



FCC TEST REPORT

**Test report
On Behalf of
TEVII TECHNOLOGY CO., LTD.
For
Wireless HDMI Extender
Model No.: G405CTX, PRESENT+SHARE (USB-C 4K EDITION),
ECW-200-Tx**

FCC ID: 2ALU5-G405CTX

Prepared For : TEVII TECHNOLOGY CO., LTD.
10F, No.125, Sec. 2, Datong Rd. 22183 Xizhi District, New Taipei City, Taiwan

Prepared By : Shenzhen HUAK Testing Technology Co., Ltd.
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Date of Test: Jun. 24, 2024 ~ Jul. 01, 2024

Date of Report: Jul. 01, 2024

Report Number: HK2406243280-1E



TEST RESULT CERTIFICATION

Applicant's name : TEVII TECHNOLOGY CO., LTD.
Address..... : 10F, No.125, Sec. 2, Datong Rd. 22183 Xizhi District, New Taipei City, Taiwan
Manufacturer's Name..... : TEVII TECHNOLOGY CO., LTD.
Address..... : 10F, No.125, Sec. 2, Datong Rd. 22183 Xizhi District, New Taipei City, Taiwan
Product description
Trade Mark..... : TEVII, Clearclick, COVID
Product name : Wireless HDMI Extender
Model and/or type reference : G405CTX, PRESENT+SHARE (USB-C 4K EDITION), ECW-200-Tx
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. 24, 2024 ~ Jul. 01, 2024**
Date of Issue : **Jul. 01, 2024**
Test Result : **Pass**

Testing Engineer : Len Liao
 (Len Liao)

Technical Manager : Sliver Wan
 (Sliver Wan)

Authorized Signatory : Jason Zhou
 (Jason Zhou)

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**** Modified History ****

Revision	Description	Issued Data	Remark
Revision 1.0	Initial Test Report Release	Jul. 01, 2024	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 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 $y \pm U$, 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	$\pm 2.71\text{dB}$
2	RF power, conducted	$\pm 0.37\text{dB}$
3	Spurious emissions, conducted	$\pm 0.11\text{dB}$
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:	Wireless HDMI Extender
Model Name:	G405CTX
Series Model:	PRESENT+SHARE (USB-C 4K EDITION), ECW-200-Tx
Model Difference:	All model's the function, software and electric circuit are the same, only with model named different. Test sample model: G405CTX.
Trade Mark:	TEVII, Clearclick, COVID
FCC ID:	2ALU5-G405CTX
Operation Frequency:	IEEE 802.11a/n/ac(HT20) 5.180GHz-5.240GHz IEEE 802.11n/ac(HT40) 5.190GHz-5.230GHz IEEE 802.11ac(HT80) 5.210GHz
Modulation Technology:	IEEE 802.11a/n/ac
Modulation Type:	256QAM, 64QAM,16QAM, QPSK, BPSK for OFDM
Antenna Type:	FPC Antenna
Antenna Gain:	3.3dBi
Power Source:	DC 5V
Power Supply:	DC 5V
Software Version	V2.0
Hardware Version	V2.0

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2.2. OPERATION FREQUENCY EACH OF CHANNEL

802.11a/802.11n/802.11ac (HT20)		802.11n/802.11ac (HT40)		802.11ac(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/ac(HT20)

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

For 802.11n/ac(HT40)

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

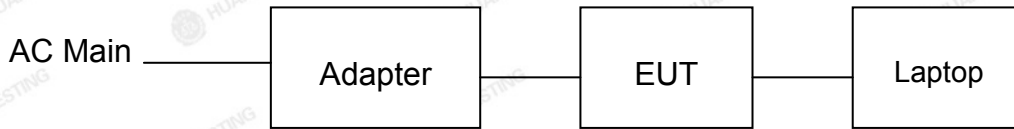
For 802.11ac(HT80)

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

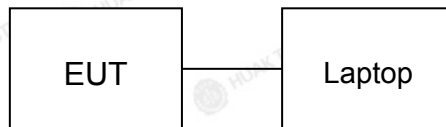


2.4. DESCRIPTION OF TEST SETUP

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



Operation of EUT during above 1GHz radiation testing:



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.



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	Mfr/Brand	Model/Type No.	Specification	Note
1	Wireless HDMI Extender	TEVII, Clearclick, COVID	G405CTX	N/A	EUT
2	Adapter	N/A	CD289	Input: AC100-240V, 50/60Hz, 2A USB-C1 Output: DC5V-3A, 9V-3A, 12V-3A, 15V-3A, 20V-5A, 28V-5A, 140W Max USB-C2 Output: DC5V-3A, 9V-3A, 12V-3A, 15V-3A, 20V-5A, 100W Max USB-A Output: DC5V-4.5A, 4.5V-5A, 5V-3A, 9V-2A, 12V-1.5A, 22.5W Max USB-A Output: DC5V/2.4A	Peripheral
3	Laptop	Lenovo	Thinkpad E450	Input: 20V 2.25A/3.25A	Peripheral

Note:

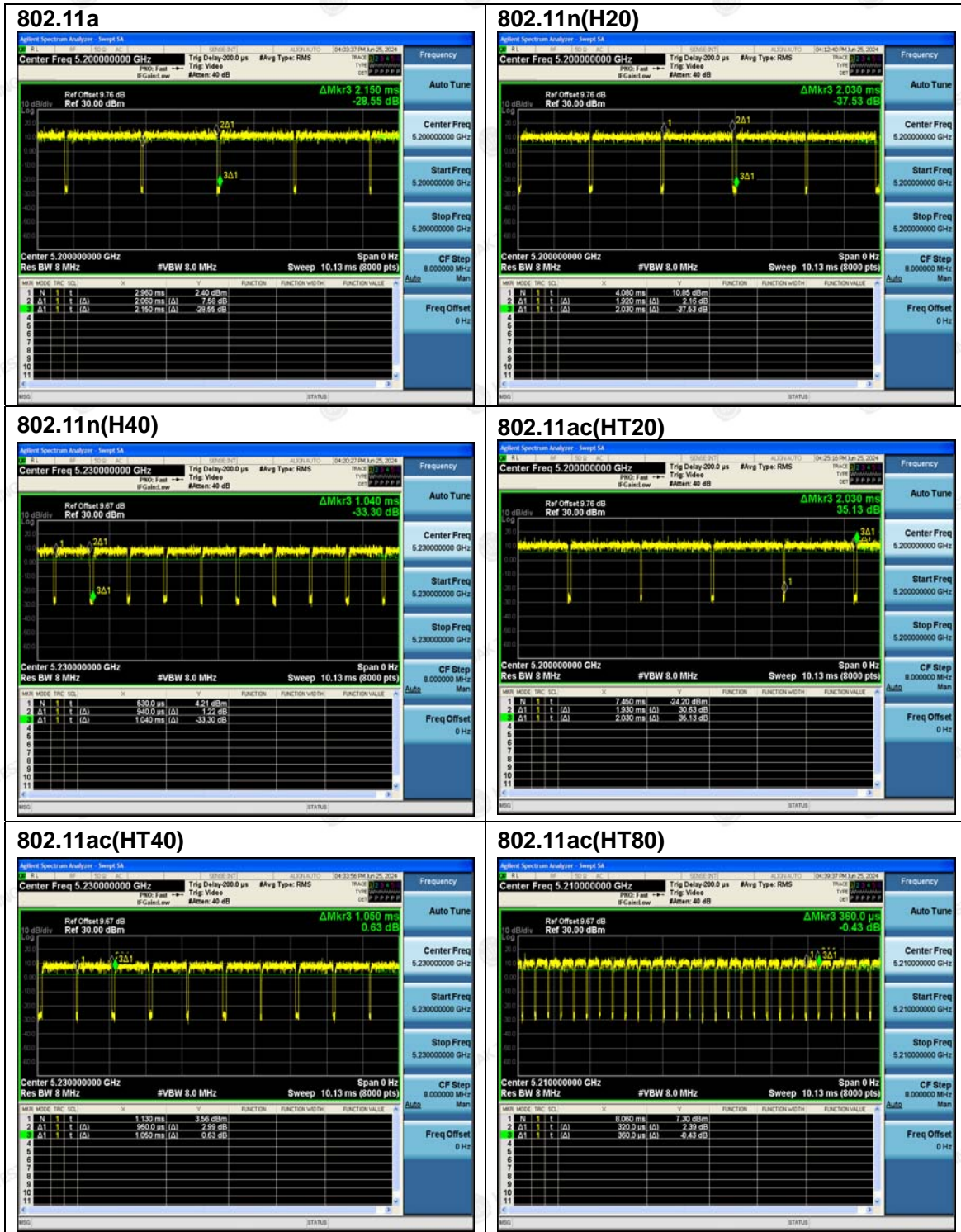
1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.
3. For conducted measurements (Output Power, 6dB Emission Bandwidth, Power 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.



