

## TEST REPORT

|                                                            |                                                                                                                                 |
|------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|
| <b>Application No.:</b>                                    | KSCR2409001732AT                                                                                                                |
| <b>FCC ID:</b>                                             | 2BHG-0211C6U4                                                                                                                   |
| <b>IC:</b>                                                 | 32743-0211C6U4                                                                                                                  |
| <b>Name of Testing Laboratory preparing the Report:</b>    | Compliance Certification Services (Kunshan) Inc.                                                                                |
| <b>Address of Testing Laboratory preparing the Report:</b> | No.10 Weiye Rd, Innovation park, Eco&Tec, Development Zone, Kunshan City, Jiangsu, China.                                       |
| <b>Applicant:</b>                                          | KeyLife International Technology Limited                                                                                        |
| <b>Address of Applicant:</b>                               | 27th Floor, Alexandra House, 18 Chater Road, Central, Hong Kong                                                                 |
| <b>Manufacturer:</b>                                       | KeyLife International Technology Limited                                                                                        |
| <b>Address of Manufacturer:</b>                            | 27th Floor, Alexandra House, 18 Chater Road, Central, Hong Kong                                                                 |
| <b>Factory:</b>                                            | Zhejiang Uniview Systems Technology Co., Ltd.                                                                                   |
| <b>Address of Factory:</b>                                 | No.1277 South Qingfeng South Road, Tongxiang City, Jiaxing City, Zhejiang Province, China                                       |
| <b>Equipment Under Test (EUT):</b>                         |                                                                                                                                 |
| <b>EUT Name:</b>                                           | Dual-cam Doorbell (battery)                                                                                                     |
| <b>Model No.:</b>                                          | DB312, DB312 XXX XXX (where X may be 0-9 A-Z a-z or blank. The differences no impact safety related constructions and EMC) ♣    |
| ♦                                                          | Please refer to section 2 of this report which indicates which model was actually tested and which were electrically identical. |
| <b>For IC Model No.:</b>                                   | DB312                                                                                                                           |
| <b>Standard(s) :</b>                                       | 47 CFR Part 15, Subpart C 15.231<br>RSS-210 issue 11 Amendment 1<br>RSS-Gen Issue 5, April 2018, Amendment 2                    |
| <b>Date of Receipt:</b>                                    | 2024-09-04                                                                                                                      |
| <b>Date of Test:</b>                                       | 2024-09-13 to 2024-10-22                                                                                                        |
| <b>Date of Issue:</b>                                      | 2024-10-22                                                                                                                      |
| <b>Test Result:</b>                                        | <b>Pass*</b>                                                                                                                    |

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

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Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 30 days only.



# Compliance Certification Services (Kunshan) Inc.

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| <b>Revision Record</b> |                    |             |               |
|------------------------|--------------------|-------------|---------------|
| <b>Version</b>         | <b>Description</b> | <b>Date</b> | <b>Remark</b> |
| 00                     | Original           | 2024-10-22  | /             |
|                        |                    |             |               |
|                        |                    |             |               |

|                          |  |                                  |  |
|--------------------------|--|----------------------------------|--|
| Authorized for issue by: |  |                                  |  |
| Tested By                |  | <u>Maker_Qi</u>                  |  |
|                          |  | <u>Maker_Qi/Project Engineer</u> |  |
| Approved By              |  | <u>Terry Hou</u>                 |  |
|                          |  | <u>Terry Hou /Reviewer</u>       |  |

## 2 Test Summary

| <b>Radio Spectrum Technical Requirement</b> |                                  |                       |               |                      |
|---------------------------------------------|----------------------------------|-----------------------|---------------|----------------------|
| <b>Item</b>                                 | <b>FCC Requirement</b>           | <b>IC Requirement</b> | <b>Method</b> | <b>Result</b>        |
| Antenna Requirement                         | 47 CFR Part 15, Subpart C 15.203 | RSS-Gen Section 8.1.3 | N/A           | Customer Declaration |

