TEST REPORT

RADIO

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Composition of document	67 pages
FCC Registration Number	166175
Standards	47 CFR Part 15.407
Issued to	SAGEMCOM 250, route de l'Empereur 92848 RUEIL MALMAISON
Apparatus under test	Home router
Trade mark	SAGEMCOM
Manufacturer	SAGEMCOM
Type	Fast 5260CV
Serial number	NQ1410709000021
FCC ID	VW3FAST5260CV
Test date	2014/10/13 and 2014/10/14
Tests performed by	Arnaud Fayette
Test site	Fontenay aux Roses
Date of issue	2015/01/16

Written by :
Arnaud Fayette
Tests operator

LABORATOIRE CENTRAL DES INDUSTRIES ELECTRIQUES
S.A.S au capital de 15 745 984 €
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F - 92266 FONTENAY AUX ROSES

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1. TEST PROGRAM

References

Standards:
- 47 CFR Part 15E
- CISPR 16-4-2
- ANSI C63.10

Standard Section	Test Description	TEST RESULT - Comments
CFR 47 § 15.407 (a) (1) (2) (3)	-26dB Bandwidth	PASS
CFR 47 § 15.407 (a) (1)	Power Limits	PASS
CFR 47 § 15.407 (a) (1)	Power Spectral Density	PASS
CFR 47 § 15.407 (b) (1) (2) (3)	Undesirable Emission limits	PASS
CFR 47 § 15.407 (b) (6) CFR 47 § 15.207	AC Power Line Conducted Emissions	PASS
CFR 47 § 15.209 (a) CFR 47 § 15.205 (a) CFR 47 § 15.407 (b) (6)	Unwanted Emissions	PASS
CFR 47 § 15.407 (g)	Frequency Stability	PASS (The Manufacturer declares the EUT emission is maintained within the band of operation under all conditions of normal operation as specified in the user manual)
CFR 47 § 15.407 (h) (1)	Transmit Power Control	NA
CFR 47 § 15.407 (h) (2)	Dynamic Frequency Selection	NA

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):

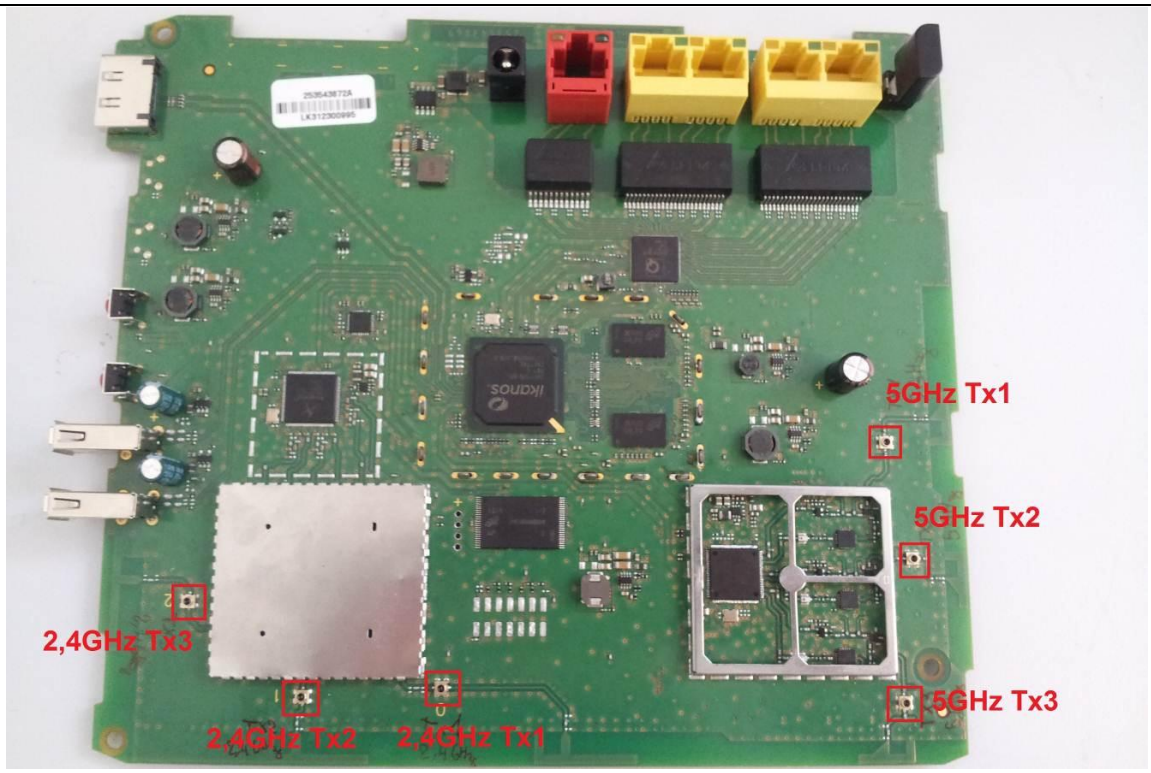
Front view

Rear View

Side view

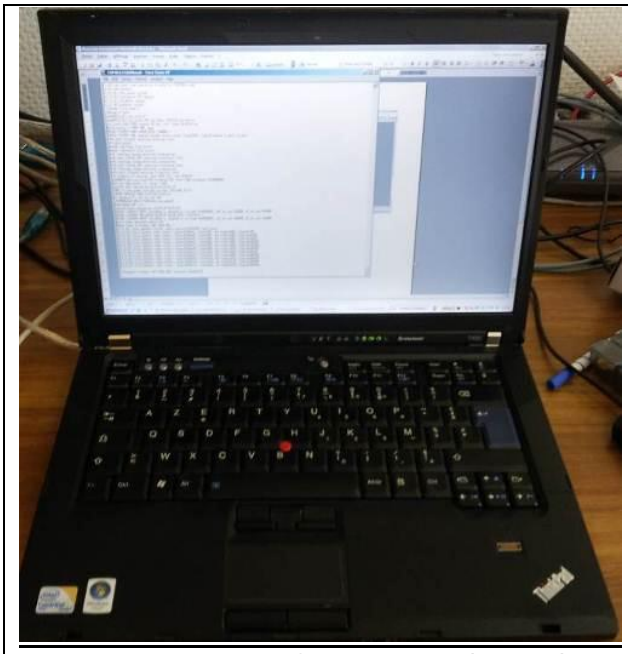
Power Supply

Photograph of EUT



Electronic Card
Photograph of EUT

Auxiliary equipment (AE) used for testing:



Laptop LENOVO T400 for Master Device Setting
Photograph of AE

Input/output:
- Input Power
- 4 Ethernet ports
- 1 WAN port
- 2 USB ports
- 1 eSATA port

Software identification:
-Software version: V6.0.9.1

Equipment information:
- Wifi Version: 802.11a/n HT20/n HT40/ac VHT80
- Modulation technology: OFDM and DSSS modulation
- Transmit operating mode: Multiples antenna without beam forming
- Number of transmit chains: 3 symmetrical
- Number of receiver chains: 3
- 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
- Operating frequency range

Frequency Band (MHz)	Test Report
2400MHz to 2483,5MHz	122014-644470A
5150MHz to 5250MHz	131079-664022A
5250MHz to 5350MHz	122014-644470C&D
5470MHz to 5725MHz (Note 1)	122014-644470C&D
5725MHz to 5850MHz	122014-644470BCr2013-11-21

(Note1: The Manufacturer declares the 5600MHz -5650MHz band is not available)

- Antenna Characteristics:

All Tx	
Frequency Band (MHz)	**Declared Overall Antenna Gain (dBi)**
5GHz	7 (Note 1)

Note 1: Informations given by the customer in “Sagemcom_F@st 5260CV_Radio-tool -Guide_Ed1_20130503” word document.

-Channel plan 802.11a, 802.11n HT20:

Channel	Frequency (MHz)
C1=36	5180
C2=40	5200
C3=48	5240

-Channel plan 802.11n HT40:

	Frequency (MHz)
C10=36+40	5190
C11=44+48	5230

-Channel plan 802.11ac VHT80:

Channel	Frequency (MHz)
C17=36+40+44+48	5210

-Data Rate:

802.11a	
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

MCS index	Spatial streams	Modulation Type	802.11n HT20		802.11n HT40	
			Data rate (Mbit/s		Data rate (Mbit/s)	
			GI=800ns	GI=400ns	GI=800ns	GI=400ns
0	1	BPSK	6.50	7.20	13.50	15.00
1	1	QPSK	13.00	14.40	27.00	30.00
2	1	QPSK	19.50	21.70	40.50	45.00
3	1	16-QAM	26.00	28.90	54.00	60.00
4	1	16-QAM	39.00	43.30	81.00	90.00
5	1	64-QAM	52.00	57.80	108.00	120.00
6	1	64-QAM	58.50	65.00	121.50	135.00
7	1	64-QAM	65.00	72.20	135.00	150.00
8	2	BPSK	13.00	14.40	27.00	30.00
9	2	QPSK	26.00	28.90	54.00	60.00
10	2	QPSK	39.00	43.30	81.00	90.00
11	2	16-QAM	52.00	57.80	108.00	120.00
12	2	16-QAM	78.00	86.70	162.00	180.00
13	2	64-QAM	104.00	115.60	216.00	240.00
14	2	64-QAM	117.00	130.00	243.00	270.00
15	2	64-QAM	130.00	144.40	270.00	300.00
16	3	BPSK	19.50	21.70	40.50	45.00
17	3	QPSK	39.00	43.30	81.00	90.00
18	3	QPSK	58.50	65.00	121.50	135.00
19	3	16-QAM	78.00	86.70	162.00	180.00
20	3	16-QAM	117.00	130.00	243.00	270.00
21	3	64-QAM	156.00	173.30	324.00	360.00
22	3	64-QAM	175.50	195.00	364.50	405.00
23	3	64-QAM	195.00	216.70	405.00	450.00

MCS index	Spatial streams	Modulation Type	802.11ac VHT80	
			Data rate (Mbit/s	
			GI=800ns	GI=400ns
0	1	BPSK	29.3	32.5
1	1	QPSK	58.5	65
2	1	QPSK	87.8	97.5
3	1	16-QAM	117	130
4	1	16-QAM	175.5	195
5	1	64-QAM	234	260
6	1	64-QAM	263.3	292.5
7	1	64-QAM	292.5	325
8	1	256-QAM	351	390
9	1	256-QAM	390	433.3
10	2	BPSK	58,6	65
11	2	QPSK	117	130
12	2	QPSK	175.6	195
13	2	16-QAM	234	260
14	2	16-QAM	351	390
15	2	64-QAM	468	520
16	2	64-QAM	526.6	585
17	2	64-QAM	585	650
18	2	256-QAM	702	780
19	2	256-QAM	780	866.6
20	3	BPSK	87.9	97.5
21	3	QPSK	175.5	195
22	3	QPSK	263.4	292.5
23	3	16-QAM	351	390
24	3	16-QAM	526,5	585
25	3	64-QAM	702	780
26	3	64-QAM	789.9	877.5
27	3	64-QAM	877.5	975
28	3	256-QAM	1053	1170
29	3	256-QAM	1170	1299.9

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 (802.11a: 6Mbps, 802.11n HT20: MCS16, 802.11n HT40: MCS16, 802.11ac VHT80: MCS0)
- Permanent reception

Following commands with the specific test software “Atheros Radio Tool client v1.17.3” are used to set the product:
- See file “Commandes de test Fast 5260CV Ed7 UNIT1 update band edge.xlsx”

2.3. EQUIPEMENT LABELLING

EUT Marking plate

EUT Power supply marking plate

2.4. EQUIPMENT MODIFICATIONS

No equipment modification has been necessary during testing.

3. -26DB BANDWIDTH

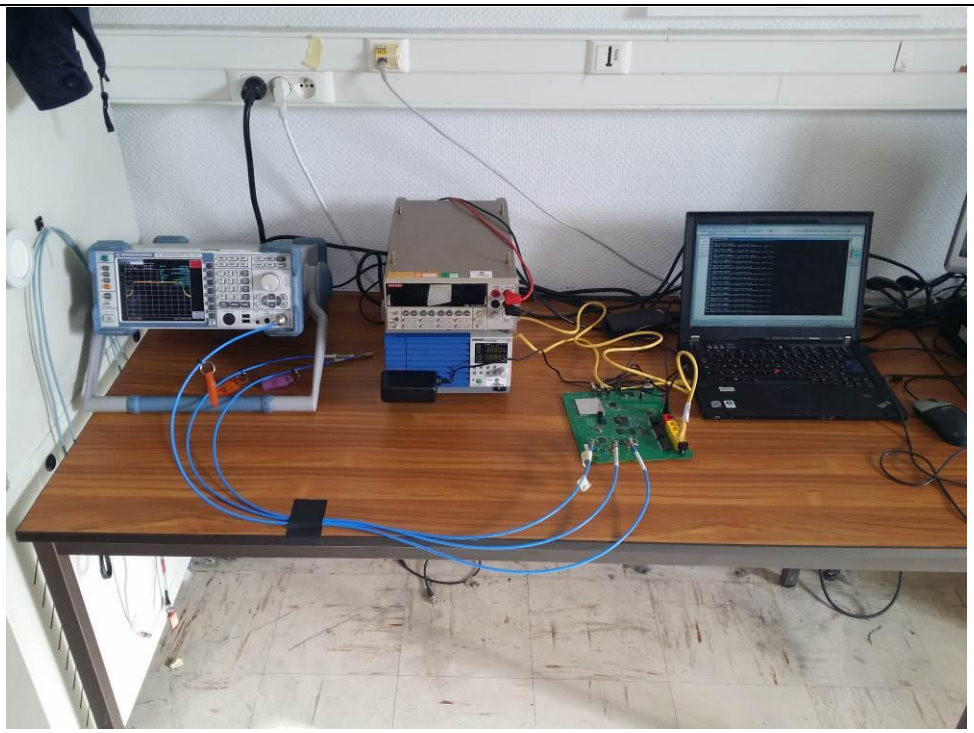
3.1. TEST CONDITIONS

Test performed by : Arnaud Fayette
Date of test : 13/10/2014
Ambient temperature : 23.7°C
Relative humidity : 46%

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 FCC KDB 789033 D02 General UNII Test Procedures New Rules v01 C.

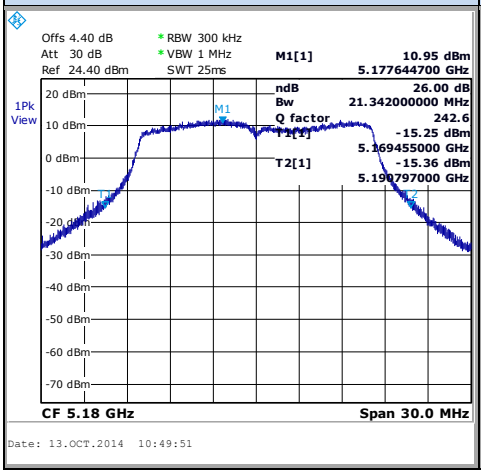
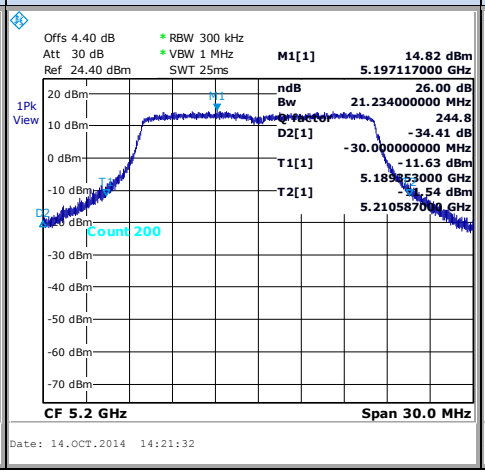
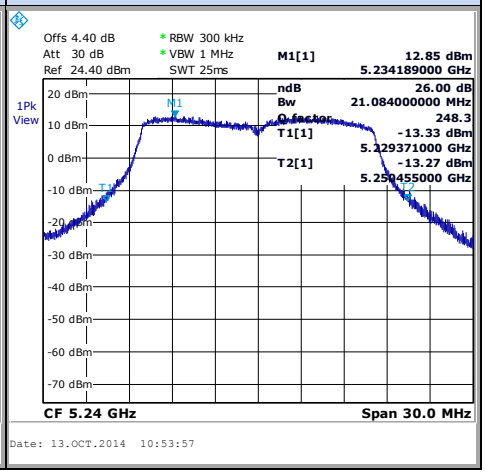
Spectrum Analyzer Setting:
Center frequency= Center of emission spectrum
Span= At least the emission spectrum
Amplitude= Sufficient to observe the signal amplitude
RBW= approximately 1% of the emission bandwidth
VBW= 3*RBW
Sweep= Auto
Trace= Max Hold
Detector= Peak
-26dB bandwidth function activated



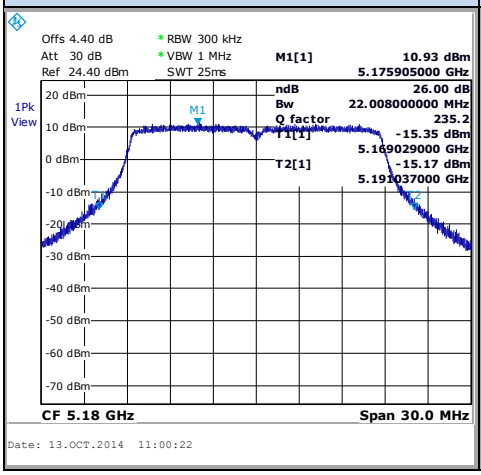
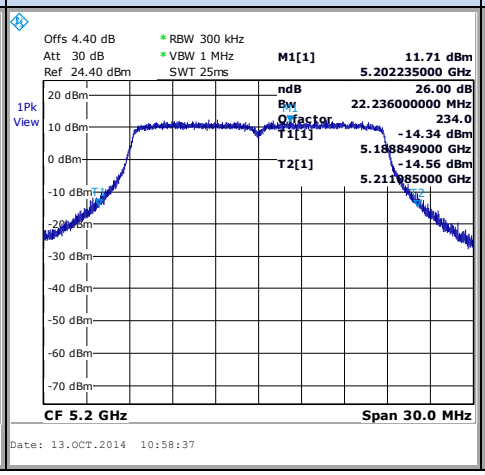
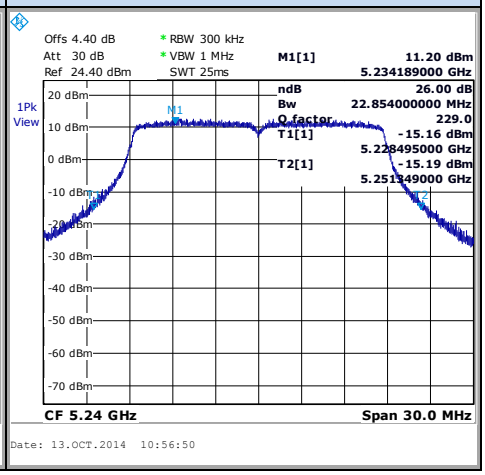
Photograph for Bandwidth

3.3. GRAPHICS & RESULTS

802.11a

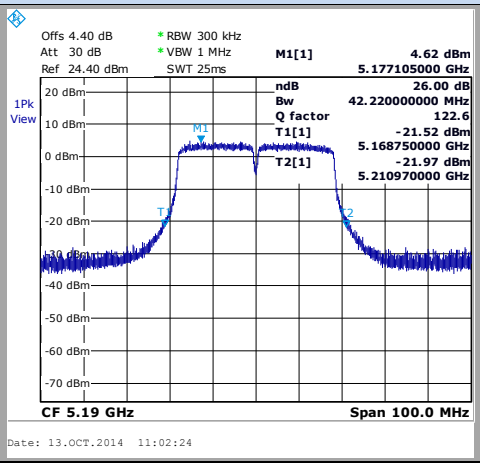
C1	C2	C3
		

802.11n HT20

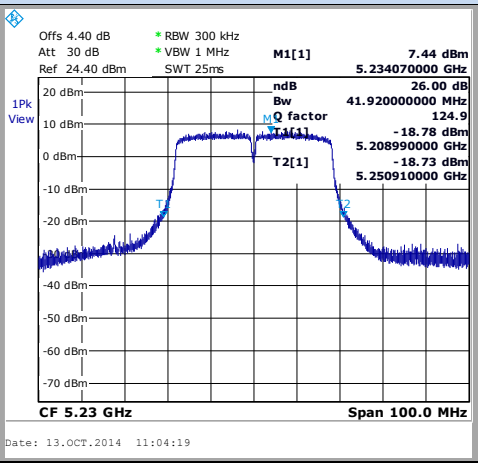
C1	C2	C3
		

802.11n HT40

C10

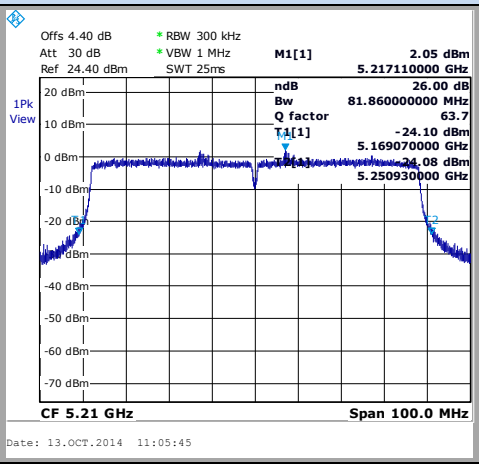


C11



802.11ac VHT80

C17



802.11a

Temperature	**Tnom**		
Voltage	**Vnom**		
Frequency	C1	C2	C3
-26dB Bandwidth (MHz)	21.34	21.23	21.08

802.11n HT20

Temperature	**Tnom**		
Voltage	**Vnom**		
Frequency	C1	C2	C3
-26dB Bandwidth (MHz)	22.08	22.24	22.85

802.11n HT40

Temperature	**Tnom**	
Voltage	**Vnom**	
Frequency	C10	C11
-26dB Bandwidth (MHz)	42.22	41.92

802.11ac VHT80

Temperature	**Tnom**
Voltage	**Vnom**
Frequency	C17
-26dB Bandwidth (MHz)	81.86

Result: PASS

-26dB Bandwidth Limit:
None

4. DUTY CYCLE

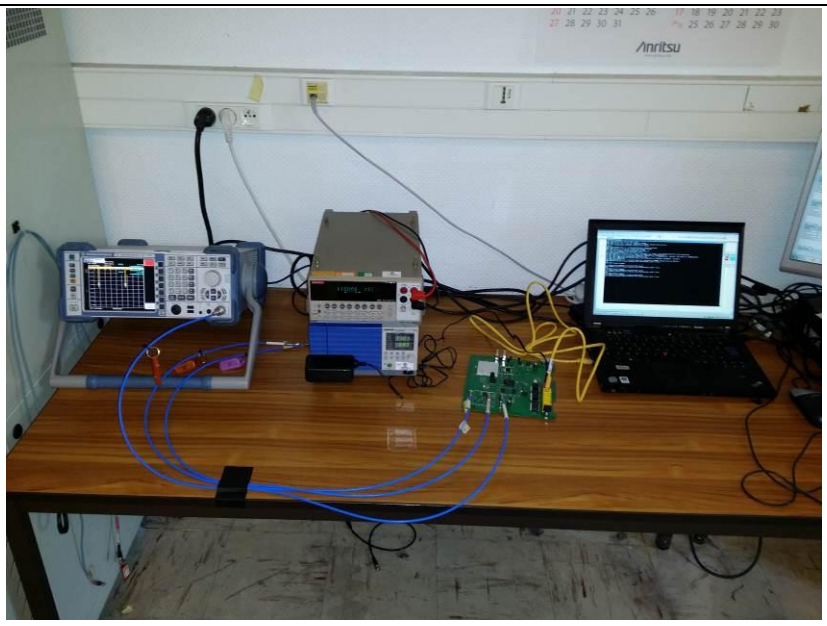
4.1. TEST CONDITIONS

Test performed by : Arnaud Fayette
Date of test : 13/10/2014
Ambient temperature : 24°C
Relative humidity : 42%

4.2. TEST SETUP

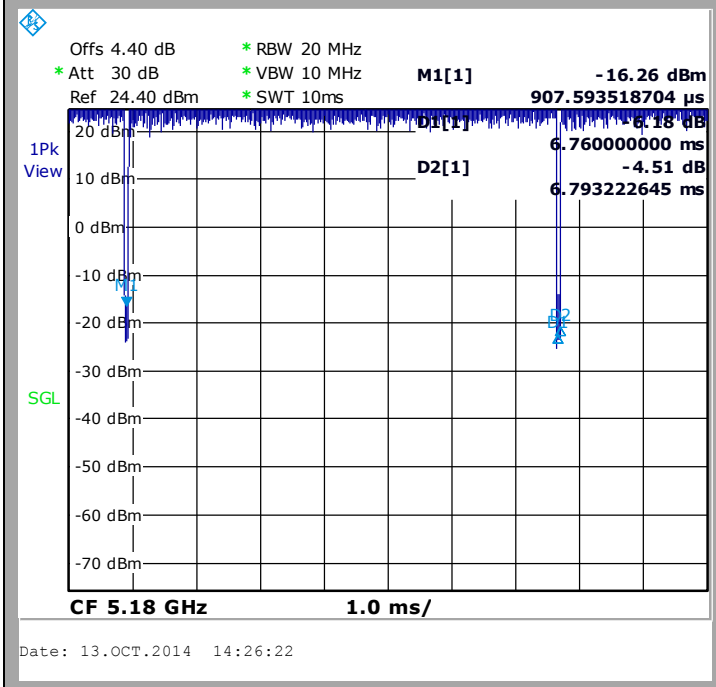
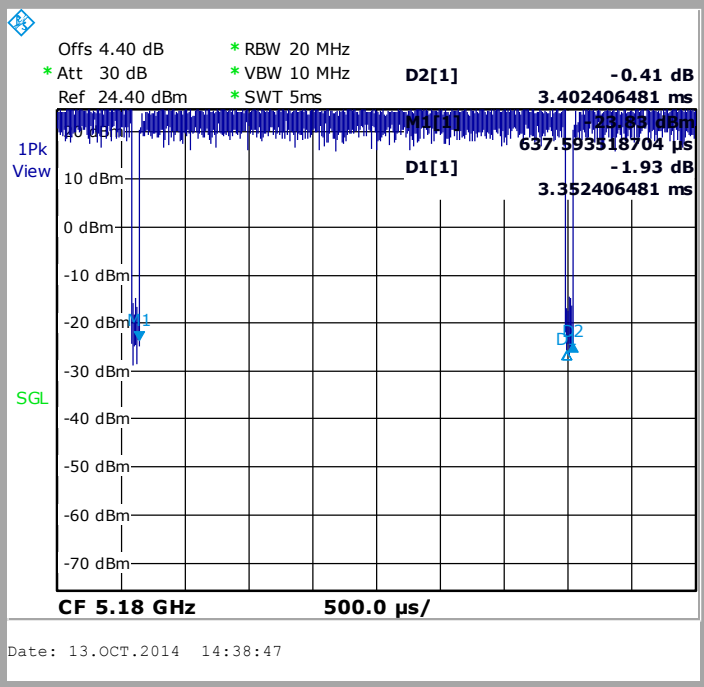
The Equipment Under Test is installed on a table and set in permanent emission with modulation. Measurement is performed with a spectrum analyzer on the EUT conducted access. The product has been tested according to the FCC KDB 789033 D02 General UNII Test Procedures New Rules v01 B.

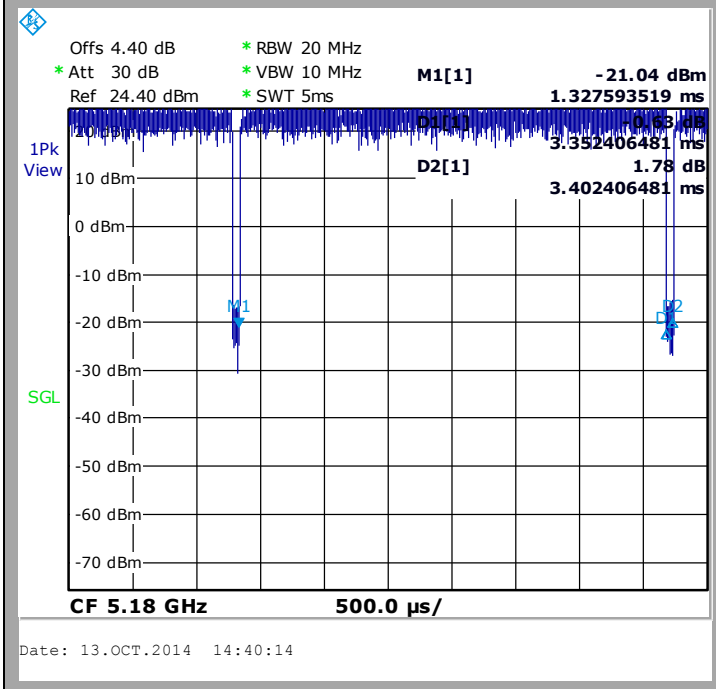
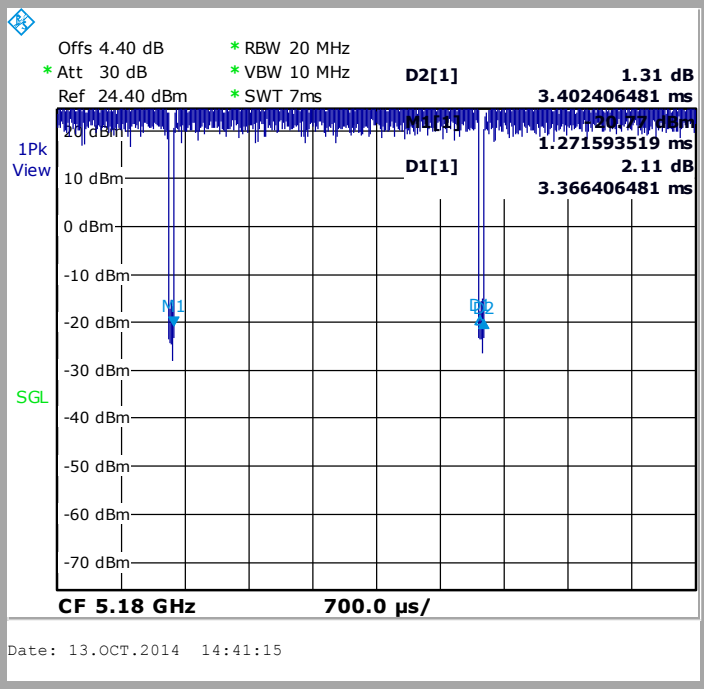
Spectrum Analyzer Setting:
Center frequency= Center of emission spectrum
Span= 0
Amplitude= Sufficient to observe the signal amplitude
RBW= Maximum
VBW= Maximum
Sweep Time= Sufficient to capture at least one period
Sweep= Single Sweep
Sweep Point= 10000
Trace= Clear/Write
Detector= Peak



Photograph for Duty Cycle

4.3. GRAPHICS & RESULTS

802.11a	802.11n HT20
C5	C5
	
Date: 13.OCT.2014 14:26:22	Date: 13.OCT.2014 14:38:47

802.11n HT40	802.11ac VHT80
C13	C18
	
Date: 13.OCT.2014 14:40:14	Date: 13.OCT.2014 14:41:15

802.11a

Temperature	**Tnom**
Voltage	**Vnom**
Frequency	C5
Duty Cycle (%)	99.51

802.11n HT20

Temperature	**Tnom**
Voltage	**Vnom**
Frequency	C5
Duty Cycle (%)	98.53

802.11n HT40

Temperature	**Tnom**
Voltage	**Vnom**
Frequency	C13
Duty Cycle (%)	98.51

802.11ac VHT80

Temperature	**Tnom**
Voltage	**Vnom**
Frequency	C18
Duty Cycle (%)	98.94

Result: PASS

Duty Cycle Limit:
None

5. POWER LIMITS & POWER SPECTRAL DENSITY

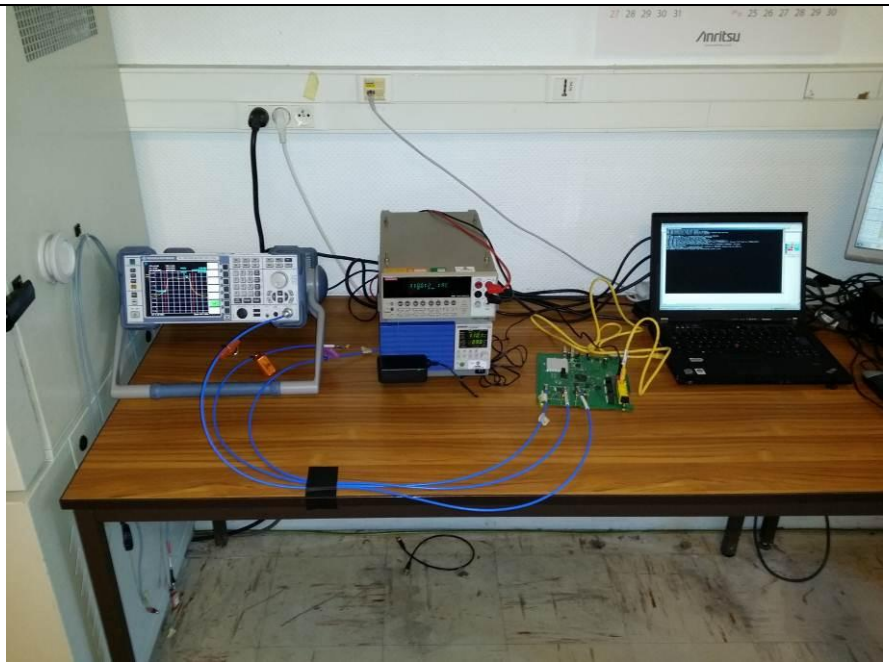
5.1. TEST CONDITIONS

Test performed by : Arnaud Fayette
Date of test : 14/10/2014
Ambient temperature : 24°C
Relative humidity : 48%

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 789033 D02 General UNII Test Procedures New Rules v01 E 2 b + F & FCC KDB 662911 D01 Multiple Transmitter Outpout v02 § E) 1).

