



FCC TEST REPORT

FOR

X-Sense Innovations Co., Ltd

Door and Window Sensor

Test Model: SDS0A

Prepared for : X-Sense Innovations Co., Ltd
Address : Room 1703, Building 7A, International Innovation Valley, Dashi 1st Road, Shenzhen, 518055, CHINA

Prepared by : Shenzhen LCS Compliance Testing Laboratory Ltd.
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Date of receipt of test sample : July 09, 2024
Number of tested samples : 2
Sample No. : A240708091-1, A240708091-2
Serial number : Prototype
Date of Test : July 09, 2024 ~ July 18, 2024
Date of Report : July 19, 2024





FCC TEST REPORT

FCC CFR 47 PART 15 C (15.249)

Report Reference No. : LCSA07084054EA

Date of Issue : July 19, 2024

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, 518000, China

Testing Location/ Procedure : Full application of Harmonised standards ■
Partial application of Harmonised standards □
Other standard testing method □

Applicant's Name : X-Sense Innovations Co., Ltd

Address : Room 1703, Building 7A, International Innovation Valley, Dashi 1st Road, Shenzhen, 518055, CHINA

Test Specification

Standard : FCC CFR 47 PART 15 C(15.249) / ANSI C63.10: 2013

Test Report Form No. : TRF-4-E-165 A/0

TRF Originator : Shenzhen LCS Compliance Testing Laboratory Ltd.

Master TRF : Dated 2011-03

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Test Item Description : Door and Window Sensor

Trade Mark : X-SENSE

Test Model : SDS0A

Ratings : Input: 1.5V, Powered by 1x1.5V AAA batteries

Result : Positive

Compiled by:

Jack Liu

Jack Liu/Administrator

Supervised by:

Cary Luo

Cary Luo/ Technique principal

Approved by:

Gavin Liang

Gavin Liang/ Manager





FCC -- TEST REPORT

| | | |
|--------------------------|-----------------------|---------------------------------------|
| Test Report No. : | LCSA07084054EA | <u>July 19, 2024</u> Date of issue |
|--------------------------|-----------------------|---------------------------------------|

| | |
|--------------------------|--|
| Test Model..... | : SDS0A |
| EUT..... | : Door and Window Sensor |
| Applicant..... | : X-Sense Innovations Co., Ltd |
| Address..... | : Room 1703, Building 7A, International Innovation Valley, Dashi 1st Road, Shenzhen, 518055, CHINA |
| Telephone..... | : / |
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| Manufacturer..... | : X-Sense Electronics Co., Ltd. |
| Address..... | : Room 402, Building 4, No. 9, Jinshagang 1st Road, Shixia Village, Dalang Town, Dongguan City, 523750 Guangdong, P.R. China |
| Telephone..... | : / |
| Fax..... | : / |
| Factory..... | : X-Sense Electronics Co., Ltd. |
| Address..... | : Room 402, Building 4, No. 9, Jinshagang 1st Road, Shixia Village, Dalang Town, Dongguan City, 523750 Guangdong, P.R. China |
| 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

| Report Version | Issue Date | Revision Content | Revised By |
|----------------|---------------|------------------|------------|
| 000 | July 19, 2024 | Initial Issue | --- |
| | | | |
| | | | |





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1. GENERAL INFORMATION

1.1 Description of Device (EUT)

EUT : Door and Window Sensor
Test Model : SDS0A
Power Supply : Input: 1.5V \pm , Powered by 1x1.5V AAA batteries
Hardware Version : V1.1
Software Version : V1.3.0
Frequency Range : 912.375MHz
Channel Number : 1 Channel
Modulation Type : FSK
Antenna Description : Spring Antenna, 1.0dBi(Max.)





1.2. Support Equipment List

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

1.3. External I/O

| I/O Port Description | Quantity | Cable |
|----------------------|----------|-------|
| --- | --- | --- |

1.4. Description of Test Facility

NVLAP Accreditation Code is 600167-0.

FCC Designation Number is CN5024.

CAB identifier is CN0071.

CNAS Registration Number is L4595.

Test Firm Registration Number: 254912.

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

1.5. Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. To CISPR 16 – 4 “Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements” and is documented in the LCS quality system acc. To DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.





1.6. Measurement Uncertainty

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

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

1.7. Description of Test Modes

The EUT has been tested under operating condition.

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

All test modes were tested, only the result of the worst case was recorded in the report.

***Note: Using a temporary antenna connector for the EUT when conducted measurements are performed.

| Mode of Operations | Transmitting Frequency (MHz) |
|-----------------------|------------------------------|
| FSK | 912.375 |
| For Radiated Emission | |
| Test Mode | TX Mode |

Detail Channel as follows:

| Channel | Frequency(MHz) | Channel | Frequency(MHz) |
|---------|----------------|---------|----------------|
| 1 | 912.375 | --- | --- |



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Scan code to check authenticity



2. 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 Shenzhen LCS Compliance Testing Laboratory Ltd.

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 15.203, 15.205, 15.207, 15.209 and 15.249 under the FCC Rules Part 15 Subpart C.

2.3. General Test Procedures

2.3.1 Radiated Emissions

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

2.4. Test Sample

The application provides 2 samples to meet requirement;

| Sample Number | Description |
|------------------------|---------------------------------------|
| Sample 1(A240319044-1) | Engineer sample – continuous transmit |
| Sample 2(A240319044-2) | Normal sample – Intermittent transmit |





3. CONNECTION DIAGRAM OF TEST SYSTEM

3.1. Justification

The system was configured for testing in a continuous transmit condition. Continuous transmitting was pre-programmed. It'll keep transmitting with modulated signal at the lowest channel by installing the batter. Rotate the button, and it goes to the next channel. Repeat the rotation button and it will be emitted on each channel in use.

