

EMC-TRF-01 Rev 1.1 Report No.: GZCR231100125502

Page: 1 of 42 FCC ID: OJFDHRU-G2-85

# TEST REPORT

Application No.: GZCR2311001255AT

Applicant: Corning Optical Communications LLC

Address of Applicant: 840 N McCarthy Blvd Milpitas, CA 95035

Manufacturer: Corning Optical Communications LLC

840 N McCarthy Blvd Milpitas, CA 95035

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

47 CFR Part 20 47 CFR Part 22 47 CFR Part 90

Date of Receipt: 2021-03-09 for original report GZCR210300001402

2023-11-29 for report GZCR231100125502

**Date of Test:** 2021-03-11 to 2021-04-03 for original report GZCR210300001402

2023-12-4 to 2023-12-10 for report GZCR231100125502

Date of Issue: 2021-04-09 for original report GZCR210300001402

2023-12-20 for report GZCR231100125502

Test Result: Pass\*

Ricky Liu Manager

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<sup>\*</sup> In the configuration tested, the EUT complied with the standards specified above.



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Revision Record				
Version	Report No.	Date	Remark	
01	GZCR231100125502	2023-12-20	Original	

Authorized for issue by:		
	Kevin Zhang	
	Kevin Zhang /Project Engineer	
	Jery Chen	
	Jerry Chan /Reviewer	



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# **Test Summary**

## 2.1 ESMR (only for downlink: 862-869MHz)

Item	Requirement	Method	Result
Out-of-band rejection	KDB935210 D05 v01r04 clause 3.3	KDB935210 D05 v01r04 clause 3.3	PASS
Input-versus-output signal comparison	47 CFR Part 2.1049	KDB935210 D05 v01r04 clause 3.4	PASS
Mean output power and amplifier/booster gain	47 CFR Part 90.635	KDB935210 D05 v01r04 clause 3.5	PASS
Out-of-band/out-of-block (including intermodulation) emissions and spurious esmissions	47 CFR Part 90.691	KDB935210 D05 v01r04 clause 3.6	PASS
Frequency stability	47 CFR Part 90.213	47 CFR Part 2.1055 KDB935210 D05 v01r04 clause 3.7 ANSI C63.26-2015 Clause 5.6	PASS
Radiated spurious emissions	47 CFR Part 90.691	KDB935210 D05 v01r04 clause 3.8 ANSI C63.26-2015 Clause 5.5	PASS



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## 2.2 Cellular (only for downlink: 869-894MHz)

Item	Requirement	Method	Result
Out-of-band rejection	KDB935210 D05 v01r04 clause 3.3	KDB935210 D05 v01r04 clause 3.3	PASS
Input-versus-output signal comparison	47 CFR Part 2.1049	KDB935210 D05 v01r04 clause 3.4	PASS
Mean output power and amplifier/booster gain	47 CFR Part 22.913	KDB935210 D05 v01r04 clause 3.5	PASS
Out-of-band/out-of-block (including intermodulation) emissions and spurious esmissions	47 CFR Part 22.917	KDB935210 D05 v01r04 clause 3.6	PASS
Frequency stability	47 CFR Part 22.355	47 CFR Part 2.1055 KDB935210 D05 v01r04 clause 3.7 ANSI C63.26-2015 Clause 5.6	PASS
Radiated spurious emissions	47 CFR Part 22.917	KDB935210 D05 v01r04 clause 3.8 ANSI C63.26-2015 Clause 5.5	PASS

#### Remark:

According to the declaration from the applicant, the model dHRU-G2-85 in this report GZCR231100125502 and model dHRU-dHPAM-85 in report GZCR210300001402 (FCC ID: OJFDHRU-DHPAM-85) are identical in the electrical circuit design, layout, components used and internal wiring were identical, with only difference on the Model No ..

All test data in this report was copied from report **GZCR210300001402**.

Furthermore, tests using 100 MHz AWGN signal for 5GNR were supplemented in this report.



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## **General Information**

## 4.1 Details of E.U.T.

Power Supply: AC 100-240V, 50/60Hz Test Voltage: AC 110V, 60Hz

AC mains (unshielded, 1.5m) Cable:

Operating Temperature: -40 to +55 °C Operating Humidity: 5 to 95 %

Frequency Range: **ESMR** Uplink: 817MHz to 824MHz

> Downlink: 862MHz to 869MHz

Cellular Uplink: 824MHz to 849MHz

> Downlink: 869MHz to 894MHz

Radio System Type: ☐ GSM

**⊠** WCDMA

X LTE

Interface: RF Port: 2 (4.3-10-Female, ANT1~ANT2)

> 1 (SFP+) **Optical Port:**

Supported Channel

Bandwidth:

**GSM** 200 kHz **WCDMA** ⊠ 5MHz

LTE

☐ 3 MHz 1.4 MHz

> X 15 MHz 10 MHz 20 MHz

☐ 5 MHz

5G NR 10 MHz ⊠ 5 MHz 

20 MHz

Band	Technology	Supported Bandwidth
ESMR	3G	5MHz
	4G/5G	5MHz
Cellular	3G	5MHz
	4G/5G	5/10/15/20MHz



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**EUT MIMO property:** 2X2 MIMO

System Gain: Max. 43dB (Downlink)

External Dedicated Antenna Antenna Type:

Permission Antenna Gain: 10dBi or less V01.00.00.04 Software Version:

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 peformed 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.

