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Test Report

Report No. : CQASZ20190700037EX-01

Applicant: Zhejiang Xunshi Technology Co., Ltd

Address of Applicant: 4th Floor, No.2 Qihang Building, Science and Technology Park, No.586 Xihuan Road, Shaoxing, Zhejiang, China

Manufacturer: Zhejiang Xunshi Technology Co., Ltd

Address of Manufacturer: 4th Floor, No.2 Qihang Building, Science and Technology Park, No.586 Xihuan Road, Shaoxing, Zhejiang, China

Equipment Under Test (EUT):

Product: Pro 3D Printer

All Model No.: SPR1902A, SPR1906A

Test Model No.: SPR1902A

Brand Name: SprintRay

FCC ID: 2AUE5-SPRPRO

Standards: 47 CFR FCC Part 15 Subpart C 15.247

Date of Test: July. 15, 2019 to Sep. 06, 2019

Date of Issue: Sep. 06, 2019

Test Result : PASS

Tested By:

Tom Chen

(Tom Chen)

Reviewed By:

Aaron Ma

(Aaron Ma)

Approved By:

Jack Ai

(Jack Ai)



* In the configuration tested, the EUT complied with the standards specified above.

The test report is effective only with both signature and specialized stamp. The result(s) shown in this report refer only to the sample(s) tested. Without written approval of CQA, this report can't be reproduced except in full.

1 Version

Revision History Of Report

Report No.	Version	Description	Issue Date
CQASZ20190700037EX-01	Rev.01	Initial report	Sep. 06, 2019

2 Test Summary

Test Item	Test Requirement	Test method	Result
Antenna Requirement	47 CFR Part 15, Subpart C Section 15.203/15.247 (c)	ANSI C63.10 2013	PASS
AC Power Line Conducted Emission	47 CFR Part 15, Subpart C Section 15.207	ANSI C63.10 2013	PASS
Conducted Peak & Average Output Power	47 CFR Part 15, Subpart C Section 15.247 (b)(3)	ANSI C63.10 2013	PASS
6dB Occupied Bandwidth	47 CFR Part 15, Subpart C Section 15.247 (a)(2)	ANSI C63.10 2013	PASS
Power Spectral Density	47 CFR Part 15, Subpart C Section 15.247 (e)	ANSI C63.10 2013	PASS
Band-edge for RF Conducted Emissions	47 CFR Part 15, Subpart C Section 15.247(d)	ANSI C63.10 2013	PASS
RF Conducted Spurious Emissions	47 CFR Part 15, Subpart C Section 15.247(d)	ANSI C63.10 2013	PASS
Radiated Spurious Emissions	47 CFR Part 15, Subpart C Section 15.205/15.209	ANSI C63.10 2013	PASS
Restricted bands around fundamental frequency (Radiated Emission)	47 CFR Part 15, Subpart C Section 15.205/15.209	ANSI C63.10 2013	PASS

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4 General Information

4.1 Client Information

Applicant:	Zhejiang Xunshi Technology Co., Ltd
Address of Applicant:	4th Floor, No.2 Qihang Building, Science and Technology Park, No.586 Xihuan Road, Shaoxing, Zhejiang, China
Manufacturer:	Zhejiang Xunshi Technology Co., Ltd
Address of Manufacturer:	4th Floor, No.2 Qihang Building, Science and Technology Park, No.586 Xihuan Road, Shaoxing, Zhejiang, China

4.2 General Description of EUT

Product Name:	Pro 3D Printer
Test Model No.:	SPR1902A
Trade Mark:	SprintRay
Hardware Version:	V 04.0419
Software Version:	V1.0
Operation Frequency:	IEEE 802.11b/g/n(HT20): 2412MHz to 2462MHz IEEE 802.11n(H40): 2422MHz~2452MHz
Channel Numbers:	IEEE 802.11b/g, IEEE 802.11n HT20: 11 Channels IEEE 802.11n HT40: 7
Channel Separation:	5MHz
Type of Modulation:	IEEE for 802.11b: DSSS(CCK,DBPSK) IEEE for 802.11g : OFDM IEEE for 802.11n(HT20): OFDM IEEE for 802.11n(HT40): OFDM
Product Type:	☐ Mobile ☐ Portable ☒ Fix Location
Antenna Type	IPEX Antenna
Antenna Gain	2dBi
Power Supply:	AC 110V 60Hz
Adapter Information:	N/A

Note: 1. This report is only for 2.4GHz WiFi.

2. For more detailed features description, please refer to the manufacturer's specifications or the User's Manual.
3. There are many products, Only the model SPR1902A was tested, since the electrical circuit design, layout, components used and internal wiring were identical for the above models, with difference being color of appearance and model name.

Operation Frequency each of channel(802.11b/g/n HT20)							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
1	2412MHz	4	2427MHz	7	2442MHz	10	2457MHz
2	2417MHz	5	2432MHz	8	2447MHz	11	2462MHz
3	2422MHz	6	2437MHz	9	2452MHz		

Note:

In section 15.31(m), regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:

For 802.11b/g/n (HT20):

Channel	Frequency
The Lowest channel	2412MHz
The Middle channel	2437MHz
The Highest channel	2462MHz

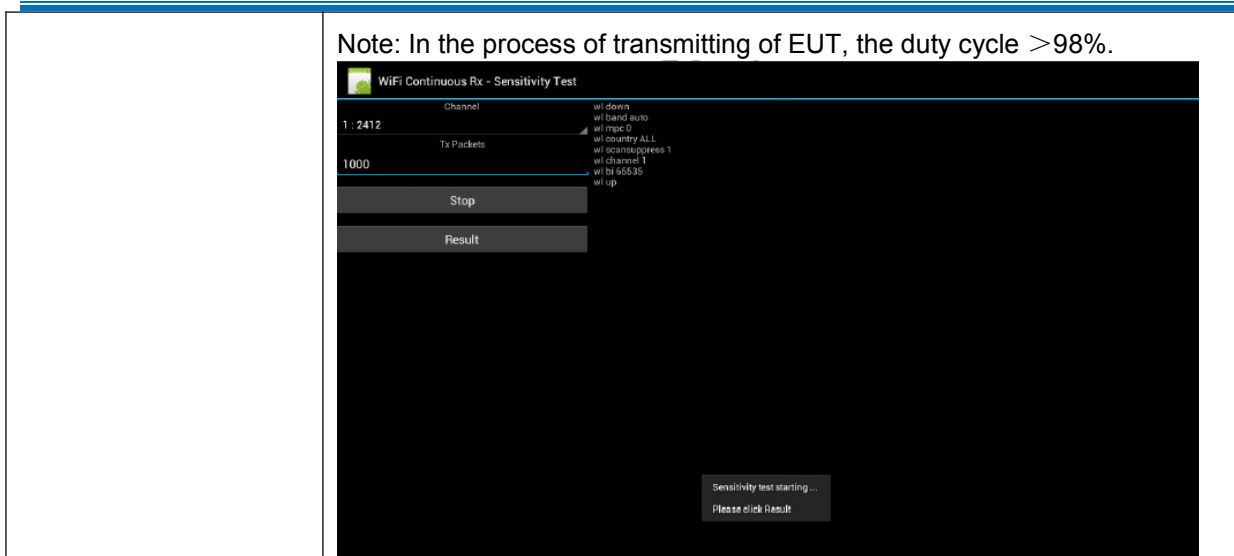
For 802.11n (HT40):

Channel	Frequency
The Lowest channel	2422MHz
The Middle channel	2437MHz
The Highest channel	2452MHz

Note: Software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel individually.

4.3 Test Environment

Operating Environment:	
Conduction emission	
Temperature:	23 °C
Humidity:	51 % RH
Atmospheric Pressure:	992mbar
Radiated Emission (Normal Conditions)	
Temperature:	25.1 °C~25.5 °C
Humidity:	51 % RH~55 % RH
Atmospheric Pressure:	992mbar
RF item test (RF test room Normal Conditions)	
Temperature:	26 °C~27.3 °C
Humidity:	58 % RH~59 % RH
Atmospheric Pressure:	992mbar
Transmitting mode:	Use test software to set the lowest frequency, the middle frequency and the highest frequency keep transmitting of the EUT.



4.4 Description of Support Units

The EUT has been tested with associated equipment below.

Description	Manufacturer	Model No.	Remark	FCC certification
/	/	/	/	/
/	/	/	/	/

4.5 Test Location

All tests were performed at:

Shenzhen Huaxia Testing Technology Co., Ltd.,

1F., Block A of Tongsheng Technology Building, Huahui Road, Dalang Street, Longhua New District, Shenzhen, Guangdong, China

4.6 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

• **ISED Registration No.: 22984-1**

The 3m Semi-anechoic chamber of Shenzhen Huaxia Testing Technology Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing

• **A2LA (Certificate No. 4742.01)**

Shenzhen Huaxia Testing Technology Co., Ltd., Shenzhen EMC Laboratory is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 4742.01.

• **FCC Registration No.: 522263**

Shenzhen Huaxia Testing Technology Co., Ltd., Shenzhen EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration No.:522263

4.7 Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate.

The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities.

The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16 - 4 „Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements“ and is documented in the **Shenzhen Huaxia Testing Technology Co., Ltd.** quality system acc. to DIN EN ISO/IEC 17025.

Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for CQA laboratory is reported:

No.	Item	Uncertainty	Notes
1	Radiated Emission (Below 1GHz)	5.12dB	(1)
2	Radiated Emission (Above 1GHz)	4.60dB	(1)
3	Conducted Disturbance (0.15~30MHz)	3.34dB	(1)
4	Radio Frequency	3×10^{-8}	(1)
5	Duty cycle	0.6 %.	(1)
6	Occupied Bandwidth	1.1%	(1)
7	RF conducted power	0.86dB	(1)
8	RF power density	0.74	(1)
9	Conducted Spurious emissions	0.86dB	(1)
10	Temperature test	0.8℃	(1)
11	Humidity test	2.0%	(1)
12	Supply voltages	0.5 %.	(1)
13	Frequency Error	5.5 Hz	(1)

(1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

4.8 Deviation from Standards

None.

4.9 Abnormalities from Standard Conditions

None.

4.10 Other Information Requested by the Customer

None.

