



TEST REPORT

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Composition of document

RADIO

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Standards

47 CFR Part 15.247
RSS-210, Issue 8
RSS-Gen, Issue 3

Issued to

WITHINGS
20, rue Rouget de Lisle
F-92130 Issy les Moulineaux

Apparatus under test

Trade mark
Manufacturer
Type
Serial number
IC
FCC ID

Withings Aura Bedside Device
Withings AuraTM
Withings
WSD01
0024E4182A06
XNAWSD01
11411A-WSD01

Test date

2014/06/13 to 2014/06/26

Tests performed by

Arnaud Fayette

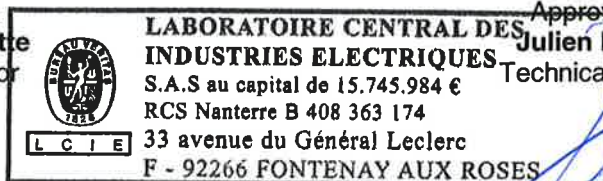
Test site

Fontenay aux Roses

Date of issue

2014/07/09

Written by :
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Tests operator



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1. TEST PROGRAM

- References**

Standards:

- 47 CFR Part 15C
- RSS-210
- RSS-Gen
- CISPR 16-4-2
- ANSI C63.10

Standard Section	Test Description	TEST RESULT - Comments
RSS-Gen § 4.6.1	Occupied Bandwidth	PASS
CFR 47 § 15.247 (a) (2) RSS-210 § A8.2(a)	-6dB Bandwidth	PASS
CFR 47 § 15.247 (b) RSS-210 § A8.4(4)	Maximum Output Power	PASS
CFR 47 § 15.247 (e) RSS-210 § A8.2 (b)	Power Spectral Density	PASS
CFR 47 § 15.247 (d) RSS-210 § A8.5	Conducted Spurious Emission at the Band Edge	PASS
CFR 47 § 15.247 (d) RSS-210 § A8.5	Unwanted Emissions into Non-Restricted Frequency Bands	PASS
CFR 47 § 15.207 RSS-Gen § 7.2.4	AC Power Line Conducted Emissions	PASS
CFR 47 § 15.209 (a) CFR 47 § 15.205 (a) CFR 47 § 15.247 (d) RSS-210 § A8.5	Unwanted Emissions into Restricted Frequency Bands	PASS
RSS-Gen § 4.10	Receiver Radiated emissions	PASS include in unwanted emission into restricted frequency bands

PASS: EUT complies with standard's requirement

FAIL: EUT does not comply with standard's requirement

NA: Not Applicable

NP: Test Not Performed



2. EQUIPMENT DESCRIPTION

2.1. HARDWARE & SOFTWARE IDENTIFICATION

- Equipment under test (EUT):

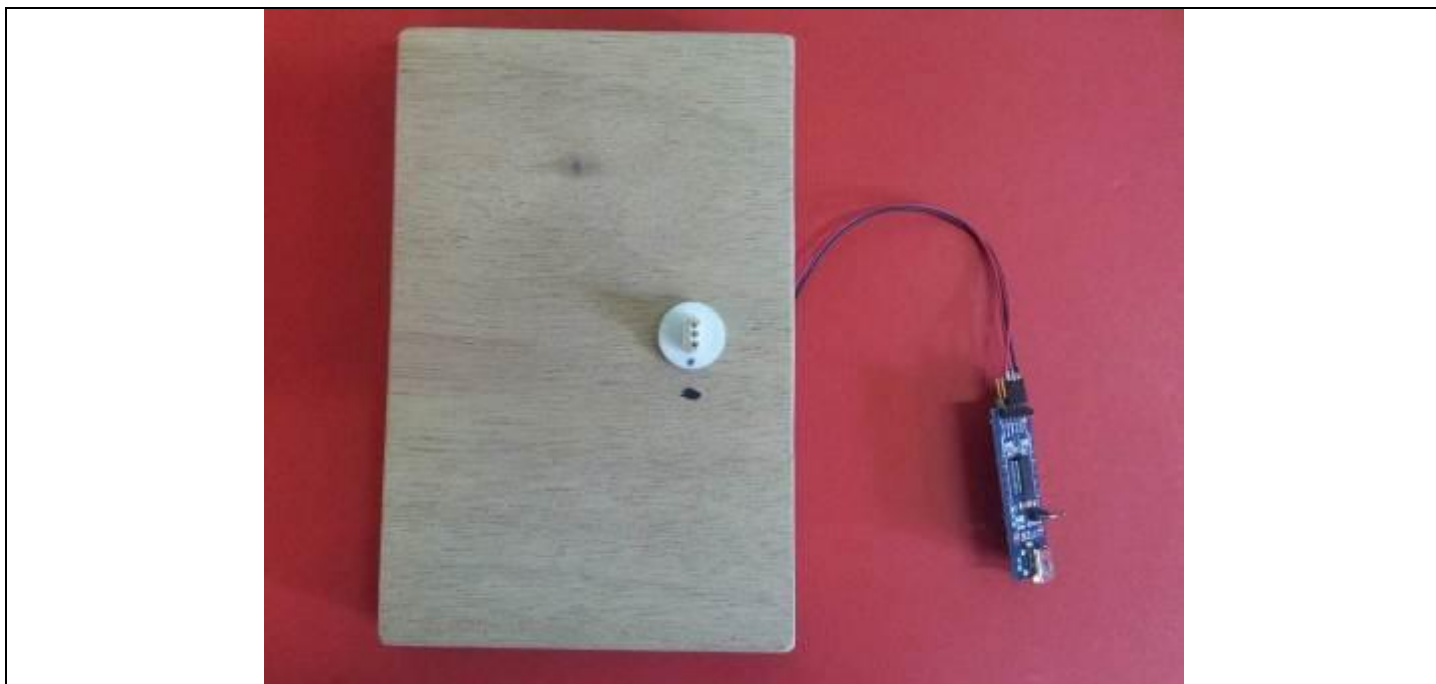


Photograph of EUT



- **Auxiliary equipment (AE) used for testing:**

- Personal Computer
- Wifi Access Point
- USB port to Uart port



Photograph of AE

- **Input/output:**

- Input Power
- 3 Usb

- **Software identification:**

-Software version: firmware_wsd01_20140522-113550_emc_radio

- **Equipment information:**

- Wifi Version: 802.11b, 802.11g, 802.11n HT20
- Modulation technology: OFDM and DSSS modulation
- Number of simultaneous channels: 1
- Transmit operating mode: Single antenna
- Number of transmit chains: 1
- Number of receiver chains: 1
- Beamforming gain: No
- Type of the equipment: Stand-alone equipment
- Type of power source: External power supply
- Antenna type: Integral
- Test sequence/test software used: See 2.2. Running Mode
- Duty Cycle: Continuous duty
- Equipement type: Pre-production model



- Operating frequency range

Frequency Band (MHz)
2400MHz to 2483,5MHz

- Antenna Characteristics:

Antenna Gain (dBi)
3.3

-Channel plan 802.11b, 802.11g & 802.11n HT20:

Channel	Frequency (MHz)
Cmin: 1	2412
2	2417
3	2422
4	2427
5	2432
Cnom: 6	2437
7	2442
8	2447
9	2452
10	2457
Cmax: 11	2462

-Channel plan 802.11n HT40:

Channel	Frequency (MHz)
Cmin: 3	2422
4	2427
5	2432
Cnom: 6	2437
7	2442
8	2447
Cmax: 9	2452



-Data Rate:

802.11b	
Data Rate (Mbps)	Modulation Type
1	DBPSK
2	DQPSK
5,5	DQPSK
11	CCK

802.11g	
Data Rate (Mbps)	Modulation Type
6	BPSK
9	BPSK
12	QPSK
18	QPSK
24	16-QAM
36	16-QAM
48	64-QAM
54	64-QAM

802.11n HT20				
MCS index	Spatial streams	Modulation Type	Data rate (Mbit/s)	
			GI=800ns	GI=400ns
0	1	BPSK	6.50	7.20
1	1	QPSK	13.00	14.40
2	1	QPSK	19.50	21.70
3	1	16-QAM	26.00	28.90
4	1	16-QAM	39.00	43.30
5	1	64-QAM	52.00	57.80
6	1	64-QAM	58.50	65.00
7	1	64-QAM	65.00	72.20



2.2. RUNNING MODE

The EUT is set in the following modes during tests:

- Permanent emission with modulation on a fixed channel in the data rate that produced the highest power (802.11b: 11Mbps, 802.11g: 6Mbps, 802.11n HT20: 6.5Mbps)
- Permanent reception

Following commands with the specific test software "TERATERM" are used to set the product:

See « WS01_EMI_test_v5.txt » file.

2.3. EQUIPEMENT LABELLING



2.4. EQUIPMENT MODIFICATIONS

No equipment modification has been necessary during testing.



3. OCCUPIED BANDWIDTH

3.1. TEST CONDITIONS

Test performed by : Arnaud Fayette
Date of test : 25/06/2014
Ambient temperature : 22°C
Relative humidity : 43%

3.2. TEST SETUP

The Equipment Under Test is installed on a table and set in permanent emission with modulation. Measurement is performed with a spectrum analyzer on the EUT conducted access. The product has been tested according to the RSS-GEN § 4.6.1 reference method.

Spectrum Analyzer Setting:

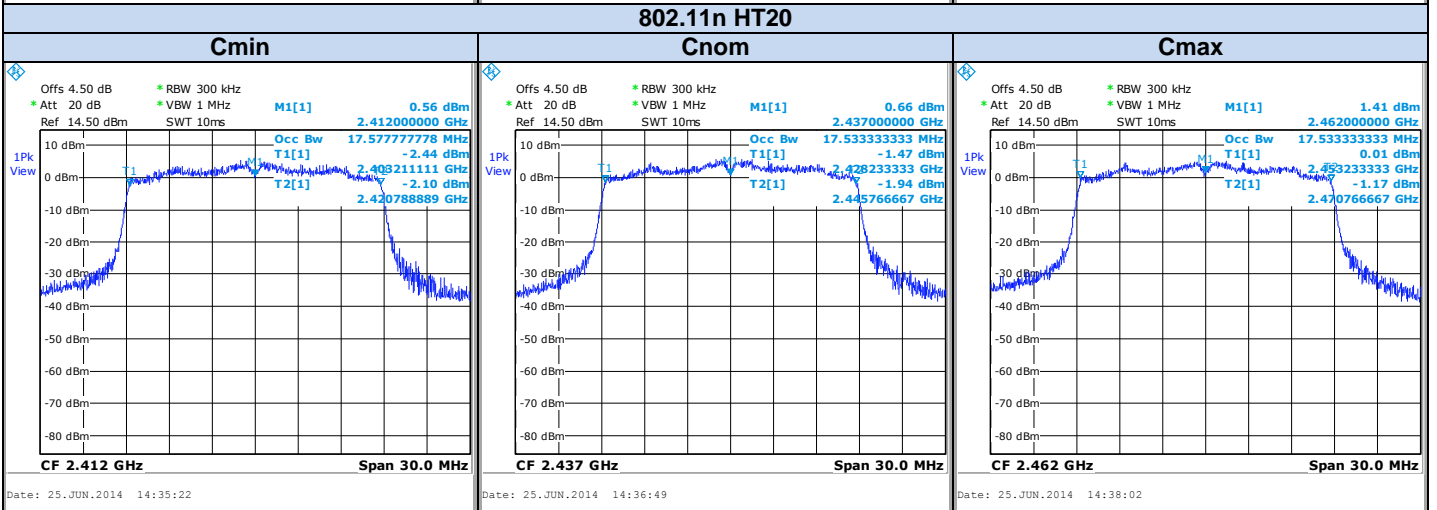
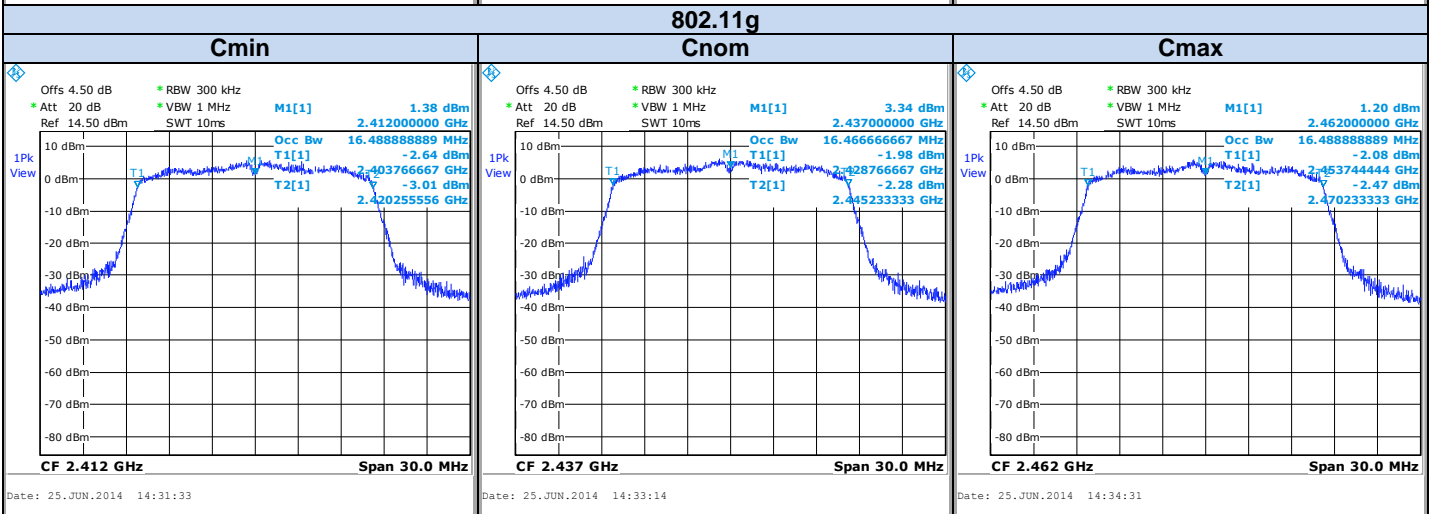
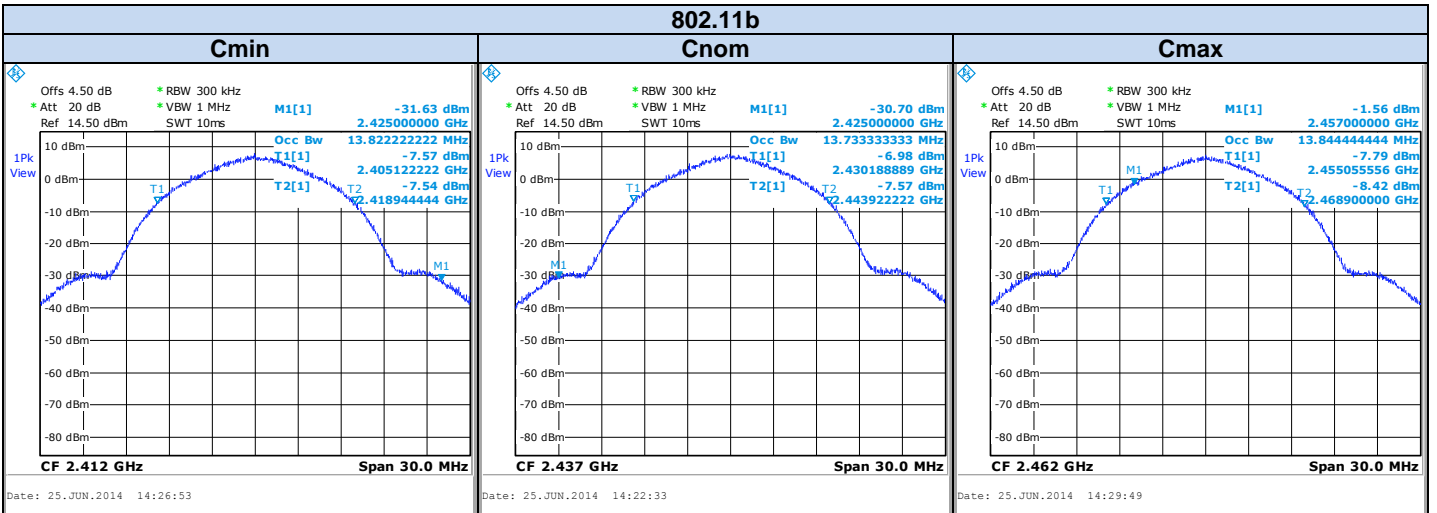
Center frequency= Cmin or Cnom or Cmax
Span= Above the emission spectrum
Amplitude= Sufficient to observe the signal amplitude
RBW= 1% of span
VBW= 3*RBW
Sweep= Auto
Trace= Max Hold
Detector= Peak
Occupied Bandwidth 99% activated



Photograph for Occupied Bandwidth



3.3. GRAPHICS & RESULTS





802.11b

Temperature	Tnom		
Voltage	Vnom		
Frequency	Cmin	Cnom	Cmax
Occupied Bandwidth (MHz)	13.82	13.73	13.84

802.11g

Temperature	Tnom		
Voltage	Vnom		
Frequency	Cmin	Cnom	Cmax
Occupied Bandwidth (MHz)	16.49	16.47	16.49

802.11n HT20

Temperature	Tnom		
Voltage	Vnom		
Frequency	Cmin	Cnom	Cmax
Occupied Bandwidth (MHz)	17.57	17.53	17.53

Result: **PASS**

Limit: → None



4. -6dB BANDWIDTH

4.1. TEST CONDITIONS

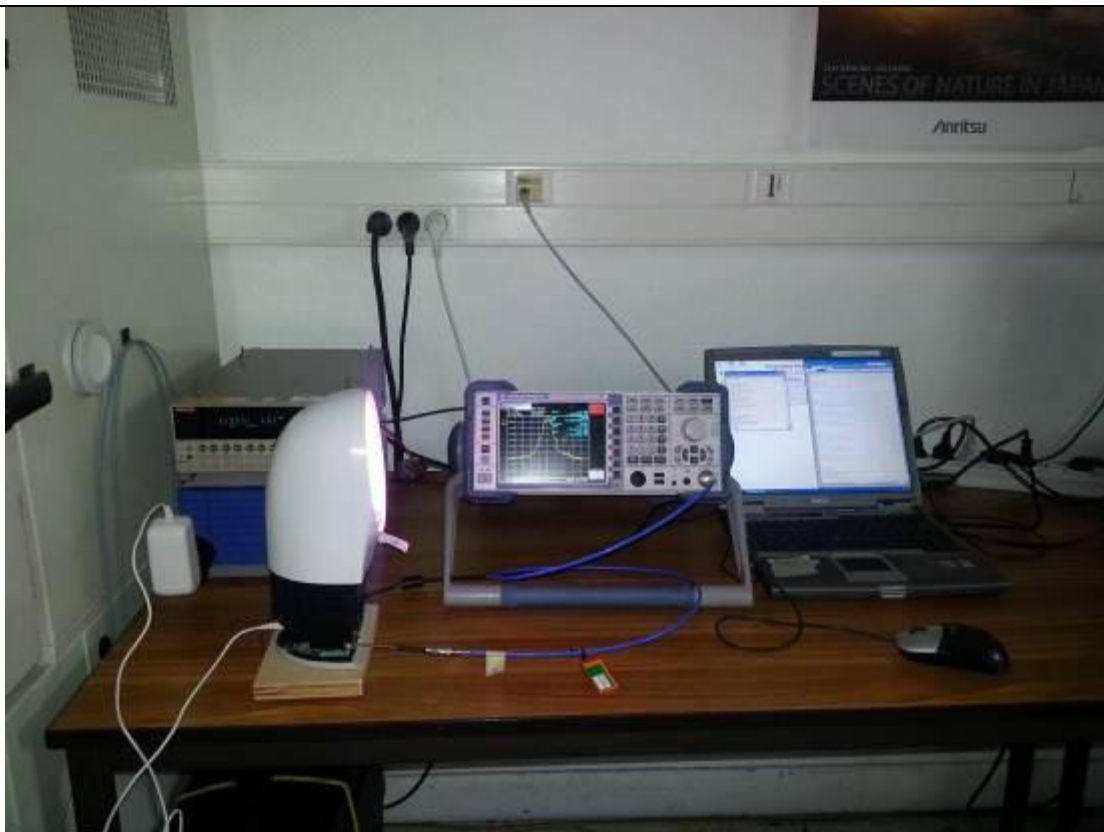
Test performed by :Arnaud Fayette
Date of test :25/06/2014
Ambient temperature :23°C
Relative humidity :44%

4.2. TEST SETUP

The Equipment Under Test is installed on a table and set in permanent emission with modulation. Measurement is performed with a spectrum analyzer on the EUT conducted access. The product has been tested according to the FCC KDB 558074 D01 DTS Meas Guidance v03r1 § 8.1.

Spectrum Analyzer Setting:

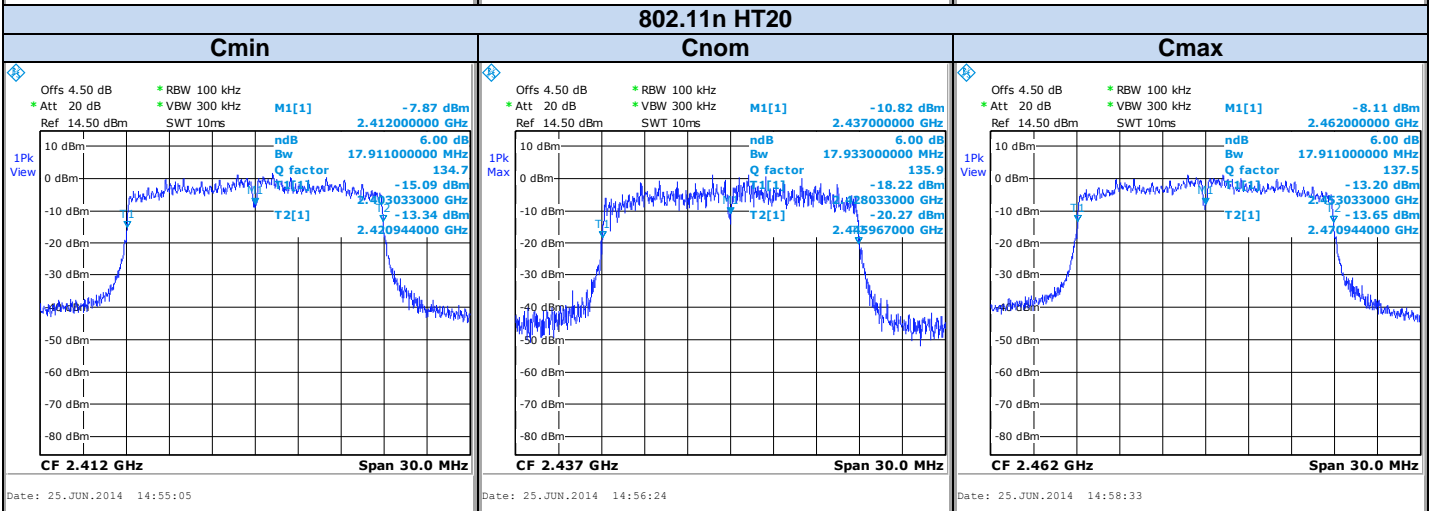
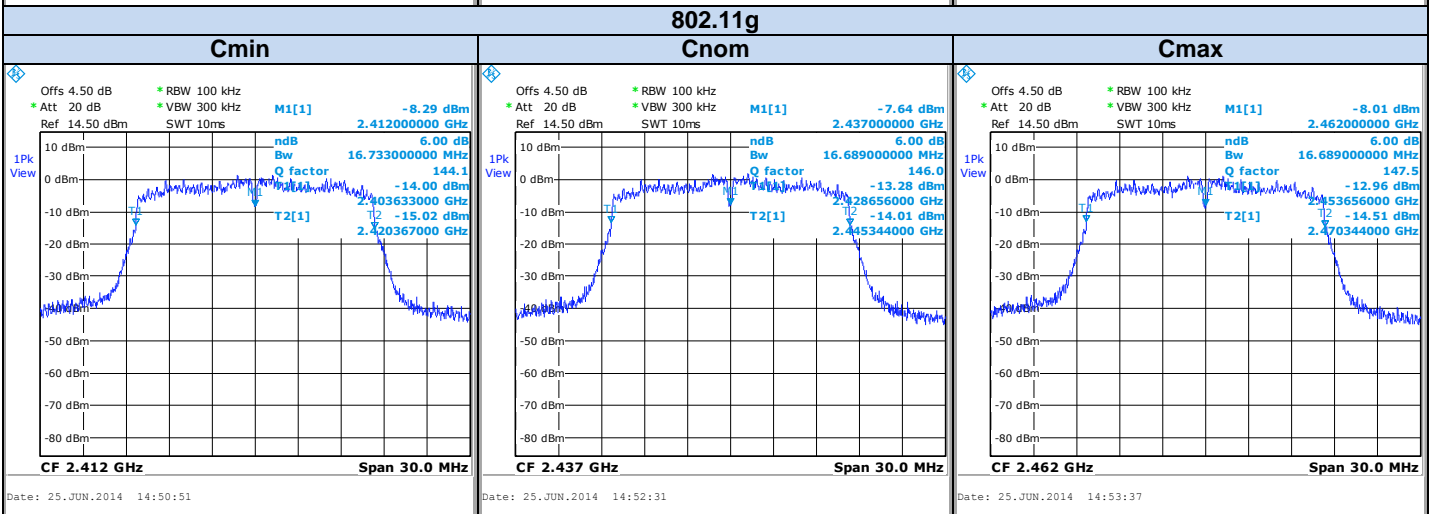
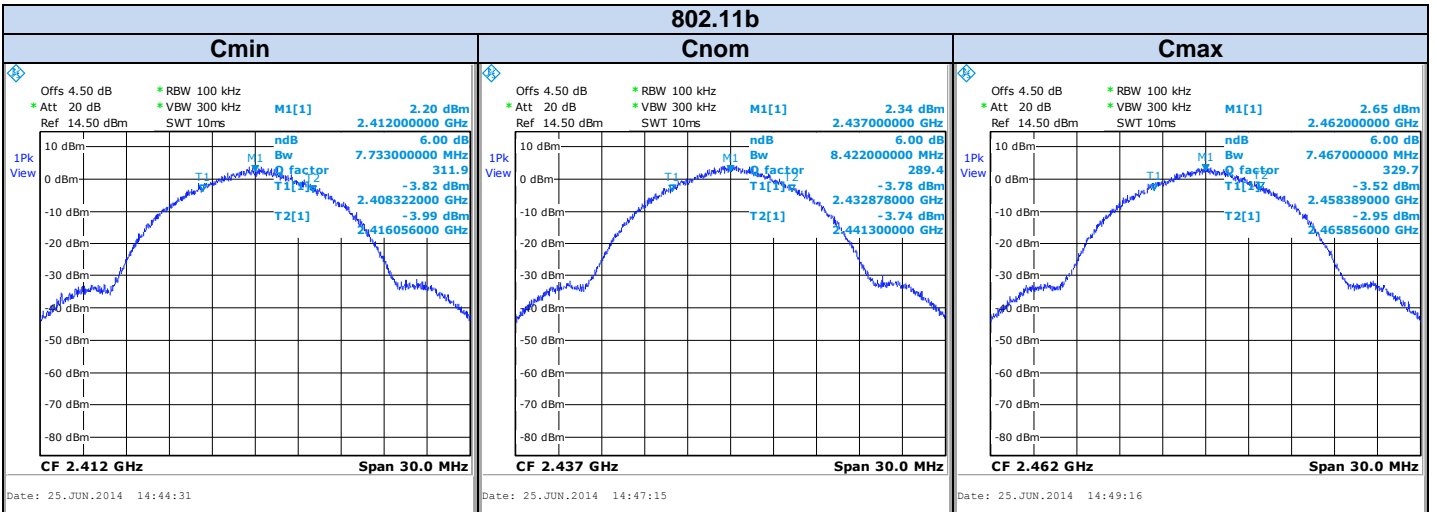
Center frequency= Cmin or Cnom or Cmax
Span= At least twice the emission spectrum
Amplitude= Sufficient to observe the signal amplitude
RBW= 100kHz
VBW= 300kHz
Sweep= Auto
Trace= Max Hold
Detector= Peak



