

TEST REPORT

Application No.: GZCR2411001351AT
Applicant: Comba Telecom Network Systems Limited
Address of Applicant: Flat/Rm 10, 3/F, Bio-Informatics Ctr, 2 Science Park West Avenue, HK Science Park, Pak Shek Kok, N.T. Hong Kong
Manufacturer: Comba Network Systems Company Limited
Address of Manufacturer: No. 10 Shenzhou Road, Guangzhou Science City, Guangzhou 510663, Guangdong, P.R. China
Factory: Comba Telecom Technology (Guangzhou) Ltd.
Address of Factory: No. 6 Jinbi Road, Economics and Technology Development District, Guangzhou, Guangdong, China
Product Name: Complex NG
Model No.: MRU-78517192537-AC, MRU-78517192537-DC ♣
♣ Please refer to section 2 of this report which indicates which item was actually tested and which were electrically identical.
Trade Mark: Comba
Standard(s) : 47 CFR Part 2
47 CFR Part 20
47 CFR Part 27
Date of Receipt: 2024-11-13
Date of Test: 2024-11-14 to 2024-12-13
Date of Issue: 2024-12-20

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



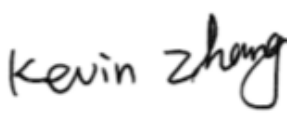

Jerry Chan
Manager



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Revision Record			
Version	Report No.	Date	Remark
01	GZCR241100135107	2024-12-20	Original

Authorized for issue by:			
			
		<hr/> Kevin Zhang/Project Engineer	
			
		<hr/> Ricky Liu/Reviewer	



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2 Test Summary

Item	Standard	Method	Requirement	Result
Out-of-band rejection	KDB935210 D05 v01r04	KDB935210 D05 v01r04 clause 3.3	KDB935210 D05 v01r04 clause 3.3	Pass
Input-versus-output signal comparison	47 CFR Part 2	KDB935210 D05 v01r04 clause 3.4	Part 2.1049	Pass
Mean output power and amplifier/booster gain	47 CFR Part 27	KDB935210 D05 v01r04 clause 3.5	Part 27.50(d)(2) Part 27.50(d)(5)	Pass
Out-of-band/out-of-block(including intermodulation) emissions		KDB935210 D05 v01r04 clause 3.6	Part 27.53(h)(1)	Pass
Conducted spurious emissions		KDB935210 D05 v01r04 clause 3.6	Part 27.53(h)(1)	Pass
Frequency stability		47 CFR Part 2.1055 KDB935210 D05 v01r04 clause 3.7 ANSI C63.26-2015 Clause 5.6	Part 27.54	Pass
Radiated spurious emissions		KDB935210 D05 v01r04 clause 3.8 ANSI C63.26-2015 Clause 5.5	Part 27.53(h)(1)	Pass

The EUT is a remote unit of DAS which can be capable of multi-band operation (details refer to clause 4.1 of this report). It receives base-station downlink via fiber-optic or coaxial cable from host unit, transmits via antenna to handset, and returns handset uplink via fiber-optic or coaxial cable to host unit.

Only test for AWS-2 & EAWS bands downlink in this report.

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.

✦ Declaration of EUT Family Grouping:

Model No.: MRU-78517192537-AC, MRU-78517192537-DC

According to the declaration from the applicant, the electrical circuit design, layout, components used and internal wiring were identical for all models, with only difference on power supply module.

Therefore, only one model MRU-78517192537-AC was test in this report.



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4 General Information

4.1 Details of EUT

Power Supply:	AC 100-240V, 50-60Hz	
Test Voltage:	AC 120V	
Cable:	AC mains (4m, unshielded)	
Operating Temperature:	-20 to +55 °C	
Operating Humidity:	≤95%	
Frequency Range:	Lower & Upper 700MHz	Uplink: 710-788MHz Downlink: 728-758MHz
	FirstNet	Uplink: 788-798MHz Downlink: 758-768MHz
	ESMR	Uplink: 817-824MHz Downlink: 862-869MHz
	Cellular	Uplink: 824-849MHz Downlink: 869-894MHz
	Broadband PCS	Uplink: 1850-1915MHz Downlink: 1930-1995MHz
	AWS-2	Uplink: 1915-1920MHz Downlink: 1995-2000MHz
	EAWS	Uplink: 1695-1780MHz Downlink: 2110-2200MHz
	BRS/EBS	Uplink: 2496-2690MHz Downlink: 2496-2690MHz
	3.45GHz Service band	Uplink: 3450-3550MHz Downlink: 3450-3550MHz
	3.7GHz Service band	Uplink: 3700-3980MHz Downlink: 3700-3980MHz
Support Technology:	LTE	
	5G NR	
Interface:	Antenna Port	1 (4.3-10 Female)
	Optical Port	1 (SC-APC)
	OMT Port	1 (RJ-45)



