TEST REPORT

No. I20N03221-WLAN

for

HMD Global Oy

Multi-band GSM/WCDMA/LTE phone with Bluetooth, WLAN

Model Name: TA-1346

with

Hardware Version: 99652_1_11

Software Version: 000T_0_080

FCC ID: 2AJOTTA-1346

IC: 23070-TA1346

Issued Date: 2021-01-18

Note:

The test results in this test report relate only to the devices specified in this report. This report shall not be reproduced except in full without the written approval of SAICT.

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1. Summary of Test Report

1.1. Test Items

Description	Multi-band GSM/WCDMA/LTE phone with Bluetooth, WLAN
Model Name	TA-1346
Applicant's name	HMD Global Oy
Manufacturer's Name	HMD Global Oy

1.2. Test Standards

FCC Part15-2019; ANSI C63.10-2013; RSS-247 Issue 2; RSS-Gen Issue 5 A1

1.3. Test Result

Pass

1.4. Testing Location

Address: Building G, Shenzhen International Innovation Center, No.1006 Shennan Road, Futian District, Shenzhen, Guangdong, P. R. China

1.5. Project data

Testing Start Date:	2020-12-15
Testing End Date:	2021-01-15

1.6. Signature

Lin Zechuang

(Prepared this test report)

Tang Weisheng

(Reviewed this test report)

Zhang Bojun

(Approved this test report)

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2. Client Information

2.1. Applicant Information

Company Name:	HMD Global Oy
Address:	Bertel Jungin aukio 902600 Espoo，Finland
Contact Person	Rosario Casillo
E-Mail	Rosario Casillo@hmdglobal.com
Telephone:	/
Fax:	/

2.2. Manufacturer Information

Company Name:	HMD Global Oy
Address:	Bertel Jungin aukio 902600 Espoo，Finland
Contact Person	Rosario Casillo
E-Mail	Rosario Casillo@hmdglobal.com
Telephone:	/
Fax:	/

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3. Equipment Under Test (EUT) and Ancillary Equipment (AE)

3.1. About EUT

Description	Multi-band GSM/WCDMA/LTE phone with Bluetooth, WLAN
Model Name	TA-1346
RF Protocol	IEEE 802.11 b/g/n-HT20
Operating Frequency	2412MHz~2462MHz
Number of Channels	11
Antenna Type	Integrated
Antenna Gain	2.1dBi
Power Supply	3.85V DC by Battery
FCC ID	2AJOTTA-1346
IC	23070-TA1346
Condition of EUT as received	No abnormality in appearance

Note: Components list, please refer to documents of the manufacturer; it is also included in the original test record of Shenzhen Academy of Information and Communications Technology.

3.2. Internal Identification of EUT

EUT ID*	IMEI	HW Version	SW Version	Receive Date
UT08aa	358742570000044	99652_1_11	000T_0_080	2020-12-07
UT12aa	358742570001730	99652_1_11	000T_0_080	2020-12-15
UT13aa	358742570007408	99652_1_11	000T_0_080	2020-12-15

*EUT ID: is used to identify the test sample in the lab internally.

UT08aa is used for conduction test, UT12aa is used for radiation test, and UT13aa is used for AC Power line Conducted Emission test.

3.3. Internal Identification of AE

AE ID*	Description	AE ID*
AE1	Battery	/
AE2	Charger	/
AE3	Data Cable	/
AE4	Headset	/

AE1

Model	WT340
Manufacturer	Guangdong Fenghua New Energy Co.,Ltd
Capacity	4900mAh
Nominal Voltage	3.85V

AE2-1

Model	PA-US5V2A-036
Manufacturer	Yutong Electronics(Huizhou) Co., Ltd

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AE2-2

Model	CH-21U
Manufacturer	Shenzhen Tianyin Electronics Co., Ltd

AE3-1

Model	CB-36A
Manufacturer	ShenZhen BRL Technology Co., Ltd

AE3-2

Model	CB-36A
Manufacturer	Huizhou Washin Electronics co.,LTD

AE4

Model	HS-34
Manufacturer	New Leader Industry Co.,Ltd

*AE ID: is used to identify the test sample in the lab internally.

3.4. General Description

The Equipment under Test (EUT) is a model of Multi-band GSM/WCDMA/LTE phone with Bluetooth, WLAN with integrated antenna and battery.

It consists of normal options: Lithium Battery, Charger, USB Cable and Headset.

Manual and specifications of the EUT were provided to fulfil the test.

Samples undergoing test were selected by the client.

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4. Reference Documents

4.1. Documents supplied by applicant

EUT feature information is supplied by the applicant or manufacturer, which is the basis of testing.

4.2. Reference Documents for testing

The following documents listed in this section are referred for testing.

Reference	Title	Version
FCC Part15	FCC CFR 47, Part 15, Subpart C: 15.205 Restricted bands of operation; 15.209 Radiated emission limits, general requirements; 15.247 Operation within the bands 902–928MHz, 2400–2483.5 MHz, and 5725–5850 MHz	2019
ANSI C63.10	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices	2013
RSS-247	Spectrum Management and Telecommunications Radio Standards Specification Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and License-Exempt Local Area Network (LE-LAN) Devices	Issue 2 February,2017
RSS-Gen	Spectrum Management and Telecommunications Radio Standards Specification General Requirements for Compliance of Radio Apparatus	Issue 5 March,2019 Amendment 1

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5. Test Results

5.1. Testing Environment

Normal Temperature: 15~35°C

Relative Humidity: 20~75%

5.2. Test Results

No	Test cases	Sub-clause of Part 15C	Sub-clause of IC	Verdict
0	Antenna Requirement	15.203	/	**P**
1	Maximum Output Power	15.247 (b)	RSS-247 section 5.4	**P**
2	Peak Power Spectral Density	15.247 (e)	RSS-247 section 5.2	**P**
3	6dB Bandwidth	15.247 (a)	RSS-247 section 5.2	**P**
4	Band Edges Compliance	15.247 (d)	RSS-247 section 5.5	**P**
5	Conducted Emission	15.247 (d)	RSS-247 section 5.5/ RSS-Gen section 6.13	**P**
6	Radiated Emission	15.247, 15.205, 15.209	RSS-247 section 5.5/ RSS-Gen section 6.13	**P**
7	AC Power line Conducted	15.107, 15.207	RSS-Gen section 8.8	**P**
8	99% Occupied Bandwidth	/	RSS-Gen section 6.7	**/**

See **ANNEX A** for details.

5.3. Statements

SAICT has evaluated the test cases requested by the applicant/manufacturer as listed in section 5.2 of this report, for the EUT specified in section 3, according to the standards or reference documents listed in section 4.2.

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6. Test Equipments Utilized

Conducted test system

No.	Equipment	Model	Serial Number	Manufacturer	Calibration Due date	Calibration Period
1	Vector Signal Analyzer	FSV40	100903	Rohde & Schwarz	2021-12-30	1 year
2	Power Sensor	U2021XA	MY55430013	Agilent	2022-01-13	1 year
3	Test Receiver	ESCI	100701	Rohde & Schwarz	2021-08-09	1 year
4	LISN	ENV216	102067	Rohde & Schwarz	2021-07-16	1 year

Radiated test system

NO.	Equipment	Model	Serial Number	Manufacturer	Calibration Due date	Calibration Period
1	Loop Antenna	HLA6120	35779	TESEQ	2022-04-25	3 years
2	BiLog Antenna	3142E	00224831	ETS-Lindgren	2021-05-17	3 years
3	Horn Antenna	3117	00066577	ETS-Lindgren	2022-04-02	3 years
4	Test Receiver	ESR7	101676	Rohde & Schwarz	2021-11-25	1 year
5	Spectrum Analyser	FSV40	101192	Rohde & Schwarz	2022-01-13	1 year
6	Chamber	FACT3-2.0	1285	ETS-Lindgren	2021-07-19	2 years
7	Antenna	QSH-SL-18 -26-S-20	17013	Q-par	2023-01-06	3 years
8	Amplifier	SCU-18D	5600190430	Rohde & Schwarz	/	/

Test software

No.	Equipment	Manufacturer	Version
1	TechMgr Software	CAICT	2.1.1
2	EMC32	Rohde & Schwarz	8.53.0
3	EMC32	Rohde & Schwarz	10.01.00

EUT is engineering software provided by the customer to control the transmitting signal. The EUT was programmed to be in continuously transmitting mode.

Anechoic Chamber

Fully anechoic Chamber by ETS-Lindgren.

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7. Laboratory Environment

Semi-anechoic chambe

Temperature	Min. = 15 ˚C, Max. = 35 ˚C
Relative humidity	Min. = 20 %, Max. = 75 %
Shielding effectiveness	0.014MHz-1MHz> 60 dB; 1MHz-18000MHz>90 dB
Electrical insulation	> 2MΩ
Ground system resistance	< 4 Ω
Normalised site attenuation (NSA)	< ±4 dB, 3 m distance, from 30 to 1000 MHz

Shielded room

Temperature	Min. = 15 ˚C, Max. = 35 ˚C
Relative humidity	Min. = 20 %, Max. = 75 %
Shielding effectiveness	0.014MHz-1MHz> 60 dB; 1MHz-1000MHz>90 dB
Electrical insulation	> 2MΩ
Ground system resistance	< 4 Ω

Fully-anechoic chamber

Temperature	Min. = 15 ˚C, Max. = 35 ˚C
Relative humidity	Min. = 20 %, Max. = 75 %
Shielding effectiveness	0.014MHz-1MHz> 60 dB; 1MHz-18000MHz>90 dB
Electrical insulation	> 2MΩ
Ground system resistance	< 4 Ω
Voltage Standing Wave Ratio （VSWR）	≤ 6 dB, from 1 to 18 GHz， 3 m distance
Uniformity of field strength	Between 0 and 6 dB, from 80 to 6000 MHz

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8. Measurement Uncertainty

Test Name	Uncertainty (*k*=2)	
1. Maximum Peak Output Power	1.32dB	
2. Peak Power Spectral Density	2.32dB	
3. 6dB Bandwidth	66Hz	
4. Band Edges Compliance	1.92dB	
5. Transmitter Spurious Emission - Conducted	30MHz≤f<1GHz	1.41dB
	1GHz≤f<7GHz	1.92dB
	7GHz≤f<13GHz	2.31dB
	13GHz≤f≤26GHz	2.61dB
6. Transmitter Spurious Emission - Radiated	9kHz≤f<30MHz	1.74dB
	30MHz≤f<1GHz	4.84dB
	1GHz≤f<18GHz	4.68dB
	18GHz≤f≤40GHz	3.76dB
7. AC Power line Conducted Emission	150kHz≤f≤30MHz	3.00dB
8. 99% Occupied Bandwidth	66Hz	

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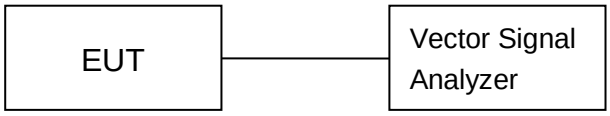
ANNEX A: Detailed Test Results

Test Configuration

The measurement is made according to ANSI C63.10.

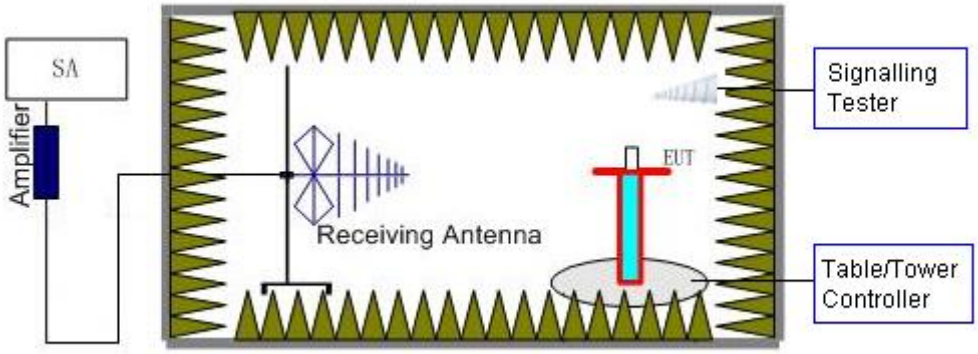
1) Conducted Measurements

1. Connect the EUT to the test system correctly.
2. Set the EUT to the required work mode.
3. Set the EUT to the required channel.
4. Set the spectrum analyzer to start measurement.
5. Record the values.



2) Radiated Measurements

Test setup: EUT was placed on a 1.5 meter high non-conductive table at a 3 meter test distance from the receive antenna. The test setup refers to figure below. Detected emissions were maximized at each frequency by rotating the EUT and adjusting the receiving antenna polarization.



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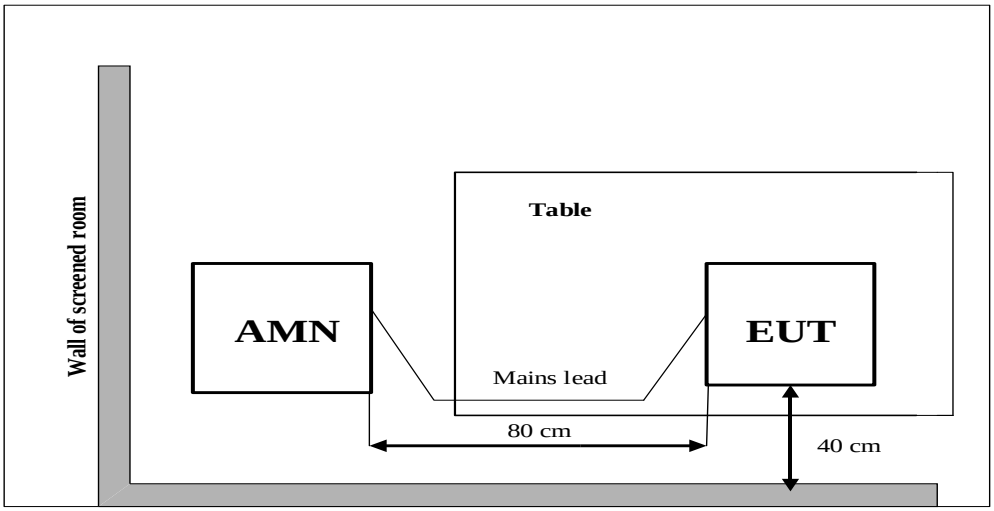
3) AC Power line Conducted Emission Measurement

For WLAN, the EUT is working under test mode. The EUT is commanded to operate at maximum transmitting power.



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A.0 Antenna requirement

Measurement Limit:

Standard	Requirement
FCC CRF Part 15.203	An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of §15.211, §15.213, §15.217, §15.219, or §15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with §15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.

Conclusion: The Directional gains of antenna used for transmitting: 2.1dBi;
The RF transmitter uses an integrate antenna without connector.

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A.1 Maximum Output Power

Measurement of method: See ANSI C63.10-2013-Clause 11.9.2.3.2

Method AVGPM-G is a measurement using a gated RF average power meter.

Alternatively, measurements may be performed using a wideband gated RF power meter provided that the gate parameters are adjusted such that the power is measured only when the EUT is transmitting at its maximum power control level. Because the measurement is made only during the ON time of the transmitter, no duty cycle correction factor is required.

Measurement Limit:

Standard	Limit (dBm)	E.I.R.P Limit (dBm)
FCC CRF Part 15.247(b) & RSS-247 Section 5.4	< 30	< 36

Measurement Results:

Mode	Channel	Frequency (MHz)	Average Conducted Power (dBm)	E.I.R.P （dBm）	Conclusion
802.11b	CH 1	2412	17.53	19.63	**P**
	CH 6	2437	18.09	20.19	**P**
	CH 11	2462	18.06	20.16	**P**
802.11g	CH 1	2412	15.05	17.15	**P**
	CH 6	2437	15.56	17.66	**P**
	CH 11	2462	15.47	17.57	**P**
802.11n-HT20	CH 1	2412	13.01	15.11	**P**
	CH 6	2437	13.41	15.51	**P**
	CH 11	2462	13.43	15.53	**P**

Note:

Worst-case data rates 1Mbps (802.11b), 6Mbps (802.11g), MCS0 (802.11n) are selected as the worst conditions.

The following cases and test graphs are performed with this condition.

The EUT was programmed to be in continuously transmitting mode and the transmit duty cycle is not less than 98%.

Conclusion: PASS

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A.2 Peak Power Spectral Density

Measurement Limit:

Standard	Limit
FCC CRF Part 15.247(e) & RSS-247 Section 5.2	< 8 dBm/3 kHz

Measurement Results:

SISO:

Mode	Channel	Frequency (MHz)	Test Results(dBm/3 kHz)		Conclusion
802.11b	CH 1	2412	Fig.1	-4.94	**P**
	CH 6	2437	Fig.2	-4.77	**P**
	CH 11	2462	Fig.3	-5.03	**P**
802.11g	CH 1	2412	Fig.4	-10.29	**P**
	CH 6	2437	Fig.5	-9.66	**P**
	CH 11	2462	Fig.6	-10.11	**P**
802.11n-HT20	CH 1	2412	Fig.7	-11.90	**P**
	CH 6	2437	Fig.8	-12.25	**P**
	CH 11	2462	Fig.9	-11.16	**P**

See below for test graphs.

Conclusion: PASS

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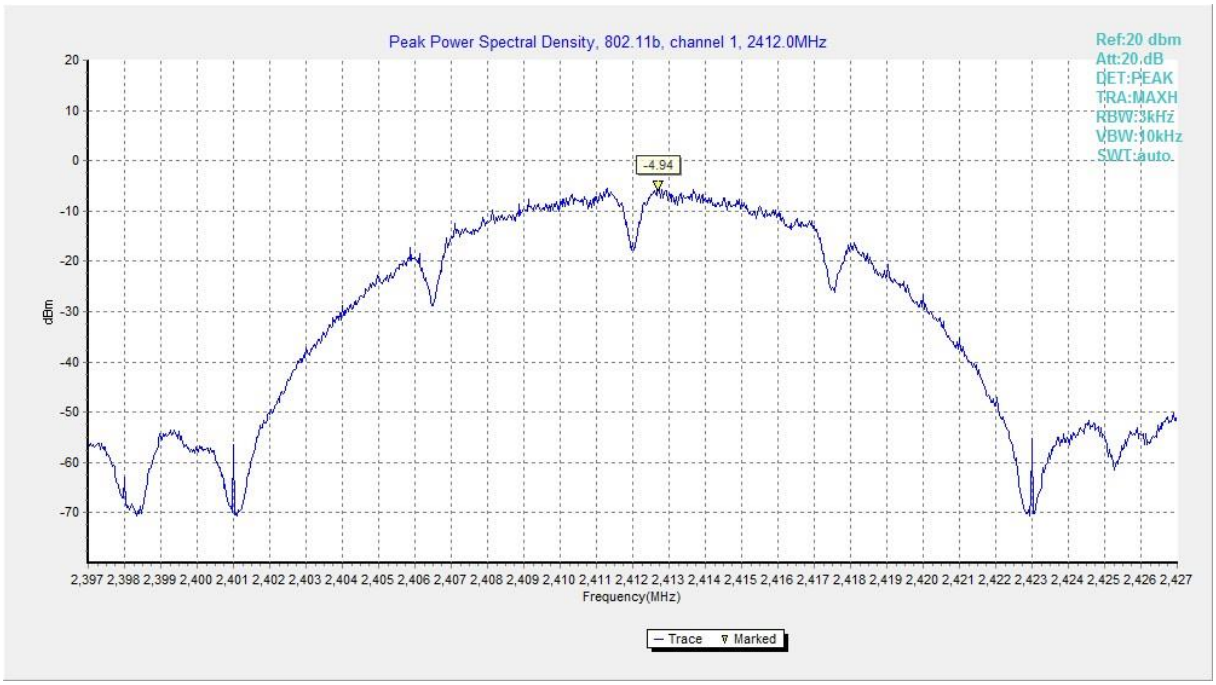

Fig.1 Power Spectral Density (802.11b, CH 1)

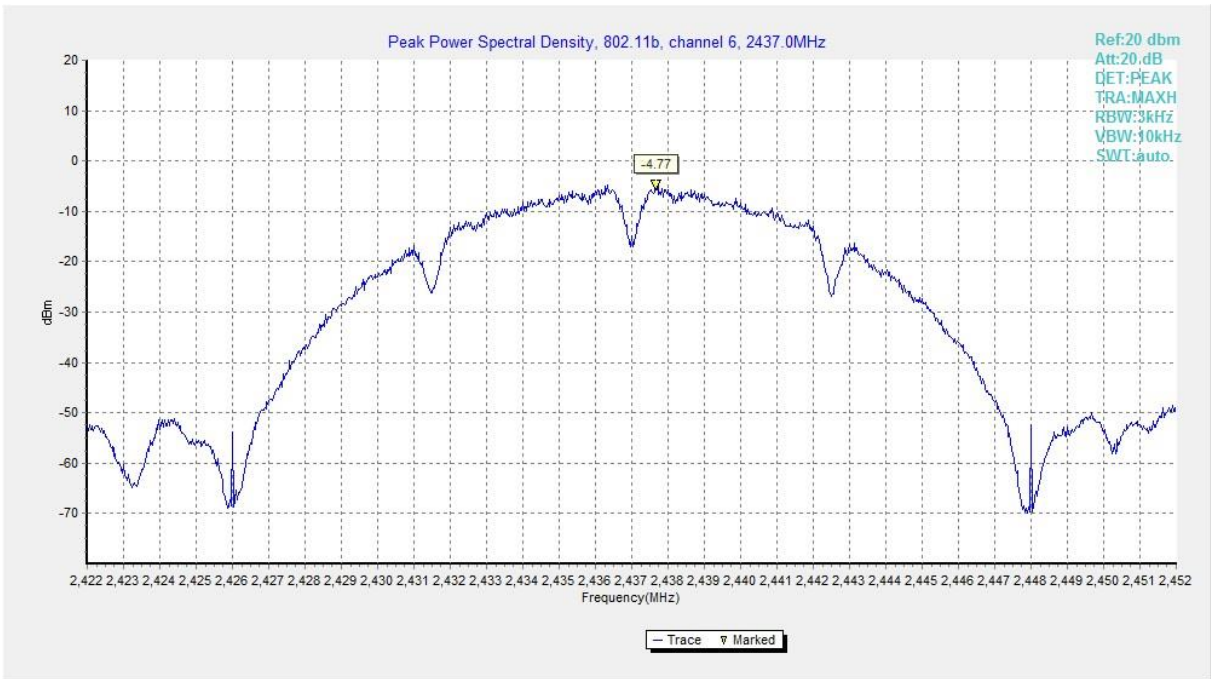

Fig.2 Power Spectral Density (802.11b, CH 6)

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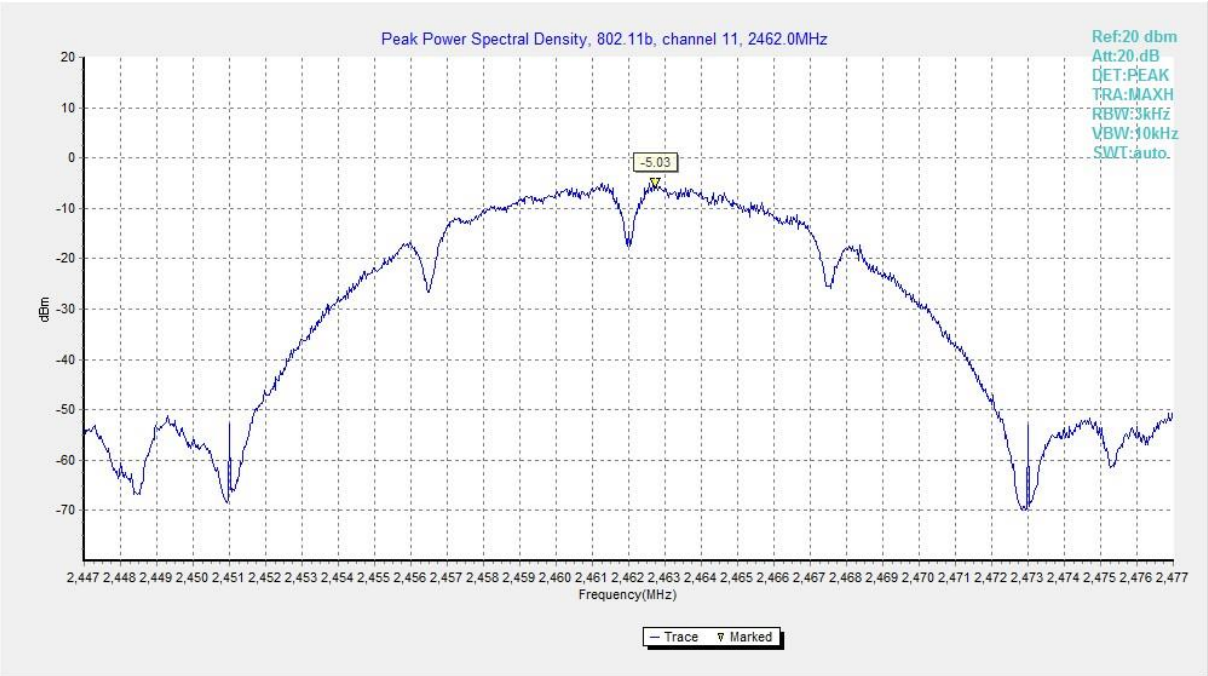

Fig.3 Power Spectral Density (802.11b, CH 11)

