



# TEST REPORT

No. I21N00886-WLAN

**HMD Global Oy**

**Smart Phone**

**Model Name: TA-1357**

**with**

**Hardware Version: V01A**

**Software Version: 00WW\_0\_010**

**FCC ID: 2AJOTTA-1357**

**Issued Date: 2021-05-31**

**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.

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## 1. Summary of Test Report

### 1.1. Test Items

Description	Smart Phone
Model Name	TA-1357
Applicant's name	HMD Global Oy
Manufacturer's Name	HMD Global Oy

### 1.2. Test Standards

FCC Part15-2019; ANSI C63.10-2013

### 1.3. Test Result

#### **Pass**

Please refer to 5.2 Test Results.

### 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:	2021-04-17
Testing End Date:	2021-05-07

### 1.6. Signature

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Lin Kanfeng  
(Prepared this test report)

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Tang Weisheng  
(Reviewed this test report)

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(Approved this test report)



## **2. Client Information**

### **2.1. Applicant Information**

Company Name: HMD Global Oy  
Address: Bertel Jungin aukio 9, 02600 Espoo, Finland  
Contact Person: Rosario Casillo  
E-Mail: rosario.casillo@hmdglobal.com  
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### **2.2. Manufacturer Information**

Company Name: HMD Global Oy  
Address: Bertel Jungin aukio 9, 02600 Espoo, Finland  
Contact Person: Rosario Casillo  
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Telephone: +393 31 6272922



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

#### **3.1. About EUT**

Description	Smart Phone
Model Name	TA-1357
RF Protocol	IEEE 802.11 b/g/n20
Operating Frequency	2412MHz~2462MHz
Number of Channels	11
Antenna Type	Integrated
Antenna Gain	-2.0 dBi
Power Supply	3.85V DC by Battery
FCC ID	2AJOTTA-1357
Condition of EUT as received	No abnormality in appearance

#### **3.2. Internal Identification of EUT**

<b>EUT ID*</b>	<b>IMEI</b>	<b>HW Version</b>	<b>SW Version</b>	<b>Receive Date</b>
UT06aa	350872080009283	V01A	00WW_0_010	2021-04-12
UT05aa	350872080003880	V01A	00WW_0_010	2021-04-12

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

\*UT06aa is used for Conduction test; UT05aa is used for Radiation test and AC Power line Conducted Emission test.

#### **3.3. Internal Identification of AE**

<b>AE ID*</b>	<b>Description</b>	<b>SN</b>
AE1	Battery	/
AE2	Charger	/
AE3	Charger	/
AE1		
Model	SE681	
Manufacturer	Shenzhen Aerospace Electronic CO.,Ltd.	
Capacity	5850mAh	
Nominal Voltage	3.85v	
AE2		
Model	A8-050200U-US3	
Manufacturer	Dongguan Aohai Technology Co., Ltd	
AE3		
Model	AD-010U	
Manufacturer	Shenzhen Baijunda Electronic 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 Smart Phone with integrated antenna and battery.



No. I21N00886-WLAN

It consists of normal options: Lithium Battery and Charger.  
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.

<b>Reference</b>	<b>Title</b>	<b>Version</b>
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



## 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	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	15.107, 15.207	P

See **ANNEX A** for details.

### 5.3. Statements

SAICT has evaluated the test cases requested by the applicant/matrix 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.



## 6. Test Equipments Utilized

### Conducted test system

No.	Equipment	Model	Serial Number	Manufacturer	Calibration 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	Data Acquisition	U2531A	TW55443507	Agilent	/	/

### Radiated emission test system

No.	Equipment	Model	Serial Number	Manufacturer	Calibration Date	Calibration Period
1	LISN	ESH2-Z5	100196	R&S	2022-01-01	1 year
2	Test Receiver	ESCI	100701	R&S	2021-08-05	1 year
3	Loop Antenna	HLA6120	35779	TESEQ	2022-05-01	3 year
4	BiLog Antenna	VULB9163	9163 329	Schwarzbeck	2024-02-15	3 year
5	Horn Antenna	3117	00066585	ETS-Lindgren	2022-03-04	3 year
6	Test Receiver	ESR7	101675	R&S	2021-07-17	1 year
7	Spectrum Analyzer	FSP 40	100378	R&S	2021-12-11	1 year
8	Chamber	FACT5-2.0	4166	ETS-Lindgren	2024-05-11	3 year
9	Antenna	QSH-SL-1 8-26-S-20	17013	Q-par	2024-01-13	3 year
10	Antenna	QSH-SL-2 6-40-K-20	17014	Q-par	2024-01-09	3 year

### 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. Laboratory Environment

### Semi-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
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

## 8. Measurement Uncertainty

Test Name	Uncertainty ( $k=2$ )	
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	$30\text{MHz} \leq f < 1\text{GHz}$	1.41dB
	$1\text{GHz} \leq f < 7\text{GHz}$	1.92dB
	$7\text{GHz} \leq f < 13\text{GHz}$	2.31dB
	$13\text{GHz} \leq f \leq 26\text{GHz}$	2.61dB
5. Transmitter Spurious Emission - Radiated	$9\text{kHz} \leq f < 30\text{MHz}$	1.70dB
	$30\text{MHz} \leq f < 1\text{GHz}$	4.90dB
	$1\text{GHz} \leq f < 18\text{GHz}$	4.60dB
	$18\text{GHz} \leq f \leq 40\text{GHz}$	4.10dB
6. AC Power line Conducted Emission	$150\text{kHz} \leq f \leq 30\text{MHz}$	3.00dB



## **ANNEX A: Detailed Test Results**

### **A.0 Antenna requirement**

#### **Measurement Limit:**

<b>Standard</b>	<b>Requirement</b>
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 -2.0dBi. The RF transmitter uses an integrate antenna without connector.



## A.1 Maximum Output Power

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

Method AVGP-M-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)	< 30	< 36

### Measurement Results:

#### 802.11b/g mode

Mode	Date Rate (Mbps)	Test Result (dBm)		
		2412MHz (CH1)	2437MHz (CH6)	2462MHz (CH11)
802.11b	1	11.97	10.28	12.86
	2	/	/	12.81
	5.5	/	/	12.79
	11	/	/	12.75
802.11g	6	11.95	10.94	13.04
	9	/	/	13.01
	12	/	/	12.97
	18	/	/	12.95
	24	/	/	12.90
	36	/	/	12.89
	48	/	/	12.86
	54	/	/	12.84

#### 802.11n HT20 mode

Mode	Date Rate (Index)	Test Result (dBm)		
		2412MHz (CH1)	2437MHz (CH6)	2462MHz (CH11)
802.11n HT20	MCS 0	11.93	10.92	12.99
	MCS 1	/	/	12.94
	MCS 2	/	/	12.92
	MCS 3	/	/	12.88
	MCS 4	/	/	12.85
	MCS 5	/	/	12.83
	MCS 6	/	/	12.79
	MCS 7	/	/	12.76



Note: The data rate 1Mbps (11b mode), 6Mbps (11g mode) and MCS0 (11n mode) are selected as the Worst-Case. 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%.

**E.I.R.P**

<b>Mode</b>	<b>Channel</b>	<b>Frequency (MHz)</b>	<b>E.I.R.P (dBm)</b>	<b>Conclusion</b>
802.11b	CH 1	2412	9.97	P
	CH 6	2437	8.28	P
	CH 11	2462	10.86	P
802.11g	CH 1	2412	9.95	P
	CH 6	2437	8.94	P
	CH 11	2462	11.04	P
802.11n HT20	CH 1	2412	9.93	P
	CH 6	2437	8.92	P
	CH 11	2462	10.99	P

Note: E.I.R.P value= Conducted values (with conducted samples) + Antenna Gain.



### 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
802.11b	CH 1	2412	Fig.1	-15.59	P
	CH 6	2437	Fig.2	-16.76	P
	CH 11	2462	Fig.3	-15.37	P
802.11g	CH 1	2412	Fig.4	-15.74	P
	CH 6	2437	Fig.5	-16.43	P
	CH 11	2462	Fig.6	-14.74	P
802.11n HT20	CH 1	2412	Fig.7	-15.75	P
	CH 6	2437	Fig.8	-16.62	P
	CH 11	2462	Fig.9	-14.86	P

See below for test graphs.

**Conclusion: PASS**

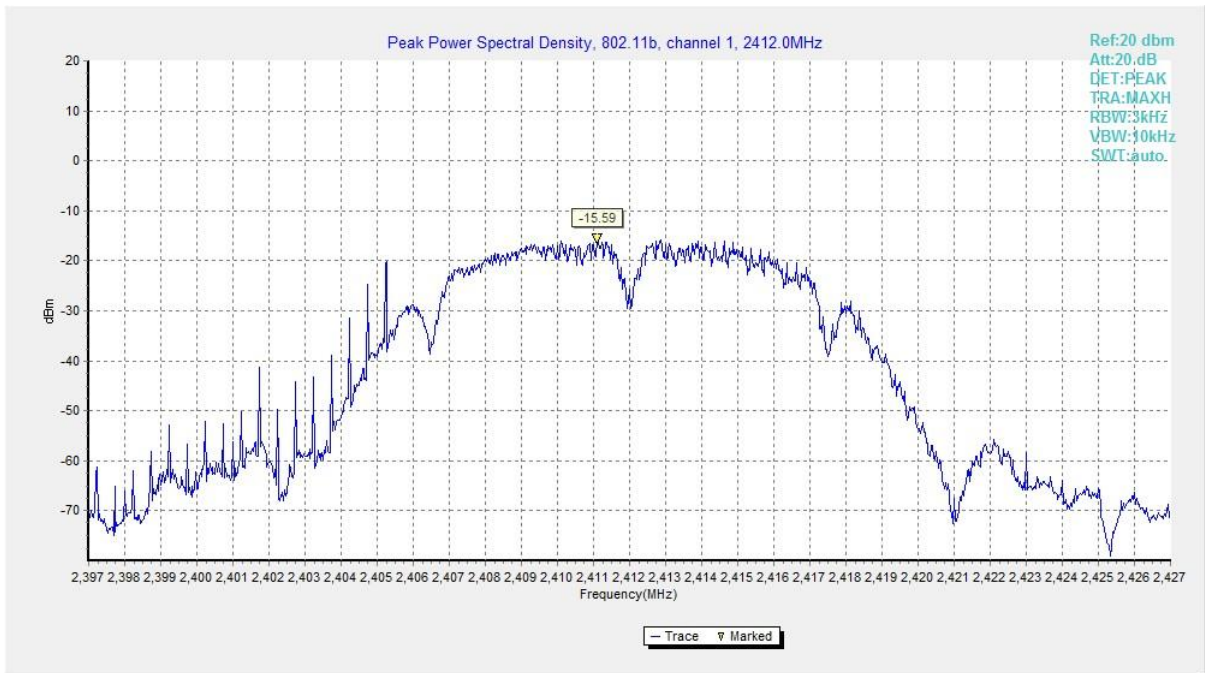


Fig.1 Power Spectral Density (802.11b, CH 1)

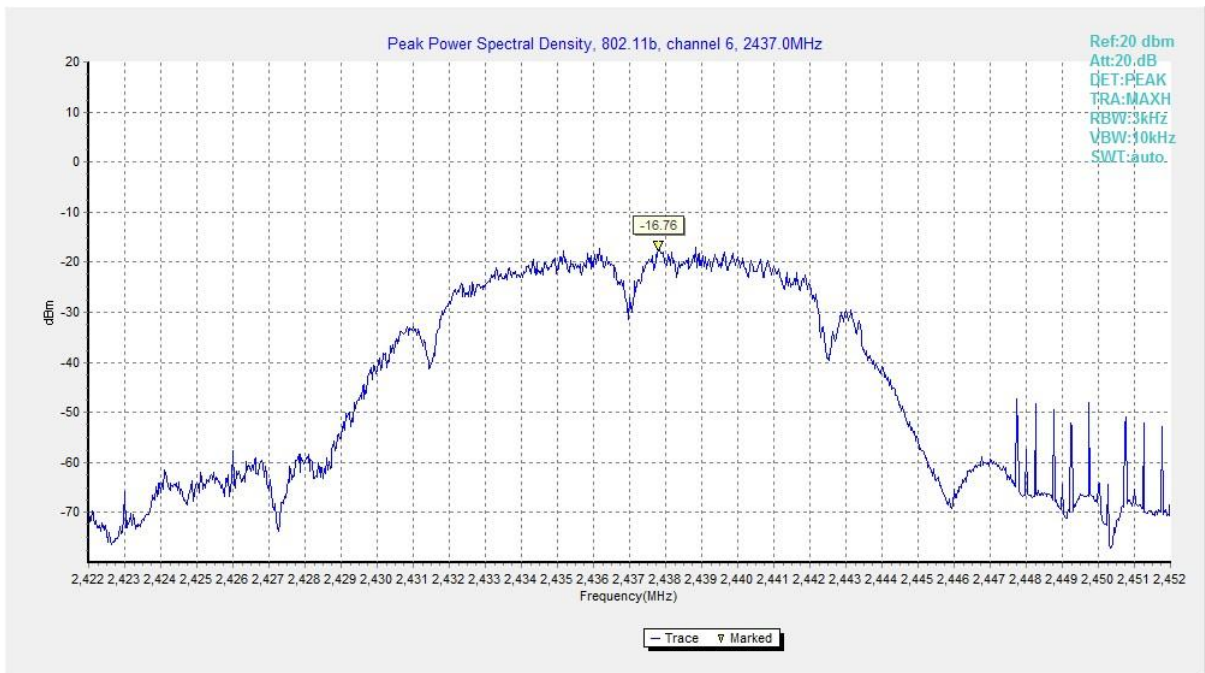


Fig.2 Power Spectral Density (802.11b, CH 6)



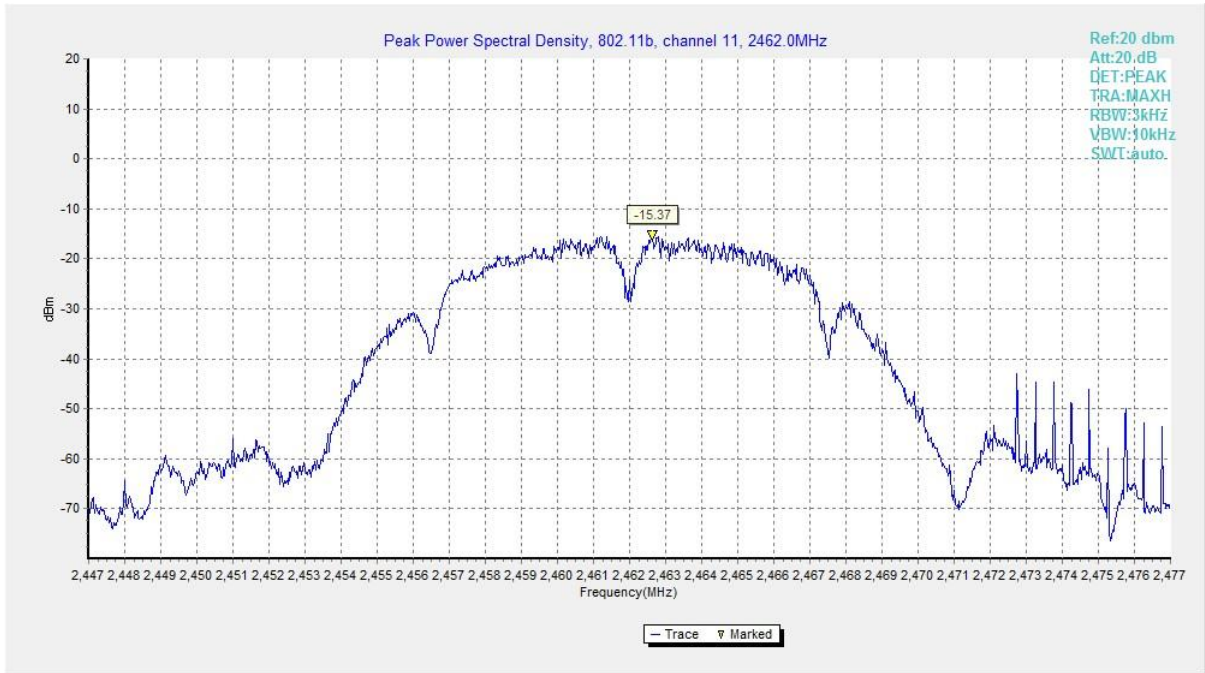


Fig.3 Power Spectral Density (802.11b, CH 11)

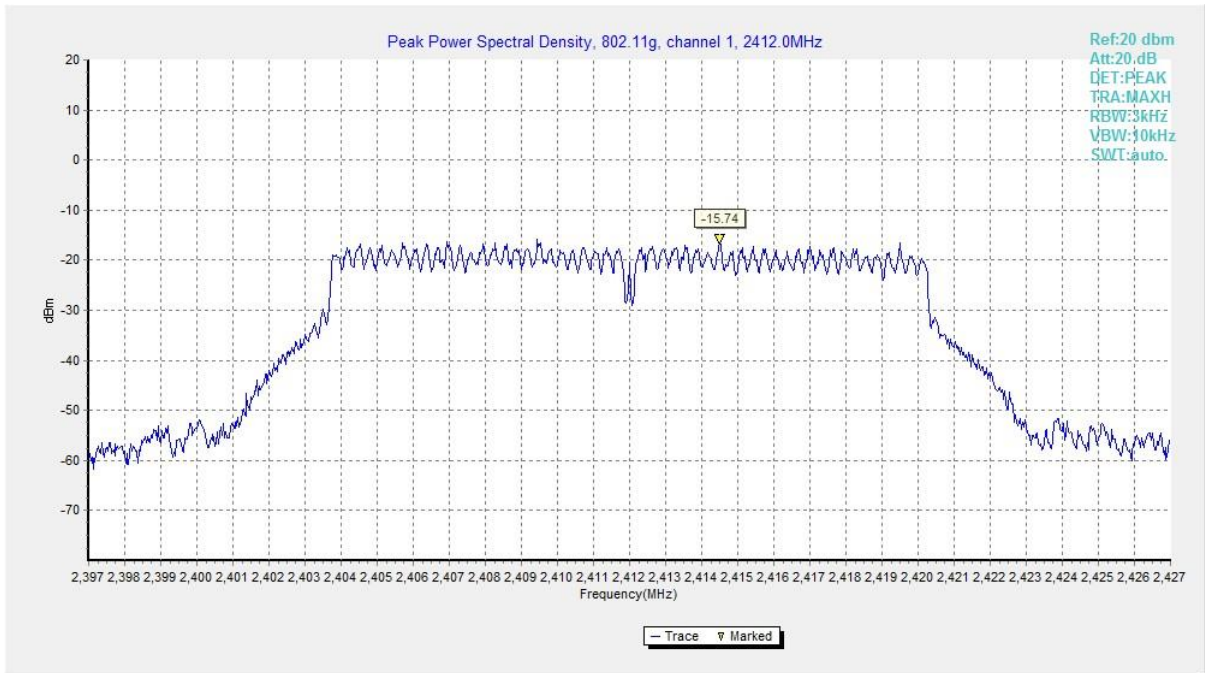


Fig.4 Power Spectral Density (802.11g, CH 1)

