FCC REPORT

Applicant:	BroadSign International LLC
Address of Applicant:	453 N Lindbergh Blvd, 2nd Floor, St-Louis, Missouri, United States, 63141

Equipment Under Test (EUT)

Product Name:	BroadSign Xpress Pro
Model No.:	XpressPro
FCC ID:	2AF84-XPRESSPRO
Applicable standards:	FCC CFR Title 47 Part 15 Subpart C Section 15.407:2014
Date of sample receipt:	November 04,2015
Date of Test:	November 05-12,2015
Date of report issue:	November 13,2015
Test Result :	PASS *

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

Authorized Signature:

Robinson Lo
Laboratory Manager

2 Version

Version No.	Date	Description
00	*November 13,2015*	*Original*

Prepared By: Sam.Gao ***Date:*** *November 13,2015*

Project Engineer

Check By: hank.yan ***Date:*** *November 13,2015*

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	15.205	PASS
Frequency Stability	15.407(f)	PASS

Remark:

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

Fail: The EUT does not comply with the essential requirements in the standard.

4.1 Measurement Uncertainty

Test Item	Frequency Range	Measurement Uncertainty	Notes
Radiated Emission	9kHz ~ 30MHz	± 4.34dB	(1)
Radiated Emission	30MHz ~ 1000MHz	± 4.24dB	(1)
Radiated Emission	1GHz ~ 40GHz	± 4.68dB	(1)
AC Power Line Conducted Emission	0.15MHz ~ 30MHz	± 3.45dB	(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 Client Information

Applicant:	BroadSign International LLC
Address of Applicant:	453 N Lindbergh Blvd, 2nd Floor, St-Louis, Missouri, United States, 63141
Manufacturer/ Factory:	Shenzhen Sunchip Technology Co., Ltd.
Address of Manufacturer/ Factory:	Room 818-831, Building B1, Mingyou Purchasing Center, Bao'an District, Shenzhen, China

5.2 General Description of EUT

Product Name:	BroadSign Xpress Pro
Model No.:	XpressPro
Operation Frequency:	802.11a/802.11n(HT20) 5180MHz ~ 5240MHz;
Channel numbers:	802.11a/802.11n(HT20): 4
Channel separation:	802.11a/802.11n(HT20): 20MHz
Modulation technology:	OFDM
Antenna Type:	Integral antenna
Antenna gain:	2.0dBi(declare by Applicant)
Power supply:	Adapter : Model: XY-AP0503000 AC:100-240V, 50/60Hz, 1.0Max DC: 5V, 3.0A

5.3 Test mode

Transmitting mode	Keep the EUT in transmitting with modulation. EUT was test with 99% duty cycle at its maximum power control level.
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.	

5.4 Test Facility

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

● **FCC —Registration No.: 600491**

Global United Technology Services Co., Ltd., Shenzhen EMC Laboratory has been registered and fuly described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in files. Registration 600491, June 28, 2013.

● **Industry Canada (IC) —Registration No.: 9079A-2**

The 3m Semi-anechoic chamber of Global United Technology Services Co., Ltd. Has been Registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 9079A-2, June 26, 2013.

5.5 Test Location

All tests were performed at:

Global United Technology Services Co., Ltd.
Address: Room 301-309, 3th Floor, Block A, Huafeng Jinyuan Business Building, No. 300 Laodong Industrial Zone, Xixiang Road, Baoan District, Shenzhen 518102
Tel: 0755-27798480
Fax: 0755-27798960

5.6 Description of Support Units

Manufacturer	Description	Model	Serial Number	FCC ID/DoC
PHILIPS	LCD TV	19PFL3120/T3	AU1A12120 02906	DoC
DELL	KEYBOARD	SK-8115	N/A	DoC
DELL	MOUSE	MOC5UO	N/A	DoC

5.7 Deviation from Standards

None.

5.8 Abnormalities from Standard Conditions

None.

5.9 Other Information Requested by the Customer

None.

5.10 Test Instruments list

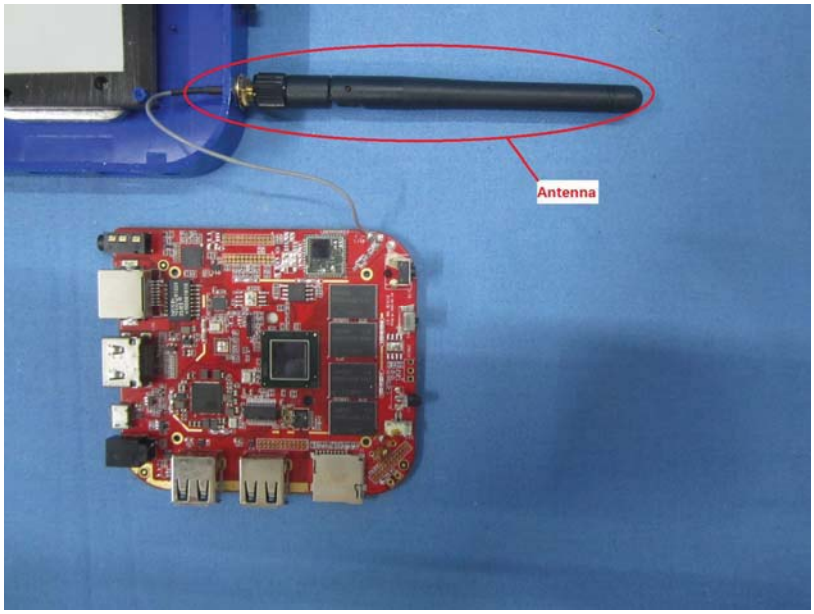
Radiated Emission:						
Item	**Test Equipment**	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal.Date (mm-dd-yy)**	**Cal.Due date (mm-dd-yy)**
1	3m Semi- Anechoic Chamber	ZhongYu Electron	9.2(L)*6.2(W)* 6.4(H)	GTS250	Mar. 28 2015	Mar. 27 2016
2	Control Room	ZhongYu Electron	6.2(L)*2.5(W)* 2.4(H)	GTS251	N/A	N/A
3	EMI Test Receiver	Rohde & Schwarz	ESU26	GTS203	June 30 2015	June 29 2016
4	Spectrum analyzer	Agilent	E4447A	GTS516	June 30 2015	June 29 2016
5	Spectrum Analyzer	Agilent	E4440A	GTS533	Nov. 19 2014	Nov. 18 2015
6	BiConiLog Antenna	SCHWARZBECK MESS-ELEKTRONIK	VULB9163	GTS214	Feb. 22 2015	Feb. 21 2016
7	Double -ridged waveguide horn	SCHWARZBECK MESS-ELEKTRONIK	9120D-829	GTS208	June 30 2015	June 29 2016
8	Horn Antenna	ETS-LINDGREN	3160	GTS217	Mar. 28 2015	Mar. 27 2016
9	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
10	Coaxial Cable	GTS	N/A	GTS213	Mar. 28 2015	Mar. 27 2016
11	Coaxial Cable	GTS	N/A	GTS211	Mar. 28 2015	Mar. 27 2016
12	Coaxial cable	GTS	N/A	GTS210	Mar. 28 2015	Mar. 27 2016
13	Coaxial Cable	GTS	N/A	GTS212	Mar. 28 2015	Mar. 27 2016
14	Amplifier(100kHz-3GHz)	HP	8347A	GTS204	June 30 2015	June 29 2016
15	Amplifier(2GHz-20GHz)	HP	8349B	GTS206	June 30 2015	June 29 2016
16	Amplifier (18-40GHz)	MITEQ	AMF-6F-18004000-29-8P	GTS534	June 30 2015	June 29 2016
17	Band filter	Amindeon	82346	GTS219	Mar. 28 2015	Mar. 27 2016
18	Constant temperature and humidity box	Oregon Scientific	BA-888	GTS248	Mar. 28 2015	Mar. 27 2016
19	D.C. Power Supply	Instek	PS-3030	GTS232	Mar. 28 2015	Mar. 27 2016
20	Universal radio communication tester	Rohde & Schwarz	CMU200	GTS235	Mar. 28 2015	Mar. 27 2016
21	Splitter	Agilent	11636B	GTS237	Mar. 28 2015	Mar. 27 2016
22	Power Meter	Anritsu	ML2495A	GTS540	June 30 2015	June 29 2016
23	Power Sensor	Anritsu	MA2411B	GTS541	June 30 2015	June 29 2016