N/A: Not applicable

| <b>Radio Spectrum Matter Part</b>                    |                                              |                       |                                    |               |
|------------------------------------------------------|----------------------------------------------|-----------------------|------------------------------------|---------------|
| <b>Item</b>                                          | <b>FCC Requirement</b>                       | <b>IC Requirement</b> | <b>Method</b>                      | <b>Result</b> |
| Conducted Emissions at AC Power Line (150kHz-30MHz)  | 47 CFR Part 15, Subpart C 15.207             | RSS-Gen Clause 8.8    | ANSI C63.10 (2013) Section 6.2     | Pass          |
| 20dB Bandwidth                                       | 47 CFR Part 15, Subpart C 15.231(c)          | -                     | ANSI C63.10 (2020) Section 6.9     | Pass          |
| Dwell Time (15.231(a))                               | 47 CFR Part 15, Subpart C 15.231(a)          | RSS-210 A1.2          | ANSI C63.10 (2013) Section 7.5     | Pass          |
| Field Strength of the Fundamental Signal (15.231(b)) | 47 CFR Part 15, Subpart C 15.231(b)          | RSS-210 A1.3          | ANSI C63.10 (2013) Section 6.5     | Pass          |
| Radiated Emissions below 1GHz                        | 47 CFR Part 15C Section 15.231(b) and 15.209 | RSS-Gen Section 8.9   | ANSI C63.10 (2013) Section 6.4&6.5 | Pass          |
| Radiated Emissions above 1GHz                        | 47 CFR Part 15C Section 15.231(b) and 15.209 | RSS-Gen Section 8.9   | ANSI C63.10 (2013) Section 6.6     | Pass          |
| 99% Bandwidth                                        | -                                            | RSS-210 A1.4          | RSS-Gen Section 6.7                | Pass          |

Model No.: DB312,DB312 XXX XXX (where X may be 0-9 A-Z a-z or blank. The differences no impact safety related constructions and EMC)

Only the model DB312 was tested.

There are series models mentioned in this report, and they are identical in electrical and electronic characters. Only the model DB312 was tested since their differences were the model number and appearance.

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## 4 General Information

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

|                     |                                                        |
|---------------------|--------------------------------------------------------|
| Power supply:       | ~12-24V,50/60Hz,1.0A<br>DC 5V/2A<br>DC 3.6V by battery |
| Test voltage:       | AC 120V/60Hz                                           |
| Operation Frequency | 433.17MHz                                              |
| Channel Numbers:    | 1                                                      |
| Modulation Type:    | ASK                                                    |
| Antenna Type:       | Internal antenna                                       |
| Transmitter type:   | Manually                                               |

### 4.2 Description of Support Units

| Description | Manufacturer | Model No. | Serial No. |
|-------------|--------------|-----------|------------|
| Notebook    | LENOVO       | K27       | EB24537645 |

### 4.3 Measurement Uncertainty

| No. | Item                            | Measurement Uncertainty                                                                |
|-----|---------------------------------|----------------------------------------------------------------------------------------|
| 1   | Radio Frequency                 | $8.4 \times 10^{-8}$                                                                   |
| 2   | Timeout                         | 2s                                                                                     |
| 3   | Duty Cycle                      | 0.37%                                                                                  |
| 4   | Occupied Bandwidth              | 3%                                                                                     |
| 5   | RF Radiated Power               | 5.2dB (Below 1GHz)<br>5.9dB (Above 1GHz)                                               |
| 6   | Radiated Spurious Emission Test | 4.2dB (Below 30MHz)<br>4.5dB (30MHz-1GHz)<br>5.1dB (1GHz-18GHz)<br>5.4dB (Above 18GHz) |
| 7   | Temperature Test                | 1°C                                                                                    |
| 8   | Humidity Test                   | 3%                                                                                     |
| 9   | Supply Voltages                 | 1.5%                                                                                   |
| 10  | Time                            | 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.

Note:

1. SGS is not responsible for wrong test results due to incorrect information (e.g., max. internal working frequency, antenna gain, cable loss, etc) is provided by the applicant. (If applicable).
2. SGS is not responsible for the authenticity, integrity and the validity of the conclusion based on results of the data provided by applicant. (If applicable).
3. Sample source: sent by customer.

### 4.5 Test Facility

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

- **A2LA**

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

- **FCC**

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

- **ISED**

Compliance Certification Services (Kunshan) Inc. has been recognized by Innovation, Science and Economic Development Canada (ISED) as an accredited testing laboratory. Company Number: 2324E

