



FCC Test Report

Test Report
On Behalf of
MICRO COMPUTER (HK) TECH LIMITED
For
MINI PC

Model No.: UM890 Pro, UM880 Pro, UM*****: where * = "0-9",
"A-Z", "a-z", "character", "space", "blank"

FCC ID: 2A49R-UMPRO

Prepared For: **MICRO COMPUTER (HK) TECH LIMITED**
RM 18, 28/F, Shui On Centre, 6-8 Harbour Road, Waterfront, Wan Chai, HK,
HONG KONG, China

Prepared By: **Shenzhen HUAKE 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: **Dec. 17, 2024 ~ Jan. 07, 2025**

Date of Report: **Jan. 07, 2025**

Report Number: **HK2412177766-4E**



Test Result Certification

Applicant's Name.....: MICRO COMPUTER (HK) TECH LIMITED

Address: RM 18, 28/F, Shui On Centre, 6-8 Harbour Road, Waterfront, Wan Chai, HK, HONG KONG, China

Manufacturer's Name: MICRO COMPUTER (HK) TECH LIMITED

Address: RM 18, 28/F, Shui On Centre, 6-8 Harbour Road, Waterfront, Wan Chai, HK, HONG KONG, China

Product Description

Trade Mark: N/A

Product Name.....: MINI PC

Model and/or Type Reference : UM890 Pro, UM880 Pro, UM*****: where * = "0-9", "A-Z", "a-z", "character", "space", "blank"

Standards: FCC Rules and Regulations Part 15 Subpart E Section 15.407
ANSI C63.10: 2013

This publication may be reproduced in whole or in part for non-commercial purposes as long as the Shenzhen HUAKE Testing Technology Co., Ltd. is acknowledged as copyright owner and source of the material. Shenzhen HUAKE Testing Technology Co., Ltd. takes no responsibility for and will not assume liability for damages resulting from the reader's interpretation of the reproduced material due to its placement and context.

Date of Test.....:

Date (s) of Performance of Tests: **Dec. 17, 2024 ~ Jan. 07, 2025**

Date of Issue.....: **Jan. 07, 2025**

Test Result.....: **Pass**

Testing Engineer :

(Len Liao)

Technical Manager :

(Sliver Wan)

Authorized Signatory :

(Jason Zhou)



Table of Contents

1. Test Result Summary	5
1.1 Test Procedures and Results.....	5
1.2 Information of the Test Laboratory	5
1.3 Measurement Uncertainty	6
2. EUT Description	7
2.1 General Description of EUT	7
2.2 Operation Frequency Each of Channel.....	8
2.3 Operation of EUT during Testing.....	8
2.4 Description of Test Setup.....	9
2.5 Description of Support Units	10
3. General Information.....	11
3.1 Test Environment and Mode	11
4. Test Results and Measurement Data	16
4.1 Conducted Emission.....	16
4.2 Maximum Conducted Output Power	20
4.3 6dB Emission Bandwidth	24
4.4 26dB Bandwidth and 99% Occupied Bandwidth	25
4.5 Power Spectral Density	42
4.6 Band Edge.....	60
4.7 Spurious Emission.....	115
4.8 Frequency Stability Measurement.....	140
4.9 Antenna Requirement.....	142
5. Photographs of Test Setup.....	143
6. Photos of the EUT.....	145



**** Modified History ****

Revision	Description	Issued Data	Remark
Revision 1.0	Initial Test Report Release	Jan. 07, 2025	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	MINI PC
Model Name	UM890 Pro
Series Model	UM880 Pro, UM*****. where * = "0-9", "A-Z", "a-z", "character", "space", "blank"
Model Difference	The differences between the models are only different due to the different sales regions and the model naming method, other circuit principles, safety structure and key components are the same, and the differences do not affect the safety and electromagnetic compatibility performance of the product. Test sample model: UM890 Pro.
Trade Mark:	N/A
FCC ID	2A49R-UMPRO
Operation Frequency:	IEEE 802.11a/n/ac(HT20)/ax(HE20) 5.180GHz-5.240GHz IEEE 802.11n/ac(HT40)/ax(HE40) 5.190GHz-5.230GHz IEEE 802.11ac(HT80)/ax(HE80) 5.210GHz
Modulation Technology:	IEEE 802.11a/n/ac/ax
Modulation Type	64QAM, 16QAM, QPSK, BPSK for OFDM 256QAM for OFDM in 11ac mode only 1024QAM for OFDMA in 11ax mode only
Antenna Type	FPC antenna
Antenna Gain	Antenna 1: 0.46dBi Antenna 2: -5.02dBi MIMO: 1.54dBi
Power Source	DC 19V from Adapter with AC100-240V, 50/60Hz, 1.6A
Power Supply:	DC 19V from Adapter with AC100-240V, 50/60Hz, 1.6A
Hardware Version	V1.0
Software Version	V1.02
Note: 1. 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. For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual. 3. Antenna gain Refer to the antenna specifications. 4. The cable loss data is obtained from the supplier. 5. The test results in the report only apply to the tested sample.	



2.2 Operation Frequency Each of Channel

802.11a/802.11n(HT20) 802.11ac(HT20)/ 802.11ax(HE20)		802.11n(HT40)/ 802.11ac(HT40)/ 802.11ax(HE40)		802.11ac(HT80)/ 802.11ax(HE80)	
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(HE20)

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(HE40)

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

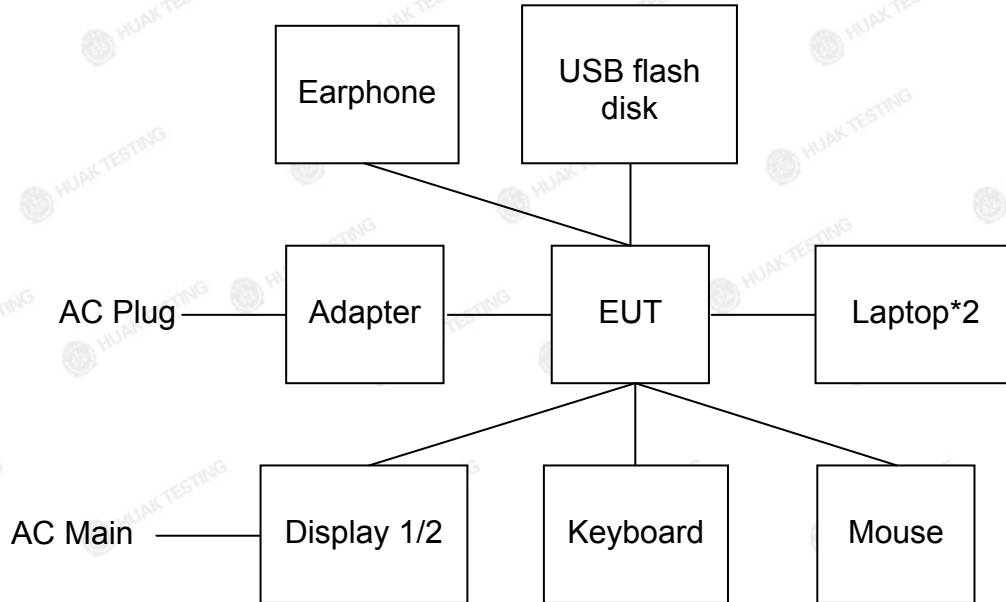
For 802.11ac(HT80)/ax(HE80)

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

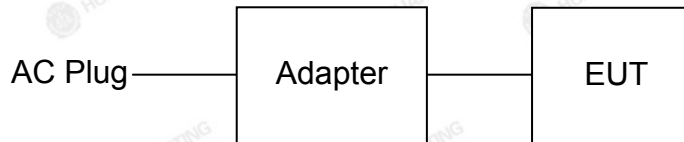


2.4 Description of Test Setup

Operation of EUT during Conducted and Radiation below 1GHz testing:



Operation of EUT during Radiation Above 1GHz testing:



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.



2.5 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.

Item	Equipment	Trade Mark	Model/Type No.	Specification	Remark
1	MINI PC	N/A	UM890 Pro	N/A	EUT
2	Adapter	N/A	HKA12019063-0D6	Input: 100-240V, 50/60Hz, 1.6A Output: DC19V, 6.32A	Accessory
3	USB Cable	N/A	N/A	Length: 100cm	Accessory
4	Laptop 1	Lenovo	TP00096A	Input: DC 20V, 2.25~3.25A Output: 5VDC, 0.5A	Peripheral
5	Laptop 2	Lenovo	TP00096A	Input: DC 20V, 2.25~3.25A Output: 5VDC, 0.5A	Peripheral
6	Display 1	AOC	N/A	N/A	Peripheral
7	Display 2	PHILIPS	N/A	N/A	Peripheral
8	Keyboard	N/A	N/A	N/A	Peripheral
9	Mouse	N/A	N/A	N/A	Peripheral
10	Earphone	N/A	N/A	N/A	Peripheral
11	USB flash disk	N/A	N/A	N/A	Peripheral

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, 26db Bandwidth and 99% Occupied 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.



