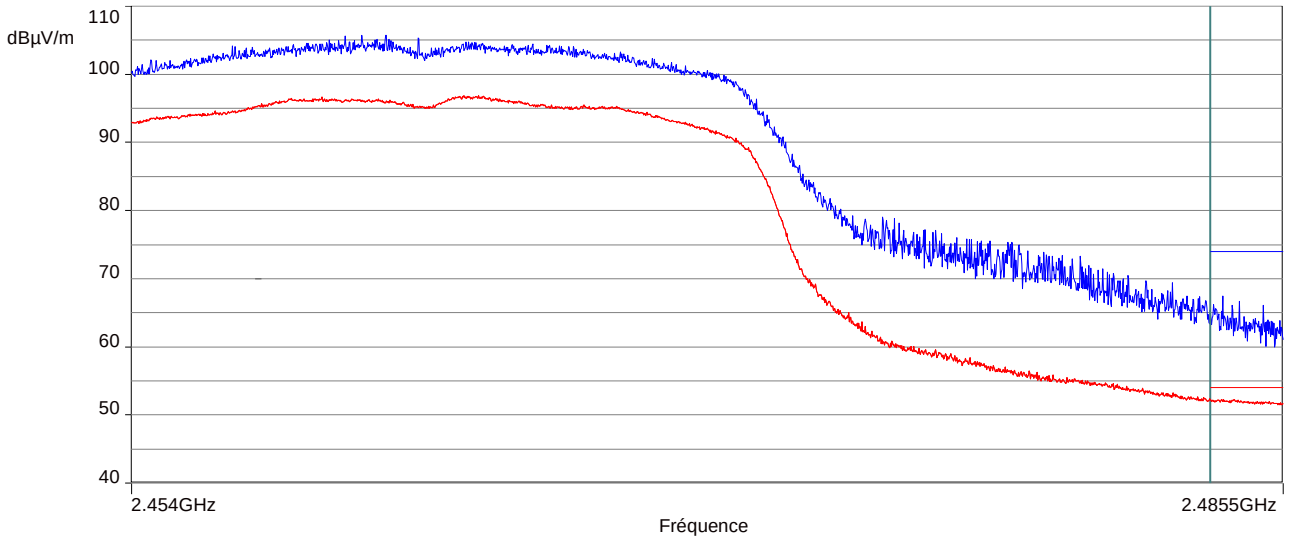
High Channel – Mode 802.11.n



Low Channel – MIMO - Mode 802.11.n



High Channel – MIMO - Mode 802.11.n



Test conclusion:

RESPECTED STANDARD

12. PEAK CONDUCTED POWER SPECTRAL DENSITY

Temperature (°C) : 19.2 **Humidity (%HR):** 36 **Date :** December 9, 2020
Technician : S. LOUIS

Standard: FCC Part 15
RSS-247

Test procedure:
For FCC Part 15: paragraph 15.247 (e), paragraph 15.247 (f)
For RSS-247: paragraph 5.2

PKPSD (Peak PSD) method of paragraph 11.10.2 of ANSI C63.10

Test set up:

First an exploratory radiated measurement was performed.

During this phase the product is oriented in these two normal positions.

Then the final measurement is realized with the product on the most critical orientation.

The system is tested in anechoic chamber, the EUT is placed on a rotating table, 1.5 m from a ground plane.

Zero degree azimuths correspond to the front of the device under test.

See photos in appendix 2.

Distance of antenna: 3 meters

Antenna height: 1.5 meter

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

The measurement of the radiated electro-magnetic field is realized with an analyser.

Span:	20MHz
Resolution bandwidth:	3kHz
Video bandwidth:	10kHz
Detector:	Peak
Number of points:	8001
Sweep time:	Auto
Trace mode:	MaxHold

Then the peak marker function is used.

Finally the radiated electro-magnetic field is converted in dBm with the following formula:
EIRP(dBm) = E (dBµV/m) + 20log(D) - 104.8; where D is the measurement distance in meters and antenna with a Gain (unit in dBi) different following the frequencies used.

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 in 802.11b, 802.11g and 802.11n modes (SISO) and 802.11.n mode (MIMO).

We used for power source the internal fully charged battery

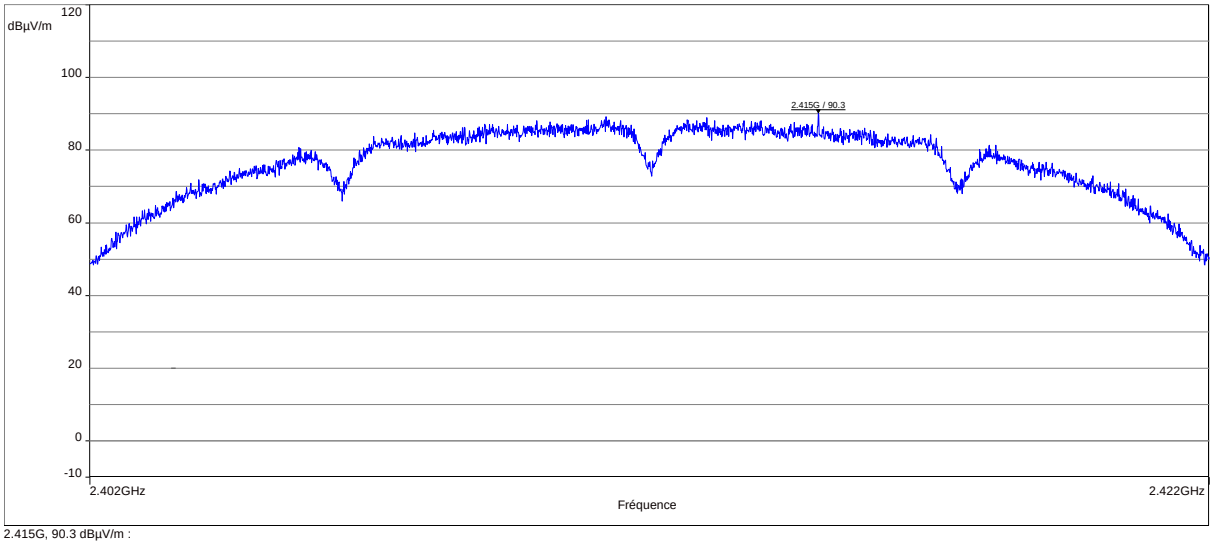
Results:

Sample N° 1: Low Channel – Mode 802.11.b - SISO

	Electro-magnetic field (dBµV/m at 3m):	Maximum Peak conducted power density(1) (dBm / 3 kHz)	Limit (dBm / 3 kHz)
Nominal supply voltage:	90.3	-6.49	8

Polarization of test antenna: Vertical (height: 150 cm)
Position of equipment: Position 2 (azimuth: 320 degrees)

Maximum Peak conducted power density:
EIRP(dBm / 3 kHz) = E (dBµV/m / 3 kHz) + 20log(D) - 104.8; where D is the measurement distance in meters and antenna Gain = +1.53dBi.