3.2. EUT Exercise Software

EUT will Test instruction packet sending

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 Part 15 Subpart C §15.249 | | |
|---|--------------------------------|-----------|
| FCC Rules | Description Of Test | Result |
| §15.203 | Antenna Requirement | Compliant |
| §15.207(a) | Power Line Conducted Emissions | N/A |
| §15.205(a), §15.209(a), §15.249(a), §15.249(c) | Radiated Emissions Measurement | Compliant |
| §15.249 (d) | Band Edges Measurement | Compliant |
| §2.1049 | 99% and 20 dB Bandwidth | Compliant |





5. ANTENNA REQUIREMENT

5.1. Standard Applicable

According to § 15.203 and RSS-Gen, 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 replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

5.2. Antenna Connected Construction

The EUT use Spring Antenna and maximum antenna gain is 1.0dBi, antenna cannot replacement, meets FCC Part §15.203 antenna requirement. Please see EUT photo for details.

5.3. Results

Compliance



6. POWER LINE CONDUCTED EMISSIONS

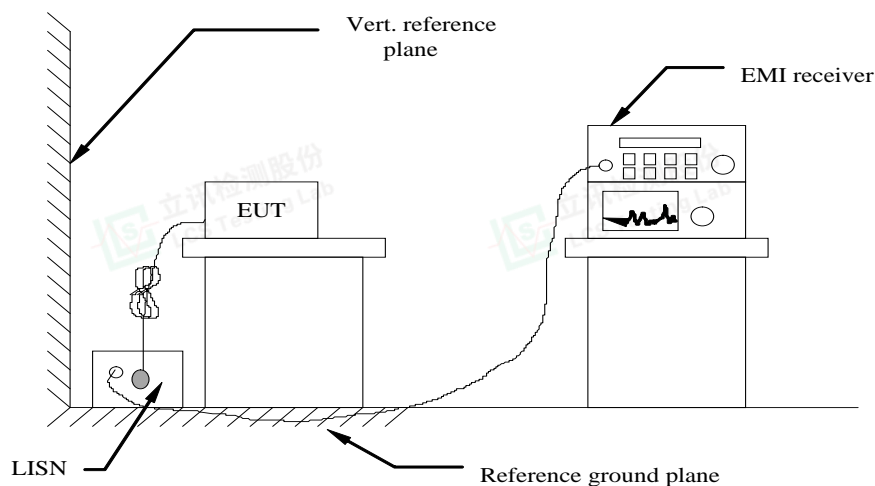
6.1. Standard Applicable

According to §15.207 (a) & RSS-Gen § 8.8: 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 (dBµV) | |
|-----------------------|---------------|----------|
| | Quasi-peak | Average |
| 0.15 to 0.50 | 66 to 56 | 56 to 46 |
| 0.50 to 5 | 56 | 46 |
| 5 to 30 | 60 | 50 |

* Decreasing linearly with the logarithm of the frequency

6.2. Block Diagram of Test Setup



6.3. Disturbance Calculation

The AC mains conducted disturbance is calculated by adding the 10dB Pulse Limiter and Cable Factor and Duty Cycle Correction Factor (if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$CD \text{ (dBuV)} = RA \text{ (dBuV)} + PL \text{ (dB)} + CL \text{ (dB)}$$

| | |
|----------------------------------|--|
| Where CD = Conducted Disturbance | CL = Cable Attenuation Factor (Cable Loss) |
| RA = Reading Amplitude | PL = 10 dB Pulse Limiter Factor |

6.4. Test Results

Not applicable.





7. RADIATED EMISSION MEASUREMENT

7.1. Standard Applicable

According to FCC § 15.249: Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

20dBc in any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) and 15.249 limit in the table below has to be followed.

| Fundamental Frequency | Field Strength of fundamental (millivolts/meter) | Field Strength of harmonics (microvolts/meter) |
|-----------------------|--|--|
| 902-928MHz | 50 | 500 |
| 2400-2483.5MHz | 50 | 500 |
| 5725-5875MHz | 50 | 500 |
| 24.0-24.25GHz | 250 | 2500 |

| 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 |

According to RSS-210 B.10:

The field strength of fundamental and harmonic emissions, measured at 3 m, shall not exceed 50 mV/m and 0.5 mV/m respectively.

The field strength limits shall be measured using an average detector, except for the fundamental emission in the frequency band 902-928 MHz, which is based on measurements using an International Special Committee on Radio Interference (CISPR) quasi-peak detector.

Emissions radiated outside of the specified frequency bands, except for harmonic emissions, shall be attenuated by at least 50 dB below the level of the fundamental emissions or to the general field strength limits listed in RSS-Gen, whichever is less stringent.

7.2. Instruments 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 th 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 |



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| | |
|------------------------|---|
| 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 |
| Start ~ Stop Frequency | 1GHz~10GHz / RB/VB 1MHz/3MHz for PK 1MHz/10Hz for AV |

7.3. Test Procedure

1) Sequence of testing 9 kHz to 30 MHz

Setup:

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

Premeasurement:

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

Final measurement:

- Identified emissions during the premeasurement the software maximizes by rotating the turntable position (0° 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:

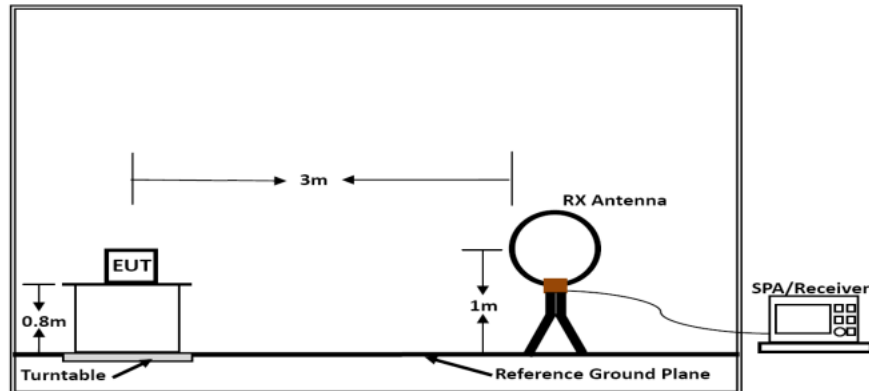
- The turntable rotates from 0° to 315° using 45° steps.
- The antenna is polarized vertical and horizontal.
- The antenna height scan range is 1 meter to 2.5 meter.
- At each turntable position and antenna polarization the analyzer sweeps with peak detection to find the maximum of all emissions.

