FCC Report (5G)

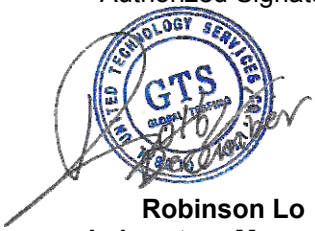
Applicant:	SHENZHEN FCAR TECHNOLOGY CO.,LTD
Address of Applicant:	8th floor, Chuangyi Building, No. 3025 Nanhai Ave., Nanshan, Shenzhen, Guangdong, China

Equipment Under Test (EUT)

Product Name:	AUTO DIAGNOSTIC SYSTEM
Model No.:	F6 PLUS
Trade Mark:	FCAR
FCC ID:	2AJDD-IDIAGSF6P
Applicable standards:	FCC CFR Title 47 Part 15 Subpart C Section 15.407:2016
Date of sample receipt:	December 16, 2016
Date of Test:	December 16-23, 2016
Date of report issue:	December 23, 2016
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	*December 23, 2016*	*Original*

Prepared By: Edward.Pan ***Date:*** *December 23, 2016*

Project Engineer

Check By: Andy.Wu ***Date:*** *December 23, 2016*

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.

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.			

5 General Information

5.1 Client Information

Applicant:	SHENZHEN FCAR TECHNOLOGY CO.,LTD
Address of Applicant:	8th floor, Chuangyi Building, No. 3025 Nanhai Ave., Nanshan, Shenzhen, Guangdong, China
Manufacturer:	SHENZHEN FCAR TECHNOLOGY CO.,LTD
Address of Manufacturer:	8th floor, Chuangyi Building, No. 3025 Nanhai Ave., Nanshan, Shenzhen, Guangdong, China
Factory:	SHENZHEN FCAR TECHNOLOGY CO.,LTD
Address of Factory:	West 1F, Bldg. B, Hengchao Industrial Park, Tangtou North Ave., Bao'an, Shenzhen, China

5.2 General Description of EUT

Product Name:	AUTO DIAGNOSTIC SYSTEM
Model No.:	F6 PLUS
Operation Frequency:	802.11a/802.11n(HT20): 5180MHz ~ 5240MHz; 802.11n(HT40): 5190MHz ~ 5230MHz
Channel numbers:	802.11a/802.11n(HT20): 4; 802.11n(HT40): 2
Channel separation:	802.11a/802.11n(HT20): 20MHz; 802.11n(HT40): 40MHz
Modulation technology:	OFDM(64QAM, 16QAM, QPSK, BPSK)
Antenna Type:	PCB antenna
Antenna gain:	1dBi
Power supply:	Adapter Model No.:HNSC050300WX Input: AC 100-240V, 50/60Hz, 0.45A MAX Output: DC 5V, 3A Or DC 3.7V 8500mAh Li-ion Battery

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 22, 2016.

● **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, August 15, 2016.

5.5 Test Location

All tests were performed at:

Global United Technology Services Co., Ltd.

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

Tel: 0755-27798480

Fax: 0755-27798960

5.6 Description of Support Units

None.

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	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. 29 2016	June. 28 2017
4	Spectrum analyzer	Agilent	E4447A	GTS516	June. 29 2016	June. 28 2017
5	Spectrum Analyzer	Agilent	E4440A	GTS533	June. 29 2016	June. 28 2017
6	BiConiLog Antenna	SCHWARZBECK MESS-ELEKTRONIK	VULB9163	GTS214	June. 29 2016	June. 28 2017
7	Double -ridged waveguide horn	SCHWARZBECK MESS-ELEKTRONIK	9120D-829	GTS208	June. 29 2016	June. 28 2017
8	Horn Antenna	ETS-LINDGREN	3160	GTS217	June. 29 2016	June. 28 2017
9	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
10	Coaxial Cable	GTS	N/A	GTS213	June. 29 2016	June. 28 2017
11	Coaxial Cable	GTS	N/A	GTS211	June. 29 2016	June. 28 2017
12	Coaxial cable	GTS	N/A	GTS210	June. 29 2016	June. 28 2017
13	Coaxial Cable	GTS	N/A	GTS212	June. 29 2016	June. 28 2017
14	Amplifier(100kHz-3GHz)	HP	8347A	GTS204	June. 29 2016	June. 28 2017
15	Amplifier(2GHz-20GHz)	HP	8349B	GTS206	June. 29 2016	June. 28 2017
16	Amplifier (18-40GHz)	MITEQ	AMF-6F-18004000-29-8P	GTS534	June. 29 2016	June. 28 2017
17	Band filter	Amindeon	82346	GTS219	June. 29 2016	June. 28 2017
18	Constant temperature and humidity box	Oregon Scientific	BA-888	GTS248	June. 29 2016	June. 28 2017
19	D.C. Power Supply	Instek	PS-3030	GTS232	June. 29 2016	June. 28 2017
20	Universal radio communication tester	Rohde & Schwarz	CMU200	GTS235	June. 29 2016	June. 28 2017
21	Splitter	Agilent	11636B	GTS237	June. 29 2016	June. 28 2017
22	Power Meter	Anritsu	ML2495A	GTS540	June. 29 2016	June. 28 2017
23	Power Sensor	Anritsu	MA2411B	GTS541	June. 29 2016	June. 28 2017

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 29 2016	June 28 2017
3	Pulse Limiter	R&S	ESH3-Z2	GTS224	June 29 2016	June 28 2017
4	Coaxial Switch	ANRITSU CORP	MP59B	GTS225	June 29 2016	June 28 2017
5	Artificial Mains Network	SCHWARZBECK MESS	NSLK8127	GTS226	June 29 2016	June 28 2017
6	Coaxial Cable	GTS	N/A	GTS227	June 29 2016	June 28 2017
7	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
8	Thermo meter	KTJ	TA328	GTS233	June 29 2016	June 28 2017

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	June 29 2016	June 28 2017

5 Test results and Measurement Data

5.1 Antenna requirement

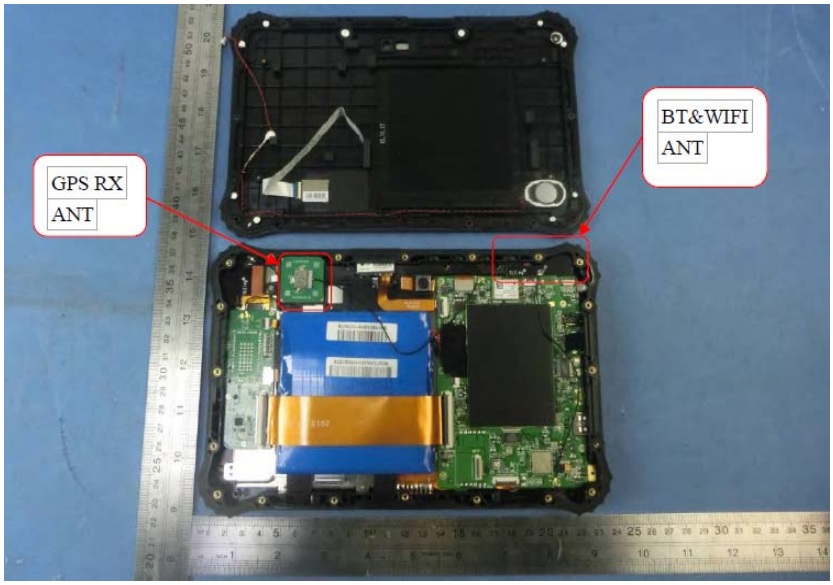
Standard requirement:	FCC Part15 C Section 15.203

