

FCC REPORT

Applicant: FN-LINK TECHNOLOGY LIMITED

Address of Applicant: No. 8, Litong Road, Liuyang Economic Development Zone, Liuyang, China


Manufacturer/ Factory: FN-LINK TECHNOLOGY LIMITED

Address of Manufacturer/ Factory: No. 8, Litong Road, Liuyang Economic Development Zone, Liuyang, China

Equipment Under Test (EUT)

Product Name: Wi-Fi Dual-band 2X2 11ac +Bluetooth V4.2 Module

Model No.: 6222D-UUB

Trade Mark: 

FCC ID: 2AATL-6222D-UUB

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

Date of sample receipt: June 19, 2018

Date of Test: June 19, 2018~ July 24, 2018

Date of report issued: July 24, 2018

Test Result : PASS *

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

Authorized Signature:



Robinson Lo

Laboratory Manager

This results shown in this test report refer only to the sample(s) tested, this test report cannot be reproduced, except in full, without prior written permission of the company. The report would be invalid without specific stamp of test institute and the signatures of compiler and approver.

2 Version

Version No.	Date	Description
00	July 24, 2018	Original

Prepared By:

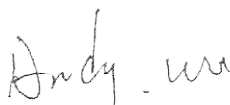


Project Engineer

Date:

July 24, 2018

Check By:



Reviewer

Date:

July 24, 2018

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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

Remark: Test according to ANSI C63.10:2013.

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%.

5 General Information

5.1 General Description of EUT

Product Name:	Wi-Fi Dual-band 2X2 11ac +Bluetooth V4.2 Module	
Model No.:	6222D-UUB	
Serial No.:	FN6222DUUB00001	
Test sample(s) ID:	GTS201805000179-1	
Sample(s) Status	Engineer sample	
Hardware version:	1.0	
Software version:	1.0	
Operation Frequency:	802.11a/802.11n(HT20)/802.11ac(HT20) @5.8G Band: 5745MHz ~ 5825MHz 802.11n(HT40)/ 802.11ac(HT40) @ 5.8G Band: 5755MHz ~ 5795MHz 802.11ac(HT80): 5775MHz	
Channel numbers:	802.11a/802.11n(HT20)/802.11ac(HT20) @5.8G Band: 6 802.11n(HT40)/ 802.11ac(HT40) @ 5.8G Band: 2 802.11ac(HT80): 1	
Channel bandwidth:	802.11a/802.11n(HT20)/802.11ac(HT20) : 20MHz 802.11n(HT40)/802.11ac(HT40) : 40MHz 802.11ac(HT80): 80MHz	
Modulation technology:	802.11a/802.11n(H20)/802.11n(H40)/802.11ac(HT20)/802.11ac(HT40) /802.11ac(HT80): Orthogonal Frequency Division Multiplexing (OFDM)	
Antenna Type:	Chain A	PIFA Antenna
	Chain B	PIFA Antenna
Antenna gain:	Chain A	5725 MHz to 5850 MHz: 4.25dBi
	Chain B	5725 MHz to 5850 MHz: 4.25dBi
Normal Test Voltage:	DC 3.3V	
Extreme Test Voltage	Min.: DC 3.15V,Max.: 3.45V	
Extreme Test Temperature	-10℃~70℃	

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		
	802.11a 802.11n(HT20) 802.11ac(VHT20)	802.11n(HT40) 802.11ac(VHT40)	802.11ac(VHT80)
Lowest channel	5745	5755	5775
Middle channel	5785	5795	5775
Highest channel	5825	5795	5815

5.2 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, the duty cycle>98%, and found that the worst case was under the nominal rated supply condition. So the report just shows that condition's data.</i>	

We have verified the construction and function in typical operation. All the test modes were carried out with the EUT in transmitting operation, which was shown in this test report and defined as follows:						
Per-scan all kind of data rate in lowest channel, and found the follow list which it was worst case.						
Mode		Data rate				
802.11a		6Mbps				
802.11n(HT20)		6.5Mbps				
802.11n(HT40)		13Mbps				
802.11ac(HT20)		6.5Mbps				
802.11ac(HT40)		13.5Mbps				
802.11ac(HT80)		29.3Mbps				
Keep the EUT in continuously transmitting or receiving with modulation test single.						
Mode	802.11a	802.11n (HT20)	802.11n (HT40)	802.11ac (VHT20)	802.11ac (VHT40)	802.11ac (VHT80)
TX/RX Function	2TX/2RX	2TX/2RX	2TX/2RX	2TX/2RX	2TX/2RX	2TX/2RX

5.3 Description of Support Units

Manufacturer	Description	Model	Serial Number
IBM Thinkpad	Notebook PC	2374	L3-G0686
Fn-link	Auxiliary PCB	N/A	N/A

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.
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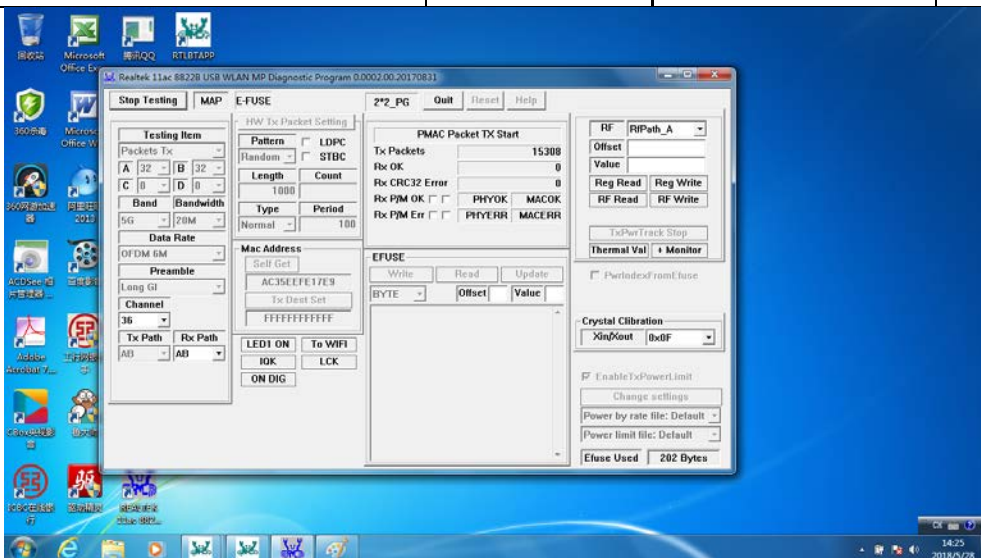
5.5 Test Location

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 Software Settings:

Mode	Special software is used. The software provided by client to enable the EUT under transmission condition continuously at specific channel frequencies individually.		
Test Software Name	Realtek 11ac 8822B USB WLAN MP Diagnostic Program 0.0002.00.20170831		
Mode	Channel	Frequency (MHz)	Soft Set
OFDM	CH149	5745	TX level : default
	CH151	5755	
	CH155	5775	
	CH157	5785	
	CH159	5795	
	CH165	5825	



6 Test Instruments list

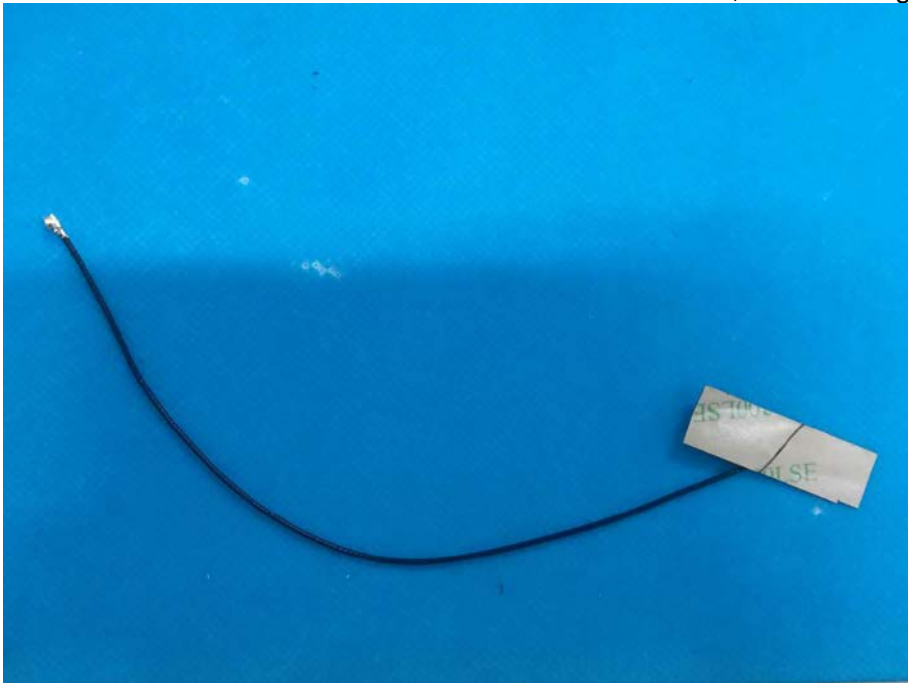
Radiated Emission:						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	3m Semi- Anechoic Chamber	ZhongYu Electron	9.2(L)*6.2(W)* 6.4(H)	GTS250	July. 03 2015	July. 02 2020
2	Control Room	ZhongYu Electron	6.2(L)*2.5(W)* 2.4(H)	GTS251	N/A	N/A
3	EMI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

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

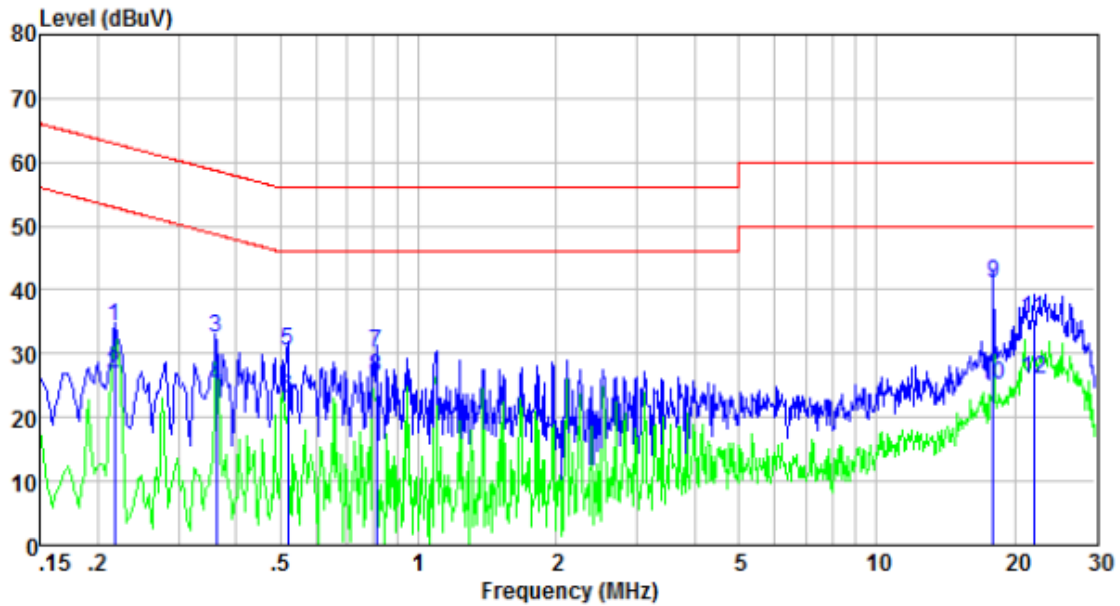
Standard requirement:	FCC Part15 C Section 15.203
<p>15.203 requirement: An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique 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.</p>	
E.U.T Antenna:	
<p>Frequency range and Max Gain: 5725MHz~5850MHz: 4.25dBi, Directional gain: 7.26dBi.</p>	
	

7.2 Conducted Emissions

Test Requirement:	FCC Part15 C Section 15.207														
Test Method:	ANSI C63.10:2013														
Test Frequency Range:	150KHz to 30MHz														
Class / Severity:	Class B														
Receiver setup:	RBW=9KHz, VBW=30KHz, Sweep time=auto														
Limit:	<table border="1"> <thead> <tr> <th rowspan="2">Frequency range (MHz)</th> <th colspan="2">Limit (dBuV)</th> </tr> <tr> <th>Quasi-peak</th> <th>Average</th> </tr> </thead> <tbody> <tr> <td>0.15-0.5</td> <td>66 to 56*</td> <td>56 to 46*</td> </tr> <tr> <td>0.5-5</td> <td>56</td> <td>46</td> </tr> <tr> <td>5-30</td> <td>60</td> <td>50</td> </tr> </tbody> </table> <p>* Decreases with the logarithm of the frequency.</p>	Frequency range (MHz)	Limit (dBuV)		Quasi-peak	Average	0.15-0.5	66 to 56*	56 to 46*	0.5-5	56	46	5-30	60	50
Frequency range (MHz)	Limit (dBuV)														
	Quasi-peak	Average													
0.15-0.5	66 to 56*	56 to 46*													
0.5-5	56	46													
5-30	60	50													
Test setup:	<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 Instruments:	Refer to section 6.0 for details														
Test mode:	Refer to section 5.2 for details														
Test results:	Pass														