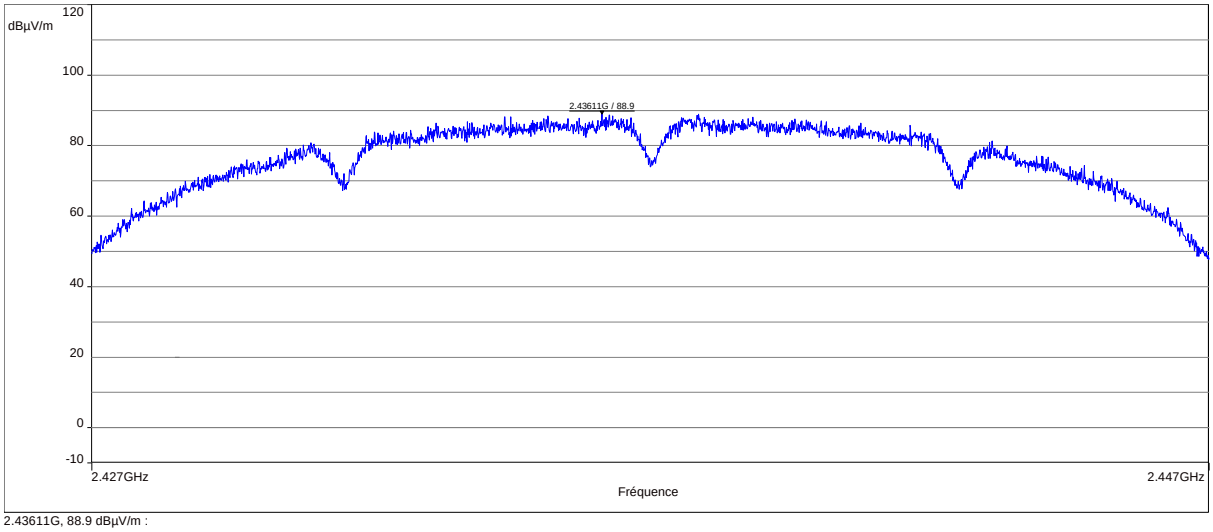


Sample N° 1: Central Channel – Mode 802.11.b - SISO

	Electro-magnetic field (dBµV/m at 3m):	Maximum Peak conducted power density(1) (dBm / 3 kHz)	Limit (dBm / 3 kHz)
Nominal supply voltage:	88.9	-8.43	8

Polarization of test antenna: Vertical (height: 150 cm)
Position of equipment: Position 2 (azimuth: 320 degrees)

Maximum Peak conducted power density:
EIRP(dBm / 3 kHz) = E (dBµV/m / 3 kHz) + 20log(D) - 104.8; where D is the measurement distance in meters and antenna Gain = +2.07dBi.

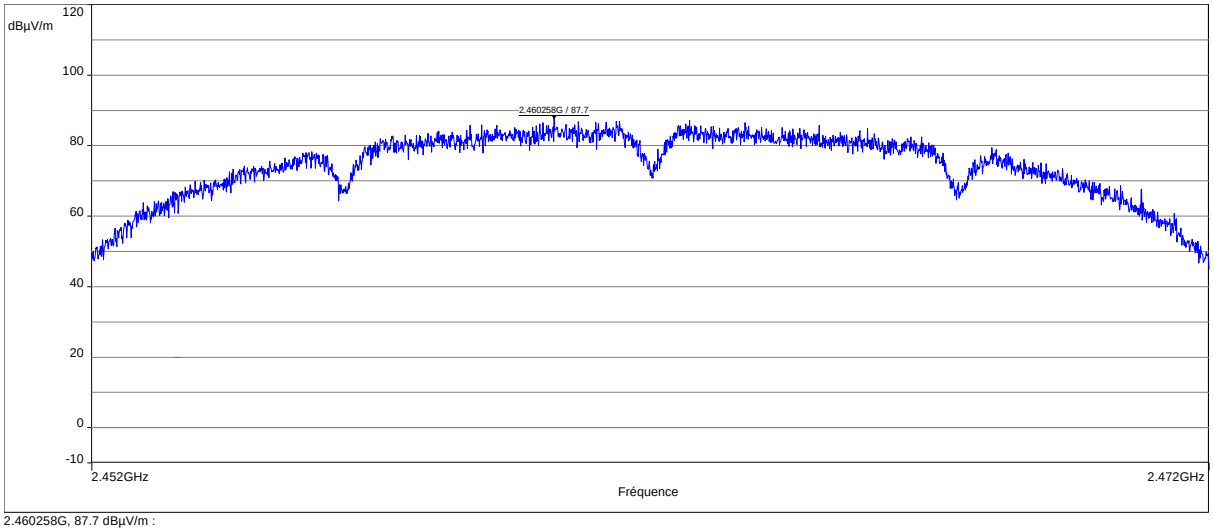


Sample N° 1: High Channel – Mode 802.11.b - SISO

	Electro-magnetic field (dBµV/m at 3m):	Maximum Peak conducted power density(1) (dBm / 3 kHz)	Limit (dBm / 3 kHz)
Nominal supply voltage:	87.7	-9.76	8

Polarization of test antenna: Vertical (height: 150 cm)
Position of equipment: Position 2 (azimuth: 320 degrees)

Maximum Peak conducted power density:
EIRP(dBm / 3 kHz) = E (dBµV/m / 3 kHz) + 20log(D) - 104.8; where D is the measurement distance in meters and antenna Gain = +2.20dBi.

