



L C I E

TEST REPORT

Number
Composition of document

FCC Registration Number
Industry Canada Number

Standards

Issued to

Apparatus under test

Trade mark
Manufacturer
Type
Serial number
FCC ID

Test date

Tests performed by

Test site

Date of issue

RADIO

125772-652184A
82 pages

166175 (FAR) & 888863 (Ecuelles)
6230B (FAR) and 6230B-1(Ecuelles)

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

SAGEMCOM
250, route de l'Empereur
92848 RUEIL MALMAISON

Home router
SAGEMCOM
SAGEMCOM
Fast 5260
1222222222222222
VW3FAST5260

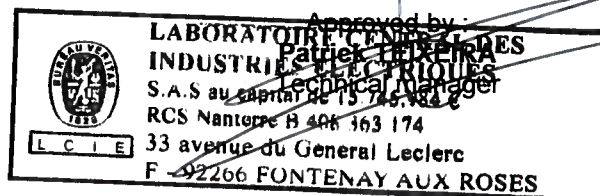
2013/07 & 2014/01

Gilles DE-BUYSER, Stephane PHOUDIAH & Laurent DENEUX

Fontenay aux Roses & Ecuelles

February 19th, 2014

Written by :
Stéphane PHOUDIAH
Tests operator



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1. TEST PROGRAM

References

Standards:

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

Standard Section	Test Description	TEST RESULT - Comments
RSS-Gen § 4.6.1	Occupied Bandwidth	PASS
CFR 47 § 15.247 (a) (2) RSS-210 § A8.2(a)	-6dB Bandwidth	PASS
CFR 47 § 15.247 (b) RSS-210 § A8.4(4)	Maximum Output Power	PASS
CFR 47 § 15.247 (e) RSS-210 § A8.2 (b)	Power Spectral Density	PASS
CFR 47 § 15.247 (d) RSS-210 § A8.5	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):



Front view



Rear View

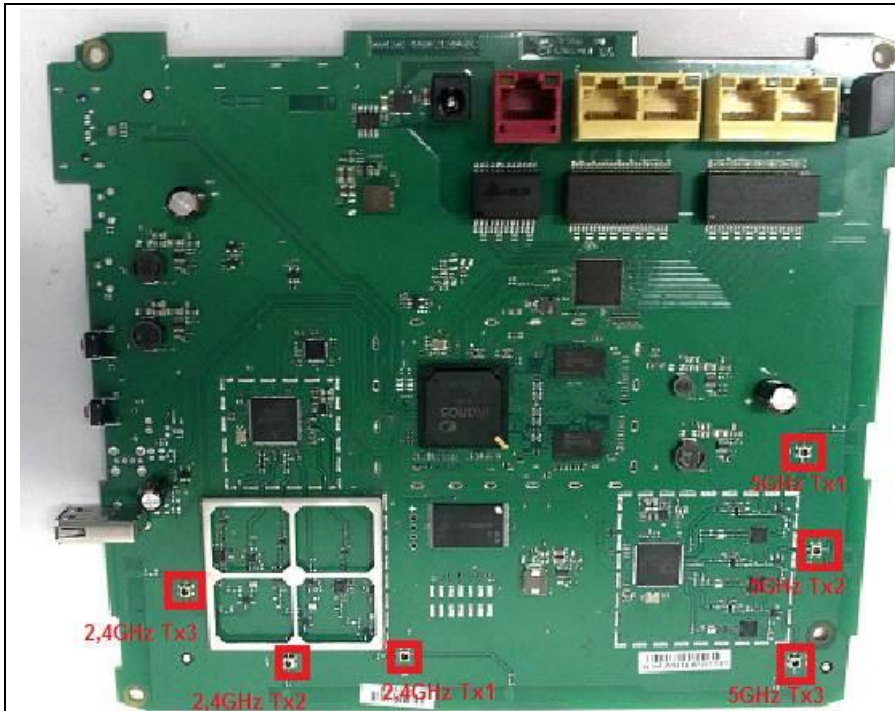


Side view



Power Supply

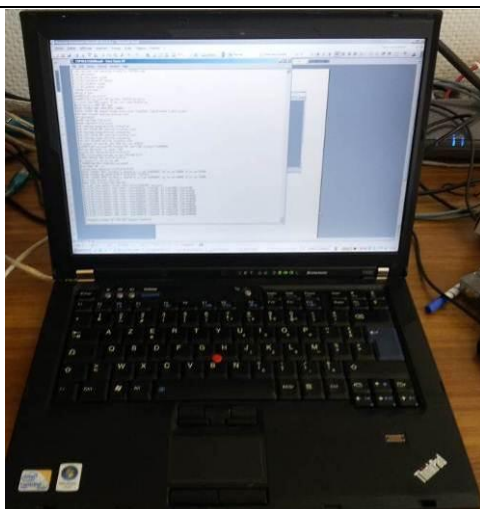
Photograph of EUT



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
- 1 USB ports

Software identification:

- Software version: V6.0.9.1

Equipment of the same family:

According to the manufacturer declaration, the router Fast 5260 is a variant of the router F@st 5260CV. This variant is created by removing e-SATA interface and one USB interface (See FAST 5260 declaration for more information), and the radio parts of these 2 variants are strictly identical.

So, Conducted Test results in this test report are retrieves from F@st 5260CV test report (FCC ID: VW3FAST5260CV).

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	125772-652184A
5150MHz to 5350MHz	125772-652184C&D
5470MHz to 5725MHz (Note 1)	125772-652184C&D
5725MHz to 5850MHz	125772-652184B

(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

Sagemcom
Fast 5260
Sagemcom P/N: 253584638
Rating == 12VDC/2.5A


LISTED
I.T.E.
E308616


S/N: *1222222222222*


WAN MAC: *FFFFFFFFF*

WiFi SSID1: BBBB_2G
WiFi SSID2: BBBB_5G
Password/PIN: *XXXXXXXX*

**Tested To Comply With**
FCC Standards
FCC ID: VW3FAST5260

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) This device must accept any interference received, including interference that may cause undesired operation.

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%

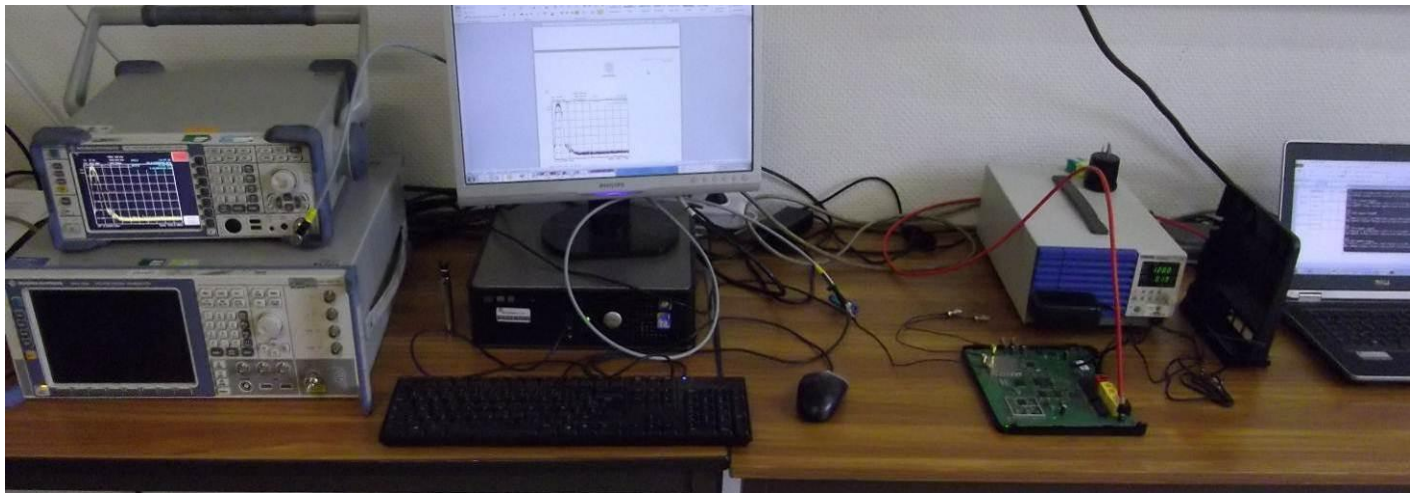
3.2. TEST SETUP

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



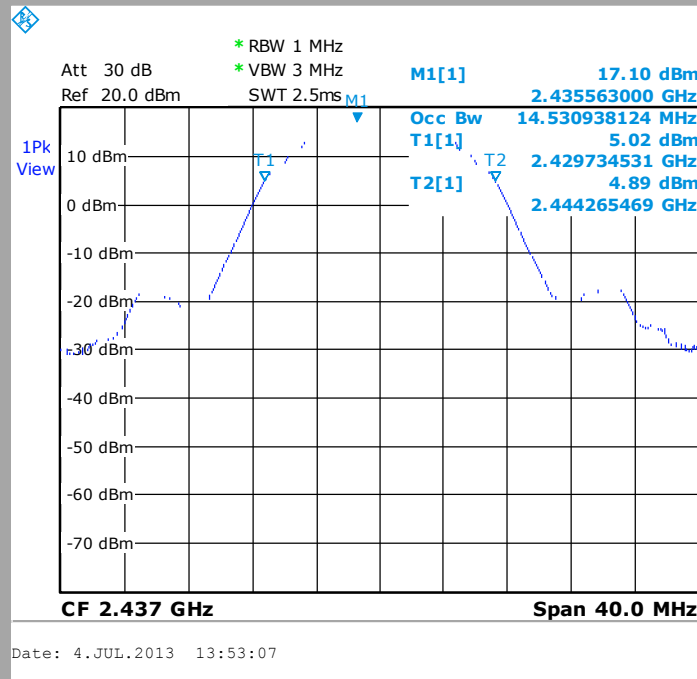
Photograph for Occupied Bandwidth

3.3. GRAPHICS & RESULTS

Occupied bandwidth

802.11b

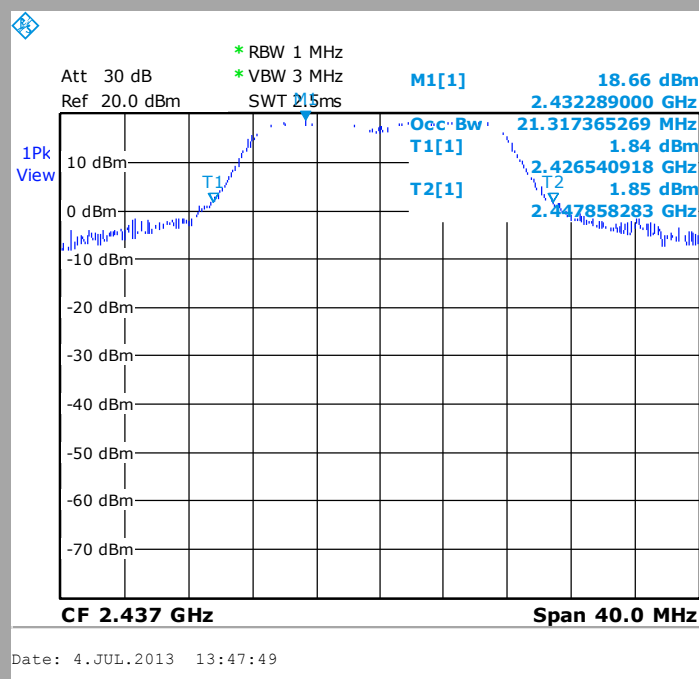
Cnom



Occupied bandwidth

802.11g

Cnom

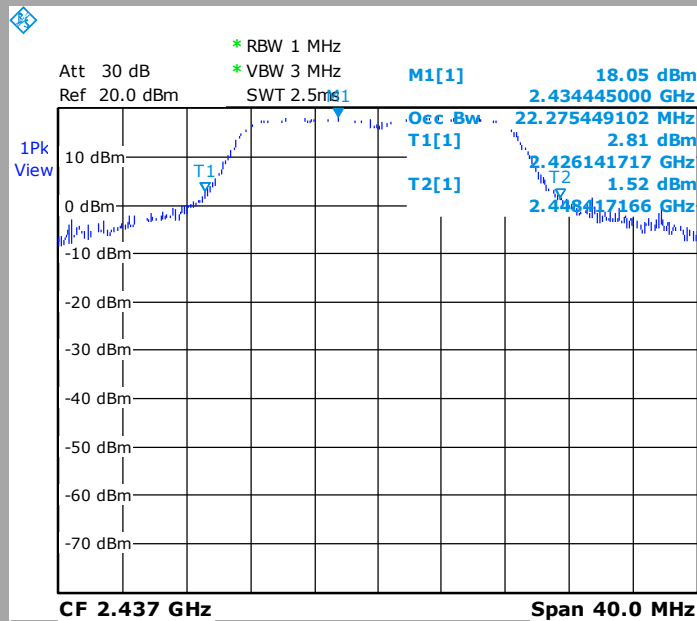




Occupied bandwidth

802.11n HT20

Cnom

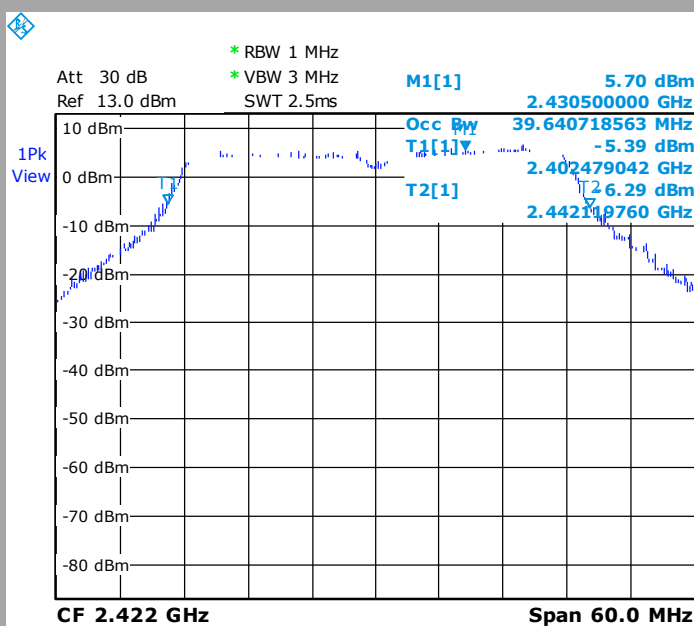


Date: 4.JUL.2013 13:43:09

Occupied bandwidth

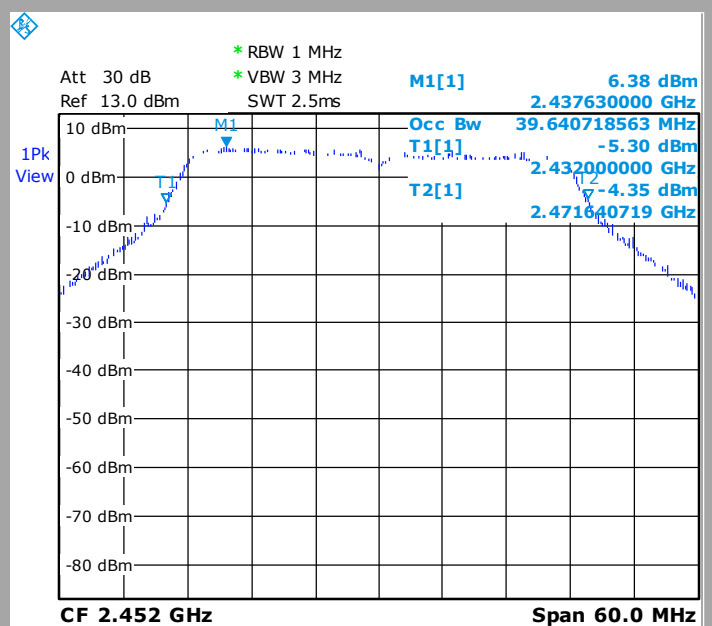
802.11n HT40

Cmin



Date: 4.JUL.2013 13:38:14

Cmax



Date: 4.JUL.2013 13:34:08



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.

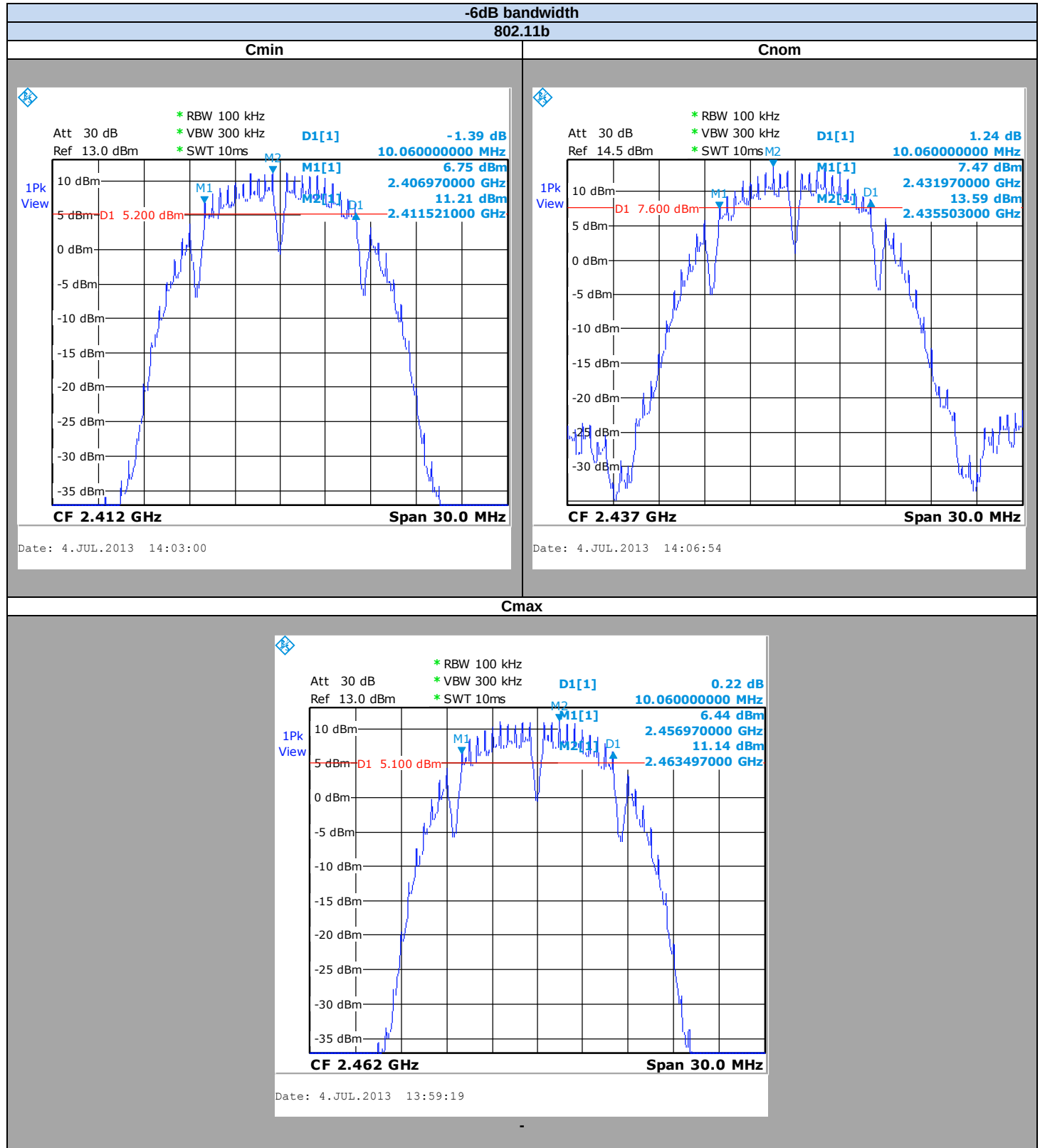
Spectrum Analyzer Setting:

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 measurement

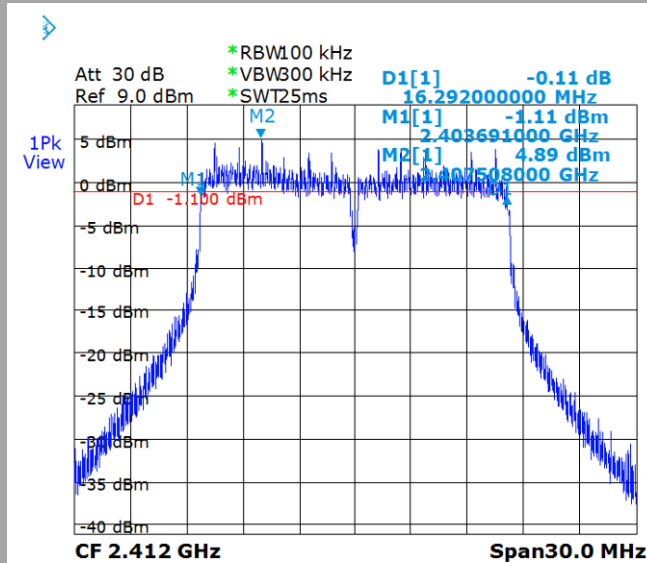
4.3. GRAPHICS & RESULTS



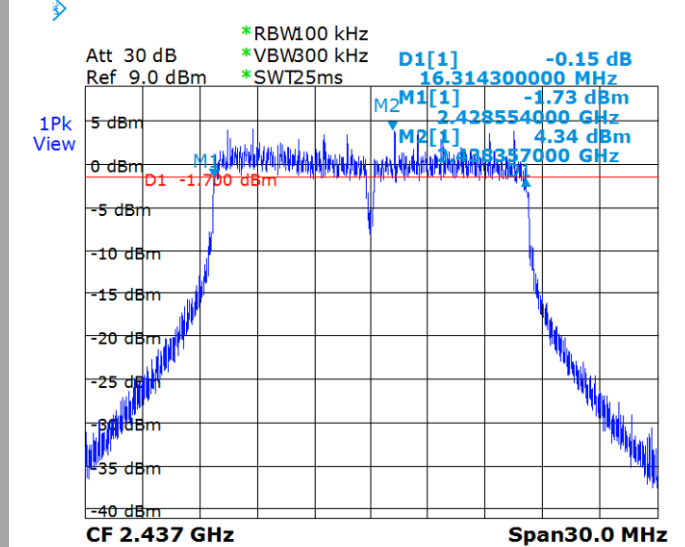
-6dB bandwidth
802.11g

Cmin

Cnom

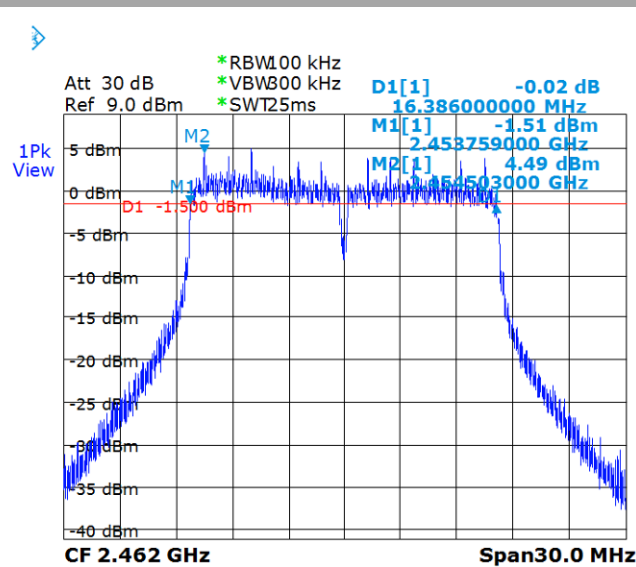


Date: 4.JUL.2013 14:25:50



Date: 4.JUL.2013 14:12:30

Cmax

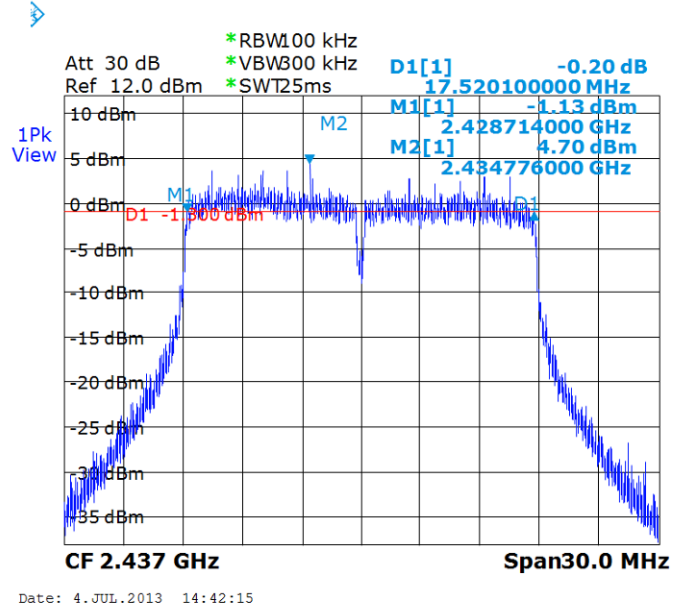
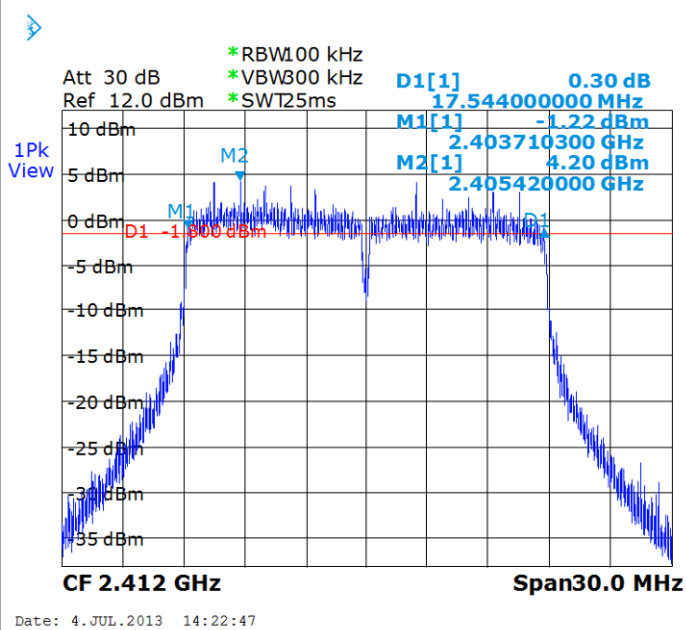


