

FCC 47 CFR PART 15 SUBPART C

CERTIFICATION TEST REPORT

For

Product: Smart Lighting

MODEL No.:S7RN5S

FCC ID: 2AROU-7887

REPORT NO: ES190320988E01

ISSUE DATE: April 11, 2019

Prepared for

**Flying Basketball LLC
1560 Sawgrass Corporate Parkway, 4th Floor, Sunrise, Florida, United
States**

Prepared by

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1 TEST RESULT CERTIFICATION

Applicant: Flying Basketball LLC
1560 Sawgrass Corporate Parkway, 4th Floor, Sunrise, Florida, United States

Manufacturer: Flying Basketball LLC
1560 Sawgrass Corporate Parkway, 4th Floor, Sunrise, Florida, United States

EUT Description: Smart Lighting

Model Number: S7RN5S

File Number: ES190320988E01

Measurement Procedure Used:

APPLICABLE STANDARDS	
STANDARD	TEST RESULT
FCC 47 CFR Part 2 2017, Subpart J FCC 47 CFR Part 15 2017, Subpart C ANSI C63.10-2013	PASS

The above equipment was tested by EMTEK(SHENZHEN) CO., LTD. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10 (2013) and the energy emitted by the sample EUT tested as described in this report is in compliance with the requirements of FCC Rules Part 2, Part 15.247
The test results of this report relate only to the tested sample identified in this report

Date of Test :

March 15, 2018 to April 29, 2018

Prepared by :

Yaping Shen

YapingShen /Tester

Reviewer :

Joe Xia

Joe Xia/ Supervisor

Approve & Authorized Signer :

Lisa Wang

Lisa Wang/Manager



2 EUT TECHNICAL DESCRIPTION

This product contains BT, WIFI, and this report only shows the test results for WIFI.

Characteristics	Description
IEEE 802.11 WLAN Mode Supported	<input checked="" type="checkbox"/> 802.11b <input checked="" type="checkbox"/> 802.11g <input checked="" type="checkbox"/> 802.11n(20MHz channel bandwidth)
Data Rate	WIFI: 802.11 b:1,2,5.5,11Mbps; 802.11 g:6,9,12,18,24,36,48,54Mbps; 802.11n(HT20):MCS0-MCS7;
Modulation	WIFI: DSSS with DBPSK/DQPSK/CCK for 802.11b; OFDM with BPSK/QPSK/16QAM/64QAM for 802.11g/n;
Operating Frequency Range	2412-2472MHz for 802.11b/g/n(HT20);
Number of Channels	WIFI: 13 channels for 802.11b/g n(HT20);
Transmit Power Max	WIFI: 21.98dBm for 802.11b; 25.62dBm for 802.11g; 24.38dBm for 802.11n(HT20);
Antenna Type	PCB antenna
Antenna Gain	5.2dBi
Power supply	AC100-240V 50/60Hz

3 SUMMARY OF TEST RESULT

FCC Part Clause	Test Parameter	Verdict	Remark
15.247(a)(2)	DTS (6dB) Bandwidth	PASS	
15.247(b)(3)	Maximum Peak Conducted Output Power	PASS	
15.247(e)	Maximum Power Spectral Density Level	PASS	
15.247(d)	Unwanted Emission Into Non-Restricted Frequency Bands	PASS	
15.207	Conducted Emission Test	PASS	
15.247(b)	Antenna Application	PASS	
	NOTE1:N/A (Not Applicable) NOTE2:According to FCC OET KDB 558074, the report use radiated measurements in the restricted frequency bands. In addition, the radiated test is also performed to ensure the emissions emanating from the device cabinet also comply with the applicable limits.		

RELATED SUBMITTAL(S) / GRANT(S):

This submittal(s) (test report) is intended for FCC ID: 2AROU-7887 filing to comply with Section 15.247 of the FCC Part 15, Subpart C Rules.

4 TEST METHODOLOGY

4.1 GENERAL DESCRIPTION OF APPLIED STANDARDS

According to its specifications, the EUT must comply with the requirements of the following standards:
 FCC 47 CFR Part 2, Subpart J
 FCC 47 CFR Part 15, Subpart C
 FCC KDB 558074 D01 DTS Meas Guidance v05r02

4.2 MEASUREMENT EQUIPMENT USED

4.2.1 Conducted Emission Test Equipment

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	DUE CAL.
Test Receiver	Rohde & Schwarz	ESCI	26115-010-0027	May 20, 2018	May 19, 2019
L.I.S.N.	Rohde & Schwarz	ENV216	101161	May 20, 2018	May 19, 2019
50ΩCoaxial Switch	Anritsu	MP59B	6100175589	May 20, 2018	May 19, 2019

4.2.2 For 3m Radiated Emission Measurement 9K-30M (3m chamber 1#)

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
EMI Test Receiver	Rohde & Schwarz	ESU	1302.6005.26	May 20, 2018	May 19, 2019
Loop Antenna	Schwarzbeck	FMZB 1519	1519-012	May 20, 2018	May 19, 2019
Cable	/	3M SF104-26.5	295838/4	May 20, 2018	May 19, 2019
Cable	/	6M SF104-26.5	295840/4	May 20, 2018	May 19, 2019

4.2.3 For 3m Radiated Emission Measurement 30M-1G (3m chamber 1#)

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	DUE CAL.
EMI Test Receiver	Rohde & Schwarz	ESU	1302.6005.26	May 19, 2018	May 18, 2019
Pre-Amplifier	HP	8447F	2944A07999	May 19, 2018	May 18, 2019
Bilog Antenna	Schwarzbeck	VULB9163	142	May 20, 2018	May 19, 2019
Cable	Schwarzbeck	AK9513	ACRX1	May 20, 2018	May 19, 2019
Cable	Rosenberger	N/A	FP2RX2	May 20, 2018	May 19, 2019
Cable	Schwarzbeck	AK9513	CRPX1	May 20, 2018	May 19, 2019
Cable	Schwarzbeck	AK9513	CRRX2	May 20, 2018	May 19, 2019

4.2.4 For 3m Radiated Emission Measurement 1G-18G (3m chamber 1#)

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Due Cal.
EMI Test Receiver	Rohde & Schwarz	ESU	1302.6005.26	May 19, 2018	May 18, 2019
Pre-Amplifier	A.H.	PAM-0126	1415261	May 20, 2018	May 19, 2019
Horn Antenna	Schwarzbeck	BBHA 9120	707	May 20, 2018	May 19, 2019
Cable	H+B	0.5M SF104-26.5	289147/4	May 20, 2018	May 19, 2019
Cable	H+B	3M SF104-26.5	295838/4	May 20, 2018	May 19, 2019
Cable	H+B	6M SF104-26.5	295840/4	May 20, 2018	May 19, 2019

4.2.5 For 3m Radiated Emission Measurement 18G-26.5G (3m chamber 1#)

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Due Cal.
EMI Test Receiver	Rohde & Schwarz	ESU	1302.6005.26	May 19, 2018	May 18, 2019
Pre-Amplifier	A.H.	PAM-0126	1415261	May 20, 2018	May 19, 2019
Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170399	May 20, 2018	May 19, 2019
Cable	H+B	0.5M SF104-26.5	289147/4	May 20, 2018	May 19, 2019
Cable	H+B	3M SF104-26.5	295838/4	May 20, 2018	May 19, 2019
Cable	H+B	6M SF104-26.5	295840/4	May 20, 2018	May 19, 2019

4.2.6 For 3m Radiated Emission Measurement 26.5G-40G (3m chamber 3#)

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Due Cal.
EMI Test Receiver	Rohde & Schwarz	FSV40	132.1-3008K39-100967-AP	May 19, 2018	May 18, 2019
Pre-Amplifier	Lunar EM	LNA26G40-40	J1013131028001	May 19, 2018	May 18, 2019
Horn Antenna	AHS/USA	SAS-573	184	May 20, 2018	May 19, 2019
Cable	A.H	SAC-40G-1	414	May 20, 2018	May 19, 2019
Cable	A.H	SAC-40G-1	413	May 20, 2018	May 19, 2019

4.2.7 Radio Frequency Test Equipment

Equipment Type	MFR	Model Number	Serial Number	Last Cal.	Due Cal.
Spectrum Analyzer	Agilent	E4407B	88156318	May 20, 2018	May 19, 2019
Signal Analyzer	Agilent	N9010A	My53470879	May 20, 2018	May 19, 2019
Power meter	Anritsu	ML2495A	0824006	May 20, 2018	May 19, 2019
Power sensor	Anritsu	MA2411B	0738172	May 20, 2018	May 19, 2019

Remark: Each piece of equipment is scheduled for calibration once a year.

4.3 DESCRIPTION OF TEST MODES

The EUT has been tested under its typical operating condition.

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

The Transmitter was operated in the normal operating mode. The TX frequency was fixed which was for the purpose of the measurements.

Test of channel included the lowest and middle and highest frequency to perform the test, then record on this report.

Those data rates (802.11b:1 Mbps; 802.11g: 6 Mbps; 802.11n(HT20)) were used for all test.

Pre-defined engineering program for regulatory testing used to control the EUT for staying in continuous transmitting and receiving mode is programmed.

Frequency and Channel list for 802.11 b/g/n(HT20):

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2412	6	2437	11	2462
2	2417	7	2442	12	2467
3	2422	8	2447	13	2472
4	2427	9	2452		
5	2432	10	2457		

Test Frequency and Channel for 802.11 b/g/n (HT20):

Lowest Frequency		Middle Frequency		Highest Frequency	
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2412	6	2437	13	2472
		11	2462		
		12	2467		

5 FACILITIES AND ACCREDITATIONS

5.1 FACILITIES

All measurement facilities used to collect the measurement data are located at Bldg 69, Majialong Industry Zone District, Nanshan District, Shenzhen, China. The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.10 and CISPR Publication 22.

5.2 LABORATORY ACCREDITATIONS AND LISTINGS

Site Description

EMC Lab. : Accredited by CNAS, 2016.10.24
The certificate is valid until 2022.10.28
The Laboratory has been assessed and proved to be in compliance with CNAS-CL01: 2006(identical to ISO/IEC17025: 2005)
The Certificate Registration Number is L229

: Accredited by TUV Rheinland Shenzhen, 2016.5.19
The Laboratory has been assessed according to the requirements ISO/IEC 17025.

: Accredited by FCC, August 06, 2018
The certificate is valid until August 07, 2020
Designation Number: CN1204
Test Firm Registration Number: 882943

: Accredited by Industry Canada, November 09, 2018
The Conformity Assessment Body Identifier is CN0008.

6 TEST SYSTEM UNCERTAINTY

The following measurement uncertainty levels have been estimated for tests performed on the apparatus:

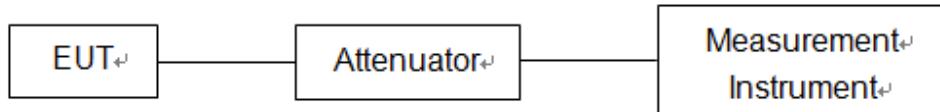
Parameter	Uncertainty
Radio Frequency	$\pm 1 \times 10^{-5}$
Maximum Peak Output Power Test	$\pm 1.0 \text{dB}$
Conducted Emissions Test	$\pm 2.0 \text{dB}$
Radiated Emission Test	$\pm 2.0 \text{dB}$
Power Density	$\pm 2.0 \text{dB}$
Occupied Bandwidth Test	$\pm 1.0 \text{dB}$
Band Edge Test	$\pm 3 \text{dB}$
All emission, radiated	$\pm 3 \text{dB}$
Antenna Port Emission	$\pm 3 \text{dB}$
Temperature	± 0.5
Humidity	$\pm 3\%$

Measurement Uncertainty for a level of Confidence of 95%

7 SETUP OF EQUIPMENT UNDER TEST

7.1 RADIO FREQUENCY TEST SETUP 1

The WLAN component's antenna port(s) of the EUT are connected to the measurement instrument per an appropriate attenuator. The EUT is controlled by PC/software to emit the specified signals for the purpose of measurements.



7.2 RADIO FREQUENCY TEST SETUP 2

The test site semi-anechoic chamber has met the requirement of NSA tolerance 4 dB according to the standards: ANSI C63.10. The test distance is 3m. The setup is according to the requirements in Section 13.1.4.1 of ANSI C63.10-2013 and CAN/CSA-CEI/IEC CISPR 22.

Below 30MHz :

The EUT is placed on a turntable 0.8 meters above the ground in the chamber, 3 meter away from the antenna (loop antenna). The Antenna should be positioned with its plane vertical at the specified distance from the EUT and rotated about its vertical axis for maximum response at each azimuth about the EUT. The center of the loop shall be 1 m above the ground. For certain applications, the loop antenna plane may also need to be positioned horizontally at the specified distance from the EUT.

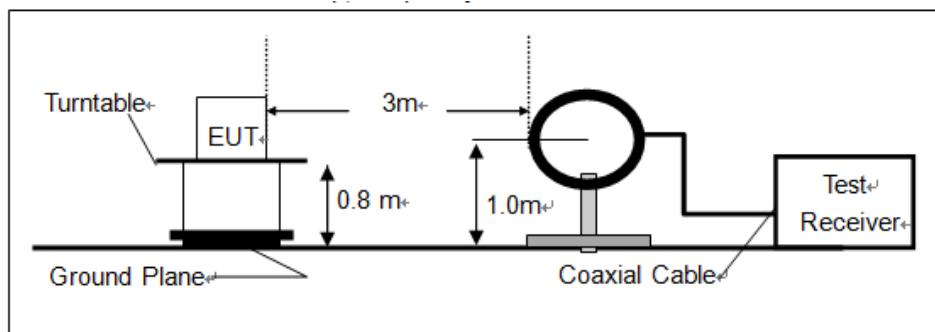
30MHz-1GHz :

The EUT is placed on a turntable 0.8 meters above the ground in the chamber, 3 meter away from the antenna. The maximal emission value is acquired by adjusting the antenna height, polarisation and turntable azimuth. Normally, the height range of antenna is 1 m to 4 m, the azimuth range of turntable is 0° to 360°, and the receive antenna has two polarizations Vertical (V) and Horizontal (H).

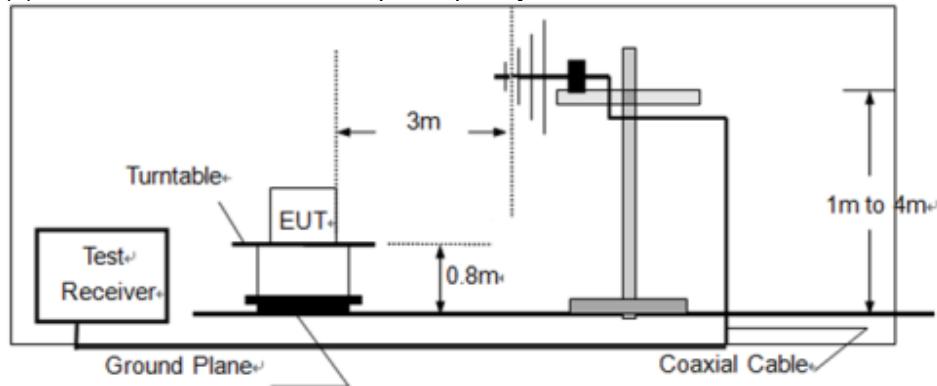
Above 1GHz :

The EUT is placed on a turntable 1.5 meters above the ground in the chamber, 3 meter away from the antenna. The maximal emission value is acquired by adjusting the antenna height, polarisation and turntable azimuth. Normally, the height range of antenna is 1 m to 4 m, the azimuth range of turntable is 0° to 360°, and the receive antenna has two polarizations Vertical (V) and Horizontal (H).

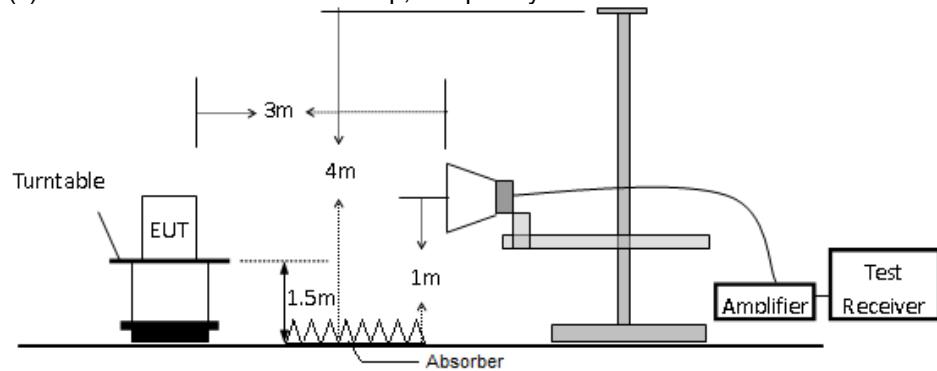
(a) Radiated Emission Test Set-Up, Frequency Below 30MHz



(b) Radiated Emission Test Set-Up, Frequency Below 1000MHz



(c) Radiated Emission Test Set-Up, Frequency above 1000MHz

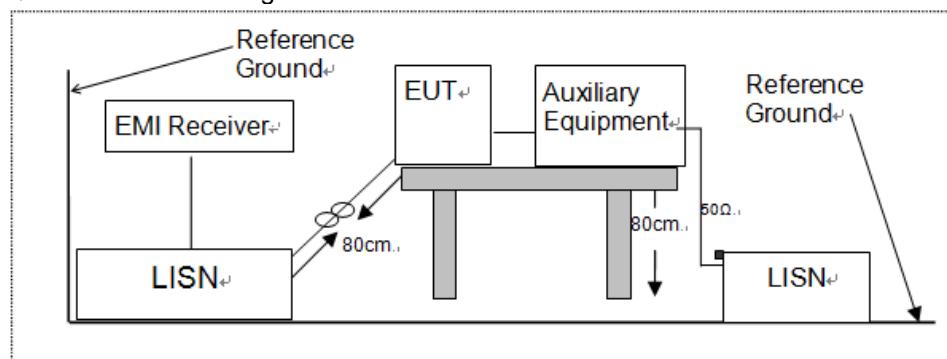


7.3 CONDUCTED EMISSION TEST SETUP

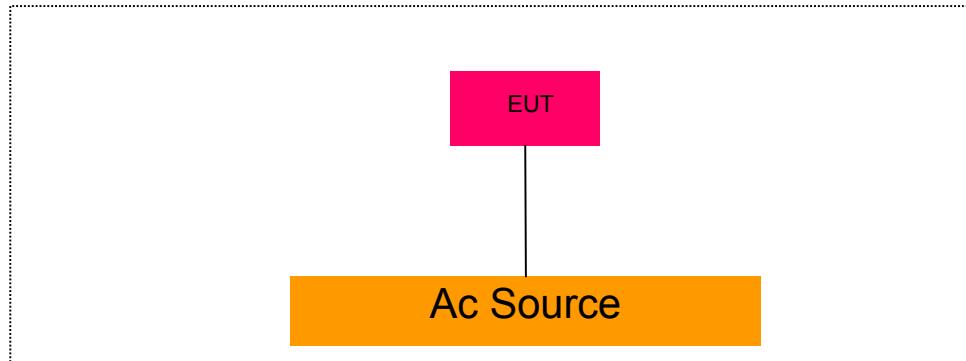
The mains cable of the EUT (maybe per AC/DC Adapter) must be connected to LISN. The LISN shall be placed 0.8 m from the boundary of EUT and bonded to a ground reference plane for LISN mounted on top of the ground reference plane. This distance is between the closest points of the LISN and the EUT. All other units of the EUT and associated equipment shall be at least 0.8m from the LISN.

Ground connections, where required for safety purposes, shall be connected to the reference ground point of the LISN and, where not otherwise provided or specified by the manufacturer, shall be of same length as the mains cable and run parallel to the mains connection at a separation distance of not more than 0.1 m.

According to the requirements in Section 13.1.4.1 of ANSI C63.10-2013 Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30 MHz using CISPR Quasi-Peak and average detector mode.



7.4 BLOCK DIAGRAM CONFIGURATION OF TEST SYSTEM



7.5 SUPPORT EQUIPMENT

Item	Equipment	Mfr/Brand	Model/Type No.	S/N
2.	Notebook	Lenovo	WB0205140E	WB06355728

Notes:

1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.

8 TEST REQUIREMENTS

8.1 DTS(6DB)BANDWIDTH

8.1.1 Applicable Standard

According to FCC Part15.247(a)(2) and KDB558074 DTS 01 Meas. Guidance v05r02

8.1.2 Conformance Limit

The minimum -6 dB bandwidth shall be at least 500 kHz.

8.1.3 Test Configuration

Test according to clause 7.1 radio frequency test setup 1

8.1.4 Test Procedure

The EUT was operating in IEEE 802.11b/g/n mode and controlled its channel. Printed out the test result from the spectrum by hard copy function.

The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.

Set to the maximum power setting and enable the EUT transmit continuously

Set RBW = 100 kHz.

Set the video bandwidth (VBW) =300kHz.

Set Span=2 times OBW

Set Detector = Peak.

Set Trace mode = max hold.

Set Sweep = auto couple.

Allow the trace to stabilize.

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

Measure and record the results in the test report.

