

# TEST REPORT

**Application No.:** KSCR2110000190AT  
**FCC ID:** VMIALSEN2  
**IC:** 12494A-ALSEN2  
**Applicant:** Swann Communications Pty Ltd.  
**Address of Applicant:** Unit 5B,706 Lorimer Street Port Melbourne,Vic 3207,Australia  
**Manufacturer:** Ningbo Changrong Lighting&Electronics Technology Co.,Ltd  
**Address of Manufacturer:** NO.72,WUSHI ROAD,XIDIAN TOWN,NINGHAI NINGBO 315600 CHINA  
**Factory:** Ningbo Changrong Lighting&Electronics Technology Co.,Ltd  
**Address of Factory:** NO.72,WUSHI ROAD,XIDIAN TOWN,NINGHAI NINGBO 315600 CHINA  
**Equipment Under Test (EUT):**  
**EUT Name:** Alert Sensor  
**Model No.:** SWALPH-ALSEN2  
**Standard(s) :** 47 CFR Part 15, Subpart C 15.231  
 RSS-210 Issue 10 December 2019  
 RSS-Gen Issue5 Amendment 2(February 2021)  
**Date of Receipt:** 2021-09-13  
**Date of Test:** 2021-09-13 to 2021-10-14  
**Date of Issue:** 2021-10-27

|                     |              |
|---------------------|--------------|
| <b>Test Result:</b> | <b>Pass*</b> |
|---------------------|--------------|

\* In the configuration tested, the EUT complied with the standards specified above.

Eric Lin  
Laboratory Manage

The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards. Any mention of SGS International Electrical Approvals or testing done by SGS International Electrical Approvals in connection with, distribution or use of the product described in this report must be approved by SGS International Electrical Approvals in writing.



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| Revision Record |             |            |        |
|-----------------|-------------|------------|--------|
| Version         | Description | Date       | Remark |
| 00              | Original    | 2021-10-27 | /      |
|                 |             |            |        |
|                 |             |            |        |

|                          |  |  |  |
|--------------------------|--|--|--|
| Authorized for issue by: |  |  |  |
|                          |  | <br><hr/> Damon Zhou / Project Engineer |  |
|                          |  | <br><hr/> Eric Lin / Reviewer          |  |



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## 2 Test Summary

| Radio Spectrum Technical Requirement |                                  |                    |        |        |
|--------------------------------------|----------------------------------|--------------------|--------|--------|
| Item                                 | FCC Requirement                  | IC Requirement     | Method | Result |
| Antenna Requirement                  | 47 CFR Part 15, Subpart C 15.203 | RSS-Gen Clause 6.8 | N/A    | Pass   |

N/A: Not applicable

| Radio Spectrum Matter Part               |                                     |                      |  |        |
|--|-------------------------------------|----------------------|--|--------|
| Item                                     | FCC Requirement                     | IC Requirement       | Method                                 | Result |
| 20dB Bandwidth                           | 47 CFR Part 15, Subpart C 15.231    | RSS-210 A1.3         | ANSI C63.10 (2013) Section 6.9         | Pass   |
| Dwell Time                               | 47 CFR Part 15, Subpart C 15.231(a) | RSS-210 A1.1         | ANSI C63.10 (2013) Section 7.8.4       | Pass   |
| Field Strength of the Fundamental Signal | 47 CFR Part 15, Subpart C 15.231(b) | RSS-210 A1.2         | ANSI C63.10 (2013) Section 6.5         | Pass   |
| Radiated Emissions                       | 47 CFR Part 15, Subpart C 15.231    | RSS-210 A1.2         | ANSI C63.10 (2013) Section 6.4&6.5&6.6 | Pass   |
| 99% Bandwidth                            | N/A                                 | RSS-210 A1.3         | RSS-Gen Section 6.7                    | Pass   |
| Frequency Stability                      | N/A                                 | RSS-Gen Section 8.11 | RSS-Gen Section 6.11                   | Note 1 |

Note 1: Frequency stability requested in RSS GEN S8.11 has been complied since the result of occupied bandwidth can demonstrate.



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## 4 General Information

### 4.1 Details of E.U.T.

|                      |                              |
|----------------------|------------------------------|
| Power supply:        | DC 4.5V                      |
| Test voltage:        | DC 4.5V                      |
| Antenna Type:        | PCB antenna                  |
| Modulation Type:     | ASK                          |
| Number of Channels:  | 1                            |
| Operation Frequency: | 433.92MHz                    |
| S/N:                 | 1330711210001                |
| Firmware Version:    | CR-18002PIR-Rev00_20210721HY |

### 4.2 Description of Support Units

The EUT has been tested independently

### 4.3 Measurement Uncertainty

| No. | Item                            | Measurement Uncertainty   |
|-----|---------------------------------|---------------------------|
| 1   | Radio Frequency                 | $\pm 8.4 \times 10^{-8}$  |
| 2   | Timeout                         | $\pm 2s$                  |
| 3   | Duty cycle                      | $\pm 0.37\%$              |
| 4   | Occupied Bandwidth              | $\pm 3\%$                 |
| 5   | RF conducted power              | $\pm 0.6dB$               |
| 6   | RF power density                | $\pm 2.84dB$              |
| 7   | Conducted Spurious emissions    | $\pm 0.75dB$              |
| 8   | RF Radiated power               | $\pm 4.6dB$ (Below 1GHz)  |
|     |                                 | $\pm 4.1dB$ (Above 1GHz)  |
| 9   | Radiated Spurious emission test | $\pm 4.2dB$ (Below 30MHz) |
|     |                                 | $\pm 4.4dB$ (30MHz-1GHz)  |
|     |                                 | $\pm 4.8dB$ (1GHz-18GHz)  |
|     |                                 | $\pm 5.2dB$ (Above 18GHz) |
| 10  | Temperature test                | $\pm 1^{\circ}C$          |
| 11  | Humidity test                   | $\pm 3\%$                 |
| 12  | Supply voltages                 | $\pm 1.5\%$               |
| 13  | Time                            | $\pm 3\%$                 |

Note: The measurement uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.



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#### 4.4 Test Location

All tests were performed at:

Compliance Certification Services (Kunshan) Inc.

No.10 Weiye Rd, Innovation park, Eco&Tec, Development Zone, Kunshan City, Jiangsu, China.

Tel: +86 512 5735 5888 Fax: +86 512 5737 0818

No tests were sub-contracted.

