FCC TEST REPORT

Test report
On Behalf of
Henansheng leiniaozhinengkeji youxiangongsi
For
usb wifi adapter
Model No.: H108, H108Plus, H108Pro, M-1200FR, M-1200NR

FCC ID: 2A47H-H108

Prepared For:	**Henansheng leiniaozhinengkeji youxiangongsi** **jinshuiquwenhualu85haoyuan7ceng707hao zhengzhou henan china 450002**
Prepared By:	**Shenzhen HUAK Testing Technology Co., Ltd.** **1-2/F., Building B2, Junfeng Zhongcheng Zhizao Innovation Park, Heping, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China**
Date of Test:	**Jan. 10, 2022 ~ Feb. 25, 2022**
Date of Report:	**Feb. 25, 2022**
Report Number:	**HK2202170428-3E**

TEST RESULT CERTIFICATION

Applicant's name	:	Henansheng leiniaozhinengkeji youxiangongsi
Address	:	jinshuiquwenhualu85haoyuan7ceng707hao zhengzhou henan china 450002
Manufacture's Name	:	Henansheng leiniaozhinengkeji youxiangongsi
Address	:	jinshuiquwenhualu85haoyuan7ceng707hao zhengzhou henan china 450002

Product description

Trade Mark:		CXFTEOXK
Product name	:	usb wifi adapter
Model and/or type reference	:	H108, H108Plus, H108Pro, M-1200FR, M-1200NR
Standards	:	FCC Rules and Regulations Part 15 Subpart E Section 15.407 ANSI C63.10: 2013

Date of Test	:	
Date (s) of performance of tests	:	Jan. 10, 2022 ~ Feb. 25, 2022
Date of Issue	:	Feb. 25, 2022
Test Result	:	Pass

Testing Engineer : Gary Qian

(Gary Qian)

Technical Manager : Eden Hu

(Eden Hu)

Authorized Signatory : Jason Zhou

(Jason Zhou)

TABLE OF CONTENTS

** Modified History **

Revision	Description	Issued Data	Remark
Revision 1.0	Initial Test Report Release	Feb. 25, 2022	Jason Zhou

1. TEST RESULT SUMMARY

1.1. TEST PROCEDURES AND RESULTS

Requirement	CFR 47 Section	Result
Antenna requirement	§15.203	PASS
AC Power Line Conducted Emission	§15.207	PASS
Maximum Conducted Output Power	§15.407(a)	PASS
6dB Emission Bandwidth	§15.407(e)	PASS
26dB Emission Bandwidth & 99% Occupied Bandwidth	§15.407(a)	N/A
Power Spectral Density	§15.407(a)	PASS
Band edge	§15.407(b)/15.209/15.205	PASS
Radiated Emission	§15.407(b)/15.209/15.205	PASS
Frequency Stability	§15.407(g)	PASS

Note:

1. PASS: Test item meets the requirement.

2. Fail: Test item does not meet the requirement.

3. N/A: Test case does not apply to the test object.

4. The test result judgment is decided by the limit of test standard.

1.2. INFORMATION OF THE TEST LABORATORY

Shenzhen HUAK Testing Technology Co., Ltd.
Add.: 1-2/F., Building B2, Junfeng Zhongcheng Zhizao Innovation Park, Heping, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China

Testing Laboratory Authorization：

A2LA Accreditation Code is 4781.01.
FCC Designation Number is CN1229.
Canada IC CAB identifier is CN0045.
CNAS Registration Number is L9589.

1.3. MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement y ± U, where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95 %.

No.	Item	MU
1	Conducted Emission	±2.71dB
2	RF power, conducted	±0.37dB
3	Spurious emissions, conducted	±0.11dB
4	All emissions, radiated(<1G)	±3.90dB
5	All emissions, radiated(>1G)	±4.28dB
6	Temperature	±0.1°C
7	Humidity	±1.0%

2. EUT DESCRIPTION

2.1. GENERAL DESCRIPTION OF EUT

Equipment	usb wifi adapter
Model Name	H108
Series Model	H108Plus, H108Pro, M-1200FR, M-1200NR
Trade Mark	CXFTEOXK
Model Difference	All model's the function, software and electric circuit are the same, only with a product color and model named different. Test sample model: H108
FCC ID	2A47H-H108
Operation Frequency	IEEE 802.11a/n/ac(HT20)5.745GHz-5.825GHz IEEE 802.11n/ac(HT40)5.755GHz-5.795GHz IEEE 802.11ac(HT80) 5.775GHz
Modulation Technology	IEEE 802.11a/n/ac
Modulation Type	CCK/OFDM/DBPSK/DAPSK
Antenna Type	External Antenna
Antenna Gain	Antenna 1:3.5dBi Antenna 2:3.5dBi MIMO: 6.510dBi
Power Source	DC 5V from micro USB
Power Supply	DC 5V from micro USB
Note: The EUT incorporates a MIMO function. Physically, it provides two completed transmitters and receivers(2T2R), two transmit signals are completely correlated, then, Direction gain=GANT + Array Gain(Array Gain=10 log(2) dB for power spectral density; Array Gain =0 for power measurement).	

2.2. OPERATION FREQUENCY EACH OF CHANNEL

802.11a/802.11n(HT20) 802.11ac(HT20)		802.11n(HT40)/ 802.11ac(HT40)		802.11ac(HT80)	
Channel	Frequency	Channel	Frequency	Channel	Frequency
149	5745	151	5755	155	5775
153	5765	159	5790		
157	5785				
161	5805				
165	5825				

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:

2.3. OPERATION OF EUT DURING TESTING

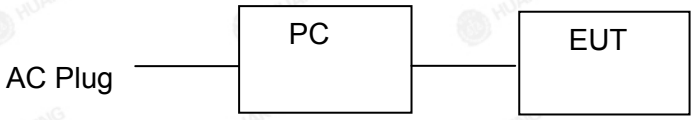
Band IV (5725 - 5850 MHz)		
For 802.11a/n (HT20)/ac (HT20)		
Channel Number	Channel	Frequency (MHz)
149	Low	5745
157	Mid	5785
165	High	5825

For 802.11n (HT40)/ac (HT40)		
Channel Number	Channel	Frequency (MHz)
151	Low	5755
159	High	5795

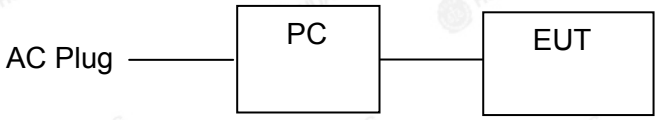
For 802.11ac (HT80)		
Channel Number	Channel	Frequency (MHz)
155	/	5775

2.4. DESCRIPTION OF TEST SETUP

Operation of EUT during conducted testing and radiation below 1GHz testing:



Operation of EUT during radiation above 1GHz testing:



PC information
Model: TP00067A
Input: DC20V, 2.25-3.25A
Output: 5VDC, 0.5A

The sample was placed (0.8m below 1GHz, 1.5m above 1GHz) above the ground plane of 3m chamber. Measurements in both horizontal and vertical polarities were performed. During the test, each emission was maximized by: having the EUT continuously working, investigated all operating modes, rotated about all 3 axis (X, Y & Z) and considered typical configuration to obtain worst position, manipulating interconnecting cables, rotating the turntable, varying antenna height from 1m to 4m in both horizontal and vertical polarizations. The emissions worst-case are shown in Test Results of the following pages. The worst case is X position.

3. GENERA INFORMATION

3.1. TEST ENVIRONMENT AND MODE

Operating Environment:	
Temperature:	25.0 °C
Humidity:	56 % RH
Atmospheric Pressure:	1010 mbar
Test Mode:	
Engineering mode:	Keep the EUT in continuous transmitting by select channel and modulations(The value of duty cycle is 100%)
The sample was placed 0.8m/1.5m for blow/above 1GHz above the ground plane of 3m chamber. Measurements in both horizontal and vertical polarities were performed. During the test, each emission was maximized by: having the EUT continuously working, investigated all operating modes, rotated about all 3 axis (X, Y & Z) and considered typical configuration to obtain worst position, manipulating interconnecting cables, rotating the turntable, varying antenna height from 1m to 4m in both horizontal and vertical polarizations. The emissions worst-case are shown in Test Results of the following pages.	

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	6 Mbps
802.11n(HT20)	MCS0
802.11n(HT40)	MCS0
802.11ac(HT20)/ac(HT40)/ac(HT80)	MCS0
Final Test Mode:	
Operation mode:	Keep the EUT in continuous transmitting with modulation

3.2. DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Equipment	Model No.	Serial No.	FCC ID	Trade Name
/	/	/	/	/

Note:

1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.

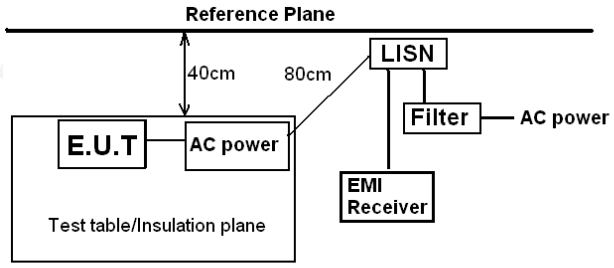
2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.

3. For conducted measurements (Output Power, Emission Bandwidth, Power Spectral Density, Spurious Emissions), the antenna of EUT is connected to the test equipment via temporary antenna connector, the antenna connector is soldered on the antenna port of EUT, and the temporary antenna connector is listed in the Test Instruments.

