

Prüfbericht-Nr.: Test report no.:	CN24U0MC 002	Auftrags-Nr.: Order no.:	168467698	Seite 1 von 11 Page 1 of 11
Kunden-Referenz-Nr.: Client reference no.:	N/A	Auftragsdatum: Order date:	2024-01-19	
Auftraggeber: Client:	Yunjing Intelligence Innovation (Shenzhen) Co., Ltd. Room A2901, Yunzhongcheng, Building 1, Vanke Yuncheng VI, Dashi 2nd Road, Xili Community, Xili Street, Nanshan District, Shenzhen, Guangdong, China			
Prüfgegenstand: Test item:	Robot Vacuum and Mop			
Bezeichnung / Typ-Nr.: Identification / Type no.:	YJCC017, YJCC022 (Trademark: NARWAL)			
Auftrags-Inhalt: Order content:	Test Report			
Prüfgrundlage: Test specification:	CFR47 FCC Part 2: Section 2.1091 CFR47 FCC Part 1: Section 1.1310 FCC KDB Publication 447498 D01 v06 FCC KDB Publication 865664 D02 v01r02 RSS-102 Issue 5 February 2021			
Wareneingangsdatum: Date of sample receipt:	2024-04-16	Please refer to Photo Document		
Prüfmuster-Nr.: Test sample no.:	A003687613-023, 026 A003687613-028~029			
Prüfzeitraum: Testing period:	2024-04-22 - 2024-05-07			
Ort der Prüfung: Place of testing:	TÜV Rheinland (Shenzhen) Co., Ltd.			
Prüflaboratorium: Testing laboratory:	TÜV Rheinland (Shenzhen) Co., Ltd.			
Prüfergebnis*: Test result*:	Pass			
geprüft von: tested by:	 Lin Lin		genehmigt von: authorized by:	 Bell Hu
Datum: Date:	2024-05-31		Ausstellungsdatum: Issue date:	2024-05-31
Stellung / Position:	Sachverständige(r)/Expert		Stellung / Position:	Sachverständige(r)/Expert
Sonstiges / Other:	FCC ID: 2A942YJCC00A IC: 30051-YJCC00A HVIN: YJCC017 Family HVIN: YJCC022			
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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Prüfbericht-Nr.: CN24U0MC 002
Test report no.:

Seite 2 von 11
Page 2 of 11

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>

Prüfbericht - Nr.: CN24U0MC 002
Test Report No.:

Seite 3 von 11
Page 3 of 11

TEST SUMMARY

3.1.1 RF EXPOSURE COMPLIANCE

RESULT: Pass

CONTENTS

1.	TEST SITES.....	5
1.1	TEST FACILITIES	5
1.2	TRACEABILITY	5
1.3	CALIBRATION.....	5
1.4	LOCATION OF ORIGINAL DATA	5
1.5	STATUS OF FACILITY USED FOR TESTING	5
2.	GENERAL PRODUCT INFORMATION	6
2.1	GENERAL DESCRIPTION	6
2.2	RATING AND SYSTEM DETAILS	6
3.	TEST RESULTS	8
3.1	TRANSMITTER REQUIREMENTS & TEST SUITES.....	8
3.1.1	RF Exposure Compliance.....	8
3.1.1.1	FCC Part 1.1310, Part 2.1091	8
3.1.1.2	RSS-102 Exemption Limits for Routine Evaluation – RF Exposure Evaluation	10
4.	LIST OF TABLES.....	11

1. Test Sites

1.1 Test Facilities

TÜV Rheinland (Shenzhen) Co., Ltd.

No.362, Huanguan Middle Road, Songyuansha Community, Guanhu Subdistrict, Longhua District, Shenzhen 518110, Guangdong, China

A2LA Certificate Number: 5162.01

FCC Registration No.: 694916

ISED Wireless Device Testing Laboratory: 25069

1.2 Traceability

All measurement equipment calibrations are traceable to NIST or where calibration is performed outside the United States, to equivalent nationally recognized standards organizations.