#### 4.5 Test Facility

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

- **CNAS (No. CNAS L4354)**

CNAS has accredited Compliance Certification Services (Kunshan) Inc. 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) for the competence in the field of testing.

- **A2LA (Certificate No. 2541.01)**

Compliance Certification Services (Kunshan) Inc. is accredited by the American Association for Laboratory Accreditation (A2LA). Certificate No. 2541.01.

- **FCC (Designation Number: CN1172)**

Compliance Certification Services Inc. has been recognized as an accredited testing laboratory. Designation Number: CN1172.

- **ISED (CAB identifier: CN0072)**

Compliance Certification Services (Kunshan) Inc. has been recognized by Innovation, Science and Economic Development Canada (ISED) as an accredited testing laboratory.

CAB Identifier: CN0072.

- **VCCI (Member No.: 1938)**

The 3m and 10m Semi-anechoic chamber and Shielded Room of Compliance Certification Services (Kunshan) Inc. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-20134, R-11600, C-11707, T-11499, G-10216 respectively.

#### 4.6 Deviation from Standards

None

#### 4.7 Abnormalities from Standard Conditions

None



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## 5 Equipment List

| Item  | Equipment                            | Manufacturer  | Model       | Serial Number | Cal Date   | Cal.Due Date |
|---|--------------------------------------|---------------|-------------|---------------|------------|--------------|
| <b>Conducted Emission at Mains Terminals (150kHz-30MHz)</b> |                                      |               |             |               |            |              |
| 1   | EMI Test Receive                     | R&S           | ESCI        | 100781        | 02/01/2021 | 01/31/2022   |
| 2   | LISN                                 | R&S           | ENV216      | 101604        | 10/19/2020 | 10/18/2021   |
| 3   | LISN                                 | Schwarzbeck   | NNLK 8129   | 8129-143      | 10/19/2020 | 10/18/2021   |
| 4   | Pulse Limiter                        | R&S           | ESH3-Z2     | 100609        | 02/01/2021 | 01/31/2022   |
| 5   | CE test Cable                        | Thermax       | /           | 14            | 10/17/2020 | 10/16/2021   |
| 6   | Test Software                        | Farad         | EZ-EMC      | CCS-03A1      | N.C.R      | N.C.R        |
| <b>RF Conducted Test</b>                                    |                                      |               |             |               |            |              |
| 1   | Spectrum Analyzer                    | Agilent       | E4446A      | MY44020154    | 04/16/2021 | 04/15/2022   |
| 2   | Spectrum Analyzer                    | Keysight      | N9020A      | MY55370209    | 12/02/2020 | 12/01/2021   |
| 3   | Spectrum Analyzer                    | Keysight      | N9010A      | MY56480443    | 02/01/2021 | 01/31/2022   |
| 4   | Signal Generator                     | Agilent       | N5182A      | MY50142015    | 08/27/2021 | 08/26/2022   |
| 5   | Radio Communication Test Station     | Anritsu       | MT8000A     | 6262012849    | N/A        | N/A          |
| 6   | Radio Communication Analyzer         | Anritsu       | MT8821C     | 6201692222    | N/A        | N/A          |
| 7   | Universal Radio Communication Tester | R&S           | CMW500      | 159275        | 10/19/2020 | 10/18/2021   |
| 8   | Universal Radio Communication Tester | R&S           | CMW500      | 167239        | 04/16/2021 | 04/15/2022   |
| 9   | Power Meter                          | Anritsu       | ML2495A     | 1445010       | 04/15/2021 | 04/14/2022   |
| 10  | Switcher                             | CCSRF         | FY562       | KUS2001M001-3 | 10/19/2020 | 10/18/2021   |
| 11  | AC Power Source                      | EXTECH        | 6605        | 1570106       | N.C.R      | N.C.R        |
| 12  | DC Power Supply                      | Aglient       | E3632A      | MY50340053    | N.C.R      | N.C.R        |
| 13  | 6dB Attenuator                       | Mini-Circuits | NAT-6-2W    | 15542-1       | N.C.R      | N.C.R        |
| 14  | Power Divider                        | AISI          | IOWOPE2068  | PE2068        | N.C.R      | N.C.R        |
| 15  | Filter                               | MICRO-TRONICS | BRM50701    | 5             | N.C.R      | N.C.R        |
| 16  | Conducted test cable                 | /             | RF01-RF04   | /             | 04/15/2021 | 04/14/2022   |
| 17  | Software                             | BST           | TST-PASS    | N/A           | N/A        | N/A          |
| 18  | Temp. / Humidity Chamber             | TERCHY        | MHK-120AK   | X30109        | 04/15/2021 | 04/14/2022   |
| 19  | Thermometer                          | Anymetre      | TH603       | CCS007        | 10/16/2020 | 10/15/2021   |
| <b>RF Radiated Test</b>                                     |                                      |               |             |               |            |              |
| 1   | Spectrum Analyzer                    | R&S           | FSV40       | 101493        | 10/19/2020 | 10/18/2021   |
| 2   | Signal Generator                     | Agilent       | E8257C      | MY43321570    | 10/19/2020 | 10/18/2021   |
| 3   | Loop Antenna                         | Schwarzbeck   | HXYZ9170    | 9170-108      | 02/22/2021 | 02/21/2022   |
| 4   | Bilog Antenna                        | TESEQ         | CBL 6112D   | 35403         | 06/21/2021 | 06/20/2023   |
| 5   | Bilog Antenna                        | SCHWARZBECK   | VULB9160    | 9160-3342     | 04/13/2021 | 04/12/2023   |
| 6   | Horn-antenna(1-18GHz)                | Schwarzbeck   | BBHA9120D   | 267           | 10/26/2020 | 10/25/2022   |
| 7   | Horn-antenna(1-18GHz)                | ETS-LINDGREN  | 3117        | 00143290      | 02/22/2021 | 02/21/2023   |
| 8   | Horn Antenna(18-40GHz)               | Schwarzbeck   | BBHA9170    | BBHA9170171   | 02/22/2021 | 02/21/2022   |
| 9   | Pre-Amplifier(30MHz~18GHz)           | LNA           | /           | /             | 04/15/2021 | 04/14/2022   |
| 10  | Amplifier(18~40GHz)                  | COM-POWER     | PAM-840A    | 461332        | 10/23/2020 | 10/22/2021   |
| 11  | Low Pass Filter                      | MICRO-TRONICS | VLFX-950    | RV142900829   | N.C.R      | N.C.R        |
| 12  | High Pass Filter                     | Mini-Circuits | VHF-1200    | 15542         | N.C.R      | N.C.R        |
| 13  | Filter (5450MHz~5770 MHz)            | MICRO-TRONICS | BRC50704-01 | 2             | N.C.R      | N.C.R        |
| 14  | Filter (5690 MHz~5930 MHz)           | MICRO-TRONICS | BRC50705-01 | 4             | N.C.R      | N.C.R        |



