



# 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 issued:** November 13,2015

**Test Result :** PASS \*

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

Authorized Signature:

Robinson Lo

**Laboratory Manager**

This report details the results of the testing carried out on one sample. The results contained in this test report do not relate to other samples of the same product and does not permit the use of the GTS product certification mark. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.

This report may only be reproduced and distributed in full. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards. Any mention of GTS or testing done by GTS in connection with, distribution or use of the product described in this report must be approved by GTS in writing.

This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

## 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

## 3 Contents

	Page
1 COVER PAGE .....	1
2 VERSION .....	2
3 CONTENTS .....	3
4 TEST SUMMARY .....	4
4.1 MEASUREMENT UNCERTAINTY .....	4
5 GENERAL INFORMATION .....	5
5.1 CLIENT INFORMATION .....	5
5.2 GENERAL DESCRIPTION OF EUT .....	5
5.3 TEST MODE .....	7
5.4 DESCRIPTION OF SUPPORT UNITS .....	7
5.5 TEST FACILITY .....	7
5.6 TEST LOCATION .....	7
6 TEST INSTRUMENTS LIST .....	8
7 TEST RESULTS AND MEASUREMENT DATA .....	10
7.1 ANTENNA REQUIREMENT .....	10
7.2 CONDUCTED EMISSIONS .....	11
7.3 CONDUCTED PEAK OUTPUT POWER .....	14
7.4 CHANNEL BANDWIDTH .....	15
7.5 POWER SPECTRAL DENSITY .....	19
7.6 BAND EDGES .....	23
7.6.1 Radiated Emission Method .....	23
7.7 SPURIOUS EMISSION .....	26
7.7.1 Radiated Emission Method .....	26
7.8 FREQUENCY STABILITY .....	31
8 TEST SETUP PHOTO .....	34
9 EUT CONSTRUCTIONAL DETAILS .....	35

## 4 Test Summary

Test Item	Section in CFR 47	Result
Antenna requirement	15.203	Pass
AC Power Line Conducted Emission	15.207	Pass
Conducted Peak Output Power	15.407(a)(3)	Pass
Channel Bandwidth	15.407(e)	Pass
Power Spectral Density	15.407(a)(3)	Pass
Band Edge	15.407(b)(4)	Pass
Spurious Emission	15.205/15.209/15.407(b)(4)	Pass

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

*Remark: Test according to ANSI C63.10:2013 and ANSI C63.4:2014*

### 4.1 Measurement Uncertainty

Test Item	Frequency Range	Measurement Uncertainty	Notes
Radiated Emission	9kHz ~ 30MHz	$\pm 4.34\text{dB}$	(1)
Radiated Emission	30MHz ~ 1000MHz	$\pm 4.24\text{dB}$	(1)
Radiated Emission	1GHz ~ 40GHz	$\pm 4.68\text{dB}$	(1)
AC Power Line Conducted Emission	0.15MHz ~ 30MHz	$\pm 3.45\text{dB}$	(1)
Note (1): The measurement uncertainty is for coverage factor of k=2 and a level of confidence of 95%.			

## 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:	5745MHz ~ 5825MHz
Channel numbers:	5
Channel bandwidth:	20MHz
Modulation technology:	802.11a/802.11n(H20): Orthogonal Frequency Division Multiplexing (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

Operation Frequency each of channel @ 5.8G Band							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
149	5745MHz	153	5765MHz	155	5775MHz	157	5785MHz
161	5805MHz	165	5825MHz				

**Note:**

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

Test channel	Frequency (MHz)		
	5.8G Band		
	802.11a 802.11n(HT20) 802.11ac(HT20)	802.11n(HT40) 802.11ac(HT40)	802.11ac(HT80)
Lowest channel	5745	N/A	
Middle channel	5785		N/A
Highest channel	5825	N/A	

## 5.3 Test mode

Transmitting mode	Keep the EUT in continuously transmitting mode
<i>Remark: During the test, the duty cycle &gt;98%, 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.</i>	

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:

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

Mode	Data rate
802.11a	6Mbps
802.11n(HT20)	6.5Mbps
802.11n(HT40)	13Mbps
802.11ac(HT20)	6.5Mbps
802.11ac(HT40)	13.5Mbps
802.11ac(HT80)	29.3Mbps

## 5.4 Description of Support Units

None.

## 5.5 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 fully 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.

## 5.6 Test Location

All tests were performed at:

Global United Technology Services Co., Ltd.

Room 301-309, 3th Floor, Block A, Huafeng Jinyuan Business Building, No. 300 Laodong Industrial Zone, Xixiang Road, Baoan District, Shenzhen, China

Tel: 0755-27798480

Fax: 0755-27798960

## 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	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

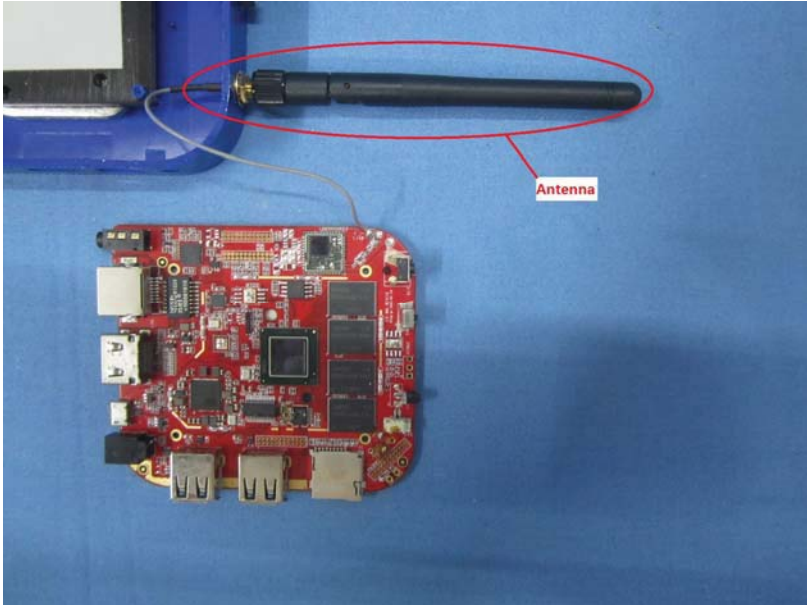


Conducted Emission:						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	Shielding Room	ZhongYu Electron	7.0(L)x3.0(W)x3.0(H)	GTS264	June 30 2015	June 29 2016
2	EMI Test Receiver	Rohde & Schwarz	ESCS30	GTS223	June 30 2015	June 29 2016
3	10dB Pulse 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