Spectrum Analyzer Setting:
Center frequency= Center of emission spectrum
Span= At least twice the emission spectrum
Amplitude= Sufficient to observe the signal amplitude
RBW= 1MHz
VBW= 3MHz
Sweep point= 5000
Sweep time= auto
Trace=At least Average 100 traces
Detector= RMS
Meas Fonction= Channel Power inside of -26dB Bandwidth



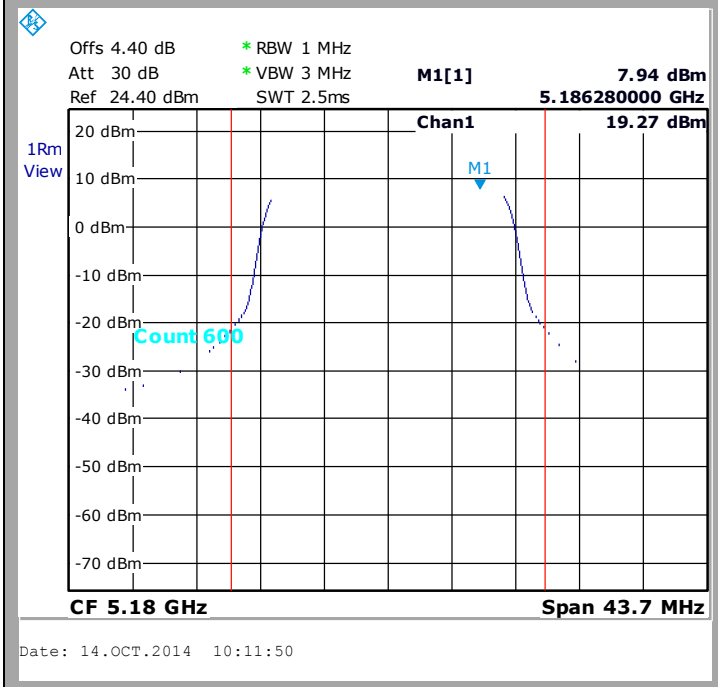
Photograph for Power Limits & Power Spectral Density

5.3. GRAPHICS & RESULTS

802.11a

C1

Tx1



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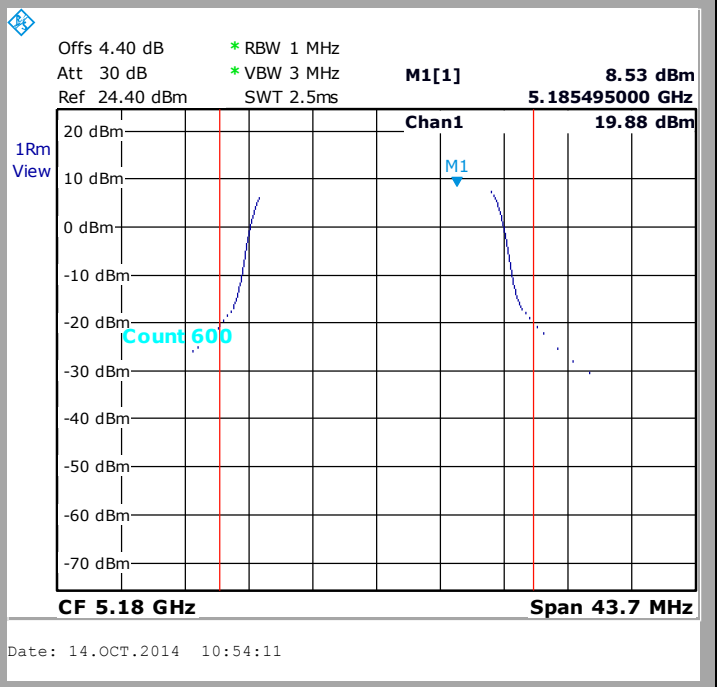
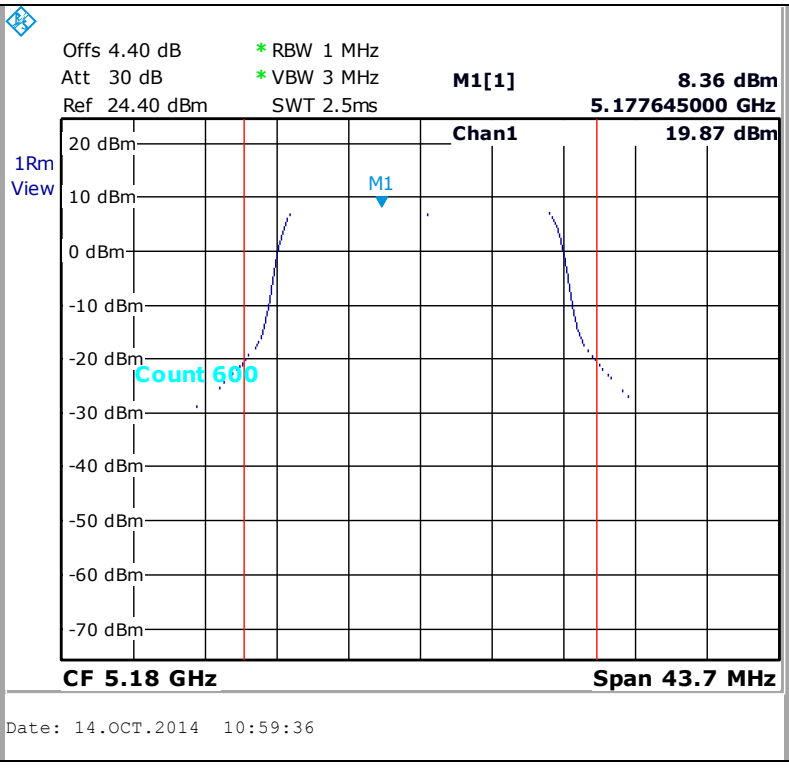


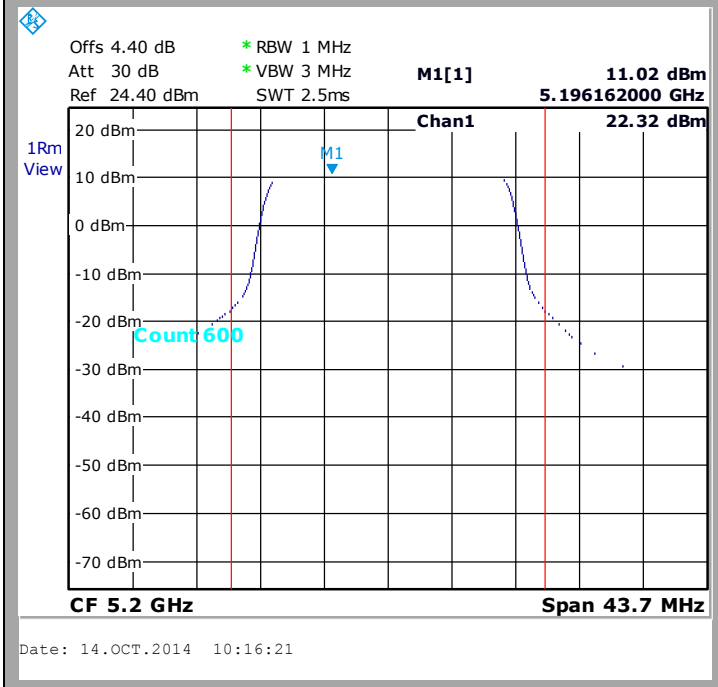
Tx3



802.11a

C2

Tx1



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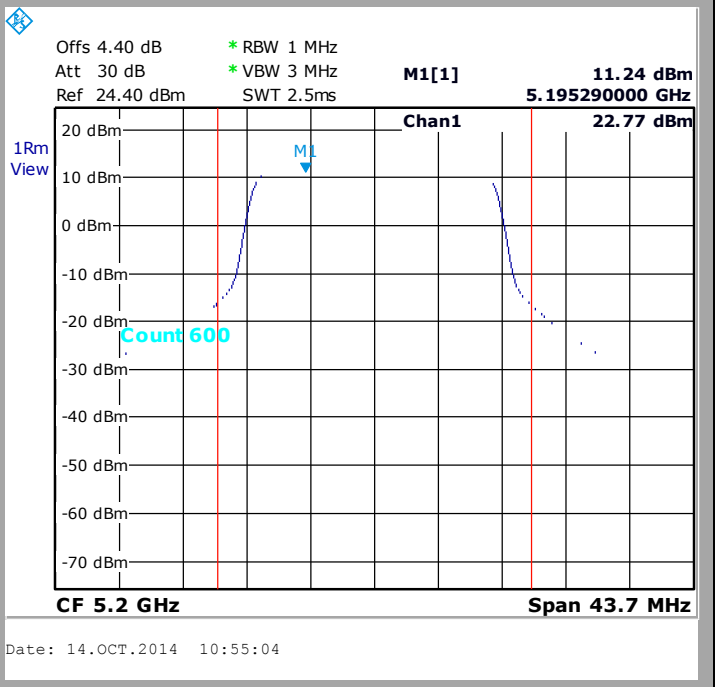
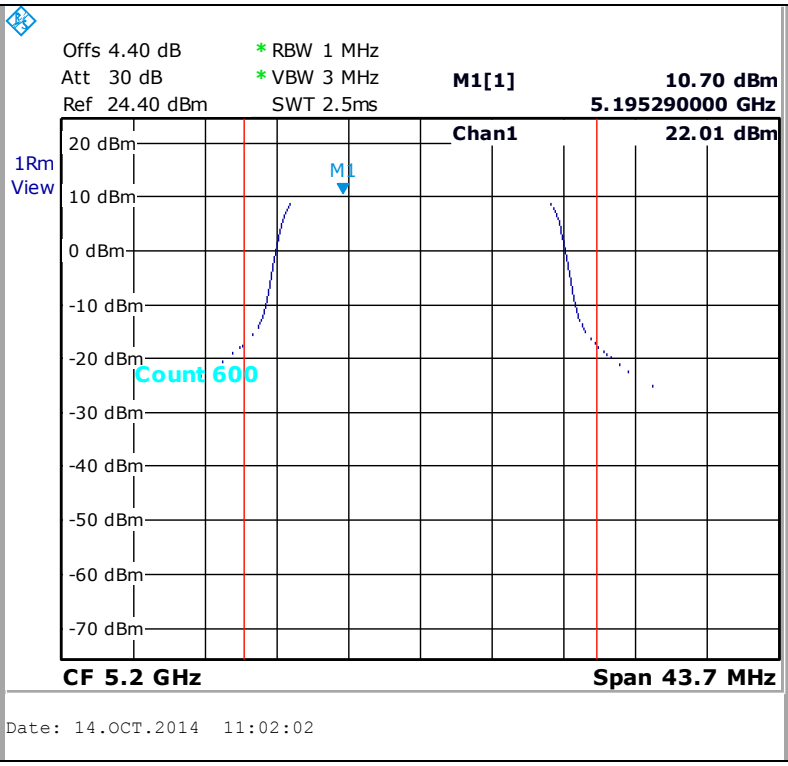
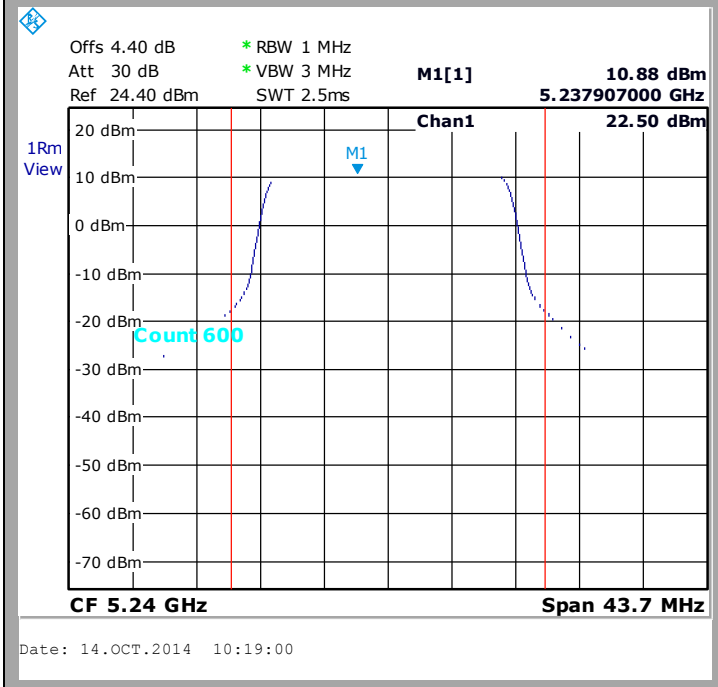
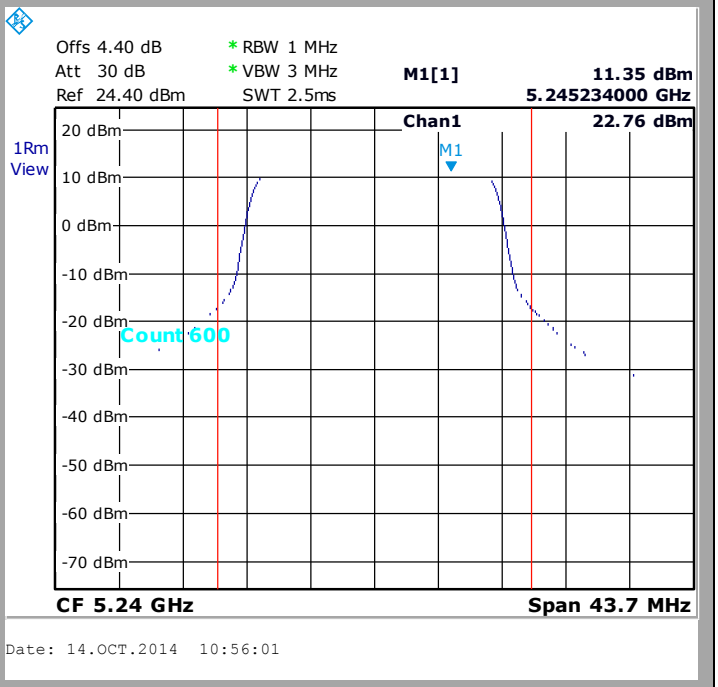


Tx3

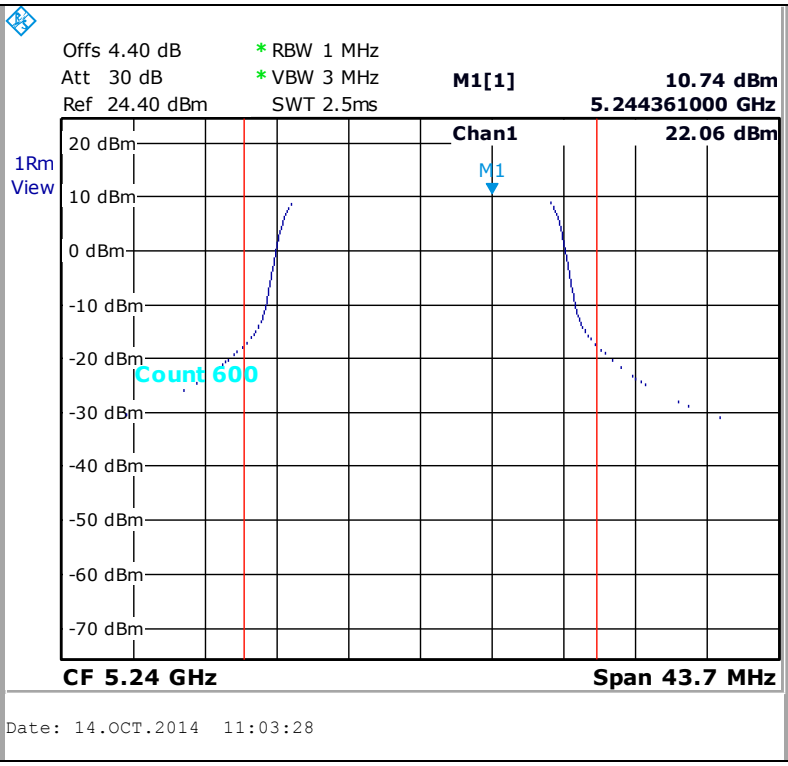


802.11a	
C3	
Tx1	Tx2





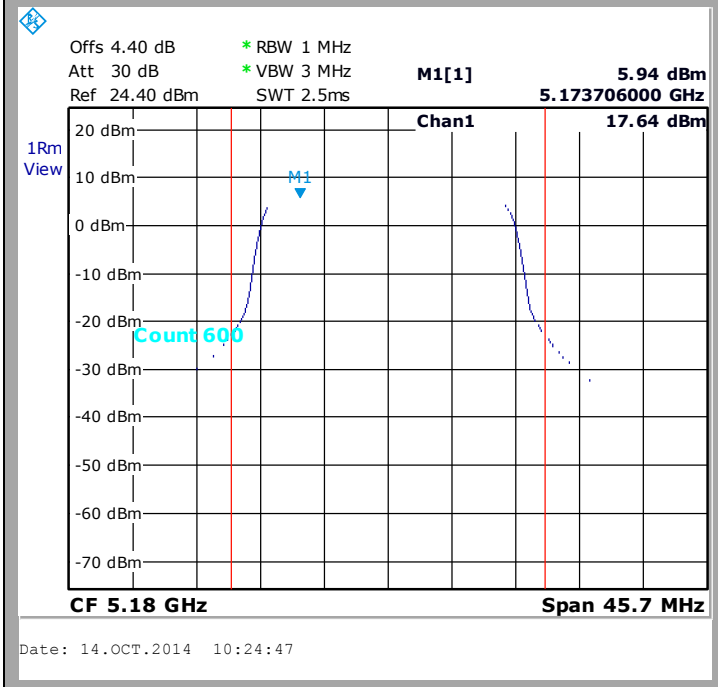
Tx3



802.11n HT20

C1

Tx1



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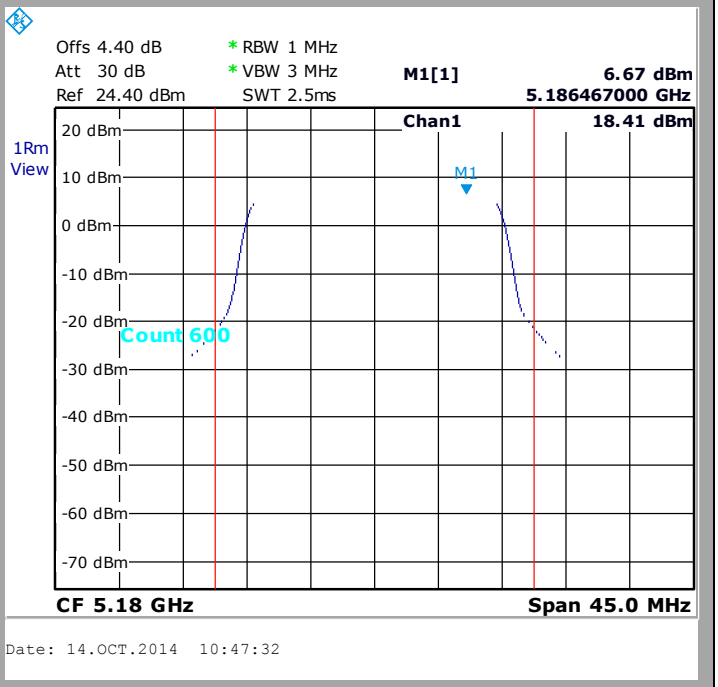

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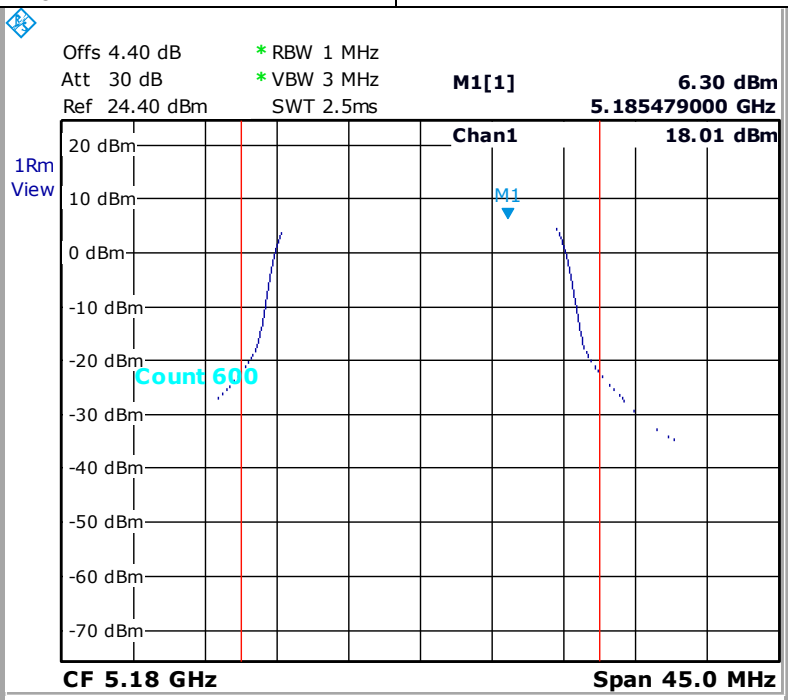
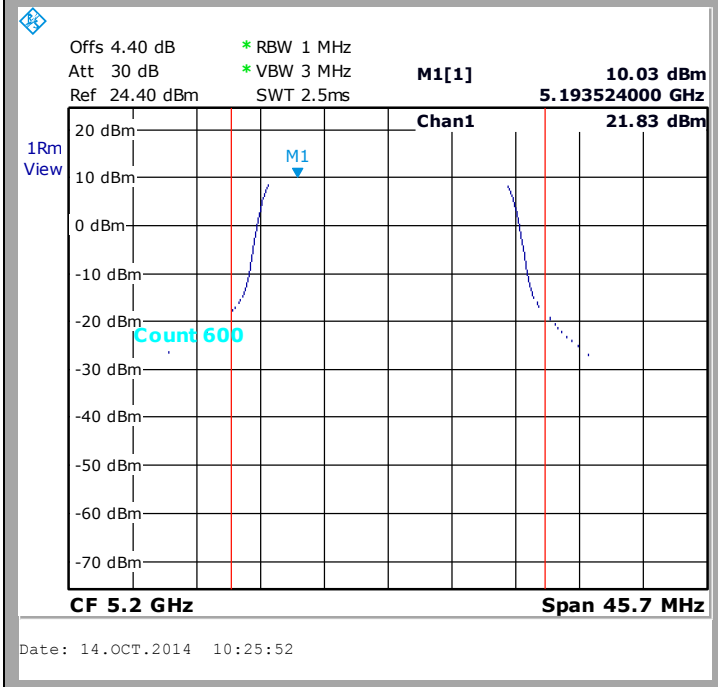


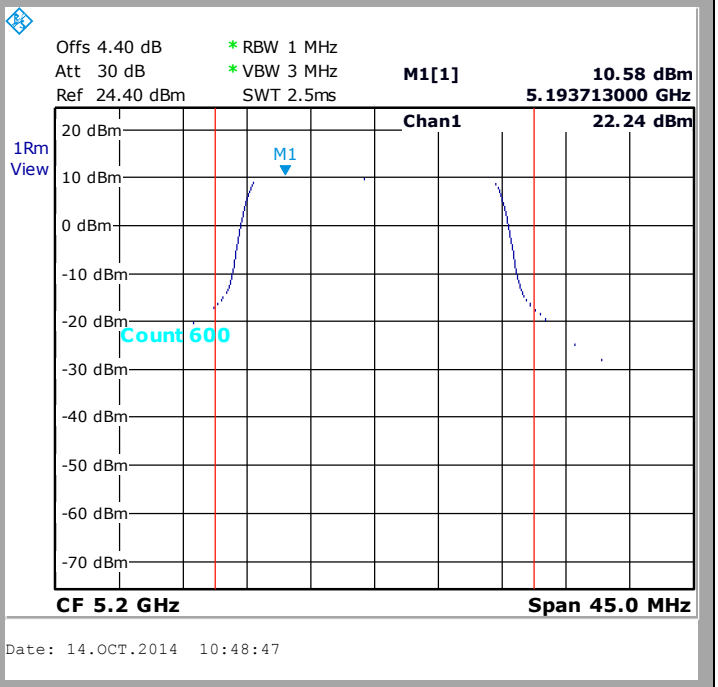
802.11n HT20

C2

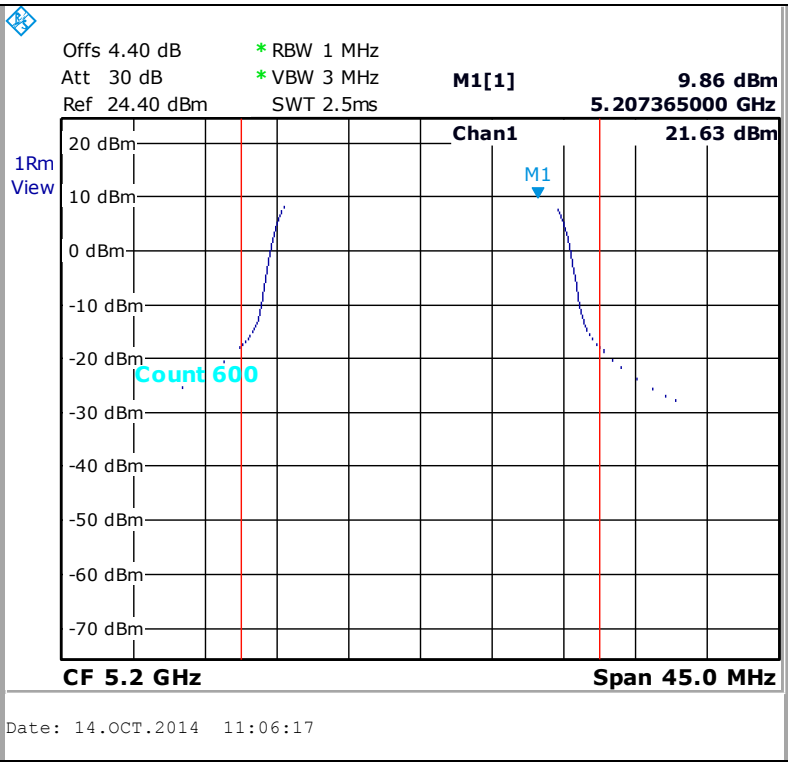
Tx1



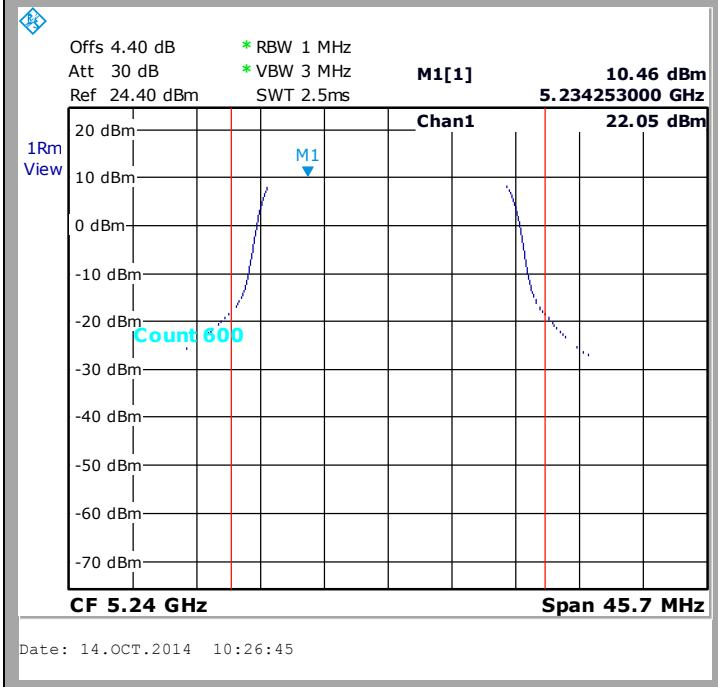
Tx2

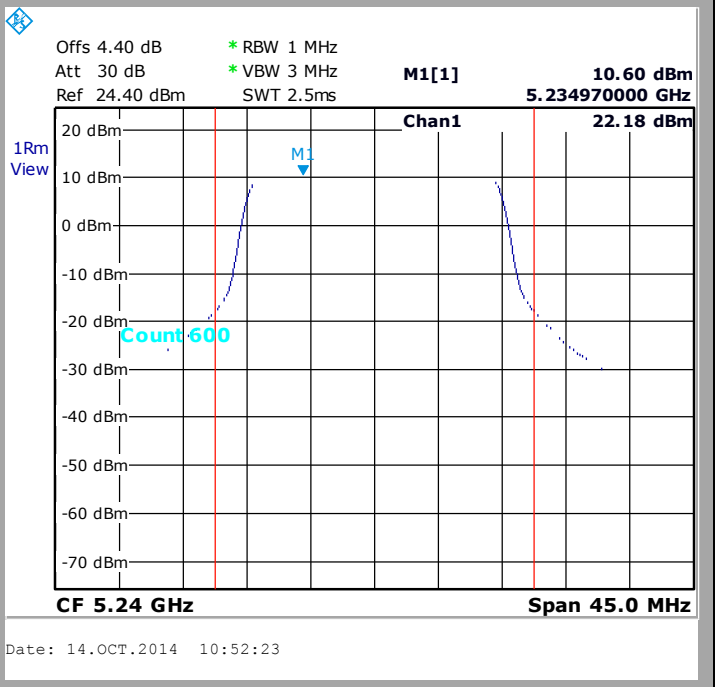


Tx3



802.11n HT20	
C3	
Tx1	Tx2





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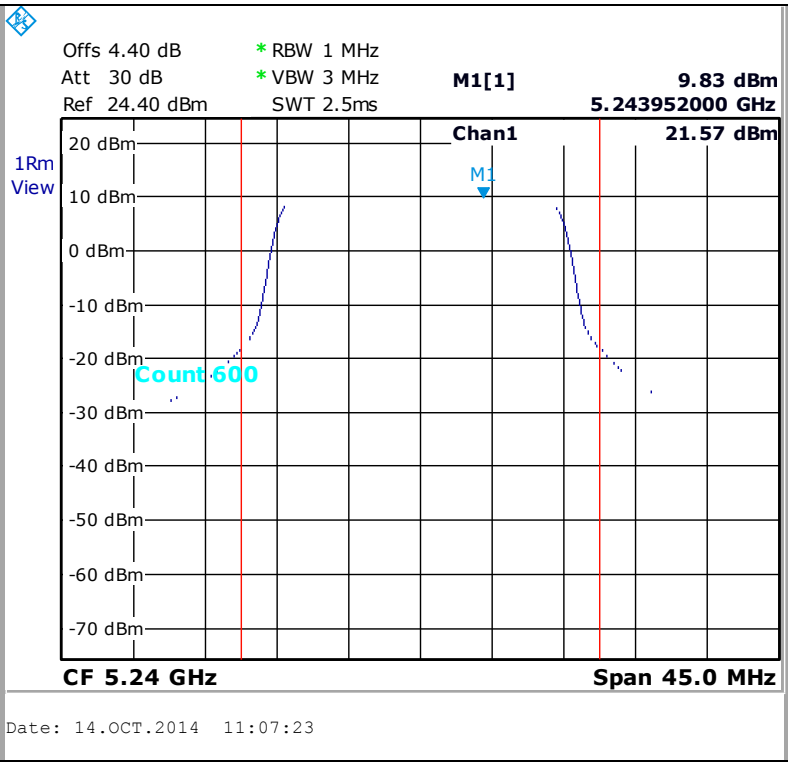
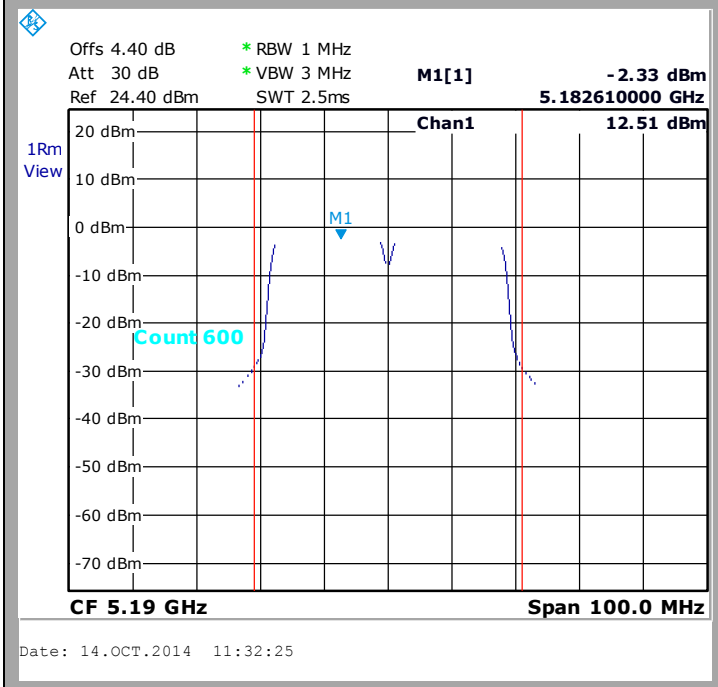


802.11n HT40

C10

Tx1



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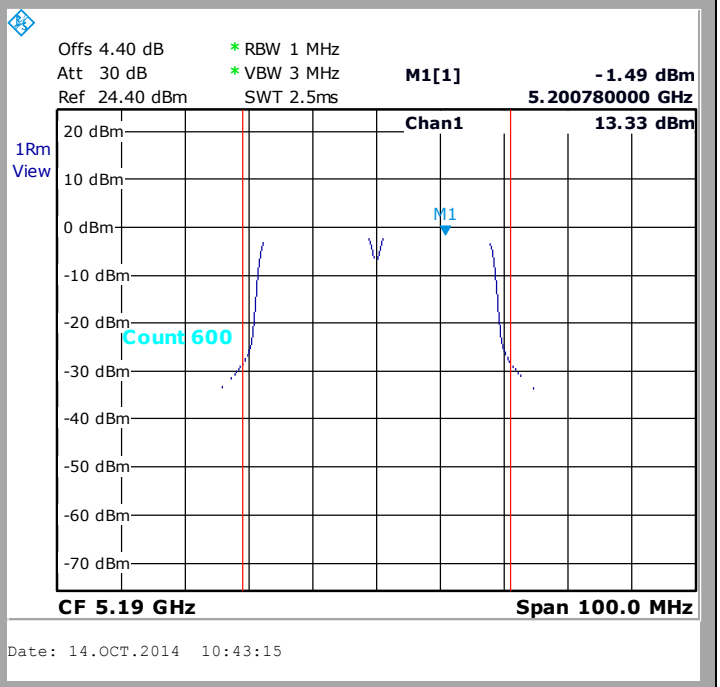

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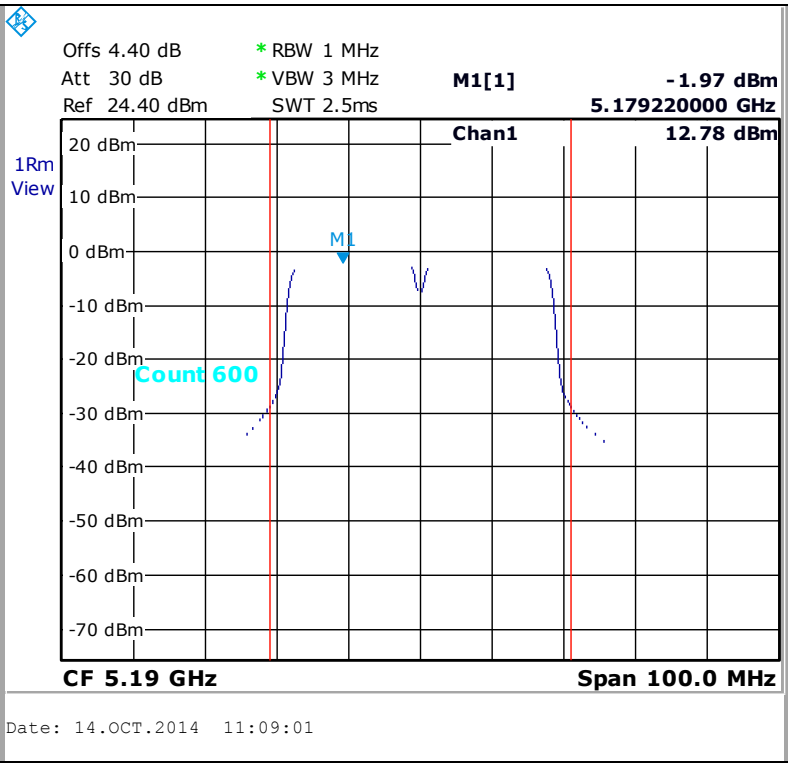
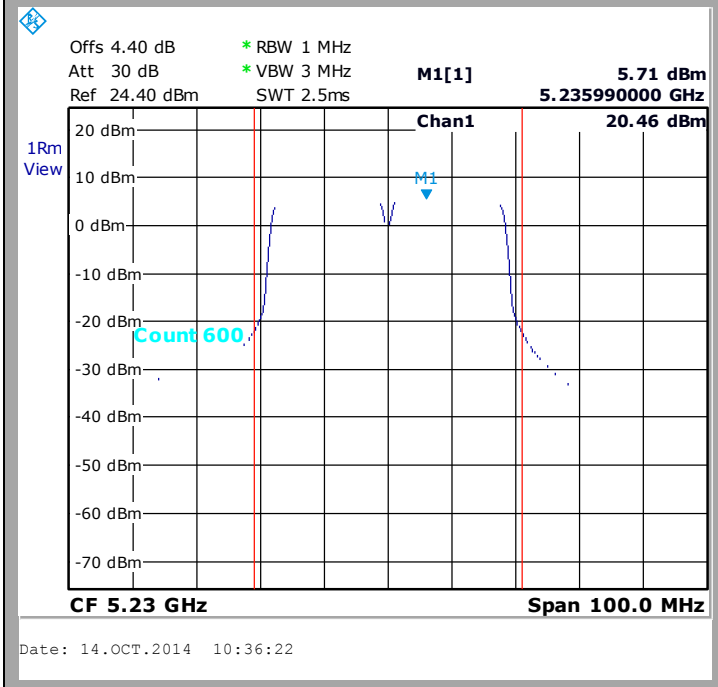


802.11n HT40

C11

Tx1



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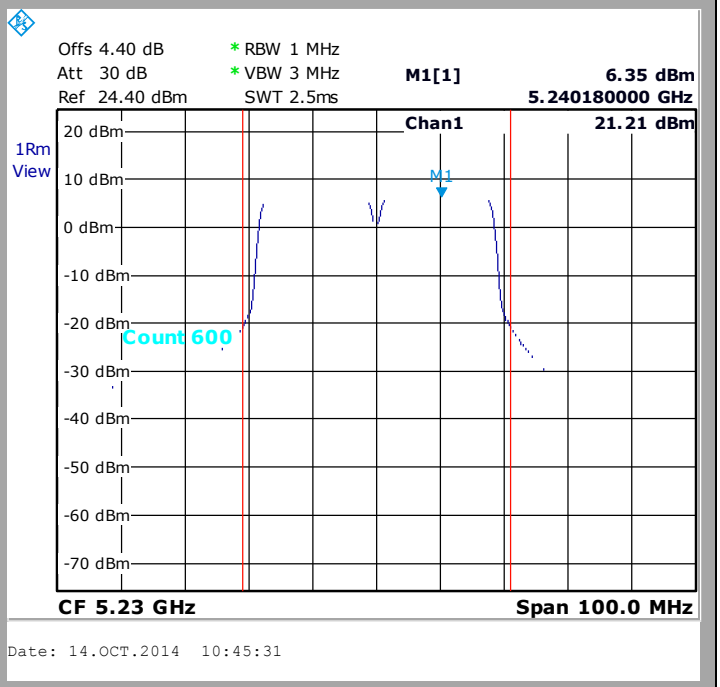
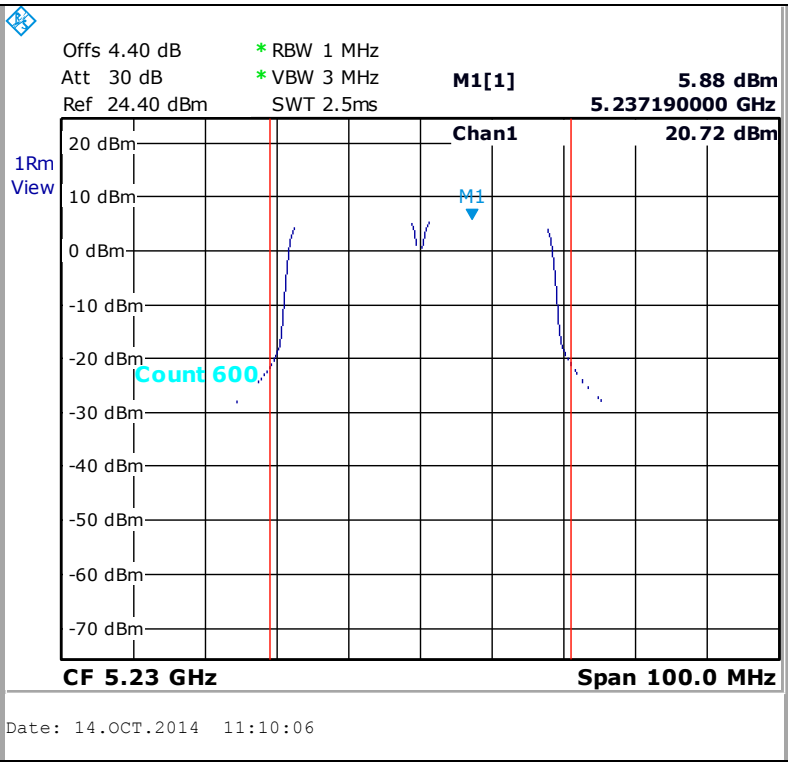
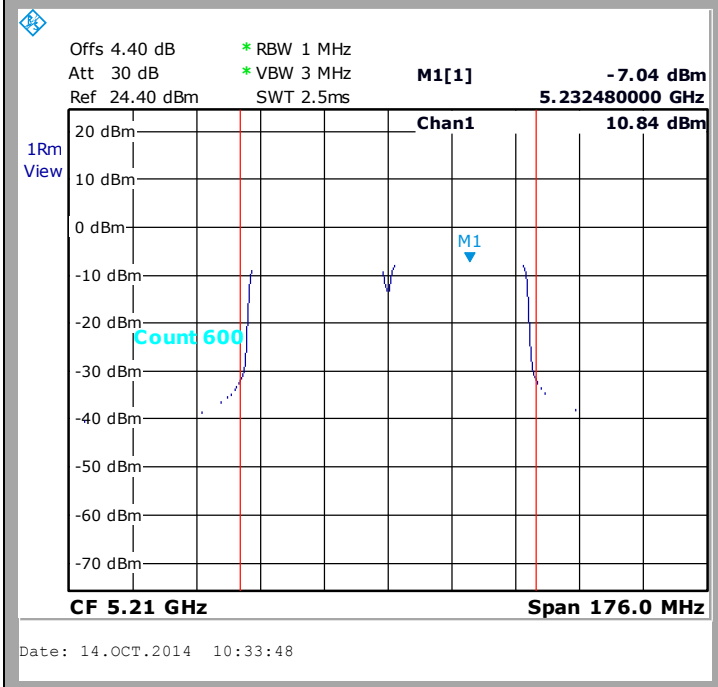
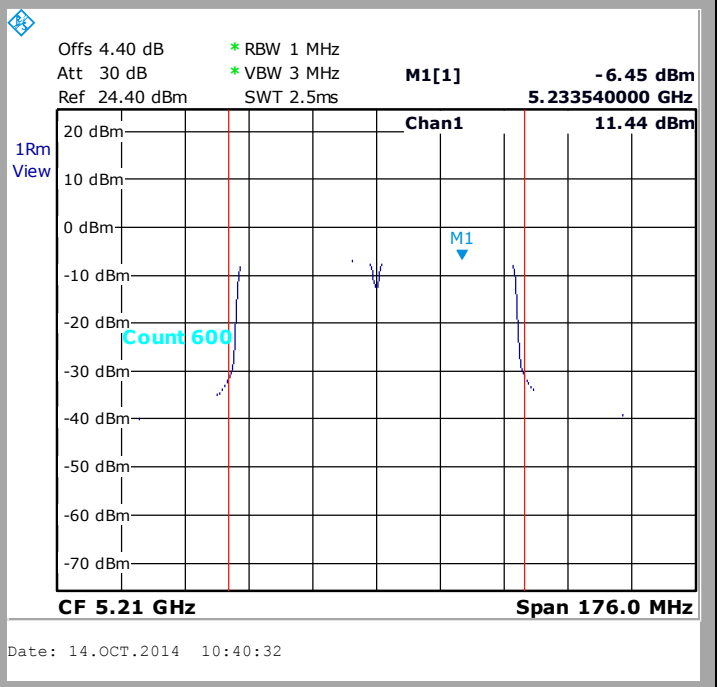


