



## FCC TEST REPORT

For  
Studio Designs Limited  
Oliver Hemming Drama Speaker  
Test Model: DRESA

Prepared for : Studio Designs Limited  
Address : 403 The Laurels Industrial Building, 32 Tai Yau Street, San Po Kong, Hong Kong

Prepared by : Shenzhen LCS Compliance Testing Laboratory Ltd.  
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Date of receipt of test sample : December 10, 2024  
Number of tested samples : 2  
Sample No. : A241125191-1, A241125191-2  
Serial number : Prototype  
Date of Test : December 10, 2024 ~ December 20, 2024  
Date of Report : December 20, 2024



**FCC TEST REPORT  
FCC CFR 47 PART 15C****Report Reference No.** : LCSA12094153EB**Date Of Issue** : December 20, 2024**Testing Laboratory Name** : Shenzhen LCS Compliance Testing Laboratory Ltd.**Address** : 101, 201 Bldg A & 301 Bldg C, Juji Industrial Park Shajing Street,  
Baoan District, Shenzhen, China**Testing Location/ Procedure** : Full application of Harmonised standards ■  
Partial application of Harmonised standards □  
Other standard testing method □**Applicant's Name** : Studio Designs Limited**Address** : 403 The Laurels Industrial Building, 32 Tai Yau Street, San Po  
Kong, Hong Kong**Test Specification****Standard** : FCC CFR 47 PART 15C**Test Report Form No.** : TRF-4-E-168 A/0**TRF Originator** : Shenzhen LCS Compliance Testing Laboratory Ltd.**Master TRF** : Dated 2011-03**Shenzhen LCS Compliance Testing Laboratory Ltd. All rights reserved.**

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**Test Item Description** : Oliver Hemming Drama Speaker**Trade Mark** : OLIVER HEMMING**Test Model** : DRESA**Ratings** : Input: 18.0V $\overline{\text{---}}$ 3.0A

For AC Adapter Input: 100-240V~, 50-60Hz, 2A

Adapter Output: 18.0V $\overline{\text{---}}$ 3.0A, 54.0W**Result** : Positive**Compiled by:**

Li Huan/ Administrator

**Supervised by:**

Cary Luo/ Technique principal

**Approved by:**

Gavin Liang/ Manager



**FCC TEST REPORT**

|                                                |                                           |
|------------------------------------------------|-------------------------------------------|
| <b>Test Report No. :</b> <b>LCSA12094153EB</b> | <u>December 20, 2024</u><br>Date of issue |
|------------------------------------------------|-------------------------------------------|

|                          |                                                                                  |
|--------------------------|----------------------------------------------------------------------------------|
| Test Model.....          | : DRESA                                                                          |
| EUT.....                 | : Oliver Hemming Drama Speaker                                                   |
| <b>Applicant.....</b>    | <b>: Studio Designs Limited</b>                                                  |
| Address.....             | : 403 The Laurels Industrial Building, 32 Tai Yau Street, San Po Kong, Hong Kong |
| Telephone.....           | : /                                                                              |
| Fax.....                 | : /                                                                              |
| <b>Manufacturer.....</b> | <b>: Studio Designs Limited</b>                                                  |
| Address.....             | : 403 The Laurels Industrial Building, 32 Tai Yau Street, San Po Kong, Hong Kong |
| Telephone.....           | : /                                                                              |
| Fax.....                 | : /                                                                              |
| <b>Factory.....</b>      | <b>: AS AUDIO.,LTO</b>                                                           |
| Address.....             | : NO.19 YINPING Area, QingXi Town.Dongguan.China                                 |
| Telephone.....           | : /                                                                              |
| Fax.....                 | : /                                                                              |

|                    |                 |
|--------------------|-----------------|
| <b>Test Result</b> | <b>Positive</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.





Revision History

| Report Version | Issue Date        | Revision Content | Revised By |
|----------------|-------------------|------------------|------------|
| 000            | December 20, 2024 | Initial Issue    | --         |
|                |                   |                  |            |
|                |                   |                  |            |





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## 1. GENERAL INFORMATION

### 1.1 Description of Device (EUT)

|                     |                                                                                                                                                          |
|---------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|
| EUT                 | : Oliver Hemming Drama Speaker                                                                                                                           |
| Test Model          | : DRESA                                                                                                                                                  |
| Ratings             | : Input: 18.0V $\overline{\text{---}}$ 3.0A<br>For AC Adapter Input: 100-240V~, 50-60Hz, 2A<br>Adapter Output: 18.0V $\overline{\text{---}}$ 3.0A, 54.0W |
| Hardware Version    | : V1.2                                                                                                                                                   |
| Software Version    | : V4.9.2                                                                                                                                                 |
| Bluetooth           | :                                                                                                                                                        |
| Frequency Range     | : 2402MHz~2480MHz                                                                                                                                        |
| Channel Number      | : 79 channels for Bluetooth V5.1(DSS)                                                                                                                    |
| Channel Spacing     | : 1MHz for Bluetooth V5.1 (DSS)                                                                                                                          |
| Modulation Type     | : GFSK, $\pi/4$ -DQPSK, 8-DPSK for Bluetooth V5.1(DSS)                                                                                                   |
| Bluetooth Version   | : V5.1                                                                                                                                                   |
| Antenna Description | : PCB Antenna, 1.98dBi(Max.)                                                                                                                             |
| Wireless Charging   | :                                                                                                                                                        |
| Operating Frequency | : 110.0~205.0KHz                                                                                                                                         |
| Modulation Type     | : ASK                                                                                                                                                    |
| Antenna Type        | : Coil Antenna                                                                                                                                           |





## 1.2 Support equipment List

| Manufacturer                                   | Description   | Model          | Serial Number   | Certificate |
|------------------------------------------------|---------------|----------------|-----------------|-------------|
| Guangdong Mingxin Power Technologies Co., Ltd. | AC/DC ADAPTER | MX65D1-1803000 | ---             | FCC         |
| Huawei                                         | Mobile phone  | FRD-AL10       | FRD-AL10C00B373 | FCC         |

Note: The Mobile phone are supplied by lab and only use tested.

## 1.3 External I/O Cable

| I/O Port Description | Quantity | Cable |
|----------------------|----------|-------|
| AUX IN Port          | 1        | N/A   |
| HDMI Port            | 1        | N/A   |
| Power Port           | 1        | N/A   |

## 1.4 Description of Test Facility

NVLAP Accreditation Code is 600167-0.

FCC Designation Number is CN5024

CAB identifier is CN0071.

CNAS Registration Number is L4595.

Test Firm Registration Number: 254912.

