



## RF Exposure Evaluation Report

**Application No.:** SZEM2103002456CR  
**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, 518055, P.R.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 ROBOTICS CORP LTD BAOAN BRANCH  
**Address of Factory:** 1-2Floor, Block B, Huilongda Industry Park, Shilongzai, Shiyan Street, Baoan District, Shenzhen City, P.R.CHINA  
**Equipment Under Test (EUT):**  
**EUT Name:** ADIBOT-S  
**Model No.:** ADAS101  
**Trade Mark:** UBTECH  
**FCC ID :** 2AHJX-ADAS101S  
47 CFR Part 1.1307  
**Standards:** 47 CFR Part 1.1310  
47 CFR Part 2.1091  
**Date of Receipt:** 2021-03-05  
**Date of Test:** 2021-03-09 to 2021-03-23  
**Date of Issue:** 2021-03-23

<b>Test Result :</b>	<b>Pass*</b>
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\* In the configuration tested, the EUT complied with the standards specified above.

*Keny Xu*

Keny Xu  
EMC Laboratory Manager



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

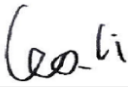
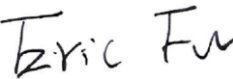
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## 2 Version

Revision Record				
Version	Chapter	Date	Modifier	Remark
01		2021-03-23		Original

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





### 3 Contents

	Page
1 COVER PAGE .....	1
2 VERSION .....	2
3 CONTENTS .....	3
4 GENERAL INFORMATION .....	4
4.1 GENERAL DESCRIPTION OF EUT .....	4
4.2 TEST LOCATION .....	6
4.3 TEST FACILITY .....	6
4.4 DEVIATION FROM STANDARDS .....	6
4.5 ABNORMALITIES FROM STANDARD CONDITIONS .....	6
4.6 OTHER INFORMATION REQUESTED BY THE CUSTOMER .....	6
5 RF EXPOSURE EVALUATION .....	7
5.1 RF EXPOSURE COMPLIANCE REQUIREMENT .....	7
5.1.1 Limits .....	7
5.1.2 Test Procedure .....	7
4.1.3 EUT RF EXPOSURE EVALUATION .....	8



## 4 General Information

### 4.1 General Description of EUT

Power supply:	AC 120V/60Hz
AC cable:	800cm unshielded
<b>For BLE:</b>	
Operation Frequency:	2402MHz to 2480MHz (ABLU module)
Bluetooth Version:	V5.1LE
Data Rate:	1Mb/s & 2Mb/s
Modulation Type:	GFSK
Number of Channels:	40
Channel Spacing:	2MHz
Antenna Type:	FPC Antenna
Antenna Gain:	5.1dBi
Operation Frequency:	2402MHz to 2480MHz (LB-LINK module)
Bluetooth Version:	V5.1LE
Data Rate:	1Mb/s
Modulation Type:	GFSK
Number of Channels:	40
Channel Spacing:	2MHz
Antenna Type:	FPC Antenna
Antenna Gain:	5.1dBi
<b>For 2.4G WIFI:</b>	
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:	FPC Antenna
Antenna Gain:	ANT1: 5.1dBi; ANT2: 5.1dBi
<b>For 5G WIFI:</b>	
Operation Frequency (20MHz):	U-NII-1: 5180-5240MHz; U-NII-3: 5745-5825MHz
Operation Frequency (40MHz):	U-NII-1: 5190-5230MHz; U-NII-3: 5755-5795MHz



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

Report No.: SZEM210300245605

Page: 5 of 9

Operation Frequency (80MHz):	U-NII-1: 5210MHz; U-NII-3: 5775MHz
Channel Spacing:	802.11a/n(HT20)/ac(HT20): 20MHz; 802.11n(HT40)/ac(HT40): 40MHz; 802.11ac(HT80): 80MHz
Antenna Type:	FPC Antenna
Antenna Gain:	ANT1: 5.1dBi; ANT2: 5.1dBi

