Shenzhen Huaxia Testing Technology Co., Ltd

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Report Template Version: V03
Report Template Revision Date: Mar.1st, 2017

Test Report

Report No. :	CQASZ20190500014EX-04
Applicant:	Speedata Group Ltd
Address of Applicant:	Room 2-308, building No. 25, No. 9 Anningzhuang Road West, Haidian district, Beijing, China
Manufacturer:	Speedata Group Ltd
Address of Manufacturer:	Room 2-308, building No. 25, No. 9 Anningzhuang Road West, Haidian district, Beijing, China
Equipment Under Test (EUT):	
Product:	PDA
All Model No.:	SD60, SD35, T35, PG35, SD55, T55, SD55LG, SD55MD, SD55UHF, SD55PTT, T55UHF, T55PPT, PG55, T60, SD60LG, SD60RT, SD60PRT, T60RT, Bio60, SD50, SN50, SD50RT, T50, PG50
Test Model No.:	SD60
Brand Name:	N/A
FCC ID:	2AJO5SD60
Standards:	47 CFR Part 15, Subpart E
Date of Test:	2019-03-26 to 2019-06-13
Date of Issue:	2019-06-13
Test Result :	**PASS**

Tested By: Daisy Qin

(Daisy Qin)

Reviewed By: Aaron Ma

(Aaron Ma)

Approved By:

(Jack Ai)

SHENZHEN HUAXIA TESTING TECHNOLOGY CO., LTD 华夏准测 APPROVED

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

1 Version

Revision History Of Report

Report No.	Version	Description	Issue Date
CQASZ20190500014EX-04	Rev.01	Initial report	2019-06-13

2 Test Summary

Test Item	Test Requirement	Test method	Result
Antenna Requirement	FCC 47 CFR Part 15 Subpart C Section 15.203 FCC 47 CFR Part 15 Subpart C Section 15.407(a)(1) (2)	ANSI C63.10-2013	PASS
AC Power Line Conducted Emission	FCC 47 CFR Part 15 Subpart E Section 15.407 (b)(6) FCC 47 CFR Part 15 Subpart C Section 15.207	ANSI C63.10-2013	PASS
26 dB emission bandwidth	FCC 47 CFR Part 15 Subpart E Section 15.407 (a)(2)(5)	KDB 789033 D02 v01r04 Section C.1	PASS
6 dB bandwidth	FCC 47 CFR Part 15 Subpart E Section 15.407 (e)	KDB 789033 D02 v01r04 Section C.2	PASS
Maximum conducted output power	FCC 47 CFR Part 15 Subpart E Section 15.407 (a)(1)(2)(3)	KDB 789033 D02 v01r04 Section E.3.a(Method PM)	PASS
Peak Power Spectral Density	FCC 47 CFR Part 15 Subpart E Section 15.407 (a)(1)(2)(3)	KDB 789033 D02 v01r04 Section F	PASS
Frequency stability	FCC 47 CFR Part 15 Subpart E Section 15.407 (g)	ANSI C63.10-2013	PASS
Radiated Emissions and Band Edge Measurement	FCC 47 CFR Part 15 Subpart E Section 15.407 (b)(1)(2)(3)(4)(6) FCC 47 CFR Part 15 Subpart C Section 15.209/205	ANSI C63.10-2013	PASS
Dynamic Frequency Selection	FCC 47 CFR Part 15 Subpart E Section 15.407 (h)	KDB 905462 D03 Client Without DFS New Rules v01r02	N/A

Note: N/A: In this whole report not application.

3 Contents

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4 General Information

4.1 Client Information

Applicant:	Speedata Group Ltd
Address of Applicant:	Room 2-308, building No. 25, No. 9 Anningzhuang Road West, Haidian district, Beijing, China
Manufacturer:	Speedata Group Ltd
Address of Manufacturer:	Room 2-308, building No. 25, No. 9 Anningzhuang Road West, Haidian district, Beijing, China

4.2 General Description of EUT

Product Name:	PDA
All Model No.:	SD60, SD35, T35, PG35, SD55, T55, SD55LG, SD55MD, SD55UHF, SD55PTT, T55UHF, T55PPT, PG55, T60, SD60LG, SD60RT, SD60PRT, T60RT, Bio60, SD50, SN50, SD50RT, T50, PG50
Model No.:	SD60
Test Model No.:	SD60
Trade Mark:	N/A
Hardware version:	8.1.0
Software version:	V.SD60.2.1.20.2019041909
Operation Frequency:	5180 ~ 5240 MHz, 5745 ~ 5825 MHz
Type of Modulation:	IEEE 802.11a: OFDM IEEE 802.11n: OFDM IEEE 802.11ac: OFDM
Channel Spacing:	IEEE 802.11a/n-HT20/ac-VHT20: 20 MHz IEEE 802.11n-HT40/ac-VHT40: 40 MHz
Product Type:	☐ Mobile ☒ Portable ☐ Fix Location
Antenna Type:	IFIA Antenna
Antenna Gain:	-3.5dBi
Power Supply:	DC 3.8V from Battery
Adapter Information:	Model: A138A-120150U-US2 Input: 100-240V-50/60Hz, 0.5A Output: 5V 2.5A/ 9V 2A/ 12V 1.5A

Note: 1. This report is only for 5GHz WiFi.

2. For more detailed features description, please refer to the manufacturer's specifications or the User's Manual.

3. There are many products,Only the model SD60 was tested, since the electrical circuit design, layout, components used and internal wiring were identical for the above models, with difference being color of appearance and model name.

Operation Frequency Each of Channel							
Channel	**Frequency**	**Channel**	**Frequency**	**Channel**	**Frequency**	**Channel**	**Frequency**
For IEEE 802.11a/n-HT20/ac-VHT20 operation in the 5150 MHz to 5250 MHz band							
36	5180 MHz	40	5200 MHz	44	5220 MHz	48	5240 MHz
For IEEE 802.11a/n-HT20/ac-VHT20 operation in the 5725 MHz to 5850 MHz band							
149	5745 MHz	153	5765 MHz	157	5785 MHz	161	5805 MHz
165	5825 MHz	--	--	--	--	--	--
For IEEE 802.11n-HT40/ac-VHT40 operation in the 5150 MHz to 5250 MHz band							
38	5190 MHz	46	5230 MHz	--	--	--	--
For IEEE 802.11n-HT40/ac-VHT40 operation in the 5725 MHz to 5850 MHz band							
151	5755 MHz	159	5795 MHz	--	--	--	--

Note:

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

Mode	**Tx/Rx Frequency**	**Test RF Channel Lists**		
		Lowest(L)	**Middle(M)**	**Highest(H)**
IEEE 802.11a IEEE 802.11n-HT20 IEEE 802.11ac-VHT20	5150 MHz to 5250 MHz	Channel 36	Channel 40	Channel 48
		5180 MHz	5200 MHz	5240 MHz
	5725 MHz to 5850 MHz	Channel 149	Channel 157	Channel 165
		5745 MHz	5785 MHz	5825 MHz
IEEE 802.11n-HT40 IEEE 802.11ac-VHT40	5150 MHz to 5250 MHz	Channel 38	--	Channel 46
		5190 MHz	--	5230 MHz
	5725 MHz to 5850 MHz	Channel 151	--	Channel 159
		5755 MHz	--	5795 MHz

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

4.3 Test Environment and Mode

Operating Environment:		
Humidity:	52 % RH	
Atmospheric Pressure:	1001 mbar	
Test Condition	Temperature (°C)	Voltage (V)
TN/VN	+15 to +35	DC3.8V
TL/VL	-20	DC3.5V
TH/VL	50	DC4.2V
TL/VH	-20	DC3.5V
TH/VH	50	DC4.2V

Remark:

1)The EUT just work in such extreme temperature of -20 °C to 50 °C and the extreme voltage of DC3.5 V to 4.2V, so here the EUT is tested in the temperature of -20 °C to 50 °C and the voltage of DC3.5 V to 4.2V.

2VN: Normal Voltage; TN: Normal Temperature;

TL: Low Extreme Test Temperature; TH: High Extreme Test Temperature;

VL: Low Extreme Test Voltage; VH: High Extreme Test Voltage.

Transmitting mode:
Use test software to set the lowest frequency, the middle frequency and the highest frequency keep transmitting of the EUT. Note: In the process of transmitting of EUT, the duty cycle ＞98%.

4.4 Description of Support Units

The EUT has been tested with associated equipment below.

Description	Manufacturer	Model No.	Remark	FCC certification
Adapter	AOHAI	A138A-120150U-US2	Provide by Client	SDOC

4.5 Test Location

All tests were performed at:

Shenzhen Huaxia Testing Technology Co., Ltd.,

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

4.6 Test Facility

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

- **CNAS (No. CNAS L5785)**

CNAS has accredited Shenzhen Huaxia Testing Technology Co., Ltd. Shenzhen Branch EMC Lab to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration Laboratories (CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing.

- **A2LA (Certificate No. 4742.01)**

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

- **FCC Registration No.: 522263**

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

4.7 Statement of the measurement uncertainty

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

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

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

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

Hereafter the best measurement capability for CQA laboratory is reported:

Test	Range	Uncertainty	Notes
Radiated Emission	Below 1GHz	±5.12dB	(1)
Radiated Emission	Above 1GHz	±4.60dB	(1)
Conducted Disturbance	0.15~30MHz	±3.34dB	(1)

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

4.8 Deviation from Standards

None.

4.9 Abnormalities from Standard Conditions

None.

4.10 Other Information Requested by the Customer

None.

4.11 Equipment List

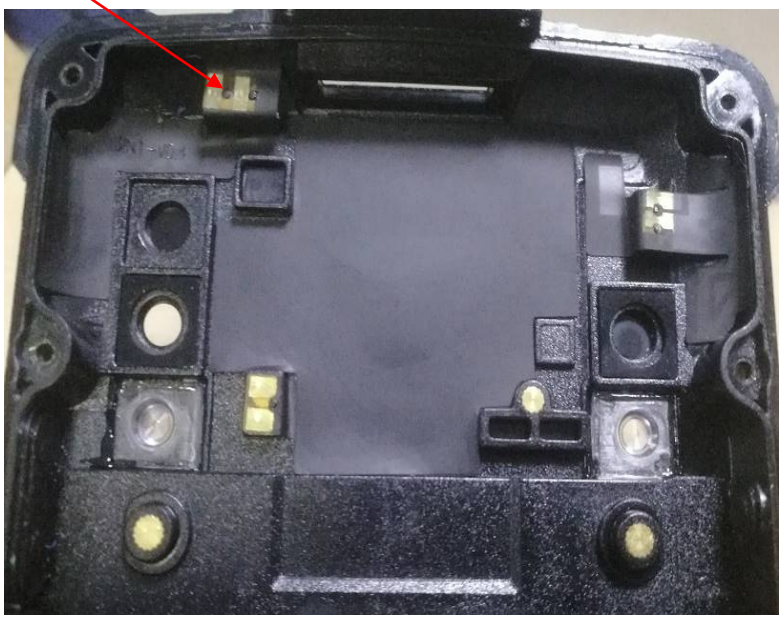
Test Equipment	Manufacturer	Model No.	Instrument No.	Calibration Date	Calibration Due Date
EMI Test Receiver	R&S	ESR7	CQA-005	2018/9/26	2019/9/25
Spectrum analyzer	R&S	FSU26	CQA-038	2018/10/28	2019/10/27
Preamplifier	MITEQ	AFS4-00010300-18-10P-4	CQA-035	2018/9/26	2019/9/25
Preamplifier	MITEQ	AMF-6D-02001800-29-20P	CQA-036	2018/11/2	2019/11/1
Loop antenna	Schwarzbeck	FMZB1516	CQA-087	2018/9/26	2020/9/25
Bilog Antenna	R&S	HL562	CQA-011	2018/9/26	2020/9/25
Horn Antenna	R&S	HF906	CQA-012	2018/9/26	2020/9/25
Horn Antenna	Schwarzbeck	BBHA 9170	CQA-088	2018/9/26	2020/9/25
Horn Antenna	A.H.Systems, Inc.	SAS-573	CQA-104	2018/10/20	2020/10/19
Coaxial Cable (Above 1GHz)	CQA	N/A	C019	2018/9/26	2019/9/25
Coaxial Cable (Below 1GHz)	CQA	N/A	C020	2018/9/26	2019/9/25
Spectrum analyzer	Agilent	E4440A	CQA-103	2018/10/28	2019/10/27
Antenna Connector	CQA	RFC-01	CQA-080	2018/9/26	2019/9/25
RF cable(9KHz~40GHz)	CQA	RF-01	CQA-079	2018/9/26	2019/9/25
Power Sensor	KEYSIGHT	U2021XA	CQA-30	2018/9/26	2019/9/25
N1918A Power Analysis Manager Power Panel	Agilent	N1918A	CQA-074	2018/9/26	2019/9/25
Power divider	MIDWEST	PWD-2533-02-SMA-79	CQA-067	2018/9/26	2019/9/25
EMI Test Receiver	R&S	ESPI3	CQA-013	2018/9/26	2019/9/25
LISN	R&S	ENV216	CQA-003	2018/11/5	2019/11/4
Coaxial cable (9KHz~300MHz)	CQA	N/A	CQA-C009	2018/9/26	2019/9/25
high-low temperature chamber	Auchno	OJN-9606	CQA-CB2	2018/9/26	2019/9/25
DC power	KEYSIGHT	E3631A	CQA-028	2018/9/26	2019/9/25

Note:

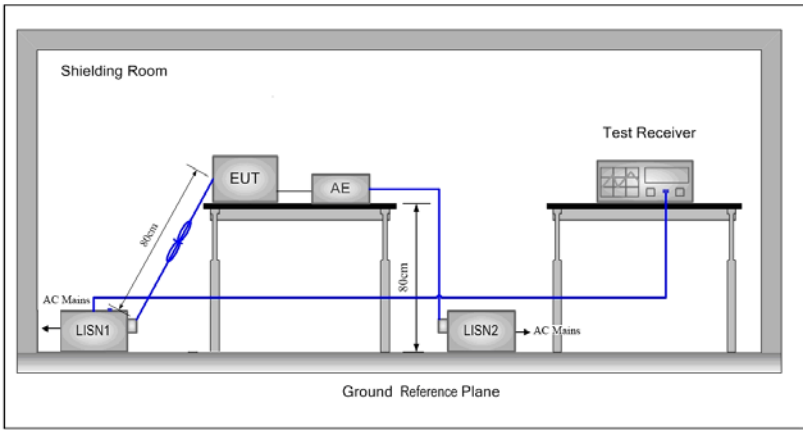
The temporary antenna connector is soldered on the PCB board in order to perform conducted tests and this temporary antenna connector is listed in the equipment list.

5 Test results and Measurement Data

5.1 Antenna Requirement

Standard requirement:	47 CFR Part 15C Section 15.203 /407
15.203 requirement: An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. 15.407(a)(1) (2) requirement: The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.	
EUT Antenna:	Antenna 
The antenna is IFIA Antenna. The best case gain of the antenna is -3.5dBi.	

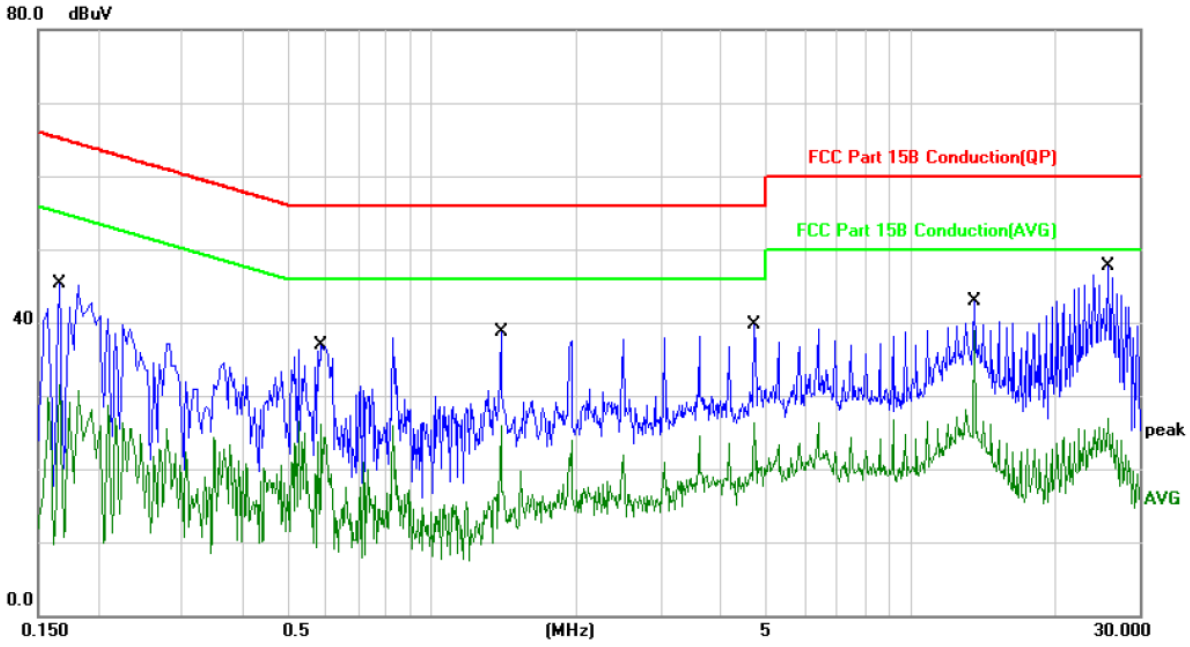
5.2 Conducted Emissions

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

Final Test Mode:	Through Pre-scan, find the 802.11n(40MHz) at lowest channel(5190MHz) is the worst case. Only the worst case is recorded in the report.
Test Voltage:	AC120V/60Hz
Test Results:	Pass

Measurement Data

Live Line:



