

RF Exposure Evaluation Report

Application No.: SZEM2011011613CR
Applicant: UBTECH ROBOTICS CORP LTD
Address of Applicant: 16th and 22nd Floor, Block C1, Nanshan I Park, No.1001 Xueyuan Road, Nanshan District, Shenzhen City, China
Manufacturer: UBTECH ROBOTICS CORP LTD
Address of Manufacturer: 16th and 22ND Floor, block C1 Nanshan I Park, NO.1001 Xueyuan Road, Nanshan District, Shenzhen City, 518055, P.R.CHINA
Factory: UBTECH (KUNMING) CO., LTD
Address of Factory: Room No.2, Block 2, Shilin Street, Chenggong District, Kunming City, Yunnan Province, P.R.CHINA
Equipment Under Test (EUT):
Product Name: ADIBOT
Model No.: ADAS101
Trade mark: UBTECH
FCC ID: 2AHJX-ADAS101
Standards: 47 CFR Part 1.1307
47 CFR Part 1.1310
47 CFR Part 2.1091
KDB447498D01 General RF Exposure Guidance v06
Date of Receipt: 2020-11-17
Date of Test: 2020-11-27 to 2020-12-13
Date of Issue: 2020-12-13

Test Result :	PASS*
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* In the configuration tested, the EUT complied with the standards specified above.

Keny Xu
EMC Laboratory Manager



2 Version

Revision Record				
Version	Chapter	Date	Modifier	Remark
01		2020-12-13		Original

Authorized for issue by:			
			
		<hr/> Leo Li/Project Engineer	
			
		<hr/> Eric Fu/Reviewer	



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4 General Information

4.1 General Description of EUT

Rated voltage:	AC 120V/60Hz
For BT:	
Operation Frequency:	2402MHz to 2480MHz
Bluetooth Version:	V5.0 Dual mode
Spectrum Spread Technology:	Frequency Hopping Spread Spectrum(FHSS)
Modulation Type:	GFSK, pi/4DQPSK, 8DPSK
Number of Channels:	79
Channel Spacing:	1MHz
Antenna Type:	FPC Antenna
Antenna Gain:	2.74dBi
For BLE:	
Operation Frequency:	2402MHz to 2480MHz
Bluetooth Version:	V5.0 Dual mode
Modulation Type:	GFSK
Number of Channels:	40
Channel Spacing:	2MHz
Data Rate:	1Mb/s & 2Mb/s
Antenna Type:	FPC Antenna
Antenna Gain:	2.74dBi
For Wi-Fi 2.4G:	
Operation Frequency:	802.11b/g/n(HT20): 2412MHz to 2462MHz;802.11n(HT40): 2422MHz to 2452MHz
Modulation Type:	802.11b: DSSS (CCK, DQPSK, DBPSK);802.11g/n: OFDM (64QAM, 16QAM, QPSK, BPSK)
Number of Channels:	802.11b/g/n(HT20):11;802.11n(HT40):7
Channel Spacing:	5MHz
Antenna Type:	ANT 1: FPC Antenna; ANT 2: FPC Antenna
Antenna Gain:	ANT 1:2.74dBi; ANT 2:2.74dBi



For Wi-Fi 5G:	
Operation Frequency (80MHz):	U-NII-1: 5210MHz; U-NII-3: 5775MHz
Operation Frequency (40MHz):	U-NII-1: 5190-5230MHz; U-NII-3: 5755-5795MHz
Operation Frequency (20MHz):	U-NII-1: 5180-5240MHz; U-NII-3: 5745-5825MHz
Moudulation Type:	802.11a: OFDM (64QAM, 16QAM, QPSK, BPSK); 802.11n: OFDM (BPSK, QPSK, 16QAM, 64QAM); 802.11ac: OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM)
Channel Spacing:	802.11a/n(HT20)/ac(HT20): 20MHz; 802.11n(HT40)/ac(HT40): 40MHz; 802.11ac(HT80): 80MHz
Antenna Type:	ANT 1: FPC Antenna; ANT 2: FPC Antenna
Antenna Gain:	U-NII-1 band: ANT 1:1.28dBi; ANT 2:1.28dBi; U-NII-3 band: ANT 1:1.32dBi; ANT 2:1.32dBi
Remark:	Two antennas can simultaneous transmission



4.2 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch

No. 1 Workshop, M-10, Middle section, Science & Technology Park, Shenzhen, Guangdong, China
518057

Telephone: +86 (0) 755 2601 2053 Fax: +86 (0) 755 2671 0594

No tests were sub-contracted.