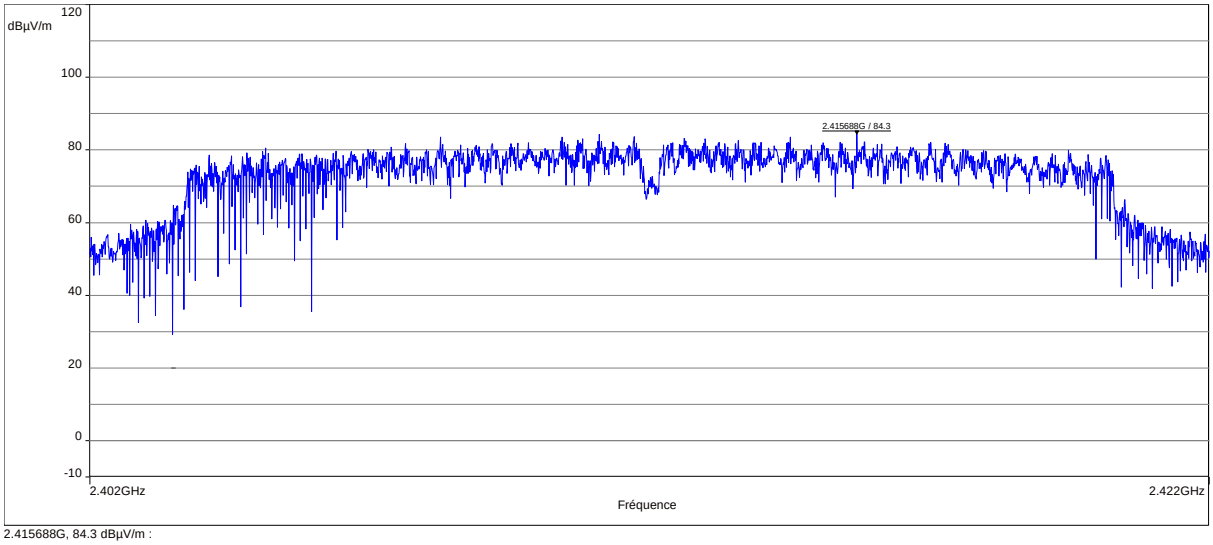


Sample N° 1: Low Channel – Mode 802.11.g - SISO

	Electro-magnetic field (dBµV/m at 3m):	Maximum Peak conducted power density(1) (dBm / 3 kHz)	Limit (dBm / 3 kHz)
Nominal supply voltage:	84.3	-12.49	8

Polarization of test antenna: Vertical (height: 150 cm)
Position of equipment: Position 2 (azimuth: 320 degrees)

Maximum Peak conducted power density:
EIRP(dBm / 3 kHz) = E (dBµV/m / 3 kHz) + 20log(D) - 104.8; where D is the measurement distance in meters and antenna Gain = +1.53dBi.



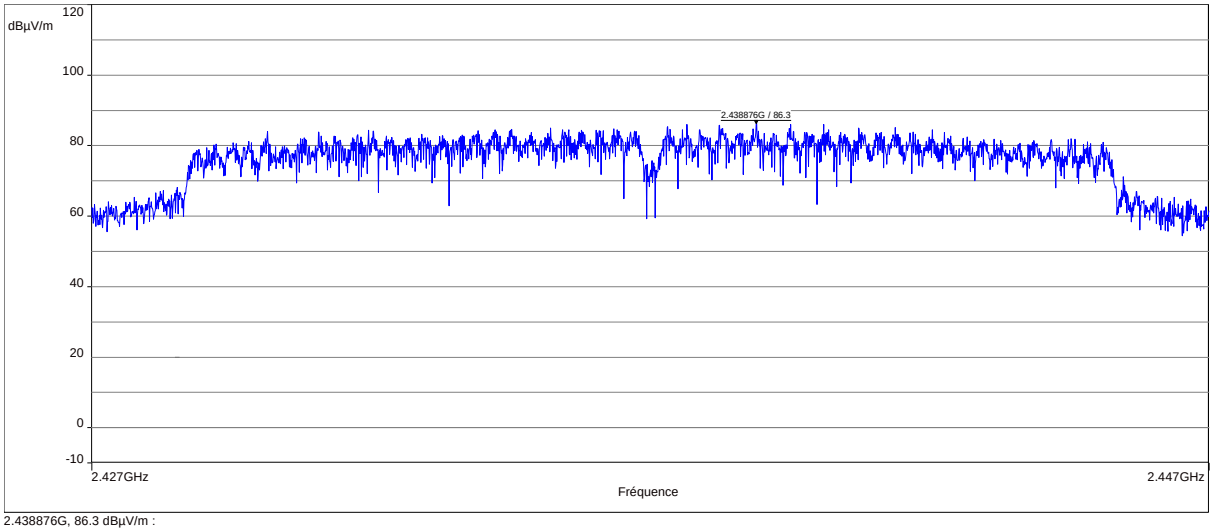
2.415688G, 84.3 dBµV/m :

Sample N° 1: Central Channel – Mode 802.11.g - SISO

	Electro-magnetic field (dBµV/m at 3m):	Maximum Peak conducted power density(1) (dBm / 3 kHz)	Limit (dBm / 3 kHz)
Nominal supply voltage:	86.3	-11.03	8

Polarization of test antenna: Vertical (height: 150 cm)
Position of equipment: Position 2 (azimuth: 320 degrees)

Maximum Peak conducted power density:
EIRP(dBm / 3 kHz) = E (dBµV/m / 3 kHz) + 20log(D) - 104.8; where D is the measurement distance in meters and antenna Gain = +2.07dBi.

