Report No.: GTS201907000125F02

Test Report

Applicant:	Nuvyyo Inc.
Address of Applicant:	555 Legget Drive Tower B Suite 836 Kanata, ON K2K2X3, Canada
Manufacturer:	Nuvyyo Inc.
Address of Manufacturer:	555 Legget Drive Tower B Suite 836 Kanata, ON K2K2X3, Canada
Factory:	SHENZHEN GIEC DIGITAL CO., LTD
Address of Factory:	1st&3rd Building, No.26 Puzai Road, Pingdi, Longgang District, Shenzhen, China

Equipment Under Test (EUT)

Product Name:	OTA streamer
Model No.:	Tablo Quad, Tablo Quad HDD, TQNS4B-02-CN, TQNS4B-01-CN, TQNS4B-03-CN, TQSS4B-01-CN, TQSS4B-02-CN, TQSS4B-03-CN, TQHD4B-01-CN, TQHD4B-02-CN, TQHD4B-03-CN
FCC ID:	2AOR7-TABLO401
Applicable standards:	FCC CFR Title 47 Part 15 Subpart E Section 15.407
Date of sample receipt:	July 18, 2019
Date of Test:	July 19, 2019- August 13, 2019
Date of report issue:	August 13, 2019
Test Result :	PASS *

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

Authorized Signature:

Robinson Lo
Laboratory Manager

This results shown in this test report refer only to the sample(s) tested, this test report cannot be reproduced, except in full, without prior written permission of the company. The report would be invalid without specific stamp of test institute and the signatures of compiler and approver.

2 Version

Version No.	Date	Description
00	*August 13, 2019*	*Original*

Prepared By:	Tiger. Chen	***Date:***	*August 13, 2019*
	Project Engineer		
Check By:	Robinson Lo	***Date:***	*August 13, 2019*
	Reviewer		

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4 Test Summary

Test Item	Section in CFR 47	Result
Antenna requirement	15.203	PASS
AC Power Line Conducted Emission	15.207	PASS
Peak Transmit Power	15.407(a)(1)	PASS
Power Spectral Density	15.407(a)(1)	PASS
Undesirable Emission	15.407(b)(6), 15.205/15.209	PASS
Radiated Emission	15.205/15.209	PASS
Band Edge	15.407(b)(1)	PASS
Frequency Stability	15.407(g)	PASS

Remark:

Pass: The EUT complies with the essential requirements in the standard.

4.1 Measurement Uncertainty

Test Item	Frequency Range	Measurement Uncertainty	Notes
Radiated Emission	9kHz ~ 30MHz	±3.8039dB	(1)
Radiated Emission	30MHz ~ 1000MHz	± 3.9679dB	(1)
Radiated Emission	1GHz ~ 40GHz	± 4.29dB	(1)
AC Power Line Conducted Emission	0.15MHz ~ 30MHz	± 3.44dB	(1)
Note (1): The measurement uncertainty is for coverage factor of k=2 and a level of confidence of 95%. Remark: Test according to ANSI C63.10:2013 and ANSI C63.4:2014			

5 General Information

5.1 General Description of EUT

<table>
<tr><td>Product Name:</td><td>OTA streamer</td></tr>
<tr><td>Model No.:</td><td>Tablo Quad, Tablo Quad HDD, TQNS4B-02-CN,
TQNS4B-01-CN, TQNS4B-03-CN, TQSS4B-01-CN,
TQSS4B-02-CN, TQSS4B-03-CN, TQHD4B-01-CN,
TQHD4B-02-CN, TQHD4B-03-CN</td></tr>
<tr><td>Test Model No:</td><td>TQNS4B-02-CN</td></tr>
<tr><td colspan="2">Remark: All above models are identical in the same PCB layout, interior structure and electrical circuits. The only difference is model name for commercial purpose.</td></tr>
<tr><td>Serial No.:</td><td>GI - Q03254039 ~GI - Q04194303</td></tr>
<tr><td>Hardware Version:</td><td>ATSC-MPEG-14G/VER1.0-2-20181025</td></tr>
<tr><td>Software Version:</td><td>2.2.26 1919814</td></tr>
<tr><td>Test sample(s) ID:</td><td>GTS201907000125 -1</td></tr>
<tr><td>Sample(s) Status:</td><td>Engineer sample</td></tr>
<tr><td>Operation Frequency:</td><td>
<table>
<tr><th>Band</th><th>Mode</th><th>Frequency Range(MHz)</th><th>Number of channels</th></tr>
<tr><td rowspan="4">U-NII Band I</td><td>IEEE 802.11a</td><td>5180-5240</td><td>4</td></tr>
<tr><td>IEEE 802.11n/ac 20MHz</td><td>5180-5240</td><td>4</td></tr>
<tr><td>IEEE 802.11n/ac 40MHz</td><td>5190-5230</td><td>2</td></tr>
<tr><td>IEEE 802.11ac 80MHz</td><td>5210</td><td>1</td></tr>
</table>
</td></tr>
<tr><td>Modulation technology:</td><td>OFDM
MIMO: 802.11n/ac
SISO: 802.11a</td></tr>
<tr><td>Antenna Type:</td><td>Integral Antenna</td></tr>
<tr><td>Antenna gain:</td><td>-1.5dBi</td></tr>
<tr><td>Power supply:</td><td>Adapter
Model No: TEKA024-1202000UK
Input: AC 100-240V, 50/60Hz, 0.7A MAX
Output: DC 12V, 2 A</td></tr>
</table>

Channel list for 802.11a/n/ac(HT20)							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
36	5180MHz	40	5200MHz	44	5220MHz	48	5240MHz

Channel list for 802.11n(HT40)/ac(HT40)							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
38	5190MHz	46	5230MHz				

Channel list for 802.11ac(HT80)							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
42	5210MHz						

5.2 Test mode

Transmitting mode	Keep the EUT in transmitting with modulation..

Remark: During the test, the test voltage was tuned from 85% to 115% of the nominal rated supply voltage, and found that the worst case was under the nominal rated supply condition. So the report just shows that condition's data.

We have verified the construction and function in typical operation. All the test modes were carried out with the EUT in transmitting operation, which was shown in this test report and defined as follows:

Pre-scan all kind of data rate in lowest channel, and found the follow list which it was worst case.

Mode	Data rate
802.11a/n/ac(HT20)	6/6.5 Mbps
802.11n/ac(HT40)	13.5 Mbps
802.11ac(HT80)	29.3 Mbps

5.3 Test Facility

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

● **FCC —Registration No.: 381383**

Global United Technology Services 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 files. Registration 381383.

● **NVLAP (LAB CODE:600179-0)**

Global United Technology Services Co., Ltd., is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP). LAB CODE:600179-0

5.4 Test Location

All tests were performed at:

Global United Technology Services Co., Ltd.

Address: No. 301-309, 3/F., Jinyuan Business Building, No.2, Laodong Industrial Zone, Xixiang Road, sBaoan District, Shenzhen, Guangdong, China 518102

Tel: 0755-27798480

Fax: 0755-27798960

5.5 Description of Support Units

Manufacturer	Description	Model	Serial Number
IBM Thinkpad	Notebook PC	2374	L3-G0686

5.6 Deviation from Standards

None.

5.7 Abnormalities from Standard Conditions

None.

5.8 Additional Instructions

Test Software	Special test command provided by manufacturer
Power level setup	Default
Version	Ver 1.0

6 Test Instruments list

Radiated Emission:						
Item	**Test Equipment**	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal.Date (mm-dd-yy)**	**Cal.Due date (mm-dd-yy)**
1	3m Semi- Anechoic Chamber	ZhongYu Electron	9.2(L)*6.2(W)* 6.4(H)	GTS250	July. 03 2015	July. 02 2020
2	Control Room	ZhongYu Electron	6.2(L)*2.5(W)* 2.4(H)	GTS251	N/A	N/A
3	EMI Test Receiver	Rohde & Schwarz	ESU26	GTS203	June. 26 2019	June. 25 2020
4	BiConiLog Antenna	SCHWARZBECK MESS-ELEKTRONIK	VULB9163	GTS214	June. 26 2019	June. 25 2020
5	Double -ridged waveguide horn	SCHWARZBECK MESS-ELEKTRONIK	BBHA 9120 D	GTS208	June. 26 2019	June. 25 2020
6	Horn Antenna	ETS-LINDGREN	3160	GTS217	June. 26 2019	June. 25 2020
7	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
8	Coaxial Cable	GTS	N/A	GTS213	June. 26 2019	June. 25 2020
9	Coaxial Cable	GTS	N/A	GTS211	June. 26 2019	June. 25 2020
10	Coaxial cable	GTS	N/A	GTS210	June. 26 2019	June. 25 2020
11	Coaxial Cable	GTS	N/A	GTS212	June. 26 2019	June. 25 2020
12	Amplifier(100kHz-3GHz)	HP	8347A	GTS204	June. 26 2019	June. 25 2020
13	Amplifier(2GHz-20GHz)	HP	84722A	GTS206	June. 26 2019	June. 25 2020
14	Amplifier (18-26GHz)	Rohde & Schwarz	AFS33-18002 650-30-8P-44	GTS218	June. 26 2019	June. 25 2020
15	Band filter	Amindeon	82346	GTS219	June. 26 2019	June. 25 2020
16	Power Meter	Anritsu	ML2495A	GTS540	June. 26 2019	June. 25 2020
17	Power Sensor	Anritsu	MA2411B	GTS541	June. 26 2019	June. 25 2020
18	Wideband Radio Communication Tester	Rohde & Schwarz	CMW500	GTS575	June. 26 2019	June. 25 2020
19	Splitter	Agilent	11636B	GTS237	June. 26 2019	June. 25 2020
20	Loop Antenna	ZHINAN	ZN30900A	GTS534	June. 26 2019	June. 25 2020
21	Breitband hornantenne	SCHWARZBECK	BBHA 9170	GTS579	Oct. 20 2018	Oct. 19 2019
22	Amplifier	TDK	PA-02-02	GTS574	Oct. 20 2018	Oct. 19 2019
23	Amplifier	TDK	PA-02-03	GTS576	Oct. 20 2018	Oct. 19 2019
24	PSA Series Spectrum Analyzer	Rohde & Schwarz	FSP	GTS578	June. 26 2019	June. 25 2020

Conducted Emission						
Item	**Test Equipment**	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal.Date (mm-dd-yy)**	**Cal.Due date (mm-dd-yy)**
1	Shielding Room	ZhongYu Electron	7.3(L)x3.1(W)x2.9(H)	GTS252	May.15 2019	May.14 2022
2	EMI Test Receiver	R&S	ESCI 7	GTS552	June. 26 2019	June. 25 2020
3	Coaxial Switch	ANRITSU CORP	MP59B	GTS225	June. 26 2019	June. 25 2020
4	Artificial Mains Network	SCHWARZBECK MESS	NSLK8127	GTS226	June. 26 2019	June. 25 2020
5	Coaxial Cable	GTS	N/A	GTS227	N/A	N/A
6	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
7	Thermo meter	KTJ	TA328	GTS233	June. 26 2019	June. 25 2020
8	Absorbing clamp	Elektronik-Feinmechanik	MDS21	GTS229	June. 26 2019	June. 25 2020
9	ISN	SCHWARZBECK	NTFM 8158	GTD565	June. 26 2019	June. 25 2020

RF Conducted Test:						
Item	**Test Equipment**	**Manufacturer**	**Model No.**	**Serial No.**	**Cal.Date (mm-dd-yy)**	**Cal.Due date (mm-dd-yy)**
1	MXA Signal Analyzer	Agilent	N9020A	GTS566	June. 26 2019	June. 25 2020
2	EMI Test Receiver	R&S	ESCI 7	GTS552	June. 26 2019	June. 25 2020
3	Spectrum Analyzer	Agilent	E4440A	GTS533	June. 26 2019	June. 25 2020
4	MXG vector Signal Generator	Agilent	N5182A	GTS567	June. 26 2019	June. 25 2020
5	ESG Analog Signal Generator	Agilent	E4428C	GTS568	June. 26 2019	June. 25 2020
6	USB RF Power Sensor	DARE	RPR3006W	GTS569	June. 26 2019	June. 25 2020
7	RF Switch Box	Shongyi	RFSW3003328	GTS571	June. 26 2019	June. 25 2020
8	Programmable Constant Temp & Humi Test Chamber	WEWON	WHTH-150L-40-880	GTS572	June. 26 2019	June. 25 2020

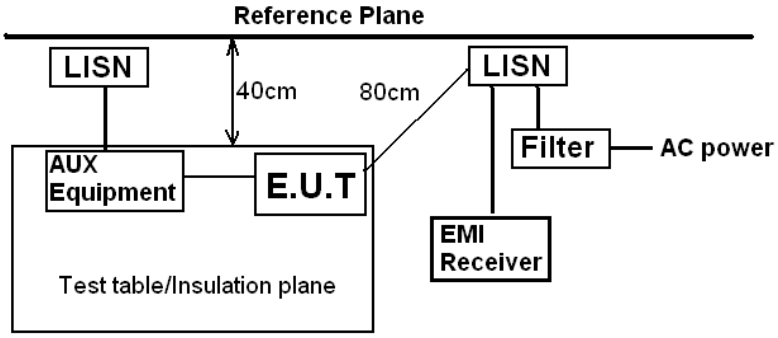
General used equipment:						
Item	**Test Equipment**	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal.Date (mm-dd-yy)**	**Cal.Due date (mm-dd-yy)**
1	Humidity/ Temperature Indicator	KTJ	TA328	GTS243	June. 26 2019	June. 25 2020
2	Barometer	ChangChun	DYM3	GTS255	June. 26 2019	June. 25 2020

7 Test results and Measurement Data

7.1 Antenna requirement:

Standard requirement:	FCC Part15 C Section 15.203
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.*	
E.U.T Antenna:	
The antennas are integral antenna, the best case gain of the antennas are -1.5dBi, reference to the appendix II for details	

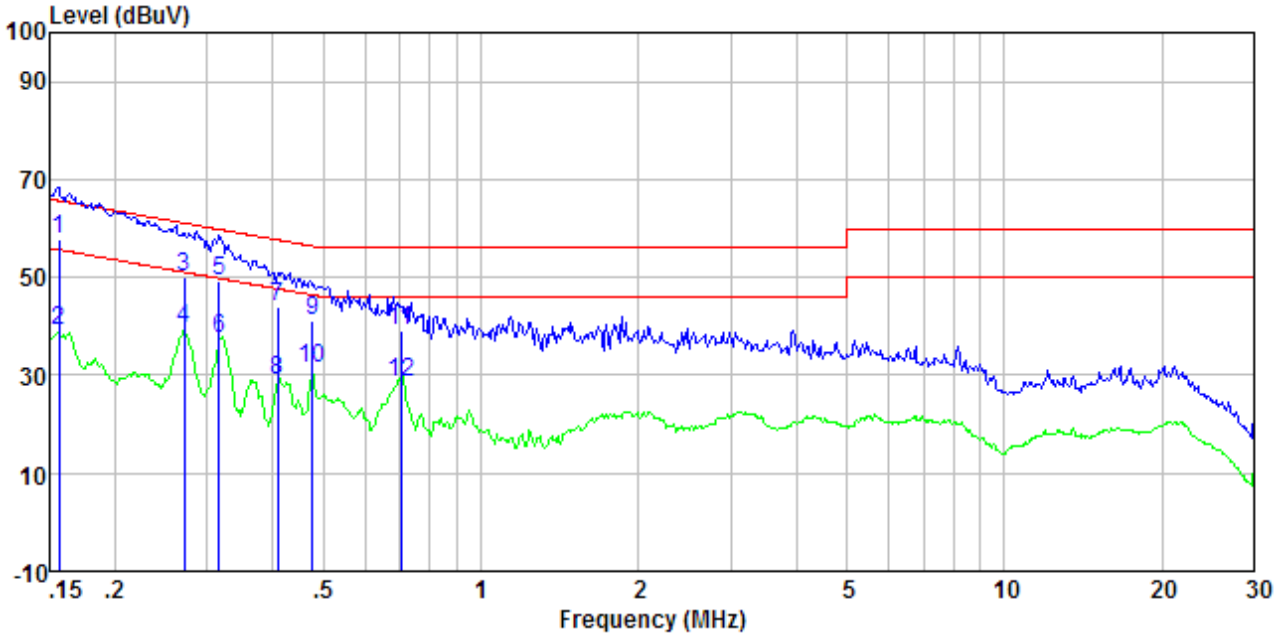
7.2 Conducted Emissions

Test Requirement:	FCC Part15 C Section 15.207
Test Method:	ANSI C63.10:2013
Test Frequency Range:	150KHz to 30MHz
Class / Severity:	Class B
Receiver setup:	RBW=9KHz, VBW=30KHz
Limit:	Frequency range (MHz) / Limit (dBuV): Quasi-peak / Average 0.15-0.5: 66 to 56* / 56 to 46* 0.5-5: 56 / 46 5-30: 60 / 50 * Decreases with the logarithm of the frequency.
Test procedure	The E.U.T and simulators are connected to the main power through a line impedance stabilization network(L.I.S.N.). The provide a 50ohm/50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refers to the block diagram of the test setup and photographs). Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10:2013 on conducted measurement.
Test setup:	 *Remark:* *E.U.T: Equipment Under Test* *LISN: Line Impedence Stabilization Network* *Test table height=0.8m*
Test Instruments:	Refer to section 5.10 for details
Test mode:	Refer to section 5.2 for details
Test environment:	Temp.: 25 °C / Humid.: 52% / Press.: 1012mbar
Test voltage:	AC 120V, 60Hz
Test results:	Pass

Remark: Both high and low voltages have been tested to show only the worst low voltage test data.