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	7.0(L)x3.0(W)x3.0(H)	GTS264	June 30 2015	June 29 2016
2	EMI Test Receiver	Rohde & Schwarz	ESCS30	GTS223	June 30 2015	June 29 2016
3	10dB Pulse Limita	Rohde & Schwarz	N/A	GTS224	June 30 2015	June 29 2016
4	Coaxial Switch	ANRITSU CORP	MP59B	GTS225	June 30 2015	June 29 2016
5	LISN	SCHWARZBECK MESS-ELEKTRONIK	NSLK 8127	GTS226	June 30 2015	June 29 2016
6	Coaxial Cable	GTS	N/A	GTS227	June 30 2015	June 29 2016
7	EMI Test Software	AUDIX	E3	N/A	N/A	N/A

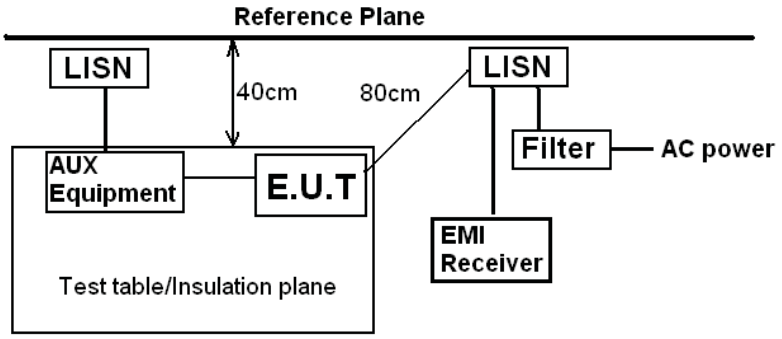
General used equipment:						
Item	**Test Equipment**	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal.Date (mm-dd-yy)**	**Cal.Due date (mm-dd-yy)**
1	Barometer	ChangChun	DYM3	GTS257	July 07 2015	July 06 2016

5 Test results and Measurement Data

5.1 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 antenna is Integral antenna, the best case gain of the antenna is 2dBi	
	

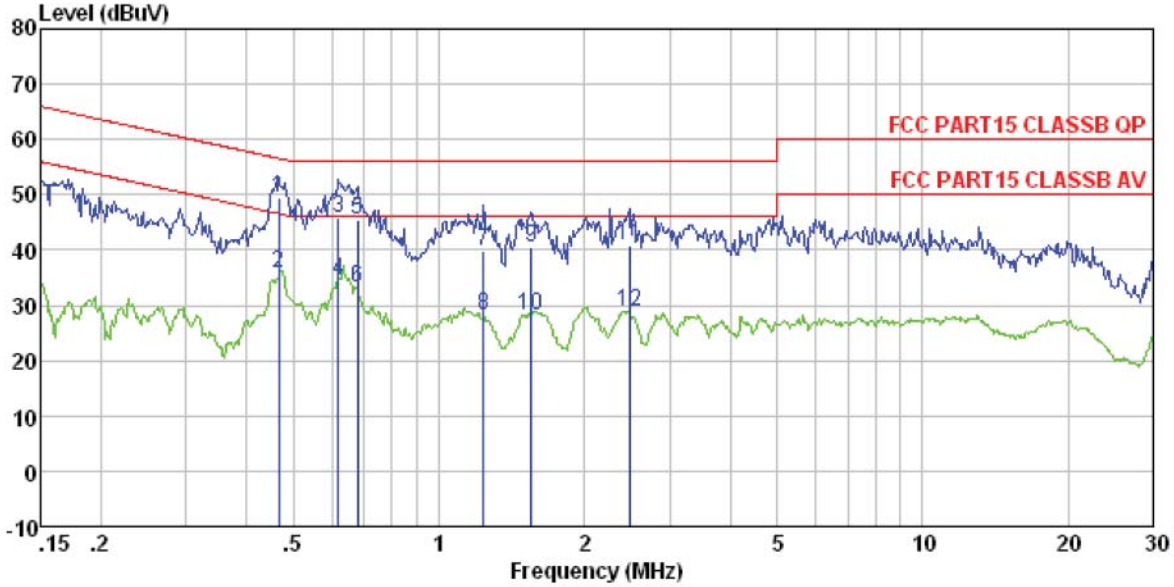
5.2 Conducted Emissions

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 5.3 for details. All of list mode were tested, and found the 802.11n(HT20) mode as the worst case. Only the data of worst case is reported.
Test results:	Pass

Measurement Data

An initial pre-scan was performed on the live and neutral lines with peak detector. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission were detected.

