

**FCC PART 15 SUBPART C TEST REPORT****FCC PART 15.236**

Report Reference No..... : BSL24040215P01-R01

FCC ID..... : 2ANQT-C-505

Compiled by  
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Date of issue..... : June 13, 2024

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Applicant's name..... : Joseph Industrial Equipment Co,Ltd

Address..... : East Industrial Zone, Enping Guangdong, China

Test specification..... :

Standard..... : FCC Part 15.236  
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**Equipment description..... : WIRELESS MICROPHONE**

Trade Mark..... : VAM®

Manufacturer..... : Joseph Industrial Equipment Co,Ltd

Model/Type reference..... : C-505

Listed Models ..... : C-305, C-306, C-307, C-905, C-202, C-203, W-101, W-102, W-103

Modulation ..... : FM

Frequency..... : From 570.00MHz to 588.75MHz

Ratings..... : DC 5V by USB Port or DC 3.7V from battery

Result..... : **PASS**

## TEST REPORT

**Equipment under Test** : **WIRELESS MICROPHONE**

Model /Type : C-505

Listed Models : C-305, C-306, C-307, C-905, C-202, C-203, W-101, W-102, W-103

Model Declaration : All the models are electrical identical including the same software parameter and hardware design, same mechanical structure and design, the only difference is the model named different.

**Applicant** : **Joseph Industrial Equipment Co,Ltd**

Address : East Industrial Zone, Enping Guangdong, China

**Manufacturer** : **Joseph Industrial Equipment Co,Ltd**

Address : East Industrial Zone, Enping Guangdong, China

|                     |             |
|---------------------|-------------|
| <b>Test Result:</b> | <b>PASS</b> |
|---------------------|-------------|

The test report merely corresponds to the test sample.  
It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

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## **1 TEST STANDARDS**

The tests were performed according to following standards:

[FCC Rules Part 15.236](#): Operation of wireless microphones in the bands 54–72 MHz, 76–88 MHz, 174–216 MHz, 470–608 MHz and 614–698 MHz.

[ANSI C63.10-2013](#): American National Standard for Testing Unlicensed Wireless Devices

## 2 SUMMARY

### 2.1 General Remarks

|                                |   |               |
|--------------------------------|---|---------------|
| Date of receipt of test sample | : | June 3, 2024  |
| Testing commenced on           | : | June 7, 2024  |
| Testing concluded on           | : | June 13, 2024 |

### 2.2 Product Description

|                       |                                                                                                                                     |
|-----------------------|-------------------------------------------------------------------------------------------------------------------------------------|
| Product Description:  | WIRELESS MICROPHONE                                                                                                                 |
| Model/Type reference: | C-505                                                                                                                               |
| Listed Models:        | C-305, C-306, C-307, C-905, C-202, C-203, W-101, W-102, W-103                                                                       |
| Power supply:         | DC 5.0V by USB Port or DC 3.7V from battery                                                                                         |
| Adapter information:  | Model: WH040A-0843000U<br>Input:AC 100-240V 50/60Hz 1.0A max<br>Output:DC 5V 1.0A<br>Manufacture:SHENZHEN WENHANG TECHNOLOGY CO,LTD |
| Testing sample ID:    | BSL24040215P01-R01-1# (Engineer sample),<br>BSL24040215P01-R01-2# (Normal sample)                                                   |
| Hardware Version:     | JP-505TX-V1.1/JP-505RX-V1.1                                                                                                         |
| Software Version:     | JT001-RX/JT001-TX                                                                                                                   |
| Modulation:           | FM                                                                                                                                  |
| Operation frequency:  | 570.00-588.75MHz                                                                                                                    |
| Channel number:       | 16                                                                                                                                  |
| Antenna type:         | Spring antenna                                                                                                                      |
| Antenna gain:         | -2.09 dBi                                                                                                                           |

### 2.3 Equipment Under Test

#### Power supply system utilised

|                      |   |                                                                                                                  |                                   |
|----------------------|---|------------------------------------------------------------------------------------------------------------------|-----------------------------------|
| Power supply voltage | : | <input type="radio"/> 230V / 50 Hz                                                                               | <input type="radio"/> 120V / 60Hz |
|                      |   | <input type="radio"/> 12 V DC                                                                                    | <input type="radio"/> 24 V DC     |
|                      |   | <input checked="" type="radio"/> Other (specified in blank below)<br>DC 5.0V by USB Port or DC 3.7V from battery |                                   |

### 2.4 Short description of the Equipment under Test (EUT)

This is a WIRELESS MICROPHONE  
For more details, refer to the user's manual of the EUT.

## 2.5 Block Diagram of Test Setup



## 2.6 Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for the device filing to comply with Section 15.236 of the FCC Part 15, Subpart C Rules.

## 2.7 Modifications

No modifications were implemented to meet testing criteria.

## 2.8 Operation Frequency

| Channel | Frequency (MHz) | Channel | Frequency (MHz) |
|---------|-----------------|---------|-----------------|
| 1       | 570.00          | 9       | 580.00          |
| 2       | 571.25          | 10      | 581.25          |
| 3       | 572.50          | 11      | 582.50          |
| 4       | 573.75          | 12      | 583.75          |
| 5       | 575.00          | 13      | 585.00          |
| 6       | 576.25          | 14      | 586.25          |
| 7       | 577.50          | 15      | 587.50          |
| 8       | 578.75          | 16      | 588.75          |

| Channel             | Frequency  |
|---------------------|------------|
| The lowest channel  | 570.00 MHz |
| The middle channel  | 580.00 MHz |
| The Highest channel | 588.75 MHz |

### **3 TEST ENVIRONMENT**

#### **3.1 Address of the test laboratory**

**BSL Testing Co., Ltd.**

1/F, Building B, Xinshidai GR Park, Shiyan Street, Bao'an District, Shenzhen, Guangdong, 518052, People's Republic of China

#### **3.2 Test Facility**

**FCC-Registration No.: 562200 Designation Number: CN1338**

BSL Testing Co.,Ltd. has been listed on the US Federal Communications Commission list of test facilities recognized to perform electromagnetic emissions measurements.

**Industry Canada Registration Number. Is: 11093A CAB identifier: CN0019**

The Laboratory has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing.

**A2LA-Lab Cert. No.: 4707.01**

BSL Testing Co.,Ltd. has been listed by American Association for Laboratory Accreditation to perform electromagnetic emission measurement.

The 3m-Semi anechoic test site fulfils CISPR 16-1-4 according to ANSI C63.10 and CISPR 16-1-4:2010.

#### **3.3 Environmental conditions**

During the measurement the environmental conditions were within the listed ranges:

Radiated Emission:

|                       |              |
|-----------------------|--------------|
| Temperature:          | 23 ° C       |
|                       |              |
| Humidity:             | 44 %         |
|                       |              |
| Atmospheric pressure: | 950-1050mbar |

AC Main Conducted testing:

|                       |              |
|-----------------------|--------------|
| Temperature:          | 24 ° C       |
|                       |              |
| Humidity:             | 47 %         |
|                       |              |
| Atmospheric pressure: | 950-1050mbar |

Conducted testing:

|                       |              |
|-----------------------|--------------|
| Temperature:          | 24 ° C       |
|                       |              |
| Humidity:             | 46 %         |
|                       |              |
| Atmospheric pressure: | 950-1050mbar |

### 3.4 Summary of measurement results

| FCC Requirements           |                             |      |
|----------------------------|-----------------------------|------|
| FCC Part 15.207            | Conducted Emission          | PASS |
| FCC Part 15.203            | Antenna requirement         | PASS |
| FCC Part 15.236 (d)1       | Conducted Peak Output Power | PASS |
| FCC Part 15.236 (f)2       | Occupied bandwidth Emission | PASS |
| FCC Part 15.236 (f)3       | Frequency Stability         | PASS |
| FCC Part 15.236(g)/ 15.209 | Radiated Emissions          | PASS |

Remark:

1.PASS: Test item meets the requirement.

2.Fail: Test item does not meet the requirement.

3.N/A: Test case does not apply to the test object.

4.The test result judgment is decided by the limit of test standard.

