TEST REPORT

Number: 122014-644470A
Composition of document: 82 pages

RADIO

FCC Registration Number Industry Canada Number	166175 (FAR) & 888863 (Ecuelles) 6230B (FAR) and 6230B-1(Ecuelles)
Standards	47 CFR Part 15.247 RSS-210, Issue 8 RSS-Gen, Issue 3
Issued to	SAGEMCOM 250, route de l'Empereur 92848 RUEIL MALMAISON
Apparatus under test Trade mark Manufacturer Type Serial number FCC ID	Home router WIFI SAGEMCOM SAGEMCOM FAST 5260CV LK312300942 VW3FAST5260CV
Test date	2013/07
Tests performed by	Gilles DE-BUYSER, Stephane PHOUDIAH & Laurent DENEUX
Test site	Fontenay aux Roses & Ecuelles
Date of issue	2013/09/09

Written by :
Stéphane PHOUDIAH, Laurent DENEUX & Gilles DE BUYSER
Tests operator

Approved by :
Patrick TEIXEIRA
Technical manager

LABORATOIRE CENTRAL DES INDUSTRIES ELECTRIQUES
S.A.S au capital de 15.745.984 €
RCS Nanterre B 408 363 174
33 avenue du Général Leclerc
F - 92266 FONTENAY AUX ROSES

SUMMARY

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	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

PASS: EUT complies with standard's requirement
FAIL: EUT does not comply with standard's requirement
NA: Not Applicable
NP: Test Not Perform

2. EQUIPMENT DESCRIPTION

2.1. HARDWARE & SOFTWARE IDENTIFICATION

Equipment under test (EUT):

Photograph of EUT

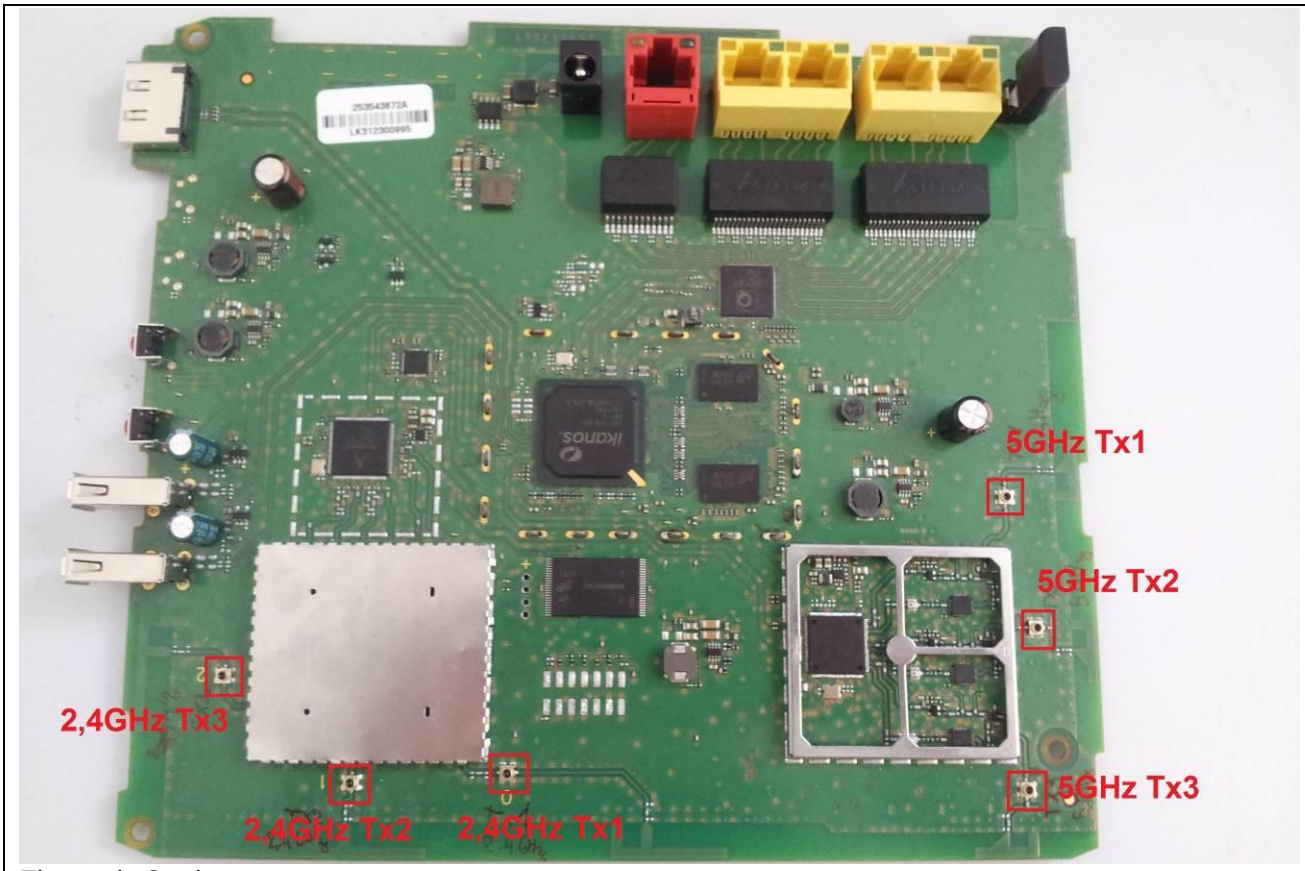
Front view

Rear View

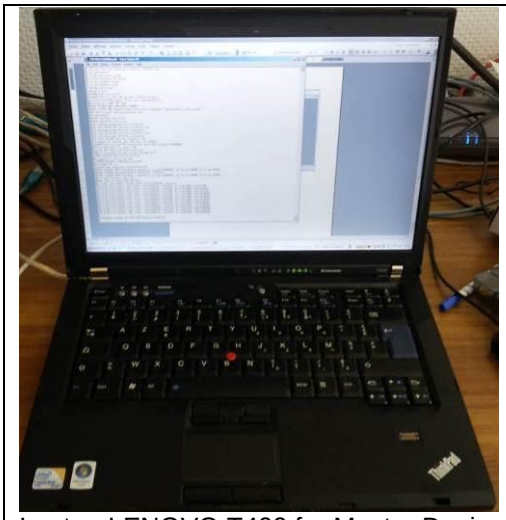
Side view

Power Supply

Auxiliary equipment (AE) used for testing:



Electronic Card
Photograph of EUT



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: 802.11b/g/n HT20/n HT40
- 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 5350MHz	122014-644470C&D
5470MHz to 5725MHz (Note 1)	122014-644470C&D
5725MHz to 5850MHz	122014-644470B

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

Antenna Characteristics:

Antenna All Tx	
Frequency Band (MHz)	**Declared Overall Antenna Gain (dBi)**
2.4GHz	6,4 (Note 1)
5GHz	7 (Note 1)

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

-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

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

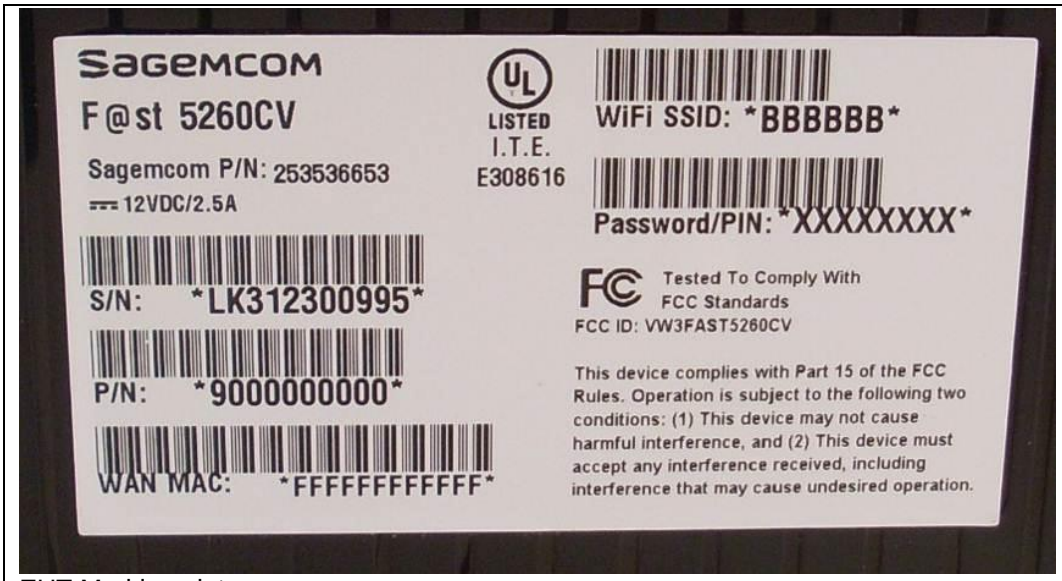
2.2. RUNNING MODE

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: 1Mbps, 802.11g: 6Mbps, 802.11n HT20: MCS16, 802.11n HT40: MCS16)
- Permanent reception

Following commands with the specific test software “Atheros Radio Tool client v1.17.3” are used to set the product:

	Modulation	Channel	Power setting	Command
802.11b	1Mbps Long	1	18	tx f=2412;pc=-1;pl=4000;tx99=1;txch=7;tp=18;r=1L;ht40=0
		6	24	tx f=2437;pc=-1;pl=4000;tx99=1;txch=7;tp=24;r=1L;ht40=0
		11	20	tx f=2462;pc=-1;pl=4000;tx99=1;txch=7;tp=20;r=1L;ht40=0
802.11g	6MBps	1	16	tx f=2412;pc=-1;pl=4000;tx99=1;txch=7;tp=16;r=6;ht40=0
		6	22	tx f=2437;pc=-1;pl=4000;tx99=1;txch=7;tp=22;r=6;ht40=0
		11	16	tx f=2462;pc=-1;pl=4000;tx99=1;txch=7;tp=16;r=6;ht40=0
802.11nHT20	MCS16 HT20	1	13	tx f=2412;r=t16;pc=-1;pl=4000;tx99=1;txch=7;ht40=0;agg=4;tp=13
		6	19	tx f=2437;r=t16;pc=-1;pl=4000;tx99=1;txch=7;ht40=0;agg=4;tp=19
		11	16	tx f=2462;r=t16;pc=-1;pl=4000;tx99=1;txch=7;ht40=0;agg=4;tp=16
802.11nHT40	MCS16 HT40	3	11	tx f=2417;pc=-1;pl=4000;tx99=1;txch=7;tp=11;r=f16;agg=8;ht40=1
		6	14	tx f=2427;pc=-1;pl=4000;tx99=1;txch=7;tp=14;r=f16;agg=8;ht40=1
		9	12	tx f=2442;pc=-1;pl=4000;tx99=1;txch=7;tp=12;r=f16;agg=8;ht40=1

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. OCCUPIED BANDWIDTH

3.1. TEST CONDITIONS

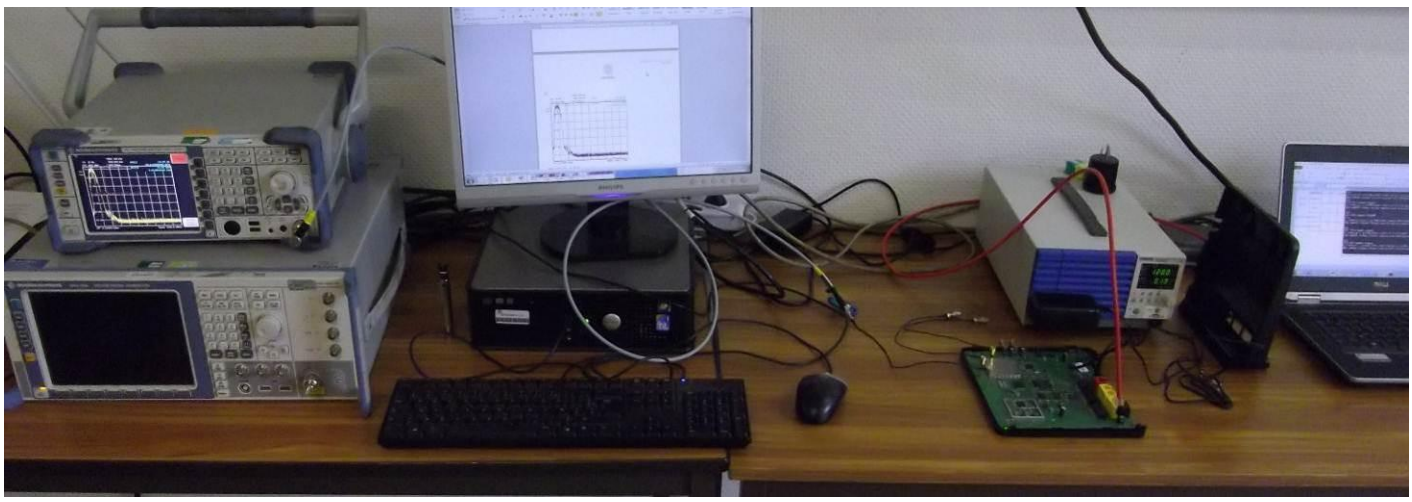
Test performed by : Gilles DE BUYSER
Date of test : 2013/07/04
Ambient temperature : 22°C
Relative humidity : 54%

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.

Measurement performed on one conducted output: Tx1.

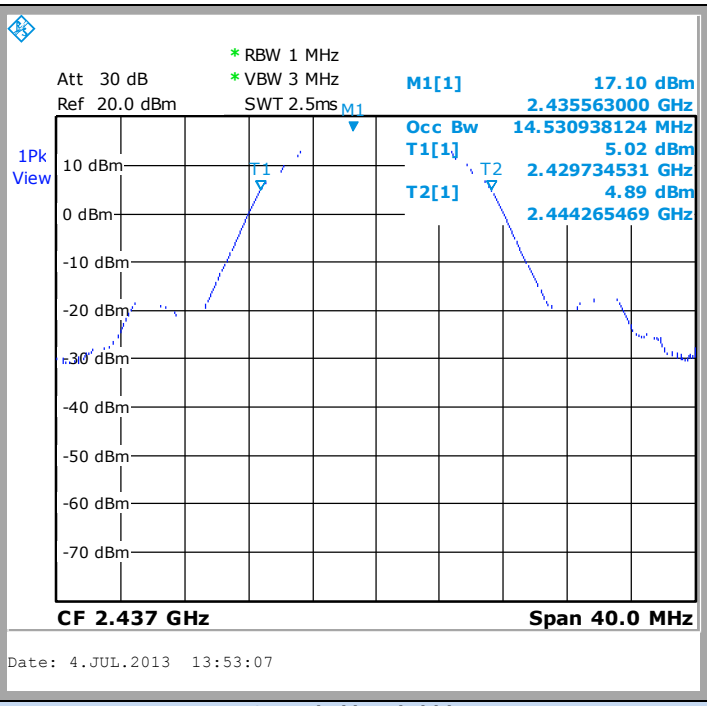
Spectrum Analyzer Setting:
Center frequency= Cmin or Cnom or Cmax
Span= 40MHz for b, g, nHT20 and 60 MHz for n HT40
RBW= 1% of span
VBW= 3*RBW
Sweep= Auto
Trace= Max Hold
Detector= Peak
Occupied Bandwidth 99% activated



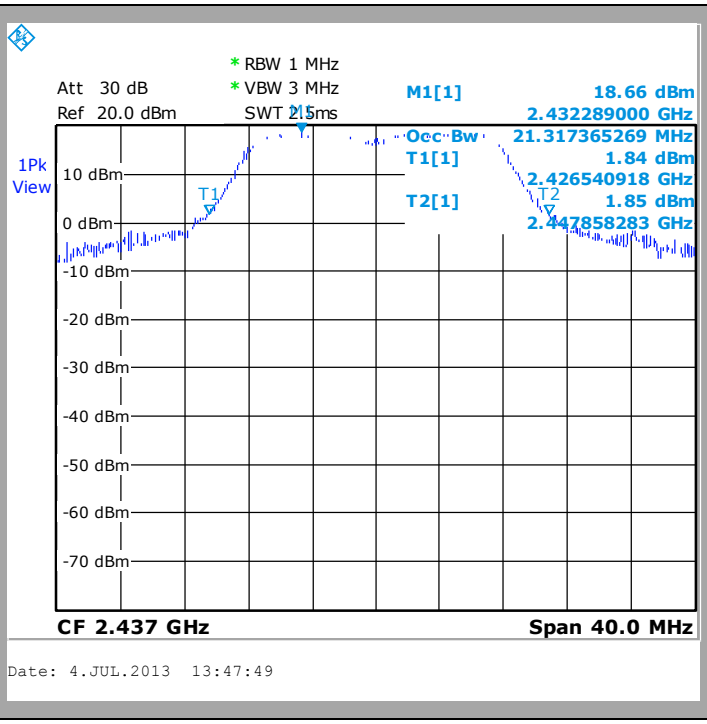
Photograph for Occupied Bandwidth

3.3. GRAPHICS & RESULTS

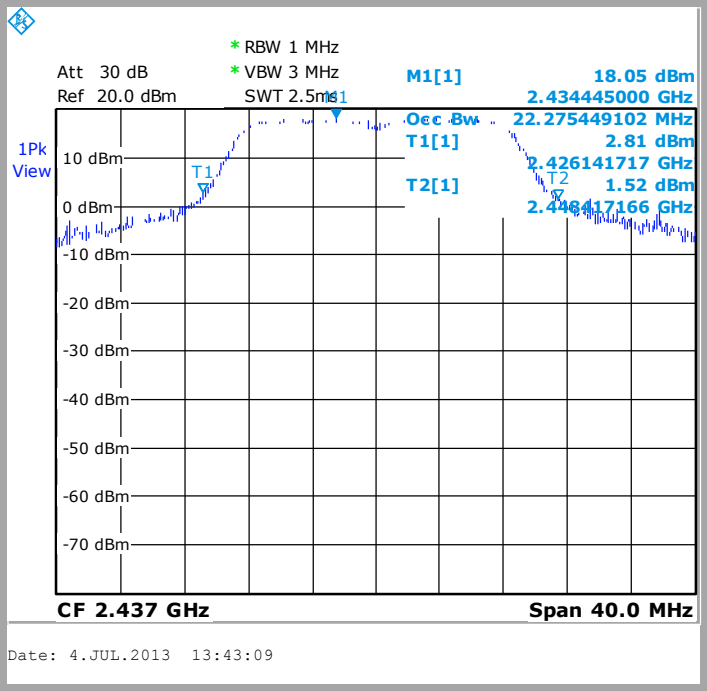
Occupied bandwidth
802.11b
Cnom



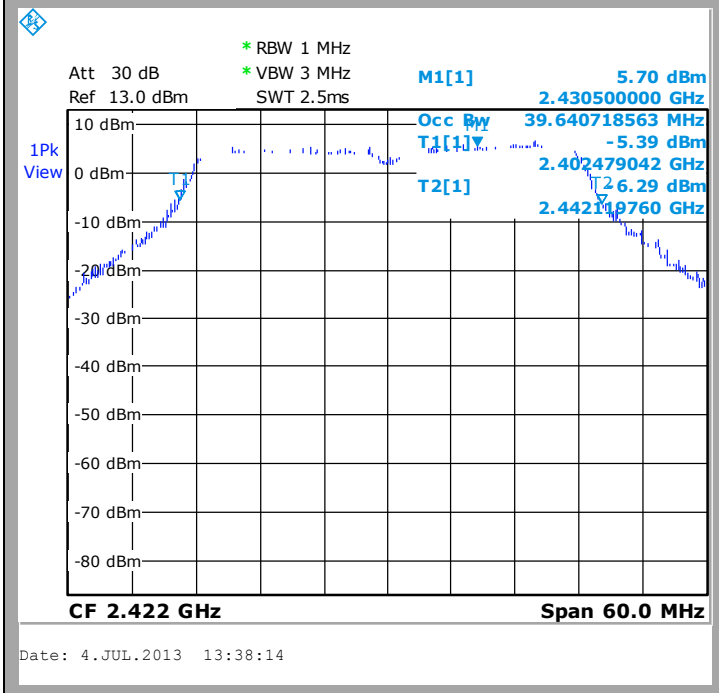
Occupied bandwidth
802.11g
Cnom

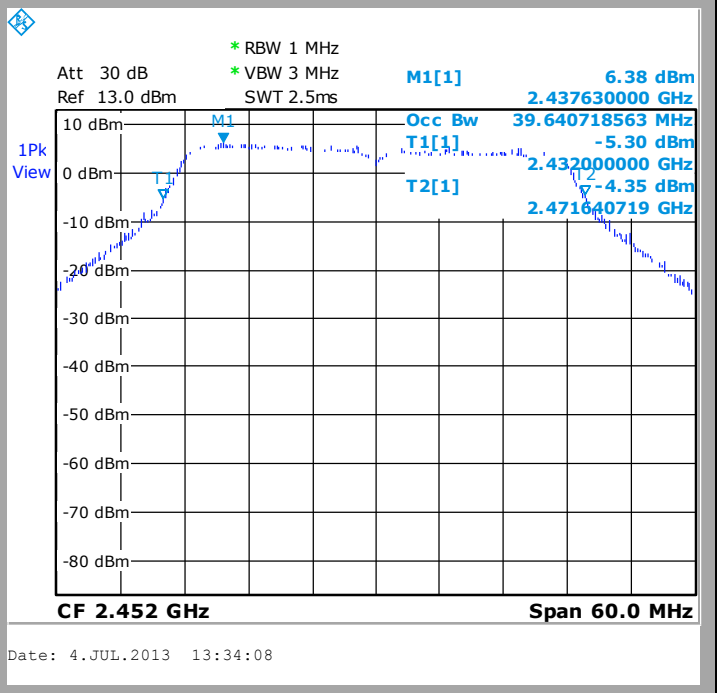


Occupied bandwidth
802.11n HT20
Cnom



Occupied bandwidth	
802.11n HT40	
Cmin	Cmax





Mode 802.11 b

Temperature	**Tnom**		
Voltage	**Vnom**		
Frequency	Cmin	Cnom	Cmax
Occupied Bandwidth (kHz)	14132	14531	14211

Mode 802.11 g

Temperature	**Tnom**		
Voltage	**Vnom**		
Frequency	Cmin	Cnom	Cmax
Occupied Bandwidth (kHz)	19241	21317	19321

Mode 802.11 n HT20

Temperature	**Tnom**		
Voltage	**Vnom**		
Frequency	Cmin	Cnom	Cmax
Occupied Bandwidth (kHz)	20040	22275	20200

Mode 802.11 n HT40

Temperature	**Tnom**		
Voltage	**Vnom**		
Frequency	Cmin	Cnom	Cmax
Occupied Bandwidth (kHz)	39640	38922	39640

Result: **PASS**
Limit: → None

4. -6DB BANDWIDTH

4.1. TEST CONDITIONS

Test performed by : Gilles DE BUYSER
Date of test : 2013/07/04
Ambient temperature : 22°C
Relative humidity : 54%

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 v03r01 § 8.1.

Measurement performed on one conducted output: Tx1.

Spectrum Analyzer Setting:
Center frequency= Cmin or Cnom or Cmax
Span= 30MHz for b, g, nHT20 and 60 MHz for n HT40
RBW= 100kHz
VBW= 300kHz
Sweep= Auto
Trace= Max Hold
Detector= Peak

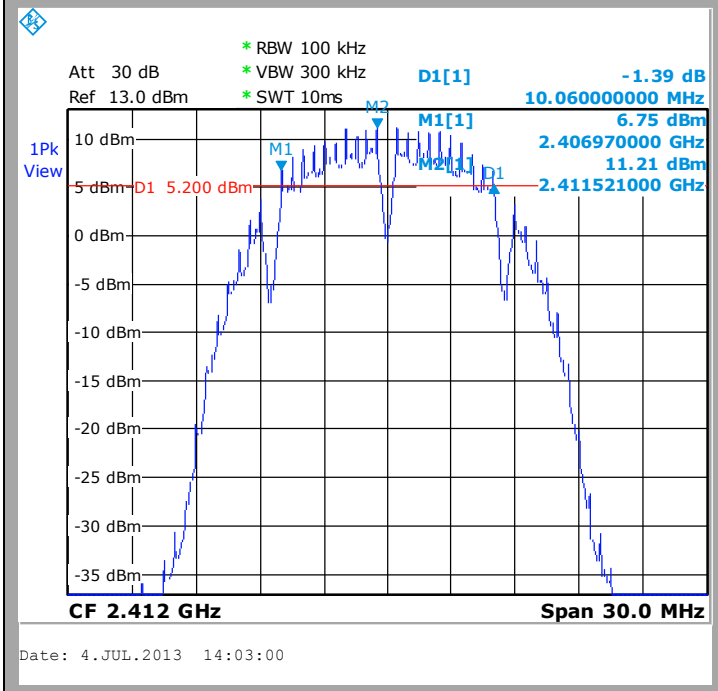
Photograph for -6 dB Bandwidth measurment

4.3. GRAPHICS & RESULTS

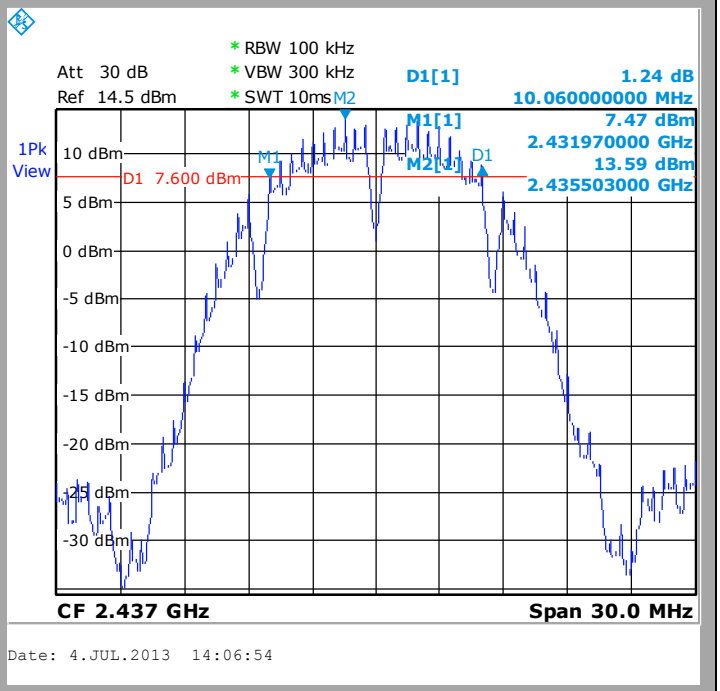
-6dB bandwidth

802.11b

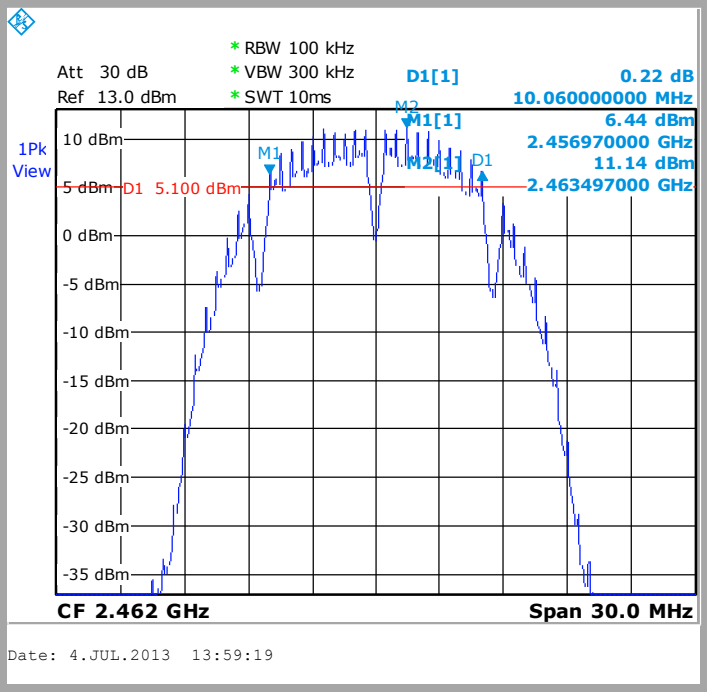
Cmin



Cnom

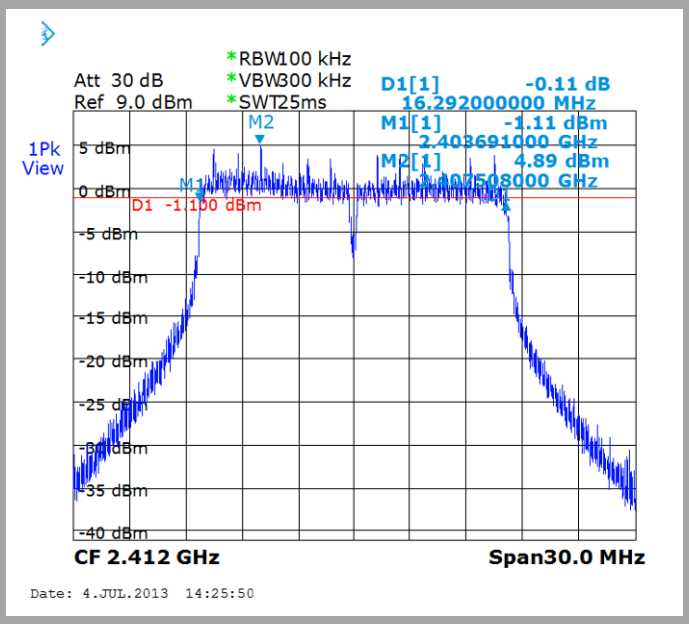


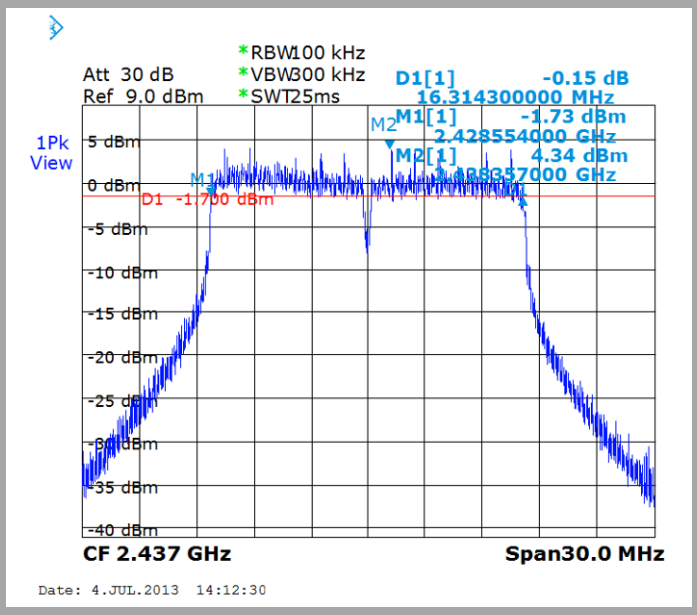
Cmax



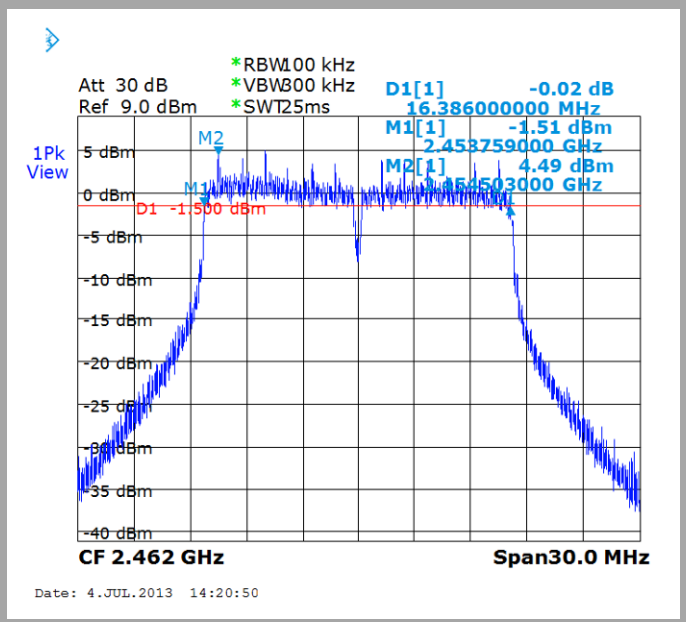
-

-6dB bandwidth	
802.11g	
Cmin	Cnom





Cmax



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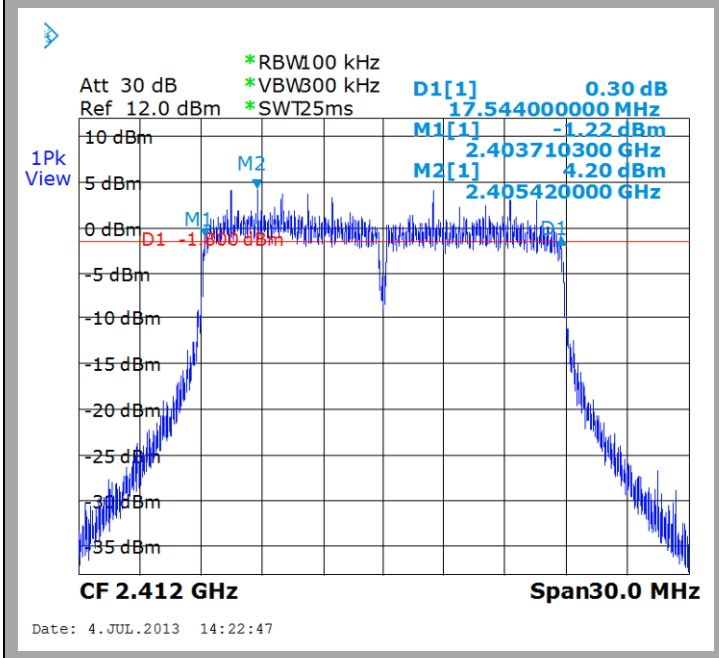
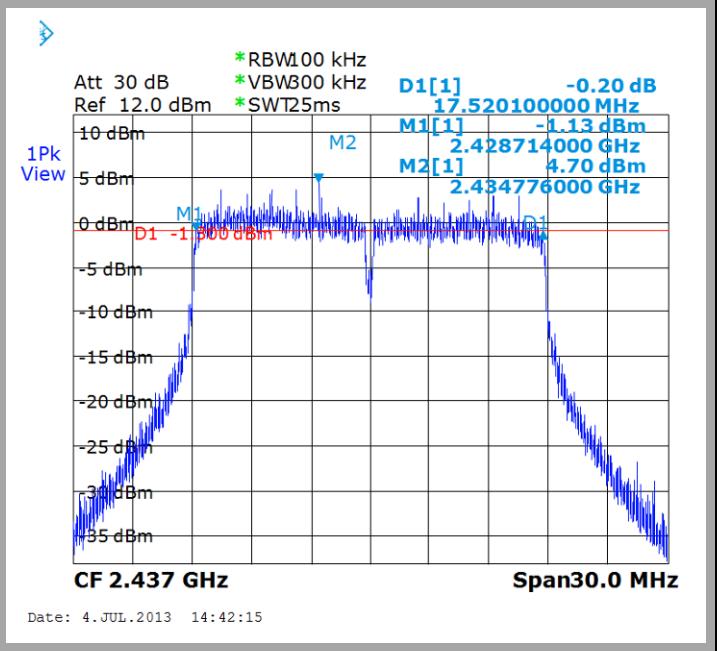
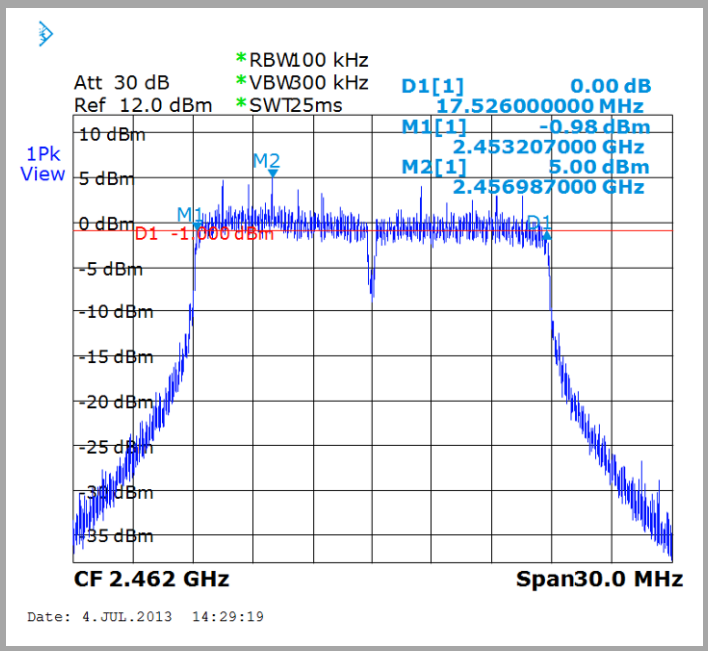
-6dB bandwidth	
802.11n HT20	
Cmin	Cnom