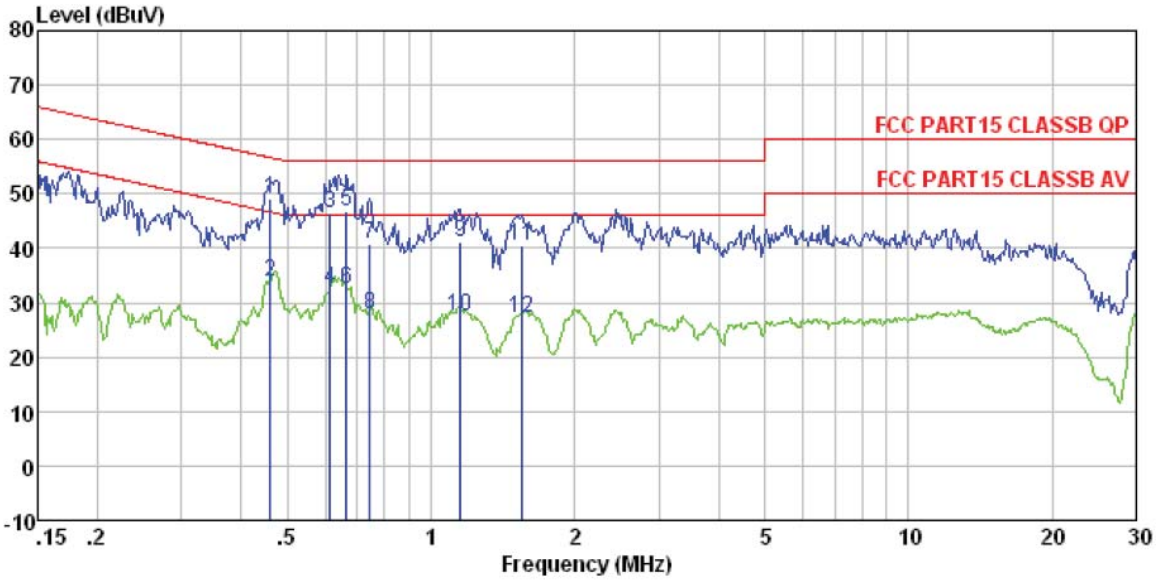
Line:



Condition : FCC PART15 CLASSB QP LISN-2013 LINE
Job No. : 1924RF
Test mode : WiFi 5GHz mode
Test Engineer: Rong

	Freq	Read Level	LISN Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dBuV	dBuV	dB	
1	0.466	49.12	0.12	0.11	49.35	56.58	-7.23	QP
2	0.466	35.66	0.12	0.11	35.89	46.58	-10.69	Average
3	0.621	45.59	0.13	0.12	45.84	56.00	-10.16	QP
4	0.621	34.15	0.13	0.12	34.40	46.00	-11.60	Average
5	0.679	45.07	0.14	0.13	45.34	56.00	-10.66	QP
6	0.679	33.05	0.14	0.13	33.32	46.00	-12.68	Average
7	1.236	39.66	0.13	0.13	39.92	56.00	-16.08	QP
8	1.236	28.02	0.13	0.13	28.28	46.00	-17.72	Average
9	1.552	40.32	0.12	0.14	40.58	56.00	-15.42	QP
10	1.552	28.00	0.12	0.14	28.26	46.00	-17.74	Average
11	2.474	40.48	0.13	0.15	40.76	56.00	-15.24	QP
12	2.474	28.58	0.13	0.15	28.86	46.00	-17.14	Average

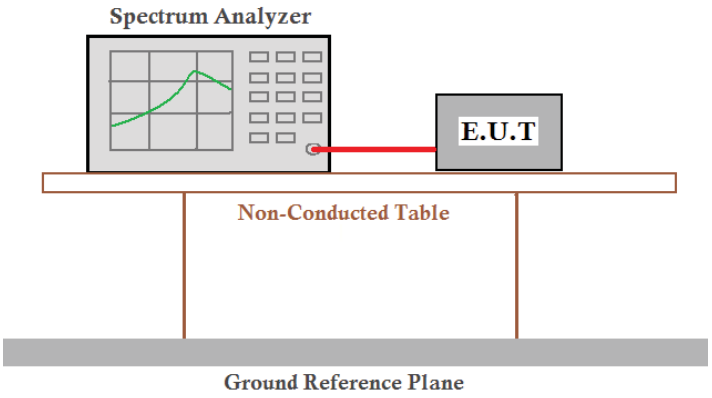
Neutral:



Condition : FCC PART15 CLASSB QP LISN-2013 NEUTRAL
Job No. : 1924RF
Test mode : WiFi 5GHz mode
Test Engineer: Rong

	Freq	Read Level	LISN Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dBuV	dBuV	dB	
1	0.461	48.91	0.06	0.11	49.08	56.67	-7.59	QP
2	0.461	33.72	0.06	0.11	33.89	46.67	-12.78	Average
3	0.614	46.19	0.07	0.12	46.38	56.00	-9.62	QP
4	0.614	32.21	0.07	0.12	32.40	46.00	-13.60	Average
5	0.665	46.57	0.07	0.13	46.77	56.00	-9.23	QP
6	0.665	32.16	0.07	0.13	32.36	46.00	-13.64	Average
7	0.743	40.47	0.07	0.13	40.67	56.00	-15.33	QP
8	0.743	27.81	0.07	0.13	28.01	46.00	-17.99	Average
9	1.153	40.86	0.08	0.13	41.07	56.00	-14.93	QP
10	1.153	27.48	0.08	0.13	27.69	46.00	-18.31	Average
11	1.552	40.21	0.09	0.14	40.44	56.00	-15.56	QP
12	1.552	27.06	0.09	0.14	27.29	46.00	-18.71	Average