Photograph for -6dB Bandwidth



4.1. GRAPHICS & RESULTS





802.11b

Temperature	Tnom		
Voltage	Vnom		
Frequency	Cmin	Cnom	Cmax
-6dB Bandwidth (MHz)	7.73	8.42	7.47

802.11g

Temperature	Tnom		
Voltage	Vnom		
Frequency	Cmin	Cnom	Cmax
-6dB Bandwidth (MHz)	16.73	16.69	16.69

802.11n HT20

Temperature	Tnom		
Voltage	Vnom		
Frequency	Cmin	Cnom	Cmax
-6dB Bandwidth (MHz)	17.91	17.93	17.91

Result: PASS

Limit: → The -6dB bandwidth must be greater than 500kHz



5. MAXIMUM CONDUCTED POWER

5.1. TEST CONDITIONS

Test performed by : Arnaud Fayette
Date of test : 25/06/2014
Ambient temperature : 23°C
Relative humidity : 45%

5.2. TEST SETUP

The Equipment Under Test is installed on a table and set in permanent emission with modulation. Measurement is performed with a spectrum analyzer on the EUT conducted access. The product has been tested according to the FCC KDB 558074 D01 DTS Meas Guidance v03r1 § 9.1.2.

Spectrum Analyzer Setting (Maximum Peak Conducted Power):

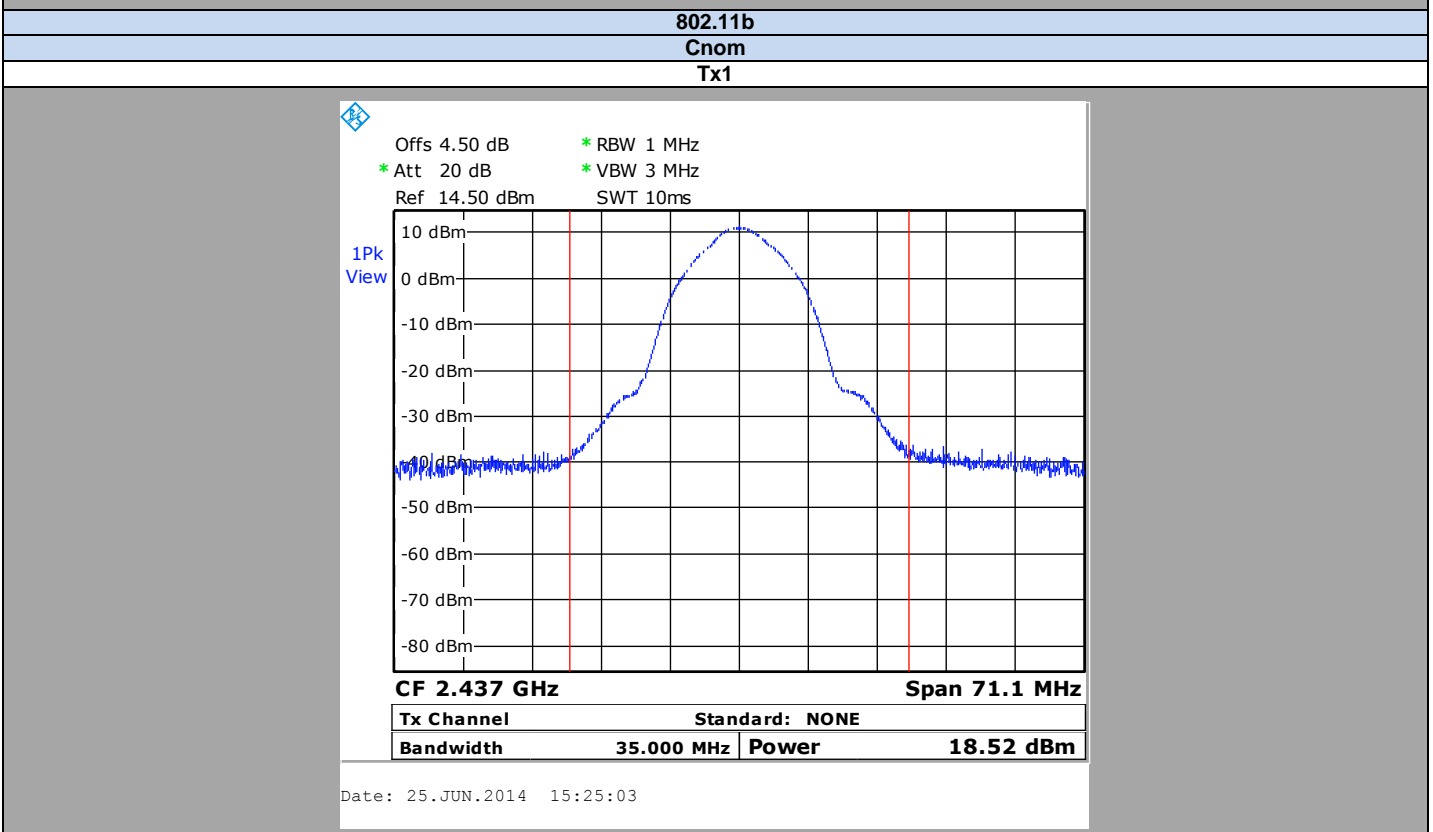
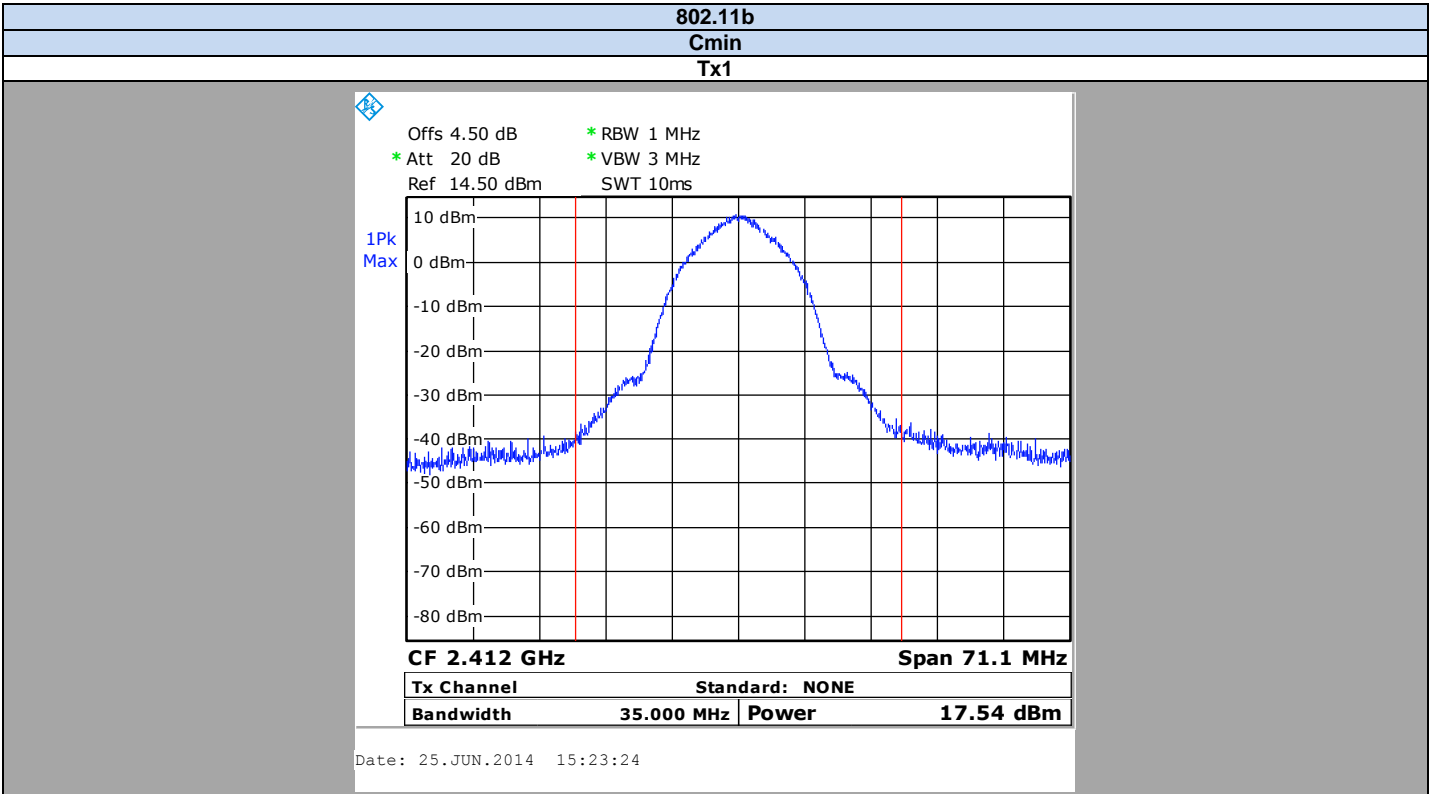
Center frequency= Cmin or Cnom or Cmax
Span= At least twice the emission spectrum
Amplitude= Sufficient to observe the signal amplitude
RBW= 1MHz
VBW= 3MHz
Sweep= Auto
Trace= Max Hold
Detector= Peak
Meas Fonction= Channel Power inside of the emission spectrum



Photograph for Maximum Conducted Power

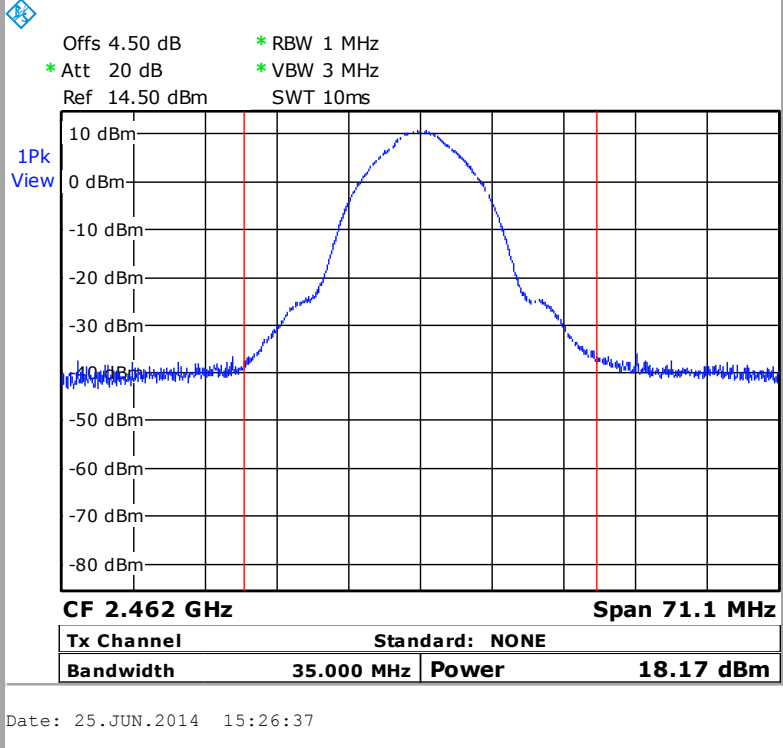


5.1. GRAPHICS & RESULTS

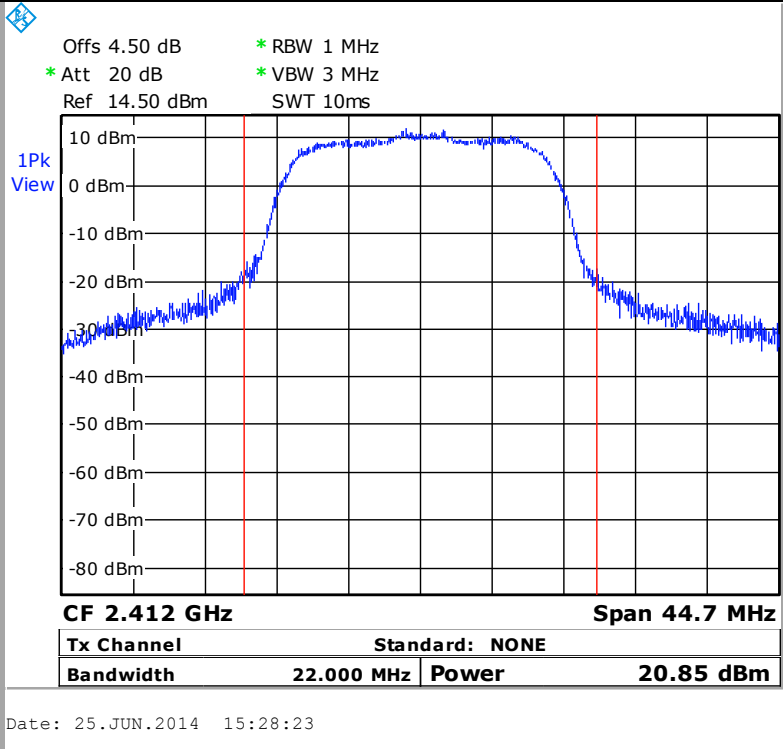


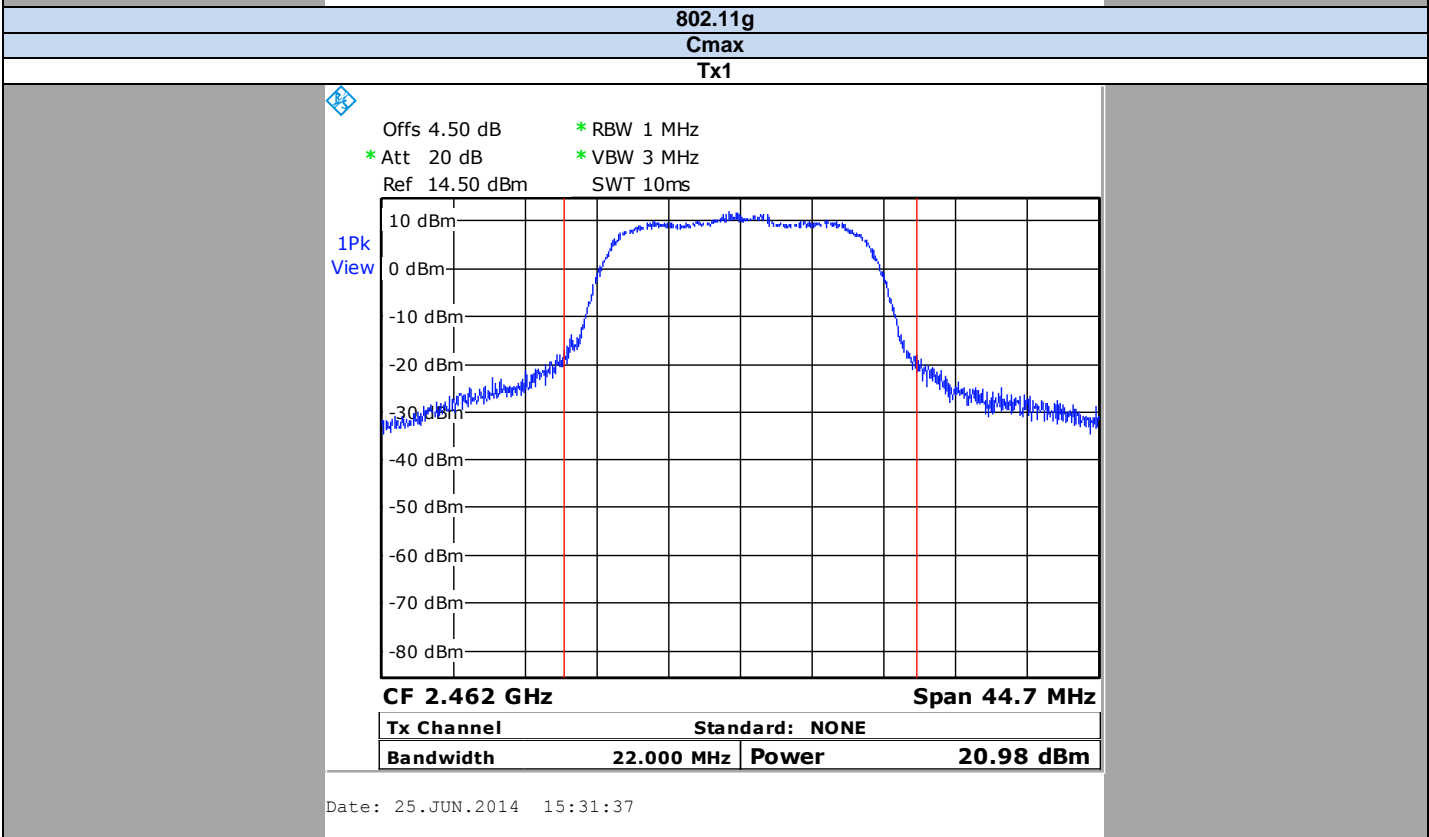
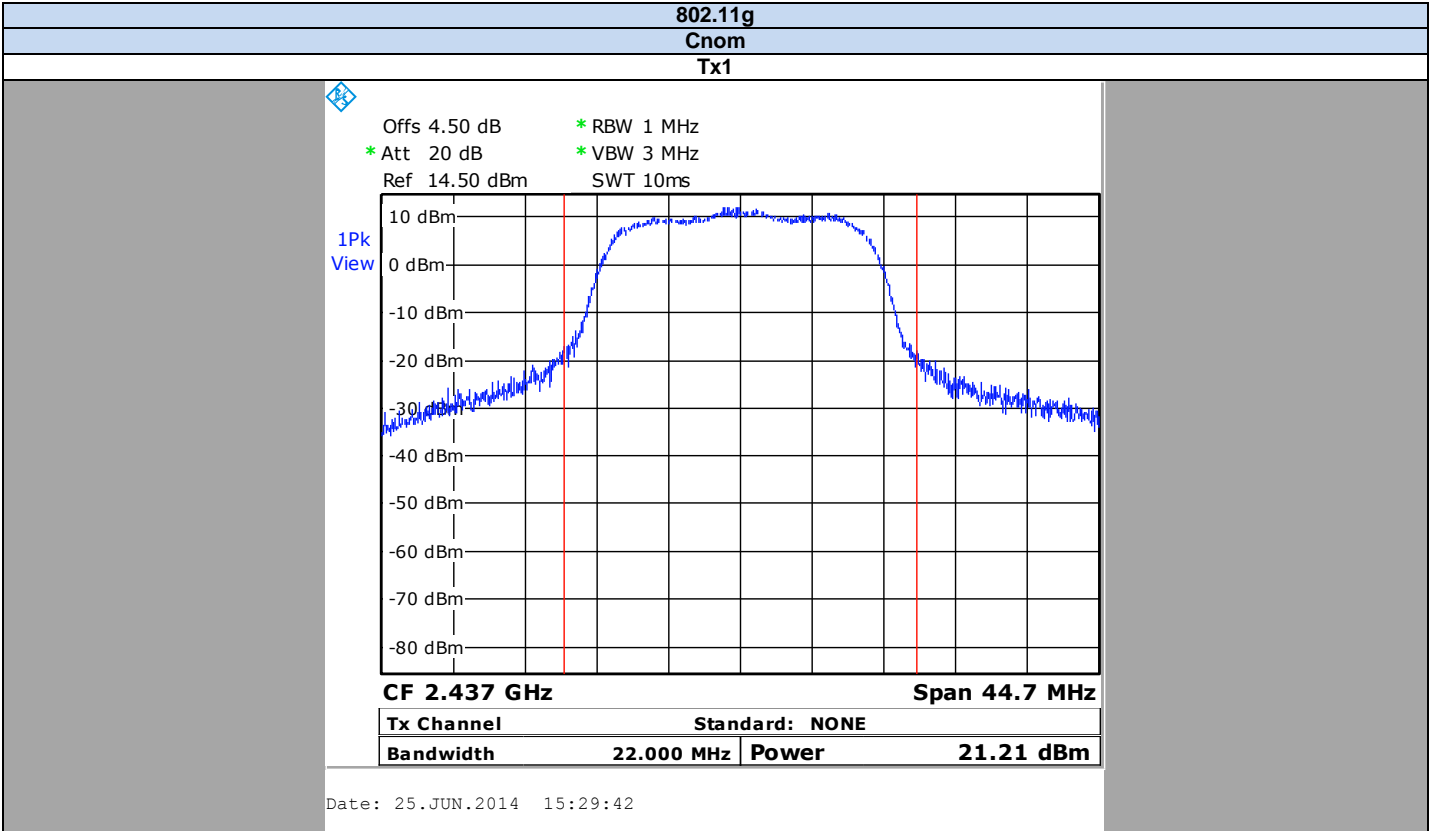


