

Prüfbericht-Nr.: Test report no.:	CN24XTFJ 002	Auftrags-Nr.: Order no.:	168501938	Seite 1 von 20 Page 1 of 20
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 C Section 15.247 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 - 2025-01-08			
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:			genehmigt von: authorized by:	
Datum: Date:	2025-01-14	Ausstellungsdatum: Issue date:		2025-01-14
Signed by: Bell Hu		Signed by: Jonathan Li		
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				
Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens. <i>This test report only relates to the above mentioned test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any test mark.</i>				

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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. <i>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.</i>
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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. <i>Test clauses with remark of * are subcontracted to qualified subcontractors and described under the respective test clause in the report.</i> <i>Deviations of testing specification(s) or customer requirements are listed in specific test clause in the report.</i>
4	Die Entscheidungsregel für Konformitätserklärungen basierend auf numerischen Messergebnissen 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 bezüglich des Risikos durch diese Entscheidungsregel siehe ILAC G8:2019. <i>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.</i>

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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 6dB BANDWIDTH

RESULT: Pass

5.1.5 99% BANDWIDTH

RESULT: Pass

5.1.6 CONDUCTED SPURIOUS EMISSIONS MEASURED IN 100 KHz BANDWIDTH

RESULT: Pass

5.1.7 RADIATED SPURIOUS EMISSION

RESULT: Pass

5.1.8 AC CONDUCTED EMISSION

RESULT: Pass

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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 whole 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 basis 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 optical tracker which supports 2.4GHz SRD, 2.4GHz Wi-Fi and 5GHz Wi-Fi functions. This report is for 2.4GHz SRD 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 2.4GHz SRD	
Operating Frequency:	2402-2480MHz
Type of Modulation:	GFSK
Channel Number:	40 channels
Channel Separation:	2 MHz
Antenna Type:	Integral Antenna
Antenna Systems	1T1R
Antenna Gain:	-3.0dBi (Provided by client)

The correctness of all data provided by customer in the test report is ensured and responsible of the customer. Any misjudgment of the test results caused using incorrect data provided by customer shall be borne by the customer.

Table 3: List of Test frequencies under Test

Wireless	Frequency list (MHz)			
2.4GHz SRD	2402	2422	2442	2462
	2404	2424	2444	2464
	2406	2426	2446	2466
	2408	2428	2448	2468
	2410	2430	2450	2470
	2412	2432	2452	2472
	2414	2434	2454	2474
	2416	2436	2456	2476
	2418	2438	2458	2478
	2420	2440	2460	2480

3.3 Independent Operation Modes

The basic operation modes are:

- A. On, 2.4GHz SRD wireless transmitting mode
 - 1) Low Channel
 - 2) Middle Channel
 - 3) High Channel
- B. On, 2.4GHz SRD connecting mode

3.4 Noise Generating and Noise Suppressing Parts

Refer to Circuit Diagram for further details.

3.5 Submitted Documents

- | | |
|--------------------|-------------------------|
| - Application Form | - User Manual |
| - Block Diagram | - 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 4: Test environments

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

Table 5: Test channel and frequency

Test Channels
2402MHz;2440MHz; 2480MHz

4.3 Special Accessories and Auxiliary Equipment

Table 6: 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)

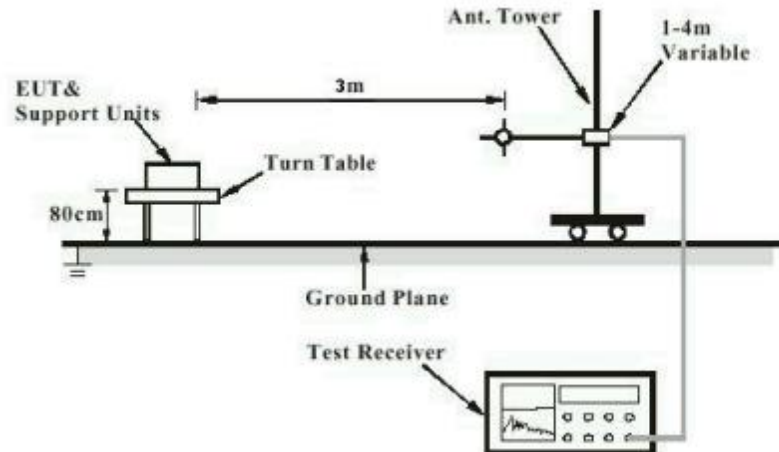


Diagram of Measurement Configuration for Radiation Test (Above 1GHz)

