FCC REPORT

Applicant:	Huizhou Tuoying Technology Limited Company
Address of Applicant:	Second Floor No.1 Factory, Lianhong Industrial Park, Sanhe Development Zone, Huiyang District, Huizhou City, China
Manufacturer/Factory:	Huizhou Tuoying Technology Limited Company
Address of Manufacturer/Factory:	Second Floor No.1 Factory, Lianhong Industrial Park, Sanhe Development Zone, Huiyang District, Huizhou City, China

Equipment Under Test (EUT)

Product Name:	Fold four axis Toy UAV
Model No.:	TE-F360
Trade Mark:	TOPE
FCC ID:	2ASBP-TE-F360
Applicable standards:	FCC CFR Title 47 Part 15 Subpart E Section 15.407
Date of sample receipt:	December 26, 2018
Date of Test:	December 27, 2018-January 12, 2019
Date of report issued:	January 15, 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	*January 15, 2019*	*Original*

Prepared By:	Tiger Chen	***Date:***	*January 15, 2019*
	Project Engineer		
Check By:	Robinson Lo	***Date:***	*January 15, 2019*
	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 GENERAL DESCRIPTION OF EUT 5
5.2 TEST MODE 7
5.3 DESCRIPTION OF SUPPORT UNITS 7
5.4 TEST FACILITY 7
5.5 TEST LOCATION 7
5.6 ADDITIONAL INSTRUCTIONS 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 16
7.5 POWER SPECTRAL DENSITY 19
7.6 BAND EDGE 23
7.6.1 Radiated Emission Method 23
7.7 SPURIOUS EMISSION 27
7.7.1 Radiated Emission Method 27
7.8 FREQUENCY STABILITY 33

8 TEST SETUP PHOTO 35

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
Frequency Stability	15.407(g)	Pass

Remarks：

1. *Pass: The EUT complies with the essential requirements in the standard.*
2. *Test according to ANSI C63.10:2013.*

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%.			

5 General Information

5.1 General Description of EUT

Product Name:	Fold four axis Toy UAV
Model No.:	TE-F360
Test sample(s) ID:	GTS201812000159-1
Sample(s) Status:	Engineer sample
Operation Frequency:	802.11a/802.11n(HT20): 5745MHz ~ 5825MHz
Channel numbers:	5
Channel bandwidth:	20MHz
Modulation technology:	OFDM MIMO: 802.11n SISO: 802.11a
Antenna Type:	Integral Antenna
Antenna gain:	1.88dBi
Power supply:	DC 7.6V 4000mAh 34.8Wh

Operation Frequency each of channel							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
149	5745MHz	151	5755MHz	153	5765MHz	155	5775MHz
157	5785MHz	159	5795MHz	161	5805MHz	163	5815MHz
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)**		
	802.11 a/n(HT20)		
Lowest channel	5745		
Middle channel	5785		
Highest channel	5825		

5.2 Test mode

Transmitting mode	Keep the EUT in continuously transmitting mode

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:

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

5.3 Description of Support Units

None.

5.4 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.

- **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.

- **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

- **CNAS (No. CNAS L5775)**

CNAS has accredited Global United Technology Services Co., Ltd., to ISO/IEC 17025:2017 General Requirements for the Competence of Testing and Calibration Laboratories (CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing.

5.5 Test Location

All tests were performed at:

Global United Technology Services Co., Ltd.

No. 301-309, 3/F., Jinyuan Business Building, No.2, Laodong Industrial Zone,

Xixiang Road, Baoan District, Shenzhen, Guangdong, China

Tel: 0755-27798480

Fax: 0755-27798960

5.6 Additional Instructions

Special test software provide by manufacturer, power set default

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. 27 2018	June. 26 2019
4	BiConiLog Antenna	SCHWARZBECK MESS-ELEKTRONIK	VULB9163	GTS214	June. 27 2018	June. 26 2019
5	Double -ridged waveguide horn	SCHWARZBECK MESS-ELEKTRONIK	BBHA 9120 D	GTS208	June. 27 2018	June. 26 2019
6	Horn Antenna	ETS-LINDGREN	3160	GTS217	June. 27 2018	June. 26 2019
7	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
8	Coaxial Cable	GTS	N/A	GTS213	June. 27 2018	June. 26 2019
9	Coaxial Cable	GTS	N/A	GTS211	June. 27 2018	June. 26 2019
10	Coaxial cable	GTS	N/A	GTS210	June. 27 2018	June. 26 2019
11	Coaxial Cable	GTS	N/A	GTS212	June. 27 2018	June. 26 2019
12	Amplifier(100kHz-3GHz)	HP	8347A	GTS204	June. 27 2018	June. 26 2019
13	Amplifier(2GHz-20GHz)	HP	84722A	GTS206	June. 27 2018	June. 26 2019
14	Amplifier (18-26GHz)	Rohde & Schwarz	AFS33-18002 650-30-8P-44	GTS218	June. 27 2018	June. 26 2019
15	Band filter	Amindeon	82346	GTS219	June. 27 2018	June. 26 2019
16	Power Meter	Anritsu	ML2495A	GTS540	June. 27 2018	June. 26 2019
17	Power Sensor	Anritsu	MA2411B	GTS541	June. 27 2018	June. 26 2019
18	Wideband Radio Communication Tester	Rohde & Schwarz	CMW500	GTS575	June. 27 2018	June. 26 2019
19	Splitter	Agilent	11636B	GTS237	June. 27 2018	June. 26 2019
20	Loop Antenna	ZHINAN	ZN30900A	GTS534	June. 27 2018	June. 26 2019
21	Breitband horn antenna	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. 27 2018	June. 26 2019

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.16 2014	May.15 2019
2	EMI Test Receiver	R&S	ESCI 7	GTS552	June. 27 2018	June. 26 2019
3	Coaxial Switch	ANRITSU CORP	MP59B	GTS225	June. 27 2018	June. 26 2019
4	Artificial Mains Network	SCHWARZBECK MESS	NSLK8127	GTS226	June. 27 2018	June. 26 2019
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. 27 2018	June. 26 2019
8	Absorbing clamp	Elektronik-Feinmechanik	MDS21	GTS229	June. 27 2018	June. 26 2019

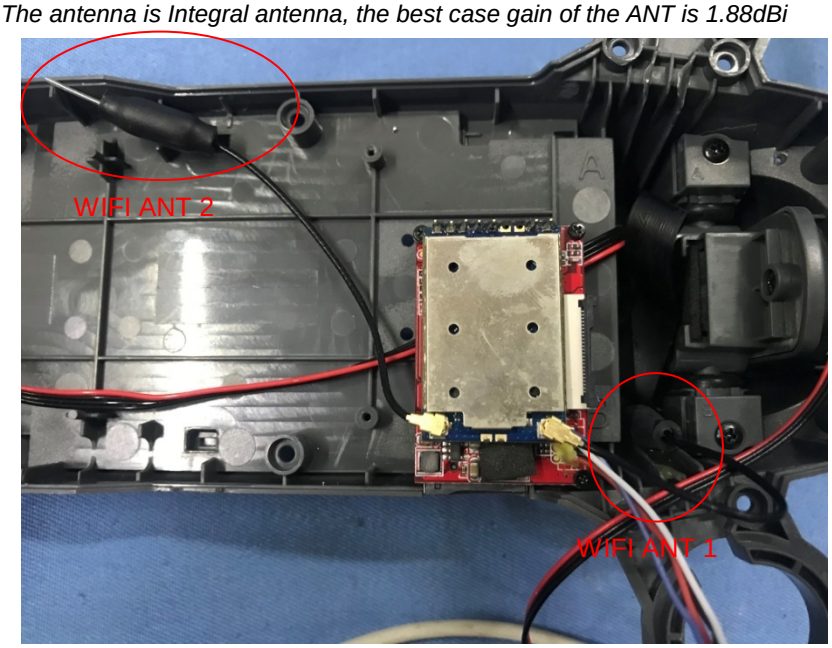
RF Conducted:						
Item	**Test Equipment**	**Manufacturer**	**Model No.**	**Serial No.**	**Cal.Date (mm-dd-yy)**	**Cal.Due date (mm-dd-yy)**
1	MXA Signal Analyzer	Agilent	N9020A	GTS566	June. 27 2018	June. 26 2019
2	EMI Test Receiver	R&S	ESCI 7	GTS552	June. 27 2018	June. 26 2019
3	Spectrum Analyzer	Agilent	E4440A	GTS533	June. 27 2018	June. 26 2019
4	MXG vector Signal Generator	Agilent	N5182A	GTS567	June. 27 2018	June. 26 2019
5	ESG Analog Signal Generator	Agilent	E4428C	GTS568	June. 27 2018	June. 26 2019
6	USB RF Power Sensor	DARE	RPR3006W	GTS569	June. 27 2018	June. 26 2019
7	RF Switch Box	Shongyi	RFSW3003328	GTS571	June. 27 2018	June. 26 2019
8	EMI Test Receiver	R&S	ESCI 7	GTS552	June. 27 2018	June. 26 2019
9	Programmable Constant Temp & Humi Test Chamber	WEWON	WHTH-150L-40-880	GTS572	June. 27 2018	June. 26 2019