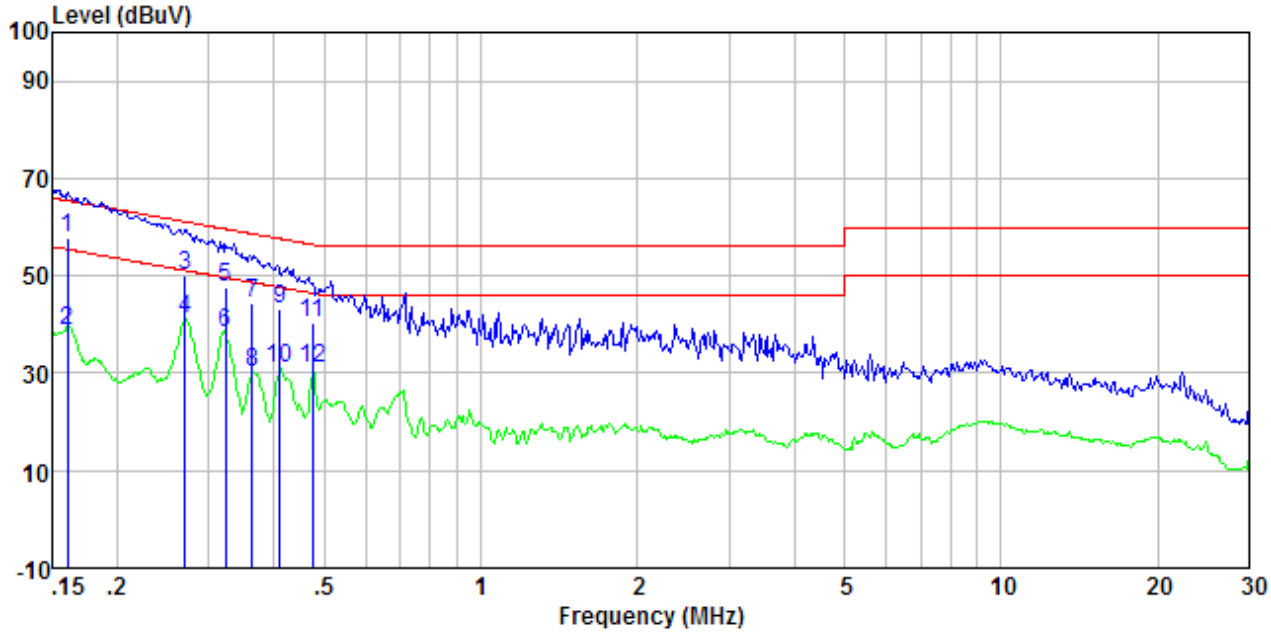
Measurement data:

Line:



Freq MHz	Reading level dBuV	LISN/ISN factor dB/m	Cable loss dB	Level dBuV	Limit level dBuV	Over limit dB	Remark
0.16	57.50	0.40	0.08	57.98	65.65	-7.67	QP
0.16	38.75	0.40	0.08	39.23	55.65	-16.42	Average
0.27	49.50	0.40	0.10	50.00	61.07	-11.07	QP
0.27	38.91	0.40	0.10	39.41	51.07	-11.66	Average
0.32	48.59	0.39	0.10	49.08	59.80	-10.72	QP
0.32	36.89	0.39	0.10	37.38	49.80	-12.42	Average
0.41	43.32	0.35	0.11	43.78	57.68	-13.90	QP
0.41	28.60	0.35	0.11	29.06	47.68	-18.62	Average
0.48	40.58	0.32	0.11	41.01	56.41	-15.40	QP
0.48	31.05	0.32	0.11	31.48	46.41	-14.93	Average
0.70	38.61	0.26	0.13	39.00	56.00	-17.00	QP
0.70	28.26	0.26	0.13	28.65	46.00	-17.35	Average

Neutral:

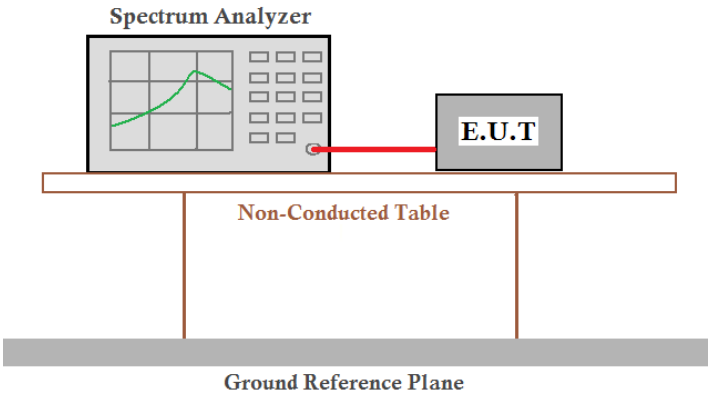


Freq MHz	Reading level dBuV	LISN/ISN factor dB/m	Cable loss dB	Level dBuV	Limit level dBuV	Over limit dB	Remark
0.16	57.12	0.40	0.08	57.60	65.43	-7.83	QP
0.16	38.21	0.40	0.08	38.69	55.43	-16.74	Average
0.27	49.64	0.40	0.10	50.14	61.12	-10.98	QP
0.27	40.73	0.40	0.10	41.23	51.12	-9.89	Average
0.32	47.03	0.39	0.10	47.52	59.62	-12.10	QP
0.32	37.86	0.39	0.10	38.35	49.62	-11.27	Average
0.36	43.80	0.37	0.10	44.27	58.65	-14.38	QP
0.36	29.66	0.37	0.10	30.13	48.65	-18.52	Average
0.41	42.91	0.35	0.11	43.37	57.64	-14.27	QP
0.41	30.42	0.35	0.11	30.88	47.64	-16.76	Average
0.47	39.82	0.32	0.11	40.25	56.45	-16.20	QP
0.47	30.44	0.32	0.11	30.87	46.45	-15.58	Average

Notes:

1. *An initial pre-scan was performed on the line and neutral lines with peak detector.*
2. *Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.*
3. *Final Level =Receiver Read level + LISN Factor + Cable Loss*

7.3 Emission Bandwidth and 99% Occupied Bandwidth

Test Requirement:	FCC Part15 E Section 15.407
Test Method:	KDB 789033 D02 General U-NII Test Procedures New Rules v02r01
Limit:	N/A
Test setup:	
Test procedure:	According to KDB 789033 D02 General U-NII Test Procedures New Rules v02r01.
Test Instruments:	Refer to section 5.10 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

Measurement Data:

ANT 1:

CH. No.	Frequency (MHz)	99% Occupied Bandwidth (MHz)			26dB Occupied Bandwidth (MHz)		
		802.11a	802.11n(HT20)	802.11ac(HT20)	802.11a	802.11n(HT20)	802.11ac(HT20)
36	5180	16.4148	17.5952	17.6325	22.367	23.195	21.931
40	5200	16.4594	17.5891	17.6151	22.280	21.810	22.650
48	5240	16.4200	17.5871	17.6152	22.075	21.883	21.653

CH. No.	Frequency (MHz)	99% Occupied Bandwidth (MHz)		26dB Occupied Bandwidth (MHz)	
		802.11n(HT40)	802.11ac(HT40)	802.11n(HT40)	802.11ac(HT40)
38	5190	36.0771	35.9454	41.779	41.475
46	5230	36.0369	36.0084	42.006	41.945

CH. No.	Frequency (MHz)	99% Occupied Bandwidth (MHz)	26dB Occupied Bandwidth (MHz)
		802.11ac(HT80)	802.11ac(HT80)
42	5210	75.1503	81.299

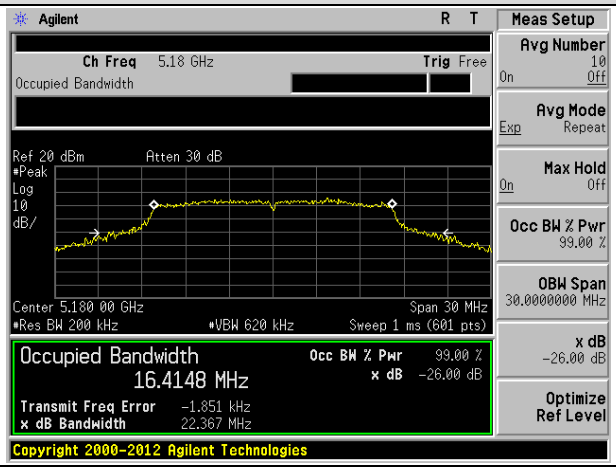
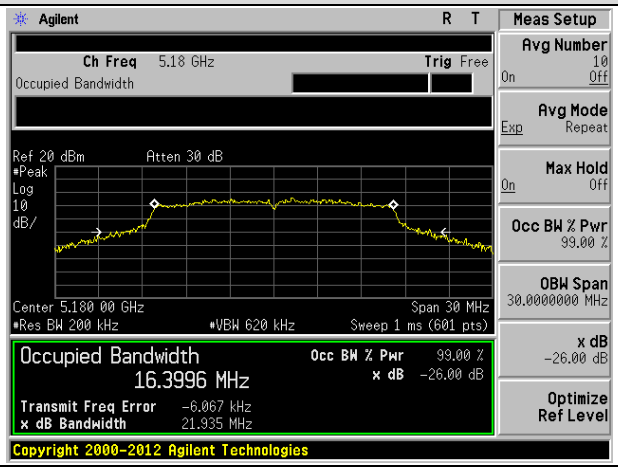
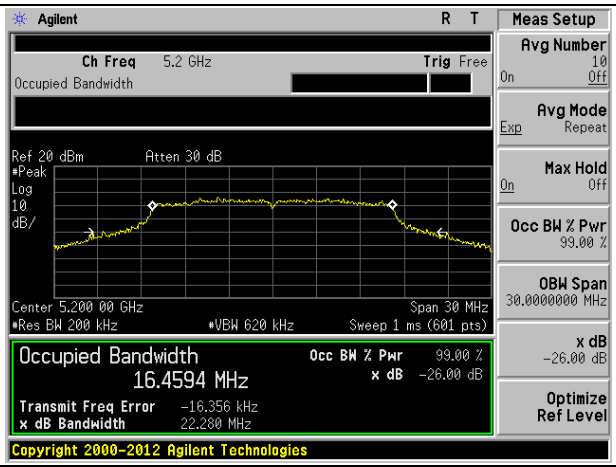
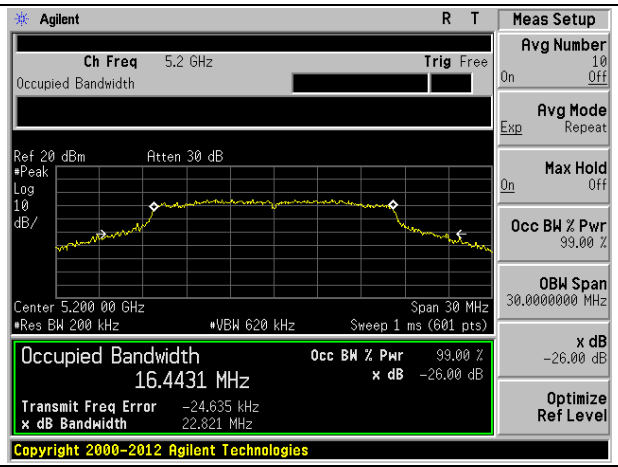
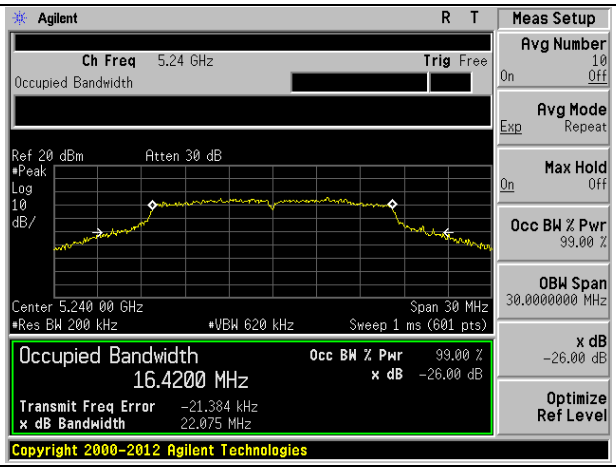
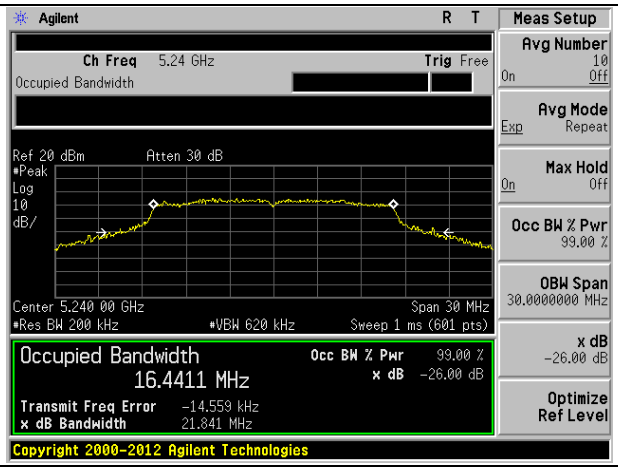
ANT 2:

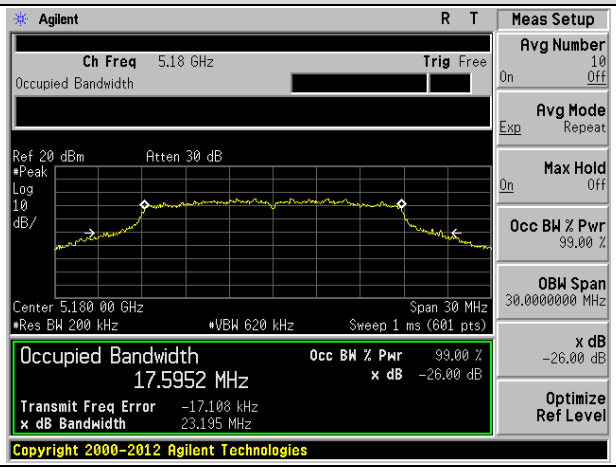
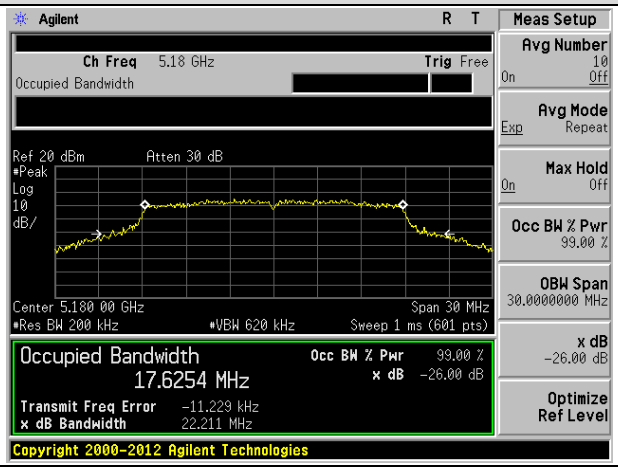
CH. No.	Frequency (MHz)	99% Occupied Bandwidth (MHz)			26dB Occupied Bandwidth (MHz)		
		802.11a	802.11n(HT20)	802.11ac(HT20)	802.11a	802.11n(HT20)	802.11ac(HT20)
36	5180	16.3996	17.6254	17.6143	21.935	22.211	21.309
40	5200	16.4431	17.5949	17.6055	22.821	22.374	22.498
48	5240	16.4411	17.6172	17.6220	21.841	21.283	22.637