The 3m-Semi anechoic test site fulfils CISPR 16-1-4 according to ANSI C63.4:2014 and CISPR 16-1-4:2010 SVSWR requirement for radiated emission above 1GHz.

## 1.5 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 CISPR 16 – 4 “Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements” and is documented in the LCS 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.





## 1.6 Measurement Uncertainty

| Test Item              | Frequency Range | Uncertainty | Note |
|------------------------|-----------------|-------------|------|
| Radiation Uncertainty  | 9KHz~30MHz      | 3.10dB      | (1)  |
|                        | 30MHz~200MHz    | 2.96dB      | (1)  |
|                        | 200MHz~1000MHz  | 3.10dB      | (1)  |
|                        | 1GHz~26.5GHz    | 3.80dB      | (1)  |
|                        | 26.5GHz~40GHz   | 3.90dB      | (1)  |
| Conduction Uncertainty | 150kHz~30MHz    | 1.63dB      | (1)  |
| Power disturbance      | 30MHz~300MHz    | 1.60dB      | (1)  |

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

## 1.7 Description of Test Modes

Equipment under test was operated during the measurement under the following conditions:

☒ Charging and communication mode

Modulation Type: CW (ASK)

| Test Modes                                                                                                               |                                                               |        |
|--------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------|--------|
| Mode 1                                                                                                                   | AC/DC Adapter(18V/3A)+EUT+mobile phone (Battery Status: <1%)  | Record |
| Mode 2                                                                                                                   | AC/DC Adapter(18V/3A)+EUT+mobile phone (Battery Status: <50%) | Record |
| Mode 3                                                                                                                   | AC/DC Adapter(18V/3A)+EUT+mobile phone (Battery Status: 100%) | Record |
| Note: All test modes were pre-tested for ac and dc mode, but we only recorded the worst case in this report for ac mode. |                                                               |        |

For AC conducted emission, pre-test at both AC 120V/60Hz and AC 240V/50Hz, recorded worst case;

For AC conducted emission, pre-test at both AC charge from power adapter modes, recorded worst case.





## 2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.10-2013, FCC CFR PART 15C 15.207.

### 2.1 EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

### 2.2 EUT Exercise

The EUT was operated in the normal operating mode and a continuous transmits mode for other tests. According to its specifications, the EUT must comply with the requirements of the Section 15.207 under the FCC Rules Part 15 Subpart C.

### 2.3 General Test Procedures

#### 2.3.1 Conducted Emissions

The EUT is placed on the turntable, which is 0.8 m above ground plane. According to the requirements in Section 6.2.1 of ANSI C63.10-2013 Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using Quasi-peak and average detector modes.

#### 2.3.2 Radiated Emissions

The EUT is placed on a turn table, which is 0.8 m above ground plane below 1GHz and 1.5 m above ground plane above 1GHz. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna, which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the maximum emissions, exploratory radiated emission measurements were made according to the requirements in Section 6.3 of ANSI C63.10-2013

### 2.4. Test Sample

The application provides 2 samples to meet requirement;

| Sample Number          | Description                           |
|------------------------|---------------------------------------|
| Sample 1(A241125191-1) | Engineer sample – continuous transmit |
| Sample 2(A241125191-2) | Normal sample – Intermittent transmit |





### 3. SYSTEM TEST CONFIGURATION

#### 3.1 Justification

The system was configured for testing in a normal condition.

#### 3.2 EUT Exercise Software

N/A.

#### 3.3 Special Accessories

| No. | Equipment | Manufacturer | Model No. | Serial No. | Length | shielded/<br>unshielded | Notes |
|-----|-----------|--------------|-----------|------------|--------|-------------------------|-------|
| /   | /         | /            | /         | /          | /      | /                       | /     |

#### 3.4 Block Diagram/Schematics

Please refer to the related document.

#### 3.5 Equipment Modifications

Shenzhen LCS Compliance Testing Laboratory Ltd. has not done any modification on the EUT.

#### 3.6 Test Setup

Please refer to the test setup photo.





#### 4. SUMMARY OF TEST EQUIPMENT

| Item | Equipment                | Manufacturer   | Model No.   | Serial No.      | Cal Date   | Due Date   |
|------|--------------------------|----------------|-------------|-----------------|------------|------------|
| 1    | MXA Signal Analyzer      | Agilent        | N9020A      | MY49100040      | 2024-06-06 | 2025-06-05 |
| 2    | RS SPECTRUM ANALYZER     | R&S            | FSP40       | 100503          | 2024-06-06 | 2025-06-05 |
| 3    | 3m Semi Anechoic Chamber | SIDT FRANKONIA | SAC-3M      | 03CH03-HY       | 2024-06-06 | 2025-06-05 |
| 4    | Positioning Controller   | Max-Full       | MF7802BS    | MF780208586     | N/A        | N/A        |
| 5    | EMI Test Software        | AUDIX          | E3          | /               | N/A        | N/A        |
| 6    | EMI Test Receiver        | R&S            | ESR 7       | 101181          | 2024-06-06 | 2025-06-05 |
| 7    | Active Loop Antenna      | SCHWARZBECK    | FMZB 1519B  | 00005           | 2024-07-13 | 2027-07-12 |
| 8    | By-log Antenna           | SCHWARZBECK    | VULB9163    | 9163-470        | 2024-08-03 | 2027-08-02 |
| 9    | EMI Test Receiver        | R&S            | ESPI        | 101940          | 2024-06-06 | 2025-06-05 |
| 10   | Artificial Mains         | R&S            | ENV216      | 101288          | 2024-06-06 | 2025-06-05 |
| 11   | 10dB Attenuator          | SCHWARZBECK    | MTS-IMP-136 | 261115-001-0032 | 2024-06-06 | 2025-06-05 |
| 12   | EMI Test Software        | Farad          | EZ          | /               | N/A        | N/A        |
| 13   | Antenna Mast             | Max-Full       | MFA-515BSN  | 1308572         | N/A        | N/A        |
| 14   | Pulse Limiter            | R&S            | ESH3-Z2     | 102750-NB       | 2024-06-06 | 2025-06-05 |
| 15   | Low-frequency amplifier  | SchwarzZBECK   | BBV9745     | 00253           | 2024-10-08 | 2025-10-07 |





## 5. SUMMARY OF TEST RESULT

| FCC Rules  | Description of Test         | Test Sample | Result    |
|------------|-----------------------------|-------------|-----------|
| §15.207(a) | AC Conducted Emissions      | Sample 1    | Compliant |
| §15.209    | Radiated Spurious Emissions | Sample 1    | Compliant |
| §15.215    | 20 dB Bandwidth             | Sample 1    | Compliant |

Remark: The measurement uncertainty is not included in the test result.