Final measurement:

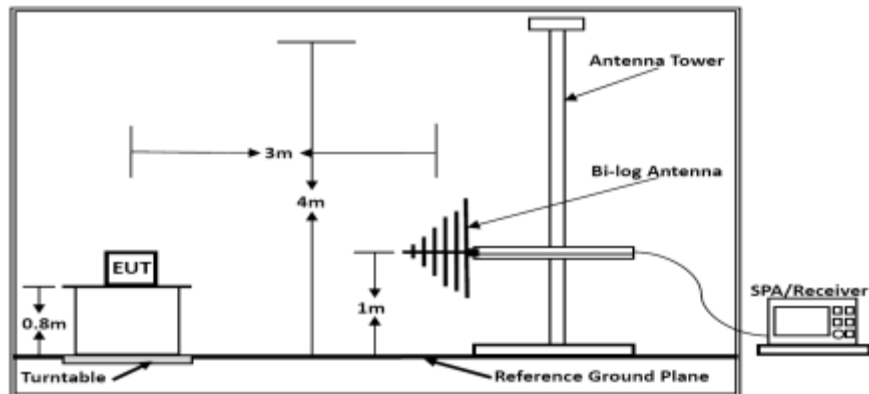
- The final measurement will be performed with minimum the six highest peaks.
- According to the maximum antenna and turntable positions of premeasurement the software maximize the peaks by changing turntable position ($\pm 45^\circ$) and antenna movement between 1 and 4 meter. This procedure is repeated 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.



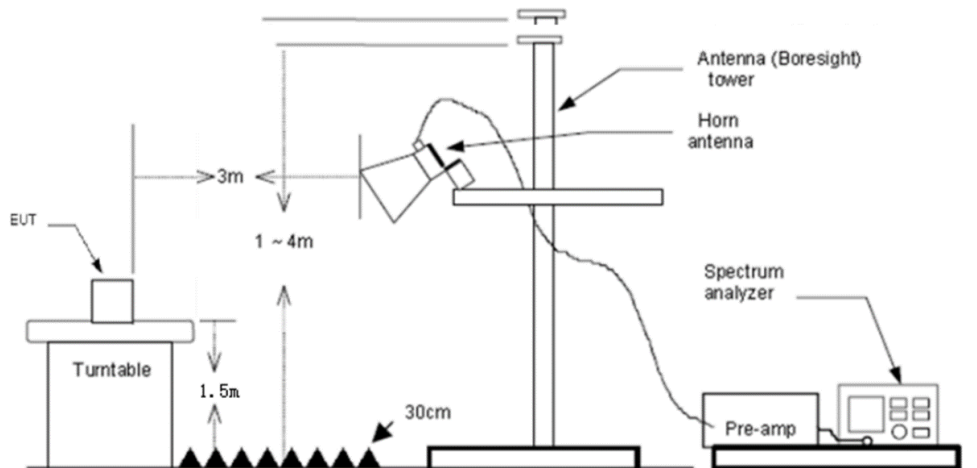
7.4. Block Diagram of Test Setup



Below 30MHz



Below 1GHz



Above 18 GHz shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade from 3m to 1m.

7.5 EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.





7.6. Field Strength Calculation

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

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

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

7.7. Test Results of Radiated Emissions (9 KHz~30 MHz)

| | | | |
|---------------|------------|----------|-------|
| Temperature | 23.8°C | Humidity | 52.1% |
| Test Engineer | Paddi Chen | | |

| Freq. (MHz) | Level (dBuV) | Over Limit (dB) | Over Limit (dBuV) | Remark |
|-------------|--------------|-----------------|-------------------|----------|
| - | - | - | - | See Note |

Note:

The amplitude of spurious emissions which are attenuated by more than 20 dB below the permissible value has no need to be reported.

Distance extrapolation factor = $40 \log (\text{specific distance} / \text{test distance})$ (dB);

Limit line = specific limits (dBuV) + distance extrapolation factor.

7.8. Test Results of Radiated Emissions (30 MHz – 1000 MHz)

| | | | |
|---------------|------------|----------|-------|
| Temperature | 23.8°C | Humidity | 52.1% |
| Test Engineer | Paddi Chen | | |

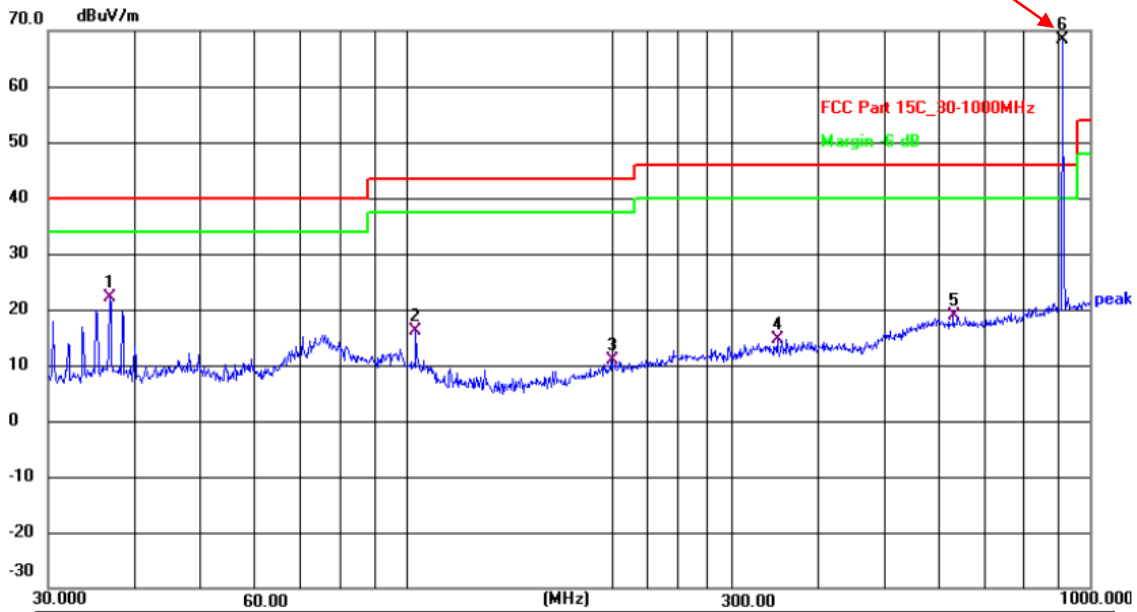
PASS.