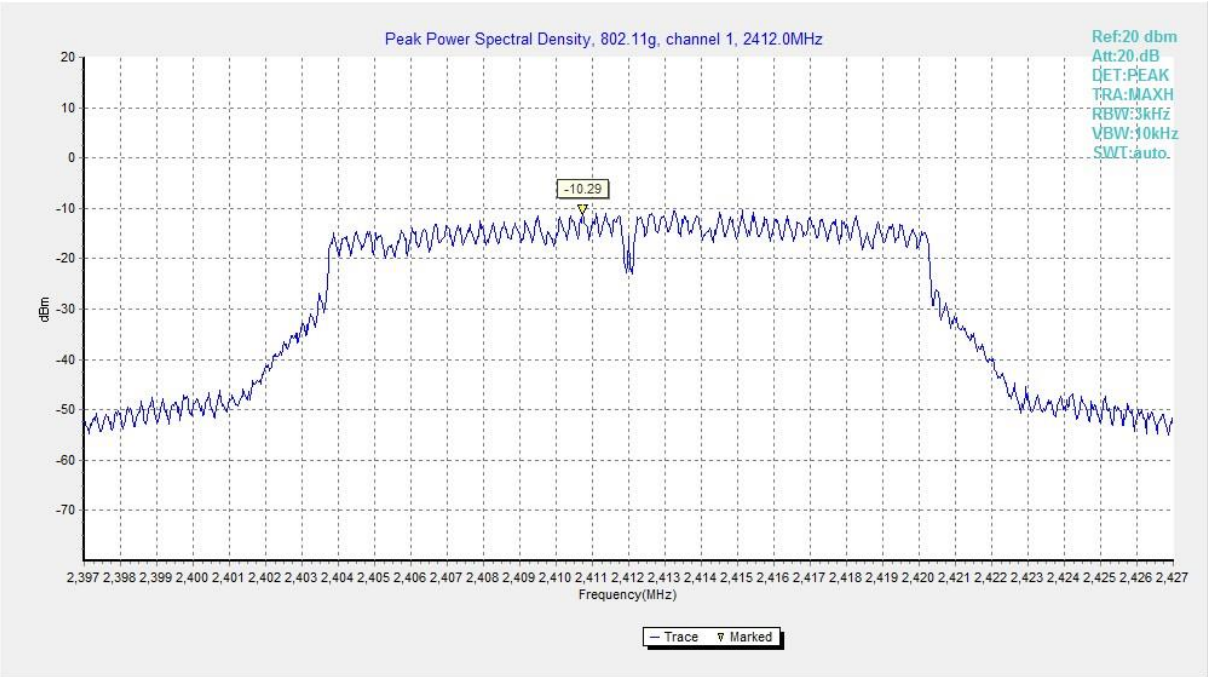

Fig.4 Power Spectral Density (802.11g, CH 1)

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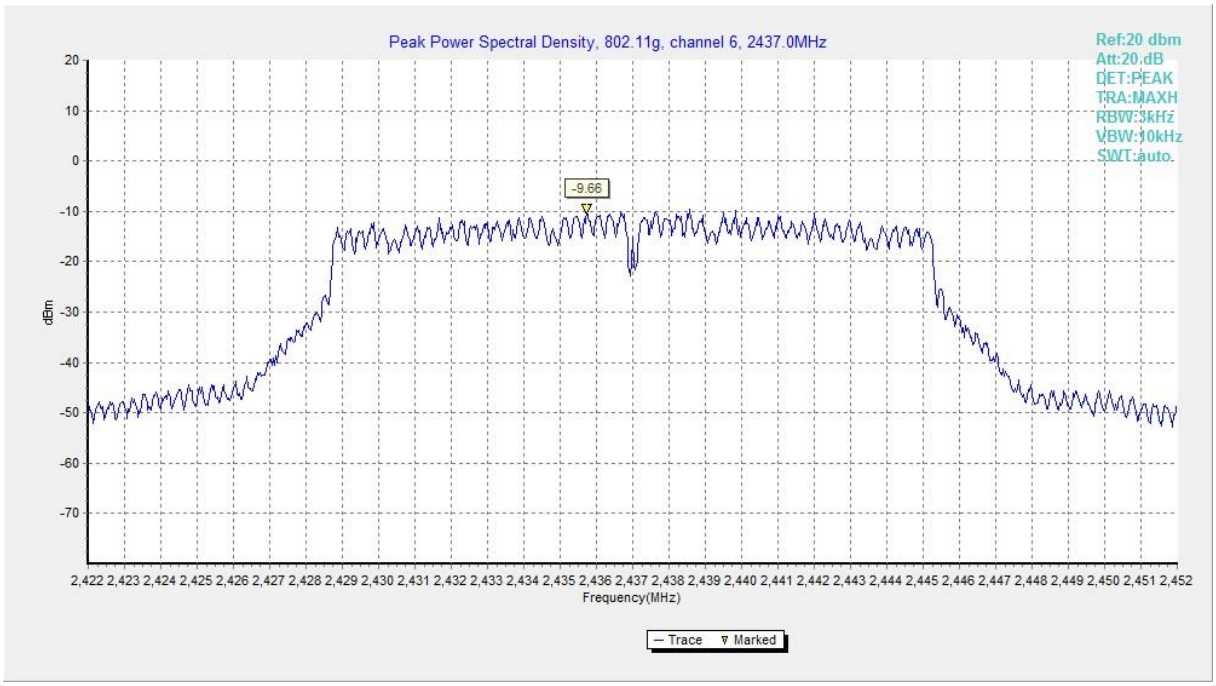

Fig.5 Power Spectral Density (802.11g, CH 6)

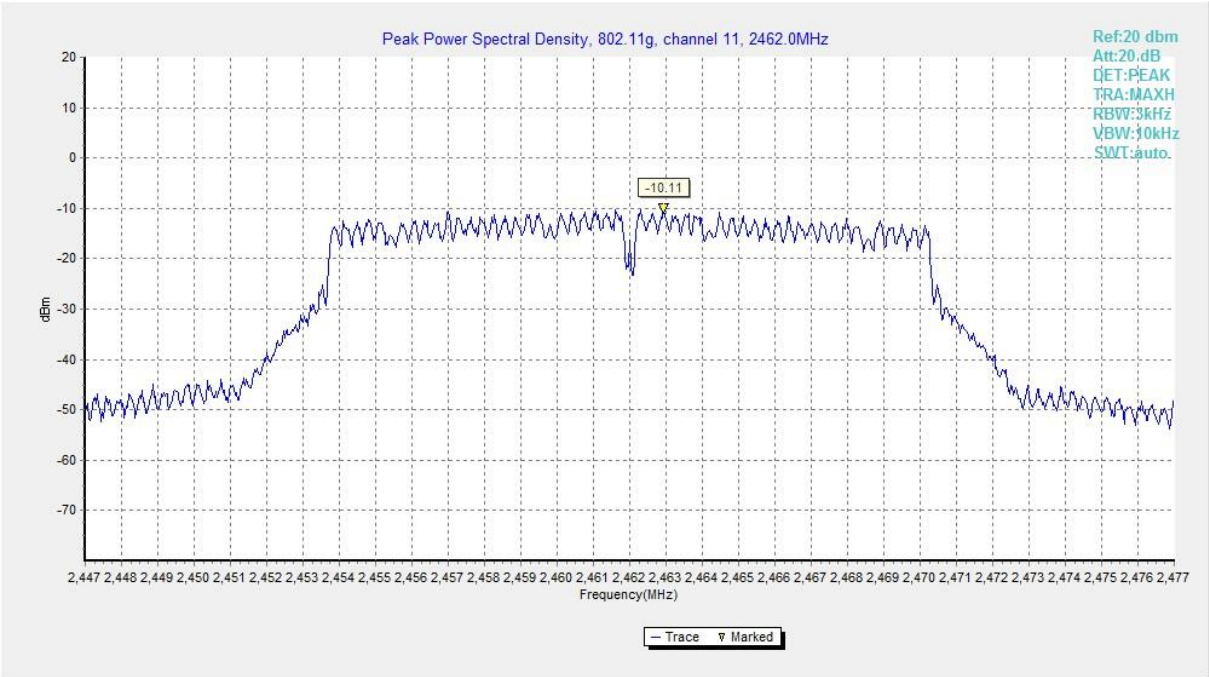

Fig.6 Power Spectral Density (802.11g, CH 11)

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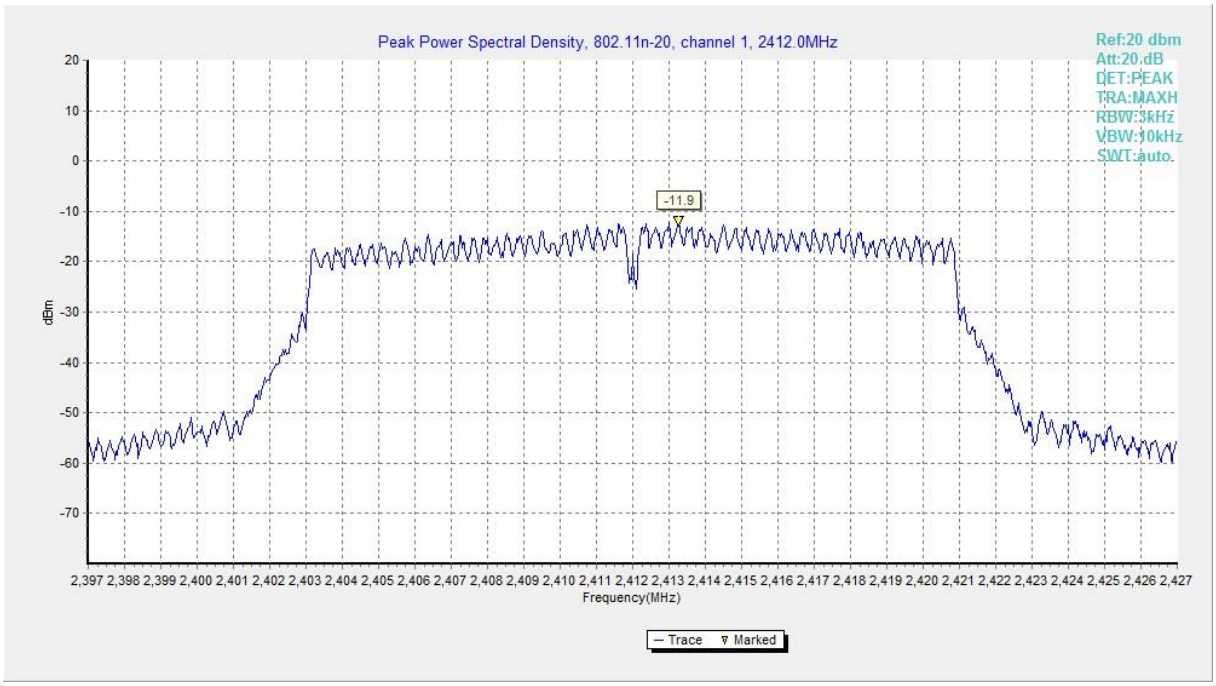

Fig.7 Power Spectral Density (802.11n-HT20, CH 1)

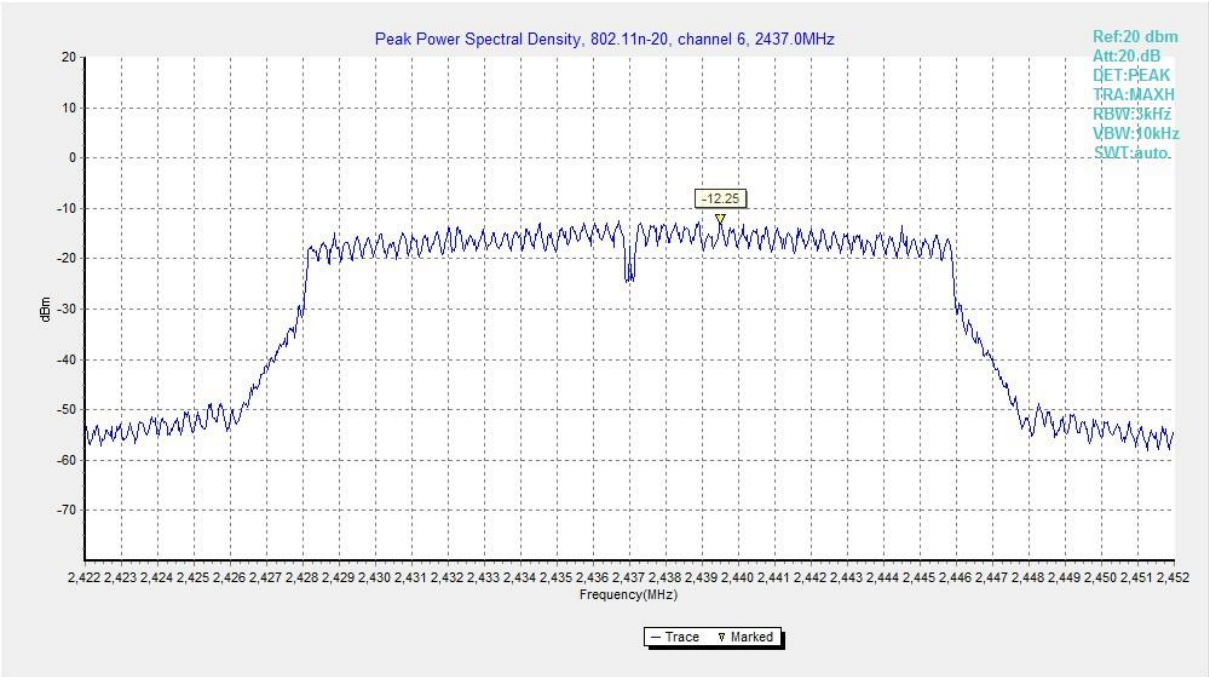

Fig.8 Power Spectral Density (802.11n-HT20, CH 6)

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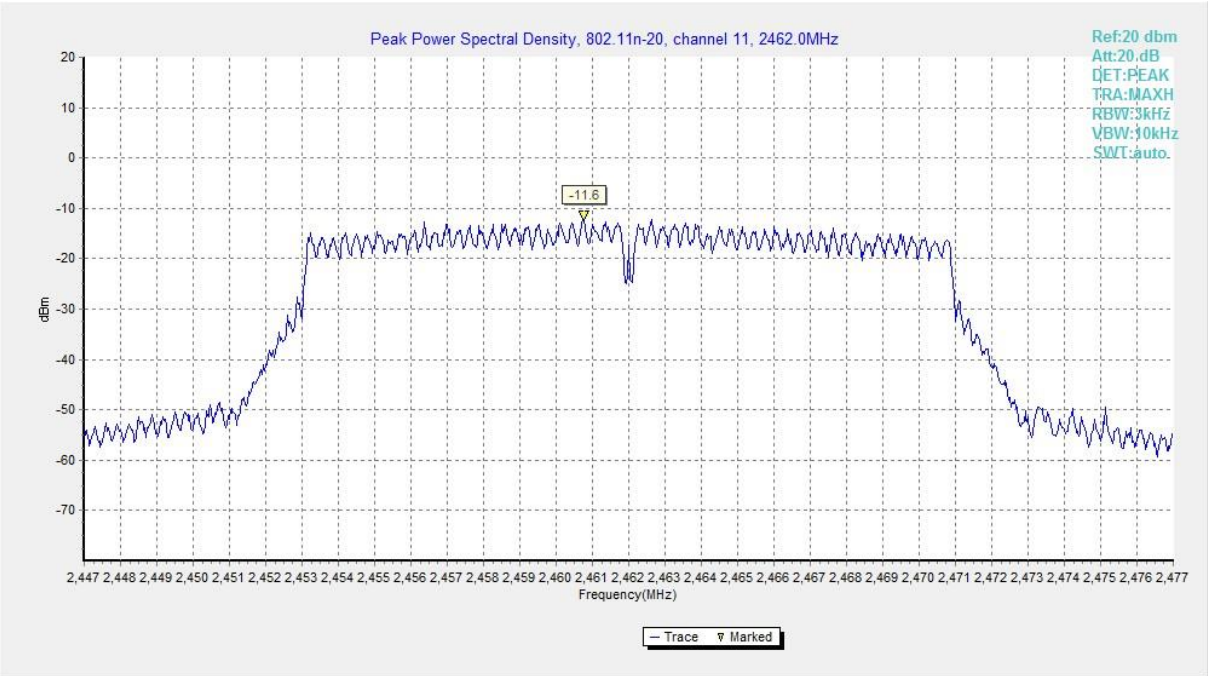

Fig.9 Power Spectral Density (802.11n-HT20, CH 11)

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A.3 6dB Bandwidth

Measurement Limit:

Standard	Limit (kHz)
FCC 47 CFR Part 15.247 (a) & RSS-247 Section 5.2	≥ 500

Measurement Result:

Mode	Channel	Frequency (MHz)	Test Results (kHz)		Conclusion
802.11b	CH 1	2412	Fig.10	8550	**P**
	CH 6	2437	Fig.11	8050	**P**
	CH 11	2462	Fig.12	8050	**P**
802.11g	CH 1	2412	Fig.13	15350	**P**
	CH 6	2437	Fig.14	15100	**P**
	CH 11	2462	Fig.15	15350	**P**
802.11n-HT20	CH 1	2412	Fig.16	15400	**P**
	CH 6	2437	Fig.17	16250	**P**
	CH 11	2462	Fig.18	15500	**P**

See below for test graphs.

Conclusion: PASS

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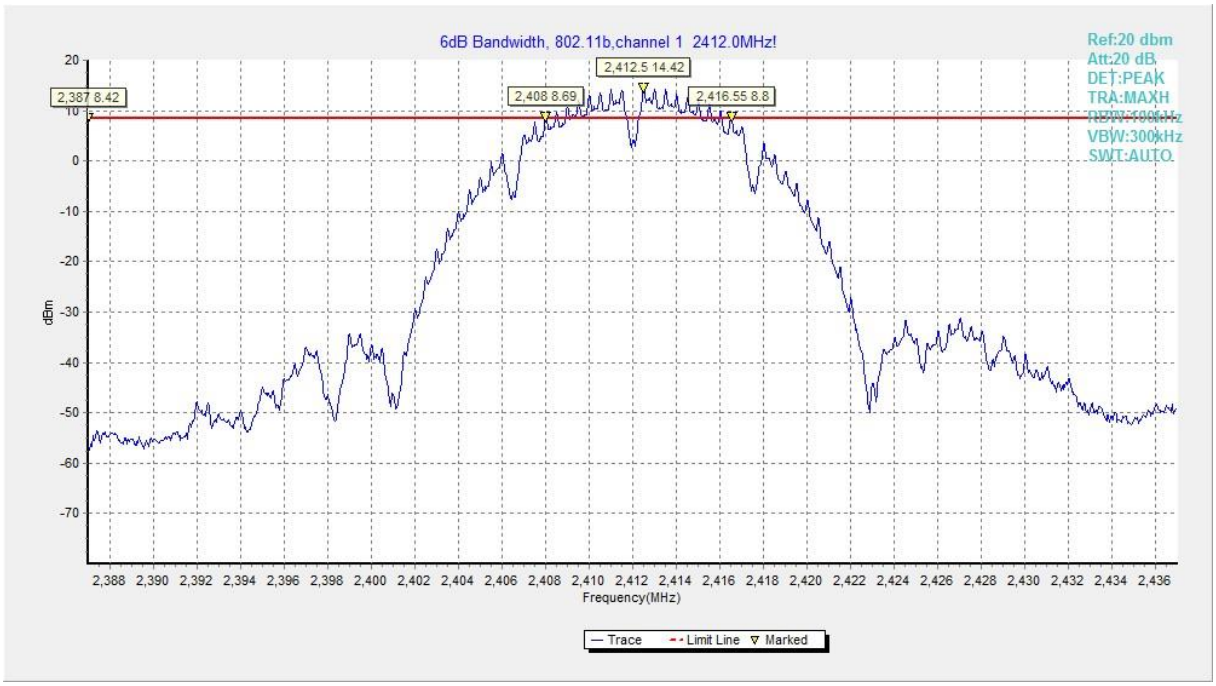

Fig.10 6dB Bandwidth (802.11b, CH 1)

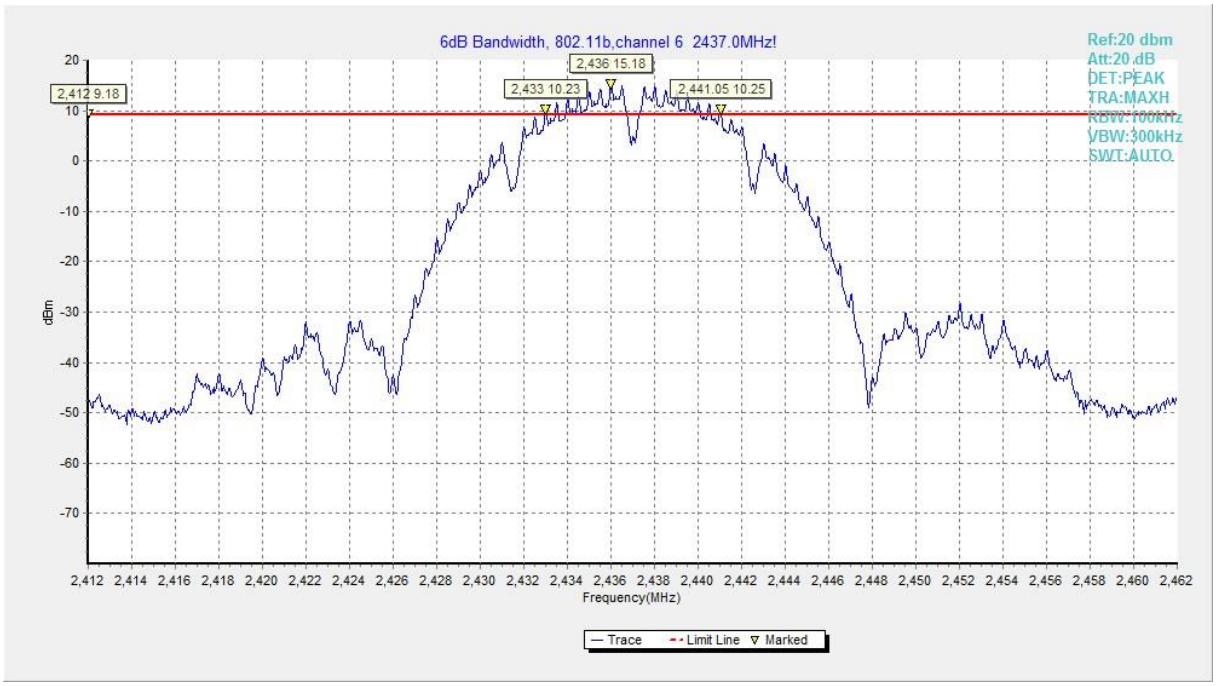

Fig.11 6dB Bandwidth (802.11b, CH 6)

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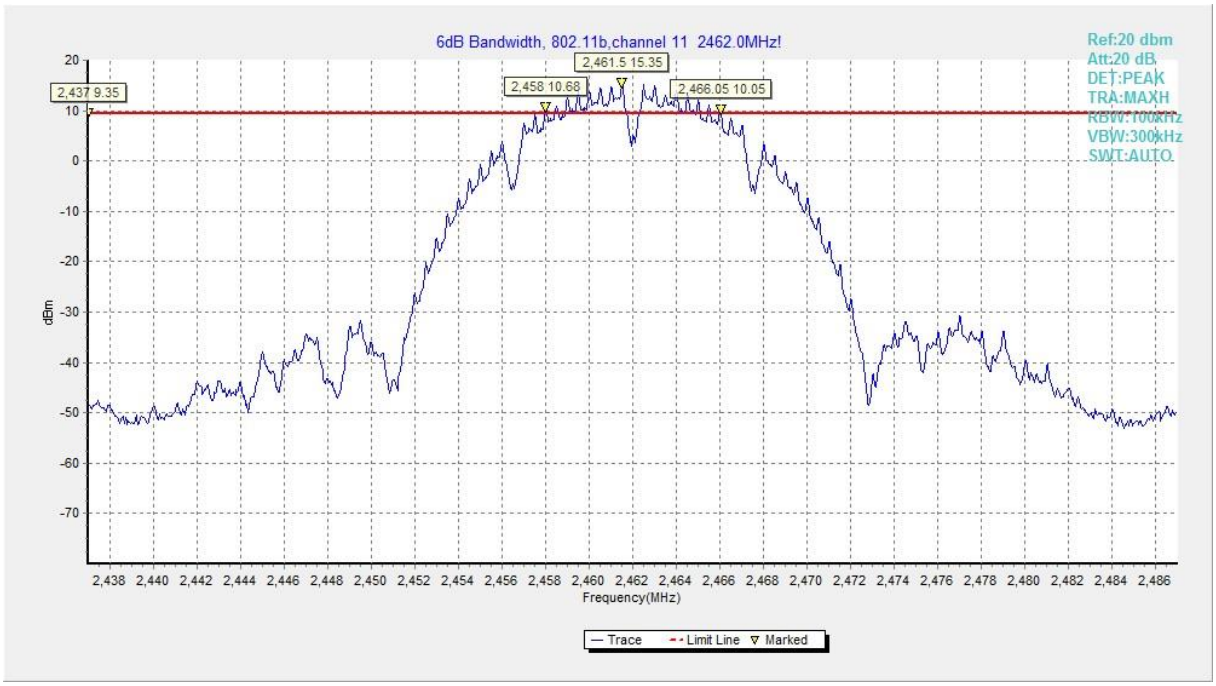

Fig.12 6dB Bandwidth (802.11b, CH 11)

