RF Exposure Evaluation Report

Application No.:	SZEM1903012041CR
Applicant:	Alliance Laundry Systems LLC
Address of Applicant:	PO Box 990, Shepard St., Ripon, Wisconsin 54971, United States
Manufacturer:	Alliance Laundry Systems LLC
Address of Manufacturer:	PO Box 990, Shepard St., Ripon, Wisconsin 54971, United States
Factory:	Embest Technology Co., Ltd
Address of Factory:	Tower B 4/F, Shanshui Building, Nanshan Yungu Innovation Industry Park, Liuxian Ave. No.1183, Nanshan District, Shenzhen, Guangdong, China
EUT Name:	Network Gateway
Model No.:	204531
FCC ID:	2ANOT-204531
Standards:	47 CFR Part 1.1307 (2016) 47 CFR Part 1.1310 (2016)
Date of Receipt:	2019-03-25
Date of Test:	2019-03-30 to 2019-04-28
Date of Issue:	2019-05-06
Test Result :	**PASS***

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

Keny Xu
EMC Laboratory Manager

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2 Version

Revision Record				
Version	**Chapter**	**Date**	**Modifier**	**Remark**
01		2019-05-06		Original

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

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4 General Description of EUT

Power supply:	Power by AC/DC adapter Model: DSA-13PFC-05 FCA Input: 100-240V~50/60Hz Output: DC 5.1V 2.5A
For BT:	
Operation Frequency:	2402MHz to 2480MHz
Spectrum Spread Technology:	Frequency Hopping Spread Spectrum(FHSS)
Bluetooth Version:	V4.1 Classic
Modulation Type:	GFSK, π/4DQPSK, 8DPSK
Number of Channels:	79
Channel Spacing:	1MHz
Antenna Type:	Chip Antenna
Antenna Gain:	1.5dBi
For BLE:	
Operation Frequency:	2402MHz to 2480MHz
Bluetooth Version:	V4.1 LE
Modulation Type:	GFSK
Number of Channels:	40
Channel Spacing:	2MHz
Antenna Type:	Chip Antenna
Antenna Gain:	1.5dBi
For 2.4G Wifi:	
Operation Frequency:	802.11b/g/n(HT20): 2412MHz to 2462MHz
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
Channel Spacing:	5MHz
Antenna Type:	Chip Antenna
Antenna Gain:	1.5dBi

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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:

• **CNAS (No. CNAS L2929)**

CNAS has accredited SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch EMC Lab to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration Laboratories (CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing.

• **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.

4.3 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: $Pd = (Pout*G)/(4* Pi * R^2)$

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.

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4.1.3 EUT RF Exposure Evaluation

Remark: The Bluetooth and Wifi function can't synchronous transmission at the same time.

For BT

Antenna: 1.5dBi

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 1.41 in linear scale.

Output Power Into Antenna & RF Exposure Evaluation Distance:

Channel	Frequency (MHz)	Max Conducted Peak Output Power (dBm)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm^2)	Limit	Result
Highest	2480	9.95	9.89	0.0028	1.0	PASS

Note: Refer to report No. SZEM190301204102 for EUT test Max Conducted Peak Output Power value.

The distancer calculated from the Fries transmission formula is far greater than 20 cm separation requirement.

For BLE

Antenna: 1.5dBi

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 1.41 in linear scale.

Output Power Into Antenna & RF Exposure Evaluation Distance:

Channel	Frequency (MHz)	Max Conducted Peak Output Power (dBm)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm2)	Limit	Result
Highest	2480	9.9	9.77	0.0027	1.0	PASS

Note: Refer to report No. SZEM190301204103 for EUT test Max Conducted Peak Output Power value.

The distancer calculated from the Fries transmission formula is far greater than 20 cm separation requirement.

For 2.4G Wifi

Antenna: 1.5dBi

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 1.41 in linear scale.

Output Power Into Antenna & RF Exposure Evaluation Distance:

Channel	Frequency (MHz)	Max Conducted Peak Output Power (dBm)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm2)	Limit	Result
Highest	2462	26.61	458.14	0.1285	1.0	PASS

Note: Refer to report No. SZEM190301204104 for EUT test Max Conducted Peak Output Power value.

The distancer calculated from the Fries transmission formula is far greater than 20 cm separation requirement.

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Member of the SGS Group (SGS SA)

For 2.4G Wifi from FCC ID: VVX-LM820-0462

Antenna: 0dBi

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 1 in linear scale.

Output Power Into Antenna & RF Exposure Evaluation Distance:

Channel	Frequency (MHz)	Max Conducted Peak Output Power (dBm)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm2)	Limit	Result
Lowest	2412	17.89	61.52	0.0122	1.0	PASS

Note: The distancer calculated from the Fries transmission formula is far greater than 20 cm separation requirement.

For LTE from FCC ID: XMR201807EG91NA

Antenna: 4dBi

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 2.51 in linear scale.

Output Power Into Antenna & RF Exposure Evaluation Distance:

Band	PG(mW)	Power Density at R = 20 cm (mW/cm2)	Limited Value (mW/cm^2)
LTE Band 12	707.946	0.141	0.47

Note: The distancer calculated from the Fries transmission formula is far greater than 20 cm separation requirement.

∑ rations of simultaneous transmitting= Wi-Fi + WiFi + LTE property:

Ratio of Power Density for WIFI at R = 20 cm	**Ratio of Power Density for WIFI at R = 20 cm**	**Ratio of Power Density for LTE at R = 20 cm**	**Total ratios of simultaneous transmitting at R =20cm**	**Limit**	**Result**
0.1285	0.0122	0.141/0.47	0.4407	1.0	PASS

- End of the Report -

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