



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

EMC-TRF-01 Rev 1.1

Report No.: GZCR241100131302

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FCC ID: OWWPS2385B14

TEST REPORT

Application No.: GZCR2411001313AT
Applicant: Shenzhen Huaptec Co., Ltd
Address of Applicant: 3FL, E BLDG, Sogood Science Park, SanWei Community, Hangcheng Street, Bao'an, District, Shenzhen, China
Manufacturer: Shenzhen Huaptec Co., Ltd
Address of Manufacturer: 3FL, E BLDG, Sogood Science Park, SanWei Community, Hangcheng Street, Bao'an, District, Shenzhen, China
Factory: Shenzhen Huaptec Co., Ltd
Address of Factory: 3FL, E BLDG, Sogood Science Park, SanWei Community, Hangcheng Street, Bao'an, District, Shenzhen, China
Product Name: Repeater
Model No.: PS23-B14-IoT
Trade Mark: HiBoost
Standard(s) : 47 CFR Part 2
47 CFR Part 20
47 CFR Part 90
Date of Receipt: 2024-11-06
Date of Test: 2024-11-19 to 2024-12-23
Date of Issue: 2024-12-24

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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Guangzhou Branch, EMC Laboratory

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Revision Record			
Version	Report No.	Date	Remark
01	GZCR241100131302	2024-12-24	Original

Authorized for issue by:			
		Kevin Zhang	
		Kevin Zhang/Project Engineer	
		Vico Cui	
		Vico Cui/Reviewer	



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2 Test Summary

Item	Standard	Method	Requirement	Result
Out-of-band rejection	KDB935210 D05 v01r04	KDB935210 D05 v01r04 clause 4.3	KDB935210 D05 v01r04 clause 4.3	Pass
Input-versus-output signal comparison	47 CFR Part 2	KDB935210 D05 v01r04 clause 4.4	Part 2.1049	Pass
Emission Mask	47 CFR Part 90	KDB935210 D05 v01r04 clause 4.4	Part 90.210(b)	Pass
Input/output power and amplifier/booster gain		KDB935210 D05 v01r04 clause 4.5	Part 90.542 Part 90.219(e)(1)	Pass
Noise figure		KDB935210 D05 v01r04 clause 4.6	Part 90.219(e)(2)	Pass
Intermodulation emissions		KDB935210 D05 v01r04 clause 4.7	Part 90.219(d)(6) Part 90.219(e)(3)	Pass
Conducted spurious emissions		KDB935210 D05 v01r04 clause 4.7	Part 90.219(e)(3) Part 90.543(e)	Pass
Noise		KDB935210 D05 v01r04 clause 4.7	Part 90.219(d)(6)	Pass
Frequency stability		47 CFR Part 2.1055 KDB935210 D05 v01r04 clause 4.8 ANSI C63.26-2015 Clause 5.6	Part 90.213	Pass
Radiated spurious emissions		KDB935210 D05 v01r04 clause 4.9 ANSI C63.26-2015 Clause 5.5	Part 90.219(e)(3) Part 90.543(f)	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 EUT

Power Supply: AC 100-240V, 50/60Hz by AC/DC adapter

Model: J482-1203000DI

Input: 100-240V, 50/60Hz 1.5A

Output: 12V--3.0A

Test Voltage: AC 120V, 60 Hz

Cable: AC mains (2m, unshielded)

Operating Temperature: -10 to +55 °C

Operating Humidity: 5% to 95%

Frequency Range: FirstNet Uplink: 788-798MHz
Downlink: 758-768MHz

Support Technology: LTE, NR

Support Channel BW: LTE 5MHz/10MHz

5G NR 5MHz/10MHz

Interface: Antenna Port 2 (N-F)

Power Jack 1

Max. Output Power: Uplink 20dBm
(conducted) Downlink 23dBm

Max. Gain: Uplink 80dB

Downlink 85dB

Antenna Type: External Dedicated Antenna

Antenna Gain: Donor antenna 7.5dBi

Service antenna 6.5dBi

Firmware Version: PS23_V1.0.1.1

Bluetooth & WiFi: Refer to Bluetooth FCC ID: 2AC7Z-ESP32WROVERB

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

Mathced load and attenuator supplied by the client.

