APPLICATION CERTIFICATION FCC Part 15C
On Behalf of
Parrot Drone SAS.

SKYCONTROLLER 2
Model No.: SKYCONTROLLER 2P

FCC ID: 2AG6ISKC2B
IC: 21053-SKC2B

Prepared for	:	Parrot Drone SAS.
Address	:	174 QUAI DE JEMMAPES, 75010 PARIS, FRANCE.
Prepared by	:	Shenzhen Accurate Technology Co., Ltd.
Address	:	1/F., Building A, Changyuan New Material Port, Science & Industry Park, Nanshan District, Shenzhen, Guangdong, P.R. China.
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Report No.	:	ATE20172164
Date of Test	:	Oct. 10, 2017--Oct. 22, 2017
Date of Report	:	Oct. 23, 2017

TABLE OF CONTENTS

Description Page

Test Report Certification

Applicant	:	Parrot Drone SAS.
Address	:	174 QUAI DE JEMMAPES, 75010 PARIS, FRANCE
Manufacturer	:	Parrot Drone SAS.
Address	:	174 QUAI DE JEMMAPES, 75010 PARIS, FRANCE
Product	:	SKYCONTROLLER 2
Model No.	:	SKYCONTROLLER 2P
Trade name	:	Parrot

Measurement Procedure Used:

FCC Rules and Regulations Part 15 Subpart C Section 15.247
ANSI C63.10: 2013
RSS-247 Issue 2 February 2017
RSS-Gen Issue 4 November 2014

The EUT was tested according to DTS test procedure of Apr 05, 2017 KDB558074 D01 DTS Meas Guidance v04 for compliance to FCC 47CFR 15.247 requirements

The device described above is tested by Shenzhen ACCURATE TECHNOLOGY CO. LTD to determine the maximum emission levels emanating from the device. The maximum emission levels are compared to the FCC Part 15 Subpart C Section 15.247 limits. The measurement results are contained in this test report and Shenzhen ACCURATE TECHNOLOGY CO. LTD is assumed full responsibility for the accuracy and completeness of these measurements. Also, this report shows that the Equipment Under Test (EUT) is to be technically compliant with the FCC requirements.

This report applies to above tested sample only. This report shall not be reproduced in part without written approval of Shenzhen ACCURATE TECHNOLOGY CO. LTD.

Date of Test : Oct. 10, 2017--Oct. 22, 2017

Date of Report: Oct. 23, 2017

Prepared by : (Tim Zhang, Engineer)

Approved & Authorized Signer : (Sean Liu, Manager)

1. GENERAL INFORMATION

1.1.Description of Device (EUT)

EUT	:	SKYCONTROLLER 2
Model Number	:	SKYCONTROLLER 2P
HVIN	:	SKYCONTROLLER 2P
Frequency Range	:	802.11b/g/n(20MHz): 2412-2462MHz
Number of Channels	:	802.11b/g/n (20MHz):11
Antenna Gain	:	Antenna 1: 4.59dBi Antenna 2: 5.38dBi Note: All transmit signals are completely uncorrelated, then Directional gain = $10\log\{(10^{G1/10}+10^{G2/10})/N_{ANT}\}$ dBi = $10\log\{(10^{4.59/10}+10^{5.38/10})/2\}$ dBi=5dBi
Type of Antenna	:	Integral Antenna
Power Supply	:	DC 3.6V, 2500mAh via battery DC 12V, 2A via external adapter
Adapter information	:	Model: CHA076001 Input: AC 100-240V～50-60Hz 1.2A Output: DC 12.6V 3.5A
Data Rate	:	802.11b: 1 Mbps 802.11g: 54, 48, 36, 24, 18, 12, 9, 6 Mbps 802.11n: up to 150Mbps
Modulation Type	:	DSSS, OFDM
Applicant	:	Parrot Drone SAS.
Address	:	174 QUAI DE JEMMAPES, 75010 PARIS, FRANCE.
Manufacturer	:	Parrot Drone SAS.
Address	:	174 QUAI DE JEMMAPES, 75010 PARIS, FRANCE.
Date of sample received	:	Oct. 10, 2017
Date of Test	:	Oct. 10, 2017--Oct. 22, 2017

1.2.Carrier Frequency of Channels

802.11b, 802.11g, 802.11n (20MHz)

Channel	Frequency(MHz)	Channel	Frequency(MHz)
01	2412	07	2442
02	2417	08	2447
03	2422	09	2452
04	2427	10	2457
05	2432	11	2462
06	2437	---	---

1.3.Accessory and Auxiliary Equipment

PC	Manufacturer: LENOVO M/N: 4290-RT8 S/N: R9-FW93G 11/08

1.4.Description of Test Facility

EMC Lab : Recognition of accreditation by Federal Communications Commission (FCC)
The Designation Number is CN1189
The Registration Number is 708358

Listed by Innovation, Science and Economic Development Canada (ISEDC)
The Registration Number is 5077A-2

Accredited by China National Accreditation Service for Conformity Assessment (CNAS)
The Registration Number is CNAS L3193

Accredited by American Association for Laboratory Accreditation (A2LA)
The Certificate Number is 4297.01

Name of Firm : Shenzhen Accurate Technology Co., Ltd.

Site Location : 1/F., Building A, Changyuan New Material Port, Science & Industry Park, Nanshan District, Shenzhen, Guangdong, P.R. China

1.5.Measurement Uncertainty

Conducted Emission Expanded Uncertainty	=	2.23dB, k=2
Radiated emission expanded uncertainty (9kHz-30MHz)	=	3.08dB, k=2
Radiated emission expanded uncertainty (30MHz-1000MHz)	=	4.42dB, k=2
Radiated emission expanded uncertainty (Above 1GHz)	=	4.06dB, k=2

2. MEASURING DEVICE AND TEST EQUIPMENT

Table 1: List of Test and Measurement Equipment

Kind of equipment	Manufacturer	Type	S/N	Calibrated dates	Calibrated until
EMI Test Receiver	Rohde&Schwarz	ESCS30	100307	Jan. 07, 2017	1 Year
EMI Test Receiver	Rohde&Schwarz	ESPI3	101526/003	Jan. 07, 2017	1 Year
Spectrum Analyzer	Rohde&Schwarz	FSV-40	101495	Jan. 07, 2017	1 Year
Spectrum Analyzer	Agilent	E7405A	MY45115511	Jan. 07, 2017	1 Year
Pre-Amplifier	Rohde&Schwarz	CBLU1183540-01	3791	Jan. 07, 2017	1 Year
Loop Antenna	Schwarzbeck	FMZB1516	1516131	Jan. 13, 2017	1 Year
Bilog Antenna	Schwarzbeck	VULB9163	9163-323	Jan. 13, 2017	1 Year
Horn Antenna	Schwarzbeck	BBHA9120D	9120D-655	Jan. 13, 2017	1 Year
Horn Antenna	Schwarzbeck	BBHA9170	9170-359	Jan. 13, 2017	1 Year
Open Switch and Control Unit	Rohde&Schwarz	OSP120 + OSP-B157	101244 + 100866	Jan. 07, 2017	1 Year
LISN	Rohde&Schwarz	ESH3-Z5	100305	Jan. 07, 2017	1 Year
LISN	Schwarzbeck	NSLK8126	8126431	Jan. 07, 2017	1 Year
Highpass Filter	Wainwright Instruments	WHKX3.6/18G-10SS	N/A	Jan. 07, 2017	1 Year
Band Reject Filter	Wainwright Instruments	WRCG2400/2485-2375/2510-60/11SS	N/A	Jan. 07, 2017	1 Year

3. OPERATION OF EUT DURING TESTING

3.1.Operating Mode

The mode is used: **1.802.11b Transmitting mode**

Low Channel: 2412MHz
Middle Channel: 2437MHz
High Channel: 2462MHz

2.802.11g Transmitting mode
Low Channel: 2412MHz
Middle Channel: 2437MHz
High Channel: 2462MHz

3.802.11n (20MHz) Transmitting mode
Low Channel: 2412MHz
Middle Channel: 2437MHz
High Channel: 2462MHz

3.2.Configuration and peripherals

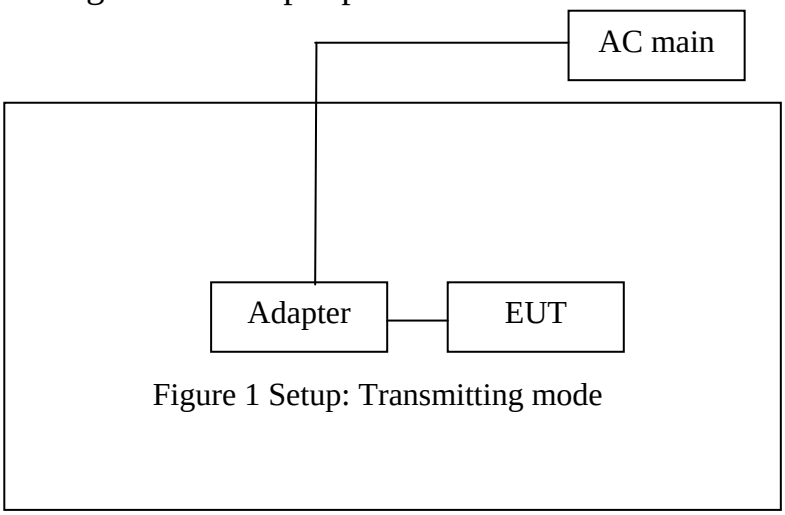


Figure 1 Setup: Transmitting mode

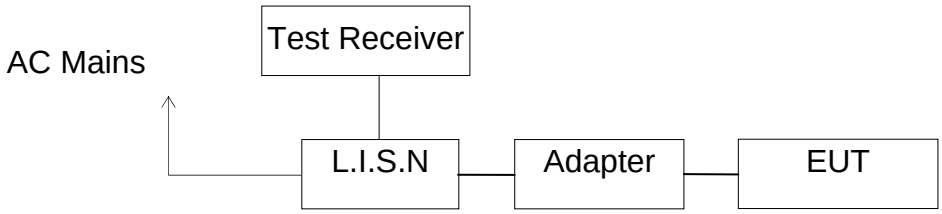
Note: The EUT have two antenna(1 and 2), They can transmit simultaneously.

4. TEST PROCEDURES AND RESULTS

FCC&IC Rules	Description of Test	Result
Section 15.247(a)(2) RSS-247 A5.2	6dB Bandwidth Test	Compliant
KDB558074 D01 DTS Meas Guidance v04	Duty cycle	Compliant
Section 15.247(e) RSS-247 A5.2	Power Spectral Density Test	Compliant
Section 15.247(b)(3) RSS-247 A5.4	Maximum Peak Output Power Test	Compliant
Section 15.247(d) RSS-247 A5.5	Band Edge Compliance Test	Compliant
Section 15.247(d) Section 15.209 RSS-247 A5.5 RSS-Gen 6.13	Radiated Spurious Emission Test	Compliant
Section 15.247(d) RSS-Gen 6.2	Conducted Spurious Emission Test	Compliant
RSS-Gen Section 6.6	99% Occupied Bandwidth	Compliant
Section 15.207 RSS-Gen Section 8.8	AC Power Line Conducted Emission Test	Compliant
Section 15.203 RSS-Gen 8.3	Antenna Requirement	Compliant

5. POWER LINE CONDUCTED MEASUREMENT

5.1.Block Diagram of Test Setup



(EUT: SKYCONTROLLER 2)

5.2.Power Line Conducted Emission Measurement Limits

Frequency (MHz)	Limit dB(μV)	
	Quasi-peak Level	Average Level
0.15 - 0.50	66.0 – 56.0 *	56.0 – 46.0 *
0.50 - 5.00	56.0	46.0
5.00 - 30.00	60.0	50.0
NOTE1: The lower limit shall apply at the transition frequencies. NOTE2: The limit decreases linearly with the logarithm of the frequency in the range 0.15MHz to 0.50MHz.		

5.3.Configuration of EUT on Measurement

The following equipments are installed on Power Line Conducted Emission Measurement to meet the commission requirement and operating regulations in a manner, which tends to maximize its emission characteristics in a normal application.

5.4.Operating Condition of EUT

5.4.1.Setup the EUT and simulator as shown as Section 5.1.

5.4.2.Turn on the power of all equipment.

5.4.3.Let the EUT work in test mode and measure it.

5.5.Test Procedure

The EUT is put on the plane 0.8 m high above the ground by insulating support and is connected to the power mains through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm coupling impedance for the EUT system. Please refer the block diagram of the test setup and photographs. Both sides of AC lines are checked to find out the maximum conducted emission. In order to find the maximum emission levels, the relative positions of equipment and all of the interface cables shall be changed according to ANSI C63.10: 2013 on Conducted Emission Measurement.
The bandwidth of test receiver (R & S ESCS30) is set at 9kHz.

The frequency range from 150kHz to 30MHz is checked.

