

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

EMC-TRF-03 Rev 1.1

Report No.: GZCR231000104604

Page: 1 of 10

FCC ID: 2BEYB-TP-WE-WRB9B
2BEYB-TP-WE-WRB2I**RF EXPOSURE EVALUATION REPORT**

Application No.: GZCR2310001046AT
Applicant: Comba Network (Singapore) Pte Ltd
Address of Applicant: 80 Playfair Road, Kapo Factory Building, #01-18. Singapore 367998
Manufacturer: COMBA NETWORK SYSTEMS COMPANY LTD
Address of Manufacturer: No.10, Shenzhou Road, Guangzhou Science City, Guangzhou, Guangdong, P.R. China
Factory: COMBA NETWORK SYSTEMS COMPANY LTD
Address of Factory: No.10, Shenzhou Road, Guangzhou Science City, Guangzhou, Guangdong, P.R. China
Equipment Under Test (EUT):
EUT Name: LTE800 Digital Wireless Repeater
Model No.: TP-WE-WR-DSL080B220P43Q-UK-MW
Trade Mark: Comba
Standard(s) : 47 CFR Part 2.1091
47 CFR Part 1.1310, Part 1.1307
Date of Receipt: 2023-10-11
Date of Evaluation: 2023-11-14
Date of Issue: 2024-04-08

Test Result:	Pass*
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* In the configuration tested, the EUT complied with the standards specified above.



Ricky Liu
Manager



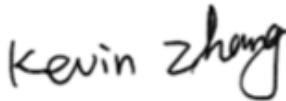
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Revision Record			
Version	Report No.	Date	Remark
01	GZCR231000104604	2024-04-08	Original

Authorized for issue by:			
	 _____ Kevin Zhang/Project Engineer		
	 _____ Jerry Chan/Reviewer		



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2 Evaluation Summary

Radio Spectrum Technical Requirement				
Item	Standard	Requirement	Method	Result
RF Exposure	47 CFR Part 2.1091 47 CFR Part 1.1310 47 CFR Part 1.1307	47 CFR Part 1.1310	47 CFR Part 1.1310	PASS

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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4 General Information

4.1 Details of E.U.T.

Power Supply: AC 120V, 50~60Hz
Cable: AC mains (1.5m, unshielded)
Operating Temperature: -25 to +55 °C
Operating Humidity: 5% to 95%
RF Characters: Refer to report GZCR231000104602 & GZCR231000104603

4.2 Evaluated Location

All tests were performed at:

SGS-CSTC Standards Technical Services Co., Ltd., Guangzhou Branch EMC Laboratory,
No.198, Kezhu Road, Science City, Economic & Technological Development Area, Guangzhou,
Guangdong, China 510663

Tel: +86 20 82155555

No tests were sub-contracted.



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4.3 Test Facility

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

- **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.

- **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.

4.4 Deviation from Standards

None

4.5 Abnormalities from Standard Conditions

None



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5 Radio Spectrum Technical Requirement

5.1 RF Exposure

5.1.1 Requirement

In accordance with 47 CFR FCC Part 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.

According to 47 CFR FCC Part 1310, the criteria listed in the following table shall be used to evaluate the environment impact of human exposure to radio frequency (RF) radiation as specified in Part 1.1307(b).

TABLE 1 TO §1.1310(E)(1)—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)
(i) Limits for Occupational/Controlled Exposure				
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
300-1,500			f/300	<6
1,500-100,000			5	<6
(ii) 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
300-1,500			f/1500	<30
1,500-100,000			1.0	<30

f = frequency in MHz. * = Plane-wave equivalent power density



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5.1.2 Method

According to IEEE C95.3:2002 section 5.5.1.1, the power density S at a point on the axis at a distance d from a transmitting antenna is given by the Friis free-space transmission formula:

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

S = power density (W)
 P = the net power delivered to the antenna
 G = gain of the antenna in linear scale
 d = distance between observation point and center of the radiator (m)

From the maximum EUT RF output power, as well as the gain of the used antenna, according to the RF power density limit stated in above table, the minimum distance between the antenna and human body will be calculated.