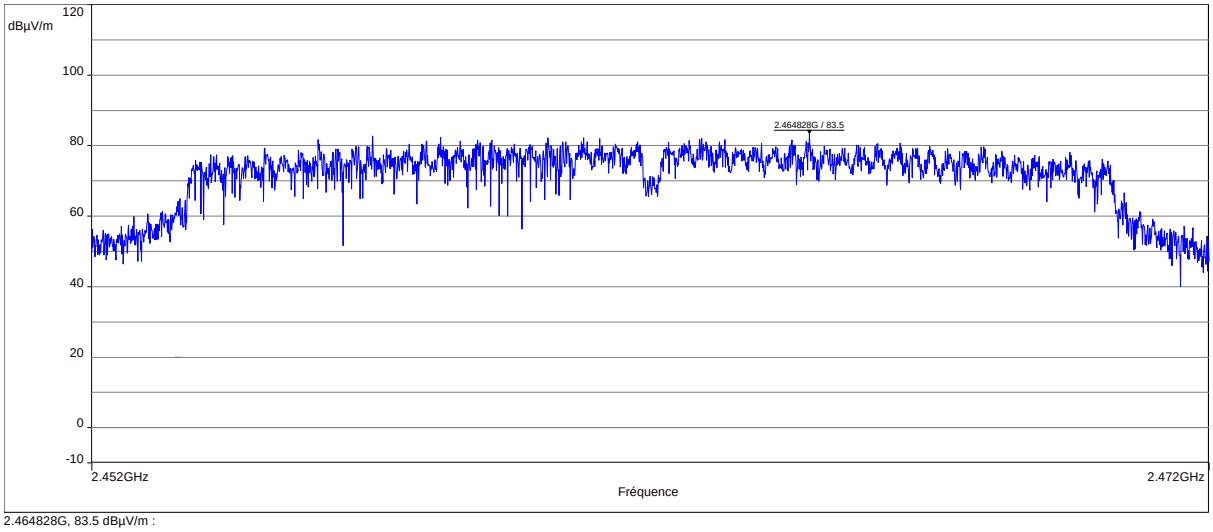


Sample N° 1: High Channel – Mode 802.11.g - SISO

	Electro-magnetic field (dBµV/m at 3m):	Maximum Peak conducted power density(1) (dBm / 3 kHz)	Limit (dBm / 3 kHz)
Nominal supply voltage:	83.5	-13.96	8

Polarization of test antenna: Vertical (height: 150 cm)
Position of equipment: Position 2 (azimuth: 320 degrees)

Maximum Peak conducted power density:
EIRP(dBm / 3 kHz) = E (dBµV/m / 3 kHz) + 20log(D) - 104.8; where D is the measurement distance in meters and antenna Gain = +2.20dBi.



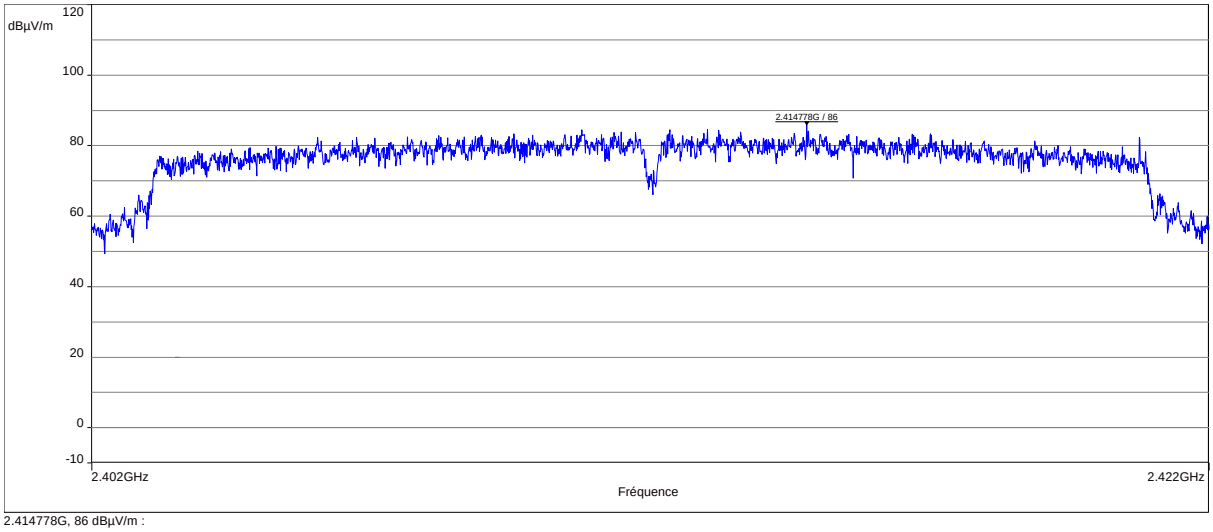
2.464828G, 83.5 dBµV/m :

Sample N° 1: Low Channel – Mode 802.11.n - SISO

	Electro-magnetic field (dBµV/m at 3m):	Maximum Peak conducted power density(1) (dBm / 3 kHz)	Limit (dBm / 3 kHz)
Nominal supply voltage:	86.0	-10.79	8

Polarization of test antenna: Vertical (height: 150 cm)
Position of equipment: Position 2 (azimuth: 320 degrees)

Maximum Peak conducted power density:
EIRP(dBm / 3 kHz) = E (dBµV/m / 3 kHz) + 20log(D) - 104.8; where D is the measurement distance in meters and antenna Gain = +1.53dBi.



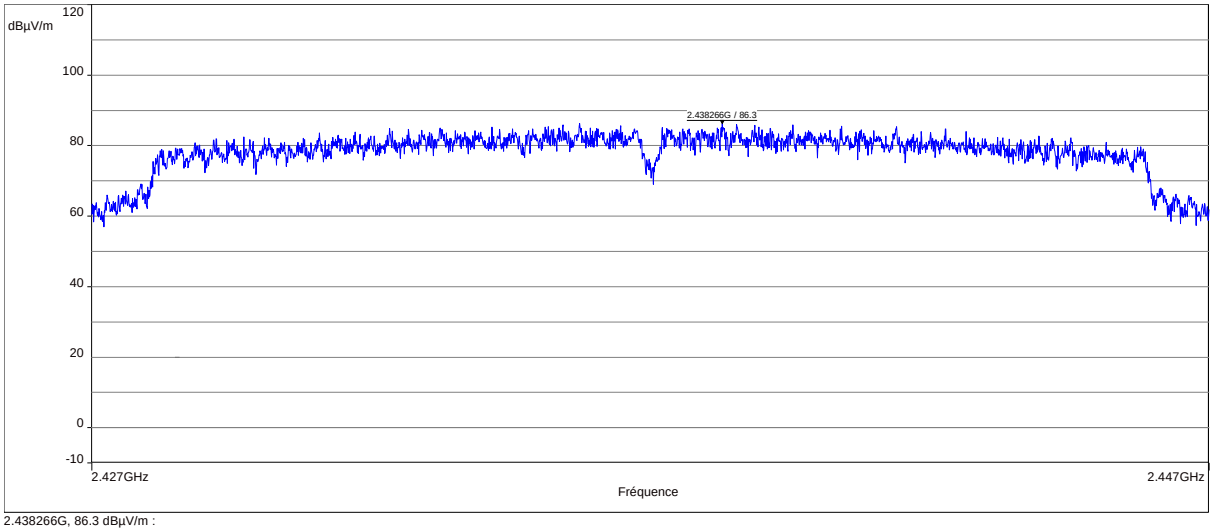
2.414778G, 86 dBµV/m :