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 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
802.11ax(HE20)/ax(HE40)/ax(HE80)	MCS0
Final Test Mode:	
Operation Mode:	Keep the EUT in continuous transmitting with modulation



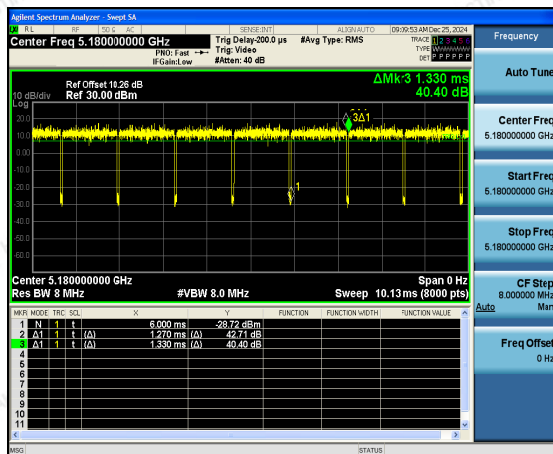
3. Mode Test Duty Cycle

ANT.1:

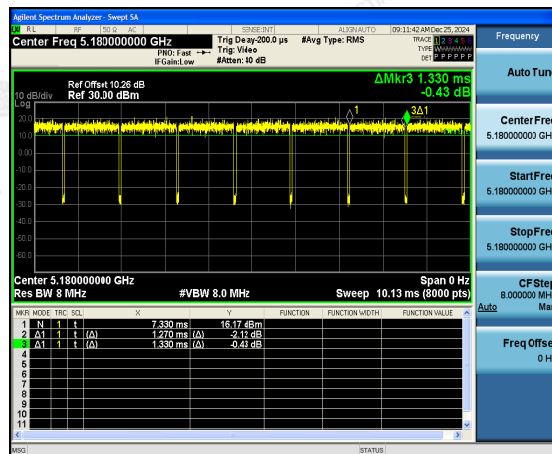
Mode	Duty Cycle	Duty Cycle Factor (dB)
802.11a	0.955	-0.200
802.11n(HT20)	0.955	-0.200
802.11n(HT40)	0.926	-0.332
802.11ac(HT20)	0.955	-0.200
802.11ac(HT40)	0.928	-0.327
802.11ac(HT80)	0.865	-0.631
802.11ax(HE20)	0.955	-0.200
802.11ax(HE40)	0.913	-0.395
802.11ax(HE80)	0.865	-0.631

Test plots as follows:

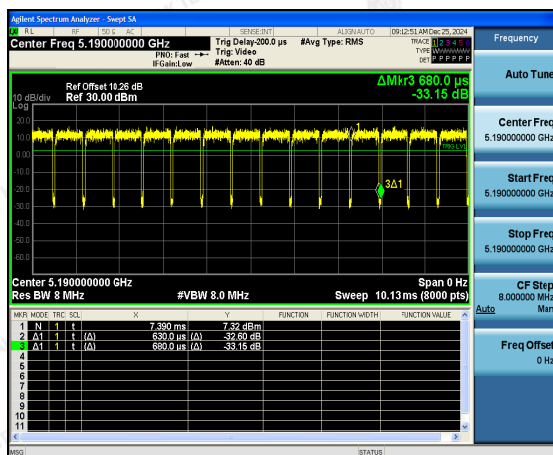
802.11a



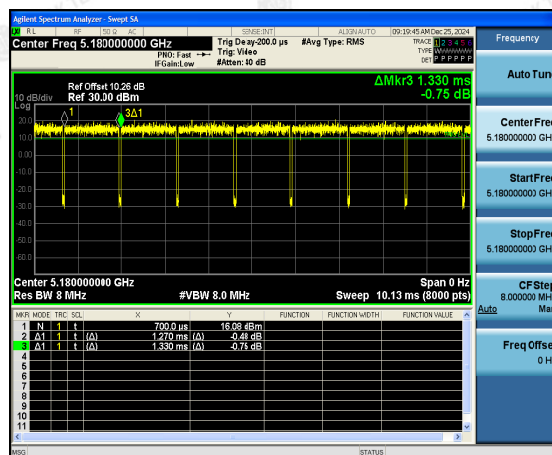
802.11n(HT20)



802.11n(HT40)



802.11ac(HT20)



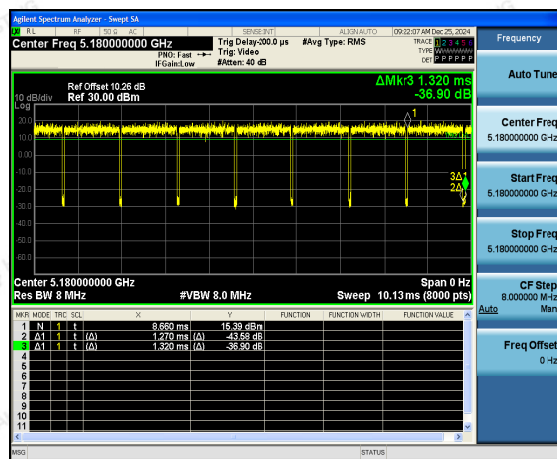


ANT.2:

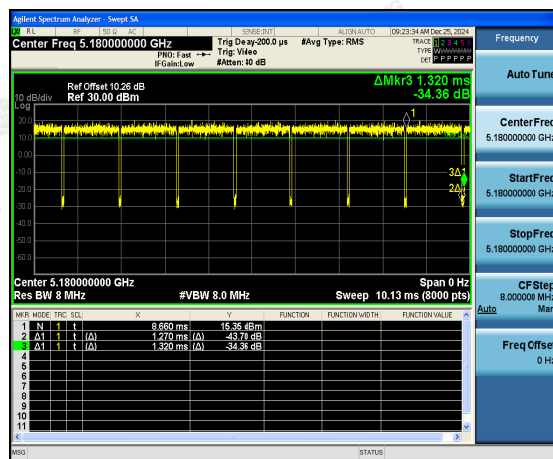
Mode	Duty Cycle	Duty Cycle Factor (dB)
802.11a	0.962	-0.168
802.11n(HT20)	0.962	-0.168
802.11n(HT40)	0.913	-0.395
802.11ac(HT20)	0.955	-0.200
802.11ac(HT40)	0.926	-0.332
802.11ac(HT80)	0.865	-0.631
802.11ax(HE20)	0.955	-0.200
802.11ax(HE40)	0.913	-0.395
802.11ax(HE80)	0.865	-0.631

Test plots as follows:

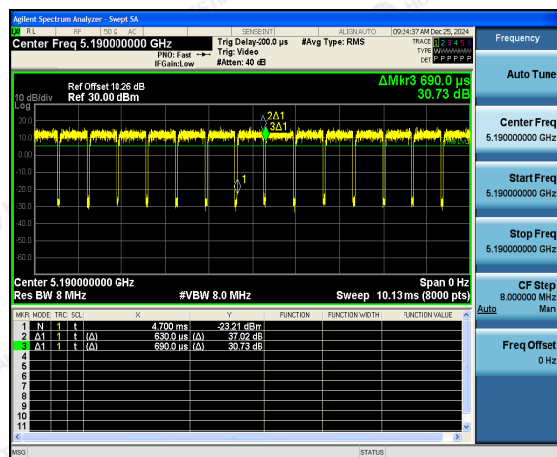
802.11a



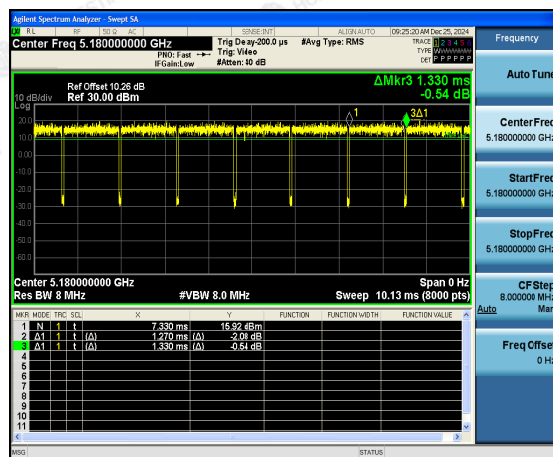
802.11n(HT20)



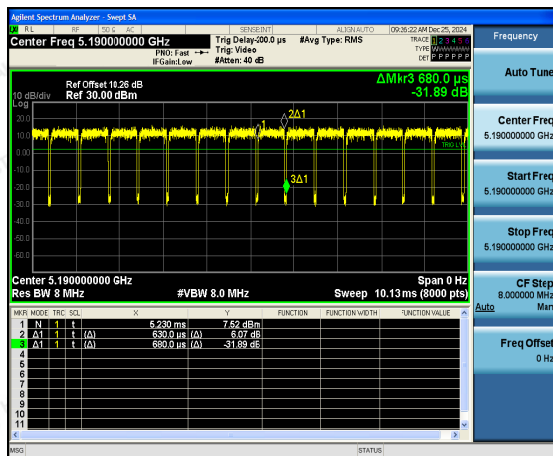
802.11n(HT40)



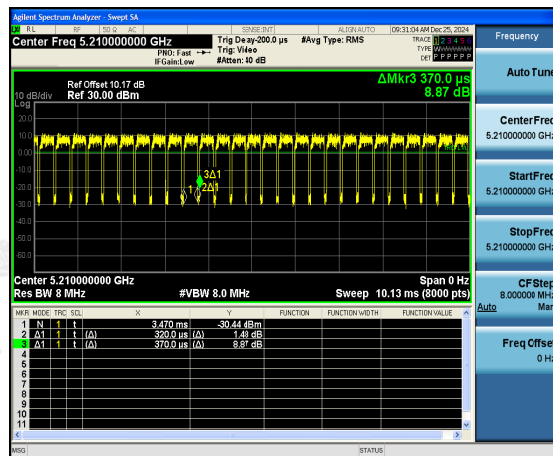
802.11ac(HT20)



