

**FCC TEST REPORT**  
**FOR**  
**SAGE HUMAN ELECTRONICS INTERNATIONAL CO.,LTD.**  
**BT FM Transmitter with QC/ 1A Dual USB Ports and Handsfree Mic**  
**TEST Model No.: BT88C**  
**Additional Model No.: 60343073694**

Prepared for : SAGE HUMAN ELECTRONICS INTERNATIONAL CO.,LTD.  
Address : 4F., A Building, Rongli Industrial Park, No.2 Guiyuan Rd. Guihua  
Community, Guanlan Town, Longhua New Dist., Shenzhen, China

Prepared by : Shenzhen LCS Compliance Testing Laboratory Ltd.  
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Date of receipt of test sample : October 28, 2020  
Number of tested samples : 2  
Sample number : 201023001A-1, 201023001A-2  
Serial number : Prototype  
Date of Test : October 28, 2020 ~ November 20, 2020  
Date of Report : November 23, 2020

**FCC TEST REPORT****FCC CFR 47 PART 15.239****Report Reference No. .... : LCS201023001AEB**

Date of Issue ..... : November 23, 2020

**Testing Laboratory Name ..... : Shenzhen LCS Compliance Testing Laboratory Ltd.**Address ..... : 101, 201 Bldg A & 301 Bldg C, Juji Industrial Park Yabianxueziwei,  
Shajing Street, Baoan District, Shenzhen, ChinaTesting Location/ Procedure..... : Full application of Harmonised standards ■  
Partial application of Harmonised standards □  
Other standard testing method □**Applicant's Name..... : SAGE HUMAN ELECTRONICS INTERNATIONAL CO.,LTD.**Address ..... : 4F., A Building, Rongli Industrial Park, No.2 Guiyuan Rd. Guihua  
Community, Guanlan Town, Longhua New Dist., Shenzhen, China**Test Specification**

Standard..... : FCC CFR 47 PART 15.239

Test Report Form No. .... : LCSEMC-1.0

TRF Originator ..... : Shenzhen LCS Compliance Testing Laboratory Ltd.

Master TRF ..... : Dated 2011-03

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**Test Item Description. .... : BT FM Transmitter with QC/ 1A Dual USB Ports and Handsfree Mic**

Trade Mark..... : cigii

Model/ Type reference..... : BT88C

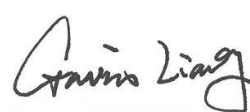
Ratings ..... : DC 12-24V

**Result ..... : Positive****Compiled by:**

Linda He / File administrators

**Supervised by:**

Jin Wang / Technique principal

**Approved by:**

Gavin Liang/ Manager

## FCC -- TEST REPORT

|                                   |                                    |
|-----------------------------------|------------------------------------|
| Test Report No. : LCS201023001AEB | November 23, 2020<br>Date of issue |
|-----------------------------------|------------------------------------|

|                   |                                                                                                                                |
|-------------------|--------------------------------------------------------------------------------------------------------------------------------|
| Type / Model..... | : BT88C                                                                                                                        |
| EUT.....          | : BT FM Transmitter with QC/ 1A Dual USB Ports and Handsfree Mic                                                               |
| Applicant.....    | : SAGE HUMAN ELECTRONICS INTERNATIONAL CO.,LTD.                                                                                |
| Address.....      | : 4F., A Building, Rongli Industrial Park, No.2 Guiyuan Rd. Guihua Community, Guanlan Town, Longhua New Dist., Shenzhen, China |
| Telephone.....    | : /                                                                                                                            |
| Fax.....          | : /                                                                                                                            |
| Manufacturer..... | : SAGE HUMAN ELECTRONICS INTERNATIONAL CO.,LTD.                                                                                |
| Address.....      | : 4F., A Building, Rongli Industrial Park, No.2 Guiyuan Rd. Guihua Community, Guanlan Town, Longhua New Dist., Shenzhen, China |
| Telephone.....    | : /                                                                                                                            |
| Fax.....          | : /                                                                                                                            |
| Factory.....      | : /                                                                                                                            |
| Address.....      | : /                                                                                                                            |
| Telephone.....    | : /                                                                                                                            |
| Fax.....          | : /                                                                                                                            |

|             |          |
|-------------|----------|
| Test Result | Positive |
|-------------|----------|

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

| Revision | Issue Date        | Revisions     | Revised By  |
|----------|-------------------|---------------|-------------|
| 00       | November 23, 2020 | Initial Issue | Gavin Liang |
|          |                   |               |             |
|          |                   |               |             |

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## 1. GENERAL INFORMATION

### 1.1 Description of Device (EUT)

|                       |                                                                                                                        |
|-----------------------|------------------------------------------------------------------------------------------------------------------------|
| EUT                   | BT FM Transmitter with QC/ 1A Dual USB Ports and Handsfree Mic                                                         |
| Test Model            | : BT88C                                                                                                                |
| Additional Models No. | : 60343073694                                                                                                          |
| Models Declaration    | : PCB board, structure and internal of these models are the same, Only the model names are different for these models. |
| Power Supply          | : DC 12-24V                                                                                                            |
| Hardware Version      | : BT88C_2819_8027_V1.2/BT88C_8825_8824_V1.2/BT88C_KEY_V1.0                                                             |
| Software Version      | : V5.0                                                                                                                 |

#### Bluetooth

|                           |                                                             |
|---------------------------|-------------------------------------------------------------|
| Frequency Range           | : 2402MHz ~ 2480MHz                                         |
| Bluetooth Version         | : V5.0                                                      |
| Bluetooth Channel Number  | : 79 channels for Bluetooth V5.0 (BDR/EDR)                  |
| Bluetooth Channel Spacing | : 1MHz for Bluetooth V4.0 (BDR/EDR)                         |
| Bluetooth Modulation Type | : GFSK, $\pi/4$ -DQPSK, 8-DPSK for Bluetooth V5.0 (BDR/EDR) |
| Antenna Description       | : Internal Antenna, -0.68dBi(Max.)                          |

#### FM

|                     |                                                                                           |
|---------------------|-------------------------------------------------------------------------------------------|
| Frequency Range     | : 88.1~107.9MHz                                                                           |
| Channel number      | : 199                                                                                     |
| Channel Spacing     | : 100KHz                                                                                  |
| Channel frequency   | : 88.1~107.9MHz(Channel Number: 199, Channel Frequency=88.1+0.1(K-1), K=1, 2, 3 .....199) |
| Modulation Type     | : FM                                                                                      |
| Antenna Description | : Internal antenna, 1.5 dBi(Max.)                                                         |

### 1.2 Support equipment List

| Manufacturer | Description | Model | Serial Number | Certificate |
|--------------|-------------|-------|---------------|-------------|
| --           | --          | --    | --            | --          |

### 1.3 External I/O Cable

| I/O Port Description | Quantity | Cable |
|----------------------|----------|-------|
| USB Port             | 2        | 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.

The 3m-Semi anechoic test site fulfils CISPR 16-1-4 according to ANSI C63.10:2013 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

The FM Transmitter is powered by a battery which is DC 12V. In the audio port and MIC port give a 2.5 kHz tone at a level 16 dB higher than that required to produce a frequency deviation of 75 KHz and make it works in TX mode (88.1 MHz, 98.0 MHz and 107.9 MHz).

Worst-case mode and channel used for 9 KHz-1000 MHz radiated emissions was the mode and channel with the highest output power, that was determined to be TX.

