

FCC REPORT

Applicant: SHENZHEN FCAR TECHNOLOGY CO.,LTD

Address of Applicant: 8th floor, Chuangyi Building, No. 3025 Nanhai Ave., Nanshan, Shenzhen, Guangdong, China 518060

Equipment Under Test (EUT)

Product Name: AUTO DIAGNOSTIC SYSTEM

Model No.: F7S-W, F7S-D, F7S-G, F7S-E, F7S-R, F7S-M, F7S-P, F7S-N

Trade Mark: FCAR

FCC ID: 2AJDD-IDIAGSF7S

Applicable standards: FCC CFR Title 47 Part 15 Subpart C Section 15.407:2015

Date of sample receipt: August 24, 2016

Date of Test: August 25-September 02, 2016

Date of report issued: September 05, 2016

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.


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2 Version

Version No.	Date	Description
00	September 05, 2016	Original

Prepared By:

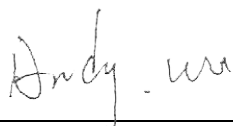


Project Engineer

Date:

September 05, 2016

Check By:



Reviewer

Date:

September 05, 2016

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.....	27
7.7.1 Radiated Emission Method.....	27
7.8 FREQUENCY STABILITY	31
8 TEST SETUP PHOTO.....	33
9 EUT CONSTRUCTIONAL DETAILS	34

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)	Pass
Spurious Emission	15.205/15.209/15.407(b)	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:	SHENZHEN FCAR TECHNOLOGY CO.,LTD
Address of Applicant:	8th floor, Chuangyi Building, No. 3025 Nanhai Ave., Nanshan, Shenzhen, Guangdong, China 518060
Manufacturer/ Factory:	SHENZHEN FCAR TECHNOLOGY CO.,LTD
Address of Manufacturer/ Factory:	8th floor, Chuangyi Building, No. 3025 Nanhai Ave., Nanshan, Shenzhen, Guangdong, China 518060

5.2 General Description of EUT

Product Name:	AUTO DIAGNOSTIC SYSTEM
Model No.:	F7S-W, F7S-D, F7S-G, F7S-E, F7S-R, F7S-M, F7S-P, F7S-N
Operation Frequency:	802.11a/802.11n(HT20)/802.11ac(HT20) @5.8G Band: 5745MHz ~ 5825MHz
Channel numbers:	5
Channel bandwidth:	802.11a/802.11n(HT20)/802.11ac(HT20) : 20MHz
Modulation technology:	802.11a/802.11n(H20) /802.11ac(HT20): Orthogonal Frequency Division Multiplexing (OFDM)
Antenna Type:	Integral Antenna
Antenna gain:	2.0dBi (declare by Applicant)
Power supply:	SWITCHING POWER ADAPTER Model No.:GME36A-120300FDS Input: AC 100~240V, 50/60Hz, 1.2A Output: DC 12V, 3A Or DC 3.7V, 10000mAh, 37Wh

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)
Lowest channel	5745
Middle channel	5785
Highest channel	5825

5.3 Test mode

Transmitting mode	Keep the EUT in continuously transmitting mode
<i>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.</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
802.11ac(HT20)	6.5Mbps

5.4 Description of Support Units

None.

5.5 Test Facility

<p>The test facility is recognized, certified, or accredited by the following organizations:</p> <ul style="list-style-type: none"> • 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 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.

5.6 Test Location

All tests were performed at:
<p>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</p>

6 Test Instruments list

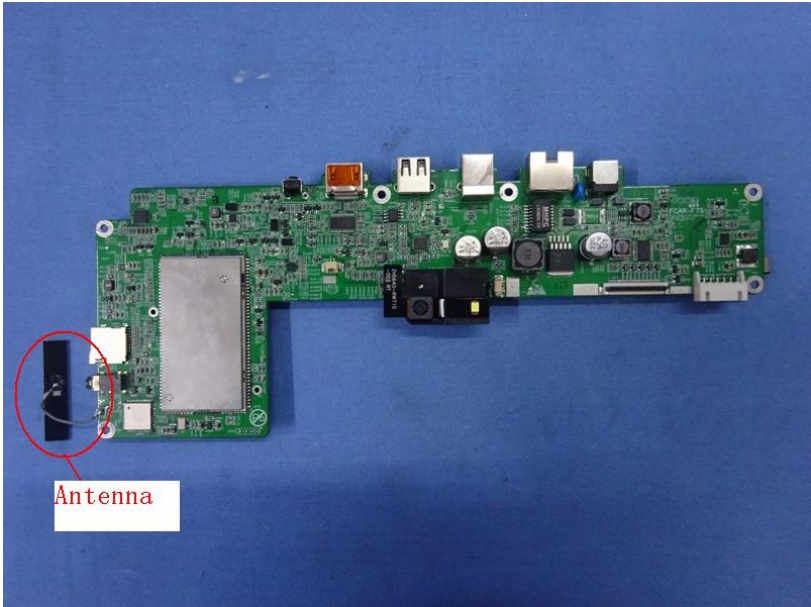
Radiated Emission:						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	3m Semi- Anechoic Chamber	ZhongYu Electron	9.2(L)*6.2(W)* 6.4(H)	GTS250	July. 03 2015	July. 02 2020
2	Control Room	ZhongYu Electron	6.2(L)*2.5(W)* 2.4(H)	GTS251	N/A	N/A
3	EMI Test Receiver	Rohde & Schwarz	ESU26	GTS203	June. 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

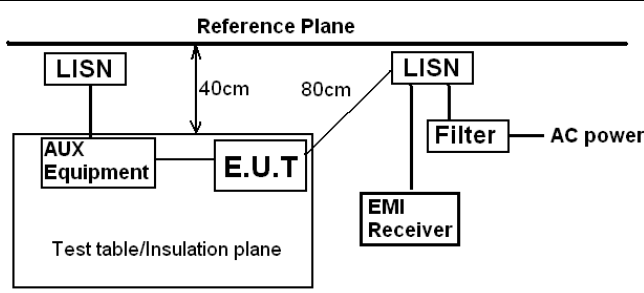
General used equipment:						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	Barometer	ChangChun	DYM3	GTS257	June 29 2016	June 28 2017

