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RF Exposure Evaluation Report

Report No. :	CQASZ20191100070EX-02
Applicant:	Unicrest Ltd
Address of Applicant:	New Zealand, 13 Nell Place, Whangarei 0110
Equipment Under Test (EUT):	
Product:	SS-1 Bluetooth LED Controller
Model No.:	SS-1 Bluetooth LED Controller
Brand Name:	N/A
FCC ID:	2AULK –UM510007
Standards:	47 CFR Part 1.1307 47 CFR Part 2.1093 KDB447498D01 General RF Exposure Guidance v06
Date of Receipt:	2019-09-06
Date of Test:	2019-09-06 to 2019-09-28
Date of Issue:	2019-11-19
Test Result :	**PASS***

Tested By: Tom Chen.

(Tom Chen)

Reviewed By: Sheek Luo

(Sheek Luo)

Approved By:

(Jack Ai)

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

2 Version

Revision History Of Report

Report No.	Version	Description	Issue Date
CQASZ20191100070EX-02	Rev.01	Initial report	2019-11-19

3 Contents

4 General Information

4.1 Client Information

Applicant:	Unicrest Ltd
Address of Applicant:	New Zealand, 13 Nell Place, Whangarei 0110
Manufacturer:	Shenzhen Huachuang Hengda Technology Co., Ltd
Address of Manufacturer:	Room 401, Unit 2, Building 2, Guanghui Technology Park, Minqin Road, Longhua, Shenzhen, China
Factory:	Shenzhen Huachuang Hengda Technology Co., Ltd
Address of Factory:	2F, Building 1, No. 37 Xia Xin Tang, Xin Tang Village, Fu Cheng street, Longhua District, Shenzhen, China

4.2 General Description of EUT

Product Name:	SS-1 Bluetooth LED Controller
Model No.:	SS-1 Bluetooth LED Controller
Trade Mark:	N/A
Type of Modulation:	BLE(GFSK)
Channel Spacing:	2MHz
Operation Frequency:	2402-2480MHz
Antenna Type:	Internal antenna
Antenna:	-1.01 dBi gain
	DC 24V From Adapter Input AC 120V/60Hz(Only Charging function); DC 14.8V From Battery

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.

5.2 1.1.3 EUT RF Exposure Evaluation

1) For LE

Antenna Gain: -1.01dBi

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 0.79 in linear scale.

Output Power Into Antenna & RF Exposure Evaluation Distance:

Measurement Data

GFSK mode				
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power	
			(dBm)	(mW)
Lowest(2402MHz)	0.09	0±0.5	0.5	1.122
Middle(2440MHz)	3.14	3±0.5	3.5	2.239
Highest(2480MHz)	4.65	4.5±0.5	5.0	3.162

The worst case:

Maximum tune-up Power (mW)	**Antenna Gain (dBi)**	**Power Density at R = 20 cm (mW/cm^2)**	**Limit**	**Result**
3.162	-1.01	0.0005	1.0	PASS

Note: 1) Refer to report No. CQASZ20191100070E-01 for EUT test Max Conducted Peak Output Power value.

2) Pd = (Pout*G)/(4* Pi * R^2)=(3.162*0.79)/(4*3.1416*20^2)=0.0005