## 2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.10-2013, FCC CFR PART 15C 15.207, 15.209 and 15.239.

### 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 engineering mode to fix the TX frequency that was for the purpose of the measurements.

According to its specifications, the EUT must comply with the requirements of the Section 15.207, 15.209, 15.239 under the FCC Rules Part 15 Subpart C.

### 2.3 General Test Procedures

#### 2.3.1 Conducted Emissions

N/A

#### 2.3.2 Radiated Emissions

The EUT is placed on a turn table 0.8 meter above ground for below 1GHz and 1.5m for 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(201023001A-1) | Engineer sample – continuous transmit |
| Sample 2(201023001A-2) | Normal sample – Intermittent transmit |

### **3. SYSTEM TEST CONFIGURATION**

#### **3.1 Justification**

The system was configured for testing in a continuous transmit condition.

#### **3.2 EUT Exercise Software**

N/A.

#### **3.3 Special Accessories**

N/A.

#### **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 RESULTS

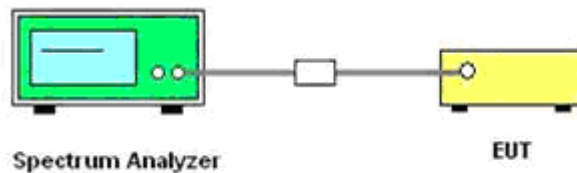
| Applied Standard: FCC CFR 47 PART 15.239 |                                         |             |           |
|------------------------------------------|-----------------------------------------|-------------|-----------|
| FCC Rules                                | Description of Test                     | Test Sample | Result    |
| §15.239 (a)                              | Occupied Bandwidth                      | Sample 2    | Compliant |
| §15.239 (b)                              | Field Strength of Fundamental frequency | Sample 1    | Compliant |
| §15.205 (a)<br>§15.209 (a)               | Radiated Spurious Emissions             | Sample 1    | Compliant |
| §15.207 (a)                              | AC Conducted Emissions                  | N/A         | N/A       |
| §15.203                                  | Antenna Requirements                    | Sample 1    | Compliant |

## 5. 99% AND 20DB BANDWIDTH

### 5.1 Limit

According to §15.239 (a) Emissions from the intentional radiator shall be confined within a band 200 kHz wide centered on the operating frequency. The 200 kHz band shall lie wholly within the frequency range of 88-108MHz.

### 5.2 Block Diagram of Test Setup



### 5.3 Test Procedure

- 1) The transmitter shall be operated at its maximum carrier power measured under normal test conditions
- 2) The span of the analyzer shall be set to capture all products of the modulation process, including the emission skirts.
- 3) The resolution bandwidth (RBW) shall be in the range of 1% to 5% of the occupied bandwidth (OBW) and video bandwidth (VBW) shall be approximately 3x RBW.
- 4) Detector function = peak.
- 5) Trace = max hold.

### 5.4 Test Results

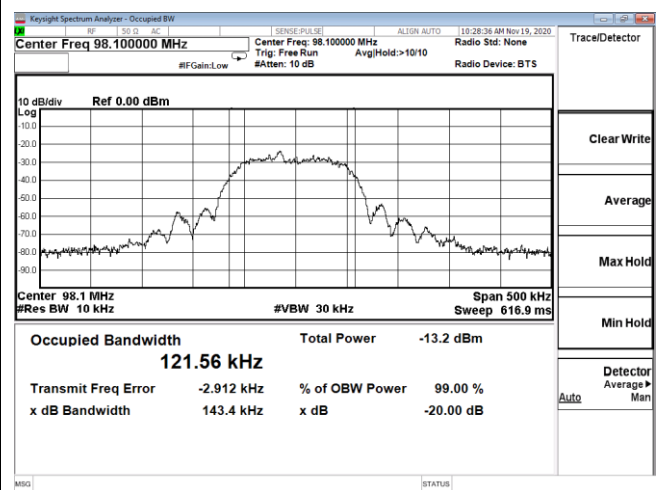
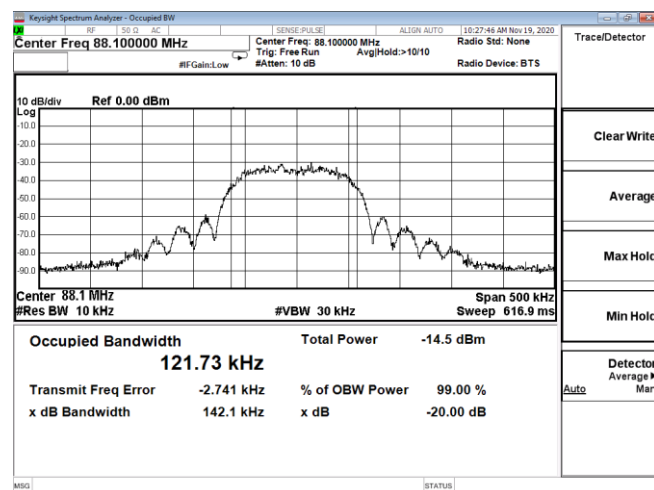
| Frequency (MHz) | 20dB Bandwidth (KHz) | 99% Bandwidth (KHz) | Limit (KHz) | Conclusion |
|-----------------|----------------------|---------------------|-------------|------------|
| 88.1            | 142.1                | 121.73              | 200.00      | PASS       |
| 98.0            | 143.4                | 121.56              | 200.00      | PASS       |
| 107.9           | 142.9                | 122.02              | 200.00      | PASS       |

*Remark:*

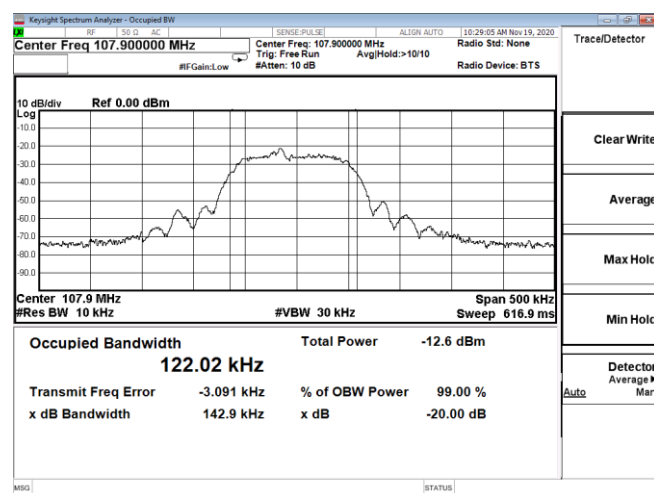
1. Test results including cable loss;
2. Please refer to the following page.

|               |         |                |       |
|---------------|---------|----------------|-------|
| Temperature   | 24.2°C  | Humidity       | 53.7% |
| Test Engineer | Ben Jin | Configurations | FM    |