15.203 requirement:

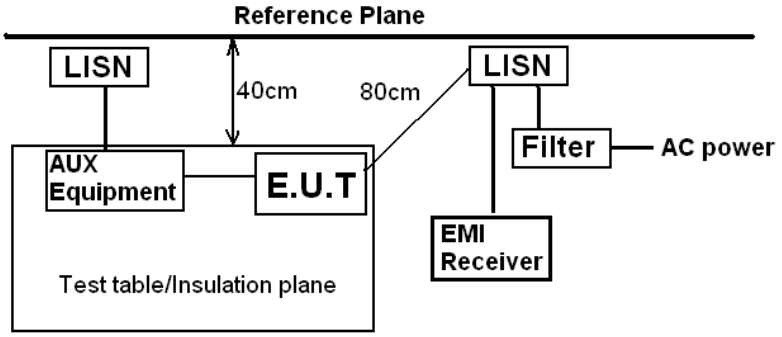
An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit 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 PCB antenna, the best case gain of the antenna is 1dBi



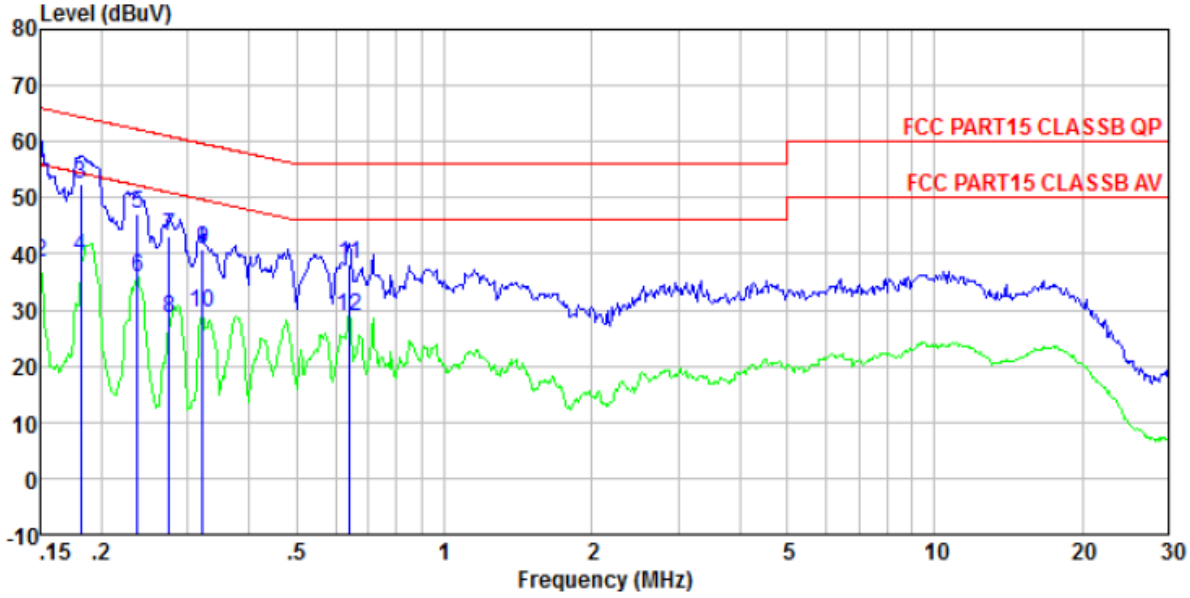
5.2 Conducted Emissions

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
Test results:	Pass

Measurement Data

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

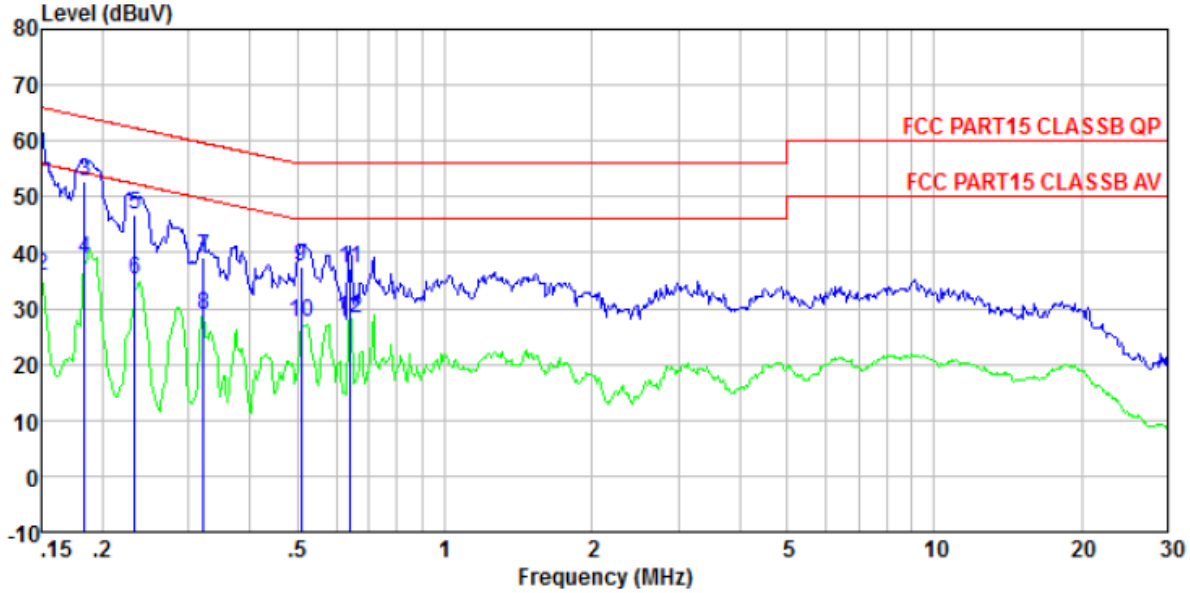
Line:



Site : Shielded room
Condition : FCC PART15 CLASSB QP LINE
Job.No : GTS201612000097
Test mode : 5G UNII mode
Test Engineer: Boy

	Freq	Read Level	LISN Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dBuV	dBuV	dB	
1	0.150	55.65	0.42	0.12	56.19	66.00	-9.81	QP
2	0.150	37.86	0.42	0.12	38.40	56.00	-17.60	Average
3	0.182	51.97	0.42	0.13	52.52	64.42	-11.90	QP
4	0.182	38.87	0.42	0.13	39.42	54.42	-15.00	Average
5	0.237	46.58	0.44	0.12	47.14	62.22	-15.08	QP
6	0.237	35.20	0.44	0.12	35.76	52.22	-16.46	Average
7	0.274	42.66	0.44	0.10	43.20	60.98	-17.78	QP
8	0.274	28.14	0.44	0.10	28.68	50.98	-22.30	Average
9	0.322	40.36	0.43	0.10	40.89	59.66	-18.77	QP
10	0.322	28.83	0.43	0.10	29.36	49.66	-20.30	Average
11	0.641	37.64	0.30	0.13	38.07	56.00	-17.93	QP
12	0.641	28.52	0.30	0.13	28.95	46.00	-17.05	Average