4. TEST RESULTS AND MEASUREMENT DATA

4.1. CONDUCTED EMISSION

4.1.1. Test Specification

<table>
<tr><td>Test Requirement:</td><td>FCC Part15 C Section 15.207</td></tr>
<tr><td>Test Method:</td><td>ANSI C63.10:2013</td></tr>
<tr><td>Frequency Range:</td><td>150 kHz to 30 MHz</td></tr>
<tr><td>Receiver setup:</td><td>RBW=9 kHz, VBW=30 kHz, Sweep time=auto</td></tr>
<tr><td>Limits:</td><td>
<table>
<tr><td rowspan="2">Frequency range (MHz)</td><td colspan="2">Limit (dBuV)</td></tr>
<tr><td>Quasi-peak</td><td>Average</td></tr>
<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>
</table>
</td></tr>
<tr><td>Test Setup:</td><td> 

Remark:
E.U.T: Equipment Under Test
LISN: Line Impedence Stabilization Network
Test table height=0.8m</td></tr>
<tr><td>Test Mode:</td><td>TX Mode</td></tr>
<tr><td>Test Procedure:</td><td>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.</td></tr>
<tr><td>Test Result:</td><td>PASS</td></tr>
</table>

4.1.2. Test Instruments

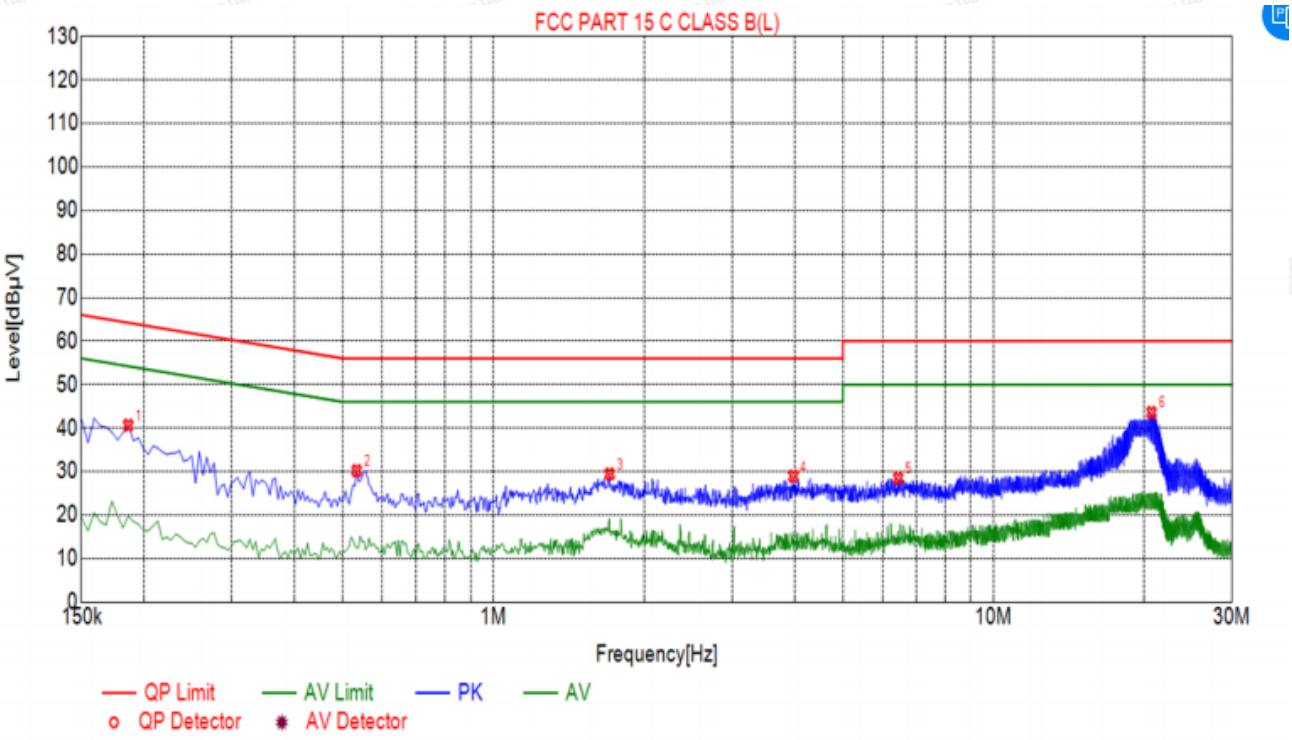
Conducted Emission Shielding Room Test Site (843)					
Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Date**	**Calibration Due**
Receiver	R&S	ESCI 7	HKE-010	Dec. 09, 2021	Dec. 08, 2022
LISN	R&S	ENV216	HKE-002	Dec. 09, 2021	Dec. 08, 2022
Coax cable (9KHz-30MHz)	Times	381806-002	N/A	Dec. 09, 2021	Dec. 08, 2022
Conducted test software	Tonscend	TS+ Rev 2.5.0.0	HKE-081	N/A	N/A

Note: *The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).*

4.1.3. Test data

All the test modes completed for test. only the worst result was reported as below:

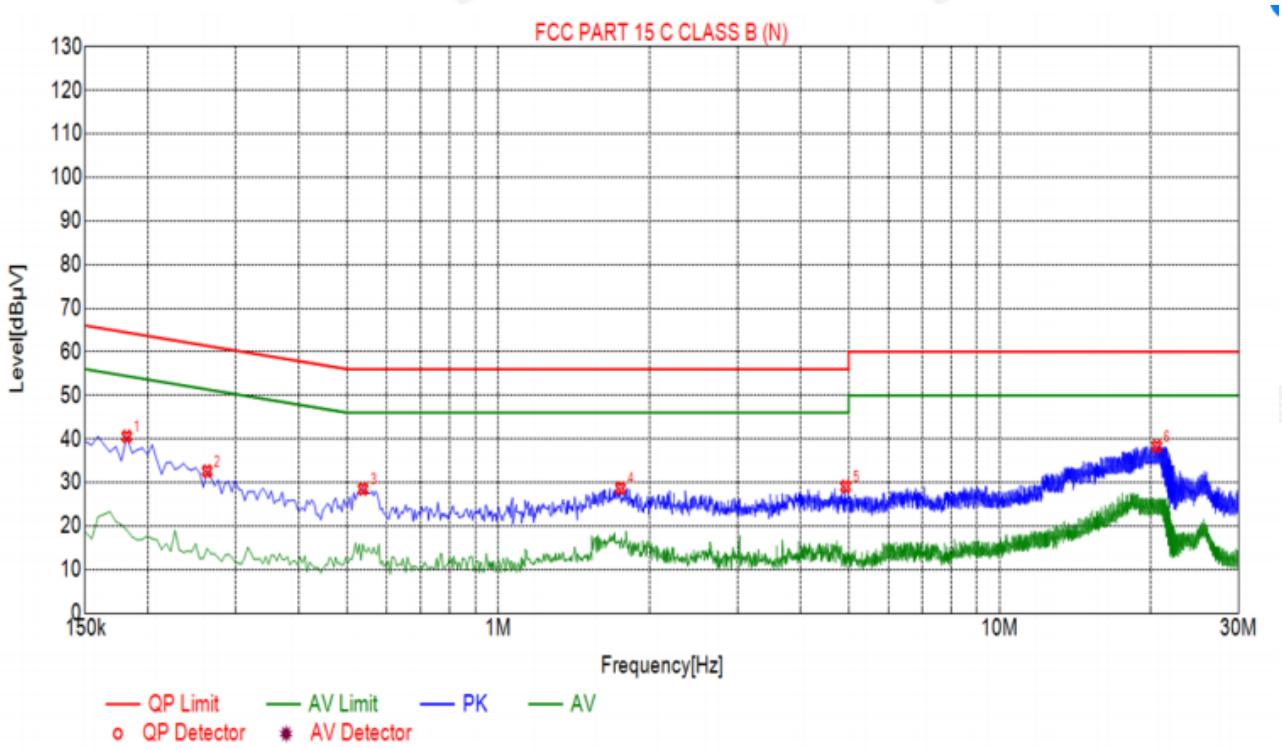
Conducted Emission on Line Terminal of the power line (150 kHz to 30MHz)



Suspected List								
NO.	Freq. [MHz]	Level [dBµV]	Factor [dB]	Limit [dBµV]	Margin [dB]	Reading [dBµV]	Detector	Type
1	0.1860	40.65	20.05	64.21	23.56	20.60	PK	L
2	0.5325	30.21	20.05	56.00	25.79	10.16	PK	L
3	1.7070	29.44	20.13	56.00	26.56	9.31	PK	L
4	3.9795	28.94	20.25	56.00	27.06	8.69	PK	L
5	6.4455	28.45	20.22	60.00	31.55	8.23	PK	L
6	20.7015	43.58	20.13	60.00	16.42	23.45	PK	L

Remark: Margin = Limit – Level
Correction factor = Cable lose + LISN insertion loss
Level=Test receiver reading + correction factor

Conducted Emission on Neutral Terminal of the power line (150 kHz to 30MHz)

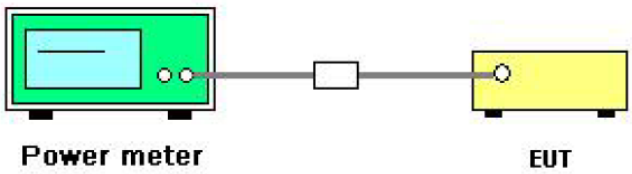


Suspected List								
NO.	Freq. [MHz]	Level [dBµV]	Factor [dB]	Limit [dBµV]	Margin [dB]	Reading [dBµV]	Detector	Type
1	0.1815	40.54	20.06	64.42	23.88	20.48	PK	N
2	0.2625	32.61	20.03	61.35	28.74	12.58	PK	N
3	0.5370	28.51	20.05	56.00	27.49	8.46	PK	N
4	1.7520	28.67	20.14	56.00	27.33	8.53	PK	N
5	4.9290	29.08	20.26	56.00	26.92	8.82	PK	N
6	20.5845	38.29	20.12	60.00	21.71	18.17	PK	N

Remark: Margin = Limit – Level
Correction factor = Cable lose + LISN insertion loss
Level=Test receiver reading + correction factor