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1660	45.46	-0.13	45.33	65.15	-19.82	QP	
2		0.1660	31.58	-0.13	31.45	55.15	-23.70	AVG	
3		0.5860	37.02	-0.04	36.98	56.00	-19.02	QP	
4		0.5860	26.23	-0.04	26.19	46.00	-19.81	AVG	
5		1.3900	38.95	-0.18	38.77	56.00	-17.23	QP	
6		1.3900	26.01	-0.18	25.83	46.00	-20.17	AVG	
7		4.7180	39.89	-0.21	39.68	56.00	-16.32	QP	
8		4.7180	26.48	-0.21	26.27	46.00	-19.73	AVG	
9		13.5580	43.09	-0.17	42.92	60.00	-17.08	QP	
10	*	13.5580	39.12	-0.17	38.95	50.00	-11.05	AVG	
11		25.8140	48.16	-0.45	47.71	60.00	-12.29	QP	
12		25.8140	27.45	-0.45	27.00	50.00	-23.00	AVG	

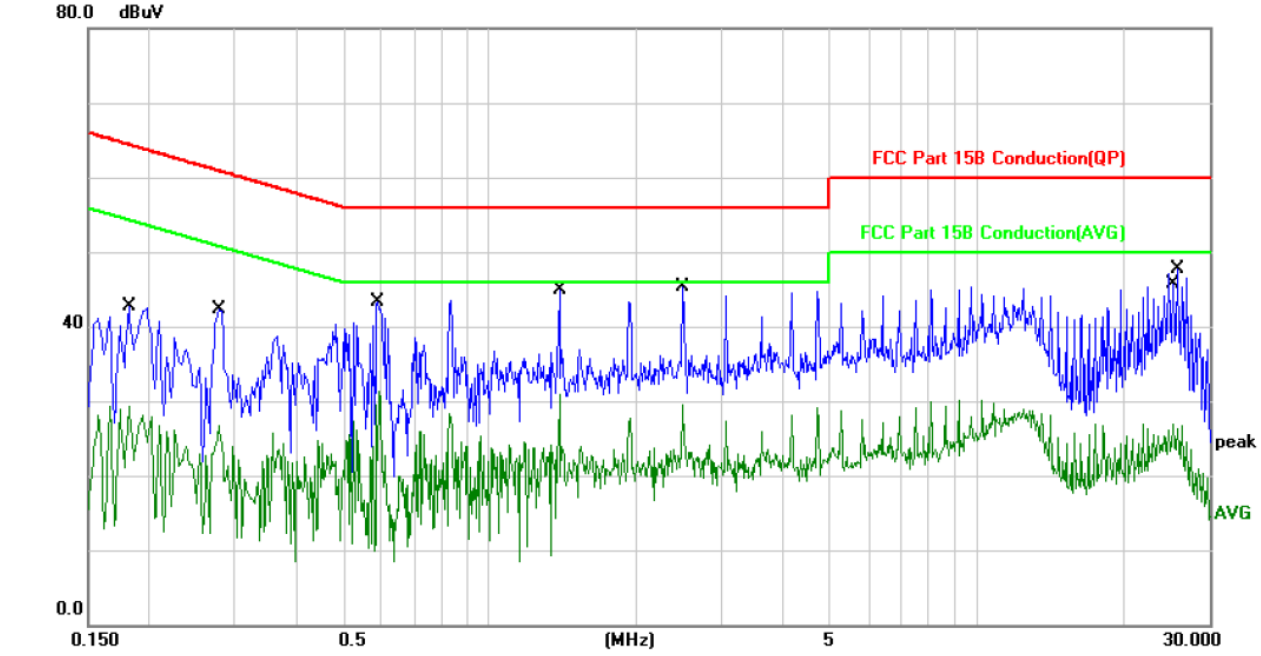
Remark:

1. The following Quasi-Peak and Average measurements were performed on the EUT:

2. Final Test Level =Receiver Reading + LISN Factor + Cable Loss.

3. If the Peak value under Average limit, the Average value is not recorded in the report.

Neutral Line:

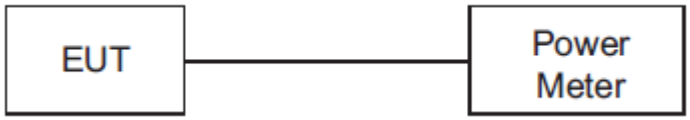


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1819	42.80	-0.13	42.67	64.39	-21.72	QP	
2		0.1819	29.45	-0.13	29.32	54.39	-25.07	AVG	
3		0.2779	42.31	-0.02	42.29	60.88	-18.59	QP	
4		0.2779	26.68	-0.02	26.66	50.88	-24.22	AVG	
5		0.5899	43.26	-0.04	43.22	56.00	-12.78	QP	
6		0.5940	31.40	-0.04	31.36	46.00	-14.64	AVG	
7		1.3900	45.01	-0.18	44.83	56.00	-11.17	QP	
8		1.3900	31.10	-0.18	30.92	46.00	-15.08	AVG	
9	*	2.4980	45.45	-0.17	45.28	56.00	-10.72	QP	
10		2.4980	29.77	-0.17	29.60	46.00	-16.40	AVG	
11		25.2660	27.30	-0.44	26.86	50.00	-23.14	AVG	
12		25.7939	48.10	-0.45	47.65	60.00	-12.35	QP	

Remark:

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

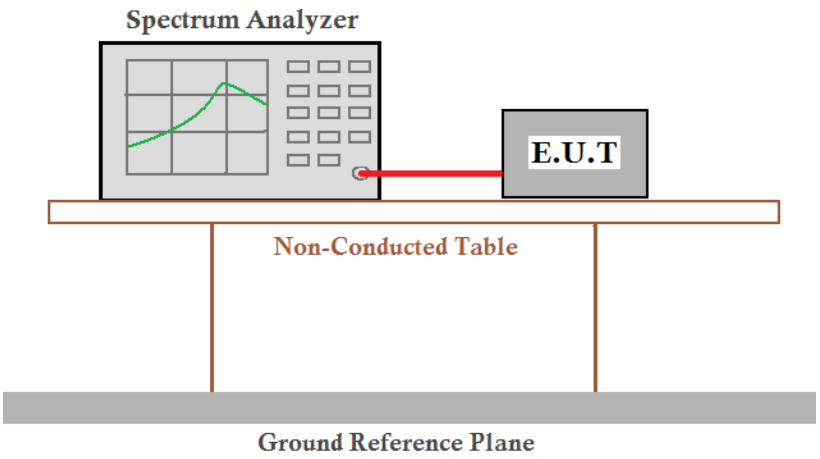
5.3 Conducted Average Output Power

Test Requirement:	47 CFR Part 15 Subpart E Section 15.407 (a)(1)(2)(3)	
Test Method:	KDB 789033 D02 v01r04 Section F	
Test Setup:		
Exploratory Test Mode:	Transmitting with all kind of modulations, data rates	
Final Test Mode:	Through Pre-scan, find the 6Mbps of rate is the worst case of 802.11a ; 6.5Mbps of rate is the worst case of 802.11n(HT20) ; 13.5Mbps of rate is the worst case of 802.11n(HT40); 6.5Mbps of rate is the worst case of 802.11ac(VHT20) ; 13.5Mbps of rate is the worst case of 802.11ac(VHT40); 29.3Mbps of rate is the worst case of 802.11ac(VHT80). Only the worst case is recorded in the report.	
Limit:	U-NII-1	24dBm
	U-NII-2A	24dBm
	U-NII-2C	24dBm
	U-NII-3	30dBm
Test Results:	Pass	

Measurement Data

Test Mode	Test Frequency [MHz]	Level [dBm]	Duty Cycle factor (dB)	Power [dBm]	Limit [dBm]	Verdict
11A	5180	20.72	0	20.72	24.00	PASS
11A	5200	20.75	0	20.75	24.00	PASS
11A	5240	19.45	0	19.45	24.00	PASS
11A	5745	15.51	0	15.51	30.00	PASS
11A	5785	15.02	0	15.02	30.00	PASS
11A	5825	15.00	0	15.00	30.00	PASS
11N20	5180	18.79	0	18.79	24.00	PASS
11N20	5200	20.87	0	20.87	24.00	PASS
11N20	5240	19.42	0	19.42	24.00	PASS
11N20	5745	17.08	0	17.08	30.00	PASS
11N20	5785	15.11	0	15.11	30.00	PASS
11N20	5825	14.45	0	14.45	30.00	PASS
11N40	5190	21.49	0	21.49	24.00	PASS
11N40	5230	19.96	0	19.96	24.00	PASS
11N40	5755	16.11	0	16.11	30.00	PASS
11N40	5795	16.46	0	16.46	30.00	PASS
11AC20	5180	16.17	0	16.17	24.00	PASS
11AC20	5200	18.98	0	18.98	24.00	PASS
11AC20	5240	17.77	0	17.77	24.00	PASS
11AC20	5745	15.74	0	15.74	30.00	PASS
11AC20	5785	13.70	0	13.70	30.00	PASS
11AC20	5825	12.81	0	12.81	30.00	PASS
11AC40	5190	19.65	0	19.65	24.00	PASS
11AC40	5230	18.18	0	18.18	24.00	PASS
11AC40	5755	16.09	0	16.09	30.00	PASS
11AC40	5795	14.63	0	14.63	30.00	PASS

5.4 26dB Bandwidth

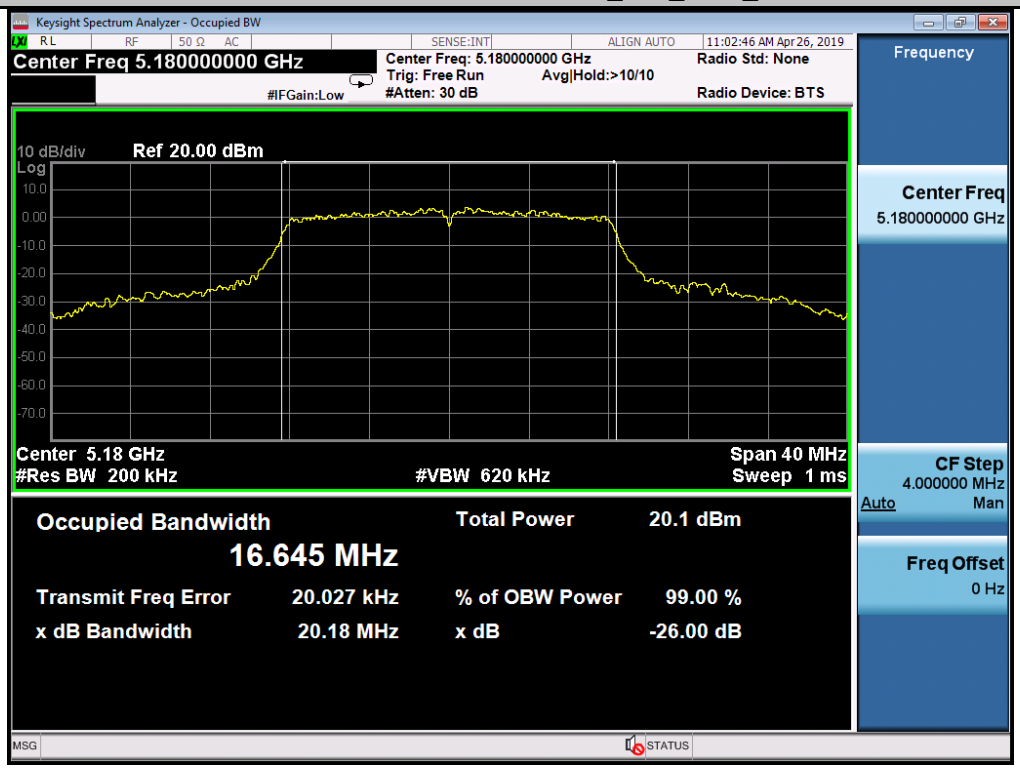
Test Requirement:	FCC 47 CFR Part 15 Subpart E Section 15.407 (a) (2)(5)
Test Method:	KDB 789033 D02 v01r04 Section C.1
Test Setup:	
Exploratory Test Mode:	Transmitting with all kind of modulations, data rates
Final Test Mode:	Through Pre-scan, find the 6Mbps of rate is the worst case of 802.11a ; 6.5Mbps of rate is the worst case of 802.11n(HT20) ; 13.5Mbps of rate is the worst case of 802.11n(HT40); 6.5Mbps of rate is the worst case of 802.11ac(VHT20) ; 13.5Mbps of rate is the worst case of 802.11ac(VHT40)
Limit:	None; for reporting purposes only.
Test Results:	Pass

Measurement Data

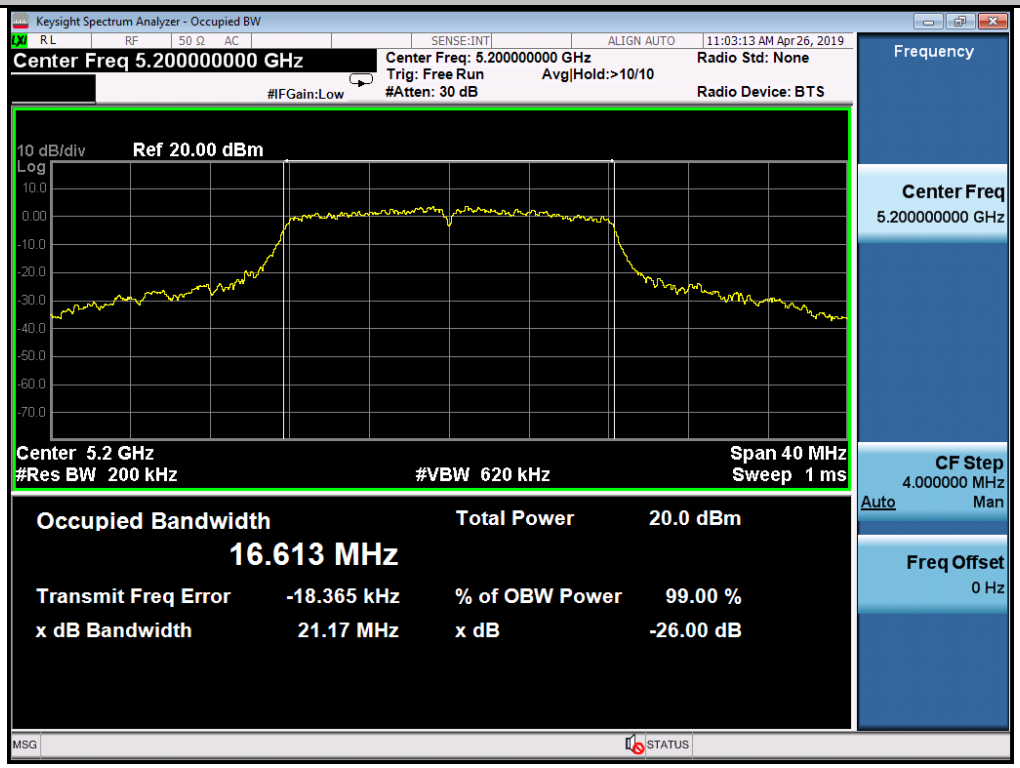
Test Mode	Test Frequency [MHz]	EBW[MHz]	Limit[MHz]	Verdict
11A	5180	20.18	---	PASS
11A	5200	21.17	---	PASS
11A	5240	23.10	---	PASS
11N20	5180	22.28	---	PASS
11N20	5200	24.30	---	PASS
11N20	5240	20.08	---	PASS
11N40	5190	44.36	---	PASS
11N40	5230	48.13	---	PASS
11AC20	5180	19.59	---	PASS
11AC20	5200	19.51	---	PASS
11AC20	5240	19.66	---	PASS
11AC40	5190	39.46	---	PASS
11AC40	5230	39.52	---	PASS

Test plot as follows:

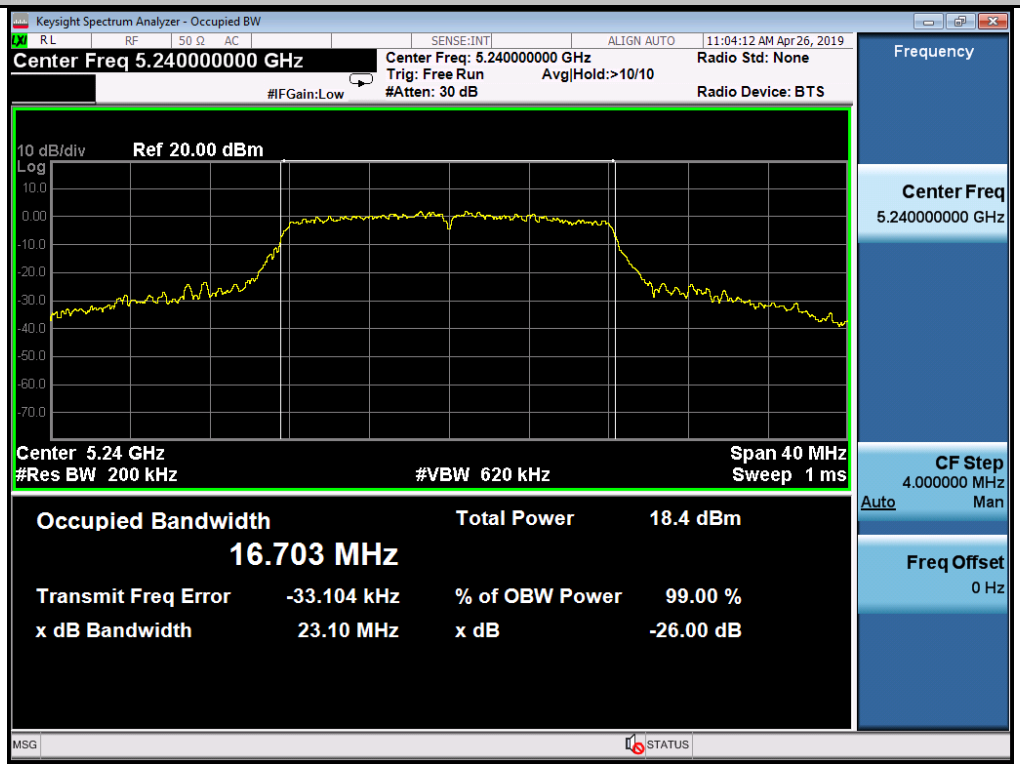
Emission Bandwidth Measurement_11A_5180_Ant1



