



Shenzhen Huaxia Testing Technology Co., Ltd

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

Telephone: +86-755-26648640

Fax: +86-755-26648637

Website: www.cqa-cert.com

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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:	<input type="checkbox"/> Mobile <input type="checkbox"/> Portable <input checked="" type="checkbox"/> 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

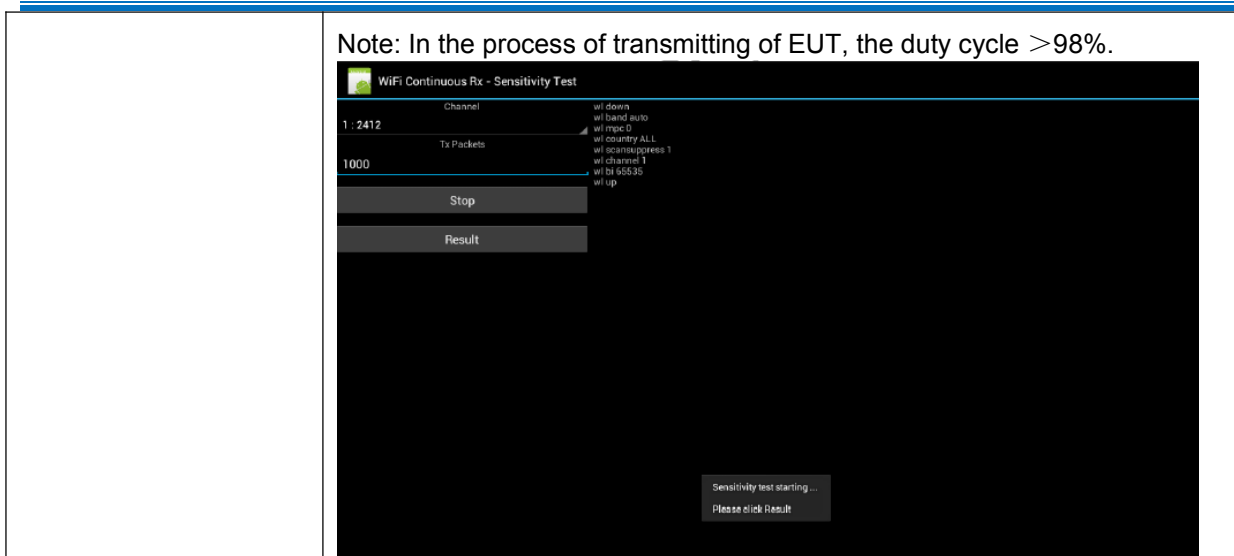
For 802.11n (HT40):

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:

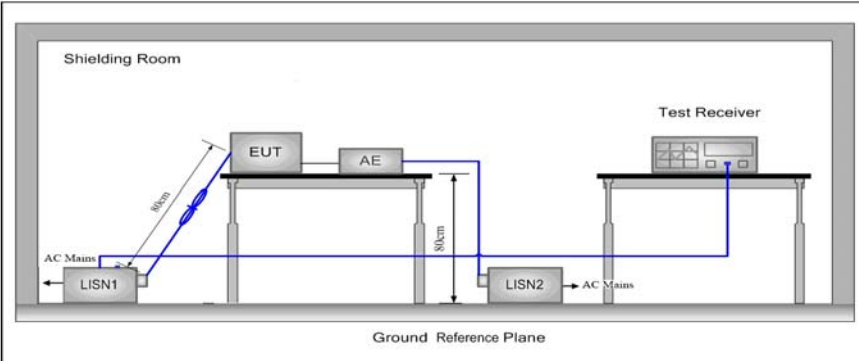
The temporary antenna connector is soldered on the PCB board in order to perform conducted tests and this temporary antenna connector is listed in the equipment list.

5 Test results and Measurement Data

5.1 Antenna Requirement

Standard requirement:	47 CFR Part 15C Section 15.203 /247(c)
<p>15.203 requirement:</p> <p>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.</p> <p>15.247(b) (4) requirement:</p> <p>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.</p>	
EUT Antenna:	<p>Antenna</p> 
The antenna is IFIA Antenna. The best case gain of the antenna is 2dBi.	

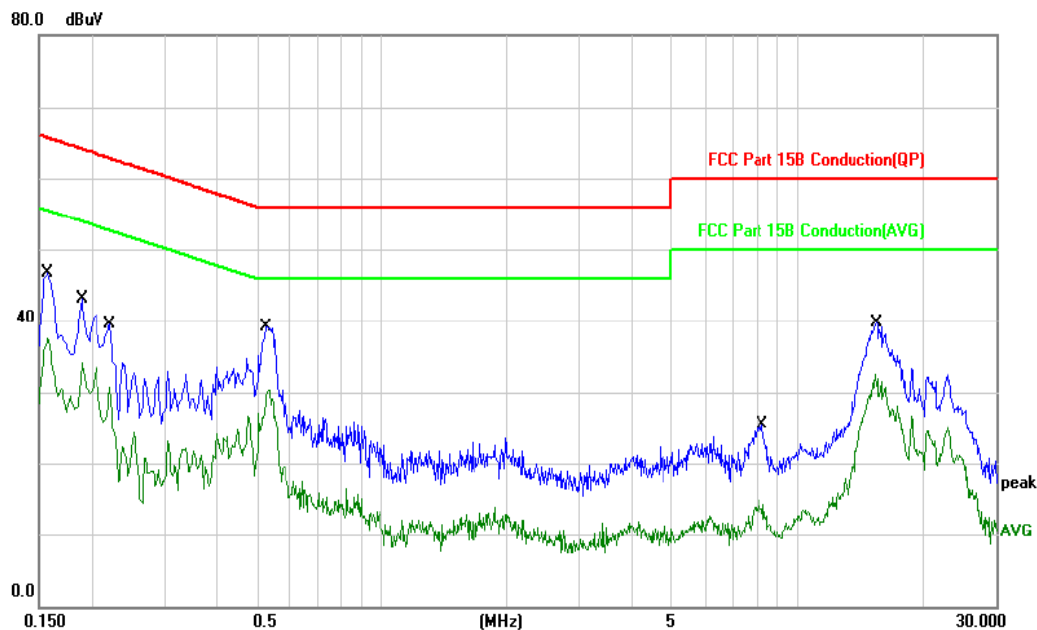
5.2 Conducted Emissions

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:	<p>1) The mains terminal disturbance voltage test was conducted in a shielded room.</p> <p>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.</p> <p>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,</p> <p>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.</p> <p>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.</p>		
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:

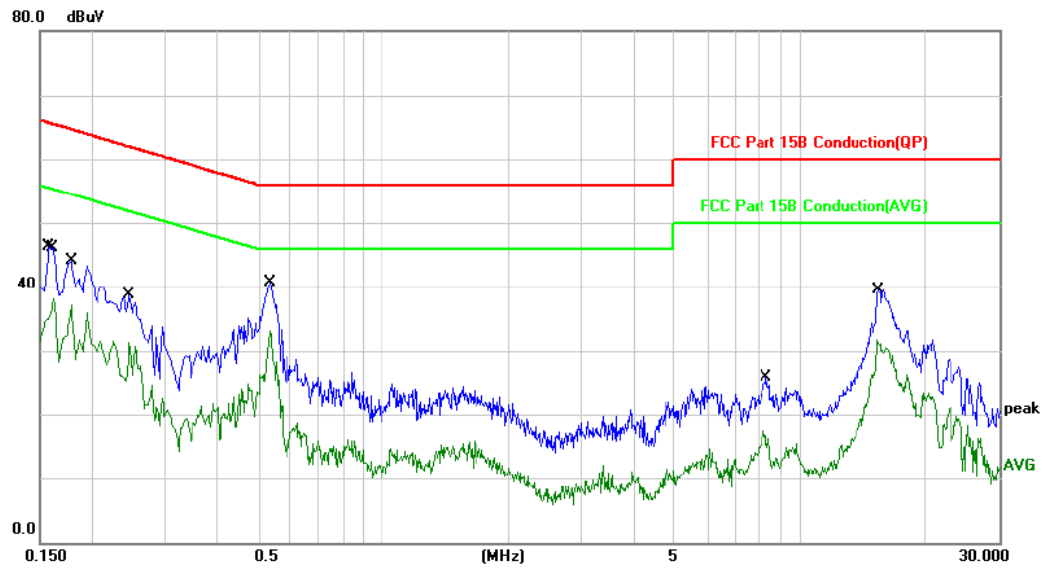


No. Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1	0.1580	46.52	0.18	46.70	65.56	-18.86	QP	
2	0.1580	37.29	0.18	37.47	55.56	-18.09	AVG	
3	0.1900	43.00	0.19	43.19	64.03	-20.84	QP	
4	0.1900	33.93	0.19	34.12	54.03	-19.91	AVG	
5	0.2220	39.28	0.20	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

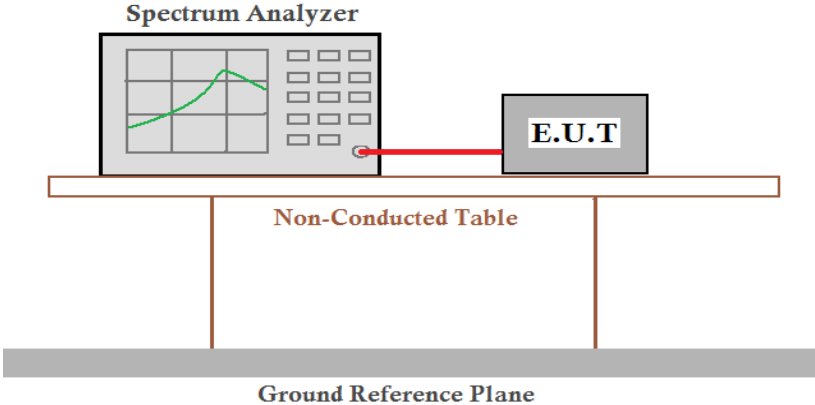
Test Requirement:	47 CFR Part 15C Section 15.247 (b)(3)
Test Method:	ANSI C63.10: 2013
Test Setup:	
Exploratory Test Mode:	Transmitting with all kind of modulations, data rates
Final Test Mode:	Through Pre-scan, find the 1Mbps of rate is the worst case of 802.11b; 6Mbps of rate is the worst case of 802.11g; 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.