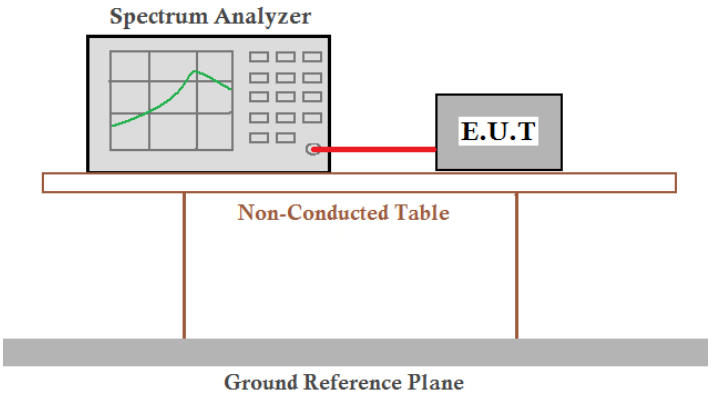
Neutral:



Site : Shielded room
Condition : FCC PART15 CLASSB QP NEUTRAL
Job.No : GTS201612000097
Test mode : 5G UNII mode
Test Engineer: Boy

	Freq	Read Level	LISN Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dBuV	dBuV	dB	
1	0.150	56.75	0.41	0.12	57.28	66.00	-8.72	QP
2	0.150	35.31	0.41	0.12	35.84	56.00	-20.16	Average
3	0.183	52.35	0.41	0.13	52.89	64.33	-11.44	QP
4	0.183	38.26	0.41	0.13	38.80	54.33	-15.53	Average
5	0.233	46.35	0.42	0.12	46.89	62.35	-15.46	QP
6	0.233	34.54	0.42	0.12	35.08	52.35	-17.27	Average
7	0.322	38.79	0.41	0.10	39.30	59.66	-20.36	QP
8	0.322	28.38	0.41	0.10	28.89	49.66	-20.77	Average
9	0.510	37.00	0.34	0.11	37.45	56.00	-18.55	QP
10	0.510	27.14	0.34	0.11	27.59	46.00	-18.41	Average
11	0.641	36.87	0.26	0.13	37.26	56.00	-18.74	QP
12	0.641	27.87	0.26	0.13	28.26	46.00	-17.74	Average

5.3 Emission Bandwidth and 99% Occupied Bandwidth

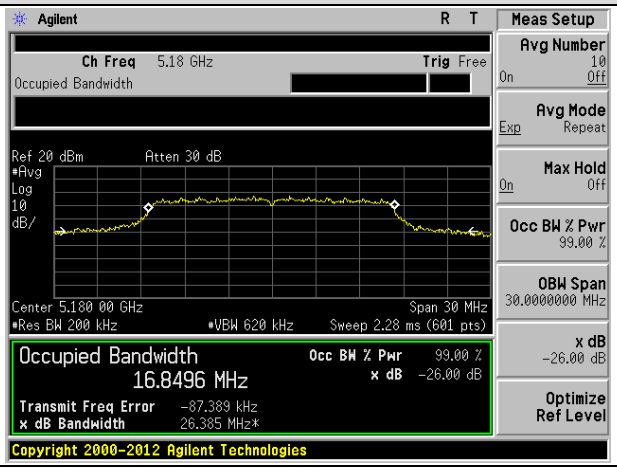
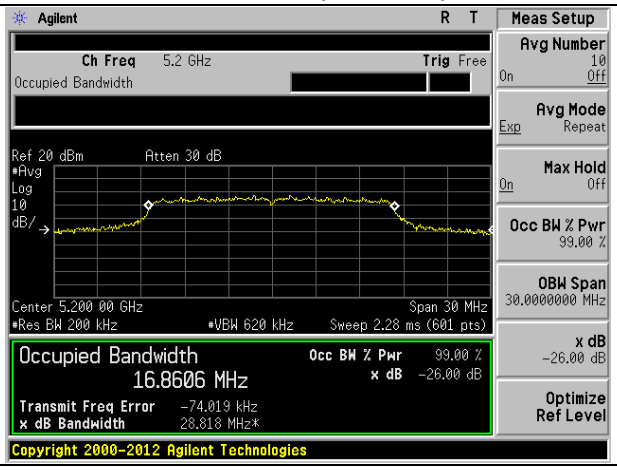
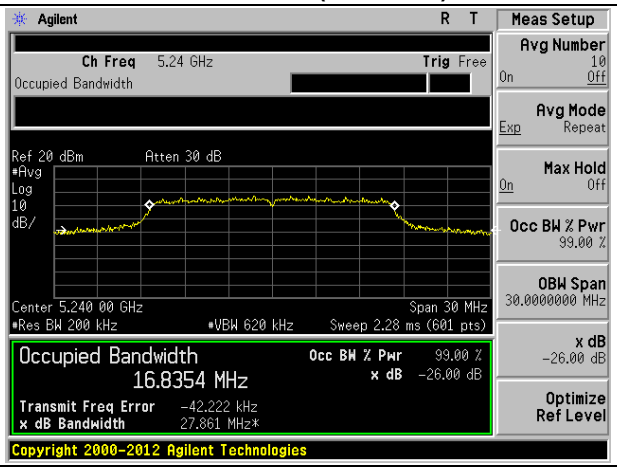
Test Requirement:	FCC Part15 E Section 15.407
Test Method:	KDB 789033 D02 General UNII Test Procedures New Rules v01
Limit:	N/A
Test setup:	
Test procedure:	According to KDB 789033 D02 General UNII Test Procedures New Rules v01.
Test Instruments:	Refer to section 5.10 for details
Test mode:	Refer to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

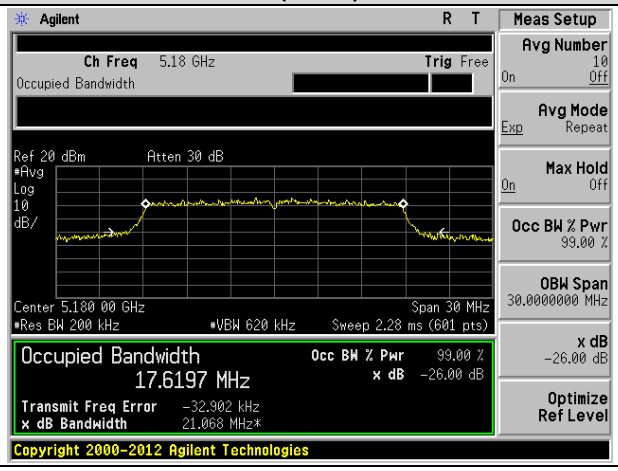
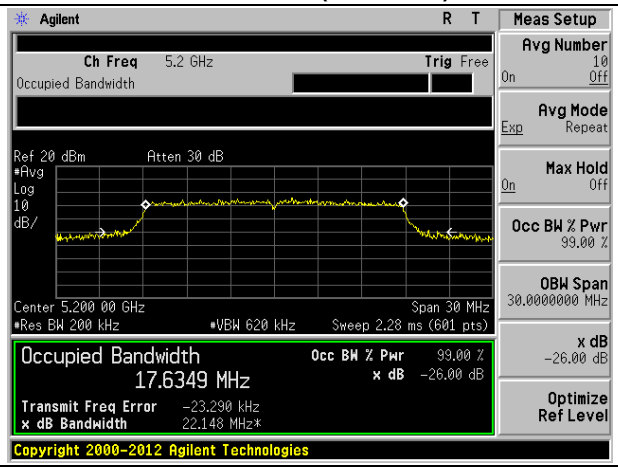
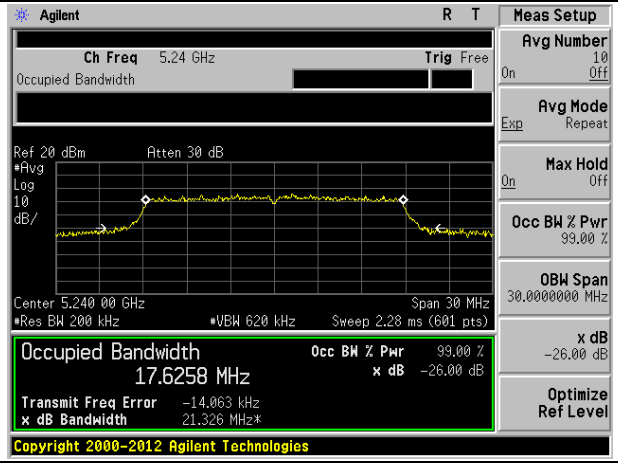
Measurement Data:

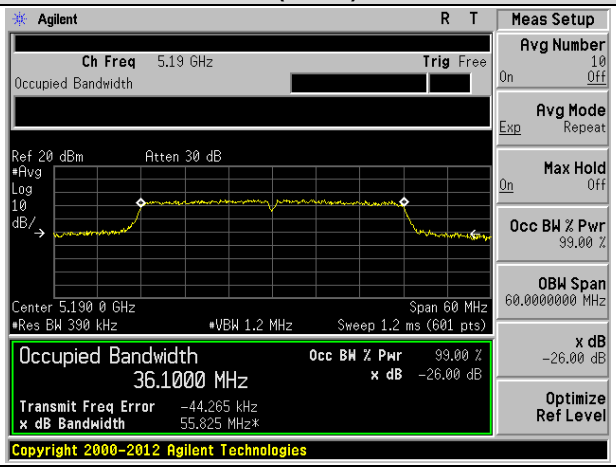
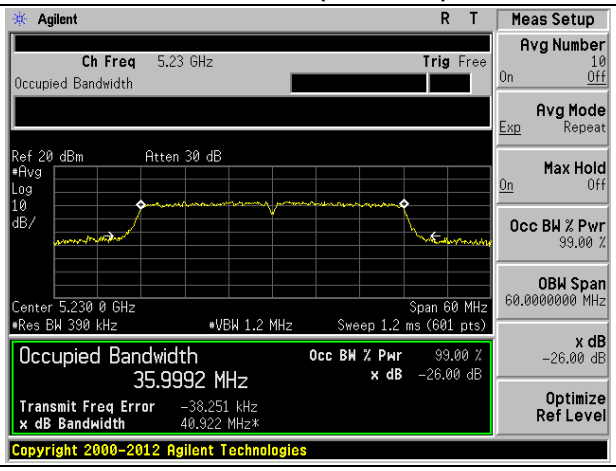
CH. No.	Frequency (MHz)	99% Occupied Bandwidth (MHz)		26dB Occupied Bandwidth (MHz)	
		802.11a	802.11n(HT20)	802.11a	802.11n(HT20)
36	5180.00	16.850	17.620	26.385	21.068
40	5200.00	16.861	17.635	28.818	22.148
48	5240.00	16.835	17.626	27.861	21.326

CH. No.	Frequency (MHz)	99% Occupied Bandwidth (MHz)	26dB Occupied Bandwidth (MHz)
		802.11n(HT40)	802.11n(HT40)
38	5190.00	36.100	55.825
46	5230.00	35.999	40.922

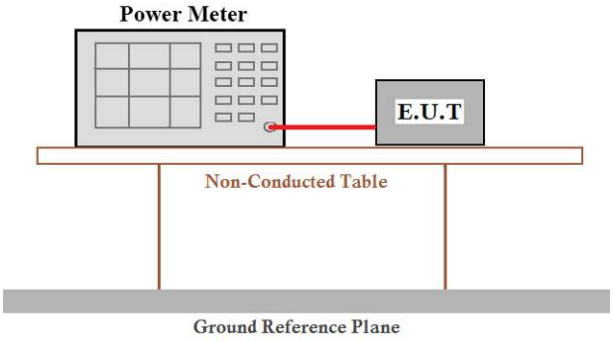
Test plots as followed:

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)

802.11n(HT40) mode

Channel 38 (5190MHz)

Channel 46 (5230MHz)

5.4 Peak Transmit Power

Test Requirement:	FCC Part15 E Section 15.407
Test Method:	KDB 789033 D02 General UNII Test Procedures New Rules v01
Limit:	For the band 5.15-5.25 GHz, the maximum conducted output power over the frequency bands of operation shall not exceed 250mW.
Test setup:	
Test procedure:	**Measurement using an RF average power meter** (i) Measurements may be performed using a wideband RF power meter with a thermocouple detector or equivalent if all of the conditions listed below are satisfied a) The EUT is configured to transmit continuously or to transmit with a constant duty cycle. b) At all times when the EUT is transmitting, it must be transmitting at its maximum power control level. c) The integration period of the power meter exceeds the repetition period of the transmitted signal by at least a factor of five. (ii) If the transmitter does not transmit continuously, measure the duty cycle, x, of the transmitter output signal as described in section B). (iii) Measure the average power of the transmitter. This measurement is an average over both the on and off periods of the transmitter. (iv) Adjust the measurement in dBm by adding 10 log(1/x) where x is the duty cycle (e.g., 10log(1/0.25) if the duty cycle is 25 percent).
Test Instruments:	Refer to section 5.10 for details
Test mode:	Refer to section 5.3 for details
Test results:	Pass

Measurement Data

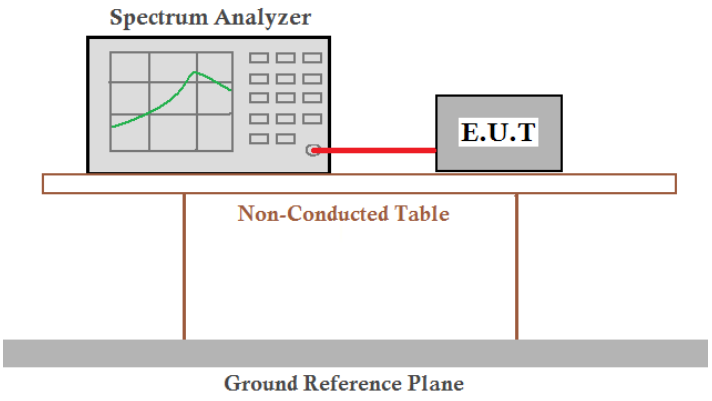
802.11a mode						
CH No.	Frequency (MHz)	Measured Power (dBm)	Duty Factor	Output Power (dBm)	Limit (dBm)	Result
36	5180.00	8.08	0.04	8.12	23.98	Pass
40	5200.00	8.45	0.04	8.49	23.98	Pass
48	5240.00	8.47	0.04	8.51	23.98	Pass

802.11n(HT20) mode						
CH No.	Frequency (MHz)	Measured Power (dBm)	Duty Factor	Output Power (dBm)	Limit (dBm)	Result
36	5180.00	7.69	0.04	7.73	23.98	Pass
40	5200.00	7.75	0.04	7.79	23.98	Pass
48	5240.00	7.86	0.04	7.90	23.98	Pass