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|----|----------------------------|---------------|--------------|-----|------------|------------|
| 15 | Filter (5150 MHz~5350 MHz) | MICRO-TRONICS | BRC50703-01  | 2   | N.C.R      | N.C.R      |
| 16 | Filter (885 MHz~915 MHz)   | MICRO-TRONICS | BRM14698     | 1   | N.C.R      | N.C.R      |
| 17 | Filter (815 MHz~860 MHz)   | MICRO-TRONICS | BRM14697     | 1   | N.C.R      | N.C.R      |
| 18 | Filter (1745 MHz~1910 MHz) | MICRO-TRONICS | BRM14700     | 1   | N.C.R      | N.C.R      |
| 19 | Filter (1922 MHz~1977 MHz) | MICRO-TRONICS | BRM50715     | 1   | N.C.R      | N.C.R      |
| 20 | Filter (2550 MHz)          | MICRO-TRONICS | HPM13362     | 5   | N.C.R      | N.C.R      |
| 21 | Filter (1532 MHz~1845 MHz) | MICRO-TRONICS | BRM50713     | 1   | N.C.R      | N.C.R      |
| 22 | Filter (2.4GHz)            | MICRO-TRONICS | BRM50701     | 5   | N.C.R      | N.C.R      |
| 23 | RE test cable              | /             | RE01-RE04    | /   | 04/15/2021 | 04/14/2022 |
| 24 | Software                   | Faratronic    | EZ_EMV-v 3A1 | N/A | N/A        | N/A        |



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## 6 Radio Spectrum Technical Requirement

### 6.1 Antenna Requirement

#### 6.1.1 Test Requirement:

47 CFR Part 15, Subpart C 15.203

#### 6.1.2 Conclusion

Standard Requirement:

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 antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit permanently attached antenna or of an so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

EUT Antenna:

The antenna is PCB antenna and no consideration of replacement.

Antenna location: Refer to Appendix (Internal Photos)



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## 7 Radio Spectrum Matter Test Results

### 7.1 20dB Bandwidth

Test Requirement 47 CFR Part 15, Subpart C 15.231(c)

Test Method: ANSI C63.10 (2013) Section 6.9

Limit:

| Frequency range(MHz) | Limit                                       |
|----------------------|---|
| 70-900               | No wider than 0.25% of the center frequency |
| Above 900            | No wider than 0.5% of the center frequency  |

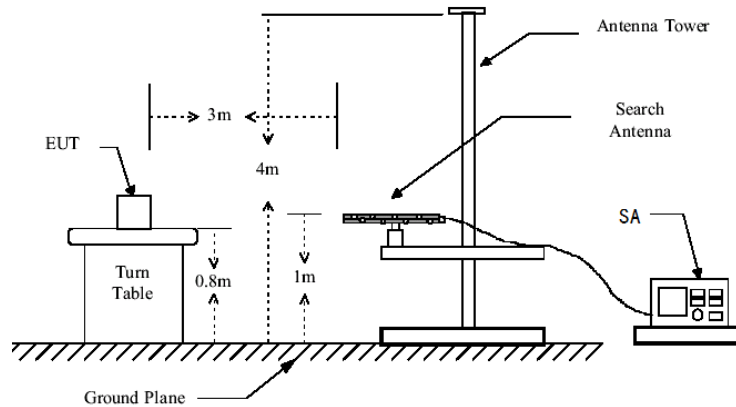
#### 7.1.1 E.U.T. Operation

Operating Environment:

Temperature: 24 °C Humidity: 49 % RH Atmospheric Pressure: 1007 mbar

Test mode a:TX mode\_Keep the EUT in transmitting with modulation mode.

#### 7.1.2 Test Setup Diagram



#### 7.1.3 Measurement Procedure and Data



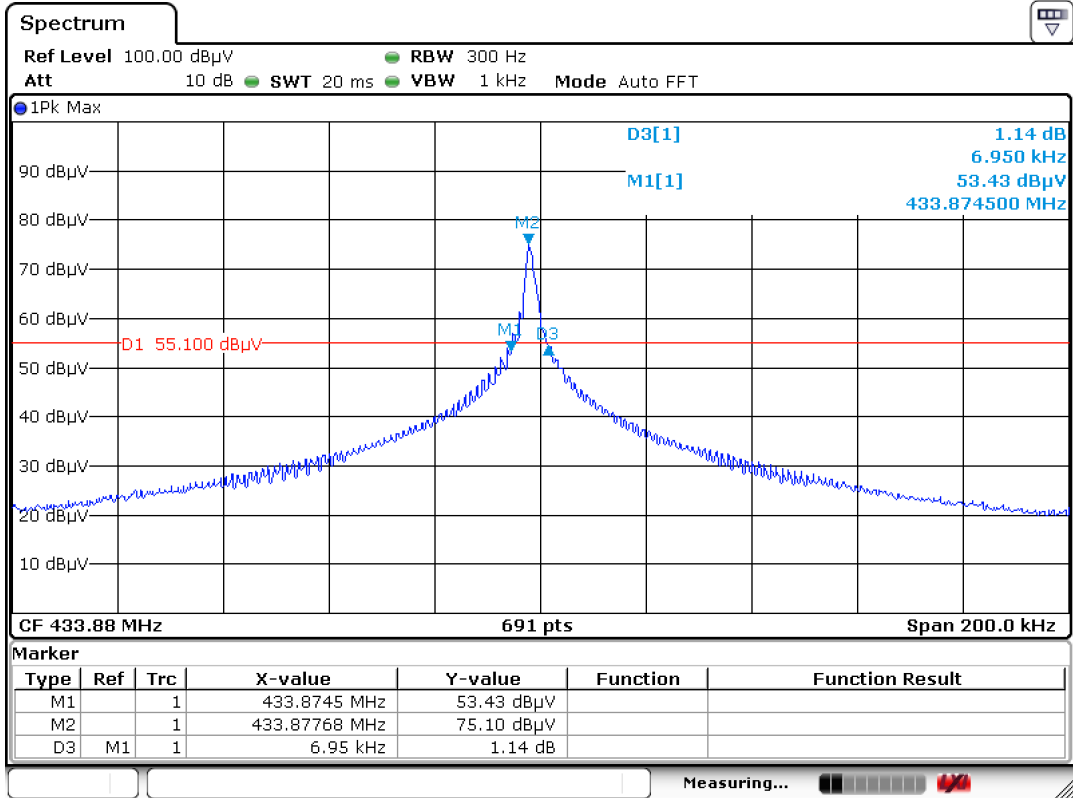
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| Frequency(MHz) | 20dB bandwidth (kHz) | Limit (kHz) | Results |
|----------------|----------------------|-------------|---------|
| 433.92         | 6.95                 | 1085        | Pass    |