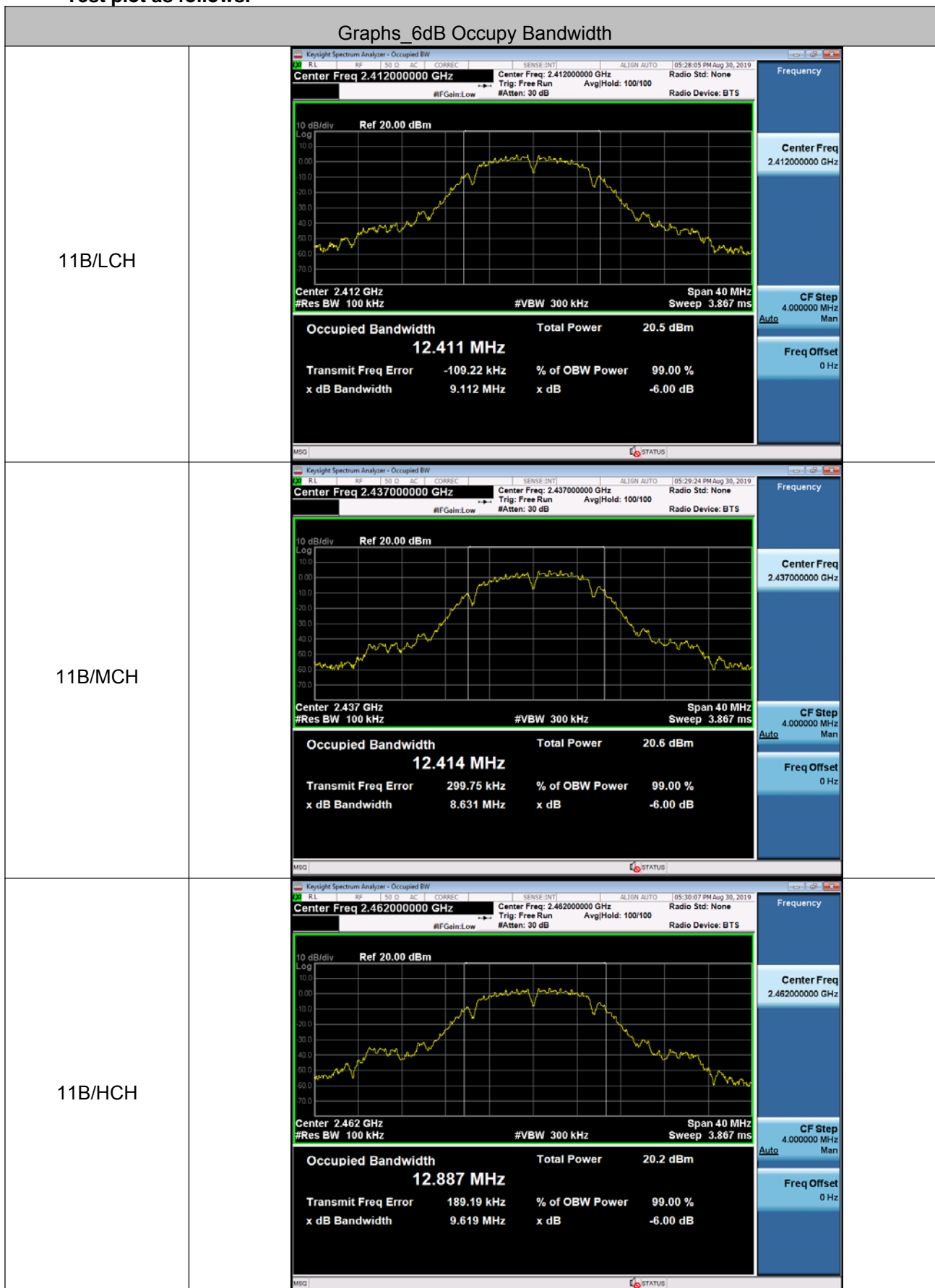
5.4 6dB Occupy Bandwidth

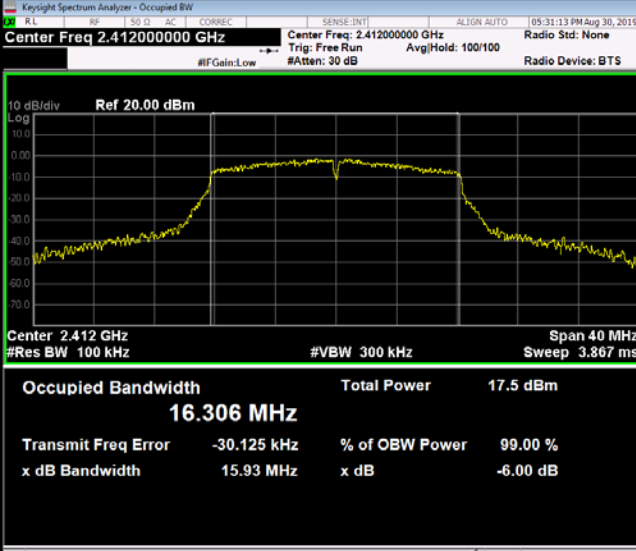
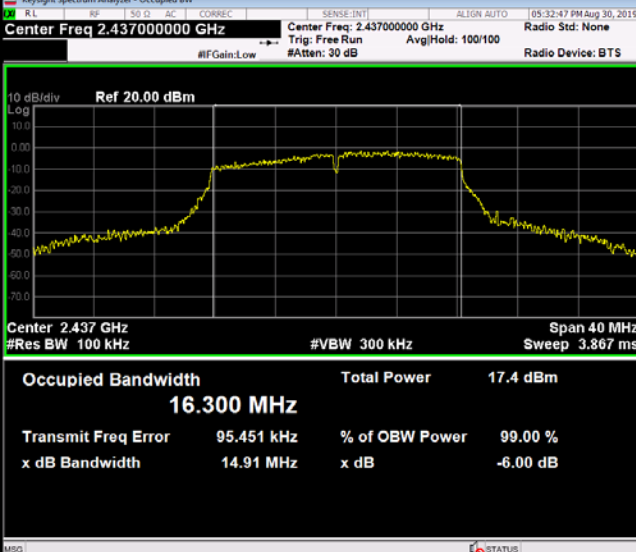
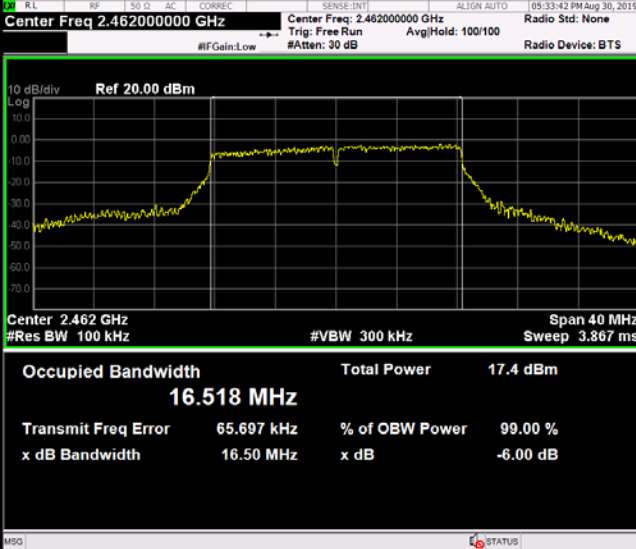
Test Requirement:	47 CFR Part 15C Section 15.247 (a)(2)
Test Method:	ANSI C63.10: 2013
Test Setup:	 <p>Offset=cable loss+ attenuation factor</p>
Exploratory Test Mode:	Transmitting with all kind of modulations, data rates
Final Test Mode:	Through Pre-scan, find the 1Mbps of rate is the worst case of 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

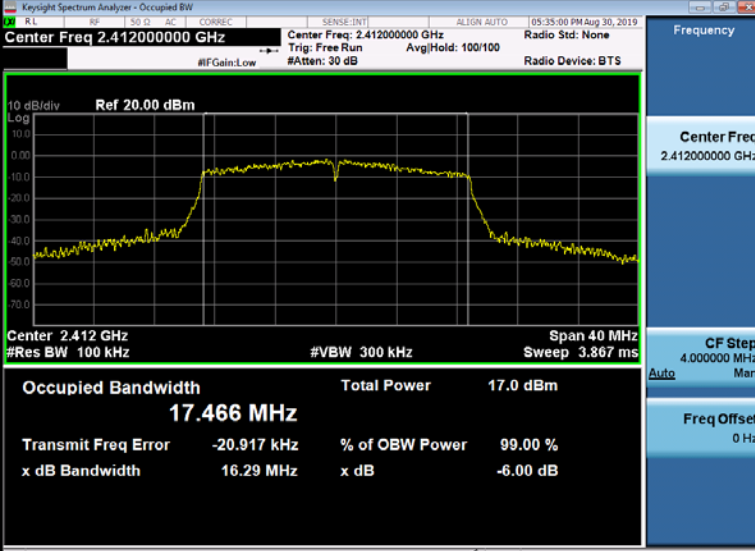
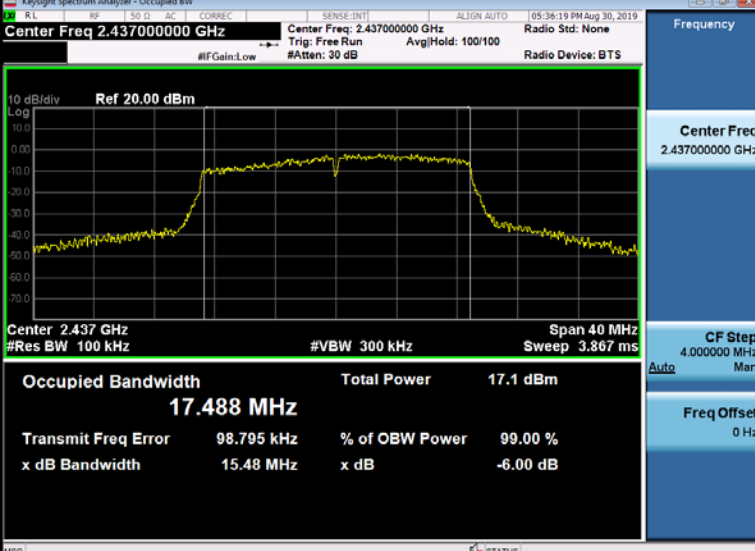
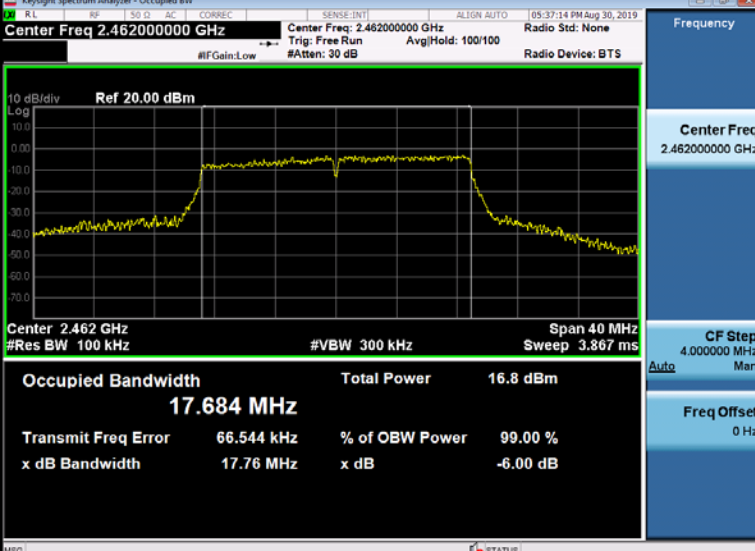
Measurement Data