802.11b
Cmax
Tx1



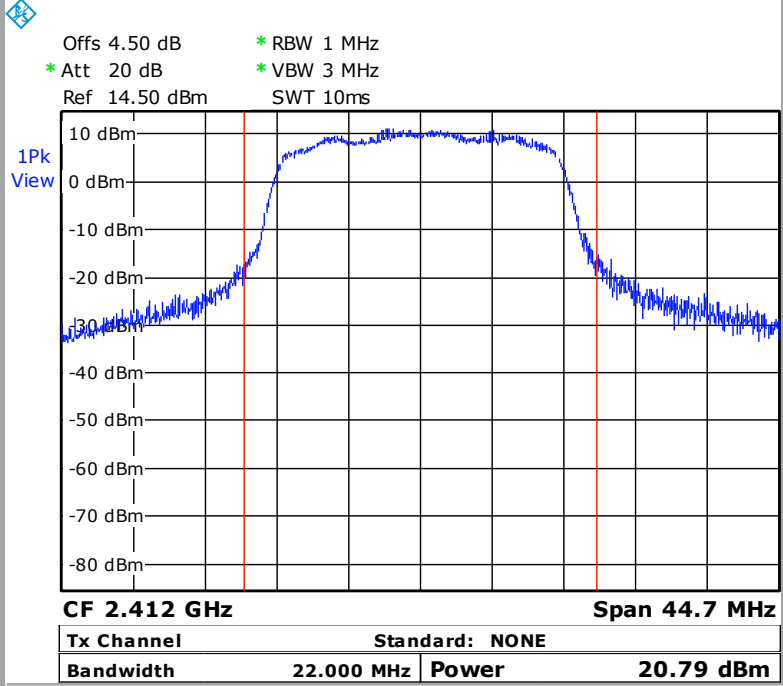
802.11g
Cmin
Tx1





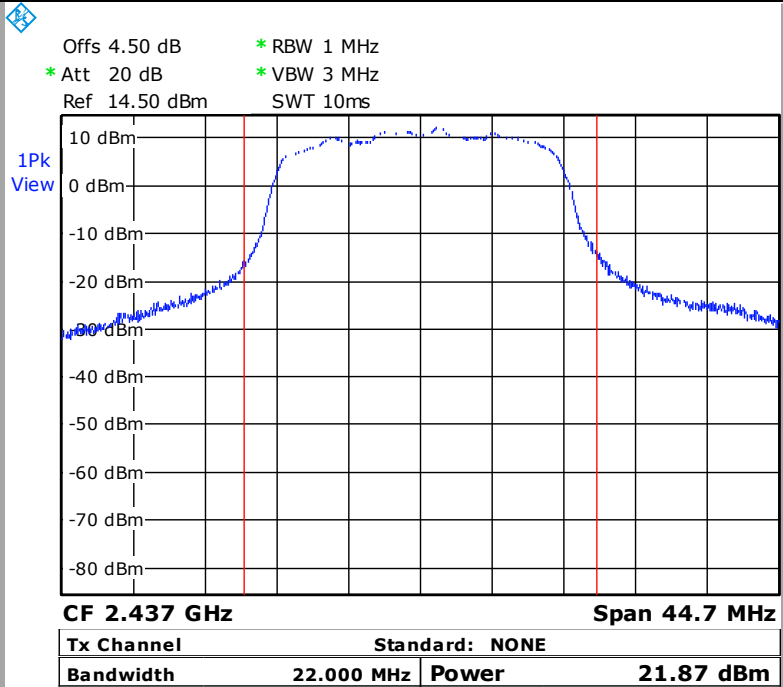


802.11n HT20
Cmin
Tx1

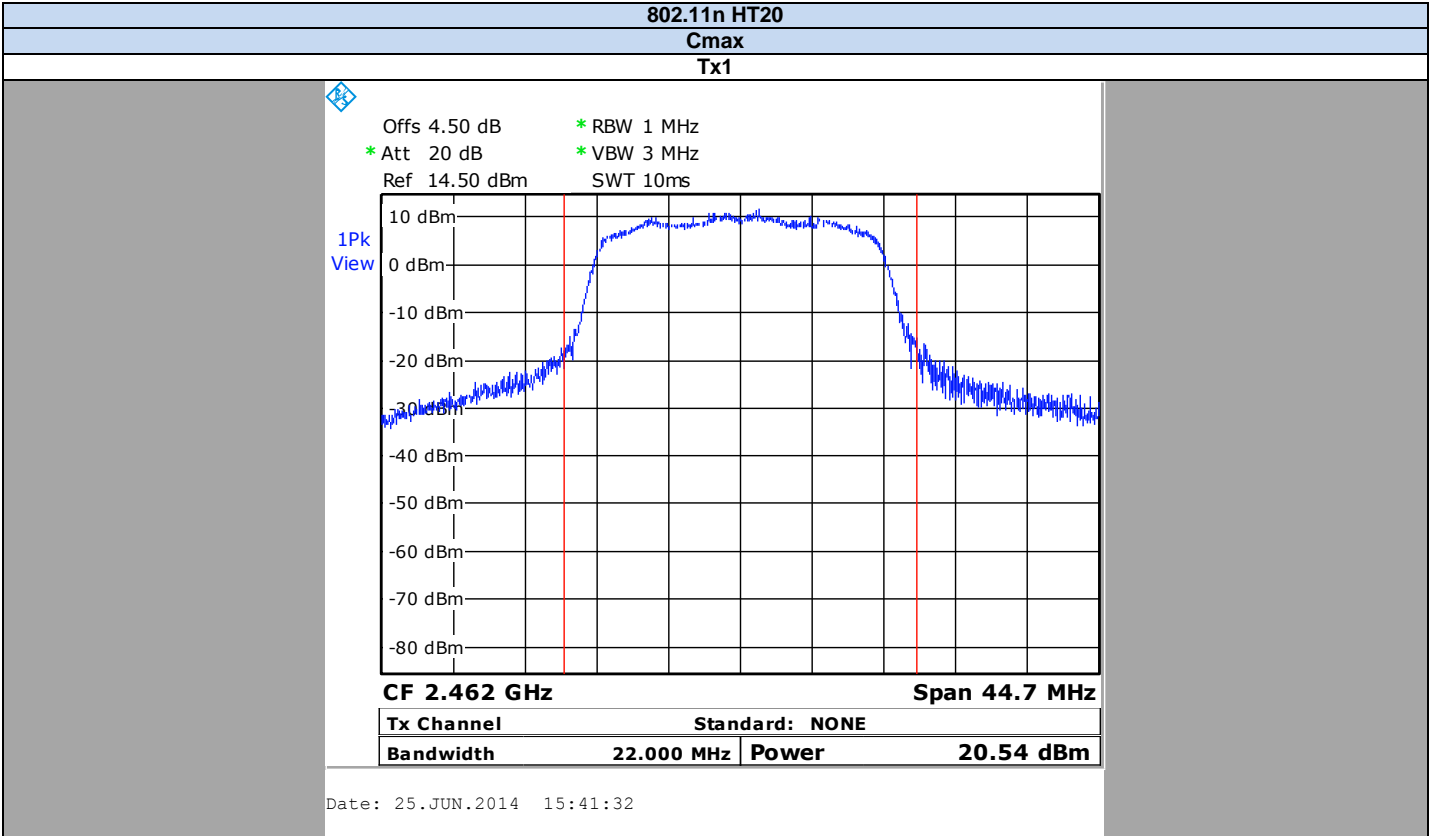


Date: 25.JUN.2014 15:40:00

802.11n HT20
Cnom
Tx1



Date: 25.JUN.2014 16:05:12





Spectrum Analyzer Offset:
Cable Loss=1.5dB + Attenuator= 3dB

802.11b

Channel	Overall Antenna Gain (dBi)	Maximum Conducted Power (dBm)	Limit (dBm)
Cmin	3.3	17.54	30
Cnom	3.3	18.52	30
Cmax	3.3	18.17	30

802.11g

Channel	Overall Antenna Gain (dBi)	Maximum Conducted Power (dBm)	Limit (dBm)
Cmin	3.3	20.85	30
Cnom	3.3	21.21	30
Cmax	3.3	20.98	30

802.11n HT20

Channel	Overall Antenna Gain (dBi)	Maximum Conducted Power (dBm)	Limit (dBm)
Cmin	3.3	20.79	30
Cnom	3.3	21.87	30
Cmax	3.3	20.54	30

Result: PASS

Limit: → The Maximum Conducted Power must be lower than 30dBm
Limits are reduced by G-6dBi if Overall Antenna Gain above 6dBi



6. POWER SPECTRAL DENSITY

6.1. TEST CONDITIONS

Test performed by : Arnaud Fayette
Date of test :25/06/2014
Ambient temperature :24°C
Relative humidity :45%

6.2. TEST SETUP

The Equipment Under Test is installed on a table and set in permanent emission with modulation. Measurement is performed with a spectrum analyzer on the EUT conducted access. The product has been tested according to the FCC KDB 558074 D01 DTS Meas Guidance v03r1 § 10.2 & FCC KDB 662911 D01 Multiple Transmitter Output v02 § E) 2) b).

Spectrum Analyzer Setting:

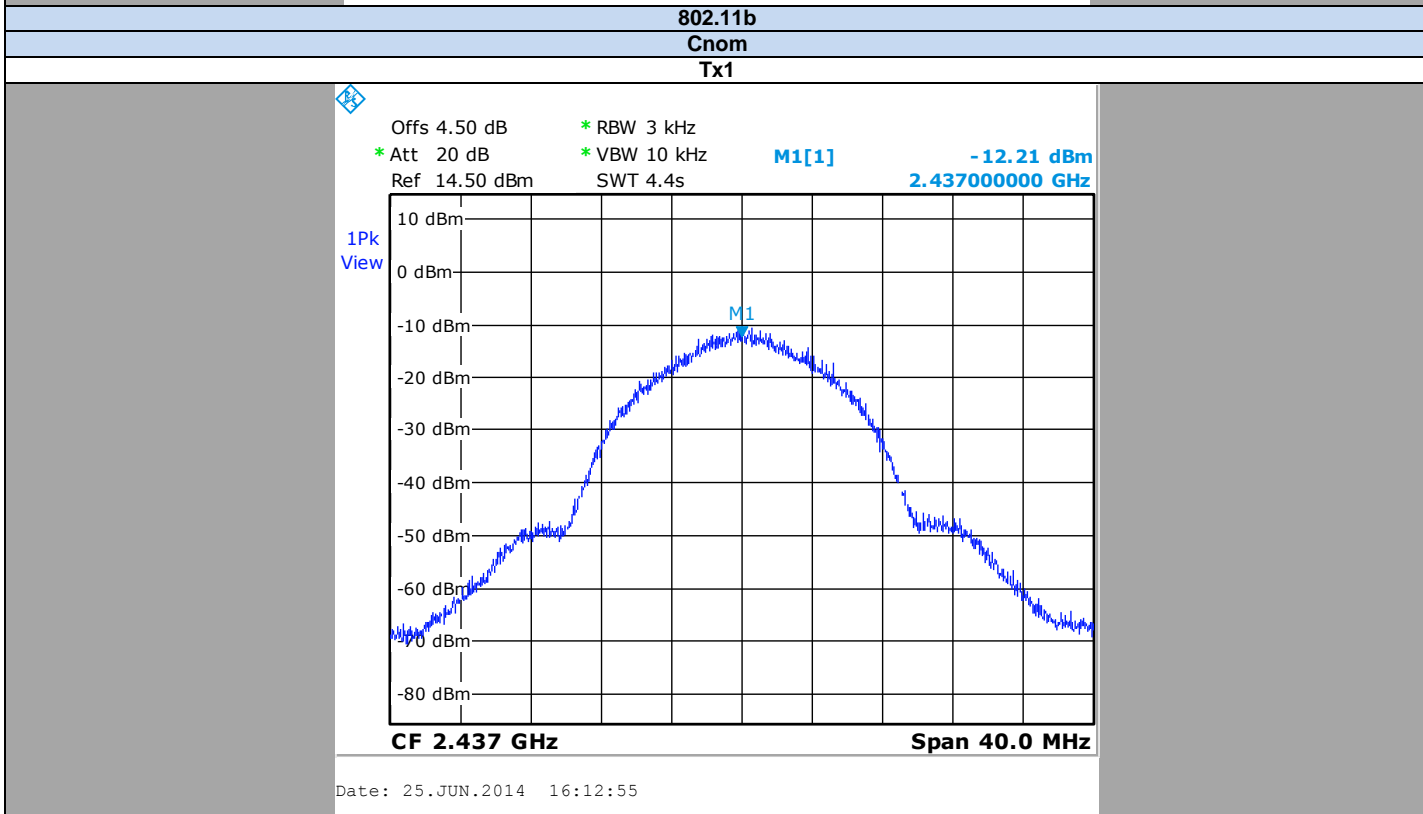
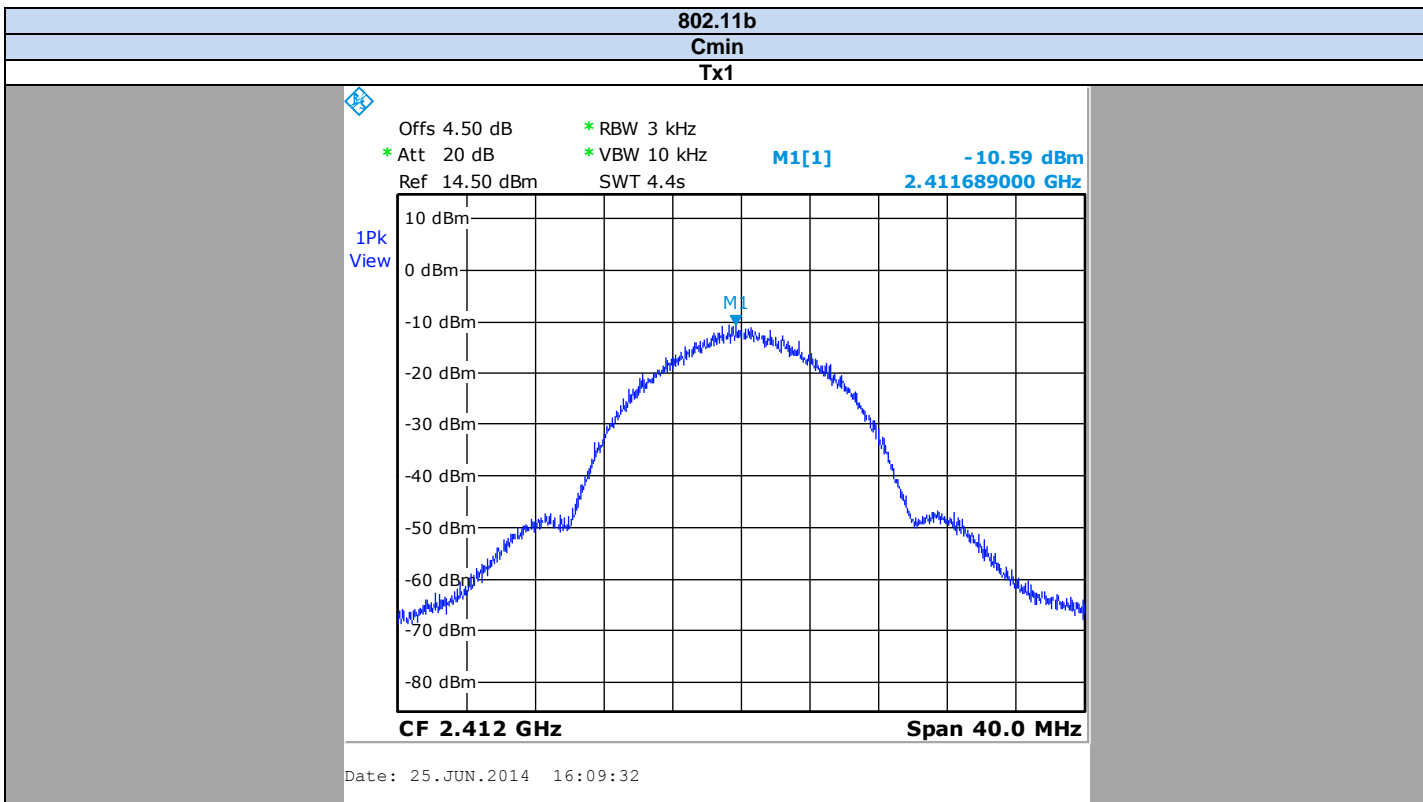
Center frequency= Cmin or Cnom or Cmax
Span= At least twice the emission spectrum
Amplitude= Sufficient to observe the signal amplitude
RBW= 3kHz
VBW= 10kHz
Sweep= Auto
Trace= Max Hold
Detector= Peak



Photograph for Power Spectral Density

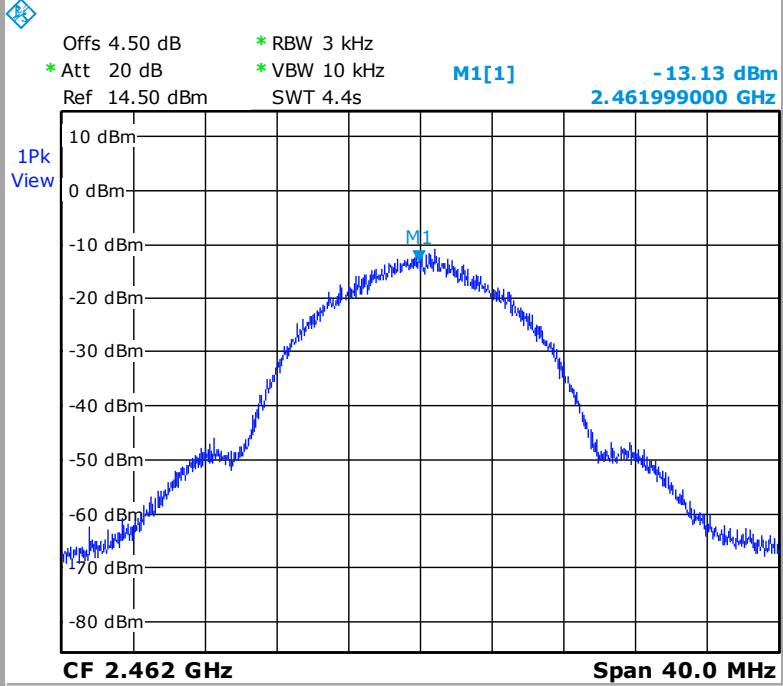


6.1. GRAPHICS & RESULTS



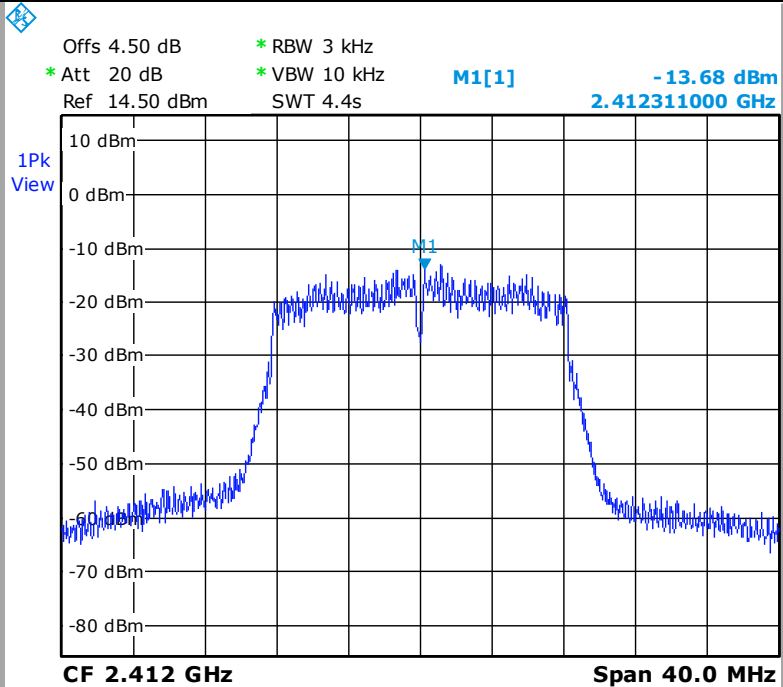


802.11b
Cmax
Tx1



Date: 25.JUN.2014 16:15:30

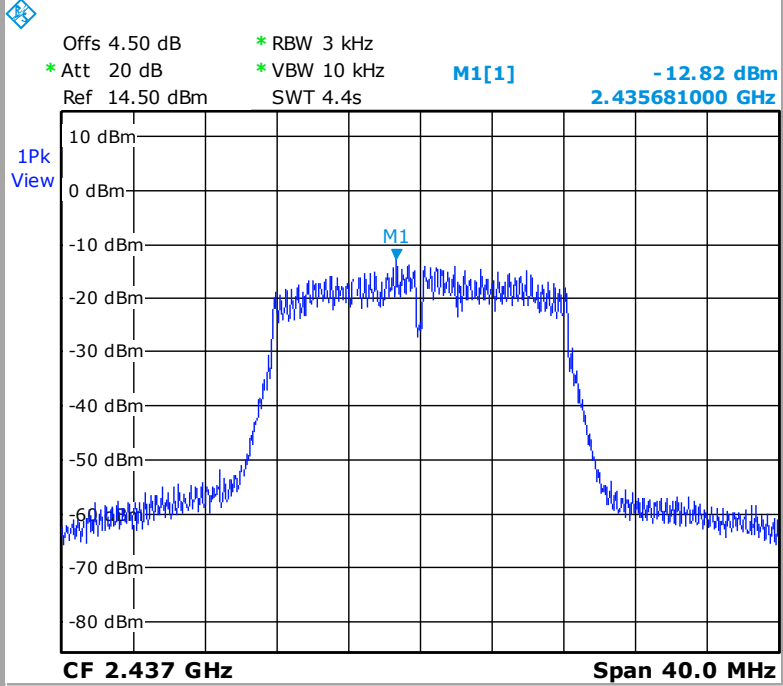
802.11g
Cmin
Tx1



Date: 25.JUN.2014 16:17:11

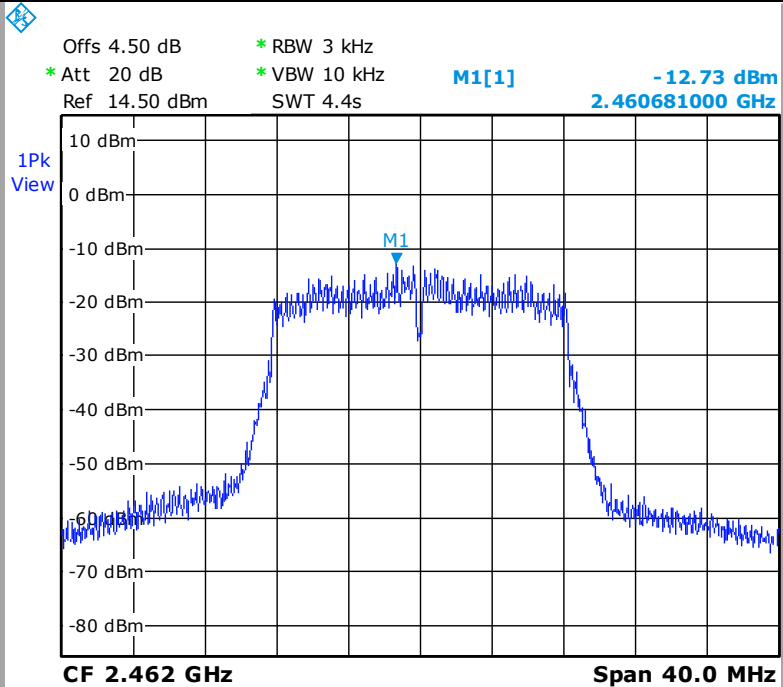


802.11g
Cnom
Tx1



Date: 25.JUN.2014 16:19:18

802.11g
Cmax
Tx1



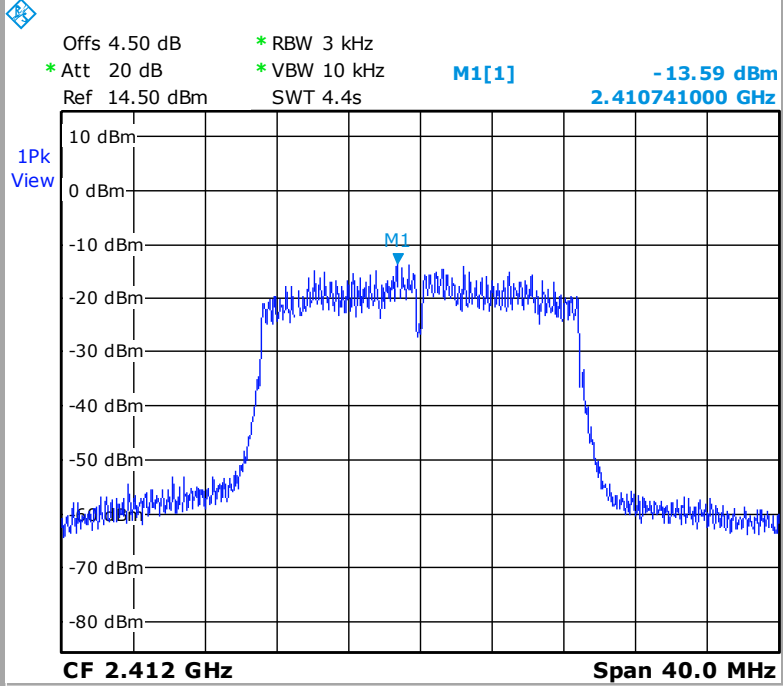
Date: 25.JUN.2014 16:21:32



802.11n HT20

Cmin

Tx1

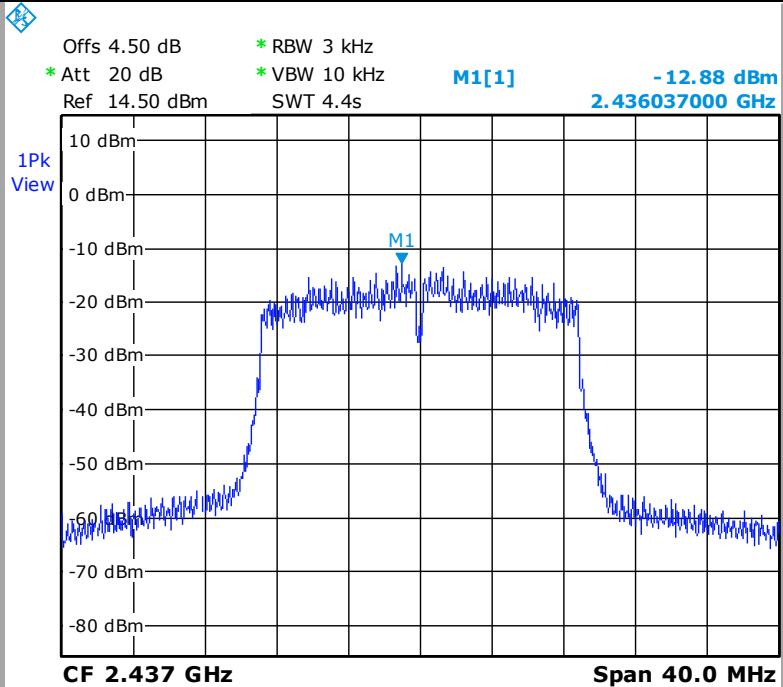


Date: 25.JUN.2014 16:24:07

802.11n HT20

Cnom

Tx1



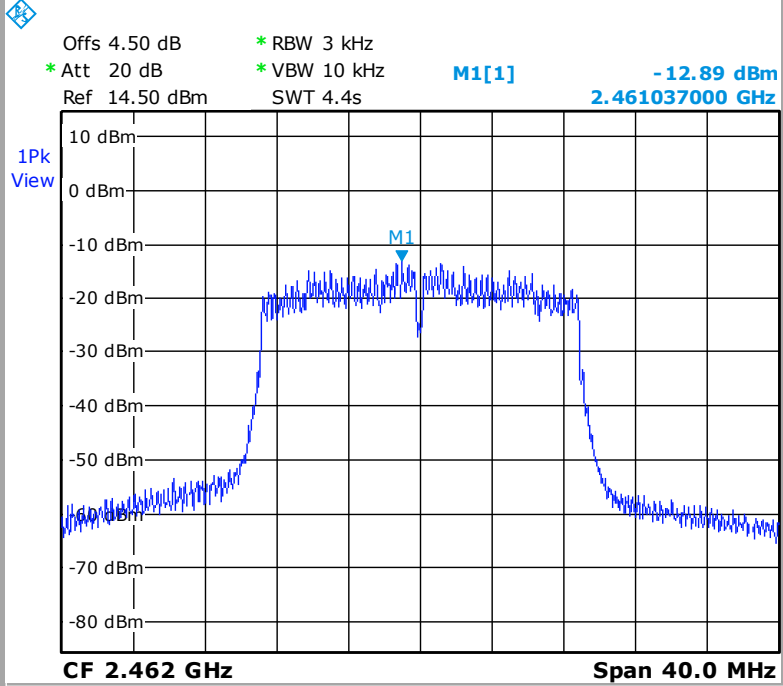
Date: 25.JUN.2014 16:26:10



802.11n HT20

Cmax

Tx1



Date: 25.JUN.2014 16:35:40



Spectrum Analyzer Offset:
Cable Loss=1.5dB + Attenuator= 3dB

802.11b

Channel	Overall Antenna Gain (dBi)	Power spectral density (dBm/3kHz)	Limit (dBm)
Cmin	3.3	-10.59	8
Cnom	3.3	-12.21	8
Cmax	3.3	-13.13	8