- **VCCI**

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          | Inventory No | Cal Date   | Cal. Due Date |
|----------------------------------------------|--------------------------------------|--------------------|----------------|--------------|------------|---------------|
| <b>Conducted Emission at Mains Terminals</b> |                                      |                    |                |              |            |               |
| 1                                            | EMI Test Receive                     | R&S                | ESCI           | KS301101     | 01/15/2024 | 01/14/2025    |
| 2                                            | LISN                                 | R&S                | ENV216         | KS301197     | 01/15/2024 | 01/14/2025    |
| 3                                            | LISN                                 | Schwarzbeck        | NNLK 8129      | KS301091     | 01/15/2024 | 01/14/2025    |
| 4                                            | Pulse Limiter                        | R&S                | ESH3-Z2        | KUS1902E001  | 01/15/2024 | 01/14/2025    |
| 5                                            | CE test Cable                        | Thermax            | /              | CZ301102     | 01/15/2024 | 01/14/2025    |
| 6                                            | Test Software                        | ESE                | E3_V 6.111221a | /            | N.C.R      | N.C.R         |
| <b>RF Radiated Test</b>                      |                                      |                    |                |              |            |               |
| 1                                            | Spectrum Analyzer                    | R&S                | FSV40          | KUS1806E003  | 08/06/2024 | 08/05/2025    |
| 2                                            | Universal Radio Communication Tester | R&S                | CMW500         | KSEM009-1    | 03/19/2024 | 03/18/2025    |
| 4                                            | Loop Antenna                         | COM-POWER          | AL-130R        | KUS1806E001  | 03/18/2023 | 03/17/2025    |
| 5                                            | Bilog Antenna                        | TESEQ              | CBL 6112D      | KUS1806E005  | 06/29/2023 | 06/28/2025    |
| 6                                            | Bilog Antenna                        | TESEQ              | CBL 6112D      | KUS1806E006  | 03/19/2024 | 03/18/2025    |
| 7                                            | Horn-antenna(1-18GHz)                | Schwarzbeck        | BBHA9120D      | KS301079     | 03/23/2024 | 08/22/2026    |
| 8                                            | Horn-antenna(1-18GHz)                | ETS-LINDGREN       | 3117           | KS301186     | 04/07/2023 | 04/06/2025    |
| 9                                            | Horn Antenna(18-40GHz)               | Schwarzbeck        | BBHA9170       | CZ301058     | 01/07/2024 | 01/06/2026    |
| 10                                           | Amplifier(30MHz~18GHz)               | PANSHAN TECHNOLOGY | LNA:1-18G      | KSEM010-1    | 01/15/2024 | 01/14/2025    |
| 11                                           | Amplifier(18~40GHz)                  | PANSHAN TECHNOLOGY | LNA180400G40   | KSEM038      | 08/12/2024 | 08/11/2025    |
| 12                                           | RE Test Cable                        | REBES MICROWAVE    | /              | CZ301097     | 08/12/2024 | 08/11/2025    |
| 13                                           | Temperature & Humidity Recorder      | Renke Control      | RS-WS-N01-6J   | KSEM024-4    | 03/21/2024 | 03/20/2025    |
| 14                                           | Software                             | Faratronic         | EZ EMC-v 3A1   | /            | NCR        | NCR           |
| 15                                           | Software                             | ESE                | E3_V 6.111221a | /            | NCR        | NCR           |

## 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

15.203 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 permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, 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.

EUT Antenna:

The antenna is Internal Antenna and no consideration of replacement.

Antenna location: Refer to Internal photos

## 7 Radio Spectrum Matter Test Results

### 7.1 Conducted Emissions at AC Power Line (150kHz-30MHz)

Test Requirement 47 CFR Part 15, Subpart C 15.207

Test Method: ANSI C63.10 (2013) Section 6.2

Limit:

| Frequency of emission(MHz) | Conducted limit(dB $\mu$ V) |           |
|----------------------------|-----------------------------|-----------|
|                            | Quasi-peak                  | Average   |
| 0.15-0.5                   | 66 to 56*                   | 56 to 46* |
| 0.5-5                      | 56                          | 46        |
| 5-30                       | 60                          | 50        |

\*Decreases with the logarithm of the frequency.

Detector: Peak for pre-scan (9kHz resolution bandwidth) 0.15M to 30MHz

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

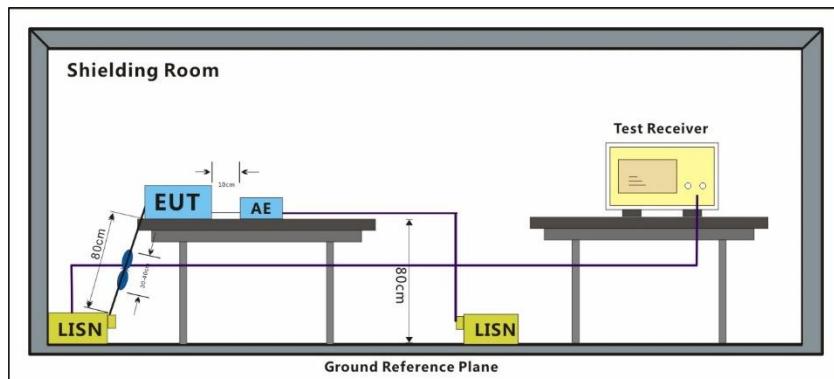
Operating Environment:

Temperature: 23 °C      Humidity: 46 % RH      Atmospheric Pressure: 1010 mbar

#### 7.1.2 Test Mode Description

| Pre-scan / Final test | Mode Code | Description                                |
|-----------------------|-----------|--------------------------------------------|
| Final test            | 08        | TX mode_Keep the EUT in transmitting mode. |

#### 7.1.3 Test Setup Diagram



**7.1.4 Measurement Procedure and Data**

- 1) The mains terminal disturbance voltage test was conducted in a shielded room.
- 2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a 50ohm/50 $\mu$ H + 5ohm linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded.
- 3) The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane.
- 4) The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0.8 m from the LISN 2.
- 5) In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10 on conducted measurement.