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. 27 2018	June. 26 2019
2	Barometer	ChangChun	DYM3	GTS255	June. 27 2018	June. 26 2019

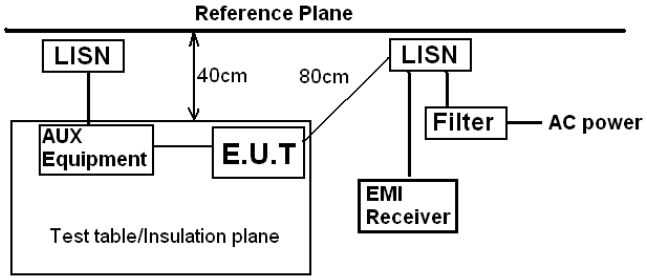
7 Test results and Measurement Data

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 antenna is Integral antenna, the best case gain of the ANT is 1.88dBi	

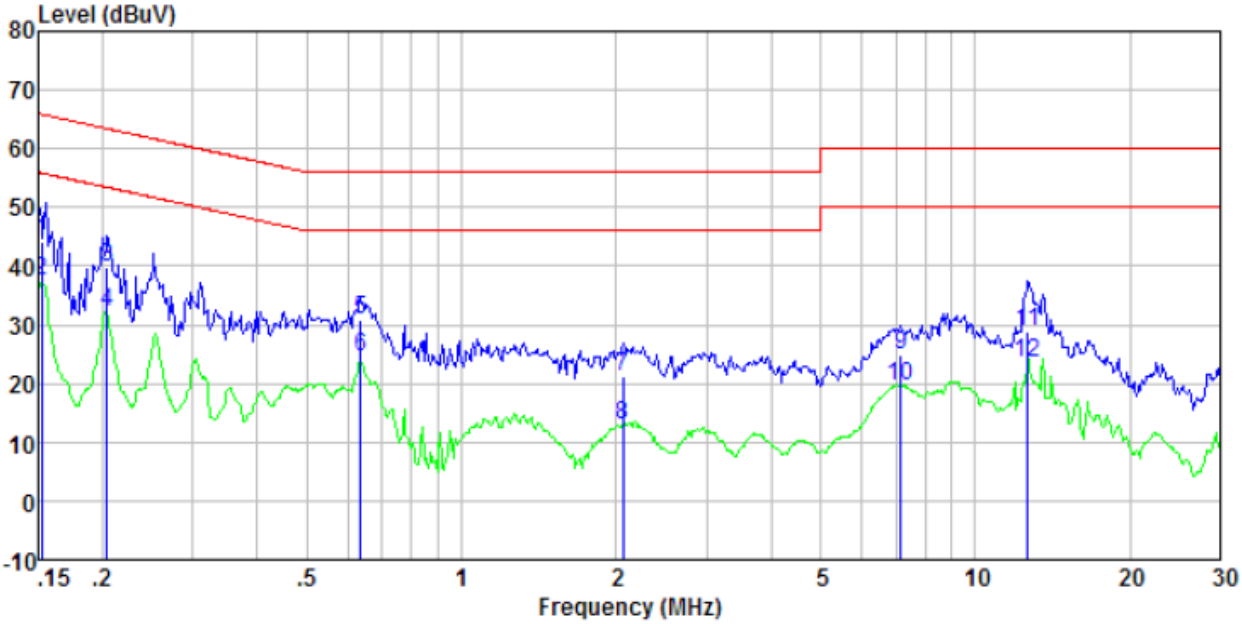


7.2 Conducted Emissions

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:	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 setup:	 *Remark:* *E.U.T: Equipment Under Test* *LISN: Line Impedence Stabilization Network* *Test table height=0.8m*
Test procedure:	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. 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). 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.
Test Instruments:	Refer to section 6.0 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

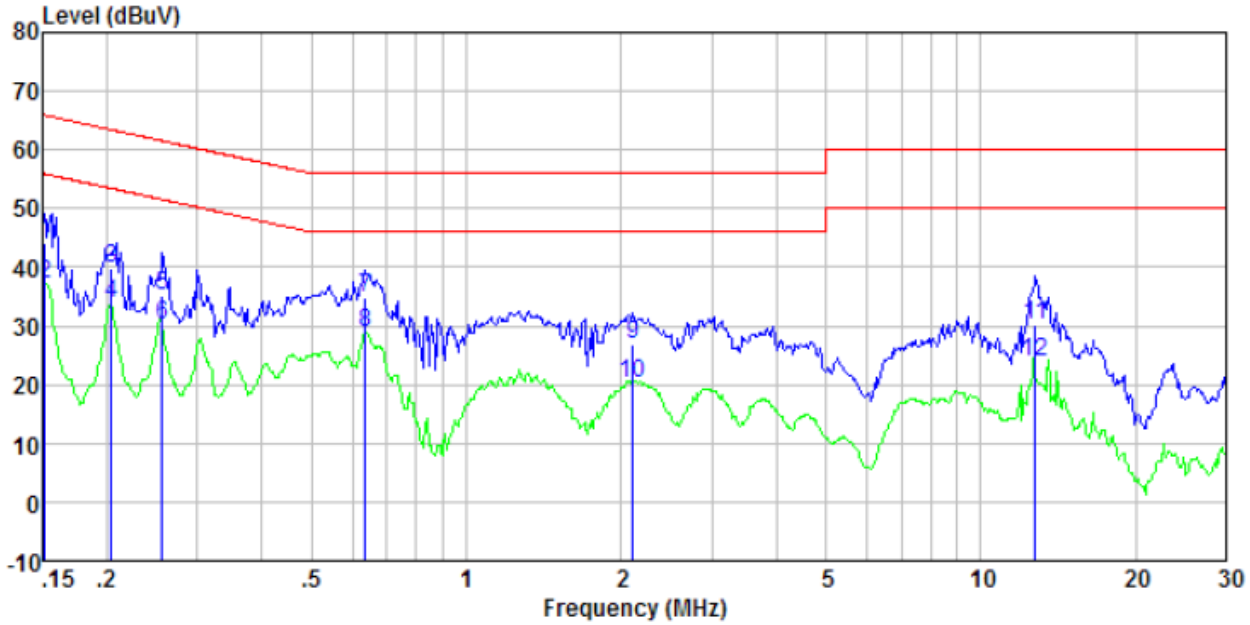
Remark: Both high and low voltages have been tested to show only the worst low voltage test data.

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
0.15	43.83	0.40	0.07	44.30	65.87	-21.57	QP
0.15	36.87	0.40	0.07	37.34	55.87	-18.53	Average
0.20	39.18	0.40	0.11	39.69	63.45	-23.76	QP
0.20	31.74	0.40	0.11	32.25	53.45	-21.20	Average
0.64	30.35	0.28	0.12	30.75	56.00	-25.25	QP
0.64	23.99	0.28	0.12	24.39	46.00	-21.61	Average
2.07	20.72	0.20	0.18	21.10	56.00	-34.90	QP
2.07	12.43	0.20	0.18	12.81	46.00	-33.19	Average
7.18	24.61	0.20	0.19	25.00	60.00	-35.00	QP
7.18	19.14	0.20	0.19	19.53	50.00	-30.47	Average
12.65	28.60	0.20	0.21	29.01	60.00	-30.99	QP
12.65	23.09	0.20	0.21	23.50	50.00	-26.50	Average

Neutral:

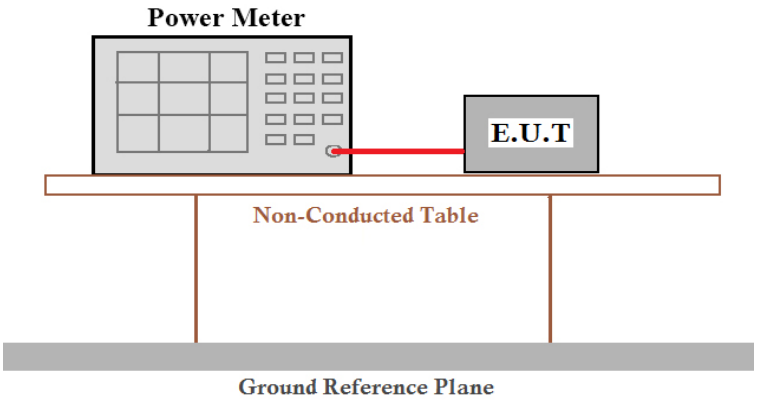


Freq MHz	Reading level dBuV	LISN/ISN factor dB/m	Cable loss dB	Level dBuV	Limit level dBuV	Over limit dB	Remark
0.15	43.67	0.40	0.07	44.14	65.91	-21.77	QP
0.15	36.74	0.40	0.07	37.21	55.91	-18.70	Average
0.20	39.31	0.40	0.11	39.82	63.45	-23.63	QP
0.20	33.19	0.40	0.11	33.70	53.45	-19.75	Average
0.26	34.54	0.40	0.10	35.04	61.56	-26.52	QP
0.26	29.67	0.40	0.10	30.17	51.56	-21.39	Average
0.64	34.50	0.28	0.12	34.90	56.00	-21.10	QP
0.64	28.48	0.28	0.12	28.88	46.00	-17.12	Average
2.11	26.38	0.20	0.18	26.76	56.00	-29.24	QP
2.11	19.73	0.20	0.18	20.11	46.00	-25.89	Average
12.78	29.77	0.20	0.21	30.18	60.00	-29.82	QP
12.78	23.33	0.20	0.21	23.74	50.00	-26.26	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 KDB 789033 D02 General U-NII Test Procedures New Rules v02r01
Limit:	30dBm
Test setup:	
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

Measurement Data

ANT 1:

Test CH	Peak Output Power (dBm)		Limit(dBm)	Result
	802.11a	802.11n(HT20)		
Lowest	18.50	18.55	30.00	Pass
Middle	15.34	17.27		
Highest	18.57	18.65		

ANT 2:

Test CH	Peak Output Power (dBm)		Limit(dBm)	Result
	802.11a	802.11n(HT20)		
Lowest	18.23	18.37	30.00	Pass
Middle	15.87	16.10		
Highest	17.74	18.21		

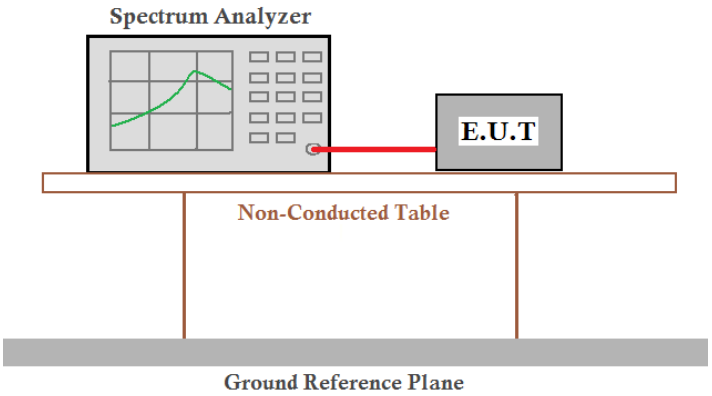
MIMO:

Test mode	Channel	ANT A power (dBm)	ANT B power (dBm)	MIMO power (dBm)	Limit (dBm)	Result
802.11n(HT20)	Lowest	18.55	18.37	21.47	30	Pass
	Middle	17.27	16.10	19.73		
	Highest	18.65	18.21	21.44		

Note: transmit signals are completely un*correlated*,

Directional gain=10 x log [($10^{1/10}$ + $10^{1/10}$)/2]=1dBi

7.4 Channel Bandwidth

Test Requirement:	FCC Part15 E Section 15.407(e)
Test Method:	ANSI C63.10:2013 and KDB 789033 D02 General U-NII Test Procedures New Rules v02r01
Limit:	>500KHz
Test setup:	
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

Measurement Data

ANT 1:

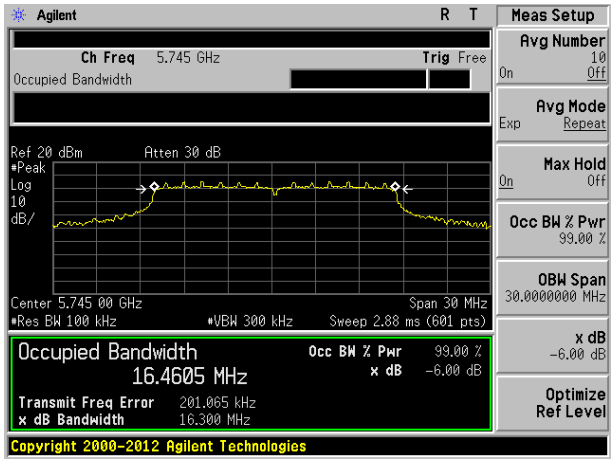
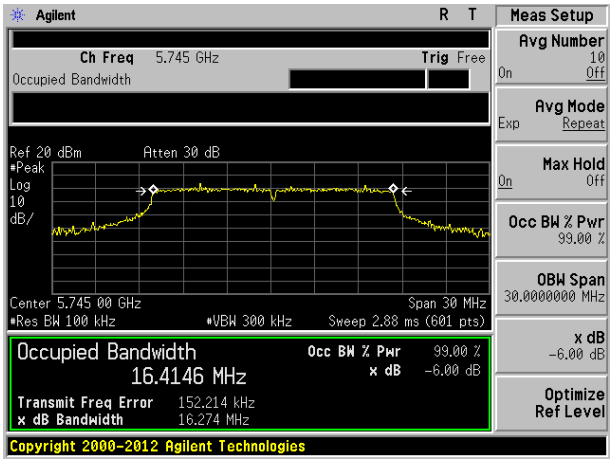
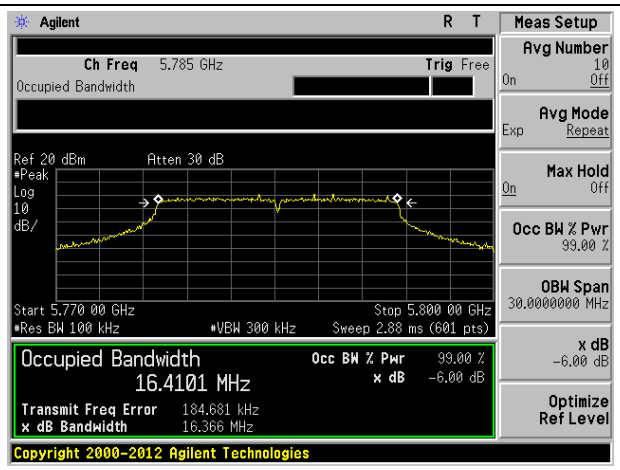
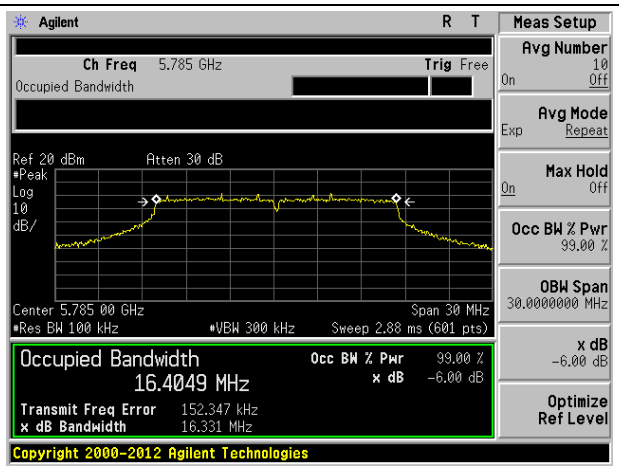
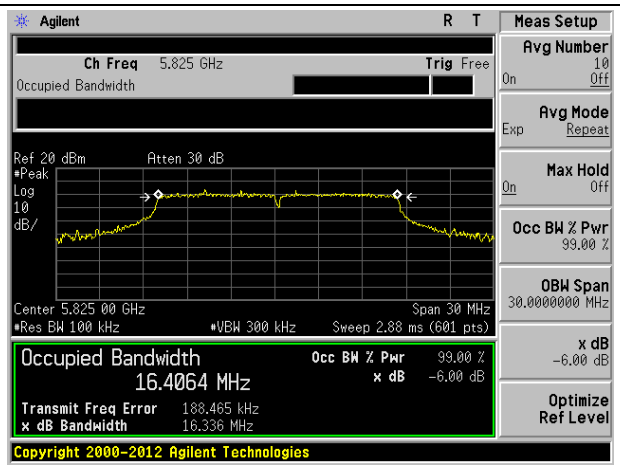
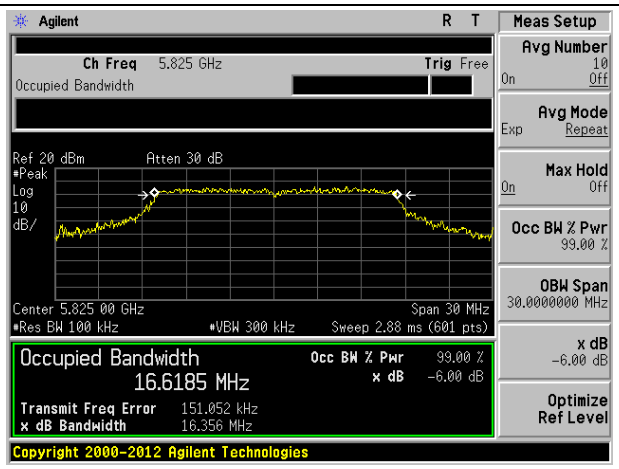
Test CH	Channel Bandwidth (MHz)		Limit (KHz)	Result
	802.11a	802.11n(HT20)		
Lowest	16.300	17.576	>500	Pass
Middle	16.366	17.201		
Highest	16.336	16.964		

