



RF EXPOSURE EVALUATION REPORT

Application No.: GZCR2103000015AT
Applicant: Corning Optical Communication Wireless
Address of Applicant: 8253 1st AveVienna, 22182, Virginia, United States
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: HRU Digital High Power Amplifier Module supporting PCS
Model No.: dHRU-dHPAM-19
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: 2021-04-12

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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Revision Record				
Version	Chapter	Date	Modifier	Remark
01		2021-04-12		Original

Authorized for issue by:			
Evaluated By	<i>Kevin Zhang</i>		2021-04-09
	Kevin_Zhang /Project Engineer		Date
Checked By	<i>Ricky Liu</i>		2021-04-12
	Ricky Liu /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: AC 100-240V, 50/60Hz via ODU
 Test Voltage: AC 100V, 60Hz
 Cable: AC mains (unshielded, 1.5m)
 Operating Temperature: -40 to +55 °C
 Operating Humidity: 5 to 95 %
 Frequency Range: Broadband PCS Uplink: 1850MHz to 1915MHz
 Downlink: 1930MHz to 1995MHz
 AWS-2 & AWS-4 Uplink: 1915MHz to 1920MHz
 Downlink: 1995MHz to 2000MHz
 2000MHz to 2020MHz

Radio System Type: GSM
 WCDMA
 LTE
 5G NR

Interface: RF Port: 2 (4.3-10-Female, ANT1~ANT2)
 Optical Port: 1 (SFP+)

Supported Channel Bandwidth: GSM 200 kHz
 WCDMA 5MHz
 LTE 1.4 MHz 1.4 MHz 1.4 MHz
 10 MHz 10 MHz 10 MHz
 5G NR 5 MHz 5 MHz 5 MHz
 20 MHz 20 MHz 20 MHz

Band	Technology	Supported Bandwidth
Broadband PCS	3G	5MHz
	4G/5G	5/10/15/20MHz
AWS-2 & AWS-4	3G	5MHz
	4G/5G	5/10/15/20MHz



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EUT MIMO property: 2X2 MIMO
System Gain: Max. 43dB (Downlink)
Antenna Type: External Dedicated Antenna
Permission Antenna Gain: 12.5dBi or less
Software Version: V01.00.00.04

Note: 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.



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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:

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



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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/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.



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5.1.3 Conclusion

For Broadband PCS (only for downlink: 1930-1995MHz)

1. According to the the test report GZCR210300001502, the tested maximum conducted power for 2x2 MIMO is $43.26\text{dBm}+43.26\text{dBm} = 42.36\text{W} = 42360\text{mW}$.
2. According to the declaration from the applicant, the permitted maximum antenna gain is 12.5dBi for single antenna, 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	42360	1	346

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

1. According to the the test report GZCR210300001502, the tested maximum conducted power for 2x2 MIMO is $43.06\text{dBm}+43.06\text{dBm} = 40.46\text{W} = 40460\text{mW}$.
2. According to the declaration from the applicant, the permitted maximum antenna gain is 12.5dBi for single antenna, 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	40460	1	337.6

So the recommend use distance away from EUT external antenna is larger than 3.46m for MIMO transmission.



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5.2 EUT Constructional Details

Please refer to Appendix A – EUT Construction Details of GZCR2103000015AT for detail.

--Report End--



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