4.2. MAXIMUM CONDUCTED OUTPUT POWER

4.2.1. Test Specification

Test Requirement:	FCC Part15 E Section 15.407(a)
Test Method:	KDB789033 D02 General UNII Test Procedures New Rules v02.r01 Section E
Limit:	Frequency Band (MHz) / Limit 5725-5850 / 1 W
Test Setup:	
Test Mode:	Transmitting mode with modulation
Test Procedure:	1. The testing follows the Measurement Procedure of KDB789033 D02 General UNII Test Procedures New Rules v02r01 Section E, 3, a. 2. The RF output of EUT was connected to the power meter by RF cable and attenuator. The path loss was compensated to the results for each measurement. 3. Set to the maximum power setting and enable the EUT transmit continuously. 4. Measure the conducted output power and record the results in the test report.
Test Result:	PASS
Remark:	Conducted output power= measurement power +10log(1/x) X is duty cycle=1, so 10log(1/1)=0 Conducted output power= measurement power

4.2.2. Test Instruments

RF Test Room					
Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Date**	**Calibration Due**
Spectrum analyzer	Agilent	N9020A	HKE-048	Dec. 09, 2021	Dec. 08, 2022
Power meter	Agilent	E4419B	HKE-085	Dec. 09, 2021	Dec. 08, 2022
Power Sensor	Agilent	E9300A	HKE-086	Dec. 09, 2021	Dec. 08, 2022
RF cable	Times	1-40G	HKE-034	Dec. 09, 2021	Dec. 08, 2022
RF automatic control unit	Tonscend	JS0806-2	HKE-060	Dec. 09, 2021	Dec. 08, 2022

Note: *The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).*

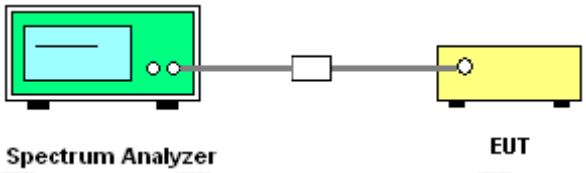
4.2.3. Test Data

Configuration Band IV (5725 - 5850 MHz)					
Mode	Test channel	Maximum Conducted Output Power (dBm)		FCC Limit (dBm)	Result
		Antenna port 1	Antenna port 2		
11a	CH149	5.86	5.96	30	PASS
11a	CH157	5.36	5.81	30	PASS
11a	CH165	5.67	5.63	30	PASS
11n(HT20)	CH149	5.74	5.33	30	PASS
11n(HT20)	CH157	6.20	5.01	30	PASS
11n(HT20)	CH165	6.46	5.22	30	PASS
11n(HT40)	CH151	6.72	5.62	30	PASS
11n(HT40)	CH159	5.23	4.18	30	PASS
11ac(HT20)	CH149	5.81	5.57	30	PASS
11ac(HT20)	CH157	5.20	4.13	30	PASS
11ac(HT20)	CH165	5.54	6.24	30	PASS
11ac(HT40)	CH151	5.23	6.08	30	PASS
11ac(HT40)	CH159	5.63	6.22	30	PASS
11ac(HT80)	CH155	5.71	5.47	30	PASS

Configuration Band IV (5725 - 5850 MHz)				
Mode	Test channel	Maximum Conducted Output Power (dBm)	FCC Limit (dBm)	Result
		MIMO		
11n(HT20)	CH149	8.55	30	PASS
11n(HT20)	CH157	8.66	30	PASS
11n(HT20)	CH165	8.89	30	PASS
11n(HT40)	CH151	9.22	30	PASS
11n(HT40)	CH159	7.75	30	PASS
11ac(HT20)	CH149	8.70	30	PASS
11ac(HT20)	CH157	7.71	30	PASS
11ac(HT20)	CH165	8.91	30	PASS
11ac(HT40)	CH151	8.69	30	PASS
11ac(HT40)	CH159	8.95	30	PASS
11ac(HT80)	CH155	8.60	30	PASS

4.3. 6DB EMISSION BANDWIDTH

4.3.1. Test Specification

Test Requirement:	FCC CFR47 Part 15 Section 15.407(e)
Test Method:	KDB789033 D02 General UNII Test Procedures New Rules v01r04 Section C
Limit:	>500kHz
Test Setup:	
Test Mode:	Transmitting mode with modulation
Test Procedure:	1. KDB789033 D02 General UNII Test Procedures New Rules v01r04 Section C. 2. Set to the maximum power setting and enable the EUT transmit continuously. 3. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 100 kHz. Set the Video bandwidth (VBW) = 300 kHz. In order to make an accurate measurement. The 6dB bandwidth must be greater than 500 kHz. 4. Measure and record the results in the test report.
Test Result:	PASS

4.3.2. Test Instruments

RF Test Room					
Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Date**	**Calibration Due**
Spectrum analyzer	Agilent	N9020A	HKE-048	Dec. 09, 2021	Dec. 08, 2022
RF cable	Times	1-40G	HKE-034	Dec. 09, 2021	Dec. 08, 2022
RF automatic control unit	Tonscend	JS0806-2	HKE-060	Dec. 09, 2021	Dec. 08, 2022

Note: *The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).*

4.3.3. Test data

ANT 1

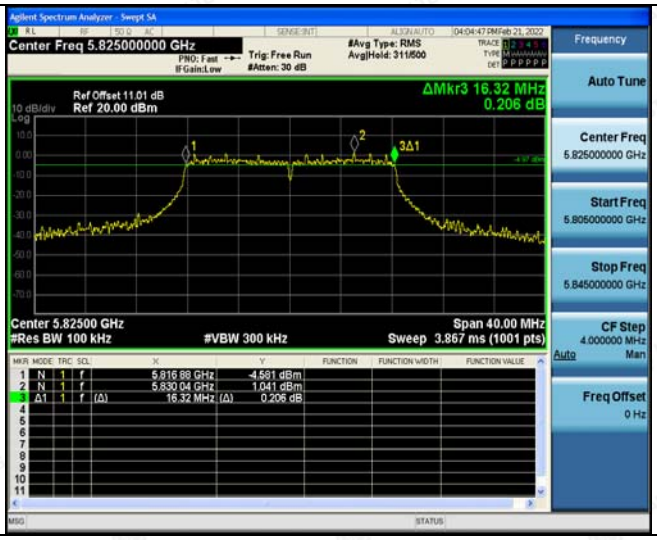
Band IV (5725 - 5850 MHz)					
Mode	Test channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Limit (MHz)	Result
11a	CH149	5745	16.320	0.5	PASS
11a	CH157	5785	16.320	0.5	PASS
11a	CH165	5825	16.320	0.5	PASS
11n(HT20)	CH149	5745	16.920	0.5	PASS
11n(HT20)	CH157	5785	16.840	0.5	PASS
11n(HT20)	CH165	5825	16.880	0.5	PASS
11n(HT40)	CH151	5755	35.760	0.5	PASS
11n(HT40)	CH159	5795	35.600	0.5	PASS
11ac(HT20)	CH149	5745	17.040	0.5	PASS
11ac(HT20)	CH157	5785	16.640	0.5	PASS
11ac(HT20)	CH165	5825	16.520	0.5	PASS
11ac(HT40)	CH151	5755	35.600	0.5	PASS
11ac(HT40)	CH159	5795	35.760	0.5	PASS
11ac(HT80)	CH155	5775	75.200	0.5	PASS

Test plots as follows:

Band IV (5725 – 5850 MHz)

