

FCC REPORT

Applicant: Autel Intelligent Tech. Corp., Ltd.

Address of Applicant: 6th - 10th Floor, Bldg. B1, Zhiyuan, Xueyuan Rd., Xili, Nanshan, Shenzhen 518055, China

Manufacturer/Factory: Autel Intelligent Tech. Corp., Ltd.

Address of Manufacturer/Factory: 6th - 10th Floor, Bldg. B1, Zhiyuan, Xueyuan Rd., Xili, Nanshan, Shenzhen 518055, China

Equipment Under Test (EUT)

Product Name: AUTOMOTIVE DIAGNOSTIC & ANALYSIS SYSTEM

Model No.: MaxiPRO MP908, MaxiPRO MP908Pro

Trade Mark: AUTEL

FCC ID: WQ8MAXIPROMP908

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

Date of sample receipt: August 06, 2018

Date of Test: August 07-22, 2018

Date of report issued: August 23, 2018

Test Result : PASS *

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

Authorized Signature:



Robinson Lo


Laboratory Manager

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2 Version

Version No.	Date	Description
00	August 23, 2018	Original

Prepared By:

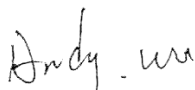


Date:

August 23, 2018

Project Engineer

Check By:



Date:

August 23, 2018

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
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

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

Remark: 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:	AUTOMOTIVE DIAGNOSTIC & ANALYSIS SYSTEM
Model No.:	MaxiPRO MP908, MaxiPRO MP908Pro
Test Model No:	MaxiPRO MP908
<i>Remark: All above models are identical in the same PCB layout, interior structure and electrical circuits. The differences are diagnostic software and model name for commercial purpose.</i>	
Serial No.:	N/A
Test sample(s) ID:	GTS201808000060-1
Sample(s) Status:	Engineer sample
Hardware version:	N/A
Software version:	N/A
Operation Frequency:	802.11a/802.11n(HT20): 5745MHz ~ 5825MHz 802.11n(HT40): 5755MHz ~ 5795MHz
Channel numbers:	802.11a/802.11n(HT20): 5 802.11n(HT40): 2
Channel bandwidth:	802.11a/802.11n(HT20): 20MHz 802.11n(HT40) :40MHz
Modulation technology:	OFDM
Antenna Type:	Integral Antenna
Antenna gain:	0.85dBi (declare by manufacturer)
Power supply:	Adapter: Model No.:GME36A-120300FDS Input: AC 100~240V, 50/60Hz, 1.2A Output: DC 12.0V, 3.0A Or DC 3.8V 15000mAh, 57Wh rechargeable Battery

Operation Frequency each of channel @ 5.8G Band							
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)	
	5.8G Band	
	802.11 a/n(HT20)	802.11 n(HT40)
Lowest channel	5745	5755
Middle channel	5785	
Highest channel	5825	5795

5.2 Test mode

Transmitting mode	Keep the EUT in continuously transmitting mode EUT was test with max duty cycle at its maximum power control level.
<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
802.11n(HT40)	13Mbps

5.3 Description of Support Units

None.

5.4 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.: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, January 08, 2018. ● 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:
<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>

5.6 Additional Instructions

EUT Fixed Frequency Settings:

Special test software was pre-built-in by manufacturer.			
Mode	Channel	Frequency (MHz)	Level Set
OFDM	CH149	5745	TX level : default
	CH151	5755	
	CH155	5775	
	CH157	5785	
	CH159	5795	
	CH165	5825	

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

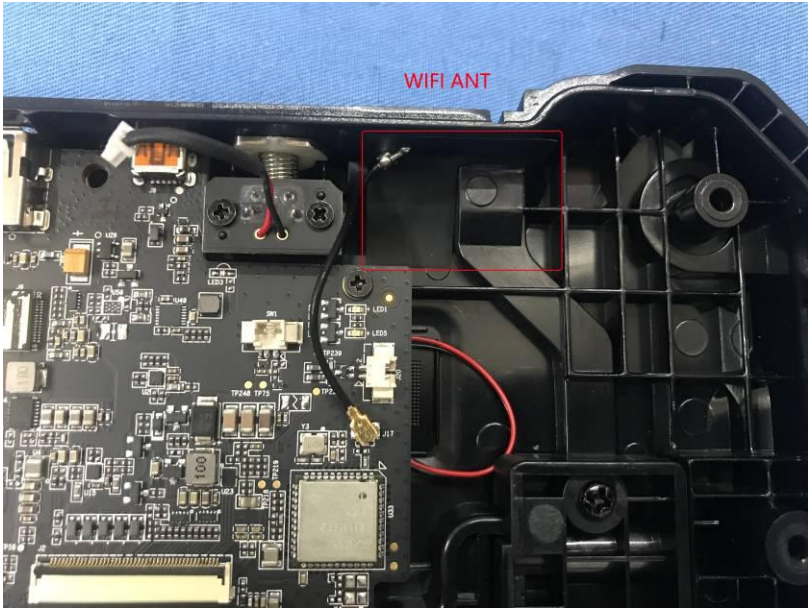
Conducted Emission						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	Shielding Room	ZhongYu Electron	7.3(L)x3.1(W)x2.9(H)	GTS252	May.16 2014	May.15 2019
2	EMI Test Receiver	R&S	ESCI 7	GTS552	June. 27 2018	June. 26 2019
3	Coaxial Switch	ANRITSU 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

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

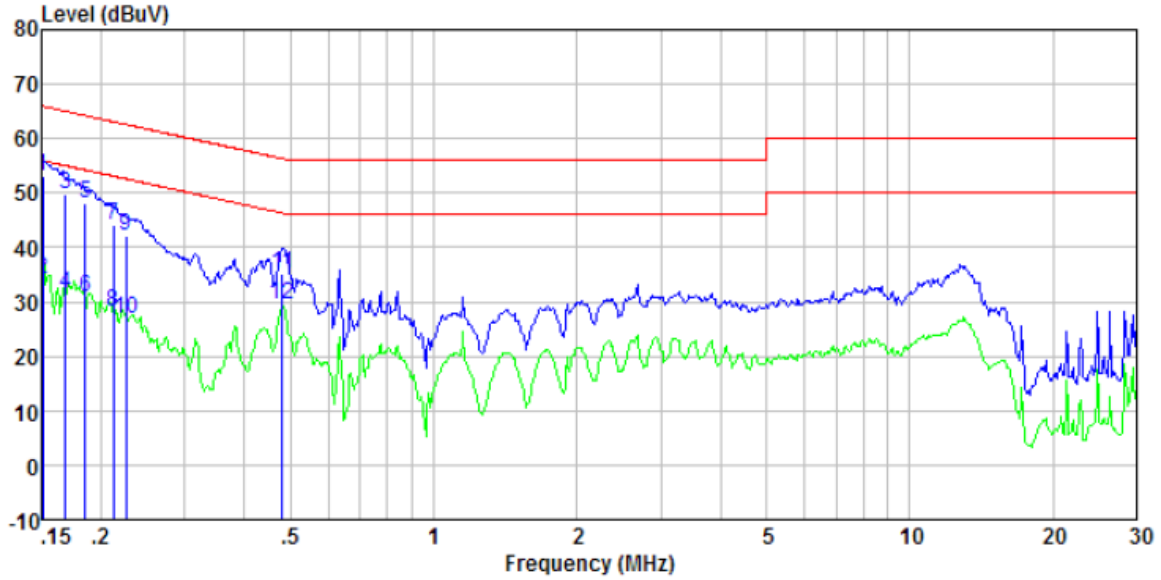
Standard requirement:	FCC Part15 C Section 15.203
<p><i>15.203 requirement:</i></p> <p><i>An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that 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 main antenna is 0.85dBi</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><i>Remark</i> E.U.T: Equipment Under Test LISN: Line Impedance Stabilization Network Test table height=0.8m</p>					
Test procedure:	<ol style="list-style-type: none"> 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 environment:	Temp.:	25 °C	Humid.:	52%	Press.:	1 012mbar
Test Instruments:	Refer to section 6.0 for details					
Test mode:	Refer to section 5.2 for details					
Test voltage:	AC120V 60Hz					
Test results:	Pass					