Tx3

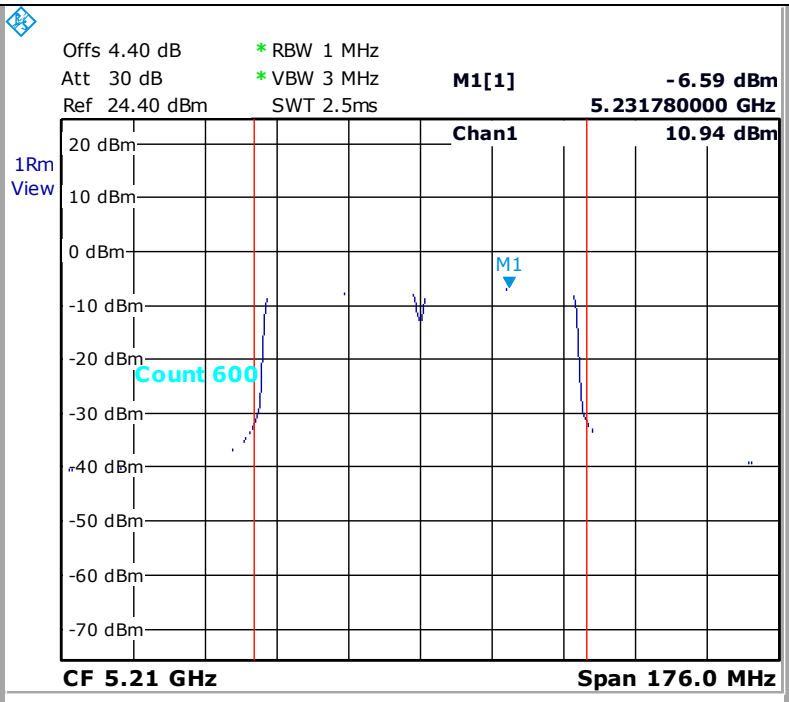


802.11ac VHT80	
C17	
Tx1	Tx2





Tx3



Spectrum Analyzer Offset:
Cable Loss=1,4dB + Attenuator= 3dB

802.11a

Channel	Tx1 (dBm)	Tx2 (dBm)	Tx3 (dBm)	Overall Antenna Gain (dBi)	Total Power (dBm)	Limit (dBm)
C1	19,27	19,88	19,87	7	24,45376261	29
C2	22,32	22,77	22,01	7	27,14913967	29
C3	22,5	22,76	22,06	7	27,22075233	29

802.11n HT20

Channel	Tx1 (dBm)	Tx2 (dBm)	Tx3 (dBm)	Overall Antenna Gain (dBi)	Total Power (dBm)	Limit (dBm)
C1	17,64	18,41	18,01	7	22,80260061	29
C2	21,83	22,84	21,63	7	26,90426777	29
C3	22,05	22,18	21,57	7	26,71237345	29

802.11n HT40

Channel	Tx1 (dBm)	Tx2 (dBm)	Tx3 (dBm)	Overall Antenna Gain (dBi)	Total Power (dBm)	Limit (dBm)
C10	12,51	13,33	12,78	7	17,65807568	29
C11	20,46	21,21	20,72	7	25,5790979	29

802.11ac VHT80

Channel	Tx1 (dBm)	Tx2 (dBm)	Tx3 (dBm)	Overall Antenna Gain (dBi)	Total Power (dBm)	Limit (dBm)
C17	10,84	11,44	10,94	7	15,85257405	29

Result: PASS

Power Limits:
5150MHz-5250MHz: Shall not exceed 30dBm or 4dBm + 10*log (-26dB Bandwidth (MHz))
Limits are reduced by G-6dBi if Overall Antenna Gain above 6dBi

Spectrum Analyzer Offset:
Cable Loss=1,4dB + Attenuator= 3dB

802.11a

Channel	Tx1 (dBm/MHz)	Tx2 (dBm/MHz)	Tx3 (dBm/MHz)	Overall Antenna Gain (dBi)	PSD(dBm/MHz)	Limit (dBm/MHz)
C1	7,94	8,53	8,36	7	13,05489277	16
C2	11,02	11,24	10,7	7	15,76351524	16
C3	10,88	11,35	10,74	7	15,76913284	16

802.11n HT20

Channel	Tx1 (dBm/MHz)	Tx2 (dBm/MHz)	Tx3 (dBm/MHz)	Overall Antenna Gain (dBi)	PSD(dBm/MHz)	Limit (dBm/MHz)
C1	5,94	6,67	6,3	7	11,08476982	16
C2	10,03	10,58	9,86	7	14,93888348	16
C3	10,46	10,6	9,83	7	15,08057816	16

802.11n HT40

Channel	Tx1 (dBm/MHz)	Tx2 (dBm/MHz)	Tx3 (dBm/MHz)	Overall Antenna Gain (dBi)	PSD(dBm/MHz)	Limit (dBm/MHz)
C10	-2,33	-1,49	-1,97	7	2,854895232	16
C11	5,71	6,35	5,88	7	10,75973174	16

802.11ac VHT80

Channel	Tx1 (dBm/MHz)	Tx2 (dBm/MHz)	Tx3 (dBm/MHz)	Overall Antenna Gain (dBi)	PSD(dBm/MHz)	Limit (dBm/MHz)
C17	-7,04	-6,35	-6,59	7	-1,879447728	16

Result: PASS

Power Spectral Density Limit:
5150MHz-5250MHz: Shall not exceed 17dBm/MHz (Reduced by G-6dBi if Overall Antenna Gain above 6dBi)

6. AC POWER LINE CONDUCTED EMISSIONS

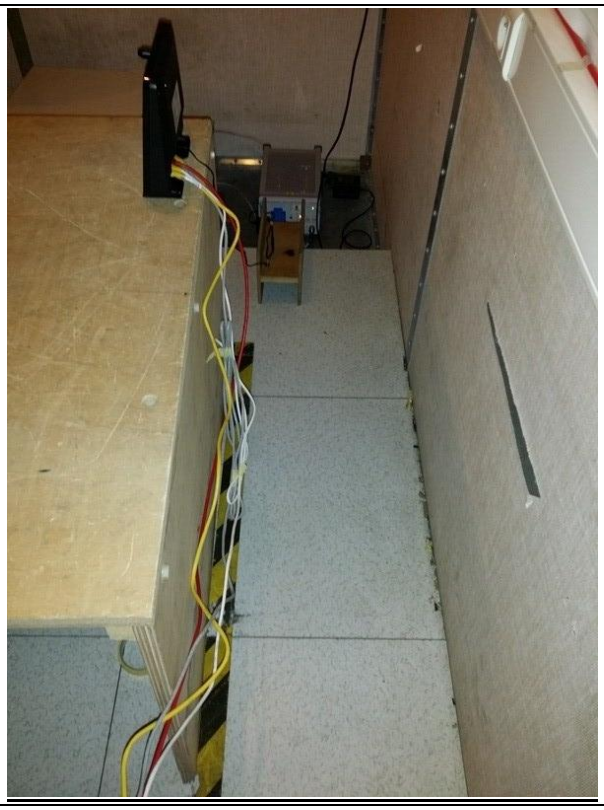
6.1. TEST CONDITIONS

Test performed by : Arnaud Fayette
Date of test : 14/10/2014
Ambient temperature : 20°C
Relative humidity : 44%

6.2. 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 50Ω / 50µH. 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)

6.3. RESULTS

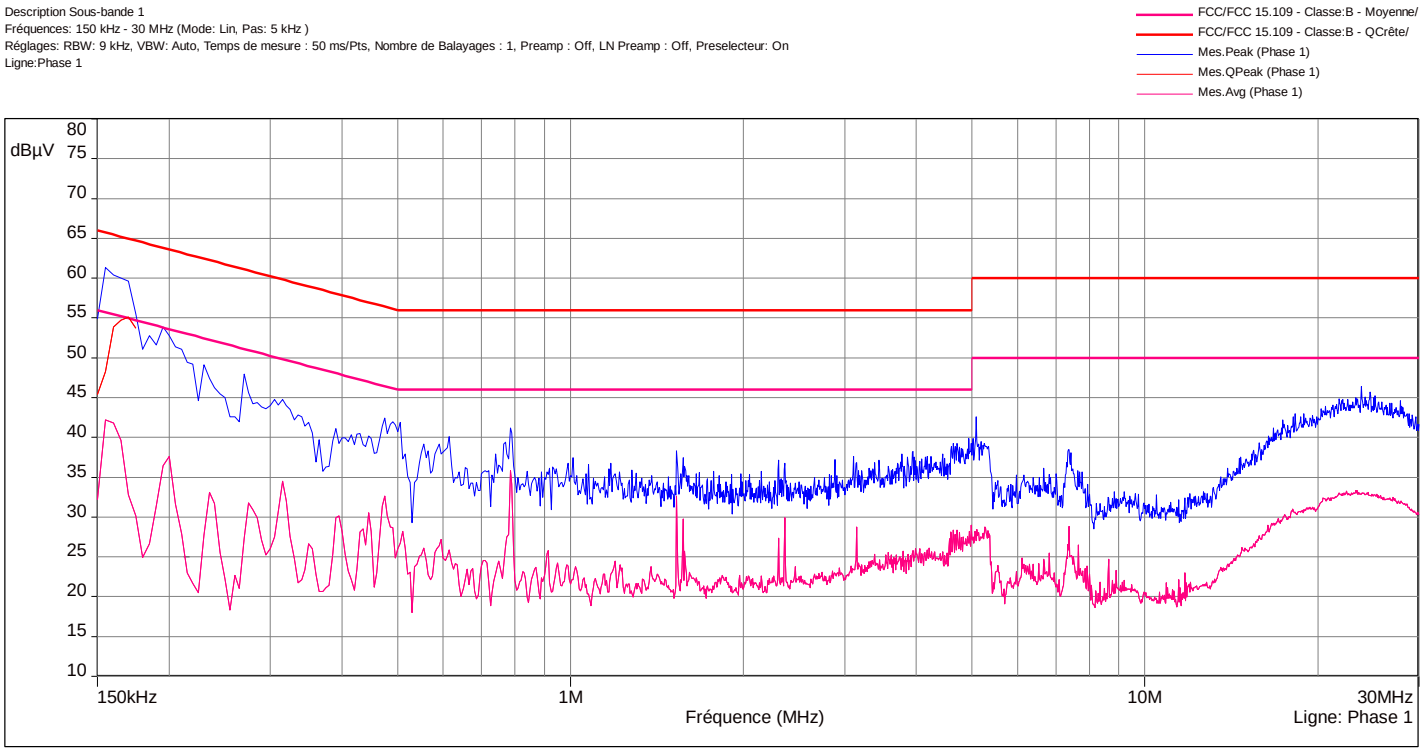
Worst case 802.11a

Phase Line

FCC Part.15 class B
SAGEMCOM
WIFI BOX
TYPE : FAST 5260CV
CONDUCTOR 1 ; 120V-60Hz

Peak and average value

Description Sous-bande 1
Fréquences: 150 kHz - 30 MHz (Mode: Lin, Pas: 5 kHz)
Réglages: RBW: 9 kHz, VBW: Auto, Temps de mesure : 50 ms/Pts, Nombre de Balayages : 1, Preamp : Off, LN Preamp : Off, Preselecteur: On
Ligne:Phase 1

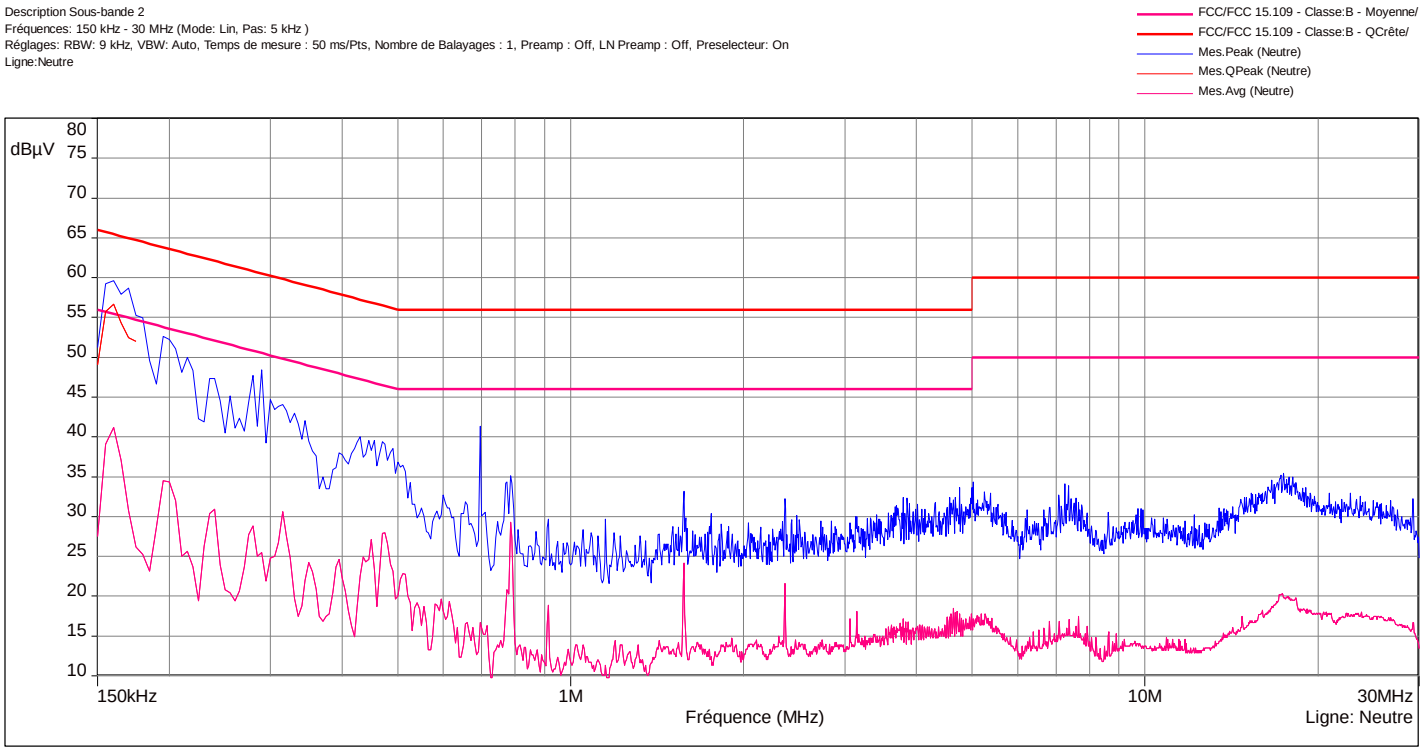


Neutral Line

FCC Part.15 class B
SAGEMCOM
WIFI BOX
TYPE : FAST 5260CV
CONDUCTOR 2 ; 120V-60Hz

Peak and average value

Description Sous-bande 2
Fréquences: 150 kHz - 30 MHz (Mode: Lin, Pas: 5 kHz)
Réglages: RBW: 9 kHz, VBW: Auto, Temps de mesure : 50 ms/Pts, Nombre de Balayages : 1, Preamp : Off, LN Preamp : Off, Preselecteur: On
Ligne:Neutre



Phase Line

Frequency (MHz)	Peak Level (dBµV)	Quasi-Peak Level (dBµV)	Quasi-Peak Limit (dBµV)	Average Level (dBµV)	Average Limit (dBµV)
0.155	61.329	48.296	65.728	42.201	55.728
0.785	41.212	-	56	35.806	46

Neutral Line

Frequency (MHz)	Peak Level (dBµV)	Quasi-Peak Level (dBµV)	Quasi-Peak Limit (dBµV)	Average Level (dBµV)	Average Limit (dBµV)
0.160	59.61	56.646	64.9	41.178	55
0.695	41.356	-	56.1	16.723	46

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

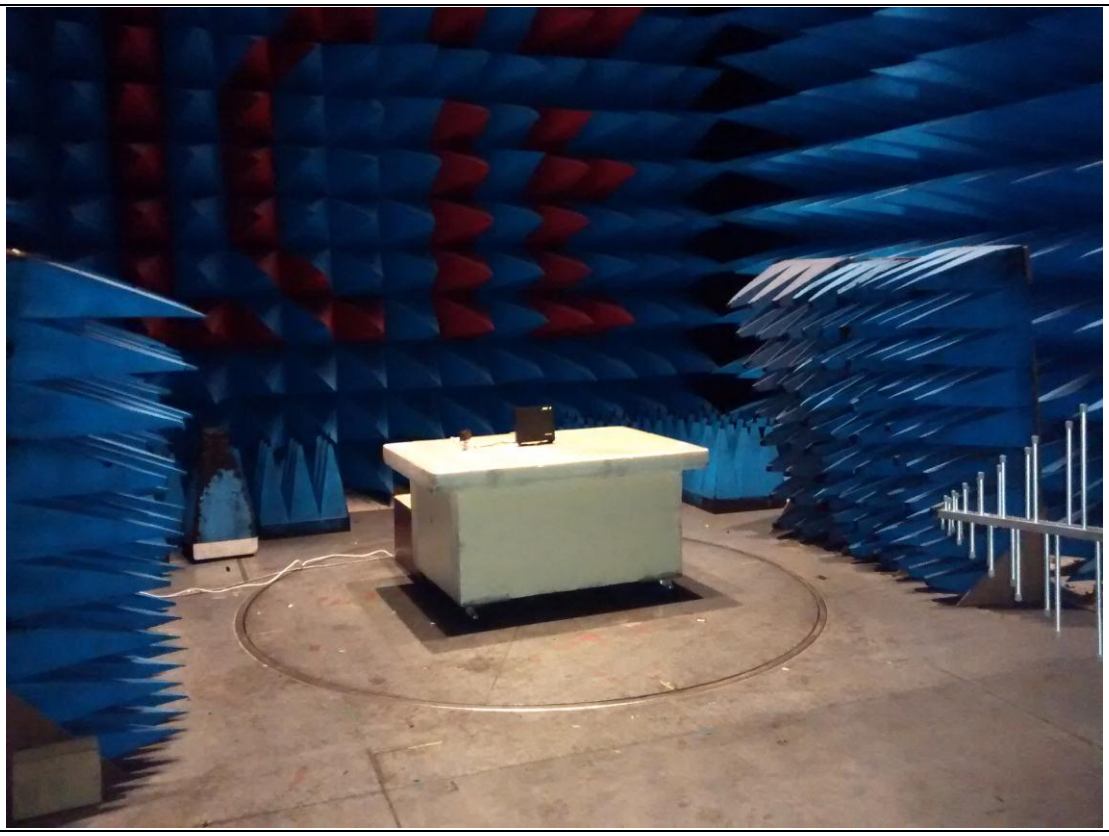
7. UNWANTED EMISSIONS & UNDESIRABLE EMISSION LIMITS

7.1. TEST CONDITIONS

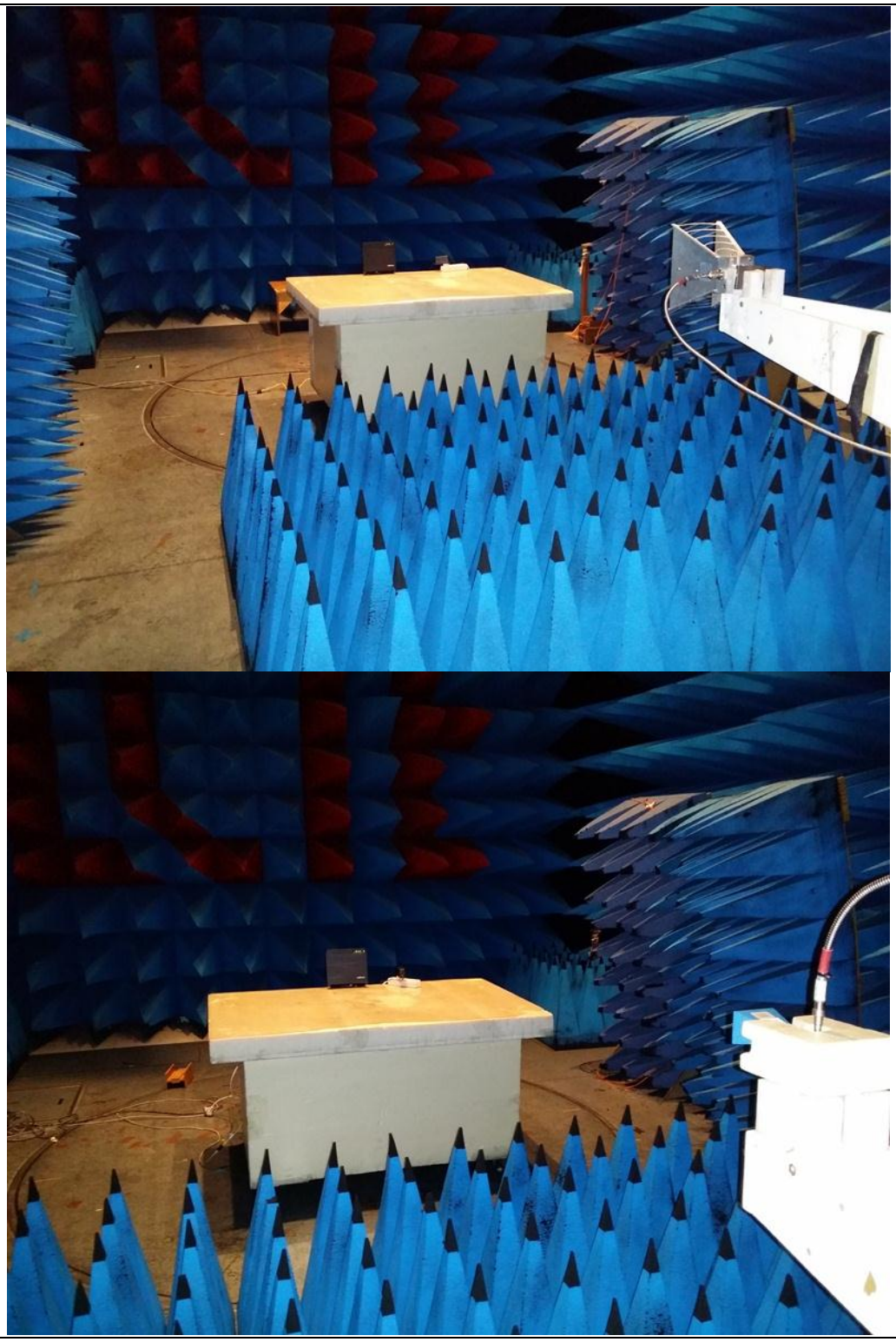
Test performed by : Arnaud Fayette
Date of test : 16/10/2014
Ambient temperature : 20°C
Relative humidity : 44%

7.2. TEST SETUP

The product has been tested according to ANSI C63.10 (2009). The EUT is placed on an open area test site. 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.
The product has been tested according to the FCC KDB 789033 D01 General UNII Test Procedures v01r03. The following factor is applied to convert E[dBµV/m] to EIRP[dBm]. EIRP[dBm]= E[dBµV/m] – 84.7



