



FCC Test Report

**Test report
On Behalf of
Shenzhen Yunlink Technology Co., Ltd
For
Access Point
Model No.: HWAP-AX880, AX880, AX-HQ880
FCC ID: 2ADUG-HWAP-AX880**

Prepared For : Shenzhen Yunlink Technology Co., Ltd
B3 Building, An'le Industrial Zone, Hangcheng Road, gushu, xixiang town, Baoan,
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Date of Test: Jun. 05, 2023 ~ Jul. 05, 2023

Date of Report: Jul. 05, 2023

Report Number: HK2306052297-2E



Test Result Certification

Applicant's name: Shenzhen Yunlink Technology Co., Ltd
Address: B3 Building, An'le Industrial Zone, Hangcheng Road, gushu, xixiang town, Baoan, Shenzhen Guangdong Province, China
Manufacture's Name.....: Shenzhen Yunlink Technology Co., Ltd
Address: B3 Building, An'le Industrial Zone, Hangcheng Road, gushu, xixiang town, Baoan, Shenzhen Guangdong Province, China

Product description

Trade Mark: N/A
Product name.....: Access Point
Model and/or type reference ..: HWAP-AX880, AX880, AX-HQ880
Standards: FCC Rules and Regulations Part 15 Subpart E Section 15.407
ANSI C63.10: 2013

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Date of Test:
Date (s) of performance of tests: Jun. 05, 2023 ~ Jul. 05, 2023
Date of Issue.....: Jul. 05, 2023
Test Result.....: Pass

Prepared by:

Project Engineer

Reviewed by:

Project Supervisor

Approved by:

Technical Director



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**** Modified History ****

Revision	Description	Issued Data	Remark
Revision 1.0	Initial Test Report Release	Jul. 05, 2023	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)	N/A
26dB Emission Bandwidth & 99% Occupied Bandwidth	§15.407(a)	PASS
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 HUAKE 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 $y \pm U$, where expanded 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	$\pm 0.37\text{dB}$
2	RF power, conducted	$\pm 3.35\text{dB}$
3	Spurious emissions, conducted	$\pm 2.20\text{dB}$
4	All emissions, radiated(<1G)	$\pm 3.90\text{dB}$
5	All emissions, radiated(>1G)	$\pm 4.28\text{dB}$
6	Temperature	$\pm 0.1^{\circ}\text{C}$
7	Humidity	$\pm 1.0\%$



2. EUT Description

2.1. General Description of EUT

Equipment	Access Point
Model Name	HWAP-AX880
Serial No.	AX880, AX-HQ880
Trade Mark	N/A
Model Difference	All model's the function, software and electric circuit are the same, only with a product model named different. Test sample model: HWAP-AX880.
FCC ID	2ADUG-HWAP-AX880
Operation Frequency:	IEEE 802.11a/n/ac/ax(HT20) 5.180GHz-5.240GHz IEEE 802.11n/ac/ax(HT40) 5.190GHz-5.230GHz IEEE 802.11ac/ax(HT80) 5.210GHz
Modulation Technology:	IEEE 802.11a/n/ac/ax
Modulation Type	OFDM, OFDMA
Antenna Type	External Antenna
Antenna Gain	Antenna 1:8.16dBi Antenna 2:8.16dBi Antenna 3:8.16dBi Antenna 4:8.16dBi MIMO: 14.18dBi
Power Source	DC 48V from Adapter
Power Supply:	DC 48V from Adapter
Hardware Version	V5.6
Software Version	V5.6
Note: The EUT incorporates a MIMO function. Physically, it provides two completed transmitters and receivers(4T4R), two transmit signals are completely correlated, then, Direction gain= GANT + Array Gain(Array Gain=10 log(4) 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)/ 802.11ax(HT20)		802.11n(HT40)/ 802.11ac(HT40)/ 802.11ax(HT40)		802.11ac(HT80)/ 802.11ax(HT80)	
Channel	Frequency	Channel	Frequency	Channel	Frequency
36	5180	38	5190	42	5210
40	5200	46	5230		
44	5220				
48	5240				

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

For 802.11a/n (HT20)/ac(HT20)/ax(HT20)

Band I (5150 - 5250 MHz)		
Channel Number	Channel	Frequency (MHz)
36	Low	5180
40	Mid	5200
48	High	5240

For 802.11n (HT40)/ ac(HT40)/ax(HT40)

Band I (5150 - 5250 MHz)		
Channel Number	Channel	Frequency (MHz)
38	Low	5190
46	High	5230

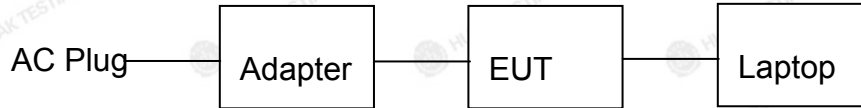
For 802.11ac(HT80)/ax(HT80)

Band I (5150 - 5250 MHz)	
Channel Number	Frequency (MHz)
42	5210



2.4. Description of Test Setup

Operation of EUT during testing:



Laptop information

Model: TP00096A

Input: DC 20V, 2.25A/3.25A

Adapter information

Model: GRT-POE20-480050A

Input: AC100-240V~50-60Hz 0.8A max

Output: 48V 500mA

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. General 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 below/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
802.11ax(HT20)/ax(HT40)/ax(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

Test Requirement:	FCC Part15 C Section 15.207														
Test Method:	ANSI C63.10:2013														
Frequency Range:	150 kHz to 30 MHz														
Receiver setup:	RBW=9 kHz, VBW=30 kHz, Sweep time=auto														
Limits:	<table><tr><th rowspan="2">Frequency range (MHz)</th><th colspan="2">Limit (dBuV)</th></tr><tr><th>Quasi-peak</th><th>Average</th></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>	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:	Reference Plane 40cm E.U.T AC power 80cm LISN Filter AC power EMI Receiver Test table/Insulation plane Remark E.U.T: Equipment Under Test LISN: Line Impedance Stabilization Network Test table height=0.8m														
Test Mode:	Tx Mode														
Test Procedure:	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 Result:	Pass														



4.1.2. Test Instruments

Conducted Emission Shielding Room Test Site (843)

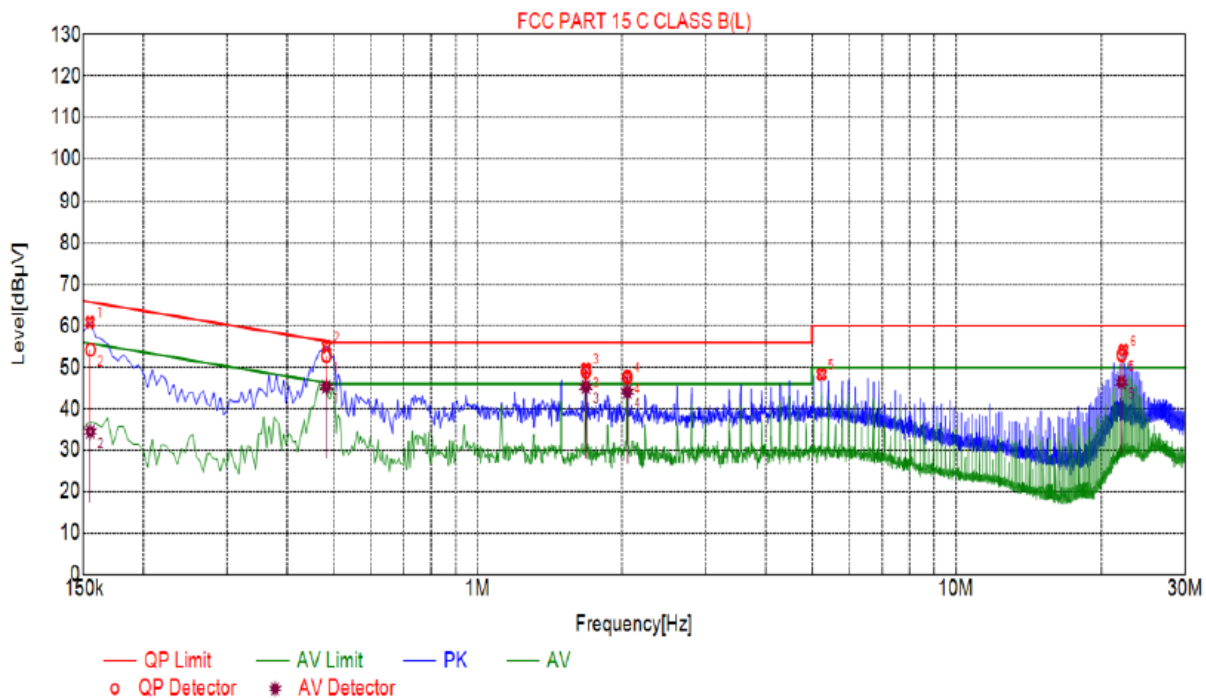
Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
Receiver	R&S	ESR-7	HKE-005	Feb. 17, 2023	Feb. 16, 2024
LISN	R&S	ENV216	HKE-002	Feb. 17, 2023	Feb. 16, 2024
Coax cable (9KHz-30MHz)	Times	381806-002	N/A	Feb. 17, 2023	Feb. 16, 2024
Conducted test software	Tonscend	TS+ Rev 2.5.0.0	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

Test Specification: Line:



Suspected List

NO.	Freq. [MHz]	Level [dBμV]	Factor [dB]	Limit [dBμV]	Margin [dB]	Reading [dBμV]	Detector	Type
1	0.1545	60.86	20.03	65.75	4.89	41.33	PK	L
2	0.4830	54.98	20.04	56.29	1.31	34.94	PK	L
3	1.6845	49.70	20.13	56.00	6.30	29.57	PK	L
4	2.0580	47.65	20.15	56.00	8.35	28.50	PK	L
5	5.2395	48.34	20.26	60.00	11.66	29.08	PK	L
6	22.2765	54.12	20.16	60.00	5.88	35.46	PK	L