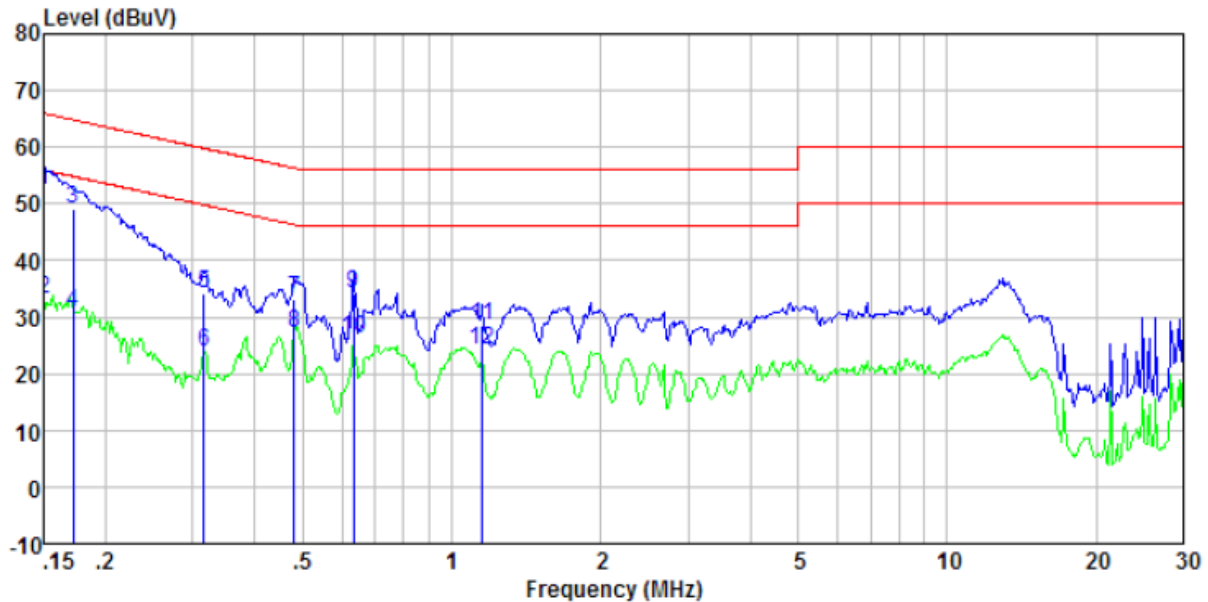
Measurement data

Test mode:	WiFi mode	Probe:	Line
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Freq MHz	Reading level dBuV	LISN/ISN factor dB/m	Cable loss dB	Level dBuV	Limit level dBuV	Over limit dB	Remark
0.15	52.76	0.40	0.07	53.23	65.96	-12.73	QP
0.15	33.83	0.40	0.07	34.30	55.96	-21.66	Average
0.17	49.19	0.40	0.09	49.68	65.03	-15.35	QP
0.17	31.12	0.40	0.09	31.61	55.03	-23.42	Average
0.19	47.46	0.40	0.10	47.96	64.24	-16.28	QP
0.19	30.50	0.40	0.10	31.00	54.24	-23.24	Average
0.21	43.63	0.40	0.11	44.14	63.10	-18.96	QP
0.21	27.60	0.40	0.11	28.11	53.10	-24.99	Average
0.23	41.66	0.40	0.11	42.17	62.61	-20.44	QP
0.23	26.27	0.40	0.11	26.78	52.61	-25.83	Average
0.48	34.65	0.32	0.11	35.08	56.32	-21.24	QP
0.48	29.10	0.32	0.11	29.53	46.32	-16.79	Average

Test mode:	WiFi mode	Probe:	Neutral
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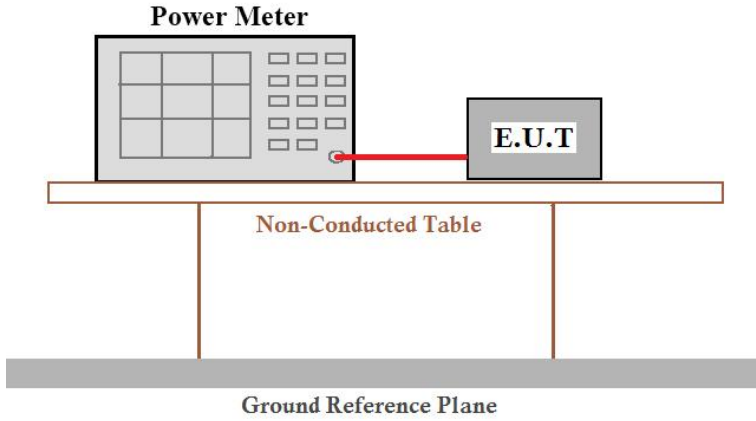


Freq MHz	Reading level dBuV	LISN/ISN factor dB/m	Cable loss dB	Level dBuV	Limit level dBuV	Over limit dB	Remark
0.15	52.10	0.40	0.07	52.57	66.00	-13.43	QP
0.15	32.85	0.40	0.07	33.32	56.00	-22.68	Average
0.17	48.46	0.40	0.09	48.95	64.86	-15.91	QP
0.17	30.30	0.40	0.09	30.79	54.86	-24.07	Average
0.32	33.84	0.39	0.10	34.33	59.80	-25.47	QP
0.32	23.53	0.39	0.10	24.02	49.80	-25.78	Average
0.48	32.72	0.32	0.11	33.15	56.32	-23.17	QP
0.48	26.81	0.32	0.11	27.24	46.32	-19.08	Average
0.63	33.66	0.28	0.12	34.06	56.00	-21.94	QP
0.63	25.91	0.28	0.12	26.31	46.00	-19.69	Average
1.15	28.31	0.20	0.16	28.67	56.00	-27.33	QP
1.15	23.95	0.20	0.16	24.31	46.00	-21.69	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

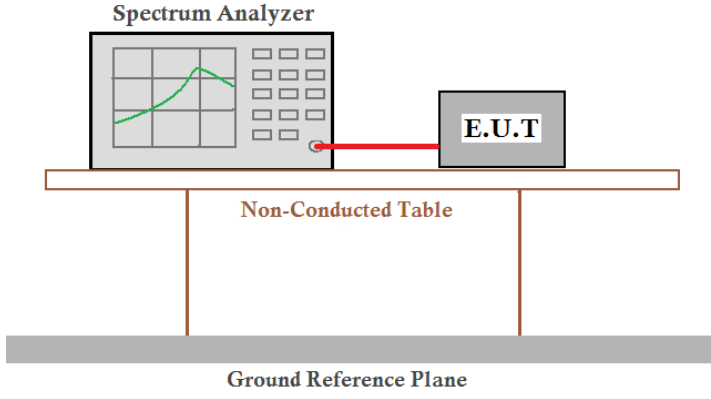
Test Requirement:	FCC Part15 E Section 15.407(a)(3)
Test Method:	ANSI C63.10:2013 and KDB 789033 D02 General U-NII Test Procedures New Rules v02r01
Limit:	30dBm
Test setup:	 <p>The diagram illustrates the test setup. A Power Meter is connected to an E.U.T. (Equipment Under Test) via a red cable. Both are placed on a Non-Conducted Table, which is supported by a Ground Reference Plane.</p>
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