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Normal Output Power: (per antenna port, only downlink)	Lower & Upper 700MHz	30dBm
	FirstNet	30dBm
	ESMR	30dBm
	Cellular	30dBm
	Broadband PCS	33dBm
	AWS-2	33dBm
	EAWS	33dBm
	BRS/EBS	37dBm
	3.45GHz Service band	37dBm
	3.7GHz Service band	37dBm
Normal System Gain: (only downlink)	Lower & Upper 700MHz	15dB
	FirstNet	15dB
	ESMR	15dB
	Cellular	15dB
	Broadband PCS	18dB
	AWS-2	18dB
	EAWS	18dB
	BRS/EBS	22dB
	3.45GHz Service band	22dB
	3.7GHz Service band	22dB
Antenna Type:	External Dedicated Antenna	
Permission Antenna Gain:	5dBi or less	
Software Version:	V01.00.00.04	
Remark: The information in this section is provided by the applicant or manufacturer, SGS is not liable to the accuracy, suitability, reliability or/and integrity of the information.		



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4.2 Description of Support Units

Description	Manufacturer	Model No.	Serial No.
Notebook	LENOVO	Lenovo Xiaoxincao 5000	PF0TNMG8
MU supplied by the client	Comba	Complex NG MU	/
Matched load and attenuator supplied by the client	/	/	/

4.3 Test Environment

Environment Parameter	Selected Values During Test	
Relative Humidity	Ambient	
Value	Temperature (°C)	Voltage (V)
TNVN	Asmbient	AC 120
TLVL	-30	AC 102
TLVH	-30	AC 138
THVL	+50	AC 102
THVH	+50	AC 138

VN: Normal Voltage, TN: Normal Teperature

VL: Lower Extreme Voltege, VH: Higher Extreme Voltage

TL: Lower Extreme Teperature, TH: Higher Extreme Teperature

4.4 Measurement Uncertainty

No.	Item	Measurement Uncertainty
1	RF Output Power	±0.75dB
2	Transmitter unwanted emissions	±0.75dB
3	Radiated Spurious Emission	±5.06dB (30MHz-1GHz; 3m); ±4.46dB (30MHz-1GHz; 10m); ±5.08dB (1GHz-6GHz); ±5.14dB (6GHz-18GHz)
4	Occupied Channel Bandwidth	± 0.274%

Remark:

The U_{lab} (lab Uncertainty) is less than U_{CISPR} (CISPR Uncertainty) or U_{ETSI} (ETSI Uncertainty).

Emission decision rule:

- Compliance is deemed to occur if no measured disturbance level exceeds the disturbance limit, marked as Pass in the report.
- Non-compliance is deemed to occur if any measured disturbance level exceeds the disturbance limit, marked as Fail in the report.



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4.5 Test Signals and Test Channels

DL 2110-2200MHz			
Test Channel	Test Frequency (MHz)	Test Signal	Stimulus Condition
LCH	2112.5	4.1MHz AWGN	a single test signal
MCH	2155		
HCH	2197.5		
LCH	2112.5, 2117.5	100MHz AWGN	two adjacent test signals
HCH	2192.5, 2197.5		
LCH	2160	100MHz AWGN	a single test signal
MCH	2155		
HCH	2150		
LCH	2110.4	GSM-TDMA	a single test signal
MCH	2155		
HCH	2199.6		
LCH	2110.4, 2110.8		two adjacent test signals
HCH	2199.2, 2199.6		

LCH: Lowest Channel
MCH: Middle Channel
HCH: Highest Channel
DL: Downlink Path
UL: Uplink Path

The EUT cannot accommodate two simultaneous 100MHz AWGN signals within the passband.



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DL 1995-2000MHz			
Test Channel	Test Frequency (MHz)	Test Signal	Stimulus Condition
MCH	1997.5	4.1MHz AWGN	a single test signal
MCH	1997.5	100MHz AWGN	a single test signal
LCH	1995.2	GSM-TDMA	a single test signal
MCH	1997.5		
HCH	1999.8		
LCH	1995.2, 1995.6		two adjacent test signals
HCH	1999.4, 1999.8		

LCH: Lowest Channel
MCH: Middle Channel
HCH: Highest Channel
DL: Downlink Path
UL: Uplink Path

The EUT cannot accommodate two simultaneous AWGN signals within the passband.