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%)	
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	
Mode Test Duty Cycle		
Mode	Duty Cycle	Duty Cycle Factor(dB)
802.11a	0.958	-0.186
802.11n(H20)	0.946	-0.242
802.11n(H40)	0.904	-0.439
802.11ac(H20)	0.951	-0.219
802.11ac(H40)	0.905	-0.435
802.11ac(H80)	0.889	-0.512



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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:	Frequency range (MHz)	Limit (dBuV)	
		Quasi-peak	Average
	0.15-0.5	66 to 56*	56 to 46*
	0.5-5	56	46
	5-30	60	50
Test Setup:	<p style="text-align: center;">Reference Plane</p> <p style="text-align: center;">40cm 80cm</p> <p style="text-align: center;">E.U.T AC power LISN Filter AC power</p> <p style="text-align: center;">Test table/Insulation plane EMI Receiver</p> <p><i>Remark</i> E.U.T: Equipment Under Test LISN: Line Impedance Stabilization Network Test table height=0.8m</p>		
Test Mode:	Tx Mode		
Test Procedure:	<ol style="list-style-type: none"> 1. The E.U.T and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm/50uH coupling impedance for the measuring equipment. 2. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refer to the block diagram of the test setup and photographs). 3. Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10: 2013 on conducted measurement. 		
Test Result:	PASS		

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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

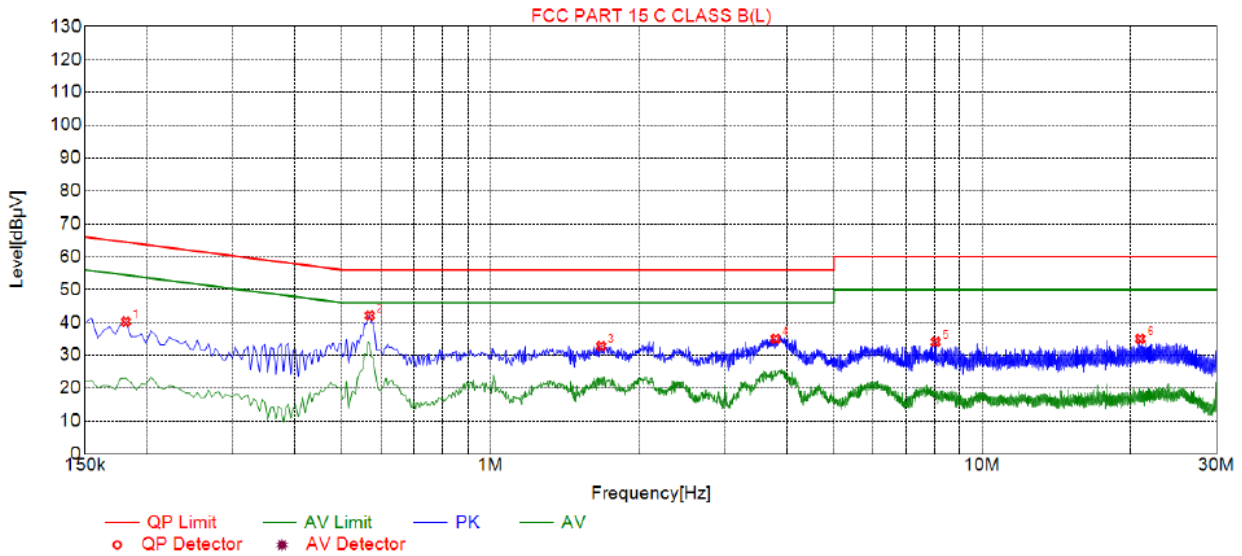
Note: The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).



Test data

All modes have been tested, only the worst mode of 802.11a is reflected.

Test Specification: Line



Suspected List								
NO.	Freq. [MHz]	Level [dBµV]	Factor [dB]	Limit [dBµV]	Margin [dB]	Reading [dBµV]	Detector	Type
1	0.1815	40.21	19.86	64.42	24.21	20.35	PK	L
2	0.5685	42.10	19.86	56.00	13.90	22.24	PK	L
3	1.6800	32.77	19.94	56.00	23.23	12.83	PK	L
4	3.8040	35.02	20.09	56.00	20.98	14.93	PK	L
5	8.0520	34.06	20.02	60.00	25.94	14.04	PK	L
6	20.9715	35.02	19.95	60.00	24.98	15.07	PK	L

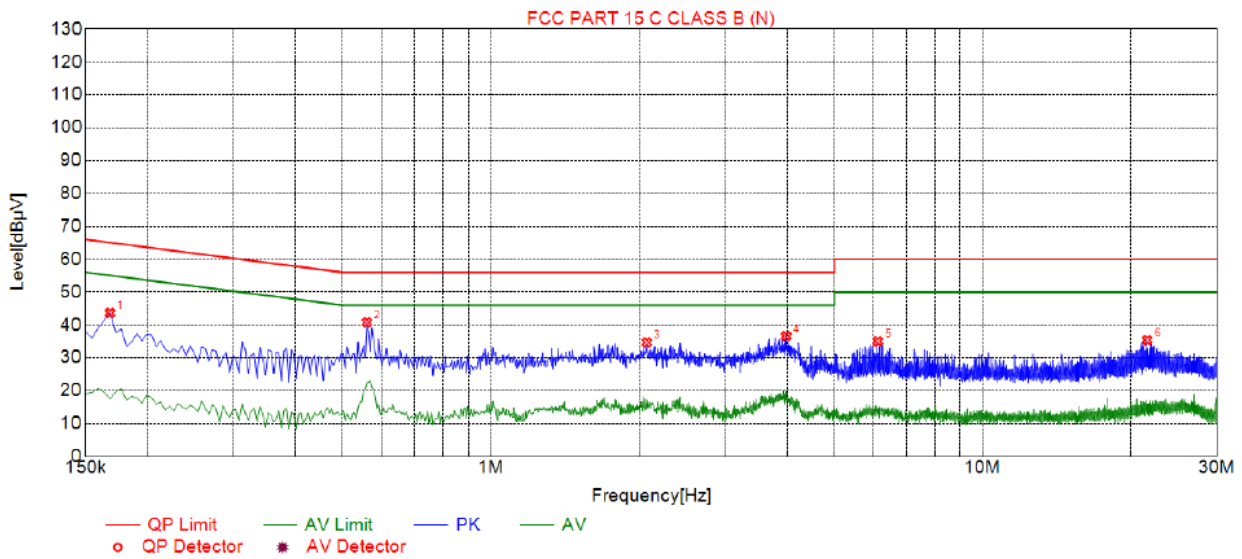
Remark: Margin = Limit – Level

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	0.1680	43.65	19.71	65.06	21.41	23.94	PK	N
2	0.5595	40.80	19.75	56.00	15.20	21.05	PK	N
3	2.0760	34.68	19.85	56.00	21.32	14.83	PK	N
4	3.9885	36.60	19.97	56.00	19.40	16.63	PK	N
5	6.1260	35.01	19.98	60.00	24.99	15.03	PK	N
6	21.6330	35.41	20.06	60.00	24.59	15.35	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
	5150-5250	250mW for client devices
Test Setup:	<p style="text-align: center;"> Power meter EUT </p>	
Test Mode:	Transmitting mode with modulation	
Test Procedure:	<ol style="list-style-type: none"> 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. 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 3.3.23	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).