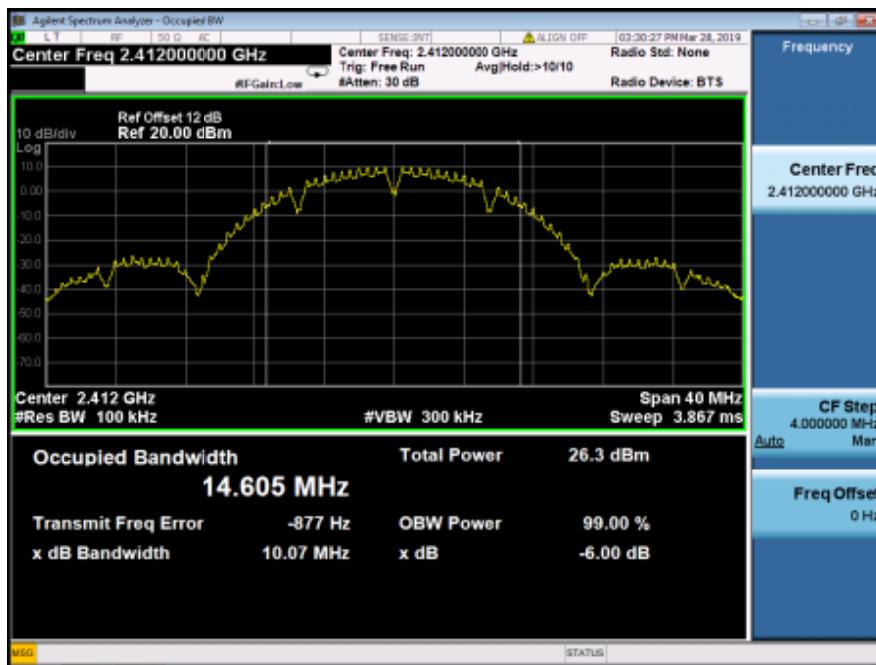
8.1.5 Test Results

Temperature :	26	Test Date :	March 28, 2019
Humidity :	60 %	Test By:	King Kong

Operation Mode	Channel Number	Channel Frequency (MHz)	Measurement Bandwidth (MHz)	Limit (kHz)	Verdict
802.11b	1	2412	10.07	>500	PASS
	6	2437	10.06	>500	PASS
	11	2462	10.08	>500	PASS
	12	2467	9.577	>500	PASS
	13	2472	10.03	>500	PASS
802.11g	1	2412	16.35	>500	PASS
	6	2437	16.36	>500	PASS
	11	2462	16.35	>500	PASS
	12	2467	16.35	>500	PASS
	13	2472	16.34	>500	PASS
802.11n (HT20)	1	2412	17.59	>500	PASS
	6	2437	17.59	>500	PASS
	11	2462	17.34	>500	PASS
	12	2467	17.58	>500	PASS
	13	2472	17.55	>500	PASS

