TEST REPORT

REPORT NUMBER: I21W00032-Rev1

ON

Type of Equipment:	Wireless Module
Type of Designation:	A7672SA/A7672SA miniPCIE
Manufacturer:	SIMCom Wireless Solutions Limited
Brand Name:	SIMCom
FCC ID:	2AJYU-8BAE001

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

Nov,15,2021

Signature

Xiang Luoyong

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.

Revision Version

Report Number	Revision	Date	Memo
I21W00032	01	2021-09-28	Initial creation of test report
I21W00032-Rev1	02	2021-11-15	First change of test report

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Chongqing Academy of Information and Communication Technology
Address：No. 8,Yuma Road, Chayuan New City, Nan'an District, Chongqing, P. R. China,401336
Tel: 0086-23-88069965   FAX:0086-23-88608777

Chongqing Academy of Information and Communication Technology
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Tel: 0086-23-88069965   FAX:0086-23-88608777

1. Test Laboratory

1.1. Testing Location

Company Name:	Chongqing Academy of Information andCommunications Technology
Address:	Building C, Technology Innovation Center, No.8, Yuma Road, Chayuan New Area, Nan'an District, Chongqing, People's Republic of China
Postal Code:	401336
Telephone:	0086-23-88069965
Fax:	0086-23-88608777

1.2. Testing Environment

Normal Temperature:	21.3°C
Relative Humidity:	65%

1.3. Project Data
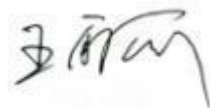
Testing Start Date:	2021-09-28
Testing End Date:	2021-11-15

1.4. Signature

	2021-11-15
Fu Bohao **(Prepared this test report)**	**Date**
	2021-11-15
Wang Lili **(Reviewed this test report)**	**Date**
	2021-11-15
Xiang Luoyong **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 Limited
Address /Post:	Building 3,No. 289, Linhong Road, Changning District, Shanghai, P.R.China
Country:	CHINA
Telephone:	15902149520
Fax:	--
Email:	yue.hai@simcom.com
Contact Person:	Haiyue

2.2. Manufacturer Information

Company Name:	SIMCom Wireless Solutions Limited
Address /Post:	Building 3,No. 289, Linhong Road, Changning District, Shanghai, P.R.China
Country:	CHINA
Telephone:	15902149520
Fax:	--
Email:	yue.hai@simcom.com
Contact Person:	Haiyue

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

3.1. About EUT

EUT Description:	Wireless Module
Model name:	A7672SA/A7672SA miniPCIE
GSM Frequency Band	850/1900
LTE Frequency Band	Band2/4/5/66
Bluetooth Frequency Band	BLE
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
S4	860710050007767	V1.01	A011B01A7672M7_GPS	2021-08-26

*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)
GPRS 850 4TS	35.00	31.99	0.64
GPRS 1900 4TS	32.00	28.99	1.87
LTE Band 2	25.70	25.70	1.87
LTE Band 4	25.70	25.70	3.12
LTE Band 5	25.70	25.70	0.64
LTE Band 66	25.70	25.70	3.12
Bluetooth	6.37	6.37	3.62

Notes:

1) Division Factors

To average the power, the division factor is as follows:

1TX-slot = 1 transmit time slot out of 8 time slots=> conducted power divided by (8/1) => -9.03dB

2TX-slots = 2 transmit time slots out of 8 time slots=> conducted power divided by (8/2) => -6.02dB

3TX-slots = 3 transmit time slots out of 8 time slots=> conducted power divided by (8/3) => -4.26dB

4TX-slots = 4 transmit time slots out of 8 time slots=> conducted power divided by (8/4) => -3.01dB

2) According to the conducted power as above, the measurements are performed with 1Txslots for 850MHz and 1900MHz.

