ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

INTENTIONAL RADIATOR CERTIFICATION TO FCC PART 15 SUBPART E AND INDUSTRY CANADA RSS 247 REQUIREMENT

OF

Applicant:	Microsoft Corporation One Microsoft Way, Redmond, WA 98052-6399 USA
Product Name:	Portable Computing Device
Brand Name:	Microsoft
Model No.:	1824
Model Difference:	N/A
FCC ID:	C3K1824
IC:	3048A-1824
Report Number:	E2/2018/10172
FCC Rule Part:	§15.407, Cat:NII
IC Rule:	RSS-247 issue 2 Feb. 2017
Issue Date:	Jun. 08, 2018
Date of Test:	Jan. 17, 2018 ~ Jun. 08, 2018
Date of EUT Received:	Jan. 17, 2018

We hereby certify that:

The above equipment was tested by SGS Taiwan Ltd. Electronics & Communication Laboratory 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 conducted and radiated emission limits.

The test results of this report relate only to the tested sample identified in this report.

Tested By: _____

Vito Pei / Sr. Engineer

Approved By: _____

Jim Chang / Manager

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Revision History

Report Number	Revision	Description	Effected Page	Issue Date	Revised By
E2/2018/10172	Rev.00	Initial creation of document	All	May 29, 2018	Tiffany Kao

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1 GENERAL INFORMATIOQN

1.1 Product Description

General:

Product Name:	Portable Computing Device	
Brand Name:	Microsoft	
Model No.:	1824	
Model Difference:	N/A	
Product SW/HW version:	Windows 10 Pro / EV1824	
Radio SW/HW version:	12.0.0.461 / V3.2	
Test SW Version:	N/A	
RF power setting in TEST SW:	N/A	
Power Supply:	7.66Vdc from Rechargeable Li-ion Battery or 15V from AC/DC Adapter	
	Battery:	Model No.: G16QA043H, Supplier: SMP
	Adapter:	Model No.: 1735, Supplier: LITEON

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FCC WLAN 5GHz:

Wi-Fi	Frequency Range	Channels	Avg. Power (dBm)	Modulation Technology
11a_20	5150~5250	4	17.39	OFDM
	5250~5350	4	17.43	
	5470~5725	12	17.37	
	5725-5850	5	17.38	
11n_HT / ac_VHT 20M	5150~5250	4	HT: 16.91	OFDM
	5250~5350	4	HT: 16.97	
	5470~5725	12	HT: 16.96	
	5725-5850	5	HT: 16.95	
11n_HT / ac_VHT 40M	5150~5250	2	HT: 16.98	OFDM
	5250~5350	2	HT: 16.95	
	5470~5725	6	HT:16.94	
	5725-5850	2	HT: 16.99	
11ac VHT80M	5150~5250	1	14.43	OFDM
	5250~5350	1	14.43	
	5470~5725	3	16.98	
	5725-5850	1	16.97	
Antenna Designation:	Loop Antenna, Main Antenna: 5150~5250MHz Peak Gain: 1.42dBi 5250~5350MHz Peak Gain: 1.42dBi 5470~5725MHz Peak Gain: 1.45dBi 5725~5850MHz Peak Gain: 1.84dBi Aux Antenna: 5150~5250MHz Peak Gain: -0.52dBi 5250~5350MHz Peak Gain: -0.52dBi 5470~5725MHz Peak Gain: 1.36dBi 5725~5850MHz Peak Gain: 0.94dBi			

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IC WLAN 5GHz:

Wi-Fi	Frequency Range	Channels	Avg. or EIRP	Rated Power(dBm)	Modulation Technology
11a	5180~5240	4	EIRP	20.96	OFDM
	5260~5320	4	Avg.	17.43	
	5500~5580	5	Avg.	17.37	
	5660~5700	3	Avg.	17.24	
	5745~5825	5	Avg.	17.38	
11n_HT / ac_VHT 20M	5180~5240	4	EIRP	HT: 20.48	OFDM
	5260~5320	4	Avg.	HT: 16.97	
	5500~5580	5	Avg.	HT: 16.96	
	5660~5720	3	Avg.	HT: 16.32	
	5745~5825	5	Avg.	HT: 16.95	
11n_HT / ac_VHT 40M	5190~5230	2	EIRP	HT: 20.55	OFDM
	5270~5310	2	Avg.	HT: 16.95	
	5510~5550	2	Avg.	HT: 16.94	
	5670~5710	1	Avg.	HT: 16.94	
	5755~5795	2	Avg.	HT: 16.99	
11ac VHT80M	5210~5210	1	EIRP	18.00	OFDM
	5290~5290	1	Avg.	14.43	
	5530~5530	1	Avg.	14.39	
	5690~5775	1	Avg.	16.97	
Modulation type		64QAM, 16QAM, QPSK, BPSK for OFDM 256QAM for OFDM in 802.11ac only			
Transition Rate:		802.11 a: 6/9/12/18/24/36/48/54 Mbps 802.11 n_20MHz: 6.5 – 144.4Mbps 802.11 n_40MHz: 13.5 - 300.0Mbps 802.11 ac_20MHz: 6.5 –144.4Mbps 802.11 ac_40MHz: 13.5 -300.0Mbps 802.11 ac_80MHz: 29.3 – 650Mbps			

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1.2 Test Methodology of Applied Standards

FCC Part 15, Subpart E §15.407

FCC KDB 789033 D02 General UNII Test Procedures New Rules

KDB 789033 D02 v01r04 General UNII Test Procedures New Rules

KDB 644545 D03 v01 Guidance for IEEE 802.11ac

FCC KDB 662911 D01 Multiple Transmitter Output

789033 D02 General UNII Test Procedures New Rules v02r01

RSS-247 issue 2 Feb. 2017

RSS-Gen. issue 5 Apr. 2018

ANSI C63.10:2013

Note: All test items have been performed and record as per the above standards.

1.3 Test Facility

SGS Taiwan Ltd. Electronics & Communication Laboratory No.134, Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803. (TAF code 0513)

FCC Registration Numbers are: 735305 / TW0002

Canada Registration Number: 4620A-5

1.4 Special Accessories

AC Adapter is used while the test is conducted and there is no other accessory attached. This is the worst case condition.

1.5 Equipment Modifications

There was no modification incorporated into the EUT.

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2 SYSTEM TEST CONFIGURATION

2.1 EUT Configuration

The EUT is configured to operate in a continuous transmission mode. EUT placement and various angles were checked to find worst mode where the emission characteristics are maximized.

2.2 EUT Exercise

An engineering test mode (software/firmware) that applicant provided was utilized to manipulate the EUT into transmit, selection of the test channel, and modulation scheme.

2.3 Test Procedure

2.3.1 Conducted Emissions

The EUT is a placed on as turn table which is 0.8 m above ground plane. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz,. The CISPR Quasi-Peak and Average detector mode is employed according to §15.207. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.

2.3.2 Radiated Emissions

The EUT is a placed on as turn table. For emissions testing at or below 1 GHz, the table height shall be 0.8 m above the reference ground plan. For emission measurements above 1 GHz, the table height shall be 1.5 m. The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this transmitter (EUT) was rotated through three orthogonal axes and measurement procedures for electric field radiated emissions above 1 GHz the EUT measurement is to be made “while keeping the antenna in the ‘cone of radiation’ from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response.” is still within the 3dB illumination BW of the measurement antenna.

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2.4 Measurement Results Explanation Example

For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuation factor between EUT conducted port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly EUT RF output level.

Note:

The spectrum analyzer offset is derived from RF cable loss and attenuator factor.
Following shows an offset computation example with cable loss 2dB, and 10dB attenuator.
offset = RF cable loss (dB)+ attenuation factor(dB)=12(dB)

2.5 Configuration of Tested System

Fig. 2-1 Radiated Emission Configuration

Fig.2-3 Conducted Emission (Antenna Port) Configuration

Fig. 2-2 Conducted Emission (AC Power Line) Configuration

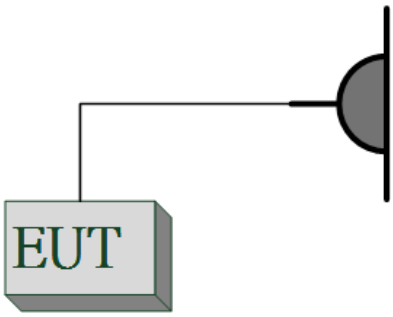

Table 2-1 Equipment Used in Tested System

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Data Cable	Power Cord
1	WLAN Test Software	N/A	N/A	N/A	N/A	N/A
2	Notebook	Lenovo	L430	R9-YYG88	Shielded	Unshielded

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3 SUMMARY OF TEST RESULT

FCC Rules	IC Rules	Description Of Test	Result
§15.207	RSS-Gen §8.8	AC Power Line Conducted Emission	Compliant
§15.403(i) §15.407(e)	RSS-247 §6.2.1~ 4 (1) RSS-Gen §6.7	26 dB & 6dB & 99% Emission Bandwidth	Compliant
§15.407(a)	RSS-247 §6.2.1~ 4 (1)	Maximum Conducted Output Power	Compliant
§15.407(a)	RSS-247 §6.2.1~ 4 (1)	Power Spectral Density	Compliant
§15.407(b)	RSS-247 §6.2.1~ 4 (2)	Undesirable Radiated Emissions	Compliant
§15.407(c)	RSS-247 §6.4	Transmission in case of Absence of Information	Compliant
§15.407(g)	RSS-Gen §6.11	Frequency Stability	Compliant
§15.203	RSS- Gen §6.8	Antenna Requirement	Compliant

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4 DESCRIPTION OF TEST MODES

4.1 Operated in U-NII Bands

Operated band in 5150 MHz ~5250 MHz:

4 channels are provided for 802.11a, 802.11n_HT20, 802.11ac_VHT20

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
36	5180 MHz	44	5220 MHz
40	5200 MHz	48	5240 MHz

2 channels are provided for 802.11n_HT40, 802.11ac_VHT40

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
38	5190 MHz	46	5230 MHz

1 channel is provided for 802.11ac_VHT80

CHANNEL	FREQUENCY
42	5210 MHz

Operated band in 5250 MHz ~5350 MHz:

4 channels are provided for 802.11a, 802.11n_HT20, 802.11ac_VHT20

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
52	5260 MHz	60	5300 MHz
56	5280 MHz	64	5320 MHz

2 channels are provided for 802.11n_HT40, 802.11ac_VHT40

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
54	5270 MHz	62	5310 MHz

1 channel is provided for 802.11ac_VHT80

CHANNEL	FREQUENCY
58	5290 MHz

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Operated band in 5470 MHz ~5725 MHz:

11 channels are provided for 802.11a, 802.11n_HT20, 802.11ac_VHT20

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
100	5500 MHz	124	5620 MHz
104	5520 MHz	128	5640 MHz
108	5540 MHz	132	5660 MHz
112	5560 MHz	136	5680 MHz
116	5580 MHz	140	5700 MHz
120	5600 MHz	144	5720 MHz

5 channels are provided for 802.11n_HT40, 802.11ac_VHT40

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
102	5510 MHz	126	5630 MHz
110	5550 MHz	134	5670 MHz
118	5590 MHz	142	5710 MHz

3 channels are provided for 802.11ac_VHT80

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
106	5530 MHz	138	5690 MHz
122	5610 MHz		

Operated band in 5725 MHz ~5850 MHz:

5 channels are provided for 802.11a, 802.11n_HT20, 802.11ac_VHT20

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
149	5745 MHz	161	5805 MHz
153	5765 MHz	165	5825 MHz
157	5785 MHz		

2 channels are provided for 802.11n_HT40, 802.11ac_VHT40

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
151	5755 MHz	159	5795 MHz

1 channel is provided for 802.11ac_VHT80

CHANNEL	FREQUENCY
155	5775 MHz

Remark:

1. The device will not operate in 5600~5650MHz band for IC.

2. Channel 144 will be disabled initially and will be enabled in future builds.

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4.2 The Worst Test Modes and Channel Details

1. The EUT has been tested under operating condition.
2. Test program used to control the EUT for staying in continuous transmitting mode is pro grammed.
3. Investigation has been done on all the possible configurations for searching the worst case.
4. For 802.11n HT and VHT modes, the HT emission testing was considered as a worst case scenario and was performed at power levels, per transimit chain, greater than or equal to the maximum power in any HT mode.
5. For MIMO modes, the 2TX emission testing was considered as a worst case scenario and was performed at power levels, per transimit chain, greater than or equal to the maximum power in any 1TX mode.

RADIATED EMISSION TEST:

RADIATED EMISSION TEST (BELOW 1 GHz)						
MODE	FREQUENCY BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)	ANTENNA PORT
802.11a	5180~5240	36 to 48	36,44,48	OFDM	6	2TX
802.11a	5260~5320	52 to 64	52,60,64	OFDM	6	2TX
802.11a	5500~5720	100 to 140	100,116,140	OFDM	6	2TX
802.11a	5745~5825	149 to 165	149,157,165	OFDM	6	2TX
RADIATED EMISSION TEST (ABOVE 1 GHz)						
MODE	FREQUENCY BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)	ANTENNA PORT
802.11a	5180~5240	36 to 48	36,44,48	OFDM	6	2TX
802.11n_HT20				OFDM	MCS8	MIMO
802.11n_HT40	5190~5230	38 to 46	38,46	OFDM	MCS8	MIMO
802.11ac_VHT80	5210	42	42	OFDM	MCS0	MIMO
802.11a	5260~5320	52 to 64	52,60,64	OFDM	6	2TX
802.11n_HT20				OFDM	MCS8	MIMO
802.11n_HT40	5270~5310	54 to 62	54,62	OFDM	MCS8	MIMO
802.11ac_VHT80	5290	58	58	OFDM	MCS0	MIMO

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MODE	FREQUENCY BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)	ANTENNA PORT
802.11a	5500~5720	100 to 144	100,116,140	OFDM	6	2TX
802.11n_HT20				OFDM	MCS8	MIMO
802.11n_HT40	5510~5710	102 to 142	102,110,134	OFDM	MCS8	MIMO
802.11ac_VHT80	5530~5690	106 to 138	106,122,138	OFDM	MCS0	MIMO
802.11a	5745~5825	149 to 165	149,157,165	OFDM	6	2TX
802.11n_HT20				OFDM	MCS8	MIMO
802.11n_HT40	5755~5795	151 to 159	151,159	OFDM	MCS8	MIMO
802.11ac_VHT80	5775	155	155	OFDM	MCS0	MIMO

Note:
The field strength of radiation emission was measured as EUT stand-up position (H, E1 mode) and lie down position (E2 mode) for 802.11a/n/ac WLAN Transmitter for channel Low, Mid and High, the worst case E2 position was reported.

ANTENNA PORT CONDUCTED MEASUREMENT:

CONDUCTED TEST						
MODE	FREQUENCY BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)	ANTENNA PORT
802.11a	5180~5240	36 to 48	36,44,48	OFDM	6	2TX
802.11n_HT20 802.11ac_VHT20				OFDM	MCS8	MIMO
802.11n_HT40 802.11ac_VHT40	5190~5230	38 to 46	38,46	OFDM	MCS8	MIMO
802.11ac_VHT80	5210	42	42	OFDM	MCS0	MIMO
802.11a	5260~5320	52 to 64	52,60,64	OFDM	6	2TX
802.11n_HT20 802.11ac_VHT20				OFDM	MCS8	MIMO
802.11n_HT40 802.11ac_VHT40	5270~5310	54 to 62	54,62	OFDM	MCS8	MIMO
802.11ac_VHT80	5290	58	58	OFDM	MCS0	MIMO
802.11a	5500~5720	100 to 144	100,116,140,144	OFDM	6	2TX
802.11n_HT20 802.11ac_VHT20				OFDM	MCS8	MIMO
802.11n_HT40 802.11ac_VHT40	5510~5710	102 to 142	102,110,134,142	OFDM	MCS8	MIMO
802.11ac_VHT80	5530~5690	106 to 138	106,122,138	OFDM	MCS0	MIMO
802.11a	5745~5825	149 to 165	149,157,165	OFDM	6	2TX
802.11n_HT20 802.11ac_VHT20				OFDM	MCS8	MIMO
802.11n_HT40 802.11ac_VHT40	5755~5795	151 to 159	151,159	OFDM	MCS8	MIMO
802.11ac_VHT80	5775	155	155	OFDM	MCS0	MIMO

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5 MEASUREMENT UNCERTAINTY

Test Items	Uncertainty
AC Power Line Conducted Emission	+/- 2.586 dB
26dB & 6dB Emission Bandwidth	+/- 123.36 Hz
The Maximum Output Power Measurement	+/- 0.96 dB
Peak Power Spectral Density Measurement	+/- 1.67 dB
Frequency Stability	+/- 123.36 Hz
Temperature	+/- 0.65 °C
Humidity	+/- 4.6 %
DC / AC Power Source	DC= +/- 0.13%, AC=+/- 0.2%

Radiated Spurious Emission:

Measurement uncertainty (Polarization : **Vertical**)	9kHz-30MHz: +/-2.87dB
	30MHz - 180MHz: +/- 3.37dB
	180MHz -417MHz: +/- 3.19dB
	0.417GHz-1GHz: +/- 3.19dB
	1GHz - 18GHz: +/- 4.04dB
	18GHz - 40GHz: +/- 4.04dB

Measurement uncertainty (Polarization : **Horizontal**)	9kHz-30MHz: +/-2.87dB
	30MHz - 167MHz: +/- 4.22dB
	167MHz -500MHz: +/- 3.44dB
	0.5GHz-1GHz: +/- 3.39dB
	1GHz - 18GHz: +/- 4.08dB
	18GHz - 40GHz: +/- 4.08dB

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

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6 CONDUCTED EMISSION TEST

6.1 Standard Applicable

Frequency range within 150 kHz to 30 MHz shall not exceed the Limit table as below.

Frequency range MHz	Limits dB(uV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50
Note 1.The lower limit shall apply at the transition frequencies 2.The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.		

6.2 Measurement Equipment Used

Conducted Emission Test Site					
EQUIPMENT TYPE	**MFR**	**MODEL NUMBER**	**SERIAL NUMBER**	**LAST CAL.**	**CAL DUE.**
EMI Test Receiver	R&S	ESCI 7	100950	12/24/2017	12/23/2018
Coaxial Cables	N/A	N30N30-1042-1 50cm	N/A	08/30/2017	08/29/2018
LISN	Schwarzbeck	NSLK 8127	8127-648	06/18/2017	06/17/2018
Test Software	Farad	EZ-EMC	Ver. SGS-03A2	N.C.R.	N.C.R.

6.3 EUT Setup

1. The conducted emission tests were performed in the test site, using the setup in accordance with the ANSI C63.10:2013.
2. The AC/DC Power adaptor of EUT was plug-in LISN. The rear of the EUT and peripherals were placed flushed with the rear of the tabletop.
3. The LISN was connected with 120Vac/60Hz power source.

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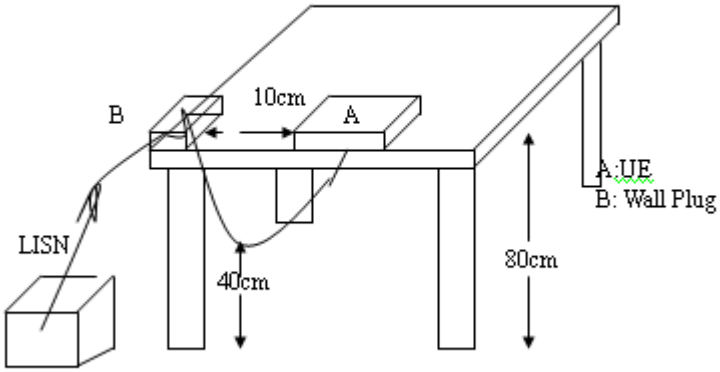
6.4 Test SET-UP



6.5 Measurement Procedure

1. The EUT was placed on a table which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all phases of power being supplied by given UE are completed.

6.6 Measurement Result

Note: Refer to next page for measurement data and plots.

Note2: The * reveals the worst-case results that closet to the limit

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AC POWER LINE CONDUCTED EMISSION TEST DATA

Operation Mode:	Operation mode	Test By:	Jerry

Site : Conduction Room
Limit: FCC Class B Conduction(QP)
Mode:
Note:

Phase: L1
Power: AC 120V/60Hz

Temperature: 25 ℃
Humidity: 85 %

Conducted Emission

File :Condution Data #958 Date: 2018/5/29 Time: 下午 05:33:37

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1	*	0.1500	39.68	9.70	49.38	66.00	-16.62	peak	
2		0.1580	39.16	9.70	48.86	65.57	-16.71	peak	
3		0.1940	32.60	9.70	42.30	63.86	-21.56	peak	
4		0.2100	27.37	9.72	37.09	63.21	-26.12	peak	
5		0.2380	26.36	9.79	36.15	62.17	-26.02	peak	
6		0.8740	21.66	9.96	31.62	56.00	-24.38	peak	

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Site	Conduction Room	Phase:	N	Temperature:	25 ℃
Limit:	FCC Class B Conduction(QP)	Power:	AC 120V/60Hz	Humidity:	85 %
Mode:					
Note:					

Conducted Emission

File :Condution Data :#955 Date: 2018/5/29 Time: 下午 05:28:50

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1	*	0.1548	41.69	9.70	51.39	65.74	-14.35	peak	
2		0.1900	33.98	9.70	43.68	64.04	-20.36	peak	
3		0.2260	28.14	9.76	37.90	62.60	-24.70	peak	
4		0.2460	27.14	9.81	36.95	61.89	-24.94	peak	
5		0.3540	19.92	10.08	30.00	58.87	-28.87	peak	
6		0.8780	18.79	9.96	28.75	56.00	-27.25	peak	

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7 DUTY CYCLE TEST SIGNAL

Pre-analysis Check: While conducting average power measurement, duty cycle of each mode shall be checked to ensure its duty cycle in order to compensate for the loss due to insufficient ratio of duty cycle.

All duty cycle is pre-scanned, and result as obtained below shows only the most representative ones where duty cycle is conducted as the given transmission with given virtual operation that expresses the percentage.