CH. No.	Frequency (MHz)	99% Occupied Bandwidth (MHz)		26dB Occupied Bandwidth (MHz)	
		802.11n(HT40)	802.11ac(HT40)	802.11n(HT40)	802.11ac(HT40)
38	5190	36.0059	35.9619	41.334	41.850
46	5230	36.0354	35.9640	41.593	41.486

CH. No.	Frequency (MHz)	99% Occupied Bandwidth (MHz)	26dB Occupied Bandwidth (MHz)
		802.11ac(HT80)	802.11ac(HT80)
42	5210	75.1051	80.702

Test plots as followed:

802.11a mode	
ANT 1	**ANT 2**
	
5180	**5180**
	
5200	**5200**
	
5240	**5240**

802.11n(HT20) mode	
ANT 1	**ANT 2**
	
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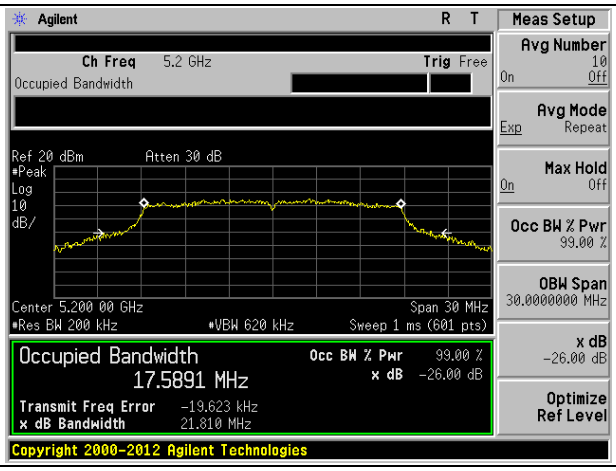	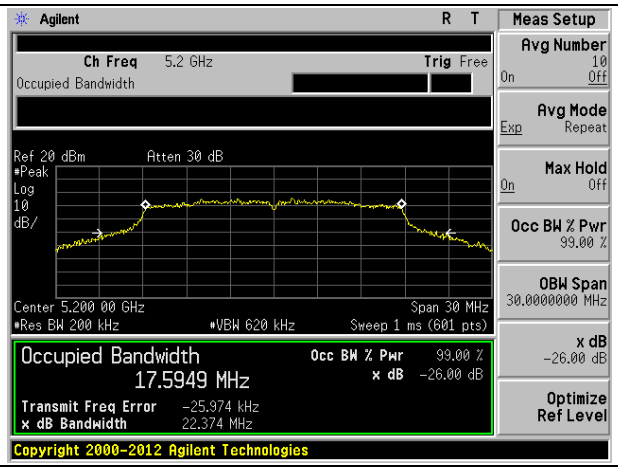
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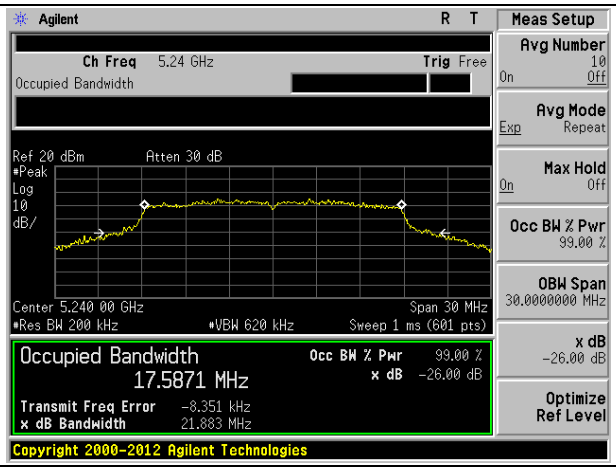
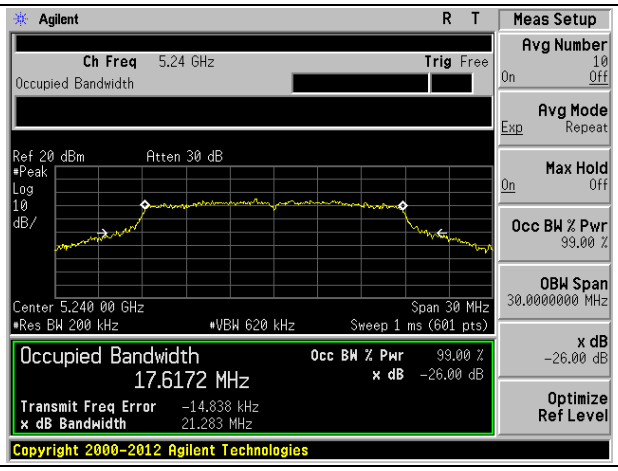
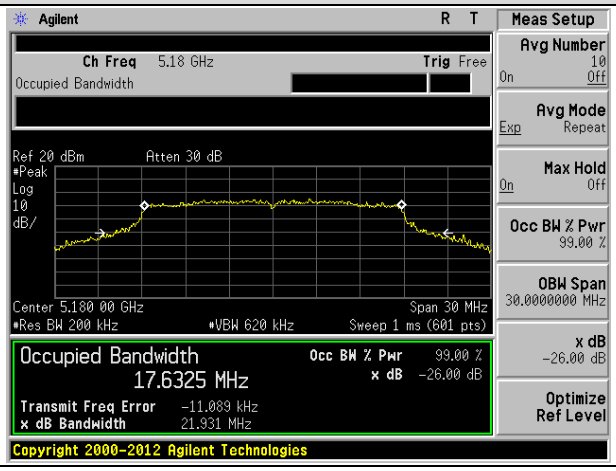
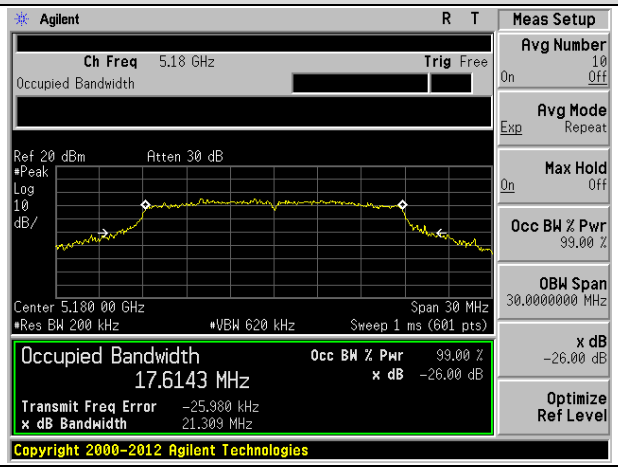
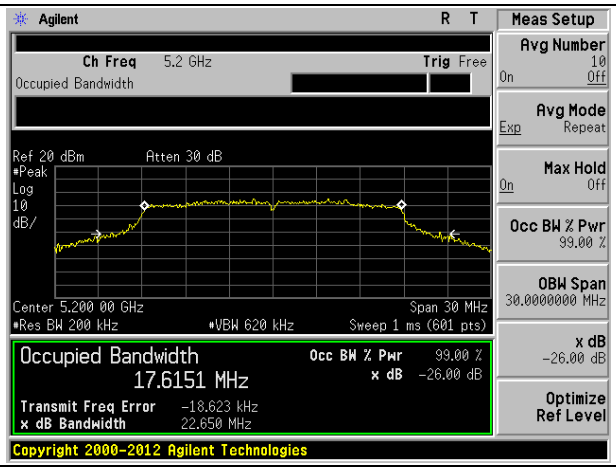
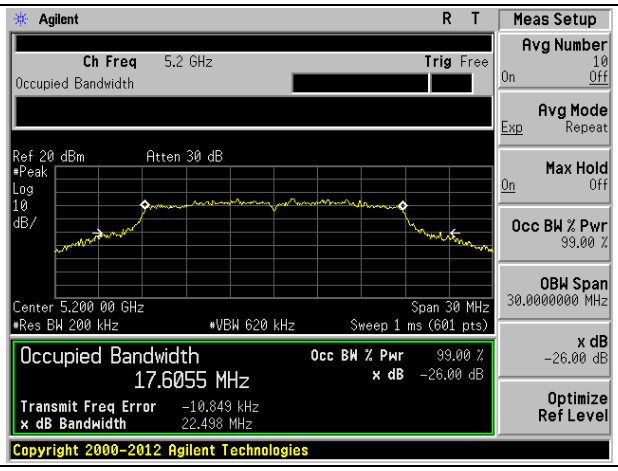
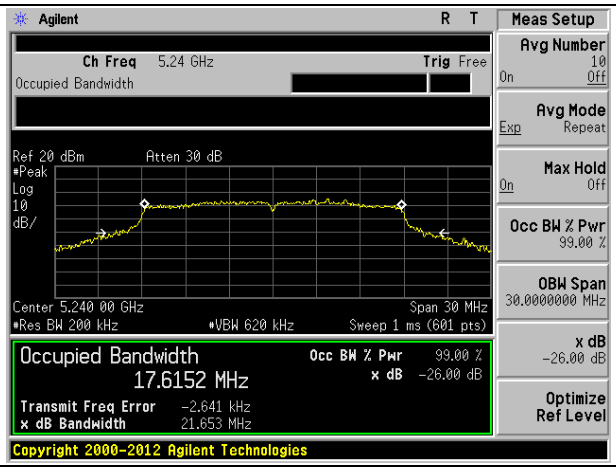
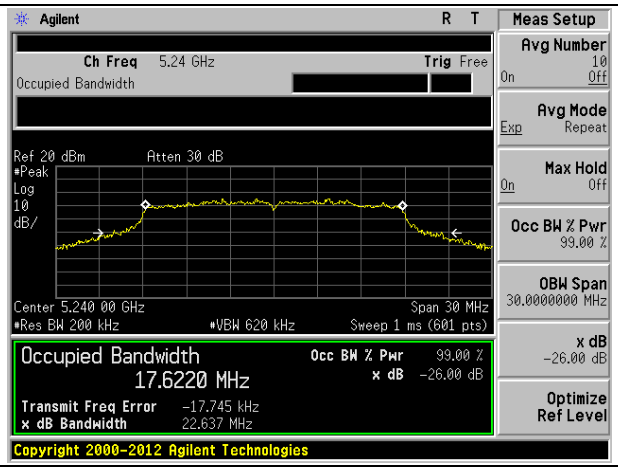
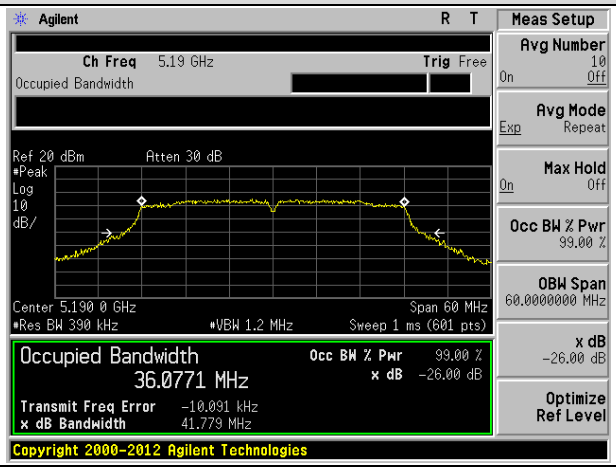
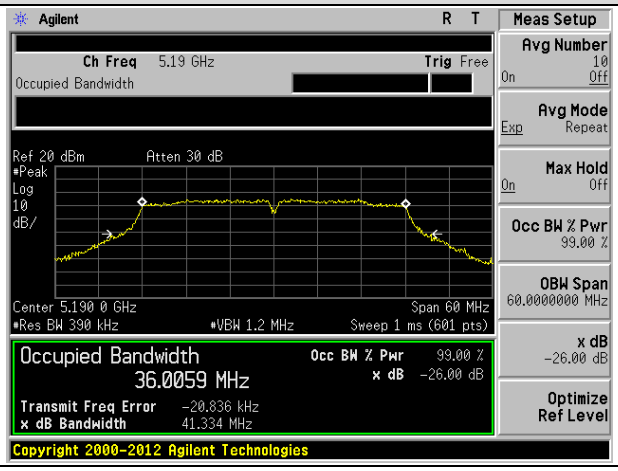
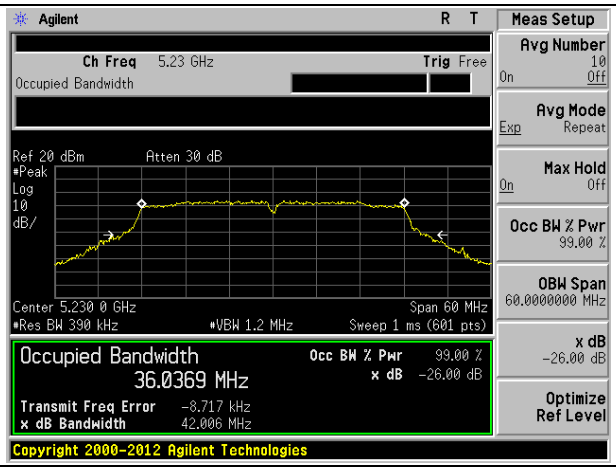
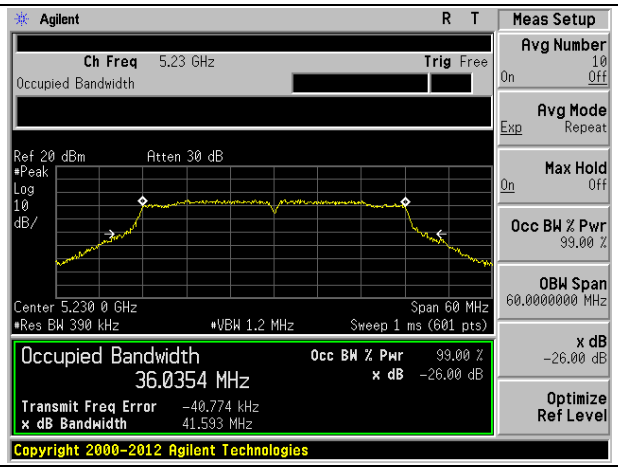
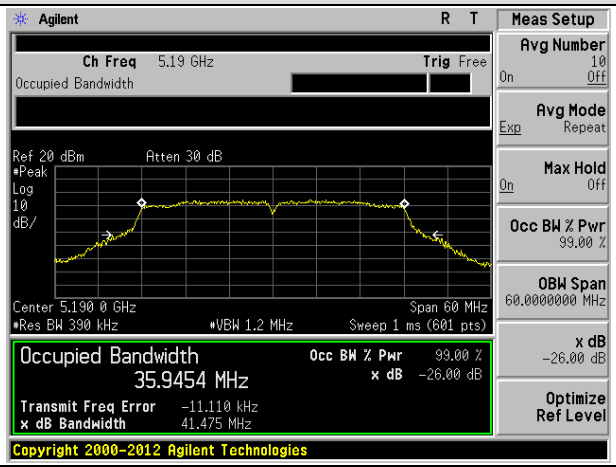
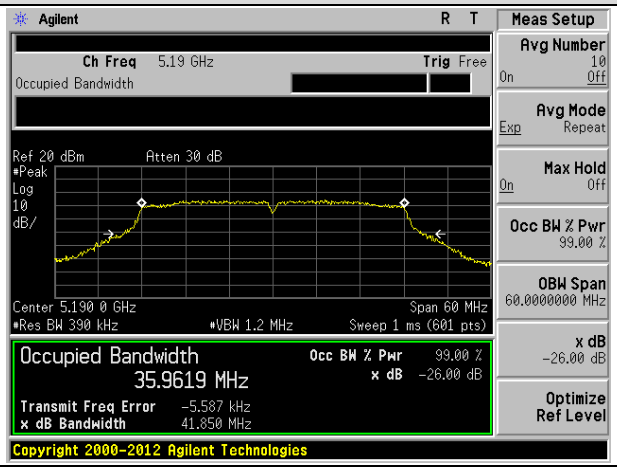
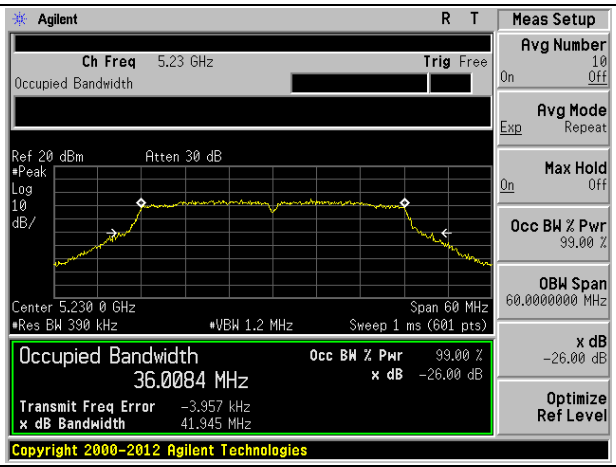
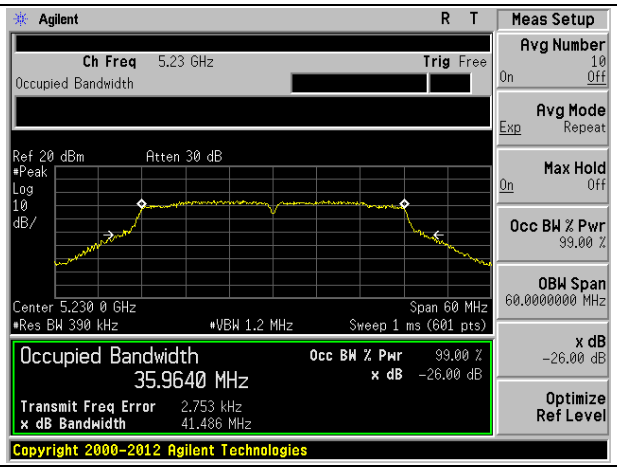
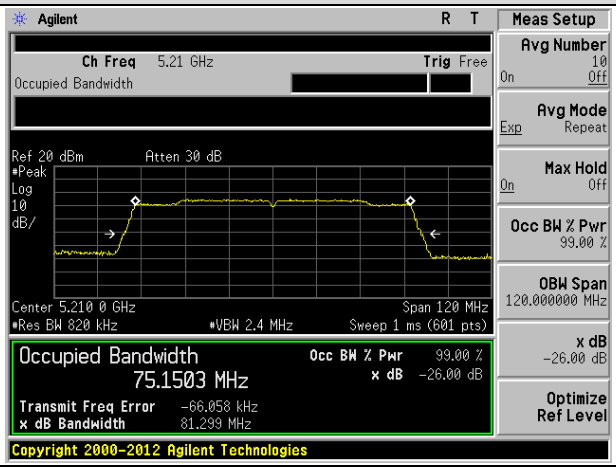
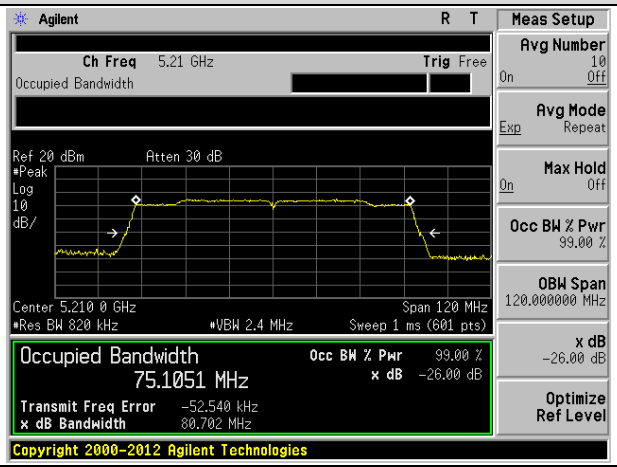
	