802.11g

Channel	Overall Antenna Gain (dBi)	Power spectral density (dBm/3kHz)	Limit (dBm)
Cmin	3.3	-13.68	8
Cnom	3.3	-12.82	8
Cmax	3.3	-12.73	8

802.11n HT20

Channel	Overall Antenna Gain (dBi)	Power spectral density (dBm/3kHz)	Limit (dBm)
Cmin	3.3	-13.59	8
Cmax	3.3	-12.89	8

Result: PASS

Limit: → The Power Spectral Density must be lower than 8dBm/3kHz
Limits are reduced by G-6dBi if Overall Antenna Gain above 6dBi



7. UNWANTED EMISSIONS INTO NON-RESTRICTED FREQUENCY BANDS AT THE BAND EDGE

7.1. TEST CONDITIONS

Test performed by : Arnaud Fayette
Date of test : 26/06/2014
Ambient temperature : 23°C
Relative humidity : 44%

7.2. TEST SETUP

The Equipment Under Test is installed on a table and set in permanent emission with modulation. Measurement is performed with a spectrum analyzer on the EUT conducted access. The product has been tested according to the FCC KDB 558074 D01 DTS Meas Guidance v03r1 § 11.2).

Spectrum Analyzer Setting:

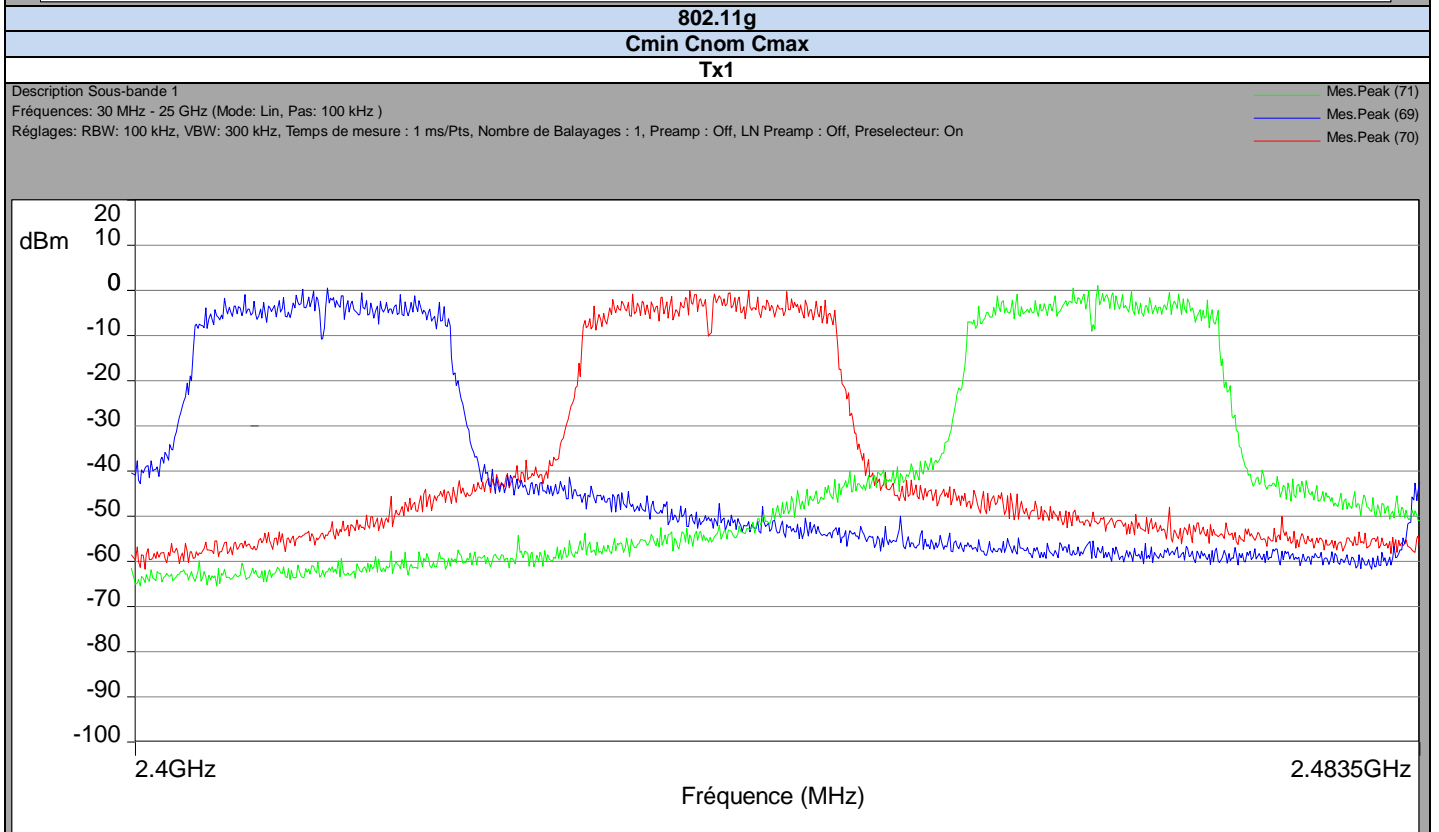
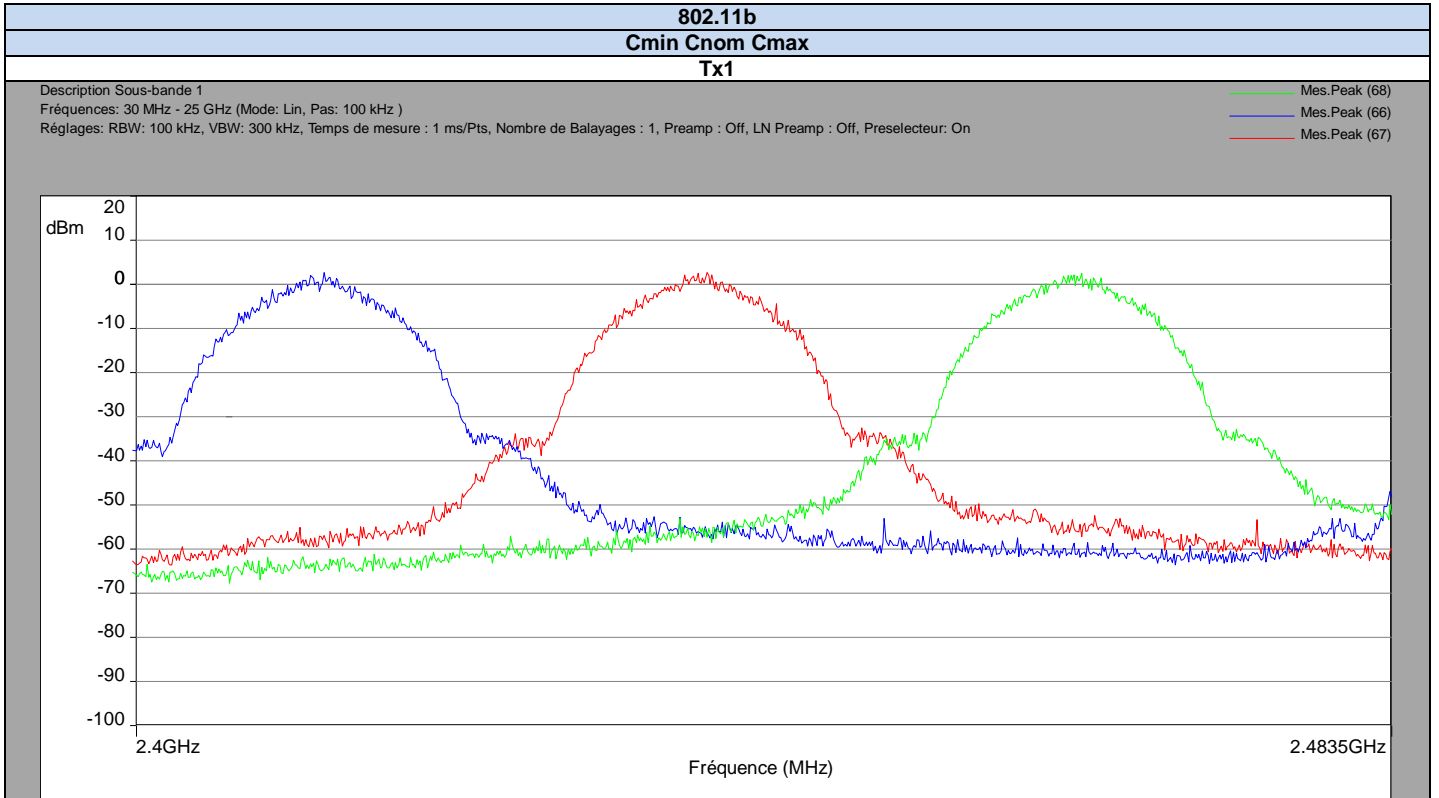
Start frequency= 2400MHz
Stop frequency= 2483.5MHz
Amplitude= Sufficient to observe the signal amplitude
RBW= 100kHz
VBW= 300kHz
Sweep Time= Auto
Trace= Max Hold
Detector= Peak

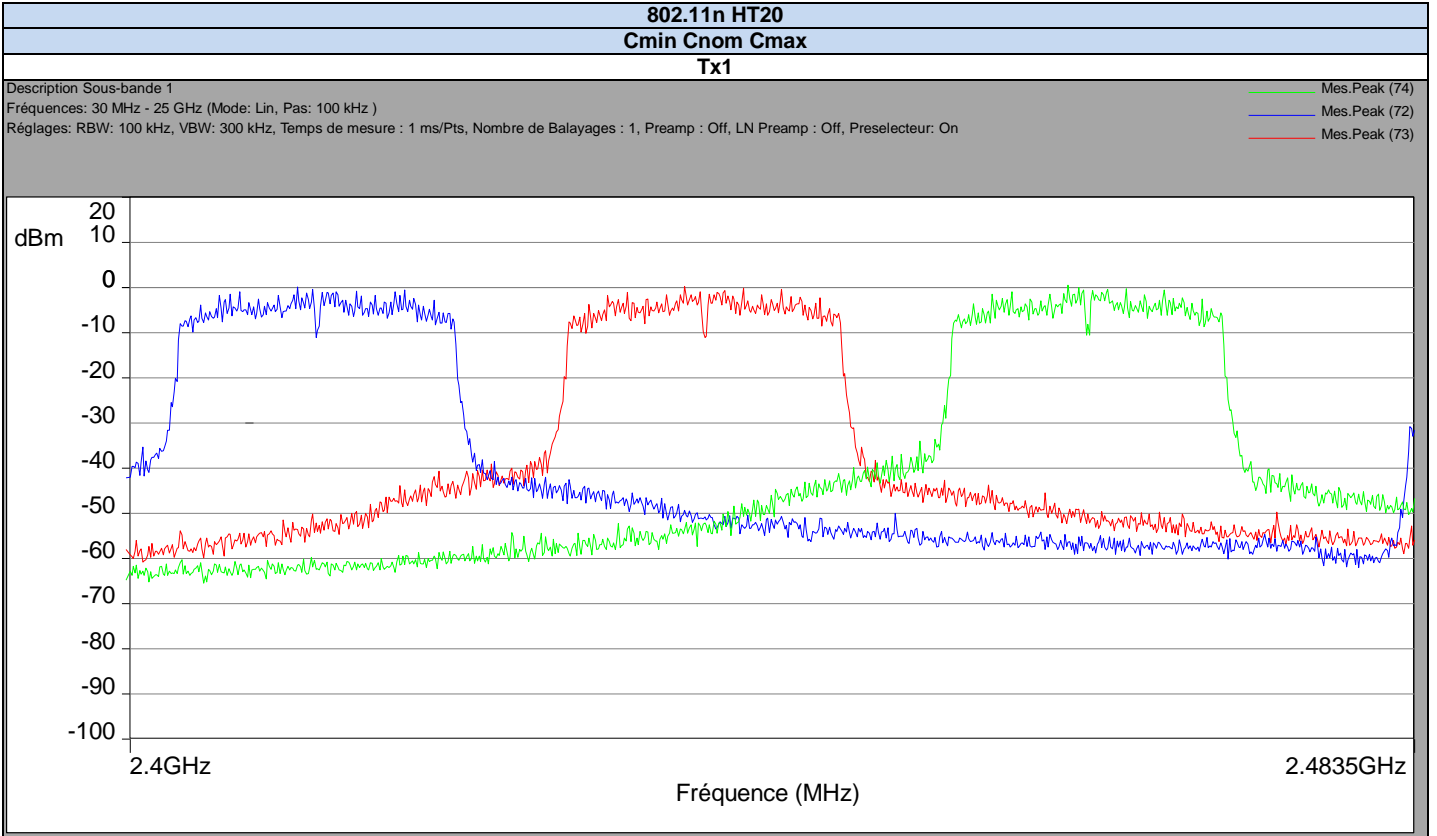


Photograph for Unwanted Emissions into Non-Restricted Frequency Bands At the Band Edge



7.1. GRAPHICS & RESULTS







802.11b

Temperature	Tnom	
Voltage	Vnom	
Conducted Spurious Emission at the Band Edge (MHz)	2400	2483,5
Spurious Level (dBc)	-33.702	-44.272

802.11g

Temperature	Tnom	
Voltage	Vnom	
Conducted Spurious Emission at the Band Edge (MHz)	2400	2483,5
Spurious Level (dBc)	-40.904	-41.694

802.11n HT20

Temperature	Tnom	
Voltage	Vnom	
Conducted Spurious Emission at the Band Edge (MHz)	2400	2483,5
Spurious Level (dBc)	-41.455	-30.286

Result: PASS

Limit: → All Spurious Emissions must be at least 20dB (Maximum Conducted Power) below the Fundamental Radiator Level at the Band Edge Edge "2400MHz & 2483,5MHz"



8. UNWANTED EMISSIONS INTO NON-RESTRICTED FREQUENCY BANDS

8.1. TEST CONDITIONS

Test performed by : Arnaud Fayette
Date of test : 26/06/2014
Ambient temperature : 23°C
Relative humidity : 44%

8.2. TEST SETUP

The Equipment Under Test is installed on a table and set in permanent emission with modulation. Measurement is performed with a spectrum analyzer on the EUT conducted access. The product has been tested according to the FCC KDB 558074 D01 DTS Meas Guidance v03r1 § 11.3

Spectrum Analyzer Setting:

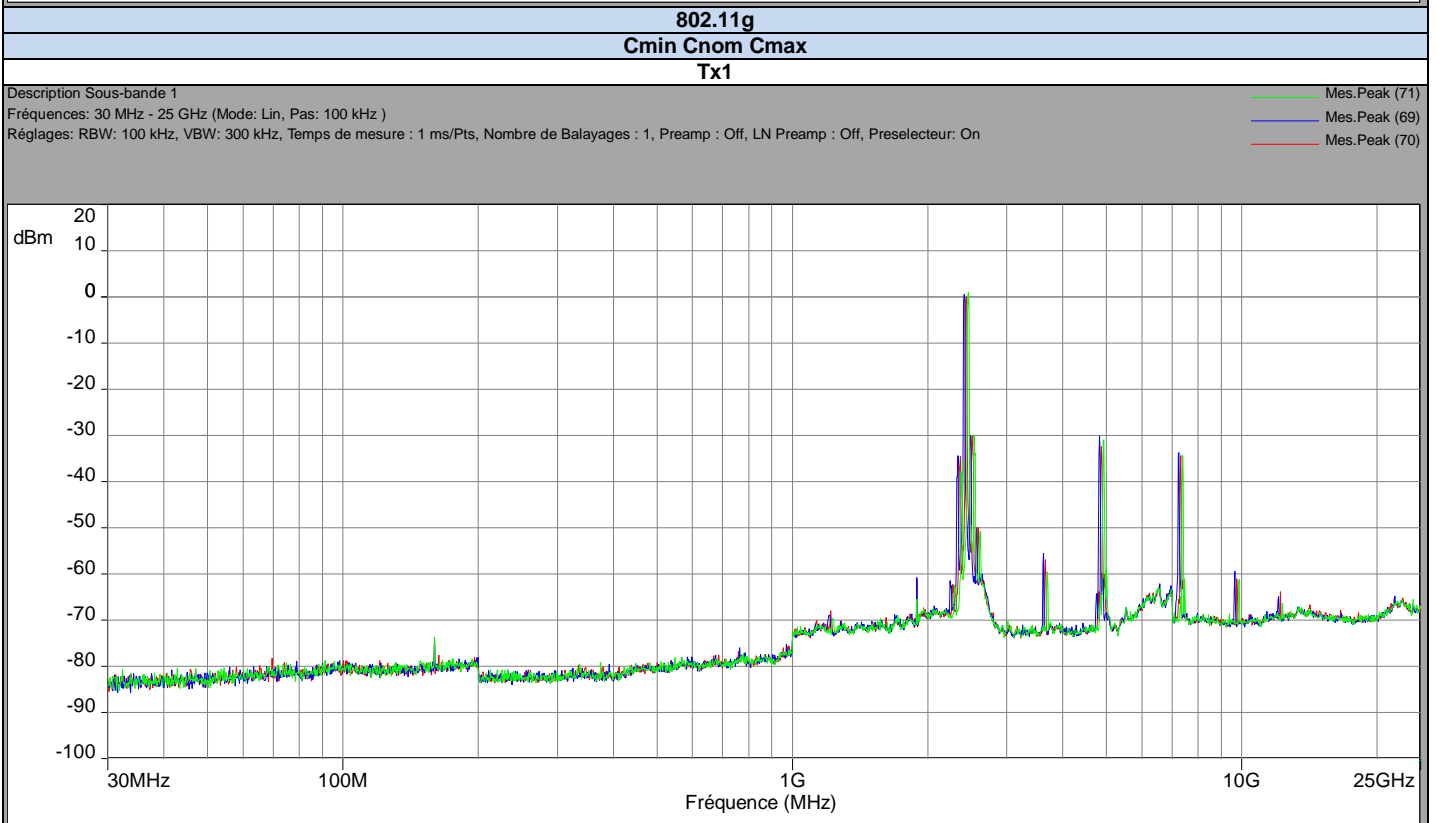
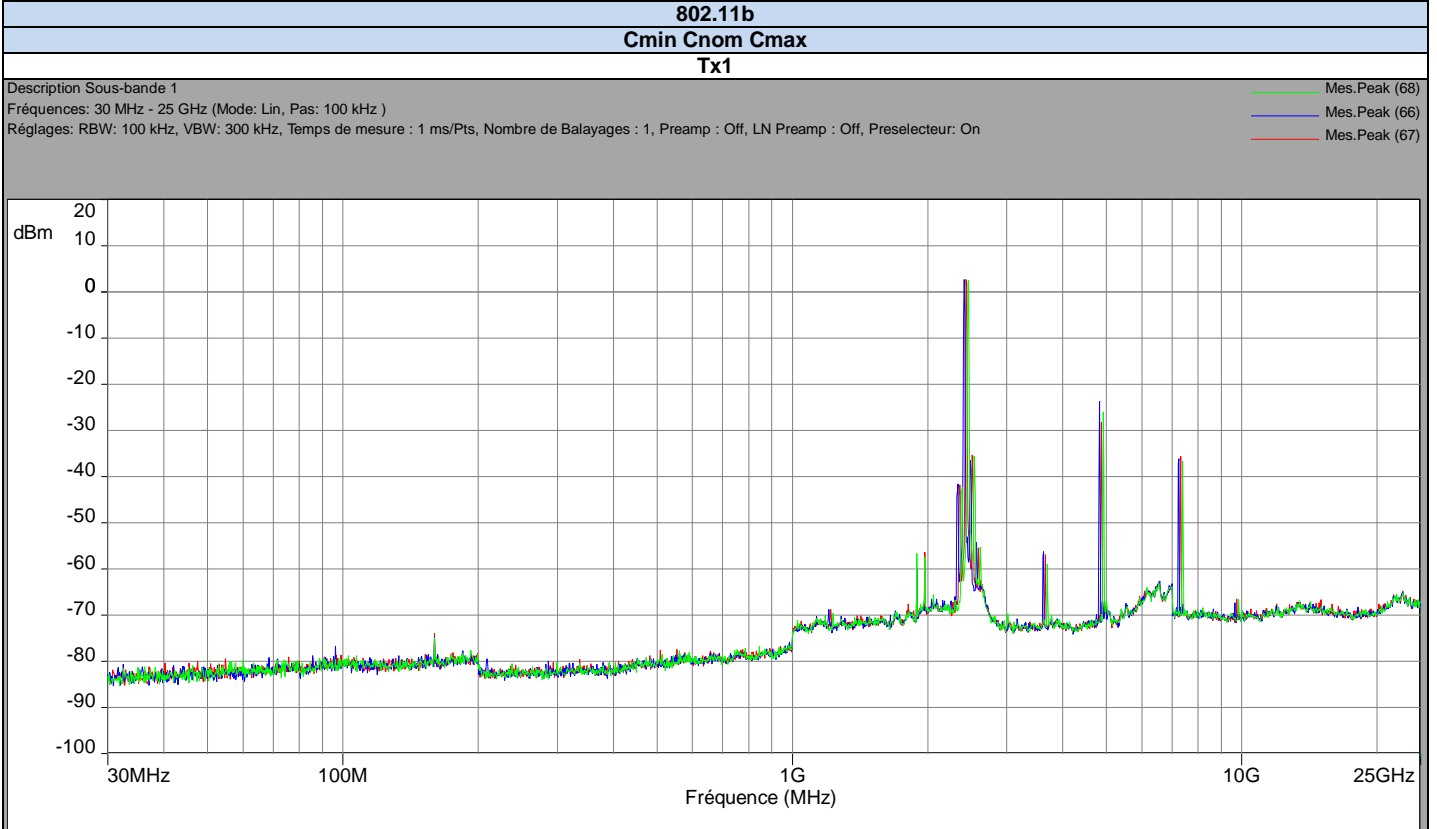
Start frequency= 30MHz
Stop frequency= 25GHz
Amplitude= Sufficient to observe the signal amplitude
RBW= 100kHz
VBW= 300kHz
Sweep Time= Auto
Sweep Point= 249700
Trace= Max Hold
Detector= Peak



