



**FCC PART 15C
TEST REPORT
No. I18N01496-WLAN**

for

Yulong Computer Telecommunication Scientific (Shenzhen) Co., Ltd

Smartphone

cp3705A

with

Hardware Version: P1

Software Version: 3705A.MPCS.181120.1D

FCC ID: R38YL3705A

Issued Date: 2018-11-26

Designation Number: CN1210

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.

Test Laboratory:

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REPORT HISTORY

Report Number	Revision	Description	Issue Date
I18N01496-WLAN	Rev.0	1st edition	2018-11-26

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1. Test Laboratory

1.1. Testing Location

Location: Shenzhen Academy of Information and Communications Technology
Address: Building G, Shenzhen International Innovation Center, No.1006
Shennan Road, Futian District, Shenzhen, Guangdong
Province ,China
Postal Code: 518026
Telephone: +86(0)755-33322000
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1.2. Testing Environment

Normal Temperature: 15-30℃
Relative Humidity: 35-60%

1.3. Project data

Testing Start Date: 2018-10-19
Testing End Date: 2018-11-23

1.4. Signature



An Ran

(Prepared this test report)



Tang Weisheng

(Reviewed this test report)



Zhang Bojun

(Approved this test report)

2. Client Information

2.1. Applicant Information

Company Name: Yulong Computer Telecommunication Scientific (Shenzhen) Co., Ltd
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2.2. Manufacturer Information

Company Name: Yulong Computer Telecommunication Scientific (Shenzhen) Co., Ltd
Address: Building B, Boton Science Park, Chaguang Road, Xili Town, Nanshan
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Contact Person Yentl Chen
E-Mail Chenyanting@yulong.com
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3. Equipment Under Test (EUT) and Ancillary Equipment (AE)

3.1. About EUT

Description	Smartphone
Model Name	cp3705A
Market Name	/
RF Protocol	IEEE 802.11 b/g/n-HT20/n-HT40
Operating Frequency	2412MHz~2462MHz
Number of Channels	11
Antenna Type	Integrated
Antenna Gain	-0.52dBi
Power Supply	3.85V DC by Battery
FCC ID	R38YL3705A
Condition of EUT as received	No abnormality in appearance

Note: Components list, please refer to documents of the manufacturer.

3.2. Internal Identification of EUT

EUT ID*	IMEI	HW Version	SW Version	Receive Date
EUT1	860667040001195	P1	3705A.MPCS.181120.1D	2018-10-17

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

3.3. Internal Identification of AE

AE ID*	Description	Mode	Manufacturer
AE1	Battery	Li-ion Polymer	Tianjin Lishen

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

3.4. General Description

The Equipment Under Test (EUT) are a model of Mobile Phone with integrated antenna.

It consists of normal options: travel Charger, USB cable.

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

Samples undergoing test were selected by the client.

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	2017
ANSI C63.10	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices	2013

5. Test Results

5.1. Summary of Test Results

No	Test cases	Sub-clause of Part 15C	Verdict
0	Antenna Requirement	15.203	P
1	Maximum Output Power	15.247 (b)	P
2	Peak Power Spectral Density	15.247 (e)	P
3	6dB Bandwidth	15.247 (a)	P
4	Band Edges Compliance	15.247 (d)	P
5	Conducted Emission	15.247 (d)	P
6	Radiated Emission	15.247, 15.205, 15.209	P
7	AC Power line Conducted	15.207	P

See **ANNEX A** for details.

5.2. Statements

SAICT has evaluated the test cases requested by the applicant/manufacture as listed in section 5.1 of this report, for the EUT specified in section 3, according to the standards or reference documents listed in section 4.2.

5.3. Terms used in the result table

Terms used in Verdict column

P	Pass
NA	Not Available
F	Fail

Abbreviations

AC	Alternating Current
AFH	Adaptive Frequency Hopping
BW	Band Width
E.I.R.P.	equivalent isotropic radiated power
ISM	Industrial, Scientific and Medical
R&TTE	Radio and Telecommunications Terminal Equipment
RF	Radio Frequency
Tx	Transmitter

5.4. Laboratory Environment

Semi-anechoic Chamber did not exceed following limits along the EMC testing

Temperature	Min. = 15 °C, Max. = 35 °C
Relative humidity	Min. = 15 %, 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 did not exceed following limits along the EMC testing

Temperature	Min. = 15 °C, Max. = 30 °C
Relative humidity	Min. =20 %, Max. = 75 %
Shielding effectiveness	0.014MHz-1MHz> 60 dB; 1MHz-10000MHz>90 dB
Electrical insulation	> 2MΩ
Ground system resistance	< 4 Ω

Fully-anechoic Chamber did not exceed following limits along the EMC testing

Temperature	Min. = 15 °C, Max. = 35 °C
Relative humidity	Min. = 15 %, 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

6. Test Facilities Utilized

Conducted test system

No.	Equipment	Model	Serial Number	Manufacturer	Calibration Due date	Calibration Period
1	Vector Signal Analyzer	FSV40	100903	Rohde & Schwarz	2019-01-17	1 year
2	Power Sensor	U2021XA	MY55430013	Agilent	2019-01-31	1 year
3	Test Receiver	ESCI	100702	Rohde & Schwarz	2019-06-20	1 year
4	LISN	ENV216	102067	Rohde & Schwarz	2018-07-18	1 year

Radiated test system

NO.	Equipment	Model	Serial Number	Manufacturer	Calibration Due date	Calibration Period
1	Loop Antenna	HLA6120	35779	TESEQ	2019-05-02	3 years
2	BiLog Antenna	3142E	00224831	ETS-Lindgren	2021-05-17	3 years
3	Horn Antenna	3117	00066577	ETS-Lindgren	2019-04-05	3 years
4	Test Receiver	ESR7	101676	Rohde & Schwarz	2018-11-29	1 year
5	Spectrum Analyser	FSV40	101192	Rohde & Schwarz	2019-05-21	1 year
6	Chamber	FACT3-2.0	1285	ETS-Lindgren	2020-07-20	3 years
7	Antenna	QSH-SL-18-26-S-20	17013	Q-par	2020-01-15	3 years
8	Antenna	QSH-SL-26-40-K-20	17014	Q-par	2020-01-11	3 years

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.

7. Measurement Uncertainty

Test Name	Uncertainty	
1. RF Output Power - Conducted	±1.32dB	
2. Power Spectral Density - Conducted	±2.32dB	
3. Occupied channel bandwidth - Conducted	±66Hz	
4 Transmitter Spurious Emission - Conducted	$30\text{MHz} \leq f \leq 1\text{GHz}$	±1.41dB
	$1\text{GHz} \leq f \leq 7\text{GHz}$	±1.92dB
	$7\text{GHz} \leq f \leq 13\text{GHz}$	±2.31dB
	$13\text{GHz} \leq f \leq 26\text{GHz}$	±2.61dB
5. Transmitter Spurious Emission - Radiated	$9\text{kHz} \leq f \leq 30\text{MHz}$	±1.84dB
	$30\text{MHz} \leq f \leq 1\text{GHz}$	±4.90dB
	$1\text{GHz} \leq f \leq 18\text{GHz}$	±5.12dB
	$18\text{GHz} \leq f \leq 40\text{GHz}$	±4.66dB
6. AC Power line Conducted Emission	$150\text{kHz} \leq f \leq 30\text{MHz}$	±3.10dB

ANNEX A: Detailed Test Results

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 is -0.52 dBi.
The RF transmitter uses an integrate antenna without connector.**

A.1 Maximum Output Power - Conduced

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)
FCC CRF Part 15.247(b)	< 30

Measurement Results:

Mode	Channel	Frequency (MHz)	Average Conducted Power (dBm)	Conclusion
802.11b	CH 1	2412	16.93	P
	CH 6	2437	16.81	P
	CH 11	2462	16.37	P
802.11g	CH 1	2412	16.17	P
	CH 6	2437	16.96	P
	CH 11	2462	15.60	P
802.11n HT20	CH 1	2412	17.21	P
	CH 6	2437	17.04	P
	CH 11	2462	15.58	P
802.11n HT40	CH 3	2422	15.45	P
	CH 6	2437	15.53	P
	CH 9	2452	16.38	P

Note:

Worst-case data rates as provided by the client were: 11Mbps (802.11b), 54Mbps (802.11g), MCS7 (802.11n). is selected as the worst condition.

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%.

A.2 Peak Power Spectral Density

Measurement Limit:

Standard	Limit
FCC CRF Part 15.247(e)	< 8 dBm/3 kHz

Measurement Results:

Mode	Channel	Frequency (MHz)	Test Results (dBm)		Conclusion
			Fig.	Value	
802.11b	CH 1	2412	Fig.1	-5.97	P
	CH 6	2437	Fig.2	-5.70	P
	CH 11	2462	Fig.3	-5.14	P
802.11g	CH 1	2412	Fig.4	-8.68	P
	CH 6	2437	Fig.5	-7.64	P
	CH 11	2462	Fig.6	-9.46	P
802.11n HT20	CH 1	2412	Fig.7	-8.17	P
	CH 6	2437	Fig.8	-8.85	P
	CH 11	2462	Fig.9	-9.50	P
802.11n HT40	CH 3	2422	Fig.10	-12.80	P
	CH 6	2437	Fig.11	-12.20	P
	CH 9	2452	Fig.12	-11.33	P

See below for test graphs.

Conclusion: PASS

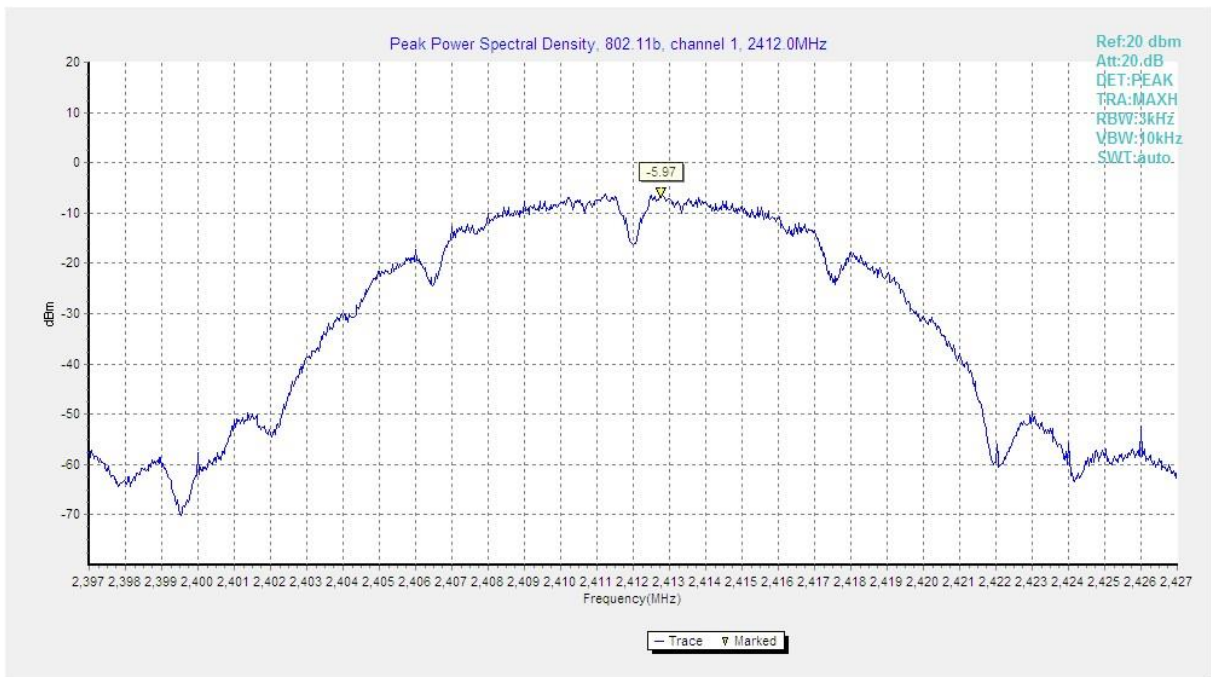


Fig.1 Power Spectral Density (802.11b, CH 1)

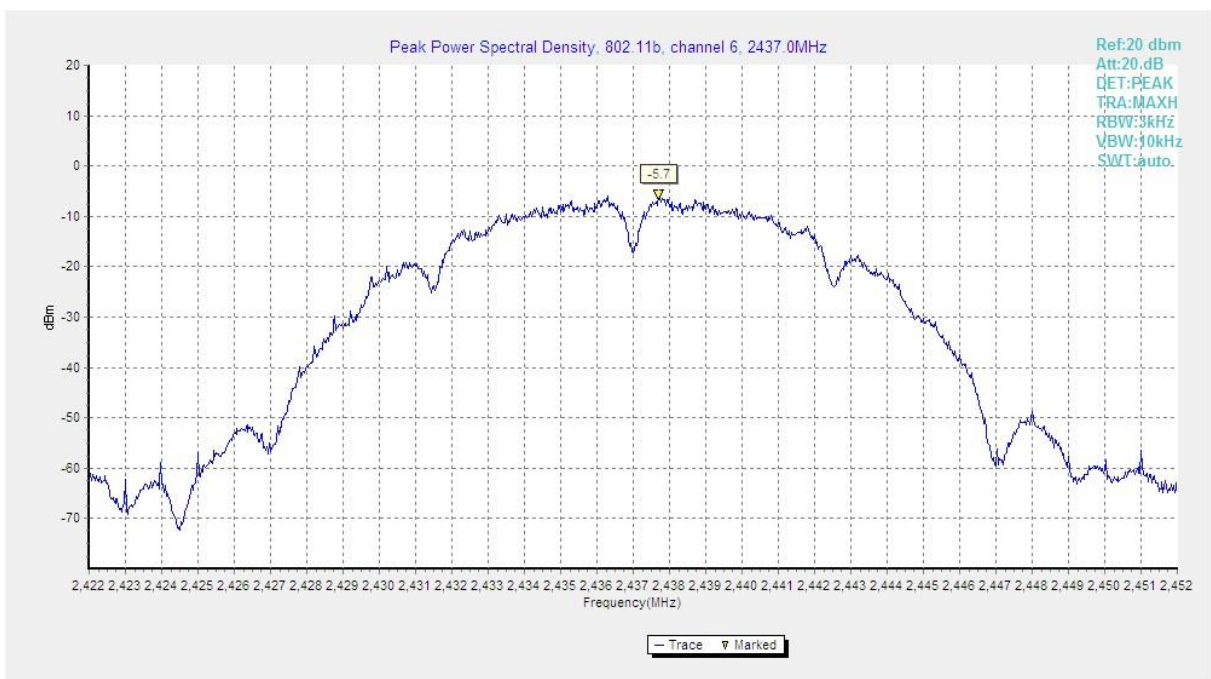


Fig.2 Power Spectral Density (802.11b, CH 6)