ANT 2:

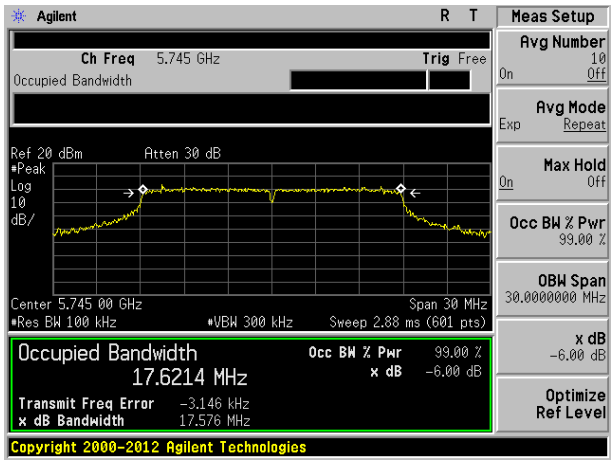
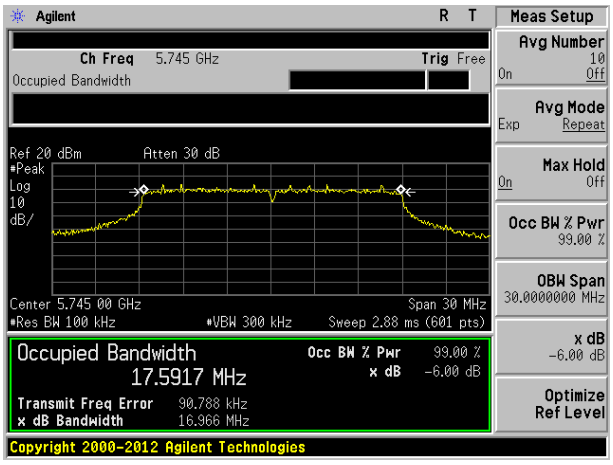
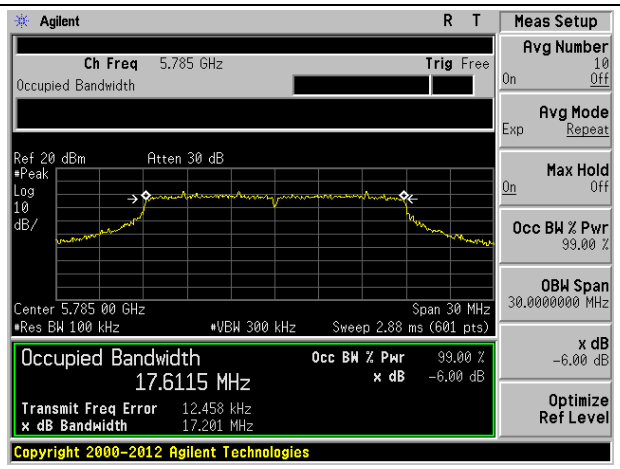
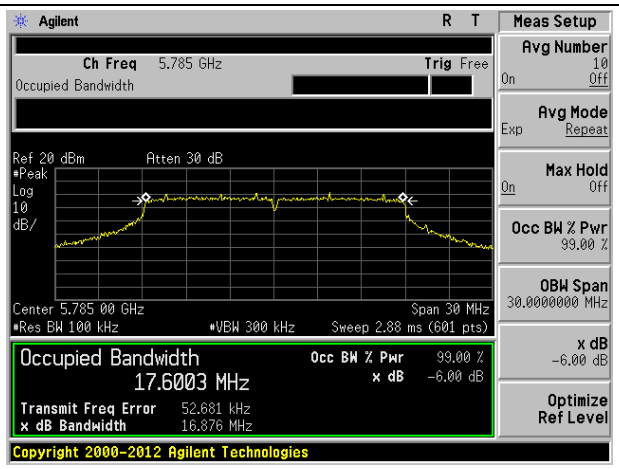
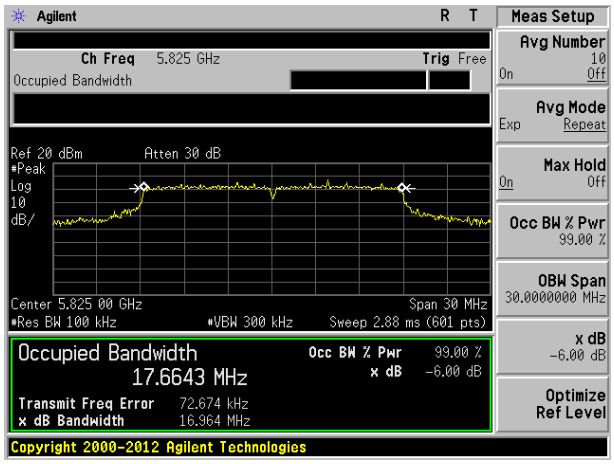
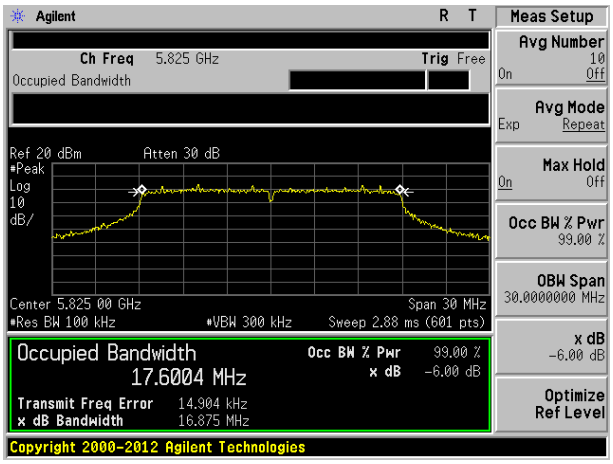
Test CH	Channel Bandwidth (MHz)		Limit (KHz)	Result
	802.11a	802.11n(HT20)		
Lowest	16.274	16.966	>500	Pass
Middle	16.331	16.876		
Highest	16.356	16.875		

Test plot as follows:

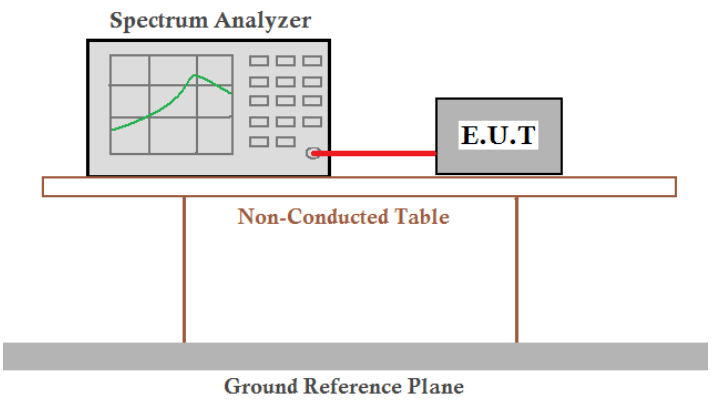
802.11a

ANT 1	ANT 2
	
Lowest channel	
	
Middle channel	
	
Highest channel	

802.11n(HT20)