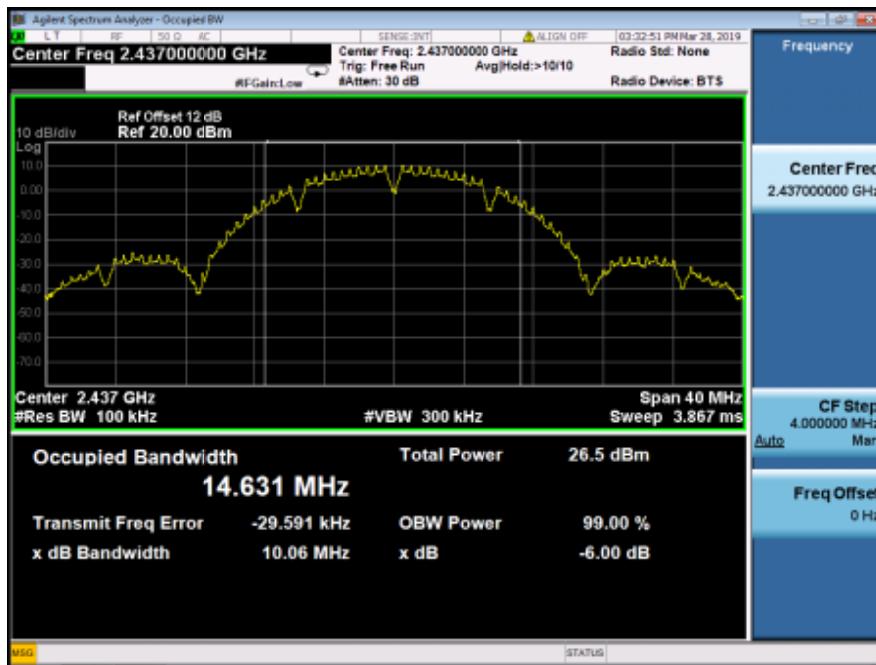
Test Model

DTS (6dB) Bandwidth
802.11b
Channel 1: 2412MHz



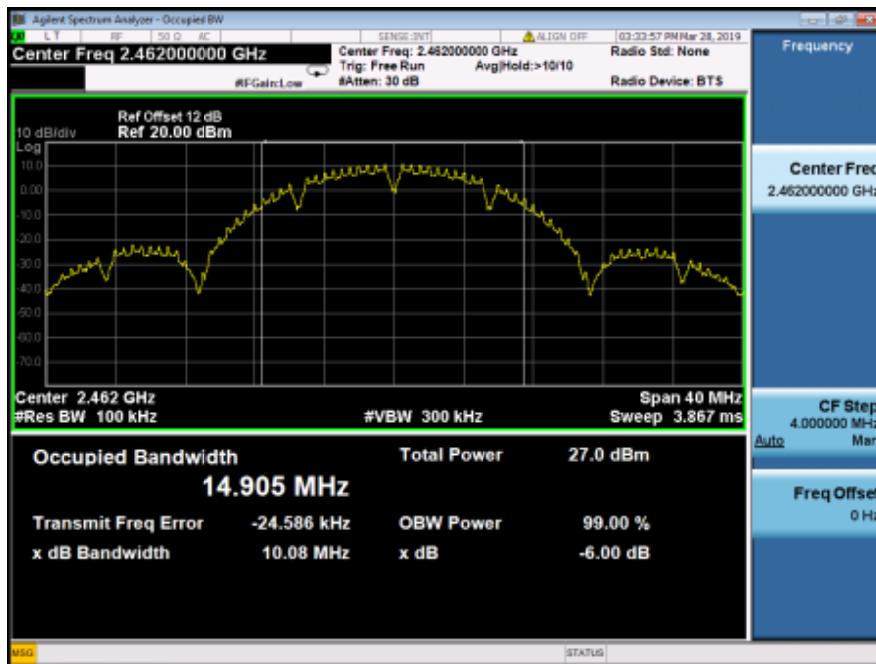
Test Model

DTS (6dB) Bandwidth
802.11b
Channel 6: 2437MHz



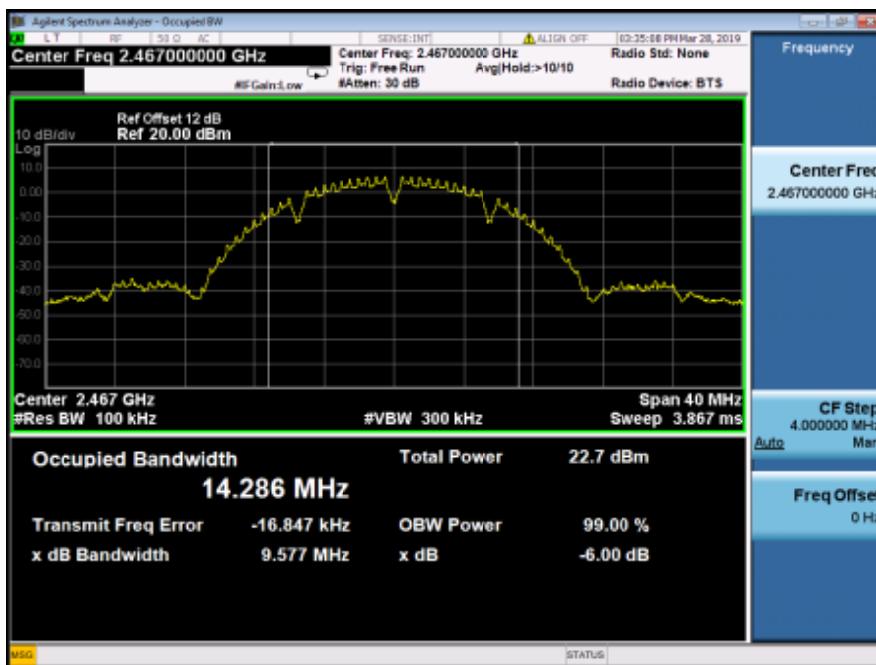
Test Model

DTS (6dB) Bandwidth
802.11b
Channel 11: 2462MHz



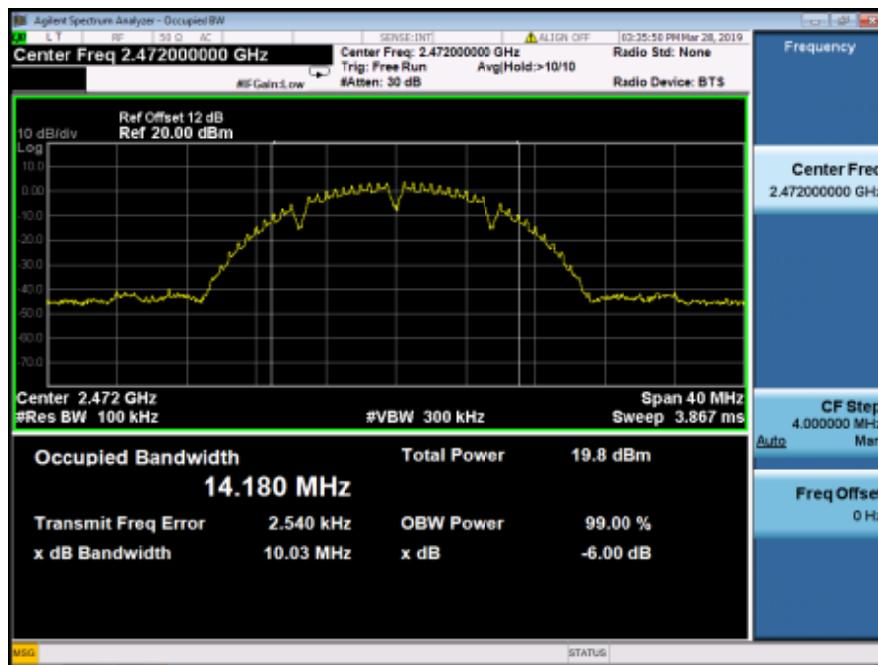
Test Model

DTS (6dB) Bandwidth
802.11b
Channel 12: 2467MHz



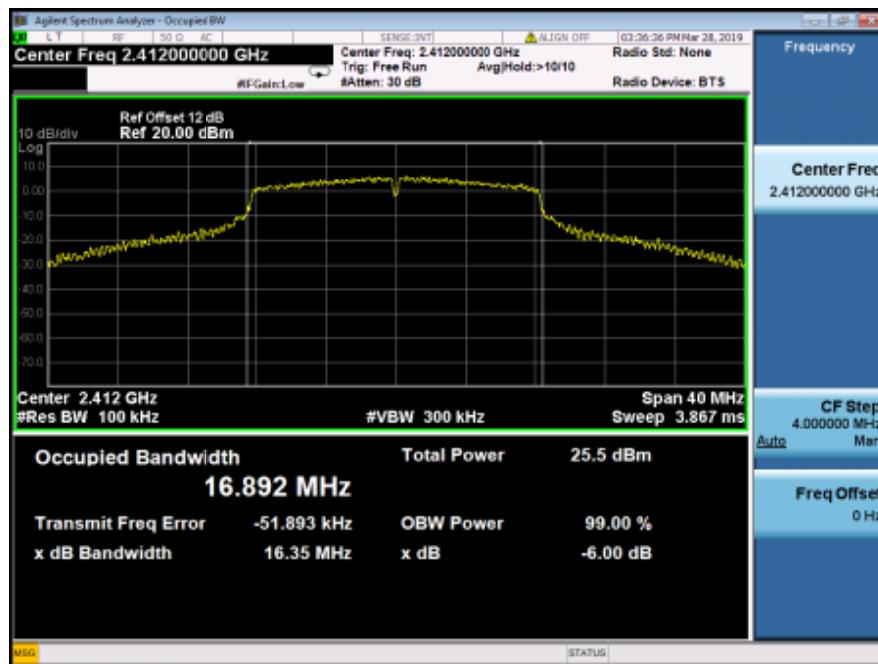
Test Model

DTS (6dB) Bandwidth
802.11b
Channel 13: 2472MHz



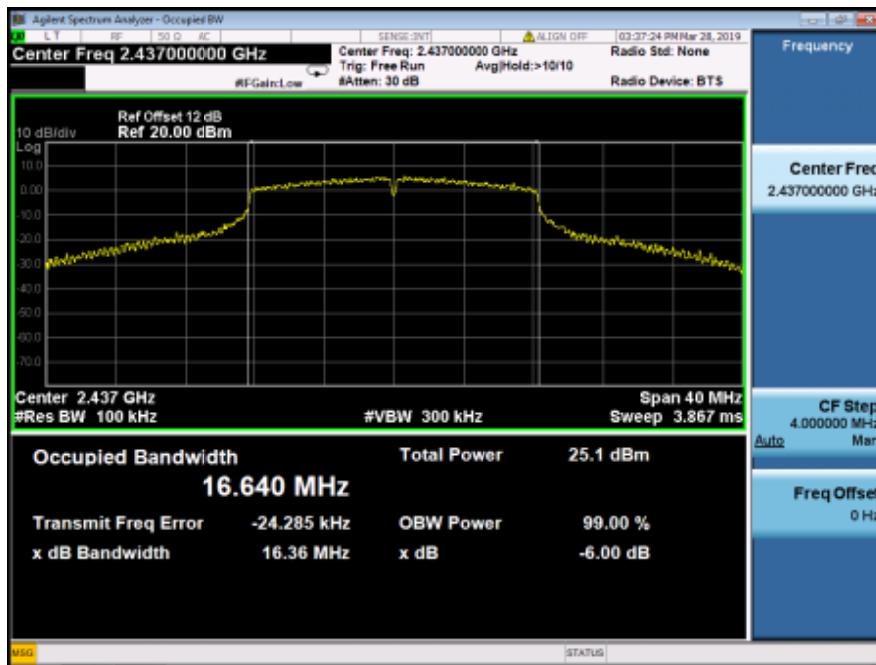
Test Model

DTS (6dB) Bandwidth
802.11g
Channel 1: 2412MHz



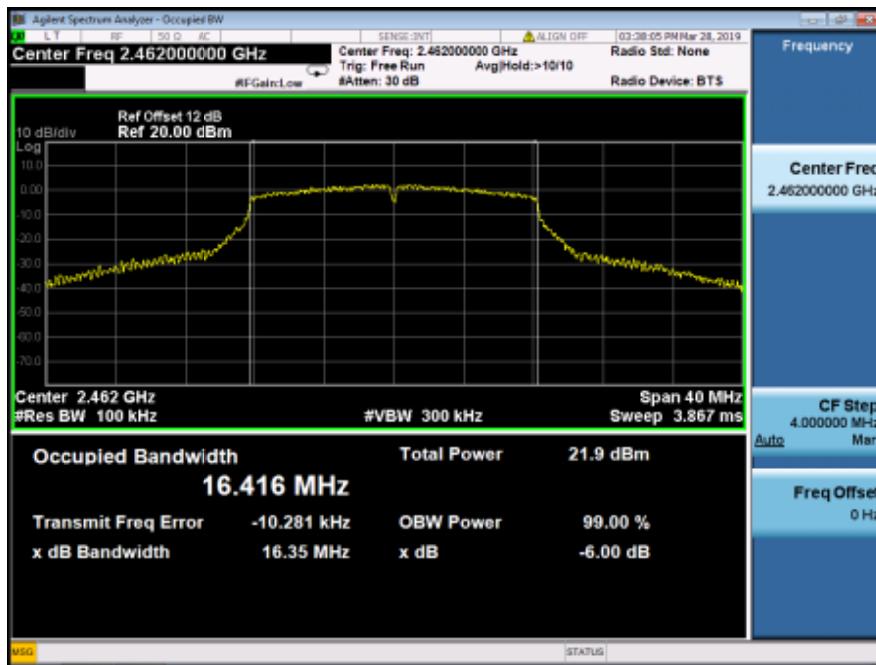
Test Model

DTS (6dB) Bandwidth
802.11g
Channel 6: 2437MHz



Test Model

DTS (6dB) Bandwidth
802.11g
Channel 11: 2462MHz



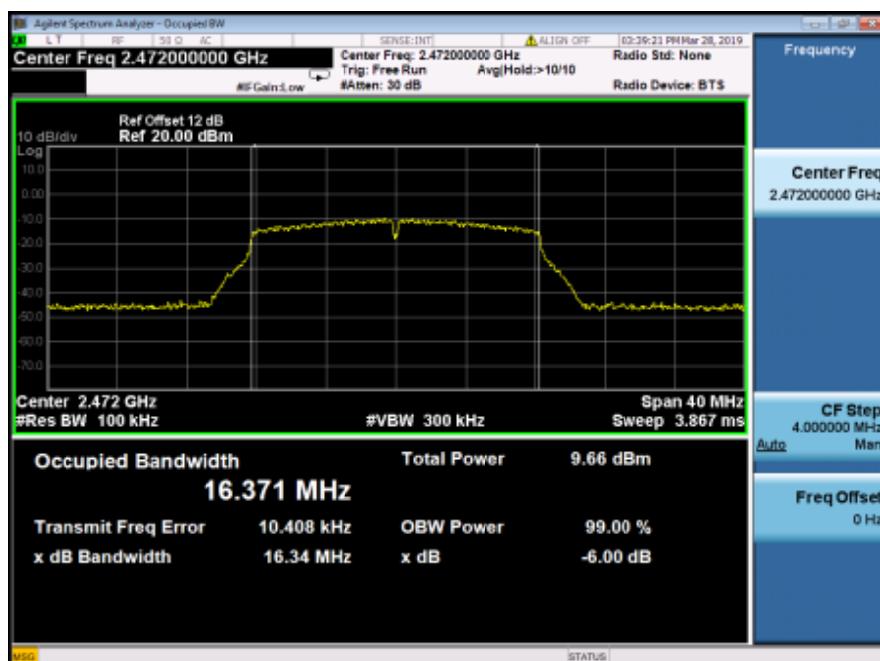
Test Model

DTS (6dB) Bandwidth
802.11g
Channel 12: 2467MHz



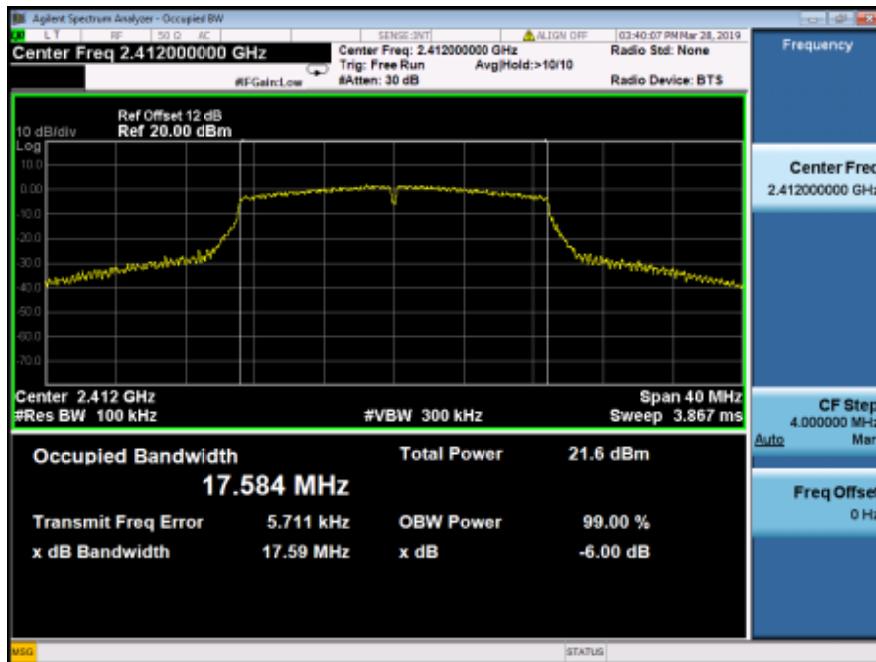
Test Model

DTS (6dB) Bandwidth
802.11g
Channel 13: 2472MHz



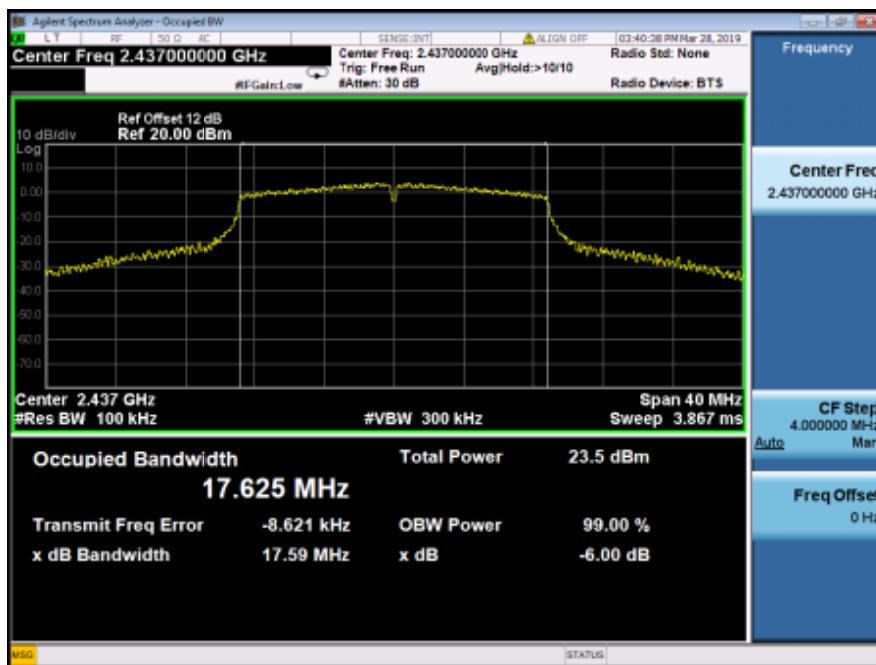
Test Model

DTS (6dB) Bandwidth
802.11n (HT20)
Channel 1: 2412MHz



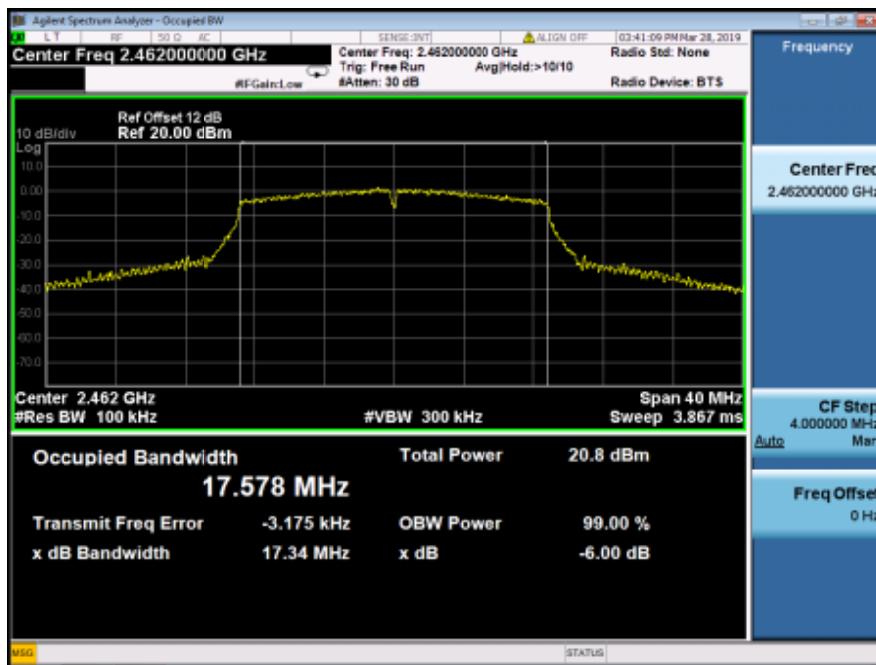
Test Model

DTS (6dB) Bandwidth
802.11n (HT20)
Channel 6: 2437MHz



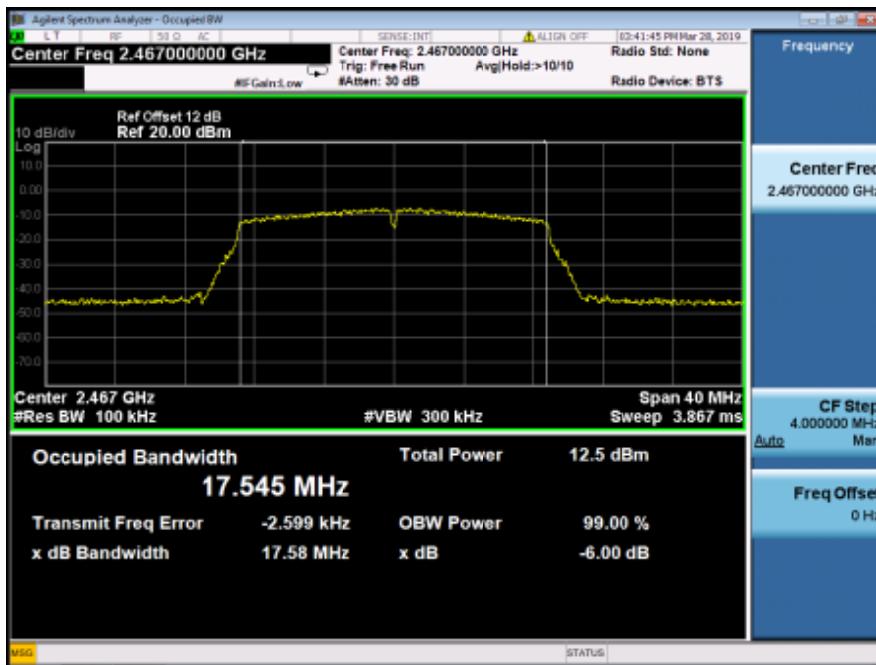
Test Model

DTS (6dB) Bandwidth
802.11n (HT20)
Channel 11: 2462MHz

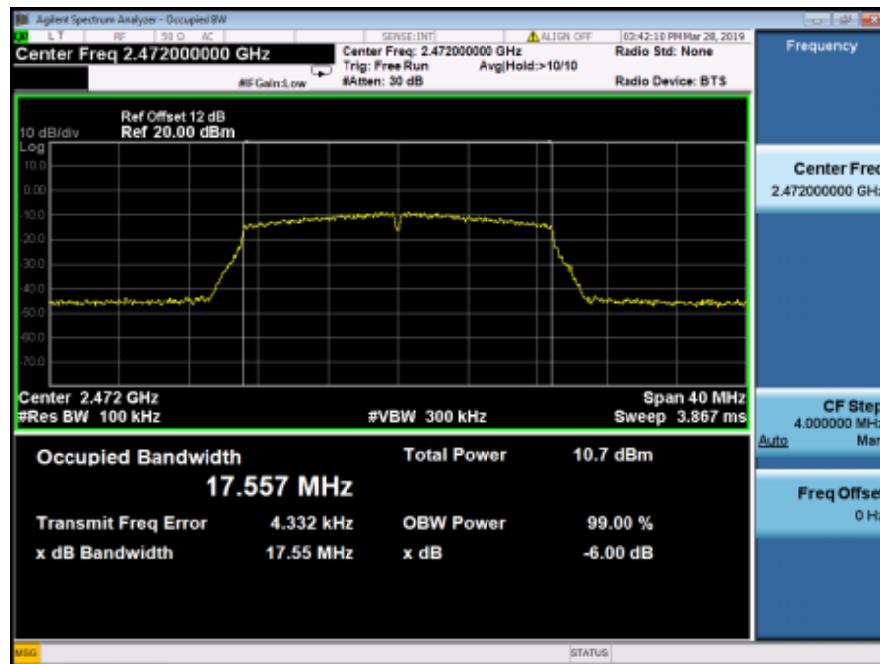


Test Model

DTS (6dB) Bandwidth
802.11n (HT20)
Channel 12: 2467MHz



Test Model DTS (6dB) Bandwidth
802.11n (HT20)
Channel 13: 2472MHz



8.2 MAXIMUM PEAK CONDUCTED OUTPUT POWER

8.2.1 Applicable Standard

According to FCC Part15.247(b)(3) and KDB558074 DTS 01 Meas. Guidance v05r02

8.2.2 Conformance Limit

FCC:

The maximum peak conducted output power of the intentional radiator for systems using digital modulation in the 2400 - 2483.5 MHz bands shall not exceed: 1 Watt (30dBm).

IC:

For DTSs employing digital modulation techniques operating in the bands 902-928 MHz and 2400-2483.5 MHz, the maximum peak conducted output power shall not exceed 1 W. The e.i.r.p. shall not exceed 4 W.

8.2.3 Test Configuration

Test according to clause 7.1 radio frequency test setup 1

8.2.4 Test Procedure

■ According to FCC Part15.247(b)(3)

The maximum peak conducted output power may be measured using a broadband peak RF power meter. The power meter shall have a video bandwidth that is greater than or equal to the DTS bandwidth and shall utilize a fast-responding diode detector.

The RF output of EUT was connected to the power meter by RF cable and attenuator. The path loss was compensated to the results for each measurement.

Set to the maximum output power setting and enable the EUT transmit continuously.

Measure the conducted output power with cable loss and record the results in the test report.

Measure and record the results in the report.

■ According to FCC Part 15.247(b)(4):

Conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Note: If antenna Gain exceeds 6 dBi, then Output power Limit=30-(Gain- 6)

8.2.5 Test Results

Temperature : 26 Test Date : March 28, 2019
 Humidity : 60 % Test By: King Kong

Operation Mode	Channel Number	Channel Frequency (MHz)	Measurement Level (dBm)	EIRP (dBm)	Limit for peak conducted output power (dBm)	Limit for EIRP (dBm)	Verdict
802.11b	1	2412	21.59	26.79	30	36	PASS
	6	2437	21.89	27.09	30	36	PASS
	11	2462	21.98	27.18	30	36	PASS
	12	2467	16.08	21.28	30	36	PASS
	13	2472	12.73	17.93	30	36	PASS
802.11g	1	2412	25.33	30.53	30	36	PASS
	6	2437	25.62	30.82	30	36	PASS
	11	2462	22.78	27.98	30	36	PASS
	12	2467	17.36	22.56	30	36	PASS
	13	2472	14.52	19.72	30	36	PASS
802.11n (HT20)	1	2412	23.18	28.38	30	36	PASS
	6	2437	24.38	29.58	30	36	PASS
	11	2462	21.56	26.76	30	36	PASS
	12	2467	14.86	20.06	30	36	PASS
	13	2472	13.14	18.34	30	36	PASS

Note: The antenna gain is 5.2dBi

8.3 MAXIMUM POWER SPECTRAL DENSITY

8.3.1 Applicable Standard

According to FCC Part15.247(e) and KDB558074 DTS 01 Meas. Guidance v05r02

8.3.2 Conformance Limit

The transmitter power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

8.3.3 Test Configuration

Test according to clause 7.1 radio frequency test setup 1

8.3.4 Test Procedure

This procedure shall be used if maximum peak conducted output power was used to demonstrate compliance

The transmitter output (antenna port) was connected to the spectrum analyzer

Set analyzer center frequency to DTS channel center frequency.

Set the span to 1.5 times the DTS bandwidth.

Set the RBW to: 3 kHz

Set the VBW to:10 kHz.

Set Detector = peak.

Set Sweep time = auto couple.

Set Trace mode = max hold.

Allow trace to fully stabilize.

Use the peak marker function to determine the maximum amplitude level within the RBW.

Note: If antenna Gain exceeds 6 dBi, then PSD Limit=8-(Gain- 6)

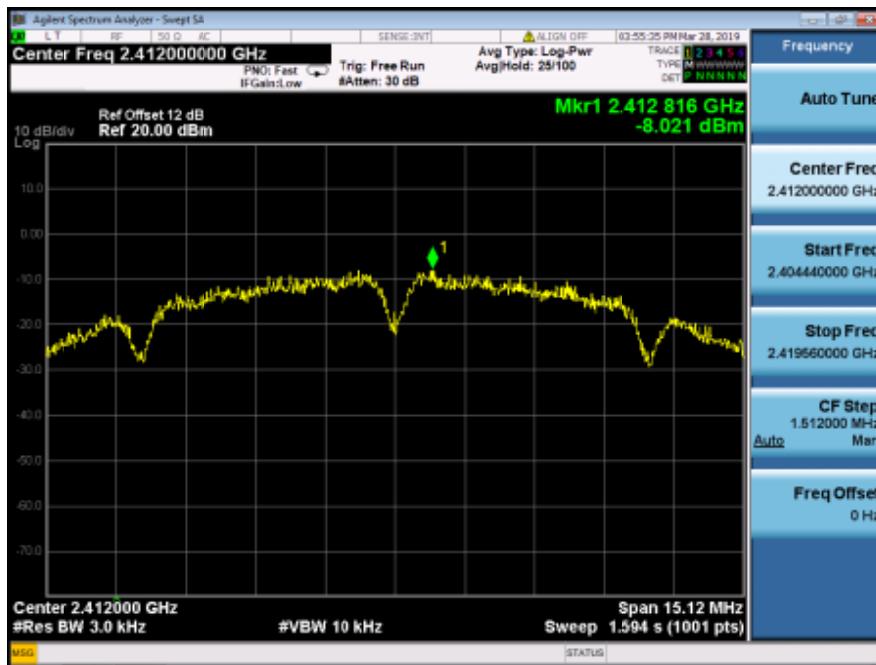
8.3.5 Test Results

Temperature :	26	Test Date :	March 28, 2019
Humidity :	60 %	Test By:	King Kong

Operation Mode	Channel Number	Channel Frequency (MHz)	Measurement Level (dBm/3kHz)	Limit (dBm/3kHz)	Verdict
802.11b	1	2412	-8.021	8	PASS
	6	2437	-2.754	8	PASS
	11	2462	-3.736	8	PASS
	12	2467	-7.821	8	PASS
	13	2472	-9.921	8	PASS
802.11g	1	2412	-5.515	8	PASS
	6	2437	-6.115	8	PASS
	11	2462	-9.415	8	PASS
	12	2467	-14.634	8	PASS
	13	2472	-21.940	8	PASS
802.11n (HT20)	1	2412	-9.706	8	PASS
	6	2437	-7.692	8	PASS
	11	2462	-11.243	8	PASS
	12	2467	-18.496	8	PASS
	13	2472	-20.948	8	PASS

Test Model

Power Spectral Density
802.11b
Channel 1: 2412MHz



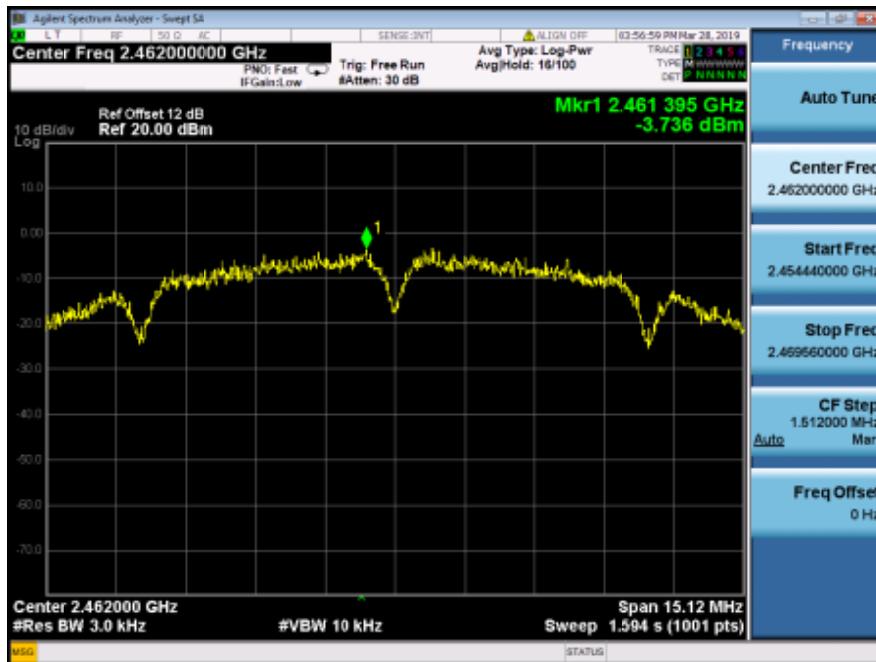
Test Model

Power Spectral Density
802.11b
Channel 6: 2437MHz



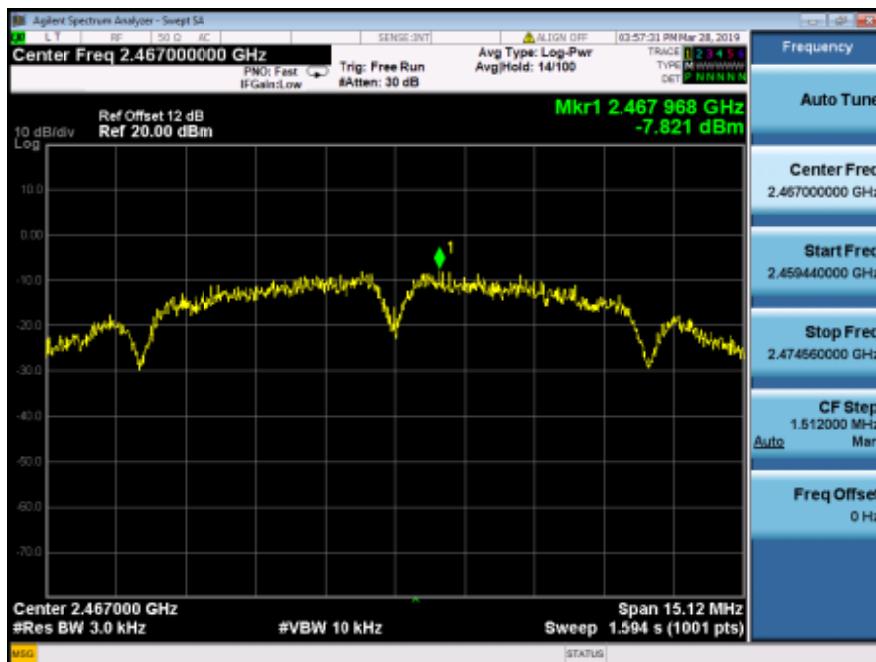
Test Model

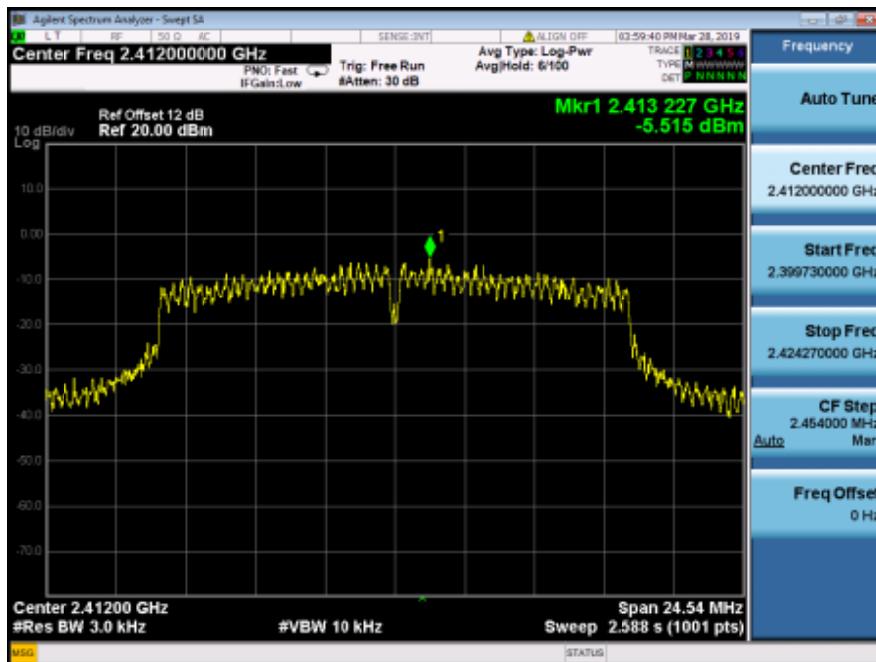
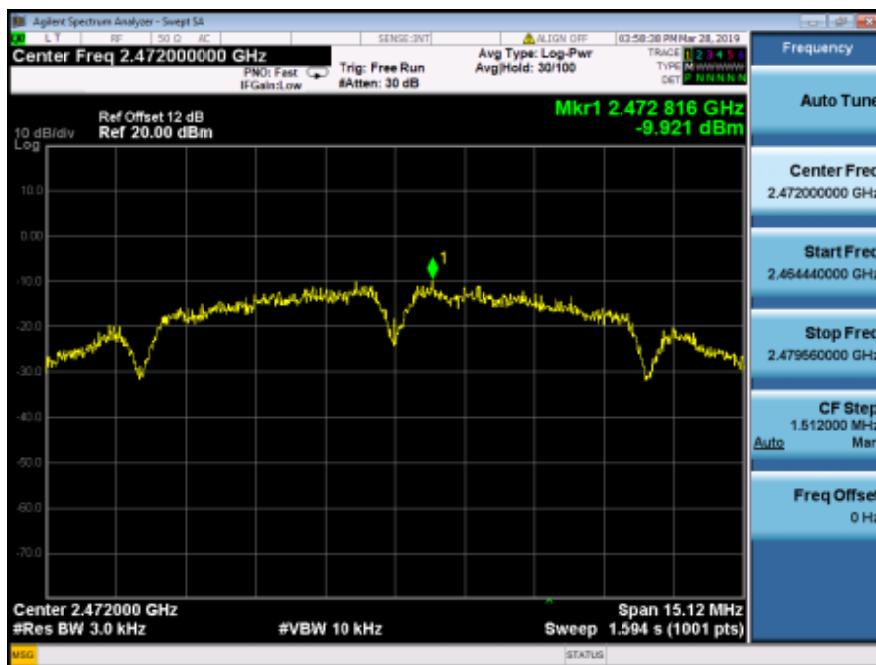
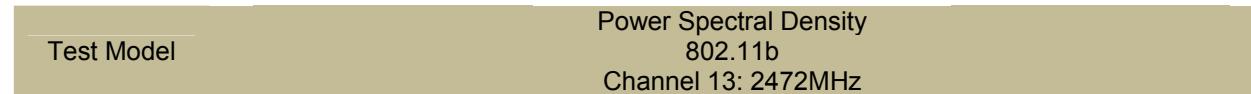
Power Spectral Density
802.11b
Channel 11: 2462MHz