Cmax



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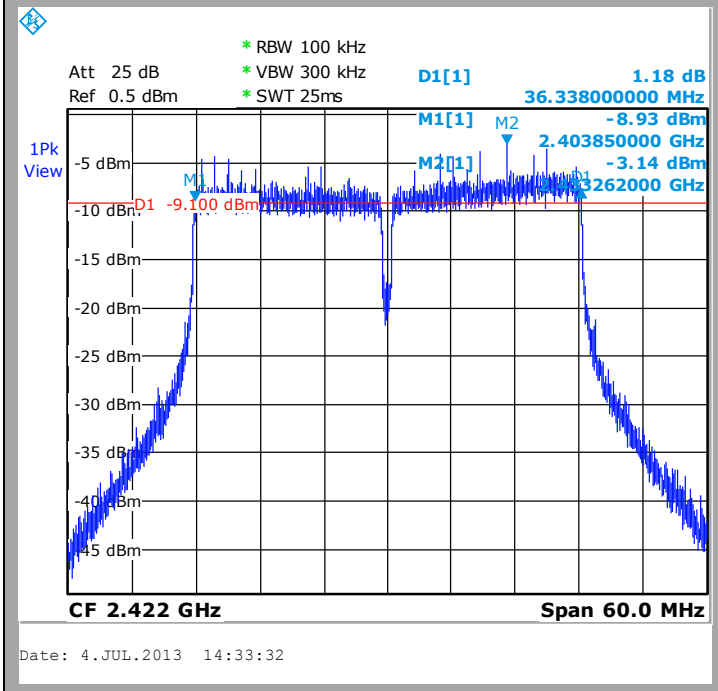
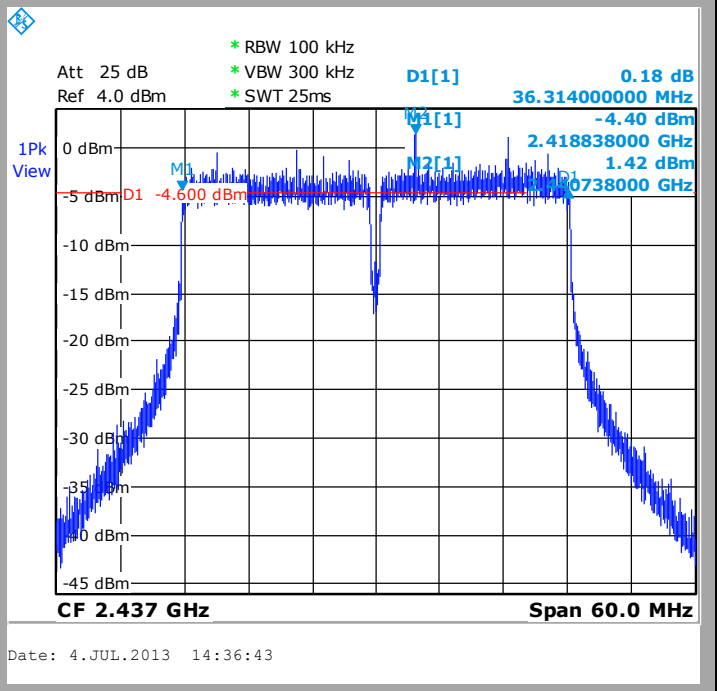
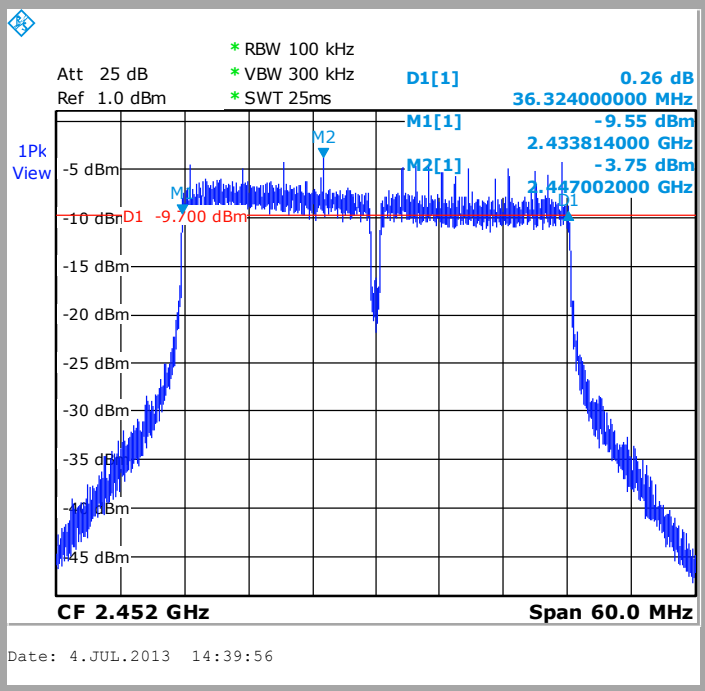
-6dB bandwidth	
802.11n HT40	
Cmin	Cnom





Cmax



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Mode 802.11 b

Temperature	**Tnom**		
Voltage	**Vnom**		
Frequency	Cmin	Cnom	Cmax
-6dB Bandwidth (kHz)	10060	10060	10060

Mode 802.11 g

Temperature	**Tnom**		
Voltage	**Vnom**		
Frequency	Cmin	Cnom	Cmax
-6dB Bandwidth (kHz)	16292	16314	16386

Mode 802.11 n HT20

Temperature	**Tnom**		
Voltage	**Vnom**		
Frequency	Cmin	Cnom	Cmax
-6dB Bandwidth (kHz)	17544	17520	17526

Mode 802.11 n HT40

Temperature	**Tnom**		
Voltage	**Vnom**		
Frequency	Cmin	Cnom	Cmax
-6dB Bandwidth (kHz)	36338	36314	36324

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

5. MAXIMUM CONDUCTED POWER

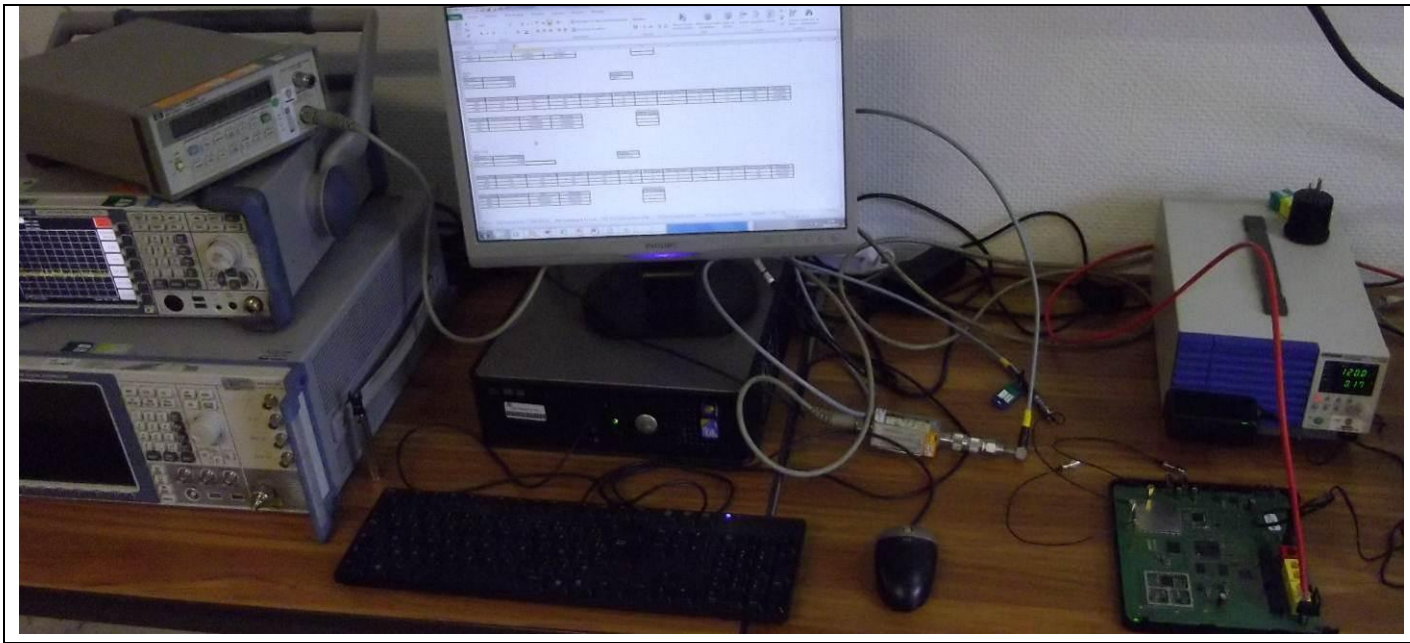
5.1. TEST CONDITIONS

Test performed by : Gilles DE BUYSER
Date of test : 2013/07/05
Ambient temperature : 23°C
Relative humidity : 58%

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 power meter (average detector) on the EUT conducted access. The product has been tested according to the FCC KDB 558074 D01 DTS Meas Guidance v03r01 § 9.2.3.1 & FCC KDB 662911 D01 Multiple Transmitter Outpout v02 § E) 1).

Power meter:
RF average power meter with a thermocouple detector
Wide band power meter sensor in a range including EUT transmission band



Photograph for Maximum Conducted Power

5.3. RESULTS

Mode 802.11 b

Temperature	**Tnom**		
Voltage	**Vnom**		
Frequency	Cmin	Cnom	Cmax
Maximum Conducted Power (dBm)	27.1	28.9	26.9

Mode 802.11 g

Temperature	**Tnom**		
Voltage	**Vnom**		
Frequency	Cmin	Cnom	Cmax
Maximum Conducted Power (dBm)	22.2	26.9	21.9

Mode 802.11 n HT20

Temperature	**Tnom**		
Voltage	**Vnom**		
Frequency	Cmin	Cnom	Cmax
Maximum Conducted Power (dBm)	22.1	27.0	21.8

Mode 802.11 n HT40

Temperature	**Tnom**		
Voltage	**Vnom**		
Frequency	Cmin	Cnom	Cmax
Maximum Conducted Power (dBm)	17.3	21.3	17.0

Remark: The power values in these tables are a summation of conducted power on Tx1, Tx2 and Tx3.

Result: PASS
Limit: → The Maximum Conducted Power must be lower than 29.6 dBm (Antenna gain = 6.4 dBi)

6. POWER SPECTRAL DENSITY

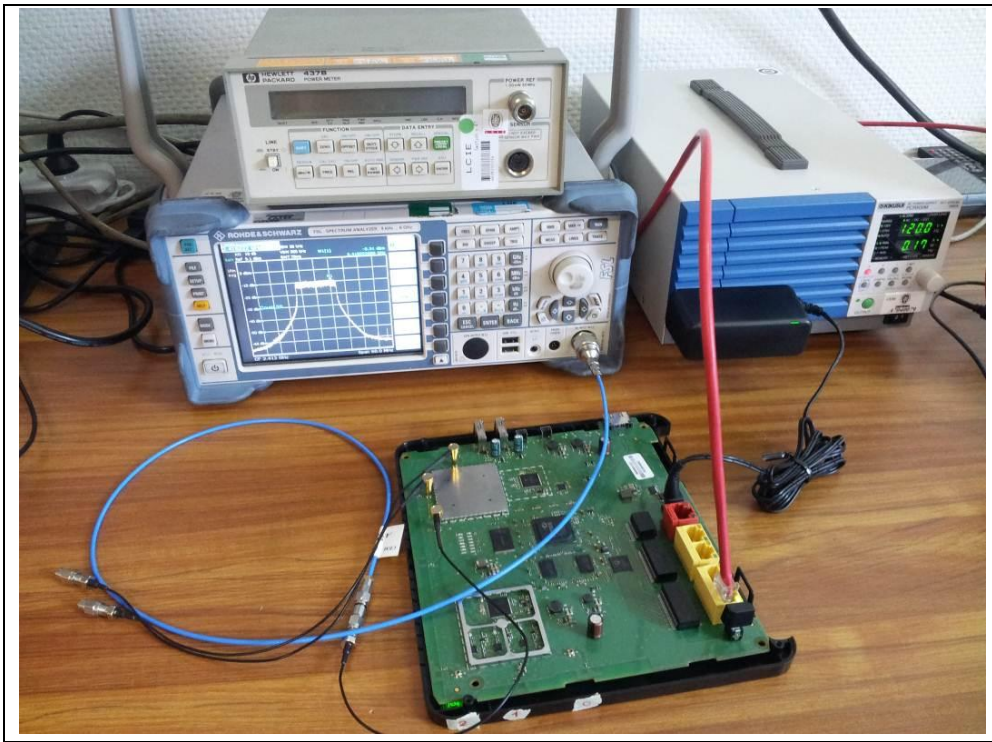
6.1. TEST CONDITIONS

Test performed by : Stéphane PHOUDIAH
Date of test : 2013/07/16 & 2013/07/17
Ambient temperature : 26°C
Relative humidity : 47%

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 § 10.3 & FCC KDB 662911 D01 Multiple Transmitter Output v02 § E) 2) b).

Spectrum Analyzer Setting:
Center frequency= Cmin or Cnom or Cmax
Span= At least 1.5xOBW
Amplitude= Sufficient to observe the signal amplitude
RBW= 30 kHz
VBW= 300 kHz
Sweep= Auto
Sweep Point= 5000 points (>2xSPAN/RBW)
Trace= Average (100)
Detector= RMS



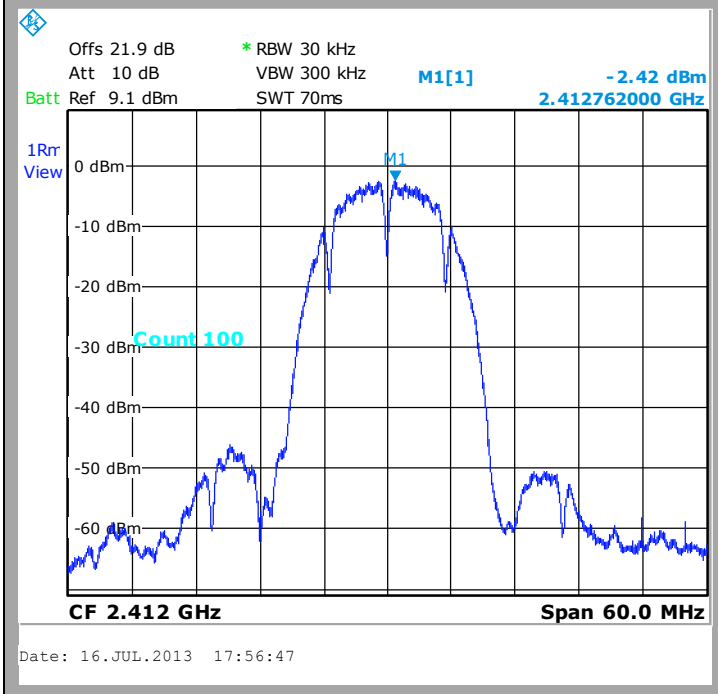
Photograph for Power Spectral Density

6.3. GRAPHICS & RESULTS

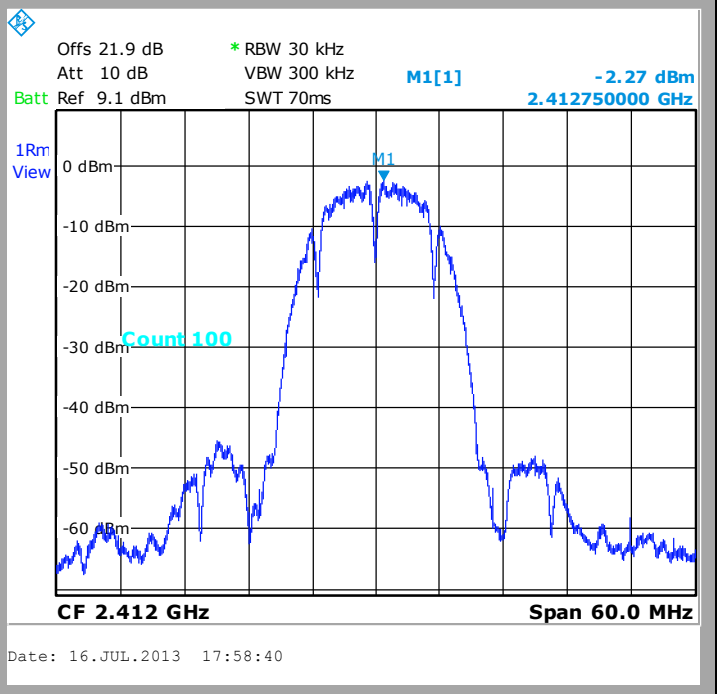
802.11b

Cmin

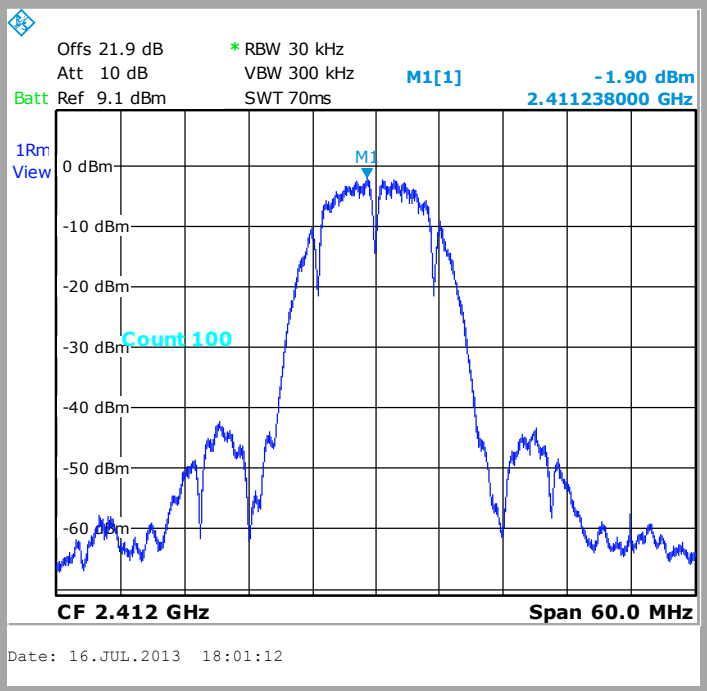
Tx1



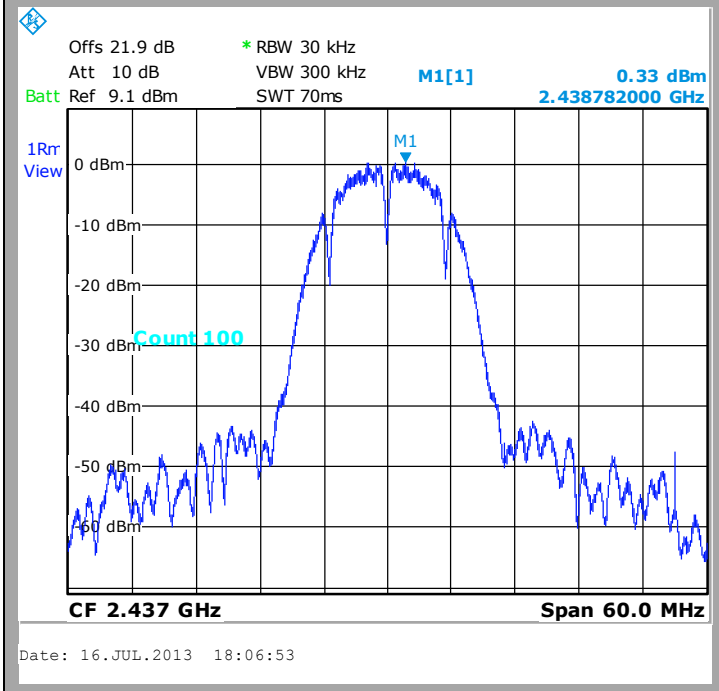
Tx2

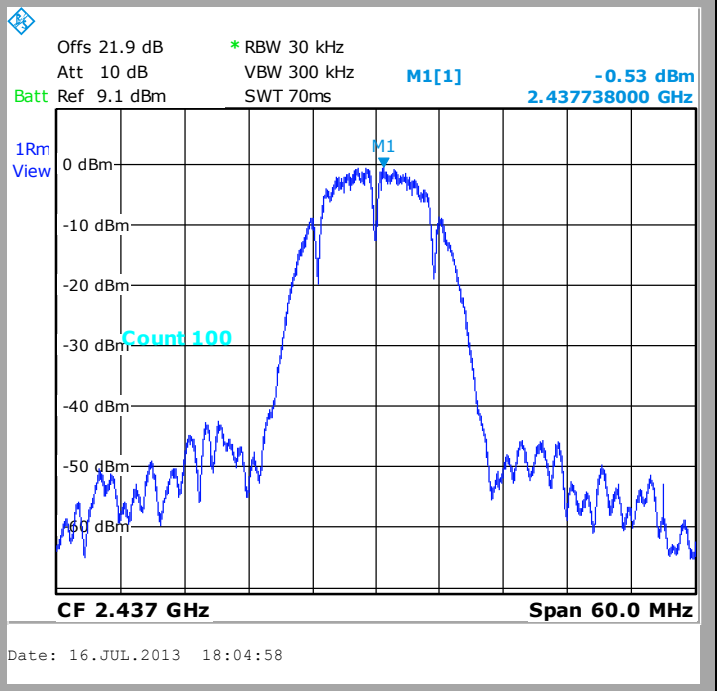


Tx3

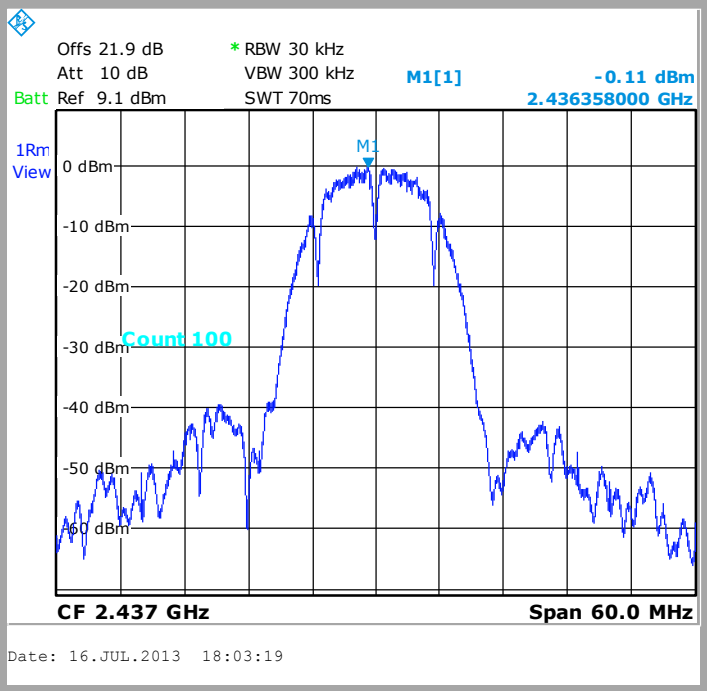


802.11b	
Cnom	
Tx1	Tx2

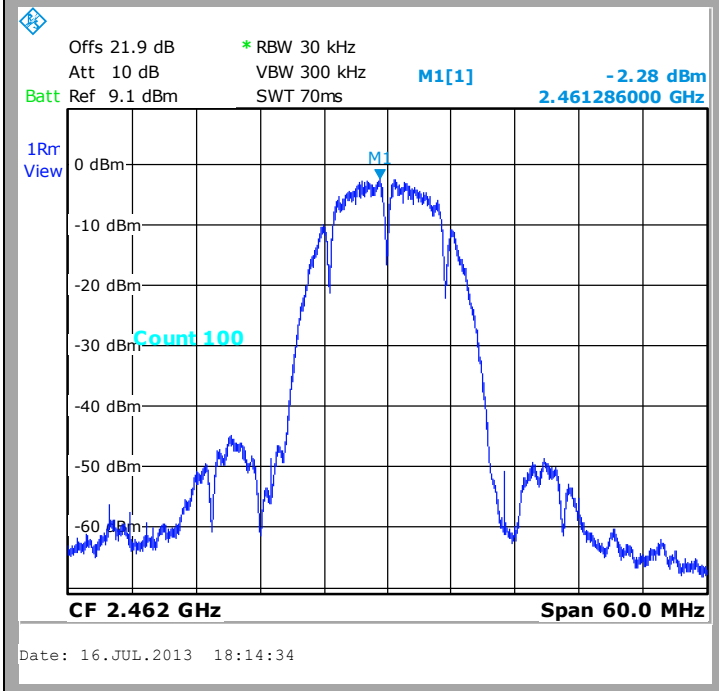


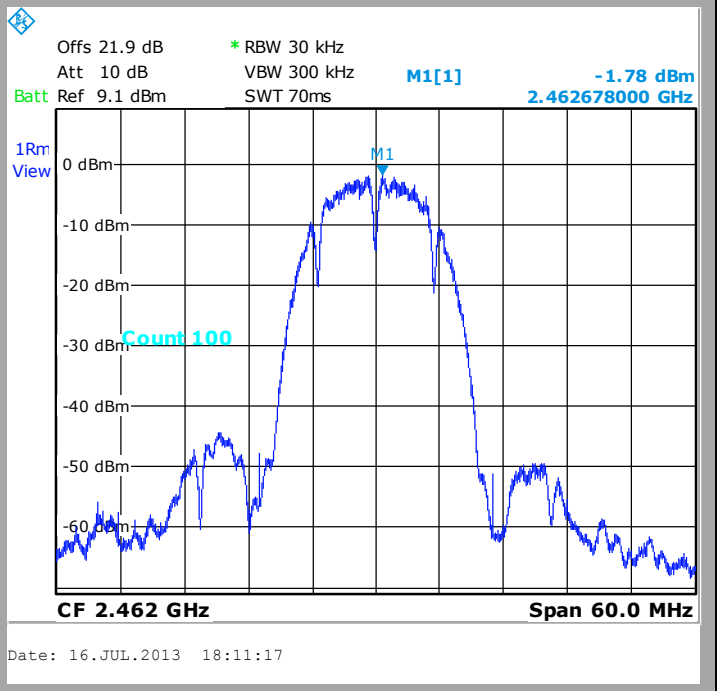


Tx3

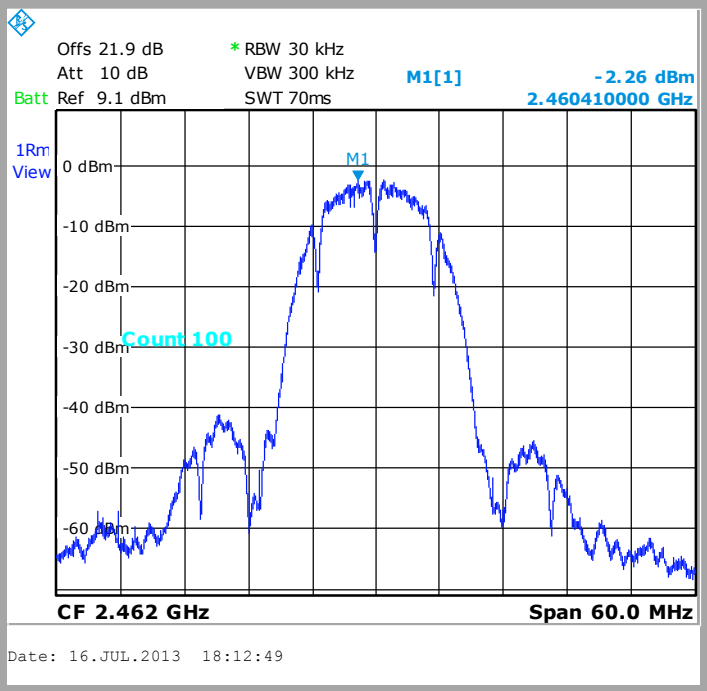


802.11b	
Cmax	
Tx1	Tx2

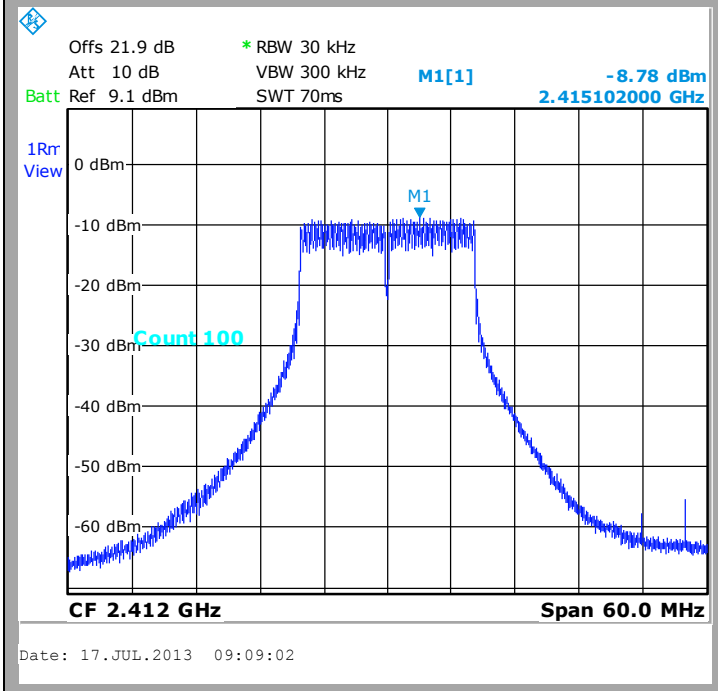


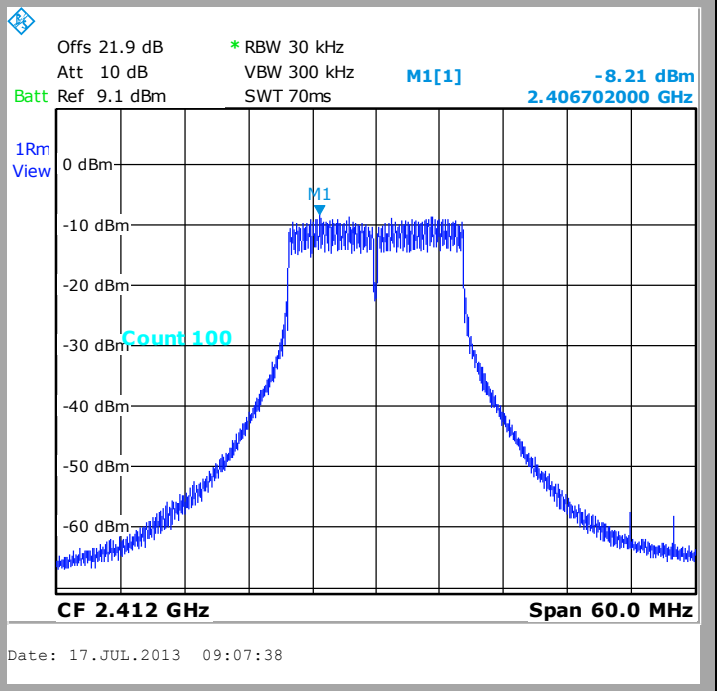


Tx3



802.11g	
Cmin	
Tx1	Tx2





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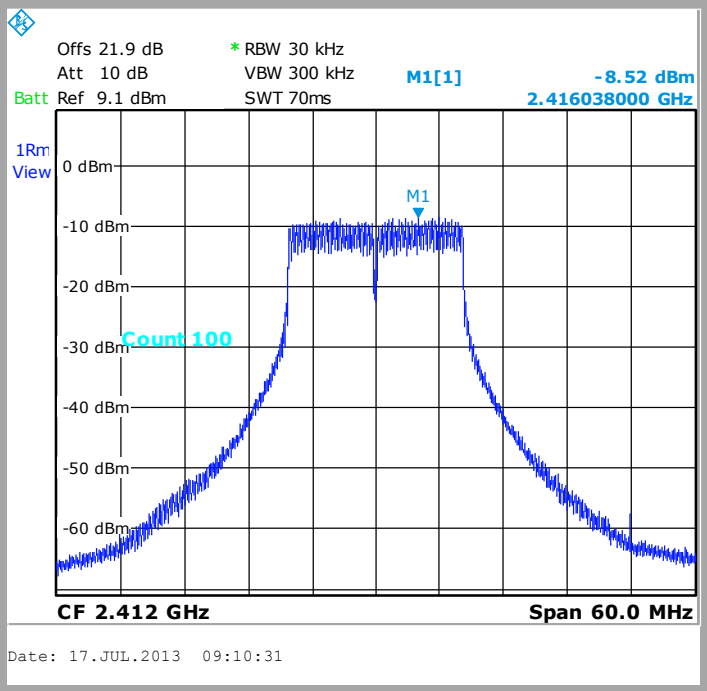
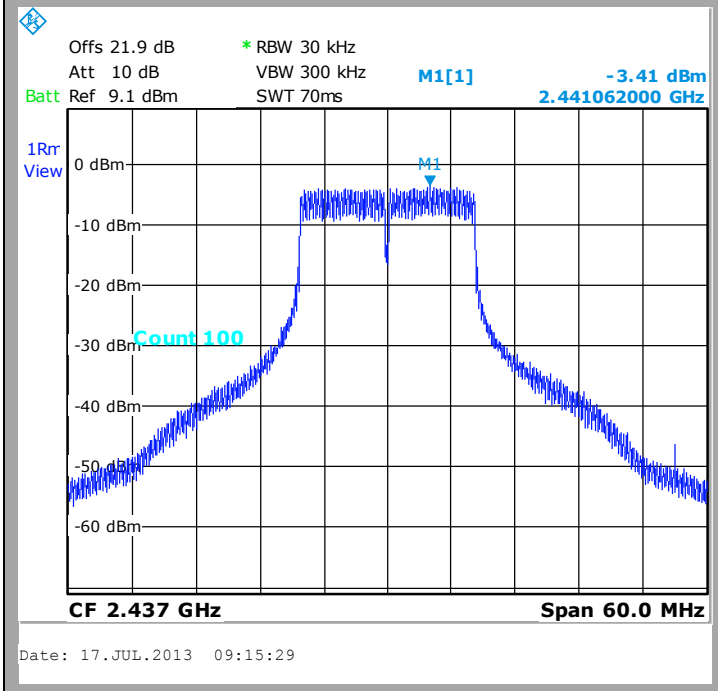
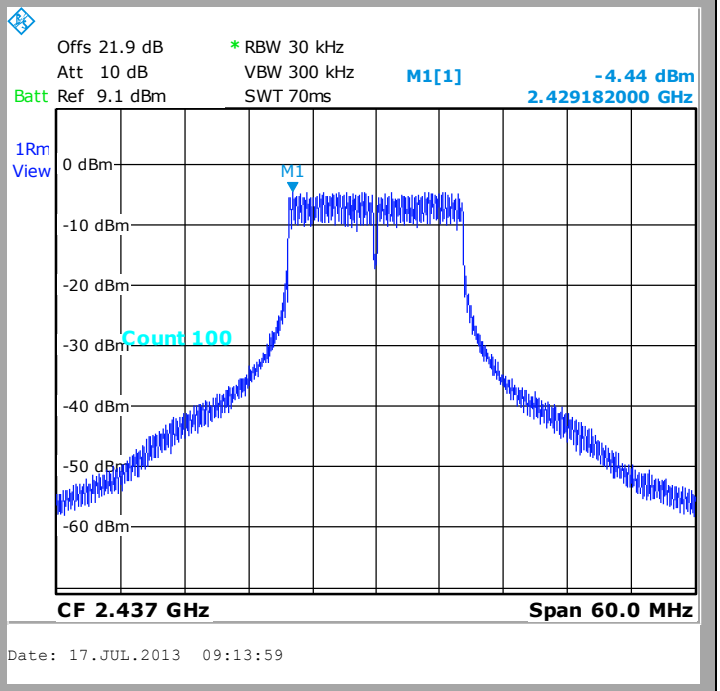
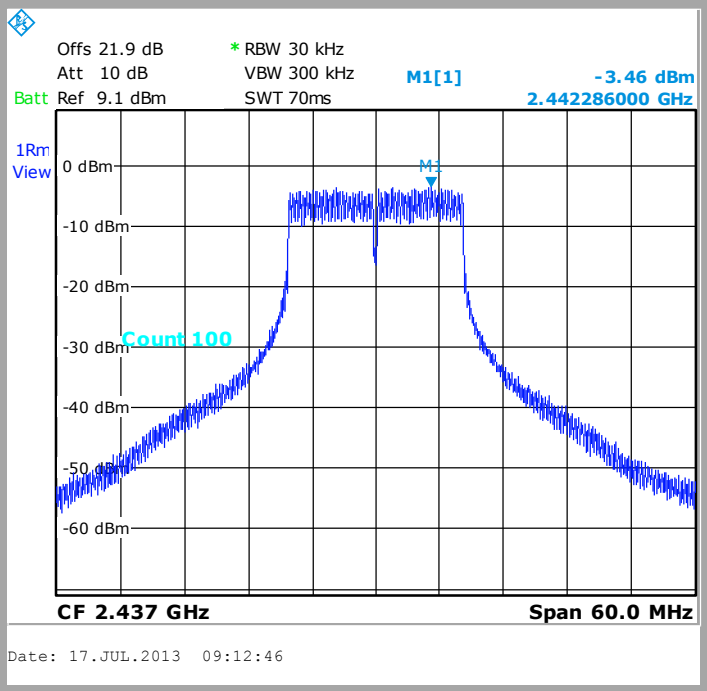