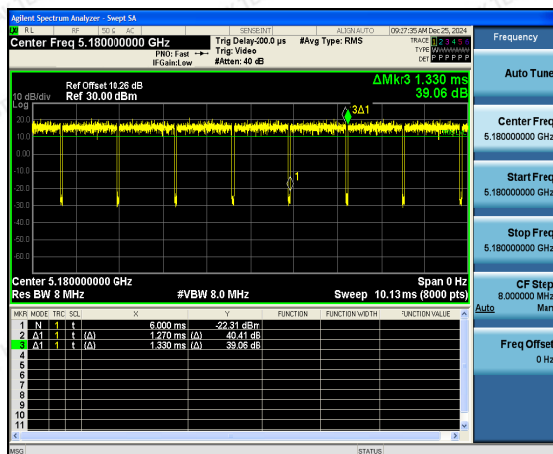
802.11ac(HT40)



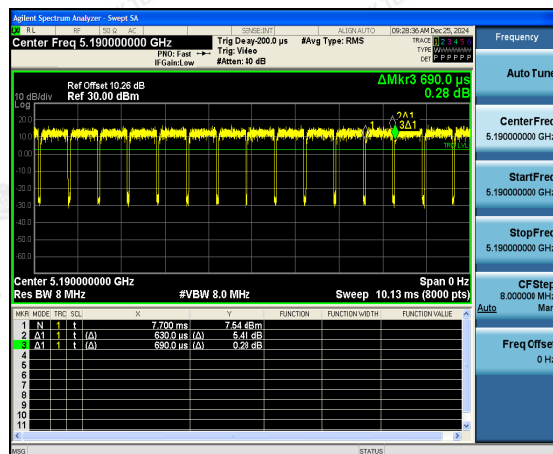
802.11ac(HT80)



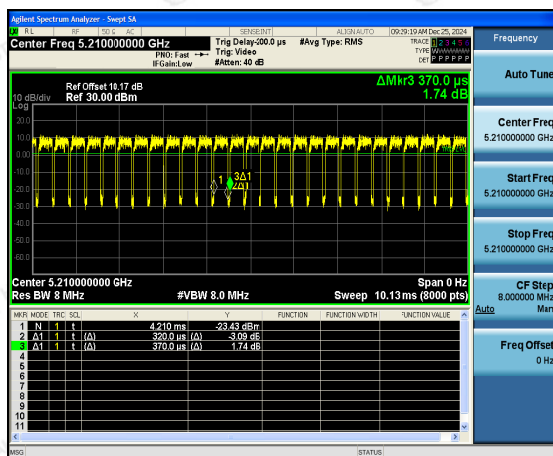
802.11ax(HE20)



802.11ax(HE40)



802.11ax(HE80)



The results shown in this test report refer only to the sample(s) tested unless otherwise stated and the sample(s) are retained for 30 days only. The document is issued by HUAK, this document cannot be reproduced except in full with our prior written permission. The more details and the authenticity of the report will be confirmed at <http://www.cer-mark.com>.

TEL : +86-755 2302 9901 FAX : +86-755 2302 9901 E-mail : service@cer-mark.com

Add: 1-2F., Building B2, Junfeng Zhongcheng Zhizao Innovation Park, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China



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)

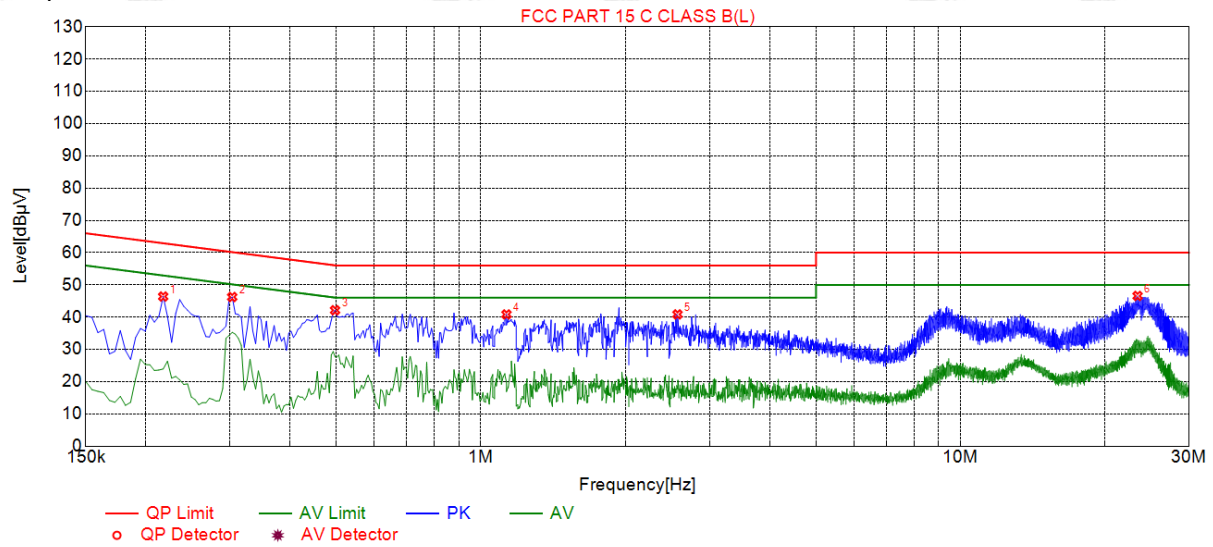
Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
Receiver	R&S	ESR	HKE-005	Feb. 20, 2024	Feb. 19, 2025
LISN	R&S	ENV216	HKE-002	Feb. 20, 2024	Feb. 19, 2025
LISN	R&S	ENV216	HKE-059	Feb. 20, 2024	Feb. 19, 2025
Coax cable (9KHz-30MHz)	Times	381806-002	N/A	Feb. 20, 2024	Feb. 19, 2025
EMI Test Software	Tonscend	JS32-CE 2.5.0.6	HKE-081	N/A	N/A
10dB Attenuator	Schwarzbeck	VTSD9561F	HKE-153	Feb. 20, 2024	Feb. 19, 2025

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	0.2175	46.39	19.85	62.91	16.52	26.54	PK	L
2	0.3030	46.24	19.85	60.16	13.92	26.39	PK	L
3	0.4965	42.14	19.84	56.06	13.92	22.30	PK	L
4	1.1310	40.84	19.90	56.00	15.16	20.94	PK	L
5	2.5710	40.85	20.03	56.00	15.15	20.82	PK	L
6	23.4240	46.58	20.07	60.00	13.42	26.51	PK	L

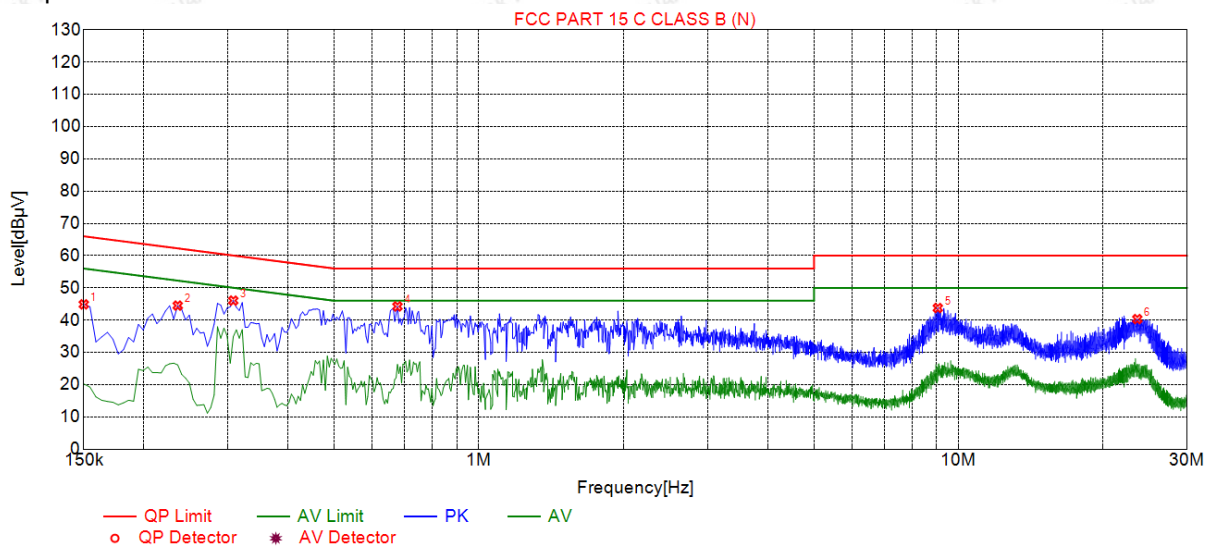
Remark: Margin = Limit – Level

Correction factor = Cable lose + ISN 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	0.1500	44.90	19.73	66.00	21.10	25.17	PK	N
2	0.2355	44.51	19.73	62.25	17.74	24.78	PK	N
3	0.3075	46.06	19.75	60.04	13.98	26.31	PK	N
4	0.6765	44.25	19.74	56.00	11.75	24.51	PK	N
5	9.0600	43.76	19.90	60.00	16.24	23.86	PK	N
6	23.6175	40.34	20.17	60.00	19.66	20.17	PK	N

