

RF Exposure evaluation

Product Name : LTE Module
Brand Name : AGENEW
Model : H1503BQ
Series Model : N/A
FCC ID : 2BOWL-H1503BQ
Applicant : **Wuxi Sunning Smart Devices Co., Ltd**
Address : No.52, Huigu Pioneer Park C, Huishan Economic Development Zone, Wuxi City, Jiangsu, China
Manufacturer : **Wuxi Sunning Smart Devices Co., Ltd**
Address : No.52, Huigu Pioneer Park C, Huishan Economic Development Zone, Wuxi City, Jiangsu, China
Standard(s) : 47CFR §1.1310, 47CFR §2.1091
KDB447498 D01 General RF Exposure Guidance v06
Date of Receipt : Mar. 06, 2025
Date of Test : Mar. 07, 2025~ Apr. 23, 2025
Issued Date : Apr. 24, 2025

Issued By: **Guangdong Asia Hongke Test Technology Limited**
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Reviewed by: 
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Note: This device has been tested and found to comply with the standard(s) listed, this test report merely corresponds to the test sample. It is not permitted to copy extracts of these test result without the written permission of the test laboratory. This report shall not be reproduced except in full, without the written approval of Guangdong Asia Hongke Test Technology Limited. If there is a need to alter or revise this document, the right belongs to Guangdong Asia Hongke Test Technology Limited, and it should give a prior written notice of the revision document. This test report must not be used by the client to claim product endorsement.

**Report Revise Record**

Report Version	Issued Date	Notes
M1	Apr. 24, 2025	Initial Release

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1 GENERAL INFORMATION

1.1 Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Normal Temperature:	25°C
Relative Humidity:	55 %
Air Pressure:	101 kPa

1.2 General Description of EUT

Product Name:	LTE Module
Model/Type reference:	H1503BQ
Serial Model:	N/A
Power Rating:	DC 3.5V~4.2V
Hardware Version:	V20
Software Version:	N/A
Sample(s) Status:	AiTSZ-250306013-1(Normal sample) AiTSZ-250306013-2(Engineer sample)
GSM/WCDMA:	
Support Networks:	GSM,GPRS, EDGE, WCDMA, HSDPA, HSUPA
Frequency Bands:	☒ GSM 850 ☒ PCS1900 (U.S. Bands) ☐ GSM 900 ☐ DCS 1800 (Non-U.S. Bands) ☒ UMTS FDD Band II ☒ UMTS FDD Band IV ☒ UMTS FDD Band V (U.S. Bands) ☐ UMTS FDD Band I ☐ UMTS FDD Band VIII (Non-U.S. Bands)
Type of Modulation:	GMSK,8PSK Modulation For GSM/GPRS/EDGE BPSK,QPSK Modulation For WCDMA/HSDPA/HSUPA
Frequency Range:	GSM/GPRS/EDGE 850: 824.2MHz-848.8 MHz GSM/GPRS/EDGE 1900: 1850.2MHz-1909.8 MHz WCDMA Band II: 1852.4MHz-1907.6 MHz WCDMA Band IV: 1712.4MHz-1752.6 MHz WCDMA Band V: 826.4-846.6 MHz
Antenna type:	FPC Antenna
Antenna gain:	GSM850: -3.40dBi, PCS1900: 0.22dBi WCDMA II: 0.22dBi, WCDMA IV:-1.32dBi WCDMA V: -3.40dBi
LTE:	
Operation Band:	FDD-LTE: Band 2/4/5/7/12/13/17/25/26a/26b/66/71 TDD-LTE: Band 41
Support Bandwidth:	Band 2: ☒ 1.4MHz, ☒ 3MHz, ☒ 5MHz, ☒ 10MHz, ☒ 15MHz, ☒ 20MHz Band 4: ☒ 1.4MHz, ☒ 3MHz, ☒ 5MHz, ☒ 10MHz, ☒ 15MHz, ☒ 20MHz Band 5: ☒ 1.4MHz, ☒ 3MHz, ☒ 5MHz, ☒ 10MHz Band 7: ☒ 5MHz, ☒ 10MHz, ☒ 15MHz, ☒ 20MHz Band 12: ☒ 1.4MHz, ☒ 3MHz, ☒ 5MHz, ☒ 10MHz Band 13: ☒ 5MHz, ☒ 10MHz

