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Report No.: GZCR210300002201
Page: 1 of 13
FCC ID: OJFDLRU1719235

RF EXPOSURE EVALUATION REPORT

Application No.: GZCR2103000022AT
Applicant: Corning Optical Communication Wireless
Address of Applicant: 8253 1st Ave, Vienna, Virginia, United States, 22182
Manufacturer: Comba Network Systems Company Limited
Address of Manufacturer: No.10 Shenzhou Road, Guangzhou Science City, Guangzhou, Guangdong
Factory: Comba Telecom Technology (Guangzhou) Ltd.
Address of Factory: No.6 Jinbi Road, Economics and Technology Development District,
Guangdong, China
Equipment Under Test (EUT):
EUT Name: Medium Band dRAU
Model No.: dLRU-17192325
Trade Mark: Corning
Standard(s) : 47 CFR Part 2.1091
47 CFR Part 1.1310, Part 1.1307
Date of Receipt: 2021-03-09
Date of Evaluation: 2021-04-09
Date of Issue: 2021-12-28

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

Kobe Jian
EMC Laboratory Manager



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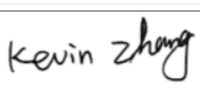
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Revision Record				
Version	Chapter	Date	Modifier	Remark
01		2021-12-28		Original

Authorized for issue by:			
Evaluated By		2021-04-09	
	Kevin_Zhang /Project Engineer	Date	
Checked By		2021-04-12	
	Jerry_Chan /Reviewer	Date	



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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:	DC 36-57V	
Test Voltage:	DC 48V	
Cable:	N/A	
Operating Temperature:	-40 to +55 °C	
Operating Humidity:	5 to 95 %	
New activated frequency bands:	AWS2&AWS4	Downlink: 1995MHz to 2000MHz 2000MHz to 2020MHz 2180MHz to 2200MHz
Radio System Type:	☐ GSM ☒ WCDMA ☒ LTE ☒ 5G NR	
Interface:	RF Port:	2 (4.3-10-Female, ANT1~ANT2)
	Management Port:	1 (RJ45)
	Power Jack:	2
	Optical Port:	3 (SFP+)
Supported Channel Bandwidth:	GSM	☐ 200 kHz
	WCDMA	☒ 5MHz
	LTE	☐ 1.4 MHz ☐ 3 MHz ☒ 5 MHz ☒ 10 MHz ☒ 15 MHz ☒ 20 MHz
	5G NR	☒ 5 MHz ☒ 10 MHz ☒ 15 MHz ☒ 20 MHz ☒ 40 MHz ☒ 60 MHz



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Detailed Band, technology and bandwidth :

Band	Technology	Supported Bandwidth
AWS-2/AWS-4	3G	5MHz
	4G/5G	5/10/15/20/40/60MHz

EUT MIMO property: 2X2 MIMO

ANT1 and ANT2 are MIMO port, and the internal circuit design is identical, the intend output power for antenna ports are identical.

System Gain: Max. 20dB (Downlink)

Antenna Type: External Dedicated Antenna

Permission Antenna Gain: 12.5dBi or less

Software Version: DRAUM_AV01.01.13.10

Note:

1. The EUT is a remote unit of a fiber DAS. The fiber DAS are typically comprised of three components (host unit, fiber-optic expansion unit and remote unit), which will be interconnected via fiber-optic.
The host unit connects directly to a base station via coaxial cable but cannot connect to antenna for receiving downlink and transmitting uplink, the EUT connects to antenna for transmitting downlink and receiving uplink. Therefore, only performed the test for downlink.
2. In additional, the host unit and fiber-optic expansion unit will be used as support unit for test in the report.
3. ANT1 and ANT2 are MIMO port, and the internal circuit design is identical, the intend output power for antenna ports are identical. Therefore only perform test at antenna port 1 and record the data in this report.



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4.2 Description of Support Units

The EUT has been tested as an independent unit.

4.3 Test Location

All tests were performed at:

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4.4 Test Facility

The test 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 C-Tick mark as a result of our NVLAP accreditation.

- **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 2.948 Listed Test Firm(Registration No.: 282399)**

SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory 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. Registration 282399, May 31, 2002.

- **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, Jul 13, 2017.

- **Industry Canada (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-10449 and T-11179)**

The 10m Semi-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-10449 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 17025:2005, the Basic Rules, IECEE 01 and Rules of procedure IECEE 02, and the relevant IECEE CB-Scheme Operational documents.



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4.5 Deviation from Standards

None

4.6 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/cm^2)
 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.



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5.1.3 Conclusion

For AWS-2 & AWS-4 (only for downlink: 1995-2020MHz)

1. According to the the test report GZEM201101673704, the tested maximum conducted power for 2x2 MIMO is $20.26\text{dBm}+20.26\text{dBm} = 211.8\text{mW}$
2. According to the declaration from the applicant, the permitted maximum antenna gain is 12.5dBi for signle antenna, MIMO antenna Correlated, The directional gain is 15.5dBi.
3. The limit of Power Density (S)(mW/cm^2) = $1\text{mW}/\text{cm}^2$

Maximum Antenna Gain (Numeric)	Total conducted power (mW)	Limit of Power Density (S) (mW/cm^2)	Minimum Distance to human body (cm)
35.48	211.8	1	24.46

For AWS-4 (only for downlink: 2180-2200MHz)

1. According to the the test report GZEM201101673704, the tested maximum conducted power for 2x2 MIMO is $20.34\text{dBm}+20.34\text{dBm} = 216\text{mW}$
2. According to the declaration from the applicant, the permitted maximum antenna gain is 12.5dBi for signle antenna, MIMO antenna Correlated, The directional gain is 15.5dBi.
3. The limit of Power Density (S)(mW/cm^2) = $1\text{mW}/\text{cm}^2$

Maximum Antenna Gain (Numeric)	Total conducted power (mW)	Limit of Power Density (S) (mW/cm^2)	Minimum Distance to human body (cm)
35.48	216	1	24.71

The tested max conducted power summary:

For AWS-2 & AWS-4 (only for downlink: 1995-2020MHz)

MIMO is $20.26\text{dBm}+20.26\text{dBm}$

For AWS-4 (only for downlink: 2180-2200MHz)

MIMO is $20.34\text{dBm}+20.34\text{dBm}$



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The max power declared by manufacture in Tune-up:

1. AWS-2 & AWS-4 (only for downlink: 1995-2020MHz)& AWS-4 (only for downlink: 2180-2200MHz)

20.5dbm for single antenna port, and 23.5dBm for MIMO.

According to the declaration from the applicant, the permitted maximum antenna gain is 12.5dBi for single antenna, MIMO antenna Correlated, The directional gain is 15.5dBi.

The limit of Power Density (S)(mW/cm²) = 1mW/cm²

Maximum Antenna Gain (Numeric)	Total conducted power (mW)	Limit of Power Density (S) (mW/cm ²)	Minimum Distance to human body (cm)
35.48	223.87	1	25.14

So the recommend use distance away from EUT external antenna is larger than 25.14cm for MIMO transmission.

5.2 EUT Constructional Details

Please refer to Appendix A – EUT Construction Details of GZCR2103000022AT for detail.

--Report End--



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