Remark: Margin = Limit – Level

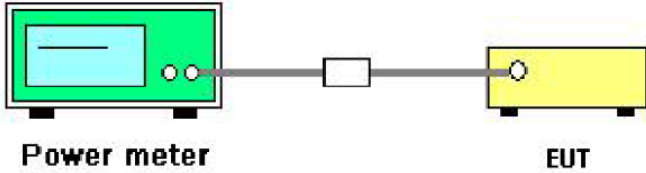
Correction factor = Cable lose + ISN insertion loss

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	250mW
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 $+10\log(1/x)$ X is duty cycle=1, so $10\log(1/1)=0$ 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-025	Feb. 20, 2024	Feb. 19, 2025
Power meter	Agilent	E4419B	HKE-085	Feb. 20, 2024	Feb. 19, 2025
Power Sensor	Agilent	E9300A	HKE-086	Feb. 20, 2024	Feb. 19, 2025
RF cable	Times	1-40G	HKE-034	Feb. 20, 2024	Feb. 19, 2025
RF automatic control unit	Tonscend	JS0806-2	HKE-060	Feb. 20, 2024	Feb. 19, 2025
RF Test Software	Tonscend	JS1120-3 Version 3.5.39	HKE-083	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).



4.2.3 Test Data

Configuration Band I (5150 - 5250 MHz)					
Mode	Test Channel	Maximum Conducted Output Power (dBm)		Limit (dBm)	Result
		Antenna port 1	Antenna port 2		
802.11a	CH36	5.66	7.23	24	PASS
802.11a	CH40	6.26	7.00	24	PASS
802.11a	CH48	6.78	6.89	24	PASS
802.11n(HT20)	CH36	5.82	6.22	24	PASS
802.11n(HT20)	CH40	5.35	6.49	24	PASS
802.11n(HT20)	CH48	6.38	6.11	24	PASS
802.11n(HT40)	CH38	5.96	7.28	24	PASS
802.11n(HT40)	CH46	6.37	7.03	24	PASS
802.11ac(HT20)	CH36	5.43	7.38	24	PASS
802.11ac(HT20)	CH40	5.92	5.87	24	PASS
802.11ac(HT20)	CH48	5.93	5.78	24	PASS
802.11ac(HT40)	CH38	5.82	6.09	24	PASS
802.11ac(HT40)	CH46	6.54	5.87	24	PASS
802.11ac(HT80)	CH42	6.52	6.86	24	PASS
802.11ax(HE20)	CH36	5.62	6.68	24	PASS
802.11ax(HE20)	CH40	6.10	6.76	24	PASS
802.11ax(HE20)	CH48	6.74	6.68	24	PASS
802.11ax(HE40)	CH38	6.17	6.91	24	PASS
802.11ax(HE40)	CH46	6.93	6.66	24	PASS
802.11ax(HE80)	CH42	6.53	5.67	24	PASS

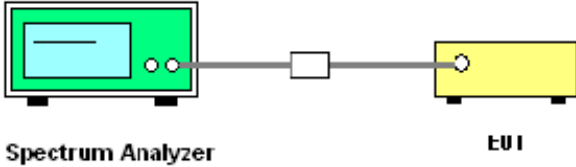
**Configuration Band I (5150 - 5250 MHz)**

Mode	Test channel	Maximum Conducted Output Power (dBm)		MIMO	Limit (dBm)	Result
		Antenna port 1	Antenna port 2			
802.11n(HT20)	CH36	5.82	6.22	9.03	24	PASS
802.11n(HT20)	CH40	5.35	6.49	8.97	24	PASS
802.11n(HT20)	CH48	6.38	6.11	9.26	24	PASS
802.11n(HT40)	CH38	5.96	7.28	9.68	24	PASS
802.11n(HT40)	CH46	6.37	7.03	9.72	24	PASS
802.11ac(HT20)	CH36	5.43	7.38	9.52	24	PASS
802.11ac(HT20)	CH40	5.92	5.87	8.91	24	PASS
802.11ac(HT20)	CH48	5.93	5.78	8.87	24	PASS
802.11ac(HT40)	CH38	5.82	6.09	8.97	24	PASS
802.11ac(HT40)	CH46	6.54	5.87	9.23	24	PASS
802.11ac(HT80)	CH42	6.52	6.86	9.70	24	PASS
802.11ax(HE20)	CH36	5.62	6.68	9.19	24	PASS
802.11ax(HE20)	CH40	6.10	6.76	9.45	24	PASS
802.11ax(HE20)	CH48	6.74	6.68	9.72	24	PASS
802.11ax(HE40)	CH38	6.17	6.91	9.57	24	PASS
802.11ax(HE40)	CH46	6.93	6.66	9.81	24	PASS
802.11ax(HE80)	CH42	6.53	5.67	9.13	24	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-025	Feb. 20, 2024	Feb. 19, 2025
RF cable	Times	1-40G	HKE-034	Feb. 20, 2024	Feb. 19, 2025
RF automatic control unit	Tonscend	JS0806-2	HKE-060	Feb. 20, 2024	Feb. 19, 2025
RF Test Software	Tonscend	JS1120-3 Version 3.5.39	HKE-083	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).

4.3.3 Test Data

N/A

The results shown in this test report refer only to the sample(s) tested unless otherwise stated and the sample(s) are retained for 30 days only. The document is issued by HUAKE, this document cannot be reproduced except in full with our prior written permission. The more details and the authenticity of the report will be confirmed at <http://www.cer-mark.com>.

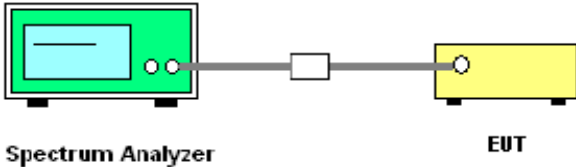
TEL : +86-755 2302 9901 FAX : +86-755 2302 9901 E-mail : service@cer-mark.com

Add: 1-2F., Building B2, Junfeng Zhongcheng Zhizao Innovation Park, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China



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-025	Feb. 20, 2024	Feb. 19, 2025
RF cable	Times	1-40G	HKE-034	Feb. 20, 2024	Feb. 19, 2025
RF automatic control unit	Tonscend	JS0806-2	HKE-060	Feb. 20, 2024	Feb. 19, 2025
RF Test Software	Tonscend	JS1120-3 Version 3.5.39	HKE-083	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).