## 99% and 20dB Bandwidth



## Low Channel / 88.1 MHz

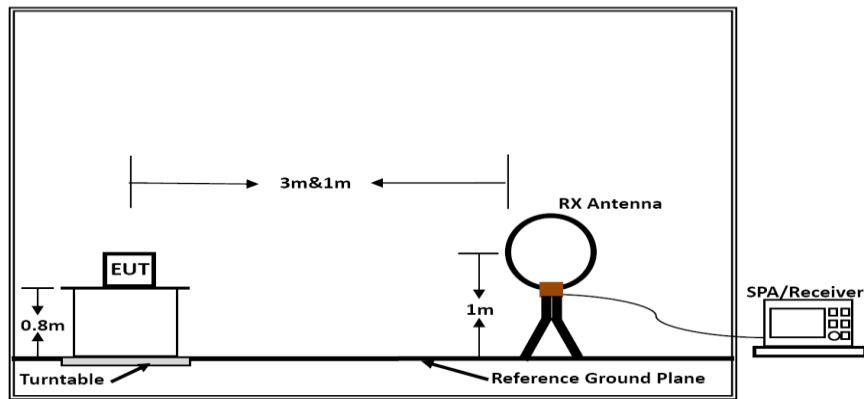


## Middle Channel / 98.1 MHz

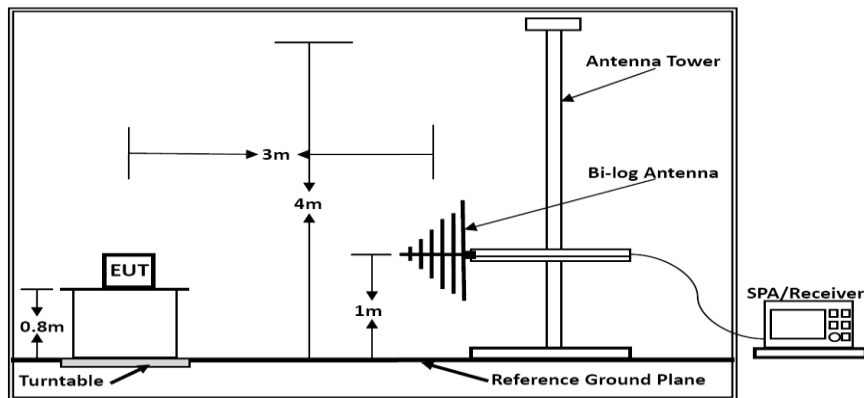
## High Channel / 107.9 MHz

## 6. RADIATED MEASUREMENT

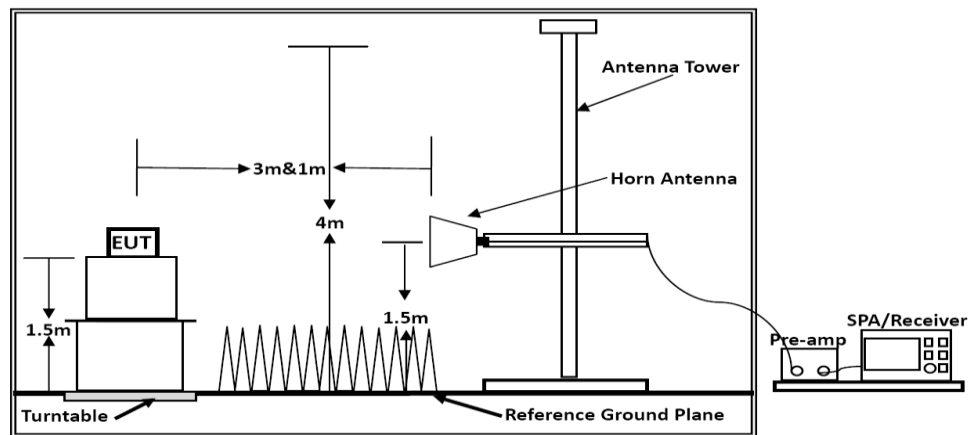
### 6.1 Block Diagram of Test Setup



Below 30MHz



Below 1GHz



Above 1GHz

## 6.2 Radiated Fundamental Frequency Limit

According to §15.239 (b): The field strength of any emissions within the permitted 200 kHz band shall not exceed 250 microvolts/meter at 3 meters. The emission limit in this paragraph is based on measurement instrumentation employing an average detector.

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                             |

Remark: (1) Emission level dBμV = 20 log Emission level μV/m;

(2) The smaller limit shall apply at the cross point between two frequency bands;

(3) Distance is the distance in meters between the measuring instrument, antenna and the closest point of any part of the device or system.

## 5.3 Instruments Setting

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

| Spectrum Parameter                        | Setting                                            |
|-------------------------------------------|----------------------------------------------------|
| Attenuation                               | Auto                                               |
| Start Frequency                           | 30 MHz                                             |
| Stop Frequency                            | 1000 MHz                                           |
| RB / VB (Emission in restricted band)     | 120KHz / 1MHz for Peak, 120 KHz / 10Hz for Average |
| RB / VB (Emission in non-restricted band) | 120KHz / 1MHz for Peak, 120 KHz / 10Hz for Average |

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

## 5.4 Test Procedures

### 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 0.8 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° to 360°) and by rotating the elevation axes (0° to 360°).
- 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° to 315° using 45° 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.

### 3) Sequence of testing 1 GHz to 18 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 rotatable table with 1.5 m height is used.
- 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° to 315° using 45° steps.
- The antenna is polarized vertical and horizontal.
- The antenna height scan range is 1 meter to 2.5 meter.
- At each turntable position and antenna polarization the analyzer sweeps with peak detection 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. This procedure is repeated for both antenna polarizations.
- The final measurement will be done in the position (turntable, EUT-table and antenna polarization) causing the highest emissions with Peak and Average detector.
- The final levels, frequency, measuring time, bandwidth, turntable position, EUT-table position, antenna polarization, 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.

#### 4) Sequence of testing above 18 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 rotatable table with 1.5 m height is used.
- 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 1 meter.
- The EUT was set into operation.

**Premeasurement:**

- The antenna is moved spherical over the EUT in different polarizations of the antenna.

**Final measurement:**

- The final measurement will be performed at the position and antenna orientation for all detected emissions that were found during the premeasurements with Peak and Average detector.
- The final levels, frequency, measuring time, bandwidth, 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.

#### 5.5 Results for Radiated Emissions

**PASS.**

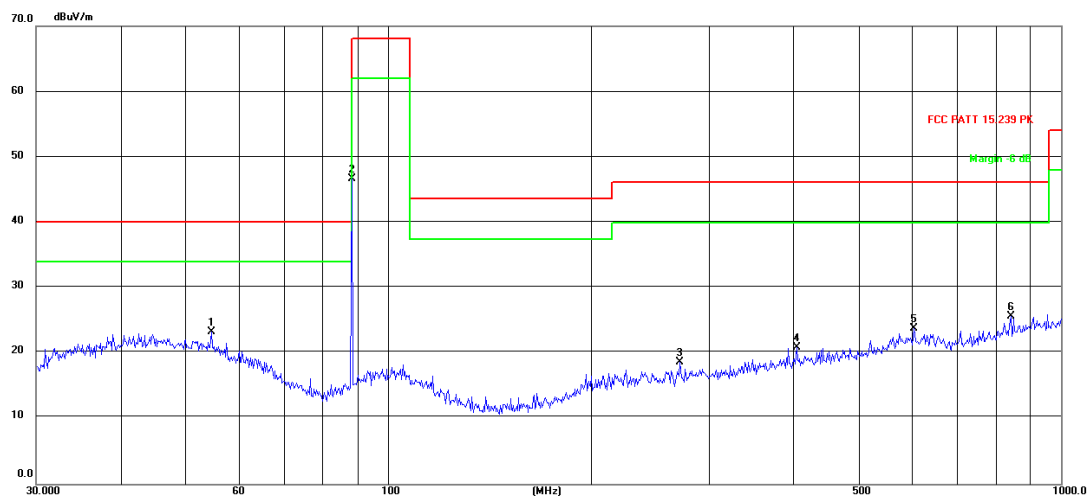
Only record the worst test result in this report.