Sample N° 1: Central Channel – Mode 802.11.n - SISO

	Electro-magnetic field (dBµV/m at 3m):	Maximum Peak conducted power density(1) (dBm / 3 kHz)	Limit (dBm / 3 kHz)
Nominal supply voltage:	86.3	-11.03	8

Polarization of test antenna: Vertical (height: 150 cm)
Position of equipment: Position 2 (azimuth: 320 degrees)

Maximum Peak conducted power density:
EIRP(dBm / 3 kHz) = E (dBµV/m / 3 kHz) + 20log(D) - 104.8; where D is the measurement distance in meters and antenna Gain = +2.07dBi.

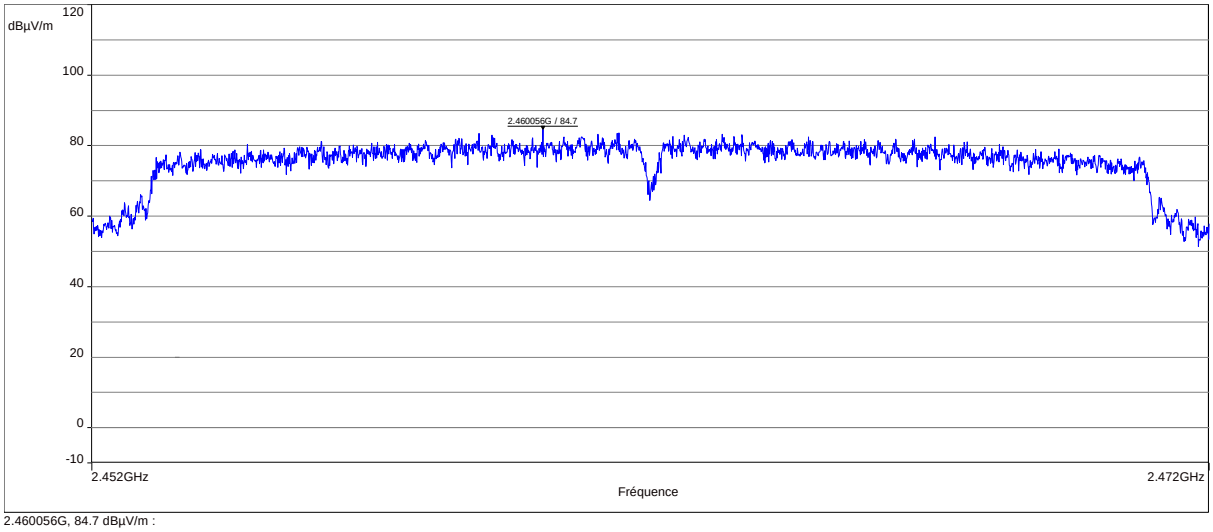


Sample N° 1: High Channel – Mode 802.11.n - SISO

	Electro-magnetic field (dBµV/m at 3m):	Maximum Peak conducted power density(1) (dBm / 3 kHz)	Limit (dBm / 3 kHz)
Nominal supply voltage:	84.7	-12.76	8

Polarization of test antenna: Vertical (height: 150 cm)
Position of equipment: Position 2 (azimuth: 320 degrees)

Maximum Peak conducted power density:
EIRP(dBm / 3 kHz) = E (dBµV/m / 3 kHz) + 20log(D) - 104.8; where D is the measurement distance in meters and antenna Gain = +2.20dBi.



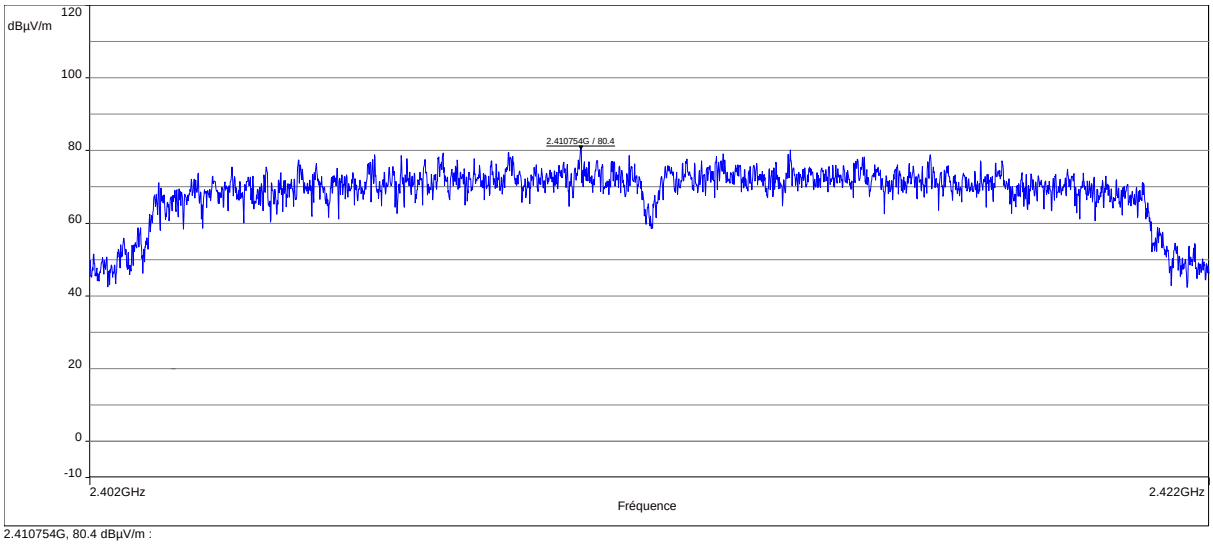
Sample N° 1: Low Channel – Mode 802.11.n - MIMO