Date: 4.JUL.2013 14:20:50

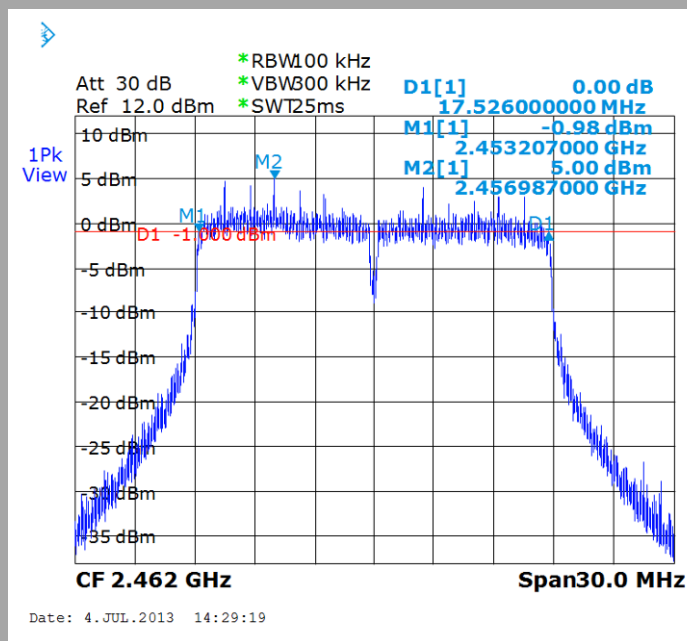
**-6dB bandwidth
802.11n HT20**

Cmin

Cnom

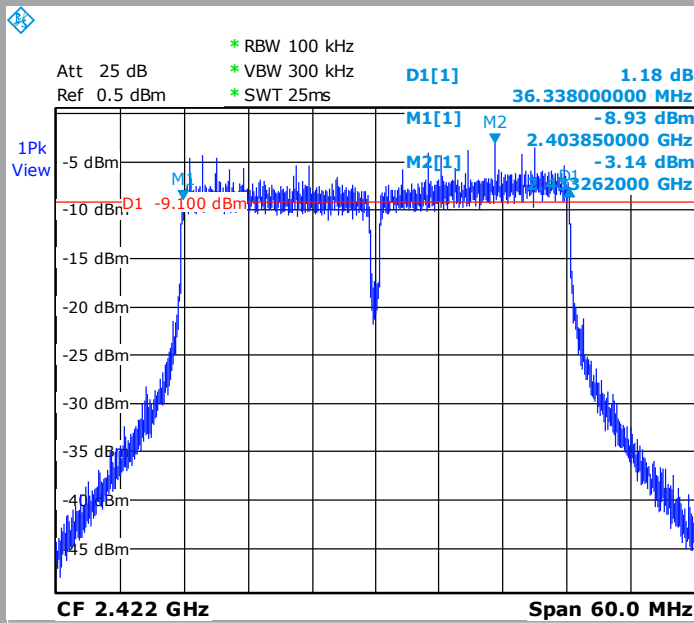


Cmax



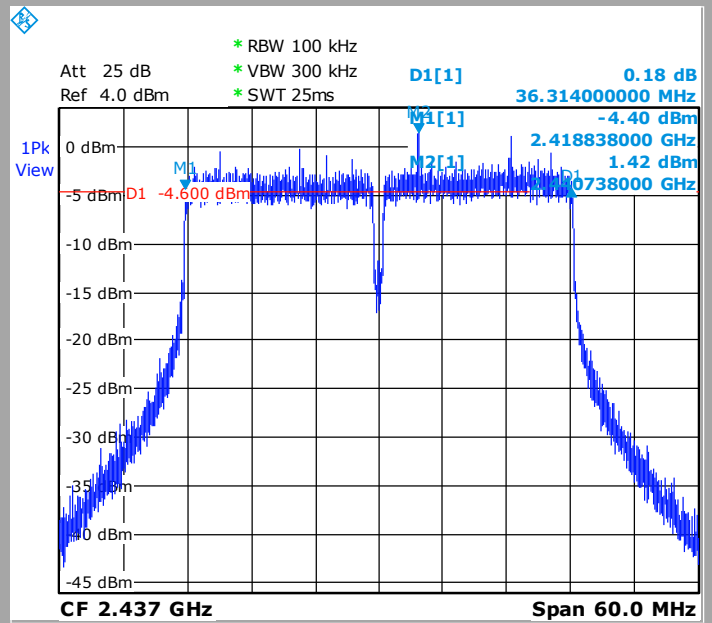
**-6dB bandwidth
802.11n HT40**

Cmin



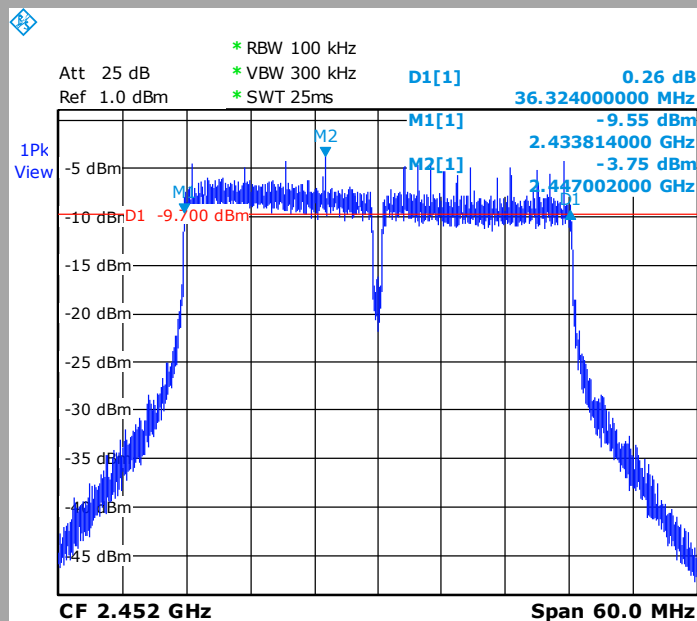
Date: 4.JUL.2013 14:33:32

Cnom



Date: 4.JUL.2013 14:36:43

Cmax



Date: 4.JUL.2013 14:39:56



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

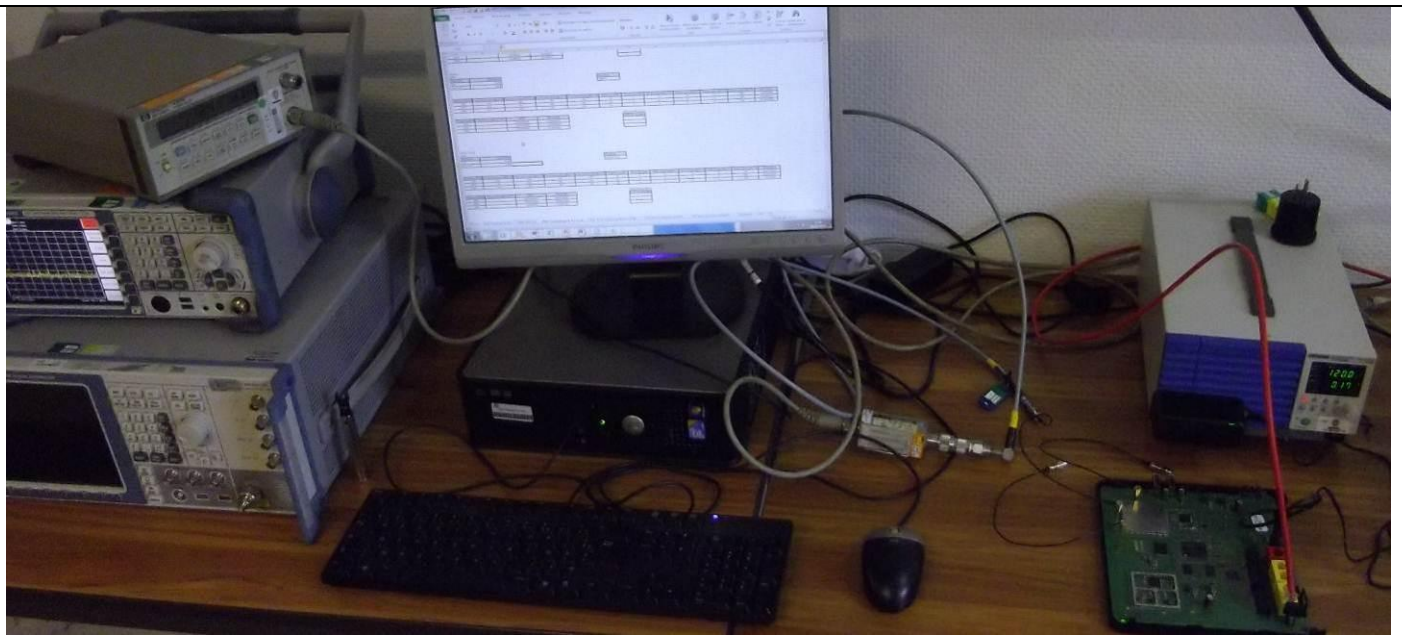
Test performed by : Gilles DE BUYSER
Date of test : 2013/07/05
Ambient temperature : 23°C
Relative humidity : 58%

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

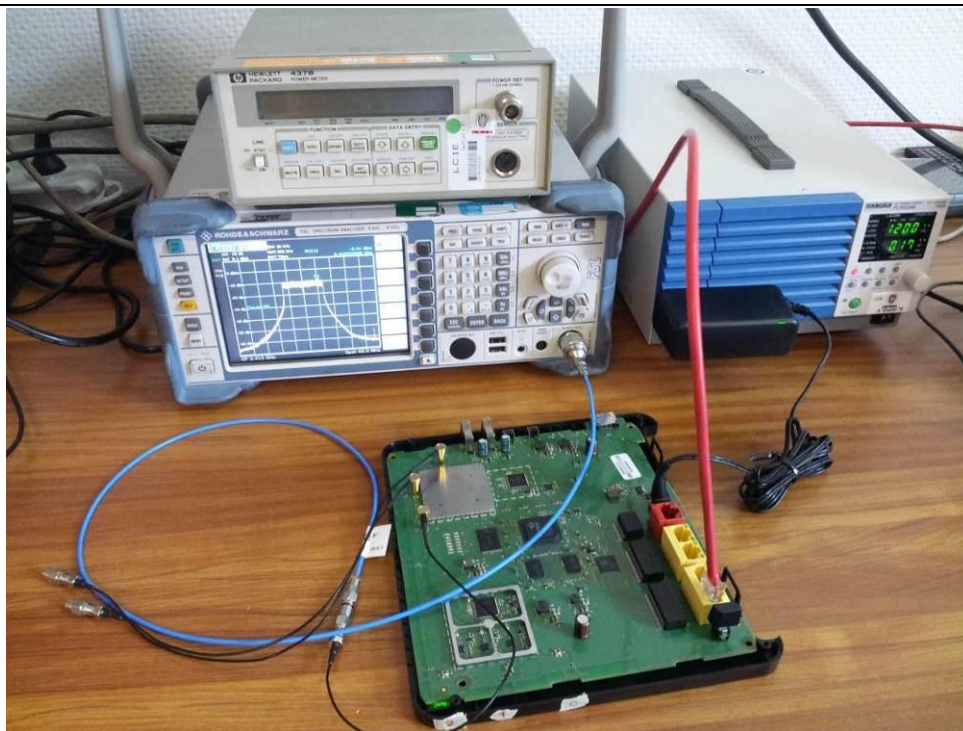
Test performed by : Stéphane PHOUDIAH
Date of test : 2013/07/16 & 2013/07/17
Ambient temperature : 26°C
Relative humidity : 47%

