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Report No.: 2311RSU028-U2 Report Version: V01 Issue Date: 2023-11-10

# **RF Exposure Evaluation Declaration**

FCC ID: ZMOFM101GL

**Applicant:** Fibocom Wireless Inc.

**Product:** LTE Module

Model No.: FM101-GL

Brand Name: Fibocom

FCC Rule Part(s): FCC Part 2.1091

**Evaluation Date:** 2023-11-08

Result: Complies

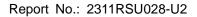
Reviewed By:			
	Jame Yuan	ilac-MRA	
Approved By:			ACCREDITED
	Robin Wu	- Whilehalin	TESTING LABORATORY

The test results relate only to the samples tested.

The test results shown in the test report are traceable to the national/international standards through the calibration of the equipment and evaluated measurement uncertainty herein.

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## **Revision History**

Report No.	Version	Description	Issue Date	Note
2311RSU028-U2	V01	Initial Report	2023-11-10	Valid



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### 1. General Information

#### 1.1. Applicant

Fibocom Wireless Inc.

1101, Tower A, Building 6, Shenzhen International Innovation Valley, Dashi 1st Rd, Nanshan, Shenzhen, China

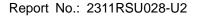
#### 1.2. Manufacturer

Fibocom Wireless Inc.

1101, Tower A, Building 6, Shenzhen International Innovation Valley, Dashi 1st Rd, Nanshan, Shenzhen, China

## 1.3. Testing Facility

$\boxtimes$	Test Site – MRT Suzhou Laboratory  Laboratory Location (Suzhou - Wuzhong)  D8 Building, No.2 Tian'edang Rd., Wuzhong Economic Development Zone, Suzhou, China  Laboratory Location (Suzhou - SIP)  4b Building, Liando U Valley, No.200 Xingpu Rd., Shengpu Town, Suzhou Industrial Park, China  Laboratory Accreditations					
	A2LA: 3628.01		CNAS	S: L10551		
FCC: CN1166 ISED: CN0001						
	VCCI:	□R-20025	□G-20034	□C-20020	□T-20020	
	VCCI:	□R-20141	□G-20134	□C-20103	□T-20104	
	Test Site – MRT Shenzhen Laboratory					
	Laboratory Location (Shenzhen)					
	1G, Building A, Ju	ınxiangda Building,	Zhongshanyuan Roa	ad West, Nanshan Di	strict, Shenzhen,	
	China					
Laboratory Accreditations						
	A2LA: 3628.02 CNAS: L10551					
	FCC: CN1284		ISED:	CN0105		
	Test Site – MRT Taiwan Laboratory  Laboratory Location (Taiwan)  No. 38, Fuxing 2nd Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C.)					
	Laboratory Accr	editations				
	TAF: 3261					
	FCC: 291082, TW	/3261	ISED:	TW3261		





#### 1.4. Product Information

Product Name	LTE Module	
Model No.	FM101-GL	
Brand Name	Fibocom	
IMEI	861023050031426	
	WCDMA Band II/IV/V	
3GPP Specification	LTE FDD Band 2, 4, 5, 7, 12, 13, 14, 17, 25, 26, 30, 66, 71	
	LTE TDD Band 38, 41, 48	
Antenna Information	Refer to Section 1.5	
Temperature Operating Range	-10 ~ 55 °C	
Power Supply Rating	3.135 ~ 4.4Vdc, typical 3.3Vdc	

#### Remark:

The information of EUT was provided by the manufacturer, and the accuracy of the information shall be the responsibility of the manufacturer.

#### 1.5. Antenna Details

Technology	Frequency Range (MHz)	Antenna Type	Max Peak Gain (dBi)
WCDMA Band II	1850 ~ 1910		4.00
WCDMA Band IV	1710 ~ 1755		3.00
WCDMA Band V	824 ~ 849		3.00
LTE Band 2	1850 ~ 1910		4.00
LTE Band 4	1710 ~ 1755		3.00
LTE Band 5	824 ~ 849		3.00
LTE Band 7	2500 ~ 2570		4.00
LTE Band 12	699 ~ 716		3.00
LTE Band 13	777 ~ 787		3.00
LTE Band 14	788 ~ 798	PIFA	3.00
LTE Band 17	704 ~ 716		3.00
LTE Band 25	1850 ~ 1915		4.00
LTE Band 26	814 ~ 849		3.00
LTE Band 30	2305 ~ 2315		1.00
LTE Band 38	2570 ~ 2620		4.00
LTE Band 41	2496 ~ 2690		4.00
LTE Band 48	3550 ~ 3700		1.00
LTE Band 66	1710 ~ 1780		3.00
LTE Band 71	663 ~ 698		3.00

Note: The antenna gain is from antenna data sheet provided by the manufacturer.