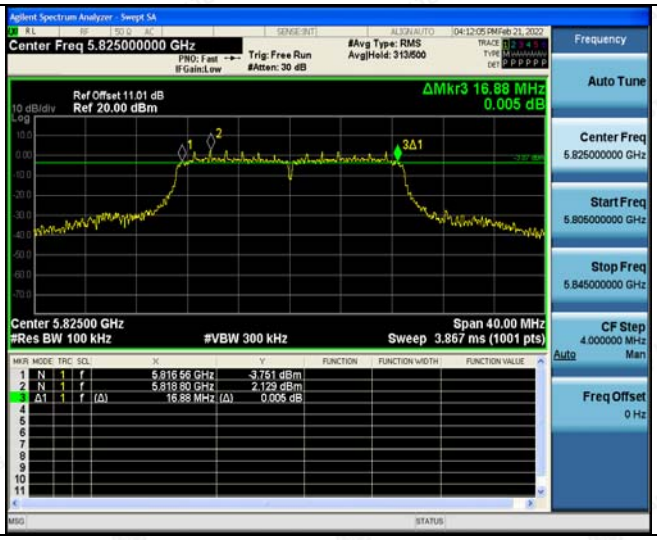
802.11a

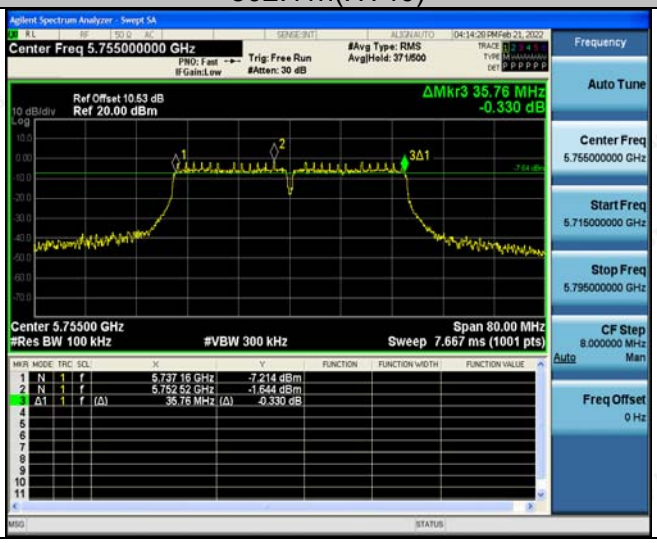
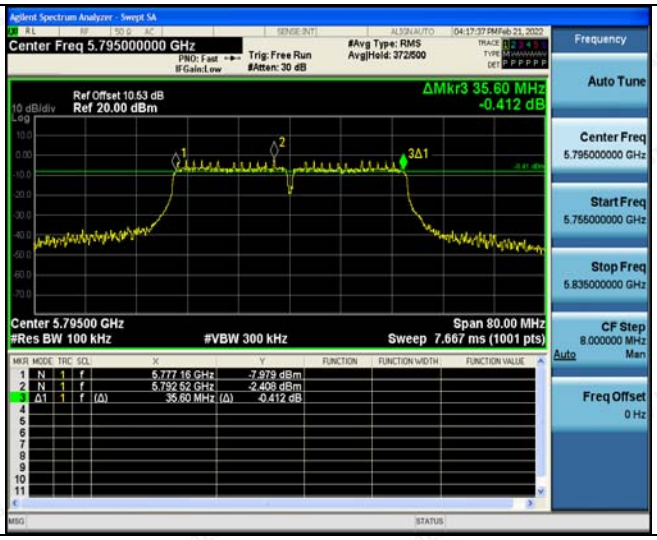
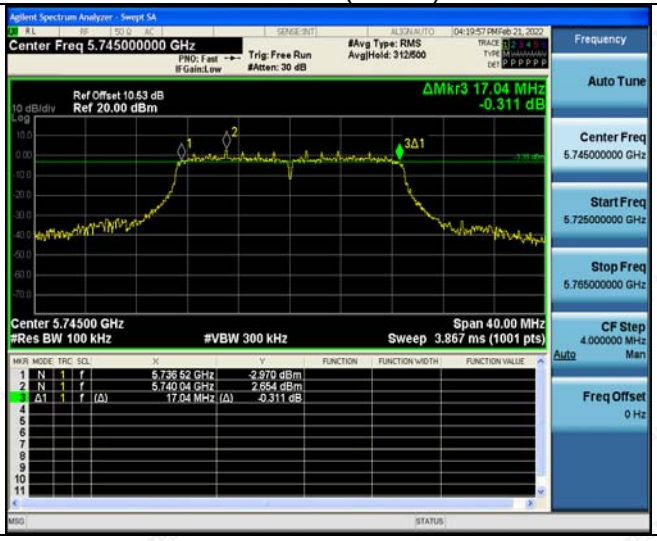
Low

Mid

High

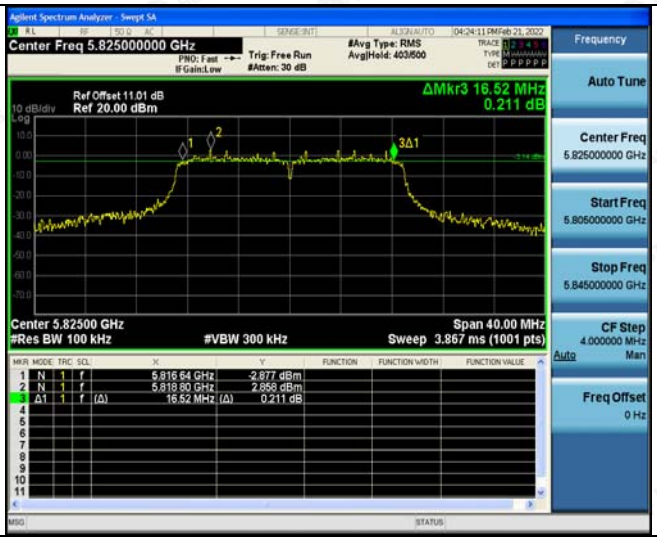
802.11n(HT20)

Low

Mid

High

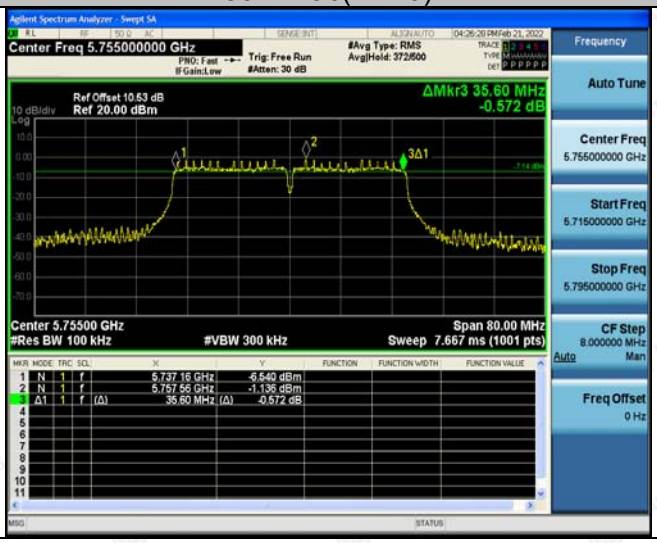
802.11n(HT40)

Low

High
802.11ac(HT20)

Low

Mid

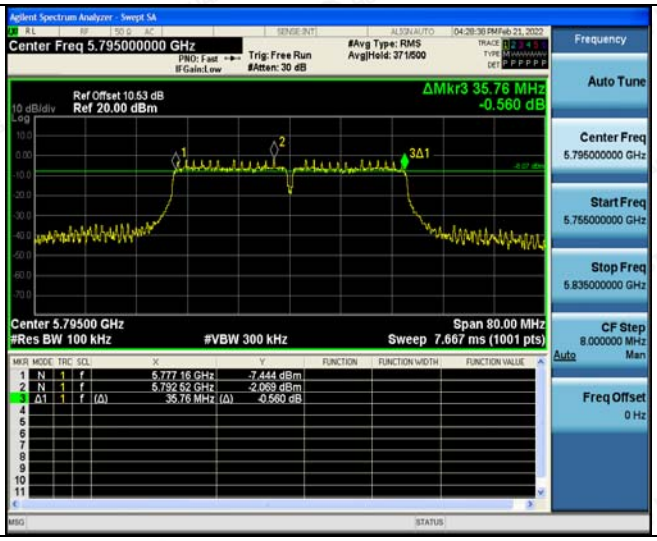


High

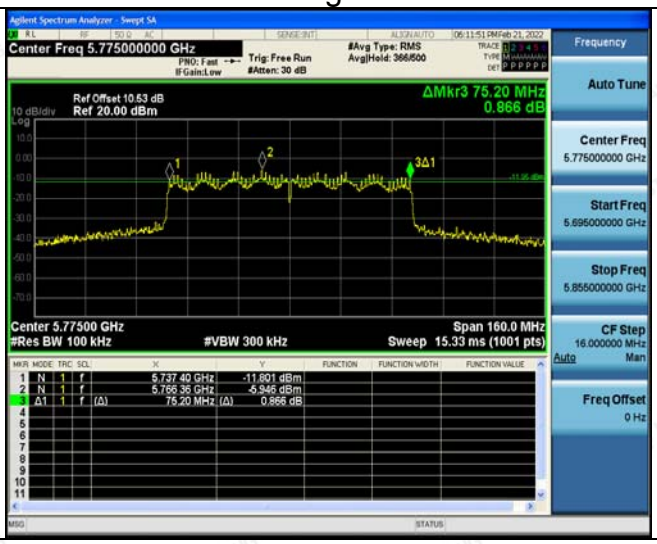
802.11ac(HT40)



Low



High



802.11ac(HT80)

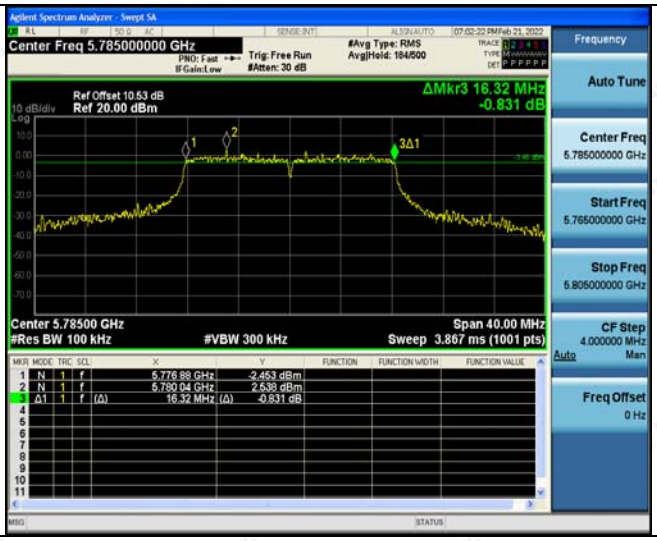
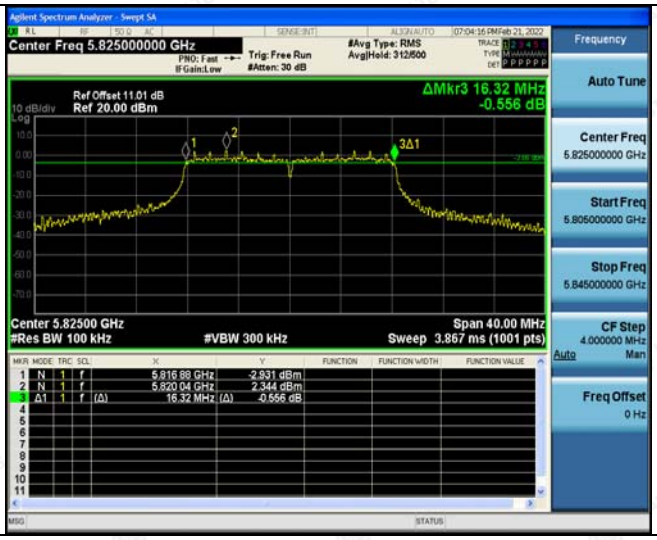
ANT 2