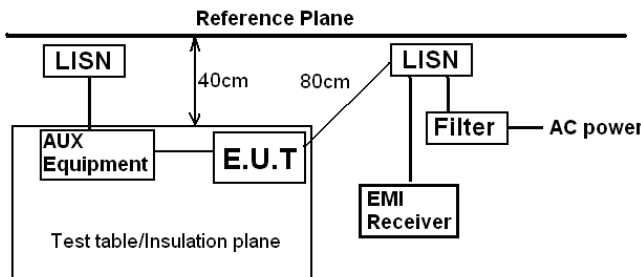
General used equipment:						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	Barometer	ChangChun	DYM3	GTS257	July 07 2015	July 06 2016

## 7 Test results and Measurement Data

### 7.1 Antenna requirement

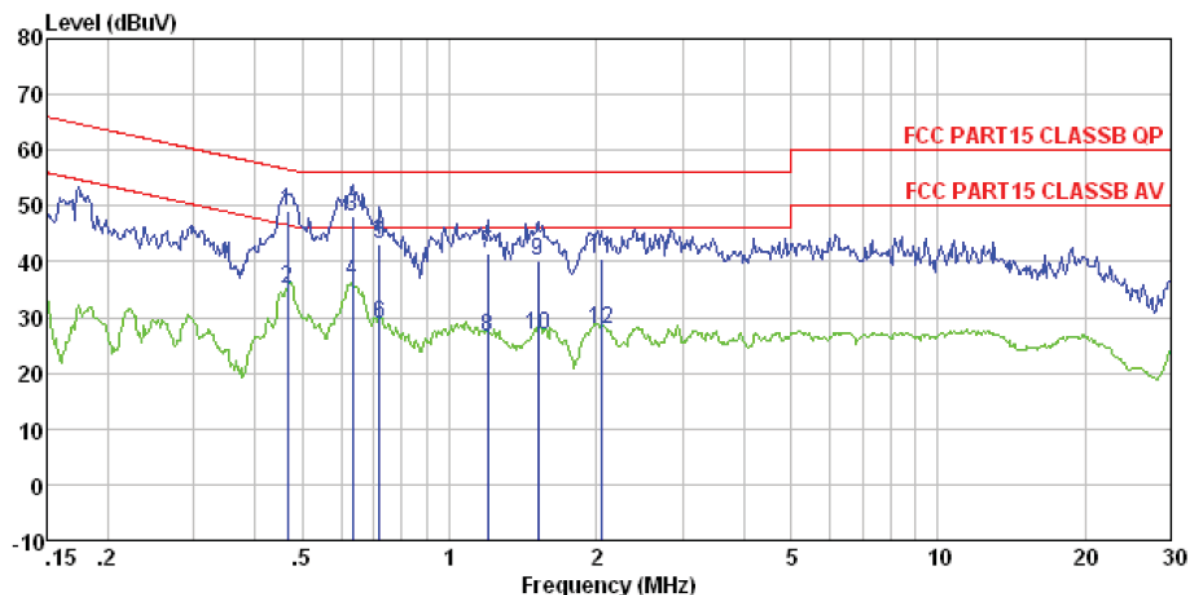
<b>Standard requirement:</b>	FCC Part15 C Section 15.203
<p><i>15.203 requirement:</i></p> <p><i>An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna 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.</i></p>	
<b>E.U.T Antenna:</b>	
<p><i>The antenna is Integral antenna, the best case gain of the antenna is 2dBi</i></p>	
	

## 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, Sweep time=auto														
Limit:	<table><tr><th rowspan="2">Frequency range (MHz)</th><th colspan="2">Limit (dBuV)</th></tr><tr><th>Quasi-peak</th><th>Average</th></tr><tr><td>0.15-0.5</td><td>66 to 56*</td><td>56 to 46*</td></tr><tr><td>0.5-5</td><td>56</td><td>46</td></tr><tr><td>5-30</td><td>60</td><td>50</td></tr></table> <p>* Decreases with the logarithm of the frequency.</p>	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
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													
Test setup:	<div><p style="text-align: center;"><b>Reference Plane</b></p><p>Remark: E.U.T: Equipment Under Test LISN: Line Impedance Stabilization Network Test table height=0.8m</p></div>														
Test procedure:	<div><div></div><div><ol style="list-style-type: none"><li>1. The E.U.T and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm/50uH coupling impedance for the measuring equipment.</li><li>2. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refer to the block diagram of the test setup and photographs).</li><li>3. 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.</li></ol></div></div>														
Test Instruments:	Refer to section 6.0 for details														
Test mode:	Refer to section 5.3 for details														
Test results:	Pass														

## Measurement data

Line:



Condition : FCC PART15 CLASSB QP LISN-2013 LINE

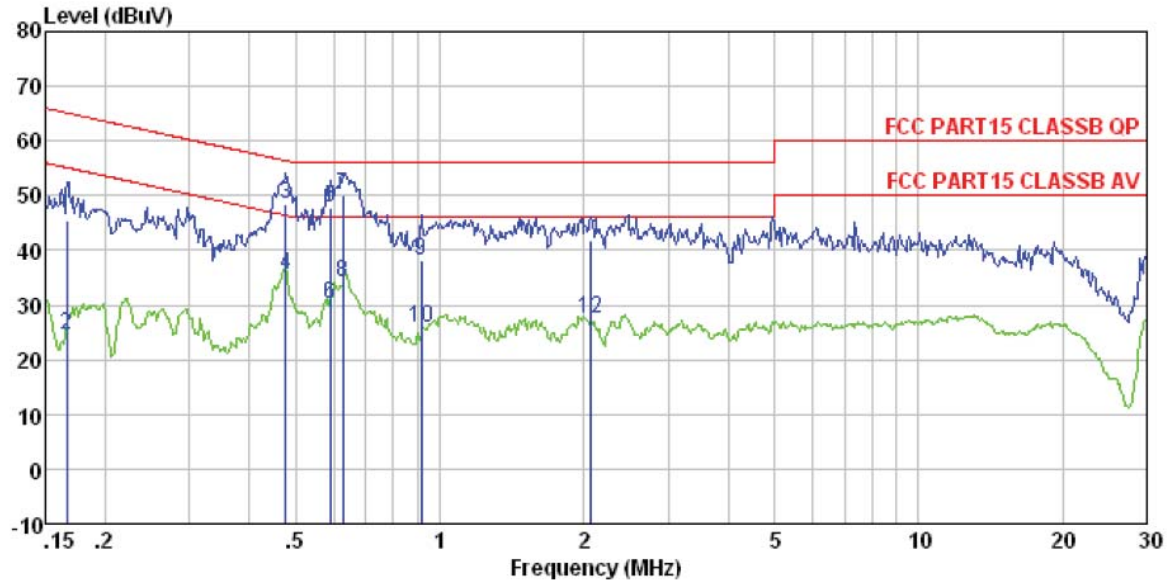
Job No. : 1924RF

Test mode : WiFi 5.8GHz mode

Test Engineer: Rong

	Read	LISN	Cable	Limit	Over	
Freq	Level	Factor	Loss	Line	Limit	Remark
MHz	dBuV	dB	dB	dBuV	dB	
1	0.466	48.87	0.12	0.11	49.10	56.58 -7.48 QP
2	0.466	34.85	0.12	0.11	35.08	46.58 -11.50 Average
3	0.634	47.98	0.13	0.13	48.24	56.00 -7.76 QP
4	0.634	36.26	0.13	0.13	36.52	46.00 -9.48 Average
5	0.720	42.89	0.14	0.13	43.16	56.00 -12.84 QP
6	0.720	28.74	0.14	0.13	29.01	46.00 -16.99 Average
7	1.197	41.18	0.13	0.13	41.44	56.00 -14.56 QP
8	1.197	26.39	0.13	0.13	26.65	46.00 -19.35 Average
9	1.519	39.87	0.12	0.14	40.13	56.00 -15.87 QP
10	1.519	26.76	0.12	0.14	27.02	46.00 -18.98 Average
11	2.044	40.37	0.12	0.15	40.64	56.00 -15.36 QP
12	2.044	27.59	0.12	0.15	27.86	46.00 -18.14 Average

Neutral:



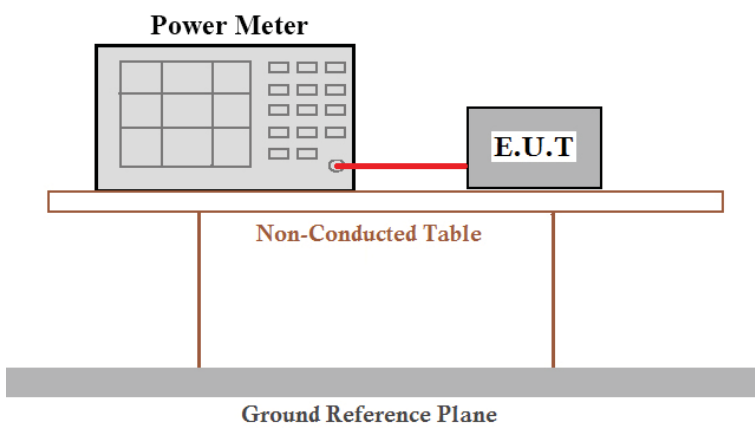
Condition : FCC PART15 CLASSB QP LISN-2013 NEUTRAL  
 Job No. : 1924RF  
 Test mode : WiFi 5.8GHz mode  
 Test Engineer: Rong

	Freq	Read Level	LISN Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dBuV	dBuV	dB	
1	0.166	45.19	0.07	0.12	45.38	65.16	-19.78	QP
2	0.166	24.21	0.07	0.12	24.40	55.16	-30.76	Average
3	0.476	48.26	0.06	0.11	48.43	56.41	-7.98	QP
4	0.476	35.32	0.06	0.11	35.49	46.41	-10.92	Average
5	0.592	47.47	0.07	0.12	47.66	56.00	-8.34	QP
6	0.592	29.90	0.07	0.12	30.09	46.00	-15.91	Average
7	0.627	50.05	0.07	0.12	50.24	56.00	-5.76	QP
8	0.627	34.11	0.07	0.12	34.30	46.00	-11.70	Average
9	0.914	37.86	0.07	0.13	38.06	56.00	-17.94	QP
10	0.914	25.62	0.07	0.13	25.82	46.00	-20.18	Average
11	2.066	41.44	0.09	0.15	41.68	56.00	-14.32	QP
12	2.066	27.36	0.09	0.15	27.60	46.00	-18.40	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
4. If the average limit is met when using a quasi-peak detector receiver, the EUT shall be deemed to meet both limits and measurement with the average detector receiver is unnecessary.

## 7.3 Conducted Peak Output Power

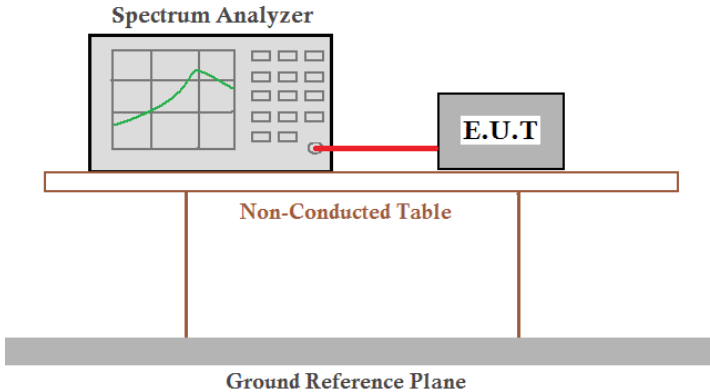
Test Requirement:	FCC Part15 E Section 15.407(a)(3)
Test Method:	ANSI C63.10:2013 and KDB789033 D02 General UNII Test Procedures New Rules v01
Limit:	30dBm
Test setup:	 <p>The diagram illustrates the test setup. A Power Meter is connected to an E.U.T. (Equipment Under Test) via a red cable. Both the Power Meter and the E.U.T. are placed on a Non-Conducted Table. The table is supported by two vertical legs and sits on a Ground Reference Plane.</p>
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.3 for details
Test results:	Pass