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

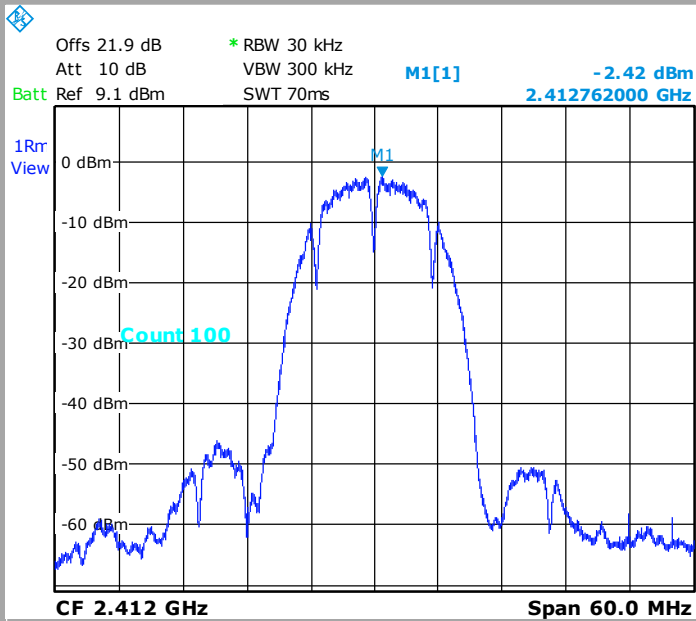


Photograph for Power Spectral Density

6.3. GRAPHICS & RESULTS

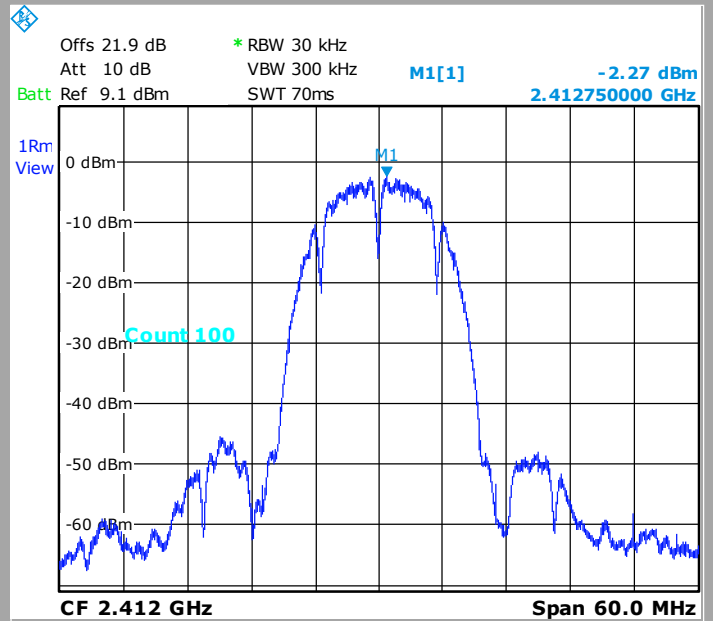
802.11b Cmin

Tx1



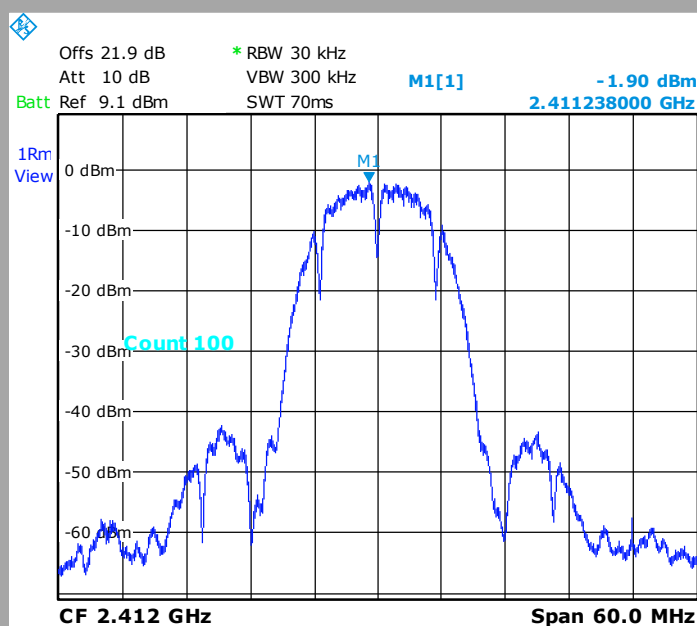
Date: 16.JUL.2013 17:56:47

Tx2



Date: 16.JUL.2013 17:58:40

Tx3

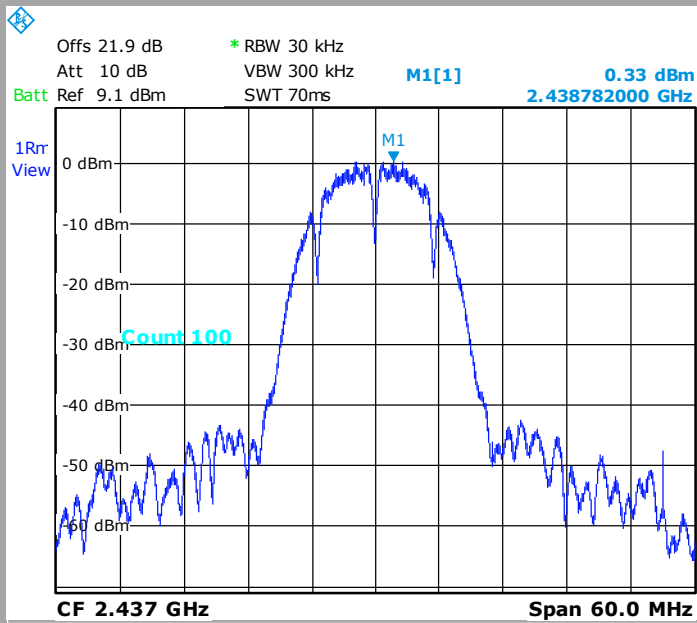


Date: 16.JUL.2013 18:01:12

802.11b

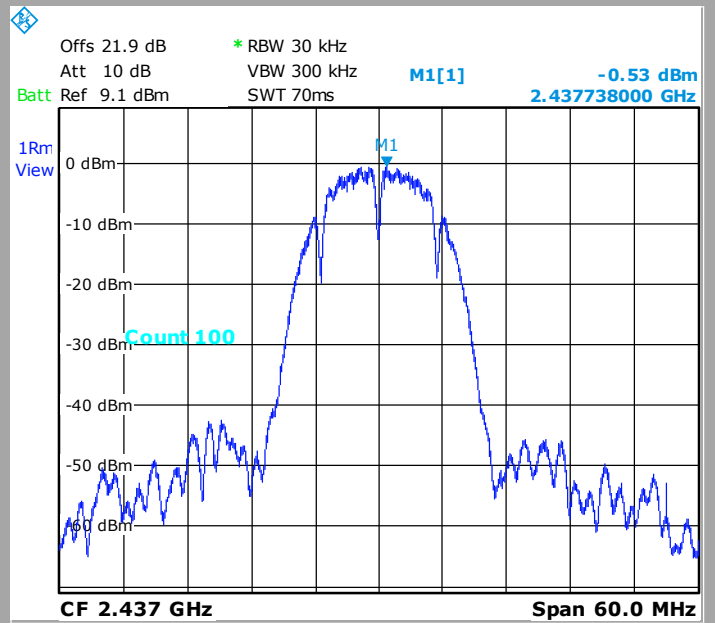
Cnom

Tx1



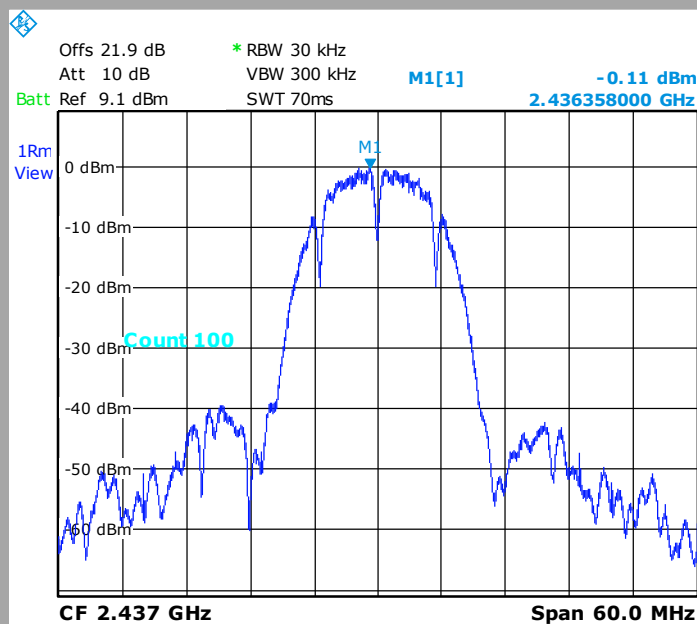
Date: 16.JUL.2013 18:06:53

Tx2



Date: 16.JUL.2013 18:04:58

Tx3

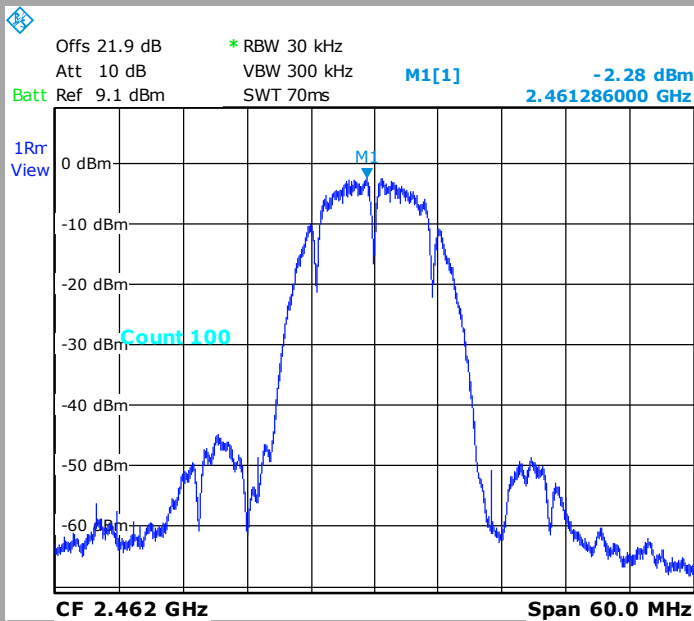


Date: 16.JUL.2013 18:03:19

802.11b

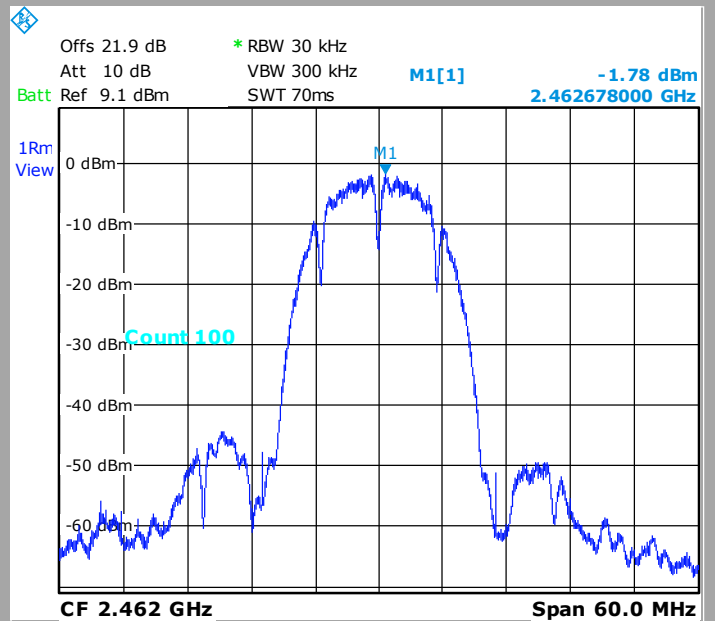
Cmax

Tx1



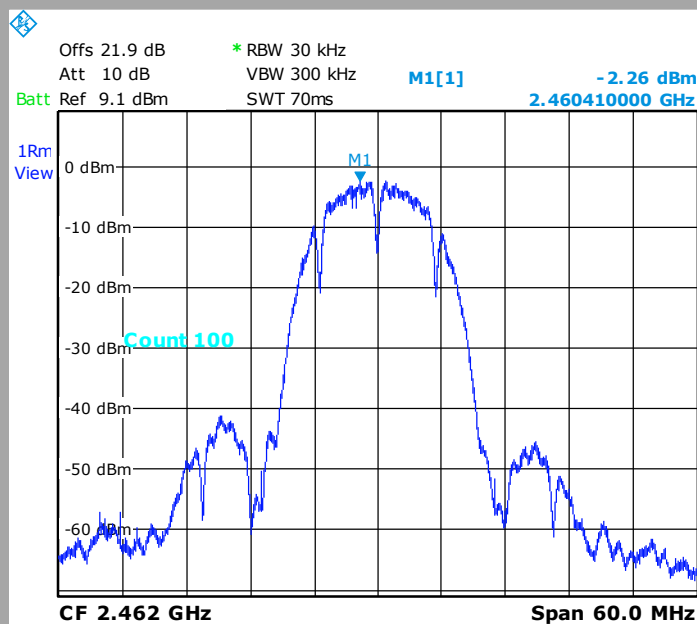
Date: 16.JUL.2013 18:14:34

Tx2

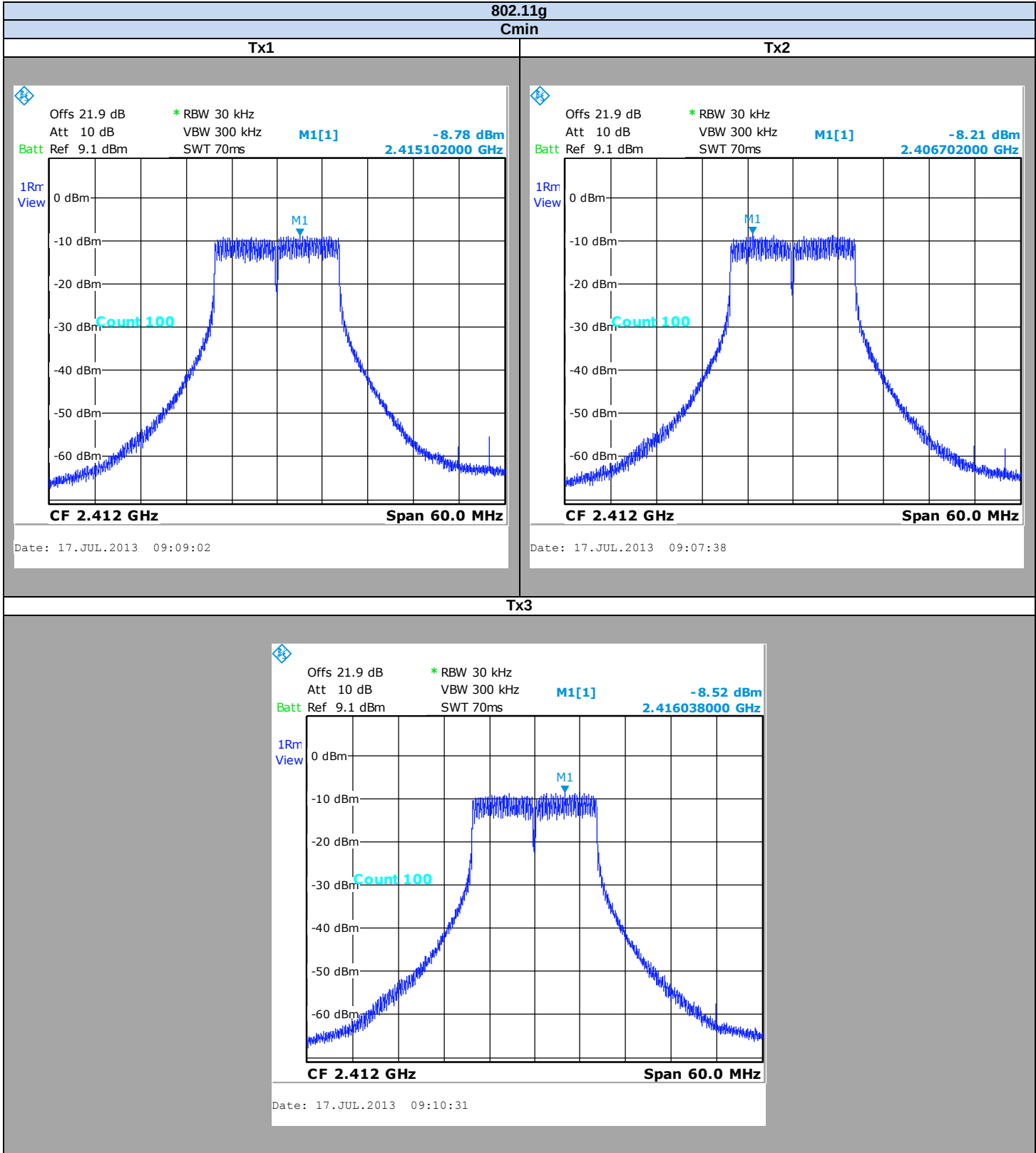


Date: 16.JUL.2013 18:11:17

Tx3



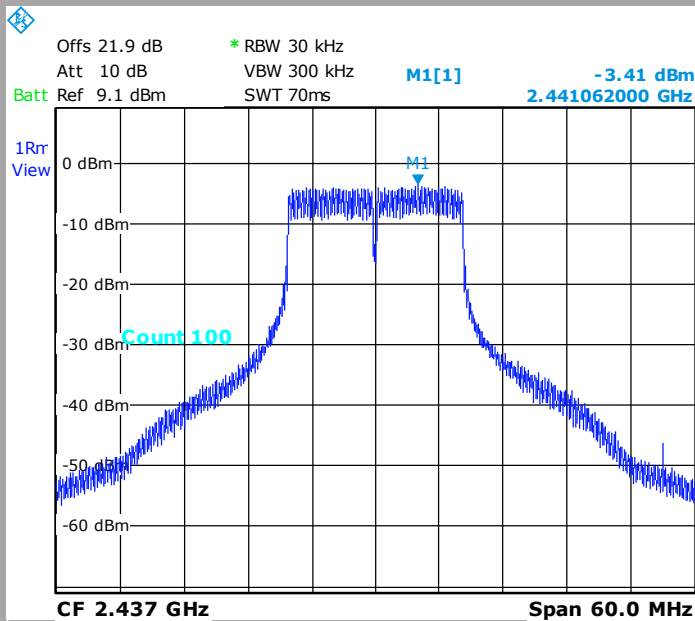
Date: 16.JUL.2013 18:12:49



802.11g

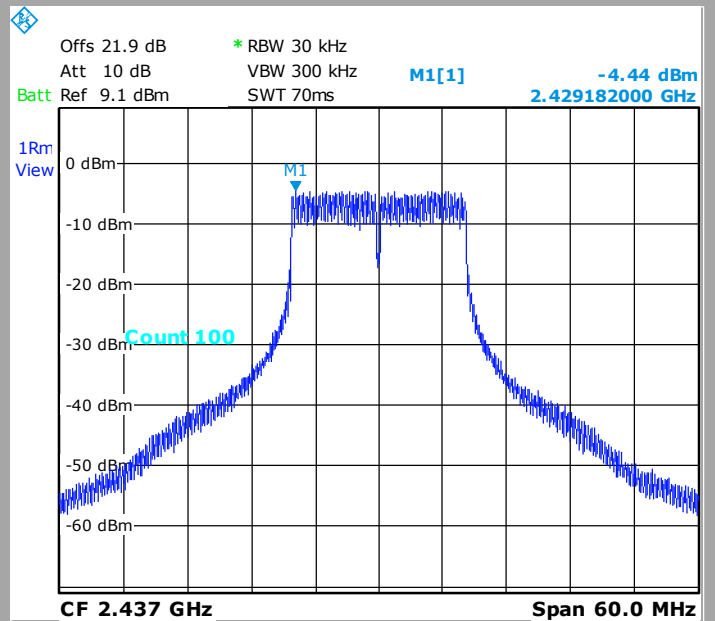
Cnom

Tx1



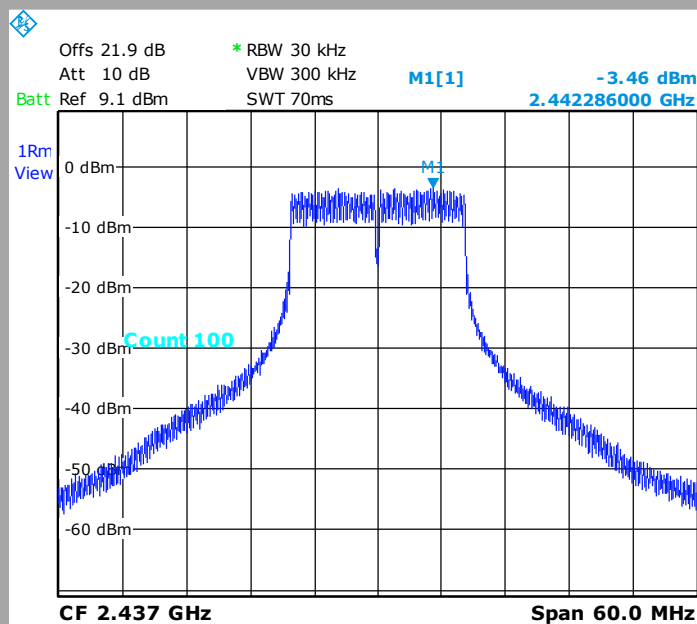
Date: 17.JUL.2013 09:15:29

Tx2

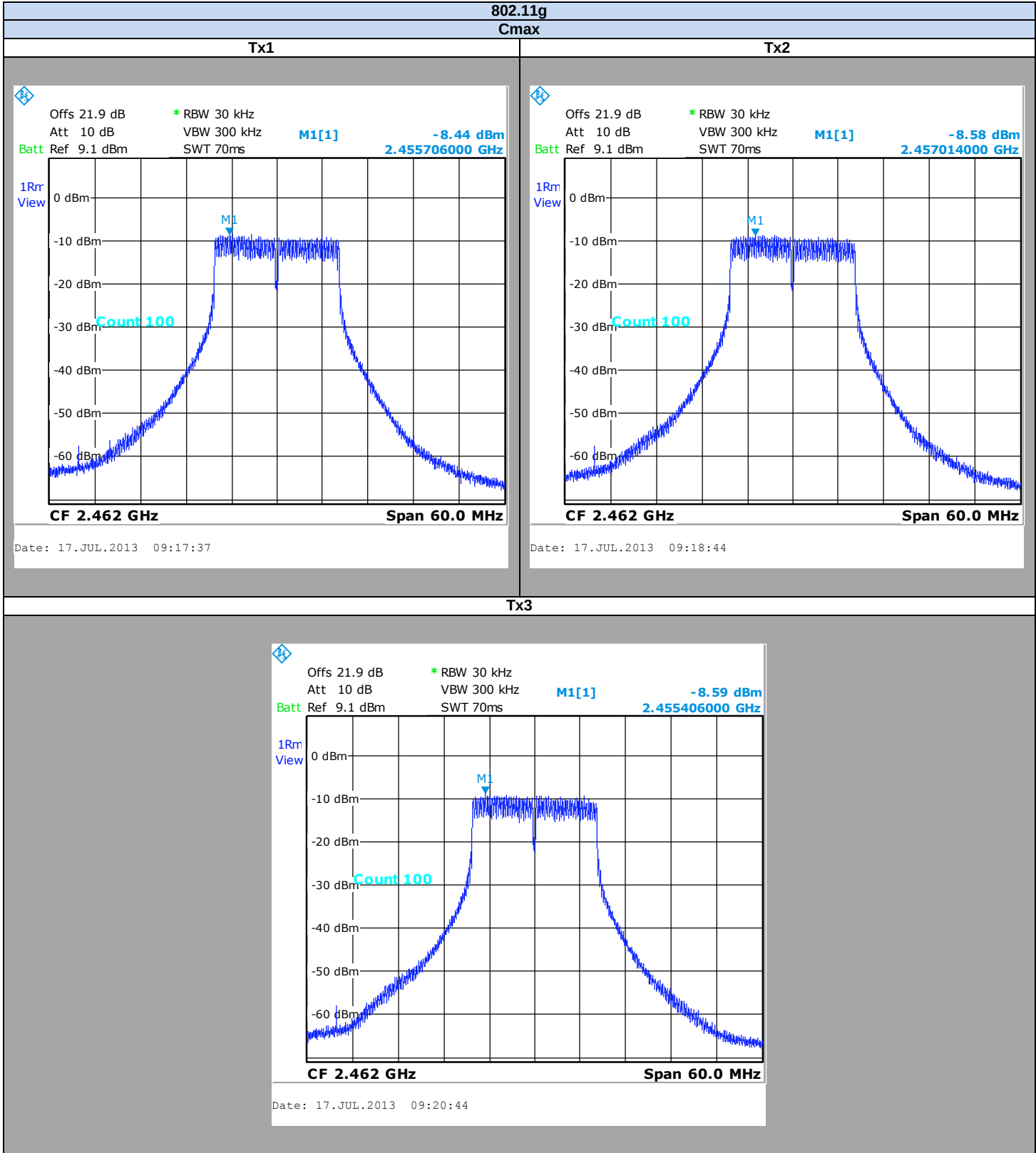


Date: 17.JUL.2013 09:13:59

Tx3



Date: 17.JUL.2013 09:12:46



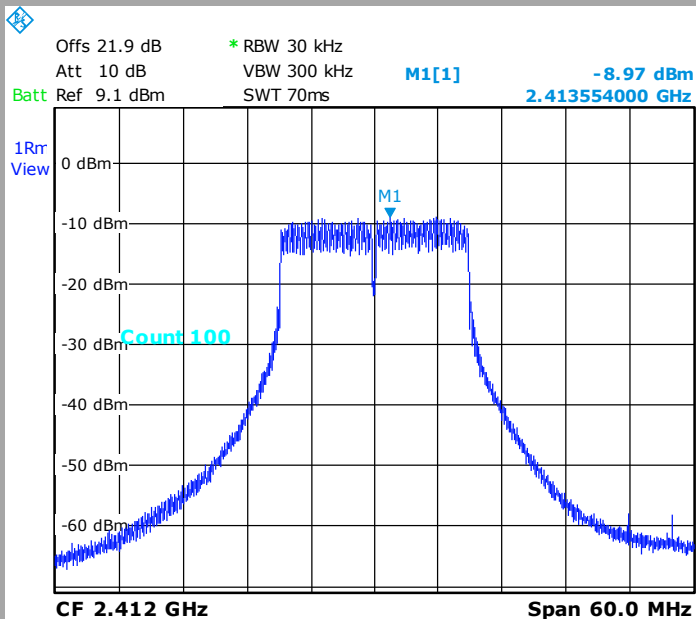


802.11n HT20

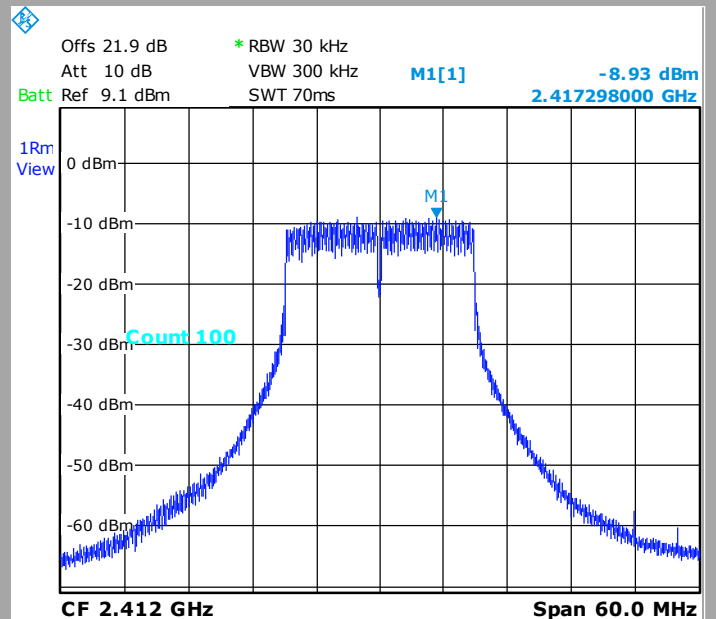
Cmin

Tx1

Tx2

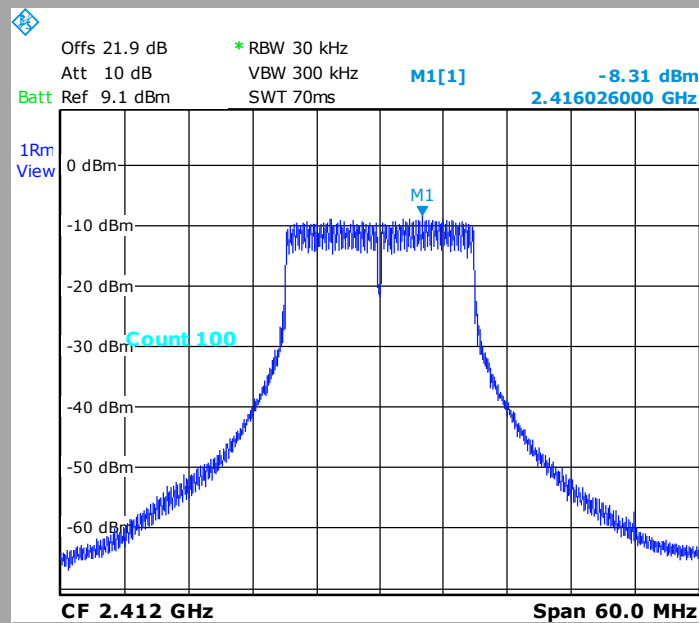


Date: 17.JUL.2013 09:25:52



Date: 17.JUL.2013 09:24:20

Tx3

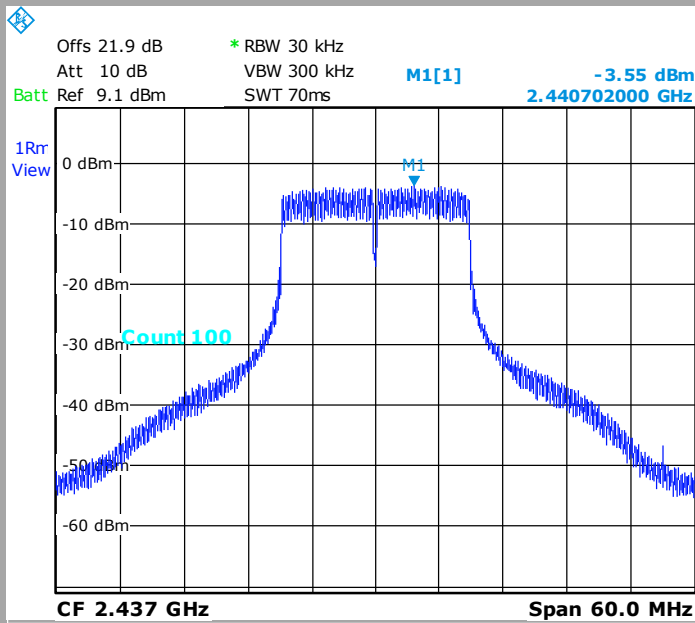


Date: 17.JUL.2013 09:22:55

802.11n HT20

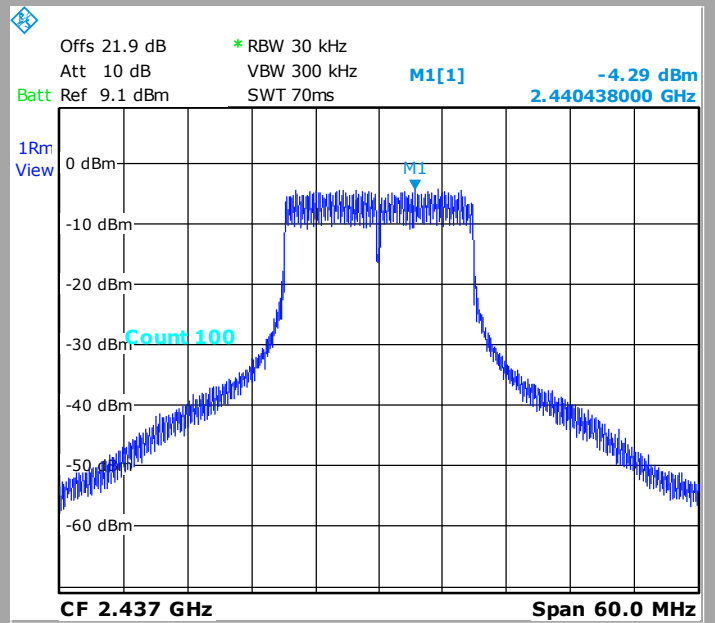
Cnom

Tx1



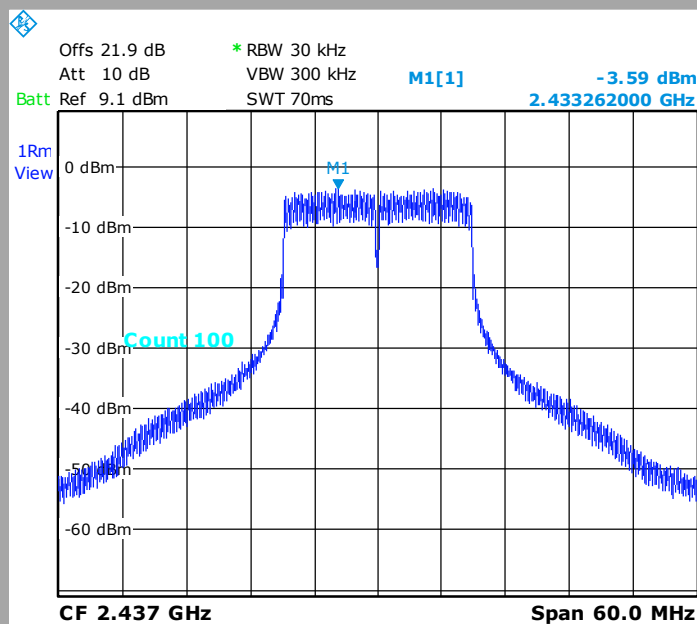
Date: 17.JUL.2013 09:28:16

Tx2



Date: 17.JUL.2013 09:29:31

Tx3



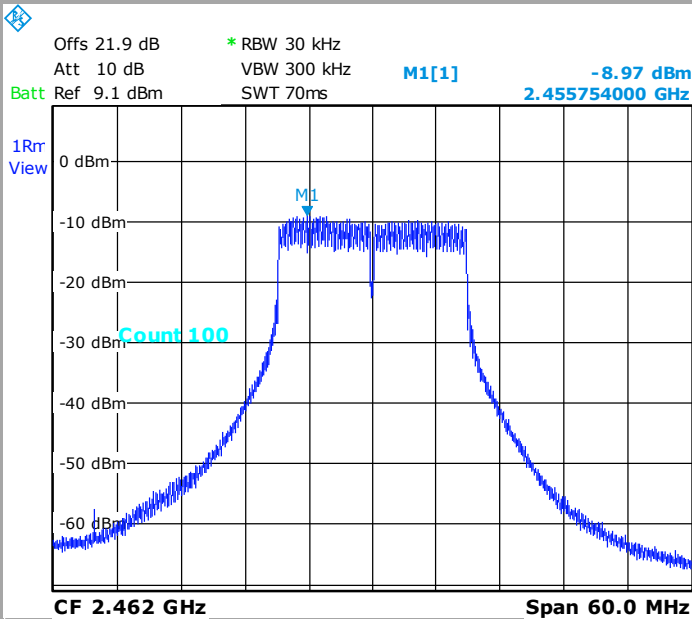
Date: 17.JUL.2013 09:31:03



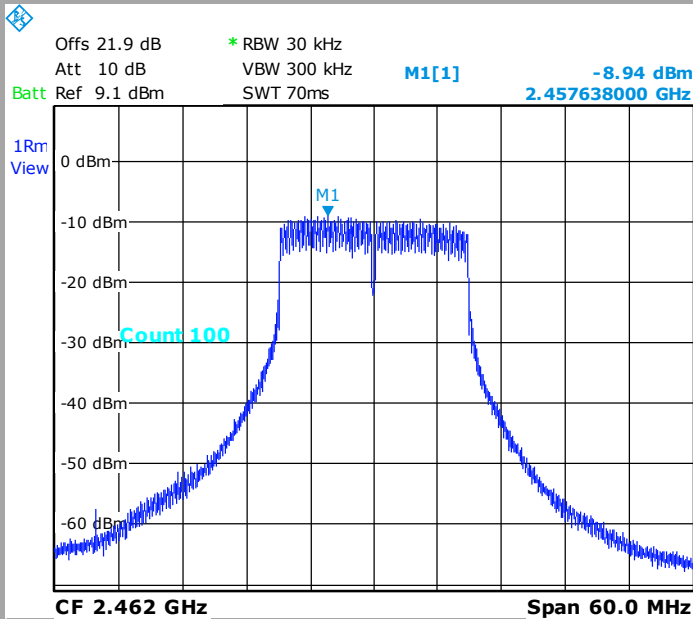
802.11n HT20
Cmax

Tx1

Tx2

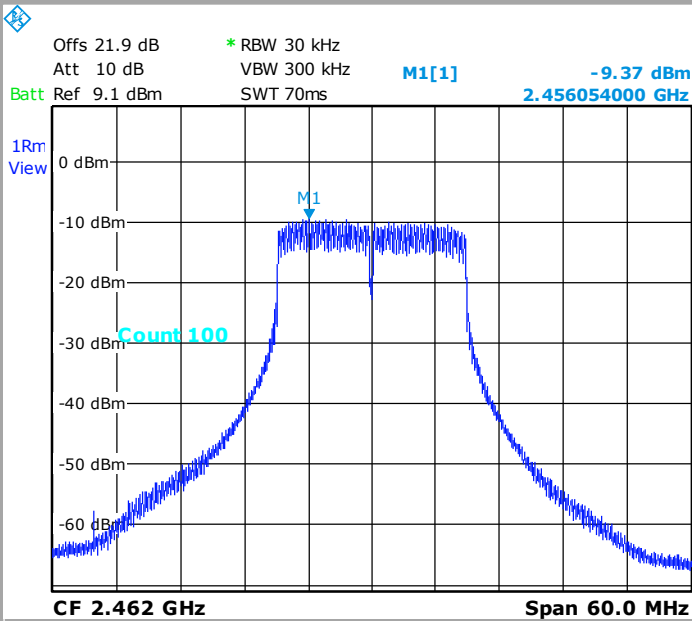


Date: 17.JUL.2013 09:40:54



Date: 17.JUL.2013 09:39:17

Tx3



Date: 17.JUL.2013 09:37:31

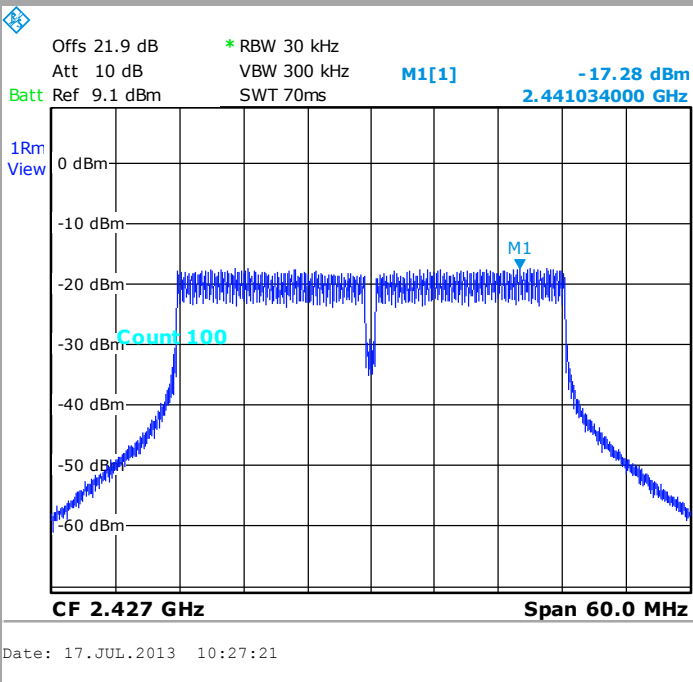
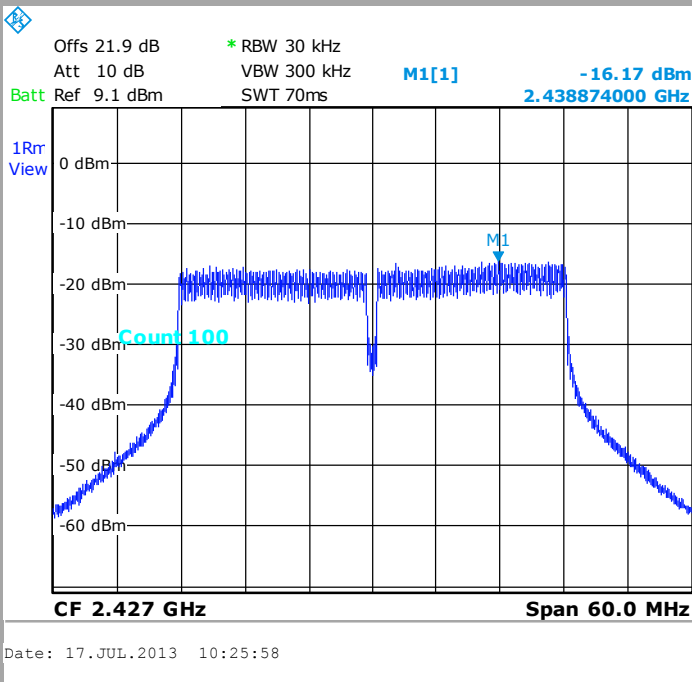


802.11n HT40

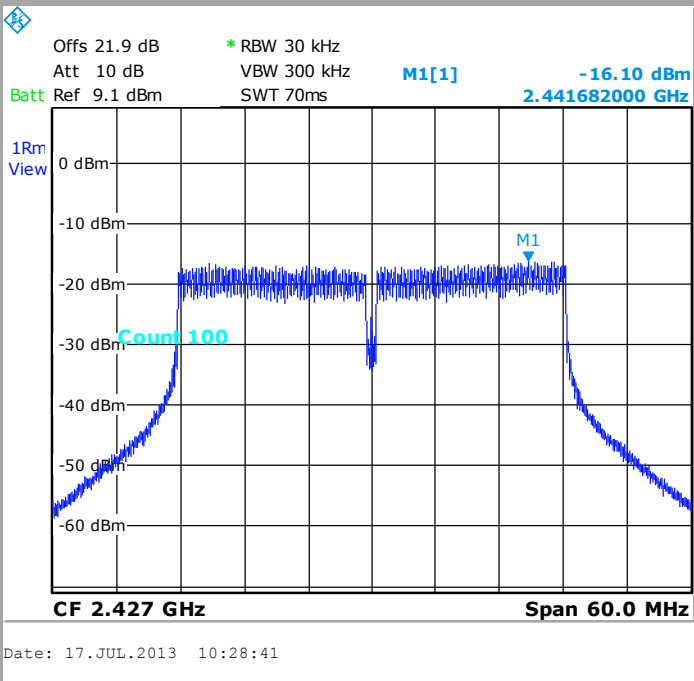
Cmin

Tx1

Tx2



Tx3

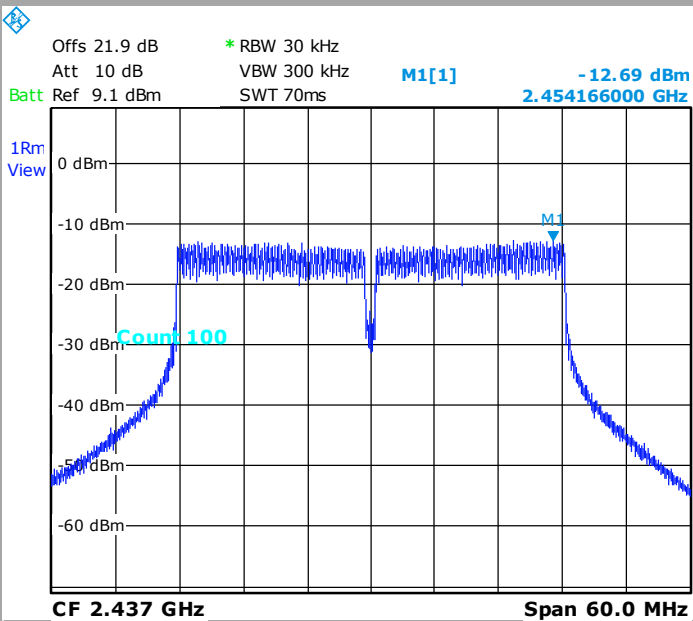
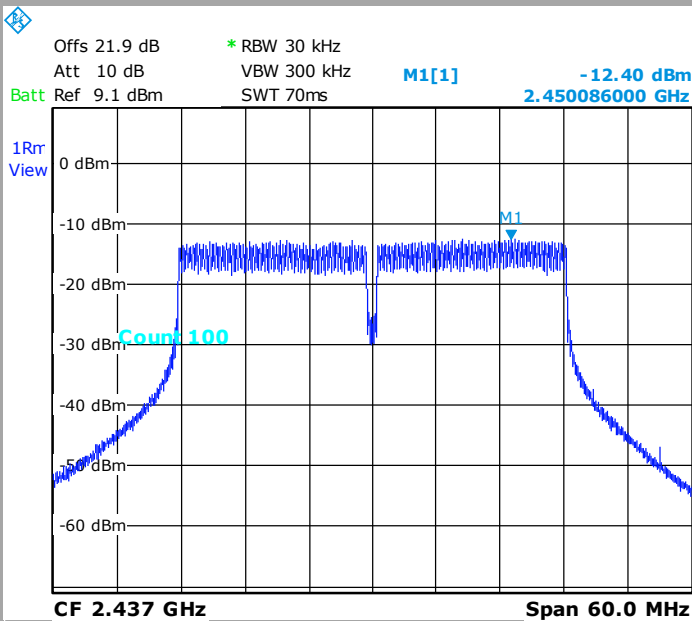




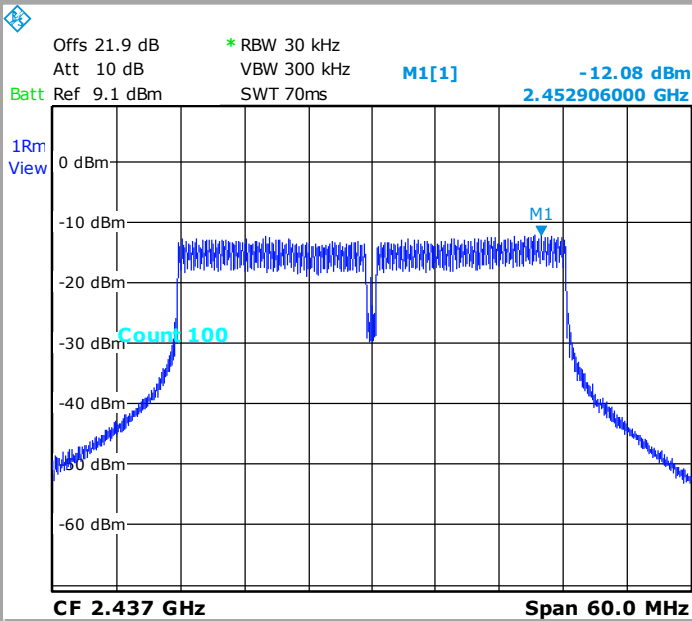
802.11n HT40
Cnom

Tx1

Tx2



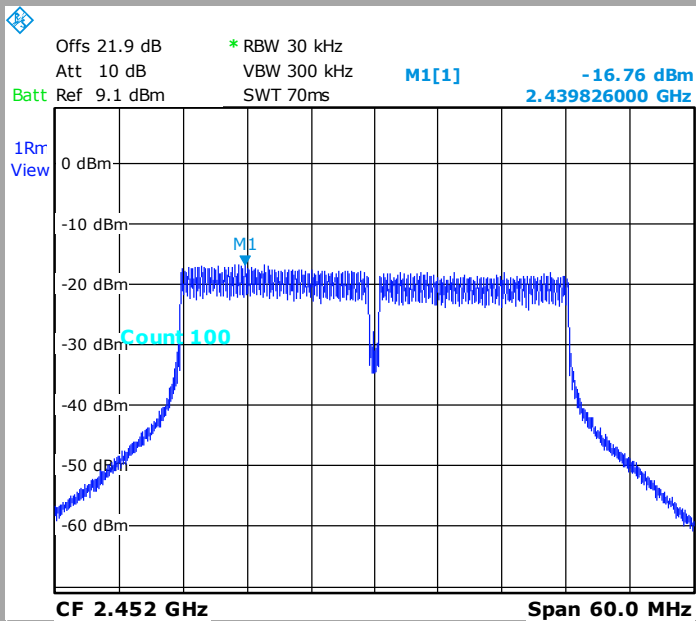
Tx3



802.11n HT40

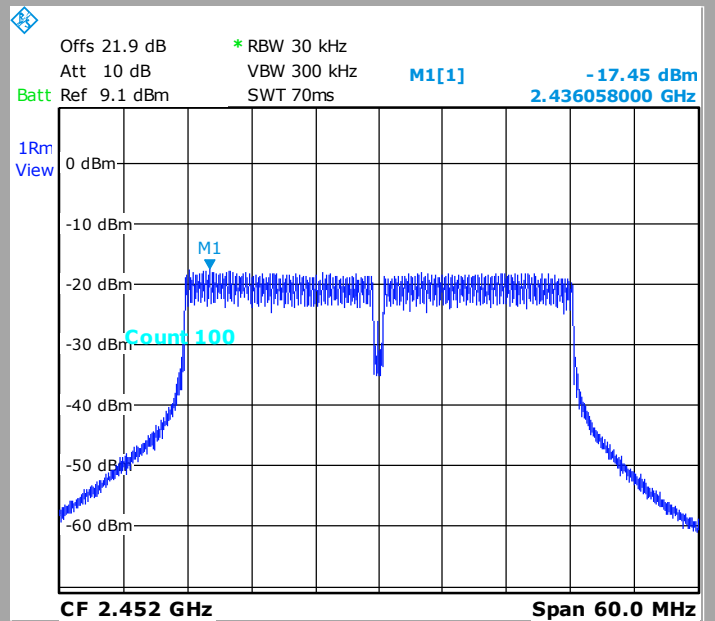
Cmax

Tx1



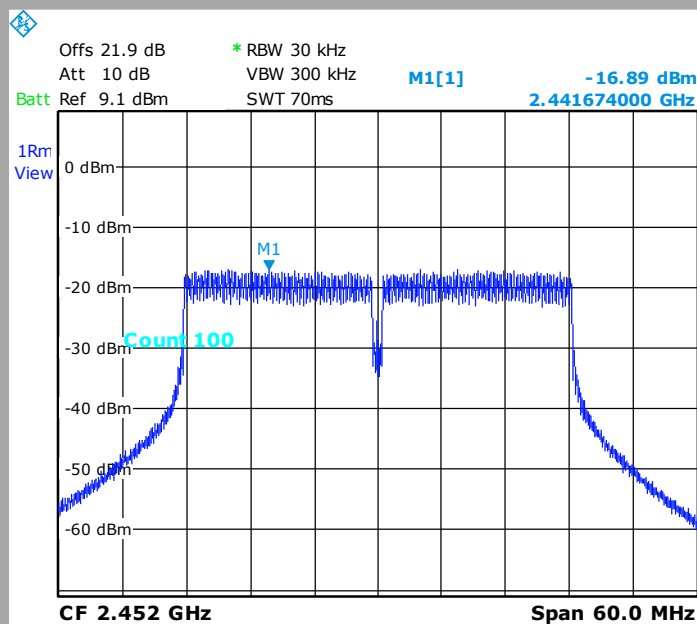
Date: 17.JUL.2013 10:23:49

Tx2



Date: 17.JUL.2013 10:22:32

Tx3



Date: 17.JUL.2013 10:21:18



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

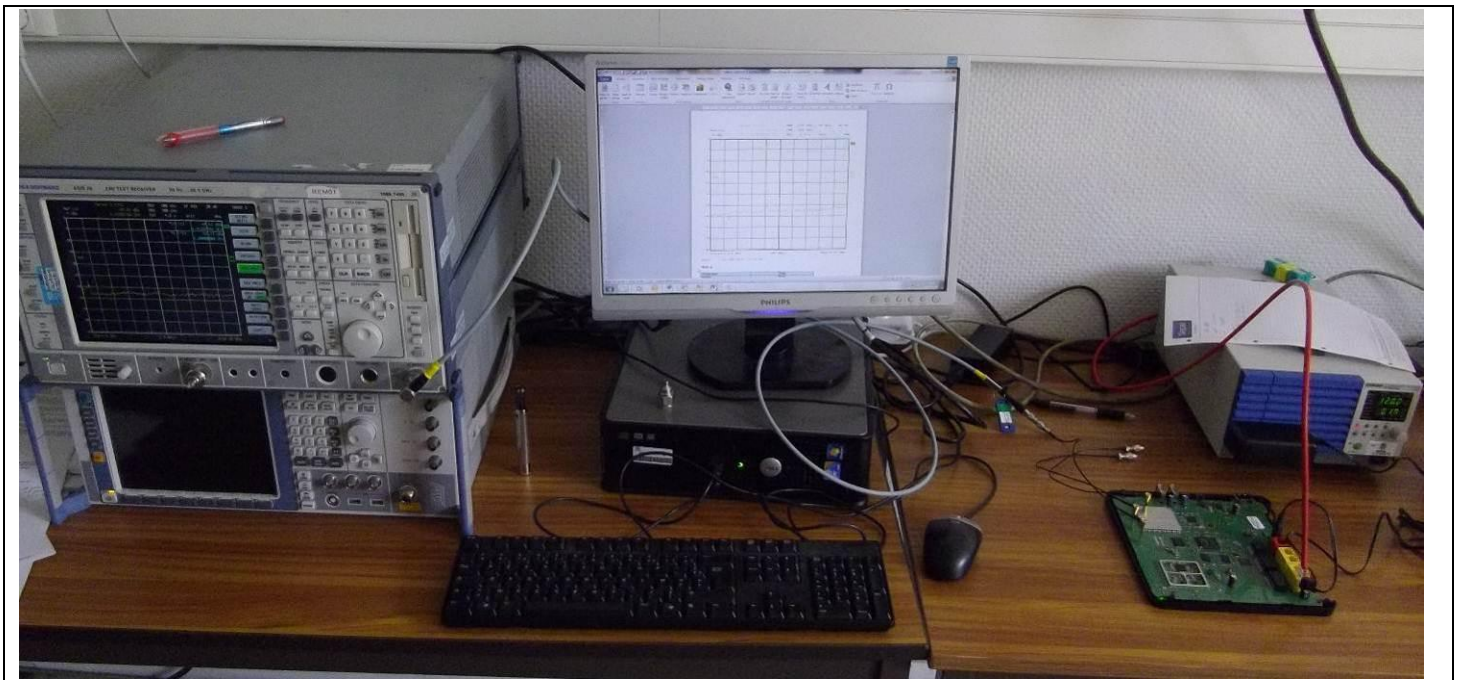
Test performed by : Gilles DE BUYSER
Date of test : 2013/07/05 and 15
Ambient temperature : 21 to 23°C
Relative humidity : 46 to 58%