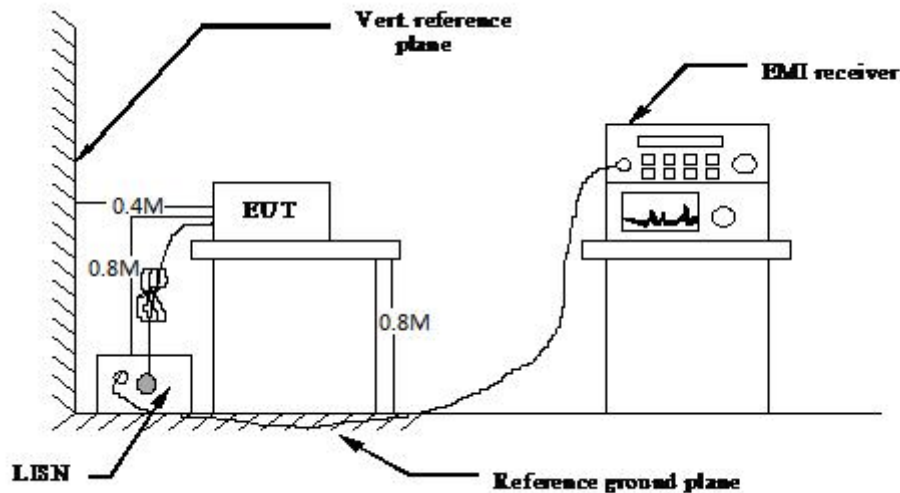
N/A – Not Applicable!!!





## 6. POWER LINE CONDUCTED MEASUREMENT

### 6.1. Block Diagram of Test Setup



### 6.2. Standard Applicable

According to §15.207: For all the consumer devices which is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed 250 microvolts (The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz). The limits at specific frequency range are listed as follows:

| Frequency Range (MHz) | Limits (dBμV) |          |
|-----------------------|---------------|----------|
|                       | Quasi-peak    | Average  |
| 0.15 to 0.50          | 66 to 56      | 56 to 46 |
| 0.50 to 5             | 56            | 46       |
| 5 to 30               | 60            | 50       |

\* Decreasing linearly with the logarithm of the frequency

### 6.3 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor (if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$FS \text{ (dB}\mu\text{V/m)} = RA \text{ (dB}\mu\text{V)} + AF \text{ (dB/m)} + CL \text{ (dB)} - AG \text{ (dB)}$$

|                           |                                            |
|---------------------------|--------------------------------------------|
| Where FS = Field Strength | CL = Cable Attenuation Factor (Cable Loss) |
| RA = Reading Amplitude    | AG = Amplifier Gain                        |
| AF = Antenna Factor       |                                            |

### 6.4 Test Results

#### PASS

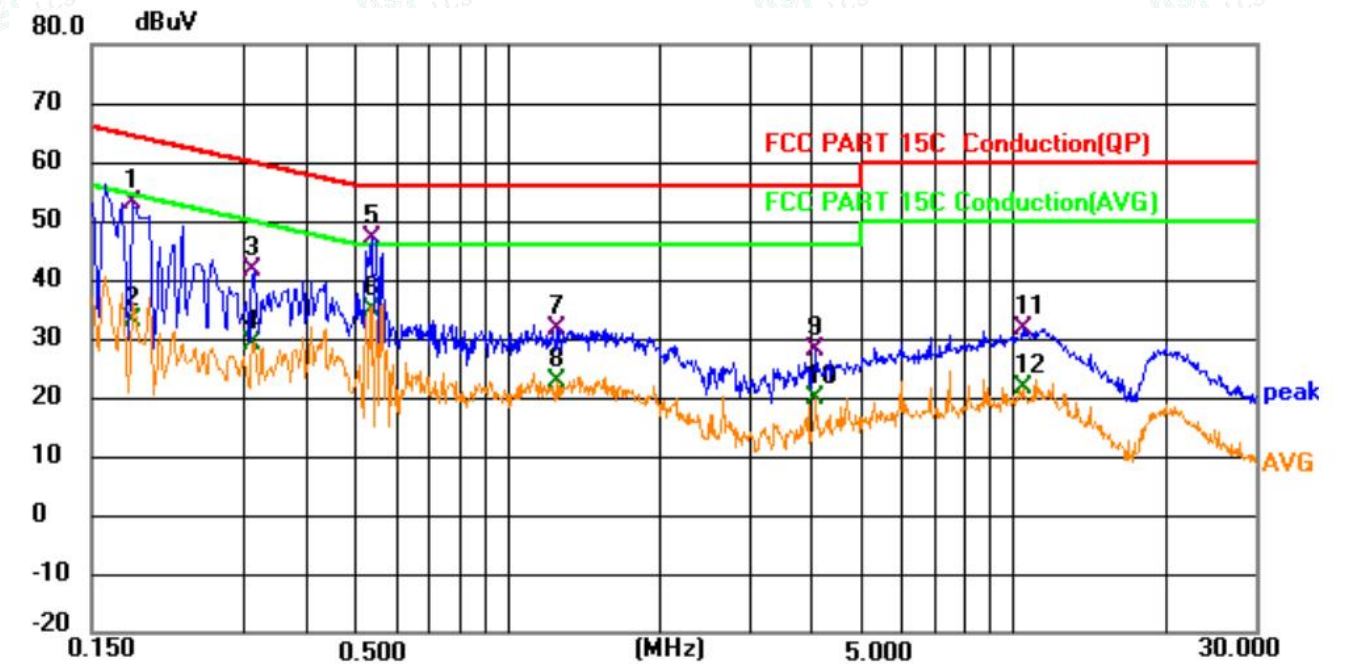
The test data please refer to following page.

|               |         |                |          |
|---------------|---------|----------------|----------|
| Temperature   | 22.5°C  | Humidity       | 53.7%    |
| Test Engineer | Jay Luo | Configurations | Transmit |