The test data please refer to following page.





Horizontal

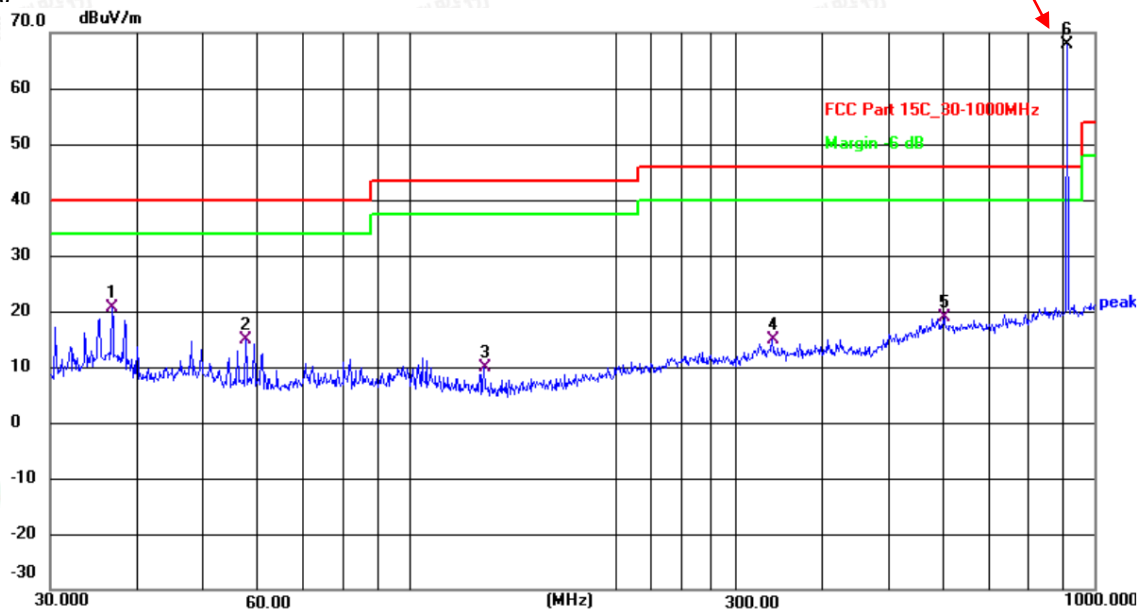


| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector |
|-----|-----------------|----------------|---------------|----------------|----------------|-------------|----------|
| 1 | 36.8953 | 39.85 | -17.69 | 22.16 | 40.00 | -17.84 | QP |
| 2 | 103.4421 | 34.61 | -18.49 | 16.12 | 43.50 | -27.38 | QP |
| 3 | 199.9856 | 28.16 | -17.39 | 10.77 | 43.50 | -32.73 | QP |
| 4 | 349.2500 | 29.51 | -14.84 | 14.67 | 46.00 | -31.33 | QP |
| 5 | 631.6884 | 29.95 | -11.06 | 18.89 | 46.00 | -27.11 | QP |
| 6 | 912.8620 | 76.43 | -8.12 | 68.31 | 46.00 | 22.31 | peak |





Vertical



| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector |
|-----|-----------------|----------------|---------------|----------------|----------------|-------------|----------|
| 1 | 36.8953 | 38.28 | -17.69 | 20.59 | 40.00 | -19.41 | QP |
| 2 | 57.7962 | 33.29 | -18.45 | 14.84 | 40.00 | -25.16 | QP |
| 3 | 128.5630 | 30.25 | -20.47 | 9.78 | 43.50 | -33.72 | QP |
| 4 | 338.4001 | 29.55 | -14.55 | 15.00 | 46.00 | -31.00 | QP |
| 5 | 603.5392 | 29.31 | -10.52 | 18.79 | 46.00 | -27.21 | QP |
| 6 | 912.8620 | 76.07 | -8.12 | 67.95 | 46.00 | 21.95 | peak |

Note:

1). Pre-scan all modes and recorded the worst case results in this report (912.375MHz).

2). Emission level (dBuV/m) = 20 Log Emission level (uV/m).