5.6.DATA SAMPLE

Frequency (MHz)	Quasi Peak Level (dBμv)	Average Level (dBμv)	Transducer value (dB)	QuasiPeak Result (dBμv)	Average Result (dBμv)	Quasi Peak Limit (dBμv)	Average Limit (dBμv)	QuasiPeak Margin (dB)	Average Margin (dB)	Remark (Pass/Fail)
X.XX	29.4	18.3	11.1	40.5	29.4	56.0	56.0	15.5	16.6	Pass

Transducer value = Insertion loss of LISN + Cable Loss
Result = Quasi-peak Level/Average Level + Transducer value
Limit = Limit stated in standard

Calculation Formula:

Margin = Limit – Reading level value – Transducer value

5.7.Power Line Conducted Emission Measurement Results

PASS.

The frequency range from 150kHz to 30MHz is checked.

Test mode : CHARGING (worse case)
Test Voltage: 120V/60Hz

MEASUREMENT RESULT: "TUV-1219-1_fin"

10/19/2017 12:22PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.155000	40.60	10.5	66	25.1	QP	L1	GND
0.435000	39.20	10.7	57	18.0	QP	L1	GND
2.520000	30.10	11.0	56	25.9	QP	L1	GND
12.970000	30.10	11.3	60	29.9	QP	L1	GND

MEASUREMENT RESULT: "TUV-1219-1_fin2"

10/19/2017 12:22PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.150000	24.70	10.5	56	31.3	AV	L1	GND
0.445000	32.30	10.7	47	14.7	AV	L1	GND
2.540000	20.20	11.0	46	25.8	AV	L1	GND
13.015000	21.90	11.3	50	28.1	AV	L1	GND

MEASUREMENT RESULT: "TUV-1219-2_fin"

10/19/2017 12:27PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.150000	41.80	10.5	66	24.2	QP	N	GND
0.445000	39.90	10.7	57	17.1	QP	N	GND
2.700000	25.40	11.0	56	30.6	QP	N	GND
14.095000	29.10	11.4	60	30.9	QP	N	GND

MEASUREMENT RESULT: "TUV-1219-2_fin2"

10/19/2017 12:27PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.150000	24.40	10.5	56	31.6	AV	N	GND
0.450000	32.50	10.7	47	14.4	AV	N	GND
1.270000	18.50	10.9	46	27.5	AV	N	GND
13.045000	20.60	11.3	50	29.4	AV	N	GND

Emissions attenuated more than 20 dB below the permissible value are not reported.
The spectral diagrams are attached as below.

ACCURATE TECHNOLOGY CO.,LTD

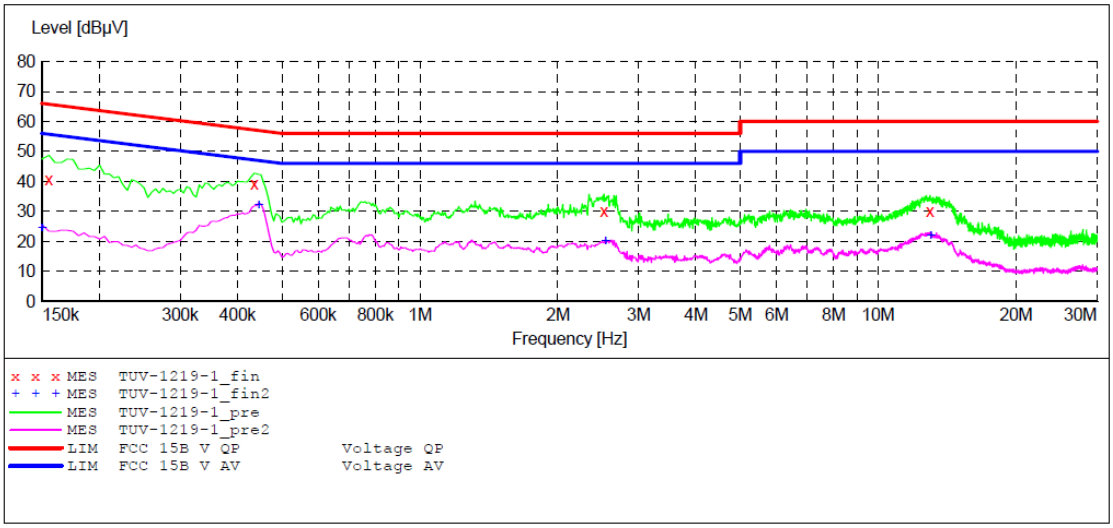
CONDUCTED EMISSION STANDARD FCC PART 15 B

EUT: SKYCONTROLLER 2 M/N:SKYCONTROLLER 2P
Manufacturer: Parrot Drone SAS
Operating Condition: Charging
Test Site: 1#Shielding Room
Operator: WADE
Test Specification: L 120V/60Hz
Comment: Mains Port
Start of Test: 10/19/2017 / 12:19:11PM

SCAN TABLE: "V 9K-30MHz fin"

Short Description: SUB STD VTERM2 1.70

Start Frequency	Stop Frequency	Step Width	Detector	Meas. Time	IF Bandw.	Transducer
9.0 kHz	150.0 kHz	100.0 Hz	QuasiPeak Average	1.0 s	200 Hz	NSLK8126 2008
150.0 kHz	30.0 MHz	5.0 kHz	QuasiPeak Average	1.0 s	9 kHz	NSLK8126 2008



MEASUREMENT RESULT: "TUV-1219-1_fin"

10/19/2017 12:22PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.155000	40.60	10.5	66	25.1	QP	L1	GND
0.435000	39.20	10.7	57	18.0	QP	L1	GND
2.520000	30.10	11.0	56	25.9	QP	L1	GND
12.970000	30.10	11.3	60	29.9	QP	L1	GND

MEASUREMENT RESULT: "TUV-1219-1_fin2"

10/19/2017 12:22PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.150000	24.70	10.5	56	31.3	AV	L1	GND
0.445000	32.30	10.7	47	14.7	AV	L1	GND
2.540000	20.20	11.0	46	25.8	AV	L1	GND
13.015000	21.90	11.3	50	28.1	AV	L1	GND

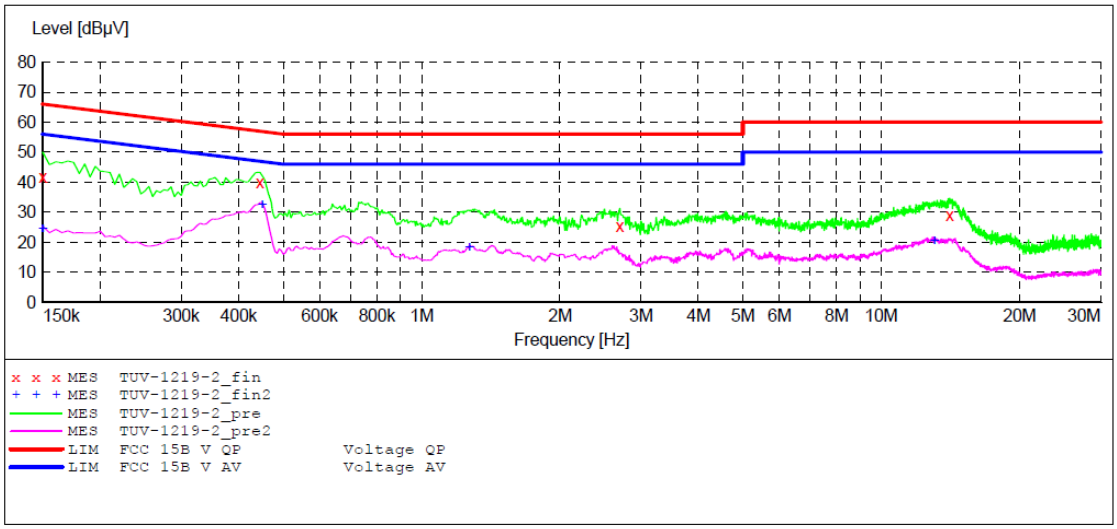
ACCURATE TECHNOLOGY CO.,LTD

CONDUCTED EMISSION STANDARD FCC PART 15 B

```
EUT:                  SKYCONTROLLER 2 M/N:SKYCONTROLLER 2P
Manufacturer:         Parrot Drone SAS
Operating Condition:  Charging
Test Site:            1#Shielding Room
Operator:             WADE
Test Specification:   N 120V/60Hz
Comment:              Mains Port
Start of Test:        10/19/2017 / 12:23:57PM
```

SCAN TABLE: "V 9K-30MHz fin"

```
  Short Description:                SUB STD VTERM2 1.70
  Start      Stop       Step       Detector  Meas.     IF       Transducer
  Frequency  Frequency  Width                Time      Bandw.
  9.0 kHz    150.0 kHz  100.0 Hz   QuasiPeak 1.0 s     200 Hz   NSLK8126 2008
                                   Average
  150.0 kHz  30.0 MHz   5.0 kHz    QuasiPeak 1.0 s     9 kHz    NSLK8126 2008
                                   Average
```



MEASUREMENT RESULT: "TUV-1219-2_fin"

10/19/2017 12:27PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.150000	41.80	10.5	66	24.2	QP	N	GND
0.445000	39.90	10.7	57	17.1	QP	N	GND
2.700000	25.40	11.0	56	30.6	QP	N	GND
14.095000	29.10	11.4	60	30.9	QP	N	GND

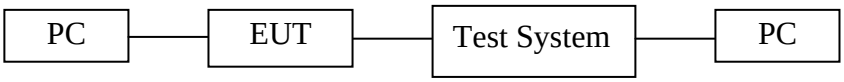
MEASUREMENT RESULT: "TUV-1219-2_fin2"

10/19/2017 12:27PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.150000	24.40	10.5	56	31.6	AV	N	GND
0.450000	32.50	10.7	47	14.4	AV	N	GND
1.270000	18.50	10.9	46	27.5	AV	N	GND
13.045000	20.60	11.3	50	29.4	AV	N	GND

6. 6DB BANDWIDTH MEASUREMENT

6.1.Block Diagram of Test Setup



6.2.The Requirement For Section 15.247(a)(2)

Section 15.247(a)(2): Systems using digital modulation techniques may operate in the 902-928MHz, 2400-2483.5MHz, and 5725-5850MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

6.3.The Requirement for 5.2(1)

The minimum -6 dB bandwidth shall be 500 kHz.

6.4.EUT Configuration on Measurement

The equipment are installed on the emission measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

6.5.Operating Condition of EUT

6.5.1.Setup the EUT and simulator as shown as Section 6.1.

6.5.2.Turn on the power of all equipment.

6.5.3.Let the EUT work in TX modes measure it. The transmit frequency are 2412-2462MHz. We select 2412MHz, 2437MHz, 2462MHz TX frequency to transmit.

6.6.Test Procedure

1. Set resolution bandwidth (RBW) = 100 kHz.
2. Set the video bandwidth (VBW) ≥ 3 x RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Allow the trace to stabilize.
7. Measure the maximum width of the emission that is constrained by the frequencies

associated with the two outermost amplitude points (upper and lower) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

6.7.Test Result

The test was performed with 802.11b			
Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Limit (MHz)
Low	2412	8.640	> 0.5MHz
Middle	2437	8.726	> 0.5MHz
High	2462	8.640	> 0.5MHz

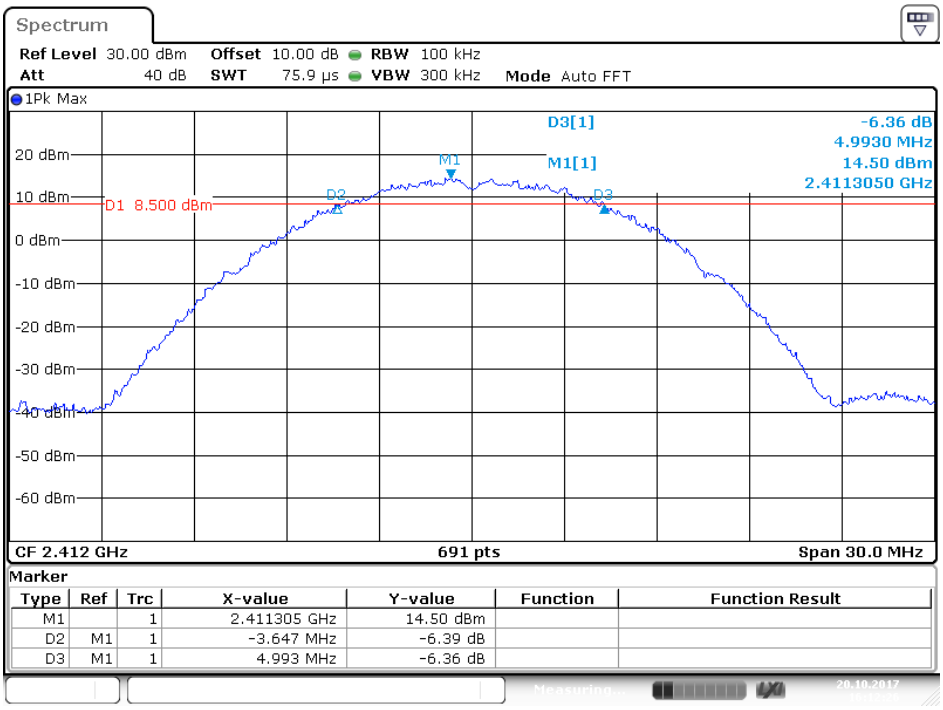
The test was performed with 802.11g			
Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Limit (MHz)
Low	2412	16.237	> 0.5MHz
Middle	2437	16.368	> 0.5MHz
High	2462	16.367	> 0.5MHz

The test was performed with 802.11n (Bandwidth: 20 MHz)				
Channel	Frequency (MHz)	6dB Bandwidth (MHz) ANT 1	6dB Bandwidth (MHz) ANT 2	Limit (MHz)
Low	2412	17.540	17.236	> 0.5MHz
Middle	2437	17.583	17.496	> 0.5MHz
High	2462	17.497	17.496	> 0.5MHz

The spectrum analyzer plots are attached as below.