802.11g	
Cnom	
Tx1	Tx2

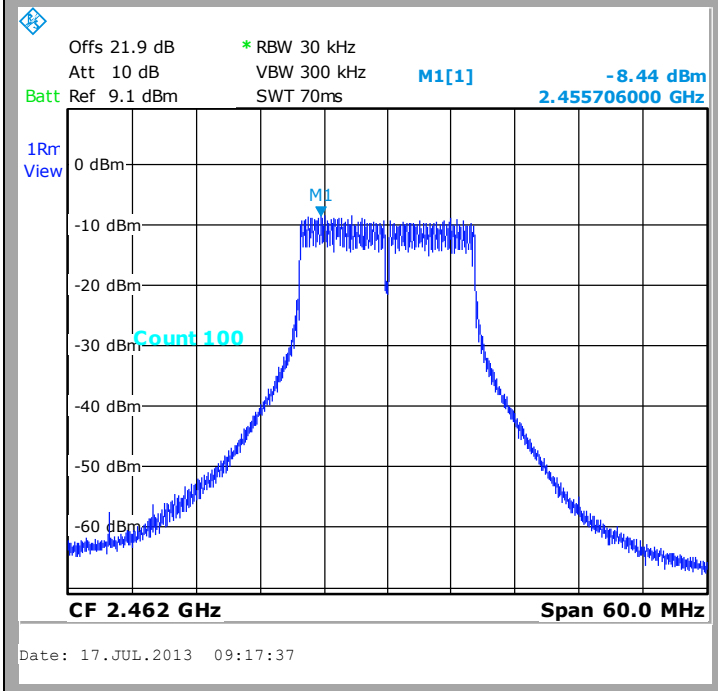


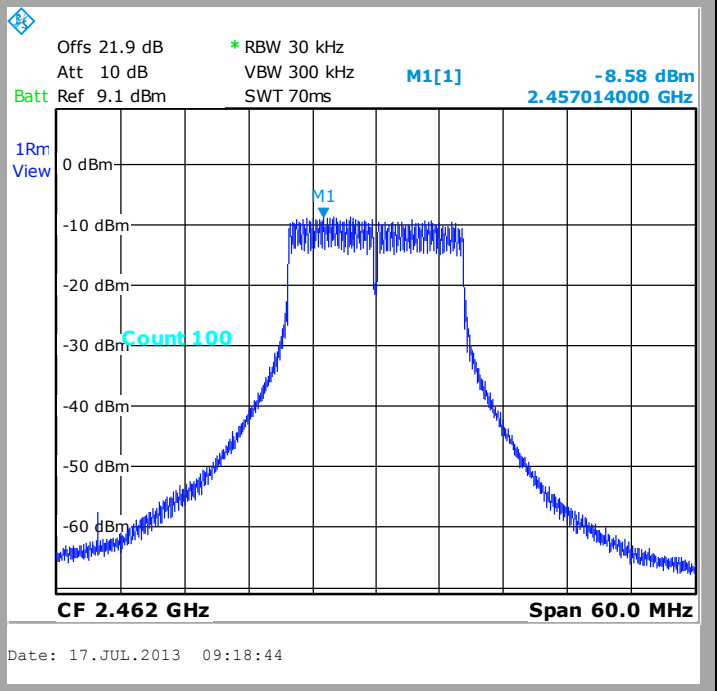


Tx3

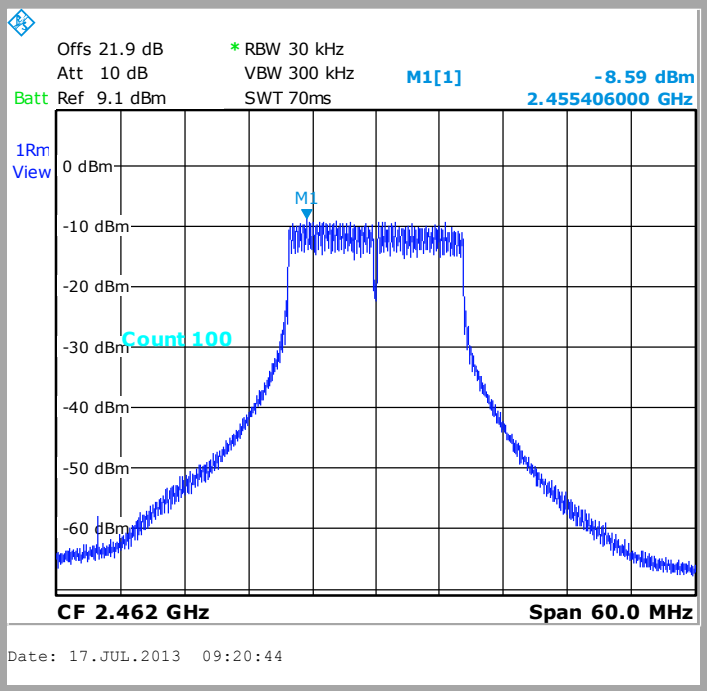


802.11g	
Cmax	
Tx1	Tx2

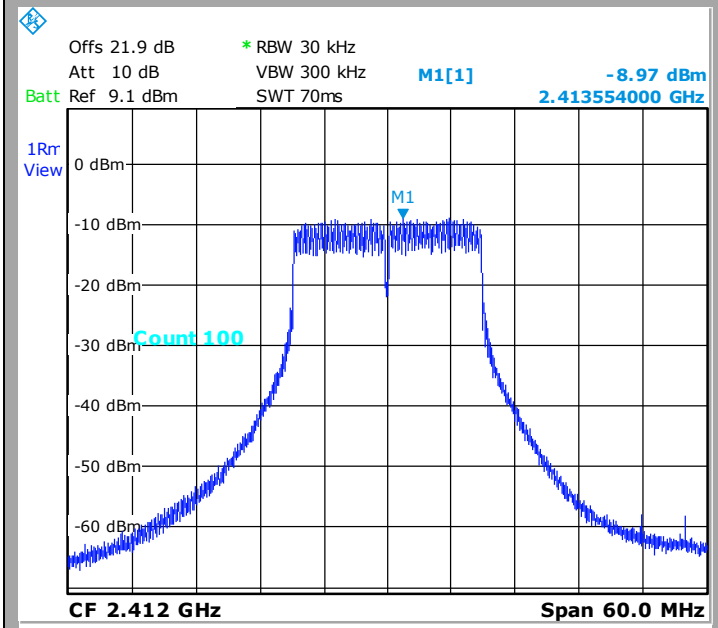


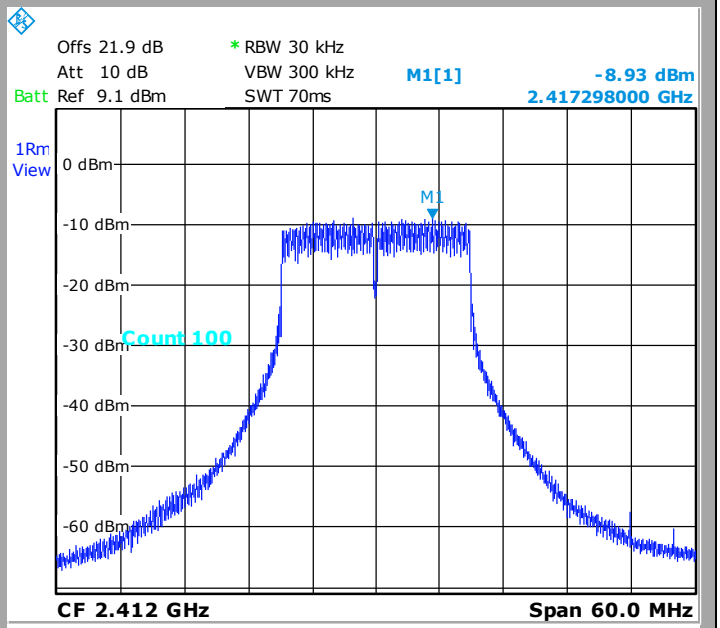


Tx3

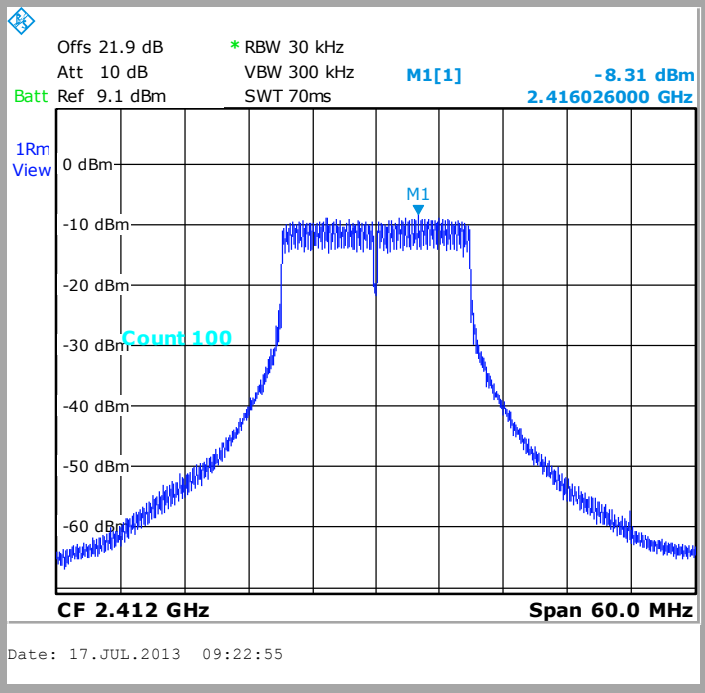


802.11n HT20	
Cmin	
Tx1	Tx2

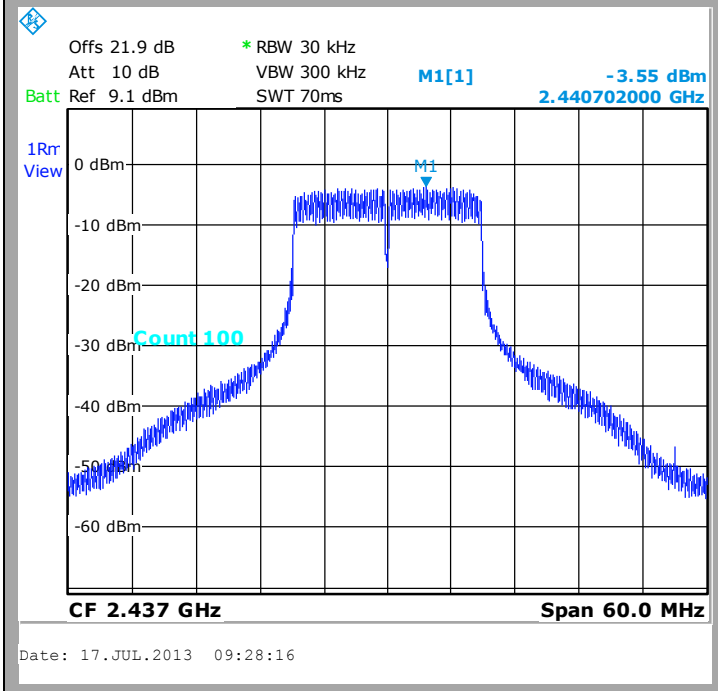


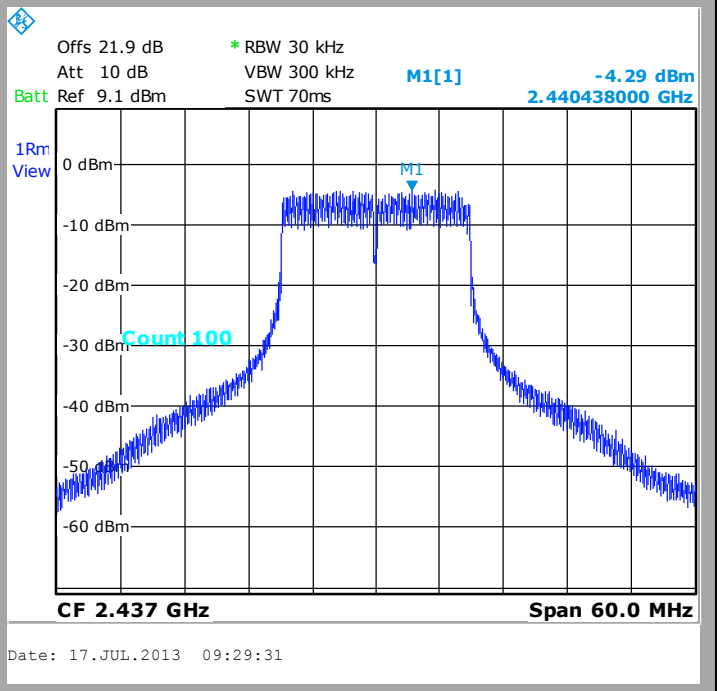


Tx3

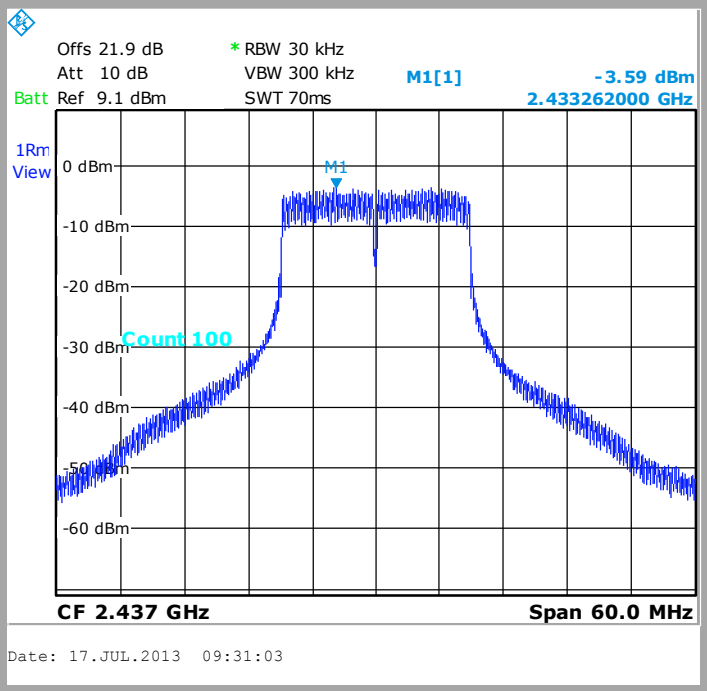


802.11n HT20	
Cnom	
Tx1	Tx2

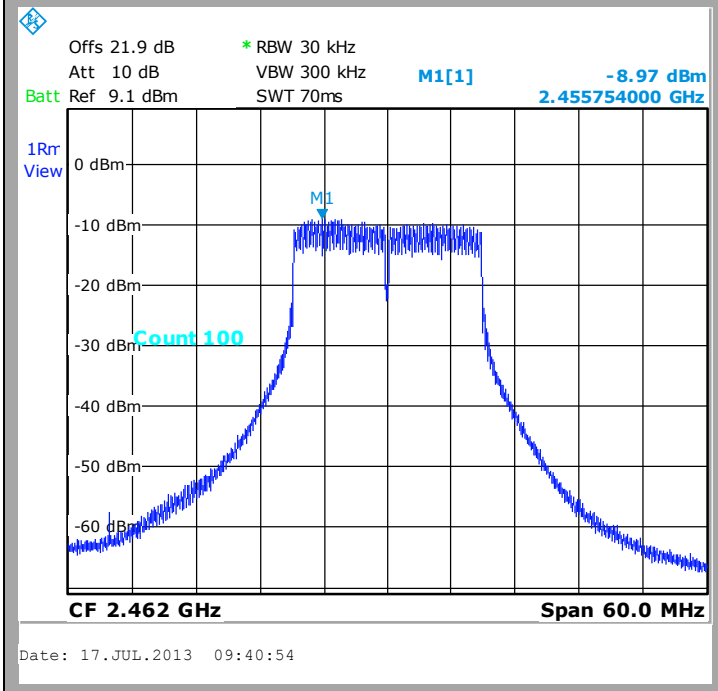


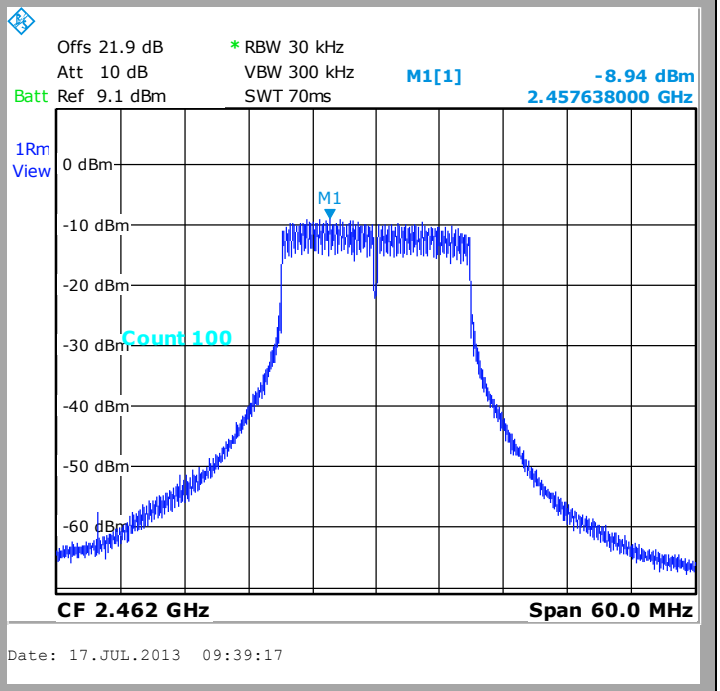


Tx3



802.11n HT20	
Cmax	
Tx1	Tx2





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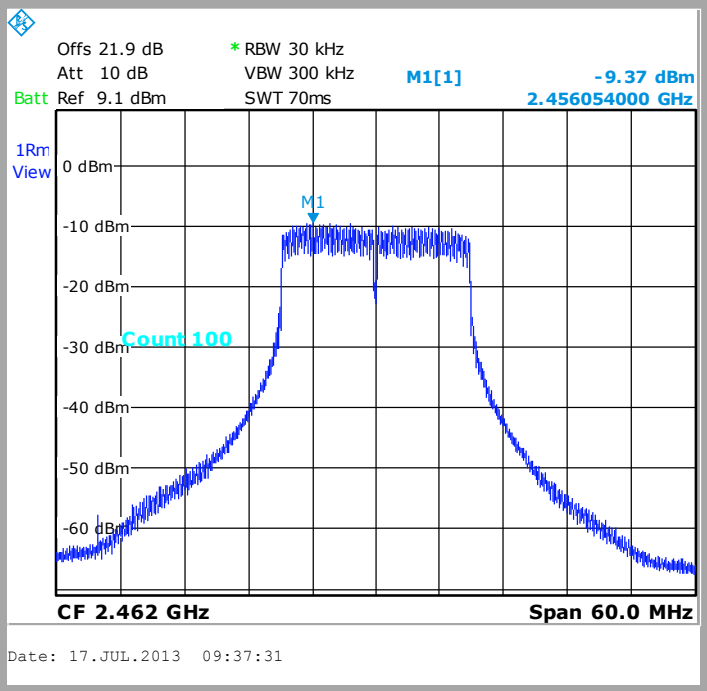
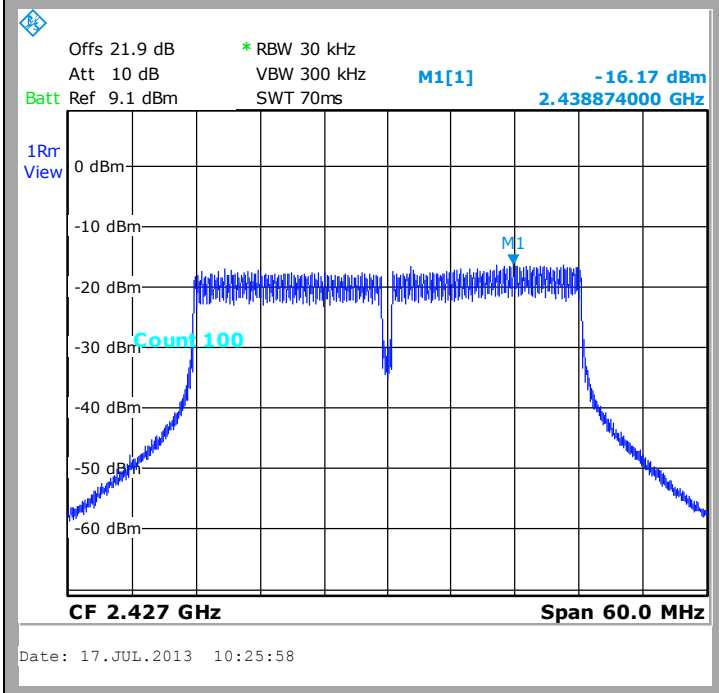
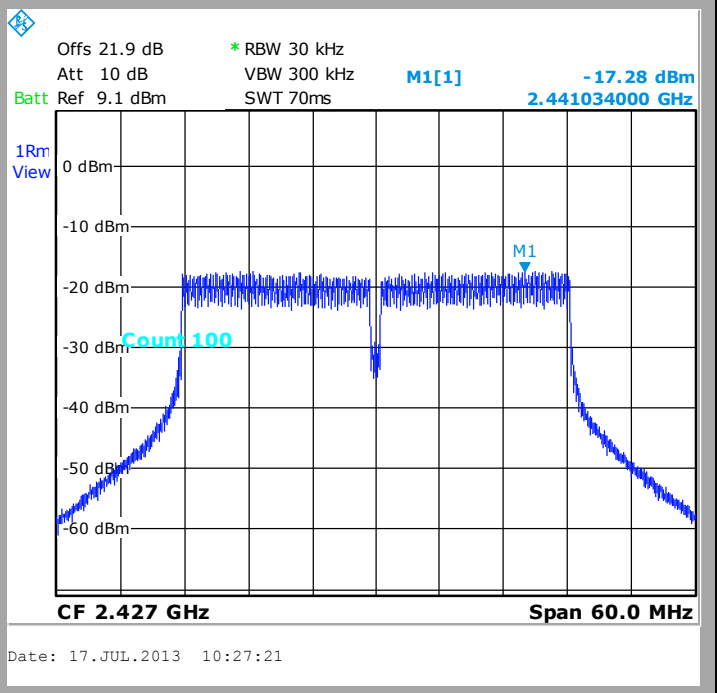
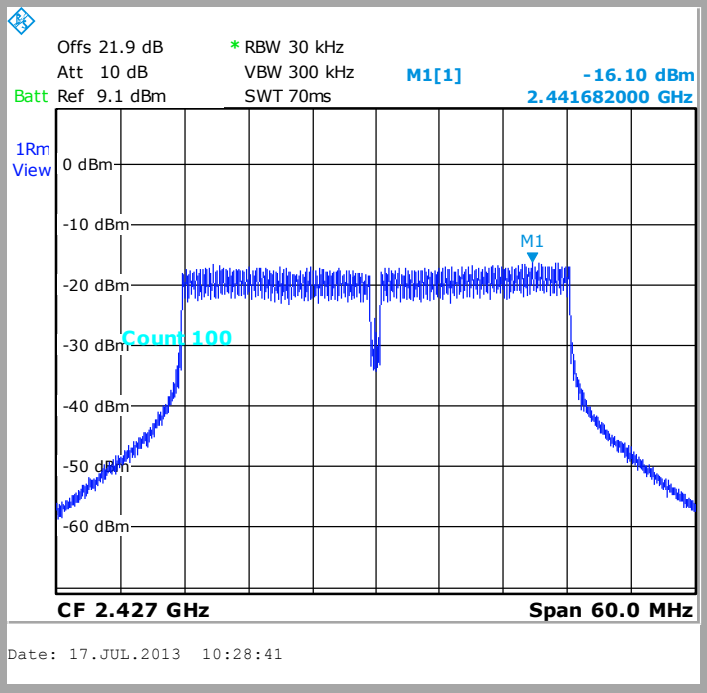


802.11n HT40	
Cmin	
Tx1	Tx2

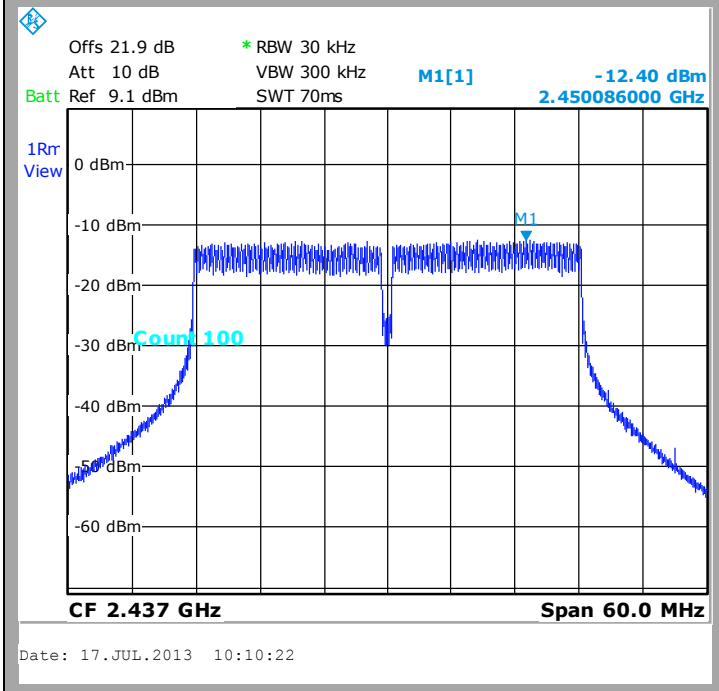


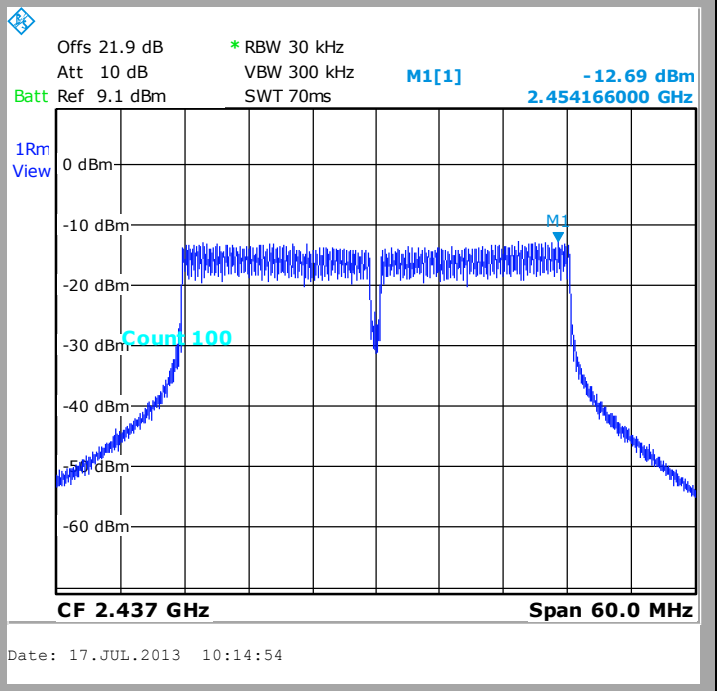


Tx3

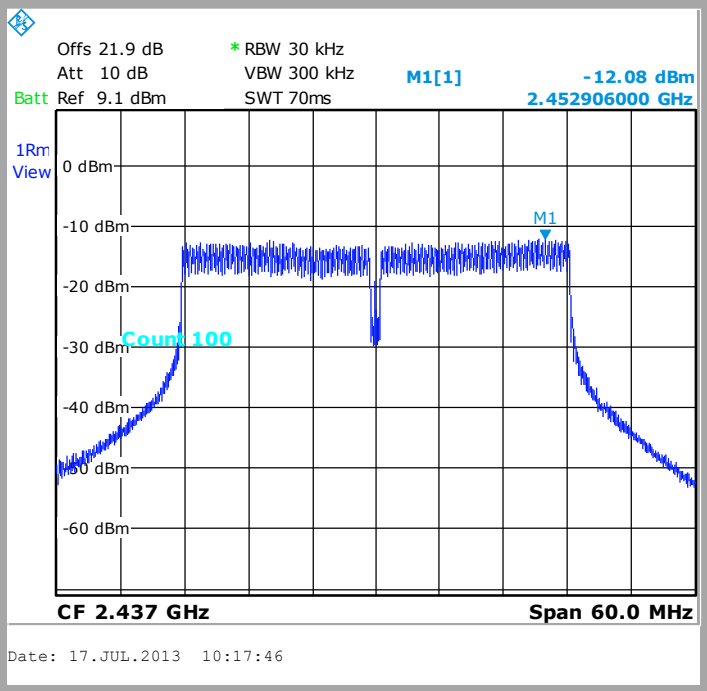


802.11n HT40	
Cnom	
Tx1	Tx2

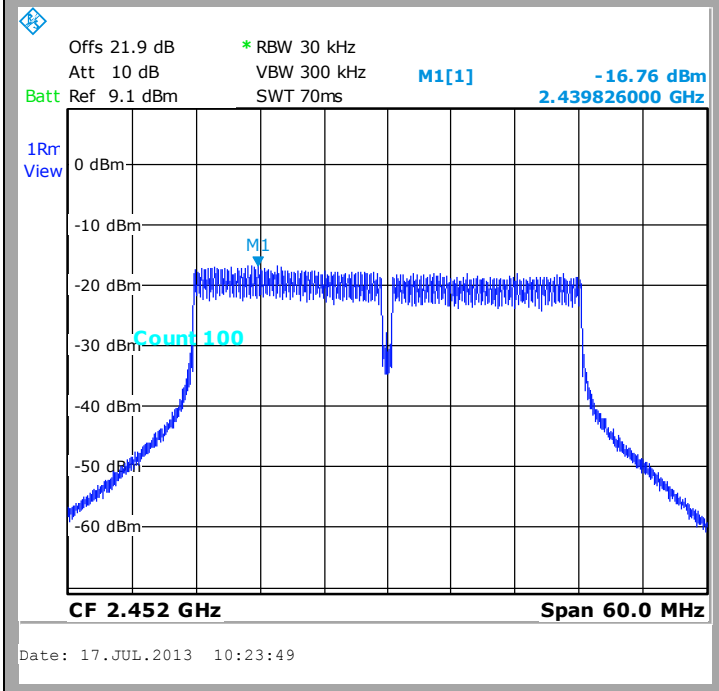


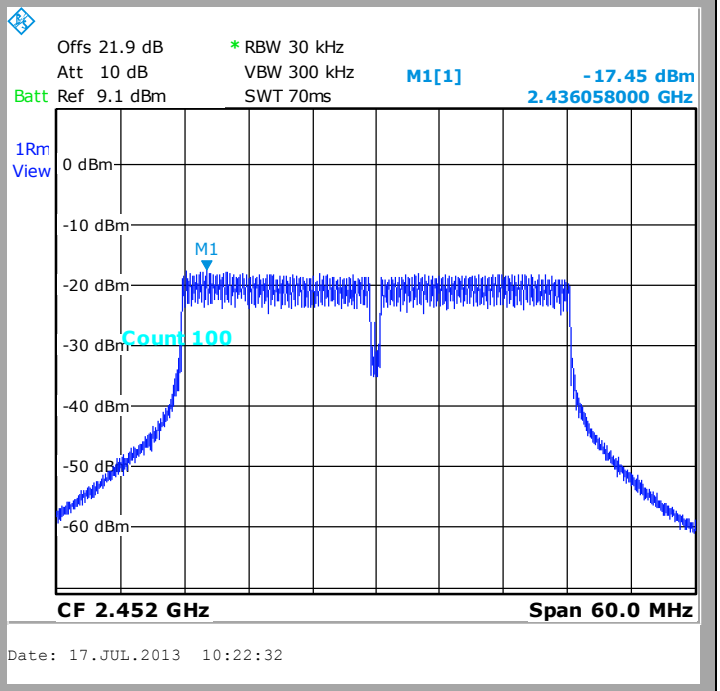


Tx3

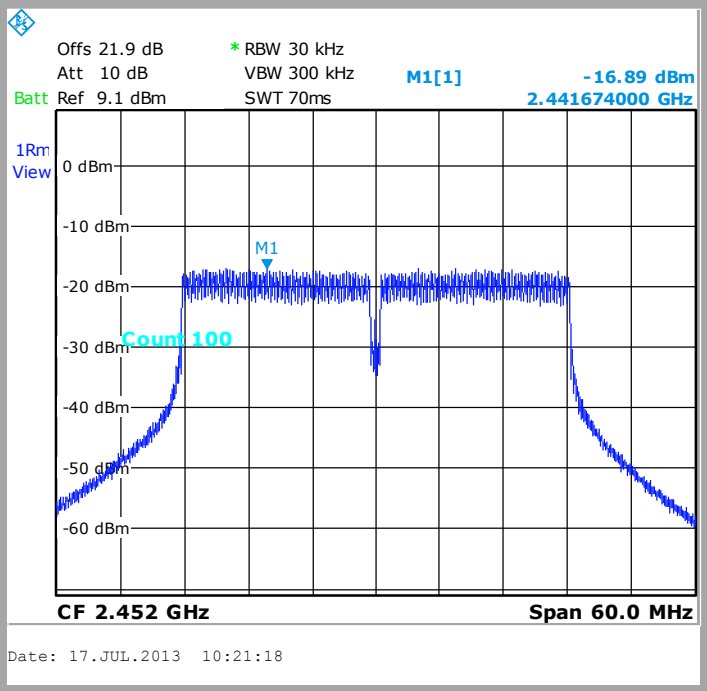


802.11n HT40	
Cmax	
Tx1	Tx2





Tx3



802.11b

Temperature	**Tnom**		
Voltage	**Vnom**		
Channel	Cmin	Cnom	Cmax
Power spectral density (dBm/30kHz)	2.6	4.7	2.6

802.11g

Temperature	**Tnom**		
Voltage	**Vnom**		
Channel	Cmin	Cnom	Cmax
Power spectral density (dBm/30kHz)	-3.7	1.1	-3.8

802.11n HT20

Temperature	**Tnom**		
Voltage	**Vnom**		
Channel	Cmin	Cnom	Cmax
Power spectral density (dBm/30kHz)	-3.9	1.0	-4.3

802.11n HT40

Temperature	**Tnom**		
Voltage	**Vnom**		
Channel	Cmin	Cnom	Cmax
Power spectral density (dBm/30kHz)	-11.7	-8.5	-12.3

Remark: The power values in these tables are a summation of conducted power on Tx1, Tx2 and TX3.
As recommended, the Power spectral density is measured with a 30kHz RBW, assuming that the same measurement with a 3 kHz RBW will give Power spectral density values lower.