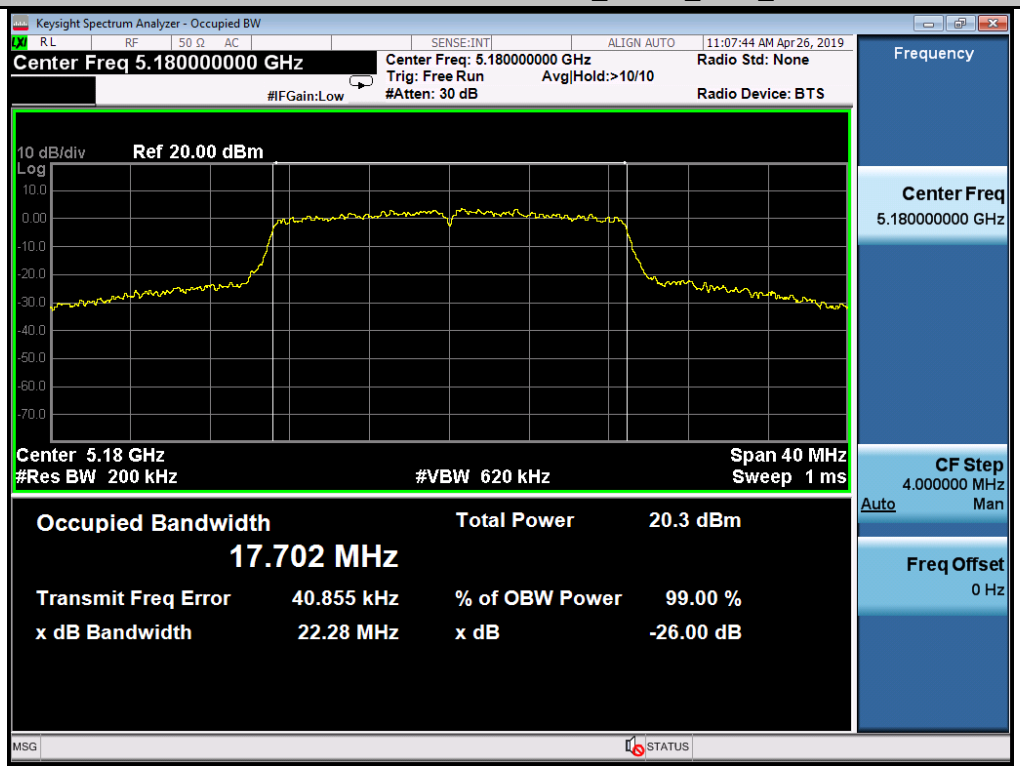
Emission Bandwidth Measurement_11A_5200_Ant1



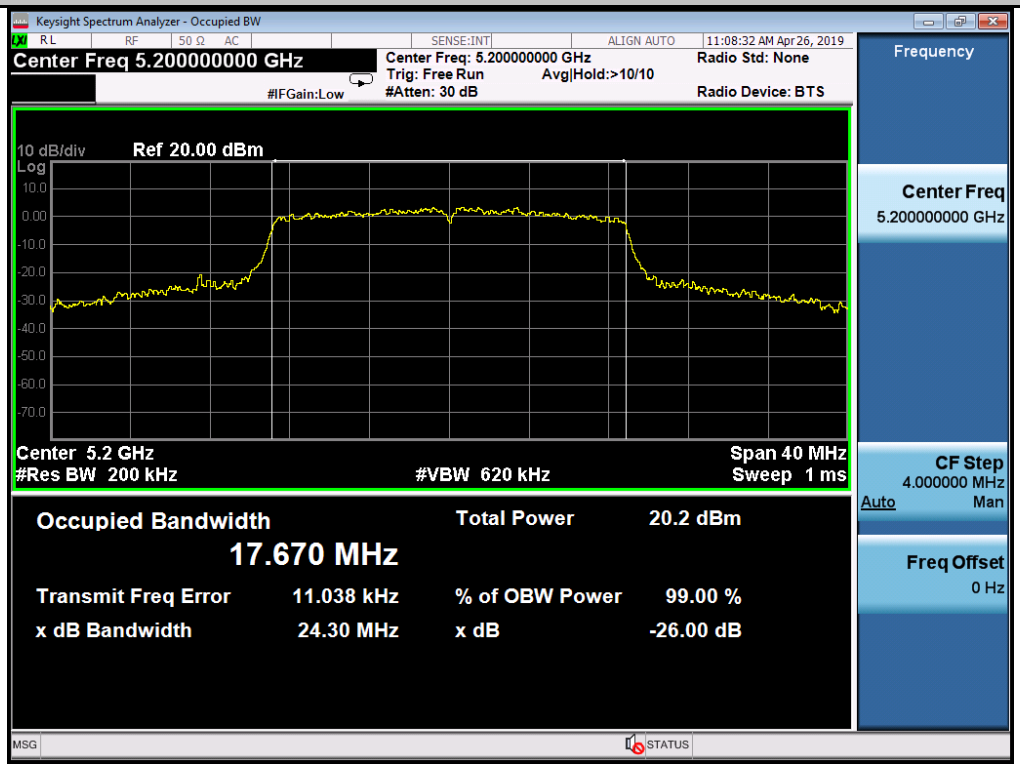
Emission Bandwidth Measurement_11A_5240_Ant1



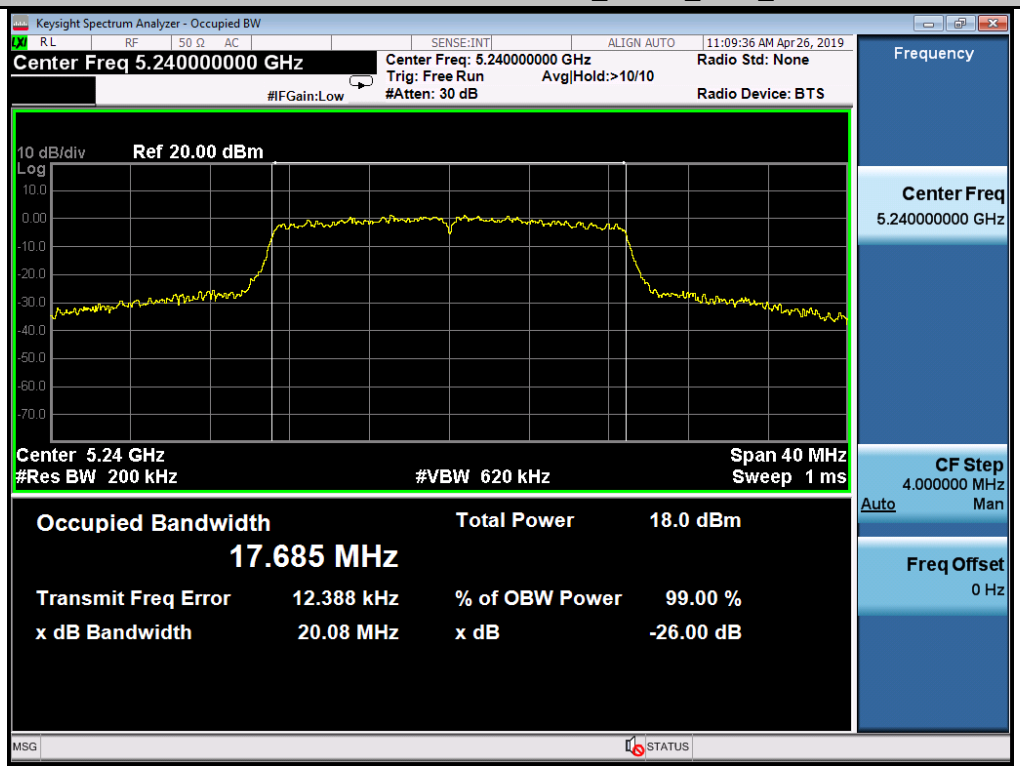
Emission Bandwidth Measurement_11N20_5180_Ant1



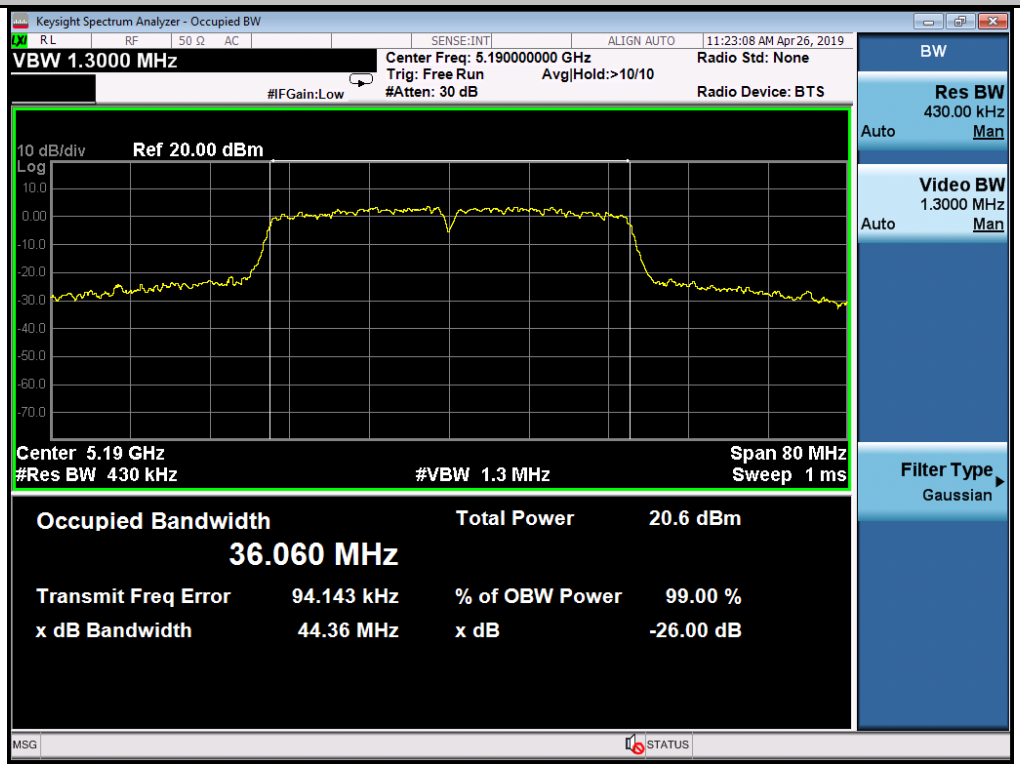
Emission Bandwidth Measurement_11N20_5200_Ant1



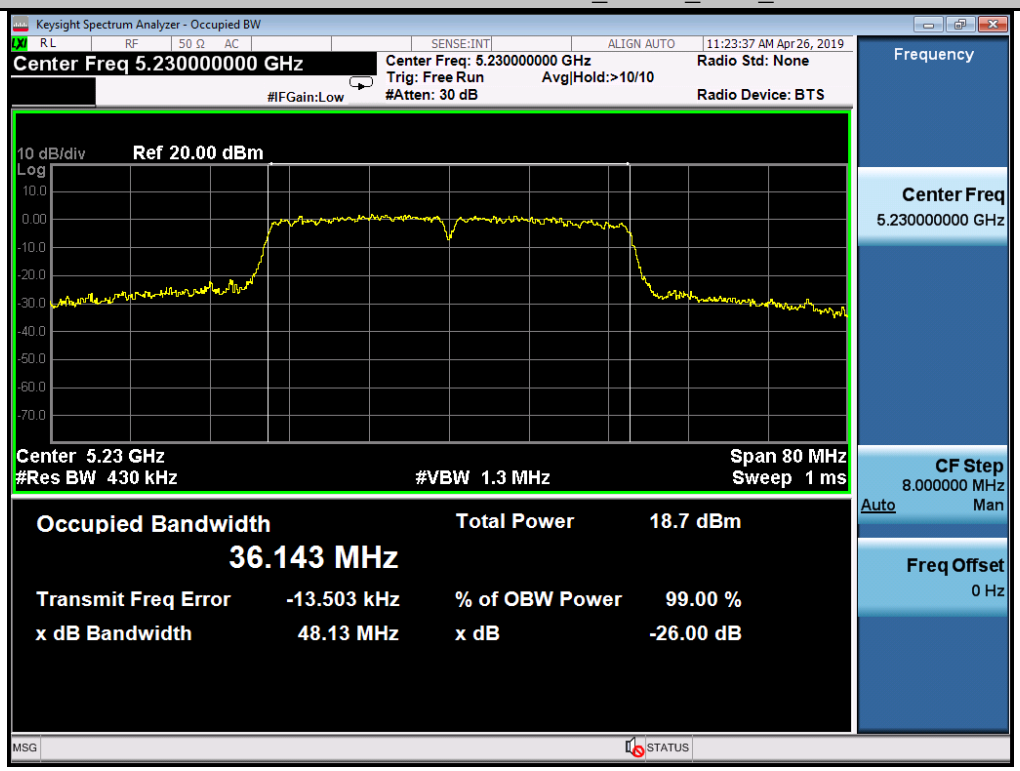
Emission Bandwidth Measurement_11N20_5240_Ant1



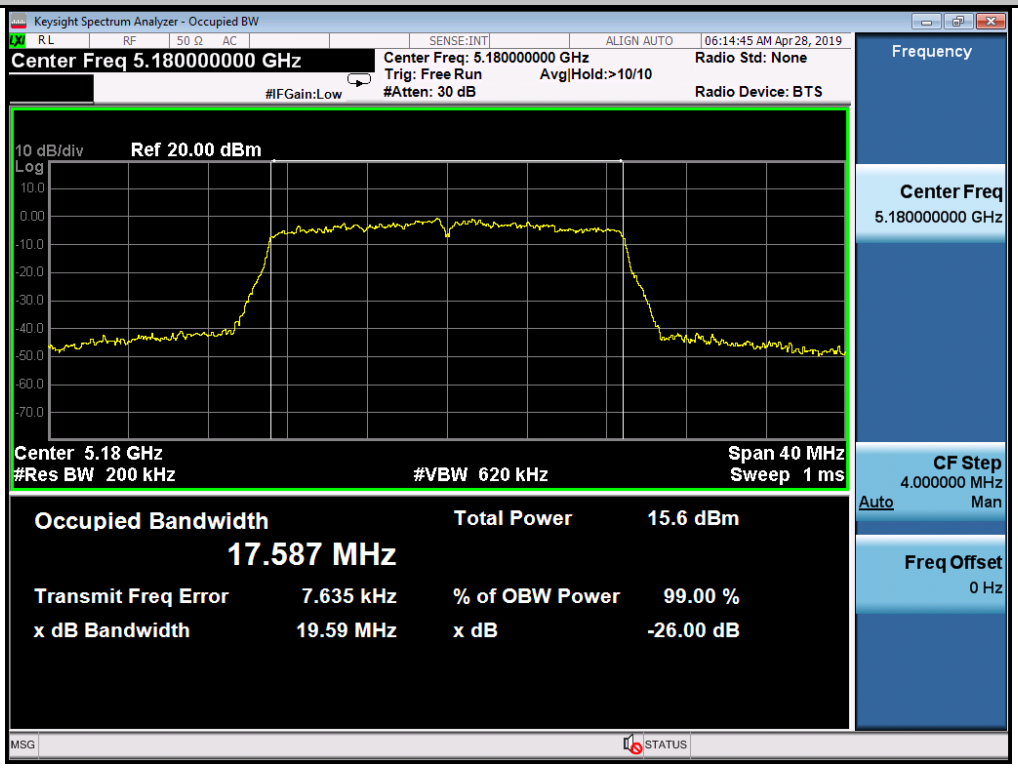
Emission Bandwidth Measurement_11N40_5190_Ant1



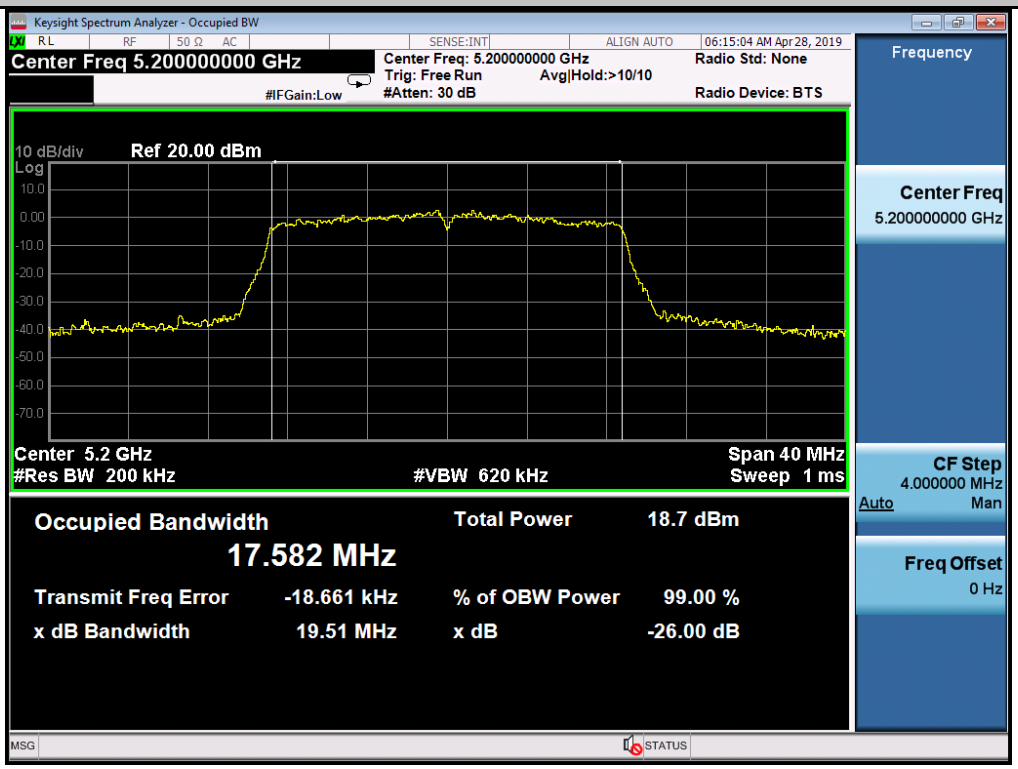
Emission Bandwidth Measurement_11N40_5230_Ant1