7 Test results and Measurement Data

7.1 Antenna requirement

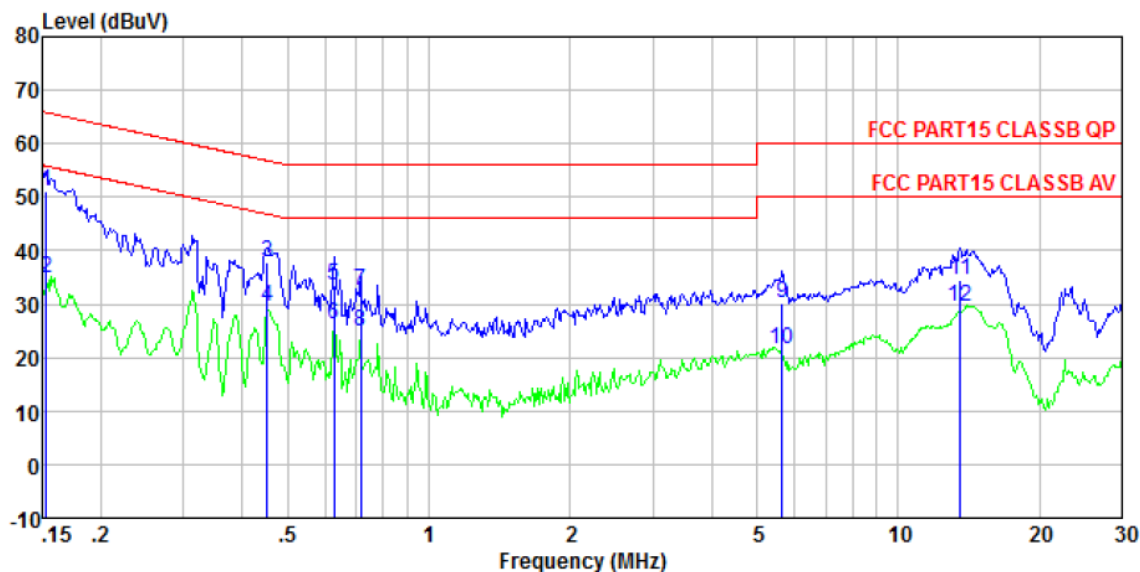
Standard requirement:	FCC Part15 C Section 15.203
<p><i>15.203 requirement:</i></p> <p><i>An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that 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>	
E.U.T Antenna:	
<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:	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:			
	<p>Remark: E.U.T: Equipment Under Test LISN: Line Impedance Stabilization Network Test table height=0.8m</p>		
Test procedure:	<div>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.</div> <div>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).</div> <div>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.</div>		
Test Instruments:	Refer to section 6.0 for details		
Test mode:	Refer to section 5.3 for details		
Test results:	Pass		

Measurement data

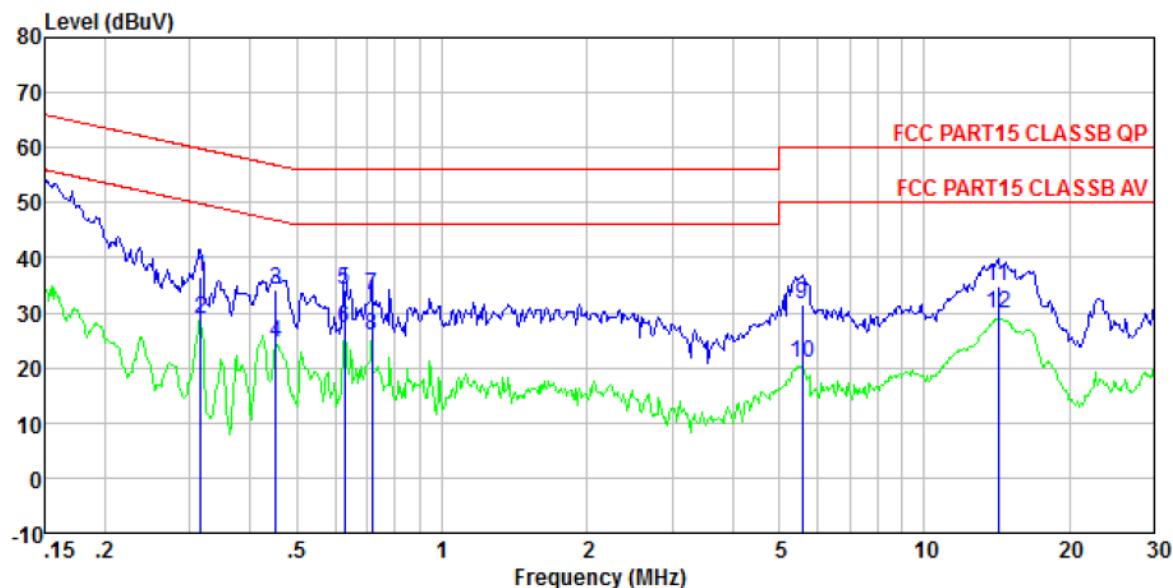
Line:



Site : Shielded room
Condition : FCC PART15 CLASSB QP LISN-2013 LINE
Job No. : 0197
Test Mode : Wifi 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	0.153	50.90	0.15	0.12	51.17	65.82	-14.65	QP
2	0.153	34.62	0.15	0.12	34.89	55.82	-20.93	Average
3	0.452	37.75	0.12	0.11	37.98	56.85	-18.87	QP
4	0.452	29.30	0.12	0.11	29.53	46.85	-17.32	Average
5	0.627	33.22	0.13	0.12	33.47	56.00	-22.53	QP
6	0.627	26.02	0.13	0.12	26.27	46.00	-19.73	Average
7	0.716	32.10	0.14	0.13	32.37	56.00	-23.63	QP
8	0.716	24.51	0.14	0.13	24.78	46.00	-21.22	Average
9	5.653	29.81	0.22	0.15	30.18	60.00	-29.82	QP
10	5.653	21.18	0.22	0.15	21.55	50.00	-28.45	Average
11	13.551	34.12	0.31	0.21	34.64	60.00	-25.36	QP
12	13.551	28.93	0.31	0.21	29.45	50.00	-20.55	Average

Neutral:



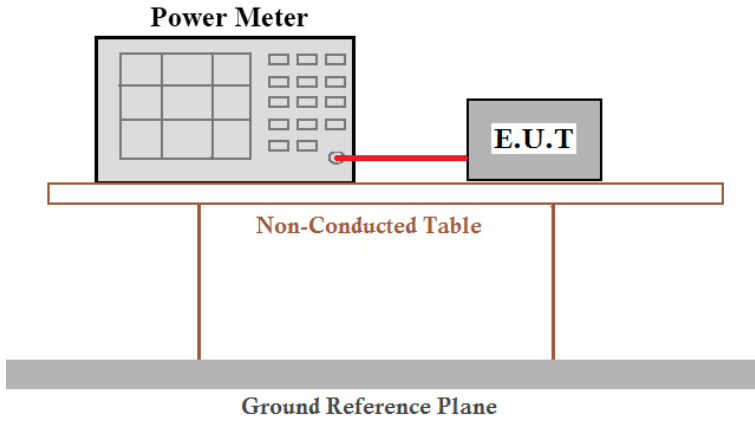
Site : Shielded room
Condition : FCC PART15 CLASSB QP LISN-2013 NEUTRAL
Job No. : 0197
Test mode : Wifi mode
Test Engineer: Boy