## Measurement Data

### 5.8G Band

Test mode	Channel	Read Level (dBm)	Limit (dBm)	Result
802.11a	Lowest	7.17	30	Pass
	Middle	5.89		
	Highest	5.25		
802.11n(HT20)	Lowest	6.38		
	Middle	5.31		
	Highest	4.59		

## 7.4 Channel Bandwidth

Test Requirement:	FCC Part15 E Section 15.407(e)
Test Method:	ANSI C63.10:2013 and KDB789033 D02 General UNII Test Procedures New Rules v01
Limit:	>500KHz
Test setup:	 <p>The diagram illustrates the test setup. A Spectrum Analyzer is connected to an E.U.T. (Equipment Under Test) via a red cable. Both the Spectrum Analyzer and the E.U.T. are placed on a Non-Conducted Table. The table is supported by a Ground Reference Plane.</p>
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.3 for details
Test results:	Pass

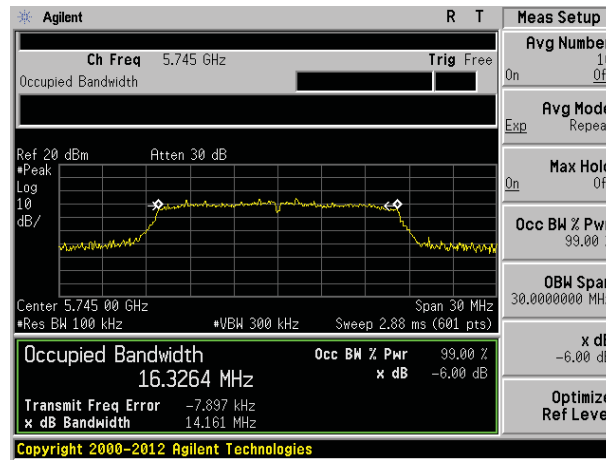
## Measurement Data

5.8G Band				
Test CH	Channel Bandwidth (MHz)		Limit (KHz)	Result
	802.11a	802.11n(HT20)		
Lowest	14.161	14.669	>500	Pass
Middle	14.577	16.767		
Highest	13.793	13.327		

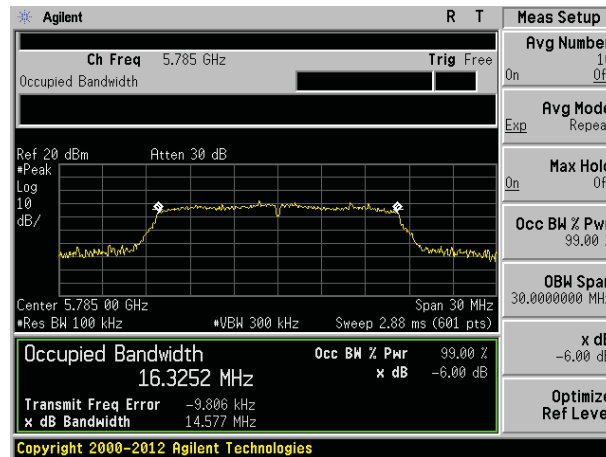
Test plot as follows:



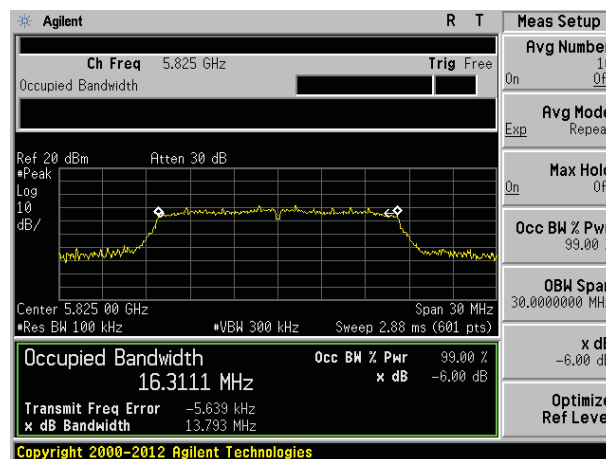
Test mode: 802.11a



Lowest channel

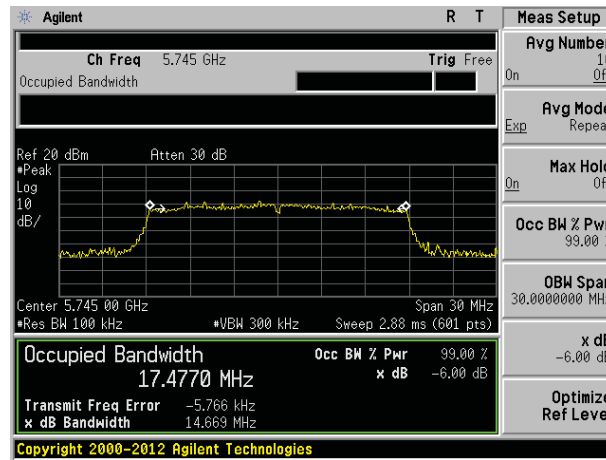


Middle channel

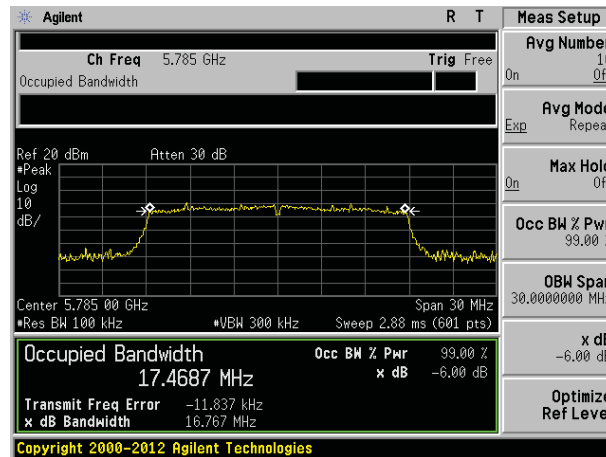


Highest channel

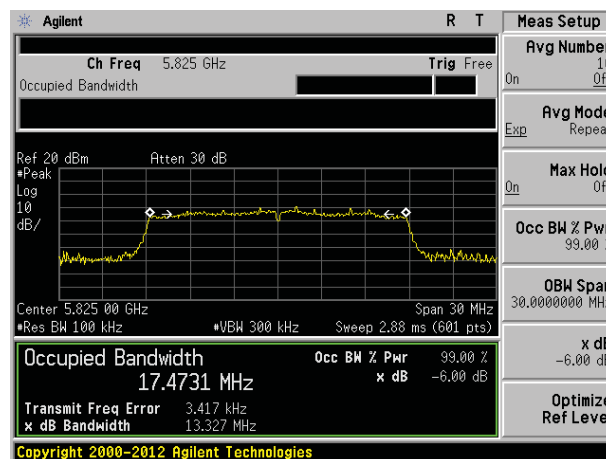
Test mode: 802.11n(HT20) @ 5.8G Band



Lowest channel

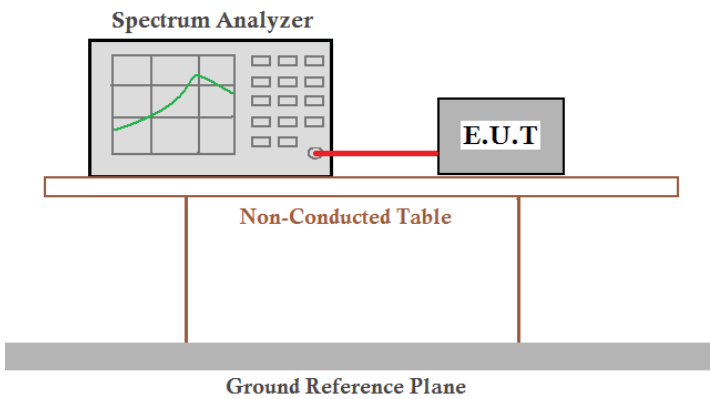


Middle channel



Highest channel

## 7.5 Power Spectral Density

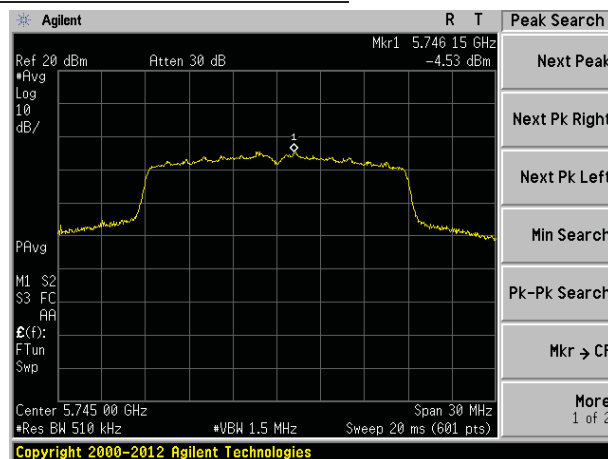
Test Requirement:	FCC Part15 E Section 15.407(a)(3)
Test Method:	ANSI C63.10:2013 and KDB789033 D02 General UNII Test Procedures New Rules v01
Limit:	30dBm
Test setup:	 <p>The diagram illustrates the test setup. A Spectrum Analyzer is connected to an E.U.T (Equipment Under Test) via a red cable. Both the Spectrum Analyzer and the E.U.T are placed on a Non-Conducted Table. The table is supported by a Ground Reference Plane.</p>
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.3 for details
Test results:	Pass

## Measurement Data

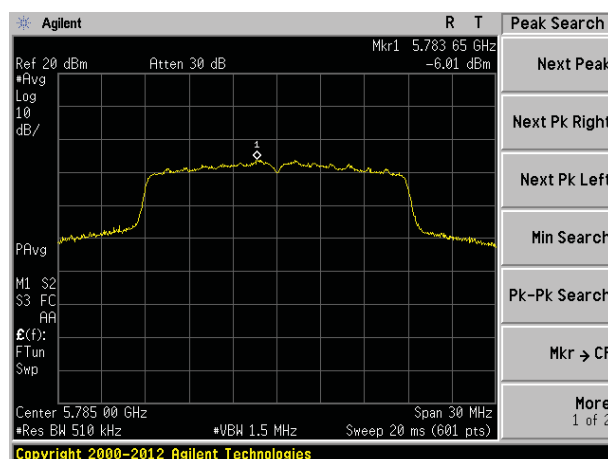
5.8G Band				
Test CH	Power Spectral Density (dBm)		Limit (dBm/500kHz)	Result
	802.11a	802.11n(HT20)		
Lowest	-4.53	-7.59	30.00	Pass
Middle	-6.01	-8.92		
Highest	-6.44	-7.87		

Test plot as follows:

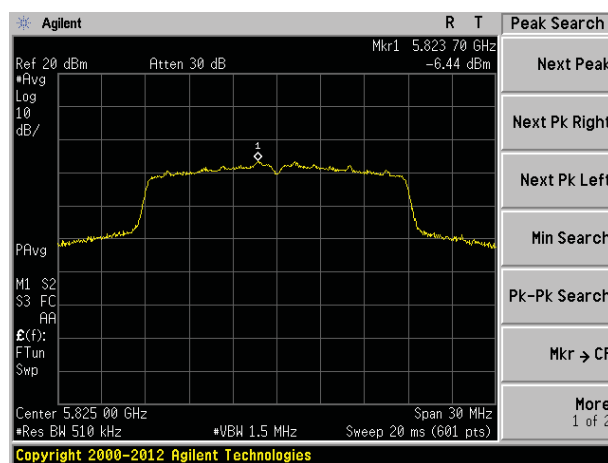
Test mode: 802.11a



Lowest channel

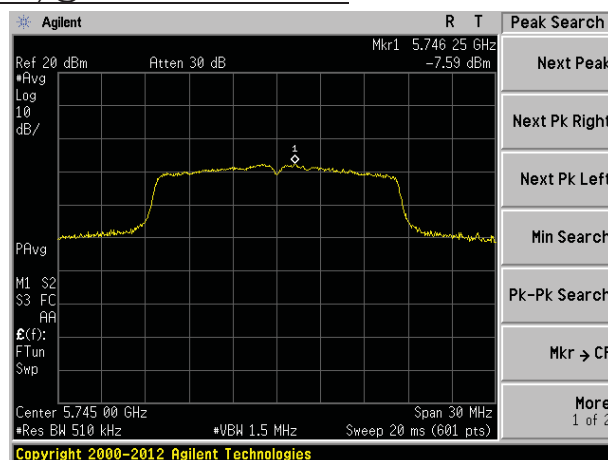


Middle channel

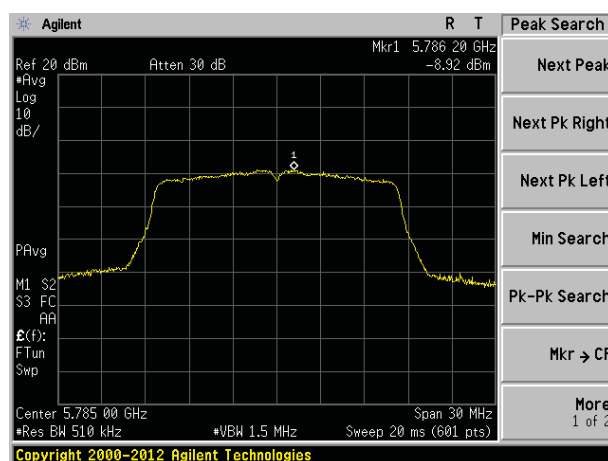


Highest channel

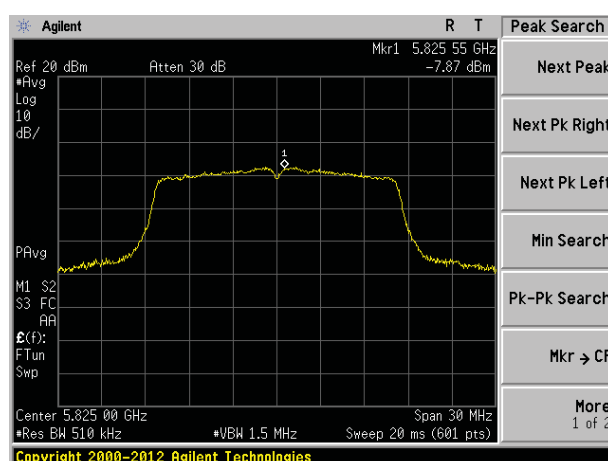
Test mode: 802.11n(HT20) @ 5.8G Band



Lowest channel



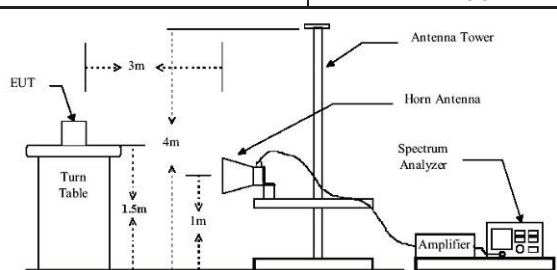
Middle channel



Highest channel

## 7.6 Band edges

### 7.6.1 Radiated Emission Method

Test Requirement:	FCC Part15 C Section 15.209 and 15.205				
Test Method:	ANSI C63.10: 2013				
Test Frequency Range:	30MHz to 40GHz, only worse case is reported				
Test site:	Measurement Distance: 3m				
Receiver setup:	Frequency	Detector	RBW	VBW	Value
	Above 1GHz	Peak	1MHz	3MHz	Peak
		Peak	1MHz	10Hz	Average
Limit:	Frequency		Limit (dBuV/m @3m)		Value
	Above 1GHz		54.00		Average
			74.00		Peak
Test setup:					
Test Procedure:	<div>1. The EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation.</div> <div>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.</div> <div>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.</div> <div>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 rota table was turned from 0 degrees to 360 degrees to find the maximum reading.</div> <div>5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.</div> <div>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.</div> <div>7. The radiation measurements are performed in X, Y, Z axis positioning. And found the X axis positioning which it is worse case, only the test worst case mode is recorded in the report.</div>				
Test Instruments:	Refer to section 6.0 for details				
Test mode:	Refer to section 5.3 for details				
Test results:	Pass				

Measurement data:

Remark: The pre-test were performed on lowest, middle and highest frequencies, only the worst case's (lowest and highest frequencies) data was showed.

Test mode:	802.11a	Test channel:	Lowest
------------	---------	---------------	--------

## Peak value:

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
5715.00	35.88	32.56	9.86	23.85	54.45	68.20	-13.75	Horizontal
5725.00	36.57	32.68	9.97	23.86	55.36	78.20	-22.84	Horizontal
5715.00	38.25	32.56	9.86	23.85	56.82	68.20	-11.38	Vertical
5725.00	38.58	32.68	9.97	23.86	57.37	78.20	-20.83	Vertical

## Average value:

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
5715.00	25.45	32.56	9.86	23.85	44.02	48.20	-4.18	Horizontal
5725.00	26.76	32.68	9.97	23.86	45.55	58.20	-12.65	Horizontal
5715.00	26.02	32.56	9.86	23.85	44.59	48.20	-3.61	Vertical
5725.00	28.90	32.68	9.97	23.86	47.69	58.20	-10.51	Vertical

Test mode:	802.11a	Test channel:	Highest
------------	---------	---------------	---------

## Peak value:

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
5850.00	35.32	32.70	9.99	23.87	54.14	78.20	-24.06	Horizontal
5860.00	30.85	32.68	9.97	23.86	49.64	68.20	-18.56	Horizontal
5850.00	37.88	32.70	9.99	23.87	56.70	78.20	-21.50	Vertical
5860.00	32.69	32.68	9.97	23.86	51.48	68.20	-16.72	Vertical

## Average value:

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
5850.00	25.68	32.70	9.99	23.87	44.50	58.20	-13.70	Horizontal
5860.00	20.33	32.68	9.97	23.86	39.12	48.20	-9.08	Horizontal
5850.00	25.48	32.70	9.99	23.87	44.30	58.20	-13.90	Vertical
5860.00	20.87	32.68	9.97	23.86	39.66	48.20	-8.54	Vertical

Remark:

1. Final Level =Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor
2. The emission levels of other frequencies are very lower than the limit and not show in test report.