4.11 Equipment List

Test Equipment	Manufacturer	Model No.	Instrument No.	Calibration Date	Calibration Due Date
EMI Test Receiver	R&S	ESR7	CQA-005	2018/9/26	2019/9/25
Spectrum analyzer	R&S	FSU26	CQA-038	2018/10/28	2019/10/27
Spectrum analyzer	keysight	N9020A	CQA-105	2018/10/28	2019/10/27
Preamplifier	MITEQ	AFS4-00010300-18-10P-4	CQA-035	2018/9/26	2019/9/25
Preamplifier	MITEQ	AMF-6D-02001800-29-20P	CQA-036	2018/11/2	2019/11/1
Loop antenna	Schwarzbeck	FMZB1516	CQA-087	2018/10/28	2020/10/27
Bilog Antenna	R&S	HL562	CQA-011	2018/9/26	2020/9/25
Horn Antenna	R&S	HF906	CQA-012	2018/9/26	2020/9/25
Horn Antenna	Schwarzbeck	BBHA 9170	CQA-088	2018/9/26	2020/9/25
Coaxial Cable (Above 1GHz)	CQA	N/A	C019	2018/9/26	2019/9/25
Coaxial Cable (Below 1GHz)	CQA	N/A	C020	2018/9/26	2019/9/25
Antenna Connector	CQA	RFC-01	CQA-080	2018/9/26	2019/9/25
RF cable(9KHz~40GHz)	CQA	RF-01	CQA-079	2018/9/26	2019/9/25
Power Sensor	KEYSIGHT	U2021XA	CQA-30	2018/9/26	2019/9/25
N1918A Power Analysis Manager Power Panel	Agilent	N1918A	CQA-074	2018/9/26	2019/9/25
Power divider	MIDWEST	PWD-2533-02-SMA-79	CQA-067	2018/9/26	2019/9/25
EMI Test Receiver	R&S	ESPI3	CQA-013	2018/9/26	2019/9/25
LISN	R&S	ENV216	CQA-003	2018/11/5	2019/11/4
Coaxial cable	CQA	N/A	CQA-C009	2018/9/26	2019/9/25

Note:

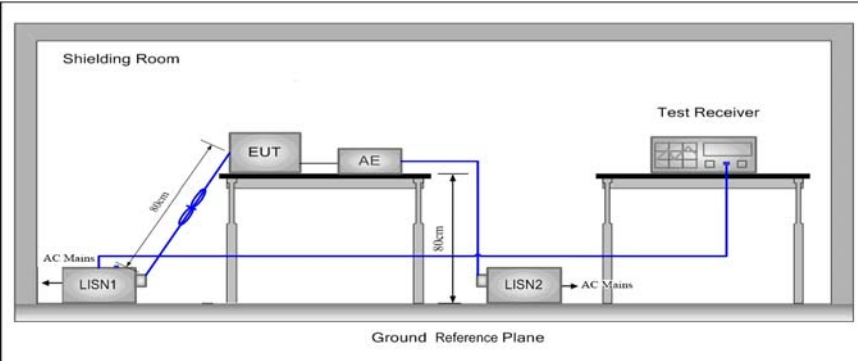
The temporary antenna connector is soldered on the PCB board in order to perform conducted tests and this temporary antenna connector is listed in the equipment list.

5 Test results and Measurement Data

5.1 Antenna Requirement

Standard requirement:	47 CFR Part 15C Section 15.203 /247(c)
15.203 requirement: 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, 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. 15.247(b) (4) requirement: The 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. Except as shown in paragraph (c) of this section, 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)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.	
EUT Antenna:	Antenna 
The antenna is IFIA Antenna. The best case gain of the antenna is 2dBi.	

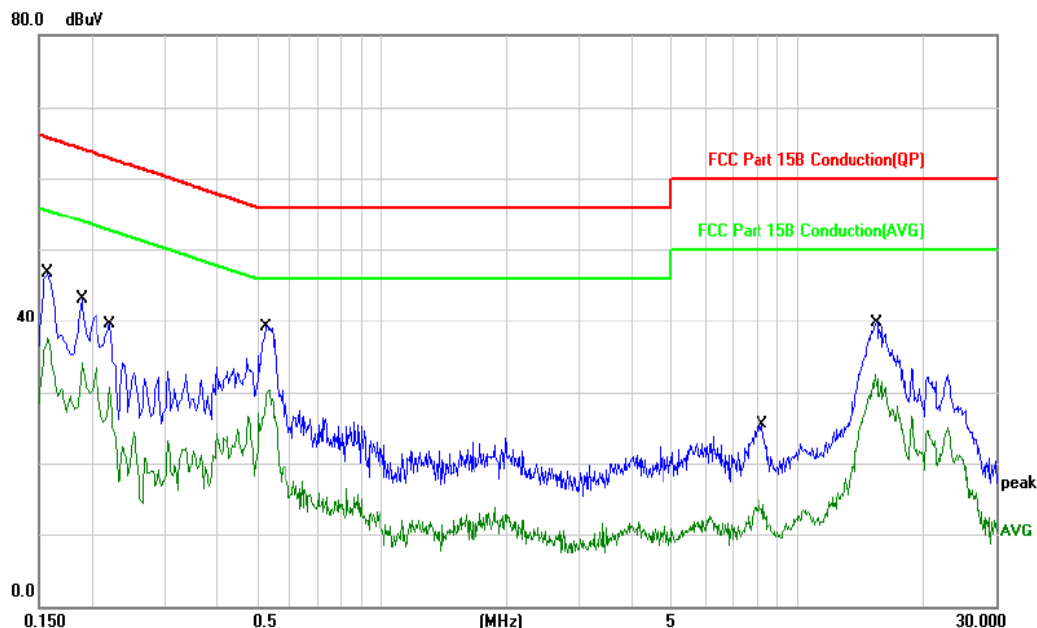
5.2 Conducted Emissions

Test Requirement:	47 CFR Part 15C Section 15.207		
Test Method:	ANSI C63.10: 2013		
Test Frequency Range:	150kHz to 30MHz		
Limit:	Frequency range (MHz)	Limit (dBuV)	
		Quasi-peak	Average
	0.15-0.5	66 to 56*	56 to 46*
	0.5-5	56	46
	5-30	60	50
* Decreases with the logarithm of the frequency.			
Test Procedure:	1) The mains terminal disturbance voltage test was conducted in a shielded room. 2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a $50\Omega/50\mu\text{H} + 5\Omega$ linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded. 3) The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane, 4) The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0.8 m from the LISN 2. 5) In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10: 2013 on conducted measurement.		
Test Setup:			
Exploratory Test Mode:	Transmitting with all kind of modulations, data rates at lowest, middle and highest channel.		

Final Test Mode:	All modes of 802.11b/g/n were tested at Low, Middle, and High channel; only the worst result of 802.11b CH11 was reported as below
Test Voltage:	AC110V/60Hz
Test Results:	Pass

Measurement Data

Live Line:

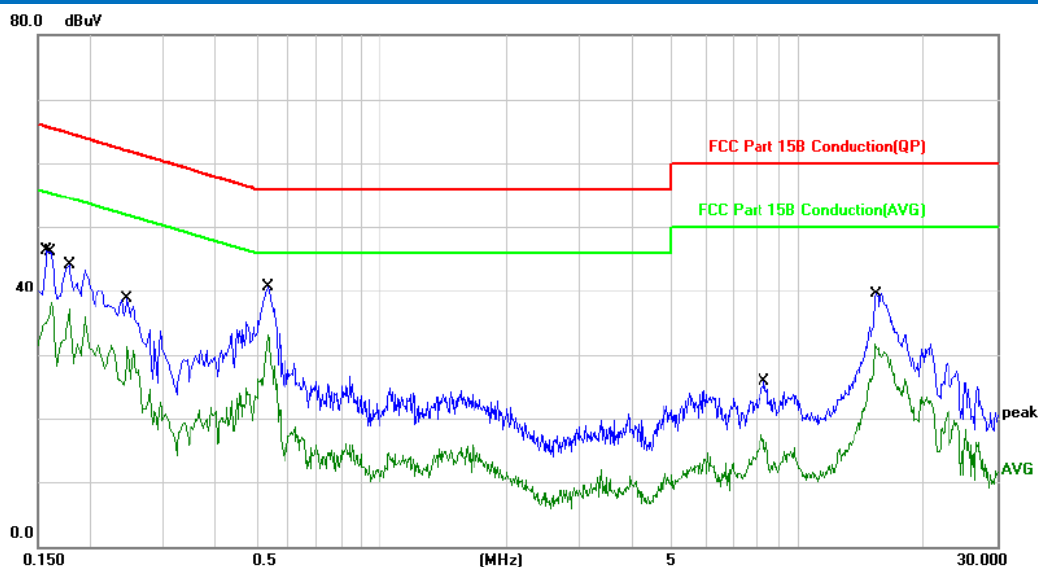


No. Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1	0.1580	46.52	0.18	46.70	65.56	-18.86	QP	
2	0.1580	37.29	0.18	37.47	55.56	-18.09	AVG	
3	0.1900	43.00	0.19	43.19	64.03	-20.84	QP	
4	0.1900	33.93	0.19	34.12	54.03	-19.91	AVG	
5	0.2220	39.28	0.20	39.48	62.74	-23.26	QP	
6	0.2220	30.46	0.20	30.66	52.74	-22.08	AVG	
7	0.5260	38.83	0.32	39.15	56.00	-16.85	QP	
8 *	0.5340	29.94	0.32	30.26	46.00	-15.74	AVG	
9	8.1940	25.44	0.06	25.50	60.00	-34.50	QP	
10	8.2980	14.34	0.06	14.40	50.00	-35.60	AVG	
11	15.5340	39.67	-0.02	39.65	60.00	-20.35	QP	
12	15.6140	31.90	-0.02	31.88	50.00	-18.12	AVG	

Remark:

1. The following Quasi-Peak and Average measurements were performed on the EUT:
2. Final Test Level = Receiver Reading + LISN Factor + Cable Loss.
3. If the Peak value under Average limit, the Average value is not recorded in the report.