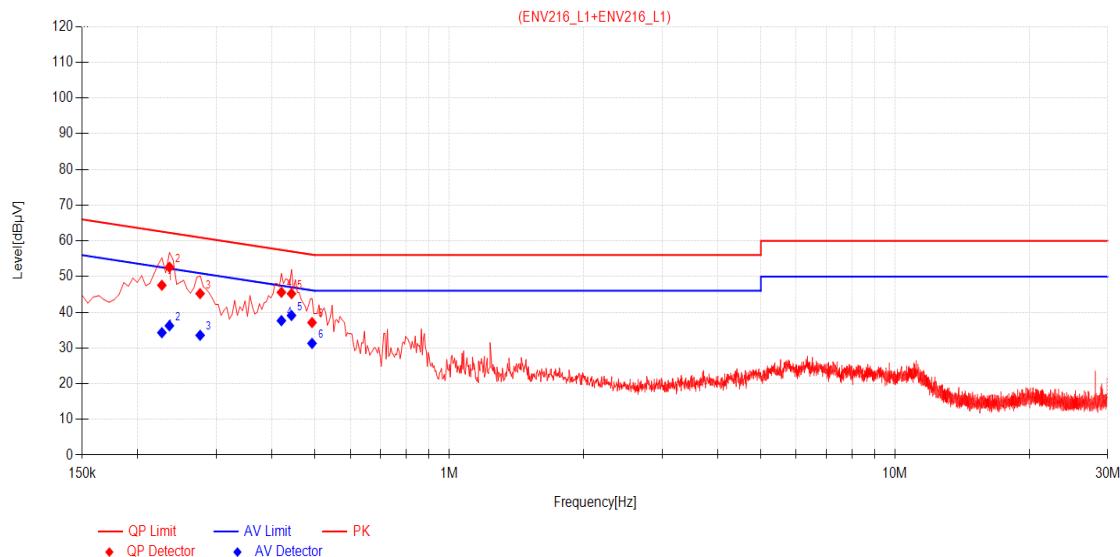
Remark: Level=Read Level+ Cable Loss+ LISN Factor