7.2. TEST SETUP

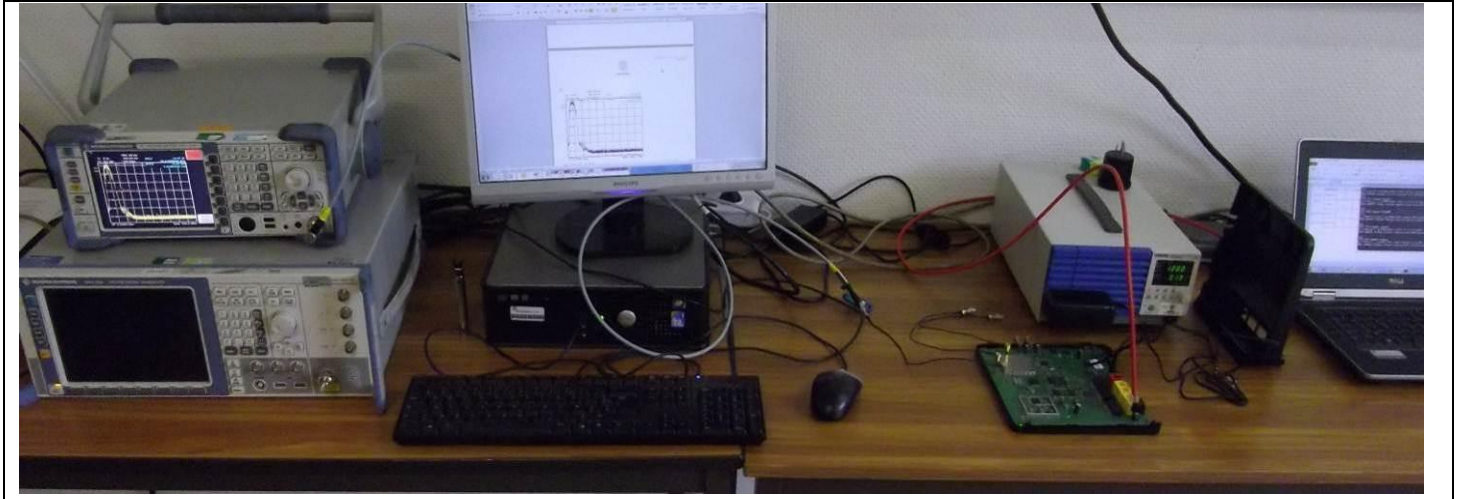
The Equipment Under Test is installed on a table and set in permanent emission with modulation. Measurement is performed with a spectrum analyzer on the EUT conducted access. The product has been tested according to the FCC KDB 558074 D01 DTS Meas Guidance v03r01 § 11.

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

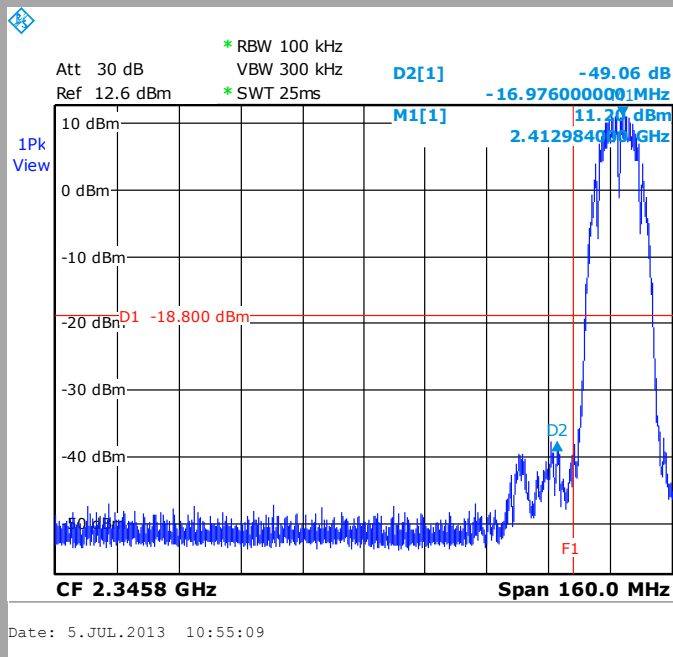


Photograph for Unwanted Emissions into Non-Restricted Frequency Bands At the Band Edge

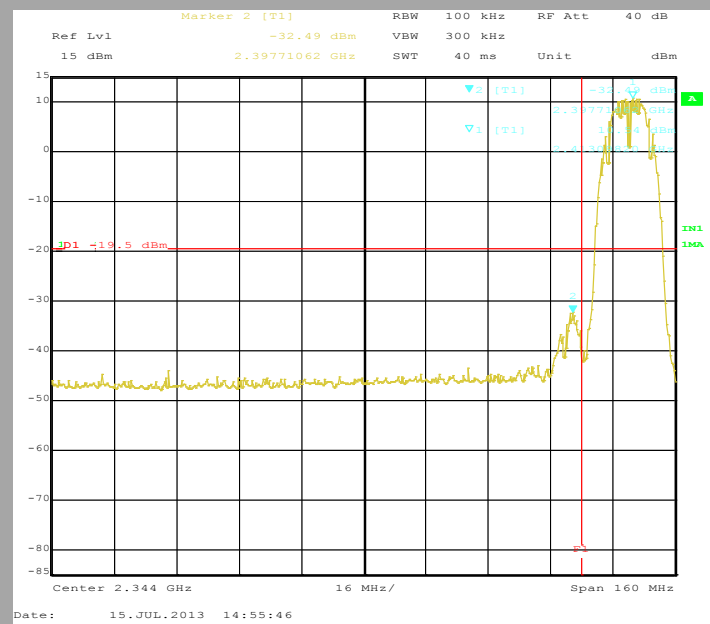
7.3. GRAPHICS & RESULTS

Conducted unwanted emissions in the band edge 802.11b Low band edge with Cmin

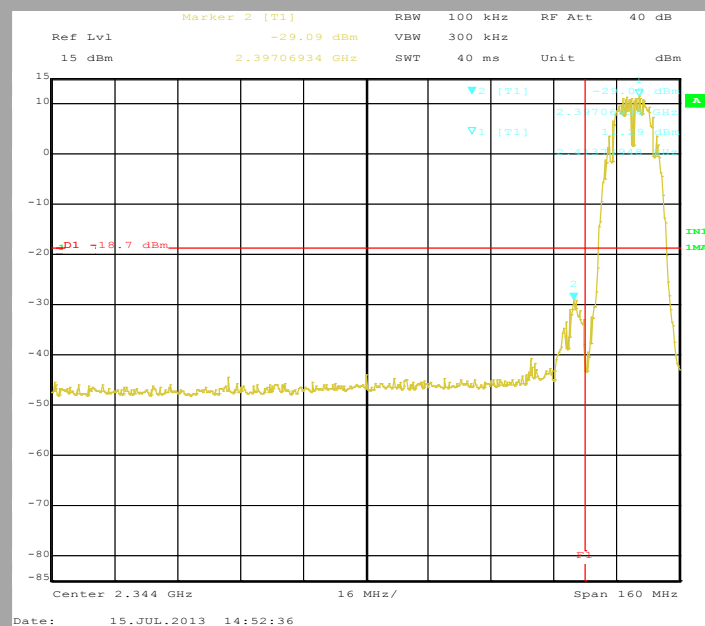
Tx1



Tx2

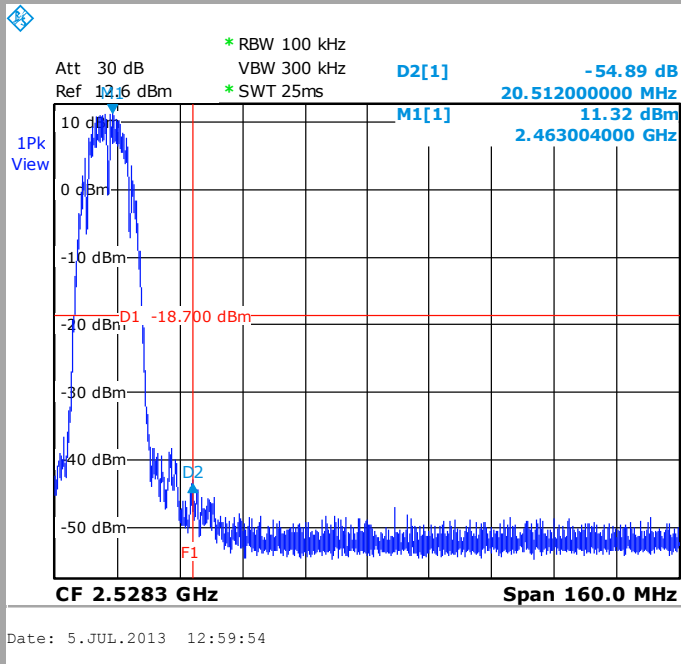


Tx3

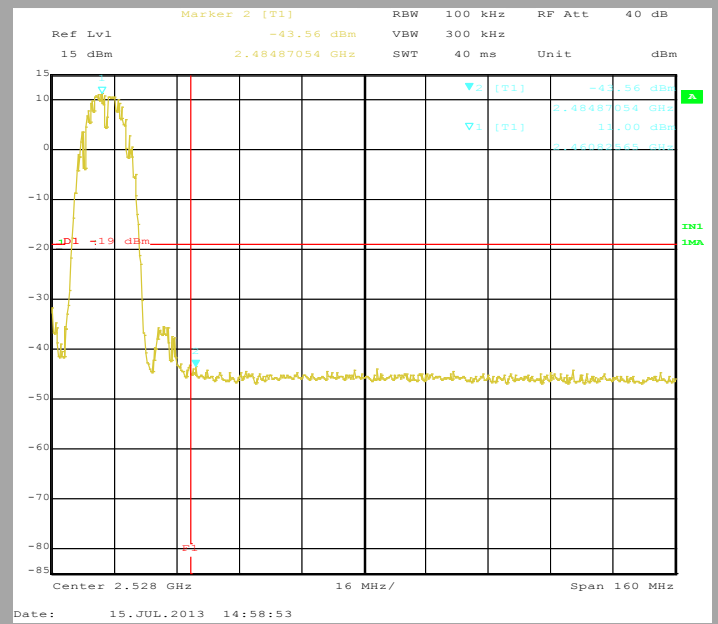


Conducted unwanted emissions in the band edge
802.11b High band egde with Cmax

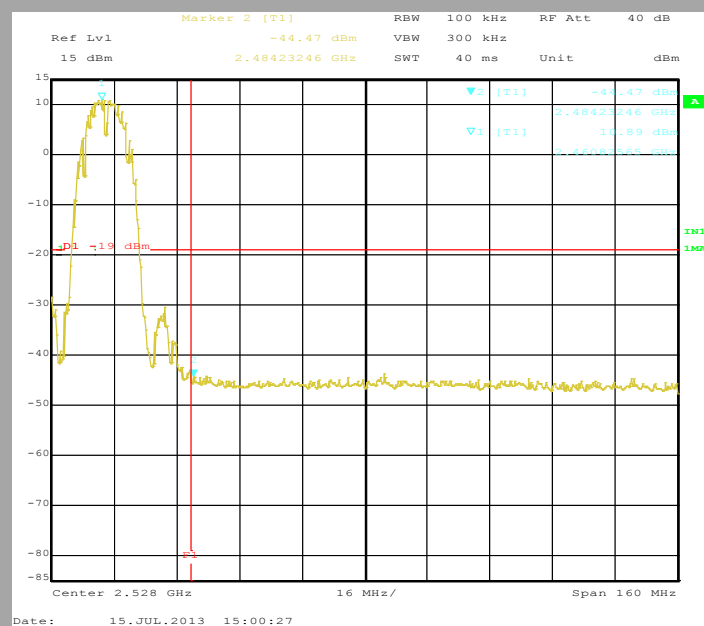
Tx1



Tx2



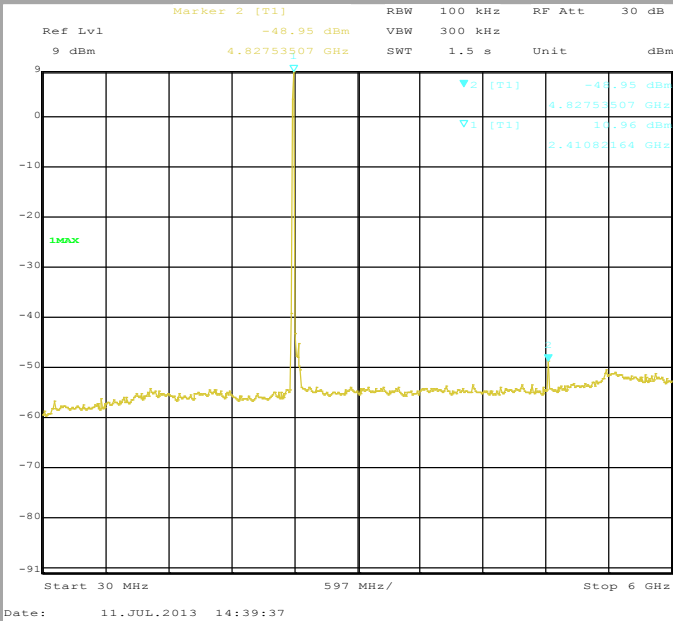
Tx3



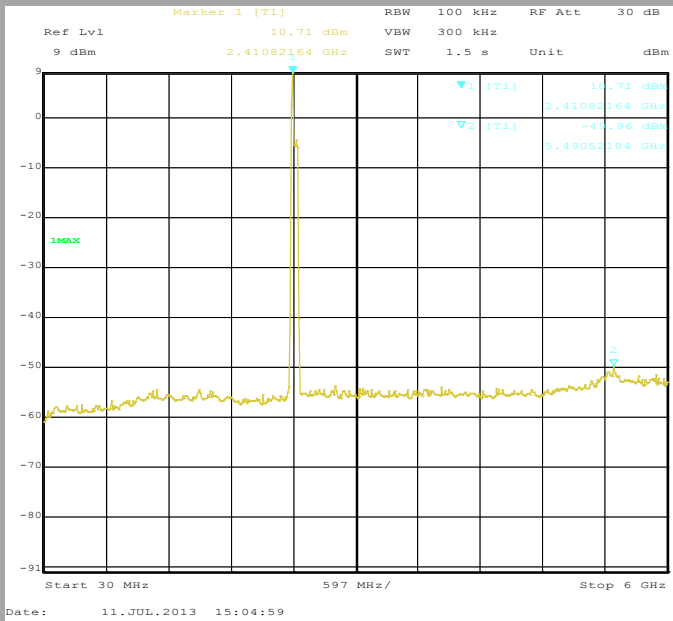


Conducted unwanted emissions
802.11b Cmin

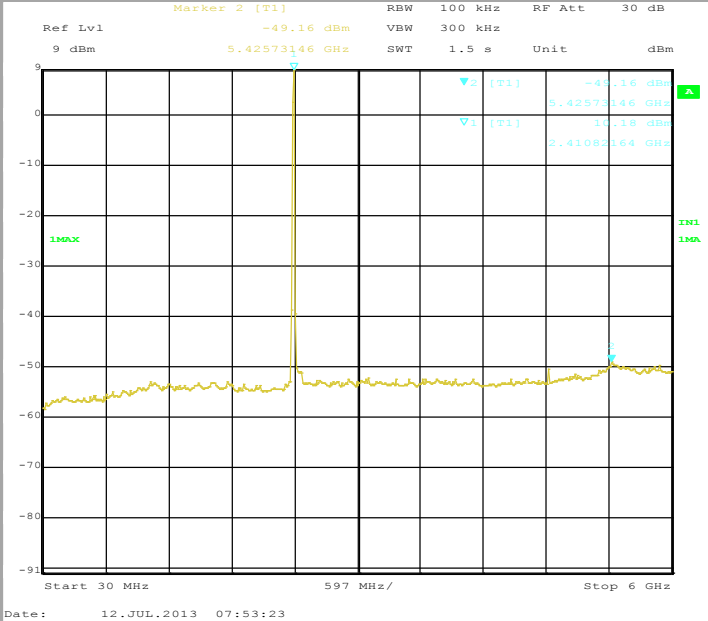
Tx1



Tx2



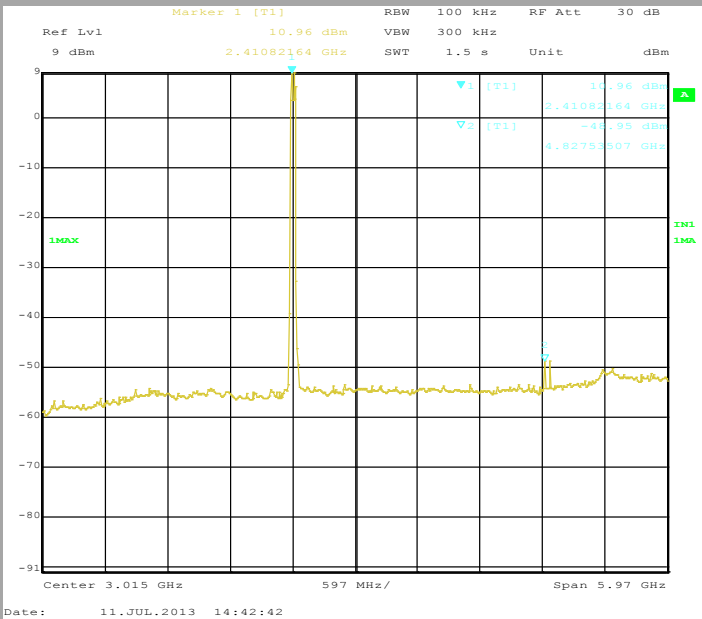
Tx3



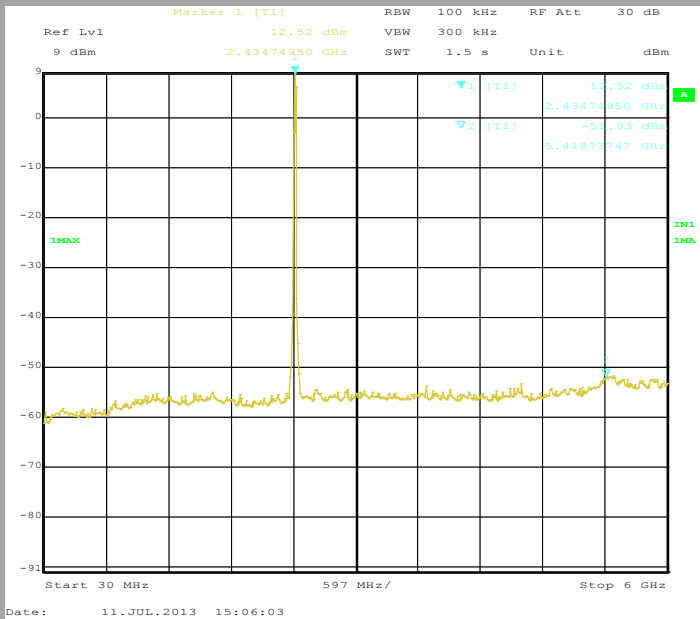


Conducted unwanted emissions
802.11b Cnom

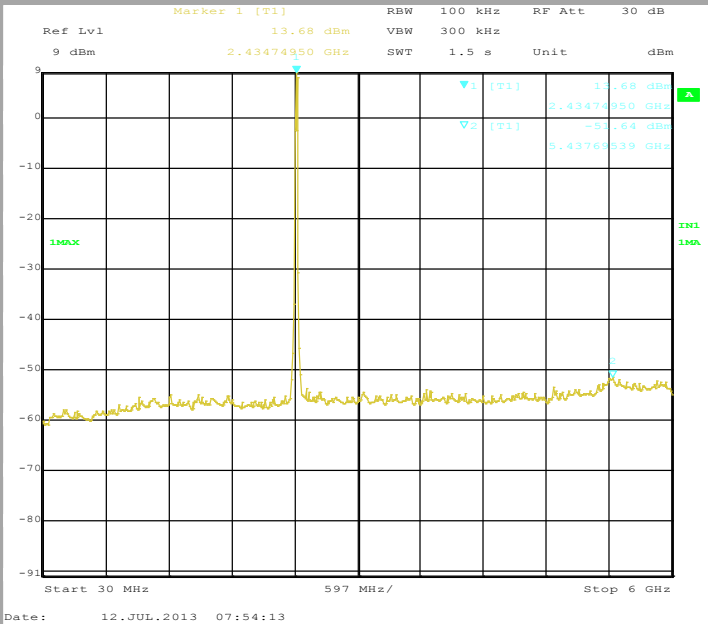
TX1



TX2



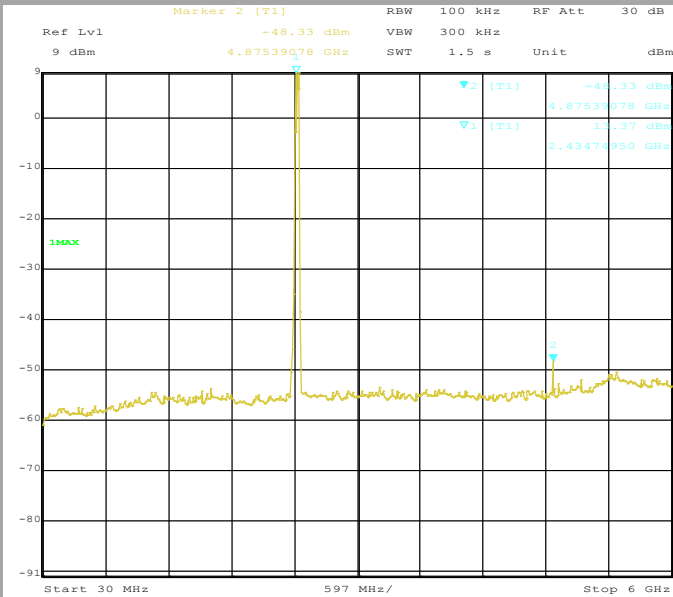
TX3





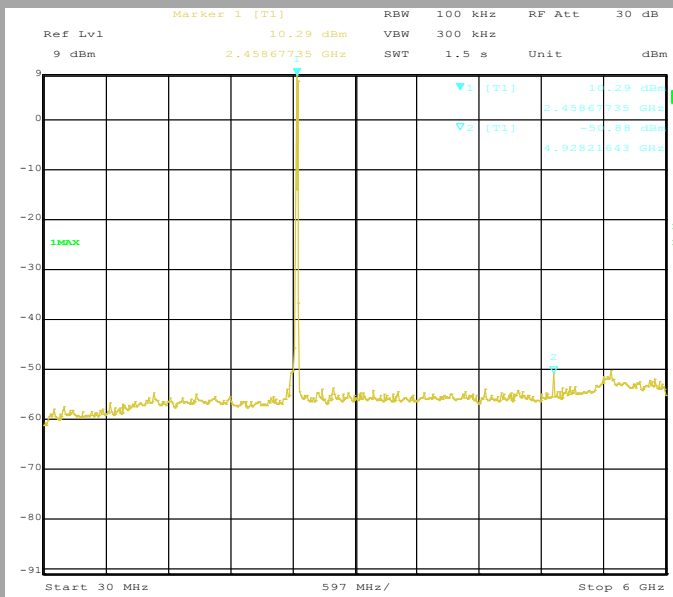
Conducted unwanted emissions
802.11b Cmax

TX1



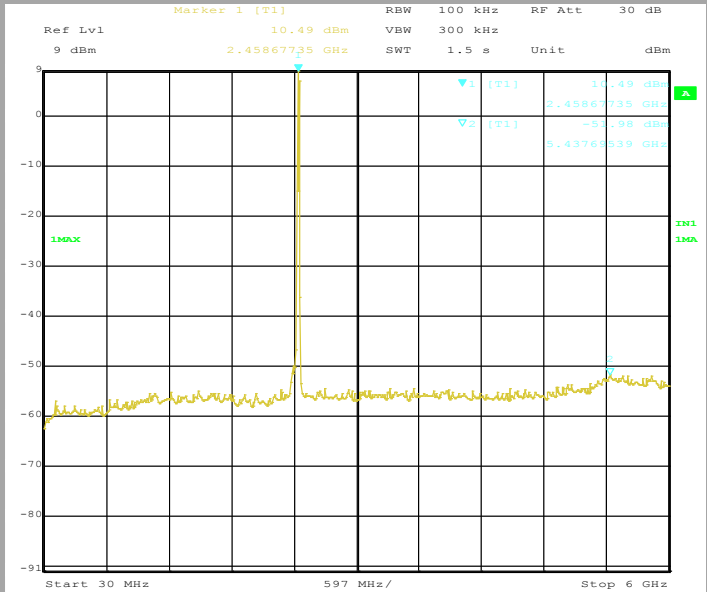
Date: 11.JUL.2013 14:45:17

TX2



Date: 11.JUL.2013 15:06:54

TX3



Date: 12.JUL.2013 07:55:08

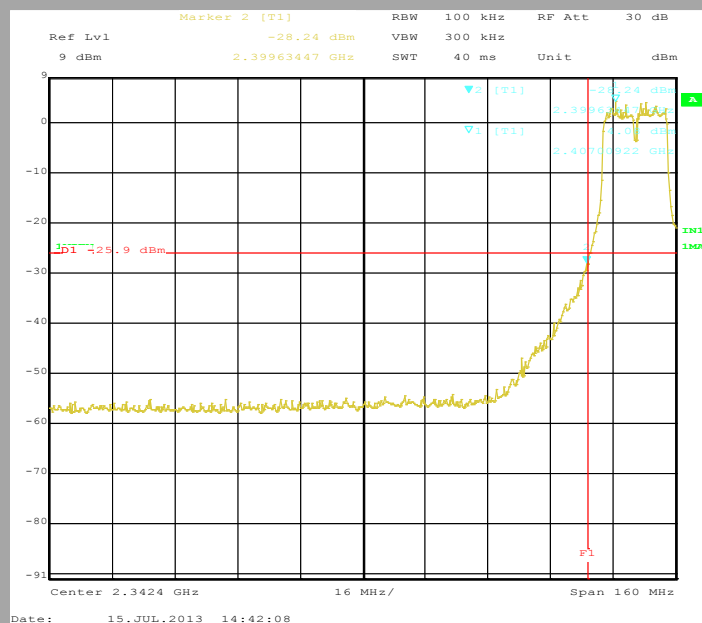
Tx1



Tx2

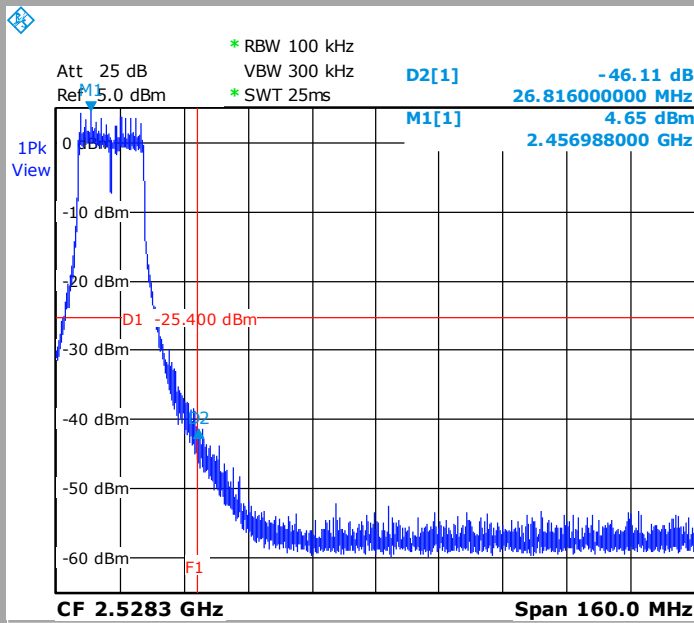


Tx3



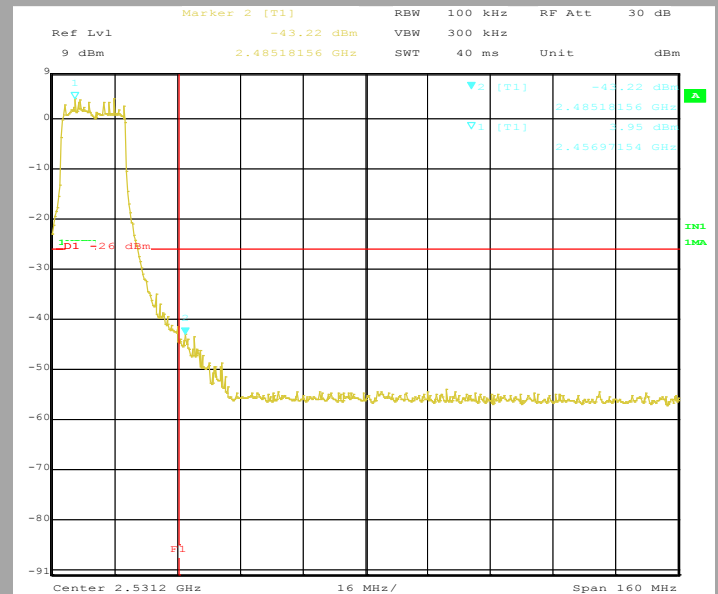
Conducted unwanted emissions in the band edge
802.11g High band edge with Cmax