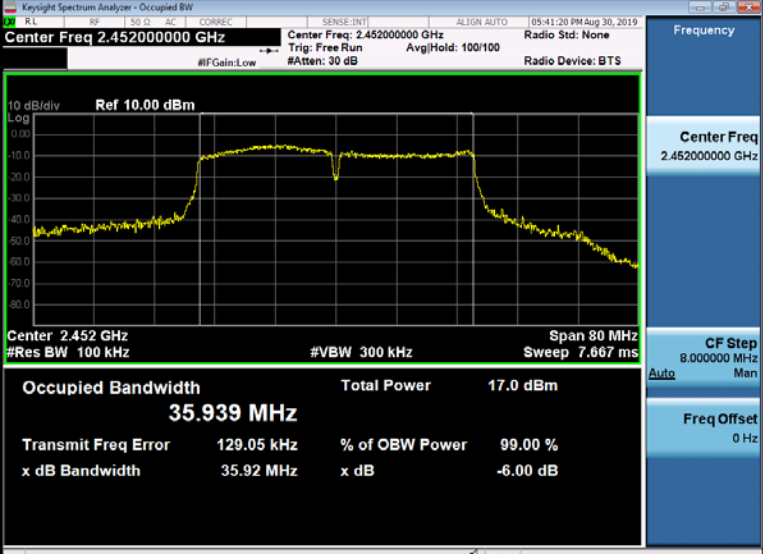
Type	Channel	6dB Bandwidth (MHz)	Limit (KHz)	Result
802.11b	Lowest	9.112	≥500	Pass
	Middle	8.631		
	Highest	9.619		
802.11g	Lowest	15.93	≥500	Pass
	Middle	14.91		
	Highest	16.50		
802.11n(HT20)	Lowest	16.29	≥500	Pass
	Middle	15.48		
	Highest	17.76		
802.11n(HT40)	Lowest	36.48	≥500	Pass
	Middle	33.67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

Test plot as follows:

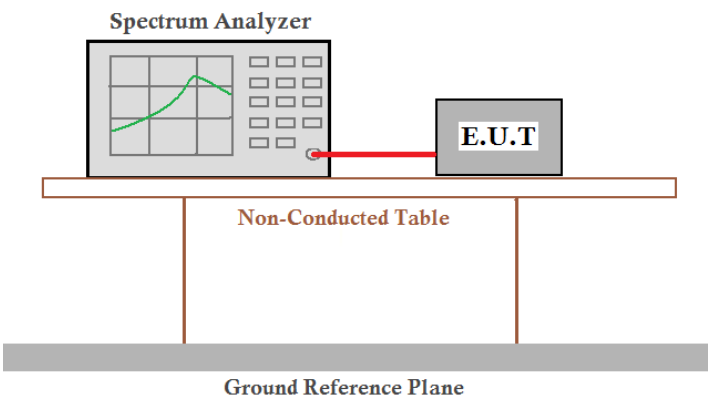


11G/LCH	 <p>KeySight Spectrum Analyzer - Occupied BW</p> <p>Center Freq 2.412000000 GHz</p> <p>Center Freq: 2.412000000 GHz</p> <p>Trig: Free Run</p> <p>Avg/Hold: 100/100</p> <p>Radio Std: None</p> <p>Radio Device: BTS</p> <p>10 dB/div Ref 20.00 dBm</p> <p>Center 2.412 GHz</p> <p>#Res BW 100 kHz</p>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

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

11N40/LCH	 <p>Keysight Spectrum Analyzer - Occupied BW</p> <p>Center Freq: 2.42200000 GHz</p> <p>Trig: Free Run</p> <p>Avg/Hold: 100/100</p> <p>Radio Std: None</p> <p>#IFGain: Low</p> <p>#Atten: 30 dB</p> <p>Radio Device: BTS</p> <p>Ref 10.00 dBm</p> <p>Center 2.422 GHz</p> <p>#Res BW 100 kHz</p> <p>#VBW 300 kHz</p> <p>Span 80 MHz</p> <p>Sweep 7.667 ms</p> <p>Occupied Bandwidth 36.141 MHz</p> <p>Total Power 16.3 dBm</p> <p>Transmit Freq Error 64.311 kHz</p> <p>% of OBW Power 99.00 %</p> <p>x dB Bandwidth 36.48 MHz</p> <p>x dB -6.00 dB</p> <p>Frequency</p> <p>Center Freq 2.42200000 GHz</p> <p>CF Step 8.000000 MHz</p> <p>Auto</p> <p>Freq Offset 0 Hz</p>
11N40/MCH	 <p>Keysight Spectrum Analyzer - Occupied BW</p> <p>Center Freq: 2.43700000 GHz</p> <p>Trig: Free Run</p> <p>Avg/Hold: 100/100</p> <p>Radio Std: None</p> <p>#IFGain: Low</p> <p>#Atten: 30 dB</p> <p>Radio Device: BTS</p> <p>Ref 10.00 dBm</p> <p>Center 2.437 GHz</p> <p>#Res BW 100 kHz</p> <p>#VBW 300 kHz</p> <p>Span 80 MHz</p> <p>Sweep 7.667 ms</p> <p>Occupied Bandwidth 35.649 MHz</p> <p>Total Power 16.9 dBm</p> <p>Transmit Freq Error -39.058 kHz</p> <p>% of OBW Power 99.00 %</p> <p>x dB Bandwidth 33.67 MHz</p> <p>x dB -6.00 dB</p> <p>Frequency</p> <p>Center Freq 2.43700000 GHz</p> <p>CF Step 8.000000 MHz</p> <p>Auto</p> <p>Freq Offset 0 Hz</p>
11N40/HCH	 <p>Keysight Spectrum Analyzer - Occupied BW</p> <p>Center Freq: 2.45200000 GHz</p> <p>Trig: Free Run</p> <p>Avg/Hold: 100/100</p> <p>Radio Std: None</p> <p>#IFGain: Low</p> <p>#Atten: 30 dB</p> <p>Radio Device: BTS</p> <p>Ref 10.00 dBm</p> <p>Center 2.452 GHz</p> <p>#Res BW 100 kHz</p> <p>#VBW 300 kHz</p> <p>Span 80 MHz</p> <p>Sweep 7.667 ms</p> <p>Occupied Bandwidth 35.939 MHz</p> <p>Total Power 17.0 dBm</p> <p>Transmit Freq Error 129.05 kHz</p> <p>% of OBW Power 99.00 %</p> <p>x dB Bandwidth 35.92 MHz</p> <p>x dB -6.00 dB</p> <p>Frequency</p> <p>Center Freq 2.45200000 GHz</p> <p>CF Step 8.000000 MHz</p> <p>Auto</p> <p>Freq Offset 0 Hz</p>