4.3 Test Environment

Environment Parameter	Selected Values During Test	
Ralative Humidity	Ambient	
Value	Temperature (°C)	Voltage (V)
TNVN	Asmbient	AC 120
TLVL	-10	AC 102
TLVH	-10	AC 138
THVL	+55	AC 102
THVH	+55	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.



4.5 Test Signals and Test Channels

Test Channel	Test Frequency (MHz)		Test Signal	Stimulus Condition
	Uplink	Downlink		
LCH	790.5	760.5	4.1MHz AWGN	a single test signal
MCH	793	763		
HCH	795.5	765.5		
LCH	838	808	100MHz AWGN	a single test signal
MCH	793	763		
HCH	738	718		

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
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	2024-08-19	2025-08-18
MXA Signal Analyzer (10Hz-50GHz)	KEYSIGHT	N9020B	SEM004-24	2024-03-16	2025-03-15
4X4 Power Sensor Unit	TST	TSPS2023R	EMC2257	2024-08-19	2025-08-18
Test Software	TST	V2.0	GZE100-78	2024-02-19	2025-02-18
ESG vector signal generator (250kHz-6GHz)	Agilent Technologies	E4438C	SEM006-03	2024-06-17	2025-06-16

Radiated Emissions (30MHz-1GHz)					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
966 Anechoic Chamber	Shenzhen C.R.T	CRTSGSSAC9 66	EMC2230	2022-04-12	2025-04-11
EMI Test Receiver(1Hz- 8GHz)	Rohde & Schwarz	ESW8	EMC2229	2024-02-19	2025-02-18
Amplifier(9k-1000MHz)	SONOMA	310	EMC2237	2024-03-22	2025-03-21
EMI Test Receiver (1Hz- 8GHz)	Rohde & Schwarz	ESW8	EMC2220	2024-05-13	2025-05-12
Test Software E3	Audix	Ver.6.120110a	GZE100-61	N/A	N/A
Trilog Broadband Antenna (25MHz-2GHz)	Schwarzbeck Mess- Elektronik	VULB 9168	EMC2238	2022-04-20	2025-04-19
Coaxial Cable	Mirco-COAX UTIFLEX ve	LA2-C125- 8000	EMC2239	2023-06-14	2025-06-13
TRILOG Broadband Antenna (25M-2GHz)	SCHWARZBECK	VULB 9168	SEM003-18	2022-03-03	2025-03-02



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	2024-10-14	2025-10-13
Microwave Broadband Preamplifier (18-40GHz)	SCHWARZBECK	BBV 9721	EMC2172	2024-08-19	2025-08-18
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 4.3

Test Method: KDB 935210 D05 clause 4.3

Limit: Within the passband

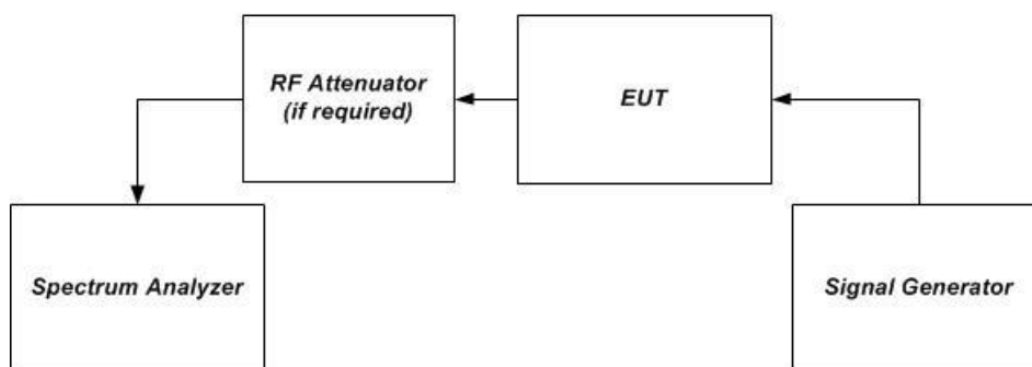
6.1.1 E.U.T. Operation

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 GZCR241100131302.



