



TEST REPORT

REPORT NUMBER: I20W00014

ON

Type of Equipment: LTE Module

Type of Designation: L720

Manufacturer: Shanghai MobileTek Communication Ltd

FCC ID: 2AK9D-GL720

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

Stp, 21, 2020

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 and Communications 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
Website:	http://www.cqcatr.com

1.2. Testing Environment

Normal Temperature:	21.3℃
Relative Humidity:	65%

1.3. Project Data

Testing Start Date:	2020-09-20
Testing End Date:	2020-09-20


1.4. Signature



2020-09-21

Fu Bohao
(Prepared this test report)

Date



2020-09-21

Wang Lili
(Reviewed this test report)

Date



2020-09-21

Zhang Yan
Director of the laboratory
(Approved this test report)

Date

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2. Client Information

2.1. Applicant Information

Company Name:	Shanghai MobileTek Communication Ltd
Address /Post:	Free Trade Zone No.33, No.17 building 6H Xiya Road,shanghai
Telephone:	15821966417
Fax:	--
Email:	b.yang@mobiletek.cn
Contact Person:	bin yang

2.2. Manufacturer Information

Company Name:	Shanghai MobileTek Communication Ltd
Address /Post:	Free Trade Zone No.33, No.17 building 6H Xiya Road,shanghai
Telephone:	15821966417
Fax:	--
Email:	b.yang@mobiletek.cn
Contact Person:	bin yang

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

3.1. About EUT

Description:	LTE Module
Model name:	L720
NB2 Frequency Band	Band2/4/5/12/13/25/66
CatM1 Frequency Band	Band2/4/5/12/13/25/26/66
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	866884045622016	V1	L720v08.02b01	2020-09-08

*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.

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 manner that ensures that the public is not exposed to radio frequency energy level in excess limit for maximum permissible exposure. In accordance with 47 CFR FCC Part 2 Subpart J, section 2.1091 this device has been defined as a mobile device whereby a distance 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.

5. Test Results

5.1. RF Power Output

Frequency Band	Highest Averaged Power Output(dBm)	Highest Frame-Averaged Output Power (dBm)	Antenna Gain(dBi)
NB2 Band2	22.00	22.00	3
NB2 Band4	22.00	22.00	4
NB2 Band5	22.79	22.79	4
NB2 Band12	23.00	23.00	4
NB2 Band13	21.79	21.79	4
NB2 Band25	22.44	22.44	3
NB2 Band66	22.00	22.00	4
CATM1 Band2	22.72	22.72	3
CATM1 Band4	22.38	22.38	4
CATM1 Band5	22.36	22.36	4
CATM1 Band12	22.67	22.67	4
CATM1 Band13	22.36	22.36	4
CATM1 Band25	22.38	22.38	3
CATM1 Band26 (824-849MHz)	22.26	22.26	4
CATM1 Band26 (814-824MHz)	22.26	22.26	4
CATM1 Band66	22.475	22.475	4

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.

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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/cm ²)	Results(mW/cm ²)	Verdict
NB2 Band2	1.000	0.063	Pass
NB2 Band4	1.000	0.079	Pass
NB2 Band5	0.549	0.095	Pass
NB2 Band12	0.466	0.100	Pass
NB2 Band13	0.518	0.075	Pass
NB2 Band25	1.000	0.070	Pass
NB2 Band66	1.000	0.079	Pass
CATM1 Band2	1.000	0.074	Pass
CATM1 Band4	1.000	0.086	Pass
CATM1 Band5	0.549	0.086	Pass
CATM1 Band12	0.466	0.092	Pass
CATM1 Band13	0.518	0.086	Pass
CATM1 Band25	1.000	0.069	Pass
CATM1 Band26 (824-849MHz)	0.549	0.084	Pass
CATM1 Band26 (814-824MHz)	0.543	0.084	Pass
CATM1 Band66	1	0.088	Pass

5.4. Result of NB2 Band 2

Test Results: MPE Limit Calculation: the EUT'S operating frequencies @ 1850.0 ~ 1909.9 MHz; The maximum conducted is 22.0dBm. The maximum gain is 3.0 dBi. Therefore, maximum limit for general public RF exposure: 1.0 mW/cm².

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

P= input power of the antenna (158.489 mW)

G = antenna gain (1.995numeric)

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

$$S=(158.489*1.995)/(4 \pi *20^2)=0.063\text{mW/cm}^2$$

Therefore, at 20 cm the spectral power density is less than the 1.0 mW/cm² limit for uncontrolled exposure.

5.5. Result of NB2 Band 4

Test Results: MPE Limit Calculation: the EUT'S operating frequencies @ 1710.0 ~ 1754.9MHz; The maximum conducted is 22.0dBm. The maximum gain is 4.0 dBi. Therefore, maximum limit for general public RF exposure: 1 mW/cm².