Measurement Data

Test CH	Peak Output Power (dBm)			Limit(dBm)	Result
	802.11a	802.11n(HT20)	802.11n(HT40)		
Lowest	14.73	15.44	15.49	30.00	Pass
Middle	14.67	15.73	---		
Highest	14.86	15.08	15.84		

Remark: "---" is not applicable

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:	 <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 are placed on a Non-Conducted Table, which is supported by a Ground Reference Plane.</p>
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

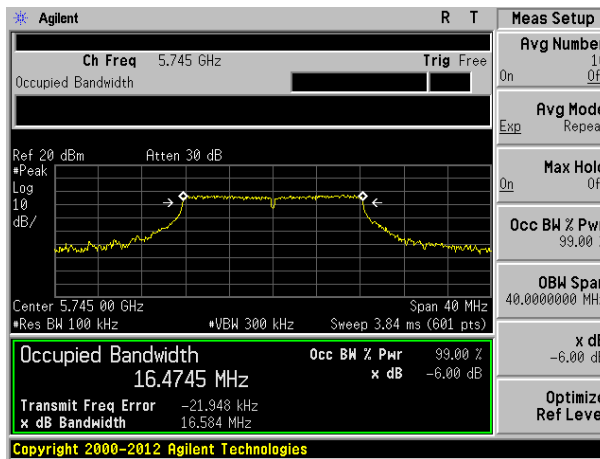
Measurement Data

5.8G Band					
Test CH	Channel Bandwidth (MHz)			Limit (KHz)	Result
	802.11a	802.11n(HT20)	802.11n(HT40)		
Lowest	16.584	17.823	36.576	>500	Pass
Middle	16.603	17.794	---		
Highest	16.567	17.776	36.584		

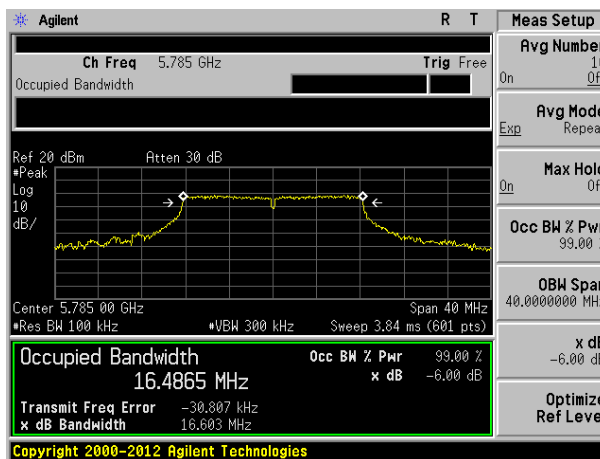
Remark: "---" is not applicable

Test plot as follows:

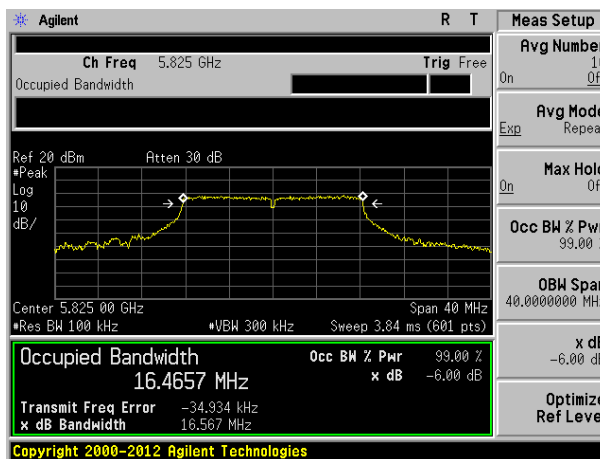
Test mode:	802.11a
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Lowest channel