Formula:

Duty Cycle = Ton / (Ton+Toff)

Measurement Procedure:

1. Set span = Zero
2. RBW = 8MHz
3. VBW = 8MHz,
4. Detector = Peak

Duty Cycle:

Mode	Duty Cycle (%)	Duty Factor (dB) =10*log (1/Duty Cycle)	1/T (kHz)	VBW setting (kHz)
802.11a	95.02	0.22	0.48	1.00
802.11n_20	94.70	0.24	0.52	1.00
802.11ac_20	94.71	0.24	0.52	1.00
802.11n_40	90.36	0.44	1.05	2.00
802.11ac_40	89.70	0.47	1.05	2.00
802.11ac_80	81.77	0.87	2.15	3.00

Duty Cycle Factor: 10 * log(1/0.9527) = 0.21
Duty Cycle Factor: 10 * log(1/0.947) = 0.24
Duty Cycle Factor: 10 * log(1/0.9471) = 0.24
Duty Cycle Factor: 10 * log(1/0.9036) = 0.44
Duty Cycle Factor: 10 * log(1/0.897) = 0.47
Duty Cycle Factor: 10 * log(1/0.8177) = 0.87

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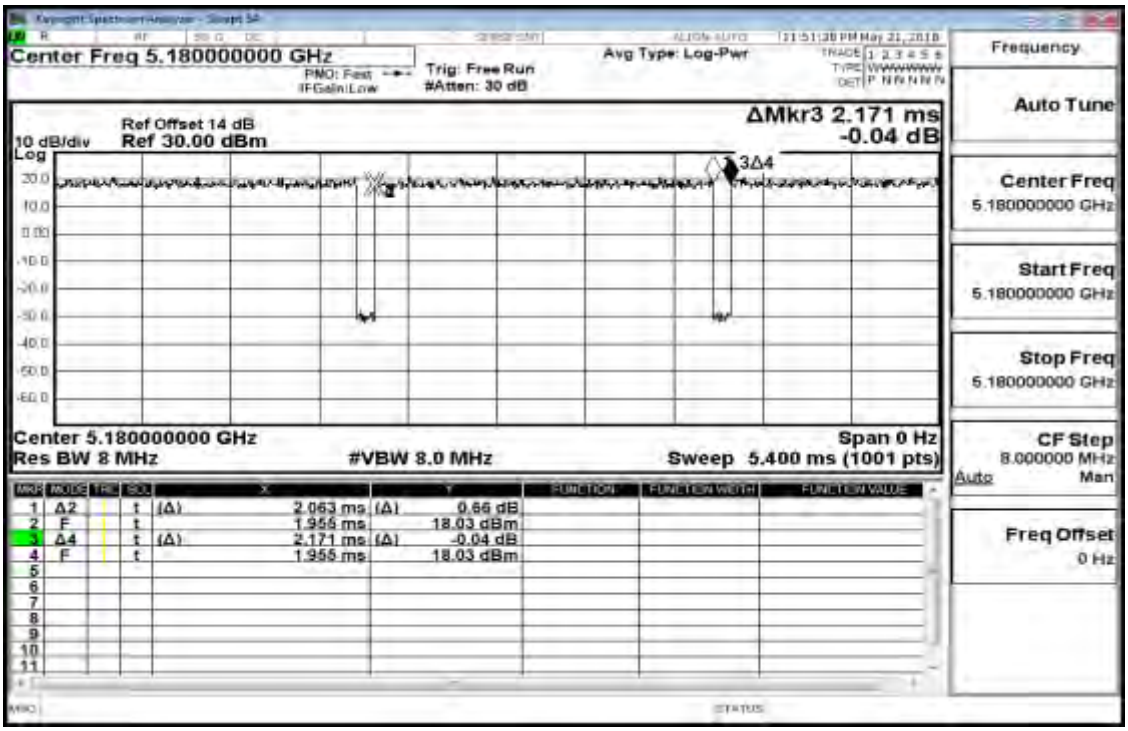
DUTY CYCLE TEST SIGNAL Measurement Result

802.11a



802.11n HT20

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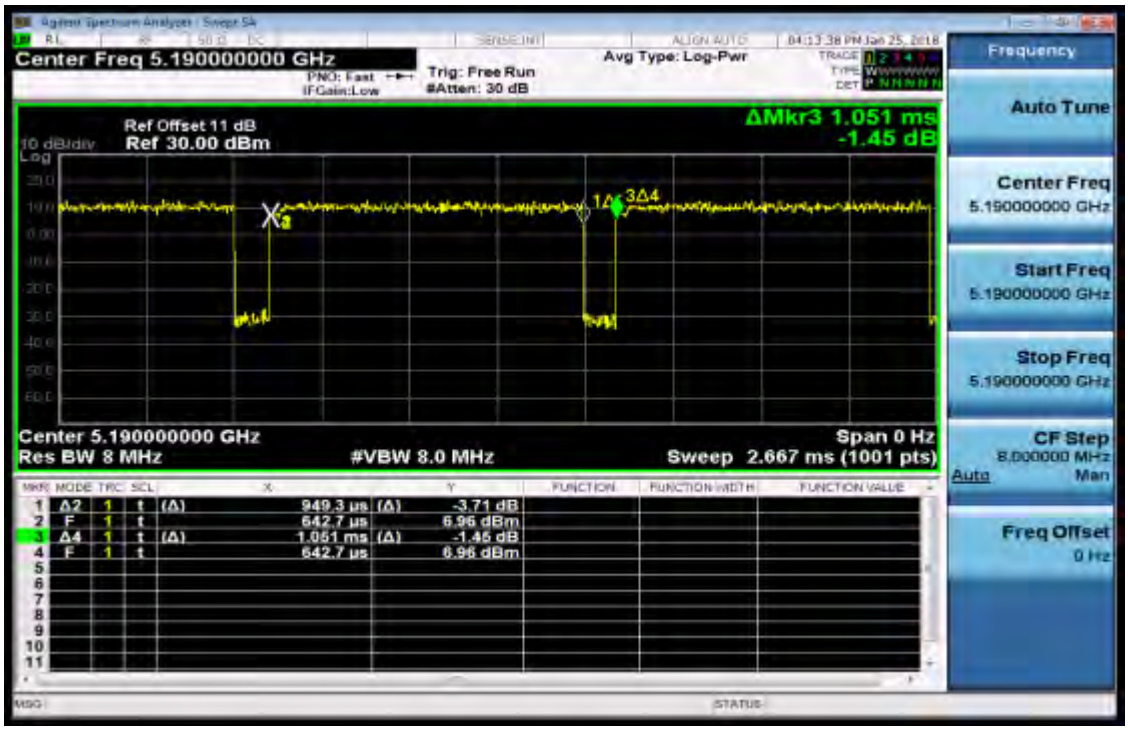
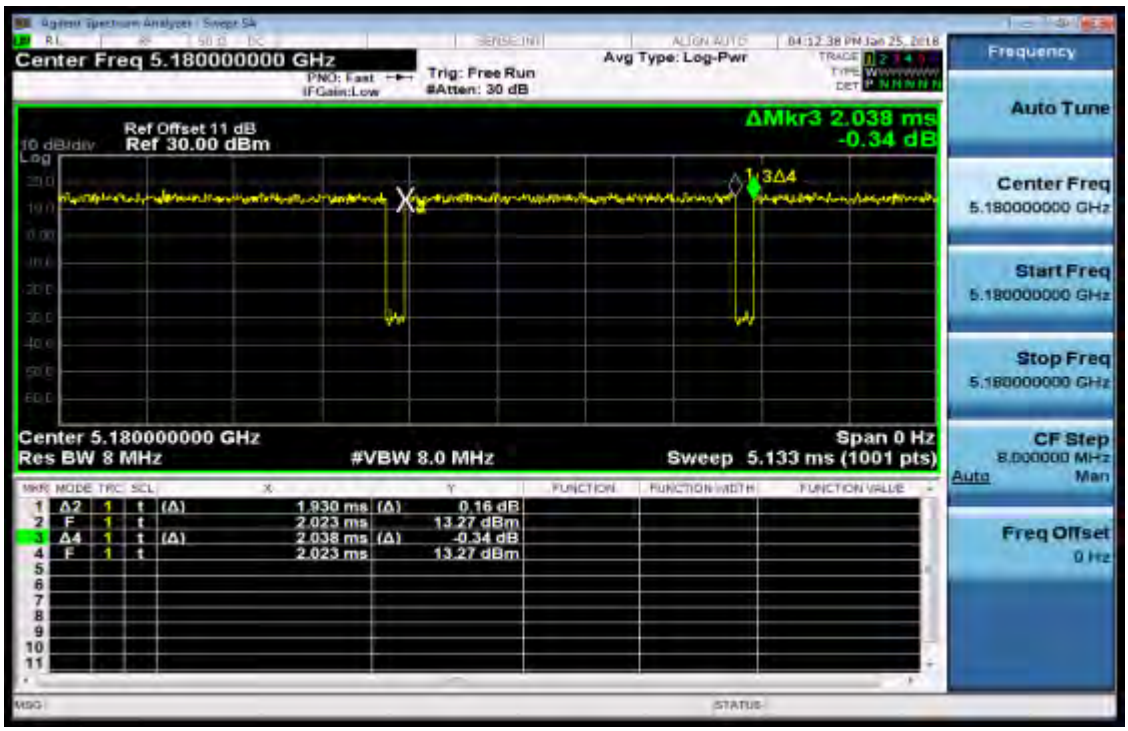
802.11n HT 40



802.11ac VHT20



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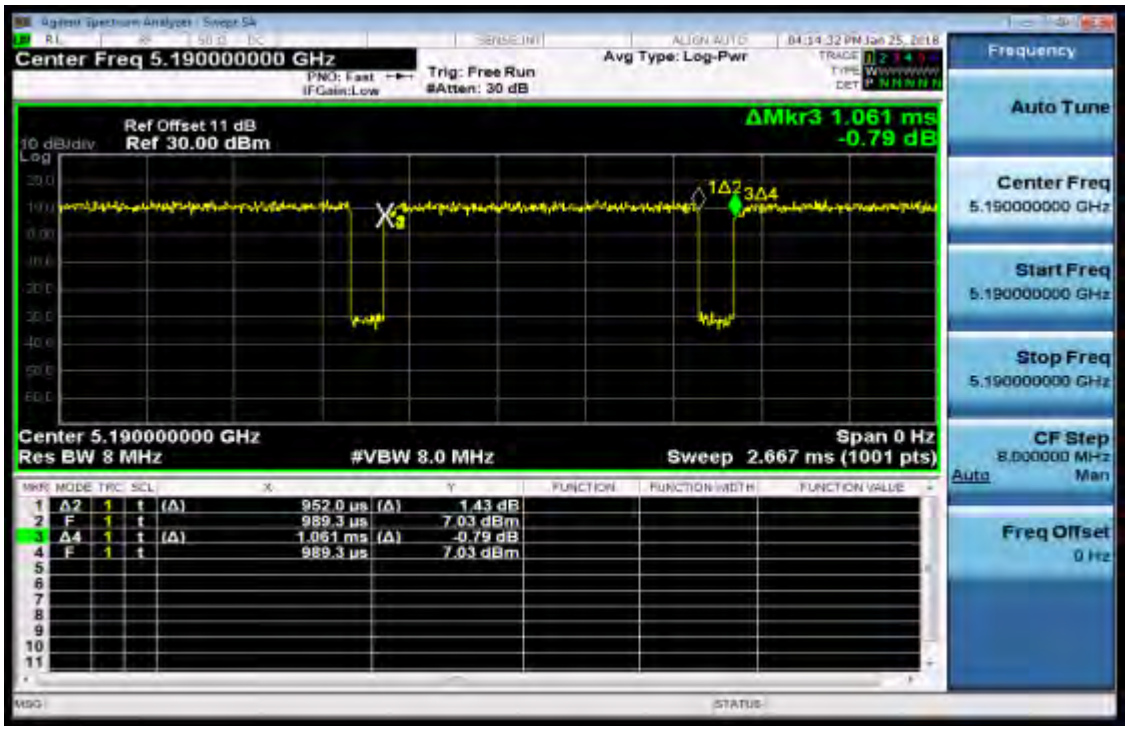
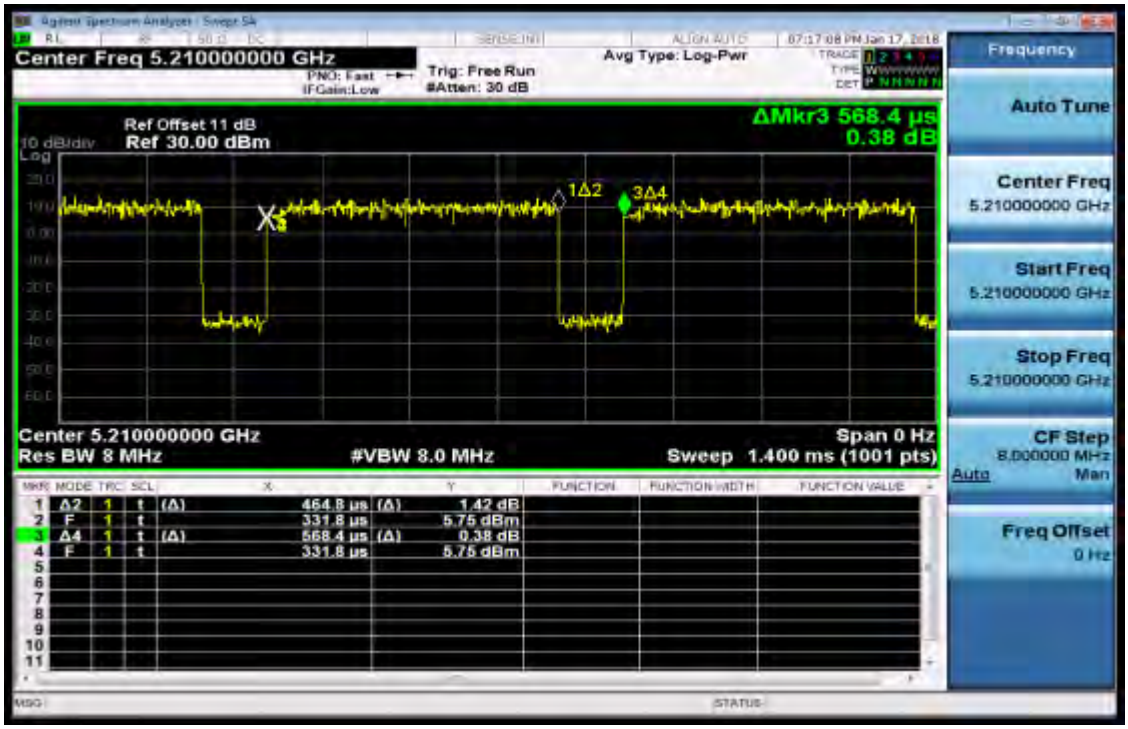
802.11ac VHT 40



802.11 ac VHT 80



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8 26DB & 6DB EMISSION BANDWIDTH MEASUREMENT

8.1 Standard Applicable

There is no limit bandwidth for U-NII-1, U-NII-2-A and U-NII-2-C.

The minimum of 6dB Bandwidth measurement is 0.5 MHz for U-NII-3

8.2 Measurement Procedure

1. Place the EUT on the table and set it in transmitting mode.
2. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules .
3. Remove the antenna from the EUT and then connect a low loss RF cable from the Antenna port to the spectrum analyzer.
   a. 26dB Band width Measurement: Set the spectrum analyzer as 1% of emission BW Sweep=auto, Detector = Peak, Trace Mode = Max Hold, Manually readjust RBW until the RBW/EBW ratio is 1% based on EBW as observed on the result of pre-sequence measurement.
   b. Mark the peak frequency and –26dB (upper and lower) frequency.
4. Repeat the procedures as list above until all test default channels (low, middle, and high) are completed.
5. Minimum Emission Bandwidth for the band 5.725-5.850GHz.
   a. Set the spectrum analyzer as RBW = 100 kHz, VBW = 3*RBW, Span = 30M/50MHz, Detector=Peak,
   Sweep=auto
   b. Mark the peak frequency and –6dB (upper and lower) frequency.
6. Repeat above procedures until all test default channel measured were complete.

Note: according 789033 D02 General UNII Test Procedures New Rules v02r01

Some IEEE Std 802.11 channels operate under two U-NII sub-bands. For example, IEEE Std 802.11 Channels 42+138 (80+80 MHz) is distributed over the U-NII-1 and U-NII-2C bands. Some of these channels that operate in more than one U-NII band are deemed “straddle” channels. The following channels are considered to be straddle channels: Channel 50 (160 MHz channel) Channel 138 (80 MHz channel) Channel 142 (40 MHz channel) Chanel 144 (20 MHz channel).

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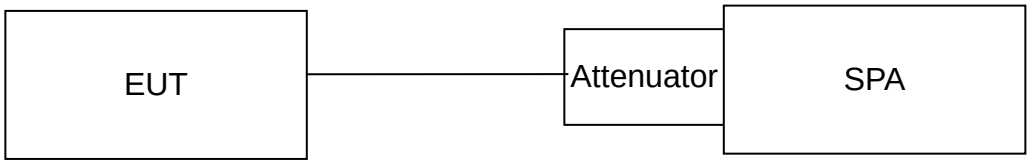
8.3 Measurement Equipment Used

SGS Conducted Room					
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Date**	**Calibration Due**
Spectrum Analyzer	KEYSIGHT	N9010A	MY51440113	06/20/2017	06/19/2018
Power Meter	Anritsu	ML2496A	1326001	06/23/2017	06/22/2018
Power Sensor	Anritsu	MA2411B	1315048	06/23/2017	06/22/2018
Power Sensor	Anritsu	MA2411B	1315049	06/23/2017	06/22/2018
Coaxial Cable 30cm	WOKEN	00100A1F1A195C	RF01	12/24/2017	12/23/2018
DC Block	PASTERNACK	PE8210	RF29	12/24/2017	12/23/2018
Splitter	RF-LAMBAD	RFLT2W1G18G	RF35	12/24/2017	12/23/2018
Attenuator	WOKEN	218FS-10	RF23	12/24/2017	12/23/2018

8.4 Test Set-up



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8.5 Measurement Result

26dB and 6dB Bandwidth

802.11a_CH0 802.11a_CH1

Frequency (MHz)	26dB BW (MHz)	10 Log (B) (dB)	Frequency (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5180	18.62	12.700	5180	19.63	12.929
5220	19.04	12.797	5220	18.72	12.723
5240	19.57	12.916	5240	18.80	12.742
5260	19.51	12.903	5260	18.54	12.681
5300	18.82	12.746	5300	19.55	12.911
5320	18.64	12.704	5320	19.52	12.905
5500	19.55	12.911	5500	19.64	12.931
5580	19.29	12.853	5580	19.23	12.840
5700	19.55	12.911	5700	20.12	13.036

802.11a_CH0 802.11a_CH1

Frequency (MHz)	6dB BW (MHz)	10 Log (B) (dB)	Frequency (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5745	14.69	11.670	5745	14.19	11.520
5785	15.01	11.764	5785	14.43	11.593
5825	15.14	11.801	5825	14.60	11.644

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802.11n_HT20_CH0 **802.11n_HT20_CH1**

Frequency (MHz)	26dB BW (MHz)	10 Log (B) (dB)	Frequency (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5180	18.85	12.753	5180	19.55	12.911
5220	19.55	12.911	5220	19.58	12.918
5240	19.44	12.887	5240	19.72	12.949
5260	19.51	12.903	5260	19.64	12.931
5300	19.67	12.938	5300	19.79	12.964
5320	19.42	12.882	5320	19.56	12.914
5500	19.41	12.880	5500	19.81	12.969
5580	20.06	13.023	5580	19.72	12.949
5700	19.79	12.964	5700	19.78	12.962
5720 (band 3)	15.22	11.824	5720 (band 3)	15.08	11.784
5720 (band 4)	4.62	6.646	5720 (band 4)	4.58	6.609

802.11n_HT20_CH0 **802.11n_HT20_CH1**

Frequency (MHz)	6dB BW (MHz)	10 Log (B) (dB)	Frequency (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5745	15.07	11.781	5745	15.15	11.804
5785	15.10	11.790	5785	14.40	11.584
5825	14.21	11.526	5825	15.10	11.790

802.11n _HT40_CH0 **802.11n _HT40_CH1**

Frequency (MHz)	26dB BW (MHz)	10 Log (B) (dB)	Frequency (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5190	40.13	16.035	5190	40.24	16.047
5230	40.21	16.043	5230	40.31	16.054
5270	40.32	16.055	5270	40.17	16.039
5310	39.62	15.979	5310	40.02	16.023
5510	40.46	16.070	5510	39.48	15.964
5550	**40.33**	16.056	5550	40.32	16.055
5670	40.33	16.056	5670	39.61	15.978
5710 (band 3)	37.12	15.696	5710 (band 3)	44.10	16.444
5710 (band 4)	4.81	6.821	5710 (band 4)	5.71	7.566

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802.11n_HT40_CH0 **802.11n_HT40_CH1**

Frequency (MHz)	6dB BW (MHz)	10 Log (B) (dB)	Frequency (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5755	35.06	15.448	5755	35.11	15.454
5795	35.07	15.449	5795	35.14	15.458

802.11ac _VHT80_CH0 **802.11ac _VHT80_CH1**

Frequency (MHz)	26dB BW (MHz)	10 Log (B) (dB)	Frequency (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5210	81.37	19.105	5210	82.86	19.183
5290	82.15	19.146	5290	82.46	19.162
5530	82.10	19.143	5530	82.47	19.163
5610	85.53	19.321	5610	87.34	19.412
5690 (band 3)	80.73	19.070	5690 (band 3)	93.84	19.724
5690 (band 4)	5.09	7.067	5690 (band 4)	5.92	7.723

802.11ac _VHT80_CH0 **802.11ac _VHT80_CH1**

Frequency (MHz)	6dB BW (MHz)	10 Log (B) (dB)	Frequency (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5775	72.66	18.613	5775	75.08	18.755

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99% Bandwidth

802.11a_CH0 802.11a_CH1

Frequency (MHz)	99% BW (MHz)	10 Log (B) (dB)	Frequency (MHz)	99% BW (MHz)	10 Log (B) (dB)
5180	16.290	12.119	5180	16.295	12.121
5220	16.263	12.112	5220	16.295	12.121
5240	16.276	12.115	5240	16.268	12.113
5260	16.274	12.115	5260	16.274	12.115
5300	16.286	12.118	5300	16.314	12.126
5320	16.275	12.115	5320	16.303	12.123
5500	16.318	12.127	5500	16.302	12.122
5580	16.294	12.120	5580	16.277	12.116
5700	16.314	12.126	5700	16.316	12.126
5745	16.313	12.125	5745	16.292	12.120
5785	16.356	12.137	5785	16.330	12.130
5825	16.323	12.128	5825	16.319	12.127

802.11a_CH0 802.11a_CH1

Frequency (MHz)	6dB BW (MHz)	10 Log (B) (dB)	Frequency (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5745	15.77	11.978	5745	16.07	12.060
5785	16.05	12.055	5785	16.07	12.060
5825	16.05	12.055	5825	15.78	11.981

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802.11n_HT20_CH0 **802.11n_HT20_CH1**

Frequency (MHz)	99% BW (MHz)	10 Log (B) (dB)	Frequency (MHz)	99% BW (MHz)	10 Log (B) (dB)
5180	17.416	12.409	5180	17.435	12.414
5220	17.445	12.417	5220	17.420	12.410
5240	17.441	12.416	5240	17.442	12.416
5260	17.409	12.408	5260	17.416	12.409
5300	17.416	12.409	5300	17.421	12.411
5320	17.407	12.407	5320	17.435	12.414
5500	17.418	12.410	5500	17.441	12.416
5580	17.429	12.413	5580	17.428	12.412
5700	17.437	12.415	5700	17.437	12.415
5720 (band 3)	13.380	11.265	5720 (band 3)	13.350	11.255
5720 (band 4)	4.070	6.096	5720 (band 4)	4.060	6.085
5745	16.471	12.167	5745	17.447	12.417
5785	17.443	12.416	5785	17.446	12.417
5825	17.452	12.418	5825	17.442	12.416

802.11n_HT20_CH0 **802.11n_HT20_CH1**

Frequency (MHz)	6dB BW (MHz)	10 Log (B) (dB)	Frequency (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5745	17.12	12.335	5745	16.78	12.248
5785	17.11	12.333	5785	17.05	12.317
5825	17.32	12.385	5825	17.24	12.365

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802.11n _HT40_Main **802.11n _HT40_Aux1**

Frequency (MHz)	99% BW (MHz)	10 Log (B) (dB)	Frequency (MHz)	99% BW (MHz)	10 Log (B) (dB)
5190	35.681	15.524	5190	35.764	15.534
5230	35.696	15.526	5230	35.764	15.534
5270	35.677	15.524	5270	35.750	15.533
5310	35.732	15.531	5310	35.806	15.540
5510	35.781	15.537	5510	35.753	15.533
5550	35.707	15.528	5550	35.745	15.532
5670	35.742	15.532	5670	35.738	15.531
5710 (band3)	31.840	15.030	5710 (band3)	31.730	15.015
5710 (band 4)	4.120	6.149	5710 (band 4)	4.110	6.138
5755	35.731	15.530	5755	35.756	15.533
5795	35.767	15.535	5795	35.769	15.535

802.11n _HT40_CH0 **802.11n _HT40_CH1**

Frequency (MHz)	6dB BW (MHz)	10 Log (B) (dB)	Frequency (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5755	35.16	15.460	5755	35.22	15.468
5795	35.55	15.508	5795	35.38	15.488

802.11ac _VHT80_Main **802.11ac _VHT80_Aux1**

Frequency (MHz)	99% BW (MHz)	10 Log (B) (dB)	Frequency (MHz)	99% BW (MHz)	10 Log (B) (dB)
5210	74.991	18.750	5210	75.097	18.756
5290	75.026	18.752	5290	75.066	18.754
5530	74.933	18.747	5530	75.179	18.761
5610	75.044	18.753	5610	75.045	18.753
5690 (band 3)	71.120	18.520	5690 (band 3)	71.140	18.521
5690 (band 4)	4.490	6.522	5690 (band 4)	4.490	6.522
5775	75.134	18.758	5775	75.163	18.760

802.11ac _VHT80_CH0 **802.11ac _VHT80_CH1**

Frequency (MHz)	6dB BW (MHz)	10 Log (B) (dB)	Frequency (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5775	75.31	18.769	5775	75.46	18.777

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802.11a_CH0

Frequency (MHz)	Measured Frequency (MHz)	Limit (MHz)
5240	5248.13	< 5250
5745	5736.78	> 5725

802.11n_HT20_CH0

Frequency (MHz)	Measured Frequency (MHz)	Limit (MHz)
5240	5248.67	< 5250
5745	5736.27	> 5725

802.11n_HT20_CH1

Frequency (MHz)	Measured Frequency (MHz)	Limit (MHz)
5240	5248.70	< 5250
5745	5736.18	> 5725

802.11n _HT40_CH0

Frequency (MHz)	Measured Frequency (MHz)	Limit (MHz)
5230	5248.05	< 5250
5755	5736.95	> 5725

802.11n _HT40_CH1

Frequency (MHz)	Measured Frequency (MHz)	Limit (MHz)
5230	5248.05	< 5250
5755	5736.90	> 5725

802.11ac _VHT80_CH0

Frequency (MHz)	Measured Frequency (MHz)	Limit (MHz)
5210	5247.85	< 5250
5775	5737.05	> 5725