## 4.2 Description of Support Units

Description	Manufacturer	Model No.	Serial No.
Notebook	IBM	T30	S/N78-3VMLX 06/01
IHU/HEU supplied by the applicant	Corning	1	1
DRU supplied by the applicant	Corning	/	1
ODU supplied by the applicant	Corning	dHRU-dHPOM	1
RIU supplied by the manufacturer	Corning	/	1
DCU supplied by the manufacturer	Corning	/	1
DEU supplied by the manufacturer	Corning	/	1



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## **4.3 Test Environment**

Environment Parameter Selected Values During Test		
Ralative Humidity	Ambient	
Value	Temperature (°ℂ)	Voltage (V)
TNVN	+20	AC 110V
TLVL	-40	AC 93.5V
TLVH	-40	AC 126.5V
THVL	+50	AC 93.5V
THVH	+50	AC 126.5V

VN: Normal Voltage

TN: Normal Teperature

VL: Lower Extreme Voltege

HL: Higher Extreme Voltage

TL: Lower Extreme Teperature

TH: Higher Extreme Teperature



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## 4.4 Test Configuration

ESMR (only for downlink: 862-869MHz)

RF Ch.	Test Conf.	Test Freq. (MHz)	Test Signal	Remark
В	DL_1S_B_AWGN	864.5		
М	DL_1S_M_AWGN	865.5		a single test signal
Т	DL_1S_T_AWGN	866.5	AWGN	
В	DL_2S_B_AWGN	864.5, 869.5	(99% OBW of 4.1MHz)	
Т	DL_2S_T_AWGN	861.5, 866.5		two adjacent test signals
В	DL_1S_B_GSM	862.4		
М	DL_1S_M_GSM	865.5		a single test signal
Т	DL_1S_T_GSM	868.6	GSM-TDMA	
В	DL_2S_B_GSM	862.4, 862.8		
Т	DL_2S_T_GSM	868.2, 868.6		two adjacent test signals
В	DL_1S_B_AWGN	912		
М	DL_1S_M_AWGN	865.5		a single test signal
Т	DL_1S_T_AWGN	819	100MHz AWGN	
В	DL_2S_B_AWGN	912, 1012		
Т	DL_2S_T_AWGN	719, 819		two adjacent test signals



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RF Ch.	Test Conf.	Test Freq. (MHz)	Test Signal	Remark
В	DL_1S_B_AWGN	871.5		
М	DL_1S_M_AWGN	881.5		a single test signal
Т	DL_1S_T_AWGN	891.5	AWGN	
В	DL_2S_B_AWGN	871.5, 876.5	(99% OBW of 4.1MHz)	
Т	DL_2S_T_AWGN	886.5, 891.5		two adjacent test signals
В	DL_1S_B_GSM	869.4		
М	DL_1S_M_GSM	881.5		a single test signal
Т	DL_1S_T_GSM	893.6	GSM-TDMA	
В	DL_2S_B_GSM	869.4, 869.8		
Т	DL_2S_T_GSM	893.2, 893.6		two adjacent test signals
В	DL_1S_B_AWGN	919		
М	DL_1S_M_AWGN	881.5		a single test signal
Т	DL_1S_T_AWGN	844	100MHz AWGN	
В	DL_2S_B_AWGN	919, 1019		
Т	DL_2S_T_AWGN	744, 844		two adjacent test signals

## 4.5 Measurement Uncertainty

No.	Item	Measurement Uncertainty
1	Radio Frequency	±5.5 x 10 <sup>-8</sup>
2	RF Conducted power	±0.68dB
3	Conducted Spurious Emissions	±1.04dB
4	4 RF Radiated Power	±4.5dB (below 1GHz)
4	RF Radiated Fower	±4.8dB (above 1GHz)
5	Radiated Spurious Emission Test	±4.5dB (30MHz-1GHz)
5	Radiated Spurious Emission Test	±4.8dB (1GHz-18GHz)
6	Temperature	±0.4°C
7	Humidity	±1.3%
8	Supply Voltages	±1.5%
9	Time	±3%



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#### 4.6 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services Co., Ltd., Guangzhou Branch EMC Laboratory, 198 Kezhu Road, Scientech Park, Guangzhou Economic & Technology Development District, Guangzhou. China 510663

