Prüfbericht-Nr.: *Test report no.*:	**CN24XTFJ 003**	**Auftrags-Nr.:** *Order no.*:	**168501938**	Seite 1 von 22 *Page 1 of 22*
Kunden-Referenz-Nr.: *Client reference no.*:	N/A	**Auftragsdatum:** *Order date:*	2024-08-27	
Auftraggeber: *Client*:	**Shining 3D Tech Co., Ltd.** No. 1398, Xiangbin Road, Wenyan, Xiaoshan, Hangzhou, Zhejiang, P.R. China			
Prüfgegenstand: *Test item*:	Laser 3D Scanner			
Bezeichnung / Typ-Nr.: *Identification / Type no.*:	FreeScan Trak ProW			
Auftrags-Inhalt: *Order content*:	Test Report			
Prüfgrundlage: *Test specification*:	CFR47 FCC Part 15: Subpart E Section 15.407 RSS-247 Issue 3 August 2023			
Wareneingangsdatum: *Date of sample receipt*:	2024-08-27	Please refer to Photo Document		
Prüfmuster-Nr.: *Test sample no:*	A003790564-001~002 A003790295-001~005			
Prüfzeitraum: *Testing period*:	2024-09-25 - 2025-01-09			
Ort der Prüfung: *Place of testing*:	Refer to section 2.1			
Prüflaboratorium: *Testing laboratory:*	TÜV Rheinland (Shenzhen) Co., Ltd.			
Prüfergebnis*: *Test result**:	Pass			

geprüft von: tested by:	x Bell Hu Signed by: Bell Hu	**genehmigt von:** *authorized by*:	x Jonathan Li Signed by: Jonathan Li
Datum: *Date:* 2025-01-14		**Ausstellungsdatum:** *Issue date:* 2025-01-14	
Stellung / Position:	Sachverständige(r)/Expert	**Stellung** / Position:	Sachverständige(r)/Expert

Sonstiges / *Other*: FCC ID: 2AMG4-FSTTGE0A0, IC: 24652-FSTTGE0A0, HVIN: FreeTrak L, PMN: FreeScan Trak ProW

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

* Legende:	P(ass) = entspricht o.g. Prüfgrundlage(n)	F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	N/A = nicht anwendbar	N/T = nicht getestet
** Legend:*	*P(ass) = passed a.m. test specification(s)*	*F(ail) = failed a.m. test specification(s)*	*N/A = not applicable*	*N/T = not tested*

No.362, Huanguan Middle Road, Songyuansha Community, Guanhu Subdistrict, Longhua District, Shenzhen, Guangdong, China
Mail: service-gc@tuv.com · Web: www.tuv.com

Anmerkungen
Remarks

1	Alle eingesetzten Prüfmittel waren zum angegebenen Prüfzeitraum gemäß eines festgelegten Kalibrierungsprogramms unseres Prüfhauses kalibriert. Sie entsprechen den in den Prüfprogrammen hinterlegten Anforderungen. Die Rückverfolgbarkeit der eingesetzten Prüfmittel ist durch die Einhaltung der Regelungen unseres Managementsystems gegeben. Detaillierte Informationen bezüglich Prüfkonditionen, Prüfequipment und Messunsicherheiten sind im Prüflabor vorhanden und können auf Wunsch bereitgestellt werden. *The equipment used during the specified testing period was calibrated according to our test laboratory calibration program. The equipment fulfils the requirements included in the relevant standards. The traceability of the test equipment used is ensured by compliance with the regulations of our management system.* *Detailed information regarding test conditions, equipment and measurement uncertainty is available in the test laboratory and could be provided on request.*
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3	Prüfklausel mit der Note * wurden an qualifizierte Unterauftragnehmer vergeben und sind unter der jeweiligen Prüfklausel des Berichts beschrieben. Abweichungen von Prüfspezifikation(en) oder Kundenanforderungen sind in der jeweiligen Prüfklausel im Bericht aufgeführt. *Test clauses with remark of * are subcontracted to qualified subcontractors and descripted under the respective test clause in the report.* *Deviations of testing specification(s) or customer requirements are listed in specific test clause in the report.*
4	Die Entscheidungsregel für Konformitätserklärungen basierend auf numerischen Messergebnisen in diesem Prüfbericht basiert auf der "Null-Grenzwert-Regel" und der "Einfachen Akzeptanz" gemäß ILAC G8:2019 und IEC Guide 115:2021, es sei denn, in der auf Seite 1 dieses Berichts genannten angewandten Norm ist etwas anderes festgelegt oder vom Kunden gewünscht. Dies bedeutet, dass die Messunsicherheit nicht berücksichtigt wird und daher auch nicht im Prüfbericht angegeben wird. Zu weiteren Informationen bezueglich des Risikos durch diese Entscheidungsregel siehe ILAC G8:2019. The decision rule for statements of conformity, based on numerical measurement results, in this test report is based on the “Zero Guard Band Rule” and “Simple Acceptance” in accordance with ILAC G8:2019 and IEC Guide 115:2021, unless otherwise specified in the applied standard mentioned on Page 1 of this report or requested by the customer. This means that measurement uncertainty is not taken in account and hence also not declared in the test report. For additional information to the resulting risk based of this decision rule please refer to ILAC G8:2019.

