Prüfbericht-Nr.: *Test report no.:*	**CN229JIA 002**	**Auftrags-Nr.:** *Order no.:*	**168361087**	**Seite 1 von 21** *Page 1 of 21*
Kunden-Referenz-Nr.: *Client reference no.:*	N/A	**Auftragsdatum:** *Order date:*	2022-02-22	
Auftraggeber: *Client:*	**Zhejiang Dahua Vision Technology Co., Ltd** No.1199, Bin'an Road, Binjiang District, Hangzhou, P.R,China			
Prüfgegenstand: *Test item:*	Smart interactive whiteboard			
Bezeichnung / Typ-Nr.: *Identification / Type no.:*	DHI-LCH86-MC410-B, DHI-LPH86-MT410-B, DHI-LCH86-MT410-B, DHI-LPH86-MC410-B, DHI-LU86-H****, DHI-LU86-M****, DHI-L*H86-M*4**-*, DHI-L*H86-*****, DHI-L*H86-M****(*=Blank, 0-9, A-Z, a-z for marketing purpose, no technical difference) Trademark: alhua			
Auftrags-Inhalt: *Order content*:	Test Report			
Prüfgrundlage: *Test specification:*	CFR47 FCC Part15: Subpart E Section 15.407			

Wareneingangsdatum: *Date of sample receipt:*	2022-02-22	Please refer to Photo Document
Prüfmuster-Nr.: *Test sample no:*	HS220222-001-002 HS220222-001-003 HS220222-001-004	
Prüfzeitraum: *Testing period:*	2022-02-23 - 2022-03-14	
Ort der Prüfung: *Place of testing:*	Hwa-Hsing (Dongguan) Testing Co., Ltd.	
Prüflaboratorium: *Testing laboratory:*	TÜV Rheinland (Shenzhen) Co., Ltd.	
Prüfergebnis*: *Test result*:*	Pass	

geprüft von: *tested by:*	X Chris Chen Signed by: Chris Chen	**genehmigt von:** *authorized by:*	X Lin Lin Signed by: Lin Lin
Datum: *Date:* 2022-04-27		**Ausstellungsdatum:** *Issue date:* 2022-04-27	
Stellung */ Position:*	Section Manager	**Stellung** */ Position:*	Reviewer
Sonstiges */ Other:*	FCC ID: SVN-LCH86		

Zustand des Prüfgegenstandes bei Anlieferung: Prüfmuster vollständig und unbeschädigt
Condition of the test item at delivery: *Test item complete and undamaged*

* Legende:	1 = sehr gut	2 = gut	3 = befriedigend	4 = ausreichend	5 = mangelhaft
	P(ass) = entspricht o.g. Prüfgrundlage(n)		F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	N/A = nicht anwendbar	N/T = nicht getestet
** Legend:*	*1 = very good*	*2 = good*	*3 = satisfactory*	*4 = sufficient*	*5 = poor*
	P(ass) = passed a.m. test specification(s)		*F(ail) = failed a.m. test specification(s)*	*N/A = not applicable*	*N/T = not tested*

Test Summary

5.1.1 ANTENNA REQUIREMENT
RESULT: Pass

5.1.2 MAXIMUM PEAK CONDUCTED OUTPUT POWER
RESULT: Pass

5.1.3 CONDUCTED POWER SPECTRAL DENSITY
RESULT: Pass

5.1.4 FREQUENCY STABILITY
RESULT: Pass

5.1.5 26DB BANDWIDTH AND 99% BANDWIDTH
RESULT: Pass

5.1.6 RADIATED SPURIOUS EMISSION
RESULT: Pass

5.1.7 CONDUCTED EMISSION
RESULT: Pass

5.1.8 DYNAMIC FREQUENCY SELECTION (DFS)
RESULT: Pass

Contents

1 General Remarks

1.1 Complementary Materials

All attachments are integral parts of this test report. This applies especially to the following appendix:

Appendix A: Photographs of the Test Set-up

Appendix B: Test Results of 5GHz Wi-Fi

2 Test Sites

2.1 Test Facilities

Hwa-Hsing (Dongguan) Testing Co., Ltd.