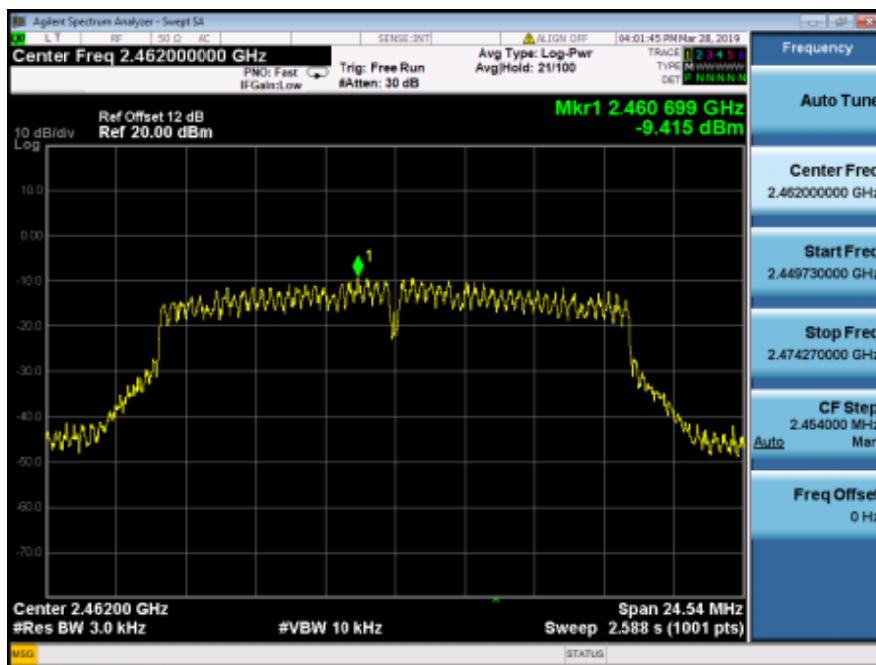
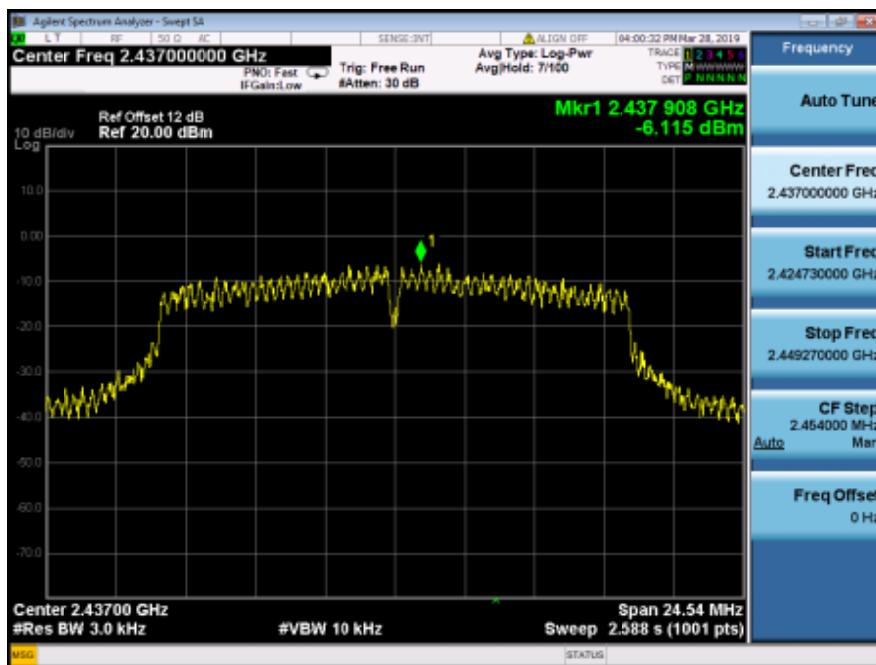
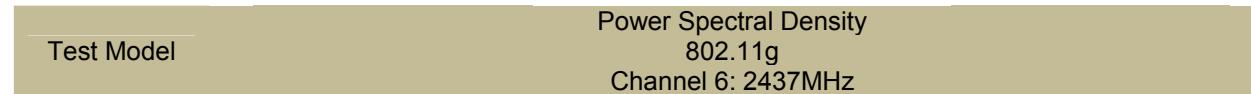


Test Model

Power Spectral Density
802.11b
Channel 12: 2467MHz

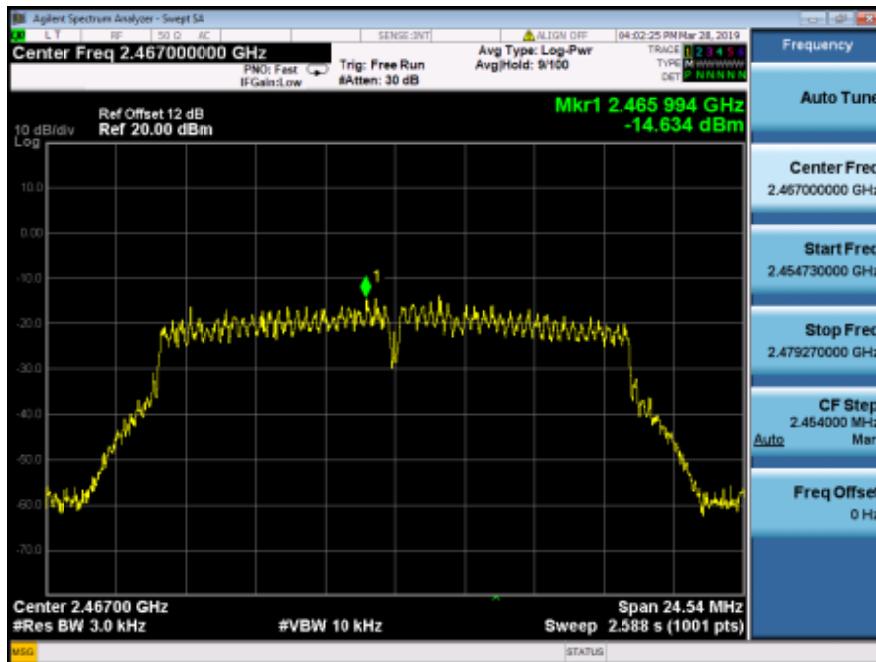






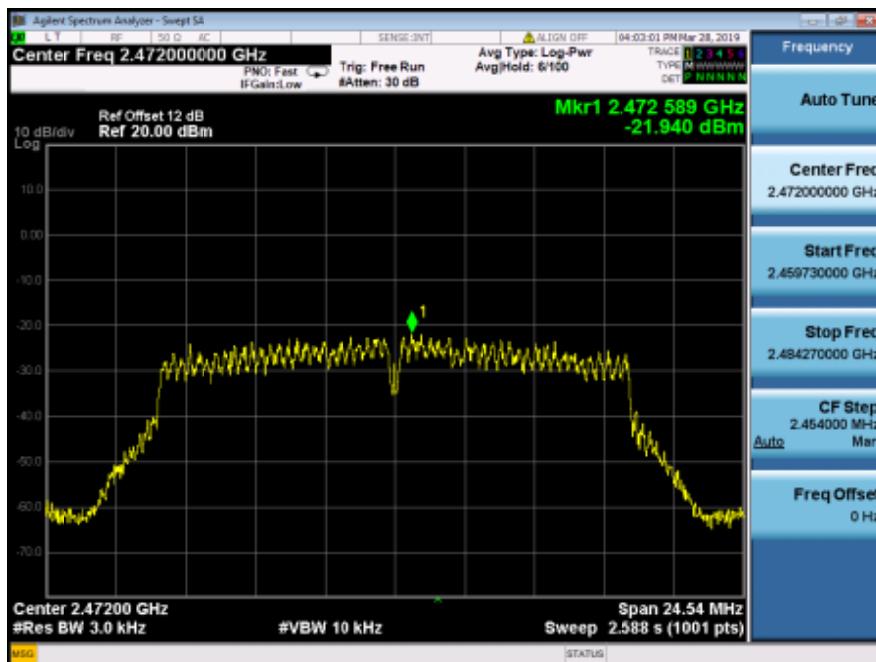
Test Model

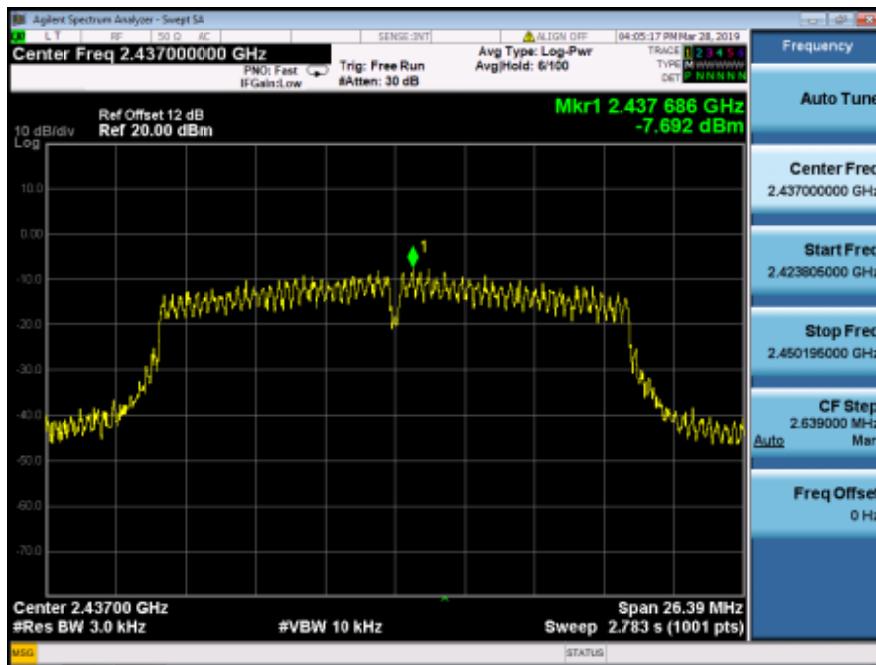
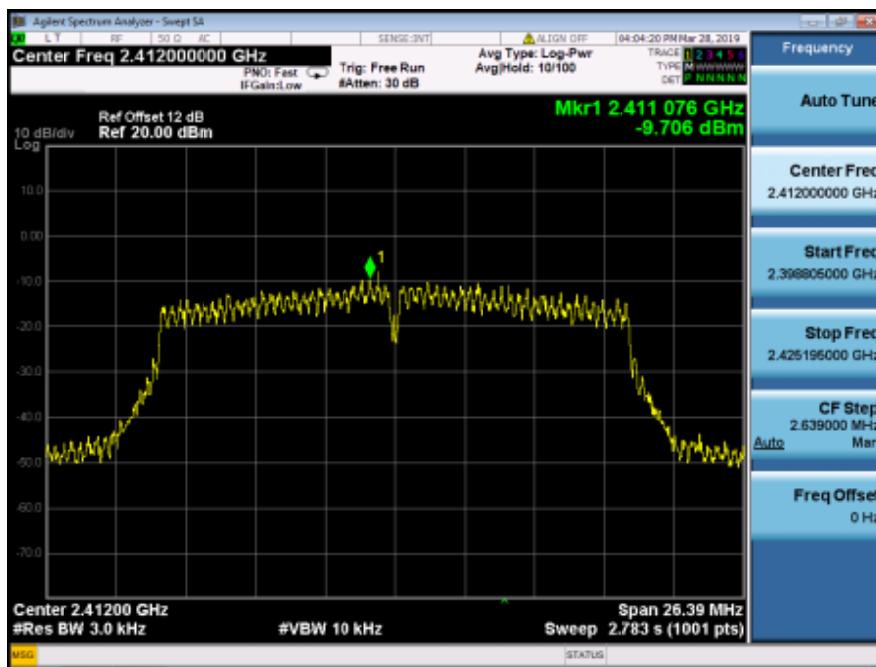
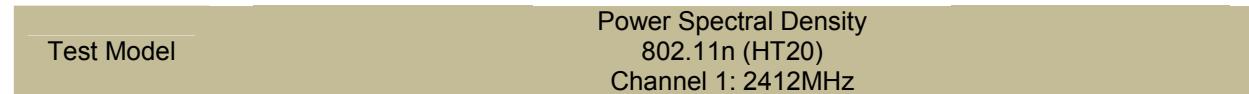
Power Spectral Density
802.11g
Channel 12: 2467MHz



Test Model

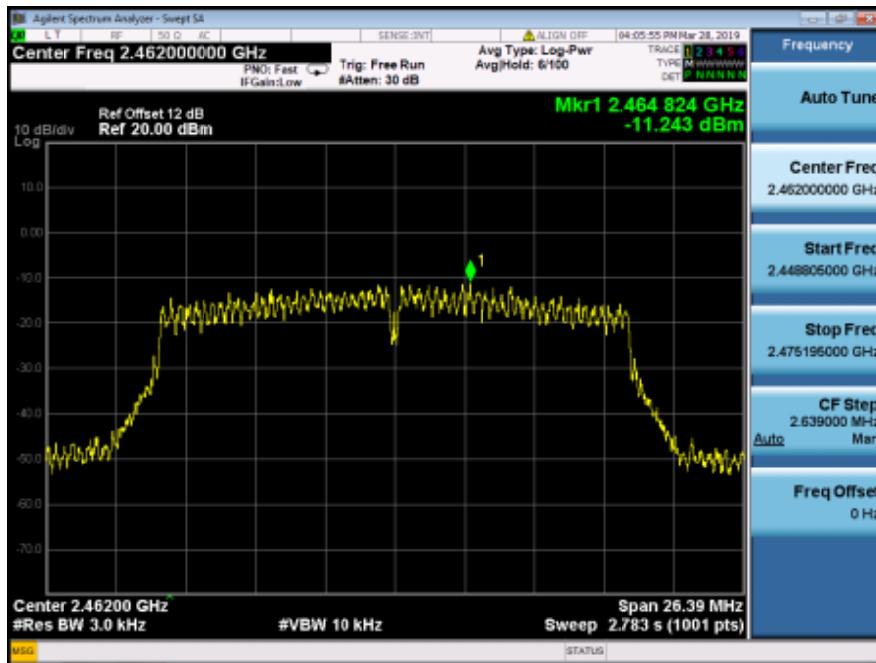
Power Spectral Density
802.11g
Channel 13: 2472MHz





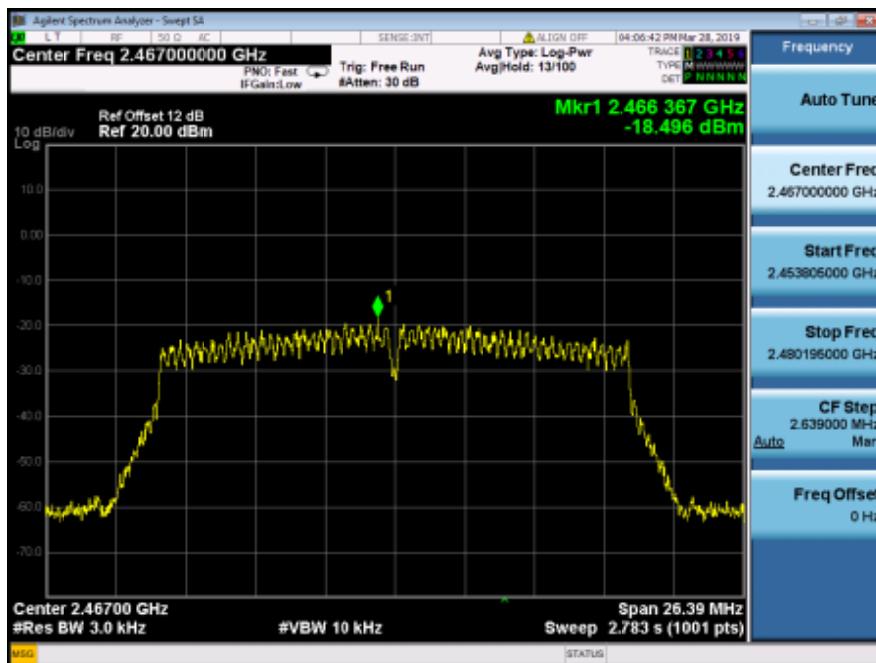
Test Model

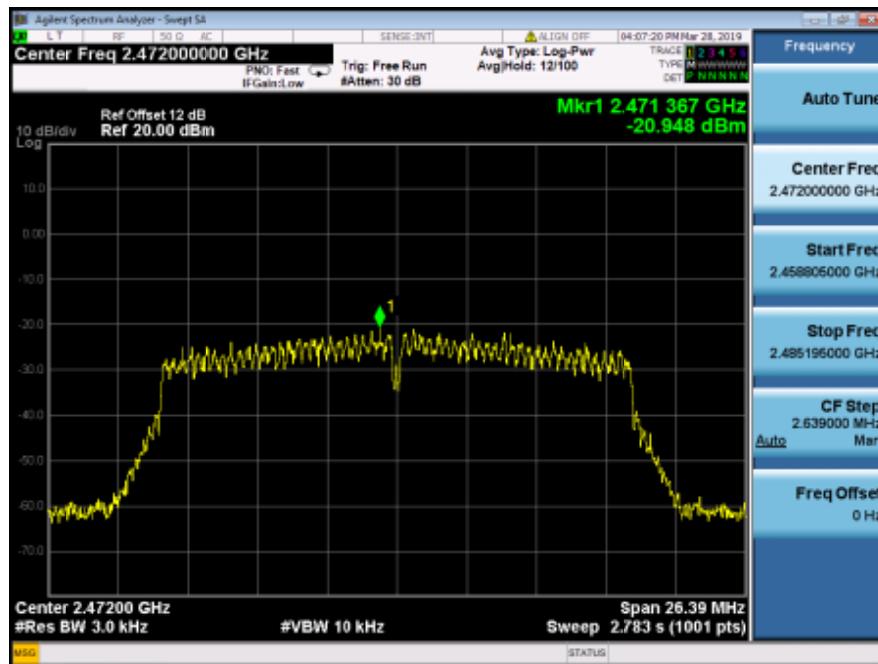
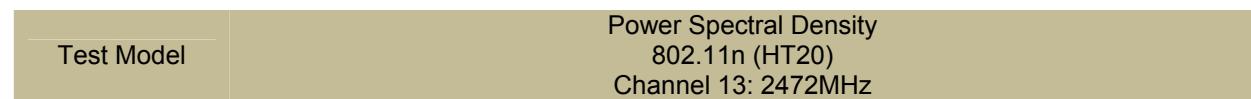
Power Spectral Density
802.11n (HT20)
Channel 11: 2462MHz



Test Model

Power Spectral Density
802.11n (HT20)
Channel 12: 2467MHz





8.4 UNWANTED EMISSIONS IN NON-RESTRICTED FREQUENCY BANDS

8.4.1 Applicable Standard

According to FCC Part15.247(d) and KDB558074 DTS 01 Meas. Guidance v05r02

8.4.2 Conformance Limit

According to FCC Part 15.247(d):

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.

8.4.3 Test Configuration

Test according to clause 7.1 radio frequency test setup 1

8.4.4 Test Procedure

The transmitter output (antenna port) was connected to the spectrum analyzer

■ Reference level measurement

Establish a reference level by using the following procedure:

Set instrument center frequency to DTS channel center frequency.

Set the span to ≥ 1.5 times the DTS bandwidth.

Set the RBW = 100 kHz.

Set the VBW $\geq 3 \times$ RBW.

Set Detector = peak.

Set Sweep time = auto couple.

Set Trace mode = max hold.

Allow trace to fully stabilize.

Use the peak marker function to determine the maximum PSD level.

Note that the channel found to contain the maximum PSD level can be used to establish the reference level.

■ Emission level measurement

Set the center frequency and span to encompass frequency range to be measured.

Set the RBW = 100 kHz.

Set the VBW = 300 kHz.

Set Detector = peak

Sweep time = auto couple.

Trace mode = max hold.

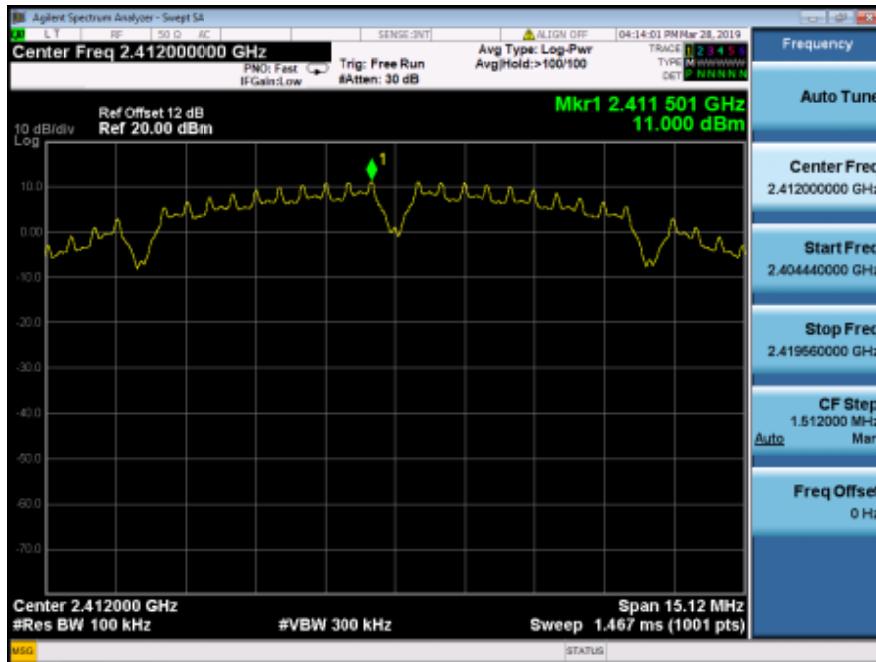
Allow trace to fully stabilize.

Use the peak marker function to determine the maximum amplitude level.

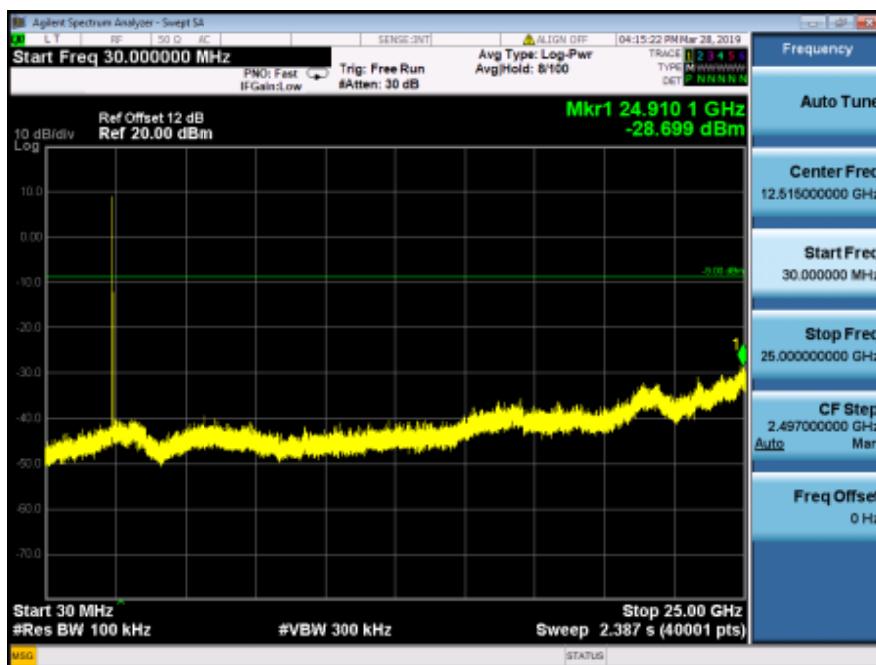
Ensure that the amplitude of all unwanted emissions outside of the authorized frequency band (excluding restricted frequency bands) are attenuated by at least the minimum requirements . Report the three highest emissions relative to the limit.