Test Summary

5.1.1 ANTENNA REQUIREMENT
RESULT: Pass

5.1.2 MAXIMUM 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 6DB BANDWIDTH
RESULT: Pass

5.1.7 RADIATED SPURIOUS EMISSION
RESULT: Pass

5.1.8 DYNAMIC FREQUENCY SELECTION (DFS)
RESULT: N/A

5.1.9 AC CONDUCTED EMISSION
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 Test Set-up

Appendix B: Test Results of Wi-Fi

2 Test Sites

2.1 Test Facilities

Shenzhen PSI Testing Co., Ltd.
1-2F, Building 5, Yudafu Industrial Park, No. 10, Xingye West Road, Shajing Street, Bao'an District, Shenzhen, Guangdong, China 518104
A2LA Certificate Number: 6975.01
CNAS Registration Number: CNAS L19010

Note: TÜV Rheinland (Shenzhen) Co., Ltd. subcontracts the all test to Shenzhen PSI Testing Co., Ltd., the tests at the test sites have been conducted under the supervision of a TÜV engineer.

2.2 List of Test and Measurement Instruments

Table 1: List of Test and Measurement Equipment

1. RF Test Equipment						
Item	**Equipment**	**Manufacturer**	**Model No.**	**Serial No.**	**Firmware Version**	**Calibrated until**
1.	9*6*6 anechoic chamber	SKET	9*6*6	N/A	/	2026.12.19
2.	Test Receiver	Rohde&Schwarz	ESCI 7	101032/003	4.42 SP3	2025.12.17
3.	Loop Antenna	Schwarz beck	FMZB 1519B	00128	/	2026.12.24
4.	Bilog Antenna	Schwarz beck	VULB 9168	01448	/	2026.12.24
5.	Spectrum Analyzer	Rohde&Schwarz	FSV-40N	101648	3.70	2025.12.17
6.	Horn Antenna	Schwarz beck	BBHA 9120 D	02706	/	2026.12.24
7.	Amplifier	SKET	LAPA_01G18G-45dB	SK2022032901	/	2025.12.17
8.	Horn Antenna	Schwarz beck	BBHA 9170	00946	/	2026.12.24
9.	Amplifier	SKET	LNPA_0118G-45	SK2020010801	/	2025.12.17
10.	RF Power Probe	Rohde&Schwarz	NRP-Z11	1138.3004.02-117725-vh	/	2025.12.17
11.	RF Power Probe	Rohde&Schwarz	NRP-Z11	1138.3004.02-1111533-Fz	/	2025.12.17
12	Vector Signal Generator	Agilent	N5182A	MY47420724	/	2025.12.17
13	Analog signal generator	Agilent	N5181A	MY50145363	/	2025.12.17
14	Comprehensive Test Instrument	Rohde&Schwarz	CMW 500	145266	/	2025.12.17
15	Spectrum Analyzer	Agilent	N9020A	MY51281067	A.14.03	2025.12.17
16	Temp. & Humid Chamber	Auchno	9606	/	/	2025.12.17
17	Regulated DC Power Supply	Xinouhua	ADC120V10A	202211251638		2025.12.17
18	Power meter	Agilent	E4419B	GB40202121	/	2025.12.17

Item	Software Name	Manufacturer
RE	EZ_EMC	Farad
RF	RTS	TACHOY

Conducted Emission				
Description	**Manufacturer**	**Model**	**Serial No.**	**Calibrated until (DD.MM.YYYY)**
Test Receiver	Rohde&Schwarz	ESCI 7	101032/003	2024.12.29
L.I.S.N.	Rohde&Schwarz	ENV 216	102282	2024.12.29
L.I.S.N.	RFT	NNB111	13835240	2025.05.03