Final Data List

NO.	Freq. [MHz]	Correction factor[dB]	QP Value [dBμV]	QP Limit [dBμV]	QP Margin [dB]	QP Reading [dBμV]	AV Value [dBμV]	AV Limit [dBμV]	AV Margin [dB]	AV Reading [dBμV]	Type
1	0.4825	20.04	52.77	56.30	3.53	32.73	45.31	46.30	0.99	25.27	L
2	0.1548	20.03	54.21	65.74	11.53	34.18	34.50	55.74	21.24	14.47	L
3	1.6830	20.13	48.89	56.00	7.11	28.76	45.30	46.00	0.70	25.17	L
4	2.0568	20.15	47.68	56.00	8.32	27.53	44.11	46.00	1.89	23.96	L
5	22.0650	20.16	53.02	60.00	6.98	32.86	46.44	50.00	3.56	26.28	L

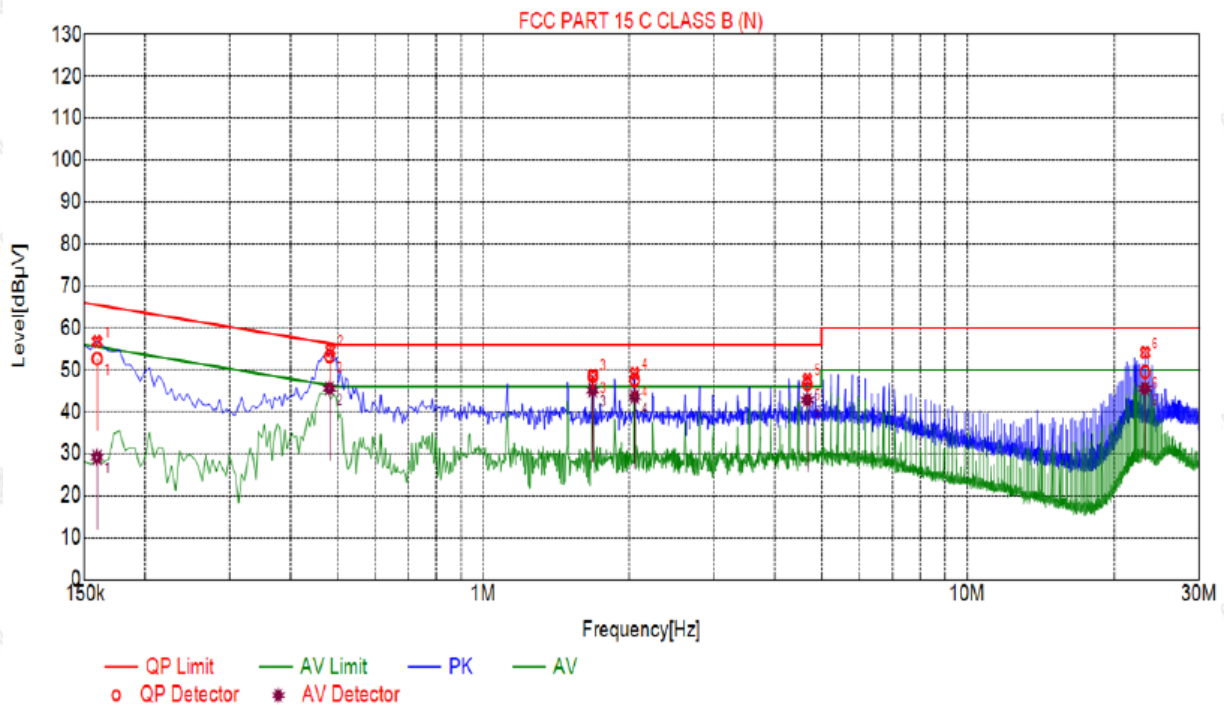
Remark: Margin = Limit – Level

Correction factor = Cable lose + LISN insertion loss

Level=Test receiver reading + correction factor



Test Specification: Neutral:



Suspected List

NO.	Freq. [MHz]	Level [dBμV]	Factor [dB]	Limit [dBμV]	Margin [dB]	Reading [dBμV]	Detector	Type
1	0.1590	56.75	20.01	65.52	8.77	36.74	PK	N
2	0.4830	54.69	20.04	56.29	1.60	35.15	PK	N
3	1.6845	48.75	20.13	56.00	7.25	29.12	PK	N
4	2.0580	49.18	20.15	56.00	6.82	29.53	PK	N
5	4.6770	47.74	20.26	56.00	8.26	27.98	PK	N
6	23.1990	54.13	20.20	60.00	5.87	34.43	PK	N

Final Data List

NO.	Freq. [MHz]	Correction factor [dB]	QP Value [dBμV]	QP Limit [dBμV]	QP Margin [dB]	QP Reading [dBμV]	AV Value [dBμV]	AV Limit [dBμV]	AV Margin [dB]	AV Reading [dBμV]	Type
1	0.1590	20.01	52.68	65.52	12.84	32.67	29.10	55.52	26.42	9.09	N
2	0.4808	20.04	53.32	56.32	3.00	33.28	45.57	46.32	0.75	25.53	N
3	1.6825	20.13	48.48	56.00	7.52	28.35	45.15	46.00	0.85	25.02	N
4	2.0566	20.15	47.61	56.00	8.39	27.46	43.60	46.00	2.40	23.45	N
5	4.6735	20.26	46.60	56.00	9.40	26.34	42.83	46.00	3.17	22.57	N
6	23.1798	20.19	49.50	60.00	10.50	29.31	45.55	50.00	4.45	25.36	N

Remark: Margin = Limit – Level

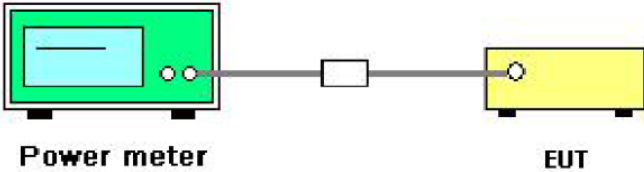
Correction factor = Cable lose + LISN insertion loss

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
	5150-5250	1W
Test Setup:	 Power meter EUT	
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	Feb. 17, 2023	Feb. 16, 2024
Power meter	Agilent	E4419B	HKE-085	Feb. 17, 2023	Feb. 16, 2024
Power Sensor	Agilent	E9300A	HKE-086	Feb. 17, 2023	Feb. 16, 2024
RF cable	Times	1-40G	HKE-034	Feb. 17, 2023	Feb. 16, 2024
RF automatic control unit	Tonscend	JS0806-2	HKE-060	Feb. 17, 2023	Feb. 16, 2024

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 I (5150 - 5250 MHz)												
Mode	Test channel	Reading Conducted Output Power (dBm)				Cable loss	Maximum Conducted Output Power (dBm)				Limit (dBm)	Result
		Antenna port 1	Antenna port 2	Antenna port 3	Antenna port 4		Antenna port 1	Antenna port 2	Antenna port 3	Antenna port 4		
11a	CH36	3.48	3.74	3.57	3.63	1	4.48	4.74	4.57	4.63	30	PASS
11a	CH40	3.70	2.58	3.39	2.39	1	4.70	3.58	4.39	3.39	30	PASS
11a	CH48	3.20	3.09	4.36	2.37	1	4.20	4.09	5.36	3.37	30	PASS
11n(HT20)	CH36	2.54	3.04	2.22	2.65	1	3.54	4.04	3.22	3.65	30	PASS
11n(HT20)	CH40	2.36	2.28	2.05	2.03	1	3.36	3.28	3.05	3.03	30	PASS
11n(HT20)	CH48	1.90	1.94	1.02	1.59	1	2.90	2.94	2.02	2.59	30	PASS
11n(HT40)	CH38	2.74	3.22	2.86	3.11	1	3.74	4.22	3.86	4.11	30	PASS
11n(HT40)	CH46	3.28	2.42	3.04	2.79	1	4.28	3.42	4.04	3.79	30	PASS
11ac(HT20)	CH36	2.69	2.44	2.73	3.20	1	3.69	3.44	3.73	4.20	30	PASS
11ac(HT20)	CH40	2.83	2.63	2.16	3.33	1	3.83	3.63	3.16	4.33	30	PASS
11ac(HT20)	CH48	2.04	1.78	1.46	2.56	1	3.04	2.78	2.46	3.56	30	PASS
11ac(HT40)	CH38	3.00	2.91	2.78	3.20	1	4.00	3.91	3.78	4.20	30	PASS
11ac(HT40)	CH46	2.55	2.47	3.78	2.83	1	3.55	3.47	4.78	3.83	30	PASS
11ac(HT80)	CH42	3.46	2.38	3.04	3.13	1	4.46	3.38	4.04	4.13	30	PASS
11ax(HT20)	CH36	1.50	0.35	1.27	2.25	1	2.50	1.35	2.27	3.25	30	PASS
11ax(HT20)	CH40	0.22	1.16	1.03	1.51	1	1.22	2.16	2.03	2.51	30	PASS
11ax(HT20)	CH48	0.82	0.70	0.13	1.92	1	1.82	1.70	1.13	2.92	30	PASS
11ax(HT40)	CH38	2.47	2.72	3.60	2.48	1	3.47	3.72	4.60	3.48	30	PASS
11ax(HT40)	CH46	2.48	3.37	2.68	1.70	1	3.48	4.37	3.68	2.70	30	PASS
11ax(HT80)	CH42	2.23	3.24	3.04	3.22	1	3.23	4.24	4.04	4.22	30	PASS

Note: Maximum Conducted Output Power(dBm)= Reading Conducted Output Power(dBm)+ Cable loss

