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

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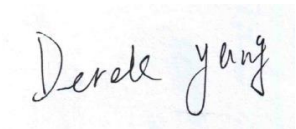
RF Exposure Evaluation Report

Application No.:	SZEM1806004850RG
Applicant:	Fibocom Wireless Inc.
Address of Applicant	5/F, Tower A, Technology Building II, 1057 Nanhai Avenue, Shenzhen, China
Manufacturer:	Fibocom Wireless Inc.
Address of Manufacturer	5/F, Tower A, Technology Building II, 1057 Nanhai Avenue, Shenzhen, China
Factory:	Shenzhen Eternity Technology Co., Ltd
Address of Factory:	1F, 2F, 4F Building A2, Yingzhan Industrial Zone, Longtian Community, Longtian Road, Pingshan District, Shenzhen, Guangdong Province, P.R. China
Product Name:	LTE Module
Model No.(EUT):	SC806-AM
Trade Mark:	Fibocom
FCC ID:	ZMOSC806AM
Standards:	47 CFR Part 2 47 CFR Part 22 subpart H 47 CFR Part 24 subpart E 47 CFR Part 27 subpart C 47 CFR Part 15
Date of Receipt:	2018-07-08
Date of Test:	2018-07-10 to 2018-07-26
Date of Issue:	2018-08-13
Test Result:	**PASS***

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

Authorized Signature:



Derek Yang
Wireless Laboratory Manager

The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards. Any mention of SGS International Electrical Approvals or testing done by SGS International Electrical Approvals in connection with, distribution or use of the product described in this report must be approved by SGS International Electrical Approvals in writing.

1 Version

Revision Record				
Version	**Chapter**	**Date**	**Modifier**	**Remark**
01		2018-08-13		*Original*

Authorized for issue by:				
		Mike Hu **Mike Hu /Project Engineer**		2018-08-13
		David Chen **David Chen /Reviewer**		2018-08-13

Contents

2 General Information

2.1 Client Information

Applicant:	Fibocom Wireless Inc.
Address of Applicant:	5/F, Tower A, Technology Building II, 1057 Nanhai Avenue, Shenzhen, China
Manufacturer:	Fibocom Wireless Inc.
Address of Manufacturer:	5/F, Tower A, Technology Building II, 1057 Nanhai Avenue, Shenzhen, China
Factory:	Shenzhen Eternity Technology Co., Ltd
Address of Factory:	1F, 2F, 4F Building A2, Yingzhan Industrial Zone, Longtian Community, Longtian Road, Pingshan District, Shenzhen, Guangdong Province, P.R. China

2.2 General Description of EUT

Product Name:	LTE Module
Model No.:	SC806-AM
Trade Mark:	Fibocom
Hardware Version:	V1.0.1
Software Version:	19060.1000.00.12.20.06
Sample Type:	LTE Module
Antenna Type:	Monopole Antenna
Antenna Gain:	WCDMA BAND II:0.9dBi WCDMA BAND IV:1.4dBi WCDMA BAND V:-1dBi LTE BAND 2:0.9dBi; LTE BAND 4:1.4dBi; LTE BAND 5:-1dBi; LTE BAND 12: -1dBi LTE BAND 13:-1dBi; LTE BAND 17:-1dBi; 2.4G WiFi:2.5dBi; 5G WiFi:2.1dBi; Bluetooth:2.5dBi;

2.3 Test Mode

Test Mode	Test Modes Description
UMTS/TM1	UMTS system, WCDMA, QPSK modulation
UMTS/TM2	UMTS system, WCDMA, 16QAM modulation
LTE/TM1	LTE system, QPSK modulation
LTE/TM2	LTE system, 16QAM modulation

NOTE: The test mode(s) are selected according to relevant radio technology specifications.

2.4 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.

2.5 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.

• 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.

2.6 Deviation from Standards

None.

2.7 Abnormalities from Standard Conditions

None.

