



RF Exposure Evaluation Report

Application No.: SZEM1911020336CR
Applicant: Clare Controls
Address of Applicant: 7519 Pennsylvania Av Suite 104, Sarasota, Florida, 34243, United States
Manufacturer: Clare Controls
Address of Manufacturer: 7519 Pennsylvania Av Suite 104, Sarasota, Florida, 34243, United States
Factory: SYBER SENSE IOT COMPANY LIMITED
Address of Factory: 3/F, Building A, Hanhaida High-tech Park, Datian Yang C District, Shiwei Community, Matian Street, Guangming New District, Shenzhen, China.
Equipment Under Test (EUT):
EUT Name: Wireless Security and Smart Home Panel
Model No.: CLR-C1-PNL1
Trade Mark: ClareOne
FCC ID: 2AC9I-C1-PNL1
47 CFR Part 1.1307
Standards: 47 CFR Part 1.1310
47 CFR Part 2.1091
Date of Receipt: 2019-11-19
Date of Test: 2019-11-19 to 2019-11-26
Date of Issue: 2019-11-27

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

Keny Xu

Keny Xu
EMC Laboratory Manager

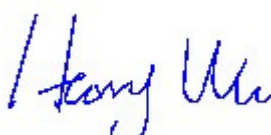


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Shenzhen Branch EMC Laboratory

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2 Version

Revision Record				
Version	Chapter	Date	Modifier	Remark
01		2019-11-27		Original

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



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4 General Description of EUT

Power supply:	Rechargeable Battery: DC3.8V, 19.76Wh Or AC/DC Adapter, Model: SW-120250 Input: AC100-240V, 50/60Hz, 0.68A Max. Output: DC 12.0V, 2.5A
Cable:	DC Cable: 180cm, Unshielded
For 433.95MHz:	
Operation Frequency:	433.95MHz
Modulation Type:	ASK
Number of Channels:	1
Antenna Type:	Integral Antenna
Antenna Gain:	-0.93dBi
For 908.4MHz:	
Operation Frequency:	908.4MHz
Modulation Type:	ASK
Number of Channels:	1
Antenna Type:	Integral Antenna
Antenna Gain:	0.67dBi
For Bluetooth:	
Operation Frequency:	2402MHz to 2480MHz
Bluetooth Version:	V4.2
Spectrum Spread Technology:	Frequency Hopping Spread Spectrum(FHSS)
Modulation Type:	GFSK, $\pi/4$ DQPSK, 8DPSK
Number of Channels:	79
Channel Spacing:	1MHz
Antenna Type:	Integral Antenna
Antenna Gain:	1.42dBi
For BLE:	
Bluetooth Version:	V4.2
Operation Frequency	2402MHz to 2480MHz
Channel Spacing	2MHz
Modulation Type	GFSK



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Number of Channels	40
Antenna Gain	1.42dBi
Antenna Type	Integral Antenna
For 2.4G wifi:	
Channel Spacing	5MHz
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
Operation Frequency	802.11b/g/n(HT20): 2412MHz to 2462MHz 802.11n(HT40): 2422MHz to 2452MHz
Antenna Gain	1.42dBi
Antenna Type	Integral Antenna
For 5G Wifi:	
Operation Frequency:	Band I: 5150-5250MHz Band IV: 5725-5850MHz
Modulation Type:	CCK,DQPSK,DBPSK for 802.11a 64-QAM,16-QAM,QPSK,BPSK for 802.11n 256-QAM, 64-QAM,16-QAM,QPSK,BPSK for 802.11ac
Channel Bandwidth:	802.11a:20MHz 802.11n:40MHz 802.11ac:80MHz
Antenna Gain:	1.17dBi
Antenna Type:	Integral Antenna
For 4G LTE:	
LTE Operation Frequency Band:	LTE FDD Band 4, 13
Modulation Type:	QPSK, 16QAM
LTE Category:	1
Frequency Range	LTE Band 4: Tx:1710-1755MHz, Rx:2110-2155MHz LTE Band 13: Tx:777-787MHz, Rx:746-756MHz
Antenna Type:	Integral Antenna
Antenna Gain:	Band 4: 1.25dBi, Band 13: 0.38dBi

4.1 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.

Tel: +86 755 2601 2053 Fax: +86 755 2671 0594

No tests were sub-contracted.

4.2 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.

- **Industry Canada (IC)**

Two 3m Semi-anechoic chambers and the 10m Semi-anechoic chamber of SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch EMC Lab have been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 4620C-1, 4620C-2, 4620C-3.

4.3 Deviation from Standards

None.

4.4 Abnormalities from Standard Conditions

None.