### 3.5 Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to TR-100028-01 "Electromagnetic compatibility and Radio spectrum Matters (ERM);Uncertainties in the measurement of mobile radio equipment characteristics; Part 1" and TR-100028-02 "Electromagnetic compatibility and Radio spectrum Matters (ERM);Uncertainties in the measurement of mobile radio equipment characteristics; Part 2 " and is documented in the BSL Testing Co., Ltd.quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for BSL Testing Co., Ltd.:

| Test                               | Range        | Measurement Uncertainty | Notes |
|------------------------------------|--------------|-------------------------|-------|
| Radiated Emission                  | 9KHz~30MHz   | 3.20 dB                 | (1)   |
| Radiated Emission                  | 30~1000MHz   | 4.10 dB                 | (1)   |
| Radiated Emission                  | 1~18GHz      | 4.32 dB                 | (1)   |
| Radiated Emission                  | 18-40GHz     | 5.54 dB                 | (1)   |
| Conducted Disturbance              | 0.9KHz~30MHz | 3.12 dB                 | (1)   |
| Occupied Channel Bandwidth         | /            | 5%                      | (1)   |
| RF Frequency                       | /            | $0.082 \cdot 10^{-7}$   | (1)   |
| RF output power, conducted         | /            | 0.73 dB                 | (1)   |
| Unwanted Emission, conducted       | /            | 1.6dB                   | (1)   |
| AC Power Lines Conducted Emissions | /            | 2.72dB                  | (1)   |

(1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

### 3.6 Equipments Used during the Test

| Conducted Emission        |                         |                      |            |              |            |
|---------------------------|-------------------------|----------------------|------------|--------------|------------|
| Test Equipment            | Manufacturer            | Model                | Serial No. | Date of Cal. | Due Date   |
| Shielding Room            | ZhongYu Electron        | 7.3(L)x3.1(W)x2.9(H) | BSL252     | 2023-10-28   | 2024-10-27 |
| EMI Test Receiver         | R&S                     | ESCI 7               | BSL552     | 2023-10-28   | 2024-10-27 |
| Coaxial Switch            | ANRITSU CORP            | MP59B                | BSL225     | 2023-10-28   | 2024-10-27 |
| ENV216 2-L-V-NETZNACHB.DE | ROHDE&SCHWARZ           | ENV216               | BSL226     | 2023-10-28   | 2024-10-27 |
| Coaxial Cable             | BSL                     | N/A                  | BSL227     | N/A          | N/A        |
| EMI Test Software         | AUDIX                   | E3                   | N/A        | N/A          | N/A        |
| Thermo meter              | KTJ                     | TA328                | BSL233     | 2023-10-28   | 2024-10-27 |
| Absorbing clamp           | Elektronik-Feinmechanik | MDS21                | BSL229     | 2023-10-28   | 2024-10-27 |
| LISN                      | R&S                     | ENV216               | 308        | 2023-10-28   | 2024-10-27 |
| LISN                      | R&S                     | ENV216               | 314        | 2023-10-28   | 2024-10-27 |

| Radiation Test equipment            |                                |                             |            |              |            |
|-------------------------------------|--------------------------------|-----------------------------|------------|--------------|------------|
| Test Equipment                      | Manufacturer                   | Model                       | Serial No. | Date of Cal. | Due Date   |
| 3m Semi- Anechoic Chamber           | ZhongYu Electron               | 9.2(L)*6.2(W)* 6.4(H)       | BSL250     | 2023-10-28   | 2024-10-27 |
| Control Room                        | ZhongYu Electron               | 6.2(L)*2.5(W)* 2.4(H)       | BSL251     | N/A          | N/A        |
| EMI Test Receiver                   | Rohde & Schwarz                | ESU26                       | BSL203     | 2023-10-28   | 2024-10-27 |
| BiConiLog Antenna                   | SCHWARZBECK<br>MESS-ELEKTRONIK | VULB9163                    | BSL214     | 2023-10-28   | 2024-10-27 |
| Double -ridged waveguide horn       | SCHWARZBECK<br>MESS-ELEKTRONIK | BBHA 9120 D                 | BSL208     | 2023-10-28   | 2024-10-27 |
| Horn Antenna                        | ETS-LINDGREN                   | 3160                        | BSL217     | 2023-10-28   | 2024-10-27 |
| EMI Test Software                   | AUDIX                          | E3                          | N/A        | N/A          | N/A        |
| Coaxial Cable                       | BSL                            | N/A                         | BSL213     | 2023-10-28   | 2024-10-27 |
| Coaxial Cable                       | BSL                            | N/A                         | BSL211     | 2023-10-28   | 2024-10-27 |
| Coaxial cable                       | BSL                            | N/A                         | BSL210     | 2023-10-28   | 2024-10-27 |
| Coaxial Cable                       | BSL                            | N/A                         | BSL212     | 2023-10-28   | 2024-10-27 |
| Amplifier(100kHz-3GHz)              | HP                             | 8347A                       | BSL204     | 2023-10-28   | 2024-10-27 |
| Amplifier(2GHz-20GHz)               | HP                             | 84722A                      | BSL206     | 2023-10-28   | 2024-10-27 |
| Amplifier (18-26GHz)                | Rohde & Schwarz                | AFS33-18002<br>650-30-8P-44 | BSL218     | 2023-10-28   | 2024-10-27 |
| Band filter                         | Amindeon                       | 82346                       | BSL219     | 2023-10-28   | 2024-10-27 |
| Power Meter                         | Anritsu                        | ML2495A                     | BSL540     | 2023-10-28   | 2024-10-27 |
| Power Sensor                        | Anritsu                        | MA2411B                     | BSL541     | 2023-10-28   | 2024-10-27 |
| Wideband Radio Communication Tester | Rohde & Schwarz                | CMW500                      | BSL575     | 2023-10-28   | 2024-10-27 |
| Splitter                            | Agilent                        | 11636B                      | BSL237     | 2023-10-28   | 2024-10-27 |

|                                 |                 |           |        |            |            |
|---------------------------------|-----------------|-----------|--------|------------|------------|
| Loop Antenna                    | ZHINAN          | ZN30900A  | BSL534 | 2023-10-28 | 2024-10-27 |
| Breitband<br>hornantenne        | SCHWARZBECK     | BBHA 9170 | BSL579 | 2023-10-28 | 2024-10-27 |
| Amplifier                       | TDK             | PA-02-02  | BSL574 | 2023-10-28 | 2024-10-27 |
| Amplifier                       | TDK             | PA-02-03  | BSL576 | 2023-10-28 | 2024-10-27 |
| PSA Series Spectrum<br>Analyzer | Rohde & Schwarz | FSP       | BSL578 | 2023-10-28 | 2024-10-27 |

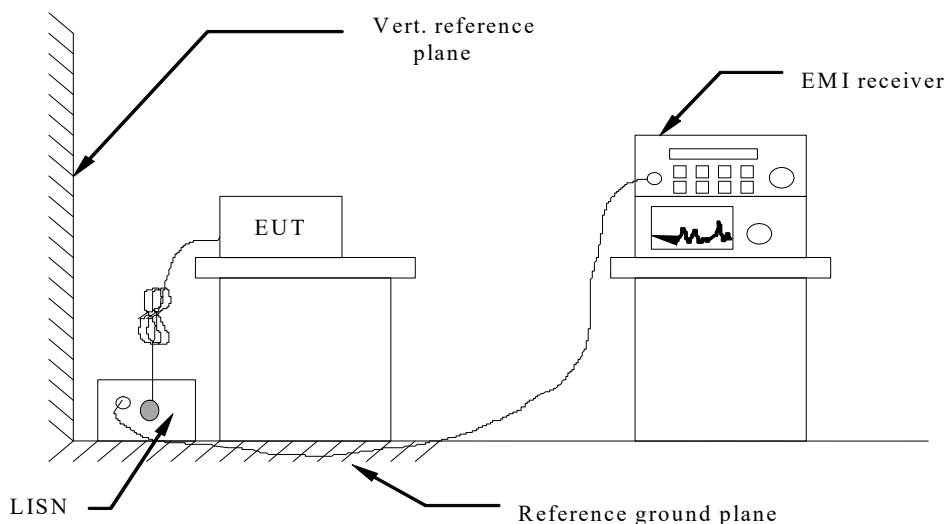
**RF Conducted Test:**

| Test Equipment                                       | Manufacturer | Model            | Serial No. | Date of Cal. | Due Date   |
|------------------------------------------------------|--------------|------------------|------------|--------------|------------|
| MXA Signal Analyzer                                  | Agilent      | N9020A           | BSL566     | 2023-10-28   | 2024-10-27 |
| EMI Test Receiver                                    | R&S          | ESCI 7           | BSL552     | 2023-10-28   | 2024-10-27 |
| Spectrum Analyzer                                    | Agilent      | E4440A           | BSL533     | 2023-10-28   | 2024-10-27 |
| MXG vector Signal<br>Generator                       | Agilent      | N5182A           | BSL567     | 2023-10-28   | 2024-10-27 |
| ESG Analog Signal<br>Generator                       | Agilent      | E4428C           | BSL568     | 2023-10-28   | 2024-10-27 |
| USB RF Power<br>Sensor                               | DARE         | RPR3006W         | BSL569     | 2023-10-28   | 2024-10-27 |
| RF Switch Box                                        | Shongyi      | RFSW3003328      | BSL571     | 2023-10-28   | 2024-10-27 |
| Programmable<br>Constant Temp &<br>Humi Test Chamber | WEWON        | WHTH-150L-40-880 | BSL572     | 2023-10-28   | 2024-10-27 |

## 4 TEST CONDITIONS AND RESULTS

### 4.1 AC Power Conducted Emission

#### TEST CONFIGURATION



#### TEST PROCEDURE

- 1 The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. The EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.10-2013.
- 2 Support equipment, if needed, was placed as per ANSI C63.10-2013
- 3 All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10-2013
- 4 The EUT received power from adapter, the adapter received AC120V/60Hz and AC 240V/60Hz power through a Line Impedance Stabilization Network (LISN) which supplied power source and was grounded to the ground plane.
- 5 All support equipments received AC power from a second LISN, if any.
- 6 The EUT test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
- 7 Analyzer / Receiver scanned from 150 KHz to 30MHz for emissions in each of the test modes.
- 8 During the above scans, the emissions were maximized by cable manipulation.