5.1.3 Conclusion

For 851-862MHz (downlink)

- According to the the test report GZCR231000104602, the tested maximum conducted power was within the tune up power range (40 ± 2 dBm) and the maximum tune up power was utilized as worst case for RF exposure evaluation.
- According to the declaration from the applicant, the permitted maximum antenna gain is 10dBi.
- The limit of Power Density (S) (mW/cm²)= $f/1500= 0.567$ ($f=851$ MHz for worst-case)

Maximum Antenna Gain (Numeric)	Max. total tune up tolerance power (W)	Limit of Power Density ($S_{DL, limit1}$) (W/m ²)	Power Density ($S_{DL, 1}$) (W/m ²)
10	15.85	0.567	$12.62/d^2$

For 862-869MHz (downlink)

- According to the the test report GZCR231000104603, the tested maximum conducted power was within the tune up power range (40 ± 2 dBm) and the maximum tune up power was utilized as worst case for RF exposure evaluation.
- According to the declaration from the applicant, the permitted maximum antenna gain is 10dBi.
- The limit of Power Density (S) (mW/cm²)= $f/1500= 0.574$ ($f=862$ MHz for worst-case)

Maximum Antenna Gain (Numeric)	Max. total tune up tolerance power (W)	Limit of Power Density ($S_{DL, limit2}$) (W/m ²)	Power Density ($S_{DL, 2}$) (W/m ²)
10	15.85	5.74	$12.62/d^2$

For multiple simultaneous transmission sources, the calculated Power Density should comply with:

$$(S_{DL, 1}/S_{DL, limit1}) + (S_{DL, 2}/S_{DL, limit2}) \leq 1$$

$$d \geq 2.11$$



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For 806-817MHz (uplink)

- According to the the test report GZCR231000104602, the tested maximum conducted power was within the tune up power range (27 ± 2 dBm) and the maximum tune up power was utilized as worst case for RF exposure evaluation.
- According to the declaration from the applicant, the permitted maximum antenna gain is 10dBi.
- The limit of Power Density (S) (mW/cm²)= $f/1500= 0.537$ ($f=806$ MHz for worst-case)

Maximum Antenna Gain (Numeric)	Max. total tune up tolerance power (W)	Limit of Power Density ($S_{UL, limit1}$) (W/m ²)	Power Density ($S_{UL, 1}$) (W/m ²)
10	0.80	5.37	0.64/d ²

For 817-824MHz (uplink)

- According to the the test report GZCR231000104603, the tested maximum conducted power was within the tune up power range (27 ± 2 dBm) and the maximum tune up power was utilized as worst case for RF exposure evaluation.
- According to the declaration from the applicant, the permitted maximum antenna gain is 10dBi.
- The limit of Power Density (S) (mW/cm²)= $f/1500= 0.544$ ($f=817$ MHz for worst-case)

Maximum Antenna Gain (Numeric)	Max. total tune up tolerance power (W)	Limit of Power Density ($S_{UL, limit2}$) (W/m ²)	Power Density ($S_{UL, 2}$) (W/m ²)
10	0.80	5.44	0.64/d ²

For multiple simultaneous transmission sources, the calculated Power Density should comply with:

$$(S_{UL, 1}/S_{UL, limit1}) + (S_{UL, 2}/S_{UL, limit2}) \leq 1$$

$$d \geq 0.49$$

Remark:

The donor antenna and service antenna must maintain sufficient distance to ensure isolation, otherwise the EUT will be shut down due to oscillation.

Therefore, the exposure evaluation only the UL and DL single transmission was concerned in this report even if the product UL and DL simultaneous emission during operation.

So the permitted use distance away from EUT external antenna is larger than 2.11m.



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5.2 EUT Constructional Details (EUT Photos)

Refer to Appendix - External and Internal Photos for GZCR2310001046AT.

- End of the Report -



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