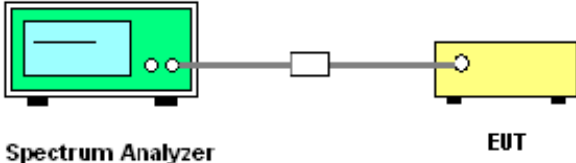


Configuration Band I (5150 - 5250 MHz)								
Mode	Test channel	Maximum Conducted Output Power (dBm)					Limit (dBm)	Result
		Antenna port 1	Antenna port 2	Antenna port 3	Antenna port 4	MIMO		
11n(HT20)	CH36	3.54	4.04	3.22	3.65	9.64	30	PASS
11n(HT20)	CH40	3.36	3.28	3.05	3.03	9.20	30	PASS
11n(HT20)	CH48	2.90	2.94	2.02	2.59	8.65	30	PASS
11n(HT40)	CH38	3.74	4.22	3.86	4.11	10.01	30	PASS
11n(HT40)	CH46	4.28	3.42	4.04	3.79	9.91	30	PASS
11ac(HT20)	CH36	3.69	3.44	3.73	4.20	9.79	30	PASS
11ac(HT20)	CH40	3.83	3.63	3.16	4.33	9.78	30	PASS
11ac(HT20)	CH48	3.04	2.78	2.46	3.56	9.00	30	PASS
11ac(HT40)	CH38	4.00	3.91	3.78	4.20	10.00	30	PASS
11ac(HT40)	CH46	3.55	3.47	4.78	3.83	9.96	30	PASS
11ac(HT80)	CH42	4.46	3.38	4.04	4.13	10.04	30	PASS
11ax(HT20)	CH36	2.50	1.35	2.27	3.25	8.42	30	PASS
11ax(HT20)	CH40	1.22	2.16	2.03	2.51	8.03	30	PASS
11ax(HT20)	CH48	1.82	1.70	1.13	2.92	7.96	30	PASS
11ax(HT40)	CH38	3.47	3.72	4.60	3.48	9.86	30	PASS
11ax(HT40)	CH46	3.48	4.37	3.68	2.70	9.62	30	PASS
11ax(HT80)	CH42	3.23	4.24	4.04	4.22	9.97	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 v02r01 Section C
Limit:	>500kHz
Test Setup:	 Spectrum Analyzer EUT
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) = 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:	N/A

4.3.2. Test Instruments

RF Test Room					
Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
Spectrum analyzer	Agilent	N9020A	HKE-048	Feb. 17, 2023	Feb. 16, 2024
RF cable	Times	1-40G	HKE-034	Feb. 17, 2023	Feb. 16, 2024
RF automatic control unit	Tonscend	JS0806-2	HKE-060	Feb. 17, 2023	Feb. 16, 2024

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

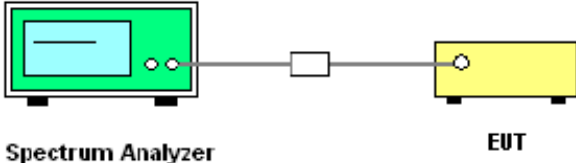
4.3.3 Test data

N/A



4.4. 26dB Bandwidth and 99% Occupied Bandwidth

4.4.1. Test Specification

Test Requirement:	47 CFR Part 15C Section 15.407
Test Method:	KDB789033 D02 General UNII Test Procedures New Rules v02r01 Section C
Limit:	No restriction limits
Test Setup:	 Spectrum Analyzer EUT
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 $RBW = 1\% \text{ EBW}$, $VBW \geq 3RBW$, In order to make an accurate measurement. 4. Measure and record the results in the test report.
Test Result:	PASS

4.4.2. Test Instruments

RF Test Room					
Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
Spectrum analyzer	Agilent	N9020A	HKE-048	Feb. 17, 2023	Feb. 16, 2024
RF cable	Times	1-40G	HKE-034	Feb. 17, 2023	Feb. 16, 2024
RF automatic control unit	Tonscend	JS0806-2	HKE-060	Feb. 17, 2023	Feb. 16, 2024

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 data****Band I**
ANT. 1

Mode	Test channel	Frequency (MHz)	26 dB Bandwidth (MHz)	Verdict
11a	CH36	5180	19.38	PASS
11a	CH40	5200	19.10	PASS
11a	CH48	5240	19.11	PASS
11n(HT20)	CH36	5180	20.44	PASS
11n(HT20)	CH40	5200	20.57	PASS
11n(HT20)	CH48	5240	20.55	PASS
11n(HT40)	CH38	5190	40.01	PASS
11n(HT40)	CH46	5230	39.96	PASS
11ac(HT20)	CH36	5180	20.33	PASS
11ac(HT20)	CH40	5200	20.43	PASS
11ac(HT20)	CH48	5240	20.53	PASS
11ac(HT40)	CH38	5190	40.45	PASS
11ac(HT40)	CH46	5230	40.21	PASS
11ac(HT80)	CH42	5210	81.99	PASS
11ax(HT20)	CH36	5180	21.66	PASS
11ax(HT20)	CH40	5200	20.83	PASS
11ax(HT20)	CH48	5240	20.92	PASS
11ax(HT40)	CH38	5190	40.83	PASS
11ax(HT40)	CH46	5230	41.03	PASS
11ax(HT80)	CH42	5210	82.51	PASS

Test plots as follows:



Band I (5150 – 5250 MHz)



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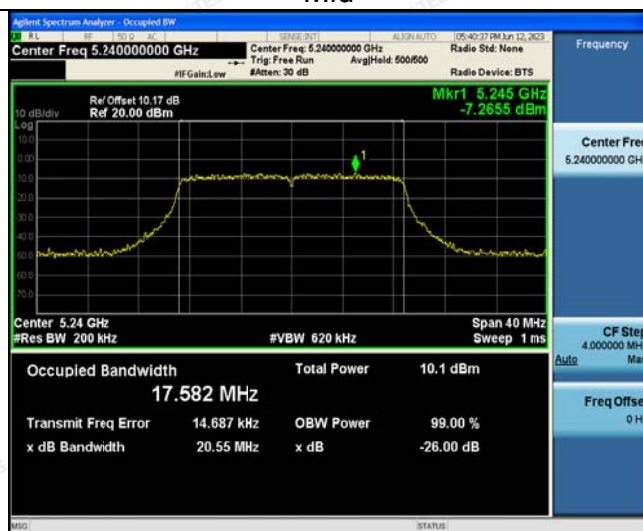
802.11n(HT20)



Low



Mid



High





802.11ac(HT20)