802.11n(HT40) mode						
CH No.	Frequency (MHz)	Measured Power (dBm)	Duty Factor	Output Power (dBm)	Limit (dBm)	Result
38	5190.00	5.83	0.04	5.87	23.98	Pass
46	5230.00	6.06	0.04	6.10	23.98	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:	KDB 789033 D02 General UNII Test Procedures New Rules v01
Limit:	11dBm/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

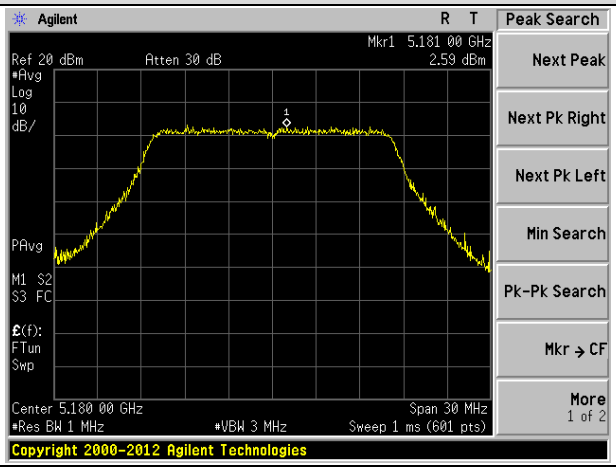
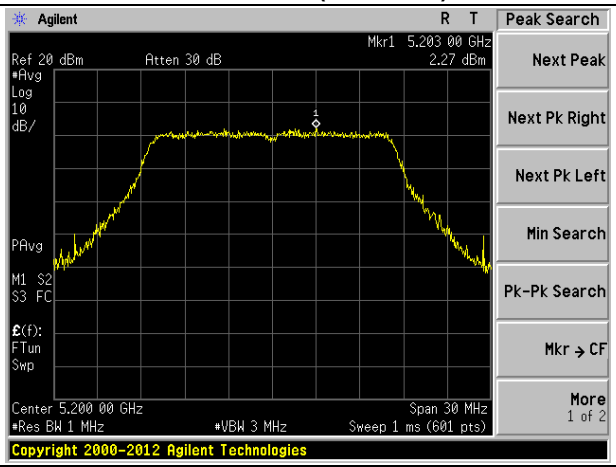
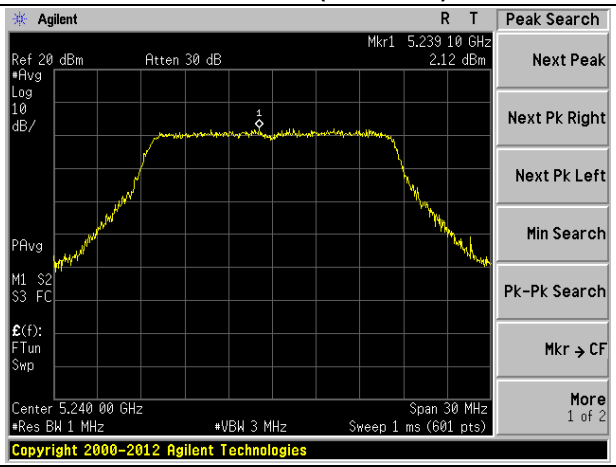
802.11a mode						
Channel No.	Frequency (MHz)	Measured PPSD (dBm/MHz)	Duty Factor	Total PPSD (dBm/MHz)	Limit (dBm/MHz)	Result
36	5180.00	2.59	0.04	2.63	11	Pass
40	5200.00	2.27	0.04	2.31	11	Pass
48	5240.00	2.12	0.04	2.16	11	Pass

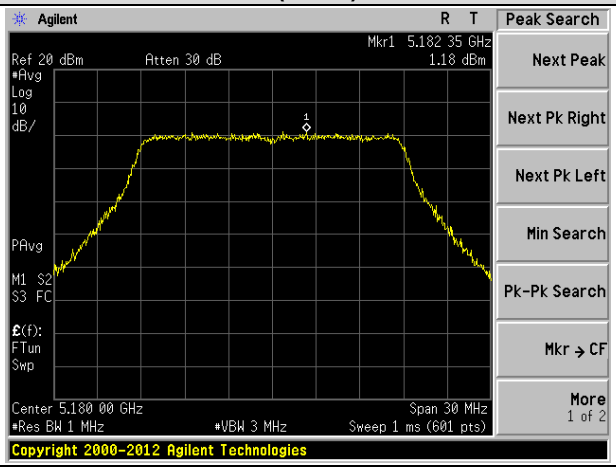
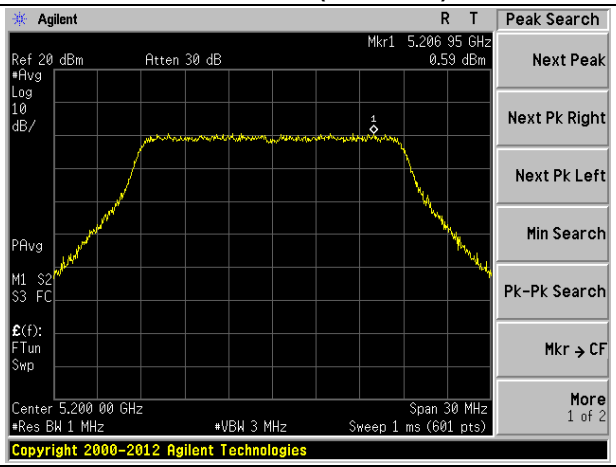
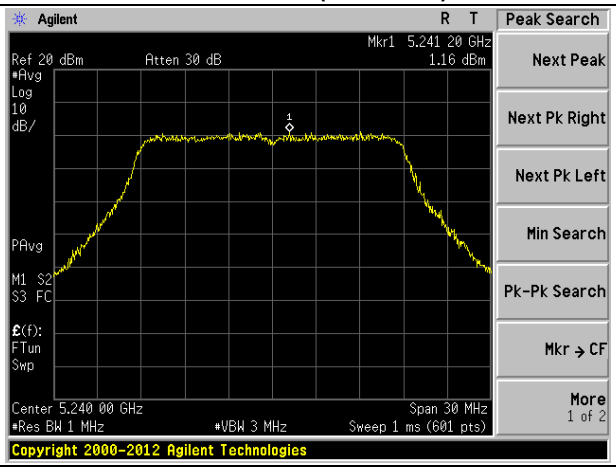
802.11n(HT20) mode						
Channel No.	Frequency (MHz)	Measured PPSD (dBm/MHz)	Duty Factor	Total PPSD (dBm/MHz)	Limit (dBm/MHz)	Result
36	5180.00	1.18	0.04	1.22	11	Pass
40	5200.00	0.59	0.04	0.63	11	Pass
48	5240.00	1.16	0.04	1.20	11	Pass