TX1



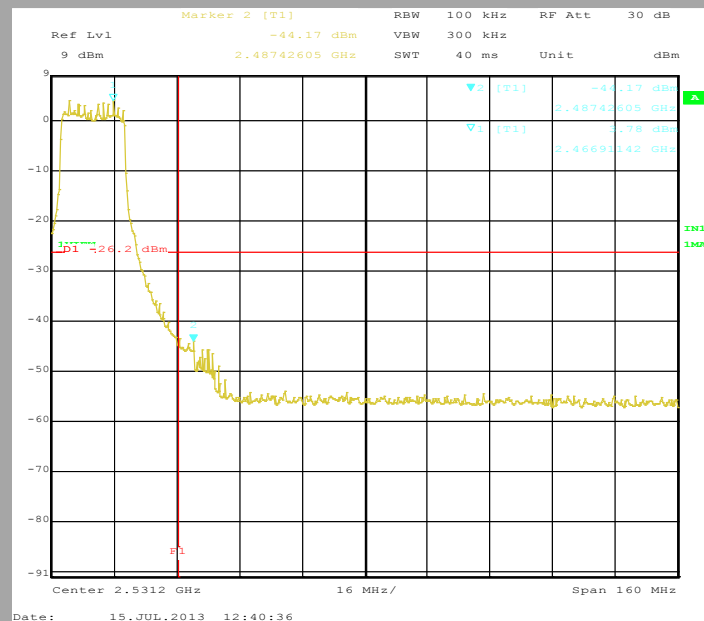
Date: 5.JUL.2013 12:54:53

TX2



Date: 15.JUL.2013 12:42:05

TX3

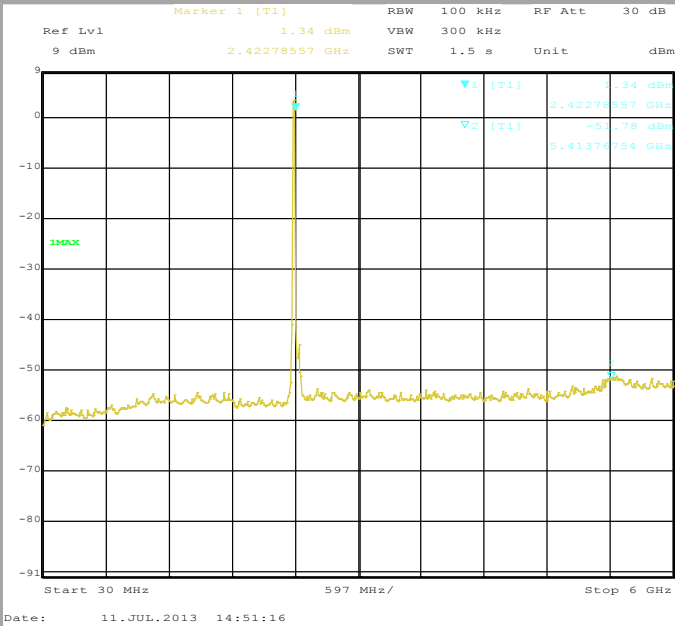


Date: 15.JUL.2013 12:40:36

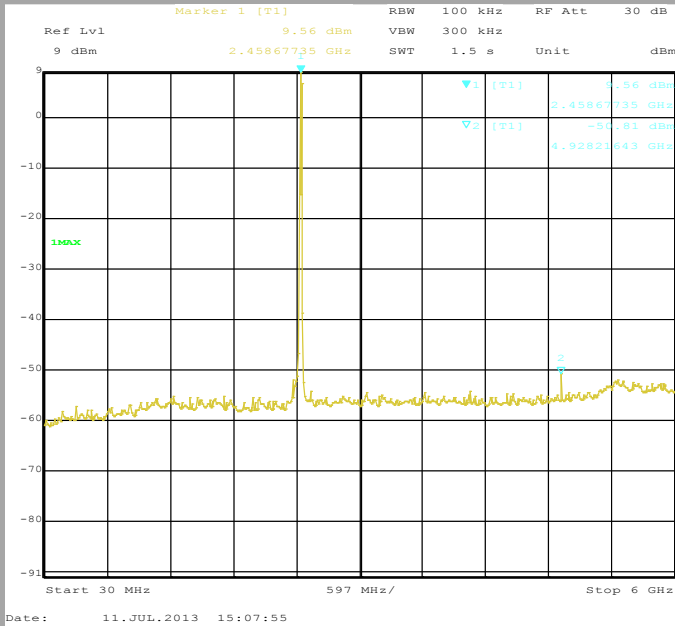


Conducted unwanted emissions
802.11g Cmin

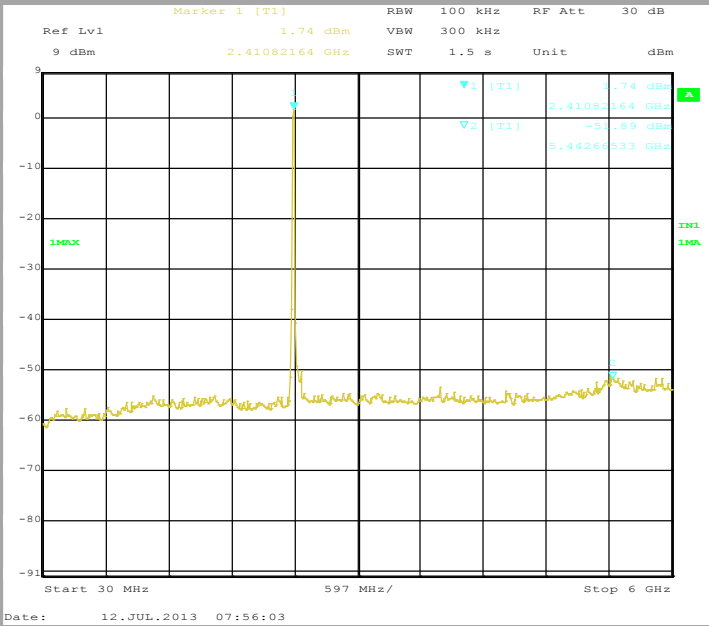
TX1



TX2



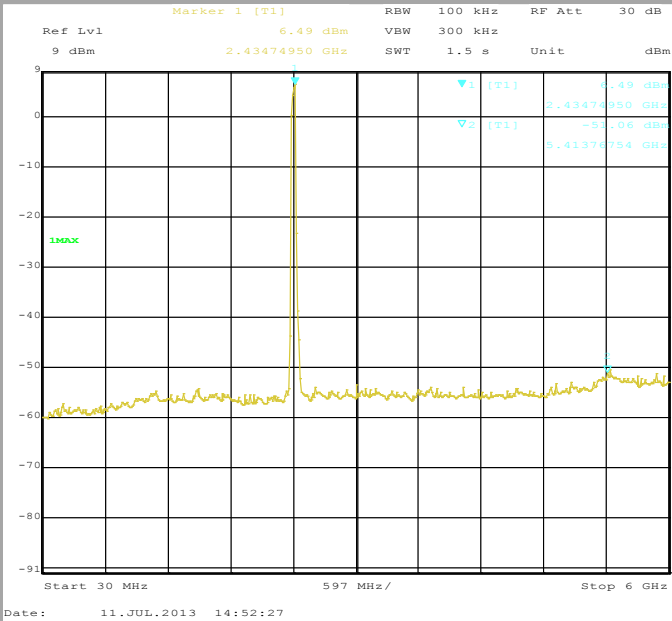
TX3



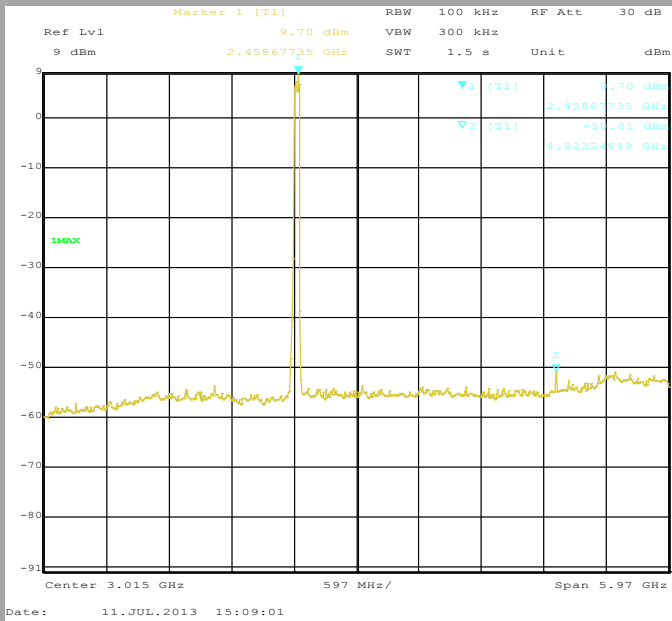


Conducted unwanted emissions
802.11g Cnom

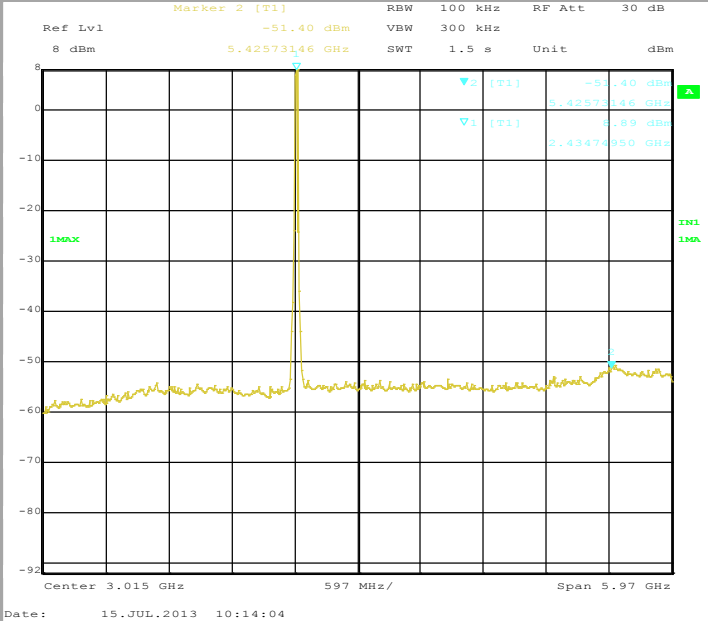
TX1



TX2



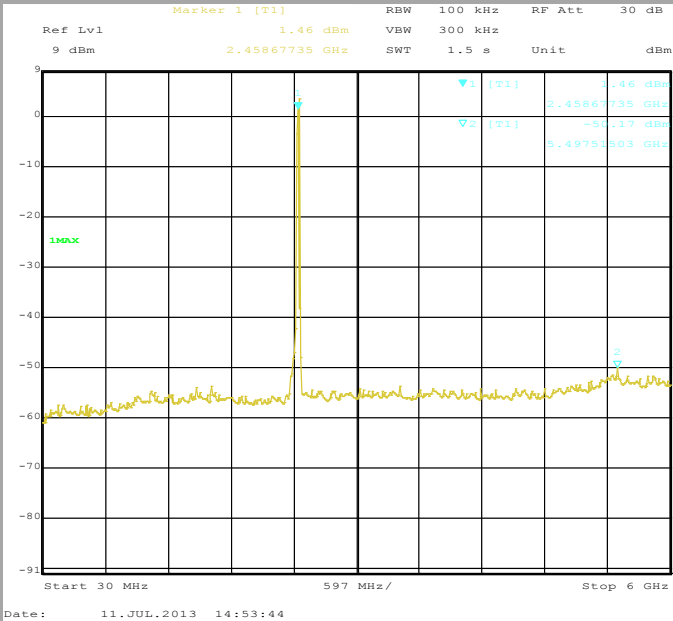
TX3



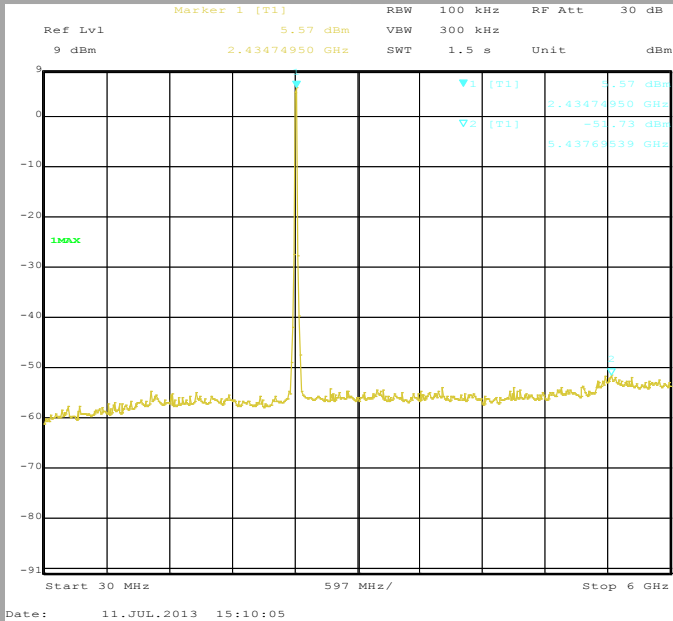


Conducted unwanted emissions
802.11g Cmax

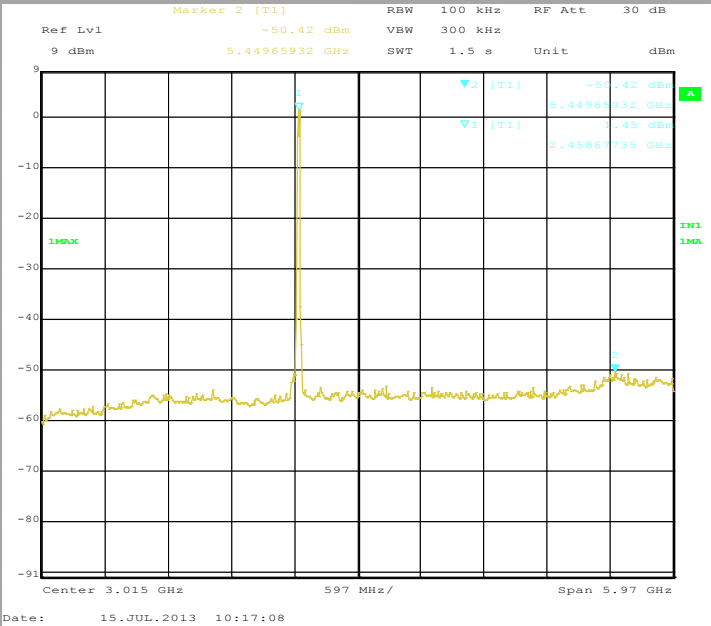
TX1



TX2



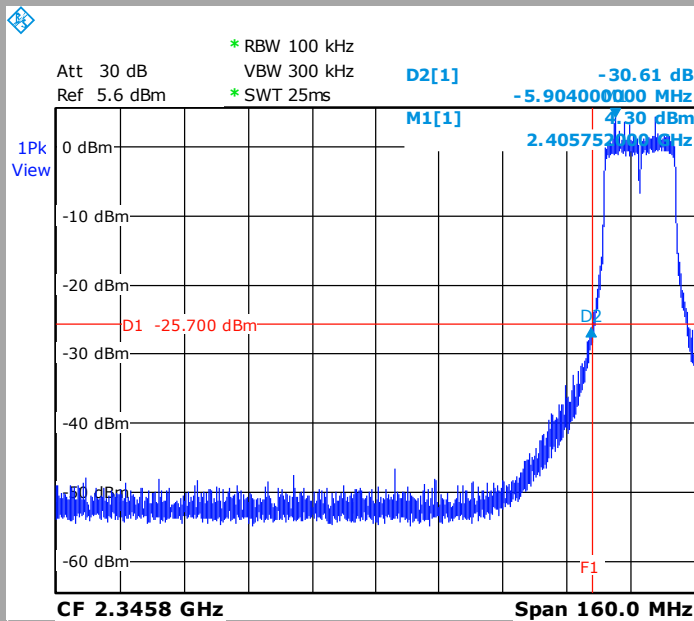
TX3





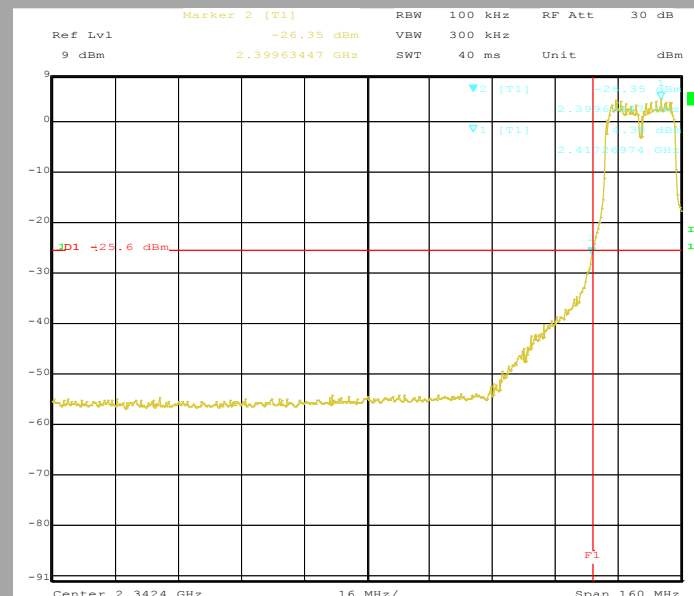
Conducted unwanted emissions in the band edge
802.11n HT20 Low band edge with Cmin

TX1



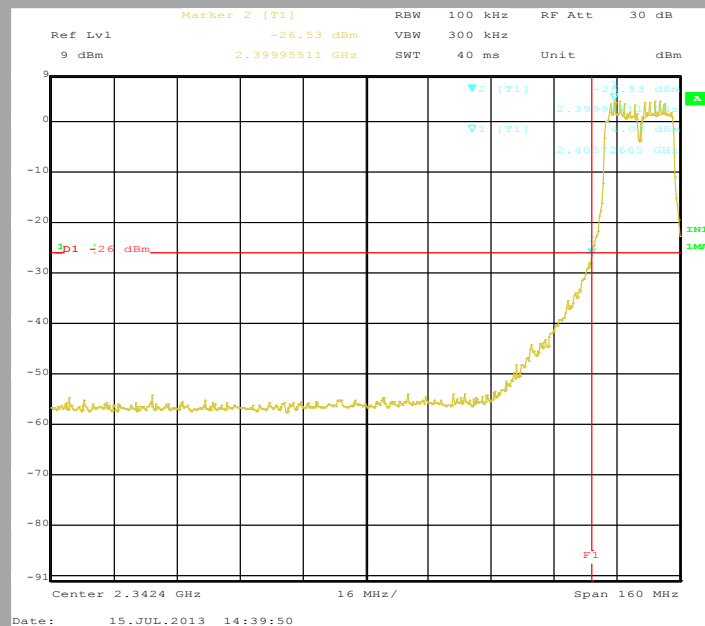
Date: 5.JUL.2013 11:01:48

TX2



Date: 15.JUL.2013 14:35:36

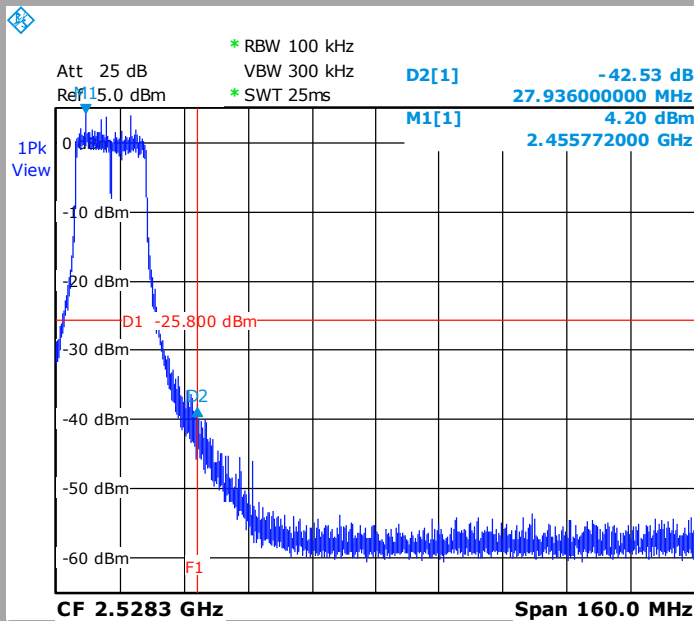
TX3



Date: 15.JUL.2013 14:39:50

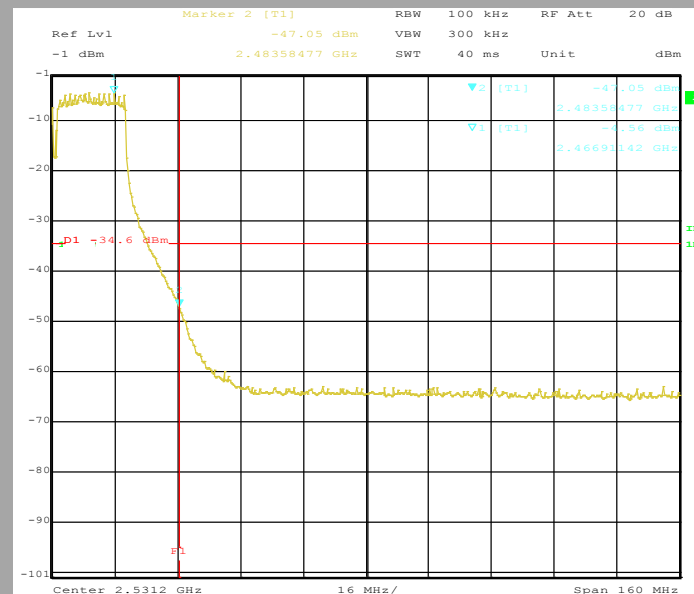
**Conducted unwanted emissions in the band edge
802.11n HT20 High band egde with Cmax**

TX1



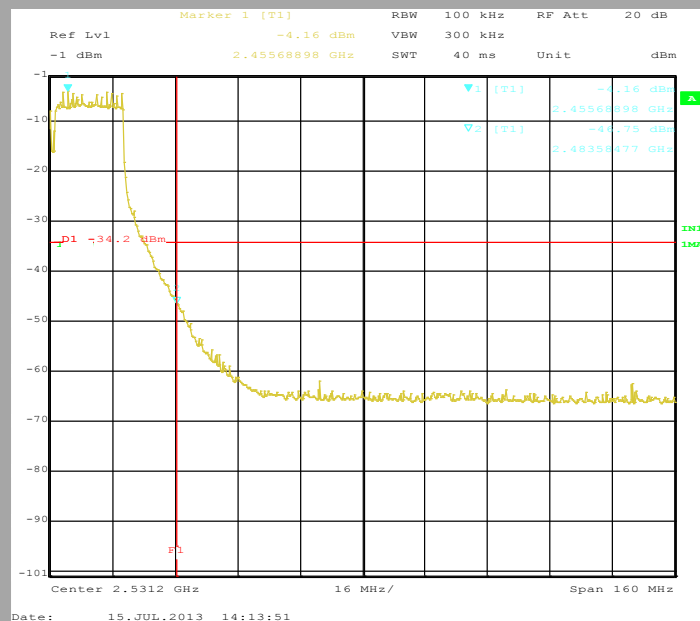
Date: 5.JUL.2013 12:49:58

TX2



Date: 15.JUL.2013 14:07:43

TX3

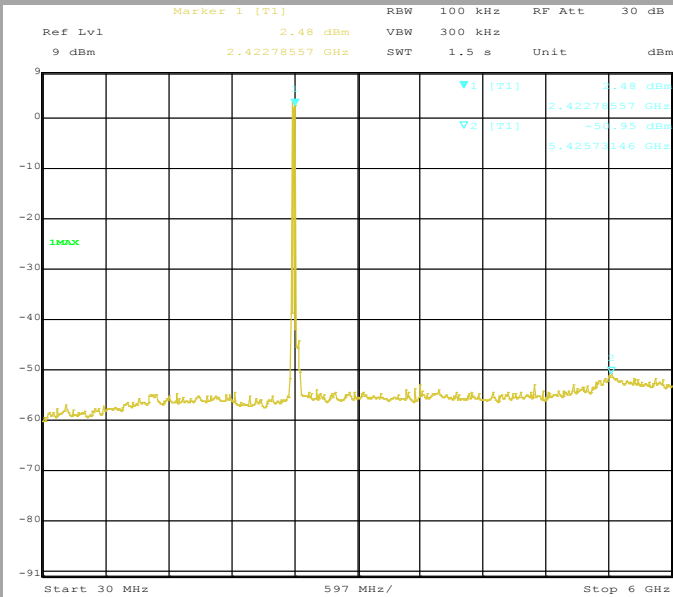


Date: 15.JUL.2013 14:13:51



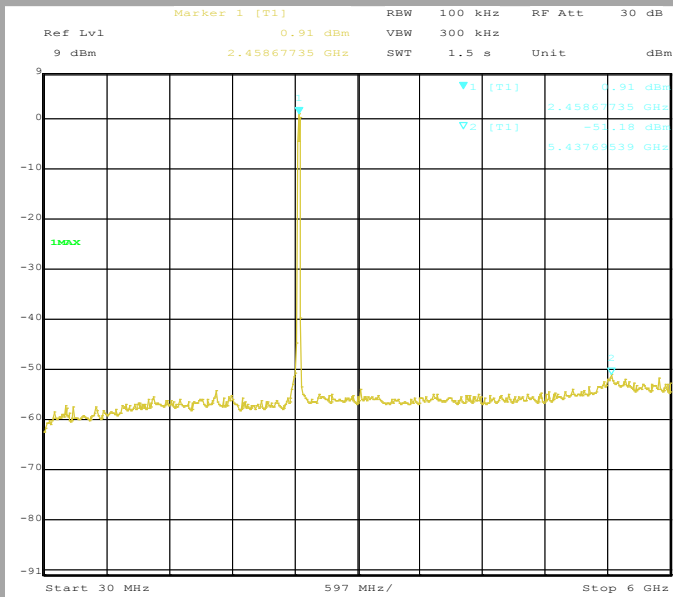
Conducted unwanted emissions
802.11n HT20 Cmin