Photograph for Unwanted Emissions into Non-Restricted Frequency Bands



8.3. GRAPHICS & RESULTS

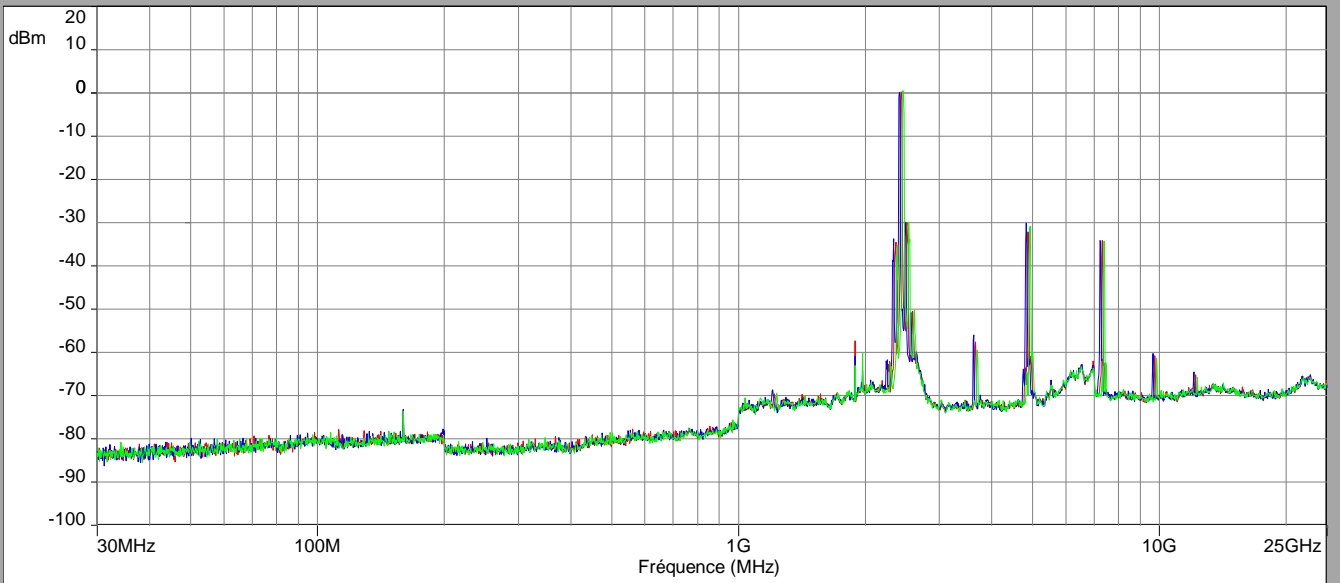




802.11n HT20
Cmin Cnom Cmax
Tx1

Description Sous-bande 1
Fréquences: 30 MHz - 25 GHz (Mode: Lin, Pas: 100 kHz)
Réglages: RBW: 100 kHz, VBW: 300 kHz, Temps de mesure : 1 ms/Pts, Nombre de Balayages : 1, Preamp : Off, LN Preamp : Off, Preselecteur: On

Mes.Peak (74)
Mes.Peak (72)
Mes.Peak (73)





802.11b

Frequency (MHz)	Spurious Level (dBm)	Spurious Level (dBc)
2485.7	-36.527	-33.911
2509.5	-35.317	-32.701
2535.7	-35.644	-33.028
4825.2	-23.710	-21.094
4822.7	-28.274	-25.658
4925.2	-26.061	-23.445
7231.6	-36.172	-33.556
7310	-35.663	-33.047
7385	-36.632	-34.016

802.11g

Frequency (MHz)	Spurious Level (dBm)	Spurious Level (dBc)
2485.7	-29.948	-28.942
2509.5	-30.151	-29.145
2535.7	-29.844	-28.838
4825.2	-30.124	-29.118
4822.7	-32.418	-31.412
4925.2	-30.917	-29.911
7231.6	-33.715	-32.709
7310	-34.437	-34.431
7385	-34.327	-34.321

802.11n HT20

Frequency (MHz)	Spurious Level (dBm)	Spurious Level (dBc)
2485.7	-29.836	-29.327
2509.5	-30.039	-29.53
2535.7	-29.8	-29.291
4825.2	-30.124	-29.615
4822.7	-31.056	-30.547
4925.2	-34.327	-33.818
7231.6	-34.123	-33.614
7310	-34.113	-33.604
7385	-30.803	-30.294

Result: PASS

Limit: → All Spurious Emissions must be at least 20dB (Maximum Conducted Power) below the Fundamental Radiator Level outside of the 2400MHz-2483,5MHz band



9. AC POWER LINE CONDUCTED EMISSIONS

9.1. TEST CONDITIONS

Test performed by :Gilles DE BUYSER
Date of test :2014/06/13
Ambient temperature :19°C
Relative humidity :54%

9.2. TEST SETUP

The product has been tested according to ANSI C63.10 (2009) method. The EUT is placed on the ground reference plane, at 80cm from the LISN. The distance between the EUT and the vertical ground plane is 40cm. Auxiliaries are powered by another LISN. The cable has been shorted to 1meter length. The EUT is powered through the LISN. Measurement is made with a receiver in peak mode. This was followed by a Quasi-Peak, i.e. CISPR measurement for any strong signal. If the average limit is met when using a Quasi-Peak detector, the EUT shall be deemed to meet both limits and measurement with the average detector is unnecessary. The LISN (measure) is $50\Omega / 50\mu\text{H}$. Interconnecting cables and equipment's were moved to position that maximized emission.



Photograph for AC Power Line Conducted Emissions (Front view)



Photograph for AC Power Line Conducted Emissions (Rear view)

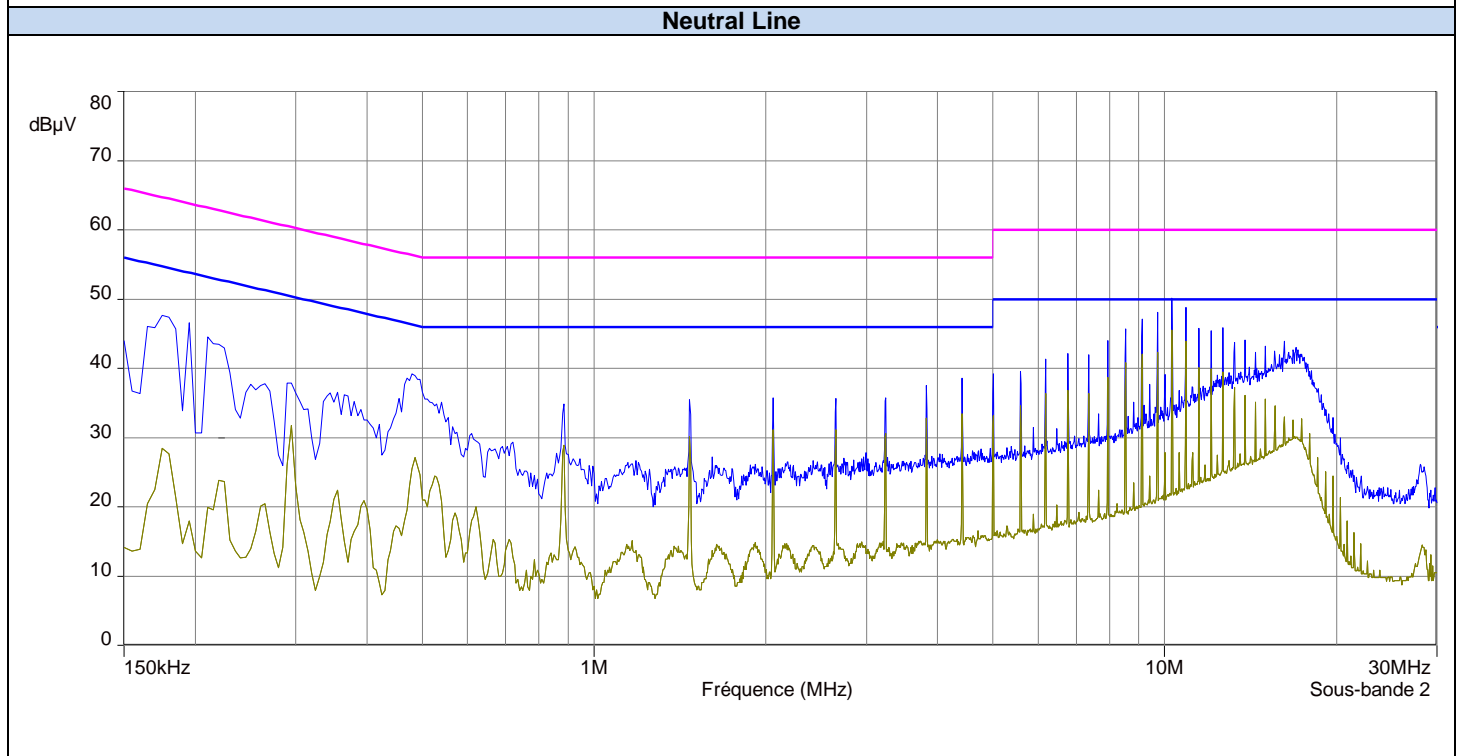
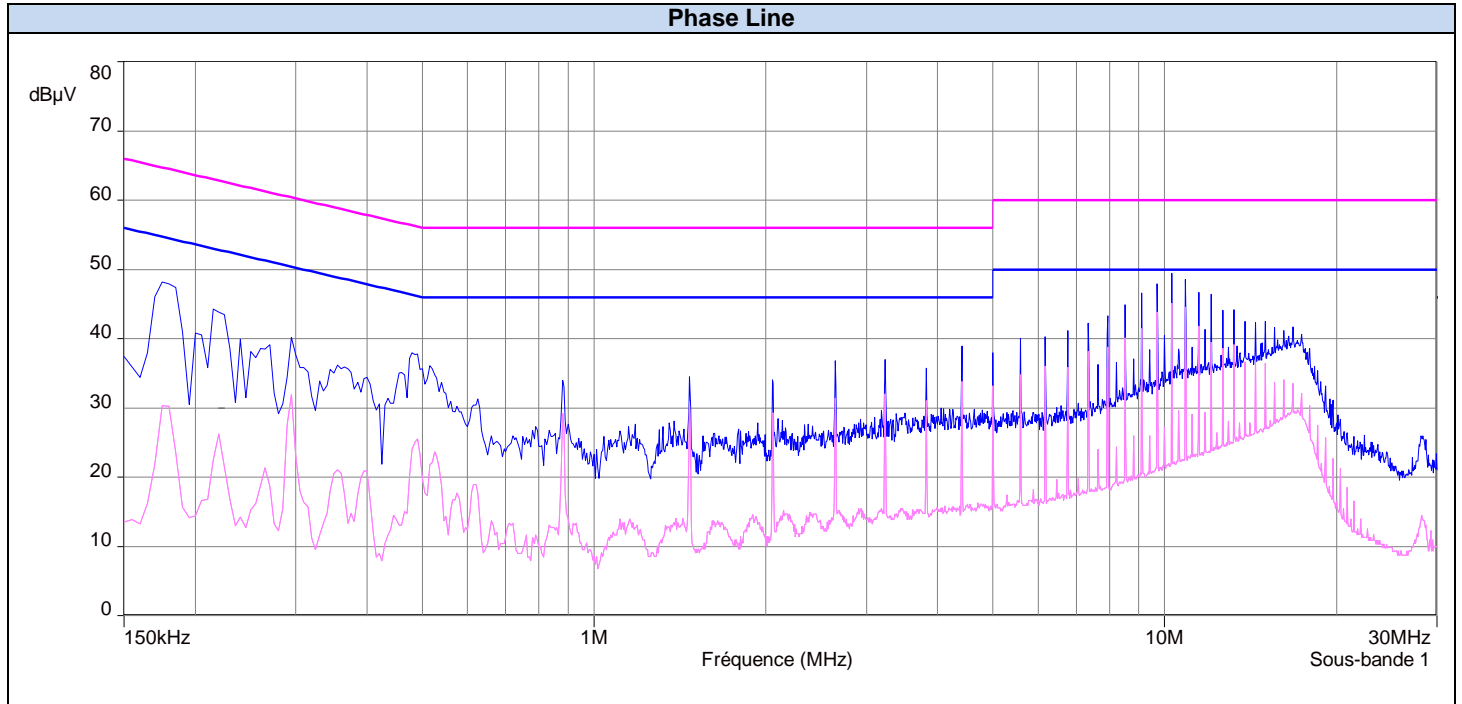


Photograph for AC Power Line Conducted Emissions (Global view)



9.3. RESULTS

802.11b/802.11g/802.11n HT20





Phase Line

Frequency (MHz)	Peak Level (dBµV)	Quasi-Peak Level (dBµV)	Quasi-Peak Limit (dBµV)	Average Level (dBµV)	Average Limit (dBµV)
0.175	48.167	-	64.7	30.353	54.7
0.495	37.804	-	56.2	25.479	46.2
5.00	37.978	-	56	33.202	46
7.96	43.259	-	60	38.713	50
9.73	47.920	-	60	43.856	50
10.29	49.405	-	60	45.082	50

Neutral Line

Frequency (MHz)	Peak Level (dBµV)	Quasi-Peak Level (dBµV)	Quasi-Peak Limit (dBµV)	Average Level (dBµV)	Average Limit (dBµV)
0.175	48.162	-	64.7	30.345	54.7
0.495	37.783	-	56.2	25.426	46.2
5.00	37.965	-	56	33.230	46
7.96	43.280	-	60	38.720	50
9.73	47.915	-	60	43.845	50
10.29	49.412	-	60	45.086	50

Result: PASS

Limit: → Quasi-Peak
 0,15kHz to 0,5MHz: 66dBµV to 56dBµV*
 0,5MHz to 5MHz: 56dBµV
 5MHz to 30MHz: 60dBµV

Average
 0,15kHz to 0,5MHz: 56dBµV to 46dBµV*
 0,5MHz to 5MHz: 46dBµV
 5MHz to 30MHz: 50dBµV

*Decreases with the logarithm of the frequency



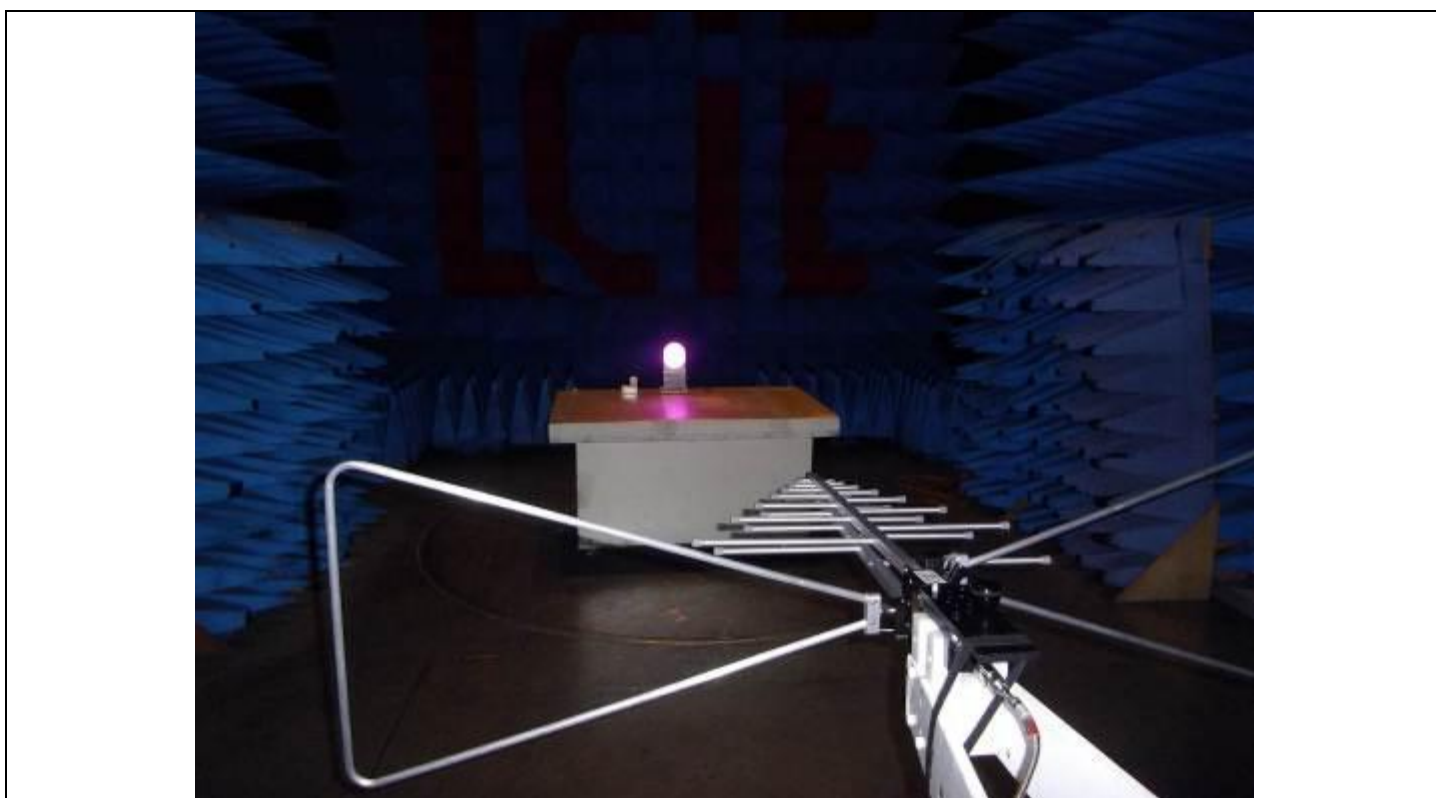
10. UNWANTED EMISSIONS INTO RESTRICTED FREQUENCY BANDS

10.1. TEST CONDITIONS

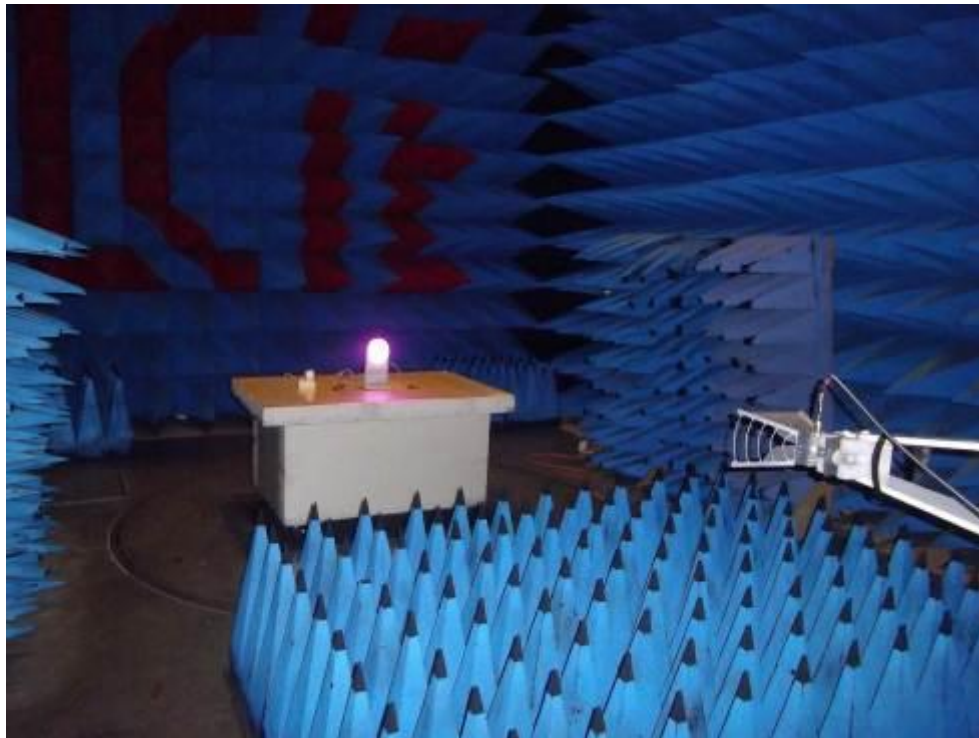
Test performed by :Christophe Ferreira
Date of test :26/05/2014
Ambient temperature :18°C
Relative humidity :52%

10.2. TEST SETUP

The product has been tested according to ANSI C63.10 (2009). The EUT is in a semi-anechoic chamber. Distance between measuring antenna and the EUT is 3m. Test is performed in horizontal (H) and vertical (V) polarization with bilog antenna below 1GHz and with a horn antenna above 1GHz. Measurement bandwidth was 120kHz below 1GHz and 1MHz above 1GHz. The level has been maximised by the turntable rotation of 360 degrees range on the 3 axis of EUT. Antenna height search was performed from 1 to 4m.



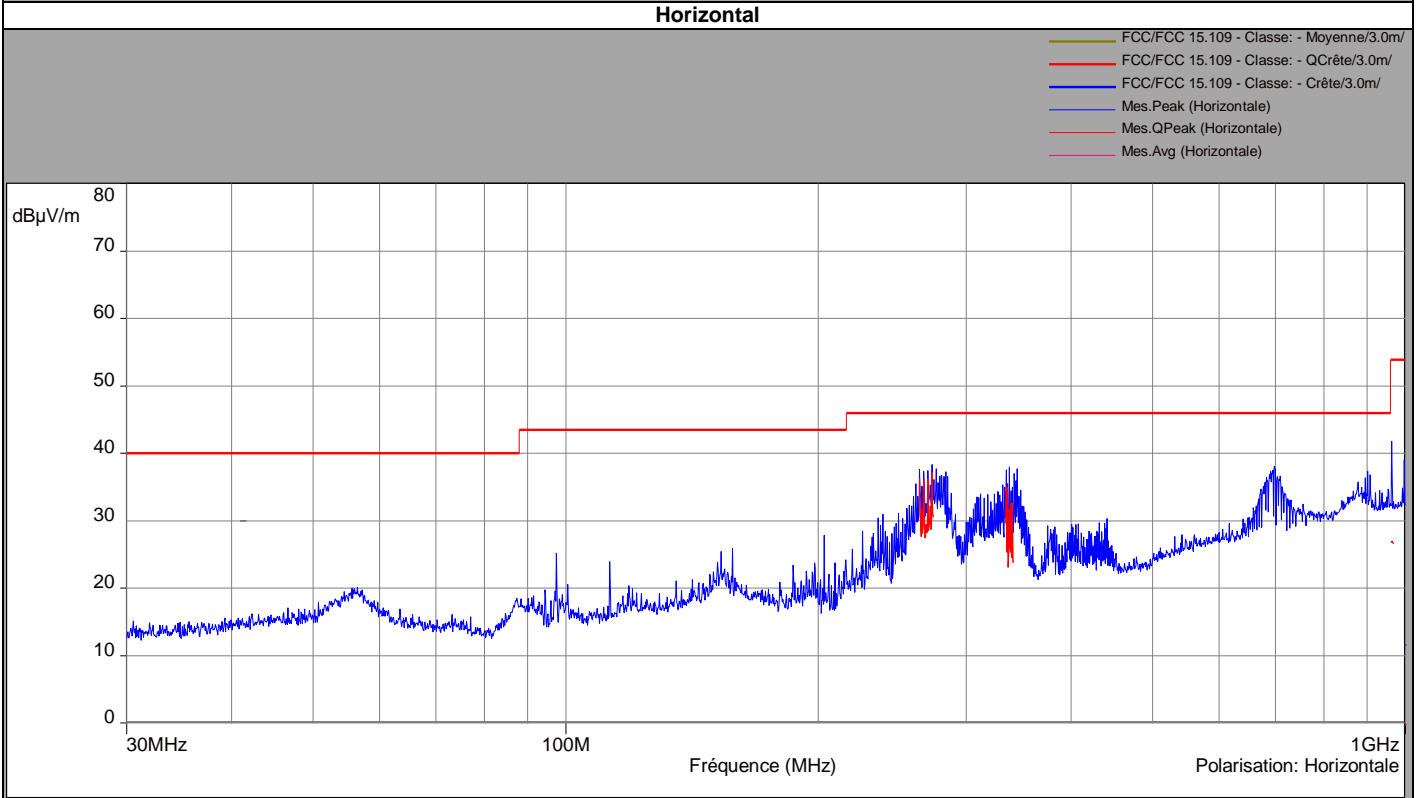
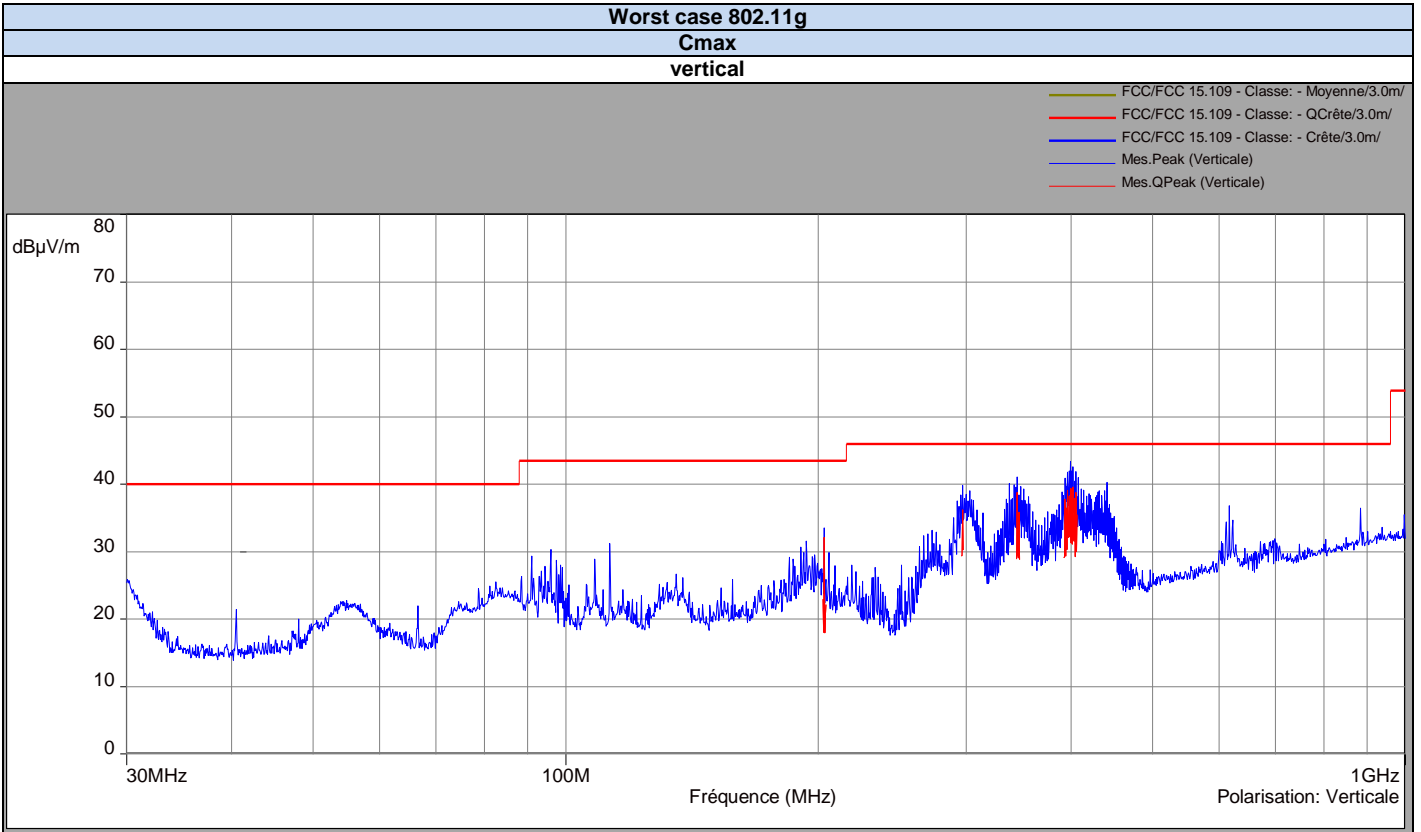
Photograph for Unwanted Emissions into Restricted Frequency Bands



