ACCREDITED
CERTIFICATE #5473.01

Test Report No.:
FCC2023-0002-H

RF Test Report

EUT	:	**Robot Vacuum Cleaner**
MODEL	:	**H1**
BRAND NAME	:	**N/A**
APPLICANT	:	**Huizhou Hai Hong Xin Chuang Technology Co., Ltd**
CLASSIFICATION OF TEST	:	**N/A**

CVC Testing Technology Co., Ltd.

Applicant	**Name: Huizhou Hai Hong Xin Chuang Technology Co., Ltd** **Address: Fifth Floor, No.38 Keyuan Road, Lilin Town, Zhongkai High-tech Zone, Huizhou**
Manufacturer	**Name: Huizhou Hai Hong Xin Chuang Technology Co., Ltd** **Address: Fifth Floor, No.38 Keyuan Road, Lilin Town, Zhongkai High-tech Zone, Huizhou**
Equipment Under Test	**Name: Robot Vacuum Cleaner** **Model/Type: H1** **Additional Models/Types: See Section 2** **Brand: N/A** **Serial NO.: N/A** **Sampe NO.: 3-1**

Date of Receipt.	**2023.02.14**	Date of Testing	**2023.02.15～2023.04.21**

Test Specification	**Test Result**
FCC Part 2 (Section 2.1091) **KDB 447498 D04** **IEEE C95.1**	PASS

Evaluation of Test Result	The equipment under test was found to comply with the requirements of the standards applied. Seal of CVC **Issue Date: 2023.04.22**

Tested by:	Reviewed by:	Approved by:
Xu ZhenFei	**Liu YongHai**	**Chen HuaWen**
Name Signature	Name Signature	Name Signature

Other Aspects: NONE.

Abbreviations:OK, Pass= passed Fail = failed N/A= not applicable EUT= equipment, sample(s) under tested

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RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
FCC2023-0002-H	Original release	2023.04.22

1 GENERAL INFORMATION

PRODUCT	Robot Vacuum Cleaner
BRAND	N/A
MODEL	H1
ADDITIONAL MODEL	See Section 2
FCC ID	2BBE5-H1
POWER SUPPLY	DC 14.8V From Rechargeable Li-ion Battery
OPERATING FREQUENCY	2412MHz ~ 2462MHz for 11b/g/n(HT20) 2402MHz ~ 2480MHz for BT-LE (1Mbps)
PEAK OUTPUT POWER	WLAN: 15.46dBm (Maximum) BLE: 5.19dBm (Maximum)
HARDWARE VERSION:	V1.1
SOFTWARE VERSION:	V1.2.0
I/O PORTS	Refer to user's manual
CABLE SUPPLIED	N/A

Remark:
1. For more detailed features description, please refer to the manufacturer's specifications or the User's Manual.
2. For the test results, the EUT had been tested with all conditions. But only the worst case was shown in test report.
3. EUT photo refer to the report (Report NO.: FCC2023-0002-E).

1. ADDITIONAL MODELS/TYPES

Models
H1 pro, H2, H2 pro, XS2230, XS2230-P, H120, X6, X6S, S860, T880
Note: Just difference is the model name and brand, others are the same.

2. DESCRIPTION OF ACCESSORIES

Rechargeable Li-ion Battery			
Typical Capacity	**No.**	**Specification**	
2200mAh	**1**	**Brand:**	BOFUNENG
		Model No.:	4Li-ion18650NP
		Charge:	16.8V±0.05V
		Discharge:	10.80±0.08V
	2	**Brand:**	HUAFULIYUAN
		Model No.:	HFLY-18650

		Charge:	16.8±0.1V
		Discharge:	10.8±0.1V
	3	**Brand:**	Grand-Pro
		Model No.:	INR18650 4S1P
		Charge:	16.8V
		Discharge:	11.0V
2600mAh	**4**	**Brand:**	HUAFULIYUAN
		Model No.:	HFLY-18650
		Charge:	16.8±0.1V
		Discharge:	10.8±0.1V
	5	**Brand:**	CVE
		Model No.:	EVE-INR18650
		Charge:	16.7V
		Discharge:	11V
2550mAh	**6**	**Brand:**	Grand-Pro
		Model No.:	ICR18650 4S1P
		Charge:	16.8V
		Discharge:	11V