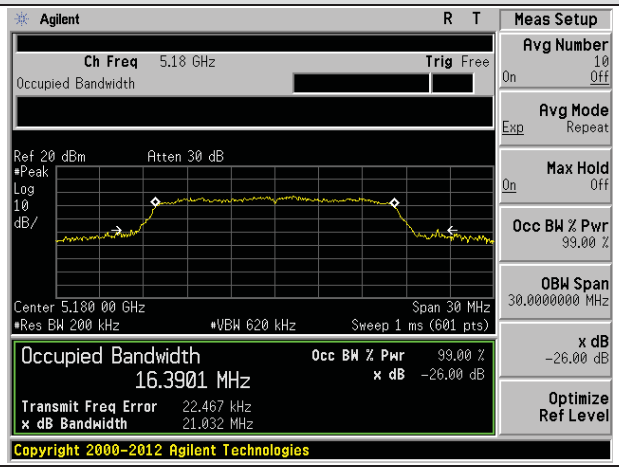
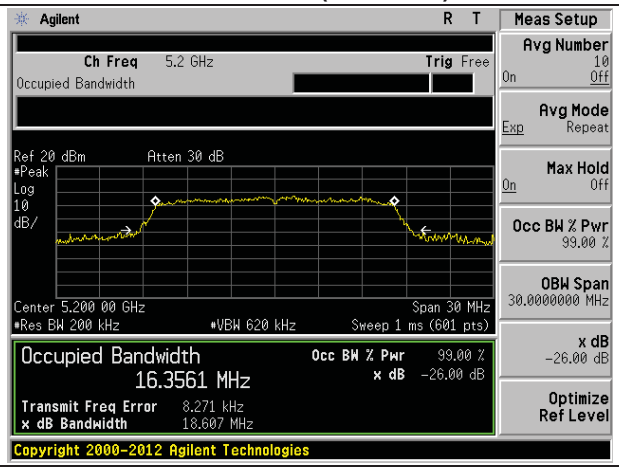
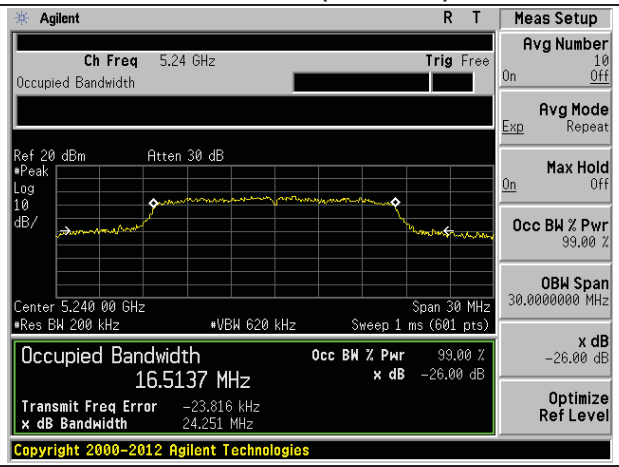
5.3 Emission Bandwidth and 99% Occupied Bandwidth

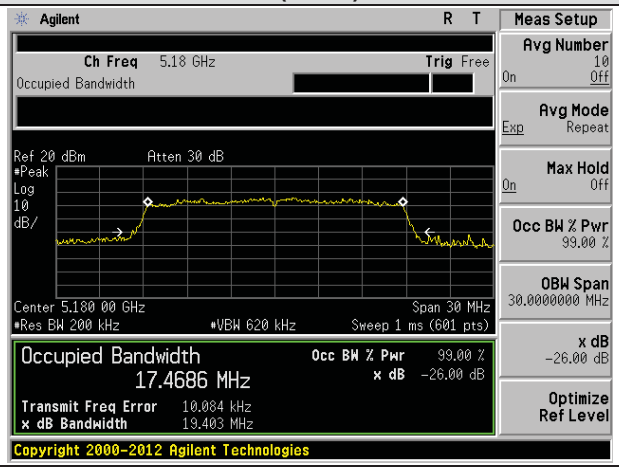
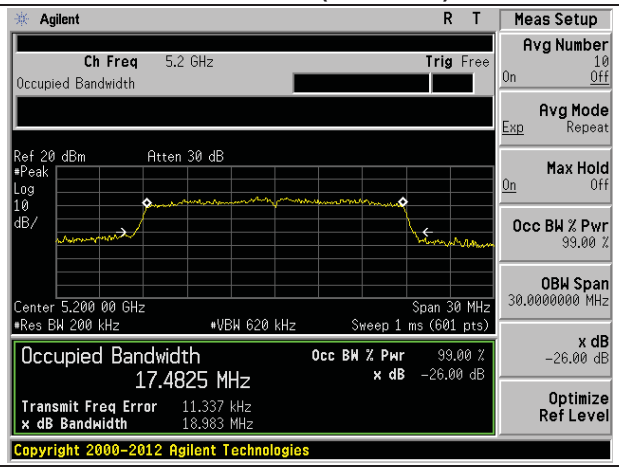
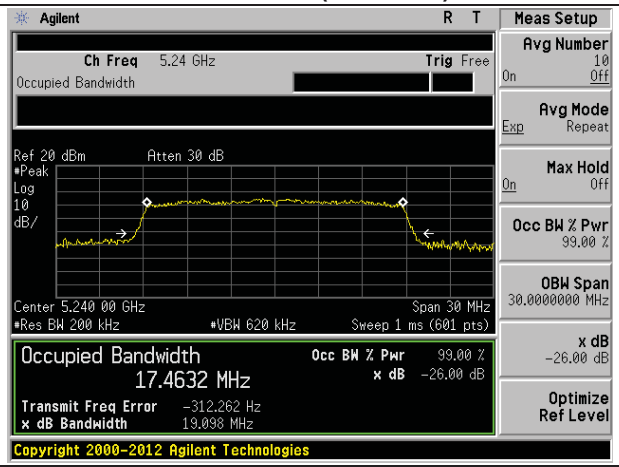
Test Requirement:	FCC Part15 E Section 15.407
Test Method:	ANSI C63.10:2013 and KDB 789033 D02 General UNII Test Procedures New Rules v01
Limit:	N/A
Test setup:	
Test procedure:	According to KDB 789033 D02 General UNII Test Procedures New Rules v01.
Test Instruments:	Refer to section 5.10 for details
Test mode:	Refer to section 5.3 for details
Test results:	Pass

Measurement Data:

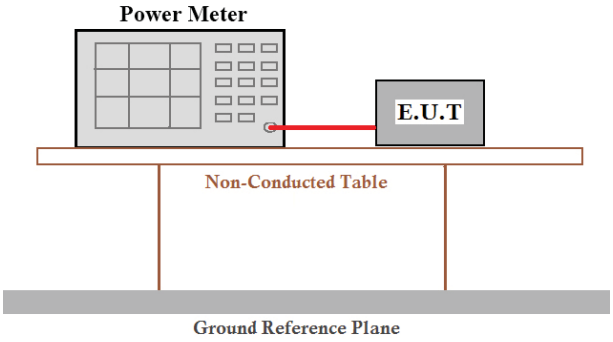
CH. No.	Frequency (MHz)	99% Occupied Bandwidth (MHz)		26dB Occupied Bandwidth (MHz)	
		802.11a	802.11n(HT20)	802.11a	802.11n(HT20)
36	5180.00	16.390	17.469	21.032	19.403
40	5200.00	16.356	17.483	18.607	18.983
48	5240.00	16.514	17.463	24.251	19.098

Test plots as followed:

802.11a mode

Channel 36 (5180MHz)

Channel 40 (5200MHz)

Channel 48 (5240MHz)

802.11n(HT20) mode

Channel 36 (5180MHz)

Channel 40 (5200MHz)

Channel 48 (5240MHz)

5.4 Max Conducted Power

Test Requirement:	FCC Part15 E Section 15.407
Test Method:	ANSI C63.10:2013 and KDB 789033 D02 General UNII Test Procedures New Rules v01
Limit:	For the band 5.725–5.825 GHz, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 1 W.
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(1/0.99) if the duty cycle is 99 percent).
Test Instruments:	Refer to section 5.10 for details
Test mode:	Refer to section 5.3 for details
Test results:	Pass

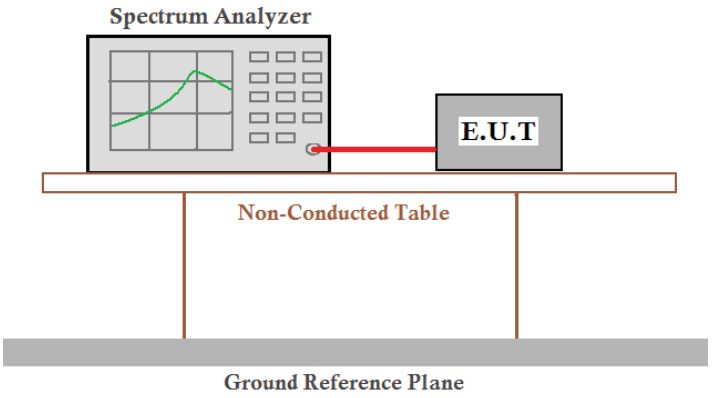
Measurement Data

802.11a mode						
CH No.	Frequency (MHz)	Measured Power (dBm)	Duty Factor	Output Power (dBm)	Limit (dBm)	Result
36	5180.00	10.51	0.04	10.55	30.00	Pass
40	5200.00	10.40	0.04	10.44	30.00	Pass
48	5240.00	10.03	0.04	10.07	30.00	Pass

802.11n(HT20) mode						
CH No.	Frequency (MHz)	Measured Power (dBm)	Duty Factor	Output Power (dBm)	Limit (dBm)	Result
36	5180.00	9.34	0.04	9.38	30.00	Pass
40	5200.00	9.19	0.04	9.23	30.00	Pass
48	5240.00	8.90	0.04	8.94	30.00	Pass

Note: Output Power = Measured Power + Duty Factor
Duty Factor = 10 log (1/Duty Cycle)

5.5 Peak Power Spectral Density

Test Requirement:	FCC Part15 E Section 15.407
Test Method:	ANSI C63.10:2013 and KDB 789033 D02 General UNII Test Procedures New Rules v01
Limit:	17dBm/MHz
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 PPSD.
Test Instruments:	Refer to section 5.10 for details
Test mode:	Refer to section 5.3 for details
Test results:	Pass

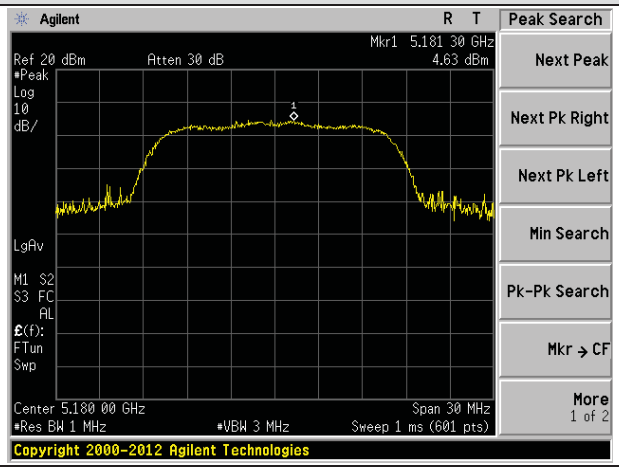
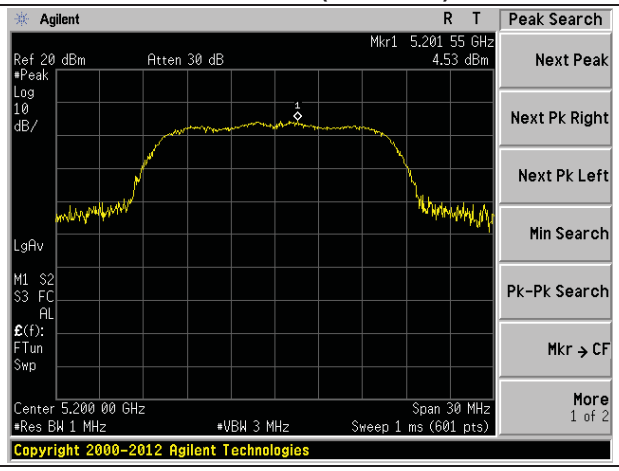
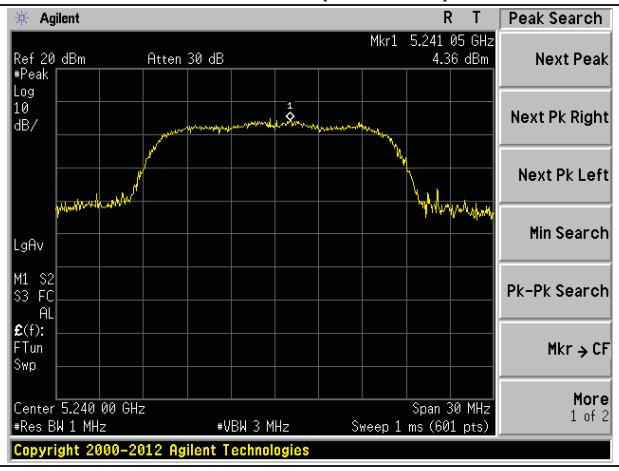
Measurement Data

