



## RF Exposure Evaluation Report

**Application No.:** ZR/2020/30021  
**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 PR China  
**EUT Description:** LTE Module  
**Model No.:** NL668-LA-01  
**Trade Mark:** Fibocom  
**FCC ID:** ZMONL668LA01  
**Standards:** 47 CFR Part 2.1091  
 FCC KDB 447498 D01 v06  
**Date of Receipt:** 2020/03/18  
**Date of Test:** 2020/03/19 to 2020/04/15  
**Date of Issue:** 2020/04/15

|                     |              |
|---------------------|--------------|
| <b>Test Result:</b> | <b>PASS*</b> |
|---------------------|--------------|

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

Authorized Signature:

Derek Yang  
Wireless Laboratory Manager



SGS-CSTC Standards Technical Services Co., Ltd.  
Shenzhen Branch Testing Center, FCC Laboratory.

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## 1 Version

| Revision Record |         |           |          |          |
|-----------------|---------|-----------|----------|----------|
| Version         | Chapter | Date      | Modifier | Remark   |
| 00              |         | 2020/4/15 |          | Original |
|                 |         |           |          |          |
|                 |         |           |          |          |

|                          |  |                                                                                     |  |           |
|--------------------------|--|-------------------------------------------------------------------------------------|--|-----------|
| Authorized for issue by: |  |                                                                                     |  |           |
|                          |  |    |  | 2020/4/15 |
|                          |  | Mike Hu /Project Engineer                                                           |  |           |
|                          |  |  |  | 2020/4/15 |
|                          |  | David Chen /Reviewer                                                                |  |           |





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## 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 PR China |

### 2.2 Test Location

|            |                                                                                             |
|------------|---------------------------------------------------------------------------------------------|
| Company:   | SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch                             |
| Address:   | No. 1 Workshop, M-10, Middle section, Science & Technology Park, Shenzhen, Guangdong, China |
| Post code: | 518057                                                                                      |
| Telephone: | +86 (0) 755 2601 2053                                                                       |
| Fax:       | +86 (0) 755 2671 0594                                                                       |
| E-mail:    | ee.shenzhen@sgs.com                                                                         |

### 2.3 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.



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## 2.4 General Description of EUT

|                   |                                                                                                                                         |
|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------|
| EUT Description:  | LTE Module                                                                                                                              |
| Model No.:        | NL668-LA-01                                                                                                                             |
| Trade Mark:       | Fibocom                                                                                                                                 |
| Hardware Version: | V1.0.0                                                                                                                                  |
| Software Version: | 19006.1000.15.02.01.03                                                                                                                  |
| Sample Type:      | <input type="checkbox"/> Portable Device, <input checked="" type="checkbox"/> Module                                                    |
| Antenna Type:     | <input checked="" type="checkbox"/> External, <input type="checkbox"/> Integrated                                                       |
| Antenna Gain:     | WCDMA Band II: 0.9dBi<br>WCDMA Band V: -1.4dBi<br>LTE Band 2: 0.9dBi<br>LTE Band 4: 1.4dBi<br>LTE Band 5: -1.4dBi<br>LTE Band 7: 2.6dBi |





### 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 <sup>2</sup> ) | Averaging time (minutes) |
|----------------------------------------------------------------|-------------------------------|-------------------------------|-------------------------------------|--------------------------|
| <b>(A) Limits for Occupational/Controlled Exposures</b>        |                               |                               |                                     |                          |
| 0.3-3.0                                                        | 614                           | 1.63                          | *(100)                              | 6                        |
| 3.0-30                                                         | 1842/f                        | 4.89/f                        | *(900/f <sup>2</sup> )              | 6                        |
| 30-300                                                         | 61.4                          | 0.163                         | 1.0                                 | 6                        |
| 300-1500                                                       | /                             | /                             | f/300                               | 6                        |
| 1500-100,000                                                   | /                             | /                             | 5                                   | 6                        |
| <b>(B) Limits for General Population/Uncontrolled Exposure</b> |                               |                               |                                     |                          |
| 0.3-1.34                                                       | 614                           | 1.63                          | *(100)                              | 30                       |
| 1.34-30                                                        | 824/f                         | 2.19/f                        | *(180/f <sup>2</sup> )              | 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:  $P_d = (P_{out} * G) / (4 * \pi * R^2)$

Where

$P_d$  = power density in mW/cm<sup>2</sup>

$P_{out}$  = 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

$P_d$  is the limit of MPE, 1 mW/cm<sup>2</sup>. 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.



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**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/cm <sup>2</sup> ) | Limit (mW/cm <sup>2</sup> ) | Gain according to EIRP (dBi) | Gain according to Pd (dBi) | Max Gain Allowed (dBi) | conclusion |
|----------------|-----------------|--------------------|------------------------------------------|-------------------------------|-----------------------|------------------------------|--------------------------------------------------|-----------------------------|------------------------------|----------------------------|------------------------|------------|
| WCDMA B2       | 1852.4          | 0.90               | 24.50                                    | 25.40                         | 33.00                 | 281.8383                     | 0.0690                                           | 1.0000                      | 8.50                         | 12.51                      | 8.50                   | Pass       |
| WCDMA B5       | 826.4           | -1.40              | 24.50                                    | 20.95                         | 38.45                 | 281.8383                     | 0.0406                                           | 0.5509                      | 16.10                        | 9.92                       | 9.92                   | Pass       |
| LTE B2         | 1880            | 0.90               | 24.00                                    | 24.90                         | 33.00                 | 251.1886                     | 0.0615                                           | 1.0000                      | 9.00                         | 13.01                      | 9.00                   | Pass       |
| LTE B4         | 1710.7          | 1.40               | 24.00                                    | 25.40                         | 30.00                 | 251.1886                     | 0.0690                                           | 1.0000                      | 6.00                         | 13.01                      | 6.00                   | Pass       |
| LTE B5         | 824.70          | -1.40              | 24.00                                    | 20.45                         | 38.45                 | 251.1886                     | 0.0362                                           | 0.5498                      | 16.60                        | 10.41                      | 10.41                  | Pass       |
| LTE B7         | 2502.50         | 2.60               | 24.00                                    | 26.60                         | 33.00                 | 251.1886                     | 0.0909                                           | 1.0000                      | 9.00                         | 13.01                      | 9.00                   | Pass       |

Remark: Refer to report No. ZR/2020/3002101 for EUT test Max Conducted Output Power value.