Neutral Line:

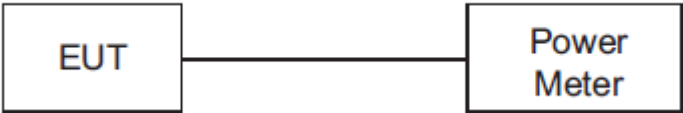


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1		0.1580	46.12	0.18	46.30	65.56	-19.26	QP	
2		0.1620	37.95	0.18	38.13	55.36	-17.23	AVG	
3		0.1780	43.96	0.19	44.15	64.57	-20.42	QP	
4		0.1780	36.98	0.19	37.17	54.57	-17.40	AVG	
5		0.2460	38.59	0.21	38.80	61.89	-23.09	QP	
6		0.2460	31.14	0.21	31.35	51.89	-20.54	AVG	
7		0.5340	40.45	0.32	40.77	56.00	-15.23	QP	
8	*	0.5340	32.75	0.32	33.07	46.00	-12.93	AVG	
9		8.1620	17.35	0.06	17.41	50.00	-32.59	AVG	
10		8.2940	25.80	0.06	25.86	60.00	-34.14	QP	
11		15.3020	31.69	-0.02	31.67	50.00	-18.33	AVG	
12		15.3900	39.55	-0.02	39.53	60.00	-20.47	QP	

Remark:

1. The following Quasi-Peak and Average measurements were performed on the EUT:
2. Final Test Level = Receiver Reading + LISN Factor + Cable Loss.
3. If the Peak value under Average limit, the Average value is not recorded in the report.

5.3 Conducted Peak & Average Output Power

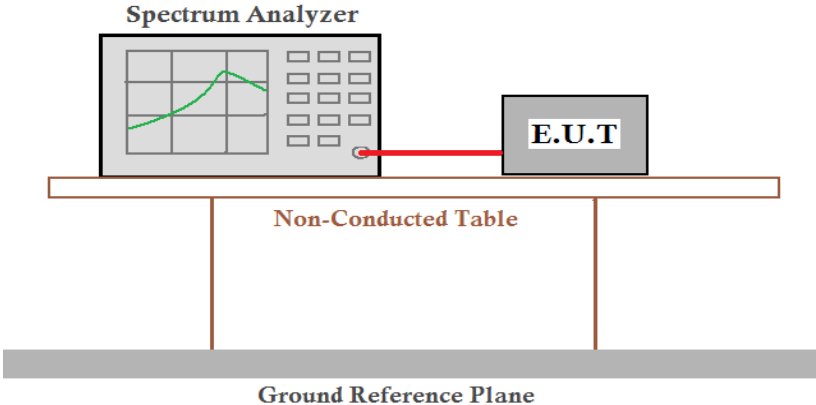
Test Requirement:	47 CFR Part 15C Section 15.247 (b)(3)
Test Method:	ANSI C63.10: 2013
Test Setup:	
Exploratory Test Mode:	Transmitting with all kind of modulations, data rates
Final Test Mode:	Through Pre-scan, find the 1Mbps of rate is the worst case of 802.11b; 6Mbps of rate is the worst case of 802.11g; 6.5Mbps of rate is the worst case of 802.11n(HT20); 13.5Mbps of rate is the worst case of 802.11n(HT40); Only the worst case is recorded in the report.
Limit:	30dBm
Test Results:	Pass

WIFI(2.4G)

Type	Test channel	Peak Output Power (dBm)	AVG Output Power (dBm)	Limit (dBm)	Result
802.11b	Lowest	17.09	14.42	30.00	Pass
	Middle	17.07	14.16		
	Highest	16.66	13.73		
802.11g	Lowest	18.33	11.48	30.00	Pass
	Middle	18.15	11.38		
	Highest	18.17	11.51		
802.11n(HT20)	Lowest	18.13	11.08	30.00	Pass
	Middle	18.45	11.19		
	Highest	17.92	10.88		
802.11n(HT40)	Lowest	17.23	10.01	30.00	Pass
	Middle	17.54	10.69		
	Highest	17.73	10.82		

Note: 1.The test results including the cable lose.

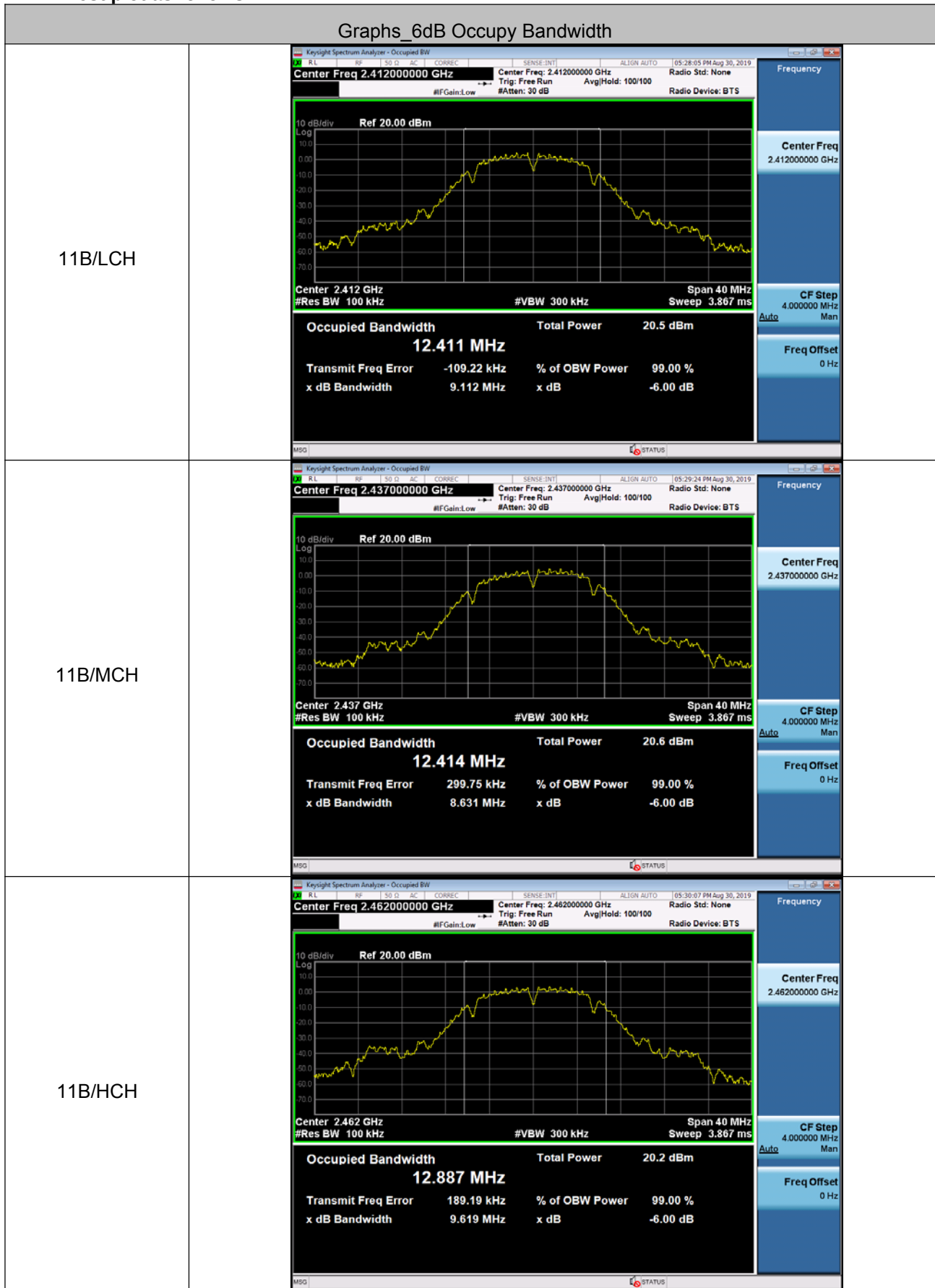
5.4 6dB Occupy Bandwidth

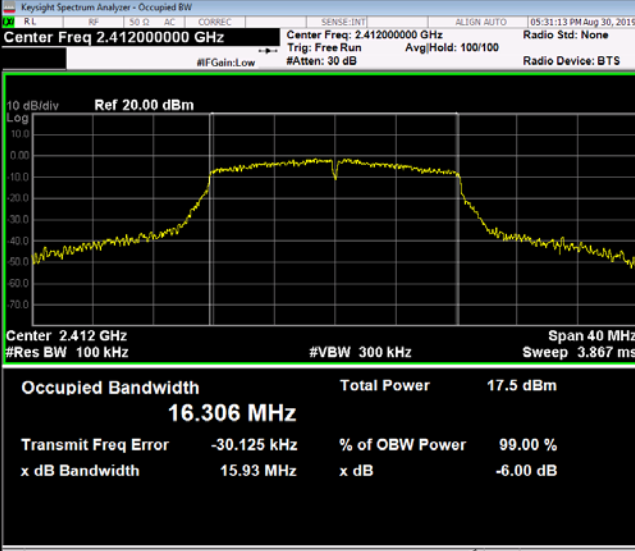
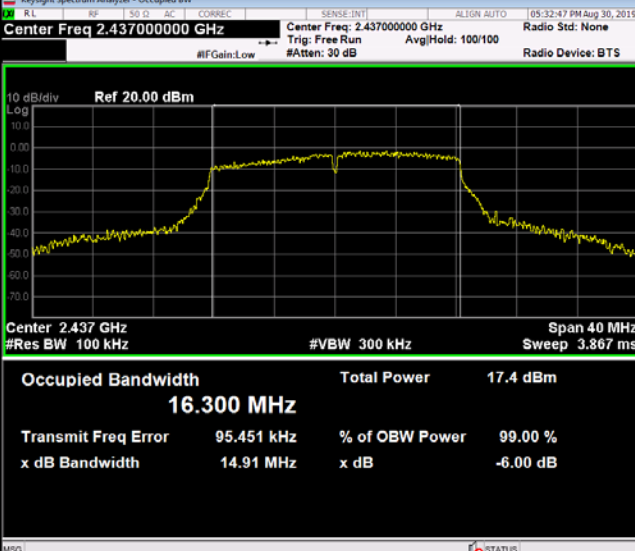
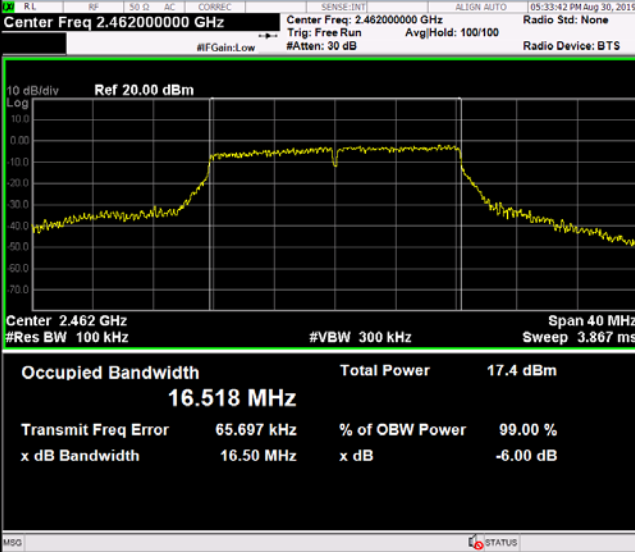
Test Requirement:	47 CFR Part 15C Section 15.247 (a)(2)
Test Method:	ANSI C63.10: 2013
Test Setup:	 Offset=cable loss+ attenuation factor
Exploratory Test Mode:	Transmitting with all kind of modulations, data rates
Final Test Mode:	Through Pre-scan, find the 1Mbps of rate is the worst case of 802.11b; 6Mbps of rate is the worst case of 802.11g; 6.5Mbps of rate is the worst case of 802.11n(HT20); 13.5Mbps of rate is the worst case of 802.11n(HT40); Only the worst case is recorded in the report.
Limit:	≥ 500 kHz
Test Results:	Pass