Tel: +86 20 82155555 Fax: +86 20 82075059

## 4.7 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.

#### 4.8 Deviation from Standards

None

## 4.9 Abnormalities from Standard Conditions

None



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#### **Equipment List** 5

For original test

Conducted Test						
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date	
MXA Signal Analyzer	AgilentTechnologies	N9020A	SEM004-10	2021-03-02	2022-03-01	
ESG Vector Signal Generator	Keysight	E4438C	SEM006-03	2021-03-12	2022-03-11	
Signal Generator	Rohde & Schwarz	SMB100A	EMC2093	2021-01-09	2022-01-08	
MXG Vector Signal Generator (9kHz-6GHz)	Keysight	N5182B	EMC2216	2020-11-04	2021-11-03	
6dB Attenuator	HP	8491A	EMC2062	2020-04-15	2022-04-14	
MI CABLE	SGS-EMC	0.8M	EMC2136	2019-11-02	2021-11-01	
MI CABLE	SGS-EMC	0.8M	EMC2137	2019-11-02	2021-11-01	
Temperature Chamber	GZ GongWen Co.Ltd.	GDJW-100	EMC0039	2020-07-01	2021-06-30	
High-low temperature control box	GZ GongWen Co.Ltd	GDJW-100	EMC0039	2020-06-29	2021-06-28	
Radiated Test						
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date	
Chamber cable	HangTianXing	N/A	EMC0542	2019-06-28	2021-06-27	
Horn Antenna 1GHz- 18GHz	Rohde & Schwarz	HF906	EMC0518	2018-09-02	2021-09-01	
1GHz-26.5 GHz Pre- Amplifier	Agilent	8449B	EMC0521	2021-01-08	2022-01-07	
Amplifier	HP	8447F	EMC2065	2020-05-26	2021-05-25	
966 Anechoic Chamber	C.R.T	9m x 6m x 6m	EMC2142	2020-12-19	2023-12-18	
MXE EMI Receiver	Keysight	N9038A	EMC2139	2020-11-13	2021-11-12	
EXA Signal Analyzer	Keysight	N9010A	EMC2138	2020-11-13	2021-11-12	
Trilog Broadband Antenna 30MHz-1GHz	SCHWARZBECKME SS-ELEKTRONIK	VULB 9168	SEM003-18	2019-02-22	2022-02-22	
Test Software E3	Audix	Ver.6.120110a	GZE100-61	N/A	N/A	



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## For supplement test

Conducted test equipment					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
Temperature Chamber	GZ GongWen Co.Ltd.	GDJW-100	EMC0039	2023-06-29	2024-06-28
MI CABLE	SGS-EMC	0.8M	EMC2137	2023-11-02	2025-11-01
MI CABLE	SGS-EMC	0.8M	EMC2136	2023-11-02	2025-11-01
EXA Signal Analyzer (10Hz-44GHz)	Keysight	N9010A	EMC2138	2023-08-23	2024-08-22
MXA Signal Analyzer (10Hz-50GHz)	KEYSIGHT	N9020B	SEM004-24	2023-03-20	2024-03-19
4X4 Power Sensor Unit	TST	TSPS2023R	EMC2257	2023-08-23	2024-08-22
Test Software	TST	V2.0	GZE100-78	N/A	N/A
ESG vector signal generator (250kHz-6GHz)	Agilent Technologies	E4438C	SEM006-03	2023-02-20	2024-02-19

Radiated test equipment (30MHz-1GHz)					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
10m Semi-Anechoic Chamber	ETS	N/A	EMC0530	2022-10-16	2025-10-15
Coaxial cable	Mirco-COAX UTIFLEX	311A	EMC0540	2023-06-14	2025-06-13
Amplifier (9kHz-1.3GHz)	HP	8447F	EMC2065	2023-06-14	2024-06-13
EMI Test Receiver (1Hz- 8GHz)	Rohde & Schwarz	ESW8	EMC2220	2023-05-19	2024-05-18
Test Software E3	Audix	Ver.6.120110a	GZE100-61	N/A	N/A
Trilog Broadband Antenna (25MHz-1GHz)	SCHWARZBECK MESS-ELEKTRONIK	VULB 9168	EMC2174	2022-06-19	2025-06-18
TRILOG Broadband Antenna (25M-2GHz)	SCHWARZBECK	VULB 9168	SEM003-18	2022-03-03	2025-03-02
EMI Test Receiver (1Hz- 8GHz)	Rohde & Schwarz	ESW8	EMC2220	2023-05-19	2024-05-18