Photograph for Unwanted Emissions into Restricted Frequency Bands

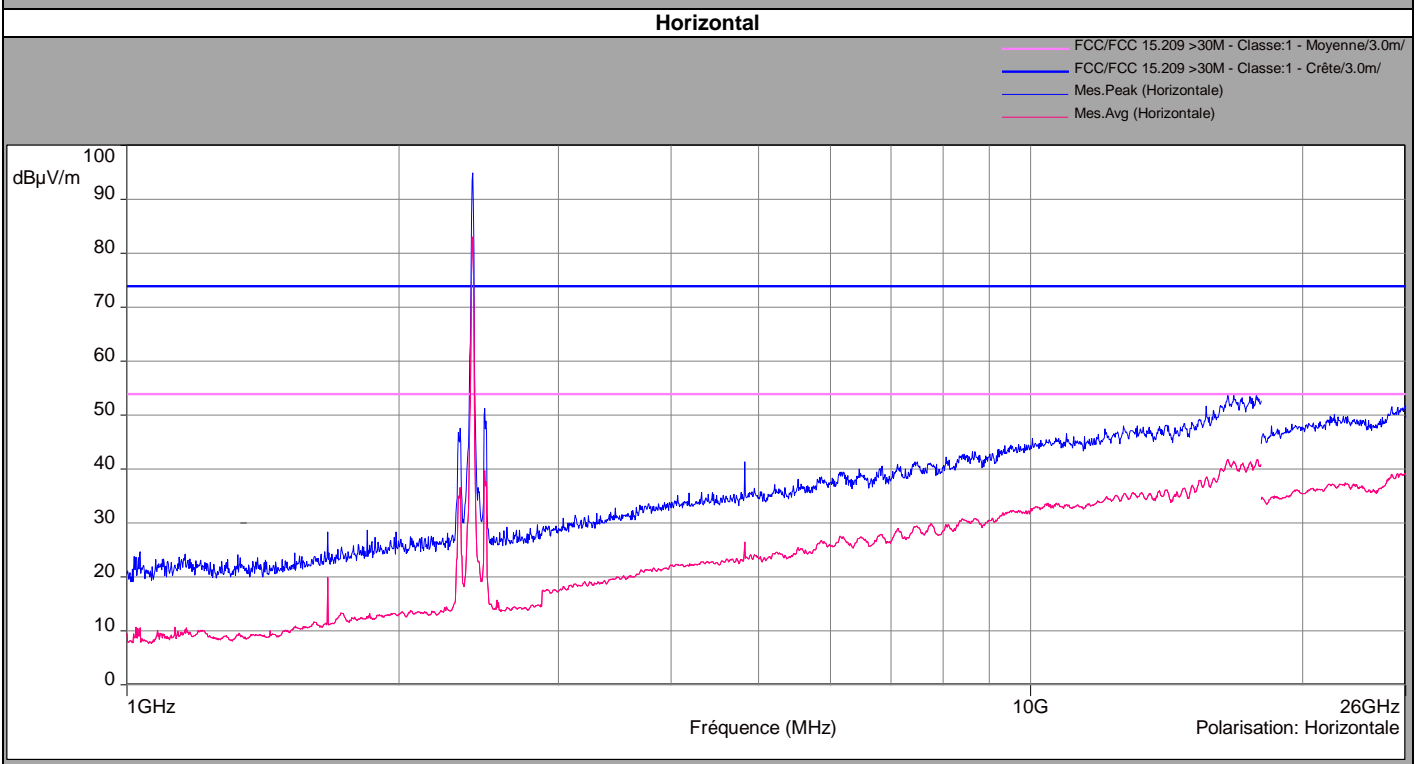
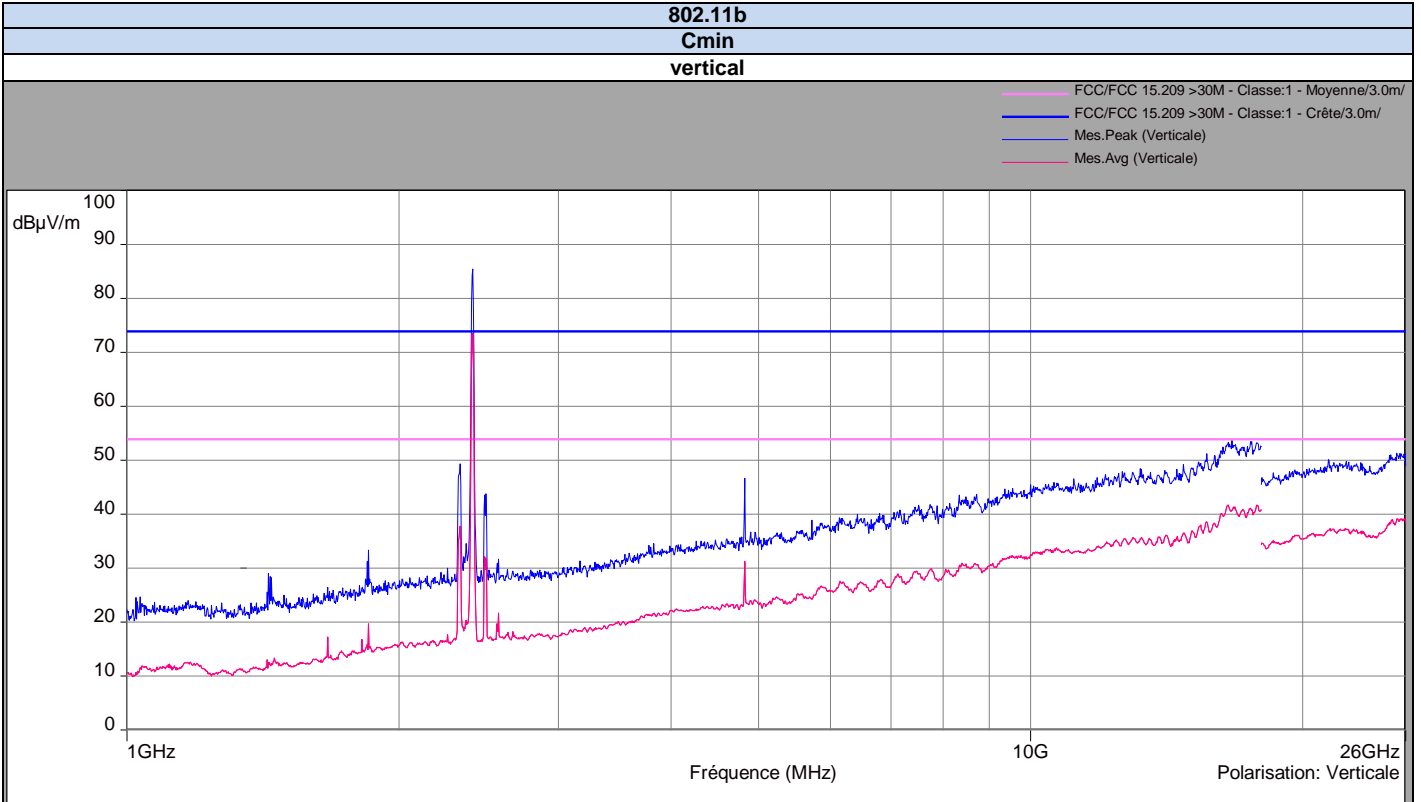


10.3. RESULTS
Below 1GHz



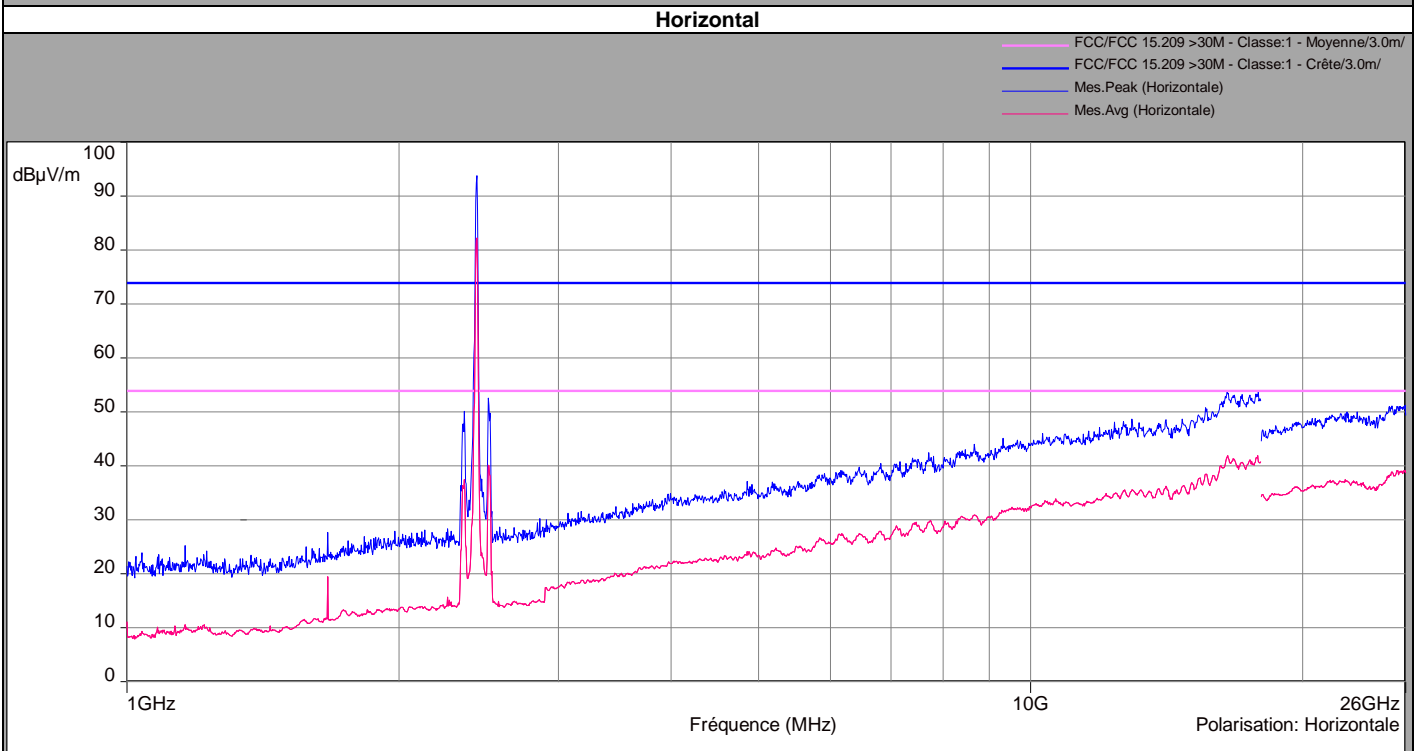
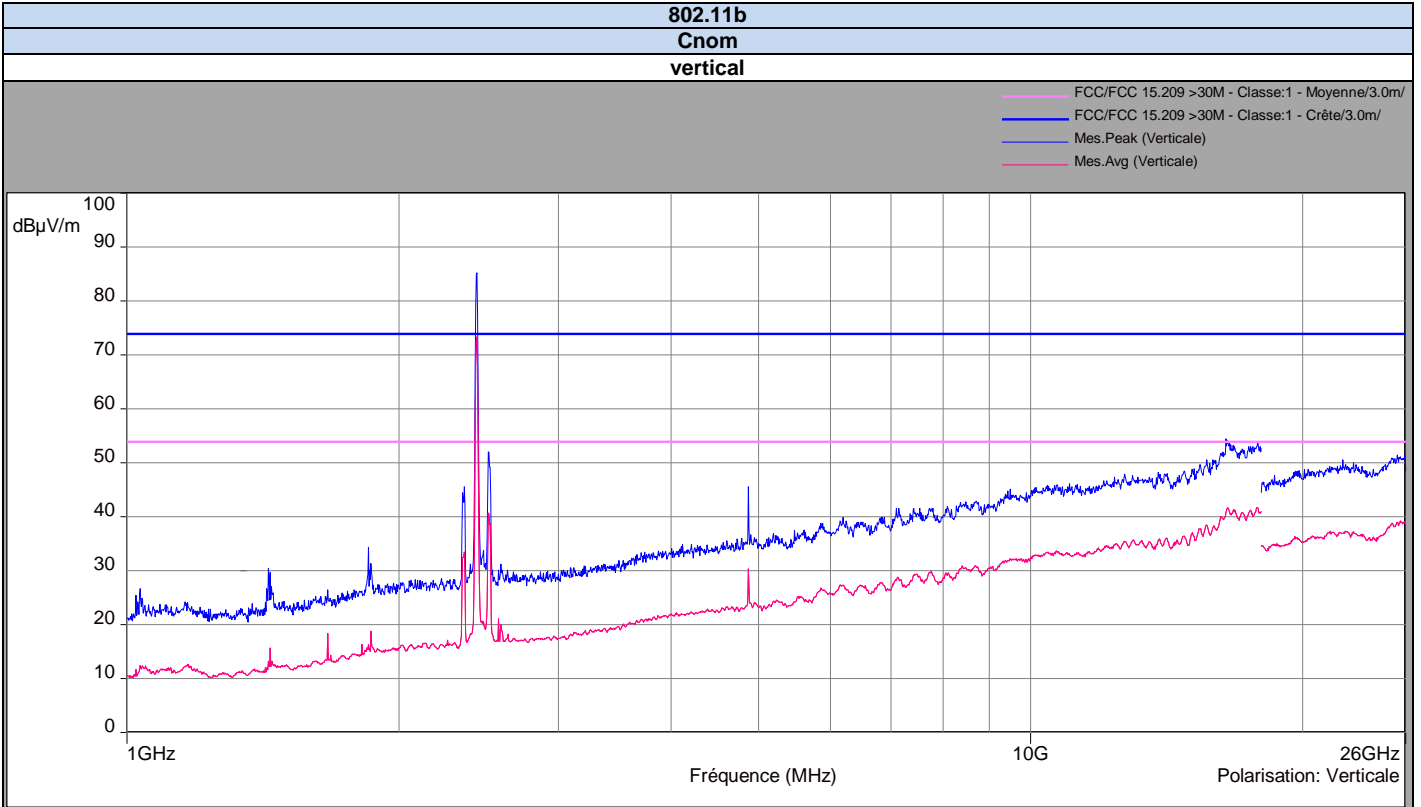


Above 1GHz



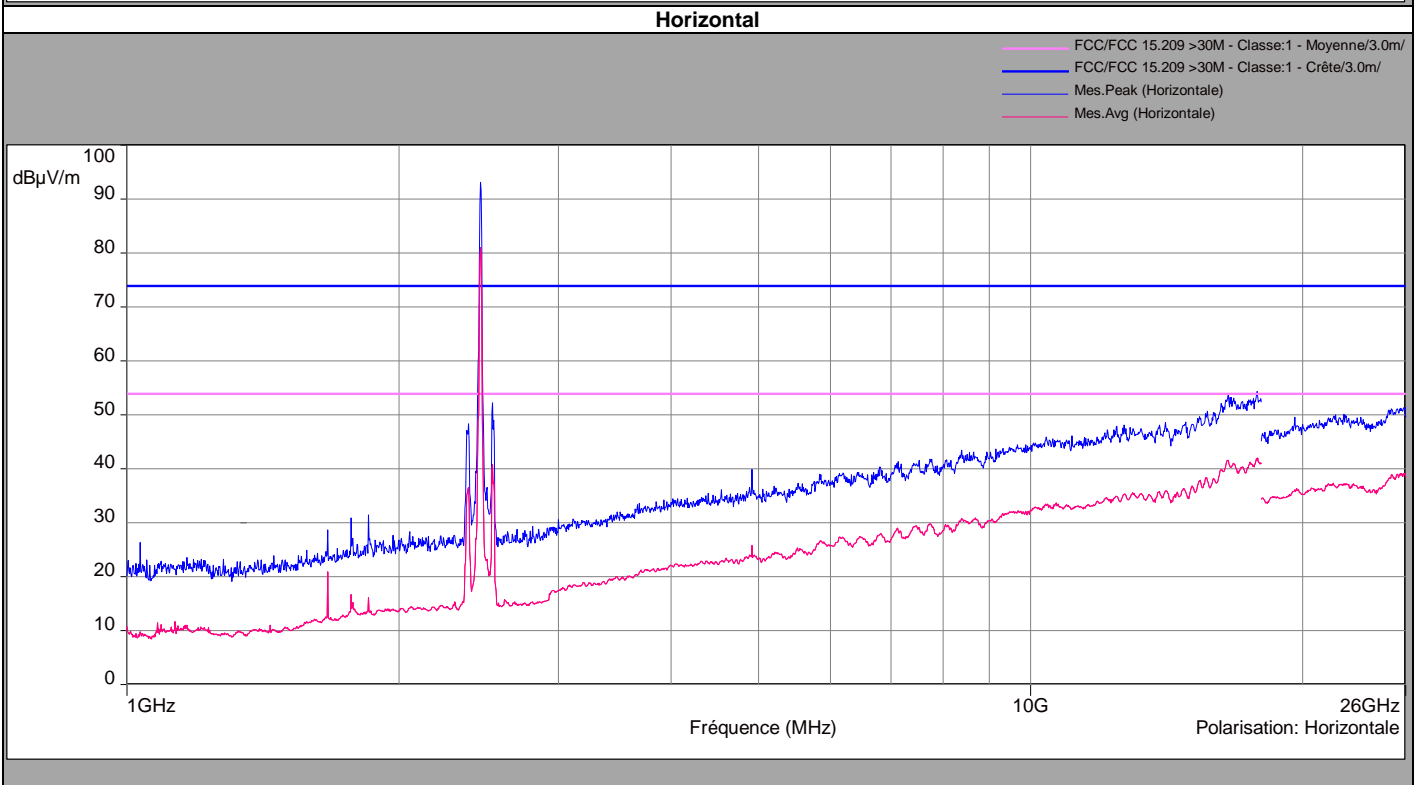
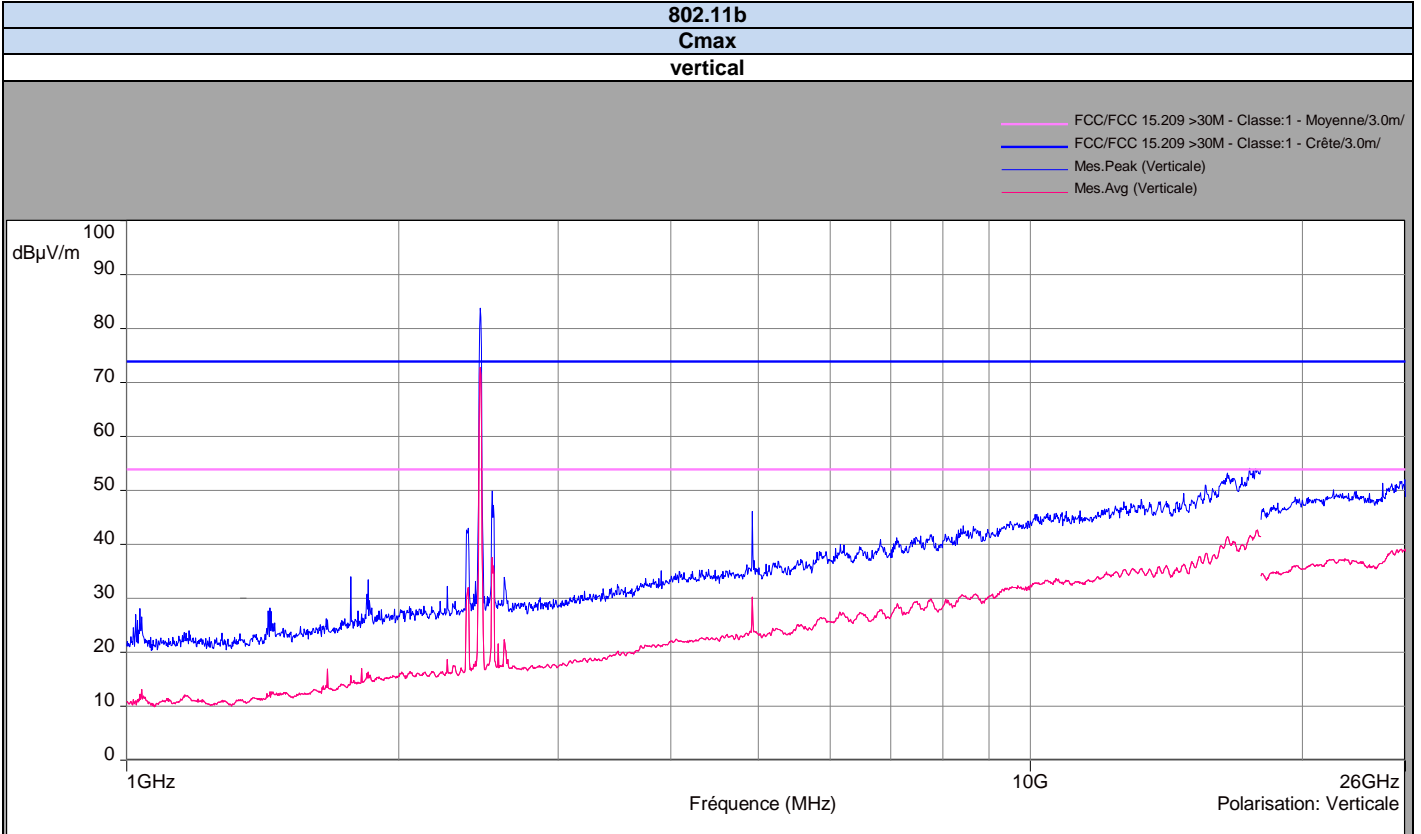