#### AC Power Conducted Emission Limit

For intentional device, according to § 15.207(a) AC Power Conducted Emission Limits is as following:

| Frequency range (MHz) | Limit (dBuV) |           |
|-----------------------|--------------|-----------|
|                       | Quasi-peak   | Average   |
| 0.15-0.5              | 66 to 56*    | 56 to 46* |
| 0.5-5                 | 56           | 46        |
| 5-30                  | 60           | 50        |

\* Decreases with the logarithm of the frequency.

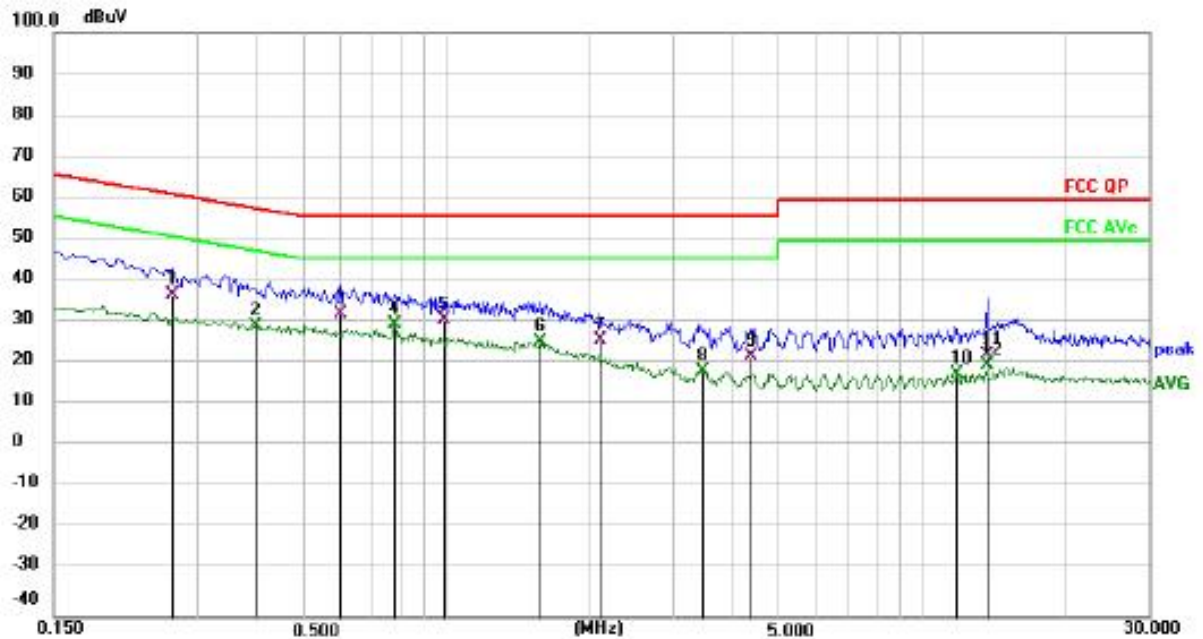
#### TEST RESULTS

Power supply:

DC 5V from Adapter AC  
120V/60Hz

Polarization

L



| No. | Frequency (MHz) | Reading (dBμV) | Factor (dB) | Level (dBμV) | Limit (dBμV) | Margin (dB) | Detector | P/F |
|-----|-----------------|----------------|-------------|--------------|--------------|-------------|----------|-----|
| 1   | 0.2669          | 20.51          | 16.72       | 37.23        | 61.21        | -23.98      | QP       | P   |
| 2   | 0.3975          | 13.09          | 16.70       | 29.79        | 47.91        | -18.12      | AVG      | P   |
| 3   | 0.5991          | 15.99          | 16.67       | 32.66        | 56.00        | -23.34      | QP       | P   |
| 4 * | 0.7799          | 13.47          | 16.65       | 30.12        | 46.00        | -15.88      | AVG      | P   |
| 5   | 0.9890          | 14.46          | 16.62       | 31.08        | 56.00        | -24.92      | QP       | P   |
| 6   | 1.5809          | 9.49           | 16.55       | 26.04        | 46.00        | -19.96      | AVG      | P   |
| 7   | 2.1104          | 9.82           | 16.47       | 26.29        | 56.00        | -29.71      | QP       | P   |
| 8   | 3.4395          | 2.78           | 16.29       | 19.07        | 46.00        | -26.93      | AVG      | P   |
| 9   | 4.3940          | 6.29           | 16.18       | 22.47        | 56.00        | -33.53      | QP       | P   |
| 10  | 11.8545         | 0.74           | 17.69       | 18.43        | 50.00        | -31.57      | AVG      | P   |
| 11  | 13.7376         | 4.62           | 18.24       | 22.86        | 60.00        | -37.14      | QP       | P   |
| 12  | 13.7490         | 2.04           | 18.24       | 20.28        | 50.00        | -29.72      | AVG      | P   |

Note:1).Level (dBμV)= Reading (dBμV)+ Factor (dB)

2). Factor (dB)=insertion loss of LISN (dB) + Cable loss (dB)

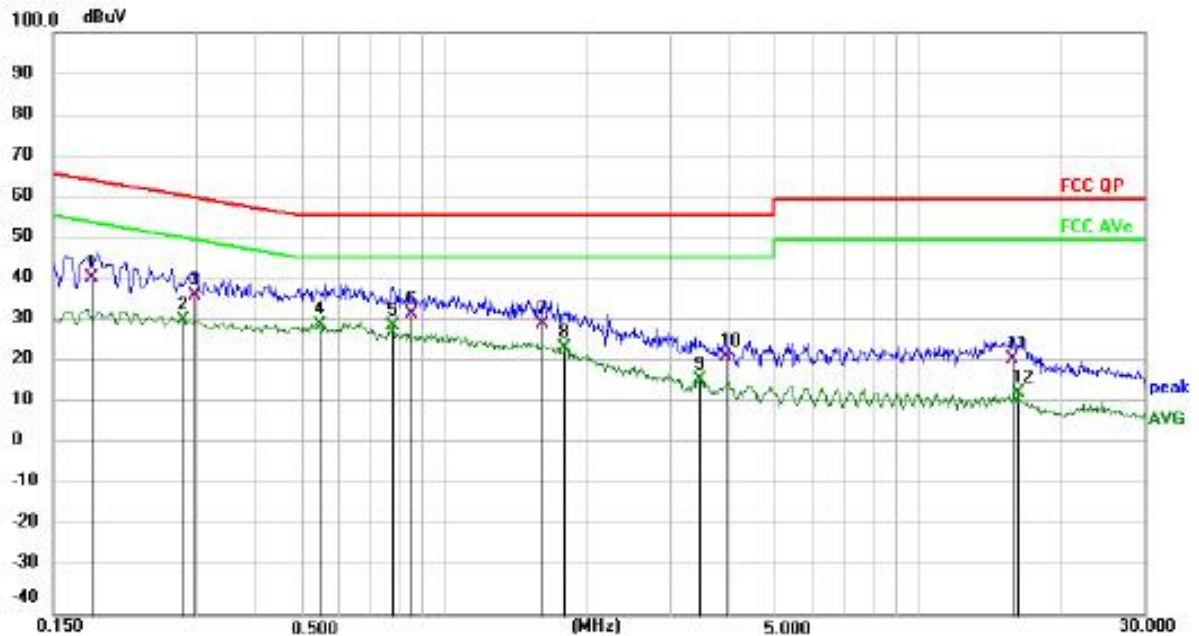
3). Margin(dB) = Limit (dBμV) - Level (dBμV)

Power supply:

DC 5V from Adapter AC  
120V/60Hz

Polarization

N



| No. | Frequency (MHz) | Reading (dBμV) | Factor (dB) | Level (dBμV) | Limit (dBμV) | Margin (dB) | Detector | P/F |
|-----|-----------------|----------------|-------------|--------------|--------------|-------------|----------|-----|
| 1   | 0.1799          | 23.55          | 17.53       | 41.08        | 64.49        | -23.41      | QP       | P   |
| 2   | 0.2805          | 13.53          | 17.52       | 31.05        | 50.80        | -19.75      | AVG      | P   |
| 3   | 0.2979          | 19.17          | 17.52       | 36.69        | 60.30        | -23.61      | QP       | P   |
| 4 * | 0.5460          | 12.40          | 17.51       | 29.91        | 46.00        | -16.09      | AVG      | P   |
| 5   | 0.7799          | 12.11          | 17.51       | 29.62        | 46.00        | -16.38      | AVG      | P   |
| 6   | 0.8568          | 14.90          | 17.51       | 32.41        | 56.00        | -23.59      | QP       | P   |
| 7   | 1.6224          | 12.20          | 17.49       | 29.69        | 56.00        | -26.31      | QP       | P   |
| 8   | 1.8015          | 6.62           | 17.48       | 24.10        | 46.00        | -21.90      | AVG      | P   |
| 9   | 3.4800          | -0.97          | 17.42       | 16.45        | 46.00        | -29.55      | AVG      | P   |
| 10  | 3.9521          | 4.76           | 17.42       | 22.18        | 56.00        | -33.82      | QP       | P   |
| 11  | 15.8534         | 2.26           | 19.02       | 21.28        | 60.00        | -38.72      | QP       | P   |
| 12  | 16.2735         | -5.83          | 19.08       | 13.25        | 50.00        | -36.75      | AVG      | P   |