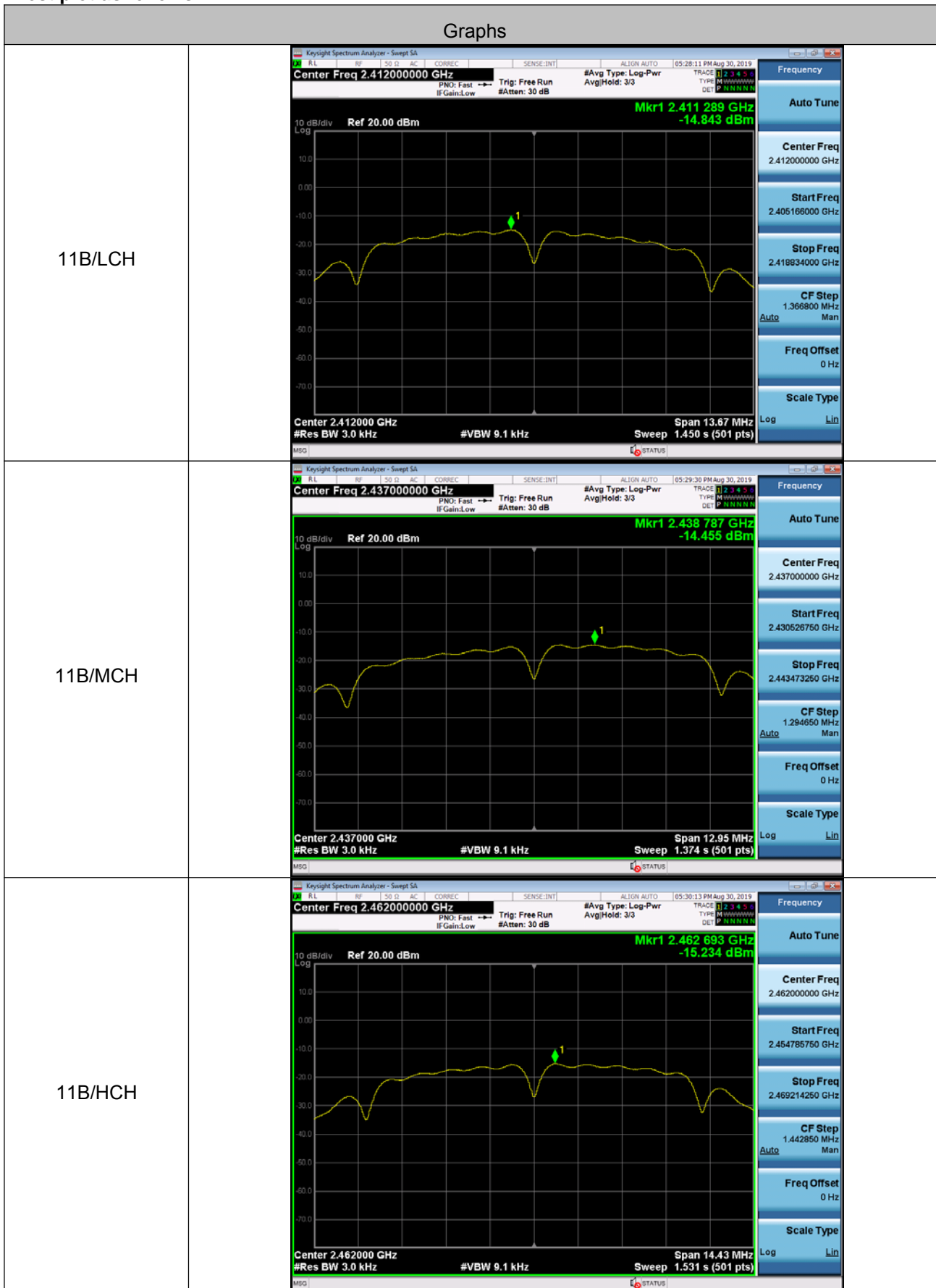
5.5 Power Spectral Density

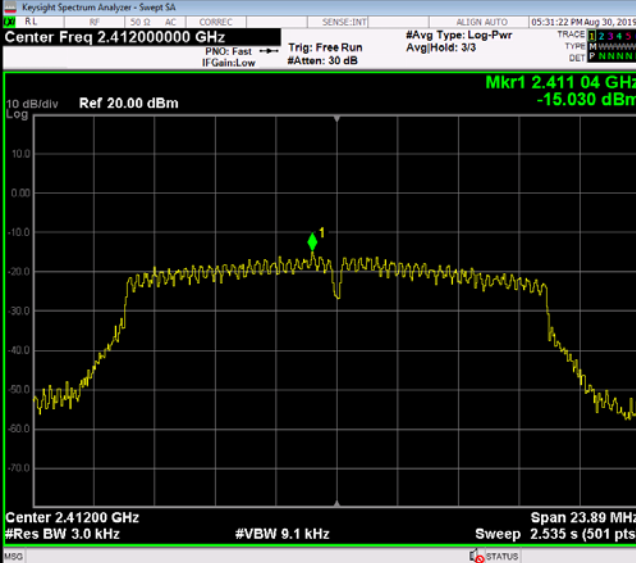
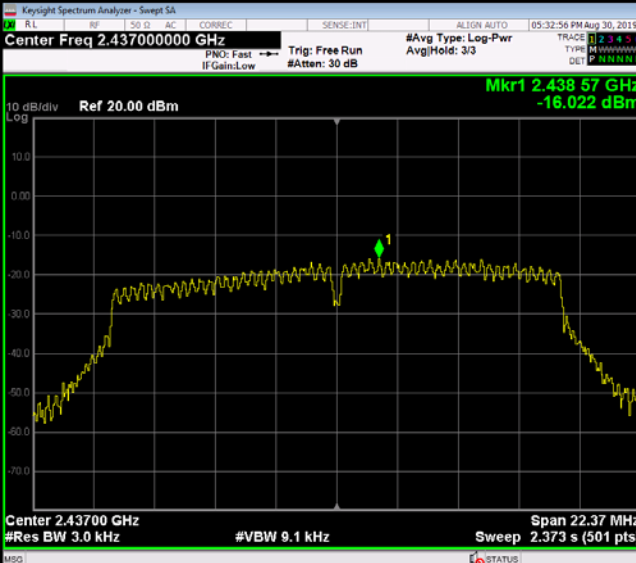
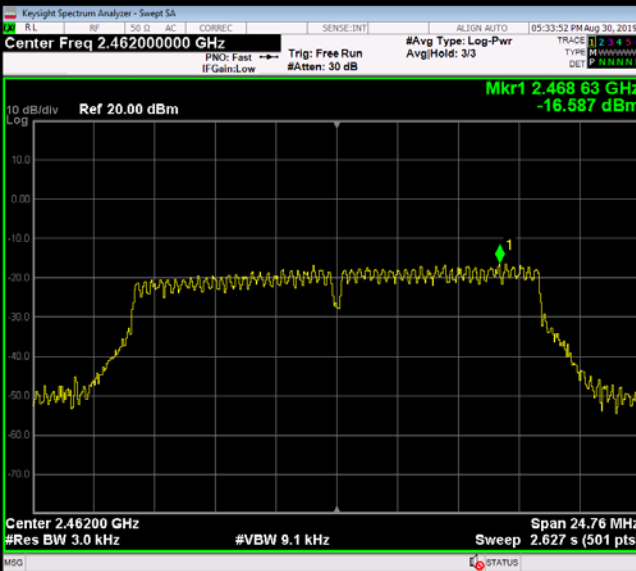
Test Requirement:	47 CFR Part 15C Section 15.247 (e)
Test Method:	ANSI C63.10: 2013
Test Setup:	 <p>Offset=cable loss+ attenuation factor</p>
Exploratory Test Mode:	Transmitting with all kind of modulations, data rates
Final Test Mode:	Through Pre-scan, find the 1Mbps of rate is the worst case of 802.11b; 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