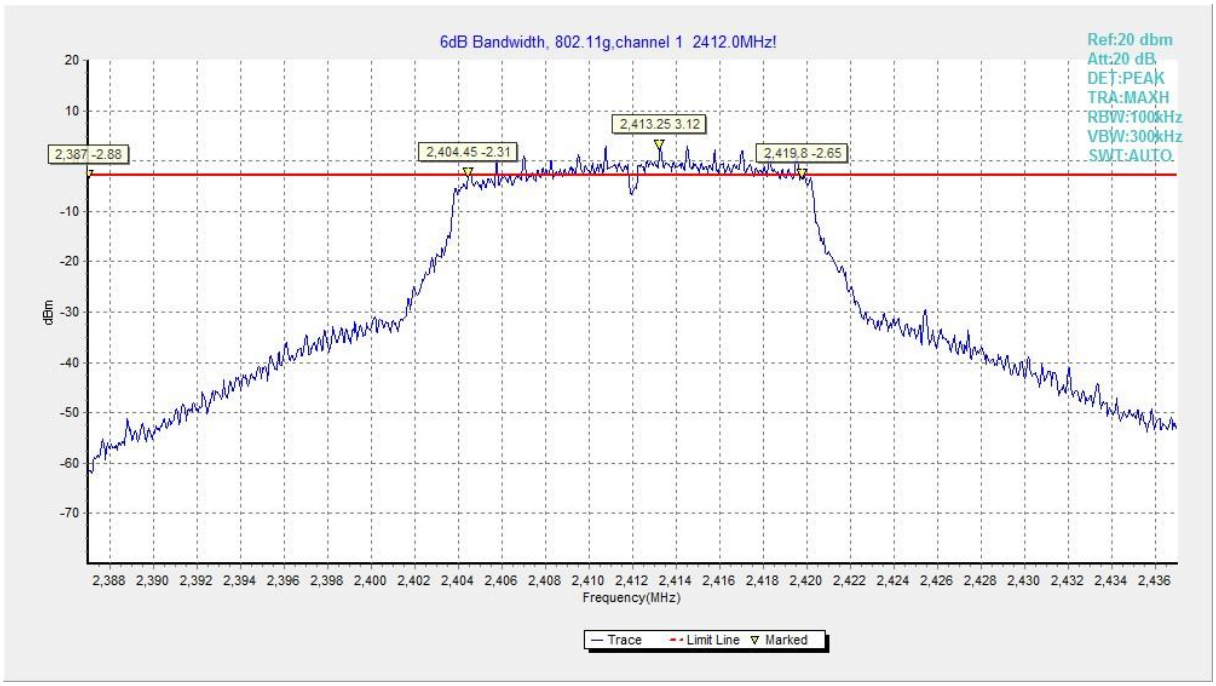

Fig.13 6dB Bandwidth (802.11g, CH 1)

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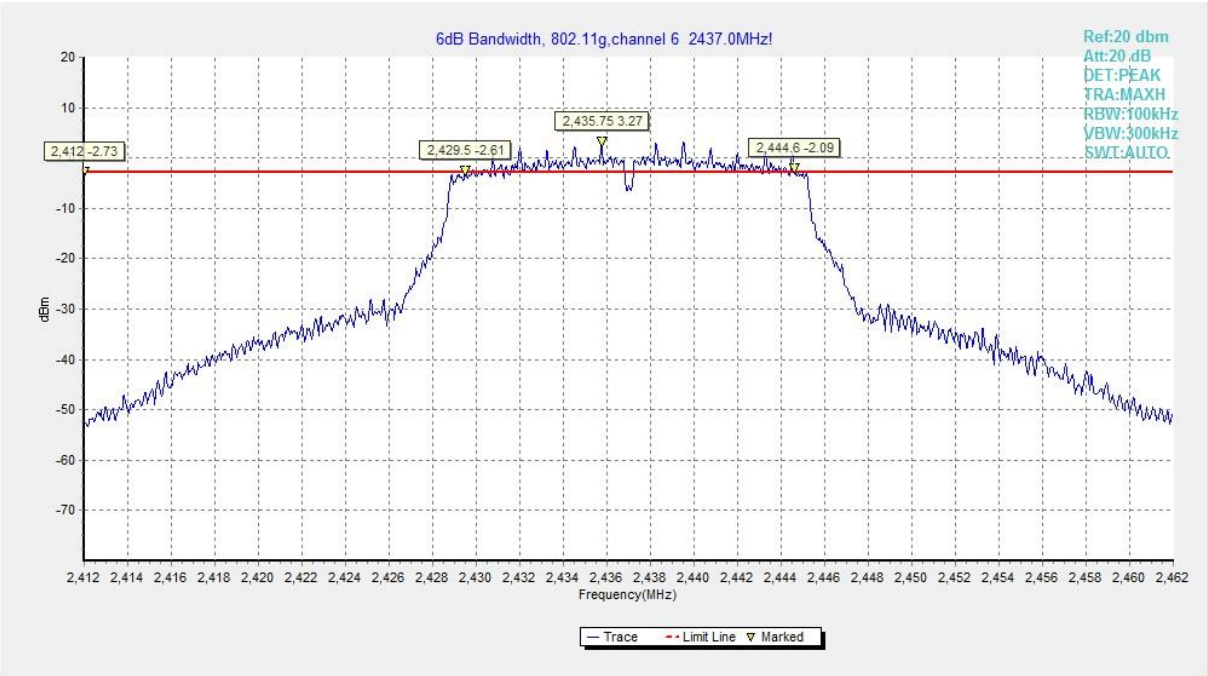

Fig.14 6dB Bandwidth (802.11g, CH 6)

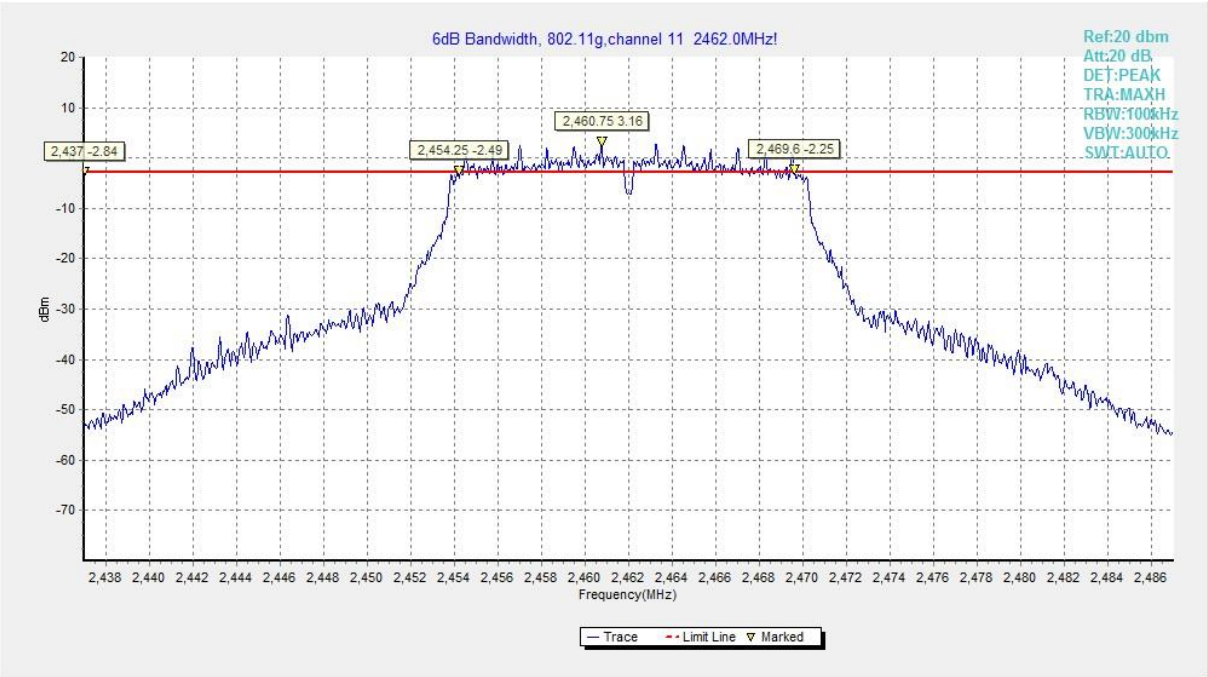

Fig.15 6dB Bandwidth (802.11g, CH 11)

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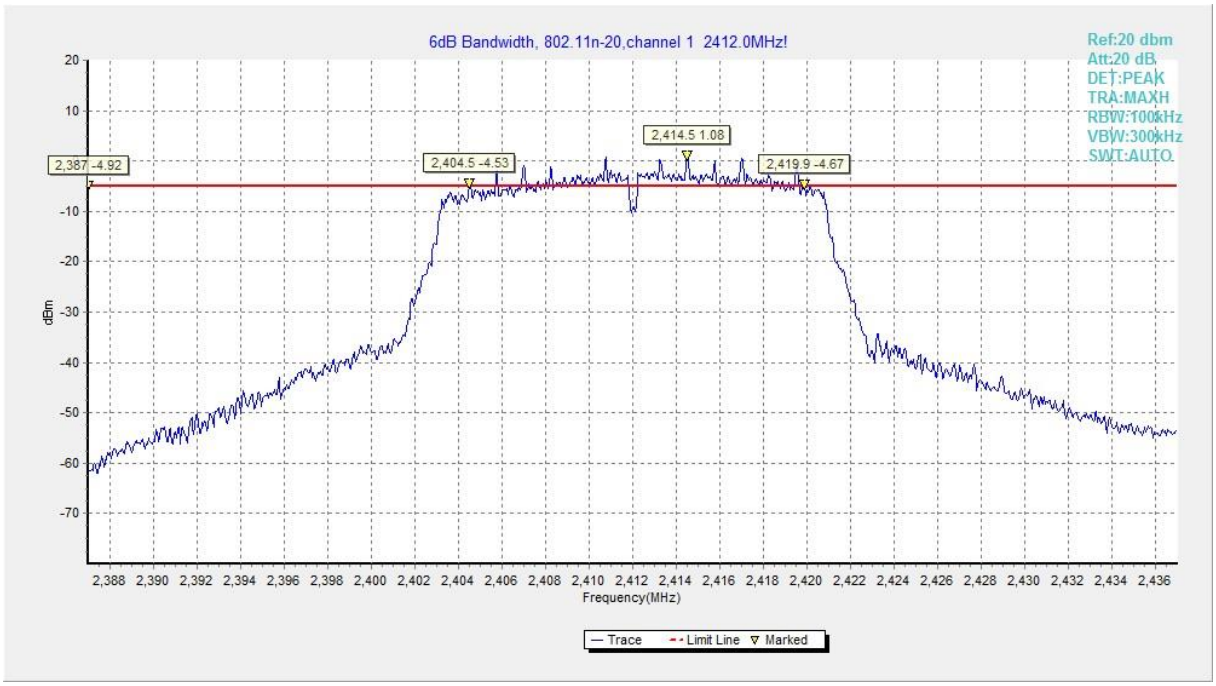

Fig.16 6dB Bandwidth (802.11n-HT20, CH 1)

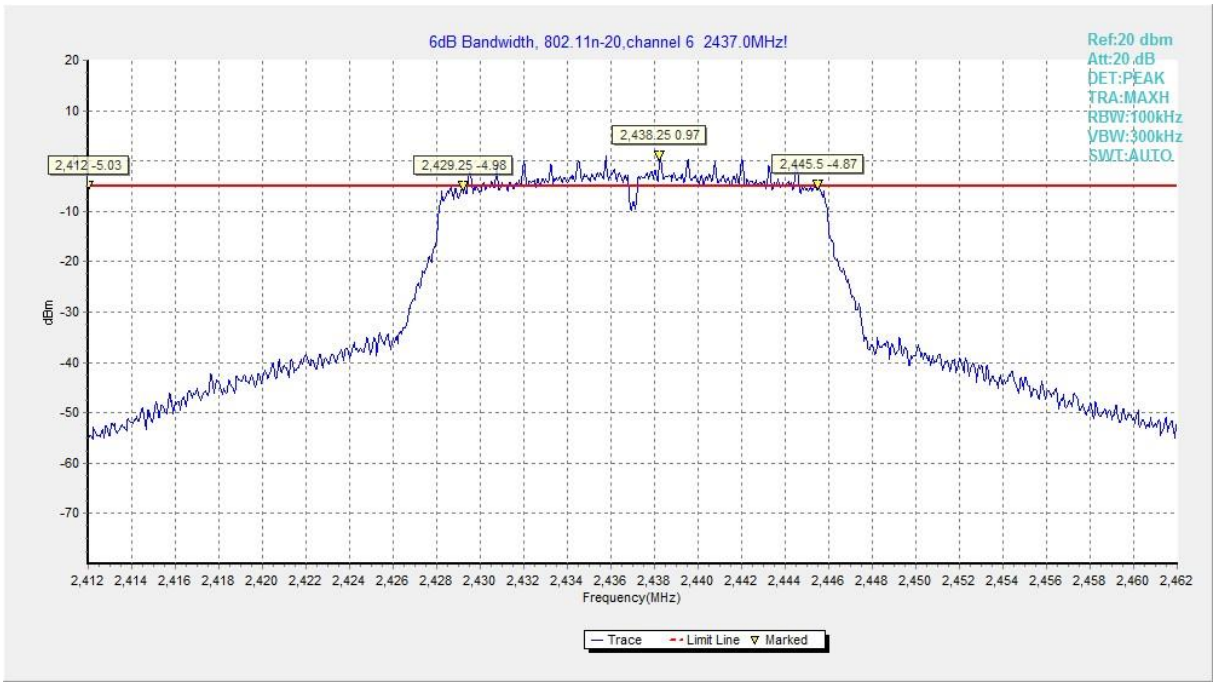

Fig.17 6dB Bandwidth (802.11n-HT20, CH 6)

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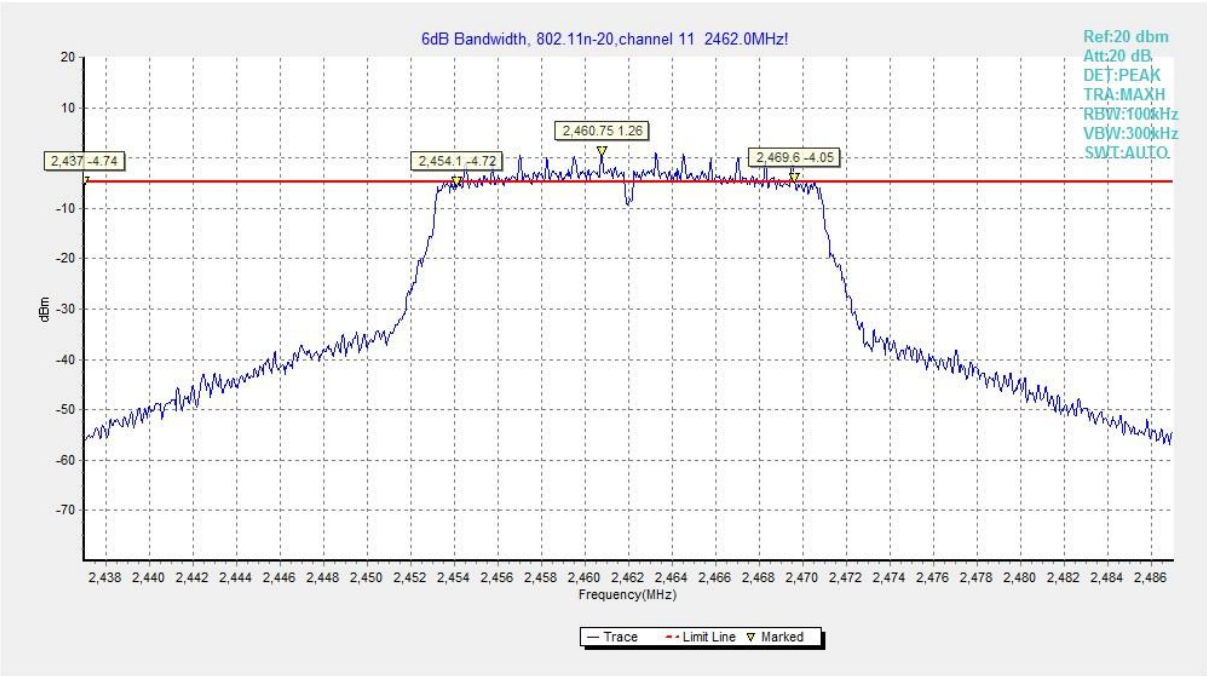

Fig.18 6dB Bandwidth (802.11n-HT20, CH 11)

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A.4 Band Edges Compliance

Measurement Limit:

Standard	Limit (dB)
FCC 47 CFR Part 15.247 (d) & RSS-247 Section 5.5	> 30

Measurement Result:

Mode	Channel	Frequency (MHz)	Test Results (dBc)		Conclusion
802.11b	CH1	2412	Fig.19	51.38	**P**
	CH11	2462	Fig.20	64.29	**P**
802.11g	CH1	2412	Fig.21	36.49	**P**
	CH11	2462	Fig.22	49.79	**P**
802.11n-HT20	CH1	2412	Fig.23	39.20	**P**
	CH11	2462	Fig.24	51.95	**P**

See below for test graphs.

Conclusion: PASS

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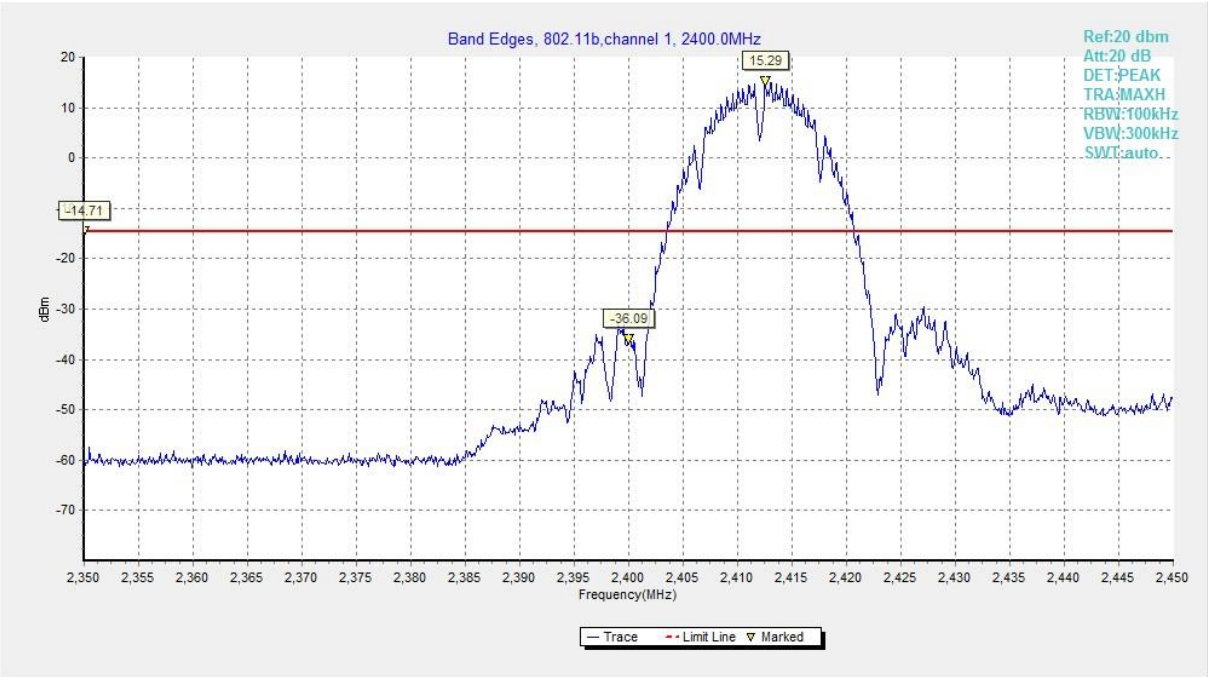

Fig.19 Band Edges (802.11b, CH 1)

Fig.20 Band Edges (802.11b, CH 11)

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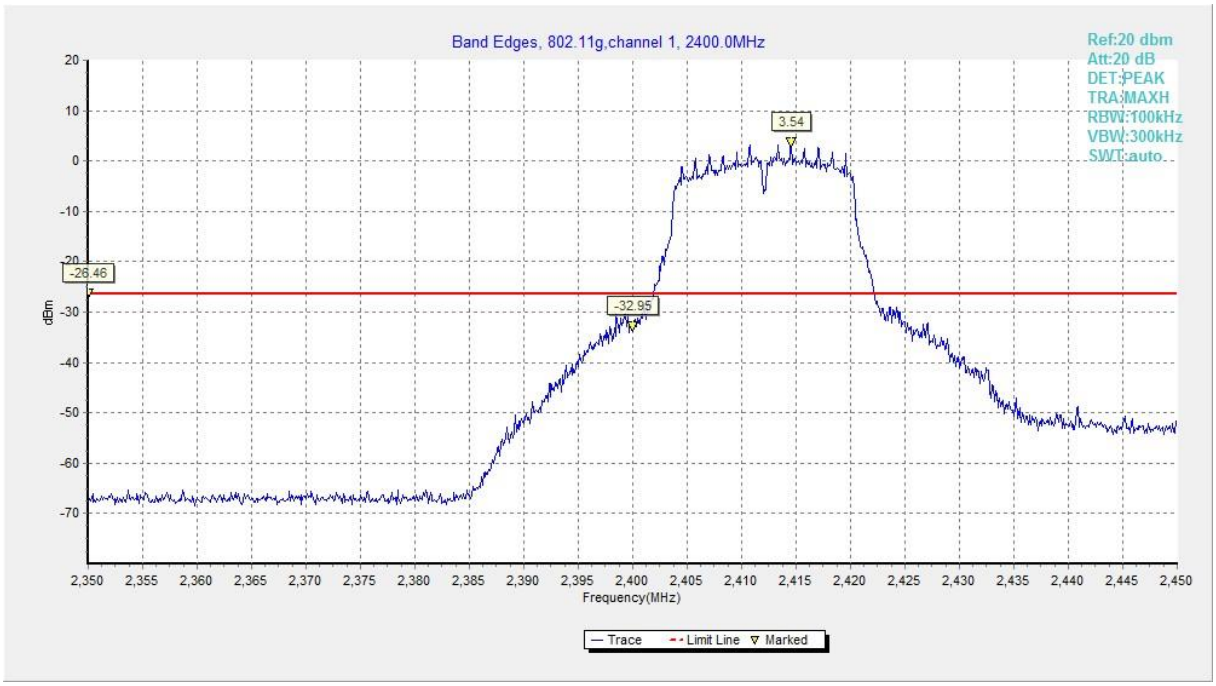

Fig.21 Band Edges (802.11g, CH 1)

Fig.22 Band Edges (802.11g, CH 11)

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Fig.23 Band Edges (802.11n-HT20, CH 1)

Fig.24 Band Edges (802.11n-HT20, CH 11)

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A.5 Conducted Emission

Measurement Limit:

Standard	Limit
FCC 47 CFR Part 15.247 (d) & RSS-247 Section 5.5/RSS-Gen Section 6.13	30dB below peak output power in 100 kHz bandwidth

Measurement Results:

Mode	Channel	Frequency (MHz)	Frequency Range	Test Results	Conclusion
802.11b	CH 1	2412	30MHz-26GHz	Fig.25	**P**
	CH 6	2437	30MHz-26GHz	Fig.26	**P**
	CH 11	2462	30MHz-26GHz	Fig.27	**P**
802.11g	CH 1	2412	30MHz-26GHz	Fig.28	**P**
	CH 6	2437	30MHz-26GHz	Fig.29	**P**
	CH 11	2462	30MHz-26GHz	Fig.30	**P**
802.11n-HT20	CH 1	2412	30MHz-26GHz	Fig.31	**P**
	CH 6	2437	30MHz-26GHz	Fig.32	**P**
	CH 11	2462	30MHz-26GHz	Fig.33	**P**

See below for test graphs.
Conclusion: PASS

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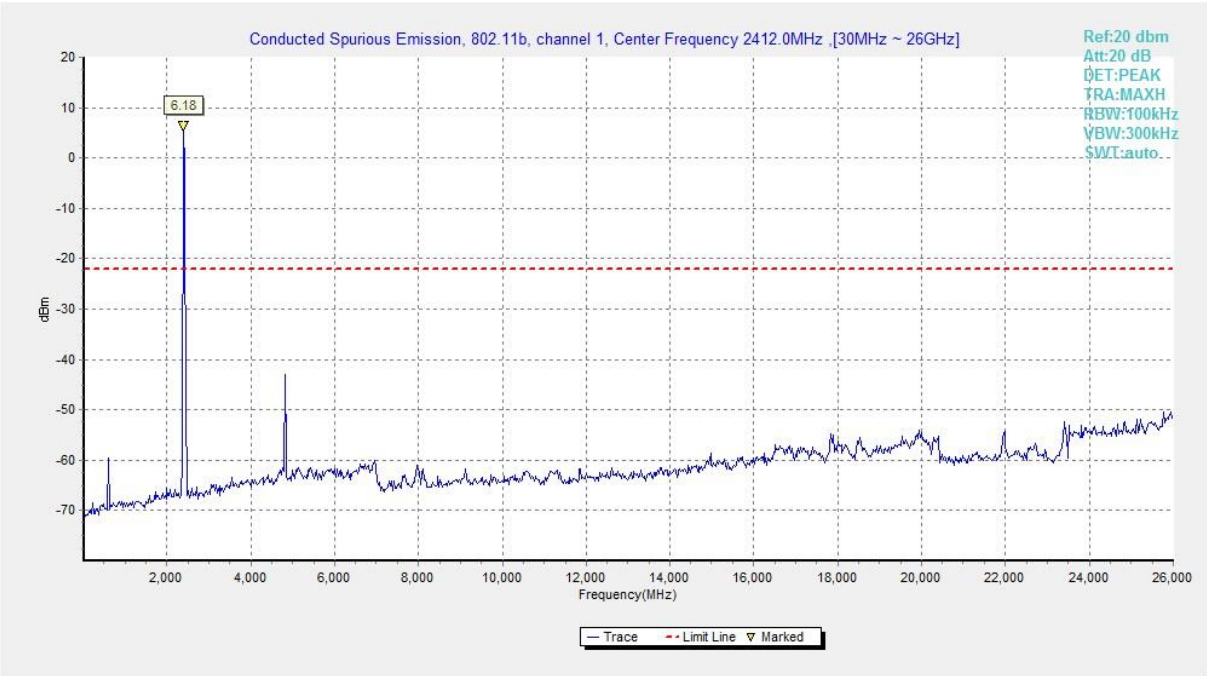