ANT 1	ANT 2
	
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 KDB 789033 D02 General U-NII Test Procedures New Rules v02r01
Limit:	30dBm/500kHz
Test setup:	
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

Measurement Data

ANT 1:

Test CH	Power Spectral Density (dBm)		Limit (dBm/500kHz)	Result
	802.11a	802.11n(HT20)		
Lowest	8.92	7.88	30.00	Pass
Middle	5.42	7.46		
Highest	8.47	10.28		

ANT 2:

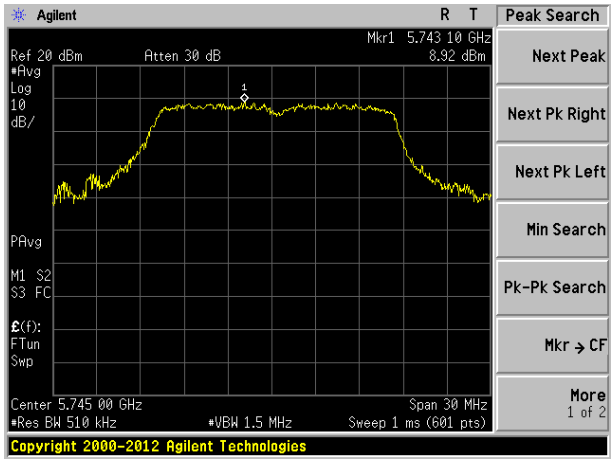
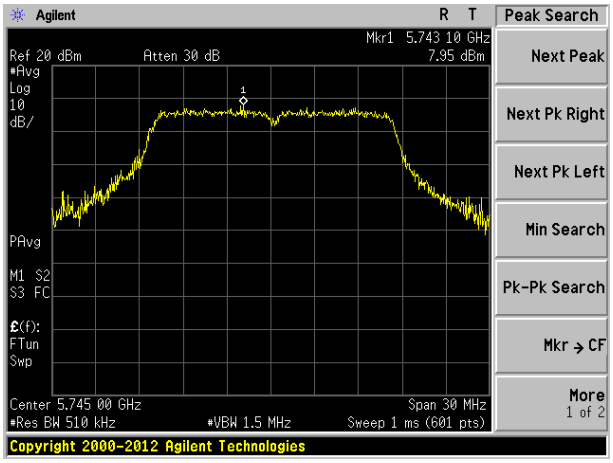
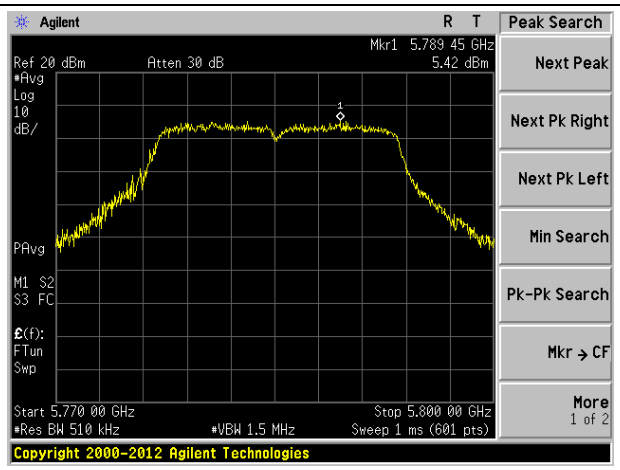
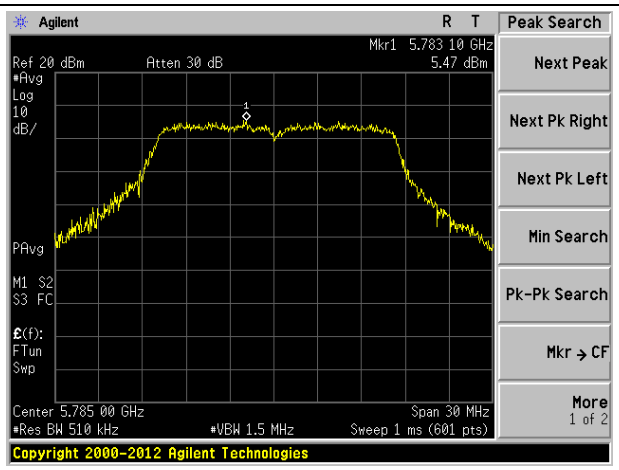
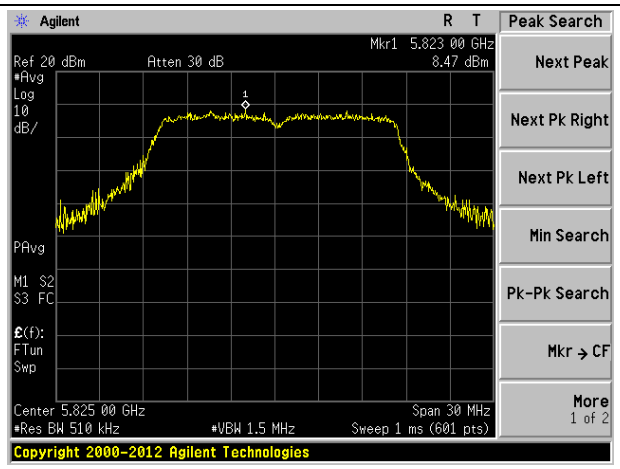
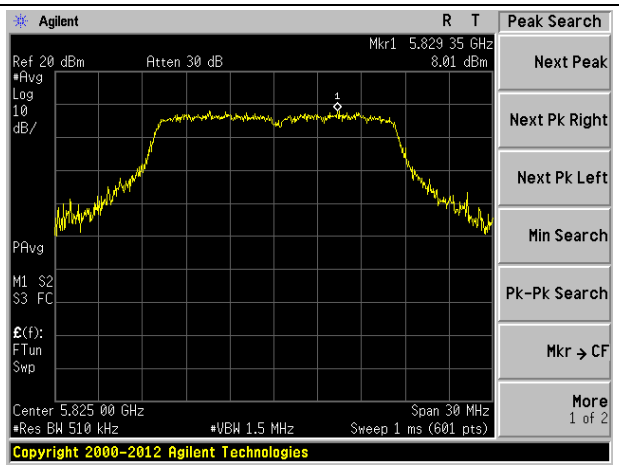
Test CH	Power Spectral Density (dBm)		Limit (dBm/500kHz)	Result
	802.11a	802.11n(HT20)		
Lowest	7.95	8.25	30.00	Pass
Middle	5.47	4.86		
Highest	8.01	8.06		

MIMO:

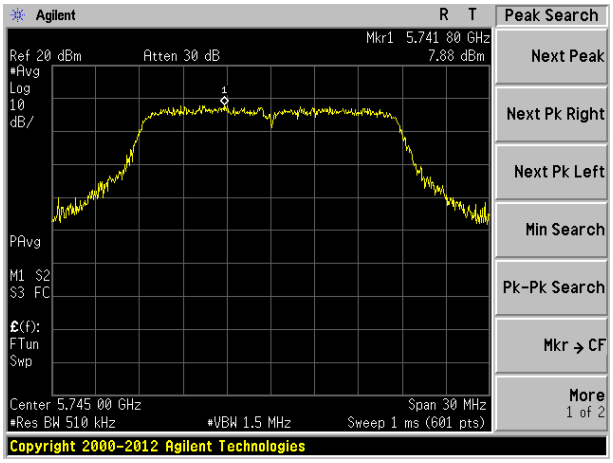
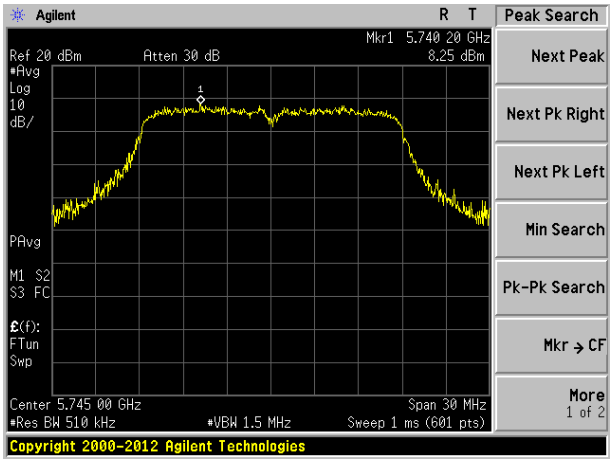
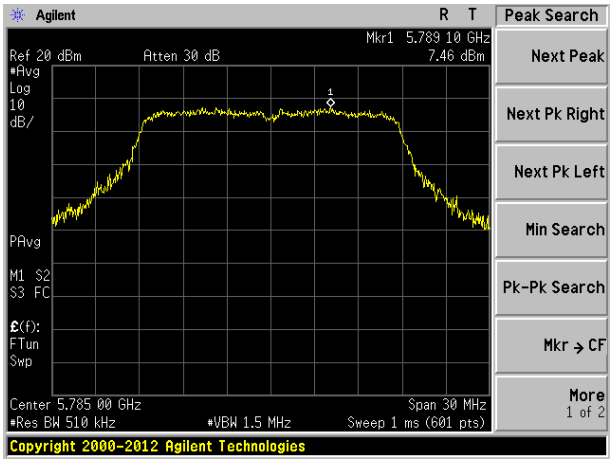
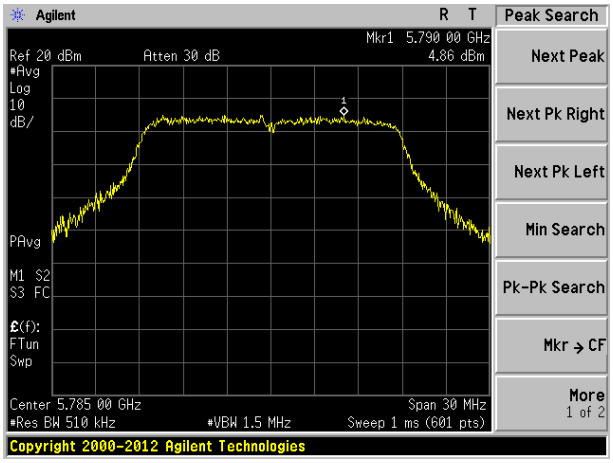
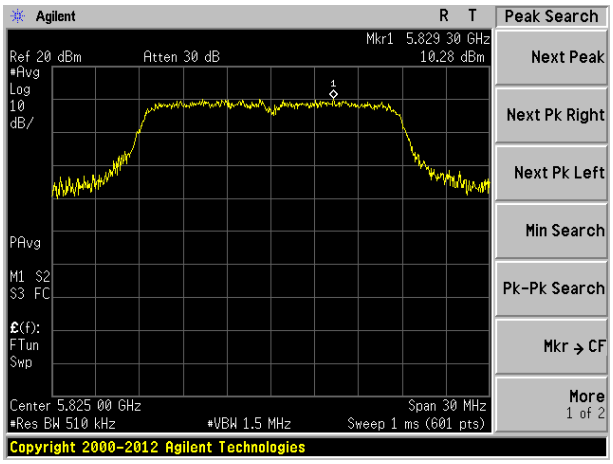
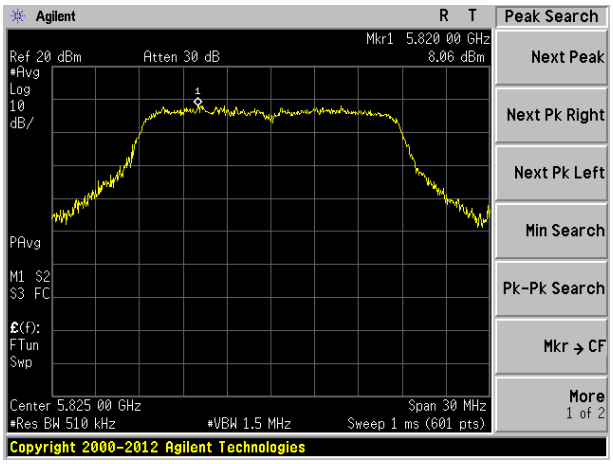
Test mode	Channel	ANT A power (dBm)	ANT B power (dBm)	MIMO power (dBm)	Limit dBm/500kHz	Result
802.11n(HT20)	Lowest	7.88	8.25	11.08	30	Pass
	Middle	7.46	4.86	9.36		
	Highest	10.28	8.06	12.32		

Test plot as follows:

802.11a

ANT 1	ANT 2
	
Lowest channel	
	
Middle channel	
	
Highest channel	

802.11n(HT20)

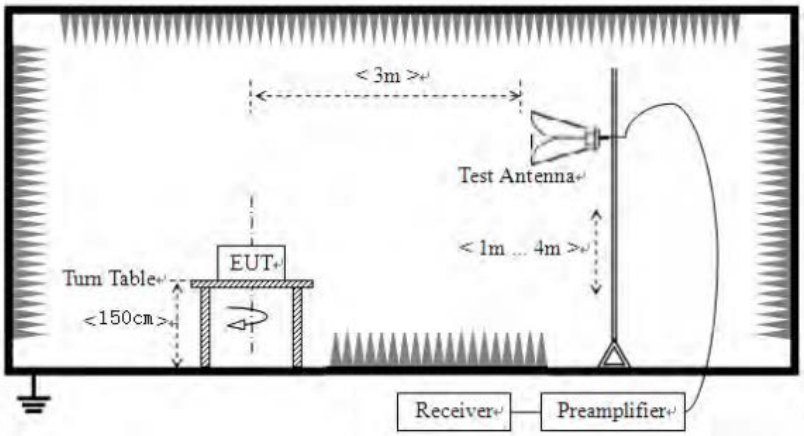
ANT 1	ANT 2
	
Lowest channel	
	
Middle channel	
	
Highest channel	

7.6 Band edge

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:	9kHz 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
	RMS	1MHz	3MHz	RMS

Limit:	All emissions shall be limited to a level of −27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.
Test setup:	
Test Procedure:	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. 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 rota 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.

	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.
Test Instruments:	Refer to section 6.0 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 D02v02r01 section G) 1) d),for measurements above 1000 MHz @3m distance, the limit of field strength is computed as follows:*

   E[dBuV/m] = EIRP[dBm] + 95.2;

   E[dBuV/m] = -27 + 95.2 = 68.2dBuV/m.

   E[dBuV/m] = 10 + 95.2 = 105.2dBuV/m.

   E[dBuV/m] = 15.6 + 95.2 = 110.8dBuV/m.

   E[dBuV/m] = 27 + 95.2 = 122.2dBuV/m

Measurement data:

IEEE 802.11a								
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
5650.00	36.98	32.36	9.72	23.83	55.23	68.2	-12.97	Horizontal
5700.00	34.53	32.5	9.79	23.84	52.98	105.2	-52.22	Horizontal
5720.00	36.82	32.53	9.81	23.85	55.31	110.8	-55.49	Horizontal
5725.00	36.64	32.53	9.83	23.86	55.14	122.2	-67.06	Horizontal
5850.00	35.51	32.7	9.99	23.87	54.33	122.2	-67.87	Horizontal
5855.00	36.14	32.72	9.99	23.88	54.97	110.8	-55.83	Horizontal
5875.00	35.29	32.74	10.04	23.89	54.18	105.2	-51.02	Horizontal
5925.00	35.15	32.8	10.11	23.9	54.16	68.2	-14.04	Horizontal
5650.00	35.35	32.36	9.72	23.83	53.60	68.2	-14.60	Vertical
5700.00	36.67	32.5	9.79	23.84	55.12	105.2	-50.08	Vertical
5720.00	36.78	32.53	9.81	23.85	55.27	110.8	-55.53	Vertical
5725.00	34.49	32.53	9.83	23.86	52.99	122.2	-69.21	Vertical
5850.00	36.06	32.7	9.99	23.87	54.88	122.2	-67.32	Vertical
5855.00	36.38	32.72	9.99	23.88	55.21	110.8	-55.59	Vertical
5875.00	35.70	32.74	10.04	23.89	54.59	105.2	-50.61	Vertical
5925.00	34.24	32.8	10.11	23.9	53.25	68.2	-14.95	Vertical