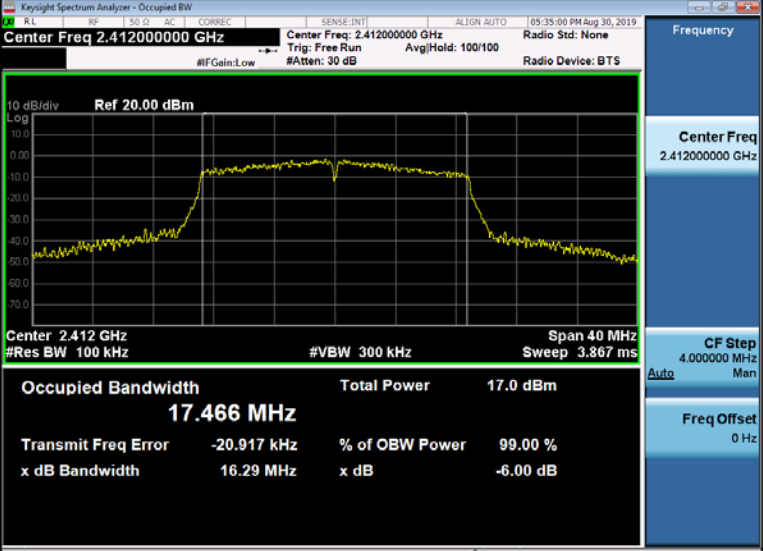
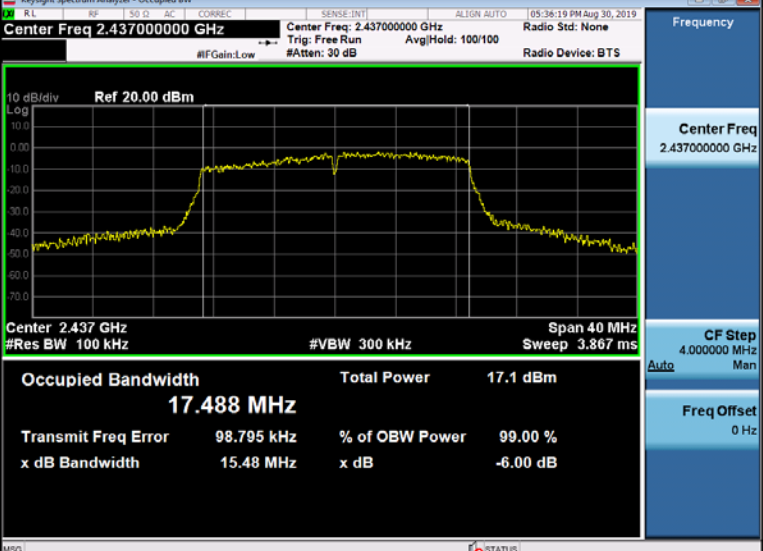
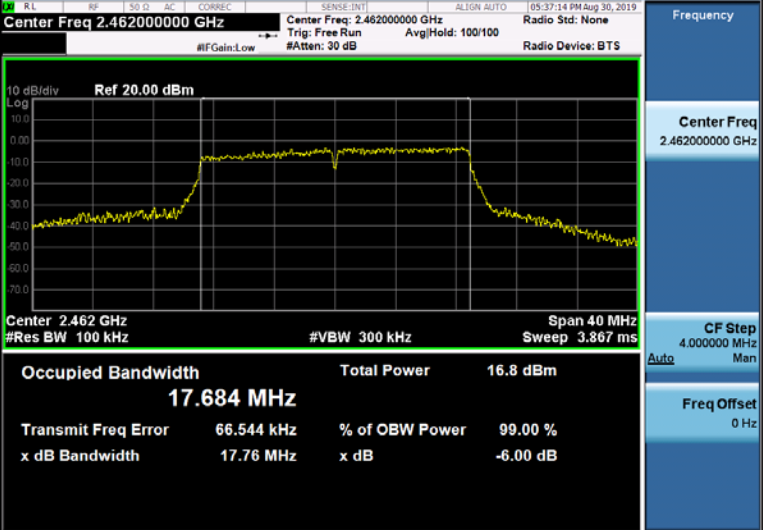
Measurement Data

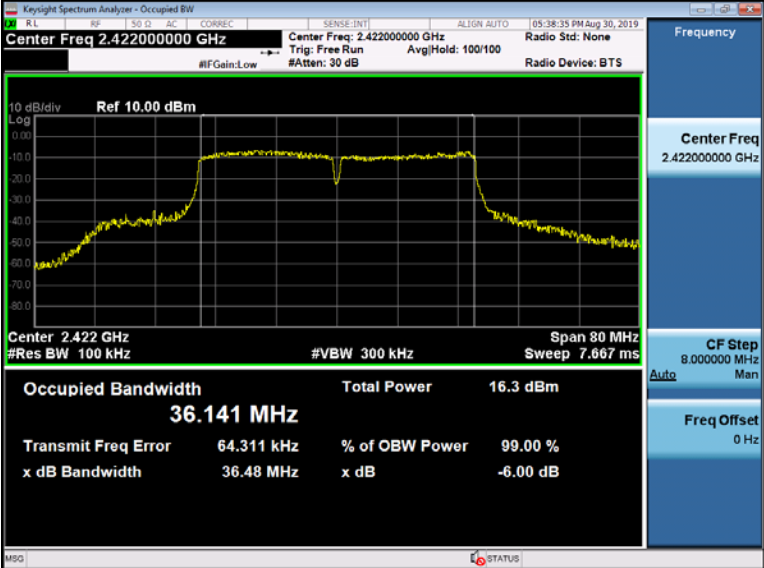
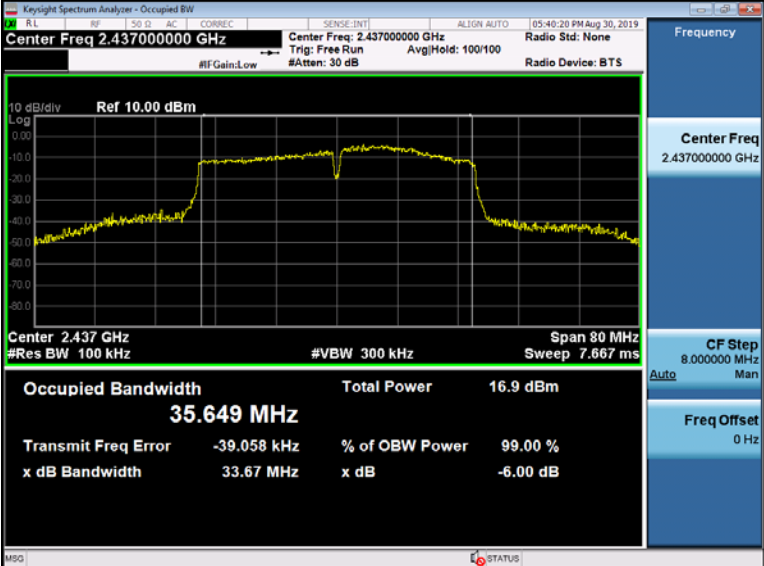
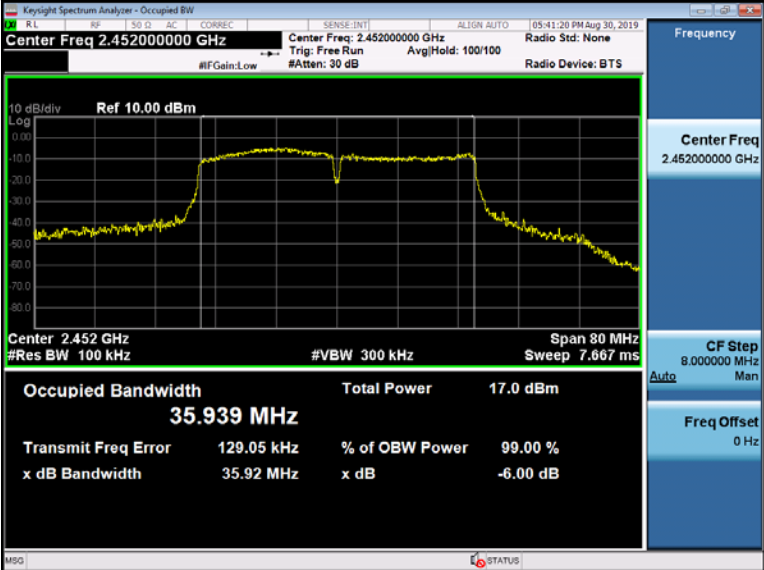
Type	Channel	6dB Bandwidth (MHz)	Limit (KHz)	Result
802.11b	Lowest	9.112	≥ 500	Pass
	Middle	8.631		
	Highest	9.619		
802.11g	Lowest	15.93	≥ 500	Pass
	Middle	14.91		
	Highest	16.50		
802.11n(HT20)	Lowest	16.29	≥ 500	Pass
	Middle	15.48		
	Highest	17.76		
802.11n(HT40)	Lowest	36.48	≥ 500	Pass
	Middle	33.67		
	Highest	35.92		

Test plot as follows:

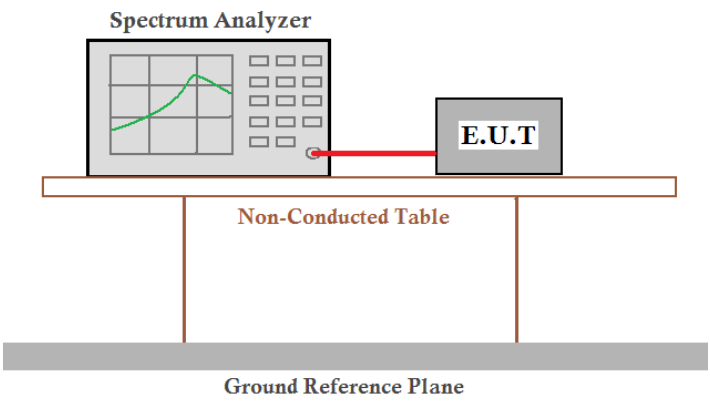


11G/LCH	 KeySight Spectrum Analyzer - Occupied BW Center Freq 2.412000000 GHz Center Freq: 2.412000000 GHz Trig: Free Run Avg/Hold: 100/100 Radio Std: None Radio Device: BTS 10 dB/div Ref 20.00 dBm Center 2.412 GHz #Res BW 100 kHz #VBW 300 kHz Span 40 MHz Sweep 3.867 ms Occupied Bandwidth 16.306 MHz Total Power 17.5 dBm Transmit Freq Error -30.125 kHz % of OBW Power 99.00 % x dB Bandwidth 15.93 MHz x dB -6.00 dB Frequency Center Freq 2.412000000 GHz CF Step 4.000000 MHz Man Auto Freq Offset 0 Hz
11G/MCH	 KeySight Spectrum Analyzer - Occupied BW Center Freq 2.437000000 GHz Center Freq: 2.437000000 GHz Trig: Free Run Avg/Hold: 100/100 Radio Std: None Radio Device: BTS 10 dB/div Ref 20.00 dBm Center 2.437 GHz #Res BW 100 kHz #VBW 300 kHz Span 40 MHz Sweep 3.867 ms Occupied Bandwidth 16.300 MHz Total Power 17.4 dBm Transmit Freq Error 95.451 kHz % of OBW Power 99.00 % x dB Bandwidth 14.91 MHz x dB -6.00 dB Frequency Center Freq 2.437000000 GHz CF Step 4.000000 MHz Man Auto Freq Offset 0 Hz
11G/HCH	 KeySight Spectrum Analyzer - Occupied BW Center Freq 2.462000000 GHz Center Freq: 2.462000000 GHz Trig: Free Run Avg/Hold: 100/100 Radio Std: None Radio Device: BTS 10 dB/div Ref 20.00 dBm Center 2.462 GHz #Res BW 100 kHz #VBW 300 kHz Span 40 MHz Sweep 3.867 ms Occupied Bandwidth 16.518 MHz Total Power 17.4 dBm Transmit Freq Error 65.697 kHz % of OBW Power 99.00 % x dB Bandwidth 16.50 MHz x dB -6.00 dB Frequency Center Freq 2.462000000 GHz CF Step 4.000000 MHz Man Auto Freq Offset 0 Hz

11N20/LCH	 KeySight Spectrum Analyzer - Occupied BW Center Freq 2.412000000 GHz Center Freq: 2.412000000 GHz Trig: Free Run Avg/Hold: 100/100 Radio Std: None Radio Device: BTS 10 dB/div Ref 20.00 dBm Center 2.412 GHz #Res BW 100 kHz #VBW 300 kHz Span 40 MHz Sweep 3.867 ms Occupied Bandwidth 17.466 MHz Total Power 17.0 dBm Transmit Freq Error -20.917 kHz % of OBW Power 99.00 % x dB Bandwidth 16.29 MHz x dB -6.00 dB Frequency Center Freq 2.412000000 GHz CF Step 4.000000 MHz Auto Freq Offset 0 Hz
11N20/MCH	 KeySight Spectrum Analyzer - Occupied BW Center Freq 2.437000000 GHz Center Freq: 2.437000000 GHz Trig: Free Run Avg/Hold: 100/100 Radio Std: None Radio Device: BTS 10 dB/div Ref 20.00 dBm Center 2.437 GHz #Res BW 100 kHz #VBW 300 kHz Span 40 MHz Sweep 3.867 ms Occupied Bandwidth 17.488 MHz Total Power 17.1 dBm Transmit Freq Error 98.795 kHz % of OBW Power 99.00 % x dB Bandwidth 15.48 MHz x dB -6.00 dB Frequency Center Freq 2.437000000 GHz CF Step 4.000000 MHz Auto Freq Offset 0 Hz
11N20/HCH	 KeySight Spectrum Analyzer - Occupied BW Center Freq 2.462000000 GHz Center Freq: 2.462000000 GHz Trig: Free Run Avg/Hold: 100/100 Radio Std: None Radio Device: BTS 10 dB/div Ref 20.00 dBm Center 2.462 GHz #Res BW 100 kHz #VBW 300 kHz Span 40 MHz Sweep 3.867 ms Occupied Bandwidth 17.684 MHz Total Power 16.8 dBm Transmit Freq Error 66.544 kHz % of OBW Power 99.00 % x dB Bandwidth 17.76 MHz x dB -6.00 dB Frequency Center Freq 2.462000000 GHz CF Step 4.000000 MHz Auto Freq Offset 0 Hz

11N40/LCH	 Keysight Spectrum Analyzer - Occupied BW Center Freq: 2.422000000 GHz Trig: Free Run Avg/Hold: 100/100 Radio Std: None Radio Device: BTS Ref 10.00 dBm Center 2.422 GHz #Res BW 100 kHz #VBW 300 kHz Span 80 MHz Sweep 7.667 ms Occupied Bandwidth 36.141 MHz Total Power 16.3 dBm Transmit Freq Error 64.311 kHz % of OBW Power 99.00 % x dB Bandwidth 36.48 MHz x dB -6.00 dB
11N40/MCH	 Keysight Spectrum Analyzer - Occupied BW Center Freq: 2.437000000 GHz Trig: Free Run Avg/Hold: 100/100 Radio Std: None Radio Device: BTS Ref 10.00 dBm Center 2.437 GHz #Res BW 100 kHz #VBW 300 kHz Span 80 MHz Sweep 7.667 ms Occupied Bandwidth 35.649 MHz Total Power 16.9 dBm Transmit Freq Error -39.058 kHz % of OBW Power 99.00 % x dB Bandwidth 33.67 MHz x dB -6.00 dB
11N40/HCH	 Keysight Spectrum Analyzer - Occupied BW Center Freq: 2.452000000 GHz Trig: Free Run Avg/Hold: 100/100 Radio Std: None Radio Device: BTS Ref 10.00 dBm Center 2.452 GHz #Res BW 100 kHz #VBW 300 kHz Span 80 MHz Sweep 7.667 ms Occupied Bandwidth 35.939 MHz Total Power 17.0 dBm Transmit Freq Error 129.05 kHz % of OBW Power 99.00 % x dB Bandwidth 35.92 MHz x dB -6.00 dB