Test mode:	802.11n(HT20) @ 5.8G Band	Test channel:	Lowest
------------	---------------------------	---------------	--------

**Peak value:**

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5715.00	35.10	32.56	9.86	23.85	53.67	68.20	-14.53	Horizontal
5725.00	34.89	32.68	9.97	23.86	53.68	78.20	-24.52	Horizontal
5715.00	36.66	32.56	9.86	23.85	55.23	68.20	-12.97	Vertical
5725.00	37.86	32.68	9.97	23.86	56.65	78.20	-21.55	Vertical

**Average value:**

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5715.00	25.63	32.56	9.86	23.85	44.20	48.2	-4.00	Horizontal
5725.00	24.87	32.68	9.97	23.86	43.66	58.2	-14.54	Horizontal
5715.00	26.06	32.56	9.86	23.85	44.63	48.2	-3.57	Vertical
5725.00	27.91	32.68	9.97	23.86	46.70	58.2	-11.50	Vertical

Test mode:	802.11a	Test channel:	Highest
------------	---------	---------------	---------

**Peak value:**

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5850.00	34.86	32.7	9.99	23.87	53.68	78.2	-24.52	Horizontal
5860.00	30.08	32.68	9.97	23.86	48.87	68.2	-19.33	Horizontal
5850.00	36.66	32.7	9.99	23.87	55.48	78.2	-22.72	Vertical
5860.00	31.05	32.68	9.97	23.86	49.84	68.2	-18.36	Vertical

**Average value:**

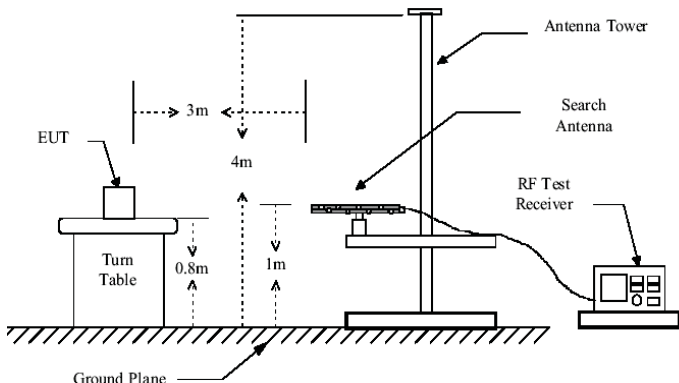
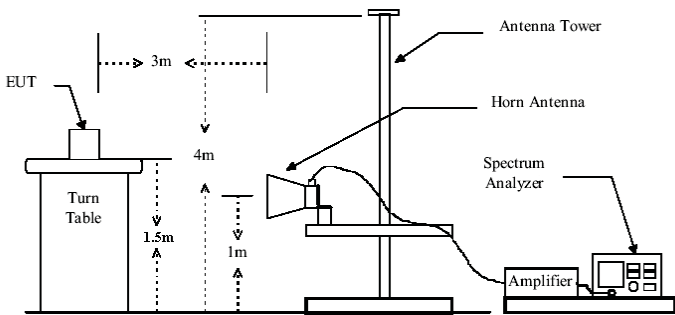
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5850.00	24.79	32.7	9.99	23.87	43.61	58.2	-14.59	Horizontal
5860.00	20.74	32.68	9.97	23.86	39.53	48.2	-8.67	Horizontal
5850.00	25.58	32.7	9.99	23.87	44.40	58.2	-13.80	Vertical
5860.00	20.81	32.68	9.97	23.86	39.60	48.2	-8.60	Vertical

**Remark:**

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor
2. The emission levels of other frequencies are very lower than the limit and not show in test report.

## 7.7 Spurious Emission

### 7.7.1 Radiated Emission Method

Test Requirement:	FCC Part15 C Section 15.209, Part 15E Section 15.407(b)(4)				
Test Method:	ANSI C63.10:2013				
Test Frequency Range:	30MHz to 40GHz				
Test site:	Measurement Distance: 3m				
Receiver setup:	Frequency	Detector	RBW	VBW	Value
	30MHz-1GHz	Quasi-peak	120KHz	300KHz	Quasi-peak Value
	Above 1GHz	Peak	1MHz	3MHz	Peak Value
		AV	1MHz	3MHz	Average Value
Limit:	Frequency		Limit (dBUV/m @3m)		Remark
	30MHz-88MHz		40.0		Quasi-peak Value
	88MHz-216MHz		43.5		Quasi-peak Value
	216MHz-960MHz		46.0		Quasi-peak Value
	960MHz-1GHz		54.0		Quasi-peak Value
	Frequency		Limit (dBm/MHz)		Remark
	Above 1GHz		-27.0		Peak Value
Test setup:	Below 1GHz				
					
Test setup:	Above 1GHz				
					
Test Procedure:	1. The EUT was placed on the top of a rotating table (0.8m for below				

	<p>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.</p> <p>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.</p> <p>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.</p> <p>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 rota table was turned from 0 degrees to 360 degrees to find the maximum reading.</p> <p>5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.</p> <p>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.</p> <p>7. The radiation measurements are performed in X, Y, Z axis positioning. And found the X axis positioning which it is worse case, only the test worst case mode is recorded in the report.</p>
Test Instruments:	Refer to section 6.0 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:

$$E[\text{dBuV/m}] = \text{EIRP}[\text{dBm}] + 95.2;$$

For example, if EIRP = -27dBm

$$E[\text{dBuV/m}] = -27 + 95.2 = 68.2\text{dBuV/m}.$$

## Measurement Data

### ■ Below 1GHz

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

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
42.30	39.90	15.57	0.69	30.03	26.13	40.00	-13.87	Vertical
66.50	42.87	12.02	0.91	29.88	25.92	40.00	-14.08	Vertical
140.84	47.25	10.20	1.51	29.45	29.51	43.50	-13.99	Vertical
258.33	35.13	14.05	2.16	29.71	21.63	46.00	-24.37	Vertical
425.03	39.28	17.49	2.97	29.45	30.29	46.00	-15.71	Vertical
691.99	37.82	20.78	4.06	29.21	33.45	46.00	-12.55	Vertical
48.84	28.87	15.32	0.76	30.00	14.95	40.00	-25.05	Horizontal
92.14	31.48	14.33	1.13	29.74	17.20	43.50	-26.30	Horizontal
143.33	42.45	10.22	1.53	29.44	24.76	43.50	-18.74	Horizontal
234.17	42.63	13.83	2.04	29.52	28.98	46.00	-17.02	Horizontal
446.41	35.94	17.57	3.07	29.40	27.18	46.00	-18.82	Horizontal
699.31	43.48	20.80	4.08	29.20	39.16	46.00	-6.84	Horizontal