4.6 Test Location

All tests were performed at:
SGS-CSTC Standards Technical Services Co., Ltd., Guangzhou Branch EMC Laboratory,
No.198, Kezhu Road, Science City, Economic & Technological Development Area, Guangzhou,
Guangdong, China 510663
Tel: +86 20 82155555
No tests were sub-contracted.



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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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5 Equipment List

Conducted test equipment					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
Temperature Chamber	GZ GongWen Co.Ltd.	GDJW-100	EMC0039	2024-06-17	2025-06-16
EXA Signal Analyzer (10Hz-44GHz)	Keysight	N9010A	EMC2138	2024-08-19	2025-08-18
MXA Signal Analyzer (10Hz-50GHz)	KEYSIGHT	N9020B	SEM004-24	2024-03-16	2025-03-15
Spectrum Analyzer(9kHz-30GHz)	Rohde & Schwarz	FSP30	SEM004-06	2024-09-21	2025-09-20
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
4X4 Power Sensor Unit	TST	TSPS2023R	EMC2257	2024-08-19	2025-08-18
Temperature Chamber	GZ GongWen Co.Ltd.	GDJW-100	EMC0039	2024-06-17	2025-06-16
ESG vector signal generator (250kHz-6GHz)	Agilent Technologies	E4438C	SEM006-03	2024-02-19	2025-02-18

Radiated test equipment					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
1GHz-26.5 GHz Pre-Amplifier	Agilent	8449B	EMC0521	2024-10-14	2025-10-13
Microwave Broadband Preamplifier (18-40GHz)	SCHWARZBECK	BBV 9721	EMC2172	2024-08-19	2025-08-18
EMI Test Receiver (10Hz-26.5GHz)	Rohde & Schwarz	ESIB26	EMC0522	2023-12-15	2024-12-14
EXA Signal Analyzer (10Hz-44GHz)	Keysight	N9010A	EMC2138	2024-08-19	2025-08-18
Chamber cable (Above 1GHz)	Scoflex	KMKM-8.0m	EMC0545	2024-08-19	2026-08-18
Chamber Cable (Below 1GHz)	Scoflex	KMKM-8.0m	EMC0546	2024-08-19	2026-08-18
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	2024-07-09	2026-07-08
966 Anechoic Chamber	C.R.T	9m x 6m x 6m	EMC2142	2023-12-23	2026-12-22
Test Software E3	Audix	Ver.6.120110a	GZE100-61	N/A	N/A



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6 Radio Spectrum Matter Test Results

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

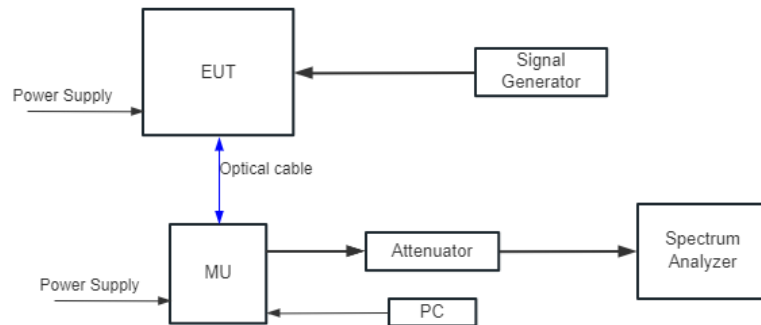
6.1.1 E.U.T. Operation

Operating Environment:

Temperature: 22~26 °C Humidity: 45~60 % RH Atmospheric Pressure: 1010 mbar

EUT Operation: Drive the EUT to the maximum output power at maximum gain.

6.1.2 Test Setup



6.1.3 Measurement Record

Please refer to Appendix - Test Data and Result for report GZCR241100135107.



