

Report No.: GZCR220400042503

Page: 1 of 11 FCC ID: 2AFIW-AXT1800

RF EXPOSURE EVALUATION REPORT

Application No.: GZCR2204000425AT

Applicant: GL Technologies (Hong Kong) Limited

Address of Applicant: FLAT/RM 203 2/F BUILDING 19W 19 SCIENCE PARK WEST AVENUE

SHATIN NT Hong Kong

Manufacturer: GL Technologies (Hong Kong) Limited

Address of Manufacturer: FLAT/RM 203 2/F BUILDING 19W 19 SCIENCE PARK WEST AVENUE

SHATIN NT Hong Kong

Factory: Shenzhen Guanglian Zhitong Technology Co., LTD

Address of Factory: Room 305, 306, Chuangwei Digital Building, Songbai Road, Shiyan Street,

Baoan District, Shenzhen

Equipment Under Test (EUT):

EUT Name: AXT1800 Wireless Router

Model No.: GL-AXT1800
Trade Mark: GL.iNET

Standard(s): FCC Rules 47 CFR §2.1091

KDB 447498 D04 interim General RF Exposure Guidance v01

Date of Receipt: 2022-03-31

Date of Evaluation: 2022-04-01 to 2022-05-19

Date of Issue: 2022-05-27

Evaluation Result: Pass*

Kobe Jian EMC Laboratory Manager

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^{*} In the configuration evaluated, the EUT complied with the standards specified above.



EMC-TRF-03 Rev 1.0

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Report No.: GZCR220400042503

Page: 2 of 11

Revision Record							
Version	Chapter	Date	Modifier	Remark			
01		2022-05-27		Original			

Authorized for issue by		
	Cof Vlu	
	Curry Wu/Project Engineer	
	Riday Liv	
	Ricky Liu/Reviewer	



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Report No.: GZCR220400042503

Page: 3 of 11

2 Evaluation Summary

Note:

E.U.T./EUT means Equipment Under Test.

Pass means the test result passed the test standard requirement, please find the detailed decision rule in the report relative section.



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Report No.: GZCR220400042503

Page: 4 of 11

3 Contents

EMC-TRF-03 Rev 1.0

		Pa	age
1	Cov	er Page	1
2	Eval	luation Summary	3
3	Con	tents	4
4		eral Information	
	4.1	General Description of E.U.T.	Ę
	4.2	Details of E.U.T.	
	4.3	Separation Distance	
	4.4	Evaluating Location	
	4.5	Facility	
	4.6	Deviation from Standards	
	4.7	Abnormalities from Standard Conditions	6
5	Tecl	nnical Requirements Specification	7
	5.1	Blanket 1 mW Blanket Exemption	7
	5.2	MPE-based Exemption	7
	5.3	SAR-based Exemption	
6	Mea	surement and Calculation	10
	6.1	Maximum transmit power	10
	6.2	RF Exposure Calculation	10
7	FUT	Constructional Details (FUT Photos)	11



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SGS-CSTC Standards Technical Services Co., Ltd. **Guangzhou Branch**

Report No.: GZCR220400042503

Page: 5 of 11

General Information

	4.1	General	Description	of E.U.T.
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. Comoran Docompaion o	G. <u>—</u> 10111			
	☐ Portable device			
Product Type:				
	☐ Fixed device			

4.2 Details of E.U.T.

Power supply: DC 5V 4A.

> Adapter Model: GDB008W3-050400ZX Input: AC 100-240V 50/60Hz 0.8A

Output: DC 5V 4A.