2.8 Other Information Requested by the Customer

None.

3 RF Exposure Evaluation

3.1 RF Exposure Compliance Requirement

3.1.1 Limits

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 *=Plane-wave equivalent power density RF exposure compliance will need to be determined with respect to 1.1307(c) and (d) of the FCC rules. The emissions should be within the limits at 300kHz in Table 1 of 1.1310(use the 300kHz limits for 150kHz:614V/m,1.63A/m).				

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.

3.1.2 Test Procedure

Software provided by client enabled the EUT to transmit data at lowest, middle and highest channel individually.

3.1.3 EUT RF Exposure Evaluation

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 2.0 / 2.0 in linear scale.

Output Power Into Antenna & RF Exposure Evaluation Distance:

Operating Band	Frequency (MHz)	Max Conducted Average Output Power (dBm)	EIRP(ERP) Limit (dBm)	Gain according to EIRP (dBi)
WCDMA BAND II	1852.40	24.50	33.00	8.50
WCDMA BAND IV	1712.40	24.50	30.00	5.50
WCDMA BAND V	826.40	24.50	38.45	16.10
LTE BAND 2	1850.70	24.00	33.00	9.00
LTE BAND 4	1710.70	24.00	30.00	6.00
LTE BAND 5	824.70	24.00	38.45	16.60
LTE BAND 12	699.70	24.00	34.77	12.92
LTE BAND 13	779.50	24.00	34.77	12.92
LTE BAND 17	706.50	24.00	34.77	12.92
Bluetooth	2402.00	8.00	30.00	/
2.4G WiFi	2412.00	16.00	30.00	/
5G WiFi	5180.00	13.50	24.00	/

Operating Band	Frequency (MHz)	Antenna Gain (dBi)	Max Conducted Average Output Power (dBm)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm^2)	Limit (mW/cm^2)	Max Gain	Result
WCDMA BAND II	1852.40	0.90	24.50	346.74	0.08	1.00	11.61	PASS
WCDMA BAND IV	1712.40	1.40	24.50	389.05	0.11	1.00	11.11	PASS
WCDMA BAND V	826.40	-1.00	24.50	136.46	0.02	0.55	13.07	PASS
LTE BAND 2	1850.70	0.90	24.00	309.03	0.08	1.00	12.11	PASS
LTE BAND 4	1710.70	1.40	24.00	346.74	0.10	1.00	11.61	PASS
LTE BAND 5	824.70	-1.00	24.00	121.62	0.02	0.55	13.56	PASS
LTE BAND 12	699.70	-1.00	24.00	121.62	0.02	0.47	12.85	PASS
LTE BAND 13	779.50	-1.00	24.00	121.62	0.02	0.52	13.31	PASS
LTE BAND 17	706.50	-1.00	24.00	121.62	0.02	0.47	12.89	PASS
Bluetooth	2402.00	2.50	8.00	11.22	0.01	1.00	/	PASS
2.4G WiFi	2412.00	2.50	16.00	70.79	0.56	1.00	/	PASS
5G WiFi	5180.00	2.10	13.50	36.31	0.16	1.00	/	PASS

3.1.4 Exposure calculations for multiple sources

When a number of sources at different frequencies, and/or broadband sources, contribute to the total exposure, it becomes necessary to weigh each contribution relative to the MPE in accordance with the provisions of Table(A) and Table(B). To comply with the MPE, the fraction of the MPE in terms of E2, H2 (or power density) incurred within each frequency interval should be determined and the sum of all such fractions should not exceed unity.