Result: PASS
Limit: → The Power Spectral Density must be lower than 7.6 dBm/3kHz (antenna gain= 6.4 dBi)

7. UNWANTED EMISSIONS INTO NON RESTRICTED FREQUENCY BANDS

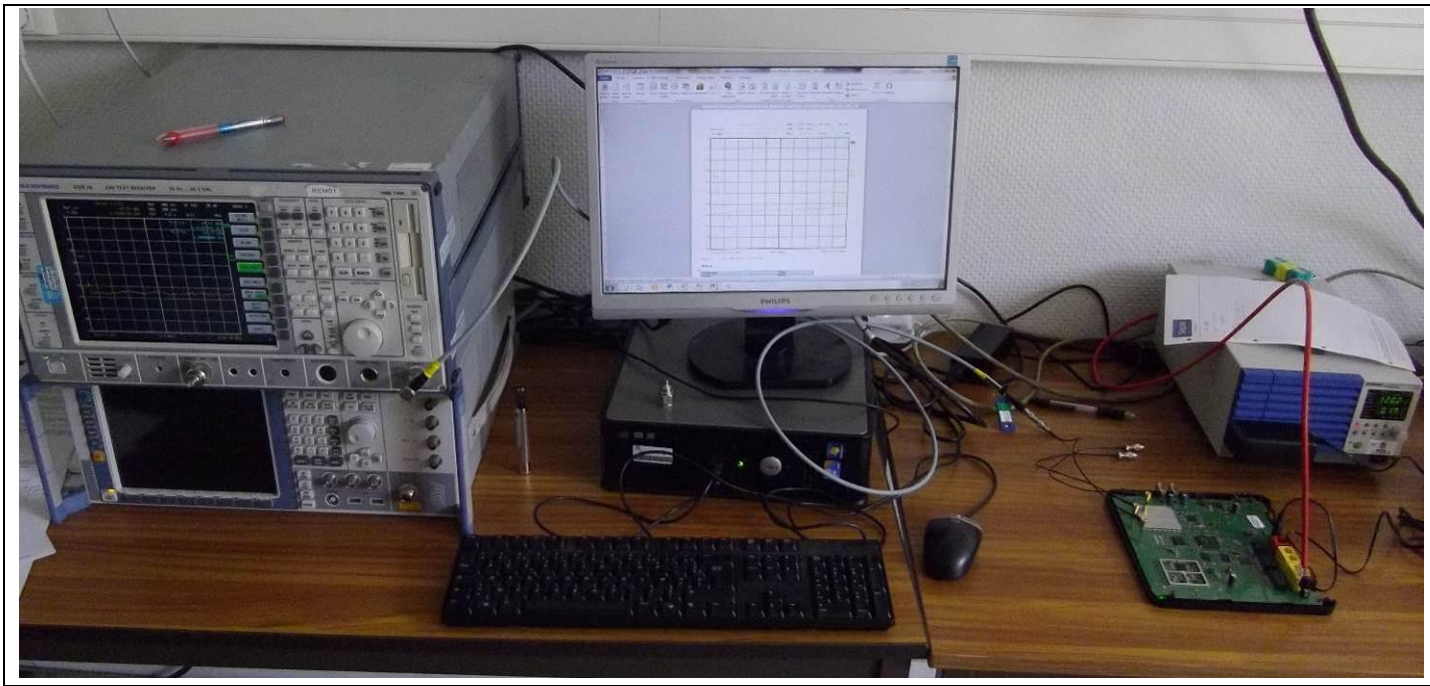
7.1. TEST CONDITIONS

Test performed by : Gilles DE BUYSER
Date of test : 2013/07/05 and 15
Ambient temperature : 21 to 23°C
Relative humidity : 46 to 58%

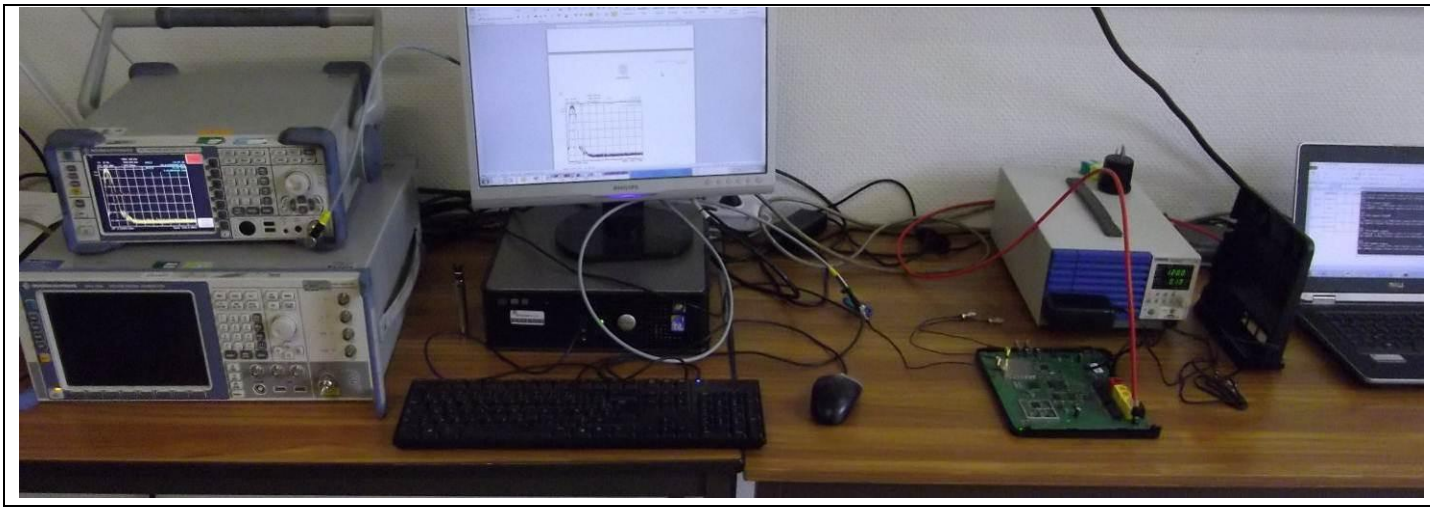
7.2. TEST SETUP

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 v03r01 § 11.

Spectrum Analyzer Setting:
From start frequency= 30MHz
To stop frequency= 25000MHz
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



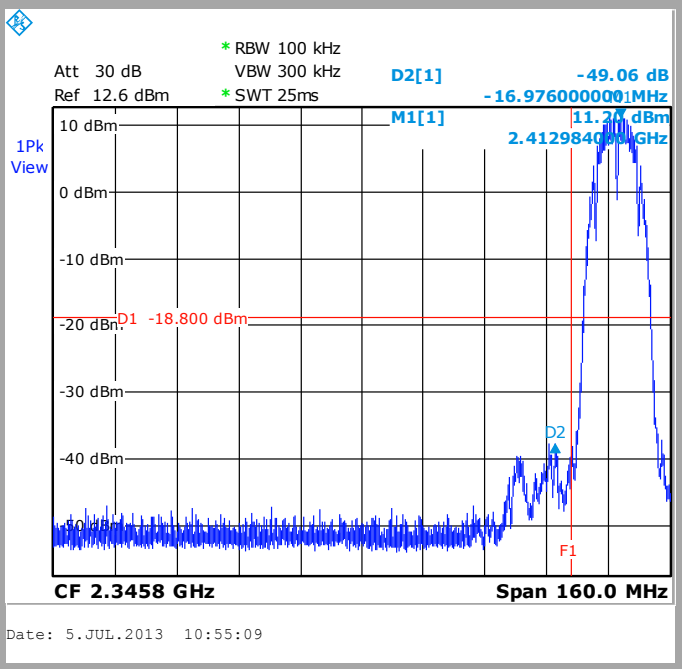
Photograph for Unwanted Emissions into Non-Restricted Frequency Bands At the Band Edge

7.3. GRAPHICS & RESULTS

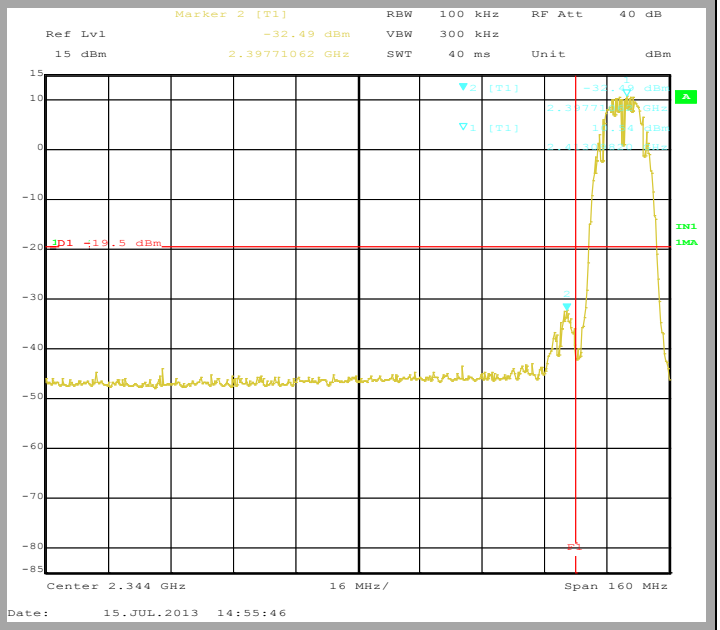
Conducted unwanted emissions in the band edge

802.11b Low band edge with Cmin

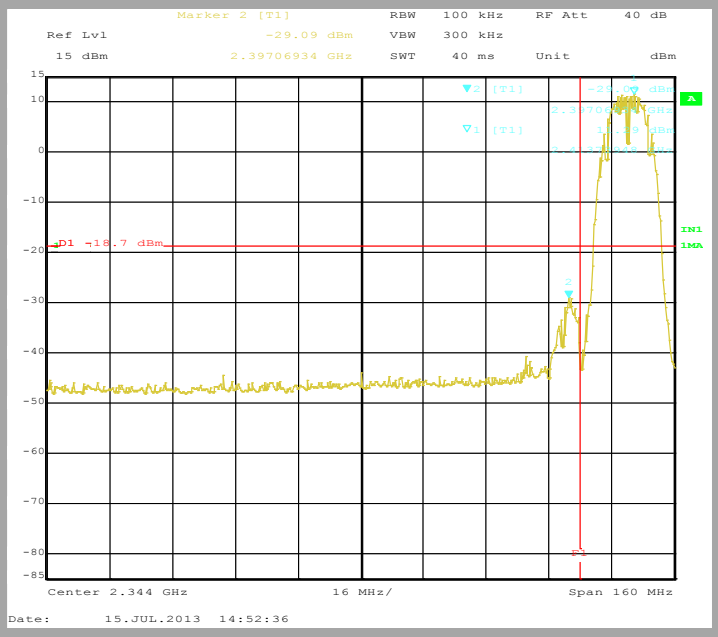
Tx1



Tx2

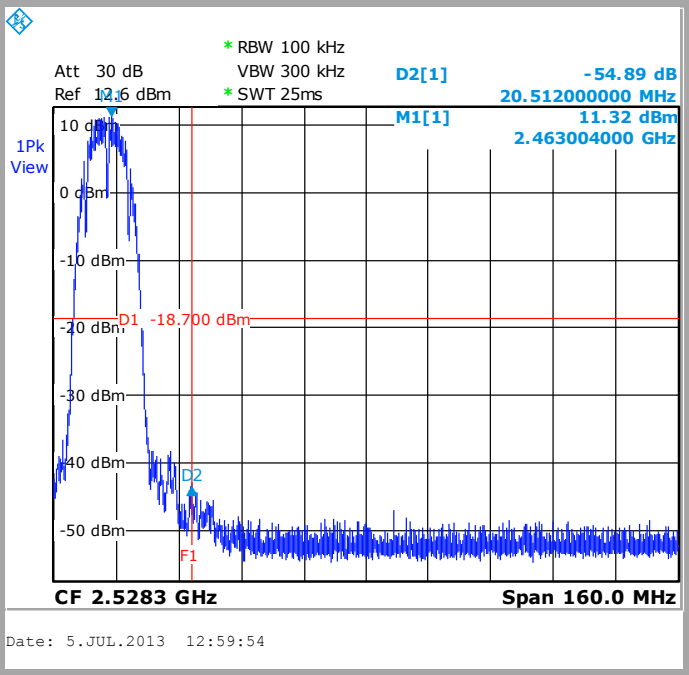


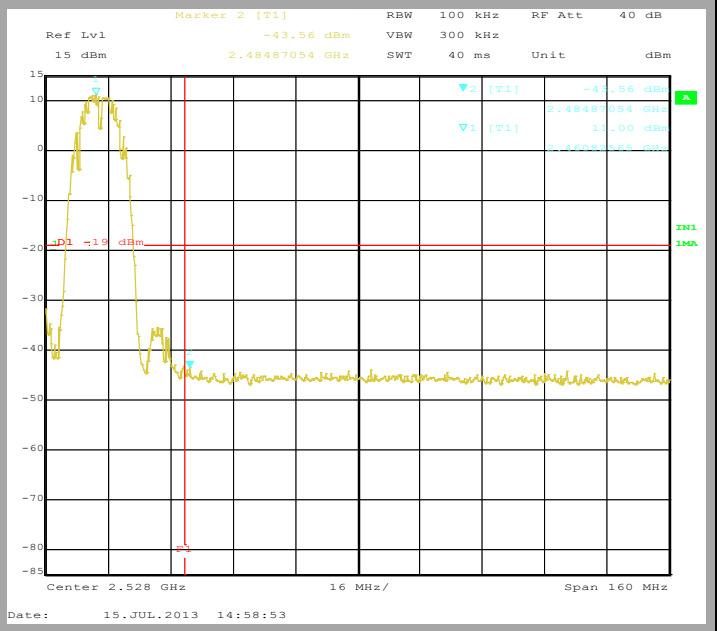
Tx3



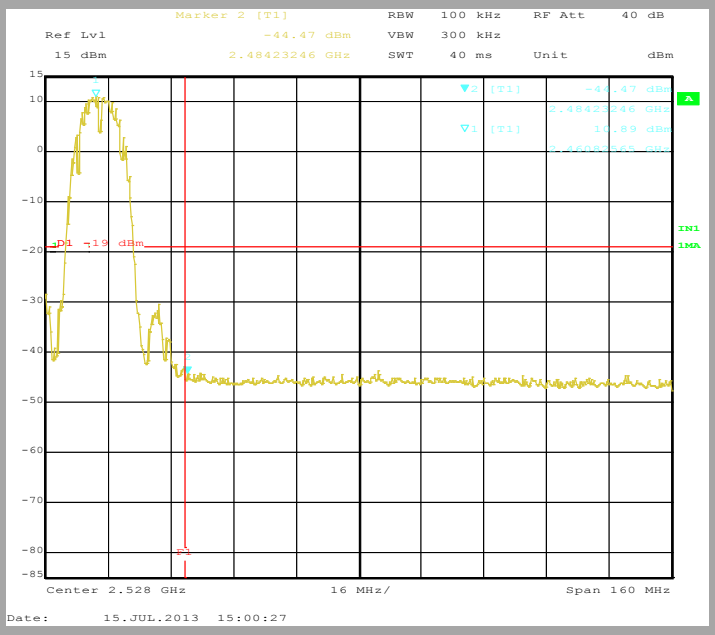
-

Conducted unwanted emissions in the band edge	
802.11b High band egde with Cmax	
Tx1	Tx2



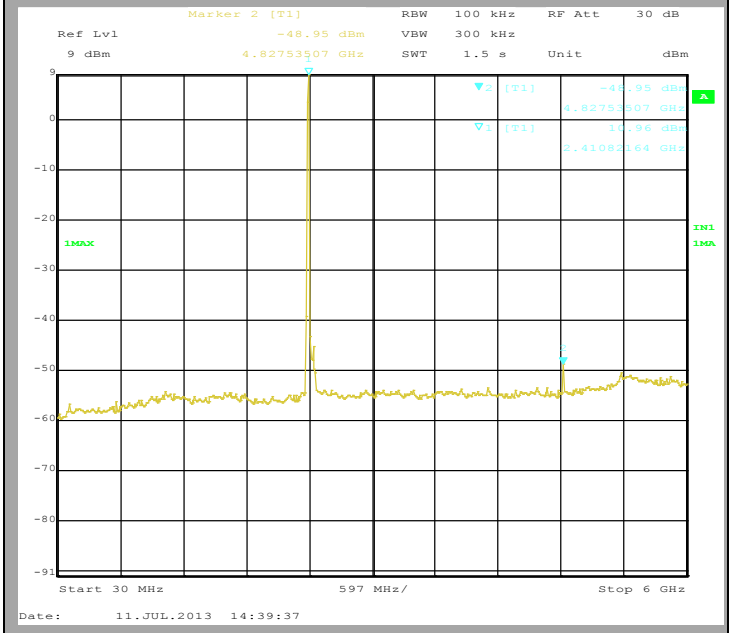


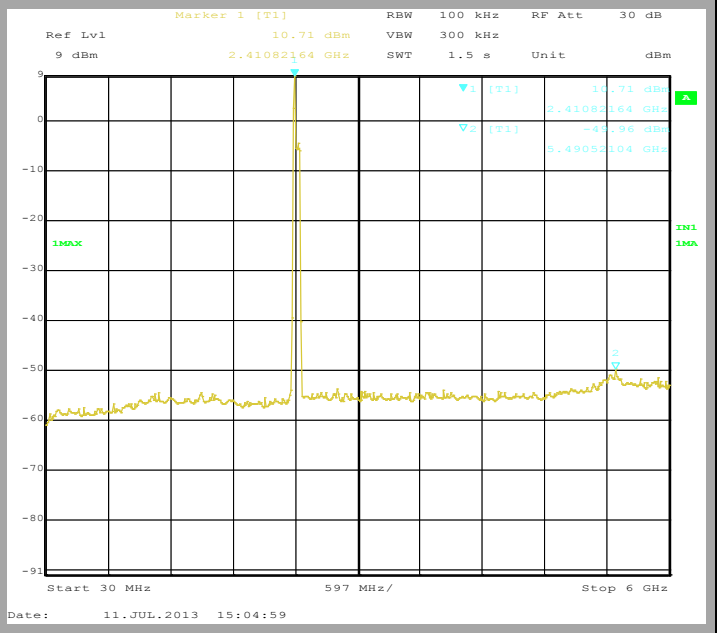
Tx3



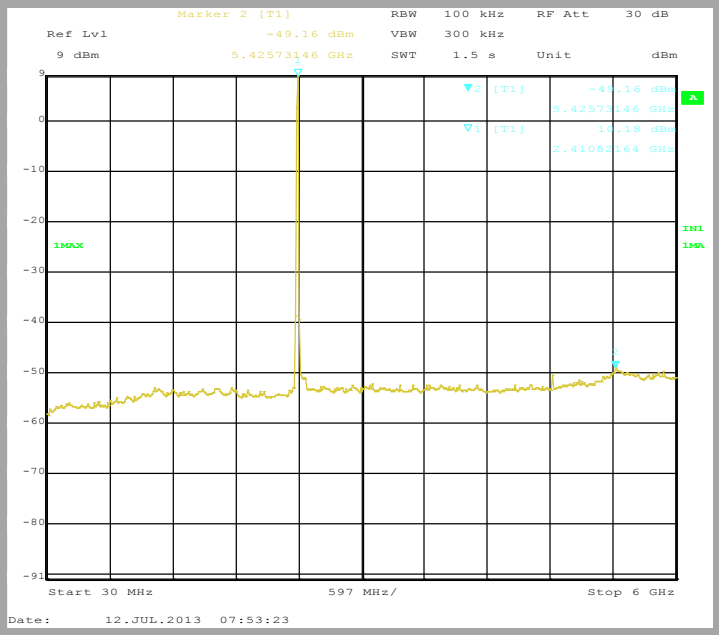
-

Conducted unwanted emissions	
802.11b Cmin	
Tx1	Tx2





Tx3



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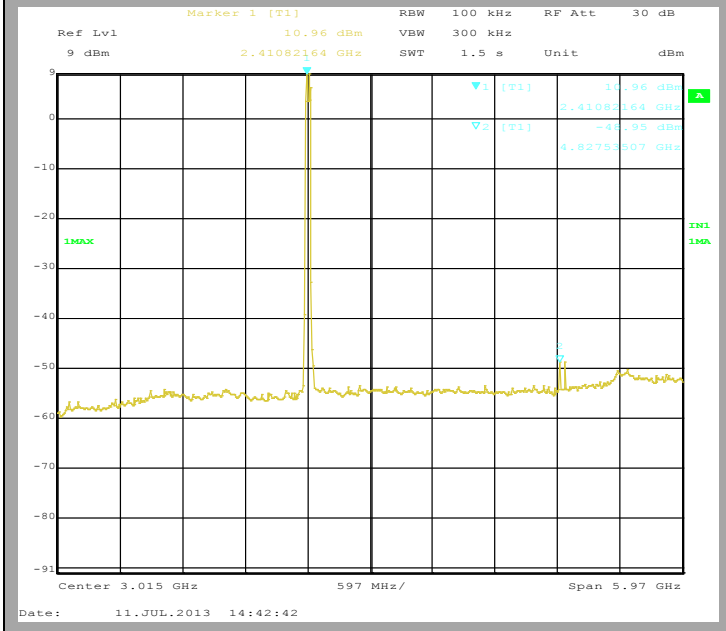
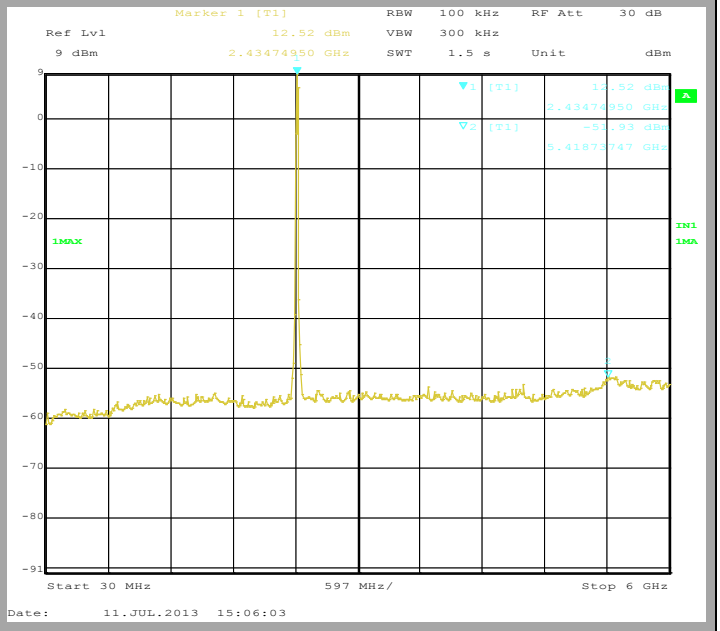
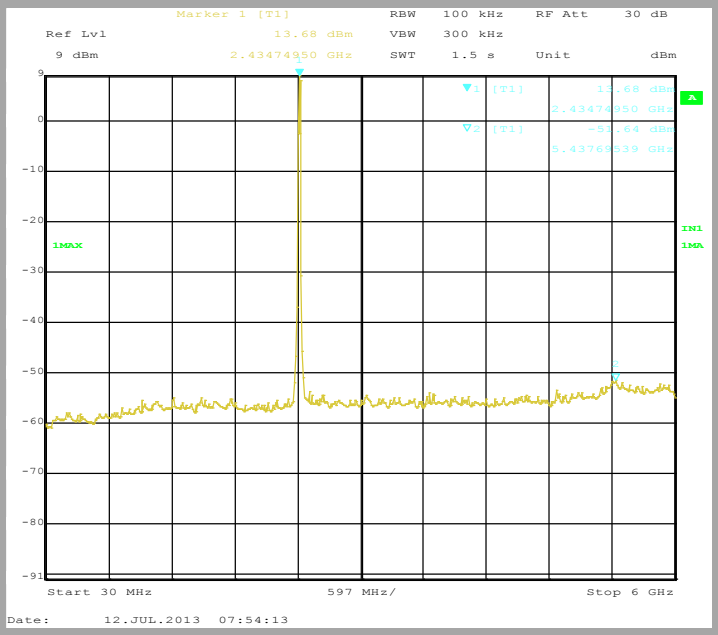
Conducted unwanted emissions	
802.11b Cnom	
TX1	TX2





TX3



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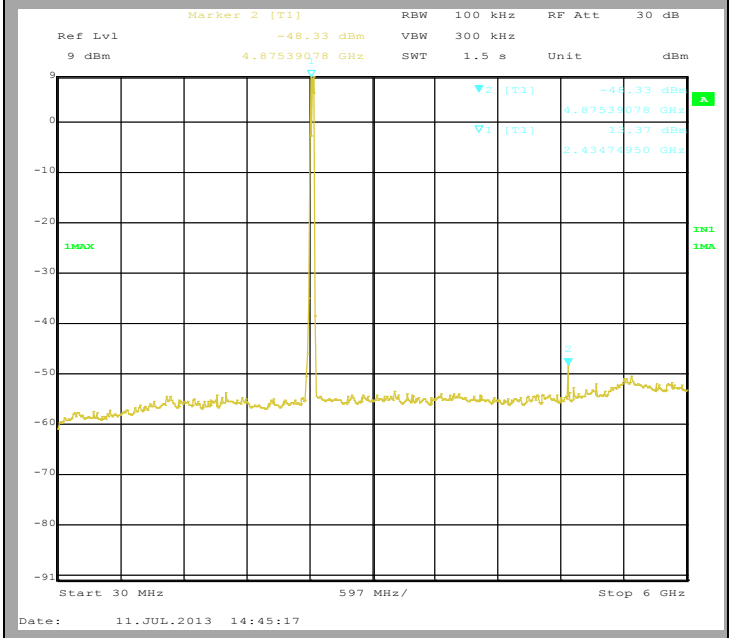
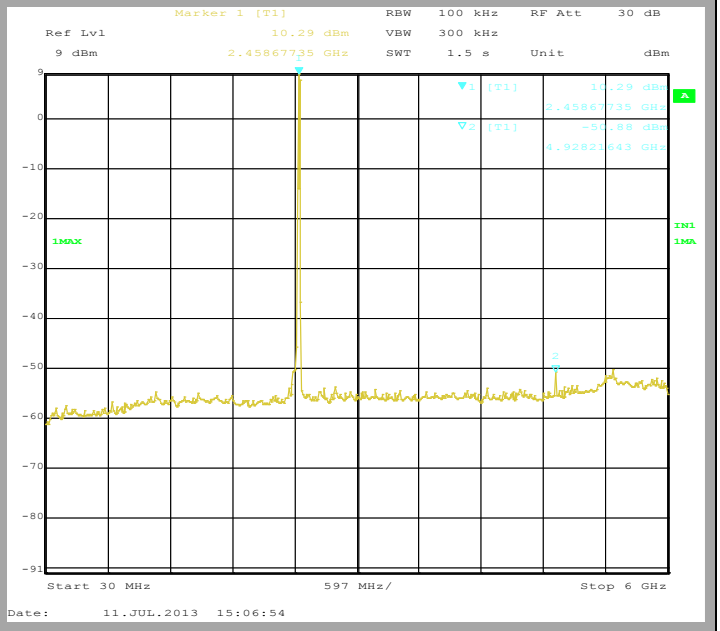
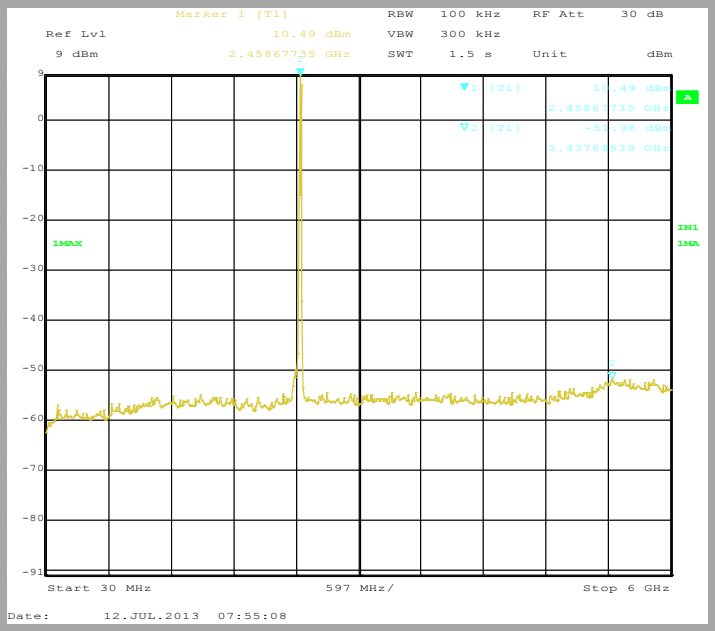
Conducted unwanted emissions	
802.11b Cmax	
TX1	TX2





TX3



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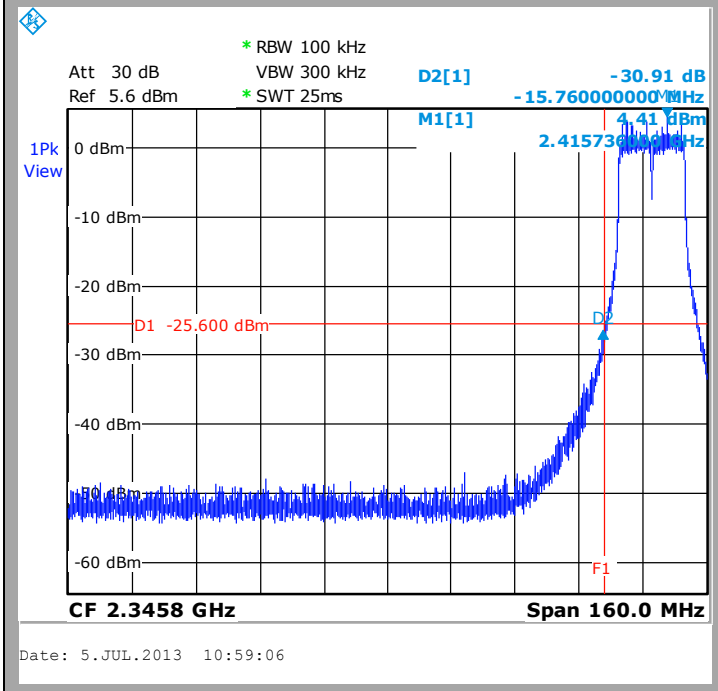
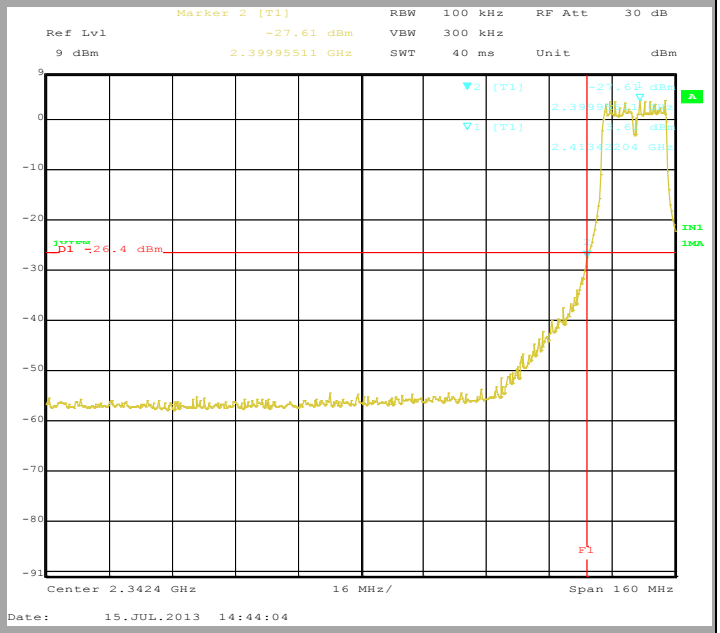
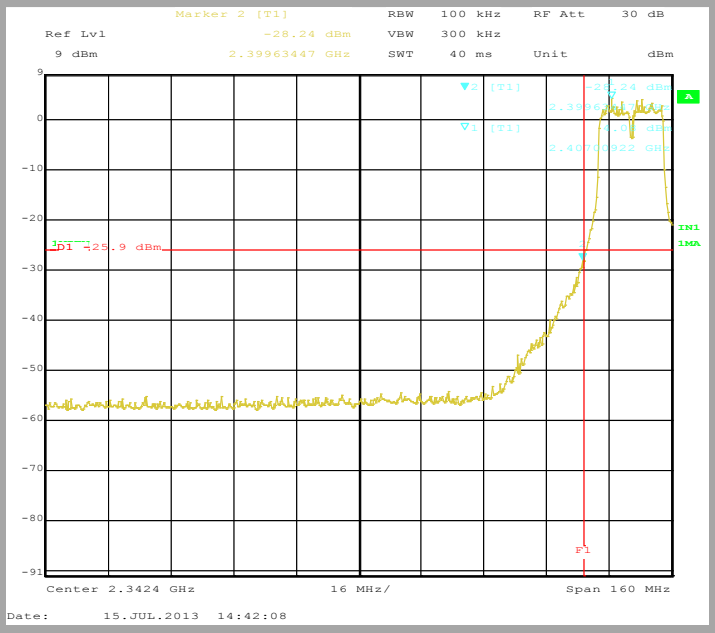
Conducted unwanted emissions in the band edge	
802.11g Low band edge with Cmin	
Tx1	Tx2