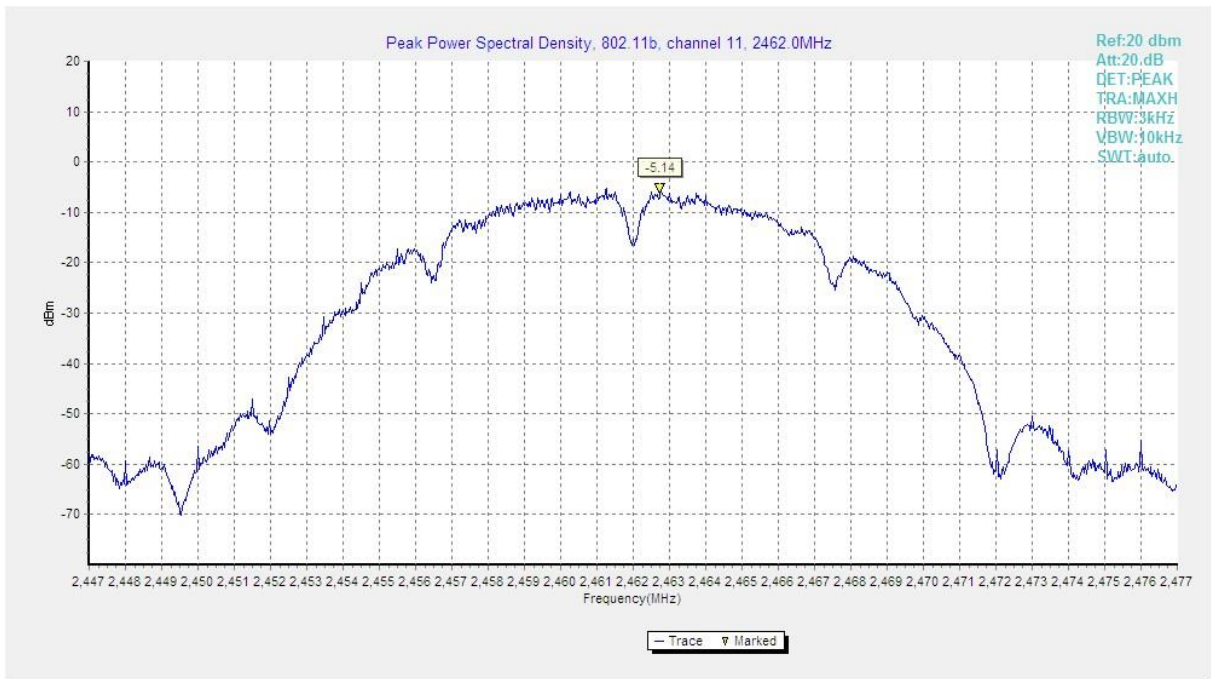


Fig.3 Power Spectral Density (802.11b, CH 11)

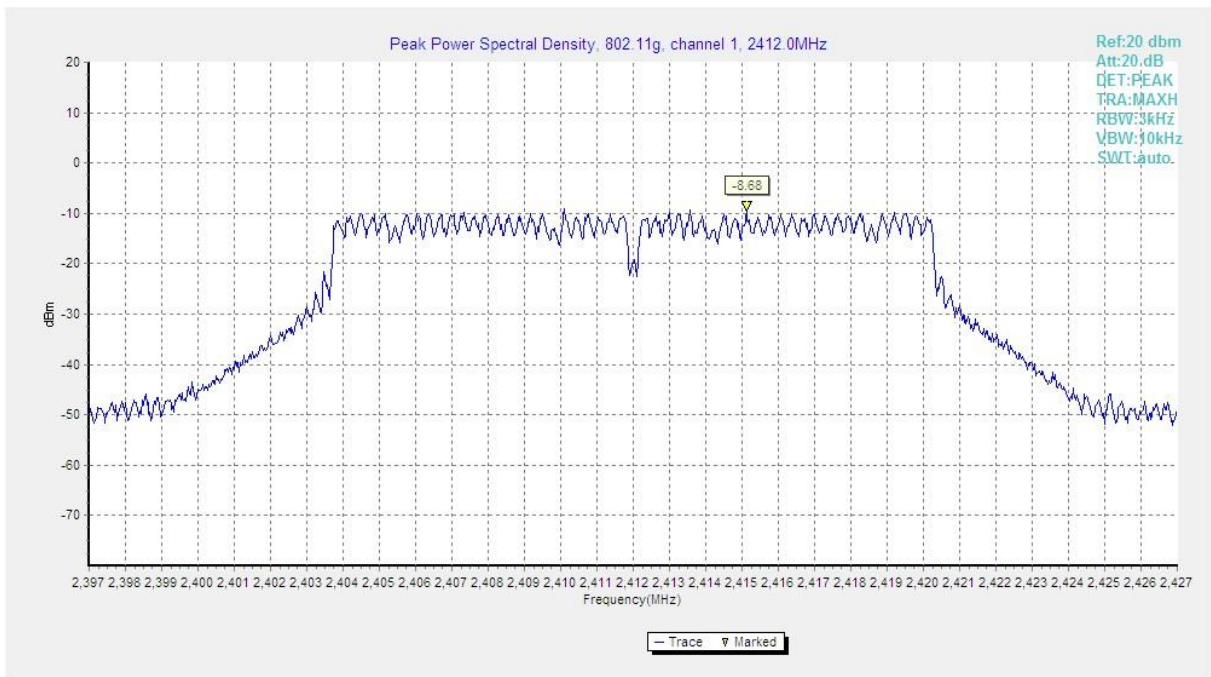


Fig.4 Power Spectral Density (802.11g, CH 1)

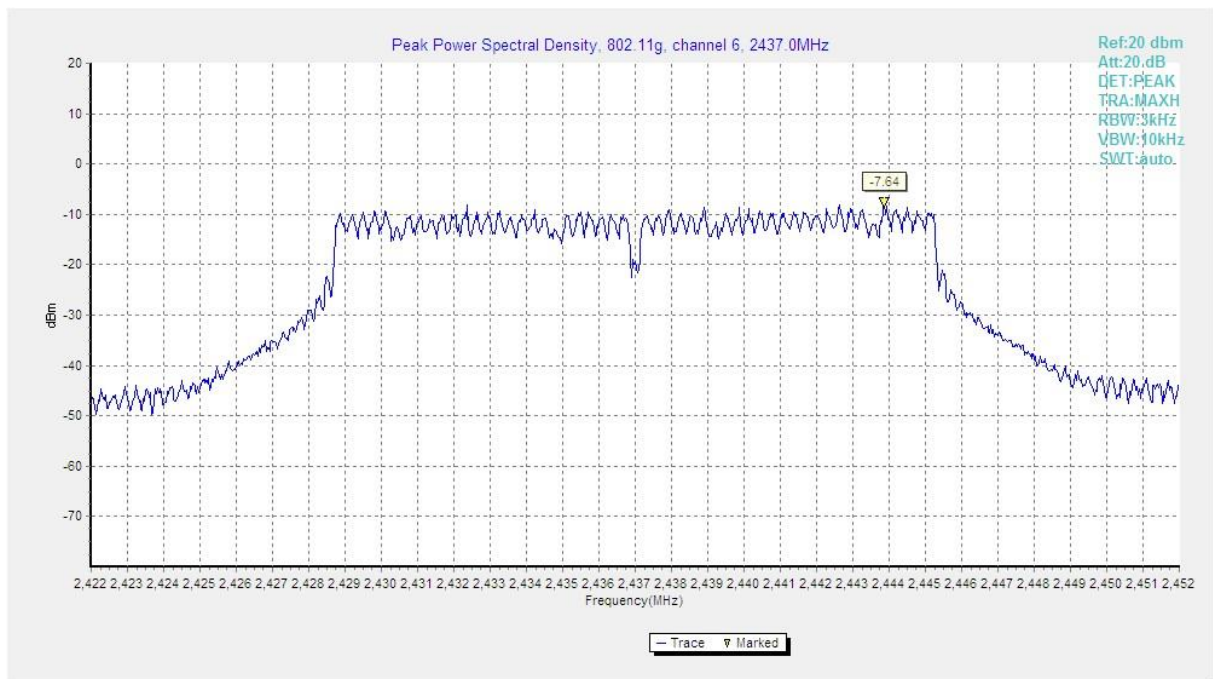


Fig.5 Power Spectral Density (802.11g, CH 6)

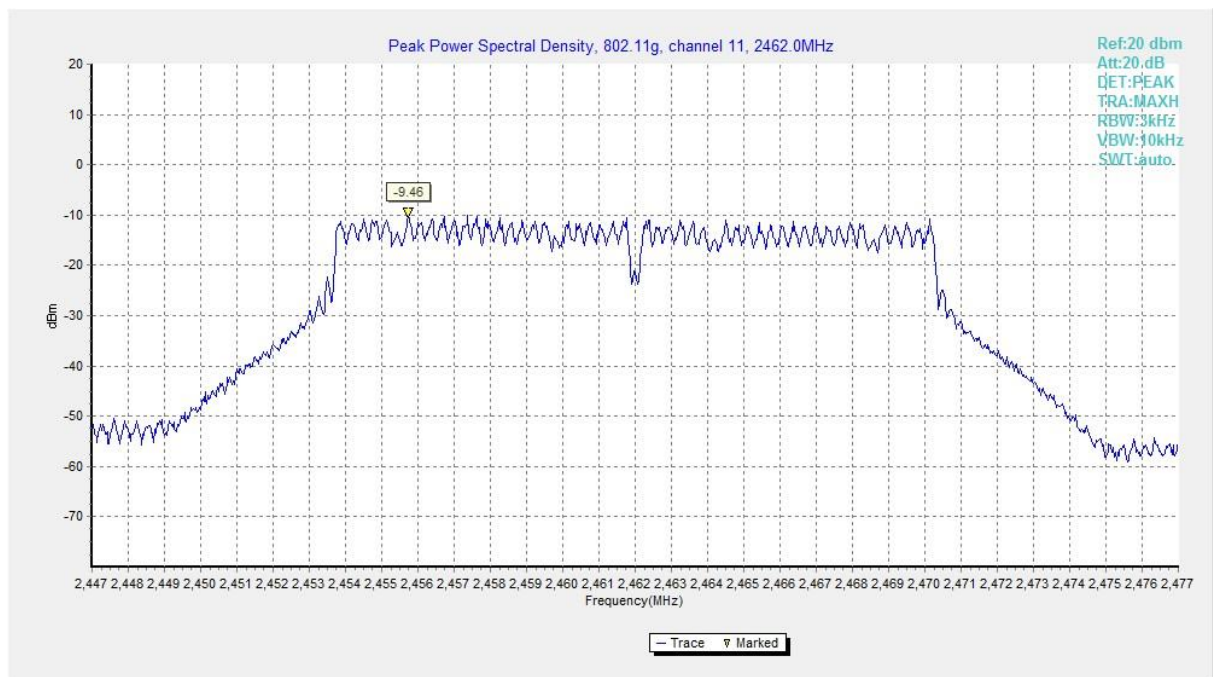


Fig.6 Power Spectral Density (802.11g, CH 11)

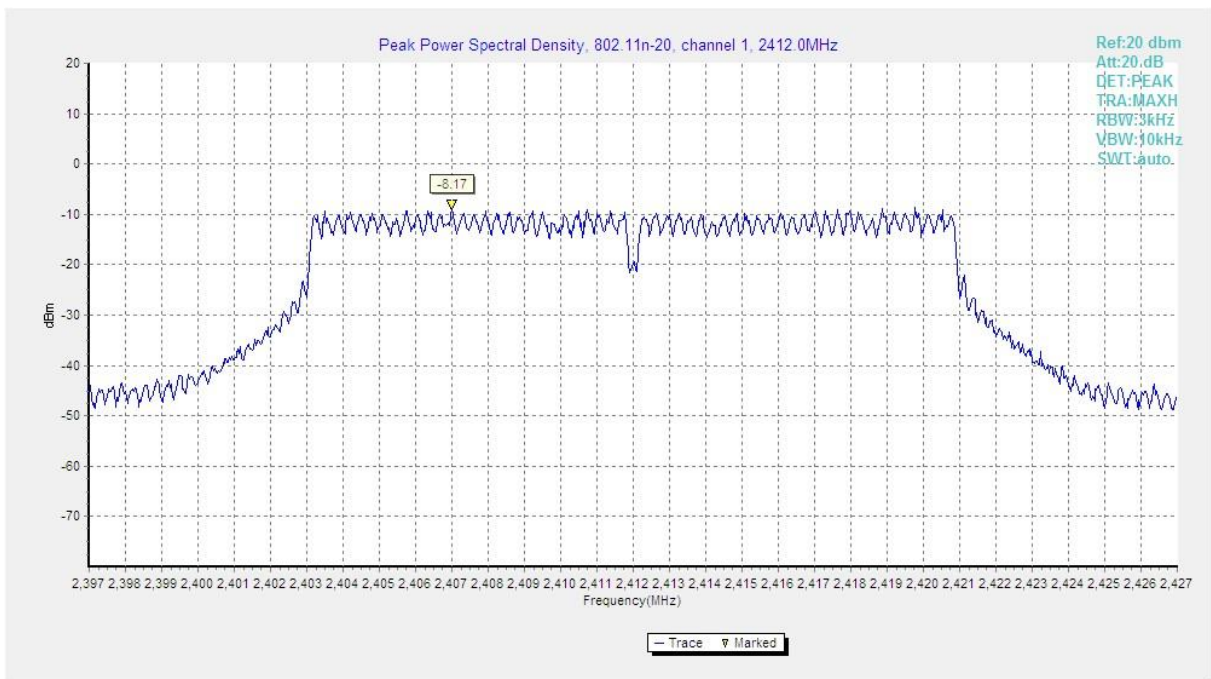


Fig.7 Power Spectral Density (802.11n HT20, CH 1)

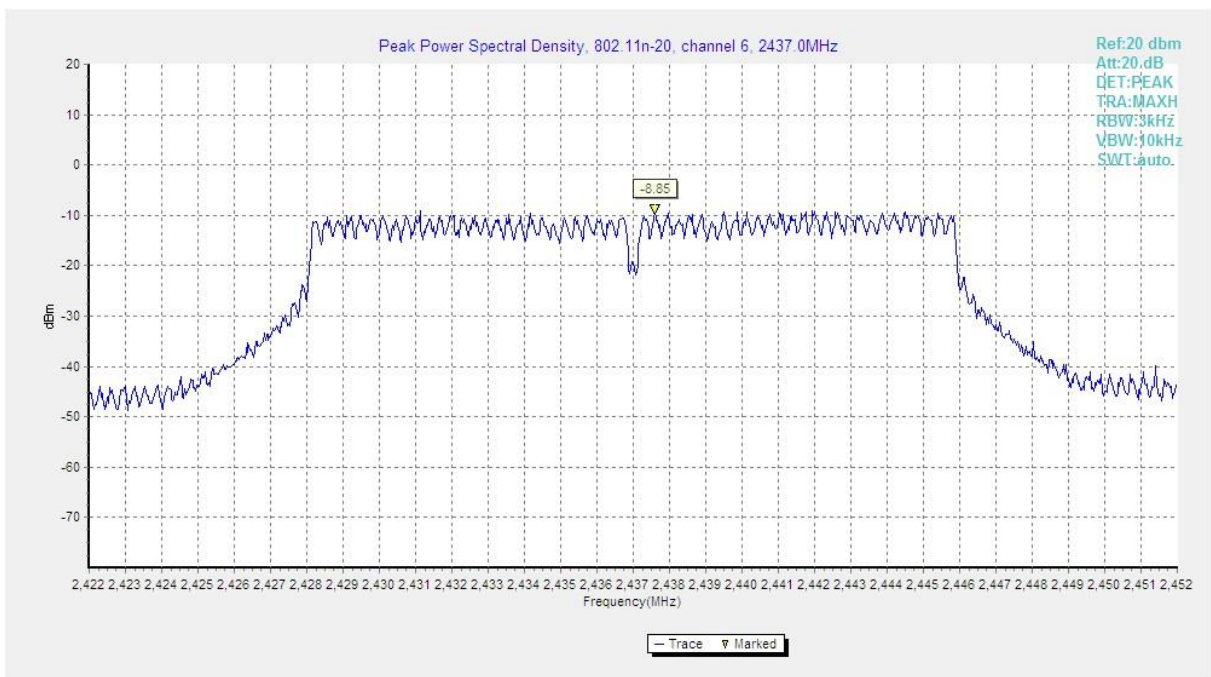


Fig.8 Power Spectral Density (802.11n HT20, CH 6)