3). Level = Reading + Factor, Margin = Level – Limit,

Factor = Antenna Factor + Cable Loss - Preamp Factor





7.9. Results for Radiated Emissions (1 – 10 GHz)

912.375MHz

| Freq. MHz | Reading Level dBuV | Ant. Fac. dB/m | Pre. Fac. dB | Cab. Loss dB | Measured dBuV/m | Limit dBuV/m | Margin dB | Remark | Pol. |
|-----------|--------------------|----------------|--------------|--------------|-----------------|--------------|-----------|---------|------------|
| 1824.75 | 54.41 | 33.06 | 35.04 | 3.94 | 56.37 | 74.00 | -17.63 | Peak | Horizontal |
| 1824.75 | 43.67 | 33.06 | 35.04 | 3.94 | 45.63 | 54.00 | -8.37 | Average | Horizontal |
| 1824.75 | 56.45 | 33.06 | 35.04 | 3.94 | 58.41 | 74.00 | -15.59 | Peak | Vertical |
| 1824.75 | 44.14 | 33.06 | 35.04 | 3.94 | 46.10 | 54.00 | -7.90 | Average | Vertical |

Fundamental and Harmonics Worst Result

| Freq. MHz | Reading Level (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit(dB μ V/m) (QP) | Conclusion |
|------------|----------------------|---------------|----------------|--------------------------|------------|
| 912.375MHz | 93.09 | -8.12 | 84.97 | 94.00 | PASS |

Notes:

- 1). Measuring frequencies from 9 KHz - 10th harmonic (ex. 10GHz), No emission found between lowest internal used/generated frequency to 30 MHz.
- 2). Radiated emissions measured in frequency range from 9 KHz - 10th harmonic (ex. 10GHz) were made with an instrument using Peak detector mode.
- 3). Margin=Reading level+Cab loss+Ant Fac-Pre Fac-Limit.



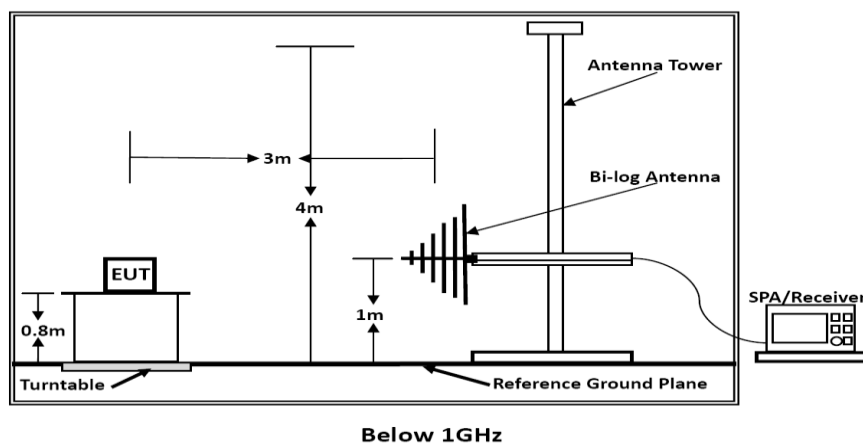
8. RESULTS FOR BAND EDGE TESTING

8.1. Standard Applicable

According to FCC §15.249 (d): Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

According to RSS-210 B.10 (b): Emissions radiated outside of the specified frequency bands, except for harmonic emissions, shall be attenuated by at least 50 dB below the level of the fundamental emissions or to the general field strength limits listed in RSS-Gen, whichever is less stringent.

8.2. Test Setup Layout



8.3. Measuring Instruments and Setting

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

8.4. Test Procedures

3) Sequence of testing 30MHz to 1000 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 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.

8.5. Measuring Instruments and Setting

| | | | |
|---------------|------------|----------|-------|
| Temperature | 23.8°C | Humidity | 52.5% |
| Test Engineer | Paddi Chen | | |

PASS

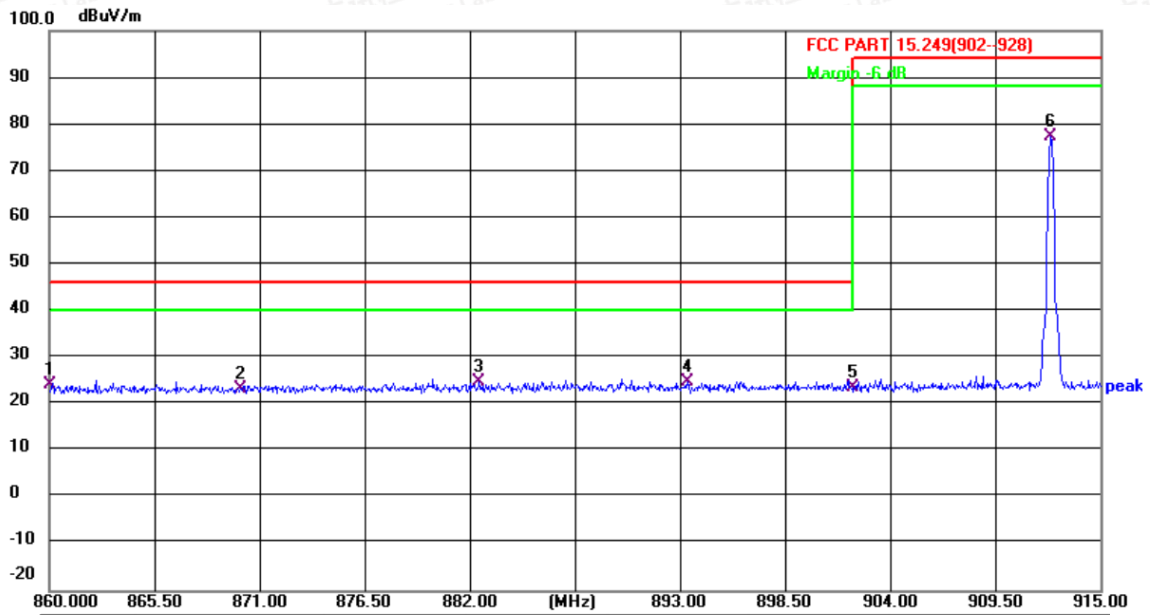
Remark:

1. The other emission levels were very low against the limit.
2. Detector PK is setting spectrum/receiver. RBW=100KHz/VBW=300KHz/Sweep time=Auto/Detector=Peak;
3. Please refer to following test plots;