**AC Power Line Conducted Emission (Power input to adapter @ AC 120V/60Hz (Worst Case))**

Line



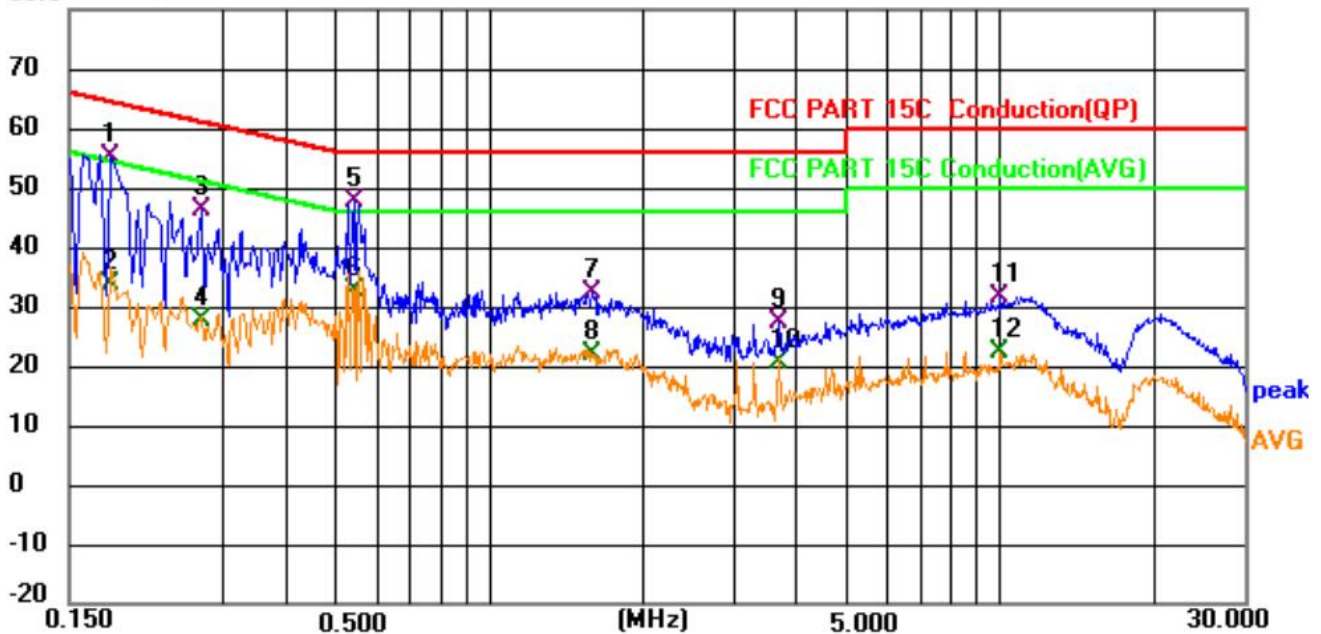
| No. | Mk. | Freq.<br>MHz | Reading<br>Level<br>dBuV | Correct<br>Factor<br>dB | Measure-<br>ment<br>dBuV | Limit<br>dBuV | Margin<br>dB | Detector | Comment |
|-----|-----|--------------|--------------------------|-------------------------|--------------------------|---------------|--------------|----------|---------|
| 1   |     | 0.181        | 33.21                    | 19.74                   | 52.95                    | 64.44         | -11.49       | QP       |         |
| 2   |     | 0.181        | 13.46                    | 19.74                   | 33.20                    | 54.44         | -21.24       | AVG      |         |
| 3   |     | 0.312        | 21.86                    | 19.83                   | 41.69                    | 59.92         | -18.23       | QP       |         |
| 4   |     | 0.312        | 9.10                     | 19.83                   | 28.93                    | 49.92         | -20.99       | AVG      |         |
| 5   | *   | 0.537        | 27.28                    | 19.73                   | 47.01                    | 56.00         | -8.99        | QP       |         |
| 6   |     | 0.537        | 15.24                    | 19.73                   | 34.97                    | 46.00         | -11.03       | AVG      |         |
| 7   |     | 1.248        | 12.49                    | 19.09                   | 31.58                    | 56.00         | -24.42       | QP       |         |
| 8   |     | 1.248        | 3.63                     | 19.09                   | 22.72                    | 46.00         | -23.28       | AVG      |         |
| 9   |     | 4.061        | 8.81                     | 19.15                   | 27.96                    | 56.00         | -28.04       | QP       |         |
| 10  |     | 4.061        | 0.71                     | 19.15                   | 19.86                    | 46.00         | -26.14       | AVG      |         |
| 11  |     | 10.401       | 12.28                    | 19.48                   | 31.76                    | 60.00         | -28.24       | QP       |         |
| 12  |     | 10.401       | 2.27                     | 19.48                   | 21.75                    | 50.00         | -28.25       | AVG      |         |





Neutral

80.0 dBuV



| No. | Mk. | Freq.  | Reading Level | Correct Factor | Measurement | Limit | Margin |          |         |
|-----|-----|--------|---------------|----------------|-------------|-------|--------|----------|---------|
|     |     | MHz    | dBuV          | dB             | dBuV        | dBuV  | dB     | Detector | Comment |
| 1   |     | 0.181  | 35.59         | 19.71          | 55.30       | 64.44 | -9.14  | QP       |         |
| 2   |     | 0.181  | 13.90         | 19.71          | 33.61       | 54.44 | -20.83 | AVG      |         |
| 3   |     | 0.272  | 26.30         | 19.78          | 46.08       | 61.06 | -14.98 | QP       |         |
| 4   |     | 0.272  | 7.91          | 19.78          | 27.69       | 51.06 | -23.37 | AVG      |         |
| 5   | *   | 0.541  | 28.36         | 19.41          | 47.77       | 56.00 | -8.23  | QP       |         |
| 6   |     | 0.541  | 13.33         | 19.41          | 32.74       | 46.00 | -13.26 | AVG      |         |
| 7   |     | 1.585  | 13.30         | 19.00          | 32.30       | 56.00 | -23.70 | QP       |         |
| 8   |     | 1.585  | 3.05          | 19.00          | 22.05       | 46.00 | -23.95 | AVG      |         |
| 9   |     | 3.683  | 8.32          | 18.98          | 27.30       | 56.00 | -28.70 | QP       |         |
| 10  |     | 3.683  | 1.63          | 18.98          | 20.61       | 46.00 | -25.39 | AVG      |         |
| 11  |     | 10.018 | 11.97         | 19.53          | 31.50       | 60.00 | -28.50 | QP       |         |
| 12  |     | 10.018 | 2.81          | 19.53          | 22.34       | 50.00 | -27.66 | AVG      |         |

\*\*\*Note: Pre-scan all modes and recorded the worst case results in this report.