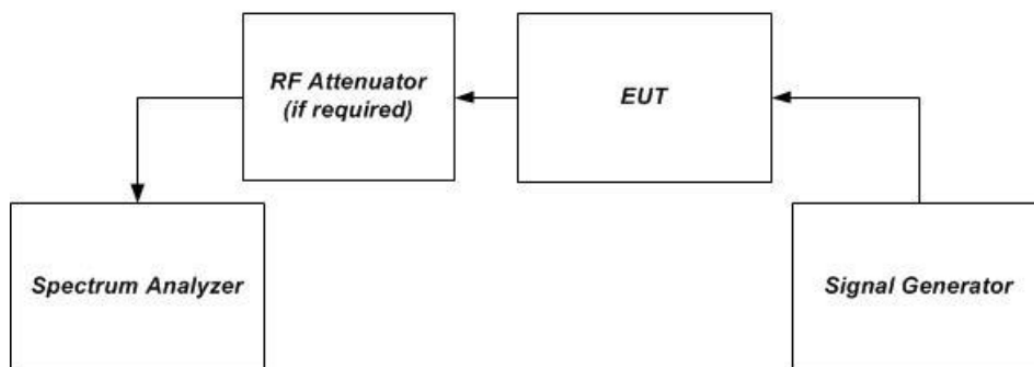
6.2 Input versus output comparison

Test Requirement: 47 CFR Part 2.1049
 Test Method: KDB 935210 D05 clause 4.4
 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 GZCR241100131302.



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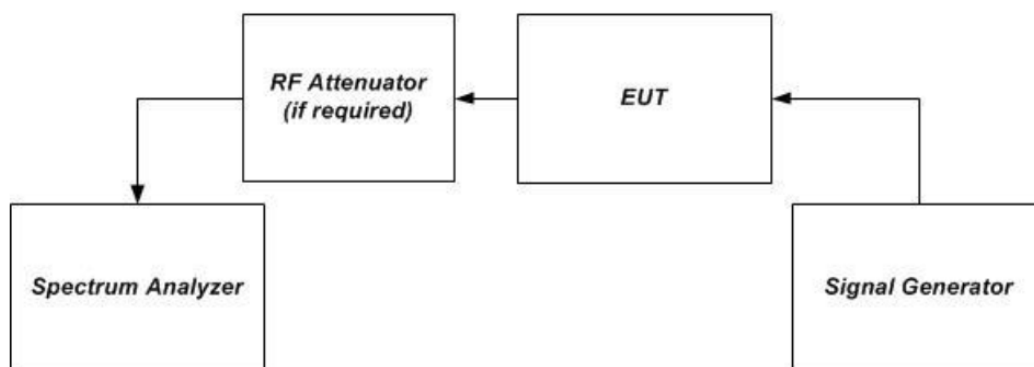
6.3 Emission Mask

Test Requirement:	47 CFR Part 90.210(b)
Test Method:	KDB 935210 D05 clause 4.4
Limit:	Emission Mask B. For transmitters that are equipped with an audio low-pass filter, the power of any emission must be attenuated below the unmodulated carrier power (P) as follows: <ul style="list-style-type: none"> (1) On any frequency removed from the assigned frequency by more than 50 percent, but not more than 100 percent of the authorized bandwidth: At least 25 dB. (2) On any frequency removed from the assigned frequency by more than 100 percent, but not more than 250 percent of the authorized bandwidth: At least 35 dB. (3) On any frequency removed from the assigned frequency by more than 250 percent of the authorized bandwidth: At least 43 + 10 log (P) dB.
Remark:	The EUT is equipped with an audio low-pass filter according to the declaration from the manufacturer.

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 GZCR241100131302.



6.4 Input/output power and amplifier/booster gain

Test Requirement: 47 CFR Part 90.542,90.219 (e)(1).

Test Method: KDB 935210 D05 clause 4.5

Limit: Fixed and base stations transmitting a signal in the 758–768 MHz band with an emission bandwidth greater than 1 MHz must not exceed an ERP of 1000 watts/MHz and an antenna height of 305 m HAAT, except that antenna heights greater than 305 m HAAT are permitted if power levels are reduced below 1000 watts/MHz ERP accordance with Table 3 of this section..