The test data please refer to following page:

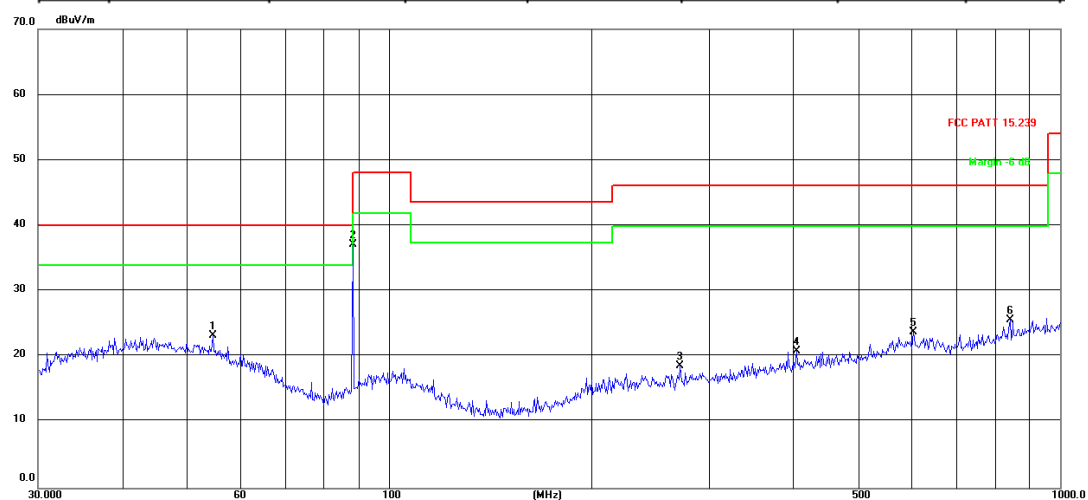
|               |         |                |       |
|---------------|---------|----------------|-------|
| Temperature   | 24.6°C  | Humidity       | 54.1% |
| Test Engineer | Ben Jin | Configurations | FM    |

**Below 1GHz****TX-88.1MHz**

Horizontal

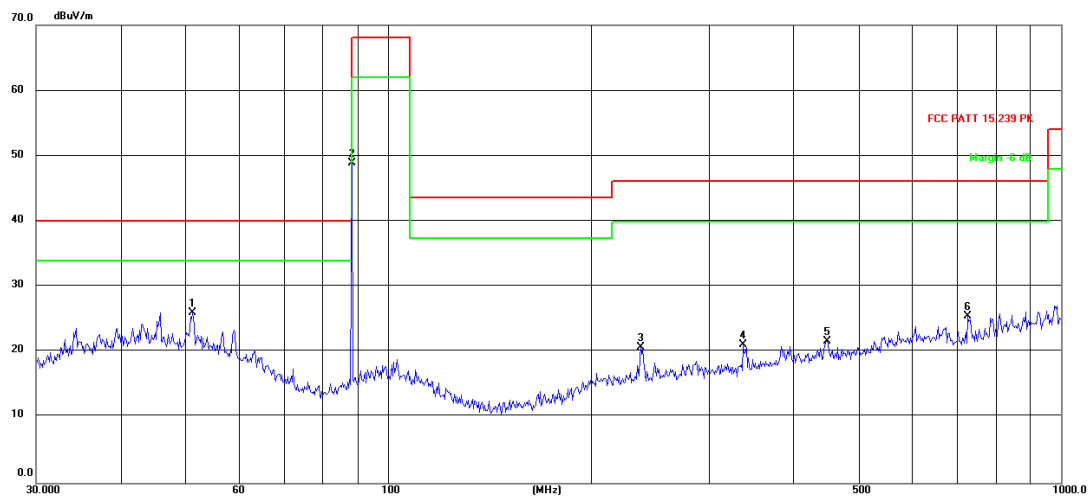


| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Det. |
|-----|-----------------|----------------|---------------|----------------|----------------|-------------|------|
| 1 * | 54.6428         | 52.07          | -28.77        | 23.30          | 40.00          | -16.70      | peak |
| 2   | 88.1000         | 79.10          | -32.41        | 46.69          | 68.00          | -21.31      | peak |
| 3   | 271.3245        | 46.63          | -27.93        | 18.70          | 46.00          | -27.30      | peak |
| 4   | 404.6664        | 45.86          | -24.87        | 20.99          | 46.00          | -25.01      | peak |
| 5   | 605.6592        | 44.84          | -21.01        | 23.83          | 46.00          | -22.17      | peak |
| 6   | 842.1295        | 45.21          | -19.56        | 25.65          | 46.00          | -20.35      | peak |

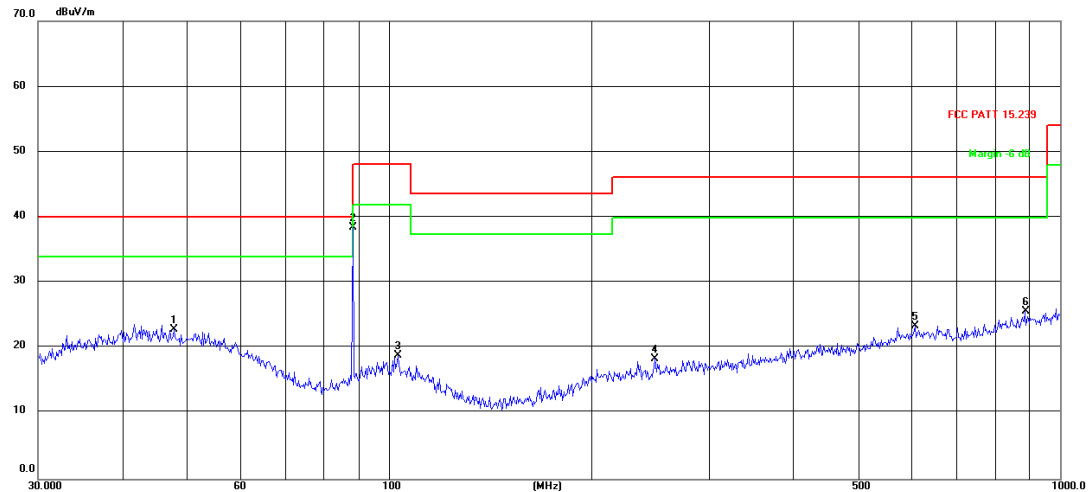


| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Det. |
|-----|-----------------|----------------|---------------|----------------|----------------|-------------|------|
| 1   | 54.6428         | 52.07          | -28.77        | 23.30          | 40.00          | -16.70      | AVG  |
| 2 * | 88.1000         | 69.64          | -32.45        | 37.19          | 48.00          | -2.81       | AVG  |
| 3   | 271.3245        | 46.63          | -27.93        | 18.70          | 46.00          | -27.30      | AVG  |
| 4   | 404.6664        | 45.86          | -24.87        | 20.99          | 46.00          | -25.01      | AVG  |
| 5   | 605.6592        | 44.84          | -21.01        | 23.83          | 46.00          | -22.17      | AVG  |
| 6   | 842.1295        | 45.21          | -19.56        | 25.65          | 46.00          | -20.35      | AVG  |