Margin=Reading level + Correct - Limit;

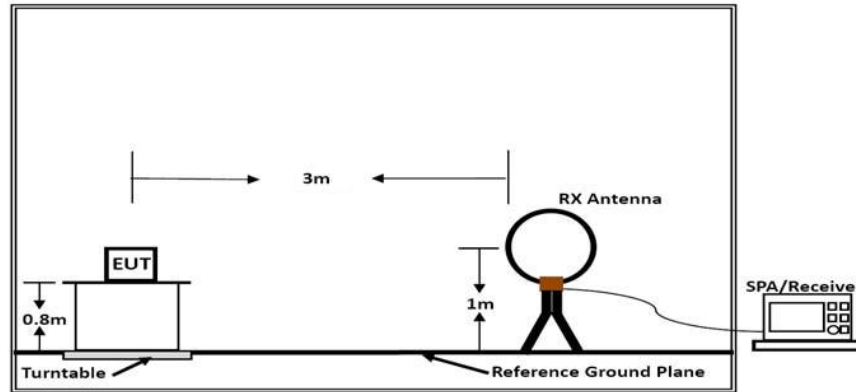
Correct Factor=Lisn Factor+Cable Factor+Insertion loss of Pulse Limiter



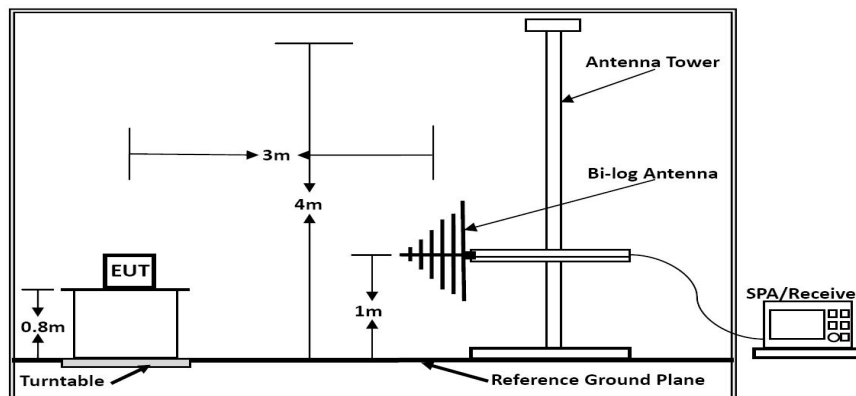


## 7. RADIATED EMISSION MEASUREMENT

### 7.1. Block Diagram of Test Setup



Below 30MHz



Below 1GHz





## 7.2. Radiated Emission Limit

15.205 (a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

| MHz               | MHz                 | MHz           | GHz         |
|-------------------|---------------------|---------------|-------------|
| 0.090-0.110       | 16.42-16.423        | 399.9-410     | 4.5-5.15    |
| 0.495-0.505       | 16.69475-16.69525   | 608-614       | 5.35-5.46   |
| 2.1735-2.1905     | 16.80425-16.80475   | 960-1240      | 7.25-7.75   |
| 4.125-4.128       | 25.5-25.67          | 1300-1427     | 8.025-8.5   |
| 4.17725-4.17775   | 37.5-38.25          | 1435-1626     | 9.0-9.2     |
| 4.20725-4.20775   | 73-74.6             | 1645.5-1646.5 | 9.3-9.5     |
| 6.215-6.218       | 74.8-75.2           | 1660-1710     | 10.6-12.7   |
| 6.26775-6.26825   | 108-121.94          | 1718.8-1722.2 | 13.25-13.4  |
| 6.31175-6.31225   | 123-138             | 2200-2300     | 14.47-14.5  |
| 8.291-8.294       | 149.9-150.05        | 2310-2390     | 15.35-16.2  |
| 8.362-8.366       | 156.52475-156.52525 | 2483.5-2500   | 17.7-21.4   |
| 8.37625-8.38675   | 156.7-156.9         | 2690-2900     | 22.01-23.12 |
| 8.41425-8.41475   | 162.0125-167.17     | 3260-3267     | 23.6-24.0   |
| 12.29-12.293      | 167.72-173.2        | 3332-3339     | 31.2-31.8   |
| 12.51975-12.52025 | 240-285             | 3345.8-3358   | 36.43-36.5  |
| 12.57675-12.57725 | 322-335.4           | 3600-4400     | (12)        |
| 13.36-13.41       |                     |               |             |

1\ Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

2\ Above 38.6

According to §15.247 (d): 20dBc in any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

| Frequencies (MHz) | Field Strength (microvolts/meter) | Measurement Distance (meters) |
|-------------------|-----------------------------------|-------------------------------|
| 0.009~0.490       | 2400/F(KHz)                       | 300                           |
| 0.490~1.705       | 24000/F(KHz)                      | 30                            |
| 1.705~30.0        | 30                                | 30                            |
| 30~88             | 100                               | 3                             |
| 88~216            | 150                               | 3                             |
| 216~960           | 200                               | 3                             |
| Above 960         | 500                               | 3                             |

## 7.3. EUT Configuration on Measurement

The following equipment are installed on Radiated Emission Measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.





## 7.4. Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor (if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$FS \text{ (dBuV/m)} = RA \text{ (dBuV)} + AF \text{ (dB/m)} + CL \text{ (dB)} - AG \text{ (dB)}$$

|                           |                                            |
|---------------------------|--------------------------------------------|
| Where FS = Field Strength | CL = Cable Attenuation Factor (Cable Loss) |
| RA = Reading Amplitude    | AG = Amplifier Gain                        |
| AF = Antenna Factor       |                                            |

## 7.5. Operating Condition of EUT

(1) Setup the EUT as shown in Section 7.1.

## 7.6. Measuring Setting

The following table is the setting of spectrum analyzer and receiver.

| Receiver Parameter     | Setting                               |
|------------------------|---------------------------------------|
| Attenuation            | Auto                                  |
| Start ~ Stop Frequency | 9kHz~150kHz / RB 200Hz for QP/Average |
| Start ~ Stop Frequency | 150kHz~30MHz / RB 9kHz for QP/Average |
| Start ~ Stop Frequency | 30MHz~1000MHz / RB 100kHz for QP      |

## 7.7. Test Procedure

### 1) Sequence of testing 9 kHz to 30 MHz

#### Setup:

- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.
- If the EUT is a tabletop system, a rotatable table with 0.8 m height is used.
- If the EUT is a floor standing device, it is placed on the ground.
- Auxiliary equipment and cables were positioned to simulate normal operation conditions.
- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.
- The measurement distance is 3 meter.
- The EUT was set into operation.

#### Premeasurement:

- The turntable rotates from 0° to 315° using 45° steps.
- The antenna height is 1.0 meter.
- At each turntable position the analyzer sweeps with peak detection to find the maximum of all emissions

#### Final measurement:





- Identified emissions during the premeasurement the software maximizes by rotating the turntable position ( $0^{\circ}$  to  $360^{\circ}$ ) and by rotating the elevation axes ( $0^{\circ}$  to  $360^{\circ}$ ).
- The final measurement will be done in the position (turntable and elevation) causing the highest emissions with QPK detector.
- The final levels, frequency, measuring time, bandwidth, turntable position, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the premeasurement and the limit will be stored.