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 (k=2)
RF output power, conducted	± 0.41dB
Occupied Channel Bandwidth	± 2.08 %
RF power density, conducted	± 0.39 dB
Unwanted Emissions, conducted	± 0.59 dB
Radiated Emission of Transmitter, valid up to 26.5 GHz	± 4.82 dB
Radiated Emission of Receiver, valid up to 26.5 GHz	± 4.82 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 TÜV Rheinland (Shenzhen) Co., Ltd. Test facility located at 362 Huanguan Road Middle Longhua District, Shenzhen 518110 People's Republic of 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 product is is optical tracker which supports 2.4GHz Wi-Fi and 5GHz Wi-Fi functions.
This report is for 5GHz Wi-Fi operation only.
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:	Laser 3D Scanner
Type Designation:	FreeScan Trak ProW
FCC ID:	2AMG4-FSTTGE0A0
IC:	24652-FSTTGE0A0
PMN:	FreeScan Trak ProW
HVIN:	FreeTrak L
Operating Voltage:	DC 24V
Technical Specification of Wi-Fi 802.11 b/g/n/ax	
Operating Frequency:	2412 - 2462 MHz for 802.11b/g/n(HT20)/ax(HE20)
Type of Modulation:	DSSS, OFDM, OFDMA
Data Rate:	1/2/5.5/11 Mbps for 802.11b 6/9/12/18/24/36/48/54 Mbps for 802.11g MCS0~MCS 7 for 802.11n(HT20) MCS0~MCS11 for 802.11ax(HE20)* (All data rates considered, only the Worst-cases reported) *Only Full RU mode supported in 802.11ax.
Channel Number:	11 channels for 802.11b/g/n(HT20)/ax(HE20)
Channel Separation:	5 MHz
Antenna Type:	Integral Antennas
Antenna Systems	2T2R, No beamforming
Antenna Gain:	-3.0dBi (Provided by client)
Technical Specification of Wi-Fi 802.11 a/n/ac/ax	
Operating Frequency:	5180-5240MHz, 5745-5825MHz
Type of Modulation:	OFDM(BPSK/QPSK/16QAM/64QAM) OFDMA(BPSK/QPSK/16QAM/64QAM/256QAM/1024QAM)
Data Rate:	6/9/12/18/24/36/48/54 Mbps for 802.11a MCS0 ~ MCS7 for 802.11n MCS0 ~ MCS9 for 802.11ac MCS0 ~ MCS11 for 802.11ax* *Only Full RU mode supported for 802.11ax.
Antenna Type:	Integral Antennas
Antenna Systems	2T2R, No beamforming
Antenna Gain:	-3.0dBi (Provided by client)

3.3 Independent Operation Modes

The basic operation modes are:

A. On, Wi-Fi 802.11 a/n/ac/ax wireless transmitting mode

1) Low Channel
2) Middle Channel
3) High Channel

B. On, Wi-Fi 802.11 a/n/ac/ax connecting mode

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 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: 2020.

According to clause 3.1, all tests were performed in this report.

Table 3: Test environments

Environment Parameter	Selected Values During Tests		
	Temperature	Voltage	Relative Humidity
NTNV	24.6°C	Normal	Ambient

Table 4: Test channel and frequency

U-NII-1					
20MHz Bandwidth		40MHz Bandwidth		80MHz Bandwidth	
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
36	5180	38	5190	42	5210
40	5200	46	5230		
44	5220				
48	5240				

U-NII-3					
20MHz Bandwidth		40MHz Bandwidth		80MHz Bandwidth	
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
149	5745	151	5755	155	5775
153	5765	159	5795		
157	5785				
161	5805				
165	5825				

4.3 Special Accessories and Auxiliary Equipment

Table 5: Auxiliary Equipment Used during Test

Description	Manufacturer	Model	SN
Hub	Shining 3D Tech Co., Ltd.	/	/
Adapter	Huntkey	HKA300240A3-A07	Input: 100-240V AC Output: DC 24V/1.5A, 300W
Notebook PC(EMC)	MSI	CROSSHAIR I5	K2201N0086025

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)