TX1



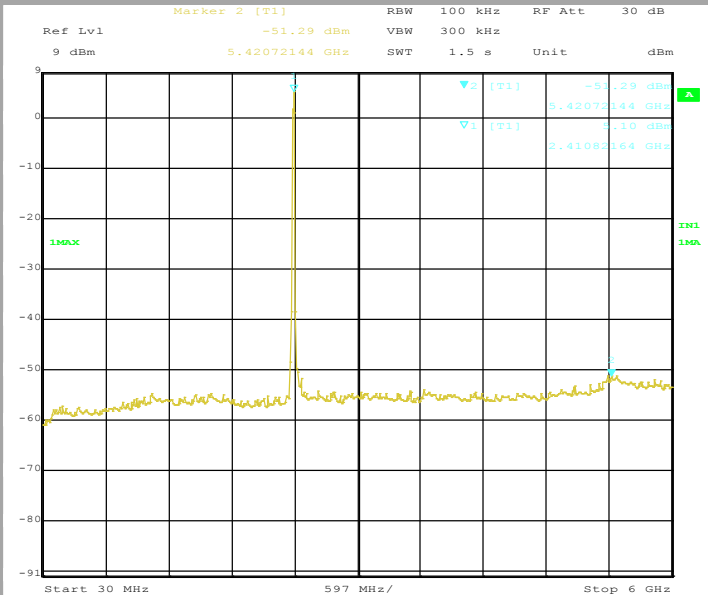
Date: 11.JUL.2013 14:55:33

TX2



Date: 11.JUL.2013 15:10:54

TX3

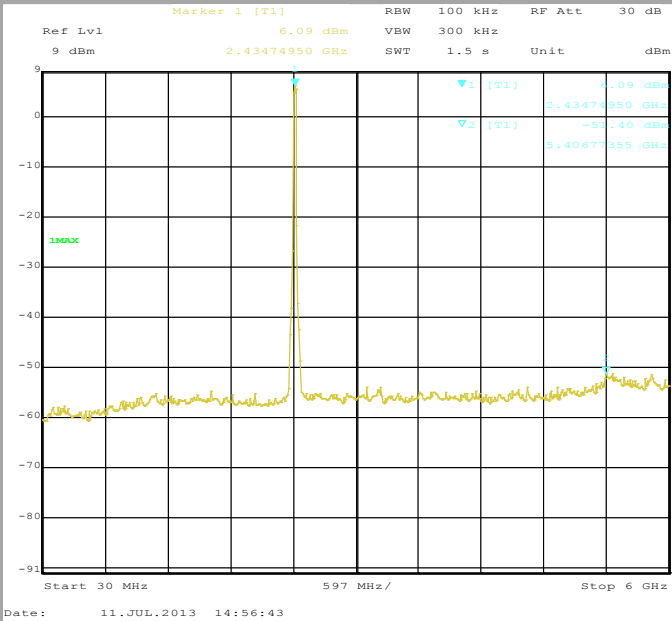


Date: 15.JUL.2013 10:42:14

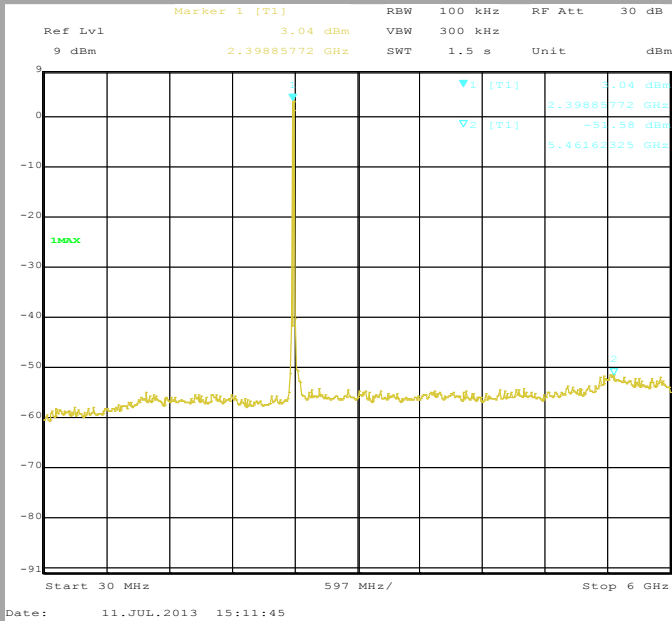


Conducted unwanted emissions
802.11n HT20 Cnom

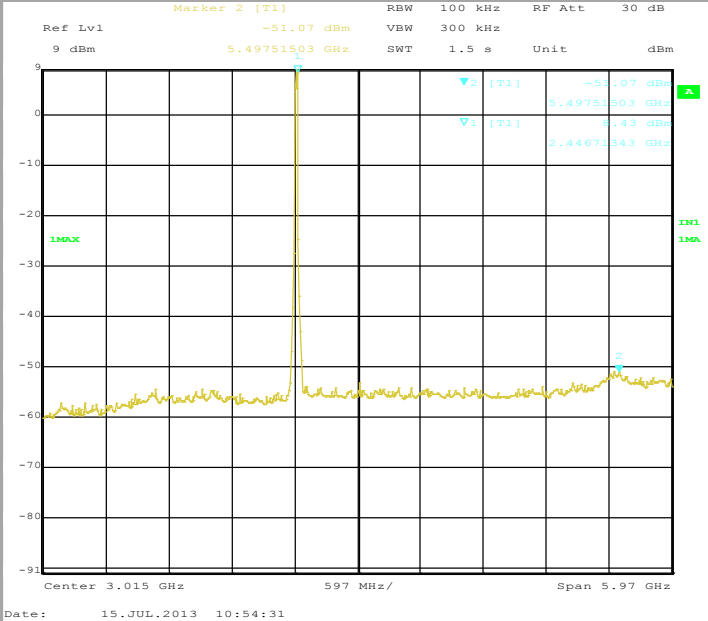
TX1



TX2



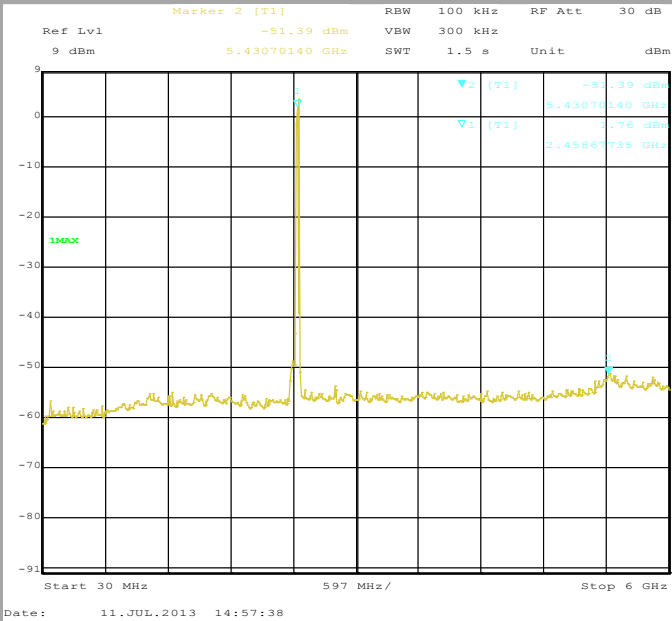
TX3



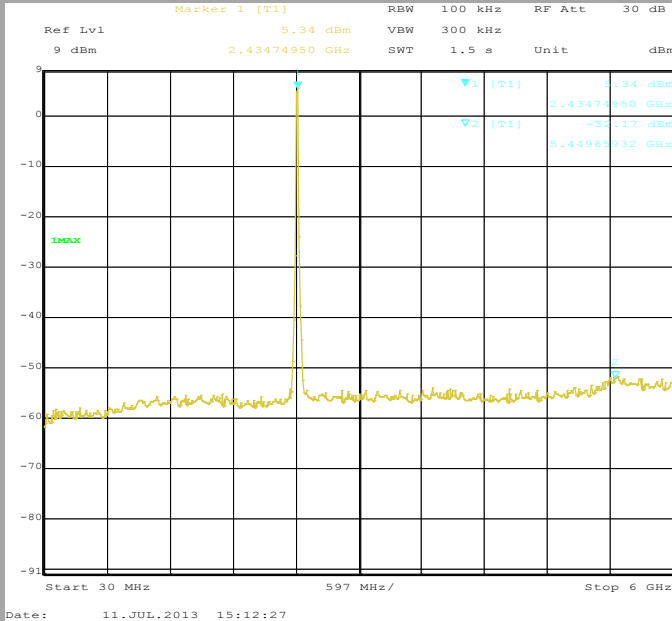


Conducted unwanted emissions
802.11n HT20 Cmax

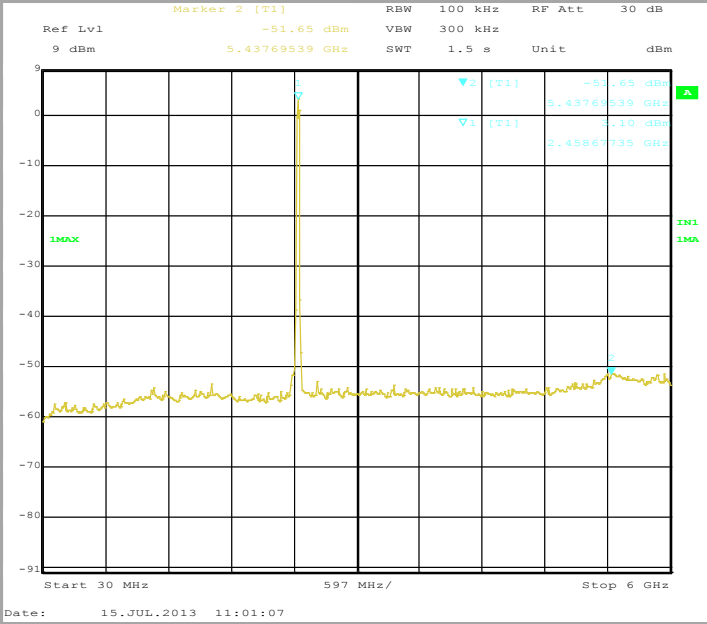
TX1



TX2

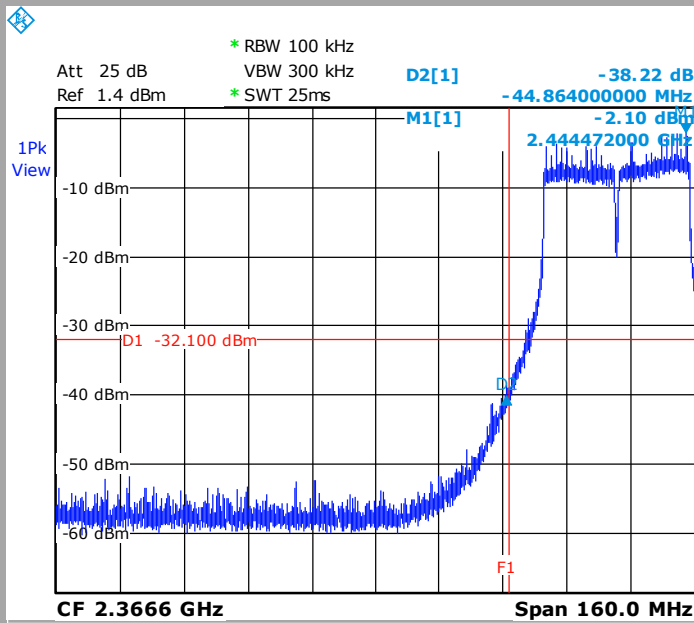


TX3



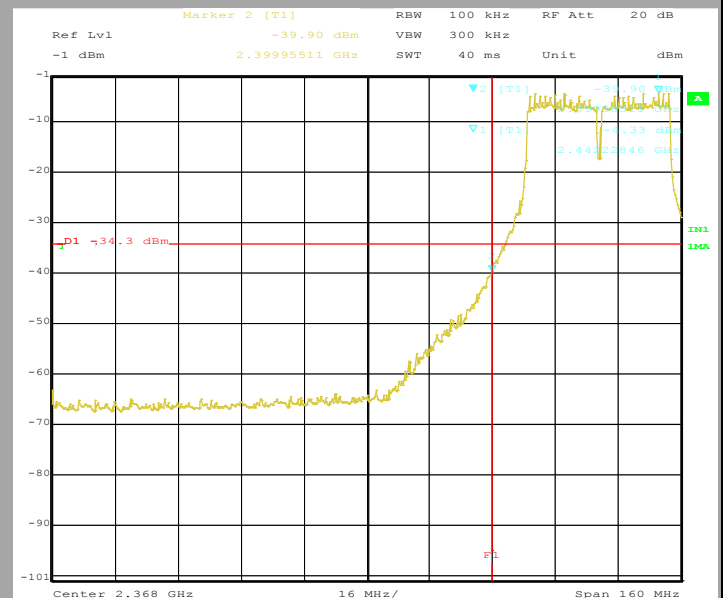
Conducted unwanted emissions in the band edge
802.11n HT40 Low band edge with Cmin

TX1



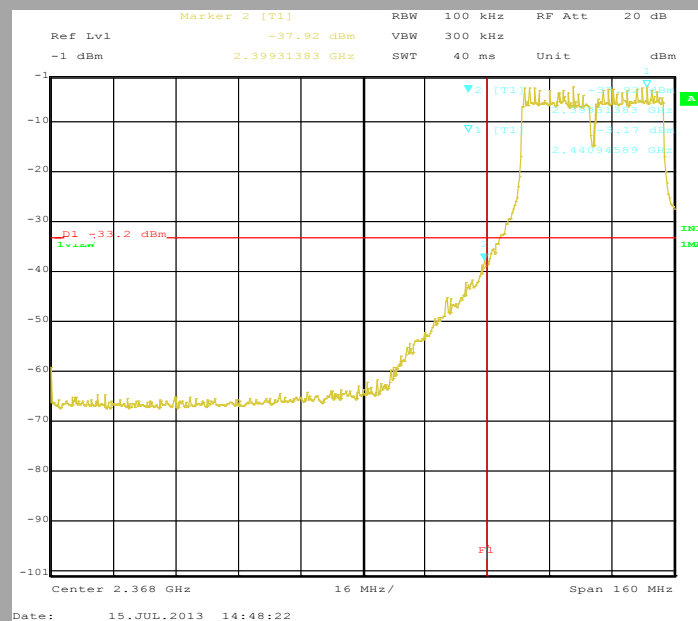
Date: 5.JUL.2013 12:36:53

TX2



Date: 15.JUL.2013 14:46:52

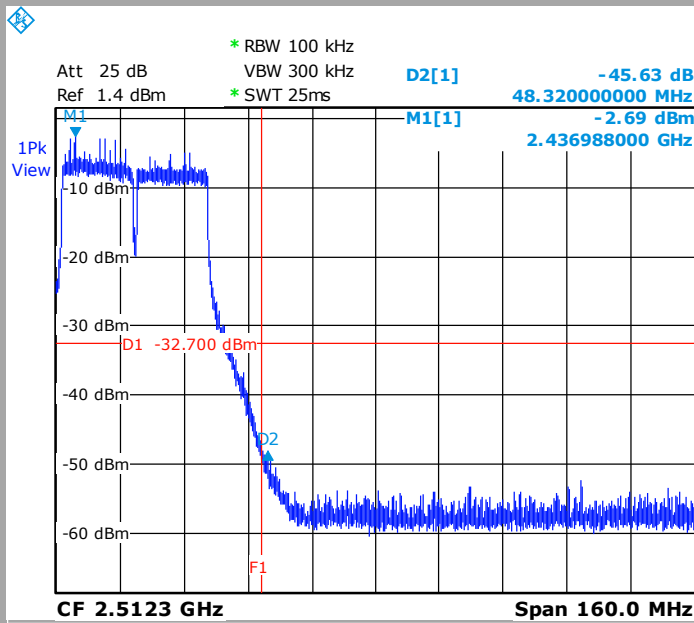
TX3



Date: 15.JUL.2013 14:48:22

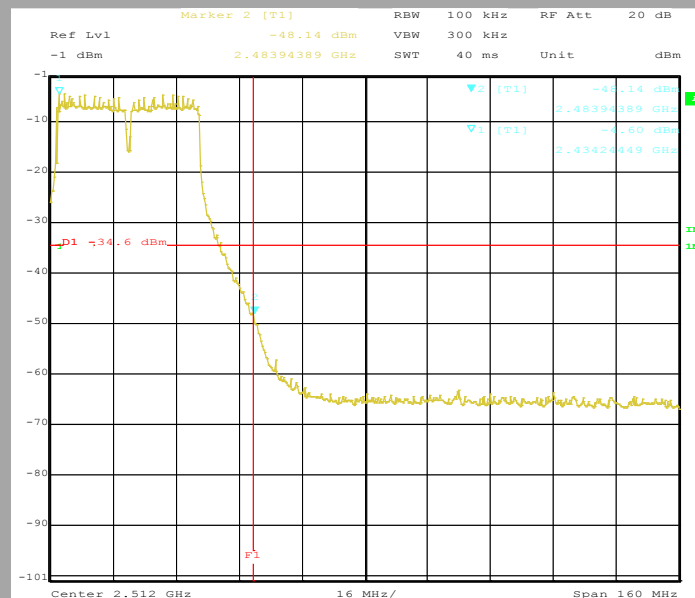
Conducted unwanted emissions in the band edge
802.11n HT40 High band edge with Cmax

