RF EXPOSURE EVALUATION

Applicant: **UBTECH ROBOTICS CORP LTD**

Address: Room 2201, Building C1 Nanshan Smart Park No. 1001 Xueyuan Avenue Changyuan Community Taoyuan Street Nanshan District Shenzhen PRC

FCC ID: **2AHJX-XCAD101**

Product Name: **CadeBot-L100**

Standard(s): **47 CFR §1.1310, 47 CFR §2.1091**
447498 D01 General RF Exposure Guidance v06

The above equipment has been tested and found compliant with the requirement of the relative standards by China Certification ICT Co., Ltd (Dongguan)

Report Number: **CR230418098-00F**

Date Of Issue: **2023/7/3**

Reviewed By: **Julie Tan**
Title: RF Engineer
Approved By: **Sun Zhong**

Title: Manager
Test Laboratory: **China Certification ICT Co., Ltd (Dongguan)**
No. 113, Pingkang Road, Dalang Town, Dongguan,
Guangdong, China
Tel: +86-769-82016888

Test Facility

The Test site used by China Certification ICT Co., Ltd (Dongguan) to collect test data is located on the No. 113, Pingkang Road, Dalang Town, Dongguan, Guangdong, China.

The lab has been recognized as the FCC accredited lab under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, FCC Registration No. : 442868, the FCC Designation No. : CN1314.

The lab has been recognized by Innovation, Science and Economic Development Canada to test to Canadian radio equipment requirements, the CAB identifier: CN0123.

Declarations

China Certification ICT Co., Ltd (Dongguan) is not responsible for the authenticity of any test data provided by the applicant. Data included from the applicant that may affect test results are marked with a triangle symbol "▲". Customer model name, addresses, names, trademarks etc. are not considered data.

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.

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DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
1.0	CR230418098-00F	Original Report	2023/7/3

FCC§1.1310 & §2.1091- MAXIMUM PERMISSIBLE EXPOSURE (MPE)

1.1 Applicable Standard

According to subpart §1.1310, systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines.

Limits for Maximum Permissible Exposure (MPE) (§1.1310, §2.1091)

(B) Limits for General Population/Uncontrolled Exposure				
Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm^2)	Averaging Time (minutes)
0.3–1.34	614	1.63	*(100)	30
1.34–30	824/f	2.19/f	*(180/f²)	30
30–300	27.5	0.073	0.2	30
300–1500	/	/	f/1500	30
1500–100,000	/	/	1.0	30

f = frequency in MHz; * = Plane-wave equivalent power density;

According to §1.1310 and §2.1091 RF exposure is calculated.

Calculation formula:

Prediction of power density at the distance of the applicable MPE limit
$S = PG/4\pi R^2$ = power density (in appropriate units, e.g. mW/cm^2);
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, the power gain factor, is normally numeric gain;
R = distance to the center of radiation of the antenna (appropriate units, e.g., cm);

For simultaneously transmit system, the calculated power density should comply with:

$$\sum_i \frac{S_i}{S_{Limit,i}} \leq 1$$

1.2 EUT Information▲:

Operation Modes	Operation Frequency (MHz)	Max Conducted output power including Tune-up Tolerance (dBm)	Maximum Antenna Gain (dBi)
BLE	2402-2480	3.5	4.45
BT	2402-2480	7	4.45
2.4G WLAN	2412-2462	17.5	4.45
5.2G WLAN	5150-5250	16.5	3.88
5.8G WLAN	5725-5850	16	3.04
WCDMA B2	1850-1910	25.5	3.8
WCDMA B4	1710-1755	25.5	4.61
WCDMA B5	824-849	25.5	1.79
LTE B2	1850-1910	25.5	3.8
LTE B4	1710-1755	25.5	4.61
LTE B5	824-849	25.5	1.79
LTE B7	2500-2570	25.5	3.9
LTE B12	698-716	25.5	0.81
LTE B13	777-787	25.5	1.45
LTE B14	788-798	25.5	2.28
LTE B25	1850-1910	25.5	3.8
LTE B26	814-849	25.5	1.79
LTE B38	2570-2620	25.5	4.37
LTE B41	2496-2690	25.5	4.37
LTE B66	1710-1780	25.5	4.61
LTE B71	663-698	25.5	3.05
Lora	902.8-927.3	16.5	2

Note:
1. The Above Parameters were provided by the manufacturer.
2. Please refer to the FCC ID: XMR2021EM05G and FCC ID: 2AD66-CC68-C1 for power about the certified WWAN module and Lora module.

1.3 Measurement Result

Operation Modes	Frequency (MHz)	Antenna Gain		Conducted output power including Tune-up Tolerance		Evaluation Distance	Power Density	MPE Limit
		(dBi)	(numeric)	(dBm)	(mW)	(cm)	(mW/cm^2)	(mW/cm^2)
BLE	2402-2480	4.45	2.79	3.5	2.24	20.00	0.0012	1
BT	2402-2480	4.45	2.79	7	5.01	20.00	0.0028	1
2.4G WLAN	2412-2462	4.45	2.79	17.5	56.23	20.00	0.0312	1
5.2G WLAN	5150-5250	3.88	2.44	16.5	44.67	20.00	0.0217	1
5.8G WALN	5725-5850	3.04	2.01	16	39.81	20.00	0.0160	1
WCDMA B2	1850-1910	3.8	2.40	25.5	354.81	20.00	0.1694	1
WCDMA B4	1710-1755	4.61	2.89	25.5	354.81	20.00	0.2042	1
WCDMA B5	824-849	1.79	1.51	25.5	354.81	20.00	0.1066	0.549
LTE B2	1850-1910	3.8	2.40	25.5	354.81	20.00	0.1694	1
LTE B4	1710-1755	4.61	2.89	25.5	354.81	20.00	0.2042	1
LTE B5	824-849	1.79	1.51	25.5	354.81	20.00	0.1066	0.549
LTE B7	2500-2570	3.9	2.45	25.5	354.81	20.00	0.1734	1
LTE B12	698-716	0.81	1.21	25.5	354.81	20.00	0.0851	0.465
LTE B13	777-787	1.45	1.40	25.5	354.81	20.00	0.0986	0.518
LTE B14	788-798	2.28	1.69	25.5	354.81	20.00	0.1194	0.525
LTE B25	1850-1910	3.8	2.40	25.5	354.81	20.00	0.1694	1
LTE B26	814-849	1.79	1.51	25.5	354.81	20.00	0.1066	0.543
LTE B38	2570-2620	4.37	2.74	25.5	354.81	20.00	0.1932	1
LTE B41	2496-2690	4.37	2.74	25.5	354.81	20.00	0.1932	1
LTE B66	1710-1780	4.61	2.89	25.5	354.81	20.00	0.2042	1
LTE B71	663-698	3.05	2.02	25.5	354.81	20.00	0.1425	0.442
Lora	902.8-927.3	2.0	1.58	16.5	44.67	20.00	0.0141	0.602

For worst case:

The Bluetooth/WLAN can't transmit simultaneously, others can transmit simultaneously together:

$$\sum_i \frac{S_i}{S_{Limit,i}} \leq 1$$

$=S_{WLAN}/S_{limit-WLAN}+ S_{WWAN}/S_{limit-WWAN}+ S_{Lora}/S_{limit-Lora}$

$=0.0312/1+0.1425/0.442+0.0141/0.602$

$=0.377$

< 1.0

Result: The device compliant the Exemption at 20cm distances.

===== END OF REPORT =====