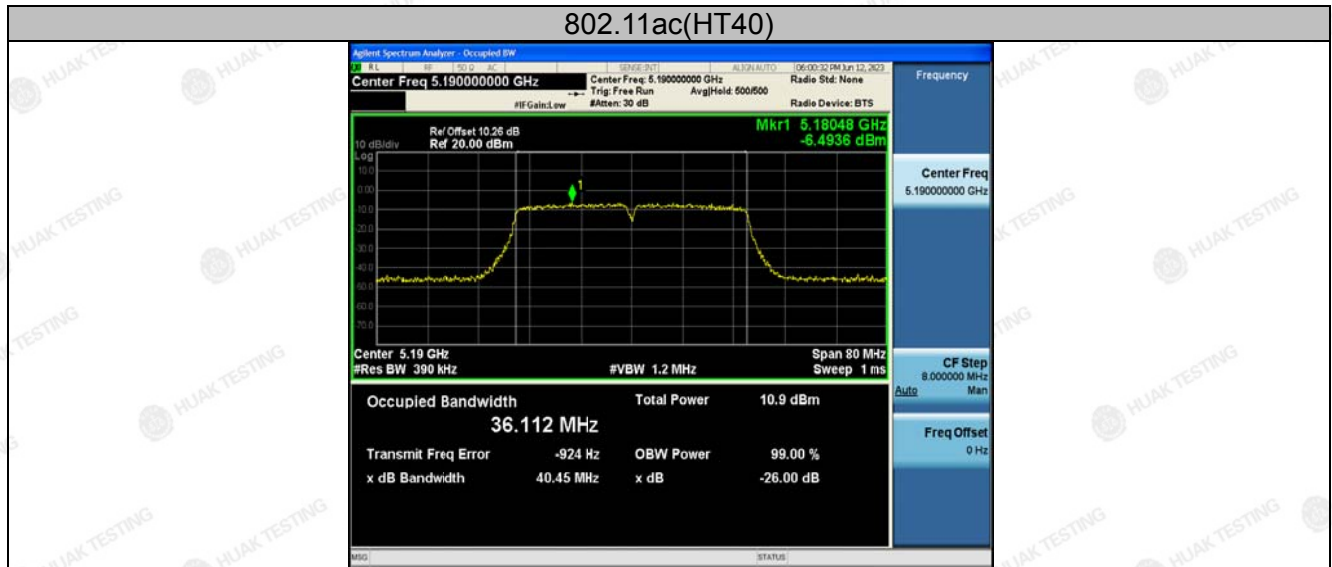
Low



Mid



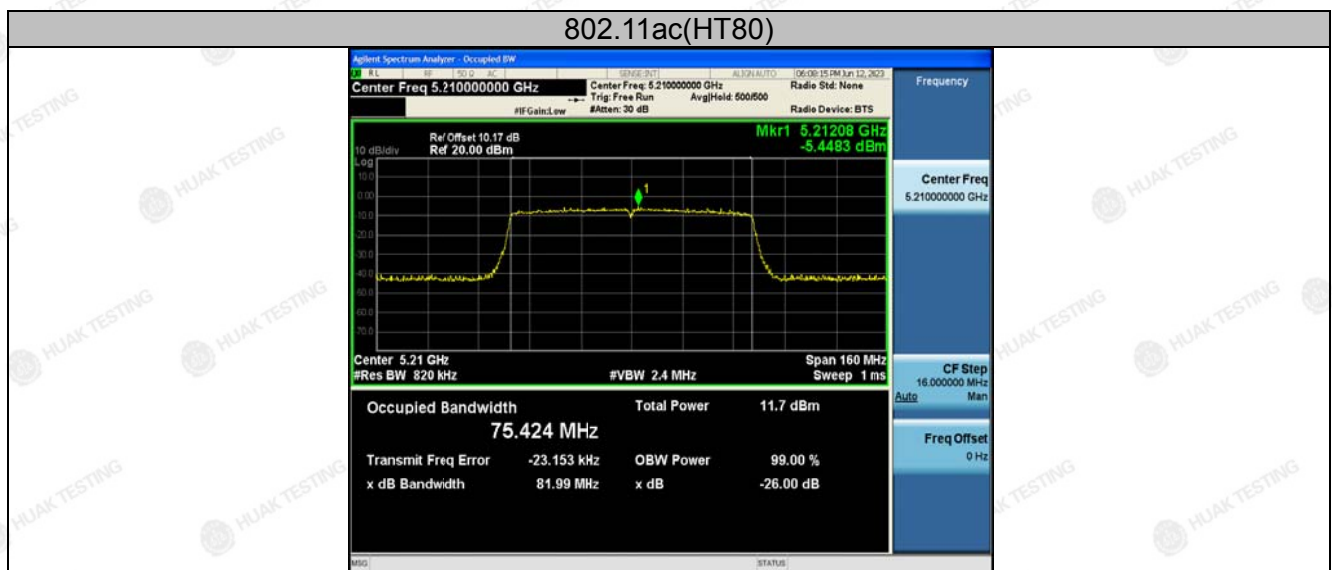
High



Low

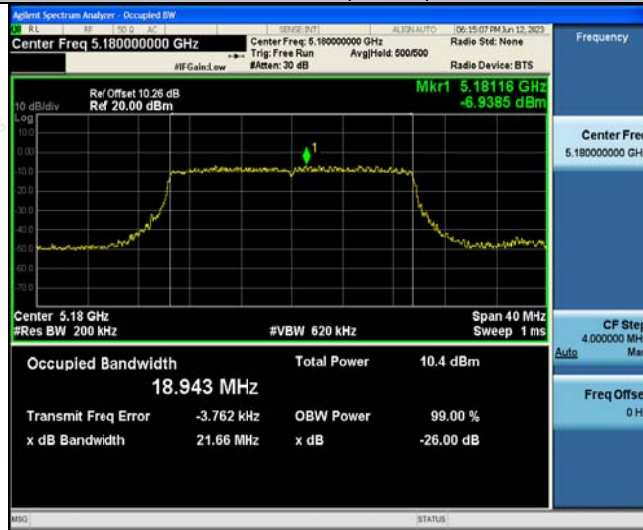


High





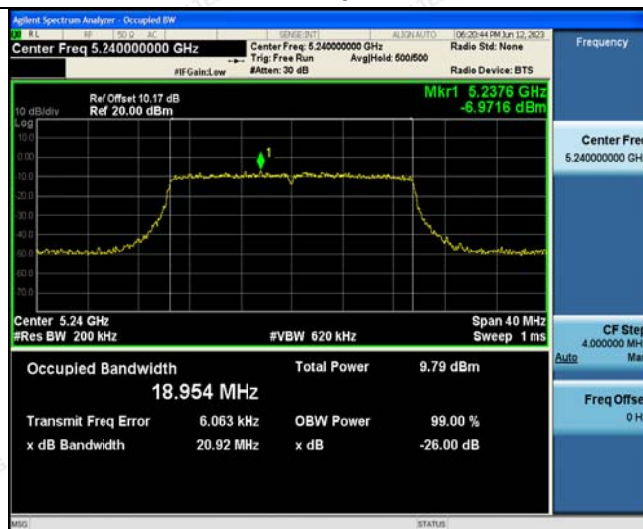
802.11ax(HT20)



Low



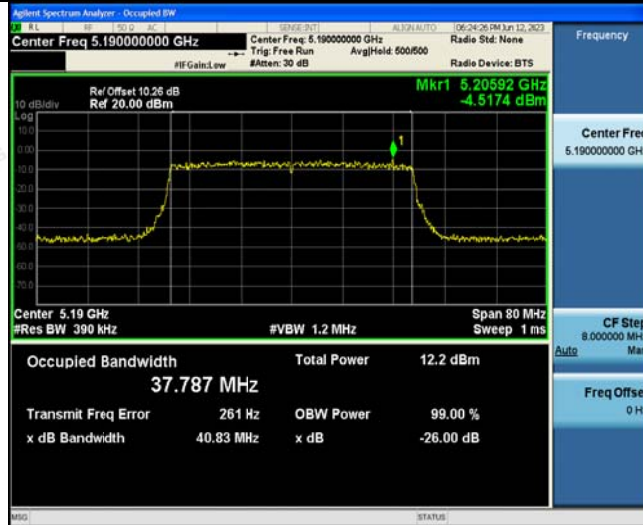
Mid



High



802.11ax(HT40)



Low



High

802.11ax(HT80)





ANT. 2

Mode	Test channel	Frequency (MHz)	26 dB Bandwidth (MHz)	Verdict
11a	CH36	5180	19.59	PASS
11a	CH40	5200	19.30	PASS
11a	CH48	5240	19.08	PASS
11n(HT20)	CH36	5180	20.18	PASS
11n(HT20)	CH40	5200	20.36	PASS
11n(HT20)	CH48	5240	20.49	PASS
11n(HT40)	CH38	5190	40.29	PASS
11n(HT40)	CH46	5230	40.33	PASS
11ac(HT20)	CH36	5180	20.19	PASS
11ac(HT20)	CH40	5200	20.59	PASS
11ac(HT20)	CH48	5240	20.44	PASS
11ac(HT40)	CH38	5190	40.34	PASS
11ac(HT40)	CH46	5230	40.18	PASS
11ac(HT80)	CH42	5210	82.02	PASS
11ax(HT20)	CH36	5180	21.27	PASS
11ax(HT20)	CH40	5200	21.00	PASS
11ax(HT20)	CH48	5240	20.98	PASS
11ax(HT40)	CH38	5190	40.94	PASS
11ax(HT40)	CH46	5230	40.36	PASS
11ax(HT80)	CH42	5210	81.91	PASS

Test plots as follows:

**Band I (5150 – 5250 MHz)**

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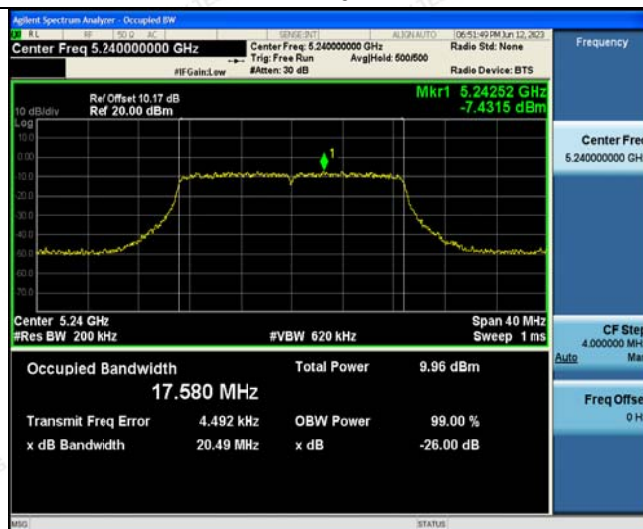
802.11n(HT20)



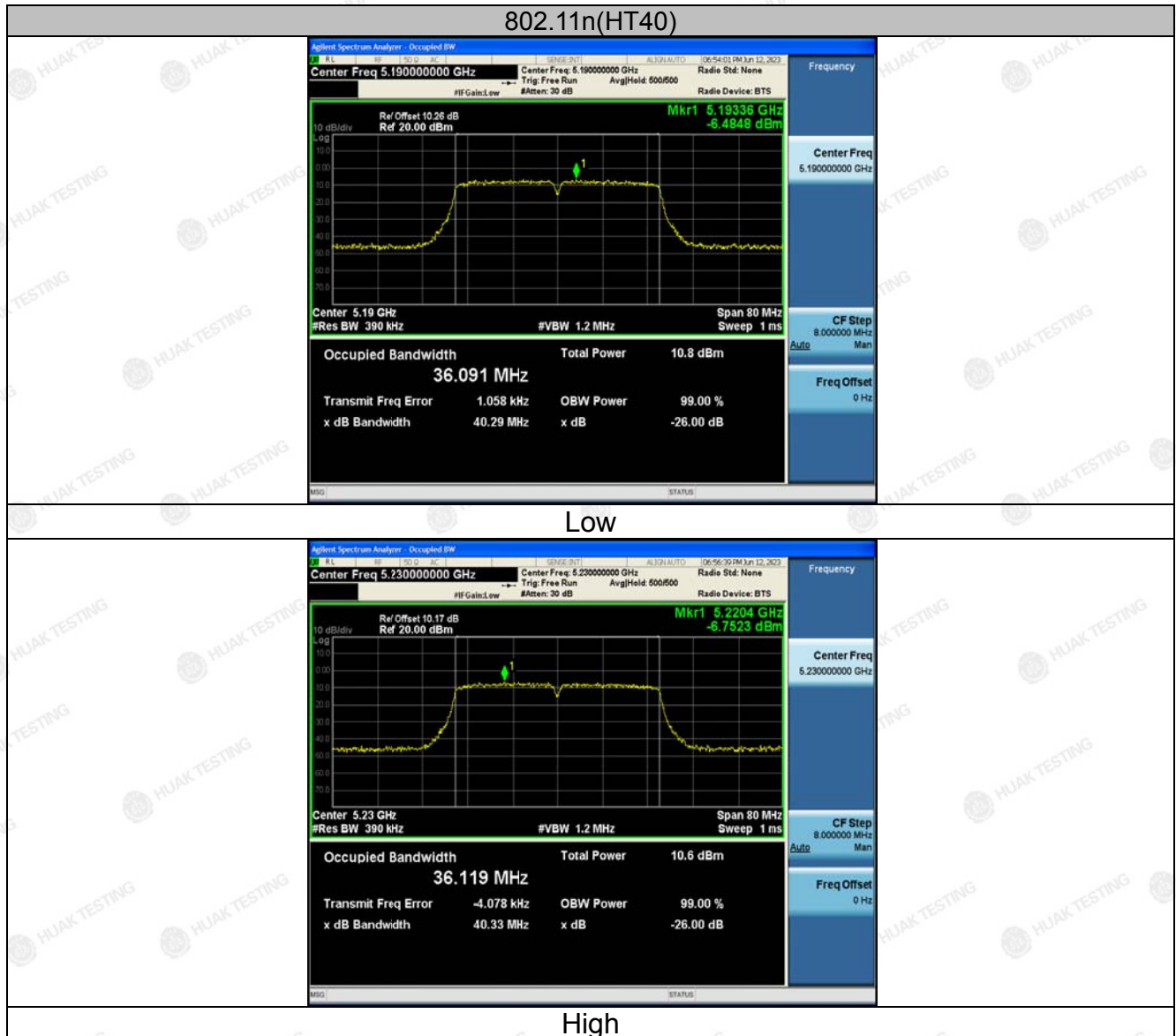
Low



Mid



High



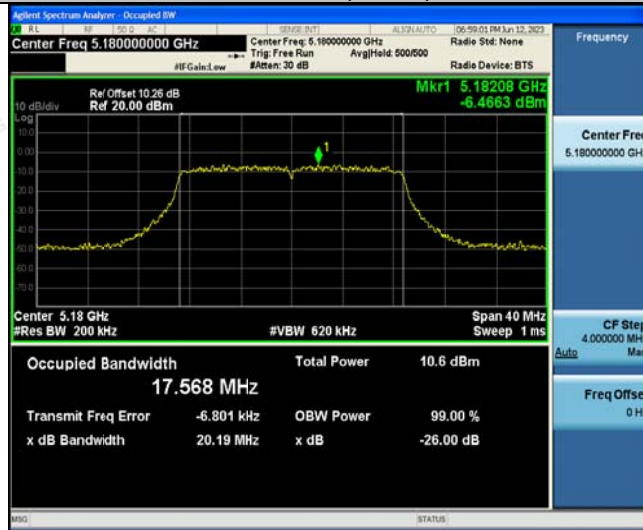
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802.11ac(HT20)



