

# TEST REPORT

## Client Information:

Applicant: Enping Shengge Electroacoustic Technology Co.,Ltd.  
Applicant add.: Fourth floor, No. 10, Dong 'an industrial zone, Enping City, Guangdong province  
Manufacturer: Enping Shengge Electroacoustic Technology Co.,Ltd.  
Manufacturer add.: Fourth floor, No. 10, Dong 'an industrial zone, Enping City, Guangdong province

## Product Information:

Product Name: Wireless microphone  
Model No.: SG-108A, SG-108  
Brand Name: N/A  
**FCC ID:** 2A823-SG-108A

Applicable standards: FCC CFR Title 47 Part 15 Subpart C Section 15.236

## Prepared By:

### Dongguan Yaxu (AiT) Technology Limited

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Date of Receipt: Aug. 22, 2022

Date of Test: Oct. 06~ Oct.19, 2022

Date of Issue: Oct. 20, 2022

Test Result: Pass

This device described above has been tested by Dongguan Yaxu (AiT) Technology Limited and the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.

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Reviewed by:



Simba Huang

Approved by:



Seal.chen

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**Revision History**

| Revision | Issue Date    | Revisions     | Revised By |
|----------|---------------|---------------|------------|
| 000      | Oct. 20, 2022 | Initial Issue | Seal Chen  |
|          |               |               |            |
|          |               |               |            |

## 2 Test Summary

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

| Test Item           | Section in CFR 47 | Result |
|---------------------|-------------------|--------|
| RF Power Output     | §15.236(d)        | Pass   |
| Occupied Bandwidth  | §15.236(f)(2)     | Pass   |
| Necessary Bandwidth | §15.236(g)        | Pass   |
| Spurious emissions  | §15.236(g)        | Pass   |
| Frequency Stability | §15.236(f)(3)     | Pass   |
| Conducted Emissions | §15.207           | N/A    |

Note

1. Test according to ANSI C63.10:2013.
2. The measurement uncertainty is not included in the test result.

### 2.1 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 AiT 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.

### 2.2 Measurement Uncertainty

| Test Item                        | Frequency Range | Measurement Uncertainty | Notes |
|----------------------------------|-----------------|-------------------------|-------|
| Radiated Emission                | 0.009MHz-30MHz  | 3.10dB                  | (1)   |
| Radiated Emission                | 30MHz-1GHz      | 3.75dB                  | (1)   |
| Radiated Emission                | 1GHz-18GHz      | 3.88dB                  | (1)   |
| Radiated Emission                | 18GHz-40GHz     | 3.88dB                  | (1)   |
| AC Power Line Conducted Emission | 0.15MHz ~ 30MHz | 1.20dB                  | (1)   |

Note (1): The measurement uncertainty is for coverage factor of k=2 and a level of confidence of 95%.

### 3 Test Facility

**The test facility is recognized, certified or accredited by the following organizations:**

**.CNAS- Registration No: L6177**

Dongguan Yaxu (AiT) technology Limited is accredited to ISO/IEC 17025:2017 general Requirements for the competence of testing and calibration laboratories (CNAS-CL01 Accreditation Criteria for the competence of testing and calibration laboratories) on Aug.04, 2020

**FCC-Registration No.: 703111 Designation Number: CN1313**

Dongguan Yaxu (AiT) technology Limited has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files.

**IC —Registration No.: 6819A CAB identifier: CN0122**

The 3m Semi-anechoic chamber of Dongguan Yaxu (AiT) technology Limited has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 6819A

**A2LA-Lab Cert. No.: 6317.01**

Dongguan Yaxu (AiT) technology Limited has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025: 2017 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

#### 3.1 Deviation from standard

None

#### 3.2 Abnormalities from standard conditions

None

#### 3.3 Test Location

**Dongguan Yaxu (AiT) Technology Limited**

Address: No.22, Jinqianling 3rd Street, Jitigang, Huangjiang,Dongguan, Guangdong, China

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## 4 General Information

|                        |                                                                                                                      |
|------------------------|----------------------------------------------------------------------------------------------------------------------|
| EUT Name:              | Wireless microphone                                                                                                  |
| Model No:              | SG-108A                                                                                                              |
| Serial Model:          | SG-108                                                                                                               |
| Test sample(s) ID:     | 22082205                                                                                                             |
| Sample(s) Status:      | Engineer sample                                                                                                      |
| Serial No.:            | N/A                                                                                                                  |
| Operation frequency:   | 614.1MHz-662.5MHz                                                                                                    |
| Channel Number:        | 14 channels                                                                                                          |
| Modulation Technology: | FM                                                                                                                   |
| Antenna Type:          | PCB antenna                                                                                                          |
| Antenna gain:          | 0 dBi                                                                                                                |
| H/W No.:               | N/A                                                                                                                  |
| S/W No.:               | N/A                                                                                                                  |
| Power supply:          | DC 3.0V("AA" x2 battery)                                                                                             |
| Model different:       | PCB board, structure and internal of these model(s) are the same,<br>So no additional models were tested.            |
| Note:                  | For a more detailed features description, please refer to the manufacturer's<br>specifications or the User's Manual. |

#### 4.1 Test frequencies

EUT channels and frequencies list:

| Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) |
|---------|-----------------|---------|-----------------|---------|-----------------|
| 01      | 614.1           | 04      | 615.0           | 07      | 615.9           |
| 02      | 614.4           | 05      | 615.3           | -       | -               |
| 03      | 614.7           | 06      | 615.6           | -       | -               |
| 08      | 657.1           | 11      | 659.9           | 14      | 662.5           |
| 09      | 658.0           | 12      | 660.7           | -       | -               |
| 10      | 658.9           | 13      | 661.6           | -       | -               |

## 4.2 EUT Peripheral List

| No. | Equipment | Manufacturer | EMC Compliance | Model No. | Serial No. | Power cord | Signal cord |
|-----|-----------|--------------|----------------|-----------|------------|------------|-------------|
| 1   | N/A       | N/A          | N/A            | N/A       | N/A        | N/A        | N/A         |

## 4.3 Test Peripheral List

| No. | Equipment | Manufacturer | EMC Compliance | Model No. | Serial No. | Power cord | Signal cord |
|-----|-----------|--------------|----------------|-----------|------------|------------|-------------|
| 1   | N/A       | N/A          | N/A            | N/A       | N/A        | N/A        | N/A         |

## 4.4 TEST METHODOLOGY

All measurements contained in this report were conducted with ANSI C63.10-2013, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices.

The radiated testing was performed at an antenna-to-EUT distance of 3 meters. All radiated and conducted emissions measurement was performed at Dongguan Yaxu (AIT) Technology Limit.