6dB Bandwidth

802.11b Channel Low 2412MHz



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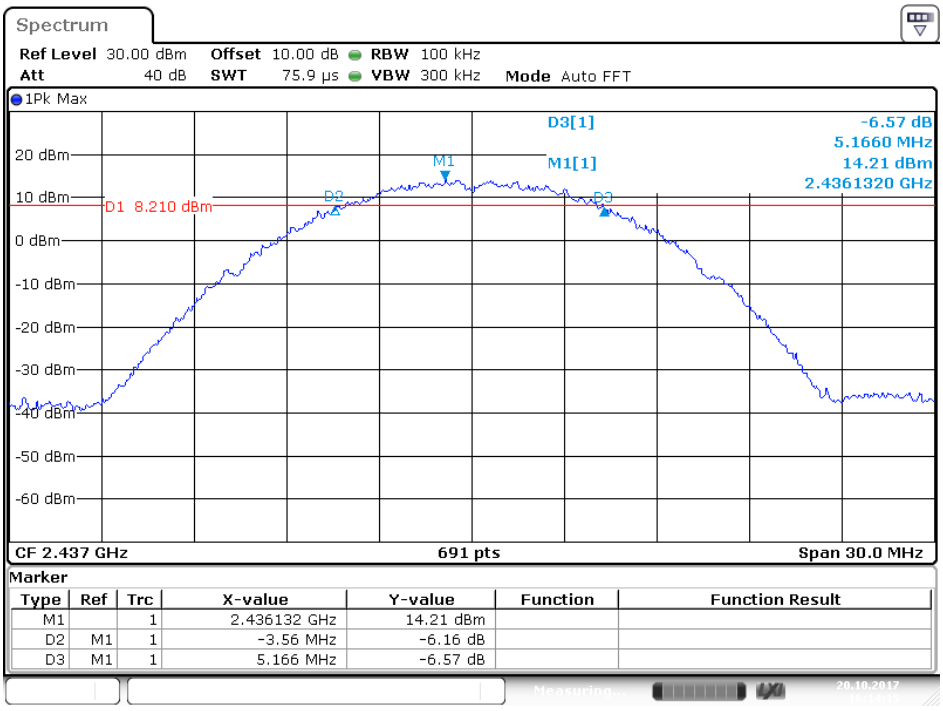
802.11b Channel Middle 2437MHz



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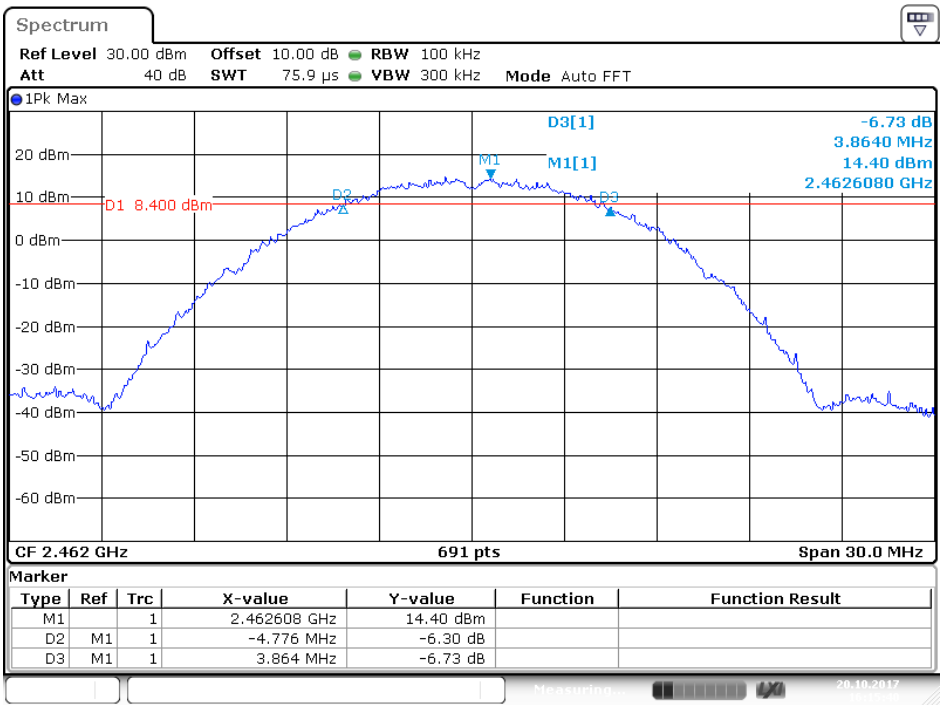
802.11b Channel High 2462MHz



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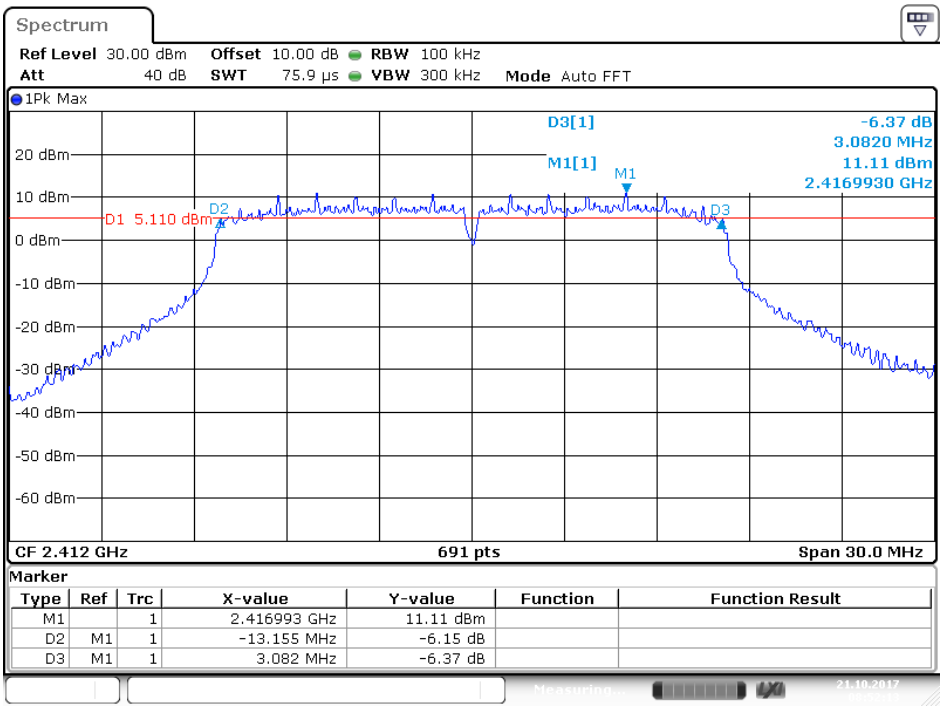
802.11g Channel Low 2412MHz



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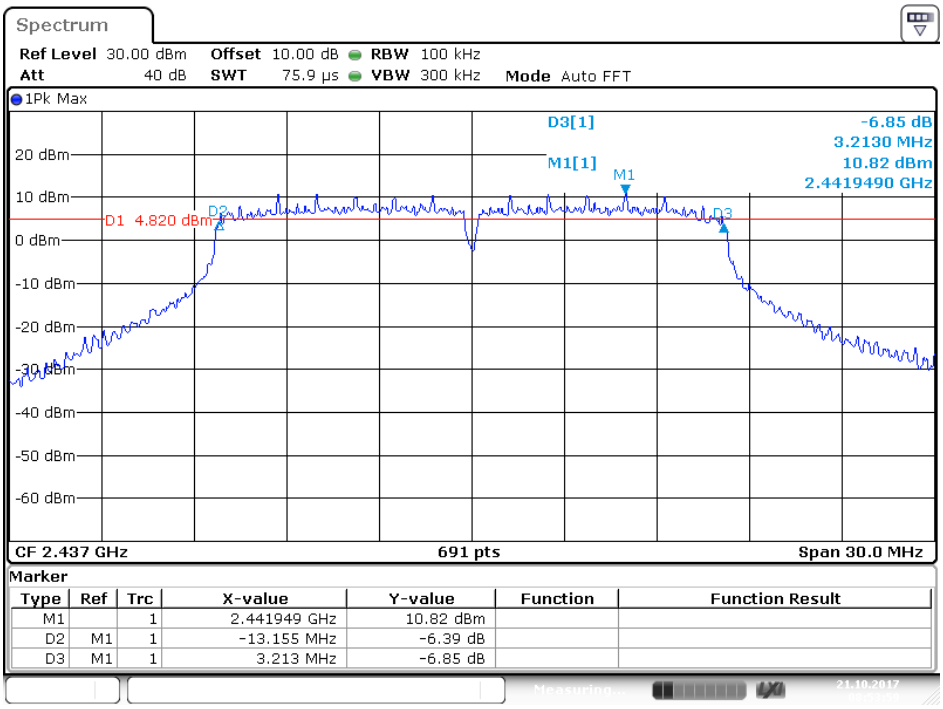
802.11g Channel Middle 2437MHz



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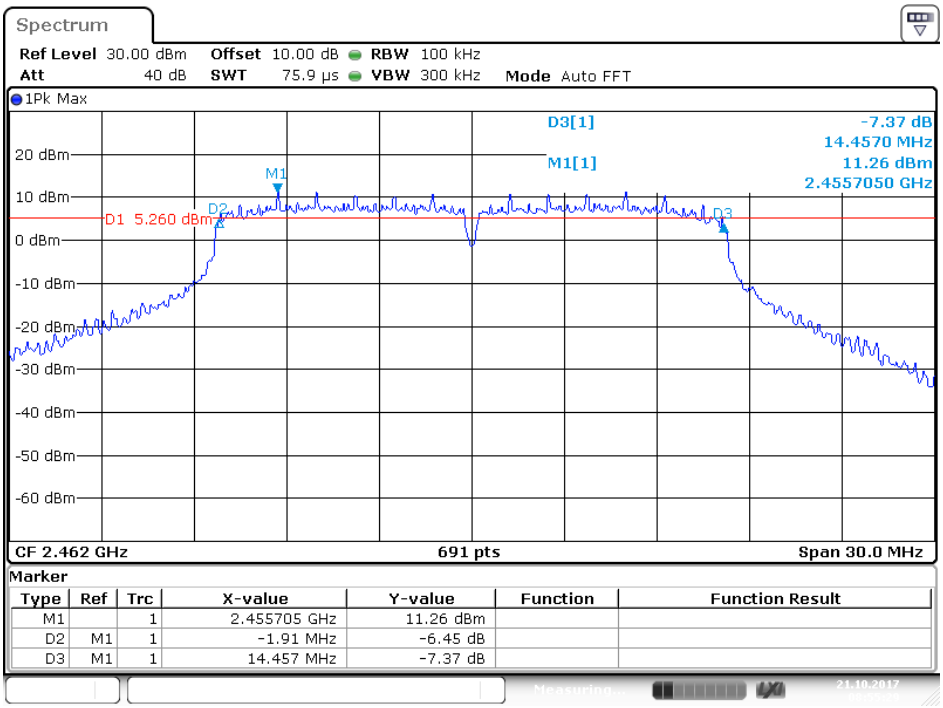
802.11g Channel High 2462MHz



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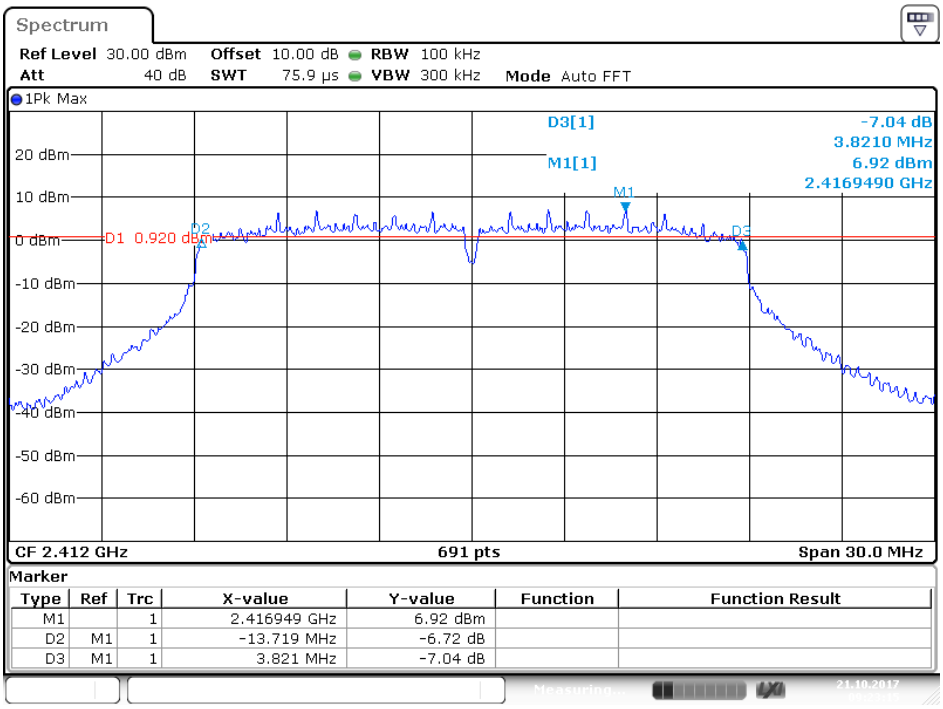
802.11n Channel Low 2412MHz (20MHz) ANT 1