Test Data

Configuration Band I (5180 - 5240 MHz)				
Mode	Test channel	Maximum Conducted Output Power (dBm)	FCC Limit (dBm)	Result
11a	CH36	10.35	24	PASS
11a	CH40	9.82	24	PASS
11a	CH48	10.21	24	PASS
11n(HT20)	CH36	9.04	24	PASS
11n(HT20)	CH40	9.48	24	PASS
11n(HT20)	CH48	10	24	PASS
11n(HT40)	CH38	9.62	24	PASS
11n(HT40)	CH46	10.24	24	PASS
11ac(HT20)	CH36	8.91	24	PASS
11ac(HT20)	CH40	9.36	24	PASS
11ac(HT20)	CH48	9.96	24	PASS
11ac(HT40)	CH38	9.63	24	PASS
11ac(HT40)	CH46	10.28	24	PASS
11ac(HT80)	CH42	10.28	24	PASS
Note: 1.The test results including the cable lose.				

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:	 <p style="text-align: center;">Spectrum Analyzer EUT</p>
Test Mode:	Transmitting mode with modulation
Test Procedure:	<ol style="list-style-type: none"> 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 $RBW = 1\% EBW$, $VBW \geq 3RBW$, 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. 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 3.3.23	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).



Test data

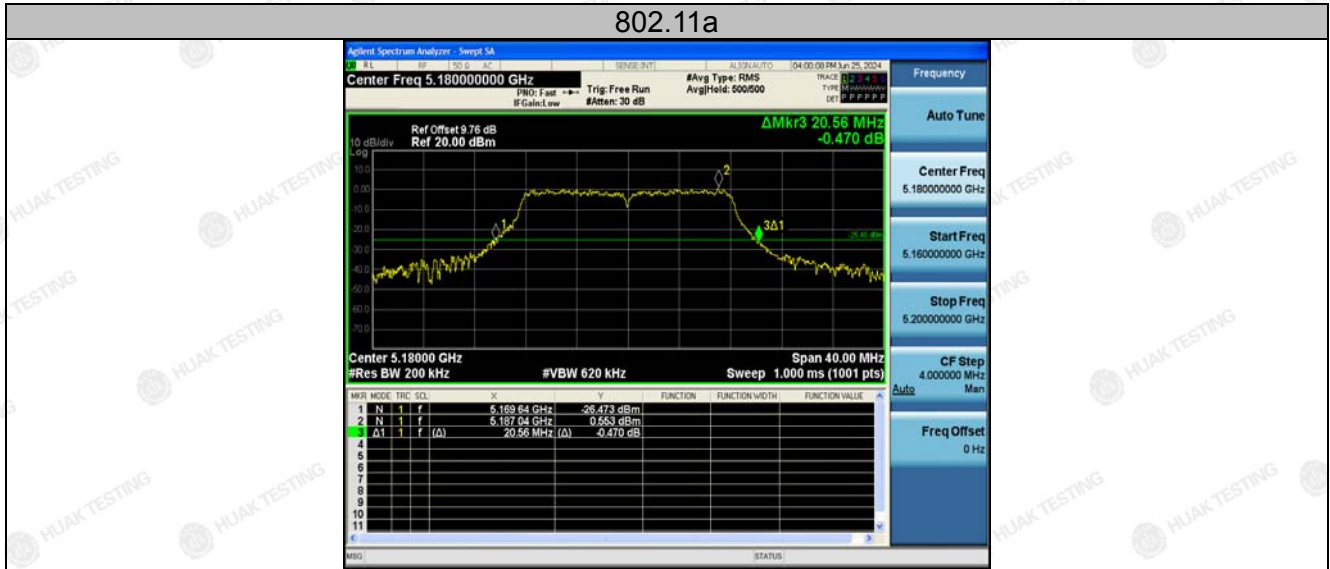
Band I

Mode	Test channel	Frequency (MHz)	26 dB Bandwidth (MHz)	Verdict
11a	CH36	5180	20.560	PASS
11a	CH40	5200	20.720	PASS
11a	CH48	5240	20.640	PASS
11n(HT20)	CH36	5180	20.680	PASS
11n(HT20)	CH40	5200	20.760	PASS
11n(HT20)	CH48	5240	20.720	PASS
11n(HT40)	CH38	5190	40.800	PASS
11n(HT40)	CH46	5230	41.280	PASS
11ac(HT20)	CH36	5180	20.680	PASS
11ac(HT20)	CH40	5200	21.120	PASS
11ac(HT20)	CH48	5240	20.400	PASS
11ac(HT40)	CH38	5190	40.880	PASS
11ac(HT40)	CH46	5230	41.040	PASS
11ac(HT80)	CH42	5210	81.760	PASS

Test plots as follows:



Band I (5150 – 5250 MHz)



Low



Mid



High

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802.11n(HT20)



Low



Mid



High

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802.11n(HT40)



Low



High

802.11ac(HT20)



Low

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Mid



High
802.11ac(HT40)



Low

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High
802.11ac(HT80)



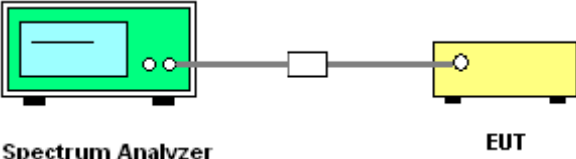
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4.5. POWER SPECTRAL DENSITY

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:	≤11.00dBm/MHz for Band I 5150MHz-5250MHz
Test Setup:	 <p style="text-align: center;">Spectrum Analyzer EUT</p>
Test Mode:	Transmitting mode with modulation
Test Procedure:	<ol style="list-style-type: none"> 1. Set the spectrum analyzer or EMI receiver span to view the entire emission bandwidth. 2. Set RBW = 1 MHz, 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	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 3.3.23	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).



4.5.3. Test data

Configuration Band I (5180 - 5240 MHz)				
Mode	Test channel	Level [dBm/MHz]	Limit (dBm/MHz)	Result
11a	CH36	4.34	11	PASS
11a	CH40	4.67	11	PASS
11a	CH48	5.23	11	PASS
11n(HT20)	CH36	3.33	11	PASS
11n(HT20)	CH40	3.58	11	PASS
11n(HT20)	CH48	4.25	11	PASS
11n(HT40)	CH38	1.22	11	PASS
11n(HT40)	CH46	1.80	11	PASS
11ac(HT20)	CH36	2.98	11	PASS
11ac(HT20)	CH40	3.64	11	PASS
11ac(HT20)	CH48	4.38	11	PASS
11ac(HT40)	CH38	1.20	11	PASS
11ac(HT40)	CH46	1.49	11	PASS
11ac(HT80)	CH42	0.57	11	PASS
Note: 1. Instrument attenuation and cable loss See test diagram				