### 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.

### 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 15.203, 15.205, 15.207, 15.209, 15.236 under the FCC Rules Part 15 Subpart C

### General Test Procedures

#### 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.

#### Radiated Emissions

The EUT is placed on a turn table, which is 0.8 m above ground plane. 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.

## 4.5 Description of Test Modes

The EUT has been tested under operating condition.

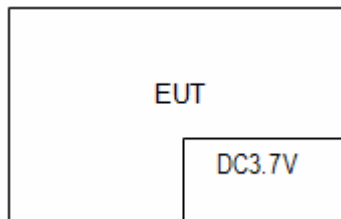
Worst-case mode and channel used for 9 KHz-1000 MHz radiated emissions was determined to be TX.

This test was performed with EUT in X, Y, Z position and the worst case was found when EUT in X position.

In section 15.31(m), regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:

|                   |                                                 |           |           |
|-------------------|-------------------------------------------------|-----------|-----------|
| Transmitting mode | Keep the EUT in continuously transmitting mode. |           |           |
| Test software:    | fixed in EUT by manufacturer                    |           |           |
| Frequency         | 614.1 MHz                                       | 657.1 MHz | 662.5 MHz |
| Parameters(1Mbps) | Default                                         | Default   | Default   |

## 4.6 Block Diagram of Test Setup



## 5 Equipment Used during Test

| No | Test Equipment                      | Manufacturer | Model No        | Serial No              | Cal. Date  | Cal. Due Date |
|----|-------------------------------------|--------------|-----------------|------------------------|------------|---------------|
| 1  | Spectrum Analyzer                   | R&S          | FSV40           | 101470                 | 2022.09.02 | 2023.09.01    |
| 2  | EMI Measuring Receiver              | R&S          | ESR             | 101160                 | 2022.09.02 | 2023.09.01    |
| 3  | Low Noise Pre Amplifier             | HP           | HP8447E         | 1937A01855             | 2022.09.02 | 2023.09.01    |
| 4  | Low Noise Pre Amplifier             | Tsj          | MLA-0120-A02-34 | 2648A04738             | 2022.09.02 | 2023.09.01    |
| 5  | Passive Loop                        | ETS          | 6512            | 00165355               | 2022.09.04 | 2024.09.03    |
| 6  | TRILOG Super Broadband test Antenna | SCHWARZBECK  | VULB9160        | 9160-3206              | 2021.08.29 | 2024.08.28    |
| 7  | Broadband Horn Antenna              | SCHWARZBECK  | BBHA9120D       | 452                    | 2021.08.29 | 2024.08.28    |
| 8  | SHF-EHF Horn Antenna 15-40GHz       | SCHWARZBECK  | BBHA9170        | BBHA9170367d           | 2020.11.24 | 2023.11.23    |
| 9  | EMI Test Receiver                   | R&S          | ESCI            | 100124                 | 2022.09.02 | 2023.09.01    |
| 10 | LISN                                | Kyoritsu     | KNW-242         | 8-837-4                | 2022.09.02 | 2023.09.01    |
| 11 | LISN                                | R&S          | ESH3-Z2         | 0357.8810.54-101161-S2 | 2022.09.02 | 2023.09.01    |
| 12 | Pro.Temp&Humi.chamber               | MENTEK       | MHP-150-1C      | MAA08112501            | 2022.09.02 | 2023.09.01    |
| 13 | RF Automatic Test system            | MW           | MW100-RFCB      | 21033016               | 2022.09.02 | 2023.09.01    |
| 14 | Signal Generator                    | Agilent      | N5182A          | MY50143009             | 2022.09.02 | 2023.09.01    |
| 15 | Wideband Radio communication tester | R&S          | CMW500          | 1201.0002K50           | 2022.09.02 | 2023.09.01    |
| 16 | RF Automatic Test system            | MW           | MW100-RFCB      | 21033016               | 2022.09.02 | 2023.09.01    |
| 17 | DC power supply                     | ZHAOXIN      | RXN-305D-2      | 28070002559            | N/A        | N/A           |
| 18 | RE Software                         | EZ           | EZ-EMC_RE       | Ver.AIT-03A            | N/A        | N/A           |
| 19 | CE Software                         | EZ           | EZ-EMC_CE       | Ver.AIT-03A            | N/A        | N/A           |
| 20 | RF Software                         | MW           | MTS 8310        | 2.0.0.0                | N/A        | N/A           |
| 21 | temporary antenna connector(Note)   | NTS          | R001            | N/A                    | N/A        | N/A           |

Note: The temporary antenna connector is soldered on the PCB board in order to perform conducted tests and this temporary antenna connector is listed in the equipment list.

## 6 Test results and Measurement Data

### 6.1 Maximum Output Power

#### Limit

The maximum radiated power shall not exceed the following values:

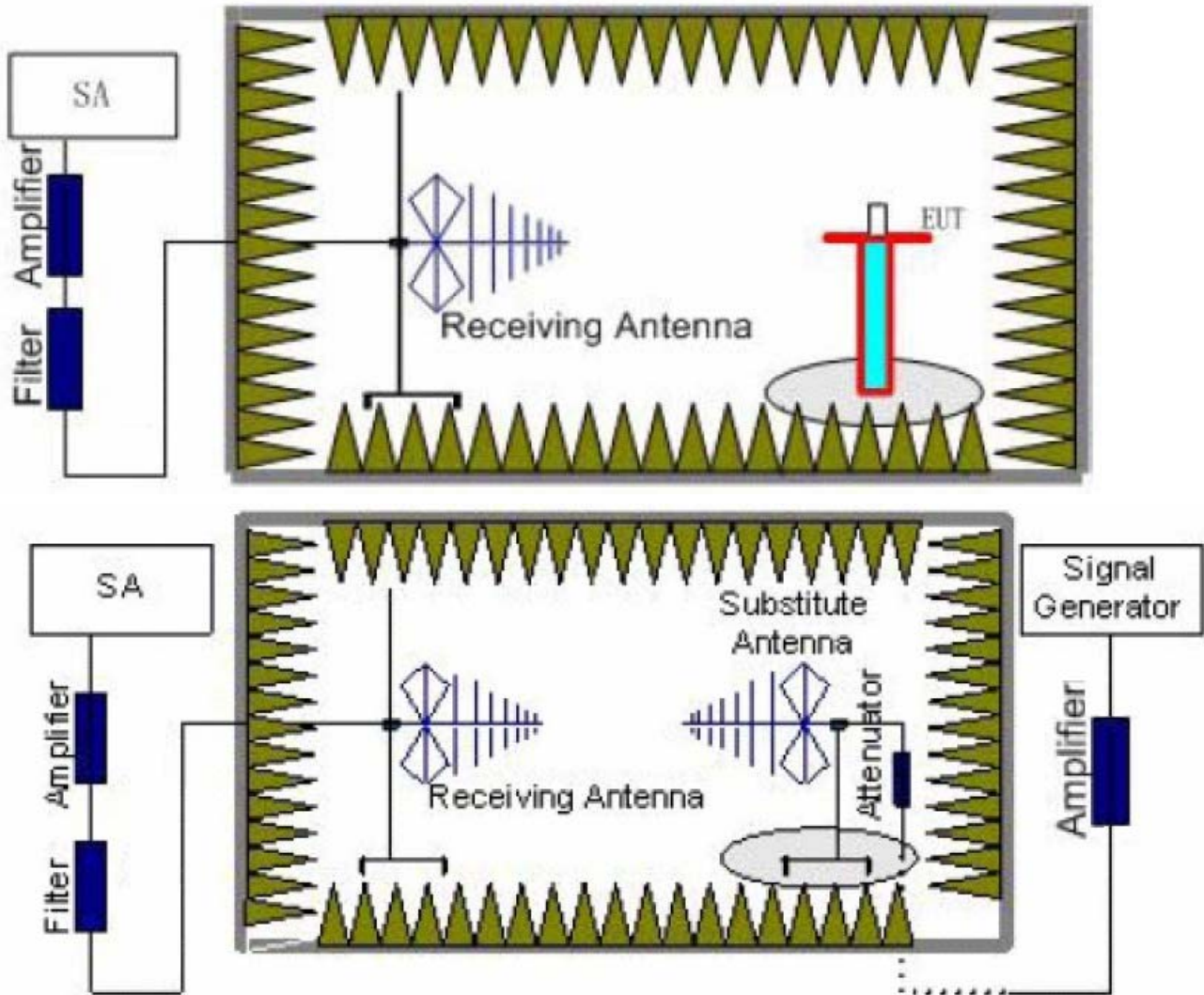
(1) In the bands allocated and assigned for broadcast television and in the 600 MHz service band: 50 mW EIRP