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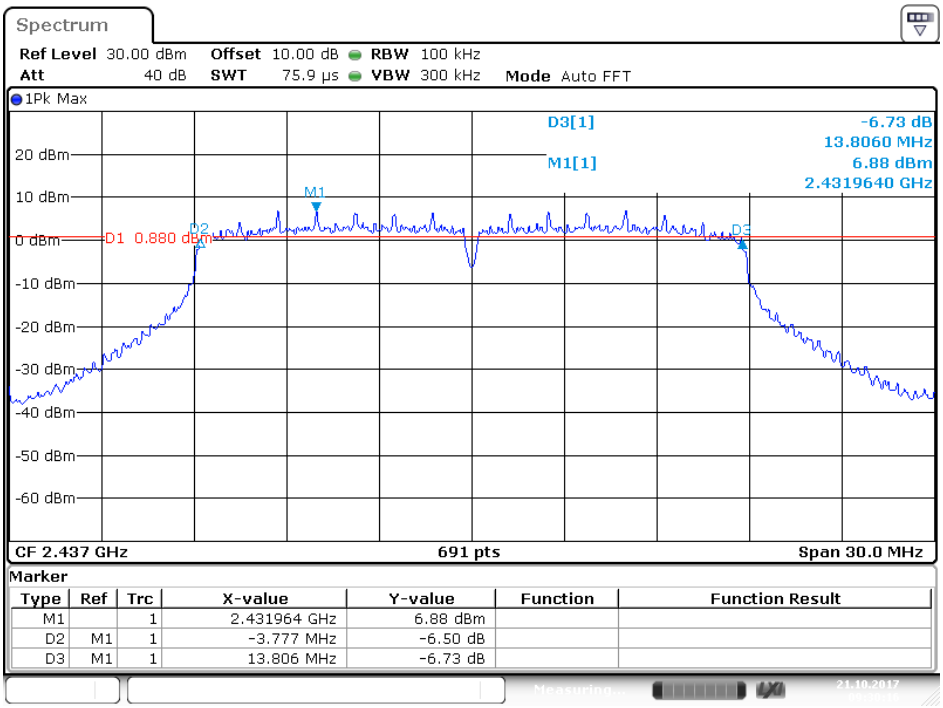
802.11n Channel Middle 2437MHz(20MHz) ANT 1



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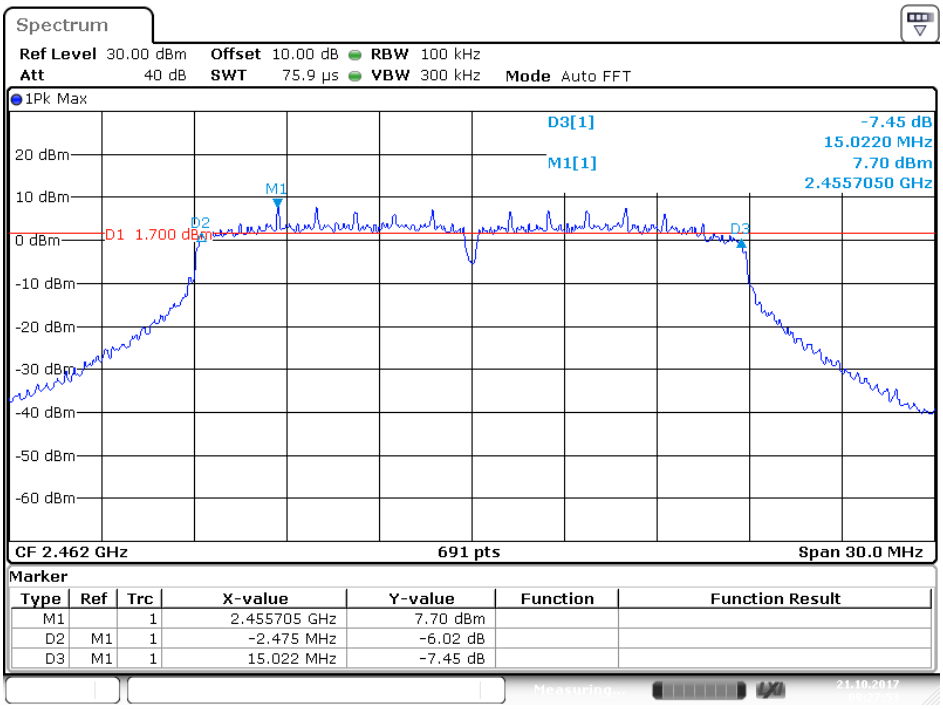
802.11n Channel High 2462MHz(20MHz) ANT 1



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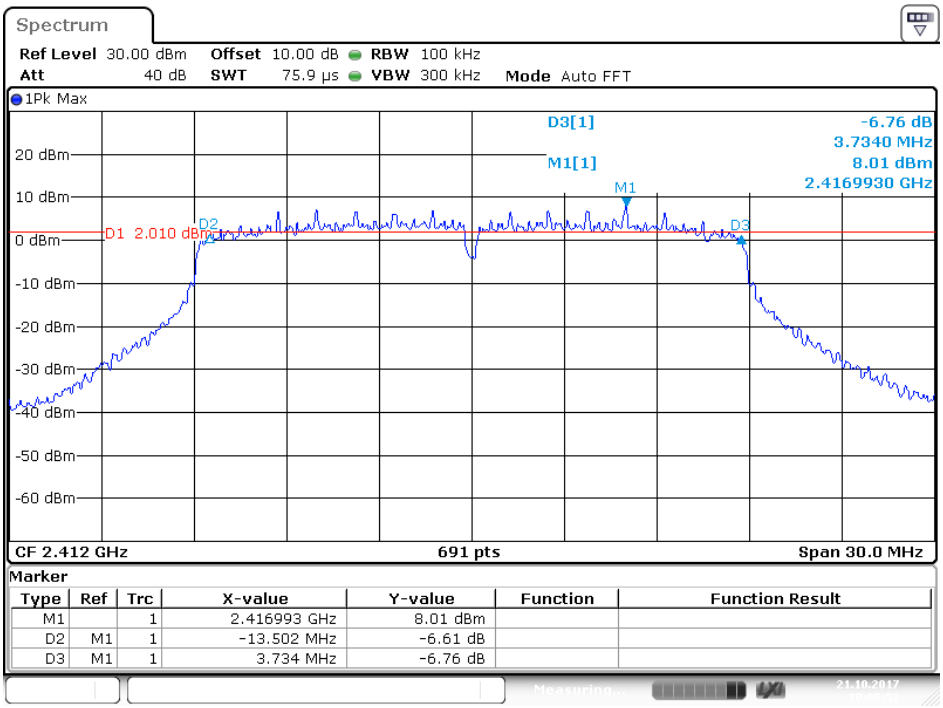
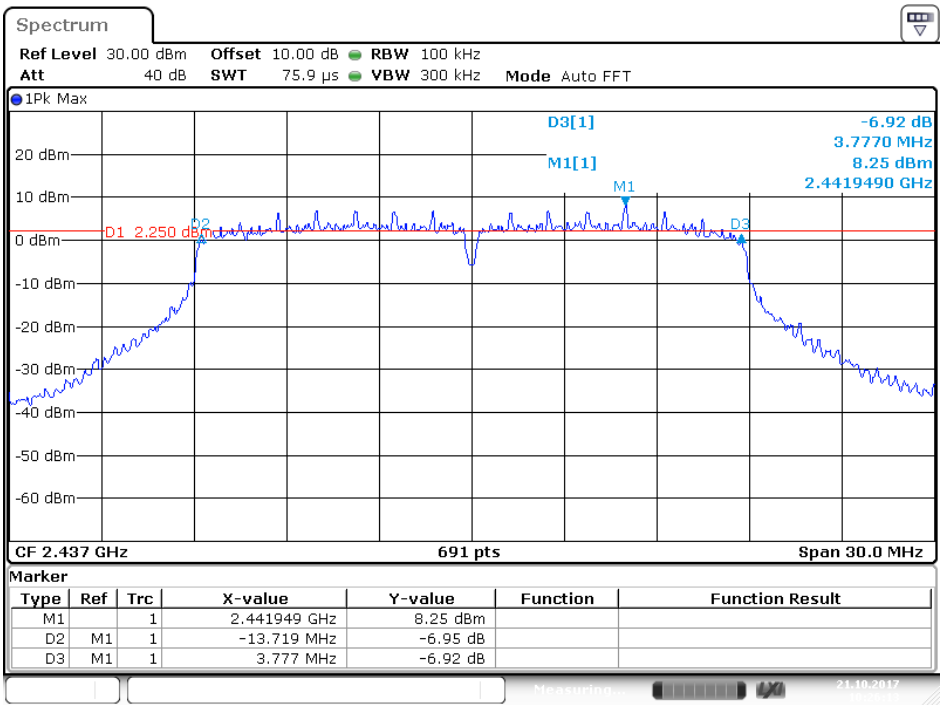
802.11n Channel Low 2412MHz (20MHz) ANT 2



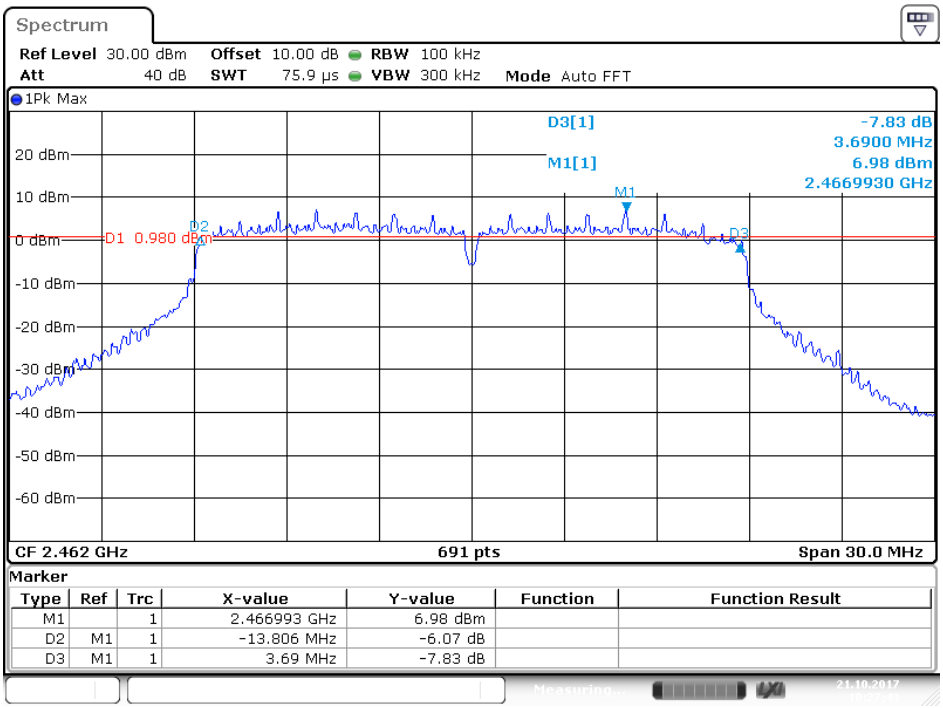
Date: 21.OCT.2017 10:08:51

802.11n Channel Middle 2437MHz(20MHz) ANT 2



Date: 21.OCT.2017 10:26:13

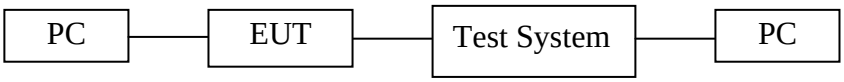
802.11n Channel High 2462MHz(20MHz) ANT 2



Date: 21.OCT.2017 10:27:43

7. DUTY CYCLE MEASUREMENT

7.1.Block Diagram of Test Setup



7.2.EUT Configuration on Measurement

The equipment are installed on the emission measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

7.3.Operating Condition of EUT

7.3.1.Setup the EUT and simulator as shown as Section 7.1.

7.3.2.Turn on the power of all equipment.

7.3.3.Let the EUT work in TX modes then measure it. The transmit frequency are 2412-2462MHz. We select 2412MHz, 2437MHz, 2462MHz TX frequency to transmit.