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Radiated test equipment (above 1GHz)					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
1GHz-26.5 GHz Pre- Amplifier	Agilent	8449B	EMC0521	2022-12-16	2023-12-15
Microwave Broadband Preamplifier (18-40GHz)	SCHWARZBECK	BBV 9721	EMC2172	2023-08-21	2024-08-20
EMI Test Receiver (10Hz-26.5GHz)	Rohde & Schwarz	ESIB26	EMC0522	2022-12-16	2023-12-15
EXA Signal Analyzer (10Hz-44GHz)	Keysight	N9010A	EMC2138	2023-08-23	2024-08-22
Chamber cable (Above 1GHz)	Scoflex	KMKM-8.0m	EMC0545	2022-08-24	2024-08-23
Chamber Cable (Below 1GHz)	Scoflex	KMKM-8.0m	EMC0546	2022-08-24	2024-08-23
Trilog Broadband Antenna (25MHz-1GHz)	SCHWARZBECK	VULB 9160	EMC2025	2022-09-07	2025-09-06
Horn Antenna (1GHz- 18GHz)	SCHWARZBECK MESS-ELEKTRONIK	BBHA 9120D	EMC2026	2022-09-21	2025-09-20
Horn Antenna 1-18GHz	SCHWARZBECK MESS-ELEKTRONIK	BBHA 9120D	EMC2251	2022-02-02	2025-08-01
Horn Antenna (14- 40GHz)	SCHWARZBECK	BBHA 9170	EMC2041	2023-06-18	2026-06-17
Broad-Band Horn Antenna (15-40GHz)	Schwarzbeck	BBHA 9170	SEM003-15	2021-7-11	2024-7-10
966 Anechoic Chamber	C.R.T	9m x 6m x 6m	EMC2142	2020-12-20	2023-12-19
Test Software E3	Audix	Ver.6.120110a	GZE100-61	N/A	N/A



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## 6 Radio Spectrum Matter Test Result for ESMR

## 6.1 Out-of-band rejection

Test Requirement: KDB 935210 D05 clause 3.3
Test Method: KDB 935210 D05 clause 3.3

Limit: Within the passband

## 6.1.1 E.U.T. Operation

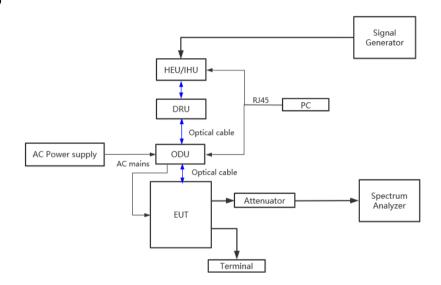
Operating Environment:

Temperature: 24.6 °C Humidity: 59 % RH Atmospheric Pressure: 1020 mbar

Test Mode: Set the EUT to maximum output power and maximum gain.

EUT Configuration: Refer to clause 4.4 in this report.

## 6.1.2 Test Setup





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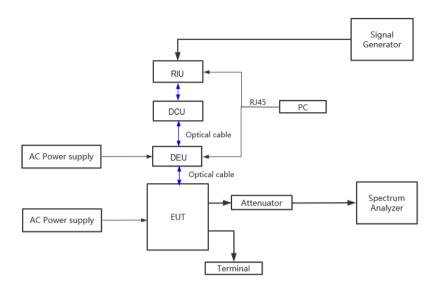
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#### 6.1.3 Measure Data

Please refer to Appendix-Test Data and Result for report GZCR231100125502



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## 6.2 Input-versus-output signal comparison

47 CFR Part 2.1049 Test Requirement:

Test Method: KDB 935210 D05 clause 3.4

Limit: Compare the input signal to the output signal to affirm that they are similar

## 6.2.1 E.U.T. Operation

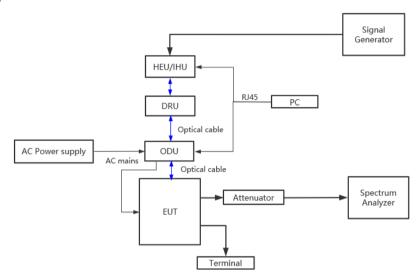
Operating Environment:

24.6 59 % RH Temperature: Humidity: Atmospheric Pressure: 1020 mbar

Test Mode: Set the EUT to maximum output power and maximum gain.

**EUT Configuration:** Refer to clause 4.4 in this report.

### 6.2.2 Test Setup





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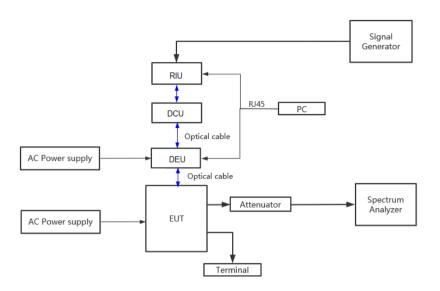
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#### 6.2.3 Measure Data

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## 6.3 Mean output power and amplifier/booster gain

Test Requirement: 47 CFR Part 90.635

Test Method: KDB 935210 D05 clause 3.5

Limit: The effective radiated power and antenna height for base stations may not

exceed 1 kilowatt (30 dBw) and 304 m. (1,000 ft.) above average terrain (AAT), respectively, or the equivalent thereof as determined from the Table. These are maximum values, and applicants will be required to justify power levels and

antenna heights requested.