No.101, Bld N, Yuyuan 2Rd, Yuyuan Industrial Park, HuangJiang Town, Dongguan, China

FCC Registration No.: 915896

IC Registration No.: 25433

2.2 List of Test and Measurement Instruments

Table 1: List of Test and Measurement Equipment

Unwanted Emission Testing (Radiated emission below 30MHz)				
Equipment	**Manufacturer**	**Model**	**Serial No.**	**Cal. until**
EMI Test Receiver	Rohde&Schwarz	ESR7	100962	2023/01/12
Test software	FARAD	FARAD	EZ_EMCV1.1.4.2	N/A
Loop Antenna	EMCI	HLA 6121	45745	2022/04/13
Preamplifier	EMCI	EMC001340	980201	2022/09/12
Unwanted Emission Testing (Radiated emission below 1GHz)				
Equipment	**Manufacturer**	**Model**	**Serial No.**	**Cal. until**
EMI Test Receiver	Rohde&Schwarz	ESR7	100962	2023/01/12
Broadband antenna	Schwarzbeck	VULB 9168	00937	2022/04/19
Signal Amplifier	Com-power	PAM-103	18020051	2022/09/11
Attenuator	Rohde&Schwarz	TS2GA-6dB	18101101	N/A
Test software	FARAD	FARAD	EZ_EMCV1.1.4.2	N/A
Unwanted Emission Testing (Frequency Range 1-18GHz)				
Equipment	**Manufacturer**	**Model**	**Serial No.**	**Cal. until**
3m Semi-anechoic Chamber	MAORUI	9m*6m*6m	NSEMC003	2022/04/15
Horn Antenna	Schwarzbeck	BBHA 9170	01959	2022/04/15
Broadband Coaxial Preamplifier	Schwarzbeck	BBV 9718	00025	2022/03/14
Spectrum	Keysight	N9020A	MY51240612	2022/09/12
Antenna Tower	MF	MFA-440H	NA	NA
Turn Table	MF	MFT-201SS	NA	NA
Unwanted Emission Testing (Frequency Range 18-40GHz)				
Equipment	**Manufacturer**	**Model**	**Serial No.**	**Cal. until**
Spectrum Analyzer	Rohde&Schwarz	FSV-40N	101783	2023/01/13
Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170242	2022/04/18
Pre-Amplifier	EMCI	EMC 184045	980102	2023/01/03
Radio spectrum Testing				
Equipment	**Manufacturer**	**Model**	**Serial No.**	**Cal. until**
Spectrum	Keysight	N9020A	MY51240612	2022/09/12
Spectrum Analyzer	Rohde&Schwarz	FSV-40N	101783	2023/01/13
Power Meter	Tonscend	JS0806-2	188060126	2022/09/12
Signal generator	Keysight	E4421B	GB40051020	2022/09/12
Signal generator	Keysight	N5182A	MY47420944	2022/09/12
Test Software	Tonscend	JS0806-2	NA	NA

Conducted Emission				
Equipment	**Manufacturer**	**Model No.**	**Serial No.**	**Cal. Until**
EMI Test Receiver	Rohde&Schwarz	ESR7	100962	2023/01/12
Artificial Mains Network	R&S	ENV216	102333	2022/08/10
Test software	EZ	EZ_EMC V1.1.4.2	N/A	N/A

2.3 Traceability

All measurement equipment calibrations are traceable to NIM (National Institute of Metrology) or where calibration is performed in other countries, to equivalent nationally recognized standards organizations.

2.4 Calibration

Equipment requiring calibration is calibrated periodically by the manufacturer or according to manufacturer's specifications. Additionally all equipment is verified for proper performance on a regular basics using in house standards or comparisons.

2.5 Measurement Uncertainty

The estimated combined standard uncertainty for radiated emissions and conducted emissions measurements as below table.