802.11n _HT80_CH1

Frequency (MHz)	Measured Frequency (MHz)	Limit (MHz)
5210	5247.85	< 5250
5775	5737.05	> 5725

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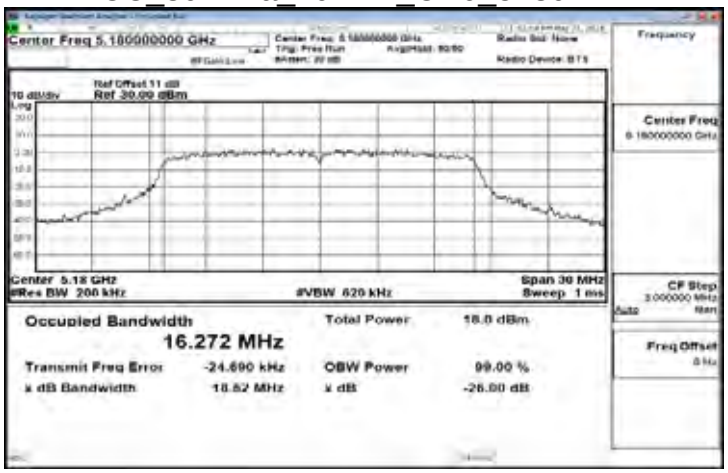
FCC_802.11a_20MHz_CH0_5180MHz



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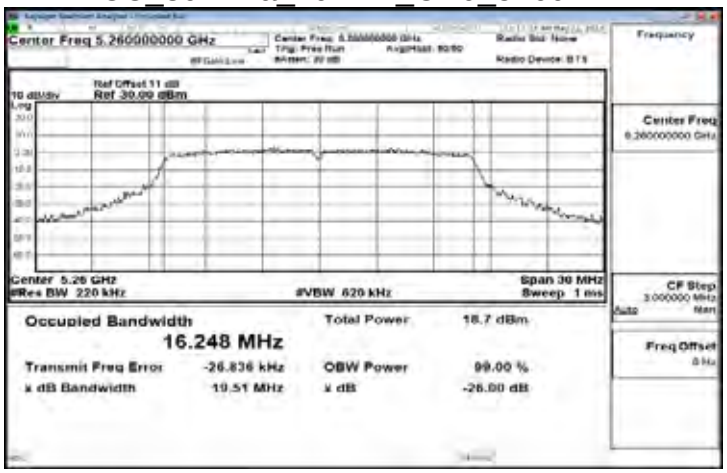
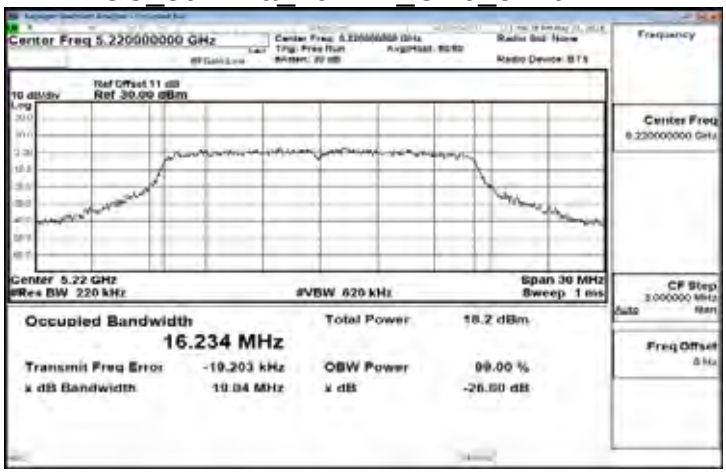
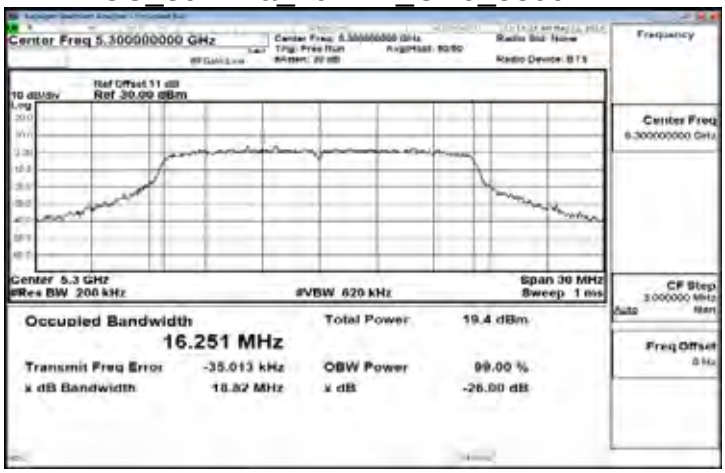


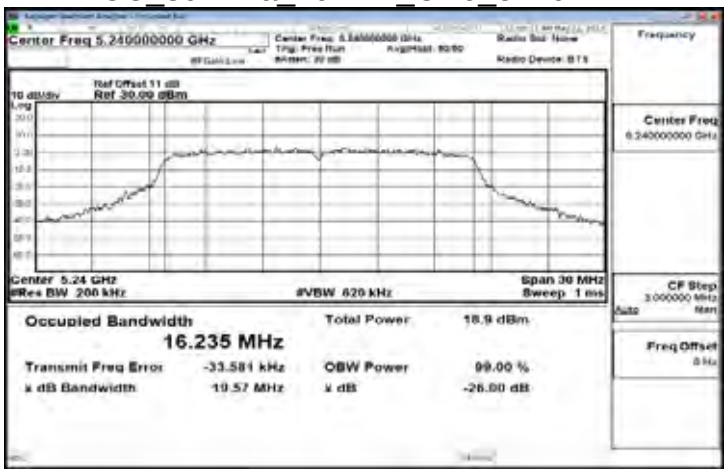
FCC_802.11a_20MHz_CH0_5220MHz



FCC_802.11a_20MHz_CH0_5300MHz



FCC_802.11a_20MHz_CH0_5240MHz



FCC_802.11a_20MHz_CH0_5320MHz

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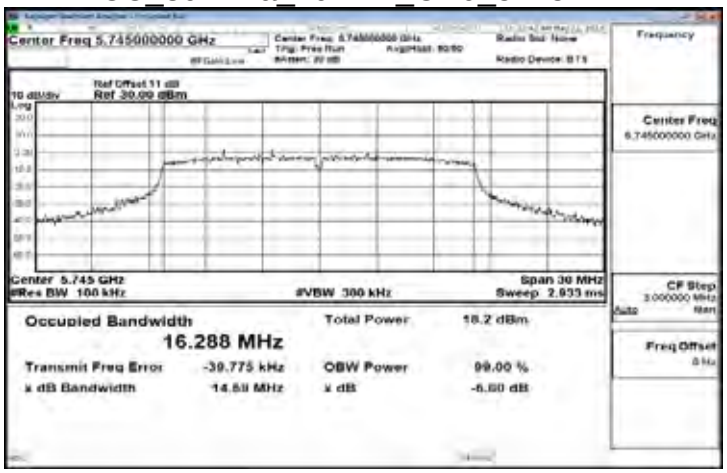
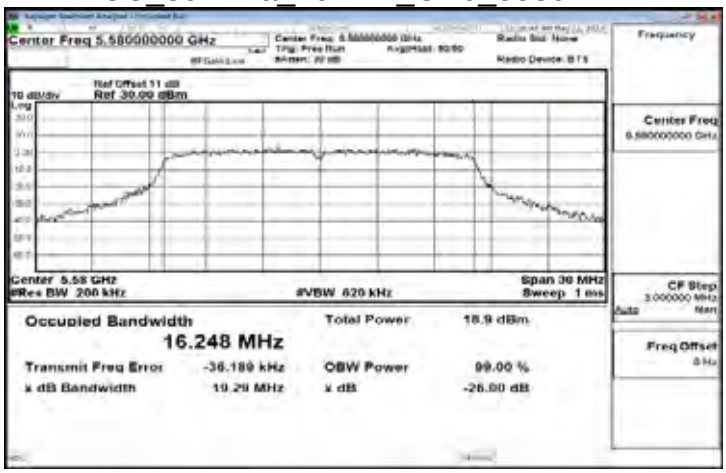
FCC_802.11a_20MHz_CH0_5500MHz

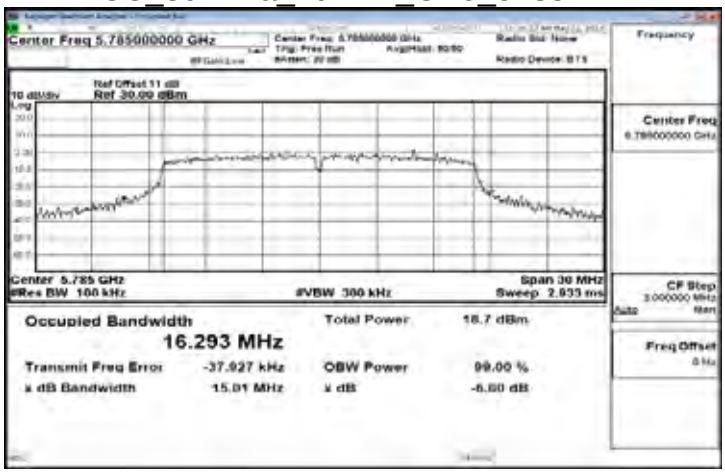
FCC_802.11a_20MHz_CH0_5745MHz



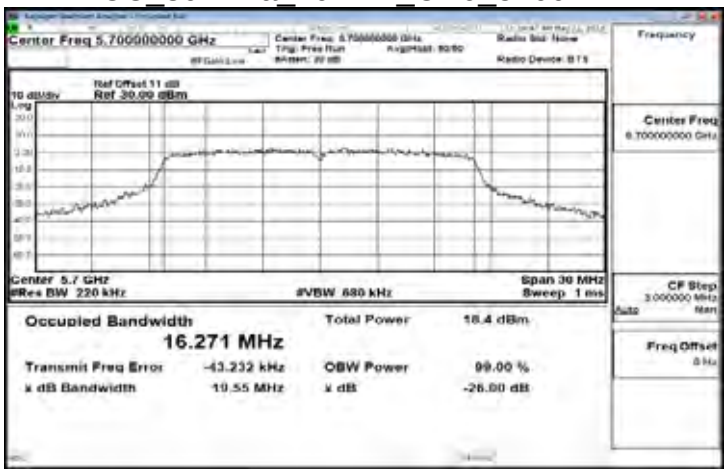
FCC_802.11a_20MHz_CH0_5580MHz



FCC_802.11a_20MHz_CH0_5785MHz



FCC_802.11a_20MHz_CH0_5700MHz



FCC_802.11a_20MHz_CH0_5825MHz

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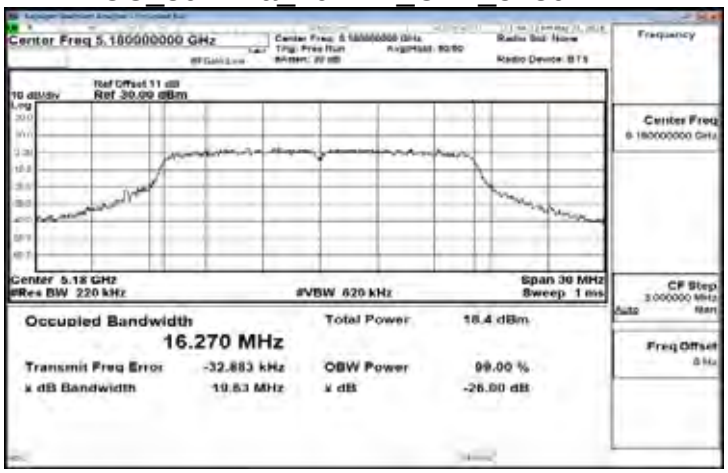
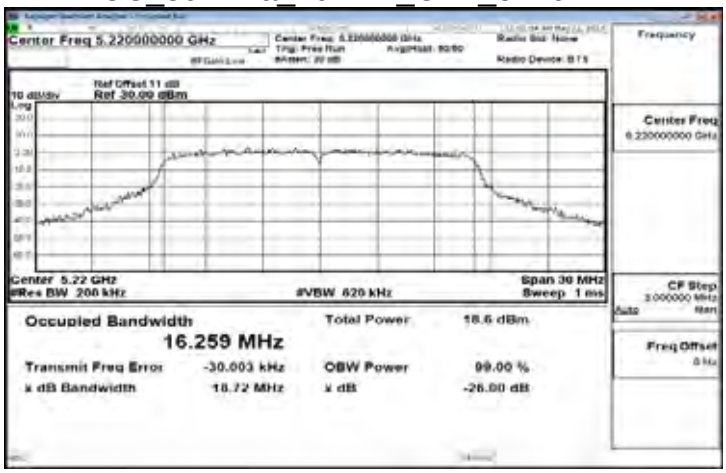
FCC_802.11a_20MHz_CH1_5180MHz



FCC_802.11a_20MHz_CH1_5260MHz

FCC_802.11a_20MHz_CH1_5220MHz



FCC_802.11a_20MHz_CH1_5300MHz

FCC_802.11a_20MHz_CH1_5240MHz

FCC_802.11a_20MHz_CH1_5320MHz

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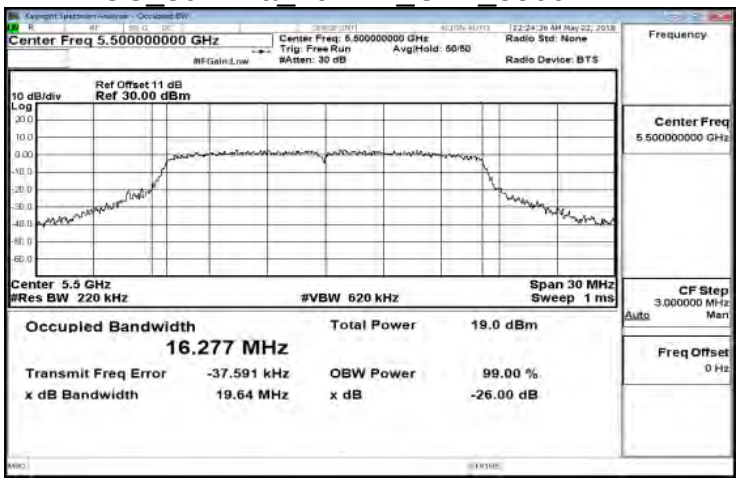
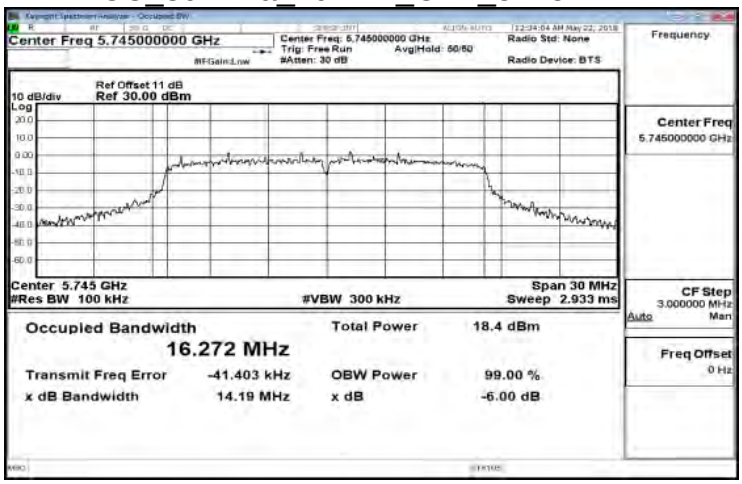
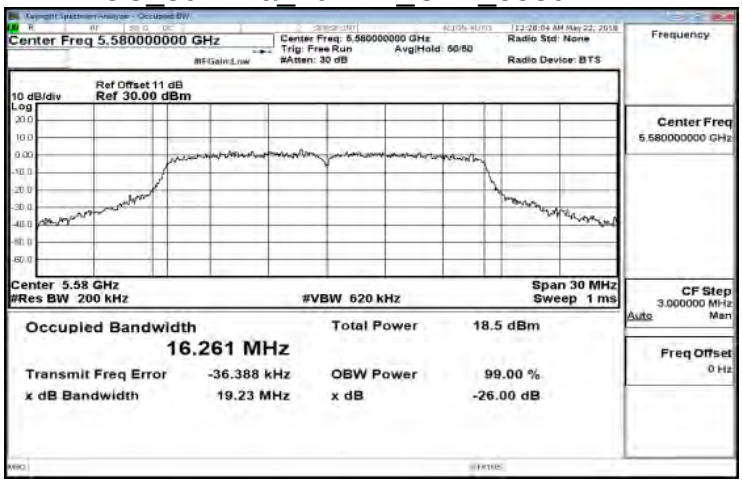
FCC_802.11a_20MHz_CH1_5500MHz



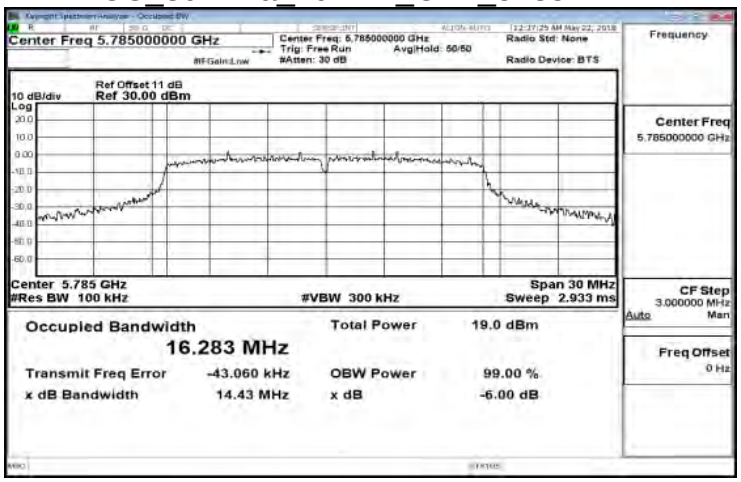
FCC_802.11a_20MHz_CH1_5745MHz



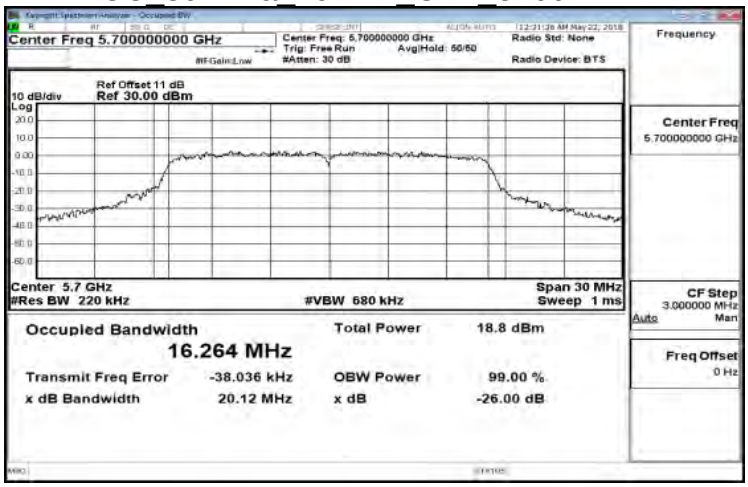
FCC_802.11a_20MHz_CH1_5580MHz



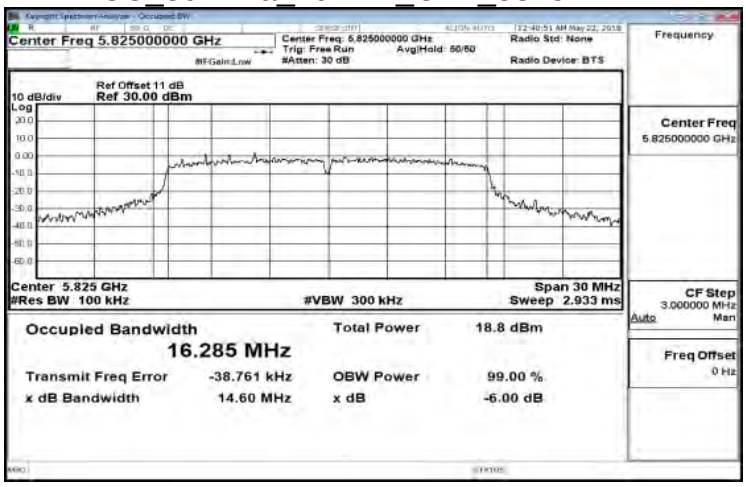
FCC_802.11a_20MHz_CH1_5785MHz



FCC_802.11a_20MHz_CH1_5700MHz



FCC_802.11a_20MHz_CH1_5825MHz



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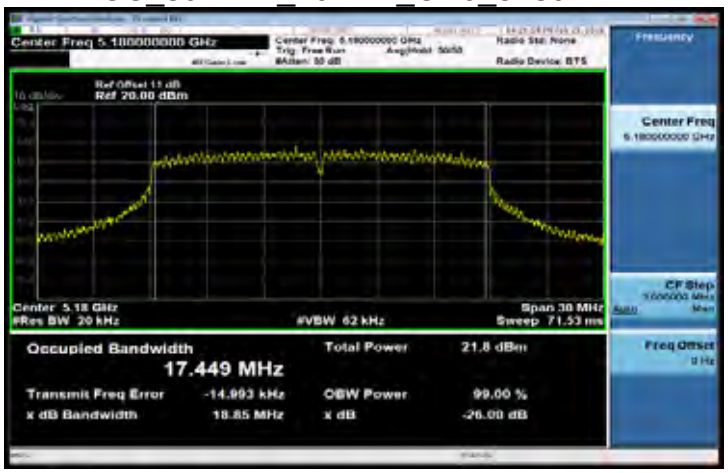
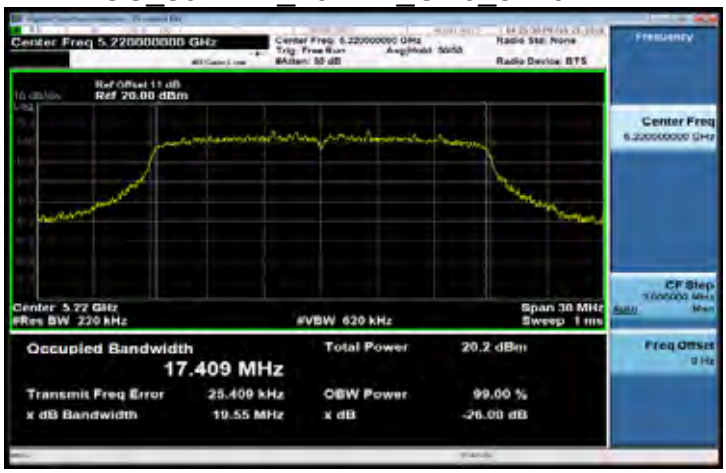
FCC_802.11n_20MHz_CH0_5180MHz



FCC_802.11n_20MHz_CH0_5260MHz

FCC_802.11n_20MHz_CH0_5220MHz



FCC_802.11n_20MHz_CH0_5300MHz

FCC_802.11n_20MHz_CH0_5240MHz

FCC_802.11n_20MHz_CH0_5320MHz

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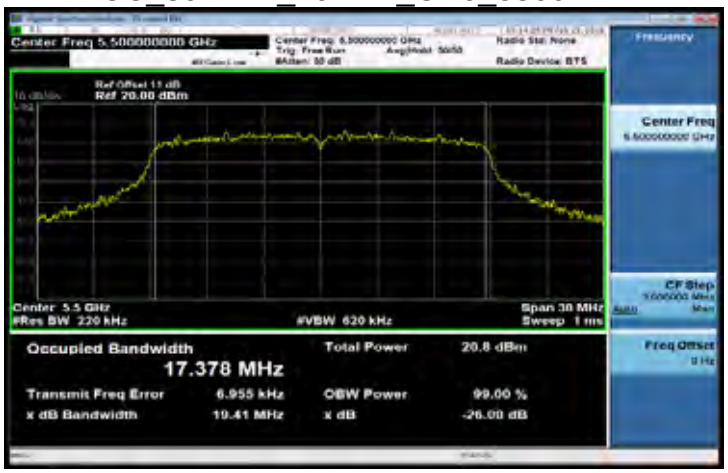
FCC_802.11n_20MHz_CH0_5500MHz