4.4.3 Test Data

Band I

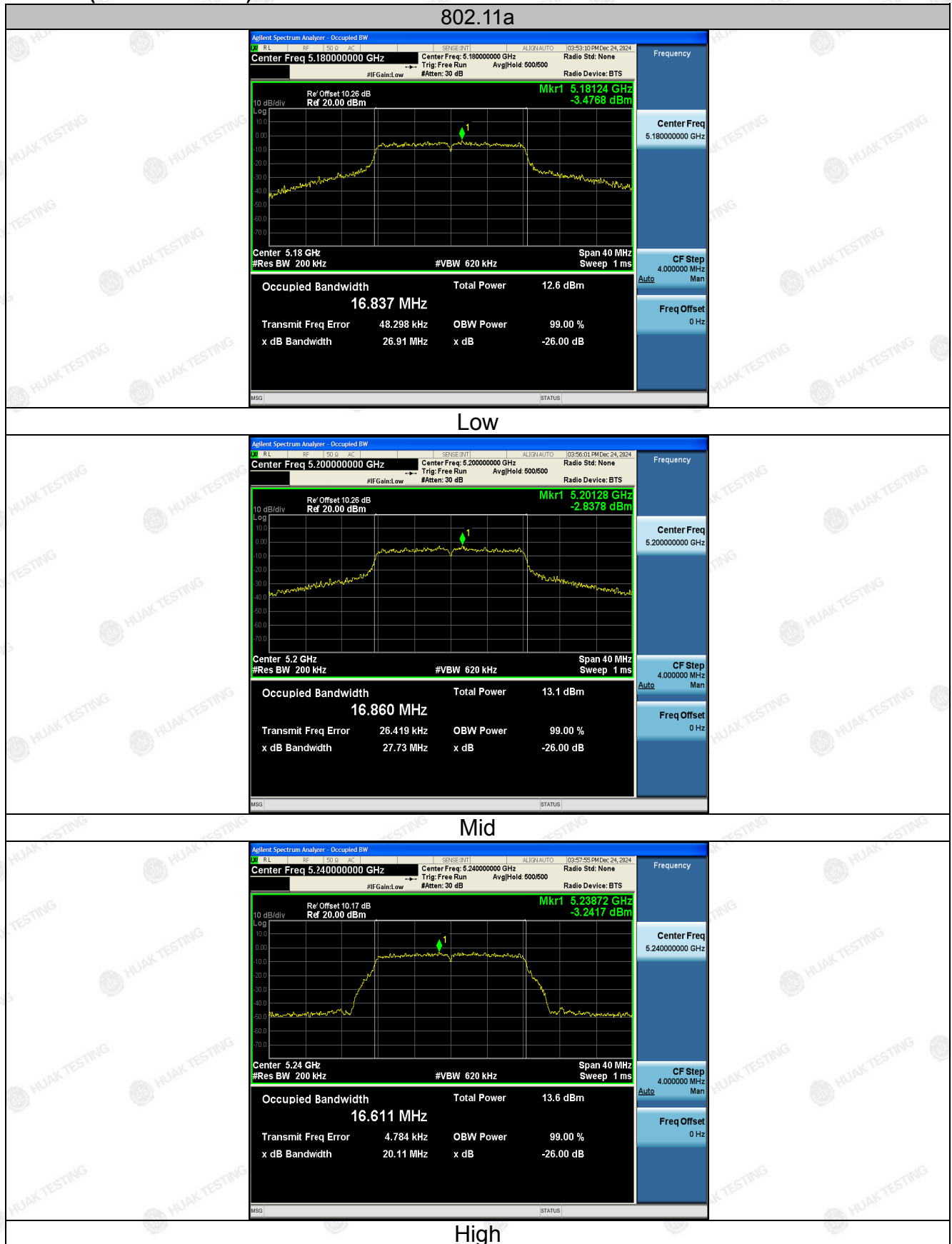
ANT. 1

Mode	Test Channel	Frequency (MHz)	26dB Bandwidth (MHz)	Verdict
802.11a	CH36	5180	26.91	PASS
802.11a	CH40	5200	27.73	PASS
802.11a	CH48	5240	20.11	PASS
802.11n(HT20)	CH36	5180	28.61	PASS
802.11n(HT20)	CH40	5200	27.53	PASS
802.11n(HT20)	CH48	5240	20.36	PASS
802.11n(HT40)	CH38	5190	53.26	PASS
802.11n(HT40)	CH46	5230	40.18	PASS
802.11ac(HT20)	CH36	5180	29.66	PASS
802.11ac(HT20)	CH40	5200	27.01	PASS
802.11ac(HT20)	CH48	5240	20.39	PASS
802.11ac(HT40)	CH38	5190	52.12	PASS
802.11ac(HT40)	CH46	5230	40.51	PASS
802.11ac(HT80)	CH42	5210	108.2	PASS
802.11ax(HE20)	CH36	5180	27.48	PASS
802.11ax(HE20)	CH40	5200	30.75	PASS
802.11ax(HE20)	CH48	5240	19.93	PASS
802.11ax(HE40)	CH38	5190	48.02	PASS
802.11ax(HE40)	CH46	5230	39.45	PASS
802.11ax(HE80)	CH42	5210	96.91	PASS

Test plots as follows:



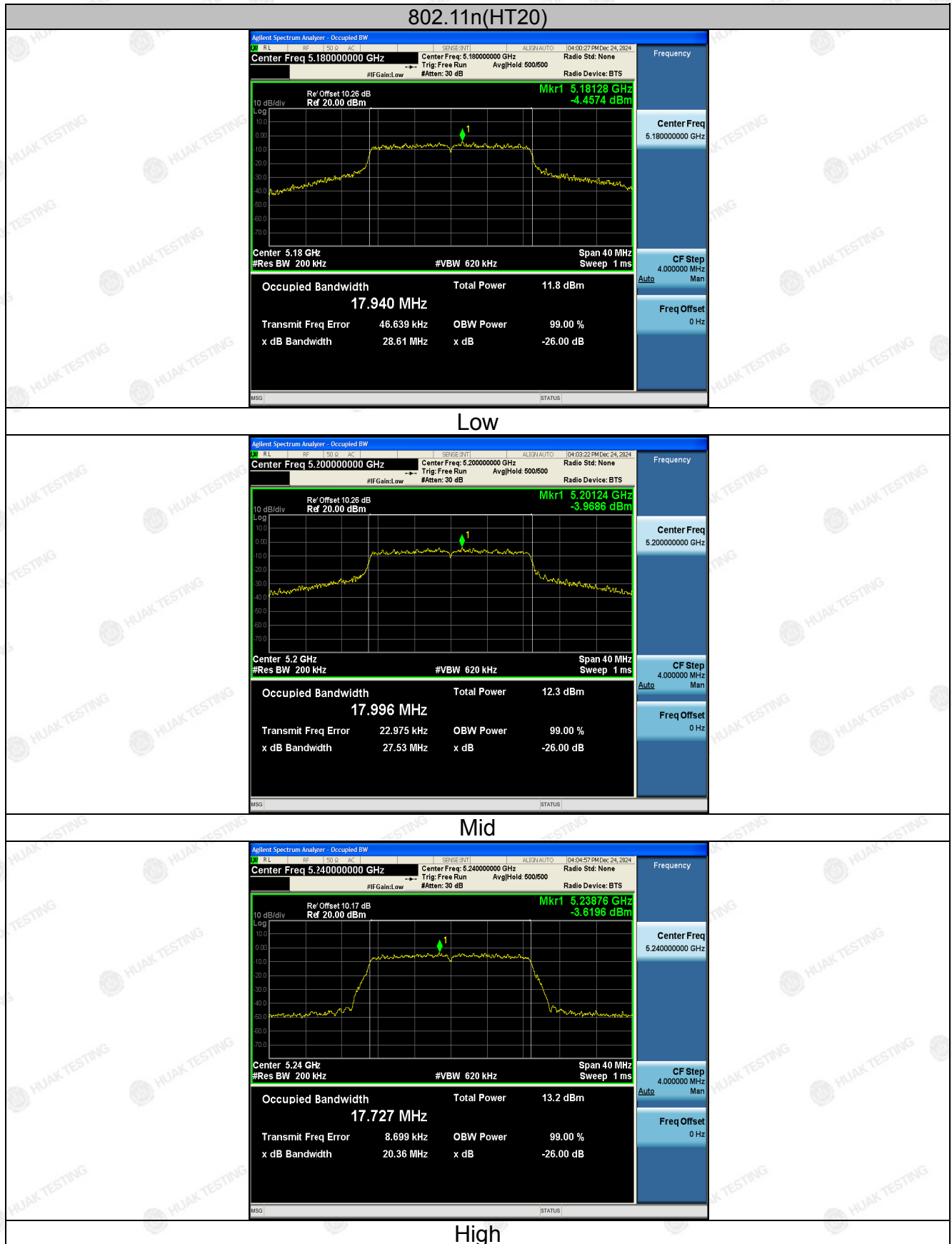
Band I (5150 – 5250 MHz)



The results shown in this test report refer only to the sample(s) tested unless otherwise stated and the sample(s) are retained for 30 days only. The document is issued by HUAKE, this document cannot be reproduced except in full with our prior written permission. The more details and the authenticity of the report will be confirmed at <http://www.cer-mark.com>.

TEL : +86-755 2302 9901 FAX : +86-755 2302 9901 E-mail : service@cer-mark.com

Add: 1-2F., Building B2, Junfeng Zhongcheng Zhizao Innovation Park, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China