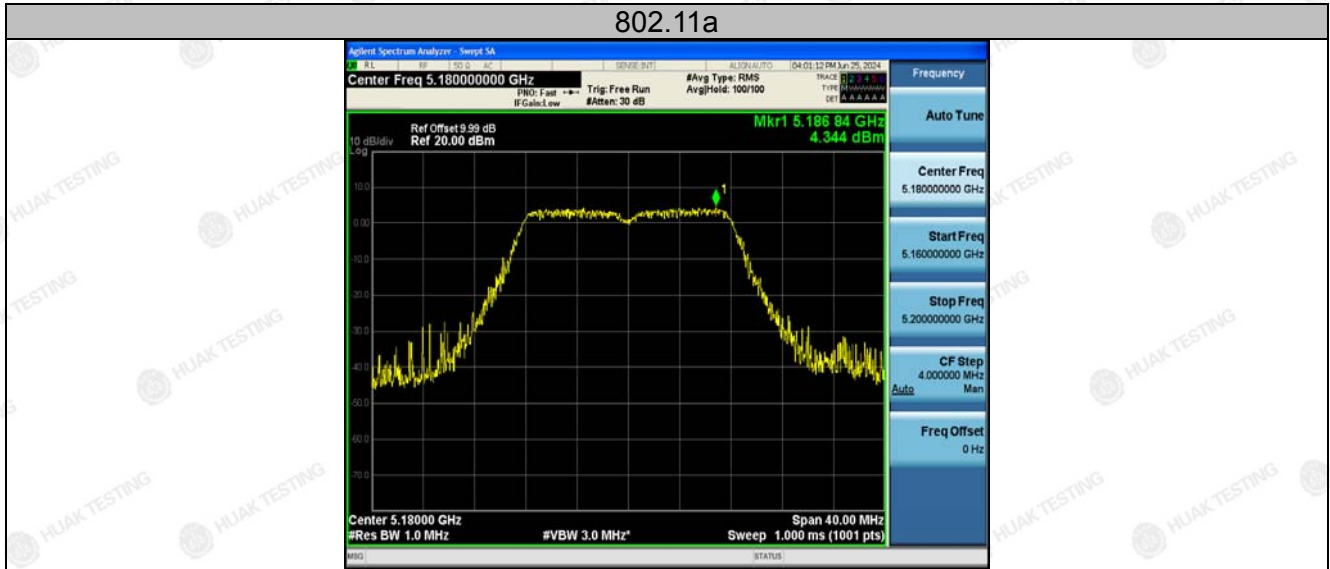
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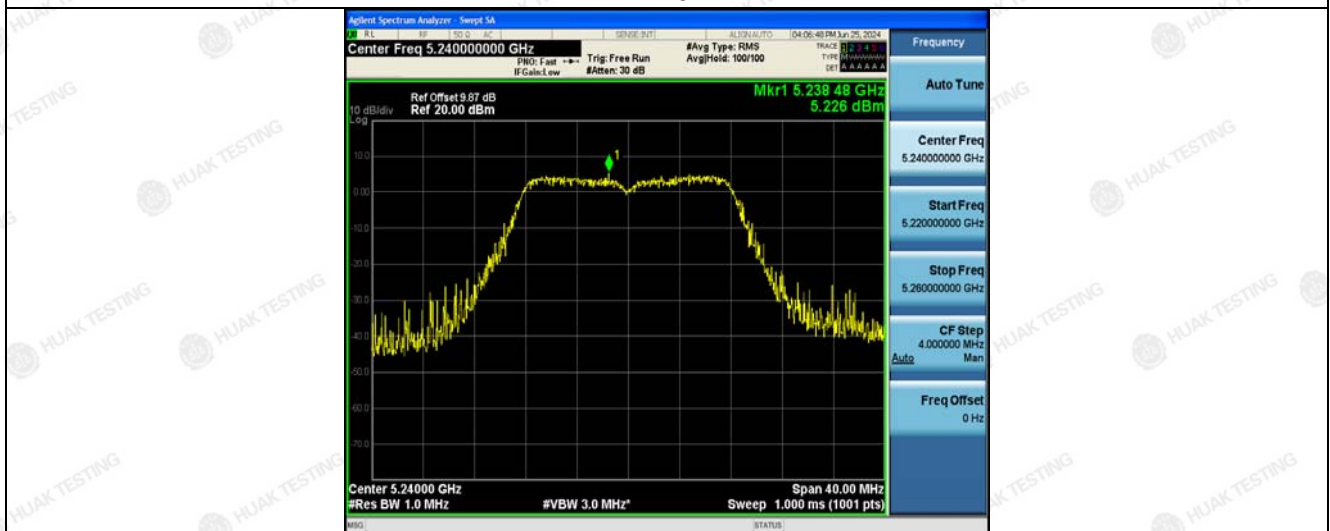
Band I (5150 – 5250 MHz)



Low



Mid



High

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802.11n(HT20)



Low



Mid



High

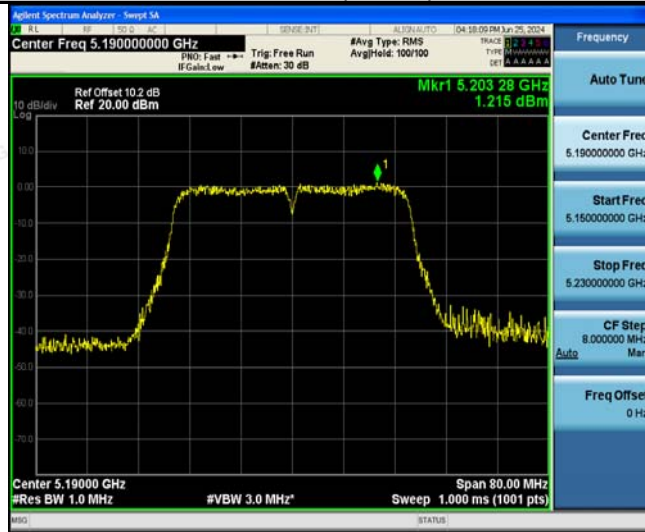
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802.11n(HT40)



Low



High

802.11ac(HT20)



Low

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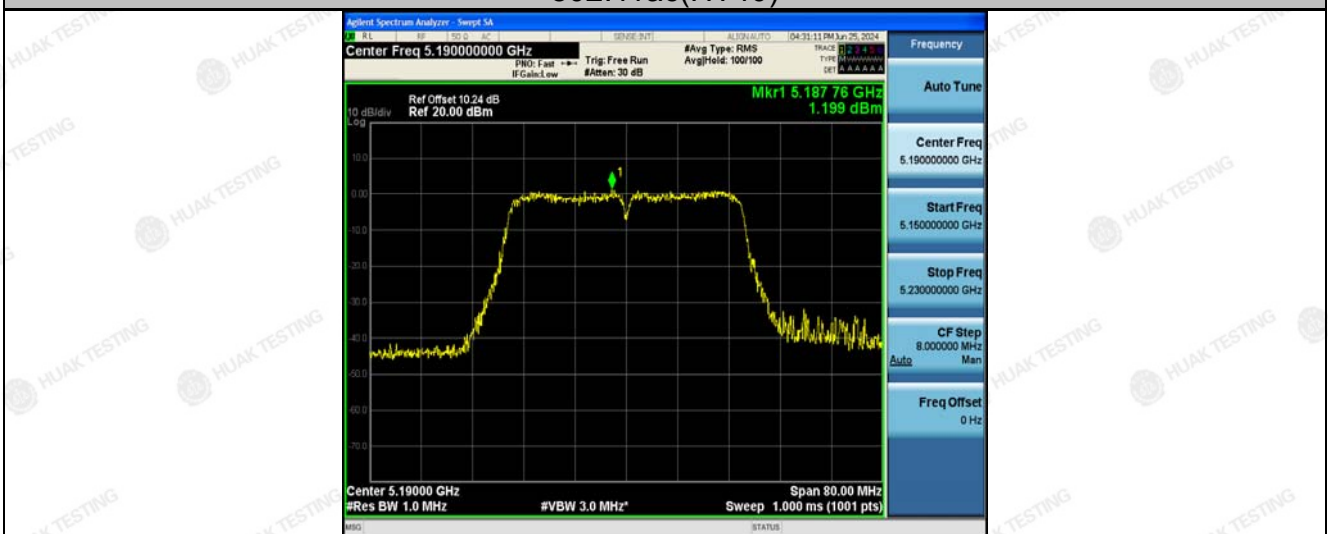
Add: 1-2F., Building B2, Junfeng Zhongcheng Zhizao Innovation Park, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China



Mid



High
802.11ac(HT40)