In order to ensure compliance with the MPE for a controlled environment, the sum of the ratios of the power density to the corresponding MPE should not exceed unity. That is

$$\sum_{i=1}^{n} \frac{S_i}{MPE_i} \leq 1$$

The product also has multiple transmitters The Simultaneous Transmission Possibilities are as below:

Simultaneous Tx Combination	Configuration
1	LTE + Bluetooth
2	LTE + WiFi 2.4G
3	LTE + WiFi 5G

No.	Mode	S(mw/cm2)	Calculation result	Limit (mw/cm2)	WWAN Max Gain	Coclusion
1	WCDMA BAND II	0.08	0.09	1.000	8.05	Pass
	Bluetooth	0.01				
	WCDMA BAND II	0.08	0.64	1.000		Pass
	WiFi 2.4G	0.56				
	WCDMA BAND II	0.08	0.24	1.000		Pass
	WiFi 5G	0.16				
2	WCDMA BAND IV	0.11	0.12	1.000	7.55	Pass
	Bluetooth	0.01				
	WCDMA BAND IV	0.11	0.67	1.000		Pass
	WiFi 2.4G	0.56				
	WCDMA BAND IV	0.11	0.27	1.000		Pass
	WiFi 5G	0.16				
3	WCDMA BAND V	0.02	0.03	1.000	12.1	Pass
	Bluetooth	0.01				
	WCDMA BAND V	0.02	0.58	1.000		Pass
	WiFi 2.4G	0.56				
	WCDMA BAND V	0.02	0.18	1.000		Pass
	WiFi 5G	0.16				
4	LTE BAND 2	0.08	0.09	1.000		Pass
	Bluetooth	0.01				

	LTE BAND 2	0.08	0.64	1.000	8.55	Pass
	WiFi 2.4G	0.56				
	LTE BAND 2	0.08	0.24	1.000		Pass
	WiFi 5G	0.16				
5	LTE BAND 4	0.10	0.11	1.000	8.05	Pass
	Bluetooth	0.01				
	LTE BAND 4	0.10	0.66	1.000		Pass
	WiFi 2.4G	0.56				
	LTE BAND 4	0.10	0.26	1.000		Pass
	WiFi 5G	0.16				
6	LTE BAND 5	0.02	0.03	1.000	12.6	Pass
	Bluetooth	0.01				
	LTE BAND 5	0.02	0.58	1.000		Pass
	WiFi 2.4G	0.56				
	LTE BAND 5	0.02	0.18	1.000		Pass
	WiFi 5G	0.16				
7	LTE BAND 12	0.02	0.03	1.000	12.6	Pass
	Bluetooth	0.01				
	LTE BAND 12	0.02	0.58	1.000		Pass
	WiFi 2.4G	0.56				
	LTE BAND 12	0.02	0.18	1.000		Pass
	WiFi 5G	0.16				
8	LTE BAND 13	0.02	0.03	1.000	12.6	Pass
	Bluetooth	0.01				
	LTE BAND 13	0.02	0.58	1.000		Pass
	WiFi 2.4G	0.56				
	LTE BAND 13	0.02	0.18	1.000		Pass
	WiFi 5G	0.16				
9	LTE BAND 17	0.02	0.03	1.000	12.6	Pass
	Bluetooth	0.01				
	LTE BAND 17	0.02	0.58	1.000		Pass
	WiFi 2.4G	0.56				
	LTE BAND 17	0.02	0.18	1.000		Pass
	WiFi 5G	0.16				

According to the Table above, we can conclude that the calculation results of all simultaneous transmission possibilities are less than 1, so it is into compliance.

Therefore the product also meets the requirements under multiple sources condition.

The Max allowed antenna gain is as following table showed:

Operating Band	Antenna Gain（dBi）
WCDMA BAND II	8.05
WCDMA BAND IV	5.50
WCDMA BAND V	12.1
LTE BAND 2	8.55
LTE BAND 4	6.00
LTE BAND 5	12.6
LTE BAND 12	12.6
LTE BAND 13	12.6
LTE BAND 17	12.6
Bluetooth	/
2.4G WiFi	/
5G WiFi	/

Note: Refer to report No. SZEM180600485001 for EUT test Max Conducted Peak Output Power value.

The distancer (6th column) calculated from the Fries transmission formula is far greater than 20 cm separation requirement.