### 6.3.1 E.U.T. Operation

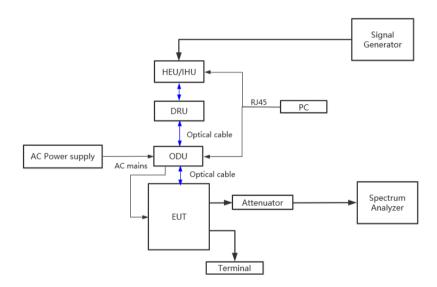
Operating Environment:

Temperature: 24.6 °C Humidity: 59 % RH Atmospheric Pressure: 1020 mbar

Test Mode: Set the EUT to maximum output power and maximum gain.

EUT Configuration: Refer to clause 4.4 in this report.

### 6.3.2 Test Setup





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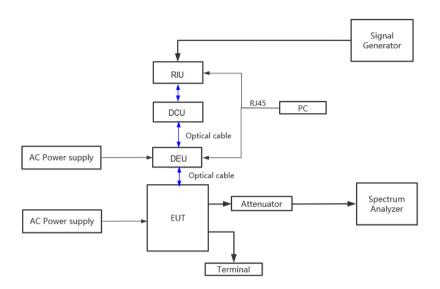
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#### 6.3.3 Measure Data

Please refer to Appendix-Test Data and Result for report GZCR231100125502



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## 6.4 Out-of-band/out-of-block (including intermodulation) emissions and spurious

47 CFR Part 90,691 Test Requirement:

Test Method: KDB 935210 D05 clause 3.6

Limit: Out-of-band emission requirement shall apply only to the "outer" channels

included in an EA license and to spectrum adjacent to interior channels used by

incumbent licensees. The emission limits are as follows:

(1) For any frequency removed from the EA licensee's frequency block by up to and including 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least 116 Log10(f/6.1) decibels or 50 + 10 Log10(P) decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 12.5 kHz

(2) For any frequency removed from the EA licensee's frequency block greater than 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least 43 + 10Log10(P) decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is

greater than 37.5 kHz.

(reduce 3.01dB when on 2×2 MIMO mode)

### 6.4.1 E.U.T. Operation

Operating Environment:

Temperature: Humidity: Atmospheric Pressure: 1020 24.6 °C 59 % RH

Test Mode: Set the EUT to maximum output power and maximum gain.

**EUT Configuration:** Refer to clause 4.4 in this report.



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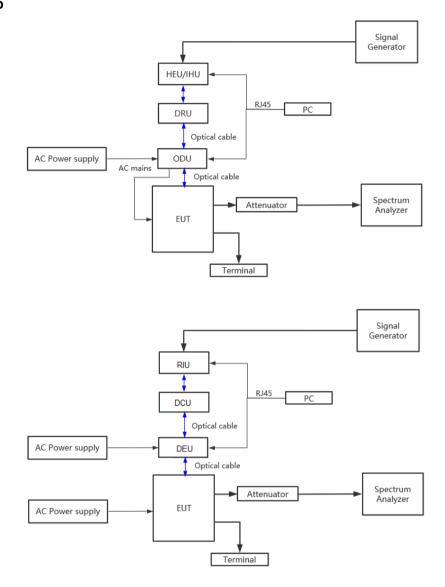


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## 6.4.2 Test Setup



## 6.4.3 Measurement Record

Please refer to Appendix-Test Data and Result for report GZCR231100125502



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## 6.5 Frequency stability

Test Requirement: 47 CFR Part 90.213 Test Method: 47 CFR Part 2.1055

> KDB 935210 D05 clause 3.7 ANSI C63.26-2015 clause 5.6

Limit: 1.5 ppm

## 6.5.1 E.U.T. Operation

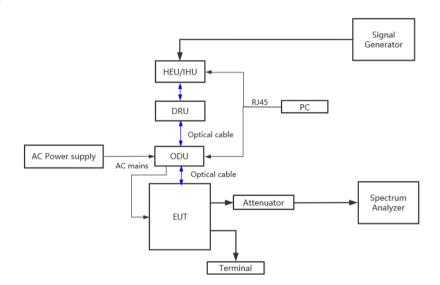
Operating Environment:

Temperature: 24.6 Humidity: 59 % RH Atmospheric Pressure: 1020 mbar

Test Mode: Set the EUT to maximum output power and maximum gain.