Photograph for Unwanted Emissions & Undesirable Emission Limits

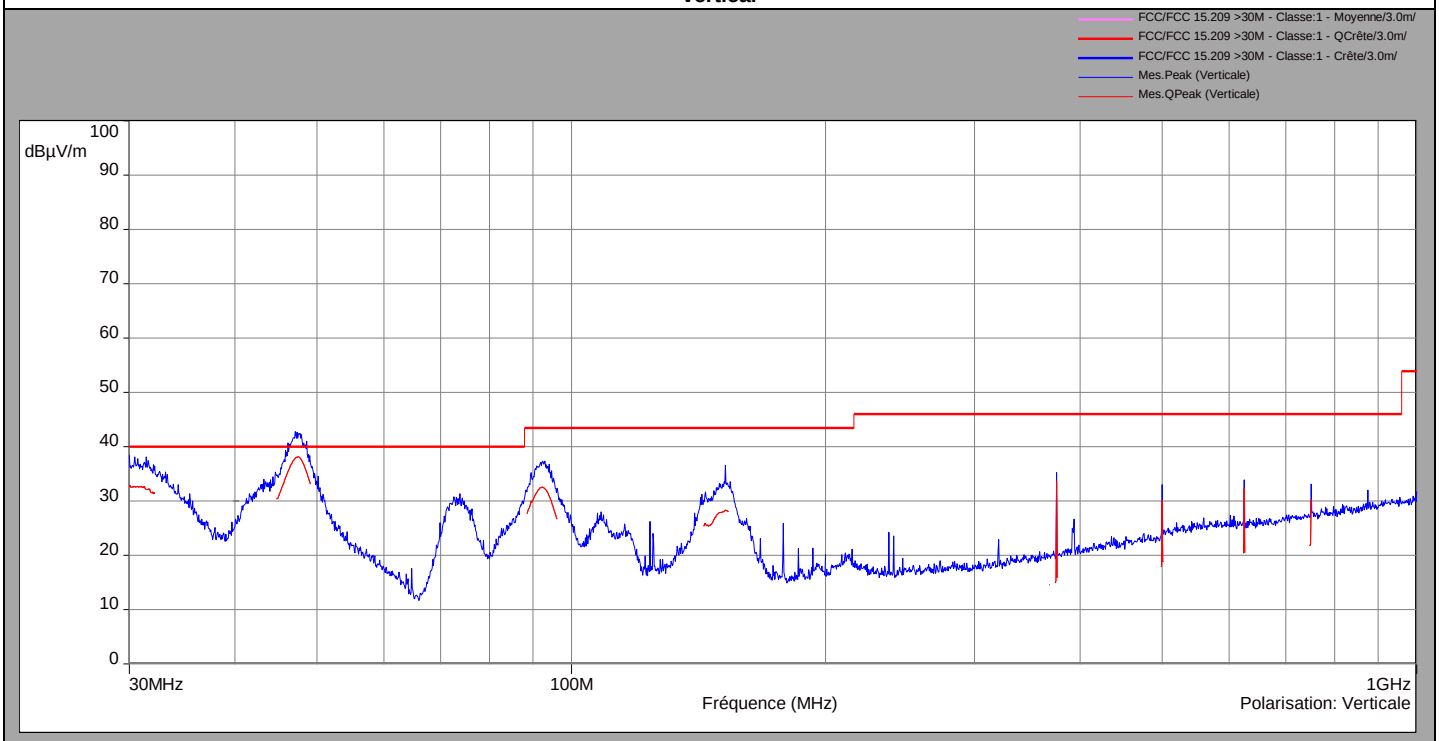


Photograph for Unwanted Emissions & Undesirable Emission Limits

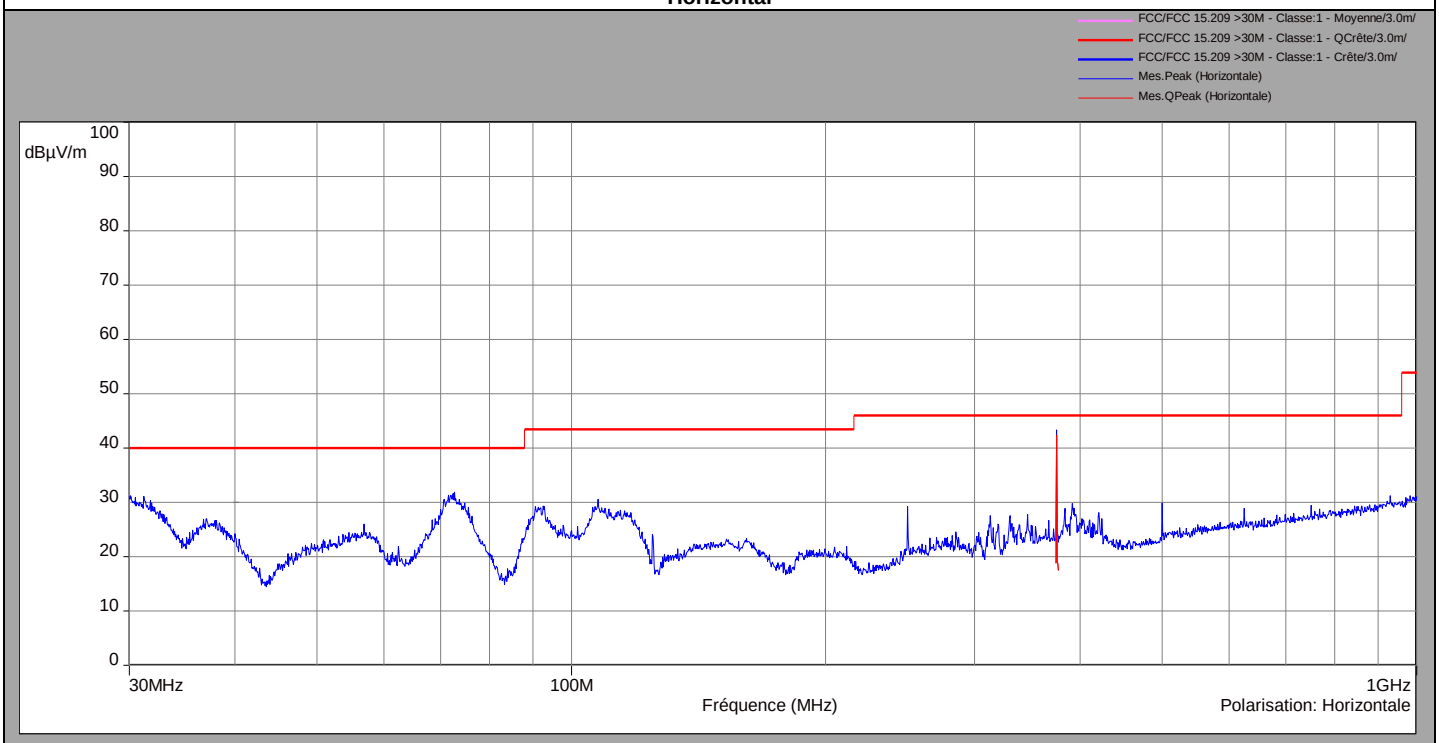
Worst case mode 802.11a

Worst case channel C3

vertical



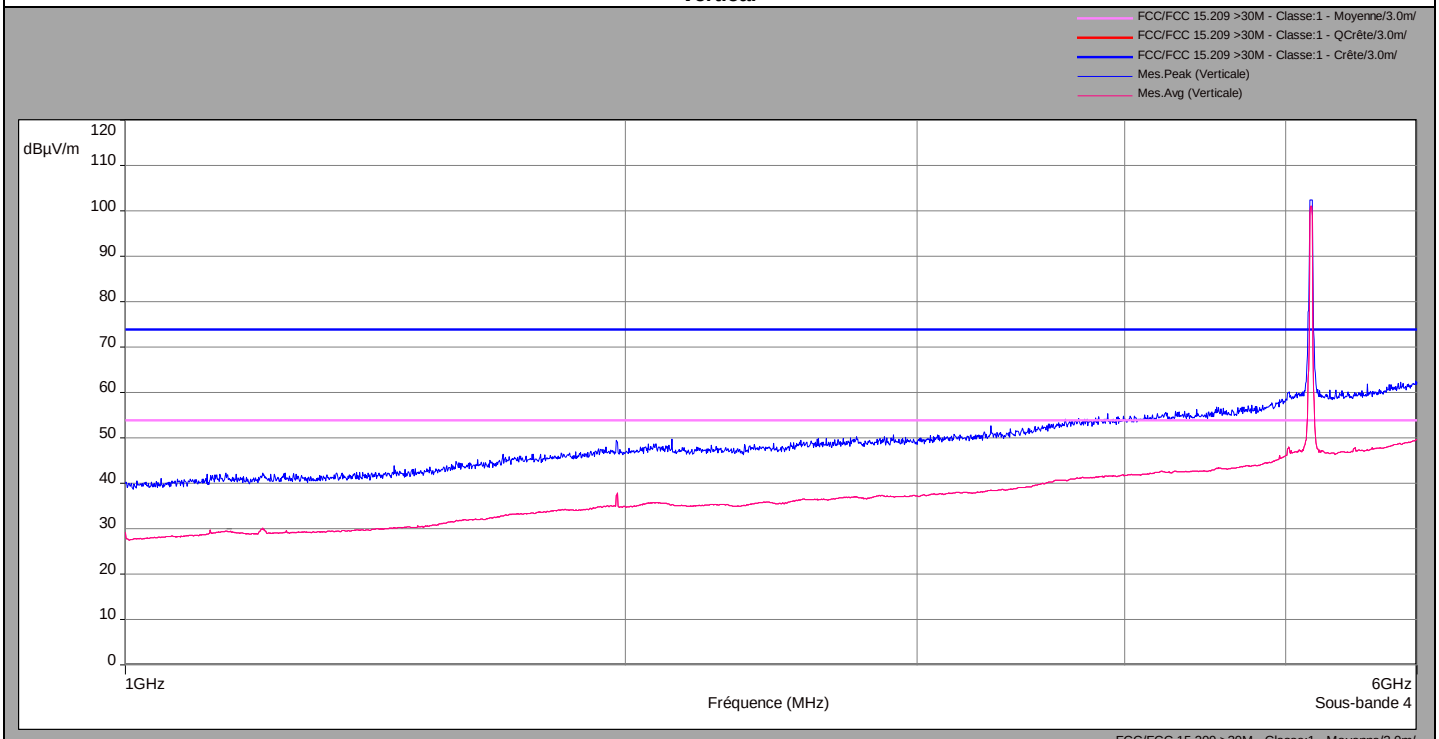
Horizontal

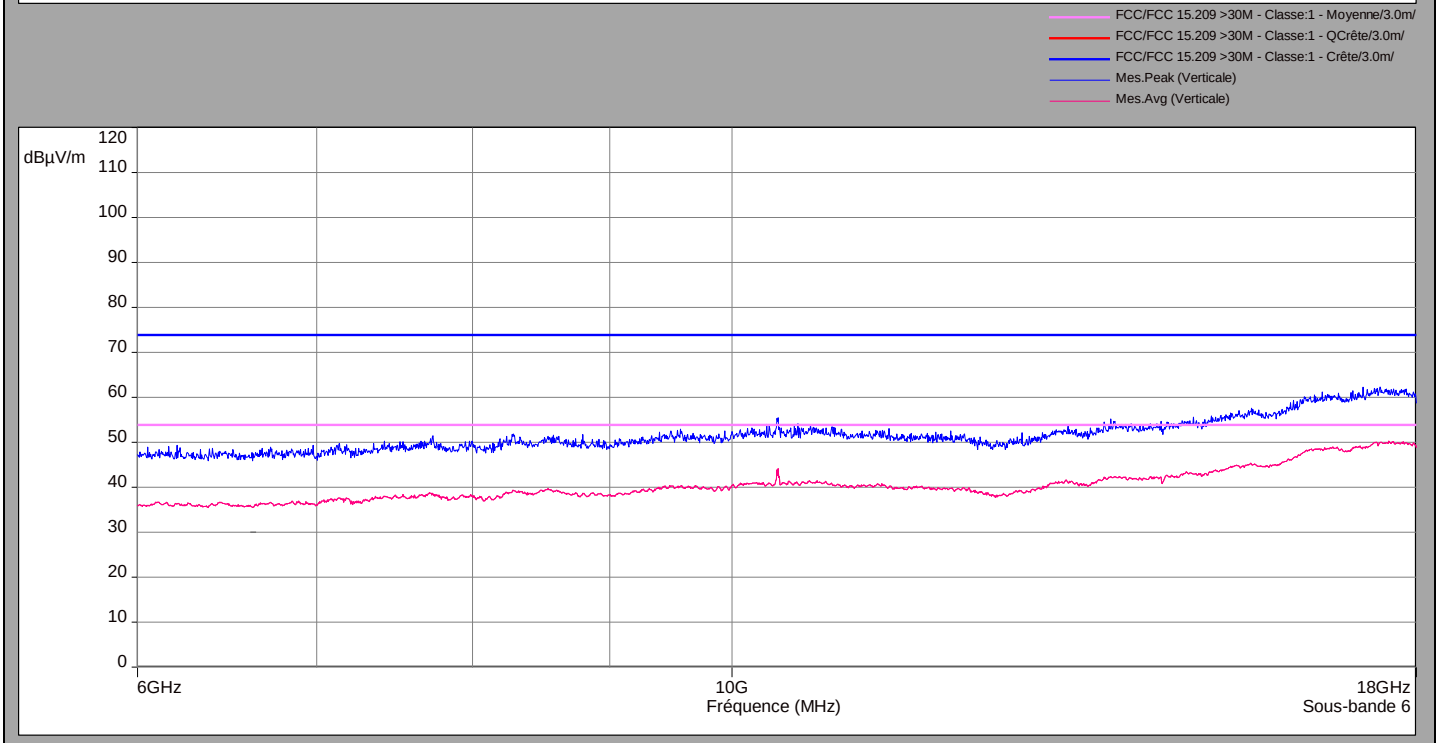


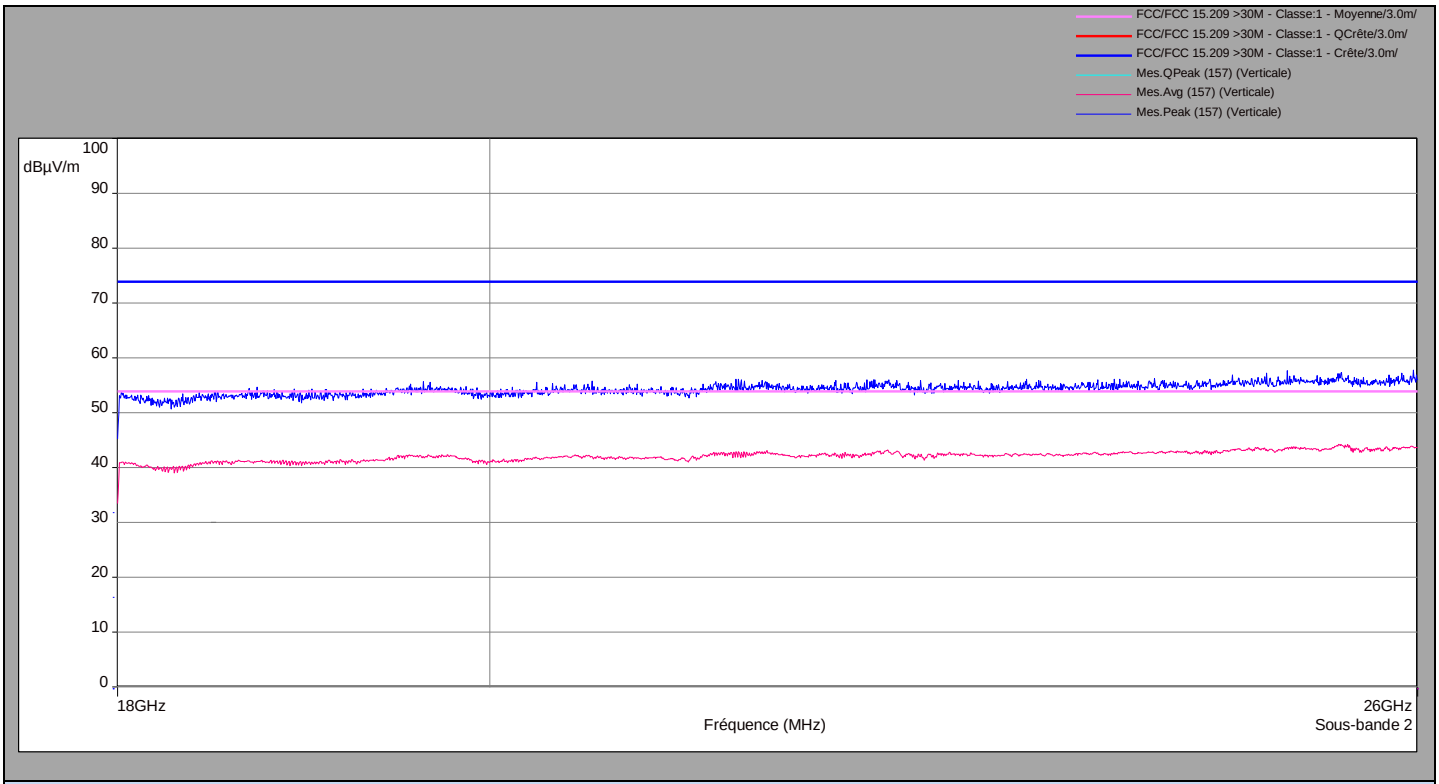
802.11a

C1

vertical

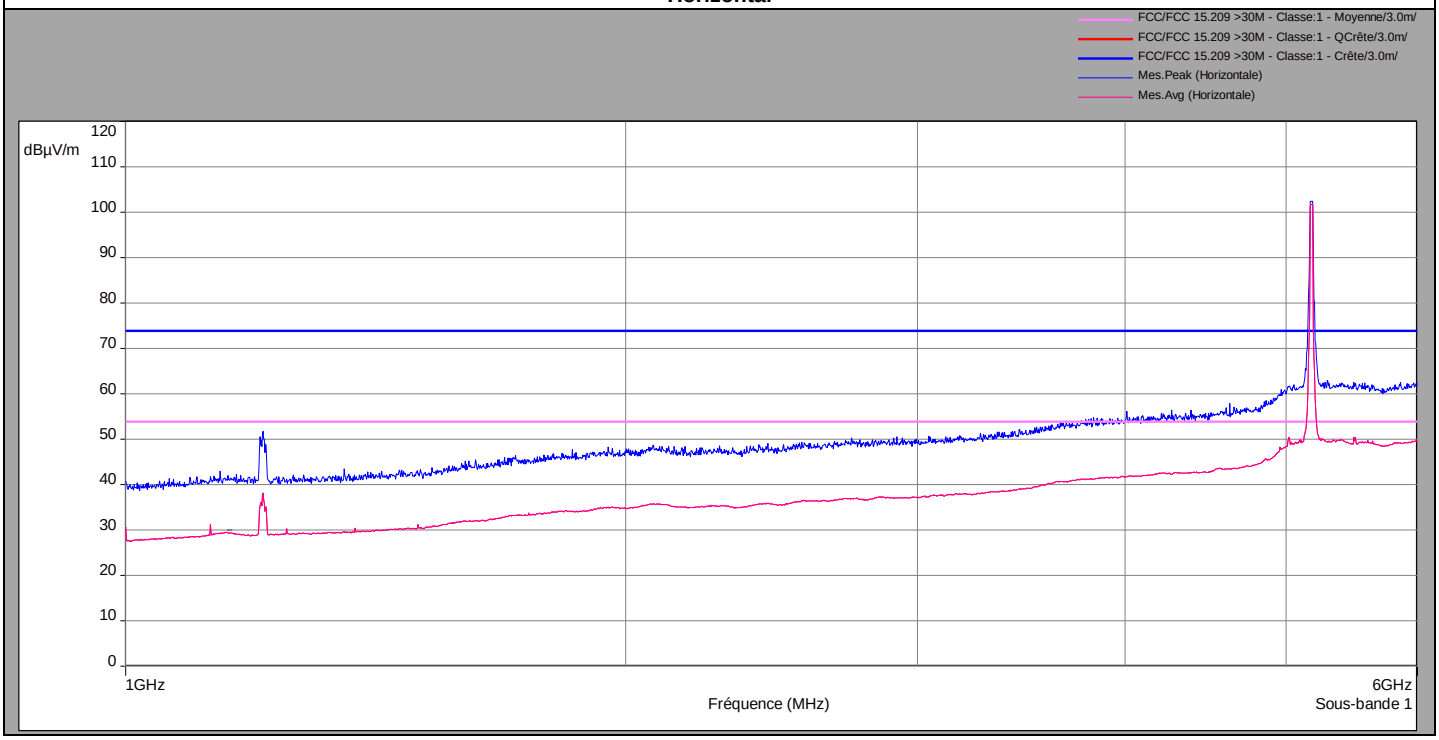


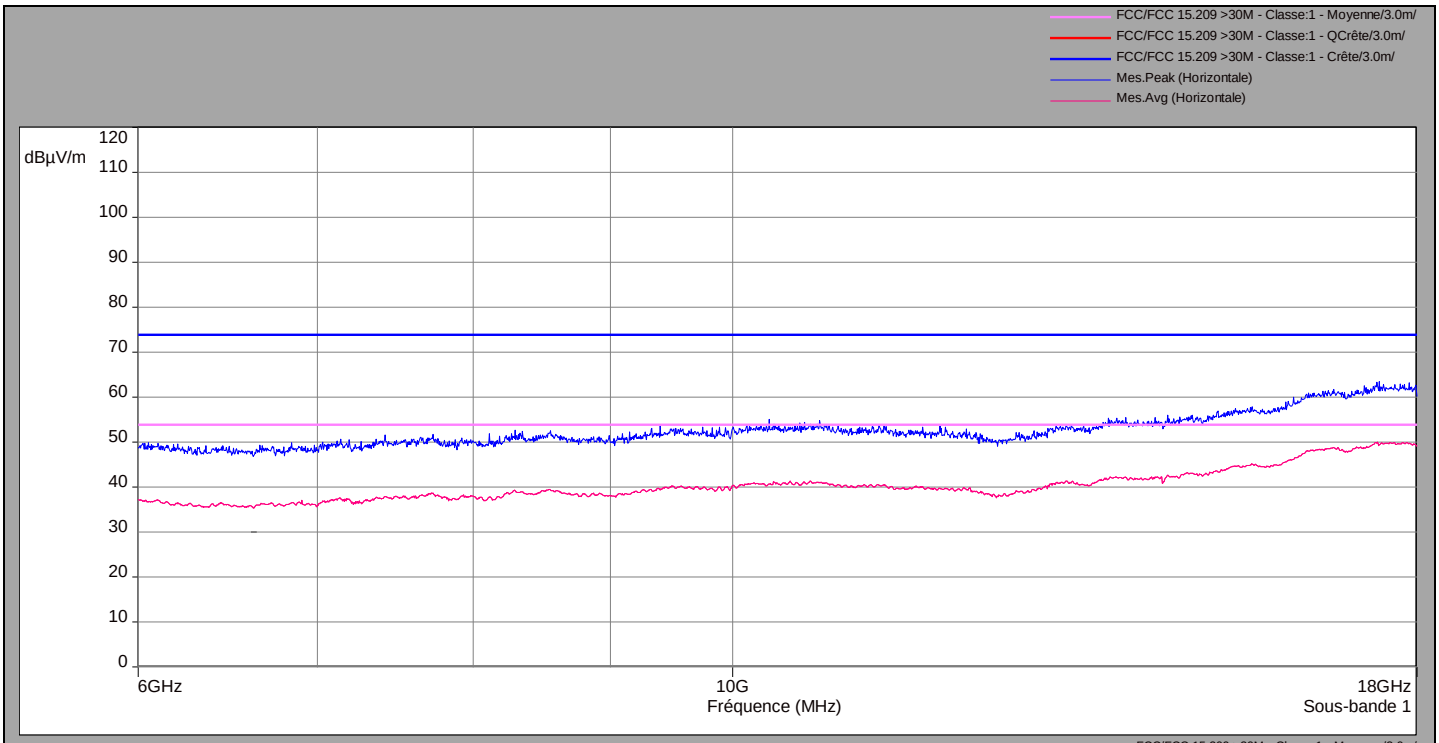




C1

Horizontal

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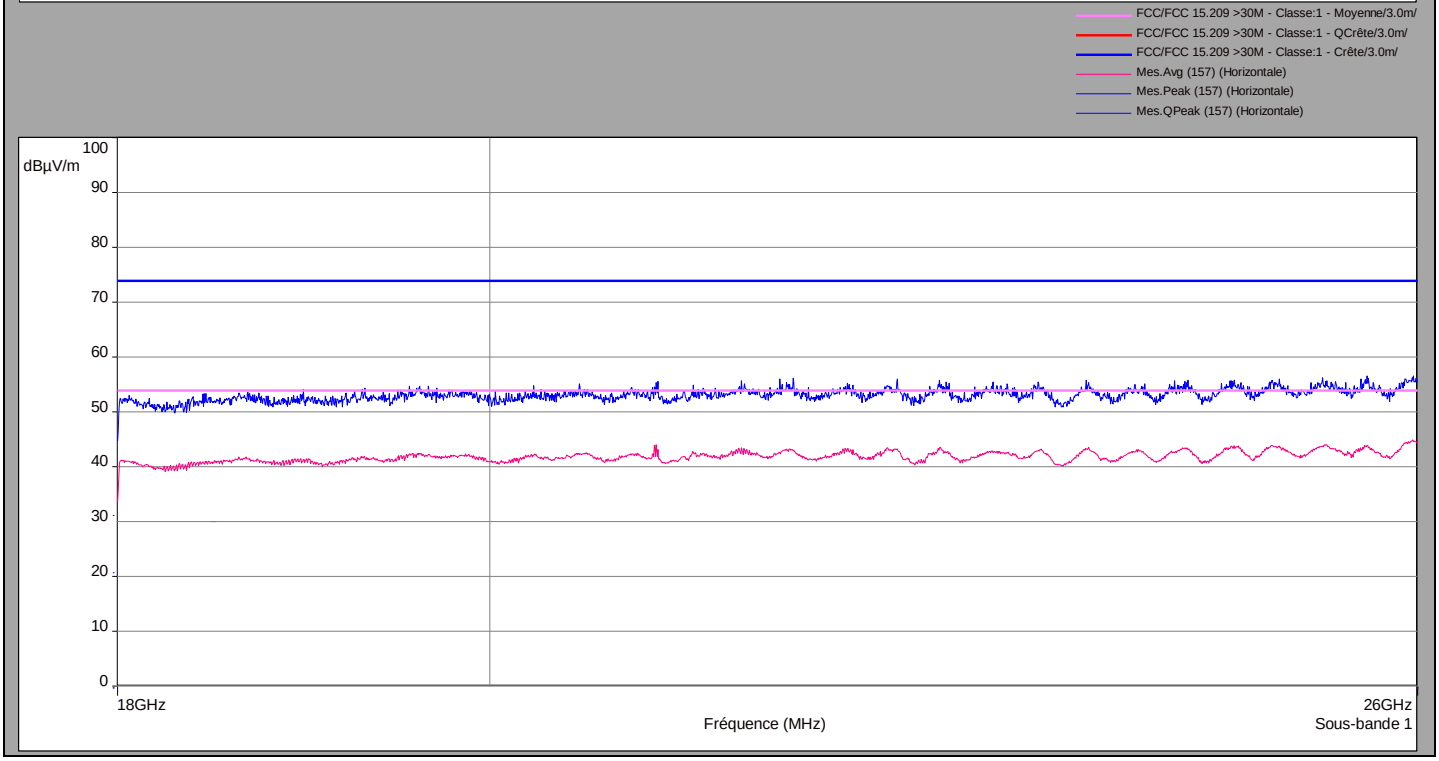
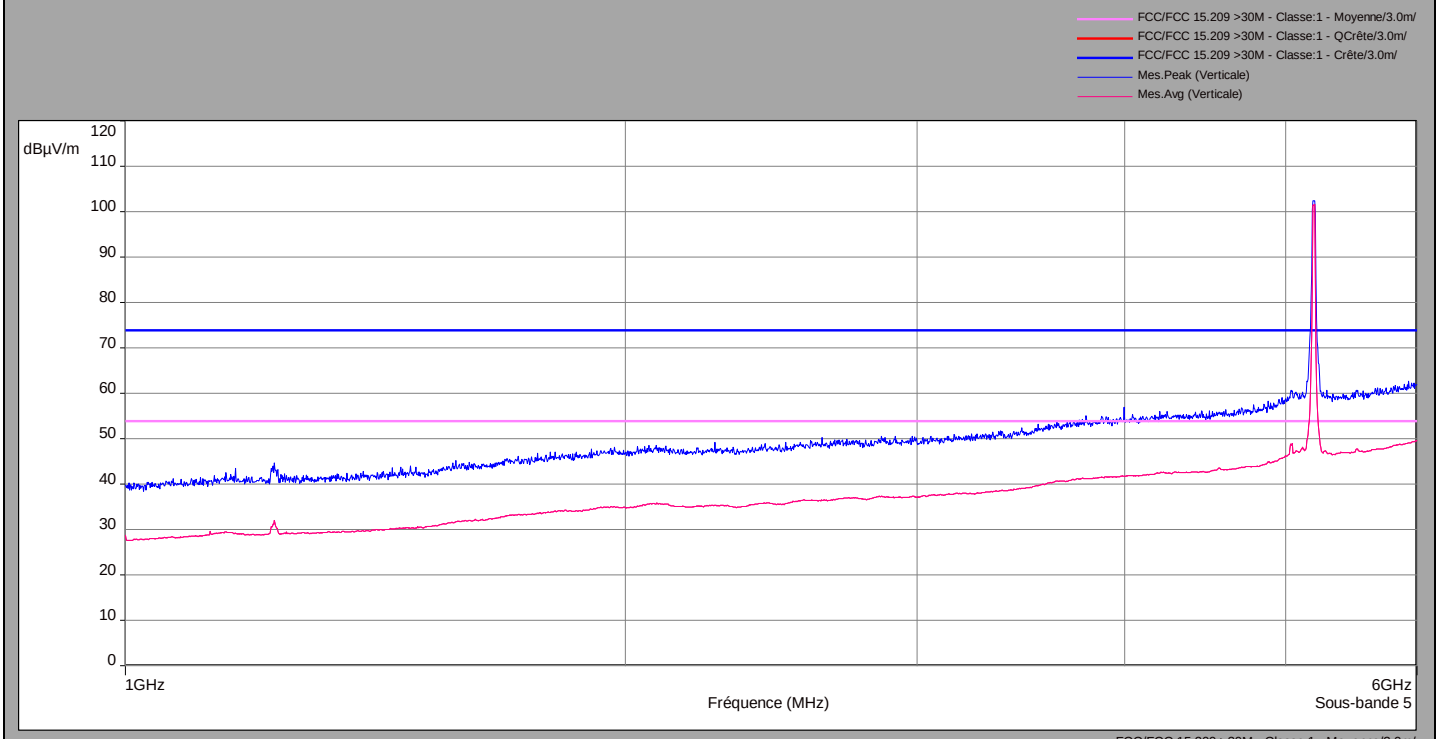
FCC/FCC 15.209 >30M - Classe:1 - QCrête/3.0m/
FCC/FCC 15.209 >30M - Classe:1 - Crête/3.0m/
Mes.Peak (Horizontale)
Mes.Avg (Horizontale)
dBµV/m
120
110
100
90
80
70
60
50
40
30
20
10
0
6GHz
10G
18GHz
Fréquence (MHz)
Sous-bande 1

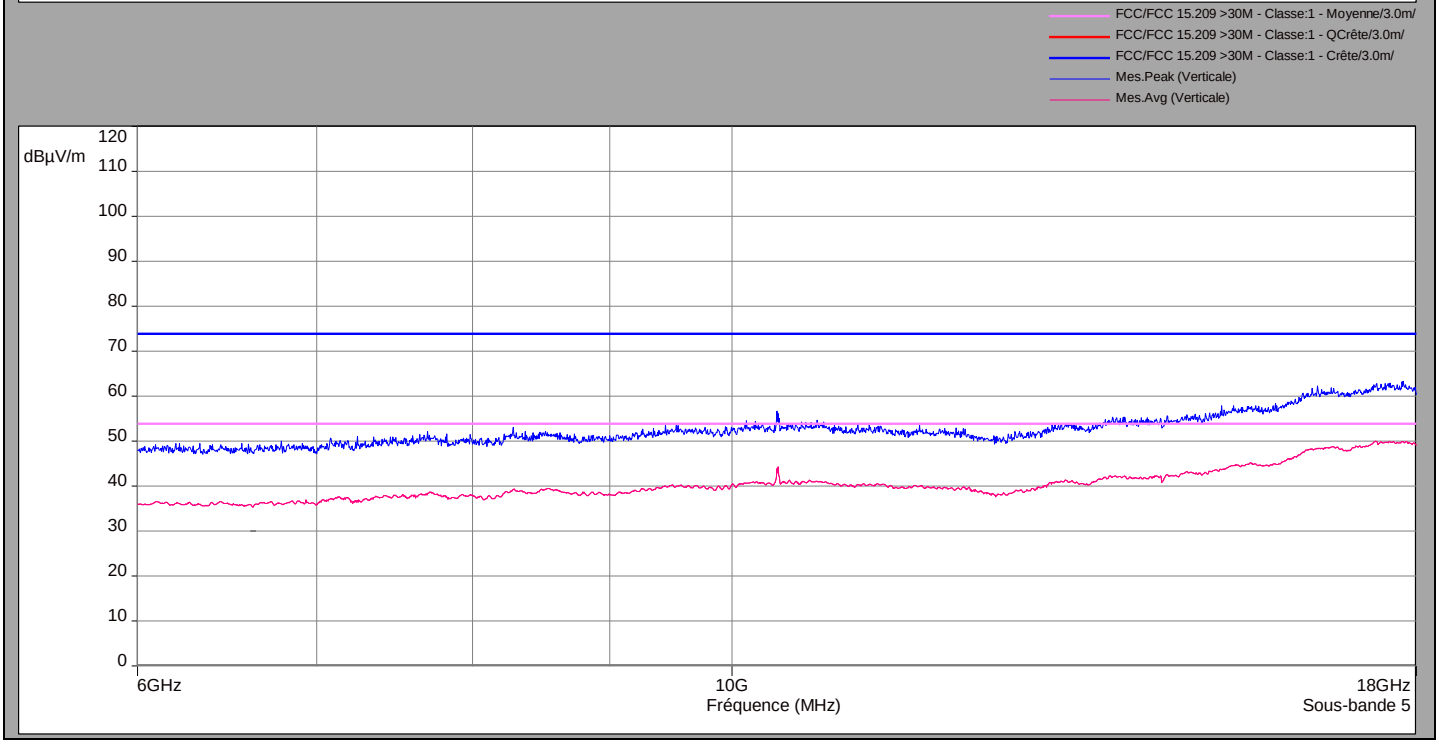

FCC/FCC 15.209 >30M - Classe:1 - Moyenne/3.0m/
FCC/FCC 15.209 >30M - Classe:1 - QCrête/3.0m/
FCC/FCC 15.209 >30M - Classe:1 - Crête/3.0m/
Mes.Avg (157) (Horizontale)
Mes.Peak (157) (Horizontale)
Mes.QPeak (157) (Horizontale)
dBµV/m
100
90
80
70
60
50
40
30
20
10
0
18GHz
26GHz
Fréquence (MHz)
Sous-bande 1

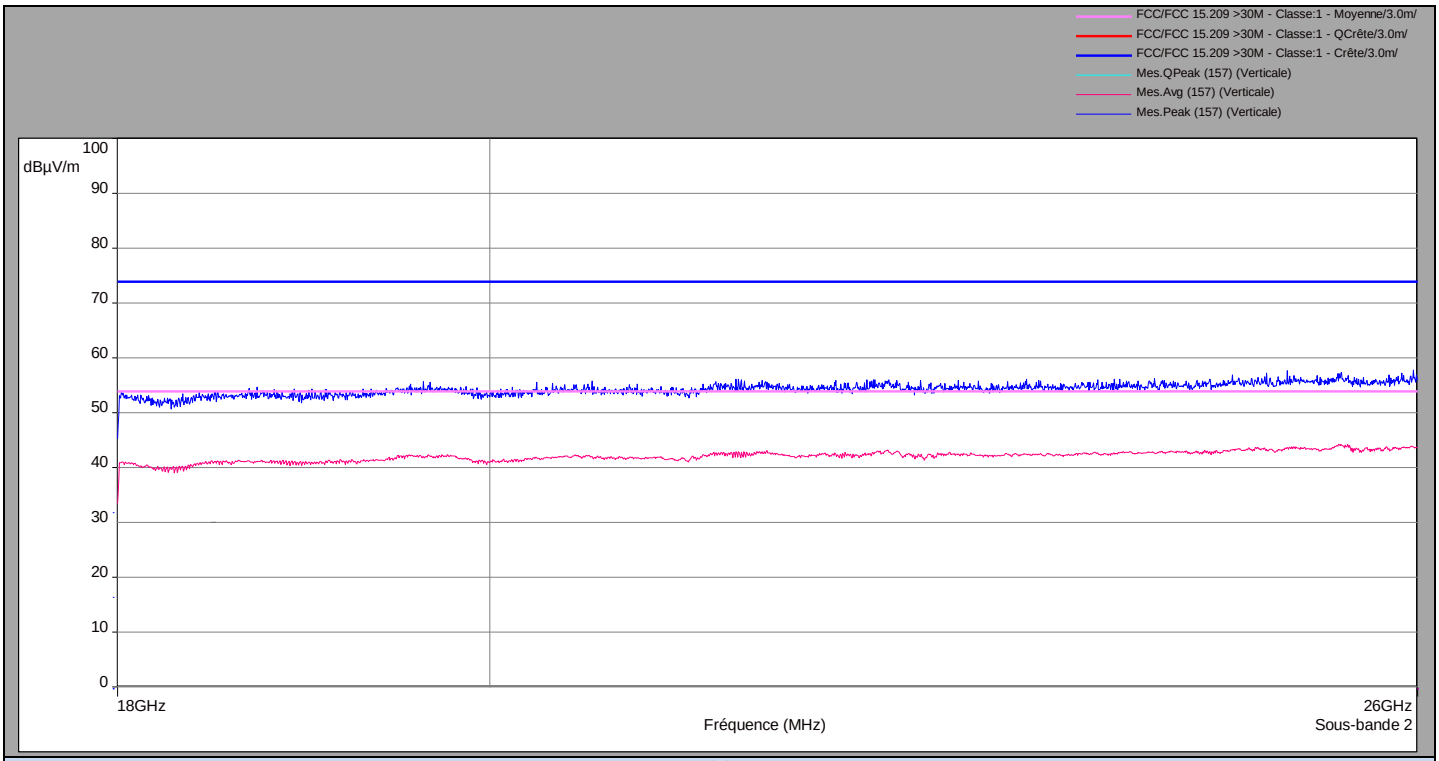
802.11a

C2

vertical

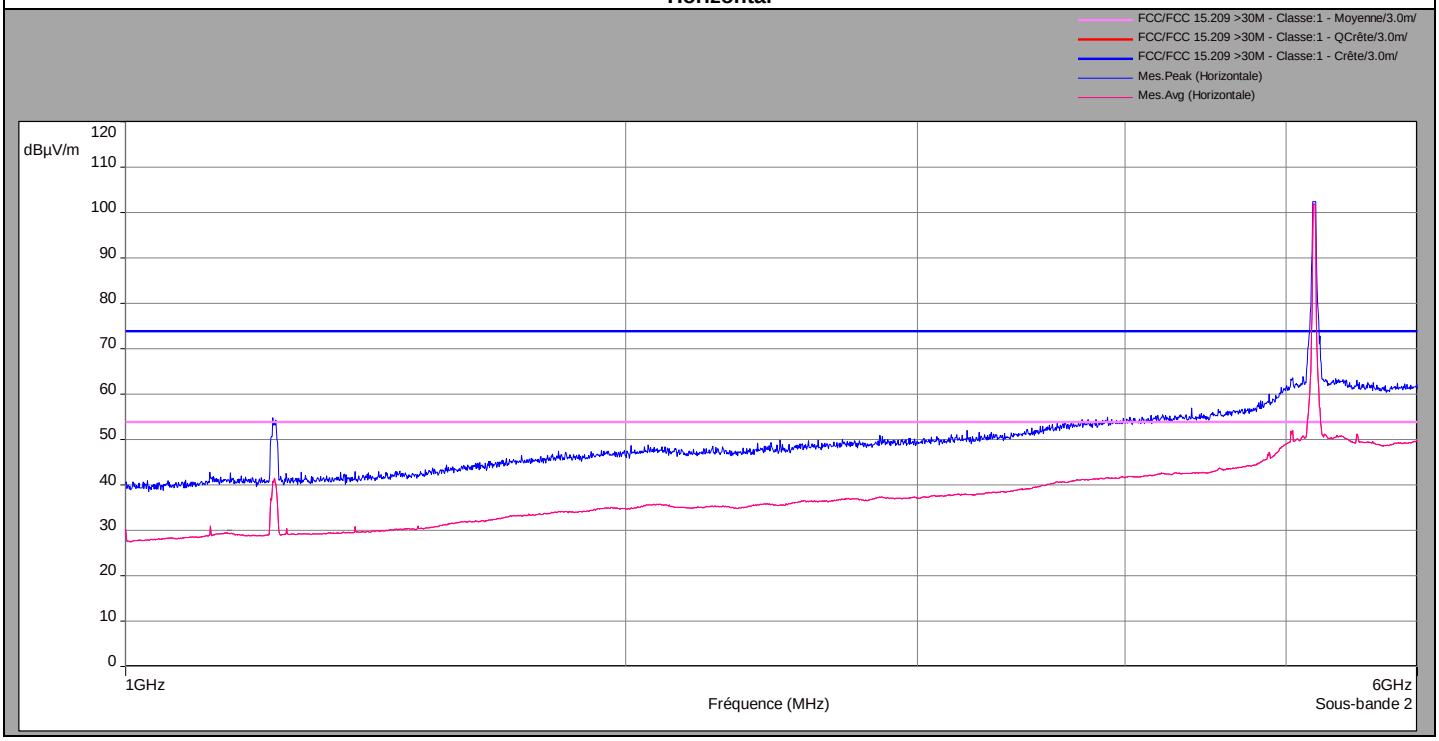


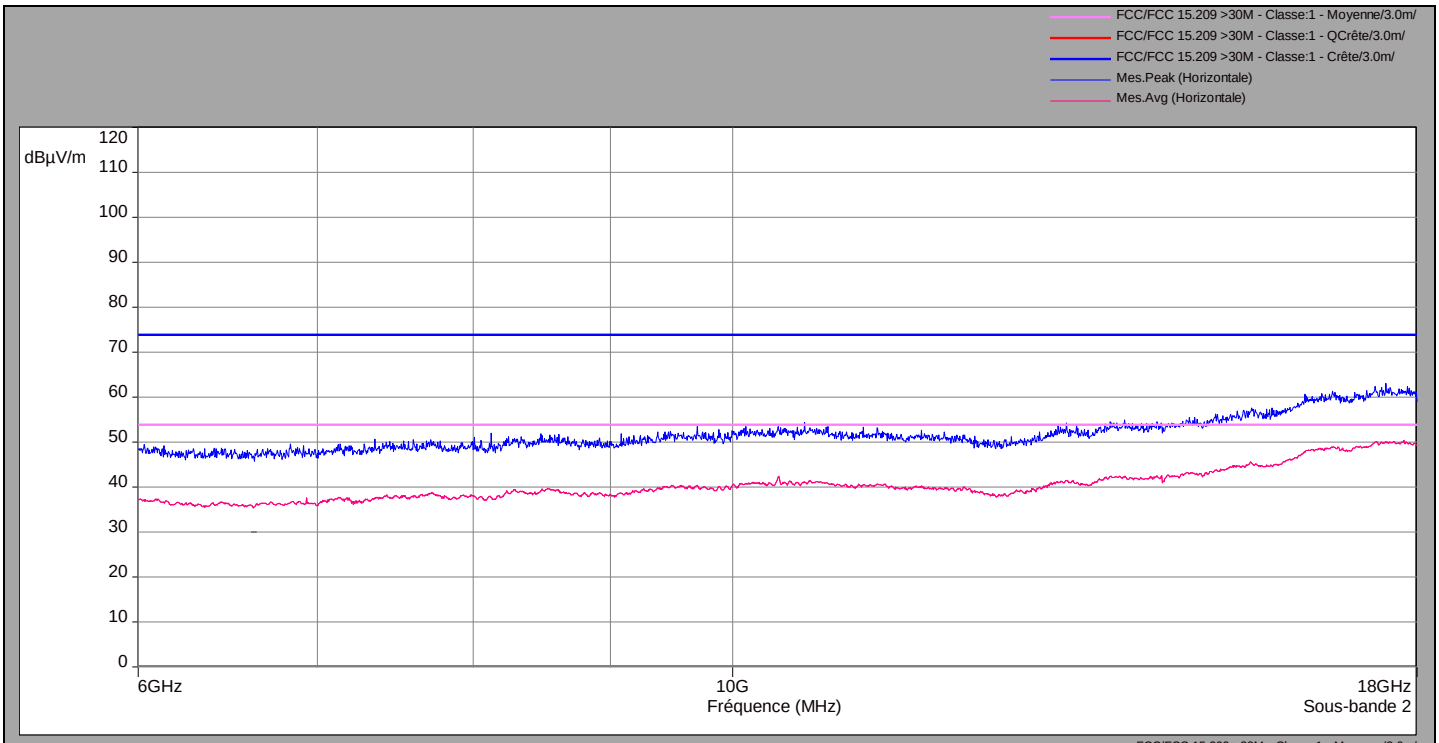


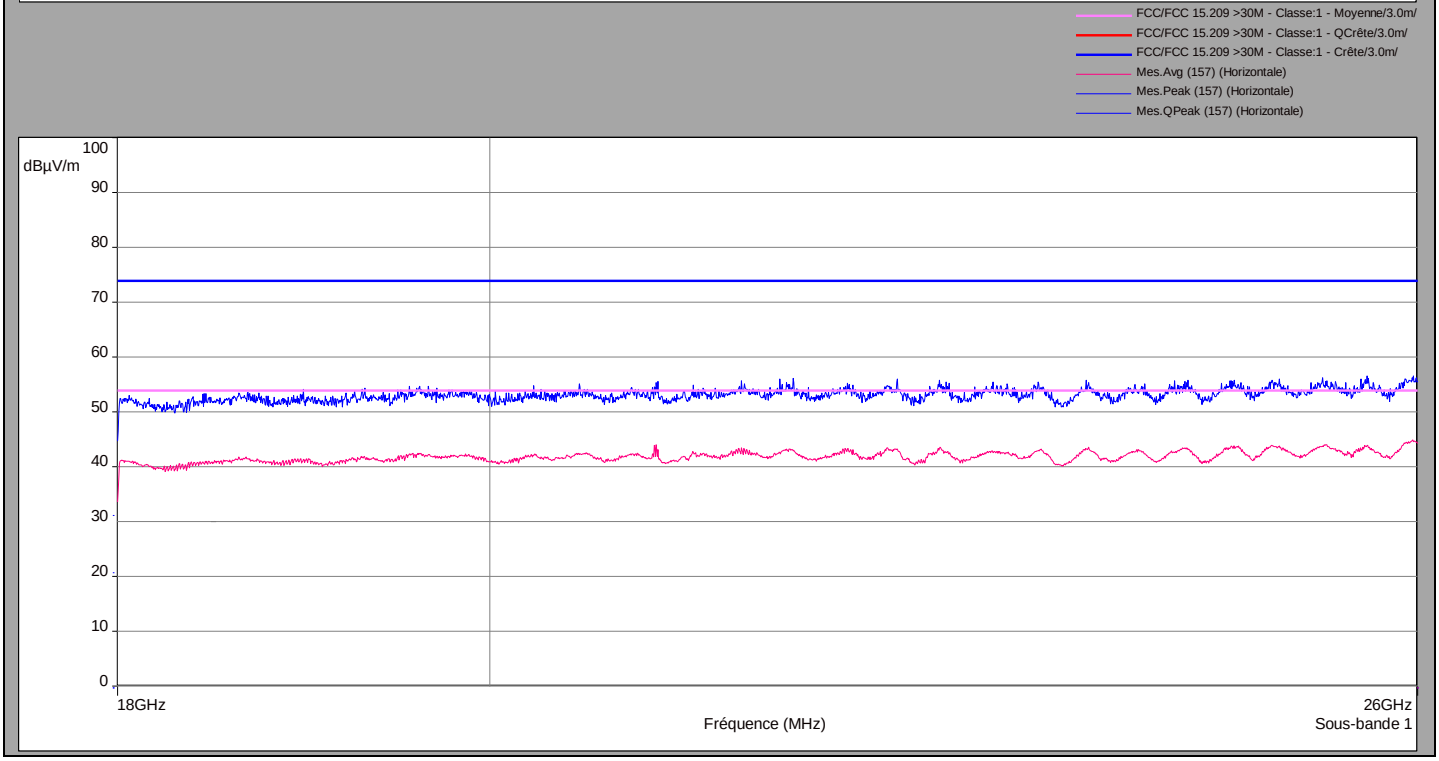


C2

Horizontal



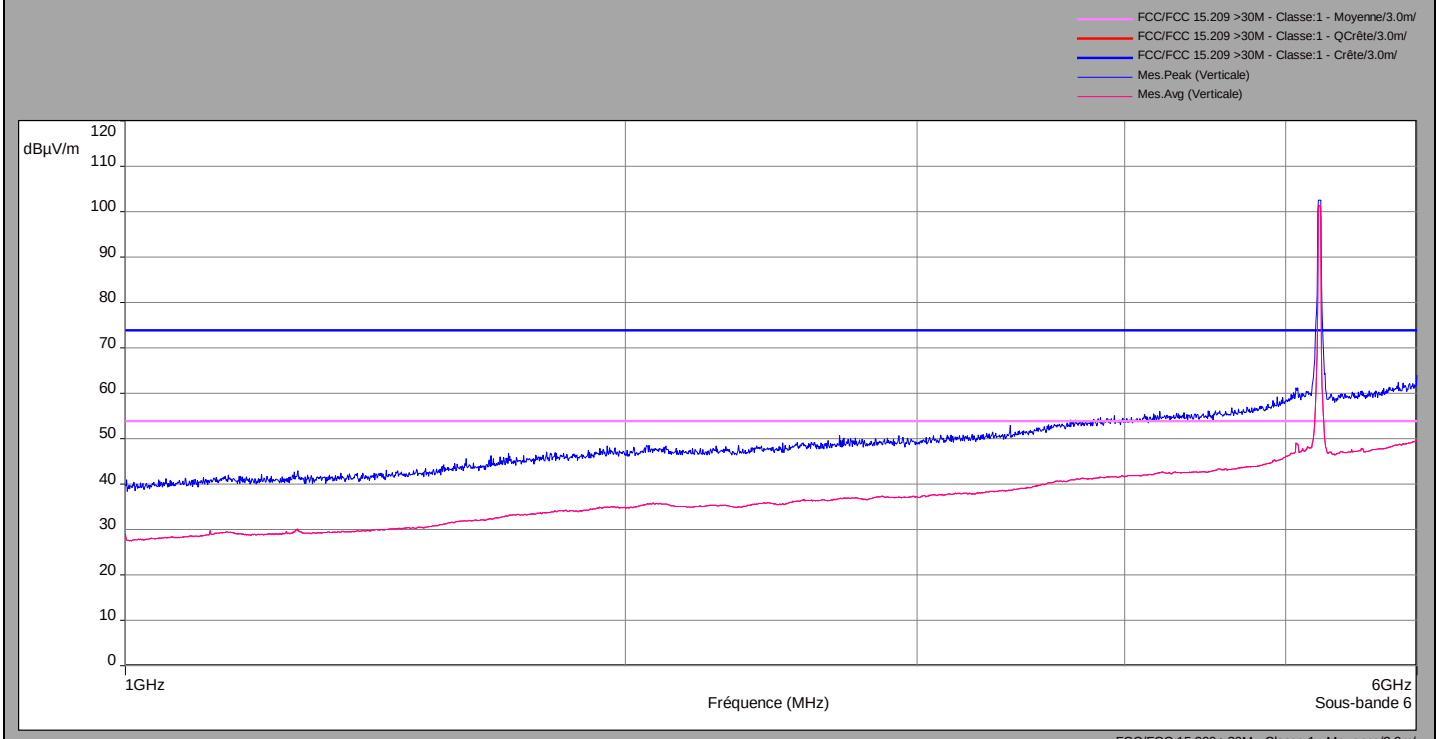

FCC/FCC 15.209 >30M - Classe:1 - Moyenne/3.0m/
FCC/FCC 15.209 >30M - Classe:1 - QCrête/3.0m/
FCC/FCC 15.209 >30M - Classe:1 - Crête/3.0m/
Mes.Peak (Horizontale)
Mes.Avg (Horizontale)
dBµV/m
120
110
100
90
80
70
60
50
40
30
20
10
0
6GHz
10G
18GHz
Fréquence (MHz)
Sous-bande 2