For 2.4G:

802.11b/g/n/ (HT20)/ax(HE20): 2412MHz to 2462MHz;802.11n (HT40)/ Operation Frequency:

ax(HE40): 2422MHz to 2452MHz

802.11b: DSSS (CCK, DQPSK, DBPSK);802.11g/n/ax: OFDM (64QAM, Modulation Type:

16QAM, QPSK, BPSK)

Number of Channels: 802.11b/g/n/ (HT20)/ax(HE20):11; 802.11n (HT40)/ ax(HE40):7

5MHz Channel Spacing:

Antenna Type: Dipole Antenna

Antenna Gain: ANT1:3.79dBi; ANT2:3.79dBi;

For 5G:

(80MHz):

Operation Frequency U-NII-1: 5180-5240MHz; U-NII-2A: 5260-5320MHz; U-NII-2C: 5500-

(20MHz): 5700MHz; U-NII-3: 5745-5825MHz

Operation Frequency U-NII-1: 5190-5230MHz; U-NII-2A: 5270-5310MHz; U-NII-2C: 5510-

(40MHz): 5670MHz; U-NII-3: 5755-5795MHz

5775MHz

Operation Frequency U-NII-1: 5210MHz; U-NII-2A: 5290MHz; U-NII-2C: 5530-5610MHz; U-NII-3:

802.11a: OFDM (64QAM, 16QAM, QPSK, BPSK); 802.11n: OFDM (BPSK,

Modulation Type: QPSK, 16QAM, 64QAM); 802.11ac/ax: OFDM (BPSK, QPSK, 16QAM,

64QAM, 256QAM)

802.11a/n(HT20)/ac(VHT20)/ax(HE20): 20MHz; 802.11n(HT40)/ac(VHT40) **Channel Spacing:**

/ax(HE40): 40MHz; 802.11ac(VHT80)/ax(HE80): 80MHz

DFS Function: Master

TPC Function: Support TPC function

Antenna Type: Dipole Antenna

Antenna Gain: ANT1:4.39dBi; ANT2:4.39dBi;

4.3 Separation Distance

Minimum test separation distance: 20cm

Remark: This minimum test separation distance is determined by the smallest distance from the antenna and radiating structures or outer surface of the device, according to the host form factor, exposure conditions and platform requirements, to any part of the body or extremity of a user or bystander.



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Report No.: GZCR220400042503

Page: 6 of 11

4.4 Evaluating Location

All tests were performed at:

SGS-CSTC Standards Technical Services Co., Ltd., Guangzhou Branch EMC Laboratory, 198 Kezhu Road, Scientech Park, Guangzhou Economic & Technology Development District,

Guangzhou, China 510663

Tel: +86 20 82155555

Fax: +86 20 82075059

No tests were sub-contracted.

4.5 Facility

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

NVLAP (Lab Code: 200611-0)

SGS-CSTC Standards Technical Services Co., Ltd., Guangzhou EMC Laboratory is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP/NIST). NVLAP Code: 200611-0.

The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

ACMA

SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory can also perform testing for the Australian/New Zealand Regulatory Compliance Mark (RCM).

SGS UK(Certificate No.: 32), SGS-TUV SAARLAND and SGS-FIMKO

Have approved SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory as a supplier of EMC TESTING SERVICES and SAFETY TESTING SERVICES.

CNAS (Lab Code: L0167)

SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory has been assessed and in compliance with CNAS-CL01:2018 accreditation criteria for testing laboratories (identical to ISO/IEC 17025:2017 General Requirements) for the Competence of Testing Laboratories.

FCC Recognized Accredited Test Firm(Registration No.: 486818)

SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory has been accredited and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Designation Number: CN5016, Test Firm Registration Number: 486818.

• ISED (Registration No.: 4620B, CAB identifier: CN0052)

SGS-CSTC Standards Technical Services Co., Ltd., has been registered by Innovation Science and Economic Development Canada for Wireless Device Testing laboratories to test to Canadian radio equipment requirements. Registration No. 4620B, CAB identifier: CN0052.

VCCI (Registration No.: R-12460, C-12584, G-20107 and T-11179)

The 10m Semi-anechoic chamber, 966 Anechoic Chamber and Shielded Room of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-12460, C-12584, G-20107 and T-11179 respectively.