Low

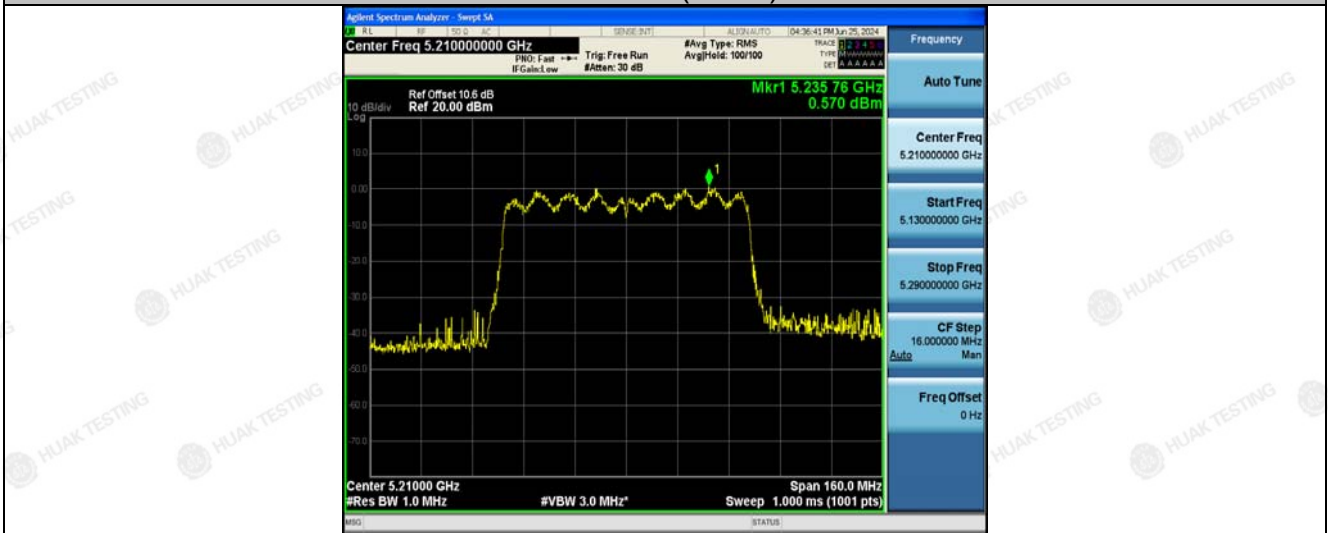
The results shown in this test report refer only to the sample(s) tested unless otherwise stated and the sample(s) are retained for 30 days only. The document is issued by HUAJ, this document cannot be reproduced except in full with our prior written permission. The more details and the authenticity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

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High
802.11ac(HT80)



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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:	<p>For band I&II&III: $E[dB\mu V/m] = EIRP[dBm] + 95.2 = 68.2 \text{ dB}\mu V/m$, for $EIRP(dBm) = -27 \text{ dBm}$</p> <p>For transmitters operating in the 5.725-5.85 GHz band:</p> <p>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.</p> <p>For band IV(5715-5725MHz&5850-5860MHz): $E[dB\mu V/m] = EIRP[dBm] + 95.2 = 78.2 \text{ dB}\mu V/m$, for $EIRP(dBm) = -27 \text{ dBm}$;</p> <p>For band IV(other un-restricted band): $E[dB\mu V/m] = EIRP[dBm] + 95.2 = 68.2 \text{ dB}\mu V/m$, for $EIRP(dBm) = -27 \text{ dBm}$</p>
Test Setup:	<p>The diagram illustrates the test setup. An Equipment Under Test (EUT) is placed on a rotating table that is 1.5 meters high. The table is positioned 3 meters away from an antenna tower. The antenna tower is 1-4 meters high. The antenna is connected to a Receiver and an Amplifier (Amp.) which is connected to the antenna's feed point. The entire setup is on a Ground Plane.</p>
Test Mode:	Transmitting mode with modulation
Test Procedure:	<ol style="list-style-type: none"> 1. The EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation. 2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. 3. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.



Test Procedure:	<p>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.</p> <p>5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.</p> <p>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.</p>
Test Result:	PASS



4.6.2. Test Instruments

Radiated Emission Test Site (966)					
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
Spectrum analyzer	Agilent	N9020A	HKE-048	Feb. 20, 2024	Feb. 19, 2025
Spectrum analyzer	R&S	FSV3044	HKE-126	Feb. 20, 2024	Feb. 19, 2025
Preamplifier	EMCI	EMC051845S	HKE-006	Feb. 20, 2024	Feb. 19, 2025
Preamplifier	Schwarzbeck	BBV 9743	HKE-016	Feb. 20, 2024	Feb. 19, 2025
Preamplifier	A.H. Systems	SAS-574	HKE-182	Feb. 21, 2024	Feb. 20, 2026
6d Attenuator	Pasternack	6db	HKE-184	Feb. 21, 2024	Feb. 20, 2026
EMI Test Receiver	Rohde & Schwarz	ESR-7	HKE-010	Feb. 21, 2024	Feb. 20, 2026
Broadband Antenna	Schwarzbeck	VULB9168	HKE-167	Feb. 21, 2024	Feb. 20, 2026
Loop Antenna	COM-POWER	AL-130R	HKE-014	Feb. 20, 2024	Feb. 19, 2025
Horn Antenna	Schwarzbeck	9120D	HKE-013	Feb. 21, 2024	Feb. 20, 2026
EMI Test Software	Tonscend	JS32-RE 5.0.0	HKE-082	N/A	N/A
RSE Test Software	Tonscend	JS36-RSE	HKE-184	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).



4.6.3. Test Data

Radiated Band Edge Test:

Operation Mode: 802.11a Mode with 5.2G TX CH Low

Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
5150	50.21	-2.49	47.72	74	-26.28	peak
5150	/	-2.49	/	54	/	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier; Level = Reading + Factor; Margin = Level-Limit.

Vertical:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
5150	53.07	-2.49	50.58	74	-23.42	peak
5150	/	-2.49	/	54	/	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier; Level = Reading + Factor; Margin = Level-Limit.



Operation Mode: TX CH High with 5.2G

Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
5350	54.54	-2.11	52.43	74	-21.57	peak
5350	/	-2.11	/	54	/	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier; Level = Reading + Factor; Margin = Level-Limit.

Vertical:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
5350	53.16	-2.11	51.05	74	-22.95	peak
5350	/	-2.11	/	54	/	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier; Level = Reading + Factor; Margin = Level-Limit.



Operation Mode: 802.11n20 Mode with 5.2G TX CH Low

Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
5150	54.14	-2.49	51.65	74	-22.35	peak
5150	/	-2.49	/	54	/	AVG
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier; Level = Reading + Factor; Margin = Level-Limit.						

Vertical:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
5150	53.17	-2.49	50.68	74	-23.32	peak
5150	/	-2.49	/	54	/	AVG
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier; Level = Reading + Factor; Margin = Level-Limit.						



Operation Mode: TX CH High with 5.2G

Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
5350	55.95	-2.11	53.84	74	-20.16	peak
5350	/	-2.11	/	54	/	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier; Level = Reading + Factor; Margin = Level-Limit.

Vertical:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
5350	55.16	-2.11	53.05	74	-20.95	peak
5350	/	-2.11	/	54	/	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier; Level = Reading + Factor; Margin = Level-Limit.



Operation Mode: 802.11 n40 Mode with 5.2G TX CH Low

Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
5150	54.16	-2.49	51.67	74	-22.33	peak
5150	/	-2.49	/	54	/	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier; Level = Reading + Factor; Margin = Level-Limit.

Vertical:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
5150	52.99	-2.49	50.5	74	-23.5	peak
5150	/	-2.49	/	54	/	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier; Level = Reading + Factor; Margin = Level-Limit.



Operation Mode: TX CH High with 5.2G

Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
5350	53.19	-2.11	51.08	74	-22.92	peak
5350	/	-2.11	/	54	/	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier; Level = Reading + Factor; Margin = Level-Limit.