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

P= input power of the antenna (158.489 mW)

G = antenna gain (2.512numeric)

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

$$S=(158.489*2.512)/(4 \pi *20^2)=0.079\text{mW/cm}^2$$

Therefore, at 20 cm the spectral power density is less than the 1mW/cm² limit for uncontrolled exposure.

5.6. Result of NB2 Band 5

Test Results: MPE Limit Calculation: the EUT'S operating frequencies @ 824.0 ~ 848.9 MHz; The maximum conducted is 22.79dBm. The maximum gain is 4.0 dBi. Therefore, maximum limit for general public RF exposure: $824.0/1500=0.549 \text{ mW/cm}^2$.

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

P= input power of the antenna (190.108 mW)

G = antenna gain (2.512numeric)

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

$$S=(190.108*2.512)/(4 \pi *20^2)=0.095\text{mW/cm}^2$$

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

5.7. Result of NB2 Band 12

Test Results: MPE Limit Calculation: the EUT'S operating frequencies @ 699.0 ~ 715.9 MHz; The maximum conducted is 23.0dBm. The maximum gain is 4.0 dBi. Therefore, maximum limit for general public RF exposure: $699.0/1500=0.466 \text{ mW/cm}^2$.

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

P= input power of the antenna (199.526 mW)

G = antenna gain (2.512numeric)

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

$$S=(199.526*2.512)/(4 \pi *20^2)=0.100\text{mW/cm}^2$$

Therefore, at 20 cm the spectral power density is less than the 0.466mW/cm^2 limit for uncontrolled exposure.

5.8. Result of NB2 Band 13

Test Results: MPE Limit Calculation: the EUT'S operating frequencies @ 777.0 ~ 848.9 MHz; The maximum conducted is 21.79dBm. The maximum gain is 4.0 dBi. Therefore, maximum limit for general public RF exposure: $777.0/1500=0.518 \text{ mW/cm}^2$.

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

P= input power of the antenna (151.008 mW)

G = antenna gain (2.512numeric)

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

$$S=(151.008*2.512)/(4 \pi *20^2)=0.075\text{mW/cm}^2$$

Therefore, at 20 cm the spectral power density is less than the 0.518mW/cm^2 limit for uncontrolled exposure.

5.9. Result of NB2 Band 25

Test Results: MPE Limit Calculation: the EUT'S operating frequencies @ 1850.0 ~ 1914.9 MHz; The maximum conducted is 22.44dBm. The maximum gain is 3.0 dBi. Therefore, maximum limit for general public RF exposure: 1 mW/cm^2 .

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

P= input power of the antenna (175.388 mW)

G = antenna gain (1.995numeric)

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

$$S=(175.388*1.995)/(4 \pi *20^2)=0.070\text{mW/cm}^2$$

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

5.10. Result of NB2 Band 66

Test Results: MPE Limit Calculation: the EUT'S operating frequencies @ 1710.0 ~ 1779.9 MHz; The maximum conducted is 22.0dBm. The maximum gain is 4.0 dBi. Therefore, maximum limit for general public RF exposure: 1 mW/cm².

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

P= input power of the antenna (158.489 mW)

G = antenna gain (1.995numeric)

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

$$S=(158.489*1.995)/(4 \pi *20^2)=0.079\text{mW/cm}^2$$

Therefore, at 20 cm the spectral power density is less than the 1 mW/cm² limit for uncontrolled exposure.

5.11. Result of CATM1 Band 2

Test Results: MPE Limit Calculation: the EUT'S operating frequencies @ 1850.0 ~ 1909.9 MHz; The maximum conducted is 22.72dBm. The maximum gain is 3.0 dBi. Therefore, maximum limit for general public RF exposure: 1.0 mW/cm².

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

P= input power of the antenna (187.068 mW)

G = antenna gain (1.995numeric)

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

$$S=(187.068*1.995)/(4 \pi *20^2)=0.074\text{mW/cm}^2$$

Therefore, at 20 cm the spectral power density is less than the 1.0 mW/cm² limit for uncontrolled exposure.

5.12. Result of CATM1 Band 4

Test Results: MPE Limit Calculation: the EUT'S operating frequencies @ 1710.0 ~ 1754.9 MHz; The maximum conducted is 22.38dBm. The maximum gain is 4.0 dBi. Therefore, maximum limit for general public RF exposure: 1 mW/cm².

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

P= input power of the antenna (172.982 mW)

G = antenna gain (2.512numeric)

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

$$S=(172.982*2.512)/(4 \pi *20^2)=0.086\text{mW/cm}^2$$

Therefore, at 20 cm the spectral power density is less than the 1 mW/cm² limit for uncontrolled exposure.