	Freq	Read Level	LISN Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dBuV	dBuV	dB	
1	0.317	36.19	0.06	0.10	36.35	59.80	-23.45	QP
2	0.317	28.73	0.06	0.10	28.89	49.80	-20.91	Average
3	0.452	33.87	0.06	0.11	34.04	56.85	-22.81	QP
4	0.452	24.27	0.06	0.11	24.44	46.85	-22.41	Average
5	0.627	33.85	0.07	0.12	34.04	56.00	-21.96	QP
6	0.627	26.86	0.07	0.12	27.05	46.00	-18.95	Average
7	0.716	32.99	0.07	0.13	33.19	56.00	-22.81	QP
8	0.716	25.51	0.07	0.13	25.71	46.00	-20.29	Average
9	5.594	31.33	0.16	0.15	31.64	60.00	-28.36	QP
10	5.594	20.49	0.16	0.15	20.80	50.00	-29.20	Average
11	14.213	34.18	0.33	0.22	34.73	60.00	-25.27	QP
12	14.213	29.18	0.33	0.22	29.73	50.00	-20.27	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.

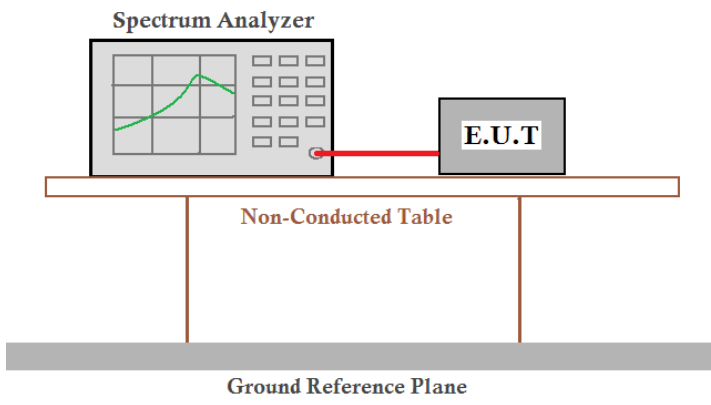
7.3 Conducted Peak Output Power

Test Requirement:	FCC Part15 E Section 15.407(a)(3)
Test Method:	KDB789033 D02 General UNII Test Procedures New Rules v01
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 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

Test CH	Peak Output Power (dBm)			Limit(dBm)	Result
	802.11a	802.11n(HT20)	802.11ac(HT20)		
Lowest	17.59	11.34	17.75	30.00	Pass
Middle	16.39	12.57	16.82		
Highest	15.33	14.45	15.22		

7.4 Channel Bandwidth

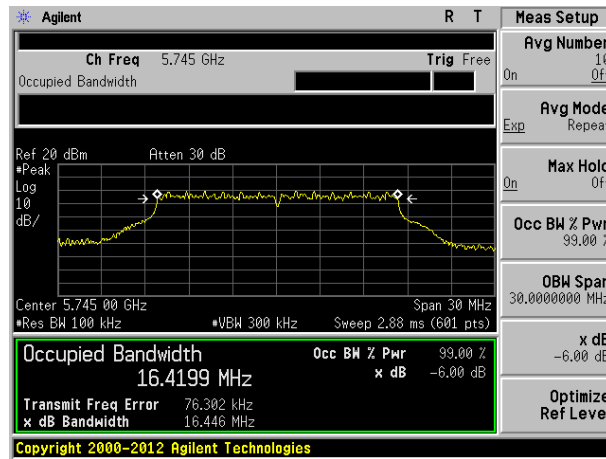
Test Requirement:	FCC Part15 E Section 15.407(e)
Test Method:	KDB789033 D02 General UNII Test Procedures New Rules v01
Test setup:	 <p>The diagram illustrates the test setup. A Spectrum Analyzer is connected to an E.U.T. (Equipment Under Test) via a red cable. Both the Spectrum Analyzer and the E.U.T. 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

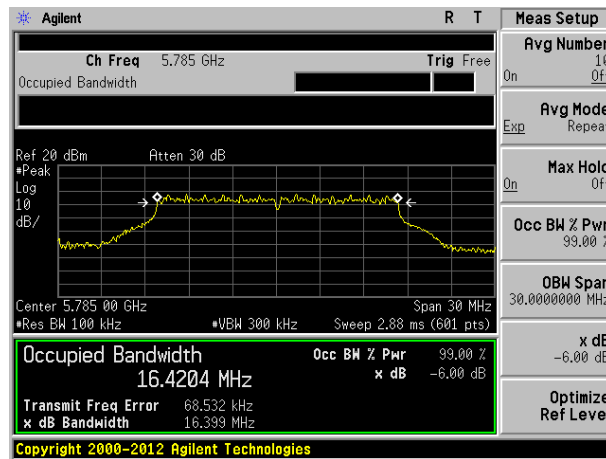
5.8G Band					
Test CH	Channel Bandwidth (MHz)			Limit (KHz)	Result
	802.11a	802.11n(HT20)	802.11ac(HT20)		
Lowest	16.446	17.611	17.743	>500	Pass
Middle	16.399	17.630	17.752		
Highest	15.094	17.586	17.778		

Test plot as follows:

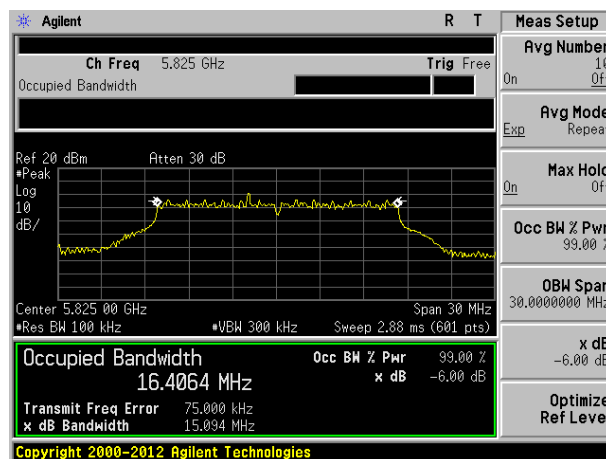
Test mode: 802.11a



Lowest channel

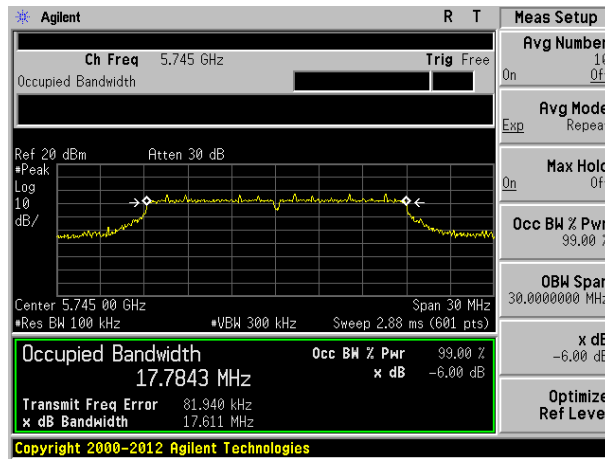


Middle channel

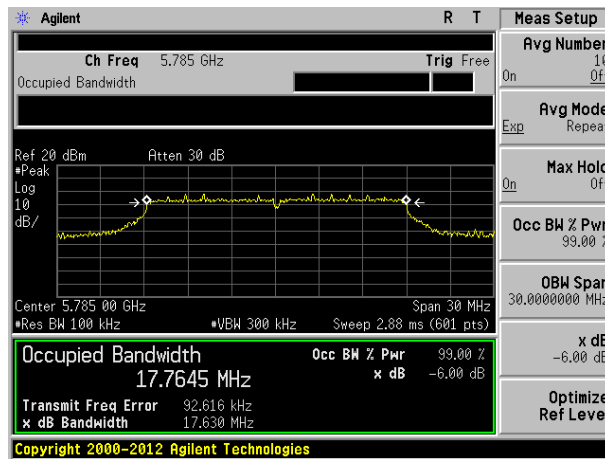


Highest channel

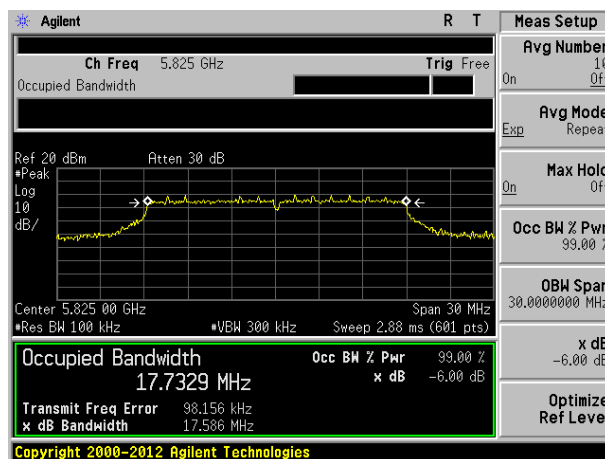
Test mode: 802.11n(HT20) @ 5.8G Band



Lowest channel

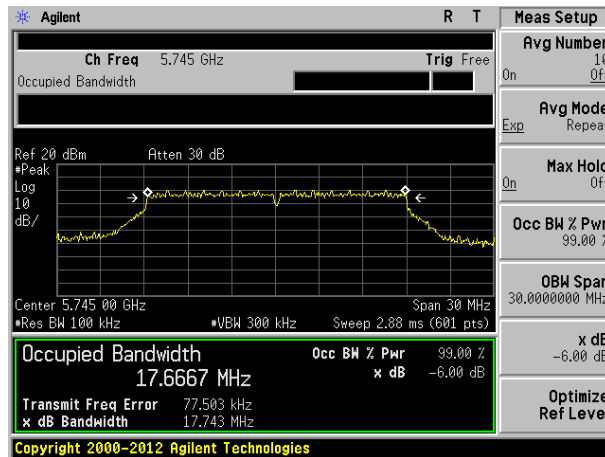


Middle channel

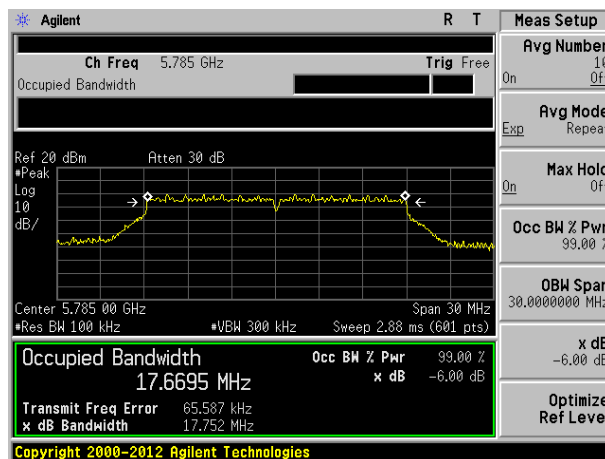


Highest channel

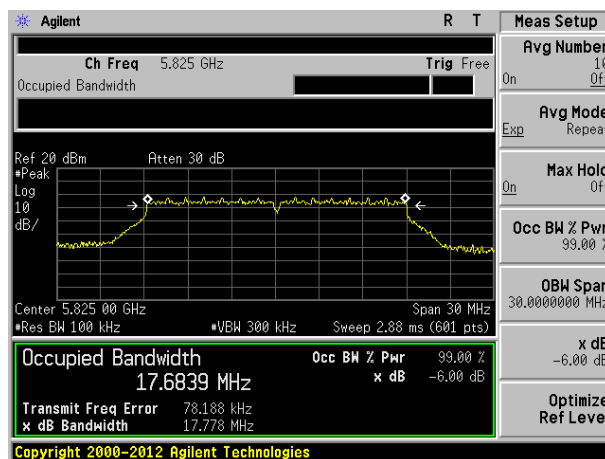
Test mode: 802.11ac(HT20)