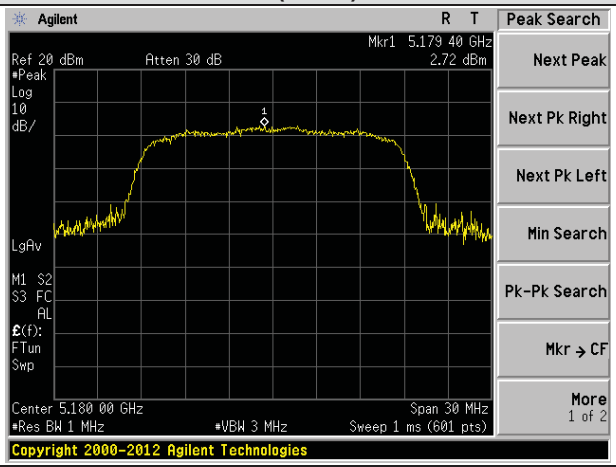
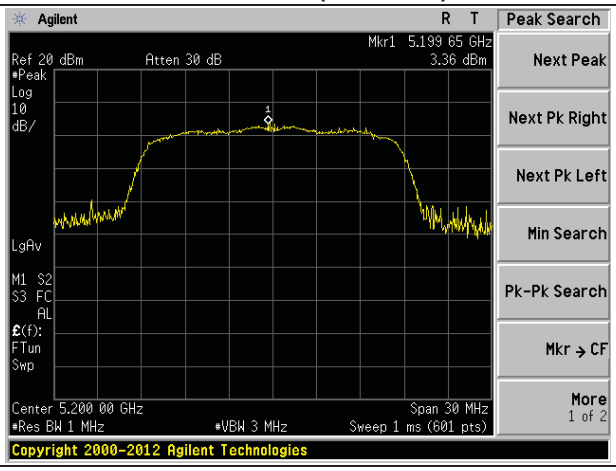
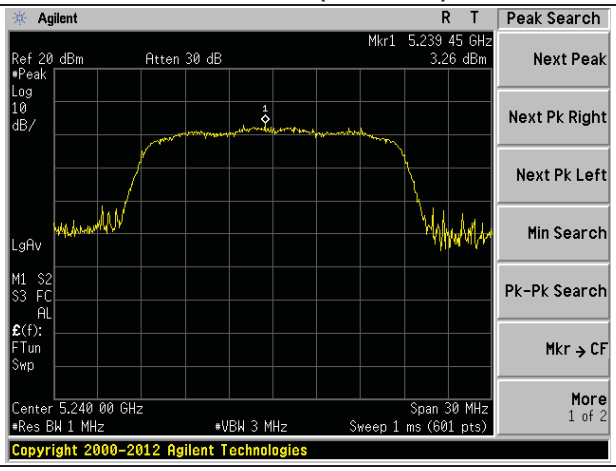
802.11a mode					
Channel No.	Frequency (MHz)	Measured PPSD (dBm/MHz)	Total PPSD (dBm/MHz)	Limit (dBm/MHz)	Result
36	5180.00	4.63	4.67	17.00	Pass
40	5200.00	4.53	4.57	17.00	Pass
48	5240.00	4.36	4.40	17.00	Pass

802.11n(HT20) mode					
Channel No.	Frequency (MHz)	Measured PPSD (dBm/MHz)	Total PPSD (dBm/MHz)	Limit (dBm/MHz)	Result
36	5180.00	2.72	2.76	17.00	Pass
40	5200.00	3.36	3.40	17.00	Pass
48	5240.00	3.26	3.30	17.00	Pass

Note: Total PPSD = Measured PPSD + 10 log (1/Duty Cycle)

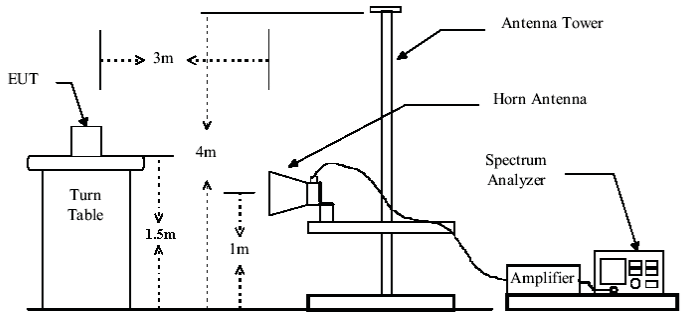
Test plots as followed:

802.11a mode

Channel 36 (5180MHz)

Channel 40 (5200MHz)

Channel 48 (5240MHz)

802.11n(HT20) mode

Channel 36 (5180MHz)

Channel 40 (5200MHz)

Channel 48 (5240MHz)

5.6 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>120KHz</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>74.0</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:	Above 1GHz 
Test Instruments:	Refer to section 5.10 for details
Test mode:	Refer to section 5.3 for details
Test results:	Pass

Remark:

According to KDB 789033 D02V01 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:

Mode:		802.11a		Frequency:		5180MHz	
Antenna Pol.	Frequency (MHz)	Reading Level (dBuV)	Factor (dB/m)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
H	5150.00	34.73	17.18	51.91	68.20	-16.29	PK
V	5150.00	37.82	17.18	55.00	68.20	-13.20	PK

Mode:		802.11a		Frequency:		5180MHz	
Antenna Pol.	Frequency (MHz)	Reading Level (dBuV)	Factor (dB/m)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
H	5150.00	25.91	17.18	43.09	54.00	-10.91	AV
V	5150.00	27.72	17.18	44.90	54.00	-9.10	AV

Mode:		802.11a		Frequency:		5240MHz	
Antenna Pol.	Frequency (MHz)	Reading Level (dBuV)	Factor (dB/m)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
H	5350.00	33.53	17.20	50.73	68.20	-17.47	PK
V	5350.00	34.21	17.20	51.41	68.20	-16.79	PK