FCC_802.11n_20MHz_CH0_5720MHz

FCC_802.11n_20MHz_CH0_5580MHz

FCC_802.11n_20MHz_CH0_5700MHz

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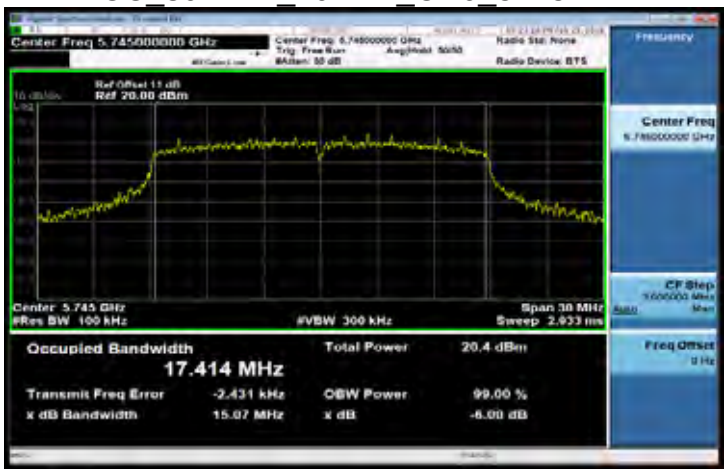
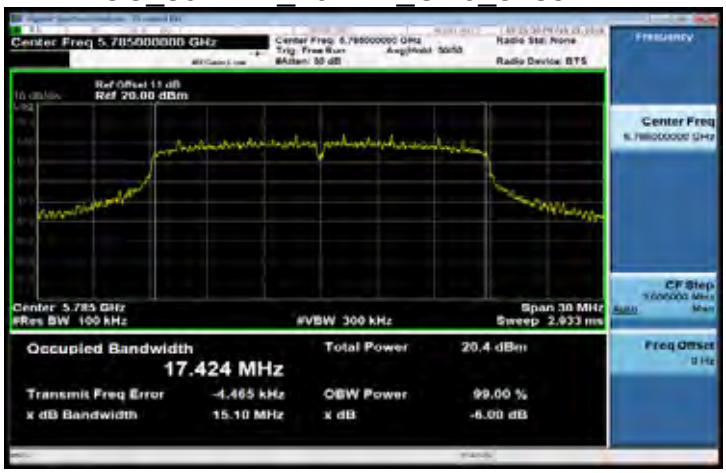
FCC_802.11n_20MHz_CH0_5745MHz



FCC_802.11n_20MHz_CH0_5785MHz



FCC_802.11n_20MHz_CH0_5825MHz

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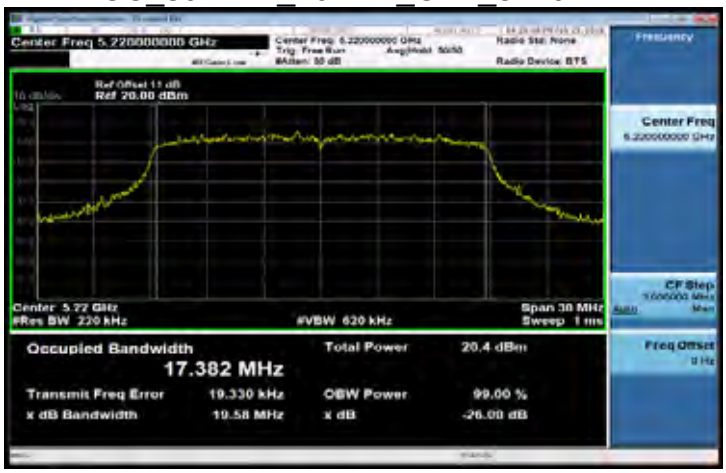
FCC_802.11n_20MHz_CH1_5180MHz

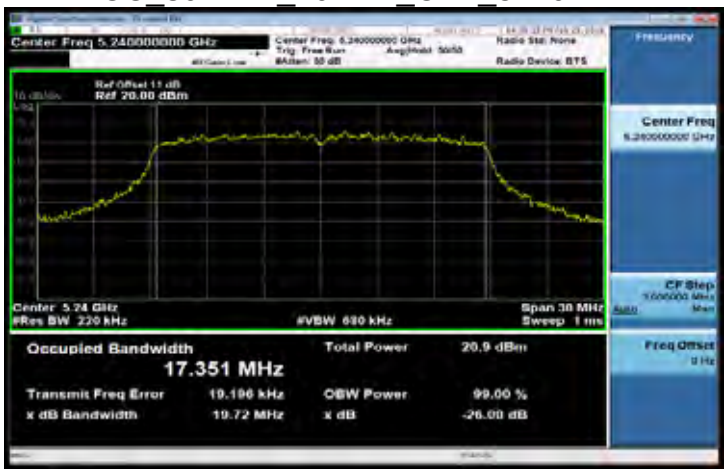
FCC_802.11n_20MHz_CH1_5260MHz

FCC_802.11n_20MHz_CH1_5220MHz



FCC_802.11n_20MHz_CH1_5300MHz

FCC_802.11n_20MHz_CH1_5240MHz



FCC_802.11n_20MHz_CH1_5320MHz

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FCC_802.11n_20MHz_CH1_5500MHz

FCC_802.11n_20MHz_CH1_5720MHz

FCC_802.11n_20MHz_CH1_5580MHz

FCC_802.11n_20MHz_CH1_5700MHz

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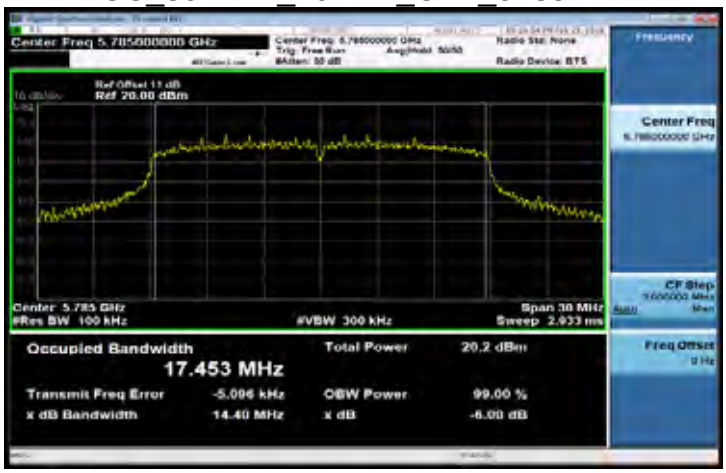
FCC_802.11n_20MHz_CH1_5745MHz

FCC_802.11n_20MHz_CH1_5785MHz



FCC_802.11n_20MHz_CH1_5825MHz

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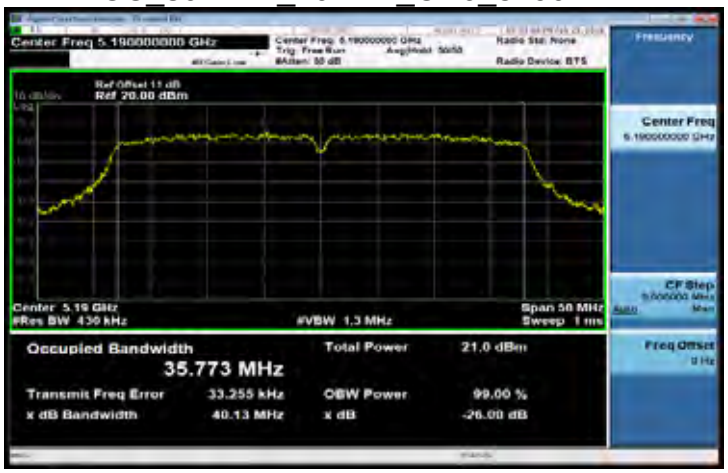
FCC_802.11n_40MHz_CH0_5190MHz



FCC_802.11n_40MHz_CH0_5310MHz

FCC_802.11n_40MHz_CH0_5230MHz

FCC_802.11n_40MHz_CH0_5510MHz

FCC_802.11n_40MHz_CH0_5270MHz

FCC_802.11n_40MHz_CH0_5550MHz

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FCC_802.11n_40MHz_CH0_5670MHz

FCC_802.11n_40MHz_CH0_5795MHz

FCC_802.11n_40MHz_CH0_5710MHz

FCC_802.11n_40MHz_CH0_5755MHz

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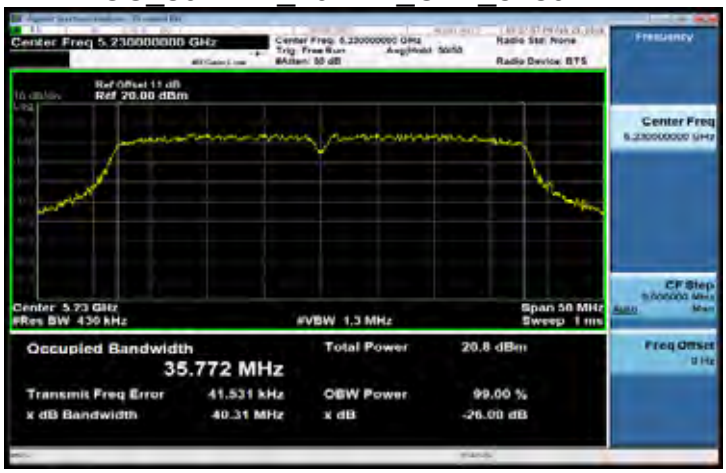
FCC_802.11n_40MHz_CH1_5190MHz

FCC_802.11n_40MHz_CH1_5310MHz

FCC_802.11n_40MHz_CH1_5230MHz



FCC_802.11n_40MHz_CH1_5510MHz

FCC_802.11n_40MHz_CH1_5270MHz

FCC_802.11n_40MHz_CH1_5550MHz

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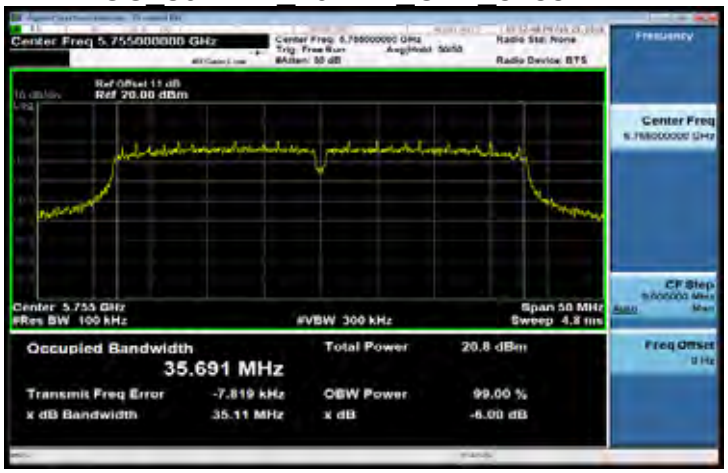
FCC_802.11n_40MHz_CH1_5670MHz

FCC_802.11n_40MHz_CH1_5795MHz

FCC_802.11n_40MHz_CH1_5710MHz

FCC_802.11n_40MHz_CH1_5755MHz



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FCC_802.11ac_80MHz_CH0_5210MHz

FCC_802.11ac_80MHz_CH0_5610MHz

FCC_802.11ac_80MHz_CH0_5290MHz

FCC_802.11ac_80MHz_CH0_5690MHz

FCC_802.11ac_80MHz_CH0_5530MHz

FCC_802.11ac_80MHz_CH0_5775MHz

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FCC_802.11ac_80MHz_CH1_5210MHz

FCC_802.11ac_80MHz_CH1_5610MHz

FCC_802.11ac_80MHz_CH1_5290MHz

FCC_802.11ac_80MHz_CH1_5690MHz

FCC_802.11ac_80MHz_CH1_5530MHz

FCC_802.11ac_80MHz_CH1_5775MHz

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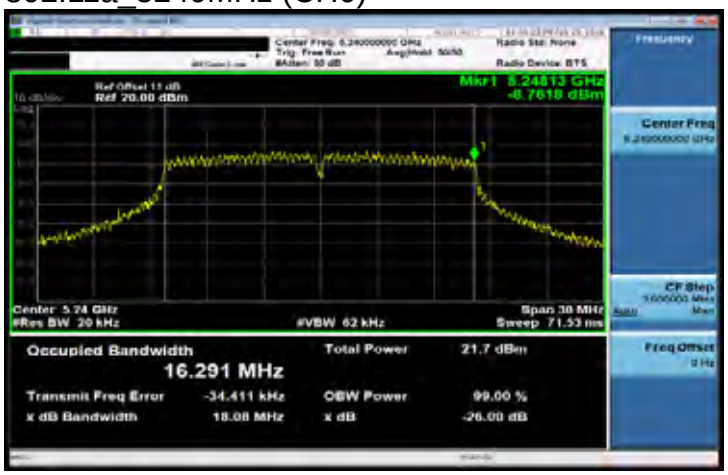
99% BW to prove that all signals in band I is no over band U-NII-1

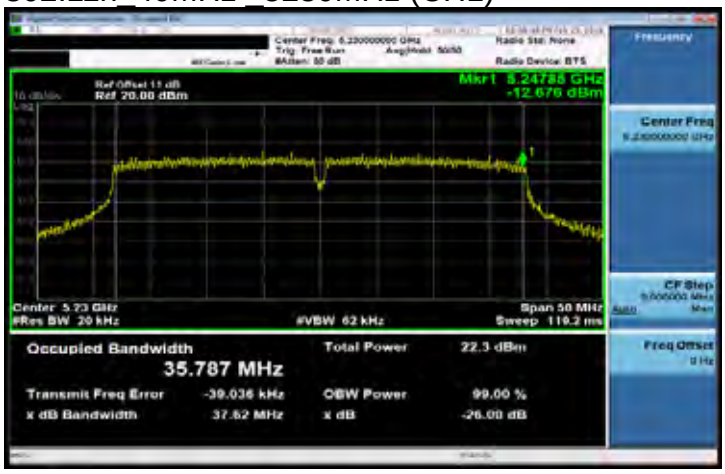
802.11a_5240MHz (CH0)



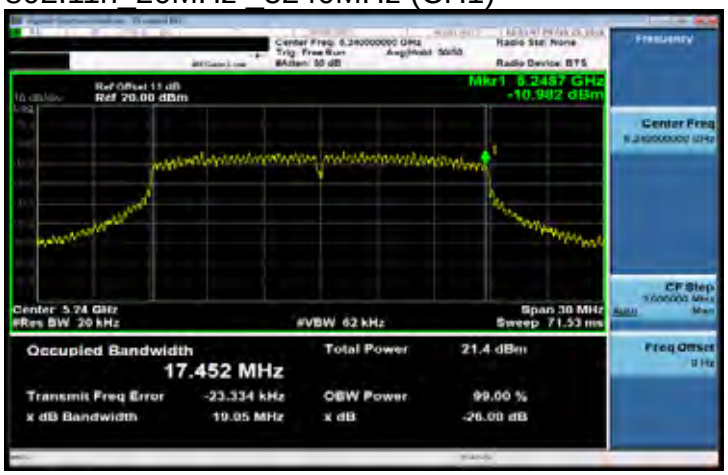
802.11n_40MHz_5230MHz (CH0)

802.11n_20MHz_5240MHz (CH0)

802.11n_40MHz _5230MHz (CH1)



802.11n_20MHz _5240MHz (CH1)



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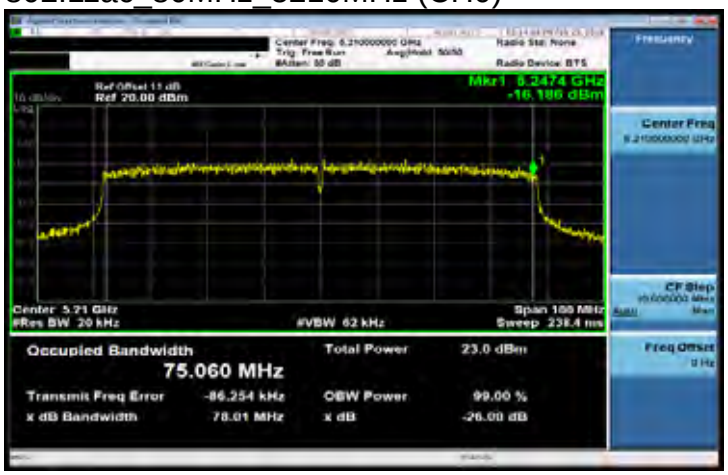
802.11ac_80MHz_5210MHz (CH0)



802.11ac_80MHz _5210MHz (CH0)

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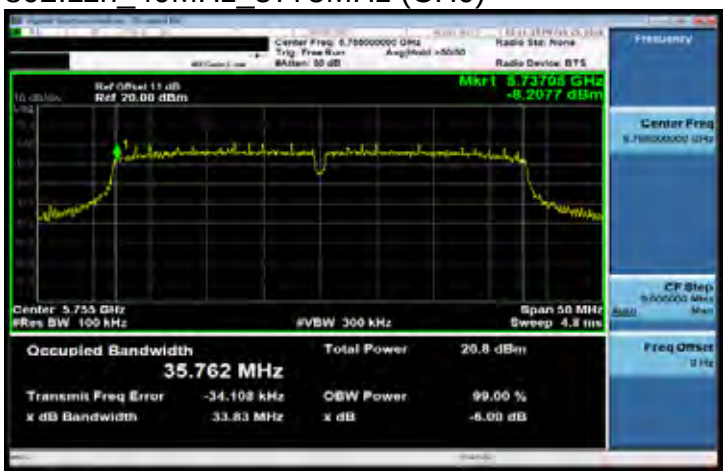
99% BW to prove that all signals in band I is no over band U-NII-3

802.11a_5745MHz (CH0)

802.11n_40MHz_5775MHz (CH0)



802.11n_20MHz_5745MHz (CH0)

802.11n_40MHz _5775MHz (CH1)

802.11n_20MHz _5745MHz (CH1)

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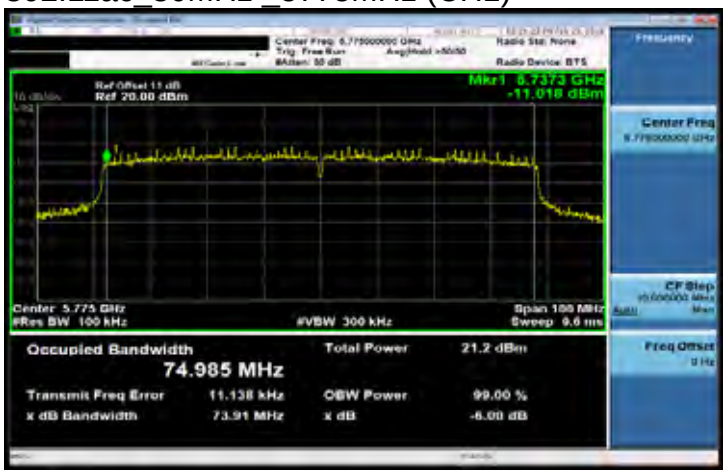
802.11ac_80MHz_5775MHz (CH0)

802.11ac_80MHz _5775MHz (CH1)



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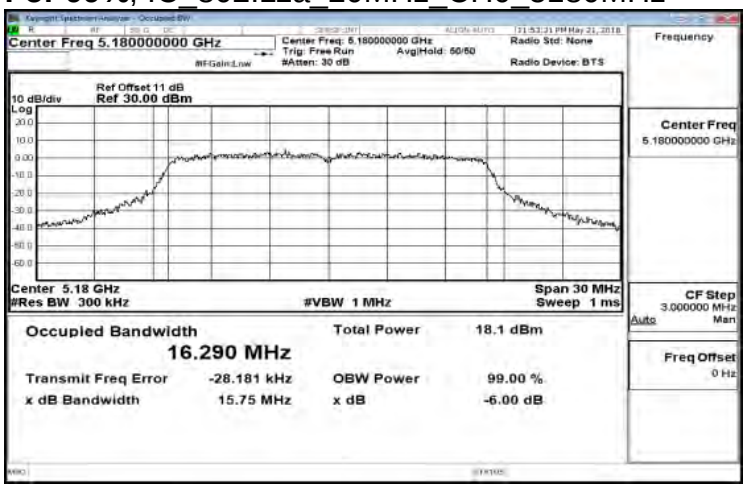
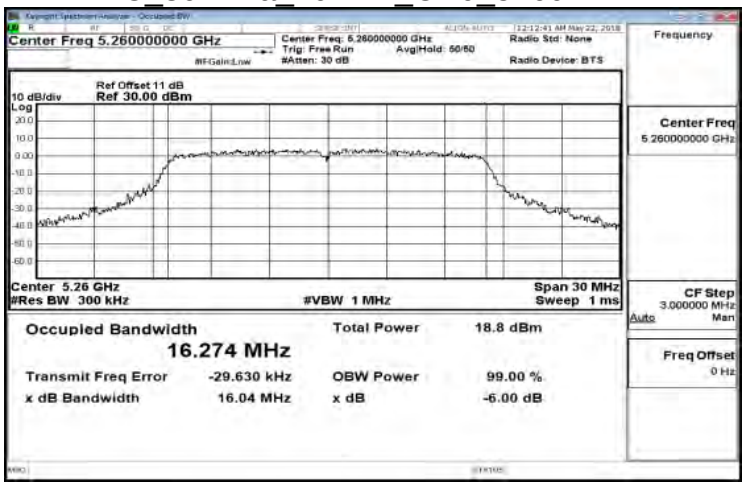
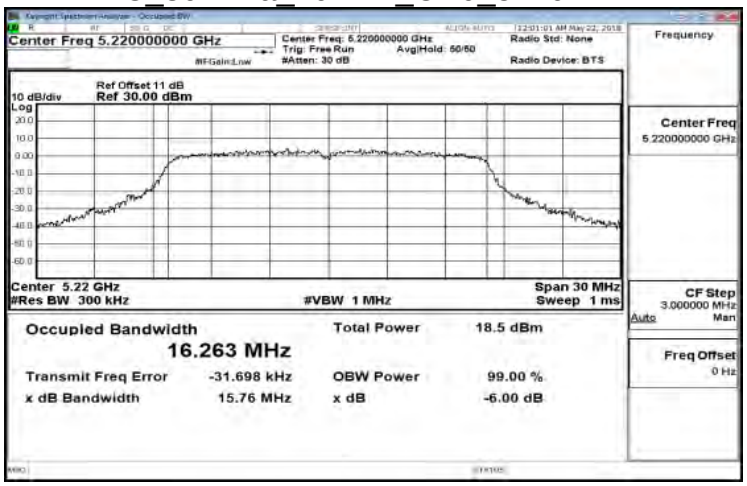
For 99%, IC_802.11a_20MHz_CH0_5180MHz