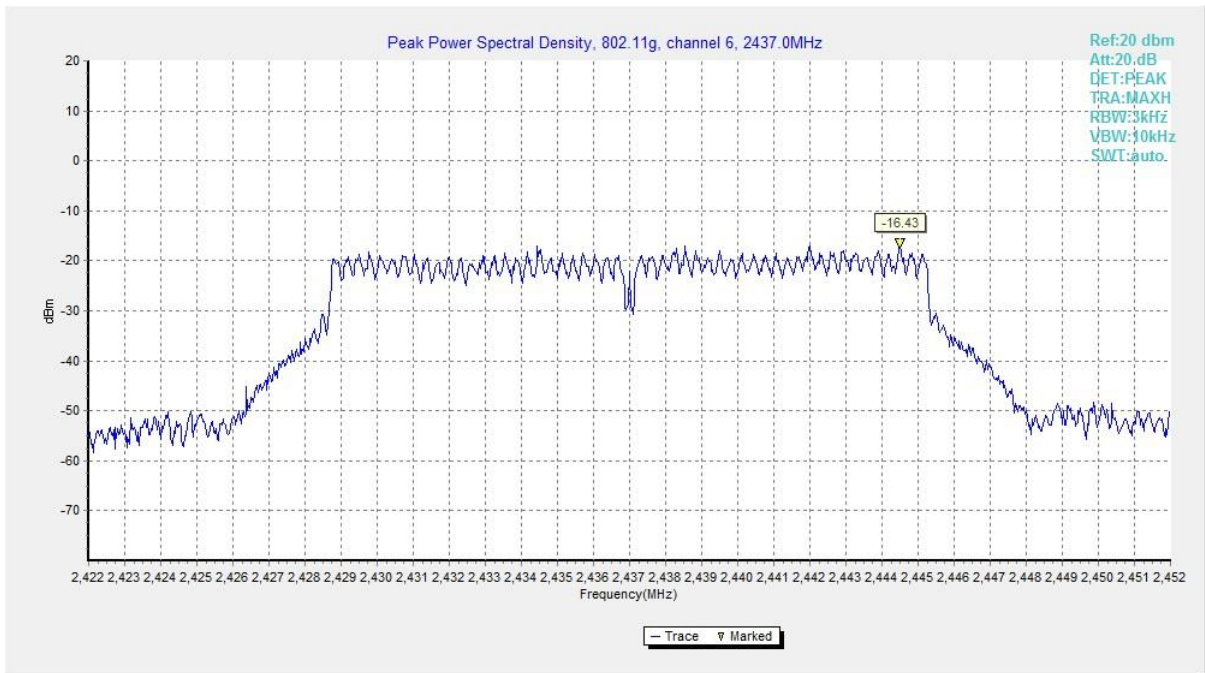


Fig.5 Power Spectral Density (802.11g, CH 6)

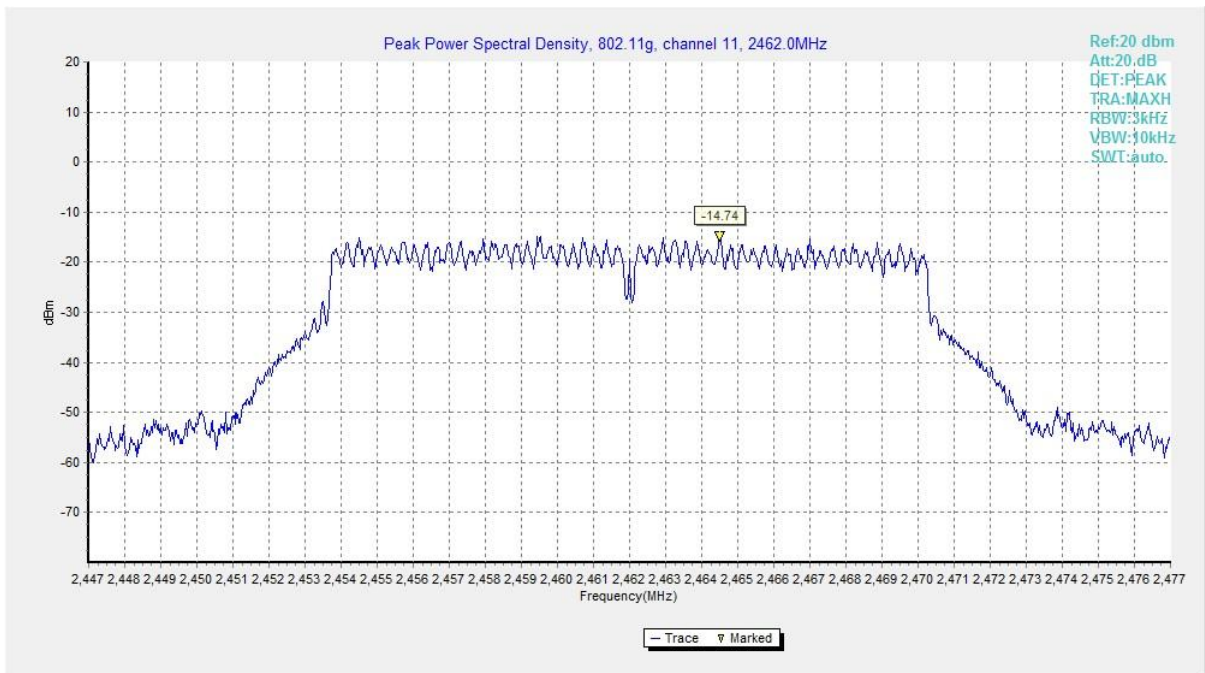
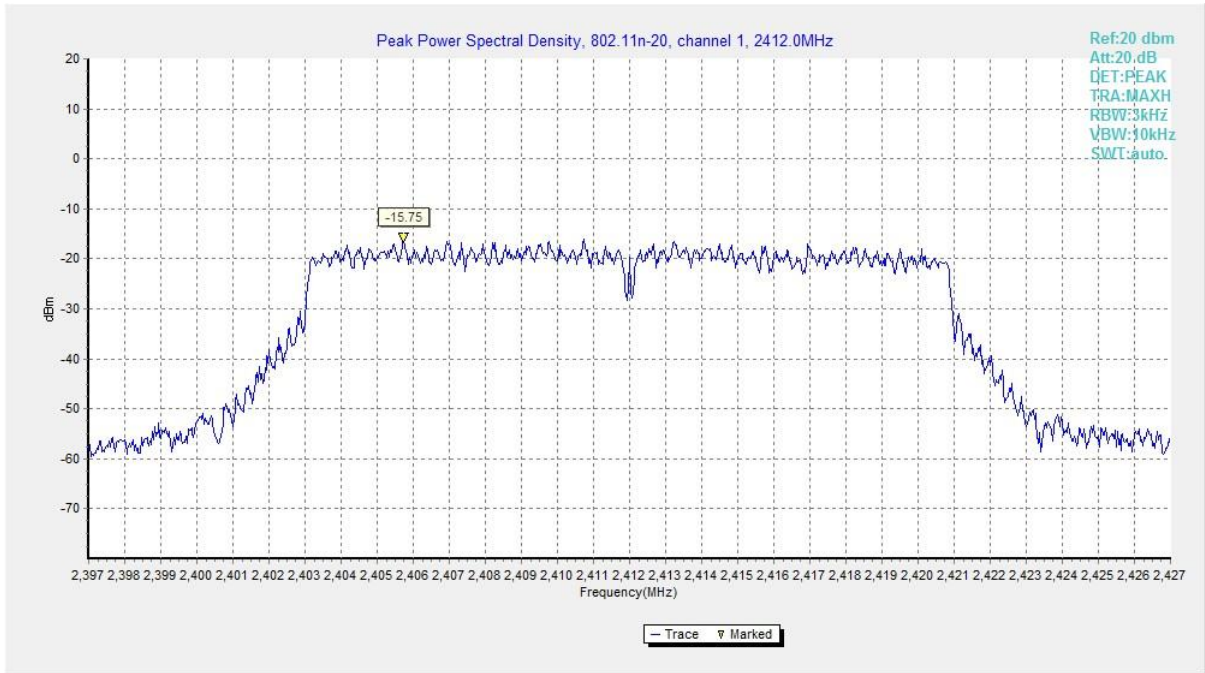
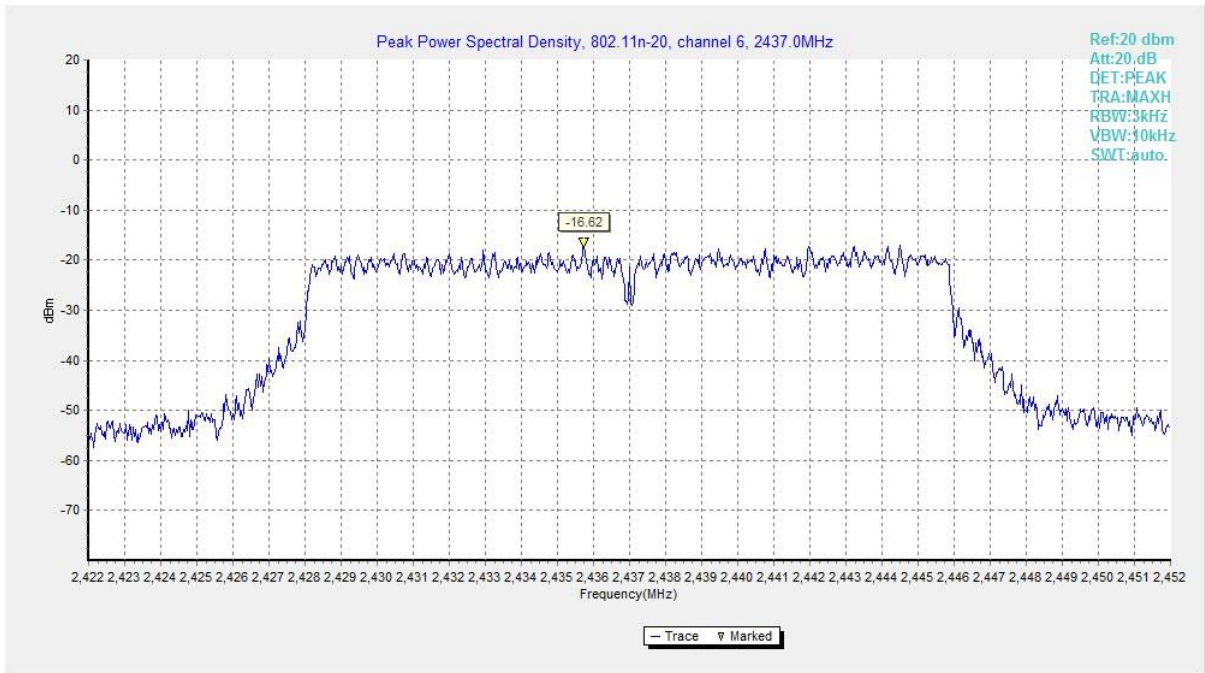


Fig.6 Power Spectral Density (802.11g, CH 11)



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



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

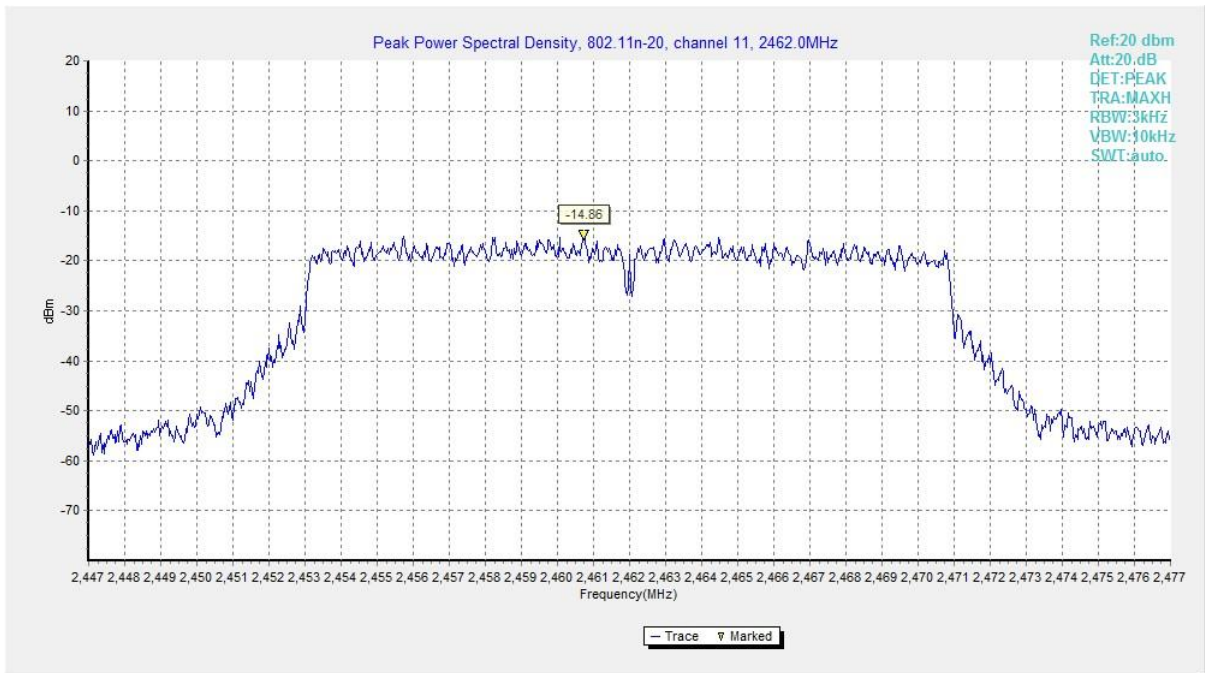


Fig.9 Power Spectral Density (802.11n HT20, CH 11)



### 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
802.11b	CH 1	2412	Fig.10	9100	P
	CH 6	2437	Fig.11	9100	P
	CH 11	2462	Fig.12	9050	P
802.11g	CH 1	2412	Fig.13	16300	P
	CH 6	2437	Fig.14	16350	P
	CH 11	2462	Fig.15	16300	P
802.11n HT20	CH 1	2412	Fig.16	17300	P
	CH 6	2437	Fig.17	17600	P
	CH 11	2462	Fig.18	17300	P

See below for test graphs.

**Conclusion: PASS**



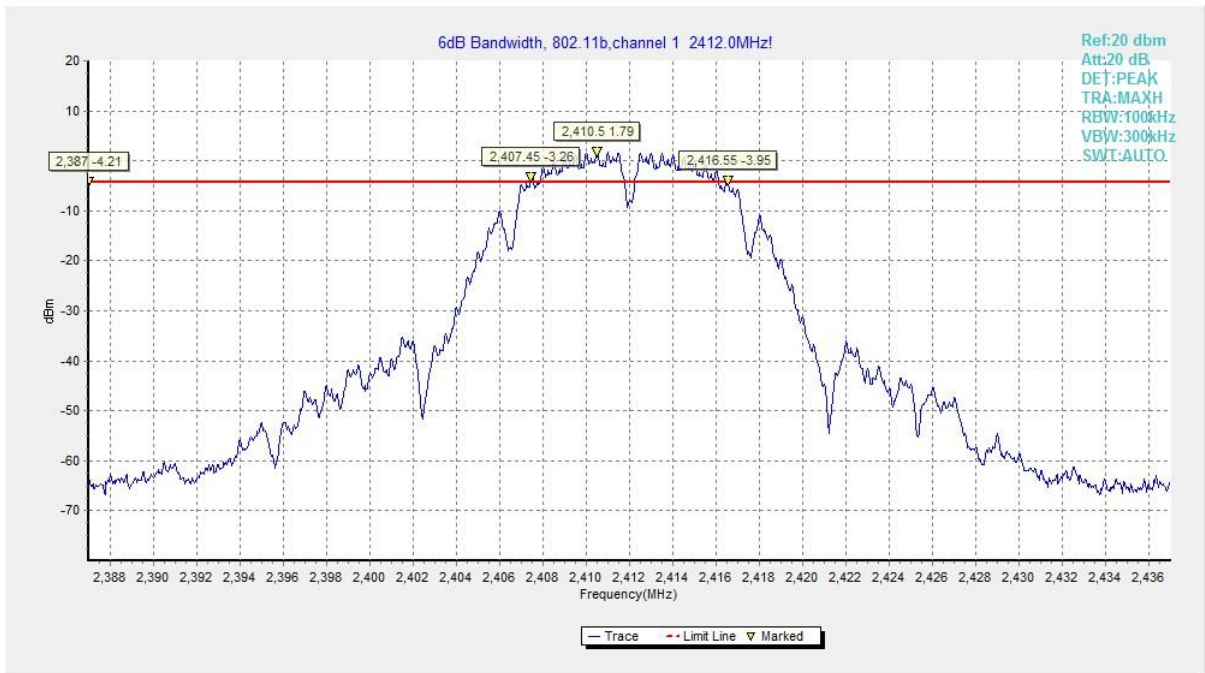


Fig.10 6dB Bandwidth (802.11b, CH 1)