Vertical:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
5350	51.72	-2.11	49.61	74	-24.39	peak
5350	/	-2.11	/	54	/	AVG

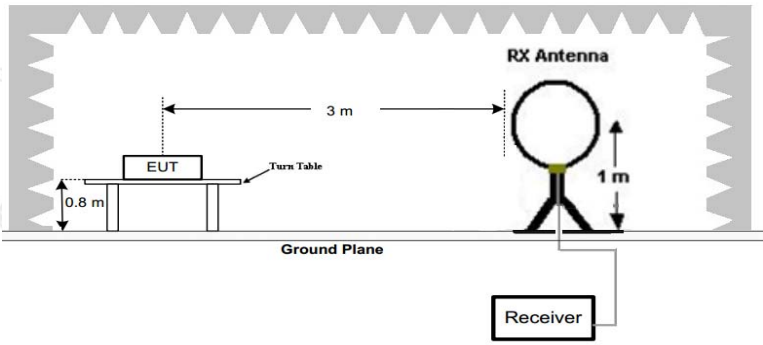
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier; Level = Reading + Factor; Margin = Level-Limit.

Remark:

1. If the PK measured levels comply with average limit, then the average level were deemed to comply with average limit.
2. In restricted bands of operation, the spurious emissions below the permissible value more than 20dB.
3. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

4.7. SPURIOUS EMISSION

4.7.1.1. Test Specification

Test Requirement:	FCC CFR47 Part 15 Section 15.407				
Test Method:	KDB 789033 D02 v02r01				
Frequency Range:	9kHz to 40GHz				
Measurement Distance:	3 m				
Antenna Polarization:	Horizontal & Vertical				
Operation mode:	Transmitting mode with modulation				
Receiver Setup:	Frequency	Detector	RBW	VBW	Remark
	9kHz- 150kHz	Quasi-peak	200Hz	1kHz	Quasi-peak Value
	150kHz- 30MHz	Quasi-peak	9kHz	30kHz	Quasi-peak Value
	30MHz-1GHz	Quasi-peak	120KHz	300KHz	Quasi-peak Value
	Above 1GHz	Peak	1MHz	3MHz	Peak Value
		Peak	1MHz	10Hz	Average Value
Limit:	<p>(1) For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.</p> <p>(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.</p> <p>The limit of frequency below 1GHz and which fall in rest ricted bands should complies 15.209.</p>				
Test setup:	<p>For radiated emissions below 30MHz</p>  <p>30MHz to 1GHz</p>				

	<p>Above 1GHz</p>
Test Procedure:	<ol style="list-style-type: none">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 rotatable was turned from 0 degrees to 360 degrees to find the maximum reading.5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.



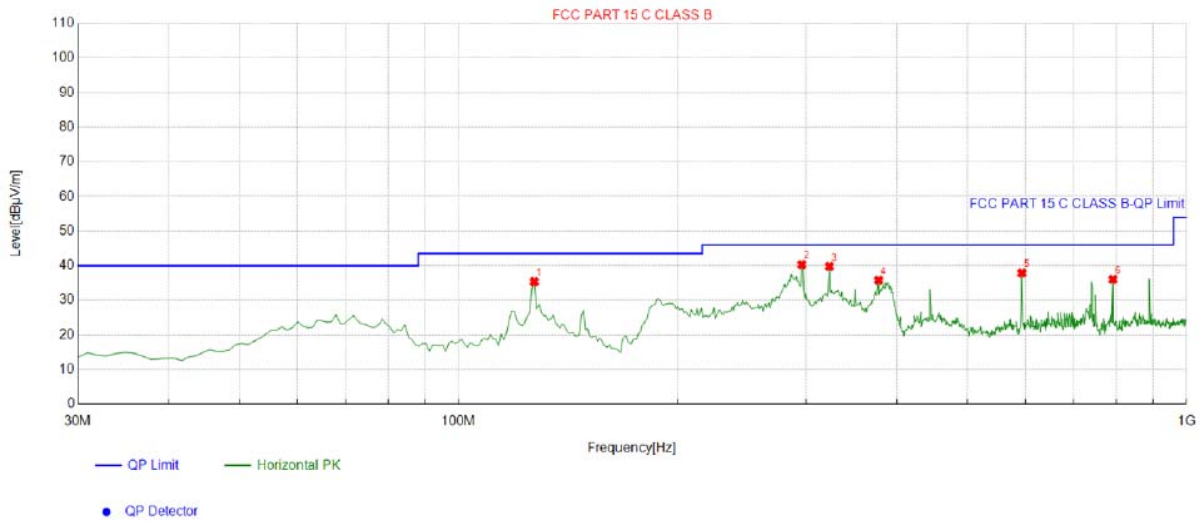
Test Procedure:	6. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
Test results:	PASS



4.7.2. Test Data

All the test modes completed for test. only the worst result of Mode 1
Below 1GHz

Horizontal

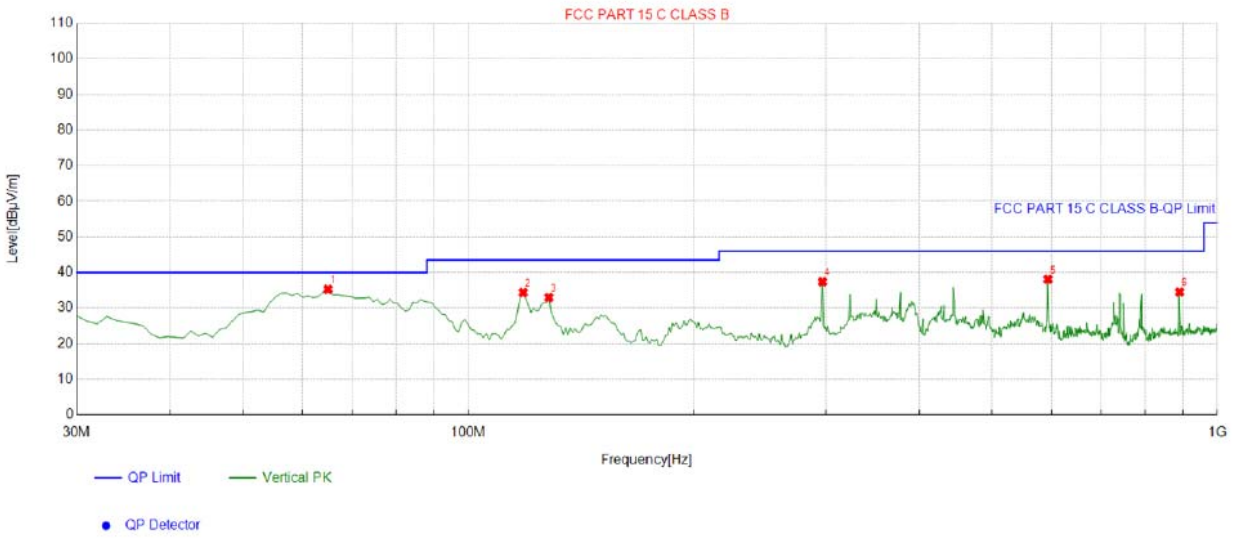


Suspected List									
NO.	Freq. [MHz]	Factor [dB]	Reading [dBµV/m]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	127.09709	-17.13	52.51	35.38	43.50	8.12	100	318	Horizontal
2	296.04604	-11.88	52.18	40.30	46.00	5.70	100	185	Horizontal
3	323.23323	-11.07	50.83	39.76	46.00	6.24	100	212	Horizontal
4	377.60760	-9.58	45.36	35.78	46.00	10.22	100	165	Horizontal
5	594.13413	-5.06	42.93	37.87	46.00	8.13	100	333	Horizontal
6	792.21221	-3.25	39.28	36.03	46.00	9.97	100	182	Horizontal

Remark: Factor = Cable loss + Antenna factor + Attenuator – Pre-amplifier; Level = Reading + Factor; Margin = Limit – Level



Vertical



Suspected List									
NO.	Freq. [MHz]	Factor [dB]	Reading [dBµV/m]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	64.954955	-15.33	50.62	35.29	40.00	4.71	100	112	Vertical
2	118.35835	-15.91	50.27	34.36	43.50	9.14	100	132	Vertical
3	128.06806	-17.32	50.31	32.99	43.50	10.51	100	286	Vertical
4	297.01701	-11.84	49.23	37.39	46.00	8.61	100	314	Vertical
5	594.13413	-5.06	43.16	38.10	46.00	7.90	100	286	Vertical
6	890.28028	-1.59	36.10	34.51	46.00	11.49	100	344	Vertical

Remark: Factor = Cable loss + Antenna factor + Attenuator – Preamplifier; Level = Reading + Factor; Margin = Limit – Level



Above 1GHz

LOW CH 36 (802.11 a Mode with 5.2G)/5180

Horizontal:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	
3647	52.41	-4.59	47.82	74	-26.18	peak
3647	43.26	-4.59	38.67	54	-15.33	AVG
10360	50.12	3.74	53.86	74	-20.14	peak
10360	38.32	3.74	42.06	54	-11.94	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier; Level = Reading + Factor; Margin = Level-Limit.