912.375 MHz
Vertical

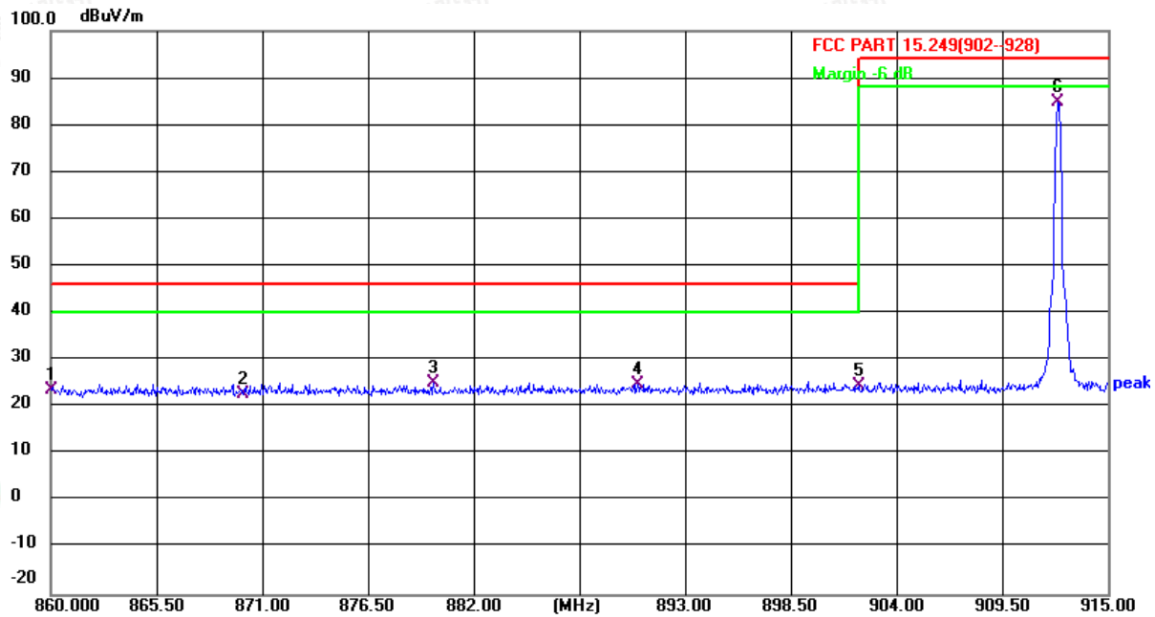


| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector |
|-----|-----------------|----------------|---------------|----------------|----------------|-------------|----------|
| 1 | 860.0000 | 32.98 | -8.86 | 24.12 | 46.00 | -21.88 | QP |
| 2 | 870.0000 | 31.98 | -8.75 | 23.23 | 46.00 | -22.77 | QP |
| 3 | 882.4950 | 33.32 | -8.57 | 24.75 | 46.00 | -21.25 | QP |
| 4 | 893.3850 | 33.18 | -8.41 | 24.77 | 46.00 | -21.23 | QP |
| 5 | 902.0000 | 31.97 | -8.27 | 23.70 | 46.00 | -22.30 | QP |
| 6 | 912.3600 | 85.44 | -8.12 | 77.32 | 94.00 | -16.68 | QP |





Horizontal

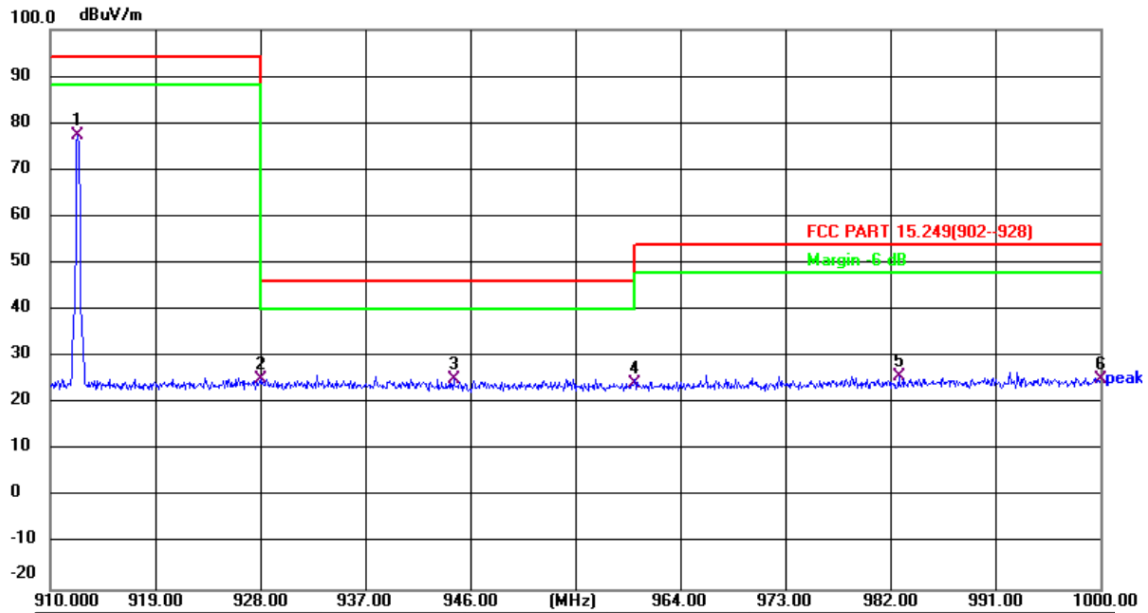


| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector |
|-----|-----------------|----------------|---------------|----------------|----------------|-------------|----------|
| 1 | 860.0000 | 32.42 | -8.86 | 23.56 | 46.00 | -22.44 | QP |
| 2 | 870.0000 | 31.49 | -8.75 | 22.74 | 46.00 | -23.26 | QP |
| 3 | 879.9100 | 33.82 | -8.61 | 25.21 | 46.00 | -20.79 | QP |
| 4 | 890.5250 | 33.42 | -8.45 | 24.97 | 46.00 | -21.03 | QP |
| 5 | 902.0000 | 32.81 | -8.27 | 24.54 | 46.00 | -21.46 | QP |
| 6 | 912.3600 | 93.09 | -8.12 | 84.97 | 94.00 | -9.03 | QP |