• CBTL (Lab Code: TL129)

SGS-CSTC Standards Technical Services Co., Ltd., E&E Laboratory has been assessed and fully comply with the requirements of ISO/IEC 17025:2017, the Basic Rules, IECEE 01 and Rules of procedure IECEE 02, and the relevant IECEE CB-Scheme Operational documents.

4.6 Deviation from Standards

None

4.7 Abnormalities from Standard Conditions

None



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Report No.: GZCR220400042503

Page: 7 of 11

5 Technical Requirements Specification

Test exemptions apply for devices used in general population/uncontrolled exposure environments, according to the SAR-based, or MPE-based exemption thresholds.

5.1 Blanket 1 mW Blanket Exemption

The 1 mW Blanket Exemption of §1.1307(b)(3)(i)(A) applies for single fixed, mobile, and portable RF sources with available maximum time-averaged power of no more than 1 mW, regardless of separation distance.

The 1-mW blanket exemption applies at separation distances less than 0.5 cm, including where there is no separation. This exemption shall not be used in conjunction with other exemption criteria other than those for multiple RF sources in paragraph §1.1307(b)(3)(ii)(A).

The 1-mW exemption is independent of service type and covers the full range of 100 kHz to 100 GHz, but it shall not be used in conjunction with other exemption criteria or in devices with higher-power transmitters operating in the same time-averaging period. Exposure from such higher-power transmitters would invalidate the underlying assumption that exposure from the lower-power transmitter is the only contributor to SAR in the relevant volume of tissue.

5.2 MPE-based Exemption

General frequency and separation-distance dependent MPE-based effective radiated power (ERP) thresholds are in Table B.1 [Table 1 of §1.1307(b)(1)(i)(C)] to support an exemption from further evaluation from 300 kHz through 100 GHz.

Table B.1—Thresholds For Single RF Sources Subject to Routine Environmental Evaluation

RF Source Frequency			Minimum Distance			Threshold ERP
f∟ MHz		f _H MHz	λ∟ / 2π		λн / 2π	W
0.3	_	1.34	159 m	-	35.6 m	1,920 R ²
1.34	_	30	35.6 m	-	1.6 m	3,450 R ² /f ²
30	_	300	1.6 m	-	159 mm	3.83 R ²
300	_	1,500	159 mm	_	31.8 mm	0.0128 R ² f
1,500	_	100,000	31.8 mm	_	0.5 mm	19.2R ²

Subscripts L and H are low and high; λ is wavelength.

From §1.1307(b)(3)(i)(C), modified by adding Minimum Distance columns.

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



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Rev 1.0

FMC-TRF-03

SGS-CSTC Standards Technical Services Co., Ltd. Guangzhou Branch

Report No.: GZCR220400042503

Page: 8 of 11

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 $\S1.1307(b)(1)(i)(C)$] at distances from 20 cm to 40 cm and in 0.3 GHz to 6 GHz, evaluation of compliance with the exposure limits in $\S1.1310$ is necessary if the ERP of the device is greater than ERP_{20cm} in Formula (B.1) [repeated from $\S2.1091(c)(1)$; also in $\S1.1307(b)(1)(i)(B)$].

$$P_{\text{th}} \text{ (mW)} = ERP_{20 \text{ cm}} \text{ (mW)} = \begin{cases} 2040f & 0.3 \text{ GHz} \le f < 1.5 \text{ GHz} \\ \\ 3060 & 1.5 \text{ GHz} \le f \le 6 \text{ GHz} \end{cases}$$
(B. 1)

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.

Limit calculation								
Frequency range	Frequency(MHz)	R(λ/2π)(m)	Threshold ERP(W)					
300~1500MHz	915	0.0522	0.032					
1500~100000MHz	2480	0.0193	0.007					

5.3 SAR-based Exemption

SAR-based thresholds are derived based on frequency, power, and separation distance of the RF source. The formula defines the thresholds in general for either available maximum time-averaged power or maximum time-averaged ERP, whichever is greater.