Test plot as follows:



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## 7.2 Dwell Time

Test Requirement 47 CFR Part 15, Subpart C 15.231(a)  
 Test Method: ANSI C63.10 (2013) Section 7.8.4  
 Limit: 15.231 (a): Not more than 5 seconds

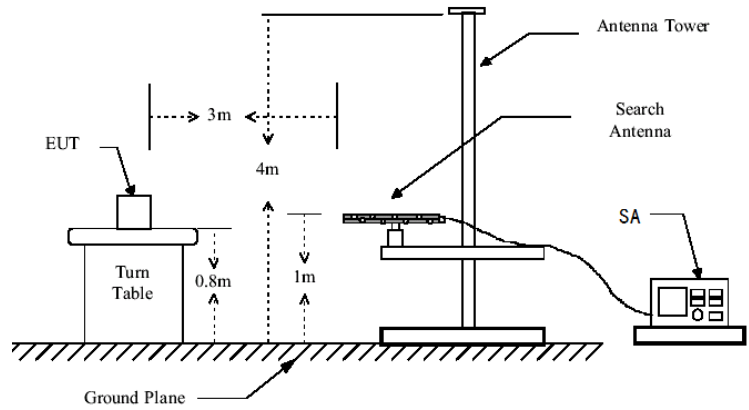
### 7.2.1 E.U.T. Operation

Operating Environment:

Temperature: 25 °C Humidity: 50 % RH Atmospheric Pressure: 1007 mbar

Test mode a:TX mode\_Keep the EUT in transmitting with modulation mode.

### 7.2.2 Test Setup Diagram



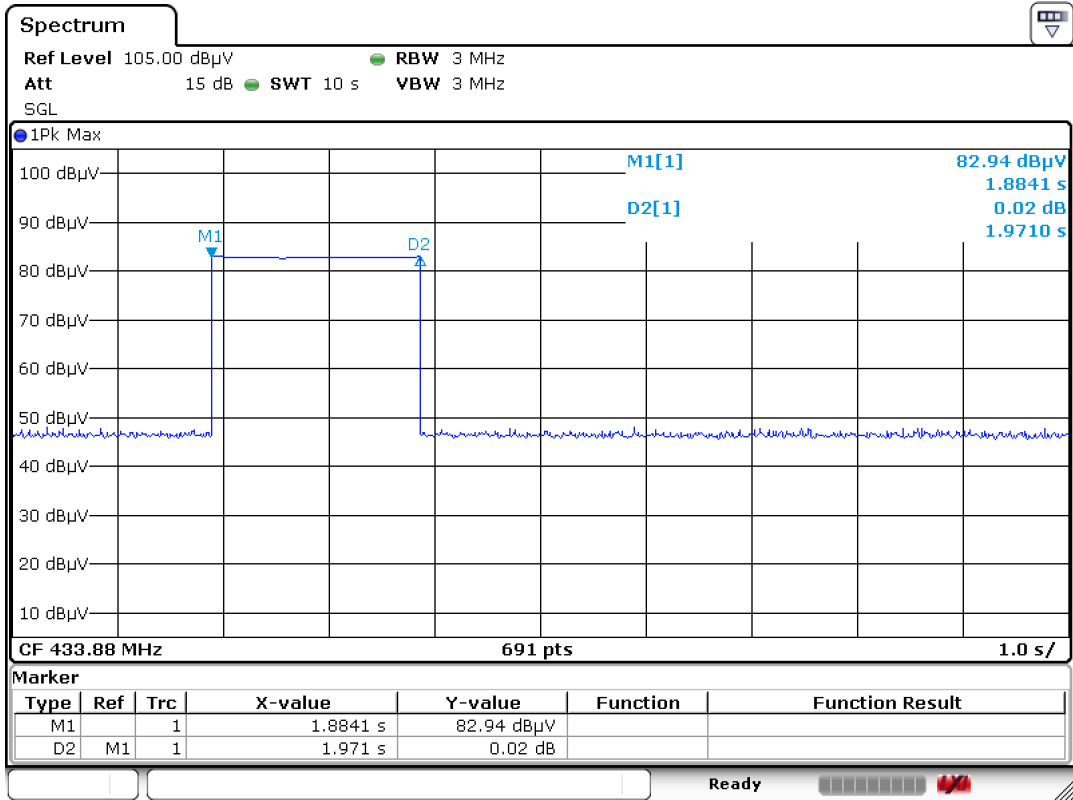
### 7.2.3 Measurement Procedure and Data

| Test item             | Limit (s) | Results |
|-----------------------|-----------|---------|
| Transmission Duration | ≤5s       | Pass    |



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Test plot as follows:



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**7.3 Field Strength of the Fundamental Signal (15.231(b))**

Test Requirement 47 CFR Part 15, Subpart C 15.231(b)

Test Method: ANSI C63.10 (2013) Section 6.5

Limit:

**Receiver Setup:**

| Frequency         | Detector   | RBW     | VBW    | Remark     |
|-------------------|------------|---------|--------|------------|
| 0.009MHz-0.015MHz | Quasi-peak | 200Hz   | 1KHz   | Quasi-peak |
| 0.015MHz-30MHz    | Quasi-peak | 9kHz    | 30KHz  | Quasi-peak |
| 30MHz-1GHz        | Quasi-peak | 120 kHz | 300KHz | Quasi-peak |
| Above 1GHz        | Peak       | 1MHz    | 3MHz   | Peak       |
|                   | Peak       | 1MHz    | 10Hz   | Average    |