5.13. Result of CATM1 Band 5

Test Results: MPE Limit Calculation: the EUT'S operating frequencies @ 824.0 ~ 848.9 MHz; The maximum conducted is 22.36dBm. The maximum gain is 4.0 dBi. Therefore, maximum limit for general public RF exposure: 824.0/1500=0.549 mW/cm².

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

P= input power of the antenna (172.187 mW)

G = antenna gain (2.512numeric)

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

$$S=(186.209*2.512)/(4 \pi *20^2)=0.086\text{mW/cm}^2$$

Therefore, at 20 cm the spectral power density is less than the 0.549mW/cm² limit for uncontrolled exposure.

5.14. Result of CATM1 Band 12

Test Results: MPE Limit Calculation: the EUT'S operating frequencies @ 699.0 ~ 715.9 MHz; The maximum conducted is 22.67dBm. The maximum gain is 4.0 dBi. Therefore, maximum limit for general public RF exposure: $699.0/1500=0.466 \text{ mW/cm}^2$.

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

P= input power of the antenna (184.927 mW)

G = antenna gain (2.512numeric)

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

$$S=(186.927*2.512)/(4 \pi *20^2)=0.092\text{mW/cm}^2$$

Therefore, at 20 cm the spectral power density is less than the 0.466mW/cm^2 limit for uncontrolled exposure.

5.15. Result of CATM1 Band 13

Test Results: MPE Limit Calculation: the EUT'S operating frequencies @ 777.0 ~ 786.9 MHz; The maximum conducted is 22.36dBm. The maximum gain is 4.0 dBi. Therefore, maximum limit for general public RF exposure: $777.0/1500=0.518 \text{ mW/cm}^2$.

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

P= input power of the antenna (172.187 mW)

G = antenna gain (2.512numeric)

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

$$S=(172.187*2.512)/(4 \pi *20^2)=0.086\text{mW/cm}^2$$

Therefore, at 20 cm the spectral power density is less than the 0.518mW/cm^2 limit for uncontrolled exposure.

5.16. Result of CATM1 Band 25

Test Results: MPE Limit Calculation: the EUT'S operating frequencies @ 1850.0 ~ 1949.9 MHz; The maximum conducted is 22.38dBm. The maximum gain is 3.0 dBi. Therefore, maximum limit for general public RF exposure: 1 mW/cm².

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

P= input power of the antenna (172.982 mW)

G = antenna gain (1.995numeric)

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

$$S=(172.982*1.995)/(4 \pi *20^2)=0.069\text{mW/cm}^2$$

Therefore, at 20 cm the spectral power density is less than the 1mW/cm² limit for uncontrolled exposure.

5.17. Result of CATM1 Band 26 (824-849MHz)

Test Results: MPE Limit Calculation: the EUT'S operating frequencies @ 824.0 ~ 849.0 MHz; The maximum conducted is 22.26dBm. The maximum gain is 4.0 dBi. Therefore, maximum limit for general public RF exposure: 824.0/1500=0.549 mW/cm².

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

P= input power of the antenna (168.267 mW)

G = antenna gain (2.512numeric)

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

$$S=(168.267*2.512)/(4 \pi *20^2)=0.084\text{mW/cm}^2$$

Therefore, at 20 cm the spectral power density is less than the 0.549mW/cm² limit for uncontrolled exposure.

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5.18. Result of CATM1 Band 26 (814-824MHz)

Test Results: MPE Limit Calculation: the EUT'S operating frequencies @ 814.0 ~ 824.0 MHz; The maximum conducted is 22.26dBm. The maximum gain is 4.0 dBi. Therefore, maximum limit for general public RF exposure: $814.0/1500=0.543 \text{ mW/cm}^2$.

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

P= input power of the antenna (168.267 mW)

G = antenna gain (2.512numeric)

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

$$S=(168.267*2.512)/(4 \pi *20^2)=0.084\text{mW/cm}^2$$

Therefore, at 20 cm the spectral power density is less than the 0.543mW/cm^2 limit for uncontrolled exposure.

5.19. Result of CATM1 Band 66

Test Results: MPE Limit Calculation: the EUT'S operating frequencies @ 1710.00 ~ 1779.9 MHz; The maximum conducted is 22.475dBm. The maximum gain is 4.0 dBi. Therefore, maximum limit for general public RF exposure: 1 mW/cm^2 .

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

P= input power of the antenna (176.807 mW)

G = antenna gain (2.512numeric)

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

$$S=(176.807*2.512)/(4 \pi *20^2)=0.088\text{mW/cm}^2$$

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

ANNEX A: EUT photograph

See the document" L720 -External Photos".

END OF REPORT

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