Note:1).Level (dBμV)= Reading (dBμV)+ Factor (dB)

2). Factor (dB)=insertion loss of LISN (dB) + Cable loss (dB)

3). Margin(dB) = Limit (dBμV) - Level (dBμV)

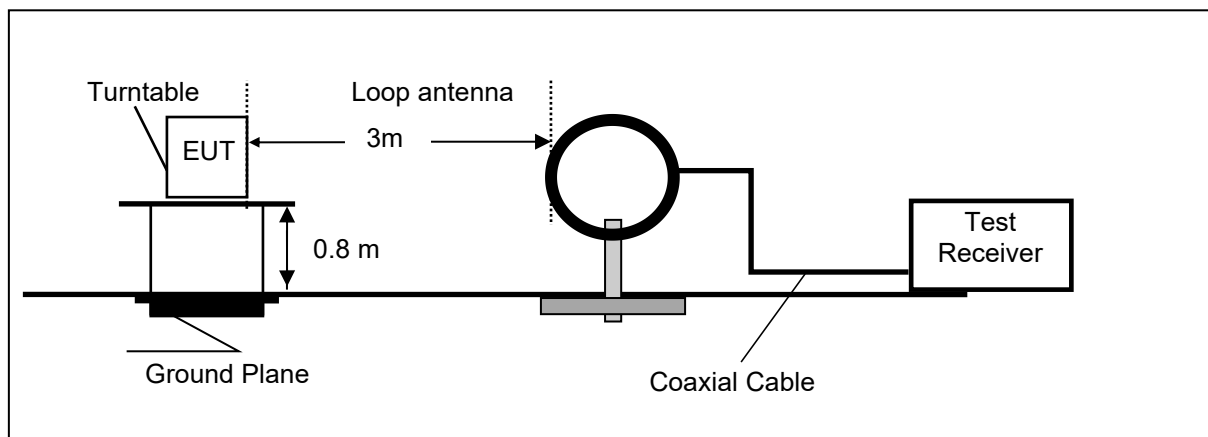
## 4.2 Radiated Emissions Test

### Limit

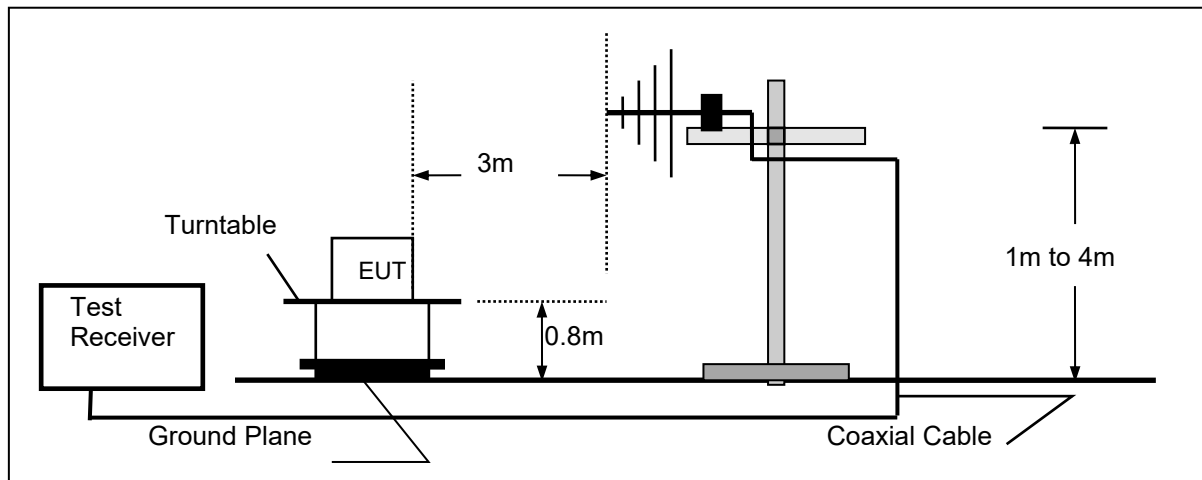
Emissions within the band from one mecahertz below to one mecahertz above the carrier frequencshall comply with the emission mask in S8.3 of ETSI EN 300 422-1 V1.4.2 (2011-08).Emissions outside of this band shall comply with the limits specified in section 8.4 of ETSI EN 300422-1 V1.4.2(2011-08)FCC Part15 (15.235), Subpart C

### Test Configuration

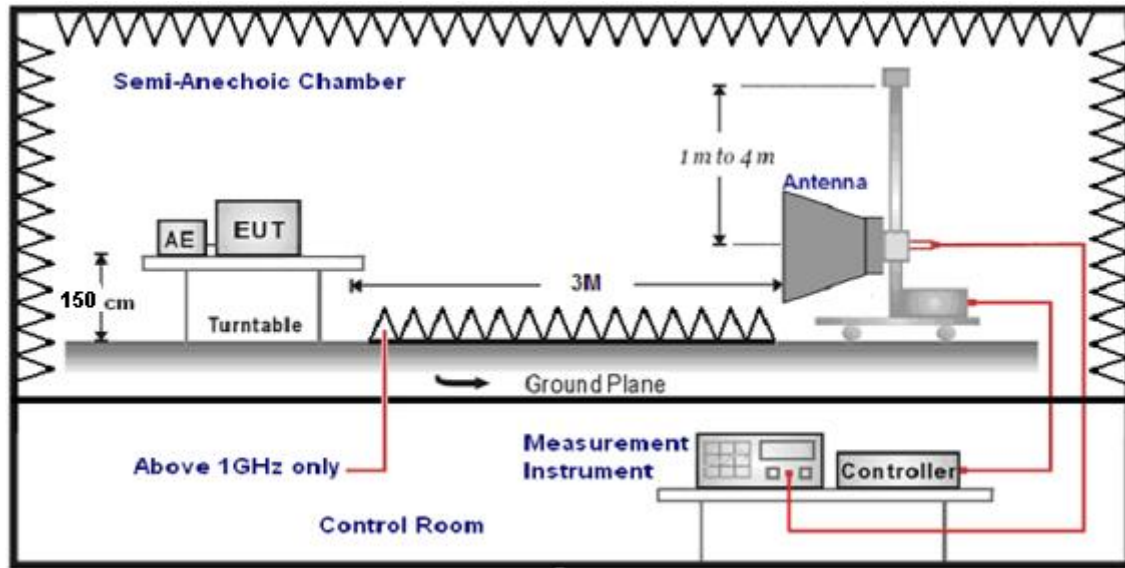
Frequency range 9 KHz – 30MHz



Frequency range 30MHz – 1000MHz



Frequency range above 1GHz-25GHz



## TEST PROCEDURE

1. The EUT was placed on a turn table which is 0.8m above ground plane when testing frequency range 9 KHz –1GHz;the EUT was placed on a turn table which is 1.5m above ground plane when testing frequency range 1GHz – 25GHz.
2. Maximum procedure was performed by raising the receiving antenna from 1m to 4m and rotating the turn table from 0° to 360° to acquire the highest emissions from EUT.
3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
4. Repeat above procedures until all frequency measurements have been completed.
5. Radiated emission test frequency band from 9KHz to 25GHz.
6. The distance between test antenna and EUT as following table states:

| Test Frequency range | Test Antenna Type          | Test Distance |
|----------------------|----------------------------|---------------|
| 9KHz-30MHz           | Active Loop Antenna        | 3             |
| 30MHz-1GHz           | Ultra-Broadband Antenna    | 3             |
| 1GHz-18GHz           | Double Ridged Horn Antenna | 3             |
| 18GHz-25GHz          | Horn Antenna               | 1             |

7. Setting test receiver/spectrum as following table states:

| Test Frequency range | Test Receiver/Spectrum Setting                                                                            | Detector |
|----------------------|-----------------------------------------------------------------------------------------------------------|----------|
| 9KHz-150KHz          | RBW=200Hz/VBW=3KHz, Sweep time=Auto                                                                       | QP       |
| 150KHz-30MHz         | RBW=9KHz/VBW=100KHz, Sweep time=Auto                                                                      | QP       |
| 30MHz-1GHz           | RBW=120KHz/VBW=1000KHz, Sweep time=Auto                                                                   | QP       |
| 1GHz-40GHz           | Peak Value: RBW=1MHz/VBW=3MHz,<br>Sweep time=Auto<br>Average Value: RBW=1MHz/VBW=10Hz,<br>Sweep time=Auto | Peak     |