8.4.5 Test Results

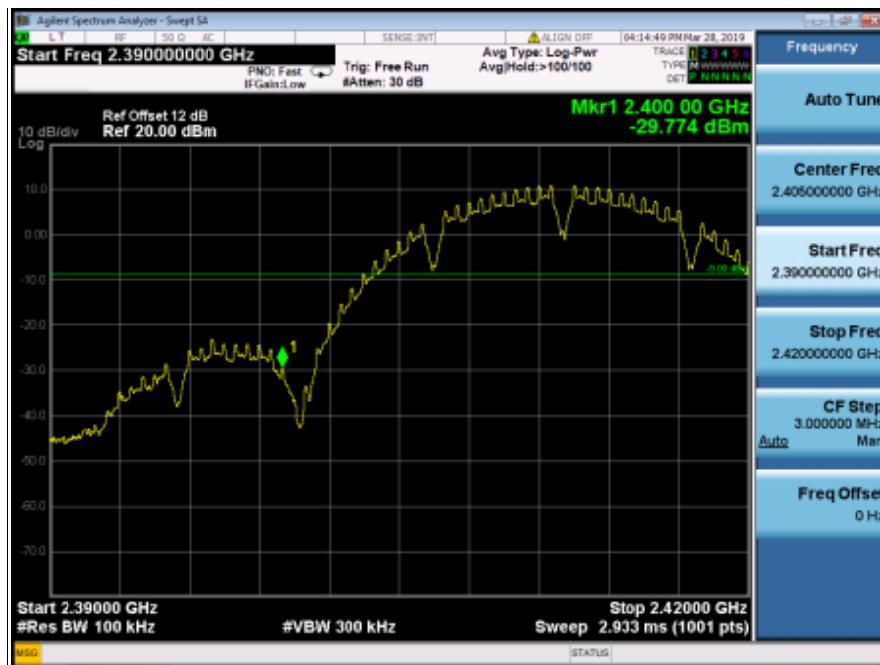
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	<input checked="" type="checkbox"/> Channel 1: 2412MHz			



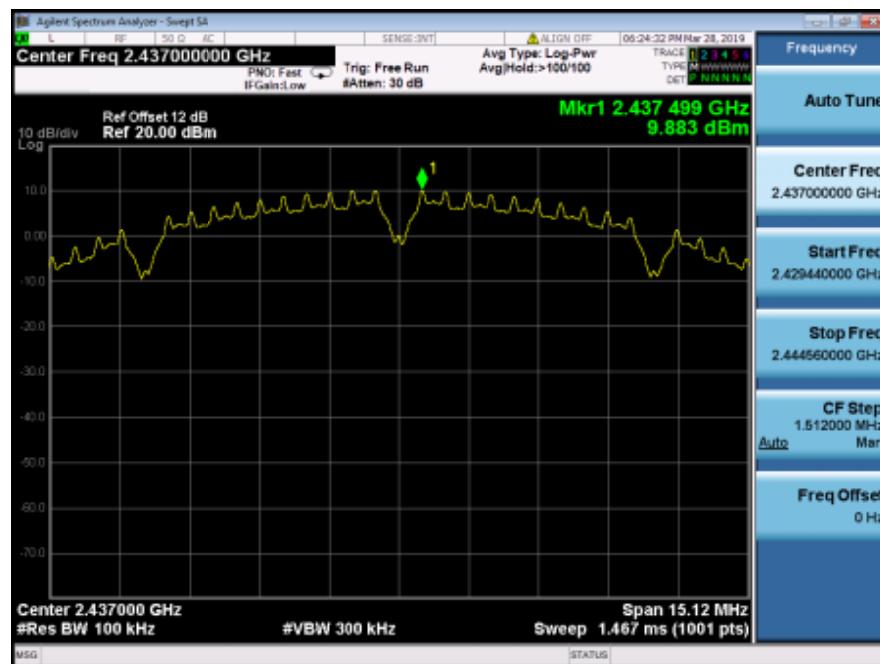
Test Model	Unwanted Emissions in non-restricted frequency bands			
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Test Model 802.11b 802.11g 802.11n(HT20) 802.11n(HT40)
 Channel 1: 2412MHz

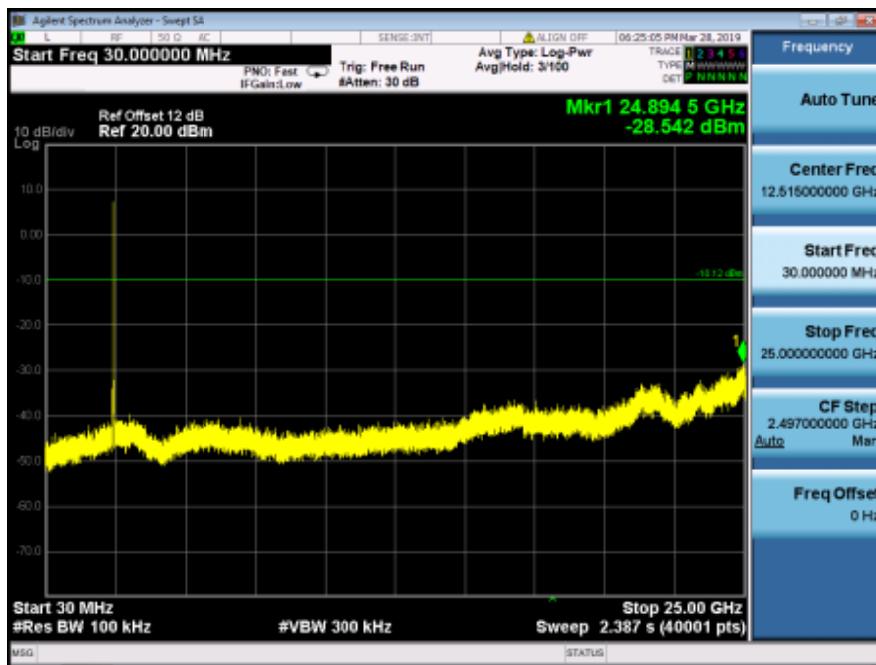


Test Model 802.11b 802.11g 802.11n(HT20) 802.11n(HT40)
Channel 6: 2437MHz



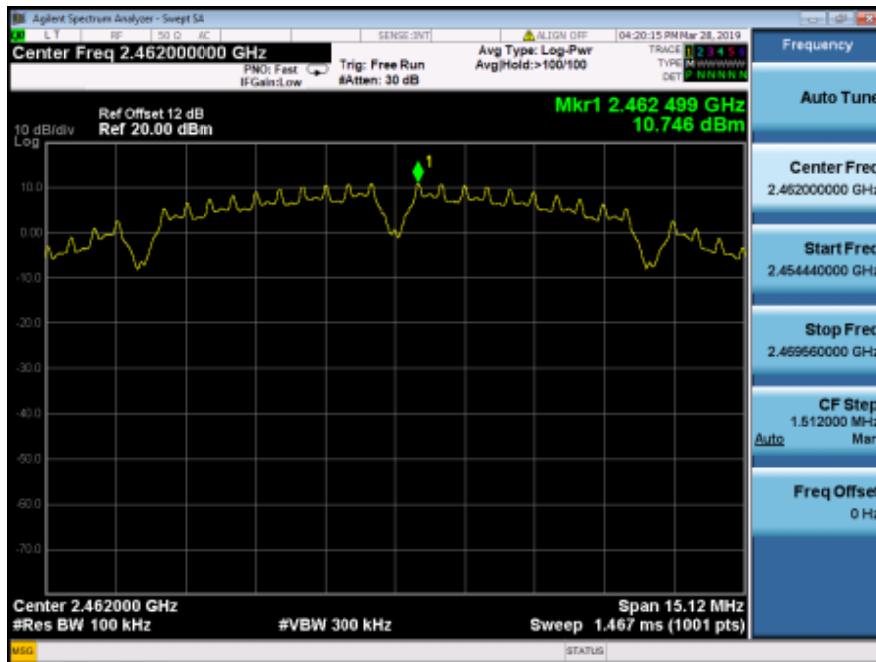
Test Model 802.11b 802.11g 802.11n(HT20) 802.11n(HT40)
Channel 6: 2437MHz

Unwanted Emissions In Non-Restricted Frequency Bands

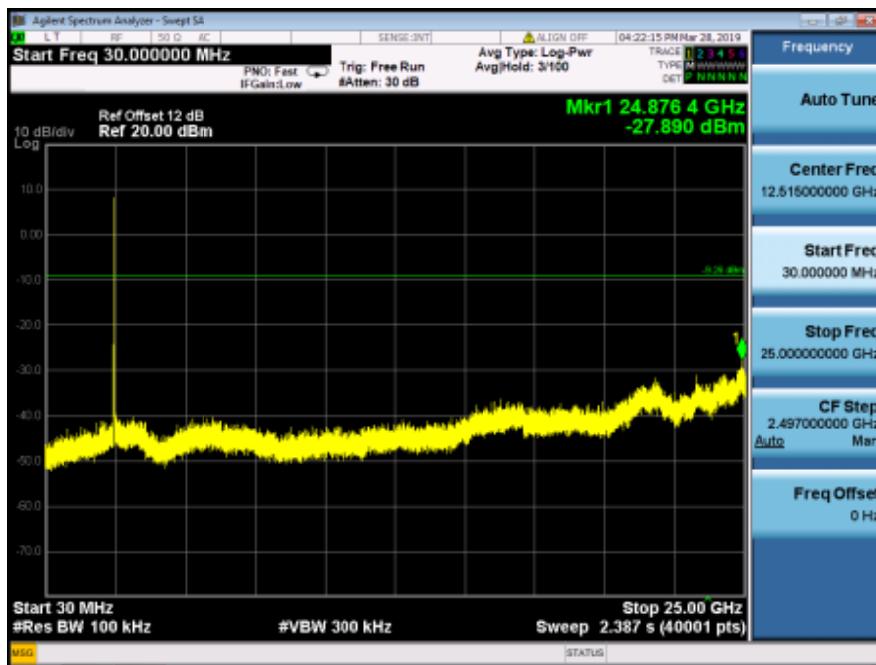


Test Model 802.11b 802.11g 802.11n(HT20) 802.11n(HT40)
 Channel 11: 2462MHz

PSD(Power Spectral Density) RBW=100kHz



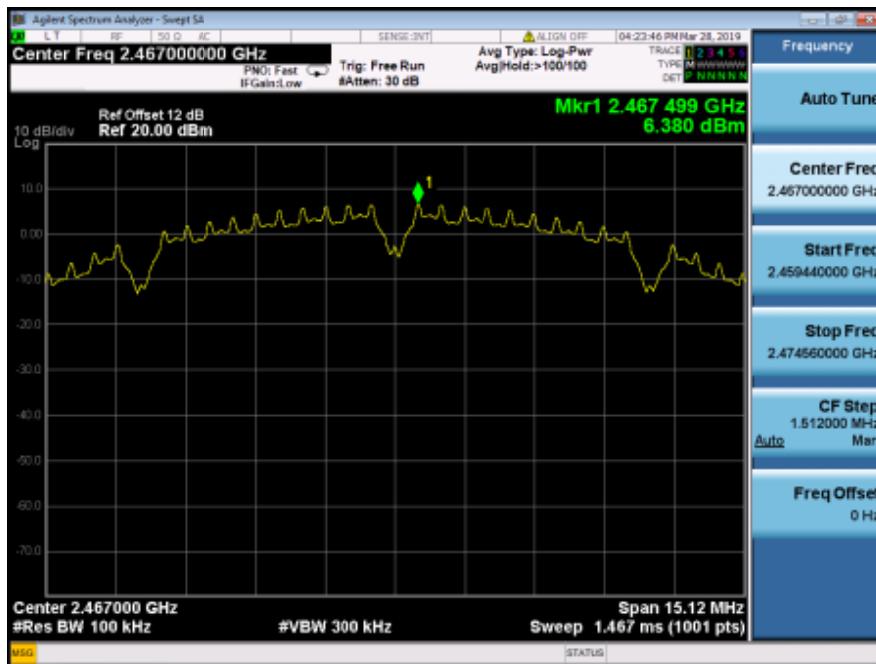
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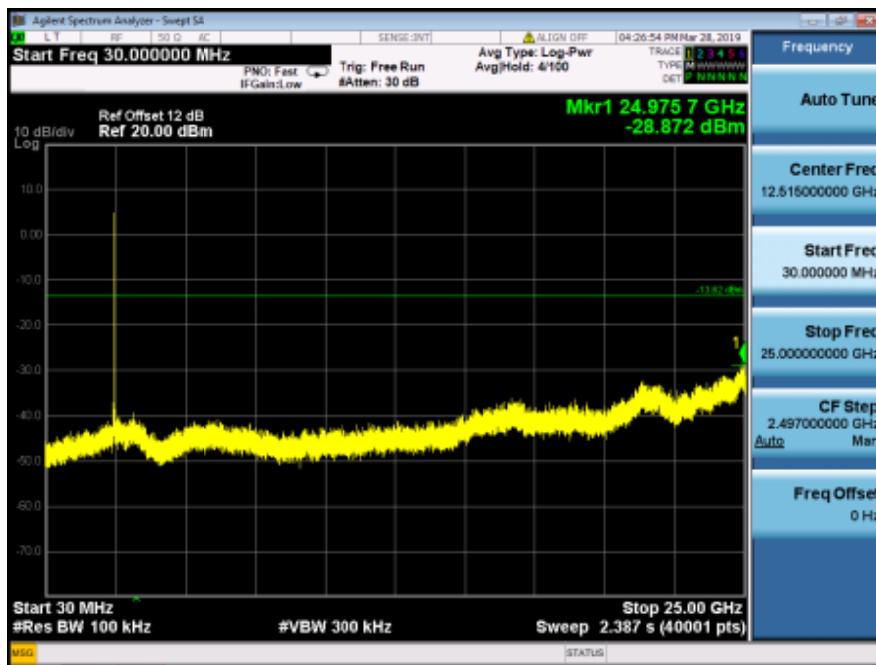
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	<input checked="" type="checkbox"/> Channel 11: 2462MHz			



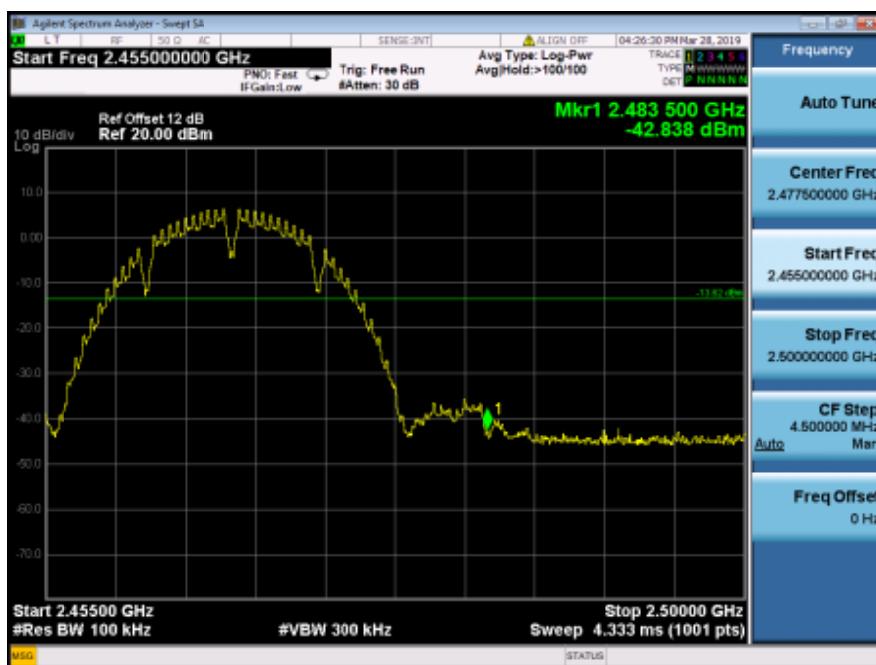
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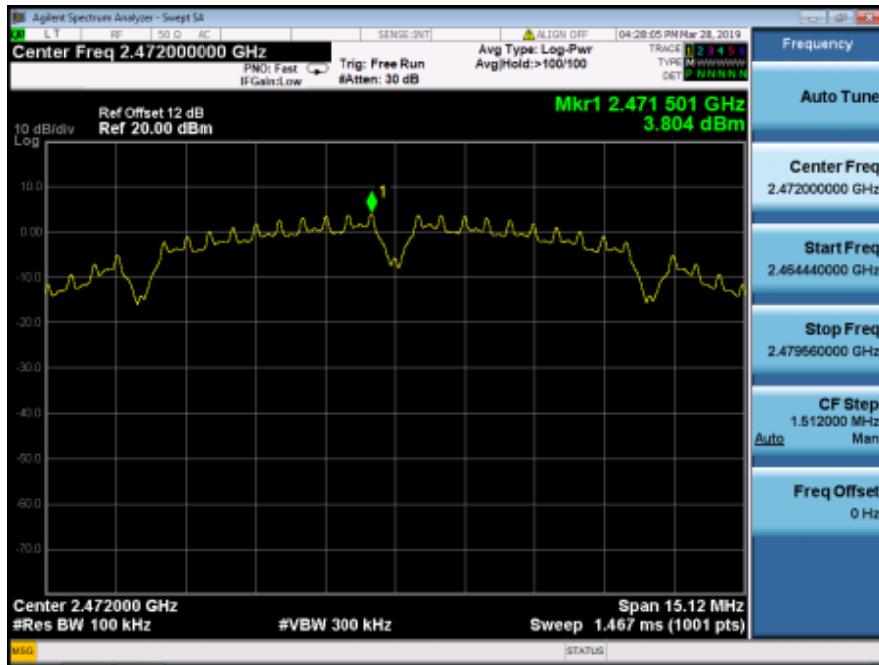
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	<input checked="" type="checkbox"/> Channel 12: 2467MHz			



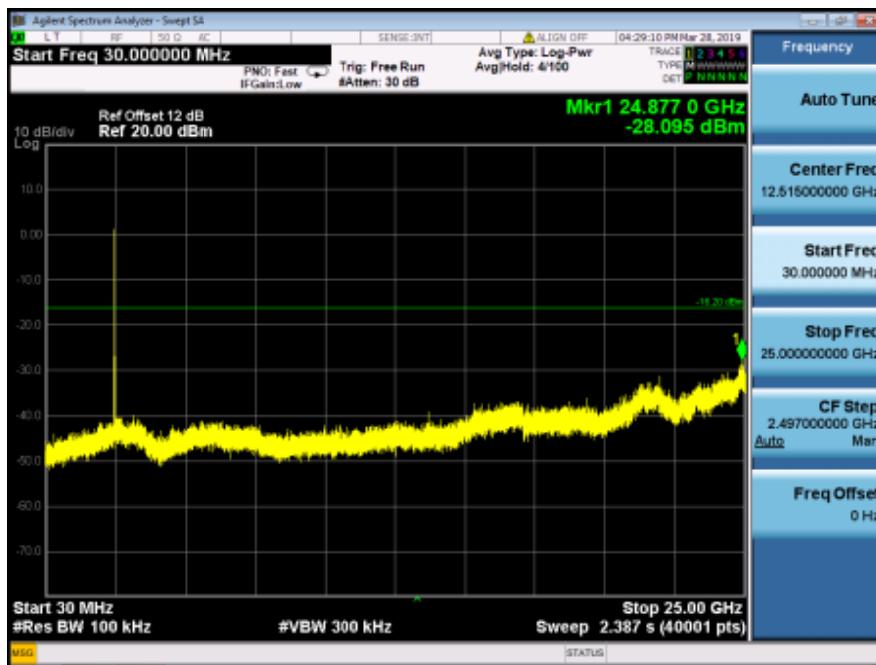
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	<input checked="" type="checkbox"/> Channel 12: 2467MHz			



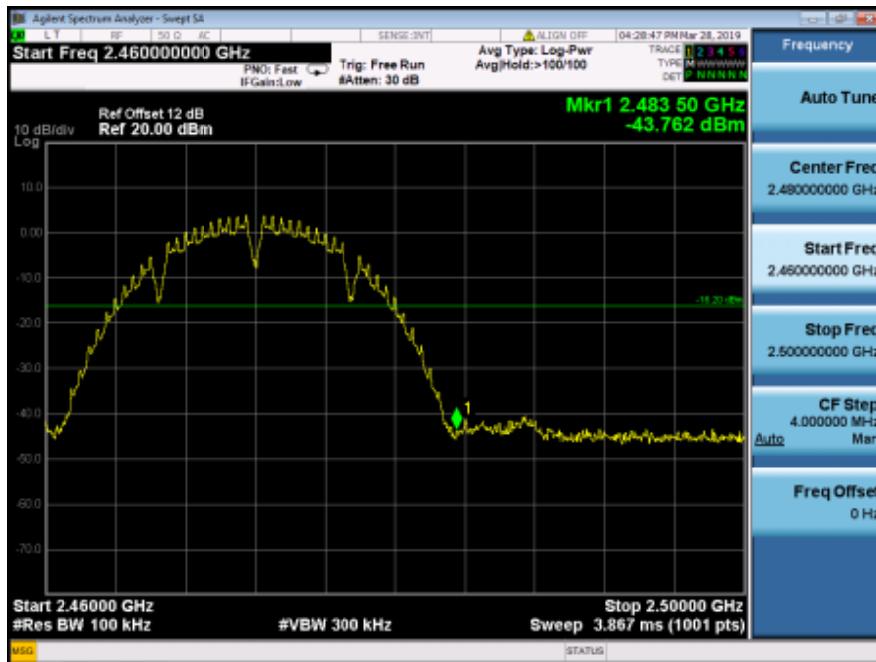
Test Model	<input checked="" type="checkbox"/> 802.11b	<input type="checkbox"/> 802.11g	<input type="checkbox"/> 802.11n(HT20)	<input type="checkbox"/> 802.11n(HT40)
	<input checked="" type="checkbox"/> Channel 13: 2472MHz			