Parameter	Uncertainty
Radio Frequency	±1 x 10-7
RF Power (conducted)	±2.5 dB
Radiated Emission of Transmitter, valid up to 26.5 GHz	±6 dB
Radiated Emission of Receiver, valid up to 26.5 GHz	±6 dB
Temperature	±1 °C
Humidity	±5 %
Voltage (DC)	±1 %
Voltage (AC, <10kHz)	±2 %
Conducted Emission	± 2.66 dB

2.6 Location of Original Data

The original copies of all test data taken during actual testing were attached at Appendix A & B of this report and delivered to the applicant. A copy has been retained in the TÜV Rheinland (Shenzhen) Co., Ltd. File for certification follow-up purposes.

2.7 Status of Facility Used for Testing

The **Hwa-Hsing (Dongguan) Testing Co., Ltd.** Test facility located at No.101, Bld N, Yuyuan 2Rd, Yuyuan Industrial Park, HuangJiang Town, Dongguan, China.is listed on the US Federal Communications Commission list of facilities approved to perform measurements.

3 General Product Information

3.1 Product Function and Intended Use

The EUT is a **Smart interactive whiteboard** which supports 2.4GHz Wi-Fi 802.11 b/g/n and 5GHz Wi-Fi 802.11a/n/ac wireless technology.

All models are same as test model DHI-LCH86-MC410-B except model number difference for marketing purpose.

For details refer to the User Manual, Technical Description and Circuit Diagram.

3.2 Ratings and System Details

Table 2: Technical Specification of EUT

General Information of EUT	Value
Kind of Equipment:	Smart interactive whiteboard
Type Designation:	DHI-LCH86-MC410-B, DHI-LPH86-MT410-B, DHI-LCH86-MT410-B, DHI-LPH86-MC410-B, DHI-LU86-H****, DHI-LU86-M****, DHI-L*H86-M*4**-*, DHI-L*H86-*****, DHI-L*H86-M****(*=Blank, 0-9, A-Z, a-z for marketing purpose, no technical difference)
Trademark:	alhua TECHNOLOGY
FCC ID:	SVN-LCH86
Operating Voltage:	100V-240V~, 50/60Hz, 4A
Testing Voltage:	AC 120V/60Hz
Technical Specification of Wi-Fi 802.11 a/n/ac: Wi-Fi Module 1 (model: nxp8997)	
Frequency Range:	5150-5350MHz, 5470-5725MHz
Operating Frequency / Channels / Protocol:	5150~5350MHz / 12 / 802.11a/n/ac(HT20/HT40/VHT80) 5470~5725MHz / 12 / 802.11a/n/ac(HT20/HT40/VHT80)
Modulation:	OFDM (256QAM, 64QAM, 16QAM, QPSK, BPSK)
Transfer Rate:	802.11a: 54.0/ 48.0/ 36.0/ 24.0/ 18.0/ 12.0/ 9.0/ 6.0Mbps 802.11n: up to 300Mbps 802.11ac: up to 866.7Mbps
SISO/MIMO mode:	802.11a/n/ac: MIMO mode 2TX2RX
Type of Device	Slave Device without Radar Detection
Channel Separation:	20MHz, 40MHz, 80MHz
Maximum RF Power:	5150-5350MHz: 17.23dBm EIRP 5470-5725MHz: 20.94dBm EIRP
Antenna Type:	PCB Antenna
Antenna number:	2
Antenna Gain:	ANT1: 4.69dBi ANT2: 3.41dBi

Technical Specification of Wi-Fi 802.11 a/n/ac: Wi-Fi Module 2: (model: 8812 CU)	
Frequency Range:	5150-5250MHz
Operating Frequency / Channels / Protocol:	5150~5250MHz / 12 / 802.11a/n/ac(HT20/HT40/VHT80)
Modulation:	OFDM (256QAM, 64QAM, 16QAM, QPSK, BPSK)
Transfer Rate:	802.11a: 54.0/ 48.0/ 36.0/ 24.0/ 18.0/ 12.0/ 9.0/ 6.0Mbps 802.11n: up to 300Mbps 802.11ac: up to 866.7Mbps
SISO/MIMO mode:	802.11a: SISO mode 1TX1RX 802.11n/ac: MIMO mode 2TX2RX
Type of Device	Slave Device without Radar Detection
Channel Separation:	20MHz, 40MHz, 80MHz
Maximum RF Power	16.68dBm EIRP
Antenna Type:	PCB Antenna
Antenna number:	2
Antenna Gain:	ANT1: 3.09dBi ANT2: 3.09dBi

*Note: The above two modules cannot work simultaneously.