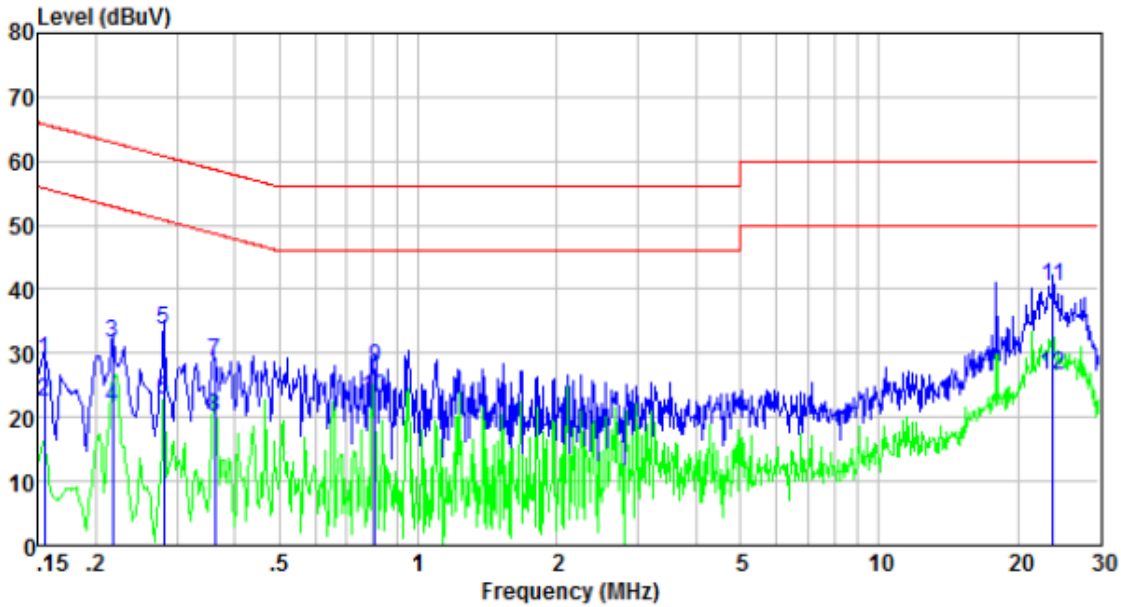
Measurement data

Line:



Freq MHz	Reading level dBuV	LISN/ISN factor dB	Cable loss dB	level dBuV	Limit level dBuV	Over limit dB	Remark
0.217	24.60	9.56	0.01	34.17	62.92	-28.75	QP
0.217	17.30	9.56	0.01	26.87	52.92	-26.05	Average
0.361	22.79	9.58	0.02	32.39	58.69	-26.30	QP
0.361	15.19	9.58	0.02	24.79	48.69	-23.90	Average
0.518	20.90	9.58	0.02	30.50	56.00	-25.50	QP
0.518	13.30	9.58	0.02	22.90	46.00	-23.10	Average
0.809	20.40	9.59	0.03	30.02	56.00	-25.98	QP
0.809	16.60	9.59	0.03	26.22	46.00	-19.78	Average
17.944	31.10	9.87	0.05	41.02	60.00	-18.98	QP
17.944	15.10	9.87	0.05	25.02	50.00	-24.98	Average
22.063	25.50	9.86	0.05	35.41	60.00	-24.59	QP
22.063	16.20	9.86	0.05	26.11	50.00	-23.89	Average

Neutral:

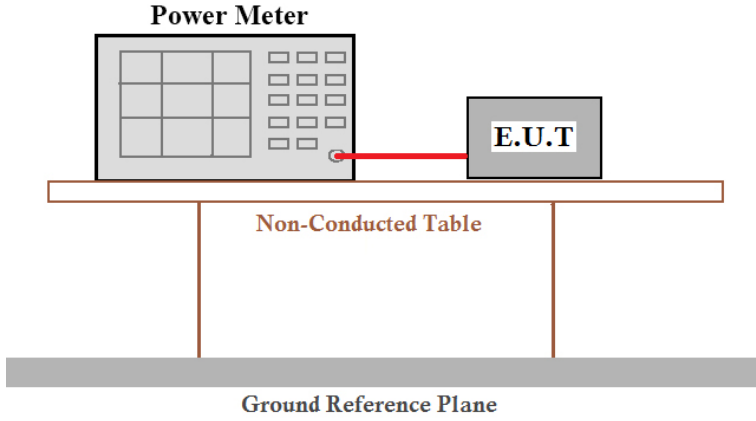


Freq MHz	Reading level dBuV	LISN/ISN factor dB	Cable loss dB	level dBuV	Limit level dBuV	Over limit dB	Remark
0.155	19.31	9.54	0.06	28.91	65.74	-36.83	QP
0.155	12.91	9.54	0.06	22.51	55.74	-33.23	Average
0.217	22.10	9.58	0.01	31.69	62.92	-31.23	QP
0.217	12.10	9.58	0.01	21.69	52.92	-31.23	Average
0.280	24.11	9.60	0.01	33.72	60.81	-27.09	QP
0.280	13.21	9.60	0.01	22.82	50.81	-27.99	Average
0.361	18.89	9.62	0.02	28.53	58.69	-30.16	QP
0.361	10.29	9.62	0.02	19.93	48.69	-28.76	Average
0.804	18.11	9.64	0.03	27.78	56.00	-28.22	QP
0.804	13.41	9.64	0.03	23.08	46.00	-22.92	Average
23.888	30.39	9.94	0.04	40.37	60.00	-19.63	QP
23.888	16.59	9.94	0.04	26.57	50.00	-23.43	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 Output Power

Test Requirement:	FCC Part15 E Section 15.407(a)(3)
Test Method:	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

Directional gain and the maximum output power limit

FCC 47 CFR Part 15 Subpart E

Frequency Band	Chain A Antenna Gain (dBi)	Chain B Antenna Gain (dBi)	Correlated Chains directional gain	Max Conducted Power Limits(dBm)
U-NII-3	4.25	4.25	7.26	28.74
<p>Basic methodology with N ANT transmit antennas, each with the same directional gain G ANT dBi, being driven by N ANT transmitter outputs of equal power. Directional gain is to be computed as follows: If any transmit signals are correlated with each other, $\text{Directional gain} = G_{\text{ANT}} + 10 \log(N_{\text{ANT}}) \text{ dBi}$</p>				

Measurement Data
U-NII Band 3

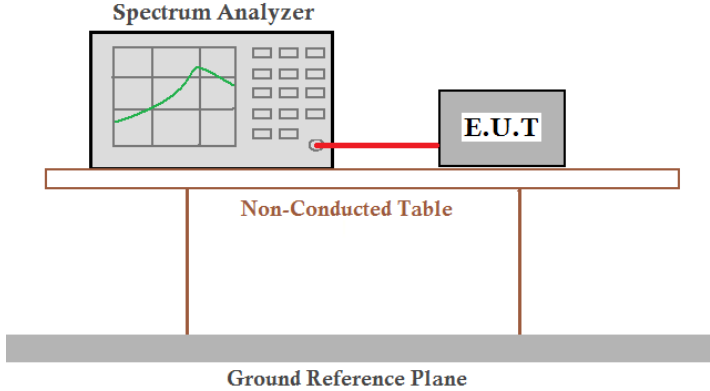
802.11a MIMO mode							
CH No.	Frequency (MHz)	Measured Power (dBm)		Duty Factor	Total Output Power Chain A+B (dBm)	Limit (dBm)	Result
		Chain A	Chain B				
149	5745.00	9.68	11.73	0.18	14.02	28.74	Pass
157	5785.00	10.25	10.97	0.18	13.82	28.74	Pass
165	5825.00	11.02	10.05	0.18	13.75	28.74	Pass
802.11n(HT20) MIMO mode							
CH No.	Frequency (MHz)	Measured Power (dBm)		Duty Factor	Total Output Power Chain A+B (dBm)	Limit (dBm)	Result
		Chain A	Chain B				
149	5745.00	9.05	10.81	0.18	13.21	28.74	Pass
157	5785.00	9.50	10.27	0.18	13.09	28.74	Pass
165	5825.00	10.25	9.70	0.18	13.17	28.74	Pass
802.11ac(VHT20) MIMO mode							
CH No.	Frequency (MHz)	Measured Power (dBm)		Duty Factor	Total Output Power Chain A+B (dBm)	Limit (dBm)	Result
		Chain A	Chain B				
149	5745.00	8.20	9.90	0.18	12.32	28.74	Pass
157	5785.00	8.38	9.22	0.18	12.01	28.74	Pass
165	5825.00	9.80	8.75	0.18	12.50	28.74	Pass
802.11n(HT40) MIMO mode							
CH No.	Frequency (MHz)	Measured Power (dBm)		Duty Factor	Total Output Power Chain A+B (dBm)	Limit (dBm)	Result
		Chain A	Chain B				
151	5755.00	9.20	11.02	0.28	13.49	28.74	Pass
159	5795.00	9.67	10.25	0.28	13.26	28.74	Pass
802.11 ac(VHT40) MIMO mode							
CH No.	Frequency (MHz)	Measured Power (dBm)		Duty Factor	Total Output Power Chain A+B (dBm)	Limit (dBm)	Result
		Chain A	Chain B				
151	5755.00	7.64	9.48	0.35	12.02	28.74	Pass
159	5795.00	8.83	9.38	0.35	12.47	28.74	Pass
802.11 ac(VHT80) MIMO mode							
CH No.	Frequency (MHz)	Measured Power (dBm)		Duty Factor	Total Output Power Chain A+B (dBm)	Limit (dBm)	Result
		Chain A	Chain B				
155	5775.00	8.18	9.37	0.60	12.43	28.74	Pass

Note: Output Power = Measured Power + Duty Factor

Duty Factor = $10 \log (1/\text{Duty Cycle})$

Total (Chain A+B) = $10 * \log [(10^{\text{Chain 0}/10}) + (10^{\text{Chain 1}/10})]$

7.4 Channel Bandwidth

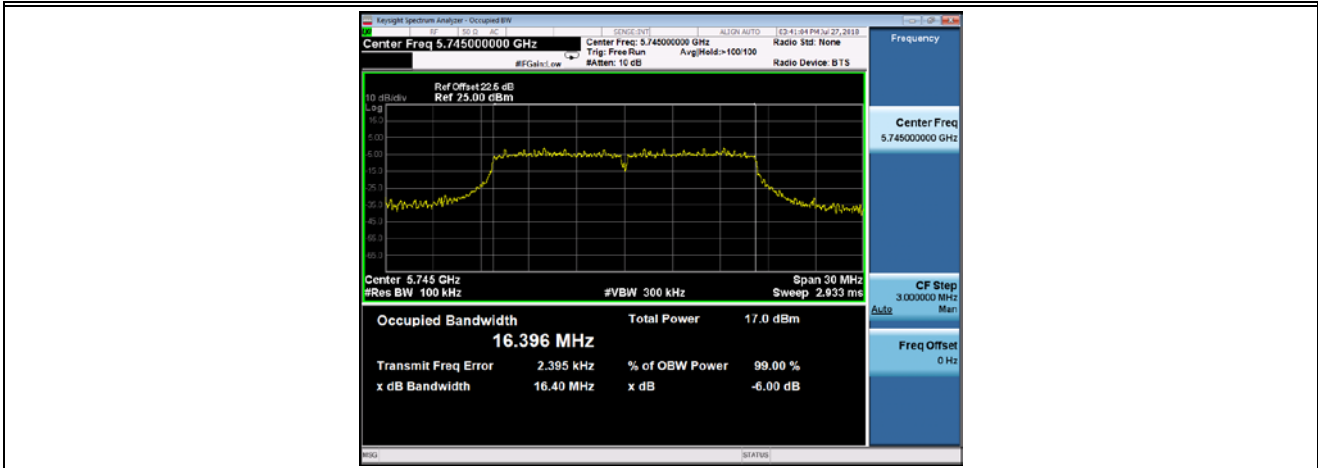
Test Requirement:	FCC Part15 E Section 15.407(e)
Test Method:	KDB 789033 D02 General U-NII Test Procedures New Rules v02r01
Limit:	>500KHz
Test setup:	 <p>The diagram illustrates the test setup. A Spectrum Analyzer is connected via a red cable to an E.U.T. (Equipment Under Test). Both are placed on a Non-Conducted Table. This table is supported by two vertical legs and sits on a Ground Reference Plane, which is represented by a thick grey bar at the bottom.</p>
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