	Band 17: ☒ 5MHz, ☒ 10MHz Band 25: ☒ 1.4MHz, ☒ 3MHz, ☒ 5MHz, ☒ 10MHz, ☒ 15MHz, ☒ 20MHz Band 26: ☒ 1.4MHz, ☒ 3MHz, ☒ 5MHz, ☒ 10MHz, ☒ 15MHz, ☒ 20MHz Band 66: ☒ 1.4MHz, ☒ 3MHz, ☒ 5MHz, ☒ 10MHz, ☒ 15MHz, ☒ 20MHz Band 71: ☒ 5MHz, ☒ 10MHz, ☒ 15MHz, ☒ 20MHz Band 41: ☒ 5MHz, ☒ 10MHz, ☒ 15MHz, ☒ 20MHz			
Frequency Range:	Band 2:uplink 1850MHz to 1910MHz; downlink 1930MHz to 1990MHz Band 4:uplink 1710MHz to 1755MHz; downlink 2110MHz to 2155MHz Band 5:uplink 824MHz to 849MHz; downlink 869MHz to 894MHz Band 7:uplink 2500MHz to 2570MHz; downlink 2620MHz to 2690MHz Band 12:uplink 699MHz to 716MHz; downlink 729MHz to 746MHz Band 13:uplink 777MHz to 787MHz; downlink 746MHz to 756MHz Band 17:uplink 704MHz to 716MHz;downlink 734MHz to 746MHz Band 25:uplink 1850MHz to 1915MHz;downlink 1930MHz to 1995MHz Band 26a:uplink 814MHz to 824MHz; downlink 859MHz to 869MHz Band 26b:uplink 824MHz to 849MHz; downlink 869MHz to 894MHz Band 66:uplink 1710MHz to 1780MHz;downlink 2110MHz to 2200MHz Band 71:uplink 663MHz to 698MHz; downlink 617MHz to 652MHz Band 41:uplink 2496 MHz -2690MHz;downlink 2496 MHz -2690MHz			
Power Class:	Power Class 3			
Modulation Type:	QPSK, 16QAM			
Antenna type:	PIFA Antenna			
Antenna gain:	LTE Band 2: 0.22dBi; LTE Band 4: -1.32dBi; LTE Band 5: -3.40dBi; LTE Band 7: 1.40dBi; LTE Band 12: -4.20dBi; LTE Band 13: -4.50dBi; LTE Band 17: -4.20dBi; LTE Band 25: 0.22dBi; LTE Band 26: -3.40dBi; LTE Band 66: -1.32dBi; LTE Band 71: -4.00dBi; LTE Band 41: 1.40dBi			
2.4G WIFI:				
Supported type:	802.11b/802.11g /802.11n(HT20)/802.11n(HT40)			
Modulation:	802.11b(DSSS):CCK,DQPSK,DBPSK 802.11g(OFDM):BPSK,QPSK,16-QAM,64-QAM 802.11n(OFDM):BPSK,QPSK,16-QAM,64-QAM			
Operation frequency:	802.11b/802.11g/802.11n(H20): 2412MHz~2462MHz 802.11n(H40): 2422MHz~2452MHz			
Channel number:	802.11b/802.11g/802.11n(H20): 11 802.11n(H40): 7			
Channel separation:	5MHz			
Antenna type:	PIFA antenna			
Antenna gain:	2.85 dBi			
5G WIFI:				
Supported type:	20MHz system	40MHz system	80MHz system	160MHz system
	802.11a 802.11n 802.11ac	802.11n 802.11ac	802.11n 802.11ac	N/A