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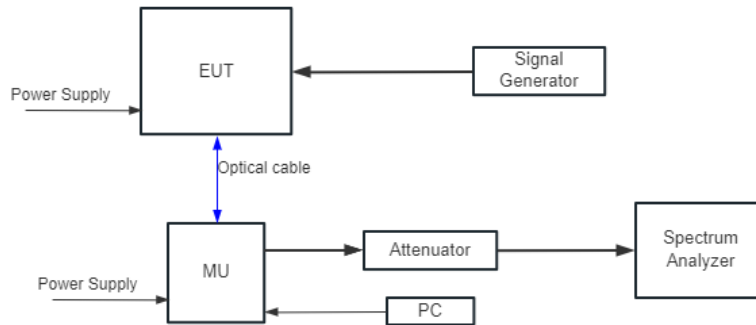
6.2 Input versus output comparison

Test Requirement: 47 CFR Part 2.1049
 Test Method: KDB 935210 D05 clause 3.4
 Limit: The spectral plots of the output signal and the input signal are similar (in passband and rolloff characteristic features and relative spectral locations).

6.2.1 E.U.T. Operation

Operating Environment:
 Temperature: 22~26 °C Humidity: 45~60 % RH Atmospheric Pressure: 1010 mbar
 EUT Operation: Drive the EUT to the maximum output power at maximum gain.

6.2.2 Test Setup



6.2.3 Measurement Record

Please refer to Appendix - Test Data and Result for report GZCR241100135107.



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6.3 Mean output power and amplifier/booster gain

Test Requirement: 47 CFR Part 27.50(d)(2), 27.50(d)(5)

Test Method: KDB 935210 D05 clause 3.5

Limit: An equivalent isotropically radiated power (EIRP) of 1640 watts when transmitting with an emission bandwidth of 1 MHz or less.
An EIRP of 1640 watts/MHz when transmitting with an emission bandwidth greater than 1 MHz.
In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

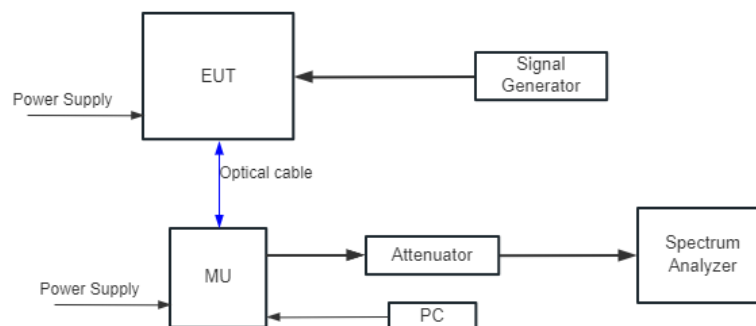
6.3.1 E.U.T. Operation

Operating Environment:

Temperature: 22~26 °C Humidity: 45~60 % RH Atmospheric Pressure: 1010 mbar

EUT Operation: Drive the EUT to the maximum output power at maximum gain.

6.3.2 Test Setup



6.3.3 Measurement Record

Please refer to Appendix - Test Data and Result for report GZCR241100135107.



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

Test Requirement: 47 CFR Part 27.53(h)(1)
 Test Method: KDB 935210 D05 clause 3.6
 Limit: the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least $43 + 10 \log_{10}(P)$ dB.

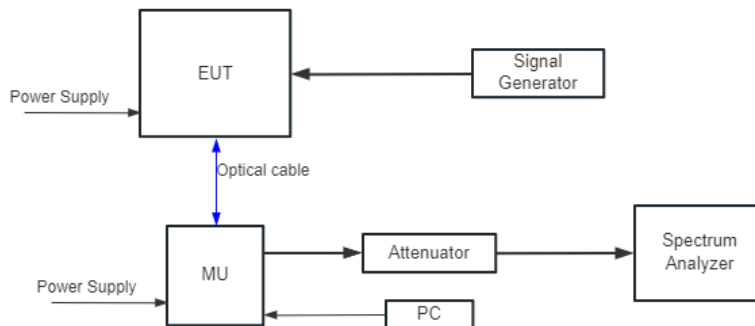
6.4.1 E.U.T. Operation

Operating Environment:

Temperature: 22~26 °C Humidity: 45~60 % RH Atmospheric Pressure: 1010 mbar

EUT Operation: Drive the EUT to the maximum output power at maximum gain.

6.4.2 Test Setup



6.4.3 Measurement Record

Please refer to Appendix - Test Data and Result for report GZCR241100135107.