**Limit:  
(Spurious Emissions)**

| Frequency         | Field strength (microvolt/meter) | Limit (dBuV/m ) | Remark     | Measurement distance (m) |
|-------------------|----------------------------------|-----------------|------------|--------------------------|
| 0.009MHz-0.490MHz | 2400/F(kHz)                      | -               | Quasi-peak | 300                      |
| 0.490MHz-1.705MHz | 24000/F(kHz)                     | -               | Quasi-peak | 30                       |
| 1.705MHz-30MHz    | 30                               | -               | Quasi-peak | 30                       |
| 30MHz-88MHz       | 100                              | 40.0            | Quasi-peak | 3                        |
| 88MHz-216MHz      | 150                              | 43.5            | Quasi-peak | 3                        |
| 216MHz-960MHz     | 200                              | 46.0            | Quasi-peak | 3                        |
| 960MHz-1GHz       | 500                              | 54.0            | Quasi-peak | 3                        |
| Above 1GHz        | 500                              | 54.0            | Average    | 3                        |
|                   |                                  | 74.0            | Peak       | 3                        |

**Limit:  
(Field strength of the fundamental signal)**

| Frequency          | Limit (dBuV/m @3m) | Remark        |
|--------------------|--------------------|---------------|
| 433.09 - 434.61MHz | 80.83              | Average Value |
|                    | 100.83             | Peak Value    |

**Test Procedure:**

- The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
- The radiation measurements are performed in X, Y, Z axis positioning. And found the Z axis positioning which it is worse case, only the test worst case mode is recorded in the report.



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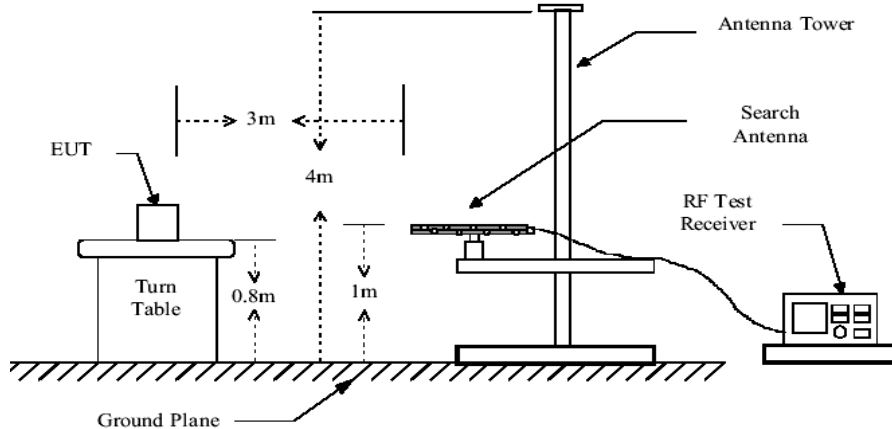
**7.3.1 E.U.T. Operation**

Operating Environment:

Temperature: 20 °C Humidity: 50 % RH Atmospheric Pressure: 1010 mbar

Test mode a:TX mode\_Keep the EUT in transmitting with modulation mode.

**7.3.2 Test Setup Diagram**



**Figure1. 30MHz to 1GHz radiated emissions test configuration**

**7.3.3 Measurement Procedure and Data**

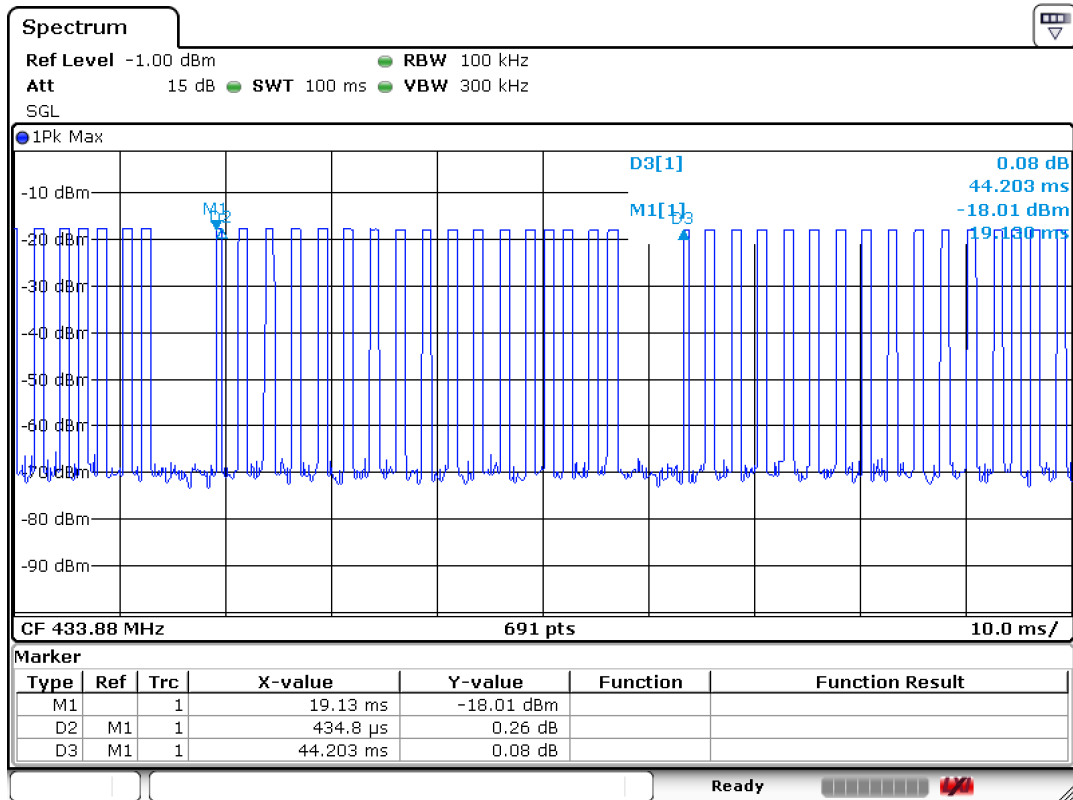
- a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- c. The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- d. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- e. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- f. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- g. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
- h. The radiation measurements are performed in X, Y, Z axis positioning. And found the X axis positioning which it is worse case, only the test worst case mode is recorded in the report.

Remark: Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor



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| Test channel | Freq. (MHz) | Result Level (dBμV/m) | Limit Line (dBμV/m) | Over Limit (dB) | Detector | Polarization |
|--------------|-------------|-----------------------|---------------------|-----------------|----------|--------------|
| Channel 1    | 433.92      | 84.61                 | 100.83              | -16.22          | Peak     | Vertical     |
|              |             | 82.43                 | 100.83              | -18.40          | Peak     | Horizontal   |
|              |             | 69.06                 | 80.83               | -11.77          | AVG      | Vertical     |
|              |             | 66.88                 | 80.83               | -13.95          | AVG      | Horizontal   |



Remark:

If the Peak value below the AV Limit, the AV test doesn't perform for this submission.