Mode:		802.11a		Frequency:		5240MHz	
Antenna Pol.	Frequency (MHz)	Reading Level (dBuV)	Factor (dB/m)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
H	5350.00	24.34	17.20	41.54	54.00	-12.46	AV
V	5350.00	25.61	17.20	42.81	54.00	-11.19	AV

Mode:		802.11n(HT20)		Frequency:		5180MHz	
Antenna Pol.	Frequency (MHz)	Reading Level (dBuV)	Factor (dB/m)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
H	5150.00	35.63	17.18	52.81	68.20	-15.39	PK
V	5150.00	37.56	17.18	54.74	68.20	-13.46	PK

Mode:		802.11n(HT20)		Frequency:		5180MHz	
Antenna Pol.	Frequency (MHz)	Reading Level (dBuV)	Factor (dB/m)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
H	5150.00	25.49	17.18	42.67	54.00	-11.33	AV
V	5150.00	27.44	17.18	44.62	54.00	-9.38	AV

Mode:		802.11n(HT20)		Frequency:		5240MHz	
Antenna Pol.	Frequency (MHz)	Reading Level (dBuV)	Factor (dB/m)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
H	5350.00	33.87	17.20	51.07	68.20	-17.13	PK
V	5350.00	34.81	17.20	52.01	68.20	-16.19	PK

Mode:		802.11n(HT20)		Frequency:		5240MHz	
Antenna Pol.	Frequency (MHz)	Reading Level (dBuV)	Factor (dB/m)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
H	5350.00	24.64	17.20	41.84	54.00	-12.16	AV
V	5350.00	25.37	17.20	42.57	54.00	-11.43	AV

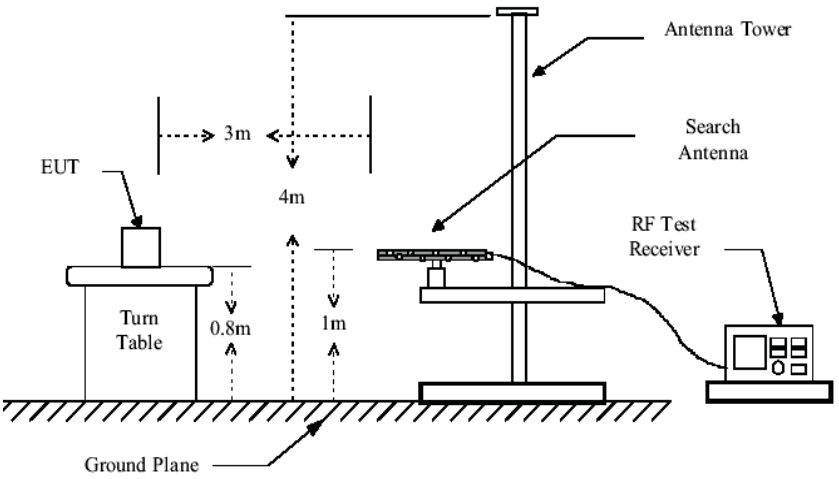
5.7 Radiated Emission

<table>
<tr><td>Test Requirement:</td><td>FCC Part15 C Section 15.209 and 15.205</td></tr>
<tr><td>Test Method:</td><td>ANSI C63.10:2013</td></tr>
<tr><td>Test Frequency Range:</td><td>30MHz to 40GHz</td></tr>
<tr><td>Test site:</td><td>Measurement Distance: 3m (Semi-Anechoic Chamber)</td></tr>
<tr><td>Receiver setup:</td><td>
<table>
<tr><th>Frequency</th><th>Detector</th><th>RBW</th><th>VBW</th><th>Value</th></tr>
<tr><td>30MHz-1GHz</td><td>Quasi-peak</td><td>120KHz</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><th>Frequency</th><th>Limit (dBuV/m @3m)</th><th>Remark</th></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>Frequency</td><td>Limit (dBm/MHz)</td><td>Remark</td></tr>
<tr><td>Above 1GHz</td><td>-27.0</td><td>Peak Value</td></tr>
</table>
</td></tr>
<tr><td>Test Procedure:</td><td>
Substitution method was performed to determine the actual ERP emission levels of the EUT.
The following test procedure as below:

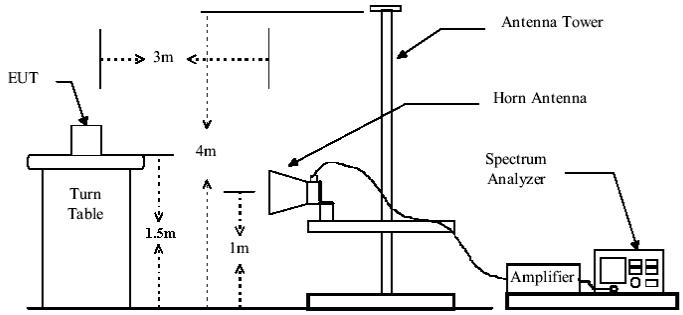
1>.Below 1GHz test procedure:
1. The EUT was placed on the top of a rotating table (0.8m for below 1GHz and 1.5 meters for above 1GHz) above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation.
2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
3. 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.
4. 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.
5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
6. 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.

2>.Above 1GHz test procedure:
1. On the test site as test setup graph above,the EUT shall be placed at the 0.8m support on the turntable and in the position closest to normal use as declared by the provider.
</td></tr>
</table>

	2. The test antenna shall be oriented initially for vertical polarization and shall be chosen to correspond to the frequency of the transmitter.The output of the test antenna shall be connected to the measuring receiver. 3. The transmitter shall be switched on, if possible, without modulation and the measuring receiver shall be tuned to the frequency of the transmitter under test. 4. The test antenna shall be raised and lowered from 1m to 4m until a maximum signal level is detected by the measuring receiver. Then the turntable should be rotated through 360° in the horizontal plane, until the maximum signal level is detected by the measuring receiver. 5. Repeat step 4 for test frequency with the test antenna polarized horizontally. 6. Remove the transmitter and replace it with a substitution antenna 7. Feed the substitution antenna at the transmitter end with a signal generator connected to the antenna by means of a nonradiating cable. With the antennas at both ends vertically polarized, and with the signal generator tuned to a particular test frequency, raise and lower the test antenna to obtain a maximum reading at the spectrum analyzer. Adjust the level of the signal generator output until the previously recorded maximum reading for this set of conditions is obtained. This should be done carefully repeating the adjustment of the test antenna and generator output. 8. Repeat step 7 with both antennas horizontally polarized for each test frequency. 9. Calculate power in dBm into a reference ideal half-wave dipole antenna by reducing the readings obtained in steps 7 and 8 by the power loss in the cable between the generator and the antenna, and further corrected for the gain of the substitution antenna used relative to an ideal half-wave dipole antenna by the following formula: EIRP(dBm) = Pg(dBm) – cable loss (dB) + antenna gain (dBi) where: Pg is the generator output power into the substitution antenna.
Test setup:	Below 1GHz