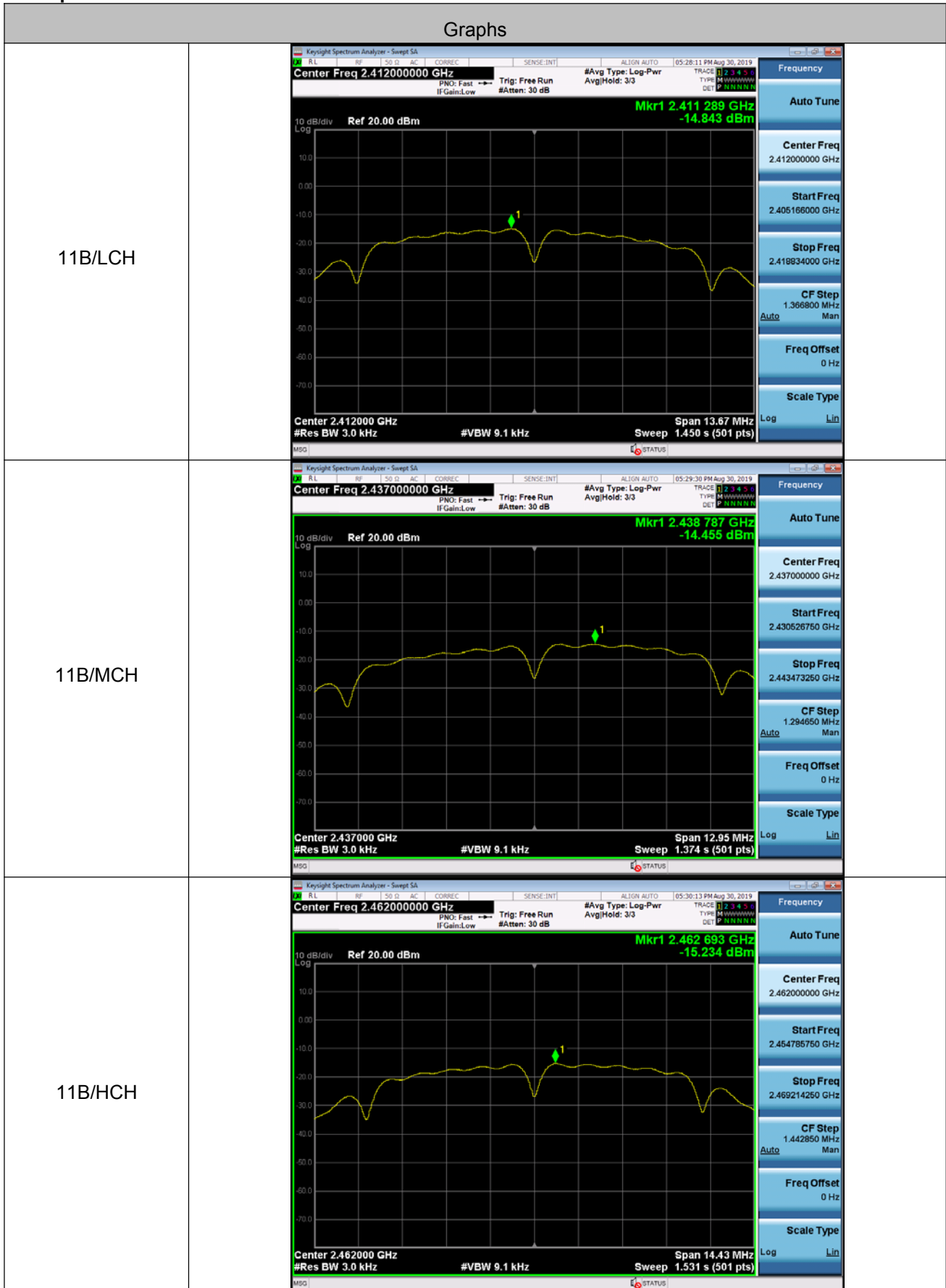
5.5 Power Spectral Density

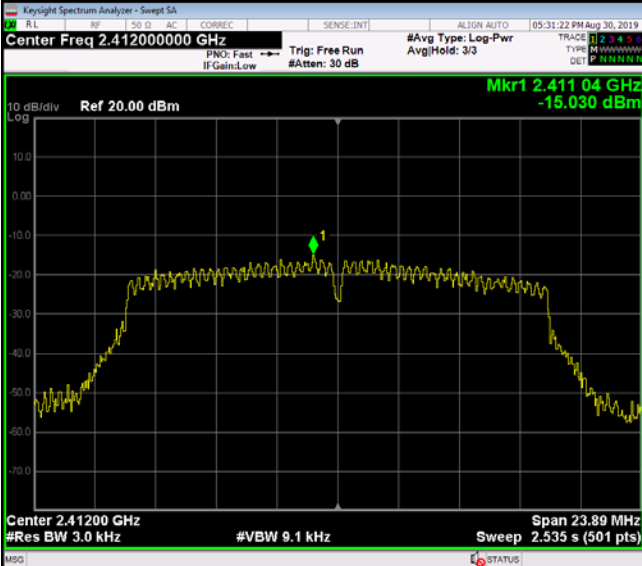
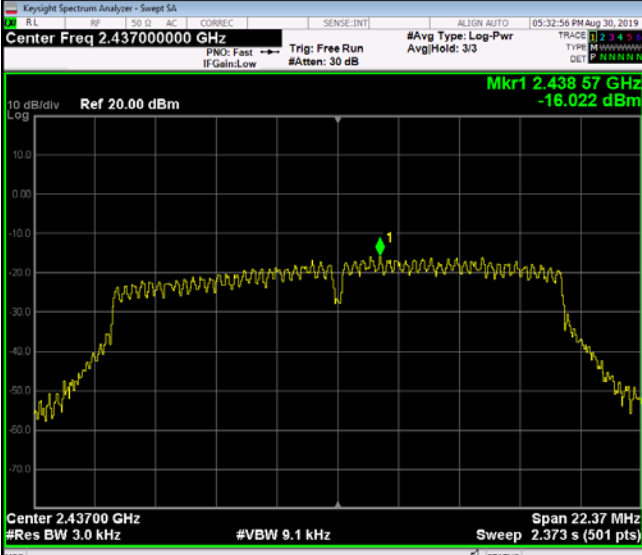
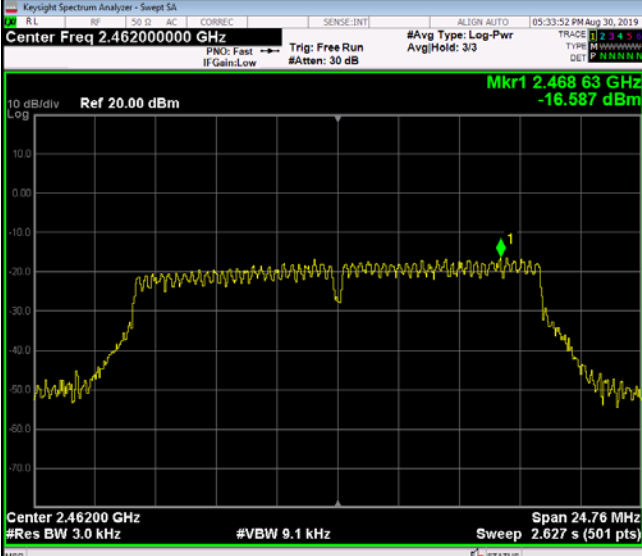
Test Requirement:	47 CFR Part 15C Section 15.247 (e)
Test Method:	ANSI C63.10: 2013
Test Setup:	 Offset=cable loss+ attenuation factor
Exploratory Test Mode:	Transmitting with all kind of modulations, data rates
Final Test Mode:	Through Pre-scan, find the 1Mbps of rate is the worst case of 802.11b; 6Mbps of rate is the worst case of 802.11g; 6.5Mbps of rate is the worst case of 802.11n(HT20); 13.5Mbps of rate is the worst case of 802.11n(HT40); Only the worst case is recorded in the report.
Limit:	$\leq 8.00\text{dBm}/3\text{kHz}$
Test Results:	Pass

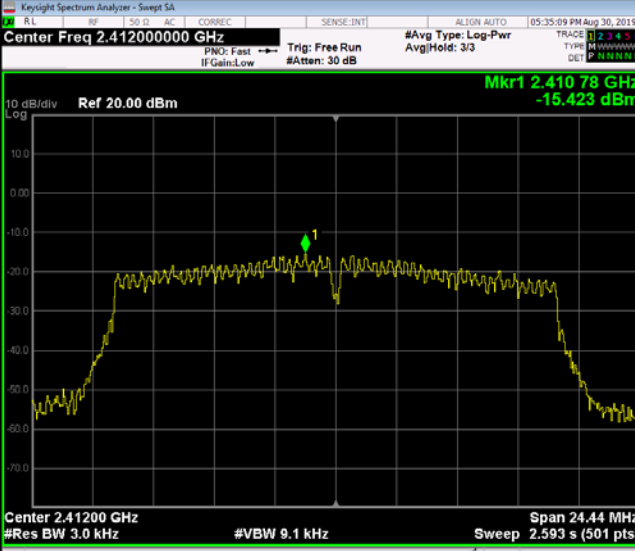
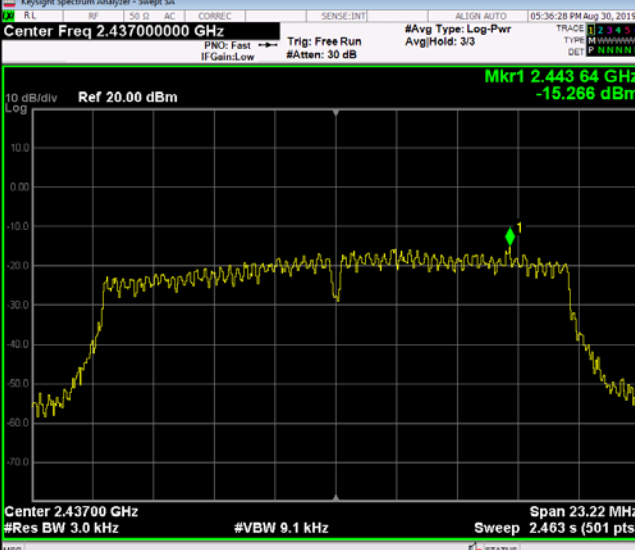
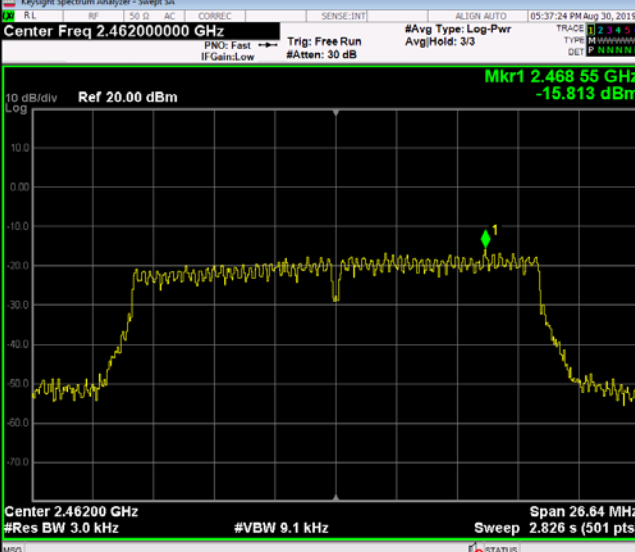
Measurement Data

Type	Channel	Power Spectral Density (dBm/3KHz)	Limit (dBm/3KHz)	Result
802.11b	Lowest	-14.843	8	Pass
	Middle	-14.455		
	Highest	-15.234		
802.11g	Lowest	-15.030	8	Pass
	Middle	-16.022		
	Highest	-16.587		
802.11n(HT20)	Lowest	-15.423	8	Pass
	Middle	-15.266		
	Highest	-15.813		
802.11n(HT40)	Lowest	-18.842	8	Pass
	Middle	-17.419		
	Highest	-17.503		

Test plot as follows:

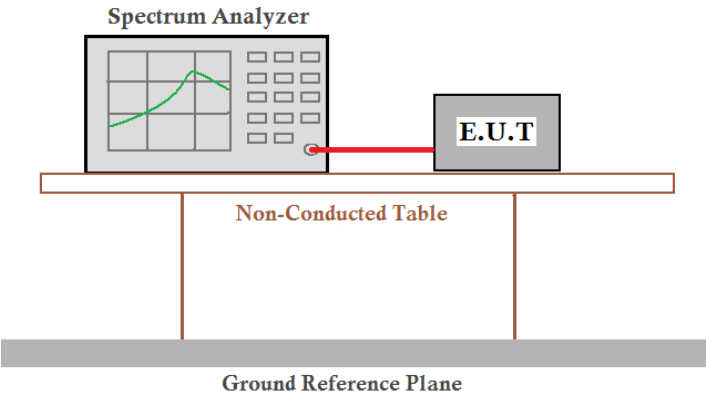


11G/LCH	 KeySight Spectrum Analyzer - Swept SA Center Freq 2.41200000 GHz RF: 50 Ω, AC, CORREC, SENSE: INT, ALIGN: AUTO, 05:31:22 PM Aug 30, 2019 PN0: Fast, Trig: Free Run, #Avg Type: Log-Pwr, Avg/Hold: 3/3 IF Gain: Low, #Atten: 30 dB 10 dB/div, Ref 20.00 dBm Mkr1 2.411 04 GHz, -15.030 dBm Center 2.41200 GHz, #Res BW 3.0 kHz, #VBW 9.1 kHz, Span 23.89 MHz, Sweep 2.535 s (501 pts) MSG, STATUS Frequency Auto Tune Center Freq 2.41200000 GHz Start Freq 2.400053250 GHz Stop Freq 2.423946750 GHz CF Step 2.389350 MHz, Man Freq Offset 0 Hz Scale Type Log, Lin
11G/MCH	 KeySight Spectrum Analyzer - Swept SA Center Freq 2.437000000 GHz RF: 50 Ω, AC, CORREC, SENSE: INT, ALIGN: AUTO, 05:32:56 PM Aug 30, 2019 PN0: Fast, Trig: Free Run, #Avg Type: Log-Pwr, Avg/Hold: 3/3 IF Gain: Low, #Atten: 30 dB 10 dB/div, Ref 20.00 dBm Mkr1 2.438 57 GHz, -16.022 dBm Center 2.43700 GHz, #Res BW 3.0 kHz, #VBW 9.1 kHz, Span 22.37 MHz, Sweep 2.373 s (501 pts) MSG, STATUS Frequency Auto Tune Center Freq 2.437000000 GHz Start Freq 2.425815250 GHz Stop Freq 2.448184750 GHz CF Step 2.236950 MHz, Man Freq Offset 0 Hz Scale Type Log, Lin
11G/HCH	 KeySight Spectrum Analyzer - Swept SA Center Freq 2.462000000 GHz RF: 50 Ω, AC, CORREC, SENSE: INT, ALIGN: AUTO, 05:33:52 PM Aug 30, 2019 PN0: Fast, Trig: Free Run, #Avg Type: Log-Pwr, Avg/Hold: 3/3 IF Gain: Low, #Atten: 30 dB 10 dB/div, Ref 20.00 dBm Mkr1 2.468 63 GHz, -16.587 dBm Center 2.46200 GHz, #Res BW 3.0 kHz, #VBW 9.1 kHz, Span 24.76 MHz, Sweep 2.627 s (501 pts) MSG, STATUS Frequency Auto Tune Center Freq 2.462000000 GHz Start Freq 2.449622000 GHz Stop Freq 2.474378000 GHz CF Step 2.475600 MHz, Man Freq Offset 0 Hz Scale Type Log, Lin

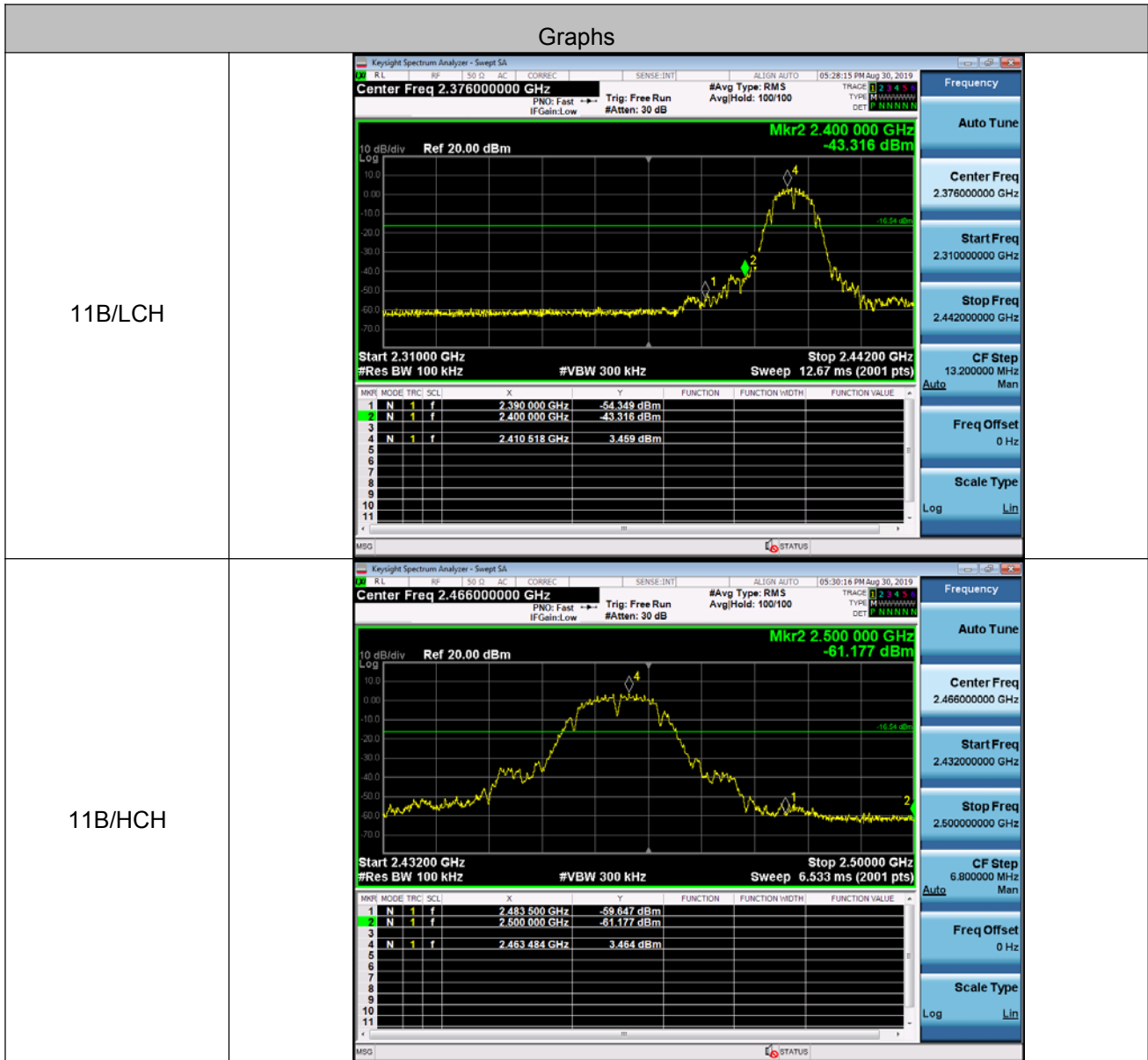
11N20/LCH	 Center Freq 2.41200000 GHz Mkr1 2.41078 GHz -15.423 dBm Center 2.41200 GHz #Res BW 3.0 kHz #VBW 9.1 kHz Span 24.44 MHz Sweep 2.593 s (501 pts)	Frequency Auto Tune Center Freq 2.41200000 GHz Start Freq 2.39780250 GHz Stop Freq 2.424219750 GHz CF Step 2.443950 MHz Freq Offset 0 Hz Scale Type Log Lin
11N20/MCH	 Center Freq 2.43700000 GHz Mkr1 2.44364 GHz -15.266 dBm Center 2.43700 GHz #Res BW 3.0 kHz #VBW 9.1 kHz Span 23.22 MHz Sweep 2.463 s (501 pts)	Frequency Auto Tune Center Freq 2.43700000 GHz Start Freq 2.425391500 GHz Stop Freq 2.448609500 GHz CF Step 2.321700 MHz Freq Offset 0 Hz Scale Type Log Lin
11N20/HCH	 Center Freq 2.46200000 GHz Mkr1 2.46855 GHz -15.813 dBm Center 2.46200 GHz #Res BW 3.0 kHz #VBW 9.1 kHz Span 26.64 MHz Sweep 2.826 s (501 pts)	Frequency Auto Tune Center Freq 2.46200000 GHz Start Freq 2.448682250 GHz Stop Freq 2.475317750 GHz CF Step 2.663550 MHz Freq Offset 0 Hz Scale Type Log Lin

11N40/LCH	 Key parameters for 11N40/LCH: - Center Freq: 2.422000000 GHz - Start Freq: 2.394638500 GHz - Stop Freq: 2.449361500 GHz - CF Step: 5.472300 MHz - Freq Offset: 0 Hz - Scale Type: Log
11N40/MCH	 Key parameters for 11N40/MCH: - Center Freq: 2.437000000 GHz - Start Freq: 2.411747500 GHz - Stop Freq: 2.462252500 GHz - CF Step: 5.050350 MHz - Freq Offset: 0 Hz - Scale Type: Log
11N40/HCH	 Key parameters for 11N40/HCH: - Center Freq: 2.452000000 GHz - Start Freq: 2.425063000 GHz - Stop Freq: 2.478937000 GHz - CF Step: 5.387400 MHz - Freq Offset: 0 Hz - Scale Type: Log

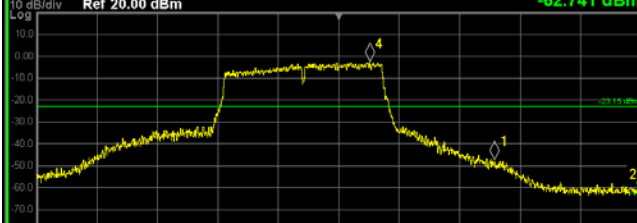
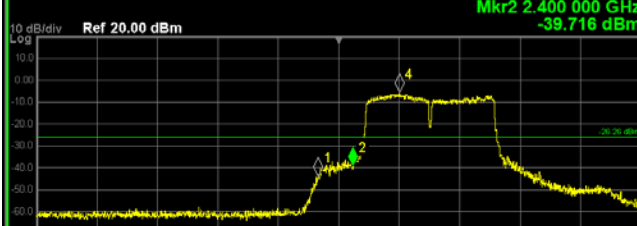
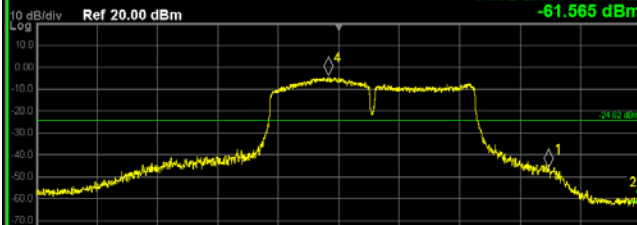
5.6 Band-edge for RF Conducted Emissions

Test Requirement:	47 CFR Part 15C Section 15.247 (d)
Test Method:	ANSI C63.10: 2013
Test Setup:	 Offset=cable loss+ attenuation factor
Exploratory Test Mode:	Transmitting with all kind of modulations, data rates
Final Test Mode:	Through Pre-scan, find the 1Mbps of rate is the worst case of 802.11b; 6Mbps of rate is the worst case of 802.11g ; 6.5Mbps of rate is the worst case of 802.11n(HT20) ; 13.5Mbps of rate is the worst case of 802.11n(HT40); Only the worst case is recorded in the report.
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum 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.
Test Results:	Pass