3.3 Independent Operation Modes

The basic operation modes are:

A. On, Wi-Fi 802.11 a/n/ac wireless transmitting mode
    1. Low channel
    2. Middle channel
    3. High channel
B. On, Wi-Fi 802.11 a/n/ac connecting mode
C. Off

3.4 Noise Generating and Noise Suppressing Parts

Refer to Circuit Diagram for further details.

3.5 Submitted Documents

- Application Form
- Block Diagram
- User Manual
- Operation Description

4 Test Set-up and Operation Modes

4.1 Principle of Configuration Selection

Radio Spectrum: The equipment under test (EUT) was configured at its highest power output in the order to measure its highest possible radiation and conducted level. The test modes were adapted accordingly in reference to the instructions for use.

Emission: The equipment under test (EUT) was configured to measure its highest possible radiation level. The test modes were adapted accordingly in reference to the instructions for use.

4.2 Test Operation and Test Software

Test operation refers to test setup in chapter 5. All tests were performed according to the procedures in ANSI C63.10: 2013.

According to clause 3.1, all tests were performed on model DHI-LCH86-MC410-B in this report.

Table 3: Test environments

Environment Parameter	Selected Values During Tests		
	Temperature	Voltage (adapter)	Relative Humidity
NTNV	24.6°C	120Vac	Ambient
LTLV	-5 °C	108Vac	---
LTHV	-5 °C	132Vac	---
HTLV	45 °C	108Vac	---
HTHV	45 °C	132Vac	---

Table 4: Test channel and frequency

Mode	Test Channels
802.11 a/n-HT20/ac20	L: 5180MHz; 5260MHz; 5500MHz; M: 5200MHz;5280MHz; 5600MHz; H: 5240MHz;5320MHz; 5700MHz;
802.11 n-HT40/ac40	L/M: 5190MHz; 5270MHz; 5510MHz; 5590MHz; H: 5230MHz; 5310MHz; 5670MHz;
802.11 ac80	L/M/H: 5210MHz; 5290MHz; 5530MHz; 5610MHz;

4.3 Special Accessories and Auxiliary Equipment

Table 5: List of Accessories and Auxiliary Equipment

Description	Manufacturer	Model	S/N	Rating
Notebook	HUAWEI	Mate Book D 14	00342-35692-30405	N/A

4.4 Countermeasures to Achieve EMC Compliance

The test sample which has been tested contained the noise suppression parts as described in the Technical Construction File (TCF).

No additional measures were employed to achieve compliance.

4.5 Test Setup Diagram

Diagram of Measurement Configuration for Radiation Test (Below 1GHz)

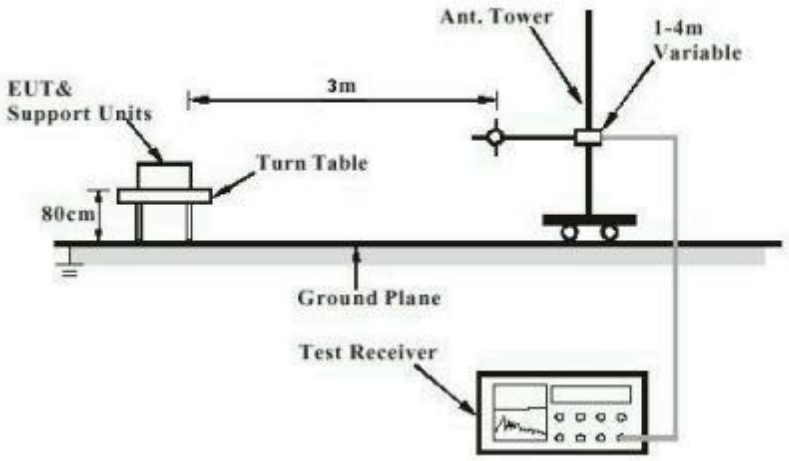


Diagram of Measurement Configuration for Radiation Test (Above 1GHz)