Above 1GHz



Test Instruments:	Refer to section 5.10 for details
Test mode:	Refer to section 5.3 for details
Test results:	Pass

Measurement Data:

Below 1GHz

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
40.14	36.32	15.58	0.66	30.04	22.52	40.00	-17.48	Vertical
62.21	34.52	13.77	0.88	29.91	19.26	40.00	-20.74	Vertical
129.92	52.35	10.93	1.44	29.51	35.21	43.50	-8.29	Vertical
229.29	38.02	13.62	2.01	29.47	24.18	46.00	-21.82	Vertical
403.25	35.60	17.14	2.87	29.49	26.12	46.00	-19.88	Vertical
570.61	37.50	19.93	3.60	29.30	31.73	46.00	-14.27	Vertical
43.20	27.98	15.56	0.70	30.03	14.21	40.00	-25.79	Horizontal
87.73	34.13	13.18	1.09	29.76	18.64	40.00	-21.36	Horizontal
179.39	41.87	11.62	1.74	29.28	25.95	43.50	-17.55	Horizontal
310.00	41.01	15.19	2.42	29.94	28.68	46.00	-17.32	Horizontal
535.71	43.49	19.31	3.46	29.30	36.96	46.00	-9.04	Horizontal
890.73	41.66	23.00	4.82	29.11	40.37	46.00	-5.63	Horizontal

Above 1GHz:

Only the data of worst case at each channel plan (nominal bandwidth =20MHz) is reported.

802.11a mode								
CH. No.	Antenna Pol.	Frequency (MHz)	Reading Level (dBuV)	Factor (dB/m)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
36	H	10360.00	26.90	21.64	48.54	54(Note3)	-5.46	PK
	H	15540.00	27.08	21.80	48.88	54(Note3)	-5.12	PK
	V	10360.00	28.65	21.64	50.29	54(Note3)	-3.71	PK
	V	15540.00	28.88	21.80	50.68	54(Note3)	-3.32	PK
40	H	10400.00	27.03	21.67	48.70	54(Note3)	-5.30	PK
	H	15600.00	28.12	21.83	49.95	54(Note3)	-4.05	PK
	V	10400.00	28.85	21.67	50.52	54(Note3)	-3.48	PK
	V	15600.00	26.86	21.83	48.69	54(Note3)	-5.31	PK
48	H	10480.00	27.32	21.64	48.96	54(Note3)	-5.04	PK
	H	15720.00	25.39	22.16	47.55	54(Note3)	-6.45	PK
	V	10480.00	26.98	21.64	48.62	54(Note3)	-5.38	PK
	V	15720.00	25.73	22.16	47.89	54(Note3)	-6.11	PK

802.11n(HT20) mode								
CH. No.	Antenna Pol.	Frequency (MHz)	Reading Level (dBuV)	Factor (dB/m)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
36	H	10360.00	28.66	21.64	50.30	54(Note3)	-3.70	PK
	H	15540.00	28.51	21.80	50.31	54(Note3)	-3.69	PK
	V	10360.00	26.99	21.64	48.63	54(Note3)	-5.37	PK
	V	15540.00	28.18	21.80	49.98	54(Note3)	-4.02	PK
40	H	10400.00	28.38	21.67	50.05	54(Note3)	-3.95	PK
	H	15600.00	27.23	21.83	49.20	54(Note3)	-4.80	PK
	V	10400.00	27.17	21.67	48.84	54(Note3)	-5.16	PK
	V	15600.00	25.38	21.83	47.35	54(Note3)	-6.65	PK
48	H	10480.00	28.56	21.65	50.21	54(Note3)	-3.79	PK
	H	15720.00	28.37	21.81	50.18	54(Note3)	-3.82	PK
	V	10480.00	26.87	21.65	48.52	54(Note3)	-5.48	PK
	V	15720.00	28.07	21.81	49.88	54(Note3)	-4.12	PK

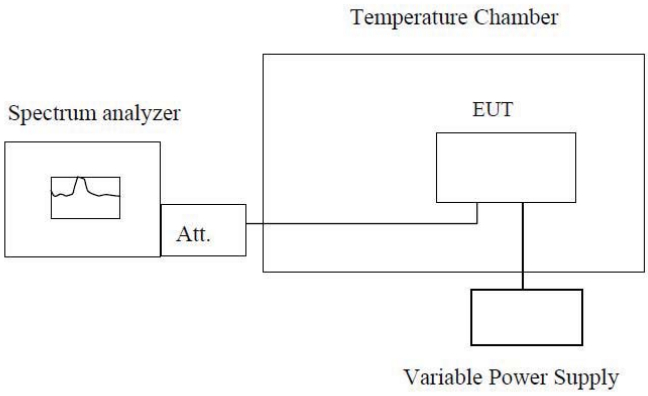
Note:

1. Measure Level = Reading Level + 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.

5.8 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, 2014; 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 5.3 for details
Test results:	Pass

Measurement data:

Frequency stability versus Temp.		
Power Supply: AC 120V		
Temp. (°C)	Operating Frequency (MHz)	Measured Frequency (MHz)
-30	5180	5179.9875
-20	5180	5179.9878
-10	5180	5179.9882
0	5180	5179.9885
10	5180	5179.9889
20	5180	5179.9892
30	5180	5179.9895
40	5180	5179.9898
50	5180	5179.9901

Frequency stability versus Voltage		
Temperature: 25°C		
Power Supply (VAC)	Operating Frequency (MHz)	Measured Frequency (MHz)
120	5180	5179.9869
102	5180	5179.9872
138	5180	5179.9874

Remark： According to user manual ， Frequency stability limit is 20ppm （5179.8964MHz-5180.1036）

6 Test Setup Photo

Radiated Emission

Conducted Emission

7 EUT Constructional Details

Reference to the test report No. GTSE15100192401

---END---