Vertical

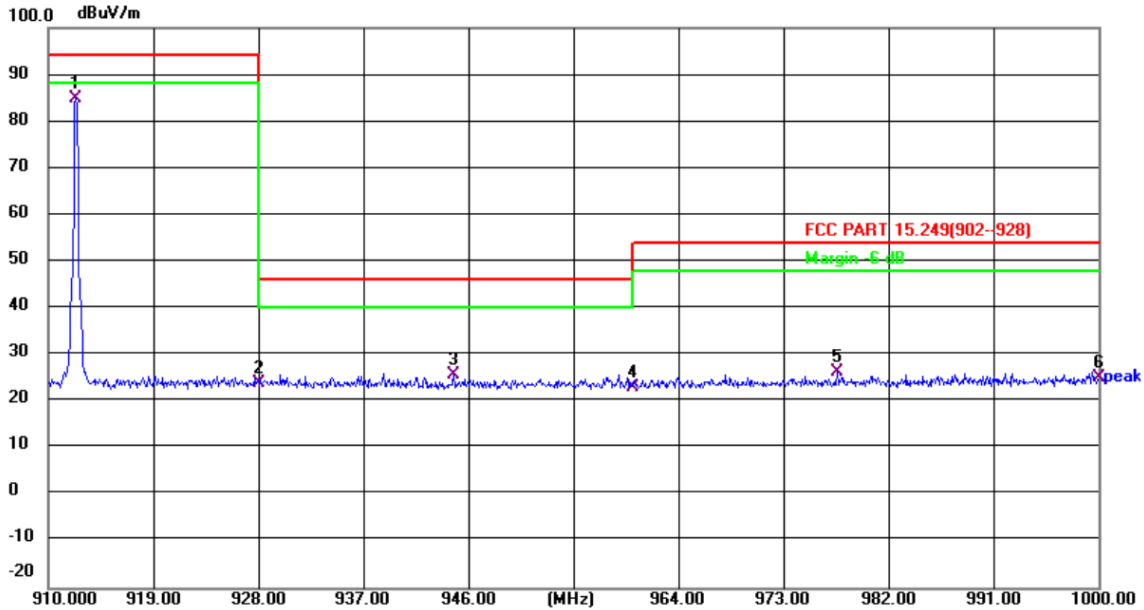


| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector |
|-----|-----------------|----------------|---------------|----------------|----------------|-------------|----------|
| 1 | 912.3400 | 85.55 | -8.12 | 77.43 | 94.00 | -16.57 | QP |
| 2 | 928.0000 | 32.97 | -7.96 | 25.01 | 46.00 | -20.99 | QP |
| 3 | 944.5600 | 33.28 | -8.10 | 25.18 | 46.00 | -20.82 | QP |
| 4 | 960.0000 | 32.13 | -8.01 | 24.12 | 46.00 | -21.88 | QP |
| 5 | 982.7200 | 33.38 | -7.62 | 25.76 | 54.00 | -28.24 | QP |
| 6 | 1000.0000 | 32.45 | -7.22 | 25.23 | 54.00 | -28.77 | QP |





Horizontal



| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector |
|-----|-----------------|----------------|---------------|----------------|----------------|-------------|----------|
| 1 | 912.3400 | 93.04 | -8.12 | 84.92 | 94.00 | -9.08 | QP |
| 2 | 928.0000 | 31.97 | -7.92 | 24.05 | 46.00 | -21.95 | QP |
| 3 | 944.7400 | 33.73 | -7.87 | 25.86 | 46.00 | -20.14 | QP |
| 4 | 960.0000 | 30.93 | -7.73 | 23.20 | 46.00 | -22.80 | QP |
| 5 | 977.5900 | 33.90 | -7.50 | 26.40 | 54.00 | -27.60 | QP |
| 6 | 1000.0000 | 32.42 | -7.22 | 25.20 | 54.00 | -28.80 | QP |

Notes:

- 1) Level (dBuV/m) = Reading + Factor;
- 2) Margin (dB) = Level - Limit;
- 3) Factor = Ant Fac - Pre Fac + Cab Loss.



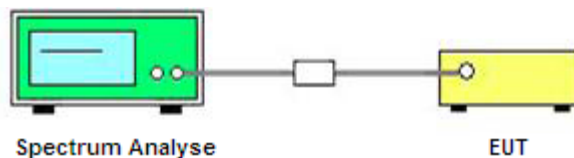
9. 99% OCCUPIED BANDWIDTH AND 20 DB BANDWIDTH MEASUREMENT

9.1. Standard Applicable

According to § 2.1049 and RSS-Gen section 6.7 “The occupied bandwidth or the “99% emission bandwidth” is defined as the frequency range between two points, one above and the other below the carrier frequency, within which 99% of the total transmitted power of the fundamental transmitted emission is contained. The occupied bandwidth shall be reported for all equipment in addition to the specified bandwidth required in the applicable RSSs.”

In some cases, the “x dB bandwidth” is required, which is defined as the frequency range between two points, one at the lowest frequency below and one at the highest frequency above the carrier frequency, at which the maximum power level of the transmitted emission is attenuated x dB below the maximum in band power level of the modulated signal, where the two points are on the outskirts of the in-band emission.