5240	**5240**

802.11ac(HT20) mode	
ANT 1	**ANT 2**
	
5180	**5180**
	
5200	**5200**
	
5240	**5240**

802.11n(HT40) mode	
ANT 1	**ANT 2**
	
5190	**5190**
	
5230	**5230**

802.11ac(HT40) mode	
ANT 1	**ANT 2**
	
5190	**5190**
	
5230	**5230**

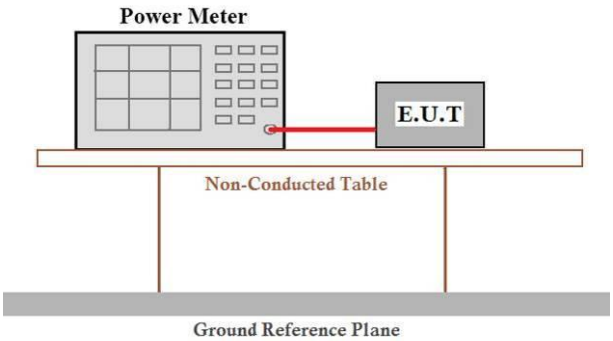
802.11ac(HT80) mode	
ANT 1	**ANT 2**
	
5210	**5210**

7.4 Peak Transmit Power

Test Requirement:	FCC Part15 E Section 15.407
Test Method:	KDB 789033 D02 General U-NII Test Procedures New Rules v02r01
Limit:	

Frequency band (MHz)	Limit
5150-5250	≤1W(30dBm) for master device
	≤250mW(23.98dBm) for client device
5250-5350	≤250mW(23.98dBm) for client device or 11dBm+10logB*
5470-5725	≤250mW(23.98dBm) for client device or 11dBm+10logB*
Remark: *Where B is the 26dB emission bandwidth in MHz. The maximum conducted output power must be measured over any interval of continuous transmission using instrumentation calibrated in terms of an rms-equivalent voltage.	

Test setup:



Test procedure:

Measurement using an RF average power meter

(i) Measurements may be performed using a wideband RF power meter with a thermocouple detector or equivalent if all of the conditions listed below are satisfied

a) The EUT is configured to transmit continuously or to transmit with a constant duty cycle.

b) At all times when the EUT is transmitting, it must be transmitting at its maximum power control level.

c) The integration period of the power meter exceeds the repetition period of the transmitted signal by at least a factor of five.

(ii) If the transmitter does not transmit continuously, measure the duty cycle, x, of the transmitter output signal as described in section B).

(iii) Measure the average power of the transmitter. This measurement is an average over both the on and off periods of the transmitter.

(iv) Adjust the measurement in dBm by adding 10 log(1/x) where x is the duty cycle (e.g., 10log(1/0.25) if the duty cycle is 25 percent).

Test Instruments:	Refer to section 5.10 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

Measurement Data

Modulation	Duty cycle	Duty Factor
802.11a	98.8%	0.05
802.11n(HT20)	98.8%	0.05
802.11n(HT40)	97.5%	0.11
802.11ac(HT20)	98.9%	0.05
802.11ac(HT40)	97.4%	0.11
802.11ac(HT80)	95.2%	0.21

ANT 1:

802.11a mode						
CH No.	Frequency (MHz)	Measured Power (dBm)	Duty Factor	Output Power (dBm)	Limit (dBm)	Result
36	5180	10.81	0.05	10.86	23.98	Pass
40	5200	10.80	0.05	10.85	23.98	Pass
48	5240	11.90	0.05	11.95	23.98	Pass
802.11n(HT20) mode						
CH No.	Frequency (MHz)	Measured Power (dBm)	Duty Factor	Output Power (dBm)	Limit (dBm)	Result
36	5180	10.33	0.05	10.38	23.98	Pass
40	5200	11.00	0.05	11.05	23.98	Pass
48	5240	11.18	0.05	11.23	23.98	Pass
802.11ac(HT20) mode						
CH No.	Frequency (MHz)	Measured Power (dBm)	Duty Factor	Output Power (dBm)	Limit (dBm)	Result
36	5180	10.80	0.05	10.85	23.98	Pass
40	5200	11.51	0.05	11.56	23.98	Pass
48	5240	11.45	0.05	11.50	23.98	Pass
802.11n(HT40) mode						
CH No.	Frequency (MHz)	Measured Power (dBm)	Duty Factor	Output Power (dBm)	Limit (dBm)	Result
38	5190	9.46	0.11	9.57	23.98	Pass
46	5230	10.38	0.11	10.49	23.98	Pass
802.11 ac(HT40) mode						
CH No.	Frequency (MHz)	Measured Power (dBm)	Duty Factor	Output Power (dBm)	Limit (dBm)	Result
38	5190	10.03	0.11	10.14	23.98	Pass
46	5230	11.36	0.11	11.47	23.98	Pass
802.11 ac(HT80)						
CH No.	Frequency (MHz)	Measured Power (dBm)	Duty Factor	Output Power (dBm)	Limit (dBm)	Result
42	5210	10.93	0.21	11.13	23.98	Pass

ANT 2:

802.11a mode						
CH No.	Frequency (MHz)	Measured Power (dBm)	Duty Factor	Output Power (dBm)	Limit (dBm)	Result
36	5180	11.37	0.05	11.42	23.98	Pass
40	5200	9.43	0.05	9.48	23.98	Pass
48	5240	10.57	0.05	10.62	23.98	Pass
802.11n(HT20) mode						
CH No.	Frequency (MHz)	Measured Power (dBm)	Duty Factor	Output Power (dBm)	Limit (dBm)	Result
36	5180	10.83	0.05	10.88	23.98	Pass
40	5200	9.67	0.05	9.72	23.98	Pass
48	5240	11.25	0.05	11.30	23.98	Pass
802.11ac(HT20) mode						
CH No.	Frequency (MHz)	Measured Power (dBm)	Duty Factor	Output Power (dBm)	Limit (dBm)	Result
36	5180	10.17	0.05	10.22	23.98	Pass
40	5200	11.61	0.05	11.66	23.98	Pass
48	5240	9.25	0.05	9.30	23.98	Pass
802.11n(HT40) mode						
CH No.	Frequency (MHz)	Measured Power (dBm)	Duty Factor	Output Power (dBm)	Limit (dBm)	Result
38	5190	9.53	0.11	9.64	23.98	Pass
46	5230	10.74	0.11	10.85	23.98	Pass
802.11 ac(HT40) mode						
CH No.	Frequency (MHz)	Measured Power (dBm)	Duty Factor	Output Power (dBm)	Limit (dBm)	Result
38	5190	9.03	0.11	9.14	23.98	Pass
46	5230	10.69	0.11	10.80	23.98	Pass
802.11 ac(HT80)						
CH No.	Frequency (MHz)	Measured Power (dBm)	Duty Factor	Output Power (dBm)	Limit (dBm)	Result
42	5210	11.35	0.21	11.56	23.98	Pass

Note: Output Power = Measured Power + Duty Factor

Duty Factor = 10 log (1/Duty Cycle)

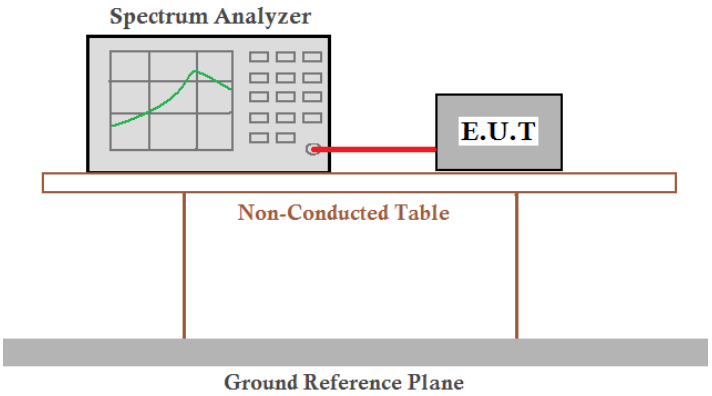
MIMO without beam forming:

Test mode	Frequency (MHz)	ANT 1 power (dBm)	ANT 2 power (dBm)	MIMO power (dBm)	Limit (dBm)	Result
802.11n(HT20)	5180	10.38	10.88	13.65	23.98	Pass
	5200	11.05	9.72	13.45		
	5240	11.23	11.30	14.28		
802.11ac(HT20)	5180	10.85	10.22	13.56		
	5200	11.56	11.66	14.62		
	5240	11.50	9.30	13.55		
802.11n(HT40)	5190	9.57	9.64	12.62		
	5230	10.49	10.85	13.68		
802.11ac(HT40)	5190	10.14	9.14	12.68		
	5230	11.47	10.80	14.16		
802.11ac(HT80)	5210	11.13	11.56	14.36		

Note: transmit signals are completely un*correlated*,

Directional gain=10 x log [($10^{-1.5/10}$ + $10^{-1.5/10}$)/2]=-1.5dBi

7.5 Power Spectral Density

Test Requirement:	FCC Part15 E Section 15.407
Test Method:	KDB 789033 D02 General U-NII Test Procedures New Rules v02r01
Limit:	Frequency band (MHz) / Limit 5150-5250: ≤17dBm in 1MHz for master device; ≤11dBm in 1MHz for client device 5250-5350: ≤11dBm in 1MHz for client device 5470-5725: ≤11dBm in 1MHz for client device Remark: The maximum power spectral density is measured as a conducted emission by direct connection of a calibrated test instrument to the equipment under test.
Test setup:	
Test procedure:	1) Create an average power spectrum for the EUT operating mode being tested by following the instructions in section E)2) for measuring maximum conducted output power using a spectrum analyzer or EMI receiver: select the appropriate test method (SA-1, SA-2, SA-3, or alternatives to each) and apply it up to, but not including, the step labeled, “Compute power…”. 2) Use the peak search function on the instrument to find the peak of the spectrum. 3) Make the following adjustments to the peak value of the spectrum, if applicable: a) If Method SA-2 or SA-2 Alternative was used, add 10 log(1/x), where x is the duty cycle, to the peak of the spectrum. b) If Method SA-3 Alternative was used and the linear mode was used in step E)2)g)(viii), add 1 dB to the final result to compensate for the difference between linear averaging and power averaging. 4) The result is the PSD.
Test Instruments:	Refer to section 5.10 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

Measurement Data

Modulation	Duty cycle	Duty Factor
802.11a	98.8%	0.05
802.11n(HT20)	98.8%	0.05
802.11n(HT40)	97.5%	0.11
802.11ac(HT20)	98.9%	0.05
802.11ac(HT40)	97.4%	0.11
802.11ac(HT80)	95.2%	0.21

ANT 1:

802.11a mode						
CH No.	Frequency (MHz)	Measured PSD (dBm/MHz)	Duty Factor	Total PSD Power(dBm/MHz)	Limit (dBm/MHz)	Result
36	5180	-1.47	0.05	-1.42	11	Pass
40	5200	-0.39	0.05	-0.34	11	Pass
48	5240	-1.24	0.05	-1.19	11	Pass
802.11n(HT20) mode						
CH No.	Frequency (MHz)	Measured PSD (dBm/MHz)	Duty Factor	Total PSD Power(dBm/MHz)	Limit (dBm/MHz)	Result
36	5180	-1.95	0.05	-1.90	11	Pass
40	5200	-0.70	0.05	-0.65	11	Pass
48	5240	-1.55	0.05	-1.50	11	Pass
802.11ac(HT20) mode						
CH No.	Frequency (MHz)	Measured PSD (dBm/MHz)	Duty Factor	Total PSD Power(dBm/MHz)	Limit (dBm/MHz)	Result
36	5180	-2.37	0.05	-2.32	11	Pass
40	5200	-1.50	0.05	-1.45	11	Pass
48	5240	-1.83	0.05	-1.78	11	Pass
802.11n(HT40) mode						
CH No.	Frequency (MHz)	Measured PSD (dBm/MHz)	Duty Factor	Total PSD Power(dBm/MHz)	Limit (dBm/MHz)	Result
38	5190	-4.80	0.11	-4.69	11	Pass
46	5230	-4.54	0.11	-4.43	11	Pass
802.11 ac(HT40) mode						
CH No.	Frequency (MHz)	Measured PSD (dBm/MHz)	Duty Factor	Total PSD Power(dBm/MHz)	Limit (dBm/MHz)	Result
38	5190	-4.58	0.11	-4.47	11	Pass
46	5230	-4.05	0.11	-3.94	11	Pass
802.11 ac(HT80)						
CH No.	Frequency (MHz)	Measured PSD (dBm/MHz)	Duty Factor	Total PSD Power(dBm/MHz)	Limit (dBm/MHz)	Result
42	5210	-8.40	0.21	-8.19	11	Pass

ANT 2:

802.11a mode						
CH No.	Frequency (MHz)	Measured PSD (dBm/MHz)	Duty Factor	Total PSD Power(dBm/MHz)	Limit (dBm/MHz)	Result
36	5180	-1.47	0.05	-1.42	11	Pass
40	5200	-1.62	0.05	-1.57	11	Pass
48	5240	-0.83	0.05	-0.78	11	Pass
802.11n(HT20) mode						
CH No.	Frequency (MHz)	Measured PSD (dBm/MHz)	Duty Factor	Total PSD Power(dBm/MHz)	Limit (dBm/MHz)	Result
36	5180	-1.52	0.05	-1.47	11	Pass
40	5200	-1.84	0.05	-1.79	11	Pass
48	5240	-1.48	0.05	-1.43	11	Pass
802.11ac(HT20) mode						
CH No.	Frequency (MHz)	Measured PSD (dBm/MHz)	Duty Factor	Total PSD Power(dBm/MHz)	Limit (dBm/MHz)	Result
36	5180	-1.48	0.05	-1.43	11	Pass
40	5200	-1.85	0.05	-1.79	11	Pass
48	5240	-0.90	0.05	-0.85	11	Pass
802.11n(HT40) mode						
CH No.	Frequency (MHz)	Measured PSD (dBm/MHz)	Duty Factor	Total PSD Power(dBm/MHz)	Limit (dBm/MHz)	Result
38	5190	-4.79	0.11	-4.68	11	Pass
46	5230	-4.92	0.11	-4.81	11	Pass
802.11 ac(HT40) mode						
CH No.	Frequency (MHz)	Measured PSD (dBm/MHz)	Duty Factor	Total PSD Power(dBm/MHz)	Limit (dBm/MHz)	Result
38	5190	-4.59	0.11	-4.48	11	Pass
46	5230	-4.38	0.11	-4.27	11	Pass
802.11 ac(HT80)						
CH No.	Frequency (MHz)	Measured PSD (dBm/MHz)	Duty Factor	Total PSD Power(dBm/MHz)	Limit (dBm/MHz)	Result
42	5210	-6.81	0.21	-6.60	11	Pass