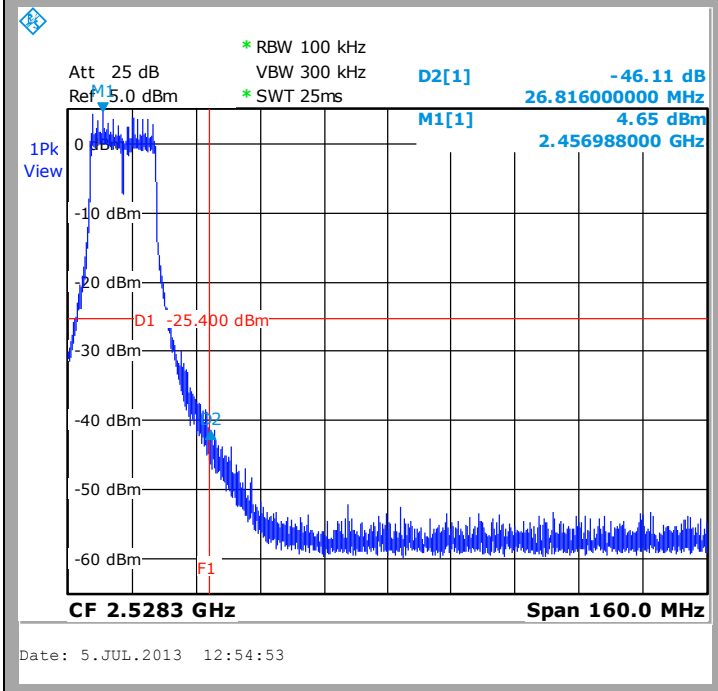


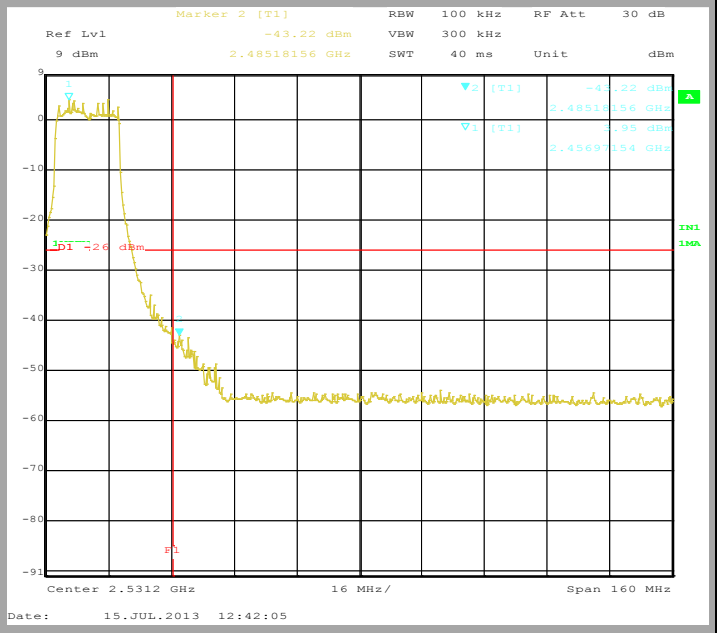
Tx3



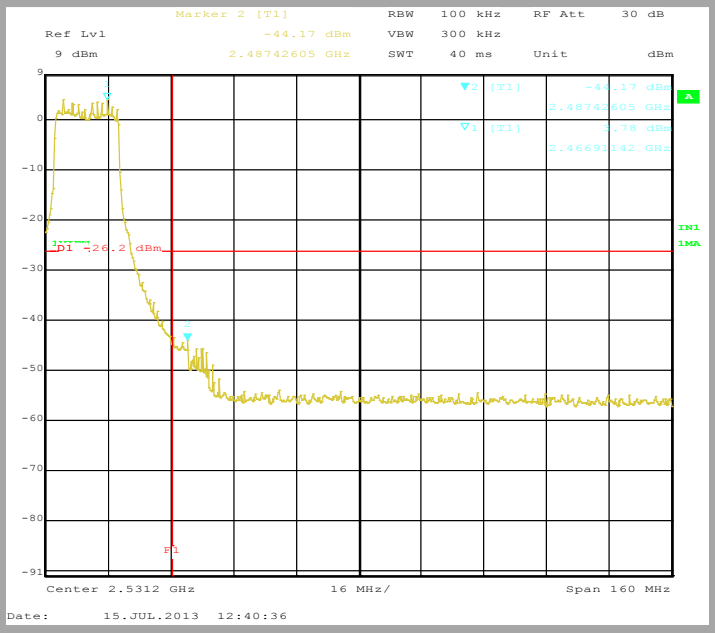
-

Conducted unwanted emissions in the band edge	
802.11g High band egde with Cmax	
TX1	TX2



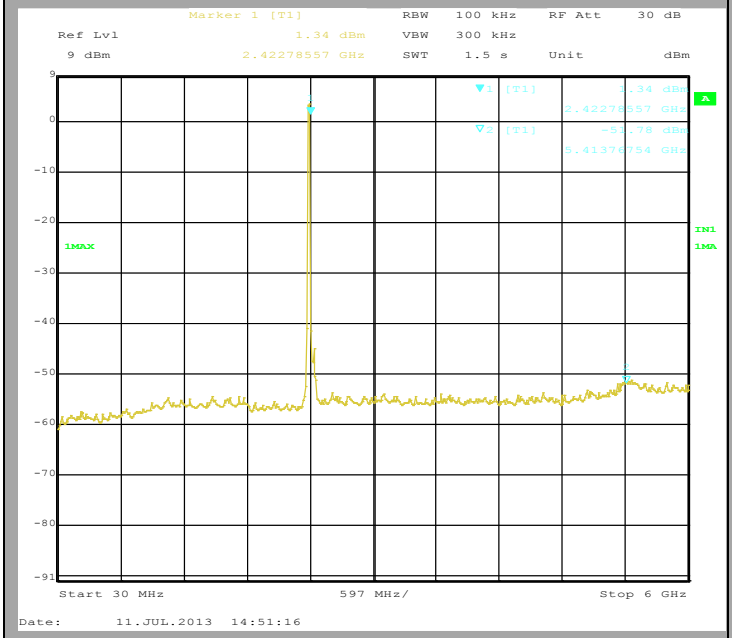


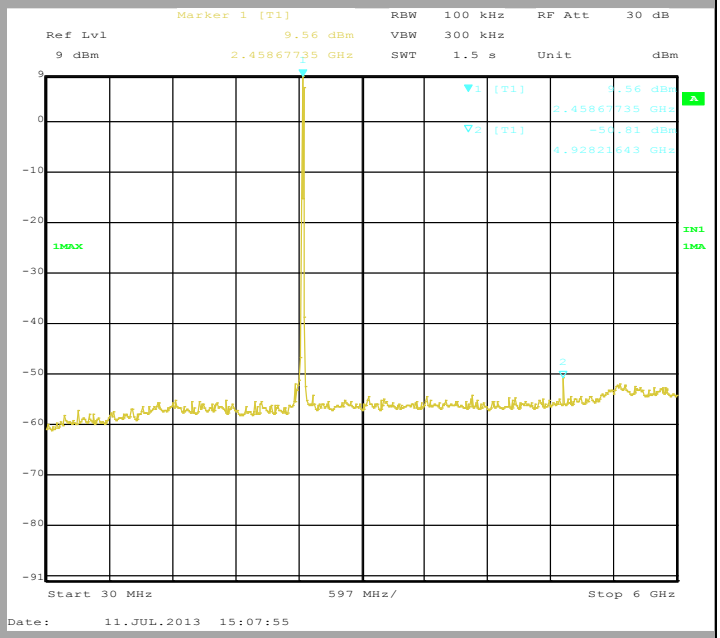
TX3



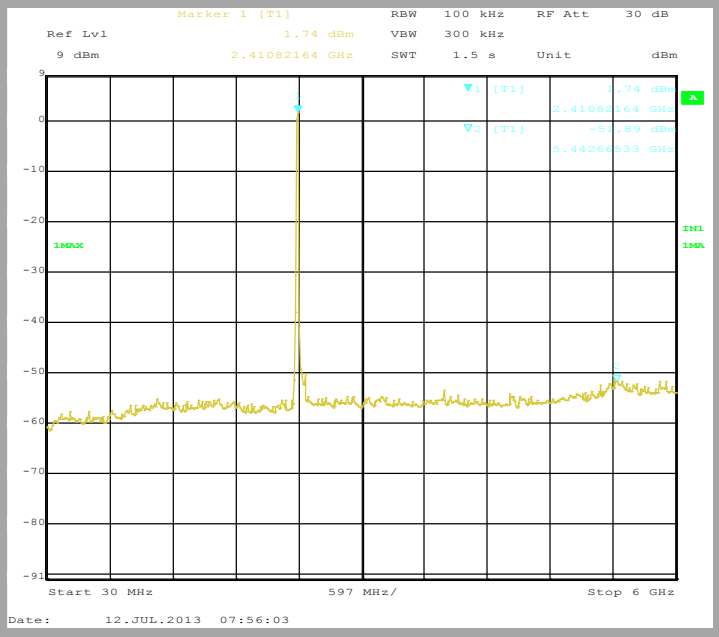
-

Conducted unwanted emissions	
802.11g Cmin	
TX1	TX2



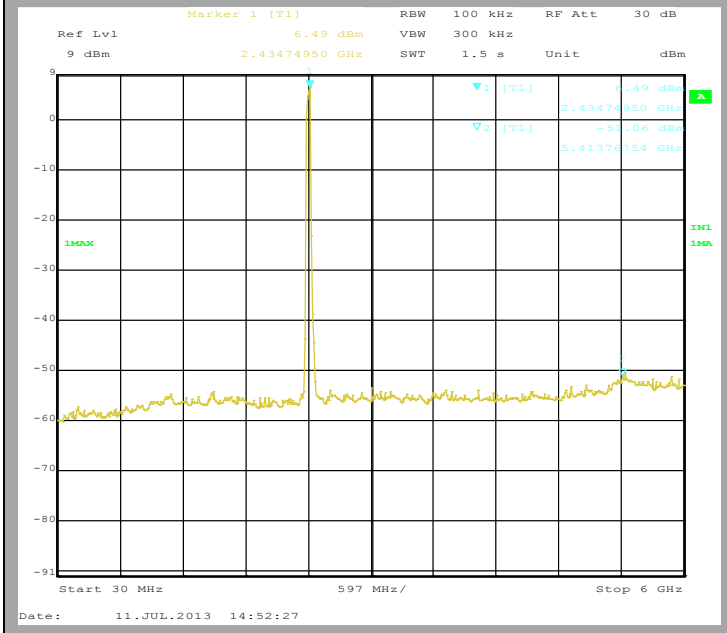


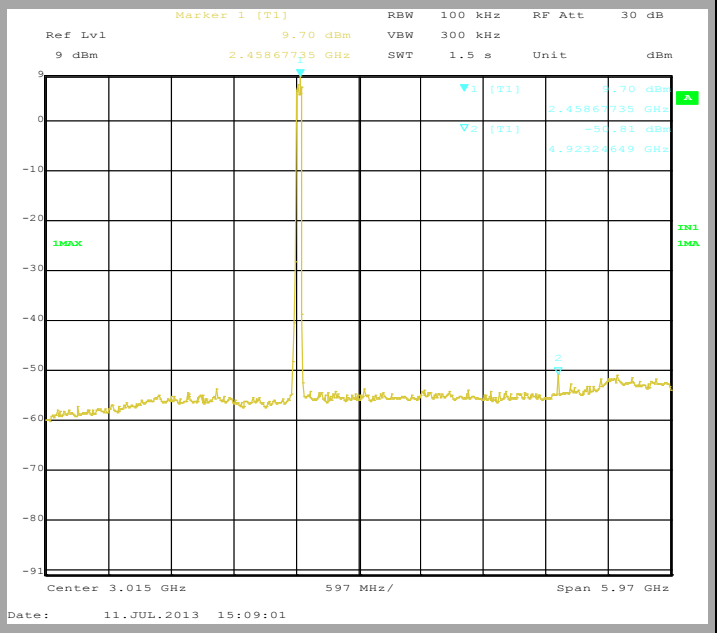
TX3



-

Conducted unwanted emissions	
802.11g Cnom	
TX1	TX2





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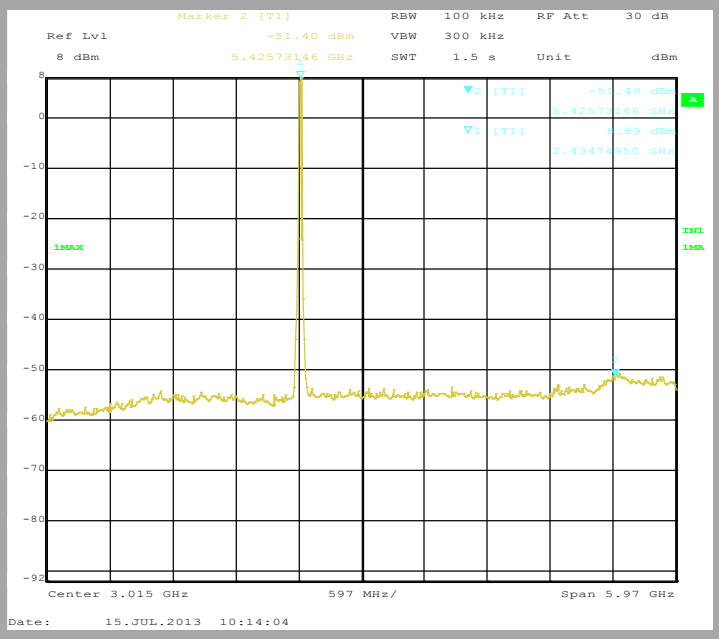
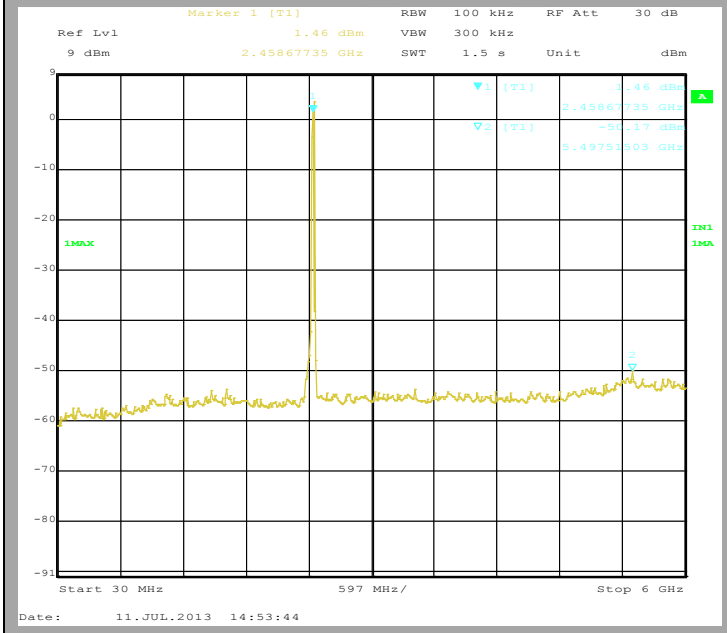
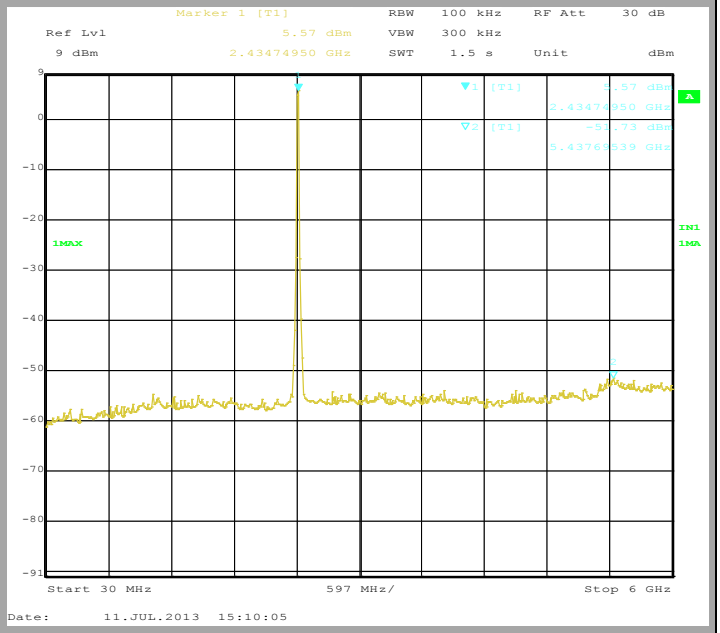


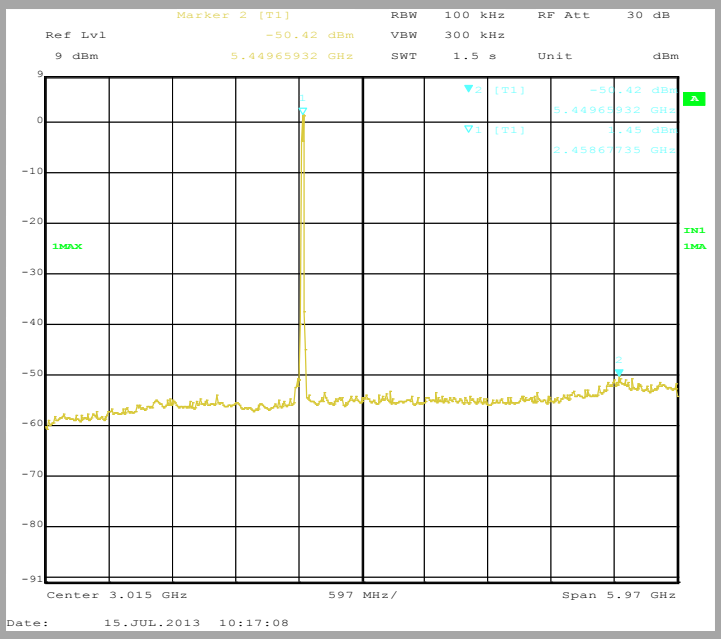
-

Conducted unwanted emissions	
802.11g Cmax	
TX1	TX2



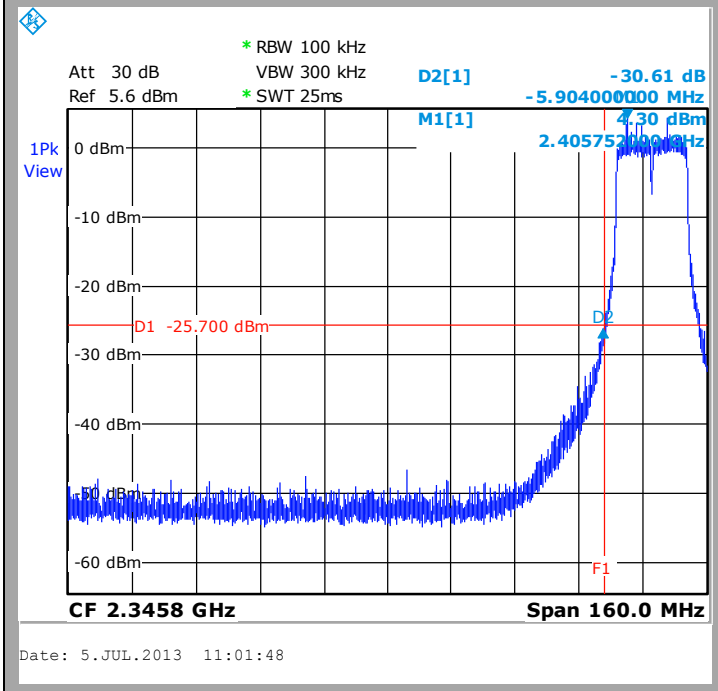


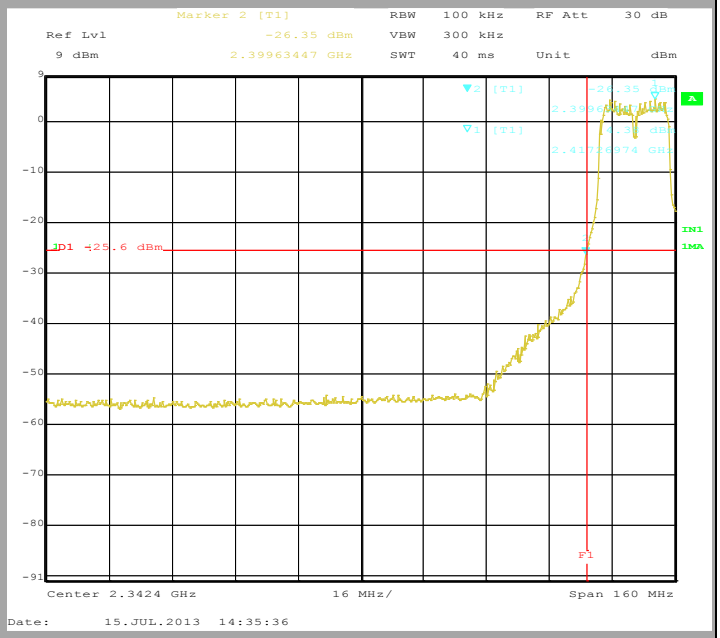
TX3



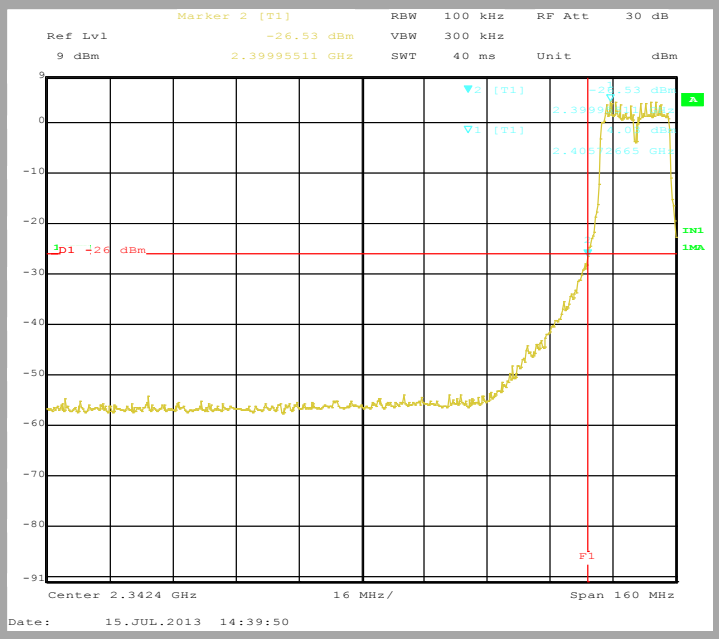
-

Conducted unwanted emissions in the band edge	
802.11n HT20 Low band edge with Cmin	
TX1	TX2



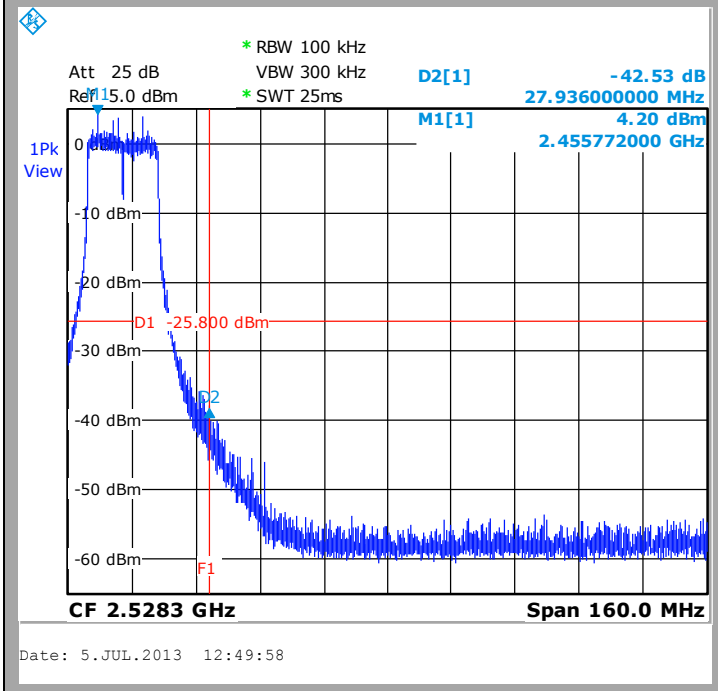


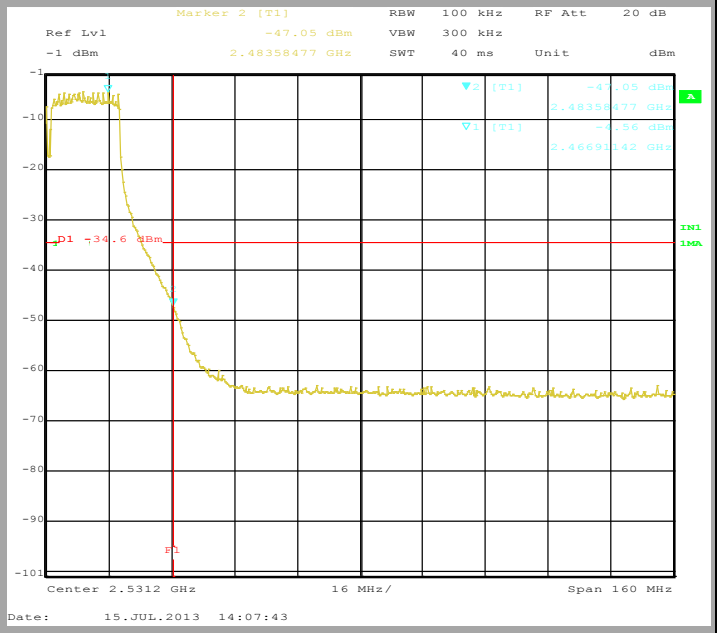
TX3



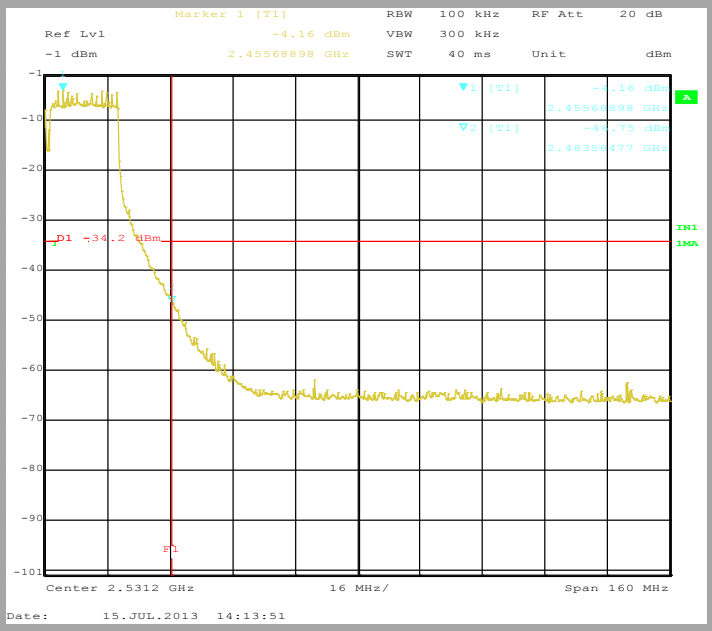
-

Conducted unwanted emissions in the band edge	
802.11n HT20 High band egde with Cmax	
TX1	TX2



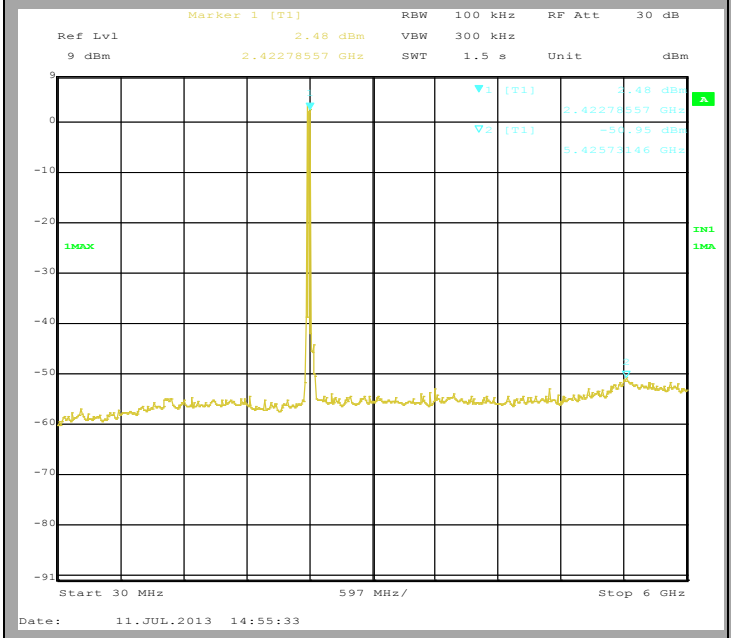


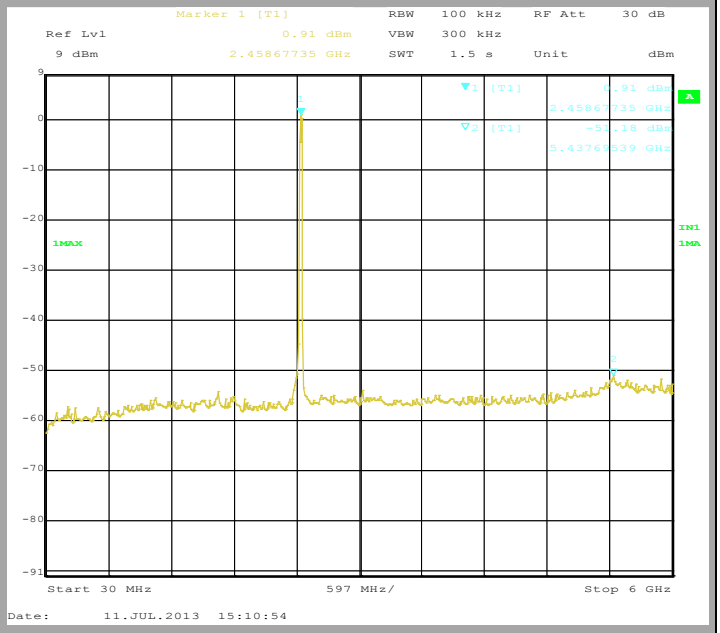
TX3



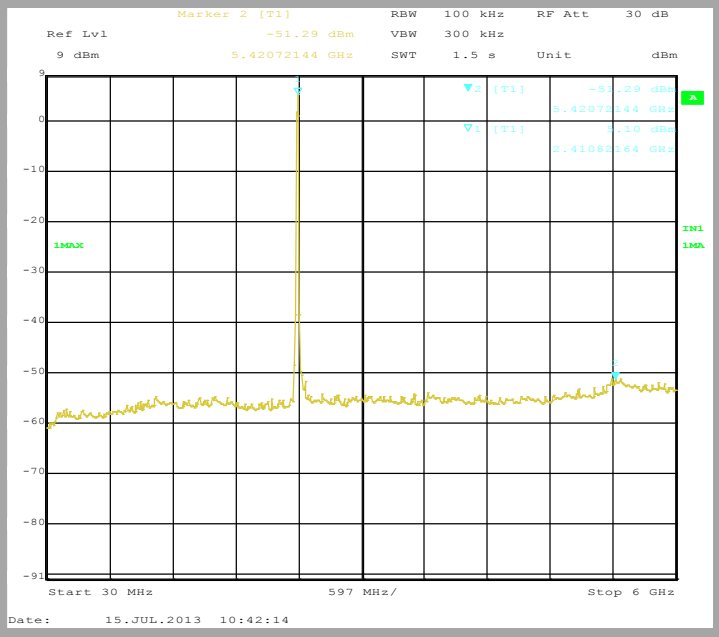
-

Conducted unwanted emissions	
802.11n HT20 Cmin	
TX1	TX2

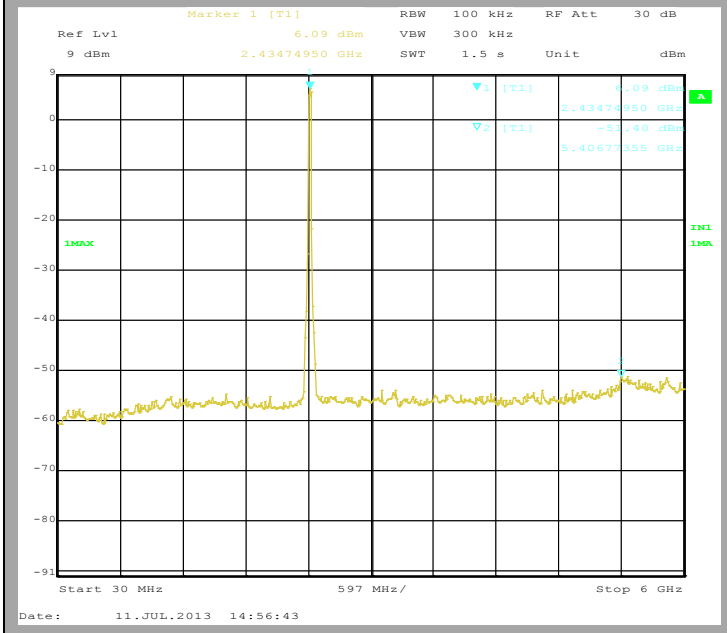
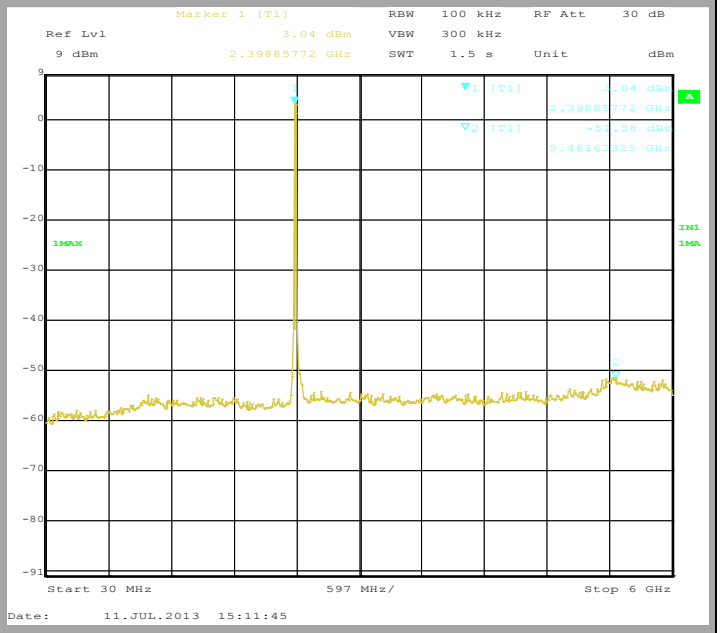
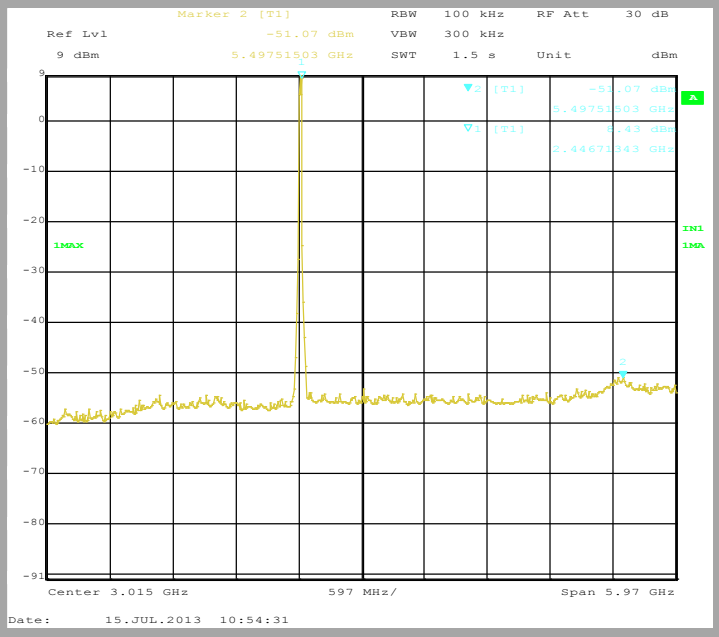