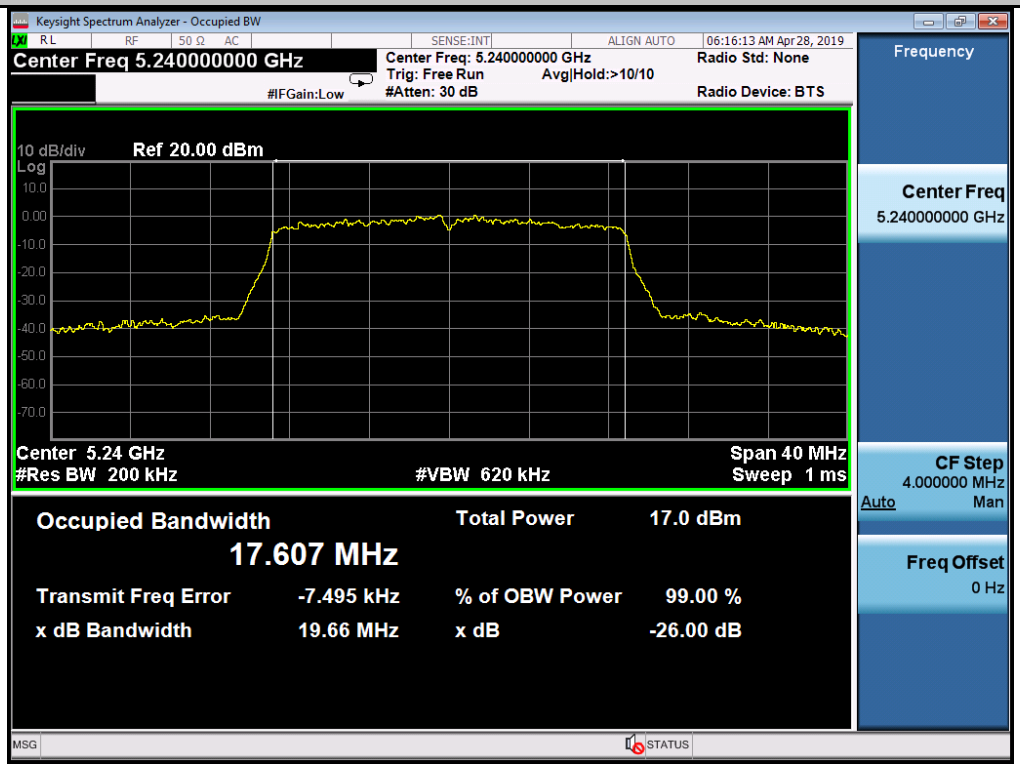
Emission Bandwidth Measurement_11AC20_5180_Ant1



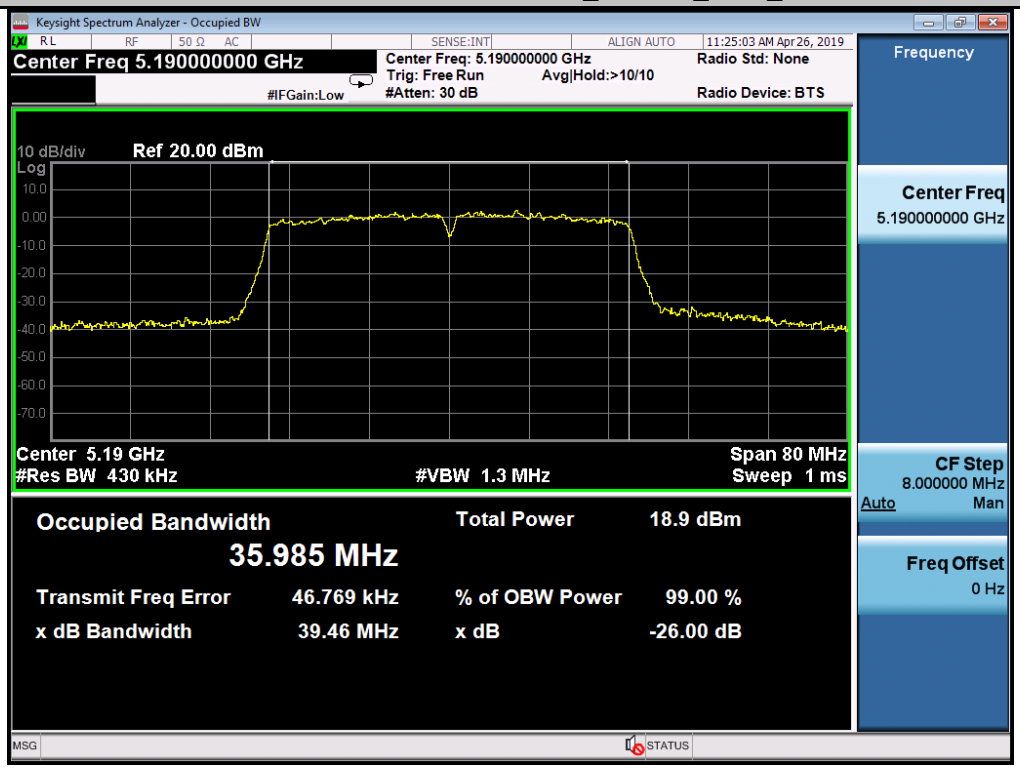
Emission Bandwidth Measurement_11AC20_5200_Ant1



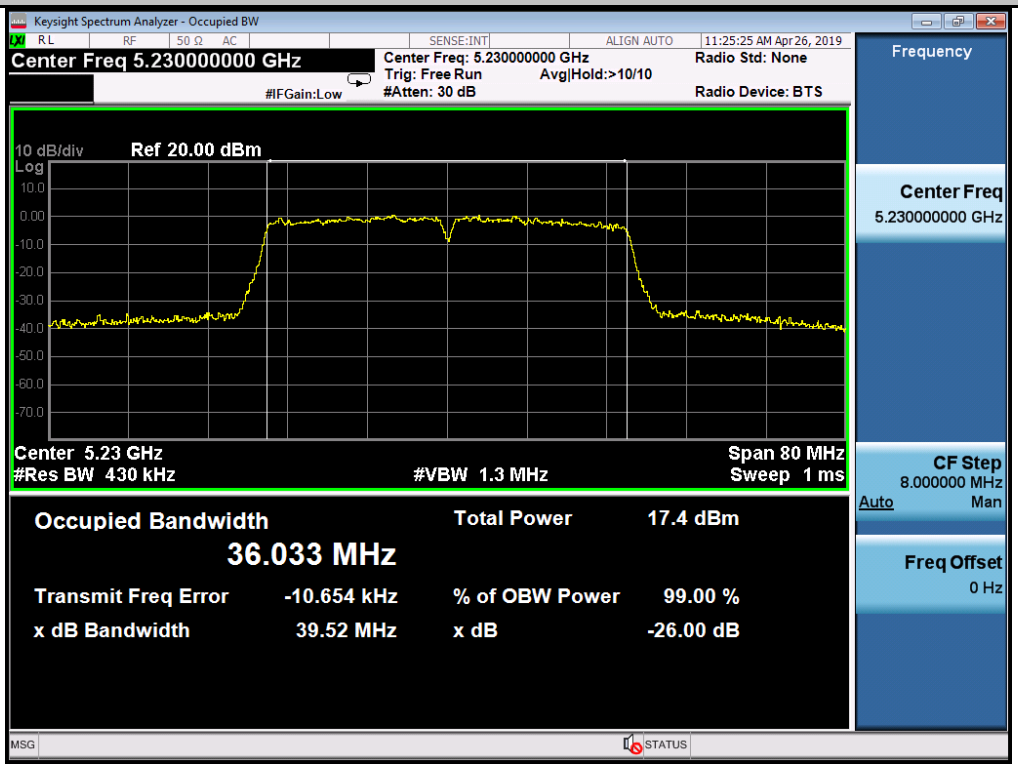
Emission Bandwidth Measurement_11AC20_5240_Ant1



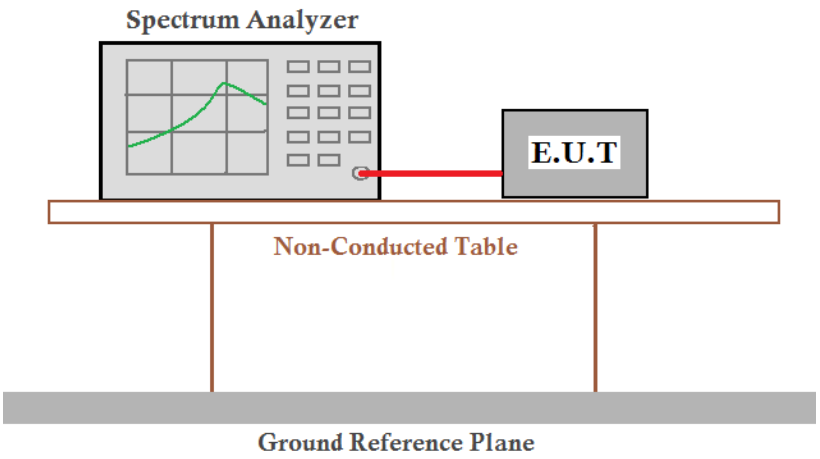
Emission Bandwidth Measurement_11AC40_5190_Ant1



Emission Bandwidth Measurement_11AC40_5230_Ant1



5.5 6dB Bandwidth

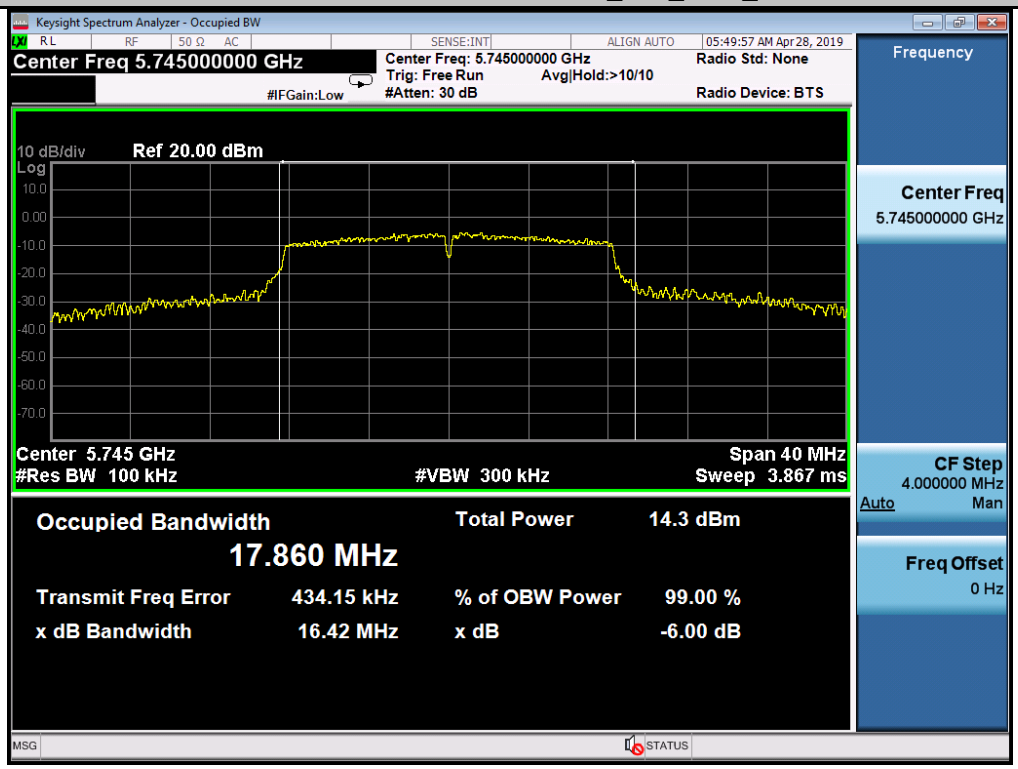
Test Requirement:	FCC 47 CFR Part 15 Subpart C Section 15.407 (e)
Test Method:	KDB 789033 D02 v01r04Section C.2
Test Setup:	
Exploratory Test Mode:	Transmitting with all kind of modulations, data rates
Final Test Mode:	Through Pre-scan, find the 6Mbps of rate is the worst case of 802.11a ; 6.5Mbps of rate is the worst case of 802.11n(HT20) ; 13.5Mbps of rate is the worst case of 802.11n(HT40); 6.5Mbps of rate is the worst case of 802.11ac(VHT20) ; 13.5Mbps of rate is the worst case of 802.11ac(VHT40)
Limit:	≥ 500 kHz
Test Results:	Pass

Measurement Data

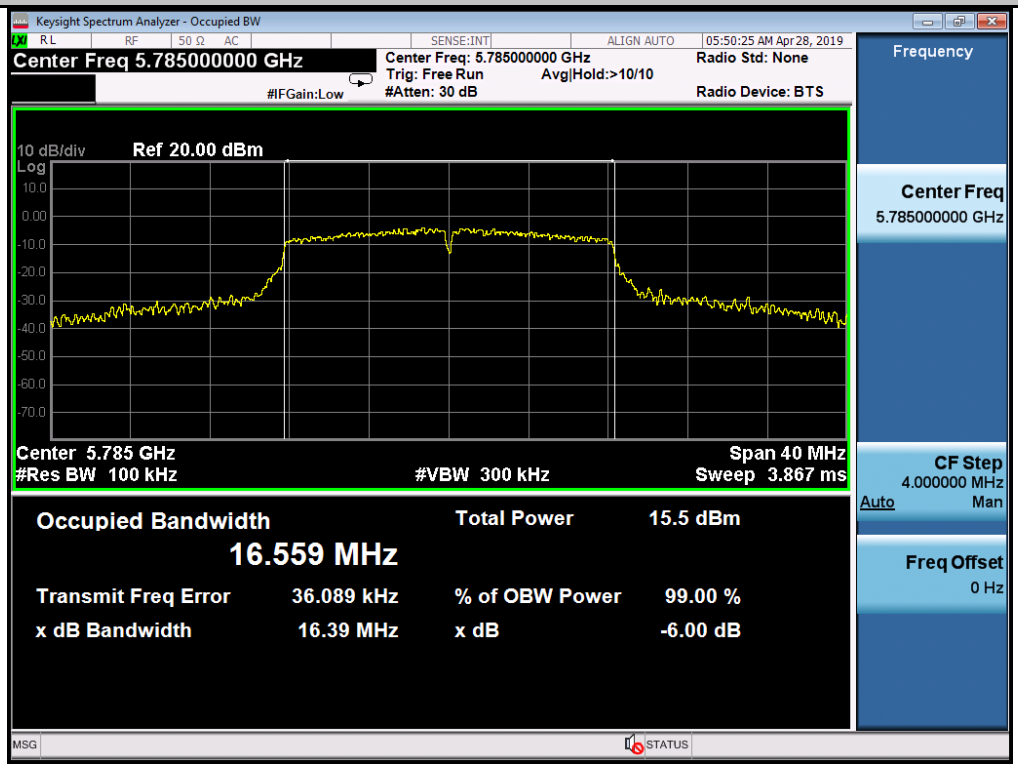
Test Mode	Test Frequency [MHz]	EBW[MHz]	Limit[MHz]	Verdict
11A	5745	16.360	0.5	PASS
11A	5785	16.400	0.5	PASS
11A	5825	16.400	0.5	PASS
11N20	5745	16.720	0.5	PASS
11N20	5785	16.400	0.5	PASS
11N20	5825	17.640	0.5	PASS
11N40	5755	35.280	0.5	PASS
11N40	5795	35.920	0.5	PASS
11AC20	5745	16.600	0.5	PASS
11AC20	5785	16.760	0.5	PASS
11AC20	5825	17.600	0.5	PASS
11AC40	5755	35.600	0.5	PASS
11AC40	5795	36.160	0.5	PASS

Test plot as follows:

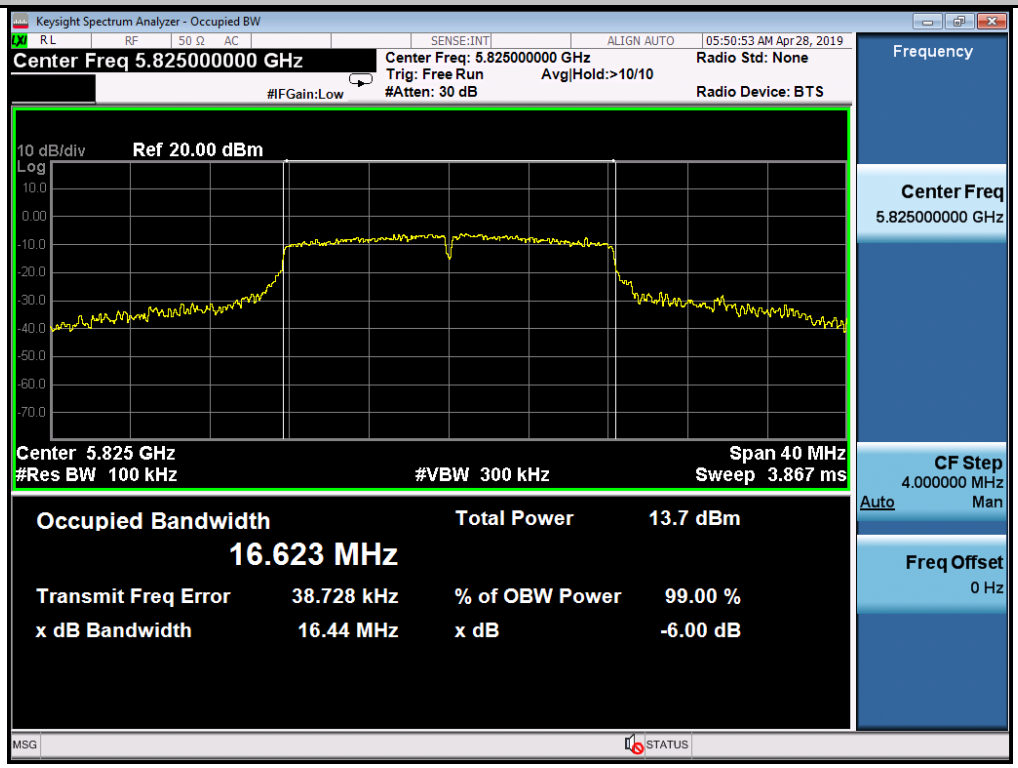
Emission Bandwidth Measurement_11A_5745_Ant1