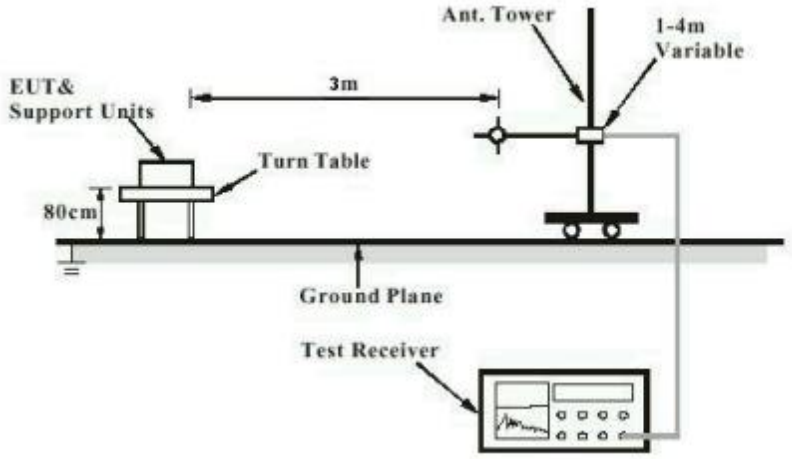


Diagram of Measurement Configuration for Radiation Test (Above 1GHz)

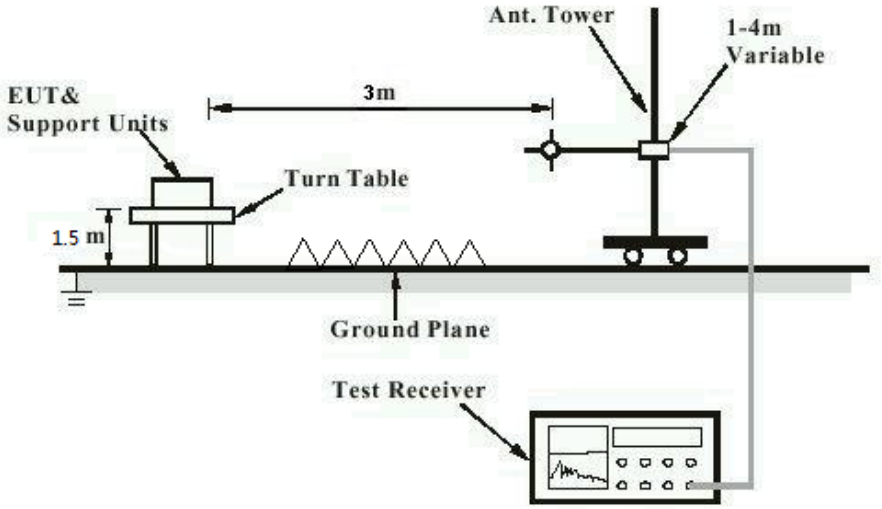
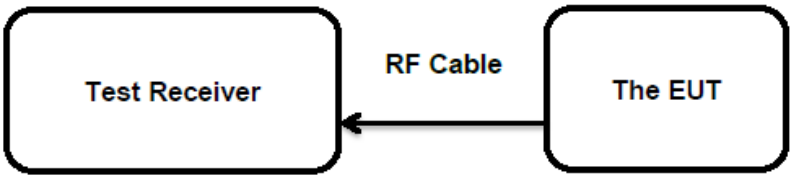


Diagram of Measurement Configuration for Conducted Transmitter Measurement



5 Test Results

5.1 Transmitter Requirement & Test Suites

5.1.1 Antenna Requirement

RESULT: **Pass**

Test Specification

Test standard : FCC Part 15.247(b)(4) and Part 15.203
RSS-Gen Clause 6.8

The EUT has integral antennas with unique connector, which is designed with permanent attachment and no consideration of replacement, as detailed on section 3.2.

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

Refer to EUT Photo for further details.

5.1.2 Maximum Conducted Output Power

RESULT: **Pass**

Test Specification

Test standard	:	FCC Part 15.407(a)(1)&(2)&(4) RSS-247 clause 6.2
Basic standard	:	ANSI C63.10: 2020
Limits	:	FCC: Conducted output power 250mW (24dBm) (5150-5250MHz) Conducted output power 250 mW (24dBm) or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in MHz, where is lesser.(5250-5350MHz, 5470-5725MHz) IC: *e.i.r.p.200 mW (23dBm) or 10 dBm + 10 logB, where B is the 99% emission bandwidth in MHz, where is lesser. (5150-5250MHz) * Conducted output power 250 mW (24dBm) or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in MHz, where is lesser. The maximum e.i.r.p. shall not exceed 1.0 W or 17 + 10 log10B, dBm, whichever is less. (5250-5350MHz, 5470-5600MHz and 5650-5725MHz)
Kind of test site	:	Shielded Room