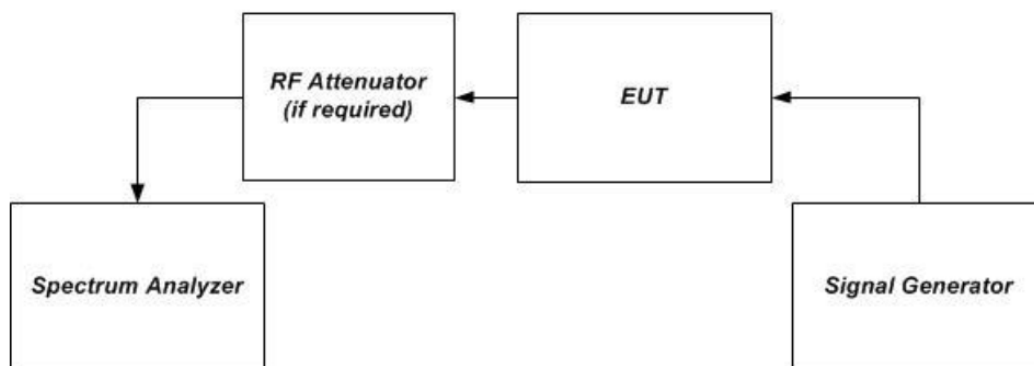
6.4.1 E.U.T. Operation

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 GZCR241100131302.



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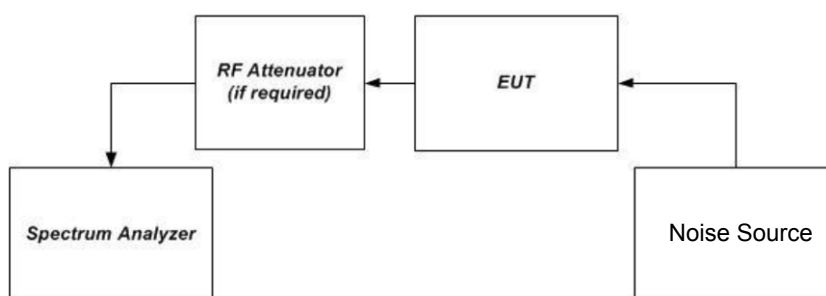
6.5 Noise figure

Test Requirement: 47 CFR Part 90.219(e)(2)
 Test Method: KDB 935210 D05 clause 4.6
 Limit: The noise figure of a signal booster must not exceed 9 dB in either direction.

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 GZCR241100131302.



6.6 Intermodulation emissions

Test Requirement: 47 CFR Part 90.219(d)(6);

Test Method: KDB 935210 D05 clause 4.7

Limit: 90.219(d)(6):
Good engineering practice must be used in regard to the radiation of intermodulation products and noise, such that interference to licensed communications systems is avoided. In the event of harmful interference caused by any given deployment, the FCC may require additional attenuation or filtering of the emissions and/or noise from signal boosters or signal booster systems, as necessary to eliminate the interference.
(i) In general, the ERP of intermodulation products should not exceed -30 dBm in 10 kHz measurement bandwidth.

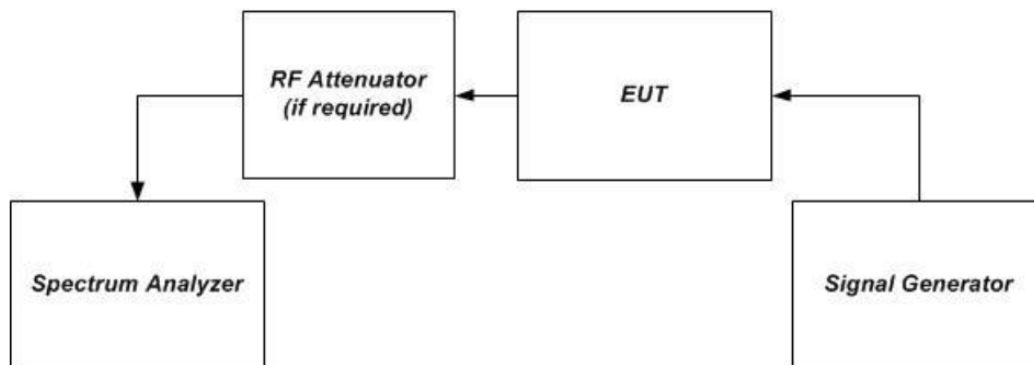
6.6.1 E.U.T. Operation

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 GZCR241100131302.



6.7 Conducted Spurious emissions

Test Requirement: 47 CFR Part 90.219(e)(3), 90.543(e)
 Test Method: KDB 935210 D05 clause 4.7
 Limit: Spurious emissions from a signal booster must not exceed -13 dBm within any 100 kHz measurement bandwidth.