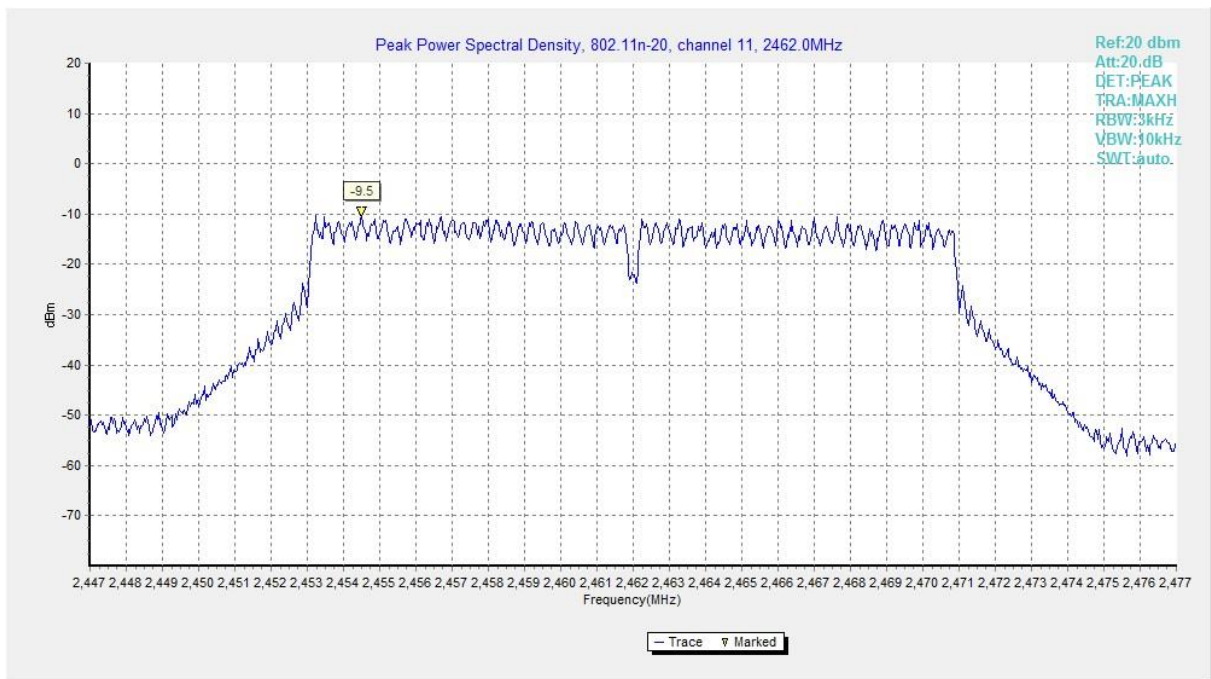


Fig.9 Power Spectral Density (802.11n HT20, CH 11)

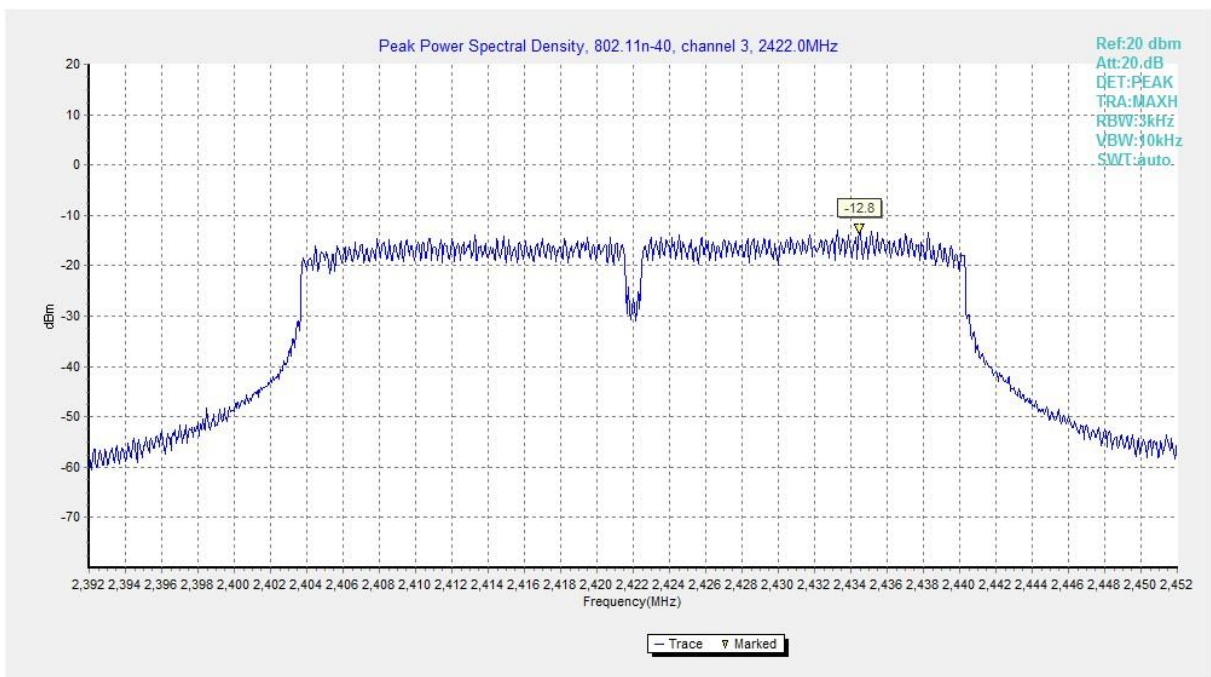


Fig.10 Power Spectral Density (802.11n HT40, CH 3)

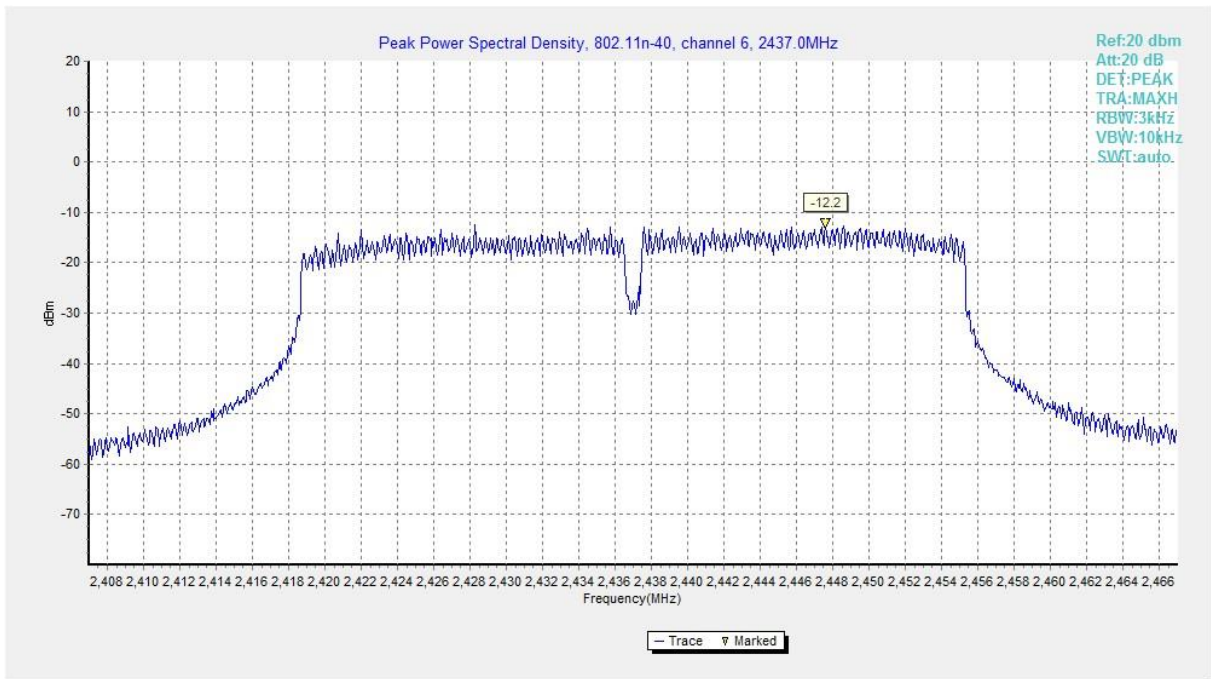


Fig.11 Power Spectral Density (802.11n HT40, CH 6)

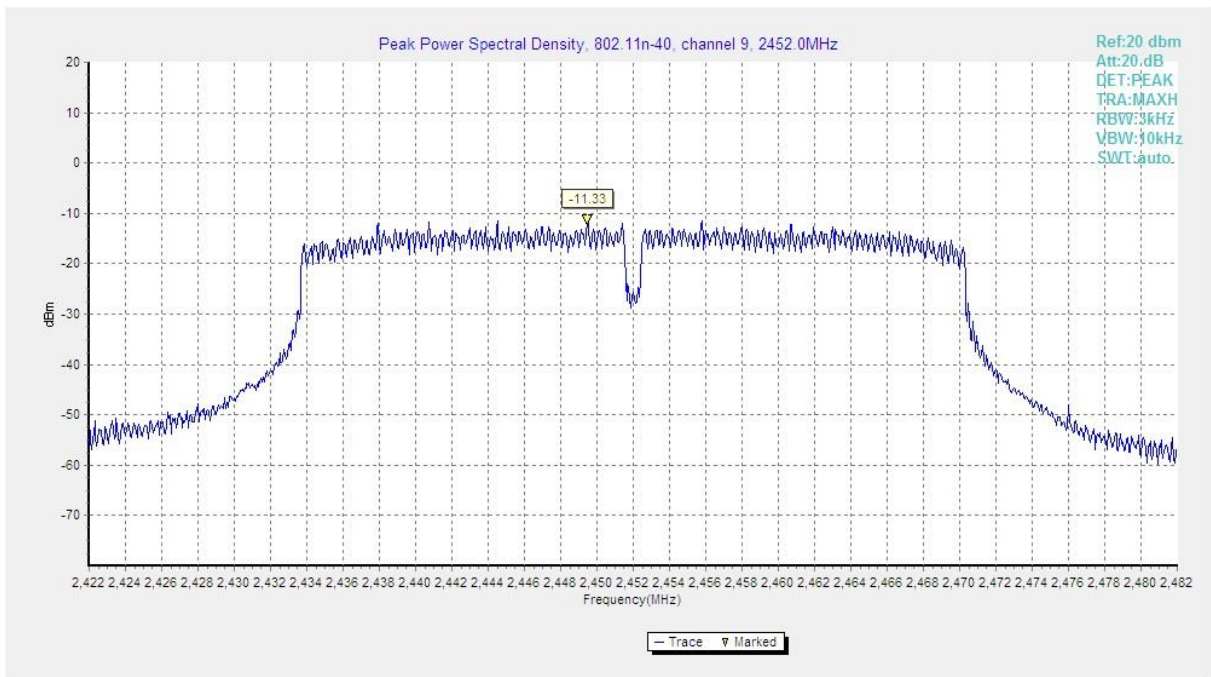


Fig.12 Power Spectral Density (802.11n HT40, CH 9)

A.3 6dB Bandwidth

Measurement Limit:

Standard	Limit (kHz)
FCC 47 CFR Part 15.247 (a)	≥ 500

Measurement Result:

Mode	Channel	Frequency (MHz)	Test Results (kHz)		Conclusion
			Fig.	Value	
802.11b	CH 1	2412	Fig.13	8050	P
	CH 6	2437	Fig.14	8500	P
	CH 11	2462	Fig.15	8550	P
802.11g	CH 1	2412	Fig.16	16350	P
	CH 6	2437	Fig.17	16350	P
	CH 11	2462	Fig.18	16300	P
802.11n HT20	CH 1	2412	Fig.19	17550	P
	CH 6	2437	Fig.20	17550	P
	CH 11	2462	Fig.21	17200	P
802.11n HT40	CH 3	2422	Fig.22	35120	P
	CH 6	2437	Fig.23	35120	P
	CH 9	2452	Fig.24	35120	P

See below for test graphs.

Conclusion: PASS

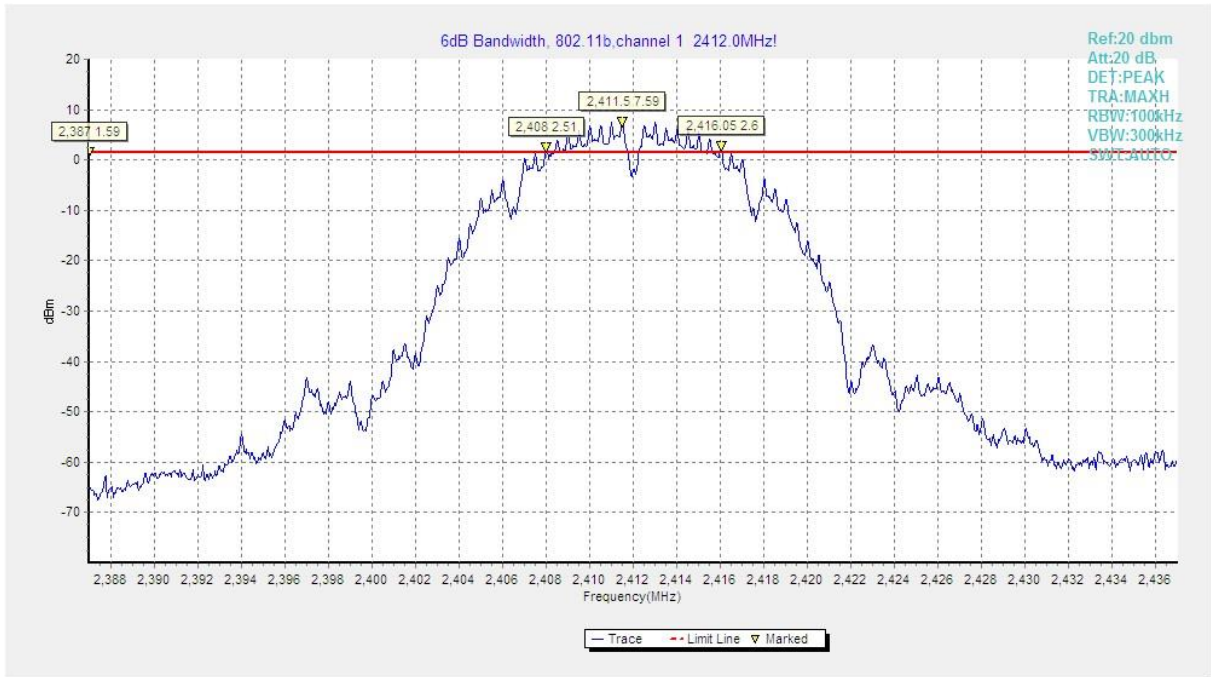


Fig.13 6dB Bandwidth (802.11b, CH 1)

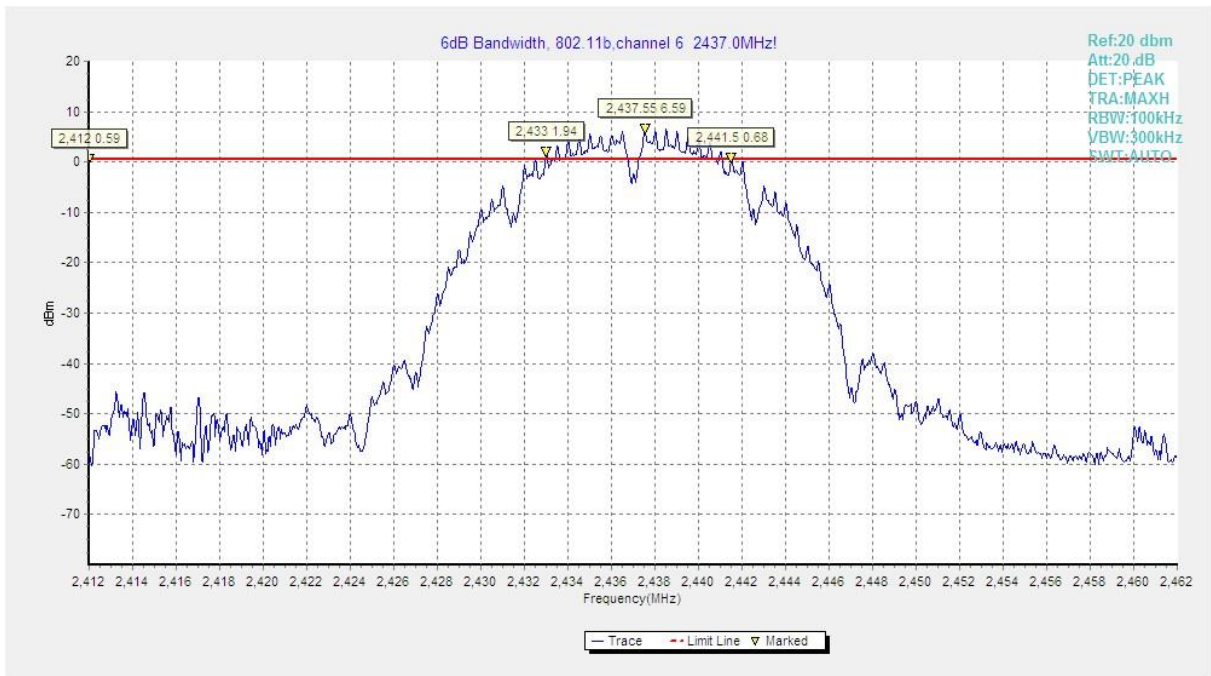


Fig.14 6dB Bandwidth (802.11b, CH 6)