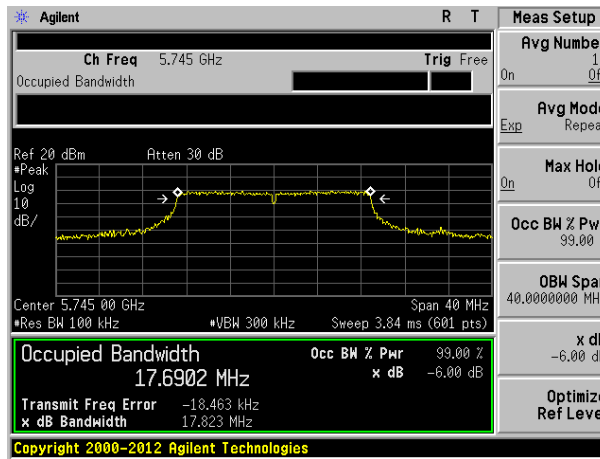


Middle channel

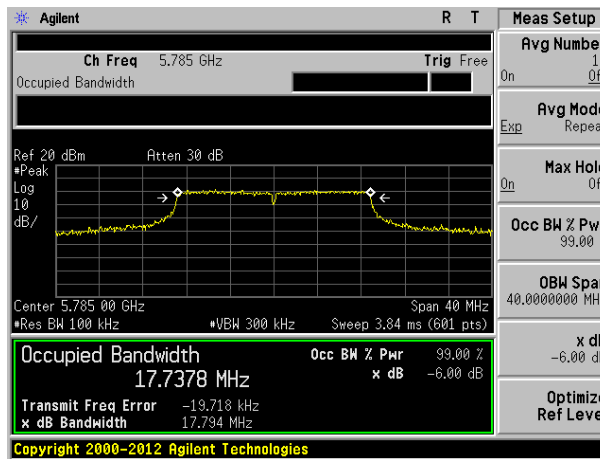


Highest channel

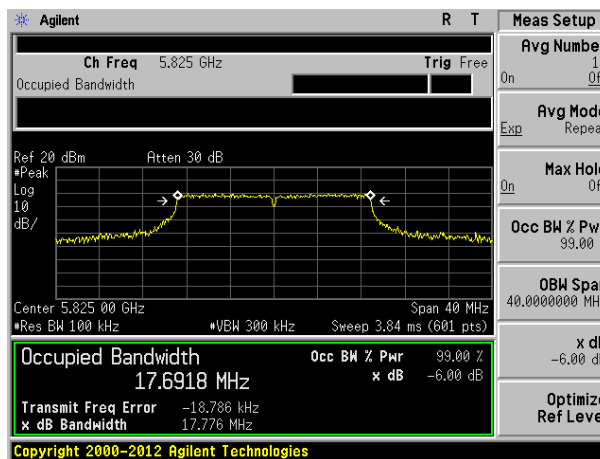
Test mode: 802.11n(HT20) @ 5.8G Band



Lowest channel

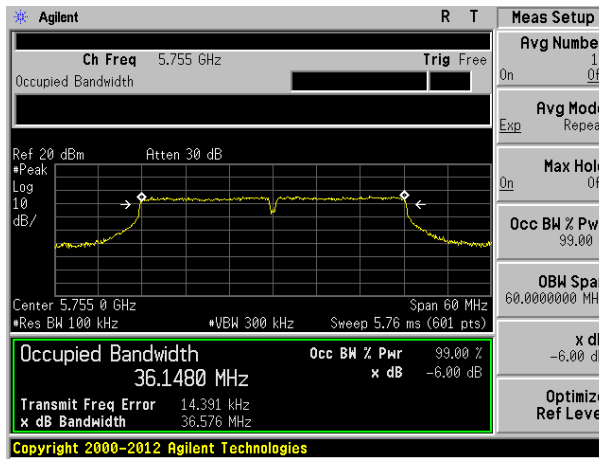


Middle channel

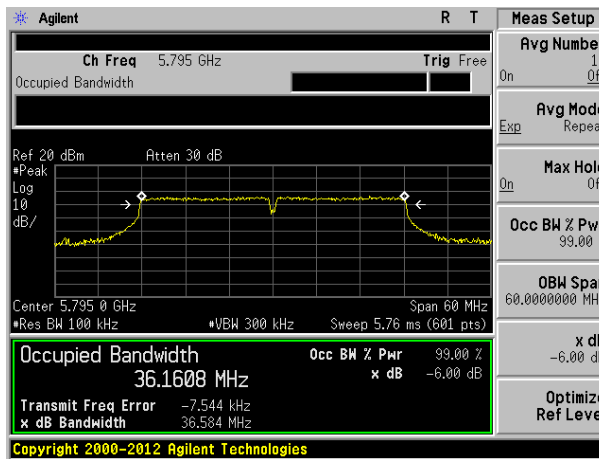


Highest channel

Test mode: 802.11n(HT40) @ 5.8G Band

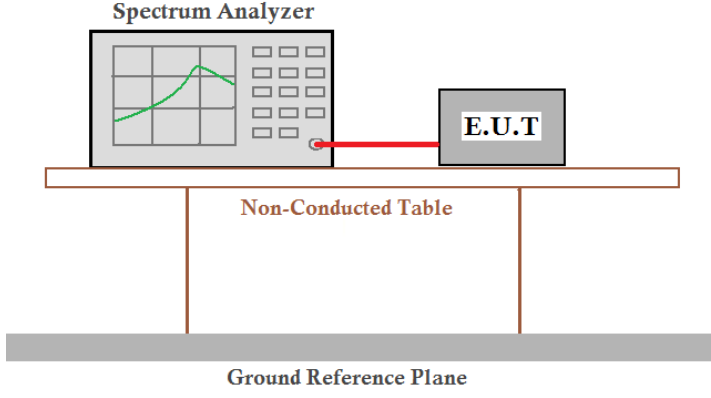


Lowest channel



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
Test setup:	
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

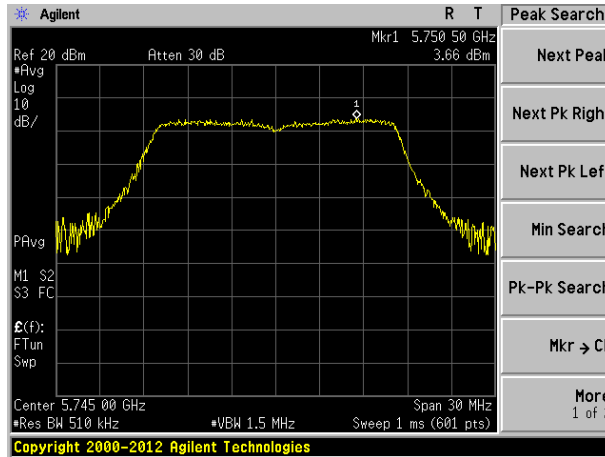
Measurement Data

5.8G Band					
Test CH	Power Spectral Density (dBm)			Limit (dBm/500kHz)	Result
	802.11a	802.11n(HT20)	802.11n(HT40)		
Lowest	3.66	6.45	1.39	30.00	Pass
Middle	6.09	6.16	---		
Highest	4.28	6.96	2.88		

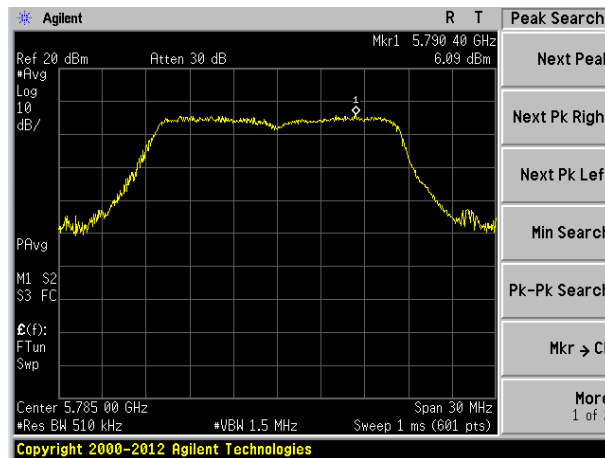
Remark: “---” is not applicable

Test plot as follows:

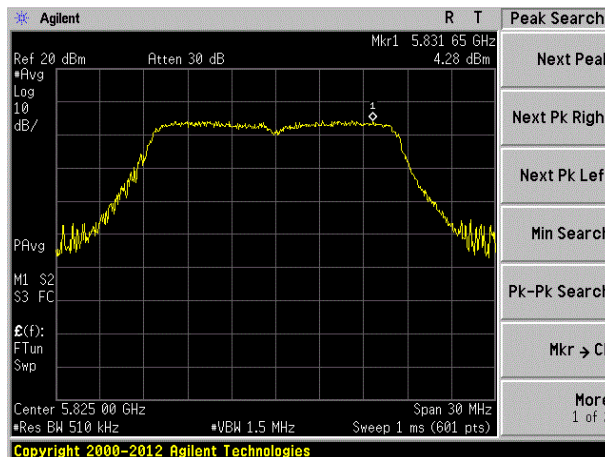
Test mode:	802.11a
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Lowest channel