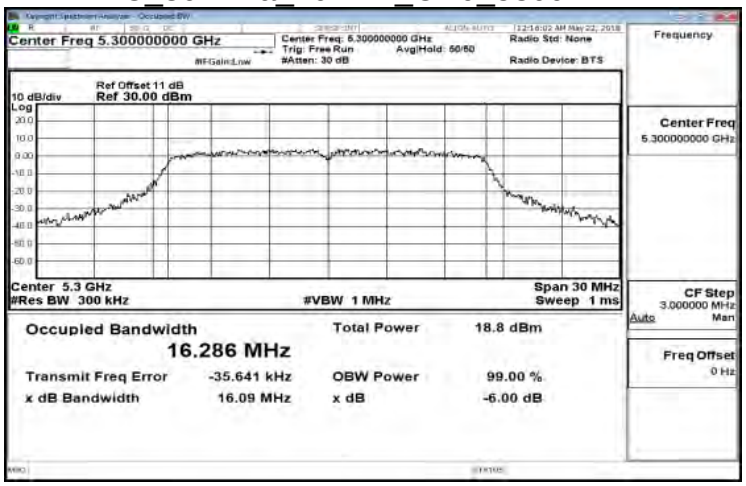
IC_802.11a_20MHz_CH0_5260MHz



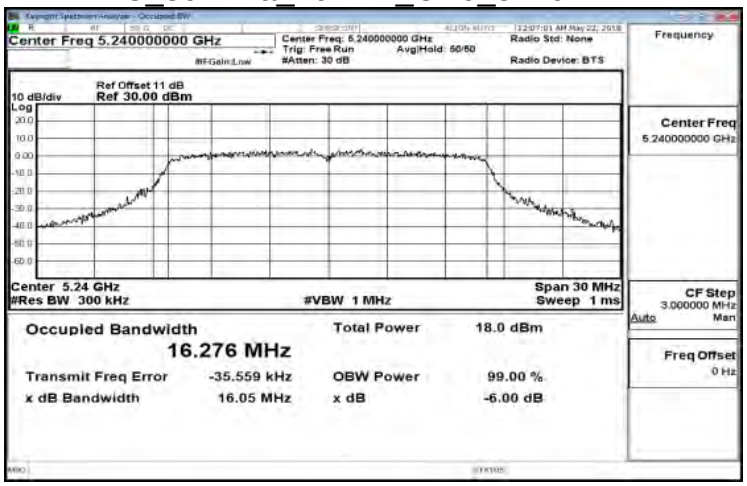
IC_802.11a_20MHz_CH0_5220MHz



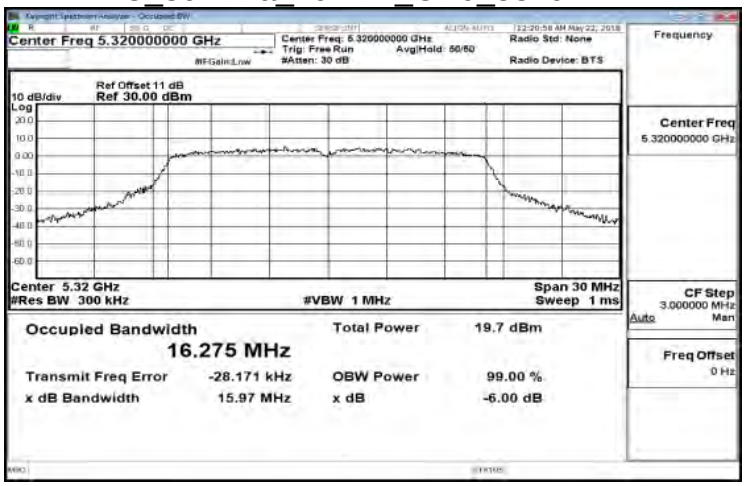
IC_802.11a_20MHz_CH0_5300MHz



IC_802.11a_20MHz_CH0_5240MHz



IC_802.11a_20MHz_CH0_5320MHz



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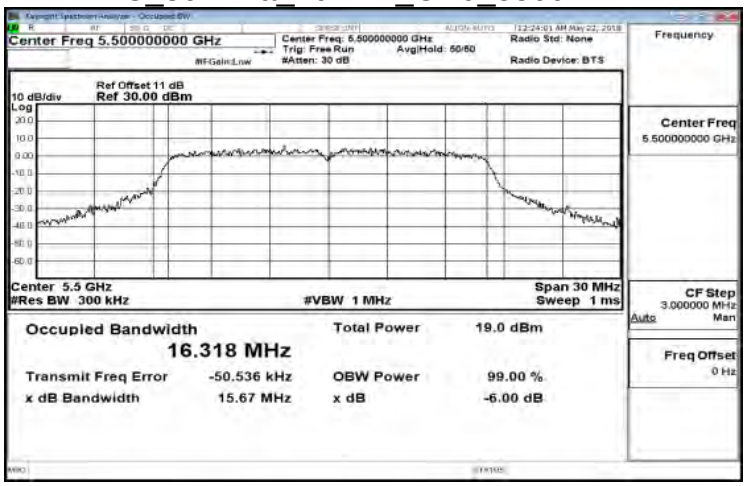
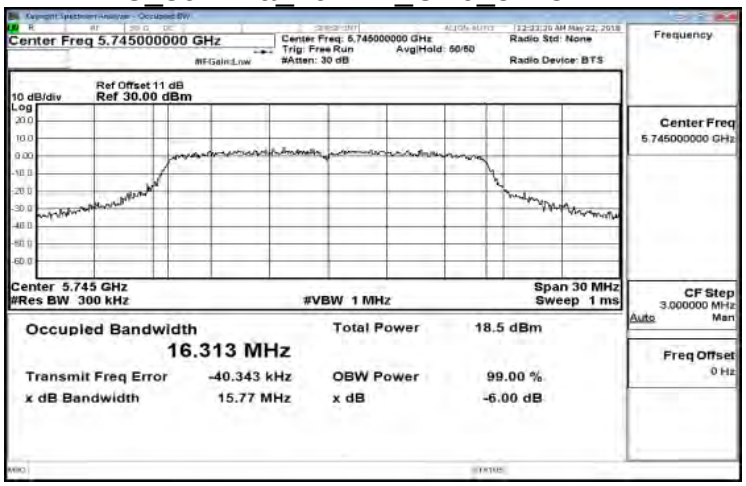
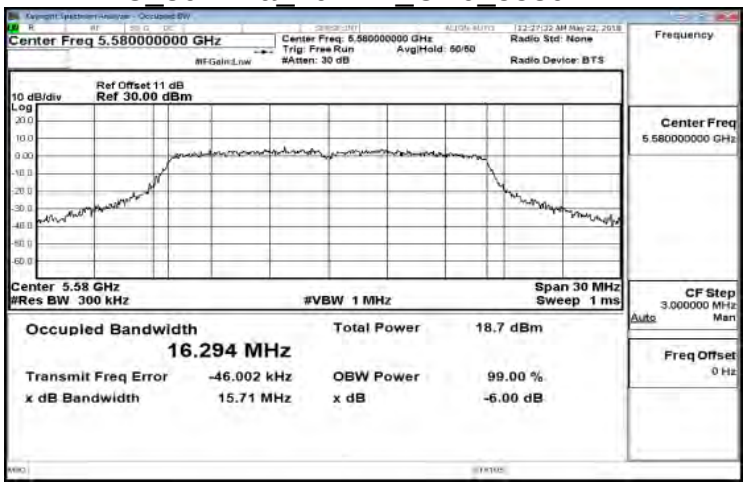
IC_802.11a_20MHz_CH0_5500MHz



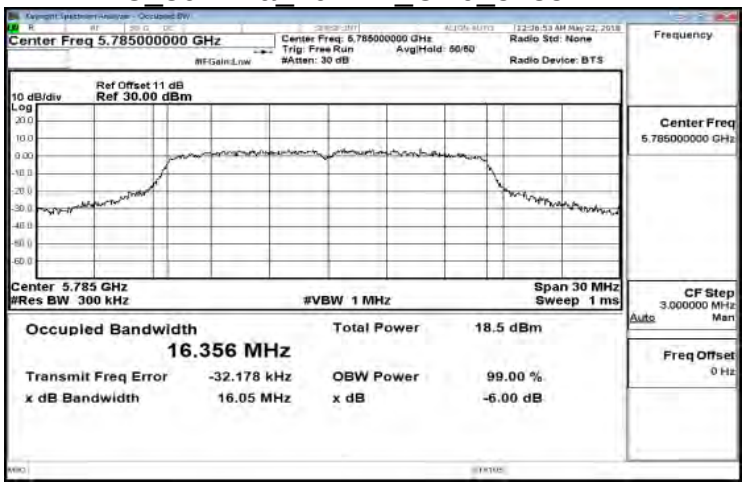
IC_802.11a_20MHz_CH0_5745MHz



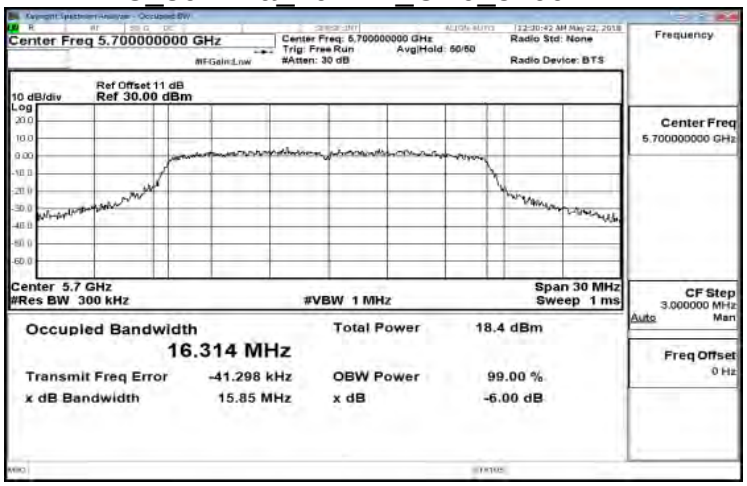
IC_802.11a_20MHz_CH0_5580MHz



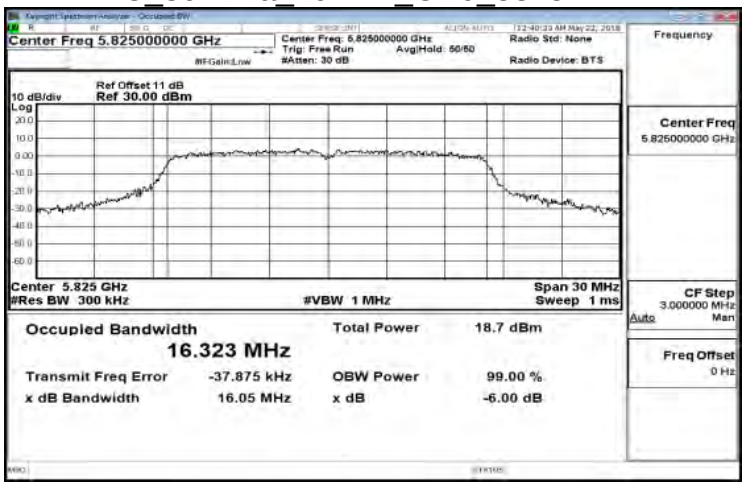
IC_802.11a_20MHz_CH0_5785MHz



IC_802.11a_20MHz_CH0_5700MHz



IC_802.11a_20MHz_CH0_5825MHz



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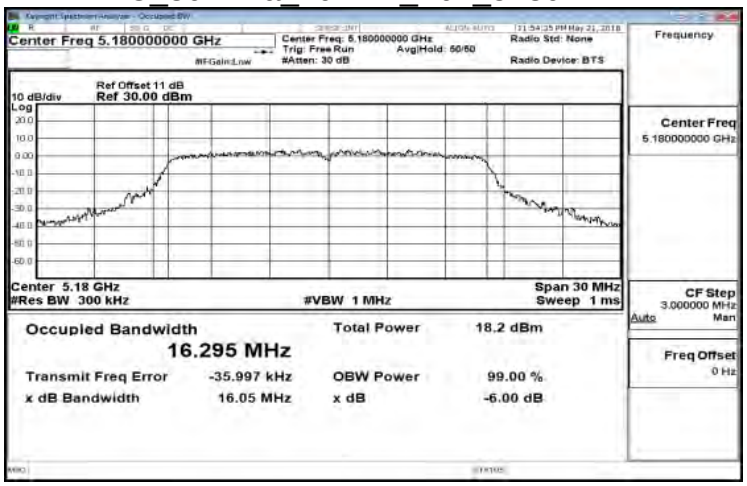
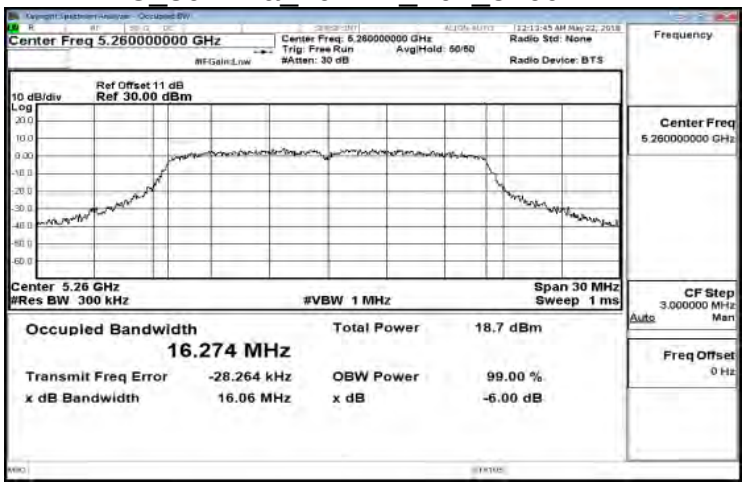
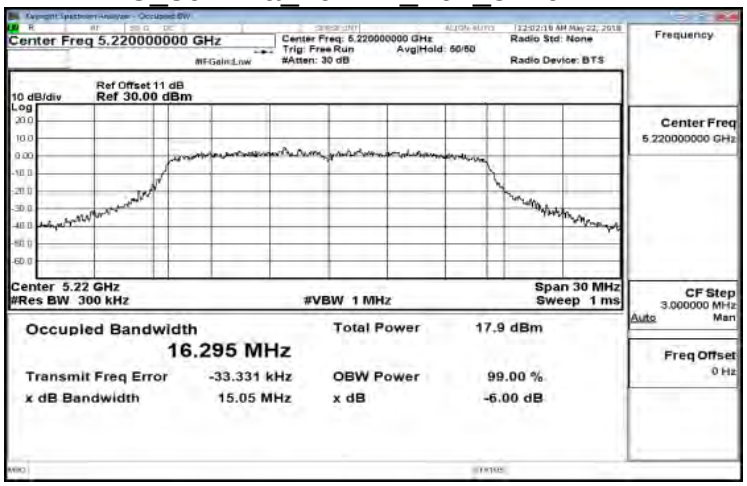
IC_802.11a_20MHz_Aux_5180MHz



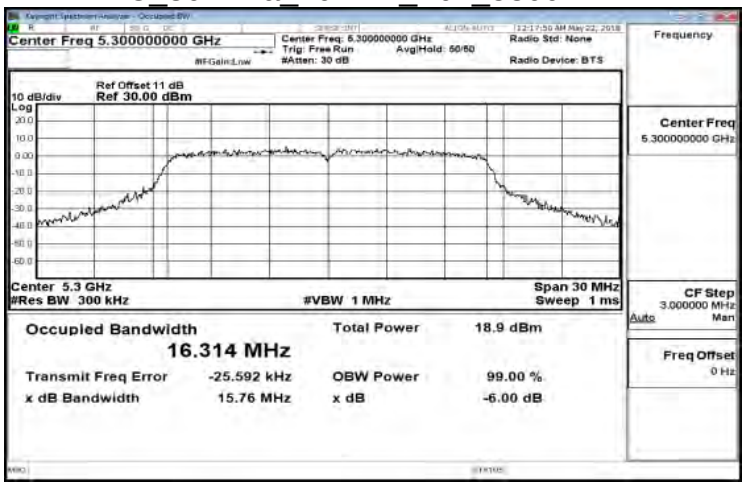
IC_802.11a_20MHz_Aux_5260MHz



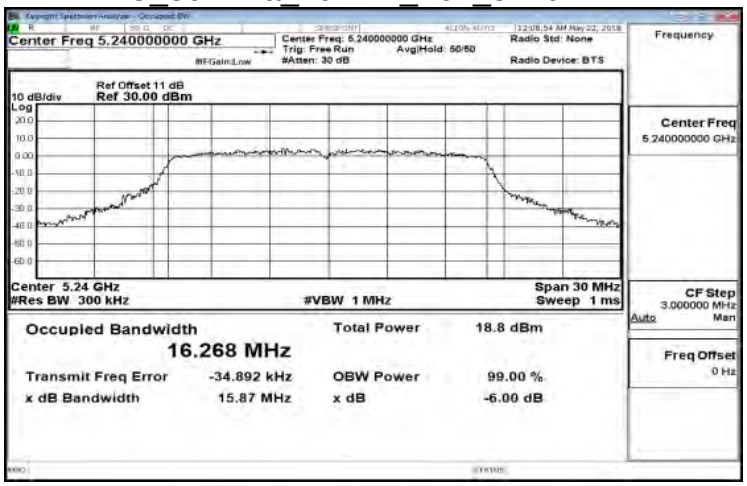
IC_802.11a_20MHz_Aux_5220MHz



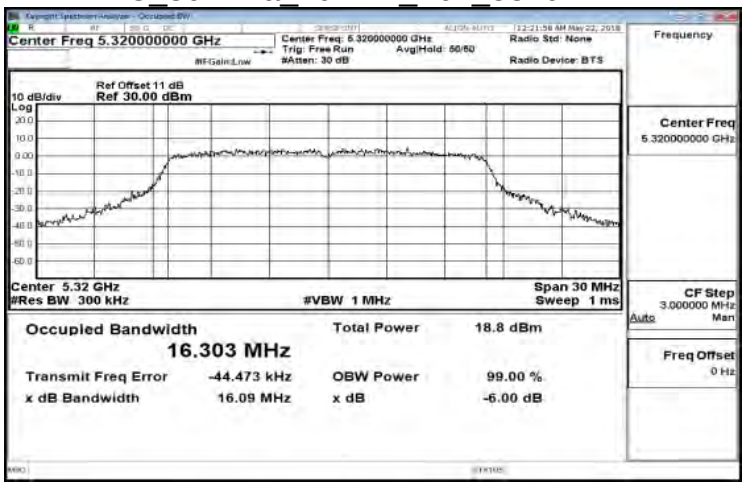
IC_802.11a_20MHz_Aux_5300MHz



IC_802.11a_20MHz_Aux_5240MHz



IC_802.11a_20MHz_Aux_5320MHz



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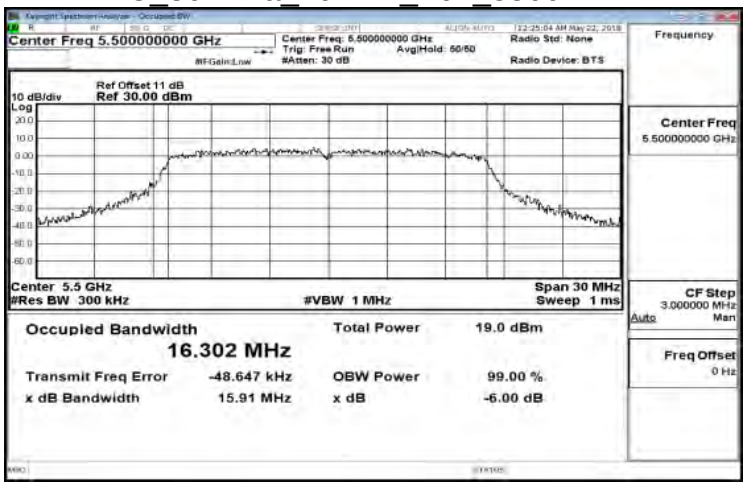
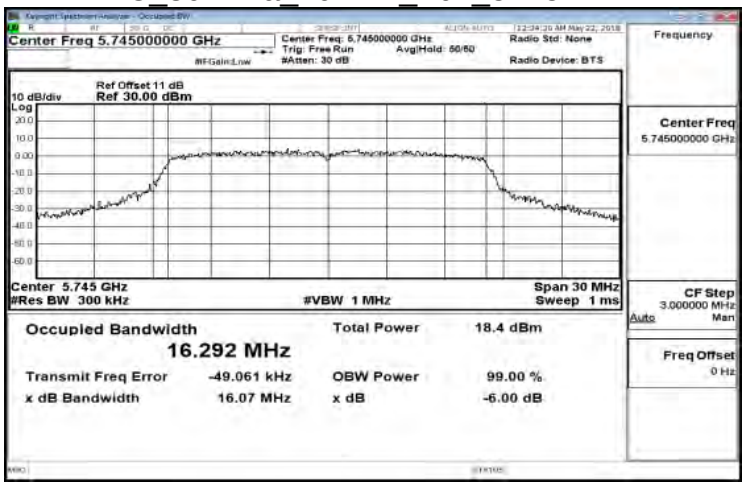
IC_802.11a_20MHz_Aux_5500MHz



IC_802.11a_20MHz_Aux_5745MHz



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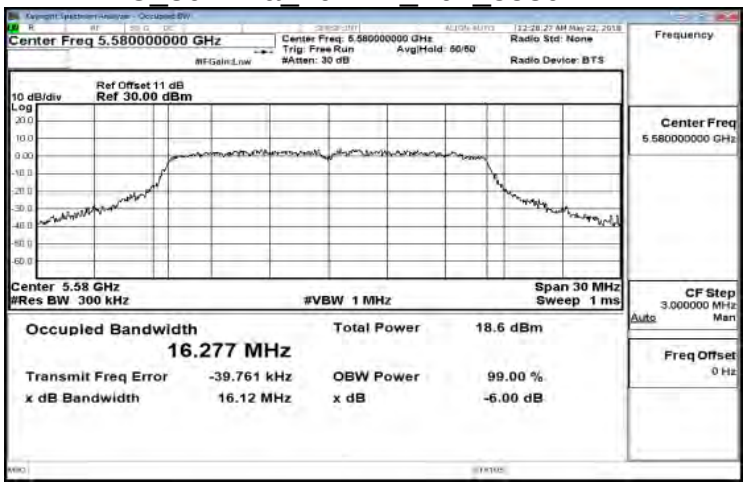
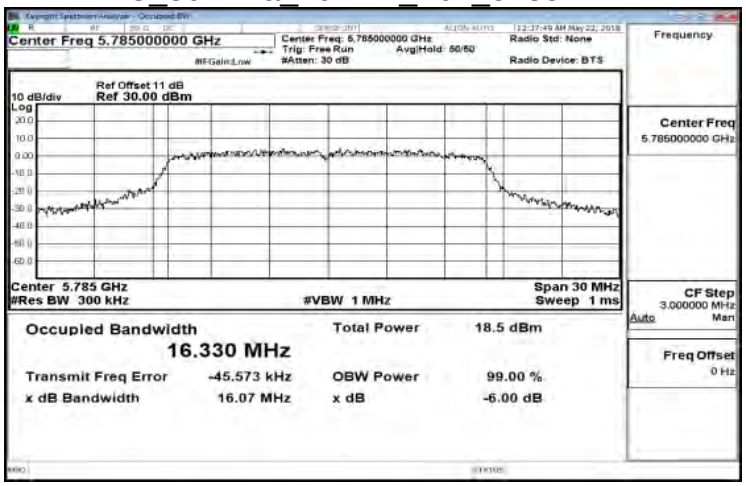
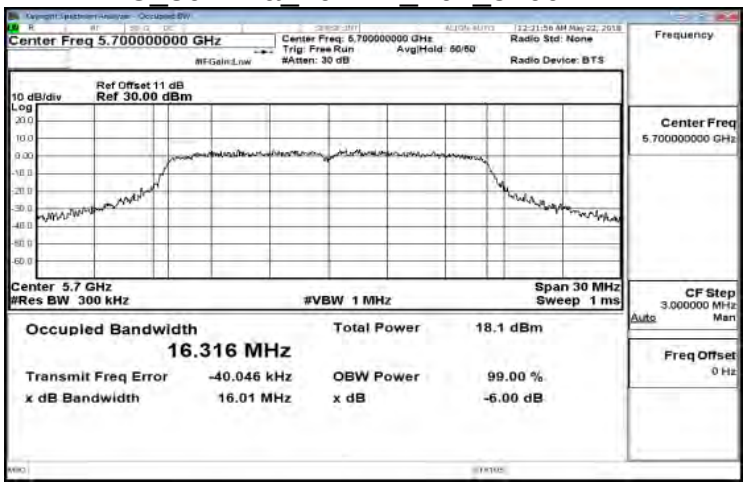


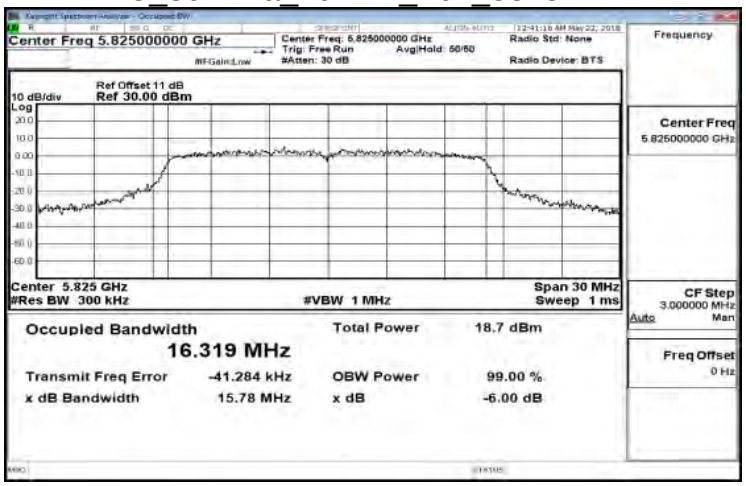
IC_802.11a_20MHz_Aux_5785MHz



IC_802.11a_20MHz_Aux_5700MHz



IC_802.11a_20MHz_Aux_5825MHz



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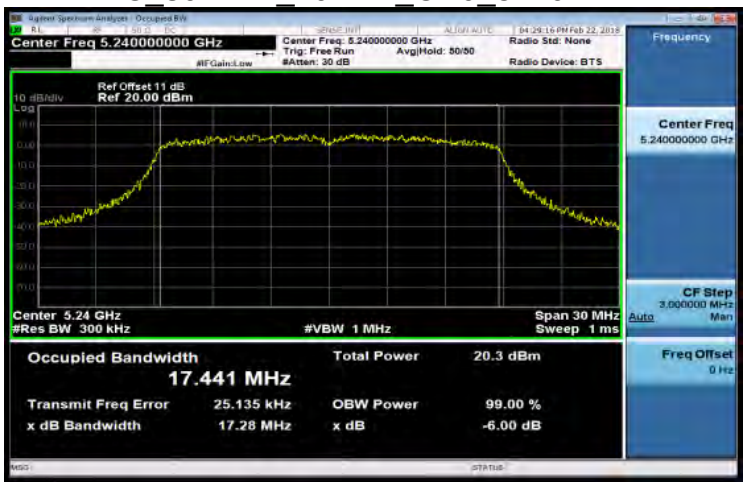
IC_802.11n_20MHz_CH0_5180MHz