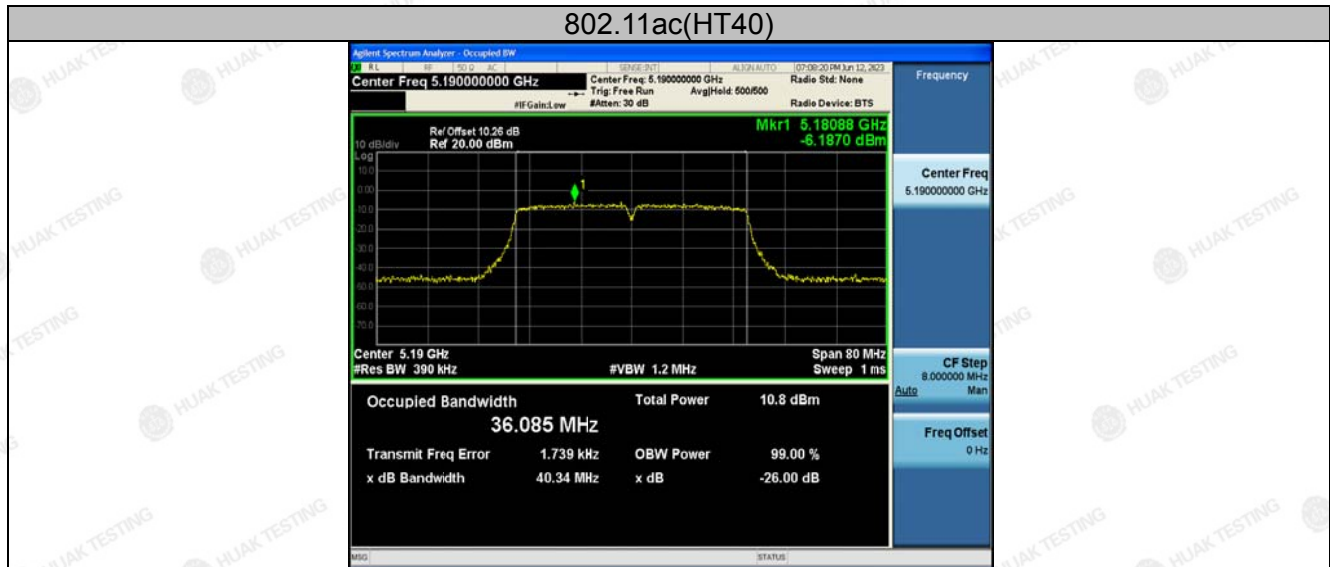
Low



Mid



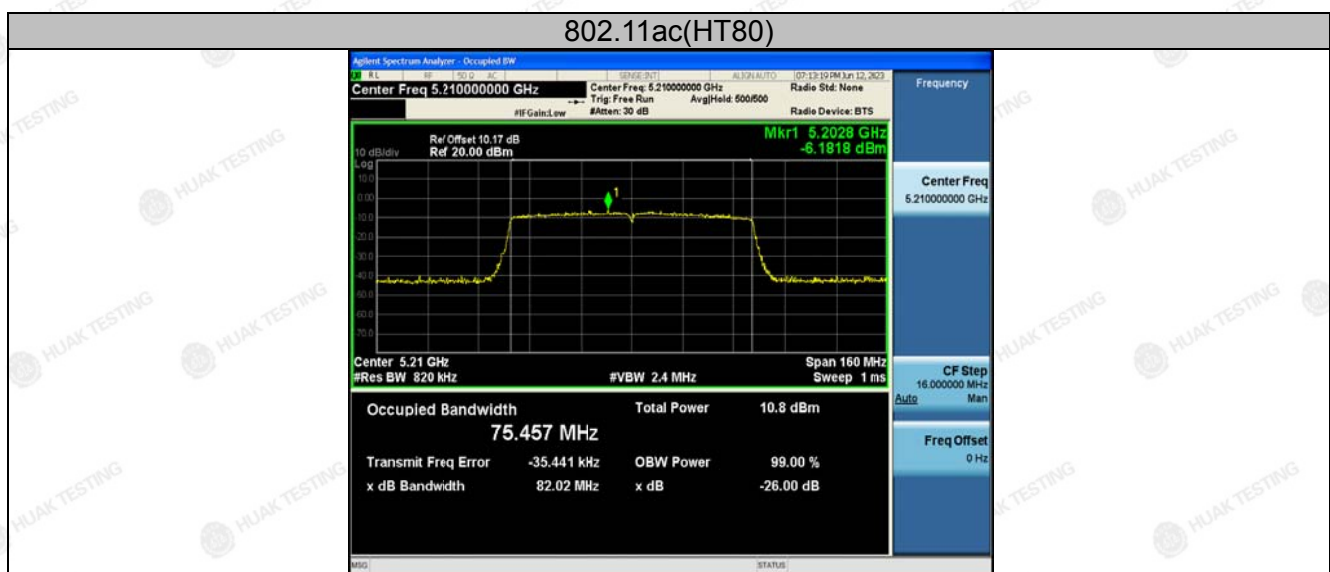
High



Low

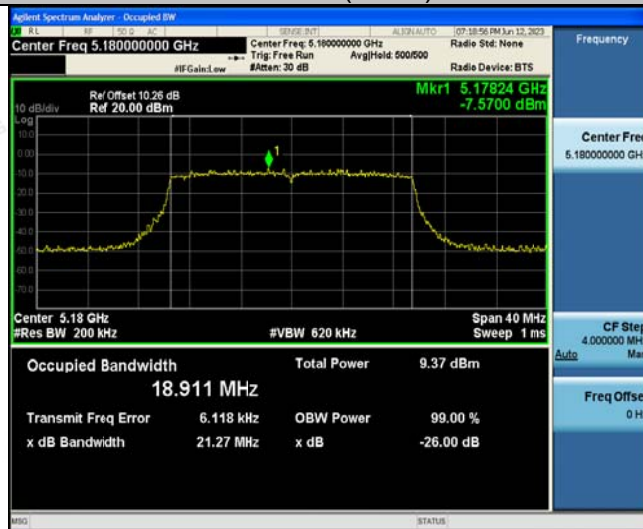


High

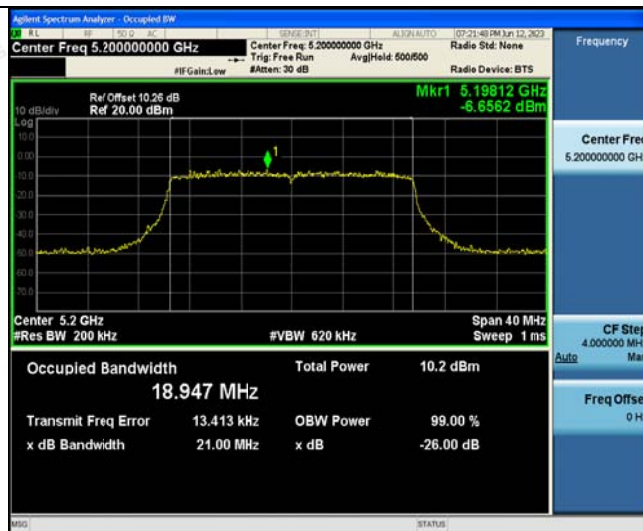




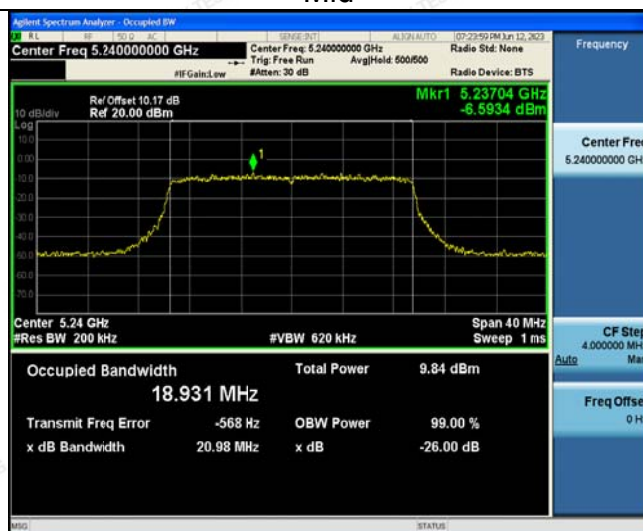
802.11ax(HT20)