For operations in the 758–768 MHz and the 788–798 MHz bands, the power of any emission outside the licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, in accordance with the following:

- (1) On all frequencies between 769–775 MHz and 799–805 MHz, by a factor not less than $76 + 10 \log (P)$ dB in a 6.25 kHz band segment, for base and fixed stations.
- (2) On all frequencies between 769–775 MHz and 799–805 MHz, by a factor not less than $65 + 10 \log (P)$ dB in a 6.25 kHz band segment, for mobile and portable stations.
- (3) On any frequency between 775–788 MHz, above 805 MHz, and below 758 MHz, by at least $43 + 10 \log (P)$ dB.

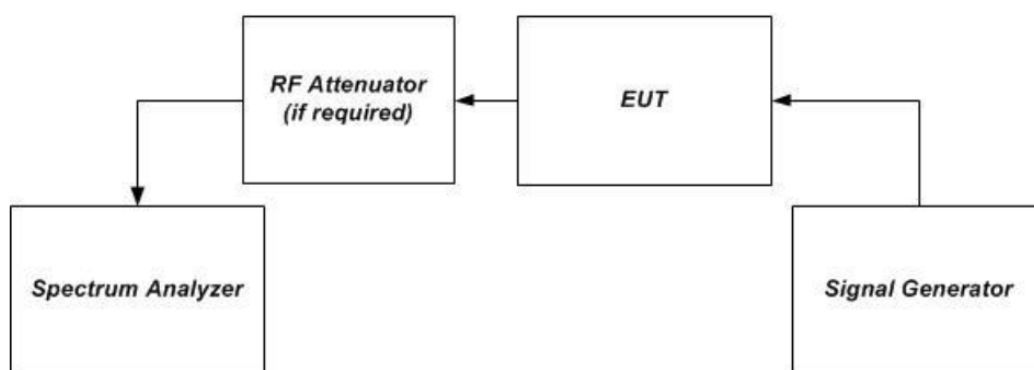
6.7.1 E.U.T. Operation

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.

6.7.2 Test Setup



6.7.3 Measurement Record

Please refer to Appendix - Test Data and Result for report GZCR241100131302.



6.8 Noise

Test Requirement: 47 CFR Part 90.219(d)(6)

Test Method: KDB 935210 D05 clause 4.7

Limit: Good engineering practice must be used in regard to the radiation of intermodulation products and noise, such that interference to licensed communications systems is avoided. In the event of harmful interference caused by any given deployment, the FCC may require additional attenuation or filtering of the emissions and/or noise from signal boosters or signal booster systems, as necessary to eliminate the interference.

(ii) In general, the ERP of noise within the passband should not exceed -43 dBm in 10 kHz measurement bandwidth.

(iii) In general, the ERP of noise on spectrum more than 1 MHz outside of the passband should not exceed -70 dBm in a 10 kHz measurement bandwidth.

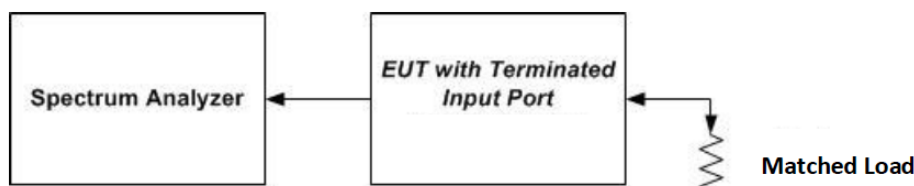
6.8.1 E.U.T. Operation

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.

6.8.2 Test Setup



6.8.3 Measurement Record

Please refer to Appendix - Test Data and Result for report GZCR241100131302.



6.9 Frequency Stability

Test Requirement: 47 CFR Part 90.213

Test Method: 47 CFR Part 2.1055
KDB 935210 D05 clause 4.8
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.