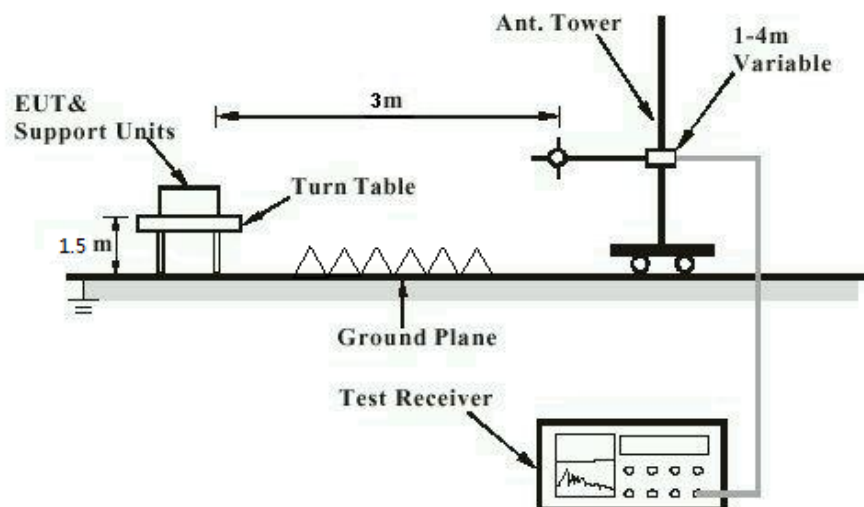
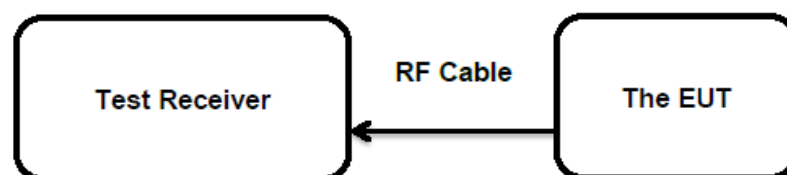


Diagram of Measurement Configuration for Conducted Transmitter Measurement



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 two 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.

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5.1.2 Maximum Peak Conducted Output Power

RESULT:**Pass****Test Specification**

Test standard	: FCC Part 15.247(b)(3)
	: RSS-247 Clause 5.4(d)
Basic standard	: ANSI C63.10: 2020
Limits	: 1.0 Watts
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 °C
Relative humidity	: 55 %
Atmospheric pressure	: 101 kPa

For the measurement records, refer to the appendix B.

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5.1.3 Conducted Power Spectral Density

RESULT:**Pass****Test Specification**

Test standard	: FCC Part 15.247(e)
	: RSS-247 Clause 5.2(b)
Basic standard	: ANSI C63.10: 2020
Limits	: < 8 dBm / 3kHz
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 °C
Relative humidity	: 55 %
Atmospheric pressure	: 101 kPa

For the measurement records, refer to the appendix B.

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5.1.4 6dB Bandwidth

RESULT:

Pass

Test Specification

Test standard : FCC Part 15.247(a)(2)
RSS-247 Clause 5.2(a)
Basic standard : ANSI C63.10: 2020
Limits : > 500 KHz
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 °C
Relative humidity : 55 %
Atmospheric pressure : 101 kPa

For the measurement records, refer to the appendix B.

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5.1.5 99% Bandwidth

RESULT:

Pass

Test Specification

Test standard : FCC Part 15.247(a)
RSS-Gen Clause 6.7
Basic standard : ANSI C63.10: 2020
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 °C
Relative humidity : 55 %
Atmospheric pressure : 101 kPa

For the measurement records, refer to the appendix B.

5.1.6 Conducted Spurious Emissions Measured in 100 kHz Bandwidth

RESULT:**Pass****Test Specification**

Test standard	: FCC Part 15.247(d) RSS-247 Clause 5.1(b)
Basic standard	: ANSI C63.10: 2020
Limits	: If the tested output power based on peak test: At least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power. If the tested output power based on RMS averaging over a time interval: At least 30 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power. In addition, radiated emissions which fall in the restricted bands, must also comply with the radiated emission limits specified in 15.209(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 °C
Relative humidity	: 55 %
Atmospheric pressure	: 101 kPa

Test results of 100kHz Bandwidth of Frequency Band Edge by Conducted method refer to test plots, and compliance is achieved as well.

For the measurement records, refer to the appendix B.

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5.1.7 Radiated Spurious Emission

RESULT:**Pass****Test Specification**

Test standard	: FCC Part 15.247(d) & FCC Part 15.205 RSS-247 Clause 3.3
Basic standard	: ANSI C63.10: 2020
Limits	: Refer to 15.209(a) of FCC part 15.247(d) RSS-Gen Table 5
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 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 (powered by Hub via AC/DC Adapter)
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 .
All modes tested, only the worst-case reported.

6 Photographs of the Test Set-Up

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

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