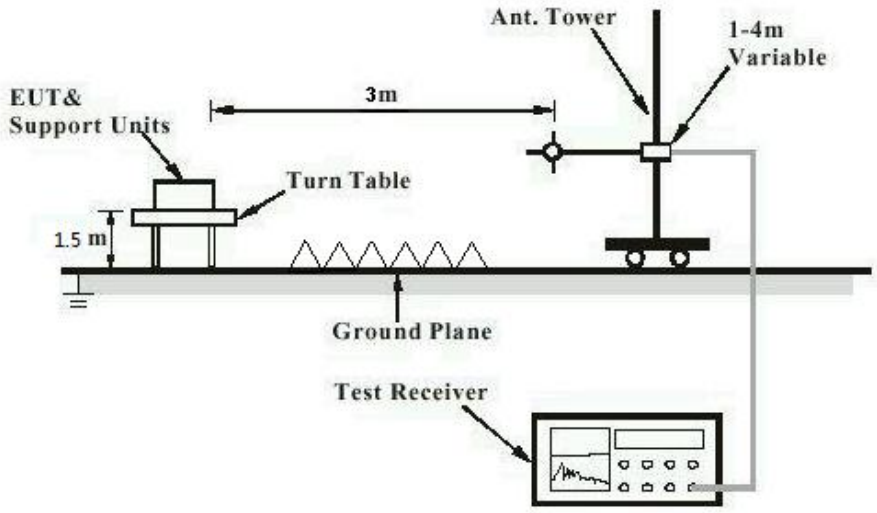


Diagram of Measurement Configuration for Conducted Transmitter Measurement

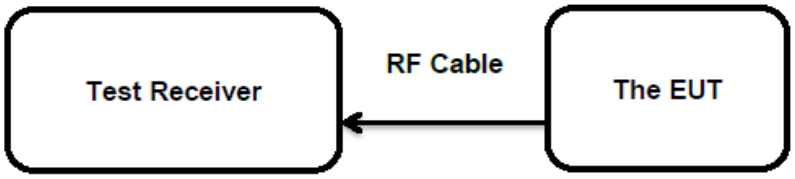


Diagram of Measurement Configuration for Dynamic Frequency Selection (DFS)