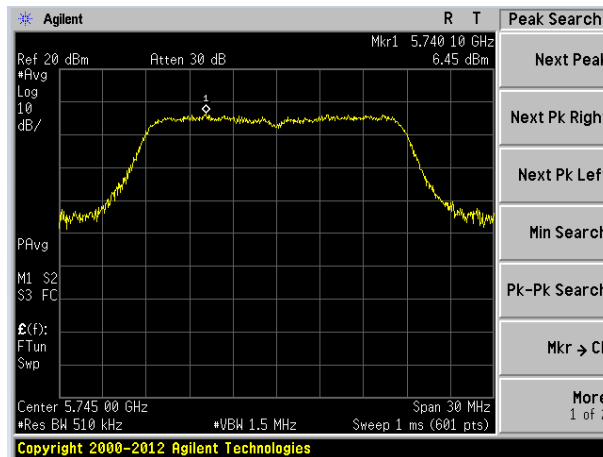


Middle channel

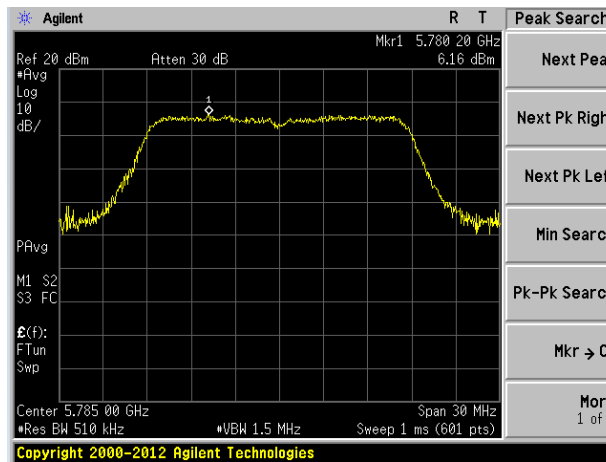


Highest channel

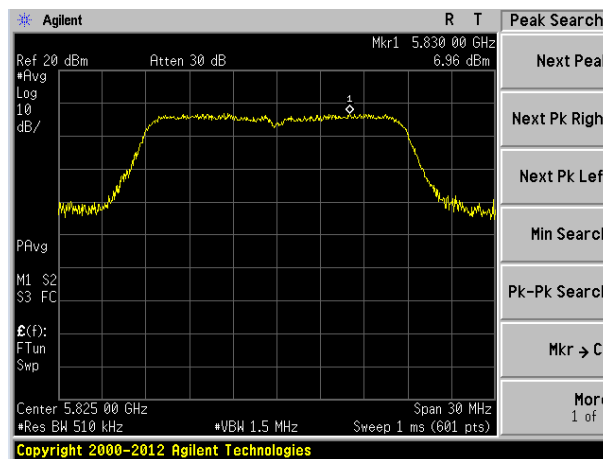
Test mode: 802.11n(HT20) @ 5.8G Band



Lowest channel

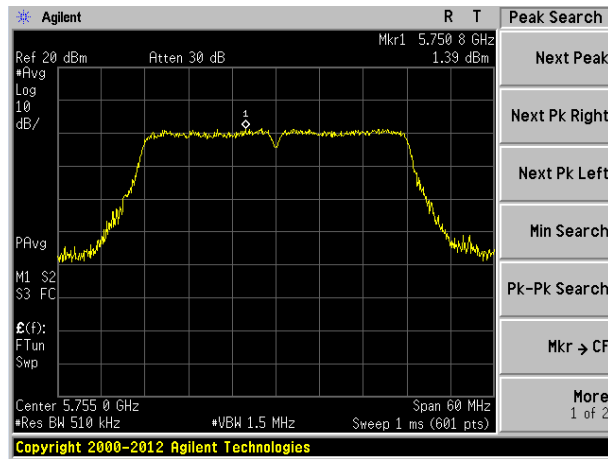


Middle channel

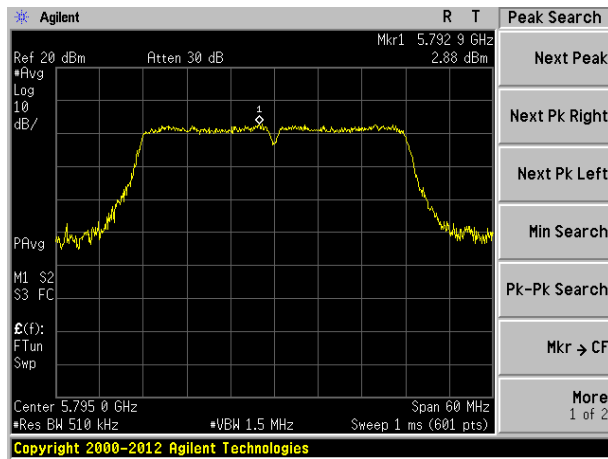


Highest channel

Test mode: 802.11n(HT40) @ 5.8G Band



Lowest 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:	9kHz to 40GHz, only worse case is reported				
Test site:	Measurement Distance: 3m				
Receiver setup:	Frequency	Detector	RBW	VBW	Value
	Above 1GHz	Peak RMS	1MHz 1MHz	3MHz 3MHz	Peak 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:	<ol style="list-style-type: none"> 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 environment:	Temp.:	25 °C	Humid.:	52%	Press.:	1 012mbar
Test Instruments:	Refer to section 6.0 for details					
Test mode:	Refer to section 5.2 for details					
Test results:	Pass					

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. *The pre-test were performed on lowest, middle and highest frequencies, only the worst case's (lowest and highest frequencies) data was showed.*
4. *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:*

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

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

$$E[\text{dBuV/m}] = 10 + 95.2 = 105.2\text{dBuV/m.}$$

$$E[\text{dBuV/m}] = 15.6 + 95.2 = 110.8\text{dBuV/m.}$$

$$E[\text{dBuV/m}] = 27 + 95.2 = 122.2\text{dBuV/m}$$

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(HT20)			Test channel:		Lowest	
Peak value:								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5725.00	46.74	32.53	9.83	32.29	56.81	68.20	-11.39	Horizontal
5725.00	44.36	32.53	9.83	32.29	54.43	68.20	-13.77	Vertical
RMS 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
5725.00	34.00	32.53	9.83	32.29	44.07	54.00	-9.93	Horizontal
5725.00	32.53	32.53	9.83	32.29	42.60	54.00	-11.40	Vertical
Test mode:		802.11a(HT20)			Test channel:		Highest	
Peak value:								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5850.00	47.38	32.70	9.99	32.22	57.85	68.20	-10.35	Horizontal
5850.00	46.97	32.70	9.99	32.22	57.44	68.20	-10.76	Vertical
RMS value:								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5850.00	35.03	32.70	9.99	32.22	45.50	54.00	-8.50	Horizontal
5850.00	34.75	32.70	9.99	32.22	45.22	54.00	-8.78	Vertical

Test mode:		802.11n(HT20)			Test channel:		Lowest	
Peak value:								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5725.00	47.88	32.53	9.83	32.29	57.95	68.20	-10.25	Horizontal
5725.00	46.62	32.53	9.83	32.29	56.69	68.20	-11.51	Vertical
RMS 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
5725.00	33.54	32.53	9.83	32.29	43.61	54.00	-10.39	Horizontal
5725.00	35.41	32.53	9.83	32.29	45.48	54.00	-8.52	Vertical
Test mode:		802.11n(HT20)			Test channel:		Highest	
Peak value:								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5850.00	46.65	32.70	9.99	32.22	57.12	68.20	-11.08	Horizontal
5850.00	44.79	32.70	9.99	32.22	55.26	68.20	-12.94	Vertical
RMS value:								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5850.00	32.74	32.70	9.99	32.22	43.21	54.00	-10.79	Horizontal
5850.00	33.83	32.70	9.99	32.22	44.30	54.00	-9.70	Vertical

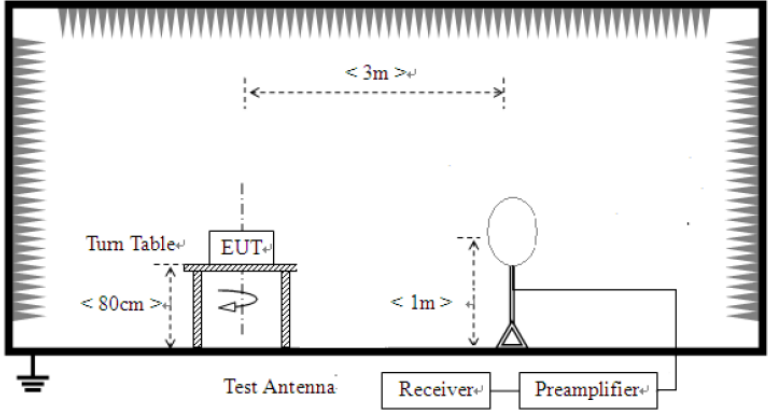
Test mode:		802.11n(HT40)			Test channel:		Lowest	
Peak value:								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5725.00	48.03	32.53	9.83	32.29	58.10	68.20	-10.10	Horizontal
5725.00	46.72	32.53	9.83	32.29	56.79	68.20	-11.41	Vertical
RMS 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
5725.00	36.34	32.53	9.83	32.29	46.41	54.00	-7.59	Horizontal
5725.00	34.86	32.53	9.83	32.29	44.93	54.00	-9.07	Vertical
Test mode:		802.11n(HT40)			Test channel:		Highest	
Peak value:								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5850.00	47.56	32.70	9.99	32.22	57.94	68.20	-10.26	Horizontal
5850.00	48.41	32.70	9.99	32.22	58.79	68.20	-9.41	Vertical
RMS value:								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5850.00	35.41	32.70	9.99	32.22	45.88	54.00	-8.12	Horizontal
5850.00	36.08	32.70	9.99	32.22	46.55	54.00	-7.45	Vertical