Electro-magnetic field (dBµV/m at 3m):		Power Spectral Density (dBm/3kHz):		Power Spectral Density (mW/3kHz):		Sum of PSD (mW/3kHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)
Chain 1	Chain 2	Chain 1	Chain 2	Chain 1	Chain 2			
80.4	83	-16.39	-15.04	0.023	0.031	0.054	-12.65	8

Polarization of test antenna: Vertical (height: 150 cm)
Position of equipment: Position 2 (azimuth: 320 degrees)

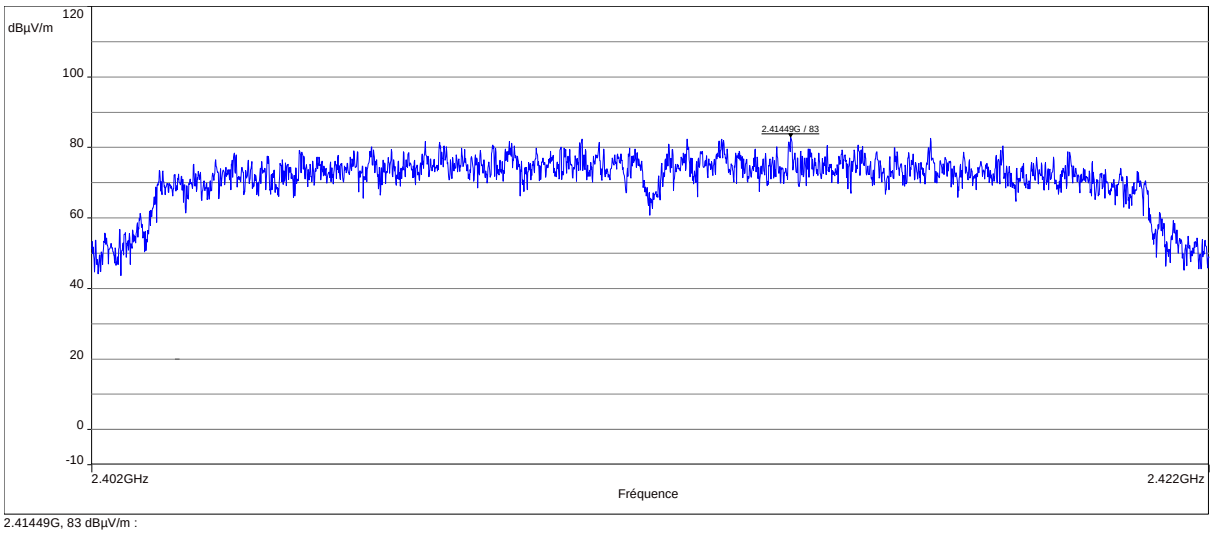
Maximum Peak conducted power density:
EIRP(dBm / 3 kHz) = E (dBµV/m / 3 kHz) + 20log(D) - 104.8; where D is the measurement distance in meters and antenna Gain = +1.53dBi for antenna 1 and +2.78dBi for antenna 2.

Chain 1



2.410754G, 80.4 dBµV/m :

Chain 2



2.41449G, 83 dBµV/m :

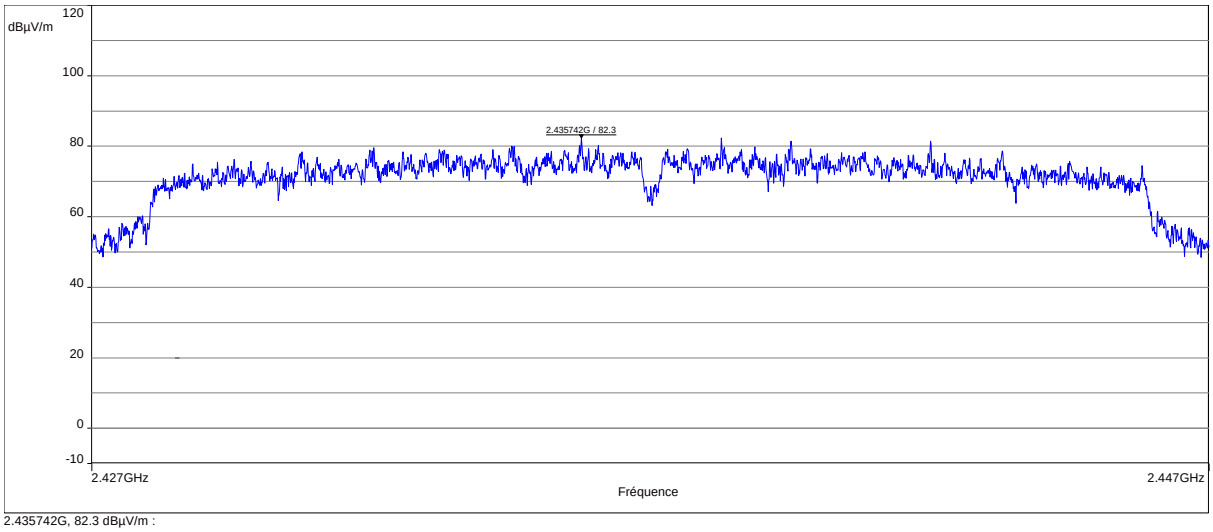
Sample N° 1: Central Channel – Mode 802.11.n - MIMO

Electro-magnetic field (dBµV/m at 3m):		Power Spectral Density (dBm/3kHz):		Power Spectral Density (mW/3kHz):		Sum of PSD (mW/3kHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)
Chain 1	Chain 2	Chain 1	Chain 2	Chain 1	Chain 2			
82.3	83.7	-15.03	-13.84	0.031	0.041	0.073	-11.38	8

Polarization of test antenna: Vertical (height: 150 cm)
Position of equipment: Position 2 (azimuth: 320 degrees)

