

RF EXPOSURE EVALUATION REPORT

Application No.: GZCR2306000567AT
Applicant: Corning Optical Communication LLC
Address of Applicant: 6 Concord Road, Shrewsbury, Massachusetts, United States
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: Digital Medium-power Remote Unit
Model No.: dMRU-G2-678
Trade Mark: Corning
Standard(s) : 47 CFR Part 2.1091
47 CFR Part 1.1310, Part 1.1307
Date of Receipt: 2023-06-08
Date of Evaluation: 2023-07-10
Date of Issue: 2023-07-10

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	GZCR230600056707	2023-07-10	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

Note:

E.U.T./ EUT means Equipment Under Test.

Pass means the test result passed the test standard requirement, please find the detailed decision rule in the report relative section.



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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 (4m, unshielded)	
Operating Temperature:	-40 to +55 °C	
Operating Humidity:	≤95%	
Frequency Range:	600MHz service	Uplink: 663-698MHz Downlink: 617-652MHz
	Lower & Upper 700MHz	Uplink: 698-787MHz Downlink: 728-757MHz
	FirstNet	Uplink: 788-798MHz Downlink: 758-768MHz
	ESMR	Uplink: 817-824MHz Downlink: 862-869MHz
	Cellular	Uplink: 824-849MHz Downlink: 869-894MHz
Support Technology:	LTE	
	5G NR	
Support Channel BW:	LTE	5MHz/10MHz/15MHz/20MHz
	5G NR	5MHz/10MHz/15MHz/20MHz
Interface:	Antenna Port	2 (4.3-10 Female)
	CPRI Port	1 (SFP+)
	Debug Port	1 (RJ-45)
Normal Output Power: (per antenna port, downlink)	36dBm	
Normal System Gain:	UL	-2dB
	DL	13dB
EUT MIMO property:	2×2 MIMO	
Antenna Type:	External Dedicated Antenna	
Permission Antenna Gain:	10dBi or less	
Software Version:	V01.00.00.04	



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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.

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 600MHz Service band (617-652MHz, downlink)

1. According to the the test report GZCR230600056702, the tested maximum conducted power was within the tune up power range (36±1dBm) 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 and the direction gain = G_{ANT}+10lg(N_{ANT}) dBi = 13dBi.
3. The maximum total tune up tolerance power is 37dBm+10lg(2)= 40.02dBm= 10.05W.
4. The limit of Power Density (S) (mW/cm²)= f/1500= 0.41 (f=617MHz for worst-case)

Maximum Antenna Gain (Numeric)	Max. total tune up tolerance power (W)	Limit of Power Density (S) (W/m ²)	Minimum distance (m)
19.953	10.05	4.1	1.97

For Lower & Upper 700MHz band (728-757MHz, downlink)

1. According to the the test report GZCR230600056703, the tested maximum conducted power was within the tune up power range (36±1dBm) 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 and the direction gain = G_{ANT}+10lg(N_{ANT}) dBi = 13dBi.
3. The maximum total tune up tolerance power is 37dBm+10lg(2)= 40.02dBm= 10.05W.
4. The limit of Power Density (S) (mW/cm²)= f/1500= 0.49 (f=728MHz for worst-case)

Maximum Antenna Gain (Numeric)	Max. total tune up tolerance power (W)	Limit of Power Density (S) (W/m ²)	Minimum distance (m)
19.953	10.05	4.9	1.82



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For FirstNet band (758-768MHz, downlink)

1. According to the the test report GZCR230600056704, the tested maximum conducted power was within the tune up power range (36±1dBm) 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 and the direction gain = $G_{ANT}+10lg(N_{ANT})$ dBi = 13dBi.
3. The maximum total tune up tolerance power is 37dBm+10lg(2)= 40.02dBm= 10.05W.
4. The limit of Power Density (S) (mW/cm^2)= $f/1500$ = 0.51 (f=758MHz for worst-case)

Maximum Antenna Gain (Numeric)	Max. total tune up tolerance power (W)	Limit of Power Density (S) (W/m ²)	Minimum distance (m)
19.953	10.05	5.10	1.78

For ESMR band (862-969MHz, downlink)

1. According to the the test report GZCR230600056705, the tested maximum conducted power was within the tune up power range (36±1dBm) 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 and the direction gain = $G_{ANT}+10lg(N_{ANT})$ dBi = 13dBi.
3. The maximum total tune up tolerance power is 37dBm+10lg(2)= 40.02dBm= 10.05W.
4. The limit of Power Density (S) (mW/cm^2)= $f/1500$ = 0.57 (f=862MHz for worst-case)

Maximum Antenna Gain (Numeric)	Max. total tune up tolerance power (W)	Limit of Power Density (S) (W/m ²)	Minimum distance (m)
19.953	10.05	5.70	1.67

For Cellular band (869-894MHz, downlink)

1. According to the the test report GZCR230600056706, the tested maximum conducted power was within the tune up power range (36±1dBm) 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 and the direction gain = $G_{ANT}+10lg(N_{ANT})$ dBi = 13dBi.
3. The maximum total tune up tolerance power is 37dBm+10lg(2)= 40.02dBm= 10.05W.
4. The limit of Power Density (S) (mW/cm^2)= $f/1500$ = 0.58 (f=869MHz for worst-case)

Maximum Antenna Gain (Numeric)	Max. total tune up tolerance power (W)	Limit of Power Density (S) (W/m ²)	Minimum distance (m)
19.953	10.05	5.8	1.66

So the permitted use distance away from EUT external antenna is larger than 1.97m.



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5.2 EUT Constructional Details (EUT Photos)

Refer to Appendix - External and Internal Photos for GZCR2306000567AT.

- End of the Report -



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