Fan			
Wind Pressure	**No.**	**Specification**	
1700Pa	**1**	**Brand:**	XINMINDA
		Model No.:	XYX-GB0515HGP
		Rated Voltage:	DC 14.4V
		Speed:	17000RPM±10%
	2	**Brand:**	SUPERNOVA
		Model No.:	QYC20A13F - 21
		Rated Voltage:	DC 14.4V
		Speed:	17800 RPM±10%
2500Pa	**3**	**Brand:**	SUPERNOVA
		Model No.:	QYC20A16F - 41
		Charge:	DC 14.4V
		Speed:	18000 RPM±10%

3. RF EXPOSURE LIMIT

(Option B) According to FCC Part2.1091 and FCC Part1.1307b, the available maximum time-averaged power or effective radiated power (ERP), whichever is greater, is less than or equal to the threshold Pth (mW) described in the following formula. This method shall only be used at separation distances (cm) from 0.5 centimeters to 40 centimeters and at frequencies from 0.3 GHz to 6 GHz (inclusive). P is given by:

$$P_{\text{th}}\,(\text{mW}) = \begin{cases} ERP_{20\,\text{cm}}(d/20\,\text{cm})^{x} & d \le 20\,\text{cm} \\ ERP_{20\,\text{cm}} & 20\,\text{cm} < d \le 40\,\text{cm} \end{cases}$$

Where：

$$x = -\log_{10}\left(\frac{60}{ERP_{20\,\text{cm}}\sqrt{f}}\right)$$

and f is in GHz;

and

$$P_{\text{th}}\,(\text{mW}) = ERP_{20\,\text{cm}}\,(\text{mW}) = \begin{cases} 2040f & 0.3\,\text{GHz} \le f < 1.5\,\text{GHz} \\ 3060 & 1.5\,\text{GHz} \le f \le 6\,\text{GHz} \end{cases}$$

(Option C) Or using Table 1 and the minimum separation distance (R in meters) from the body of a nearby person for the frequency (f in MHz) at which the source operates, the ERP (watts) is no more than the calculated value prescribed for that frequency. For the exemption in Table 1 to apply, R must be at least λ/2π, where λ is the free-space operating wavelength in meters. If the ERP of a single RF source is not easily obtained, then the available maximum time-averaged power may be used in lieu of ERP if the physical dimensions of the radiating structure(s) do not exceed the electrical length of λ/4 or if the antenna gain is less than that of a half-wave dipole (1.64 linear value).

Table 1 to §1.1307(b)(3)(i)(C) - Single RF Sources Subject to Routine Environmental Evaluation

RF Source Frequency (MHz)	Threshold ERP (W)
0.3 - 1.34	$1920R^2$
1.34 - 30	$3450R^2/f^2$
30 - 300	$3.38R^2$
300 - 1500	$0.0128R^2/f^2$
1500 - 100000	$19.2R^2$

For multiple RF sources: Multiple RF sources are exempt if:

a) The available maximum time-averaged power of each source is no more than 1 mW and there is a separation distance of two centimeters between any portion of a radiating structure operating and the nearest portion of any other radiating structure in the same device, except if the sum of multiple sources is less than 1 mW during the time-averaging period, in which case they may be treated as a single source (separation is not required). This exemption may not be used in conjunction with other exemption criteria other than those is paragraph (b)(3)(i)(A) of this section. Medical implant devices may only use this exemption and that in paragraph (b)(3)(i)(A).

b) in the case of fixed RF sources operating in the same time-averaging period, or of multiple mobile or portable RF sources within a device operating in the same time averaging period, if the sum of the fractional contributions to the applicable thresholds is less than or equal to 1 as indicated in the following equation.

$$\sum_{i=1}^{a} \frac{P_i}{P_{th,i}} + \sum_{j=1}^{b} \frac{ERP_j}{ERP_{th,j}} + \sum_{k=1}^{c} \frac{Evaluated_k}{Exposure\ Limit_k} \leq 1$$

Where:

a = number of fixed, mobile, or portable RF sources claiming exemption using paragraph (b)(3)(i)(B) of this section for Pth, including existing exempt transmitters and those being added.

b = number of fixed, mobile, or portable RF sources claiming exemption using paragraph (b)(3)(i)(C) of this section for Threshold ERP, including existing exempt transmitters and those being added.

c = number of existing fixed, mobile, or portable RF sources with known evaluation for the specified minimum distance including existing evaluated transmitters.