1.3 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.

1.4 Location of Original Data

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

1.5 Status of Facility Used for Testing

The TÜV Rheinland (Shenzhen) Co., Ltd. facility located at No.362, Huanguan Middle Road, Songyuansha Community, Guanhu Subdistrict, Longhua District, Shenzhen 518110, Guangdong, China is listed on the US Federal Communications Commission list of facilities approved to perform measurements.

2. General Product Information

2.1 General Description

The product is Robot Vacuum and Mop which supports Bluetooth low energy and 2.4GHz Wi-Fi wireless technologies.

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

2.2 Rating and System details

Table 1: Technical Specification of EUT

General Information of EUT	Value
Kind of Equipment	Robot Vacuum and Mop
Type Designation	YJCC017, YJCC022 Note1: Compared with YJCC022, YJCC017 adds a dust collection air outlet structure that leads the garbage to the automatic cleaning charging station. Note2: The model YJCC017 was selected to test as master EUT.
Trademark	NARWAL
FCC ID	2A942YJCC00A
IC	30051-YJCC00A
HVIN	YJCC017
Family HVIN	YJCC022
Operating Voltage	DC 20V@2.0A input via Charging Station or Internal battery operated (14.4V)
Testing Voltage	Fully charged battery or AC 120V, 60Hz
Extreme Temperature Range	+5 °C ~ +40 °C
Charging Station	Model: YJCB017, YJCB022 (Note: Compared with YJCB022, YJCB017 has added functions and structures related to dust collection.) Input: AC 100-270V, 50-60Hz, Output: DC 20V, 2.0A
Technical Specification of Bluetooth LE	
Operating Frequency	2402-2480MHz
Type of Modulation	GFSK
Channel Number	40 channels
Data Rate	1Mbps
Channel Separation:	2 MHz
Antenna Type	Integral Antenna
Antenna Number	1Tx1Rx
Antenna Gain	2.0 dBi (Provided by the Client)
The type of wideband data transmission equipment	Non-FHSS for Bluetooth BLE
Technical Specification of 2.4GHz Wi-Fi	

Prüfbericht - Nr.: CN24U0MC 002

Test Report No.:

Seite 7 von 11

Page 7 of 11

Operating Frequency	2412 - 2462MHz for 802.11b/g/n(HT20)
Type of Modulation	DSSS(DBPSK/DQPSK/CCK) OFDM(BPSK/QPSK/16QAM/64QAM)
Data Rate	1/2/5.5/11 Mbps for 802.11b 6/9/12/18/24/36/48/54 Mbps for 802.11g MCS0 ~ MCS7 for 802.11n
Channel Number	11 channels for 802.11b/g/n(HT20)
Channel Separation	5 MHz
Antenna Type	Integral Antenna
Antenna Number	1Tx1Rx
Antenna Gain	1.0 dBi (Provided by the Client)
The type of wideband data transmission equipment	DTS

3. Test Results

3.1 Transmitter Requirements & Test Suites

3.1.1 RF Exposure Compliance

RESULT:
Pass

Test standard	:	RSS-102 Issue 5 47 CFR FCC Part 2.1091
Limit	:	Table 1 of 47 CFR FCC Part 1.1310 Section 2.5.2 of RSS-102 Issue 5
Kind of test site	:	Shielded room

This device is mobile device, and the applicant declares that the minimum separation distance is greater than 20cm. Therefore, MPE measurement or computational modelling should be used to determine compliance.

Antenna Gain: 2.00 dBi for Bluetooth, 1.00 dBi for 2.4GHz Wi-Fi.