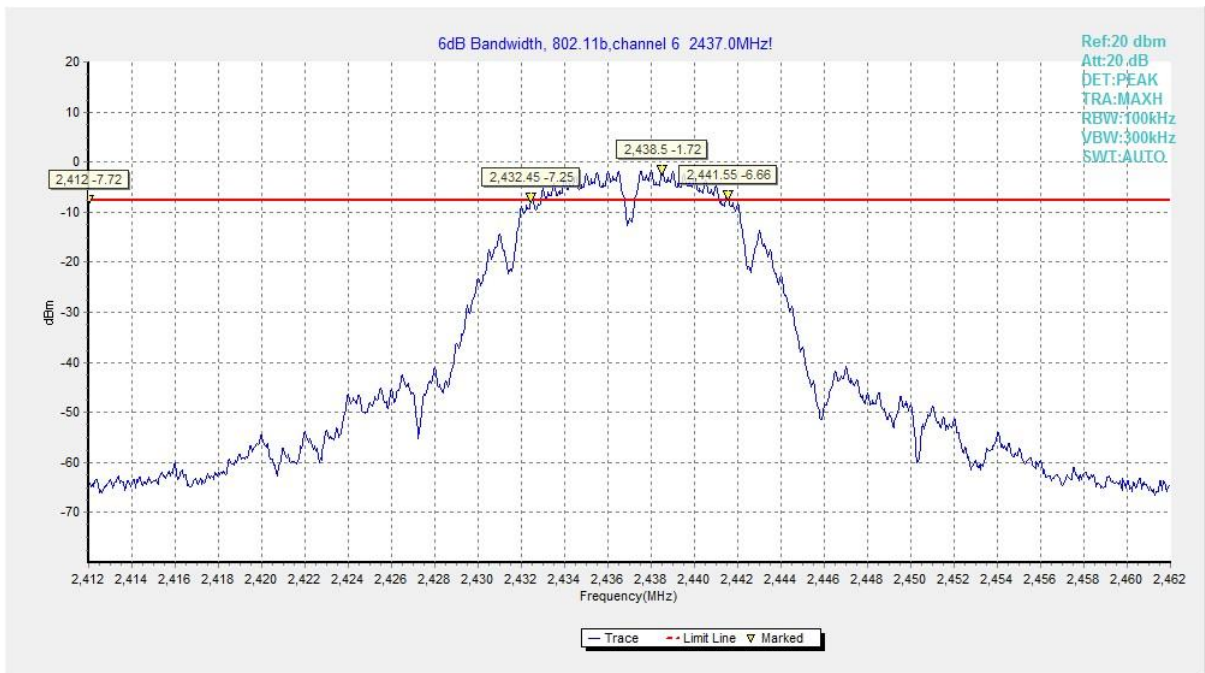


Fig.11 6dB Bandwidth (802.11b, CH 6)

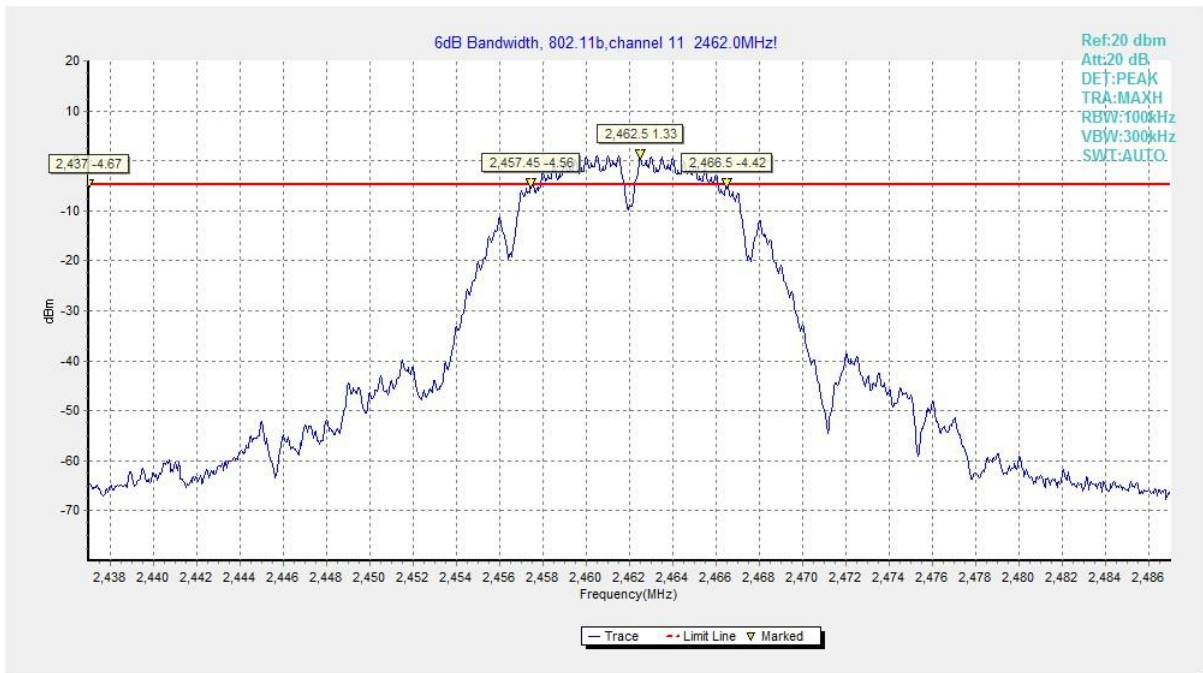


Fig.12 6dB Bandwidth (802.11b, CH 11)

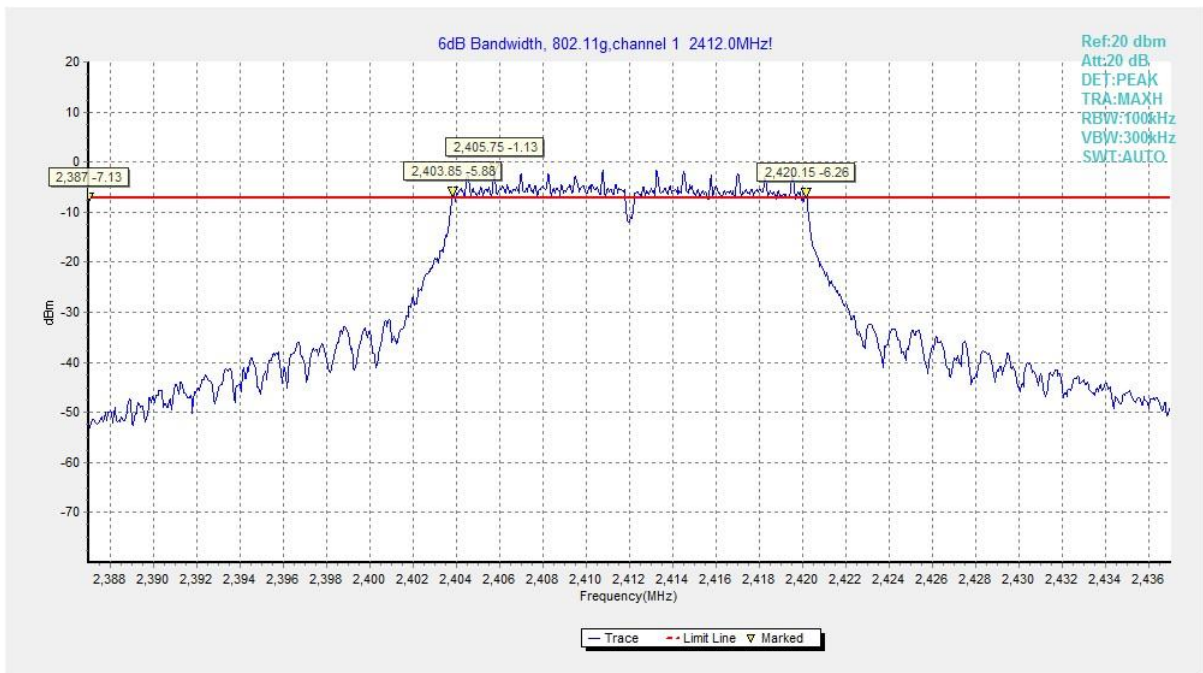


Fig.13 6dB Bandwidth (802.11g, CH 1)

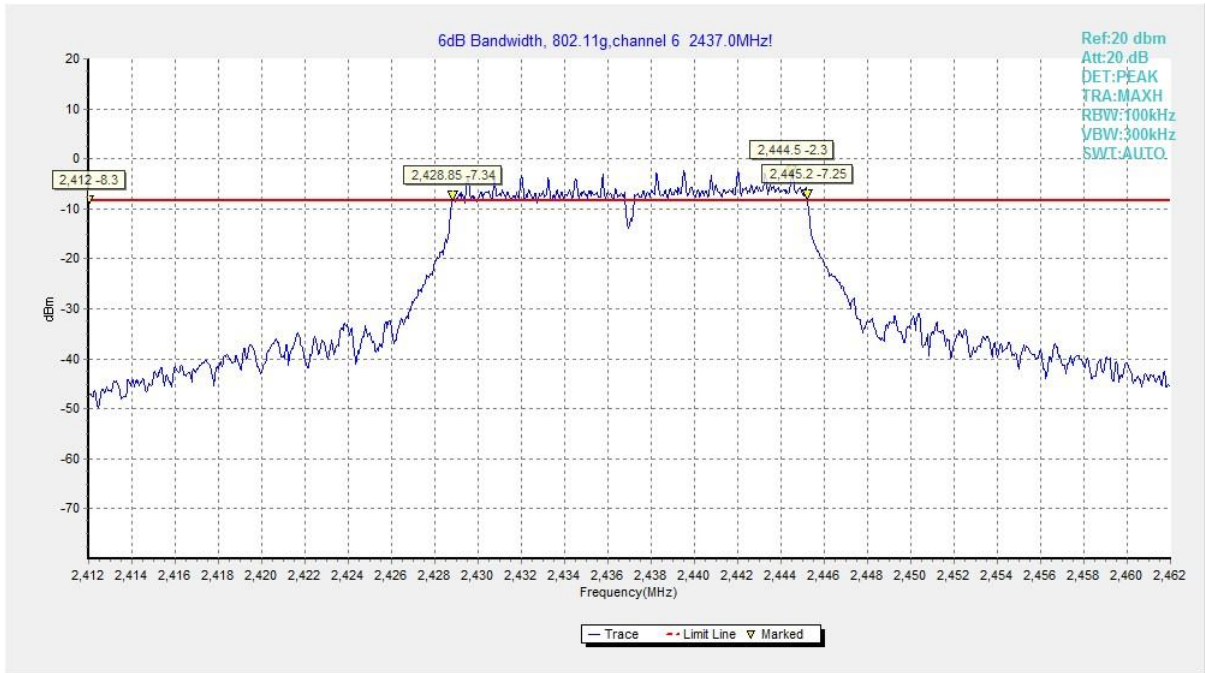


Fig.14 6dB Bandwidth (802.11g, CH 6)

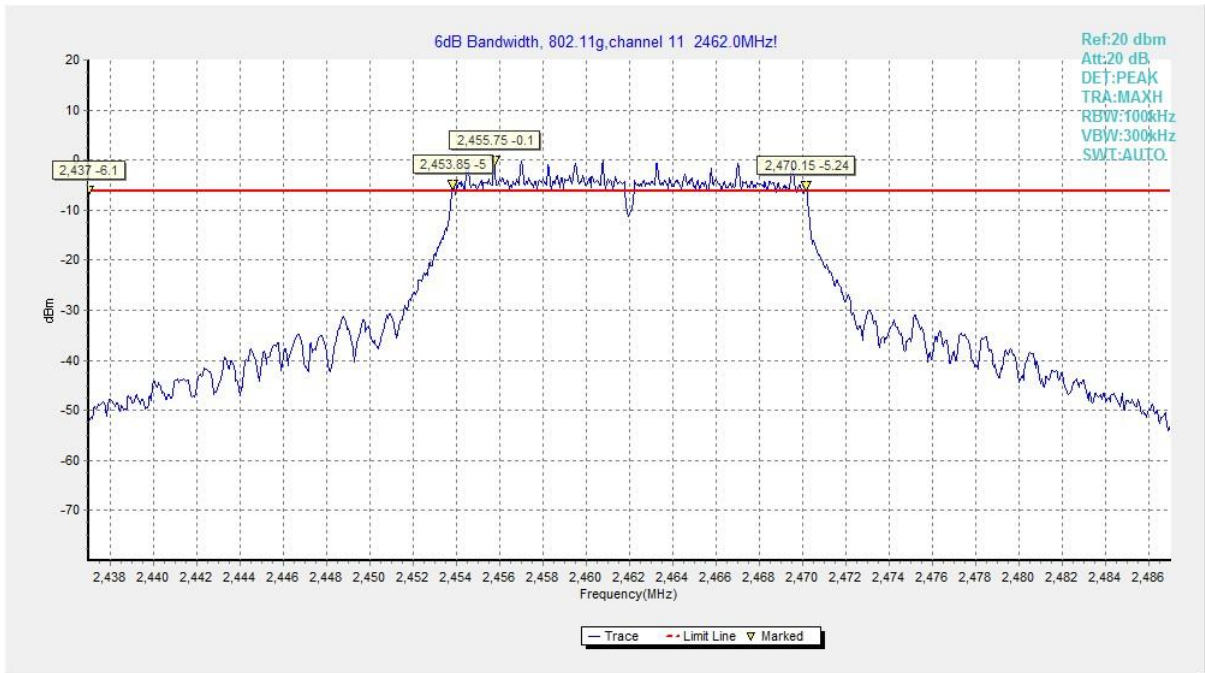


Fig.15 6dB Bandwidth (802.11g, CH 11)



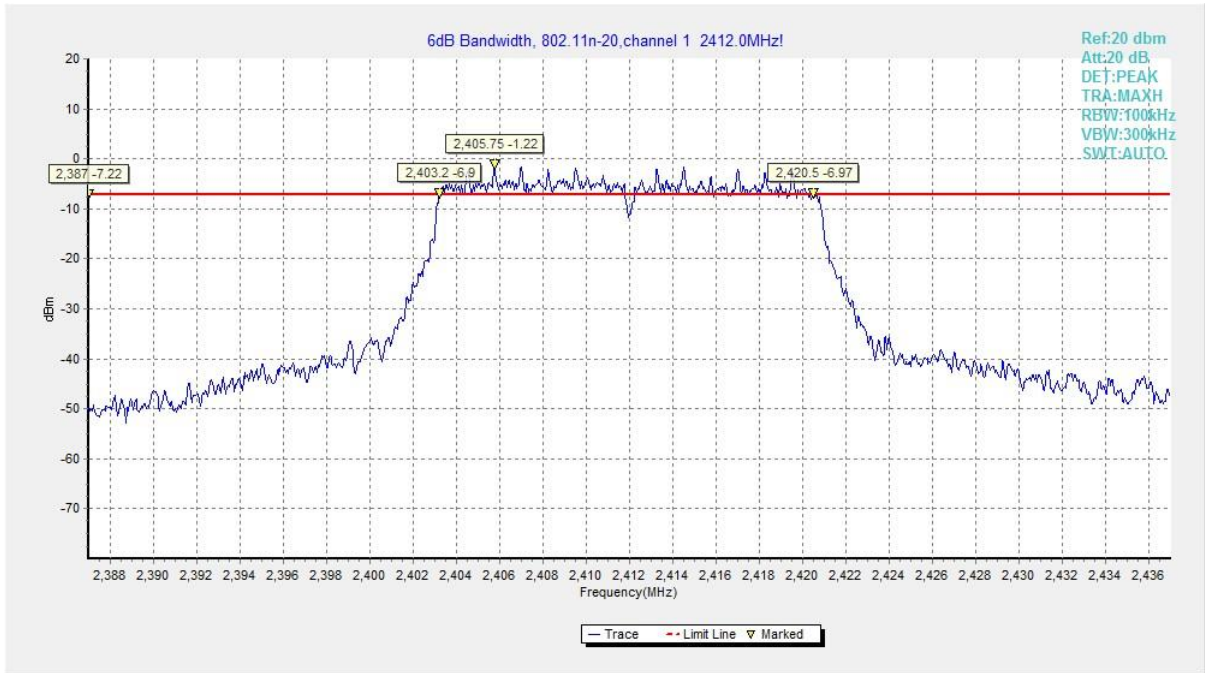


Fig.16 6dB Bandwidth (802.11n HT20, CH 1)