Pi = the available maximum time-averaged power or the ERP, whichever is greater, for fixed, mobile, or portable RF source i at a distance between 0.5 cm and 40 cm (inclusive).

Pth,i = the exemption threshold power (Pth) according to paragraph (b)(3)(i)(B) of this section for fixed, mobile, or portable RF source i.

ERPj = the ERP of fixed, mobile, or portable RF source j.

ERPth,j = exemption threshold ERP for fixed, mobile, or portable RF source j, at a distance of at least λ/2π according to the applicable formula of paragraph (b)(3)(i)(C) of this section.

Evaluatedk = the maximum reported SAR or MPE of fixed, mobile, or portable RF source *k* either in the device or at the transmitter site from an existing evaluation at the location of exposure.

Exposure Limitk = either the general population/uncontrolled maximum permissible exposure (MPE) or specific absorption rate (SAR) limit for each fixed, mobile, or portable RF source *k,* as applicable from § 1.1310 of this chapter.

4. CLASSIFICATION

The antenna of this product, under normal use condition, is at least 20cm away from the body of the user. So, this device is classified as **Mobile Device**.

5. ANTENNA GAIN

The antennas provided to the EUT, please refer to the following table:

Transmitter Circuit	Peak Gain (dBi)	Antenna Type
BT	2.54	PCB Antenna
2.4G WiFi	2.54	PCB Antenna

This is provided by the manufacturer. The laboratory is not responsible for technical data provided by the customer.

6. CALCULATION RESULT OF MAXIMUM CONDUCTED AV POWER

The measured Conducted Average Power

Option	Mode	Frequency (MHz)	Target Power (dBm)	Tolerance (dBm)	Lower Tolerance (dBm)	Upper Tolerance (dBm)
B	BT	2402 ~ 2480	3	+-1	2	4
	2.4G WiFi	2412 ~ 2462	14	+-1	13	15

The tuned Conducted Average Power at 20 cm (declared by client)

Option	Technology	Maximum conducted power (dBm)	Maximum Antenna Gain (dBi)	EIRP (dBm)	ERP (dBm)	ERP (mW)	Part1.1307b Threshold (mW)	Verify
B	BT	3.52	2.54	6.06	3.91	2.46	3060	PASS
	2.4G WiFi	14.19	2.54	16.73	14.58	28.71	3060	PASS

Note: This device can operate simultaneously in BT and 2.4G WIFI

CALCULATION FOR SIMULTANEOUS TRANSMISSION:

LORA, BT, NFC and WiFi can transmit simultaneously, the formula of calculated the MPE is

$$\sum_{i=1}^{a} \frac{P_i}{P_{th,i}} + \sum_{j=1}^{b} \frac{ERP_j}{ERP_{th,j}} + \sum_{k=1}^{c} \frac{Evaluated_k}{Exposure\ Limit_k} \leq 1$$

Max： (2.46/3060) + (28.71/3060) = 0.0098< 1, which is less than the “1” limit.

Important

(1) The test report is valid without the official stamp of CVC;

(2) Any part photocopies of the test report are forbidden without the written permission from CVC;

(3) The test report is invalid without the signatures of Approval and Reviewer;

(4) The test report is invalid if altered;

(5) Objections to the test report must be submitted to CVC within 15 days.

(6) Generally, commission test is responsible for the tested samples only.

(7) As for the test result “-” or “N” means “not applicable”, “/” means “not test”, “P” means “pass” and “F” means “fail”

The test data and test results given in this test report should only be used for purposes of scientific research, teaching and internal quality control when the CMA symbol is not presented.

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