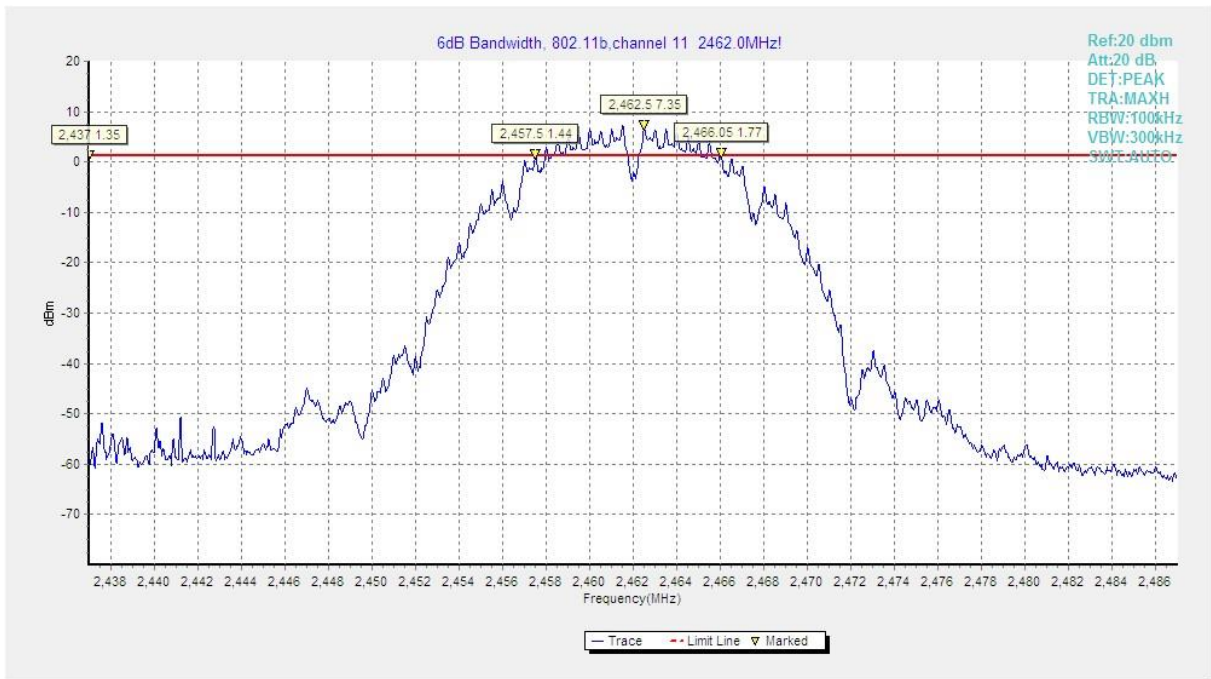


Fig.15 6dB Bandwidth (802.11b, CH 11)

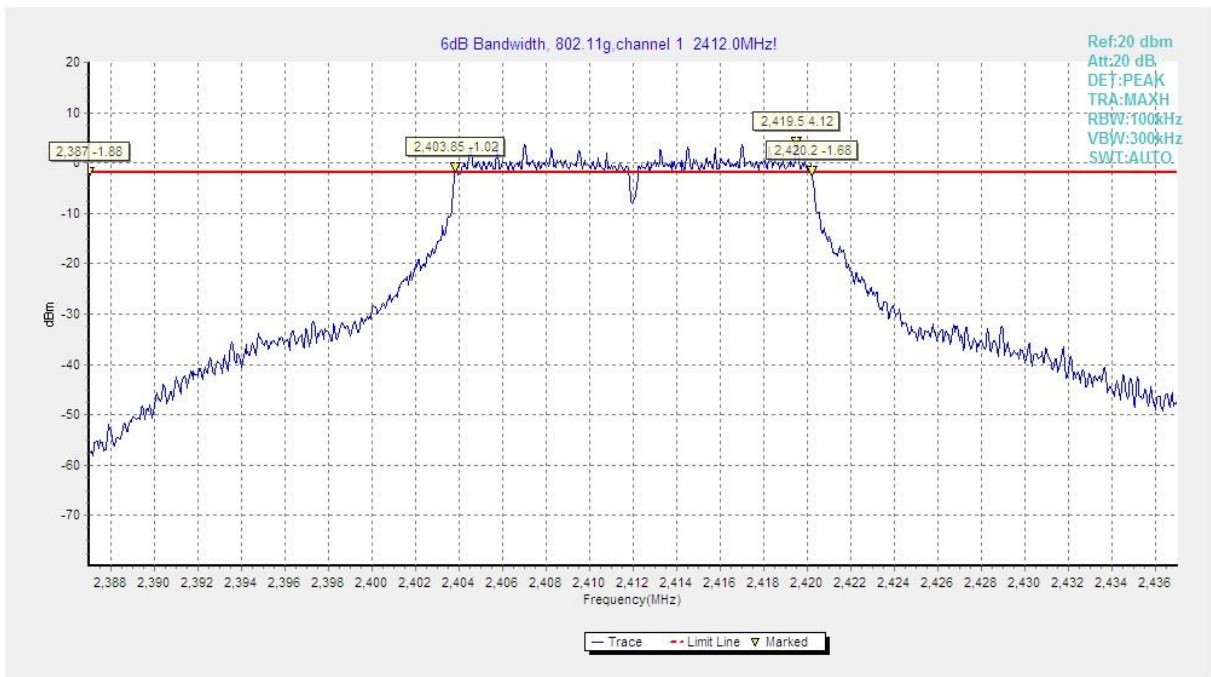


Fig.16 6dB Bandwidth (802.11g, CH 1)

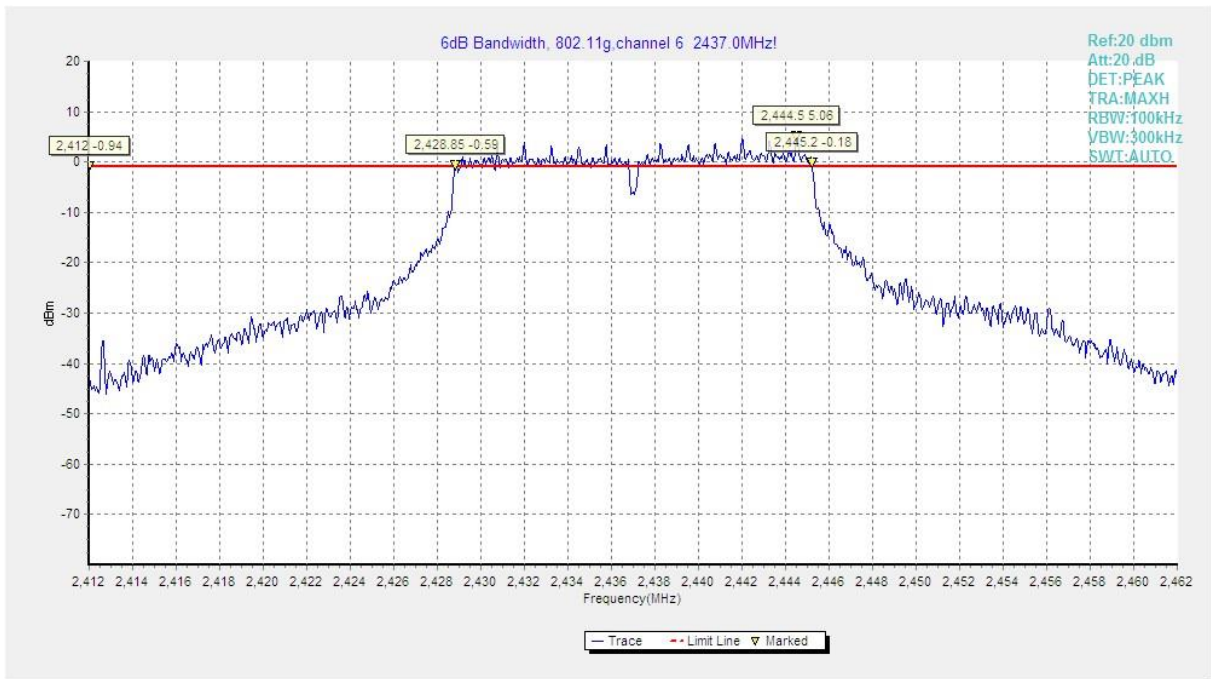


Fig.17 6dB Bandwidth (802.11g, CH 6)

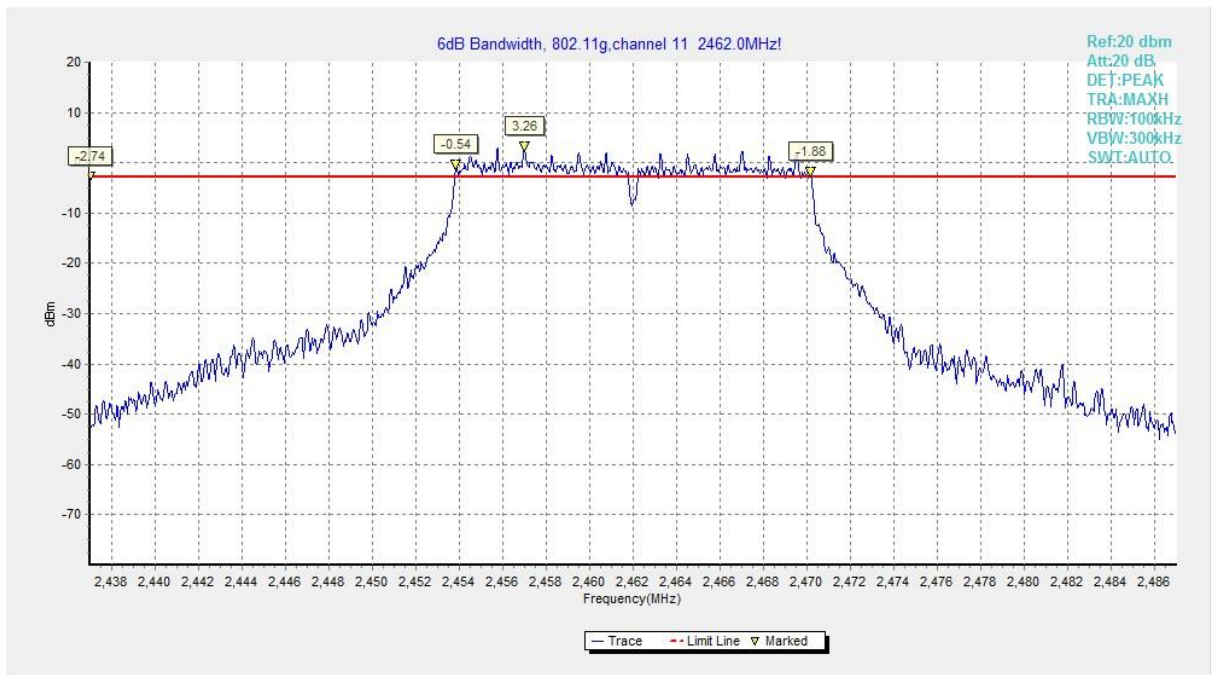


Fig.18 6dB Bandwidth (802.11g, CH 11)

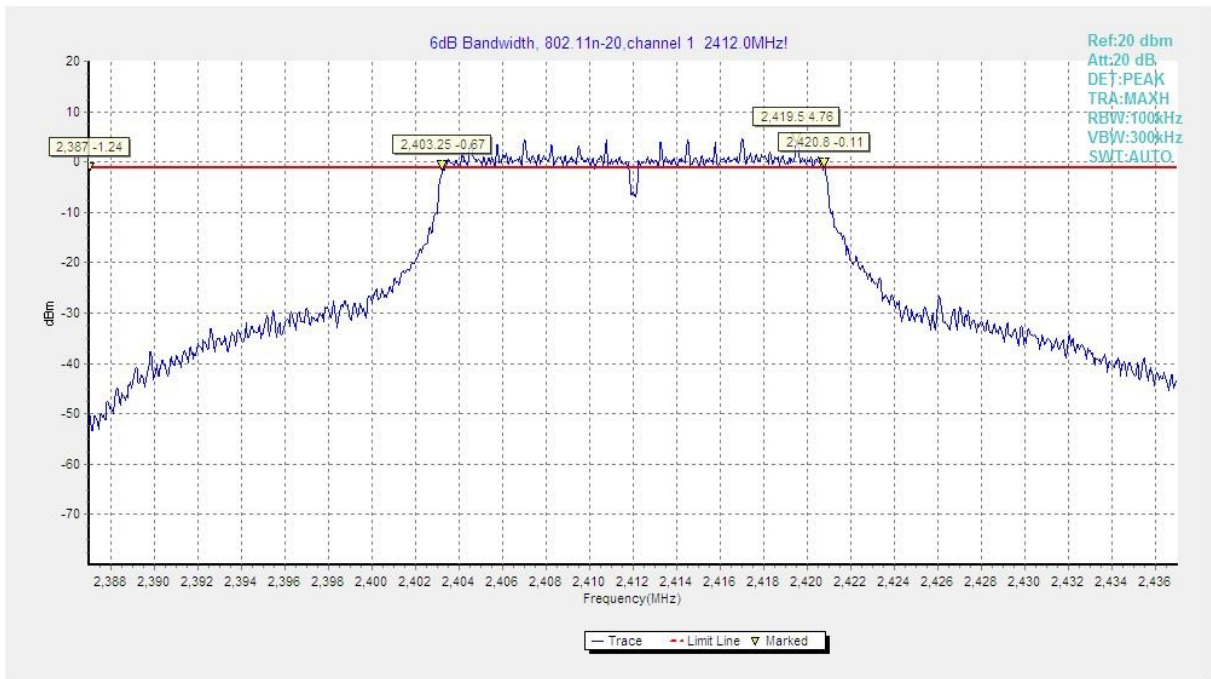


Fig.19 6dB Bandwidth (802.11n HT20, CH 1)

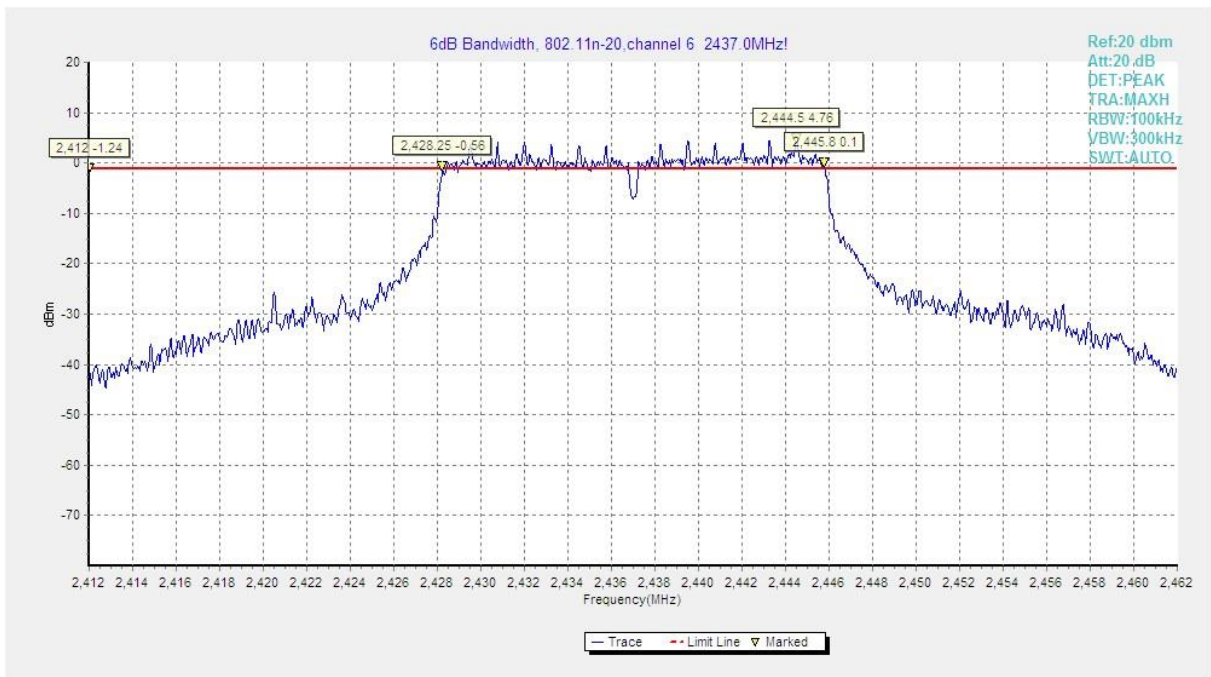


Fig.20 6dB Bandwidth (802.11n HT20, CH 6)

