TEST REPORT

REPORT NUMBER: B19W50105-MPE-Rev2

ON

Type of Equipment:	NB-IoT Wireless Module
Type of Designation:	SIM7020G
Manufacturer:	SIMCom Wireless Solutions Co.,Ltd
FCC ID:	2AJYU-8FCA101

ACCORDING TO

FCC CFR 47 Part 2.1091《Radiofrequency radiation exposure evaluation: mobile devices》
FCC CFR 47 Part1.1310《Radiofrequency radiation exposure limits》

Chongqing Academy of Information and Communication Technology

Month date, year

Aug 26, 2019

Signature

Zhang Yan

Director

Note:
The test results in this test report relate only to the devices specified in this report. This report shall not be reproduced except in full without the written approval of Chongqing Academy of Information and Communications Technology.

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1. Test Laboratory

1.1. Testing Location

Company Name:	Chongqing Academy of Information andCommunications Technology
Address:	No. 8, Yuma Road, Chayuan New City, Nan'an District, Chongqing, P. R. China
Postal Code:	401336
Telephone:	0086-23-88069965
Fax:	0086-23-88608777

1.2. Testing Environment

Normal Temperature:	21.3℃
Relative Humidity:	75%

1.3. Project Data

Testing Start Date:	2019-07-07
Testing End Date:	2019-07-07

1.4. Signature

	2019-08-26
Ang Xinyu **(Prepared this test report)**	**Date**
	2019-08-26
Wang Lili **(Reviewed this test report)**	**Date**
	2019-08-26
Zhang Yan **Director of the laboratory** **(Approved this test report)**	**Date**

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2. Client Information

2.1. Applicant Information

Company Name:	SIMCom Wireless Solutions Co.,Ltd
Address /Post:	Building B,SIM Technology Building, No.633 Jinzhong Road, Changning District, Shanghai P.R.China
Telephone:	13918237170
Fax:	--
Email:	--
Contact Person:	Chunlin.zhu

2.2. Manufacturer Information

Company Name:	SIMCom Wireless Solutions Limited
Address /Post:	SIM Technology Building.,No.633, Jinzhong Rd,Changning District, Shanghai, P.R.China
Telephone:	--
Fax:	--
Email:	--
Contact Person:	--

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3. Equipment Under Test (EUT) and Ancillary Equipment (AE)

3.1. About EUT

Description:	NB-IoT Wireless Module
Model name:	SIM7020G
GSM Frequency Band	--
NB-IOT Band	Band2/4/12/13/26/66/71
Note：Photographs of EUT are shown in ANNEX A of this test report.	

3.2. Internal Identification of EUT used during the test

EUT ID*	SN or IMEI	HW Version	SW Version	**Date of receipt**
S6	868334032569323	V4.02	1910B01SIM7020G	2019-3-21

*EUT ID: is used to identify the test sample in the lab internally.

3.3. Internal Identification of AE used during the test

EUT ID*	SN	Description
NA	NA	NA

*AE ID: is used to identify the test sample in the lab internally.

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4. Reference Documents

4.1. Applicable Standards

The MPE report was carried out on a sample equipment to demonstrate limited compliance with FCC CFR 47 Part 2.1091.

FCC CFR 47 Part 2.1091: Radiofrequency radiation exposure evaluation: mobile devices

4.2. Test Limits

Systems operating under the provisions of this section shall be operated in a mannerthat ensures that the public is not exposed to radio frequency energy level in excesslimit for maximum permissible exposure. In accordance with 47 CFR FCC Part 2Subpart J, section 2.1091 this device has been defined as a mobile device whereby adistance of 0.2m normally can be maintained between the user and the device.

MPE for the upper tier (people in controlled environments)

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 Exposure				
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
1500-100000	--	--	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
1500-100000	--	--	1.0	30

Note: f=frequency in MHz; *Plane-wave equivalent power density

For the DUT, the limits for the general public when an RF safety program is unavailable.

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5. Test Results

5.1. RF Power Output

Frequency Band	Highest Averaged Power Output(dBm)	Highest Frame-Averaged Output Power (dBm)	Antenna Gain(dBi)
NB-IOT Band2	25.7	25.7	1.87
NB-IOT Band4	25.7	25.7	3.12
NB-IOT Band12	25.7	25.7	0.95
NB-IOT Band13	25.7	25.7	2.23
NB-IOT Band26	25.7	25.7	1.40
NB-IOT Band66	25.7	25.7	3.12
NB-IOT Band71	25.7	25.7	-0.48

5.2. Calculation Information

For conservative evaluation consideration, only maximum power of each frequency band based on the tighter limits respectively are used to calculate the boundary power density.

