



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

EMC-TRF-01 Rev 1.1

Report No.: GZCR231100125403

Page: 1 of 9

FCC ID: OJFDHRU-G2-7

RF EXPOSURE EVALUATION REPORT

Application No.: GZCR2311001254AT
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 700
Model No.: dHRU-G2-7
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* |
|---------------------|--------------|

* In the configuration tested, the EUT complied with the standards specified above.

Ricky Liu
Manager



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EMC-TRF-01 Rev 1.1

Report No.: GZCR231100125403

Page: 2 of 9

| Revision Record | | | |
|-----------------|------------------|------------|----------|
| Version | Report No. | Date | Remark |
| 01 | GZCR231100125403 | 2023-12-20 | Original |
| | | | |
| | | | |

| Authorized for issue by: | | | |
|--------------------------|--|-------------------------------------|--|
| | | <i>Kevin Zhang</i> | |
| | | Kevin Zhang/Project Engineer | |
| | | <i>Jerry Chen</i> | |
| | | 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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SGS-CSTC Standards Technical Services Co., Ltd. Guangzhou Branch

EMC-TRF-01 Rev 1.1

Report No.: GZCR231100125403

Page: 4 of 9

3 Contents

- 1 Covers Page1
- 2 Evaluation Summary3
- 3 Contents4
- 4 General Information.....5
 - 4.1 Details of E.U.T. 5
 - 4.2 Evaluation Location 5
 - 4.3 Facility 5
 - 4.4 Deviation from Standards 6
 - 4.5 Abnormalities from Standard Conditions 6
- 5 Radio Spectrum Technical Requirement.....7
 - 5.1 RF Exposure 7
 - 5.1.1 Requirement 7
 - 5.1.2 Method..... 7
 - 5.1.3 Conclusion 8
- 6 EUT Constructional Details9



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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 GZCR231100125402 |

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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EMC-TRF-01 Rev 1.1

Report No.: GZCR231100125403

Page: 6 of 9

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 | | | | |

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 Lower & Upper 700MHz (only for downlink: 728-757MHz)

1. According to the the test report GZCR231100125402, the tested maximum conducted power was within the tune up power range ($43 \pm 1\text{dBm}$) and the maximum tune up power was utilized as worst case for RF exposure evaluation.
2. According to the declaration from the applicant, the permitted maximum antenna gain is 12.5dBi for signle antenna, MIMO antenna Correlated, The directional gain is 15.5dBi.
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) = $f/1500 = 0.478\text{mW}/\text{cm}^2 = 4.78\text{W}/\text{m}^2$ (Here, f is the lowest operation frequency for worst-case, 728MHz)

| Maximum Antenna Gain (Numeric) | Total conducted power (W) | Limit of Power Density (S_{limit1}) (W/m^2) | S_1/S_{limit1} |
|--------------------------------|---------------------------|--|-------------------------|
| 35.481 | 50.36 | 4.85 | $29.8/d^2$ |

For FirstNet (only for downlink: 758-768MHz)

1. According to the the test report GZCR231100125402, the tested maximum conducted power was within the tune up power range ($43 \pm 1\text{dBm}$) and the maximum tune up power was utilized as worst case for RF exposure evaluation.
2. According to the declaration from the applicant, the permitted maximum antenna gain is 12.5dBi for signle antenna, MIMO antenna Correlated, The directional gain is 15.5dBi.
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) = $f/1500 = 0.5053\text{mW}/\text{cm}^2 = 5.053\text{W}/\text{m}^2$ (Here, f is the lowest operation frequency for worst-case, 758MHz)

| Maximum Antenna Gain (Numeric) | Total conducted power (W) | Limit of Power Density (S_{limit2}) (W/m^2) | S_2/S_{limit2} |
|--------------------------------|---------------------------|--|-------------------------|
| 35.481 | 50.36 | 5.053 | $28.2/d^2$ |

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

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

$$(29.8/d^2) + (28.2/d^2) \leq 1$$

$$d \geq 7.7$$

So the permitted use distance away from EUT external antenna is larger than 7.7m.



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Report No.: GZCR231100125403

Page: 9 of 9

6 EUT Constructional Details

Refer to Appendix - External and Internal Photos for GZCR2311001254AT.

--Report End--



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