**Compliance Certification Services (Kunshan) Inc.**

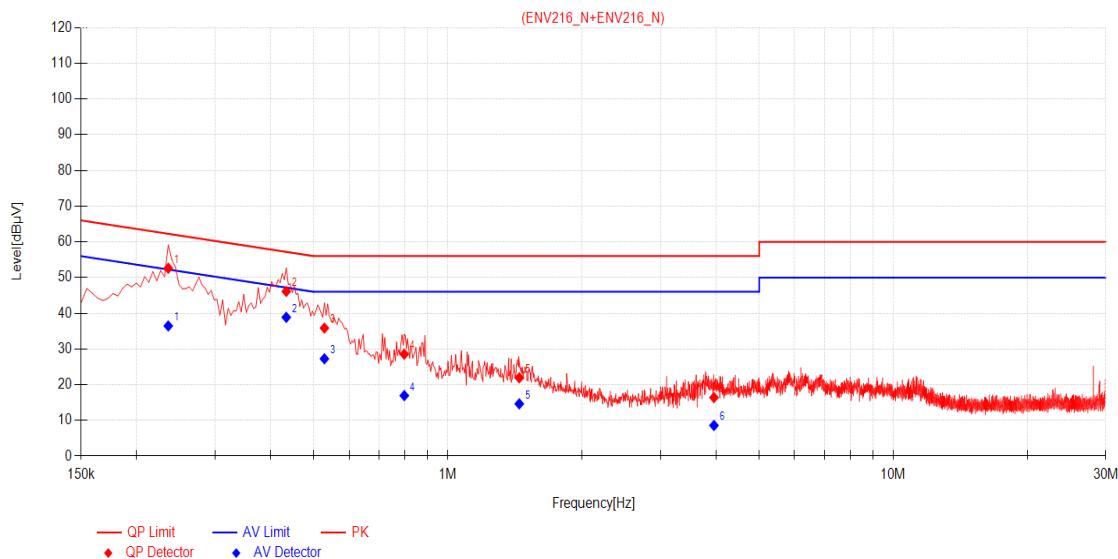
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| Final Data List |                 |             |                         |                       |                       |                |                         |                       |                       |                |         |
|-----------------|-----------------|-------------|-------------------------|-----------------------|-----------------------|----------------|-------------------------|-----------------------|-----------------------|----------------|---------|
| NO.             | Frequency [MHz] | Factor [dB] | QP Reading [dB $\mu$ V] | QP Value [dB $\mu$ V] | QP Limit [dB $\mu$ V] | QP Margin [dB] | AV Reading [dB $\mu$ V] | AV Value [dB $\mu$ V] | AV Limit [dB $\mu$ V] | AV Margin [dB] | Verdict |
| 1               | 0.2265          | 10.17       | 37.38                   | 47.55                 | 62.58                 | 15.03          | 24.11                   | 34.28                 | 52.58                 | 18.30          | PASS    |
| 2               | 0.2355          | 10.16       | 42.45                   | 52.61                 | 62.25                 | 9.64           | 26.06                   | 36.22                 | 52.25                 | 16.03          | PASS    |
| 3               | 0.2760          | 10.15       | 35.07                   | 45.22                 | 60.94                 | 15.72          | 23.40                   | 33.55                 | 50.94                 | 17.39          | PASS    |
| 4               | 0.4200          | 10.17       | 35.41                   | 45.58                 | 57.45                 | 11.87          | 27.48                   | 37.65                 | 47.45                 | 9.80           | PASS    |
| 5               | 0.4425          | 10.17       | 35.03                   | 45.20                 | 57.01                 | 11.81          | 28.93                   | 39.10                 | 47.01                 | 7.91           | PASS    |
| 6               | 0.4920          | 10.17       | 26.94                   | 37.11                 | 56.13                 | 19.02          | 21.11                   | 31.28                 | 46.13                 | 14.85          | PASS    |



| Final Data List |                 |             |                   |                 |                 |                |                   |                 |                 |                |         |
|-----------------|-----------------|-------------|-------------------|-----------------|-----------------|----------------|-------------------|-----------------|-----------------|----------------|---------|
| NO.             | Frequency [MHz] | Factor [dB] | QP Reading [dBμV] | QP Value [dBμV] | QP Limit [dBμV] | QP Margin [dB] | AV Reading [dBμV] | AV Value [dBμV] | AV Limit [dBμV] | AV Margin [dB] | Verdict |
| 1               | 0.2355          | 10.16       | 42.45             | 52.61           | 62.25           | 9.64           | 26.29             | 36.45           | 52.25           | 15.80          | PASS    |
| 2               | 0.4335          | 10.16       | 35.95             | 46.11           | 57.19           | 11.08          | 28.71             | 38.87           | 47.19           | 8.32           | PASS    |
| 3               | 0.5280          | 10.17       | 25.69             | 35.86           | 56.00           | 20.14          | 17.08             | 27.25           | 46.00           | 18.75          | PASS    |
| 4               | 0.7980          | 10.16       | 18.39             | 28.55           | 56.00           | 27.45          | 6.79              | 16.95           | 46.00           | 29.05          | PASS    |
| 5               | 1.4460          | 10.12       | 11.81             | 21.93           | 56.00           | 34.07          | 4.52              | 14.64           | 46.00           | 31.36          | PASS    |
| 6               | 3.9570          | 10.14       | 6.26              | 16.40           | 56.00           | 39.60          | -1.56             | 8.58            | 46.00           | 37.42          | PASS    |

## 7.2 20dB Bandwidth

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

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

Measurement Distance: 3m

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  |

### 7.2.1 E.U.T. Operation

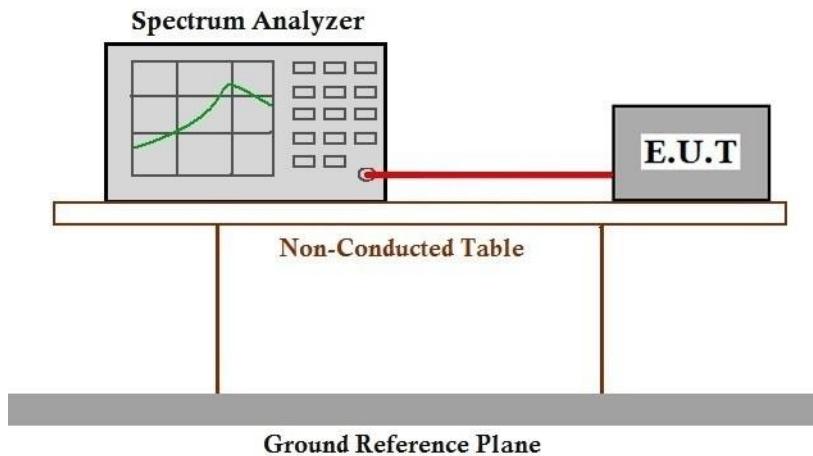
Operating Environment:

Temperature: 23 °C Humidity: 46 % RH Atmospheric Pressure: 1010 mbar

### 7.2.2 Test Mode Description

| Pre-scan / Final test | Mode Code | Description                               |
|-----------------------|-----------|-------------------------------------------|
| Final test            | 00        | TX mode_Keep the EUT in transmitting mode |

### 7.2.3 Test Setup Diagram



### 7.2.4 Measurement Procedure and Data

Please Refer to Appendix for Details

### 7.3 Dwell Time (15.231(a))

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

Test Method: ANSI C63.10 (2013) Section 7.5

Measurement Distance: 3m

Limit:

| Device type                                                                                                  | Limit                                                                                                |
|--------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------|
| Manually operated transmitter                                                                                | The switch automatically deactivate the transmitter within not more than 5 seconds of being released |
| Automatically activated transmitter                                                                          | Cease transmission within 5 seconds after activation                                                 |
| Periodic transmissions to determine system integrity of transmitters used in security or safety applications | The total transmission time does not exceed 2 seconds per hour                                       |

#### 7.3.1 E.U.T. Operation

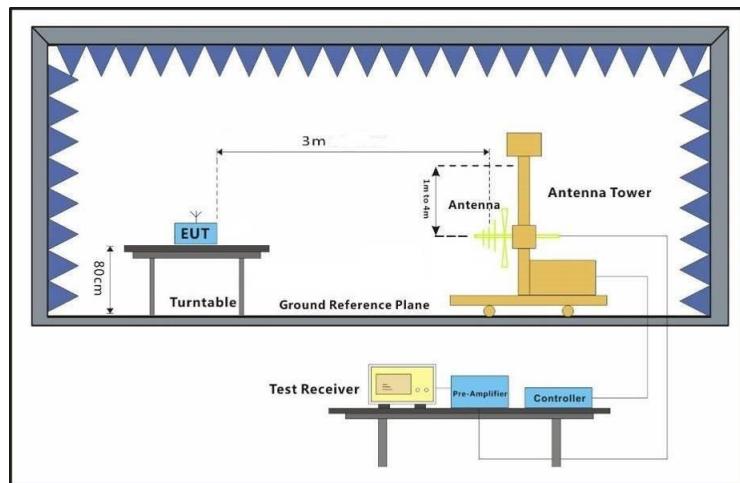
Operating Environment:

Temperature: 20.5 °C      Humidity: 51.2 % RH      Atmospheric Pressure: 1010 mbar

#### 7.3.2 Test Mode Description

| Pre-scan / Final test | Mode Code | Description                               |
|-----------------------|-----------|-------------------------------------------|
| Final test            | 00        | TX mode_Keep the EUT in transmitting mode |

#### 7.3.3 Test Setup Diagram



#### 7.3.4 Measurement Procedure and Data

Please Refer to Appendix for Details

## 7.4 Radiated Emissions below 1GHz

Test Requirement 47 CFR Part 15C Section 15.231(b) and 15.209

Test Method: ANSI C63.10 (2013) Section 6.4&6.5

Measurement Distance: 3m

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.

### 7.4.1 E.U.T. Operation

Operating Environment:

Temperature: 23 °C

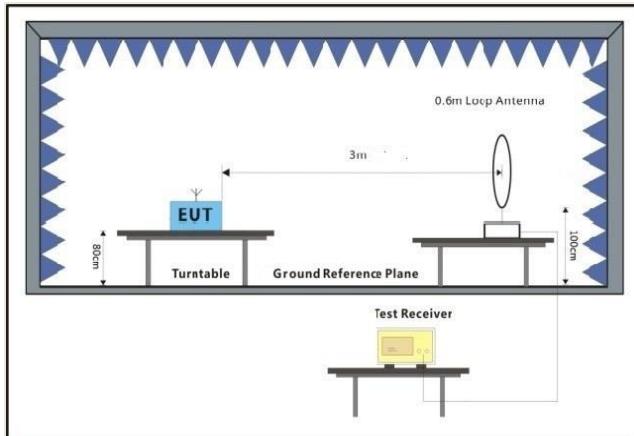
Humidity: 46 % RH

Atmospheric Pressure: 1010 mbar

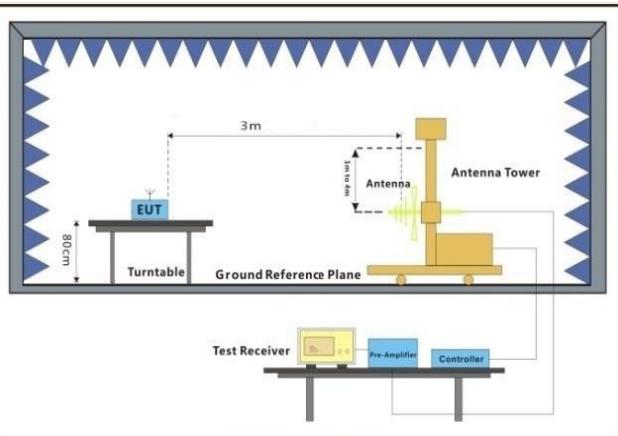
### 7.4.2 Test Mode Description

| Pre-scan / Final test | Mode Code | Description                               |
|-----------------------|-----------|-------------------------------------------|
| Final test            | 00        | TX mode_Keep the EUT in transmitting mode |

### 7.4.3 Test Setup Diagram



Below 30MHz



30MHz-1GHz

**7.4.4 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. 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.
- c. 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.
- d. 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.
- e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. 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.
- g. 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:**

- 1) 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
- 2) Scan from 9kHz to 1GHz, 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.

Please Refer to Appendix for Details

## 7.5 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

Measurement Distance: 3m

Limit:

| Fundamental frequency(MHz) | Field strength of fundamental(microvolts/meter) | Field strength of spurious emissions(microvolts/meter) |
|----------------------------|-------------------------------------------------|--------------------------------------------------------|
| 40.66-40.70                | 2250                                            | 225                                                    |
| 70-130                     | 1250                                            | 125                                                    |
| 130-174                    | 1250 to 3750                                    | 125 to 375                                             |
| 174-260                    | 3750                                            | 375                                                    |
| 260-470                    | 3750 to 12500                                   | 375 to 1250                                            |
| Above 470                  | 12500                                           | 1250                                                   |

Remark: the emission limit is based on measurement instrumentation employing an average detector at a distance of 3 meters. The frequencies above 1000MHz 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.

### 7.5.1 E.U.T. Operation

Operating Environment:

Temperature: 23 °C

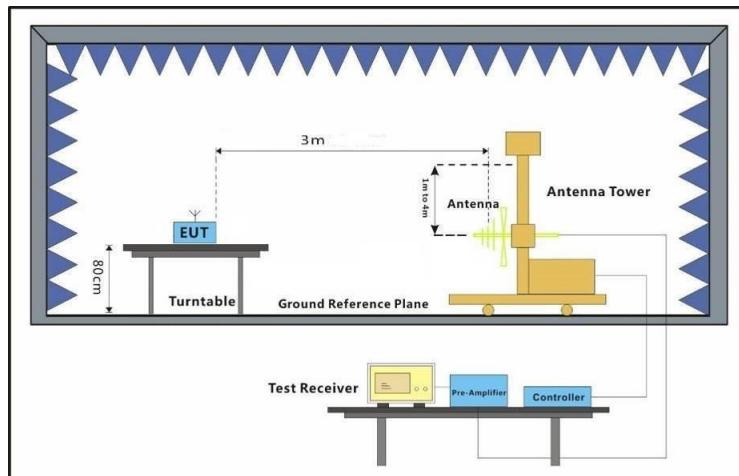
Humidity: 46 % RH

Atmospheric Pressure: 1010 mbar

### 7.5.2 Test Mode Description

| Pre-scan / Final test | Mode Code | Description                               |
|-----------------------|-----------|-------------------------------------------|
| Final test            | 00        | TX mode_Keep the EUT in transmitting mode |

### 7.5.3 Test Setup Diagram



**7.5.4 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 is worse case, only the test worst case mode is recorded in the report.

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

Please Refer to Appendix for Details

## 7.6 Radiated Emissions above 1GHz

Test Requirement 47 CFR Part 15C Section 15.231(b) and 15.209

Test Method: ANSI C63.10 (2013) Section 6.6

Measurement Distance: 3m

Limit:

For Restricted bands

| 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.