**EUT Configuration:** Refer to clause 4.4 in this report.

## 6.5.2 Test Setup





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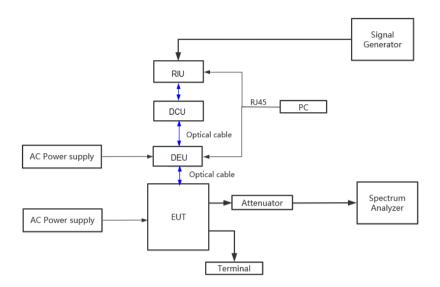
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#### 6.5.3 Measure Data

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## 6.6 Radiated spurious emission

Test Requirement: 47 CFR Part 90.691(a)

Test Method: KDB 935210 D05 clause 3.8

ANSI C63.26-2015 clause 5.6

Limit: Out-of-band emission requirement shall apply only to the "outer" channels

included in an EA license and to spectrum adjacent to interior channels used by

incumbent licensees. The emission limits are as follows:

(1) For any frequency removed from the EA licensee's frequency block by up to and including 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least 116 Log10(f/6.1) decibels or 50 + 10 Log10(P) decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 12.5 kHz

(2) For any frequency removed from the EA licensee's frequency block greater than 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least 43 + 10Log10(P) decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 37.5 kHz.

### 6.6.1 E.U.T. Operation

Operating Environment:

Temperature: 25.1 °C Humidity: % RH Atmospheric Pressure: 1010 mbar

Set the EUT to maximum output power and maximum gain (activate MIMO mode Test Mode:

simultaneously).



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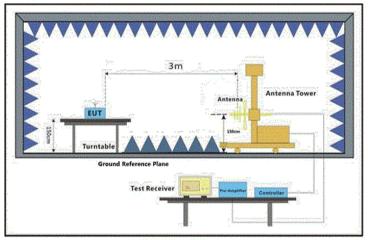


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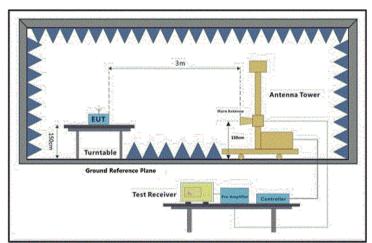
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## 6.6.2 Test Setup



30MHz-1GHz



Above 1GHz



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### 6.6.3 Test procedure

- 1. Scan from 30MHz to 12.75GHz, find the maximum radiation frequency to measure.
- 2. The technique used to find the Spurious Emissions of the transmitter was the antenna substitution method. Substitution method was performed to determine the actual ERP/EIRP emission levels of the EUT.

Below 1GHz test procedure as below:

- 1) The EUT was powered on and placed on a table in the chamber. The antenna of the transmitter was extended to its maximum length. modulation mode and the measuring receiver shall be tuned to the frequency of the transmitter under test.
- 2) Rotating through 360° the turntable. After the fundamental emission was maximized, a field strength measurement was made.
- 3) Steps 1) and 2) were performed with the EUT and the receive antenna in both vertical and horizontal polarization.
- 4) The transmitter was then removed and replaced with another antenna. The center of the antenna was approximately at the same location as the center of the transmitter.
- 5) A signal at the disturbance was fed to the substitution antenna by means of a non-radiating cable. With both the substitution and the receive antennas horizontally polarized, the receive antenna was raised and lowered to obtain a maximum reading at the test receiver. The level of the signal generator was adjusted until the measured field strength level in step 2) is obtained for this set of conditions.
- 6) The output power into the substitution antenna was then measured.
- 7) Steps 5) and 6) were repeated with both antennas vertically polarized.
- 8) Calculate power in dBm by the following formula:

Level (dBm) = Read Level (dBm) + Correction Factor (dB)

Above 1GHz test procedure as below:

- 1) Different between above is the test site, change from Semi- Anechoic Chamber to fully Anechoic Chamber.
- 2) Calculate power in dBm by the following formula:

Level (dBm) = Read Level (dBm) + Correction Factor (dB)

#### 6.6.4 Measure Data

Please refer to Appendix-Test Data and Result for report GZCR231100125502



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## 7 Radio Spectrum Matter Test Result for Cellular

## 7.1 Out-of-band rejection

Test Requirement: KDB 935210 D05 clause 3.3
Test Method: KDB 935210 D05 clause 3.3

Limit: Within the passband

## 7.1.1 E.U.T. Operation

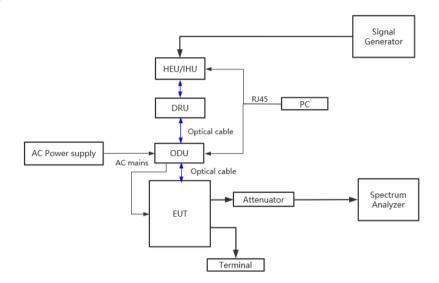
Operating Environment:

Temperature: 24.6 °C Humidity: 59 % RH Atmospheric Pressure: 1020 mbar

Test Mode: Set the EUT to maximum output power and maximum gain.

EUT Configuration: Refer to clause 4.4 in this report.