3.1.1.1 FCC Part 1.1310, Part 2.1091

➤ **Radio Frequency Exposure Limit**

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm ²)
300-1,500	--	--	f/1500
1,500-100,000	--	--	1.0

➤ **Radio Frequency Exposure Calculation Formula**

$$S = \frac{PG}{4\pi R^2}$$

where: S = power density (in appropriate units, e.g. mW/cm²)
P = power input to the antenna (in appropriate units, e.g., mW)
G = power gain of the antenna in the direction of interest relative to an isotropic radiator
R = distance to the center of radiation of the antenna (appropriate units, e.g., cm)

or:

$$S = \frac{EIRP}{4\pi R^2}$$

where: EIRP = equivalent (or effective) isotropically radiated power

Prüfbericht - Nr.: CN24U0MC 002

Test Report No.:

Seite 9 von 11

Page 9 of 11

Table 2: Test Results of RF Exposure Calculations for FCC, stand-alone mode

Operating Mode	Max. EIRP (dBm)	Distance (cm)	MPE P_d (mW/cm ²)	Limit (mW/cm ²)	Verdict
Bluetooth	11.2	20	0.0026	1.0	Pass
2.4G Wi-Fi	26.7	20	0.093	1.0	Pass

➤ **Simultaneous transmission MPE**

Per KDB 447498 D01 v06, simultaneous transmission MPE test exclusion applies when the sum of the MPE ratios for all simultaneous transmitting antennas incorporated in a host device, based on calculated or measured field strengths or power density, is ≤ 1.0 .

Simultaneous transmission Scenarios

No.	Simultaneous transmission Scenarios
1	Bluetooth + 2.4GHz Wi-Fi

Table 3: Test Results of RF Exposure Calculations for FCC, Simultaneous mode

No.	Mode	Calculation (mW/cm ²)	Limit (mW/cm ²)	Calculation	Limit
1	Bluetooth	0.0026	1.0	0.0956	1
	2.4GHz Wi-Fi	0.093	1.0		

As the sum of MPE ratios for all simultaneous transmitting antennas is ≤ 1.0 , simultaneous transmission MPE test exclusion will be applied.

➤ **Conclusion**

Therefore the maximum calculations result of above are meet the requirement of Radio Frequency Exposure (MPE) limit.

3.1.1.2 RSS-102 Exemption Limits for Routine Evaluation – RF Exposure Evaluation

RF exposure evaluation is required if the separation distance between the user and/or bystander and the device's radiating element is greater than 20 cm, except when the device operates as follows:

- below 20 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 1 W (adjusted for tune-up tolerance);
- at or above 20 MHz and below 48 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than $4.49/f^{0.5}$ W (adjusted for tune-up tolerance), where f is in MHz;
- at or above 48 MHz and below 300 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 0.6 W (adjusted for tune-up tolerance);
- at or above 300 MHz and below 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than $1.31 \times 10^{-2} f^{0.6834}$ W (adjusted for tune-up tolerance), where f is in MHz;
- at or above 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 5 W (adjusted for tune-up tolerance).

In these cases, the information contained in the RF exposure technical brief may be limited to information that demonstrates how the e.i.r.p. was derived.

Table 4: Test Results of RF Exposure Calculations for ISED, Stand-alone mode

Operating Mode	Max. EIRP incl. tune-up (dBm)	Distance (cm)	Maximum EIRP (W)	Sum (W)	Threshold power (W)	Verdict
Bluetooth	11.2	20	0.0132	0.4809	2.68	Pass
2.4G Wi-Fi	26.7	20	0.4677		2.70	Pass
	Note: The maximum EIRP lower than the threshold power in section 2.5.2, thus compliant.					

Both e.i.r.p. for Bluetooth & Wi-Fi are less than the RF exposure evaluation exempted power. So RF exposure evaluation is not required.

➤ Conclusion

“RF Radiation Exposure Statement Caution: This Transmitter must be installed to provide a separation distance of at least 20 cm from all persons.”

4. List of Tables

Table 1: Technical Specification of EUT	6
Table 2: Test Results of RF Exposure Calculations for FCC, stand-alone mode.....	9
Table 3: Test Results of RF Exposure Calculations for FCC, Simultaneous mode.....	9
Table 4: Test Results of RF Exposure Calculations for ISED, Stand-alone mode	10