Average level=Peak level+Duty Cycle Factor

Duty Cycle Factor= 20log(Duty Cycle)= -15.55dB



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### 7.4 Radiated Emissions

Test Requirement 47 CFR Part 15, Subpart C 15.231(b)  
 Test Method: ANSI C63.10 (2013) Section 6.4&6.5&6.6  
 Limit:

| Frequency(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: The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90kHz, 110-490kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.



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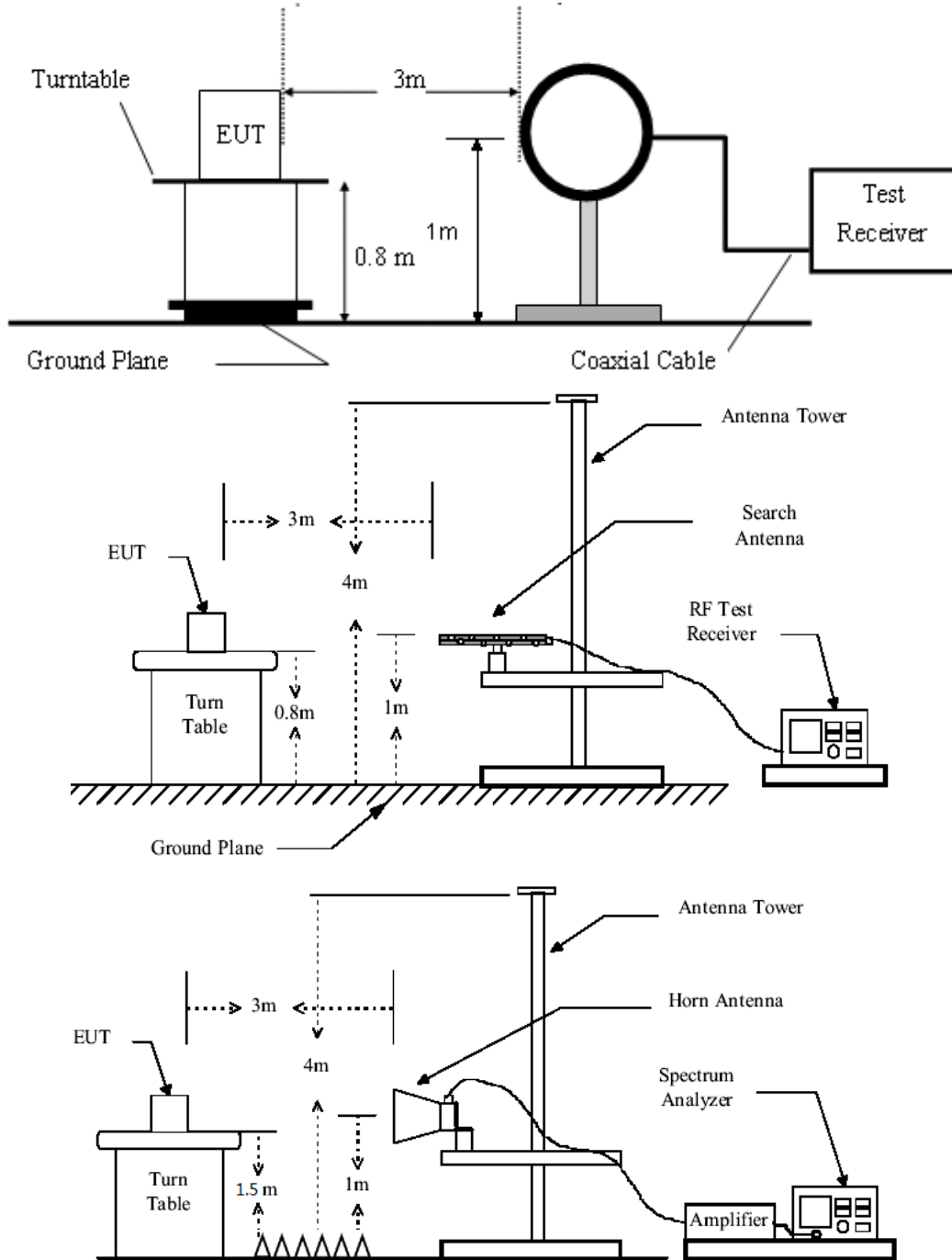
**7.4.1 E.U.T. Operation**

Operating Environment:

Temperature: 25 °C Humidity: 50 % RH Atmospheric Pressure: 1006 mbar

Test mode a:TX mode\_Keep the EUT in transmitting with modulation mode.

**7.4.2 Test Setup Diagram**



**Figure3. Above 1GHz radiated emissions test configuration**



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### 7.4.3 Measurement Procedure and Data

- a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- c. The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- d. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- e. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- f. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- g. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
- h. Test the EUT in the lowest channel, the middle channel, the Highest channel.
- i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.
- j. Repeat above procedures until all frequencies measured was complete.

#### Remark:

- 1) For emission below 1GHz, through pre-scan found the worst case is the lowest channel. Only the worst case is recorded in the report.
- 2) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:  
Final Test Level = Receiver Reading + Antenna Factor + Cable Factor – Preamplifier Factor
- 3) Scan from 9kHz to 6GHz, the disturbance below 30MHz was very low. The points marked on above plots are the highest emissions could be found when testing, so only above points had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.
- 4) For frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For the emissions whose peak level is lower than the average limit, only the peak measurement is shown.