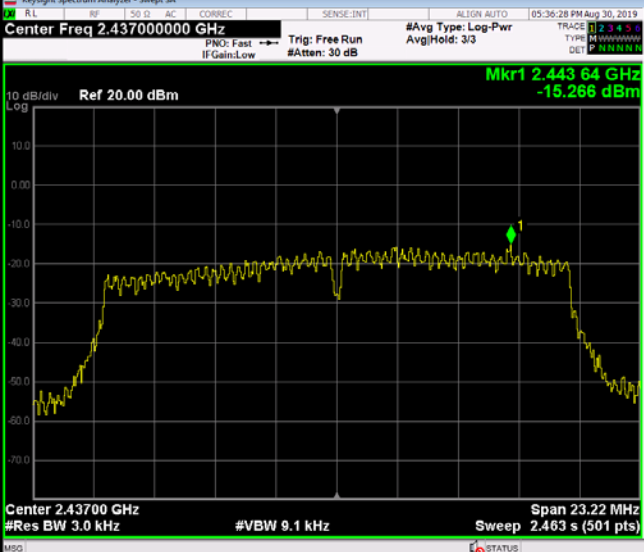
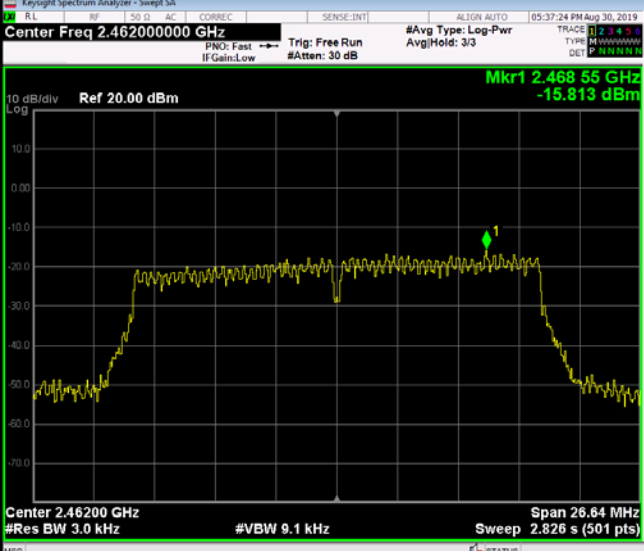
Measurement Data

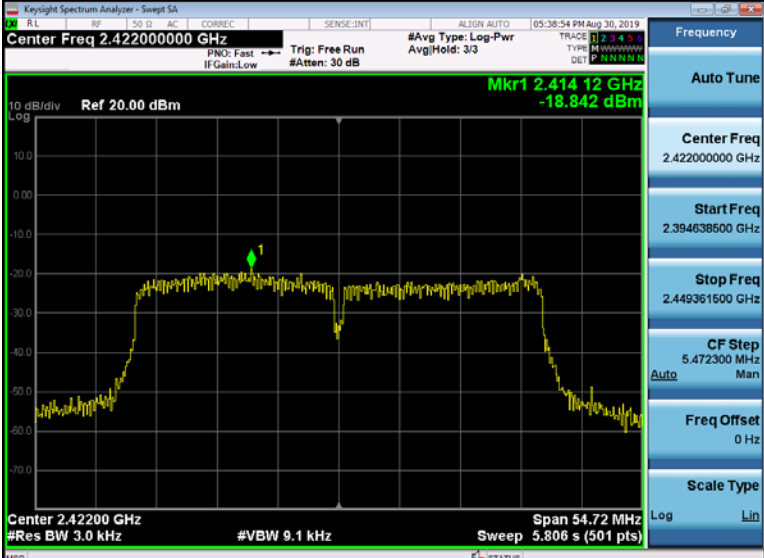

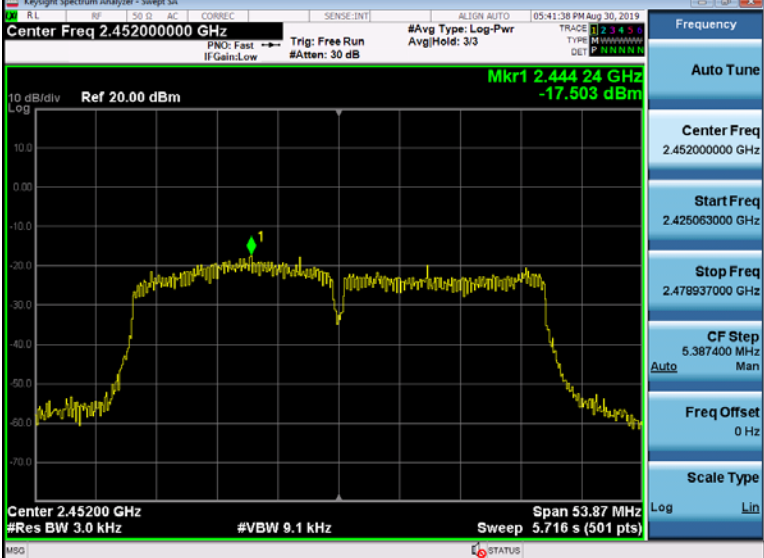
Type	Channel	Power Spectral Density (dBm/3KHz)	Limit (dBm/3KHz)	Result
802.11b	Lowest	-14.843	8	Pass
	Middle	-14.455		
	Highest	-15.234		
802.11g	Lowest	-15.030	8	Pass
	Middle	-16.022		
	Highest	-16.587		
802.11n(HT20)	Lowest	-15.423	8	Pass
	Middle	-15.266		
	Highest	-15.813		
802.11n(HT40)	Lowest	-18.842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

Test plot as follows:

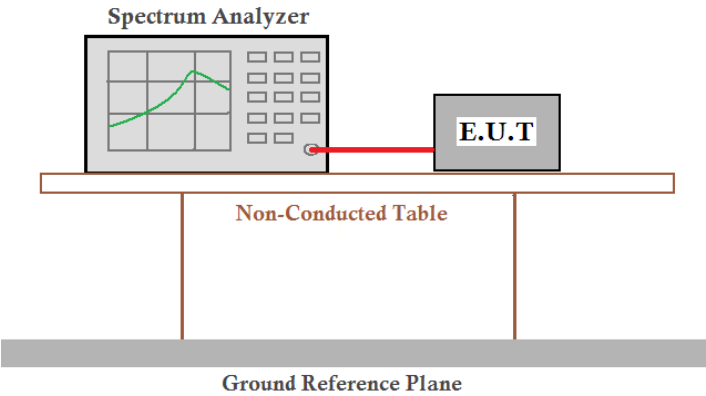


11G/LCH	 <p>KeySight Spectrum Analyzer - Swept SA</p> <p>Center Freq 2.41200000 GHz</p> <p>Ref 20.00 dBm</p> <p>Mkr1 2.411 04 GHz -15.030 dBm</p> <p>Center 2.41200 GHz</p> <p>#Res BW 3.0 kHz</p> <p>#VBW 9.1 kHz</p> <p>Span 23.89 MHz</p> <p>Sweep 2.535 s (501 pts)</p> <p>Frequency</p> <p>Auto Tune</p> <p>Center Freq 2.41200000 GHz</p> <p>Start Freq 2.400053250 GHz</p> <p>Stop Freq 2.423946750 GHz</p> <p>CF Step 2.389350 MHz</p> <p>Freq Offset 0 Hz</p> <p>Scale Type Log Lin</p>
11G/MCH	 <p>KeySight Spectrum Analyzer - Swept SA</p> <p>Center Freq 2.43700000 GHz</p> <p>Ref 20.00 dBm</p> <p>Mkr1 2.438 57 GHz -16.022 dBm</p> <p>Center 2.43700 GHz</p> <p>#Res BW 3.0 kHz</p> <p>#VBW 9.1 kHz</p> <p>Span 22.37 MHz</p> <p>Sweep 2.373 s (501 pts)</p> <p>Frequency</p> <p>Auto Tune</p> <p>Center Freq 2.43700000 GHz</p> <p>Start Freq 2.425815250 GHz</p> <p>Stop Freq 2.448184750 GHz</p> <p>CF Step 2.236950 MHz</p> <p>Freq Offset 0 Hz</p> <p>Scale Type Log Lin</p>
11G/HCH	 <p>KeySight Spectrum Analyzer - Swept SA</p> <p>Center Freq 2.46200000 GHz</p> <p>Ref 20.00 dBm</p> <p>Mkr1 2.468 63 GHz -16.587 dBm</p> <p>Center 2.46200 GHz</p> <p>#Res BW 3.0 kHz</p> <p>#VBW 9.1 kHz</p> <p>Span 24.76 MHz</p> <p>Sweep 2.627 s (501 pts)</p> <p>Frequency</p> <p>Auto Tune</p> <p>Center Freq 2.46200000 GHz</p> <p>Start Freq 2.449622000 GHz</p> <p>Stop Freq 2.474378000 GHz</p> <p>CF Step 2.475600 MHz</p> <p>Freq Offset 0 Hz</p> <p>Scale Type Log Lin</p>

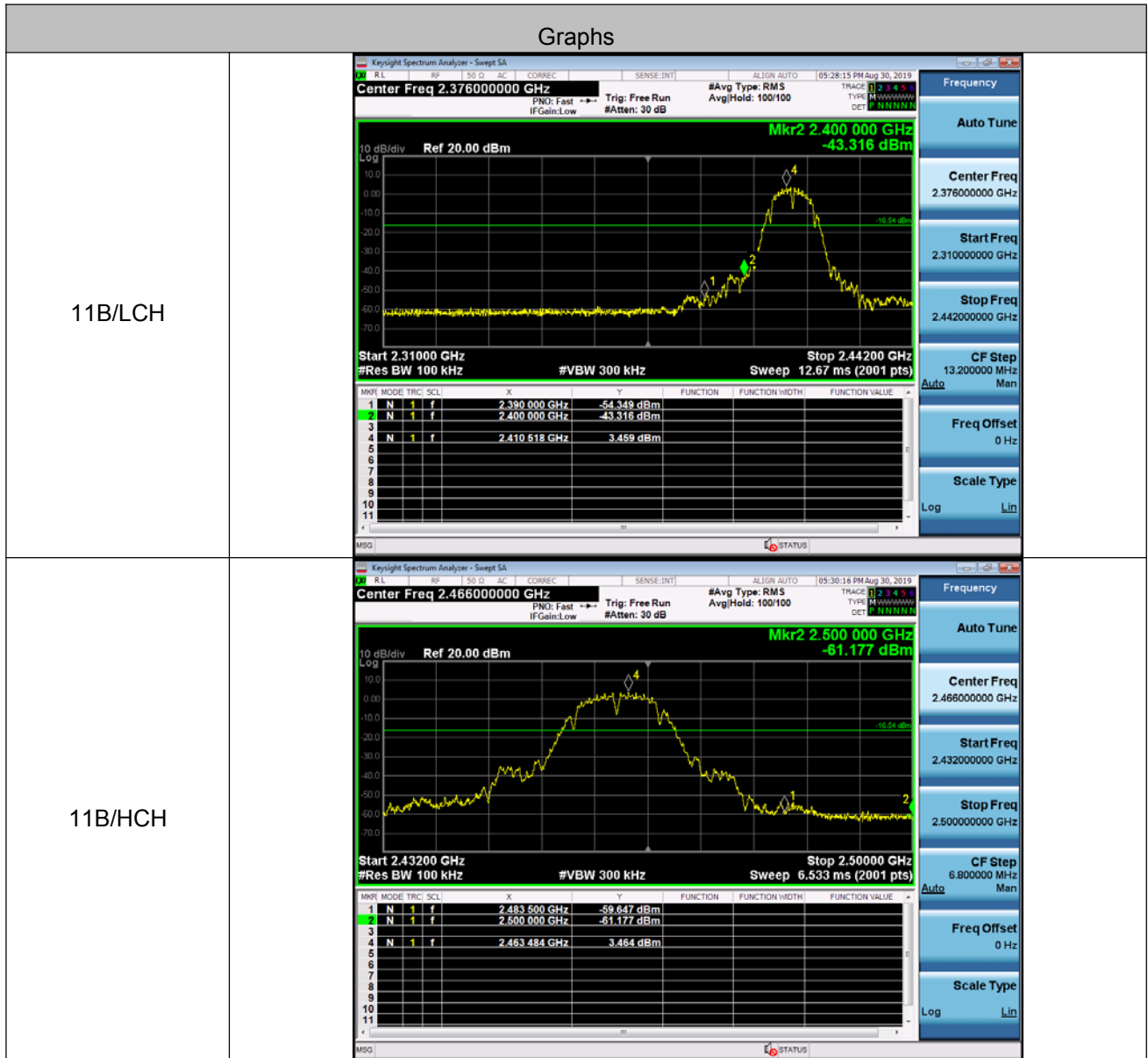
11N20/LCH	 <p>KeySight Spectrum Analyzer - Swept SA</p> <p>Center Freq 2.41200000 GHz</p> <p>Mkr1 2.41078 GHz -15.423 dBm</p> <p>Ref 20.00 dBm</p> <p>Center 2.41200 GHz</p> <p>#Res BW 3.0 kHz</p> <p>#VBW 9.1 kHz</p> <p>Span 24.44 MHz</p> <p>Sweep 2.593 s (501 pts)</p> <p>Frequency</p> <p>Auto Tune</p> <p>Center Freq 2.41200000 GHz</p> <p>Start Freq 2.399780250 GHz</p> <p>Stop Freq 2.424219750 GHz</p> <p>CF Step 2.443950 MHz</p> <p>Freq Offset 0 Hz</p> <p>Scale Type Log Lin</p>
11N20/MCH	 <p>KeySight Spectrum Analyzer - Swept SA</p> <p>Center Freq 2.43700000 GHz</p> <p>Mkr1 2.44364 GHz -15.266 dBm</p> <p>Ref 20.00 dBm</p> <p>Center 2.43700 GHz</p> <p>#Res BW 3.0 kHz</p> <p>#VBW 9.1 kHz</p> <p>Span 23.22 MHz</p> <p>Sweep 2.463 s (501 pts)</p> <p>Frequency</p> <p>Auto Tune</p> <p>Center Freq 2.43700000 GHz</p> <p>Start Freq 2.425391500 GHz</p> <p>Stop Freq 2.448608500 GHz</p> <p>CF Step 2.321700 MHz</p> <p>Freq Offset 0 Hz</p> <p>Scale Type Log Lin</p>
11N20/HCH	 <p>KeySight Spectrum Analyzer - Swept SA</p> <p>Center Freq 2.46200000 GHz</p> <p>Mkr1 2.46855 GHz -15.813 dBm</p> <p>Ref 20.00 dBm</p> <p>Center 2.46200 GHz</p> <p>#Res BW 3.0 kHz</p> <p>#VBW 9.1 kHz</p> <p>Span 26.64 MHz</p> <p>Sweep 2.826 s (501 pts)</p> <p>Frequency</p> <p>Auto Tune</p> <p>Center Freq 2.46200000 GHz</p> <p>Start Freq 2.448682250 GHz</p> <p>Stop Freq 2.475317750 GHz</p> <p>CF Step 2.663550 MHz</p> <p>Freq Offset 0 Hz</p> <p>Scale Type Log Lin</p>