Operation frequency:	5180-5240MHz 5260-5320MHz 5500-5700MHz 5745-5825MHz	5190-5230MHz 5270-5310MHz 5510-5670MHz 5755-5795MHz	5210MHz 5290MHz 5530MHz 5775MHz	N/A
Modulation:	OFDM	OFDM	OFDM	N/A
Channel number:	24	11	5	N/A
Channel separation:	20MHz	40MHz	80MHz	N/A
Antenna type:	PIFA antenna			
Antenna gain:	3.04dBi			
Bluetooth :				
Supported type:	Bluetooth BR/EDR			
Modulation:	GFSK, π/4DQPSK, 8DPSK			
Operation frequency:	2402MHz~2480MHz			
Channel number:	79			
Channel separation:	1MHz			
Antenna type:	PIFA antenna			
Antenna gain:	2.85 dBi			
Bluetooth LE:				
Supported type:	Bluetooth LE 1M/2M			
Modulation:	GFSK			
Operation frequency:	2402MHz~2480MHz			
Channel number:	40			
Channel separation:	2MHz			
Antenna type:	PIFA antenna			
Antenna gain:	2.85 dBi			
Remark: The above DUT's information was declared by manufacturer. For more detailed features description, please refer to the manufacturer's specifications or the User's Manual..				

1.3 Test Facility

Test Laboratory:

Guangdong Asia Hongke Test Technology Limited

B1/F, Building 11, Junfeng Industrial Park, Chongqing Road, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China

The test facility is recognized, certified or accredited by the following organizations:

FCC-Registration No.: 251906 Designation Number: CN1376

Guangdong Asia Hongke Test Technology Limited has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files.

IC —Registration No.: 31737 CAB identifier: CN0165

The 3m Semi-anechoic chamber of Guangdong Asia Hongke Test Technology Limited has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 31737

A2LA-Lab Cert. No.: 7133.01

Guangdong Asia Hongke Test Technology Limited has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025: 2017 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

1.4 Measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report according to CISPR 16 - 4 "Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements" and is documented in the Guangdong Asia Hongke Test Technology Limited's quality system according to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for Asia Hongke laboratory is reported:

Test	Measurement Uncertainty	Notes
Power Line Conducted Emission	9KHz~30MHz ± 1.20 dB	(1)
Radiated Emission	9KHz~30MHz ± 3.10 dB	(1)
Radiated Emission	30MHz ~1GHz ± 3.75 dB	(1)
Radiated Emission	1GHz~18GHz ± 3.88 dB	(1)
Radiated Emission	18GHz-40GHz ± 3.88 dB	(1)
RF power, conducted	30MHz~6GHz ± 0.16 dB	(1)
RF power density, conducted	± 0.24 dB	(1)
Spurious emissions, conducted	± 0.21 dB	(1)
Temperature	$\pm 1^{\circ}\text{C}$	(1)
Humidity	$\pm 3\%$	(1)
DC and low frequency voltages	$\pm 1.5\%$	(1)
Time	$\pm 2\%$	(1)
Duty cycle	$\pm 2\%$	(1)
Bandwidth	$\pm 1.5 \times 10^{-6}$	(1)

The report uncertainty of measurement $y \pm U$, where expanded uncertainty U is based on a standard uncertainty Multiplied by a coverage factor of $k=2$, providing a level of confidence of approximately 95%.

2 Method of measurement

2.1 Applicable Standard

According to §1.1307(b)(1), 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 of the Commission's guidelines.

According to §1.1310 and §2.1091 RF exposure is calculated.