TX3



-

Conducted unwanted emissions	
802.11n HT20 Cnom	
TX1	TX2
	
TX3	
	

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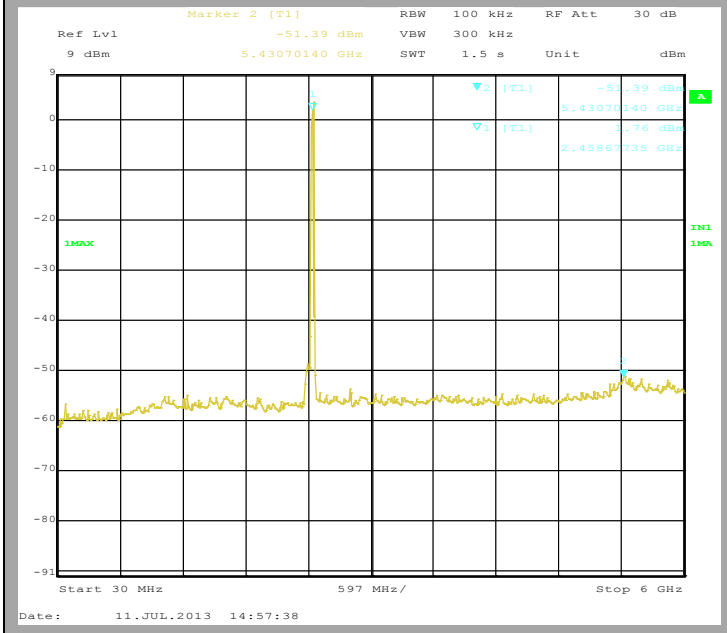
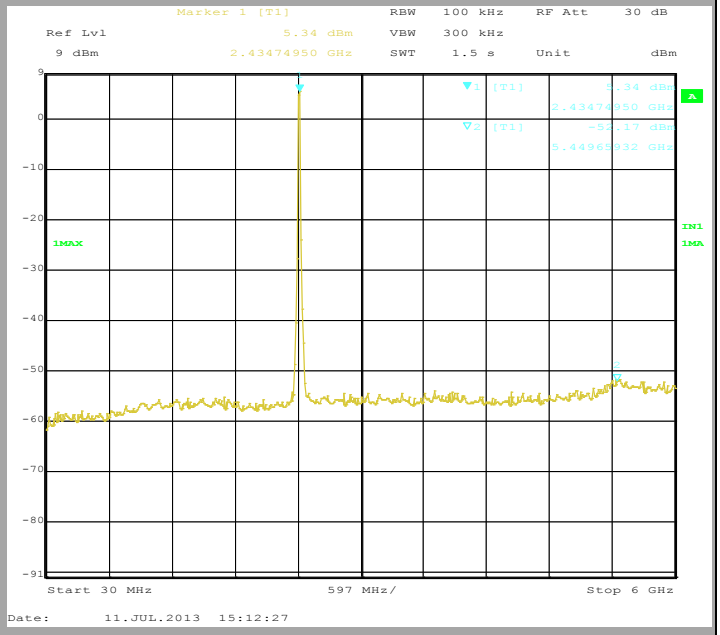
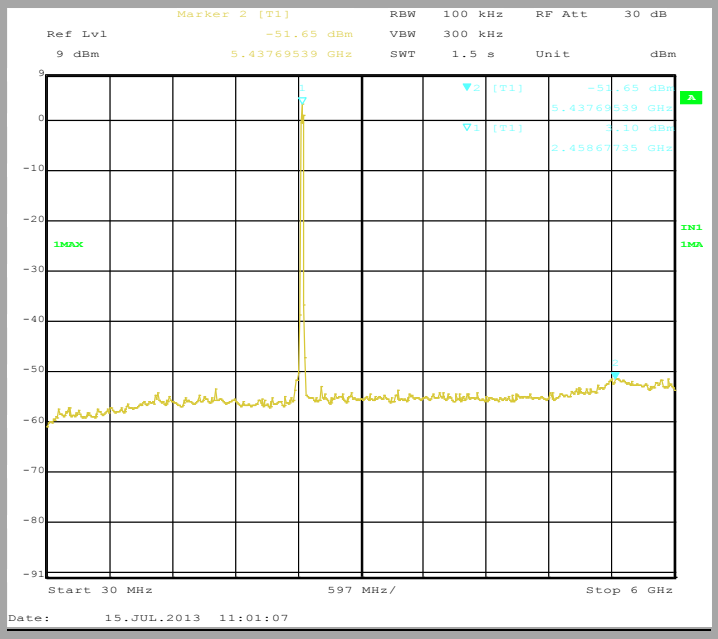
Conducted unwanted emissions	
802.11n HT20 Cmax	
TX1	TX2
	
TX3	
	

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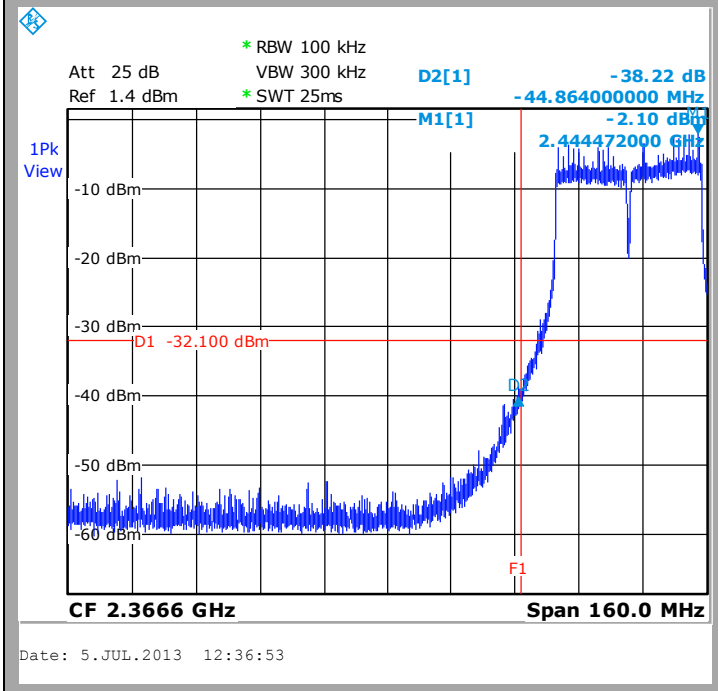
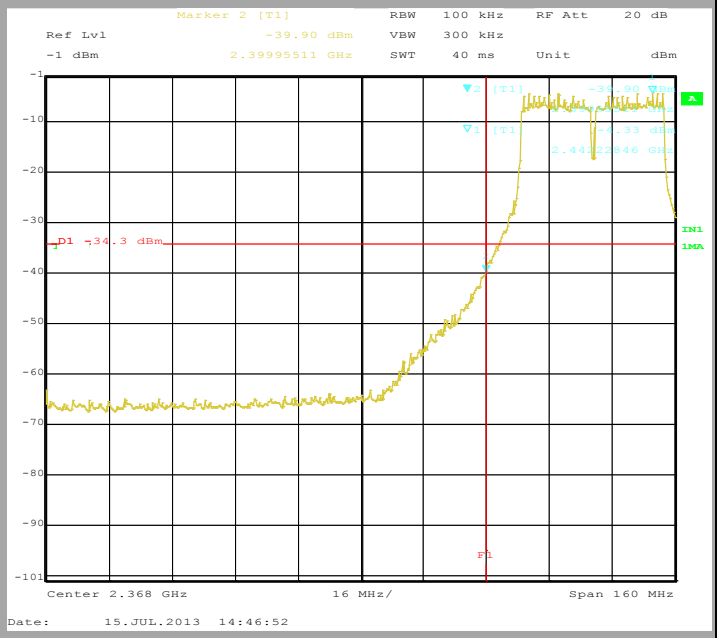
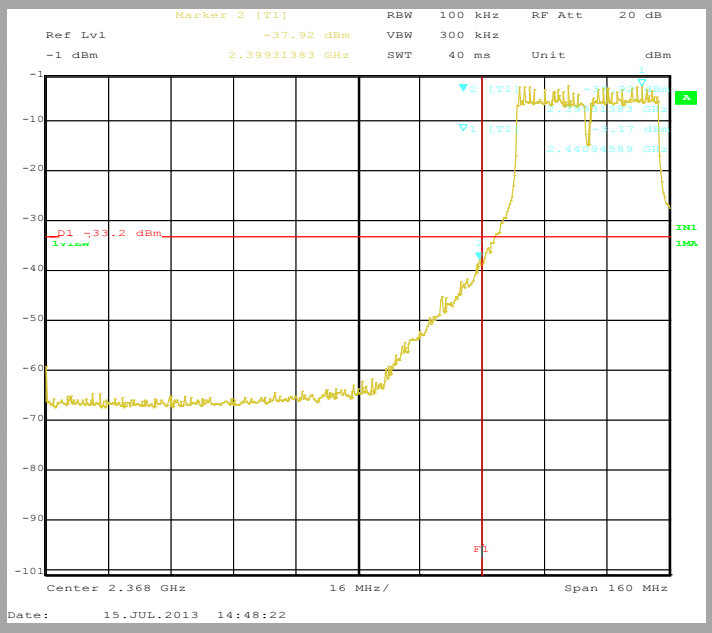
Conducted unwanted emissions in the band edge	
802.11n HT40 Low band edge with Cmin	
TX1	TX2





TX3



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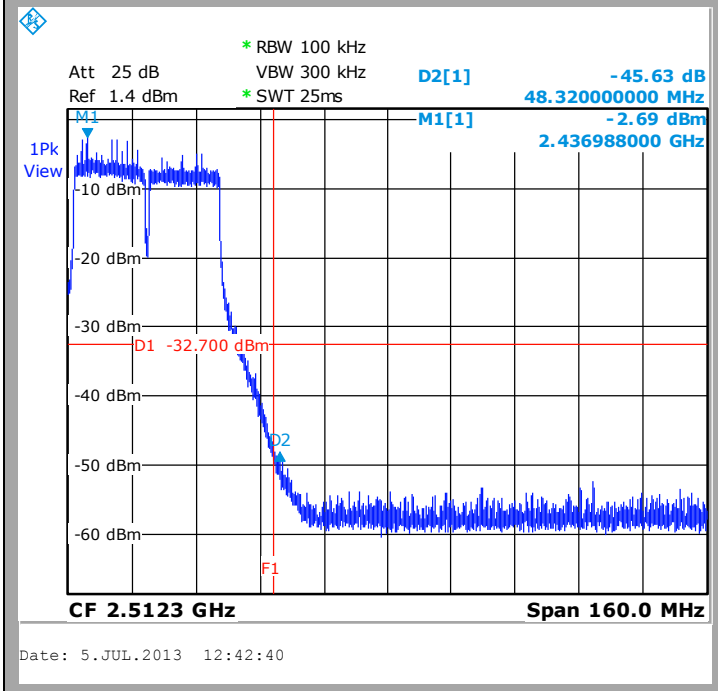
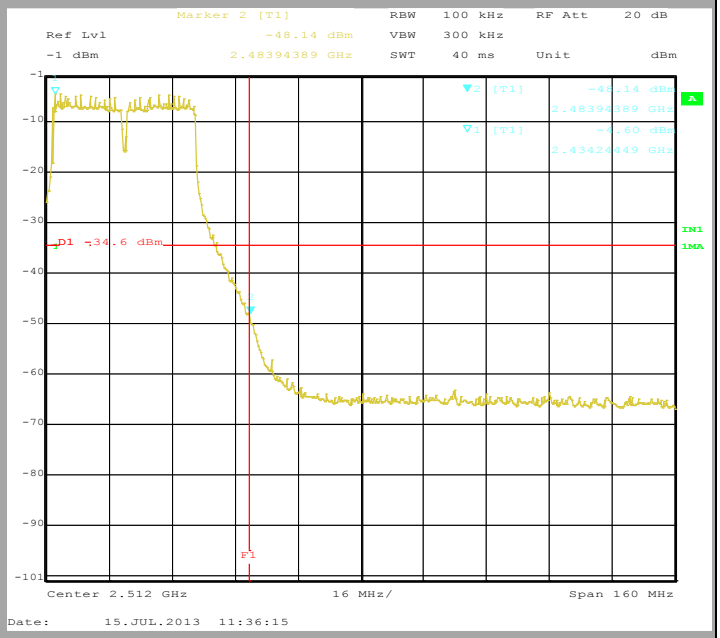
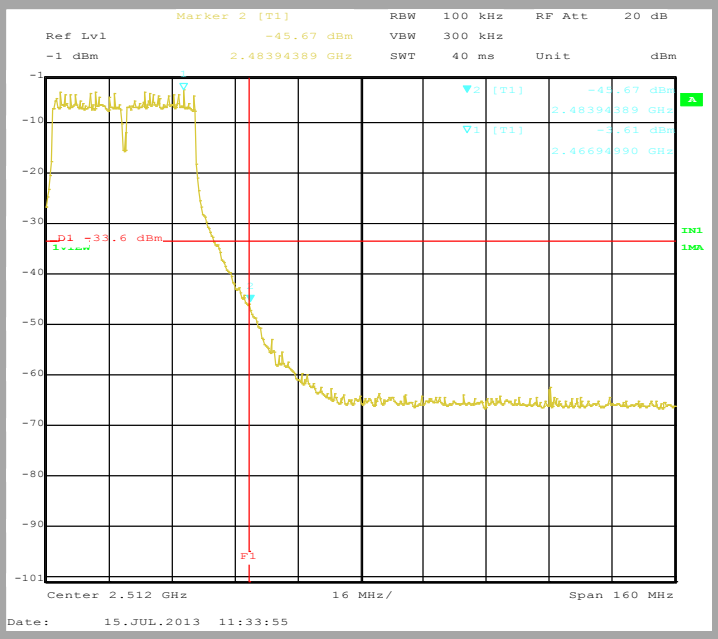
Conducted unwanted emissions in the band edge	
802.11n HT40 High band egde with Cmax	
TX1	TX2





TX3



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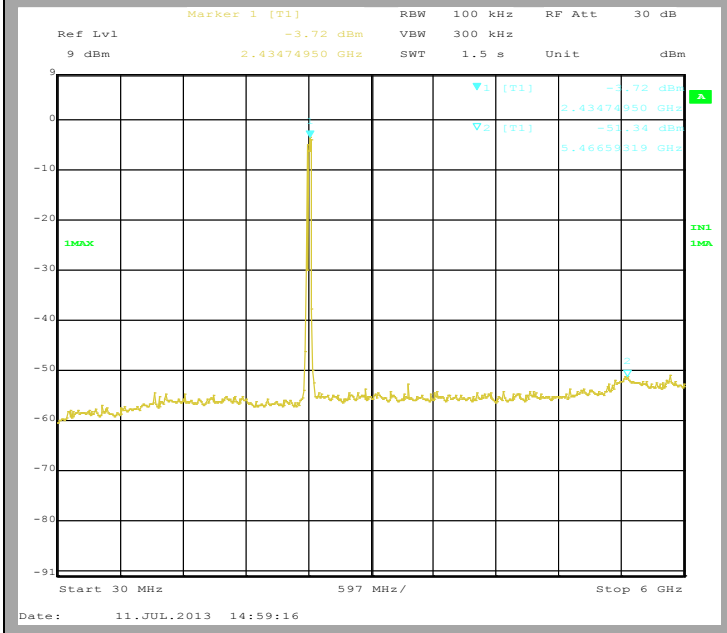
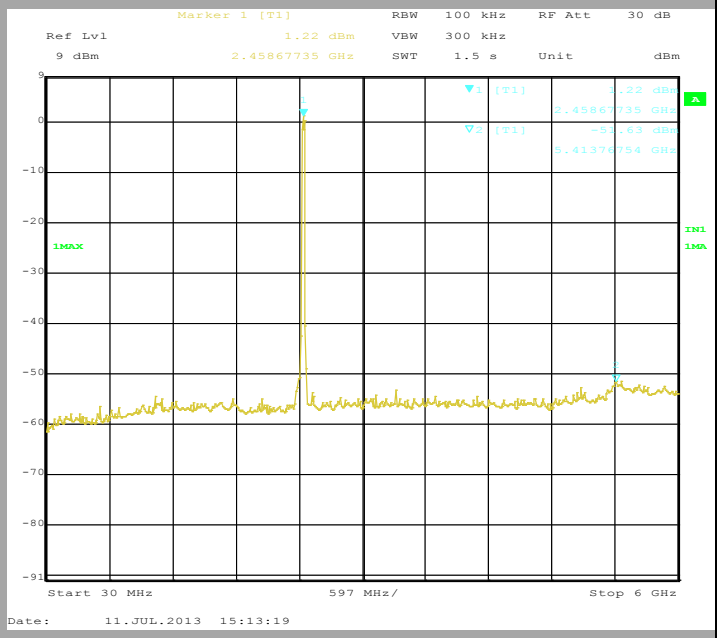
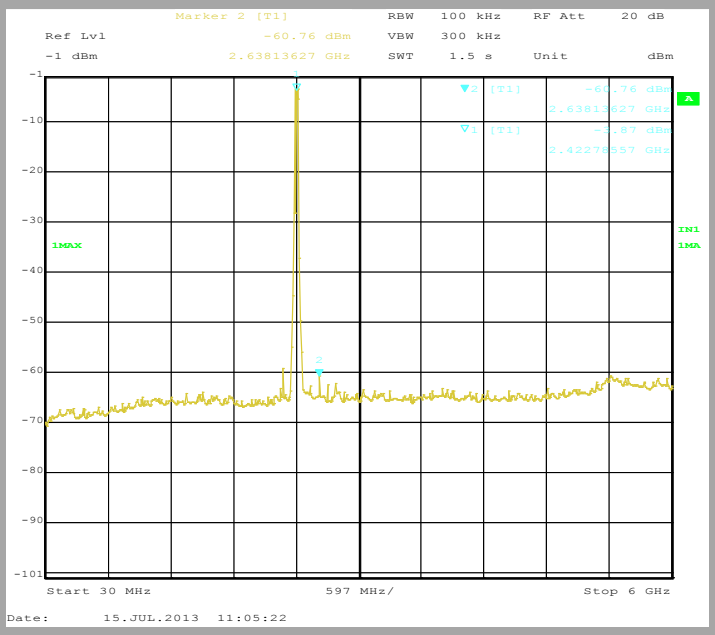
Conducted unwanted emissions	
802.11n HT40 Cmin	
TX1	TX2



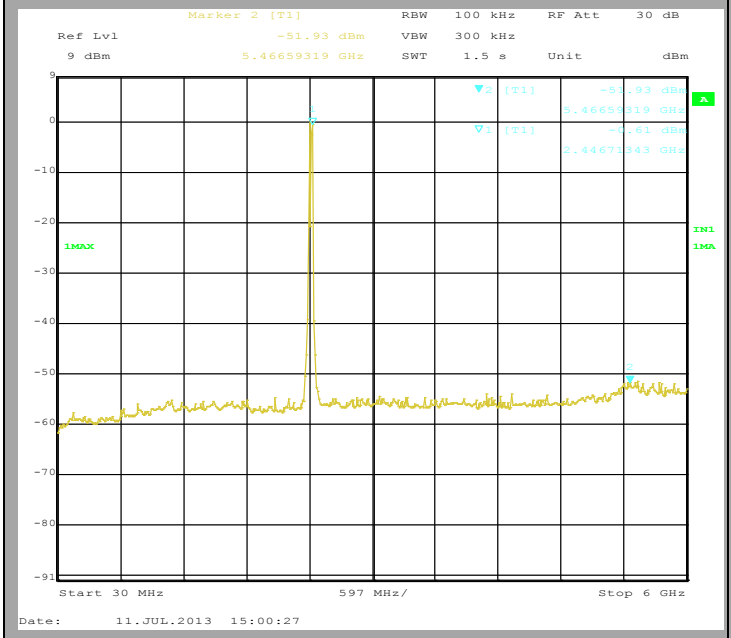


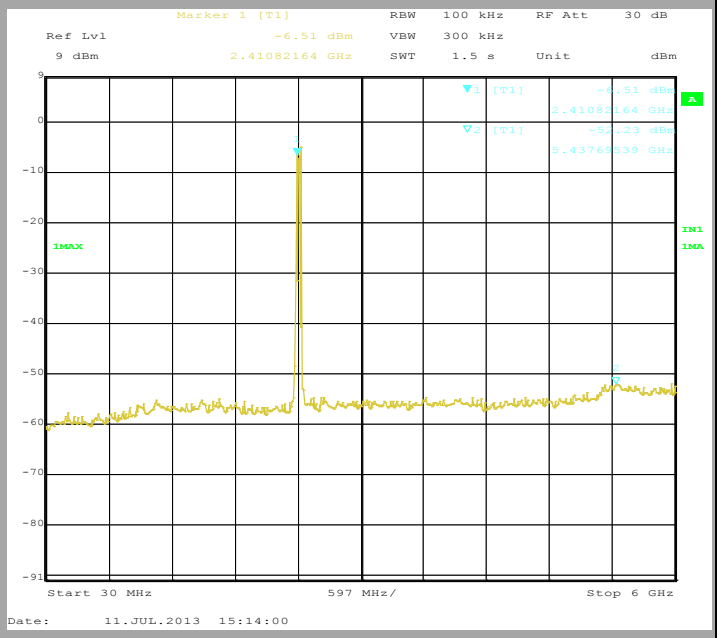
TX3



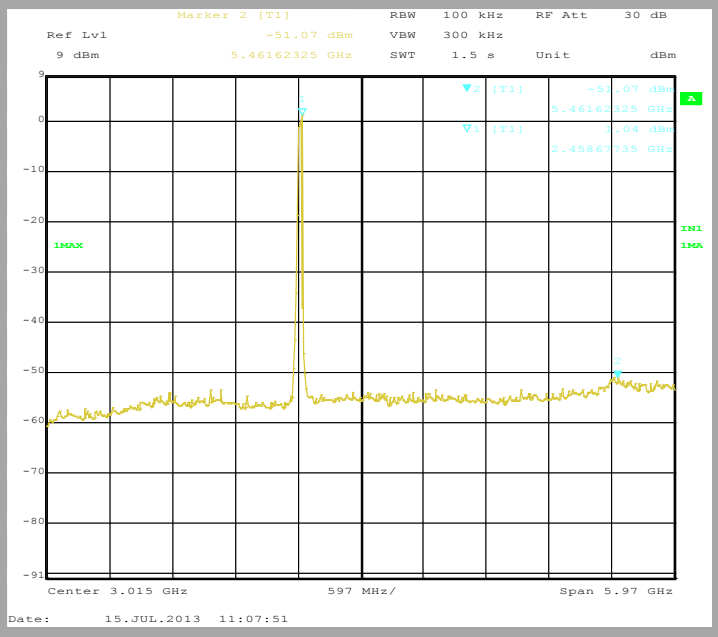
-

Conducted unwanted emissions in the band edge	
802.11n HT40 Cnom	
TX1	TX2





TX3



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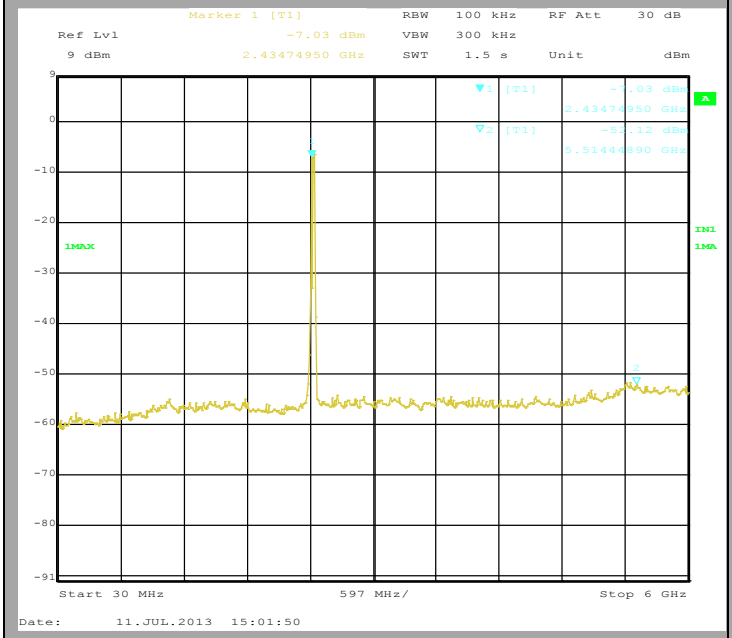
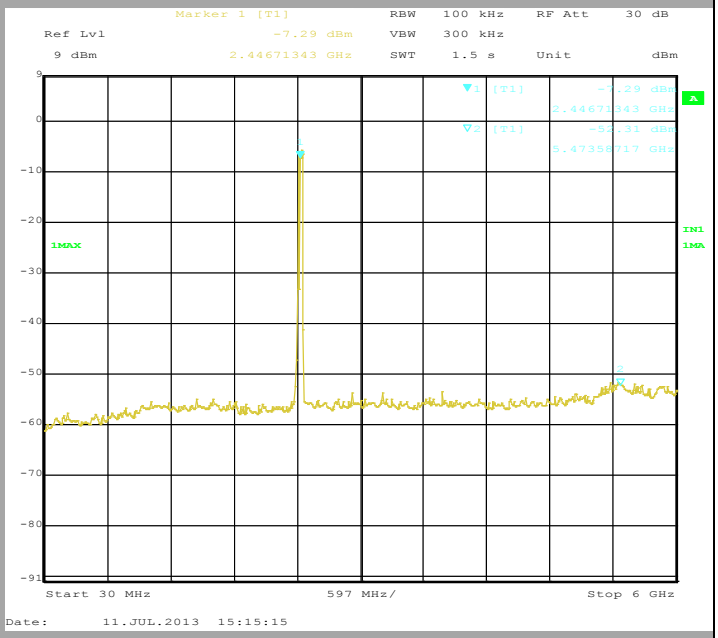
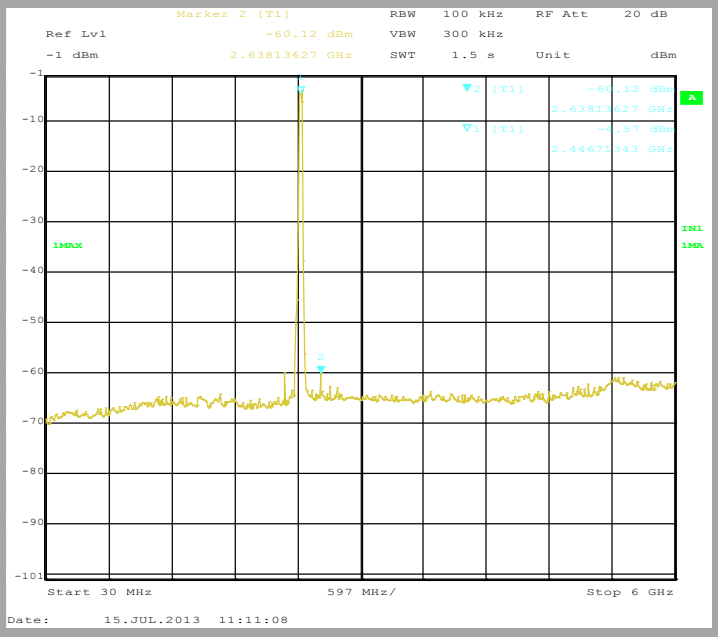
Conducted unwanted emissions in the band edge	
802.11n HT40	
band egde with Cmax on TX1	band egde with Cmax on TX2





band egde with Cmax on TX3



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Mode 802.11b

Temperature	**Tnom**	
Voltage	**Vnom**	
Band Edge (MHz)	2400	2483.5
Spurious Level (dBc)	-40.4	-54.6

Mode 802.11g

Temperature	**Tnom**	
Voltage	**Vnom**	
Band Edge (MHz)	2400	2483.5
Spurious Level (dBc)	-30.9	-46.1

Mode 802.11n HT20

Temperature	**Tnom**	
Voltage	**Vnom**	
Band Edge (MHz)	2400	2483.5
Spurious Level (dBc)	-30.5	-42.4

Mode 802.11n HT40

Temperature	**Tnom**	
Voltage	**Vnom**	
Band Edge (MHz)	2400	2483.5
Spurious Level (dBc)	-34.7	-42.1

Remark: the conducted emissions observed in the range 6G to 25GHz are at least 45 dB below the fundamental transmitter level.

Result: PASS
Limit: → All Spurious Emissions must be at least 30dB below the Fundamental Radiator Level at the Band Edge 2400-2483.5MHz

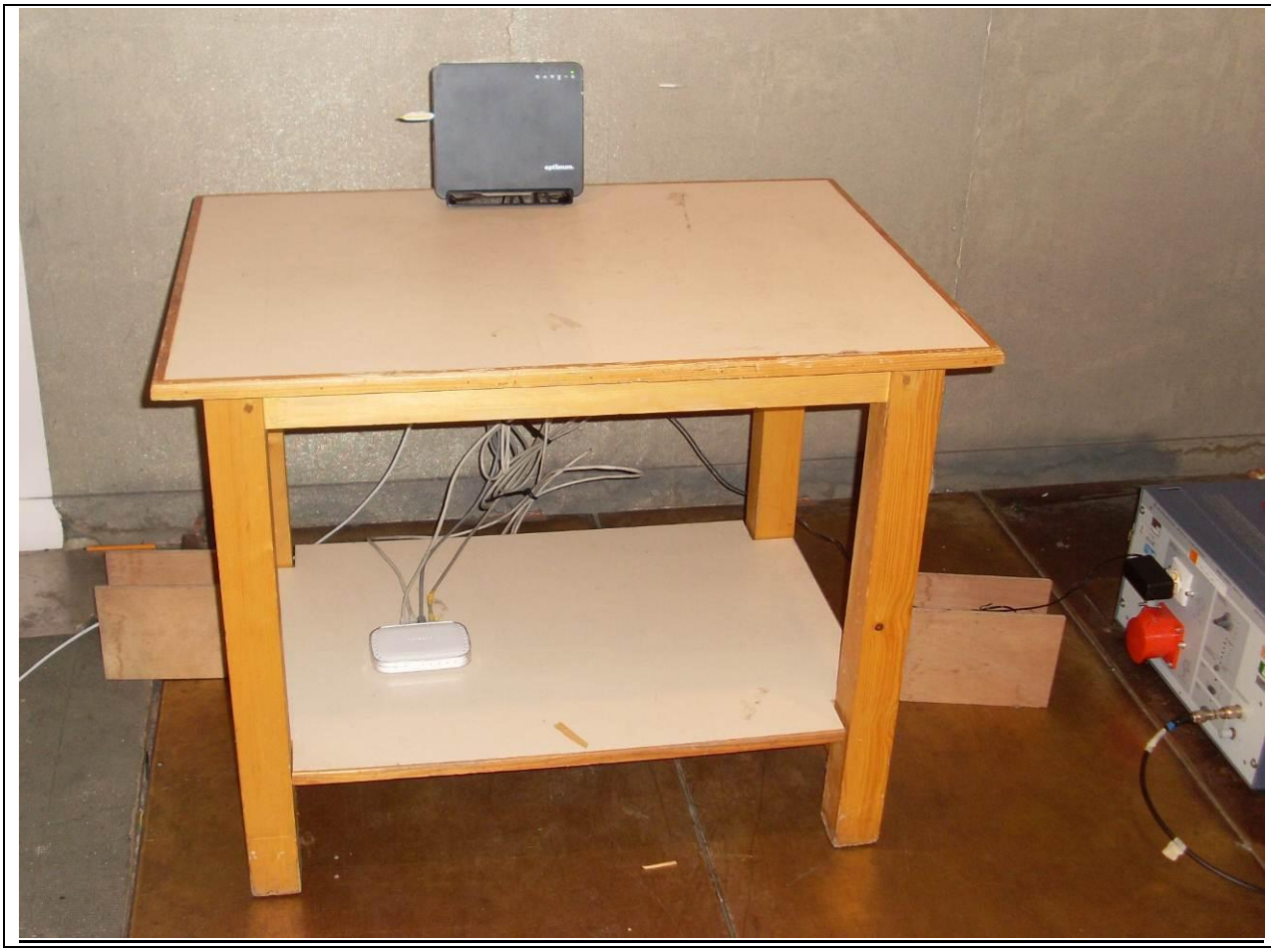
8. AC POWER LINE CONDUCTED EMISSIONS

8.1. TEST CONDITIONS

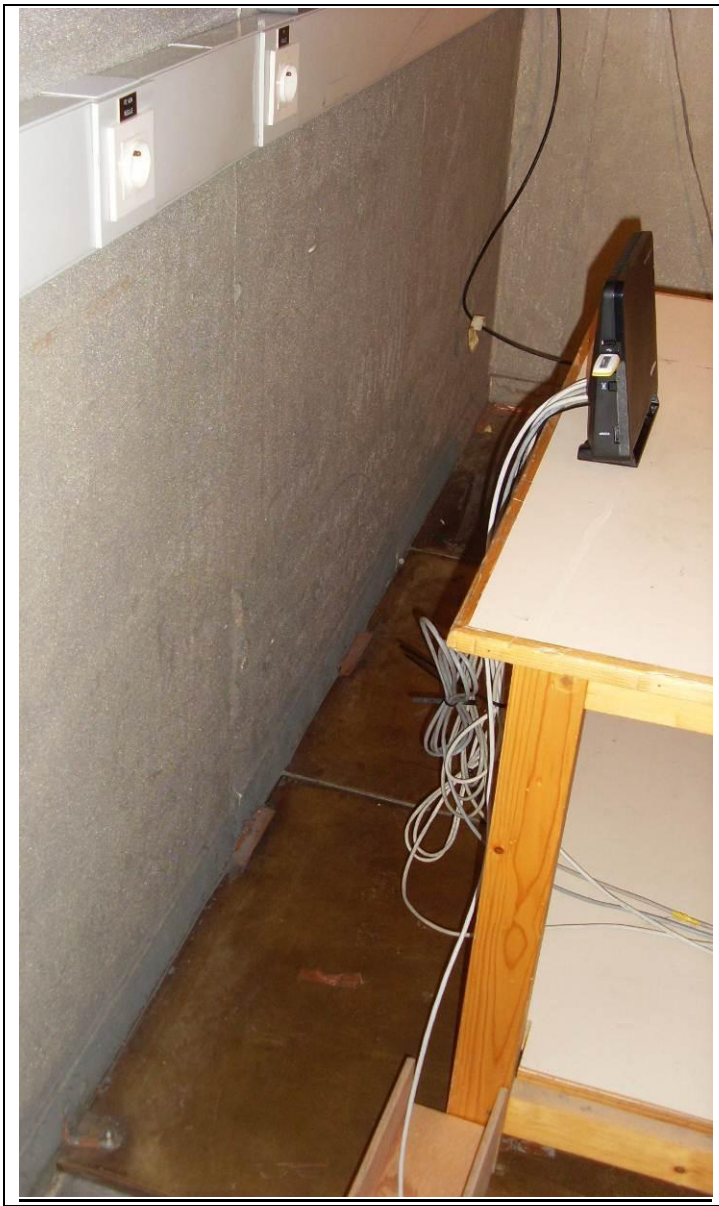
Test performed by :Laurent DENEUX
Date of test :2013/07/23
Ambient temperature : 22°C
Relative humidity : 51%