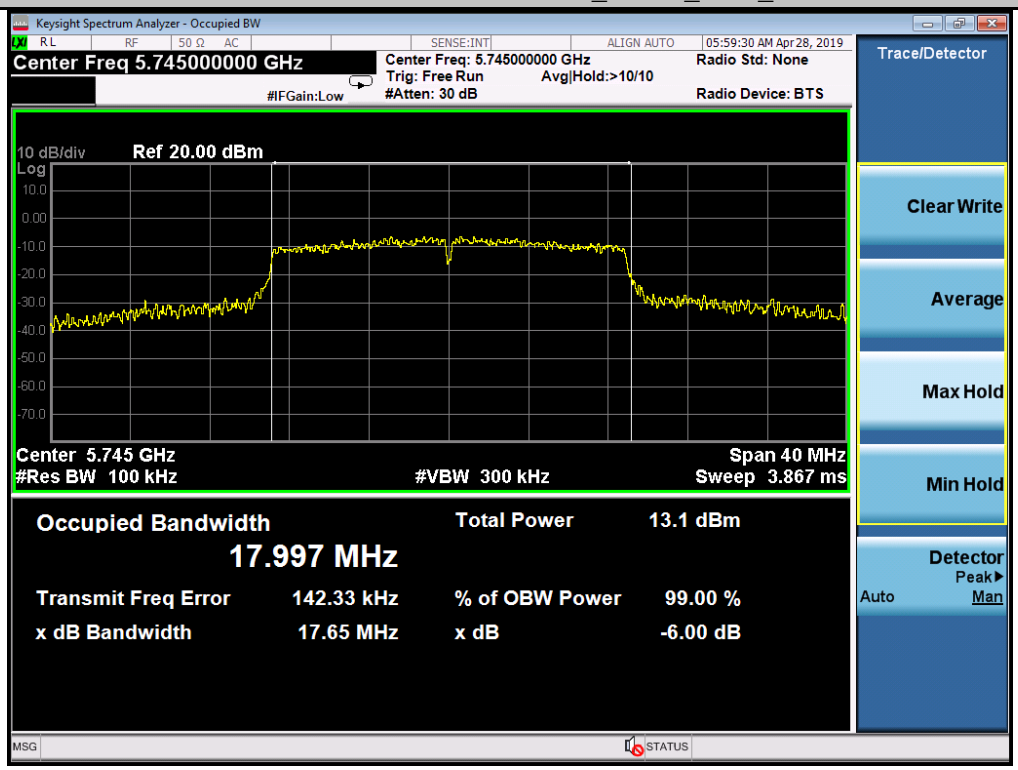
Emission Bandwidth Measurement_11A_5785_Ant1



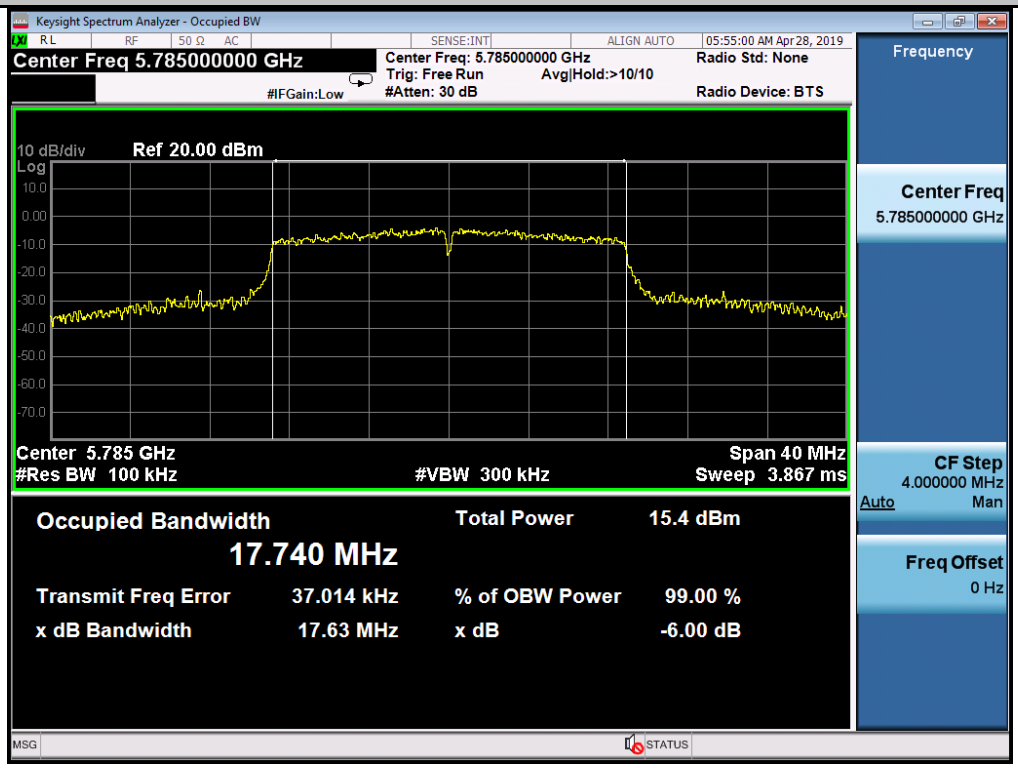
Emission Bandwidth Measurement_11A_5825_Ant1



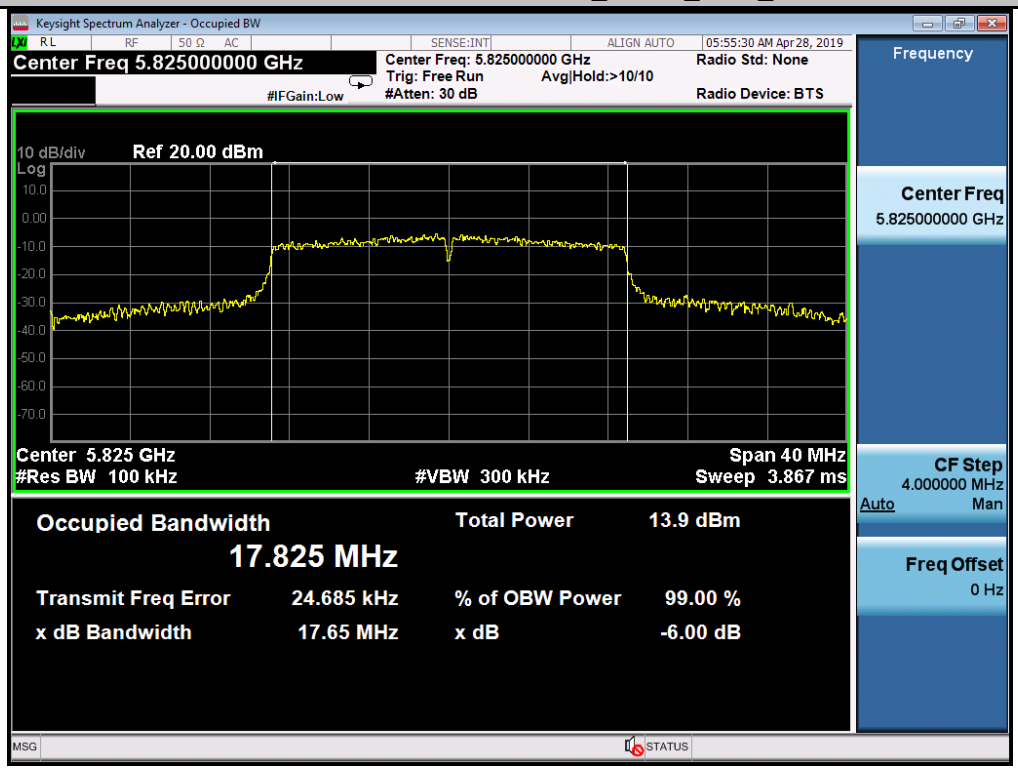
Emission Bandwidth Measurement_11N20_5745_Ant1



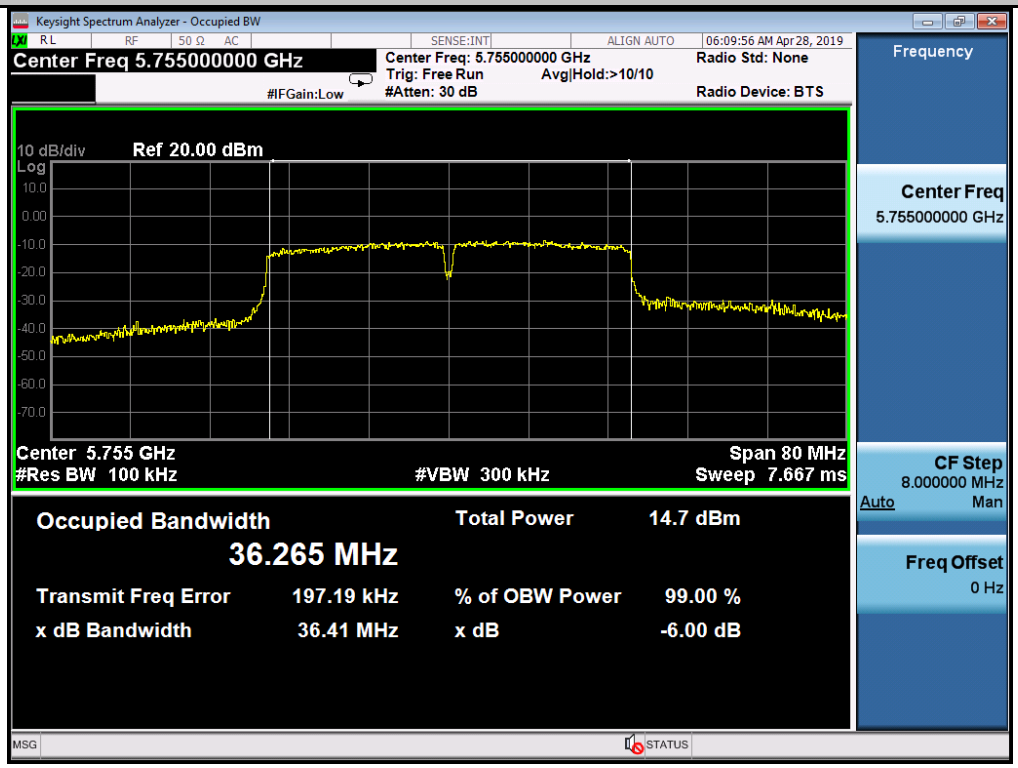
Emission Bandwidth Measurement_11N20_5785_Ant1



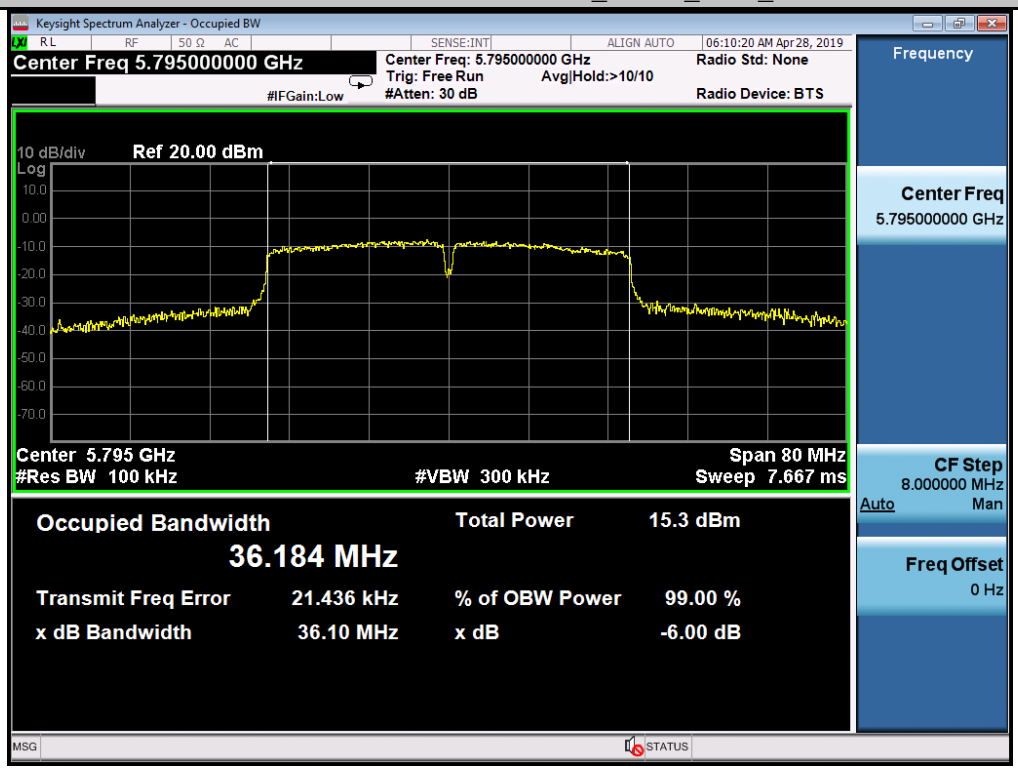
Emission Bandwidth Measurement_11N20_5825_Ant1



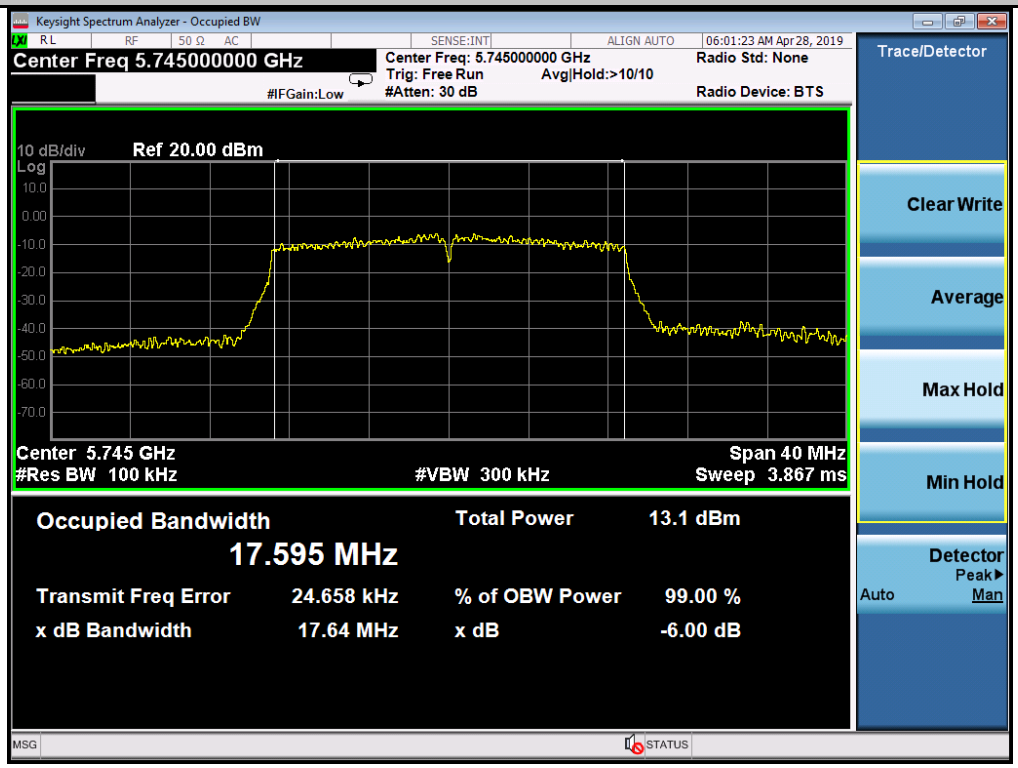
Emission Bandwidth Measurement_11N40_5755_Ant1