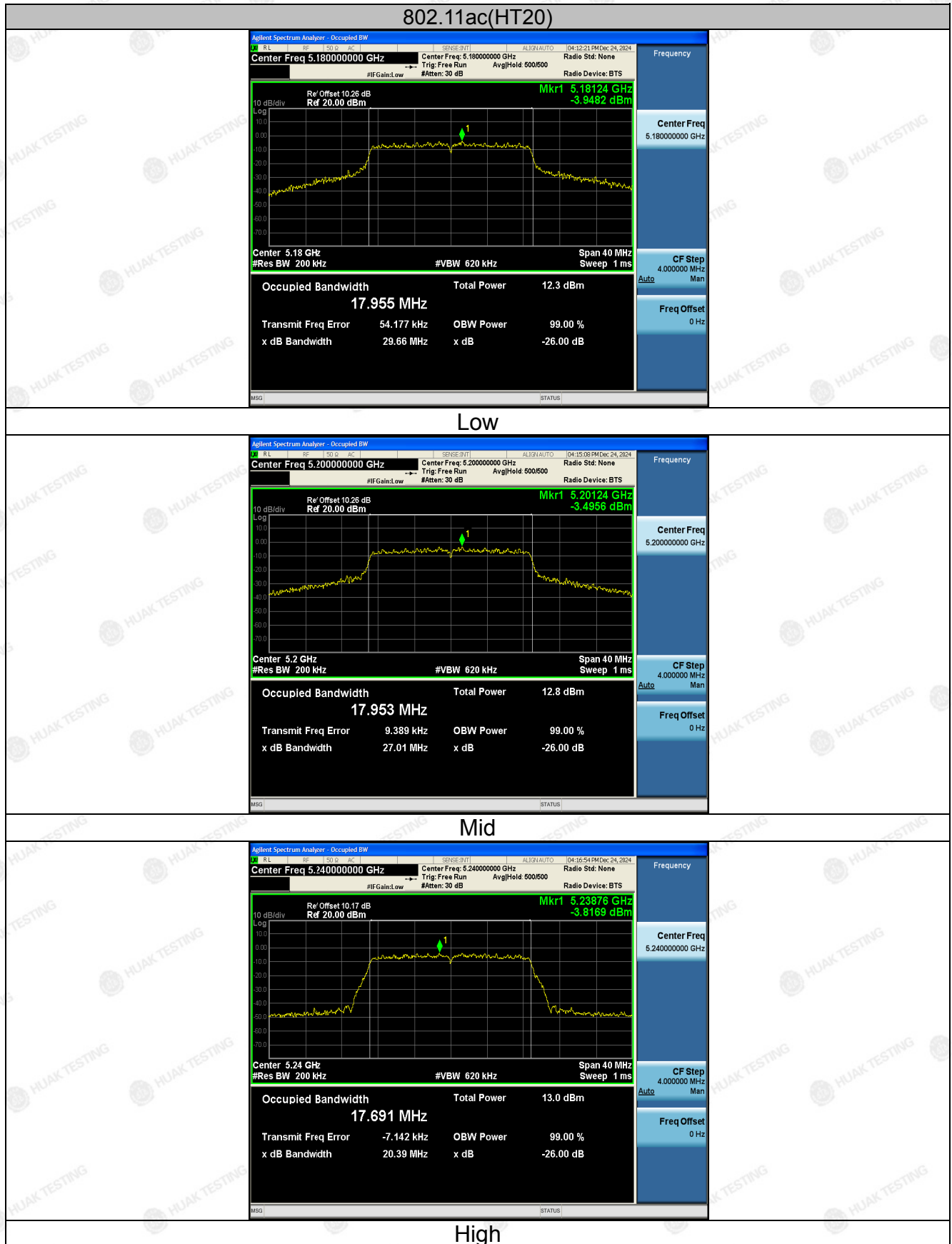


The results shown in this test report refer only to the sample(s) tested unless otherwise stated and the sample(s) are retained for 30 days only. The document is issued by HUAKE, this document cannot be reproduced except in full with our prior written permission. The more details and the authenticity of the report will be confirmed at <http://www.cer-mark.com>.

TEL : +86-755 2302 9901 FAX : +86-755 2302 9901 E-mail : service@cer-mark.com

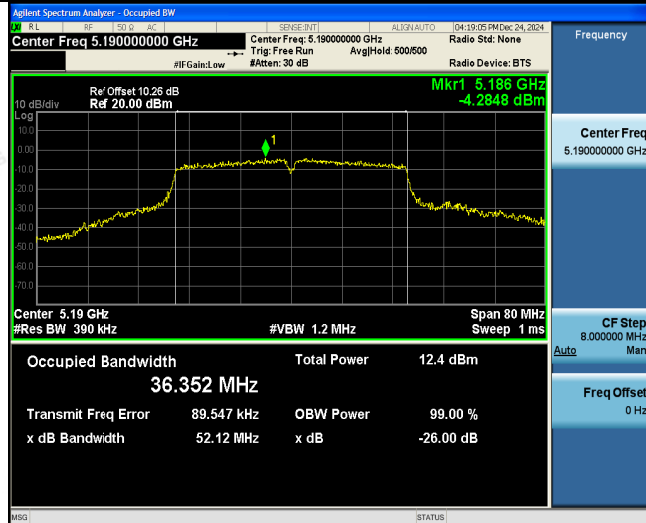
Add: 1-2F., Building B2, Junfeng Zhongcheng Zhizao Innovation Park, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China







802.11ac(HT40)



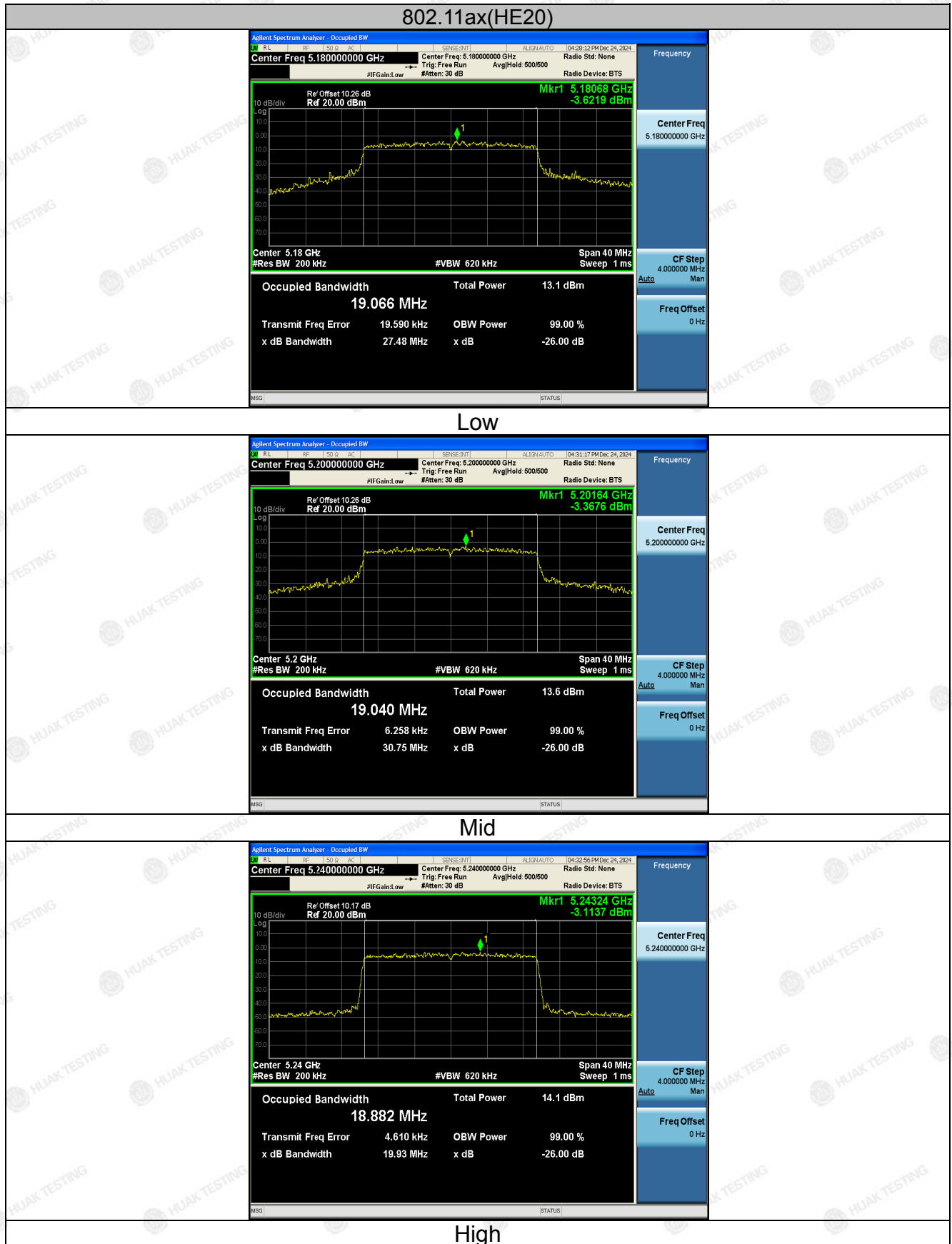
Low



High

802.11ac(HT80)



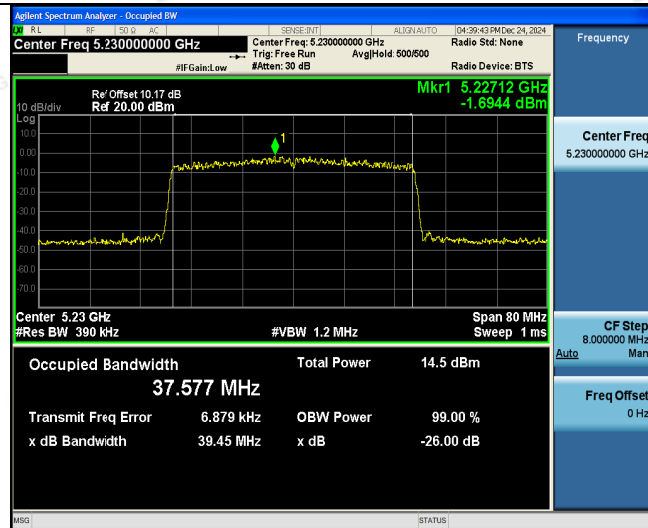




802.11ax(HE40)



Low



High

802.11ax(HE80)