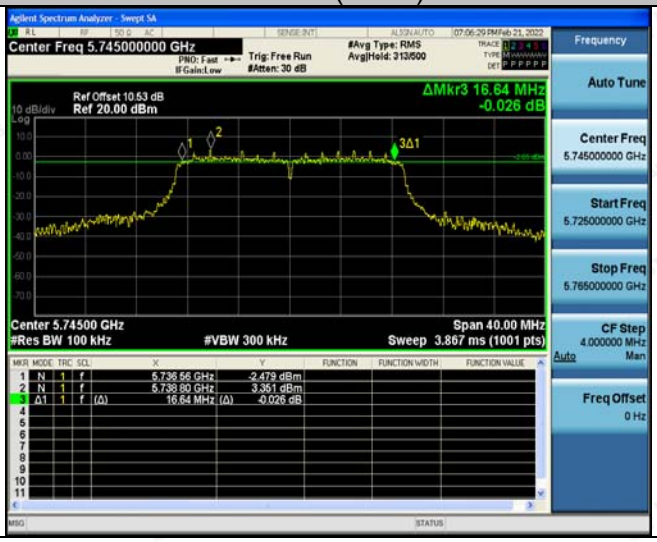
Band IV (5725 - 5850 MHz)					
Mode	Test channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Limit (MHz)	Result
11a	CH149	5745	16.320	0.5	PASS
11a	CH157	5785	16.320	0.5	PASS
11a	CH161	5825	16.320	0.5	PASS
11n(HT20)	CH149	5745	16.640	0.5	PASS
11n(HT20)	CH157	5785	17.040	0.5	PASS
11n(HT20)	CH161	5825	16.560	0.5	PASS
11n(HT40)	CH151	5755	35.680	0.5	PASS
11n(HT40)	CH159	5795	35.600	0.5	PASS
11ac(HT20)	CH149	5745	16.880	0.5	PASS
11ac(HT20)	CH157	5785	16.920	0.5	PASS
11ac(HT20)	CH165	5825	16.960	0.5	PASS
11ac(HT40)	CH151	5755	35.600	0.5	PASS
11ac(HT40)	CH159	5795	35.440	0.5	PASS
11ac(HT80)	CH155	5755	75.200	0.5	PASS

Test plots as follows:

Band IV (5725 – 5850 MHz)

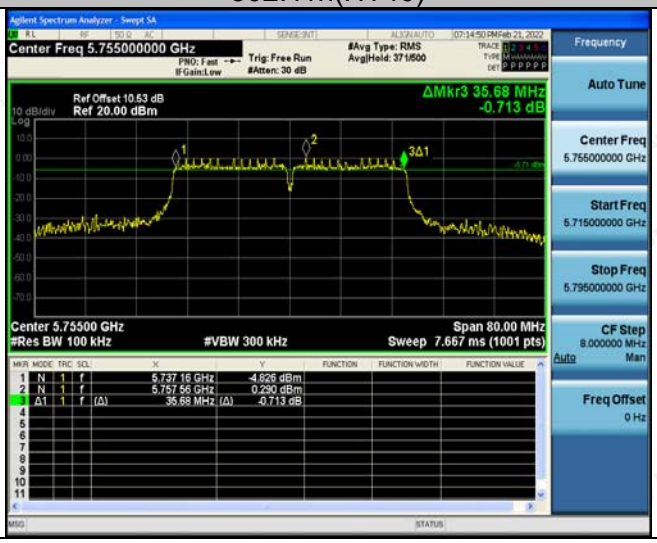
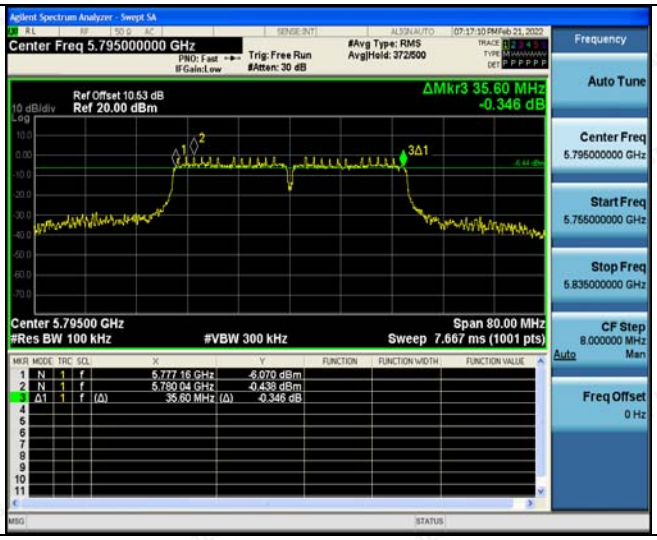
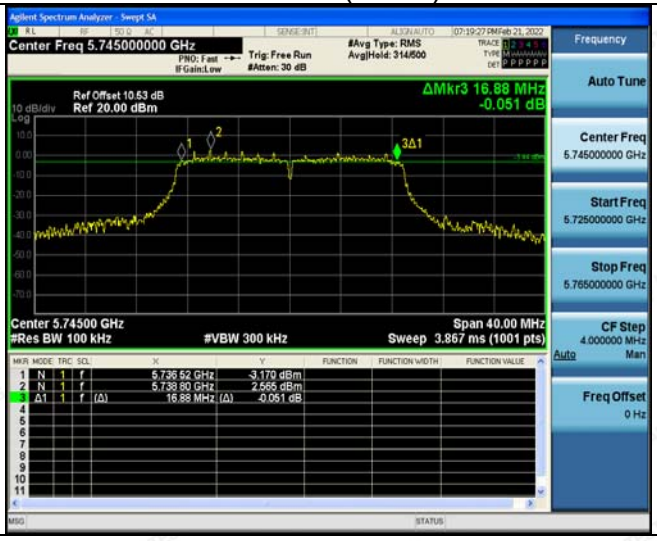
802.11a

Low

Mid

High

802.11n(HT20)

Low

Mid

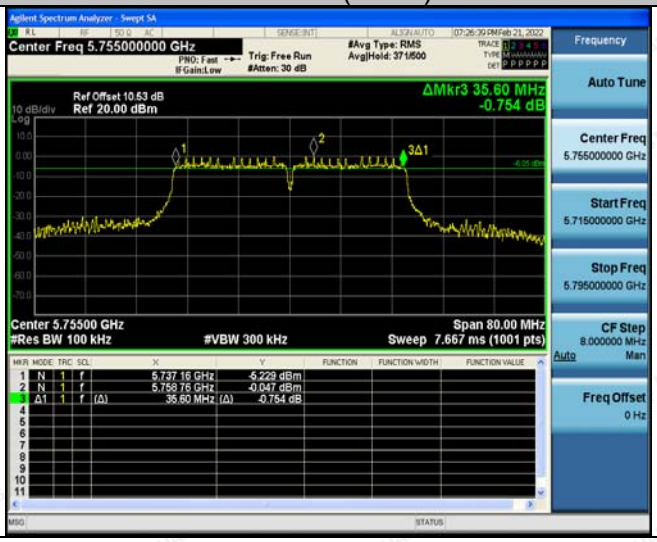
High

802.11n(HT40)

Low

High
802.11ac(HT20)

Low

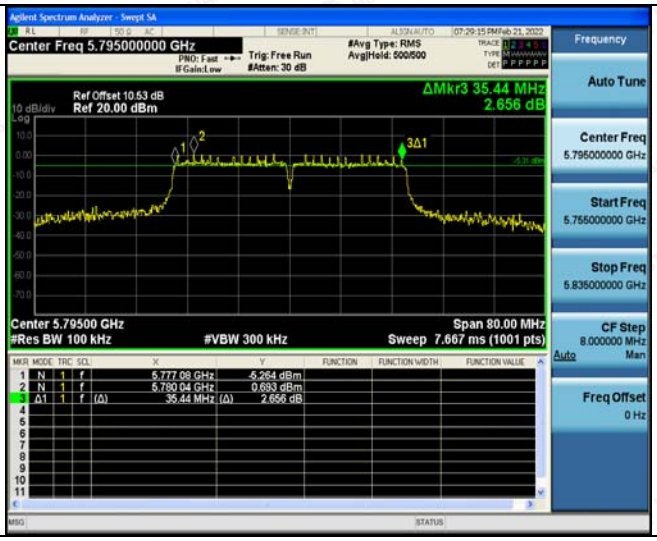
Mid

High

802.11ac(HT40)

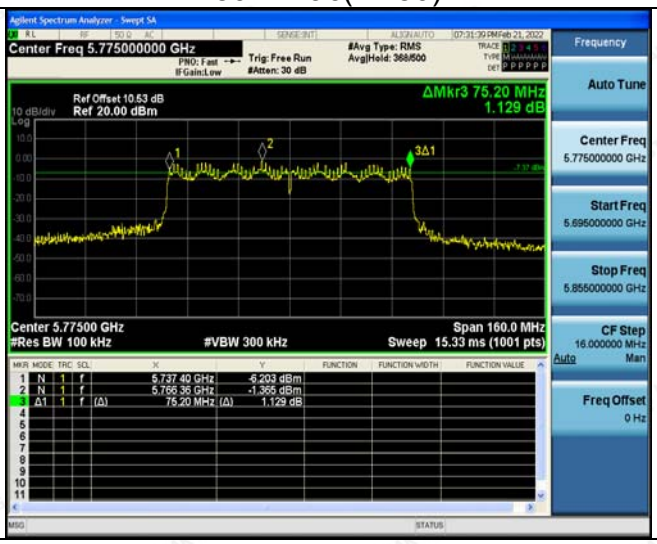


Low



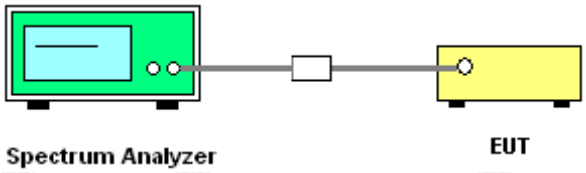
High

802.11ac(HT80)



4.4. 26DB BANDWIDTH AND 99% OCCUPIED BANDWIDTH

4.4.1. Test Specification

Test Requirement:	47 CFR Part 15C Section 15.407 (a)
Test Method:	KDB789033 D02 General UNII Test Procedures New Rules v02r01 Section C
Limit:	No restriction limits
Test Setup:	
Test Mode:	Transmitting mode with modulation
Test Procedure:	1. KDB789033 D02 General UNII Test Procedures New Rules v02r01 Section C. 2. Set to the maximum power setting and enable the EUT transmit continuously. 3. Make the measurement with the spectrum analyzer's resolution bandwidth RBW = 1% EBW, VBW≥3RBW, In order to make an accurate measurement. 4. Measure and record the results in the test report.
Test Result:	N/A