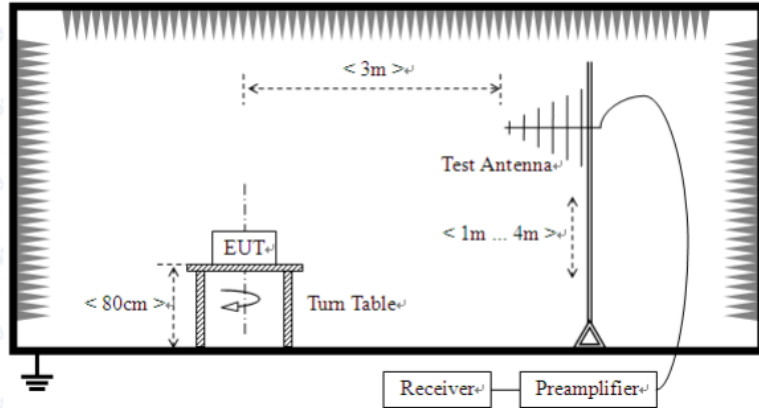
Remark:

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

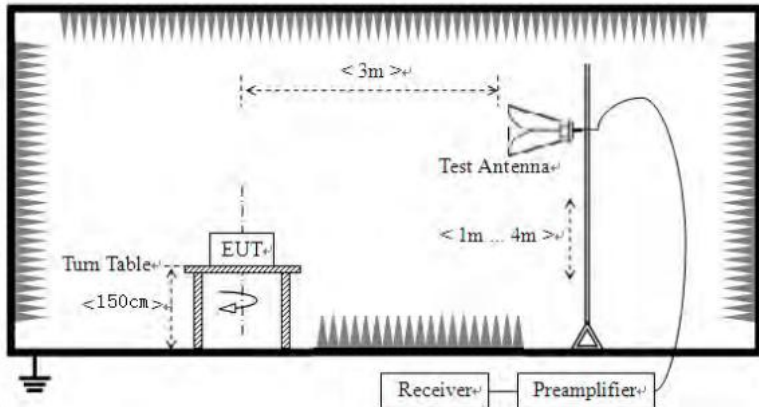
7.7 Spurious Emission

7.7.1 Radiated Emission Method

Test Requirement:	FCC Part15 C Section 15.209, Part 15E Section 15.407(b)(4)				
Test Method:	ANSI C63.10:2013				
Test Frequency Range:	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				
	 <p>For radiated emissions from 30MHz to 1GHz</p>				



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

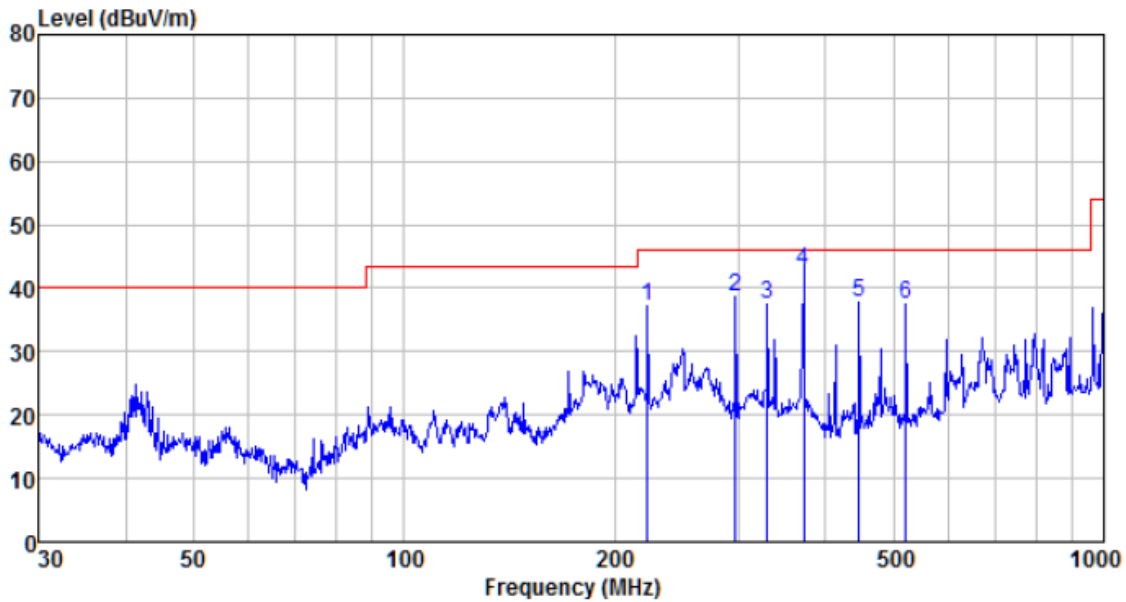
	average method as specified and then reported in a data sheet. 7. The radiation measurements are performed in X, Y, Z axis positioning. And found the X axis positioning which it is worse case, only the test worst case mode is recorded in the report.					
Test environment:	Temp.:	25 °C	Humid.:	52%	Press.:	1 012mbar
Test Instruments:	Refer to section 6.0 for details					
Test mode:	Refer to section 5.2 for details					
Test voltage:	AC120V 60Hz					
Test results:	Pass					

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.