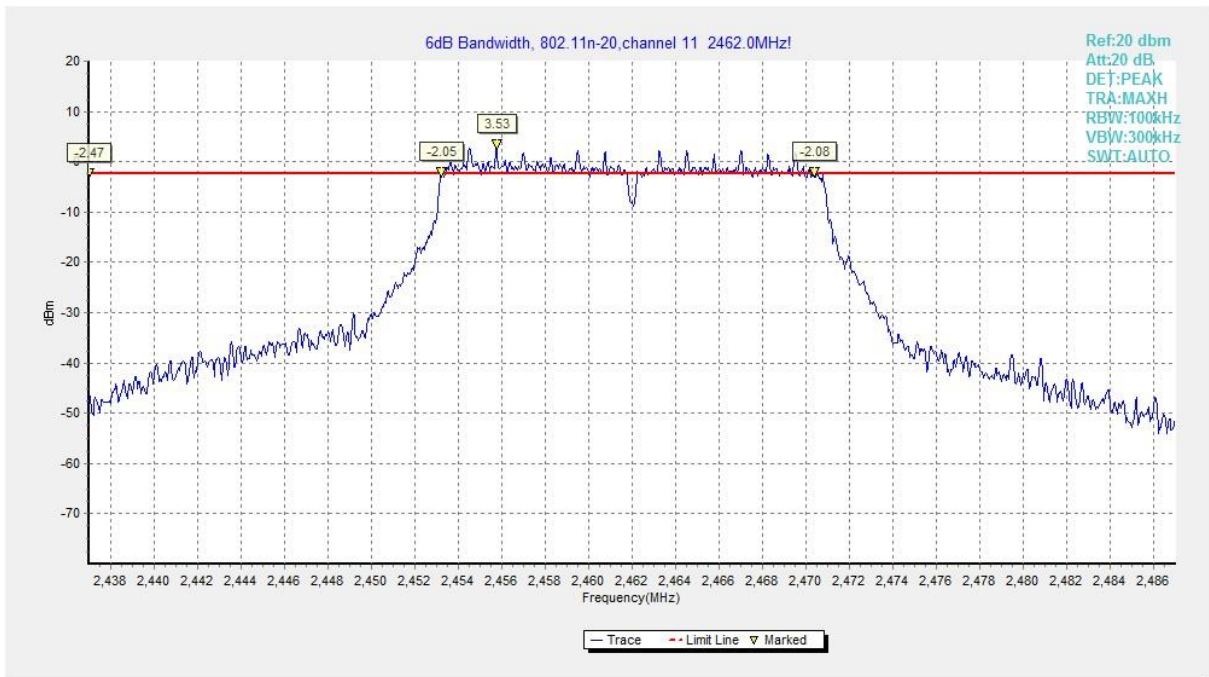


Fig.21 6dB Bandwidth (802.11n HT20, CH 11)

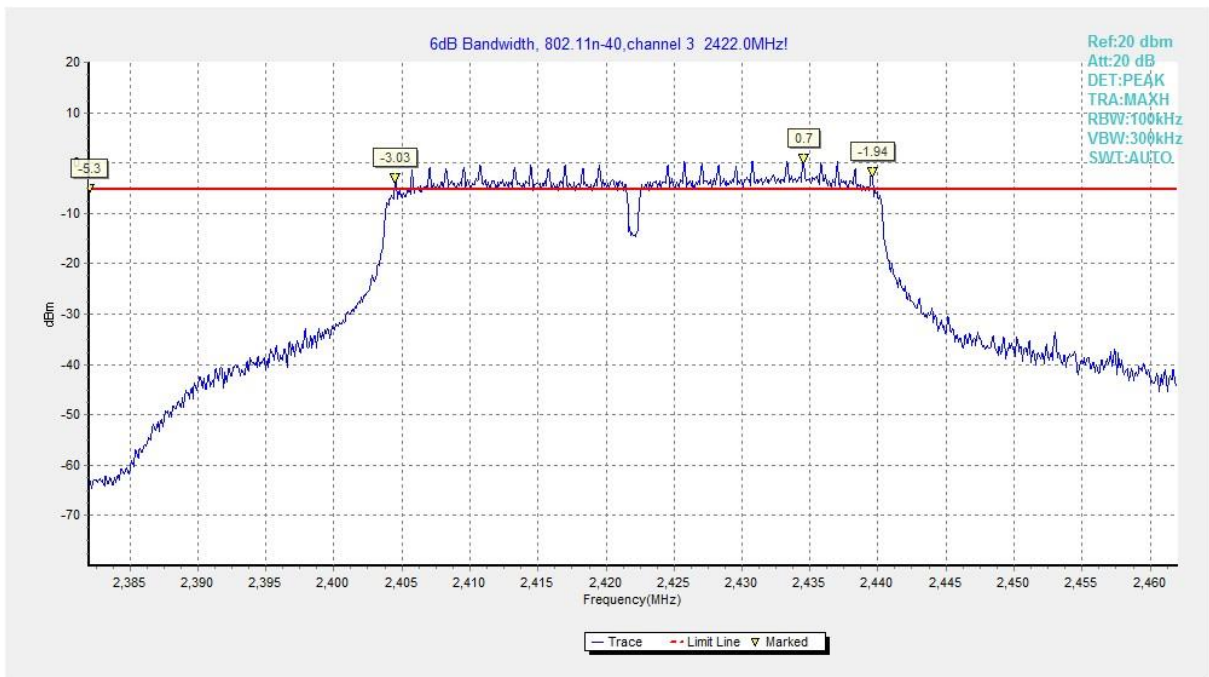


Fig.22 6dB Bandwidth (802.11n HT40, CH 3)

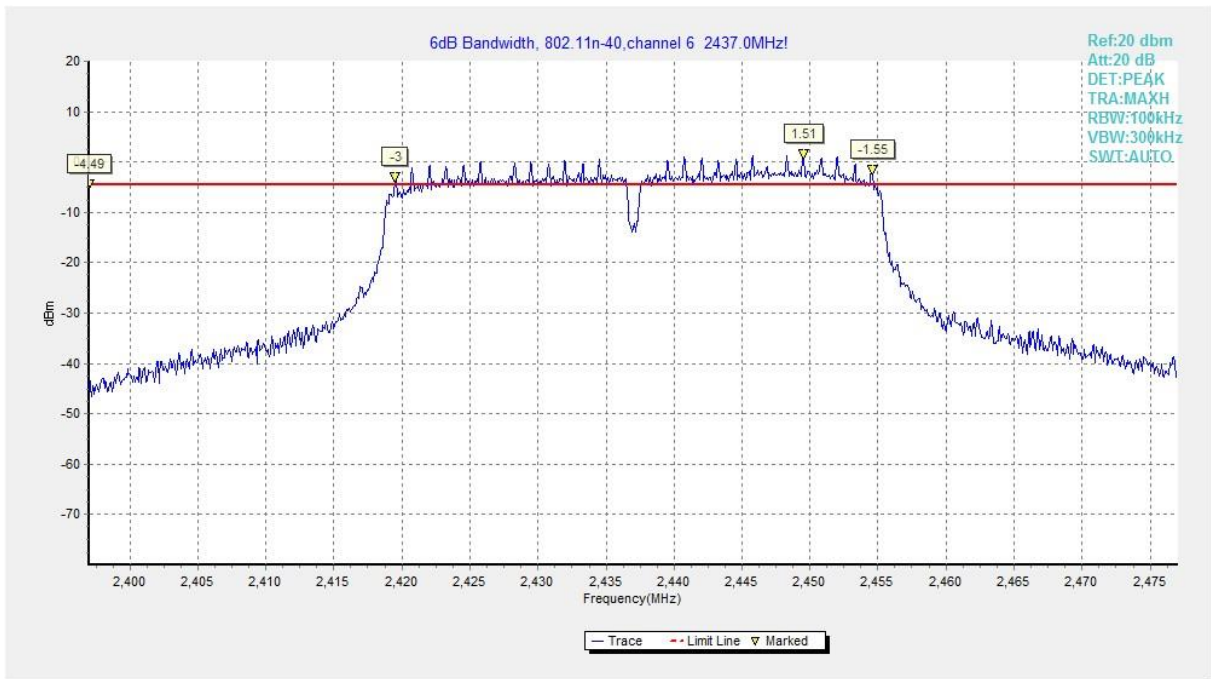


Fig.23 6dB Bandwidth (802.11n HT40, CH 6)

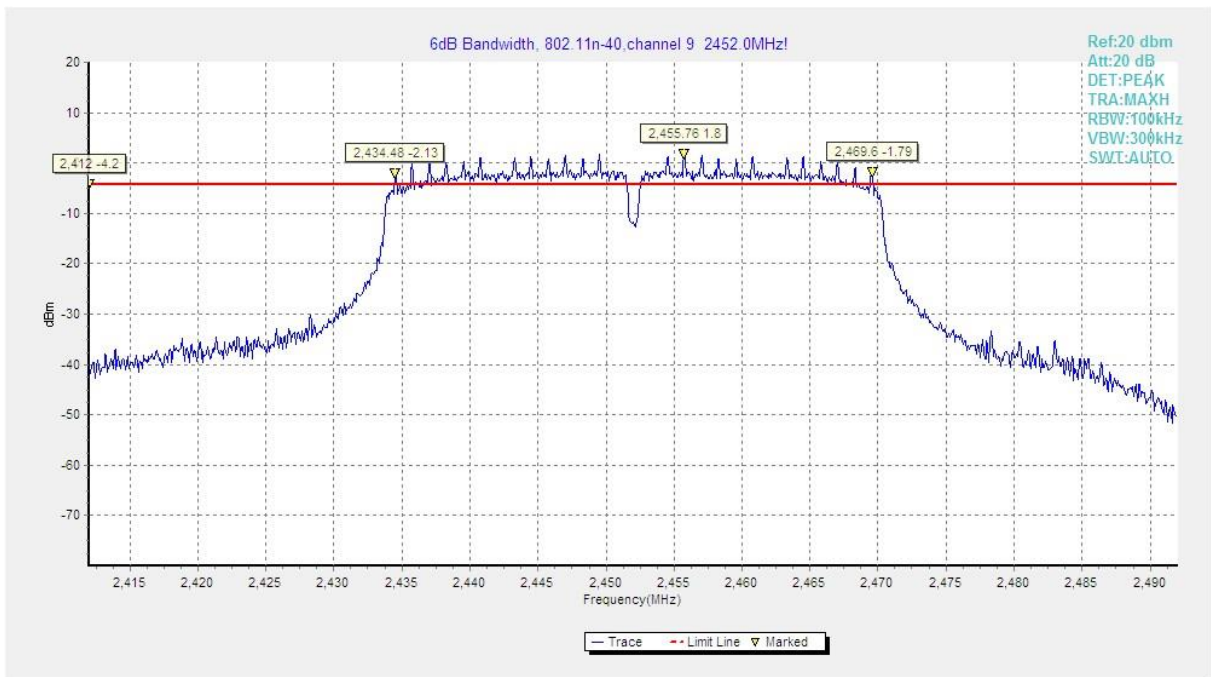


Fig.24 6dB Bandwidth (802.11n HT40, CH 9)

A.4 Band Edges Compliance

Measurement Limit:

Standard	Limit (dBc)
FCC 47 CFR Part 15.247 (d)	> 20

Measurement Result:

Mode	Channel	Frequency (MHz)	Test Results (dBc)		Conclusion
			Fig.	Value	
802.11b	CH1	2412	Fig.25	54.22	P
	CH11	2462	Fig.26	68.61	P
802.11g	CH1	2412	Fig.27	33.03	P
	CH11	2462	Fig.28	47.76	P
802.11n HT20	CH1	2412	Fig.29	31.81	P
	CH11	2462	Fig.30	46.68	P
802.11n HT40	CH3	2422	Fig.31	34.17	P
	CH9	2452	Fig.32	42.38	P

See below for test graphs.

Conclusion: PASS

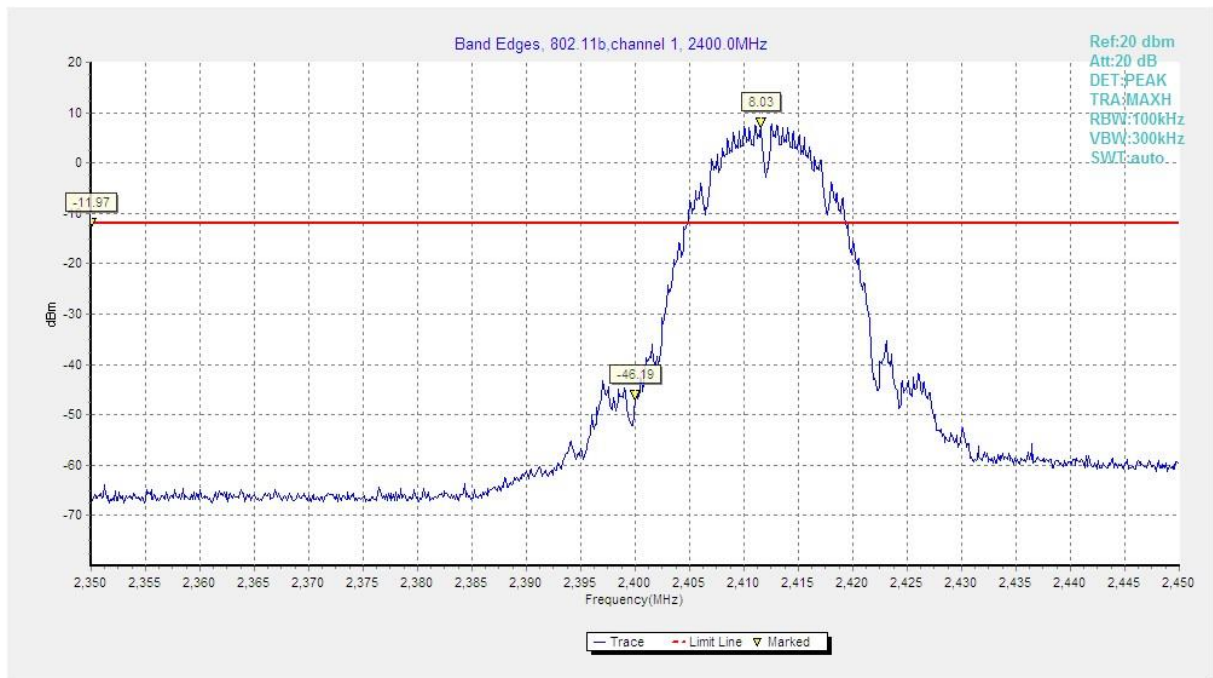


Fig.25 Band Edges (802.11b, CH 1)