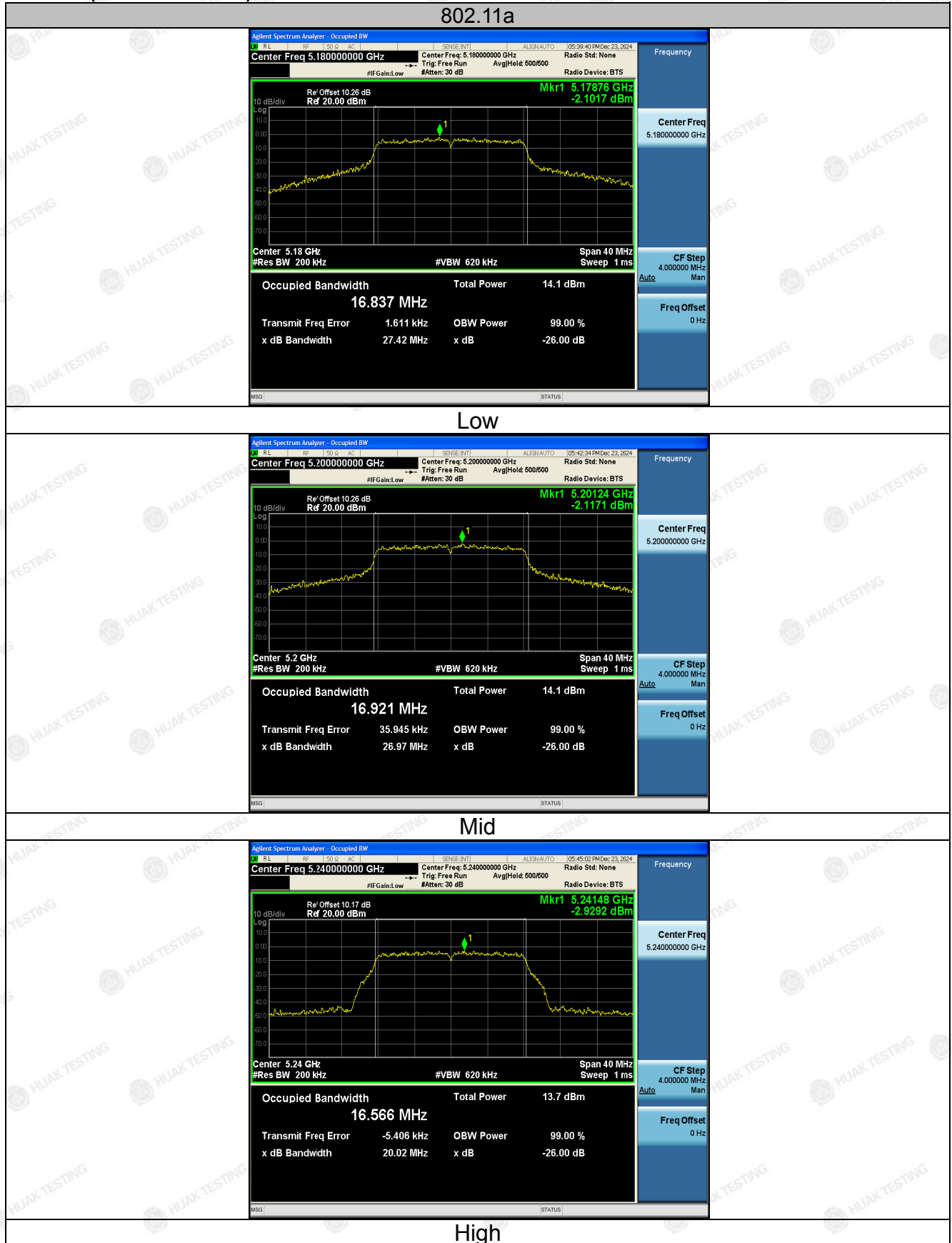
**ANT. 2**

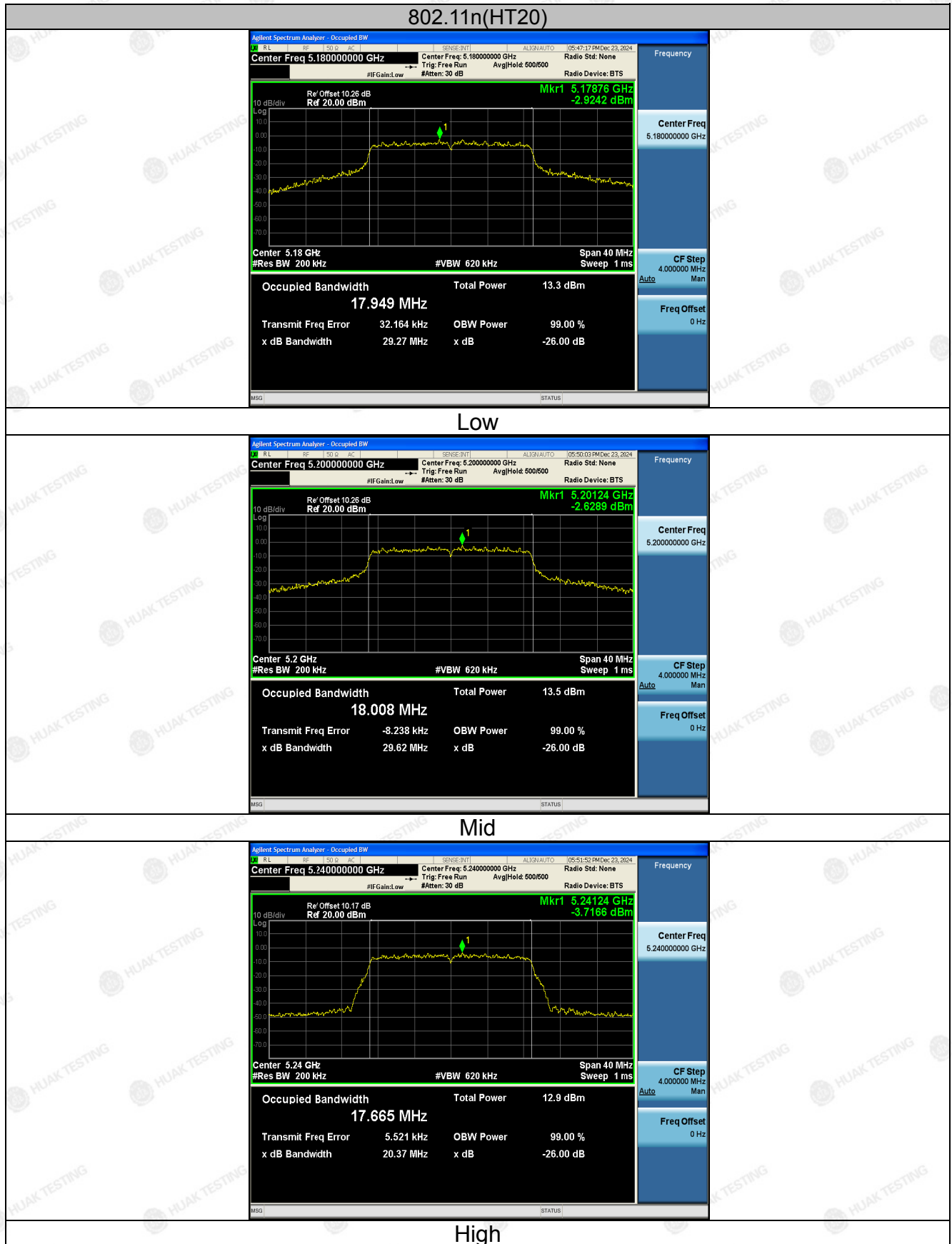
Mode	Test Channel	Frequency (MHz)	26dB Bandwidth (MHz)	Verdict
802.11a	CH36	5180	27.42	PASS
802.11a	CH40	5200	26.97	PASS
802.11a	CH48	5240	20.02	PASS
802.11n(HT20)	CH36	5180	29.27	PASS
802.11n(HT20)	CH40	5200	29.62	PASS
802.11n(HT20)	CH48	5240	20.37	PASS
802.11n(HT40)	CH38	5190	57.08	PASS
802.11n(HT40)	CH46	5230	40.19	PASS
802.11ac(HT20)	CH36	5180	29.22	PASS
802.11ac(HT20)	CH40	5200	28.67	PASS
802.11ac(HT20)	CH48	5240	20.10	PASS
802.11ac(HT40)	CH38	5190	54.03	PASS
802.11ac(HT40)	CH46	5230	39.84	PASS
802.11ac(HT80)	CH42	5210	105.1	PASS
802.11ax(HE20)	CH36	5180	25.90	PASS
802.11ax(HE20)	CH40	5200	29.75	PASS
802.11ax(HE20)	CH48	5240	19.86	PASS
802.11ax(HE40)	CH38	5190	48.02	PASS
802.11ax(HE40)	CH46	5230	39.58	PASS
802.11ax(HE80)	CH42	5210	98.73	PASS

Test plots as follows:



Band I (5150 – 5250 MHz)