4.4.2. Test Instruments

RF Test Room					
Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Date**	**Calibration Due**
Spectrum analyzer	Agilent	N9020A	HKE-048	Dec. 09, 2021	Dec. 08, 2022
RF cable	Times	1-40G	HKE-034	Dec. 09, 2021	Dec. 08, 2022
RF automatic control unit	Tonscend	JS0806-2	HKE-060	Dec. 09, 2021	Dec. 08, 2022

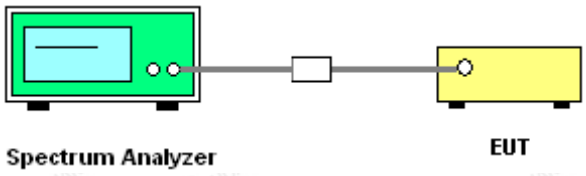
Note: *The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).*

4.4.3. Test Result

N/A

4.5. POWER SPECTRAL DENSITY

4.5.1. Test Specification

Test Requirement:	FCC Part15 E Section 15.407 (a)
Test Method:	KDB789033 D02 General UNII Test Procedures New Rules v02r01 Section F
Limit:	≤30.00dBm/500KHz for Band IV 5725MHz-5850MHz
Test Setup:	
Test Mode:	Transmitting mode with modulation
Test Procedure:	1. Set the spectrum analyzer or EMI receiver span to view the entire emission bandwidth. 2. Set RBW = 510KHz, VBW ⩾ 3*RBW, Sweep time = Auto, Detector = RMS. 3. Allow the sweeps to continue until the trace stabilizes. 4. Use the peak marker function to determine the maximum amplitude level. 5. The E.I.R.P spectral density used radiated test method. At a test site that has been validated using the procedures of ANSI C63.4 or the latest CISPR 16-1-4 for measurements above 1 GHz, so as to simulate a near free-space environment.
Test Result:	PASS

4.5.2. Test Instruments

RF Test Room					
Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Date**	**Calibration Due**
Spectrum analyzer	Agilent	N9020A	HKE-048	Dec. 09, 2021	Dec. 08, 2022
RF cable	Times	1-40G	HKE-034	Dec. 09, 2021	Dec. 08, 2022
RF automatic control unit	Tonscend	JS0806-2	HKE-060	Dec. 09, 2021	Dec. 08, 2022

Note: *The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).*

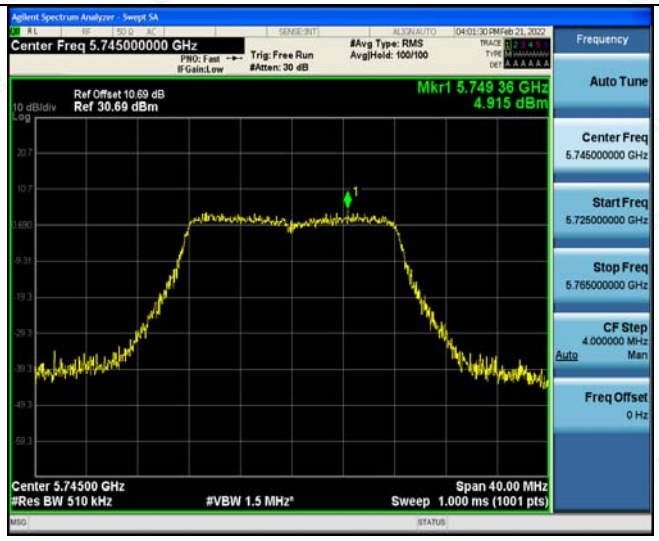
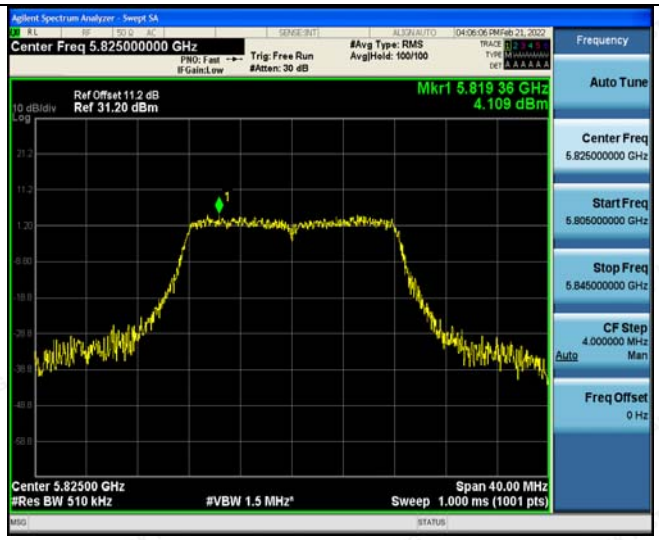
4.5.3. Test data

ANT 1

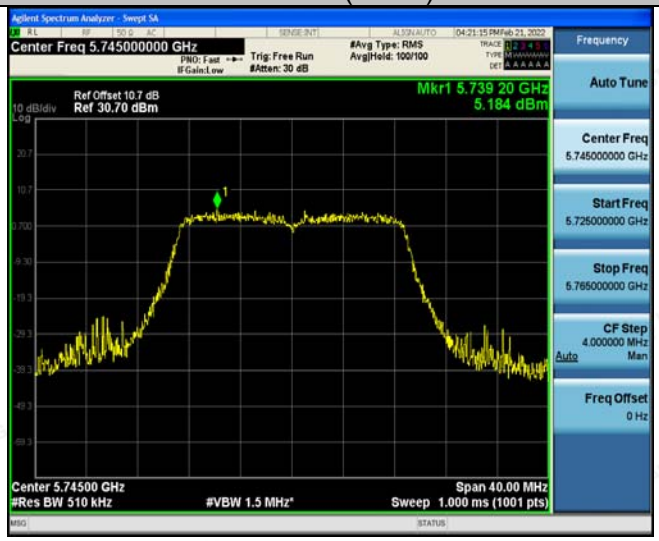
Mode	Test channel	Level [dBm/510kHz]	10log(500/510)	Power Spectral Density(dBm/500kHz)	Limit (dBm/500kHz)	Result
11a	CH149	4.92	-0.086	4.83	30	PASS
11a	CH157	3.75	-0.086	3.66	30	PASS
11a	CH161	4.11	-0.086	4.02	30	PASS
11n(HT20)	CH149	5.37	-0.086	5.28	30	PASS
11n(HT20)	CH157	3.71	-0.086	3.62	30	PASS
11n(HT20)	CH161	5.34	-0.086	5.25	30	PASS
11n(HT40)	CH151	0.86	-0.086	0.77	30	PASS
11n(HT40)	CH159	0.35	-0.086	0.26	30	PASS
11ac(HT20)	CH149	5.18	-0.086	5.09	30	PASS
11ac(HT20)	CH157	3.8	-0.086	3.71	30	PASS
11ac(HT20)	CH161	4.94	-0.086	4.85	30	PASS
11ac(HT40)	CH151	1.53	-0.086	1.44	30	PASS
11ac(HT40)	CH159	1.2	-0.086	1.11	30	PASS
11ac(HT80)	CH155	-3.89	-0.086	-3.98	30	PASS

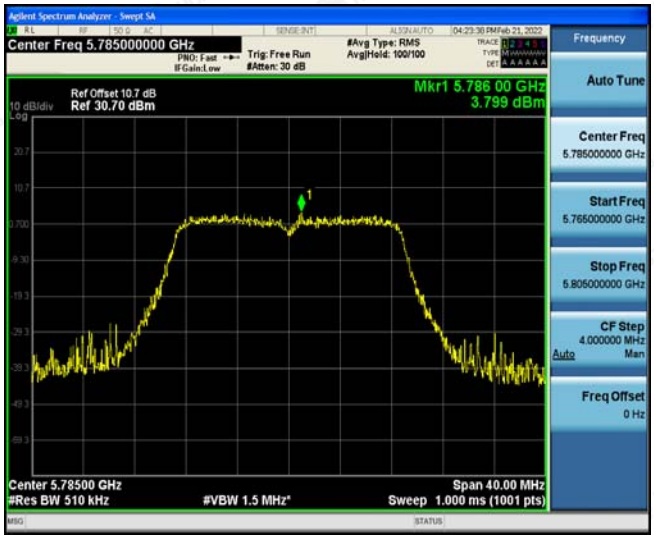
Test plots as follows:

Band IV (5725 – 5850 MHz)

802.11a
 Low
 Mid
 High

802.11n(HT20)
 Low
 Mid
 High

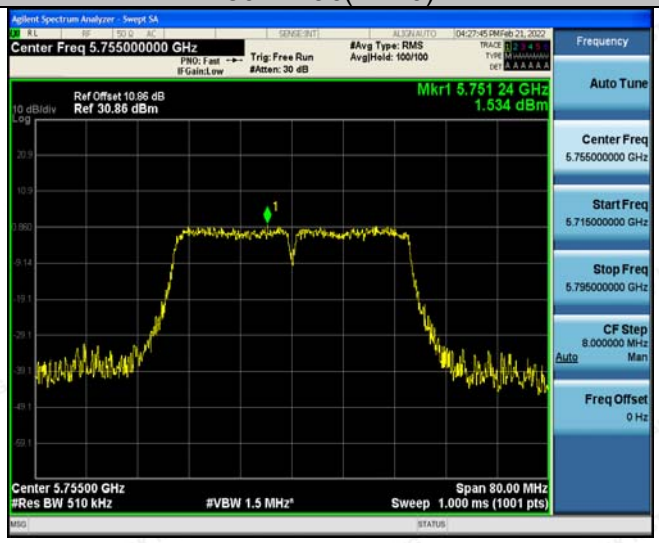
802.11n(HT40)
 Low
 High
802.11ac(HT20)
 Low