11N40/LCH	 <p>Key parameters from the screenshot:</p> <ul style="list-style-type: none"> Center Freq: 2.422000000 GHz Span: 54.72 MHz Res BW: 3.0 kHz Sweep: 5.806 s (501 pts) Marker 1: 2.414 12 GHz, -18.842 dBm
11N40/MCH	 <p>Key parameters from the screenshot:</p> <ul style="list-style-type: none"> Center Freq: 2.437000000 GHz Span: 50.50 MHz Res BW: 3.0 kHz Sweep: 3.767 s (501 pts) Marker 1: 2.445 88 GHz, -17.419 dBm
11N40/HCH	 <p>Key parameters from the screenshot:</p> <ul style="list-style-type: none"> Center Freq: 2.452000000 GHz Span: 53.87 MHz Res BW: 3.0 kHz Sweep: 5.716 s (501 pts) Marker 1: 2.444 24 GHz, -17.503 dBm

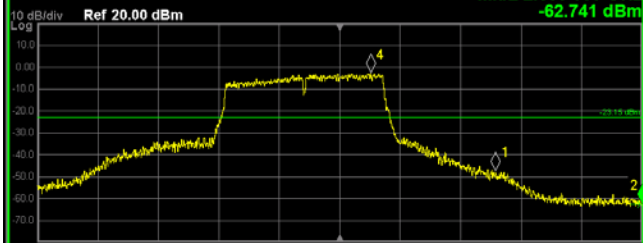
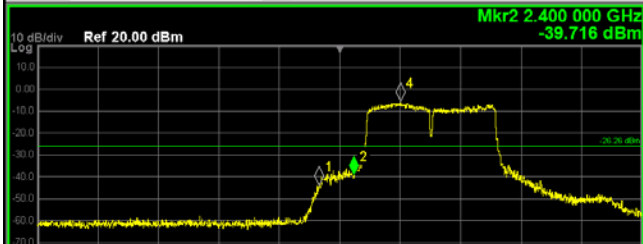
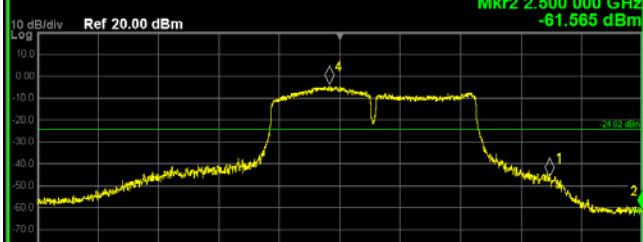
5.6 Band-edge for RF Conducted Emissions

Test Requirement:	47 CFR Part 15C Section 15.247 (d)
Test Method:	ANSI C63.10: 2013
Test Setup:	 <p>Offset=cable loss+ attenuation factor</p>
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

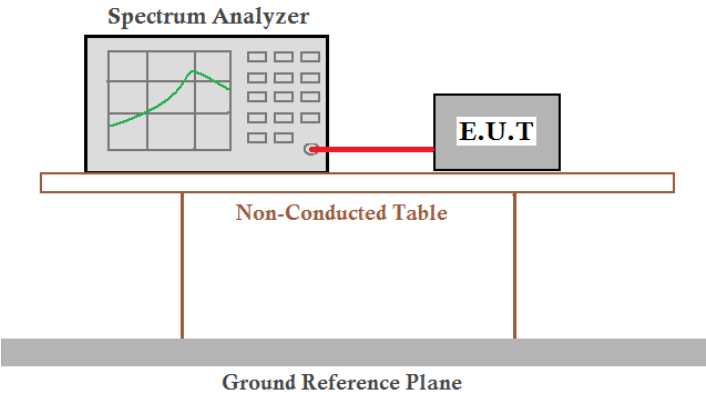
Test plot as follows:



11G/LCH	<div><div><div>KeySight Spectrum Analyzer - Sweep SA</div><div><div>Center Freq 2.376000000 GHz</div><div>Ref 20.00 dBm</div><div>Mkr2 2.400 000 GHz -38.581 dBm</div><div>Start 2.31000 GHz #Res BW 100 kHz #VBW 300 kHz Stop 2.44200 GHz Sweep 12.67 ms (2001 pts)</div><table><thead><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></thead><tbody><tr><td>1</td><td>N</td><td>1</td><td>f</td><td>2.390 000 GHz</td><td>-55.097 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>-38.581 dBm</td><td></td><td></td><td></td></tr><tr><td>3</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>4</td><td>N</td><td>1</td><td>f</td><td>2.410 716 GHz</td><td>-1.381 dBm</td><td></td><td></td><td></td></tr><tr><td>5</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>6</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>7</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>8</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>9</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>10</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>11</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr></tbody></table></div><div><div>Frequency</div><div>Auto Tune</div><div>Center Freq 2.376000000 GHz</div><div>Start Freq 2.310000000 GHz</div><div>Stop Freq 2.442000000 GHz</div><div>CF Step 13.200000 MHz Man</div><div>Auto</div><div>Freq Offset 0 Hz</div><div>Scale Type Log Lin</div></div></div></div>	MNR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	1	N	1	f	2.390 000 GHz	-55.097 dBm				2	N	1	f	2.400 000 GHz	-38.581 dBm				3									4	N	1	f	2.410 716 GHz	-1.381 dBm				5									6									7									8									9									10									11								
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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:	 <p>The diagram illustrates the test setup for RF conducted spurious emissions. A Spectrum Analyzer is connected via a red cable to an E.U.T. (Equipment Under Test). Both are placed on a Non-Conducted Table, which is supported by two vertical legs. Below the table is a Ground Reference Plane, represented by a thick grey bar.</p> <p>Offset=cable loss+ attenuation factor</p>
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