IEEE 802.11n HT20								
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
5650.00	35.28	32.36	9.72	23.83	53.53	68.2	-14.67	Horizontal
5700.00	35.63	32.5	9.79	23.84	54.08	105.2	-51.12	Horizontal
5720.00	35.06	32.53	9.81	23.85	53.55	110.8	-57.25	Horizontal
5725.00	36.46	32.53	9.83	23.86	54.96	122.2	-67.24	Horizontal
5850.00	36.50	32.7	9.99	23.87	55.32	122.2	-66.88	Horizontal
5855.00	34.42	32.72	9.99	23.88	53.25	110.8	-57.55	Horizontal
5875.00	36.72	32.74	10.04	23.89	55.61	105.2	-49.59	Horizontal
5925.00	35.71	32.8	10.11	23.9	54.72	68.2	-13.48	Horizontal
5650.00	34.28	32.36	9.72	23.83	52.53	68.2	-15.67	Vertical
5700.00	35.39	32.5	9.79	23.84	53.84	105.2	-51.36	Vertical
5720.00	36.37	32.53	9.81	23.85	54.86	110.8	-55.94	Vertical
5725.00	35.63	32.53	9.83	23.86	54.13	122.2	-68.07	Vertical
5850.00	35.18	32.7	9.99	23.87	54.00	122.2	-68.20	Vertical
5855.00	36.59	32.72	9.99	23.88	55.42	110.8	-55.38	Vertical
5875.00	36.81	32.74	10.04	23.89	55.70	105.2	-49.50	Vertical
5925.00	34.35	32.8	10.11	23.9	53.36	68.2	-14.84	Vertical

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:	9kHz to 40GHz
Test site:	Measurement Distance: 3m

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

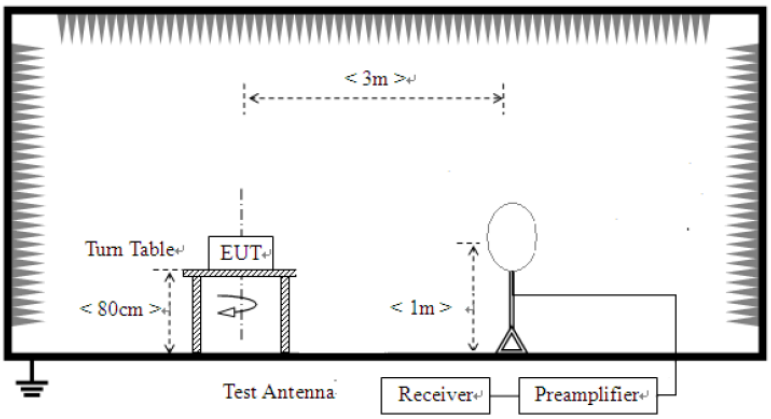
Limit:

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	

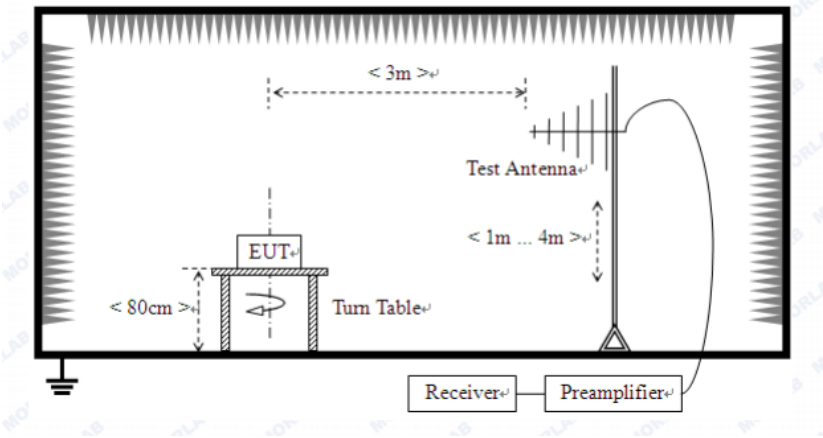
Frequency	Limit (dBm/MHz)	Remark
Above 1GHz	-27.0	Peak Value

Test setup:

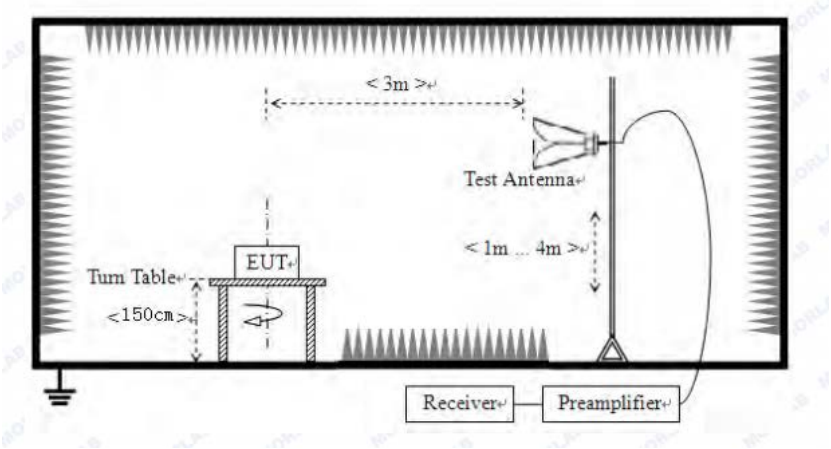
For radiated emissions from 9kHz to 30MHz



For radiated emissions from 30MHz to1GHz



For radiated emissions above 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 rota 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. 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.					
Test Instruments:	Refer to section 6.0 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.*

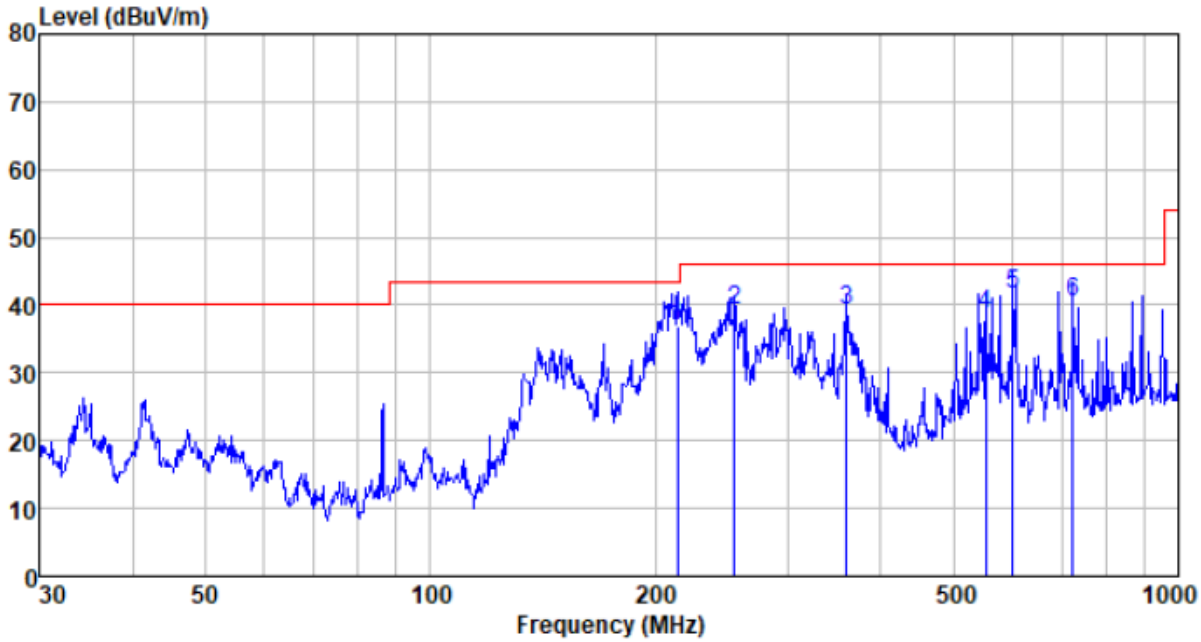
Measurement Data:

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.