Test Setup

Date of testing	:	2024-09-25 to 2024-12-15
Input voltage	:	DC 24V
Operation mode	:	A
Test channel	:	Low / Middle / High
Ambient temperature	:	24.6 ℃
Relative humidity	:	55 %
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) RSS-247 clause 6.2
Basic standard	:	ANSI C63.10: 2020 KDB 789033 D02 v01r03
Limits	:	FCC: The maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band.(5150-5250MHz,5250-5350MHz, 5470-5725MHz) IC: The e.i.r.p. spectral density shall not exceed 10 dBm in any 1.0 MHz band. (5150-5250MHz) The power spectral density shall not exceed 11 dBm in any 1.0 MHz band. (5250-5350MHz, 5470-5600MHz and 5650-5725MHz)
Kind of test site	:	Shielded Room

Test Setup

Date of testing	:	2024-09-25 to 2025-01-09
Input voltage	:	DC 24V
Operation mode	:	A
Test channel	:	Low / Middle / High
Ambient temperature	:	24.6 ℃
Relative humidity	:	55 %
Atmospheric pressure	:	101 kPa

For the measurement records, refer to the appendix B.

5.1.4 Frequency Stability

RESULT: **Pass**

Test Specification

Test standard	:	FCC Part 15.407(g) RSS-Gen Clause 6.11
Basic standard	:	ANSI C63.10: 2020
Limits	:	Within assigned bands
Kind of test site	:	Shielded Room

The device will be maintained within assigned bands under all conditions of normal operation as specified

5.1.5 26dB Bandwidth and 99% Bandwidth

RESULT: **Pass**

Test Specification

Test standard	:	FCC Part 15.407(e) RSS-Gen Clause 6.6
Basic standard	:	ANSI C63.10: 2020
Limits	:	N/A
Kind of test site	:	Shielded Room

Test Setup

Date of testing	:	2024-09-25 to 2024-12-15
Input voltage	:	DC 24V
Operation mode	:	A
Test channel	:	Low / Middle / High
Ambient temperature	:	24.6 ℃
Relative humidity	:	55 %
Atmospheric pressure	:	101 kPa

For the measurement records, refer to the appendix B.

5.1.6 6dB Bandwidth

RESULT: **Pass**

Test Specification

Test standard	:	FCC Part 15.407(e)
Basic standard	:	ANSI C63.10: 2020
Limits	:	At least 500KHz (5725-5850MHz)
Kind of test site	:	Shielded Room

Test Setup

Date of testing	:	2024-09-25 to 2024-12-15
Input voltage	:	DC 24V
Operation mode	:	A
Test channel	:	Low / Middle / High
Ambient temperature	:	24.8 ℃
Relative humidity	:	55 %
Atmospheric pressure	:	101 kPa

For the measurement records, refer to the appendix B.

5.1.7 Radiated Spurious Emission

RESULT: **Pass**

Test Specification

Test standard	:	FCC Part 15.407(b) & FCC Part 15.205 & FCC Part 15.209 RSS-247 clause 6.2 & RSS-GEN clause 8.9 and 8.10
Basic standard	:	ANSI C63.10: 2020 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. • For transmitters operating in the 5.725-5.85 GHz band: 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. Restricted Bands meet the requirement of 15.209 limit and RSS-GEN
Kind of test site	:	3m Semi-anechoic Chamber

Test Setup

Date of testing	:	2024-09-25 to 2024-12-15
Input voltage	:	DC 24V
Operation mode	:	A
Test channel	:	Low / Middle / High
Ambient temperature	:	Refer to test result
Relative humidity	:	Refer to test result
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.

5.1.8 Dynamic Frequency Selection (DFS)

RESULT: **N/A**

Test Specification

Test standard	:	FCC Part 15.407(h)
Basic standard	:	ANSI C63.10: 2020
Limits	:	5250-5350MHz, 5470-5725MHz FCC Part 15.407(h)(2)
Kind of test site	:	Shielded Room

Note: This device does not support DFS bands

5.1.9 AC Conducted Emission

RESULT: **Pass**

Test Specification

Test standard	:	FCC Part 15.207(a) RSS-GEN clause 8.8
Basic standard	:	ANSI C63.10: 2020
Frequency range	:	0.15 – 30MHz
Limits	:	FCC Part 15.207(a)
Kind of test site	:	Shielded Room

Test Setup

Date of testing	:	2024-09-25 to 2024-12-15
Input voltage	:	DC 24V
Operation mode	:	B
Earthing	:	Not connected
Ambient temperature	:	Refer to test result
Relative humidity	:	Refer to test result
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