Fig.25 Conducted Spurious Emission (802.11b, CH1)

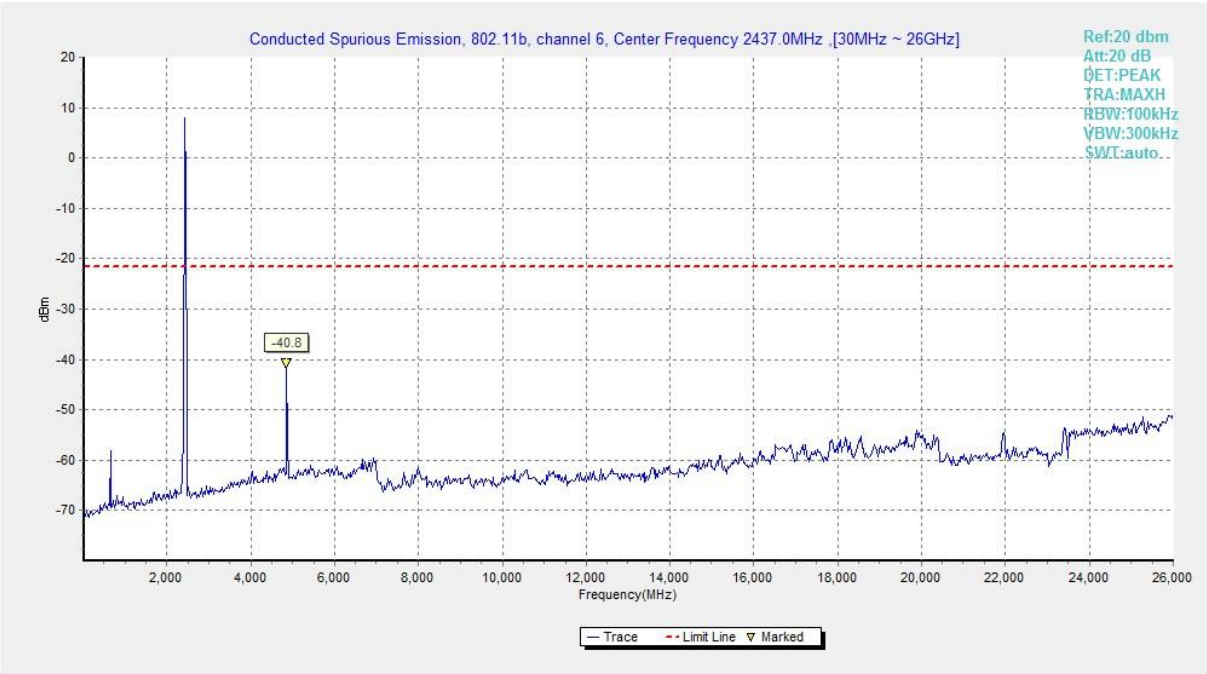

Fig.26 Conducted Spurious Emission (802.11b, CH6)

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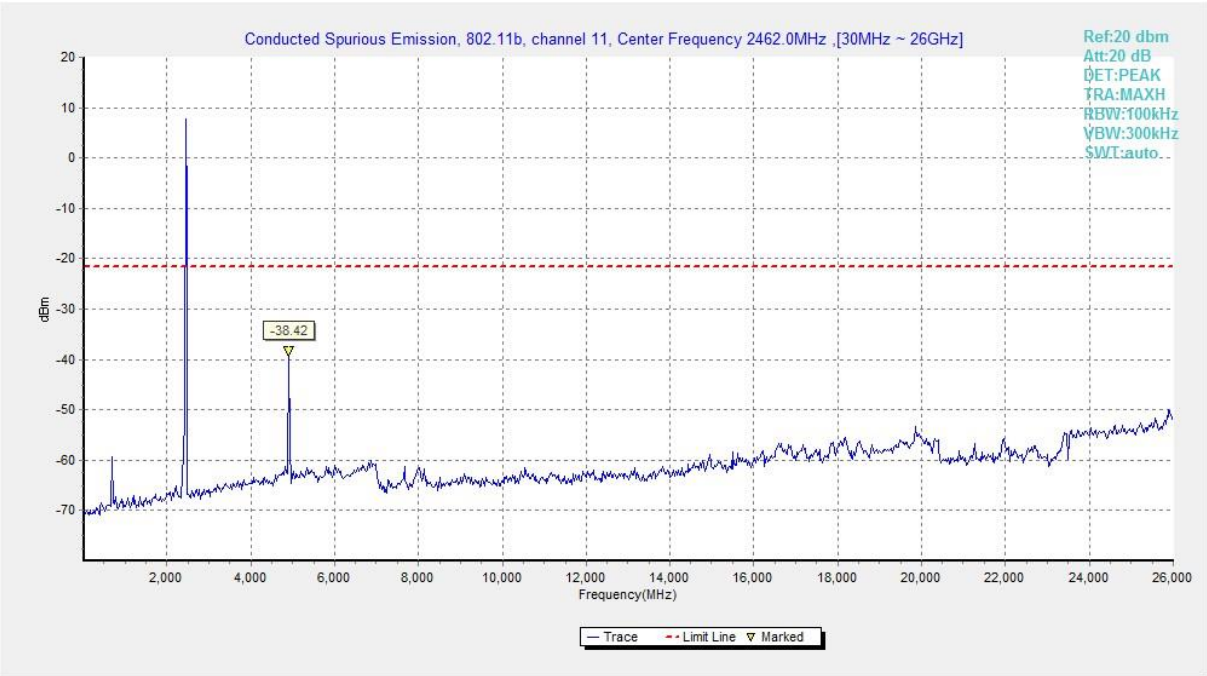

Fig.27 Conducted Spurious Emission (802.11b, CH11)

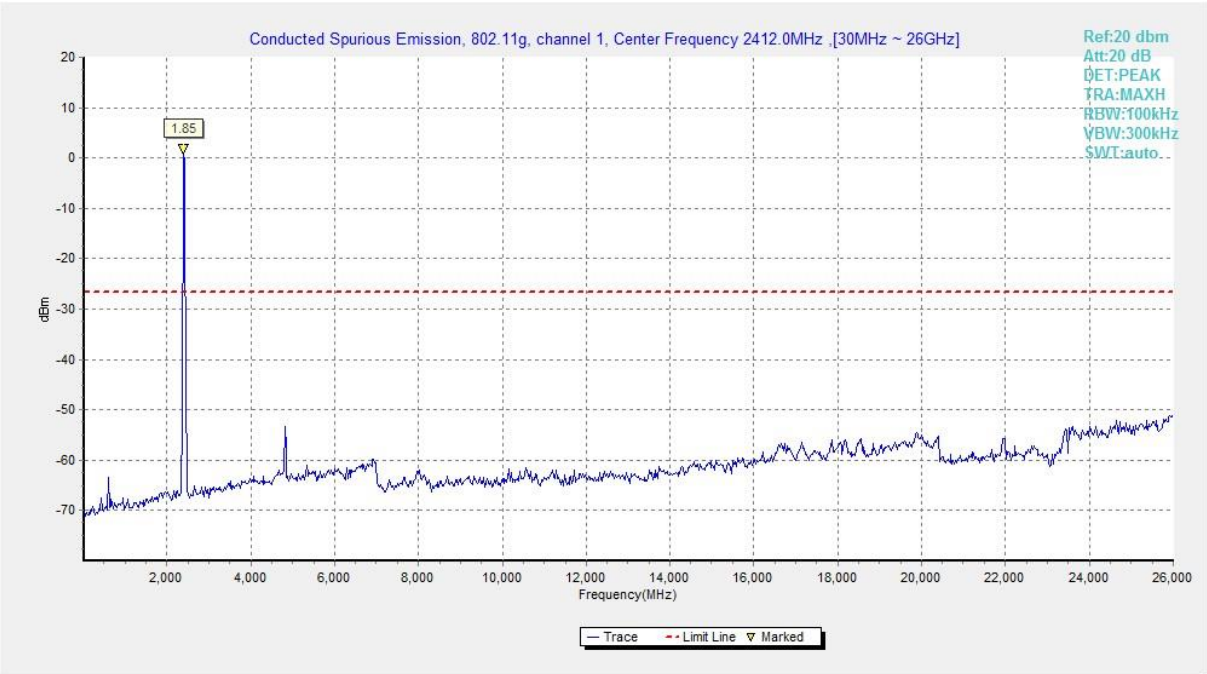

Fig.28 Conducted Spurious Emission (802.11g, CH1)

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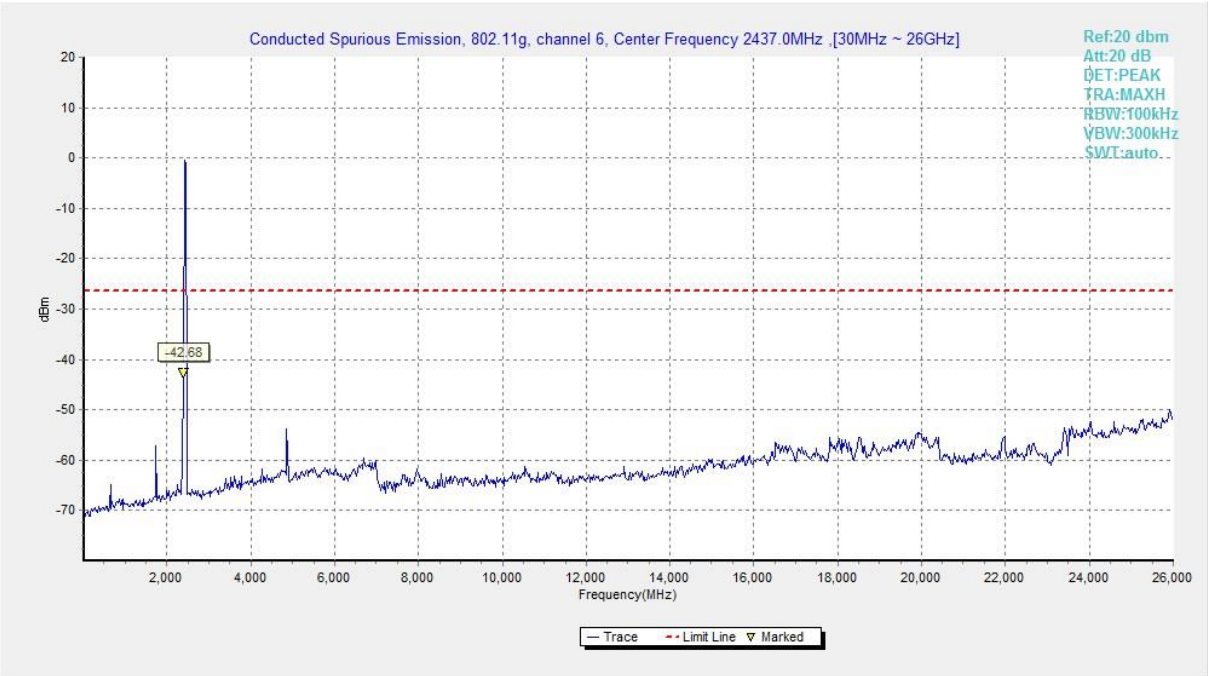

Fig.29 Conducted Spurious Emission (802.11g, CH6)

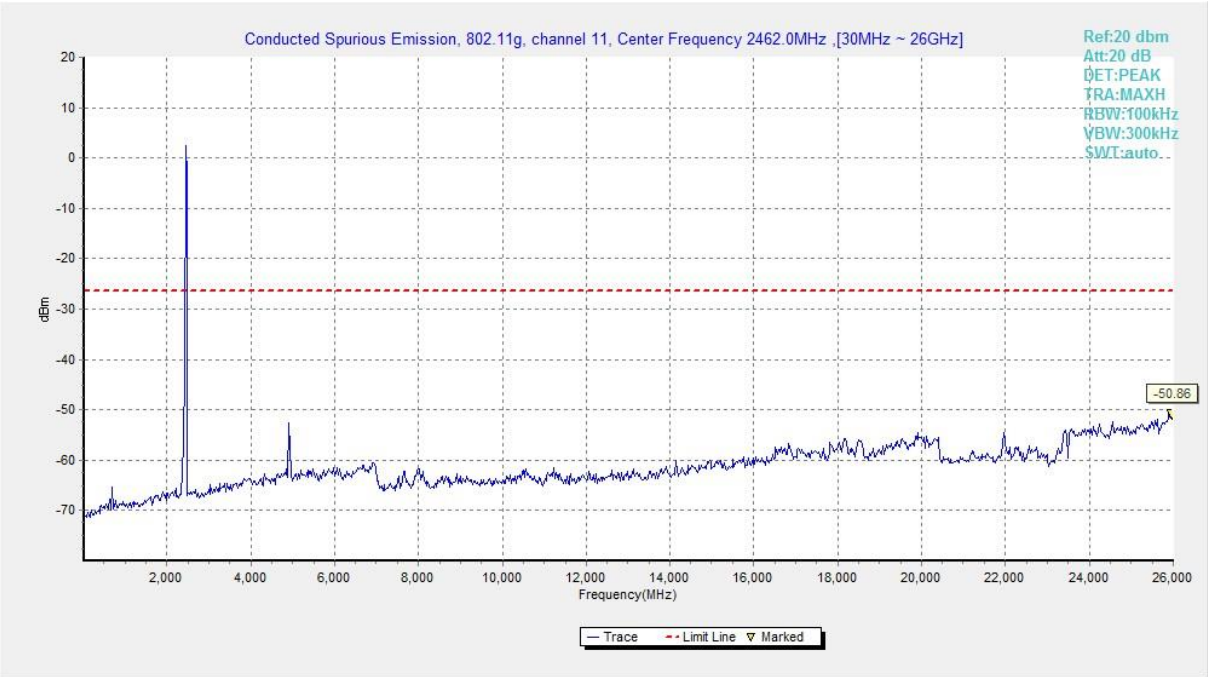

Fig.30 Conducted Spurious Emission (802.11g, CH11)

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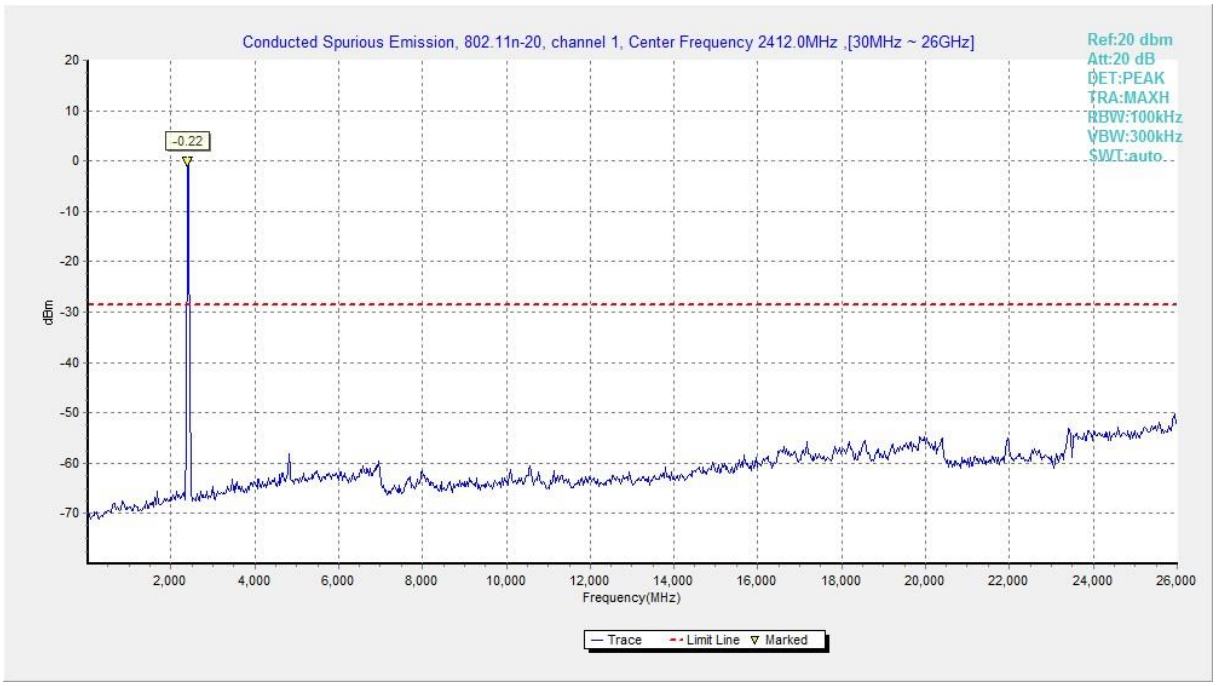

Fig.31 Conducted Spurious Emission (802.11n-HT20, CH1)

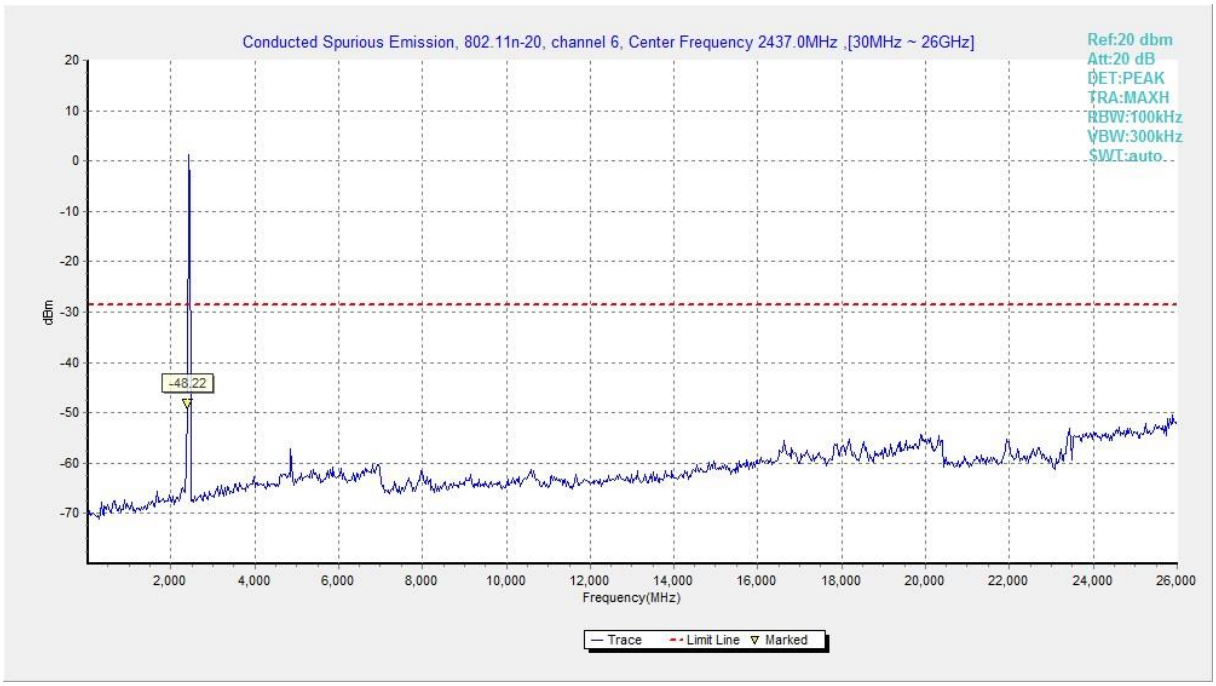

Fig.32 Conducted Spurious Emission (802.11n-HT20, CH6)

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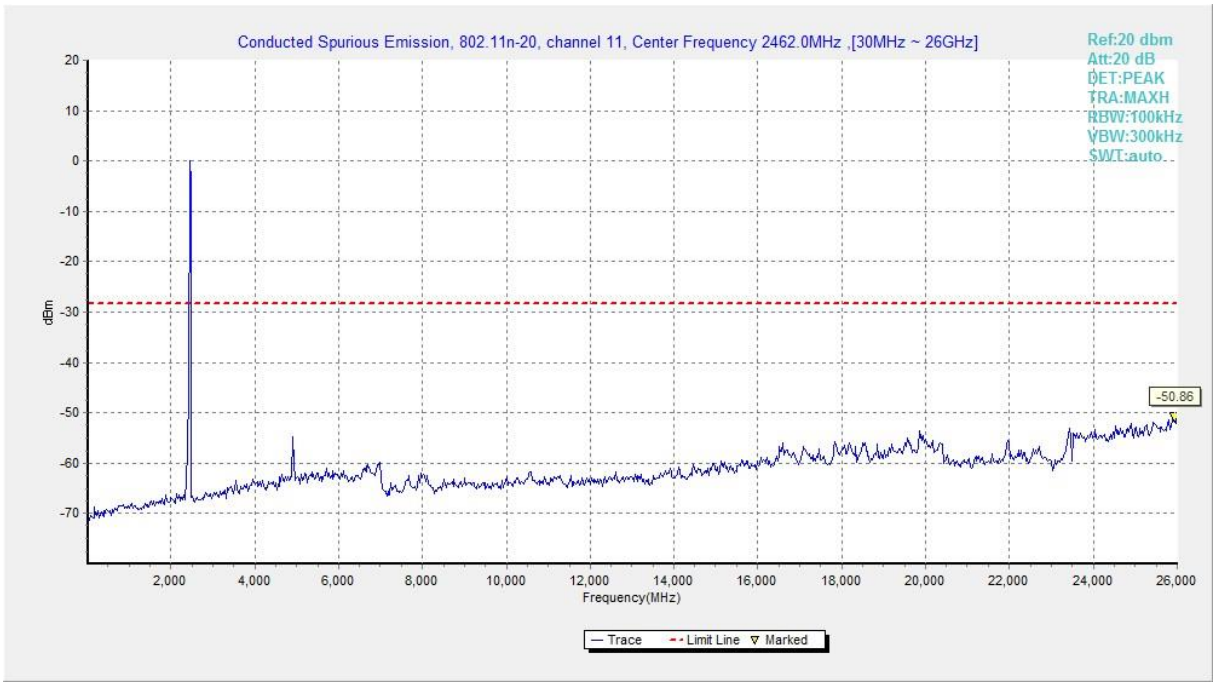

Fig.33 Conducted Spurious Emission (802.11n-HT20, CH11)

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A.6 Radiated Emission

Measurement Limit:

Standard	Limit
FCC 47 CFR Part 15.247, 15.205, 15.209 & RSS-247 section 5.5/RSS-Gen section 6.13	20dB below peak output power

In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a) (see § 15.205(c)).

Limit in restricted band:

Frequency of emission (MHz)	Field strength(μV/m)	Measurement distance(meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Test Condition:

The EUT was placed on a non-conductive table. The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and the EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. This maximization process was repeated with the EUT positioned in each of its three orthogonal orientations.

Frequency of emission (MHz)	RBW/VBW	Sweep Time(s)
30-1000	120kHz/300kHz	5
1000-4000	1MHz/3MHz	15
4000-18000	1MHz/3MHz	40
18000-26500	1MHz/3MHz	20

Note:

According to the performance evaluation, the radiated emission margin of EUT is over 20dB in the band below 30MHz. Therefore, the measurement starts from 30MHz to tenth harmonic.

The measurement results include the horizontal polarization and vertical polarization measurements.