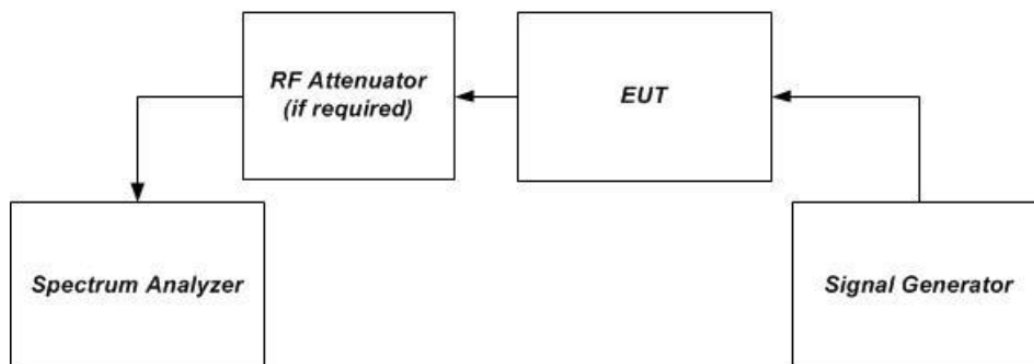
6.9.1 E.U.T. Operation

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.

6.9.2 Test Setup



6.9.3 Measurement Record

Please refer to Appendix - Test Data and Result for report GZCR241100131302.



6.10 Radiated Spurious emission

- Test Requirement:** 47 CFR Part 90.219(e)(3), 90.543(e).90.543(f)
- Test Method:** KDB 935210 D05 clause 4.9
ANSI C63.26-2015 clause 5.5
- Limit:** Spurious emissions from a signal booster must not exceed -13 dBm within any 100 kHz measurement bandwidth.
For operations in the 758–768 MHz and the 788–798 MHz bands, the power of any emission outside the licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, in accordance with the following:
- (1) On all frequencies between 769–775 MHz and 799–805 MHz, by a factor not less than $76 + 10 \log (P)$ dB in a 6.25 kHz band segment, for base and fixed stations.
 - (2) On all frequencies between 769–775 MHz and 799–805 MHz, by a factor not less than $65 + 10 \log (P)$ dB in a 6.25 kHz band segment, for mobile and portable stations.
 - (3) On any frequency between 775–788 MHz, above 805 MHz, and below 758 MHz, by at least $43 + 10 \log (P)$ dB.
- 90.543(f): For operations in the 758–775 MHz and 788–805 MHz bands, all emissions including harmonics in the band 1559–1610 MHz shall be limited to -70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and -80 dBW EIRP for discrete emissions of less than 700 Hz bandwidth. For the purpose of equipment authorization, a transmitter shall be tested with an antenna that is representative of the type that will be used with the equipment in normal operation.

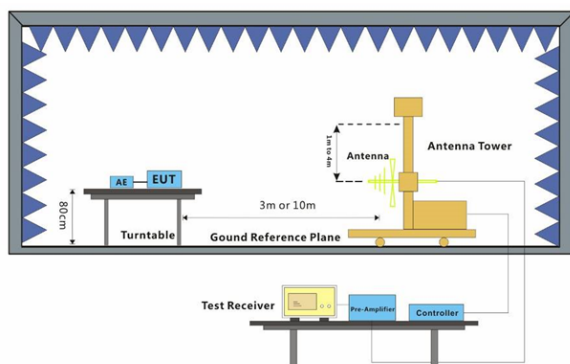
6.10.1 E.U.T. Operation

Operating Environment:

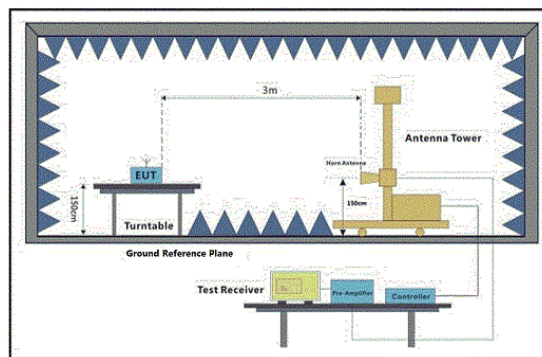
Temperature: 25.2 °C Humidity: 61 % RH Atmospheric Pressure: 1015 mbar

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

6.10.2 Test Setup



below 1GHz



above 1GHz



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6.10.3 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)

6.10.4 Measurement Record

Please refer to Appendix - Test Data and Result for report GZCR241100131302.



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7 Test Setup Photographs

Refer to Appendix - Test Setup Photos for GZCR2411001313AT.

8 EUT Constructional Details (EUT Photos)

Refer to Appendix -External and Internal Photos for GZCR2411001313AT.

- End of the Report -



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