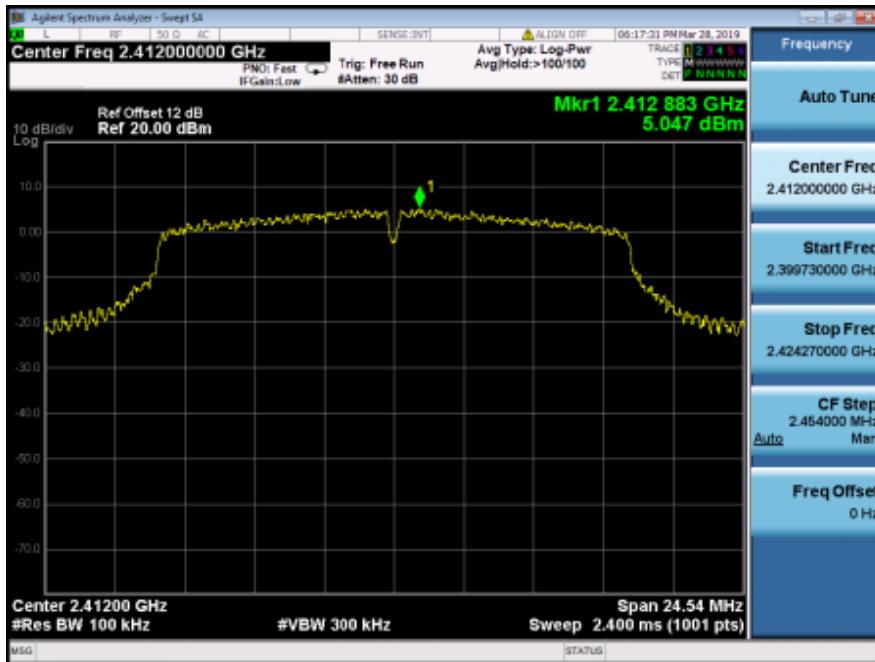
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	<input checked="" type="checkbox"/> Channel 13: 2472MHz			



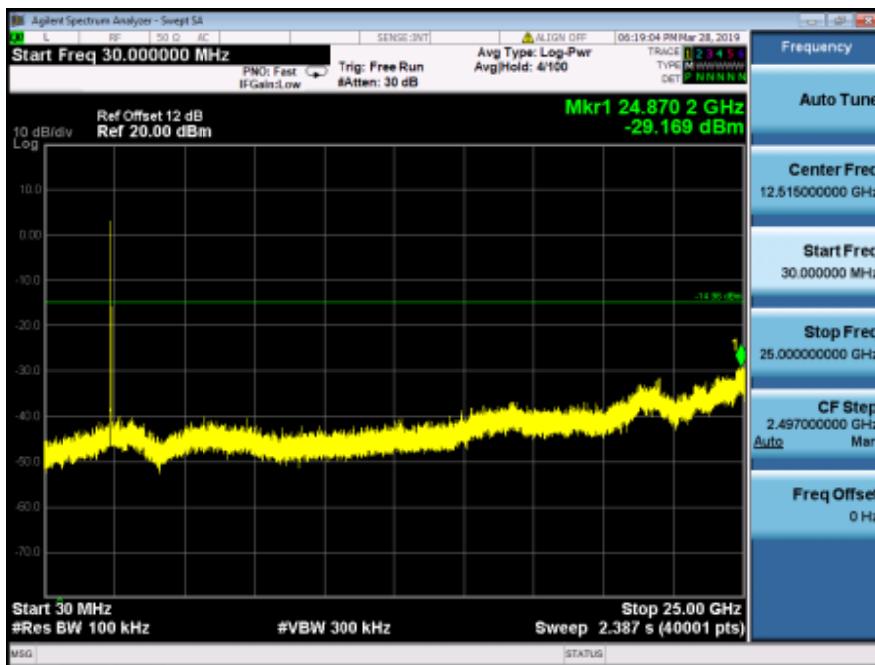
Test Model	<input checked="" type="checkbox"/> 802.11b	<input type="checkbox"/> 802.11g	<input type="checkbox"/> 802.11n(HT20)	<input type="checkbox"/> 802.11n(HT40)
	<input checked="" type="checkbox"/> Channel 13: 2472MHz			



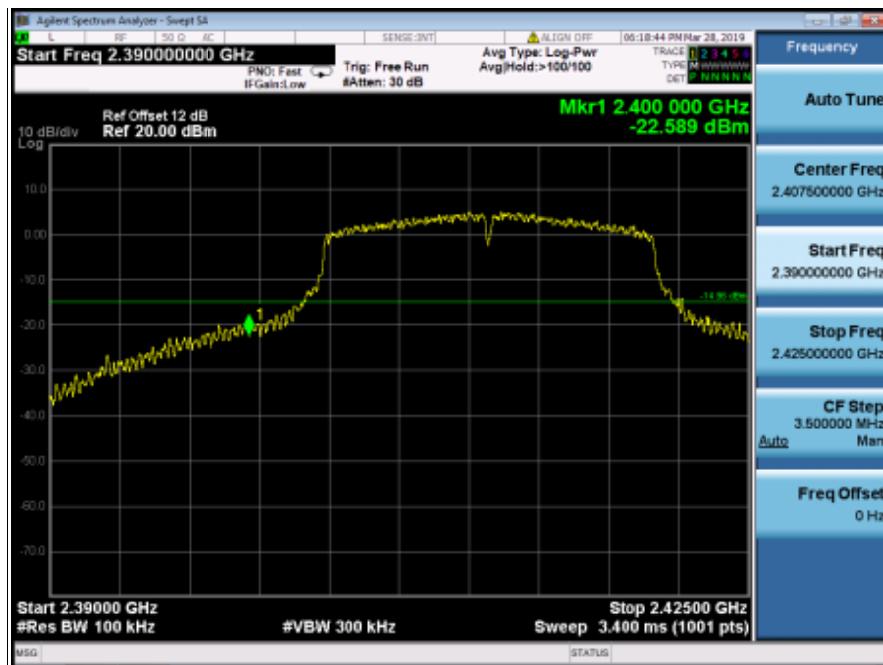
Test Model	<input type="checkbox"/> 802.11b	<input checked="" type="checkbox"/> 802.11g	<input type="checkbox"/> 802.11n(HT20)	<input type="checkbox"/> 802.11n(HT40)
	<input checked="" type="checkbox"/> Channel 1: 2412MHz			



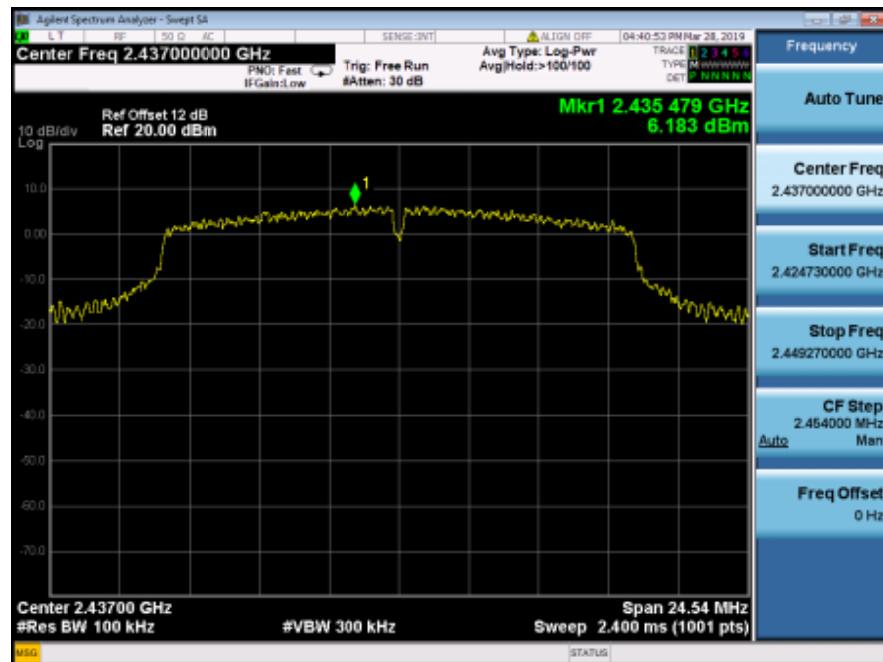
Test Model	Unwanted Emissions in non-restricted frequency bands			
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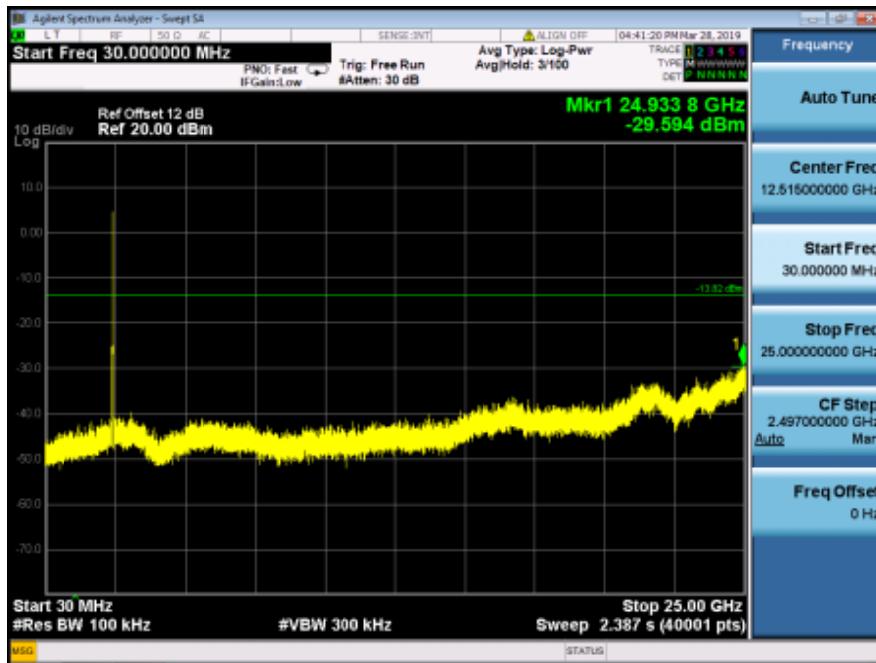
Test Model 802.11b 802.11g 802.11n(HT20) 802.11n(HT40)
 Channel 1: 2412MHz



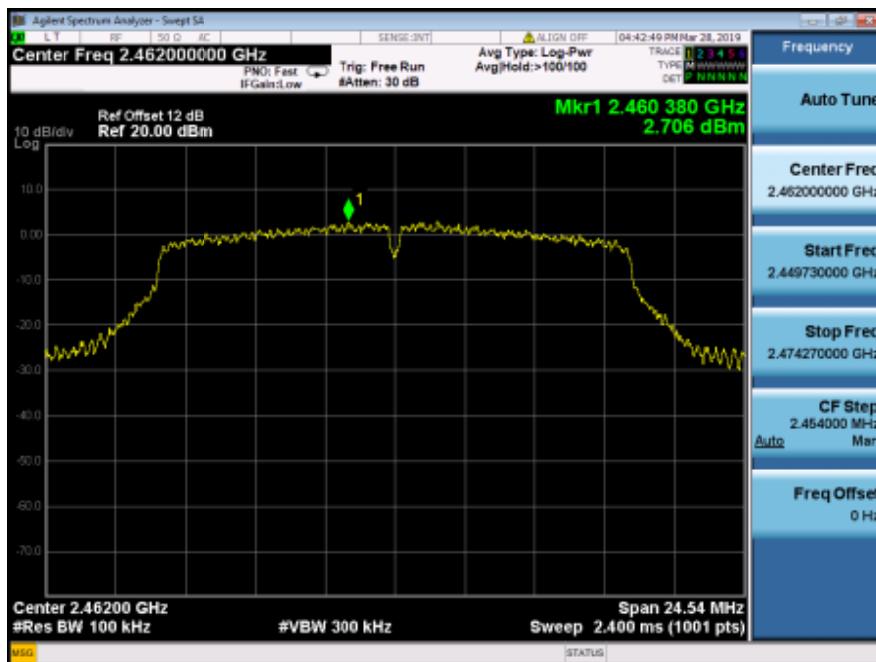
Test Model PSD(Power Spectral Density) RBW=100kHz
 802.11b 802.11g 802.11n(HT20) 802.11n(HT40)
 Channel 6: 2437MHz



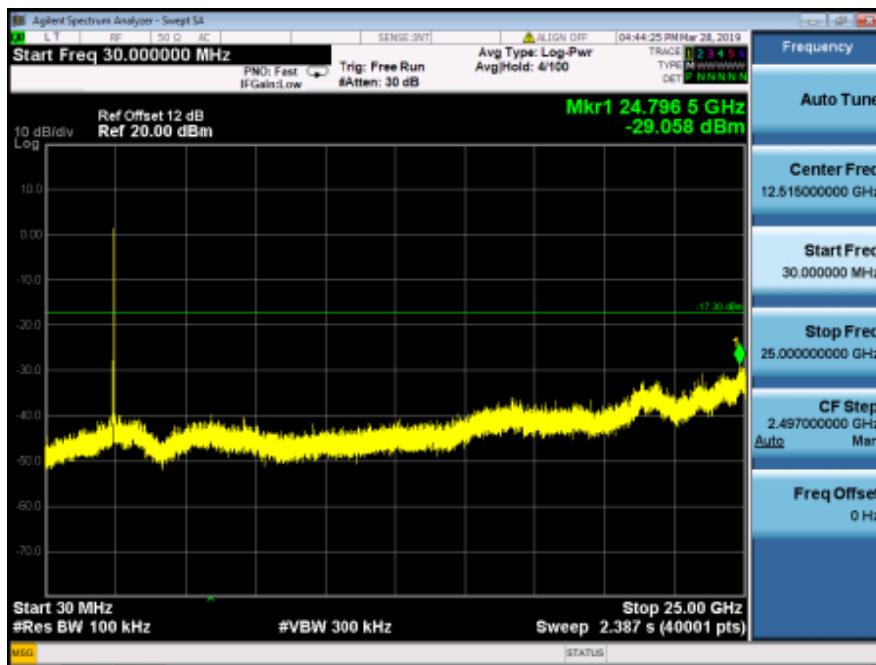
Test Model 802.11b 802.11g 802.11n(HT20) 802.11n(HT40)
Channel 6: 2437MHz



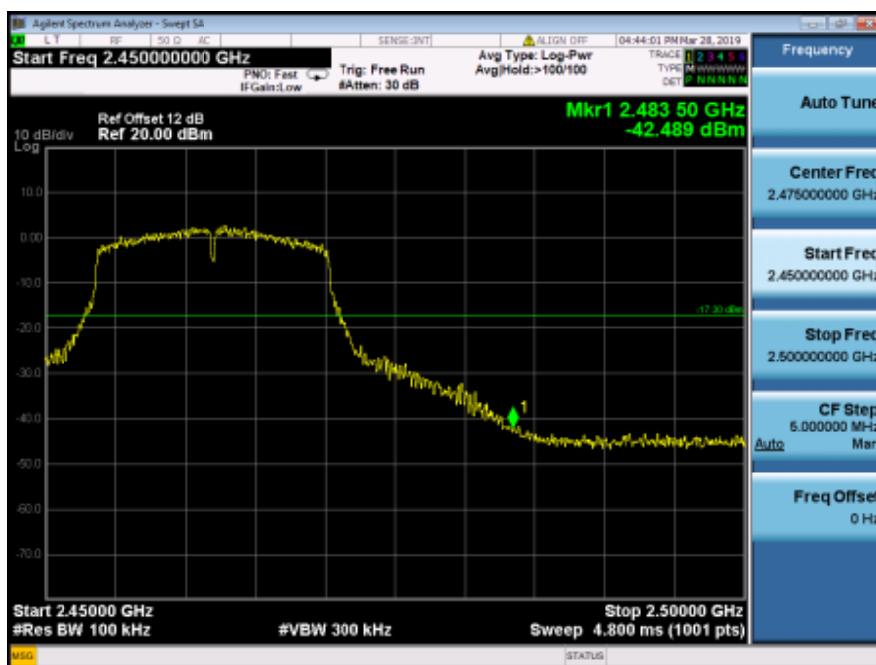
Test Model 802.11b 802.11g 802.11n(HT20) 802.11n(HT40)
Channel 11: 2462MHz



Test Model	<input type="checkbox"/> 802.11b	<input checked="" type="checkbox"/> 802.11g	<input type="checkbox"/> 802.11n(HT20)	<input type="checkbox"/> 802.11n(HT40)
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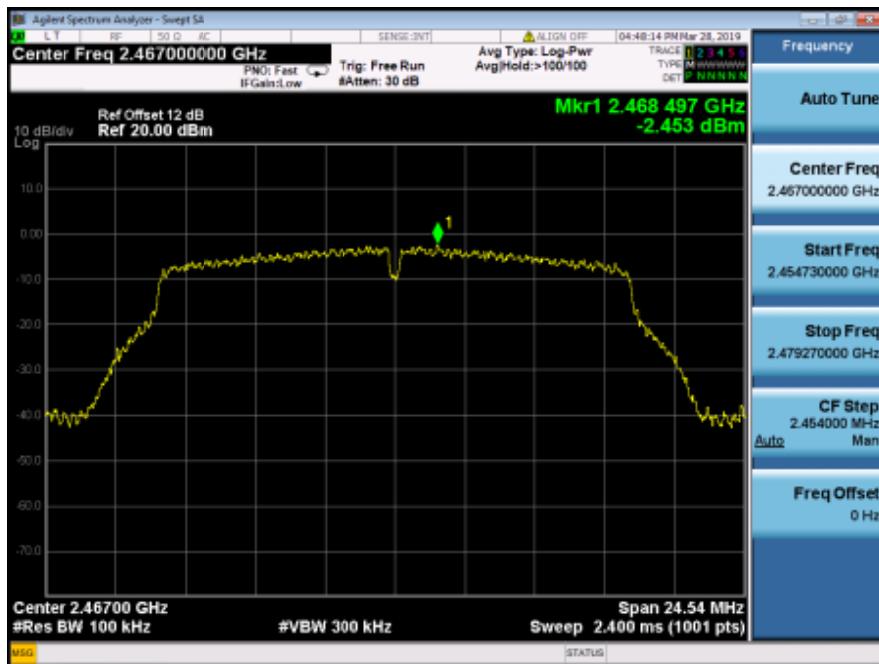


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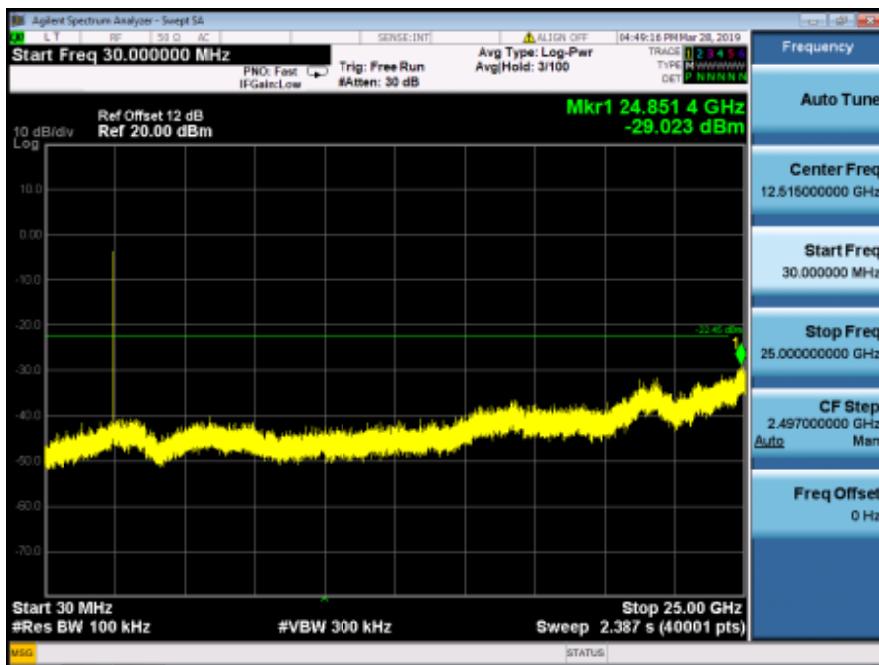


Test Model	PSD(Power Spectral Density) RBW=100kHz			
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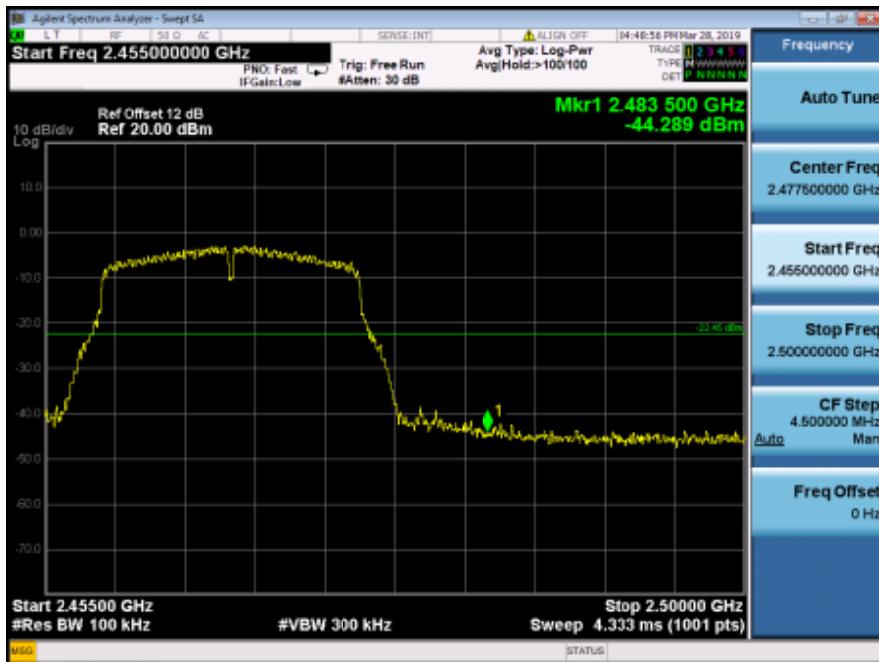
Channel 12: 2467MHz