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6.5 Conducted Spurious emissions

Test Requirement: 47 CFR Part 27.53(h)(1)

Test Method: KDB 935210 D05 clause 3.6

Limit: the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least $43 + 10 \log_{10}(P)$ dB.
 For operations in the 1995–2000 MHz band, the power of any emission between 2005–2020MHz shall be attenuated below the transmitter power (P) in watts by at least $70 + 10 \log_{10}(P)$ dB

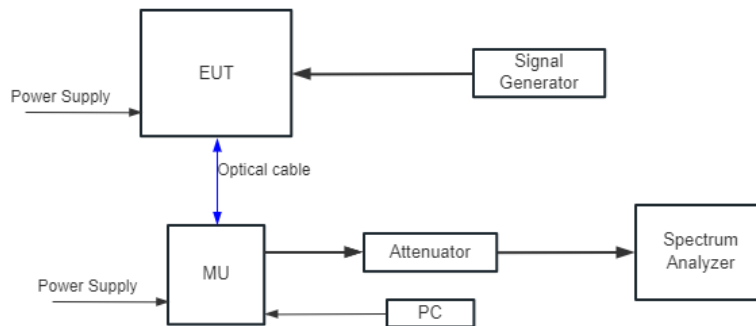
6.5.1 E.U.T. Operation

Operating Environment:

Temperature: 22~26 °C Humidity: 45~60 % RH Atmospheric Pressure: 1010 mbar

EUT Operation: Drive the EUT to the maximum output power at maximum gain.

6.5.2 Test Setup



6.5.3 Measurement Record

Please refer to Appendix - Test Data and Result for report GZCR241100135107.



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6.6 Frequency Stability

Test Requirement: 47 CFR Part 27.54

Test Method: 47 CFR Part 2.1055
KDB 935210 D05 clause 3.7
ANSI C63.26-2015 clause 5.6

Limit: The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

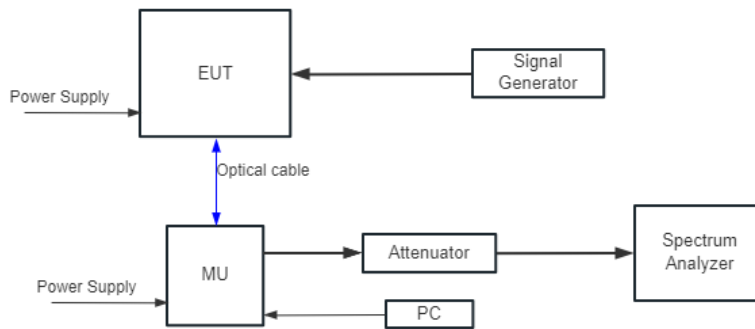
6.6.1 E.U.T. Operation

Operating Environment:

Temperature: 22~26 °C Humidity: 45~60 % RH Atmospheric Pressure: 1010 mbar

EUT Operation: Drive the EUT to the maximum output power at maximum gain.

6.6.2 Test Setup



6.6.3 Measurement Record

Please refer to Appendix - Test Data and Result for report GZCR241100135107.



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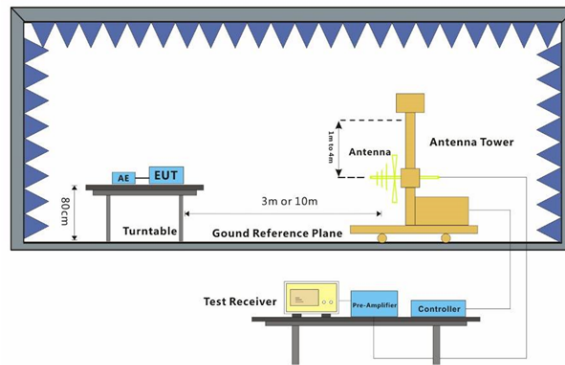
6.7 Radiated Spurious emission

Test Requirement: 47 CFR Part 27.53(h)(1)
 Test Method: KDB 935210 D05 clause 3.8
 ANSI C63.26-2015 clause 5.5
 Limit: the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least $43 + 10 \log_{10}(P)$ dB.

6.7.1 E.U.T. Operation

Operating Environment:
 Temperature: 24.6 °C Humidity: 55 % RH Atmospheric Pressure: 1020 mbar
 EUT Operation: Drive the EUT to the maximum output power at maximum gain.

6.7.2 Test Setup



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6.7.3 Test procedure

1. Scan from 30MHz to 40GHz, 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)

6.7.4 Measurement Record

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7 Test Setup Photographs

Refer to Appendix - Test Setup Photos for GZCR2411001351AT.

8 EUT Constructional Details (EUT Photos)

Refer to External and Internal Photos for GZCR2411001351AT.

- End of the Report -



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