7.4.Test Procedure

Measurements of duty cycle and transmission duration shall be performed using one of the following techniques:
1. A diode detector and an oscilloscope that together have sufficiently short response time to permit accurate measurements of the on- and off-times of the transmitted signal.
2. The zero-span mode on a spectrum analyzer or EMI receiver if the response time and spacing between bins on the sweep are sufficient to permit accurate measurements of the on- and off-times of the transmitted signal
a. Set the center frequency of the instrument to the centre frequency of the transmission
b. Set RBW ≥ OBW if possible; otherwise, set RBW to the largest available value(10MHz).
c. Set detector = Peak or average.
d. The zero-span measurement method shall not be used unless both RBW and VBW are > 50/T and the number of sweep points across duration T exceeds 100.
(For example, if VBW and/or RBW are limited to 3MHz, then the zero-span method of measuring duty cycle shall not be used if T≤16.7 microseconds.)

7.5.Test Result

The manufacturer can set up the duty cycle of 100%,

So we tested the power and PSD at 100% of the duty cycle.

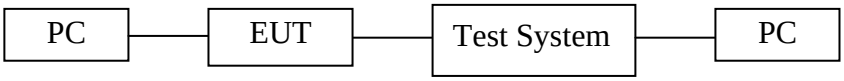
Note: Single antenna transmit in 820.11b and 802.11g mode

Both antennas are transmitted at the same time in 802.11n mode.

We have recorded the worst case value in the report.

8. MAXIMUM CONDUCTED (AVERAGE) OUTPUT POWER

8.1.Block Diagram of Test Setup



8.2.The Requirement For Section 15.247(b)(3)

Section 15.247(b)(3): For systems using digital modulation in the 902-928MHz, 2400-2483.5MHz, and 5725-5850MHz bands: 1 Watt.

8.3.EUT Configuration on Measurement

The equipment is installed on the emission Measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

8.4.Operating Condition of EUT

8.4.1.Setup the EUT and simulator as shown as Section 8.1.

8.4.2.Turn on the power of all equipment.

8.4.3.Let the EUT work in TX modes then measure it. The transmit frequency are 2412-2462MHz. We select 2412, 2437, 2462MHz TX frequency to transmit.

8.5.Test Procedure

8.5.1.The EUT was tested according to DTS test procedure of Apr 05, 2017 KDB5580 74 D01 DTS Meas Guidance v04 for compliance to FCC 47CFR 15.247 requirements.

8.5.2.The transmitter output was connected to the spectrum analyzer through a low loss cable.

8.5.3.Set RBW = 1-5% of the OBW, not to exceed 1 MHz, VBW $\geqslant$ 3 x RBW, Sweep time = auto, Set span to at least 1.5 times the OBW, Detector = RMS.

8.5.4.Measurement the Maximum conducted (average) output power.

8.6.Test Result

Note: Single antenna transmit in 820.11b and 802.11g mode

Both antennas are transmitted at the same time in 802.11n mode.

We have recorded the worst case value in the report.

Final power= Ave output power+10log(1/ duty cycle)

The test was performed with 802.11b								
Frequency (MHz)	Ave output power (dBm)	10log(1/ duty cycle)	Final power (dBm)	Final power (W)	FCC Limits dBm / W	Antenna gain (max) dBi	E.I.R.P. (dBm)	IC E.I.R.P. Limits dBm/W
2412	26.32	0.00	26.32	0.43	30 dBm / 1 W	5.38	31.70	36dBm/4W
2437	26.13	0.00	26.13	0.41	30 dBm / 1 W	5.38	31.51	36dBm/4W
2462	26.41	0.00	26.41	0.44	30 dBm / 1 W	5.38	31.79	36dBm/4W

The test was performed with 802.11g								
Frequency (MHz)	Ave output power (dBm)	10log(1/ duty cycle)	Final power (dBm)	Final power (W)	FCC Limits dBm / W	Antenna gain (max) dBi	E.I.R.P. (dBm)	IC E.I.R.P. Limits dBm / W
2412	26.58	0.00	26.58	0.45	30 dBm / 1 W	5.38	31.96	36dBm/4W
2437	26.76	0.00	26.76	0.47	30 dBm / 1 W	5.38	32.14	36dBm/4W
2462	26.88	0.00	26.88	0.49	30 dBm / 1 W	5.38	32.26	36dBm/4W

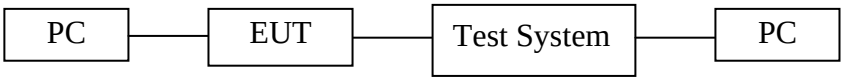
The test was performed with 802.11n20(MIMO mode)								
Frequency (MHz)	Ave output power ANT1 (dBm)	Ave output power ANT 2 (dBm)	10log(1/ duty cycle) ANT 1	10log(1/ duty cycle) ANT 2	Final output power ANT 1 (dBm)	Final output power ANT 2 (dBm)	Total output power (dBm)	FCC Limits dBm
2412	22.87	22.73	0.00	0.00	22.87	22.73	25.81	30 dBm / 1 W
2437	22.36	22.89	0.00	0.00	22.36	22.89	25.64	30 dBm / 1 W
2462	22.80	22.55	0.00	0.00	22.80	22.55	25.69	30 dBm / 1 W

The test was performed with 802.11n20(MIMO mode)						
Frequency (MHz)	Total output power (dBm)	Antenna gain (Ant 1) dBi	Antenna gain (Ant 2) dBi	Directional gain dBi	E.I.R.P. dBm	IC E.I.R.P. Limits dBm / W
2412	25.81	4.59	5.38	5	30.81	36 dBm / 4 W
2437	25.64	4.59	5.38	5	30.64	36 dBm / 4 W
2462	25.69	4.59	5.38	5	30.69	36 dBm / 4 W

Directional gain=$10\log\{(10^{G1/10}+10^{G2/10})/N_{ANT}\}$ dBi

9. POWER SPECTRAL DENSITY MEASUREMENT

9.1.Block Diagram of Test Setup



9.2.The Requirement For Section 15.247(e)

Section 15.247(e): For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

9.3.EUT Configuration on Measurement

The equipment are installed on the emission Measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

9.4.Operating Condition of EUT

9.4.1.Setup the EUT and simulator as shown as Section 9.1.

9.4.2.Turn on the power of all equipment.

9.4.3.Let the EUT work in TX modes then measure it. The transmit frequency are 2412-2462MHz. We select 2412MHz, 2437MHz, 2462MHz TX frequency to transmit.

9.5.Test Procedure

9.5.1.The transmitter output was connected to the spectrum analyzer through a low loss cable.

9.5.2.Measurement Procedure AVGPSD-2:

This procedure is applicable when the EUT cannot be configured to transmit continuously(i.e., duty cycle<98%), and when sweep triggering/signal gating cannot be used to measure only when the EUT is transmitting at its maximum power control level, and when the transmission duty is constant(i.e., duty cycle variations are less than ±2%):

Measure the dyty cycle(x) of the transmitter output signal as described in Section 6.0.
Set instrument center frequency to DTS channel center frequency.
Set span to at least 1.5×OBW.
Set RBW to: 3kHz≤ RBW≤100kHz.
Set VBW≥ 3×RBW
Detector=power averaging(RMS) or sample detector(when RMS not available).
Ensure that the number of measurement points in sweep≥2×span/RBW.
Sweep time=auto couple.
Do not use sweep triggering. Allow sweep to “free run”.
Employ trace averaging(RMS) mode over a minimum of 100 traces.
Use the peak maker function to determine the maximum amplitude level.
Add 10log(1/x), where x is the duty cycle measured in step(a, to the measured PSD to compute the average PSD during the actual transmission time.
If resultant value exceeds the limit, then reduce RBW(no less than 3kHz) and repeat(note that this may require zooming in on the emission of interest and reducing the span in order to meet the minimum measurement point requirement as the RBW is reduced).

9.6.Test Result

Note: Single antenna transmit in 820.11b and 802.11g mode

Both antennas are transmitted at the same time in 802.11n mode.

We have recorded the worst case value in the report.

The test was performed with 802.11b					
Channel	Frequency (MHz)	AVG Power Spectral Density(dBm)	10log(1/ duty cycle)	Final Power Spectral Density(dBm)	Limits (dBm)
Low	2412	3.49	0.00	3.49	8 dBm
Middle	2437	3.24	0.00	3.24	8 dBm
High	2462	3.48	0.00	3.48	8 dBm

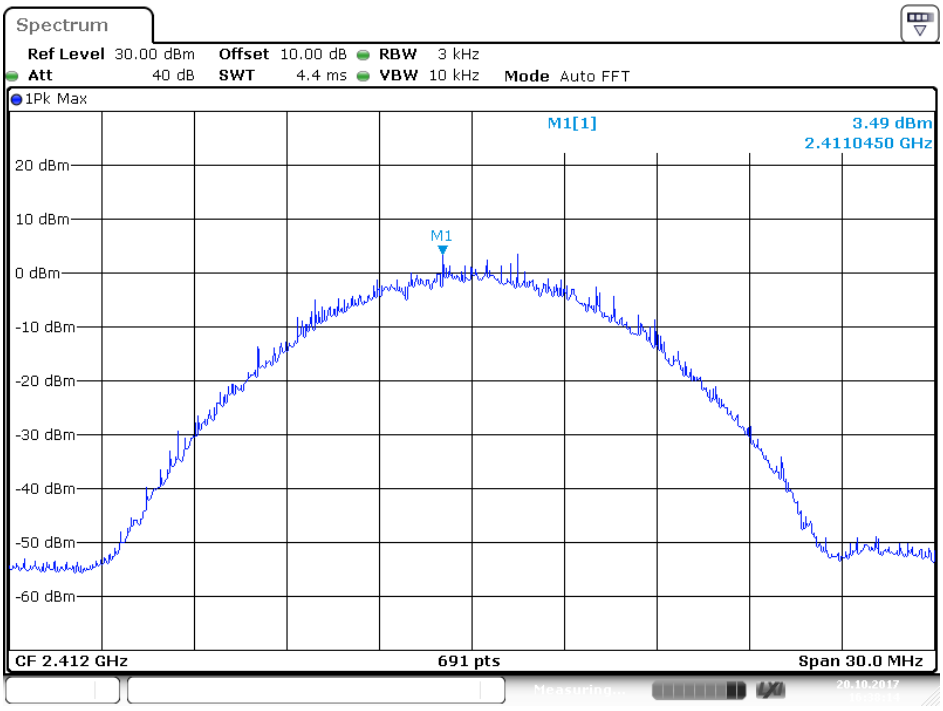
The test was performed with 802.11g					
Channel	Frequency (MHz)	AVG Power Spectral Density(dBm)	10log(1/ duty cycle)	Final Power Spectral Density(dBm)	Limits (dBm)
Low	2412	-1.96	0.00	-1.96	8 dBm
Middle	2437	-1.52	0.00	-1.52	8 dBm
High	2462	-1.71	0.00	-1.71	8 dBm

The test was performed with 802.11n20(MIMO mode)								
Frequency (MHz)	Power Spectral Density ANT 1 (dBm)	Power Spectral Density ANT 2 (dBm)	10log(1/x) ANT 1	10log(1/x) ANT 2	Final Power Spectral Density ANT 1 (dBm)	Final Power Spectral Density ANT 2 (dBm)	Total Power Spectral Density (dBm)	Limits (dBm)
2412	-6.92	-5.53	0.00	0.00	-6.92	-5.53	-3.16	8 dBm
2437	-6.86	-6.58	0.00	0.00	-6.86	-6.58	-3.71	8 dBm
2462	-6.60	-6.51	0.00	0.00	-6.60	-6.51	-3.54	8 dBm

The spectrum analyzer plots are attached as below.