#### 1.6. Device Classification

According to the user manual, this device is classified as a Mobile Device. So, the RF exposure evaluation requirements of § 2.1091 for mobile device exposure conditions subject to MPE limits.

## 1.7. Applied Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

FCC Part 2.1091 & KDB 447498 D04 Interim General RF Exposure Guidance v01



## 2. RF Exposure Evaluation

#### 2.1. Test Limits

According to FCC §1.1310: 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 §1.1307(b)

Limits For Maximum Permissible Exposure (MPE)

Frequency Range	Electric Field	Magnetic Field	Power Density	Average Time	
(MHz)	Strength (V/m)	Strength (A/m)	(mW/cm²)	(Minutes)	
	(A) Limits for Occupational/ Control Exposures				
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	
300-1,500			f/300	<6	
1,500-100,000			5	<6	
	(B) Limits for General Population/ Uncontrolled Exposures				
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	
300-1,500			f/1500	<30	
1,500-100,000			1.0	<30	

f= frequency in MHz. \* = Plane-wave equivalent power density.



#### 2.2. MPE Exemptions

**For single RF sources** (i.e., any single fixed RF source, mobile device, or portable device, as defined in paragraph §1.1307(b)(2) of this section): A single RF source is exempt if:

**(Option A)** The available maximum time-averaged power is no more than 1 mW, regardless of separation distance. This exemption may not be used in conjunction with other exemption criteria other than those in paragraph §1.1307(b)(3)(ii)(A) of this section.

Medical implant devices may only use this exemption and that in paragraph §1.1307(b)(3)(ii)(A);

**(Option B)** Or the available maximum time-averaged power or effective radiated power (ERP), whichever is greater, is less than or equal to the threshold P (mW) described in the following formula. This method shall only be used at separation distances (cm) from 0.5 centimeters to 40 centimeters and at frequencies from 0.3 GHz to 6 GHz (inclusive). P is given by:

$$P th(mW) = \{ERP_{20cm}(d / 20cm)^x d \le 20cm\}$$

$$P th(mW) = \{ERP_{20cm} 20cm < d \le 40cm\}$$

Where

$$x = -\log_{10}\left(\frac{60}{ERP_{20cm}\sqrt{f}}\right)$$
 and f is in GHz;

and

$$ERP_{20cm}(mW) = \{2040f \ 0.3GHz \le f < 1.5GHz\}$$

$$ERP_{20cm}(mW) = \{3060 \ 1.5GHz \le f \le 6GHz \$$

(Option C) Or using Table 1 and the minimum separation distance (R in meters) from the body of a nearby person for the frequency (f in MHz) at which the source operates, the ERP (watts) is no more than the calculated value prescribed for that frequency. For the exemption in Table 1 to apply, R must be at least  $\lambda/2\pi$ , where  $\lambda$  is the free-space operating wavelength in meters. If the ERP of a single RF source is not easily obtained, then the available maximum time-averaged power may be used in lieu of ERP if the physical dimensions of the radiating structure(s) do not exceed the electrical length of  $\lambda/4$  or if the antenna gain is less than that of a half-wave dipole (1.64 linear value).



Table 1 to 91.1307 (b)(3)(1)(c) = Siliule IXI Soulces Subject to Noutlife Elivirollifiental Evaluation	Table 1 to	§1.1307(b)(3)(i)(C)	- Single RF Sources Subi	ject to Routine Environmental Evaluation
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RF Source Frequency (MHz)	Threshold ERP (watts)
0.3-1.34	1920R <sup>2</sup>
1.34-30	3450R²/f²
30-300	3.83R <sup>2</sup>
300-1,500	0.0128R <sup>2</sup> f
1,500-100,000	19.2R <sup>2</sup>

For multiple RF sources: Multiple RF sources are exempt if:

(A) The available maximum time-averaged power of each source is no more than 1 mW and there is a separation distance of two centimeters between any portion of a radiating structure operating and the nearest portion of any other radiating structure in the same device, except if the sum of multiple sources is less than 1 mW during the time-averaging period, in which case they may be treated as a single source (separation is not required). This exemption may not be used in conjunction with other exemption criteria other than those is paragraph §1.1307(b)(3)(i)(A) of this section. Medical implant devices may only use this exemption and that in paragraph §1.1307(b)(3)(i)(A).