**EUT Operation during Test**

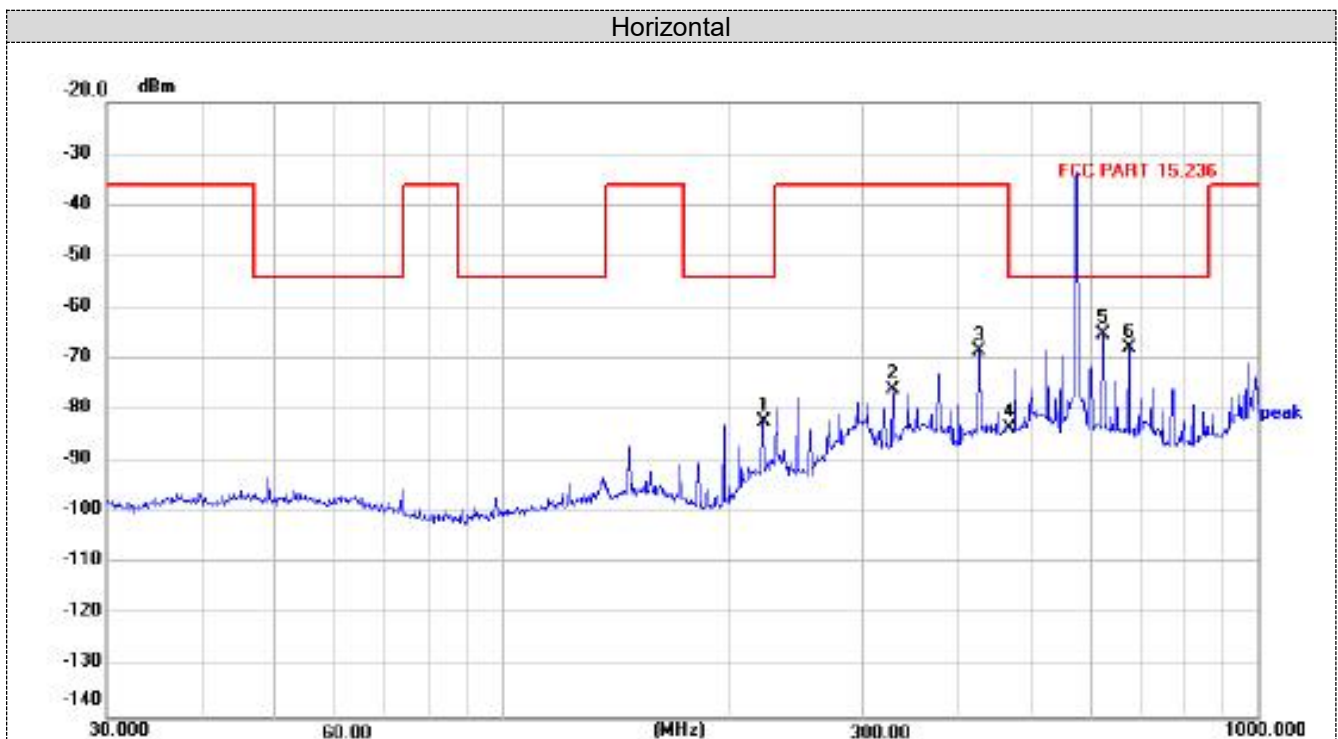
The EUT was programmed to be in continuously transmitting mode.

Below 1GHz Test Results: (Show only the worst test results)

All modes have been tested, and only the worst mode is recorded

**Test result**

|               |       |                |       |
|---------------|-------|----------------|-------|
| Temperature   | 23.7℃ | Humidity       | 52.1% |
| Test Engineer | /     | Configurations | TX    |

**Measurement data:**

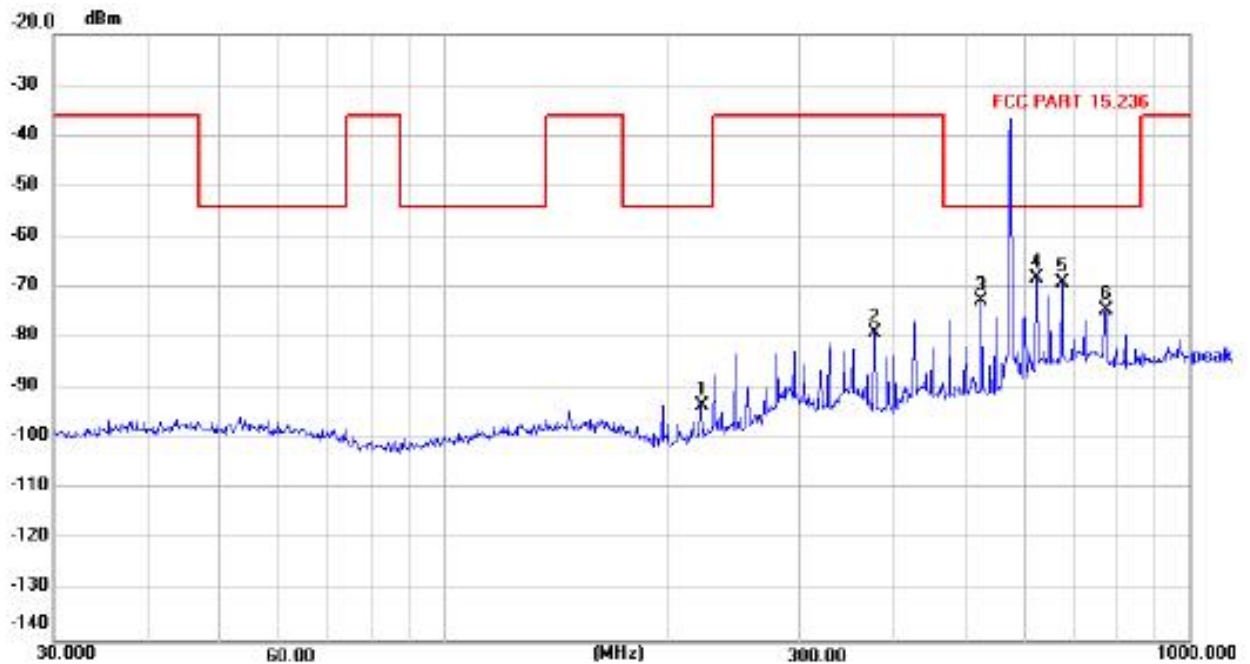
| No. | Frequency (MHz) | Reading (dBm) | Factor (dB) | Level (dBm) | Limit (dBm) | Margin (dB) | Detector |
|-----|-----------------|---------------|-------------|-------------|-------------|-------------|----------|
| 1   | 221.3917        | -63.09        | -19.23      | -82.32      | -54.00      | -28.32      | peak     |
| 2   | 329.0389        | -61.00        | -14.85      | -75.85      | -36.00      | -39.85      | peak     |
| 3   | 428.0192        | -56.22        | -12.29      | -68.51      | -36.00      | -32.51      | peak     |
| 4   | 470.5230        | -72.24        | -11.26      | -83.50      | -54.00      | -29.50      | peak     |
| 5 * | 625.0778        | -57.55        | -7.45       | -65.00      | -54.00      | -11.00      | peak     |
| 6   | 675.2078        | -61.21        | -6.78       | -67.99      | -54.00      | -13.99      | peak     |

Note: 1). Level (dBμV/m) = Reading (dBμV/m) + Factor (dB/m)

2). Factor (dB/m) = Antenna Factor (dB/m) + Cable loss (dB) - Pre Amplifier gain (dB)

3). Margin (dB) = Limit (dBμV/m) - Level (dBμV/m)

## Vertical



| No. | Frequency (MHz) | Reading (dBm) | Factor (dB) | Level (dBm) | Limit (dBm) | Margin (dB) | Detector |
|-----|-----------------|---------------|-------------|-------------|-------------|-------------|----------|
| 1   | 221.3917        | -74.10        | -19.23      | -93.33      | -54.00      | -39.33      | peak     |
| 2   | 378.5842        | -65.40        | -13.63      | -79.03      | -36.00      | -43.03      | peak     |
| 3   | 526.3967        | -62.68        | -9.94       | -72.62      | -54.00      | -18.62      | peak     |
| 4 * | 625.0778        | -60.85        | -7.45       | -68.30      | -54.00      | -14.30      | peak     |
| 5   | 675.2078        | -62.16        | -6.78       | -68.94      | -54.00      | -14.94      | peak     |
| 6   | 774.1584        | -69.49        | -4.98       | -74.47      | -54.00      | -20.47      | peak     |

Note:1).Level (dBμV/m)= Reading (dBμV/m)+ Factor (dB/m)

2). Factor(dB/m)=Antenna Factor (dB/m) + Cable loss (dB) - Pre Amplifier gain (dB)

3). Margin(dB) = Limit (dBμV/m) - Level (dBμV/m)

**Harmonics and Spurious Emissions Frequency Range (9 kHz-30MHz)**

| Frequency (MHz) | Level@3m (dBμV/m) | Limit@3m (dBμV/m) |
|-----------------|-------------------|-------------------|
| --              | --                | --                |
| --              | --                | --                |
| --              | --                | --                |
| --              | --                | --                |

**Note:**1. Emission Level=Reading+ Cable loss+ Antenna factor-Amp factor.

2. The emission levels are 20 dB below the limit value, which are not reported. It is deemed to comply with the requirement.