9.2. Block Diagram of Test Setup



9.3. Test Procedure

Use the following spectrum analyzer settings:

Span = 300 KHz

RBW = 1 KHz

VBW = 3 KHz

Sweep = auto

Detector function = peak

Trace = max hold

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





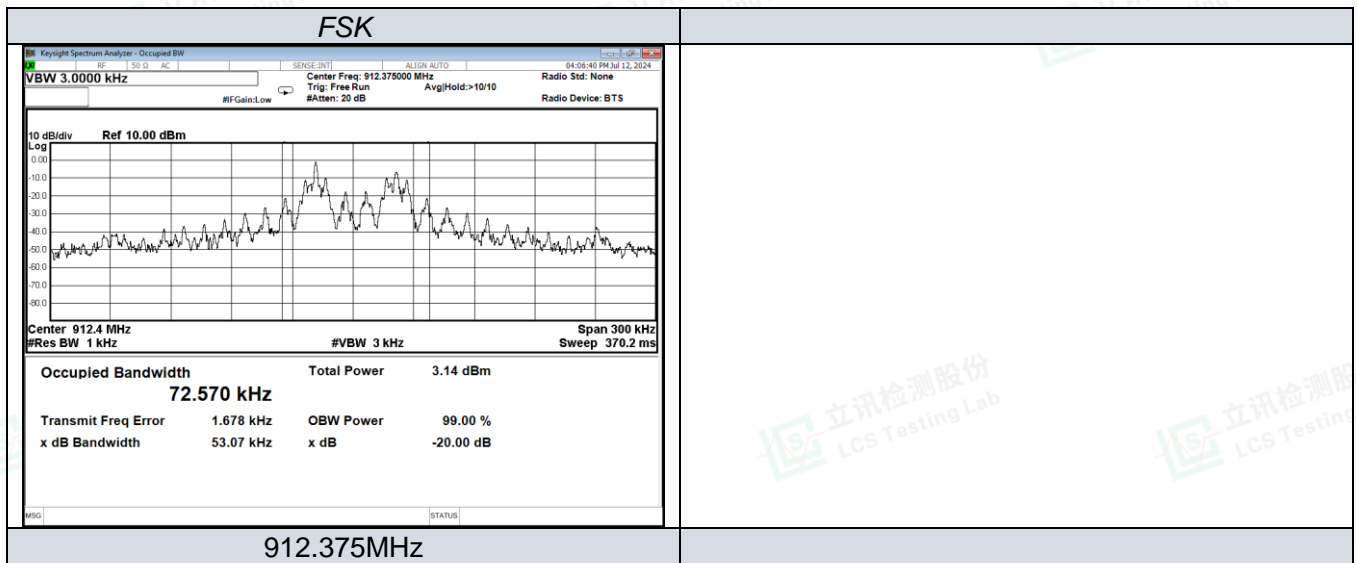
9.4. Test Results

| | | | |
|---------------|------------|----------|-------|
| Temperature | 24.6°C | Humidity | 54.1% |
| Test Engineer | Paddi Chen | | |

| Test Result of 99% and 20dB Bandwidth Measurement | | | |
|---|----------------------|---------------------|---------------|
| Test Frequency (MHz) | 20dB Bandwidth (KHz) | 99% Bandwidth (KHz) | Limit (MHz) |
| 912.375 | 53.07 | 72.570 | Non-Specified |

Remark:

1. Test results including cable loss;
2. Please refer following test plots;



**10. LIST OF MEASURING EQUIPMENT**

| Item | Equipment | Manufacturer | Model No. | Serial No. | Cal Date | Due Date |
|------|--------------------------------|-------------------|-------------|-----------------|------------|------------|
| 1 | MXA Signal Analyzer | Agilent | N9020A | MY49100060 | 2023-10-18 | 2024-10-17 |
| 2 | DC Power Supply | Agilent | E3642A | N/A | 2023-10-18 | 2024-10-17 |
| 3 | Temperature & Humidity Chamber | GUANGZHOU GOGNWEN | GDS-100 | 70932 | 2023-10-05 | 2024-10-04 |
| 4 | EMI Test Software | AUDIX | E3 | / | N/A | N/A |
| 5 | 3m Semi Anechoic Chamber | SIDT FRANKONIA | SAC-3M | 03CH03-HY | 2024-06-06 | 2025-06-05 |
| 6 | Positioning Controller | Max-Full | MF7802BS | MF780208586 | N/A | N/A |
| 7 | Active Loop Antenna | SCHWARZBECK | FMZB 1519B | 00005 | 2021-08-29 | 2024-08-28 |
| 8 | By-log Antenna | SCHWARZBECK | VULB9163 | 9163-470 | 2021-09-12 | 2024-09-11 |
| 9 | Horn Antenna | SCHWARZBECK | BBHA 9120D | 9120D-1925 | 2021-09-05 | 2024-09-04 |
| 10 | EMI Test Receiver | R&S | ESR 7 | 101181 | 2024-06-06 | 2025-06-05 |
| 11 | RS SPECTRUM ANALYZER | R&S | FSP40 | 100503 | 2024-06-06 | 2025-06-05 |
| 12 | Low-frequency amplifier | SchwarzZBECK | BBV9745 | 00253 | 2023-10-18 | 2024-10-17 |
| 13 | High-frequency amplifier | JS Denki Pte | PA0118-43 | JSPA21009 | 2023-10-18 | 2024-10-17 |
| 14 | EMI Test Receiver | R&S | ESPI | 101940 | 2024-06-06 | 2025-06-05 |
| 15 | Artificial Mains | R&S | ENV216 | 101288 | 2024-06-06 | 2025-06-05 |
| 16 | 10dB Attenuator | SCHWARZBECK | MTS-IMP-136 | 261115-001-0032 | 2024-06-06 | 2025-06-05 |
| 17 | EMI Test Software | Farad | EZ | / | N/A | N/A |
| 18 | Antenna Mast | Max-Full | MFA-515BSN | 1308572 | N/A | N/A |
| 19 | Pulse Limiter | R&S | ESH3-Z2 | 102750-NB | 2024-06-06 | 2025-06-05 |



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Scan code to check authenticity



11. TEST SETUP PHOTOGRAPHS OF THE EUT

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

12. EXTERIOR PHOTOGRAPHS OF THE EUT

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

13. INTERIOR PHOTOGRAPHS OF THE EUT

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

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