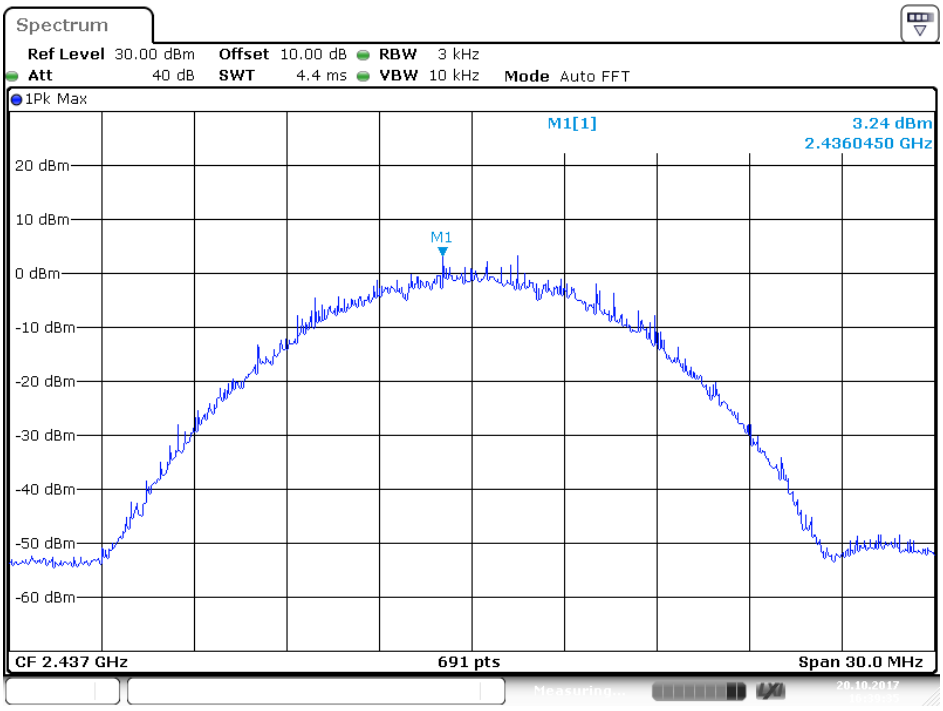
Test mode: SISO

802.11b Low Channel 2412MHz



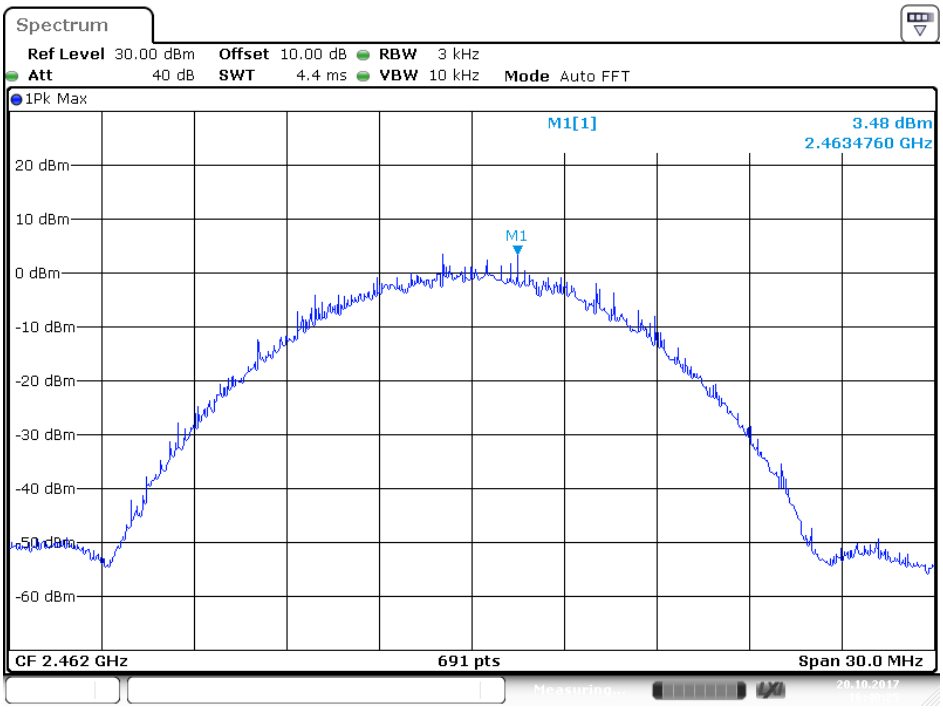
Date: 20.OCT.2017 16:38:14

802.11b Middle Channel 2437MHz



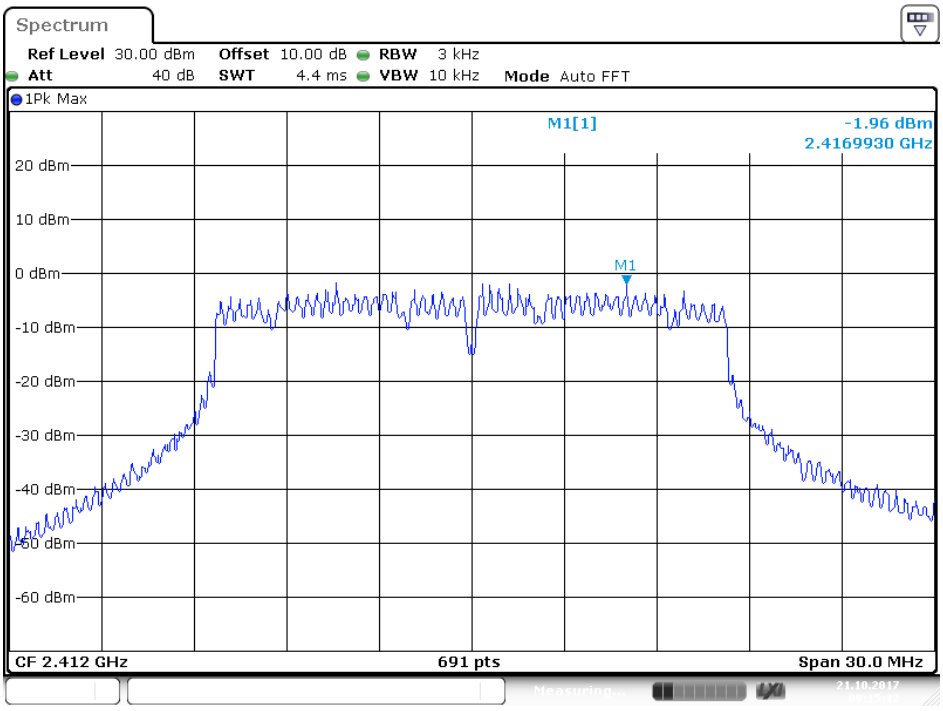
Date: 20.OCT.2017 16:39:35

802.11b High Channel 2462MHz



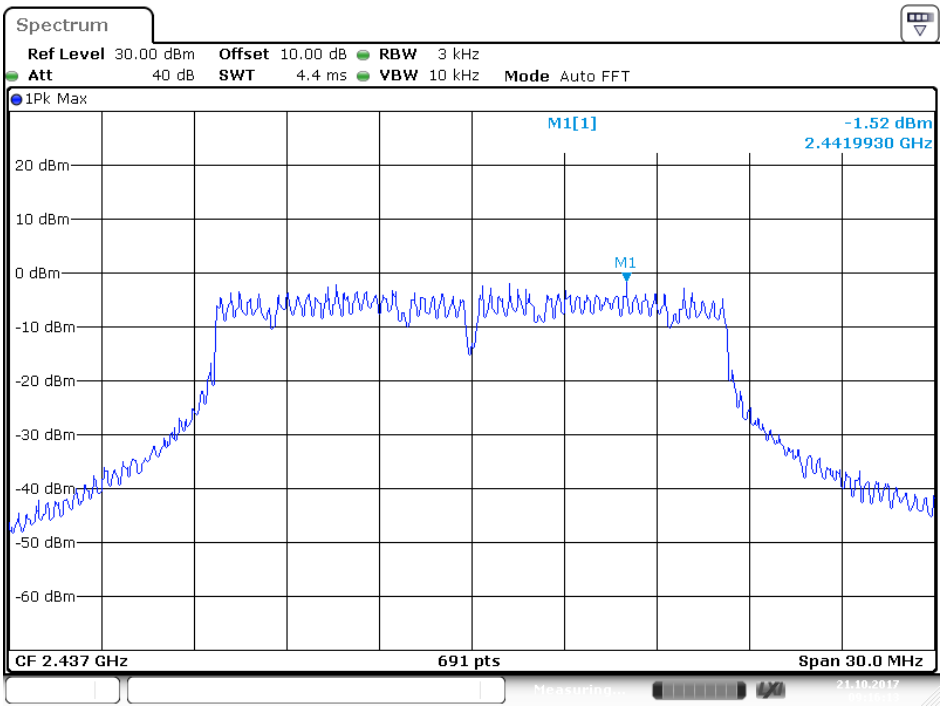
Date: 20.OCT.2017 16:40:24

802.11g Low Channel 2412MHz



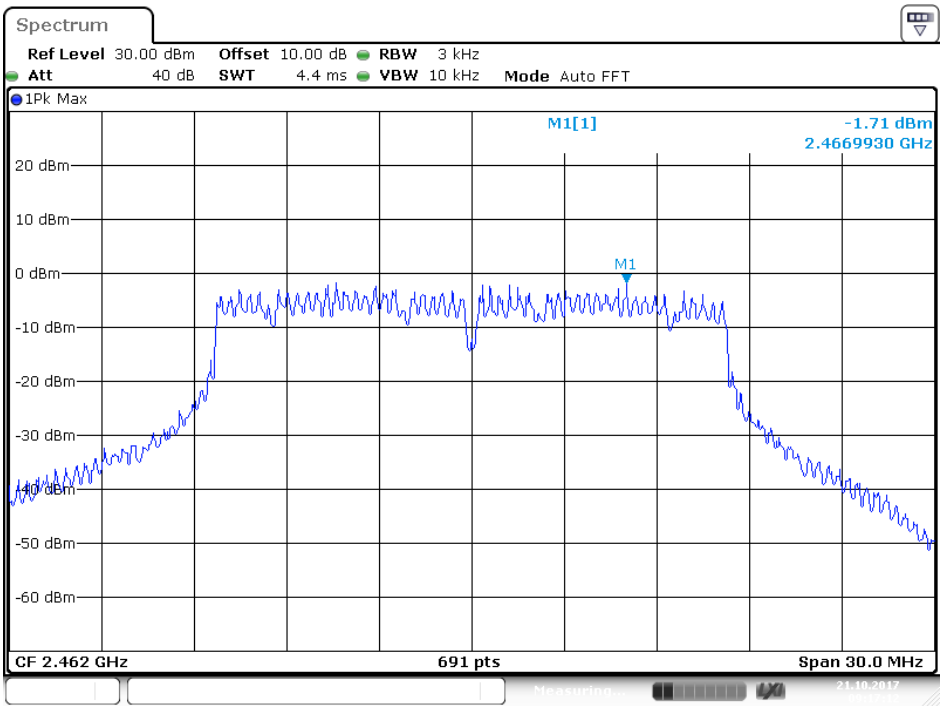
Date: 21.OCT.2017 09:15:11

802.11g Middle Channel 2437MHz



Date: 21.OCT.2017 09:16:12

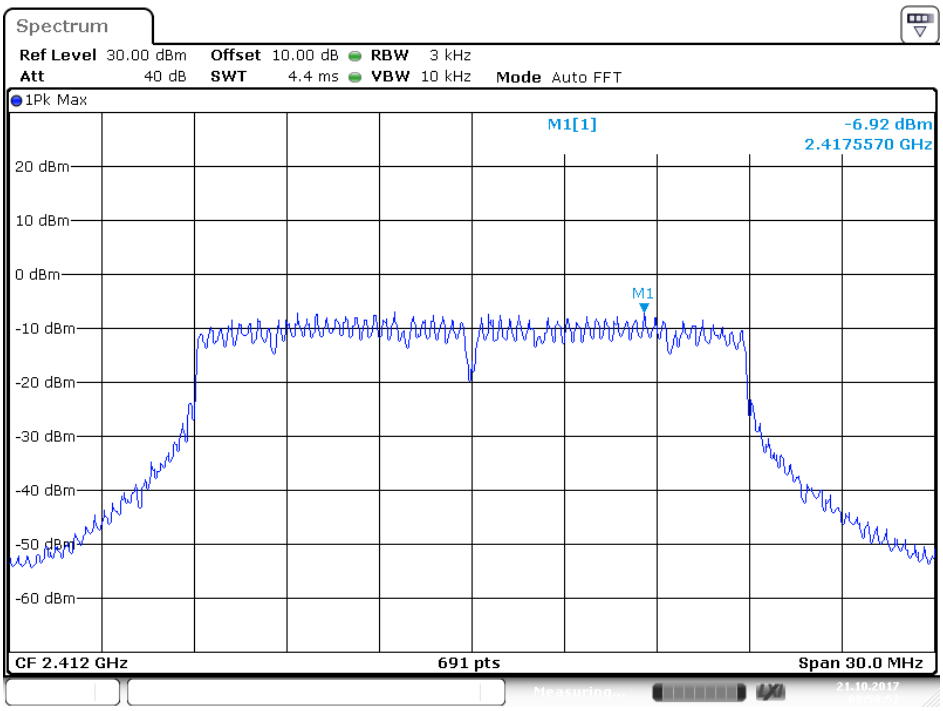
802.11g High Channel 2462MHz



Date: 21.OCT.2017 09:17:12

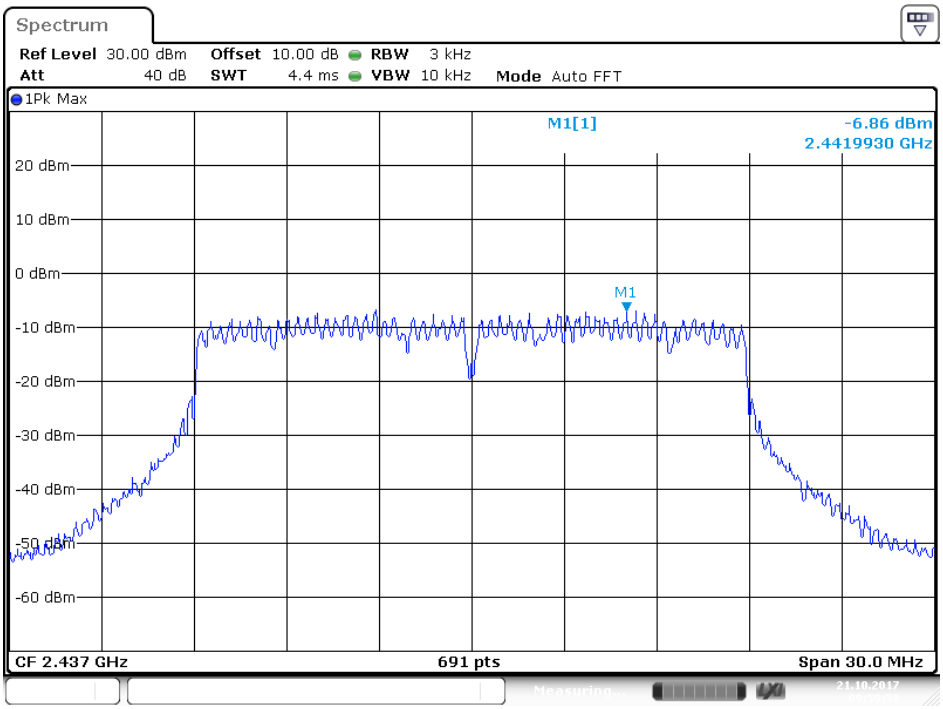
Test mode: MIMO

802.11n Low Channel 2412MHz (20MHz) ANT 1



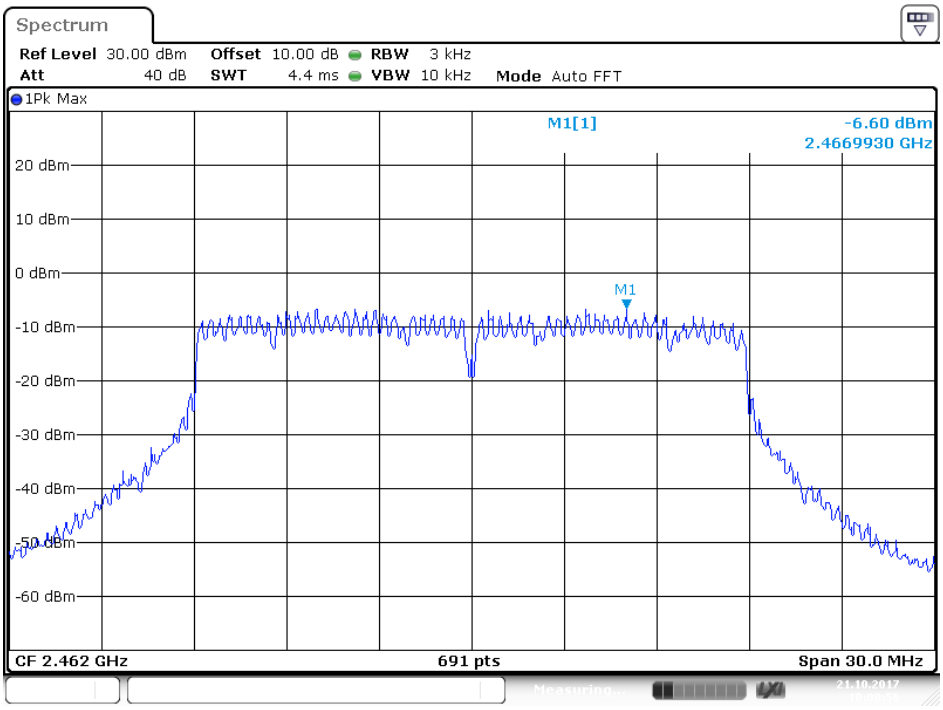
Date: 21.OCT.2017 09:58:51

802.11n Middle Channel 2437MHz (20MHz) ANT 1



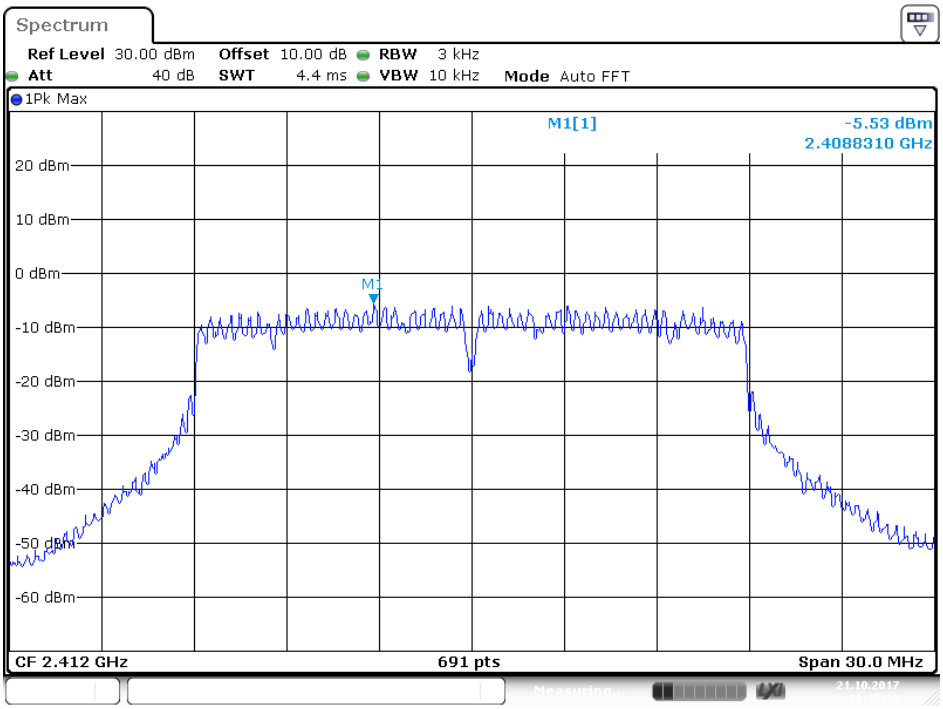
Date: 21.OCT.2017 09:59:58

802.11n High Channel 2462MHz(20MHz) ANT 1



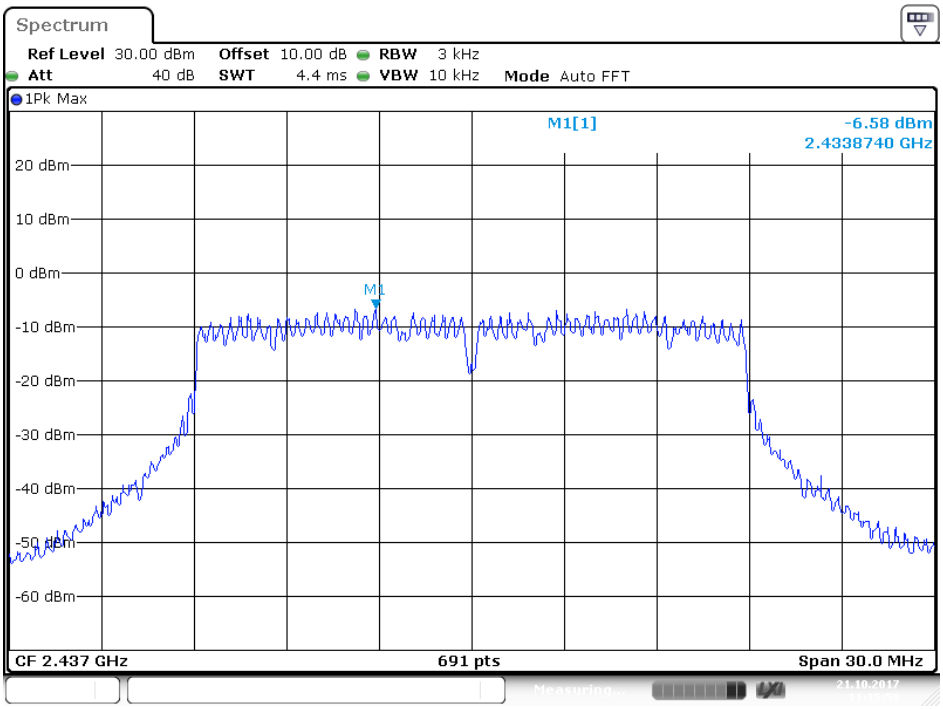
Date: 21.OCT.2017 10:00:56

802.11n Low Channel 2412MHz (20MHz) ANT 2



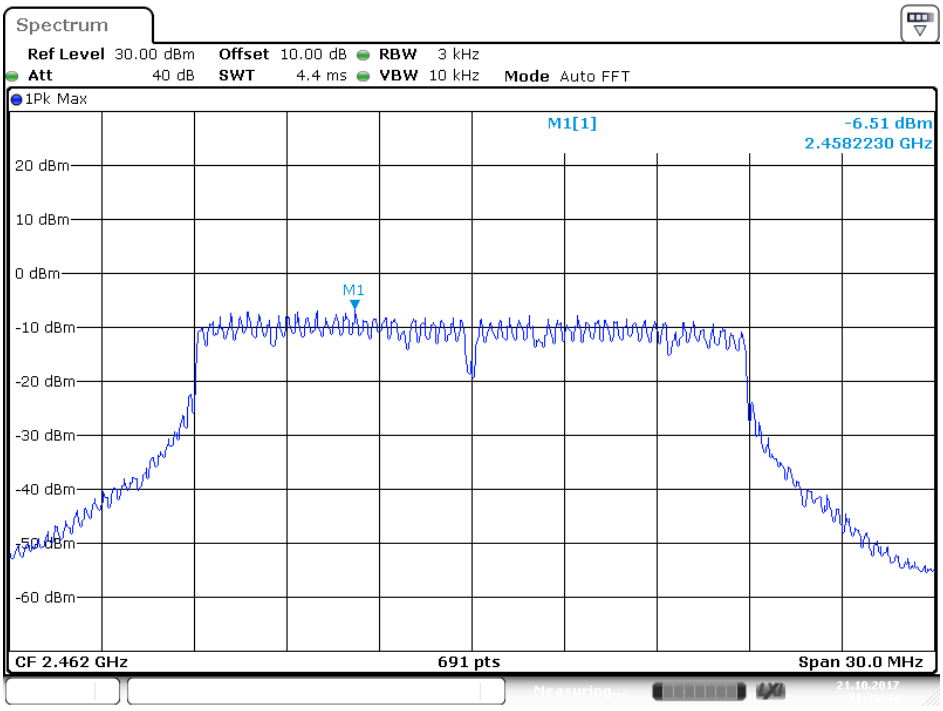
Date: 21.OCT.2017 11:15:13

802.11n Middle Channel 2437MHz(20MHz) ANT 2



Date: 21.OCT.2017 11:15:50

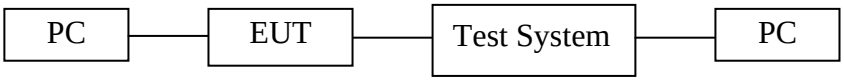
802.11n High Channel 2462MHz(20MHz) ANT 2



Date: 21.OCT.2017 11:16:44

10.BAND EDGE COMPLIANCE TEST

10.1.Block Diagram of Test Setup



10.2.The Requirement For Section 15.247(d)