Above 1GHz



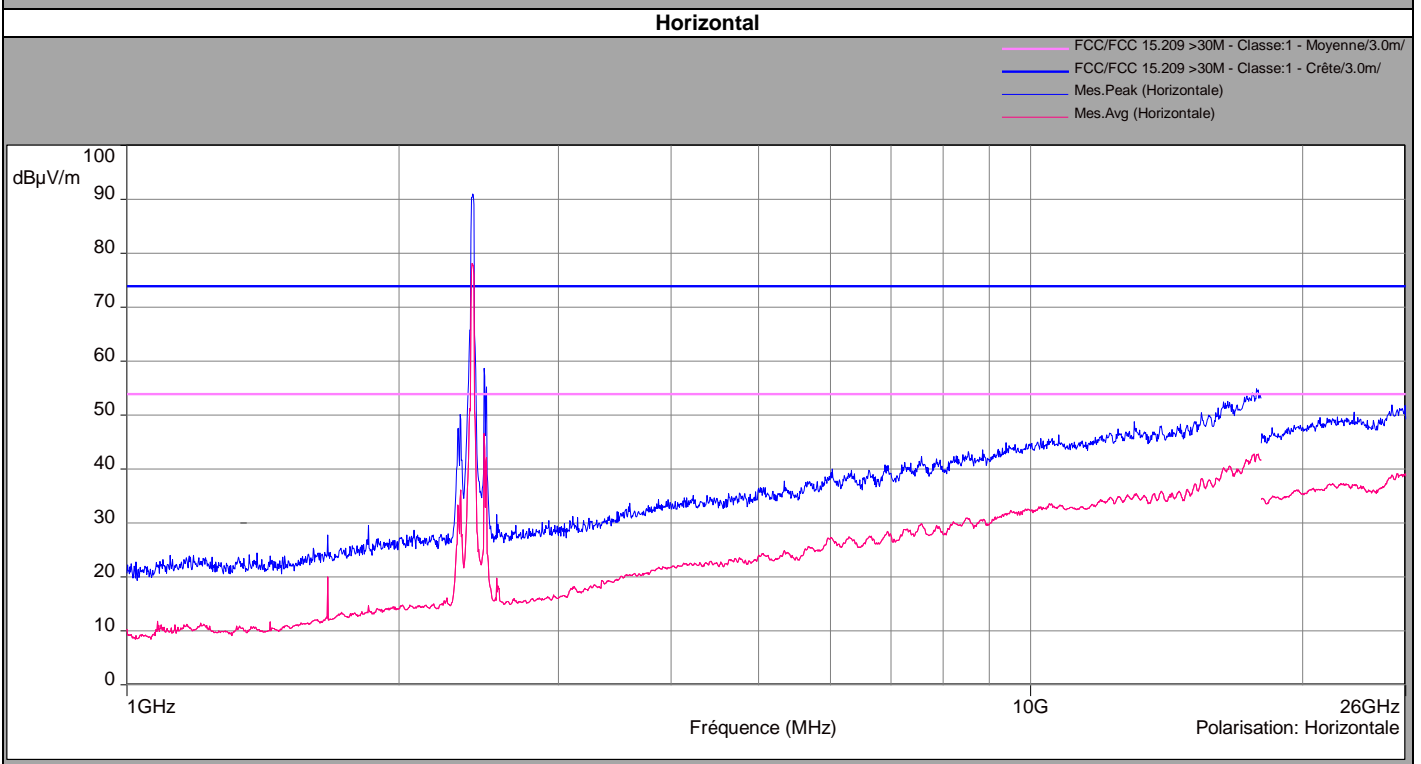
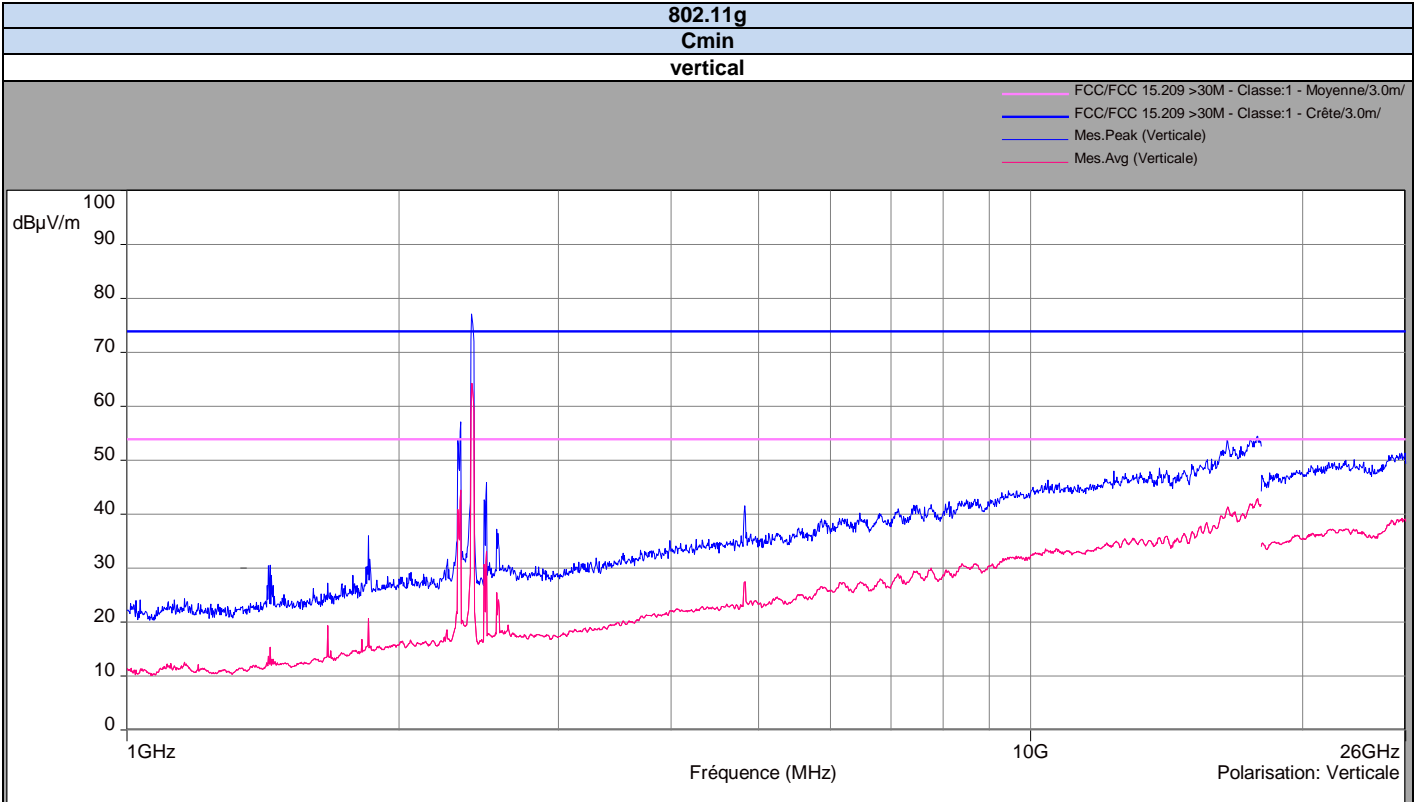


Above 1GHz



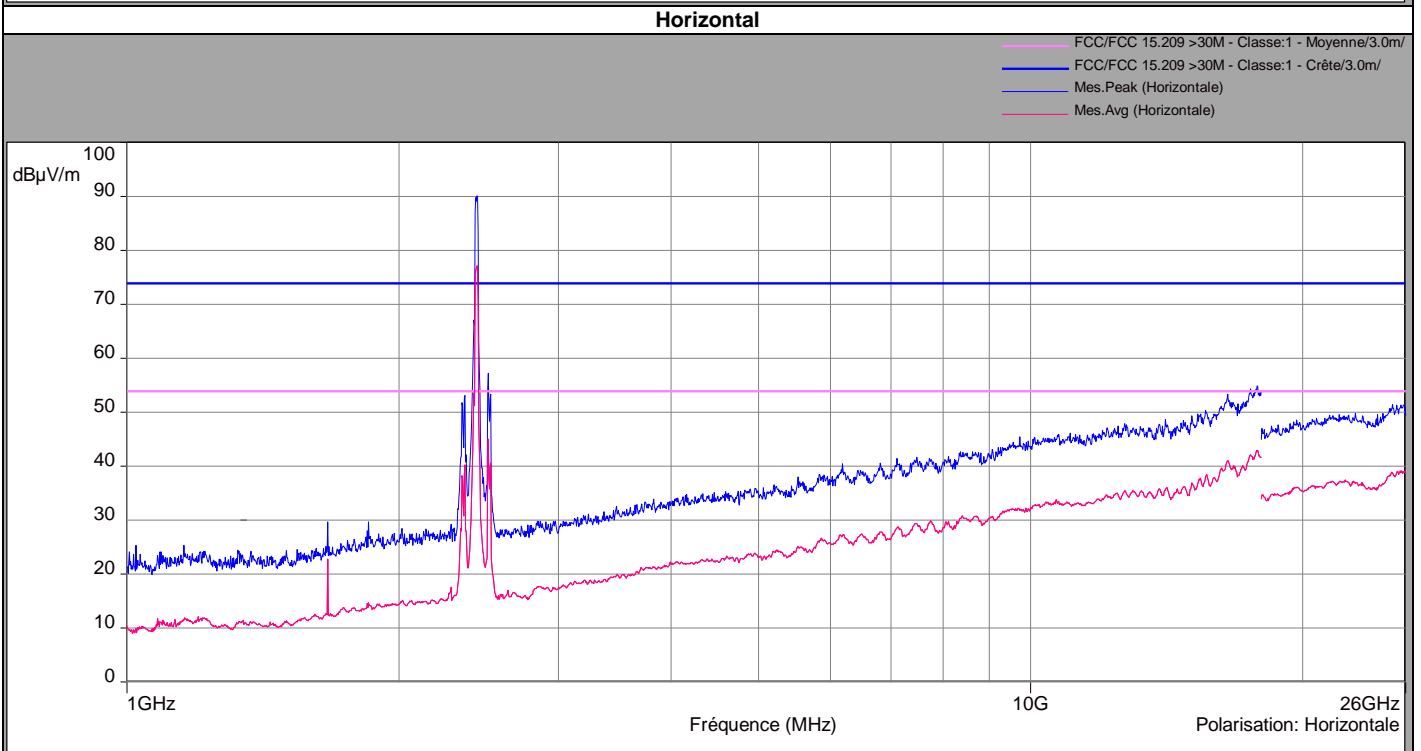
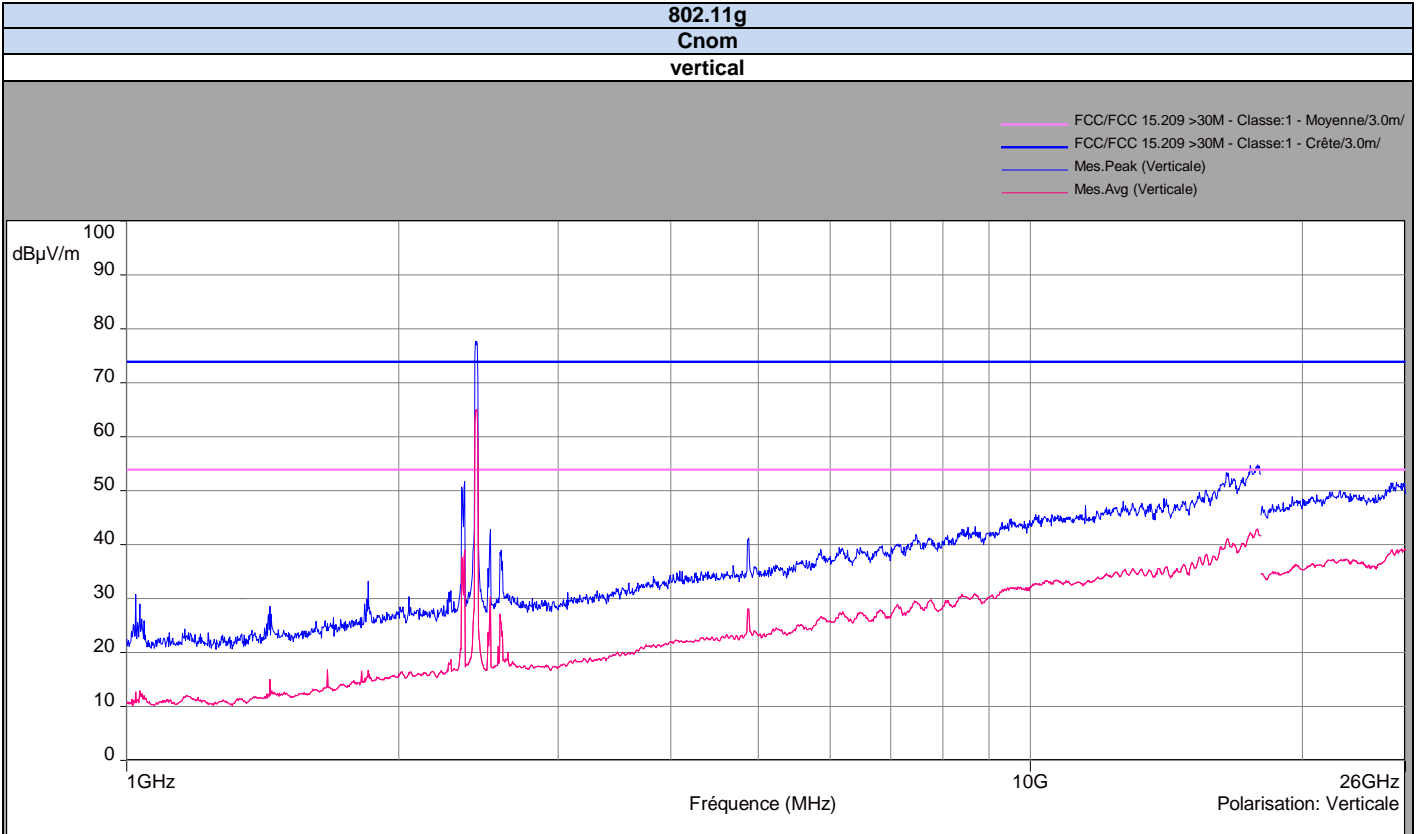


Above 1GHz



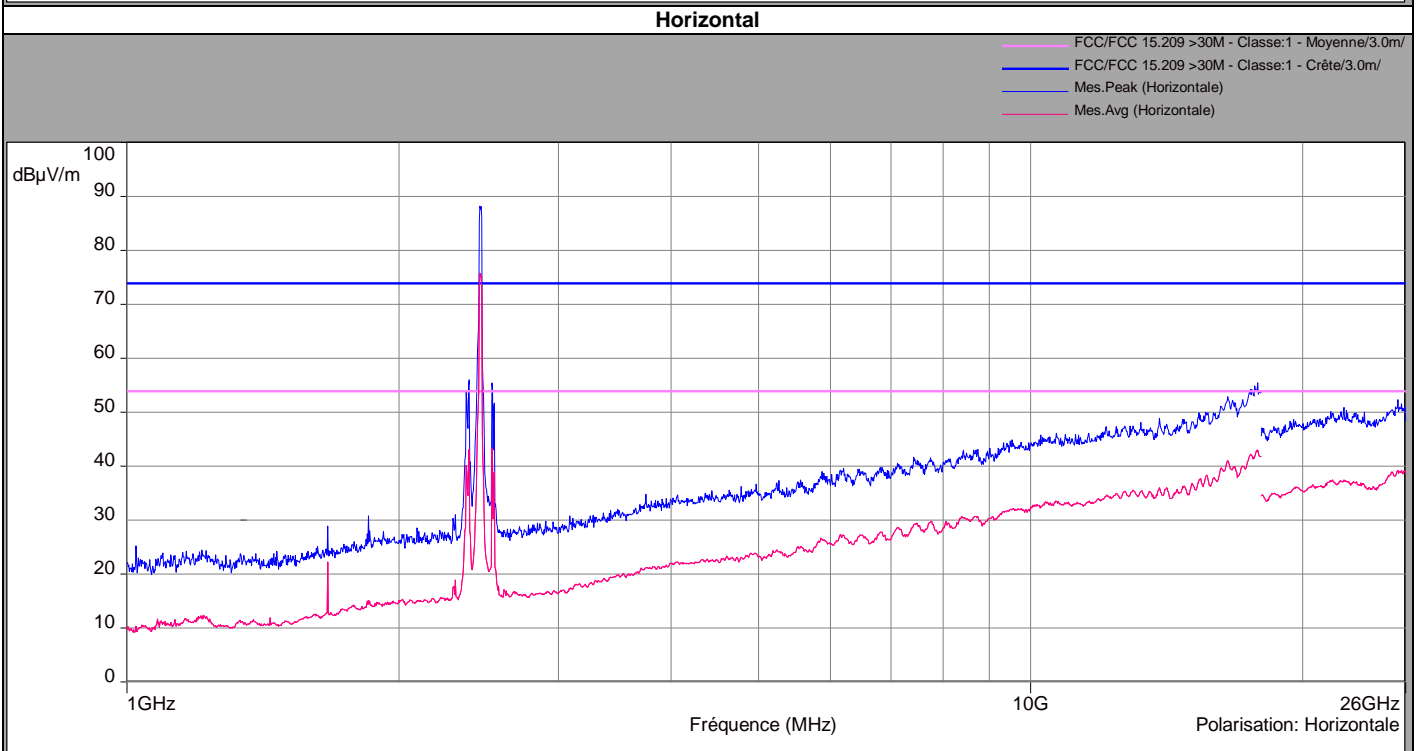
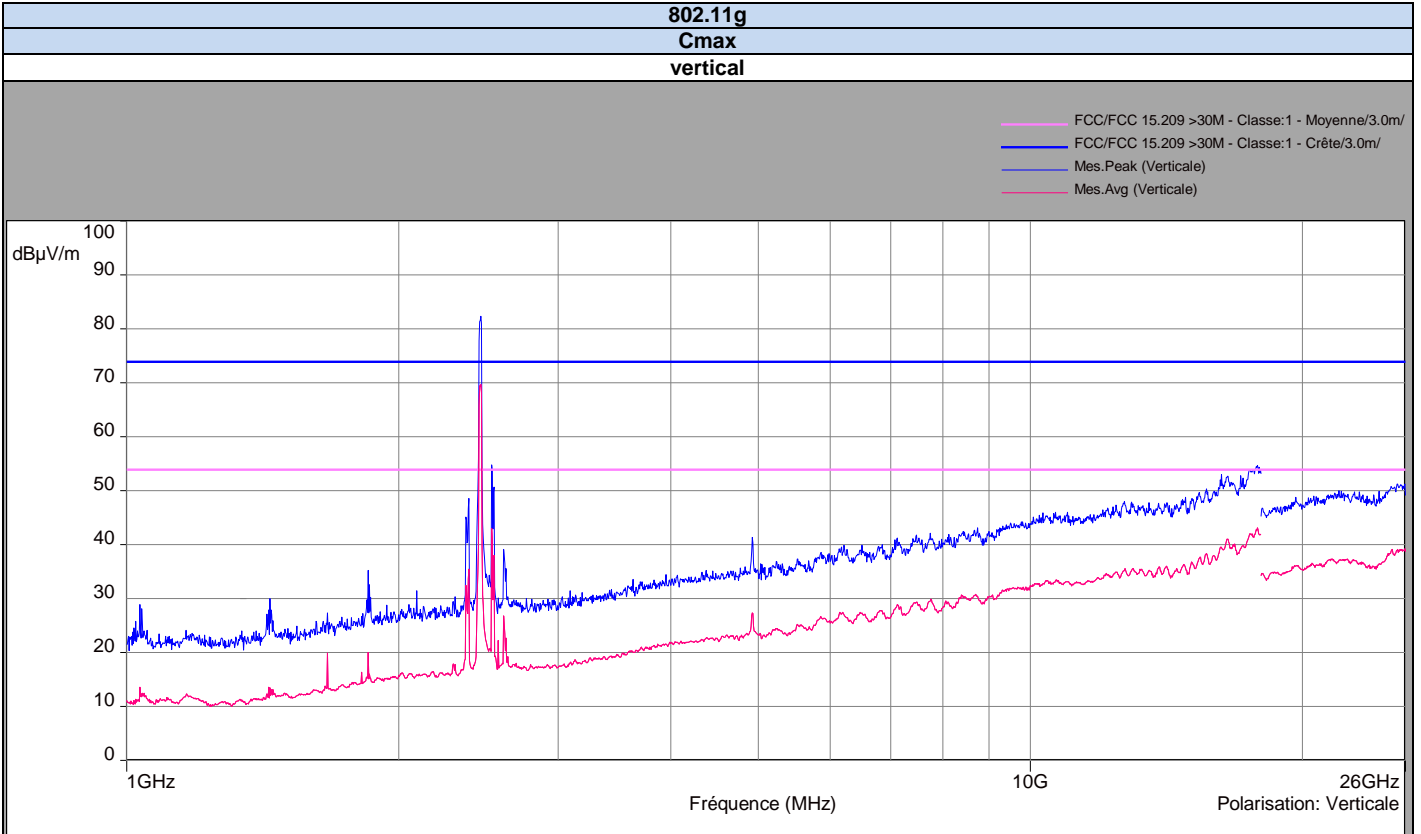


Above 1GHz



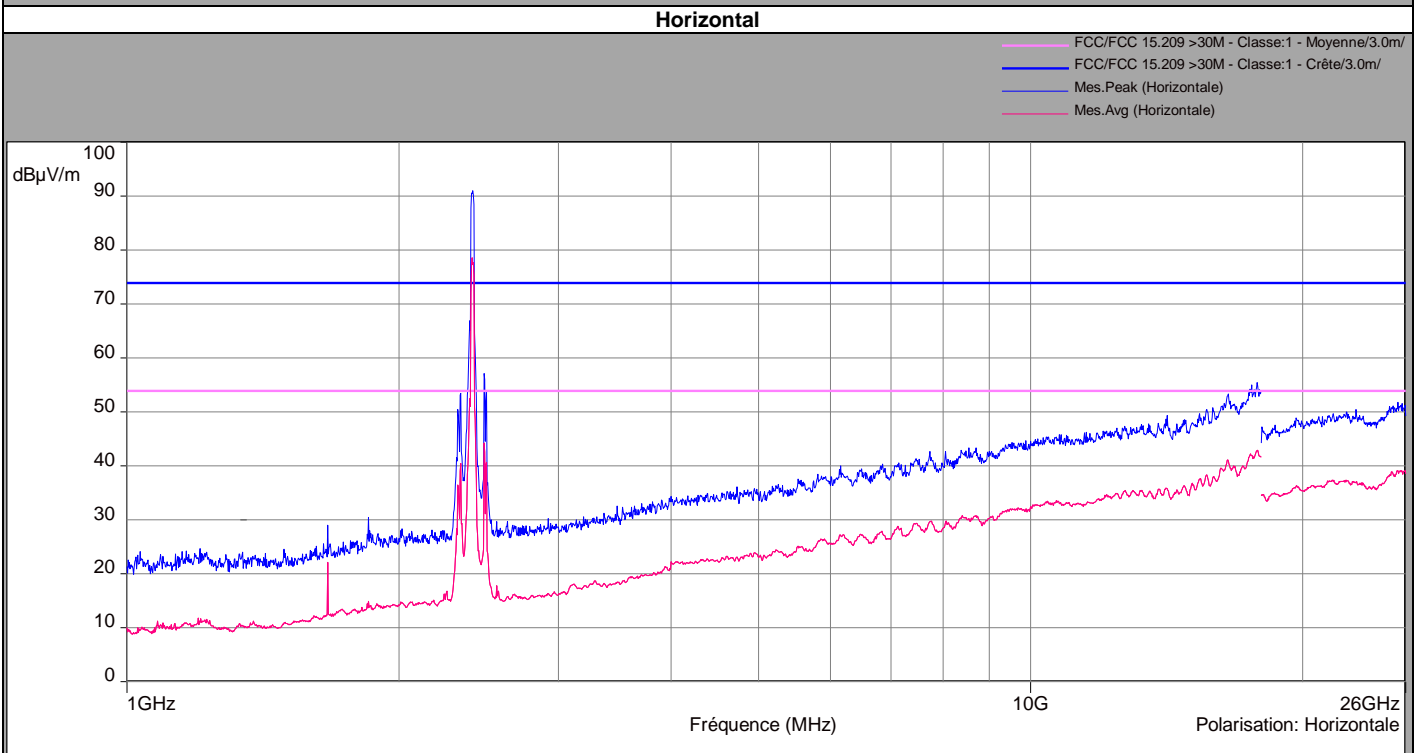
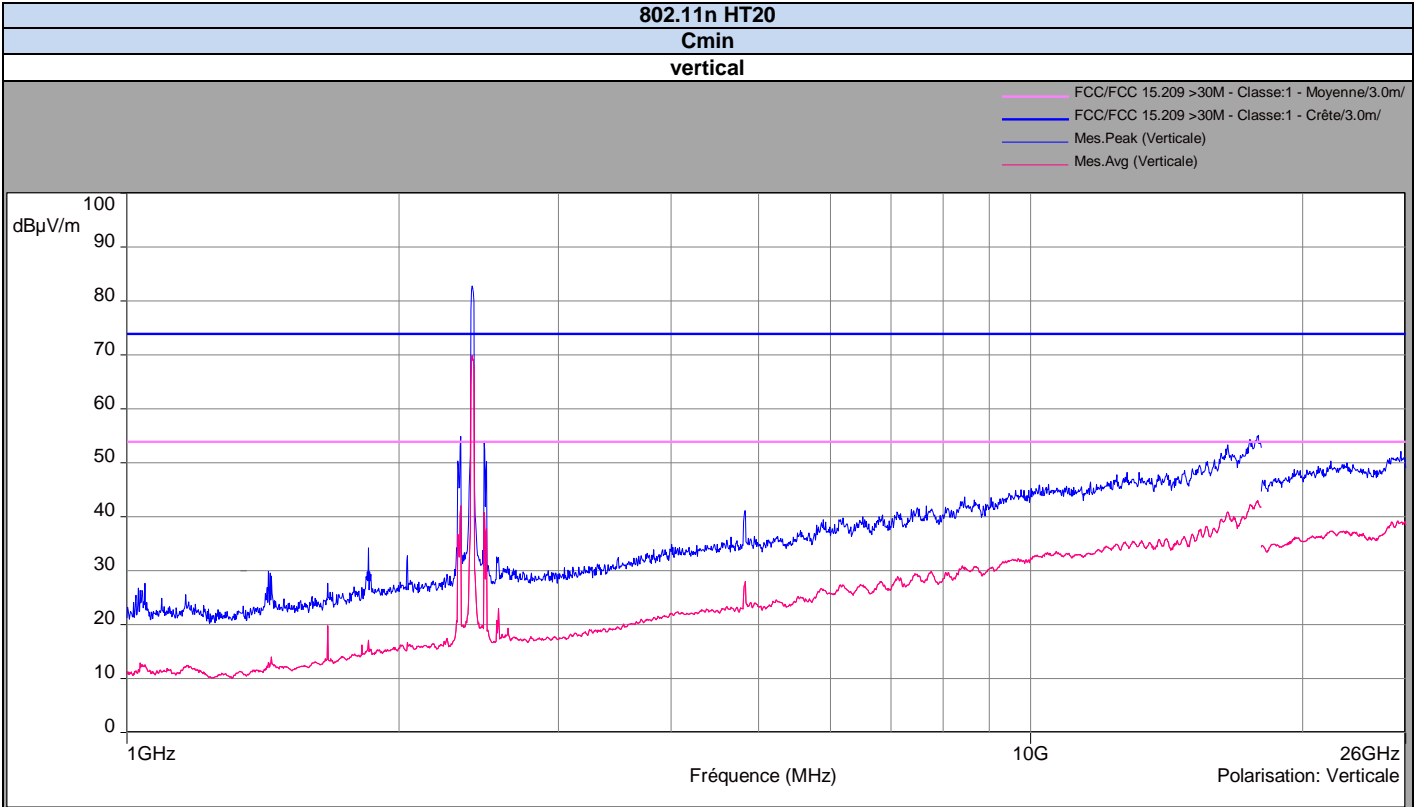