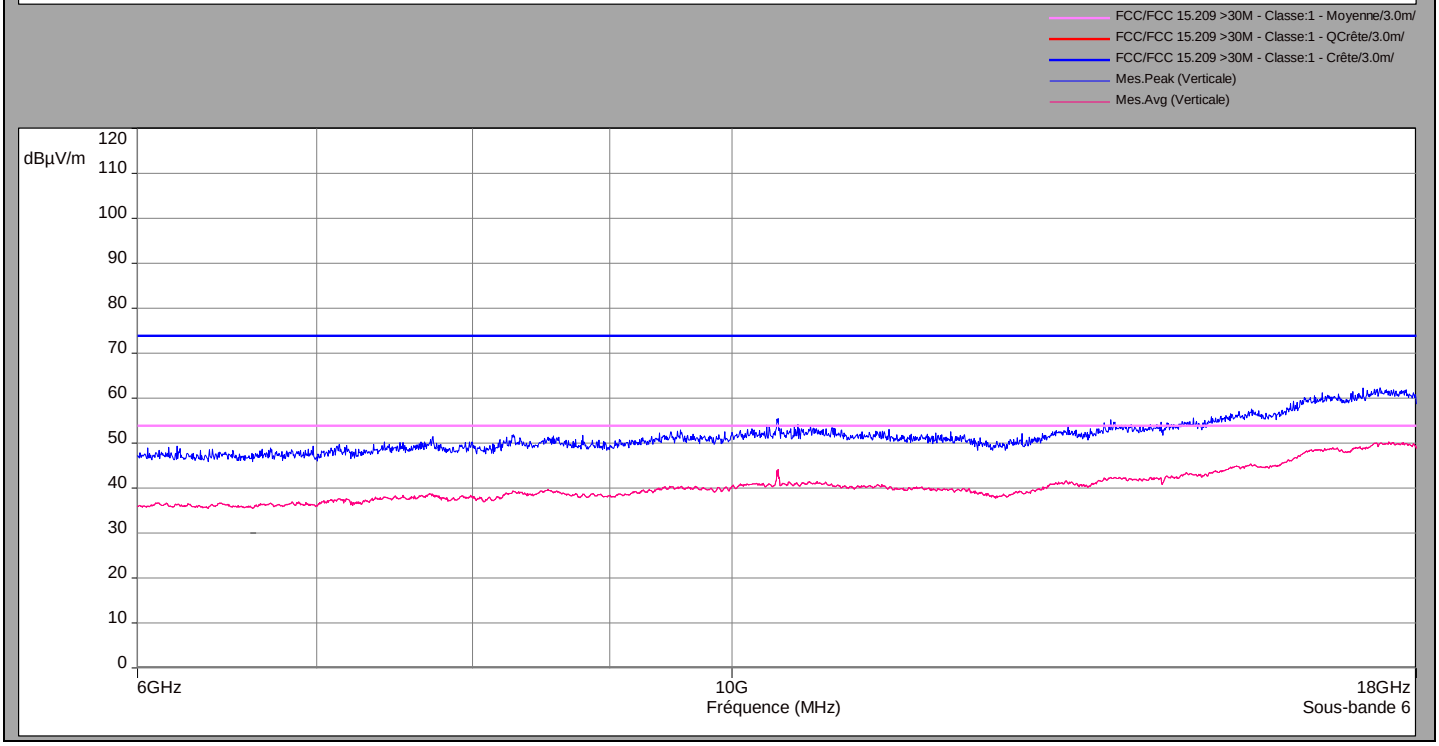

FCC/FCC 15.209 >30M - Classe:1 - Moyenne/3.0m/
FCC/FCC 15.209 >30M - Classe:1 - QCrête/3.0m/
FCC/FCC 15.209 >30M - Classe:1 - Crête/3.0m/
Mes.Avg (157) (Horizontale)
Mes.Peak (157) (Horizontale)
Mes.QPeak (157) (Horizontale)
dBµV/m
100
90
80
70
60
50
40
30
20
10
0
18GHz
26GHz
Fréquence (MHz)
Sous-bande 1

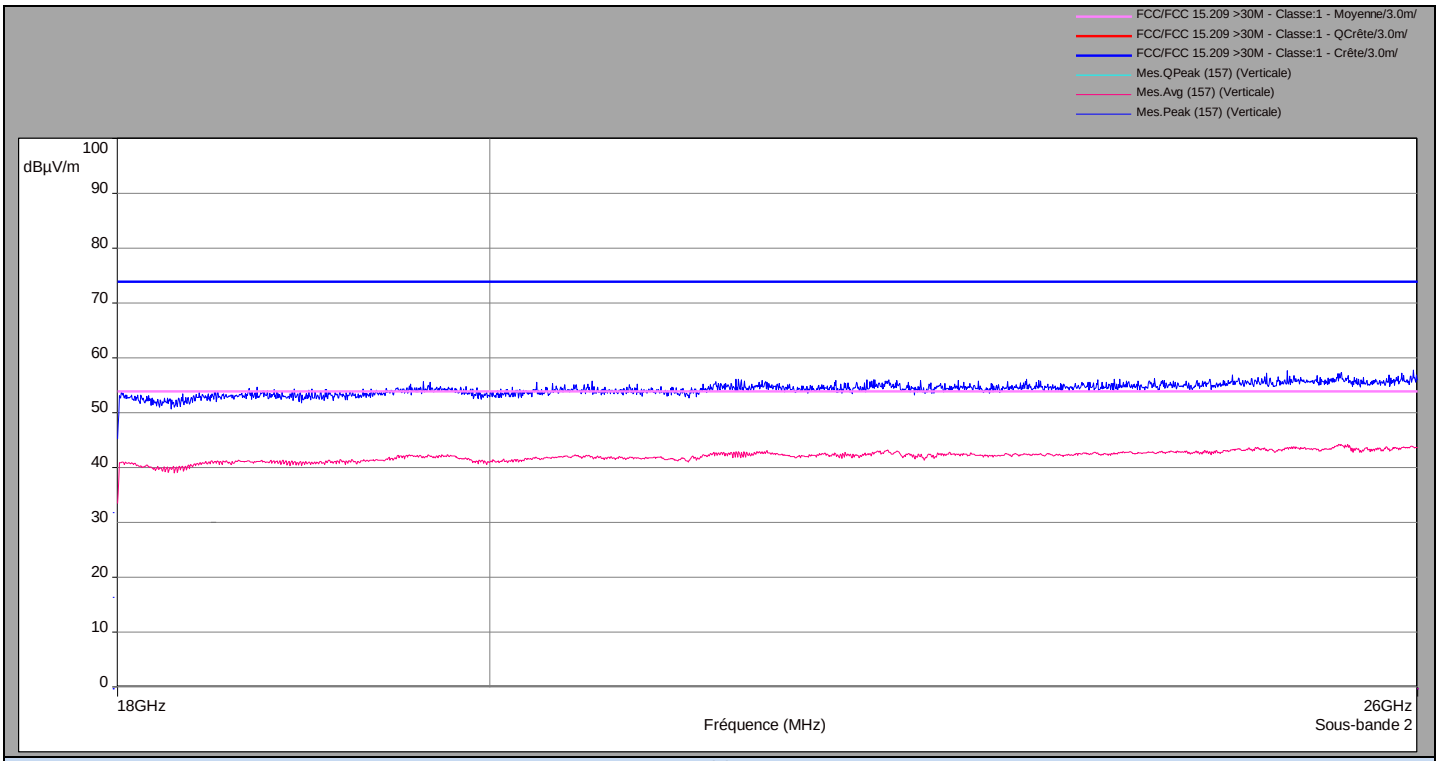
802.11a

C3

vertical

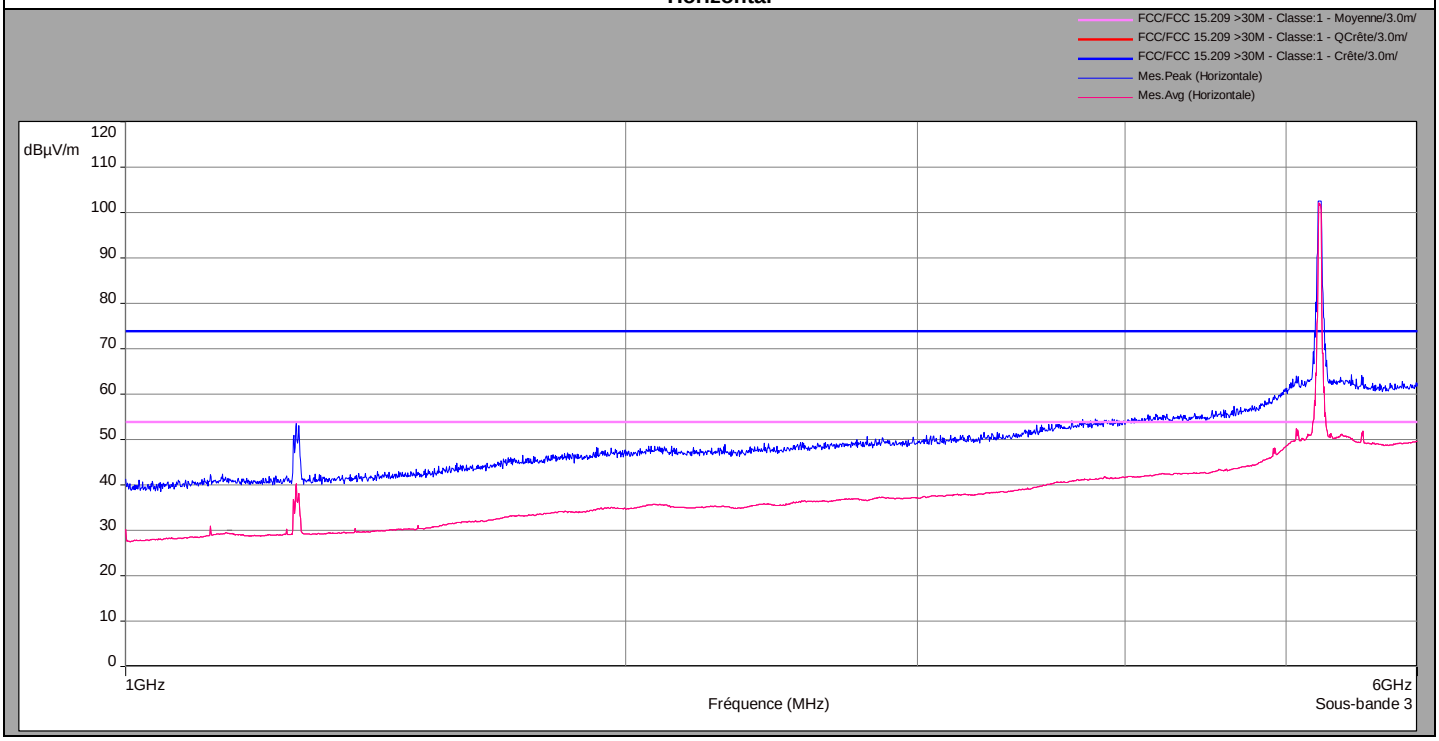


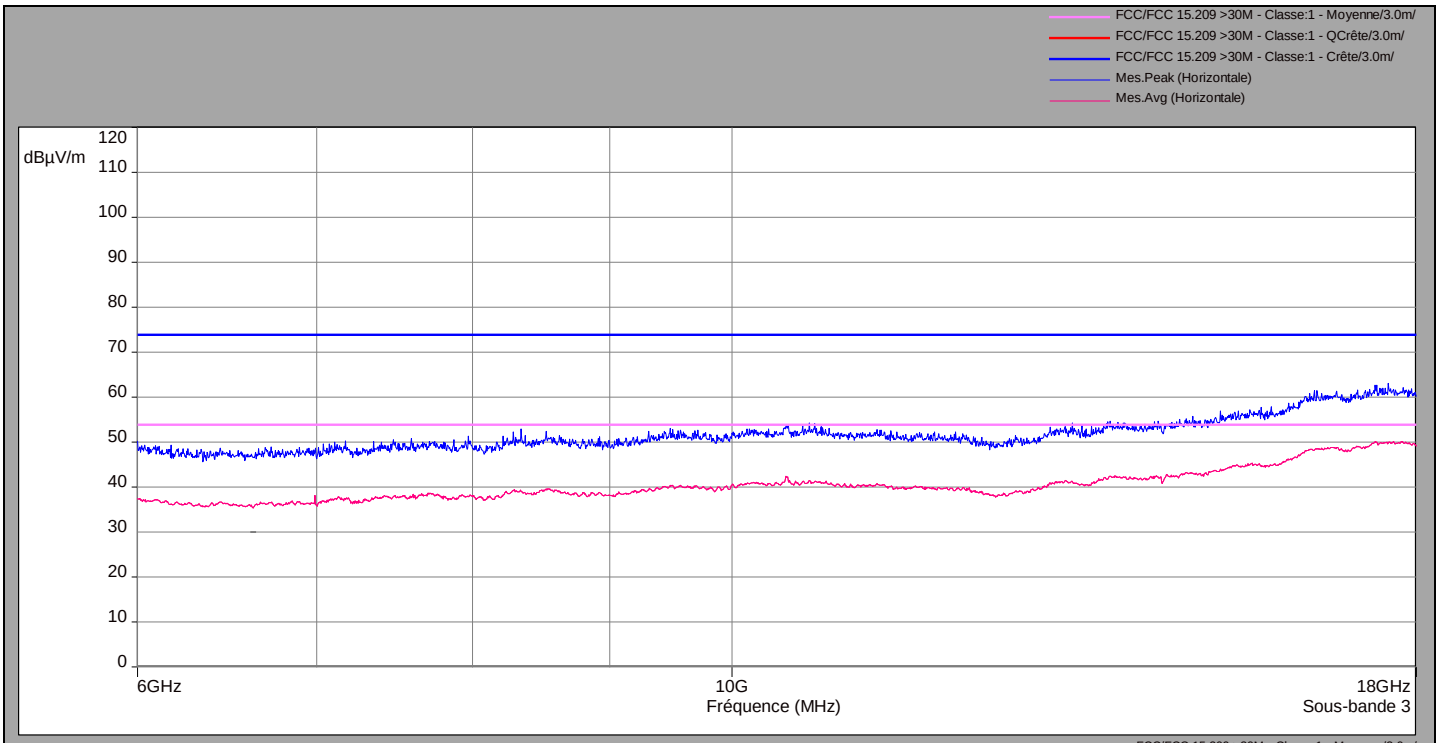


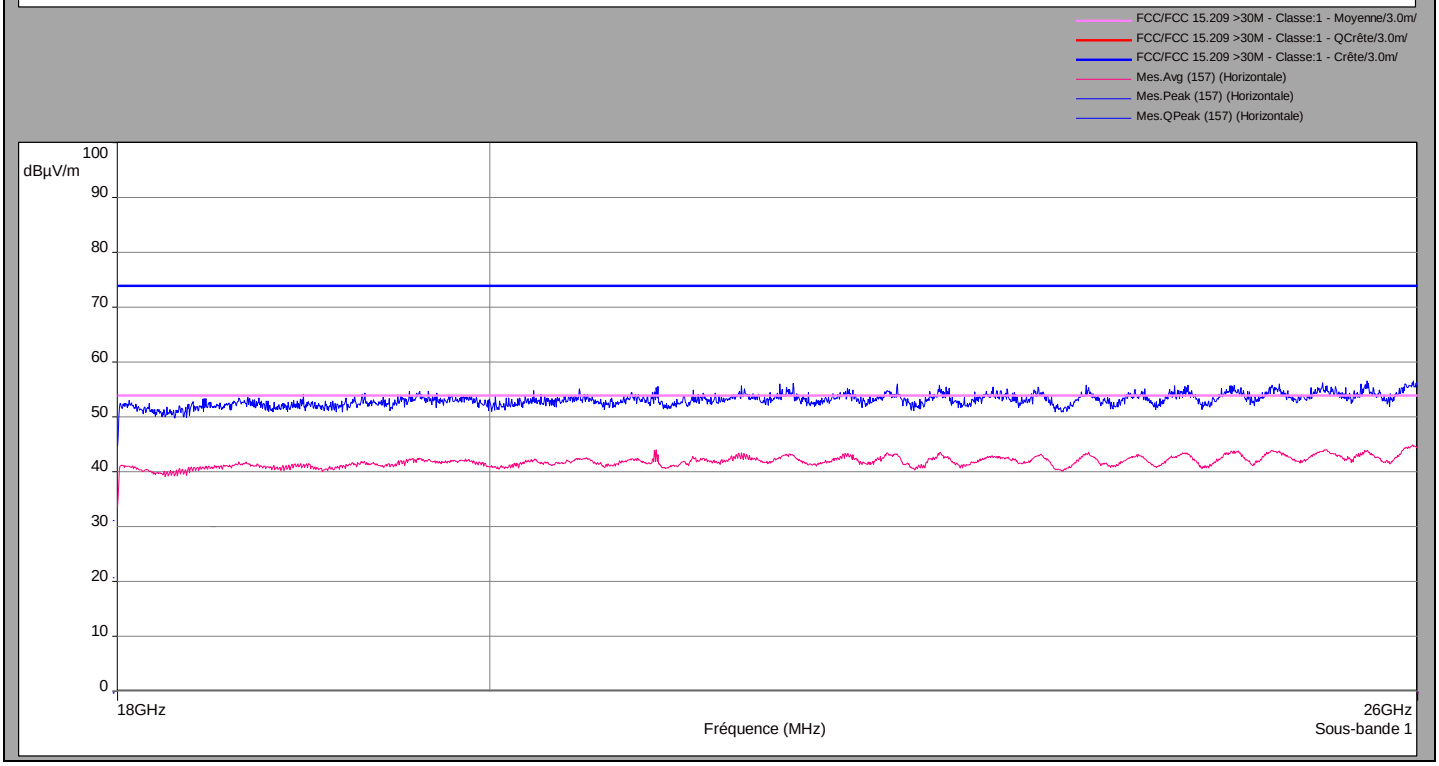


C3

Horizontal



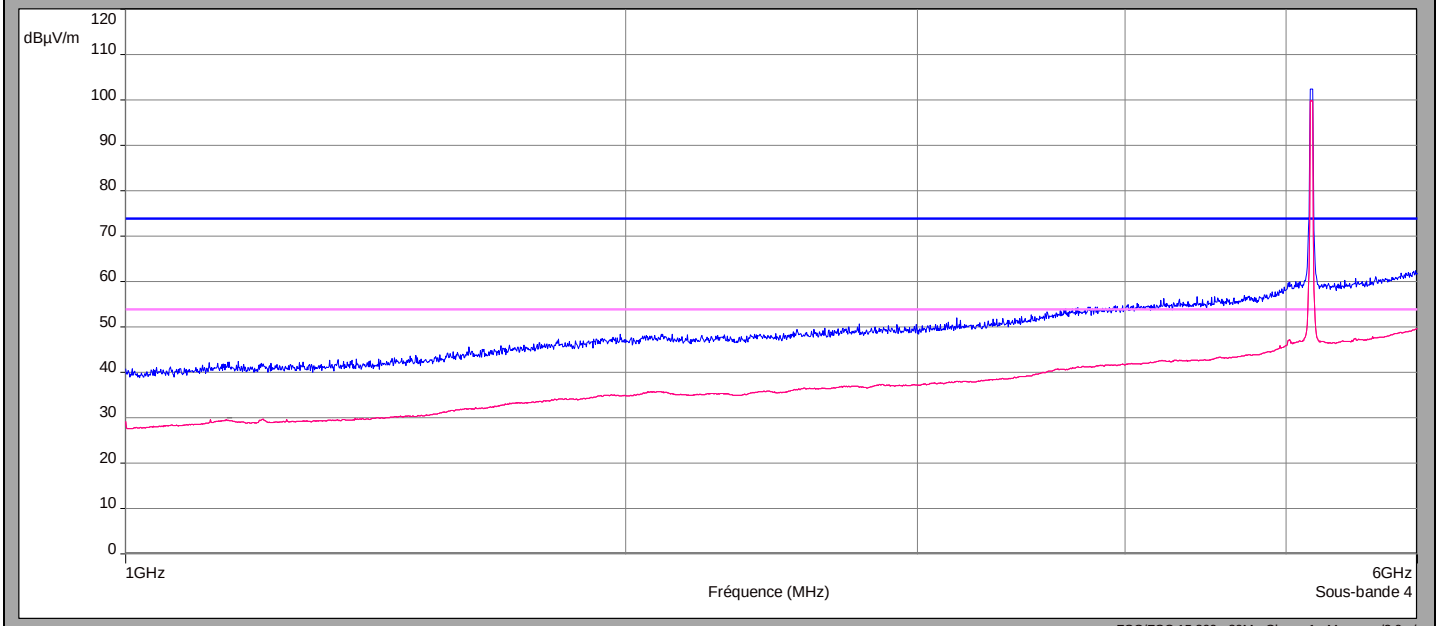

FCC/FCC 15.209 >30M - Classe:1 - Moyenne/3.0m/
FCC/FCC 15.209 >30M - Classe:1 - QCrête/3.0m/
FCC/FCC 15.209 >30M - Classe:1 - Crête/3.0m/
Mes.Peak (Horizontale)
Mes.Avg (Horizontale)
dBµV/m
120
110
100
90
80
70
60
50
40
30
20
10
0
6GHz
10G
18GHz
Fréquence (MHz)
Sous-bande 3

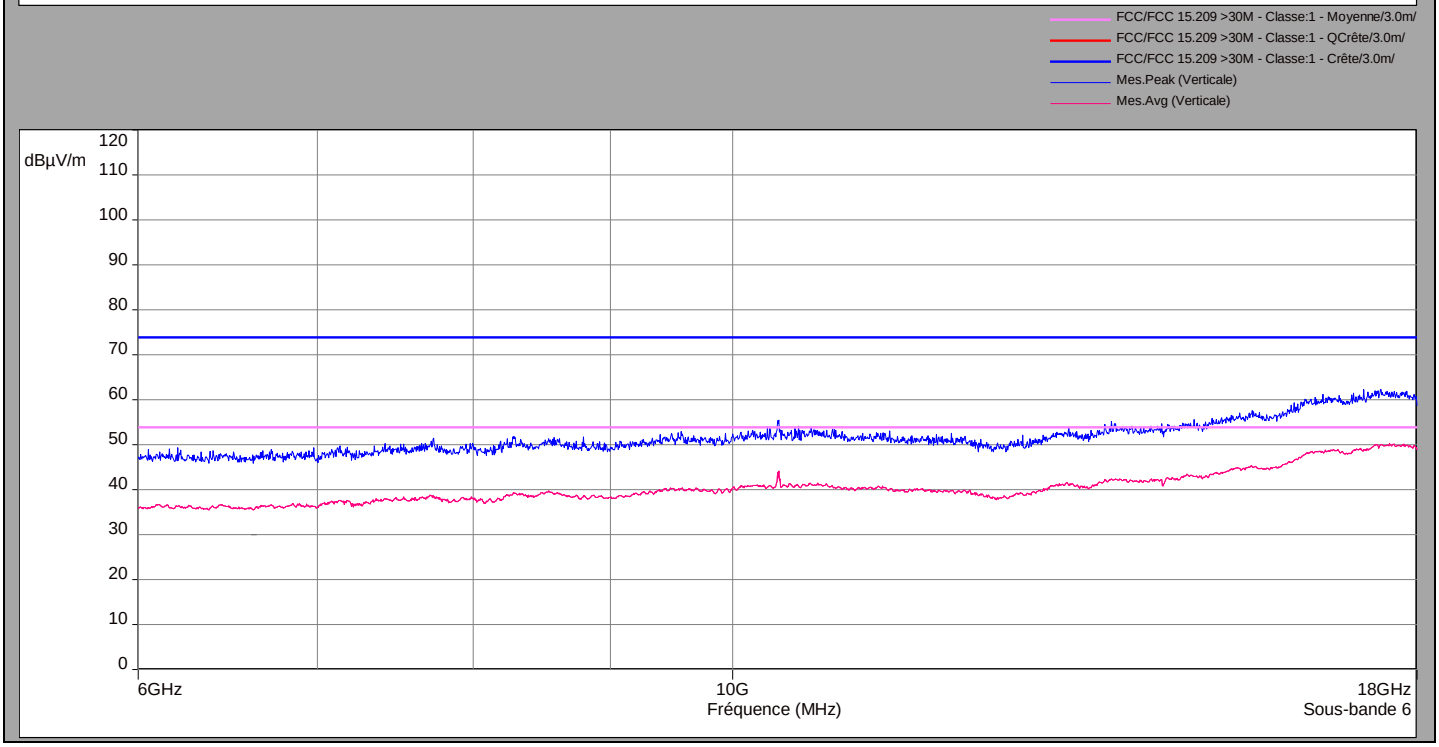

FCC/FCC 15.209 >30M - Classe:1 - Moyenne/3.0m/
FCC/FCC 15.209 >30M - Classe:1 - QCrête/3.0m/
FCC/FCC 15.209 >30M - Classe:1 - Crête/3.0m/
Mes.Avg (157) (Horizontale)
Mes.Peak (157) (Horizontale)
Mes.QPeak (157) (Horizontale)
dBµV/m
100
90
80
70
60
50
40
30
20
10
0
18GHz
26GHz
Fréquence (MHz)
Sous-bande 1

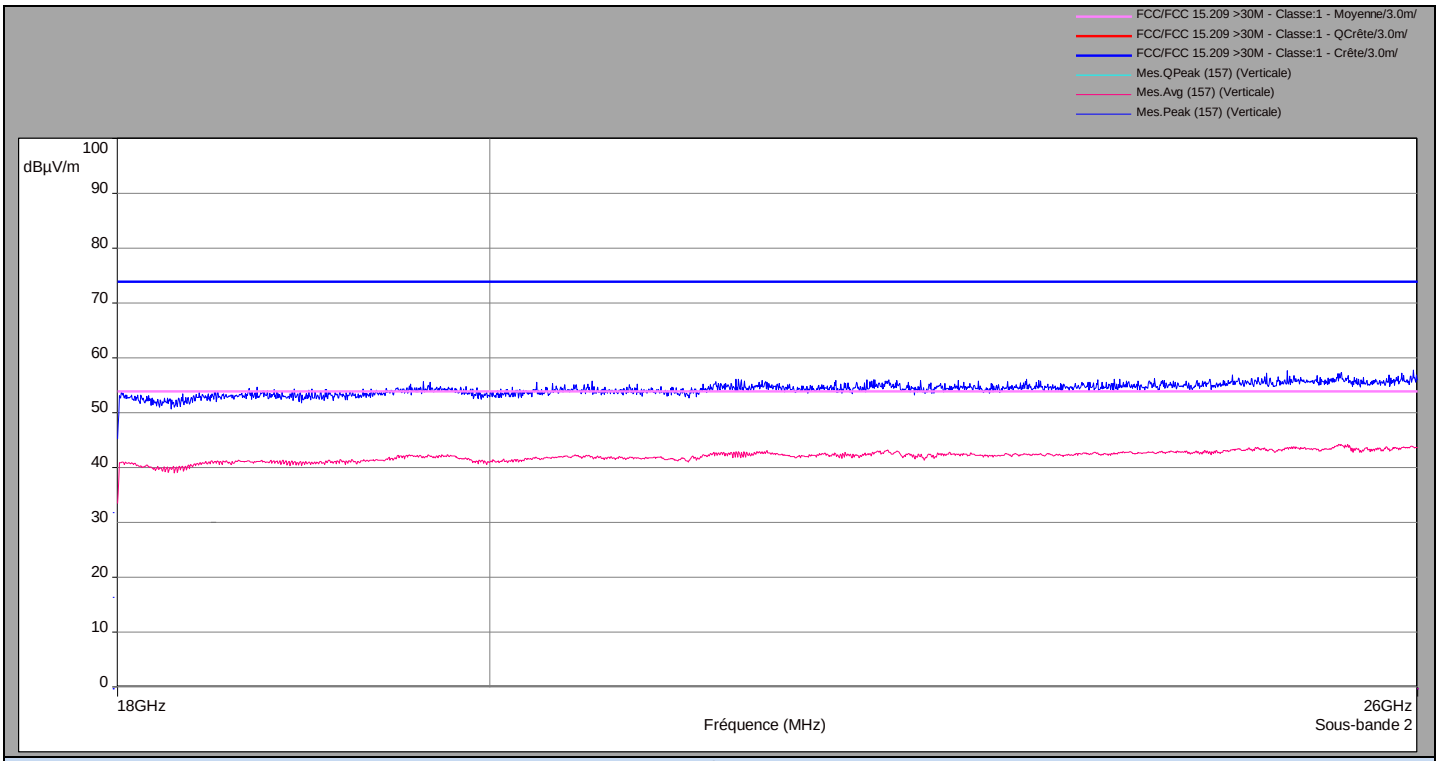
802.11 n HT20

C1

vertical

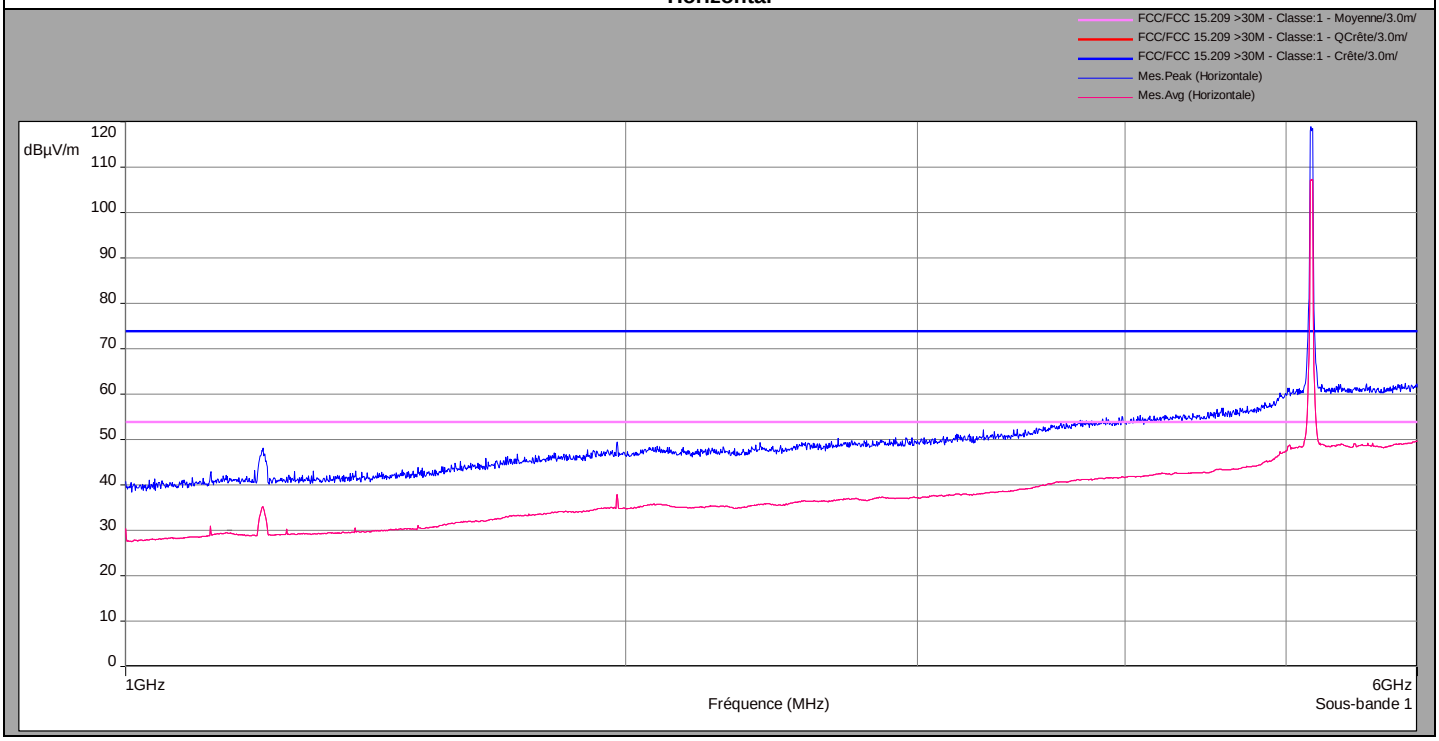


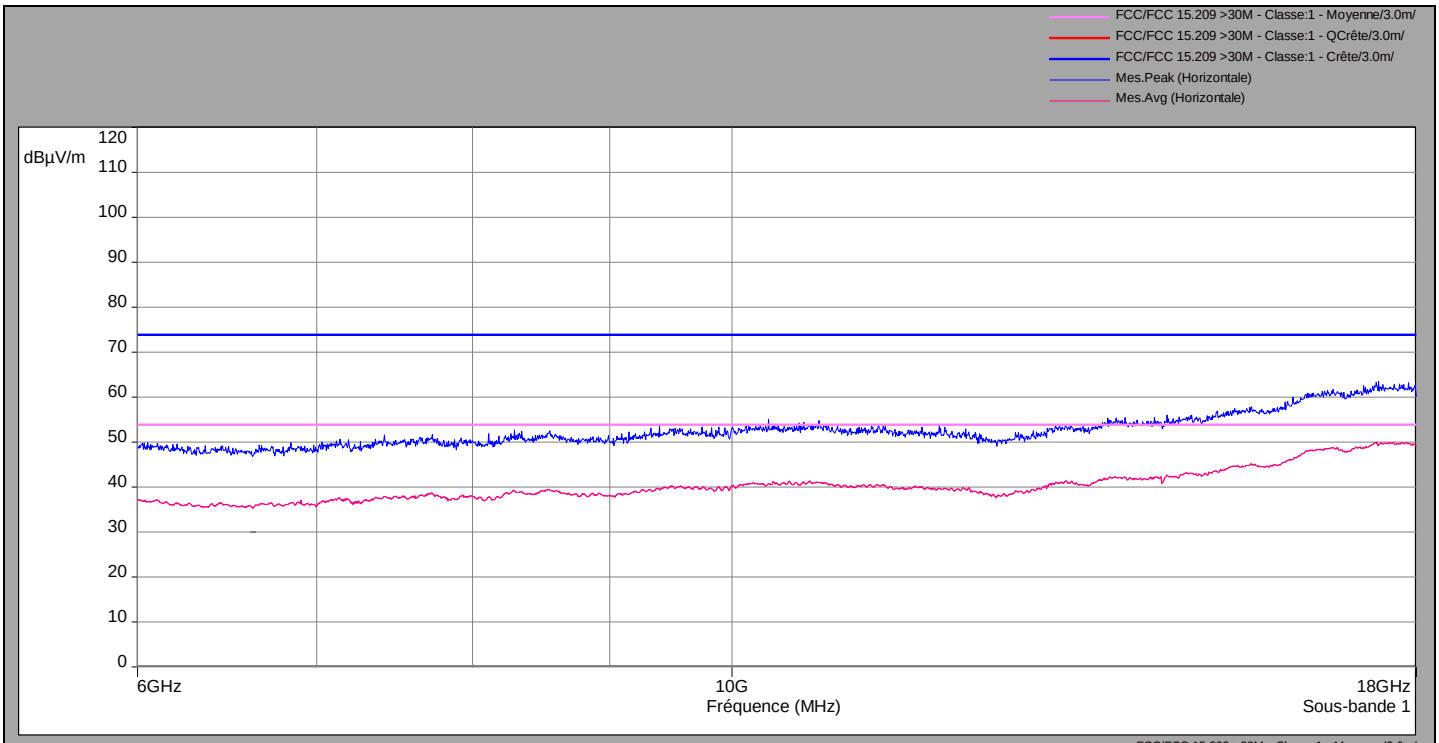


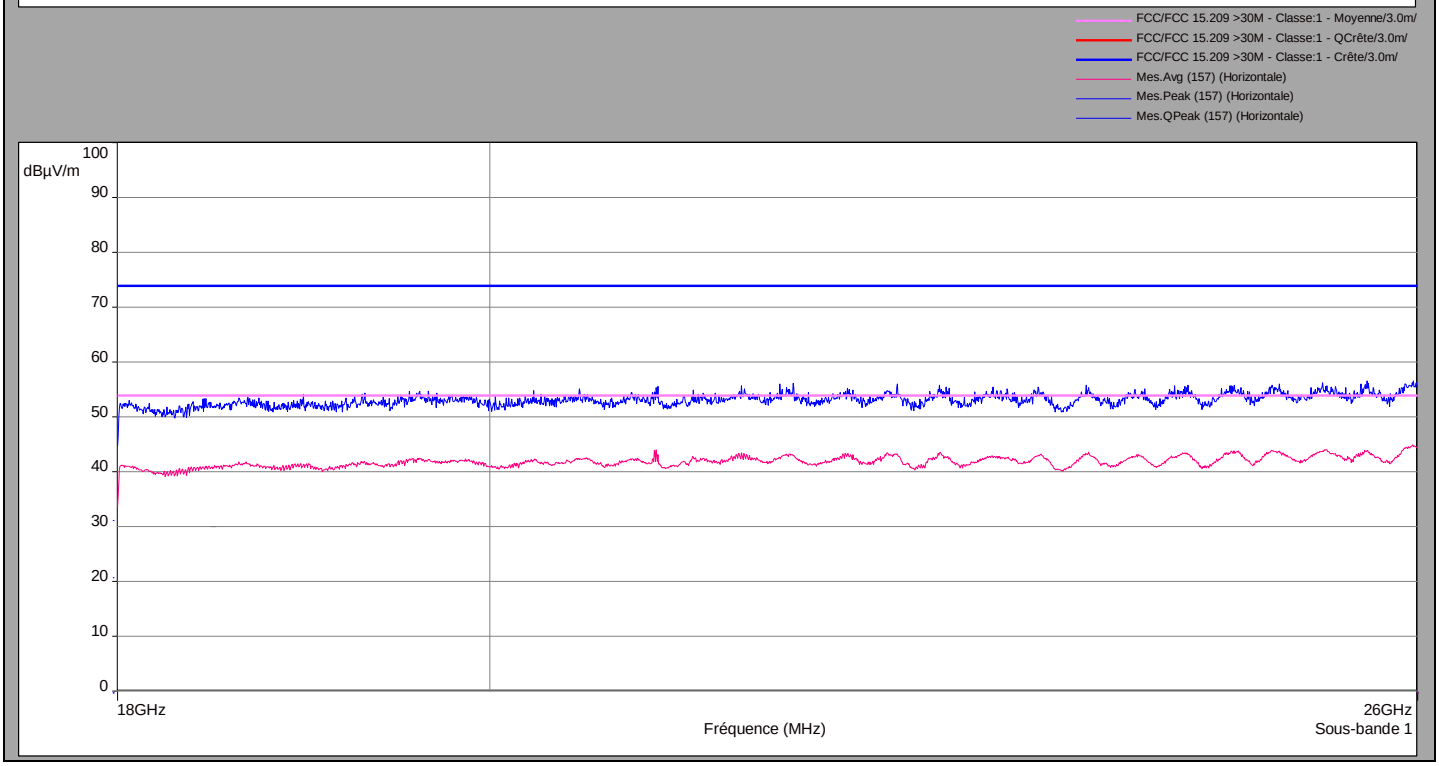


C1

Horizontal



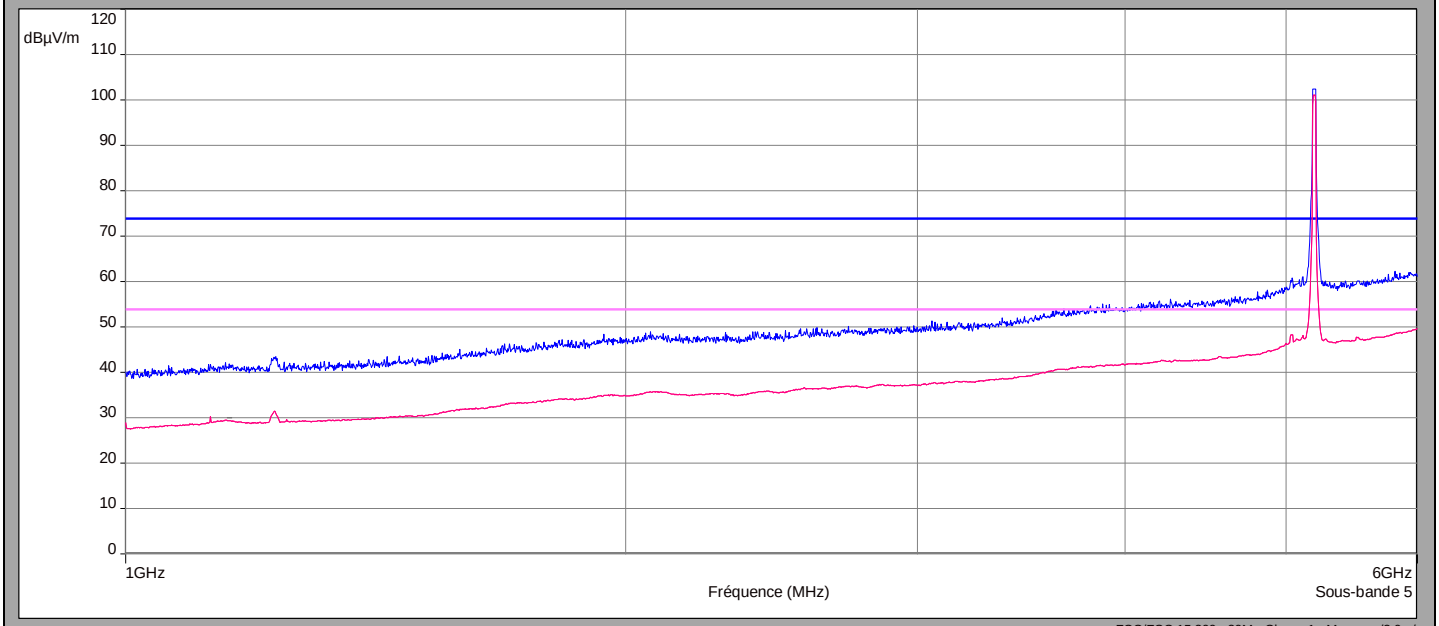

FCC/FCC 15.209 >30M - Classe:1 - Moyenne/3.0m/
FCC/FCC 15.209 >30M - Classe:1 - QCrête/3.0m/
FCC/FCC 15.209 >30M - Classe:1 - Crête/3.0m/
Mes.Peak (Horizontale)
Mes.Avg (Horizontale)
dBµV/m
120
110
100
90
80
70
60
50
40
30
20
10
0
6GHz
10G
18GHz
Fréquence (MHz)
Sous-bande 1