8.2. 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)

8.3. RESULTS

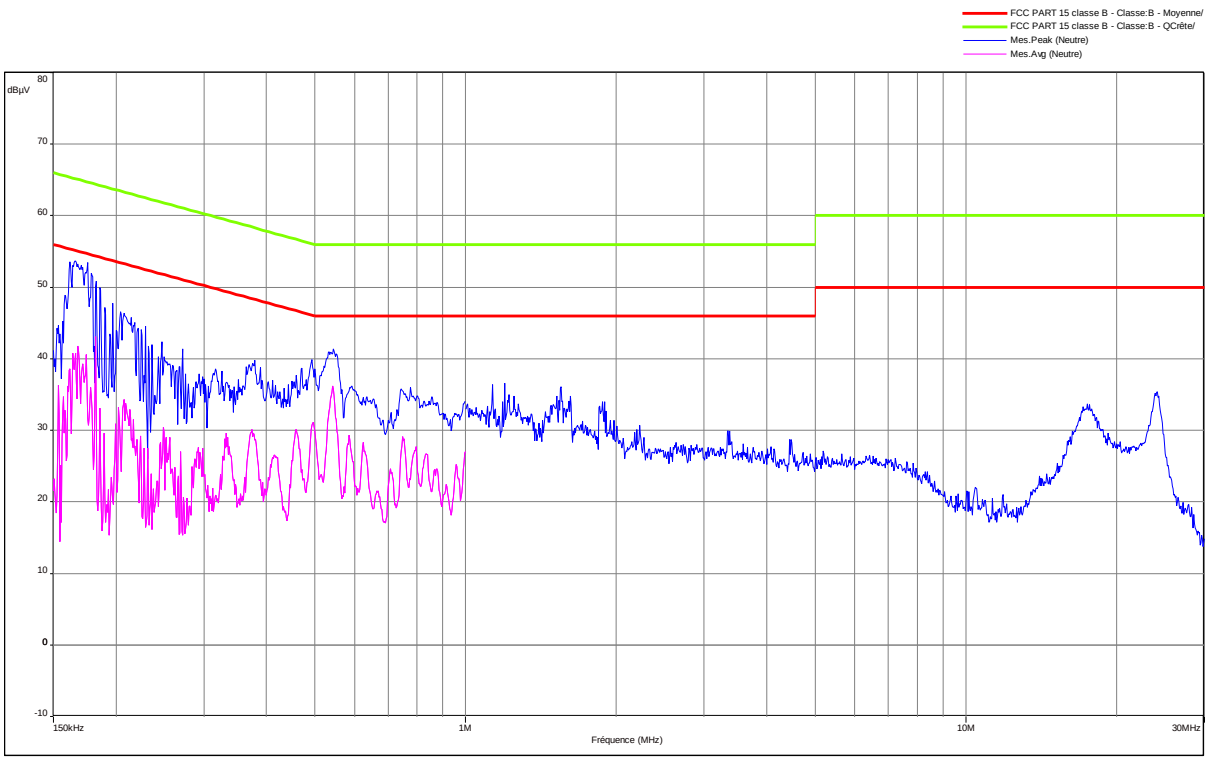
802.11b/802.11g/802.11n HT20/802.11n HT40

Phase Line

FCC Part.15 class B

SAGEMCOM
WIFI BOX
TYPE : FAST 5260CV
CONDUCTOR 1 ; 120V-60Hz

Peak and average value

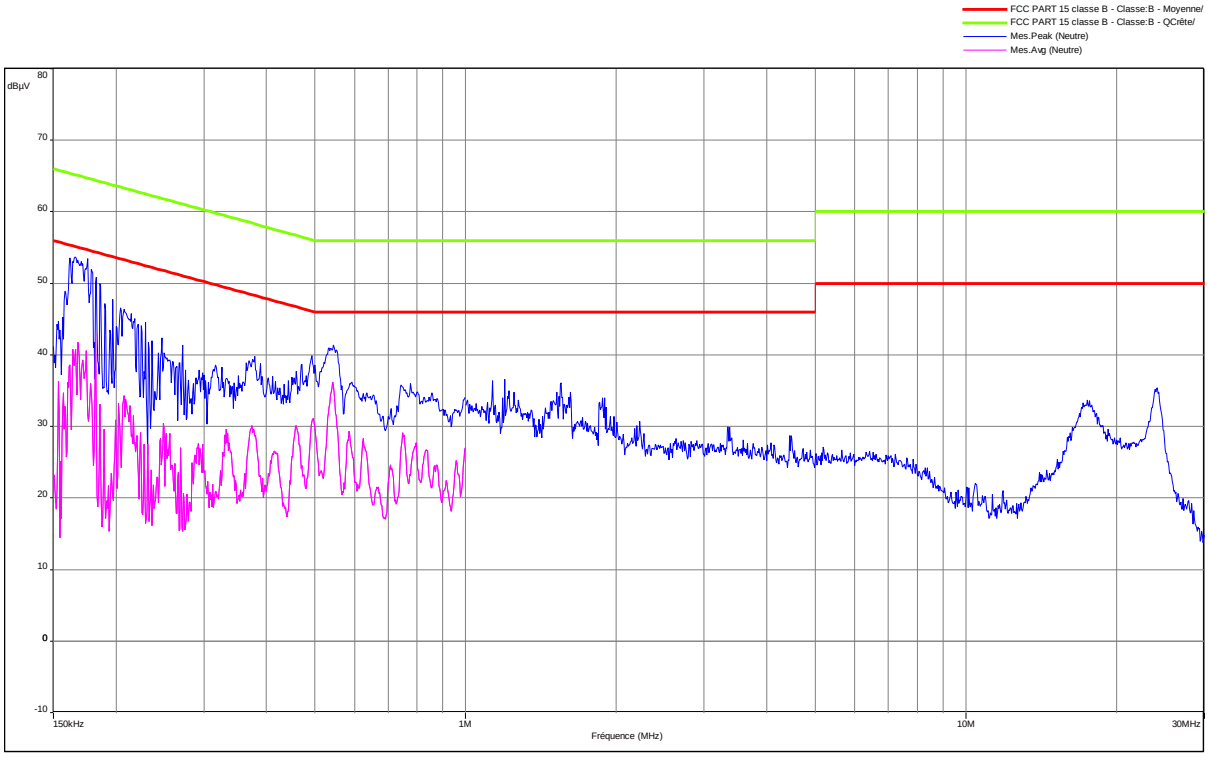


Neutral Line

FCC Part.15 class B

SAGEMCOM
WIFI BOX
TYPE : FAST 5260CV
CONDUCTOR 2 ; 120V-60Hz

Peak and average value



Phase Line

Frequency (MHz)	Peak Level (dBµV/m)	Quasi-Peak Level (dBµV/m)	Quasi-Peak Limit (dBµV/m)	Average Level (dBµV/m)	Average Limit (dBµV/m)
0.166	53.6	-	65	43	55
0.544	41.3	-	56	36	46
1.552	36	-	56	-	46
17.52	33.7	-	60	-	50
24	35.4	-	60	-	50

Neutral Line

Frequency (MHz)	Peak Level (dBµV/m)	Quasi-Peak Level (dBµV/m)	Quasi-Peak Limit (dBµV/m)	Average Level (dBµV/m)	Average Limit (dBµV/m)
0.167	53.5	-	64.9	43.6	55
0.499	39	-	56.1	32.8	46
1.554	34.5	-	56	-	46
17.216	36	-	60	-	50

Result: PASS

Limit: →

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

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

*Decreases with the logarithm of the frequency

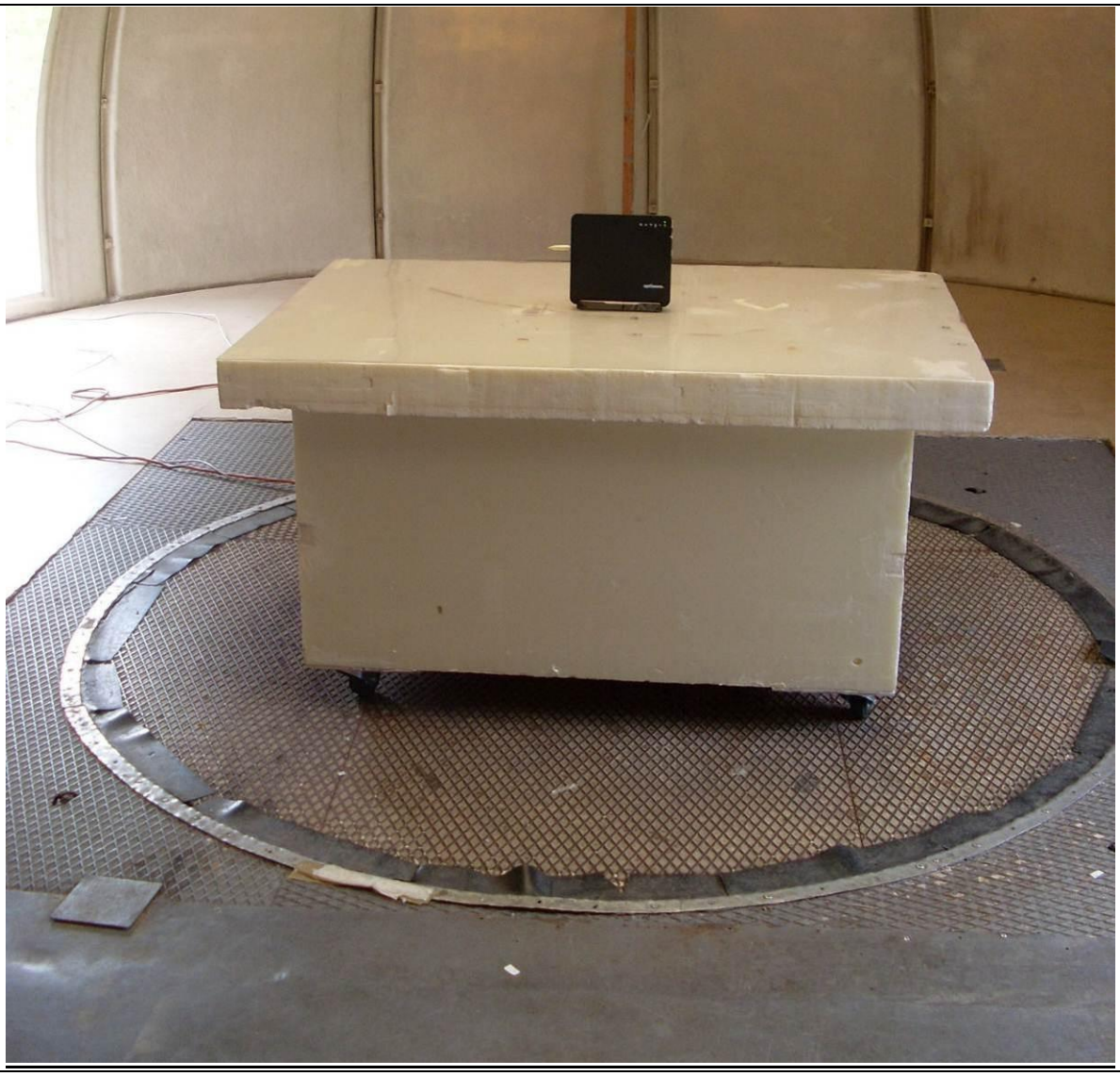
9. UNWANTED EMISSIONS INTO RESTRICTED FREQUENCY BANDS

9.1. TEST CONDITIONS

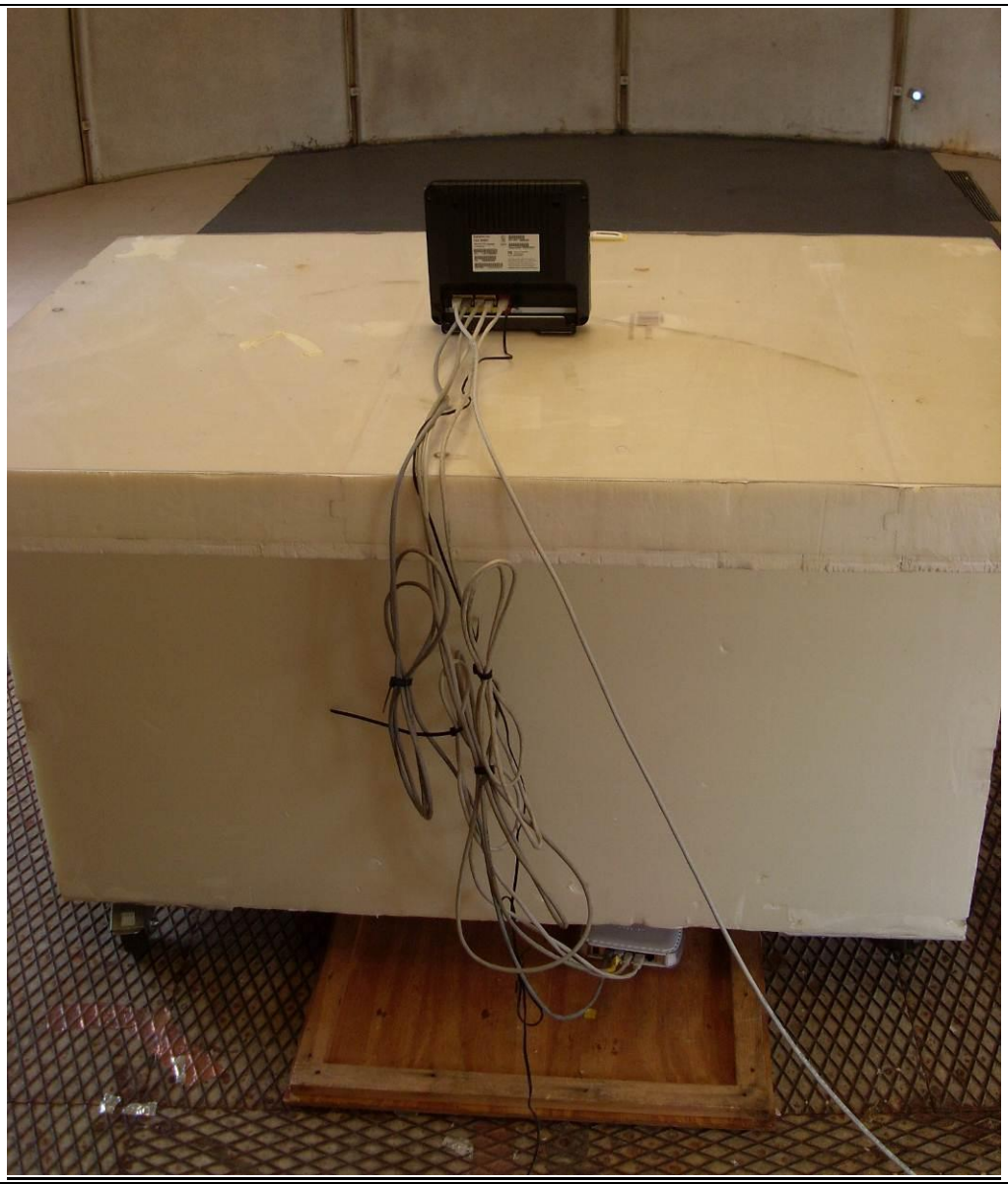
Test performed by :Laurent DENEUX
Date of test :2013/07/23
Ambient temperature : 26 °C to 35°C
Relative humidity : 51%

9.2. 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 10m. 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.



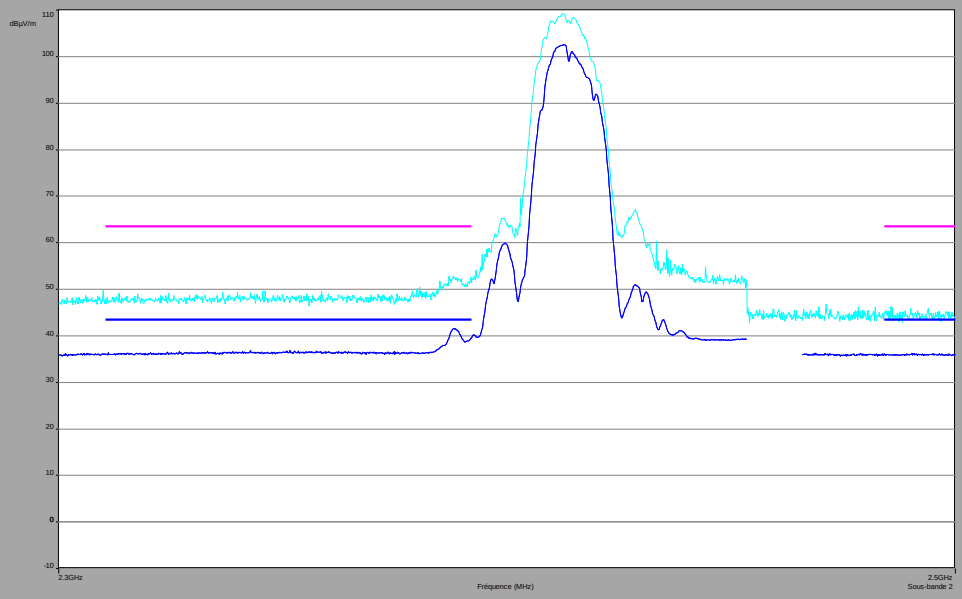
Photograph for Unwanted Emissions into Restricted Frequency Bands



Photograph for Unwanted Emissions into Restricted Frequency Bands

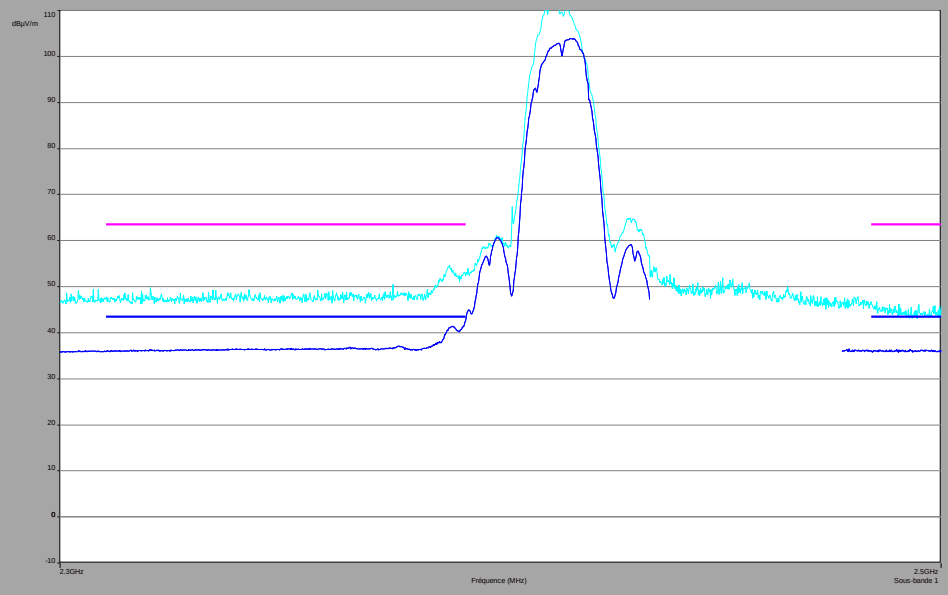
9.3. RESULTS

802.11 b
C1
vertical



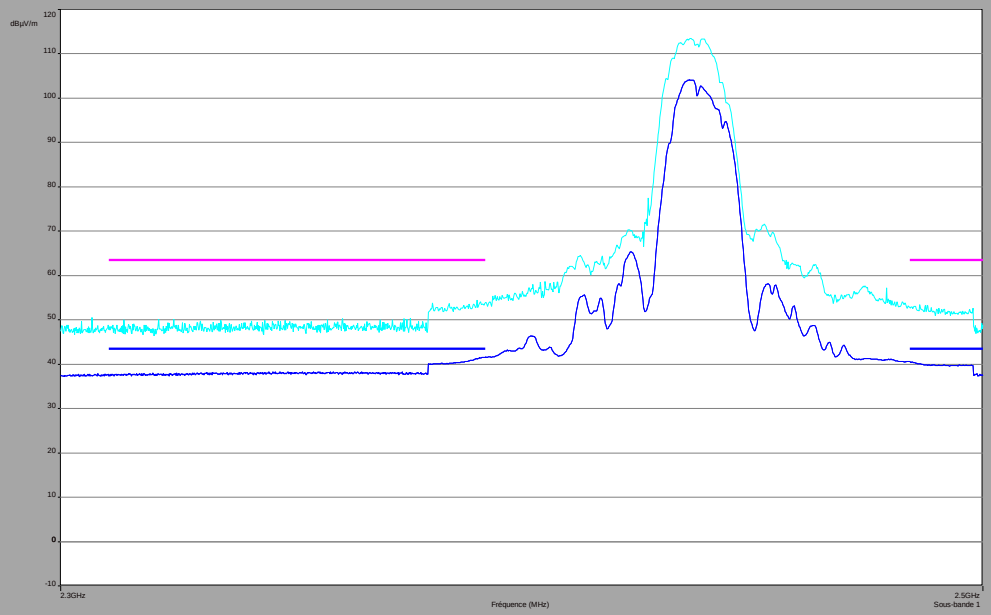
FCC Part.15 restricted band – peak limit
FCC Part.15 restricted band – average value limit
Peak measurement
Average value

C1
Horizontal



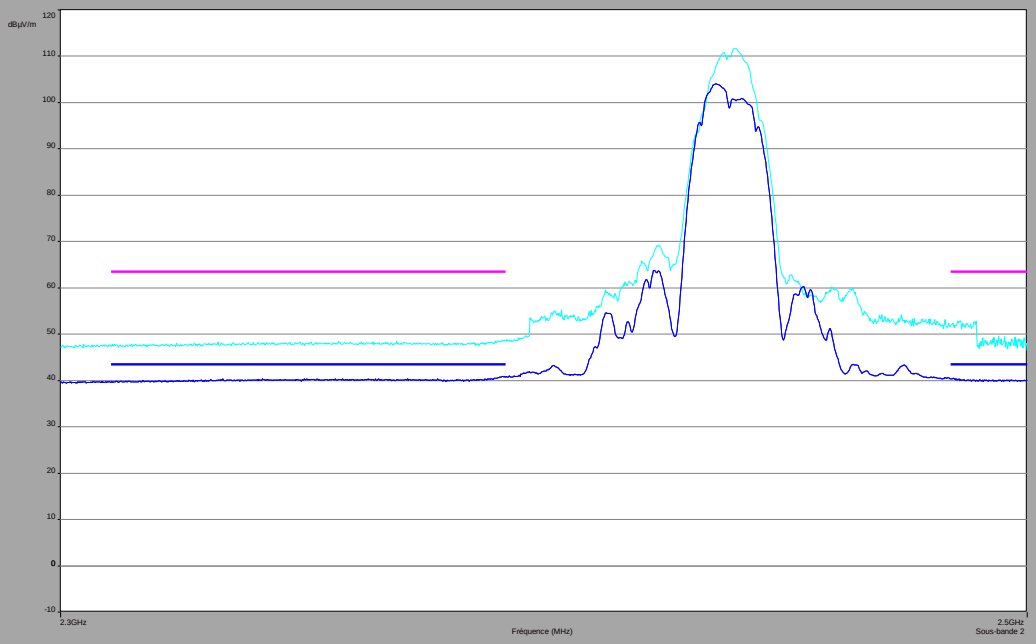
FCC Part.15 restricted band – peak limit
FCC Part.15 restricted band – average value limit
Peak measurement
Average value

802.11 b
C6
vertical



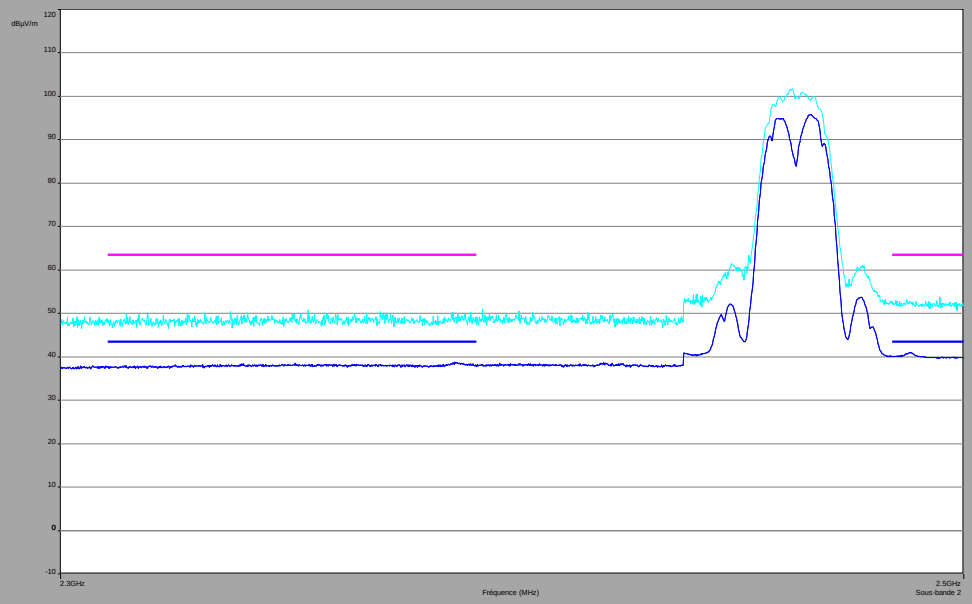
FCC Part.15 restricted band – peak limit
FCC Part.15 restricted band – average value limit
Peak measurement
Average value

C6
Horizontal



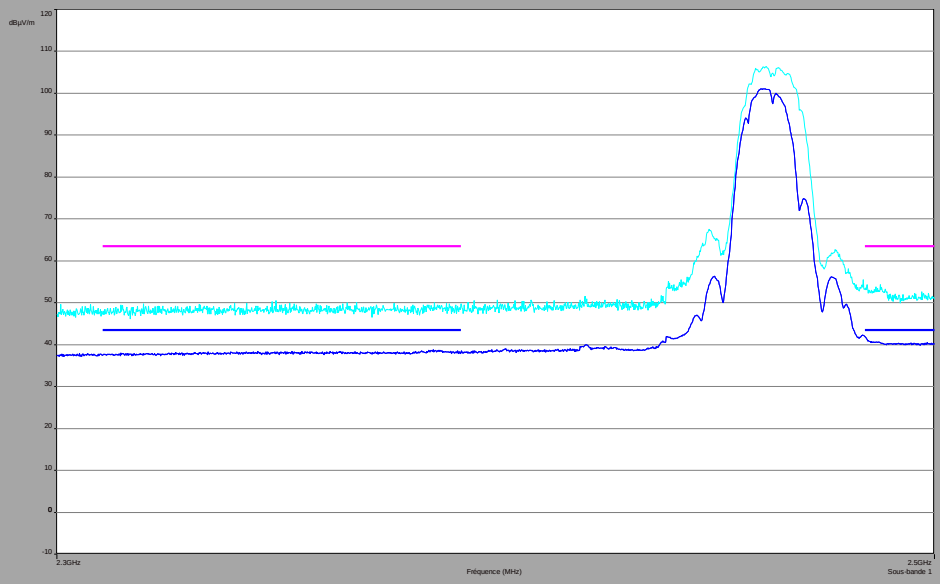
FCC Part.15 restricted band – peak limit
FCC Part.15 restricted band – average value limit
Peak measurement
Average value

802.11 b
C11
vertical



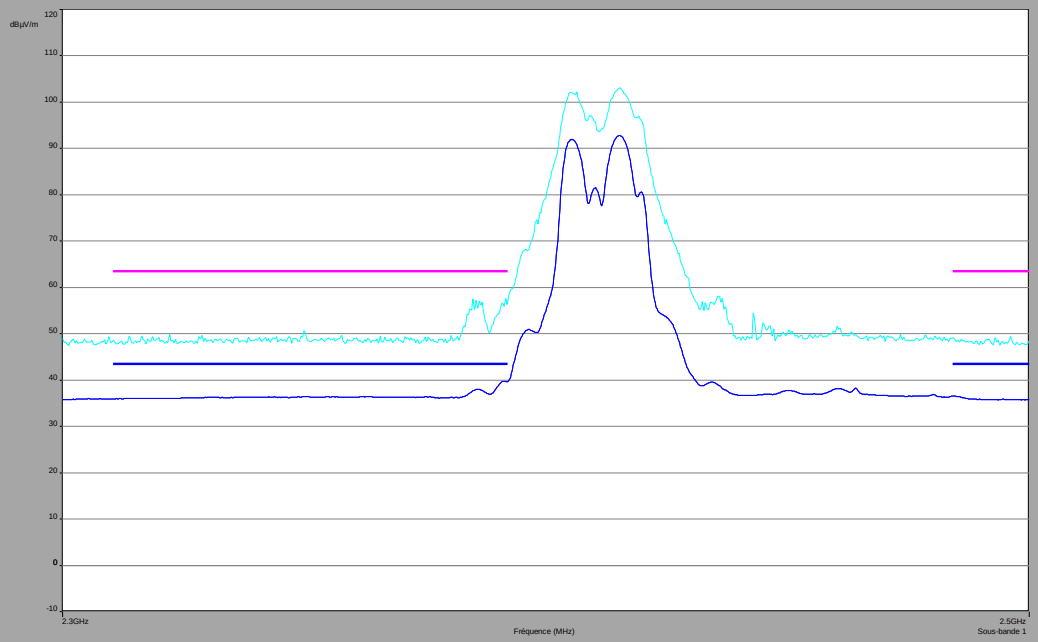
FCC Part.15 restricted band – peak limit
FCC Part.15 restricted band – average value limit
Peak measurement
Average value

C11
Horizontal



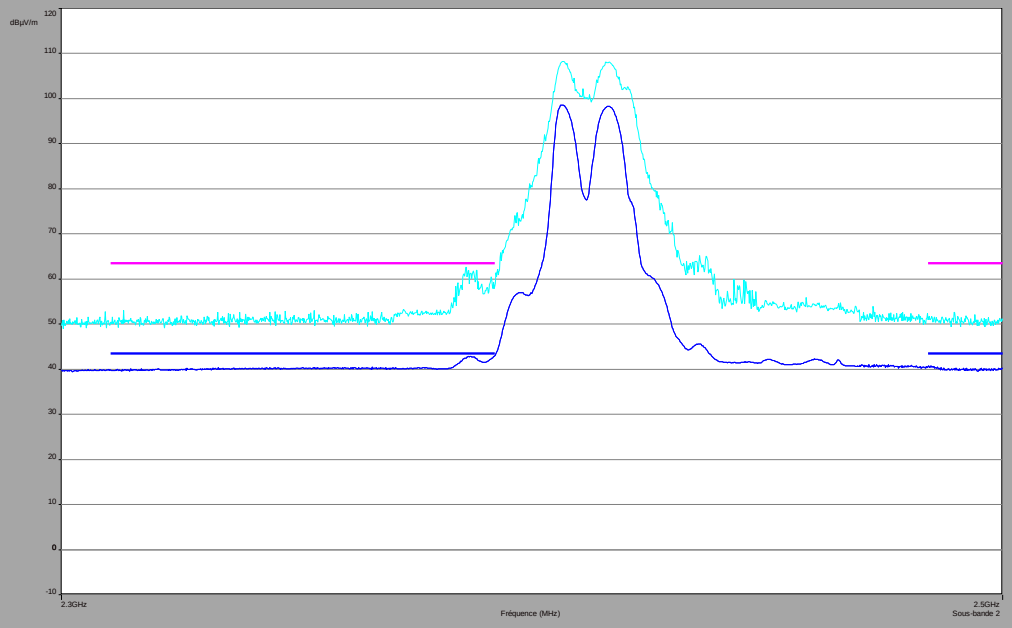
FCC Part.15 restricted band – peak limit
FCC Part.15 restricted band – average value limit
Peak measurement
Average value

802.11 g
C1
vertical



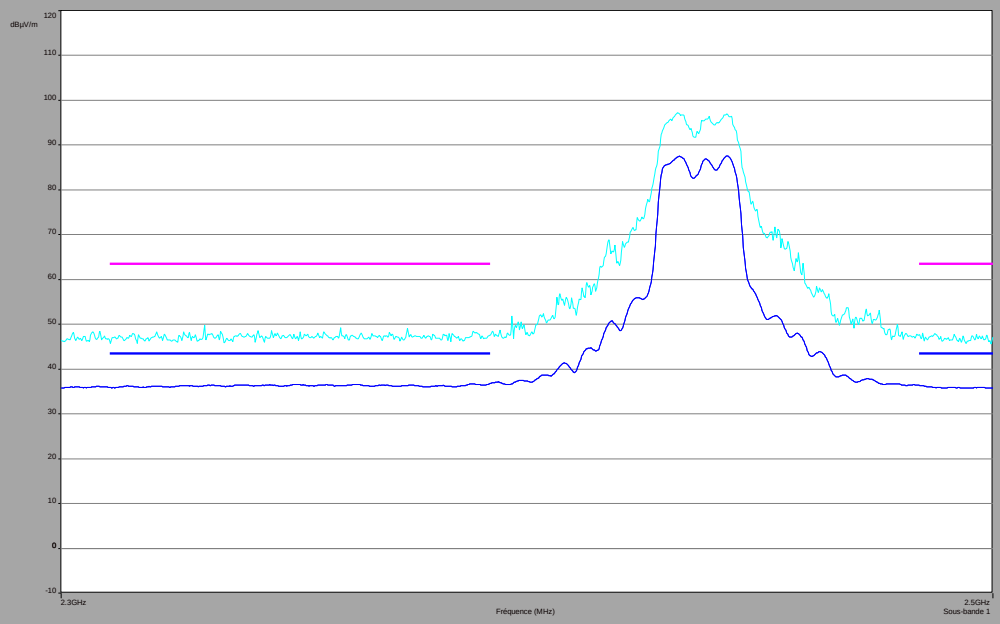
FCC Part.15 restricted band – peak limit
FCC Part.15 restricted band – average value limit
Peak measurement
Average value