Section 15.247(d): In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a).

10.3.The Requirement For RSS-247 Section 5.5

5.5: In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under Section 5.4(4), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in RSS-Gen is not required.

10.4.EUT Configuration on Measurement

The equipment are installed on the emission Measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

10.5.Operating Condition of EUT

10.5.1.Setup the EUT and simulator as shown as Section 10.1.

10.5.2.Turn on the power of all equipment.

10.5.3.Let the EUT work in TX modes then measure it. The transmit frequency are 2412-2462MHz. We select 2412MHz, 2462MHz TX frequency to transmit.

10.6.Test Procedure

Conducted Band Edge:

10.6.1.The transmitter output was connected to the spectrum analyzer via a low loss cable.

10.6.2.Set RBW of spectrum analyzer to 100kHz and VBW to 300kHz.

Radiate Band Edge:

10.6.3.The EUT is placed on a turntable, which is 0.8m above the ground plane and worked at highest radiated power.

10.6.4.The turntable was rotated for 360 degrees to determine the position of maximum emission level.

10.6.5.EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emission.

10.6.6.Set the spectrum analyzer in the following setting in order to capture the lower and upper band-edges of the emission:

10.6.7.RBW=1MHz, VBW=1MHz

10.6.8.The band edges was measured and recorded.