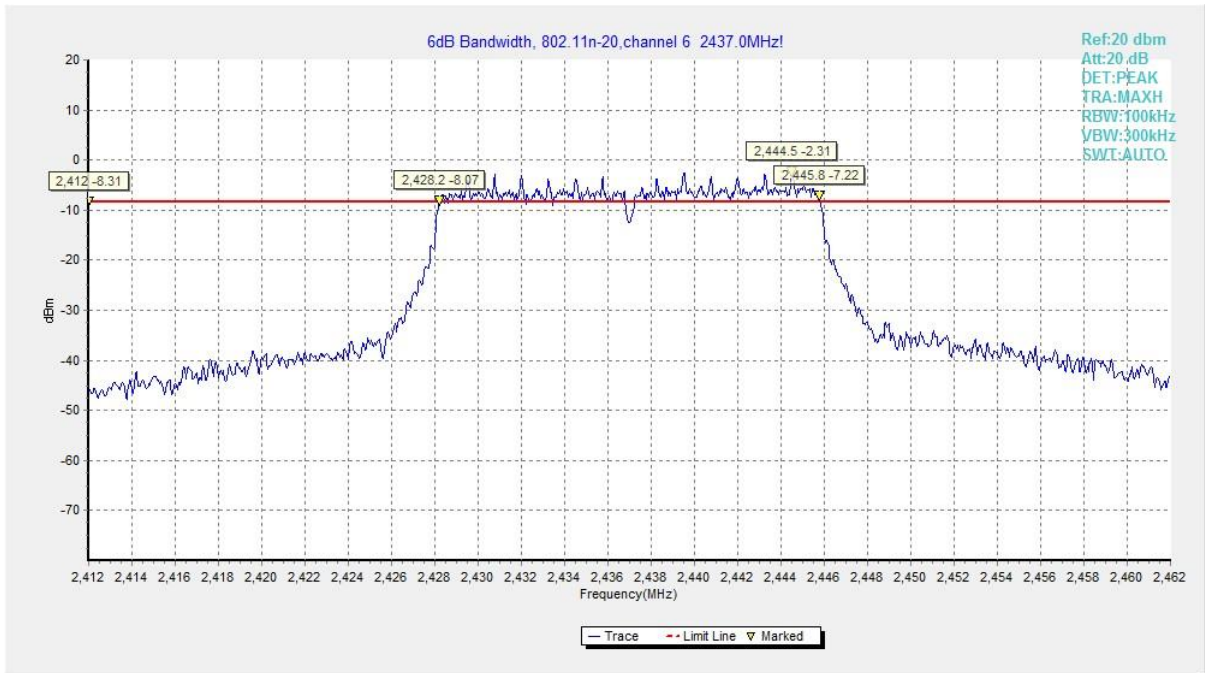
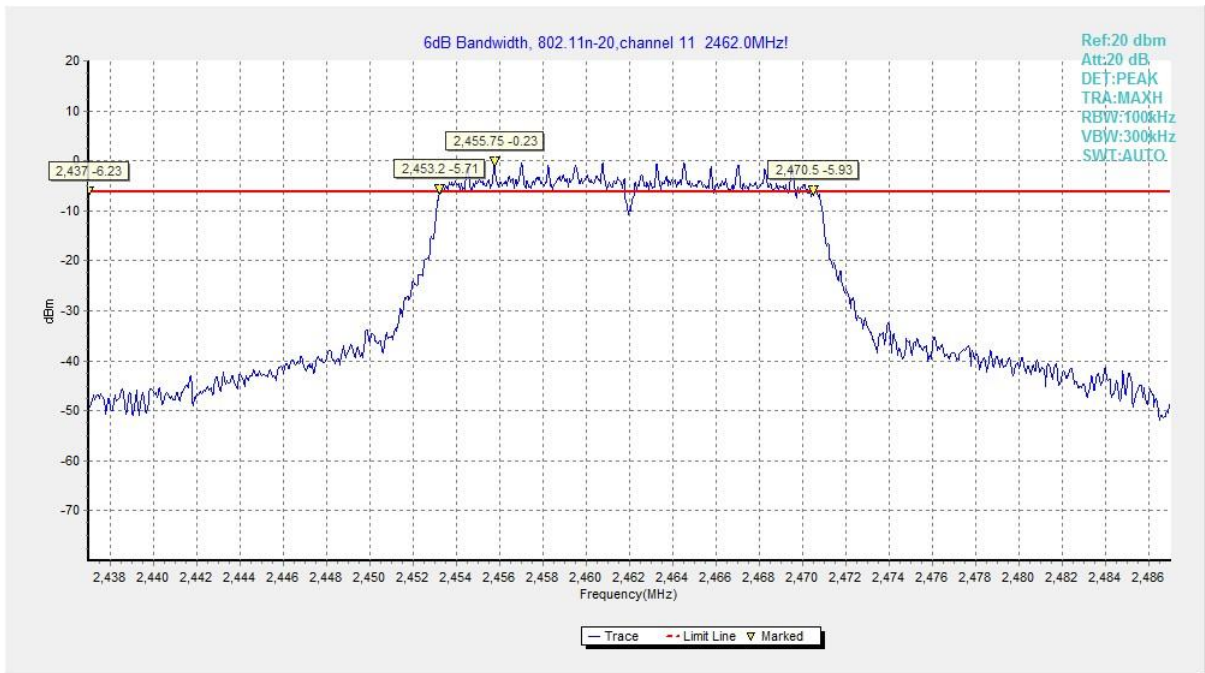


Fig.17 6dB Bandwidth (802.11n HT20, CH 6)



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

### A.4 Band Edges Compliance

**Measurement Limit:**

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

**Measurement Result:**

Mode	Channel	Frequency (MHz)	Test Results (dB)		Conclusion
			Fig.	Value	
802.11b	CH 1	2412	Fig.19	46.14	P
	CH 11	2462	Fig.20	64.25	P
802.11g	CH 1	2412	Fig.21	33.51	P
	CH 11	2462	Fig.22	45.43	P
802.11n HT20	CH 1	2412	Fig.23	36.39	P
	CH 11	2462	Fig.24	43.98	P

See below for test graphs.

**Conclusion: PASS**



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

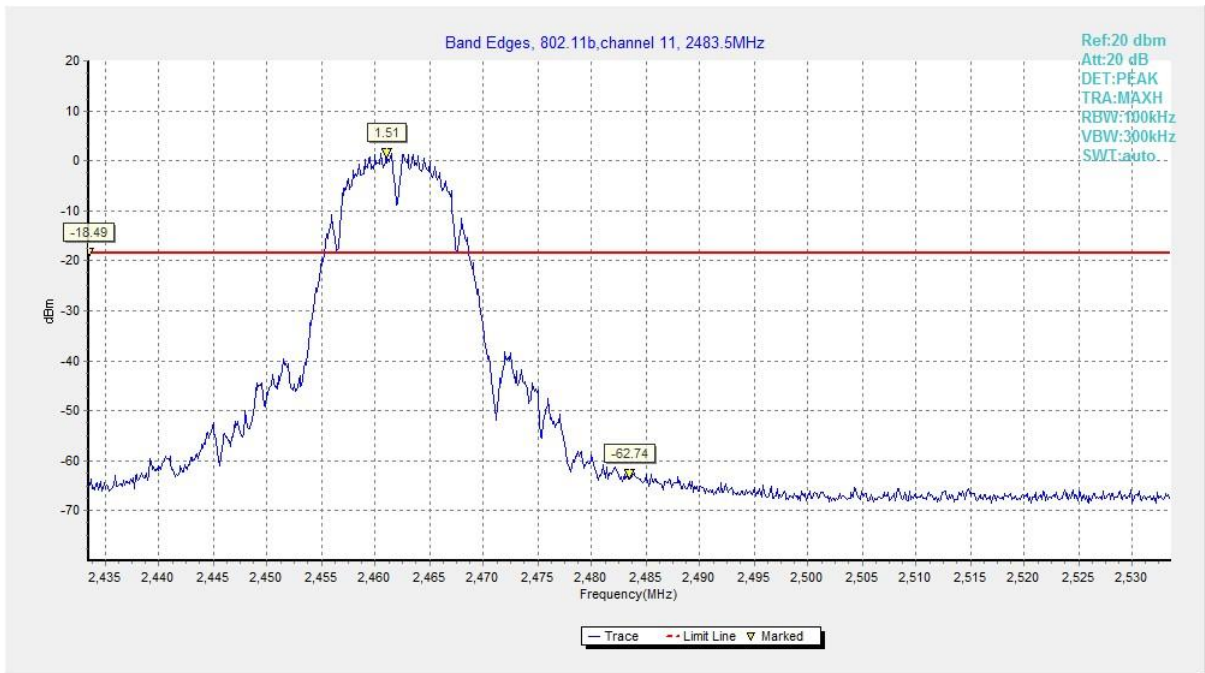


Fig.20 Band Edges (802.11b, CH 11)

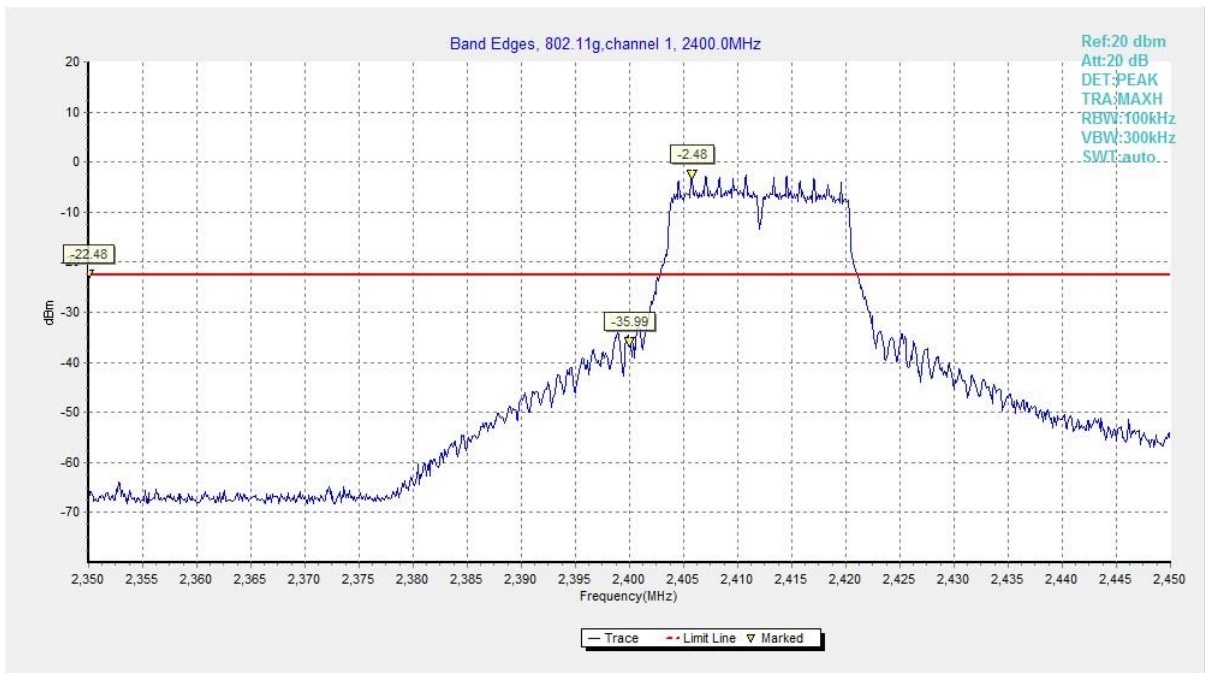


Fig.21 Band Edges (802.11g, CH 1)



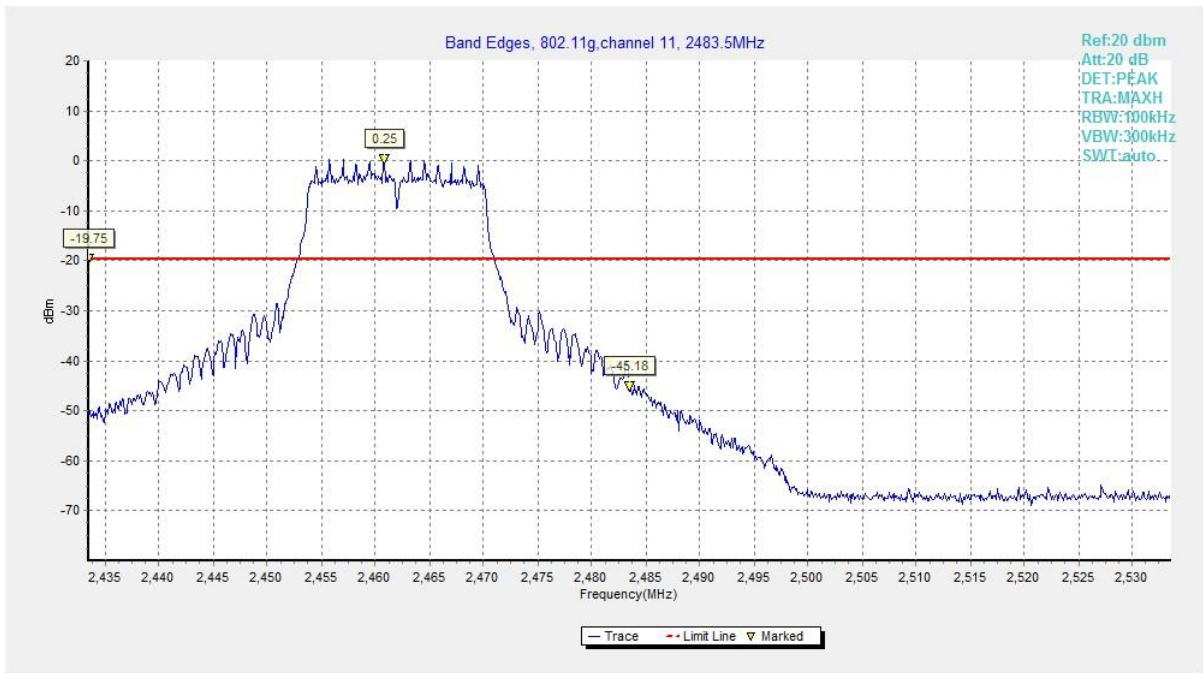


Fig.22 Band Edges (802.11g, CH 11)

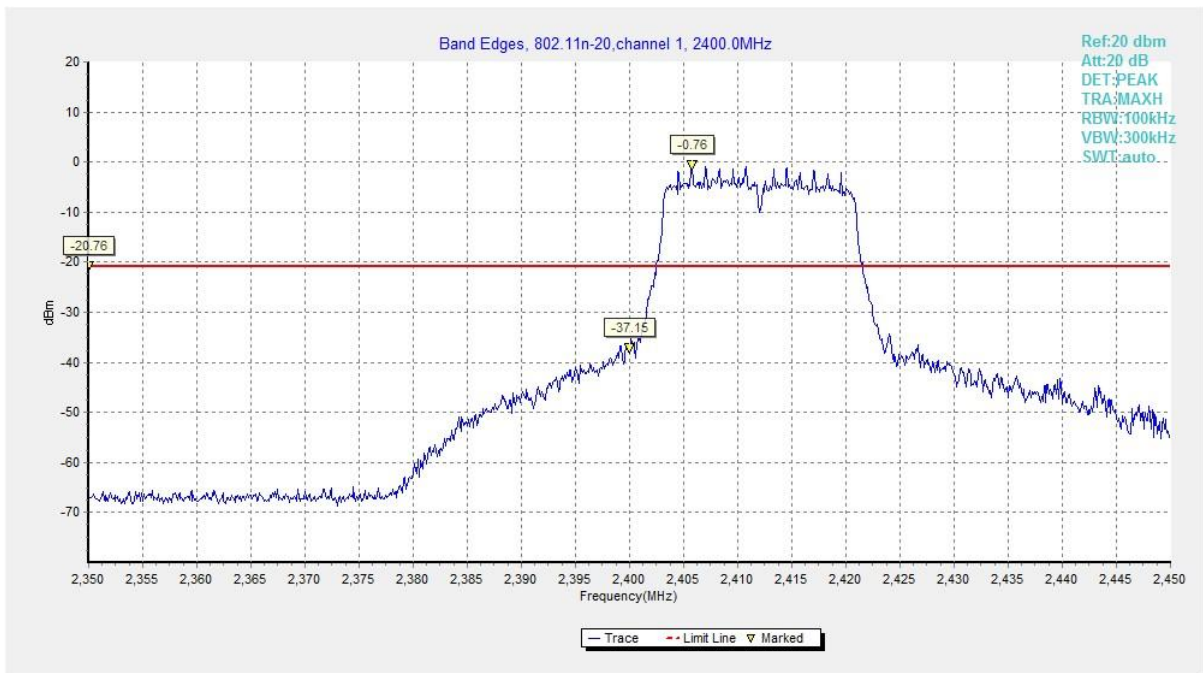


Fig.23 Band Edges (802.11n HT20, CH 1)

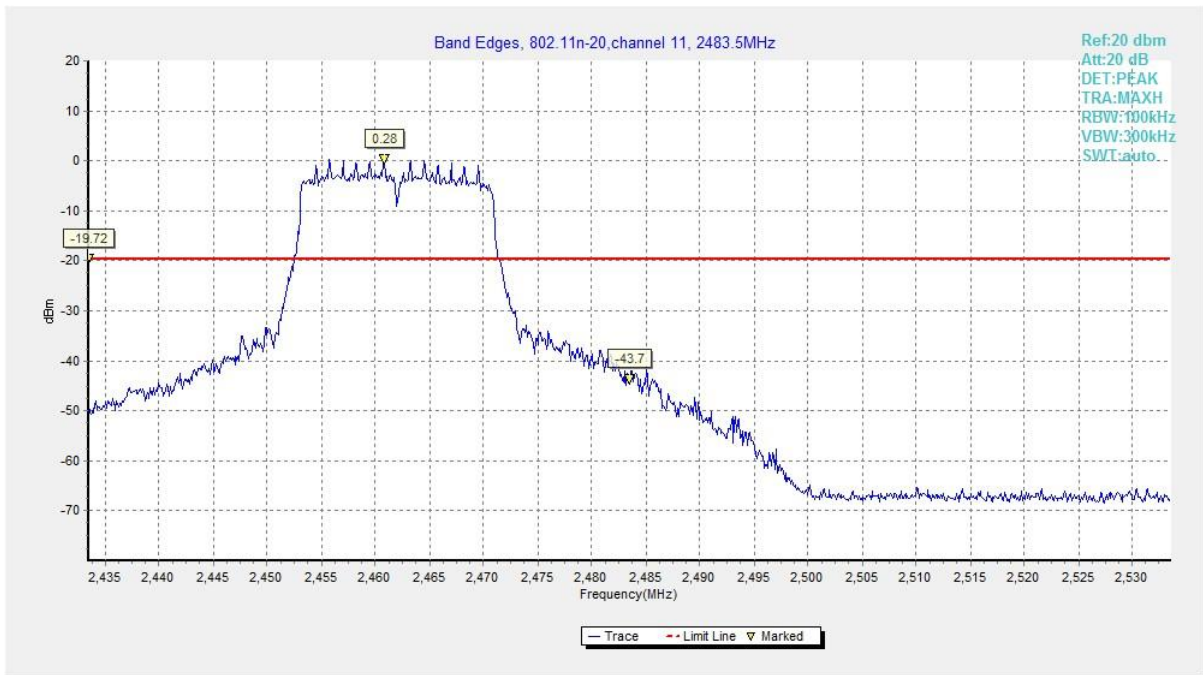


Fig.24 Band Edges (802.11n HT20, CH 11)



### A.5 Conducted Emission

**Measurement Limit:**

Standard	Limit
FCC 47 CFR Part 15.247 (d)	30dB below peak output power in 100kHz 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**