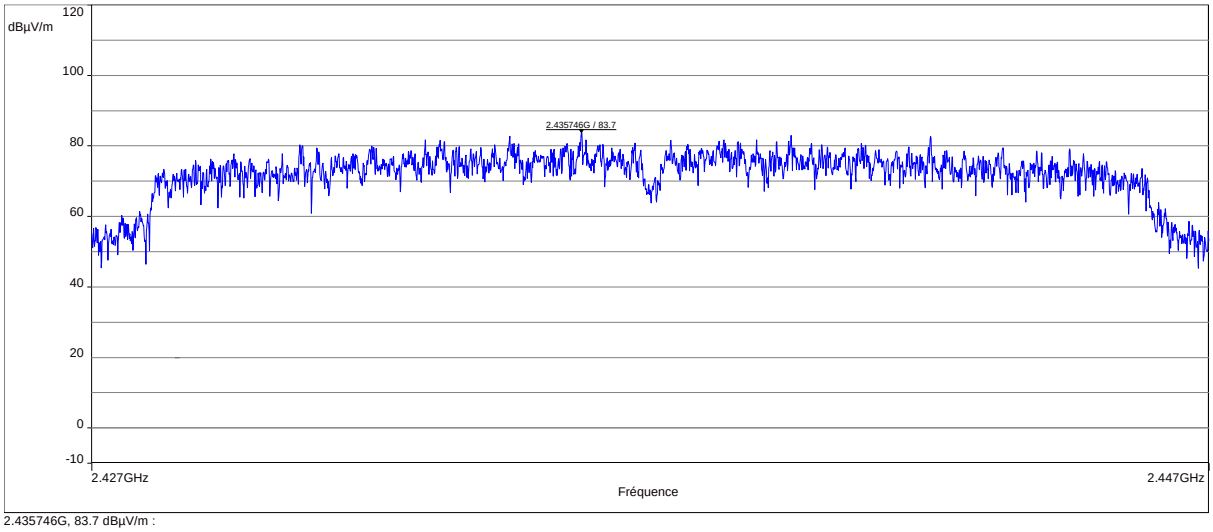
Maximum Peak conducted power density:
EIRP(dBm / 3 kHz) = E (dBµV/m / 3 kHz) + 20log(D) - 104.8; where D is the measurement distance in meters and antenna Gain = +2.07dBi for antenna 1 and +2.28dBi for antenna 2.

Chain 1



2.435742G, 82.3 dBµV/m :

Chain 2



2.435746G, 83.7 dBµV/m :

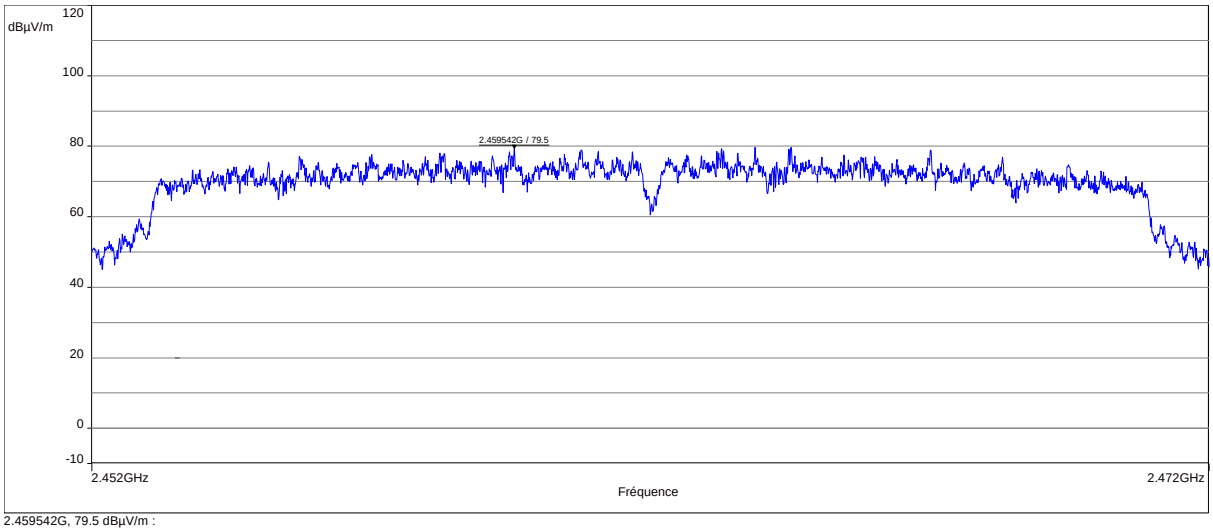
Sample N° 1: High Channel – Mode 802.11.n - MIMO

Electro-magnetic field (dBµV/m at 3m):		Power Spectral Density (dBm/3kHz):		Power Spectral Density (mW/3kHz):		Sum of PSD (mW/3kHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)
Chain 1	Chain 2	Chain 1	Chain 2	Chain 1	Chain 2			
79.5	81.7	-17.96	-15.85	0.016	0.026	0.042	-13.77	8

Polarization of test antenna: Vertical (height: 150 cm)
Position of equipment: Position 2 (azimuth: 320 degrees)

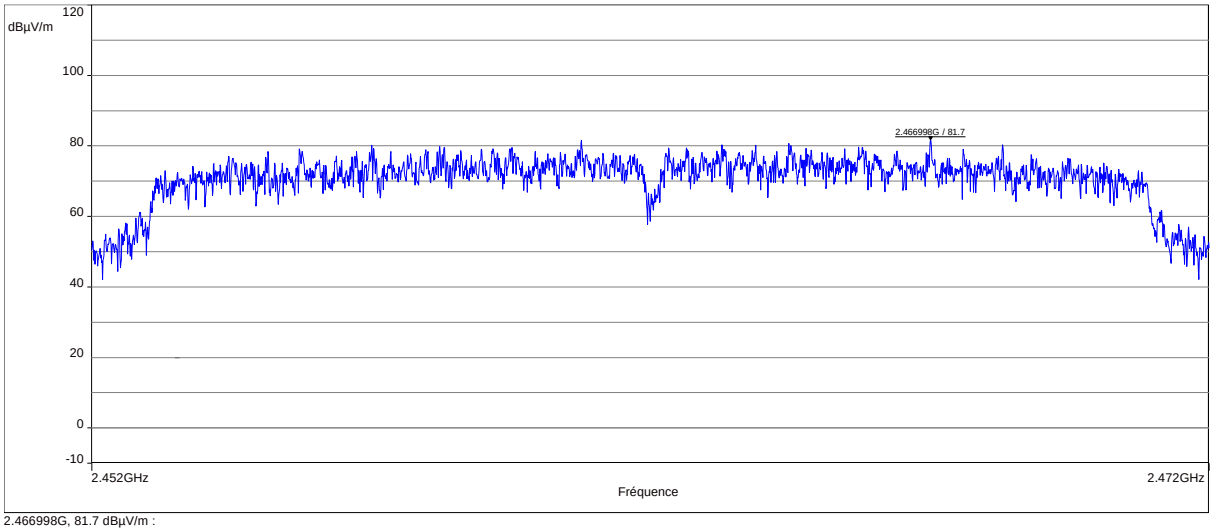
Maximum Peak conducted power density:
EIRP(dBm / 3 kHz) = E (dBµV/m / 3 kHz) + 20log(D) - 104.8; where D is the measurement distance in meters and antenna Gain = +2.20dBi for antenna 1 and +2.29dBi for antenna 2.