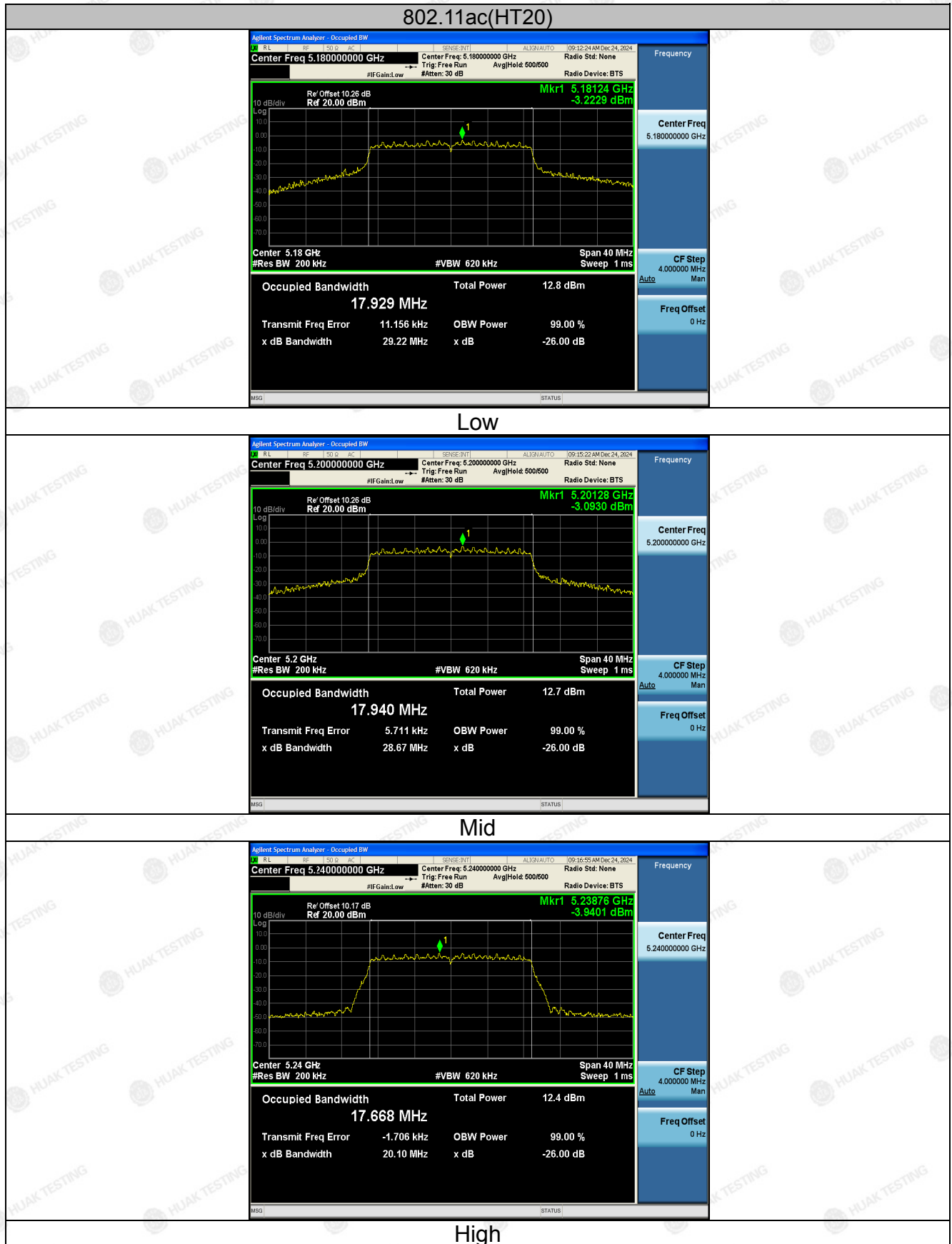


The results shown in this test report refer only to the sample(s) tested unless otherwise stated and the sample(s) are retained for 30 days only. The document is issued by HUAKE, this document cannot be reproduced except in full with our prior written permission. The more details and the authenticity of the report will be confirmed at <http://www.cer-mark.com>.

TEL : +86-755 2302 9901 FAX : +86-755 2302 9901 E-mail : service@cer-mark.com

Add: 1-2F., Building B2, Junfeng Zhongcheng Zhizao Innovation Park, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China





The results shown in this test report refer only to the sample(s) tested unless otherwise stated and the sample(s) are retained for 30 days only. The document is issued by HUAKE, this document cannot be reproduced except in full with our prior written permission. The more details and the authenticity of the report will be confirmed at <http://www.cer-mark.com>.

TEL : +86-755 2302 9901 FAX : +86-755 2302 9901 E-mail : service@cer-mark.com

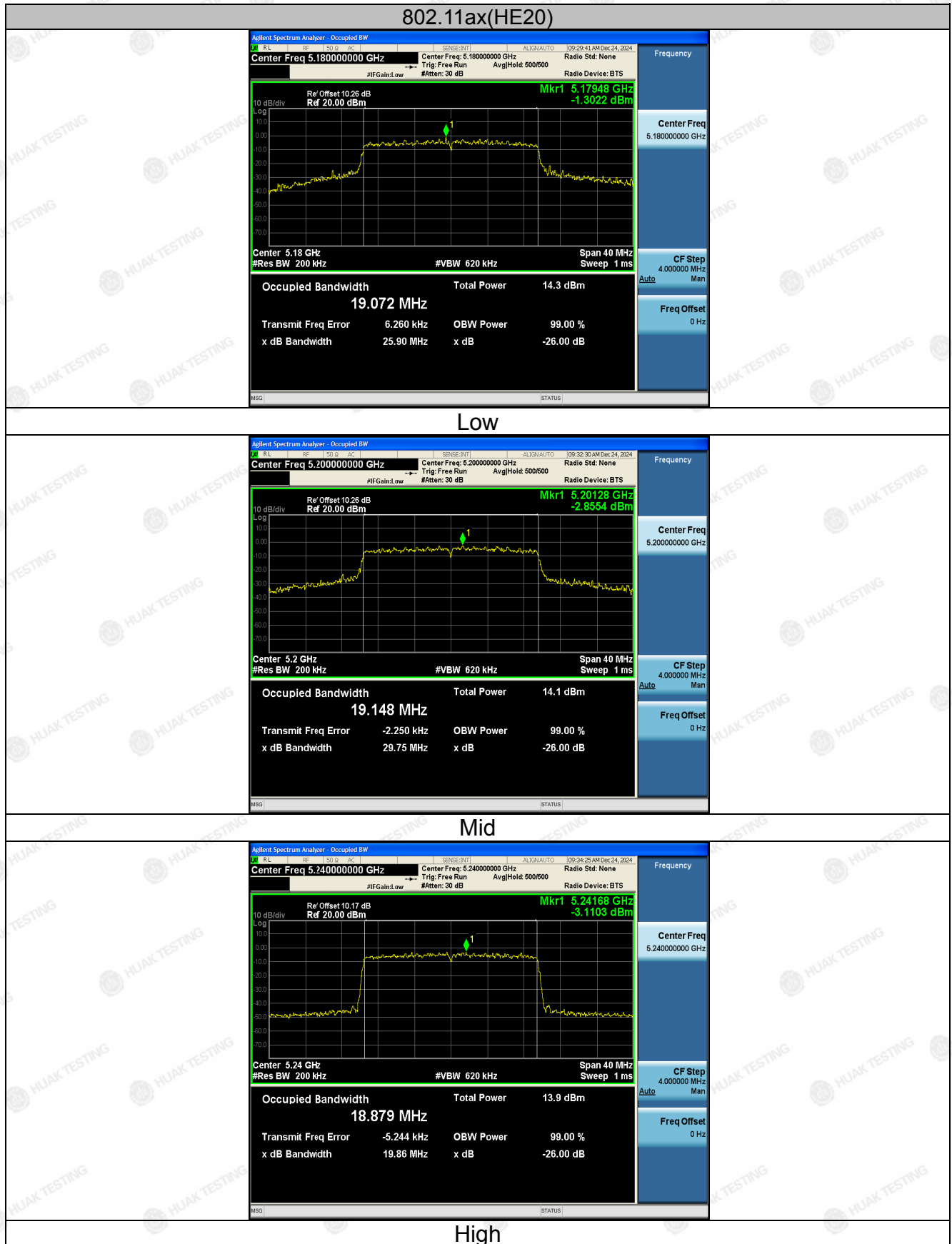
Add: 1-2F., Building B2, Junfeng Zhongcheng Zhizao Innovation Park, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China



The results shown in this test report refer only to the sample(s) tested unless otherwise stated and the sample(s) are retained for 30 days only. The document is issued by HUAKE, this document cannot be reproduced except in full with our prior written permission. The more details and the authenticity of the report will be confirmed at <http://www.cer-mark.com>.

TEL : +86-755 2302 9901 FAX : +86-755 2302 9901 E-mail : service@cer-mark.com

Add: 1-2F., Building B2, Junfeng Zhongcheng Zhizao Innovation Park, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China



The results shown in this test report refer only to the sample(s) tested unless otherwise stated and the sample(s) are retained for 30 days only. The document is issued by HUAKE, this document cannot be reproduced except in full with our prior written permission. The more details and the authenticity of the report will be confirmed at <http://www.cer-mark.com>.

TEL : +86-755 2302 9901 FAX : +86-755 2302 9901 E-mail : service@cer-mark.com

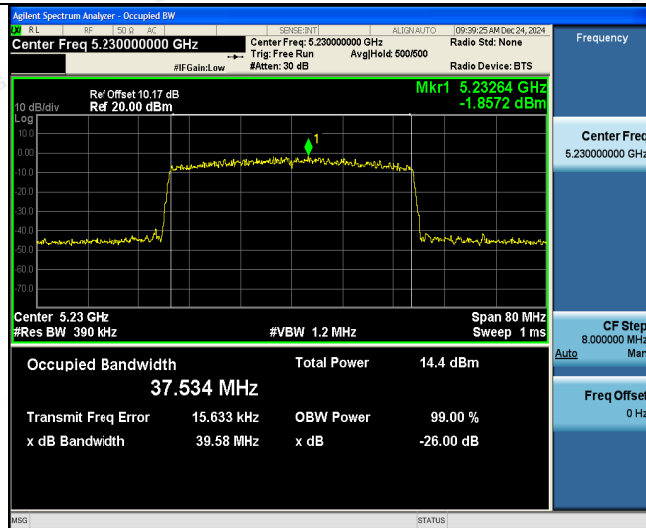
Add: 1-2F., Building B2, Junfeng Zhongcheng Zhizao Innovation Park, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China



802.11ax(HE40)



Low



High

802.11ax(HE80)