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Measurement Results:

Mode	Channel	Frequency Range	Test Results	Conclusion
802.11b	CH 1	1 GHz ~3 GHz	Fig.34	**P**
		3 GHz ~18 GHz	Fig.35	
	CH 6	1 GHz ~3 GHz	Fig.36	**P**
		3 GHz ~18 GHz	Fig.37	
	CH 11	1 GHz ~3 GHz	Fig.38	**P**
		3 GHz ~18 GHz	Fig.39	
	Restricted Band (CH1)	2.38 GHz ~ 2.45 GHz	Fig.40	**P**
	Restricted Band (CH11)	2.45 GHz ~ 2.5 GHz	Fig.41	**P**
802.11g	CH 1	1 GHz ~3 GHz	Fig.42	**P**
		3 GHz ~18 GHz	Fig.43	
	CH 6	1 GHz ~3 GHz	Fig.44	**P**
		3 GHz ~18 GHz	Fig.45	
	CH 11	1 GHz ~3 GHz	Fig.46	**P**
		3 GHz ~18 GHz	Fig.47	
	Restricted Band (CH1)	2.38 GHz ~ 2.45 GHz	Fig.48	**P**
	Restricted Band (CH11)	2.45 GHz ~ 2.5 GHz	Fig.49	**P**
802.11n-HT20	CH 1	1 GHz ~3 GHz	Fig.50	**P**
		3 GHz ~18 GHz	Fig.51	
	CH 6	1 GHz ~3 GHz	Fig.52	**P**
		3 GHz ~18 GHz	Fig.53	
	CH 11	1 GHz ~3 GHz	Fig.54	**P**
		3 GHz ~18 GHz	Fig.55	
	Restricted Band (CH1)	2.38 GHz ~ 2.45 GHz	Fig.56	**P**
	Restricted Band (CH11)	2.45 GHz ~ 2.5 GHz	Fig.57	**P**
/	All Channels	9 kHz ~30 MHz	Fig.58	**P**
		30 MHz ~1 GHz	Fig.59	**P**
		18 GHz ~26.5 GHz	Fig.60	**P**

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Worst-Case Result:

802.11b CH6 (1-18GHz)

Frequency (MHz)	MaxPeak (dBuV/m)	Limit (dBμV/m)	Margin (dB)	Pol	Corr. (dB/m)
4874.000000	50.21	74.00	23.79	V	0.1
10987.000000	46.63	74.00	27.37	H	6.1
13100.000000	48.29	74.00	25.71	H	9.7
14507.000000	49.24	74.00	24.76	V	11.7
16931.000000	52.61	74.00	21.39	V	15.9
17892.000000	52.31	74.00	21.69	V	16.3

Frequency (MHz)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Pol	Corr. (dB/m)
4874.000000	46.68	54.00	7.32	V	0.1
11008.000000	34.79	54.00	19.21	H	6.6
13189.000000	36.20	54.00	17.80	H	9.8
14877.000000	37.41	54.00	16.59	H	11.7
16779.000000	39.81	54.00	14.19	V	15.8
17935.500000	40.69	54.00	13.31	V	17.0

802.11g CH6 (1GHz-18GHz)

Frequency (MHz)	MaxPeak (dBuV/m)	Limit (dBμV/m)	Margin (dB)	Pol	Corr. (dB/m)
4881.500000	46.77	74.00	27.23	H	-0.1
11365.000000	46.93	74.00	27.07	V	6.7
12692.000000	48.41	74.00	25.59	H	8.8
15283.000000	49.42	74.00	24.58	V	12.1
16878.500000	52.51	74.00	21.49	H	16.0
17911.000000	52.67	74.00	21.33	H	17.3

Frequency (MHz)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Pol	Corr. (dB/m)
4874.500000	34.68	54.00	19.32	V	0.1
11453.000000	34.90	54.00	19.10	H	6.8
13098.000000	36.42	54.00	17.58	H	9.8
14464.000000	37.48	54.00	16.52	V	11.7
16815.000000	39.94	54.00	14.06	H	16.0
17912.000000	40.75	54.00	13.25	H	17.3

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802.11n HT20 CH11 (1GHz-18GHz)

Frequency (MHz)	MaxPeak (dBuV/m)	Limit (dBμV/m)	Margin (dB)	Pol	Corr. (dB/m)
4936.000000	45.63	74.00	28.37	V	0.0
11003.000000	46.73	74.00	27.27	H	6.3
12234.000000	48.24	74.00	25.76	V	8.5
14069.500000	49.69	74.00	24.31	H	10.4
16959.500000	51.41	74.00	22.59	V	15.9
17936.000000	51.86	74.00	22.14	V	17.0

Frequency (MHz)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Pol	Corr. (dB/m)
4931.000000	34.12	54.00	19.88	V	0.0
11483.000000	34.66	54.00	19.34	H	6.8
13143.500000	36.08	54.00	17.92	H	9.6
14869.000000	37.44	54.00	16.56	H	11.7
16784.500000	40.05	54.00	13.95	V	15.9
17907.500000	40.69	54.00	13.31	V	17.3

Note:

A "reference path loss" is established and the A_{Rpl} is the attenuation of “reference path loss”, and Antenna Factor, the gain of the preamplifier, the cable loss. P_{Mea} is the field strength recorded from the instrument. The measurement results are obtained as described below:

Result= P_{Mea} +Cable Loss +Antenna Factor-Gain of the preamplifier.

See below for test graphs.

Conclusion: PASS

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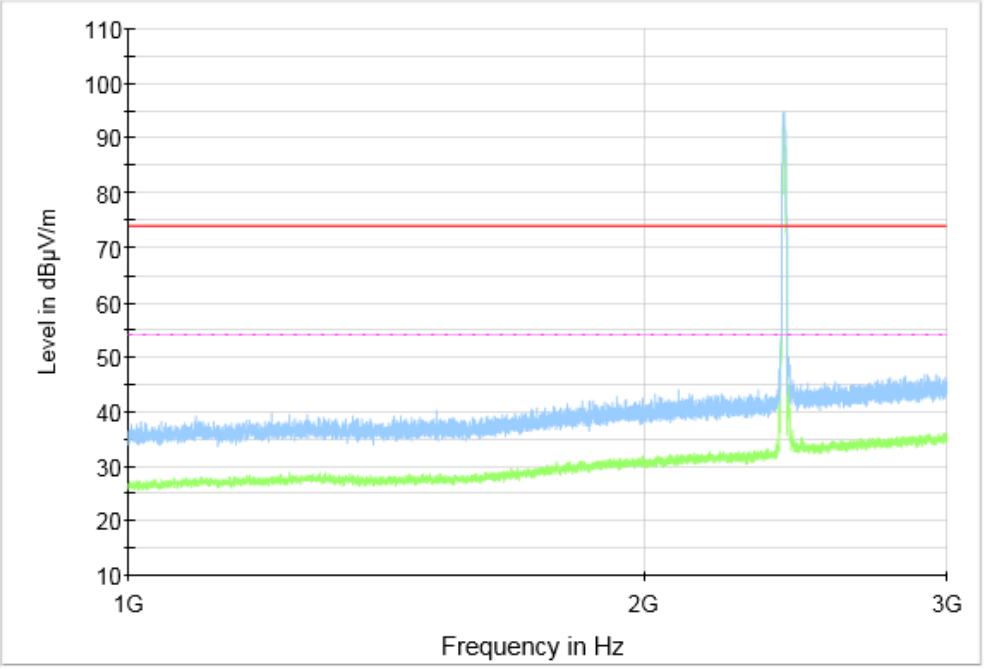

Fig.34 Radiated Spurious Emission (802.11b, CH1, 1 GHz-3 GHz)

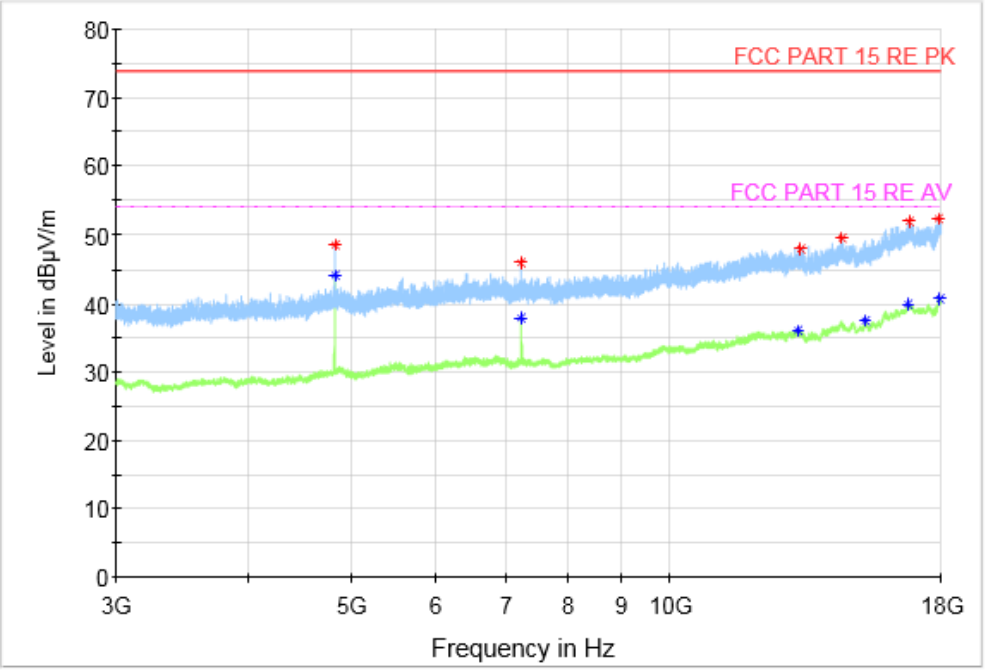

Fig.35 Radiated Spurious Emission (802.11b, CH1, 3 GHz-18 GHz)

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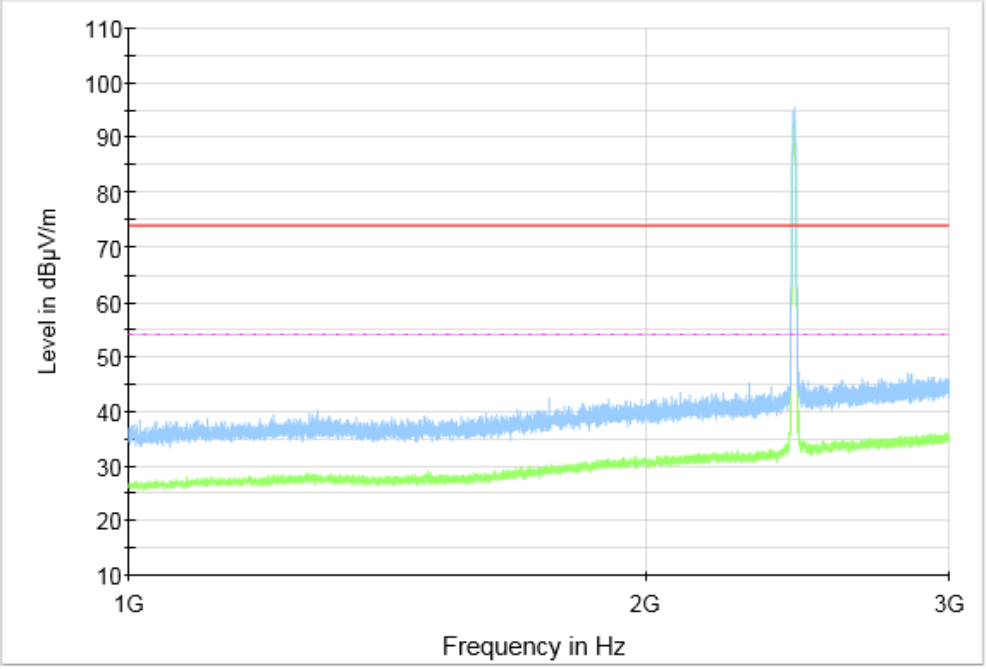

Fig.36 Radiated Spurious Emission (802.11b, CH6, 1 GHz-3 GHz)

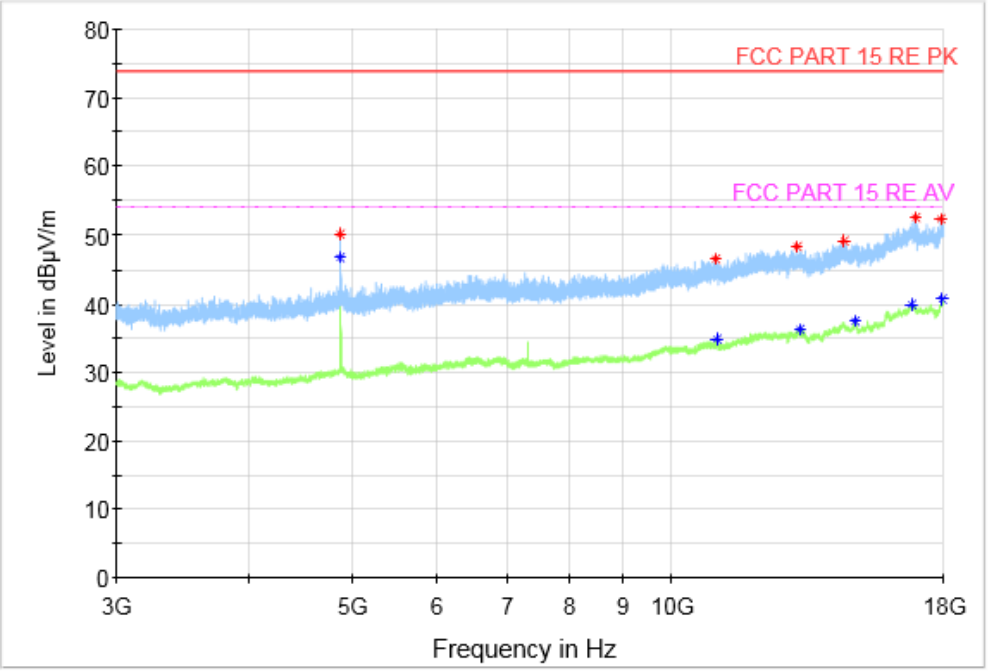

Fig.37 Radiated Spurious Emission (802.11b, CH6, 3 GHz-18 GHz)

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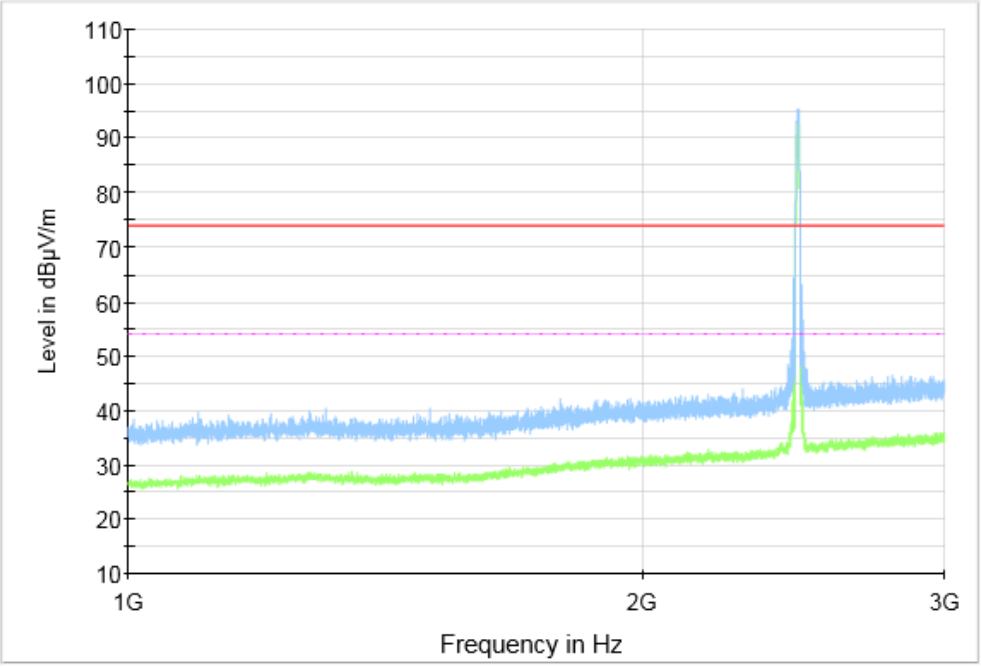

Fig.38 Radiated Spurious Emission (802.11b, CH11, 1 GHz-3 GHz)

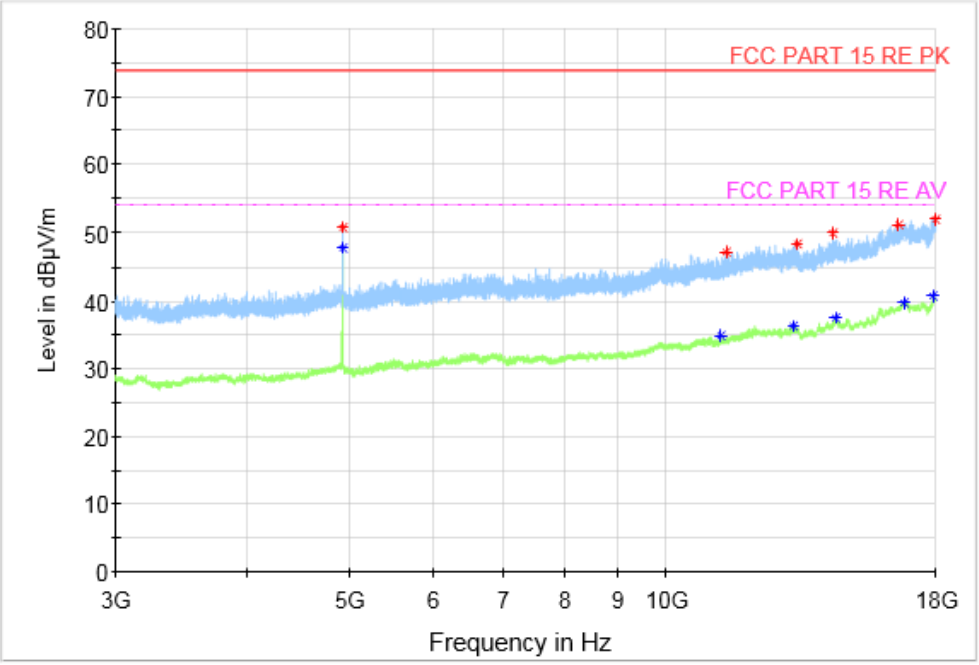

Fig.39 Radiated Spurious Emission (802.11b, CH11, 3 GHz-18 GHz)

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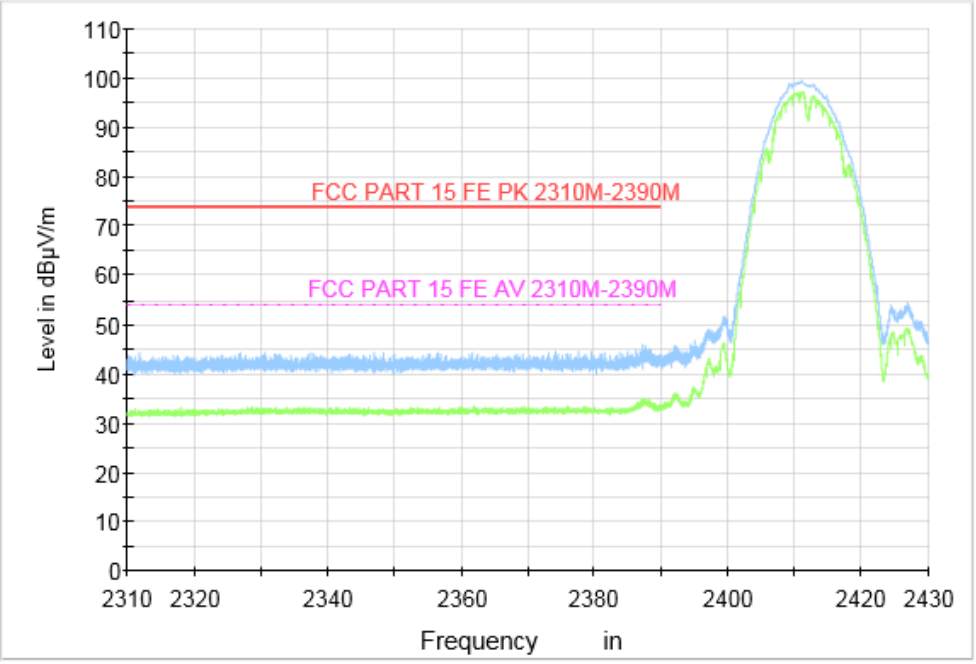

Fig.40 Radiated Restricted Band (802.11b, CH1, 2.38GHz~2.45GHz)

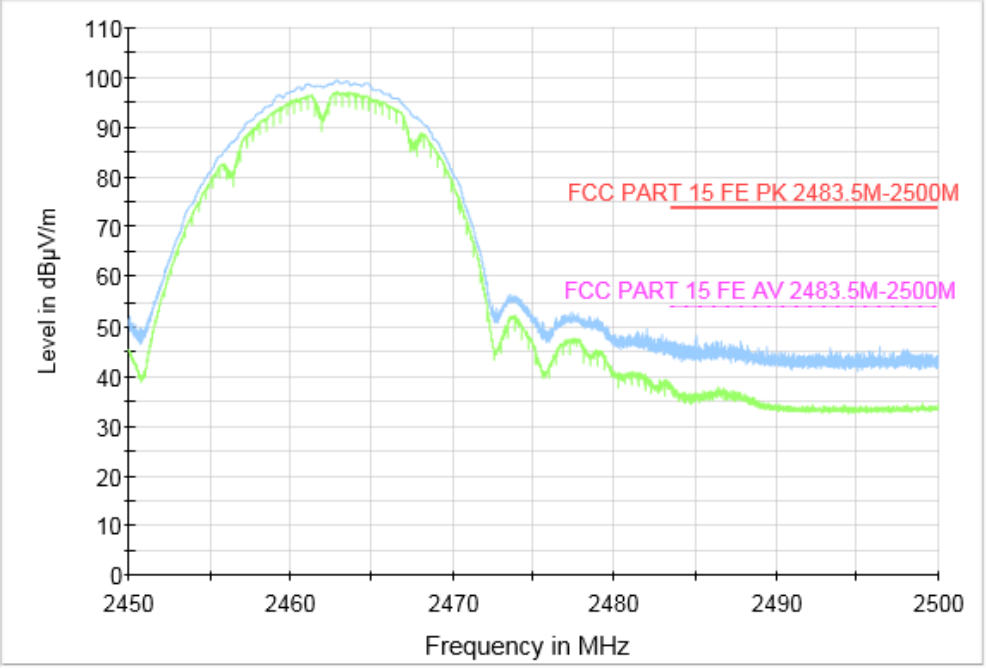

Fig.41 Radiated Restricted Band (802.11b, CH11, 2.45GHz~2.5GHz)

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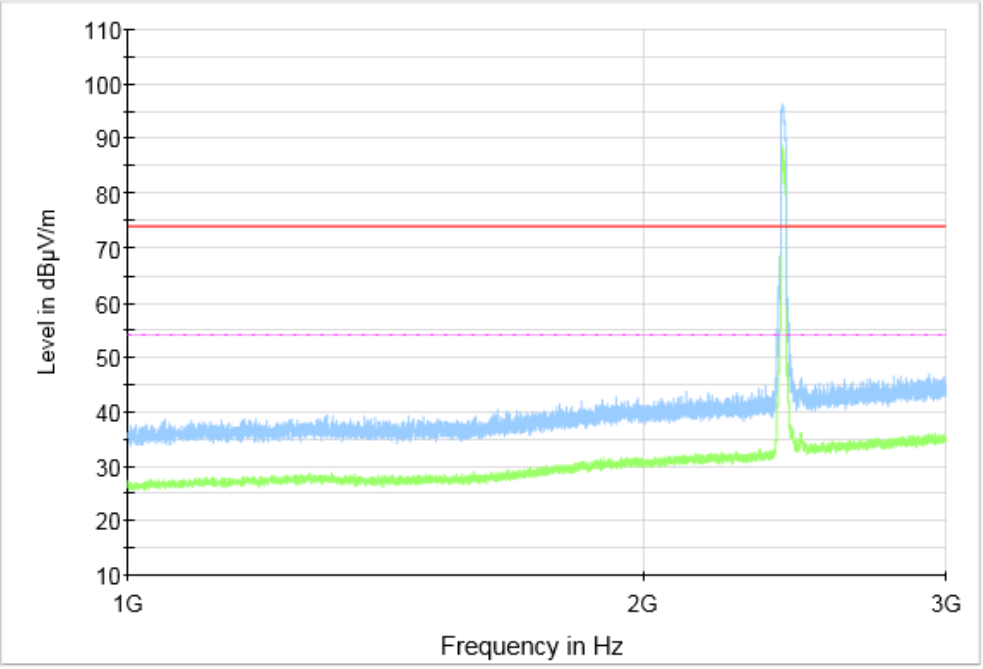

Fig.42 Radiated Spurious Emission (802.11g, CH1, 1 GHz-3 GHz)

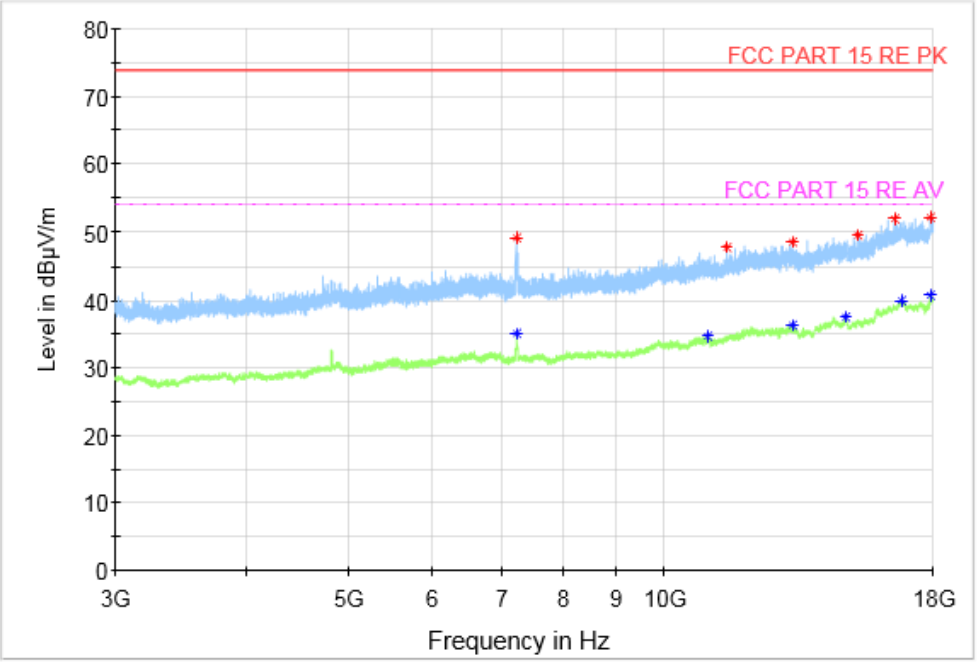

Fig.43 Radiated Spurious Emission (802.11g, CH1, 3 GHz-18 GHz)