4.5 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 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: $P_d = (P_{out} \cdot G) / (4 \cdot \pi \cdot R^2)$

Where

P_d = power density in mW/cm²

P_{out} = output power to antenna in mW

G = gain of antenna in linear scale

π = 3.1416

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

P_d 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 Bluetooth

Output Power Into Antenna & RF Exposure Evaluation Distance:

Frequency (MHz)	Max Conducted Output Power (including tune-up tolerance) (dBm)	Output Power to Antenna(mW)	Power Density at R = 20 cm (mW/cm2)	Limit (mW/cm2)	Result
2441MHz	6.53	4.50	0.001	1.0	PASS

Note: Refer to Report: NTC1710203FV00.

The distancer (4th column) calculated from the Fries transmission formula is far greater than 20 cm separation requirement.

For 2.4G WiFi

Output Power Into Antenna & RF Exposure Evaluation Distance:

Frequency (MHz)	Max Conducted Output Power (including tune-up tolerance) (dBm)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm2)	Limit (mW/cm2)	Result
2412MHz	21.87	153.82	0.031	1.0	PASS

Note: Refer to Report: NTC1712035FV00.

The distancer (4th column) calculated from the Fries transmission formula is far greater than 20 cm separation requirement.

For 5G WiFi

Output Power Into Antenna & RF Exposure Evaluation Distance:

Frequency (MHz)	Max Conducted Output Power (including tune-up tolerance) (dBm)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm2)	Limit (mW/cm2)	Result
5240MHz	19.80	95.50	0.019	1.0	PASS

Note: Refer to Report: TCT171018E032.

The distancer (4th column) calculated from the Fries transmission formula is far greater than 20 cm separation requirement.



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For 4G LTE

Output Power Into Antenna & RF Exposure Evaluation Distance:

Test mode	Frequency (MHz)	Declared Max Average Output Power (dBm)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)	Limit (mW/cm ²)	Result
Band 4	1754.3	23.39	218.27	0.043	1.0	PASS
Band 13	782.0	23.33	218.28	0.043	0.52	PASS

Note: Refer to Report: R1806A0295-R2.

The distancer (4th column) calculated from the Fries transmission formula is far greater than 20 cm separation requirement.

For 433.95MHz

Output Power Into Antenna & RF Exposure Evaluation Distance:

Frequency (MHz)	Max Output Power (including tune-up tolerance) (dBm)	Output Power to Antenna(mW)	Power Density at R = 20 cm (mW/cm ²)	Limit (mW/cm ²)	Result
433.95MHz	-14.1	0.039	0.000008	0.29	PASS

Note: Refer to Report: SZEM191102033602.

The distancer (4th column) calculated from the Fries transmission formula is far greater than 20 cm separation requirement.

For 908.4MHz

Output Power Into Antenna & RF Exposure Evaluation Distance:

Frequency (MHz)	Max Output Power (including tune-up tolerance) (dBm)	Output Power to Antenna(mW)	Power Density at R = 20 cm (mW/cm ²)	Limit (mW/cm ²)	Result
908.4MHz	-17.6	0.017	0.000003	0.61	PASS

Note: Refer to Report: SZEM191102033603.

The distancer (4th column) calculated from the Fries transmission formula is far greater than 20 cm separation requirement.





There are 5 Antennas in the EUT, WiFi/Bluetooth Antenna, Z Wave Antenna, 433.95MHz Antenna and two LTE antennas. Bluetooth, Wifi and LTE functions can't transmit at the same time. Bluetooth and Wifi can transmit at the same time and share the same Antenna.

1. The simultaneous transmission result between of Antennas: Bluetooth, WiFi, Z Wave and 433.95MHz :

The SAR Exclusion Threshold Level:

$$= \text{CPD1} / \text{LPD1} + \text{CPD2} / \text{LPD2} + \text{CPD3} / \text{LPD3} + \text{CPD4} / \text{LPD4}$$

(CPD = Calculation power density, LPD = Limit of power density)

$$= (0.001/1) + (0.031/1) + (0.000003/0.61) + (0.000008/0.29) = 0.032023 < 0.29$$

2. The simultaneous transmission result between of Antennas: LTE, Z Wave and 433.95MHz :

The SAR Exclusion Threshold Level:

$$= 2 \times \text{CPD1} / \text{LPD1} + \text{CPD2} / \text{LPD2} + \text{CPD3} / \text{LPD3}$$

(CPD = Calculation power density, LPD = Limit of power density)

$$= (0.043/0.52) \times 2 + (0.000003/0.61) + (0.000008/0.29) = 0.165417 < 0.29$$

Since the source-based time-averaging conducted output power is well below the SAR low threshold level, so the EUT is considered to comply with SAR requirement without testing.

- End of the Report -



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