IC_802.11n_20MHz_CH0_5260MHz

IC_802.11n_20MHz_CH0_5220MHz

IC_802.11n_20MHz_CH0_5300MHz

IC_802.11n_20MHz_CH0_5240MHz



IC_802.11n_20MHz_CH0_5320MHz

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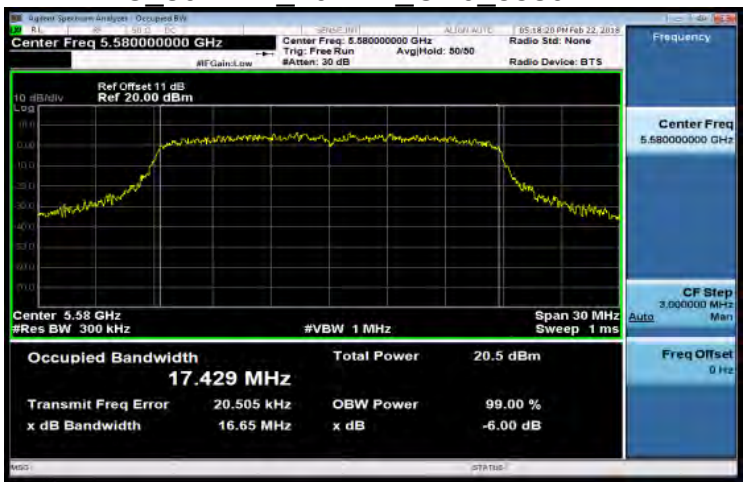
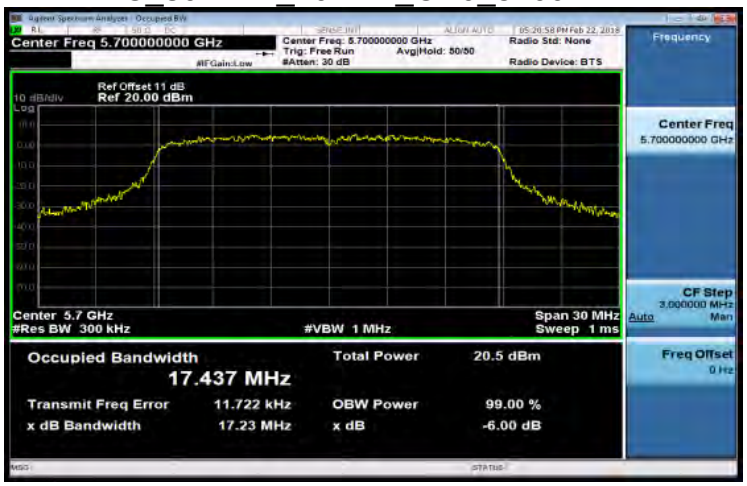
IC_802.11n_20MHz_CH0_5500MHz

IC_802.11n_20MHz_CH0_5720MHz

IC_802.11n_20MHz_CH0_5580MHz



IC_802.11n_20MHz_CH0_5700MHz



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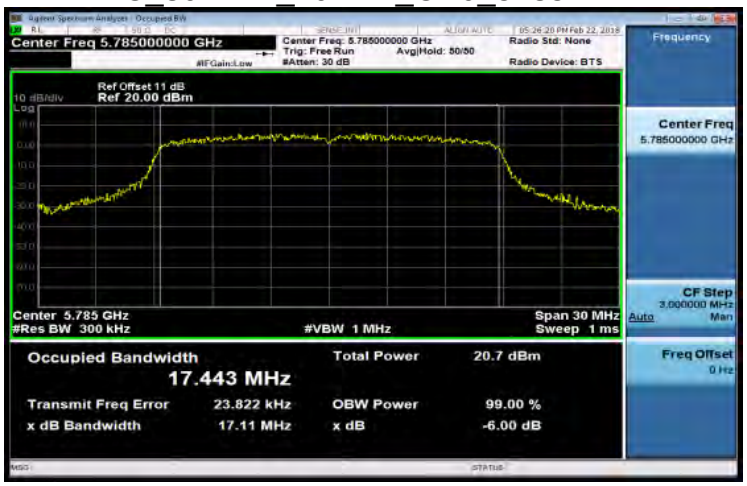
IC_802.11n_20MHz_CH0_5745MHz

IC_802.11n_20MHz_CH0_5785MHz



IC_802.11n_20MHz_CH0_5825MHz

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IC_802.11n_20MHz_CH1_5180MHz

IC_802.11n_20MHz_CH1_5260MHz

IC_802.11n_20MHz_CH1_5220MHz

IC_802.11n_20MHz_CH1_5300MHz

IC_802.11n_20MHz_CH1_5240MHz

IC_802.11n_20MHz_CH1_5320MHz

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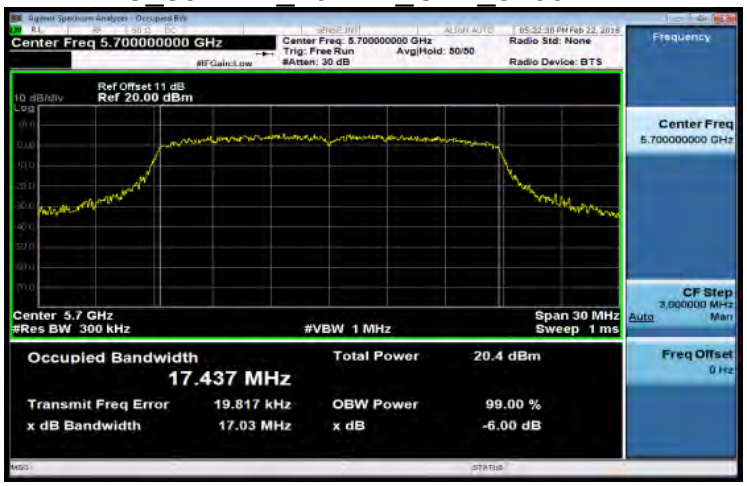
IC_802.11n_20MHz_CH1_5500MHz

IC_802.11n_20MHz_CH1_5720MHz

IC_802.11n_20MHz_CH1_5580MHz

IC_802.11n_20MHz_CH1_5700MHz



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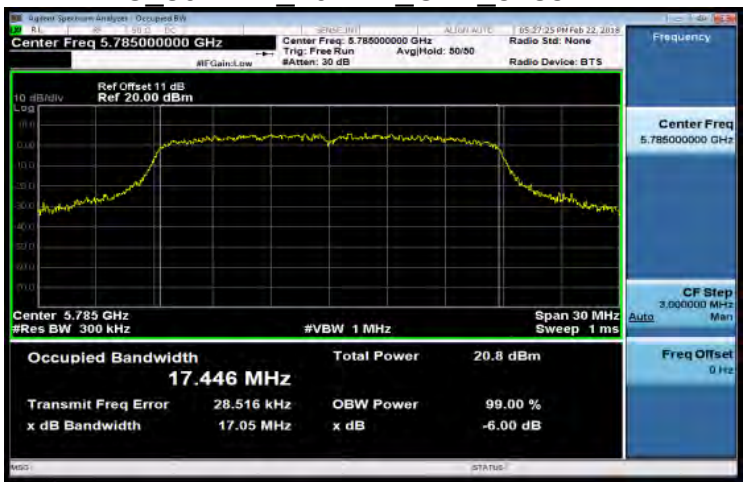
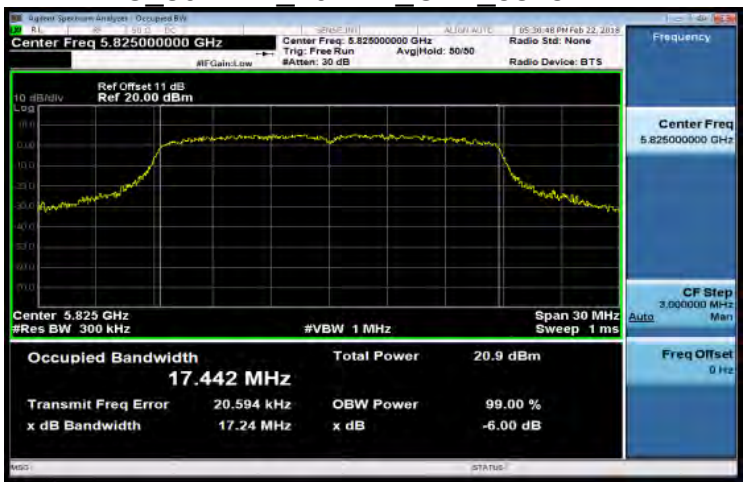
IC_802.11n_20MHz_CH1_5745MHz

IC_802.11n_20MHz_CH1_5785MHz



IC_802.11n_20MHz_CH1_5825MHz



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IC_802.11n_40MHz_CH0_5190MHz

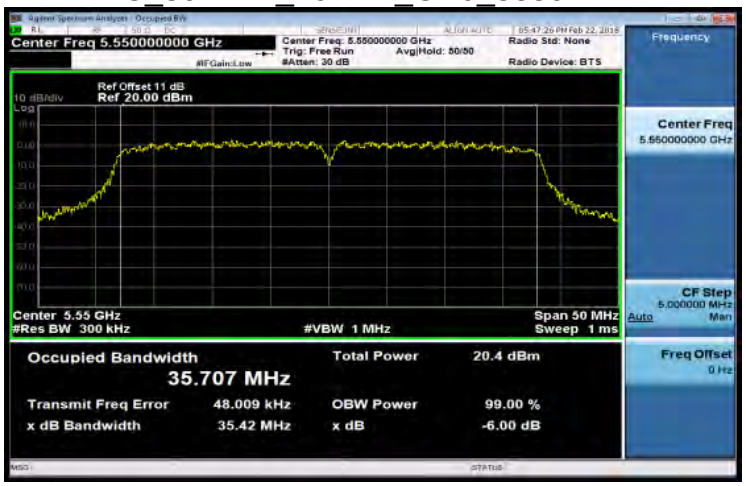
IC_802.11n_40MHz_CH0_5310MHz

IC_802.11n_40MHz_CH0_5230MHz

IC_802.11n_40MHz_CH0_5510MHz

IC_802.11n_40MHz_CH0_5270MHz

IC_802.11n_40MHz_CH0_5550MHz



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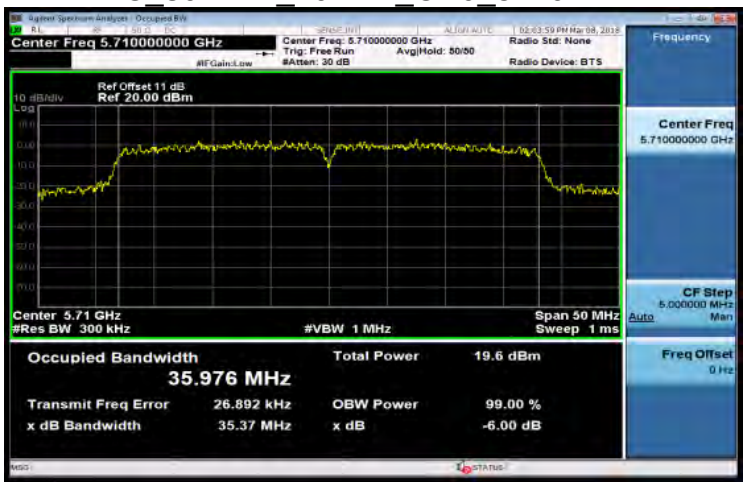
IC_802.11n_40MHz_CH0_5670MHz

IC_802.11n_40MHz_CH0_5795MHz

IC_802.11n_40MHz_CH0_5710MHz



IC_802.11n_40MHz_CH0_5755MHz

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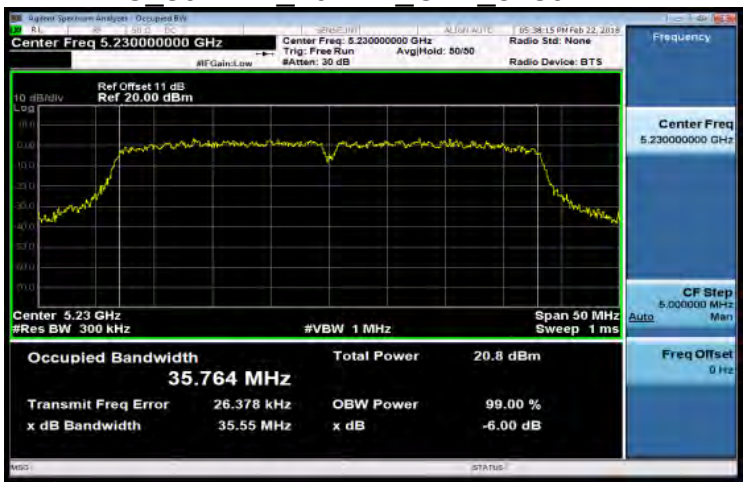
IC_802.11n_40MHz_CH1_5190MHz

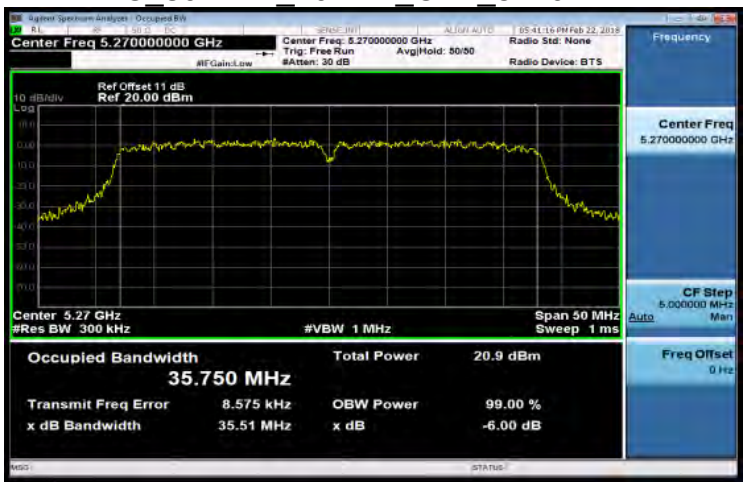
IC_802.11n_40MHz_CH1_5310MHz

IC_802.11n_40MHz_CH1_5230MHz



IC_802.11n_40MHz_CH1_5510MHz

IC_802.11n_40MHz_CH1_5270MHz



IC_802.11n_40MHz_CH1_5550MHz

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IC_802.11n_40MHz_CH1_5670MHz

IC_802.11n_40MHz_CH1_5795MHz

IC_802.11n_40MHz_CH1_5710MHz

IC_802.11n_40MHz_CH1_5755MHz

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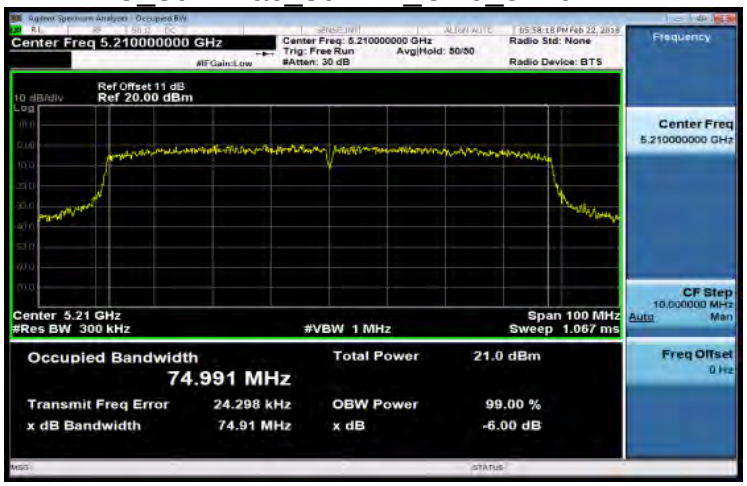
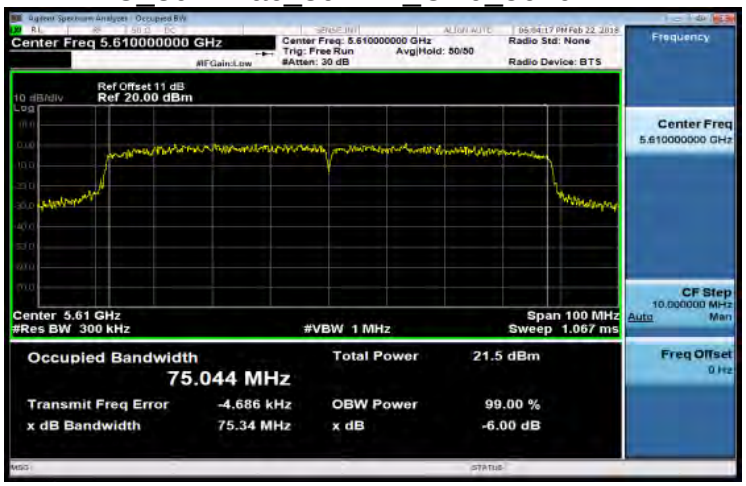
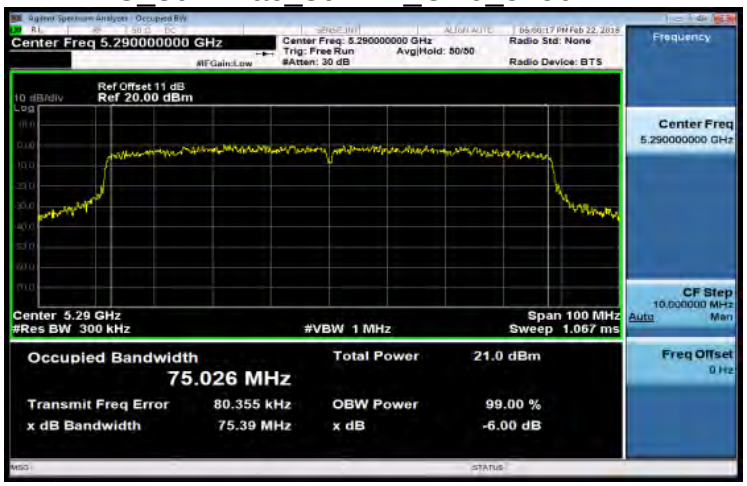
IC_802.11ac_80MHz_CH0_5210MHz



IC_802.11ac_80MHz_CH0_5610MHz

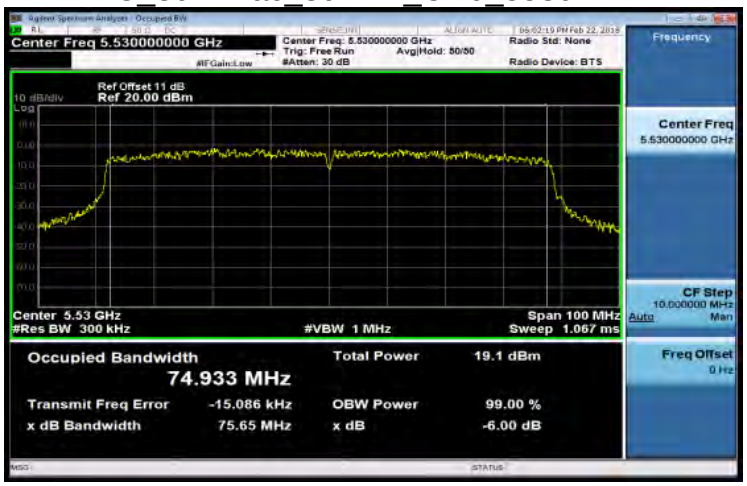


IC_802.11ac_80MHz_CH0_5290MHz

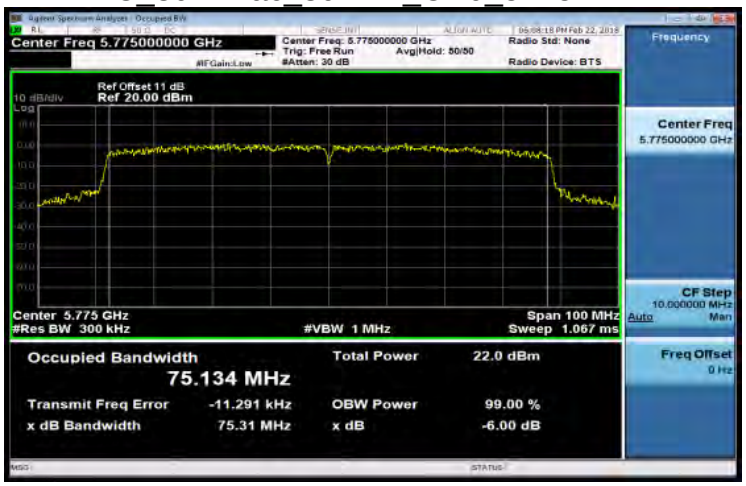


IC_802.11ac_80MHz_CH0_5690MHz

IC_802.11ac_80MHz_CH0_5530MHz



IC_802.11ac_80MHz_CH0_5775MHz



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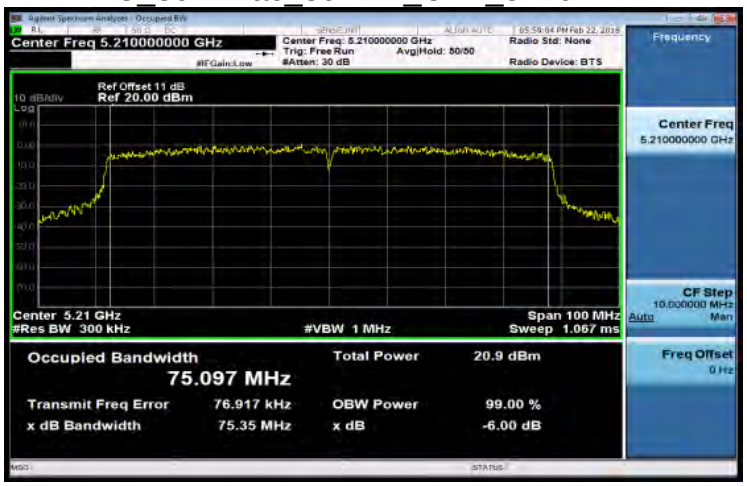
IC_802.11ac_80MHz_CH1_5210MHz



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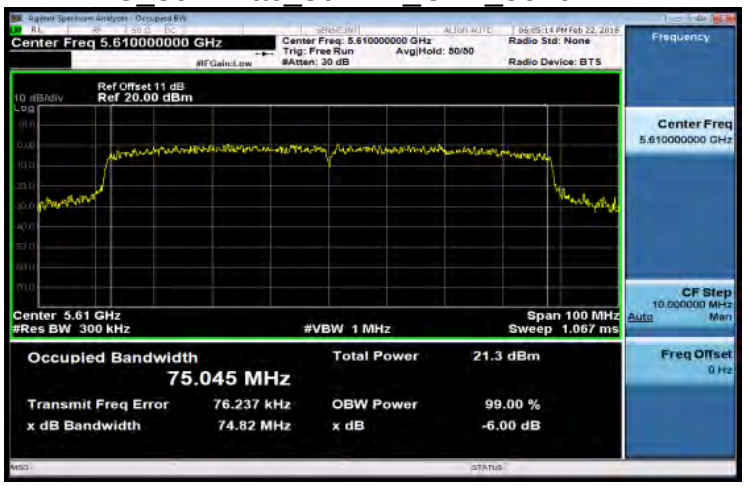
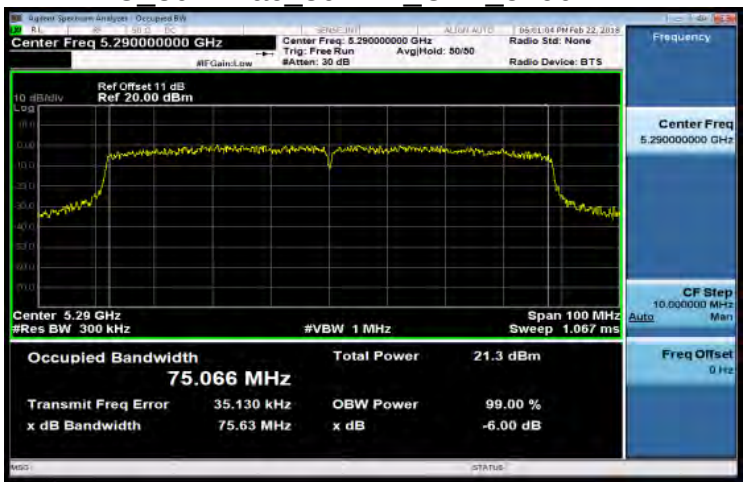
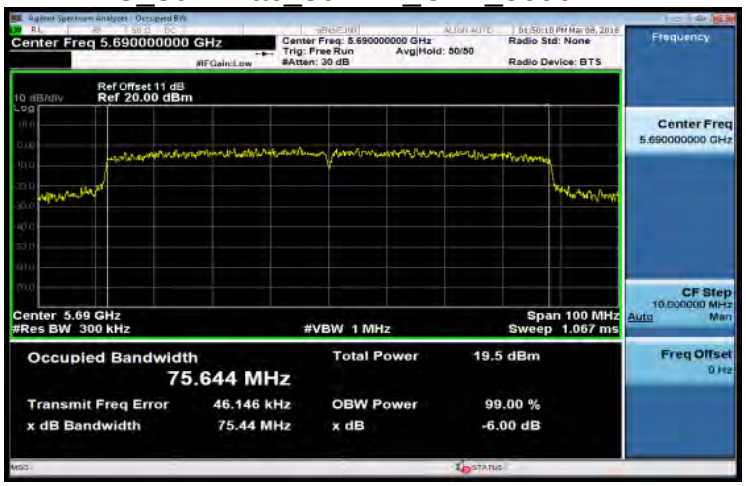