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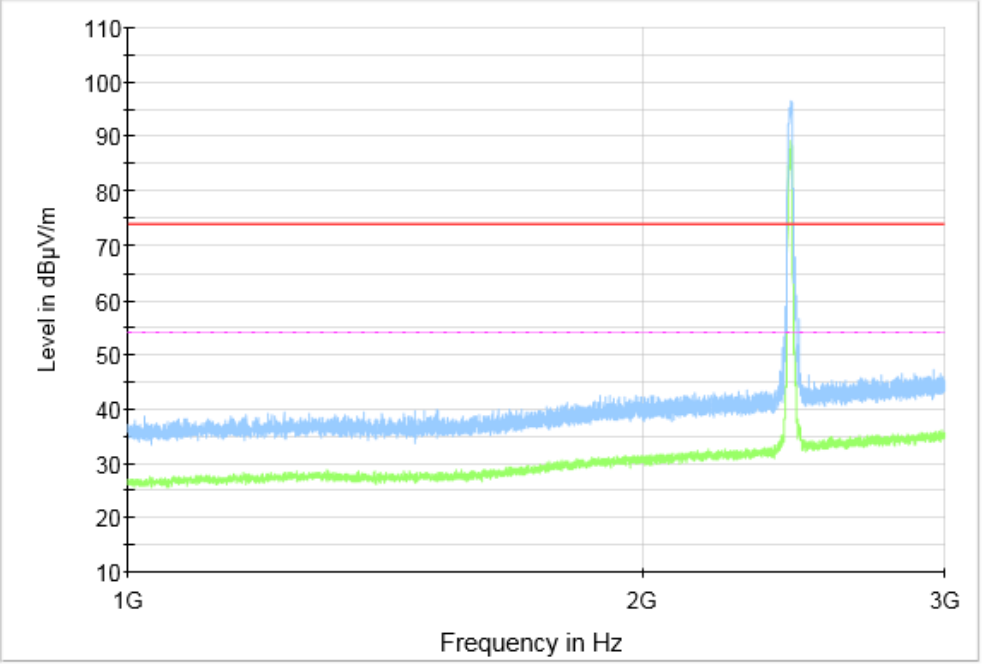

Fig.44 Radiated Spurious Emission (802.11g, CH6, 1 GHz-3 GHz)

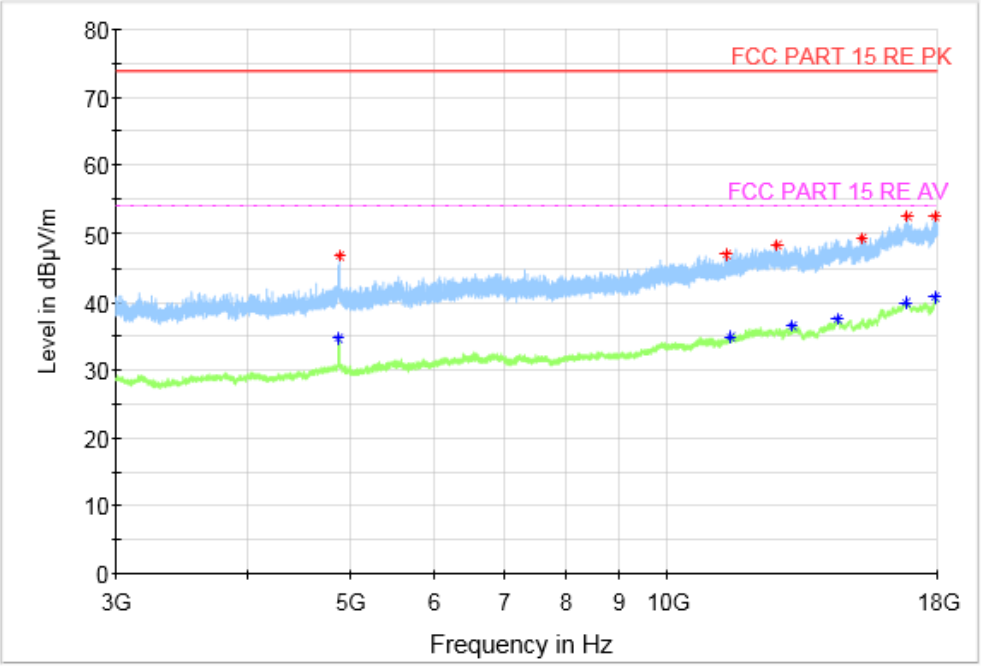

Fig.45 Radiated Spurious Emission (802.11g, CH6, 3 GHz-18 GHz)

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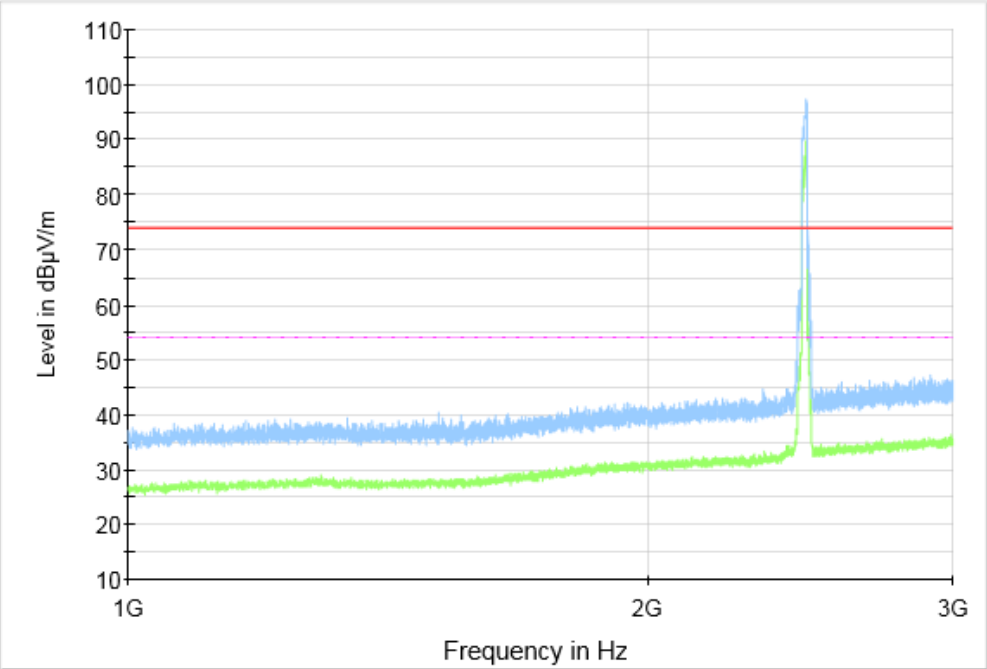

Fig.46 Radiated Spurious Emission (802.11g, CH11, 1 GHz-3 GHz)

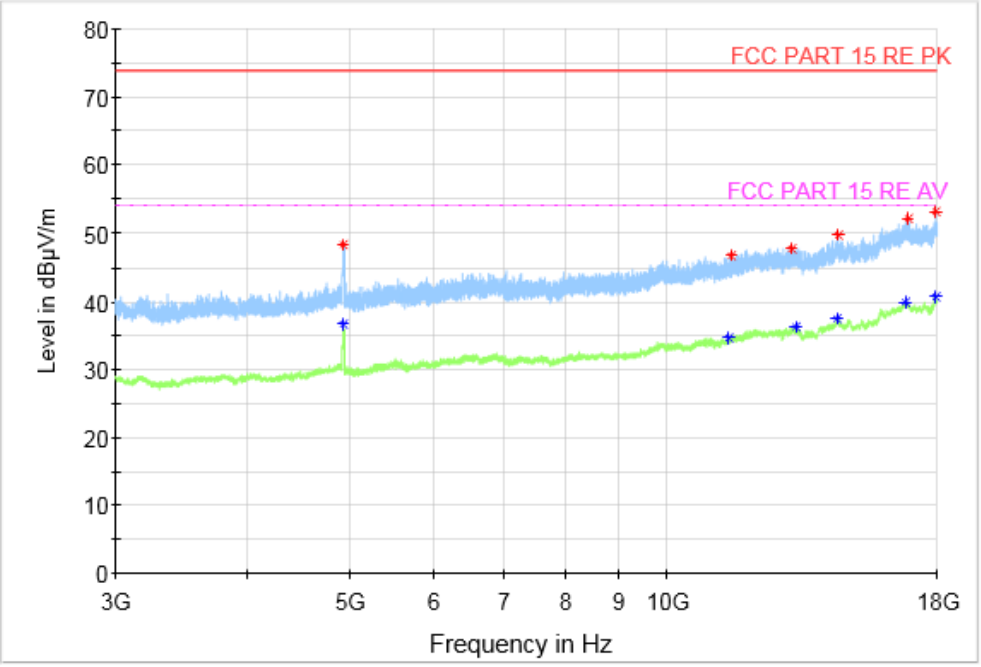

Fig.47 Radiated Spurious Emission (802.11g, CH11, 3 GHz-18 GHz)

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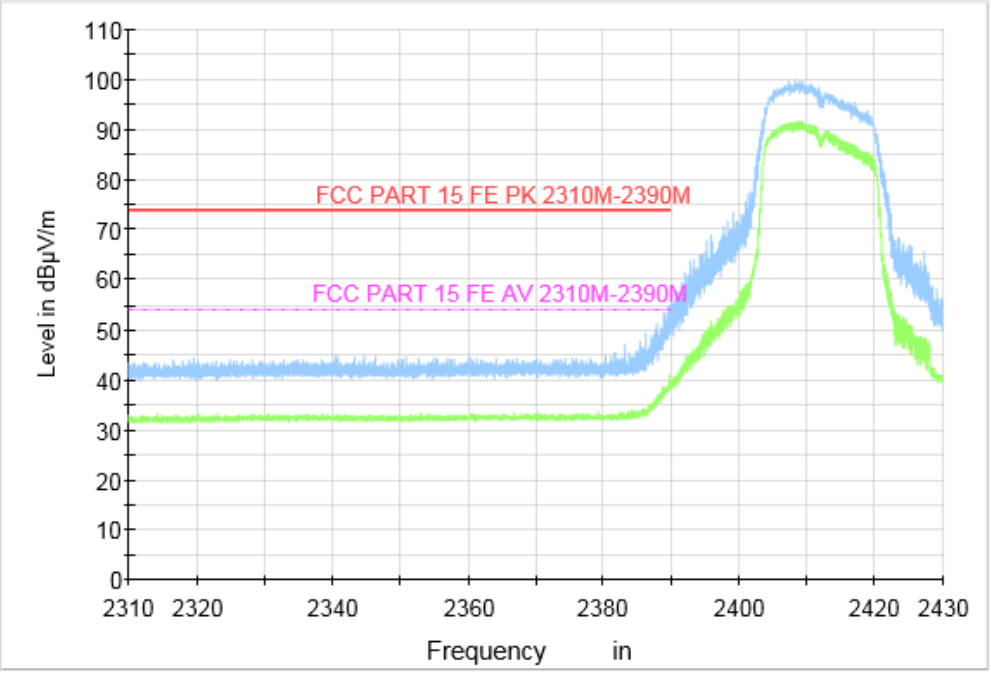

Fig.48 Radiated Restricted Band (802.11g, CH1, 2.38GHz~2.45GHz)

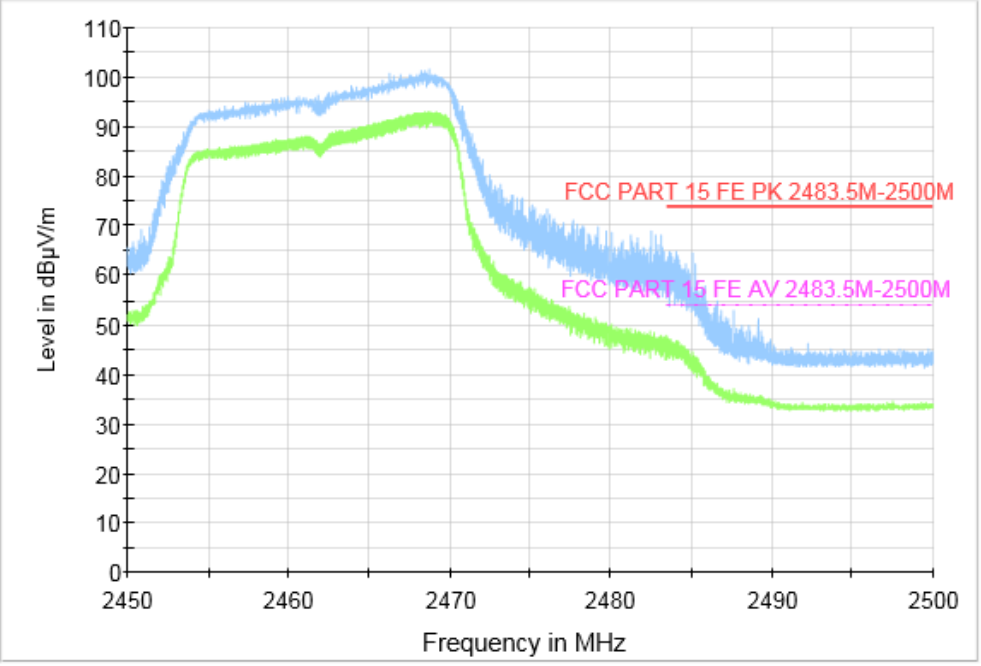

Fig.49 Radiated Restricted Band (802.11g, CH11, 2.45GHz~2.5GHz)

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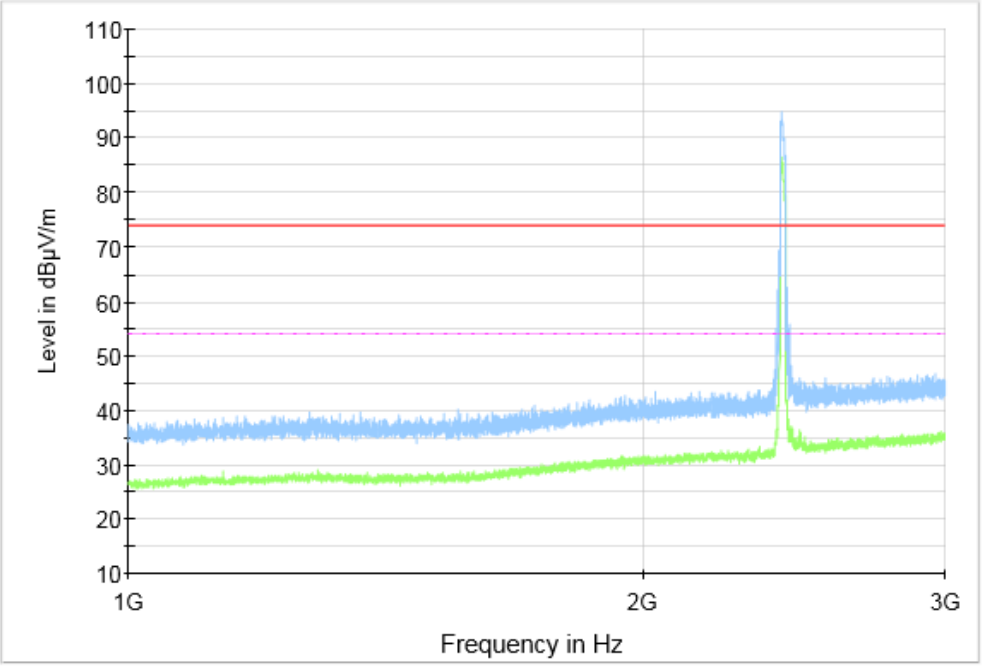

Fig.50 Radiated Spurious Emission (802.11n-HT20, CH1, 1 GHz-3 GHz)

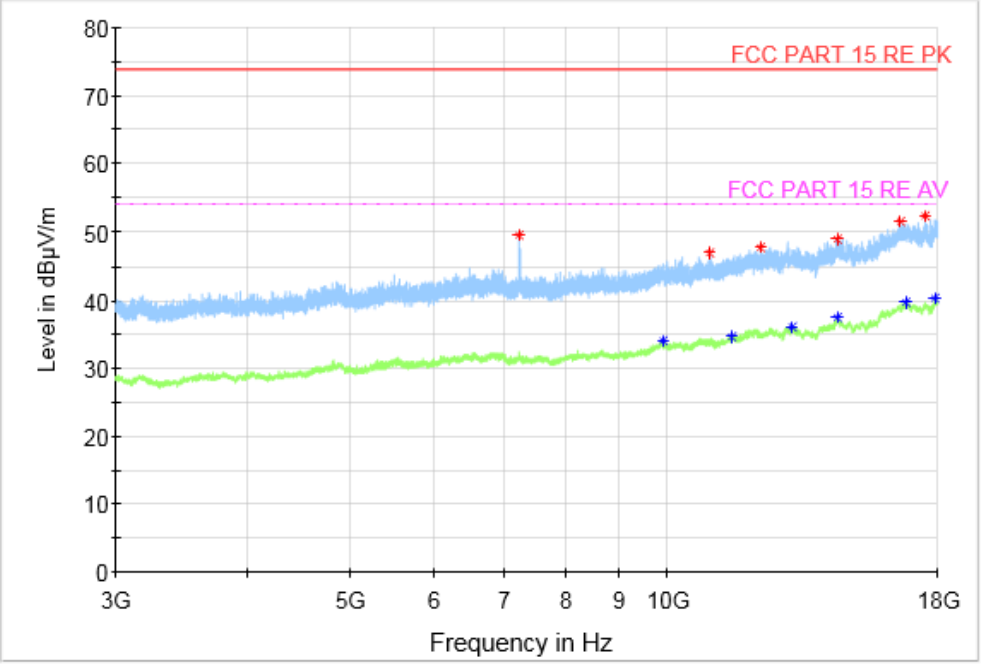

Fig.51 Radiated Spurious Emission (802.11n-HT20, CH1, 3 GHz-18 GHz)

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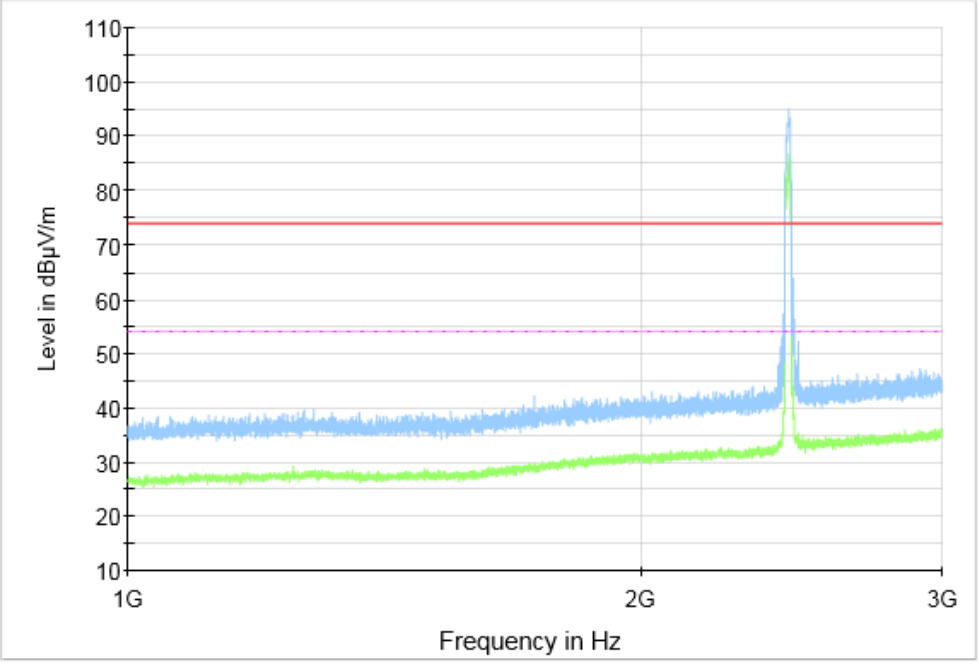

Fig.52 Radiated Spurious Emission (802.11n-HT20, CH6, 1 GHz-3 GHz)

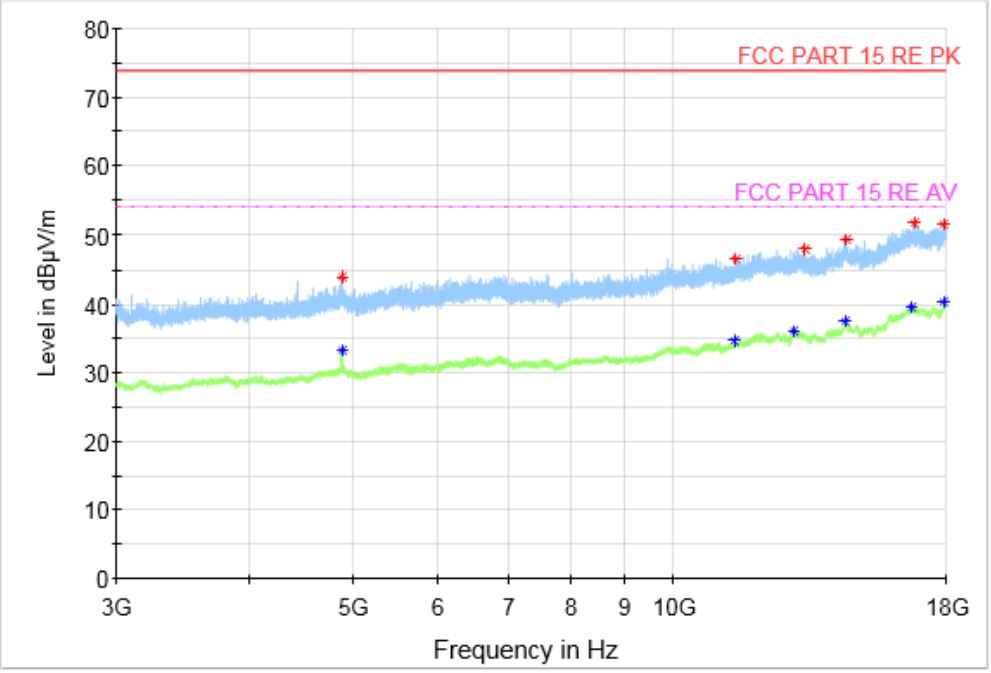

Fig.53 Radiated Spurious Emission (802.11n-HT20, CH6, 3 GHz-18 GHz)

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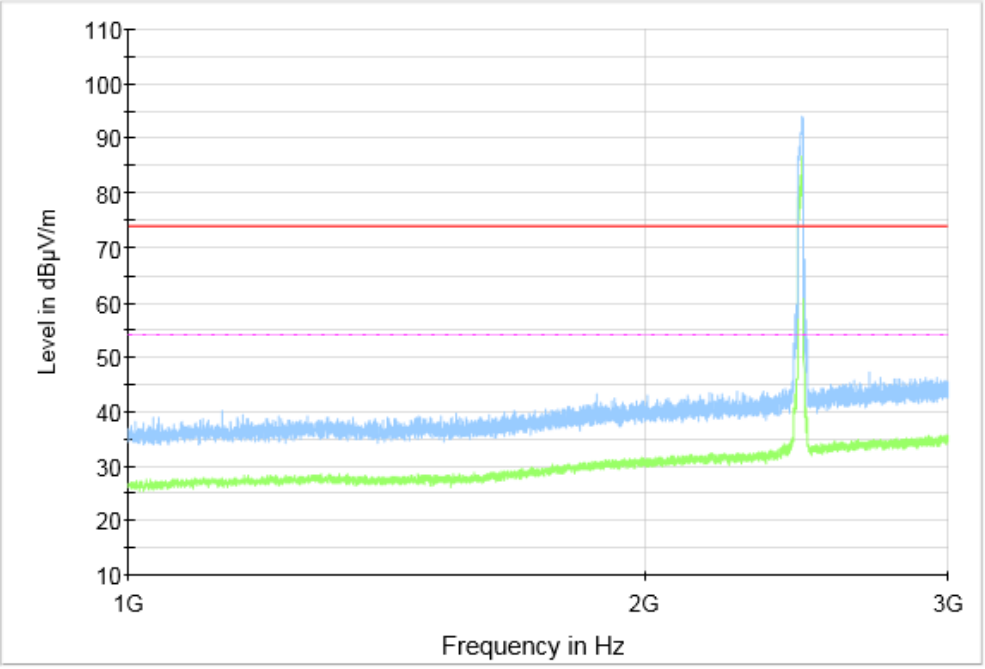

Fig.54 Radiated Spurious Emission (802.11n-HT20, CH11, 1 GHz-3 GHz)