(2) In the 600 MHz guard band and the 600 MHz duplex gap: 20 mW EIRP.

#### Test Procedure

1. EUT was placed on a 1.5 meter high non-conductive stand at a 3 meter test distance from the receive antenna. A receiving antenna was placed on the antenna mast 3 meters from the EUT for emission measurements. The height of receiving antenna is 1.5m. Detected emissions were maximized at each frequency by rotating the EUT through 360° and adjusting the receiving antenna polarization. The radiated emission measurements of all test transmit frequencies were measured with peak detector.
2. A log-periodic antenna or double-ridged waveguide horn antenna shall be substituted in place of the EUT. The log-periodic antenna will be driven by a signal generator and the level will be adjusted till the same power value on the spectrum analyzer or receiver. The level of the spurious emissions can be calculated through the level of the signal generator, cable loss, the gain of the substitution antenna and the reading of the spectrum analyzer or receiver.
3. The EUT is then put into continuously transmitting mode at its maximum power level during the test. Set Test Receiver or Spectrum RBW=1MHz, VBW=3MHz, And the maximum value of the receiver should be recorded as ( $P_r$ ).
4. The EUT shall be replaced by a substitution antenna. In the chamber, an substitution antenna for the frequency band of interest is placed at the reference point of the chamber. An RF Signal source for the frequency band of interest is connected to the substitution antenna with a cable that has been constructed to not interfere with the radiation pattern of the antenna. A power ( $P_{Mea}$ ) is applied to the input of the substitution antenna, and adjust the level of the signal generator output until the value of the receiver reach the previously recorded ( $P_r$ ). The power of signal source ( $P_{Mea}$ ) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.
5. An amplifier may be connected to the Signal Source output port. And the cable should be connect between the Amplifier and the Substitution Antenna. The cable loss ( $P_{cl}$ ), the Substitution Antenna Gain ( $G_a$ ) and the Amplifier Gain ( $P_{Ag}$ ) should be recorded after test.  
The measurement results are obtained as described below:  
$$\text{Power(EIRP)} = P_{Mea} + P_{Ag} - P_{cl} + G_a$$
6. This value is EIRP since the measurement is calibrated using an antenna of known gain (2.15 dBi) and known input power.
7. ERP can be calculated from EIRP by subtracting the gain of the dipole,  $ERP = EIRP - 2.15\text{dBi}$ .

## Test Configuration



## Test Results

|               |             |                |     |
|---------------|-------------|----------------|-----|
| Temperature   | 24.8℃       | Humidity       | 56% |
| Test Engineer | Simba Huang | Configurations | TX  |

Remark;

The field strength of radiation emission was measured in the following position: EUT stand-up position (Z axis), lie-down position (X, Y axis). The data show in this report only with the worst case setup. After exploratory measurement the worst case of Z axis and receiver antenna at vertical polarization was reported.

| Test Frequency (MHz) | P <sub>Mea</sub> (dBm) | P <sub>cl</sub> (dB) | G <sub>a</sub> Antenna Gain(dBi) | P <sub>Ag</sub> (dB) | EIRP (dBm) | EIRP (mW) | FCC Limit (mW) | Polarization |
|----------------------|------------------------|----------------------|----------------------------------|----------------------|------------|-----------|----------------|--------------|
| 614.1                | -25.42                 | 2.04                 | 8.54                             | 28.78                | 9.86       | 9.68      | 50             | V            |
| 657.1                | -24.98                 | 2.09                 | 8.6                              | 28.82                | 10.35      | 10.84     | 50             | V            |
| 662.5                | -25.37                 | 2.48                 | 9.22                             | 28.88                | 10.25      | 10.59     | 50             | V            |

Remark:  $EIRP = P_{Mea}(dBm) + P_{Ag}(dB) - P_{cl}(dB) + G_a(dBi)$

## 6.2 Spectrum Bandwidth Measurement

### 6.4.1 Standard requirement:

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 200 kHz.

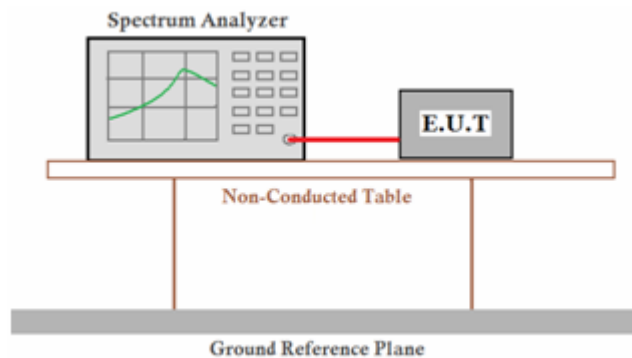
### 6.4.2 Measuring Instruments:

Please refer to equipment's list in this report.

### 6.4.3 Test Procedures

The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with 3 KHz RBW and 10 KHz VBW.