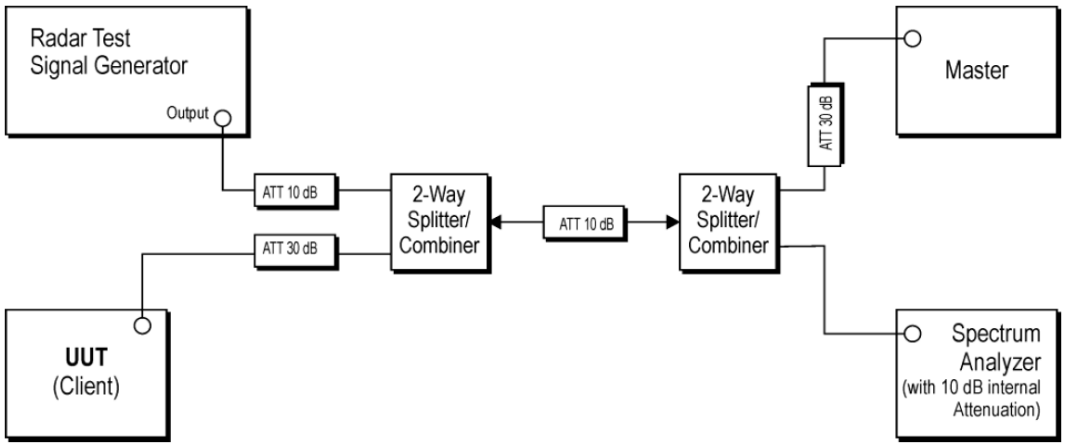
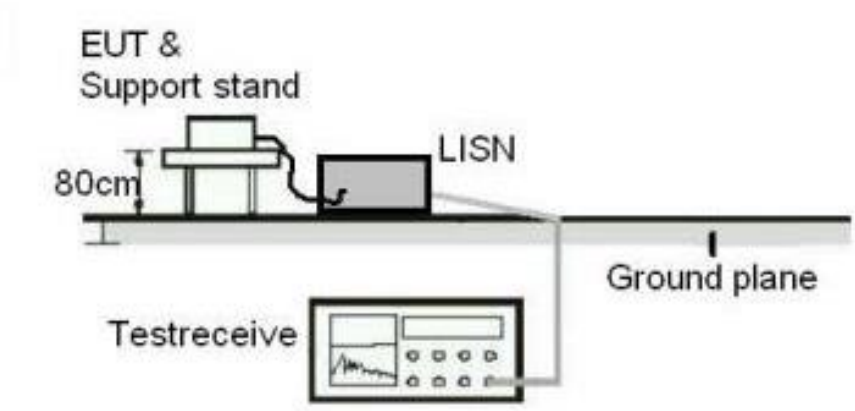


Diagram of Measurement Configuration for Mains Conduction Measurement



5 Test Results

5.1 Transmitter Requirement & Test Suites

5.1.1 Antenna Requirement

RESULT: **Pass**

Test Specification
Test standard : FCC Part 15.203

According to the manufacturer declared, the EUT has a PCB antenna, the directional gain of antenna see the table 2, and the antenna connector is designed with permanent attachment and no consideration of replacement.

Therefore, the EUT is considered sufficient to comply with the provision.

Refer to EUT Photo for further details.

5.1.2 Maximum Peak Conducted Output Power

RESULT: **Pass**

Test Specification

Test standard	:	FCC Part 15.407(a)(1)&(2)&(4)
Basic standard	:	ANSI C63.10: 2013
Limits	:	FCC: <250mW (24dBm) (5150-5250MHz) *<250mW (24dBm) (5250-5350MHz, 5470-5725MHz) *250 mW (24dBm) or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in MHz, where is lesser. <1W (30dBm) (5725-5850MHz)
Kind of test site	:	Shielded Room

Test Setup

Date of testing	:	2022-03-06
Input voltage	:	AC120V/60Hz
Operation mode	:	A
Test channel	:	Low / Middle / High
Ambient temperature	:	23.5 ℃
Relative humidity	:	46.2 %
Atmospheric pressure	:	101 kPa

For the measurement records, refer to the appendix B.

5.1.3 Conducted Power Spectral Density

RESULT: **Pass**

Test Specification

Test standard	:	FCC part 15.407(a)
Basic standard	:	ANSI C63.10: 2013 KDB 789033 D02 v01r03
Limits	:	FCC: <11dBm/MHz (5150-5250MHz 5250-5350MHz, 5470-5725MHz) <30dBm/500KHz (5725-5850MHz)
Kind of test site	:	Shielded Room

Test Setup

Date of testing	:	2022-03-06
Input voltage	:	AC120V/60Hz
Operation mode	:	A
Test channel	:	Low / Middle / High
Ambient temperature	:	23.5 ℃
Relative humidity	:	46.2 %
Atmospheric pressure	:	101 kPa

For the measurement records, refer to the appendix B.
Remark: All modulation type tested, but only the worst / Maximum test data showed in appendix B.