Based on the FCC KDB 447498 D01 and 47 CFR §2.1091, the DUT is evaluated as a mobile device.

$$S = \frac{PG}{4\pi d^2}$$

Where

P = Power in Watts

G = Numeric antenna gain

d = Distance in meters

S = Power density in milliwatts / square centimeter

5.3. Results

Frequency range	Limit(mW/m^2)	Results(mW/m^2)	Verdict
NB-IOT Band2	1.0	0.114	Pass
NB-IOT Band4	1.0	0.152	Pass
NB-IOT Band12	0.47	0.092	Pass
NB-IOT Band13	0.50	0.124	Pass
NB-IOT Band26	0.54	0.102	Pass
NB-IOT Band66	1.0	0.152	Pass
NB-IOT Band71	0.41	0.066	Pass

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5.4. Result of NB-IOT Band2

Test Results: MPE Limit Calculation: the EUT'S operating frequencies @ 1850.0～1909.9MHz; The maximum conducted is 25.70 dBm. The maximum gain is 1.87 dBi. Therefore, maximum limit for general public RF exposure:1.0 mW/cm^2.

$$S = \frac{PG}{4\pi d^2}$$

P= input power of the antenna（371.5mW）

G = antenna gain（1.538 numeric）

r = distance to the center of radiation of antenna (in meter)=20 cm

S=(395.4*1.233)/(4π*20^2)=0.114mW/cm^2

Therefore, at 20 cm the spectral power density is less than the 1.0 mW/cm^2 limit for uncontrolled exposure.

5.5. Result of NB-IOT Band4

Test Results: MPE Limit Calculation: the EUT'S operating frequencies @ 1710.0～1754.9 MHz; The maximum conducted is 25.7dBm. The maximum gain is 3.12dBi. Therefore, maximum limit for general public RF exposure:1.0 mW/cm^2.

$$S = \frac{PG}{4\pi d^2}$$

P= input power of the antenna（371.5mW）

G = antenna gain（2.051numeric）

r = distance to the center of radiation of antenna (in meter)=20 cm

S=(198.15*1.538)/(4π*20^2)=0.152 mW/cm^2

Therefore, at 20 cm the spectral power density is less than the 1.0 mW/cm^2 limit for uncontrolled exposure.

5.6. Result of NB-IOT Band12

Test Results: MPE Limit Calculation: the EUT'S operating frequencies @ 699.0～715.9MHz; The maximum conducted is 25.70 dBm. The maximum gain is 0.95 dBi. Therefore, maximum limit for general public RF exposure: 699.0/1500=0.47mW/cm^2.

$$S = \frac{PG}{4\pi d^2}$$

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P= input power of the antenna（371.5mW）

G = antenna gain（1.245numeric）

r = distance to the center of radiation of antenna (in meter)=20 cm

S=(1581.2*1.233)/(4π*20^2)=0.092 mW/cm^2

Therefore, at 20 cm the spectral power density is less than the 0.47 mW/cm^2 limit for uncontrolled exposure.

5.7. Result of NB-IOT Band13

Test Results: MPE Limit Calculation: the EUT'S operating frequencies @ 746.0～755.9 MHz; The maximum conducted is 25.70dBm. The maximum gain is 2.23dBi. Therefore, maximum limit for general public RF exposure:746.0/1500=0.50mW/cm^2.

$$S = \frac{PG}{4\pi d^2}$$

P= input power of the antenna（371.5mW）

G = antenna gain（1.671numeric）

r = distance to the center of radiation of antenna (in meter)=20 cm

S=(792.5*1.671)/(4π*20^2)=0.124 mW/cm^2

Therefore, at 20 cm the spectral power density is less than the 0.50 mW/cm^2 limit for uncontrolled exposure.

5.8. Result of NB-IOT Band26

Test Results: MPE Limit Calculation: the EUT'S operating frequencies @ 814.0～848.9 MHz; The maximum conducted is 25.70 dBm. The maximum gain is 1.40dBi. Therefore, maximum limit for general public RF exposure:814.0/1500=0.54mW/cm^2.

$$S = \frac{PG}{4\pi d^2}$$

P= input power of the antenna（371.5mW）

G = antenna gain（1.380numeric）

r = distance to the center of radiation of antenna (in meter)=20 cm

S=(316.23*1.538)/(4π*20^2)=0.102mW/cm^2

Therefore, at 20 cm the spectral power density is less than the 0.54 mW/cm^2 limit for uncontrolled

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exposure.

5.9. Result of NB-IOT Band66

Test Results: MPE Limit Calculation: the EUT'S operating frequencies @ 1710.0~1779.9 MHz; The maximum conducted is 25.7 dBm. The maximum gain is 3.12dBi. Therefore, maximum limit for general public RF exposure:1.0 mW/cm^2.

$$S = \frac{PG}{4\pi d^2}$$

P= input power of the antenna（371.5mW）

G = antenna gain（1.479numeric）

r = distance to the center of radiation of antenna (in meter)=20 cm

S=(316.23*1.538)/(4π*20^2)=0.152mW/cm^2

Therefore, at 20 cm the spectral power density is less than the 1.0 mW/cm^2 limit for uncontrolled exposure.

5.10. Result of NB-IOT Band71

Test Results: MPE Limit Calculation: the EUT'S operating frequencies @ 617.0~651.9MHz; The maximum conducted is 25.7 dBm. The maximum gain is -0.48dBi. Therefore, maximum limit for general public RF exposure:617.0/1500=0.41 mW/cm^2.

$$S = \frac{PG}{4\pi d^2}$$

P= input power of the antenna（371.5mW）

G = antenna gain（0.895numeric）

r = distance to the center of radiation of antenna (in meter)=20 cm

S=(316*1.233)/(4π*20^2)=0.066mW/cm^2

Therefore, at 20 cm the spectral power density is less than the 0.41 mW/cm^2 limit for uncontrolled exposure.

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ANNEX A: EUT photograph

See the document" SIM7020G -External Photos".

END OF REPORT

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