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

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5.3. Results

Frequency range	Limit(mW/cm^2)	Results(mW/cm^2)	Verdict
GPRS 850 4TS	0.55	0.365	Pass
GPRS 1900 4TS	1.00	0.243	Pass
LTE Band 2	1.00	0.114	Pass
LTE Band 4	1.00	0.152	Pass
LTE Band 5	0.549	0.086	Pass
LTE Band 66	1.00	0.152	Pass
Bluetooth	1.00	0.002	Pass

5.4. Simultaneous transmission

From (5.3. Results) We can get the combination of the maximum value of simultaneous transmission as GPRS 850 and Bluetooth:0.365/0.550+0.002/1.000=0.664+0.002=0.666

Conclusion：max ratio 0.666 is less than 1,so compilance RF exposure requirement

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5.5. Result of GPRS 850

Test Results: MPE Limit Calculation: the EUT'S operating frequencies @ 824.2 ～ 848.8 MHz; The maximum conducted is 31.99 dBm. The maximum gain is 0.64 dBi. Therefore, maximum limit for general public RF exposure: 824.2/1500= 0.55 mW/cm^2.

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

P= input power of the antenna（1581.248 mW）

G = antenna gain （1.159 numeric）

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

S=(1581.248*1.159)/(4 π*20^2)=0.365 mW/cm^2

Therefore, at 20 cm the spectral power density is less than the 0.55 mW/cm^{2}limit for uncontrolled exposure.

5.6. Result of GPRS 1900

Test Results: MPE Limit Calculation: the EUT'S operating frequencies @ 1850.2 ～ 1909.8 MHz; The maximum conducted is 28.99 dBm. The maximum gain is 1.87 dBi. Therefore, maximum limit for general public RF exposure: 1 mW/cm^2.

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

P= input power of the antenna（792.501 mW）

G = antenna gain （1.87 numeric）

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

S=(792.501*1.87)/(4 π*20^2)=0.243 mW/cm^2

Therefore, at 20 cm the spectral power density is less than the 1 mW/cm^{2}limit for uncontrolled exposure.

5.7. Result of LTE Band 2

Test Results: MPE Limit Calculation: the EUT'S operating frequencies @ 1850.0 ～ 1909.9 MHz; 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（371.535 mW）

G = antenna gain （1.538numeric）

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

S=(371.535*1.538)/(4 π*20^2)=0.114 mW/cm^2

Therefore, at 20 cm the spectral power density is less than the 1 mW/cm^2 limit for uncontrolled exposure.

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5.8. Result of LTE Band 4

Test Results: MPE Limit Calculation: the EUT'S operating frequencies @ 1710.0～1754.9MHz; The maximum conducted is 25.70 dBm. The maximum gain is 3.12 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（371.535 mW）

G = antenna gain （2.051numeric）

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

S=(371.535*2.051)/(4 π*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.

5.9. Result of LTE Band 5

Test Results: MPE Limit Calculation: the EUT'S operating frequencies @ 824.0～848.9 MHz; The maximum conducted is 25.70 dBm. The maximum gain is 0.64 dBi. Therefore, maximum limit for general public RF exposure: 824.0/1500=0.549 mW/cm^2.

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

P= input power of the antenna（371.535 mW）

G = antenna gain （1.159numeric）

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

S=(371.535*1.159)/(4 π*20^2)=0.086mW/cm^2

Therefore, at 20 cm the spectral power density is less than the 0.549mW/cm^2 limit for uncontrolled exposure.

5.10. Result of LTE Band 66

Test Results: MPE Limit Calculation: the EUT'S operating frequencies @ 1710.0～1779.9 MHz; The maximum conducted is 25.70 dBm. The maximum gain is 3.12 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（371.535 mW）

G = antenna gain （2.051numeric）

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

S=(371.535*2.051)/(4 π*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.

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5.11.　Result of Bluetooth

Test Results: MPE Limit Calculation: the EUT'S operating frequencies @ 2402.0～2480.0 MHz; The maximum conducted is 6.37 dBm. The maximum gain is 3.39 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（4.335 mW）

G = antenna gain（2.301numeric）

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

S=(4.335*2.301)/(4 π*20^2)=0.002mW/cm^2

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

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ANNEX A: EUT photograph

See the document" A7672SA/A7672SA miniPCIE -External Photos".

END OF REPORT

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