(B) in the case of fixed RF sources operating in the same time-averaging period, or of multiple mobile or portable RF sources within a device operating in the same time averaging period, if the sum of the fractional contributions to the applicable thresholds is less than or equal to 1 as indicated in the following equation.

$$\sum_{i=1}^{a} \frac{P_i}{P_{th,i}} + \sum_{j=1}^{b} \frac{ERP_j}{ERP_{th,j}} + \sum_{k=1}^{c} \frac{Evaluated_k}{Exposure\ Limit_k} \le 1$$

Where:

a = number of fixed, mobile, or portable RF sources claiming exemption using paragraph §1.1307(b)(3)(i)(B) of this section for  $P_{th}$ , including existing exempt transmitters and those being added.

b = number of fixed, mobile, or portable RF sources claiming exemption using paragraph 1.1307(b)(3)(i)(C) of this section for Threshold ERP, including existing exempt transmitters and those being added.

c = number of existing fixed, mobile, or portable RF sources with known evaluation for the specified minimum distance including existing evaluated transmitters.

 $P_i$  = the available maximum time-averaged power or the ERP, whichever is greater, for fixed, mobile, or portable RF source i at a distance between 0.5 cm and 40 cm (inclusive).

 $P_{th,i}$  = the exemption threshold power ( $P_{th}$ ) according to paragraph §1.1307(b)(3)(i)(B) of this section for fixed, mobile, or portable RF source i.

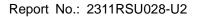
 $ERP_j$  = the ERP of fixed, mobile, or portable RF source j.



 $ERP_{th,j}$  = exemption threshold ERP for fixed, mobile, or portable RF source j, at a distance of at least  $\lambda/2\pi$  according to the applicable formula of paragraph §1.1307(b)(3)(i)(C) of this section.

**Evaluated**<sub>k</sub> = the maximum reported SAR or MPE of fixed, mobile, or portable RF source k either in the device or at the transmitter site from an existing evaluation at the location of exposure.

**Exposure Limit**<sub>k</sub> = either the general population/uncontrolled maximum permissible exposure (MPE) or specific absorption rate (SAR) limit for each fixed, mobile, or portable RF source k, as applicable from §1.1310 of this chapter.





## 2.3. Calculated Result

Product	LTE Module
Test Item	RF Exposure Evaluation

Test Mode	Frequency Band (MHz)	Tune-up Conducted Power (dBm)	Antenna Gain (dBi)	Tune-up ERP (dBm)
WCDMA B2	1850 ~ 1910	24.50	4.00	26.35
WCDMA B4	1710 ~ 1755	24.50	3.00	25.35
WCDMA B5	824 ~ 849	24.50	3.00	25.35
LTE B2	1850 ~ 1910	24.00	4.00	25.85
LTE B4	1710 ~ 1755	24.00	3.00	24.85
LTE B5	824 ~ 849	25.00	3.00	25.85
LTE B7	2500 ~ 2570	24.00	4.00	25.85
LTE B12	699 ~ 716	25.00	3.00	25.85
LTE B13	777 ~ 787	25.00	3.00	25.85
LTE B14	788 ~ 798	25.00	3.00	25.85
LTE B17	704 ~ 716	25.00	3.00	25.85
LTE B25	1850 ~ 1915	24.00	4.00	25.85
LTE B26	814 ~ 849	25.00	3.00	25.85
LTE B30	2305 ~ 2315	23.00	1.00	21.85
LTE B38	2570 ~ 2620	24.00	4.00	25.85
LTE B41	2496 ~ 2690	24.00	4.00	25.85
LTE B41_HPUE	2496 ~ 2690	27.00	4.00	28.85
LTE B48	3550 ~ 3700	22.00	1.00	20.85
LTE B66	1710 ~ 1780	24.00	3.00	24.85
LTE B71	663 ~ 698	25.00	3.00	25.85

Note: Tune-up power was declared by manufacturer.



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## For single RF source, Option B

Test Mode	R	Max. Conducted Power	Thresholds ERP
	(m)	or ERP	(mW)
		(mW)	
WCDMA B2	0.20	431.5	3060.0
WCDMA B4	0.20	342.8	3060.0
WCDMA B5	0.20	342.8	1681.0
LTE B2	0.20	384.6	3060.0
LTE B4	0.20	305.5	3060.0
LTE B5	0.20	384.6	1681.0
LTE B7	0.20	384.6	3060.0
LTE B12	0.20	384.6	1426.0
LTE B13	0.20	384.6	1585.1
LTE B14	0.20	384.6	1607.5
LTE B17	0.20	384.6	1436.2
LTE B25	0.20	384.6	3060.0
LTE B26	0.20	384.6	1660.6
LTE B30	0.20	199.5	3060.0
LTE B38	0.20	384.6	3060.0
LTE B41	0.20	384.6	3060.0
LTE B41_HPUE	0.20	767.4	3060.0
LTE B48	0.20	158.5	3060.0
LTE B66	0.20	305.5	3060.0
LTE B71	0.20	384.6	1352.5

Note: R is from user manual.

Therefore, the device qualifies for RF exposure test exemption.

The End