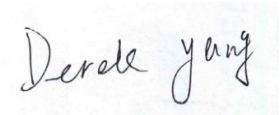
RF Exposure Evaluation Report

Application No.:	ZR/2019/80032
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 CatM1&NB-IoT&EGPRS Module
Model No.(EUT):	MA510-GL
Trade Mark:	Fibocom
FCC ID:	ZMOMA510GL
Standards:	47 CFR Part 2.1051
	FCC KDB 447498 D01 v06
Date of Receipt:	2019/9/1
Date of Test:	2019/9/3 to 2019/10/30
Date of Issue:	2019/10/30
Test Result:	**PASS***

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

Authorized Signature:



Derek Yang
Wireless Laboratory Manager

1 Version

Revision Record				
Version	**Chapter**	**Date**	**Modifier**	**Remark**
01		2019/10/30		*Original*

Authorized for issue by:				
		Mike Hu		2019/10/30
		Mike Hu /Project Engineer		
		David Chen		2019/10/30
		David Chen /Reviewer		

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

EUT Description:	LTE CatM1&NB-IoT&EGPRS Module
Model No.:	MA510-GL
Trade Mark:	Fibocom
Hardware Version:	V1.0.3
Software Version:	69400.1000.00.00.00.13
Sample Type:	☐ Portable Device, ☒Module
Antenna Type:	☒ External, ☐ Integrated
Antenna Gain:	GSM 850: -1.0dBi; GSM1900: 0.9dBi; LTE NB1 Band 2: 0.9dBi; LTE NB1 Band 4:1.6dBi; LTE NB1 Band 5: -1.0dBi; LTE NB1 Band 12: -1.4dBi; LTE NB1 Band 13: -0.7dBi; LTE NB1 Band 25: 0.9dBi; LTE NB1 Band 26（814-824）: -1.0dBi; LTE NB1 Band 26（824-849）: -1.0dBi; LTE NB1 Band 66: 1.6dBi; LTE NB1 Band 71: -1.5dBi; LTE NB1 Band 85: -0.7dBi; LTE CatM1 Band 2: 0.9dBi; LTE CatM1 Band 4: 1.6dBi; LTE CatM1 Band 5: -1.0dBi; LTE CatM1 Band 12: -1.4dBi;

	LTE CatM1 Band 13: -0.7dBi; LTE CatM1 Band 14: -0.7dBi; LTE CatM1 Band 25: 0.9dBi; LTE CatM1 Band 26（814-824）: -1.0dBi; LTE CatM1 Band 26（824-849）: -1.0dBi; LTE CatM1 Band 66: 1.6dBi; LTE CatM1 Band 85: -0.7dBi;

2.3 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.

2.4 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.

2.5 Deviation from Standards

None.

2.6 Abnormalities from Standard Conditions

None.

2.7 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)	Antenna Gain (dBi)	Max Conducted Average Output Power (dBm)	Output Power to Antenna (dBm)	EIRP(ERP) Limit (dBm)	Output Power to Antenna (mw)	Power Density at R = 20 cm (mW/cm2)	Limit (mW/cm2)	Gain according to EIRP (dBi)	Gain according to Pd (dBi)	Max Gain Allowed (dBi)	conclusion
GSM 850	824.20	-1.00	23.31	20.16	38.45	103.7528	0.0339	0.5495	8.10	14.25	8.10	Pass
GSM 1900	1850.20	0.90	20.81	21.71	33.00	148.2518	0.0295	1.0000	3.00	15.30	3.00	Pass
LTE NB1 Band 2	1850.10	0.90	21.00	21.90	33.00	154.8817	0.0308	1.0000	12.00	15.11	12.00	Pass
LTE NB1 Band 4	1710.10	1.60	21.00	22.60	30.00	125.8925	0.0362	1.0000	9.00	16.01	9.00	Pass
LTE NB1 Band 5	824.10	-1.00	21.00	17.85	38.45	125.8925	0.0199	0.5494	19.60	13.41	13.41	Pass
LTE NB1 Band 12	699.10	-1.40	21.00	17.45	34.77	125.8925	0.0181	0.4661	15.92	12.69	12.69	Pass
LTE NB1 Band 13	777.10	-0.70	21.00	18.15	34.77	125.8925	0.0213	0.5181	15.92	13.15	13.15	Pass
LTE NB1 Band 25	1850.10	1.60	21.00	22.60	33.00	125.8925	0.0362	1.0000	12.00	16.01	12.00	Pass
LTE NB1 Band 26 (814-823.9)	814.20	-1.00	21.00	17.85	50.00	125.8925	0.0199	0.5428	31.15	13.35	13.35	Pass
LTE NB1 Band 26 (824-849)	824.10	-1.00	21.00	17.85	38.45	125.8925	0.0199	0.5494	19.60	13.41	13.41	Pass
LTE NB1 Band 66	1710.10	1.60	21.00	19.50	30.00	125.8925	0.0362	1.0000	9.00	16.01	9.00	Pass
LTE NB1 Band 71	663.10	-1.50	21.00	18.15	34.77	125.8925	0.0177	0.4421	15.92	12.46	12.46	Pass
LTE NB1 Band 85	698.10	-0.70	21.00	19.75	34.77	125.8925	0.0213	0.4654	15.92	12.69	12.69	Pass
LTE CatM1 Band 2	1850.70	0.90	22.00	22.90	33.00	158.4893	0.0388	1.0000	11.00	15.01	11.00	Pass
LTE CatM1 Band 4	1710.70	1.60	22.00	23.60	30.00	158.4893	0.0456	1.0000	8.00	15.01	8.00	Pass
LTE CatM1 Band 5	824.70	-1.00	22.00	18.85	38.45	158.4893	0.0250	0.5498	18.60	12.41	12.41	Pass
LTE CatM1 Band 12	699.70	-1.40	22.00	18.45	34.77	158.4893	0.0228	0.4665	14.92	11.70	11.70	Pass
LTE CatM1 Band 13	779.50	-0.70	22.00	19.15	34.77	158.4893	0.0268	0.5197	14.92	12.16	12.16	Pass
LTE CatM1 Band 14	790.50	-0.70	22.00	19.15	34.77	158.4893	0.0268	0.5270	14.92	12.23	12.23	Pass
LTE CatM1 Band 25	1850.70	0.90	22.00	22.90	33.00	158.4893	0.0388	1.0000	11.00	15.01	11.00	Pass
LTE CatM1 Band 26 (814-824)	814.70	-1.00	22.00	18.85	50.00	158.4893	0.0250	0.5431	30.15	12.36	12.36	Pass
LTE CatM1 Band 26 (824-849)	824.70	-1.00	22.00	18.85	38.45	158.4893	0.0250	0.5498	18.60	12.41	12.41	Pass
LTE CatM1 Band 66	1710.70	1.60	22.00	23.60	30.00	158.4893	0.0456	1.0000	8.00	15.01	8.00	Pass
LTE CatM1 Band 85	700.50	-0.70	22.00	19.15	34.77	158.4893	0.0268	0.4670	14.92	11.70	11.70	Pass

Note: Refer to report No. ZR/2019/8003201 for EUT test Max Conducted Output Power value.

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