TX1



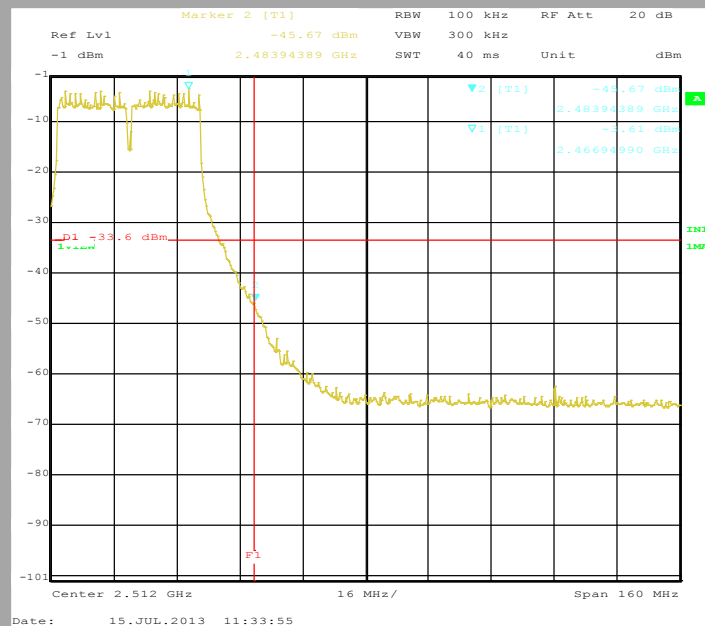
Date: 5.JUL.2013 12:42:40

TX2



Date: 15.JUL.2013 11:36:15

TX3



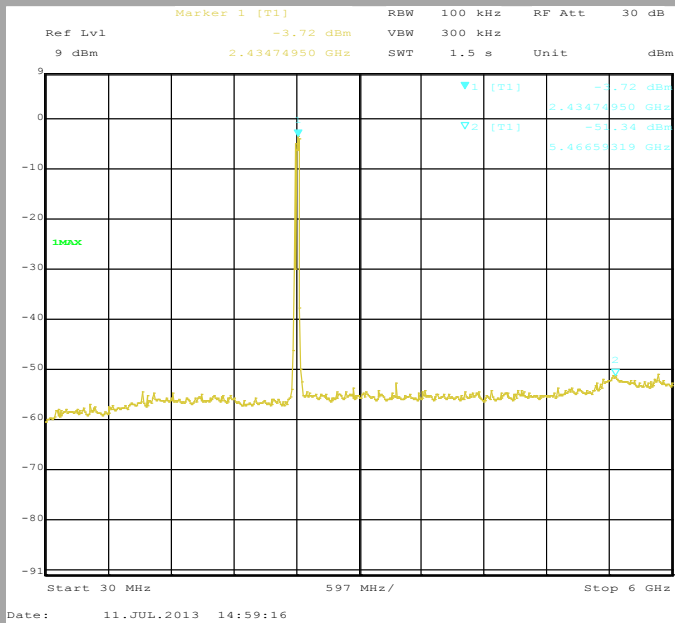
Date: 15.JUL.2013 11:33:55



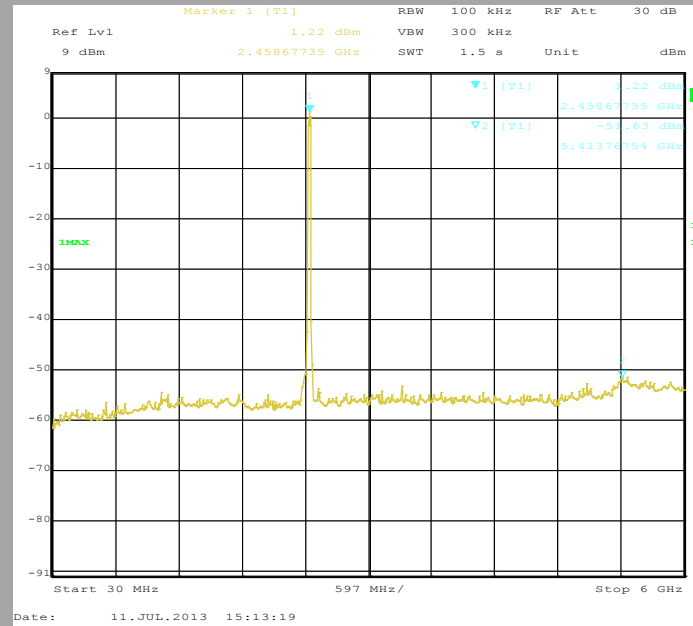
Conducted unwanted emissions

802.11n HT40 Cmin

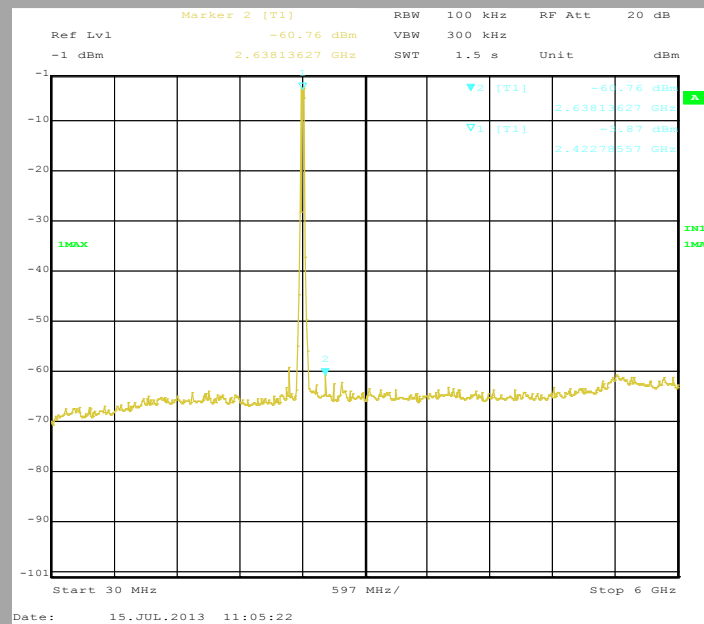
TX1



TX2



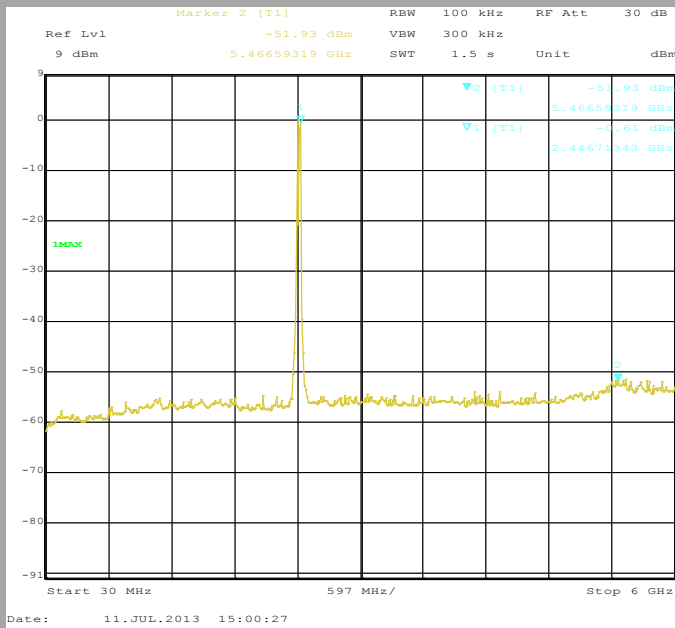
TX3



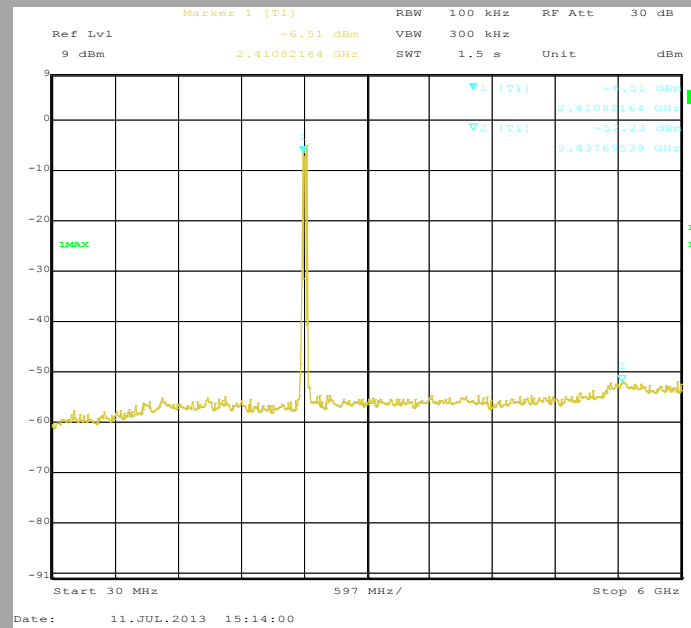


Conducted unwanted emissions in the band edge
802.11n HT40 Cnom

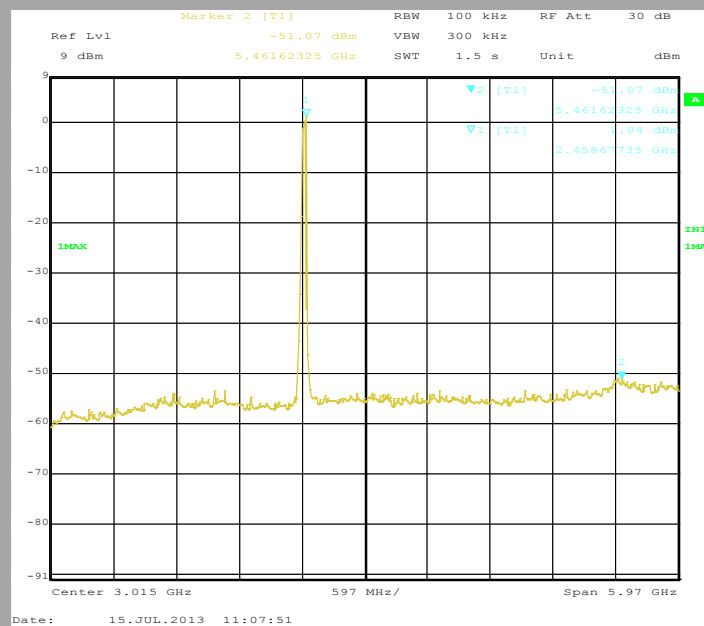
TX1



TX2



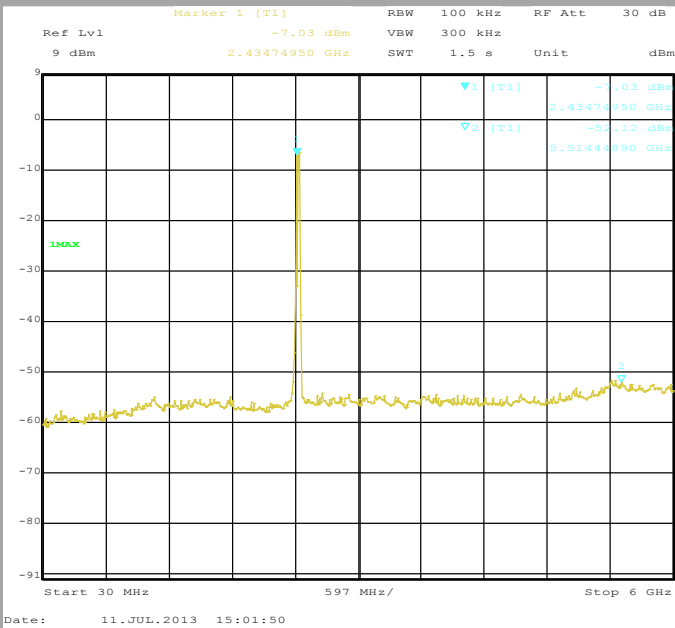
TX3



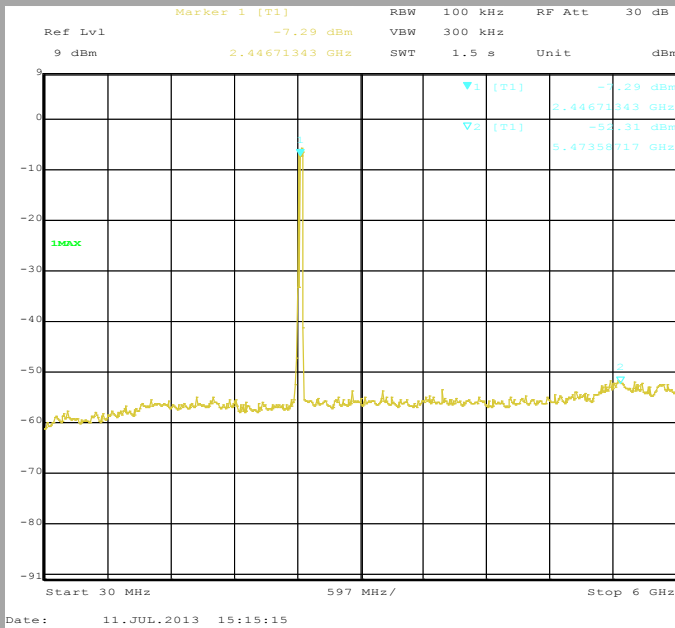


Conducted unwanted emissions in the band edge
802.11n HT40

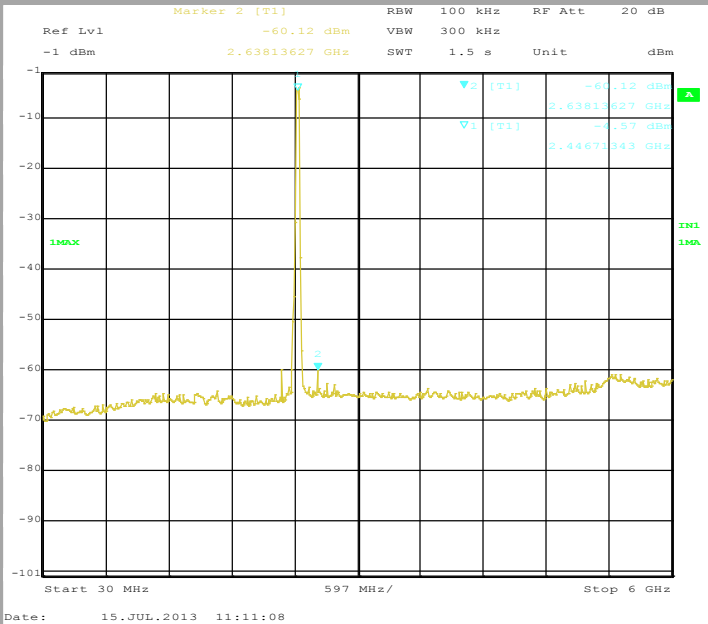
band egde with Cmax on TX1



band egde with Cmax on TX2



band egde with Cmax on TX3





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



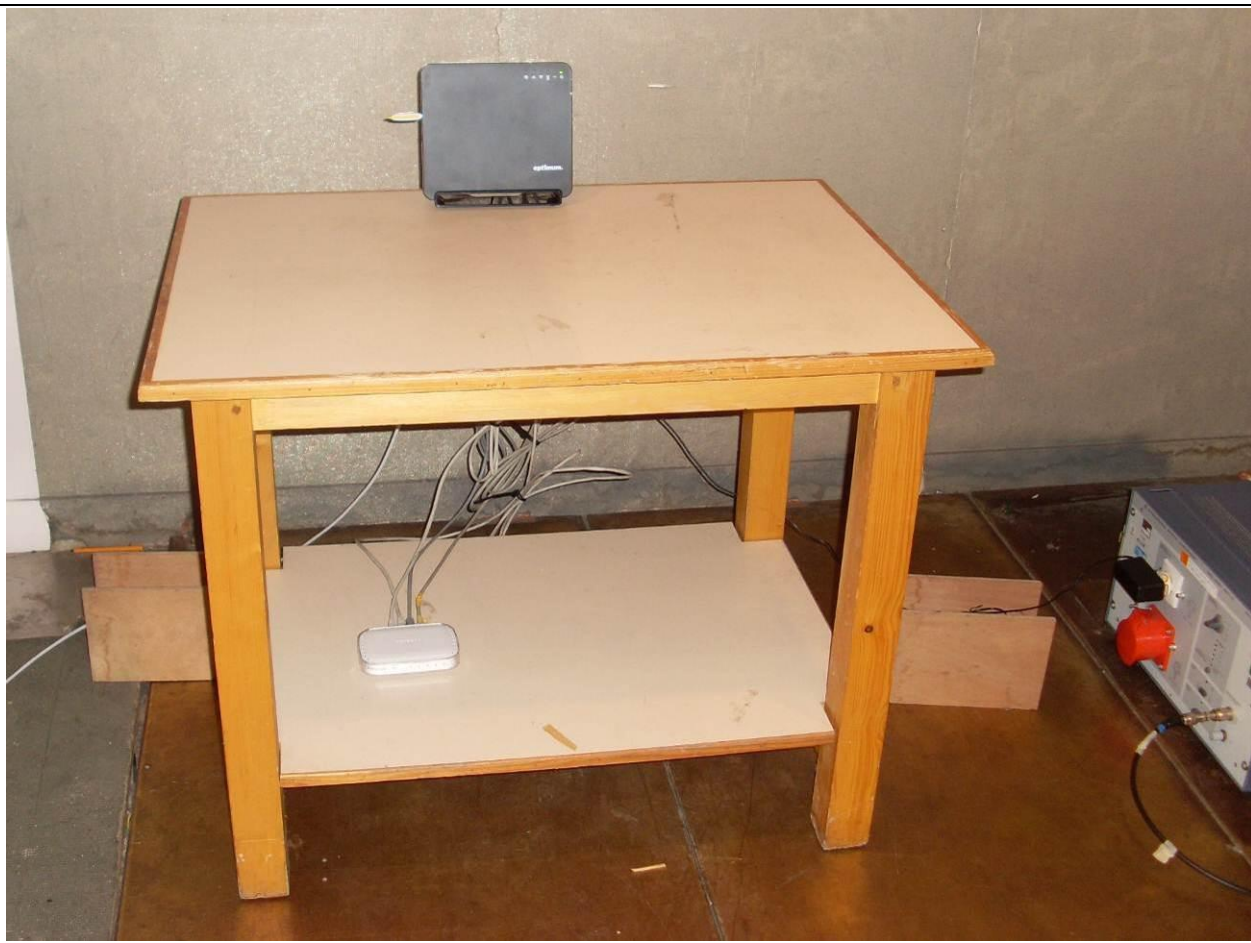
8. AC POWER LINE CONDUCTED EMISSIONS

8.1. TEST CONDITIONS

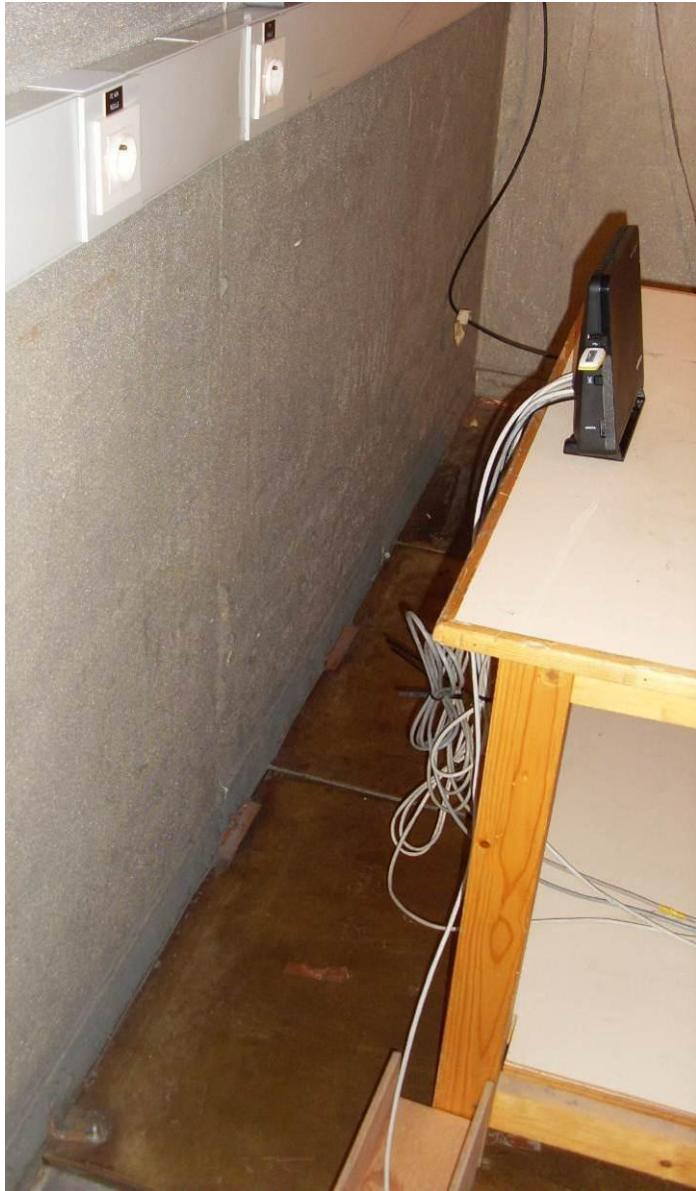
Test performed by : Laurent DENEUX
Date of test : 2013/07/23
Ambient temperature : 22°C
Relative humidity : 51%

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 $50\Omega / 50\mu\text{H}$. Interconnecting cables and equipment's were moved to position that maximized emission.



Photograph for AC Power Line Conducted Emissions (Front view)



Photograph for AC Power Line Conducted Emissions (Rear view)



8.3. RESULTS

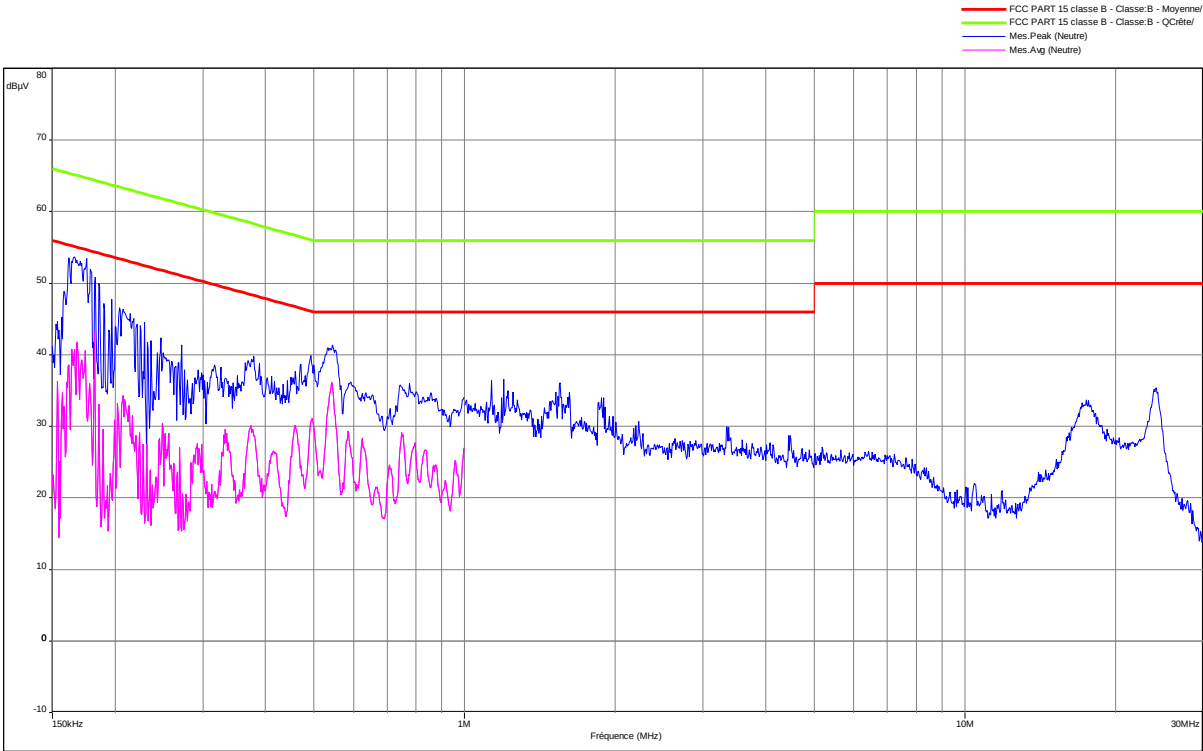
802.11b/802.11g/802.11n HT20/802.11n HT40

Phase Line

FCC Part.15 class B

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

Peak and average value



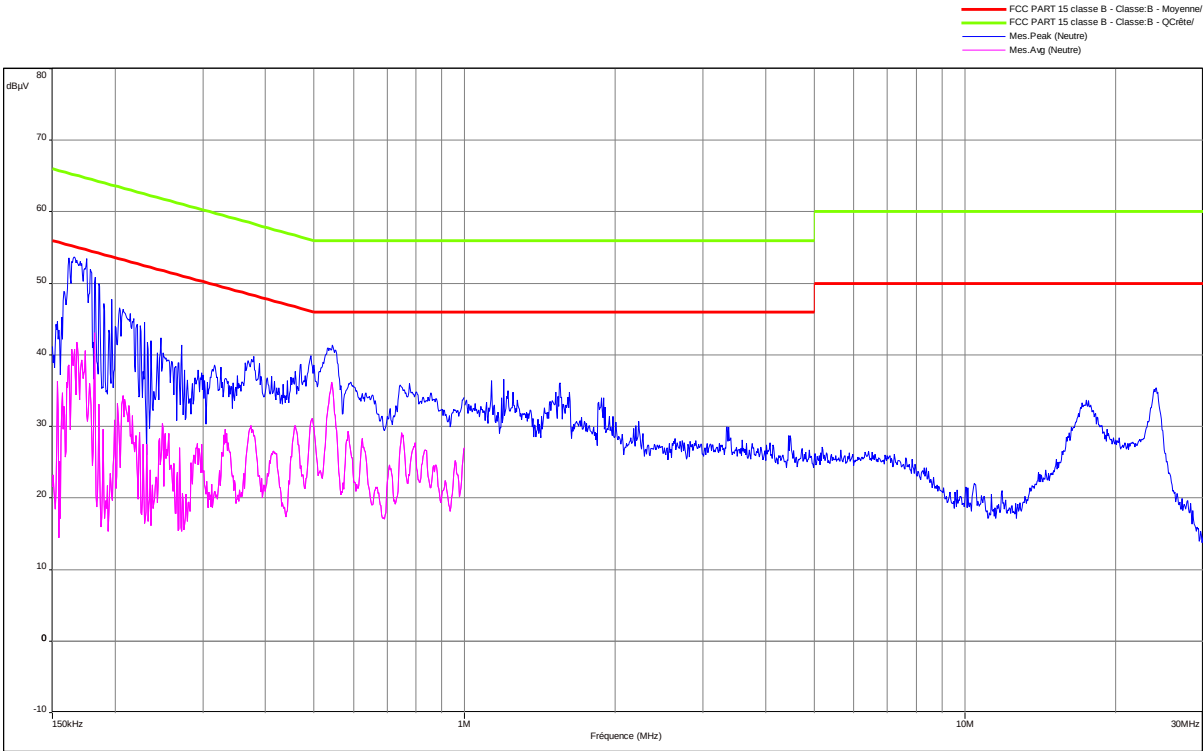


Neutral Line

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 & 2014/01/17
Ambient temperature : 18°C to 35°C
Relative humidity : 45% to 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



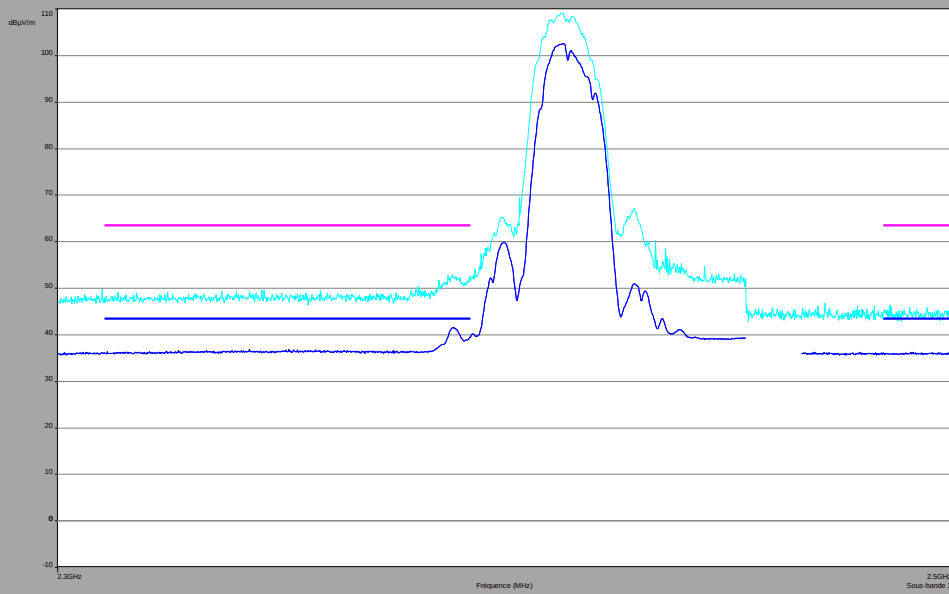
Photograph for Unwanted Emissions into Restricted Frequency Bands