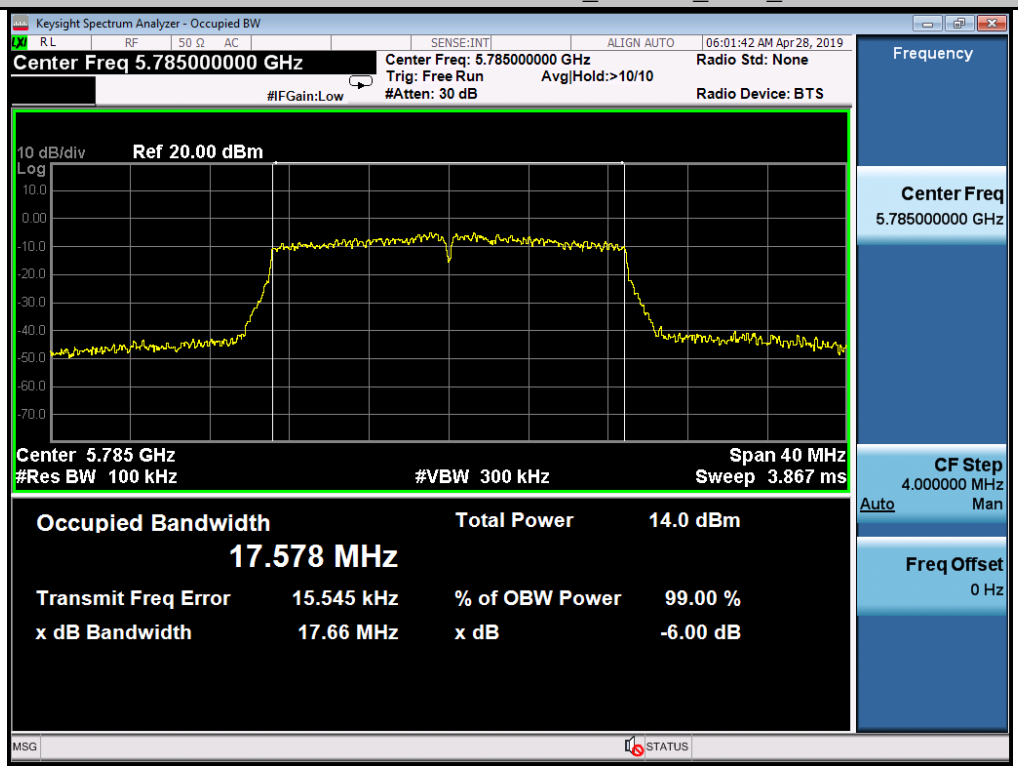
Emission Bandwidth Measurement_11N40_5795_Ant1



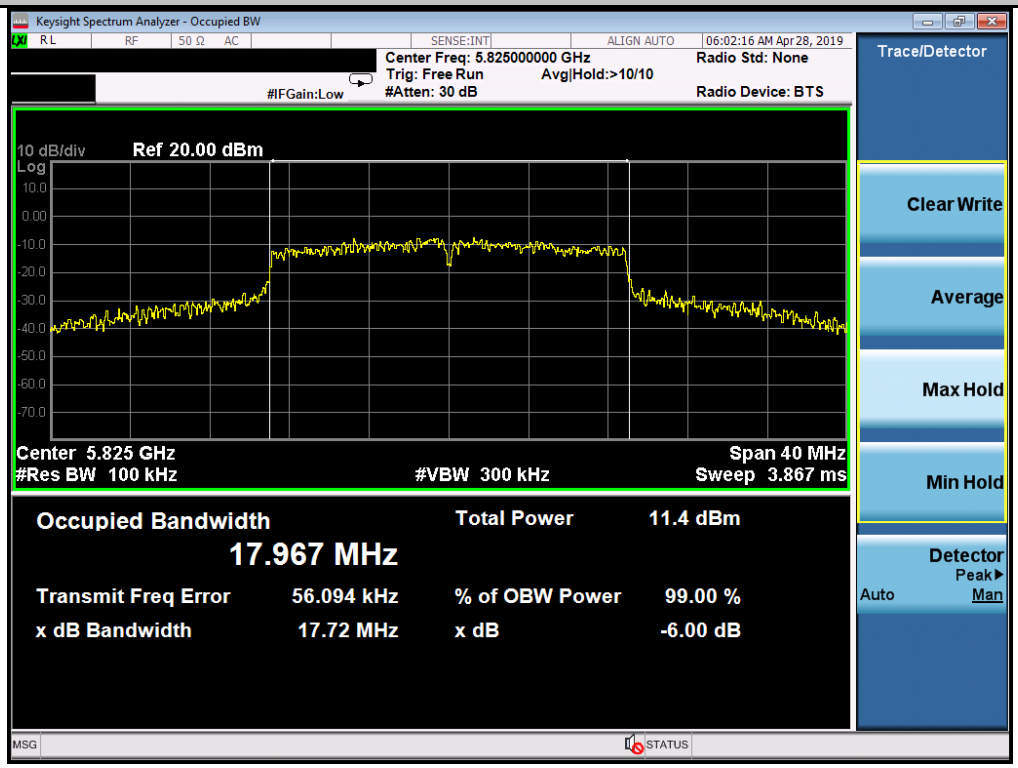
Emission Bandwidth Measurement_11AC20_5745_Ant1



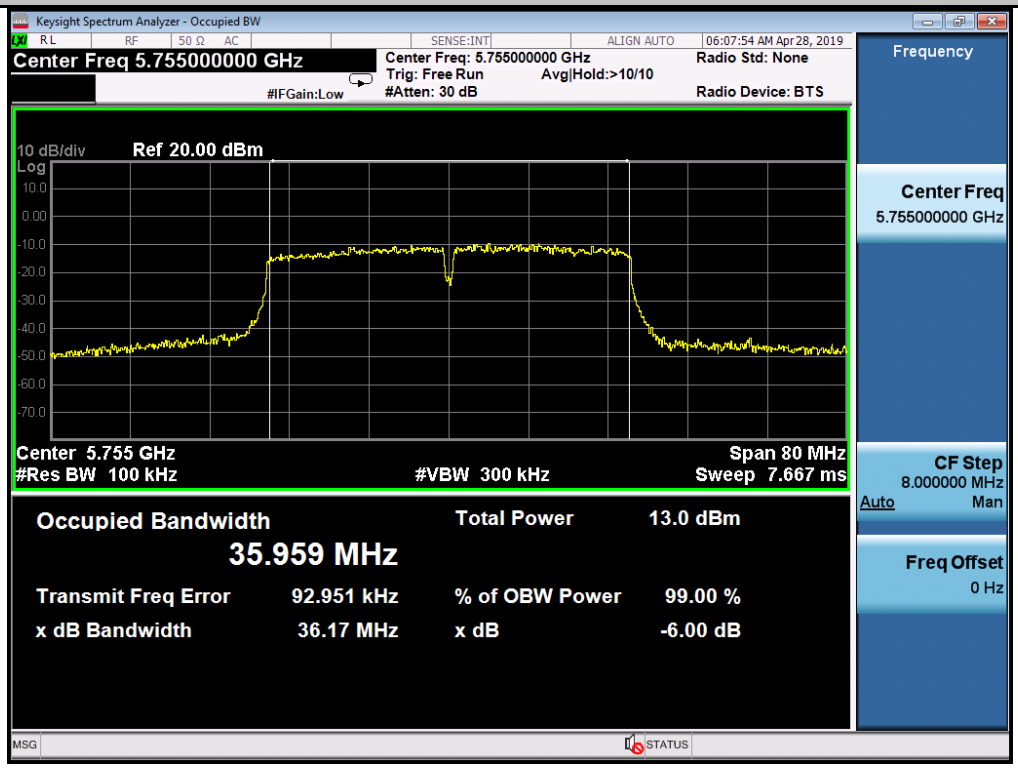
Emission Bandwidth Measurement_11AC20_5785_Ant1



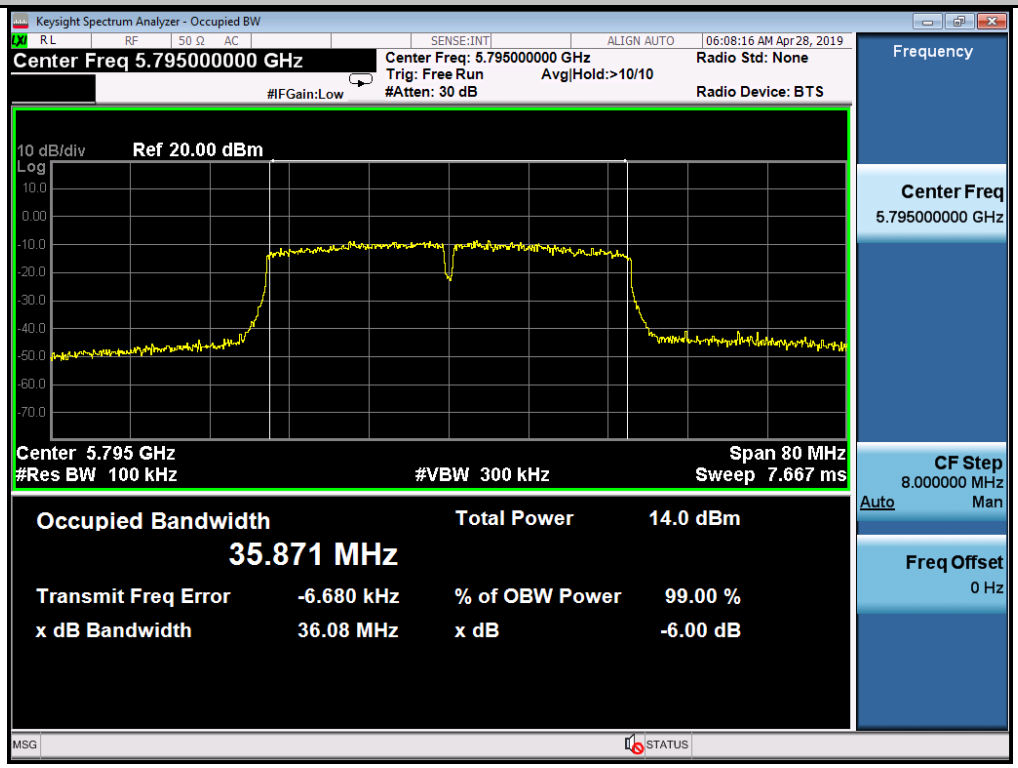
Emission Bandwidth Measurement_11AC20_5825_Ant1



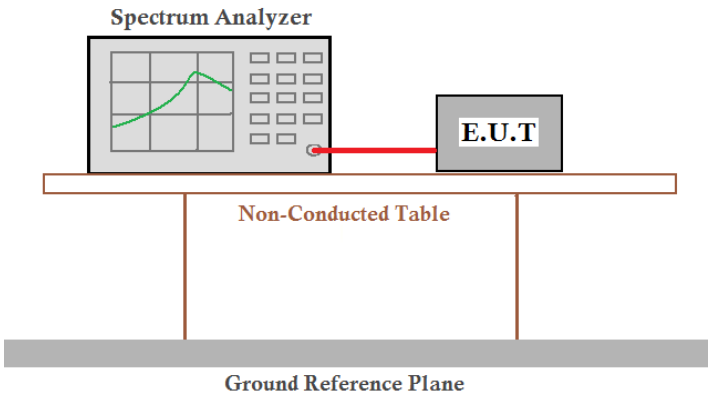
Emission Bandwidth Measurement_11AC40_5755_Ant1



Emission Bandwidth Measurement_11AC40_5795_Ant1



5.6 Power Spectral Density

Test Requirement:	FCC 47 CFR Part 15 Subpart E Section 15.407 (a)(1)(2)(3)	
Test Method:	KDB 789033 D02 v01r04 Section F	
Test Setup:	 *Remark:* *Offset the High-Frequency cable loss in the spectrum analyzer.*	
Exploratory Test Mode:	Transmitting with all kind of modulations, data rates	
Final Test Mode:	Through Pre-scan, find the 6Mbps of rate is the worst case of 802.11a ; 6.5Mbps of rate is the worst case of 802.11n(HT20) ; 13.5Mbps of rate is the worst case of 802.11n(HT40); 6.5Mbps of rate is the worst case of 802.11ac(VHT20) ; 13.5Mbps of rate is the worst case of 802.11ac(VHT40).	
Limit:	U-NII-1	11dBm/MHz
	U-NII-2A	11dBm/MHz
	U-NII-2C	11dBm/MHz
	U-NII-3	30dBm/500KHz
Test Results:	Pass	

Measurement Data

For U-NII-1 Band:

Test Mode	Test Frequency [MHz]	Meas PSD [dBm/MHz]	Duty Cycle Factor [dB]	PSD [dBm/MHz]	Limit [dBm/MHz]	Verdict
11A	5180	8.641	0	8.641	11.00	PASS
11A	5200	8.923	0	8.923	11.00	PASS
11A	5240	9.134	0	9.134	11.00	PASS
11N20	5180	9.095	0	9.095	11.00	PASS
11N20	5200	9.111	0	9.111	11.00	PASS
11N20	5240	9.142	0	9.142	11.00	PASS
11N40	5190	7.922	0	7.922	11.00	PASS
11N40	5230	6.604	0	6.604	11.00	PASS
11AC20	5180	9.448	0	9.448	11.00	PASS
11AC20	5200	9.804	0	9.804	11.00	PASS
11AC20	5240	7.484	0	7.484	11.00	PASS
11AC40	5190	6.375	0	6.375	11.00	PASS
11AC40	5230	4.772	0	4.772	11.00	PASS

Remark:

PSD = Meas PSD + Duty Cycle Factor

For U-NII-3 Band:

Test Mode	Test Frequency [MHz]	Meas PSD [dBm/500kHz]	Duty Cycle Factor [dB]	PSD [dBm/500kHz]	Limit [dBm/500kHz]	Verdict
11A	5745	2.930	0	2.930	17.00	PASS
11A	5785	3.741	0	3.741	17.00	PASS
11A	5825	1.344	0	1.344	17.00	PASS
11N20	5745	2.369	0	2.369	17.00	PASS
11N20	5785	3.847	0	3.847	17.00	PASS
11N20	5825	1.408	0	1.408	17.00	PASS
11N40	5755	-1.488	0	-1.488	17.00	PASS
11N40	5795	-1.985	0	-1.985	17.00	PASS
11AC20	5745	0.810	0	0.810	17.00	PASS
11AC20	5785	2.323	0	2.323	17.00	PASS
11AC20	5825	1.009	0	1.009	17.00	PASS
11AC40	5755	-2.739	0	-2.739	17.00	PASS
11AC40	5795	-1.850	0	-1.850	17.00	PASS

Remark:

PSD = Meas PSD + Duty Cycle Factor

Test plot as follows:

Maximum Power Spectral Density_TNVN_11A_5180_Ant1

Maximum Power Spectral Density_TNVN_11A_5200_Ant1

Maximum Power Spectral Density_TNVN_11A_5240_Ant1

Maximum Power Spectral Density_TNVN_11A_5745_Ant1

Maximum Power Spectral Density_TNVN_11A_5785_Ant1

Maximum Power Spectral Density_TNVN_11A_5825_Ant1

Maximum Power Spectral Density_TNVN_11N20_5180_Ant1

Maximum Power Spectral Density_TNVN_11N20_5200_Ant1

Maximum Power Spectral Density_TNVN_11N20_5240_Ant1

Maximum Power Spectral Density_TNVN_11N20_5745_Ant1

Maximum Power Spectral Density_TNVN_11N20_5785_Ant1

Maximum Power Spectral Density_TNVN_11N20_5825_Ant1

Maximum Power Spectral Density_TNVN_11N40_5190_Ant1

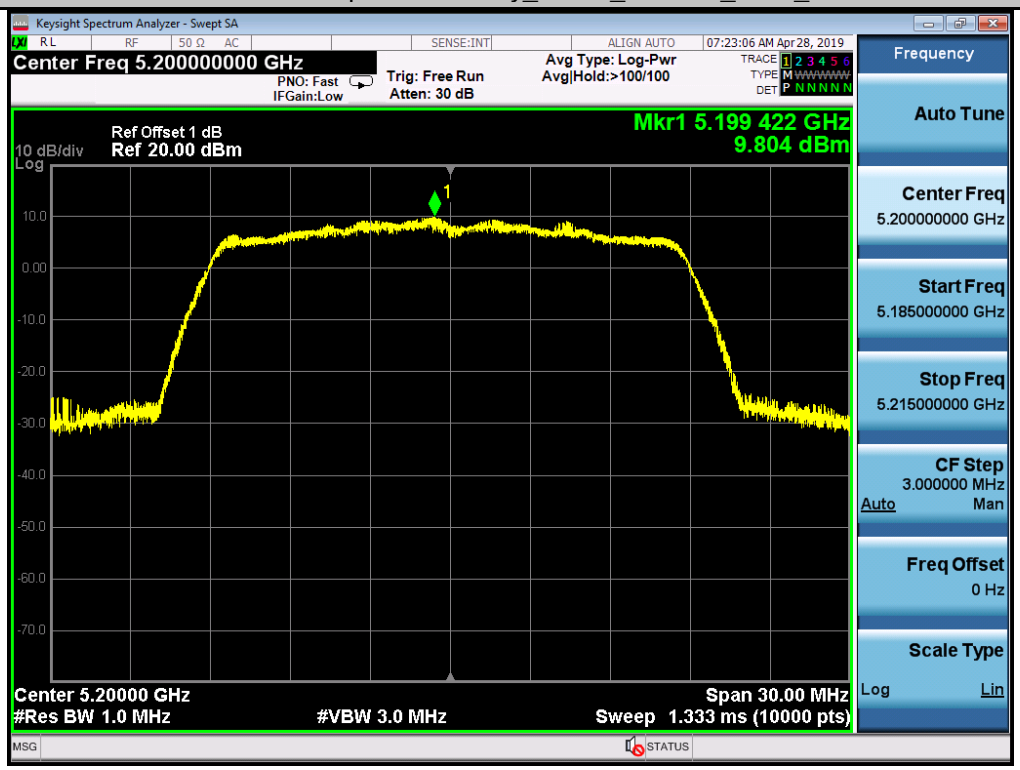
Maximum Power Spectral Density_TNVN_11N40_5230_Ant1