## ■ Above 1GHz

Test mode:		802.11a			Test channel:		lowest	
Antenna Pol.	Frequency (MHz)	Reading Level (dBuV)	Factor (dB/m)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	
V	11490.00	25.29	21.64	46.93	54(Note3)	-7.07	PK	
V	17235.00	22.70	21.80	44.50	54(Note3)	-9.50	PK	
H	11510.00	22.32	21.83	44.15	54(Note3)	-9.85	PK	
H	17265.00	22.20	21.67	43.87	54(Note3)	-10.13	PK	

Test mode:		802.11a			Test channel:		Middle	
Antenna Pol.	Frequency (MHz)	Reading Level (dBuV)	Factor (dB/m)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	
V	11570.00	25.30	21.64	46.94	54(Note3)	-7.06	PK	
V	17355.00	23.29	21.80	45.09	54(Note3)	-8.91	PK	
H	11570.00	22.80	21.83	44.63	54(Note3)	-9.37	PK	
H	17355.00	22.05	21.67	43.72	54(Note3)	-10.28	PK	

Test mode:		802.11a			Test channel:		Highest	
Antenna Pol.	Frequency (MHz)	Reading Level (dBuV)	Factor (dB/m)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	
V	11650.00	24.79	21.64	46.43	54(Note3)	-7.57	PK	
V	17475.00	22.87	21.80	44.67	54(Note3)	-9.33	PK	
H	11650.00	22.73	21.83	44.56	54(Note3)	-9.44	PK	
H	17475.00	21.72	21.67	43.39	54(Note3)	-10.61	PK	

Test mode:		802.11n(HT20)			Test channel:		lowest
Antenna Pol.	Frequency (MHz)	Reading Level (dBuV)	Factor (dB/m)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
V	11490.00	26.52	21.64	48.16	54(Note3)	-5.84	PK
V	17235.00	24.25	21.80	46.05	54(Note3)	-7.95	PK
H	11510.00	24.32	21.83	46.15	54(Note3)	-7.85	PK
H	17265.00	23.20	21.67	44.87	54(Note3)	-9.13	PK

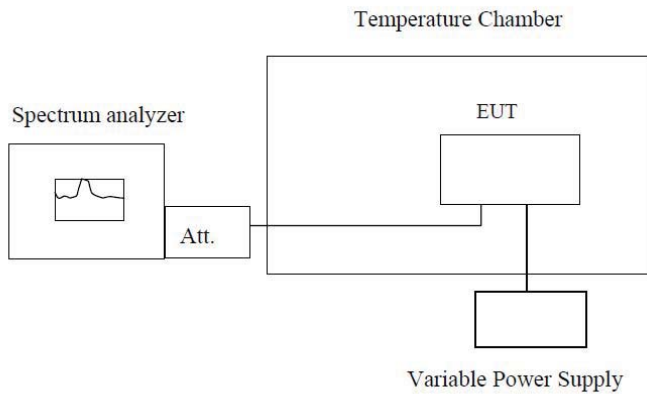
Test mode:		802.11n(HT20)			Test channel:		Middle
Antenna Pol.	Frequency (MHz)	Reading Level (dBuV)	Factor (dB/m)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
V	11570.00	26.60	21.64	48.24	54(Note3)	-5.76	PK
V	17355.00	24.29	21.80	46.09	54(Note3)	-7.91	PK
H	11570.00	24.45	21.83	46.28	54(Note3)	-7.72	PK
H	17355.00	23.27	21.67	44.94	54(Note3)	-9.06	PK

Test mode:		802.11n(HT20)			Test channel:		Highest
Antenna Pol.	Frequency (MHz)	Reading Level (dBuV)	Factor (dB/m)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
V	11650.00	25.46	21.64	47.10	54(Note3)	-6.90	PK
V	17475.00	23.42	21.80	45.22	54(Note3)	-8.78	PK
H	11650.00	23.56	21.83	45.39	54(Note3)	-8.61	PK
H	17475.00	22.36	21.67	44.03	54(Note3)	-9.97	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.

## 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, 2014; tested to 2.1055 for compliance to FCC Part 15.407(g) requirements.
Test setup:	 <p><b>Note :</b> Measurement setup for testing on Antenna connector</p>
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		
Frequency stability versus Temp.		
Power Supply: AC 120V		
Temp. (°C)	Operating Frequency (MHz)	Measured Frequency (MHz)
-30	5745	5744.9931
-20	5745	5744.9937
-10	5745	5744.9943
0	5745	5744.9947
10	5745	5744.9933
20	5745	5744.9939
30	5745	5744.9944
40	5745	5744.9949
50	5745	5744.9931

Frequency stability versus Voltage		
Temperature: 25°C		
Power Supply (VAC)	Operating Frequency (MHz)	Measured Frequency (MHz)
120	5745	5744.9894
102	5745	5744.9900
138	5745	5744.9905

Remark : According to user manual , Frequency stability limit is 20ppm (5744.8851MHz-5745.1149)



802.11n(HT20)		
Frequency stability versus Temp.		
Power Supply: AC 120V		
Temp. (°C)	Operating Frequency (MHz)	Measured Frequency (MHz)
-30	5745	5744.9894
-20	5745	5744.9903
-10	5745	5744.9911
0	5745	5744.9919
10	5745	5744.9897
20	5745	5744.9906
30	5745	5744.9914
40	5745	5744.9921
50	5745	5744.9893

Frequency stability versus Voltage		
Temperature: 25°C		
Power Supply (VAC)	Operating Frequency (MHz)	Measured Frequency (MHz)
120	5745	5744.9839
108	5745	5744.9849
132	5745	5744.9857

## 8 Test Setup Photo

Radiated Emission



## Conducted Emission



## 9 EUT Constructional Details

Reference to the test report No. GTSE15100192401

-----END-----