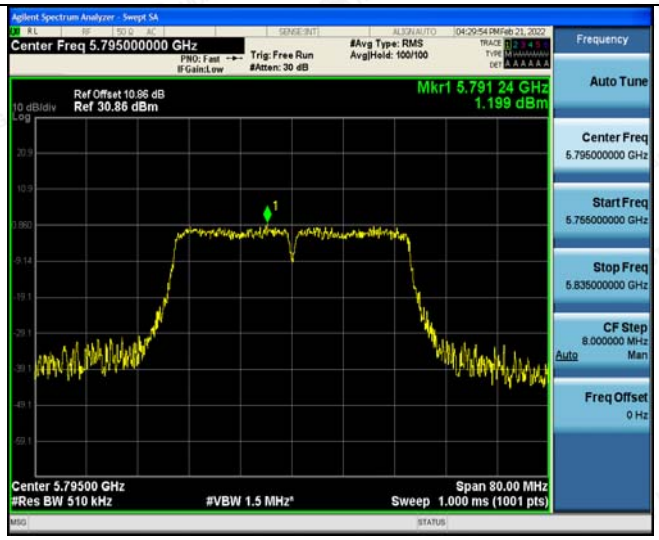
Mid

High

802.11ac(HT40)



Low

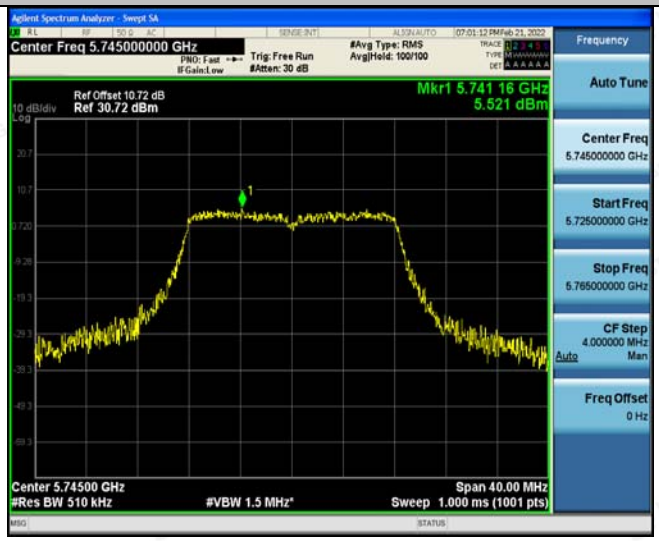

High
802.11ac(HT80)


ANT 2

Configuration Band IV (5725 - 5850 MHz)						
Mode	Test channel	Level [dBm/510kHz]	10log(500/510)	Power Spectral Density(dBm/500kHz)	Limit (dBm/500kHz)	Result
11a	CH149	5.52	-0.086	5.43	30	PASS
11a	CH157	5.96	-0.086	5.87	30	PASS
11a	CH161	5.84	-0.086	5.75	30	PASS
11n(HT20)	CH149	6.14	-0.086	6.05	30	PASS
11n(HT20)	CH157	3.64	-0.086	3.55	30	PASS
11n(HT20)	CH161	5.03	-0.086	4.94	30	PASS
11n(HT40)	CH151	2.95	-0.086	2.86	30	PASS
11n(HT40)	CH159	2.54	-0.086	2.45	30	PASS
11ac(HT20)	CH149	5.09	-0.086	5.00	30	PASS
11ac(HT20)	CH157	3.61	-0.086	3.52	30	PASS
11ac(HT20)	CH161	4.87	-0.086	4.78	30	PASS
11ac(HT40)	CH151	2.43	-0.086	2.34	30	PASS
11ac(HT40)	CH159	2.66	-0.086	2.57	30	PASS
11ac(HT80)	CH155	1.85	-0.086	1.76	30	PASS

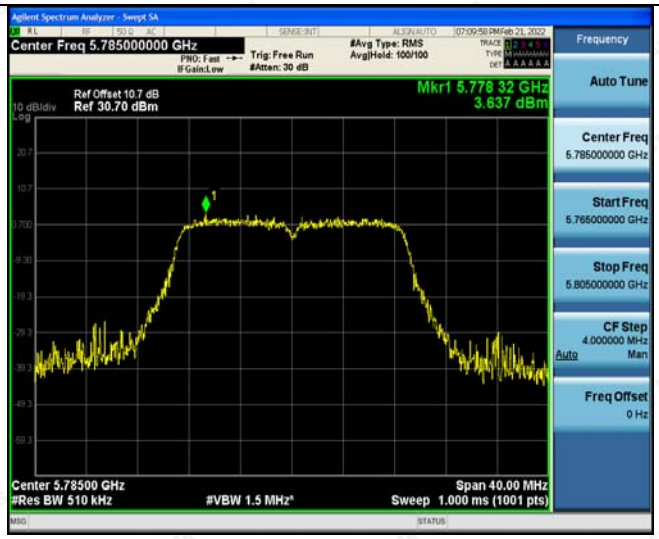
Test plots as follows:

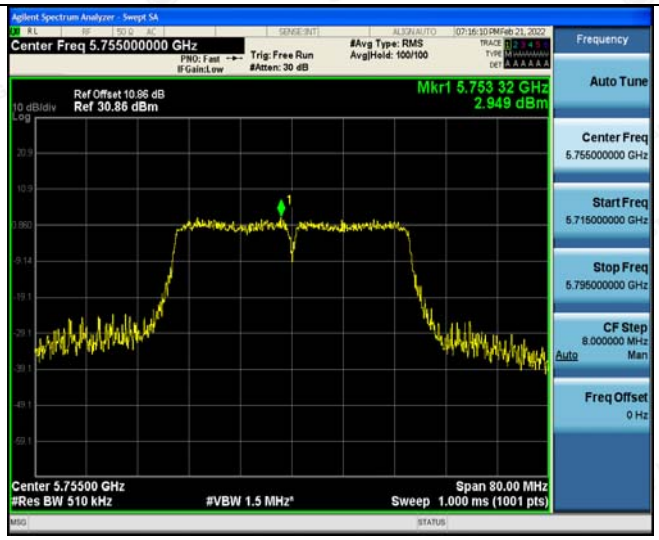
Band IV (5725 – 5850 MHz)

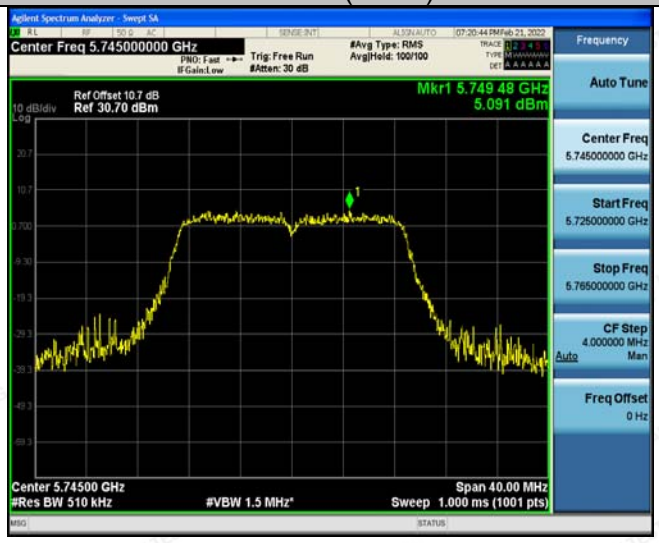
802.11a

Low

Mid

High

802.11n(HT20)
 Low
 Mid
 High

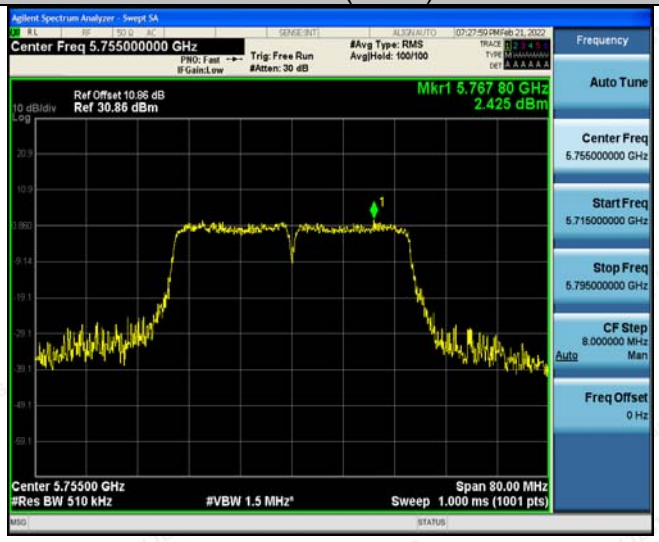
802.11n(HT40)

Low

High
802.11ac(HT20)

Low

Mid

High

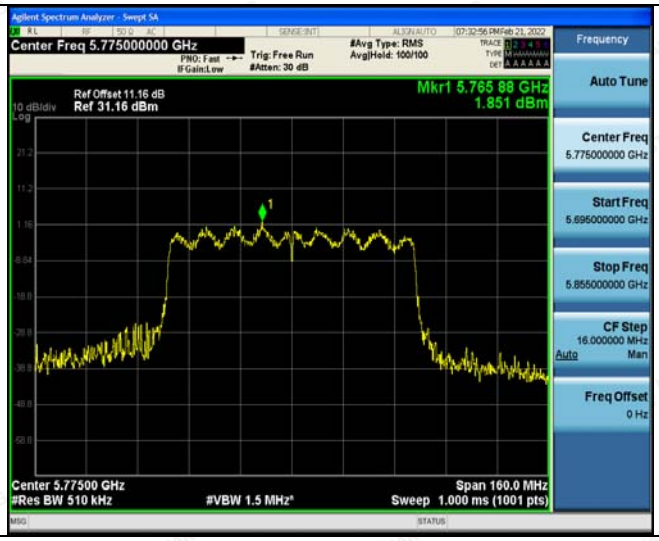
802.11ac(HT40)



Low

High

802.11ac(T80)