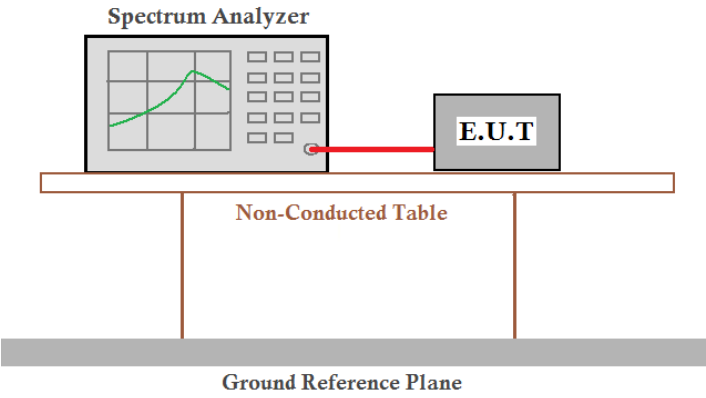
Test plot as follows:



11G/LCH	KeySight Spectrum Analyzer - Swept SA ALL SENSE-INT ALGOR AUTO 05:31:25 PM Aug 30, 2019 Center Freq 2.376000000 GHz PNO: Fast IFGain:Low Trig: Free Run #Atten: 30 dB #Avg Type: RMS AvgHold: 100/100 TRACE 1 2 3 4 5 TYPE M
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11N20/HCH	KeySight Spectrum Analyzer - Swept SA AL: 100.000 MHz SENSE: INT ALGN: AUTO 05:37:27 PM Aug 30, 2019 Center Freq 2.466000000 GHz Trig: Free Run #Avg Type: RMS PNO: Fast IFGain: Low #Atten: 30 dB AvgHold: 100/100 TRACE: 1 2 3 4 5 TYPE: M DET: NNNNN 10 dB/div Ref 20.00 dBm Log  Mkr2 2.500 000 GHz -62.741 dBm -29.15 dBm Start 2.43200 GHz #Res BW 100 kHz #VBW 300 kHz Sweep 6.533 ms (2001 pts) Stop 2.50000 GHz <table><tr><th>MNR</th><th>MODE</th><th>TRC</th><th>SCL</th><th>X</th><th>Y</th><th>FUNCTION</th><th>FUNCTION WIDTH</th><th>FUNCTION VALUE</th></tr><tr><td>1</td><td>N</td><td>1</td><td>f</td><td>2.483 500 GHz</td><td>-48.066 dBm</td><td></td><td></td><td></td></tr><tr><td>2</td><td>N</td><td>1</td><td>f</td><td>2.500 000 GHz</td><td>-62.741 dBm</td><td></td><td></td><td></td></tr><tr><td>3</td><td>N</td><td>1</td><td>f</td><td>2.489 502 GHz</td><td>-3.149 dBm</td><td></td><td></td><td></td></tr><tr><td>4</td><td>N</td><td>1</td><td>f</td><td>2.489 502 GHz</td><td>-3.149 dBm</td><td></td><td></td><td></td></tr><tr><td>5</td><td>N</td><td>1</td><td>f</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>6</td><td>N</td><td>1</td><td>f</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>7</td><td>N</td><td>1</td><td>f</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>8</td><td>N</td><td>1</td><td>f</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>9</td><td>N</td><td>1</td><td>f</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>10</td><td>N</td><td>1</td><td>f</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>11</td><td>N</td><td>1</td><td>f</td><td></td><td></td><td></td><td></td><td></td></tr></table> MSG STATUS Frequency Auto Tune Center Freq 2.466000000 GHz Start Freq 2.432000000 GHz Stop Freq 2.500000000 GHz CF Step 6.800000 MHz Auto Man Freq Offset 0 Hz Scale Type Log Lin	MNR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	1	N	1	f	2.483 500 GHz	-48.066 dBm				2	N	1	f	2.500 000 GHz	-62.741 dBm				3	N	1	f	2.489 502 GHz	-3.149 dBm				4	N	1	f	2.489 502 GHz	-3.149 dBm				5	N	1	f						6	N	1	f						7	N	1	f						8	N	1	f						9	N	1	f						10	N	1	f						11	N	1	f					
MNR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE																																																																																																					
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11N40/LCH	KeySight Spectrum Analyzer - Swept SA AL: 100.000 MHz SENSE: INT ALGN: AUTO 05:38:57 PM Aug 30, 2019 Center Freq 2.396000000 GHz Trig: Free Run #Avg Type: RMS PNO: Fast IFGain: Low #Atten: 30 dB AvgHold: 100/100 TRACE: 1 2 3 4 5 TYPE: M DET: NNNNN 10 dB/div Ref 20.00 dBm Log  Mkr2 2.400 000 GHz -39.716 dBm -26.26 dBm Start 2.31000 GHz #Res BW 100 kHz #VBW 300 kHz Sweep 16.53 ms (2001 pts) Stop 2.48200 GHz <table><tr><th>MNR</th><th>MODE</th><th>TRC</th><th>SCL</th><th>X</th><th>Y</th><th>FUNCTION</th><th>FUNCTION WIDTH</th><th>FUNCTION VALUE</th></tr><tr><td>1</td><td>N</td><td>1</td><td>f</td><td>2.396 000 GHz</td><td>-44.636 dBm</td><td></td><td></td><td></td></tr><tr><td>2</td><td>N</td><td>1</td><td>f</td><td>2.400 000 GHz</td><td>-39.716 dBm</td><td></td><td></td><td></td></tr><tr><td>3</td><td>N</td><td>1</td><td>f</td><td>2.413 286 GHz</td><td>-6.255 dBm</td><td></td><td></td><td></td></tr><tr><td>4</td><td>N</td><td>1</td><td>f</td><td>2.413 286 GHz</td><td>-6.255 dBm</td><td></td><td></td><td></td></tr><tr><td>5</td><td>N</td><td>1</td><td>f</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>6</td><td>N</td><td>1</td><td>f</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>7</td><td>N</td><td>1</td><td>f</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>8</td><td>N</td><td>1</td><td>f</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>9</td><td>N</td><td>1</td><td>f</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>10</td><td>N</td><td>1</td><td>f</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>11</td><td>N</td><td>1</td><td>f</td><td></td><td></td><td></td><td></td><td></td></tr></table> MSG STATUS Frequency Auto Tune Center Freq 2.396000000 GHz Start Freq 2.310000000 GHz Stop Freq 2.482000000 GHz CF Step 17.200000 MHz Auto Man Freq Offset 0 Hz Scale Type Log Lin	MNR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	1	N	1	f	2.396 000 GHz	-44.636 dBm				2	N	1	f	2.400 000 GHz	-39.716 dBm				3	N	1	f	2.413 286 GHz	-6.255 dBm				4	N	1	f	2.413 286 GHz	-6.255 dBm				5	N	1	f						6	N	1	f						7	N	1	f						8	N	1	f						9	N	1	f						10	N	1	f						11	N	1	f					
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11N40/HCH	KeySight Spectrum Analyzer - Swept SA AL: 100.000 MHz SENSE: INT ALGN: AUTO 05:41:42 PM Aug 30, 2019 Center Freq 2.446000000 GHz Trig: Free Run #Avg Type: RMS PNO: Fast IFGain: Low #Atten: 30 dB AvgHold: 100/100 TRACE: 1 2 3 4 5 TYPE: M DET: NNNNN 10 dB/div Ref 20.00 dBm Log  Mkr2 2.500 000 GHz -61.565 dBm -24.62 dBm Start 2.39200 GHz #Res BW 100 kHz #VBW 300 kHz Sweep 10.40 ms (2001 pts) Stop 2.50000 GHz <table><tr><th>MNR</th><th>MODE</th><th>TRC</th><th>SCL</th><th>X</th><th>Y</th><th>FUNCTION</th><th>FUNCTION WIDTH</th><th>FUNCTION VALUE</th></tr><tr><td>1</td><td>N</td><td>1</td><td>f</td><td>2.483 500 GHz</td><td>-46.571 dBm</td><td></td><td></td><td></td></tr><tr><td>2</td><td>N</td><td>1</td><td>f</td><td>2.500 000 GHz</td><td>-61.565 dBm</td><td></td><td></td><td></td></tr><tr><td>3</td><td>N</td><td>1</td><td>f</td><td>2.444 164 GHz</td><td>-4.621 dBm</td><td></td><td></td><td></td></tr><tr><td>4</td><td>N</td><td>1</td><td>f</td><td>2.444 164 GHz</td><td>-4.621 dBm</td><td></td><td></td><td></td></tr><tr><td>5</td><td>N</td><td>1</td><td>f</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>6</td><td>N</td><td>1</td><td>f</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>7</td><td>N</td><td>1</td><td>f</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>8</td><td>N</td><td>1</td><td>f</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>9</td><td>N</td><td>1</td><td>f</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>10</td><td>N</td><td>1</td><td>f</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>11</td><td>N</td><td>1</td><td>f</td><td></td><td></td><td></td><td></td><td></td></tr></table> MSG STATUS Frequency Auto Tune Center Freq 2.446000000 GHz Start Freq 2.392000000 GHz Stop Freq 2.500000000 GHz CF Step 10.800000 MHz Auto Man Freq Offset 0 Hz Scale Type Log Lin	MNR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	1	N	1	f	2.483 500 GHz	-46.571 dBm				2	N	1	f	2.500 000 GHz	-61.565 dBm				3	N	1	f	2.444 164 GHz	-4.621 dBm				4	N	1	f	2.444 164 GHz	-4.621 dBm				5	N	1	f						6	N	1	f						7	N	1	f						8	N	1	f						9	N	1	f						10	N	1	f						11	N	1	f					
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5.7 RF Conducted Spurious Emissions

Test Requirement:	47 CFR Part 15C Section 15.247 (d)
Test Method:	ANSI C63.10: 2013
Test Setup:	 Offset=cable loss+ attenuation factor
Exploratory Test Mode:	Transmitting with all kind of modulations, data rates
Final Test Mode:	Through Pre-scan, find the 1Mbps of rate is the worst case of 802.11b; 6Mbps of rate is the worst case of 802.11g; 6.5Mbps of rate is the worst case of 802.11n(HT20); 13.5Mbps of rate is the worst case of 802.11n(HT40); Only the worst case is recorded in the report.
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum 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.
Test Results:	Pass