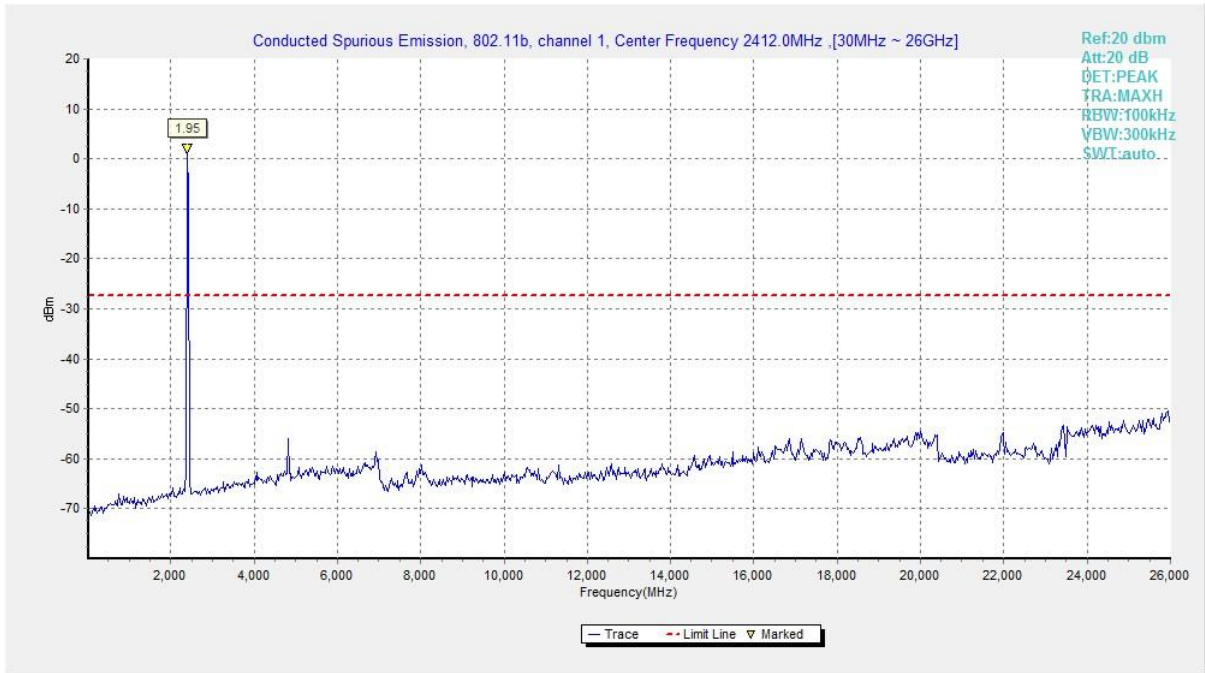


Fig.25 Conducted Spurious Emission (802.11b, CH1)

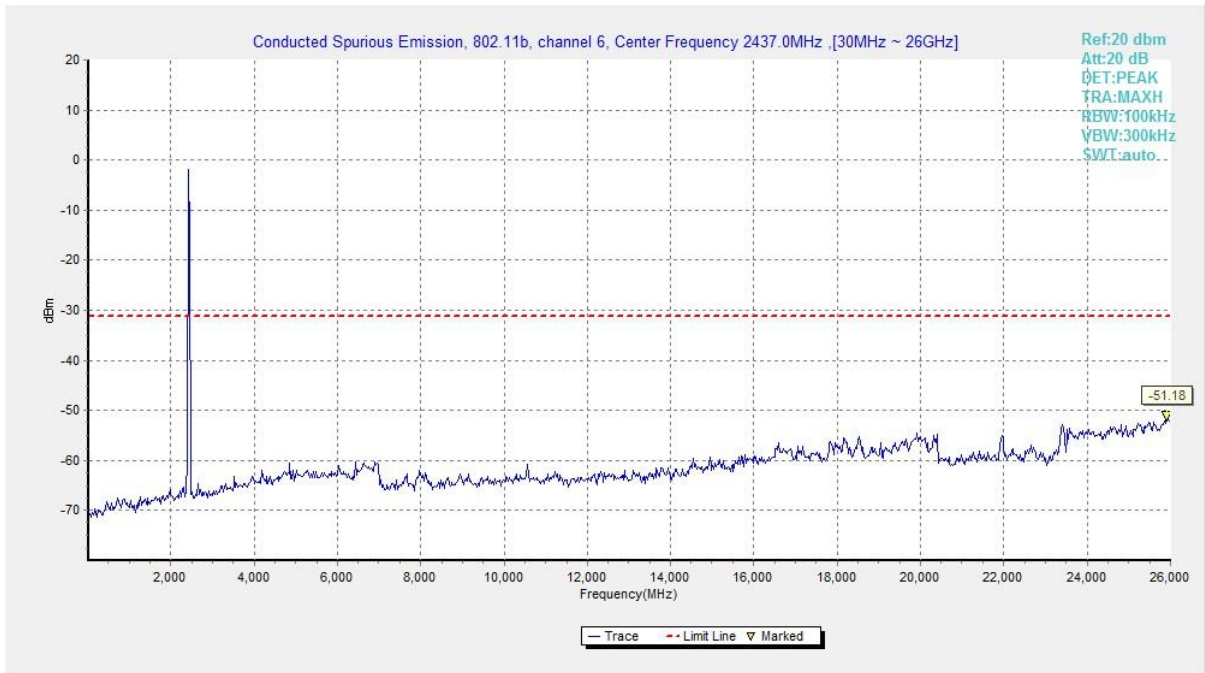


Fig.26 Conducted Spurious Emission (802.11b, CH6)



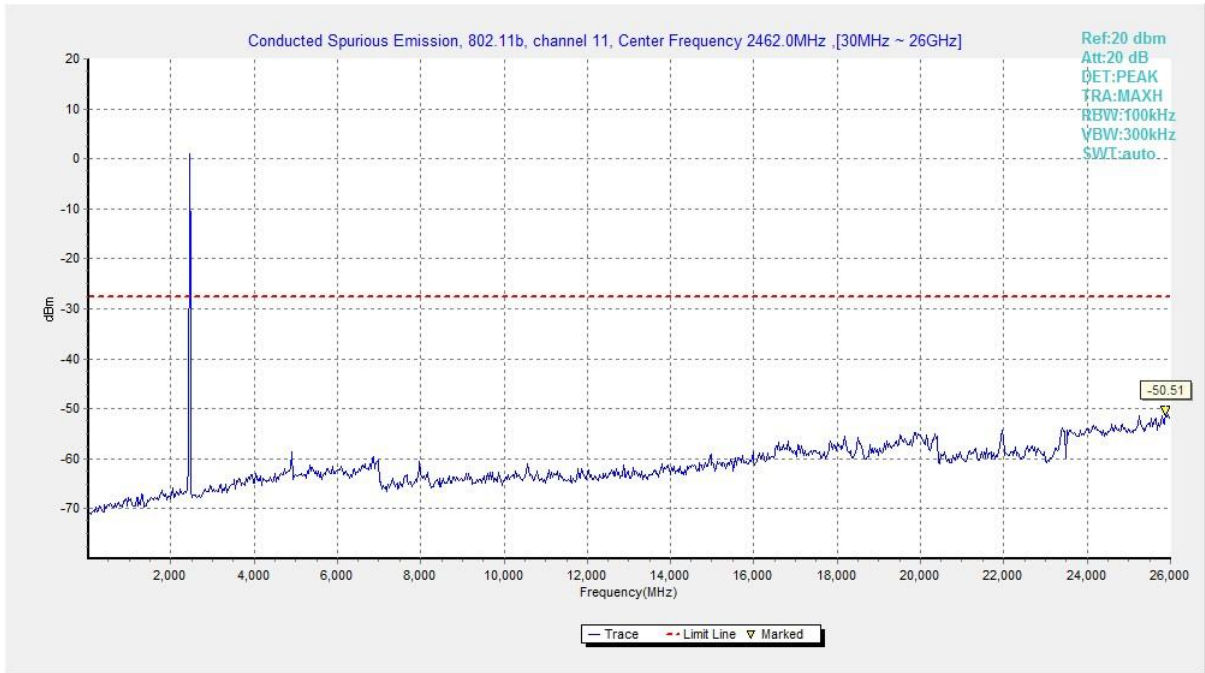


Fig.27 Conducted Spurious Emission (802.11b, CH11)

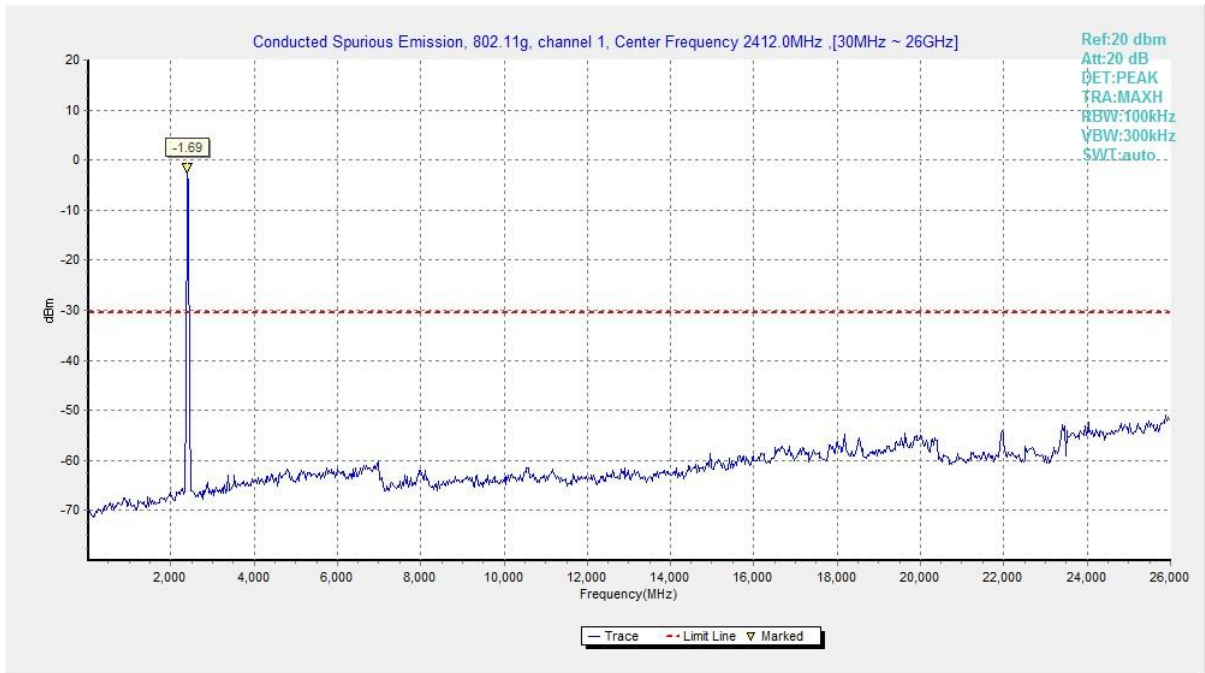
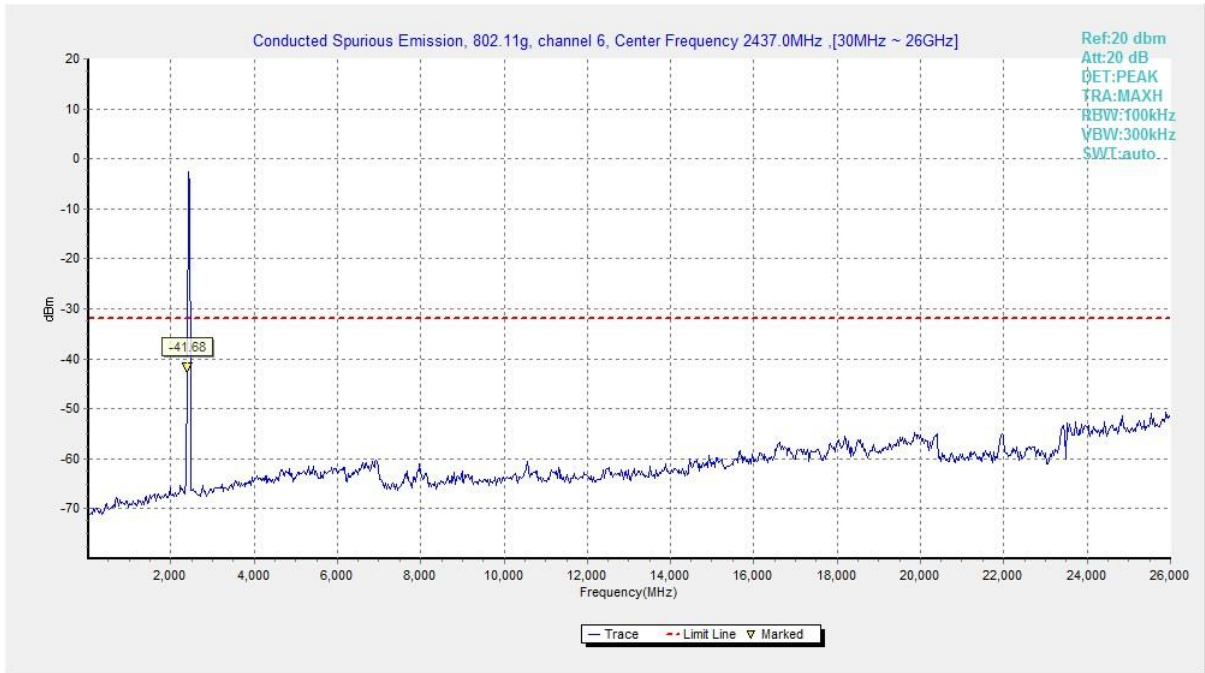
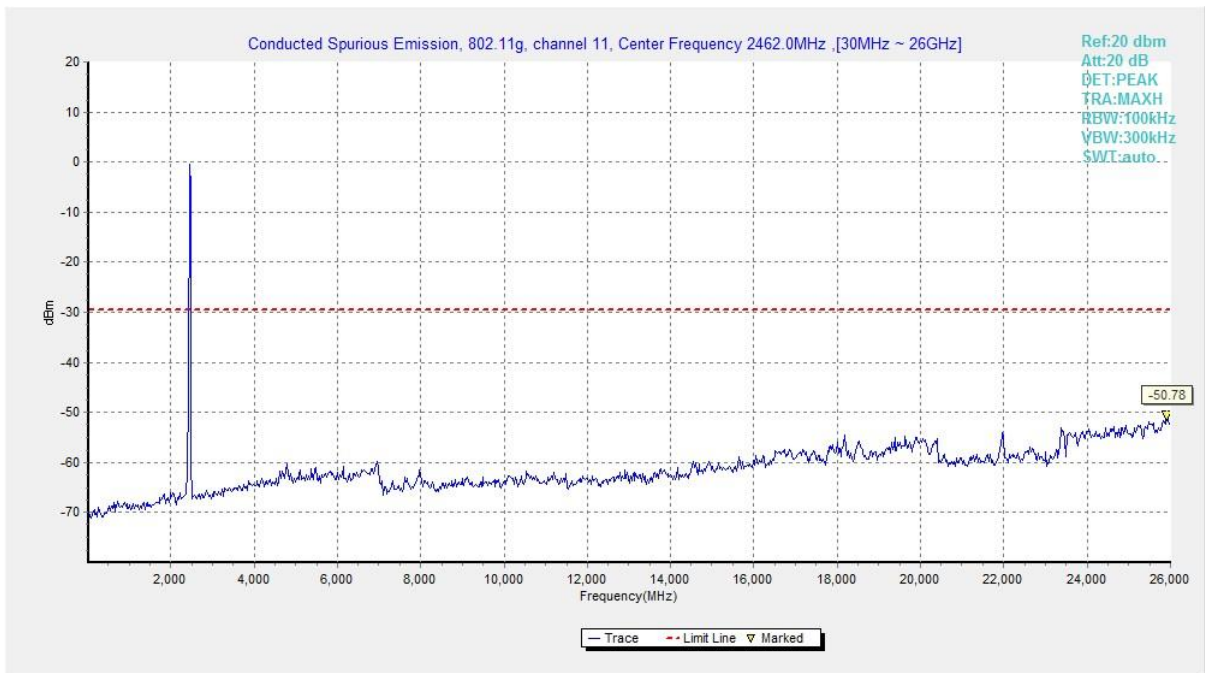


Fig.28 Conducted Spurious Emission (802.11g, CH1)



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



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

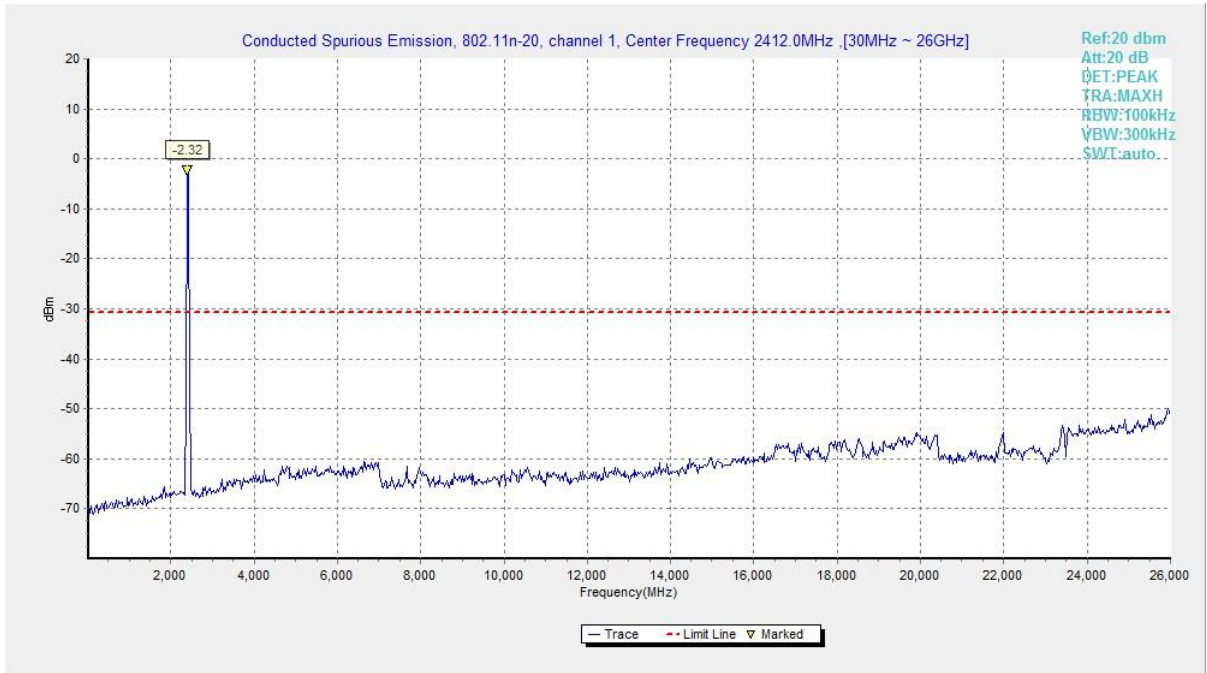


Fig.31 Conducted Spurious Emission (802.11n HT20, CH1)