Above 1GHz



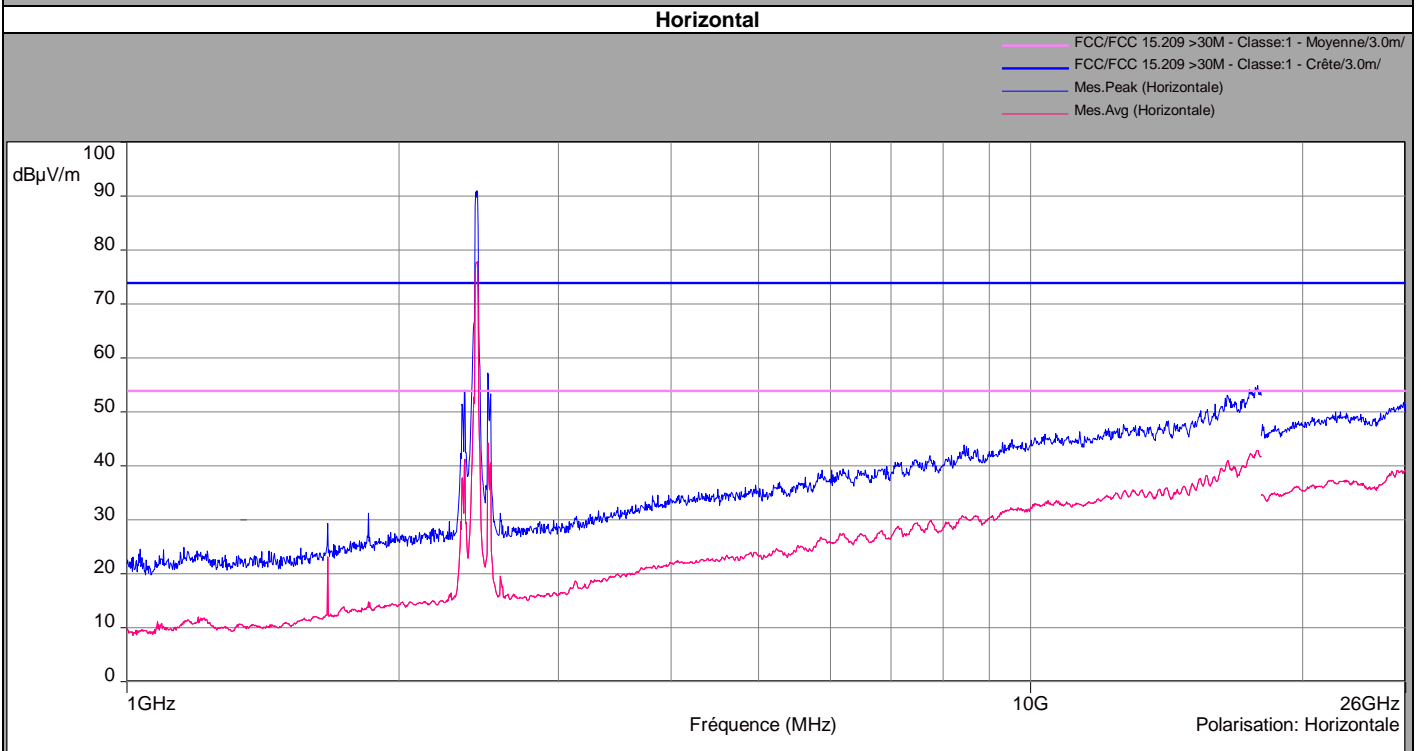
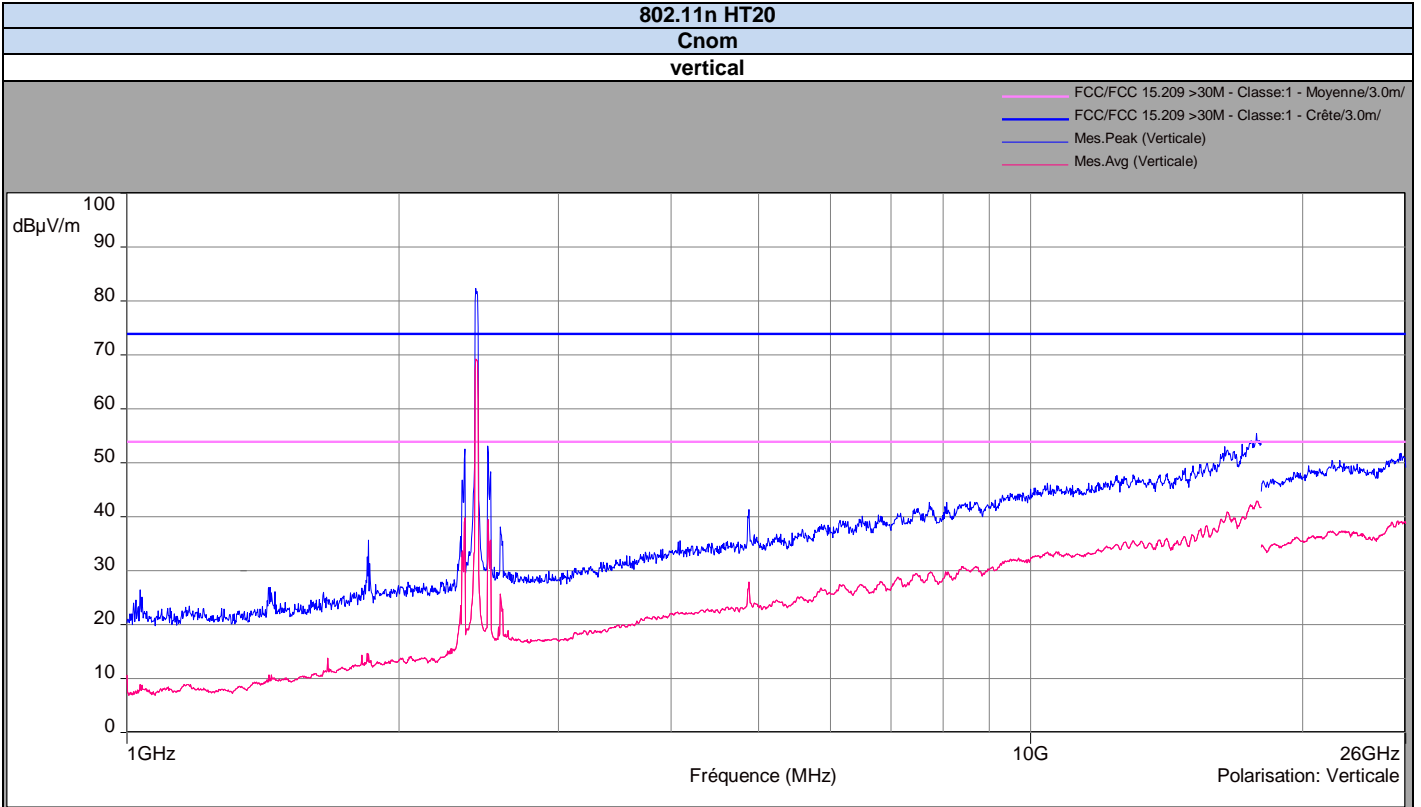


Above 1GHz



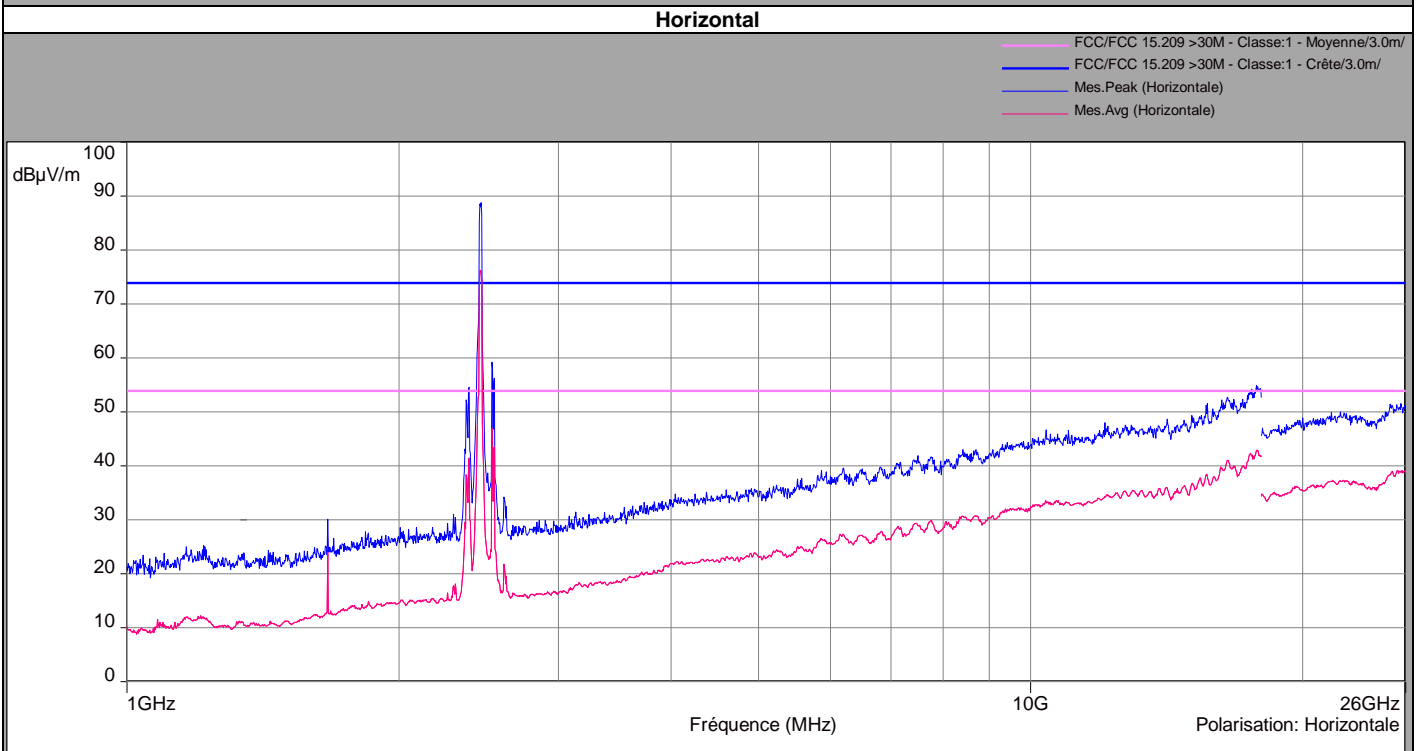
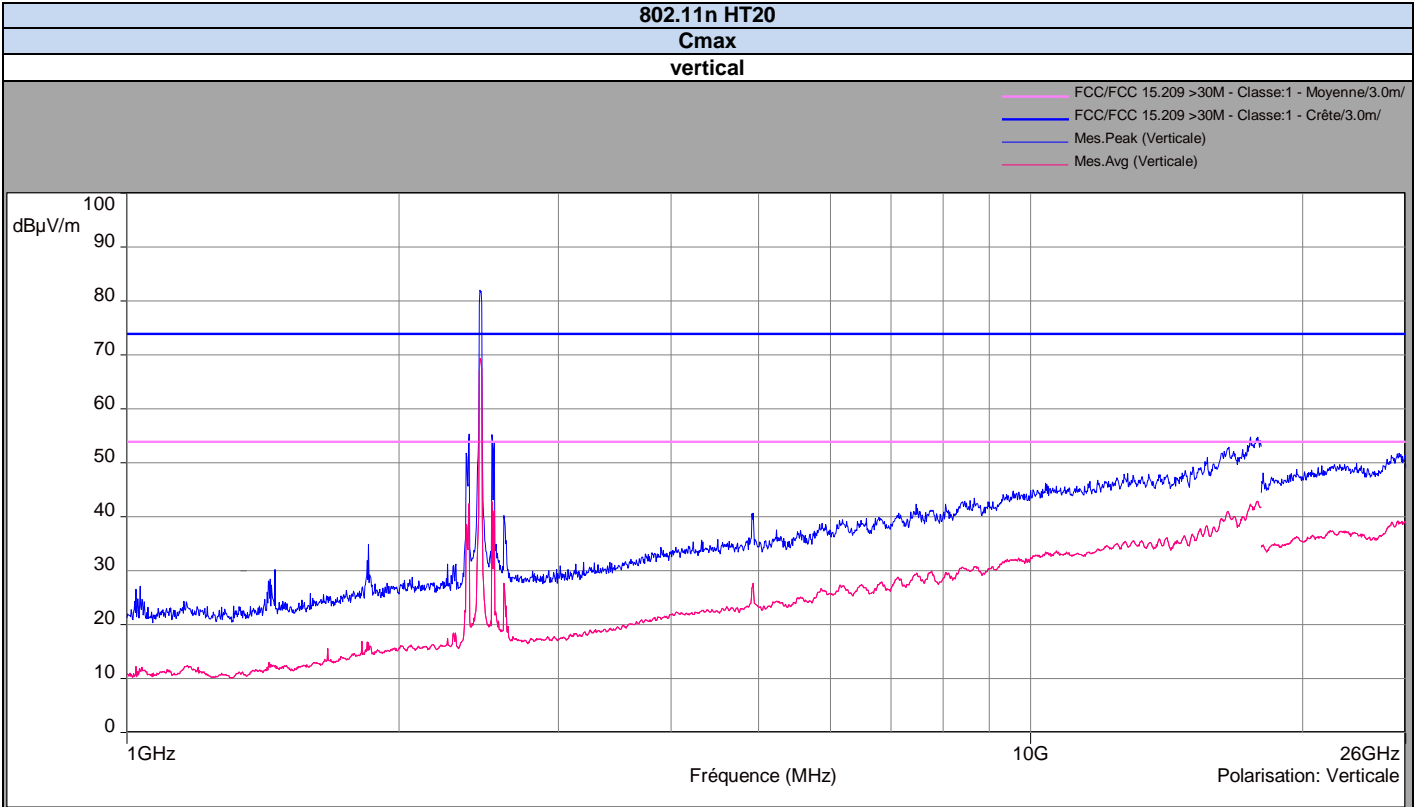


Above 1GHz





Above 1GHz





• **Characterization in a semi anechoic chamber (30MHz to 26GHz):**

802.11g

Below 1GHz

Cmax

Polarisation	Frequency (MHz)	Peak Level (dBµV/m)	QPeak Level (dBµV/m)	Limit (dBµV/m)
Verticale	203.12	33.528	32.048	43.5
Verticale	297.02	39.835	36.192	46
Verticale	345.02	41.067	38.774	46
Verticale	399.02	43.353	39.366	46
Horizontale	273.02	38.281	37.17	46
Horizontale	334.52	37.506	35.118	46

802.11b

Above 1GHz

Cmin

Polarisation	Frequency (MHz)	Average Level (dBµV/m)	Average Limit (dBµV/m)	Peak Level (dBµV/m)	Peak Limit (dBµV/m)
Horizontale	2336.5	36.55	53.9	47.6	73.9
Horizontale	2487.5	39.7	53.9	51.253	73.9
Horizontale	4824	26.465	53.9	41.346	73.9
Verticale	2337	37.795	53.9	49.377	73.9
Verticale	2497.5	32.131	53.9	43.794	73.9
Verticale	4824	31.251	53.9	46.617	73.9

Cnom

Polarisation	Frequency (MHz)	Average Level (dBµV/m)	Average Limit (dBµV/m)	Peak Level (dBµV/m)	Peak Limit (dBµV/m)
Horizontale	2362.5	37.501	53.9	50.151	73.9
Horizontale	2511.5	40.129	53.9	52.519	73.9
Verticale	2362.5	33.418	53.9	45.551	73.9
Verticale	2513	40.686	53.9	52.034	73.9
Verticale	4874	30.386	53.9	45.540	73.9

Cmax

Polarisation	Frequency (MHz)	Average Level (dBµV/m)	Average Limit (dBµV/m)	Peak Level (dBµV/m)	Peak Limit (dBµV/m)
Horizontale	2387	36.438	53.9	42.298	73.9
Horizontale	2537.5	40.765	53.9	52.214	73.9
Horizontale	4915.5	25.736	53.9	39.891	73.9
Verticale	2386	32.018	53.9	42.965	73.9
Verticale	2538	37.605	53.9	49.9	73.9
Verticale	4924	30.245	53.9	46.077	73.9



802.11g
Above 1GHz
Cmin

Polarisation	Frequency (MHz)	Average Level (dBµV/m)	Average Limit (dBµV/m)	Peak Level (dBµV/m)	Peak Limit (dBµV/m)
Horizontale	2337	34.483	53.9	50.123	73.9
Horizontale	2484.5	45.556	53.9	58.671	73.9
Verticale	2339.5	44.397	53.9	57.072	73.9
Verticale	2499.5	33.143	53.9	45.848	73.9
Verticale	4825.5	27.481	53.9	41.594	73.9

Cnom

Polarisation	Frequency (MHz)	Average Level (dBµV/m)	Average Limit (dBµV/m)	Peak Level (dBµV/m)	Peak Limit (dBµV/m)
Horizontale	2364.5	40.188	53.9	53.146	73.9
Horizontale	2509.5	45.015	53.9	57.269	73.9
Verticale	2364.5	39.041	53.9	51.702	73.9
Verticale	2524.5	30.309	53.9	42.778	73.9
Verticale	4874	28.139	53.9	41.24	73.9

Cmax

Polarisation	Frequency (MHz)	Average Level (dBµV/m)	Average Limit (dBµV/m)	Peak Level (dBµV/m)	Peak Limit (dBµV/m)
Horizontale	2389.5	43.107	53.9	55.958	73.9
Horizontale	2534.5	43.324	53.9	55.438	73.9
Verticale	2389.5	35.402	53.9	48.558	73.9
Verticale	2534.5	43.048	53.9	54.809	73.9
Verticale	4923	27.327	53.9	41.364	73.9



802.11n HT20
Above 1GHz
Cmin

Polarisation	Frequency (MHz)	Average Level (dBµV/m)	Average Limit (dBµV/m)	Peak Level (dBµV/m)	Peak Limit (dBµV/m)
Horizontale	2339.5	40.418	53.9	53.446	73.9
Horizontale	2484.5	44.268	53.9	57.104	73.9
Verticale	2339.5	41.998	53.9	54.848	73.9
Verticale	2484.5	40.744	53.9	53.998	73.9
Verticale	4831.5	28.027	53.9	41.109	73.9

Cnom

Polarisation	Frequency (MHz)	Average Level (dBµV/m)	Average Limit (dBµV/m)	Peak Level (dBµV/m)	Peak Limit (dBµV/m)
Horizontale	2364.5	41.177	53.9	54.008	73.9
Horizontale	2509.5	44.2	53.9	57.267	73.9
Verticale	2364.5	39.821	53.9	52.546	73.9
Verticale	2508.5	39.501	53.9	53.121	73.9
Verticale	4881.5	27.883	53.9	41.377	73.9

Cmax

Polarisation	Frequency (MHz)	Average Level (dBµV/m)	Average Limit (dBµV/m)	Peak Level (dBµV/m)	Peak Limit (dBµV/m)
Horizontale	2389.5	41.457	53.9	54.55	73.9
Horizontale	2534.5	46.903	53.9	59.277	73.9
Verticale	2389.5	42.468	53.9	55.289	73.9
Verticale	2534.5	42.747	53.9	55.189	73.9
Verticale	4931.5	27.698	53.9	40.667	73.9

Result: PASS

Limit: →

30MHz to 88MHz:	40dBµV/m QPeak
88MHz to 216MHz:	43,5dBµV/m QPeak
216MHz to 960MHz:	46dBµV/m QPeak
960MHz to 1000MHz:	54dBµV/m QPeak
Above 1000MHz:	74dBµV/m Peak
	54dBµV/m Average



11. TEST EQUIPMENT LIST

Unwanted Emissions into Restricted Frequency Bands & Receiver Spurious Emissions					
Apparatus	Trade Mark	Type	Registration number	Calibration date	Calibration due
Cable	-	-	A5329261	2014/05	2015/05
Cable	CABLES & CONNECTIQUES	-	A5329374	2014/05	2015/05
Cable	CABLES & CONNECTIQUES	-	A5329459	2014/04	2015/04
Preamplifier	LCIE	LCIE-ALB-001	A7080073	2013/11	2014/11
Bilog antenna	SCHWARZBECK	VULB 9160	C2040150	2014/06	2015/06
Horn antenna 18-26,5GHz	AH SYSTEMS	SAS572	C2042026	2014/01	2016/01
EMI Test Receiver	ROHDE & SCHWARZ	ESIB26	A2642021	2013/04	2014/04
Horn antenna	A-INFOMW	LB-10180-NF	C2042051	2014/04	2015/04
Semi anechoic chamber	SIEPEL	-	D3044008	2011/04	2014/04
AC Power Line Conducted Emissions					
Apparatus	Trade Mark	Type	Registration number	Calibration date	Calibration due
Cable	CABLES & CONNECTIQUES	-	A5329411	2014/05	2015/05
EMI Test Receiver	ROHDE & SCHWARZ	ESIB26	A2642021	2013/04	2014/04
V LISN	ROHDE & SCHWARZ	ENV216	C2320162	2014/03	2015/03
Semi anechoic chamber	SIEPEL	-	D3044008	2011/04	2014/04
Occupied Bandwidth, -6dB Bandwidth, Maximum Peak Output Power, Power Spectral Density and Unwanted Emissions into Non-Restricted Frequency Bands					
Apparatus	Trade Mark	Type	Registration number	Calibration date	Calibration due
Programmable AC/DC power supply	KIKUSUI	PCR500M	A7040079	2014/05	2015/05
Attenuator	MINI CIRCUITS	BW-S3W2+	A5329674	2013/07	2014/07
RF cable	Télédyne	920-0202-024	A7122237	2014/04	2015/04
Multi-meter	KEITHLEY	2000	A1241084	2014/02	2016/02
Spectrum analyzer	ROHDE & SCHWARZ	FSL6	A4060032	2012/11	2014/11
EMI Test Receiver	ROHDE & SCHWARZ	ESIB26	A2642021	2013/04	2014/04
Multi-meter	KEITHLEY	2000	A1241084	2014/02	2016/02
Measurement RF cable	-	-	A5329592	2014/05	2015/05
Programmable AC/DC power supply	-; KIKUSUI	PCR500M	A7040079	2014/05	2015/05
Attenuator 3dB	WEINSCHL	WA54-3-12	A7122223	2013/12	2014/12

Note: In our Quality System, the calibration due of our equipments is more or less 2 months.



12. UNCERTAINTIES CHART

Kind of test	Measurement uncertainties (k=2) $\pm x(\text{dB}) / (\text{Hz})$	Limit for uncertainties $\pm y(\text{dB})$
TRANSMITTER REQUIREMENTS		
Radio frequency	$\pm 2 \cdot 10^{-8}$ Hz	$\pm 1 \cdot 10^{-7}$ Hz
RF Conducted power	± 0.6 dB	± 1.5 dB
Spurious emissions <ul style="list-style-type: none"> • Frequency < 1000 MHz • Frequency > 1000 MHz 	± 3.9 dB ± 3.1 dB	± 6 dB
Spurious in conduction	± 1.6 dB	± 3 dB
Temperature	$\pm 0.5^\circ\text{C}$	$\pm 1^\circ\text{C}$
Humidity	± 2.5 %	± 10 %