4.3 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

- **A2LA (Certificate No. 3816.01)**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 3816.01.

- **VCCI**

The 3m Fully-anechoic chamber for above 1GHz, 10m Semi-anechoic chamber for below 1GHz, Shielded Room for Mains Port Conducted Interference Measurement and Telecommunication Port Conducted Interference Measurement of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: G-20026, R-14188, C-12383 and T-11153 respectively.

- **FCC –Designation Number: CN1178**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized as an accredited testing laboratory.

Designation Number: CN1178. Test Firm Registration Number: 406779.

- **Innovation, Science and Economic Development Canada**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized by ISED as an accredited testing laboratory.

CAB identifier: CN0006.

IC#: 4620C.

4.4 Deviation from Standards

None.

4.5 Abnormalities from Standard Conditions

None.

4.6 Other Information Requested by the Customer

None.



5 RF Exposure Evaluation

5.1 RF Exposure Compliance Requirement

5.1.1 Limits

According to FCC Part1.1310: The criteria listed in the following table shall be used to evaluate the environment impact of human exposure to radio frequency (RF) radiation as specified in part1.1307(b)

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposures				
0.3–3.0	614	1.63	*(100)	6
3.0–30	1842/f	4.89/f	*(900/f ²)	6
30–300	61.4	0.163	1.0	6
300–1500 .....	.....	.....	f/300	6
1500–100,000 .....	.....	.....	5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3–1.34	614	1.63	*(100)	30
1.34–30	824/f	2.19/f	*(180/f ²)	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

Friis Formula

Friis transmission formula: $Pd = (Pout \cdot G) / (4 \cdot \pi \cdot R^2)$

Where

Pd = power density in mW/cm²

Pout = output power to antenna in mW

G = gain of antenna in linear scale

Pi = 3.1416

R = distance between observation point and center of the radiator in cm

Pd is the limit of MPE, 1 mW/cm². If we know the maximum gain of the antenna and the total power input to the antenna, through the calculation, we will know the distance r where the MPE limit is reached.

5.1.2 Test Procedure

Software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel individually.



5.1.3 EUT RF Exposure Evaluation

For BT:

Antenna Gain: 2.74dBi

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 1.88 in linear scale.

Frequency (MHz)	Antenna	Max Conducted Peak Output Power (dBm)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)	Limit	Result
2480	1	10.41	10.99	0.0041	1.0	PASS

Note: Refer to report No. SZEM201101161302 for EUT test Max Conducted Peak Output Power value. The distance r (4th column) calculated from the Fries transmission formula is far greater than 20 cm separation requirement.

For BLE:

Antenna Gain: 2.74dBi

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 1.88 in linear scale.

Frequency (MHz)	Antenna	Max Conducted Peak Output Power (dBm)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)	Limit	Result
2480	1	6.27	4.24	0.0010	1.0	PASS

Note: Refer to report No. SZEM201101161303 for EUT test Max Conducted Peak Output Power value. The distance r (4th column) calculated from the Fries transmission formula is far greater than 20 cm separation requirement.



For 2.4G:

Antenna Gain: 2.74dBi

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 1.88 in linear scale.

Frequency (MHz)	Antenna	Max Conducted Peak Output Power (dBm)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)	Limit	Result
2422	1+2	19.30	85.11	0.0318	1.0	PASS

Note: Refer to report No. SZEM201101161304 for EUT test Max Conducted Peak Output Power value. The distance r (4th column) calculated from the Fries transmission formula is far greater than 20 cm separation requirement.

For 5G:

Antenna Gain: 1.32dBi

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 1.36 in linear scale.

Frequency (MHz)	Antenna	Max Conducted Peak Output Power (dBm)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)	Limit	Result
5745	1+2	20.08	101.86	0.0276	1.0	PASS

Note: Refer to report No. SZEM201101161305 for EUT test Max Conducted Peak Output Power value. The distance r (4th column) calculated from the Fries transmission formula is far greater than 20 cm separation requirement.

- End of the Report -

