

RF EXPOSURE EVALUATION REPORT

Application No.: GZCR2303000224AT
Applicant: Comba Telecom Network Systems Limited
Address of Applicant: Flat/Rm 10, 3/F, Bio-Informatics Ctr, 2 Science Park West Avenue, HK Science Park, Pak Shek Kok, N.T. Hong Kong
Manufacturer: Comba Network Systems Company Limited
Address of Manufacturer: No. 10 Shenzhou Road, Guangzhou Science City, Guangzhou 510663, Guangdong, P.R.China
Factory: Comba Telecom Technology (Guangzhou) Ltd.
Address of Factory: No. 6 Jinbi Road, Economics and Technology Development District, Guangzhou, Guangdong, China

Equipment Under Test (EUT):
EUT Name: Comflex NG
Model No.: Comflex NG MU
Trade Mark: Comba
Standard(s) : 47 CFR Part 2.1091
47 CFR Part 1.1310, Part 1.1307
Date of Receipt: 2023-03-02
Date of Evaluation: 2023-04-17
Date of Issue: 2023-04-28

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



Ricky Liu
Manager



Revision Record			
Version	Chapter	Date	Modifier Remark
01	GZCR230300022408	2023-04-28	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



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4 General Information

4.1 Details of E.U.T.

Power Supply:	AC 100-240V, 50/60Hz	
Test Voltage:	AC 110V	
Cable:	AC mains (2m, unshielded)	
Operating Temperature:	-40 to +55 °C	
Operating Humidity:	≤95%	
Frequency Range:	Lower 700MHz:	Uplink: 698-716MHz Downlink: 728-746MHz
	Upper 700MHz:	Uplink: 777-787MHz Downlink: 746-756MHz
Cellular:		Uplink: 824-849MHz Downlink: 869-894MHz
	EAWS:	Uplink: 1710-1755MHz Downlink: 2110-2180MHz
Broadband PCS:		Uplink: 1850-1915MHz Downlink: 1930-1995MHz
	BRS/EBS:	Uplink: 2496-2690MHz Downlink: 2496-2690MHz
3.7GHz service*:		Uplink: 3700-3980MHz Downlink: 3700-3980MHz
	Support Technology:	LTE 5G NR
Modulation Type:	PSK/QPSK/QAM/16QAM/64QAM/256QAM	
Interface:	BDA Card Port	4.3-10-Female
	POI Card port	4.3-10-Female
	Debug Port	RJ-45
Normal Output Power: (per antenna port, uplink, BDA card)	Lower 700MHz:	19dBm
	Upper 700MHz:	19dBm
	Cellular:	19dBm
	EAWS:	19dBm
	Broadband PCS:	19dBm
	BRS/EBS:	22dBm
Normal System Gain:	uplink & downlink: 80dB (BDA card)	
EUT Configuration:	1T1R	



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Antenna Type: External Dedicated Antenna
Permission Antenna Gain: 14dBi or less (declared by the manufacturer)
Software Version: ChassisOAMV0100.01

Note:

*: 3.7GHz service band can only operate on POI card, which connects directly to a base station via coaxial cable but cannot connect to antenna and/or amplifier.

4.2 Evaluated Location

All evaluation were performed at:

SGS-CSTC Standards Technical Services Co., Ltd., Guangzhou Branch EMC Laboratory,
198 Kezhu Road, Sciencetech Park, Guangzhou Economic & Technology Development District,
Guangzhou, China 510663

Tel: +86 20 82155555 Fax: +86 20 82075059

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.



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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 Part1.1307(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 (mW/cm²)
P = the net power delivered to the antenna (mW)
G = gain of the antenna in linear scale
d = distance between observation point and center of the radiator (cm)

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 Lower 700MHz band (698-716MHz, uplink)

1. According to the the test report GZCR230300022402, the tested maximum conducted power was within the tune up power range (≤21dBm) and the maximum tune up power was utilized as worst case for RF exposure evaluation.
2. According to the declaration from the applicant, the permission maximum antenna gain is 14dBi.
3. The limit for Power Density (S)(mW/cm²) = f/1500= (f is the lowest operation frequency for the strictest limit, 698MHz).

Maximum Antenna Gain (Numeric)	Max. total tune up tolerance power (mW)	Limit of Power Density (S) (mW/cm ²)	Minimum Distance to human body (cm)
25.119	125.9	0.46	24

For Upper 700MHz band (777-787MHz, uplink)

1. According to the the test report GZCR230300022403, the tested maximum conducted power was within the tune up power range (≤21dBm) and the maximum tune up power was utilized as worst case for RF exposure evaluation.
2. According to the declaration from the applicant, the permission maximum antenna gain is 5dBi.
3. The limit for Power Density (S)(mW/cm²) = f/1500= (f is the lowest operation frequency for the strictest limit, 777MHz).

Maximum Antenna Gain (Numeric)	Max. total tune up tolerance power (mW)	Limit of Power Density (S) (mW/cm ²)	Minimum Distance to human body (cm)
25.119	125.9	0.51	23



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For Cellular band (824-849MHz, uplink)

1. According to the the test report GZCR230300022404, the tested maximum conducted power was within the tune up power range ($\leq 21\text{dBm}$) and the maximum tune up power was utilized as worst case for RF exposure evaluation.
2. According to the declaration from the applicant, the permission maximum antenna gain is 5dBi.
3. The limit for Power Density (S)(mW/cm^2) = $f/1500$ (f is the lowest operation frequency for the strictest limit, 824MHz).

Maximum Antenna Gain (Numeric)	Max. total tune up tolerance power (mW)	Limit of Power Density (S) (mW/cm^2)	Minimum Distance to human body (cm)
25.119	125.9	0.54	22

For EAWS band (1710-1755MHz, uplink)

1. According to the the test report GZCR230300022405, the tested maximum conducted power was within the tune up power range ($\leq 21\text{dBm}$) and the maximum tune up power was utilized as worst case for RF exposure evaluation.
2. According to the declaration from the applicant, the permission maximum antenna gain is 14dBi.

Maximum Antenna Gain (Numeric)	Max. total tune up tolerance power (mW)	Limit of Power Density (S) (mW/cm^2)	Minimum Distance to human body (cm)
25.119	125.9	1	16

For Broadband PCS band (1850-1915MHz, uplink)

1. According to the the test report GZCR230300022406, the tested maximum conducted power was within the tune up power range ($\leq 21\text{dBm}$) and the maximum tune up power was utilized as worst case for RF exposure evaluation.
2. According to the declaration from the applicant, the permission maximum antenna gain is 14dBi.

Maximum Antenna Gain (Numeric)	Max. total tune up tolerance power (mW)	Limit of Power Density (S) (mW/cm^2)	Minimum Distance to human body (cm)
25.119	125.9	1	16

For BRS/EBS band (2496-2690MHz, uplink)

1. According to the the test report GZCR230300022407, the tested maximum conducted power was within the tune up power range ($\leq 24\text{dBm}$) and the maximum tune up power was utilized as worst case for RF exposure evaluation.
2. According to the declaration from the applicant, the permission maximum antenna gain is 14dBi.

Maximum Antenna Gain (Numeric)	Max. total tune up tolerance power (mW)	Limit of Power Density (S) (mW/cm^2)	Minimum Distance to human body (cm)
25.119	251.2	1	23

So the recommend use distance away from EUT external antenna is larger than 24cm.



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5.2 EUT Constructional Details (EUT Photos)

Refer to External and Internal Photos for GZCR2303000224AT.

- End of the Report -



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