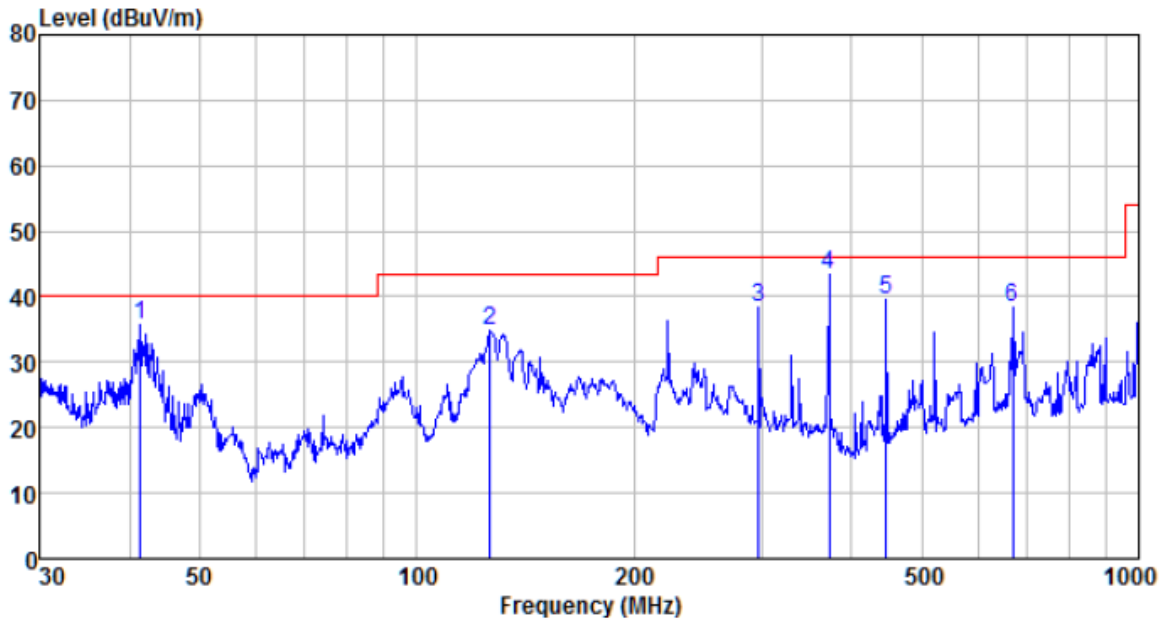
Below 1GHz

Test mode:	WiFi mode	Probe:	Horizontal
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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
222.950	61.29	11.27	1.98	37.35	37.19	46.00	-8.81	QP
297.224	60.17	13.53	2.35	37.42	38.63	46.00	-7.37	QP
330.195	58.21	14.18	2.52	37.45	37.46	46.00	-8.54	QP
372.005	62.60	14.89	2.72	37.49	42.72	46.00	-3.28	QP
446.414	56.04	16.28	3.07	37.52	37.87	46.00	-8.13	QP
520.888	53.86	17.80	3.39	37.52	37.53	46.00	-8.47	QP

Test mode:	WiFi mode	Probe:	Vertical
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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
41.422	58.52	12.22	0.68	35.75	35.67	40.00	-4.33	QP
126.329	61.61	8.66	1.41	36.93	34.75	43.50	-8.75	QP
297.224	59.92	13.53	2.35	37.42	38.38	46.00	-7.62	QP
372.005	63.24	14.89	2.72	37.49	43.36	46.00	-2.64	QP
446.414	57.60	16.28	3.07	37.52	39.43	46.00	-6.57	QP
668.142	52.53	19.57	3.97	37.60	38.47	46.00	-7.53	QP

Above 1GHz:

802.11a(HT20) 5745MHz

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
11490.00	28.06	39.85	14.98	34.60	48.29	74.00	-25.71	Vertical
17235.00	28.25	45.51	18.98	33.95	58.79	74.00	-15.21	Vertical
11490.00	29.70	39.85	14.98	34.60	49.93	74.00	-24.07	Horizontal
17235.00	29.52	45.51	18.98	33.95	60.06	74.00	-13.94	Horizontal
11490.00	22.63	39.85	14.98	34.60	42.86	54.00	-11.14	Vertical
17235.00	18.18	45.51	18.98	33.95	48.72	54.00	-5.28	Vertical
11490.00	20.21	39.85	14.98	34.60	40.44	54.00	-13.56	Horizontal
17235.00	17.16	45.51	18.98	33.95	47.70	54.00	-6.30	Horizontal

802.11a(HT20) 5785MHz

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
11570.00	30.95	39.76	14.99	34.75	50.95	74.00	-23.05	Vertical
17355.00	28.94	46.19	18.98	34.45	59.66	74.00	-14.34	Vertical
11570.00	28.70	39.76	14.99	34.75	48.70	74.00	-25.30	Horizontal
17355.00	28.17	46.19	18.98	34.45	58.89	74.00	-15.11	Horizontal
11570.00	21.03	39.76	14.99	34.75	41.03	54.00	-12.97	Vertical
17355.00	18.64	46.19	18.98	34.45	49.36	54.00	-4.64	Vertical
11570.00	20.57	39.76	14.99	34.75	40.57	54.00	-13.43	Horizontal
17355.00	17.48	46.19	18.98	34.45	48.20	54.00	-5.80	Horizontal

802.11a(HT20) 5825MHz

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
11650.00	28.67	39.61	14.99	34.86	48.41	74.00	-25.59	Vertical
17475.00	30.62	46.78	18.97	34.95	61.42	74.00	-12.59	Vertical
11650.00	29.33	39.61	14.99	34.86	49.07	74.00	-24.93	Horizontal
17475.00	30.15	46.78	18.97	34.95	60.95	74.00	-13.05	Horizontal
11650.00	21.53	39.61	14.99	34.86	41.27	54.00	-12.73	Vertical
17475.00	19.00	46.78	18.97	34.95	49.80	54.00	-4.20	Vertical
11650.00	21.34	39.61	14.99	34.86	41.08	54.00	-12.92	Horizontal
17475.00	17.01	46.78	18.97	34.95	47.81	54.00	-6.19	Horizontal

802.11n(HT20) 5745MHz

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
11490.00	28.83	39.85	14.98	34.60	49.06	74.00	-24.94	Vertical
17235.00	28.44	45.51	18.98	33.95	58.98	74.00	-15.02	Vertical
11490.00	29.56	39.85	14.98	34.60	49.79	74.00	-24.21	Horizontal
17235.00	29.30	45.51	18.98	33.95	59.84	74.00	-14.16	Horizontal
11490.00	21.13	39.85	14.98	34.60	41.36	54.00	-12.64	Vertical
17235.00	17.57	45.51	18.98	33.95	48.11	54.00	-5.89	Vertical
11490.00	20.83	39.85	14.98	34.60	41.06	54.00	-12.94	Horizontal
17235.00	19.58	45.51	18.98	33.95	50.12	54.00	-3.88	Horizontal

802.11n(HT20) 5785MHz

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
11570.00	29.06	39.76	14.99	34.75	49.06	74.00	-24.94	Vertical
17355.00	28.12	46.19	18.98	34.45	58.84	74.00	-15.16	Vertical
11570.00	29.95	39.76	14.99	34.75	49.95	74.00	-24.05	Horizontal
17355.00	30.89	46.19	18.98	34.45	61.61	74.00	-12.39	Horizontal
11570.00	22.21	39.76	14.99	34.75	42.21	54.00	-11.79	Vertical
17355.00	16.82	46.19	18.98	34.45	47.54	54.00	-6.46	Vertical
11570.00	21.94	39.76	14.99	34.75	41.94	54.00	-12.06	Horizontal
17355.00	18.61	46.19	18.98	34.45	49.33	54.00	-4.67	Horizontal

802.11n(HT20) 5825MHz

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
11650.00	29.35	39.61	14.99	34.86	49.09	74.00	-24.91	Vertical
17475.00	30.47	46.78	18.97	34.95	61.27	74.00	-12.73	Vertical
11650.00	28.84	39.61	14.99	34.86	48.58	74.00	-25.42	Horizontal
17475.00	28.32	46.78	18.97	34.95	59.12	74.00	-14.88	Horizontal
11650.00	21.28	39.61	14.99	34.86	41.02	54.00	-12.98	Vertical
17475.00	17.67	46.78	18.97	34.95	48.47	54.00	-6.46	Vertical
11650.00	22.09	39.61	14.99	34.86	41.83	54.00	-12.06	Horizontal
17475.00	19.37	46.78	18.97	34.95	50.17	54.00	-3.83	Horizontal