C1
Horizontal



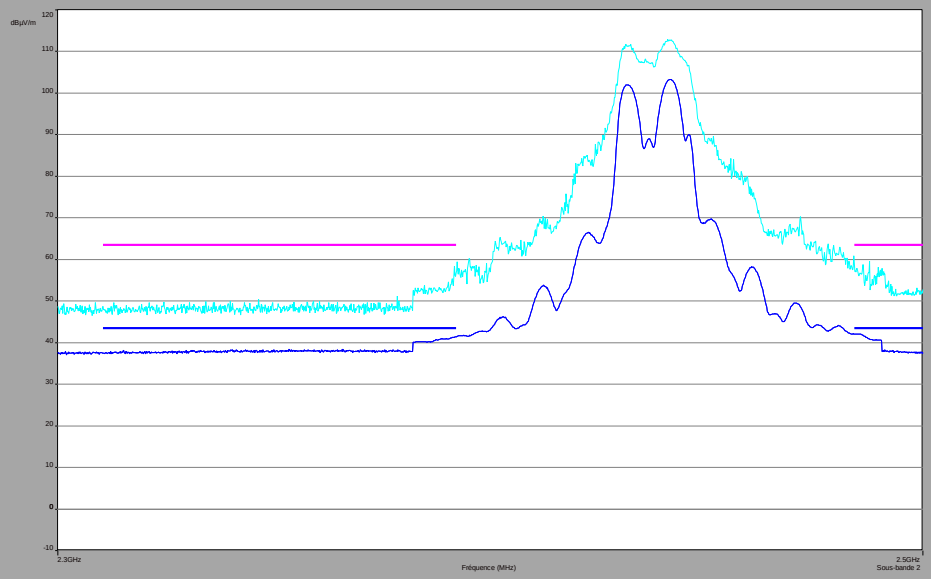
FCC Part.15 restricted band – peak limit
FCC Part.15 restricted band – average value limit
Peak measurement
Average value

802.11 g
C6
vertical



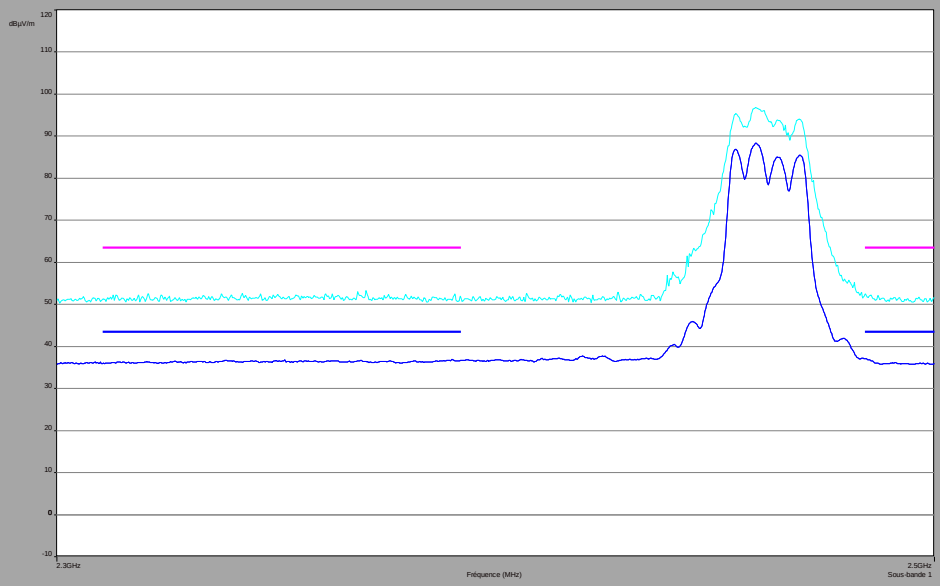
FCC Part.15 restricted band – peak limit
FCC Part.15 restricted band – average value limit
Peak measurement
Average value

C6
Horizontal



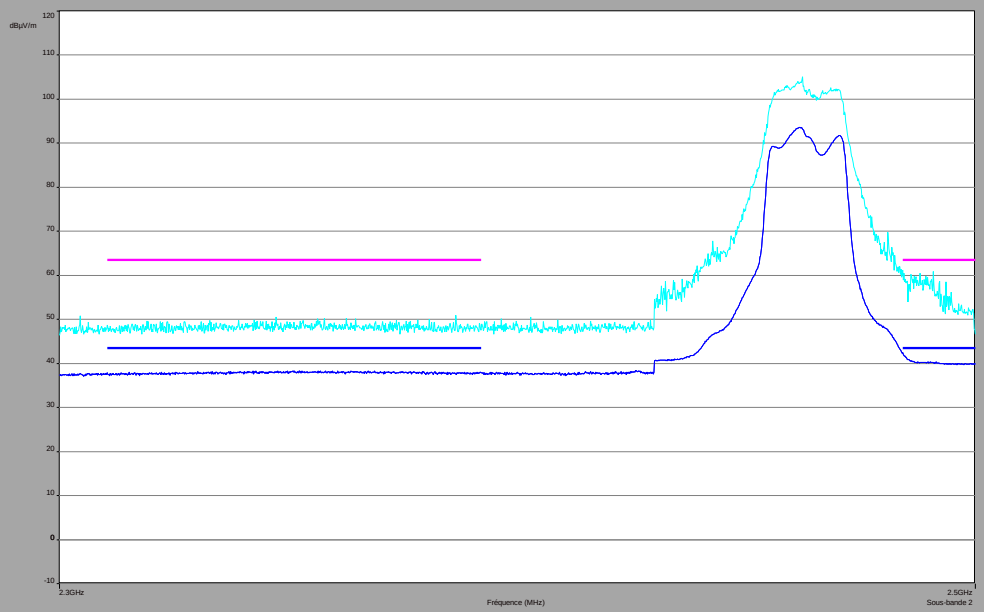
FCC Part.15 restricted band – peak limit
FCC Part.15 restricted band – average value limit
Peak measurement
Average value

802.11 g
C11
vertical



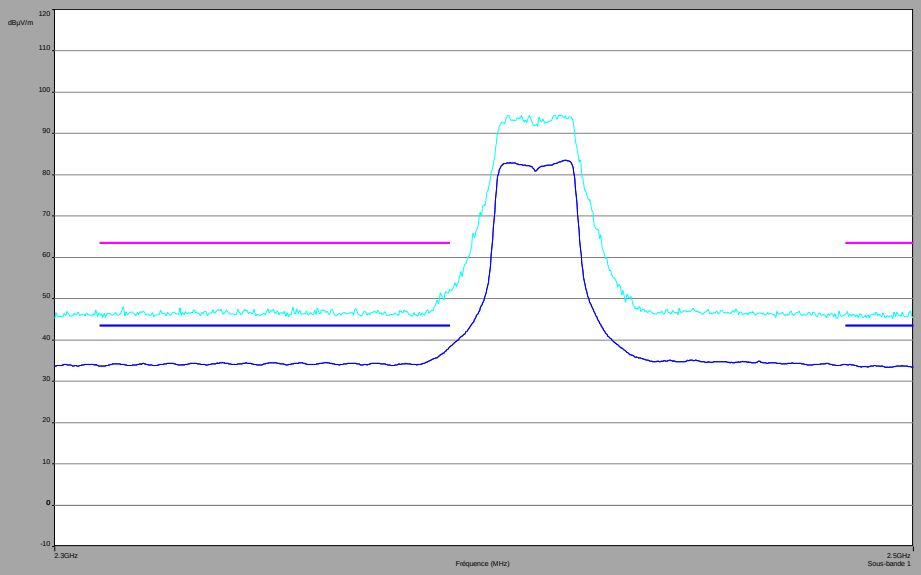
FCC Part.15 restricted band – peak limit
FCC Part.15 restricted band – average value limit
Peak measurement
Average value

C11
Horizontal



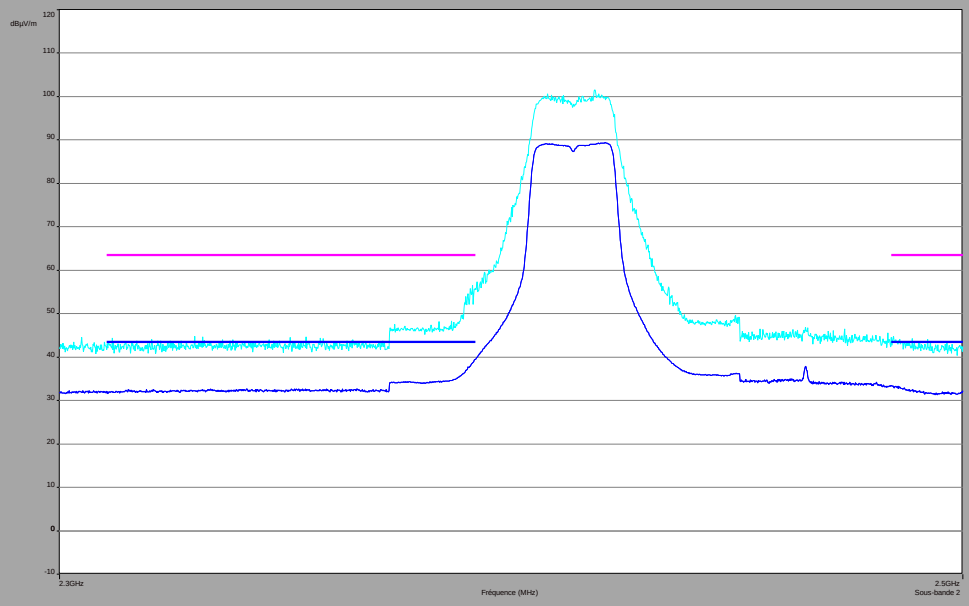
FCC Part.15 restricted band – peak limit
FCC Part.15 restricted band – average value limit
Peak measurement
Average value

802.11 nHT20
C1
vertical



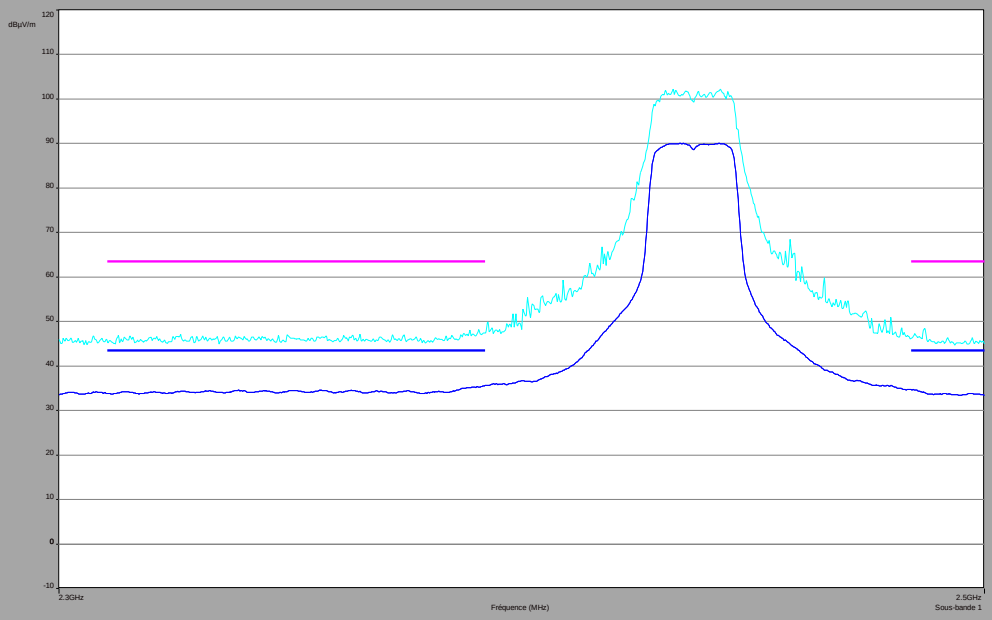
FCC Part.15 restricted band – peak limit
FCC Part.15 restricted band – average value limit
Peak measurement
Average value

C1
Horizontal



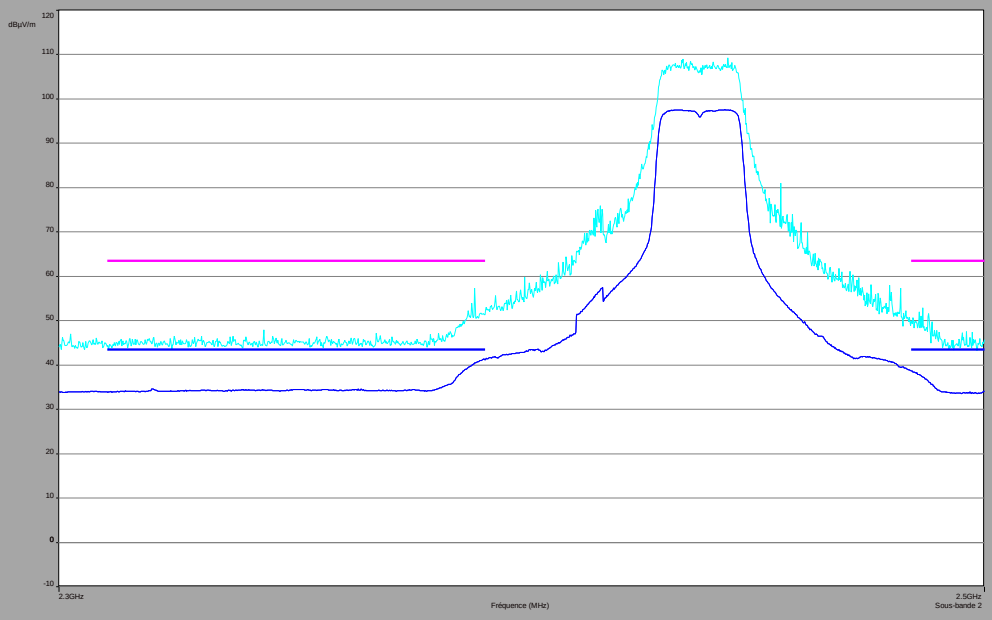
FCC Part.15 restricted band – peak limit
FCC Part.15 restricted band – average value limit
Peak measurement
Average value

802.11 nHT20
C6
vertical



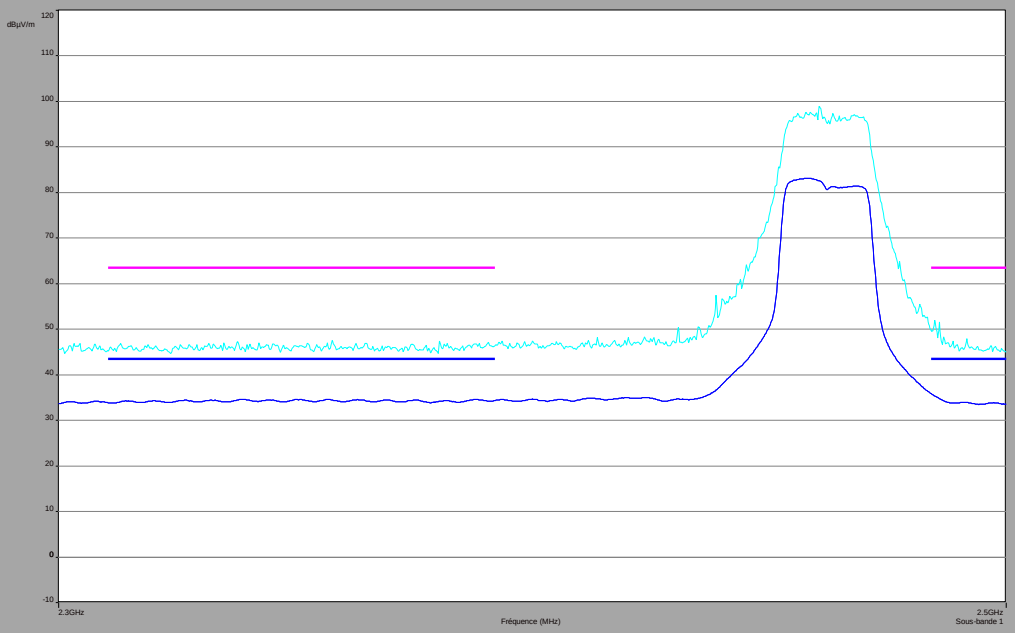
FCC Part.15 restricted band – peak limit
FCC Part.15 restricted band – average value limit
Peak measurement
Average value

C6
Horizontal



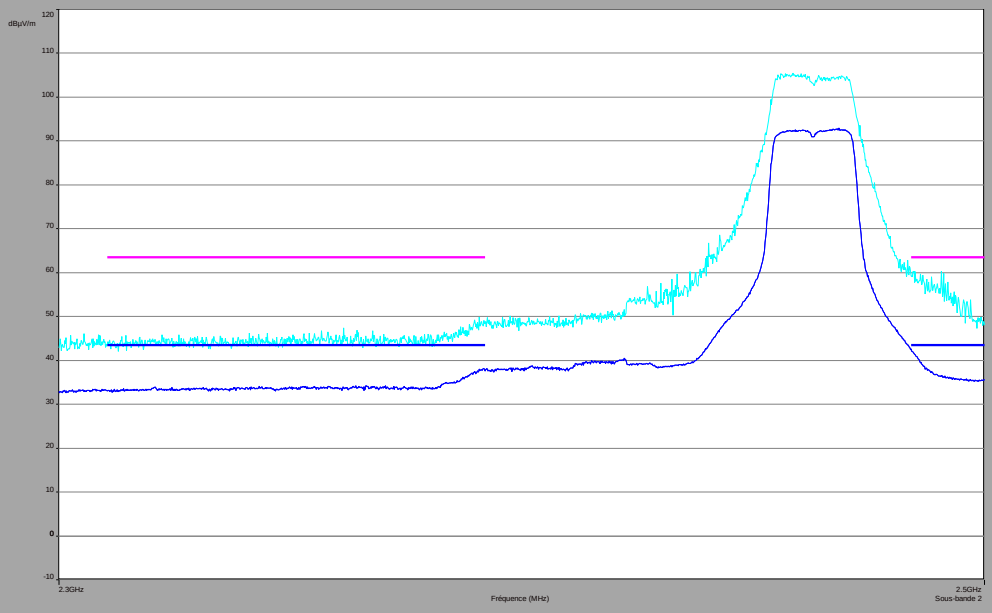
FCC Part.15 restricted band – peak limit
FCC Part.15 restricted band – average value limit
Peak measurement
Average value

802.11 nHT20
C11
vertical



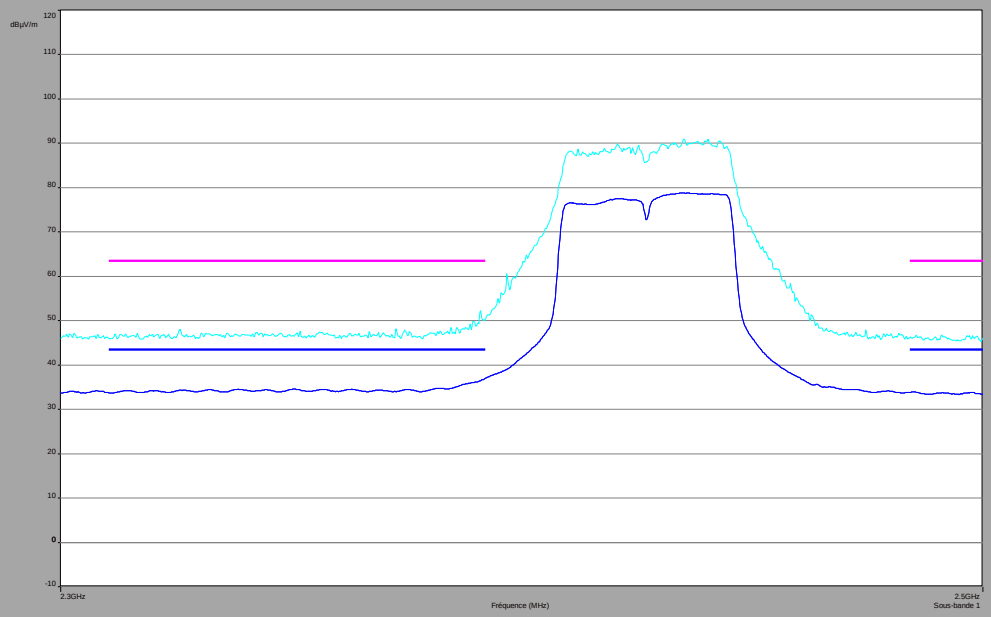
FCC Part.15 restricted band – peak limit
FCC Part.15 restricted band – average value limit
Peak measurement
Average value

C11
Horizontal



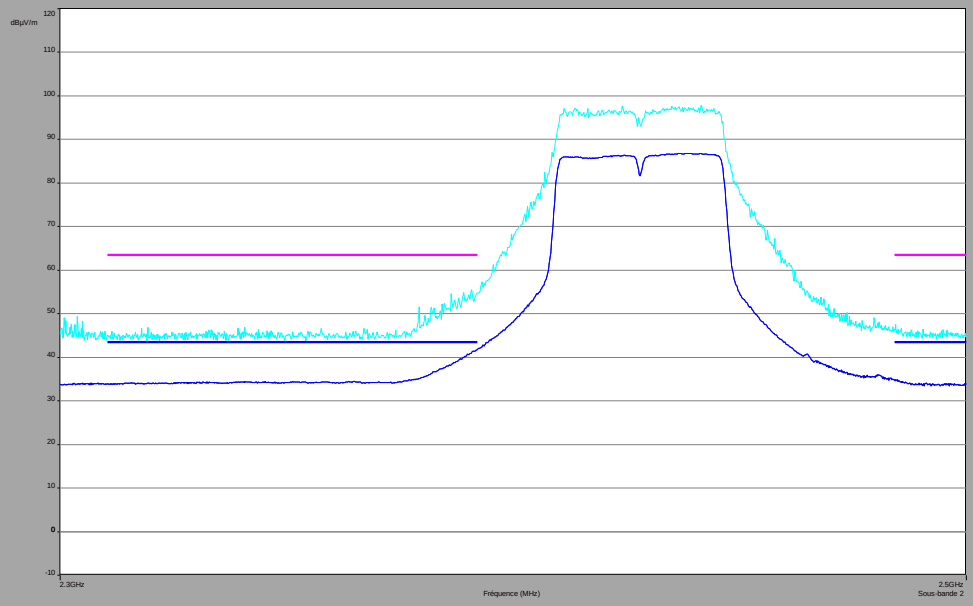
FCC Part.15 restricted band – peak limit
FCC Part.15 restricted band – average value limit
Peak measurement
Average value

802.11 nHT40
C2
vertical



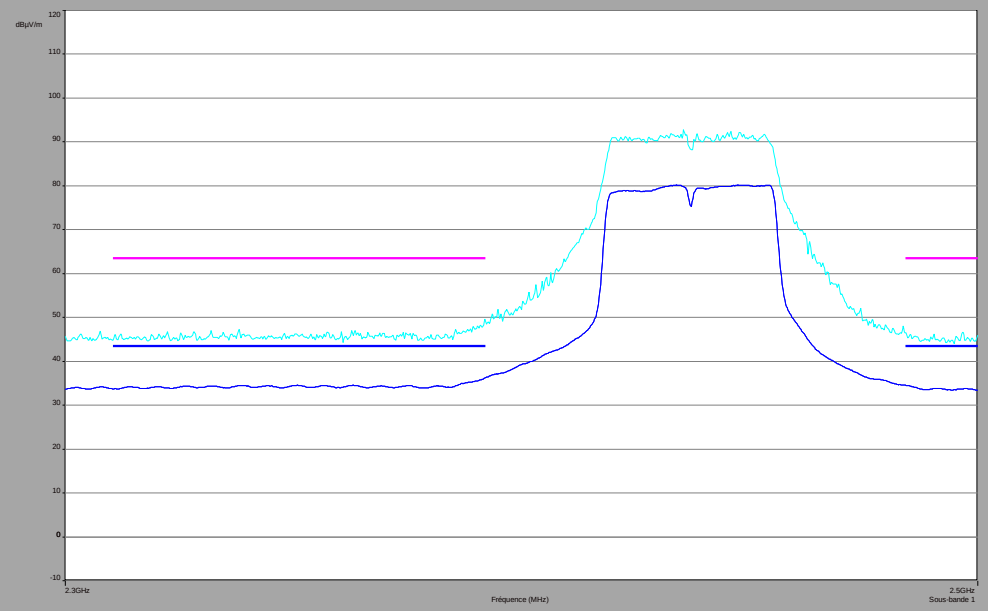
FCC Part.15 restricted band – peak limit
FCC Part.15 restricted band – average value limit
Peak measurement
Average value

C2
Horizontal



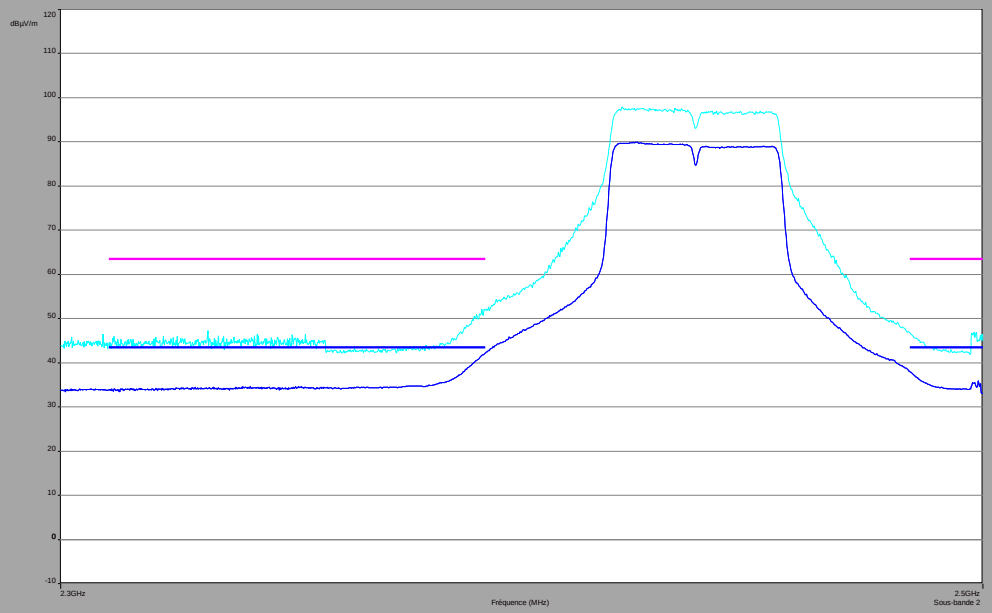
FCC Part.15 restricted band – peak limit
FCC Part.15 restricted band – average value limit
Peak measurement
Average value

802.11 nHT40
C4
vertical



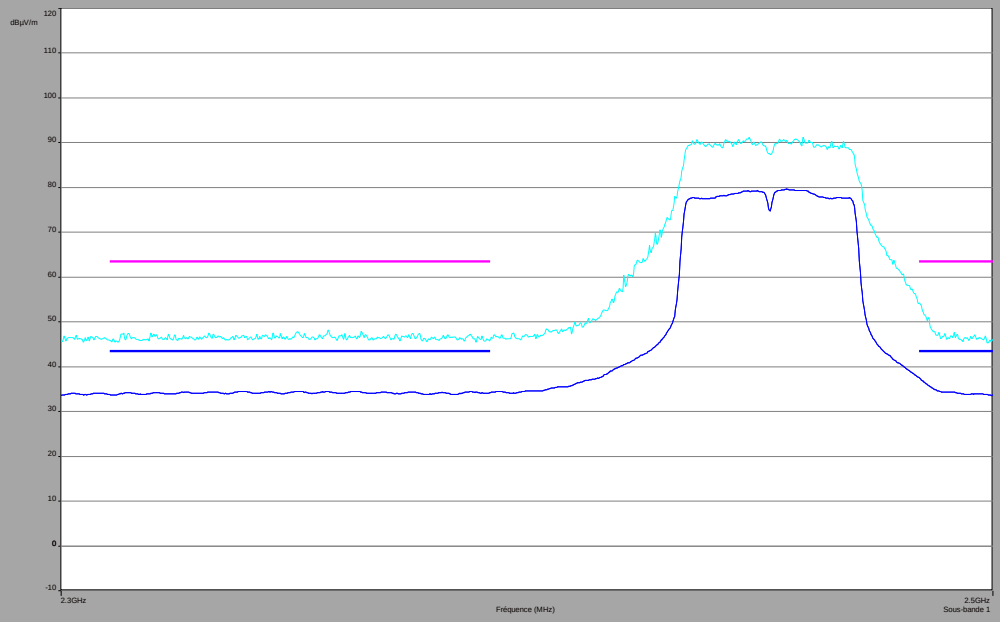
FCC Part.15 restricted band – peak limit
FCC Part.15 restricted band – average value limit
Peak measurement
Average value

C4
Horizontal



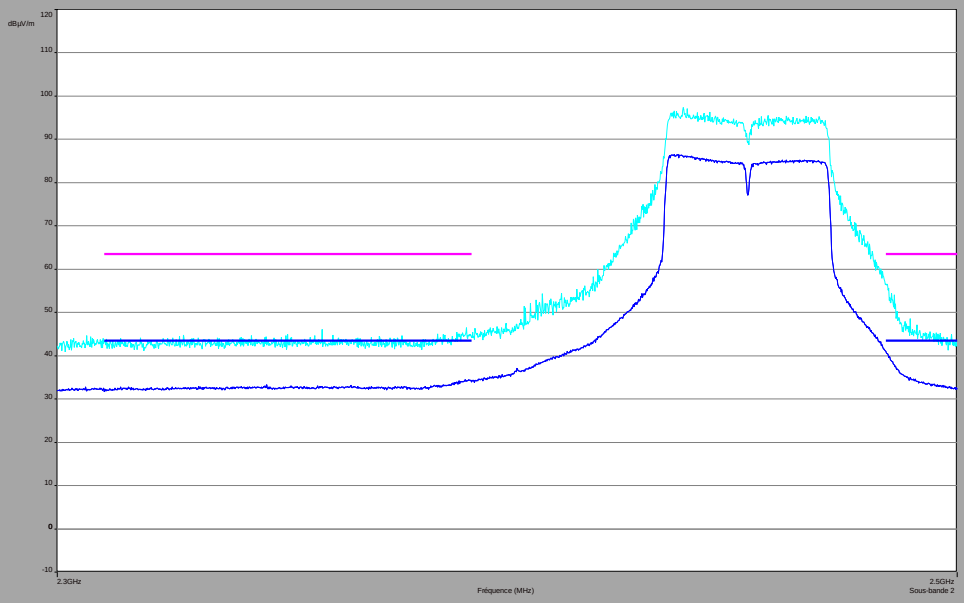
FCC Part.15 restricted band – peak limit
FCC Part.15 restricted band – average value limit
Peak measurement
Average value

802.11 n HT40
C7
vertical



FCC Part.15 restricted band – peak limit
FCC Part.15 restricted band – average value limit
Peak measurement
Average value

C7
Horizontal



FCC Part.15 restricted band – peak limit
FCC Part.15 restricted band – average value limit
Peak measurement
Average value

Below 1GHz

Frequency (MHz)	Peak Level (dBµV/m)	QPeak Level (dBµV/m)	Limit (dBµV/m)
37.5	23.4	17.4	29.5
74.4	22.3	18.5	29.5
110.2	20.4	23	33
114.1	22.1	18.7	33
115	25	16.2	33
118.1	25.5	20.6	33
118.2	22.5	14.1	33
131.4	27	24.7	33
135.8	19	17.8	33
250	30.3	29.6	35.5
330.2	23	18	35.5
998	35.4	30	44

Above 1GHz

Frequency (MHz)	Average Level (dBµV/m)	Average Limit (dBµV/m)	Peak Level (dBµV/m)	Peak Limit (dBµV/m)
1125	27.3	44	36.3	64
1375	24.6	44	30.3	64
1500.1	29.6	44	33.7	64
1625.1	27	44	39.5	64
2250	31.5	44	43.6	64
2384	42.8	44	62.8	64
2390	42.6	44	58.9	64
2483.5	42.5	44	61.5	64
4824	36.5	44	48.4	64

Result: PASS

Limit: →

30MHz to 88MHz:	29.5dBµV/m QPeak
88MHz to 216MHz:	33dBµV/m QPeak
216MHz to 960MHz:	35.5dBµV/m QPeak
960MHz to 1000MHz:	44dBµV/m QPeak
Above 1000MHz:	64dBµV/m Peak
	44dBµV/m Average

10. TEST EQUIPMENT LIST

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**
RF Cable	-	2.92 mm	A5329441	2013/03	2014/03
Attenuator3 dB	MINI CIRCUITS	BW-S3W2+	A7122210	2013/07	2014/07
Spectrum Analyser	ROHDE & SCHWARZ	FSL	A4060032	2012/12	2013/12
EMI Test Receiver	ROHDE & SCHWARZ	ESIB26	A2642021	2013/04	2014/04
EMI Test receiver	RHODE & SCHWARZ	ESI40	A2642010	2012/09	2013/09
Power meter	HEWLETT PACKARD	437B	A1503001	2013/01	2014/01
Power meter sensor	HEWLETT PACKARD	8484A	A1509070	2013/01	2014/01
Attenuator 30 dB	HEWLETT PACKARD	11708A	A7122215	2013/01	2014/01
Signal Generator	ROHDE & SCHWARZ	SMJ100A	A544407	2013/01	2014/01
RF Cable	Pasternack	095 Series	A5329592	Calibrated with Power Meter & Signal Generator before use	Calibrated with Power Meter & Signal Generator before use
Power supply	KIKUSUI	PCR500M	A7040079	-	-
Unwanted Emissions into Restricted Frequency Bands & Receiver Spurious Emissions					
Apparatus	**Trade Mark**	**Type**	**Registration number**	**Calibration date**	**Calibration due**
Open test site	LCIE	-	F2000400	2013/04	2014/04
EMI Test Receiver	ROHDE & SCHWARZ	ESU	A2642018	2013/04	2014/04
Horn antenna	PASTERNACK	PE9850/2F-20	A2642010	-	-
EMI Test receiver	RHODE & SCHWARZ	ESI40	A2642010	2012 /09	2013/09
Preamplifier	HEWLETT PACKARD	8449B	A4069002	2013/11	2014/11
Bilog antenna	CHASE	CBL 6112A	C2040040	2013/04	2014/04
Dipole	ROHDE & SCHWARZ	HUF-Z1	C2040011	2013/03	2014/03
Logperiodic antenna	ROHDE & SCHWARZ	HL 023 A2	C2040001	2013/03	2014/03
Horn antenna	EMV	3115	C2040023	2013/04	2014/04
Horn antenna	AH SYSTEMS	SAS-572	C2042026	2012/10	2013/10
AC Power Line Conducted Emissions					
Apparatus	**Trade Mark**	**Type**	**Registration number**	**Calibration date**	**Calibration due**
Receiver	RHODE & SCHWARZ	ESU	A2642018	2013/04	2014/04
V ISLN	ROHDE & SCHWARZ	ESH2-Z5	C2322001	2013/06	2014/06
Pulse limiter	ROHDE & SCHWARZ	ESH3-Z2	A2649008	2013/02	2014/02
ground plan 2m x 3m	LCIE	-	-		

11. 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