### 6.4.4 Test Setup Layout



### 6.4.5 EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

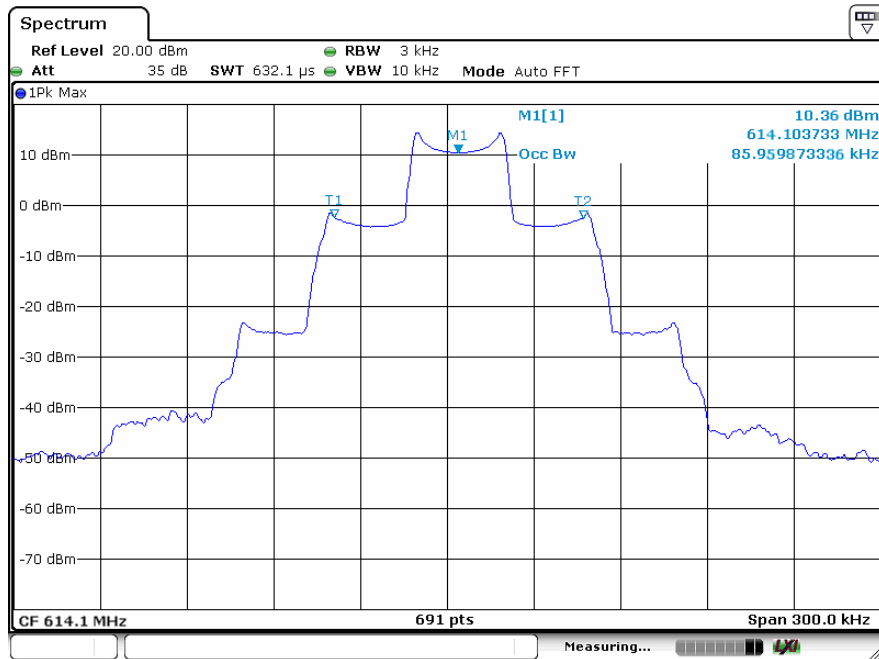
### 6.4.6 Test result

PASS

| Antenna | Frequency (MHz) | 99% Bandwidth (MHz) | Limit Bandwidth (kHz) | Verdict |
|---------|-----------------|---------------------|-----------------------|---------|
| Ant1    | 614.1           | 85.960              | 200                   | Pass    |
| Ant1    | 657.1           | 86.397              | 200                   | Pass    |
| Ant1    | 662.5           | 85.962              | 200                   | Pass    |

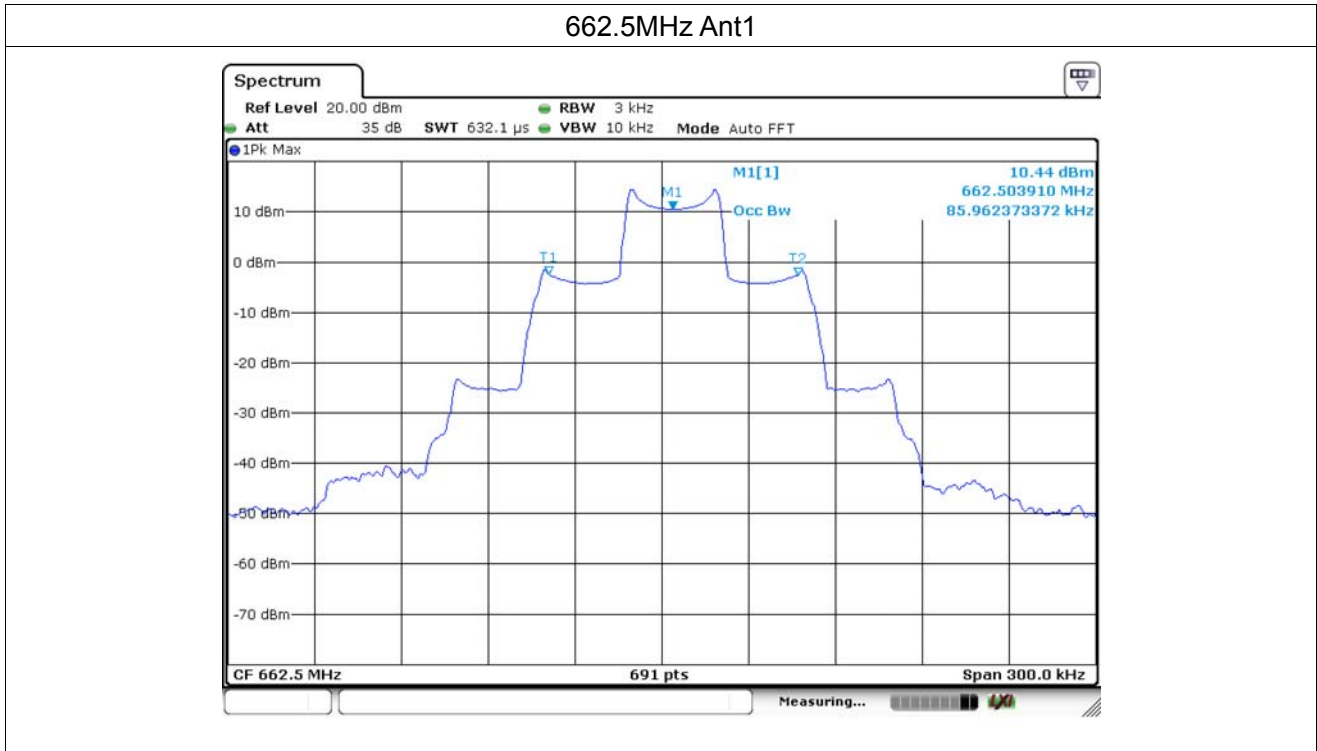
### Test Graphs

#### 614.1MHz Ant1



#### 657.1MHz Ant1





**Remark:**

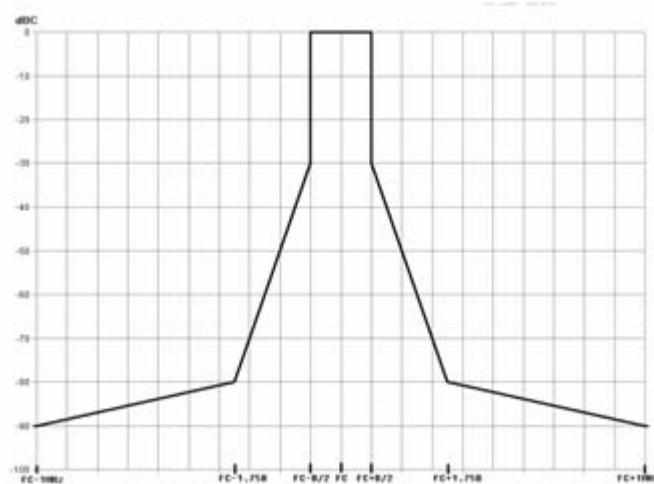
- 1). Measured Bandwidth at difference data rate for each mode and recorded worst case for each mode.
- 2). Test results including cable loss;