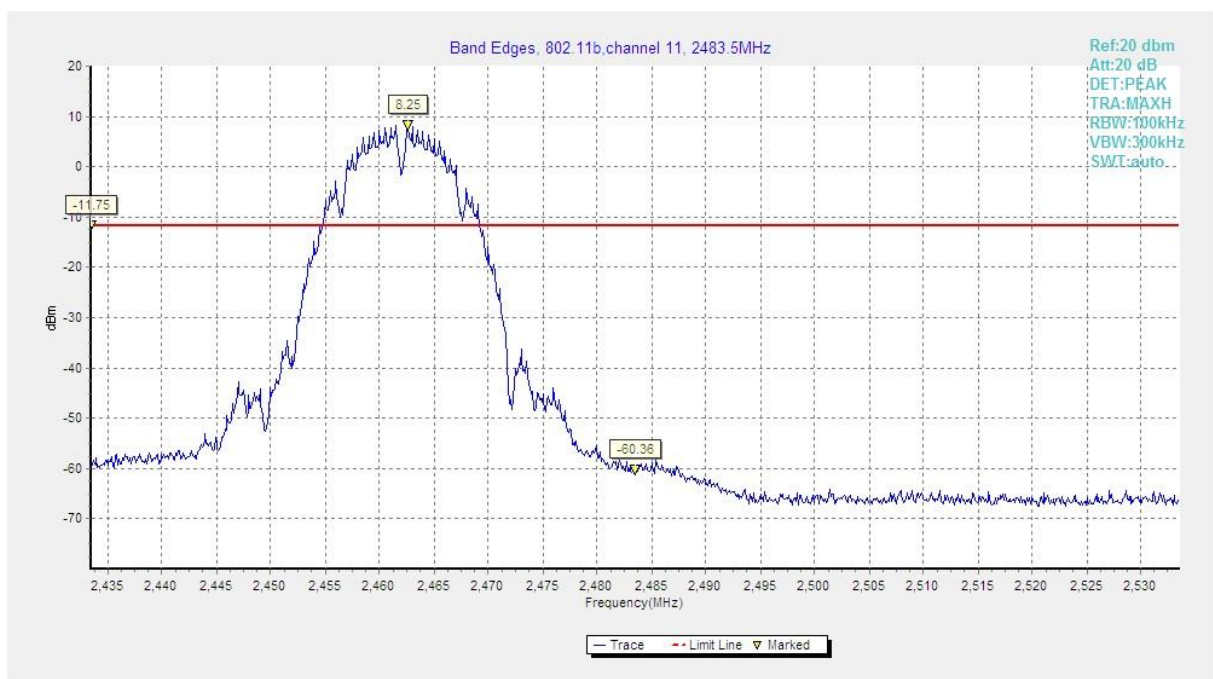


Fig.26 Band Edges (802.11b, CH 11)

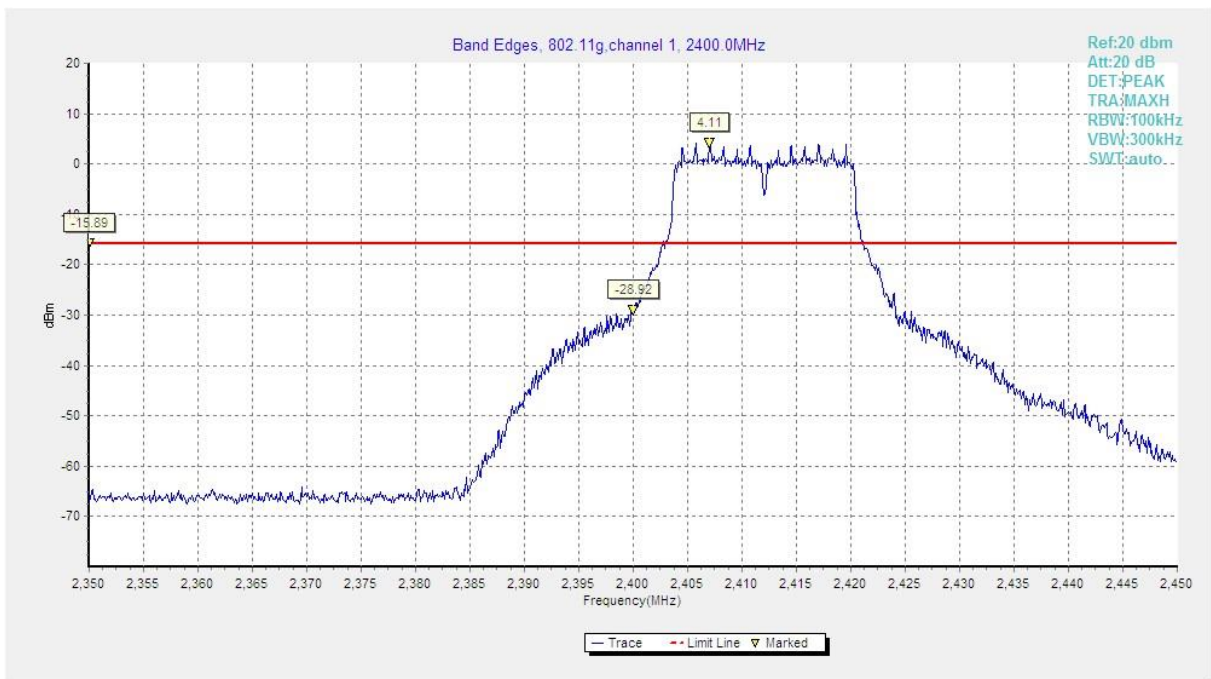


Fig.27 Band Edges (802.11g, CH 1)

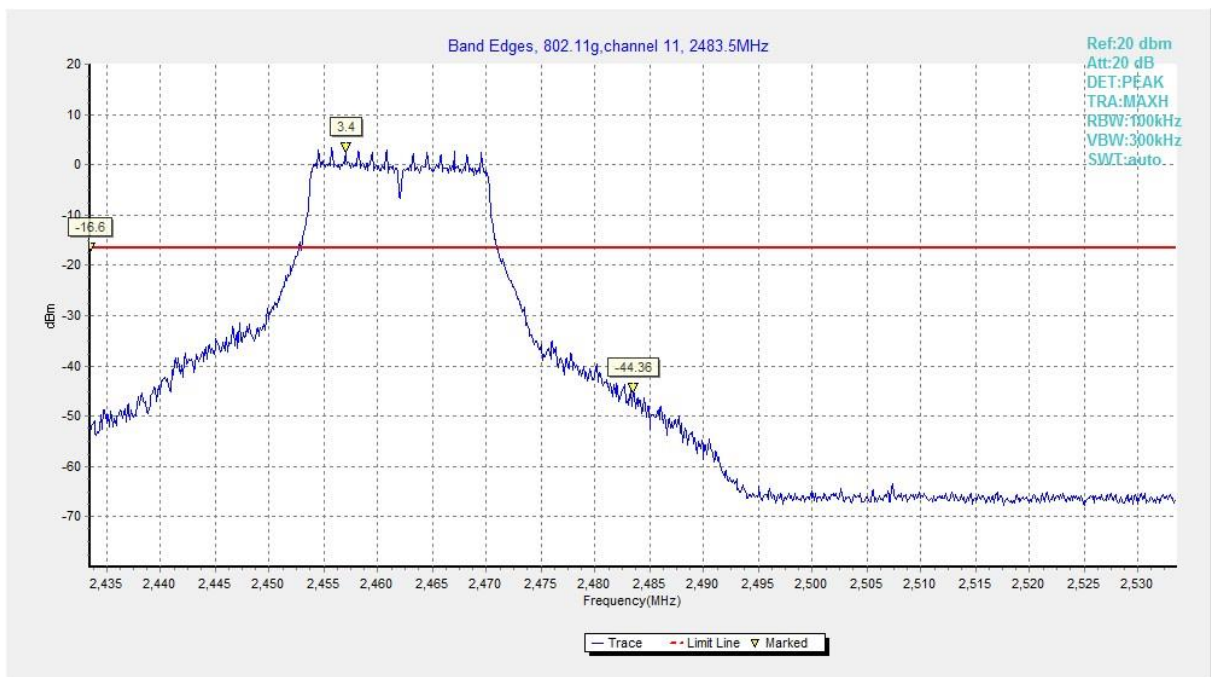


Fig.28 Band Edges (802.11g, CH 11)

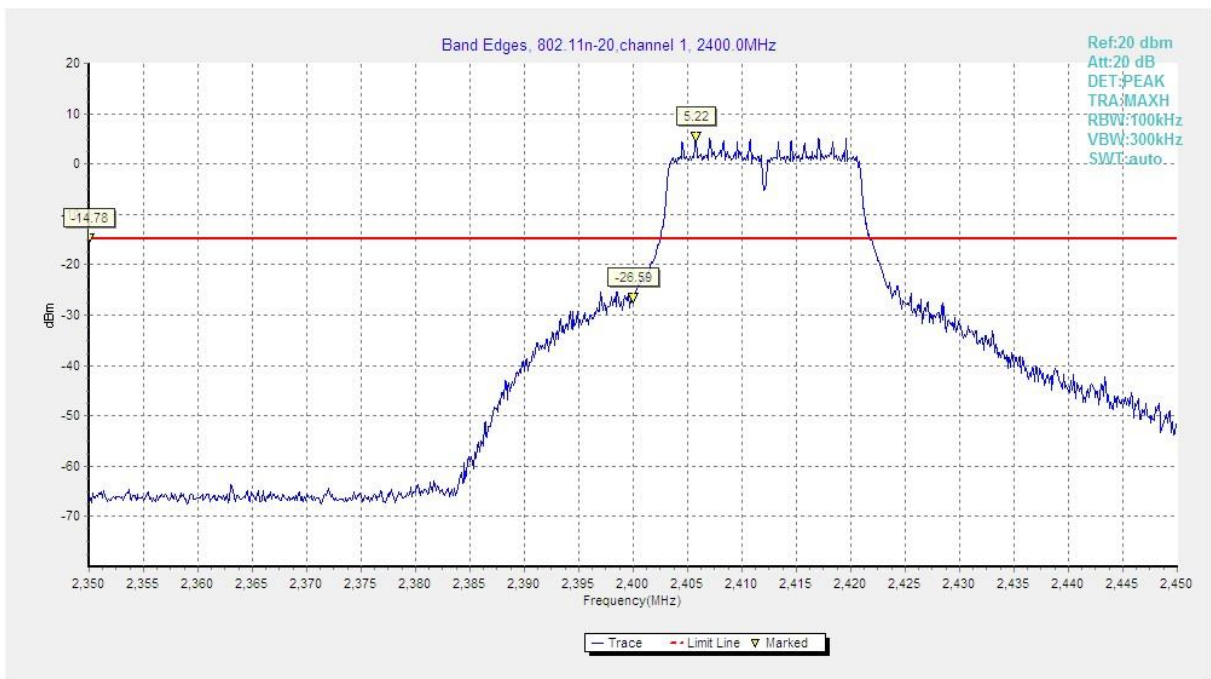


Fig.29 Band Edges (802.11n HT20, CH 1)

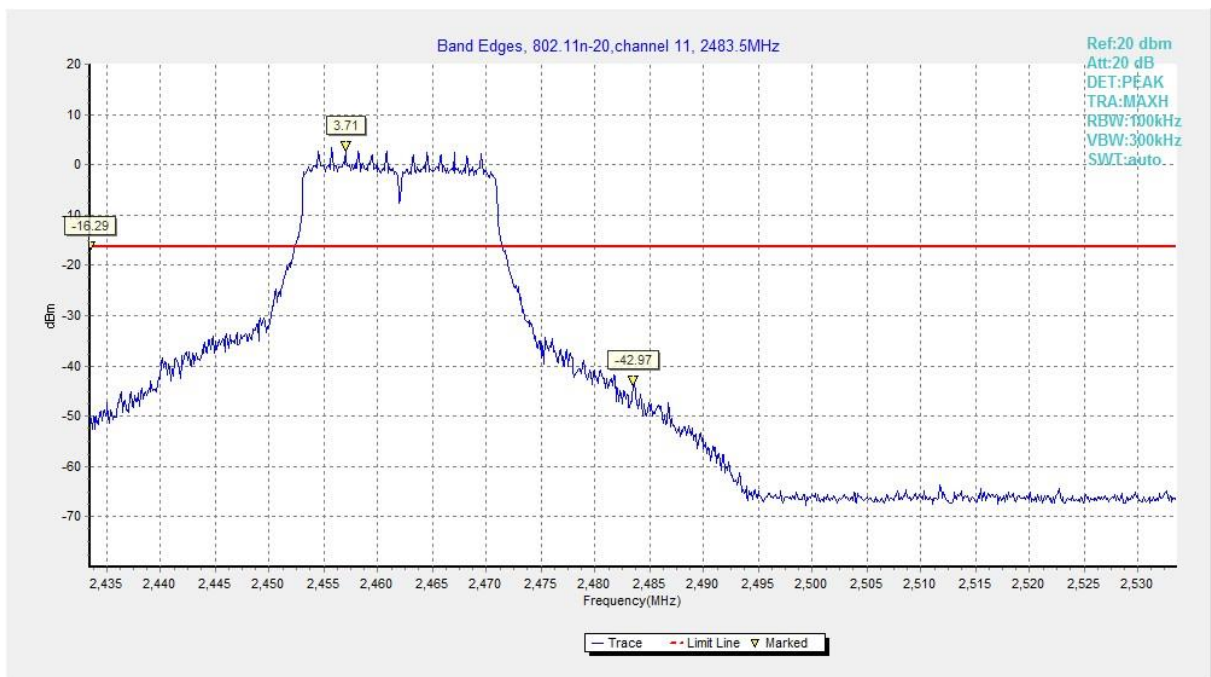


Fig.30 Band Edges (802.11n HT20, CH 11)



Fig.31 Band Edges (802.11n HT40, CH 3)



Fig.32 Band Edges (802.11n HT40, CH 9)

A.5 Conducted Emission

Measurement Limit:

Standard	Limit
FCC 47 CFR Part 15.247 (d)	20dB 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.33	P
	CH 6	2437	30MHz-26GHz	Fig.34	P
	CH 11	2462	30MHz-26GHz	Fig.35	P
802.11g	CH 1	2412	30MHz-26GHz	Fig.36	P
	CH 6	2437	30MHz-26GHz	Fig.37	P
	CH 11	2462	30MHz-26GHz	Fig.38	P
802.11n HT20	CH 1	2412	30MHz-26GHz	Fig.39	P
	CH 6	2437	30MHz-26GHz	Fig.40	P
	CH 11	2462	30MHz-26GHz	Fig.41	P
802.11n HT40	CH 3	2422	30MHz-26GHz	Fig.42	P
	CH 6	2437	30MHz-26GHz	Fig.43	P
	CH 9	2452	30MHz-26GHz	Fig.44	P

See below for test graphs.