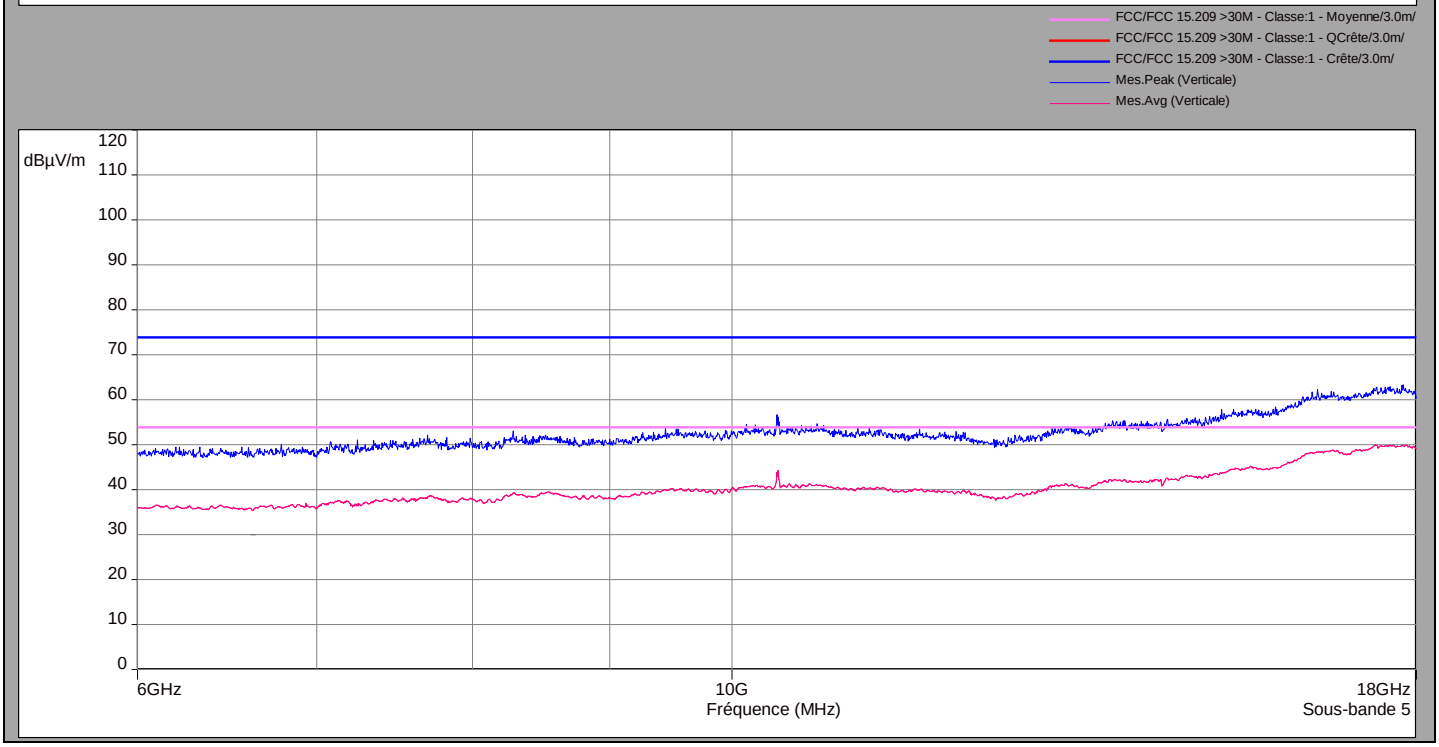

FCC/FCC 15.209 >30M - Classe:1 - Moyenne/3.0m/
FCC/FCC 15.209 >30M - Classe:1 - QCrête/3.0m/
FCC/FCC 15.209 >30M - Classe:1 - Crête/3.0m/
Mes.Avg (157) (Horizontale)
Mes.Peak (157) (Horizontale)
Mes.QPeak (157) (Horizontale)
dBµV/m
100
90
80
70
60
50
40
30
20
10
0
18GHz
26GHz
Fréquence (MHz)
Sous-bande 1

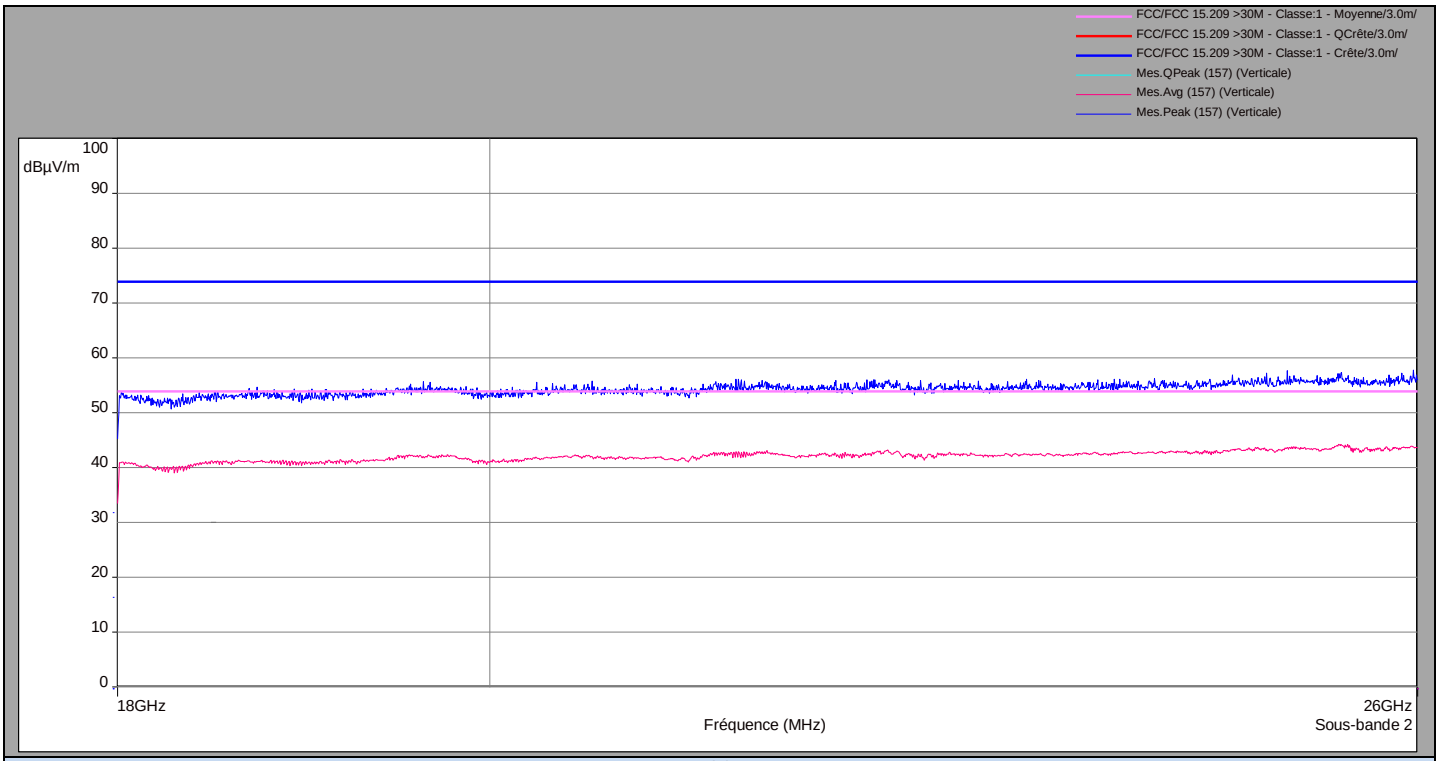
802.11 n HT20

C2

vertical

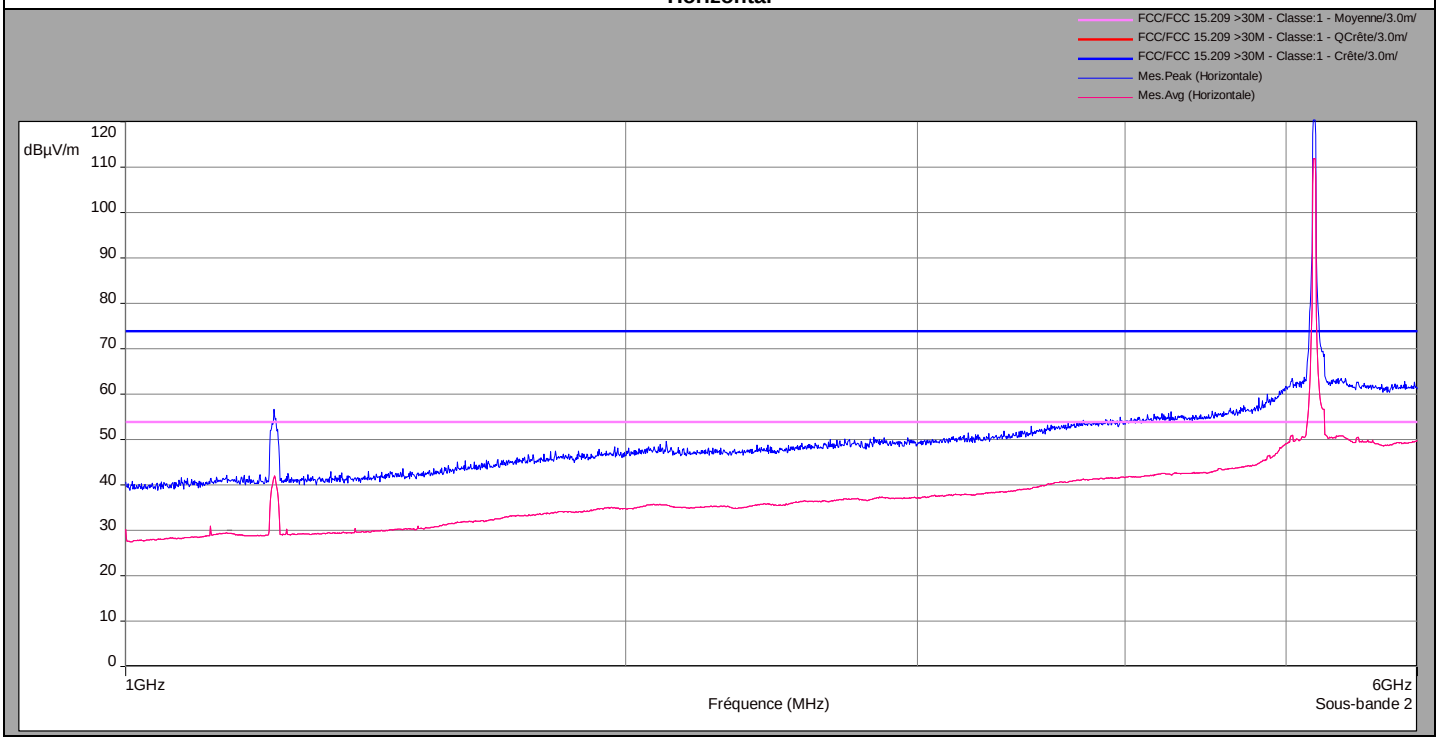


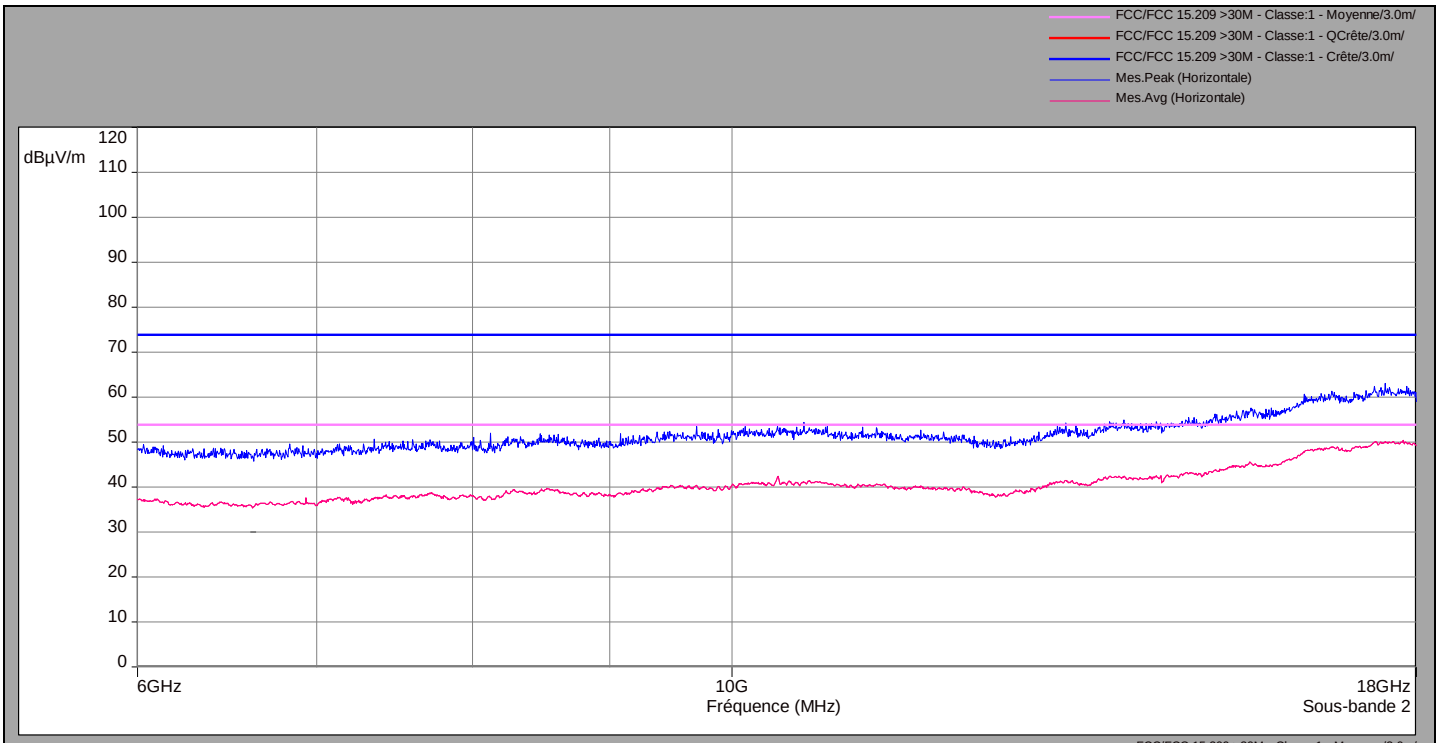


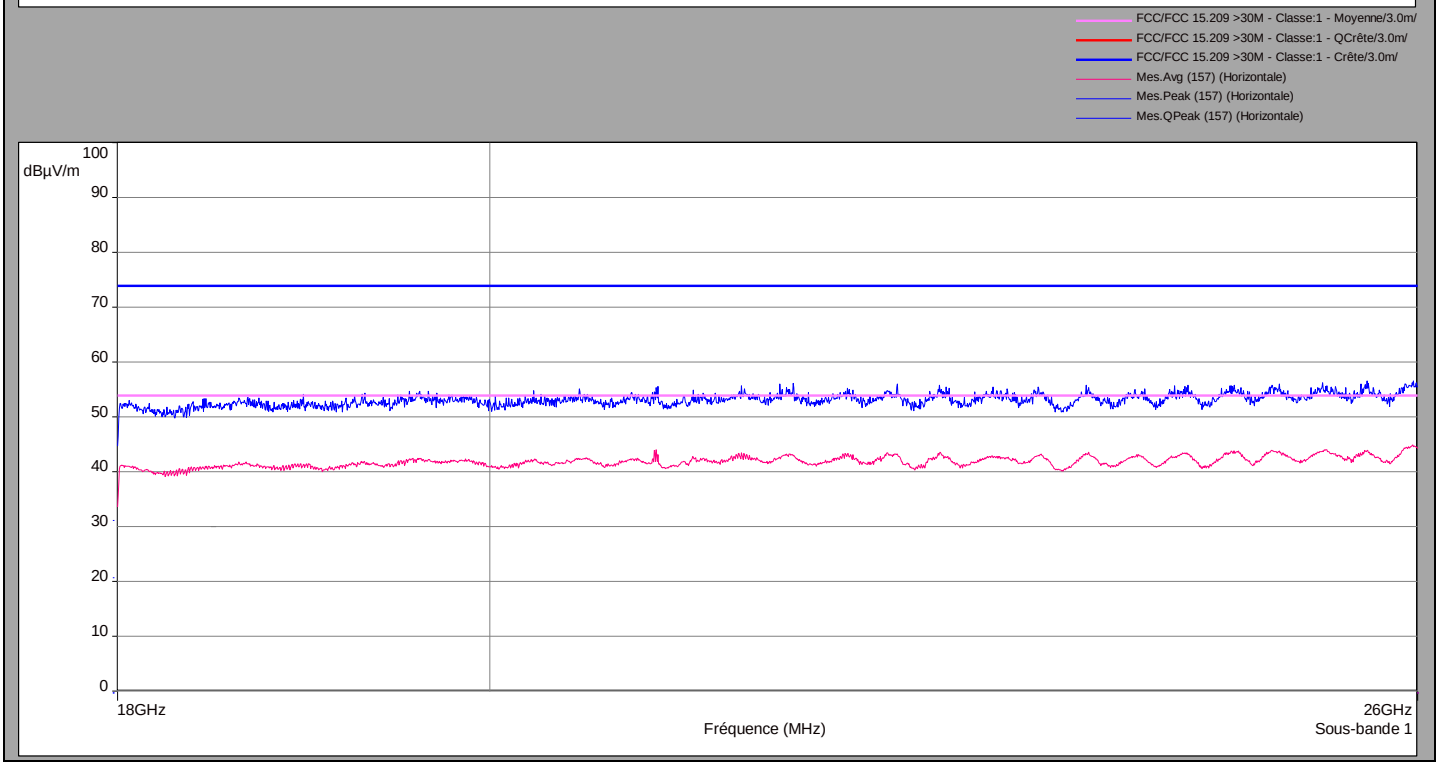


C2

Horizontal



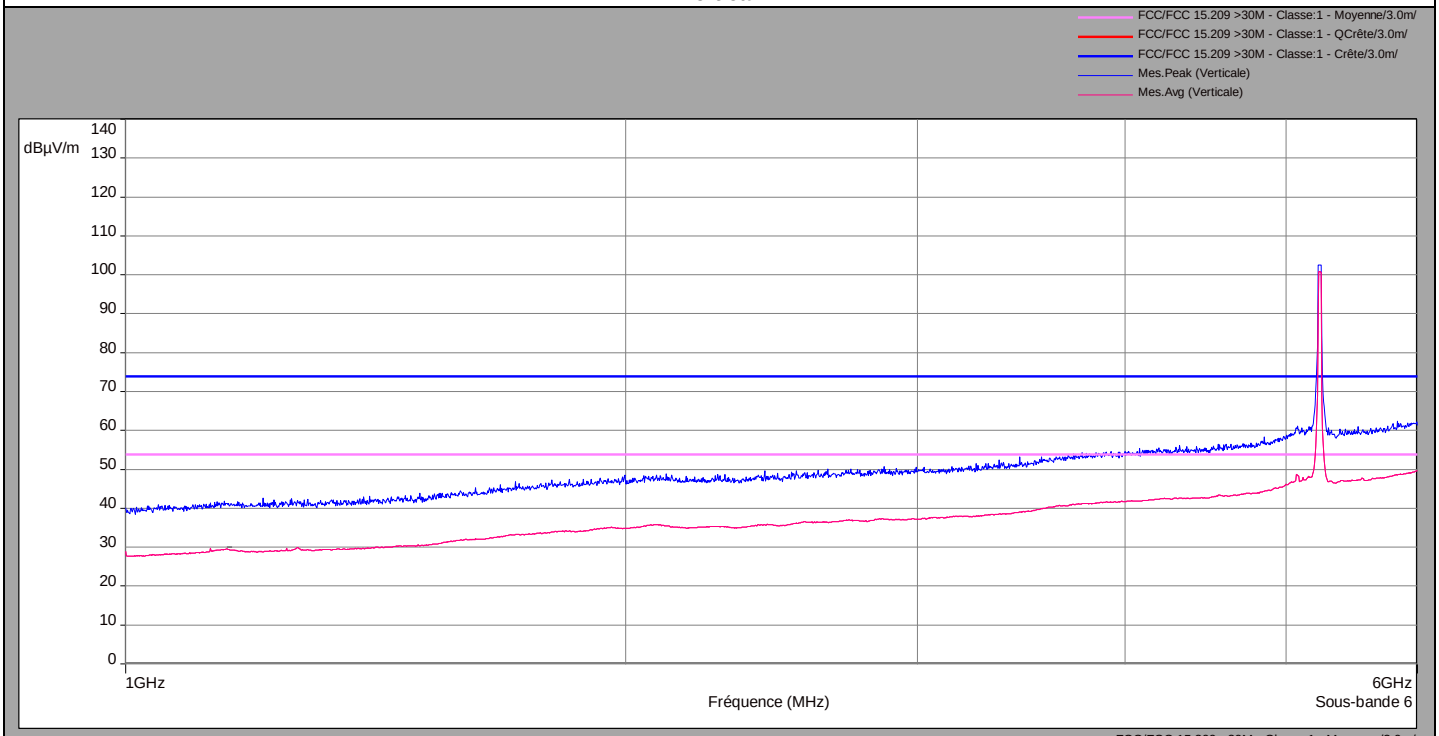

FCC/FCC 15.209 >30M - Classe:1 - Moyenne/3.0m/
FCC/FCC 15.209 >30M - Classe:1 - QCrête/3.0m/
FCC/FCC 15.209 >30M - Classe:1 - Crête/3.0m/
Mes.Peak (Horizontale)
Mes.Avg (Horizontale)
dBµV/m
120
110
100
90
80
70
60
50
40
30
20
10
0
6GHz
10G
18GHz
Fréquence (MHz)
Sous-bande 2

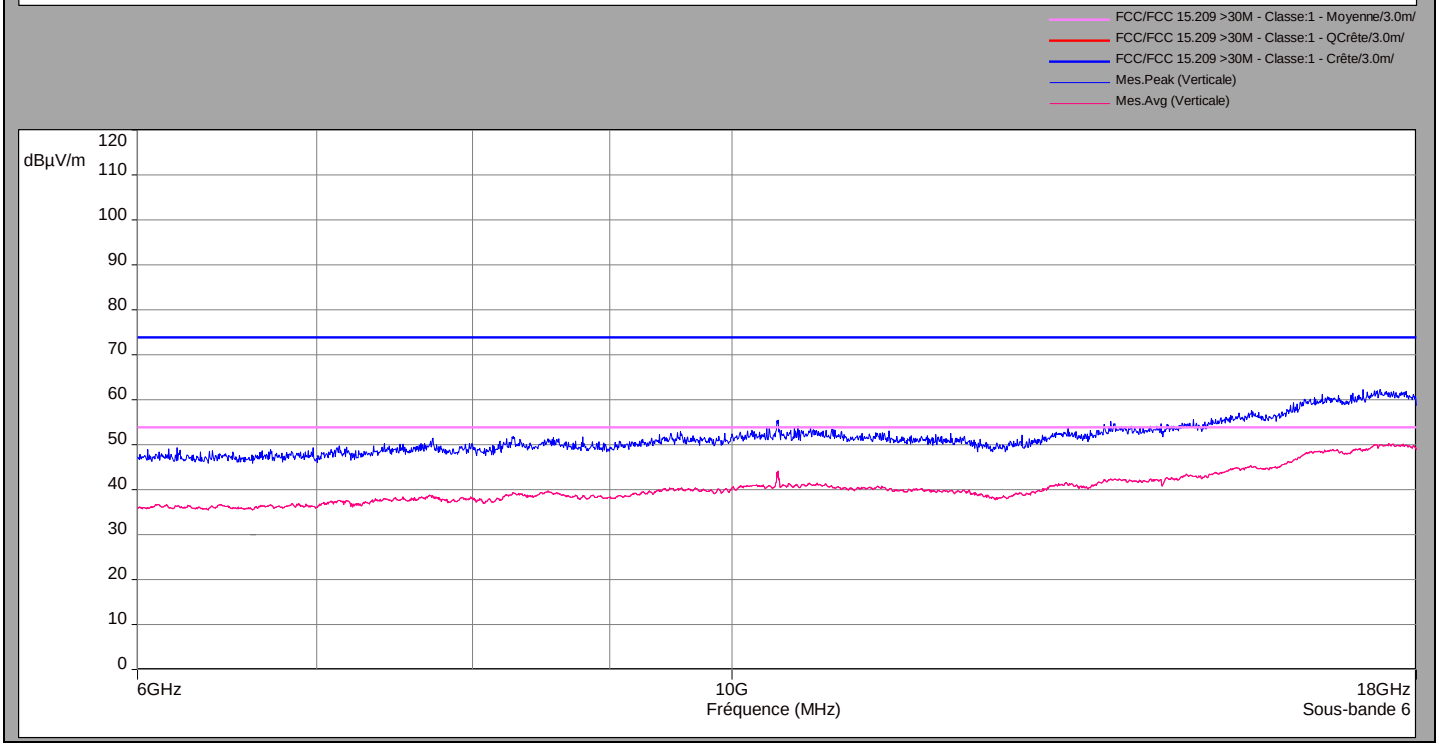

FCC/FCC 15.209 >30M - Classe:1 - Moyenne/3.0m/
FCC/FCC 15.209 >30M - Classe:1 - QCrête/3.0m/
FCC/FCC 15.209 >30M - Classe:1 - Crête/3.0m/
Mes.Avg (157) (Horizontale)
Mes.Peak (157) (Horizontale)
Mes.QPeak (157) (Horizontale)
dBµV/m
100
90
80
70
60
50
40
30
20
10
0
18GHz
26GHz
Fréquence (MHz)
Sous-bande 1