## 2) Sequence of testing 30 MHz to 1 GHz

### Setup:

- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.
- If the EUT is a tabletop system, a table with 0.8 m height is used, which is placed on the ground plane.
- If the EUT is a floor standing device, it is placed on the ground plane with insulation between both.
- Auxiliary equipment and cables were positioned to simulate normal operation conditions
- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.
- The measurement distance is 3 meter.
- The EUT was set into operation.

### Premeasurement:

- The turntable rotates from  $0^{\circ}$  to  $315^{\circ}$  using  $45^{\circ}$  steps.
- The antenna is polarized vertical and horizontal.
- The antenna height changes from 1 to 3 meter.
- At each turntable position, antenna polarization and height the analyzer sweeps three times in peak to find the maximum of all emissions.

### Final measurement:

- The final measurement will be performed with minimum the six highest peaks.
- According to the maximum antenna and turntable positions of premeasurement the software maximize the peaks by changing turntable position ( $\pm 45^{\circ}$ ) and antenna movement between 1 and 4 meter.
- The final measurement will be done with QP detector with an EMI receiver.
- The final levels, frequency, measuring time, bandwidth, antenna height, antenna polarization, turntable angle, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the premeasurement with marked maximum final measurements and the limit will be stored.

## 7.8. Test Results

PASS.

*Both AC and DC modes were tested, only AC mode was recorded  
Only report the worst test data (Mode 1) in test report;*

*The test data please refer to following page:*



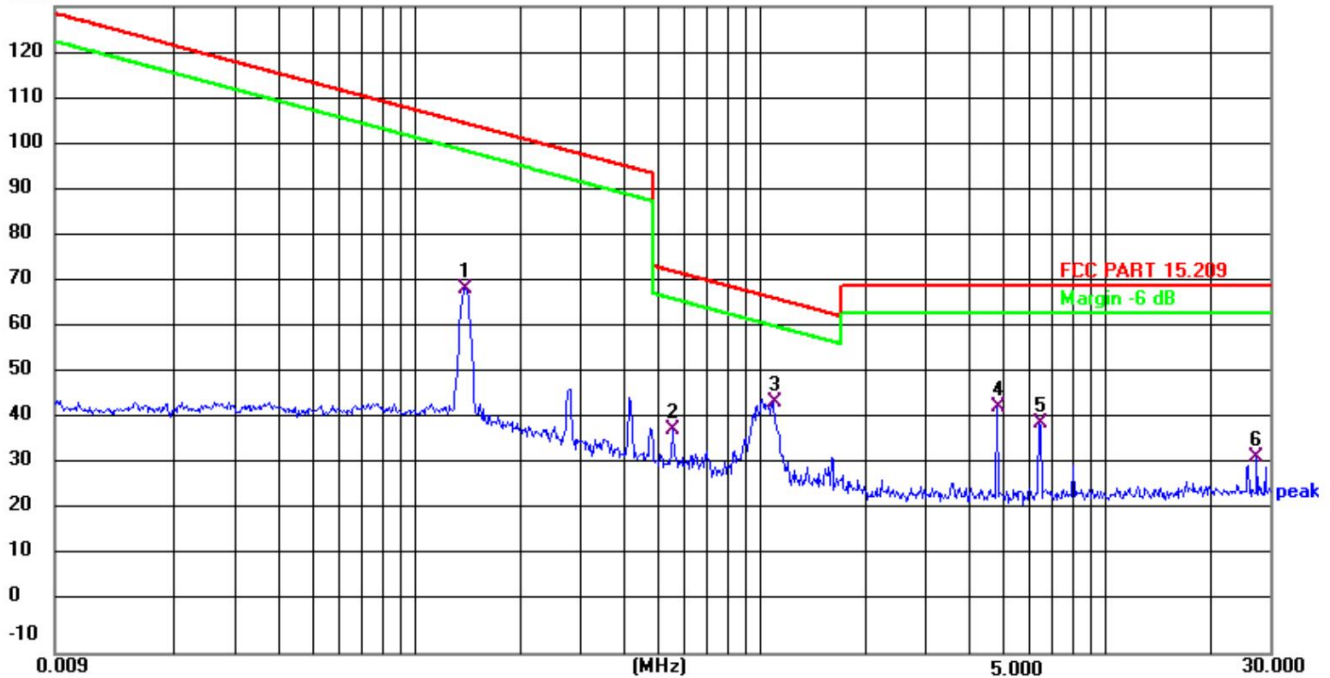


|               |         |                |          |
|---------------|---------|----------------|----------|
| Temperature   | 23.6°C  | Humidity       | 52.2%    |
| Test Engineer | Jay Luo | Configurations | Transmit |

0.009 MHz – 30 MHz

0 degree

130.0 dBuV/m



| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector |
|-----|-----------------|----------------|---------------|----------------|----------------|-------------|----------|
| 1   | 0.1396          | 79.37          | -10.38        | 68.99          | 104.65         | -35.66      | QP       |
| 2   | 0.5544          | 48.61          | -10.27        | 38.34          | 72.73          | -34.39      | QP       |
| 3   | 1.0870          | 54.63          | -10.05        | 44.58          | 66.88          | -22.30      | QP       |
| 4   | 4.8358          | 53.19          | -9.90         | 43.29          | 69.54          | -26.25      | QP       |
| 5   | 6.4235          | 49.80          | -9.90         | 39.90          | 69.54          | -29.64      | QP       |
| 6   | 27.4390         | 41.75          | -9.14         | 32.61          | 69.54          | -36.93      | QP       |