## 6.3 Necessary Bandwidth Measurement

### 6.4.7 Standard requirement:

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) as below:

The transmitter output spectrum shall be within the mask defined in figure below where B is the declared channel bandwidth



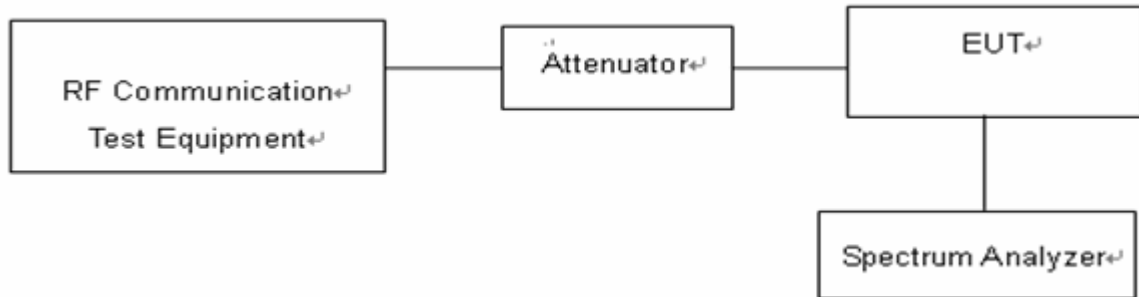
### 6.4.8 Measuring Instruments:

Please refer to equipment's list in this report.

### 6.4.9 Test Procedures

1. With the Low Frequency (LF) audio signal generator set to 500 Hz, the audio input level to the EUT shall be Adjusted to 8 dB below the limiting threshold (-8dB limit) as declared by the manufacturer.
2. The corresponding audio output level from the demodulator shall be measured and recorded.
3. The input impedance of the noise meter shall be sufficiently high to avoid more than 0.1 dB changes in input level when the meter is switched between input and output.
4. 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.
5. It shall be checked that the audio output level has increased by  $\leq 10$  dB.
6. If the step 5 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 -8dB (lim).
7. Measure the input level at the transmitter required to give +12 dB (lim) and record the EUT output level test plots by the spectrum analyzer.
8. The transmitter RF output spectrum shall be measured, using a spectrum analyser with the following settings:
  - centre frequency: fc: Transmitter (Tx) nominal frequency;
  - dispersion (Span): fc - 1 MHz to fc + 1 MHz;
  - Resolution BandWidth (RBW): 1 kHz;
  - Video BandWidth (VBW): 1 kHz;
  - detector: Peak hold.

#### 6.4.10 Test Setup Layout

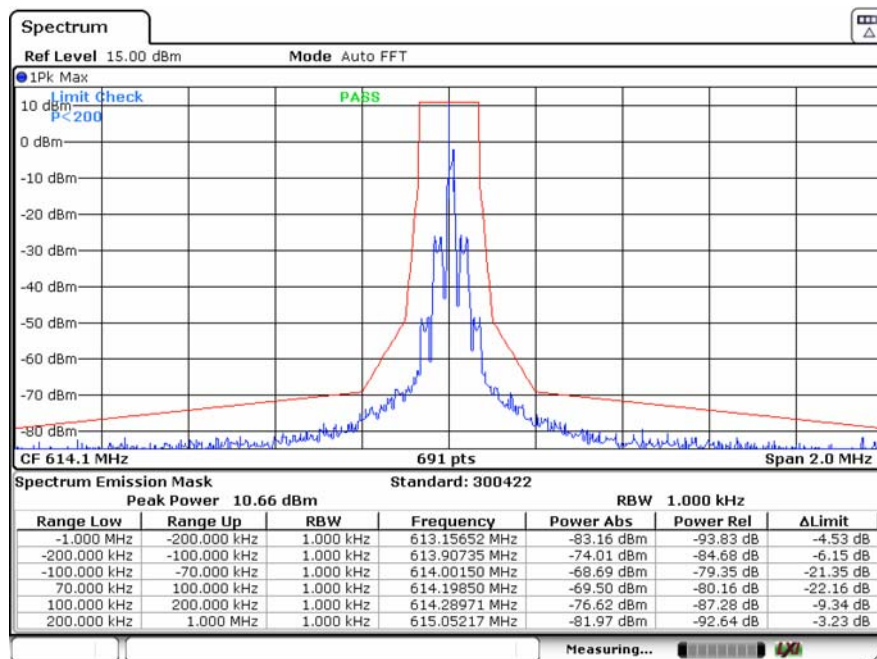


#### 6.4.11 EUT Operation during Test

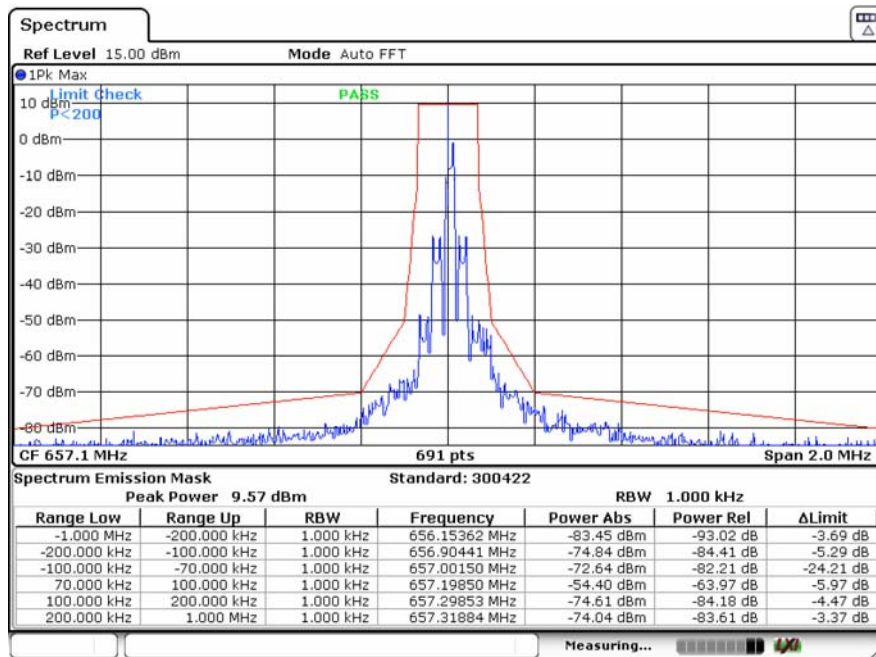
The EUT was programmed to be in continuously transmitting mode.