Measurement Data

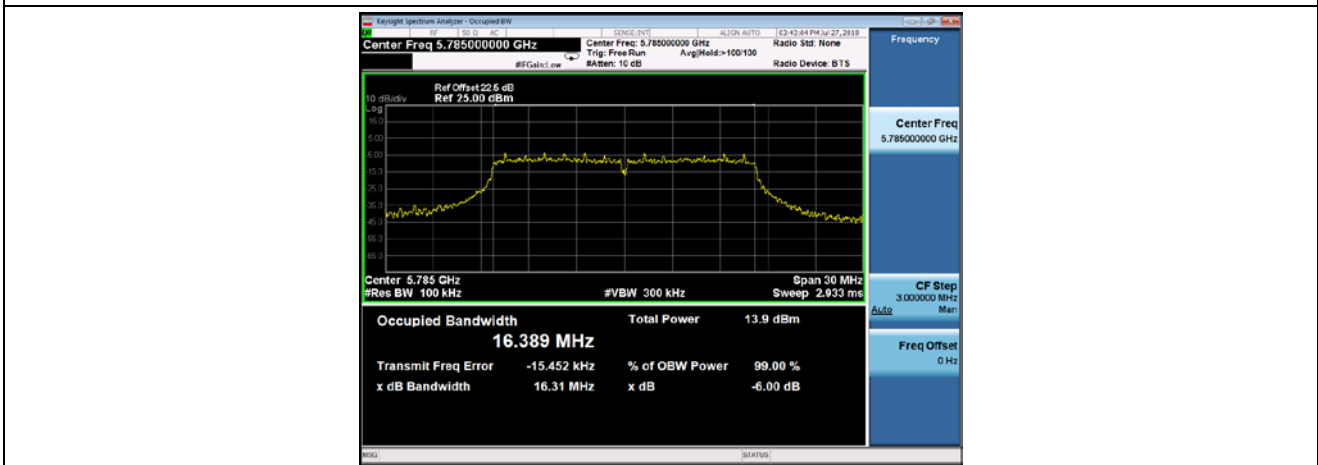
U-NII Band 3_MIMO							
The worst case test data: Chain A							
CH. No.	Frequency (MHz)	99% Occupied Bandwidth (MHz)			6dB Occupied Bandwidth (MHz)		
		802.11a	802.11n(HT 20)	802.11ac(V HT20)	802.11a	802.11n(HT 20)	802.11ac(V HT20)
149	5745.00	16.396	17.537	17.547	16.40	17.04	16.64
157	5785.00	16.389	17.546	17.527	16.31	16.55	17.04
165	5825.00	16.392	17.549	17.545	16.31	17.03	16.64
CH. No.	Frequency (MHz)	99% Occupied Bandwidth (MHz)		6dB Occupied Bandwidth (MHz)			
		802.11n(HT40)	802.11ac(VHT40)	802.11n(HT40)	802.11ac(VHT40)		
151	5755.00	36.086	36.039	35.54	35.54		
159	5795.00	36.065	36.066	35.57	35.82		
CH. No.	Frequency (MHz)	99% Occupied Bandwidth (MHz)	6dB Occupied Bandwidth (MHz)				
		802.11ac(VHT80)	802.11ac(VHT80)				
155	5775.00	75.107	75.22				

Test plot as follows:

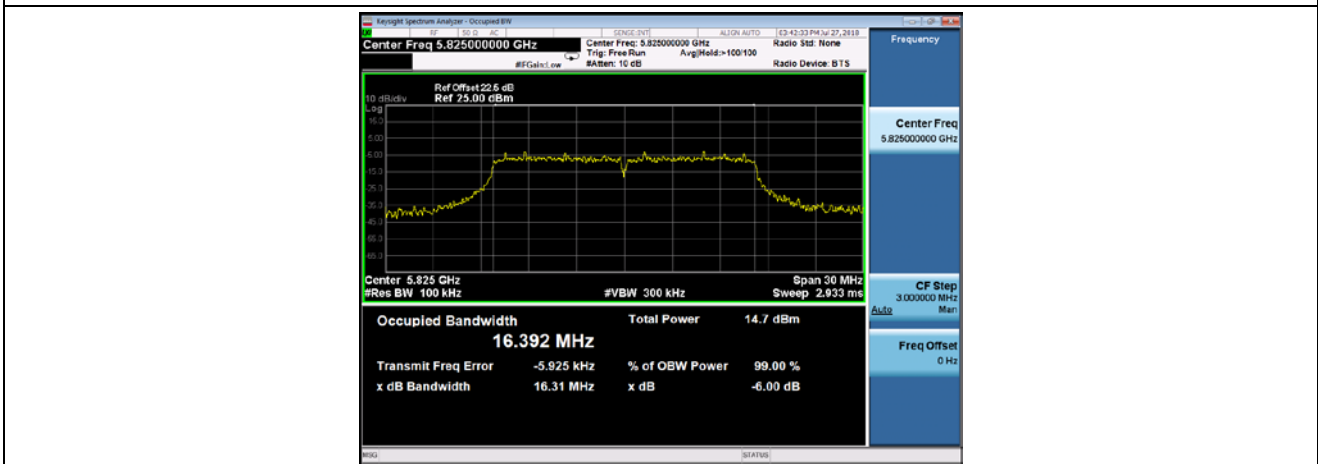
Test mode: 802.11a



Lowest channel

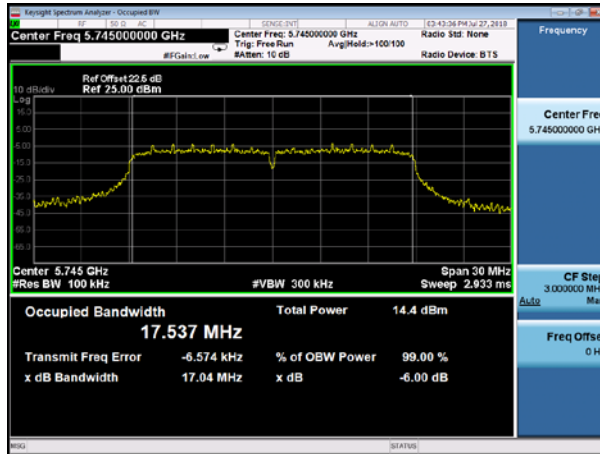


Middle channel

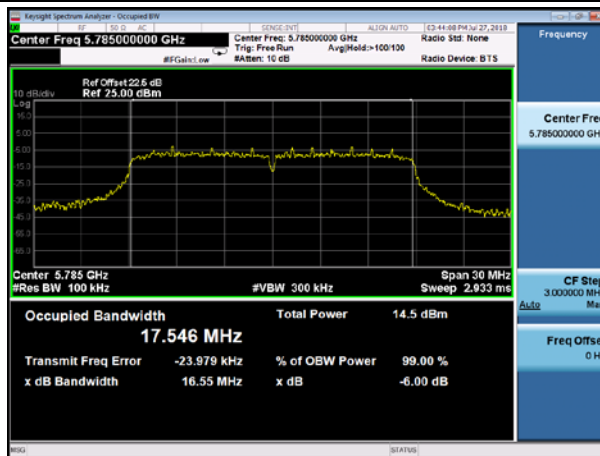


Highest channel

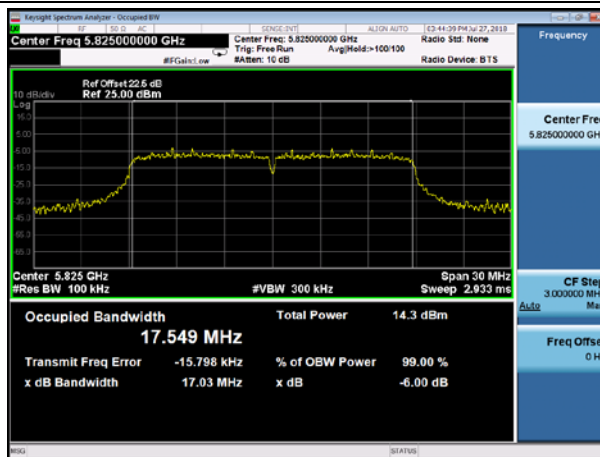
Test mode: 802.11n(HT20) @ 5.8G Band



Lowest channel

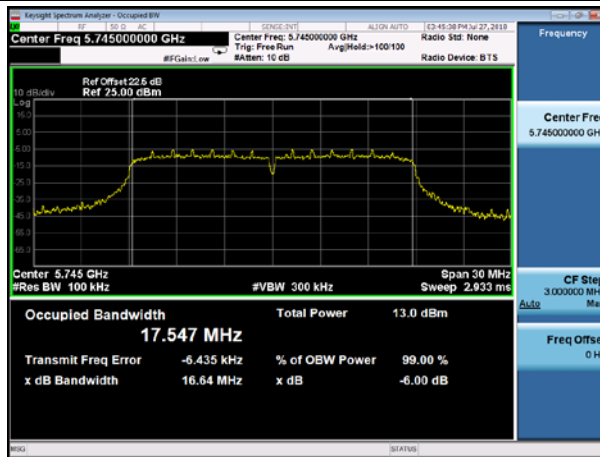


Middle channel

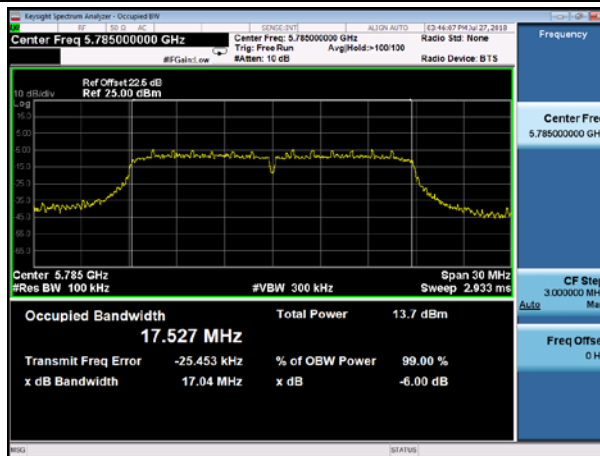


Highest channel

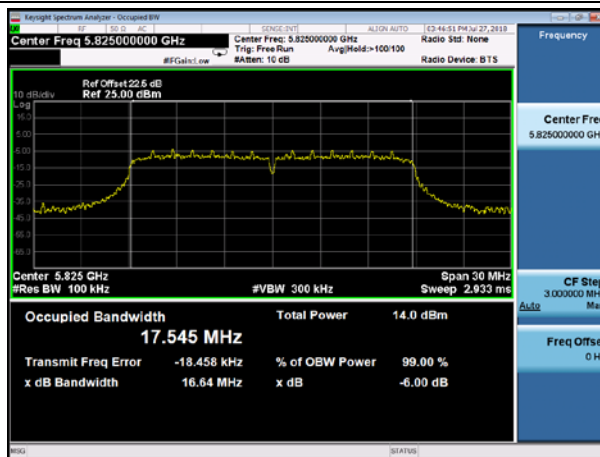
Test mode: 802.11ac(VHT20)



Lowest channel

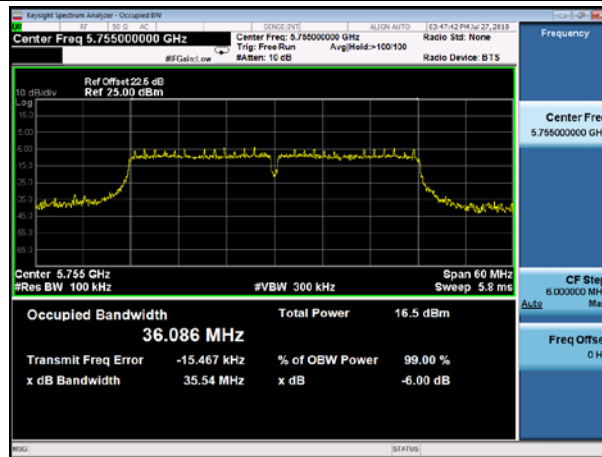


Middle channel

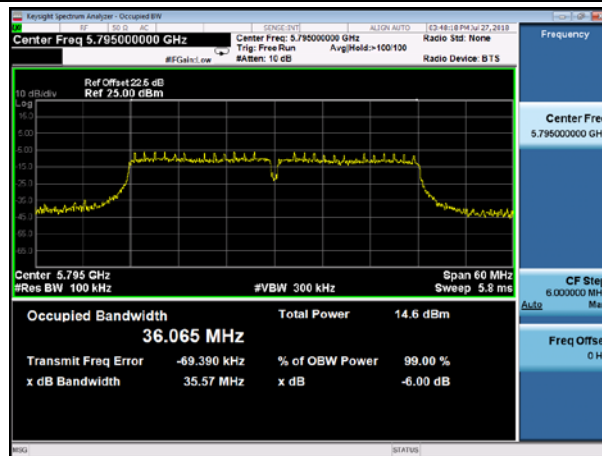


Highest channel

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

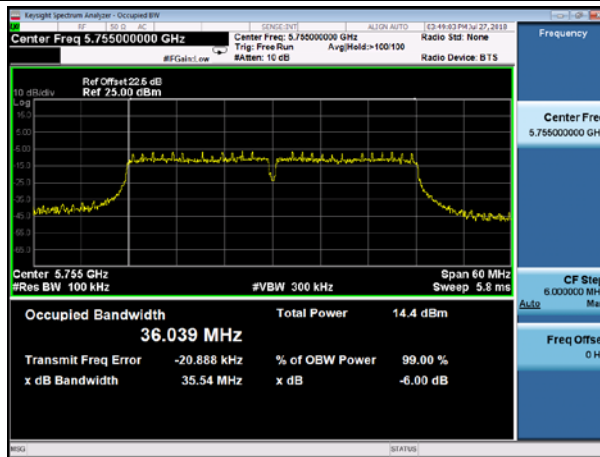


Lowest channel

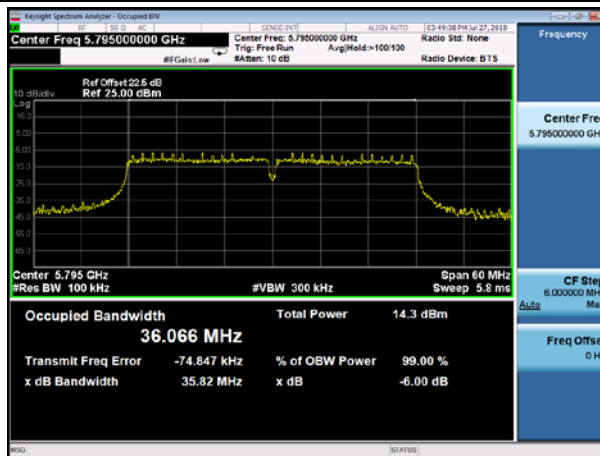


Highest channel

Test mode: 802.11ac(VHT40)