Test Model	<input type="checkbox"/> 802.11b	<input checked="" type="checkbox"/> 802.11g	<input type="checkbox"/> 802.11n(HT20)	<input type="checkbox"/> 802.11n(HT40)
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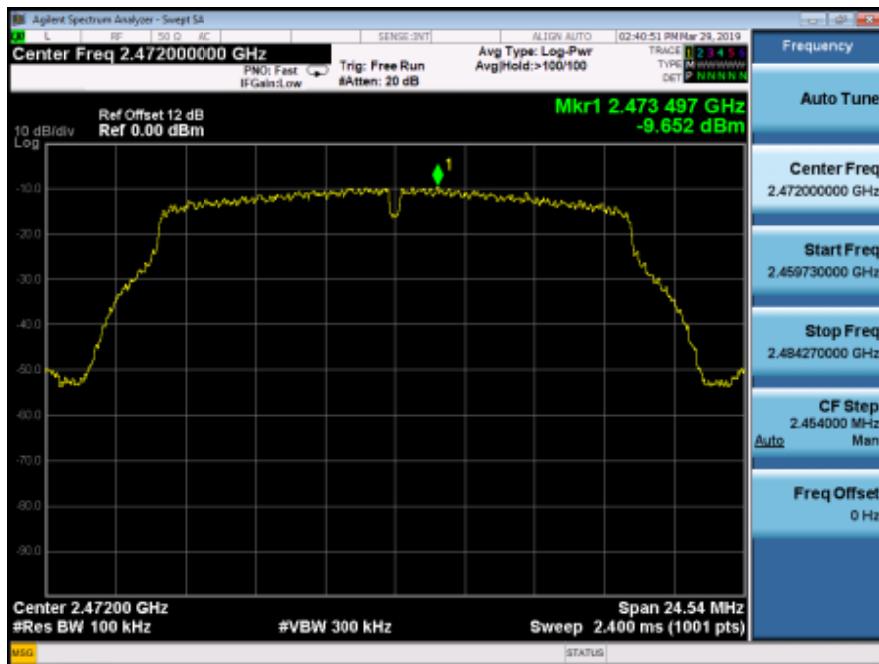


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	<input checked="" type="checkbox"/> Channel 12: 2467MHz			

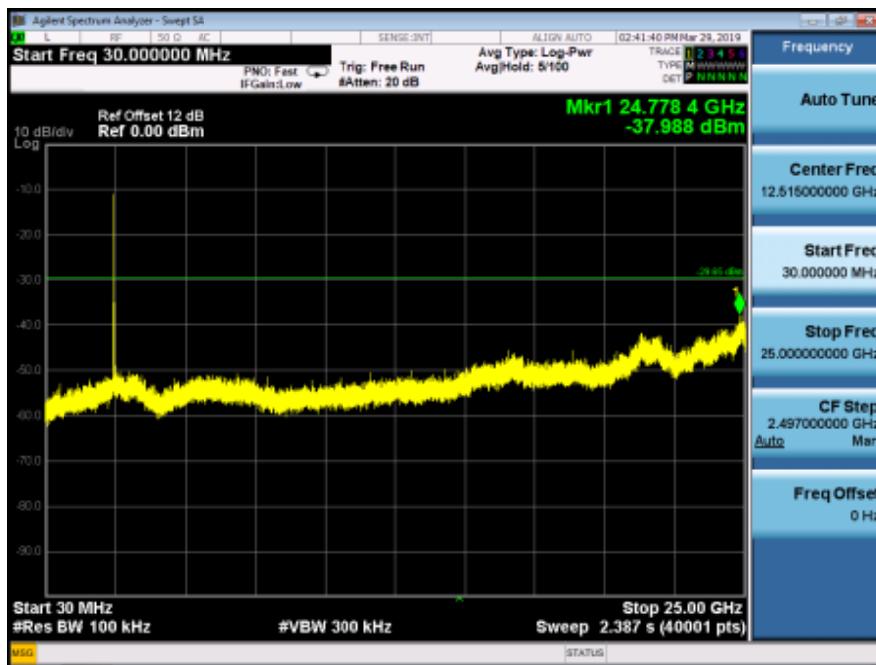


Test Model	PSD(Power Spectral Density) RBW=100kHz			
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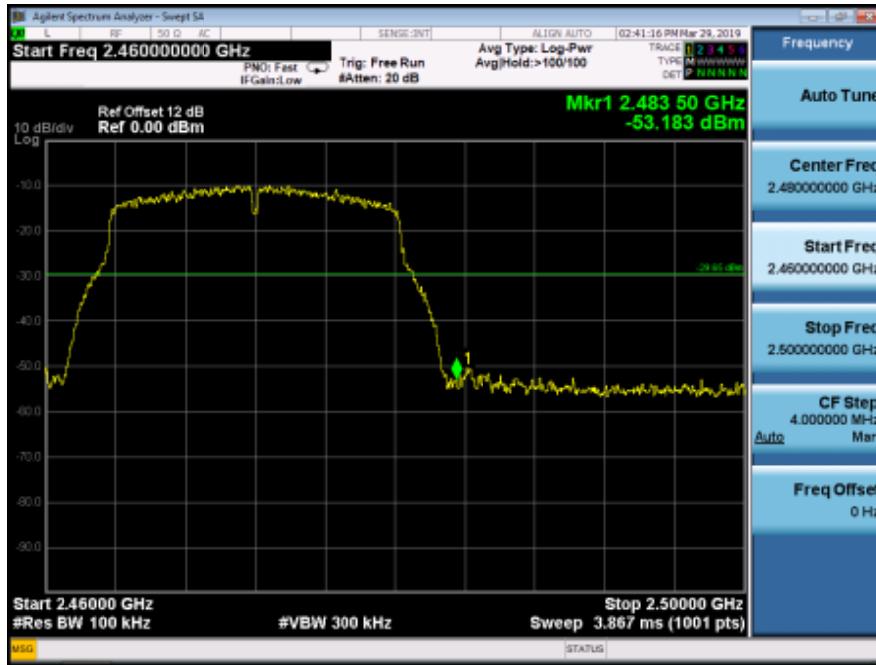
Channel 13: 2472MHz



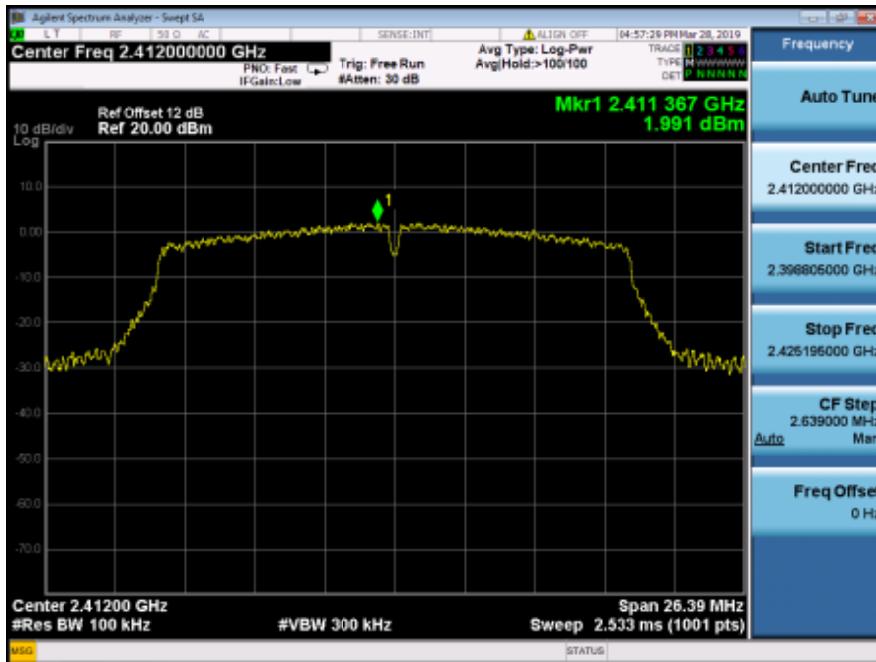
Test Model	<input type="checkbox"/> 802.11b	<input checked="" type="checkbox"/> 802.11g	<input type="checkbox"/> 802.11n(HT20)	<input type="checkbox"/> 802.11n(HT40)
	<input checked="" type="checkbox"/> Channel 13: 2472MHz			



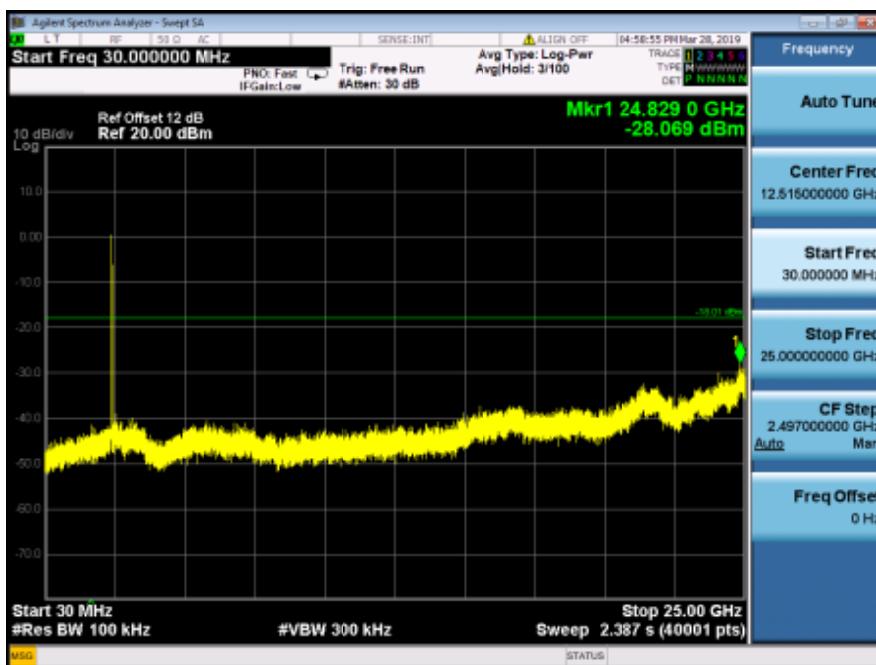
Test Model	<input type="checkbox"/> 802.11b	<input checked="" type="checkbox"/> 802.11g	<input type="checkbox"/> 802.11n(HT20)	<input type="checkbox"/> 802.11n(HT40)
	<input checked="" type="checkbox"/> Channel 13: 2472MHz			



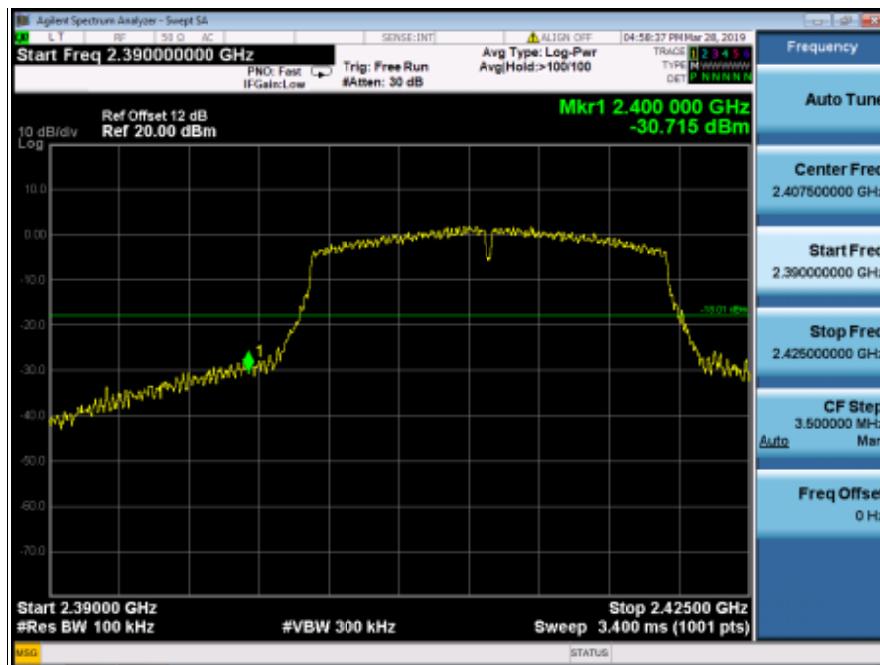
Test Model	<input type="checkbox"/> 802.11b	<input type="checkbox"/> 802.11g	<input type="checkbox"/> 802.11n(HT20)	<input type="checkbox"/> 802.11n(HT40)
	<input checked="" type="checkbox"/> Channel 1: 2412MHz			



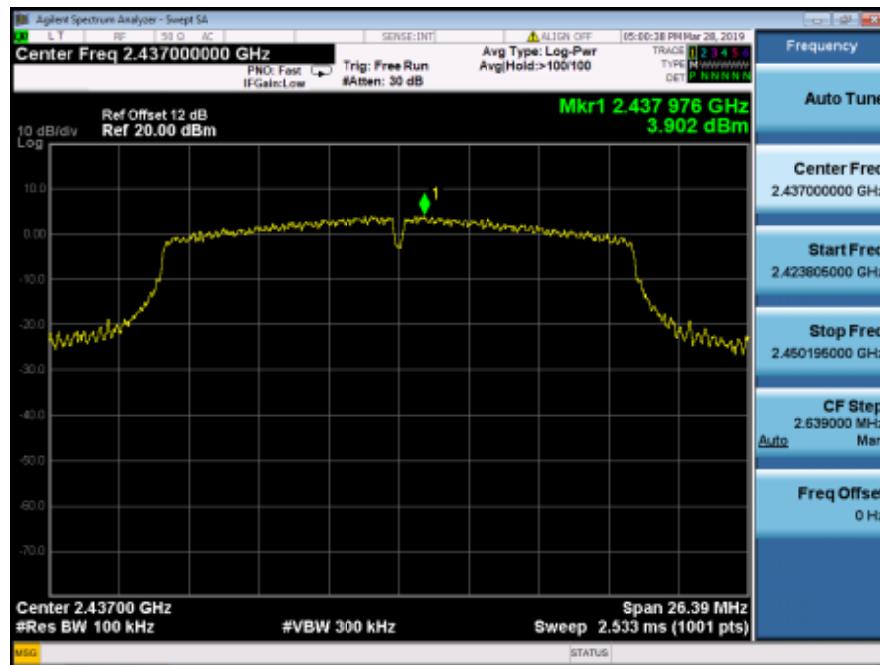
Test Model	Unwanted Emissions in non-restricted frequency bands			
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	<input checked="" type="checkbox"/> Channel 1: 2412MHz			



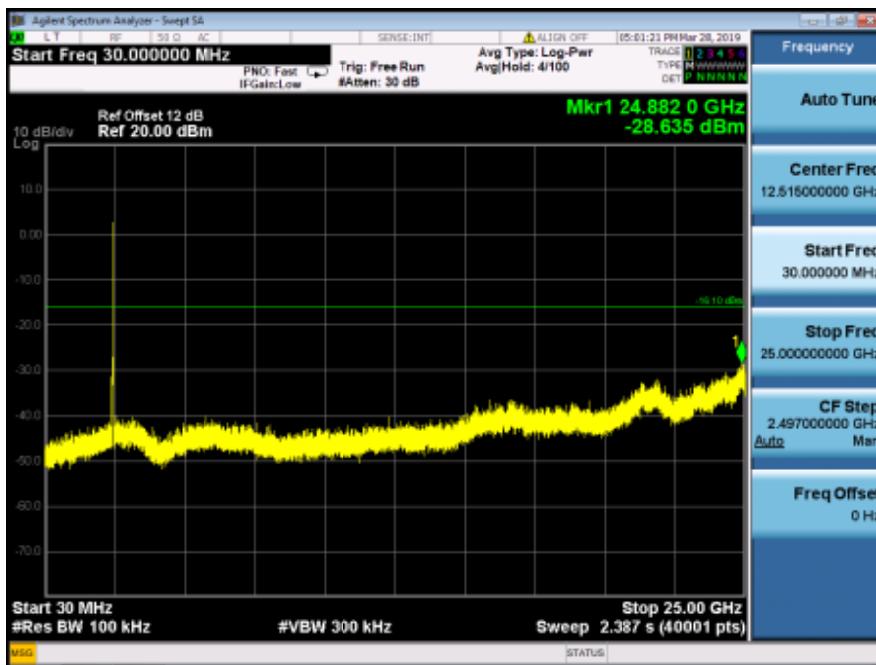
Test Model	<input type="checkbox"/> 802.11b	<input type="checkbox"/> 802.11g	<input type="checkbox"/> Band edge 802.11n(HT20)	<input type="checkbox"/> 802.11n(HT40)
	<input checked="" type="checkbox"/> Channel 1: 2412MHz			



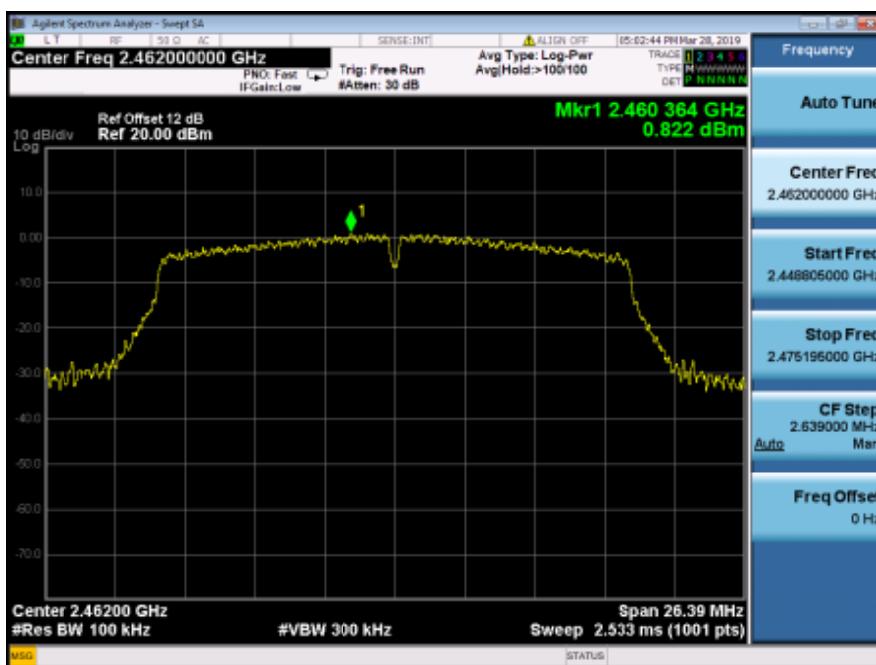
Test Model	<input type="checkbox"/> 802.11b	<input type="checkbox"/> 802.11g	<input checked="" type="checkbox"/> 802.11n(HT20)	<input type="checkbox"/> 802.11n(HT40)
	Channel 6: 2437MHz			



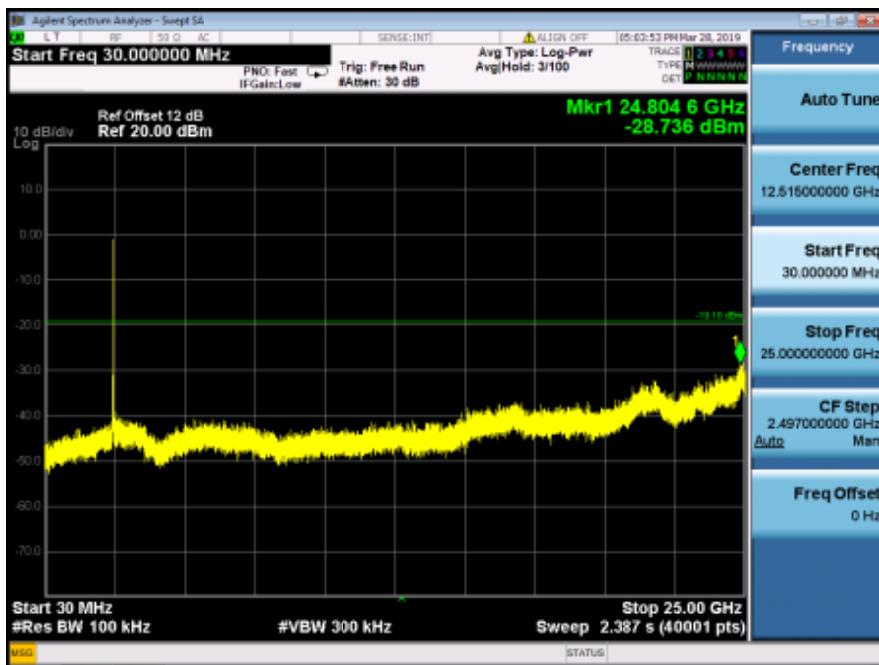
Test Model 802.11b 802.11g 802.11n(HT20) 802.11n(HT40)
Channel 6: 2437MHz