Vertical:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	
3647	53.04	-4.59	48.45	74	-25.55	peak
3647	43.33	-4.59	38.74	54	-15.26	AVG
10360	49.52	3.74	53.26	74	-20.74	peak
10360	37.74	3.74	41.48	54	-12.52	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier; Level = Reading + Factor; Margin = Level-Limit.



MID CH40 (802.11 a Mode with 5.2G)/5200

Horizontal:

Frequency (MHz)	Meter Reading (dBµV)	Factor (dB)	Emission Level (dBµV/m)	Limits (dBµV/m)	Margin (dB)	Detector Type
3647	53.56	-4.59	48.97	74	-25.03	peak
3647	41.99	-4.59	37.4	54	-16.6	AVG
10400	51.06	3.74	54.8	74	-19.2	peak
10400	39.54	3.74	43.28	54	-10.72	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier; Level = Reading + Factor; Margin = Level-Limit.

Vertical:

Frequency (MHz)	Meter Reading (dBµV)	Factor (dB)	Emission Level (dBµV/m)	Limits (dBµV/m)	Margin (dB)	Detector Type
3647	53.34	-4.59	48.75	74	-25.25	peak
3647	41.59	-4.59	37	54	-17	AVG
10400	51.21	3.74	54.95	74	-19.05	peak
10400	40.56	3.74	44.3	54	-9.7	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier; Level = Reading + Factor; Margin = Level-Limit.



HIGH CH 48 (802.11a Mode with 5.2G)/5240

Horizontal:

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
3647	51.29	-4.59	46.7	74	-27.3	peak
3647	43.35	-4.59	38.76	54	-15.24	AVG
10480	50	3.75	53.75	74	-20.25	peak
10480	37.82	3.75	41.57	54	-12.43	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier; Level = Reading + Factor; Margin = Level-Limit.

Vertical:

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
3647	51.29	-4.59	46.7	74	-27.3	peak
3647	43.35	-4.59	38.76	54	-15.24	AVG
10480	50	3.75	53.75	74	-20.25	peak
10480	37.82	3.75	41.57	54	-12.43	AVG

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier; Level = Reading + Factor; Margin = Level-Limit.

Remark:

- (1) Measuring frequencies from 1 GHz to the 40 GHz.
- (2) "F" denotes fundamental frequency; "H" denotes spurious frequency; "E" denotes band edge frequency.
- (3) * denotes emission frequency which appearing within the Restricted Bands specified in provision of 15.205, then the general radiated emission limits in 15.209 apply.
- (4) The emissions are attenuated more than 20dB below the permissible limits are not recorded in the report.
- (5) The IF bandwidth of EMI Test Receiver between 30MHz to 1GHz was 120KHz, 1 MHz for measuring above 1 GHz, below 30MHz was 10KHz.
- (6) When the test results of Peak Detected below the limits of Average Detected, the Average Detected is not need completed. For example: Top Channel at Fundamental 73.16dBuV/m(PK Value) <93.98(AV Limit), at harmonic 53.20 dBuV/m(PK Value) <54 dBuV/m(AV Limit), the Average Detected not need to completed.
- (7) All the test modes completed for test. only the worst result of Mode 1(802.11a Mode)



4.8. FREQUENCY STABILITY MEASUREMENT

4.8.1. Test Specification

Test Requirement:	FCC Part15 Section 15.407(g)
Test Method:	ANSI C63.10: 2013
Limit:	The frequency tolerance shall be maintained within the band of operation frequency over a temperature variation of 0 degrees to 35 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C.
Test Setup:	<pre> graph LR SA[Spectrum Analyzer] --- EUT[EUT] subgraph TC [Temperature Chamber] EUT end P[AC/DC Power supply] --- EUT </pre>
Test Procedure:	The EUT was placed inside the environmental test chamber and powered by nominal AC/DC voltage. b. Turn the EUT on and couple its output to a spectrum analyzer. c. Turn the EUT off and set the chamber to the highest temperature specified. d. Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize. e. Repeat step 2 and 3 with the temperature chamber set to the lowest temperature. f. The test chamber was allowed to stabilize at +20 degree C for a minimum of 30 minutes. The supply voltage was then adjusted on the EUT from 85% to 115% and the frequency record.
Test Result:	PASS
Remark:	N/A



4.8.2. Test Instruments

RF Test Room					
Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
RF Automatic control unit	Tonscend	JS 0806-2	HKE-060	Feb. 20, 2024	Feb. 19, 2025
Spectrum analyzer	Agilent	N9020A	HKE-048	Feb. 20, 2024	Feb. 19, 2025
Temperature and humidity meter	Boyang	HTC-1	HKE-077	Feb. 20, 2024	Feb. 19, 2025
programmable power supply	Agilent	E3646A	HKE-092	Feb. 20, 2024	Feb. 19, 2025
RF Test Software	Tonscend	JS1120-3 Version 3.3.23	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).



Test Result as follows:

Mode	Voltage (V)	FHL (5180MHz)	Deviation (KHz)	FHH (5240MHz)	Deviation (KHz)
5.2G Band	4.25V	5180.047	47	5240.007	35
	5V	5179.979	-21	5239.960	-40
	5.75V	5180.017	17	5239.956	-44

Mode	Temperature (°C)	FHL (5180MHz)	Deviation (KHz)	FHH (5240MHz)	Deviation (KHz)
5.2G Band	-30	5180.005	5	5239.999	-1
	-20	5179.961	-39	5240.038	38
	-10	5180.004	4	5239.952	-48
	0	5180.025	25	5239.980	-20
	10	5179.999	-1	5240.015	15
	20	5180.025	25	5239.984	-16
	30	5179.977	-23	5239.986	-4
	40	5179.975	-25	5239.971	-29
	50	5179.972	-28	5240.004	4

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4.9. ANTENNA REQUIREMENT

Standard Applicable

For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

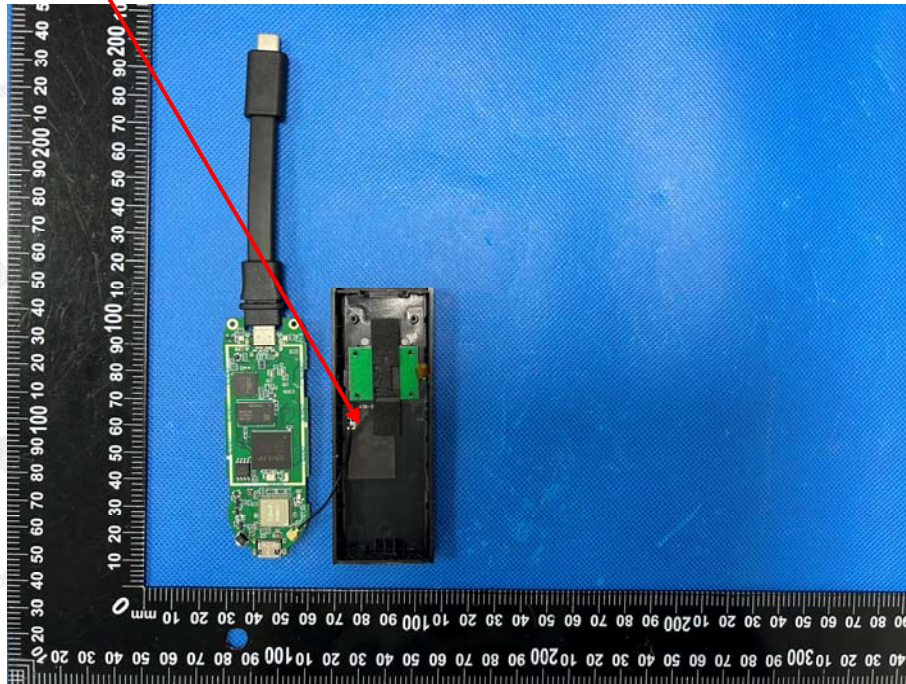
Refer to statement below for compliance.