Operation Frequency:	Band	Mode	Frequency Range(MHz)	Number of channels
	UNII Band I	IEEE 802.11a	5180-5240	4
		IEEE 802.11n/ac 20MHz	5180-5240	4
		IEEE 802.11n/ac 40MHz	5190-5230	2
		IEEE 802.11ac 80MHz	5210	1
	UNII Band III	IEEE 802.11a	5745-5825	5
		IEEE 802.11n/ac 20MHz	5745-5825	5
		IEEE 802.11n/ac 40MHz	5755-5795	2
		IEEE 802.11ac 80MHz	5775	1
Type of Modulation:	IEEE 802.11a: OFDM(BPSK/QPSK/16QAM/64QAM) IEEE 802.11n: OFDM(BPSK/QPSK/16QAM/64QAM) IEEE 802.11ac: OFDM (BPSK/QPSK/16QAM/64QAM/256QAM)			
Remark:	Two Antennas can simultaneous transmit WIFI signal at 802.11n(HT20), 802.11n(HT40), 802.11ac(HT20), 802.11ac(HT40), 802.11ac(HT80) modes.			



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## 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.



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## 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 <sup>2</sup> )	Averaging time (minutes)
<b>(A) Limits for Occupational/Controlled Exposures</b>				
0.3–3.0 .....	614	1.63	*(100)	6
3.0–30 .....	1842/f	4.89/f	*(900/f <sup>2</sup> )	6
30–300 .....	61.4	0.163	1.0	6
300–1500 .....	.....	.....	f/300	6
1500–100,000 .....	.....	.....	5	6
<b>(B) Limits for General Population/Uncontrolled Exposure</b>				
0.3–1.34 .....	614	1.63	*(100)	30
1.34–30 .....	824/f	2.19/f	*(180/f <sup>2</sup> )	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:  $P_d = (P_{out} * G) / (4 * \pi * R^2)$

Where

$P_d$  = power density in mW/cm<sup>2</sup>

$P_{out}$  = 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

$P_d$  is the limit of MPE, 1 mW/cm<sup>2</sup>. 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.



### 4.1.3 EUT RF Exposure Evaluation

**For BLE:**

Antenna Gain: 5.1dBi

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 3.24 in linear scale.

Output Power Into Antenna & RF Exposure Evaluation Distance:

**For LB-LINK Module**

Frequency (MHz)	Tx Type	Max Conducted Peak Output Power (dBm)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm <sup>2</sup> )	Limit	Result
2402 MHz	SISO	-2.02	0.63	0.0004	1.0	PASS

**For ABLUE Module**

Frequency (MHz)	Tx Type	Max Conducted Peak Output Power (dBm)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm <sup>2</sup> )	Limit	Result
2480 MHz	SISO	5.72	3.73	0.0024	1.0	PASS

Note: Refer to report No. SZEM210300245602 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 WIFI:**

Antenna Gain : 5.1dBi

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 3.24 in linear scale.

Output Power Into Antenna & RF Exposure Evaluation Distance:

Frequency (MHz)	Tx Type	Max Conducted Peak Output Power (dBm)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm <sup>2</sup> )	Limit	Result
2412MHz	SISO	18.25	66.83	0.0431	1.0	PASS

Note: Refer to report No. SZEM210300245603 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 WIFI:**

Antenna Gain :5.1dBi

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 3.24 in linear scale.

Output Power Into Antenna & RF Exposure Evaluation Distance:

Frequency (MHz)	Tx Type	Max Conducted Peak Output Power (dBm)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm <sup>2</sup> )	Limit	Result
5795 MHz	MIMO	21.71	148.25	0.0956	1.0	PASS

Note: Refer to report No. SZEM210300245604 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.

The simultaneous transmission result between of ABLUE module and LB-LINK module:

The SAR Exclusion Threshold Level:

=BLE( ABLUE module)+ WiFi 5G MIMO(LB-LINK module)

= (0.0024/1) +(0.0956/1) = 0.0980 < 1

Since the SAR Exclusion Threshold Level is well below the SAR low threshold level, so the EUT is considered to comply with SAR requirement without testing.

- End of the Report -