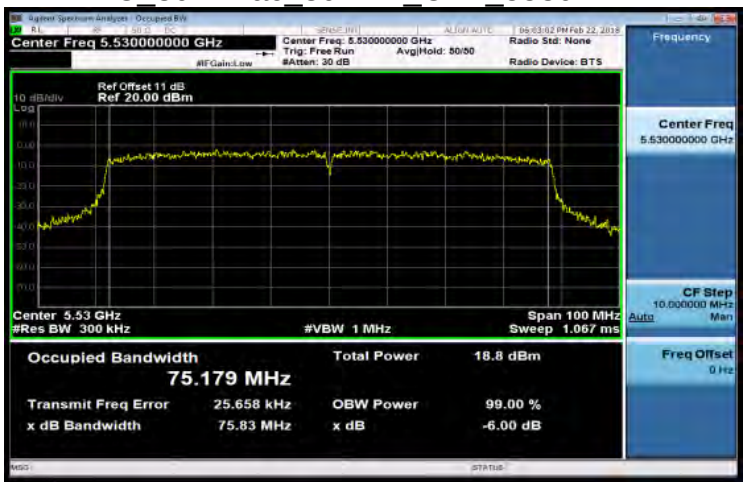
IC_802.11ac_80MHz_CH1_5290MHz



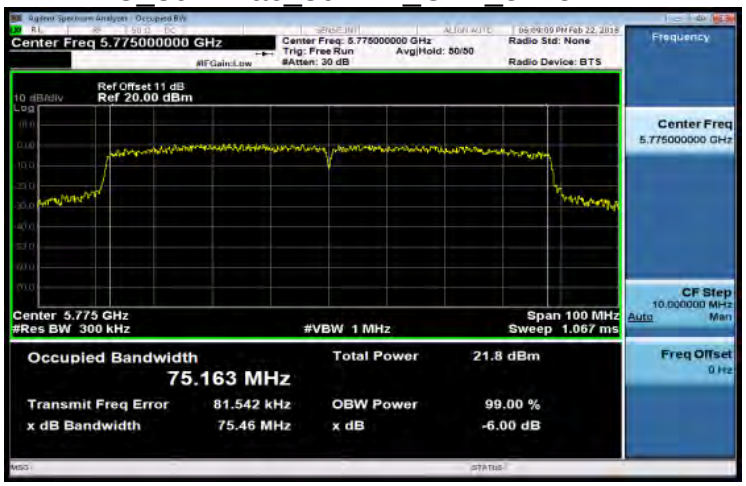
IC_802.11ac_80MHz_CH1_5690MHz



IC_802.11ac_80MHz_CH1_5530MHz



IC_802.11ac_80MHz_CH1_5775MHz



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9 MAXIMUM CONDUCTED OUTPUT POWER MEASUREMENT

9.1 Standard Applicable

FCC

OPERZTION Band	EUT CATEGORY		LIMIT
U-NII-1		Access Point (Mater device)	1 Watt(30dBm)
		Fixed point-to-point Acess Ponit	1 Watt(30dBm)
	√	Mobile and portable clinet device	250mW(23.98dBm)
U-NII-2A	√		250mW(23.98dBm) or 11dBm+10 log B
U-NII-2C	√		250mW(23.98dBm) or 11dBm+10 log B
U-NII-3	√		1 Watt(30dBm)

IC

OPERZTION FREQUENCY BAND	LIMIT
5150~5250 MHz	EIRP shall not exceed 200 mW or 10 + 10 $\log_{10}$B, dBm
5250~5350 MHz	Conducted output power shall not exceed 250 mW or 11 +10 $\log_{10}$B EIRP shall not exceed 1.0 W or 17 + 10 $\log_{10}$B, dBm
5470-5600 MHz and 5650-5725 MHz	Conducted output power shall not exceed 250 mW or 11 +10 $\log_{10}$ B EIRP shall not exceed 1.0 W or 17 + 10 $\log_{10}$B, dBm
5725~5850 MHz	Conducted output power shall not exceed 1 W

If transmitting antennas of directional gain greater than 6 dBi are used, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the direction-al gain of the antenna exceeds 6 dBi.

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Per KDB 662911 D01 Multiple Transmitter Output Method of conducted output power measurement on IEEE 802.11 devices,

For power measurements on all other devices:

Directional gain = GANT MAX + 10 log(NANT/NSS) dBi, where NSS = the number of independent spatial streams of data and GANT MAX is.the gain of the antenna having the highest gain (in dBi)..

Main Antenna Gain	dBi
Antenna Assembly Gain for 5.15-5.25G	1.42
Antenna Assembly Gain for 5.25-5.35G	1.42
Antenna Assembly Gain for 5.47-5.725G	1.45
Antenna Assembly Gain for 5.725-5.825G	1.84

Aux1 Antenna Gain	dBi
Antenna Assembly Gain for 5.15-5.25G	-0.52
Antenna Assembly Gain for 5.25-5.35G	-0.52
Antenna Assembly Gain for 5.47-5.725G	1.36
Antenna Assembly Gain for 5.725-5.825G	0.94

Mimo Antenna Gain	dBi
Antenna Assembly Gain for 5.15-5.25G	3.57
Antenna Assembly Gain for 5.25-5.35G	3.57
Antenna Assembly Gain for 5.47-5.725G	4.42
Antenna Assembly Gain for 5.725-5.825G	4.42

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9.2 Measurement Procedure

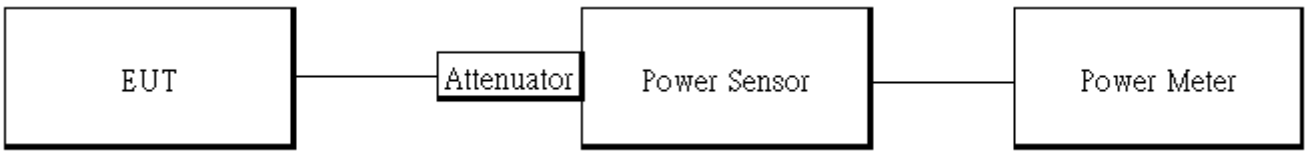
1. Place the EUT on the table and set it in transmitting mode.
2. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules.
3. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the power meter
4. Power Meter is used as the auxiliary test equipment to conduct the output power measurement.
5. Record the max. reading and add 10 log(1/duty cycle).
6. Repeat above procedures until all frequency (low, middle, and high channel) measured were complete.

Note: The reported CH0 and CH1 power values in the 2Tx and MIMO tables were measured whe performing additional measurements and all reported values are within compliance.

9.3 Measurement Equipment Used

SGS Conducted Room					
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Date**	**Calibration Due**
Spectrum Analyzer	KEYSIGHT	N9010A	MY51440113	06/20/2017	06/19/2018
Power Meter	Anritsu	ML2496A	1326001	06/23/2017	06/22/2018
Power Sensor	Anritsu	MA2411B	1315048	06/23/2017	06/22/2018
Power Sensor	Anritsu	MA2411B	1315049	06/23/2017	06/22/2018
Coaxial Cable 30cm	WOKEN	00100A1F1A195C	RF01	12/24/2017	12/23/2018
DC Block	PASTERNACK	PE8210	RF29	12/24/2017	12/23/2018
Splitter	RF-LAMBAD	RFLT2W1G18G	RF35	12/24/2017	12/23/2018
Attenuator	WOKEN	218FS-10	RF23	12/24/2017	12/23/2018
DC Power Supply	Agilent	E3640A	MY53140006	05/02/2018	05/01/2019

9.4 Test Set-up



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9.5 Measurement Result

Conducted output power (FCC)

802.11a_CH0

CH	Frequency (MHz)	Data Rate	TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
36	5180	6	**14.46**	27.925	30	PASS
44	5220	6	14.43	27.733	30	PASS
48	5240	6	14.44	27.797	30	PASS
52	5260	6	**14.49**	28.119	23.98 or 11+10log(B) = 23.58	PASS
60	5300	6	14.39	27.479	23.98 or 11+10log(B) = 23.51	PASS
64	5320	6	14.41	27.606	23.98 or 11+10log(B) = 23.57	PASS
100	5500	6	**14.44**	27.797	23.98 or 11+10log(B) = 23.45	PASS
116	5580	6	**14.44**	27.797	23.98 or 11+10log(B) = 23.66	PASS
140	5700	6	14.41	27.606	23.98 or 11+10log(B) = 23.65	PASS
149	5745	6	14.47	27.990	30	PASS
157	5785	6	**14.48**	28.054	30	PASS
165	5825	6	14.45	27.861	30	PASS

802.11a_Aux1

CH	Frequency (MHz)	Data Rate	TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
36	5180	6	14.42	27.669	23.98	PASS
44	5220	6	14.41	27.606	23.98	PASS
48	5240	6	14.42	27.669	23.98	PASS
52	5260	6	14.44	27.797	23.98 or 11+10log(B) = 23.68	PASS
60	5300	6	14.32	27.040	23.98 or 11+10log(B) = 23.91	PASS
64	5320	6	14.38	27.416	23.98 or 11+10log(B) = 23.90	PASS
100	5500	6	14.41	27.606	23.98 or 11+10log(B) = 23.93	PASS
116	5580	6	14.40	27.542	23.98 or 11+10log(B) = 23.84	PASS
140	5700	6	14.38	27.416	23.98 or 11+10log(B) = 24.04	PASS
149	5745	6	14.41	27.606	30	PASS
157	5785	6	14.44	27.797	30	PASS
165	5825	6	14.41	27.606	30	PASS

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802.11a_2TX

CH	Frequency (MHz)	Data Rate	Avg. POWER (dBm)		TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
			CH 0	CH 1				
36	5180	6	13.95	14.38	**17.39**	54.828	23.98	PASS
44	5220	6	13.63	14.05	17.07	50.933	23.98	PASS
48	5240	6	13.64	14.01	17.05	50.699	23.98	PASS
52	5260	6	13.92	14.03	**17.20**	52.481	23.98 or 11+10log(B) = 23.68	PASS
60	5300	6	14.07	14.34	**17.43**	55.335	23.98 or 11+10log(B) = 23.75	PASS
64	5320	6	14.01	14.17	17.31	53.827	23.98 or 11+10log(B) = 23.70	PASS
100	5500	6	13.73	13.91	17.04	50.582	23.98 or 11+10log(B) = 23.91	PASS
116	5580	6	14.34	13.95	**17.37**	54.576	23.98 or 11+10log(B) = 23.84	PASS
140	5700	6	14.18	13.85	17.24	52.966	23.98 or 11+10log(B) = 23.91	PASS
149	5745	6	14.07	13.72	17.12	51.523	30	PASS
157	5785	6	14.33	13.99	**17.38**	54.702	30	PASS
165	5825	6	14.19	13.65	17.15	51.880	30	PASS

802.11n_HT20_CH0

CH	Frequency (MHz)	Data Rate	TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
36	5180	MCS0	**13.98**	25.003	30	PASS
44	5220	MCS0	13.96	24.889	30	PASS
48	5240	MCS0	13.94	24.774	30	PASS
52	5260	MCS0	**13.98**	25.003	23.98 or 11+10log(B) = 23.90	PASS
60	5300	MCS0	13.93	24.717	23.98 or 11+10log(B) = 23.94	PASS
64	5320	MCS0	13.96	24.889	23.98 or 11+10log(B) = 23.88	PASS
100	5500	MCS0	**13.97**	24.946	23.98 or 11+10log(B) = 23.88	PASS
116	5580	MCS0	13.96	24.889	23.98 or 11+10log(B) = 24.02	PASS
140	5700	MCS0	12.92	19.588	23.98 or 11+10log(B) = 23.96	PASS
144	5720 (band 3)	MCS0	**12.83**	19.187	23.98 or 11+10log(B) = 22.82	PASS
144	5720 (band 4)	MCS0	1.15	1.303	23.98 or 11+10log(B) = 17.65	PASS
149	5745	MCS0	13.92	24.660	30	PASS
157	5785	MCS0	13.91	24.604	30	PASS
165	5825	MCS0	**13.97**	24.946	30	PASS

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802.11n_HT20_CH1

CH	Frequency (MHz)	Data Rate	TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
36	5180	MCS0	13.89	24.491	30	PASS
44	5220	MCS0	13.87	24.378	30	PASS
48	5240	MCS0	13.84	24.210	30	PASS
52	5260	MCS0	13.91	24.604	23.98 or 11+10log(B) = 23.93	PASS
60	5300	MCS0	13.82	24.099	23.98 or 11+10log(B) = 23.96	PASS
64	5320	MCS0	13.88	24.434	23.98 or 11+10log(B) = 23.91	PASS
100	5500	MCS0	13.88	24.434	23.98 or 11+10log(B) = 23.97	PASS
116	5580	MCS0	13.86	24.322	23.98 or 11+10log(B) = 23.95	PASS
140	5700	MCS0	12.89	19.454	23.98 or 11+10log(B) = 23.96	PASS
144	5720 (band 3)	MCS0	12.73	18.750	23.98 or 11+10log(B) = 22.78	PASS
144	5720 (band 4)	MCS0	1.15	1.303	23.98 or 11+10log(B) = 17.61	PASS
149	5745	MCS0	13.82	24.099	30	PASS
157	5785	MCS0	13.81	24.044	30	PASS
165	5825	MCS0	13.88	24.434	30	PASS

802.11n_HT20_MIMO

CH	Frequency (MHz)	Data Rate	Avg. POWER (dBm)		TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
			CH 0	CH 1				
36	5180	MCS8	13.34	13.97	**16.91**	49.091	30	PASS
44	5220	MCS8	13.59	13.69	16.89	48.865	30	PASS
48	5240	MCS8	13.52	13.73	**16.87**	48.641	30	PASS
52	5260	MCS8	13.55	13.67	16.86	48.529	23.98 or 11+10log(B) = 23.90	PASS
60	5300	MCS8	13.68	13.76	**16.97**	49.774	23.98 or 11+10log(B) = 23.94	PASS
64	5320	MCS8	13.65	13.77	16.96	49.659	23.98 or 11+10log(B) = 23.88	PASS
100	5500	MCS8	13.62	13.63	16.87	48.641	23.98 or 11+10log(B) = 23.88	PASS
116	5580	MCS8	13.92	13.49	**16.96**	49.659	23.98 or 11+10log(B) = 23.95	PASS
140	5700	MCS8	12.76	12.64	15.95	39.355	23.98 or 11+10log(B) = 23.96	PASS
144	5720 (band 3)	MCS8	12.57	12.3	**16.32**	42.855	23.98 or 11+10log(B) = 22.78	PASS
144	5720 (band 4)	MCS8	1.15	1.15	4.40	2.754	23.98 or 11+11log(B) = 17.61	PASS
149	5745	MCS8	13.89	13.51	**16.95**	49.545	30	PASS
157	5785	MCS8	13.86	13.33	16.85	48.417	30	PASS
165	5825	MCS8	13.77	13.52	16.89	48.865	30	PASS

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802.11n_HT40_CH0

CH	Frequency (MHz)	Data Rate	TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
38	5190	MCS0	11.97	15.740	30	PASS
46	5230	MCS0	**13.94**	24.774	30	PASS
54	5270	MCS0	**13.98**	25.003	23.98 or 11+10log(B) = 27.06	PASS
62	5310	MCS0	11.94	15.631	23.98 or 11+10log(B) = 26.98	PASS
102	5510	MCS0	11.95	15.668	23.98 or 11+10log(B) = 27.07	PASS
110	5550	MCS0	**13.96**	24.889	23.98 or 11+10log(B) = 27.06	PASS
134	5670	MCS0	13.79	23.933	23.98 or 11+10log(B) = 27.06	PASS
142	5710 (band 2)	MCS0	**13.45**	22.131	23.98 or 11+10log(B) = 26.70	PASS
142	5710 (band 4)	MCS0	**0.53**	1.130	23.98 or 11+10log(B) = 17.82	PASS
151	5755	MCS0	**13.96**	24.889	30	PASS
159	5795	MCS0	13.92	24.660	30	PASS

802.11n_HT40_CH1

CH	Frequency (MHz)	Data Rate	TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
38	5190	MCS0	11.92	15.560	30	PASS
46	5230	MCS0	13.82	24.099	30	PASS
54	5270	MCS0	13.87	24.378	23.98 or 11+10log(B) = 27.04	PASS
62	5310	MCS0	11.92	15.560	23.98 or 11+10log(B) = 27.02	PASS
102	5510	MCS0	11.90	15.488	23.98 or 11+10log(B) = 26.96	PASS
110	5550	MCS0	13.85	24.266	23.98 or 11+10log(B) = 27.06	PASS
134	5670	MCS0	13.67	23.281	23.98 or 11+10log(B) = 26.98	PASS
142	5710 (band 2)	MCS0	13.36	21.677	23.98 or 11+10log(B) = 27.44	PASS
142	5710 (band 4)	MCS0	**0.53**	1.130	23.98 or 11+10log(B) = 18.57	PASS
151	5755	MCS0	13.86	24.322	30	PASS
159	5795	MCS0	13.83	24.155	30	PASS

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802.11n_HT40_MIMO

CH	Frequency (MHz)	Data Rate	Avg. POWER (dBm)		TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
			CH 0	CH 1				
38	5190	MCS8	11.58	11.37	14.93	31.117	30	PASS
46	5230	MCS8	13.33	13.72	**16.98**	49.888	30	PASS
54	5270	MCS8	13.31	13.68	**16.95**	49.545	23.98 or 11+10log(B) = 27.04	PASS
62	5310	MCS8	11.62	11.43	14.98	31.477	23.98 or 11+10log(B) = 26.98	PASS
102	5510	MCS8	11.55	11.41	14.93	31.117	23.98 or 11+10log(B) = 26.96	PASS
110	5550	MCS8	14.11	12.75	**16.94**	49.431	23.98 or 11+10log(B) = 27.06	PASS
134	5670	MCS8	14.14	12.73	**16.94**	49.431	23.98 or 11+10log(B) = 26.98	PASS
142	5710 (band 3)	MCS8	13.1	12.74	**16.38**	43.451	23.98 or 11+10log(B) = 26.70	PASS
142	5710 (band 4)	MCS8	0.53	0.53	**4.01**	2.518	23.98 or 11+10log(B) = 17.82	PASS
151	5755	MCS8	14.08	12.91	**16.99**	50.003	30	PASS
159	5795	MCS8	14.12	12.85	16.98	49.888	30	PASS

802.11ac_VHT20_CH0

CH	Frequency (MHz)	Data Rate	TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
36	5180	MCS0	**13.80**	23.988	30	PASS
44	5220	MCS0	13.78	23.878	30	PASS
48	5240	MCS0	13.76	23.768	30	PASS
52	5260	MCS0	**13.84**	24.210	23.98 or 11+10log(B) = 23.90	PASS
60	5300	MCS0	13.77	23.823	23.98 or 11+10log(B) = 23.94	PASS
64	5320	MCS0	13.80	23.988	23.98 or 11+10log(B) = 23.88	PASS
100	5500	MCS0	**13.83**	24.155	23.98 or 11+10log(B) = 23.88	PASS
116	5580	MCS0	13.78	23.878	23.98 or 11+10log(B) = 24.02	PASS
140	5700	MCS0	12.86	19.320	23.98 or 11+10log(B) = 23.96	PASS
144	5720 (band 3)	MCS0	**12.80**	19.055	23.98 or 11+10log(B) = 22.82	PASS
144	5720 (band 4)	MCS0	**1.15**	1.303	23.98 or 11+10log(B) = 17.65	PASS
149	5745	MCS0	13.77	23.823	30	PASS
157	5785	MCS0	13.74	23.659	30	PASS
165	5825	MCS0	**13.82**	24.099	30	PASS

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802.11ac_VHT20_CH1

CH	Frequency (MHz)	Data Rate	TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
36	5180	MCS0	13.72	23.550	30	PASS
44	5220	MCS0	13.70	23.442	30	PASS
48	5240	MCS0	13.68	23.335	30	PASS
52	5260	MCS0	13.74	23.659	23.98 or 11+10log(B) = 23.93	PASS
60	5300	MCS0	13.66	23.227	23.98 or 11+10log(B) = 23.96	PASS
64	5320	MCS0	13.74	23.659	23.98 or 11+10log(B) = 23.91	PASS
100	5500	MCS0	13.71	23.496	23.98 or 11+10log(B) = 23.97	PASS
116	5580	MCS0	13.70	23.442	23.98 or 11+10log(B) = 23.95	PASS
140	5700	MCS0	12.82	19.143	23.98 or 11+10log(B) = 23.96	PASS
144	5720 (band 3)	MCS0	12.71	18.664	23.98 or 11+10log(B) = 22.78	PASS
144	5720 (band 4)	MCS0	**1.15**	1.303	23.98 or 11+10log(B) = 17.61	PASS
149	5745	MCS0	13.67	23.281	30	PASS
157	5785	MCS0	13.62	23.014	30	PASS
165	5825	MCS0	13.73	23.605	30	PASS

802.11ac_VHT20_MIMO

CH	Frequency (MHz)	Data Rate	Avg. POWER (dBm		TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
			CH 0	CH 1				
36	5180	MCS8	13.18	13.81	**16.75**	47.315	30	PASS
44	5220	MCS8	13.42	13.5	16.71	46.881	30	PASS
48	5240	MCS8	13.33	13.58	**16.70**	46.774	30	PASS
52	5260	MCS8	13.38	13.51	16.69	46.666	23.98 or 11+10log(B) = 23.90	PASS
60	5300	MCS8	13.52	13.6	**16.81**	47.973	23.98 or 11+10log(B) = 23.94	PASS
64	5320	MCS8	13.49	13.59	16.79	47.753	23.98 or 11+10log(B) = 23.88	PASS
100	5500	MCS8	13.44	13.46	16.70	46.774	23.98 or 11+10log(B) = 23.88	PASS
116	5580	MCS8	13.76	13.33	**16.80**	47.863	23.98 or 11+10log(B) = 23.95	PASS
140	5700	MCS8	12.63	12.59	15.86	38.548	23.98 or 11+10log(B) = 23.96	PASS
144	5720 (band 3)	MCS8	12.46	12.19	**15.57**	36.058	23.98 or 11+10log(B) = 22.78	PASS
144	5720 (band 4)	MCS8	1.15	1.15	**4.40**	2.754	23.98 or 11+10log(B) = 17.61	PASS
149	5745	MCS8	13.72	13.35	**16.79**	47.753	30	PASS
157	5785	MCS8	13.7	13.18	16.70	46.774	30	PASS
165	5825	MCS8	13.61	13.33	16.72	46.989	30	PASS

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802.11ac_VHT40_CH0

CH	Frequency (MHz)	Data Rate	TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
38	5190	MCS0	11.92	15.560	30	PASS
46	5230	MCS0	**13.83**	24.155	30	PASS
54	5270	MCS0	**13.86**	24.322	23.98 or 11+10log(B) = 27.06	PASS
62	5310	MCS0	11.91	15.524	23.98 or 11+10log(B) = 26.98	PASS
102	5510	MCS0	11.89	15.453	23.98 or 11+10log(B) = 27.07	PASS
110	5550	MCS0	**13.83**	24.155	23.98 or 11+10log(B) = 27.06	PASS
134	5670	MCS0	13.67	23.281	23.98 or 11+10log(B) = 27.06	PASS
142	5710 (band 3)	MCS0	**13.44**	22.080	23.98 or 11+10log(B) = 26.70	PASS
142	5710 (band 4)	MCS0	**0.53**	1.130	23.98 or 11+10log(B) = 17.82	PASS
151	5755	MCS0	**13.84**	24.210	30	PASS
159	5795	MCS0	13.79	23.933	30	PASS

802.11ac_VHT40_CH1

CH	Frequency (MHz)	Data Rate	TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
38	5190	MCS0	11.87	15.382	30	PASS
46	5230	MCS0	13.68	23.335	30	PASS
54	5270	MCS0	13.76	23.768	23.98 or 11+10log(B) = 27.04	PASS
62	5310	MCS0	11.86	15.346	23.98 or 11+10log(B) = 27.02	PASS
102	5510	MCS0	11.83	15.241	23.98 or 11+10log(B) = 26.96	PASS
110	5550	MCS0	13.72	23.550	23.98 or 11+10log(B) = 27.06	PASS
134	5670	MCS0	13.66	23.227	23.98 or 11+10log(B) = 26.98	PASS
142	5710 (band 3)	MCS0	13.35	21.627	23.98 or 11+10log(B) = 27.44	PASS
142	5710 (band 4)	MCS0	**0.53**	1.130	23.98 or 11+10log(B) = 18.57	PASS
151	5755	MCS0	13.72	23.550	30	PASS
159	5795	MCS0	13.67	23.281	30	PASS