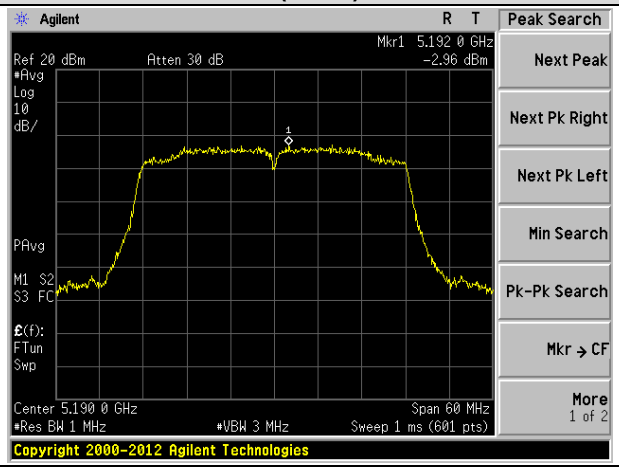
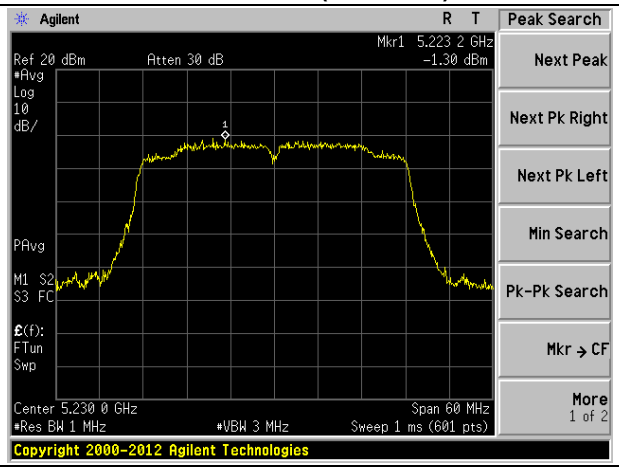
802.11n(HT40) mode						
Channel No.	Frequency (MHz)	Measured PPSD (dBm/MHz)	Duty Factor	Total PPSD (dBm/MHz)	Limit (dBm/MHz)	Result
38	5190.00	-2.96	0.04	-2.92	11	Pass
46	5230.00	-1.30	0.04	-1.26	11	Pass

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

Test plots as followed:

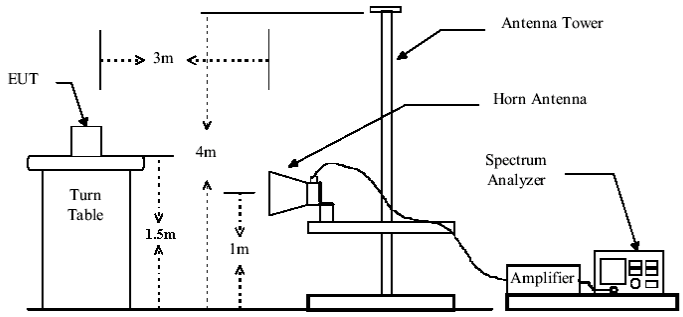
802.11a mode

Channel 36 (5180MHz)

Channel 40 (5200MHz)

Channel 48 (5240MHz)

802.11n(HT20) mode

Channel 36 (5180MHz)

Channel 40 (5200MHz)

Channel 48 (5240MHz)

802.11n(HT40) mode

Channel 38 (5190MHz)

Channel 46 (5230MHz)

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>100KHz</td><td>300KHz</td><td>Quasi-peak Value</td></tr>
<tr><td rowspan="2">Above 1GHz</td><td>Peak</td><td>1MHz</td><td>3MHz</td><td>Peak Value</td></tr>
<tr><td>AV</td><td>1MHz</td><td>3MHz</td><td>Average Value</td></tr>
</table>
</td></tr>
<tr><td>Limit:</td><td>
<table>
<tr><td>Frequency</td><td>Limit (dBuV/m @3m)</td><td>Remark</td></tr>
<tr><td>30MHz-88MHz</td><td>40.0</td><td>Quasi-peak Value</td></tr>
<tr><td>88MHz-216MHz</td><td>43.5</td><td>Quasi-peak Value</td></tr>
<tr><td>216MHz-960MHz</td><td>46.0</td><td>Quasi-peak Value</td></tr>
<tr><td>960MHz-1GHz</td><td>54.0</td><td>Quasi-peak Value</td></tr>
<tr><td rowspan="2">Above 1GHz</td><td>54.0</td><td>Average Value</td></tr>
<tr><td>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)	Over limit(dB)	Detector
H	5150.00	35.26	17.18	52.44	68.20	-15.76	PK
H	5150.00	26.84	17.18	44.02	54.00	-9.98	AV
V	5150.00	35.71	17.18	52.89	68.20	-15.31	PK
V	5150.00	24.97	17.18	42.15	54.00	-11.85	AV
Mode:		802.11a		Frequency:		5240MHz	
Antenna Pol.	Frequency (MHz)	Reading Level (dBuV)	Factor (dB/m)	Measure Level (dBuV/m)	Limit (dBuV/m)	Over limit(dB)	Detector
H	5350.00	35.78	17.20	52.98	68.20	-15.22	PK
H	5350.00	26.59	17.20	43.79	54.00	-10.21	AV
V	5350.00	35.93	17.20	53.13	68.20	-15.07	PK
V	5350.00	26.07	17.20	43.27	54.00	-10.73	AV

Mode:		802.11n(HT20)		Frequency:		5180MHz	
Antenna Pol.	Frequency (MHz)	Reading Level (dBuV)	Factor (dB/m)	Measure Level (dBuV/m)	Limit (dBuV/m)	Over limit(dB)	Detector
H	5150.00	36.84	17.18	54.02	68.20	-14.18	PK
H	5150.00	26.97	17.18	44.15	54.00	-9.85	AV
V	5150.00	35.21	17.18	52.39	68.20	-15.81	PK
V	5150.00	25.33	17.18	42.51	54.00	-11.49	AV
Mode:		802.11n(HT20)		Frequency:		5240MHz	
Antenna Pol.	Frequency (MHz)	Reading Level (dBuV)	Factor (dB/m)	Measure Level (dBuV/m)	Limit (dBuV/m)	Over limit(dB)	Detector
H	5350.00	34.62	17.20	51.82	68.20	-16.38	PK
H	5350.00	25.16	17.20	42.36	54.00	-11.64	AV
V	5350.00	36.07	17.20	53.27	68.20	-14.93	PK
V	5350.00	25.89	17.20	43.09	54.00	-10.91	AV

