

RF EXPOSURE EVALUATION REPORT

Application No.: GZCR2311001255AT
Applicant: Corning Optical Communications LLC
Address of Applicant: 840 N McCarthy Blvd Milpitas, CA 95035
Manufacturer: Comba Network Systems Company Limited
Address of Manufacturer: No.10 Shenzhou Road, Guangzhou Science City, Guangzhou 510663, Guangdong, P.R.China

Equipment Under Test (EUT):

EUT Name: HRU Digital High Power Amplifier Module supporting 800/850
Model No.: dHRU-G2-85
Trade Mark: Corning
Standard(s) : 47 CFR Part 2.1091
 47 CFR Part 1.1310, Part 1.1307
Date of Receipt: 2023-11-29
Date of Evaluation: 2023-12-15
Date of Issue: 2023-12-20

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

Ricky Liu

Ricky Liu
Manager



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Revision Record			
Version	Report No.	Date	Remark
01	GZCR231100125503	2023-12-18	Original

Authorized for issue by:				
		Kevin Zhang		
		Kevin Zhang/Project Engineer		
		Jerry Chen		
		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
Cable:	AC mains (unshielded, 1.5m)
Operating Temperature:	-40 to +55 °C
Operating Humidity:	5 to 95 %
RF Characters:	Refer to report GZCR231100125502

4.2 Evaluation Location

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 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



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

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 ESMR (only for downlink: 862-869MHz)

1. According to the the test report GZCR231100125502, the tested maximum conducted power was within the tune up power range (43 ± 1 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 permitted maximum antenna gain is 10dBi for single antenna, MIMO antenna Correlated, The directional gain is 13dBi.
3. The maximum total tune up tolerance power is $44\text{dBm} + 10\lg(2) = 47.02\text{dBm} = 50.36\text{W}$.
4. The limit of Power Density (S)(mW/cm^2) = $f/1500 = 0.5746\text{mW}/\text{cm}^2 = 5.746\text{W}/\text{m}^2$ (Here, f is the lowest operation frequency for worst-case, 862MHz)

Maximum Antenna Gain (Numeric)	Total conducted power (W)	Limit of Power Density (S_{limit1}) (W/m^2)	S_1/S_{limit1}
19.953	50.36	5.746	$14.0/d^2$

For Cellular (only for downlink: 869-894MHz)

1. According to the the test report GZCR231100125502, the tested maximum conducted power was within the tune up power range (43 ± 1 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 permitted maximum antenna gain is 10dBi for single antenna, MIMO antenna Correlated, The directional gain is 13dBi.
3. The maximum total tune up tolerance power is $44\text{dBm} + 10\lg(2) = 47.02\text{dBm} = 50.36\text{W}$.
4. The limit of Power Density (S)(mW/cm^2) = $f/1500 = 0.5793\text{mW}/\text{cm}^2 = 5.793\text{W}/\text{m}^2$ (Here, f is the lowest operation frequency for worst-case, 869MHz)

Maximum Antenna Gain (Numeric)	Total conducted power (W)	Limit of Power Density (S_{limit2}) (W/m^2)	S_2/S_{limit2}
19.953	50.36	5.793	$13.9/d^2$

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

$$(S_1/S_{\text{limit1}}) + (S_2/S_{\text{limit2}}) \leq 1$$

$$(14.0/d^2) + (13.9/d^2) \leq 1$$

$$d \geq 5.3$$

So the permitted use distance away from EUT external antenna is larger than 5.3m.



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6 EUT Constructional Details

Refer to Appendix – External and Internal Photos for GZCR2311001255AT.

--Report End--