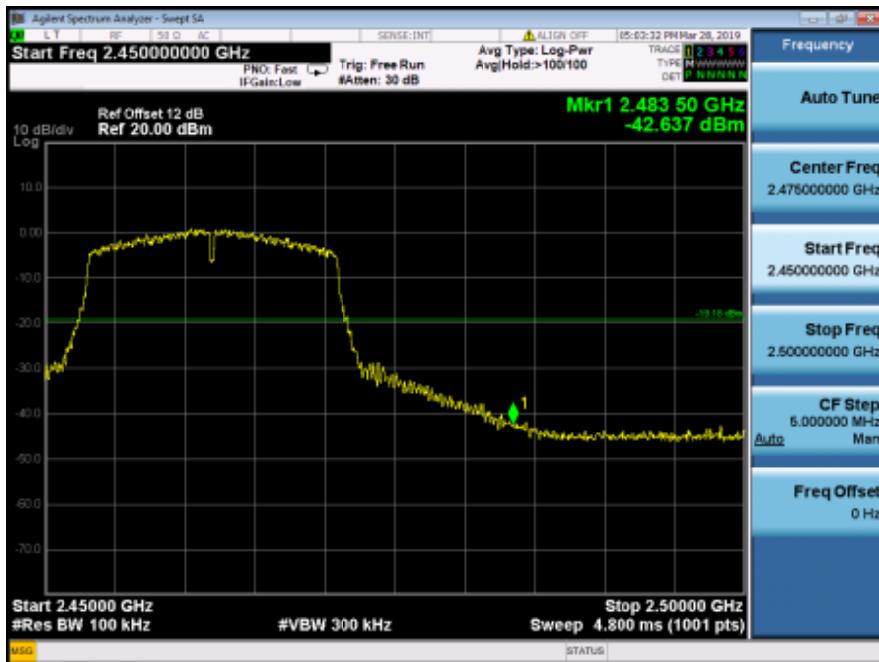
Test Model 802.11b 802.11g 802.11n(HT20) 802.11n(HT40)
 Channel 11: 2462MHz



Test Model	<input type="checkbox"/> 802.11b	<input type="checkbox"/> 802.11g	<input type="checkbox"/> 802.11n(HT20)	<input type="checkbox"/> 802.11n(HT40)
	<input checked="" type="checkbox"/> Channel 11: 2462MHz			

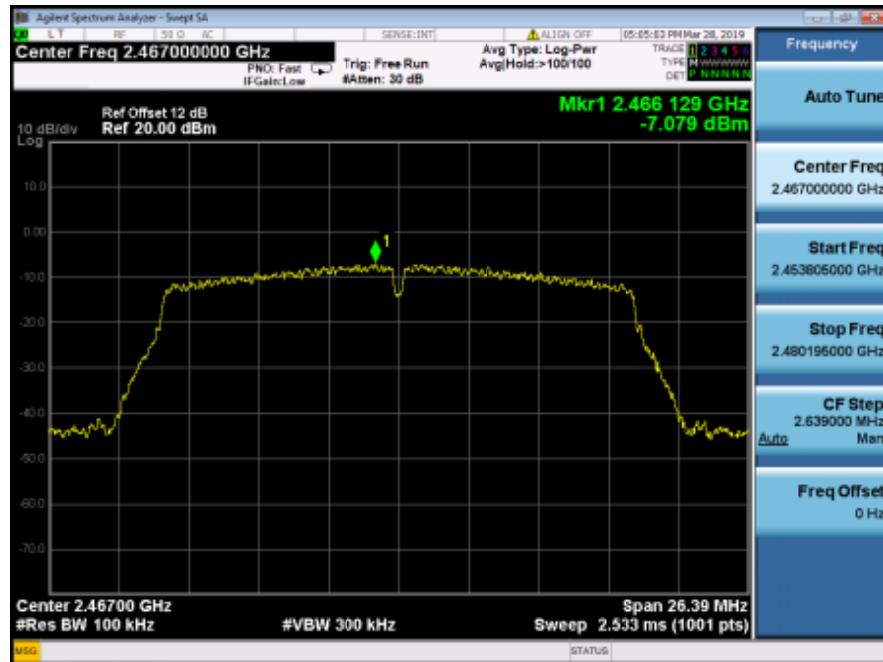


Test Model	<input type="checkbox"/> 802.11b	<input type="checkbox"/> 802.11g	<input type="checkbox"/> 802.11n(HT20)	<input type="checkbox"/> 802.11n(HT40)
	<input checked="" type="checkbox"/> Channel 11: 2462MHz			

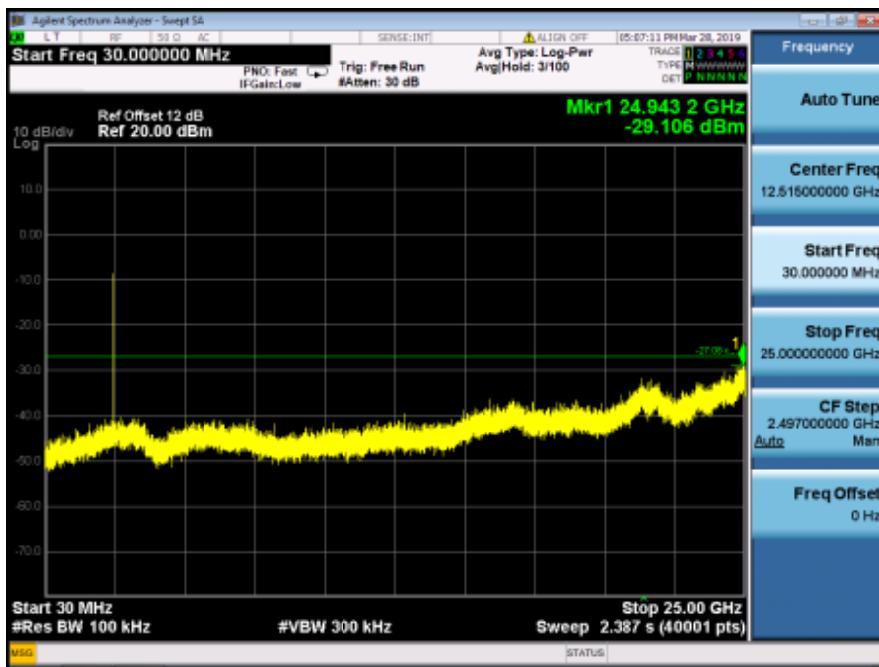


Test Model	PSD(Power Spectral Density) RBW=100kHz			
	<input type="checkbox"/> 802.11b	<input type="checkbox"/> 802.11g	<input checked="" type="checkbox"/> 802.11n(HT20)	<input type="checkbox"/> 802.11n(HT40)

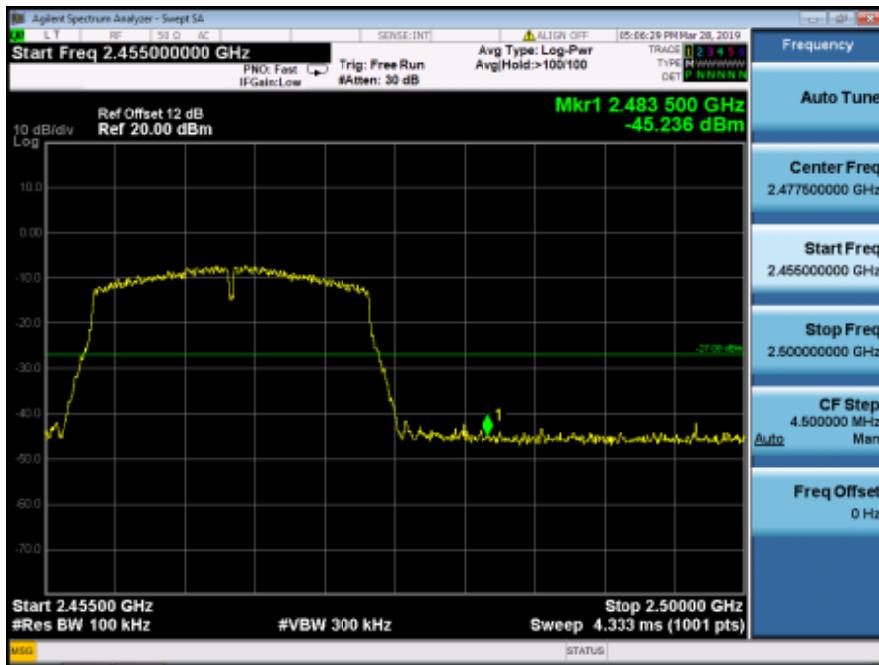
Channel 12: 2467MHz



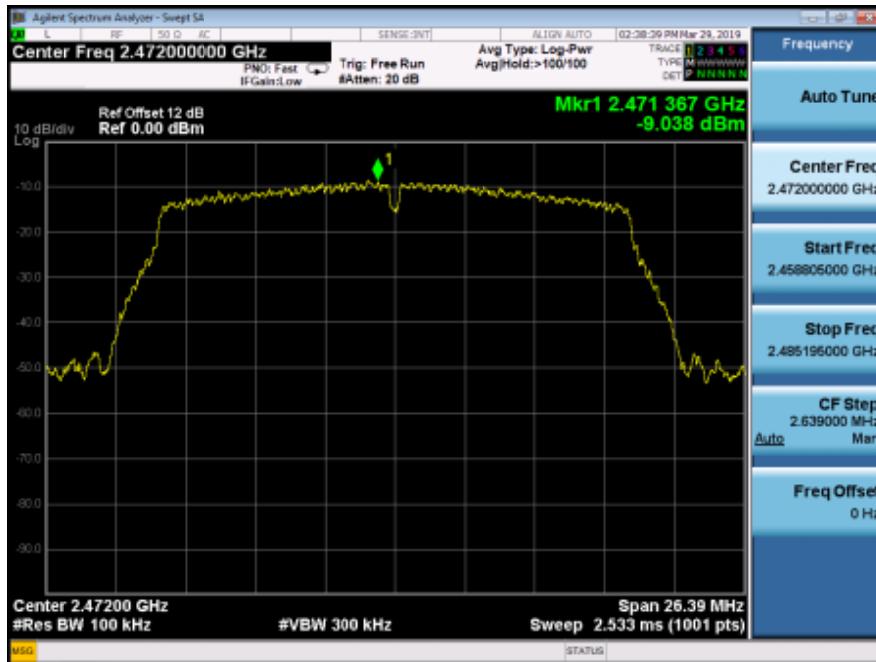
Test Model	<input type="checkbox"/> 802.11b	<input type="checkbox"/> 802.11g	<input checked="" type="checkbox"/> 802.11n(HT20)	<input type="checkbox"/> 802.11n(HT40)
	<input checked="" type="checkbox"/> Channel 12: 2467MHz			



Test Model	<input type="checkbox"/> 802.11b	<input type="checkbox"/> 802.11g	<input checked="" type="checkbox"/> 802.11n(HT20)	<input type="checkbox"/> 802.11n(HT40)
	<input checked="" type="checkbox"/> Channel 12: 2467MHz			

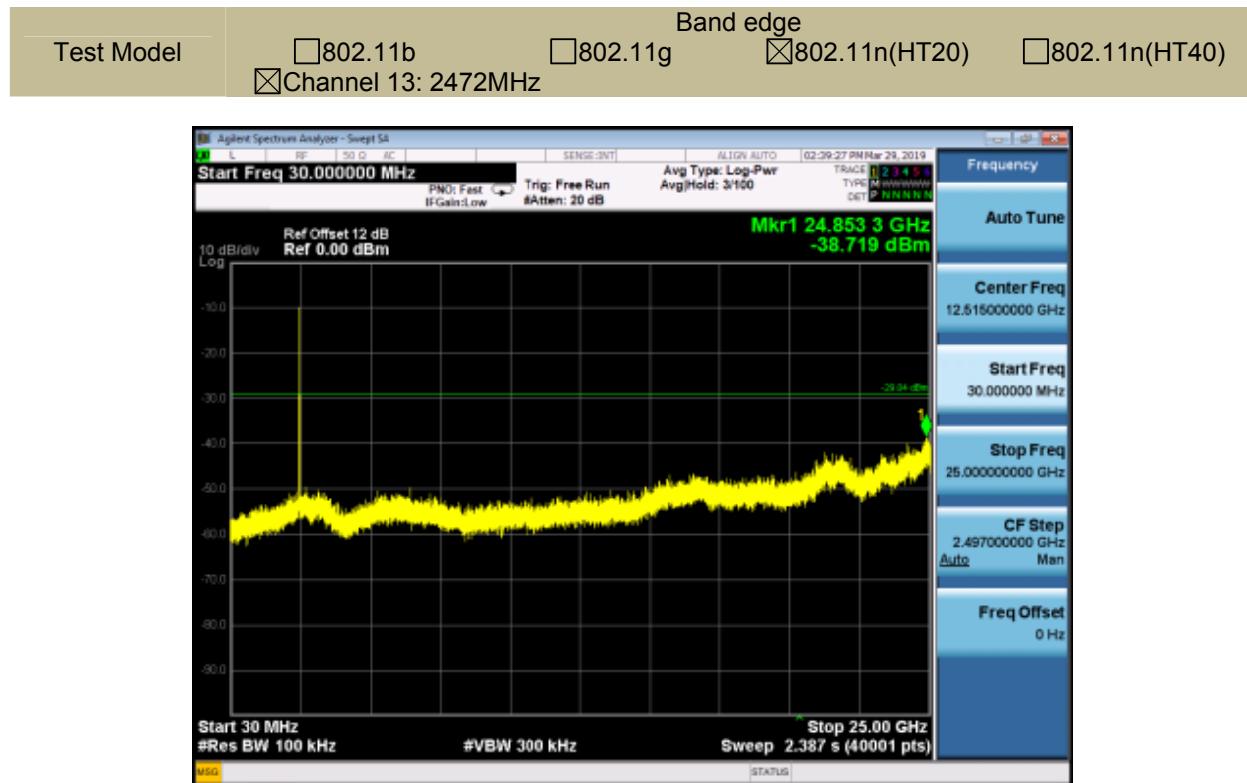


Test Model	<input type="checkbox"/> 802.11b	<input type="checkbox"/> 802.11g	<input checked="" type="checkbox"/> 802.11n(HT20)	<input type="checkbox"/> 802.11n(HT40)
	<input checked="" type="checkbox"/> Channel 13: 2472MHz			



Test Model	<input type="checkbox"/> 802.11b	<input type="checkbox"/> 802.11g	<input checked="" type="checkbox"/> 802.11n(HT20)	<input type="checkbox"/> 802.11n(HT40)
	<input checked="" type="checkbox"/> Channel 13: 2472MHz			





8.5 CONDUCTED EMISSIONS TEST

8.5.1 Applicable Standard

According to FCC Part 15.207(a)

8.5.2 Conformance Limit

Conducted Emission Limit		
Frequency(MHz)	Quasi-peak	Average
0.15-0.5	66-56	56-46
0.5-5.0	56	46
5.0-30.0	60	50

Note: 1. The lower limit shall apply at the transition frequencies

2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

8.5.3 Test Configuration

Test according to clause 7.3 conducted emission test setup

8.5.4 Test Procedure

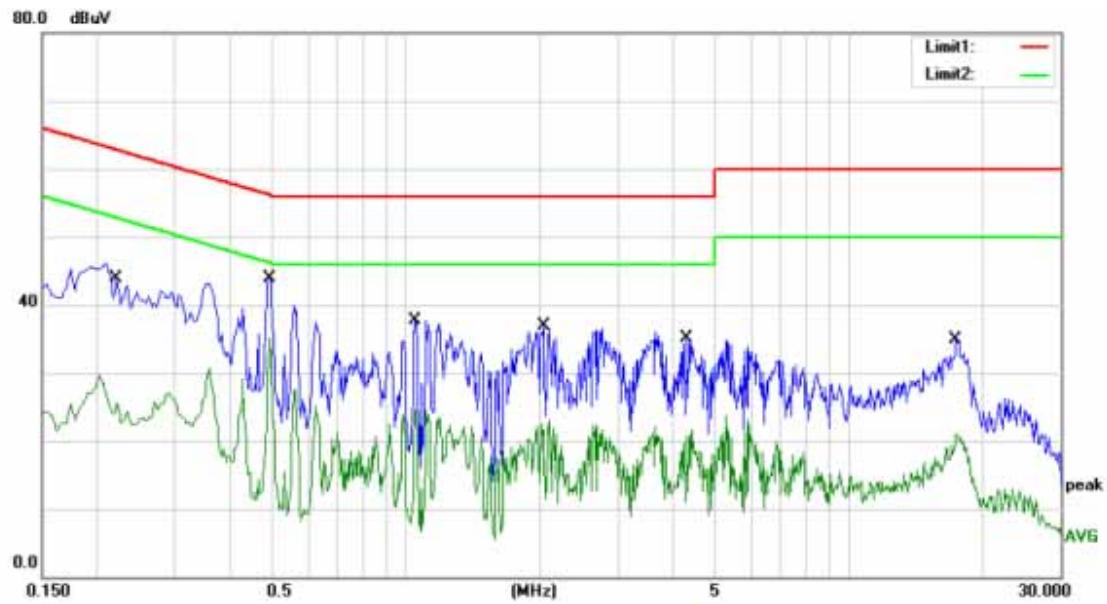
The EUT was placed on a table which is 0.8m above ground plane.

Maximum procedure was performed on the highest emissions to ensure EUT compliance.

Repeat above procedures until all frequency measured were complete.

8.5.5 Test Results

Pass



Site Conduction #1

Phase: **L1**

Temperature: 24.9C

Limit: (CE)FCC PART 15.207

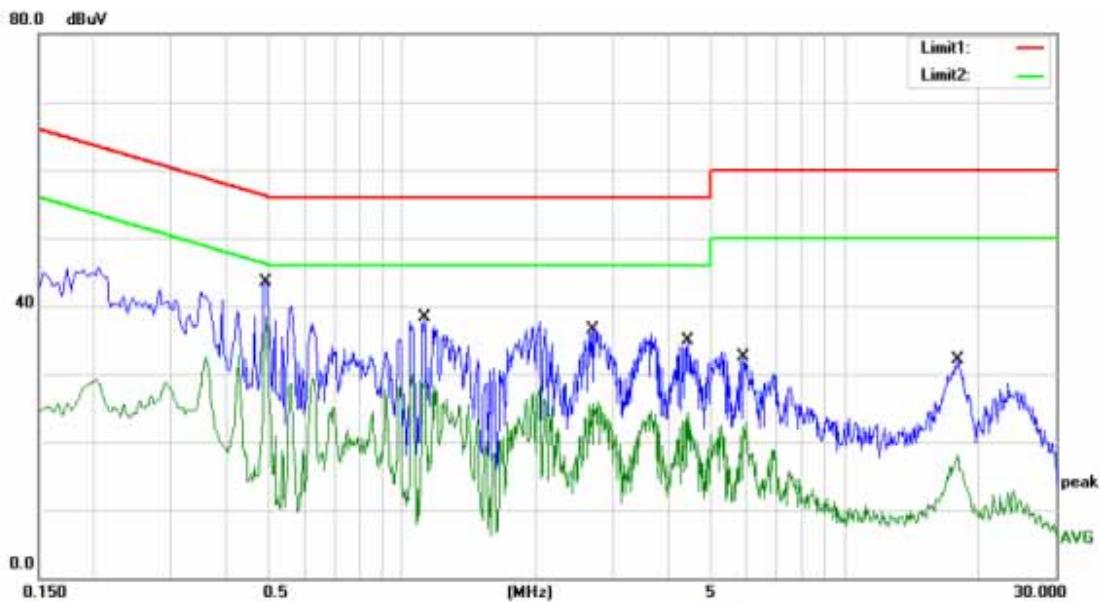
Power: AC 120V/60Hz

Humidity: 54 %

Mode: WIFI ON+ALL stress

Note:

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor	Measure- ment dBuV	Limit dBuV	Over dB	Detector		Comment
								Detector	Comment	
1		0.2220	24.33	19.56	43.89	62.74	-18.85	QP		
2		0.2220	10.13	19.56	29.69	52.74	-23.05	AVG		
3		0.4900	24.54	19.32	43.86	56.17	-12.31	QP		
4	*	0.4900	15.73	19.32	35.05	46.17	-11.12	AVG		
5		1.0460	18.42	19.23	37.65	56.00	-18.35	QP		
6		1.0460	5.54	19.23	24.77	46.00	-21.23	AVG		
7		2.0380	17.68	19.19	36.87	56.00	-19.13	QP		
8		2.0380	4.00	19.19	23.19	46.00	-22.81	AVG		
9		4.2940	15.90	19.20	35.10	56.00	-20.90	QP		
10		4.2940	4.43	19.20	23.63	46.00	-22.37	AVG		
11		17.4620	15.28	19.66	34.94	60.00	-25.06	QP		
12		17.4620	1.21	19.66	20.87	50.00	-29.13	AVG		



Site Conduction #1

Limit: (CE)FCC PART 15.207

Phase: **N**

Temperature: 24.9C

Power: AC 120V/60Hz

Humidity: 54 %

Mode: WIFI ON+ALL stress

Note:

No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Over	Detector	Comment
			Level	Factor	ment				
		MHz	dBuV	dB	dBuV	dBuV	dB		
1		0.4900	24.15	19.32	43.47	56.17	-12.70	QP	
2	*	0.4900	19.15	19.32	38.47	46.17	-7.70	AVG	
3		1.1220	19.01	19.22	38.23	56.00	-17.77	QP	
4		1.1220	10.59	19.22	29.81	46.00	-16.19	AVG	
5		2.7060	17.31	19.19	36.50	56.00	-19.50	QP	
6		2.7060	8.83	19.19	28.02	46.00	-17.98	AVG	
7		4.4220	15.73	19.20	34.93	56.00	-21.07	QP	
8		4.4220	6.03	19.20	25.23	46.00	-20.77	AVG	
9		5.8940	13.18	19.23	32.41	60.00	-27.59	QP	
10		5.8940	3.68	19.23	22.91	50.00	-27.09	AVG	
11		17.9460	12.39	19.69	32.08	60.00	-27.92	QP	
12		17.9460	-1.59	19.69	18.10	50.00	-31.90	AVG	

8.6 ANTENNA APPLICATION

8.6.1 Antenna Requirement

Standard	Requirement
FCC CRF Part15.203	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.

For intentional device, according to FCC 47 CFR Section 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. And according to FCC 47 CFR Section 15.247 (b), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

8.6.2 Result

PASS.

The EUT has 1 antenna: a PCB Antenna for BT with classic model, the gain is 5.2 dBi;

Note: Antenna use a permanently attached antenna which is not replaceable.
 Not using a standard antenna jack or electrical connector for antenna replacement
 The antenna has to be professionally installed (please provide method of installation)

which in accordance to section 15.203, please refer to the internal photos.