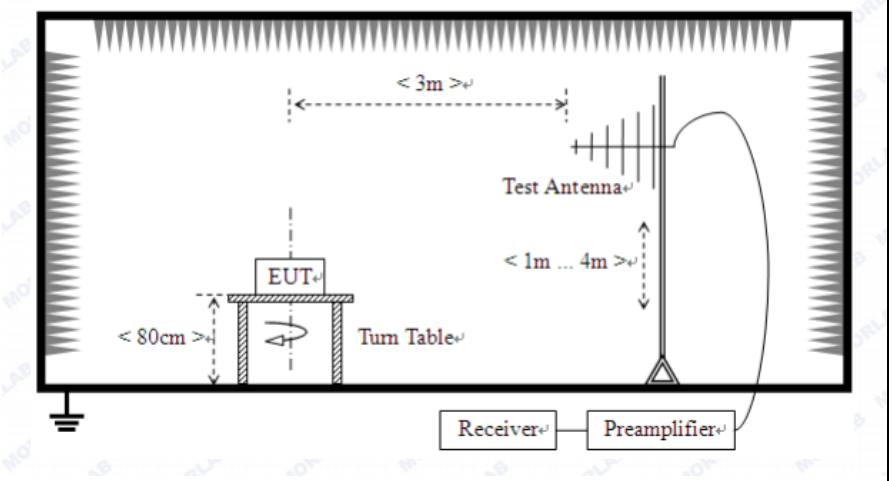
Mode:		802.11n(HT40)		Frequency:		5190MHz	
Antenna Pol.	Frequency (MHz)	Reading Level	Factor	Measure Level	Limit (dBuV/m)	Margin (dB)	Detector
H	5150.00	37.06	17.18	54.24	68.20	-13.96	PK
H	5150.00	26.82	17.18	44.00	54.00	-10.00	AV
V	5150.00	35.49	17.18	52.67	68.20	-15.53	PK
V	5150.00	25.40	17.18	42.58	54.00	-11.42	AV
Mode:		802.11n(HT40)		Frequency:		5230MHz	
Antenna Pol.	Frequency (MHz)	Reading Level	Factor	Measure Level	Limit (dBuV/m)	Margin (dB)	Detector
H	5350.00	35.83	17.20	53.03	68.20	-15.17	PK
H	5350.00	25.39	17.20	42.59	54.00	-11.41	AV
V	5350.00	35.42	17.20	52.62	68.20	-15.58	PK
V	5350.00	26.05	17.20	43.25	54.00	-10.75	AV

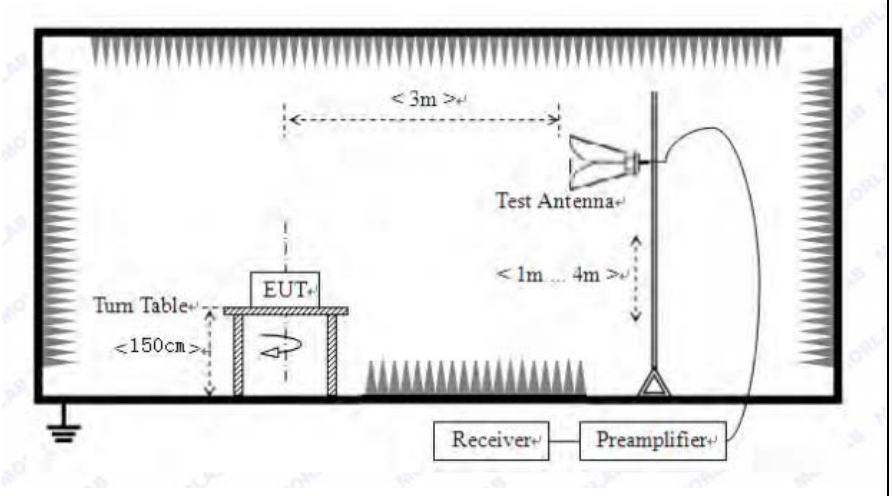
5.7 Radiated Emission

<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>100KHz</td><td>300KHz</td><td>Quasi-peak Value</td></tr>
<tr><td rowspan="2">Above 1GHz</td><td>Peak</td><td>1MHz</td><td>3MHz</td><td>Peak Value</td></tr>
<tr><td>AV</td><td>1MHz</td><td>3MHz</td><td>Average Value</td></tr>
</table>
</td></tr>
<tr><td>Limit:</td><td>
<table>
<tr><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>
</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.
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
</td></tr>
</table>

	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
50.06	39.56	15.25	0.77	30.00	25.58	40.00	-14.42	Vertical
85.00	41.37	12.31	1.07	29.77	24.98	40.00	-15.02	Vertical
137.42	42.73	10.35	1.49	29.47	25.10	43.50	-18.40	Vertical
236.65	39.74	13.93	2.05	29.54	26.18	46.00	-19.82	Vertical
272.28	39.46	14.46	2.24	29.81	26.35	46.00	-19.65	Vertical
390.72	38.00	16.87	2.81	29.54	28.14	46.00	-17.86	Vertical
47.00	32.63	15.44	0.74	30.01	18.80	40.00	-21.20	Horizontal
135.98	39.39	10.45	1.48	29.48	21.84	43.50	-21.66	Horizontal
172.00	45.82	11.10	1.70	29.31	29.31	43.50	-14.19	Horizontal
250.30	48.22	14.07	2.12	29.65	34.76	46.00	-11.24	Horizontal
350.48	43.72	16.27	2.62	29.73	32.88	46.00	-13.12	Horizontal
774.16	42.60	21.72	4.36	29.20	39.48	46.00	-6.52	Horizontal

Above 1GHz:

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

802.11 n(HT20) mode								
CH. No.	Antenna Pol.	Frequency (MHz)	Reading Level	Factor	Measure Level	Limit (dBuV/m)	Over limit(dB)	Detector
36	H	10360.00	17.52	21.64	39.16	54(Note3)	-14.84	PK
	H	15540.00	13.56	21.80	35.36	54(Note3)	-18.64	PK
	V	10360.00	14.43	21.64	36.07	54(Note3)	-17.93	PK
	V	15540.00	19.96	21.80	41.76	54(Note3)	-12.24	PK
40	H	10400.00	20.21	21.67	41.88	54(Note3)	-12.12	PK
	H	15600.00	21.35	21.83	43.18	54(Note3)	-10.82	PK
	V	10400.00	14.65	21.67	36.32	54(Note3)	-17.68	PK
	V	15600.00	13.10	21.83	34.93	54(Note3)	-19.07	PK
48	H	10480.00	19.87	21.64	41.51	54(Note3)	-12.49	PK
	H	15720.00	12.69	22.16	34.85	54(Note3)	-19.15	PK
	V	10480.00	11.82	21.64	33.46	54(Note3)	-20.54	PK
	V	15720.00	20.69	22.16	42.85	54(Note3)	-11.15	PK

802.11n(HT40) mode								
CH. No.	Antenna Pol.	Frequency (MHz)	Reading Level	Factor	Measure Level	Limit (dBuV/m)	Margin (dB)	Detector
38	H	10380.00	12.97	21.64	34.61	54(Note3)	-19.39	PK
	H	15570.00	20.49	21.80	42.29	54(Note3)	-11.71	PK
	V	10380.00	20.55	21.64	42.19	54(Note3)	-11.81	PK
	V	15570.00	11.66	21.80	33.46	54(Note3)	-20.54	PK
46	H	10460.00	14.82	21.67	36.49	54(Note3)	-17.51	PK
	H	15690.00	16.69	21.83	38.52	54(Note3)	-15.48	PK
	V	10460.00	18.47	21.67	40.14	54(Note3)	-13.86	PK
	V	15690.00	18.65	21.83	40.48	54(Note3)	-13.52	PK

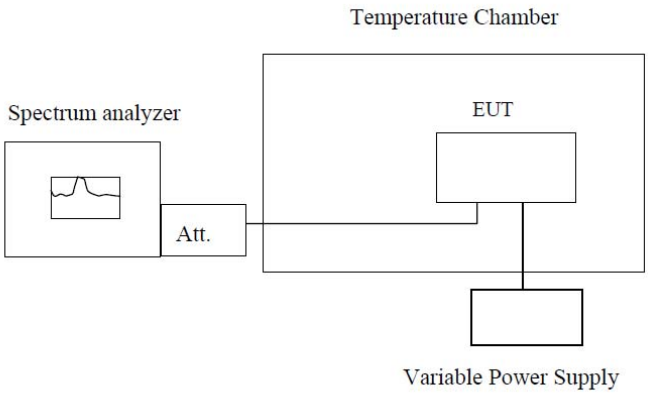
Note:

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

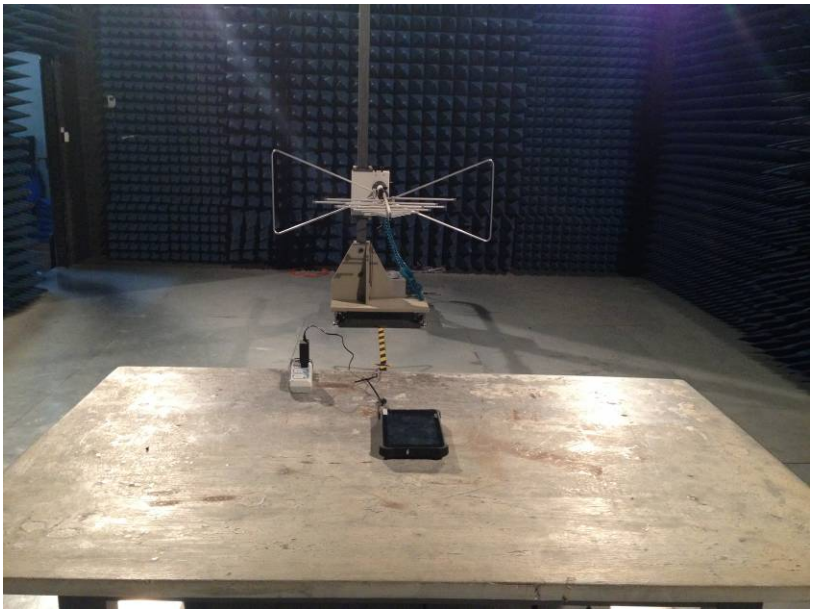
Measurement data:

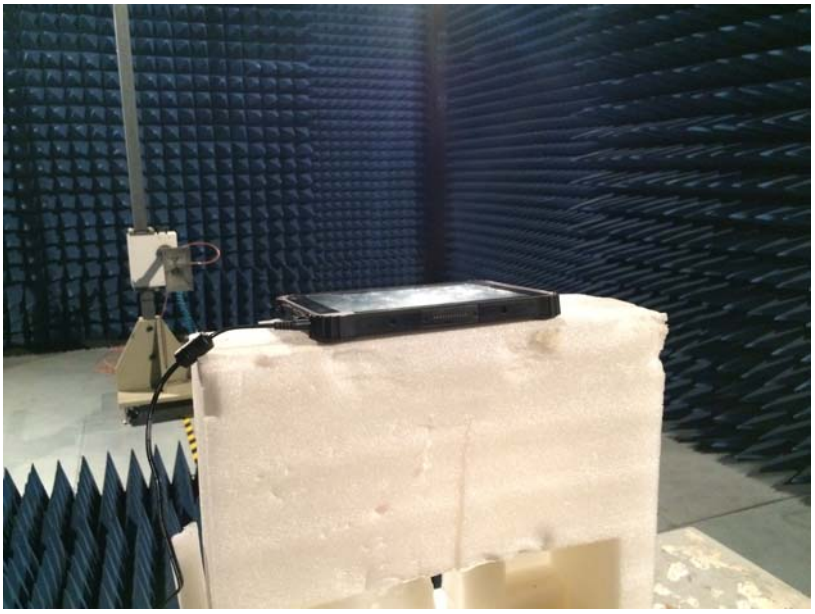
Frequency stability versus Temp.					
Power Supply: DC 3.7V					
Temp. (°C)	Operating Frequency (MHz)	0 minute	2 minute	5 minute	10 minute
		Measured Frequency (MHz)	Measured Frequency (MHz)	Measured Frequency (MHz)	Measured Frequency (MHz)
-30	5180	5176.0687	5182.8249	5181.2442	5177.7389
	5200	5198.5202	5202.6701	5202.2740	5199.3058
	5220	5219.7007	5220.2992	5221.1674	5219.7837
	5240	5239.8969	5240.6706	5240.1099	5239.6216
-20	5180	5179.7573	5180.2944	5180.6480	5179.9911
	5200	5199.5906	5200.4019	5200.0567	5199.7522
	5220	5219.2967	5220.4812	5220.1215	5219.7237
	5240	5239.3734	5240.2079	5240.4396	5239.1181
-10	5180	5179.0013	5180.3317	5180.1444	5179.0542
	5200	5199.8815	5200.7827	5200.9887	5199.1987
	5220	5219.6089	5220.6000	5220.2218	5219.4777
	5240	5239.4328	5240.5442	5240.8986	5239.3408
0	5180	5179.9919	5180.4698	5180.3014	5179.2583
	5200	5199.4327	5200.6270	5200.7563	5199.8542
	5220	5219.0438	5220.0291	5220.0082	5219.9771
	5240	5239.4398	5240.6346	5240.2855	5239.5282
10	5180	5179.1846	5180.0709	5180.8798	5179.3336
	5200	5199.3751	5200.1582	5200.5461	5199.8214
	5220	5219.1598	5220.2019	5220.0809	5219.8280
	5240	5239.0553	5240.5216	5240.6426	5239.6225
20	5180	5179.7902	5180.2032	5180.3252	5179.3511
	5200	5199.6511	5200.4005	5200.8141	5199.4444
	5220	5219.4130	5220.6676	5220.3710	5219.5744
	5240	5239.1440	5240.8696	5240.3374	5239.3192
30	5180	5179.8476	5180.8221	5180.1961	5179.7338
	5200	5199.2194	5200.2297	5200.2910	5199.5565
	5220	5219.2583	5220.4507	5220.9143	5219.5430
	5240	5239.5687	5240.2940	5240.7564	5239.9917
40	5180	5179.8886	5180.6081	5180.1391	5179.9885
	5200	5199.4928	5200.6900	5200.8309	5199.7044
	5220	5219.3797	5220.5214	5220.5883	5219.6076
	5240	5239.3262	5240.8700	5240.6540	5239.9958
50	5180	5179.4018	5180.4764	5180.3674	5179.2140
	5200	5199.2490	5200.7946	5200.2013	5199.2759
	5220	5219.7416	5220.8228	5220.5299	5219.3600
	5240	5239.4667	5240.2276	5240.0121	5239.2702

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)
3.3	5180	5183.9048	5181.9198	5176.2708	5178.5336
	5200	5203.8262	5200.1891	5196.7549	5198.0041
	5220	5220.7493	5220.2034	5217.4129	5219.8387
	5240	5240.7087	5240.7518	5238.4864	5239.3392
3.7	5180	5180.9781	5180.2992	5179.2130	5179.3551
	5200	5200.1740	5200.5893	5199.8789	5199.2439
	5220	5220.9553	5220.2861	5219.6715	5219.6681
	5240	5240.0801	5240.7848	5239.3405	5239.7950
4.1	5180	5180.1700	5180.5389	5179.2287	5179.2840
	5200	5200.3835	5200.4865	5199.2229	5199.3899
	5220	5220.0028	5220.8285	5219.1584	5219.3015
	5240	5240.6934	5240.4117	5239.6403	5239.0381

6 Test Setup Photo

Radiated Emission





Conducted Emission

7 EUT Constructional Details

Reference to the test report No. GTS201612000097F01

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