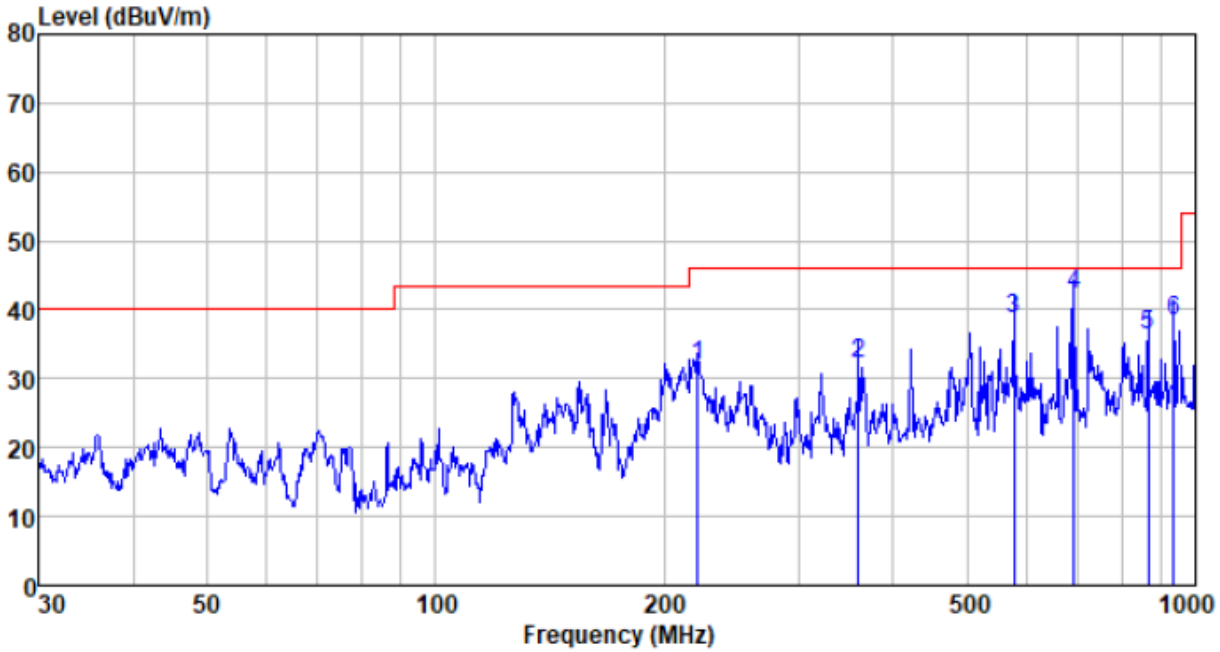
Below 1GHz

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
213.763	61.29	10.91	1.92	37.34	36.78	43.50	-6.72	QP
254.728	62.22	12.29	2.15	37.38	39.28	46.00	-6.72	QP
360.448	59.33	14.70	2.67	37.48	39.22	46.00	-6.78	QP
552.883	54.23	18.51	3.53	37.53	38.74	46.00	-7.26	QP
601.427	56.06	19.50	3.73	37.54	41.75	46.00	-4.25	QP
721.726	53.73	20.03	4.17	37.63	40.30	46.00	-5.70	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
221.392	55.94	11.20	1.97	37.35	31.76	46.00	-14.24	QP
360.448	52.39	14.70	2.67	37.48	32.28	46.00	-13.72	QP
576.644	53.72	19.00	3.63	37.53	38.82	46.00	-7.18	QP
691.987	56.22	19.59	4.06	37.62	42.25	46.00	-3.75	QP
866.088	47.32	21.99	4.73	37.61	36.43	46.00	-9.57	QP
935.546	48.57	22.45	4.99	37.57	38.44	46.00	-7.56	QP

Above 1GHz:

802.11a,11n(HT20) all have been tested,
Only the data of worst case at each channel plan (nominal bandwidth =20MHz) is reported.

Test mode:		802.11a		Test channel:		lowest	
Antenna Pol.	Frequency (MHz)	Reading Level (dBuV/m)	Factor (dBuV/m)	Measure Level (dBuV/m)	Limit (dBuV/m)	Over limit(dB)	Detector
V	11490	22.05	21.64	43.69	54(Note3)	-10.31	PK
V	17235	21.83	21.8	43.63	54(Note3)	-10.37	PK
H	11490	19.64	21.83	41.47	54(Note3)	-12.53	PK
H	17235	22.66	21.67	44.33	54(Note3)	-9.67	PK

Test mode:		802.11a		Test channel:		Middle	
Antenna Pol.	Frequency (MHz)	Reading Level (dBuV/m)	Factor (dBuV/m)	Measure Level (dBuV/m)	Limit (dBuV/m)	Over limit(dB)	Detector
V	11570	20.27	21.64	41.91	54(Note3)	-12.09	PK
V	17355	19.05	21.8	40.85	54(Note3)	-13.15	PK
H	11570	21.71	21.83	43.54	54(Note3)	-10.46	PK
H	17355	19.05	21.67	40.72	54(Note3)	-13.28	PK

Test mode:		802.11a		Test channel:		Highest	
Antenna Pol.	Frequency (MHz)	Reading Level (dBuV/m)	Factor (dBuV/m)	Measure Level (dBuV/m)	Limit (dBuV/m)	Over limit(dB)	Detector
V	11650	19.24	21.64	40.88	54(Note3)	-13.12	PK
V	17475	23.99	21.8	45.79	54(Note3)	-8.21	PK
H	11650	21.88	21.83	43.71	54(Note3)	-10.29	PK
H	17475	22.95	21.67	44.62	54(Note3)	-9.38	PK

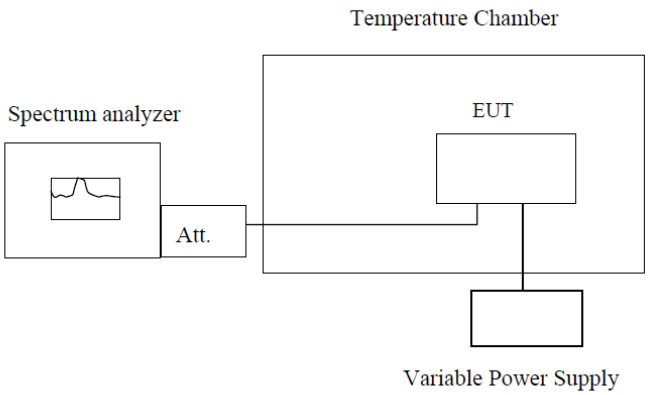
Notes:

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, 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

Measurement data:

HT 20MHz					
Frequency stability versus Temp.					
Power Supply: DC 7.4V					
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	5745	5745.6929	5743.6694	**5742.0181**	5746.2664
	5785	5785.4631	5783.1508	5782.9987	5786.9885
	5825	5825.1110	5824.6978	5822.8286	**5826.0348**
-20	5745	5745.2946	5744.3361	5744.2999	5746.8103
	5785	5785.8057	5784.9490	5784.8296	5785.1237
	5825	5825.5640	5824.4805	5824.5371	5825.6886
-10	5745	5745.3535	5744.4836	5744.4251	5745.6044
	5785	5785.2191	5784.7876	5784.9357	5785.0766
	5825	5825.2862	5824.3169	5824.0140	5825.1915
0	5745	5745.5879	5744.2479	5744.1521	5745.1094
	5785	5785.5268	5784.3572	5784.9601	5785.1101
	5825	5825.7856	5824.2700	5824.6937	5825.6551
10	5745	5745.4571	5744.9941	5744.9345	5745.2759
	5785	5785.4375	5784.0376	5784.5703	5785.1889
	5825	5825.6994	5824.0436	5824.0891	5825.0993
20	5745	5745.9439	5744.5129	5744.0315	5745.5911
	5785	5785.2725	5784.7927	5784.6685	5785.3672
	5825	5825.3503	5824.4084	5824.8412	5825.6239
30	5745	5745.0620	5744.2242	5744.9546	5745.8492
	5785	5785.9138	5784.2359	5784.3538	5785.7947
	5825	5825.7757	5824.3660	5824.8357	5825.4116
40	5745	5745.2665	5744.3469	5744.6650	5745.5261
	5785	5785.5686	5784.8765	5784.7190	5785.5692
	5825	5825.4551	5824.7813	5824.5339	5825.9978
50	5745	5745.2451	5744.9043	5744.9490	5745.0255
	5785	5785.2785	5784.5825	5784.7611	5785.9733
	5825	5825.9753	5824.8308	5824.8243	5825.0258

Frequency stability versus Voltage					
Temperature: 25°C					
Power Supply (Vdc)	Operating Frequency (MHz)	0 minute	2 minute	5 minute	10 minute
		Measured Frequency (MHz)	Measured Frequency (MHz)	Measured Frequency (MHz)	Measured Frequency (MHz)
6.66	5745	5746.1106	5746.5509	5744.0248	5743.8762
	5785	5785.9865	5785.8951	5784.2455	5783.7411
	5825	5825.6450	5825.2044	5824.1556	5824.7564
7.4	5745	5745.4558	5745.6172	5744.2286	5744.8797
	5785	5785.0990	5785.1760	5784.0640	5784.1620
	5825	5825.9665	5825.3056	5824.2670	5824.2673
8.14	5745	5745.2697	5745.3760	5744.7998	5744.2461
	5785	5785.5728	5785.0309	5784.7916	5784.5394
	5825	5825.0629	5825.7258	5824.5076	5824.9290

8 Test Setup Photo

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

9 EUT Constructional Details

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

------END------