## Vertical



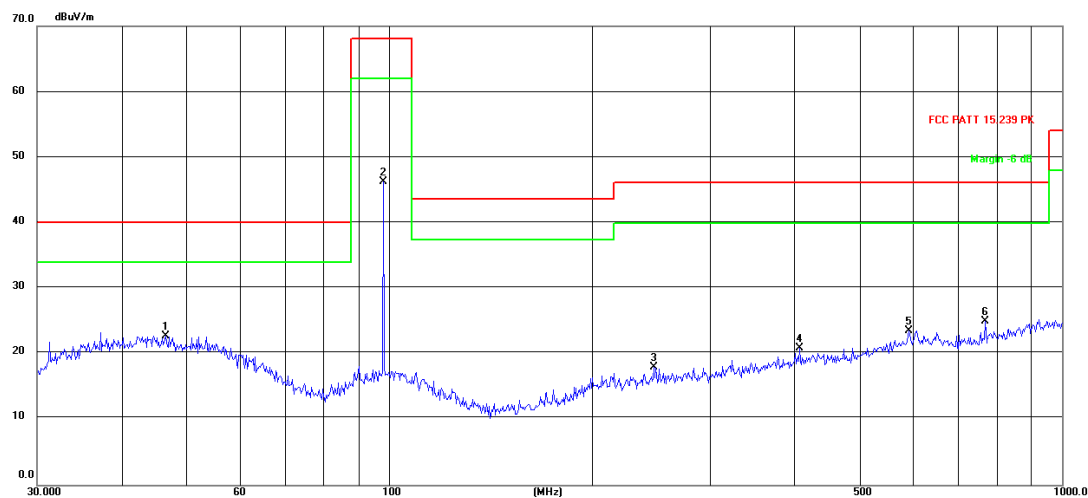
| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Det. |
|-----|-----------------|----------------|---------------|----------------|----------------|-------------|------|
| 1 * | 51.3004         | 54.47          | -28.37        | 26.10          | 40.00          | -13.90      | peak |
| 2   | 88.1000         | 81.39          | -32.41        | 48.98          | 68.00          | -19.02      | peak |
| 3   | 237.4755        | 49.58          | -28.78        | 20.80          | 46.00          | -25.20      | peak |
| 4   | 337.2155        | 47.68          | -26.45        | 21.23          | 46.00          | -24.77      | peak |
| 5   | 449.5557        | 46.04          | -24.32        | 21.72          | 46.00          | -24.28      | peak |
| 6   | 726.8052        | 46.61          | -21.01        | 25.60          | 46.00          | -20.40      | peak |



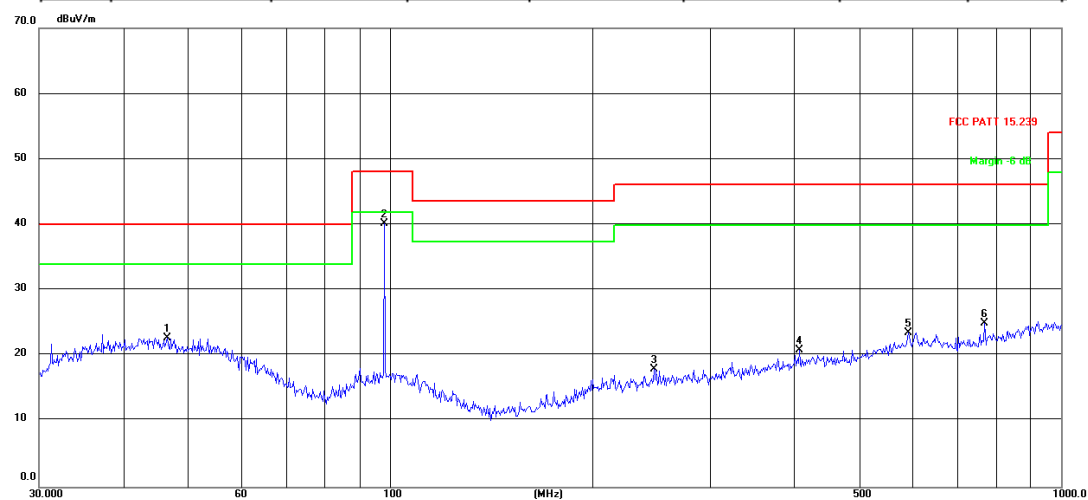
| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Det. |
|-----|-----------------|----------------|---------------|----------------|----------------|-------------|------|
| 1   | 47.8260         | 51.15          | -28.19        | 22.96          | 40.00          | -17.04      | AVG  |
| 2 * | 88.1000         | 70.93          | -32.45        | 38.48          | 40.00          | -1.52       | AVG  |
| 3   | 103.0800        | 49.25          | -30.25        | 19.00          | 48.00          | -29.00      | AVG  |
| 4   | 249.4250        | 46.86          | -28.38        | 18.48          | 46.00          | -27.52      | AVG  |
| 5   | 607.7867        | 44.52          | -21.02        | 23.50          | 46.00          | -22.50      | AVG  |
| 6   | 887.6099        | 44.64          | -18.96        | 25.68          | 46.00          | -20.32      | AVG  |

## TX-98MHz

## Horizontal

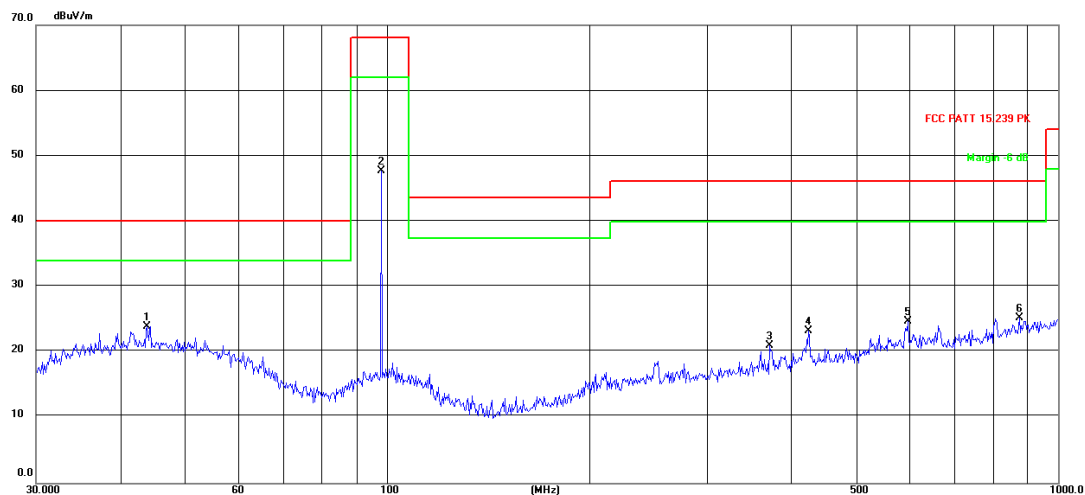


| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Det. |
|-----|-----------------|----------------|---------------|----------------|----------------|-------------|------|
| 1 * | 46.6663         | 51.03          | -28.19        | 22.84          | 40.00          | -17.16      | peak |
| 2   | 98.1000         | 76.70          | -30.45        | 46.25          | 68.00          | -21.75      | peak |
| 3   | 247.6818        | 46.46          | -28.43        | 18.03          | 46.00          | -27.97      | peak |
| 4   | 407.5144        | 45.77          | -24.83        | 20.94          | 46.00          | -25.06      | peak |
| 5   | 593.0496        | 44.82          | -21.18        | 23.64          | 46.00          | -22.36      | peak |
| 6   | 768.7481        | 45.50          | -20.51        | 24.99          | 46.00          | -21.01      | peak |