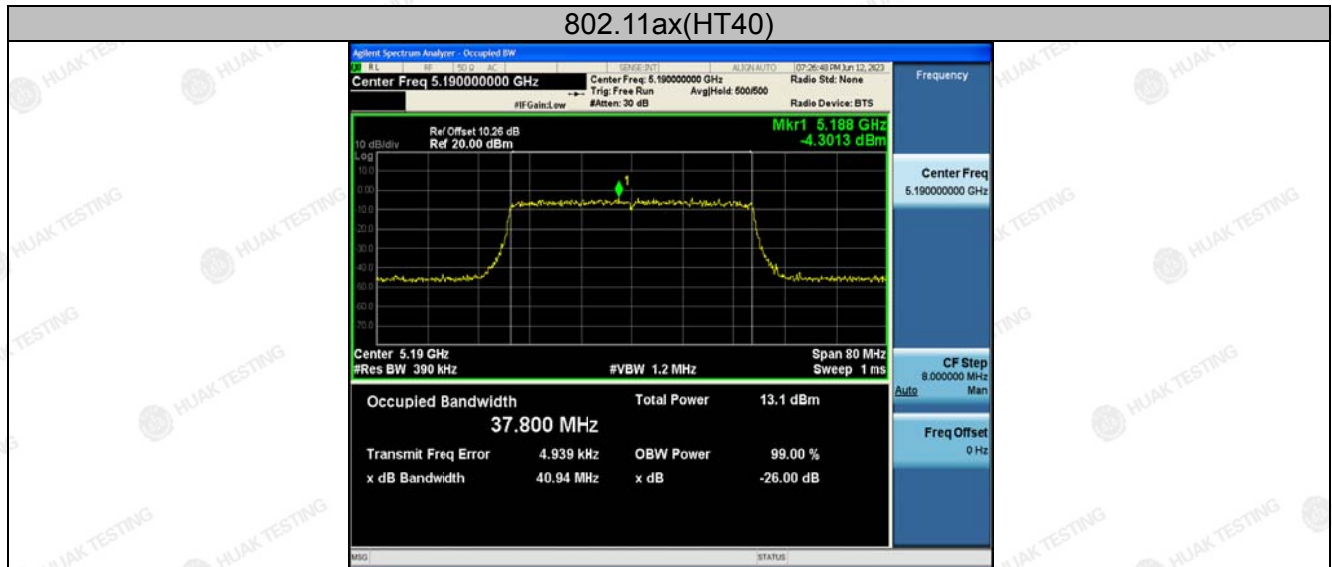
Low



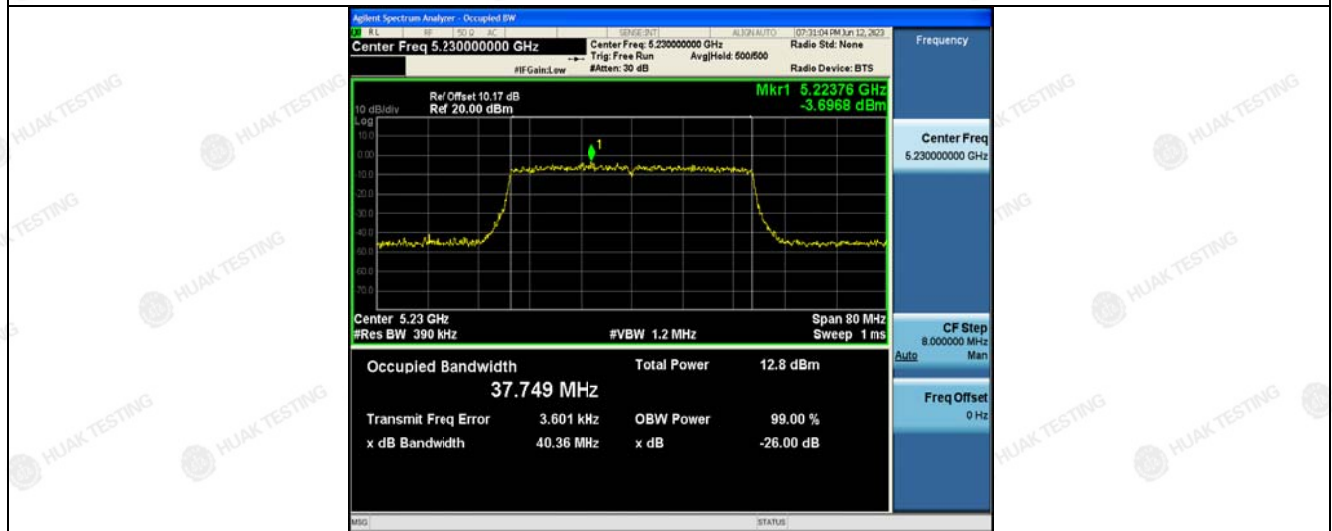
Mid



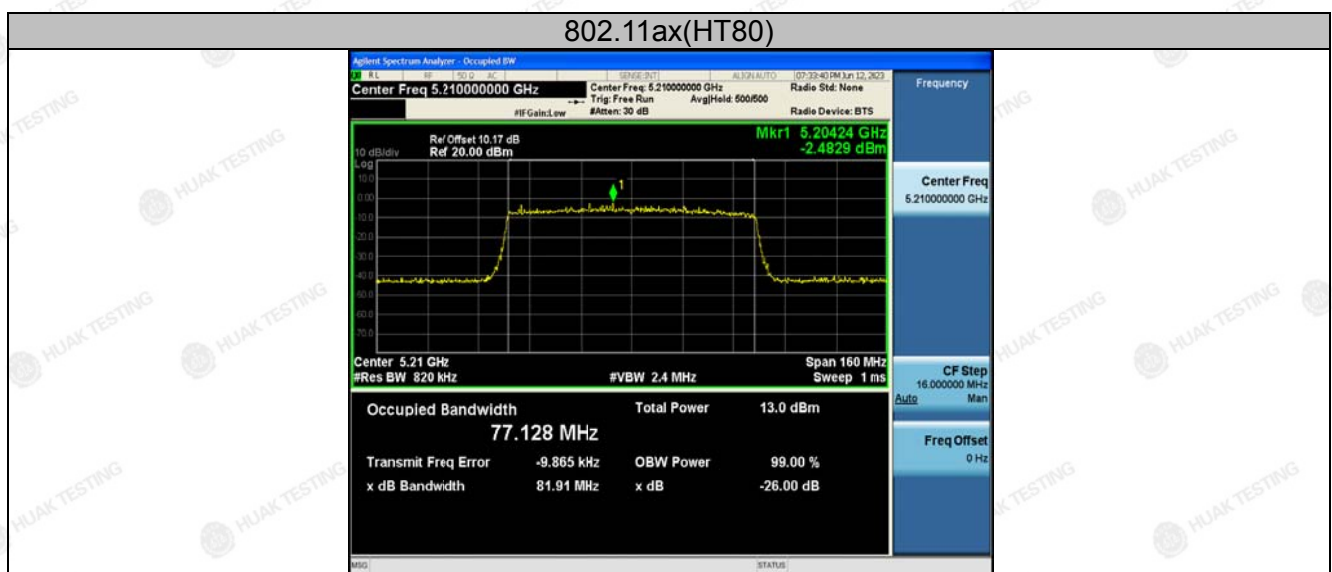
High



Low



High



**ANT. 3**

Mode	Test channel	Frequency (MHz)	26 dB Bandwidth (MHz)	Verdict
11a	CH36	5180	19.08	PASS
11a	CH40	5200	19.38	PASS
11a	CH48	5240	19.30	PASS
11n(HT20)	CH36	5180	20.41	PASS
11n(HT20)	CH40	5200	20.47	PASS
11n(HT20)	CH48	5240	20.46	PASS
11n(HT40)	CH38	5190	40.12	PASS
11n(HT40)	CH46	5230	40.20	PASS
11ac(HT20)	CH36	5180	20.40	PASS
11ac(HT20)	CH40	5200	20.41	PASS
11ac(HT20)	CH48	5240	20.35	PASS
11ac(HT40)	CH38	5190	40.35	PASS
11ac(HT40)	CH46	5230	40.07	PASS
11ac(HT80)	CH42	5210	82.20	PASS
11ax(HT20)	CH36	5180	20.82	PASS
11ax(HT20)	CH40	5200	20.91	PASS
11ax(HT20)	CH48	5240	21.35	PASS
11ax(HT40)	CH38	5190	40.73	PASS
11ax(HT40)	CH46	5230	40.51	PASS
11ax(HT80)	CH42	5210	81.57	PASS

Test plots as follows:



Band I (5150 – 5250 MHz)



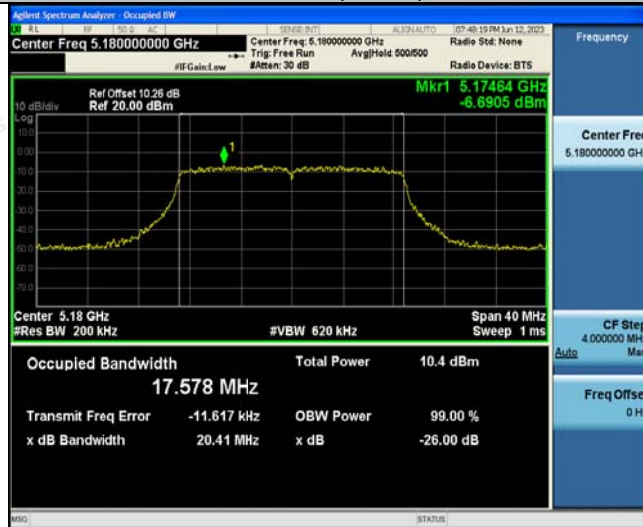
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802.11n(HT20)



Low



Mid



High



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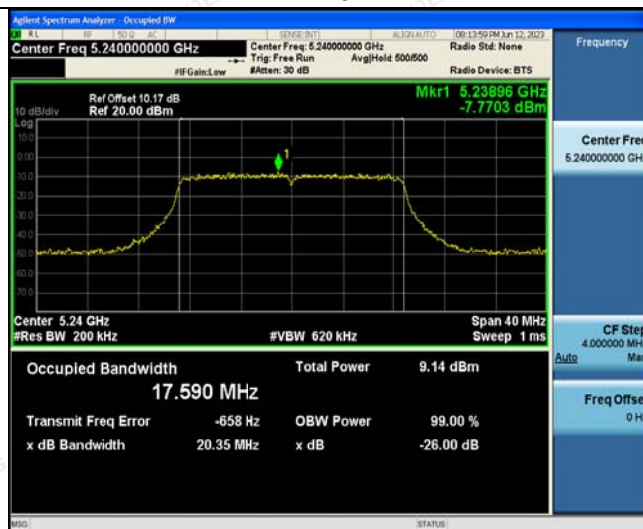
802.11ac(HT20)