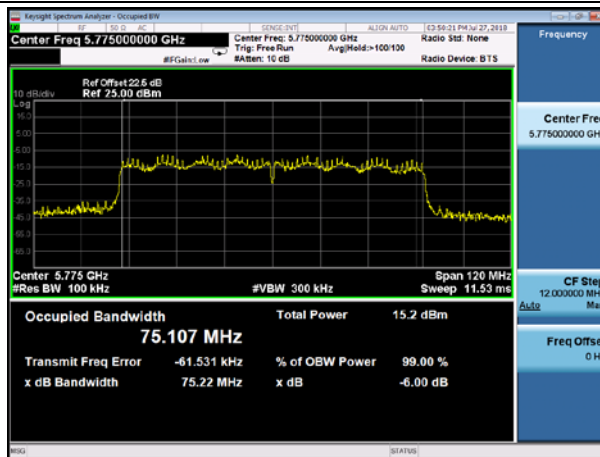


Lowest channel



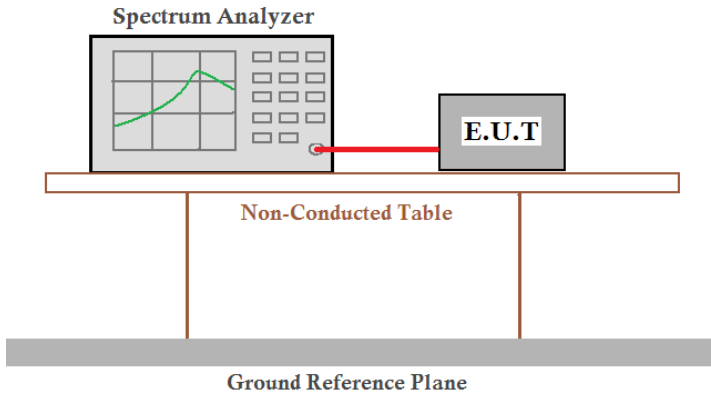
Highest channel

Test mode: 802.11ac(VHT80)



Middle channel

7.5 Power Spectral Density

Test Requirement:	FCC Part15 E Section 15.407(a)(3)
Test Method:	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

Directional gain and the maximum output power limit

FCC 47 CFR Part 15 Subpart E

Frequency Band	Chain 0 Antenna Gain (dBi)	Chain 1 Antenna Gain (dBi)	Correlated Chains directional gain	PSD Limits (dBm/500kHz)
U-NII-3	4.25	4.25	7.26	28.74
<p>Basic methodology with N_{ANT} transmit antennas, each with the same directional gain G_{ANT} dBi, being driven by N ANT transmitter outputs of equal power. Directional gain is to be computed as follows: If any transmit signals are correlated with each other, Directional gain = G_{ANT} + 10 log(N_{ANT}) dBi</p>				

Measurement Data
U-NII Band 3

802.11a MIMO mode							
CH No.	Frequency (MHz)	Measured Power (dBm)		Duty Factor	Total PSD (dBm)	Limit (dBm/500kHz)	Result
		Chain A	Chain B				
149	5745.00	-2.806	-2.617	0.18	0.48	28.74	Pass
157	5785.00	-3.031	-3.168	0.18	0.09	28.74	Pass
165	5825.00	-3.130	-2.802	0.18	0.23	28.74	Pass
802.11n(HT20) MIMO mode							
CH No.	Frequency (MHz)	Measured Power (dBm)		Duty Factor	Total PSD (dBm)	Limit (dBm/500kHz)	Result
		Chain A	Chain B				
149	5745.00	-3.451	-4.221	0.18	-0.63	28.74	Pass
157	5785.00	-4.076	-3.877	0.18	-0.79	28.74	Pass
165	5825.00	-3.707	-2.839	0.18	-0.06	28.74	Pass
802.11ac(VHT20) MIMO mode							
CH No.	Frequency (MHz)	Measured Power (dBm)		Duty Factor	Total PSD (dBm)	Limit (dBm/500kHz)	Result
		Chain A	Chain B				
149	5745.00	-4.669	-4.494	0.18	-1.39	28.74	Pass
157	5785.00	-4.939	-5.229	0.18	-1.89	28.74	Pass
165	5825.00	-4.314	-4.069	0.18	-1.00	28.74	Pass
802.11n(HT40) MIMO mode							
CH No.	Frequency (MHz)	Measured Power (dBm)		Duty Factor	Total PSD (dBm)	Limit (dBm/500kHz)	Result
		Chain A	Chain B				
151	5755.00	-6.708	-6.915	0.28	-3.52	28.74	Pass
159	5795.00	-6.802	-6.680	0.28	-3.45	28.74	Pass
802.11 ac(VHT40) MIMO mode							
CH No.	Frequency (MHz)	Measured Power (dBm)		Duty Factor	Total PSD (dBm)	Limit (dBm/500kHz)	Result
		Chain A	Chain B				
151	5755.00	-8.226	-8.359	0.35	-4.93	28.74	Pass
159	5795.00	-7.690	-7.318	0.35	-4.14	28.74	Pass
802.11 ac(VHT80) MIMO mode							
CH No.	Frequency (MHz)	Measured Power (dBm)		Duty Factor	Total PSD (dBm)	Limit (dBm/500kHz)	Result
		Chain A	Chain B				
155	5775.00	-9.893	-10.137	0.60	-6.40	28.74	Pass

Note: PSD = Measured Power + Duty Factor

 Duty Factor = $10 \log (1/\text{Duty Cycle})$

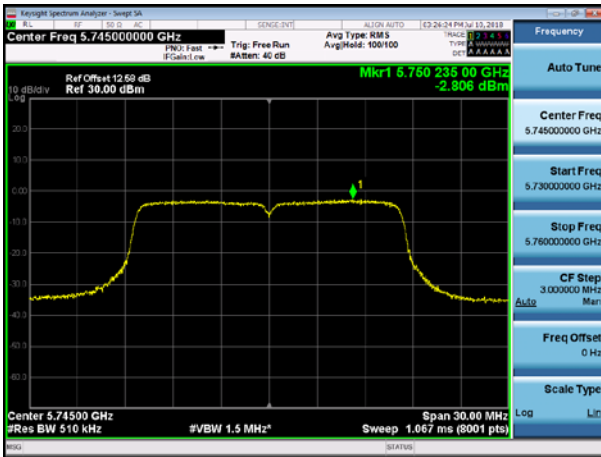
 Total (Chain A+B) = $10 * \log [(10^{\text{Chain 0}/10}) + (10^{\text{Chain 1}/10})]$

Test plot as follows:

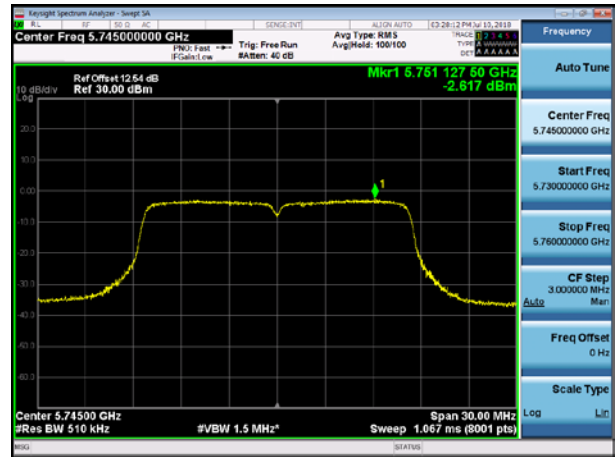
Test mode: 802.11a

Chain A:

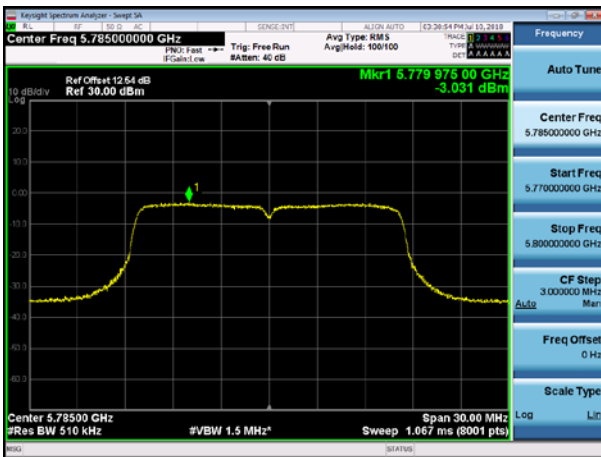
Chain B:



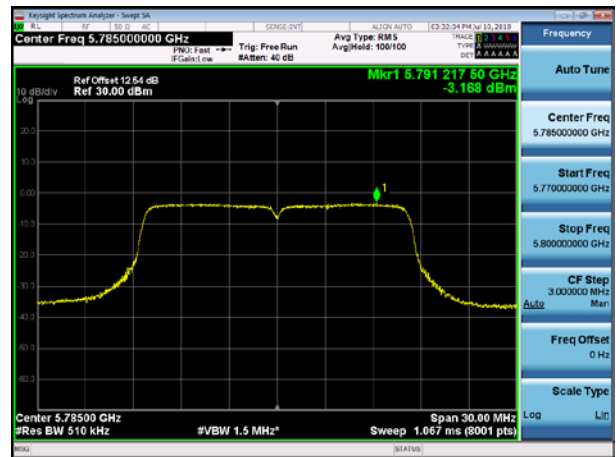
Lowest channel



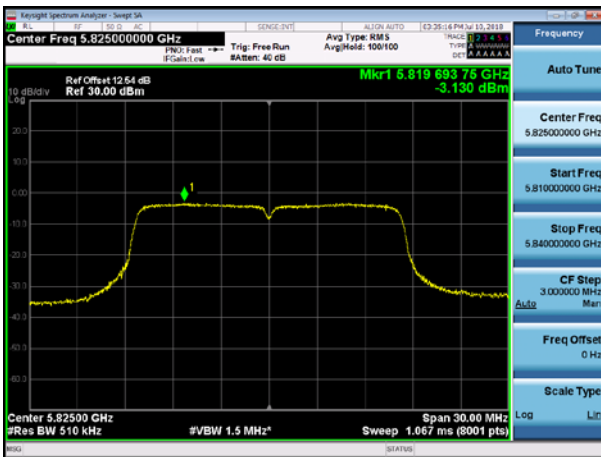
Lowest channel



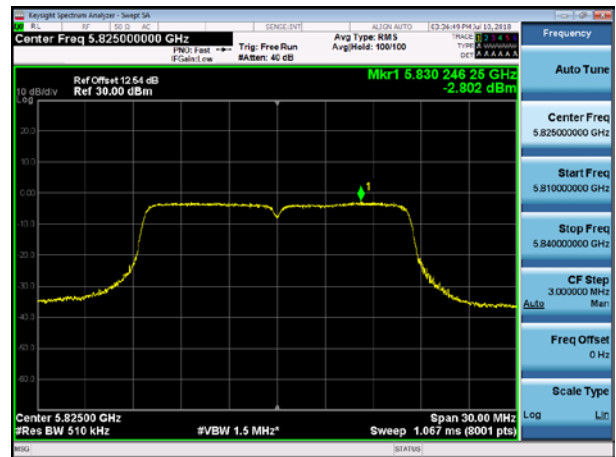
Middle channel



Middle channel



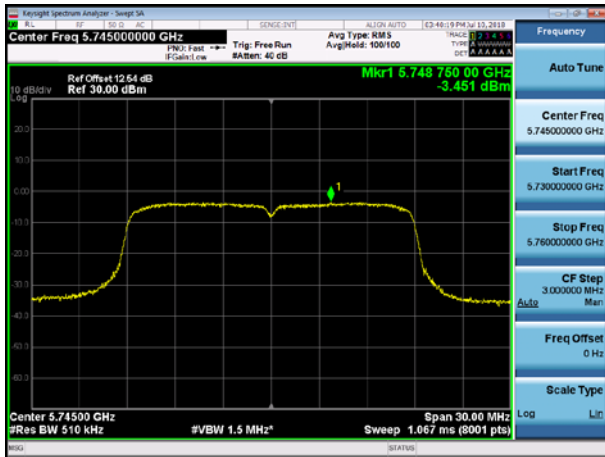
Highest channel



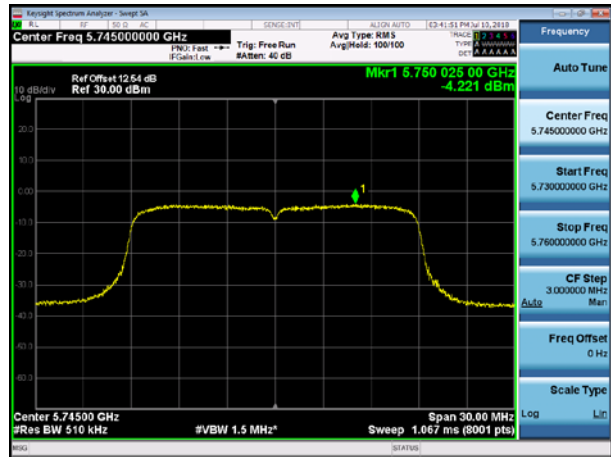
Highest channel

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

Chain A: Chain B:



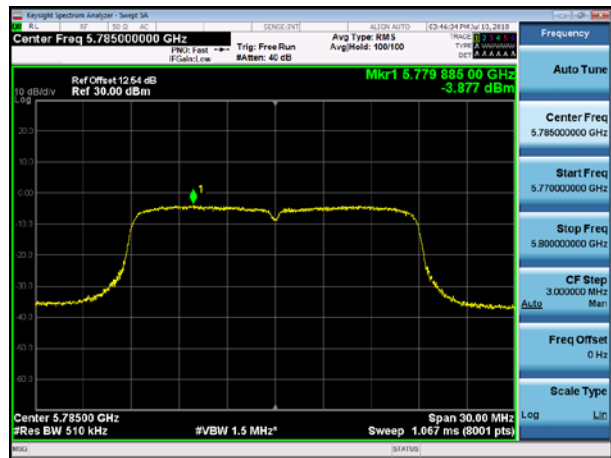
Lowest channel



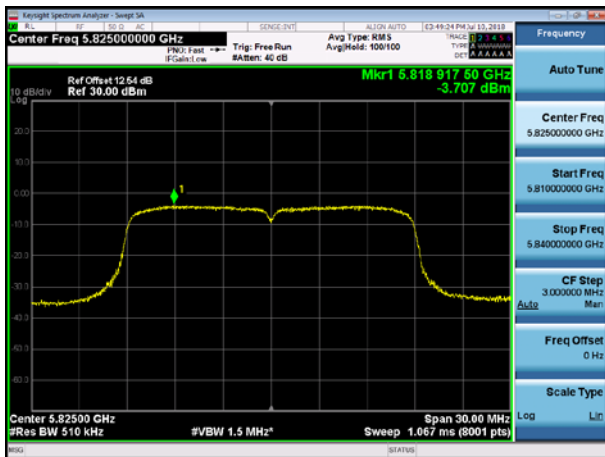
Lowest channel



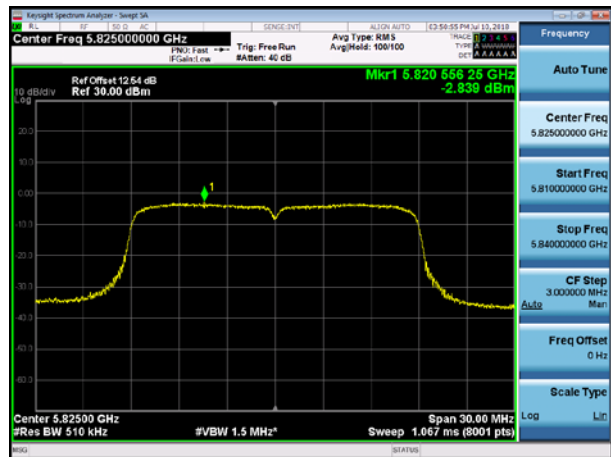
Middle channel



Middle channel



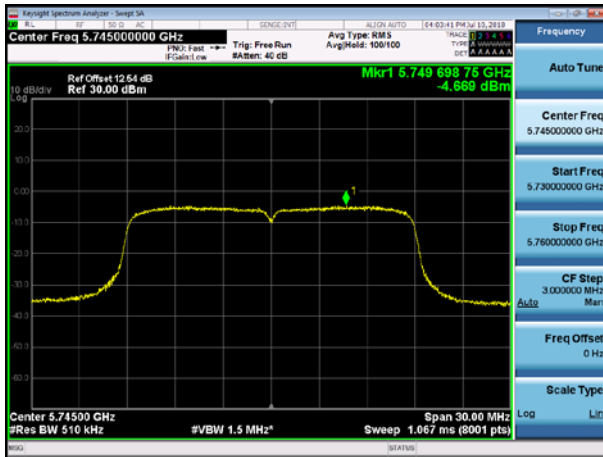
Highest channel



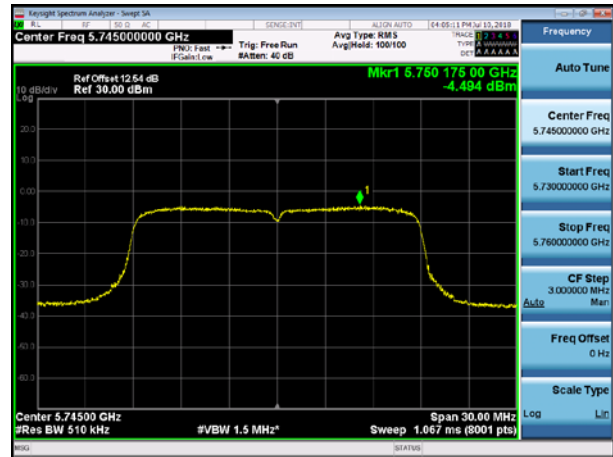
Highest channel

Test mode: 802.11ac(VHT20)

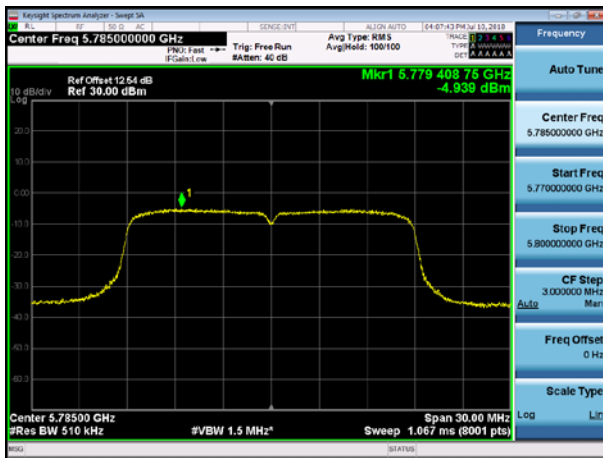
Chain A: Chain B:



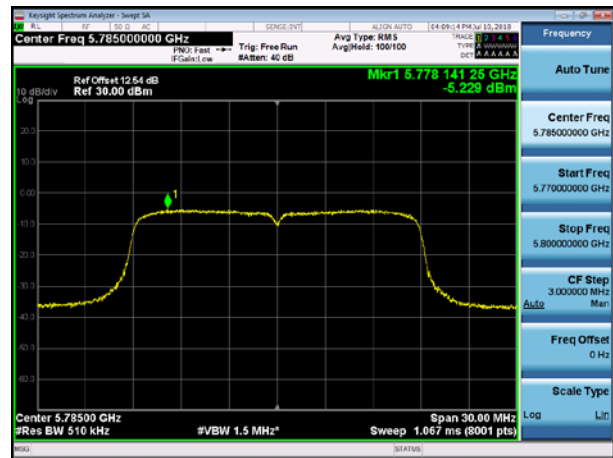
Lowest channel



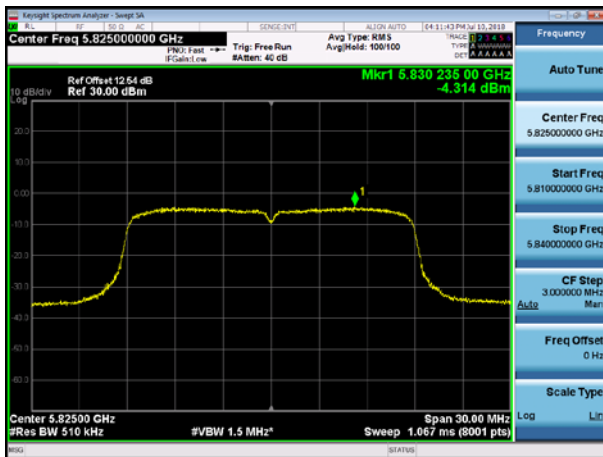
Lowest channel



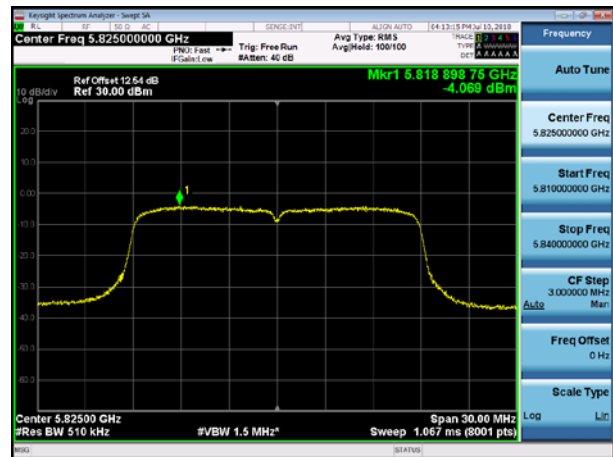
Middle channel



Middle channel



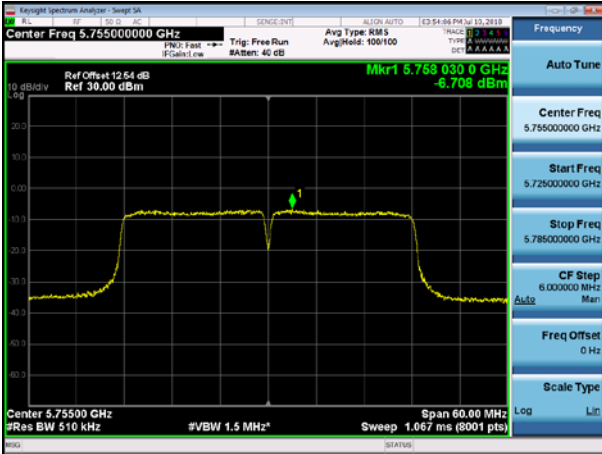
Highest channel



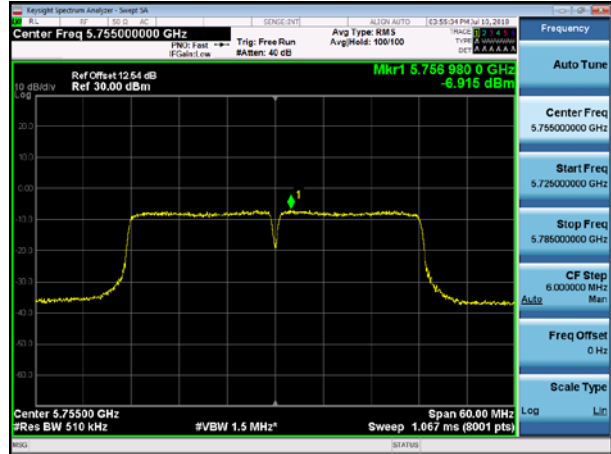
Highest channel

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

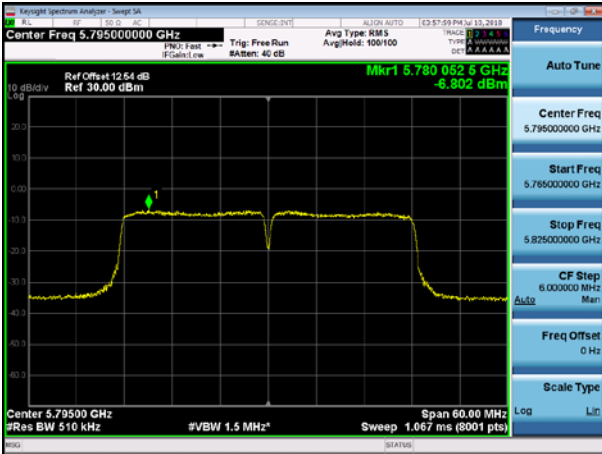
Chain A: Chain B:



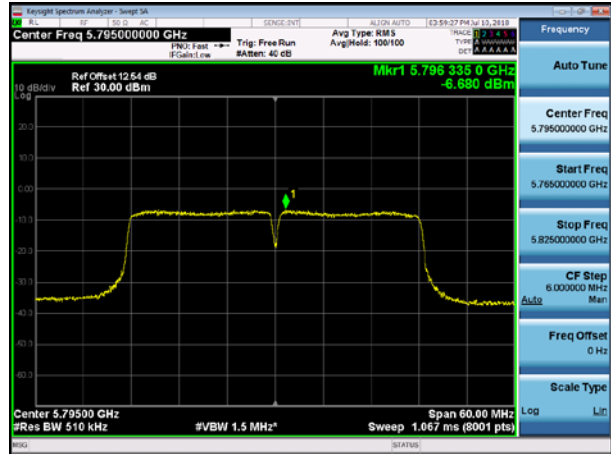
Lowest channel



Lowest channel



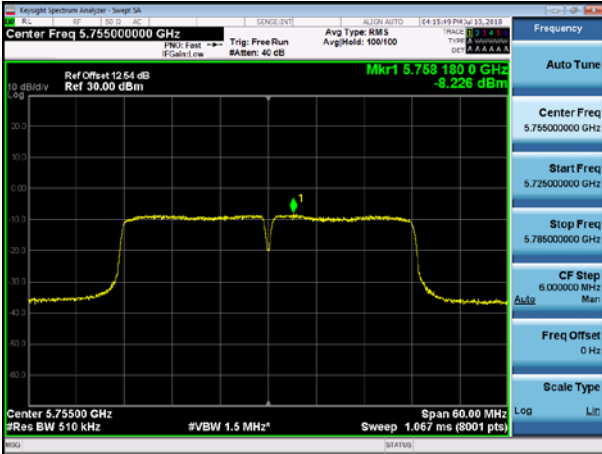
Highest channel



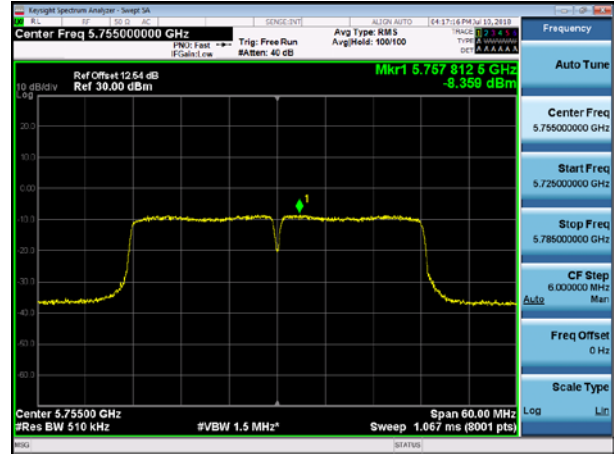
Highest channel

Test mode: 802.11ac(HT40)

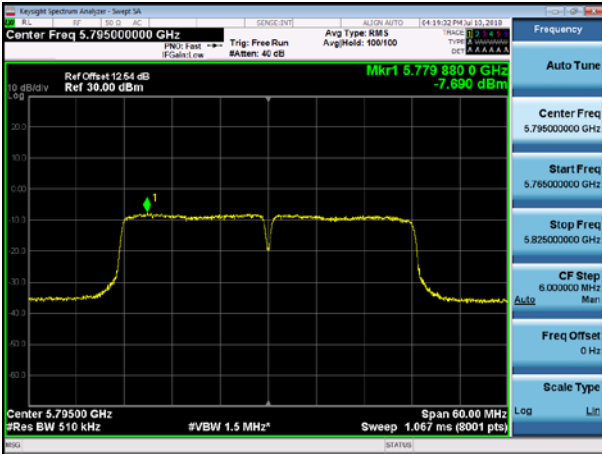
Chain A: Chain B:



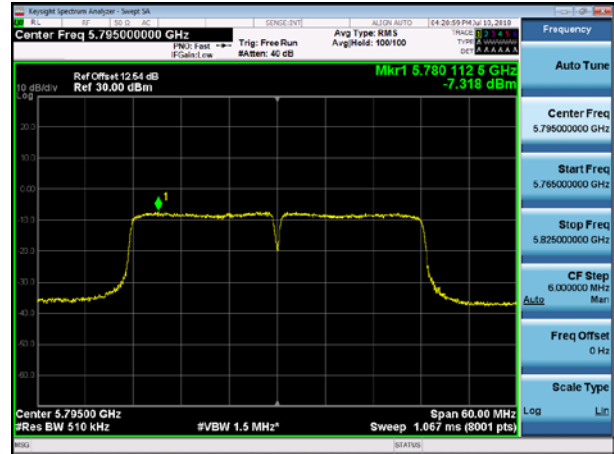
Lowest channel



Lowest channel



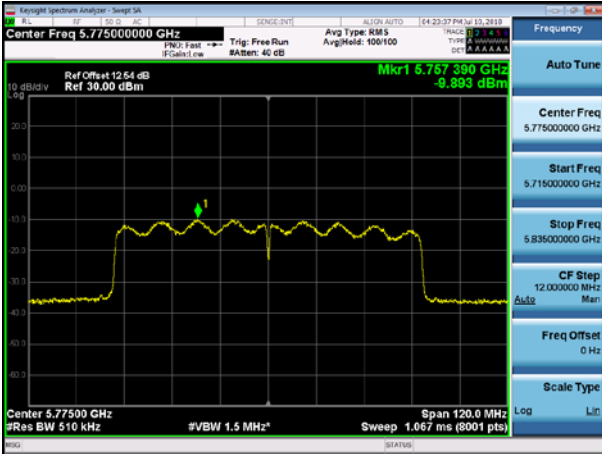
Highest channel



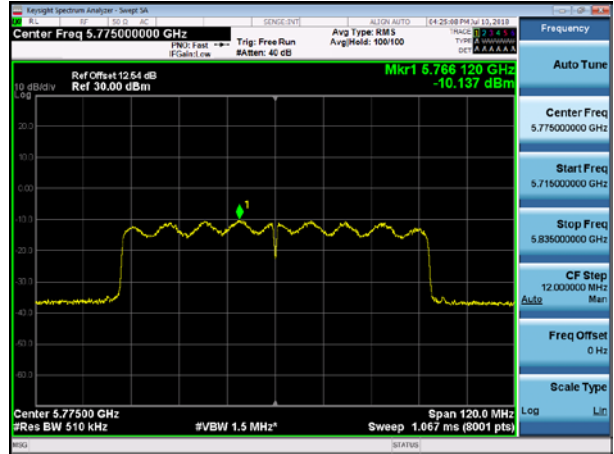
Highest channel

Test mode: 802.11ac(HT80)

Chain A: Chain B:



Middle channel



Middle 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	1MHz	3MHz	Peak
RMS		1MHz	3MHz	RMS	
Limit:	All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.				
Test setup:					
Test Procedure:	<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- 				

	<p>peak or average method as specified and then reported in a data sheet.</p> <p>7. The radiation measurements are performed in X, Y, Z axis positioning. And found the X axis positioning which it is worse case, only the test worst case mode is recorded in the report.</p>
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 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:*

$$E[\text{dBuV/m}] = \text{EIRP}[\text{dBm}] + 95.2;$$
For example, if EIRP = -27dBm

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

Measurement data:

IEEE 802.11a_MIMO_Chain A+B								
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	78.41	32.28	6.42	35.13	81.98	122.20	-40.22	Horizontal
5850.00	70.00	32.38	6.53	34.94	73.97	122.20	-48.23	Horizontal
5855.00	67.39	32.38	6.53	34.93	71.37	110.80	-39.43	Horizontal
5875.00	55.76	32.4	6.53	34.91	59.78	105.20	-45.42	Horizontal
5925.00	51.69	32.44	6.52	34.83	55.82	68.20	-12.38	Horizontal
5725.00	85.99	32.28	6.42	35.13	89.56	122.20	-32.64	Vertical
5850.00	80.38	32.38	6.53	34.94	84.35	122.20	-37.85	Vertical
5855.00	77.85	32.38	6.53	34.93	81.83	110.80	-28.97	Vertical
5875.00	64.60	32.4	6.53	34.9	68.62	105.20	-36.58	Vertical
5925.00	51.71	32.44	6.52	34.83	55.84	68.20	-12.36	Vertical

IEEE 802.11n_HT20_MIMO_Chain A+B								
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	78.96	32.28	6.42	35.13	82.53	122.20	-39.67	Horizontal
5850.00	71.88	32.38	6.53	34.94	75.85	122.20	-46.35	Horizontal
5855.00	66.51	32.38	6.53	34.93	70.49	110.80	-40.31	Horizontal
5875.00	52.35	32.4	6.53	34.91	56.37	105.20	-48.83	Horizontal
5925.00	51.56	32.44	6.52	34.83	55.69	68.20	-12.51	Horizontal
5725.00	85.91	32.28	6.42	35.13	89.48	122.20	-32.72	Vertical
5850.00	78.52	32.38	6.53	34.94	82.49	122.20	-39.71	Vertical
5855.00	74.07	32.38	6.53	34.93	78.05	110.80	-32.75	Vertical
5875.00	60.39	32.4	6.53	34.9	64.41	105.20	-40.79	Vertical
5925.00	51.92	32.44	6.52	34.83	56.05	68.20	-12.15	Vertical

IEEE 802.11ac VHT20_MIMO_Chain A+B								
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	75.55	32.28	6.42	35.13	79.12	122.20	-43.08	Horizontal
5850.00	67.02	32.38	6.53	34.94	70.99	122.20	-51.21	Horizontal
5855.00	63.52	32.38	6.53	34.93	67.50	110.80	-43.3	Horizontal
5875.00	51.69	32.4	6.53	34.91	55.71	105.20	-49.49	Horizontal
5925.00	51.33	32.44	6.52	34.83	55.46	68.20	-12.74	Horizontal
5725.00	83.68	32.28	6.42	35.13	87.25	122.20	-34.95	Vertical
5850.00	77.78	32.38	6.53	34.94	81.75	122.20	-40.45	Vertical
5855.00	73.55	32.38	6.53	34.93	77.53	110.80	-33.27	Vertical
5875.00	58.06	32.4	6.53	34.9	62.08	105.20	-43.12	Vertical
5925.00	51.81	32.44	6.52	34.83	55.94	68.20	-12.26	Vertical

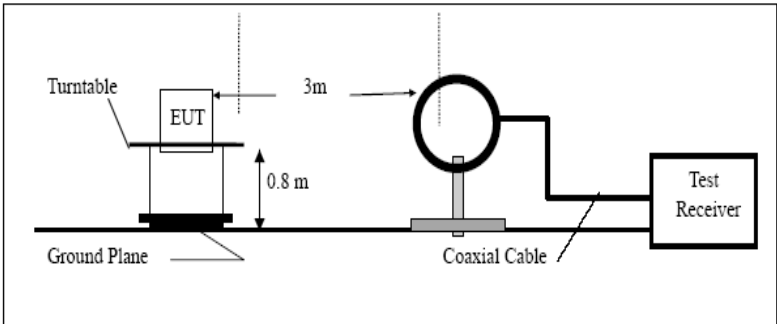
IEEE 802.11n HT40_MIMO_Chain A+B								
Peak value:								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5725.00	75.61	32.28	6.42	35.13	79.18	122.20	-43.02	Horizontal
5850.00	61.08	32.38	6.53	34.94	65.05	122.20	-57.15	Horizontal
5855.00	59.49	32.38	6.53	34.93	63.47	110.80	-47.33	Horizontal
5875.00	53.67	32.4	6.53	34.91	57.69	105.20	-47.51	Horizontal
5925.00	51.87	32.44	6.52	34.83	56.00	68.20	-12.2	Horizontal
5725.00	83.91	32.28	6.42	35.13	87.48	122.20	-34.72	Vertical
5850.00	70.27	32.38	6.53	34.94	74.24	122.20	-47.96	Vertical
5855.00	68.53	32.38	6.53	34.93	72.51	110.80	-38.29	Vertical
5875.00	60.09	32.4	6.53	34.9	64.11	105.20	-41.09	Vertical
5925.00	51.80	32.44	6.52	34.83	55.93	68.20	-12.27	Vertical

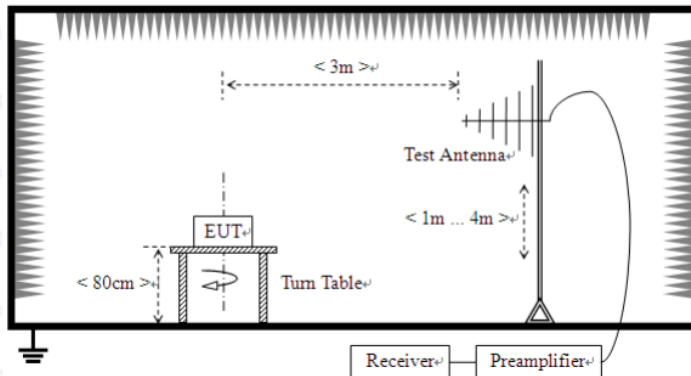
IEEE 802.11ac VHT40_MIMO_Chain A+B								
Peak value:								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5725.00	75.28	32.28	6.42	35.13	78.85	122.20	-43.35	Horizontal
5850.00	60.52	32.38	6.53	34.94	64.49	122.20	-57.71	Horizontal
5855.00	58.61	32.38	6.53	34.93	62.59	110.80	-48.21	Horizontal
5875.00	52.39	32.4	6.53	34.91	56.41	105.20	-48.79	Horizontal
5925.00	51.85	32.44	6.52	34.83	55.98	68.20	-12.22	Horizontal
5725.00	81.93	32.28	6.42	35.13	85.50	122.20	-36.7	Vertical
5850.00	69.84	32.38	6.53	34.94	73.81	122.20	-48.39	Vertical
5855.00	67.42	32.38	6.53	34.93	71.40	110.80	-39.4	Vertical
5875.00	58.15	32.4	6.53	34.9	62.17	105.20	-43.03	Vertical
5925.00	51.33	32.44	6.52	34.83	55.46	68.20	-12.74	Vertical