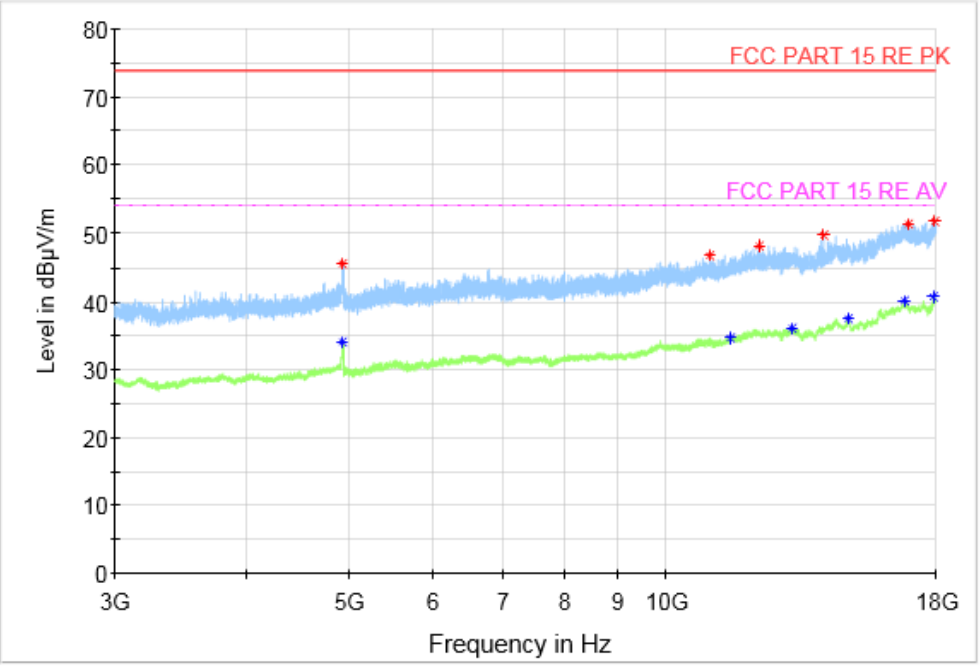

Fig.55 Radiated Spurious Emission (802.11n-HT20, CH11, 3 GHz-18 GHz)

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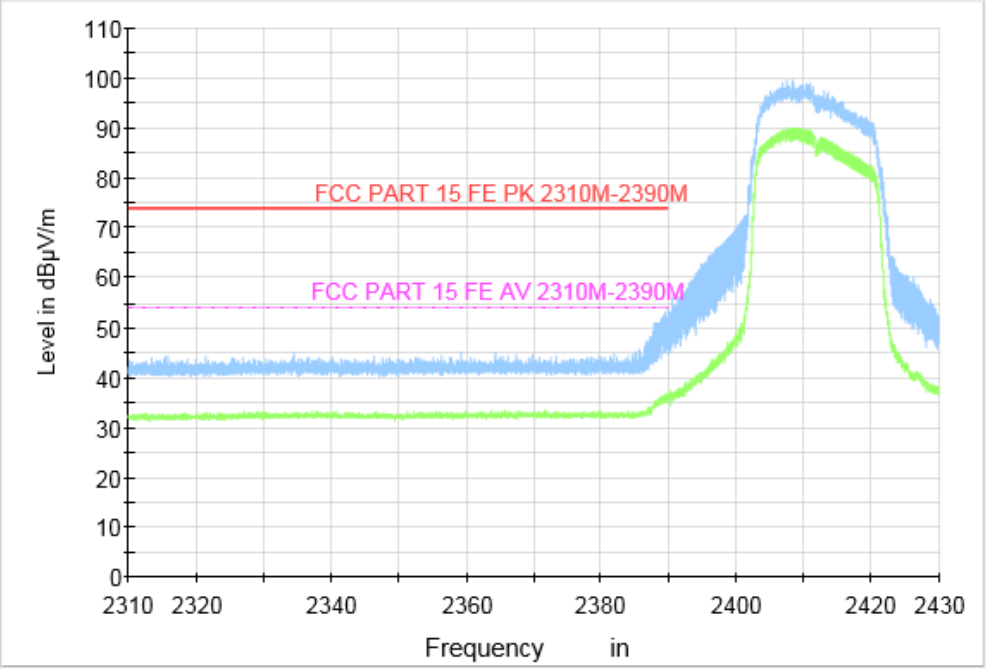

Fig.56 Radiated Restricted Band (802.11n-HT20, CH1, 2.38GHz~2.45GHz)

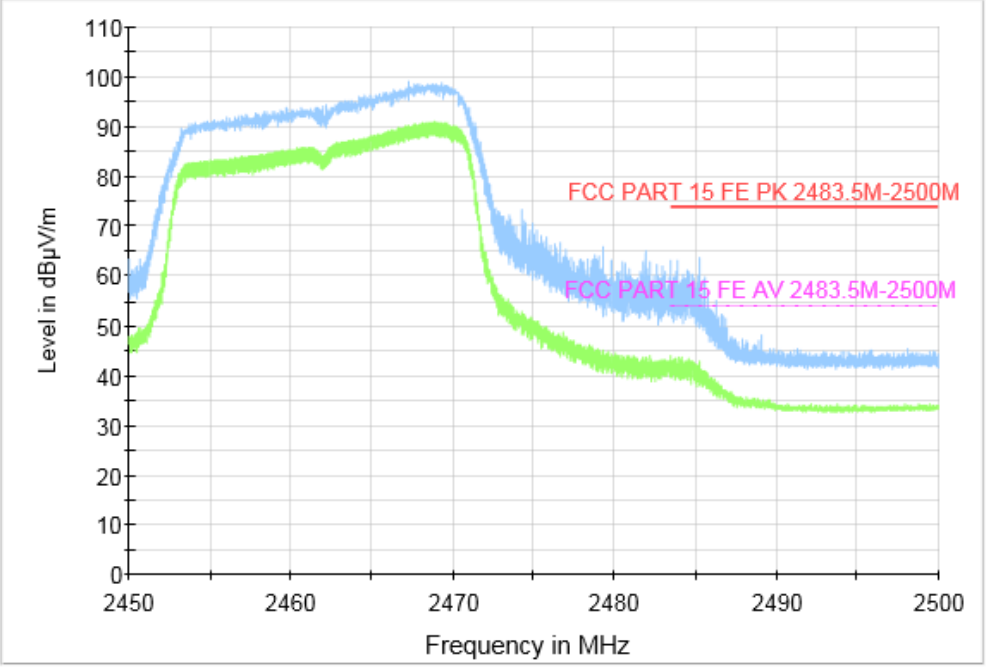

Fig.57 Radiated Restricted Band (802.11n-HT20, CH11, 2.45GHz~2.5GHz)

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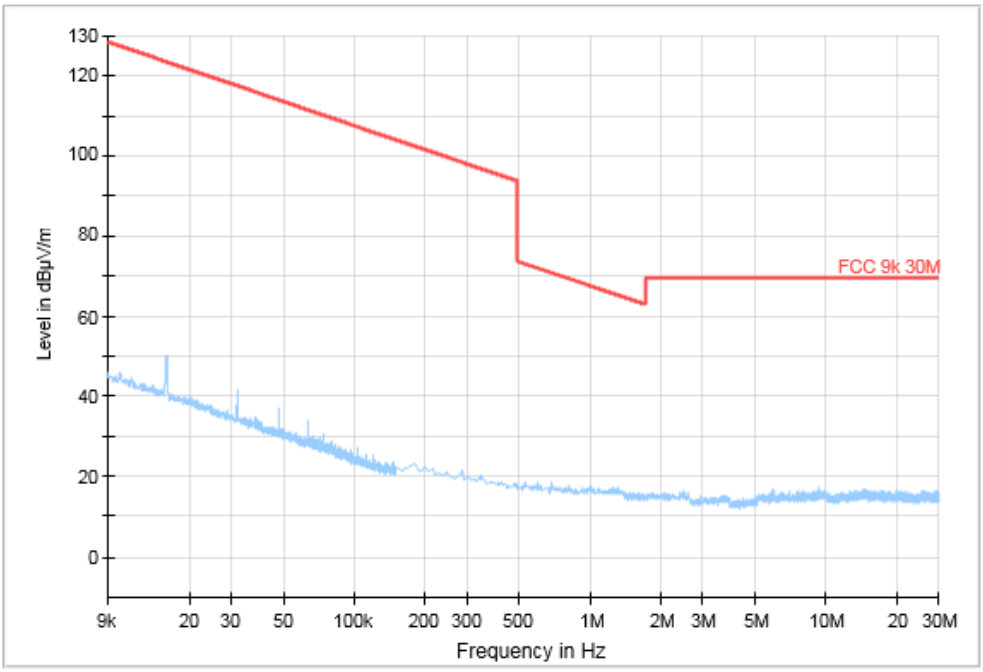

Fig.58 Radiated Spurious Emission (All Channels, 9 kHz-30 MHz)

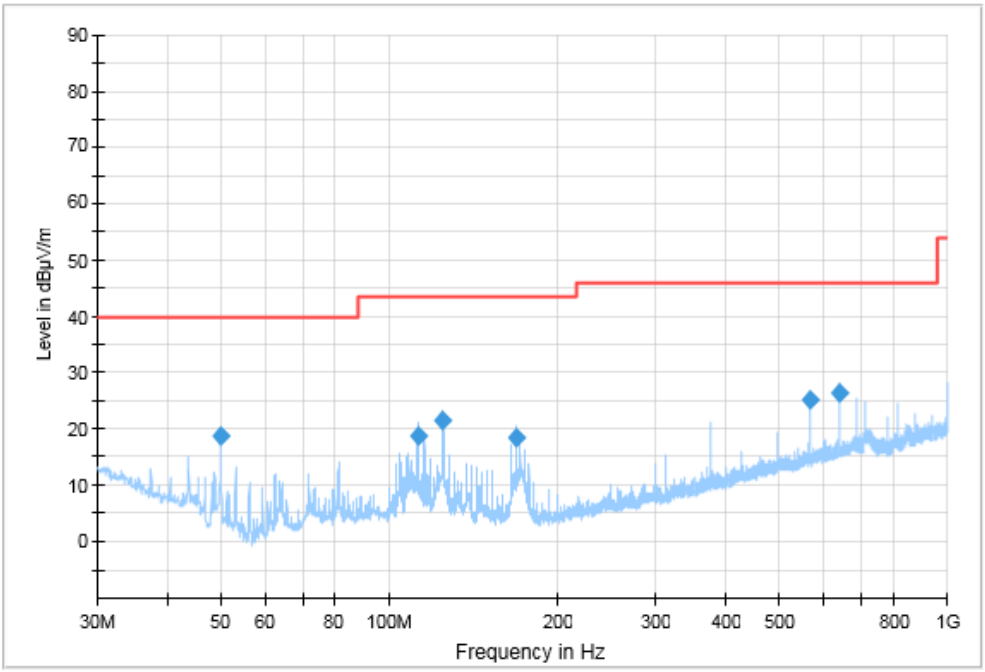

Fig.59 Radiated Spurious Emission (All Channels, 30MHz-1 GHz)

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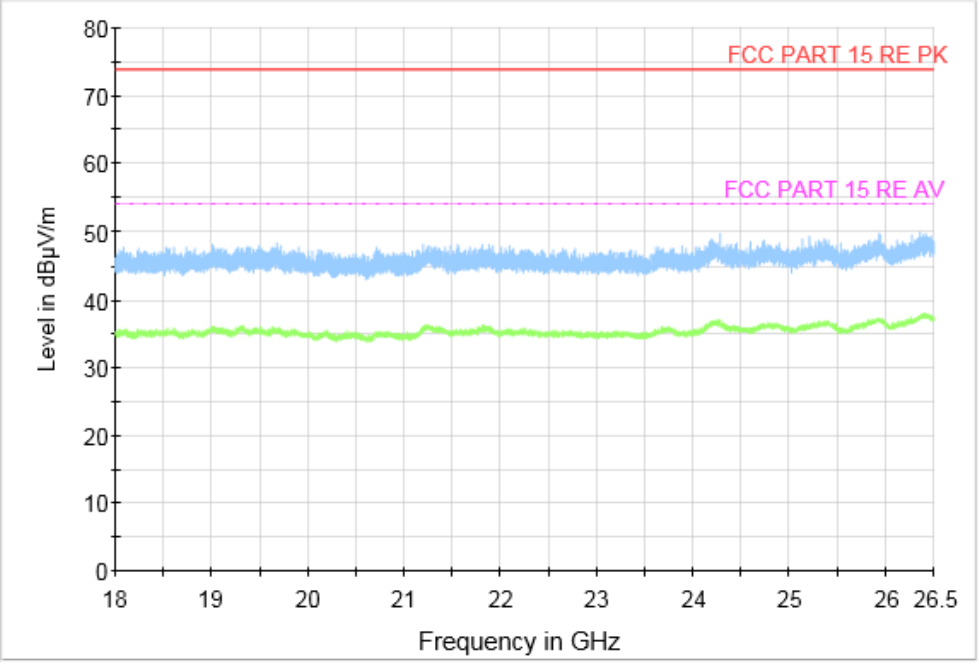

Fig.60 Radiated Spurious Emission (All Channels, 18 GHz-26.5 GHz)

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A.7 AC Power line Conducted Emission

Test Condition:

Voltage（V）	Frequency（Hz）
120	60

Measurement Result and limit:

WLAN (Quasi-peak Limit)-A2-1, A3-1

Frequency range (MHz)	Quasi-peak Limit (dBμV)	Result (dBμV)		Conclusion
		Traffic	Idle	
0.15 to 0.5	66 to 56	Fig.61	Fig.62	P
0.5 to 5	56			
5 to 30	60			
NOTE: The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz.				

WLAN (Average Limit)-A2-1, A3-1

Frequency range (MHz)	Average-peak Limit (dBμV)	Result (dBμV)		Conclusion
		Traffic	Idle	
0.15 to 0.5	56 to 46	Fig.61	Fig.62	P
0.5 to 5	46			
5 to 30	50			
NOTE: The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz.				

WLAN (Quasi-peak Limit)-A2-2, A3-2

Frequency range (MHz)	Quasi-peak Limit (dBμV)	Result (dBμV)		Conclusion
		Traffic	Idle	
0.16 to 0.5	66 to 56	Fig.63	Fig.64	P
0.5 to 5	56			
5 to 30	60			
NOTE: The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz.				

WLAN (Average Limit)-A2-2, A3-2

Frequency range (MHz)	Average-peak Limit (dBμV)	Result (dBμV)		Conclusion
		Traffic	Idle	
0.15 to 0.5	56 to 46	Fig.63	Fig.64	P
0.5 to 5	46			
5 to 30	50			
NOTE: The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz.				

Note: The measurement results include the L1 and N measurements.

See below for test graphs.

Conclusion: PASS

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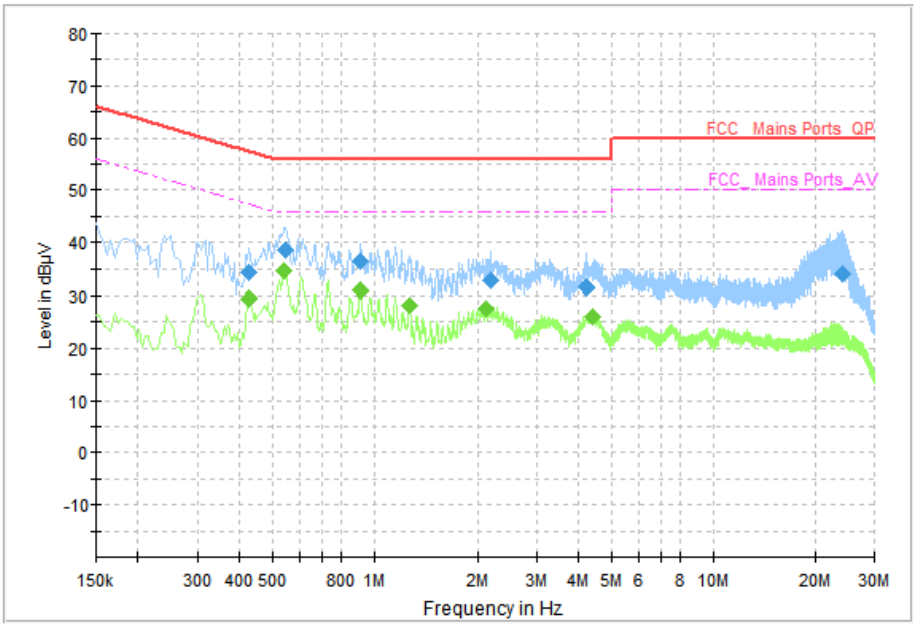

Fig.61 AC Power line Conducted Emission (Traffic), A2-1, A3-1

Measurement Results: Quasi Peak

Frequency (MHz)	QuasiPeak (dBµV)	Limit (dBµV)	Margin (dB)	Line	Filter	Corr. (dB)
0.426000	34.35	57.33	22.98	N	ON	10
0.546000	38.47	56.00	17.53	N	ON	10
0.910000	36.39	56.00	19.61	L1	ON	10
2.194000	32.87	56.00	23.13	L1	ON	10
4.222000	31.43	56.00	24.57	L1	ON	10
24.118000	33.92	60.00	26.08	N	ON	10

Measurement Results: Average

Frequency (MHz)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Filter	Corr. (dB)
0.426000	29.32	47.33	18.01	L1	ON	10
0.542000	34.53	46.00	11.47	L1	ON	10
0.906000	31.06	46.00	14.94	L1	ON	10
1.274000	28.06	46.00	17.94	L1	ON	10
2.130000	27.63	46.00	18.38	L1	ON	10
4.374000	25.93	46.00	20.07	L1	ON	10

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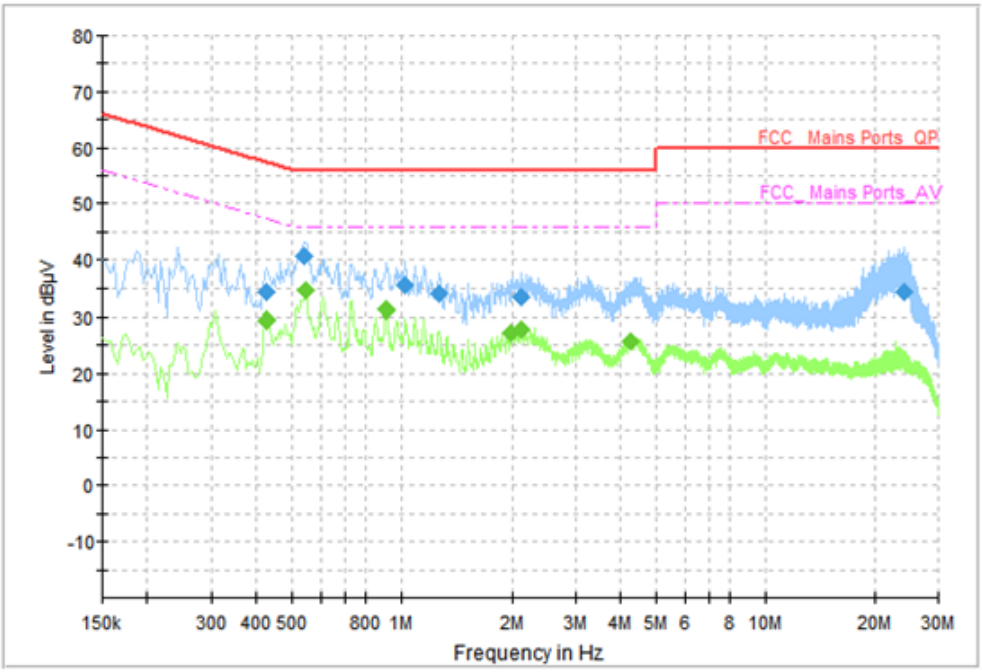

Fig.62 AC Power line Conducted Emission (Idle), A2-1, A3-1

Measurement Results: Quasi Peak

Frequency (MHz)	Quasi Peak (dBµV)	Limit (dBµV)	Margin (dB)	Line	Filter	Corr. (dB)
0.426000	34.34	57.33	22.99	N	ON	10
0.542000	40.55	56.00	15.45	L1	ON	10
1.030000	35.49	56.00	20.51	L1	ON	10
1.274000	34.10	56.00	21.90	L1	ON	10
2.122000	33.22	56.00	22.78	L1	ON	10
24.070000	34.14	60.00	25.86	N	ON	10

Measurement Results: Average

Frequency (MHz)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Filter	Corr. (dB)
0.426000	29.30	47.33	18.03	L1	ON	10
0.546000	34.69	46.00	11.31	L1	ON	10
0.914000	31.17	46.00	14.83	L1	ON	10
1.998000	27.21	46.00	18.79	L1	ON	10
2.126000	27.83	46.00	18.17	L1	ON	10
4.246000	25.62	46.00	20.38	L1	ON	10

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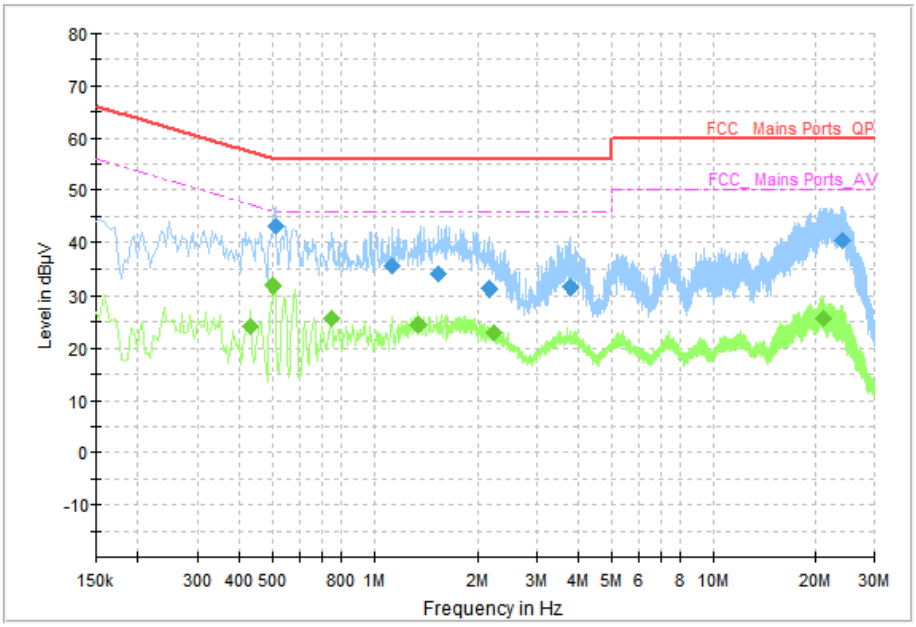

Fig.63 AC Power line Conducted Emission (Traffic), A2-2, A3-2

Measurement Results: Quasi Peak

Frequency (MHz)	QuasiPeak (dBµV)	Limit (dBµV)	Margin (dB)	Line	Filter	Corr. (dB)
0.510000	43.22	56.00	12.78	L1	ON	10
1.130000	35.39	56.00	20.61	L1	ON	10
1.534000	34.08	56.00	21.92	L1	ON	10
2.166000	31.19	56.00	24.81	L1	ON	10
3.778000	31.65	56.00	24.35	L1	ON	10
24.058000	40.30	60.00	19.70	L1	ON	10

Measurement Results: Average

Frequency (MHz)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Filter	Corr. (dB)
0.430000	24.30	47.25	22.95	L1	ON	10
0.502000	31.82	46.00	14.18	N	ON	10
0.746000	25.62	46.00	20.38	L1	ON	10
1.338000	24.64	46.00	21.36	N	ON	10
2.230000	22.87	46.00	23.13	N	ON	10
21.214000	25.80	50.00	24.20	L1	ON	10

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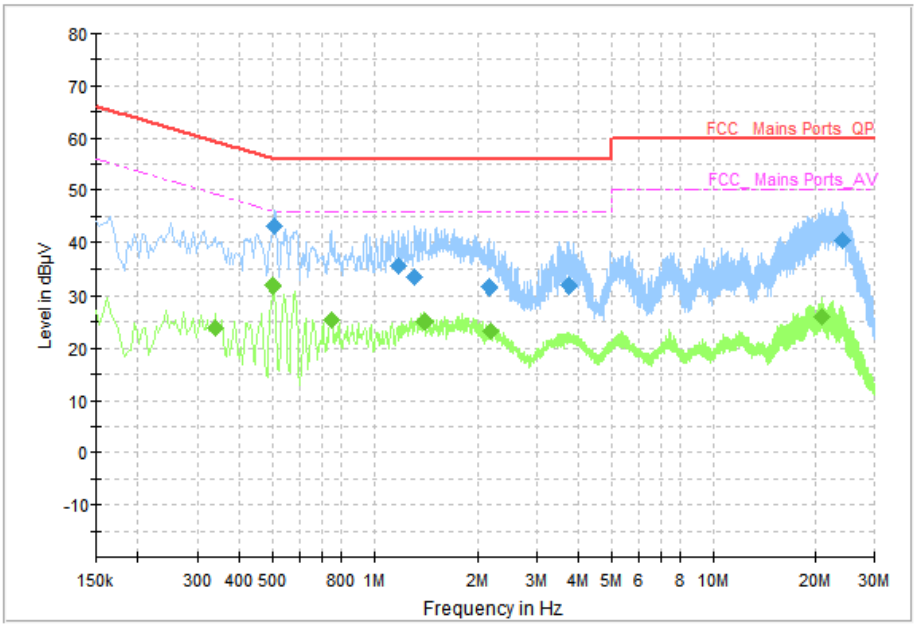

Fig.64 AC Power line Conducted Emission (Idle), A2-2, A3-2

Measurement Results: Quasi Peak

Frequency (MHz)	Quasi Peak (dBµV)	Limit (dBµV)	Margin (dB)	Line	Filter	Corr. (dB)
0.506000	43.13	56.00	12.87	L1	ON	10
1.178000	35.36	56.00	20.64	L1	ON	10
1.318000	33.23	56.00	22.77	L1	ON	10
2.170000	31.37	56.00	24.63	L1	ON	10
3.742000	31.83	56.00	24.17	L1	ON	10
24.054000	40.35	60.00	19.65	L1	ON	10

Measurement Results: Average

Frequency (MHz)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Filter	Corr. (dB)
0.338000	23.93	49.25	25.32	L1	ON	10
0.502000	31.79	46.00	14.21	N	ON	10
0.746000	25.52	46.00	20.48	L1	ON	10
1.406000	25.06	46.00	20.94	N	ON	10
2.186000	23.26	46.00	22.74	N	ON	10
21.034000	26.01	50.00	23.99	L1	ON	10

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A.8 99% Occupied Bandwidth

Measurement Limit:

Standard	Limit
RSS-Gen section 6.7	/

Measurement Result:

Mode	Channel	Frequency (MHz)	Test Results (MHz)		Conclusion
802.11b	CH1	2412	Fig.65	12.91	/
	CH6	2437	Fig.66	13.03	/
	CH11	2462	Fig.67	13.07	/
802.11g	CH1	2412	Fig.68	16.42	/
	CH6	2437	Fig.69	16.46	/
	CH11	2462	Fig.70	16.54	/
802.11n-HT20	CH1	2412	Fig.71	17.58	/
	CH6	2437	Fig.72	17.66	/
	CH11	2462	Fig.73	17.62	/

See below for test graphs.