#### 6.4.12 Test result

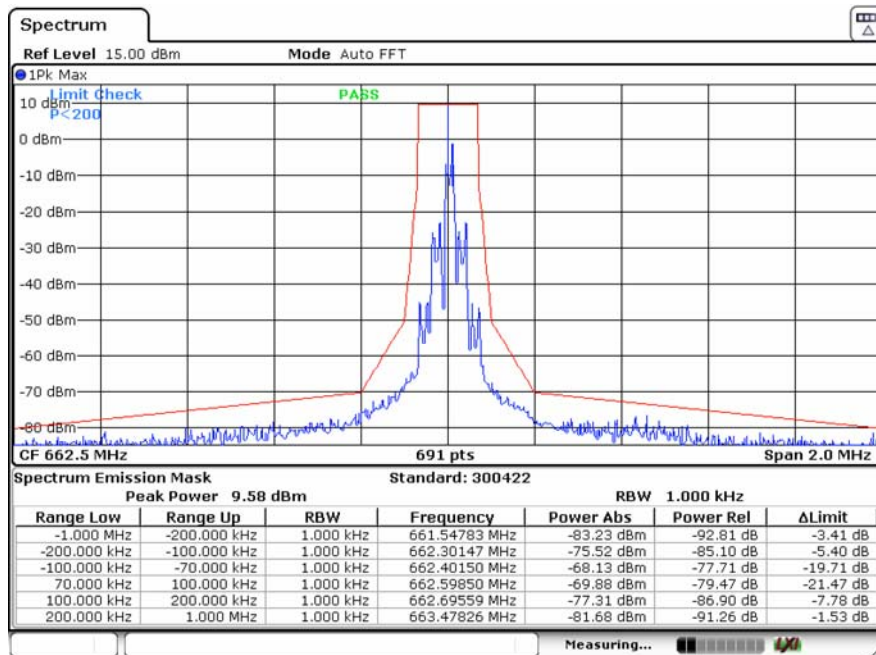
Test Graphs  
Plots of Necessary Bandwidth  
614.1MHz



### 657.1MHz



### 662.5MHz



Remark:

- 1). Measured Bandwidth at difference data rate for each mode and recorded worst case for each mode.
- 2). Test results including cable loss;

## 6.4 Radiated Emissions Measurement

### 6.8.1 Standard requirement:

**Table 3: Limits for spurious emissions**

| State     | Frequency                                                                           |                                      |                                |
|-----------|-------------------------------------------------------------------------------------|--------------------------------------|--------------------------------|
|           | 47 MHz to 74 MHz<br>87,5 MHz to 137 MHz<br>174 MHz to 230 MHz<br>470 MHz to 862 MHz | Other Frequencies<br>below 1 000 MHz | Frequencies above<br>1 000 MHz |
| Operation | 4 nW                                                                                | 250 nW                               | 1 $\mu$ W                      |
| Standby   | 2 nW                                                                                | 2 nW                                 | 20 nW                          |

### 6.8.2 Measuring Instruments and Setting:

Please refer to equipment list in this report. The following table is the setting of spectrum analyzer and receiver.

| Spectrum Parameter                        | Setting                                           |
|-------------------------------------------|---------------------------------------------------|
| Attenuation                               | Auto                                              |
| Start Frequency                           | 1000 MHz                                          |
| Stop Frequency                            | 10 <sup>th</sup> carrier harmonic                 |
| RB / VB (Emission in restricted band)     | 1MHz / 1MHz for Peak, 1 MHz / 1/B kHz for Average |
| RB / VB (Emission in non-restricted band) | 1MHz / 1MHz for Peak, 1 MHz / 1/B kHz for Average |

| Receiver Parameter     | Setting                                    |
|------------------------|--------------------------------------------|
| Attenuation            | Auto                                       |
| Start ~ Stop Frequency | 9kHz~150kHz / RB/VB 200Hz/1KHz for QP/AVG  |
| Start ~ Stop Frequency | 150kHz~30MHz / RB/VB 9kHz/30KHz for QP/AVG |
| Start ~ Stop Frequency | 30MHz~1000MHz / RB/VB 120kHz/1MHz for QP   |