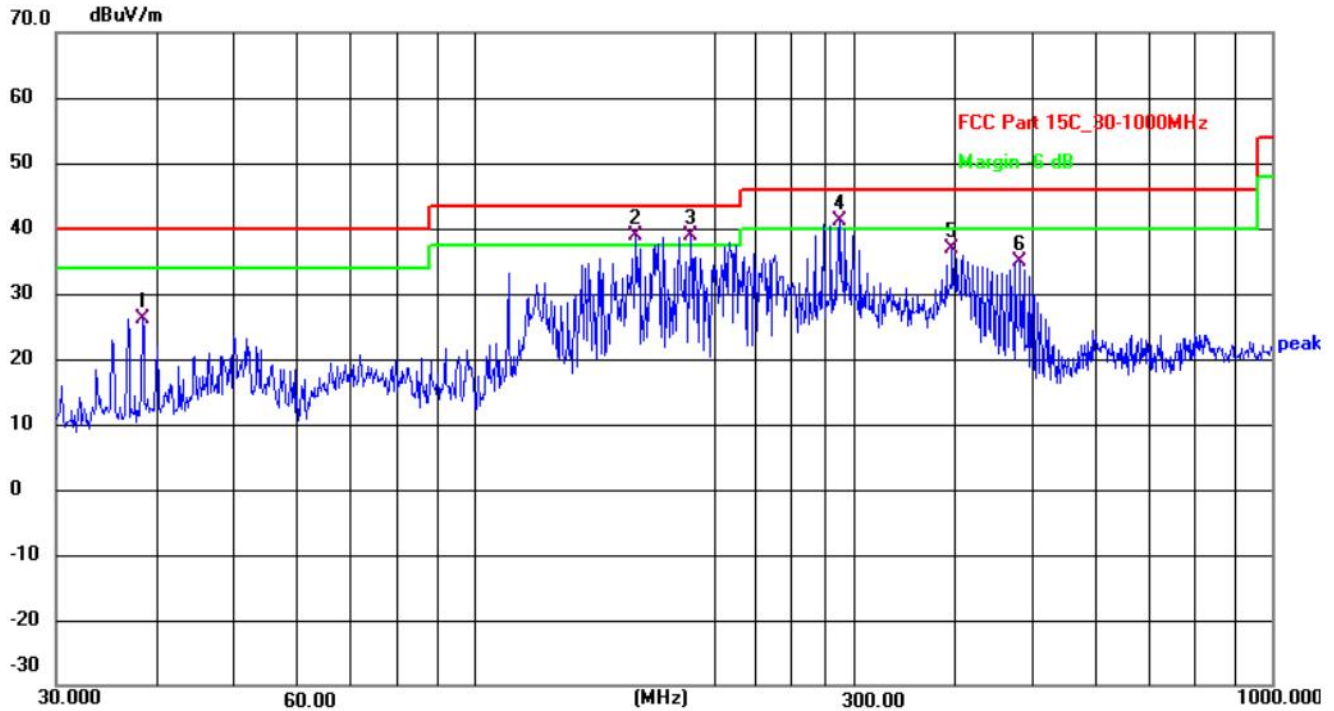
Remark: 1). Measured at antenna position 0 degree and 90 degree, recorded worst case at 0 degree.

2). Margin=Reading level + Factor- Limit





|               |         |                |          |
|---------------|---------|----------------|----------|
| Temperature   | 23.8℃   | Humidity       | 52.1%    |
| Test Engineer | Jay Luo | Configurations | Transmit |

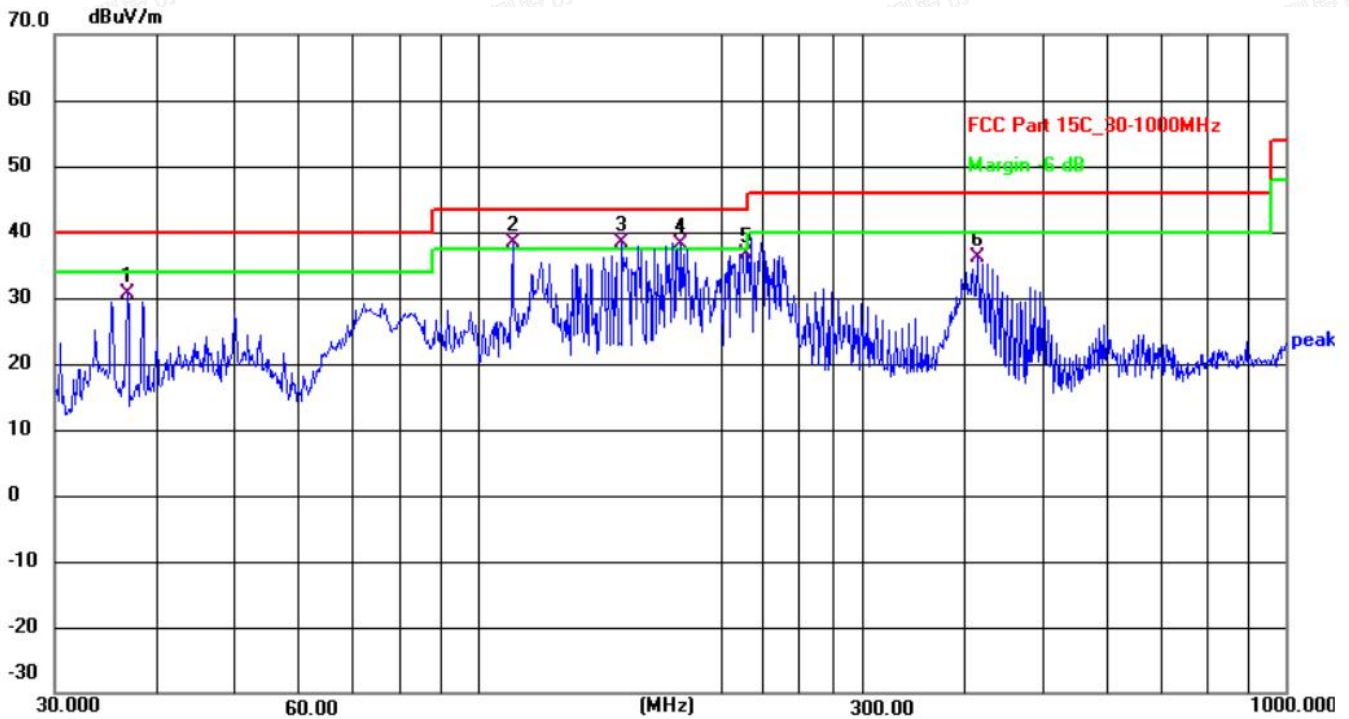
**Below 1GHz***Horizontal*

| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector |
|-----|-----------------|----------------|---------------|----------------|----------------|-------------|----------|
| 1   | 38.4808         | 43.26          | -17.13        | 26.13          | 40.00          | -13.87      | QP       |
| 2   | 159.7844        | 59.68          | -20.88        | 38.80          | 43.50          | -4.70       | QP       |
| 3   | 187.0954        | 58.77          | -19.90        | 38.87          | 43.50          | -4.63       | QP       |
| 4   | 287.9904        | 57.22          | -15.98        | 41.24          | 46.00          | -4.76       | QP       |
| 5   | 397.6333        | 50.30          | -13.36        | 36.94          | 46.00          | -9.06       | QP       |
| 6   | 483.9094        | 47.74          | -12.87        | 34.87          | 46.00          | -11.13      | QP       |





Vertical



| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector |
|-----|-----------------|----------------|---------------|----------------|----------------|-------------|----------|
| 1   | 36.8952         | 48.34          | -17.70        | 30.64          | 40.00          | -9.36       | QP       |
| 2   | 110.5686        | 57.37          | -19.11        | 38.26          | 43.50          | -5.24       | QP       |
| 3   | 151.0663        | 58.09          | -19.81        | 38.28          | 43.50          | -5.22       | QP       |
| 4   | 178.1324        | 57.08          | -18.85        | 38.23          | 43.50          | -5.27       | QP       |
| 5   | 215.2675        | 53.73          | -16.99        | 36.74          | 43.50          | -6.76       | QP       |
| 6   | 416.1791        | 50.53          | -14.42        | 36.11          | 46.00          | -9.89       | QP       |

1). Emission level (dBuV/m) = 20 log Emission level (uV/m).