Conclusion: PASS

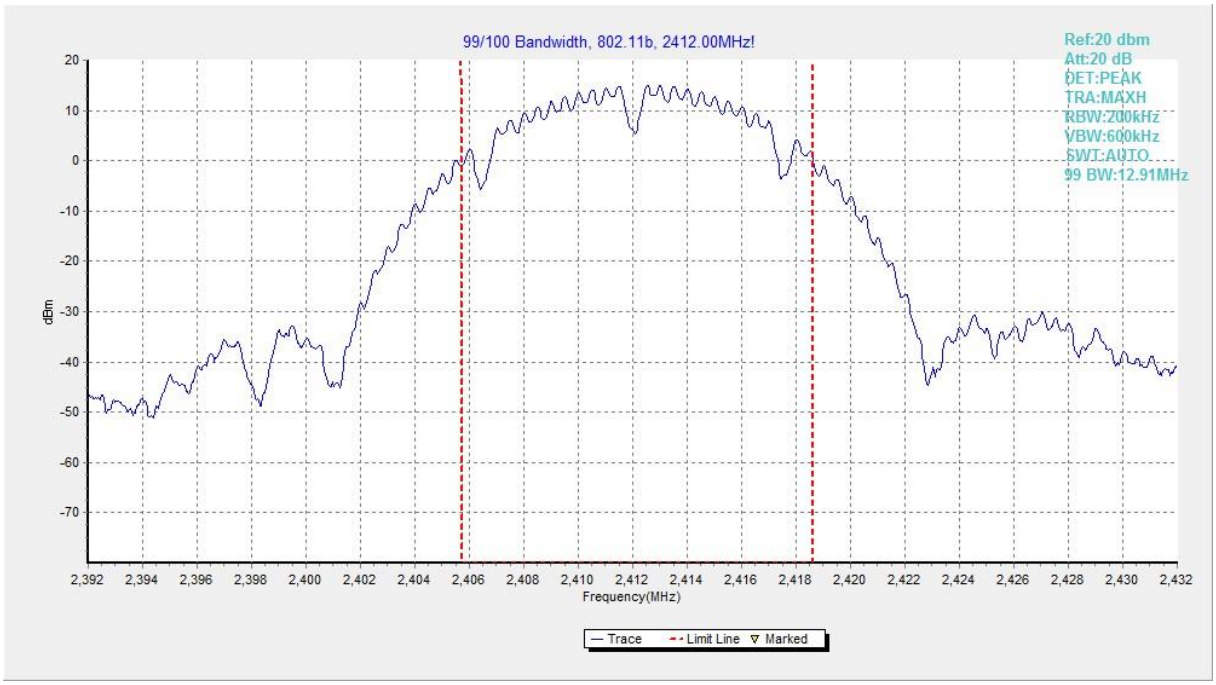

Fig.65 99% Occupied Bandwidth (802.11b, CH 1)

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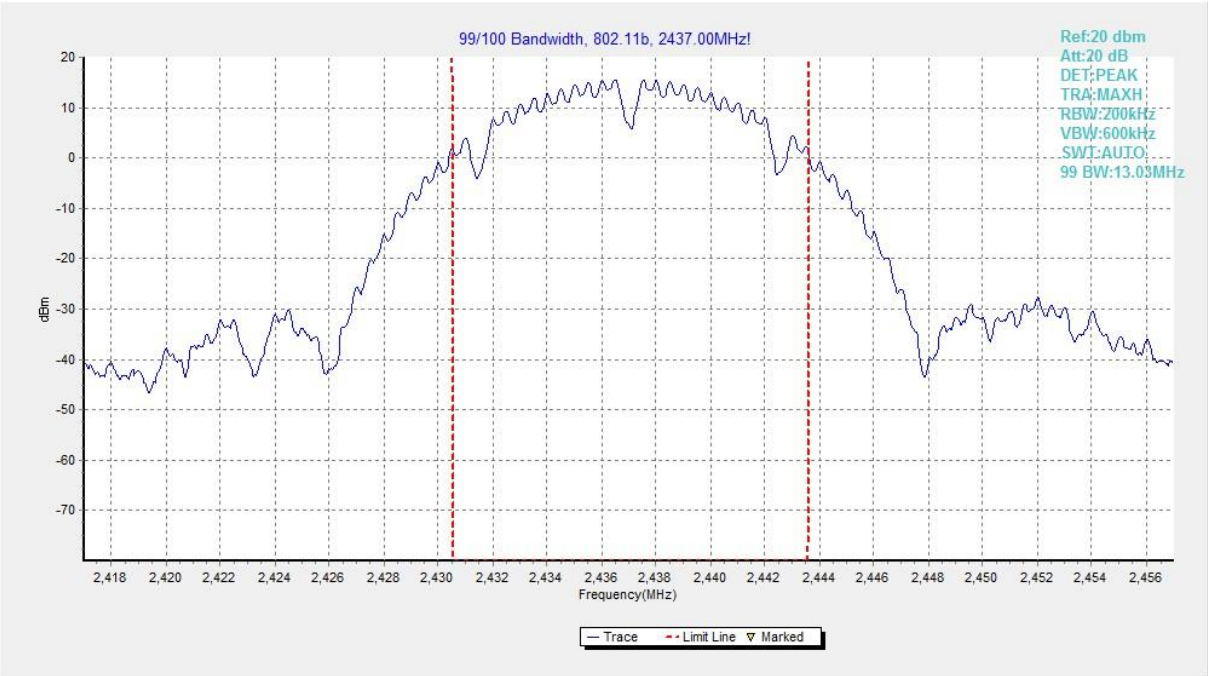

Fig.66 99% Occupied Bandwidth (802.11b, CH 6)

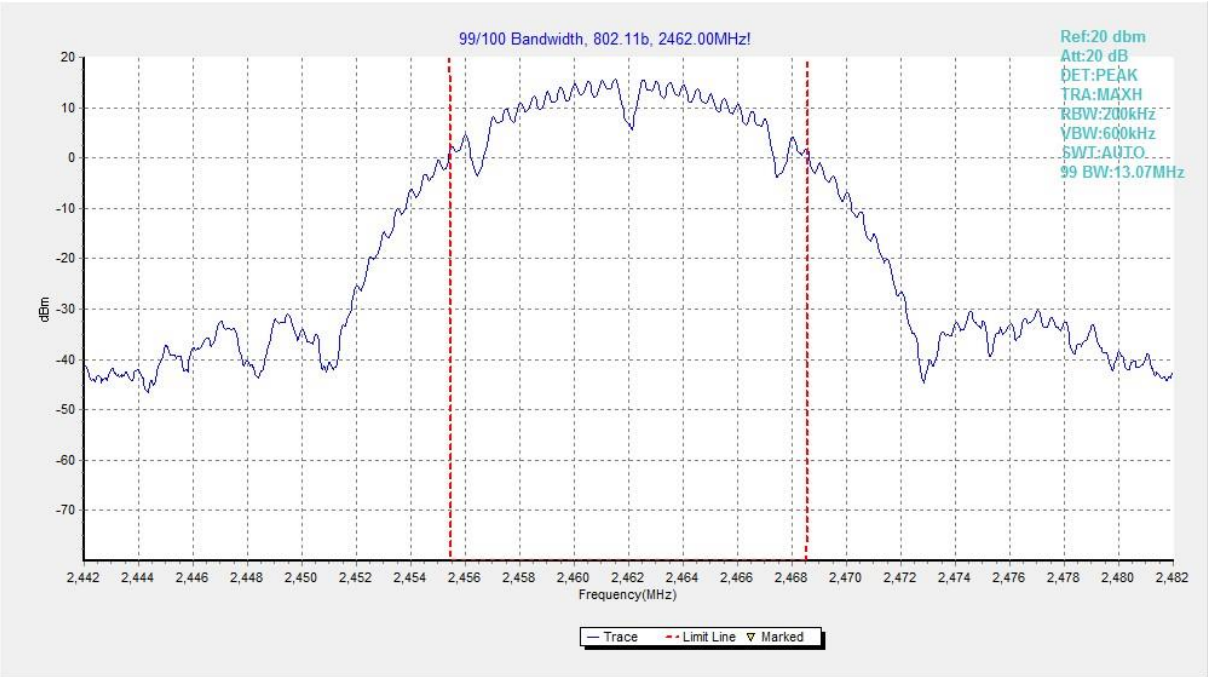

Fig.67 99% Occupied Bandwidth (802.11b, CH 11)

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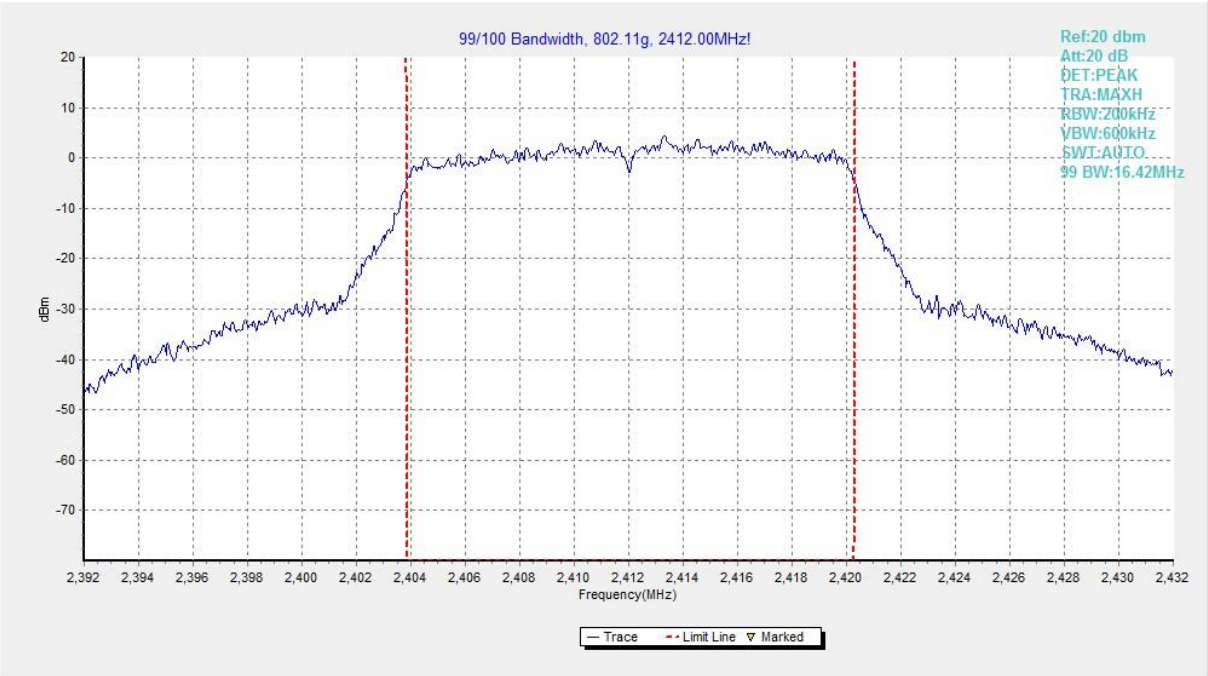

Fig.68 99% Occupied Bandwidth (802.11g, CH 1)

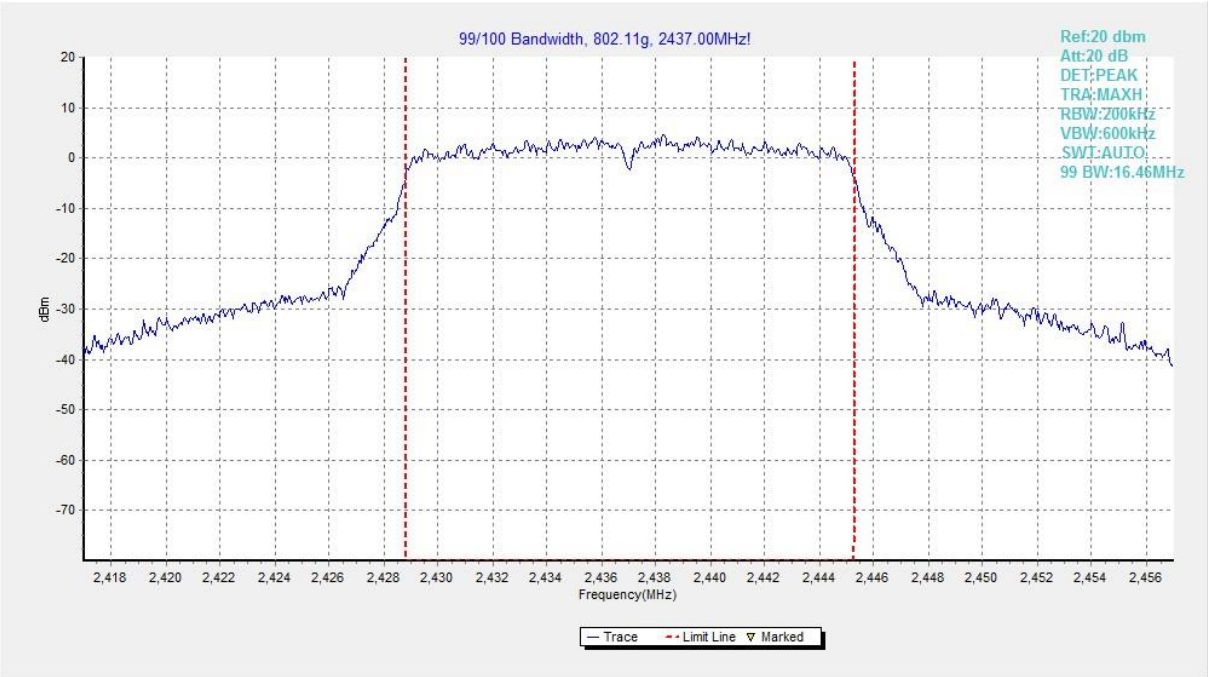

Fig.69 99% Occupied Bandwidth (802.11g, CH 6)

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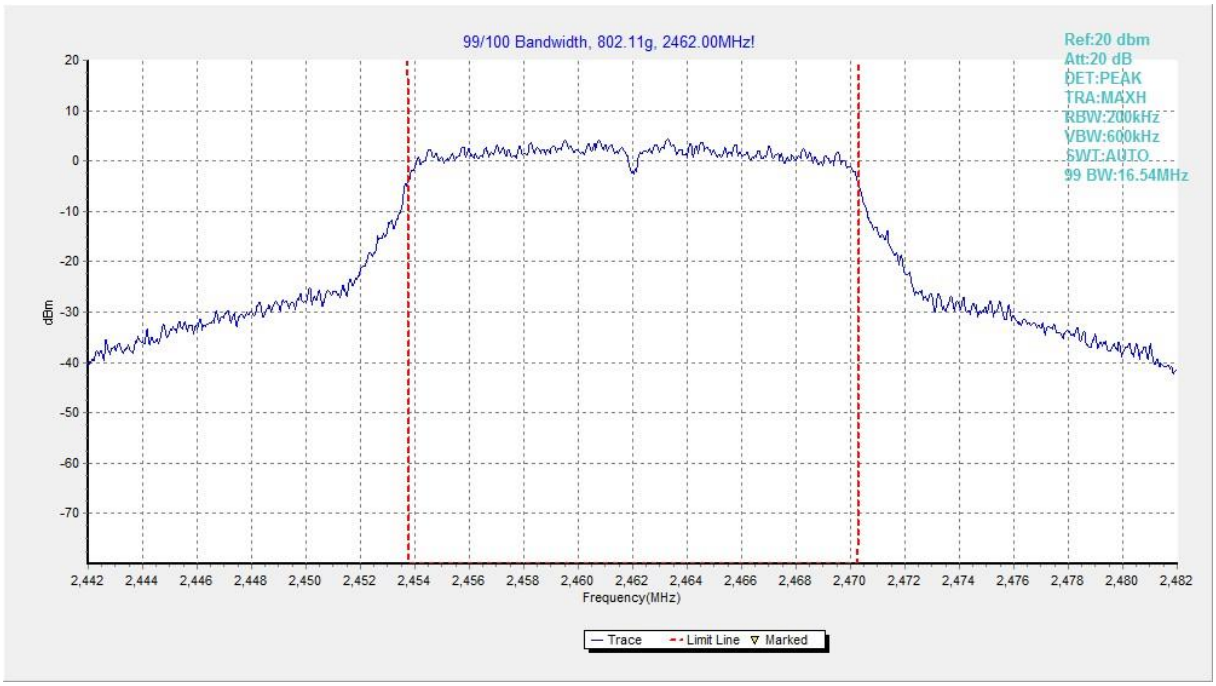

Fig.70 99% Occupied Bandwidth (802.11g, CH 11)

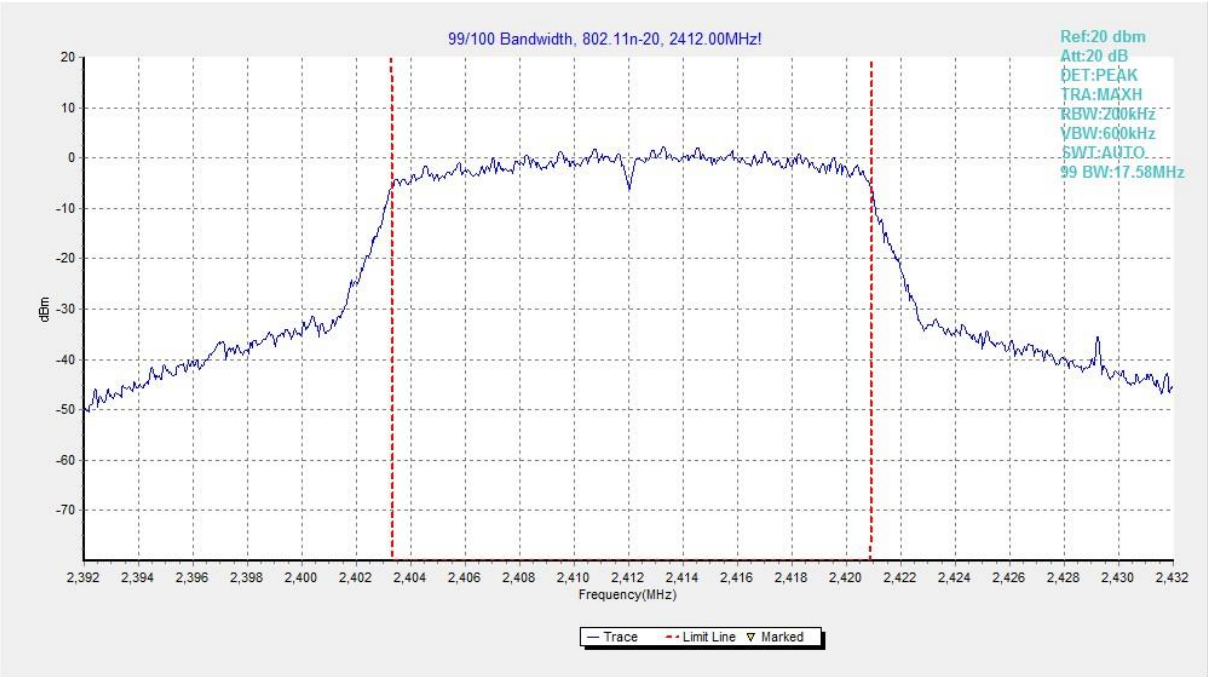

Fig.71 99% Occupied Bandwidth (802.11n-HT20, CH 1)

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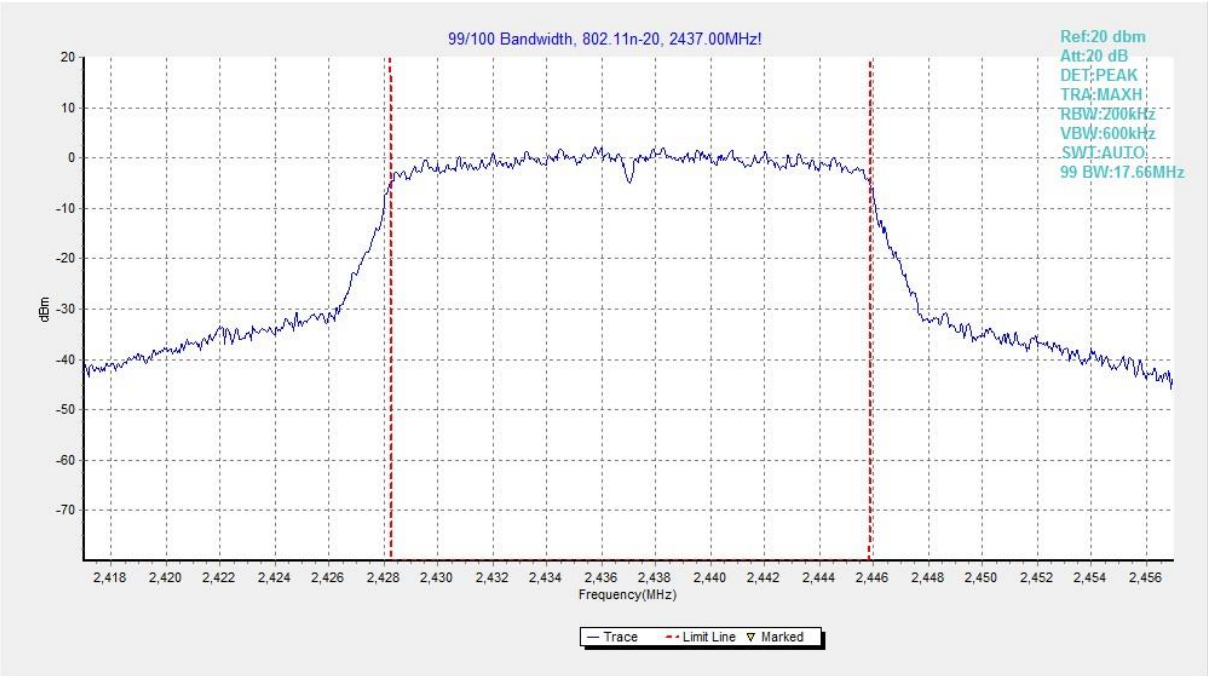

Fig.72 99% Occupied Bandwidth (802.11n-HT20, CH 6)

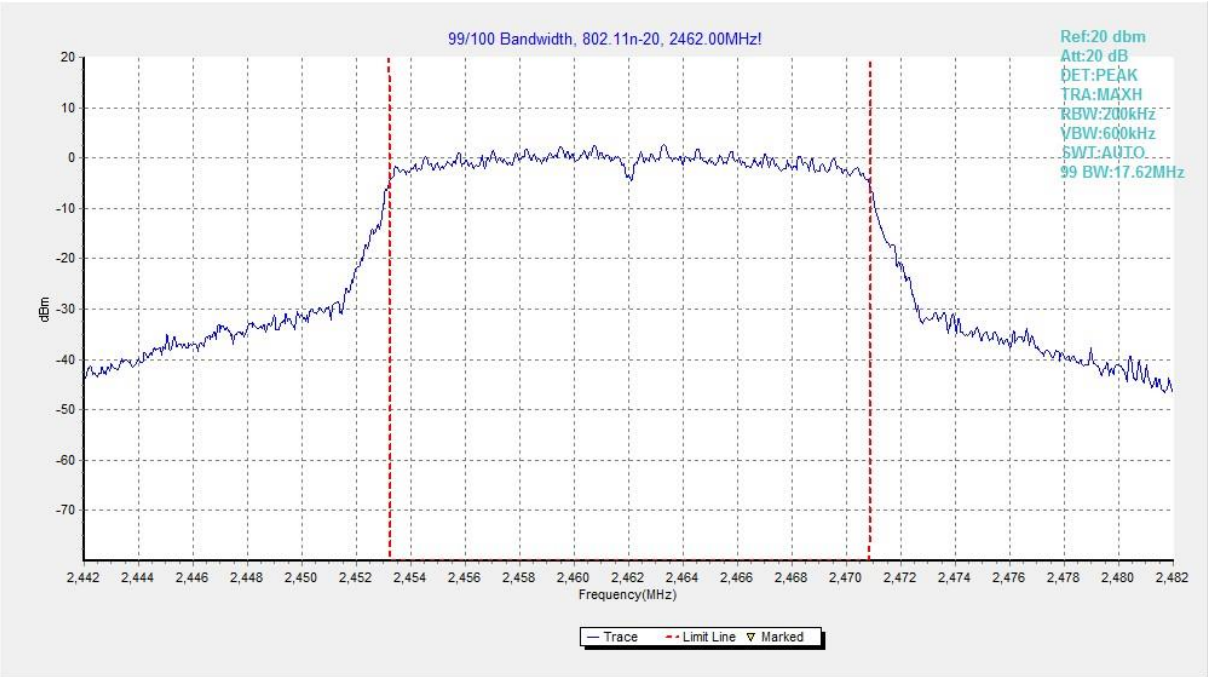

Fig.73 99% Occupied Bandwidth (802.11n-HT20, CH 11)

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