



Shenzhen Huaxia Testing Technology Co., Ltd.

1F., Block A of Tongsheng Technology Building, Huahui Road, Dalang Street, Longhua District, Shenzhen, China

Telephone: +86-755-26648640

Fax: +86-755-26648637

Website: www.cqa-cert.com

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RF Exposure Evaluation Report

Report No.: CQASZ20220901575E-02
Applicant: Shanghai TUGE Data Technologies Co., Ltd.
Address of Applicant: Room 316, Lane 302, Lane 838, Shuyuan Town, Pudong New Area, Shanghai
Equipment Under Test (EUT):
EUT Name: 4G Wireless Router
Model No.: TR100
Test Model No.: TR100
Brand Name: N/A
FCC ID: 2AU4T-TR100
Standards: 47 CFR Part 1.1307
47 CFR Part 1.1310
447498 D04 Interim General RF Exposure Guidance v01
Date of Receipt: 2022-09-09
Date of Test: 2022-09-09 to 2022-09-20
Date of Issue: 2022-10-09
Test Result: PASS*

*In the configuration tested, the EUT complied with the standards specified above

Tested By: Lewis Zhou

(Lewis Zhou)

Reviewed By: Timo Lei

(Timo Lei)

Approved By: Jack Ai

(Jack Ai)



1 Version

Revision History Of Report

Report No.	Version	Description	Issue Date
CQASZ20220901575E-02	Rev.01	Initial report	2022-10-09

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3 General Information

3.1 Client Information

Applicant:	Shanghai TUGE Data Technologies Co., Ltd.
Address of Applicant:	Room 316, Lane 302, Lane 838, Shuyuan Town, Pudong New Area, Shanghai
Manufacturer:	Shenzhen Zhibotong Eletronics Co., Ltd.
Address of Manufacturer:	Bldg A2, Hedian Industrial Park, NO.9 Shijing Rd, Guanlan, Longhua District, ShenZhen, China
Factory:	Shenzhen Zhibotong Eletronics Co., Ltd.
Address of Factory:	Bldg A2, Hedian Industrial Park, NO.9 Shijing Rd, Guanlan, Longhua District, ShenZhen, China

3.2 General Description of EUT

Product Name:	4G Wireless Router
Model No.:	TR100
Test Model No.:	TR100
Trade Mark:	N/A
Software Version:	V1.0
Hardware Version:	V1.0
EUT Power Supply:	AC:100~240V ,50~60Hz DC:12V/1A

3.3 General Description of 2.4G WIFI Classic

Operation Frequency:	2412MHz~2462MHz
Type of Modulation:	IEEE for 802.11b: DSSS(CCK,DQPSK,DBPSK) IEEE for 802.11g : OFDM(64QAM, 16QAM, QPSK, BPSK) IEEE for 802.11n(HT20 and HT40) : OFDM (64QAM, 16QAM, QPSK, BPSK)
Number of Channel:	IEEE 802.11b/g, IEEE 802.11n HT20: 11 Channels IEEE 802.11n HT40: 7 Channels
Channel Separation:	5MHz
Transfer Rate:	IEEE for 802.11b: 1Mbps/2Mbps/5.5Mbps/11Mbps IEEE for 802.11g : 6Mbps/9Mbps/12Mbps/18Mbps/24Mbps/36Mbps/48Mbps/54Mbps IEEE for 802.11n(HT20) : 6.5Mbps/13Mbps/19.5Mbps/26Mbps/39Mbps/52Mbps/58.5Mbps/65Mbps IEEE for 802.11n(HT40) : 13.5Mbps/27Mbps/40.5Mbps/54Mbps/81Mbps/108Mbps/121.5Mbps/135Mbps
Sample Type:	☐ Mobile ☐ Portable ☒ Fix Location
Antenna Type:	External antenna
Antenna Gain:	5.0dBi

Note:

The above parameters will directly affect the test results. The information is provided by the applicant.

4 MPE Evaluation

4.1 RF Exposure Compliance Requirement

4.1.1 Limits

The table applies to any RF source (i.e., single fixed, mobile, and portable transmitters) and specifies power and distance criteria for each of the five frequency ranges used for the MPE limits. These criteria apply at separation distances from any part of the radiating structure of at least $\lambda/2\pi$. The thresholds are based on the general population MPE limits with a single perfect reflection, outside of the reactive near-field, and in the main beam of the radiator. For mobile devices that are not exempt per Table B.1 [Table 1 of § 1.1307(b)(1)(i)(C)] at distances from 20 cm to 40 cm and in 0.3 GHz to 6 GHz, evaluation of compliance with the exposure limits in § 1.1310 is necessary if the ERP of the device is greater than ERP_{20cm} in Formula (B.1) [repeated from § 2.1091(c)(1) and § 1.1307(b)(1)(i)(B)].

$$P_{th} \text{ (mW)} = ERP_{20 \text{ cm}} \text{ (mW)} = \begin{cases} 2040f & 0.3 \text{ GHz} \leq f < 1.5 \text{ GHz} \\ 3060 & 1.5 \text{ GHz} \leq f \leq 6 \text{ GHz} \end{cases}$$

If the ERP is not easily obtained, then the available maximum time-averaged power may be used (i.e., without consideration of ERP only 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.

SAR-based exemptions are constant at separation distances between 20 cm and 40 cm to avoid discontinuities in the threshold when transitioning between SAR-based and MPE-based exemption criteria at 40 cm, considering the importance of reflections.

4.1.2 Test Procedure

Software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel individually.

4.1.3 EUT RF Exposure

For 2.4G WIFI Classic

Measurement Data

11B SISO Mode				
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power	
			(dBm)	(mW)
Lowest(2412MHz)	6.91	7.0±1	8.0	6.31
Middle(2437MHz)	7.77	7.5±1	8.5	7.08
Highest(2462MHz)	9.36	9.5±1	10.5	11.22
11G SISO Mode				
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power	
			(dBm)	(mW)
Lowest(2412MHz)	6.66	6.5±1	7.5	5.62
Middle(2437MHz)	7.55	7.5±1	8.5	7.08
Highest(2462MHz)	7.49	7.5±1	8.5	7.08
11N20 MIMO Mode				
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power	
			(dBm)	(mW)
Lowest(2412MHz)	9.63	9.5±1	10.5	11.22
Middle(2437MHz)	10.47	10.5±1	11.5	14.13
Highest(2462MHz)	10.43	10.5±1	11.5	14.13
11N40 MIMO Mode				
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power	
			(dBm)	(mW)
Lowest(2422MHz)	9.99	10.0±1	11.0	12.59
Middle(2437MHz)	10.29	10.0±1	11.0	12.59
Highest(2452MHz)	10.92	11.0±1	12.0	15.85

Note: 1) Refer to report No. CQASZ20220901575E-01 for EUT test Max Conducted Average power measured value.

2) EUT's WIFI module is more than 20cm away from the human body.

*** END OF REPORT ***