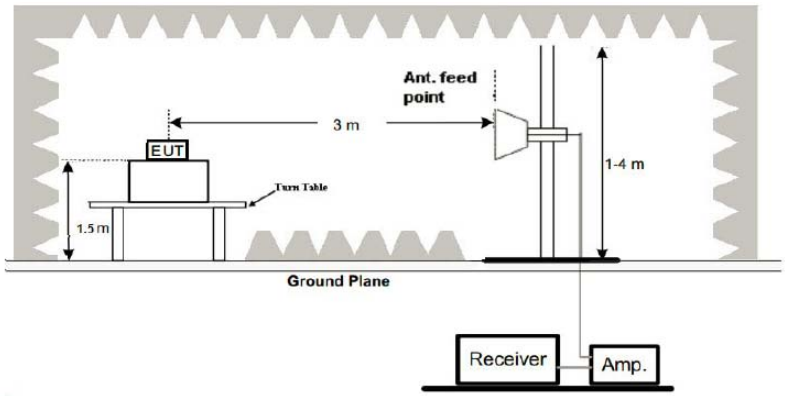
For MIMO antenna port 1+antenna port 2

Configuration Band IV (5725 - 5850 MHz)				
Mode	**Test channel**	**Power Density (dBm/500KHz)**	**Limit (dBm/500KHz)**	**Result**
11n(HT20)	CH149	8.69	29.49	**PASS**
11n(HT20)	CH157	6.60	29.49	**PASS**
11n(HT20)	CH161	8.11	29.49	**PASS**
11n(HT40)	CH151	4.95	29.49	**PASS**
11n(HT40)	CH159	4.50	29.49	**PASS**
11ac(HT20)	CH149	8.06	29.49	**PASS**
11ac(HT20)	CH157	6.63	29.49	**PASS**
11ac(HT20)	CH161	7.83	29.49	**PASS**
11ac(HT40)	CH151	4.92	29.49	**PASS**
11ac(HT40)	CH159	4.91	29.49	**PASS**
11ac(HT80)	CH155	2.79	29.49	**PASS**
Note: 1 According to KDB 662911, Result power = $10\log(10^{(ant1/10)}+10^{(ant2/10)})$. 2. limit=30dBm-(direction gain-6dBi)=29.49dBm				

Note: This product supports antenna 1 and antenna 2 launch, but only support 802.11 n/ac for MIMO mode, not support 802.11 a for MIMO mode.

4.6. BAND EDGE

4.6.1. Test Specification

Test Requirement:	FCC CFR47 Part 15E Section 15.407
Test Method:	ANSI C63.10 2013
Limit:	(1) For transmitters operating in the 5.725-5.85 GHz band: (i) 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. The limit of frequency below 1GHz and which fall in restricted ba nds should complies 15.209.
Test Setup:	
Test Mode:	Transmitting mode with modulation
	1. The EUT was placed on the top of a rotating table 0.8 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.

Test Procedure:	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.
Test Result:	PASS

4.6.2. Test Instruments

Radiated Emission Test Site (966)					
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Date**	**Calibration Due**
Receiver	R&S	ESRP3	HKE-005	Dec. 09, 2021	Dec. 08, 2022
Spectrum analyzer	Agilent	N9020A	HKE-048	Dec. 09, 2021	Dec. 08, 2022
Preamplifier	EMCI	EMC051845SE	HKE-015	Dec. 09, 2021	Dec. 08, 2022
Preamplifier	Agilent	83051A	HKE-016	Dec. 09, 2021	Dec. 08, 2022
Loop antenna	Schwarzbeck	FMZB 1519 B	HKE-014	Dec. 09, 2021	Dec. 08, 2022
Broadband antenna	Schwarzbeck	VULB 9163	HKE-012	Dec. 09, 2021	Dec. 08, 2022
Horn antenna	Schwarzbeck	9120D	HKE-013	Dec. 09, 2021	Dec. 08, 2022
Antenna Mast	Keleto	CC-A-4M	N/A	N/A	N/A
Position controller	Taiwan MF	MF7802	HKE-011	Dec. 09, 2021	Dec. 08, 2022
Radiated test software	Tonscend	TS+ Rev 2.5.0.0	HKE-082	N/A	N/A
RF cable (9KHz-1GHz)	Times	381806-001	N/A	N/A	N/A
Hf antenna	Schwarzbeck	LB-180400-KF	HKE-031	Dec. 09, 2021	Dec. 08, 2022
RF cable	Tonscend	1-18G	HKE-099	Dec. 09, 2021	Dec. 08, 2022
RF cable	Times	1-40G	HKE-034	Dec. 09, 2021	Dec. 08, 2022
Horn Antenna	Schewarzbeck	BBHA 9170	HKE-017	Dec. 09, 2021	Dec. 08, 2022
Spectrum analyzer	R&S	FSP40	HKE-025	Dec. 09, 2021	Dec. 08, 2022

Note: *The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).*

4.6.3. Test Data

ANT 1

Operation Mode: 802.11a Mode with 5.8G TX CH Low

Horizontal:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
5650	51.84	-2.06	49.78	68.2	-18.42	peak
5700	89.6	-1.96	87.64	105.2	-17.56	peak
5720	93.16	-2.87	90.29	110.8	-20.51	peak
5725	106.85	-2.14	104.71	122.2	-17.49	peak
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

Vertical:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
5650	52.68	-2.06	50.62	68.2	-17.58	peak
5700	89.78	-1.96	87.82	105.2	-17.38	peak
5720	95.06	-2.87	92.19	110.8	-18.61	peak
5725	105.92	-2.14	103.78	122.2	-18.42	peak
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

Operation Mode: TX CH High with 5.8G

Horizontal:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
5850	105.02	-1.97	103.05	122.2	-19.15	peak
5855	94.44	-2.13	92.31	110.8	-18.49	peak
5875	91.32	-2.65	88.67	105.2	-16.53	peak
5925	53.17	-2.28	50.89	68.2	-17.31	peak
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

Vertical:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
5850	91.61	-1.97	89.64	122.2	-32.56	peak
5855	90.53	-2.13	88.4	110.8	-22.4	peak
5875	82.55	-2.65	79.9	105.2	-25.3	peak
5925	51.81	-2.28	49.53	68.2	-18.67	peak
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

Operation Mode: 802.11n20 Mode with 5.8G TX CH Low

Horizontal:

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
5650	56.21	-2.06	54.15	68.2	-14.05	peak
5700	86.23	-1.96	84.27	105.2	-20.93	peak
5720	90.19	-2.87	87.32	110.8	-23.48	peak
5725	95.37	-2.14	93.23	122.2	-28.97	peak
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

Vertical:

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
5650	60.17	-2.06	58.11	68.2	-10.09	peak
5700	94.26	-1.96	92.3	105.2	-12.9	peak
5720	93.39	-2.87	90.52	110.8	-20.28	peak
5725	94.31	-2.14	92.17	122.2	-30.03	peak
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

Operation Mode: TX CH High with 5.8G

Horizontal:

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
5850	95.08	-1.97	93.11	122.2	-29.09	peak
5855	94.11	-2.13	91.98	110.8	-18.82	peak
5875	86.99	-2.65	84.34	105.2	-20.86	peak
5925	51.4	-2.28	49.12	68.2	-19.08	peak
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

Vertical:

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
5850	93.47	-1.97	91.5	122.2	-30.7	peak
5855	91.24	-2.13	89.11	110.8	-21.69	peak
5875	83.24	-2.65	80.59	105.2	-24.61	peak
5925	54.21	-2.28	51.93	68.2	-16.27	peak
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

Operation Mode: 802.11n40 Mode with 5.8G TX CH Low

Horizontal:

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
5650	54.15	-2.06	52.09	68.2	-16.11	peak
5700	90.25	-1.96	88.29	105.2	-16.91	peak
5720	93.58	-2.87	90.71	110.8	-20.09	peak
5725	97.79	-2.14	95.65	122.2	-26.55	peak
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

Vertical:

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
5650	58.62	-2.06	56.56	68.2	-11.64	peak
5700	93.25	-1.96	91.29	105.2	-13.91	peak
5720	86.95	-2.87	84.08	110.8	-26.72	peak
5725	92.42	-2.14	90.28	122.2	-31.92	peak
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

Operation Mode: TX CH High with 5.8G

Horizontal:

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
5850	95.38	-1.97	93.41	122.2	-28.79	peak
5855	91.77	-2.13	89.64	110.8	-21.16	peak
5875	83.23	-2.65	80.58	105.2	-24.62	peak
5925	52.77	-2.28	50.49	68.2	-17.71	peak
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

Vertical:

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
5850	96.86	-1.97	94.89	122.2	-27.31	peak
5855	89.52	-2.13	87.39	110.8	-23.41	peak
5875	82.94	-2.65	80.29	105.2	-24.91	peak
5925	51.02	-2.28	48.74	68.2	-19.46	peak
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

Operation Mode: 802.11ac20 Mode with 5.8G TX CH Low

Horizontal:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
5650	54.18	-2.06	52.12	68.2	-16.08	peak
5700	85.02	-1.96	83.06	105.2	-22.14	peak
5720	86.34	-2.87	83.47	110.8	-27.33	peak
5725	103.44	-2.14	101.3	122.2	-20.9	peak
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

Vertical:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
5650	53.29	-2.06	51.23	68.2	-16.97	peak
5700	90.29	-1.96	88.33	105.2	-16.87	peak
5720	90.19	-2.87	87.32	110.8	-23.48	peak
5725	96.51	-2.14	94.37	122.2	-27.83	peak
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

Operation Mode: TX CH High with 5.8G

Horizontal:

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
5850	105.64	-1.97	103.67	122.2	-18.53	peak
5855	95.35	-2.13	93.22	110.8	-17.58	peak
5875	87.19	-2.65	84.54	105.2	-20.66	peak
5925	51.21	-2.28	48.93	68.2	-19.27	peak
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

Vertical:

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
5850	94.56	-1.97	92.59	122.2	-29.61	peak
5855	89.46	-2.13	87.33	110.8	-23.47	peak
5875	90.84	-2.65	88.19	105.2	-17.01	peak
5925	54.57	-2.28	52.29	68.2	-15.91	peak
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.						