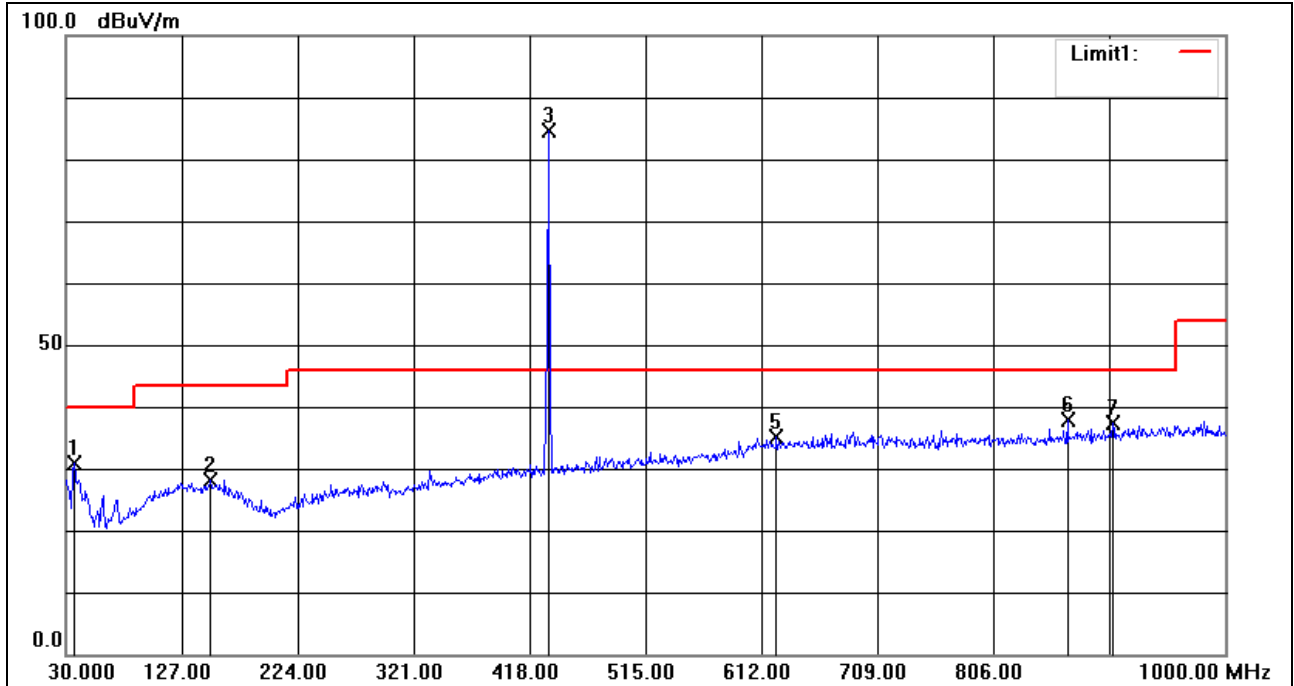


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30MHz-1GHz

Vertical:



| No. | Frequency (MHz) | Reading (dBuV) | Correct Factor(dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|-----|-----------------|----------------|----------------------|-----------------|----------------|-------------|--------|
| 1   | 36.7900         | 8.80           | 22.06                | 30.86           | 40.00          | -9.14       | QP     |
| 2   | 151.2500        | 8.10           | 20.04                | 28.14           | 43.50          | -15.36      | QP     |
| 3   | 434.4900        | 60.53          | 24.08                | 84.61           | N/A            | N/A         | Peak   |
| 5   | 624.6100        | 8.26           | 26.81                | 35.07           | 46.00          | -10.93      | QP     |
| 6   | 868.0800        | 9.55           | 28.29                | 37.84           | 46.00          | -8.16       | QP     |
| 7   | 905.9100        | 8.64           | 28.74                | 37.38           | 46.00          | -8.62       | QP     |

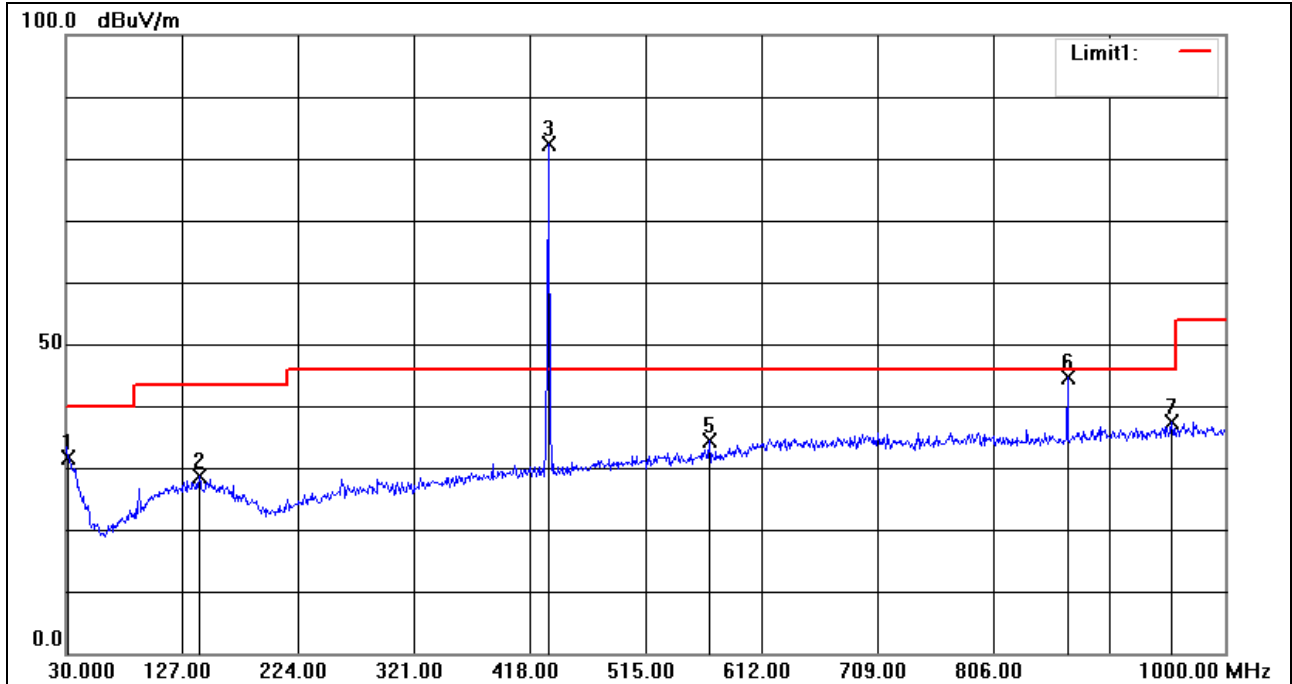


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Horizontal:



| No. | Frequency (MHz) | Reading (dBuV) | Correct Factor(dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|-----|-----------------|----------------|----------------------|-----------------|----------------|-------------|--------|
| 1   | 31.9400         | 6.82           | 24.82                | 31.64           | 40.00          | -8.36       | QP     |
| 2   | 141.5500        | 8.65           | 19.86                | 28.51           | 43.50          | -14.99      | QP     |
| 3   | 433.5200        | 58.36          | 24.07                | 82.43           | N/A            | N/A         | Peak   |
| 5   | 568.3500        | 8.25           | 26.08                | 34.33           | 46.00          | -11.67      | QP     |
| 6   | 868.0800        | 16.37          | 28.29                | 44.66           | 46.00          | -1.34       | QP     |
| 7   | 955.3800        | 7.98           | 29.29                | 37.27           | 46.00          | -8.73       | QP     |