## 7.1.2 Test Setup





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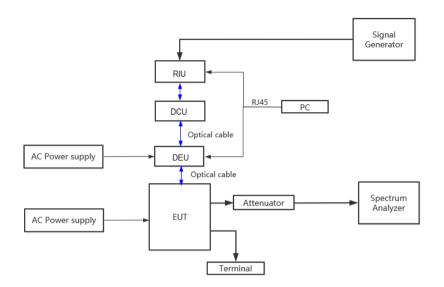
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#### 7.1.3 Measure Data

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## 7.2 Input-versus-output signal comparison

47 CFR Part 2.1049 Test Requirement:

Test Method: KDB 935210 D05 clause 3.4

Limit: Compare the input signal to the output signal to affirm that they are similar

### 7.2.1 E.U.T. Operation

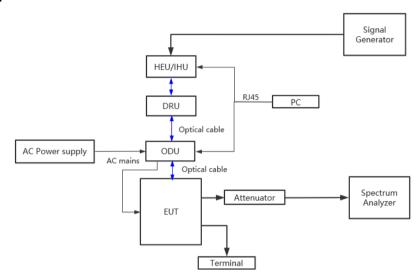
Operating Environment:

24.6 59 % RH Temperature: Humidity: Atmospheric Pressure: 1020 mbar

Test Mode: Set the EUT to maximum output power and maximum gain.

**EUT Configuration:** Refer to clause 4.4 in this report.

### 7.2.2 Test Setup





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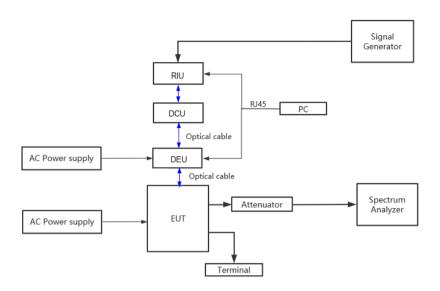
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#### 7.2.3 Measure Data

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## 7.3 Mean output power and amplifier/booster gain

Test Requirement: 47 CFR Part 22.913

Test Method: KDB 935210 D05 clause 3.5

Limit: The ERP of transmitters in the Cellular Radiotelephone Service must not

exceed 500 watts per emission

### 7.3.1 E.U.T. Operation

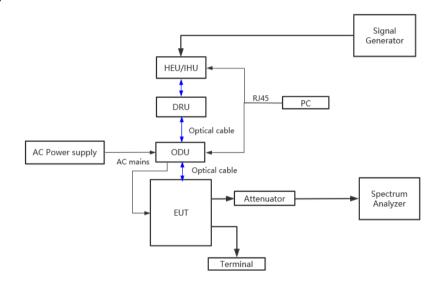
Operating Environment:

Temperature: 24.6 Humidity: 59 % RH Atmospheric Pressure: 1020 mbar

Test Mode: Set the EUT to maximum output power and maximum gain.

**EUT Configuration:** Refer to clause 4.4 in this report.

### 7.3.2 Test Setup





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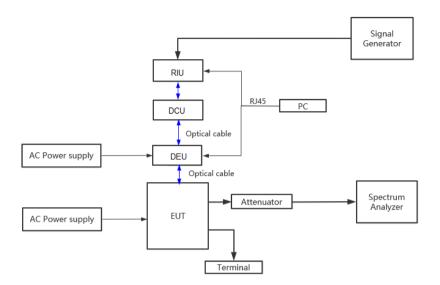
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#### 7.3.3 Measure Data

Please refer to Appendix-Test Data and Result for report GZCR231100125502



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## 7.4 Out-of-band/out-of-block (including intermodulation) emissions and spurious

Test Requirement: 47 CFR Part 27.53(g)

Test Method: KDB 935210 D05 clause 3.6

Limit: The power of any emission outside of the authorized operating frequency

ranges must be attenuated below the transmitting power (P) by a factor of at

least 43 + 10 log(P) dB.

(reduce 3.01dB when on 2×2 MIMO mode)

### 7.4.1 E.U.T. Operation

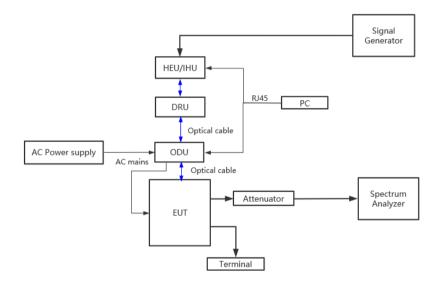
Operating Environment:

Temperature: 24.6 °C Humidity: 59 % RH Atmospheric Pressure: 1020 mbar

Test Mode: Set the EUT to maximum output power and maximum gain.

EUT Configuration: Refer to clause 4.4 in this report.