802.11n(HT40) 5755MHz

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
11510.00	28.83	39.85	14.98	34.63	49.03	74.00	-24.97	Vertical
17265.00	30.47	45.51	18.98	34.09	60.87	74.00	-13.13	Vertical
11510.00	28.18	39.85	14.98	34.63	48.38	74.00	-25.62	Horizontal
17265.00	30.92	45.51	18.98	34.09	61.32	74.00	-12.69	Horizontal
11510.00	20.24	39.85	14.98	34.63	40.44	54.00	-13.56	Vertical
17265.00	17.70	45.51	18.98	34.09	48.10	54.00	-5.90	Vertical
11510.00	20.69	39.85	14.98	34.63	40.89	54.00	-13.11	Horizontal
17265.00	19.44	45.51	18.98	34.09	49.84	54.00	-4.16	Horizontal

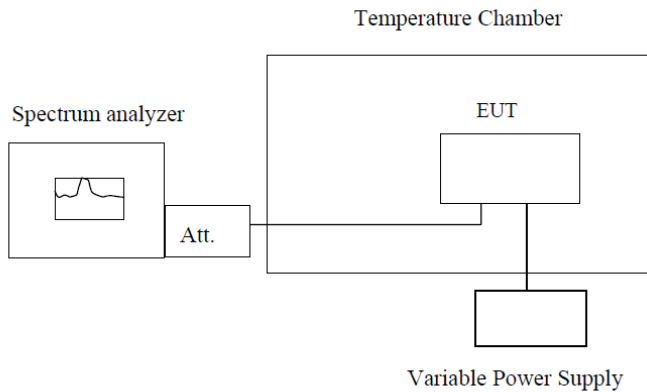
802.11n(HT40) 5795MHz

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
11590.00	28.80	39.71	14.99	34.78	48.72	74.00	-25.28	Vertical
17385.00	30.08	46.49	18.98	34.59	60.96	74.00	-13.04	Vertical
11590.00	30.75	39.71	14.99	34.78	50.67	74.00	-23.33	Horizontal
17385.00	29.73	46.49	18.98	34.59	60.61	74.00	-13.39	Horizontal
11590.00	22.35	39.71	14.99	34.78	42.27	54.00	-11.73	Vertical
17385.00	18.00	46.49	18.98	34.59	48.88	54.00	-5.12	Vertical
11590.00	21.24	39.71	14.99	34.78	41.16	54.00	-12.84	Horizontal
17385.00	18.47	46.49	18.98	34.59	49.35	54.00	-4.65	Horizontal

Note:

1. Measure Level = Reading Level + Factor.
2. The test trace is same as the ambient noise (the test frequency range: 18GHz~40GHz), therefore no data appear in the report.
3. This limit applies for using average detector, if the test result on peak is lower than average limit, then average measurement needn't be performed.

7.8 Frequency stability

Test Requirement:	FCC Part15 C Section 15.407(g)
Test Method:	ANSI C63.10:2013, FCC Part 2.1055
Limit:	Manufactures of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified
Test Procedure:	The EUT was setup to ANSI C63.4, 2003; tested to 2.1055 for compliance to FCC Part 15.407(g) requirements.
Test setup:	 <p style="text-align: center;">Note : Measurement setup for testing on Antenna connector</p>
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 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	5745	5743.0333	5744.1556	5744.2613	5743.3041
	5785	5784.1201	5783.3088	5783.2664	5782.7812
	5825	5823.8526	5824.1625	5822.2227	5822.8056
-20	5745	5744.7299	5743.4057	5744.7047	5744.6214
	5785	5783.0067	5784.1940	5784.3845	5784.5720
	5825	5824.7684	5823.1323	5824.7691	5824.8299
-10	5745	5743.8662	5743.7967	5744.9488	5744.9848
	5785	5784.8448	5783.7267	5784.0480	5784.7969
	5825	5824.9480	5824.5123	5824.9075	5824.0742
0	5745	5743.3776	5743.7060	5744.3406	5744.9140
	5785	5783.0715	5784.6229	5784.3416	5783.7054
	5825	5823.0033	5824.8055	5824.8000	5824.0733
10	5745	5744.5459	5743.4945	5744.5218	5744.5160
	5785	5784.8936	5783.0098	5784.3532	5784.3318
	5825	5823.6037	5823.9313	5824.1110	5824.9953
20	5745	5744.9410	5744.2743	5744.6371	5744.9431
	5785	5784.4691	5783.6755	5784.7238	5783.9856
	5825	5824.6210	5823.8166	5824.8046	5824.3259
30	5745	5743.8383	5743.1869	5744.0249	5744.8932
	5785	5784.5497	5784.6526	5783.4290	5783.1087
	5825	5823.6334	5824.0741	5823.7204	5823.9118
40	5745	5744.2785	5744.2952	5743.8820	5744.2352
	5785	5784.4654	5784.2599	5784.2623	5784.0802
	5825	5824.7652	5824.3493	5824.2001	5824.8649
50	5745	5743.8188	5744.5067	5744.0265	5743.7614
	5785	5783.7339	5783.2345	5784.0107	5784.4315
	5825	5823.7479	5824.7577	5824.0267	5824.9885

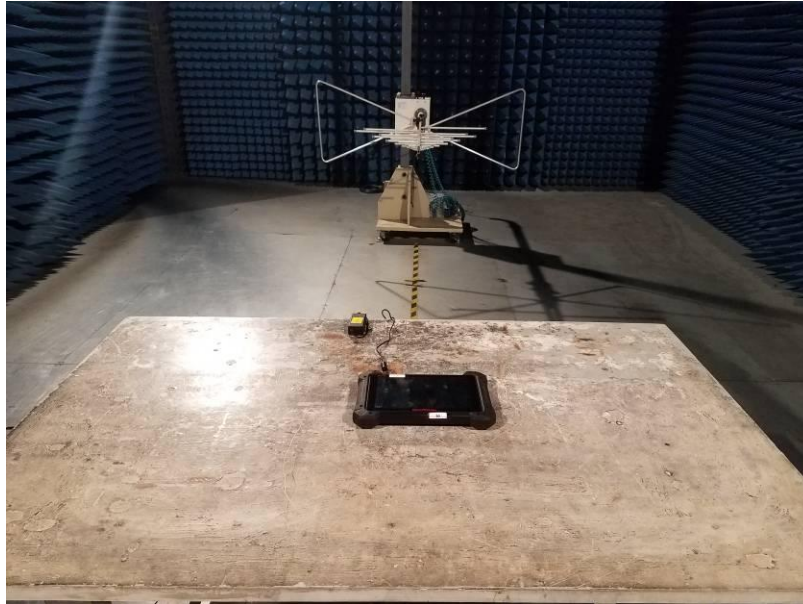
Note: The worst case is FL=5743.0333MHz, FH=5824.0742MHz

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	5745	5744.7460	5744.3696	5744.9550	5744.5700
	5785	5784.2273	5784.7881	5783.7133	5784.6475
	5825	5823.6214	5824.3046	5824.6056	5824.8272
3.7	5745	5744.4597	5744.5155	5743.2279	5743.8474
	5785	5783.2630	5783.1581	5784.5639	5783.5271
	5825	5823.4312	5824.2821	5823.8535	5824.4484
4.1	5745	5743.7509	5743.4244	5744.6991	5744.7393
	5785	5784.2143	5783.0291	5784.3245	5784.9476
	5825	5824.1934	5824.8501	5824.2599	5824.9493

Note: The worst case is FL=5744.7460MHz, FH=5824.9493MHz

8 Test Setup Photo

Radiated Emission



Conducted Emission



9 EUT Constructional Details

Reference to the test report No. GTS201808000060F01

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