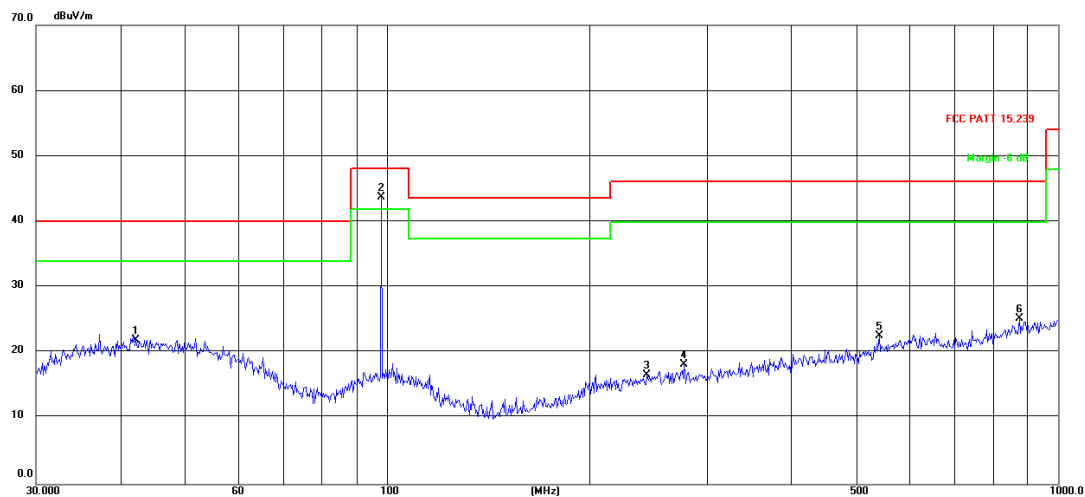


| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Det. |
|-----|-----------------|----------------|---------------|----------------|----------------|-------------|------|
| 1   | 46.6663         | 51.03          | -28.19        | 22.84          | 40.00          | -17.16      | AVG  |
| 2 * | 98.1000         | 70.70          | -30.45        | 40.25          | 48.00          | -7.75       | AVG  |
| 3   | 247.6818        | 46.46          | -28.43        | 18.03          | 46.00          | -27.97      | AVG  |
| 4   | 407.5144        | 45.77          | -24.83        | 20.94          | 46.00          | -25.06      | AVG  |
| 5   | 593.0496        | 44.82          | -21.18        | 23.64          | 46.00          | -22.36      | AVG  |
| 6   | 768.7481        | 45.50          | -20.51        | 24.99          | 46.00          | -21.01      | AVG  |

## Vertical



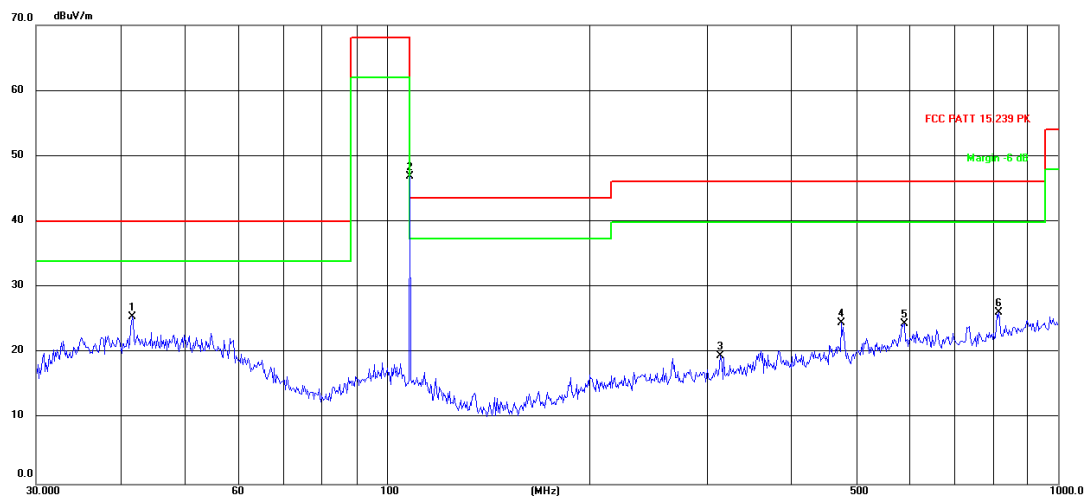
| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Det. |
|-----|-----------------|----------------|---------------|----------------|----------------|-------------|------|
| 1 * | 43.9658         | 52.33          | -28.35        | 23.98          | 40.00          | -16.02      | peak |
| 2   | 98.1000         | 78.20          | -30.45        | 47.75          | 68.00          | -20.25      | peak |
| 3   | 372.0045        | 46.74          | -25.61        | 21.13          | 46.00          | -24.87      | peak |
| 4   | 425.0280        | 47.94          | -24.62        | 23.32          | 46.00          | -22.68      | peak |
| 5   | 597.2232        | 45.90          | -21.07        | 24.83          | 46.00          | -21.17      | peak |
| 6   | 875.2468        | 44.45          | -19.13        | 25.32          | 46.00          | -20.68      | peak |



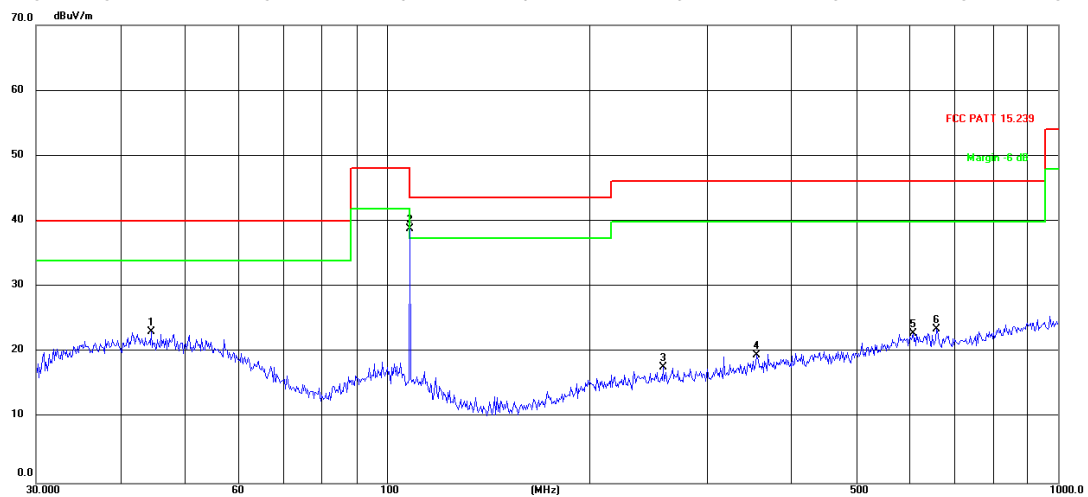
| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Det. |
|-----|-----------------|----------------|---------------|----------------|----------------|-------------|------|
| 1   | 42.3022         | 50.60          | -28.62        | 21.98          | 40.00          | -18.02      | AVG  |
| 2 * | 98.1000         | 74.20          | -30.45        | 43.75          | 48.00          | -4.25       | AVG  |
| 3   | 244.2321        | 45.31          | -28.54        | 16.77          | 46.00          | -29.23      | AVG  |
| 4   | 277.0935        | 46.07          | -27.82        | 18.25          | 46.00          | -27.75      | AVG  |
| 5   | 541.3725        | 45.27          | -22.58        | 22.69          | 46.00          | -23.31      | AVG  |
| 6   | 875.2469        | 44.45          | -19.13        | 25.32          | 46.00          | -20.68      | AVG  |