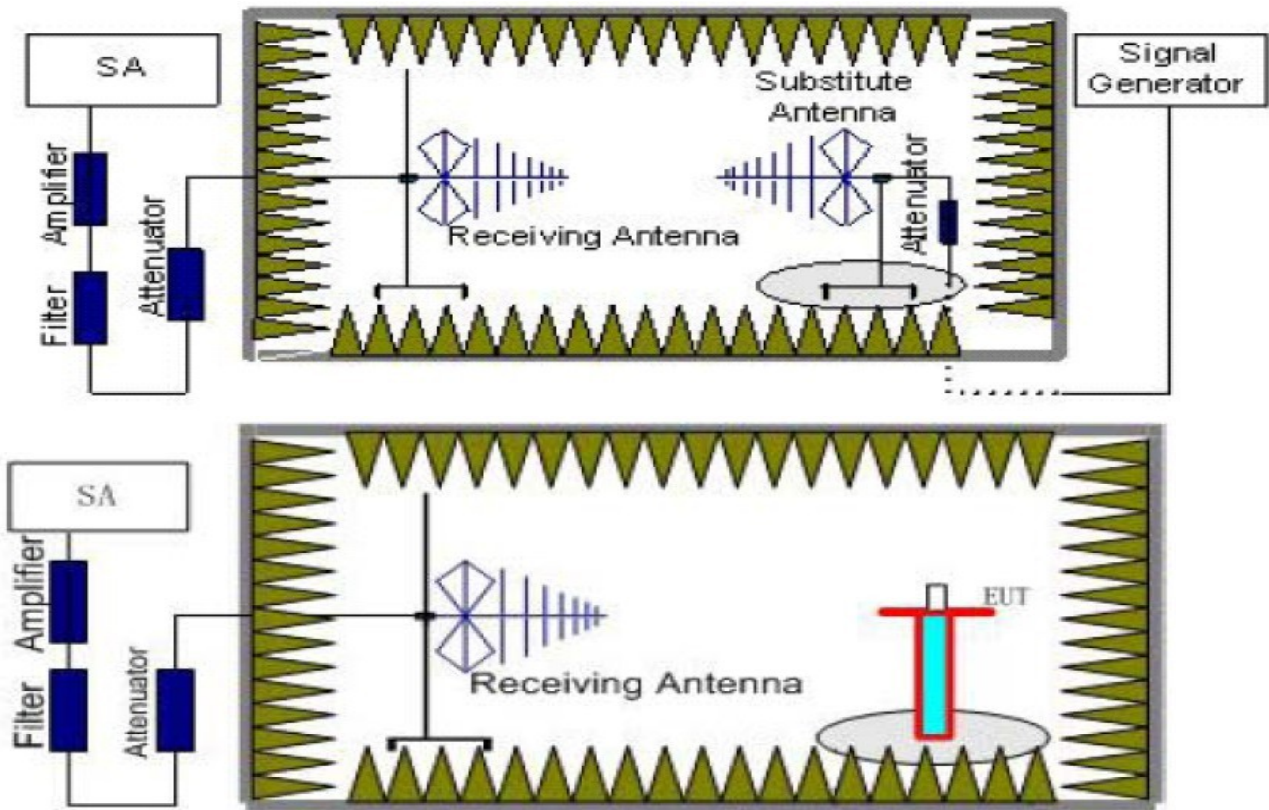
### 6.8.3 Test Procedures

1. Please refer to ETSI EN 300 422-1 V1.4.2 (2011-08) clause 6.1 for the test conditions.
2. Please refer to ETSI EN 300 422-1 V1.4.2 (2011-08) clause 8.4.2 for the measurement method.

### 6.8.4 Test Setup Layout

#### Test Configuration

#### Effective Radiated Power measurement (30 MHz to 12.75 GHz)



### 6.8.5 EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

### 6.8.6 Test result

|               |             |                |       |
|---------------|-------------|----------------|-------|
| Temperature   | 25.2°C      | Humidity       | 52.1% |
| Test Engineer | Simba Huang | Configurations | TX    |

#### Remarks:

1. Pre-scan all kind of the place mode (X-axis, Y-axis, Z-axis), and found the Y-axis which it is worse case.

#### 6.4.1 Spurious emissions

The test frequency range from 25MHz to 7GHz and recorded worst at below:

| Test mode: Tx (614.1MHz) |          |                        |             |             |        |
|--------------------------|----------|------------------------|-------------|-------------|--------|
| Frequency (MHz)          | Pol./Ant | Measurement EIRP (dBm) | Limit (dBm) | Margin (dB) | Result |
| 1228.200                 | V        | -43.27                 | -30         | 13.27       | PASS   |
| 1842.300                 | V        | -41.88                 | -30         | 11.88       |        |
| 2456.400                 | V        | -39.52                 | -30         | 9.52        |        |
| 3070.500                 | V        | -37.74                 | -30         | 7.74        |        |
| 3684.600                 | V        | -35.36                 | -30         | 5.36        |        |
| --                       | V        | --                     | --          | --          |        |
| 1228.200                 | H        | -44.55                 | -30         | 14.55       |        |
| 1842.300                 | H        | -42.27                 | -30         | 12.27       |        |
| 2456.400                 | H        | -42.41                 | -30         | 12.41       |        |
| 3070.500                 | H        | -40.96                 | -30         | 10.96       |        |
| 3684.600                 | H        | -38.72                 | -30         | 8.72        |        |
| --                       | H        | --                     | --          | --          |        |

| Test mode: Tx (657.1MHz) |          |                        |             |             |        |
|--------------------------|----------|------------------------|-------------|-------------|--------|
| Frequency (MHz)          | Pol./Ant | Measurement EIRP (dBm) | Limit (dBm) | Margin (dB) | Result |
| 1314.200                 | V        | -43.27                 | -30         | 13.27       | PASS   |
| 1971.300                 | V        | -44.48                 | -30         | 14.48       |        |
| 2628.400                 | V        | -42.33                 | -30         | 12.33       |        |
| 3285.500                 | V        | -41.57                 | -30         | 11.57       |        |
| 3942.600                 | V        | -38.14                 | -30         | 8.14        |        |
| --                       | V        | --                     | --          | --          |        |
| 1314.200                 | H        | -46.43                 | -30         | 16.43       |        |
| 1971.300                 | H        | -44.58                 | -30         | 14.58       |        |
| 2628.400                 | H        | -44.62                 | -30         | 14.62       |        |
| 3285.500                 | H        | -39.78                 | -30         | 9.78        |        |
| 3942.600                 | H        | -37.33                 | -30         | 7.33        |        |
| --                       | H        | --                     | --          | --          |        |

| Test mode: Tx (662.5MHz) |          |                        |             |             |        |
|--------------------------|----------|------------------------|-------------|-------------|--------|
| Frequency (MHz)          | Pol./Ant | Measurement EIRP (dBm) | Limit (dBm) | Margin (dB) | Result |
| 1325.000                 | V        | -45.63                 | -30         | 15.63       | PASS   |
| 1987.500                 | V        | -46.25                 | -30         | 16.25       |        |
| 2650.000                 | V        | -43.42                 | -30         | 13.42       |        |
| 3312.500                 | V        | -37.67                 | -30         | 7.67        |        |
| 3975.000                 | V        | -36.45                 | -30         | 6.45        |        |
| --                       | V        | --                     | --          | --          |        |
| 1325.000                 | H        | -45.75                 | -30         | 15.75       |        |
| 1987.500                 | H        | -46.69                 | -30         | 16.69       |        |
| 2650.000                 | H        | -39.75                 | -30         | 9.75        |        |
| 3312.500                 | H        | -40.39                 | -30         | 10.39       |        |
| 3975.000                 | H        | -38.92                 | -30         | 8.92        |        |
| --                       | H        | --                     | --          | --          |        |

#### Remark:

- The test frequency range from 25MHz to 7GHz, RBW/VBW: 100 KHz/300KHz below 1GHz, RBW/VBW: 1000 KHz/3000KHz above 7GHz.
- "Other emission levels were very low against the limit and not reported.

## 6.5 Frequency Stability

### 6.4.13 Standard requirement:

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

### 6.4.14 Measuring Instruments:

Please refer to equipment's list in this report.