IEEE 802.11ac VHT80_MIMO_Chain A+B								
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	50.78	32.28	6.42	35.13	54.35	122.20	-67.85	Horizontal
5850.00	48.95	32.38	6.53	34.94	52.92	122.20	-69.28	Horizontal
5855.00	48.94	32.38	6.53	34.93	52.92	110.80	-57.88	Horizontal
5875.00	44.76	32.4	6.53	34.91	48.78	105.20	-56.42	Horizontal
5925.00	43.07	32.44	6.52	34.83	47.20	68.20	-21	Horizontal
5725.00	61.18	32.28	6.42	35.13	64.75	122.20	-57.45	Vertical
5850.00	60.93	32.38	6.53	34.94	64.90	122.20	-57.3	Vertical
5855.00	57.78	32.38	6.53	34.93	61.76	110.80	-49.04	Vertical
5875.00	53.81	32.4	6.53	34.9	57.83	105.20	-47.37	Vertical
5925.00	45.89	32.44	6.52	34.83	50.02	68.20	-18.18	Vertical

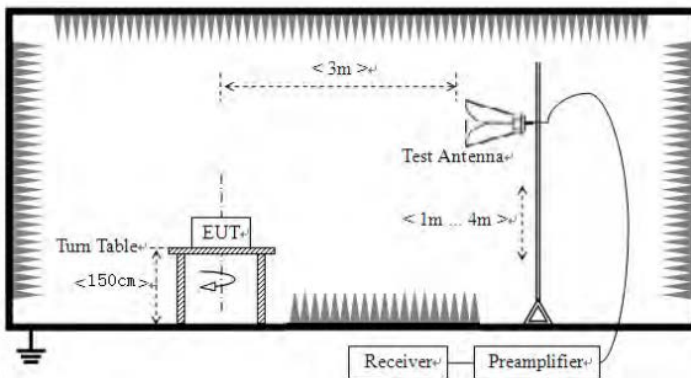
7.7 Spurious Emission

7.7.1 Radiated Emission Method

Test Requirement:	FCC Part15 C Section 15.209, Part 15E Section 15.407(b)(4)				
Test Method:	ANSI C63.10:2013				
Test Frequency Range:	9kHz to 40GHz				
Test site:	Measurement Distance: 3m				
Receiver setup:	Frequency	Detector	RBW	VBW	Value
	30MHz-1GHz	Quasi-peak	120KHz	300KHz	Quasi-peak Value
	Above 1GHz	Peak	1MHz	3MHz	Peak Value
		Peak	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:	Below 30MHz				
					
	Below 1GHz				



Above 1GHz



Test Procedure:

1. The EUT was placed on the top of a rotating table (0.8m for below 1GHz and 1.5 meters for above 1GHz) above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation.
2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
3. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rota table was turned from 0 degrees to 360 degrees to find the maximum reading.
5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
6. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

	7. The radiation measurements are performed in X, Y, Z axis positioning. And found the X axis positioning which it is worse case, only the test worst case mode is recorded in the report.
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

Measurement Data

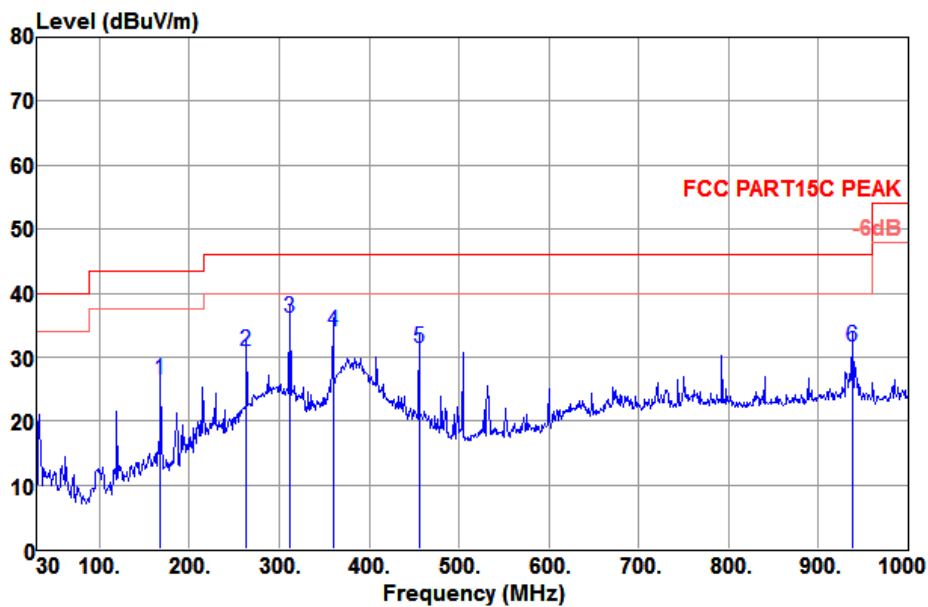
■ 9kHz~30MHz

The low frequency, which started from 9 kHz to 30 MHz, was pre-scanned and the result which was 20 dB lower than the limit line per 15.31(o) was not reported.

■ Below 1GHz

Horizontal:

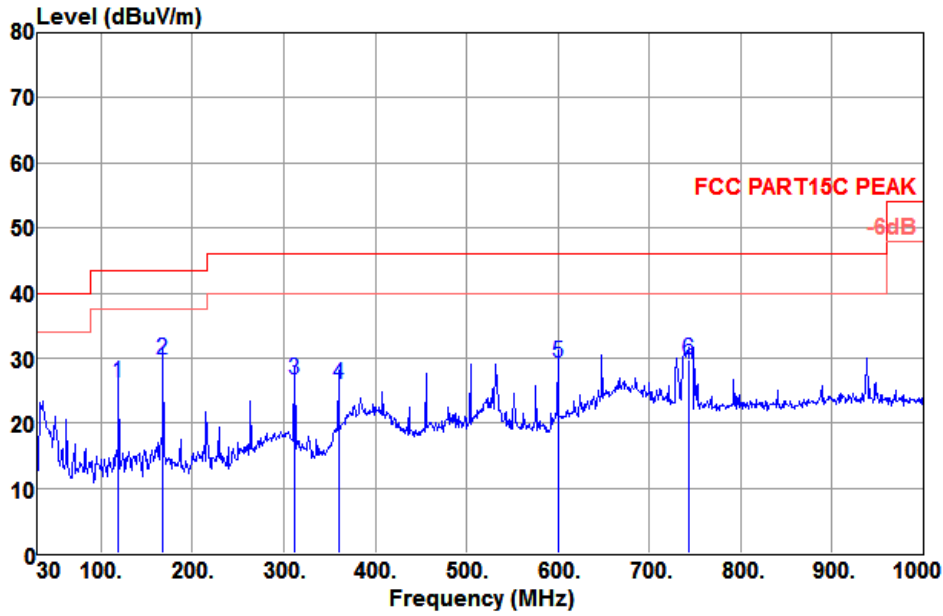
Data: 4



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
167.740	43.06	13.43	2.53	32.52	26.50	43.50	-17.00	QP
263.770	48.36	11.81	3.25	32.53	30.89	46.00	-15.11	QP
312.270	51.86	13.13	3.52	32.51	36.00	46.00	-10.00	QP
359.800	48.69	14.04	3.86	32.49	34.10	46.00	-11.90	QP
455.830	43.92	15.75	4.34	32.52	31.49	46.00	-14.51	QP
937.920	35.40	21.93	6.43	32.06	31.70	46.00	-14.30	QP

Vertical:

Data: 3



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
119.240	44.50	12.12	2.11	32.47	26.26	43.50	-17.24	QP
167.740	46.23	13.43	2.53	32.52	29.67	43.50	-13.83	QP
312.270	42.56	13.13	3.52	32.51	26.70	46.00	-19.30	QP
359.800	40.59	14.04	3.86	32.49	26.00	46.00	-20.00	QP
600.360	38.48	18.40	5.02	32.69	29.21	46.00	-16.79	QP
743.920	36.63	20.18	5.58	32.72	29.67	46.00	-16.33	QP

■ Above 1GHz

802.11a_MIMO_ChainA+B_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	Detector
11490.00	43.55	39.91	8.72	33.00	59.18	74.00	-14.82	Vertical	Peak
11490.00	30.06	39.91	8.72	33.00	45.69	54.00	-8.31	Vertical	Average
17235.00	36.59	43.17	9.48	30.56	58.68	74.00	-15.32	Vertical	Peak
17235.00	23.79	43.17	9.48	30.56	45.88	54.00	-8.12	Vertical	Average
11490.00	42.53	39.91	8.72	33.00	58.16	74.00	-15.84	Horizontal	Peak
11490.00	28.62	39.91	8.72	33.00	44.25	54.00	-9.75	Horizontal	Average
17235.00	36.14	43.17	9.48	30.56	58.23	74.00	-15.77	Horizontal	Peak
17235.00	23.24	43.17	9.48	30.56	45.33	54.00	-8.67	Horizontal	Average

802.11a_MIMO_ChainA+B_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	Detector
11570.00	48.14	39.84	8.74	32.93	63.79	74.00	-10.21	Vertical	Peak
11570.00	32.54	39.84	8.74	32.93	48.19	54.00	-5.81	Vertical	Average
17355.00	36.14	44.02	9.52	30.48	59.20	74.00	-14.80	Vertical	Peak
17355.00	22.73	44.02	9.52	30.48	45.79	54.00	-8.21	Vertical	Average
11570.00	44.03	39.84	8.74	32.93	59.68	74.00	-14.32	Horizontal	Peak
11570.00	32.76	39.84	8.74	32.93	48.41	54.00	-5.59	Horizontal	Average
17355.00	36.77	44.02	9.52	30.48	59.83	74.00	-14.17	Horizontal	Peak
17355.00	22.71	44.02	9.52	30.48	45.77	54.00	-8.23	Horizontal	Average

802.11a_MIMO_ChainA+B_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	Detector
11650.00	44.62	39.78	8.75	32.86	60.29	74.00	-13.71	Vertical	Peak
11650.00	28.77	39.78	8.75	32.86	44.44	54.00	-9.56	Vertical	Average
17475.00	36.79	44.87	9.55	30.39	60.82	74.00	-13.18	Vertical	Peak
17475.00	23.70	44.87	9.55	30.39	47.73	54.00	-6.27	Vertical	Average
11650.00	44.41	39.78	8.75	32.86	60.08	74.00	-13.92	Horizontal	Peak
11650.00	28.67	39.78	8.75	32.86	44.34	54.00	-9.66	Horizontal	Average
17475.00	36.78	44.87	9.55	30.39	60.81	74.00	-13.19	Horizontal	Peak
17475.00	23.66	44.87	9.55	30.39	47.69	54.00	-6.31	Horizontal	Average

802.11n(HT20)_MIMO_ChainA+B_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	Detector
11490.00	43.63	39.91	8.72	33.00	59.26	74.00	-14.74	Vertical	Peak
11490.00	29.67	39.91	8.72	33.00	45.30	54.00	-8.70	Vertical	Average
17235.00	37.47	43.17	9.48	30.56	59.56	74.00	-14.44	Vertical	Peak
17235.00	23.43	43.17	9.48	30.56	45.52	54.00	-8.48	Vertical	Average
11490.00	43.00	39.91	8.72	33.00	58.63	74.00	-15.37	Horizontal	Peak
11490.00	29.08	39.91	8.72	33.00	44.71	54.00	-9.29	Horizontal	Average
17235.00	35.66	43.17	9.48	30.56	57.75	74.00	-16.25	Horizontal	Peak
17235.00	23.24	43.17	9.48	30.56	45.33	54.00	-8.67	Horizontal	Average

802.11n(HT20)_MIMO_ChainA+B_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	Detector
11570.00	49.65	39.84	8.74	32.93	65.30	74.00	-8.70	Vertical	Peak
11570.00	34.60	39.84	8.74	32.93	50.25	54.00	-3.75	Vertical	Average
17355.00	36.51	44.02	9.52	30.48	59.57	74.00	-14.43	Vertical	Peak
17355.00	22.84	44.02	9.52	30.48	45.90	54.00	-8.10	Vertical	Average
11570.00	45.45	39.84	8.74	32.93	61.10	74.00	-12.90	Horizontal	Peak
11570.00	32.47	39.84	8.74	32.93	48.12	54.00	-5.88	Horizontal	Average
17355.00	36.23	44.02	9.52	30.48	59.29	74.00	-14.71	Horizontal	Peak
17355.00	22.75	44.02	9.52	30.48	45.81	54.00	-8.19	Horizontal	Average

802.11n(HT20)_MIMO_ChainA+B_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	Detector
11650.00	44.07	39.78	8.75	32.86	59.74	74.00	-14.86	Vertical	Peak
11650.00	27.47	39.78	8.75	32.86	43.14	54.00	-10.86	Vertical	Average
17475.00	38.74	44.87	9.55	30.39	62.77	74.00	-11.23	Vertical	Peak
17475.00	23.71	44.87	9.55	30.39	47.74	54.00	-6.26	Vertical	Average
11650.00	43.57	39.78	8.75	32.86	59.24	74.00	-14.76	Horizontal	Peak
11650.00	27.17	39.78	8.75	32.86	42.84	54.00	-11.16	Horizontal	Average
17475.00	38.93	44.87	9.55	30.39	62.96	74.00	-11.04	Horizontal	Peak
17475.00	23.70	44.87	9.55	30.39	47.73	54.00	-6.27	Horizontal	Average