Lowest channel

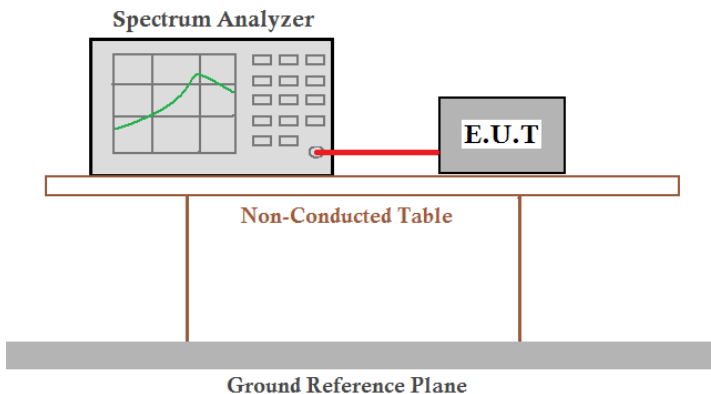


Middle channel



Highest channel

7.5 Power Spectral Density

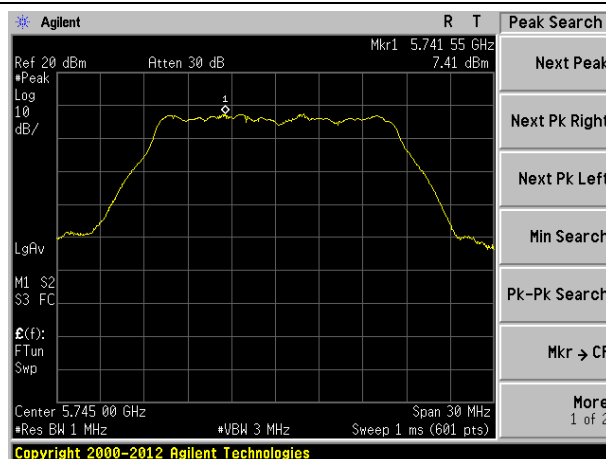
Test Requirement:	FCC Part15 E Section 15.407(a)(3)
Test Method:	KDB789033 D02 General UNII Test Procedures New Rules v01
Test setup:	 <p>The diagram illustrates the test setup. A Spectrum Analyzer is connected to an E.U.T. (Equipment Under Test) via a red cable. Both the Spectrum Analyzer and the E.U.T. 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

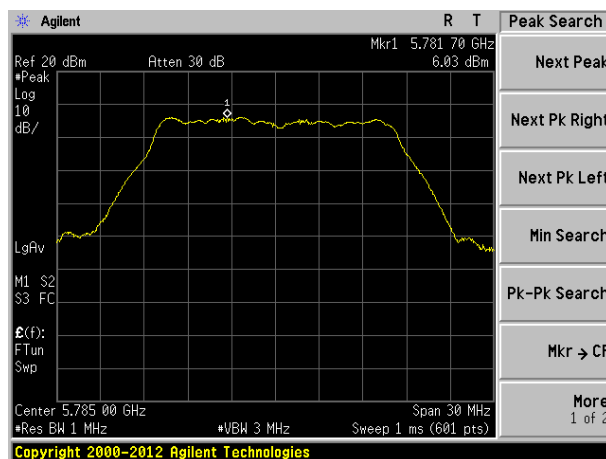
5.8G Band					
Test CH	Power Spectral Density (dBm)			Limit (dBm/500k Hz)	Result
	802.11a	802.11n(HT20)	802.11ac(HT20)		
Lowest	7.41	4.82	9.08	30	Pass
Middle	6.03	5.86	7.95		
Highest	4.18	7.43	6.28		

Test plot as follows:

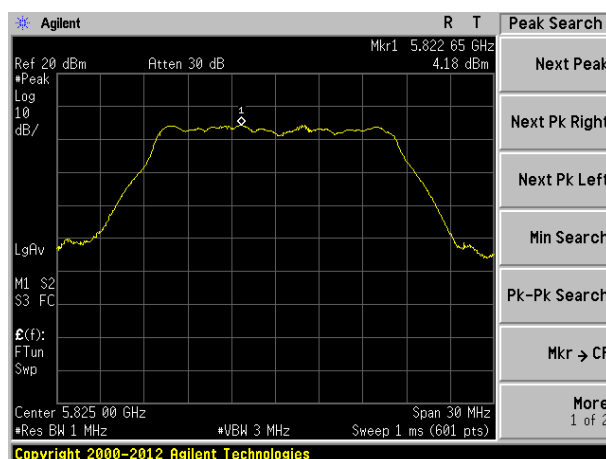
Test mode: 802.11a



Lowest channel

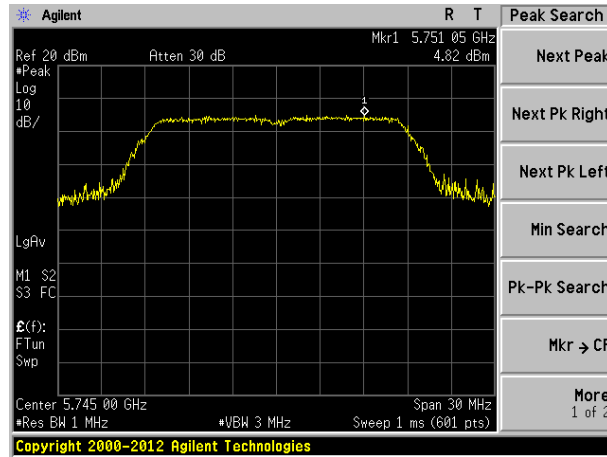


Middle channel

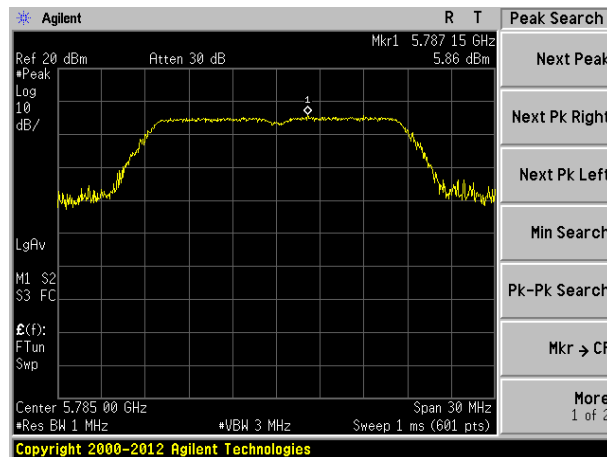


Highest channel

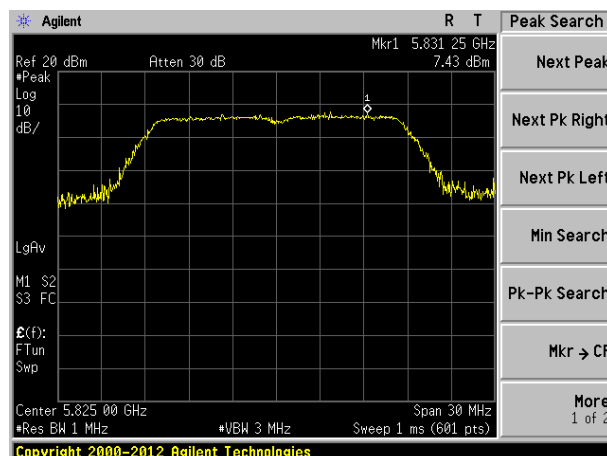
Test mode: 802.11n(HT20) @ 5.8G Band



Lowest channel

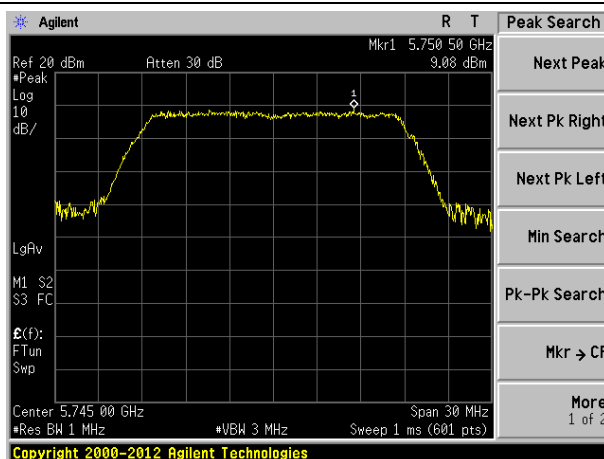


Middle channel

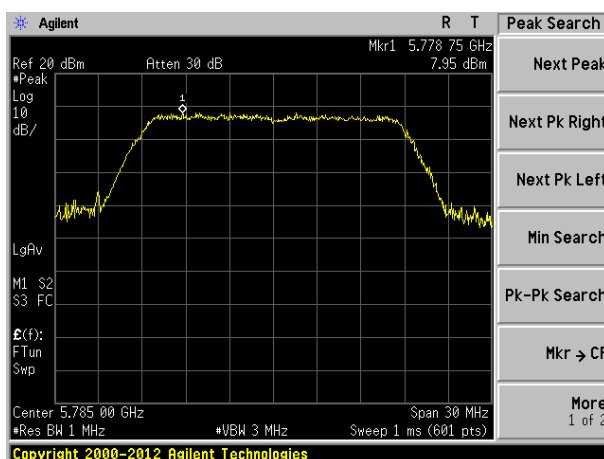


Highest channel

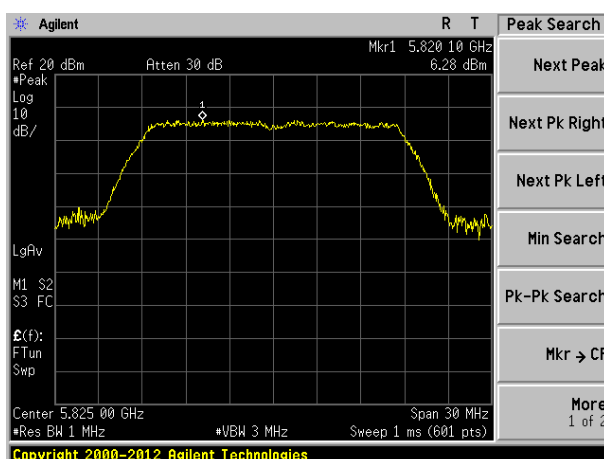
Test mode: 802.11ac(HT20)



Lowest channel



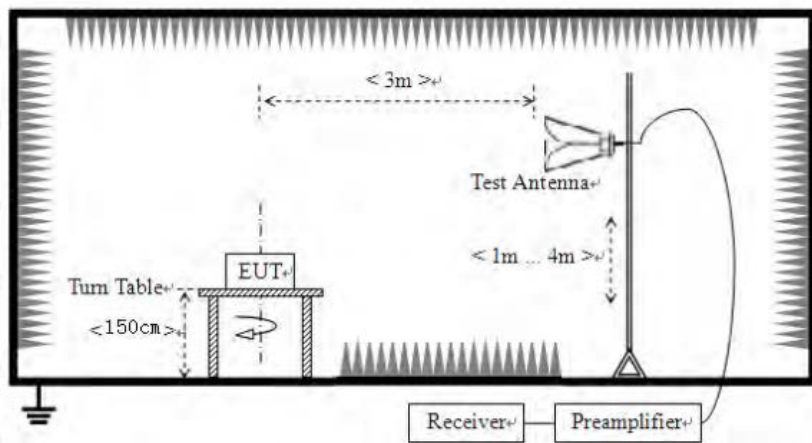
Middle channel



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.</div>				

	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 5.3 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
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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
5725.00	50.00	32.68	9.97	23.86	51.15	68.2	-17.05	Horizontal
5725.00	51.71	32.68	9.97	23.86	52.86	68.2	-15.34	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
5725.00	37.37	32.68	9.97	23.86	38.52	54.00	-15.48	Horizontal
5725.00	34.41	32.68	9.97	23.86	35.56	54.00	-18.44	Vertical

Test mode:	802.11a	Test channel:	Highest
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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	46.38	32.70	9.99	23.87	47.54	68.2	-20.66	Horizontal
5850.00	48.26	32.70	9.99	23.87	49.42	68.2	-18.78	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	34.13	32.70	9.99	23.87	35.29	54.00	-18.71	Horizontal
5850.00	36.05	32.70	9.99	23.87	37.21	54.00	-16.79	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
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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
5725.00	40.58	32.68	9.97	23.86	41.73	68.2	-26.47	Horizontal
5725.00	42.82	32.68	9.97	23.86	43.97	68.2	-24.23	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
5725.00	31.75	32.68	9.97	23.86	32.90	54.00	-21.10	Horizontal
5725.00	32.46	32.68	9.97	23.86	33.61	54.00	-20.39	Vertical

Test mode:	802.11n(HT20) @ 5.8G Band	Test channel:	Highest
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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	40.14	32.70	9.99	23.87	41.30	68.2	-26.9	Horizontal
5850.00	41.61	32.70	9.99	23.87	42.77	68.2	-25.43	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	29.98	32.70	9.99	23.87	31.14	54.00	-22.86	Horizontal
5850.00	30.25	32.70	9.99	23.87	31.41	54.00	-22.59	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:	802.11ac(HT20)	Test channel:	Lowest
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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
5725.00	49.24	32.68	9.97	23.86	50.39	68.2	-17.81	Horizontal
5725.00	50.83	32.68	9.97	23.86	51.98	68.2	-16.22	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
5725.00	28.24	32.68	9.97	23.86	29.39	54.00	-24.61	Horizontal
5725.00	29.31	32.68	9.97	23.86	30.46	54.00	-23.54	Vertical

Test mode:	802.11ac(HT20)	Test channel:	Highest
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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	48.67	32.74	10.04	23.87	49.84	68.2	-18.36	Horizontal
5850.00	50.67	32.74	10.04	23.87	51.84	68.2	-16.36	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	28.57	32.74	10.04	23.87	29.74	54.00	-24.26	Horizontal
5850.00	29.20	32.74	10.04	23.87	30.37	54.00	-23.63	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.
3. 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:

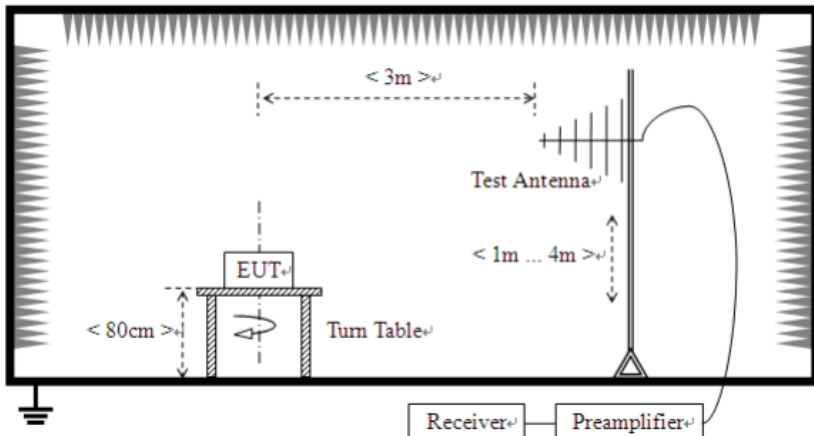
$$E[\text{dBuV/m}] = \text{EIRP}[\text{dBm}] + 95.2;$$

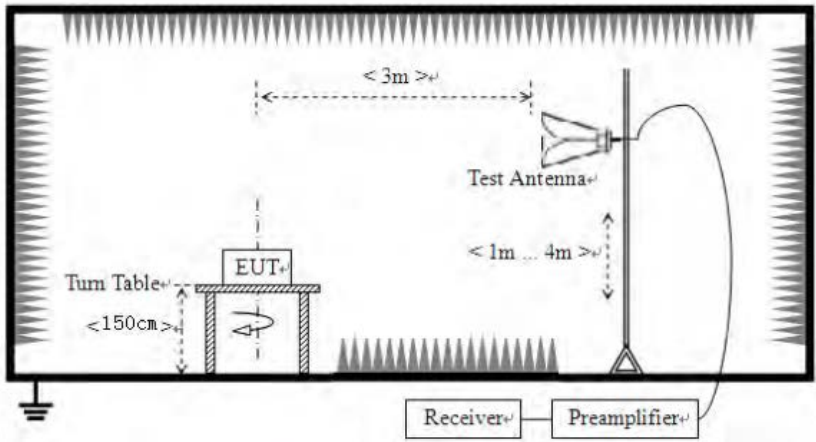
$$\text{EIRP} = -27\text{dBm/MHz}$$

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

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
		Peak	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
Test setup:	Below 1GHz				
	<div></div>				
Test setup:	Above 1GHz				

	
Test Procedure:	<ol style="list-style-type: none"> 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 5.3 for details
Test results:	Pass

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
34.52	48.18	14.30	0.60	30.07	33.01	40.00	-6.99	Vertical
42.60	43.28	15.56	0.69	30.03	29.50	40.00	-10.50	Vertical
87.42	47.14	13.18	1.09	29.76	31.65	40.00	-8.35	Vertical
125.01	45.31	11.70	1.40	29.54	28.87	43.50	-14.63	Vertical
167.82	43.99	10.90	1.67	29.33	27.23	43.50	-16.27	Vertical
375.94	37.08	16.56	2.75	29.61	26.78	46.00	-19.22	Vertical
56.00	33.30	14.95	0.83	29.95	19.13	40.00	-20.87	Horizontal
79.80	40.59	10.54	1.03	29.80	22.36	40.00	-17.64	Horizontal
150.54	42.08	10.29	1.57	29.41	24.53	43.50	-18.97	Horizontal
167.82	41.53	10.90	1.67	29.33	24.77	43.50	-18.73	Horizontal
262.90	39.18	14.17	2.19	29.74	25.80	46.00	-20.20	Horizontal
750.11	32.86	21.43	4.28	29.20	29.37	46.00	-16.63	Horizontal

■ Above 1GHz

Test mode:		802.11a			Test channel:		lowest	
Antenna Pol.	Frequency (MHz)	Reading Level	Factor	Measure Level	Limit (dBuV/m)	Over limit(dB)	Detector	
V	11510.00	28.52	21.64	50.16	54(Note3)	-3.84	PK	
V	17265.00	26.25	21.80	48.05	54(Note3)	-5.95	PK	
H	11510.00	26.32	21.83	48.15	54(Note3)	-5.85	PK	
H	17265.00	25.12	21.67	46.79	54(Note3)	-7.21	PK	

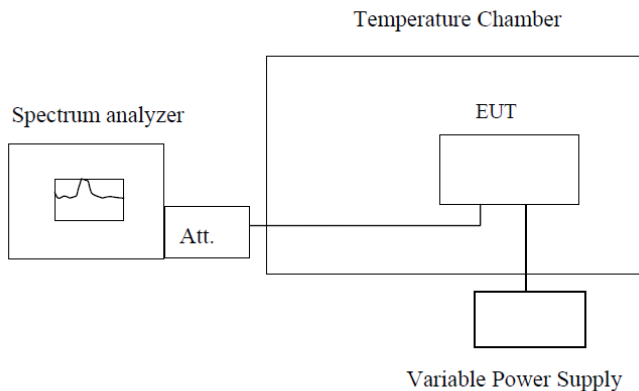
Test mode:		802.11a			Test channel:		Middle	
Antenna Pol.	Frequency (MHz)	Reading Level	Factor	Measure Level	Limit (dBuV/m)	Over limit(dB)	Detector	
V	11570.00	26.35	21.64	47.99	54(Note3)	-6.01	PK	
V	17355.00	25.04	21.80	46.84	54(Note3)	-7.16	PK	
H	11570.00	22.70	21.83	44.53	54(Note3)	-9.47	PK	
H	17355.00	23.36	21.67	45.03	54(Note3)	-8.97	PK	

Test mode:		802.11a			Test channel:		Highest	
Antenna Pol.	Frequency (MHz)	Reading Level	Factor	Measure Level	Limit (dBuV/m)	Over limit(dB)	Detector	
V	11650.00	26.52	21.64	48.16	54(Note3)	-5.84	PK	
V	17475.00	24.13	21.80	45.93	54(Note3)	-8.07	PK	
H	11650.00	24.36	21.83	46.19	54(Note3)	-7.81	PK	
H	17475.00	22.42	21.67	44.09	54(Note3)	-9.91	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)
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:	 <p>Note : 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