2). Margin=Reading level + Factor- Limit.

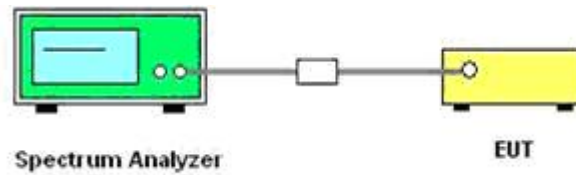
Correct Factor=Antenna Factor+Cable Factor- Pre-amplifier Factor





## 8. 20 DB BANDWIDTH MEASUREMENT

### 8.1. Block Diagram of Test Setup



### 8.2. Test Procedure

Use the following spectrum analyzer settings:

Span = 10 KHz

RBW = 100Hz

VBW = 300Hz

Sweep = auto

Detector function = peak

Trace = max hold

The EUT should be transmitting at its maximum data rate. Allow the trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission. Use the marker-delta function to measure 20 dB down one side of the emission. Reset the marker-delta function, and move the marker to the other side of the emission, until it is (as close as possible to) even with the reference marker level. The marker-delta reading at this point is the 20 dB bandwidth of the emission. If this value varies with different modes of operation (e.g., data rate, modulation format, etc.), repeat this test for each variation. The limit is specified in one of the subparagraphs of this Section. Submit this plot(s).





### 8.3. Test Results

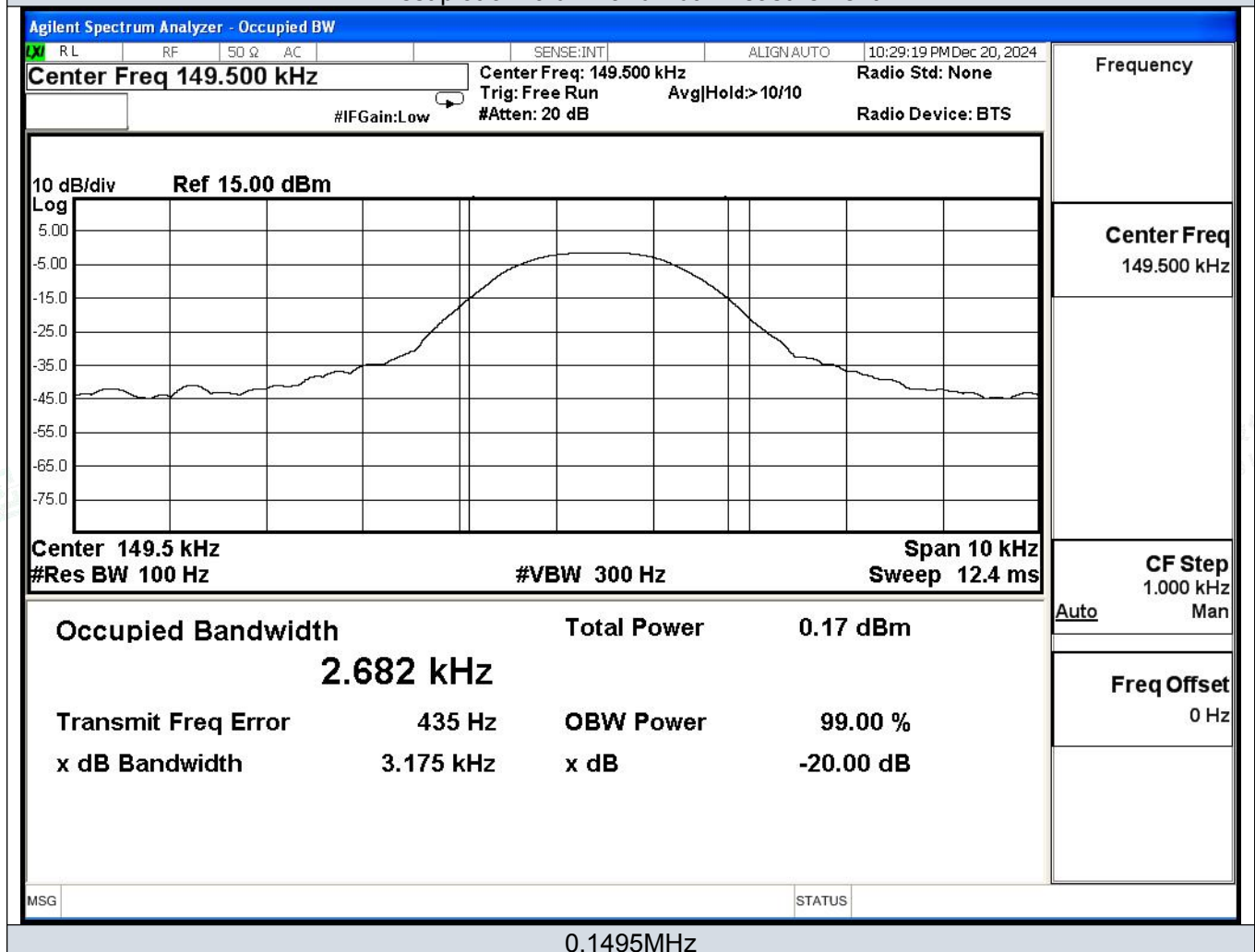
Test Result Of 20dB Bandwidth Measurement

| Test Mode | Test Frequency (MHz) | 20dB Bandwidth (kHz) | Limit (kHz)   |
|-----------|----------------------|----------------------|---------------|
| TM1       | 0.1495               | 3.175                | Non-Specified |

Result: Pass

Please refer to the following page for test plot.

Test plot of 20 dB Bandwidth Measurement





## 9. PHOTOGRAPHS OF TEST SETUP

Please refer to separated files for Test Setup Photos of the EUT.

## 10. EXTERNAL PHOTOGRAPHS OF THE EUT

Please refer to separated files for External Photos of the EUT.

## 11. INTERNAL PHOTOGRAPHS OF THE EUT

Please refer to separated files for Internal Photos of the EUT.

-----THE END OF REPORT-----