FCC KDB447498 D01 General RF Exposure Guidance v06: Mobile and Portable Device, RF Exposure, Equipment Authorization Procedures

2.2 Limit

Limits for Maximum Permissible Exposure (MPE)/Controlled Exposure

Frequency Range(MHz)	Electric Field Strength(V/m)	Magnetic Field Strength(A/m)	Power Density (mW/cm ²)	Averaging Time (minute)
Limits for Occupational/Controlled Exposure				
0.3 – 3.0	614	1.63	(100) *	6
3.0 – 30	1842/f	4.89/f	(900/f)*	6
30 – 300	61.4	0.163	1.0	6
300 – 1500	/	/	f/300	6
1500 – 100,000	/	/	5	6

Limits for Maximum Permissible Exposure (MPE)/Uncontrolled Exposure

Frequency Range(MHz)	Electric Field Strength(V/m)	Magnetic Field Strength(A/m)	Power Density (mW/cm ²)	Averaging Time (minute)
Limits for Occupational/Controlled Exposure				
0.3 – 3.0	614	1.63	(100) *	30
3.0 – 30	824/f	2.19/f	(180/f)*	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

2.3 MPE Calculation Method

Predication of MPE limit at a given distance

Equation from page 18 of OET Bulletin 65, Edition 97-01

$$S = PG / 4\pi R^2$$

Where: S=power density

P=power input to antenna

G=power gain of the antenna in the direction of interest relative to an isotropic radiator

R=distance to the center of radiation of the antenna

2.4 Target Power and antenna gain

Band	Burst Turn up Power (dBm)	Division Factors (dB)	Time-Averaged Tune up Power (dBm)	Antenna Gain (dBi)
GSM 850	34	-9.03	24.97	-3.40
PCS 1900	31	-9.03	21.97	0.22

Remark:

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

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

Band	Max Target Power (dBm)	Antenna Gain (dBi)
WCDMA band 2	23	0.22
WCDMA band 4	24	-1.32
WCDMA band 5	24	-3.40
LTE BAND 2	25	0.22
LTE BAND 4	24	-1.32
LTE BAND 5	25	-3.40
LTE BAND 7	24	1.40
LTE BAND 12	25	-4.20
LTE BAND 13	24	-4.50
LTE BAND 17	25	-4.20
LTE BAND 25	24	0.22
LTE BAND 26	25	-3.40
LTE BAND 41	23	1.40
LTE BAND 66	24	-1.32
LTE BAND 71	25	-4.00
WLAN 2.4G	15	5*
UNII Band 1	12	5*
UNII Band 2A	11	5*
UNII Band 2C	12	5*
UNII Band 3	10	5*
BT	6	5*
BLE	2	5*

Note: *Assume WLAN/BT max. antenna is 5dBi for follow calculation.

2.5 MPE Result

As declared by the Applicant, the EUT is a wireless device used in a fix application, at least 20 cm from any body part of the user or nearby persons; from the maximum EUT RF output power, the minimum separation distance, $r=20\text{cm}$, as well as the gain of the used antenna is refer to section 2.2, the RF power density can be obtained.