Chain 1



2.459542G, 79.5 dBµV/m :

Chain 2



2.466998G, 81.7 dBµV/m :

Test conclusion:

RESPECTED STANDARD

□□□ End of report, 1 appendix to be forwarded □□□

APPENDIX 1: Test equipment list

Occupied bandwidth

TYPE	MANUFACTURER	EMITECH NUMBER
Anechoic Chamber	EMITECH	8593
Turntable controller 1060C	MATURO	14736
Satellite synchronized frequency standard GPS8	ACQUISYS	8896
Spectrum Analyzer FSP7	Rohde & Schwarz	6796
Spectrum Analyzer FSV40	Rohde & Schwarz	15666
Antenna 3115	EMCO	8535
Low-noise amplifier PAM-118A	COM-POWER	15812
N-1.5M Cable	SUCOFLEX	7279
N-2M Cable	Huber + Suhner	12911
N-5M Cable	SUCOFLEX	15882
Attenuator 20dB	Hewlett Packard	2507
Multimeter 177	Fluke	14831
Meteo station WS-9232	La Crosse Technology	8750
Software	GPIBShot V2.4	/
Software	RS Commander	//

Band edge

TYPE	MANUFACTURER	EMITECH NUMBER
Anechoic Chamber	EMITECH	8593
Turntable controller 1060C	MATURO	14736
Satellite synchronized frequency standard GPS8	ACQUISYS	8896
Spectrum Analyzer FSP7	Rohde & Schwarz	6796
Spectrum Analyzer FSV40	Rohde & Schwarz	15666
Antenna 3115	EMCO	8535
Low-noise amplifier PAM-118A	COM-POWER	15812
N-1.5M Cable	SUCOFLEX	7279
N-2M Cable	Huber + Suhner	12911
N-5M Cable	SUCOFLEX	15882
Attenuator 20dB	Hewlett Packard	2507
Multimeter 177	Fluke	14831
Meteo station WS-9232	La Crosse Technology	8750
Software	GPIBShot V2.4	/
Software	RS Commander	//

Peak conducted output power

TYPE	MANUFACTURER	EMITECH NUMBER
Anechoic Chamber	EMITECH	8593
Turntable controller 1060C	MATURO	14736
Satellite synchronized frequency standard GPS8	ACQUISYS	8896
Spectrum Analyzer FSV40	Rohde & Schwarz	15666
Antenna 3115	EMCO	8535
Low-noise amplifier PAM-118A	COM-POWER	15812
N-1.5M Cable	SUCOFLEX	7279
N-2M Cable	Huber + Suhner	12911
N-5M Cable	SUCOFLEX	15882
Attenuator 20dB	Hewlett Packard	2507
Power sensor NRV-Z86	Rohde & Schwarz	11592
Multimeter 177	Fluke	14831
Meteo station WS-9232	La Crosse Technology	8750
Software	R&S Power Viewer Plus V5.9	///

Radiated spurious emissions

TYPE	MANUFACTURER	EMITECH NUMBER
Open test site	EMITECH	8732
Turntable and mat controller	EMITECH	8855
Anechoic Chamber	EMITECH	8593
Turntable controller 1060C	MATURO	14736
Satellite synchronized frequency standard GPS8	ACQUISYS	8896
Test receiver ESI7	Rohde & Schwarz	8707
Spectrum Analyzer FSV40	Rohde & Schwarz	15666
Loop antenna 6502	EMCO	1406
Biconical antenna VHBB 9124	Schwarzbeck	8526
Log periodic antenna UHALP 9108A	Schwarzbeck	8543
Antenna 3115	EMCO	8535
Antenna SAS-572	A.H Systems	7124
Antenna SAS-572	A.H Systems	7125
Low-noise amplifier 8447D	Hewlett Packard	8511
Low-noise amplifier PAM-118A	COM-POWER	15812
Low-noise amplifier S180265L3201	LUCIX Corp.	8704
N-1.5M Cable	SUCOFLEX	7279
N-2M Cable	Huber + Suhner	12911
N-5M Cable	SUCOFLEX	15882
Cable k-20cm	STORM MICROWAE	8974
Cable k-20cm	STORM MICROWAE	8975
Low pass filter LP03/1000-7GH	Filtek	4087
Reject band filter BRM50702	Microtronics	7299
Multimeter 177	Fluke	14831
Meteo station BAR 206	Oregon Scientific	14474
Meteo station WS-9232	La Crosse Technology	8750
Software	BAT-EMC V3.18.0.26	0000
Software	Champ libre Juigné. V3.5	8864

Peak conducted power spectral density

TYPE	MANUFACTURER	EMITECH NUMBER
Anechoic Chamber	EMITECH	8593
Turntable controller 1060C	MATURO	14736
Satellite synchronized frequency standard GPS8	ACQUISYS	8896
Spectrum Analyzer FSV40	Rohde & Schwarz	15666
Antenna 3115	EMCO	8535
Low-noise amplifier PAM-118A	COM-POWER	15812
N-1.5M Cable	SUCOFLEX	7279
N-2M Cable	Huber + Suhner	12911
N-5M Cable	SUCOFLEX	15882
Attenuator 20dB	Hewlett Packard	2507
Multimeter 177	Fluke	14831
Meteo station WS-9232	La Crosse Technology	8750
Software	BAT-EMC V3.18.0.26	0000