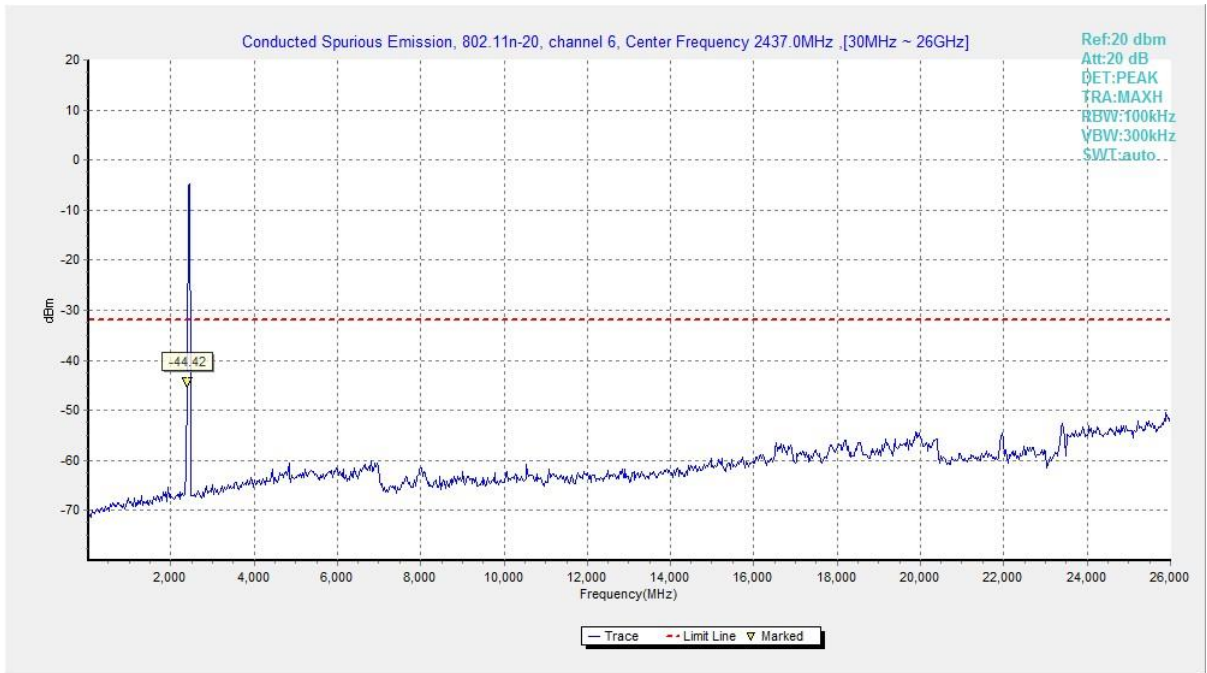


Fig.32 Conducted Spurious Emission (802.11n HT20, CH6)

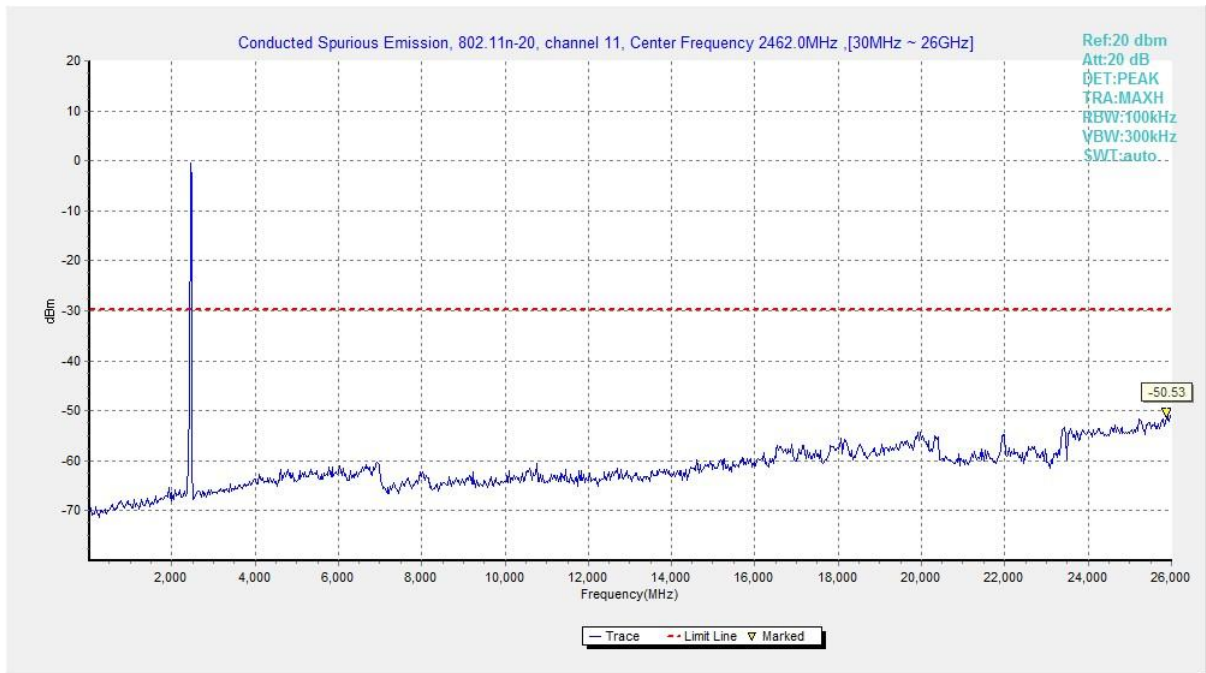


Fig.33 Conducted Spurious Emission (802.11n HT20, CH11)

## 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 from 9kHz to 30MHz. Therefore, the measurement starts from 30MHz to tenth harmonic. The measurement results include the horizontal polarization and vertical polarization measurements.

**Measurement Results:**

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



**Worst-Case Result:**

**802.11b CH11 (1-18GHz)**

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Pol	Corr. (dB)
2972.800000	45.2	74.0	28.8	V	9.0
3501.000000	35.2	74.0	38.8	V	-13.7
5097.900000	39.9	74.0	34.1	H	-9.1
7241.600000	44.1	74.0	29.9	V	-2.3
11260.000000	47.4	74.0	26.6	H	1.5
17985.600000	55.4	74.0	18.6	H	14.1

Frequency (MHz)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Pol	Corr. (dB)
2972.800000	33.0	54.0	21.0	V	9.0
3501.000000	22.8	54.0	31.2	V	-13.7
5097.900000	26.5	54.0	27.5	H	-9.1
7241.600000	30.7	54.0	23.3	V	-2.3
11260.000000	34.6	54.0	19.4	H	1.5
17985.600000	42.9	54.0	11.1	H	14.1

**802.11g CH11 (1-18GHz)**

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Pol	Corr. (dB)
2974.000000	45.7	74.0	28.3	H	9.0
3228.300000	35.5	74.0	38.5	H	-14.1
5011.200000	38.9	74.0	35.1	H	-8.7
7842.800000	44.4	74.0	29.6	H	-2.5
14850.400000	50.2	74.0	23.8	H	6.2
17920.000000	55.4	74.0	18.6	H	13.8

Frequency (MHz)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Pol	Corr. (dB)
2974.000000	32.4	54.0	21.6	H	9.0
3228.300000	22.8	54.0	31.2	H	-14.1
5011.200000	26.7	54.0	27.3	H	-8.7
7842.800000	31.3	54.0	22.7	H	-2.5
14850.400000	37.9	54.0	16.1	H	6.2
17920.000000	43.1	54.0	10.9	H	13.8



**802.11n HT20 CH11 (1-18GHz)**

Frequency (MHz)	MaxPeak (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Pol	Corr. (dB)
2978.800000	45.4	74.0	28.6	H	9.0
3573.300000	35.4	74.0	38.6	H	-13.1
4948.200000	38.4	74.0	35.6	H	-9.1
6887.200000	42.5	74.0	31.5	H	-4.1
14442.800000	50.3	74.0	23.7	H	5.8
17922.000000	55.9	74.0	18.1	H	13.9

Frequency (MHz)	Average (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Pol	Corr. (dB)
2978.800000	33.0	54.0	21.0	H	9.0
3573.300000	23.4	54.0	30.6	H	-13.1
4948.200000	25.4	54.0	28.6	H	-9.1
6887.200000	29.0	54.0	25.0	H	-4.1
14442.800000	37.2	54.0	16.8	H	5.8
17922.000000	42.4	54.0	11.6	H	13.9

**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**



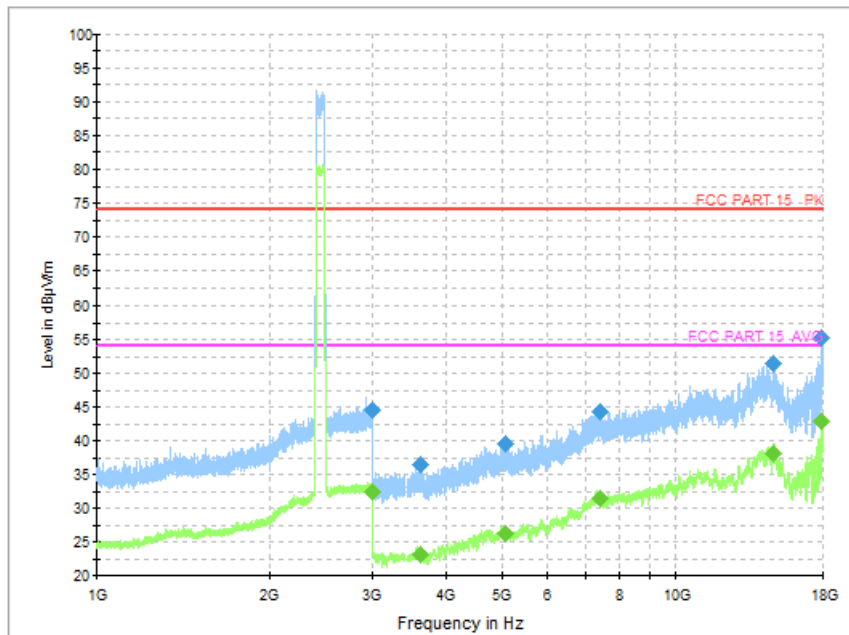


Fig.34 Radiated Spurious Emission (802.11b, CH1, 1GHz-18GHz)

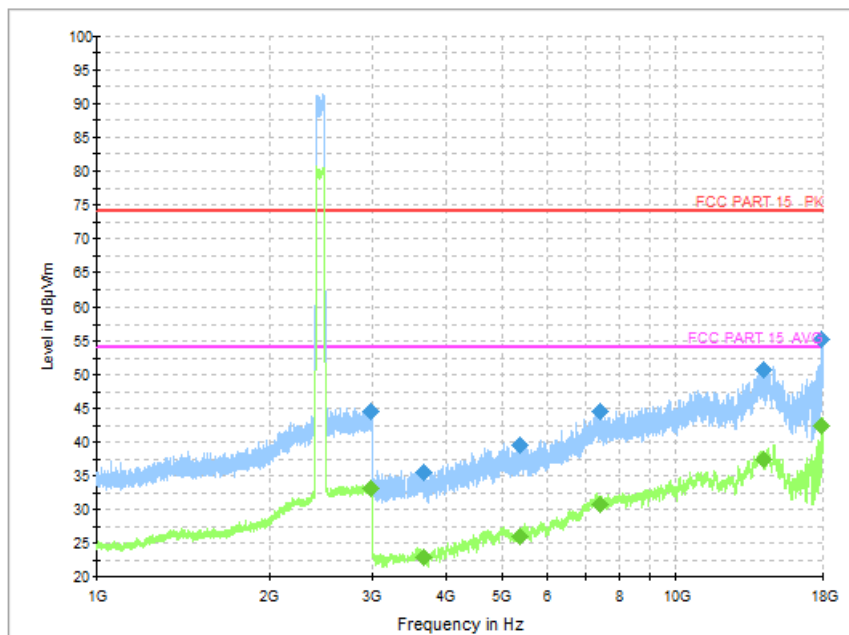


Fig.35 Radiated Spurious Emission (802.11b, CH6, 1GHz-18GHz)

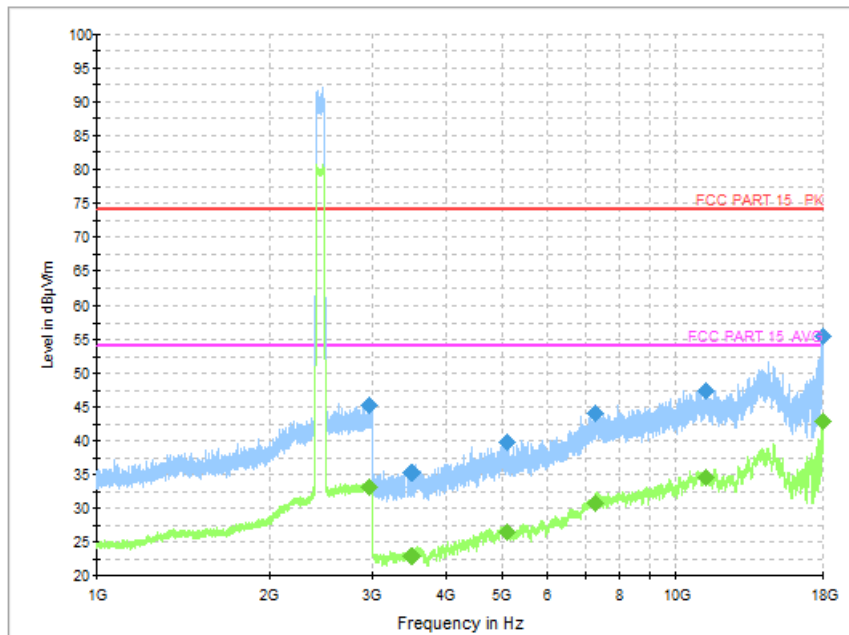


Fig.36 Radiated Spurious Emission (802.11b, CH11, 1GHz-18GHz)

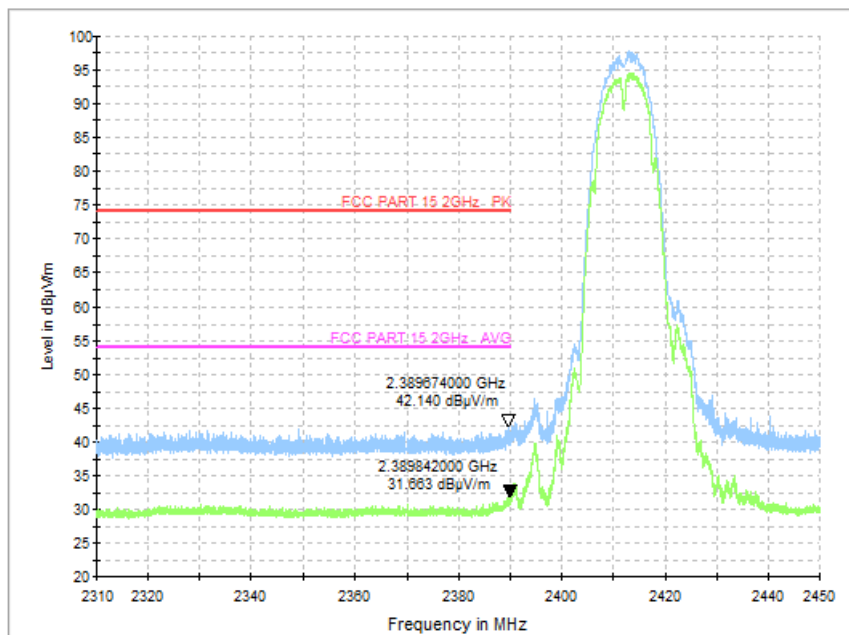


Fig.37 Radiated Restricted Band (802.11b, CH1, 2.38GHz~2.45GHz)

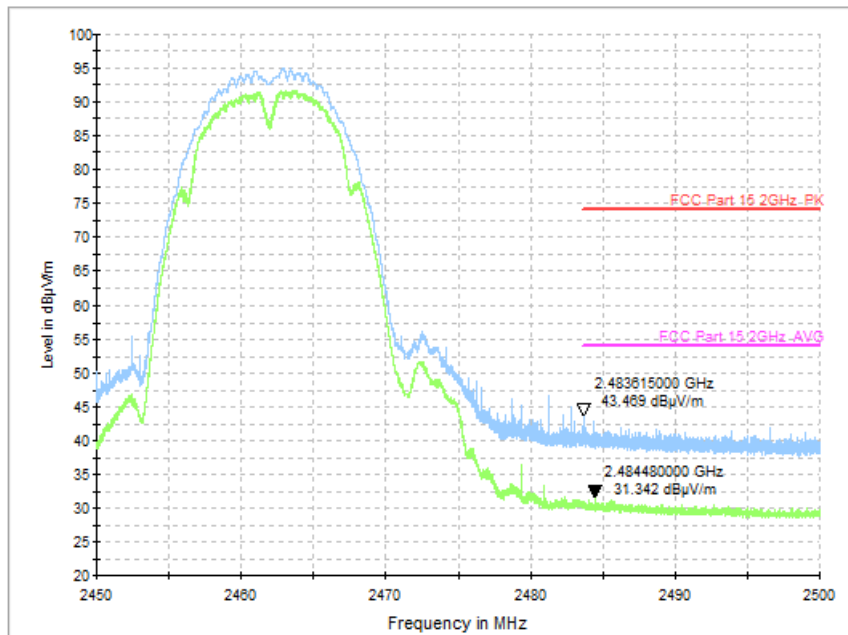


Fig.38 Radiated Restricted Band (802.11b, CH11, 2.45GHz~2.5GHz)