If the ERP of a device is not easily determined, such as for a portable device with a small form factor, the applicant may use the available maximum time-averaged power exclusively if the device antenna or radiating structure does not exceed an electrical length of $\lambda/4$.

As for devices with antennas of length greater than $\lambda/4$ where the gain is not well defined, but always less than that of a half-wave dipole (length $\lambda/2$), the available maximum time-averaged power generated by the device may be used in place of the maximum time-averaged ERP, where that value is not known.

The separation distance is the smallest distance from any part of the antenna or radiating structure for all persons, during operation at the applicable ERP. In the case of mobile or portable devices, the separation distance is from the outer housing of the device where it is closest to the antenna.



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Rev 1.0

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Report No.: GZCR220400042503

Page: 9 of 11

The SAR-based exemption formula of $\S1.1307(b)(3)(i)(B)$, repeated here as Formula (B.2), applies for single fixed, mobile, and portable RF sources with available maximum time-averaged power or effective radiated power (ERP), whichever is greater, of less than or equal to the threshold P_{th} (mW).

This method shall only be used at separation distances from 0.5 cm to 40 cm and at frequencies from 0.3 GHz to 6 GHz (inclusive). P_{th} is given by Formula (B.2).

$$P_{\text{th}} \text{ (mW)} = \begin{cases} ERP_{20 \text{ cm}} (d/20 \text{ cm})^x & d \le 20 \text{ cm} \\ ERP_{20 \text{ cm}} & 20 \text{ cm} < d \le 40 \text{ cm} \end{cases}$$
(B. 2)

where

EMC-TRF-03

$$x = -\log_{10}\left(\frac{60}{ERP_{20}\operatorname{cm}\sqrt{f}}\right)$$

and f is in GHz, d is the separation distance (cm), and ERP_{20cm} is per Formula (B.1).

Example values shown in Table B.2 are for illustration only.

Table B.2—Example Power Thresholds (mW)

Frequency				•	Distanc	ce(mm)		,		
(MHz)	5	10	15	20	25	30	35	40	45	50
300	39	65	88	110	129	148	166	184	201	217
450	22	44	67	89	112	135	158	180	203	226
835	9	25	44	66	90	116	145	175	207	240
1900	3	12	26	44	66	92	122	157	195	236
2450	3	10	22	38	59	83	111	143	179	219
3600	2	8	18	32	49	71	96	125	158	195
5800	1	6	14	25	40	58	80	106	136	169

Limit calculation						
Frequency range(GHz)	Frequency(GHz)	Χ	Distance(cm)	Pth (mW)		
0.3~1.5	0.915	1.474	0.5	8.133		
1.5~6	2.48	1.905	0.5	2.717		



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Report No.: GZCR220400042503

Page: 10 of 11

6 Measurement and Calculation

6.1 Maximum transmit power

The Power Data is based on the RF Test Report GZCR220400042501& GZCR220400042502

Mode	Test Channel	EIRP[dBm]	EIRP (mW)
2.4G	2437	26.93	493.17
5G	5825	32.8	1905.46

6.2 RF Exposure Calculation

The Max EIRP is 1905.46mW. The best case gain of the antenna is 4.39dBi.

The 2.4G and 5G cannot simultaneous transmission.

Remark: we used the maximum power between the conducted power and ERP/EIRP to perform RF exposure exemption evaluation.

	Evaluation method	Exempt Limit(mW)	Verdict
	Blanket 1 mW Blanket Exemption	1mW	N/A
	MPE-based Exemption(ERP)	7mW(ERP)	N/A
\boxtimes	SAR-based Exemption(P_{th})	3060mW	Yes

So, the device is to qualify for SAR test exemption, the exemption report is in lieu of the SAR report.



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Report No.: GZCR220400042503

Page: 11 of 11

7 EUT Constructional Details (EUT Photos)

Refer to appendix - external and internal photos for GZCR2204000425AT.

- End of the Report -



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