Maximum Power Spectral Density_TNVN_11N40_5755_Ant1

Maximum Power Spectral Density_TNVN_11N40_5795_Ant1

Maximum Power Spectral Density_TNVN_11AC20_5180_Ant1

Maximum Power Spectral Density_TNVN_11AC20_5200_Ant1



Maximum Power Spectral Density_TNVN_11AC20_5240_Ant1

Maximum Power Spectral Density_TNVN_11AC20_5745_Ant1

Maximum Power Spectral Density_TNVN_11AC20_5785_Ant1

Maximum Power Spectral Density_TNVN_11AC20_5825_Ant1

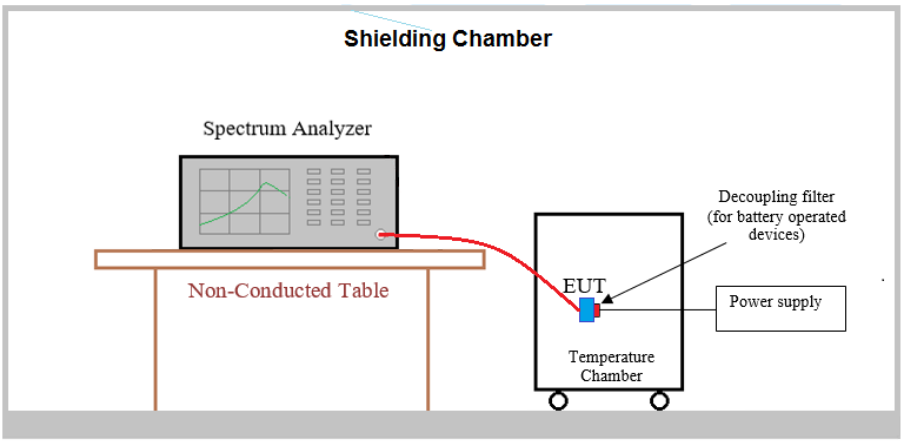
Maximum Power Spectral Density_TNVN_11AC40_5190_Ant1

Maximum Power Spectral Density_TNVN_11AC40_5230_Ant1

Maximum Power Spectral Density_TNVN_11AC40_5755_Ant1

Maximum Power Spectral Density_TNVN_11AC40_5795_Ant1

5.7 Frequency Stability

Test Requirement:	FCC 47 CFR Part 15 Subpart E Section 15.407 (g)
Test Method:	ANSI C63.10-2013
Test Setup:	 *Remark:* *Offset the High-Frequency cable loss in the spectrum analyzer.*
Exploratory Test Mode:	Transmitting with all kind of modulations, data rates
Final Test Mode:	Through Pre-scan, find the 6Mbps of rate of 802.11a at lowest channel is the worst case. Only the worst case is recorded in the report.
Limit:	The frequency of the carrier signal shall be maintained within band of operation.
Test Results:	Pass

Measurement Data

Frequency Stability Versus Temp.			
Operating Frequency: 5180 MHz			
Temp (℃)	Volta ge	Measured Frequency (MHz)	Frequency Drift (ppm)
50	VN	5179.97	-5.79151
40		5179.97	-5.79151
30		5179.99	-2.89575
20		5179.97	-5.79151
10		5179.96	-8.68726
0		5179.96	-8.68726
-10		5180.00	0.00000
-20		5179.99	-2.89575

Frequency Stability Versus Temp.			
Operating Frequency: 5180 MHz			
Temp.	Volta ge	Measured Frequency (MHz)	Frequency Drift (ppm)
TN	VL	5179.96	-8.68726
	VN	5179.96	-8.68726
	VH	5179.97	-5.79151

5.8 Radiated Spurious Emissions

Test Requirement:	FCC 47 CFR Part 15 Subpart E Section 15.407 (b)(1)(2)(3)(4)(6) FCC 47 CFR Part 15 Subpart C Section 15.209/205
Test Method:	KDB 789033 D02 v01r04 Section G.3, G.4, G.5, and G.6
Test Site:	Measurement Distance: 3m (Semi-Anechoic Chamber)

Receiver Setup:

Frequency	Detector	RBW	VBW	Remark
0.009MHz-0.090MHz	Peak	10kHz	30kHz	Peak
0.009MHz-0.090MHz	Average	10kHz	30kHz	Average
0.090MHz-0.110MHz	Quasi-peak	10kHz	30kHz	Quasi-peak
0.110MHz-0.490MHz	Peak	10kHz	30kHz	Peak
0.110MHz-0.490MHz	Average	10kHz	30kHz	Average
0.490MHz -30MHz	Quasi-peak	10kHz	30kHz	Quasi-peak
30MHz-1GHz	Quasi-peak	100 kHz	300kHz	Quasi-peak
Above 1GHz	Peak	1MHz	3MHz	Peak
	Peak	1MHz	10Hz	Average

Limit:

Frequency	Field strength (microvolt/meter)	Limit (dBuV/m)	Remark	Measurement distance (m)
0.009MHz-0.490MHz	2400/F(kHz)	-	-	300
0.490MHz-1.705MHz	24000/F(kHz)	-	-	30
1.705MHz-30MHz	30	-	-	30
30MHz-88MHz	100	40.0	Quasi-peak	3
88MHz-216MHz	150	43.5	Quasi-peak	3
216MHz-960MHz	200	46.0	Quasi-peak	3
960MHz-1GHz	500	54.0	Quasi-peak	3
Above 1GHz	500	54.0	Average	3

Note: 15.35(b), Unless otherwise specified, the limit on peak radio frequency emissions is 20dB above the maximum permitted average emission limit applicable to the equipment under test. This peak limit applies to the total peak emission level radiated by the device.

Test Setup:	

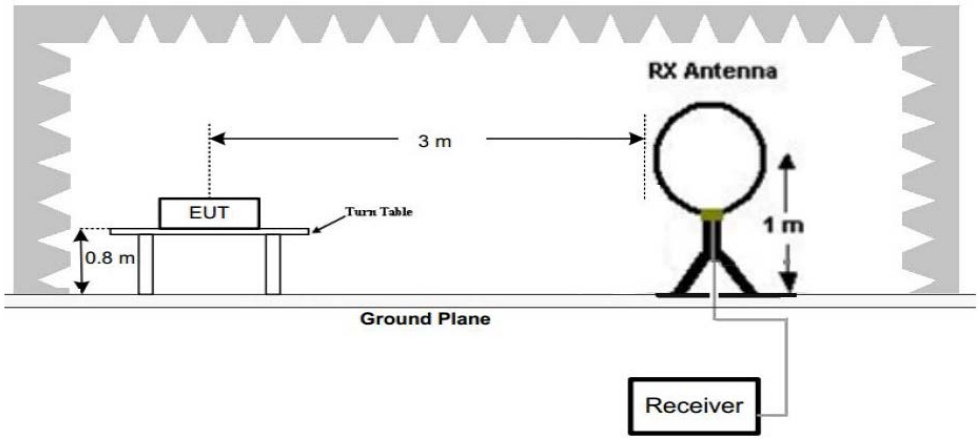


Figure 1. Below 30MHz

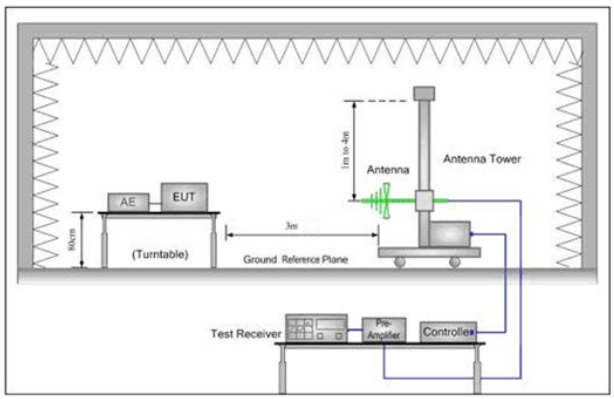


Figure 2. 30MHz to 1GHz

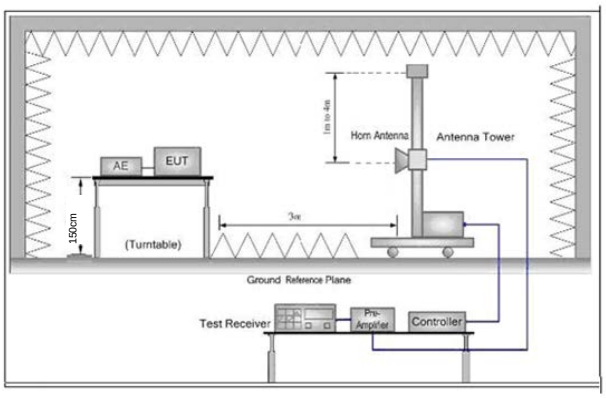


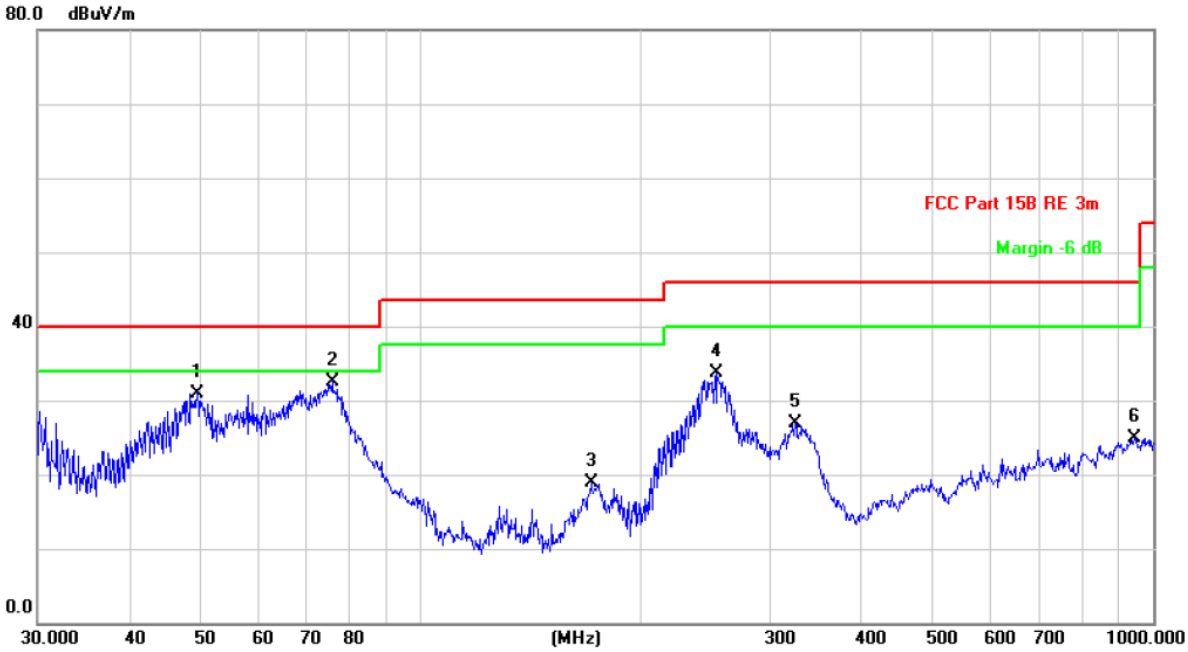
Figure 3. Above 1 GHz

Test Procedure:	a. 1) Below 1G: The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation. 2) Above 1G: The EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter semi-anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation. Note: For the radiated emission test above 1GHz: Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane. b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. c. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement. d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters(for

	the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading. e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet. g. Test the EUT in the lowest channel ,the middle channel ,the Highest channel h. Repeat above procedures until all frequencies measured was complete.
Exploratory Test Mode:	Transmitting with all kind of modulations, data rates. Transmitting mode, Charge + Transmitting mode.
Final Test Mode:	Pretest the EUT at Transmitting mode and Charge +Transmitting mode, found the Charge +Transmitting mode which it is worse case Through Pre-scan, find the 6Mbps of rate is the worst case of 802.11a ; 6.5Mbps of rate is the worst case of 802.11n(HT20) ; 13.5Mbps of rate is the worst case of 802.11n(HT40); 6.5Mbps of rate is the worst case of 802.11ac(VHT20) ; 13.5Mbps of rate is the worst case of 802.11ac(VHT40). For below 1GHz, through Pre-scan, find the 6Mbps of rate of 802.11a at lowest channel is the worst case. Only the worst case is recorded in the report.
Test Results:	Pass

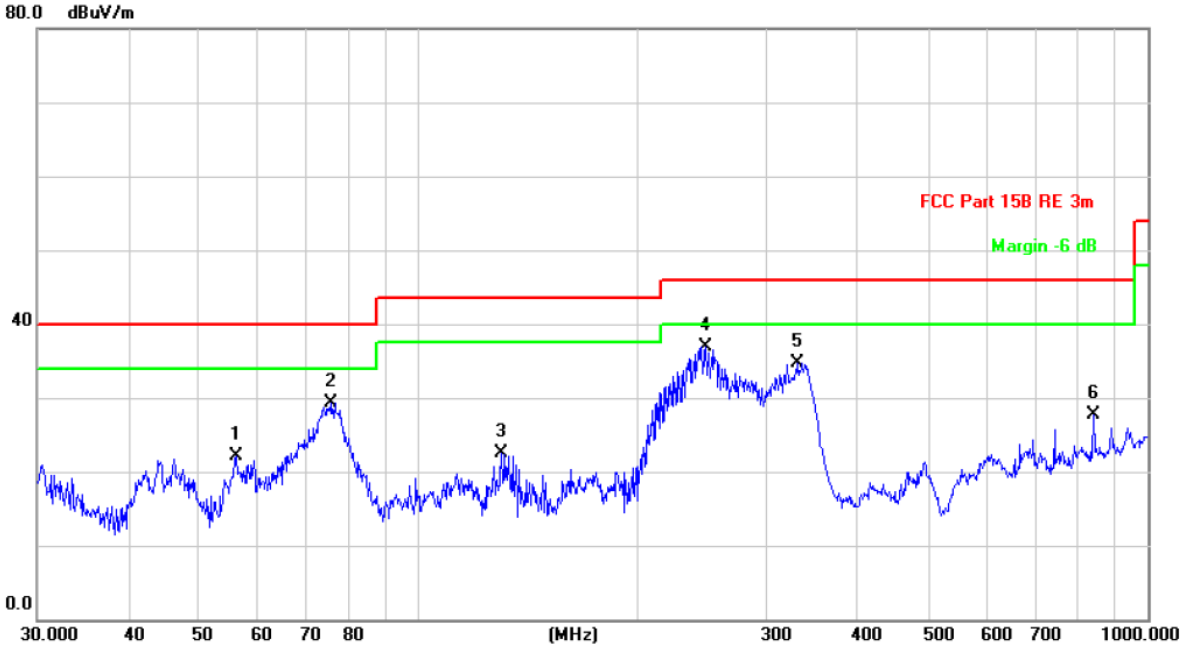
5.8.1 Radiated emission below 1GHz

30MHz~1GHz		
Test mode:	Charge +Transmitting	Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1		49.5328	47.95	-16.95	31.00	40.00	-9.00	QP			
2	*	75.7114	50.89	-18.29	32.60	40.00	-7.40	QP			
3		170.7926	32.31	-13.44	18.87	43.50	-24.63	QP			
4		253.8367	46.58	-12.95	33.63	46.00	-12.37	QP			
5		324.4561	37.42	-10.54	26.88	46.00	-19.12	QP			
6		942.1305	24.07	0.92	24.99	46.00	-21.01	QP			

Test mode:	Charge +Transmitting	Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1		56.1974	40.50	-18.33	22.17	40.00	-17.83	QP			
2		75.7114	47.36	-17.97	29.39	40.00	-10.61	QP			
3		129.9226	35.30	-12.75	22.55	43.50	-20.95	QP			
4	*	247.6819	49.89	-13.02	36.87	46.00	-9.13	QP			
5		331.3546	44.52	-9.83	34.69	46.00	-11.31	QP			
6		842.1296	28.57	-0.91	27.66	46.00	-18.34	QP			

5.8.2 Transmitter emission above 1GHz

Test mode:		802.11a(6Mbps)		Test channel:		36	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V
10360.000	51.21	2.13	53.34	74	-20.66	peak	H
10360.000	36.86	2.13	38.99	54	-15.01	AVG	H
15540.000	48.43	3.62	52.05	74	-21.95	peak	H
15540.000	37.27	3.62	40.89	54	-13.11	AVG	H
10360.000	48.62	2.13	50.75	74	-23.25	peak	V
10360.000	39.92	2.13	42.05	54	-11.95	AVG	V
15540.000	49.79	3.62	53.41	74	-20.59	peak	V
15540.000	35.00	3.62	38.62	54	-15.38	AVG	V

Test mode:		802.11a(6Mbps)		Test channel:		40	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V
10440.000	50.54	2.23	52.77	74	-21.23	peak	H
10440.000	37.85	2.23	40.08	54	-13.92	AVG	H
15660.000	49.06	3.75	52.81	74	-21.19	peak	H
15660.000	37.18	3.75	40.93	54	-13.07	AVG	H
10440.000	49.39	2.23	51.62	74	-22.38	peak	V
10440.000	38.88	2.23	41.11	54	-12.89	AVG	V
15660.000	48.41	3.75	52.16	74	-21.84	peak	V
15660.000	36.50	3.75	40.25	54	-13.75	AVG	V

Test mode:		802.11a(6Mbps)		Test channel:		48	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V
10480.000	49.28	2.31	51.59	74	-22.41	peak	H
10480.000	36.17	2.31	38.48	54	-15.52	AVG	H
15720.000	49.15	3.82	52.97	74	-21.03	peak	H
15720.000	37.63	3.82	41.45	54	-12.55	AVG	H
10480.000	50.23	2.31	52.54	74	-21.46	peak	V
10480.000	39.48	2.31	41.79	54	-12.21	AVG	V
15720.000	48.46	3.82	52.28	74	-21.72	peak	V
15720.000	36.53	3.82	40.35	54	-13.65	AVG	V

Test mode:		802.11a(6Mbps)		Test channel:		149	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V
11490.000	50.70	2.42	53.12	74	-20.88	peak	H
11490.000	37.92	2.42	40.34	54	-13.66	AVG	H
17235.000	49.96	3.92	53.88	74	-20.12	peak	H
17235.000	37.73	3.92	41.65	54	-12.35	AVG	H
11490.000	48.71	2.42	51.13	74	-22.87	peak	V
11490.000	38.65	2.42	41.07	54	-12.93	AVG	V
17235.000	48.45	3.92	52.37	74	-21.63	peak	V
17235.000	35.59	3.92	39.51	54	-14.49	AVG	V

Test mode:		802.11a(6Mbps)		Test channel:		157	
Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Over (dB)	Detector Type	Ant. Pol. H/V
11570.000	50.70	2.47	53.17	74	-20.83	peak	H
11570.000	37.35	2.47	39.82	54	-14.18	AVG	H
17355.000	48.38	3.96	52.34	74	-21.66	peak	H
17355.000	38.51	3.96	42.47	54	-11.53	AVG	H
11570.000	49.17	2.47	51.64	74	-22.36	peak	V
11570.000	39.01	2.47	41.48	54	-12.52	AVG	V
17355.000	50.01	3.96	53.97	74	-20.03	peak	V
17355.000	35.53	3.96	39.49	54	-14.51	AVG	V

Test mode:		802.11a(6Mbps)		Test channel:		165	
Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Over (dB)	Detector Type	Ant. Pol. H/V
11650.000	49.37	2.55	51.92	74	-22.08	peak	H
11650.000	36.44	2.55	38.99	54	-15.01	AVG	H
17475.000	49.73	4.01	53.74	74	-20.26	peak	H
17475.000	38.48	4.01	42.49	54	-11.51	AVG	H
11650.000	48.49	2.55	51.04	74	-22.96	peak	V
11650.000	39.04	2.55	41.59	54	-12.41	AVG	V
17475.000	49.00	4.01	53.01	74	-20.99	peak	V
17475.000	35.26	4.01	39.27	54	-14.73	AVG	V

Remark:

1) The 6Mbps of rate of 802.11a is the worst case.

2) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:

Final Test Level =Receiver Reading + Antenna Factor + Cable Factor – Preamplifier Factor

3) Scan from 9kHz to 40GHz,The disturbance above 18GHz and below 30MHz was very low, and the above harmonics were the highest point could be found when testing, so only the above harmonics had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.

5.9 Restricted bands around fundamental frequency

Test Requirement:	FCC 47 CFR Part 15 Subpart E Section 15.407 (b)(1)(2)(3)(4)(6) FCC 47 CFR Part 15 Subpart C Section 15.209/205
Test Method:	KDB 789033 D02 v01r04 Section G.3, G.4, G.5, and G.6
Test Site:	Measurement Distance: 3m (Semi-Anechoic Chamber)
Limit:	

Applicable To	**Limit**	
789033 D02 General U-NII Test Procedures New Rules v01r04	**Field Strength at 3 m**	
	PK: 74 (dBμV/m)	**AV: 54 (dBμV/m)**
Applicable To	EIRP Limit	Equivalent Field Strength at 3 m
FCC 47 CFR Part 15 Subpart E Section 6.2.1.2	PK: -27 (dBm/MHz)	PK: 74 (dBμV/m)
FCC 47 CFR Part 15 Subpart E Section 6.2.2.2	PK: -27 (dBm/MHz)	PK: 74 (dBμV/m)
FCC 47 CFR Part 15 Subpart E Section 6.2.3.2	PK: -27 (dBm/MHz)	PK: 68.2 (dBμV/m)
FCC 47 CFR Part 15 Subpart E Section 6.2.4.2	27 dBm/MHz at frequencies from the band edges decreasing linearly to 15.6 dBm/MHz at 5 MHz above or below the band edges;	PK: 68.2 (dBμV/m)
	15.6 dBm/MHz at 5 MHz above or below the band edges decreasing linearly to 10 dBm/MHz at 25 MHz above or below the band edges;	
	10 dBm/MHz at 25 MHz above or below the band edges decreasing linearly to -27 dBm/MHz at 75 MHz above or below the band edges;	
	-27 dBm/MHz at	

		frequencies more than 75 MHz above or below the band edges.	

Test Setup:

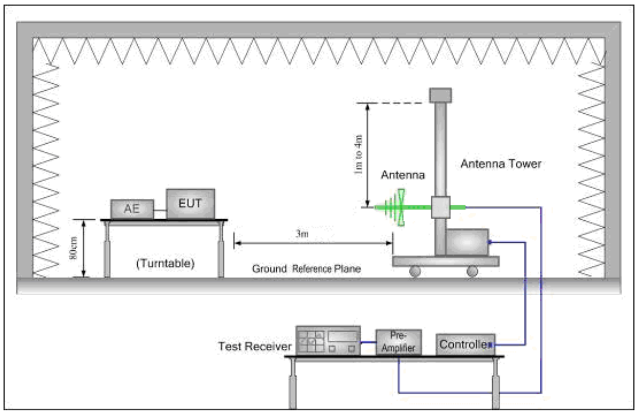


Figure 1. 30MHz to 1GHz

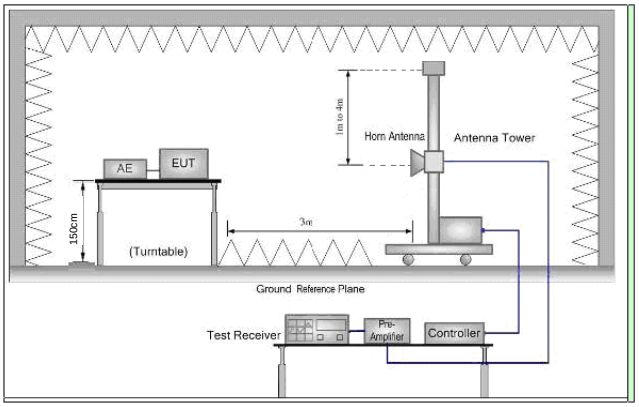


Figure 2. Above 1 GHz

Test Procedure:

a. 1) Below 1G: The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation.
2) Above 1G: The EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter semi-anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation.
Note: For the radiated emission test above 1GHz:

Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.

b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

c. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

f. Place a marker at the end of the restricted band closest to the transmit frequency to show compliance. Also measure any emissions in the restricted bands. Save the spectrum analyzer plot. Repeat for each power and modulation for lowest and highest channel

g. Test the EUT in the lowest channel , the Highest channel

	h. Repeat above procedures until all frequencies measured was complete.
Exploratory Test Mode:	Transmitting with all kind of modulations, data rates. Transmitting mode.
Final Test Mode:	Pretest the EUT at Transmitting mode, found the Transmitting mode which it is worse case Through Pre-scan, find the 6Mbps of rate is the worst case of 802.11a ; 6.5Mbps of rate is the worst case of 802.11n(HT20) ; 13.5Mbps of rate is the worst case of 802.11n(HT40); 6.5Mbps of rate is the worst case of 802.11ac(VHT20) ; 13.5Mbps of rate is the worst case of 802.11ac(VHT40). Only the worst case is recorded in the report.
Test Results:	Pass

Test data:

Worse case mode:		802.11a(6Mbps)		Test channel:		36	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V
5150.00	58.47	-3.63	54.84	74	-19.16	peak	H
5150.00	44.37	-3.63	40.74	54	-13.26	AVG	H
5150.00	58.65	-3.63	55.02	74	-18.98	peak	V
5150.00	46.02	-3.63	42.39	54	-11.61	AVG	V

Worse case mode:		802.11a(6Mbps)		Test channel:		48	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V
5350.00	57.90	-3.59	54.31	74	-19.69	peak	H
5350.00	44.39	-3.59	40.80	54	-13.20	AVG	H
5350.00	58.59	-3.59	55.00	74	-19.00	peak	V
5350.00	45.63	-3.59	42.04	54	-11.96	AVG	V

Worse case mode:		802.11a(6Mbps)		Test channel:		149	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V
5650.00	57.96	-3.46	54.5	68.2	-13.7	peak	H
5742.15	97.56	-3.44	94.12	122.2	-28.08	peak	H
5650.00	59.23	-3.46	55.77	68.2	-12.43	peak	V
5742.37	89.12	-3.44	85.68	122.2	-36.52	peak	V

Worse case mode:		802.11a(6Mbps)		Test channel:		165	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V
5824.77	98.21	-3.42	94.79	122.2	-27.41	peak	H
5925.00	60.2	-3.41	56.79	68.2	-11.41	peak	H
5818.71	88.23	-3.42	84.81	122.2	-37.39	peak	V
5925.00	46.2	-3.41	42.79	68.2	-25.41	peak	V

Worse case mode:		802.11n(HT20)(6.5Mbps)		Test channel:		36	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V
5150.00	58.67	-3.63	55.04	74	-18.96	peak	H
5150.00	44.46	-3.63	40.83	54	-13.17	AVG	H
5150.00	58.49	-3.63	54.86	74	-19.14	peak	V
5150.00	45.36	-3.63	41.73	54	-12.27	AVG	V

Worse case mode:		802.11n(HT20)(6.5Mbps)		Test channel:		48	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V
5350.00	59.15	-3.59	55.56	74	-18.44	peak	H
5350.00	44.83	-3.59	41.24	54	-12.76	AVG	H
5350.00	58.75	-3.59	55.16	74	-18.84	peak	V
5350.00	45.36	-3.59	41.77	54	-12.23	AVG	V

Worse case mode:		802.11n(HT20)(6.5Mbps)		Test channel:		149	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V
5650.00	58.43	-3.46	54.97	68.2	-13.23	peak	H
5751.09	98.17	-3.44	94.73	122.2	-27.47	peak	H
5650.00	59.48	-3.46	56.02	68.2	-12.18	peak	V
5744.27	88.99	-3.44	85.55	122.2	-36.65	peak	V

Worse case mode:		802.11n(HT20)(6.5Mbps)		Test channel:		165	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V
5823.41	98.21	-3.42	94.79	122.2	-27.41	peak	H
5925.00	60.11	-3.41	56.7	68.2	-11.5	peak	H
5824.65	88.54	-3.42	85.12	122.2	-37.08	peak	V
5925.00	45.8	-3.41	42.39	68.2	-25.81	peak	V

Worse case mode:		802.11n(HT40)(13.5Mbps)		Test channel:		38	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V
5150.00	58.82	-3.63	55.19	74	-18.81	peak	H
5150.00	45.27	-3.63	41.64	54	-12.36	AVG	H
5150.00	59.30	-3.63	55.67	74	-18.33	peak	V
5150.00	45.65	-3.63	42.02	54	-11.98	AVG	V

Worse case mode:		802.11n(HT40)(13.5Mbps)		Test channel:		46	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V
5350.00	58.63	-3.59	55.04	74	-18.96	peak	H
5350.00	45.03	-3.59	41.44	54	-12.56	AVG	H
5350.00	59.17	-3.59	55.58	74	-18.42	peak	V
5350.00	45.73	-3.59	42.14	54	-11.86	AVG	V

Worse case mode:		802.11n(HT40)(13.5Mbps)		Test channel:		151	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V
5650.00	58.57	-3.46	55.11	68.2	-13.09	peak	H
5762.68	95.13	-3.44	91.69	122.2	-30.51	peak	H
5650.00	59.67	-3.46	56.21	68.2	-11.99	peak	V
5741.70	85.72	-3.44	82.28	122.2	-39.92	peak	V

Worse case mode:		802.11n(HT40)(13.5Mbps)		Test channel:		159	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V
5743.60	95.37	-3.42	91.95	122.2	-30.25	peak	H
5925.00	59.28	-3.41	55.87	68.2	-12.33	peak	H
5779.52	85.62	-3.42	82.2	122.2	-40	peak	V
5925.00	46.08	-3.41	42.67	68.2	-25.53	peak	V

Worse case mode:		802.11ac(HT20)(6.5Mbps)		Test channel:		36	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V
5150.00	58.41	-3.63	54.78	74	-19.22	peak	H
5150.00	45.30	-3.63	41.67	54	-12.33	AVG	H
5150.00	58.61	-3.63	54.98	74	-19.02	peak	V
5150.00	45.55	-3.63	41.92	54	-12.08	AVG	V

Worse case mode:		802.11ac(HT20)(6.5Mbps)		Test channel:		48	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V
5350.00	58.47	-3.59	54.88	74	-19.12	peak	H
5350.00	45.08	-3.59	41.49	54	-12.51	AVG	H
5350.00	58.37	-3.59	54.78	74	-19.22	peak	V
5350.00	46.00	-3.59	42.41	54	-11.59	AVG	V

Worse case mode:		802.11ac(HT20)(6.5Mbps)		Test channel:		149	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V
5650	58.31	-3.46	54.85	68.2	-13.35	peak	H
5743.53	98.89	-3.44	95.45	122.2	-26.75	peak	H
5650	59.44	-3.46	55.98	68.2	-12.22	peak	V
5739.27	88.99	-3.44	85.55	122.2	-36.65	peak	V

Worse case mode:		802.11ac(HT20)(6.5Mbps)		Test channel:		165	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V
5831.03	98.09	-3.42	94.67	122.2	-27.53	peak	H
5925	59.36	-3.41	55.95	68.2	-12.25	peak	H
5825.11	88.92	-3.42	85.5	122.2	-36.7	peak	V
5925	46.14	-3.41	42.73	68.2	-25.47	peak	V

Worse case mode:		802.11ac(VHT40)(13.5Mbps)		Test channel:		38	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V
5150.00	58.72	-3.63	55.09	74	-18.91	peak	H
5150.00	44.71	-3.63	41.08	54	-12.92	AVG	H
5150.00	58.95	-3.63	55.32	74	-18.68	peak	V
5150.00	45.73	-3.63	42.10	54	-11.90	AVG	V

Worse case mode:		802.11ac(VHT40)(13.5Mbps)		Test channel:		46	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V
5350.00	58.37	-3.59	54.78	74	-19.22	peak	H
5350.00	44.52	-3.59	40.93	54	-13.07	AVG	H
5350.00	58.69	-3.59	55.10	74	-18.90	peak	V
5350.00	45.38	-3.59	41.79	54	-12.21	AVG	V

Worse case mode:		802.11ac(VHT40)(13.5Mbps)		Test channel:		151	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V
5650	58.51	-3.46	55.05	68.2	-13.15	peak	H
5751.12	95.83	-3.44	92.39	122.2	-29.81	peak	H
5650	59.53	-3.46	56.07	68.2	-12.13	peak	V
5741.73	85.28	-3.44	81.84	122.2	-40.36	peak	V

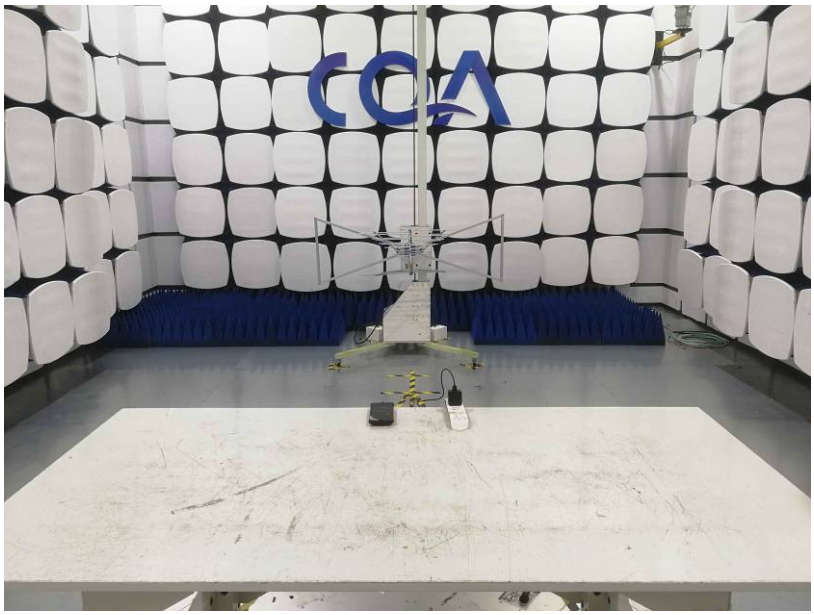
Worse case mode:		802.11ac(VHT40)(13.5Mbps)		Test channel:		159	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V
5771.13	95.22	-3.42	91.8	122.2	-30.4	peak	H
5925	59.57	-3.41	56.16	68.2	-12.04	peak	H
5806.54	85.8	-3.42	82.38	122.2	-39.82	peak	V
5925	45.52	-3.41	42.11	68.2	-26.09	peak	V

Note:
The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:

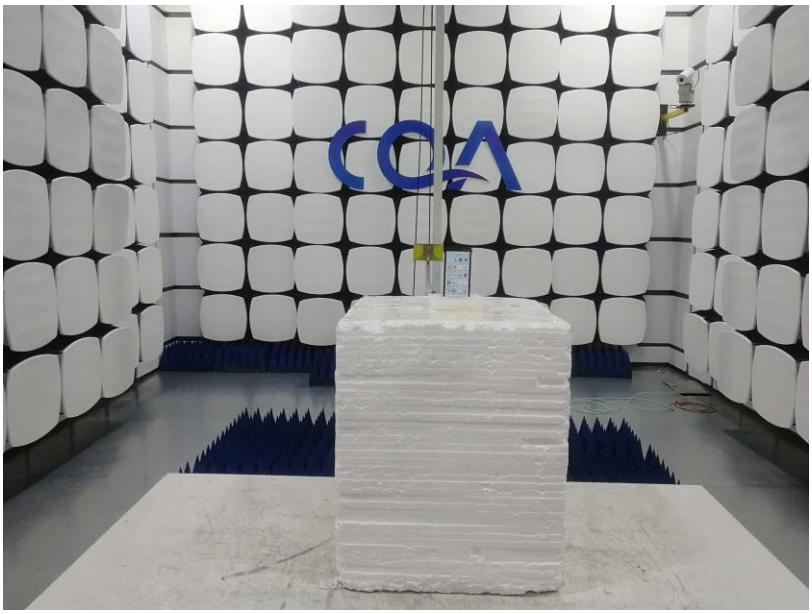
Final Test Level =Receiver Reading + Antenna Factor + Cable Factor – Preamplifier Factor

6 Photographs - EUT Test Setup

6.1 Radiated Spurious Emission



30MHz~1GHz:



Above 1GHz:

6.2 Conducted Emission

7 Photographs - EUT Constructional Details

Please refer to the report No: CQASZ20190500014EX-01

THE END