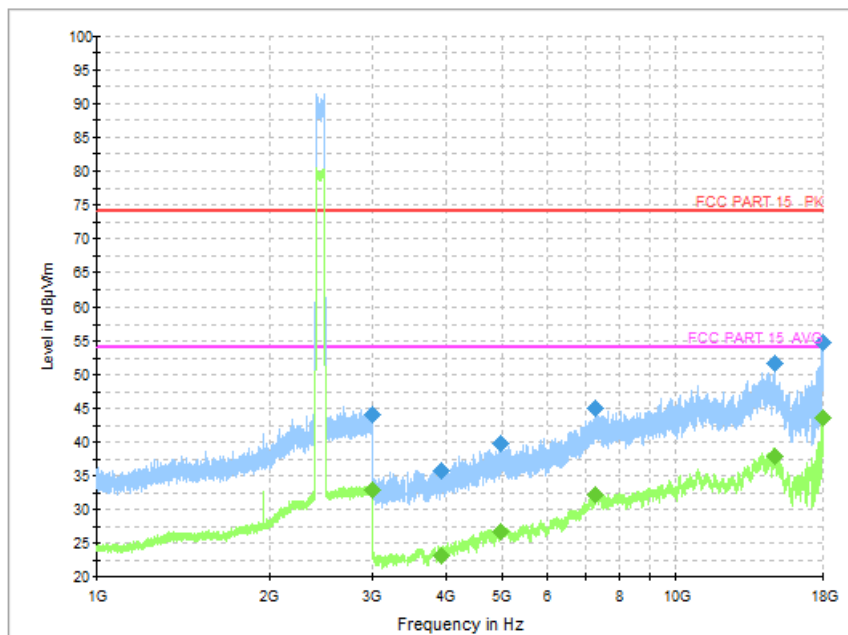


Fig.39 Radiated Spurious Emission (802.11g, CH1, 1GHz-18GHz)

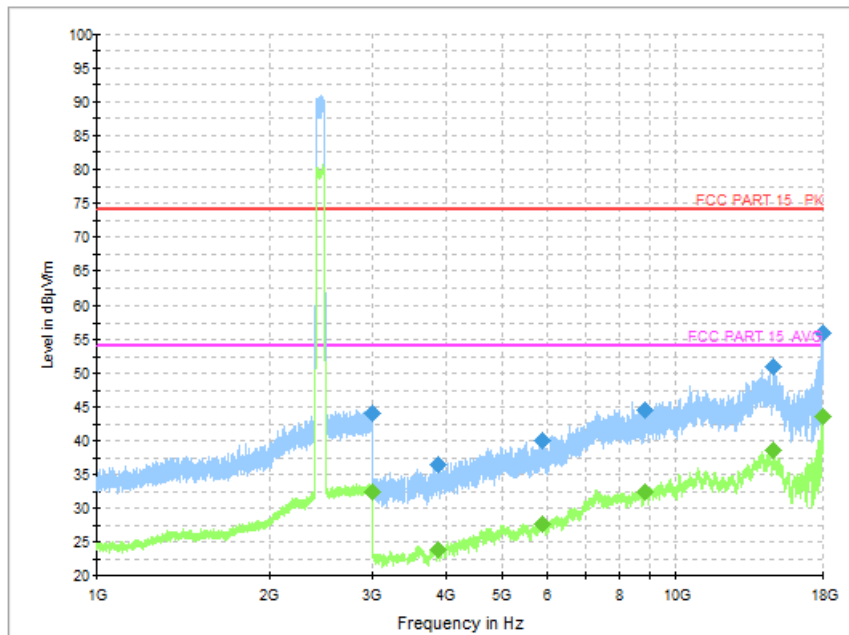


Fig.40 Radiated Spurious Emission (802.11g, CH6, 1GHz-18GHz)

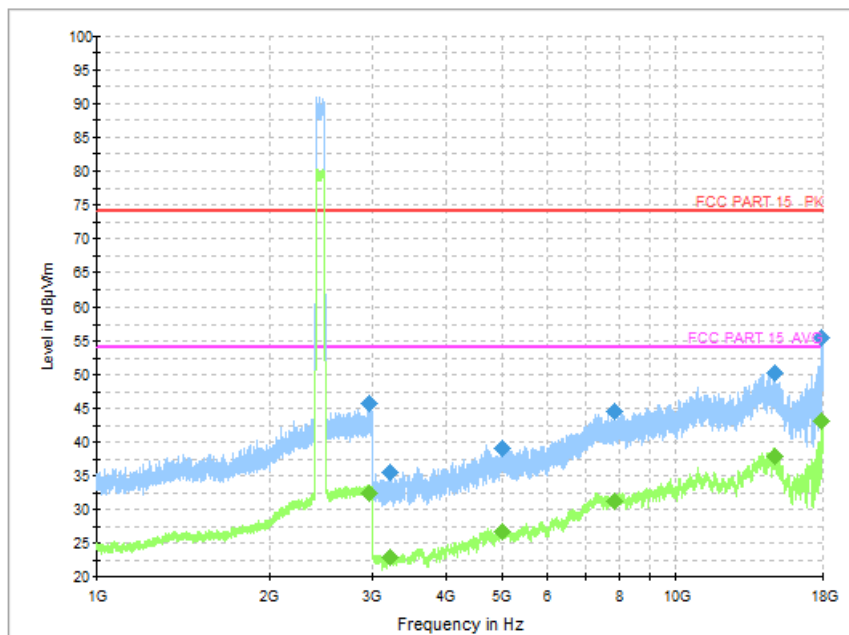


Fig.41 Radiated Spurious Emission (802.11g, CH11, 1GHz-18GHz)

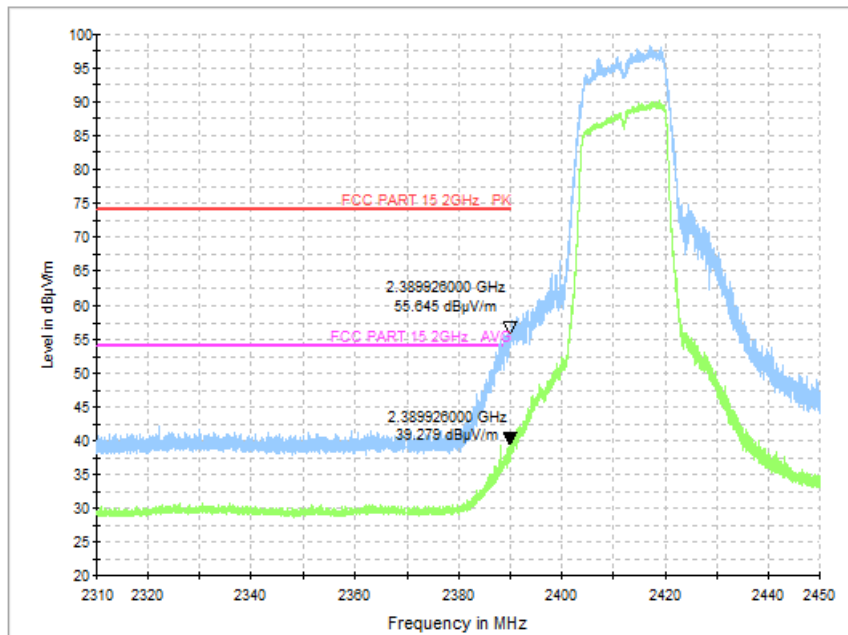


Fig.42 Radiated Restricted Band (802.11g, CH1, 2.38GHz~2.45GHz)

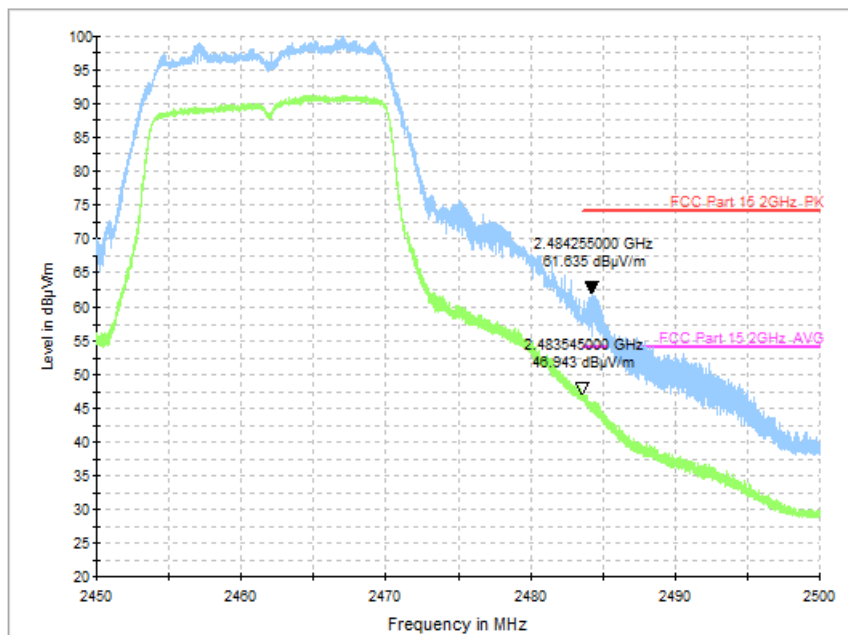
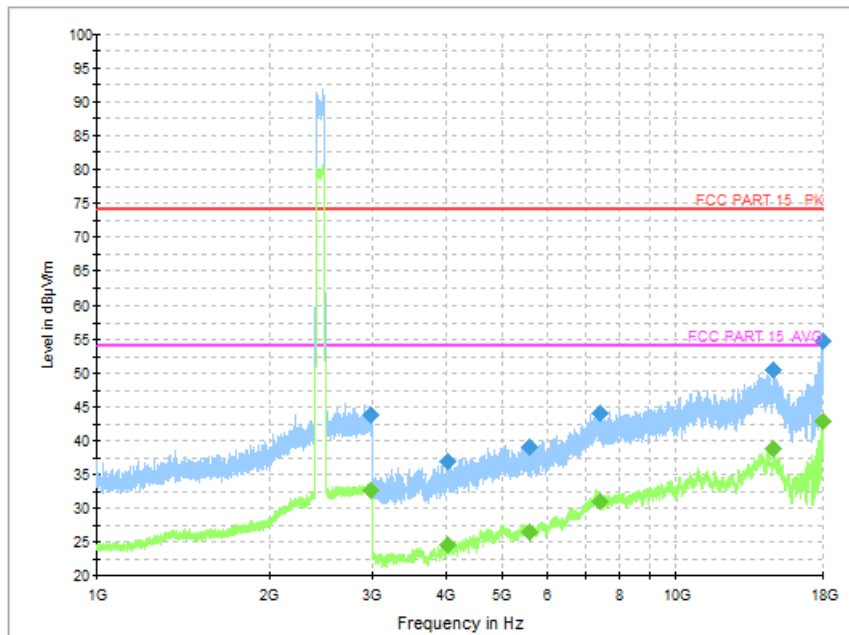
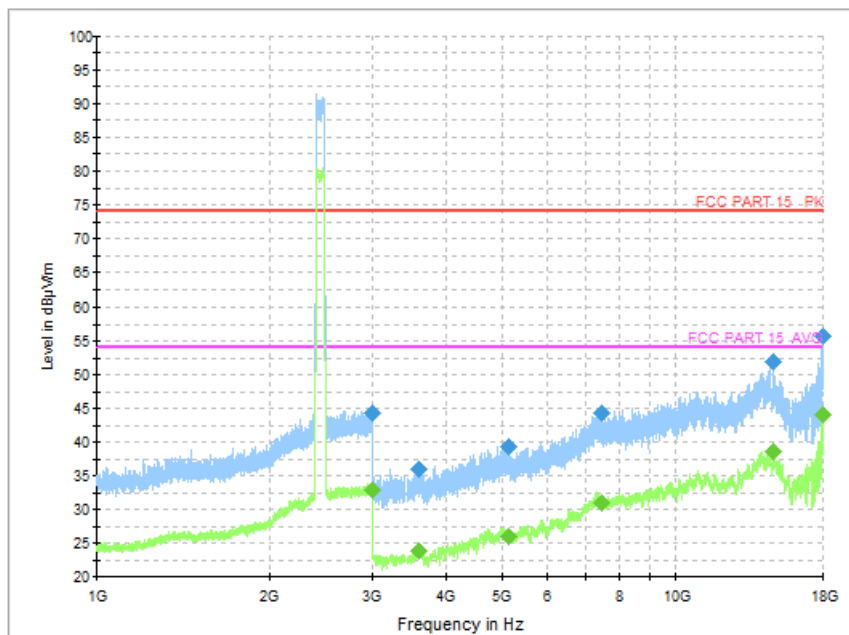


Fig.43 Radiated Restricted Band (802.11g, CH11, 2.45GHz~2.5GHz)



**Fig.44 Radiated Spurious Emission (802.11n HT20, CH1, 1GHz-18GHz)**



**Fig.45 Radiated Spurious Emission (802.11n HT20, CH6, 1GHz-18GHz)**

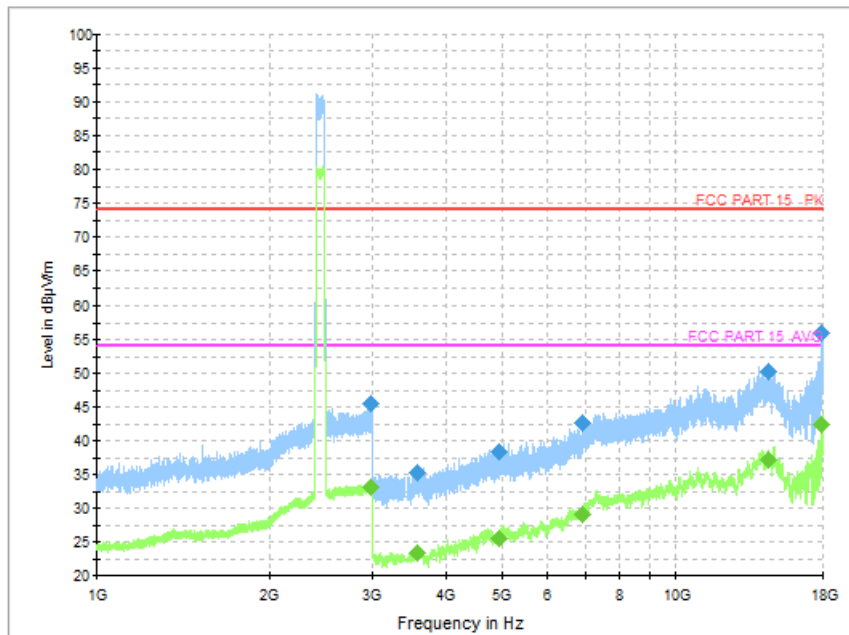


Fig.46 Radiated Spurious Emission (802.11n HT20, CH11, 1GHz-18GHz)

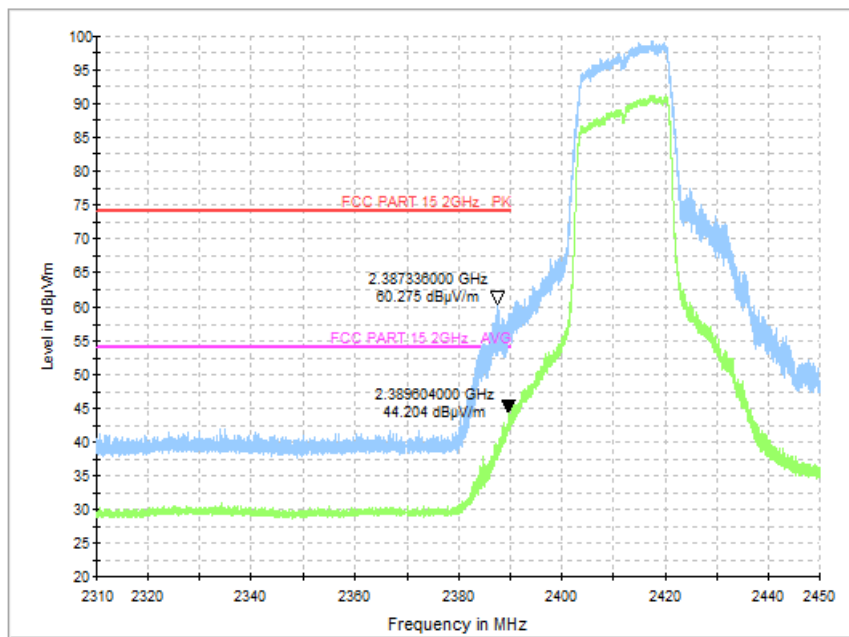
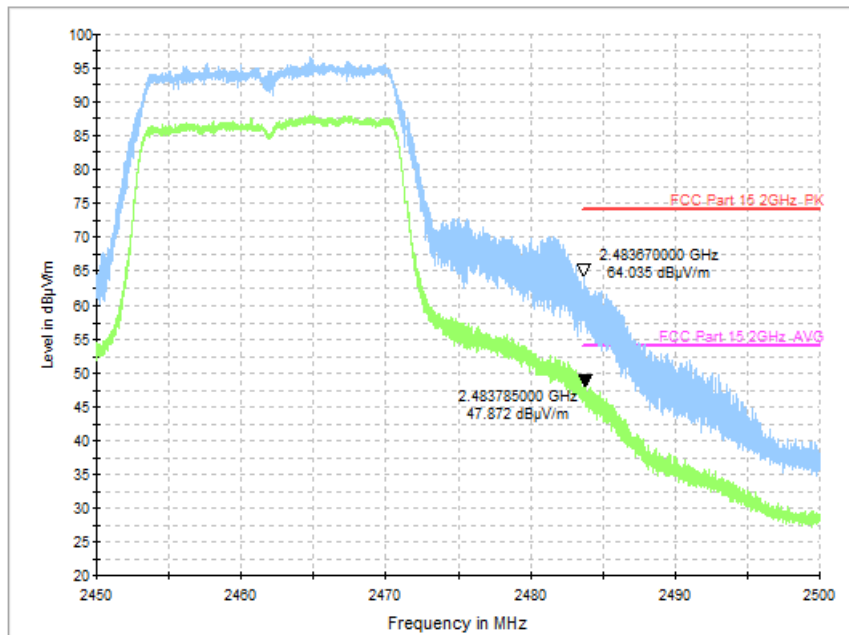
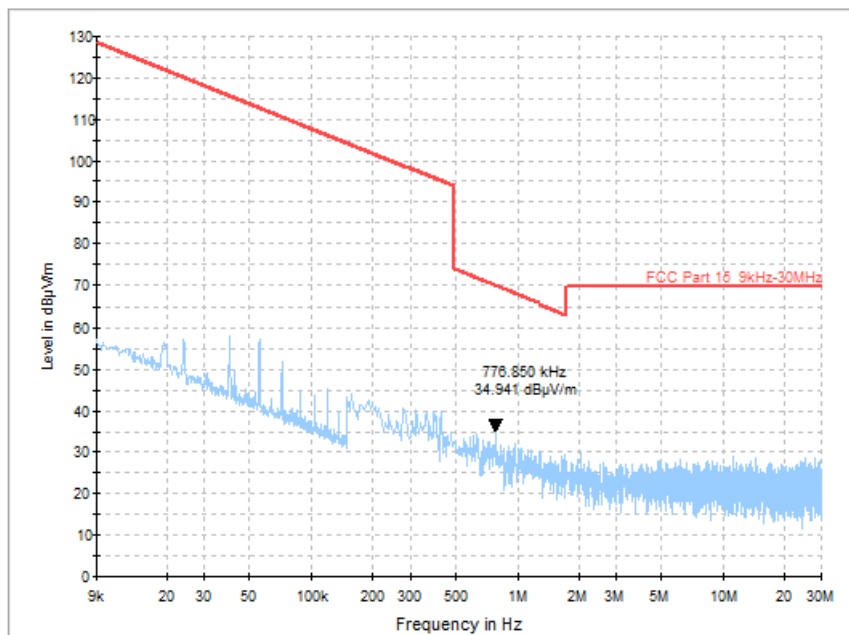