**ABOVE 1GHz test results:**

All modes have been tested, and only the worst mode is recorded.

| Transmitting at 570.00MHz                                                                                     |               |        |                |        |        |            |
|---------------------------------------------------------------------------------------------------------------|---------------|--------|----------------|--------|--------|------------|
| Frequency                                                                                                     | Meter Reading | Factor | Emission Level | Limits | Margin | Value Type |
| (MHz)                                                                                                         | (dBm)         | (dB)   | (dBm)          | (dBm)  | (dB)   |            |
| 1140.00                                                                                                       | -40.86        | -5.81  | -46.67         | -30    | -16.67 | Horizontal |
| 1140.00                                                                                                       | -36.85        | -5.81  | -42.66         | -30    | -12.66 | Vertical   |
| 1710.00                                                                                                       | -33.42        | -6.06  | -39.48         | -30    | -9.48  | Vertical   |
| 1710.00                                                                                                       | -30.34        | -5.81  | -36.15         | -30    | -6.15  | Horizontal |
| Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier; Level = Reading + Factor; Margin = Level-Limit. |               |        |                |        |        |            |

| Transmitting at 580.00MHz                                                                                     |               |        |                |        |        |            |
|---------------------------------------------------------------------------------------------------------------|---------------|--------|----------------|--------|--------|------------|
| Frequency                                                                                                     | Meter Reading | Factor | Emission Level | Limits | Margin | Value Type |
| (MHz)                                                                                                         | (dBm)         | (dB)   | (dBm)          | (dBm)  | (dB)   |            |
| 1160.00                                                                                                       | -40.12        | -5.81  | -45.93         | -30    | -15.93 | Horizontal |
| 1160.00                                                                                                       | -37.65        | -5.81  | -43.46         | -30    | -13.46 | Vertical   |
| 1740.00                                                                                                       | -35.24        | -6.06  | -41.30         | -30    | -11.30 | Vertical   |
| 1740.00                                                                                                       | -31.62        | -5.81  | -37.43         | -30    | -7.43  | Horizontal |
| Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier; Level = Reading + Factor; Margin = Level-Limit. |               |        |                |        |        |            |

| Transmitting at 588.75MHz                                                                                     |               |        |                |        |        |            |
|---------------------------------------------------------------------------------------------------------------|---------------|--------|----------------|--------|--------|------------|
| Frequency                                                                                                     | Meter Reading | Factor | Emission Level | Limits | Margin | Value Type |
| (MHz)                                                                                                         | (dBm)         | (dB)   | (dBm)          | (dBm)  | (dB)   |            |
| 1177.50                                                                                                       | -40.68        | -5.81  | -46.49         | -30    | -16.49 | Horizontal |
| 1177.50                                                                                                       | -36.85        | -5.81  | -42.66         | -30    | -12.66 | Vertical   |
| 1766.25                                                                                                       | -33.25        | -6.06  | -39.31         | -30    | -9.31  | Vertical   |
| 1766.25                                                                                                       | -30.45        | -5.81  | -36.26         | -30    | -6.26  | Horizontal |
| Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier; Level = Reading + Factor; Margin = Level-Limit. |               |        |                |        |        |            |

## Remark:

- (1) Measuring frequencies from 1 GHz to the 18 GHz.
- (2) "F" denotes fundamental frequency; "H" denotes spurious frequency; "E" denotes band edge frequency.
- (3) \* denotes emission frequency which appearing within the Restricted Bands specified in provision of 15.205, then the general radiated emission limits in 15.209 apply.
- (4) The emissions are attenuated more than 20dB below the permissible limits are not record in the report.
- (5) The IF bandwidth of EMI Test Receiver between 30MHz to 1GHz was 120KHz, 1 MHz for measuring above 1 GHz, below 30MHz was 10KHz. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz for peak measurement with peak detector at frequency above 1GHz. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 10Hz for Average measurement with peak detection at frequency above 1GHz.
- (6) When the test results of Peak Detected below the limits of Average Detected, the Average Detected is not need completed. For example: Top Channel at Fundamental 73.16dBuV/m(PK Value) <93.98(AV Limit), at harmonic 53.20 dBuV/m(PK Value) <54 dBuV/m(AV Limit), the Average Detected not need to completed.

### 4.3 Conducted Output Power

#### Limit

According to FCC 15.236(d)(1), for low power auxiliary station operating in the 470-608, and 614-698MHz bands, In the bands allocated and assigned for broadcast television and in the 600 MHz serviceband: 50 mW EIRP

#### Test Procedure

Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the power sensor.

#### Test Configuration



#### Test Results

| Test Channel | frequency (MHz) | Conducted Output Power (dBm) | ANT Gain (dBi) | EIRP (dBm) | Limit (dBm) | Result |
|--------------|-----------------|------------------------------|----------------|------------|-------------|--------|
| CH01         | 570.00          | 1.561                        | 0              | 1.561      | 17          | PASS   |
| CH09         | 580.00          | 1.121                        | 0              | 1.121      |             | PASS   |
| CH16         | 588.75          | 0.562                        | 0              | 0.562      |             | PASS   |

#### 4.4 Occupied Bandwidth Measurement

##### Limit

According to FCC 15.236(f)(2), The operating frequency within a permissible band of operation as defined in paragraph (c) must comply with the following requirements.

(1)The frequency selection shall be offset from the upper or lower band limits by 25 kHz or an integral multiple thereof.

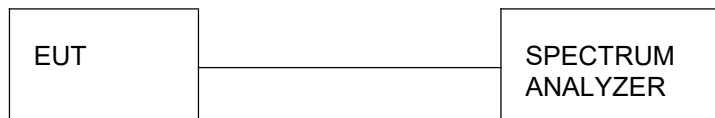
(2)One or more adjacent 25 kHz segments within the assignable frequencies may be combined to form a channel whose maximum bandwidth shall not exceed 200 kHz. The operating bandwidth shall not exceed 200kHz.

Emissions within the band from one megahertz below to one megahertz above the carrier frequency shall comply with the emission mask in Section 8.3 of ETSI EN 300 422-1 V1.4.2 (2011-08) (incorporated by reference, see § 15.38). Emissions outside this band shall comply with the limit specified at the edges of the ETSI mask.

##### Test Procedure

According to TIA-603 for additional Test Set-Up procedures, the occupied bandwidth of emission was measured with a Spectrum Analyzer connected to the antenna terminal while EUT was operating in 2.5kHz tone at an input level 16 dB greater than that necessary to produce 50 percent modulation. Then mark the -26dB Bandwidth and record it.

##### Test Configuration

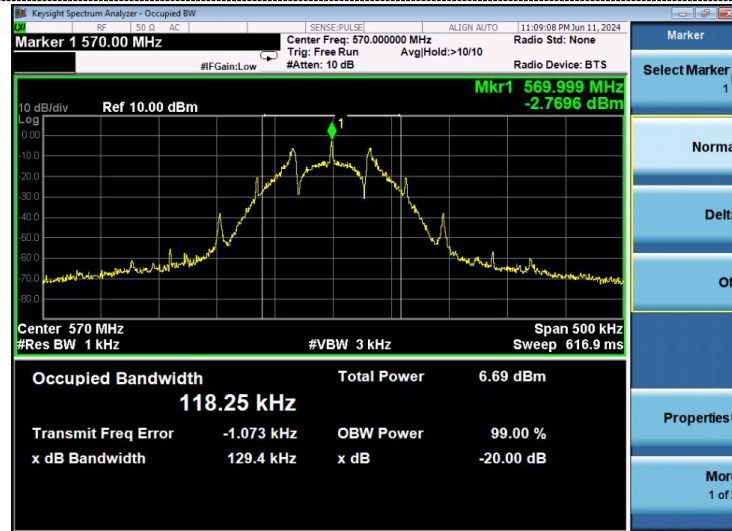


##### Test Results

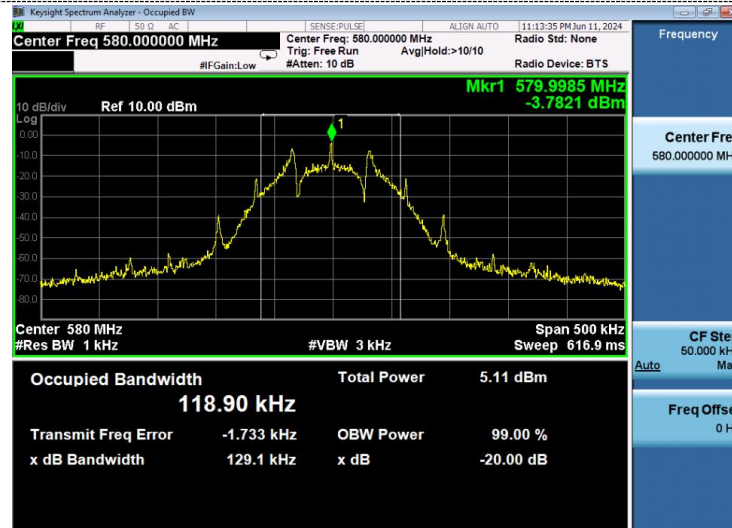
| Test Channel | frequency (MHz) | -20Bandwidth (kHz) | 99%Bandwidth (kHz) | Limit -20Bandwidth (kHz) | Result |
|--------------|-----------------|--------------------|--------------------|--------------------------|--------|
| CH01         | 570.00          | 129.4              | 118.25             | 200                      | PASS   |
| CH09         | 580.00          | 129.1              | 118.90             |                          | PASS   |
| CH16         | 588.75          | 129.1              | 117.11             |                          | PASS   |

Test plot as follows:

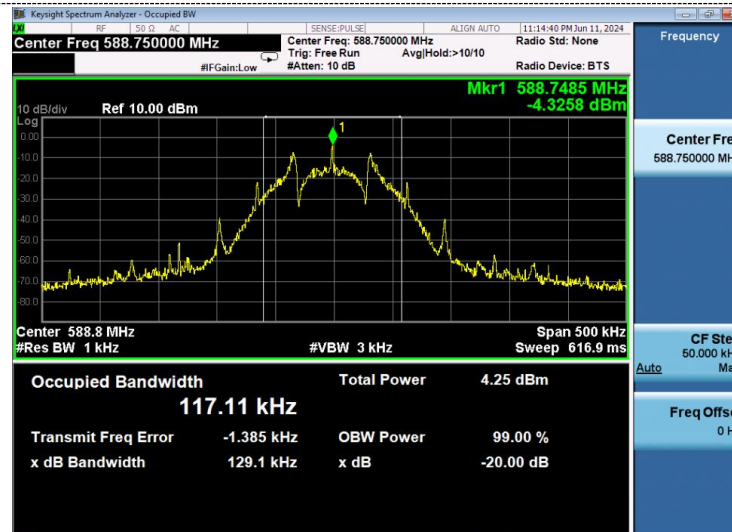
### 570.00 MHz



### 580.00 MHz

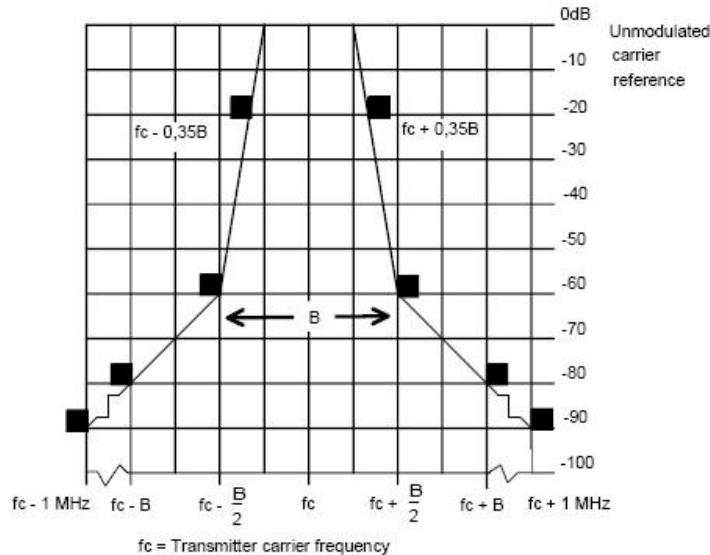


### 588.75 MHz



## 4.5 Necessary Bandwidth

### Limit



### Standard Applicable

According to § 15.236 (g) Emissions within the band from one megahertz below to one megahertz above the carrier frequency shall comply with the emission mask in § 8.3 of ETSI EN 300 422-1 V1.4.2 (2011-08), Electromagnetic compatibility and Radio spectrum Matters (ERM); Wireless UHF Microphones in the 25 MHz to 3GHz frequency range; Part 1: Technical characteristics and methods of measurement. Emissions outside of this band shall comply with the limits specified in section 8.4 of ETSI EN 300 422-1 V1.4.2 (2011-08).

According to ETSI EN 300 422-2 V2.1.1 section 8.3, the transmitter output spectrum shall be within the mask defined in the following figure.

### Test Configuration



### Test Procedure

The arrangement of test equipment as shown in figure B.1 shall be used. Note that the noise meter conforms to (quasi peak) without weighting filter (flat).

With the Low Frequency (LF) audio signal generator set to 500 Hz, the audio input level to the DUT shall be adjusted to 8 dB below the limiting threshold (-8 dB (lim)) as declared by the manufacturer.

The corresponding audio output level from the demodulator shall be measured and recorded.

The input impedance of the noise meter shall be sufficiently high to avoid more than 0.1 dB change in input level when the meter is switched between input and output.

The audio input level shall be increased by 20 dB, i.e. to +12 dB (lim), and the corresponding change in output level shall be measured.

It shall be checked that the audio output level has increased by  $\leq 10$  dB.

If this condition is not met, the initial audio input level shall be increased from -8 dB (lim) in 1 dB steps until the above condition is fulfilled, and the input level recorded in the test report. This level replaces the value derived from the manufacturer's declaration and is defined as -8 dB (lim).

Measure the input level at the transmitter required to give +12 dB (lim).

The LF generator shall be replaced with the weighted noise source to Recommendation ITU-R BS.559-2 [i.3], band-limited to 15 kHz as described in IEC 60244-13 [2], and the level shall be adjusted such that the measured input to the transmitter corresponds to +12 dB (lim).

If the transmitter incorporates any ancillary coding or signalling channels (e.g. pilot-tones), these shall be enabled prior to any spectral measurements.

If the transmitter incorporates more than one audio input, e.g. stereo systems, the second and subsequent channels shall be simultaneously driven from the same noise source, attenuated to a level of -6 dB (lim).

-centre frequency:  $f_c$ : Transmitter (Tx) nominal frequency;

-dispersion (Span):  $f_c - 1$  MHz to  $f_c + 1$  MHz;

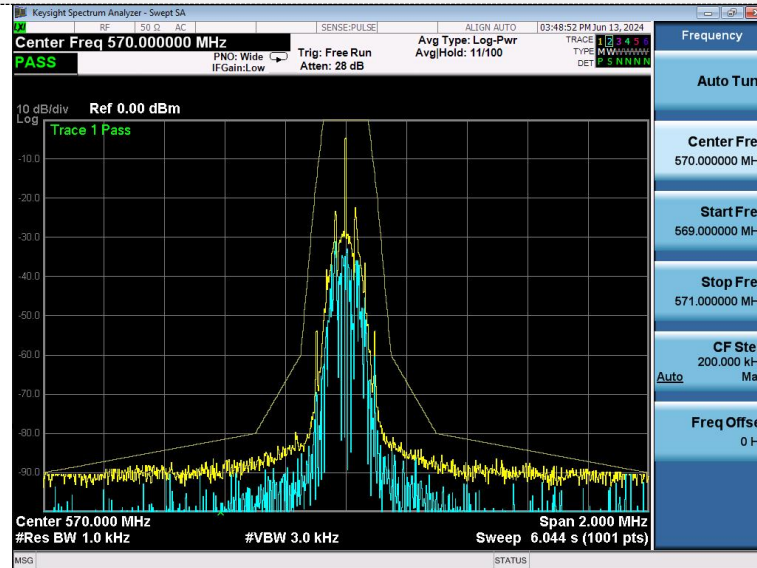
-Resolution Bandwidth (RBW): 1 kHz;

-Video Bandwidth (VBW): 3 kHz;

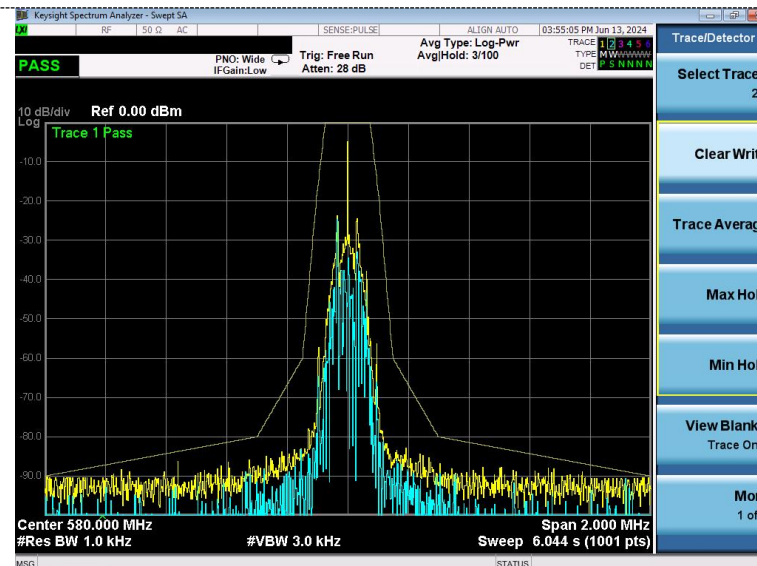
-detector: Peak hold.

**Test Results**

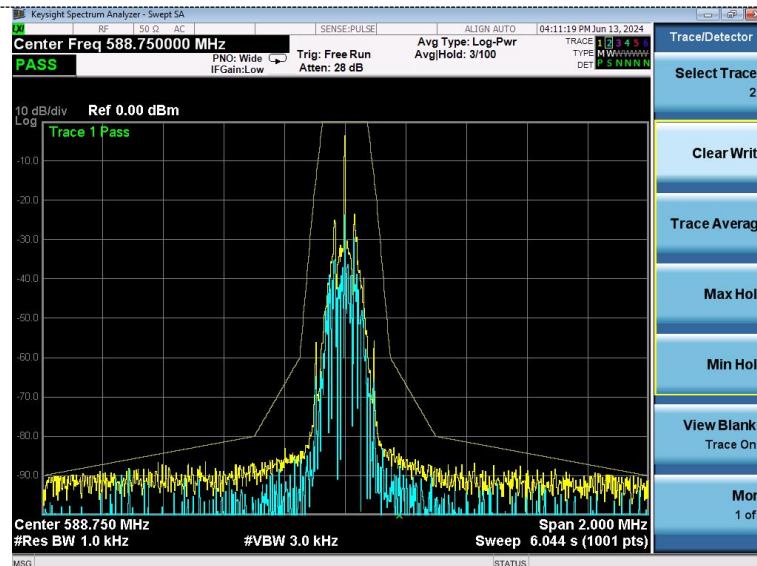
570.00MHz



580.00MHz



588.75MHz



## 4.6 Frequency Stability

### Limit

±50ppm

### Standard Applicable

According to FCC 15.236(f)(3), The frequency tolerance of the carrier signal shall be maintained within  $\pm 0.005\%$  of the operating frequency over a temperature variation of  $-20$  degrees to  $+50$  degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. Battery operated equipment shall be tested using a new battery.