Band	Frequency (MHz)	Output power with tune up dBm	Antenna Gain (dBi)	MPE (mW/cm ²)	MPE Limits (mW/cm ²)	Ratio	Max allow Ratio in simultaneous transmission	FCC ERP/EIRP Limit(dBm)	Ant Gain to Meet ERP/EIRP limit (dBi)	Ant Gain to Meet MPE limit (dBi)	Max Gain Allowed (dBi)
GSM 850	824	24.97	-3.40	0.02856	0.5493	0.0520	0.9801	40.60	15.63	9.35	9.35
PCS 1900	1850	21.97	0.22	0.03294	1.0000	0.0329	0.9801	33.01	11.04	14.96	11.04
WCDMA band 2	1850	23	0.22	0.04176	1.0000	0.0418	0.9801	33.01	10.01	13.93	10.01
WCDMA band 4	1710	24	-1.32	0.0369	1.0000	0.0369	0.9801	30.00	6.00	12.93	6.00
WCDMA band 5	824	24	-3.40	0.0228	0.5493	0.0415	0.9801	40.60	16.60	10.32	10.32
LTE BAND 2	1850	25	0.22	0.0662	1.0000	0.0662	0.9801	33.01	8.01	11.93	8.01
LTE BAND 4	1710	24	-1.32	0.03687	1.0000	0.0369	0.9801	30.00	6.00	12.93	6.00
LTE BAND 5	824	25	-3.40	0.02876	0.5493	0.0524	0.9801	40.60	15.60	9.32	9.32
LTE BAND 7	2500	24	1.40	0.06898	1.0000	0.0690	0.9801	33.01	9.01	12.93	9.01
LTE BAND 12	699	25	-4.20	0.0239	0.4660	0.0513	0.9801	34.77	9.77	8.61	8.61
LTE BAND 13	777	24	-4.50	0.0177	0.5180	0.0342	0.9801	34.77	10.77	10.07	10.07
LTE BAND 17	704	25	-4.20	0.0239	0.4693	0.0509	0.9801	34.77	9.77	8.64	8.64
LTE BAND 25	1850	24	0.22	0.05257	1.0000	0.0526	0.9801	33.01	9.01	12.93	9.01
LTE BAND 26	814	25	-3.40	0.02876	0.5427	0.0530	0.9801	40.60	15.60	9.27	9.27
LTE BAND 41	2496	23	1.40	0.05479	1.0000	0.0548	0.9801	33.01	10.01	13.93	10.01
LTE BAND 66	1710	24	-1.32	0.0369	1.0000	0.0369	0.9801	30.00	6.00	12.93	6.00
LTE BAND 71	663	25	-4.00	0.0250	0.4420	0.0566	0.9801	34.77	9.77	8.38	8.38
WLAN 2.4G	2412	15	5.00	0.01989	1.0000	0.0199	0.0199	N/A	N/A	N/A	N/A
UNII Band 1	5180	12	5.00	0.00997	1.0000	0.0100	0.0100	N/A	N/A	N/A	N/A
UNII Band 2A	5260	11	5.00	0.00792	1.0000	0.0079	0.0079	N/A	N/A	N/A	N/A
UNII Band 2C	5500	12	5.00	0.0100	1.0000	0.0100	0.0100	N/A	N/A	N/A	N/A
UNII Band 3	5745	10	5.00	0.0063	1.0000	0.0063	0.0063	N/A	N/A	N/A	N/A
BT	2402	6	5.00	0.0025	1.0000	0.0025	0.0025	N/A	N/A	N/A	N/A
BLE	2402	2	5.00	0.00100	1.0000	0.0010	0.0010	N/A	N/A	N/A	N/A

Note 1: For mobile or fixed location transmitters, minimum separation distance is 20cm, even if calculations indicate EMF distance is less.

Note 2: For conservativeness, the lowest uplink frequency of each band is used to determine the MPE limit of that band.

Note 3: Chose the maximum RF output tune up power of all antennas among same frequency WWAN bands and the maximum antenna gain to perform MPE calculation conservatively.

Note 4: A maximum antenna gain of 5dBi for WLAN/BT has been assumed for all collocated antennas.

simultaneous transmission Evaluation

In order to ensure compliance with the MPE for a controlled environment, the sum of the ratios of the power density to the corresponding MPE should not exceed unity. That is.

$$\sum_{i=1}^n \frac{S_i}{MPE_i} \leq 1$$

The product also has multiple transmitters The Simultaneous Transmission Possibilities are as below:

Simultaneous Tx Combination	Configuration
1	WWAN + WiFi 2.4G + WiFi 5G + Bluetooth

No.	Mode	Max.Result Ratio	Total Ratio	Limit	Limit Result
1	WWAN	0.0690	0.1014	1.0	Pass
	Bluetooth	0.0025			
	WLAN2.4GHz	0.0199			
	WLAN5GHz	0.0100			

2.6 Conclusion

The measurement results comply with the FCC Limit per 47 CFR 2.1091 for the uncontrolled RF Exposure of mobile device.

***** End of Report *****