## TX-107.9MHZ

## Horizontal

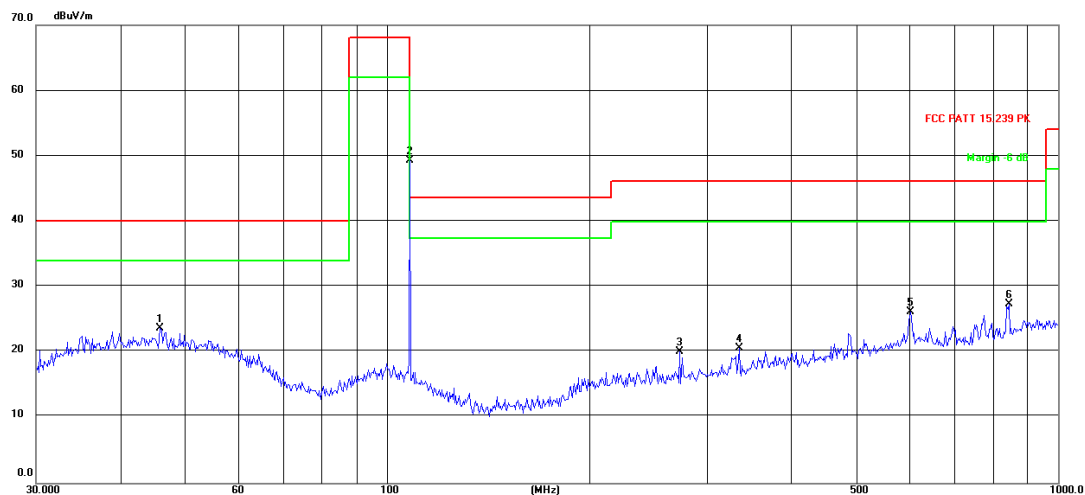


| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Det. |
|-----|-----------------|----------------|---------------|----------------|----------------|-------------|------|
| 1 * | 41.7129         | 54.23          | -28.70        | 25.53          | 40.00          | -14.47      | peak |
| 2   | 107.9000        | 77.43          | -30.48        | 46.95          | 68.00          | -21.05      | peak |
| 3   | 314.3763        | 46.63          | -27.00        | 19.63          | 46.00          | -26.37      | peak |
| 4   | 475.4990        | 48.61          | -24.00        | 24.61          | 46.00          | -21.39      | peak |
| 5   | 590.9737        | 45.79          | -21.23        | 24.56          | 46.00          | -21.44      | peak |
| 6   | 815.9678        | 46.10          | -19.93        | 26.17          | 46.00          | -19.83      | peak |

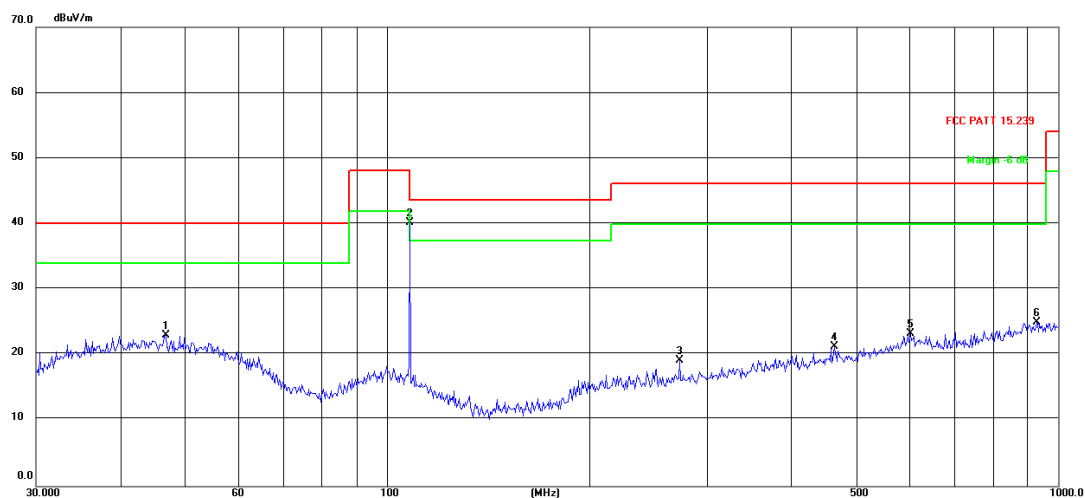


| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Det. |
|-----|-----------------|----------------|---------------|----------------|----------------|-------------|------|
| 1   | 44.5868         | 51.37          | -28.25        | 23.12          | 40.00          | -16.88      | AVG  |
| 2 * | 107.9000        | 69.43          | -30.48        | 38.95          | 48.00          | -9.05       | AVG  |
| 3   | 258.3264        | 46.00          | -28.19        | 17.81          | 46.00          | -28.19      | AVG  |
| 4   | 355.4272        | 45.56          | -26.01        | 19.55          | 46.00          | -26.45      | AVG  |
| 5   | 607.7867        | 43.99          | -21.02        | 22.97          | 46.00          | -23.03      | AVG  |
| 6   | 658.8361        | 44.77          | -21.19        | 23.58          | 46.00          | -22.42      | AVG  |

## Vertical



| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Det. |
|-----|-----------------|----------------|---------------|----------------|----------------|-------------|------|
| 1 * | 45.8551         | 51.95          | -28.19        | 23.76          | 40.00          | -16.24      | peak |
| 2   | 107.9000        | 79.75          | -30.48        | 49.27          | 68.00          | -18.73      | peak |
| 3   | 273.2339        | 48.06          | -27.90        | 20.16          | 46.00          | -25.84      | peak |
| 4   | 334.8586        | 47.11          | -26.50        | 20.61          | 46.00          | -25.39      | peak |
| 5   | 603.5389        | 47.25          | -21.00        | 26.25          | 46.00          | -19.75      | peak |
| 6   | 845.0877        | 46.90          | -19.53        | 27.37          | 46.00          | -18.63      | peak |



| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Det. |
|-----|-----------------|----------------|---------------|----------------|----------------|-------------|------|
| 1   | 46.8302         | 51.19          | -28.19        | 23.00          | 40.00          | -17.00      | AVG  |
| 2 * | 107.9000        | 70.75          | -30.48        | 40.27          | 48.00          | -7.73       | AVG  |
| 3   | 273.2340        | 47.06          | -27.90        | 19.16          | 46.00          | -26.84      | AVG  |
| 4   | 463.9696        | 45.46          | -24.15        | 21.31          | 46.00          | -24.69      | AVG  |
| 5   | 603.5391        | 44.25          | -21.00        | 23.25          | 46.00          | -22.75      | AVG  |
| 6   | 929.0081        | 43.72          | -18.63        | 25.09          | 46.00          | -20.91      | AVG  |

Note: The result below 30MHz and above 1GHz is too low so there is no record. The test setup show in the test setup photograph is the worst case.