Low



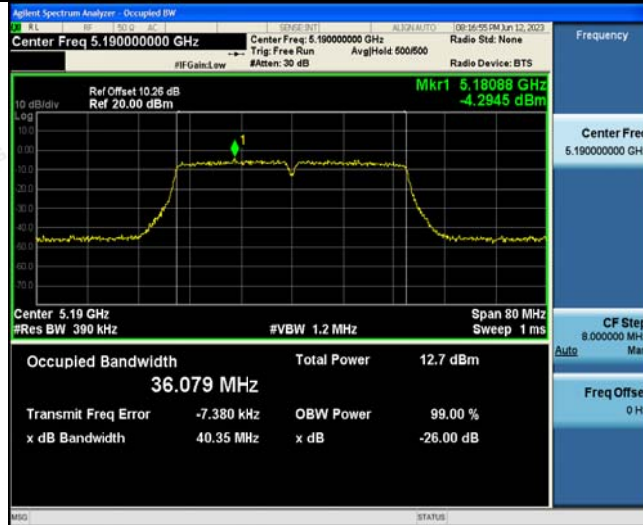
Mid



High



802.11ac(HT40)

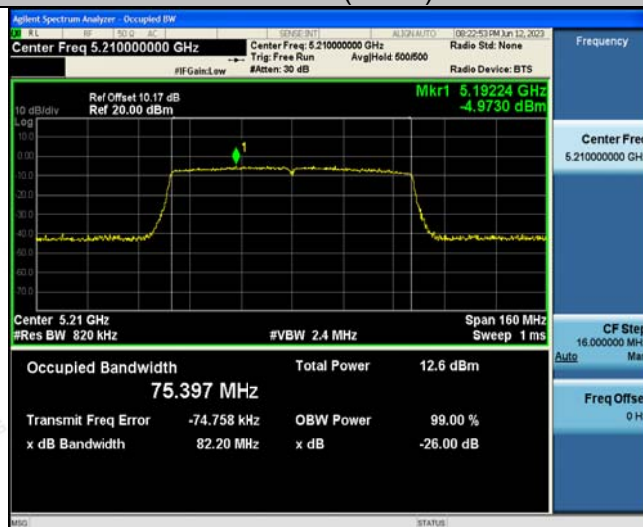


Low



High

802.11ac(HT80)





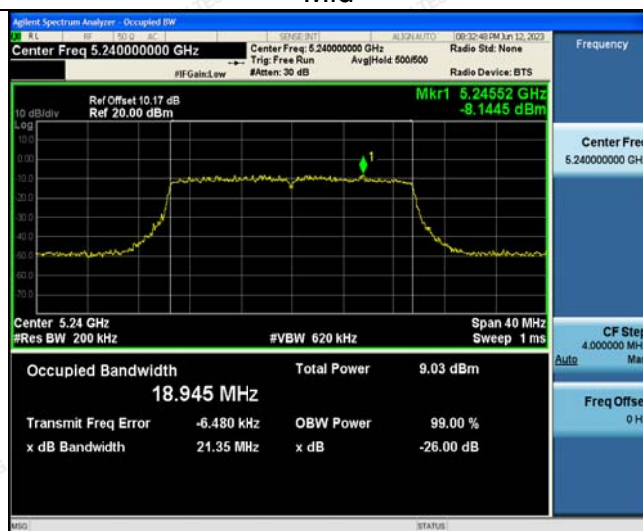
802.11ax(HT20)



Low



Mid



High



802.11ax(HT40)

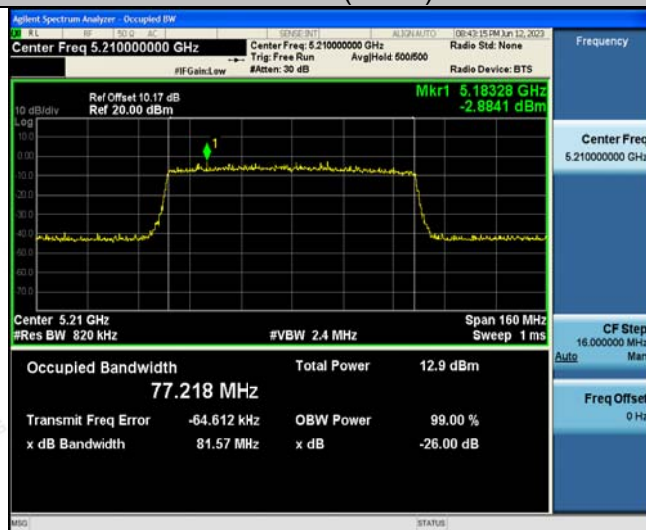


Low



High

802.11ax(HT80)



**ANT. 4**

Mode	Test channel	Frequency (MHz)	26 dB Bandwidth (MHz)	Verdict
11a	CH36	5180	19.10	PASS
11a	CH40	5200	19.18	PASS
11a	CH48	5240	19.41	PASS
11n(HT20)	CH36	5180	20.12	PASS
11n(HT20)	CH40	5200	20.36	PASS
11n(HT20)	CH48	5240	20.32	PASS
11n(HT40)	CH38	5190	40.08	PASS
11n(HT40)	CH46	5230	40.30	PASS
11ac(HT20)	CH36	5180	20.28	PASS
11ac(HT20)	CH40	5200	20.27	PASS
11ac(HT20)	CH48	5240	20.33	PASS
11ac(HT40)	CH38	5190	40.77	PASS
11ac(HT40)	CH46	5230	39.99	PASS
11ac(HT80)	CH42	5210	82.18	PASS
11ax(HT20)	CH36	5180	20.86	PASS
11ax(HT20)	CH40	5200	21.07	PASS
11ax(HT20)	CH48	5240	20.99	PASS
11ax(HT40)	CH38	5190	41.09	PASS
11ax(HT40)	CH46	5230	40.74	PASS
11ax(HT80)	CH42	5210	82.27	PASS

Test plots as follows:



Band I (5150 – 5250 MHz)



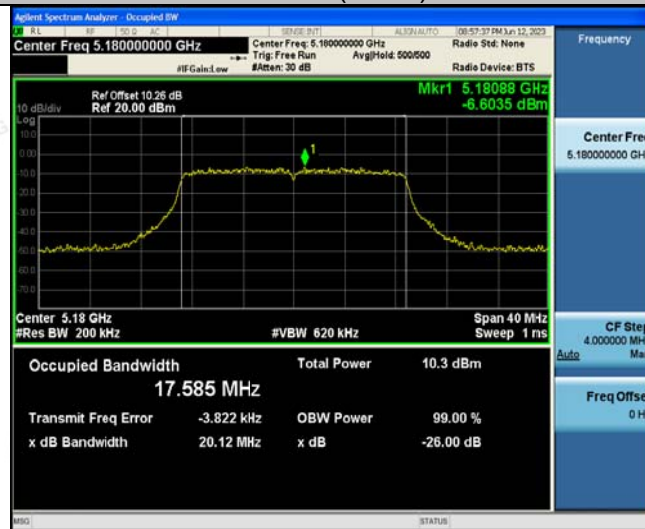
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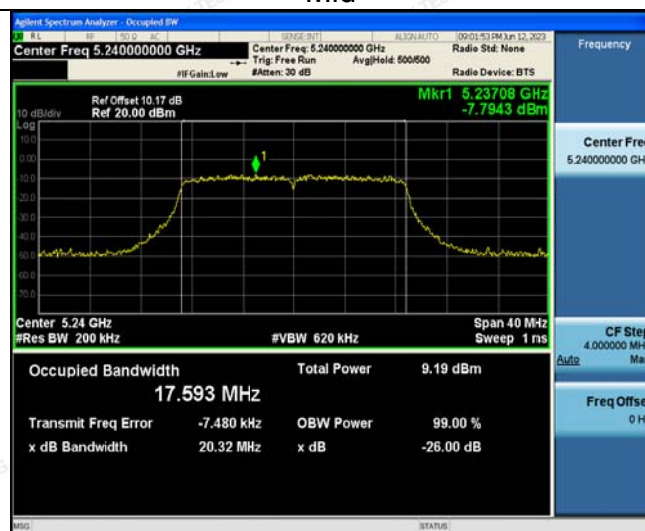
802.11n(HT20)



Low



Mid



High





802.11ac(HT20)