### 6.4.15 Test Procedures

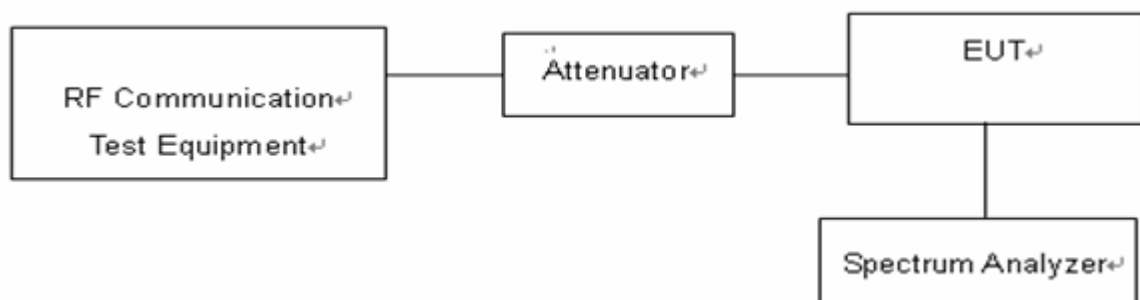
#### 1. a) Frequency stability versus environmental temperature

1. Setup as Test Configuration for frequencies measured at ambient temperature if it is within  $15^{\circ}\text{C}$  to  $25^{\circ}\text{C}$ . Otherwise, an environmental chamber set for a temperature of  $20^{\circ}\text{C}$  shall be used.
2. Turn on EUT and set SA center frequency to the right frequency needs to be measured. Then set SA RBW to 3 kHz, VBW to 10kHz and frequency span to 500 kHz. Record this frequency to be a reference.
3. Set the temperature of chamber to  $50^{\circ}\text{C}$ . Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize. While maintaining a constant temperature inside the chamber, turn the EUT on and measure the EUT operating frequency.
4. Repeat step 2 with a  $10^{\circ}\text{C}$  decreased per stage until the lowest temperature  $-20^{\circ}\text{C}$  is measured, record all measurement frequencies.

#### b) Frequency stability versus input voltage

1. Setup as Test Configuration for frequencies measured at ambient temperature if it is within  $15^{\circ}\text{C}$  to  $25^{\circ}\text{C}$ . Otherwise, an environmental chamber set for a temperature of  $20^{\circ}\text{C}$  shall be used. Install new batteries in the EUT.
2. Set SA center frequency to the right frequency needs to be measured. Then set SA RBW to 3kHz, VBW to 10kHz and frequency span to 500 kHz. Record this frequency to be a reference.
3. For non hand carried, operated device, supply the EUT primary voltage with 85 and 115 percent of the nominal value and record the frequency.

### 6.4.16 Test Setup Layout



#### 6.4.17 EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

#### 6.4.18 Test result

PASS

| Reference Frequency: 614.1MHz |                  |                       |                         |           |        |
|-------------------------------|------------------|-----------------------|-------------------------|-----------|--------|
| Voltage ( V )                 | Temperature (°C) | Frequency error (MHz) | Frequency Tolerance (%) | Limit (%) | Result |
| 3.0V                          | -20              | 0.00072               | 0.00012%                | ±0.005    | PASS   |
|                               | -10              | 0.00101               | 0.00016%                |           |        |
|                               | 0                | 0.00098               | 0.00016%                |           |        |
|                               | 10               | 0.00222               | 0.00036%                |           |        |
|                               | 20               | 0.00132               | 0.00021%                |           |        |
|                               | 30               | 0.00117               | 0.00019%                |           |        |
|                               | 40               | 0.00103               | 0.00017%                |           |        |
|                               | 50               | 0.00092               | 0.00015%                |           |        |
| 2.7 V                         | 20               | 0.00088               | 0.00014%                |           |        |

| Reference Frequency: 657.1MHz |                  |                       |                         |           |        |
|-------------------------------|------------------|-----------------------|-------------------------|-----------|--------|
| Voltage ( V )                 | Temperature (°C) | Frequency error (MHz) | Frequency Tolerance (%) | Limit (%) | Result |
| 3.0V                          | -20              | 0.00097               | 0.00015%                | ±0.005    | PASS   |
|                               | -10              | 0.00113               | 0.00017%                |           |        |
|                               | 0                | 0.00072               | 0.00011%                |           |        |
|                               | 10               | 0.00092               | 0.00014%                |           |        |
|                               | 20               | 0.00078               | 0.00012%                |           |        |
|                               | 30               | 0.00141               | 0.00021%                |           |        |
|                               | 40               | 0.00123               | 0.00019%                |           |        |
|                               | 50               | 0.00069               | 0.00011%                |           |        |
| 2.7 V                         | 20               | 0.00066               | 0.00010%                |           |        |

| Reference Frequency: 662.5MHz |                  |                       |                         |           |        |
|-------------------------------|------------------|-----------------------|-------------------------|-----------|--------|
| Voltage ( V )                 | Temperature (°C) | Frequency error (MHz) | Frequency Tolerance (%) | Limit (%) | Result |
| 3.0V                          | -20              | 0.00094               | 0.00014%                | ±0.005    | PASS   |
|                               | -10              | 0.00113               | 0.00017%                |           |        |
|                               | 0                | 0.00067               | 0.00010%                |           |        |
|                               | 10               | 0.00083               | 0.00013%                |           |        |
|                               | 20               | 0.00101               | 0.00015%                |           |        |
|                               | 30               | 0.00069               | 0.00010%                |           |        |
|                               | 40               | 0.00084               | 0.00013%                |           |        |
|                               | 50               | 0.00091               | 0.00014%                |           |        |
| 2.7 V                         | 20               | 0.00088               | 0.00013%                |           |        |

## 6.6 Conducted Emissions

### 6.9.1 Standard requirement:

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 is listed as follows:

| Frequency Range<br>(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

### 6.9.2 Measuring Instruments and Setting:

Please refer to equipment list in this report. The following table is the setting of the spectrum analyzer.

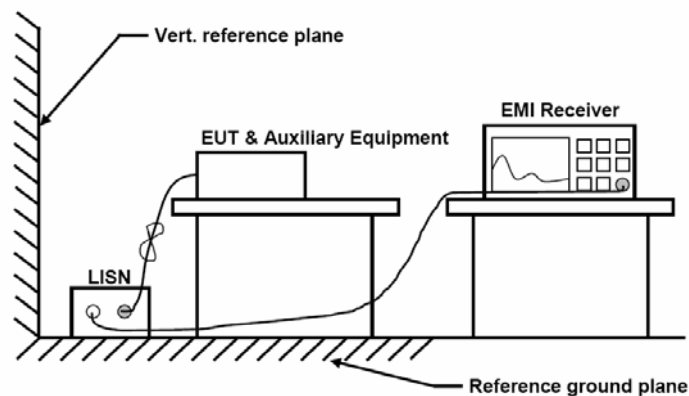
| Spectrum Parameter                    | Setting       |
|---------------------------------------|---------------|
| Detector                              | Peak          |
| Attenuation                           | Auto          |
| RB / VB (Emission in restricted band) | 100KHz/300KHz |

### 6.9.3 Test Procedures

The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz

The spectrum from 9 kHz to 26.5GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

### 6.9.4 Test Setup Layout



#### **6.9.5 EUT Operation during Test**

The EUT was programmed to be in continuously transmitting mode.

#### **6.9.6 Test result**

N/A

The EUT is powered by Battery, So this test item is not applicable.

## 7 Test Setup Photo

Reference to the **appendix Setup photo** for details.

## 8 EUT Constructional Details

Reference to the appendix **External EUT photo & Internal EUT photo** for details.

-----End-----