10.7.Test Result

The test was performed with 802.11b		
Frequency (MHz)	Result of Band Edge (dBc)	Limit of Band Edge (dBc)
2337.7	53.16	> 30dBc
2491.2	54.27	> 30dBc

The test was performed with 802.11g		
Frequency (MHz)	Result of Band Edge (dBc)	Limit of Band Edge (dBc)
2400	34.76	> 30dBc
2486.3	50.75	> 30dBc

The test was performed with 802.11n (20MHz) ANT 1		
Frequency (MHz)	Result of Band Edge (dBc)	Limit of Band Edge (dBc)
2400	36.41	> 30dBc
2498.0	45.96	> 30dBc

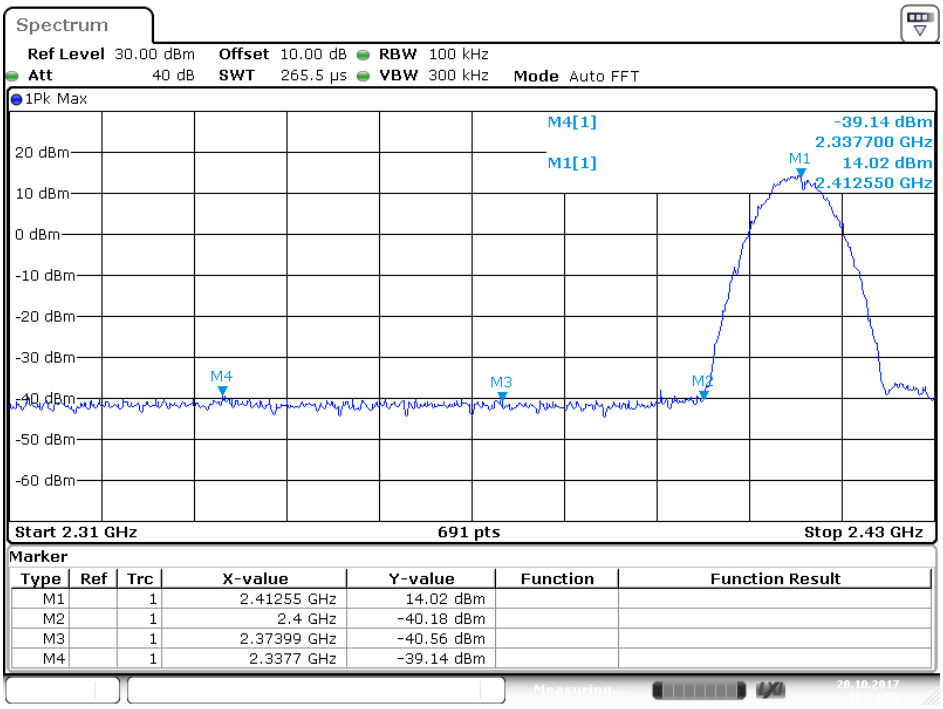
The test was performed with 802.11n (20MHz) ANT 2		
Frequency (MHz)	Result of Band Edge (dBc)	Limit of Band Edge (dBc)
2400	37.23	> 30dBc
2496.8	46.26	> 30dBc

Note: Single antenna transmit in 820.11b and 802.11g mode

Both antennas are transmitted at the same time in 802.11n mode.

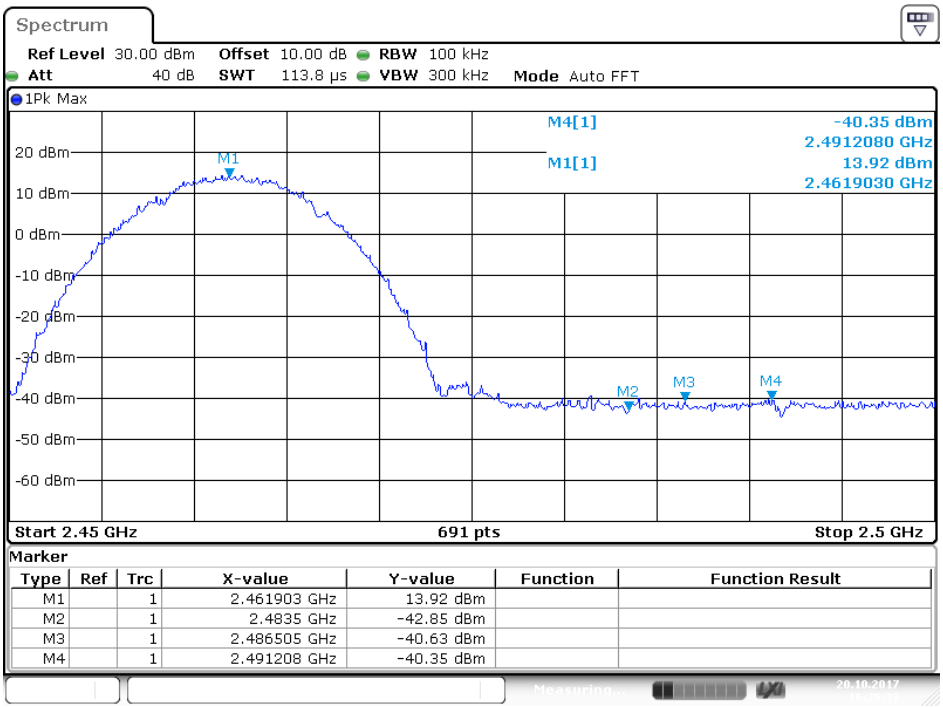
We have recorded the worst case value in the report.

802.11b Low Channel 2412MHz



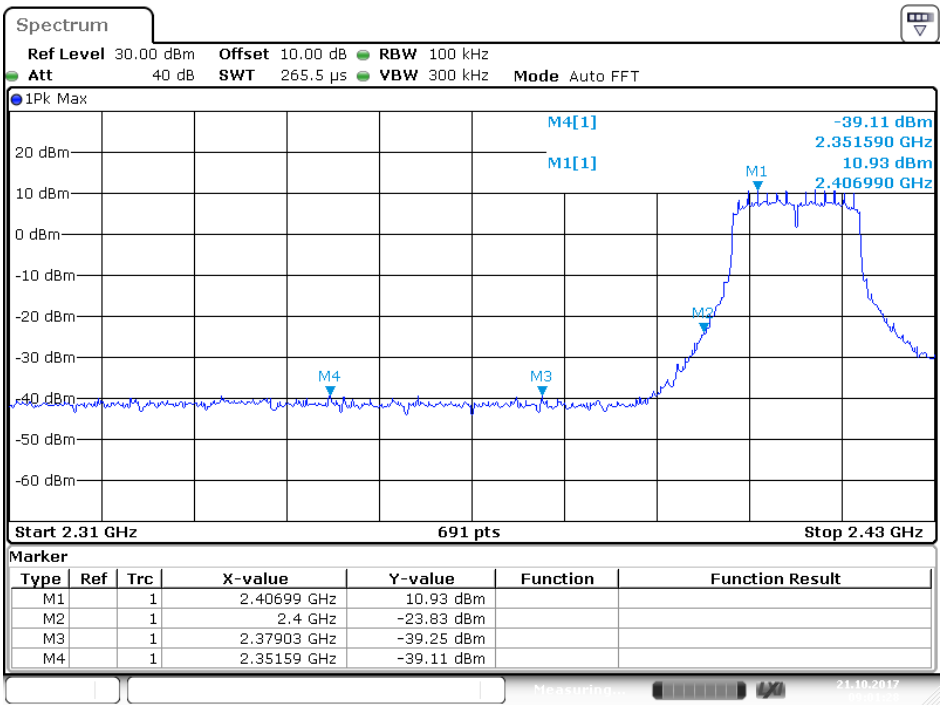
Date: 20.OCT.2017 16:24:50

802.11b High Channel 2462MHz



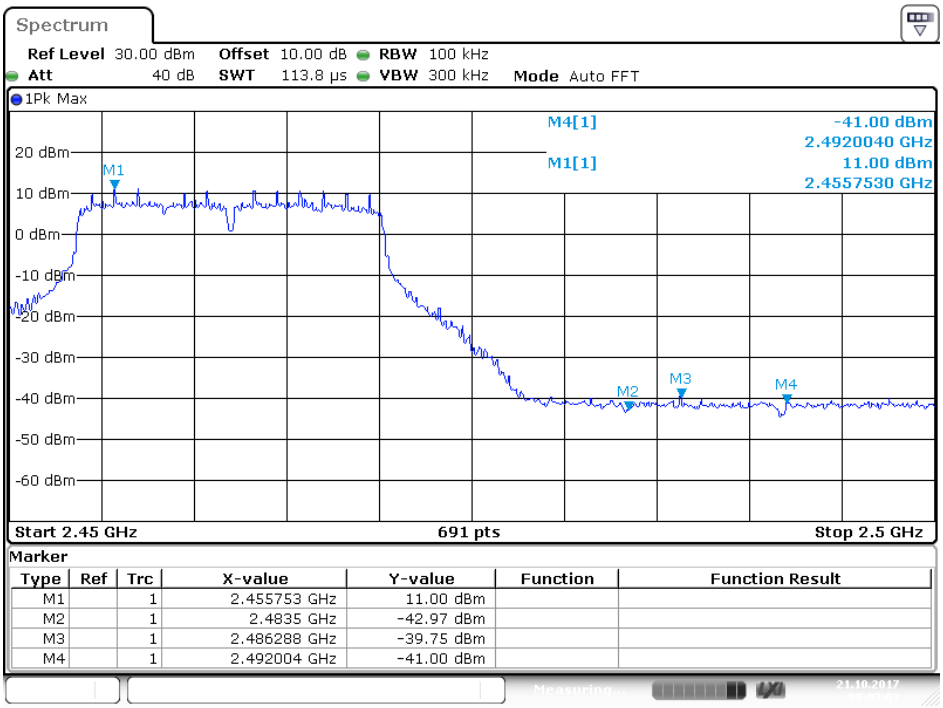
Date: 20.OCT.2017 16:26:37

802.11g Low Channel 2412MHz



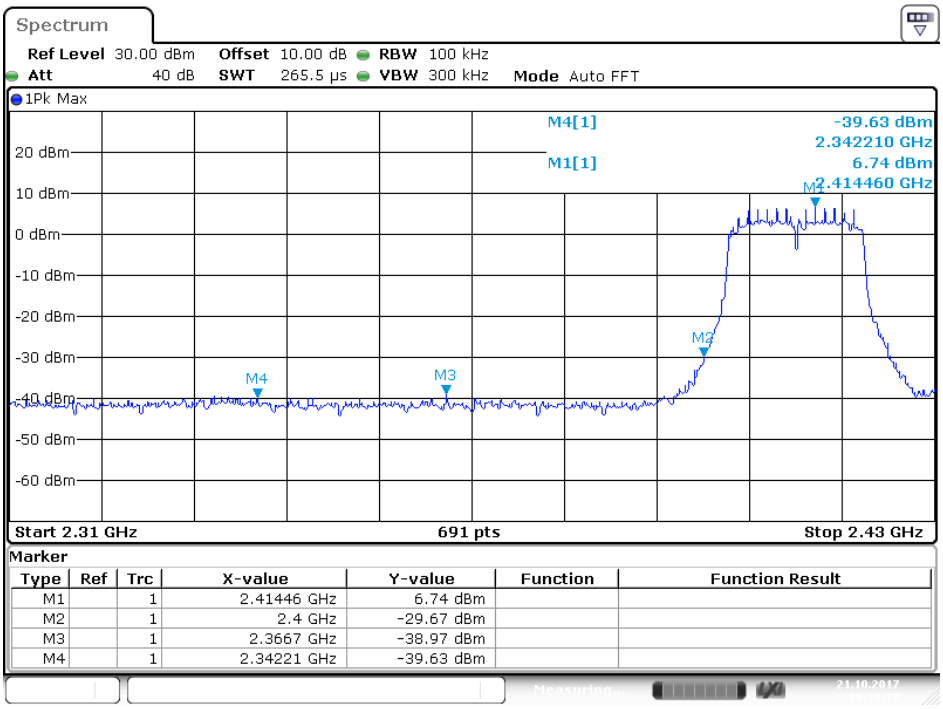
Date: 21.OCT.2017 09:01:28

802.11g High Channel 2462MHz



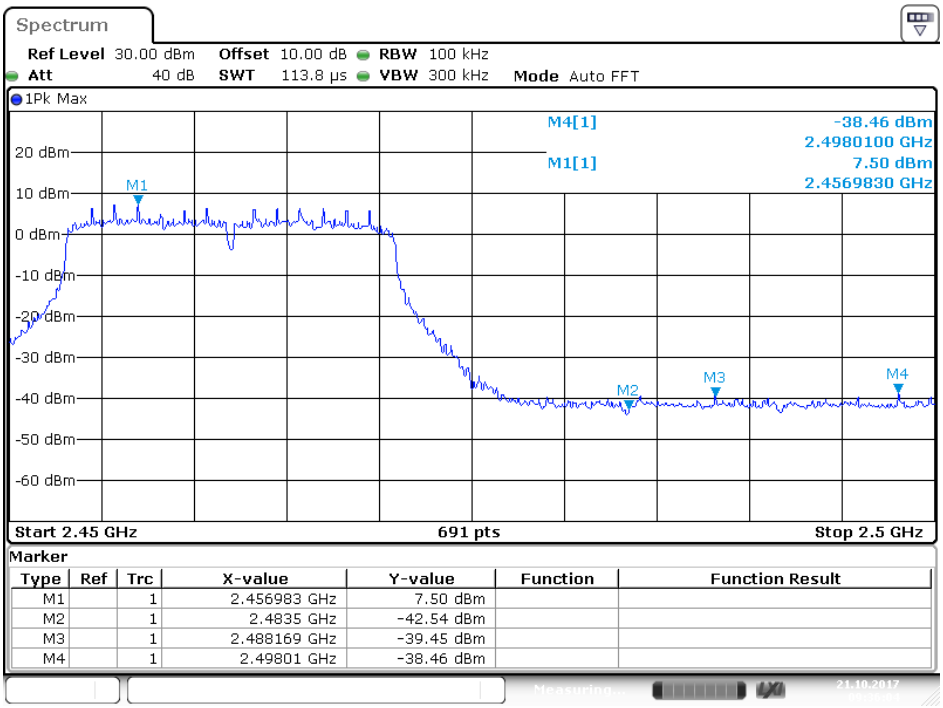
Date: 21.OCT.2017 09:03:02

802.11n Low Channel 2412MHz (20MHz) ANT 1



Date: 21.OCT.2017 09:38:09

802.11n High Channel 2462MHz (20MHz) ANT 1



Date: 21.OCT.2017 09:36:04