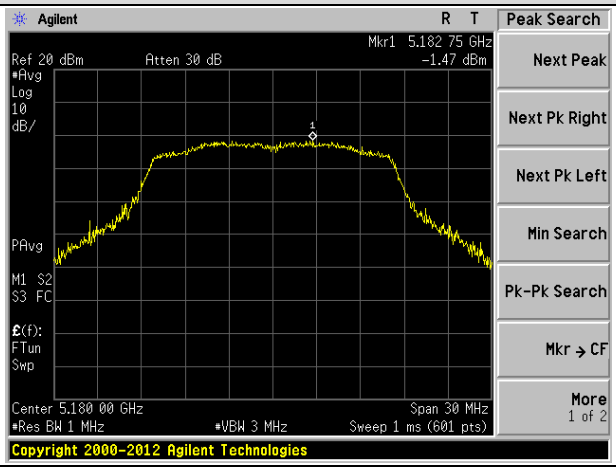
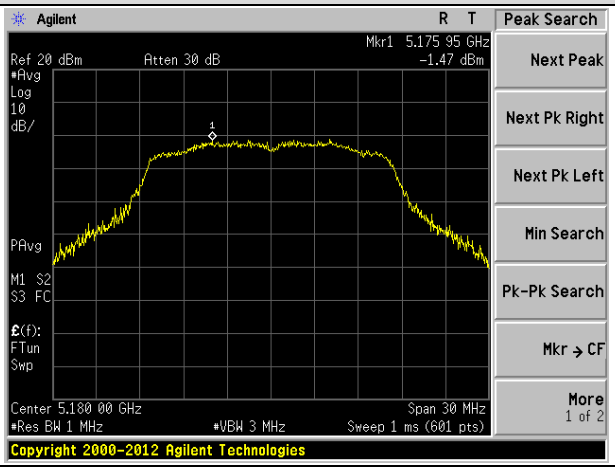
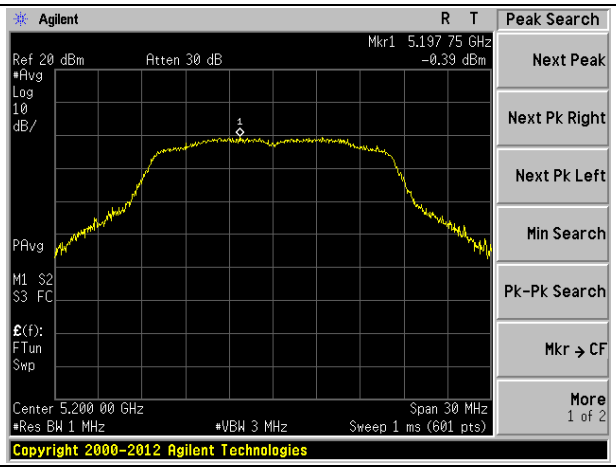
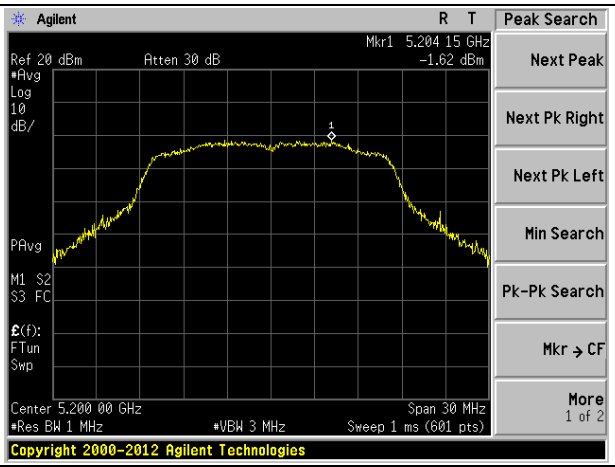
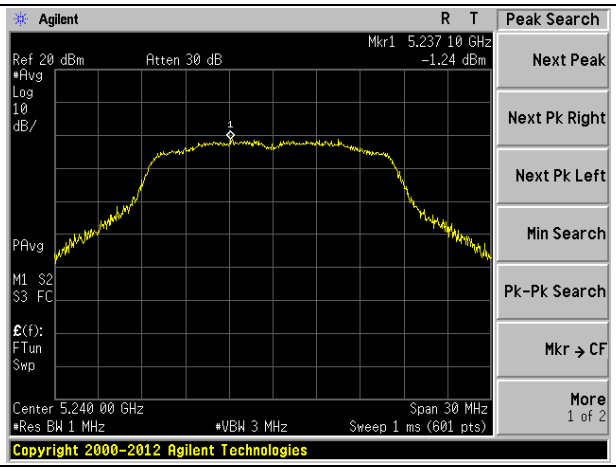
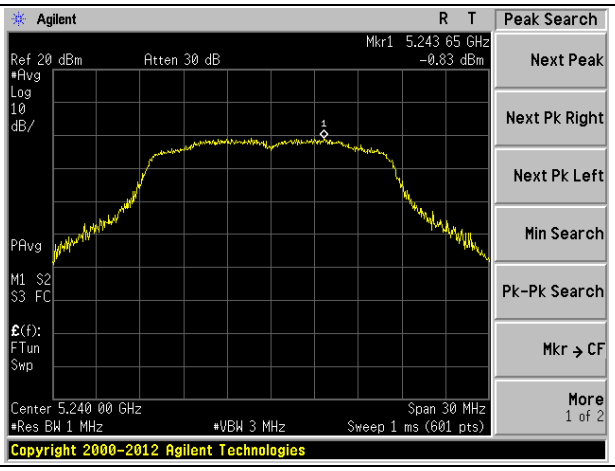
Note: Output Power = Measured Power + Duty Factor

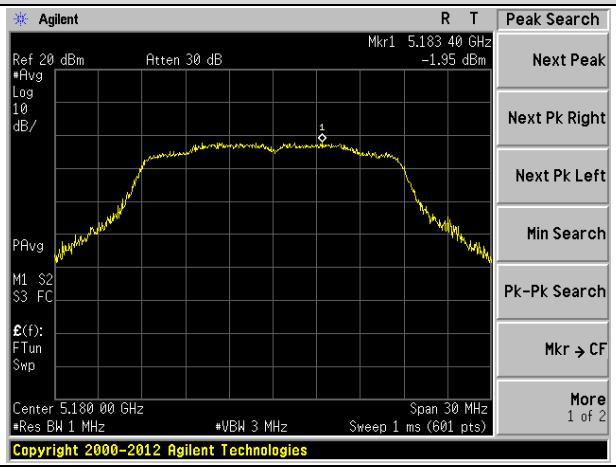
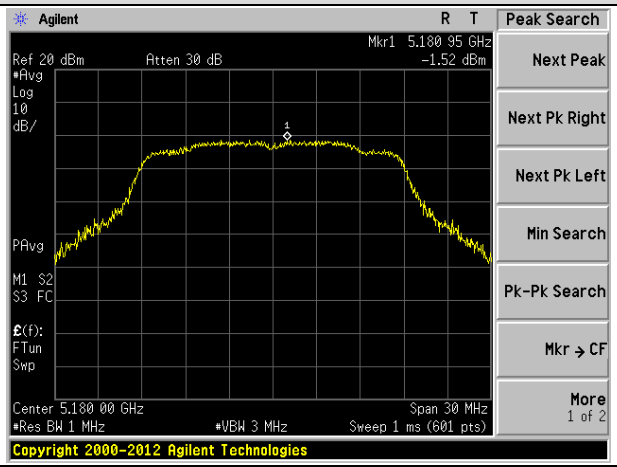
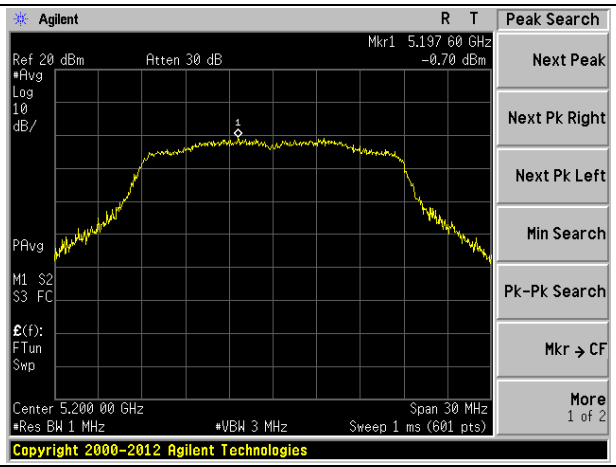
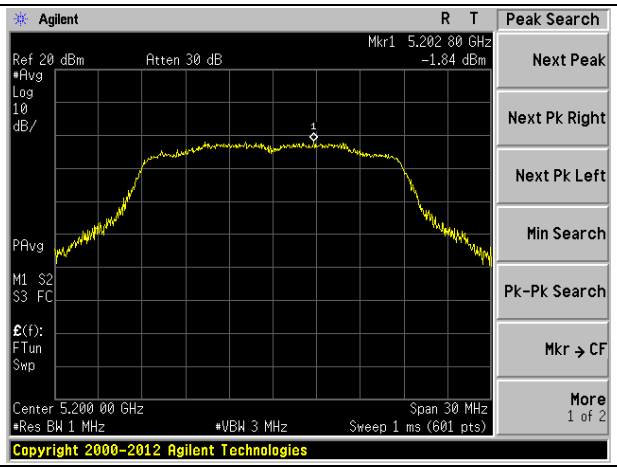
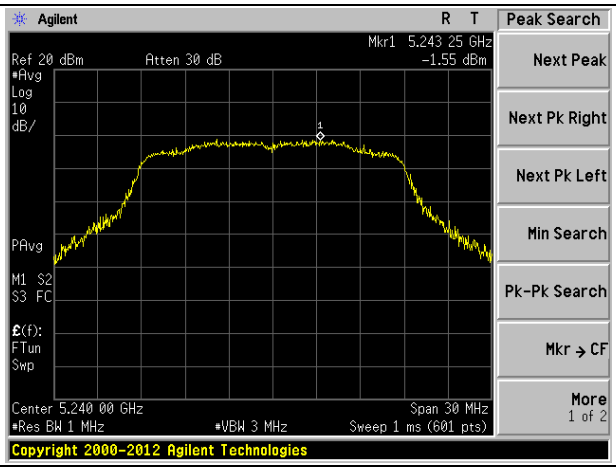
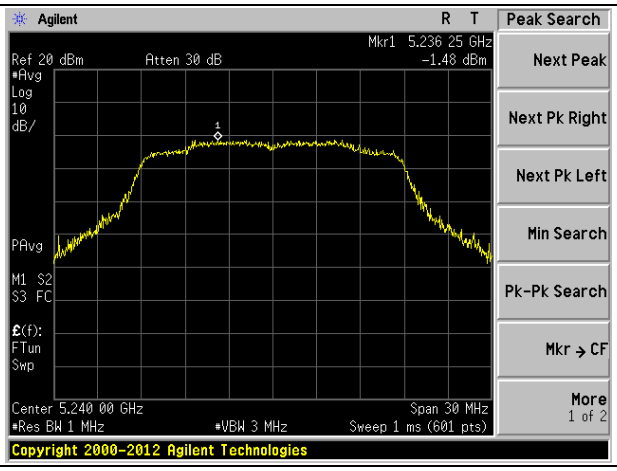
Duty Factor = 10 log (1/Duty Cycle)

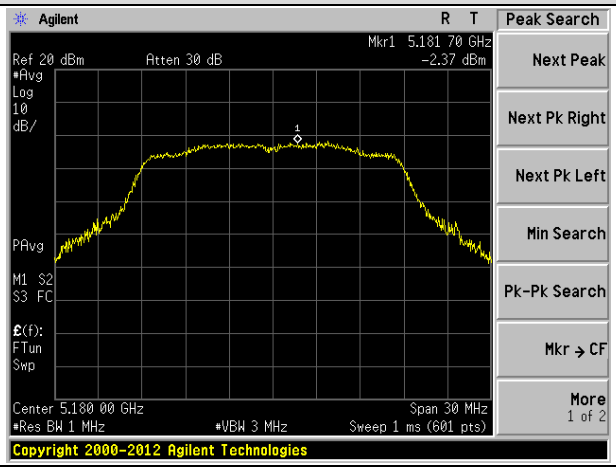
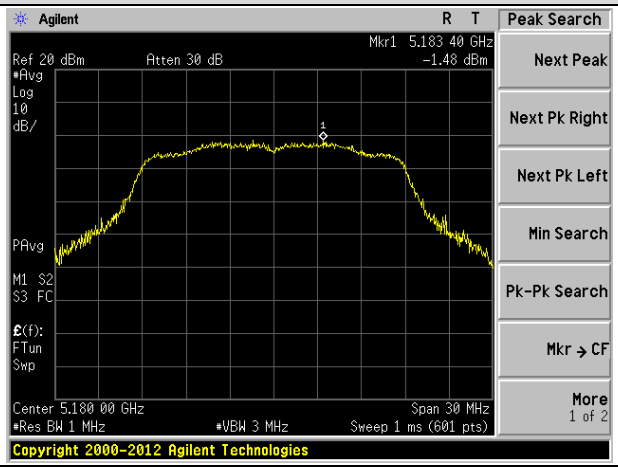
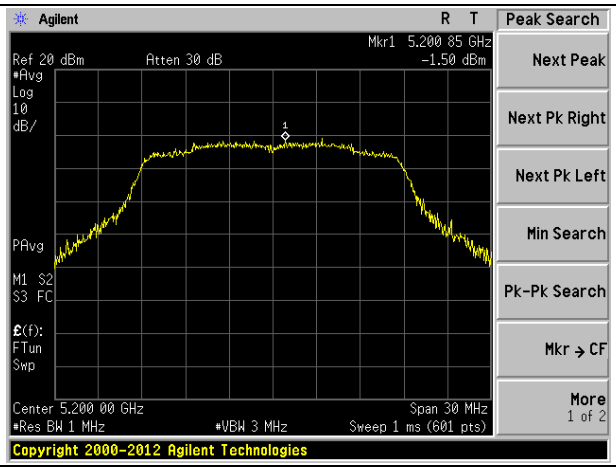
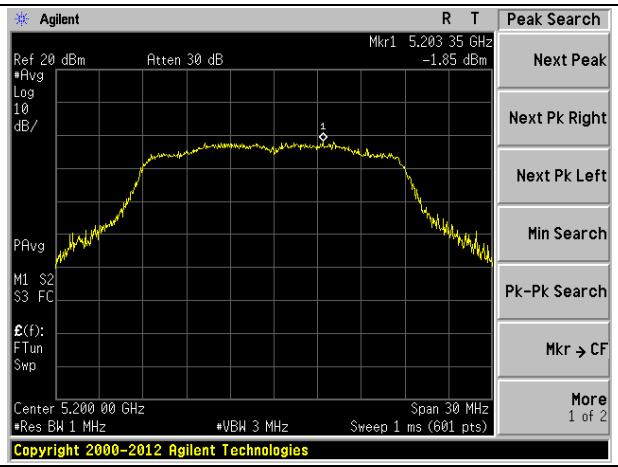
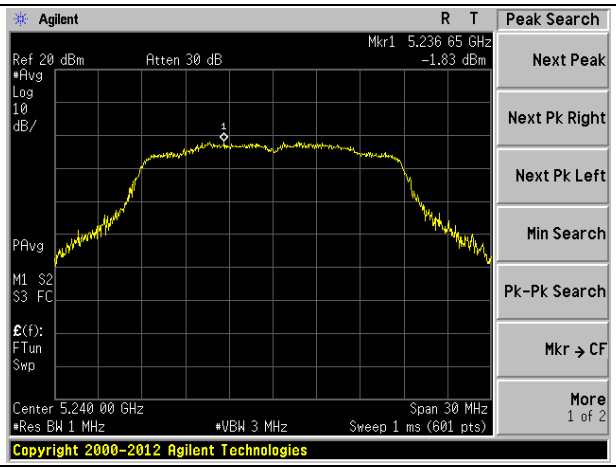
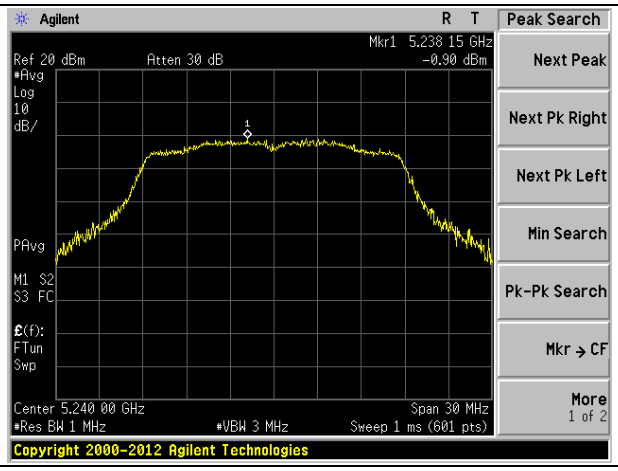
MIMO without beam forming:

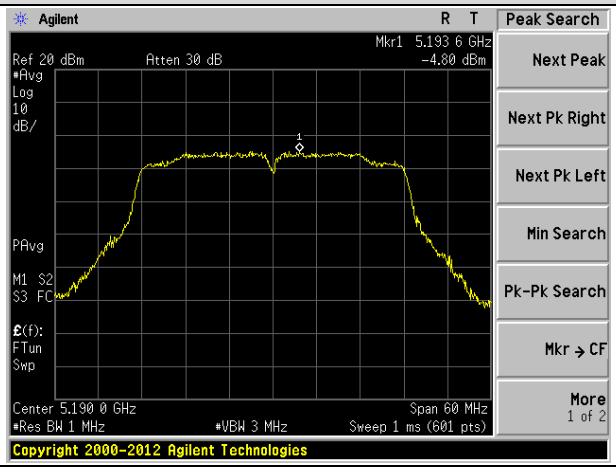
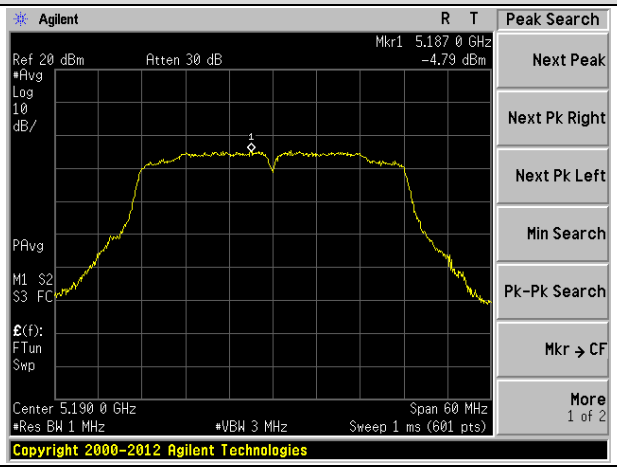
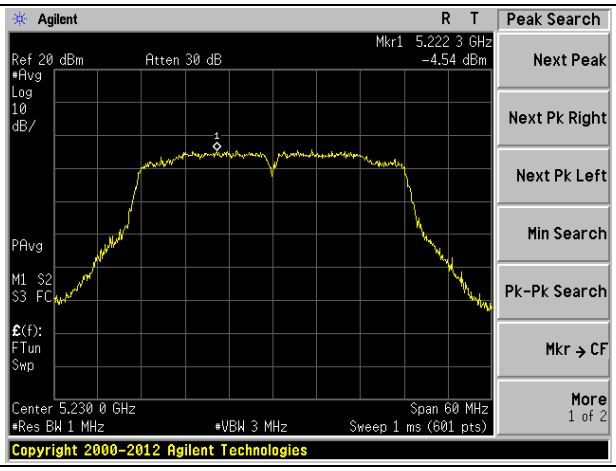
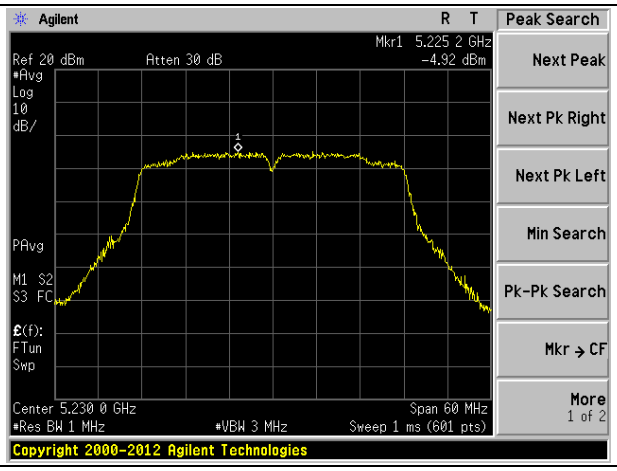
Test mode	Frequency (MHz)	ANT 1 PSD (dBm/MHz)	ANT 2 PSD (dBm/MHz)	MIMO (dBm/MHz)	Limit	Result
802.11n(HT20)	5180	-1.90	-1.47	1.33	11 dBm/MHz	Pass
	5200	-0.65	-1.79	1.83		
	5240	-1.50	-1.43	1.55		
802.11ac(HT20)	5180	-2.32	-1.43	1.16		
	5200	-1.45	-1.79	1.39		
	5240	-1.78	-0.85	1.72		
802.11n(HT40)	5190	-4.69	-4.68	-1.67		
	5230	-4.43	-4.81	-1.61		
802.11ac(HT40)	5190	-4.47	-4.48	-1.46		
	5230	-3.94	-4.27	-1.09		
802.11ac(HT80)	5210	-8.19	-6.60	-4.31		

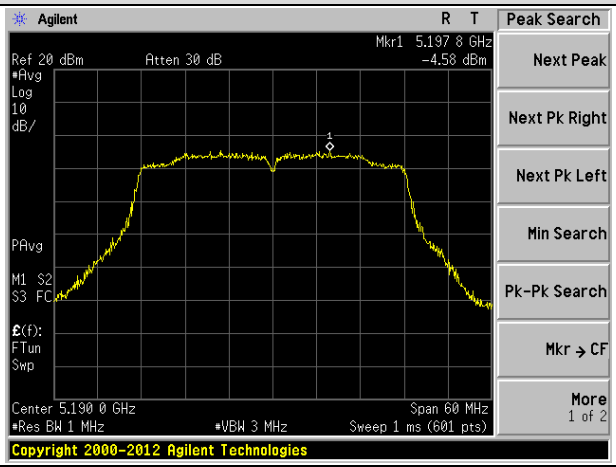
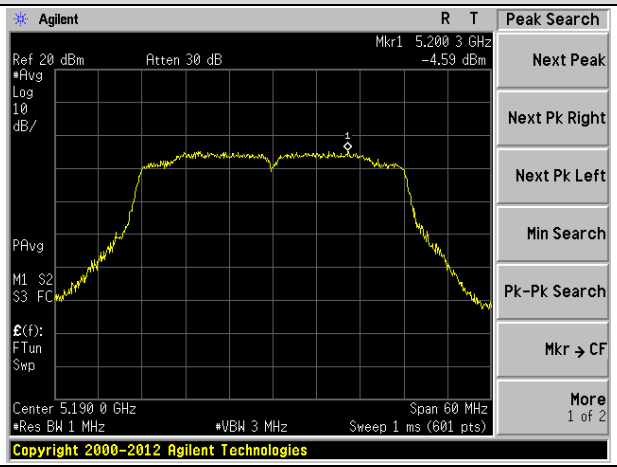
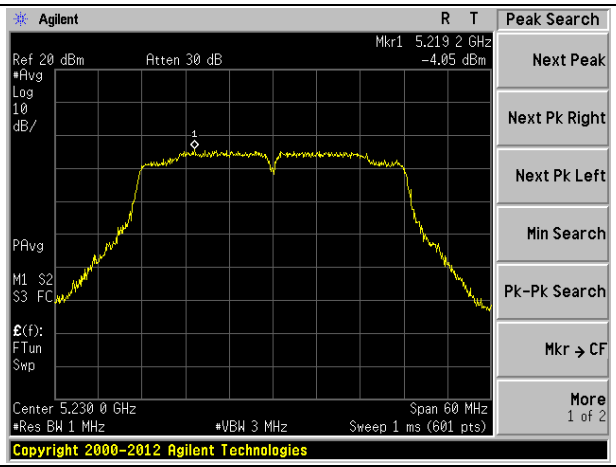
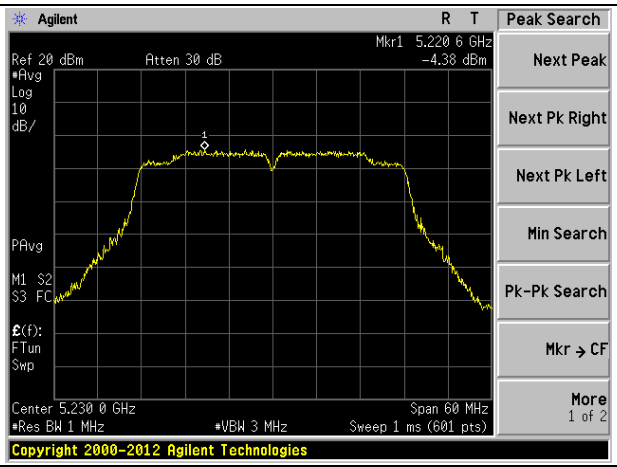
Test plots as followed:

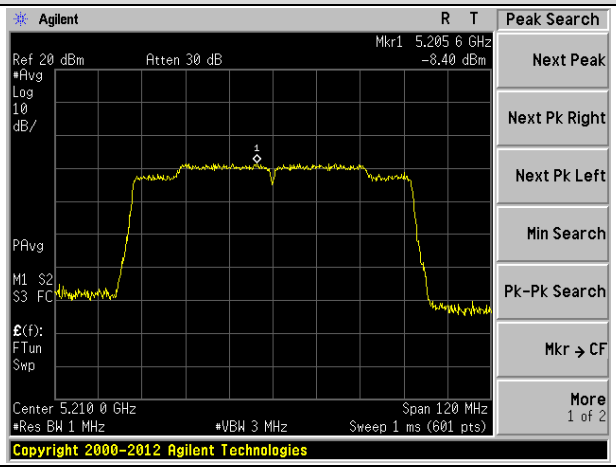
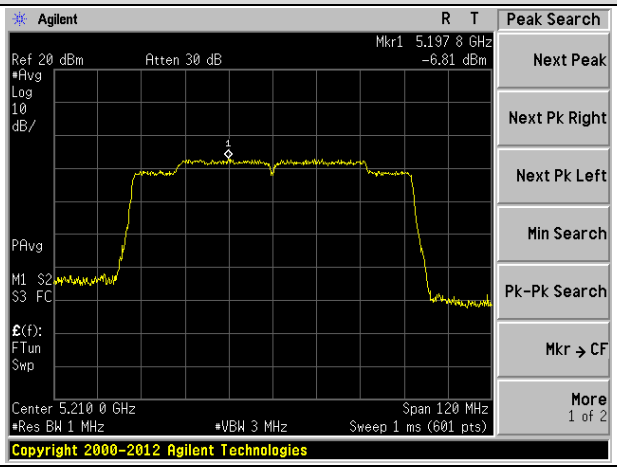
802.11a mode	
ANT 1	**ANT 2**
	
5180	**5180**
	
5200	**5200**
	
5240	**5240**

802.11n(HT20) mode	
ANT 1	**ANT 2**
	
5180	**5180**
	
5200	**5200**
	
5240	**5240**

802.11ac(HT20) mode	
ANT 1	**ANT 2**
	
5180	**5180**
	
5200	**5200**
	
5240	**5240**

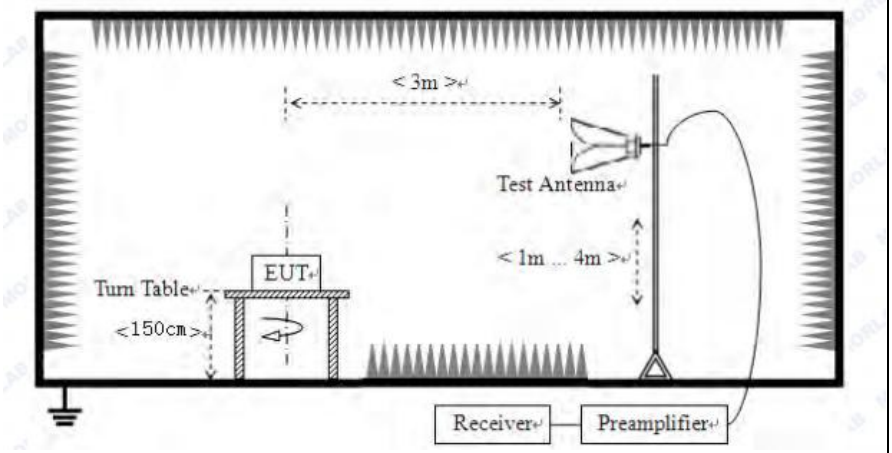
802.11n(HT40) mode	
ANT 1	**ANT 2**
	
5190	**5190**
	
5230	**5230**

802.11ac(HT40) mode	
ANT 1	**ANT 2**
	
5190	**5190**
	
5230	**5230**

802.11ac(HT80) mode	
ANT 1	**ANT 2**
	
5210	**5210**

7.6 Band Edge

<table>
<tr><td>Test Requirement:</td><td>FCC Part15 E Section 15.407 and 5.205</td></tr>
<tr><td>Test Method:</td><td>ANSI C63.10:2013</td></tr>
<tr><td>Test site:</td><td>Measurement Distance: 3m (Semi-Anechoic Chamber)</td></tr>
<tr><td>Receiver setup:</td><td>
<table>
<tr><td>Frequency</td><td>Detector</td><td>RBW</td><td>VBW</td><td>Remark</td></tr>
<tr><td>30MHz-1GHz</td><td>Quasi-peak</td><td>100KHz</td><td>300KHz</td><td>Quasi-peak Value</td></tr>
<tr><td rowspan="2">Above 1GHz</td><td>Peak</td><td>1MHz</td><td>3MHz</td><td>Peak Value</td></tr>
<tr><td>AV</td><td>1MHz</td><td>3MHz</td><td>Average Value</td></tr>
</table>
</td></tr>
<tr><td>Limit:</td><td>
<table>
<tr><td>Frequency</td><td>Limit (dBuV/m @3m)</td><td>Remark</td></tr>
<tr><td>30MHz-88MHz</td><td>40.0</td><td>Quasi-peak Value</td></tr>
<tr><td>88MHz-216MHz</td><td>43.5</td><td>Quasi-peak Value</td></tr>
<tr><td>216MHz-960MHz</td><td>46.0</td><td>Quasi-peak Value</td></tr>
<tr><td>960MHz-1GHz</td><td>54.0</td><td>Quasi-peak Value</td></tr>
<tr><td rowspan="2">Above 1GHz</td><td>54.0</td><td>Average Value</td></tr>
<tr><td>68.2</td><td>Peak Value</td></tr>
</table>
Undesirable emission limits:
(1) For transmitters operating in the 5.15-5.25 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27 dBm/MHz.
(2) For transmitters operating in the 5.25-5.35 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27 dBm/MHz. Devices operating in the 5.25-5.35 GHz band that generate emissions in the 5.15-5.25 GHz band must meet all applicable technical requirements for operation in the 5.15-5.25 GHz band (including indoor use) or alternatively meet an out-of-band emission EIRP limit of -27 dBm/MHz in the 5.15-5.25 GHz band.
(3) For transmitters operating in the 5.47-5.725 GHz band: all emissions outside of the 5.47-5.725 GHz band shall not exceed an EIRP of −27 dBm/MHz.
</td></tr>
<tr><td>Test Procedure:</td><td>
a. The EUT was placed on the top of a rotating table 1.5 m above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation.
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 rotable 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
</td></tr>
</table>

	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.
Test setup:	For radiated emissions above 1GHz 
Test Instruments:	Refer to section 5.10 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

Remarks:

1. *Only the worst case Main Antenna test data.*
2. *Final Level =Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor*
3. *The emission levels of other frequencies are very lower than the limit and not show in test report.*
4. *The pre-test were performed on lowest, middle and highest frequencies, only the worst case's (lowest and highest frequencies) data was showed.*
5. *According to KDB 789033 D02 v02r01 section G) 1) (d), for For measurements above 1000 MHz @ 3m distance, the limit of field strength is computed as follows:*
   E[dBuV/m] = EIRP[dBm] + 95.2;
   For example, if EIRP = -27dBm
   E[dBuV/m] = -27 + 95.2 = 68.2dBuV/m.