Conclusion: PASS

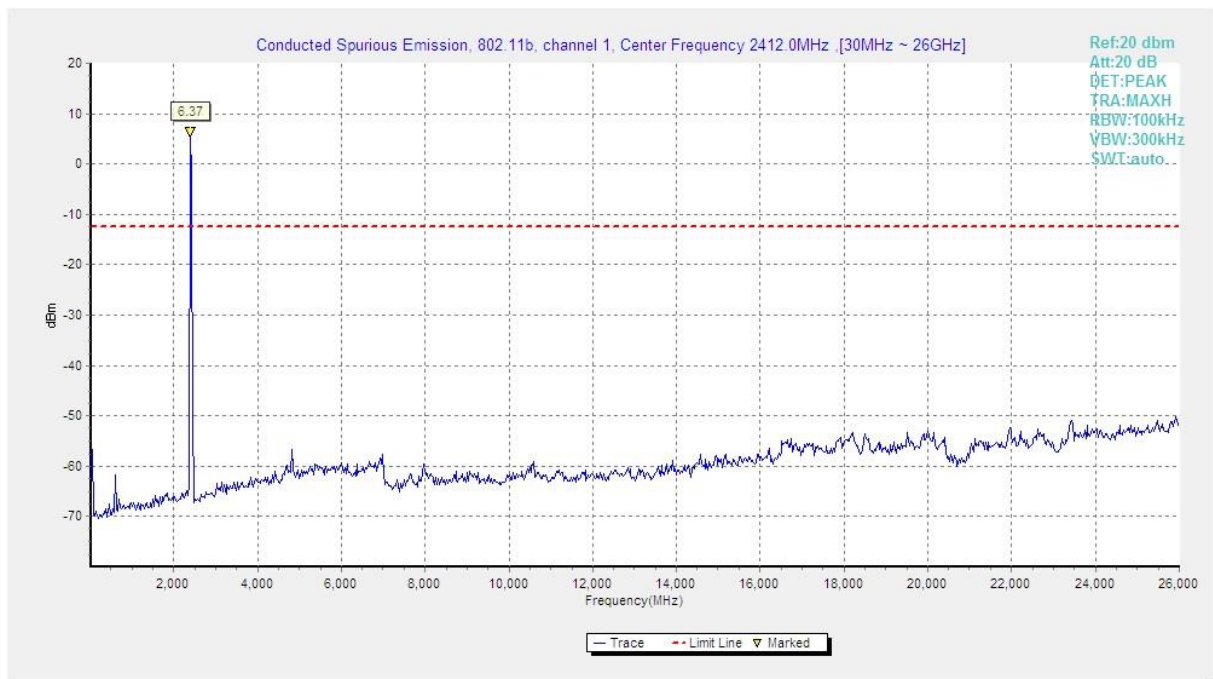


Fig.33 Conducted Spurious Emission (802.11b, CH1)

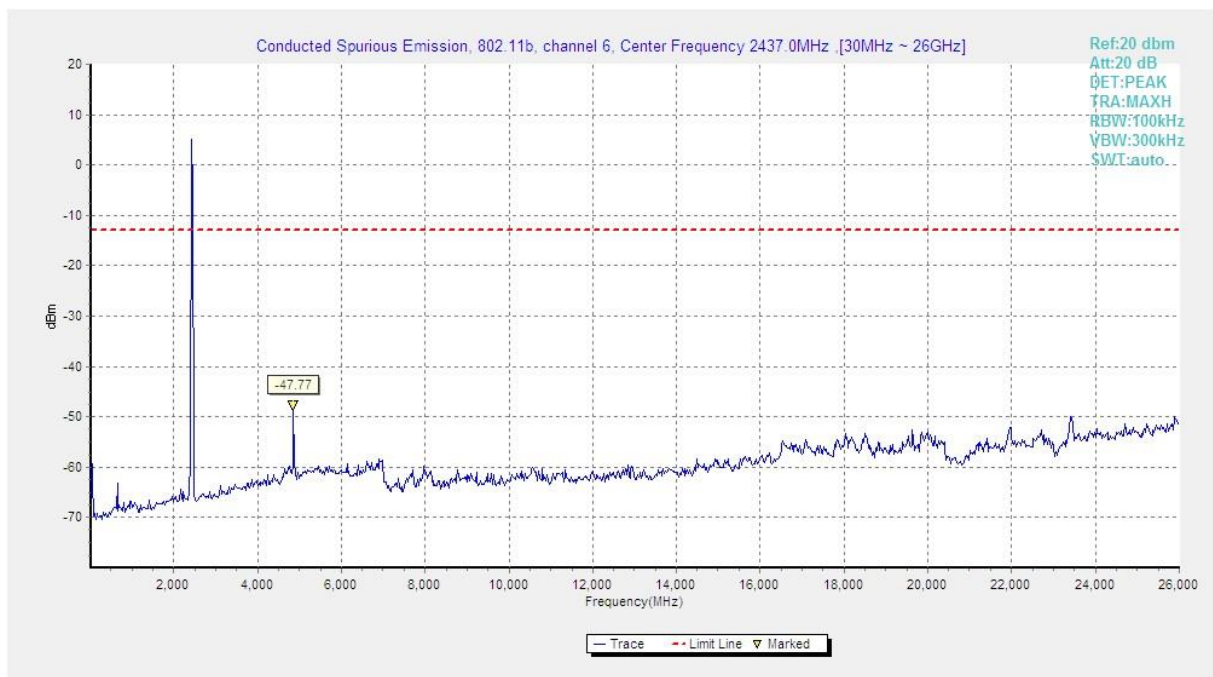


Fig.34 Conducted Spurious Emission (802.11b, CH6)

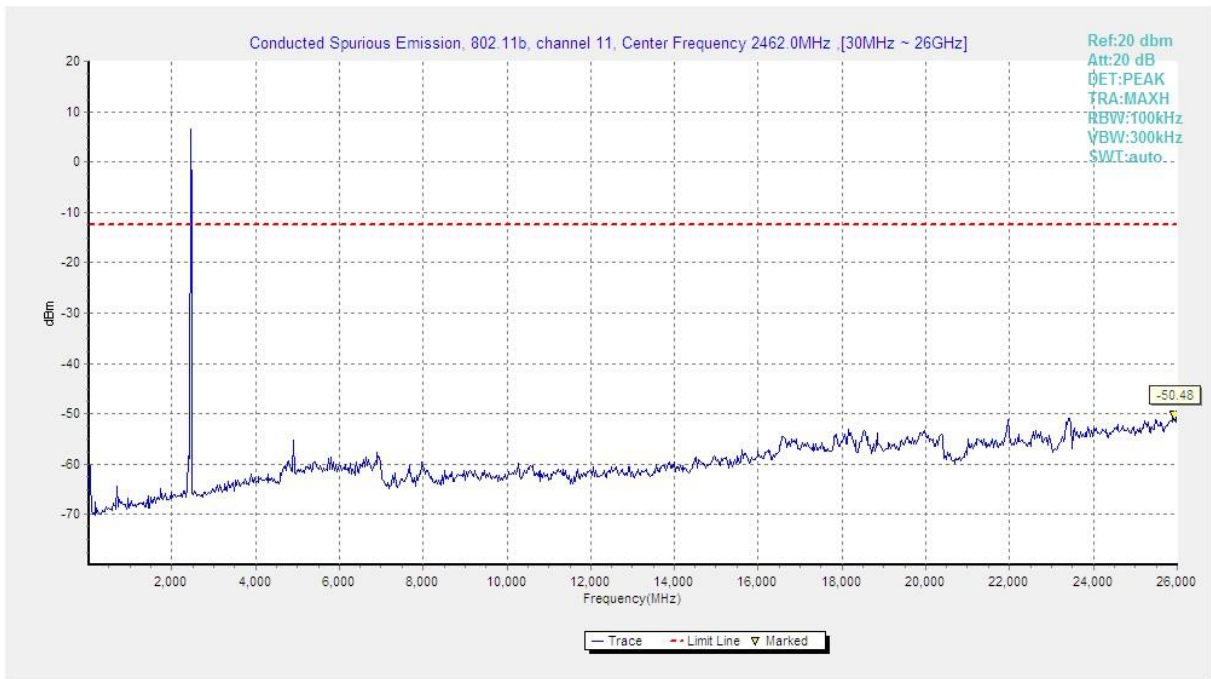


Fig.35 Conducted Spurious Emission (802.11b, CH11)

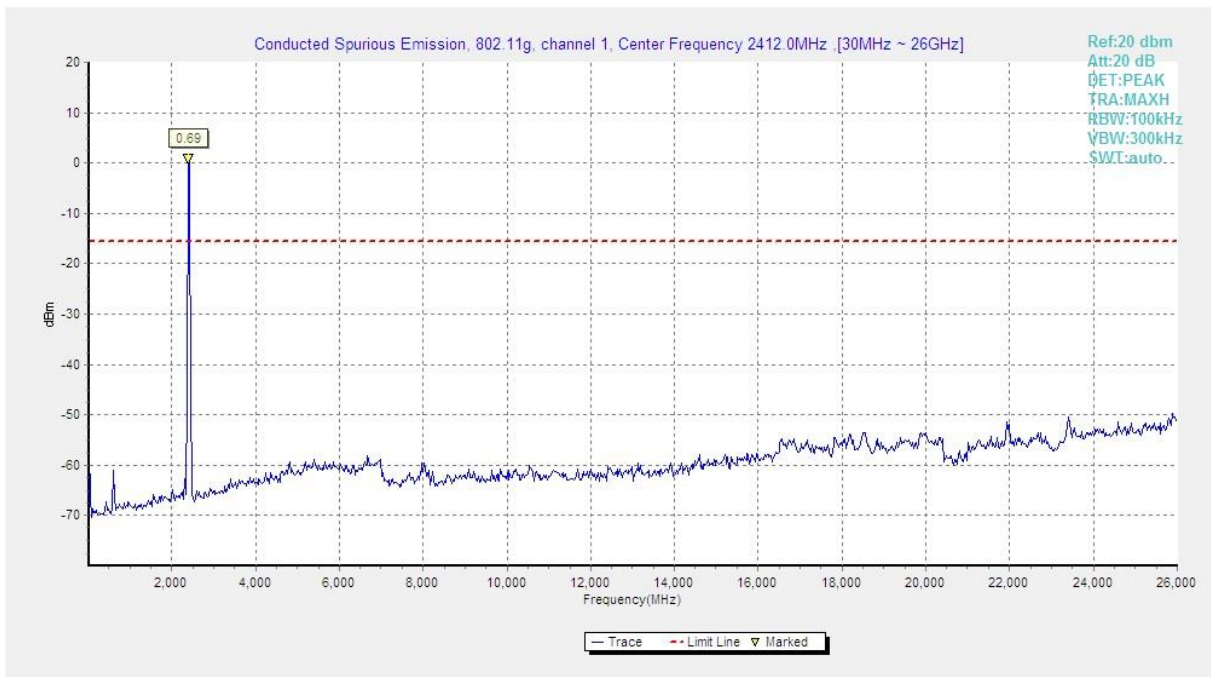


Fig.36 Conducted Spurious Emission (802.11g, CH1)

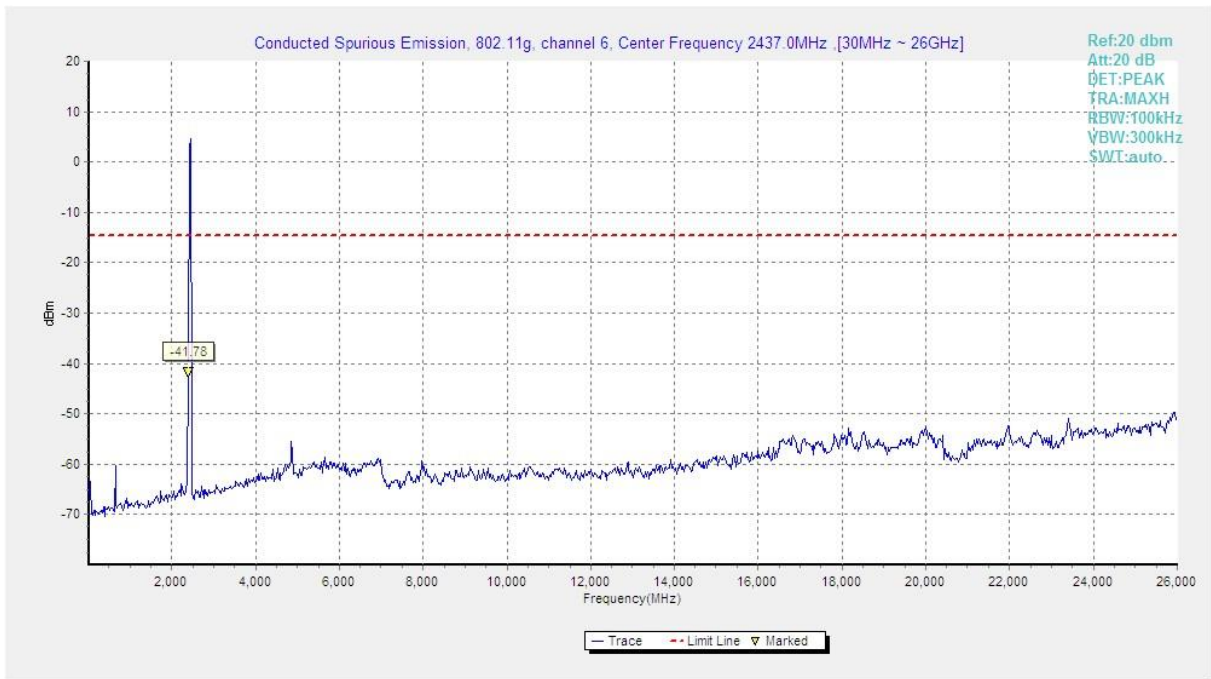


Fig.37 Conducted Spurious Emission (802.11g, CH6)

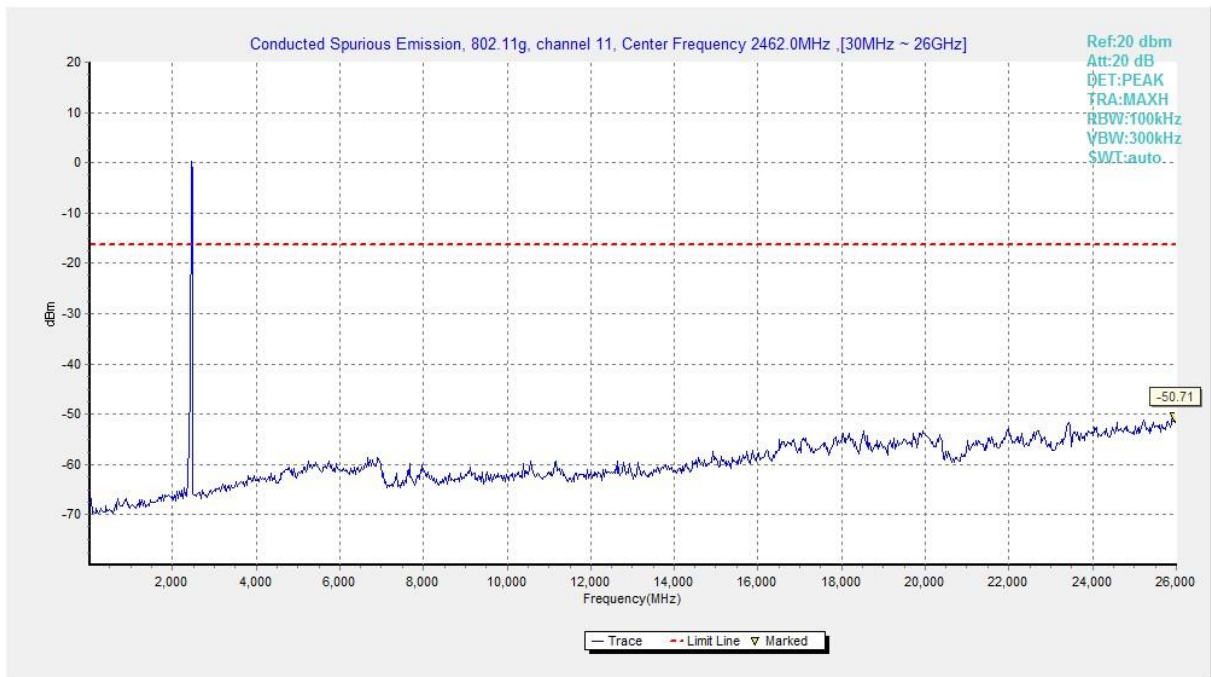


Fig.38 Conducted Spurious Emission (802.11g, CH11)