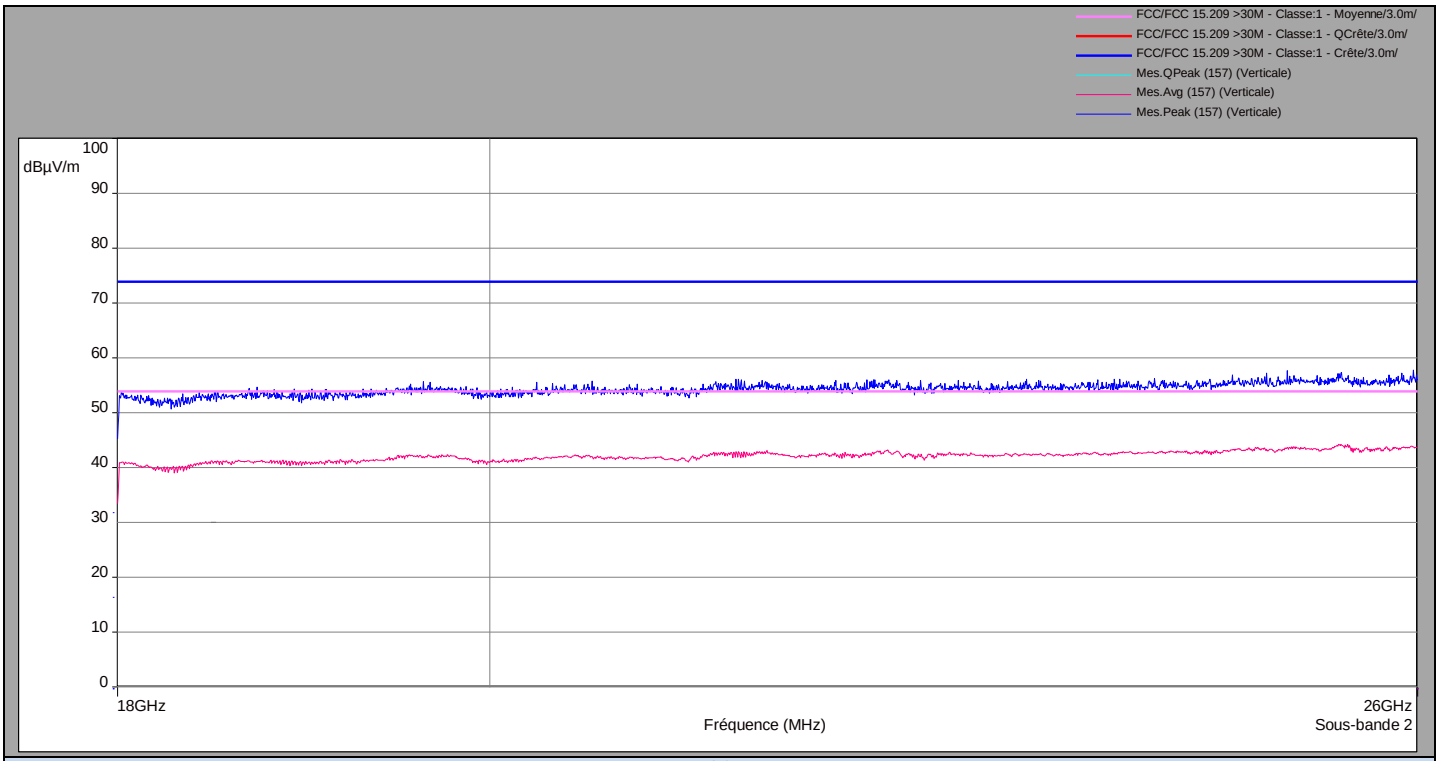
802.11 n HT20

C2

vertical

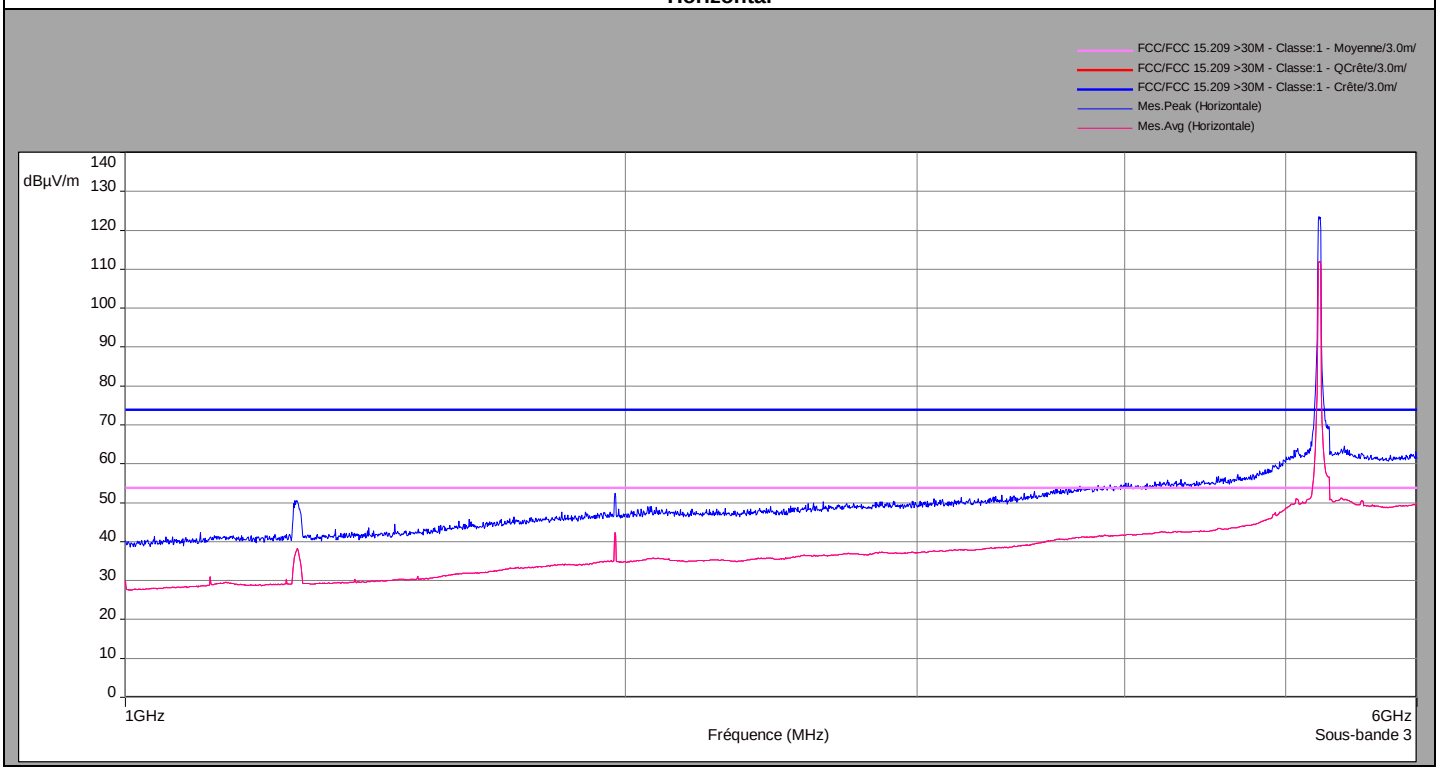


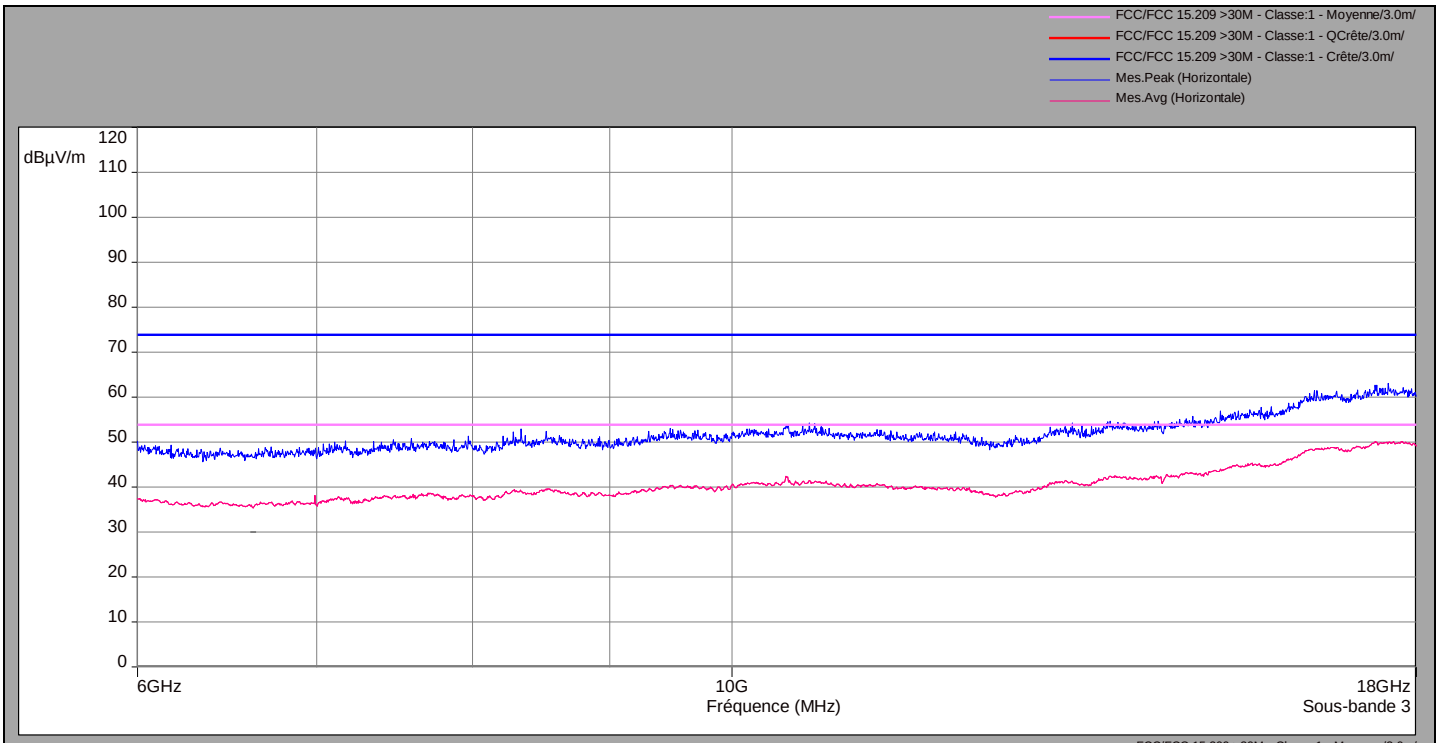


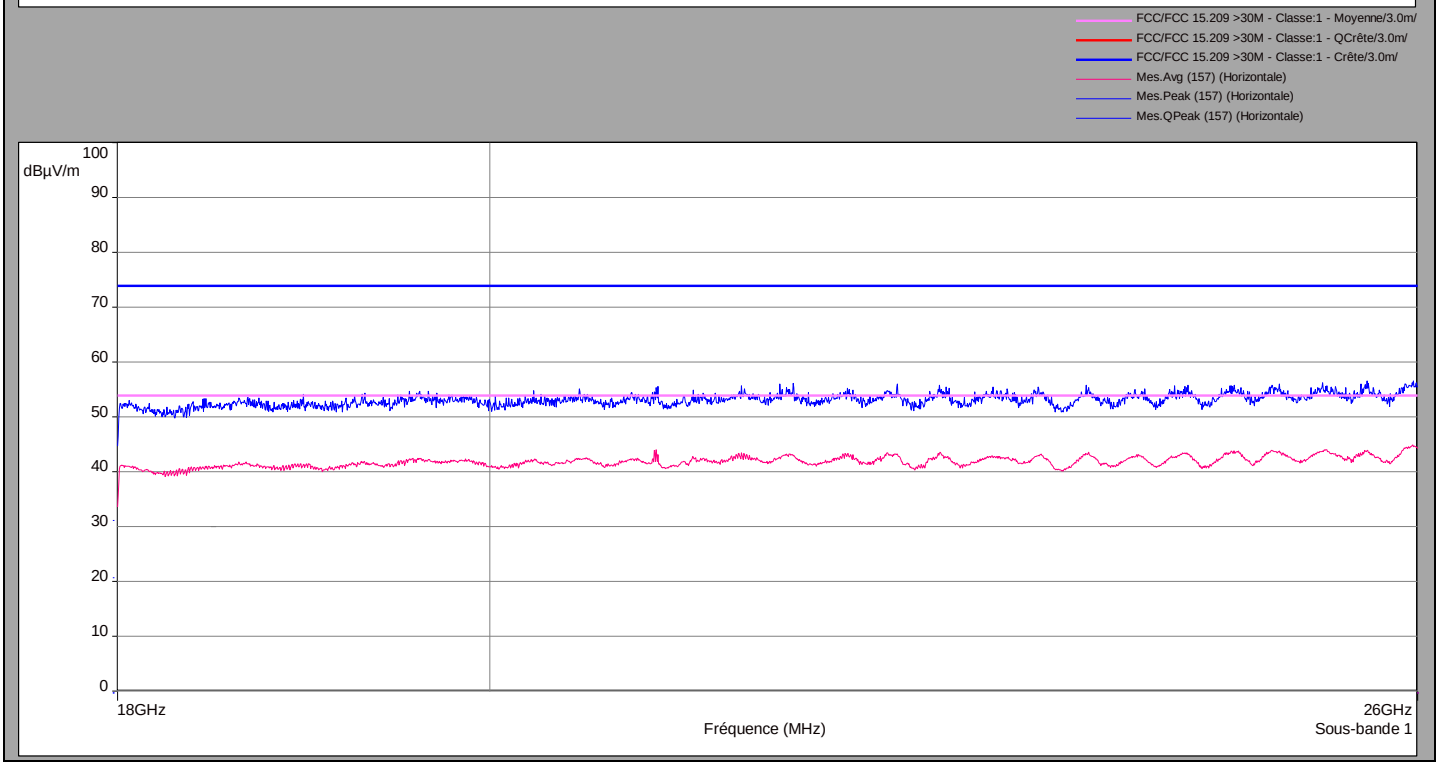


C2

Horizontal



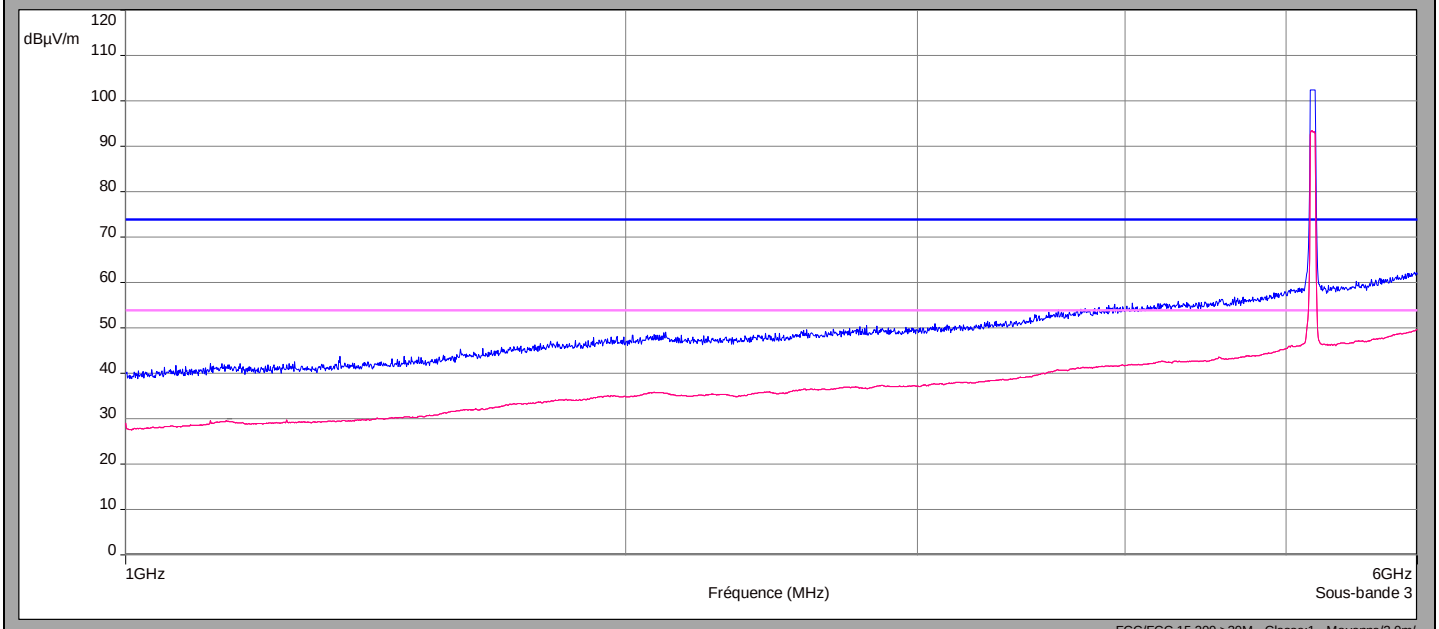

FCC/FCC 15.209 >30M - Classe:1 - Moyenne/3.0m/
FCC/FCC 15.209 >30M - Classe:1 - QCrête/3.0m/
FCC/FCC 15.209 >30M - Classe:1 - Crête/3.0m/
Mes.Peak (Horizontale)
Mes.Avg (Horizontale)
dBµV/m
120
110
100
90
80
70
60
50
40
30
20
10
0
6GHz
10G
18GHz
Fréquence (MHz)
Sous-bande 3

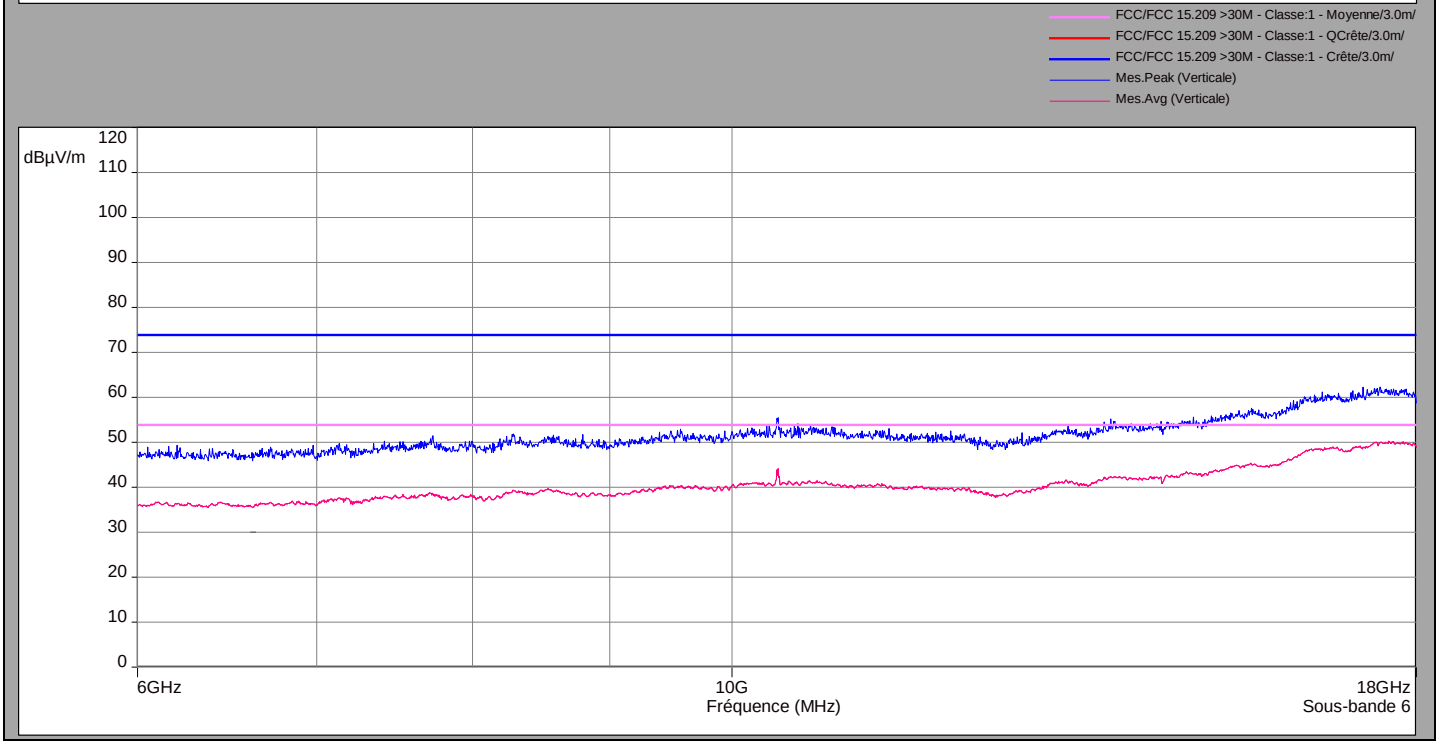

FCC/FCC 15.209 >30M - Classe:1 - Moyenne/3.0m/
FCC/FCC 15.209 >30M - Classe:1 - QCrête/3.0m/
FCC/FCC 15.209 >30M - Classe:1 - Crête/3.0m/
Mes.Avg (157) (Horizontale)
Mes.Peak (157) (Horizontale)
Mes.QPeak (157) (Horizontale)
dBµV/m
100
90
80
70
60
50
40
30
20
10
0
18GHz
26GHz
Fréquence (MHz)
Sous-bande 1

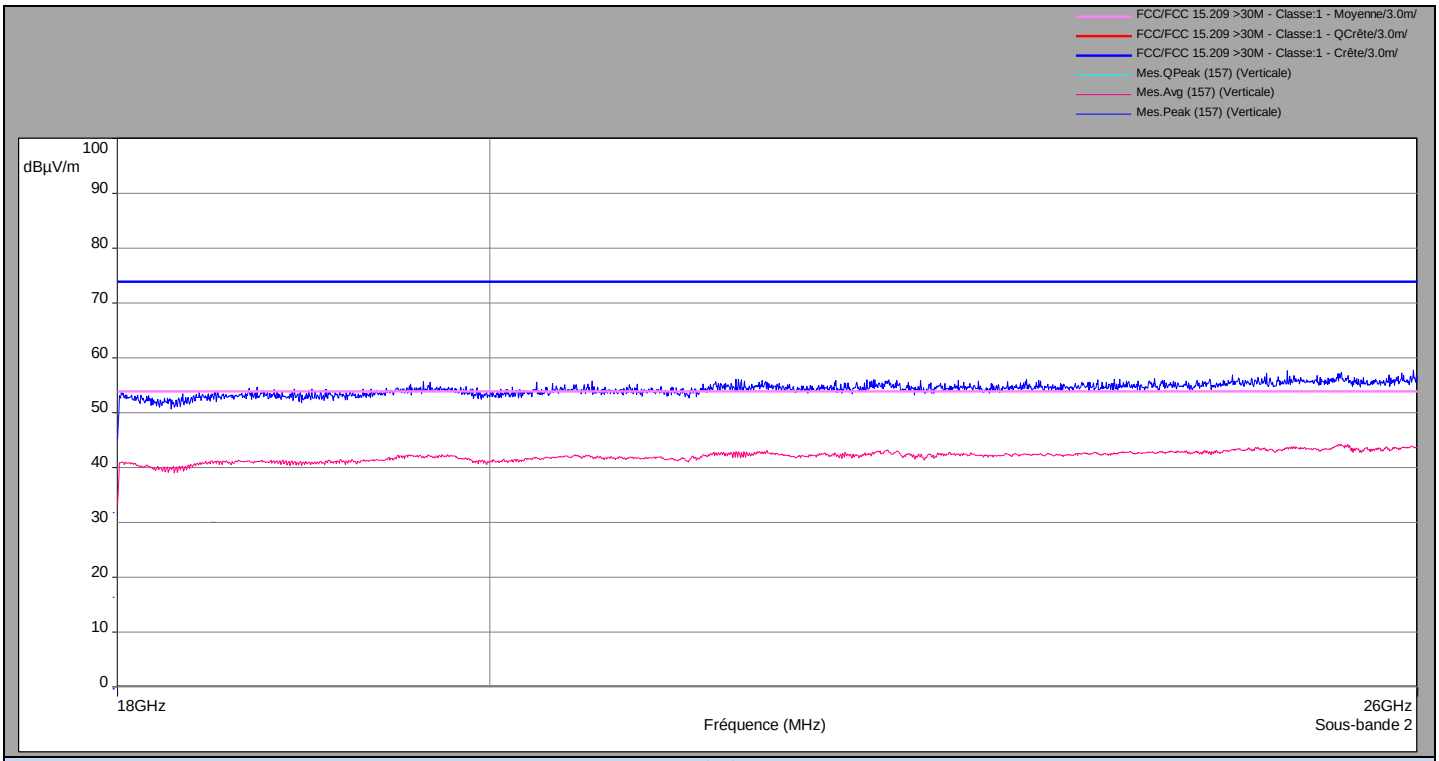
802.11 n HT40

C10

vertical

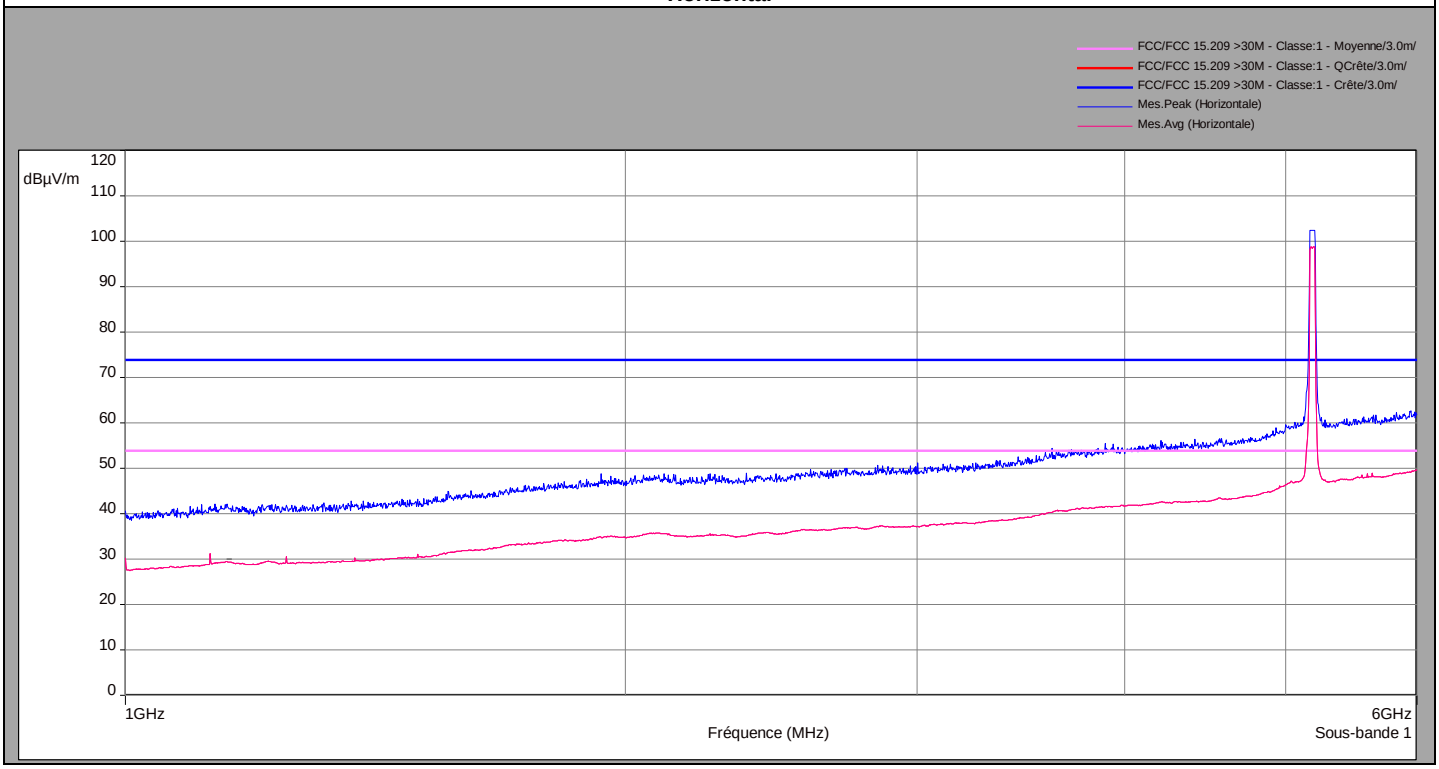


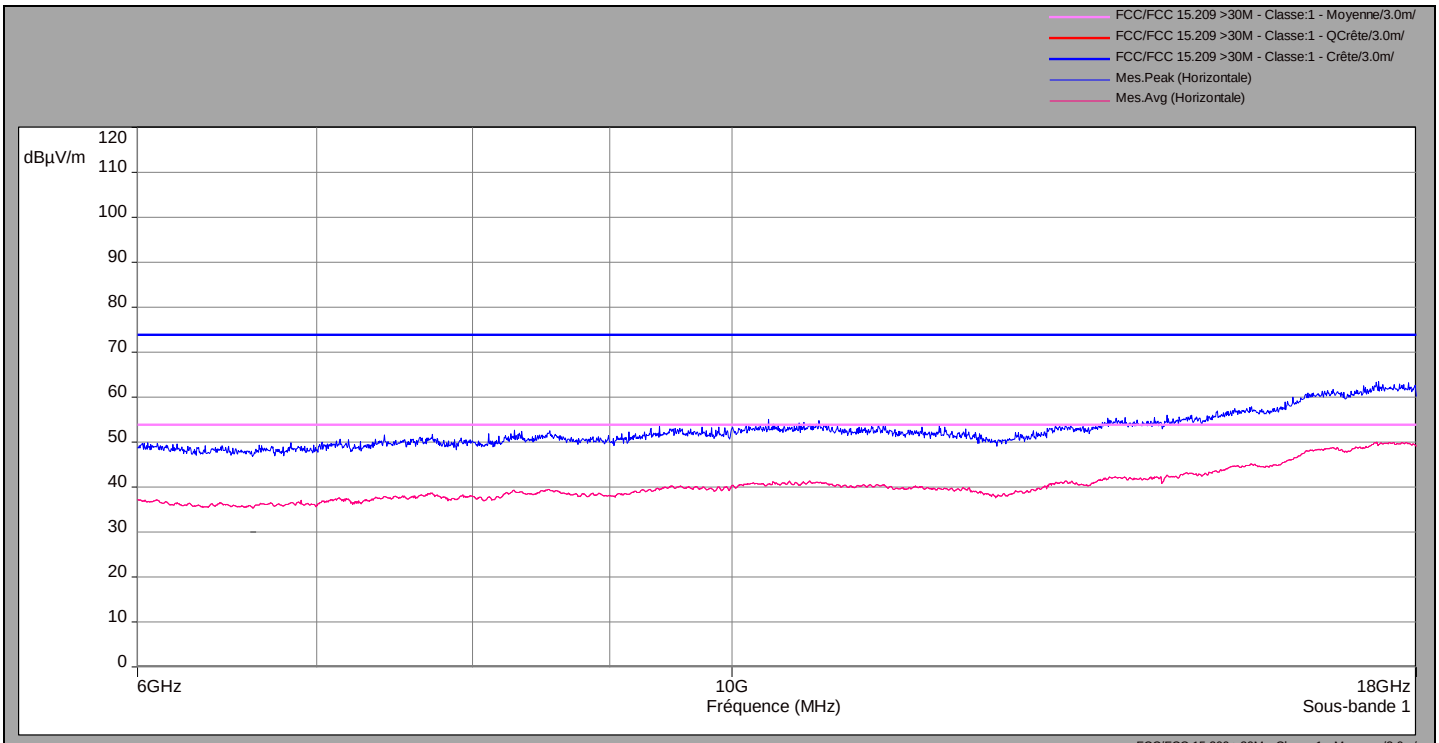


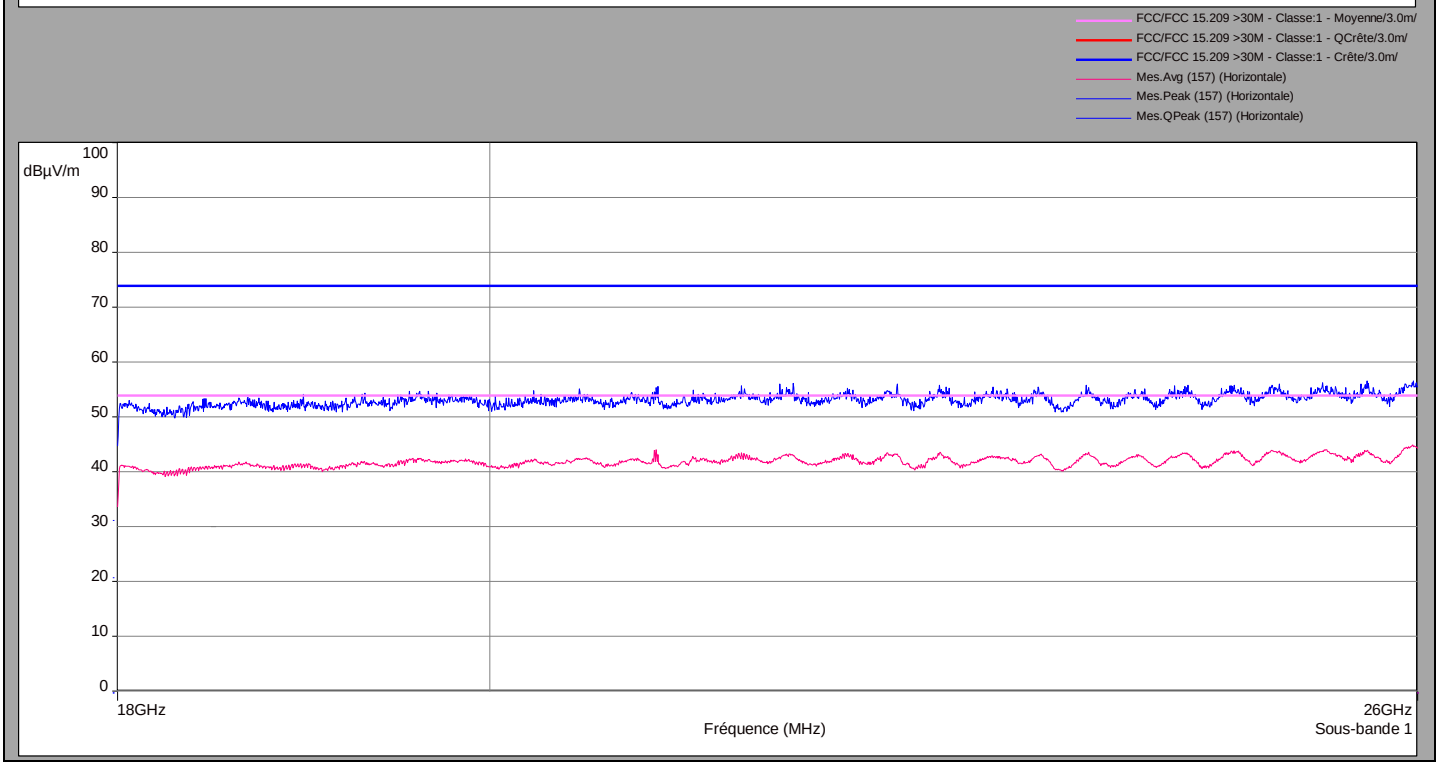


C10

Horizontal



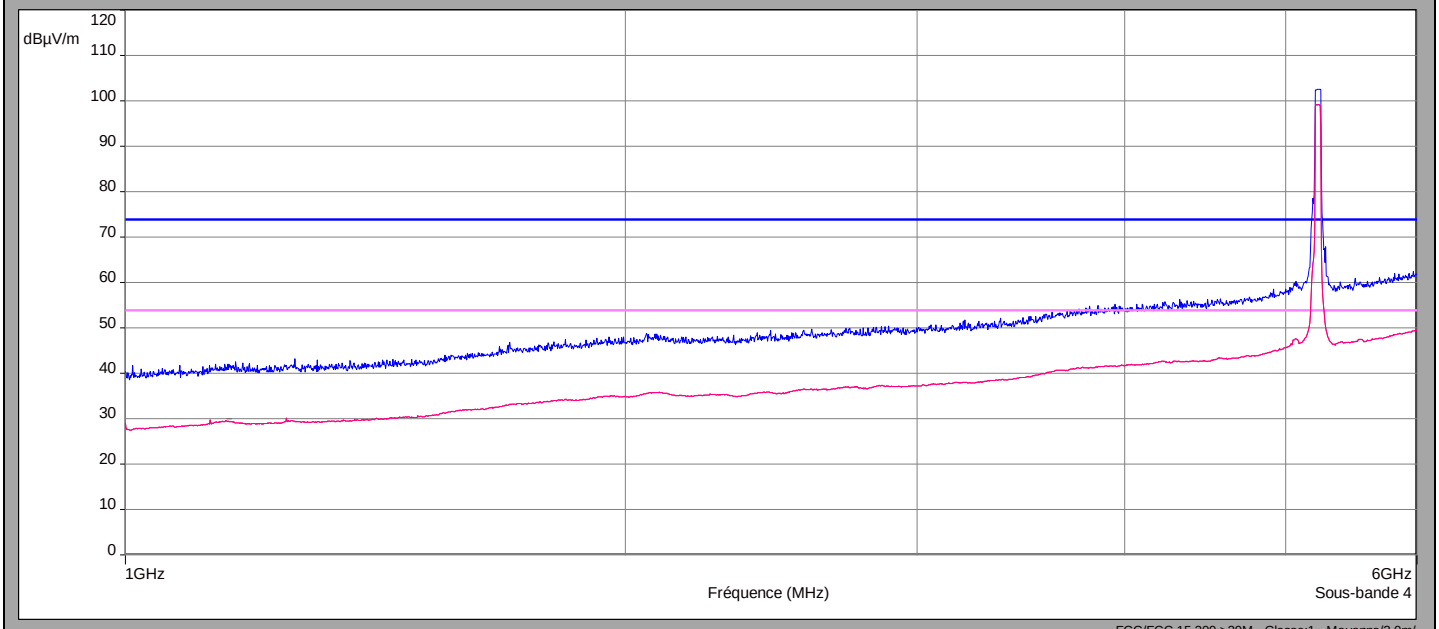

FCC/FCC 15.209 >30M - Classe:1 - Moyenne/3.0m/
FCC/FCC 15.209 >30M - Classe:1 - QCrête/3.0m/
FCC/FCC 15.209 >30M - Classe:1 - Crête/3.0m/
Mes.Peak (Horizontale)
Mes.Avg (Horizontale)
dBµV/m
120
110
100
90
80
70
60
50
40
30
20
10
0
6GHz
10G
18GHz
Fréquence (MHz)
Sous-bande 1

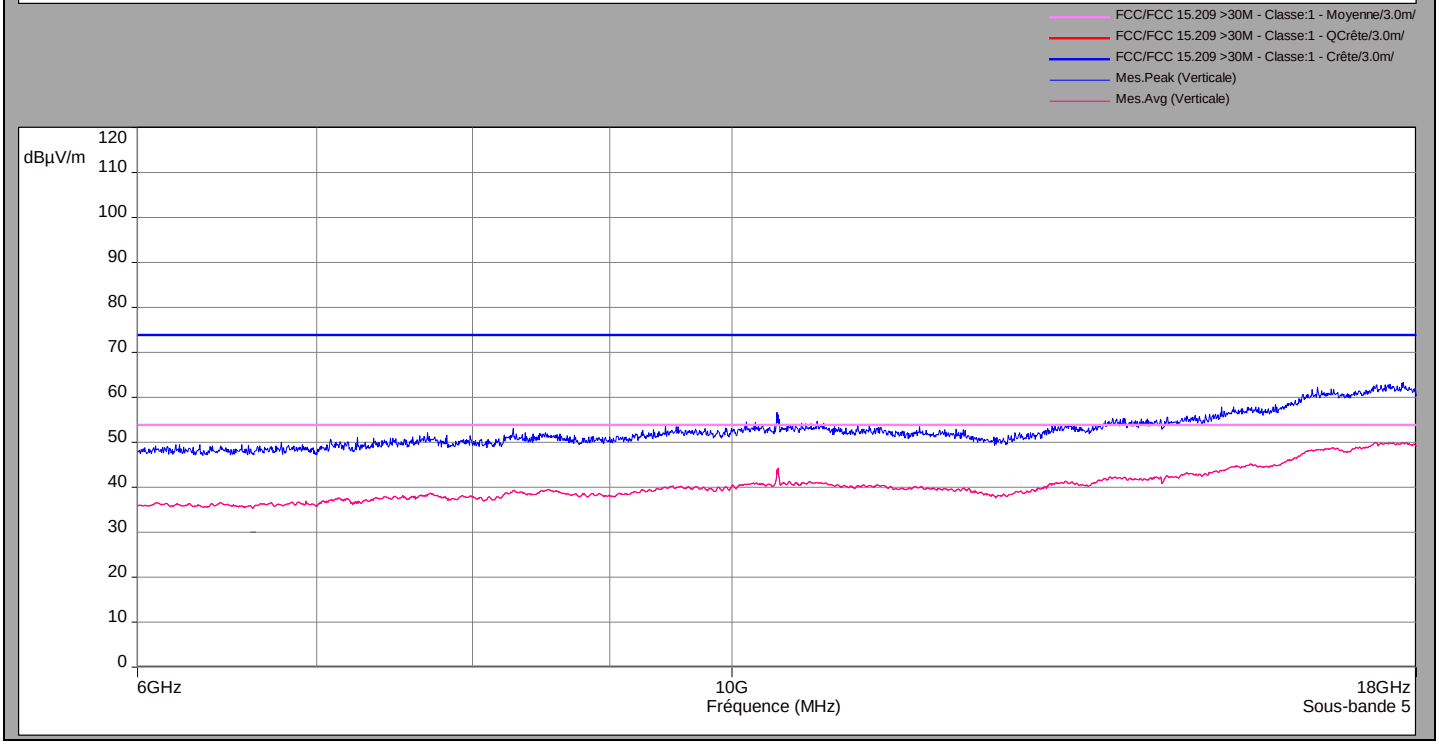

FCC/FCC 15.209 >30M - Classe:1 - Moyenne/3.0m/
FCC/FCC 15.209 >30M - Classe:1 - QCrête/3.0m/
FCC/FCC 15.209 >30M - Classe:1 - Crête/3.0m/
Mes.Avg (157) (Horizontale)
Mes.Peak (157) (Horizontale)
Mes.QPeak (157) (Horizontale)
dBµV/m
100
90
80
70
60
50
40
30
20
10
0
18GHz
26GHz
Fréquence (MHz)
Sous-bande 1