802.11ac(VHT20)_MIMO_ChainA+B_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	Detector
11490.00	43.52	39.91	8.72	33.00	59.15	74.00	-14.85	Vertical	Peak
11490.00	29.21	39.91	8.72	33.00	44.84	54.00	-9.16	Vertical	Average
17235.00	37.58	43.17	9.48	30.56	59.67	74.00	-14.33	Vertical	Peak
17235.00	23.12	43.17	9.48	30.56	45.21	54.00	-8.79	Vertical	Average
11490.00	43.23	39.91	8.72	33.00	58.86	74.00	-15.14	Horizontal	Peak
11490.00	29.02	39.91	8.72	33.00	44.65	54.00	-9.35	Horizontal	Average
17235.00	35.49	43.17	9.48	30.56	57.58	74.00	-16.42	Horizontal	Peak
17235.00	23.52	43.17	9.48	30.56	45.61	54.00	-8.39	Horizontal	Average

802.11ac(VHT20)_MIMO_ChainA+B_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	Detector
11570.00	49.52	39.84	8.74	32.93	65.17	74.00	-8.83	Vertical	Peak
11570.00	34.72	39.84	8.74	32.93	50.37	54.00	-3.63	Vertical	Average
17355.00	36.08	44.02	9.52	30.48	59.14	74.00	-14.86	Vertical	Peak
17355.00	22.62	44.02	9.52	30.48	45.68	54.00	-8.32	Vertical	Average
11570.00	45.62	39.84	8.74	32.93	61.27	74.00	-12.73	Horizontal	Peak
11570.00	32.38	39.84	8.74	32.93	48.03	54.00	-5.97	Horizontal	Average
17355.00	36.31	44.02	9.52	30.48	59.37	74.00	-14.63	Horizontal	Peak
17355.00	22.64	44.02	9.52	30.48	45.70	54.00	-8.30	Horizontal	Average

802.11ac(VHT20)_MIMO_ChainA+B_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	Detector
11650.00	43.41	39.78	8.75	32.86	59.08	74.00	-14.92	Vertical	Peak
11650.00	27.01	39.78	8.75	32.86	42.68	54.00	-11.32	Vertical	Average
17475.00	38.93	44.87	9.55	30.39	62.96	74.00	-11.04	Vertical	Peak
17475.00	23.68	44.87	9.55	30.39	47.71	54.00	-6.29	Vertical	Average
11650.00	42.38	39.78	8.75	32.86	58.05	74.00	-15.95	Horizontal	Peak
11650.00	26.86	39.78	8.75	32.86	42.53	54.00	-11.47	Horizontal	Average
17475.00	39.55	44.87	9.55	30.39	63.58	74.00	-10.42	Horizontal	Peak
17475.00	23.65	44.87	9.55	30.39	47.68	54.00	-6.32	Horizontal	Average

802.11n(HT40)_MIMO_ChainA+B_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	Detector
11510.00	43.55	39.89	8.73	32.99	59.18	74.00	-14.82	Vertical	Peak
11510.00	28.92	39.89	8.73	32.99	44.55	54.00	-9.45	Vertical	Average
17265.00	36.60	43.38	9.49	30.54	58.93	74.00	-15.07	Vertical	Peak
17265.00	23.55	43.38	9.49	30.54	45.88	54.00	-8.12	Vertical	Average
11510.00	39.77	39.89	8.73	32.99	55.40	74.00	-18.60	Horizontal	Peak
11510.00	28.09	39.89	8.73	32.99	43.72	54.00	-10.28	Horizontal	Average
17265.00	37.83	43.38	9.49	30.54	60.16	74.00	-13.84	Horizontal	Peak
17265.00	23.53	43.38	9.49	30.54	45.86	54.00	-8.14	Horizontal	Average

802.11n(HT40)_MIMO_ChainA+B_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	Detector
11590.00	45.49	39.83	8.74	32.92	61.14	74.00	-12.86	Vertical	Peak
11590.00	29.68	39.83	8.74	32.92	45.33	54.00	-8.67	Vertical	Average
17385.00	36.40	44.23	9.53	30.45	59.71	74.00	-14.29	Vertical	Peak
17385.00	23.04	44.23	9.53	30.45	46.35	54.00	-7.65	Vertical	Average
11590.00	41.83	39.83	8.74	32.92	57.48	74.00	-16.52	Horizontal	Peak
11590.00	29.51	39.83	8.74	32.92	45.16	54.00	-8.84	Horizontal	Average
17385.00	36.68	44.23	9.53	30.45	59.99	74.00	-14.01	Horizontal	Peak
17385.00	23.07	44.23	9.53	30.45	46.38	54.00	-7.62	Horizontal	Average

802.11ac(VHT40)_MIMO_ChainA+B_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	Detector
11510.00	43.47	39.89	8.73	32.99	59.10	74.00	-14.90	Vertical	Peak
11510.00	28.64	39.89	8.73	32.99	44.27	54.00	-9.73	Vertical	Average
17265.00	36.54	43.38	9.49	30.54	58.87	74.00	-15.13	Vertical	Peak
17265.00	23.42	43.38	9.49	30.54	45.75	54.00	-8.25	Vertical	Average
11510.00	39.55	39.89	8.73	32.99	55.18	74.00	-18.82	Horizontal	Peak
11510.00	28.23	39.89	8.73	32.99	43.86	54.00	-10.14	Horizontal	Average
17265.00	37.69	43.38	9.49	30.54	60.02	74.00	-13.98	Horizontal	Peak
17265.00	23.48	43.38	9.49	30.54	45.81	54.00	-8.19	Horizontal	Average

802.11ac(VHT40)_MIMO_ChainA+B_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	Detector
11590.00	45.26	39.83	8.74	32.92	60.91	74.00	-13.09	Vertical	Peak
11590.00	29.54	39.83	8.74	32.92	45.19	54.00	-8.81	Vertical	Average
17385.00	36.33	44.23	9.53	30.45	59.64	74.00	-14.36	Vertical	Peak
17385.00	23.13	44.23	9.53	30.45	46.44	54.00	-7.56	Vertical	Average
11590.00	41.76	39.83	8.74	32.92	57.41	74.00	-16.59	Horizontal	Peak
11590.00	29.43	39.83	8.74	32.92	45.08	54.00	-8.92	Horizontal	Average
17385.00	36.51	44.23	9.53	30.45	59.82	74.00	-14.18	Horizontal	Peak
17385.00	23.24	44.23	9.53	30.45	46.55	54.00	-7.45	Horizontal	Average

802.11ac(VHT80)_MIMO_ChainA+B_5775MHz

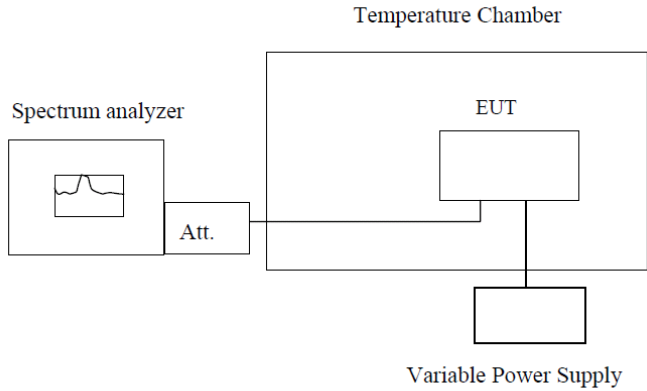
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization	Detector
11550.00	43.22	39.86	8.74	32.95	58.87	74.00	-15.13	Vertical	Peak
11550.00	26.44	39.86	8.74	32.95	42.09	54.00	-11.91	Vertical	Average
17325.00	38.78	43.81	9.51	30.50	61.60	74.00	-12.40	Vertical	Peak
17325.00	23.28	43.81	9.51	30.50	46.10	54.00	-7.90	Vertical	Average
11550.00	40.66	39.86	8.74	32.95	56.31	74.00	-17.69	Horizontal	Peak
11550.00	26.22	39.86	8.74	32.95	41.87	54.00	-12.13	Horizontal	Average
17325.00	38.34	43.81	9.51	30.50	61.16	74.00	-12.84	Horizontal	Peak
17325.00	23.26	43.81	9.51	30.50	46.08	54.00	-7.92	Horizontal	Average

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.

Note: All low mid high channels have been tested, only worse case is reported.

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:	<p>a. The EUT was placed inside the environmental test chamber and powered by nominal DC voltage.</p> <p>b. Turn the EUT on and couple its output to a spectrum analyzer.</p> <p>c. Turn the EUT off and set the chamber to the highest temperature specified.</p> <p>d. Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize, turn the EUT on and measure the operating frequency after 2, 5, and 10 Minutes.</p> <p>e. Repeat step 2 and 3 with the temperature chamber set to the lowest temperature.</p> <p>f. The test chamber was allowed to stabilize at +20 degree C for a minimum of 30 Minute</p> <p>s. The supply voltage was then adjusted on the EUT from 85% to 115% and the frequency record.</p>
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 5.2 for details
Test results:	Pass

Remark: Set the EUT transmits at un-modulation mode to test frequency stability. The test mode 11a 5745MHz is the worst case show as below.

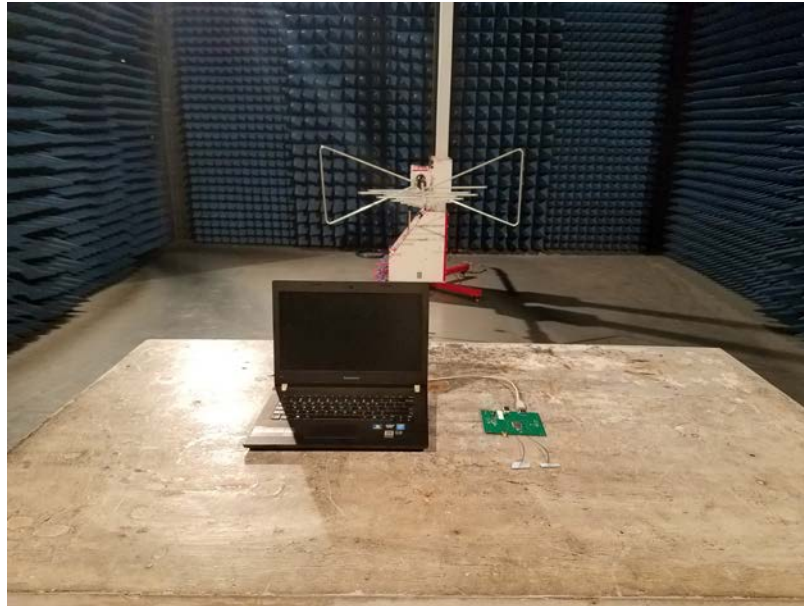
Measurement data:

Frequency stability versus Temp.									
Worse Case Operating Frequency: 11a 5745MHz									
Temp. (°C)	Power Supply (Vdc)	0 minute		2 minute		5 minute		10 minute	
		Measured Frequency (MHz)	Pass /Fail	Measured Frequency (MHz)	Pass /Fail	Measured Frequency (MHz)	Pass /Fail	Measured Frequency (MHz)	Pass /Fail
-30	3.3	5744.784	Pass	5744.378	Pass	5744.59	Pass	5744.423	Pass
-20	3.3	5744.07	Pass	5745.341	Pass	5745.584	Pass	5745.639	Pass
-10	3.3	5745.27	Pass	5744.993	Pass	5745.116	Pass	5745.667	Pass
0	3.3	5745.01	Pass	5745.859	Pass	5745.772	Pass	5745.898	Pass
10	3.3	5744.589	Pass	5745.944	Pass	5744.397	Pass	5745.402	Pass
20	3.3	5745.599	Pass	5745.956	Pass	5745.122	Pass	5745.701	Pass
30	3.3	5745.417	Pass	5744.546	Pass	5745.892	Pass	5745.228	Pass
40	3.3	5744.338	Pass	5744.118	Pass	5744.006	Pass	5744.638	Pass
50	3.3	5744.375	Pass	5745.084	Pass	5745.642	Pass	5745.759	Pass

Frequency stability versus Temp.									
Worse Case Operating Frequency: 11a 5745MHz									
Temp. (°C)	Power Supply (Vdc)	0 minute		2 minute		5 minute		10 minute	
		Measured Frequency (MHz)	Pass /Fail	Measured Frequency (MHz)	Pass /Fail	Measured Frequency (MHz)	Pass /Fail	Measured Frequency (MHz)	Pass /Fail
25	3.15	5744.206	Pass	5744.89	Pass	5744.328	Pass	5745.322	Pass
25	3.3	5744.09	Pass	5745.655	Pass	5744.273	Pass	5745.749	Pass
25	3.45	5745.872	Pass	5745.326	Pass	5745.992	Pass	5744.321	Pass

8 Test Setup Photo

Radiated Emission



Conducted Emission



9 EUT Constructional Details

Reference to the test report No. GTS201806000179F01

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