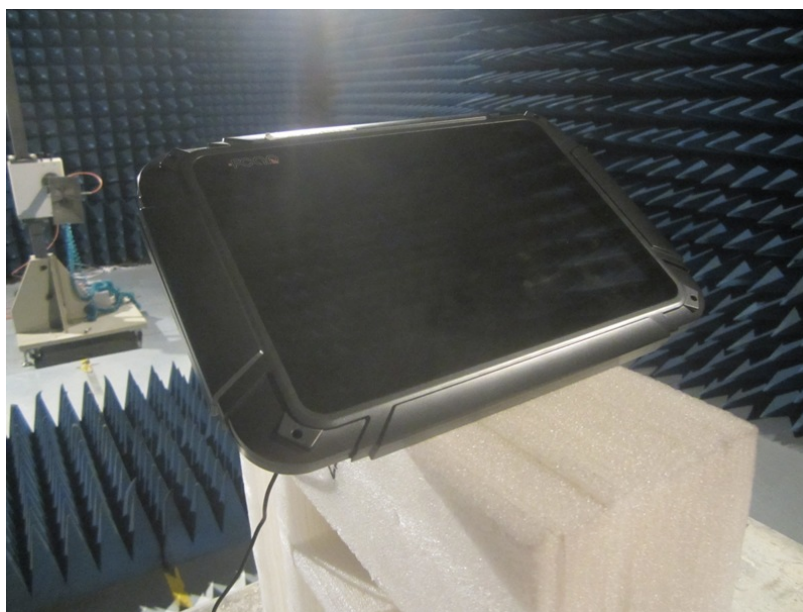
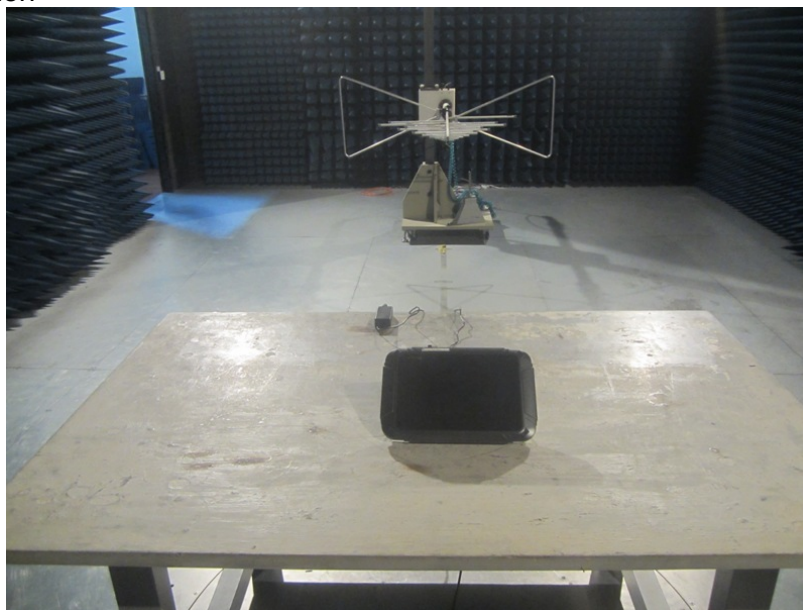
Measurement data:

Frequency stability versus Temp.					
Power Supply: DC 3.7V					
Temp. (°C)	Operating Frequency (MHz)	0 minute Measured Frequency (MHz)	2 minute Measured Frequency (MHz)	5 minute Measured Frequency (MHz)	10 minute Measured Frequency (MHz)
-30	5745	5744.9831	5744.9839	5744.9852	5744.9859
	5785	5784.9836	5784.9844	5784.9856	5784.9864
	5825	5824.9841	5824.9849	5824.9860	5824.9868
-20	5745	5744.9850	5744.9857	5744.9868	5744.9875
	5785	5784.9854	5784.9861	5784.9872	5784.9879
	5825	5824.9859	5824.9865	5824.9876	5824.9882
-10	5745	5744.9867	5744.9873	5744.9883	5744.9889
	5785	5784.9871	5784.9877	5784.9887	5784.9892
	5825	5824.9874	5824.9880	5824.9890	5824.9895
0	5745	5744.9836	5744.9844	5744.9856	5744.9863
	5785	5784.9841	5784.9848	5784.9860	5784.9867
	5825	5824.9845	5824.9853	5824.9864	5824.9871
10	5745	5744.9854	5744.9861	5744.9872	5744.9879
	5785	5784.9859	5784.9865	5784.9876	5784.9882
	5825	5824.9863	5824.9869	5824.9880	5824.9886
20	5745	5744.9871	5744.9877	5744.9886	5744.9892
	5785	5784.9874	5784.9880	5784.9890	5784.9895
	5825	5824.9878	5824.9884	5824.9893	5824.9898
30	5745	5744.9830	5744.9838	5744.9851	5744.9858
	5785	5784.9835	5784.9842	5784.9855	5784.9862
	5825	5824.9839	5824.9847	5824.9859	5824.9866
40	5745	5744.9849	5744.9856	5744.9867	5744.9874
	5785	5784.9853	5784.9860	5784.9871	5784.9878
	5825	5824.9857	5824.9864	5824.9875	5824.9881
50	5745	5744.9865	5744.9872	5744.9882	5744.9888
	5785	5784.9869	5784.9876	5784.9885	5784.9891
	5825	5824.9873	5824.9879	5824.9889	5824.9894

Frequency stability versus Voltage					
Temperature: 25°C					
Power Supply (VDC)	Operating Frequency (MHz)	0 minute Measured Frequency (MHz)	2 minute Measured Frequency (MHz)	5 minute Measured Frequency (MHz)	10 minute Measured Frequency (MHz)
3.3	5745	5744.9849	5744.9856	5744.9868	5744.9874
	5785	5784.9854	5784.9861	5784.9872	5784.9878
	5825	5824.9858	5824.9865	5824.9875	5824.9882
3.7	5745	5744.9866	5744.9872	5744.9882	5744.9888
	5785	5784.9870	5784.9876	5784.9886	5784.9892
	5825	5824.9874	5824.9880	5824.9889	5824.9895
4.1	5745	5744.9881	5744.9887	5744.9896	5744.9901
	5785	5784.9884	5784.9890	5784.9899	5784.9904
	5825	5824.9888	5824.9893	5824.9902	5824.9907

8 Test Setup Photo

Radiated Emission



Conducted Emission



9 EUT Constructional Details

Reference to the test report No. GTS201608000197E01

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