5.1.4 Frequency Stability

RESULT: **Pass**

Test Specification

Test standard	:	FCC Part 15.407(g)
Basic standard	:	ANSI C63.10: 2013
Limits	:	Within assigned bands
Kind of test site	:	Shielded Room

Test Setup

Date of testing	:	2022-03-07
Input voltage	:	AC120V/60Hz
Operation mode	:	A
Test channel	:	Low / Middle / High
Ambient temperature	:	23.5 ℃
Relative humidity	:	46.2 %
Atmospheric pressure	:	101 kPa

For the measurement records, refer to the appendix B.
Remark: All modulation type tested, but only the worst / Maximum test data showed in appendix B.

5.1.5 26dB Bandwidth and 99% Bandwidth

RESULT: **Pass**

Test Specification

Test standard	:	FCC Part 15.407(e)
Basic standard	:	ANSI C63.10: 2013
Limits	:	N/A
Kind of test site	:	Shielded Room

Test Setup

Date of testing	:	2022-03-06
Input voltage	:	AC120V/60Hz
Operation mode	:	A
Test channel	:	Low / Middle / High
Ambient temperature	:	23.5 ℃
Relative humidity	:	46.2 %
Atmospheric pressure	:	101 kPa

For the measurement records, refer to the appendix B.
Remark: All modulation type tested, but only the worst / Maximum test data showed in appendix B.

5.1.6 Radiated Spurious Emission

RESULT: **Pass**

Test Specification

Test standard	:	FCC Part 15.407(b) & FCC Part 15.205 & FCC Part 15.209
Basic standard	:	ANSI C63.10: 2013 KDB 789033 D02 v01r03
Limits	:	• 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. • For transmitters operating in the 5.25-5.35 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. • For transmitters operating in the 5.47-5.725 GHz band: All emissions outside of the 5.47-5.725 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz. Emissions outside the band 5470-5600 MHz and 5650-5725 MHz shall not exceed -27 dBm/MHz e.i.r.p. Restricted Bands meet the requirement of 15.209 limit
Kind of test site	:	3m Semi-anechoic Chamber

Test Setup

Date of testing	:	2022-02-24 ~ 2022-03-12
Input voltage	:	AC120V/60Hz
Operation mode	:	A
Test channel	:	Low / Middle / High
Ambient temperature	:	23.5~24.2 ℃
Relative humidity	:	46.2~55.2 %
Atmospheric pressure	:	101 kPa

Remark:
Testing was carried out within frequency range 9kHz to the tenth harmonics. Only the worst case spurious emissions configuration of the each mode were reported.

For the measurement records, refer to the appendix B.

5.1.7 Conducted Emission

RESULT: **Pass**

Test Specification

Test standard	:	FCC Part 15.207(a)
Basic standard	:	ANSI C63.10: 2013
Frequency range	:	0.15 – 30MHz
Limits	:	FCC Part 15.207(a)
Kind of test site	:	Shielded Room

Test Setup

Date of testing	:	2022-02-26 ~ 2022-03-11
Input voltage	:	AC120V/60Hz
Operation mode	:	A
Earthing	:	Low / Middle / High
Ambient temperature	:	23.7 ℃
Relative humidity	:	46.3 %
Atmospheric pressure	:	101 kPa

For the measurement records, refer to the appendix B.

5.1.8 Dynamic Frequency Selection (DFS)

RESULT: **Pass**

Test Specification

Test standard	:	FCC Part 15.407(h)
Basic standard	:	ANSI C63.10: 2013
Limits	:	5250-5350MHz, 5470-5725MHz Channel Move Time: Within 10 seconds. Channel Closing Transmission Time: 200ms+aggregate of 60ms over remaining 10s period; Non-Occupancy Period: at least 30 minutes.
Kind of test site	:	Shielded Room

Test Setup

Date of testing	:	2022-03-07
Input voltage	:	AC120V/60Hz
Operation mode	:	A
Test channel	:	Low / Middle / High
Ambient temperature	:	23.5 ℃
Relative humidity	:	46.2 %
Atmospheric pressure	:	101 kPa

For the measurement records, refer to the appendix B.

6 Photographs of the Test Set-Up

For photographs of the test set-up, refer to the appendix A.

7 List of Tables