### Test Configuration



### Test Procedure

1. Setup the configuration of the ambient temperature from  $-20^{\circ}\text{C}$  to  $50^{\circ}\text{C}$  with sufficient time. And measure the different power of the EUT with an artificial power from highest to end point voltage.
2. Set frequency counter center frequency to the right frequency needs to be measured band.

### Test Results

Note: All modes have been tested, and only the worst mode is recorded.

| Test frequency | Test Conditions |                  | Measure Frequency | Frequency Error |      | Limit  | Result |
|----------------|-----------------|------------------|-------------------|-----------------|------|--------|--------|
| (MHz)          | Voltage (V)     | Temperature (°C) | (MHz)             | (MHz)           | ppm  | ppm    |        |
| 570.00MHz      | N               | N                | 569.9969          | -0.0031         | -5.4 | ±50ppm | PASS   |
|                |                 | L                | 569.9981          | -0.0019         | -3.3 |        |        |
|                |                 | H                | 569.9974          | -0.0026         | -4.6 |        |        |
|                | L               | N                | 569.9956          | -0.0044         | -7.7 |        |        |
|                |                 | L                | 569.9977          | -0.0023         | -4.0 |        |        |
|                |                 | H                | 569.9962          | -0.0038         | -6.7 |        |        |
|                | H               | N                | 569.9946          | -0.0054         | -9.5 |        |        |
|                |                 | L                | 569.9955          | -0.0045         | -7.9 |        |        |
|                |                 | H                | 569.9986          | -0.0014         | -2.5 |        |        |

| Test frequency | Test Conditions |                  | Measure Frequency | Frequency Error |      | Limit  | Result |
|----------------|-----------------|------------------|-------------------|-----------------|------|--------|--------|
| (MHz)          | Voltage (V)     | Temperature (°C) | (MHz)             | (MHz)           | ppm  | ppm    |        |
| 580.00MHz      | N               | N                | 579.9972          | -0.0028         | -4.8 | ±50ppm | PASS   |
|                |                 | L                | 579.9989          | -0.0011         | -1.9 |        |        |
|                |                 | H                | 579.9964          | -0.0036         | -6.2 |        |        |
|                | L               | N                | 579.9979          | -0.0021         | -3.6 |        |        |
|                |                 | L                | 579.9958          | -0.0042         | -7.2 |        |        |
|                |                 | H                | 579.9942          | -0.0051         | -8.8 |        |        |
|                | H               | N                | 579.9966          | -0.0034         | -5.9 |        |        |
|                |                 | L                | 579.9991          | -0.0009         | -1.6 |        |        |
|                |                 | H                | 579.9981          | -0.0019         | -3.3 |        |        |

| Test frequency | Test Conditions |                  | Measure Frequency | Frequency Error |      | Limit  | Result |
|----------------|-----------------|------------------|-------------------|-----------------|------|--------|--------|
| (MHz)          | Voltage (V)     | Temperature (°C) | (MHz)             | (MHz)           | ppm  | ppm    |        |
| 588.75MHz      | N               | N                | 588.7498          | -0.0002         | -0.3 | ±50ppm | PASS   |
|                |                 | L                | 588.7494          | -0.0006         | -1.0 |        |        |
|                |                 | H                | 588.7495          | -0.0005         | -0.8 |        |        |
|                | L               | N                | 588.7493          | -0.0007         | -1.2 |        |        |
|                |                 | L                | 588.7492          | -0.0008         | -1.4 |        |        |
|                |                 | H                | 588.7491          | -0.0009         | -1.5 |        |        |
|                | H               | N                | 588.7495          | -0.0005         | -0.8 |        |        |
|                |                 | L                | 588.7494          | -0.0006         | -1.0 |        |        |
|                |                 | H                | 588.7497          | -0.0003         | -0.5 |        |        |

## **4.7 Antenna Requirement**

### **Standard Applicable**

According to FCC Part 15C 15.203

a)An intentional radiator shall be de-signed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

b)The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

### **Refer to statement below for compliance.**

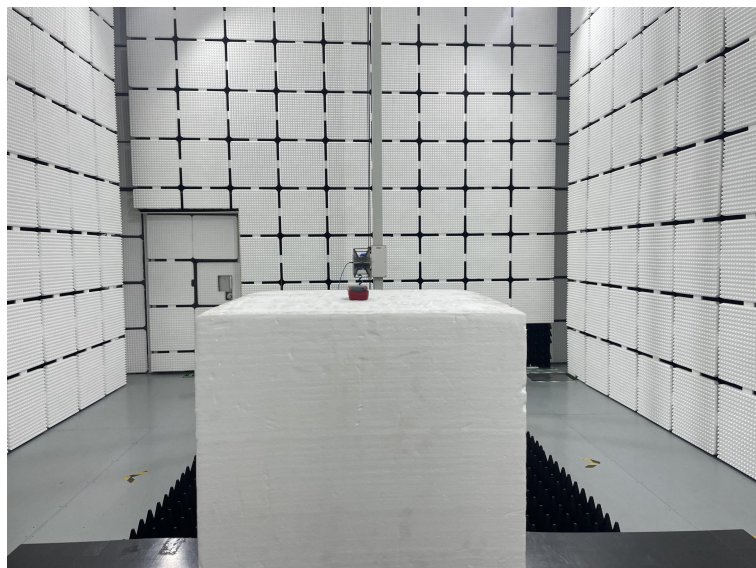
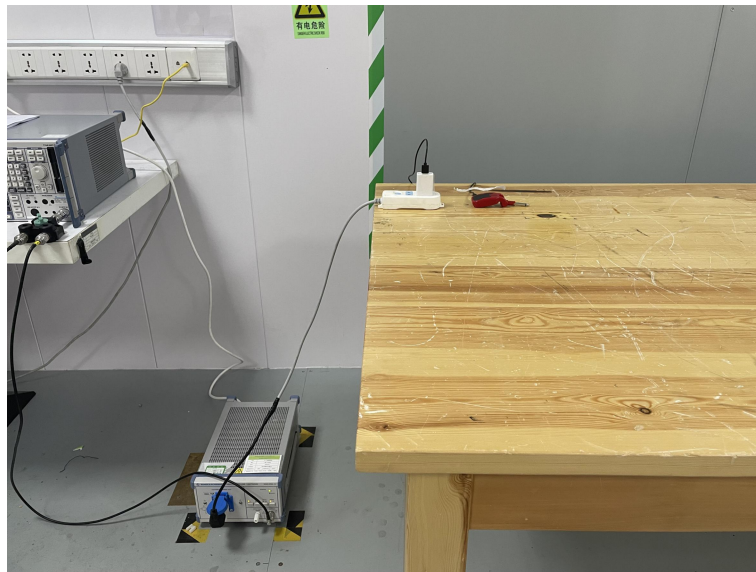
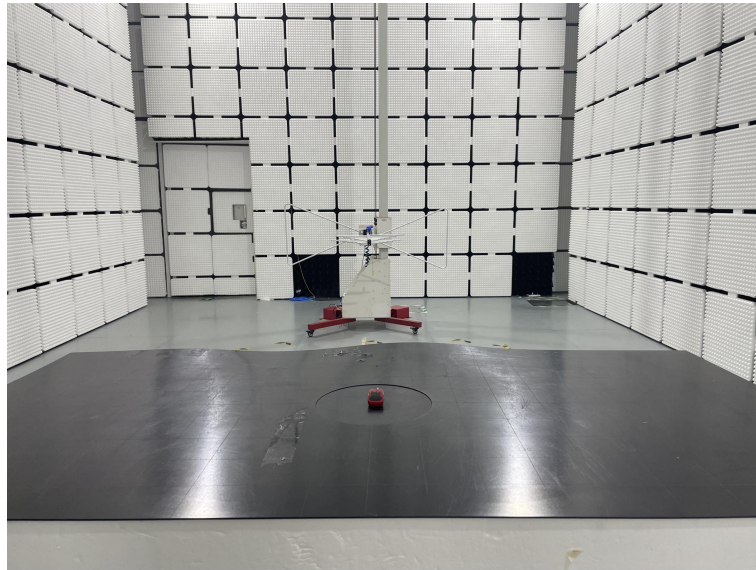
The manufacturer may design the unit so that the user can replace a broken antenna, but the use of a standard antenna jack or electrical connector is prohibited. Further, this requirement does not apply to intentional radiators that must be professionally installed.

### **Antenna Connected Construction**

The maximum gain of antenna was -2.09 dBi.

Remark:The antenna gain is provided by the customer , if the data provided by the customer is not accurate, BSL Testing Co., Ltd. does not assume any responsibility.

## 5 Test Setup Photos of the EUT



## **6 Photos of the EUT**

**Reference to the report ANNEX A of external photos and ANNEX B of internal photos.**

**\*\*\*\*\* End of Report \*\*\*\*\***