Fig.47 Radiated Restricted Band (802.11n HT20, CH1, 2.38GHz~2.45GHz)





**Fig.48 Radiated Restricted Band (802.11n HT20, CH11, 2.45GHz~2.5GHz)**



**Fig.49 Radiated Spurious Emission (All Channels, 9KHz-30MHz)**

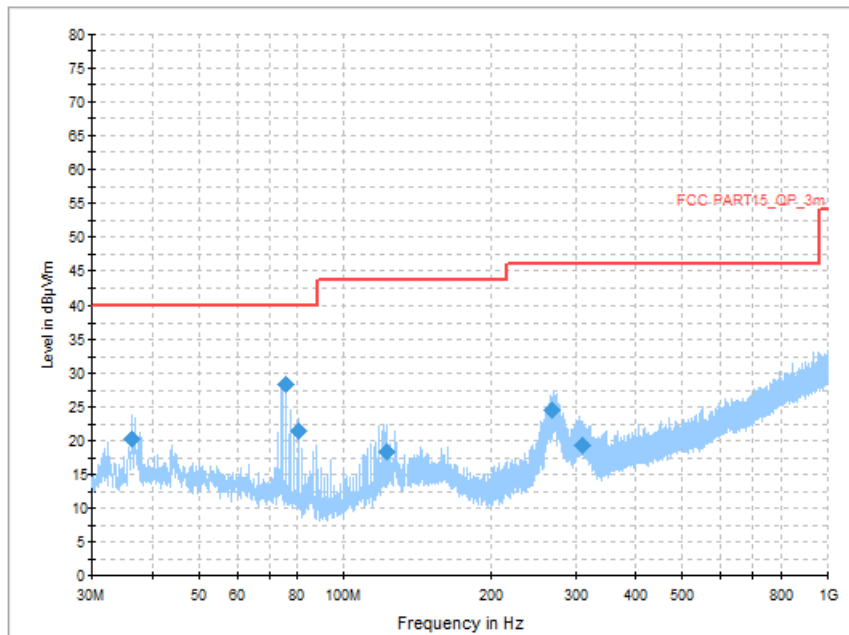


Fig.50 Radiated Spurious Emission (All Channels, 30MHz-1GHz)

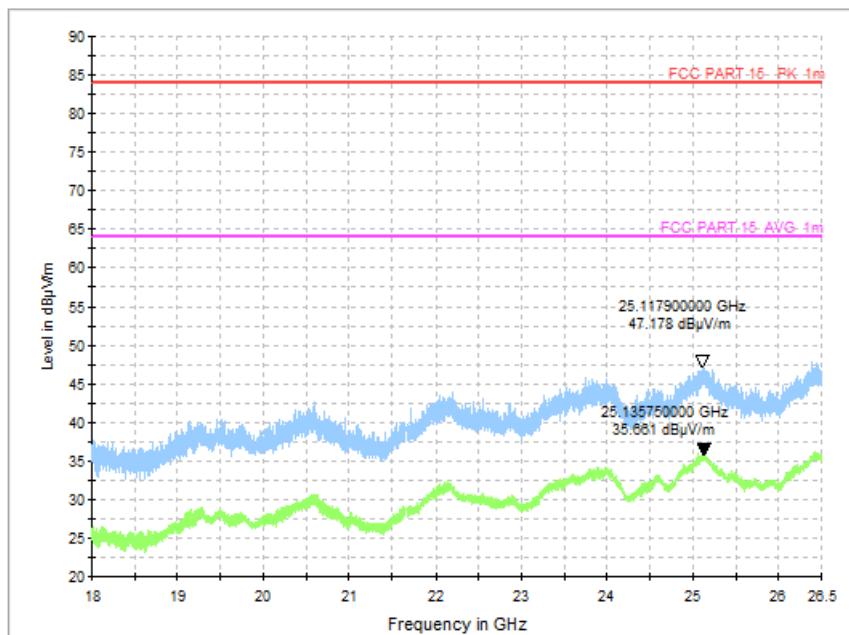


Fig.51 Radiated Spurious Emission (All Channels, 18GHz-26.5GHz)

## A.7 AC Power line Conducted Emission

### Test Condition:

Voltage (V)	Frequency (Hz)
120	60

### Measurement Result and limit:

#### WLAN (Quasi-peak Limit) - AE2

Frequency range (MHz)	Quasi-peak Limit (dB $\mu$ V)	Result (dB $\mu$ V)		Conclusion
		Traffic	Idle	
0.15 to 0.5	66 to 56	Fig.52	Fig.53	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) - AE2

Frequency range (MHz)	Average-peak Limit (dB $\mu$ V)	Result (dB $\mu$ V)		Conclusion
		Traffic	Idle	
0.15 to 0.5	56 to 46	Fig.52	Fig.53	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) - AE3

Frequency range (MHz)	Quasi-peak Limit (dB $\mu$ V)	Result (dB $\mu$ V)		Conclusion
		Traffic	Idle	
0.15 to 0.5	66 to 56	Fig.54	Fig.55	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) - AE3

Frequency range (MHz)	Average-peak Limit (dB $\mu$ V)	Result (dB $\mu$ V)		Conclusion
		Traffic	Idle	
0.15 to 0.5	56 to 46	Fig.54	Fig.55	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.



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

**See below for test graphs.**

**Conclusion: PASS**

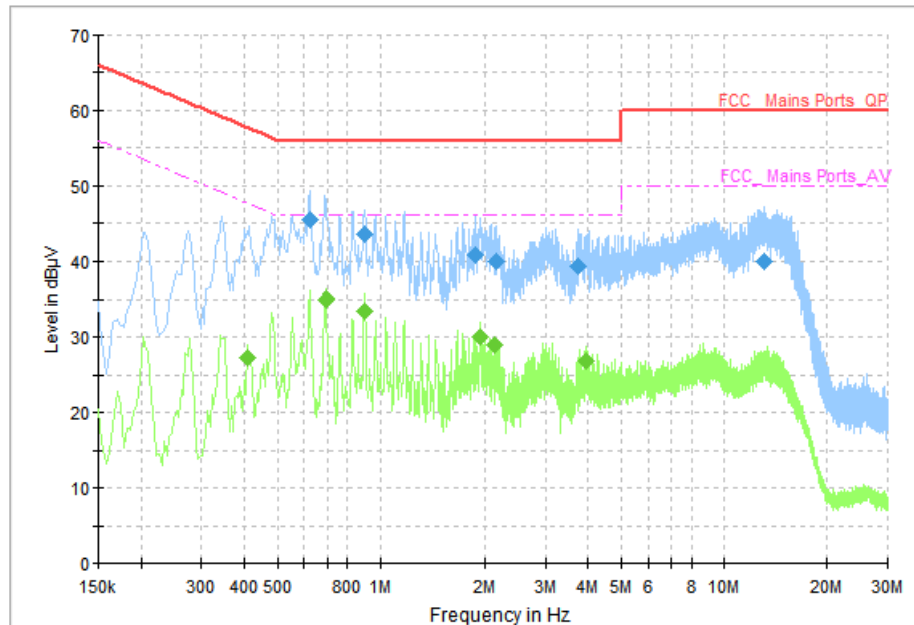


Fig.52 AC Power line Conducted Emission (Traffic, AE2, 120V)

**Measurement Results: Quasi Peak**

Frequency (MHz)	QuasiPeak (dBµV)	Limit (dBµV)	Margin (dB)	Line	Filter	Corr. (dB)
0.622000	45.37	56.00	10.63	N	ON	10
0.898000	43.46	56.00	12.54	L1	ON	10
1.870000	40.85	56.00	15.15	L1	ON	10
2.146000	39.86	56.00	16.14	L1	ON	10
3.758000	39.20	56.00	16.80	L1	ON	10
13.046000	39.92	60.00	20.08	L1	ON	10

**Measurement Results: Average**

Frequency (MHz)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Filter	Corr. (dB)
0.410000	27.23	47.65	20.42	N	ON	10
0.694000	35.02	46.00	10.98	L1	ON	10
0.898000	33.47	46.00	12.53	L1	ON	10
1.930000	30.19	46.00	15.81	L1	ON	10
2.142000	29.03	46.00	16.97	L1	ON	10
3.966000	26.84	46.00	19.16	L1	ON	10

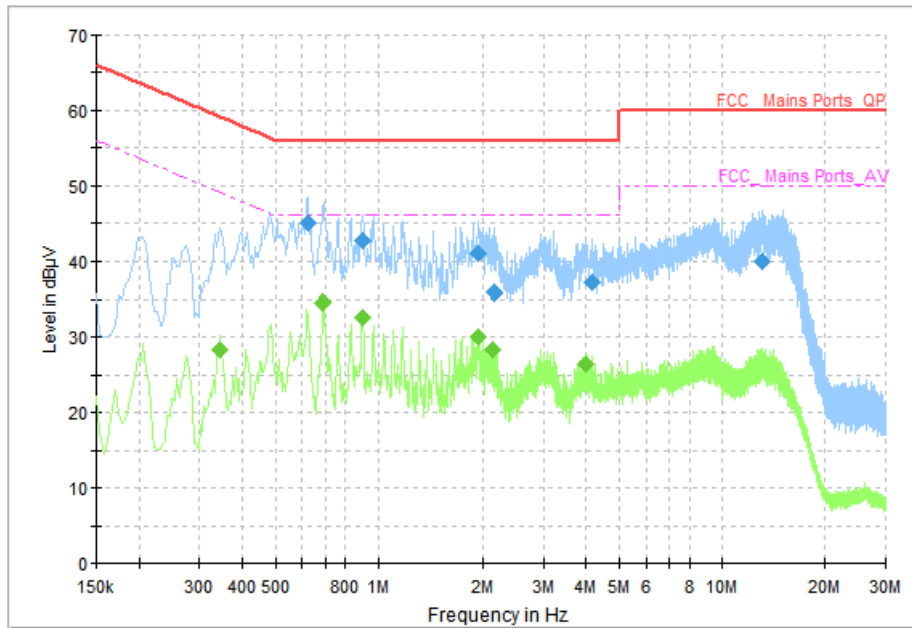


Fig.53 AC Power line Conducted Emission (Idle, AE2, 120V)

**Measurement Results: Quasi Peak**

Frequency (MHz)	QuasiPeak (dBµV)	Limit (dBµV)	Margin (dB)	Line	Filter	Corr. (dB)
0.622000	44.96	56.00	11.04	N	ON	10
0.898000	42.58	56.00	13.42	L1	ON	10
1.938000	41.05	56.00	14.95	L1	ON	10
2.158000	35.80	56.00	20.20	L1	ON	10
4.182000	37.04	56.00	18.96	L1	ON	10
13.078000	39.82	60.00	20.18	L1	ON	10

**Measurement Results: Average**

Frequency (MHz)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Filter	Corr. (dB)
0.346000	28.41	49.06	20.65	N	ON	10
0.690000	34.52	46.00	11.48	L1	ON	10
0.898000	32.57	46.00	13.43	L1	ON	10
1.938000	30.12	46.00	15.88	L1	ON	10
2.142000	28.34	46.00	17.66	L1	ON	10
3.978000	26.45	46.00	19.55	L1	ON	10

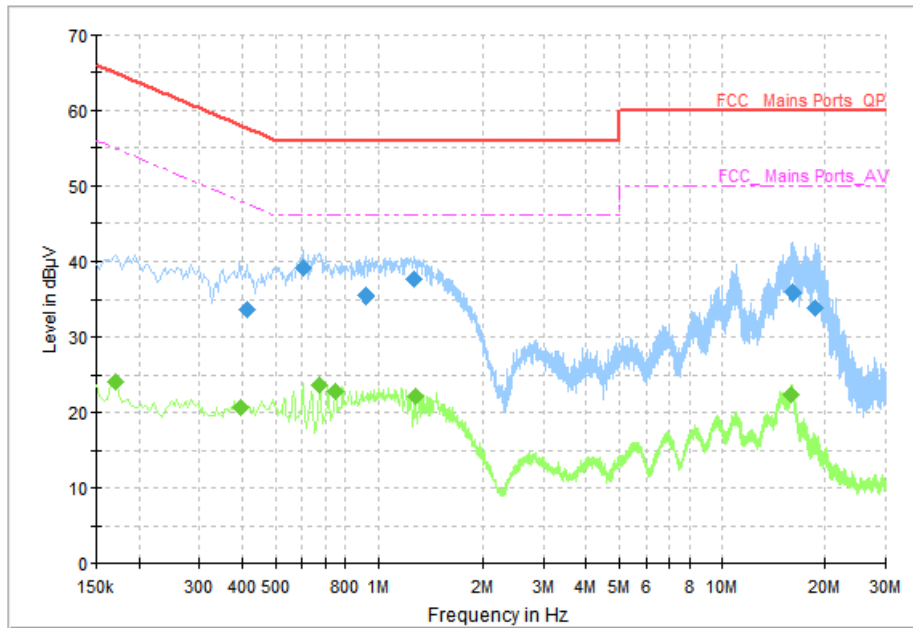


Fig.54 AC Power line Conducted Emission (Traffic, AE3, 120V)

**Measurement Results: Quasi Peak**

Frequency (MHz)	QuasiPeak (dBµV)	Limit (dBµV)	Margin (dB)	Line	Filter	Corr. (dB)
0.414000	33.78	57.57	23.79	N	ON	10
0.606000	38.97	56.00	17.03	N	ON	10
0.918000	35.44	56.00	20.56	N	ON	10
1.274000	37.52	56.00	18.48	N	ON	10
16.126000	35.86	60.00	24.14	L1	ON	10
18.754000	34.02	60.00	25.98	N	ON	10

**Measurement Results: Average**

Frequency (MHz)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Filter	Corr. (dB)
0.170000	24.14	54.96	30.82	N	ON	10
0.398000	20.65	47.90	27.24	N	ON	10
0.674000	23.65	46.00	22.35	N	ON	10
0.750000	22.74	46.00	23.26	N	ON	10
1.278000	22.11	46.00	23.89	N	ON	10
15.938000	22.49	50.00	27.51	L1	ON	10



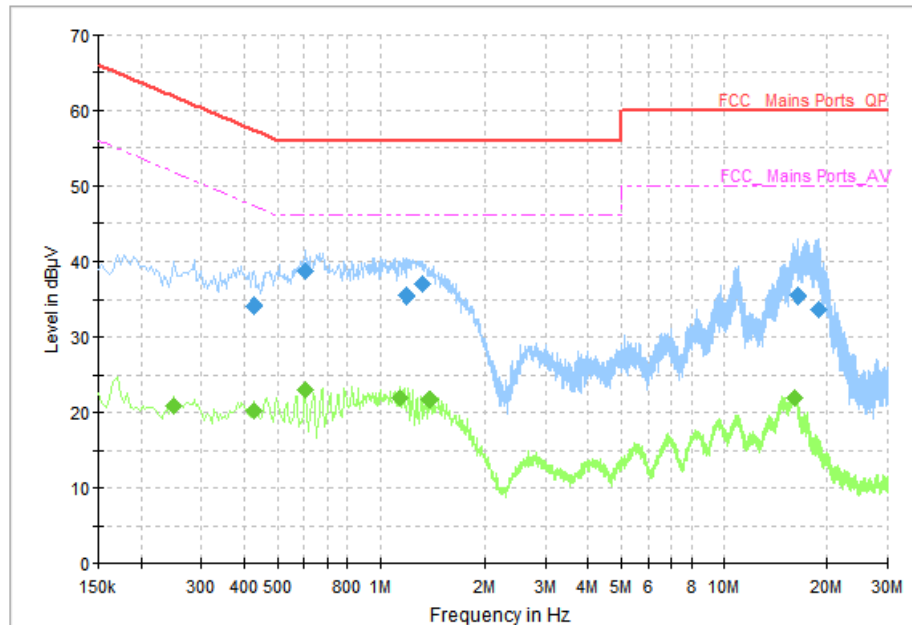


Fig.55 AC Power line Conducted Emission (Idle, AE3, 120V)

**Measurement Results: Quasi Peak**

Frequency (MHz)	QuasiPeak (dBµV)	Limit (dBµV)	Margin (dB)	Line	Filter	Corr. (dB)
0.426000	34.05	57.33	23.28	N	ON	10
0.606000	38.73	56.00	17.27	N	ON	10
1.194000	35.46	56.00	20.54	N	ON	10
1.326000	36.95	56.00	19.05	N	ON	10
16.342000	35.52	60.00	24.48	L1	ON	10
18.886000	33.80	60.00	26.20	L1	ON	10

**Measurement Results: Average**

Frequency (MHz)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Filter	Corr. (dB)
0.250000	20.90	51.76	30.86	L1	ON	10
0.426000	20.36	47.33	26.97	N	ON	10
0.602000	23.12	46.00	22.88	N	ON	10
1.138000	21.98	46.00	24.02	N	ON	10
1.390000	21.77	46.00	24.23	N	ON	10
16.126000	21.92	50.00	28.08	L1	ON	10

\*\*\*END OF REPORT\*\*\*