### 7.4.2 Test Setup





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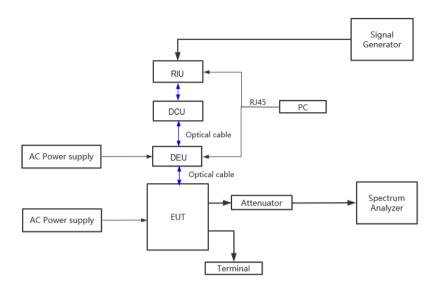
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#### 7.4.3 Measure Data

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## 7.5 Frequency stability

Test Requirement: 47 CFR Part 22.355 Test Method: 47 CFR Part 2.1055

> KDB 935210 D05 clause 3.7 ANSI C63.26-2015 clause 5.6

Limit: 1.5 ppm

## 7.5.1 E.U.T. Operation

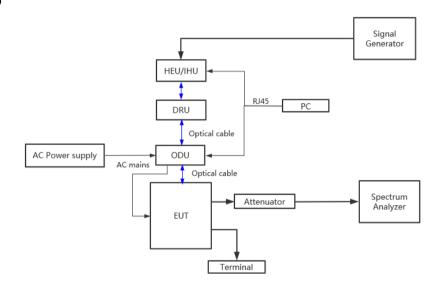
Operating Environment:

Temperature: 24.6 Humidity: 59 % RH Atmospheric Pressure: 1020 mbar

Test Mode: Set the EUT to maximum output power and maximum gain.

**EUT Configuration:** Refer to clause 4.4 in this report.

### 7.5.2 Test Setup





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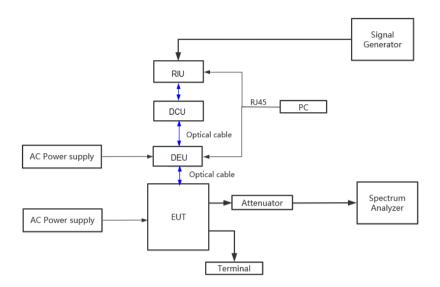
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#### 7.5.3 Measure Data

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## 7.6 Radiated spurious emission

Test Requirement: 47 CFR Part 22.917

Test Method: KDB 935210 D05 clause 3.8

ANSI C63.26-2015 clause 5.6

Limit: The power of any emission outside of the authorized operating frequency

ranges must be attenuated below the transmitting power (P) by a factor of at

least 43 + 10 log(P) dB.

### 7.6.1 E.U.T. Operation

Operating Environment:

25.1 °C Temperature: % RH Atmospheric Pressure: Humidity: 59 1010 mbar

Set the EUT to maximum output power and maximum gain (activate MIMO mode

Test Mode: simultaneously).



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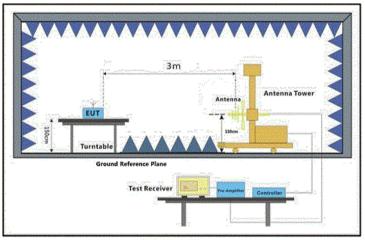


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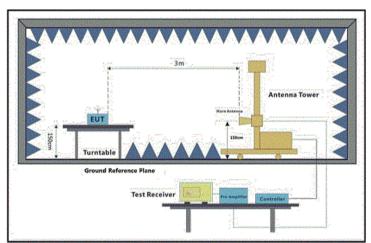
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## 7.6.2 Test Setup



30MHz-1GHz



Above 1GHz



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#### 7.6.3 Test procedure

- 1. Scan from 30MHz to 12.75GHz, find the maximum radiation frequency to measure.
- 2. The technique used to find the Spurious Emissions of the transmitter was the antenna substitution method. Substitution method was performed to determine the actual ERP/EIRP emission levels of the EUT.

Below 1GHz test procedure as below:

- 1) The EUT was powered on and placed on a table in the chamber. The antenna of the transmitter was extended to its maximum length. modulation mode and the measuring receiver shall be tuned to the frequency of the transmitter under test.
- 2) Rotating through 360° the turntable. After the fundamental emission was maximized, a field strength measurement was made.
- 3) Steps 1) and 2) were performed with the EUT and the receive antenna in both vertical and horizontal polarization.
- 4) The transmitter was then removed and replaced with another antenna. The center of the antenna was approximately at the same location as the center of the transmitter.
- 5) A signal at the disturbance was fed to the substitution antenna by means of a non-radiating cable. With both the substitution and the receive antennas horizontally polarized, the receive antenna was raised and lowered to obtain a maximum reading at the test receiver. The level of the signal generator was adjusted until the measured field strength level in step 2) is obtained for this set of conditions.
- 6) The output power into the substitution antenna was then measured.
- 7) Steps 5) and 6) were repeated with both antennas vertically polarized.
- 8) Calculate power in dBm by the following formula:

Level (dBm) = Read Level (dBm) + Correction Factor (dB)

#### 7.6.4 Measurement Record

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#### 8 **Test Setup Photographs**

Refer to Appendix - Test Setup Photos for GZCR2311001255AT.

#### **EUT Constructional Details (EUT Photos)** 9

Please refer to Appendix A – EUT Construction Details of GZCR2311001255AT for detail.

--Report End--



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