The manufacturer may design the unit so that the user can replace a broken antenna, but the use of a standard antenna jack or electrical connector is prohibited. Further, this requirement does not apply to intentional radiators that must be professionally installed.

Antenna Connected Construction

The antenna used in this product is a FPC Antenna. It conforms to the standard requirements. The directional gains of antenna used for transmitting is 3.30dBi.

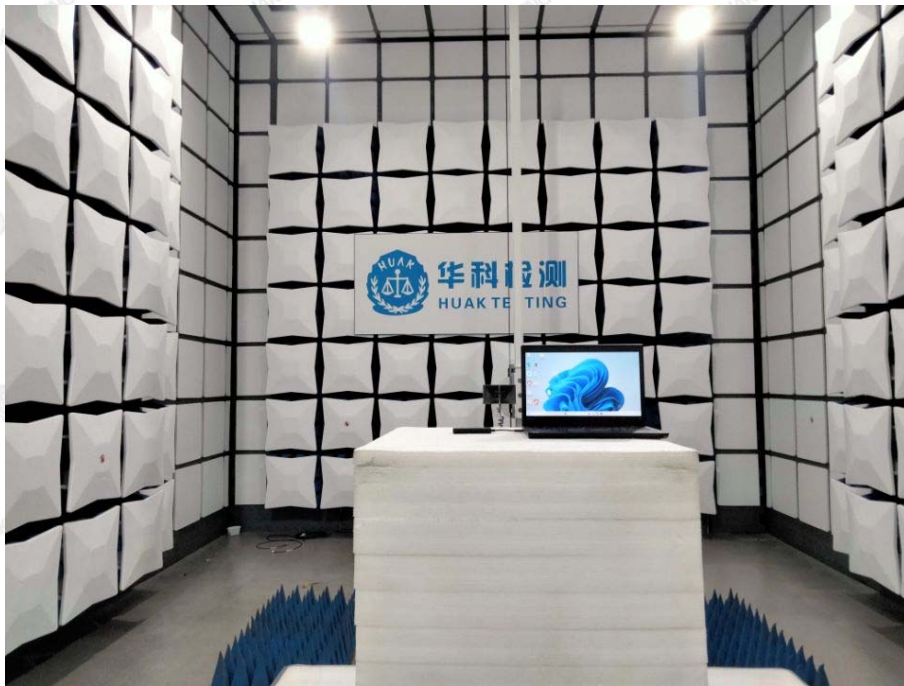
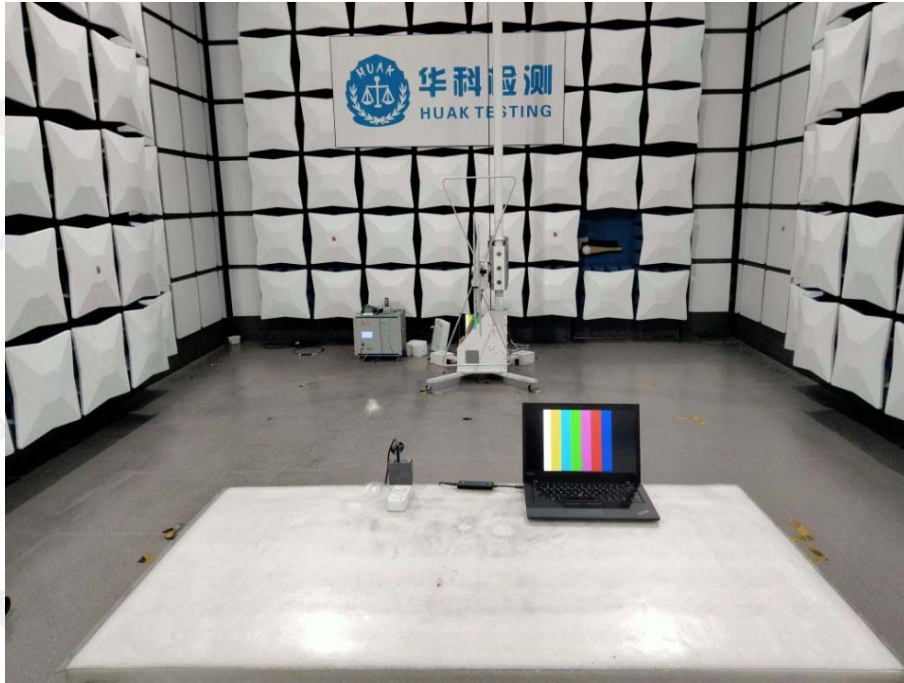
WIFI ANTENNA





5. PHOTOGRAPHS OF TEST SETUP

Radiated Emissions



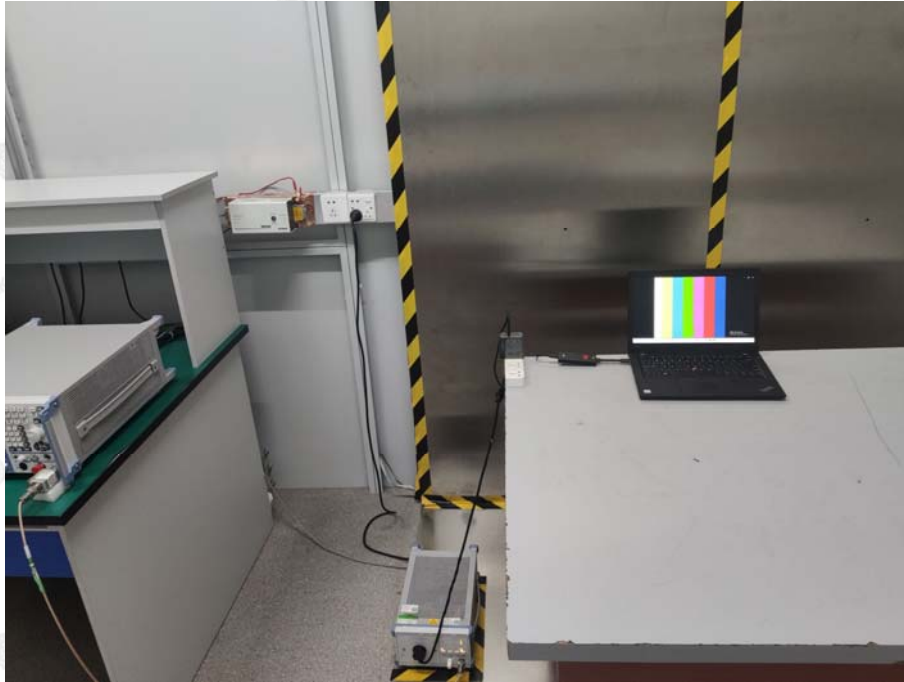
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Conducted Emissions



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6. PHOTOS OF THE EUT

Reference to the report: ANNEX A of external photos and ANNEX B of internal photos.

-----End of test report-----