802.11ac_VHT40_MIMO

CH	Frequency (MHz)	Data Rate	Avg. POWER (dBm		TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
			CH 0	CH 1				
38	5190	MCS8	11.47	11.32	14.85	30.549	30	PASS
46	5230	MCS8	13.19	13.54	**16.85**	48.417	30	PASS
54	5270	MCS8	13.16	13.5	**16.81**	47.973	23.98 or 11+10log(B) = 27.04	PASS
62	5310	MCS8	11.55	11.32	14.89	30.832	23.98 or 11+10log(B) = 26.98	PASS
102	5510	MCS8	11.47	11.34	14.86	30.620	23.98 or 11+10log(B) = 26.96	PASS
110	5550	MCS8	13.95	12.57	16.80	47.863	23.98 or 11+10log(B) = 27.06	PASS
134	5670	MCS8	13.98	12.58	**16.82**	48.084	23.98 or 11+10log(B) = 26.98	PASS
142	5710 (band 3)	MCS8	12.9	12.64	**16.25**	42.170	23.98 or 11+10log(B) = 26.70	PASS
142	5710 (band 4)	MCS8	0.53	0.53	**4.01**	2.518	23.98 or 11+10log(B) = 17.82	PASS
151	5755	MCS8	13.9	12.73	16.84	48.306	30	PASS
159	5795	MCS8	13.96	12.69	**16.85**	48.417	30	PASS

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802.11ac_VHT80_CH0

CH	Frequency (MHz)	Data Rate	TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)			RESULT
42	5210	MCS0	**11.46**	13.996	30			PASS
58	5290	MCS0	**11.48**	14.060	23.98	or 11+10log(B) =	30.15	PASS
106	5530	MCS0	11.46	13.996	23.98	or 11+10log(B) =	30.14	PASS
122	5610	MCS0	**13.88**	24.434	23.98	or 11+10log(B) =	30.32	PASS
138	5690 (band 3)	MCS0	**13.39**	21.827	23.98	or 11+10log(B) =	30.07	PASS
138	5690 (band 4)	MCS0	0.27	1.064	23.98	or 11+10log(B) =	18.07	PASS
155	5775	MCS0	**13.96**	24.889	30			PASS

802.11ac_VHT80_CH1

CH	Frequency (MHz)	Data Rate	TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)			RESULT
42	5210	MCS0	11.38	13.740	30			PASS
58	5290	MCS0	11.42	13.868	23.98	or 11+10log(B) =	30.16	PASS
106	5530	MCS0	11.41	13.836	23.98	or 11+10log(B) =	30.16	PASS
122	5610	MCS0	13.81	24.044	23.98	or 11+10log(B) =	30.41	PASS
138	5690 (band 3)	MCS0	13.34	21.577	23.98	or 11+10log(B) =	30.72	PASS
138	5690 (band 4)	MCS0	0.27	1.064	23.98	or 11+10log(B) =	18.72	PASS
155	5775	MCS0	13.90	24.547	30			PASS

802.11ac_VHT80_MIMO

CH	Frequency (MHz)	Data Rate	Avg. POWER (dBm)		TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)			RESULT
			CH 0	CH 1						
42	5210	MCS8	10.72	10.37	**14.43**	27.733	30			PASS
58	5290	MCS8	10.65	10.43	**14.43**	27.733	23.98	or 11+10log(B) =	30.15	PASS
106	5530	MCS8	10.62	10.38	14.39	27.479	23.98	or 11+10log(B) =	30.14	PASS
122	5610	MCS8	13.67	12.44	**16.98**	49.888	23.98	or 11+10log(B) =	30.32	PASS
138	5690 (band 3)	MCS8	13.35	12.24	**16.71**	46.881	23.98	or 11+11log(B) =	30.07	PASS
138	5690 (band 4)	MCS8	0.27	0.27	4.15	2.600	23.98	or 11+12log(B) =	18.07	PASS
155	5775	MCS8	13.59	12.52	**16.97**	49.774	30			PASS

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Conducted output power (IC)

802.11a_CH0

CH	Frequency (MHz)	TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)			RESULT
52	5260	**14.49**	**28.119**	23.98	or 11+10log(B) =	23.12	PASS
60	5300	14.39	27.479	23.98	or 11+10log(B) =	23.12	PASS
64	5320	14.41	27.606	23.98	or 11+10log(B) =	23.11	PASS
100	5500	**14.44**	**27.797**	23.98	or 11+10log(B) =	23.12	PASS
116	5580	**14.44**	**27.797**	23.98	or 11+10log(B) =	23.12	PASS
140	5700	**14.41**	**27.606**	23.98	or 11+10log(B) =	23.12	PASS
149	5745	14.47	27.990	30			PASS
157	5785	**14.48**	**28.054**	30			PASS
165	5825	14.45	27.861	30			PASS

802.11a_Aux1

CH	Frequency (MHz)	TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)			RESULT
52	5260	**14.44**	**27.797**	23.98	or 11+10log(B) =	23.11	PASS
60	5300	14.32	27.040	23.98	or 11+10log(B) =	23.13	PASS
64	5320	14.38	27.416	23.98	or 11+10log(B) =	23.12	PASS
100	5500	**14.41**	**27.606**	23.98	or 11+10log(B) =	23.12	PASS
116	5580	14.40	27.542	23.98	or 11+10log(B) =	23.12	PASS
140	5700	**14.38**	**27.416**	23.98	or 11+10log(B) =	23.13	PASS
149	5745	14.41	27.606	30			PASS
157	5785	**14.44**	**27.797**	30			PASS
165	5825	14.41	27.606	30			PASS

802.11a_2TX

CH	Frequency (MHz)	AVERAGE POWER		TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)			RESULT
		CH 0	CH 1						
52	5260	13.9	14	17.20	52.481	23.98	or 11+10log(B) =	23.11	PASS
60	5300	14.1	14.3	17.43	55.335	23.98	or 11+10log(B) =	23.12	PASS
64	5320	14	14.2	17.31	53.827	23.98	or 11+10log(B) =	23.12	PASS
100	5500	13.7	13.9	17.04	50.582	23.98	or 11+10log(B) =	23.12	PASS
116	5580	14.3	14	17.37	54.576	23.98	or 11+10log(B) =	23.12	PASS
140	5700	14.2	13.9	17.24	52.966	23.98	or 11+10log(B) =	23.13	PASS
149	5745	14.1	13.7	17.12	51.523	30			PASS
157	5785	14.3	14	17.38	54.702	30			PASS
165	5825	14.2	13.7	17.15	51.880	30			PASS

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802.11n_HT20_CH0

CH	Frequency (MHz)	TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
52	5260	**13.98**	**25.003**	23.98 or 11+10log(B) = 23.41	PASS
60	5300	13.93	24.717	23.98 or 11+10log(B) = 23.41	PASS
64	5320	13.96	24.889	23.98 or 11+10log(B) = 23.41	PASS
100	5500	**13.97**	**24.946**	23.98 or 11+10log(B) = 23.41	PASS
116	5580	13.96	24.889	23.98 or 11+10log(B) = 23.41	PASS
140	5700	**12.92**	**19.588**	23.98 or 11+10log(B) = 23.41	PASS
144	5720 (band 3)	12.83	**19.187**	23.98 or 11+10log(B) = 22.26	PASS
144	5720 (band 4)	1.15	1.303	23.98 or 11+10log(B) = 17.10	PASS
149	5745	13.92	24.660	30	PASS
157	5785	13.91	24.604	30	PASS
165	5825	**13.97**	**24.946**	30	PASS

802.11n_HT20_CH1

CH	Frequency (MHz)	TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
52	5260	**13.91**	**24.604**	23.98 or 11+10log(B) = 23.41	PASS
60	5300	13.82	24.099	23.98 or 11+10log(B) = 23.41	PASS
64	5320	13.88	24.434	23.98 or 11+10log(B) = 23.41	PASS
100	5500	**13.88**	**24.434**	23.98 or 11+10log(B) = 23.42	PASS
116	5580	13.86	24.322	23.98 or 11+10log(B) = 23.41	PASS
140	5700	**12.89**	**19.454**	23.98 or 11+10log(B) = 23.41	PASS
144	5720 (band 3)	12.73	**18.750**	23.98 or 11+10log(B) = 22.25	PASS
144	5720 (band 4)	1.15	1.303	23.98 or 11+10log(B) = 17.09	PASS
149	5745	13.82	24.099	30	PASS
157	5785	13.81	24.044	30	PASS
165	5825	**13.88**	**24.434**	30	PASS

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802.11n_HT20_MIMO

CH	Frequency (MHz)	AVERAGE POWER		TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
		CH 0	CH 1				
52	5260	13.6	13.7	16.86	48.529	23.98 or 11+10log(B) = 23.41	PASS
60	5300	13.7	13.8	**16.97**	**49.774**	23.98 or 11+10log(B) = 23.41	PASS
64	5320	13.7	13.8	16.96	49.659	23.98 or 11+10log(B) = 23.41	PASS
100	5500	13.6	13.6	16.87	48.641	23.98 or 11+10log(B) = 23.41	PASS
116	5580	13.9	13.5	**16.96**	**49.659**	23.98 or 11+10log(B) = 23.41	PASS
140	5700	12.8	12.6	15.95	39.355	23.98 or 11+10log(B) = 23.41	PASS
144	5720 (band 3)	12.6	12.3	**16.32**	**42.855**	23.98 or 11+10log(B) = 22.25	PASS
144	5720 (band 4)	1.15	1.15	4.40	2.754	23.98 or 11+10log(B) = 17.09	PASS
149	5745	13.9	13.5	**16.95**	**49.545**	30	PASS
157	5785	13.9	13.3	16.85	48.417	30	PASS
165	5825	13.8	13.5	16.89	48.865	30	PASS

802.11n_HT40_CH0

CH	Frequency (MHz)	TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
54	5270	**13.98**	**25.003**	23.98 or 11+10log(B) = 26.52	PASS
62	5310	11.94	15.631	23.98 or 11+10log(B) = 26.53	PASS
102	5510	11.95	15.668	23.98 or 11+10log(B) = 26.54	PASS
110	5550	**13.96**	**24.889**	23.98 or 11+10log(B) = 26.53	PASS
134	5670	**13.79**	**23.933**	23.98 or 11+10log(B) = 26.53	PASS
142	5710 (band 3)	13.45	**22.131**	23.98 or 11+10log(B) = 26.03	PASS
142	5710 (band 4)	0.53	1.130	23.98 or 11+10log(B) = 17.15	PASS
151	5755	**13.96**	**24.889**	30	PASS
159	5795	13.92	24.660	30	PASS

802.11n_HT40_CH1

CH	Frequency (MHz)	TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
54	5270	**13.87**	**24.378**	23.98 or 11+10log(B) = 26.53	PASS
62	5310	11.92	15.560	23.98 or 11+10log(B) = 26.54	PASS
102	5510	11.90	15.488	23.98 or 11+10log(B) = 26.53	PASS
110	5550	**13.85**	**24.266**	23.98 or 11+10log(B) = 26.53	PASS
134	5670	**13.67**	**23.281**	23.98 or 11+10log(B) = 26.53	PASS
142	5710 (band 3)	13.36	**21.677**	23.98 or 11+10log(B) = 26.01	PASS
142	5710 (band 4)	0.53	1.130	23.98 or 11+10log(B) = 17.14	PASS
151	5755	**13.86**	**24.322**	30	PASS
159	5795	13.83	24.155	30	PASS

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802.11n_HT40_MIMO

CH	Frequency (MHz)	AVERAGE POWER		TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)			RESULT
		CH 0	CH 1						
54	5270	13.3	13.7	16.95	49.545	23.98	or 11+10log(B) =	26.52	PASS
62	5310	11.6	11.4	14.98	31.477	23.98	or 11+10log(B) =	26.53	PASS
102	5510	11.6	11.4	14.93	31.117	23.98	or 11+10log(B) =	26.53	PASS
110	5550	14.1	12.8	**16.94**	**49.431**	23.98	or 11+10log(B) =	26.53	PASS
134	5670	14.1	12.7	**16.94**	**49.431**	23.98	or 11+10log(B) =	26.53	PASS
142	5710 (band 3)	13.1	12.7	**16.38**	**43.451**	23.98	or 11+10log(B) =	26.01	PASS
142	5710 (band 4)	0.53	0.53	4.01	2.518	23.98	or 11+10log(B) =	17.14	PASS
151	5755	14.1	12.9	**16.99**	**50.003**	30			PASS
159	5795	14.1	12.9	16.98	49.888	30			PASS

802.11ac_VHT20_CH0

CH	Frequency (MHz)	TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)			RESULT
52	5260	**13.84**	**24.210**	23.98	or 11+10log(B) =	23.41	PASS
60	5300	13.77	23.823	23.98	or 11+10log(B) =	23.41	PASS
64	5320	13.80	23.988	23.98	or 11+10log(B) =	23.41	PASS
100	5500	**13.83**	**24.155**	23.98	or 11+10log(B) =	23.41	PASS
116	5580	13.78	23.878	23.98	or 11+10log(B) =	23.41	PASS
140	5700	**12.86**	**19.320**	23.98	or 11+10log(B) =	22.26	PASS
144	5720 (band 3)	12.80	**19.055**	23.98	or 11+10log(B) =	17.10	PASS
144	5720 (band 4)	1.15	1.303	23.98	or 11+10log(B) =	11.00	PASS
149	5745	13.77	23.823	30			PASS
157	5785	13.74	23.659	30			PASS
165	5825	**13.82**	**24.099**	30			PASS

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802.11ac_VHT20_CH1

CH	Frequency (MHz)	TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
52	5260	**13.74**	**23.659**	23.98 or 11+10log(B) = 23.41	PASS
60	5300	13.66	23.227	23.98 or 11+10log(B) = 23.41	PASS
64	5320	**13.74**	**23.659**	23.98 or 11+10log(B) = 23.41	PASS
100	5500	**13.71**	**23.496**	23.98 or 11+10log(B) = 23.42	PASS
116	5580	13.70	23.442	23.98 or 11+10log(B) = 23.41	PASS
140	5700	**12.82**	**19.143**	23.98 or 11+10log(B) = 23.41	PASS
144	5720 (band 3)	12.71	**18.664**	23.98 or 11+10log(B) = 22.25	PASS
144	5720 (band 4)	1.15	1.303	23.98 or 11+10log(B) = 17.09	PASS
149	5745	13.67	23.281	30	PASS
157	5785	13.62	23.014	30	PASS
165	5825	**13.73**	**23.605**	30	PASS

802.11ac_VHT20_MIMO

CH	Frequency (MHz)	AVERAGE POWER		TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
		CH 0	CH 1				
52	5260	13.4	13.5	16.69	46.666	23.98 or 11+10log(B) = 23.41	PASS
60	5300	13.5	13.6	**16.81**	**47.973**	23.98 or 11+10log(B) = 23.41	PASS
64	5320	13.5	13.6	16.79	47.753	23.98 or 11+10log(B) = 23.41	PASS
100	5500	13.4	13.5	16.70	46.774	23.98 or 11+10log(B) = 23.41	PASS
116	5580	13.8	13.3	**16.80**	**47.863**	23.98 or 11+10log(B) = 23.41	PASS
140	5700	12.6	12.6	**15.86**	**38.548**	23.98 or 11+10log(B) = 23.41	PASS
144	5720 (band 3)	12.5	12.2	**15.57**	**36.058**	23.98 or 11+10log(B) = 22.25	PASS
144	5720 (band 4)	1.15	1.15	4.40	2.754	23.98 or 11+10log(B) = 17.09	PASS
149	5745	13.7	13.4	**16.79**	**47.753**	30	PASS
157	5785	13.7	13.2	16.70	46.774	30	PASS
165	5825	13.6	13.3	16.72	46.989	30	PASS

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802.11ac_VHT40_CH0

CH	Frequency (MHz)	TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
54	5270	**13.86**	**24.322**	23.98 or 11+10log(B) = 26.52	PASS
62	5310	11.91	15.524	23.98 or 11+10log(B) = 26.53	PASS
102	5510	11.89	15.453	23.98 or 11+10log(B) = 26.54	PASS
110	5550	**13.83**	**24.155**	23.98 or 11+10log(B) = 26.53	PASS
134	5670	**13.67**	**23.281**	23.98 or 11+10log(B) = 26.53	PASS
142	5710 (band 3)	**13.44**	**22.080**	23.98 or 11+10log(B) = 26.03	PASS
142	5710 (band 4)	0.53	1.130	23.98 or 11+10log(B) = 17.15	PASS
151	5755	**13.84**	**24.210**	30	PASS
159	5795	13.79	23.933	30	PASS

802.11ac_VHT40_CH1

CH	Frequency (MHz)	TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
54	5270	**13.76**	**23.768**	23.98 or 11+10log(B) = 26.53	PASS
62	5310	11.86	15.346	23.98 or 11+10log(B) = 26.54	PASS
102	5510	11.83	15.241	23.98 or 11+10log(B) = 26.53	PASS
110	5550	**13.72**	**23.550**	23.98 or 11+10log(B) = 26.53	PASS
134	5670	**13.66**	**23.227**	23.98 or 11+10log(B) = 26.53	PASS
142	5710 (band 3)	**13.35**	**21.627**	23.98 or 11+10log(B) = 26.01	PASS
142	5710 (band 4)	0.53	1.130	23.98 or 11+10log(B) = 17.14	PASS
151	5755	**13.72**	**23.550**	30	PASS
159	5795	13.67	23.281	30	PASS

802.11ac_VHT40_MIMO

CH	Frequency (MHz)	AVERAGE POWER		TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
		CH 0	CH 1				
54	5270	13.2	13.5	16.81	47.973	23.98 or 11+10log(B) = 26.52	PASS
62	5310	11.6	11.3	14.89	30.832	23.98 or 11+10log(B) = 26.53	PASS
102	5510	11.5	11.3	14.86	30.620	23.98 or 11+10log(B) = 26.53	PASS
110	5550	14	12.6	**16.80**	**47.863**	23.98 or 11+10log(B) = 26.53	PASS
134	5670	14	12.6	**16.82**	**48.084**	23.98 or 11+10log(B) = 26.53	PASS
142	5710 (band 3)	12.9	12.6	**16.25**	**42.170**	23.98 or 11+10log(B) = 26.01	PASS
142	5710 (band 4)	0.53	0.53	4.01	2.518	23.98 or 11+10log(B) = 17.14	PASS
151	5755	13.9	12.7	16.84	48.306	30	PASS
159	5795	14	12.7	**16.85**	**48.417**	30	PASS

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802.11ac_VHT80_CH0

CH	Frequency (MHz)	TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)			RESULT
58	5290	**11.48**	14.060	23.98	or 11+10log(B) =	29.75	PASS
106	5530	11.46	13.996	23.98	or 11+10log(B) =	29.75	PASS
138	5690 (band 3)	**13.39**	**21.827**	23.98	or 11+12log(B) =	29.52	PASS
138	5690 (band 4)	0.27	**1.064**	23.98	or 11+13log(B) =	17.52	PASS
155	5775	**13.96**	**24.889**	30			PASS

802.11ac_VHT80_CH1

CH	Frequency (MHz)	TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)			RESULT
58	5290	**11.42**	13.868	23.98	or 11+10log(B) =	29.75	PASS
106	5530	11.41	13.836	23.98	or 11+10log(B) =	29.76	PASS
138	5690 (band 3)	**13.34**	**21.577**	23.98	or 11+12log(B) =	29.52	PASS
138	5690 (band 4)	0.27	**1.064**	23.98	or 11+13log(B) =	17.52	PASS
155	5775	**13.90**	**24.547**	30			PASS

802.11ac_VHT80_MIMO

CH	Frequency (MHz)	AVERAGE POWER		TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)			RESULT
		CH 0	CH 1						
58	5290	10.7	10.4	**14.43**	27.733	23.98	or 11+10log(B) =	29.75	PASS
106	5530	10.6	10.4	14.39	27.479	23.98	or 11+10log(B) =	29.75	PASS
138	5690 (band 3)	13.4	12.2	**16.71**	**46.881**	23.98	or 11+12log(B) =	29.52	PASS
138	5690 (band 4)	0.27	0.27	**4.15**	**2.600**	23.98	or 11+13log(B) =	17.52	PASS
155	5775	13.6	12.5	**16.97**	**49.774**	30			PASS

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EIRP

802.11a_2TX

CH	Frequency (MHz)	TOTAL POWER (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP (mW)	REQUIRED LIMIT (dBm)			RESULT
36	5180	17.39	3.568	20.96	124.673	23.01	or 10+10log(B)=	22.12	PASS
44	5220	17.07	3.568	20.64	115.817	23.01	or 10+10log(B)=	22.11	PASS
48	5240	17.05	3.568	20.62	115.285	23.01	or 10+10log(B)=	22.11	PASS
52	5260	17.20	3.568	20.77	119.337	30	or 17+10log(B)=	29.11	PASS
60	5300	17.43	3.568	21.00	125.827	30	or 17+10log(B)=	29.12	PASS
64	5320	17.31	3.568	20.88	122.398	30	or 17+10log(B)=	29.12	PASS
100	5500	17.04	4.416	21.46	139.815	30	or 17+10log(B)=	29.12	PASS
116	5580	17.37	4.416	21.79	150.853	30	or 17+10log(B)=	29.12	PASS
140	5700	17.24	4.416	21.66	146.404	30	or 17+10log(B)=	29.13	PASS

802.11n_HT20_MIMO

CH	Frequency (MHz)	TOTAL POWER (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP (mW)	REQUIRED LIMIT (dBm)			RESULT
36	5180	**16.91**	3.568	**20.48**	**111.628**	23.01	or 10+10log(B)=	22.41	PASS
44	5220	16.89	3.568	20.46	111.115	23.01	or 10+10log(B)=	22.41	PASS
48	5240	16.87	3.568	20.44	110.605	23.01	or 10+10log(B)=	22.42	PASS
52	5260	16.86	3.568	20.43	110.350	30	or 17+10log(B)=	29.41	PASS
60	5300	**16.97**	3.568	**20.54**	**113.181**	30	or 17+10log(B)=	29.41	PASS
64	5320	16.96	3.568	20.53	112.921	30	or 17+10log(B)=	29.41	PASS
100	5500	16.87	4.416	21.29	134.448	30	or 17+10log(B)=	29.41	PASS
116	5580	**16.96**	4.416	**21.38**	**137.263**	30	or 17+10log(B)=	29.41	PASS
140	5700	**15.95**	4.416	**20.37**	**108.781**	30	or 17+10log(B)=	29.41	PASS

802.11n_HT40_MIMO

CH	Frequency (MHz)	TOTAL POWER (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP (mW)	REQUIRED LIMIT (dBm)			RESULT
38	5190	14.93	3.568	18.50	70.758	23.01	or 10+10log(B)=	25.52	PASS
46	5230	**16.98**	3.568	**20.55**	**113.442**	23.01	or 10+10log(B)=	25.53	PASS
54	5270	**16.95**	3.568	**20.52**	**112.661**	30	or 17+10log(B)=	32.52	PASS
62	5310	14.98	3.568	18.55	71.577	30	or 17+10log(B)=	32.53	PASS
102	5510	14.93	4.416	19.35	86.011	30	or 17+10log(B)=	32.53	PASS
110	5550	**16.94**	4.416	**21.36**	**136.632**	30	or 17+10log(B)=	32.53	PASS
134	5670	**16.94**	4.416	**21.36**	**136.632**	30	or 17+10log(B)=	32.53	PASS

802.11ac_VHT80_MIMO

CH	Frequency (MHz)	TOTAL POWER (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP (mW)	REQUIRED LIMIT (dBm)			RESULT
42	5210	**14.43**	3.568	**18.00**	**63.063**	23.01	or 10+10log(B)=	28.75	PASS
58	5290	**14.43**	3.568	**18.00**	**63.063**	30	or 17+10log(B)=	35.75	PASS
106	5530	**14.39**	4.416	**18.81**	**75.954**	30	or 17+10log(B)=	35.75	PASS

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.
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9.6 Some channels have reduced power and were tested at the reduced power

802.11	Channel list for power reduction	Power value (dBm)
n_HT20	Channel 140	13
n_HT40	Channel 38	12
	Channel 62	12
	Channel 102	12
ac_VHT20	Channel 140	13
ac_VHT40	Channel 38	12
	Channel 62	12
	Channel 102	12
ac_VHT80	Channel 42	11.5
	Channel 58	11.5
	Channel 106	11.5

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