Measurement Data:

802.11a(HT20)				PK				
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
5150.00	43.08	32.07	8.99	37.49	46.65	68.20	-21.55	Horizontal
5350.00	43.55	31.75	9.29	37.20	47.39	68.20	-20.81	Horizontal
5150.00	45.77	32.07	8.99	37.49	49.34	68.20	-18.86	Vertical
5350.00	44.00	31.75	9.29	37.20	47.84	68.20	-20.36	Vertical

802.11a(HT20)				AV				
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
5150.00	33.41	32.07	8.99	37.49	36.98	54.00	-17.02	Horizontal
5350.00	33.77	31.75	9.29	37.20	37.61	54.00	-16.39	Horizontal
5150.00	34.73	32.07	8.99	37.49	38.30	54.00	-15.70	Vertical
5350.00	33.28	31.75	9.29	37.20	37.12	54.00	-16.88	Vertical

802.11n(HT20)				PK				
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
5150.00	45.64	32.07	8.99	37.49	49.21	68.20	-18.99	Horizontal
5350.00	45.12	31.75	9.29	37.20	48.96	68.20	-19.24	Horizontal
5150.00	46.77	32.07	8.99	37.49	50.34	68.20	-17.86	Vertical
5350.00	44.31	31.75	9.29	37.20	48.15	68.20	-20.05	Vertical

802.11n(HT20)				AV				
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
5150.00	34.92	32.07	8.99	37.49	38.49	54.00	-15.51	Horizontal
5350.00	34.53	31.75	9.29	37.20	38.37	54.00	-15.63	Horizontal
5150.00	31.25	32.07	8.99	37.49	34.82	54.00	-19.18	Vertical
5350.00	32.65	31.75	9.29	37.20	36.49	54.00	-17.51	Vertical

802.11ac(HT20)				PK				
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
5150.00	43.85	32.07	8.99	37.49	47.42	68.20	-20.78	Horizontal
5350.00	43.03	31.75	9.29	37.20	46.87	68.20	-21.33	Horizontal
5150.00	44.78	32.07	8.99	37.49	48.35	68.20	-19.85	Vertical
5350.00	46.67	31.75	9.29	37.20	50.51	68.20	-17.69	Vertical

802.11ac(HT20)				AV				
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
5150.00	34.12	32.07	8.99	37.49	37.69	54.00	-16.31	Horizontal
5350.00	33.68	31.75	9.29	37.20	37.52	54.00	-16.48	Horizontal
5150.00	34.16	32.07	8.99	37.49	37.73	54.00	-16.27	Vertical
5350.00	31.47	31.75	9.29	37.20	35.31	54.00	-18.69	Vertical

802.11n(HT40)				PK				
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
5150.00	44.02	32.07	8.99	37.49	47.59	68.20	-20.61	Horizontal
5350.00	43.92	31.75	9.29	37.20	47.76	68.20	-20.44	Horizontal
5150.00	44.03	32.07	8.99	37.49	47.60	68.20	-20.60	Vertical
5350.00	46.99	31.75	9.29	37.20	50.83	68.20	-17.37	Vertical

802.11n(HT40)				AV				
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
5150.00	34.72	32.07	8.99	37.49	38.29	54.00	-15.71	Horizontal
5350.00	32.22	31.75	9.29	37.20	36.06	54.00	-17.94	Horizontal
5150.00	32.47	32.07	8.99	37.49	36.04	54.00	-17.96	Vertical
5350.00	32.06	31.75	9.29	37.20	35.90	54.00	-18.10	Vertical

802.11ac(HT40)				PK				
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
5150.00	43.68	32.07	8.99	37.49	47.25	68.20	-20.95	Horizontal
5350.00	45.01	31.75	9.29	37.20	48.85	68.20	-19.35	Horizontal
5150.00	43.96	32.07	8.99	37.49	47.53	68.20	-20.67	Vertical
5350.00	44.28	31.75	9.29	37.20	48.12	68.20	-20.08	Vertical

802.11ac(HT40)				AV				
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
5150.00	31.65	32.07	8.99	37.49	35.22	54.00	-18.78	Horizontal
5350.00	32.97	31.75	9.29	37.20	36.81	54.00	-17.19	Horizontal
5150.00	33.54	32.07	8.99	37.49	37.11	54.00	-16.89	Vertical
5350.00	34.40	31.75	9.29	37.20	38.24	54.00	-15.76	Vertical

802.11ac(HT80)				PK				
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
5150.00	43.52	32.07	8.99	37.49	47.09	68.20	-21.11	Horizontal
5350.00	44.32	31.75	9.29	37.20	48.16	68.20	-20.04	Horizontal
5150.00	45.66	32.07	8.99	37.49	49.23	68.20	-18.97	Vertical
5350.00	43.10	31.75	9.29	37.20	46.94	68.20	-21.26	Vertical

802.11ac(HT80)				AV				
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
5150.00	33.40	32.07	8.99	37.49	36.97	54.00	-17.03	Horizontal
5350.00	34.13	31.75	9.29	37.20	37.97	54.00	-16.03	Horizontal
5150.00	32.05	32.07	8.99	37.49	35.62	54.00	-18.38	Vertical
5350.00	34.67	31.75	9.29	37.20	38.51	54.00	-15.49	Vertical

7.7 Radiated Emission

Test Requirement:	FCC Part15 C Section 15.209 and 15.205
Test Method:	ANSI C63.10:2013
Test Frequency Range:	9kHz to 40GHz
Test site:	Measurement Distance: 3m (Semi-Anechoic Chamber)

Receiver setup:

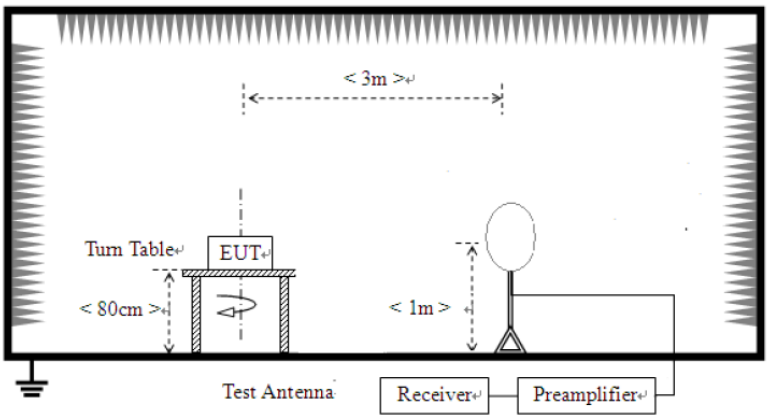
Frequency	Detector	RBW	VBW	Value
9kHz-150KHz	Quasi-peak	200Hz	1kHz	Quasi-peak Value
150kHz-30MHz	Quasi-peak	9kHz	30kHz	Quasi-peak Value
30MHz-1GHz	Quasi-peak	100KHz	300KHz	Quasi-peak Value
Above 1GHz	Peak	1MHz	3MHz	Peak Value
	AV	1MHz	3MHz	Average Value

Limit:

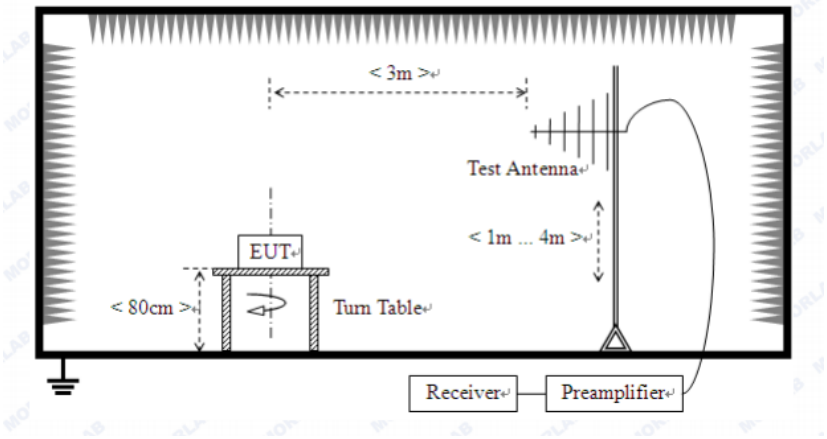
Frequency	Limit (uV/m)	Value	Measurement Distance
0.009MHz-0.490MHz	2400/F(KHz)	QP	300m
0.490MHz-1.705MHz	24000/F(KHz)	QP	300m
1.705MHz-30MHz	30	QP	30m
30MHz-88MHz	100	QP	3m
88MHz-216MHz	150	QP	
216MHz-960MHz	200	QP	
960MHz-1GHz	500	QP	
Above 1GHz	500	Average	
	5000	Peak	

Test setup:

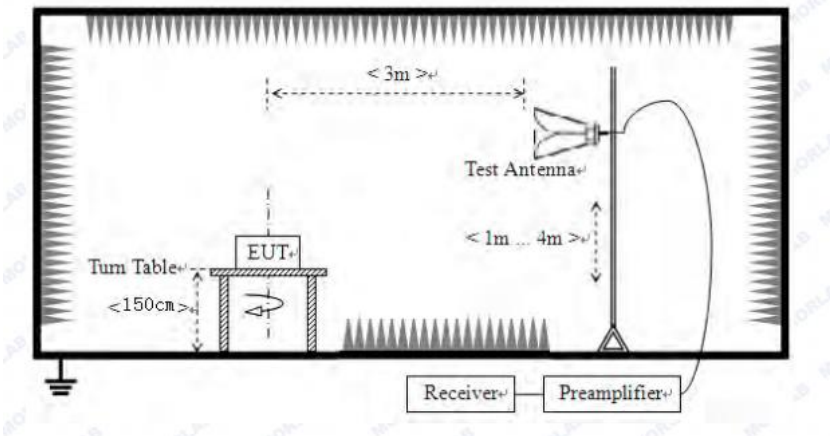
For radiated emissions from 9kHz to 30MHz



For radiated emissions from 30MHz to1GHz



For radiated emissions above 1GHz



Test Instruments:	Refer to section 5.10 for details					
Test mode:	Refer to section 5.2 for details					
Test environment:	Temp.:	25 °C	Humid.:	52%	Press.:	1012mbar
Test voltage:	AC 120V, 60Hz					
Test results:	Pass					

Remarks:

1. *Only the worst case Main Antenna test data.*
2. *Pre-scan all kind of the place mode (X-axis, Y-axis, Z-axis), and found the Y-axis which it is worse case.*

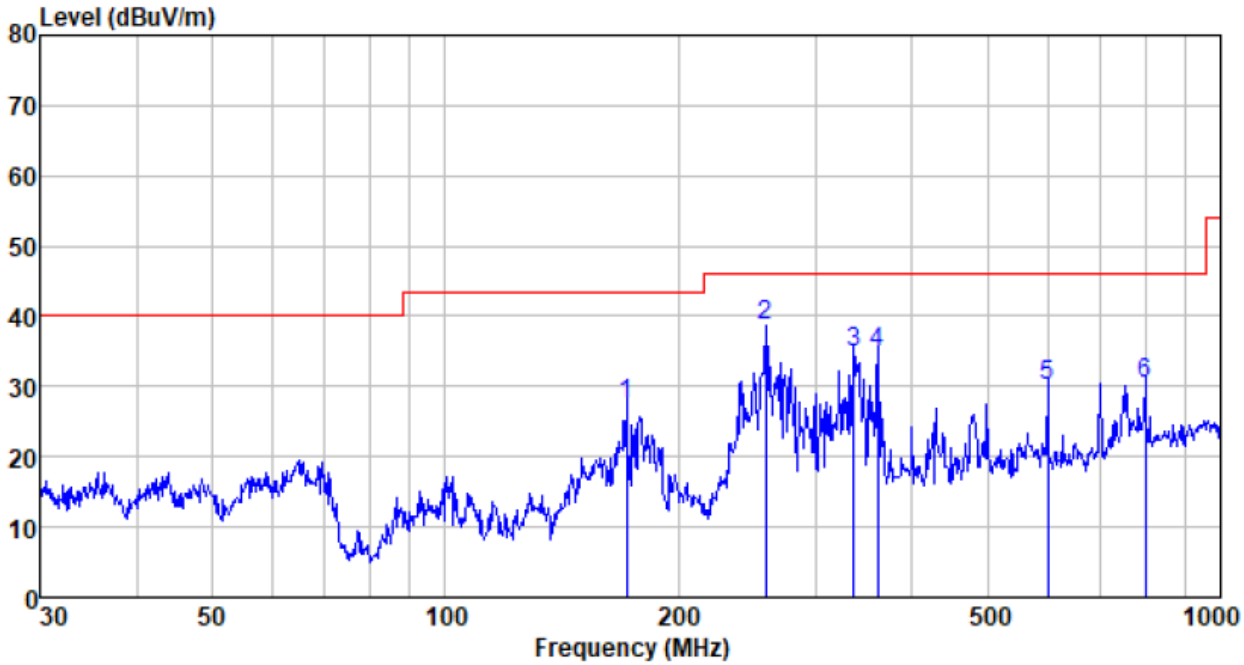
Measurement Data:

9 kHz ~ 30 MHz

The low frequency, which started from 9 kHz to 30 MHz, was pre-scanned and the result which was 20 dB lower than the limit line per 15.31(o) was not reported.

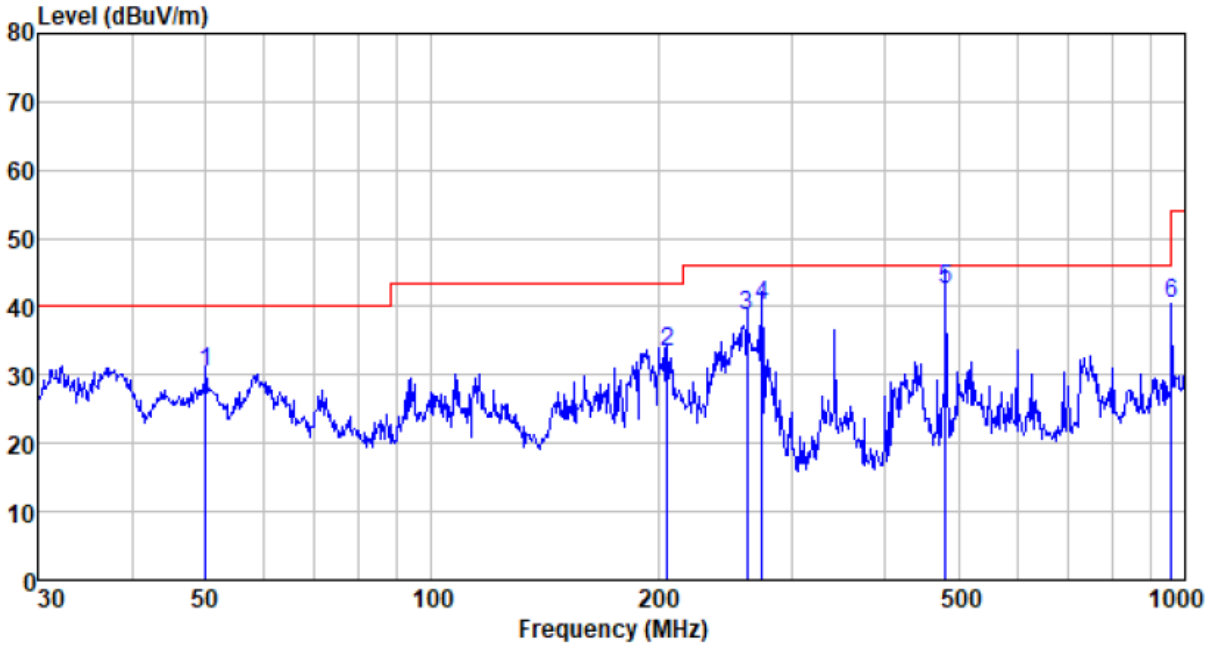
30MHz~ 1GHz

Horizontal:



Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV	Limit level dBuV/m	Over limit dB	Remark
171.393	54.44	8.53	1.69	37.19	27.47	43.50	-16.03	QP
259.234	61.52	12.44	2.17	37.39	38.74	46.00	-7.26	QP
336.035	55.57	14.29	2.55	37.46	34.95	46.00	-11.05	QP
361.714	54.86	14.72	2.68	37.49	34.77	46.00	-11.23	QP
599.321	44.49	19.44	3.72	37.54	30.11	46.00	-15.89	QP
798.980	42.28	21.40	4.45	37.62	30.51	46.00	-15.49	QP

Vertical:



Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV	Limit level dBuV/m	Over limit dB	Remark
50.057	53.46	12.30	0.77	36.18	30.35	40.00	-9.65	QP
205.675	58.27	10.62	1.88	37.34	33.43	43.50	-10.07	QP
261.975	61.36	12.55	2.18	37.39	38.70	46.00	-7.30	QP
274.194	62.47	12.87	2.24	37.40	40.18	46.00	-5.82	QP
480.528	59.74	16.93	3.22	37.51	42.38	46.00	-3.62	QP
958.794	50.50	22.54	5.08	37.55	40.57	46.00	-5.43	QP

Above 1GHz:

802.11a(HT20) 5180MHz

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
10360.00	31.40	39.67	14.62	32.65	53.04	74.00	-20.96	Vertical
15540.00	32.58	38.60	17.66	34.46	54.38	74.00	-19.62	Vertical
10360.00	34.89	39.67	14.62	32.65	56.53	74.00	-17.47	Horizontal
15540.00	33.19	38.60	17.66	34.46	54.99	74.00	-19.01	Horizontal

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
10360.00	20.24	39.67	14.62	32.65	41.88	54.00	-12.12	Vertical
15540.00	20.53	38.60	17.66	34.46	42.33	54.00	-11.67	Vertical
10360.00	22.09	39.67	14.62	32.65	43.73	54.00	-10.27	Horizontal
15540.00	20.65	38.60	17.66	34.46	42.45	54.00	-11.55	Horizontal

802.11a(HT20) 5200MHz

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
10400.00	32.50	39.75	14.63	32.71	54.17	74.00	-19.83	Vertical
15600.00	34.10	38.33	17.67	34.17	55.93	74.00	-18.07	Vertical
10400.00	33.47	39.75	14.63	32.71	55.14	74.00	-18.86	Horizontal
15600.00	31.88	38.33	17.67	34.17	53.71	74.00	-20.29	Horizontal

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
10400.00	19.75	39.75	14.63	32.71	41.42	54.00	-12.58	Vertical
15600.00	21.49	38.33	17.67	34.17	43.32	54.00	-10.68	Vertical
10400.00	22.66	39.75	14.63	32.71	44.33	54.00	-9.67	Horizontal
15600.00	19.89	38.33	17.67	34.17	41.72	54.00	-12.28	Horizontal

802.11a(HT20) 5240MHz

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
10480.00	33.36	39.82	14.68	32.86	55.00	74.00	-19.00	Vertical
15720.00	31.71	38.09	17.73	33.66	53.87	74.00	-20.13	Vertical
10480.00	32.99	39.82	14.68	32.86	54.63	74.00	-19.37	Horizontal
15720.00	31.67	38.09	17.73	33.66	53.83	74.00	-20.17	Horizontal

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
10480.00	21.45	39.82	14.68	32.86	43.09	54.00	-10.91	Vertical
15720.00	19.87	38.09	17.73	33.66	42.03	54.00	-11.97	Vertical
10480.00	21.35	39.82	14.68	32.86	42.99	54.00	-11.01	Horizontal
15720.00	21.38	38.09	17.73	33.66	43.54	54.00	-10.46	Horizontal

802.11n(HT20) 5180MHz

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
10360.00	33.60	39.67	14.62	32.65	55.24	74.00	-18.76	Vertical
15540.00	33.40	38.60	17.66	34.46	55.20	74.00	-18.80	Vertical
10360.00	33.78	39.67	14.62	32.65	55.42	74.00	-18.58	Horizontal
15540.00	32.39	38.60	17.66	34.46	54.19	74.00	-19.81	Horizontal

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
10360.00	20.38	39.67	14.62	32.65	42.02	54.00	-11.98	Vertical
15540.00	19.52	38.60	17.66	34.46	41.32	54.00	-12.68	Vertical
10360.00	20.80	39.67	14.62	32.65	42.44	54.00	-11.56	Horizontal
15540.00	19.31	38.60	17.66	34.46	41.11	54.00	-12.89	Horizontal

802.11n(HT20) 5200MHz

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
10400.00	33.87	39.75	14.63	32.71	55.54	74.00	-18.46	Vertical
15600.00	32.80	38.33	17.67	34.17	54.63	74.00	-19.37	Vertical
10400.00	33.04	39.75	14.63	32.71	54.71	74.00	-19.29	Horizontal
15600.00	33.75	38.33	17.67	34.17	55.58	74.00	-18.42	Horizontal

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
10400.00	21.71	39.75	14.63	32.71	43.38	54.00	-10.62	Vertical
15600.00	21.45	38.33	17.67	34.17	43.28	54.00	-10.72	Vertical
10400.00	22.54	39.75	14.63	32.71	44.21	54.00	-9.79	Horizontal
15600.00	23.37	38.33	17.67	34.17	45.20	54.00	-8.80	Horizontal

802.11n(HT20) 5240MHz

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
10480.00	32.64	39.82	14.68	32.86	54.28	74.00	-19.72	Vertical
15720.00	33.51	38.09	17.73	33.66	55.67	74.00	-18.33	Vertical
10480.00	31.91	39.82	14.68	32.86	53.55	74.00	-20.45	Horizontal
15720.00	33.61	38.09	17.73	33.66	55.77	74.00	-18.23	Horizontal

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
10480.00	23.96	39.82	14.68	32.86	45.60	54.00	-8.40	Vertical
15720.00	19.06	38.09	17.73	33.66	41.22	54.00	-12.78	Vertical
10480.00	20.02	39.82	14.68	32.86	41.66	54.00	-12.34	Horizontal
15720.00	21.34	38.09	17.73	33.66	43.50	54.00	-10.50	Horizontal

802.11ac(HT20) 5180MHz

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
10360.00	31.39	39.67	14.62	32.65	53.03	74.00	-20.97	Vertical
15540.00	32.78	38.60	17.66	34.46	54.58	74.00	-19.42	Vertical
10360.00	33.78	39.67	14.62	32.65	55.42	74.00	-18.58	Horizontal
15540.00	34.78	38.60	17.66	34.46	56.58	74.00	-17.42	Horizontal

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
10360.00	21.39	39.67	14.62	32.65	43.03	54.00	-10.97	Vertical
15540.00	21.31	38.60	17.66	34.46	43.11	54.00	-10.89	Vertical
10360.00	19.61	39.67	14.62	32.65	41.25	54.00	-12.75	Horizontal
15540.00	19.90	38.60	17.66	34.46	41.70	54.00	-12.30	Horizontal

802.11ac(HT20) 5200MHz

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
10400.00	32.20	39.75	14.63	32.71	53.87	74.00	-20.13	Vertical
15600.00	32.89	38.33	17.67	34.17	54.72	74.00	-19.28	Vertical
10400.00	33.29	39.75	14.63	32.71	54.96	74.00	-19.04	Horizontal
15600.00	33.32	38.33	17.67	34.17	55.15	74.00	-18.85	Horizontal

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
10400.00	23.08	39.75	14.63	32.71	44.75	54.00	-9.25	Vertical
15600.00	21.83	38.33	17.67	34.17	43.66	54.00	-10.34	Vertical
10400.00	23.90	39.75	14.63	32.71	45.57	54.00	-8.43	Horizontal
15600.00	23.51	38.33	17.67	34.17	45.34	54.00	-8.66	Horizontal

802.11ac(HT20) 5240MHz

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
10480.00	32.93	39.82	14.68	32.86	54.57	74.00	-19.43	Vertical
15720.00	33.70	38.09	17.73	33.66	55.86	74.00	-18.14	Vertical
10480.00	32.41	39.82	14.68	32.86	54.05	74.00	-19.95	Horizontal
15720.00	34.08	38.09	17.73	33.66	56.24	74.00	-17.76	Horizontal

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
10480.00	20.84	39.82	14.68	32.86	42.48	54.00	-11.52	Vertical
15720.00	21.80	38.09	17.73	33.66	43.96	54.00	-10.04	Vertical
10480.00	22.79	39.82	14.68	32.86	44.43	54.00	-9.57	Horizontal
15720.00	20.26	38.09	17.73	33.66	42.42	54.00	-11.58	Horizontal

802.11nHT40) 5190MHz

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
10380.00	33.82	39.71	14.63	32.68	55.48	74.00	-18.52	Vertical
15570.00	33.39	38.46	17.67	34.32	55.20	74.00	-18.80	Vertical
10380.00	34.04	39.71	14.63	32.68	55.70	74.00	-18.30	Horizontal
15570.00	32.36	38.46	17.67	34.32	54.17	74.00	-19.83	Horizontal

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
10380.00	21.35	39.71	14.63	32.68	43.01	54.00	-10.99	Vertical
15570.00	22.19	38.46	17.67	34.32	44.00	54.00	-10.00	Vertical
10380.00	21.53	39.71	14.63	32.68	43.19	54.00	-10.81	Horizontal
15570.00	22.52	38.46	17.67	34.32	44.33	54.00	-9.67	Horizontal

802.11n(HT40) 5230MHz

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
10460.00	34.08	39.75	14.65	32.74	55.74	74.00	-18.26	Vertical
15690.00	31.66	38.33	17.69	34.03	53.65	74.00	-20.35	Vertical
10460.00	34.83	39.75	14.65	32.74	56.49	74.00	-17.51	Horizontal
15690.00	33.54	38.33	17.69	34.03	55.53	74.00	-18.47	Horizontal

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
10460.00	22.82	39.75	14.65	32.74	44.48	54.00	-9.52	Vertical
15690.00	22.72	38.33	17.69	34.03	44.71	54.00	-9.29	Vertical
10460.00	22.07	39.75	14.65	32.74	43.73	54.00	-10.27	Horizontal
15690.00	23.63	38.33	17.69	34.03	45.62	54.00	-8.38	Horizontal

802.11acHT40) 5190MHz

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
10380.00	34.41	39.71	14.63	32.68	56.07	74.00	-17.93	Vertical
15570.00	31.22	38.46	17.67	34.32	53.03	74.00	-20.97	Vertical
10380.00	32.08	39.71	14.63	32.68	53.74	74.00	-20.26	Horizontal
15570.00	32.59	38.46	17.67	34.32	54.40	74.00	-19.60	Horizontal

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
10380.00	21.21	39.71	14.63	32.68	42.87	54.00	-11.13	Vertical
15570.00	20.15	38.46	17.67	34.32	41.96	54.00	-12.04	Vertical
10380.00	19.36	39.71	14.63	32.68	41.02	54.00	-12.98	Horizontal
15570.00	19.80	38.46	17.67	34.32	41.61	54.00	-12.39	Horizontal

802.11ac(HT40) 5230MHz

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
10460.00	31.24	39.75	14.65	32.74	52.90	74.00	-21.10	Vertical
15690.00	32.32	38.33	17.69	34.03	54.31	74.00	-19.69	Vertical
10460.00	33.72	39.75	14.65	32.74	55.38	74.00	-18.62	Horizontal
15690.00	32.03	38.33	17.69	34.03	54.02	74.00	-19.98	Horizontal

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
10460.00	19.88	39.75	14.65	32.74	41.54	54.00	-12.46	Vertical
15690.00	21.78	38.33	17.69	34.03	43.77	54.00	-10.23	Vertical
10460.00	21.68	39.75	14.65	32.74	43.34	54.00	-10.66	Horizontal
15690.00	19.28	38.33	17.69	34.03	41.27	54.00	-12.73	Horizontal

802.11ac(HT80) 5210MHz

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
10420.00	32.40	39.82	14.66	32.80	54.08	74.00	-19.92	Vertical
15630.00	31.11	38.09	17.71	33.81	53.10	74.00	-20.90	Vertical
10420.00	31.97	39.82	14.66	32.80	53.65	74.00	-20.35	Horizontal
15630.00	32.78	38.09	17.71	33.81	54.77	74.00	-19.23	Horizontal

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
10420.00	21.09	39.82	14.66	32.80	42.77	54.00	-11.23	Vertical
15630.00	19.73	38.09	17.71	33.81	41.72	54.00	-12.28	Vertical
10420.00	19.13	39.82	14.66	32.80	40.81	54.00	-13.19	Horizontal
15630.00	20.13	38.09	17.71	33.81	42.12	54.00	-11.88	Horizontal

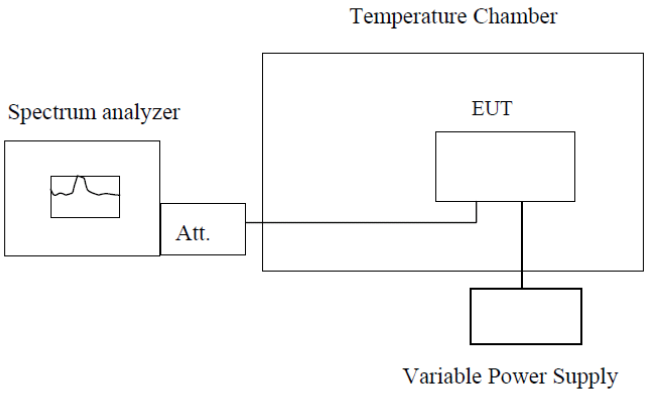
Notes:

1. Level = Read Level + Antenna Factor+ Cable loss- Preamp Factor.

2. The test trace is same as the ambient noise (the test frequency range: 18GHz~40GHz), therefore no data appear in the report.

3. This limit applies for using average detector, if the test result on peak is lower than average limit, then average measurement needn't be performed.

7.8 Frequency stability

Test Requirement:	FCC Part15 C Section 15.407(g)
Test Method:	ANSI C63.10:2013, FCC Part 2.1055
Limit:	Manufactures of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified
Test Procedure:	The EUT was setup to ANSI C63.4, 2003; tested to 2.1055 for compliance to FCC Part 15.407(g) requirements.
Test setup:	 **Note :** Measurement setup for testing on Antenna connector
Test Instruments:	Refer to section 5.10 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

Remark: Set the EUT transmits at un-modulation mode to test frequency stability.

Measurement data:

Frequency stability versus Temp.					
Power Supply: AC 120V					
Temp. (°C)	Operating Frequency (MHz)	0 minute	2 minute	5 minute	10 minute
		Measured Frequency (MHz)	Measured Frequency (MHz)	Measured Frequency (MHz)	Measured Frequency (MHz)
-30	5190	5190.155	5190.227	5190.186	5190.134
	5200	5200.71	5200.172	5200.879	5200.575
	5210	5210.26	5210.354	5210.362	5210.894
-20	5190	5190.16	5190.201	5190.163	5190.121
	5200	5200.272	5200.183	5200.361	5200.438
	5210	5210.105	5210.508	5210.165	5210.472
-10	5190	5190.96	5190.316	5190.02	5190.407
	5200	5200.094	5200.797	5200.396	5200.576
	5210	5210.34	5210.385	5210.774	5210.363
0	5190	5190.41	5190.55	5190.808	5190.336
	5200	5200.654	5200.64	5200.23	5200.671
	5210	5210.367	5210.412	5210.101	5210.601
10	5190	5190.518	5190.462	5190.067	5190.86
	5200	5200.293	5200.912	5200.186	5200.119
	5210	5210.889	5210.958	5210.246	5210.345
20	5190	5190.459	5190.165	5190.227	5190.239
	5200	5200.834	5200.001	5200.948	5200.861
	5210	5210.384	5210.87	5210.39	5210.632
30	5190	5190.653	5190.629	5190.612	5190.444
	5200	5200.893	5200.031	5200.42	5200.083
	5210	5210.429	5210.515	5210.025	5210.472
40	5190	5190.275	5190.047	5190.067	5190.039
	5200	5200.456	5200.654	5200.633	5200.232
	5210	5210.576	5210.632	5210.491	5210.309
50	5190	5190.238	5190.616	5190.926	5190.287
	5200	5200.112	5200.575	5200.169	5200.826
	5210	5210.47	5210.393	5210.922	5210.888

Frequency stability versus Voltage					
Temperature: 20°C					
Power Supply (VAC)	Operating Frequency (MHz)	0 minute	2 minute	5 minute	10 minute
		Measured Frequency (MHz)	Measured Frequency (MHz)	Measured Frequency (MHz)	Measured Frequency (MHz)
108	5190	5190.445	5190.542	5190.221	5190.904
	5200	5200.988	5200.612	5200.903	5200.048
	5210	5210.606	5210.119	5210.773	5210.536
120	5190	5190.188	5190.881	5190.708	5190.82
	5200	5200.924	5200.424	5200.835	5200.461
	5210	5210.295	5210.072	5210.8	5210.713
132	5190	5190.695	5190.118	5190.463	5190.646
	5200	5200.965	5200.443	5200.995	5200.825
	5210	5210.311	5210.774	5210.899	5210.333

8 Test Setup Photo

Reference to the **appendix I** for details.

9 EUT Constructional Details

Reference to the **appendix II** for details.

---END---