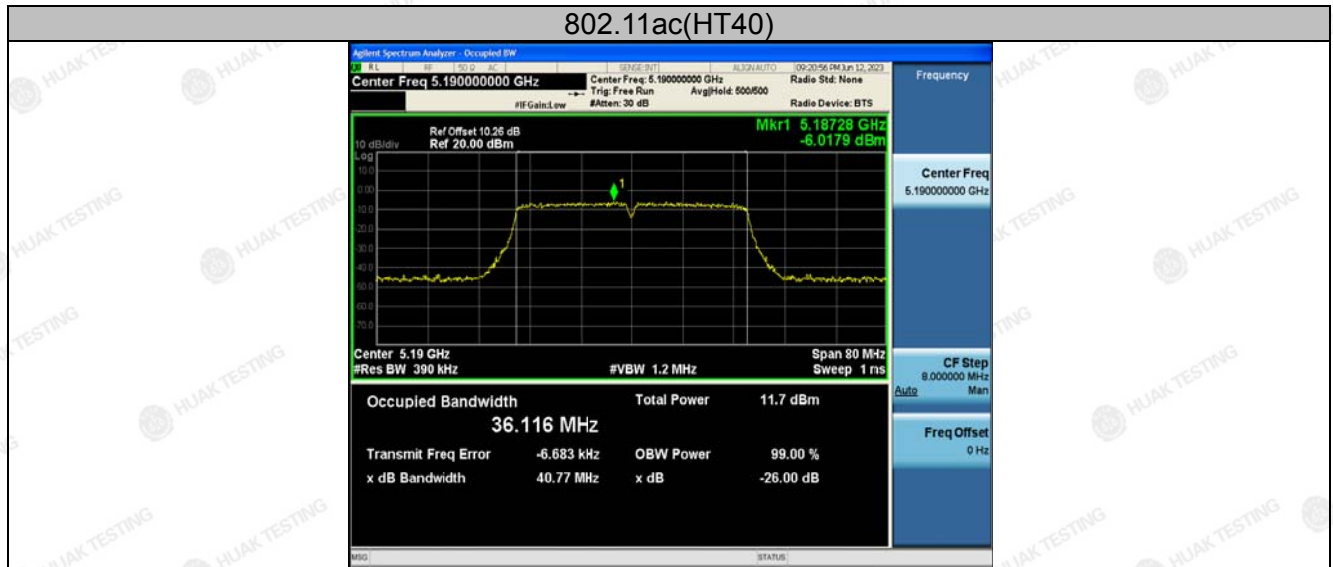
Low



Mid



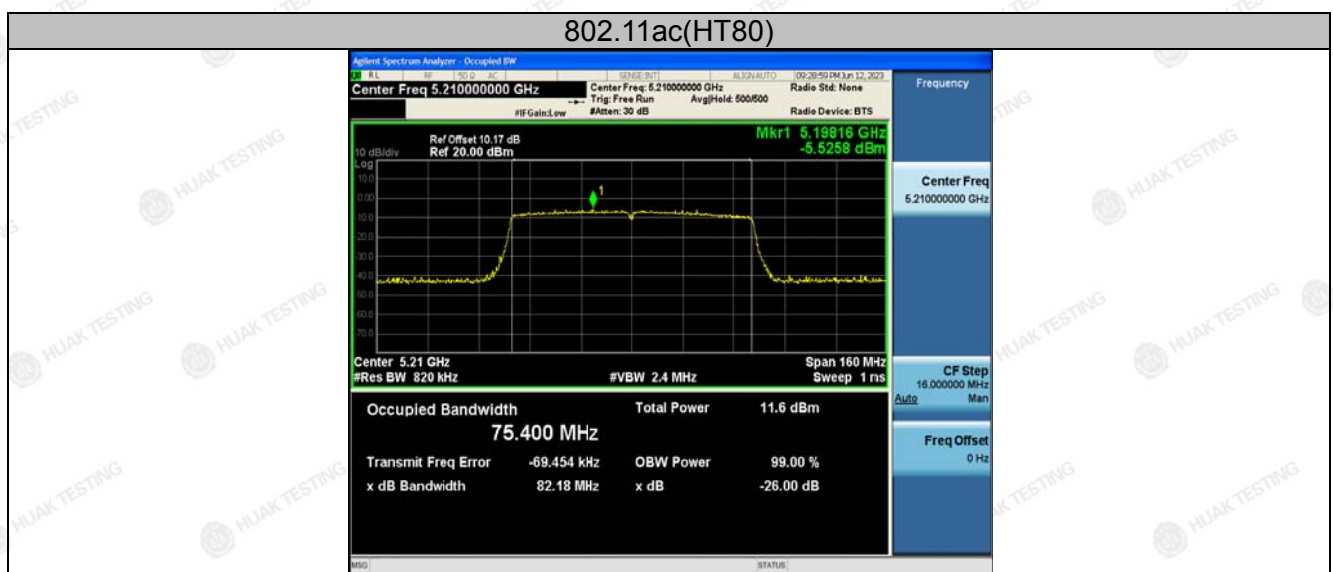
High



Low

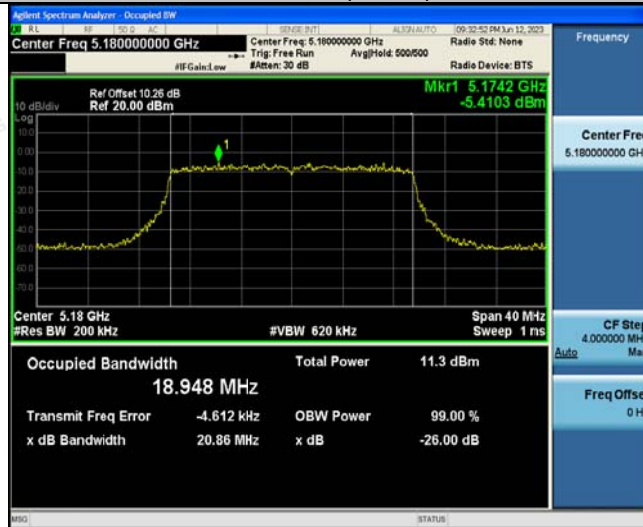


High





802.11ax(HT20)



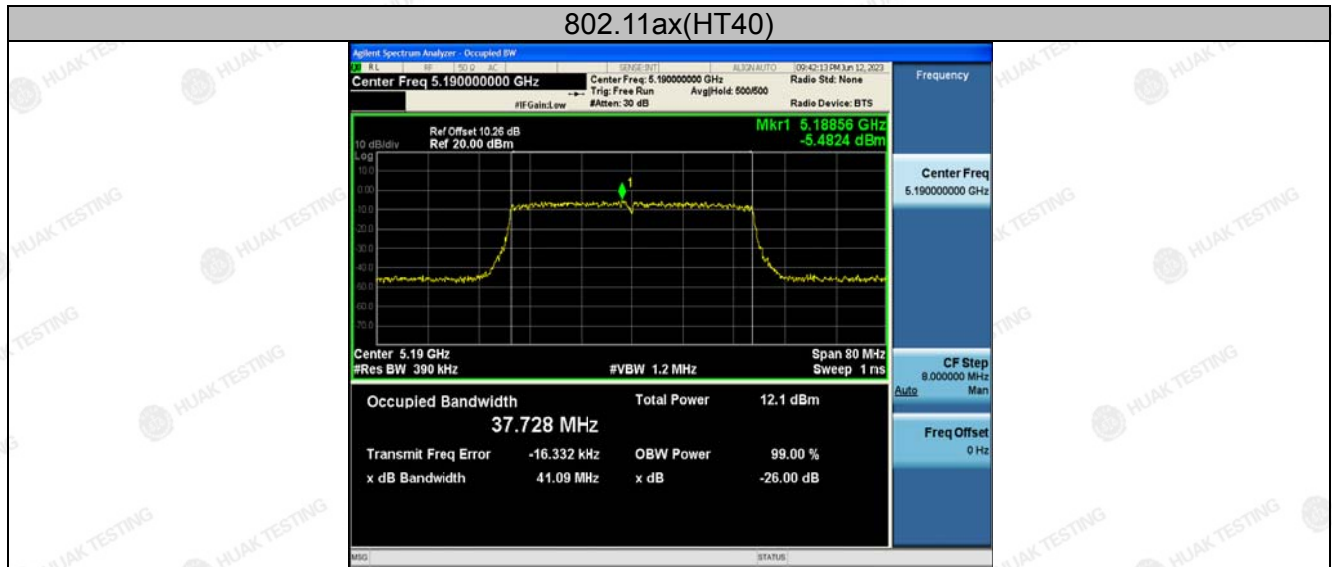
Low



Mid



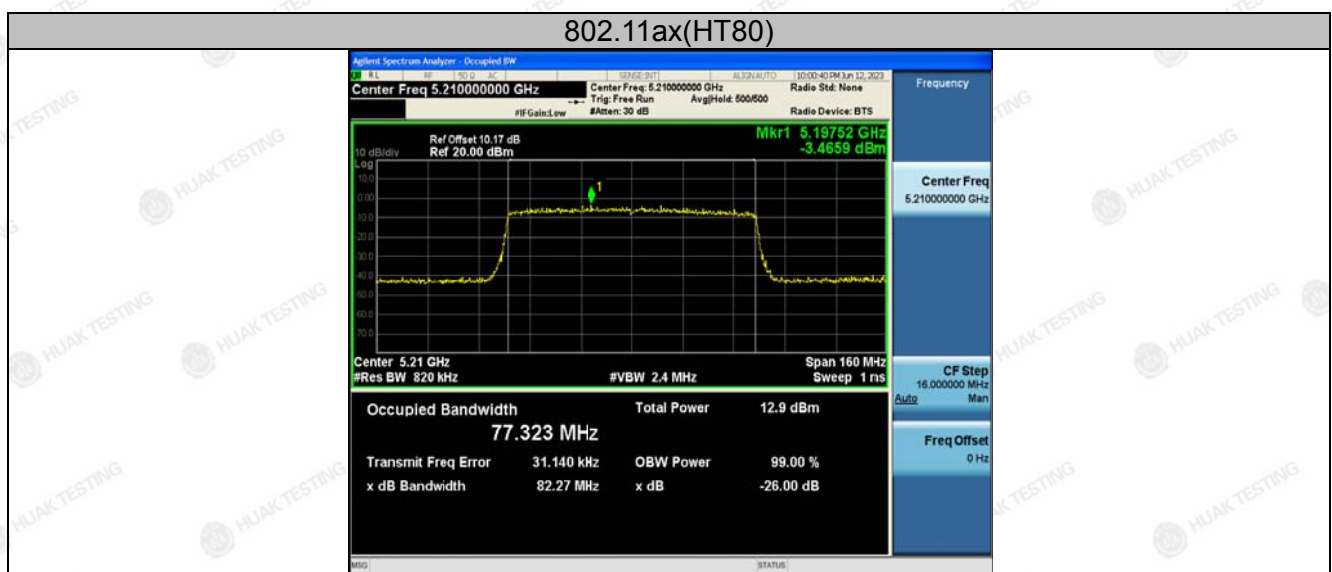
High



Low



High





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:	17dBm/MHz for Band I 5150MHz-5250MHz
Test Setup:	 Spectrum Analyzer EMI
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 = 1 MHz, VBW $\geq 3 \times$ 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	Feb. 17, 2023	Feb. 16, 2024
RF cable	Times	1-40G	HKE-034	Feb. 17, 2023	Feb. 16, 2024
RF automatic control unit	Tonscend	JS0806-2	HKE-060	Feb. 17, 2023	Feb. 16, 2024

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