RF Exposure Evaluation Report

Application No.:	SZEM2011011025AT
Applicant:	Solaborate Inc.
Address of Applicant:	8300 Utica Ave #283, Rancho Cucamonga, California, United States 91730 3852
Manufacturer:	Solaborate Inc.
Address of Manufacturer:	#283 - 8300 Utica Ave, Rancho Cucamonga, CA 91730, USA
Factory:	Dongguan Tai Sing Audio Technology Ltd.
Address of Factory:	No. 12, Niujiokeng Road, Dongcheng Street, Guangdong Province
Equipment Under Test (EUT):	
EUT Name:	HELLO2PLUS
Model No.:	HELLO2PLUS
FCC ID :	2AW3M-HELLO2PLUS
Standards:	47 CFR Part 1.1307 47 CFR Part 1.1310 47 CFR Part 2.1091
Date of Receipt:	2020-11-03
Date of Test:	2020-11-15 to 2021-01-31
Date of Issue:	2021-02-05
Test Result :	**Pass***

* In the configuration tested, the EUT complied with the standards specified above.

Keny Xu
EMC Laboratory Manager

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

2 Version

Revision Record				
Version	**Chapter**	**Date**	**Modifier**	**Remark**
01		2021-02-05		Original

Authorized for issue by:				
				
		Harry Wu /Project Engineer		
				
		Eric Fu /Reviewer		

3 Contents

4 General Information

4.1 General Description of EUT

Power Supply:	AC/DC Adapter Model: EA1019AVRS-050 Input: AC 100-240V, 50-60Hz, 0.8A Output: DC 5.0V, 3.0A
Cable:	DC Cable 1.5 meters Unshielded Non-Core HDMI Cable 1.5 meters Shielded Non-Core
For BT:	
Bluetooth Version:	V5.0
Operation Frequency:	2402MHz to 2480MHz
Spectrum Spread Technology:	Frequency Hopping Spread Spectrum(FHSS)
Number of Channels:	79
Modulation Type:	GFSK, π/4DQPSK, 8DPSK
Channel Spacing:	1MHz
Antenna Type:	FPC Antenna
Antenna Gain:	1.24dBi
For BLE:	
Bluetooth Version:	V5.0
Operation Frequency:	2402MHz to 2480MHz
Modulation Type:	GFSK
Number of Channels:	40
Channel Spacing:	2MHz
Data Rate:	1Mb/s,2Mb/s
Antenna Type:	FPC Antenna
Antenna Gain:	1.24dBi
For 2.4G WIFI:	
Operation Frequency:	802.11b/g/n(HT20): 2412MHz to 2462MHz 802.11n(HT40): 2422MHz to 2452MHz
Number of Channels:	802.11b/g/n(HT20):11 802.11n(HT40):7
Modulation Type:	802.11b: DSSS (CCK, DQPSK, DBPSK)

<table>
<tr><td></td><td>802.11g/n: OFDM (64QAM, 16QAM, QPSK, BPSK)</td></tr>
<tr><td>Channel Spacing:</td><td>5MHz</td></tr>
<tr><td>Antenna Type:</td><td>FPC Antenna</td></tr>
<tr><td>Antenna Gain:</td><td>Antenna 1 &2: 1.24dBi</td></tr>
<tr><td>Remark:</td><td>Two Antennas can simultaneous transmit WIFI signal at 802.11n(HT20) and 802.11n(HT40) mode.</td></tr>
<tr><td>For 5G WIFI:</td><td></td></tr>
<tr><td>DFS Function:</td><td>Slave without Radar detection</td></tr>
<tr><td>TPC Function:</td><td>Not Support</td></tr>
<tr><td>Operation Frequency:</td><td>
<table>
<tr><th>Band</th><th>Mode</th><th>Frequency Range(MHz)</th><th>Number of channels</th></tr>
<tr><td rowspan="4">UNII Band I</td><td>IEEE 802.11a</td><td>5180-5240</td><td>4</td></tr>
<tr><td>IEEE 802.11n/ac 20MHz</td><td>5180-5240</td><td>4</td></tr>
<tr><td>IEEE 802.11n/ac 40MHz</td><td>5190-5230</td><td>2</td></tr>
<tr><td>IEEE 802.11ac 80MHz</td><td>5210</td><td>1</td></tr>
<tr><td rowspan="4">UNII Band II-A</td><td>IEEE 802.11a</td><td>5260-5320</td><td>4</td></tr>
<tr><td>IEEE 802.11n/ac 20MHz</td><td>5260-5320</td><td>4</td></tr>
<tr><td>IEEE 802.11n/ac 40MHz</td><td>5270-5310</td><td>2</td></tr>
<tr><td>IEEE 802.11ac 80MHz</td><td>5290</td><td>1</td></tr>
<tr><td rowspan="4">UNII Band II-C</td><td>IEEE 802.11a</td><td>5500-5700</td><td>11</td></tr>
<tr><td>IEEE 802.11n/ac 20MHz</td><td>5500-5700</td><td>11</td></tr>
<tr><td>IEEE 802.11n/ac 40MHz</td><td>5510-5670</td><td>5</td></tr>
<tr><td>IEEE 802.11ac 80MHz</td><td>5530-5690</td><td>3</td></tr>
<tr><td rowspan="4">UNII Band III</td><td>IEEE 802.11a</td><td>5745-5825</td><td>5</td></tr>
<tr><td>IEEE 802.11n/ac 20MHz</td><td>5745-5825</td><td>5</td></tr>
<tr><td>IEEE 802.11n/ac 40MHz</td><td>5755-5795</td><td>2</td></tr>
<tr><td>IEEE 802.11ac 80MHz</td><td>5775</td><td>1</td></tr>
</table>
</td></tr>
<tr><td>Type of Modulation:</td><td>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)</td></tr>
<tr><td>Antenna Type:</td><td>FPC Antenna</td></tr>
</table>

Antenna Gain:	Antenna 1 &2: 2.57dBi
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.

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*G)/(4* Pi * 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 id 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.

4.1.3 EUT RF Exposure Evaluation

For BT:
Antenna Gain: 1.24dBi
Antenna Gain: The maximum Gain measured in fully anechoic chamber is 1.33 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^2)	Limit	Result
2402 MHz	SISO	11.93	15.60	0.0041	1.0	PASS

Note: Refer to report No. SZEM201101102502 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: 1.24dBi
Antenna Gain: The maximum Gain measured in fully anechoic chamber is 1.33 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^2)	Limit	Result
2402 MHz	SISO	1.80	1.51	0.0004	1.0	PASS

Note: Refer to report No. SZEM201101102503 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.

No.1 Workshop, M-10, Middle Section, Science & Technology Park, Shenzhen, China 518057 t (86-755) 26012053 f (86-755) 26710594 www.sgsgroup.com.cn
中国·深圳·科技园中区M-10栋一号厂房 邮编: 518057 t (86-755) 26012053 f (86-755) 26710594 sgs.china@sgs.com

For 2.4G WIFI:
Antenna Gain : 1.24dBi
Antenna Gain: The maximum Gain measured in fully anechoic chamber is 1.33 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^2)	Limit	Result
2437 MHz	MIMO	16.15	41.21	0.011	1.0	PASS

Note: Refer to report No. SZEM201101102504 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 :2.57dBi
Antenna Gain: The maximum Gain measured in fully anechoic chamber is 1.81 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^2)	Limit	Result
5745 MHz	MIMO	17.61	57.68	0.021	1.0	PASS

Note: Refer to report No. SZEM201101102505 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 -