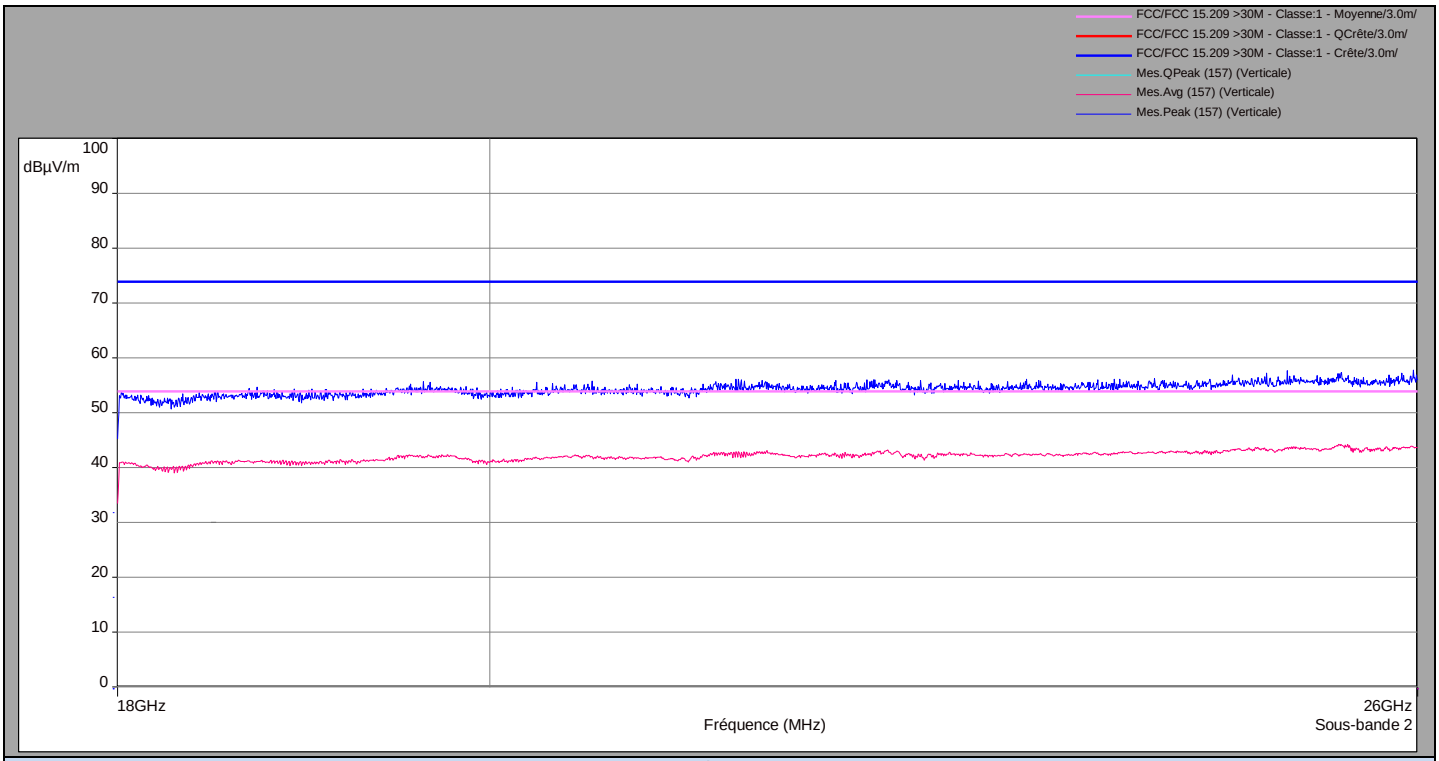
802.11 n HT40

C11

vertical

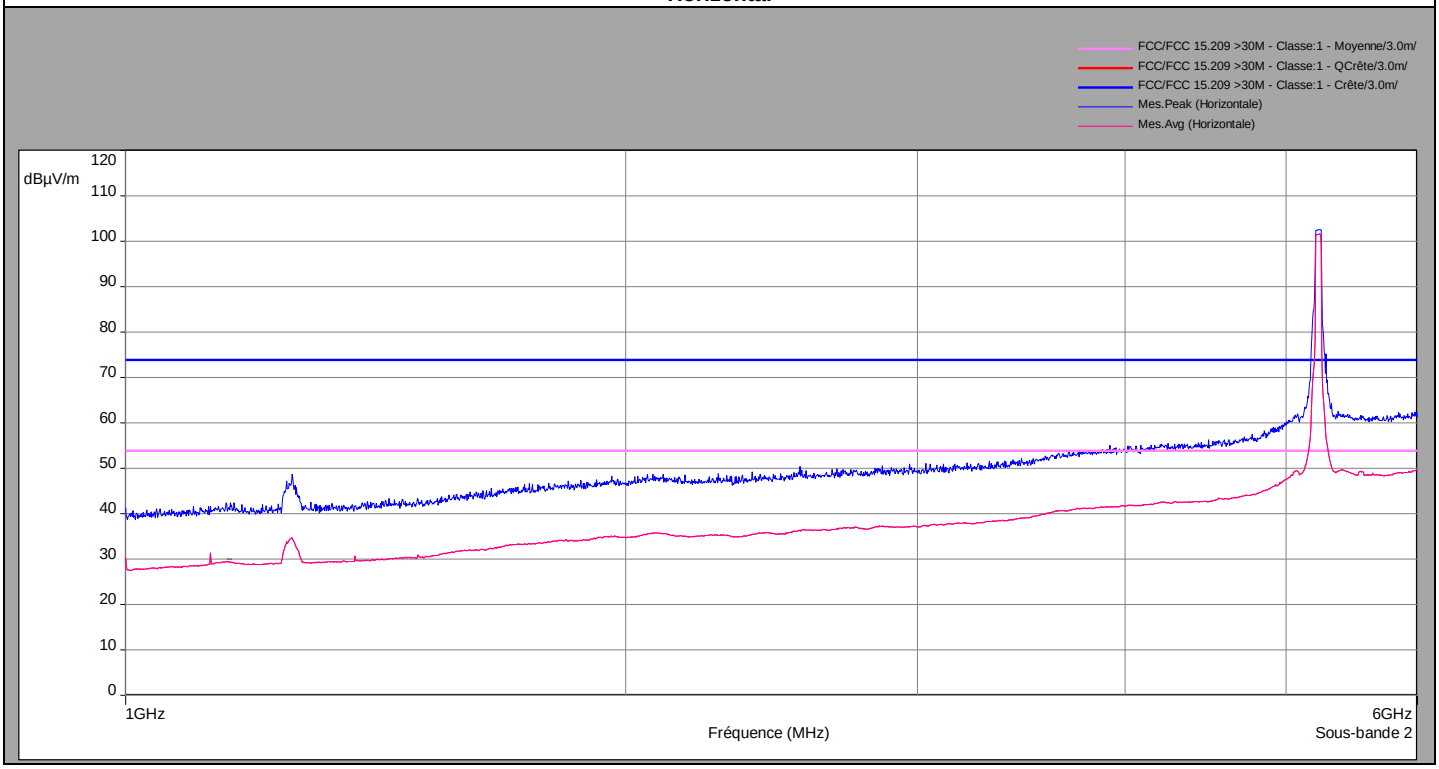


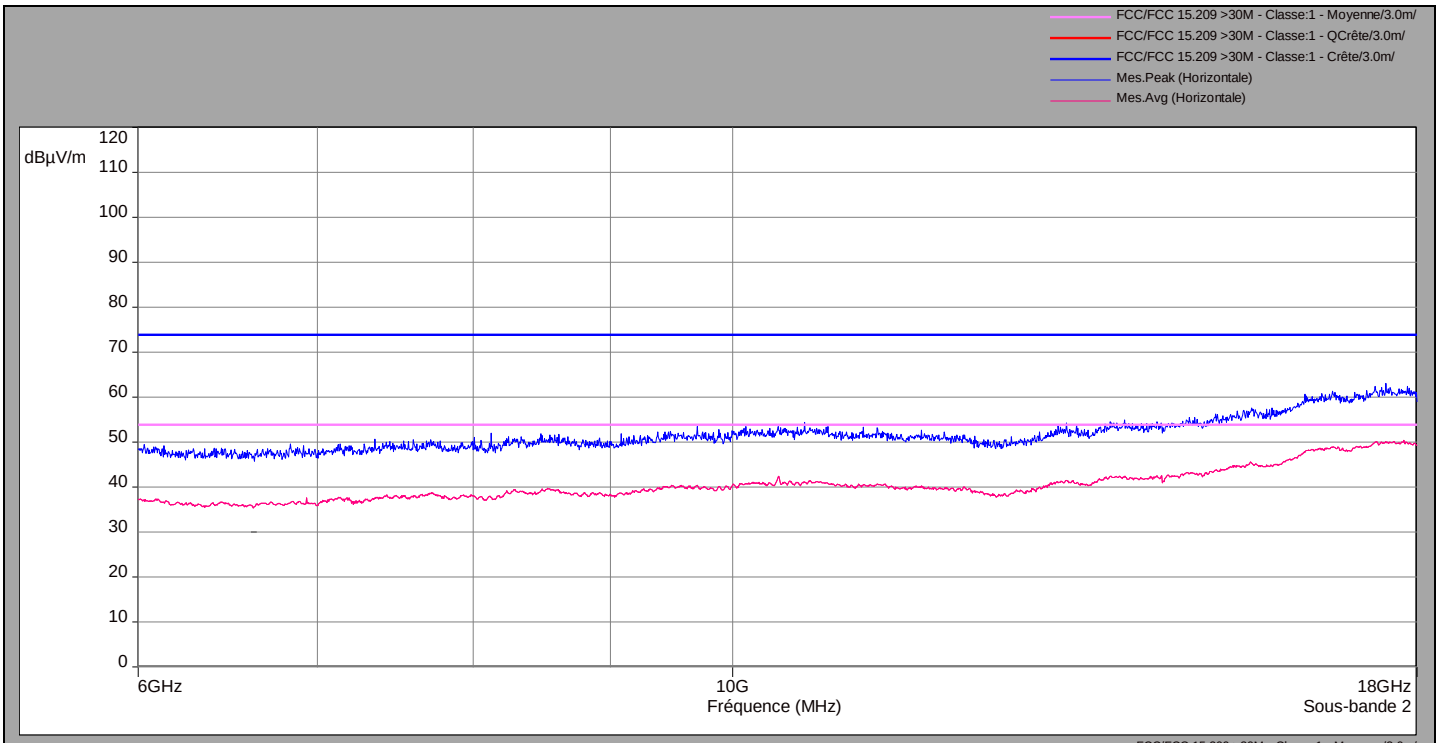


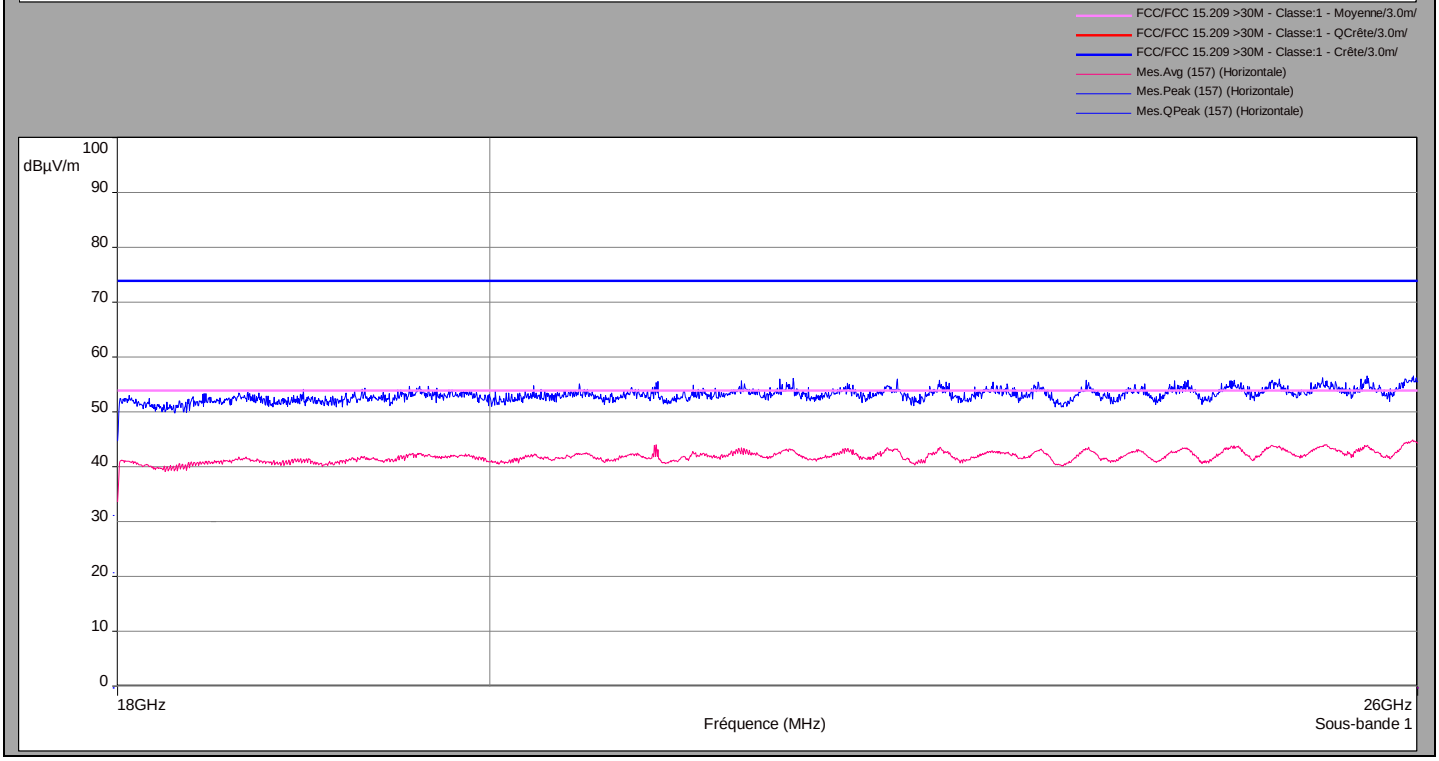


C11

Horizontal



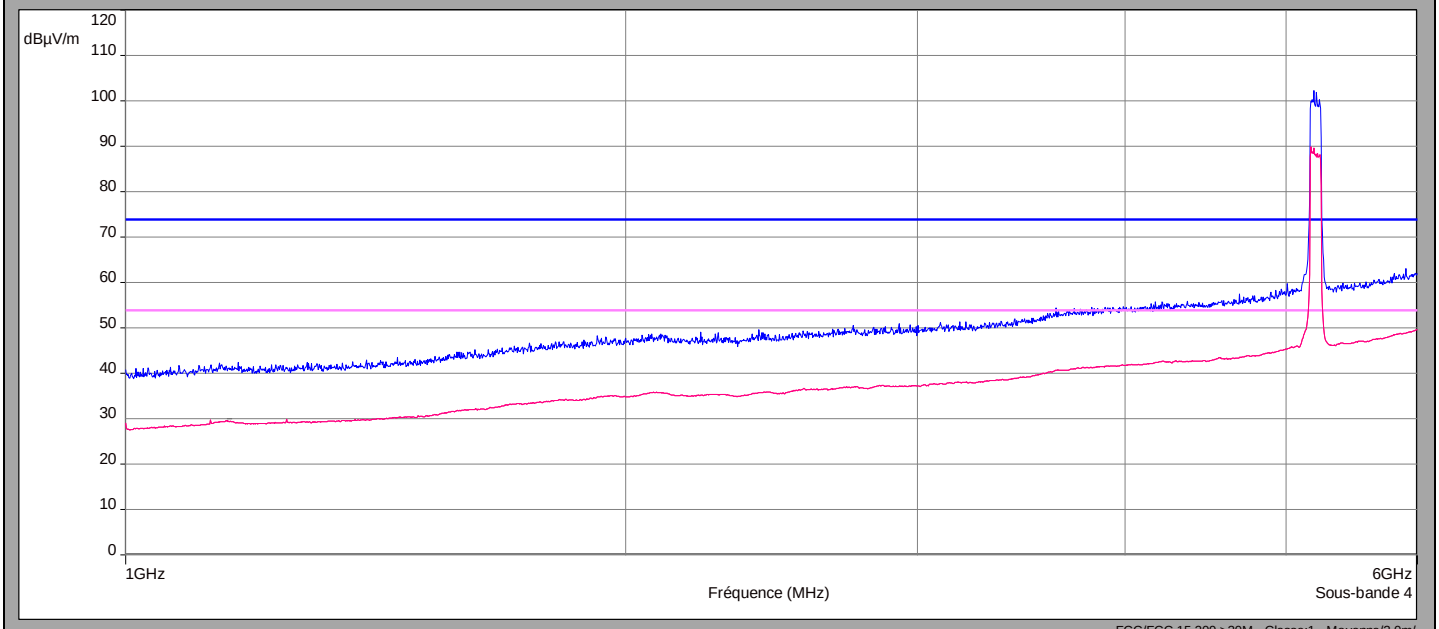

FCC/FCC 15.209 >30M - Classe:1 - Moyenne/3.0m/
FCC/FCC 15.209 >30M - Classe:1 - QCrête/3.0m/
FCC/FCC 15.209 >30M - Classe:1 - Crête/3.0m/
Mes.Peak (Horizontale)
Mes.Avg (Horizontale)
dBµV/m
120
110
100
90
80
70
60
50
40
30
20
10
0
6GHz
10G
18GHz
Fréquence (MHz)
Sous-bande 2

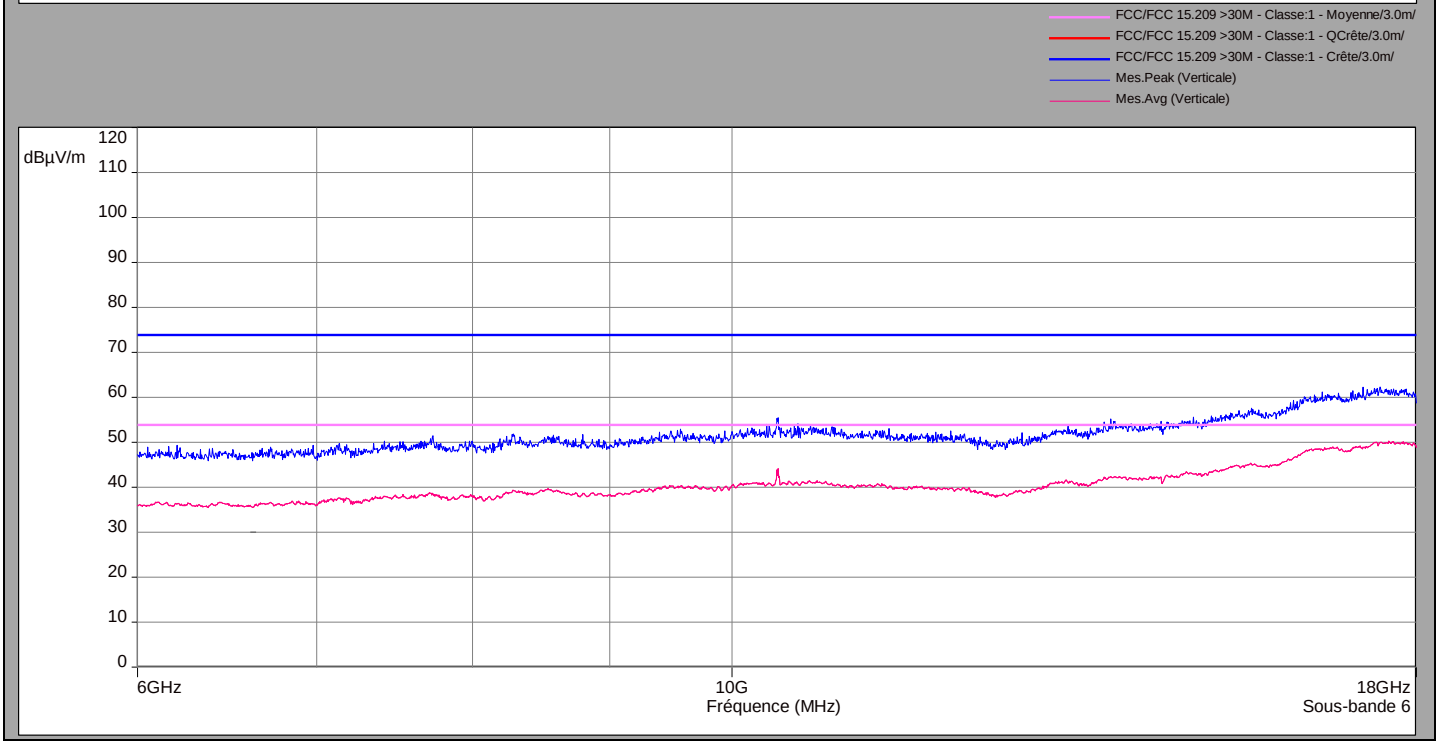

FCC/FCC 15.209 >30M - Classe:1 - Moyenne/3.0m/
FCC/FCC 15.209 >30M - Classe:1 - QCrête/3.0m/
FCC/FCC 15.209 >30M - Classe:1 - Crête/3.0m/
Mes.Avg (157) (Horizontale)
Mes.Peak (157) (Horizontale)
Mes.QPeak (157) (Horizontale)
dBµV/m
100
90
80
70
60
50
40
30
20
10
0
18GHz
26GHz
Fréquence (MHz)
Sous-bande 1

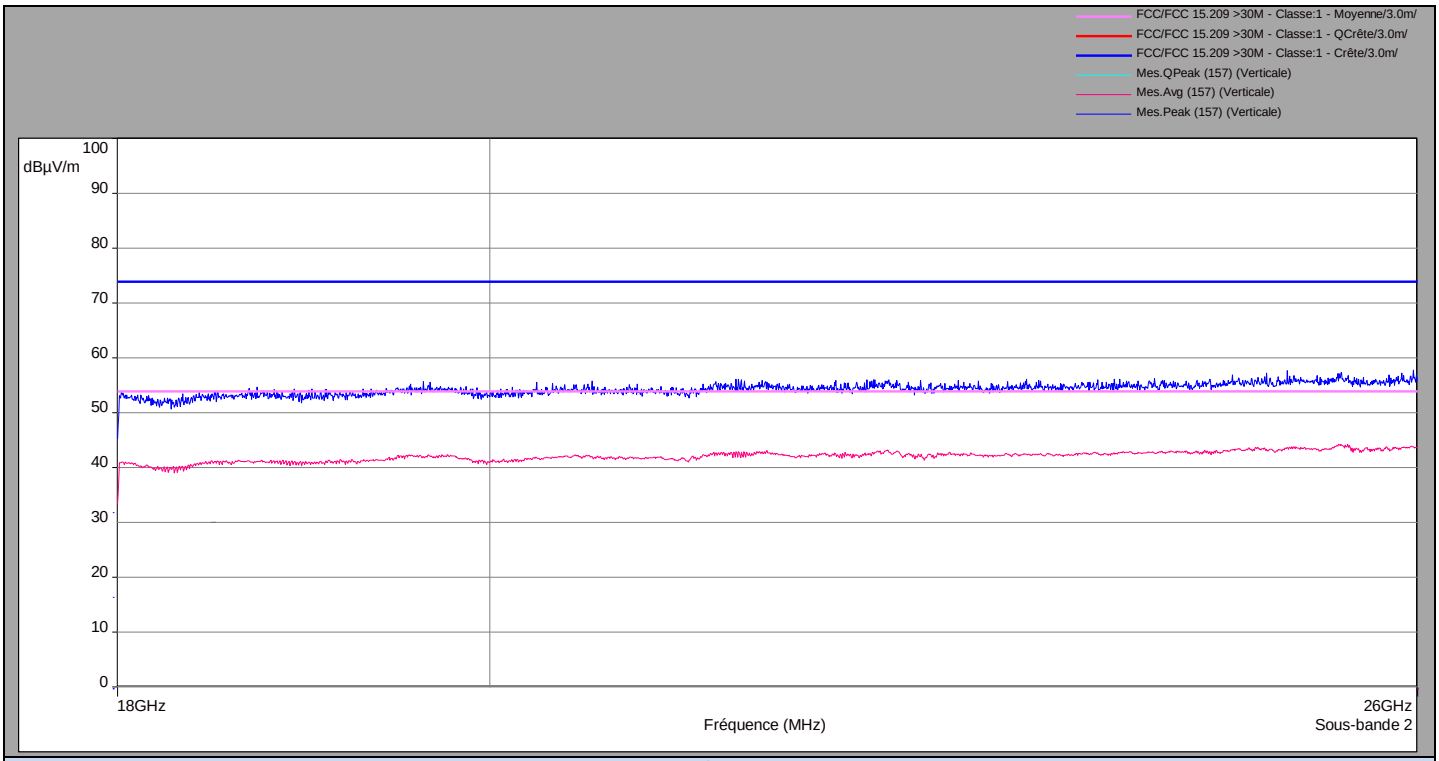
802.11 n HT80

C17

vertical

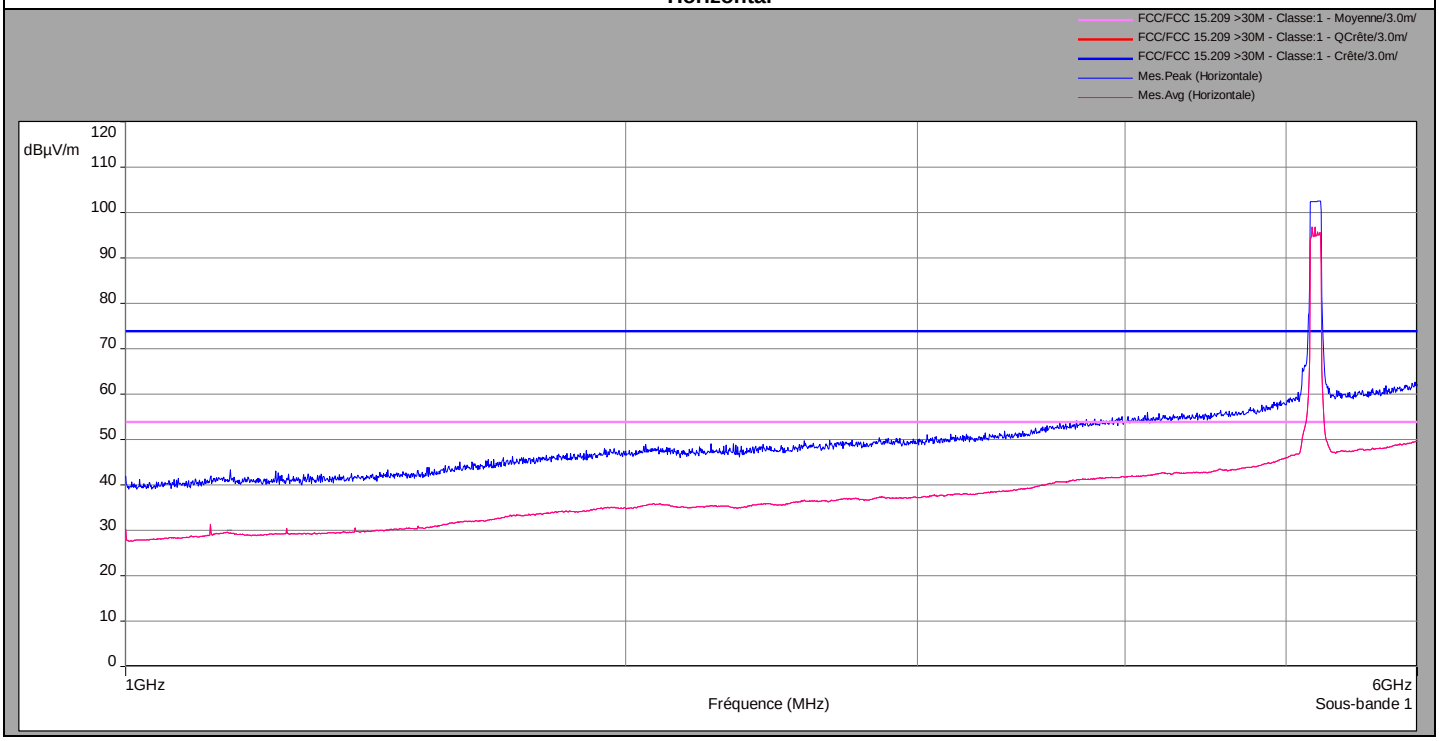


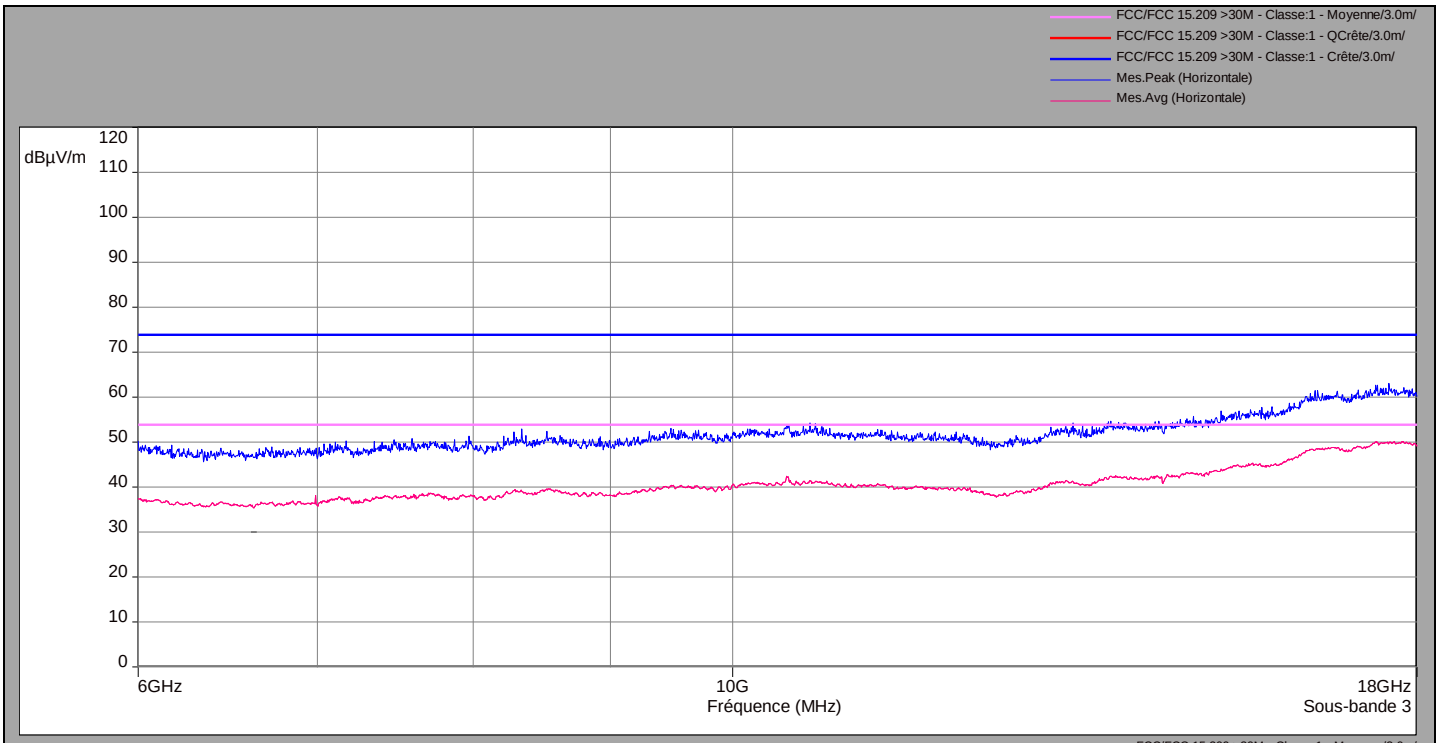


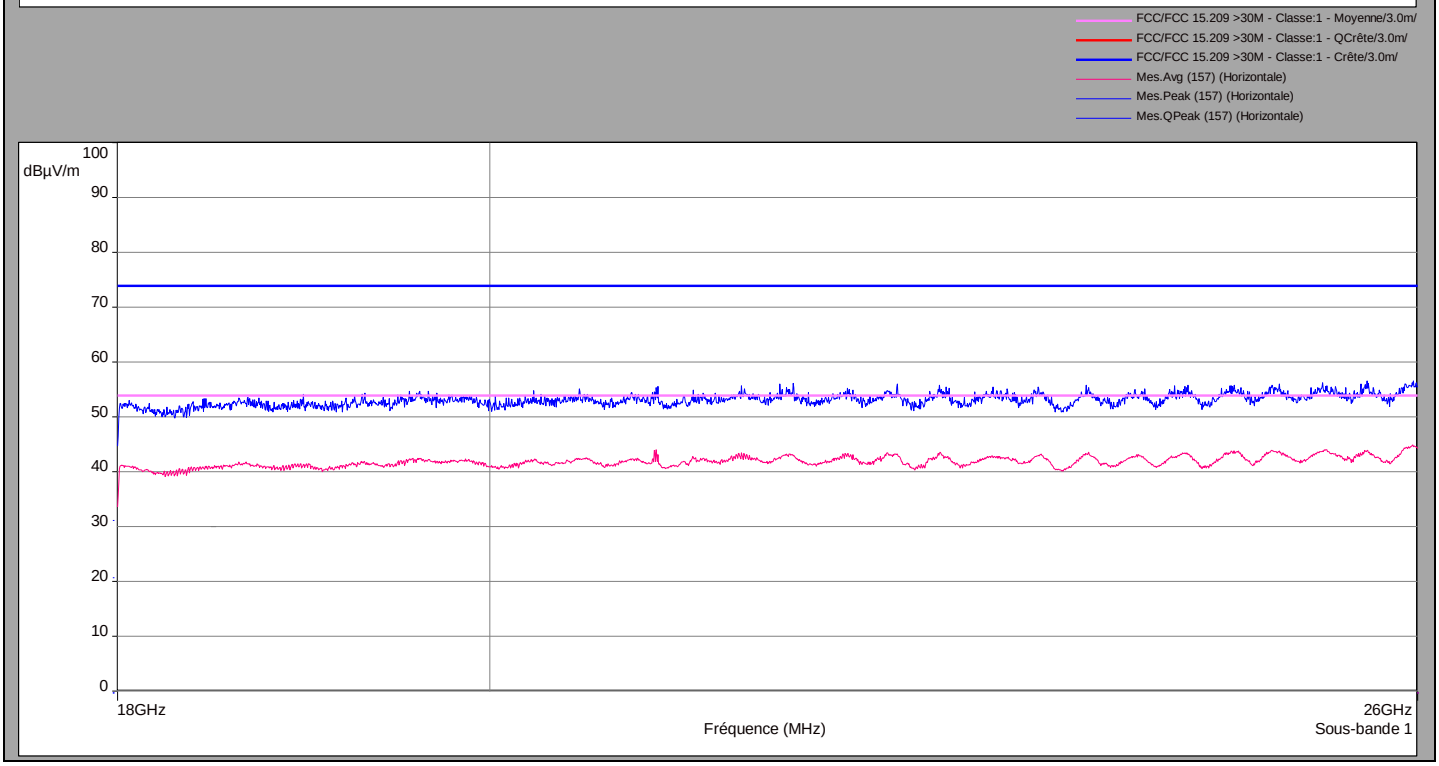


C17

Horizontal




FCC/FCC 15.209 >30M - Classe:1 - Moyenne/3.0m/
FCC/FCC 15.209 >30M - Classe:1 - QCrête/3.0m/
FCC/FCC 15.209 >30M - Classe:1 - Crête/3.0m/
Mes.Peak (Horizontale)
Mes.Avg (Horizontale)
dBµV/m
120
110
100
90
80
70
60
50
40
30
20
10
0
6GHz
10G
18GHz
Fréquence (MHz)
Sous-bande 3


FCC/FCC 15.209 >30M - Classe:1 - Moyenne/3.0m/
FCC/FCC 15.209 >30M - Classe:1 - QCrête/3.0m/
FCC/FCC 15.209 >30M - Classe:1 - Crête/3.0m/
Mes.Avg (157) (Horizontale)
Mes.Peak (157) (Horizontale)
Mes.QPeak (157) (Horizontale)
dBµV/m
100
90
80
70
60
50
40
30
20
10
0
18GHz
26GHz
Fréquence (MHz)
Sous-bande 1

7.1. RESULTS

802.11a

Polarisation	Frequency (MHz)	Peak Level (dBµV/m)	QPeak Level (dBµV/m)	QPeakLevel (dBm)	Limit (dBµV/m)	Limit (dBm)
H	72.75	31.847	-	-	40	-55.2
H	375.02	43.373	42.371	-52.829	46	-49.2
V	30	38.466	32.872	-62.328	40	-55.2
V	47.15	42.802	38.141	-57.059	40	-55.2
V	92.5	37.313	32.563	-62.637	43.5	-51.7
V	152.1	36.551	28.367	-66.833	43.5	-51.7
V	375.02	35.201	33.702	-61.498	46	-49.2
V	500	33.041	30.09	-65.11	46	-49.2
V	625.04	33.869	32.371	-62.829	46	-49.2
V	750.02	33.074	30.384	-64.816	46	-49.2

Polarisation	Frequency (MHz)	Average Level (dBµV/m)	Average Limit (dBµV/m)	Peak Level (dBµV/m)	Peak Level (dBm)	Peak Limit (dBµV/m)	Peak Limit (dBm)
H	5150	53.607	54	66.013	-29.187	73.9	-27
H	5350	49.639	54	60.729	-34.471	73.9	-27

802.11nHT20

Polarisation	Frequency (MHz)	Average Level (dBµV/m)	Average Limit (dBµV/m)	Peak Level (dBµV/m)	Peak Level (dBm)	Peak Limit (dBµV/m)	Peak Limit (dBm)
H	5150	53.423	54	65.114	-30.086	73.9	-27
H	5350	49.815	54	61.741	-33.459	73.9	-27

802.11nHT40

Polarisation	Frequency (MHz)	Average Level (dBµV/m)	Average Limit (dBµV/m)	Peak Level (dBµV/m)	Peak Level (dBm)	Peak Limit (dBµV/m)	Peak Limit (dBm)
H	5150	52.966	54	65.114	-30.086	73.9	-27
H	5350	48.836	54	61.195	-34.005	73.9	-27

802.11nHT80

Polarisation	Frequency (MHz)	Average Level (dBµV/m)	Average Limit (dBµV/m)	Peak Level (dBµV/m)	Peak Level (dBm)	Peak Limit (dBµV/m)	Peak Limit (dBm)
H	5150	53.893	54	66.142	-29.058	73.9	-27
H	5350	46.799	54	58.269	-36.931	73.9	-27

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: 53.9dBµV/m QPeak
Above 1000MHz: 73.9dBµV/m Peak
54dBµV/m Average

Limit: → 5150MHz-5250MHz: Shall not exceed -27dBm outside of the band

8. TEST EQUIPMENT LIST

Occupied Bandwidth, -26dB Bandwidth, Maximum Peak Output Power, Power Spectral Density					
Apparatus	**Trade Mark**	**Type**	**Registration number**	**Calibration date**	**Calibration due**
Cable	-	CASS-0627	A5329661	2014/05	2015/05
Cable	-	CASS-0627	A5329674	2014/05	2015/05
Cable	-	CASS-0627	A53229675	2014/05	2015/05
Attenuator 3dB	MINI CIRCUITS	BW-S3W2+	A7122235	2014/04	2016/04
Attenuator 3dB	MINI CIRCUITS	BW-S3W2+	A7122242	2014/04	2016/04
Attenuator 3dB	MINI CIRCUITS	BW-S3W2+	A7122243	2014/04	2016/04
Spectrum Analyser	ROHDE & SCHWARZ	FSL	A4060032	2012/11	2014/11
Power supply	KIKUSUI	PCR500M	A7040079	-	-
Multi-meter	KEITHLEY	2000	A1241084	2014/02	2016/02
Unwanted Emissions & Undesirable Emission limits					
Apparatus	**Trade Mark**	**Type**	**Registration number**	**Calibration date**	**Calibration due**
Semi anechoic chamber 11,8x8,1x9,5m	SIEPEL	C01	D3044008	2014/09	2015/09
EMI Test Receiver	ROHDE & SCHWARZ	ESIB26	A2642021	2014/04	2015/04
Bilog antenna	SCHWARZBEK	VULB 9160	A2040150	2013/03	2014/03
Cable	-	-	A5329374	2014/04	2015/04
Cable	-	-	A5329459	2014/04	2015/04
Horn antenna	AH SYSTEMS	SAS 571	C2042041	2014/07	2015/07
Preamplifier	LCIE; LCIE	LCIE-ALB-001	A7080073	2013/11	2014/11
Horn antenna	A-INFOMW	LB-10180-NF	C2042051	2014/04	2015/04
Programmable AC power supply	-; ADAPTIVE POWER SYSTEM	FC210	A7360017	2014/08	2015/08
EMI receiver	ROHDE & SCHWARZ	ESI40 1088 740K40	A2642010	2014/02	2015/02
Horn antenna 18-26,5GHz	PASTERNACK	PE9852/2F-20	C2042049	2013/02	2015/02
Horn antenna 26,5-40GHz	PASTERNACK	PE9850/2F-20	C2042052	2013/09	2015/09
AC Power Line Conducted Emissions					
Apparatus	**Trade Mark**	**Type**	**Registration number**	**Calibration date**	**Calibration due**
Semi anechoic chamber 11,8x8,1x9,5m	SIEPEL	C01	D3044008	2014/09	2015/09
EMI Test Receiver	ROHDE & SCHWARZ	ESIB26	A2642021	2014/04	2015/04
V LISN	ROHDE & SCHWARZ	ENV216	C2320163	2013/12	2014/12
Cable	-	-	A5329411	2014/05	2015/05

9. UNCERTAINTIES CHART

Kind of test	Measurement uncertainties (k=2) ±x(dB) / (Hz)	Limit for uncertainties ±y(dB)
TRANSMITTER REQUIREMENTS		
Radio frequency	$\pm 2.10^{-8}$ Hz	$\pm 1.10^{-7}$ Hz
RF Conducted power	±0.6 dB	±1.5 dB
Spurious emissions • Frequency < 1000 MHz • Frequency > 1000 MHz	 ±3.9 dB ±3.1 dB	±6 dB
Spurious in conduction	±1.6 dB	±3 dB
Temperature	±0.5°C	±1°C
Humidity	±2.5 %	±10 %
RECEIVER REQUIREMENTS		
Spurious emissions • Frequency < 1000 MHz • Frequency > 1000 MHz	 ±3.9 dB ±3.1 dB	±6 dB