9.3. RESULTS

802.11 b

C1

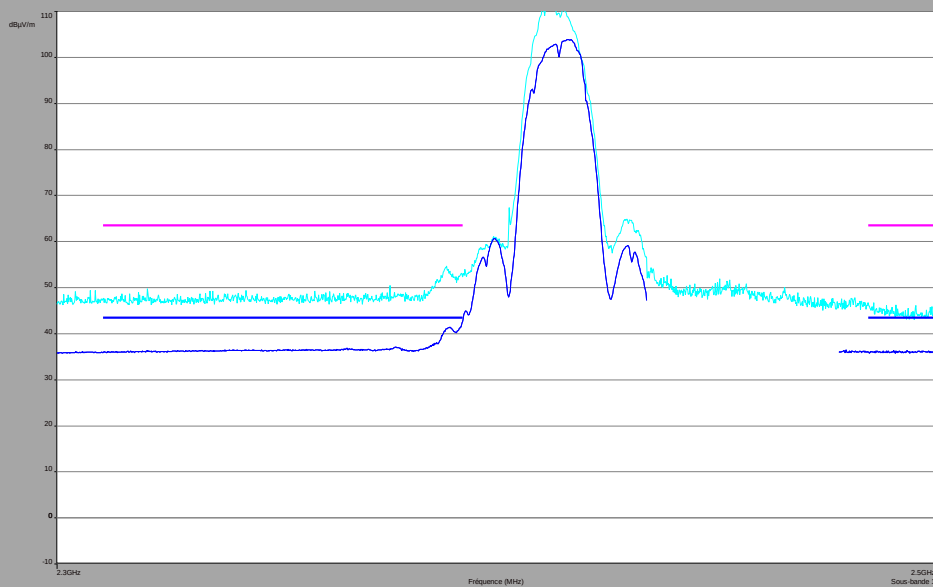
vertical



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

C1

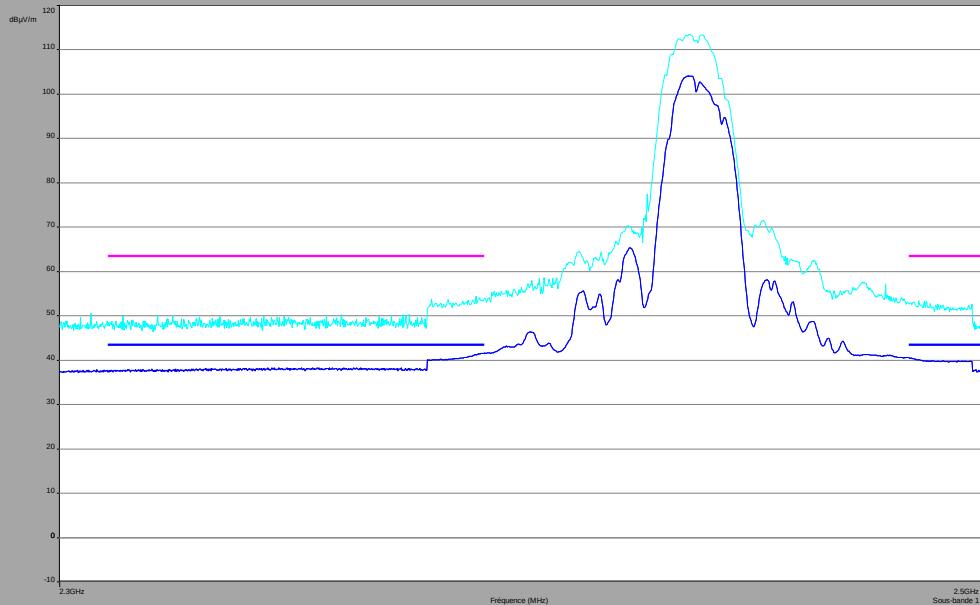
Horizontal



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

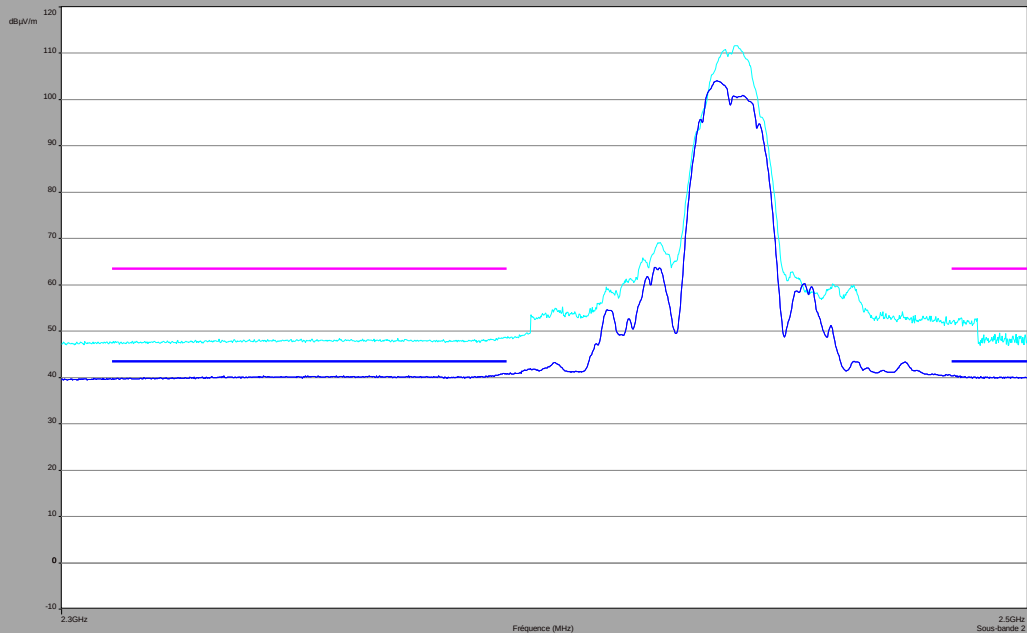


802.11 b
C6
vertical



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

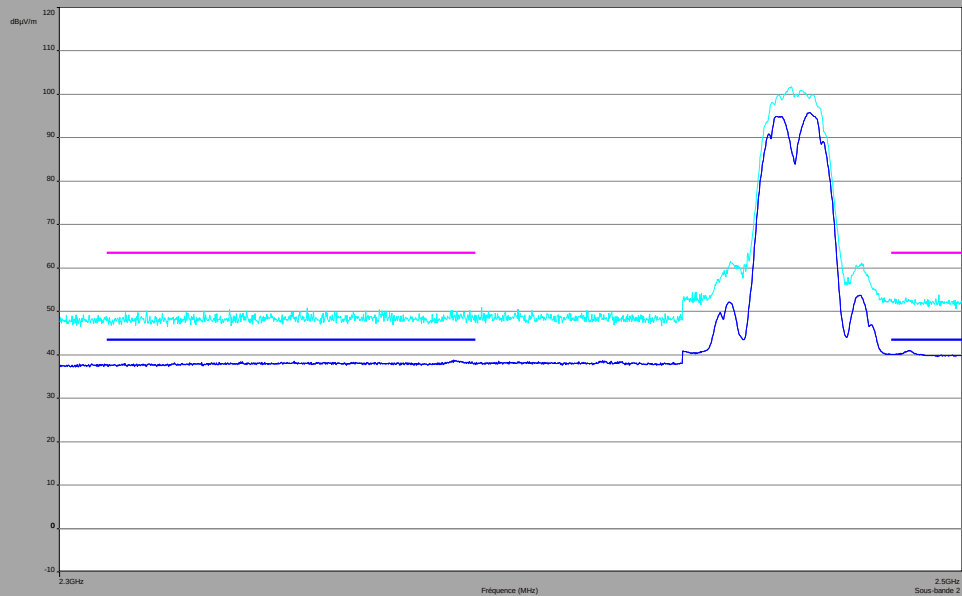
C6
Horizontal



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

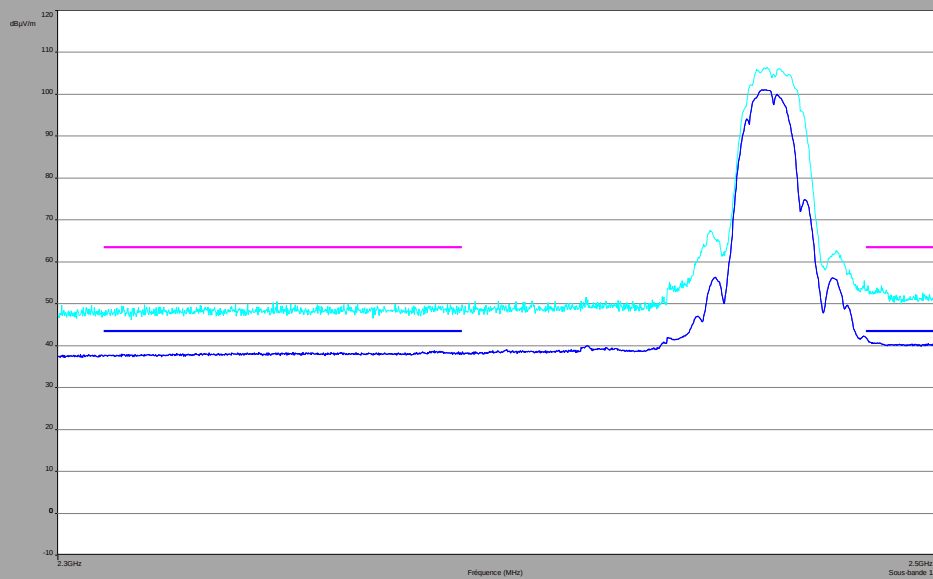


802.11 b
C11
vertical



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

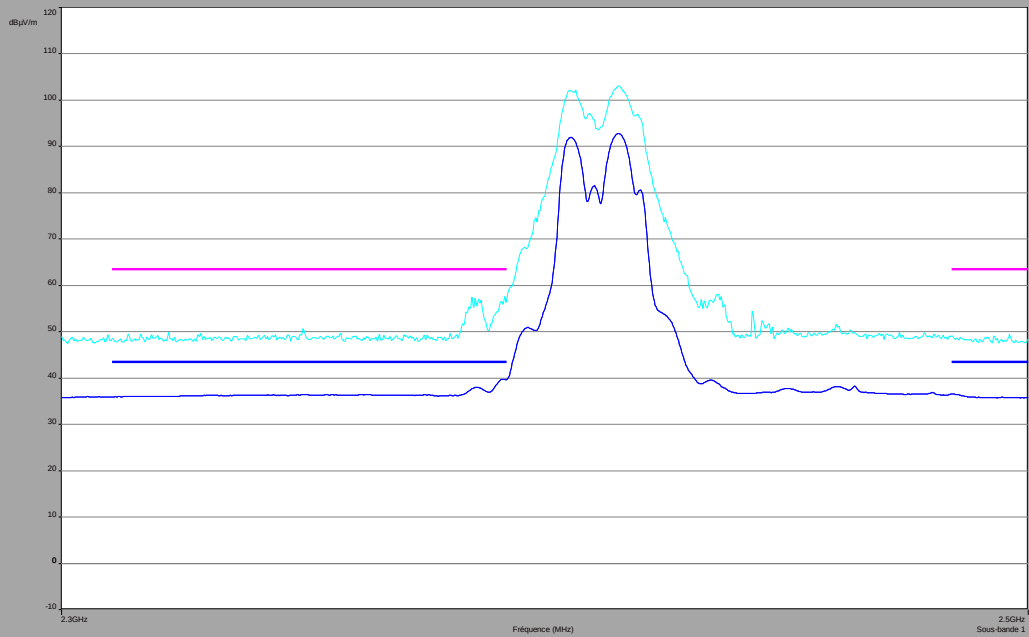
C11
Horizontal



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

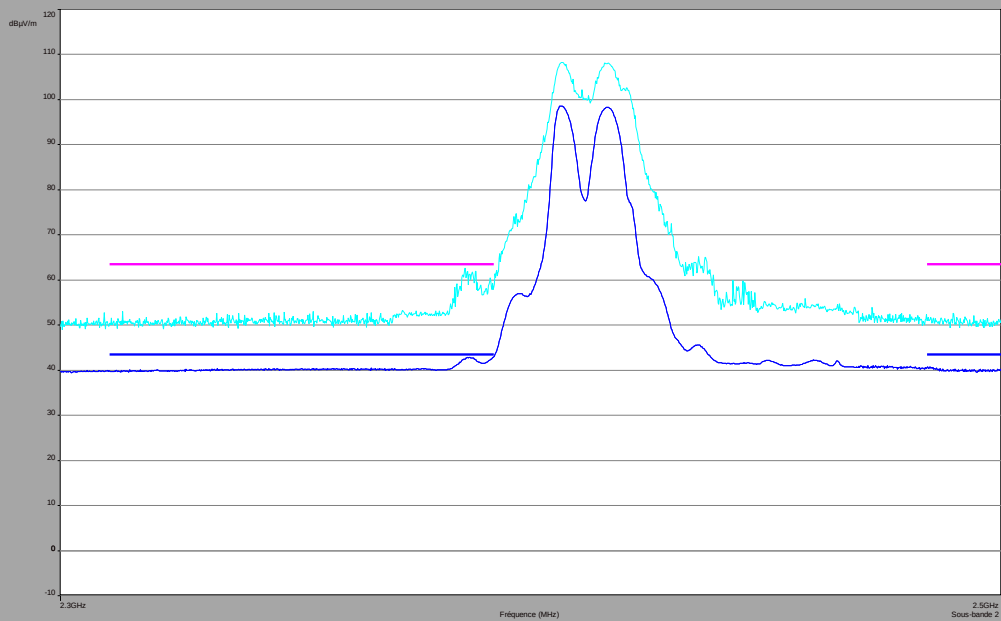


802.11 g
C1
vertical



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

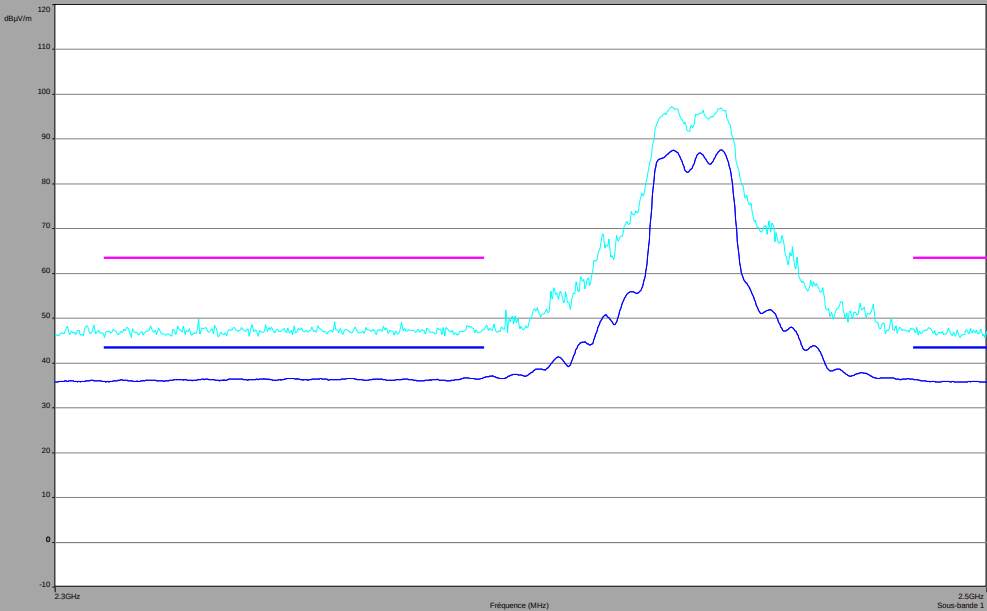
C1
Horizontal



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

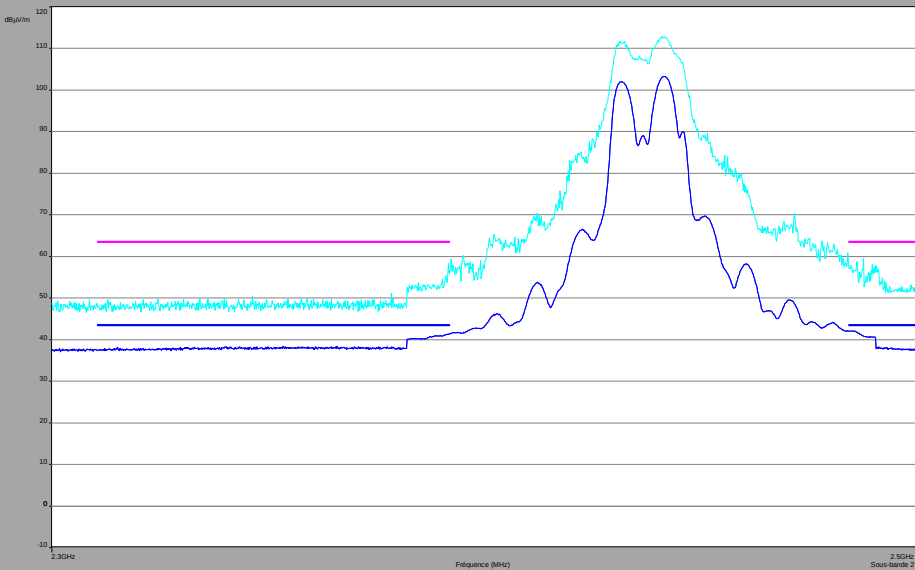


802.11 g
C6
vertical



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

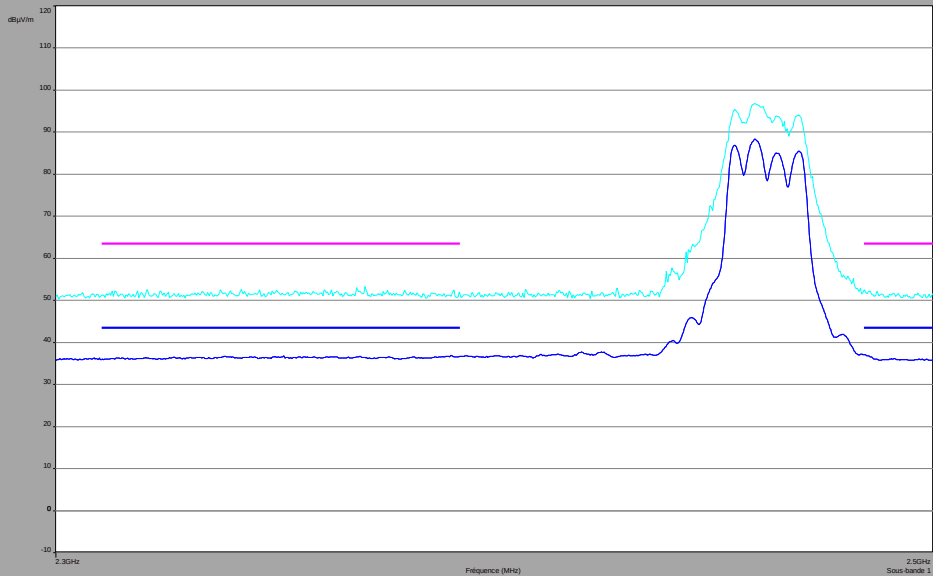
C6
Horizontal



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

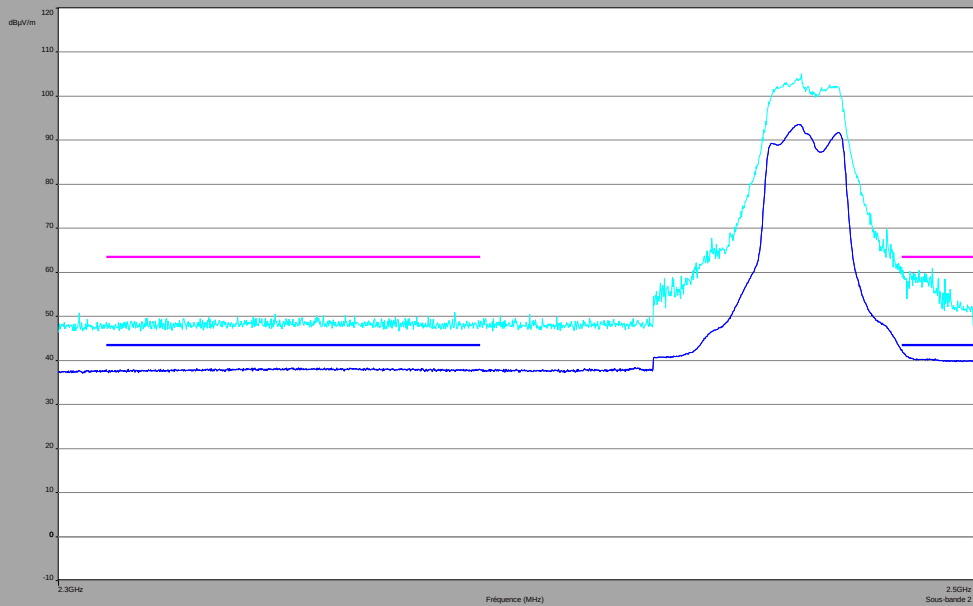


802.11 g
C11
vertical



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

C11
Horizontal



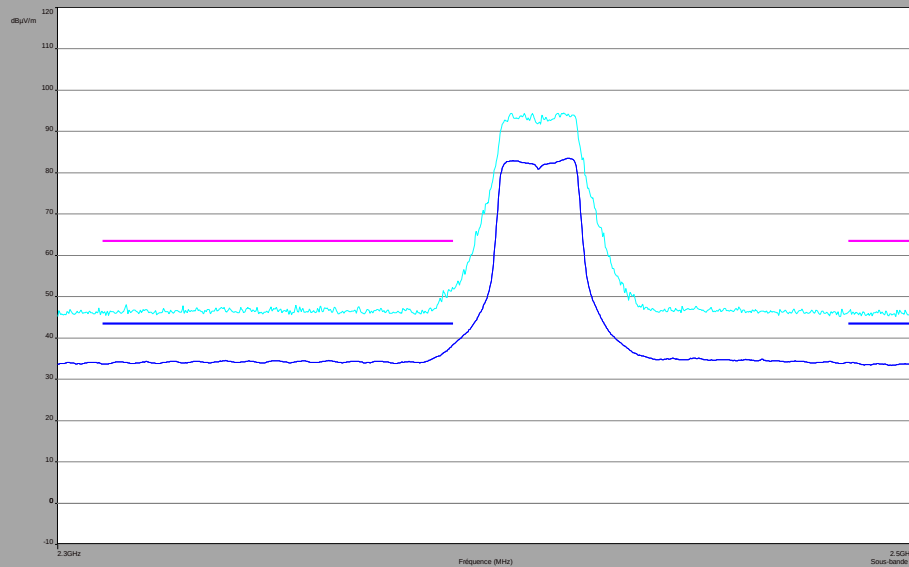
- FCC Part.15 restricted band – peak limit
- FCC Part.15 restricted band – average value limit
- Peak measurement
- Average value



802.11 nHT20

C1

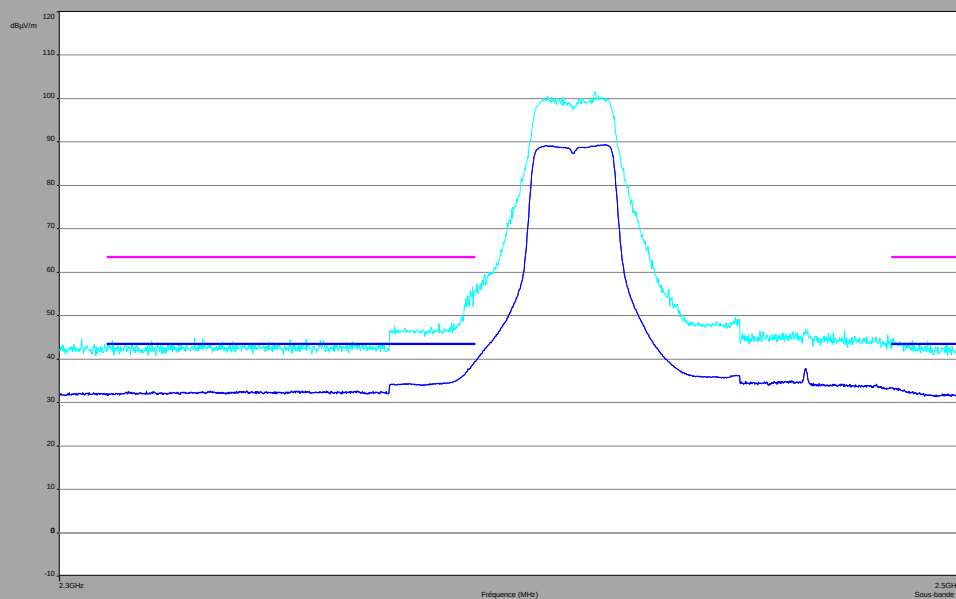
vertical



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

C1

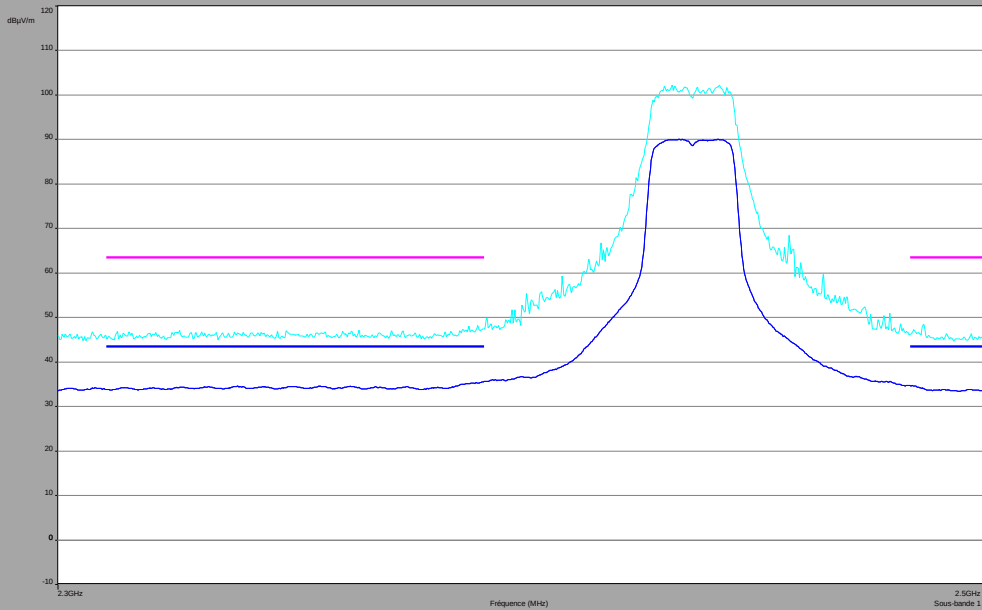
Horizontal



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

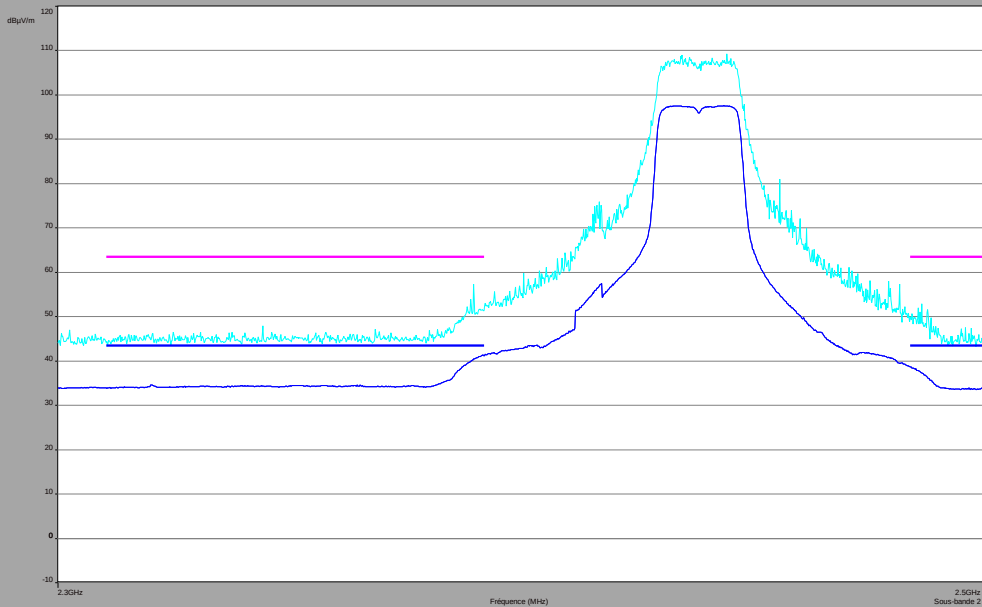


802.11 nHT20
C6
vertical



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

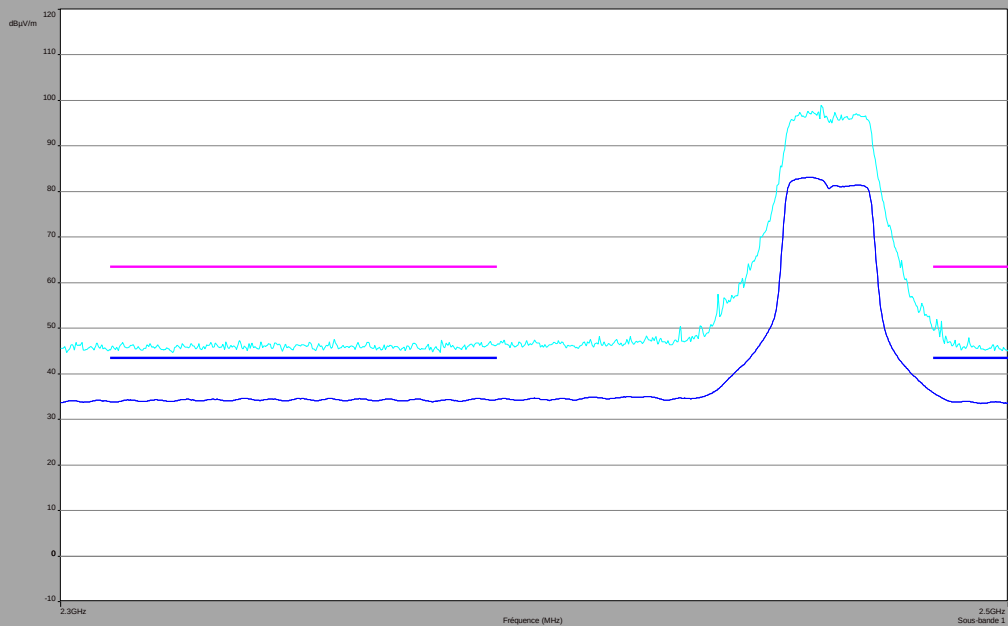
C6
Horizontal



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

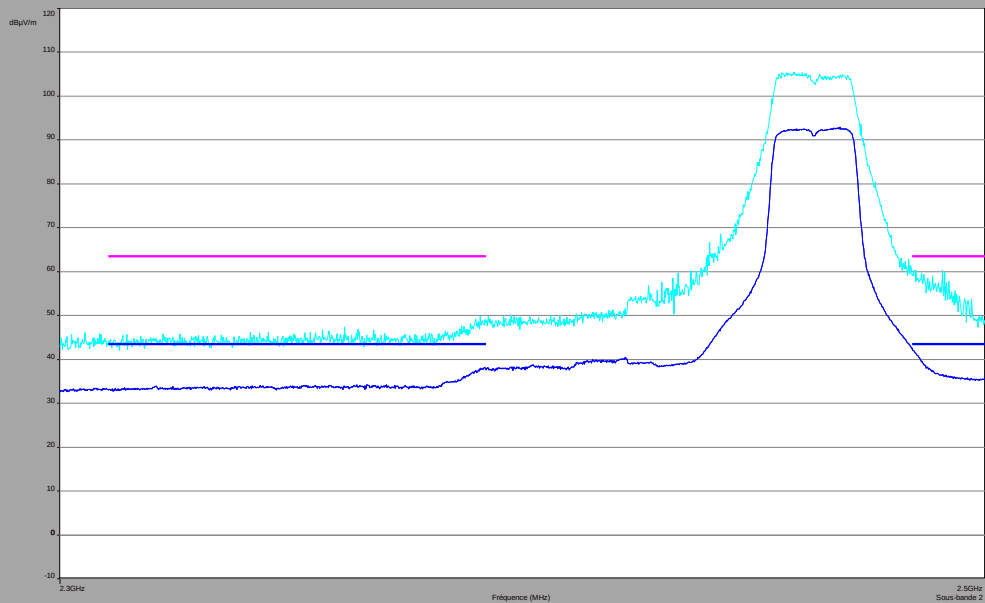


802.11 nHT20
C11
vertical



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

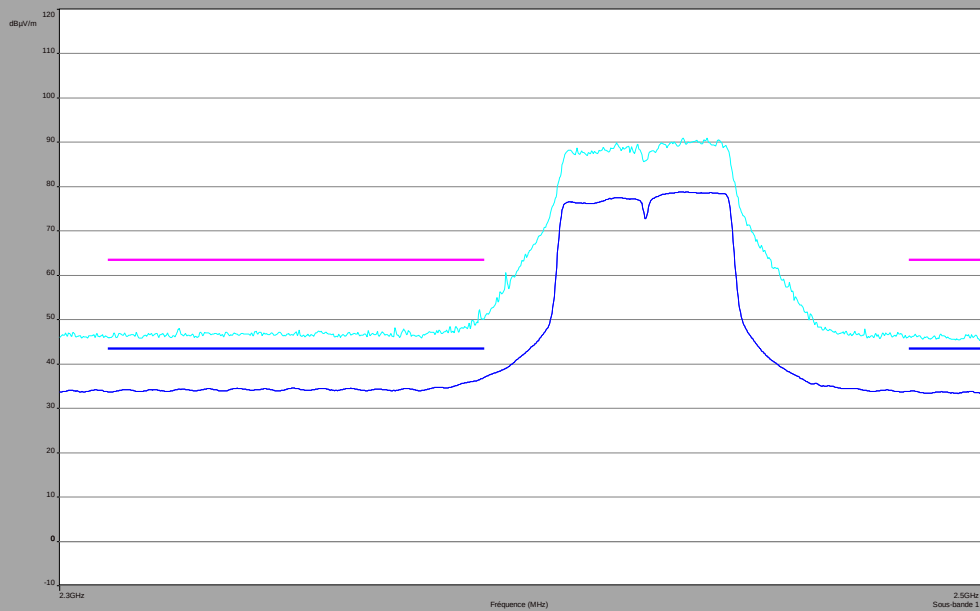
C11
Horizontal



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

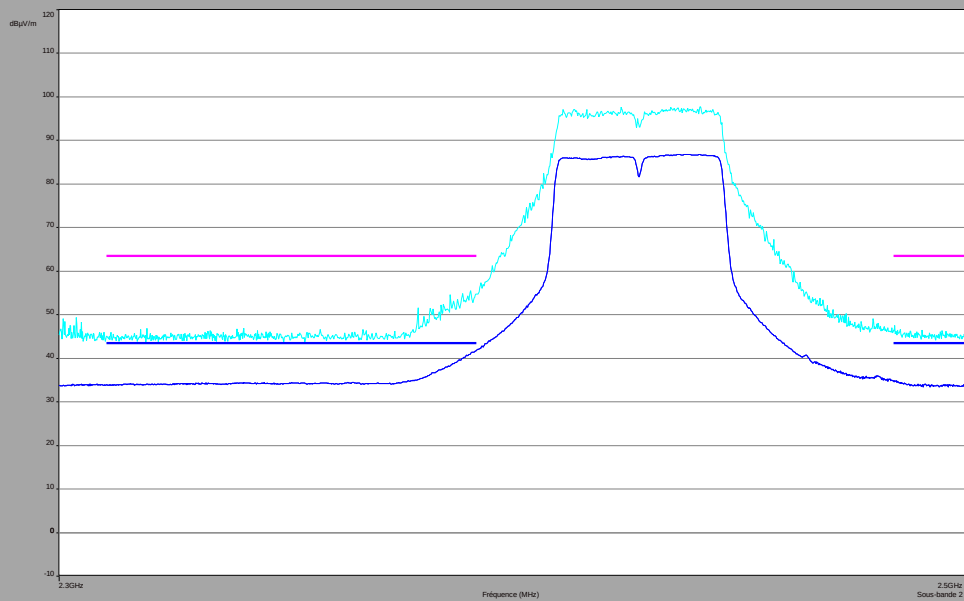


802.11 nHT40
C2
vertical



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

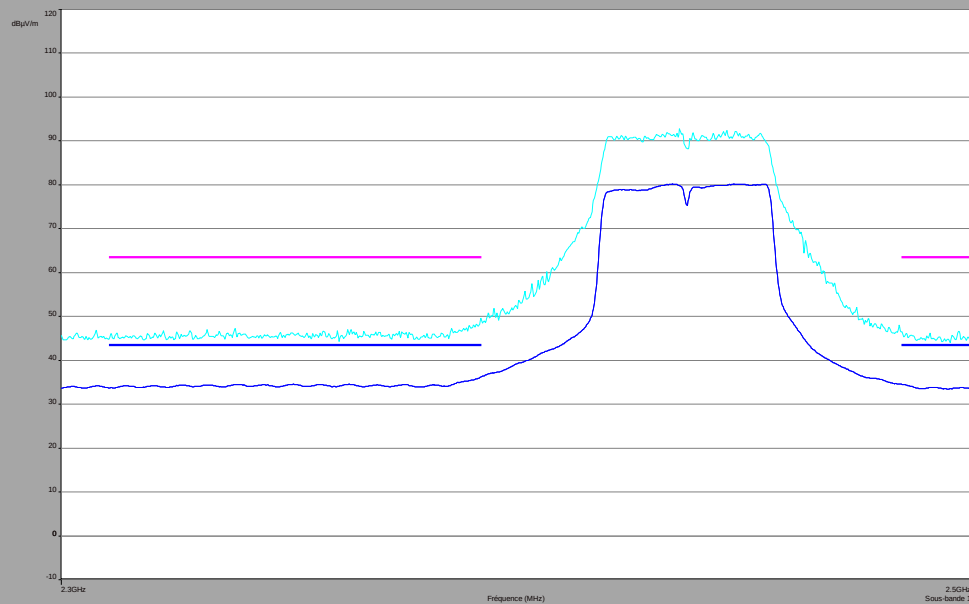
C2
Horizontal



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

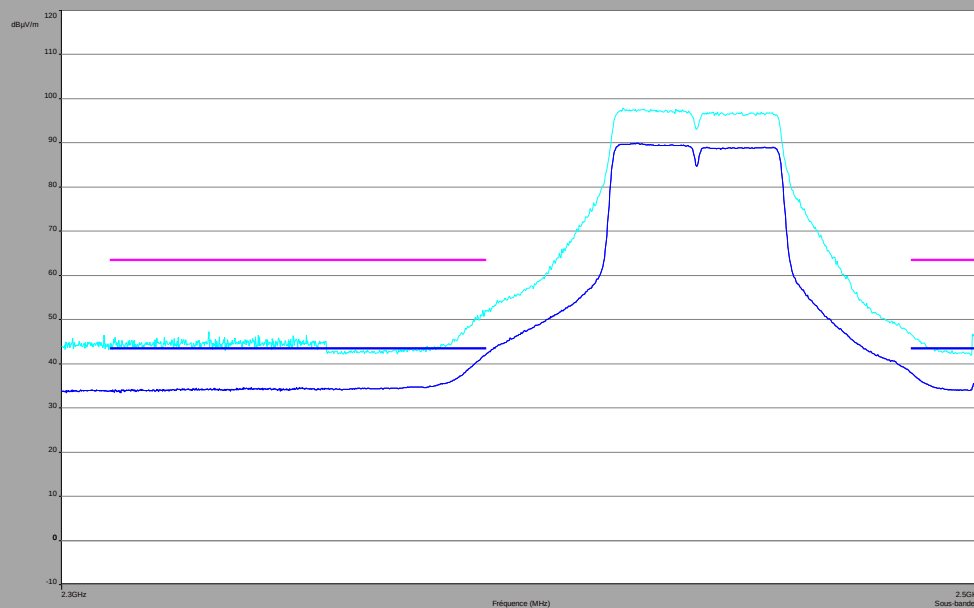


802.11 nHT40
C4
vertical



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

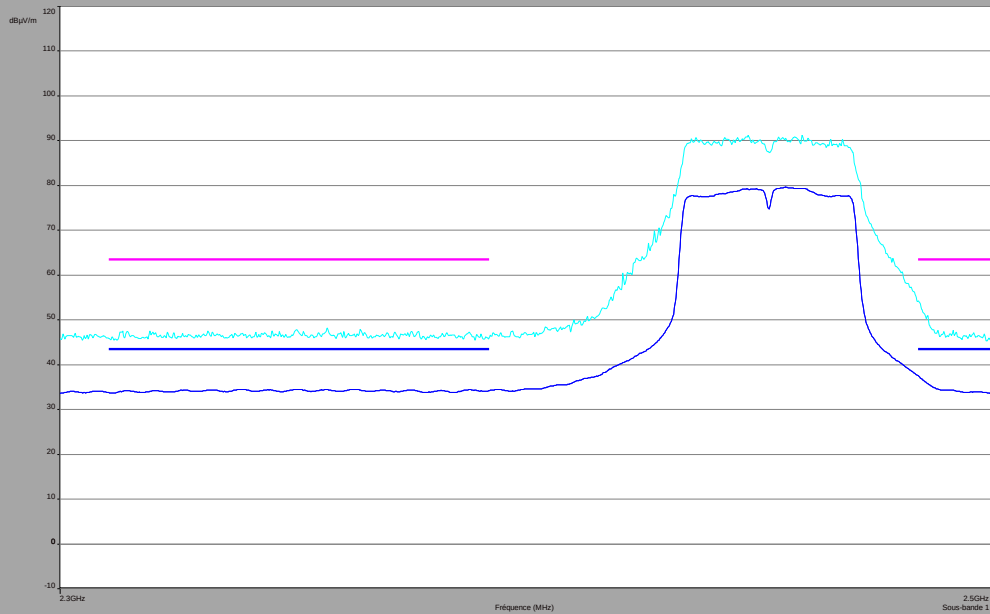
C4
Horizontal



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

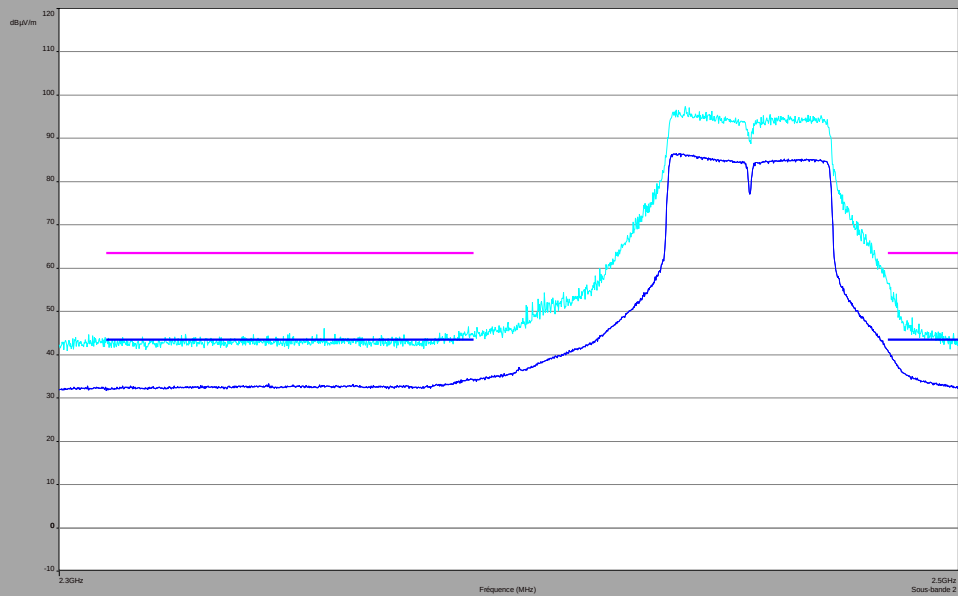


802.11 n HT40
C7
vertical



- 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)
31.4	27.7	20.8	29.5
37.5	33.2	25.6	29.5
44.1	30.7	20.4	29.5
46	29	24.1	29.5
51.8	26.4	17.8	29.5
60.3	25.9	15.6	29.5
72.2	24.9	20.7	29.5
74.4	23.4	15.8	29.5
110	20.0	16.5	33
114.1	27.3	18.9	33
118.1	18	14.7	33
125	27.3	20.7	33
131.4	19.8	16.7	33
135.8	32.2	16.8	33
200	21	25.8	33
250	27.8	21.8	35.5
297.3	25.8	19.8	35.5
300	29.7	27	35.5
375	38.2	34.5	35.5
450	28.7	24.8	35.5
500	38.7	33.9	35.5
625	34.7	29.3	35.5
675	33.2	29.6	35.5
750	36.1	30.6	35.5
775	34.4	31	35.5
875	37	32.2	35.5
998	36	30.1	44

Above 1GHz

Frequency (MHz)	Average Level (dBμV/m)	Average Limit (dBμV/m)	Peak Level (dBμV/m)	Peak Limit (dBμV/m)
1375	25	44	30.7	64
1500	30.1	44	32.4	64
1625.	29.5	44	37.5	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
Attenuator 3 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	PASTERNAK	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) $\pm x(\text{dB})$ / (Hz)	Limit for uncertainties $\pm y(\text{dB})$
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	$\pm 0.5^{\circ}\text{C}$	$\pm 1^{\circ}\text{C}$
Humidity	± 2.5 %	± 10 %
RECEIVER REQUIREMENTS		
Spurious emissions - Frequency < 1000 MHz - Frequency > 1000 MHz	± 3.9 dB ± 3.1 dB	± 6 dB