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Above 1GHz

| Mark | Frequency (MHz) | Reading (dBuV) | Factor (dB) | Emission (dBuV/m) | Limit (dBuV/m) | Over Limit (dB) | Detector | polarization |
|------|-----------------|----------------|-------------|-------------------|----------------|-----------------|----------|--------------|
| 1    | 1525.000        | 55.33          | -17.51      | 37.82             | 54.00          | -16.18          | peak     | Vertical     |
| 2    | 2015.000        | 55.55          | -16.65      | 38.90             | 54.00          | -15.10          | peak     | Vertical     |
| 3    | 2625.000        | 52.50          | -14.33      | 38.17             | 54.00          | -15.83          | peak     | Vertical     |
| 4    | 1350.000        | 55.64          | -18.23      | 37.41             | 54.00          | -16.59          | peak     | Horizontal   |
| 5    | 1745.000        | 57.57          | -17.14      | 40.43             | 54.00          | -13.57          | peak     | Horizontal   |
| 6    | 2505.000        | 53.15          | -14.59      | 38.56             | 54.00          | -15.44          | peak     | Horizontal   |

Remark:

- 1) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:  

$$\text{Final Test Level} = \text{Receiver Reading Level} + \text{Antenna Factor} + \text{Cable Factor} - \text{Preamplifier Factor}$$
- 2) If Peak Result comply with AV limit, AV Result is deemed to comply with QP limit
- 3) No any other emissions level which are attenuated less than 20dB below the limit. According to 15.31(o), the amplitude of spurious emissions from intentional radiators and emissions from unintentional radiators which are attenuated more than 20 dB below the permissible value need not be reported unless specifically required elsewhere in this Part. Hence there no other emissions have been reported.



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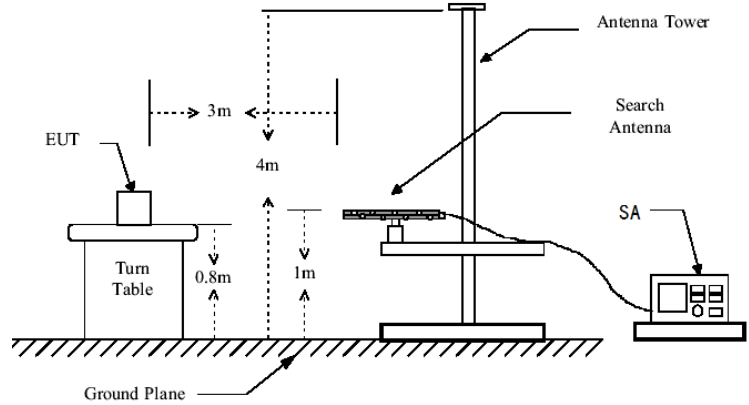
### 7.5 99% Bandwidth

Test Requirement RSS-210 A1.3  
 Test Method: RSS-Gen Section 6.7

#### 7.5.1 E.U.T. Operation

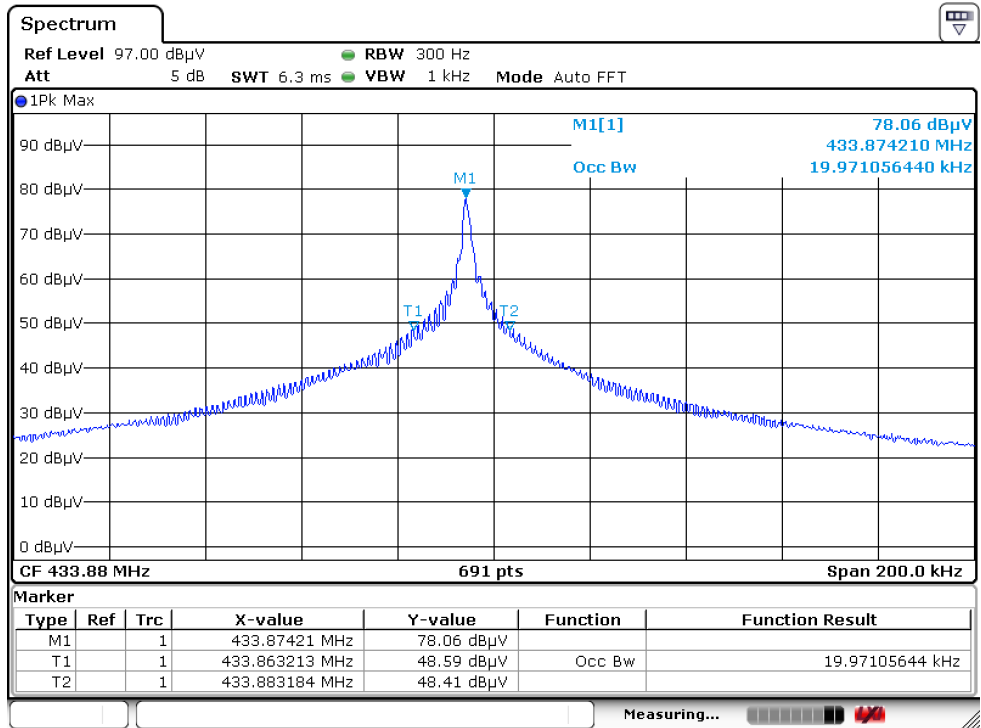
Operating Environment:  
 Temperature: 20 °C Humidity: 50 % RH Atmospheric Pressure: 1010 mbar  
 Test mode a:TX mode\_Keep the EUT in transmitting with modulation mode.

#### 7.5.2 Test Setup Diagram



#### 7.5.3 Measurement Procedure and Data

| Test mode | Frequency (MHz) | Bandwidth (MHz) | Limit(MHz) | Result |
|-----------|-----------------|-----------------|------------|--------|
| Mode a    | 433.92          | 0.0200          | 1.085      | PASS   |



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## 8 Test Setup Photographs

Refer to the < Test Setup photos-FCC>.

## 9 EUT Constructional Details

Refer to the < External Photos > & < Internal Photos >.

**- End of the Report -**



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