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## 6. POWER LINE CONDUCTED EMISSIONS(Not Applicable)

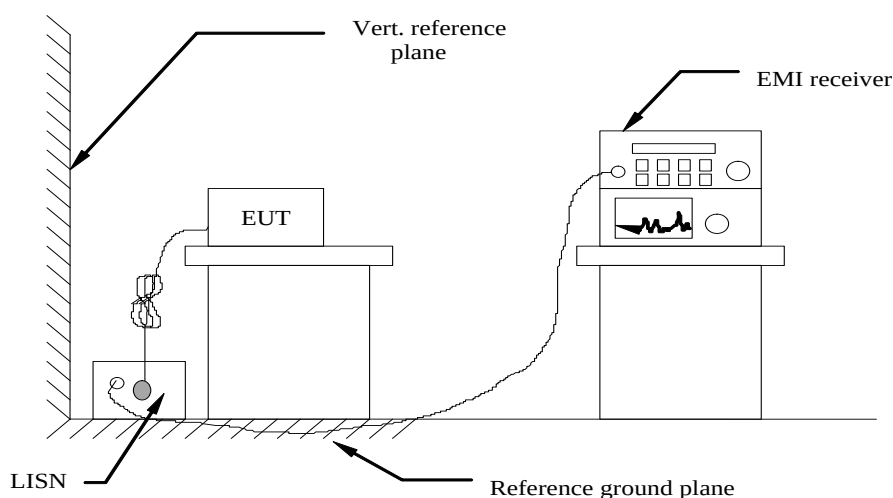
### 6.1 Standard Applicable

According to §15.207 (a): For an intentional radiator 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 (dB $\mu$ V) |          |
|-----------------------|---------------------|----------|
|                       | 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

### 6.2 Block Diagram of Test Setup



### 6.3 Test Results

Not applicable!!!

The device was powered by DC power!!!

## 7. ANTENNA REQUIREMENT

### 7.1 Standard Applicable

According to antenna requirement of §15.203.

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that a broken antenna can be re-placed by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of Sections 15.211, 15.213, 15.217, 15.219, or 15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with Section 15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this Part are not exceeded.

### 7.2 Antenna Connected Construction

#### 7.2.1. Standard Applicable

According to § 15.203 & RSS-Gen Issue 4, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

#### 7.2.2. Antenna Connector Construction

The directional gains of antenna used for transmitting is 1.5dBi, and the antenna is an internal antenna connect to PCB board and no consideration of replacement. Please see EUT photo for details.

#### 7.2.3. Results: Compliance.

## 8. LIST OF TEST EQUIPMENT

| Item                                                                                                                 | Equipment              | Manufacturer   | Model No.    | Serial No.      | Cal Date   | Due Date   |
|----------------------------------------------------------------------------------------------------------------------|------------------------|----------------|--------------|-----------------|------------|------------|
| 1                                                                                                                    | Power Meter            | R&S            | NRVS         | 100444          | 2020-06-22 | 2021-06-21 |
| 2                                                                                                                    | Power Sensor           | R&S            | NRV-Z81      | 100458          | 2020-06-22 | 2021-06-21 |
| 3                                                                                                                    | Power Sensor           | R&S            | NRV-Z32      | 10057           | 2020-06-22 | 2021-06-21 |
| 4                                                                                                                    | Test Software          | Tonscend       | JS1120-2     | /               | N/A        | N/A        |
| 5                                                                                                                    | RF Control Unit        | Tonscend       | JS0806-2     | N/A             | 2020-06-22 | 2021-06-21 |
| 6                                                                                                                    | MXA Signal Analyzer    | Agilent        | N9020A       | MY50510140      | 2019-11-22 | 2020-11-21 |
| 7                                                                                                                    | DC Power Supply        | Agilent        | E3642A       | N/A             | 2020-11-13 | 2021-11-12 |
| 8                                                                                                                    | EMI Test Software      | EZ             | EZ-EMC       | /               | N/A        | N/A        |
| 9                                                                                                                    | 3m Anechoic Chamber    | SIDT FRANKONIA | SAC-3M       | 03CH03-HY       | 2020-06-22 | 2021-06-21 |
| 10                                                                                                                   | Positioning Controller | MF             | MF7082       | MF78020803      | 2020-06-22 | 2021-06-21 |
| 11                                                                                                                   | Active Loop Antenna    | SCHWARZBECK    | FMZB 1519B   | 00005           | 2018-07-26 | 2021-07-25 |
| 12                                                                                                                   | By-log Antenna         | SCHWARZBECK    | VULB9163     | 9163-470        | 2018-07-26 | 2021-07-25 |
| 13                                                                                                                   | Horn Antenna           | SCHWARZBECK    | BBHA 9120D   | 9120D-1925      | 2018-07-02 | 2021-07-01 |
| 14                                                                                                                   | Broadband Horn Antenna | SCHWARZBECK    | BBHA 9170    | 791             | 2020-09-20 | 2021-09-19 |
| 15                                                                                                                   | Broadband Preamplifier | SCHWARZBECK    | BBV9745      | 9719-025        | 2020-06-22 | 2021-06-21 |
| 16                                                                                                                   | EMI Test Receiver      | R&S            | ESR 7        | 101181          | 2020-06-22 | 2021-06-21 |
| 17                                                                                                                   | RS SPECTRUM ANALYZER   | R&S            | FSP40        | 100503          | 2020-11-13 | 2021-11-12 |
| 18                                                                                                                   | Broadband Preamplifier | /              | BP-01M18G    | P190501         | 2020-06-22 | 2021-06-21 |
| 19                                                                                                                   | RF Cable-R03m          | Jye Bao        | RG142        | CB021           | 2020-06-22 | 2021-06-21 |
| 20                                                                                                                   | RF Cable-HIGH          | SUHNER         | SUCOFLEX 106 | 03CH03-HY       | 2020-06-22 | 2021-06-21 |
| 21                                                                                                                   | 6dB Attenuator         | /              | 100W/6dB     | 1172040         | 2020-06-22 | 2021-06-21 |
| 22                                                                                                                   | 3dB Attenuator         | /              | 2N-3dB       | /               | 2020-06-22 | 2021-06-21 |
| 23                                                                                                                   | EMI Test Receiver      | R&S            | ESPI         | 101840          | 2020-06-22 | 2021-06-21 |
| 24                                                                                                                   | Artificial Mains       | R&S            | ENV216       | 101288          | 2020-06-22 | 2021-06-21 |
| 25                                                                                                                   | 10dB Attenuator        | SCHWARZBECK    | MTS-IMP-136  | 261115-001-0032 | 2020-06-22 | 2021-06-21 |
| Note: All equipment is calibrated through CHINA CEPREI LABORATORY and GUANGZHOU LISAI CALIBRATION AND TEST CO., LTD. |                        |                |              |                 |            |            |

## **9. TEST SETUP PHOTOGRAPHS OF EUT**

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

## **10. EXTERIOR PHOTOGRAPHS OF THE EUT**

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

## **11. INTERIOR PHOTOGRAPHS OF THE EUT**

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

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