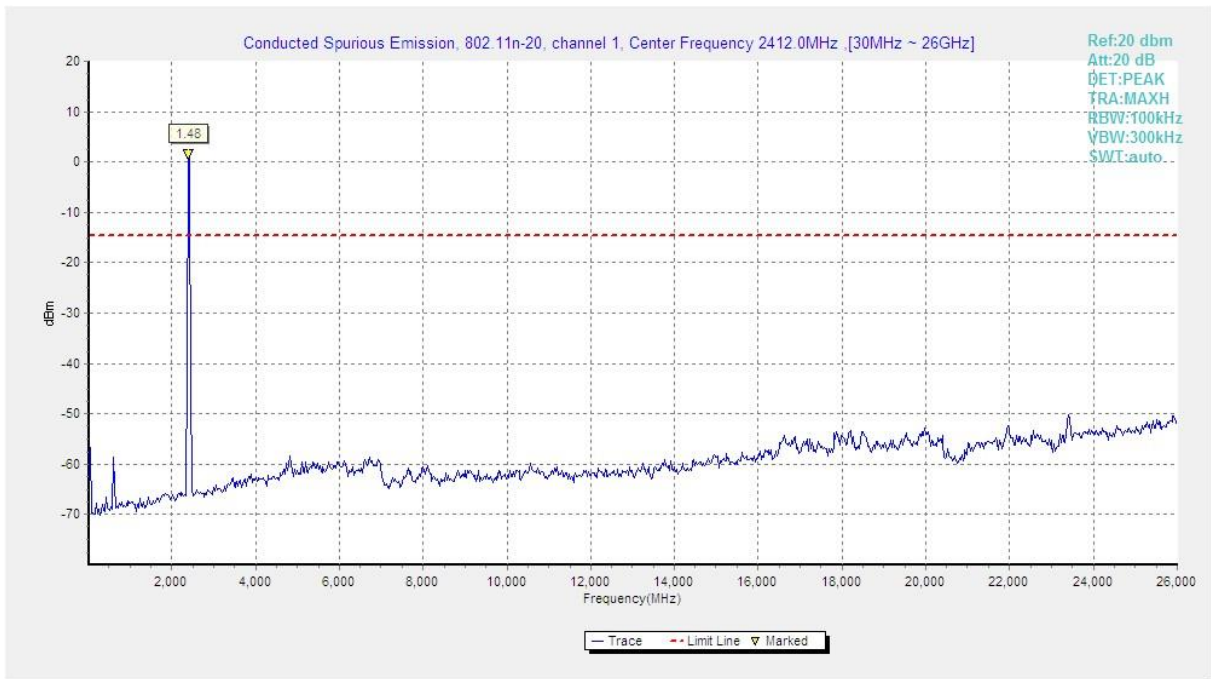


Fig.39 Conducted Spurious Emission (802.11n HT20, CH1)

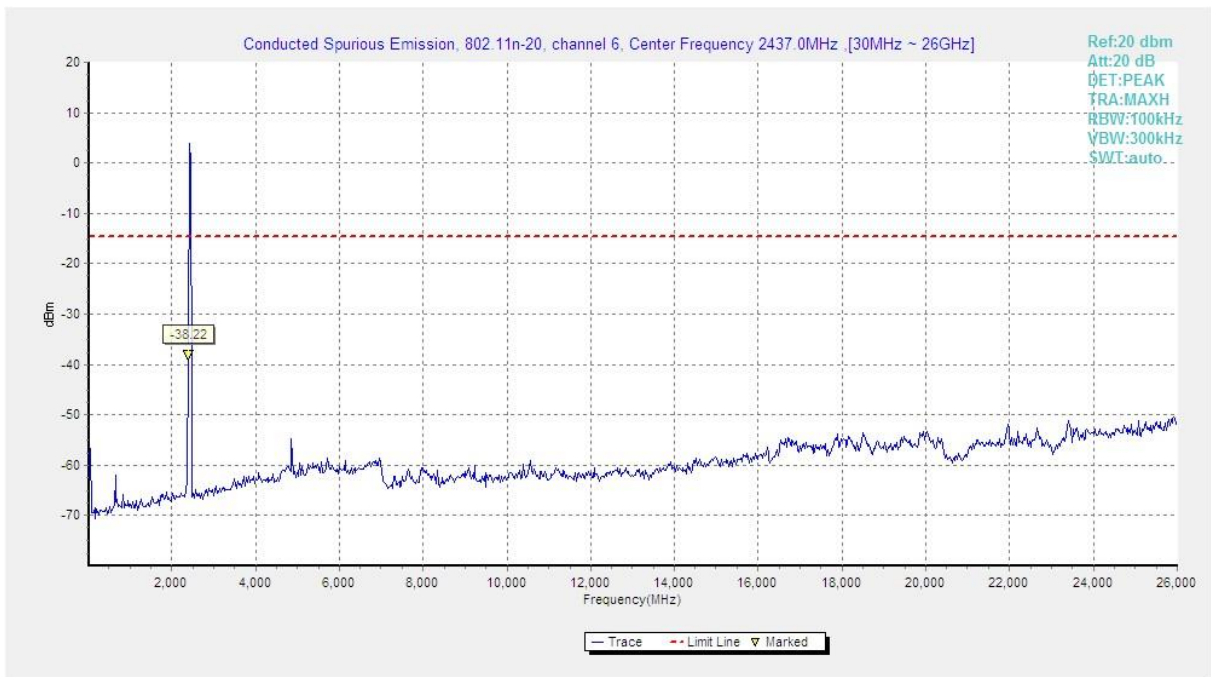


Fig.40 Conducted Spurious Emission (802.11n HT20, CH6)

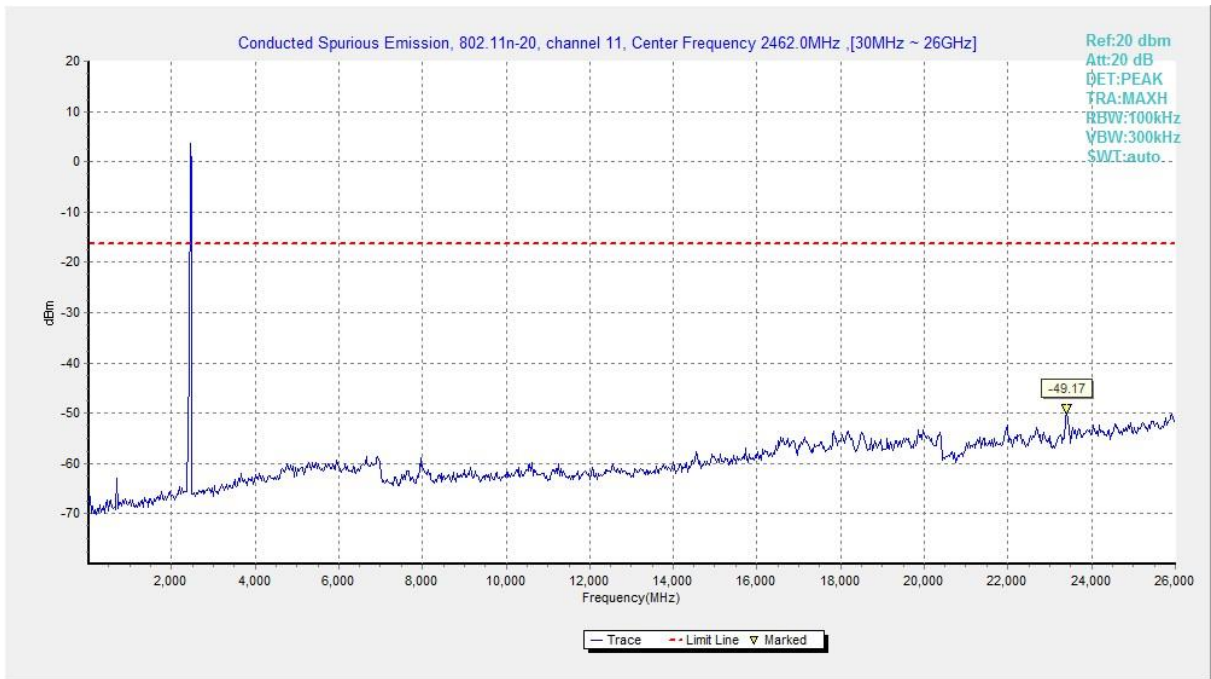


Fig.41 Conducted Spurious Emission (802.11n HT20, CH11)

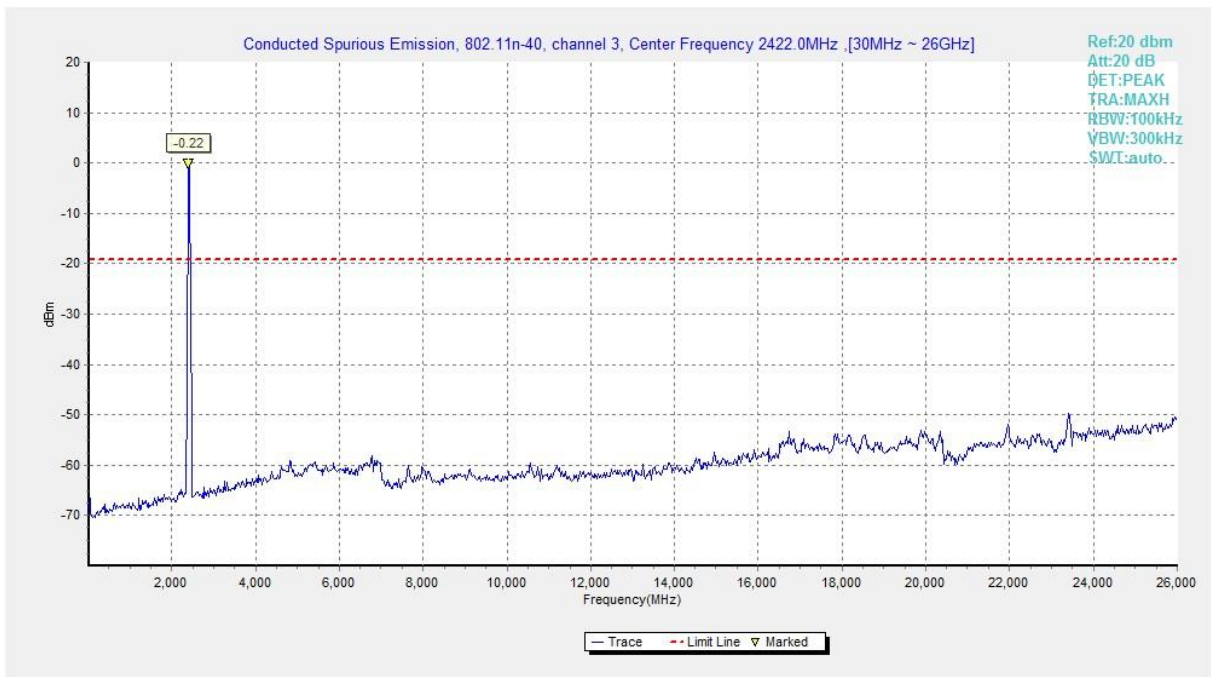


Fig.42 Conducted Spurious Emission (802.11n HT40, CH3)

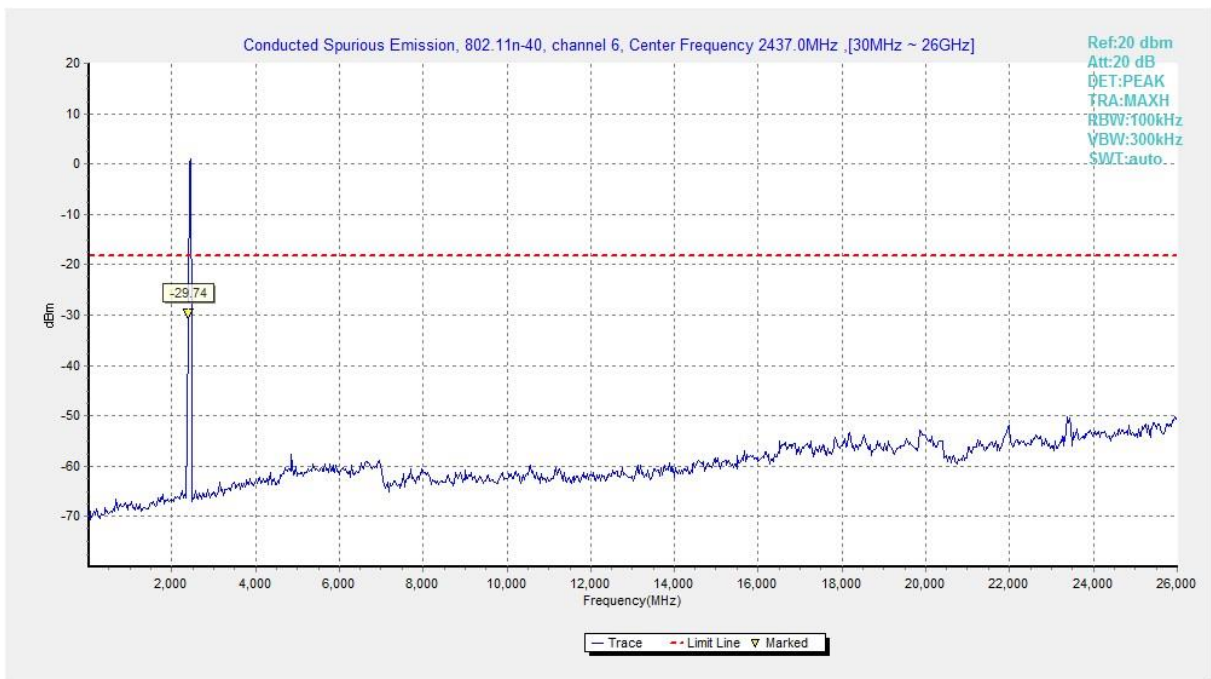


Fig.43 Conducted Spurious Emission (802.11n HT40, CH6)

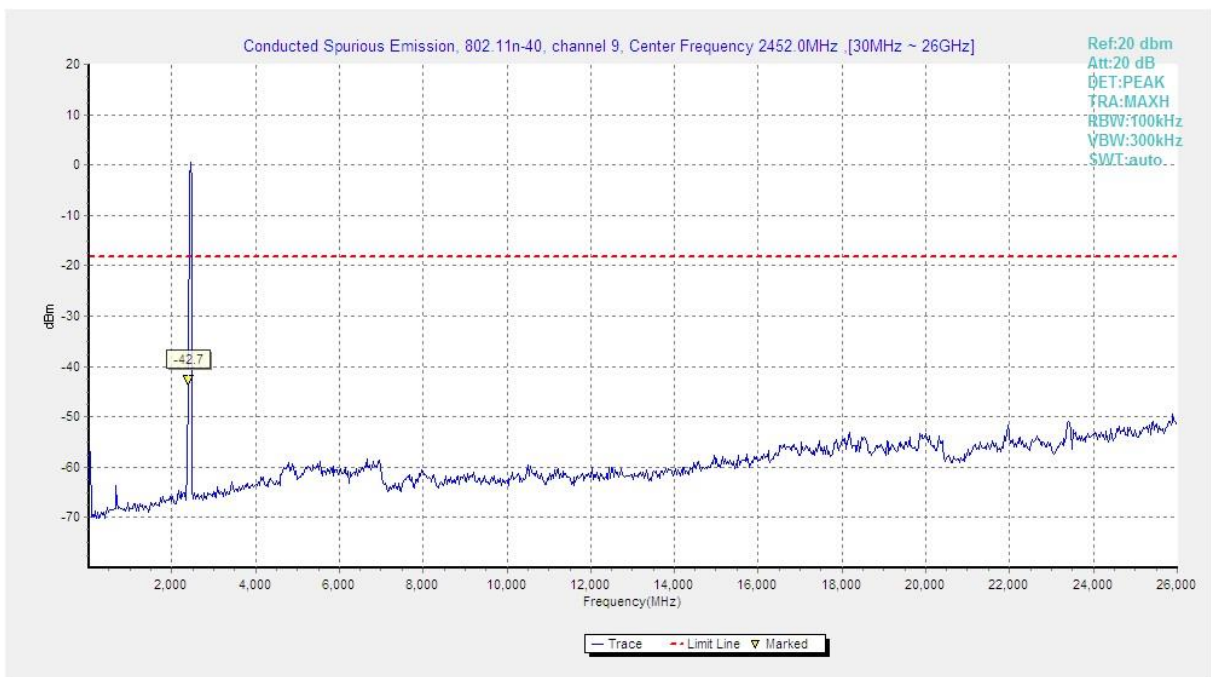


Fig.44 Conducted Spurious Emission (802.11n HT40, CH9)

A.6 Radiated Emission

Measurement Limit:

Standard	Limit
FCC 47 CFR Part 15.247, 15.205, 15.209	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($\mu\text{V}/\text{m}$)	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.