For Other bands

| Fundamental Frequency MHz | Field Strength of Fundamental (dB $\mu$ V/m @ 3 m)     | Field Strength of Harmonics and Spurious Emissions (dB $\mu$ V/m @ 3 m) |
|---------------------------|--------------------------------------------------------|-------------------------------------------------------------------------|
| 40.66 to 40.70            | 67.04                                                  | 47.04                                                                   |
| 70 to 130                 | 61.94                                                  | 41.94                                                                   |
| 130 to 174                | **61.94 to 71.48                                       | 41.94 to 51.48                                                          |
| 174 to 260                | 71.48                                                  | 51.48                                                                   |
| 260 to 470                | **71.48 to 81.94                                       | 51.48 to 61.94                                                          |
| Above 470                 | 81.94                                                  | 61.94                                                                   |
| <b>Detector:</b>          | Peak for pre-scan                                      |                                                                         |
|                           | QP for 30MHz to 1000 MHz: 120 kHz resolution bandwidth |                                                                         |
|                           | Peak for Above 1 GHz: 1 MHz resolution bandwidth       |                                                                         |

\*\* linear interpolations

[Where F is the frequency in MHz, the formulas for calculating the maximum permitted fundamental field strengths are as follows:

for the band 130-174 MHz, uV/m at 3 meters = 56.81818(F) - 6136.3636;

for the band 260-470 MHz, uV/m at 3 meters = 41.6667(F) - 7083.3333.

The maximum permitted unwanted emission level is 20 dB below the maximum permitted fundamental level.]

The fundamental frequency of the EUT is 433.17 MHz

The limit for average or QP field strength dB $\mu$ V/m for the fundamental emission= 80.80 dB $\mu$ V/m

No fundamental is allowed in the restricted bands.

The limit for average field strength dB<sub>V</sub>/m for the spurious emission=60.80 dB<sub>V</sub>/m. Spurious in the restricted bands must be less than 60.83 dB<sub>V</sub>/m or 15.209, whichever limit permits a higher field strength.

### 7.6.1 E.U.T. Operation

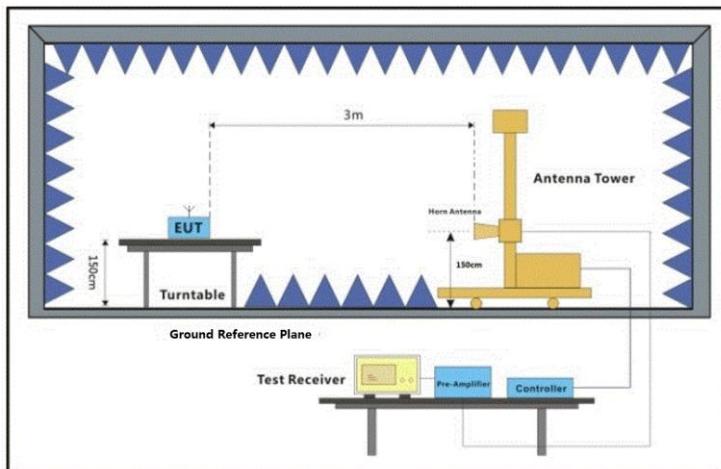
Operating Environment:

Temperature: 23 °C      Humidity: 46 % RH      Atmospheric Pressure: 1010 mbar

### 7.6.2 Test Mode Description

| Pre-scan / Final test | Mode Code | Description                               |
|-----------------------|-----------|-------------------------------------------|
| Final test            | 00        | TX mode_Keep the EUT in transmitting mode |

### 7.6.3 Test Setup Diagram



**7.6.4 Measurement Procedure and Data**

- a. 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.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. 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.
- d. 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 and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. 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.
- g. 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:**

- 1) 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
- 2) 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 in the report.

Please Refer to Appendix for Details

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### 7.7 99% Bandwidth

Test Requirement RSS-Gen Section 6.7

Test Method: RSS-Gen March 2019 Amendment 1 Section 6.7

Measurement Distance: 3m

Limit:

| Operate frequency | Limit                                               |
|-------------------|-----------------------------------------------------|
| 70MHz to 900MHz   | less than or equal to 0.25% of the centre frequency |
| Above 900MHz      | less than or equal to 0.5% of the centre frequency. |

#### 7.7.1 E.U.T. Operation

Operating Environment:

Temperature: 23 °C      Humidity: 46 % RH      Atmospheric Pressure: 1010 mbar

#### 7.7.2 Test Mode Description

| Pre-scan / Final test | Mode Code | Description                               |
|-----------------------|-----------|-------------------------------------------|
| Final test            | 00        | TX mode_Keep the EUT in transmitting mode |

#### 7.7.3 Measurement Procedure and Data

Please Refer to Appendix for Details

## **8 Test Setup Photo**

Refer to Appendix - Test Setup Photo for KSCR2409001732AT

## **9 EUT Constructional Details (EUT Photos)**

Refer to Appendix - Photographs of EUT Constructional Details for KSCR2409001732AT

## 10 Appendix

### 10.1 Field Strength of the Fundamental Signal

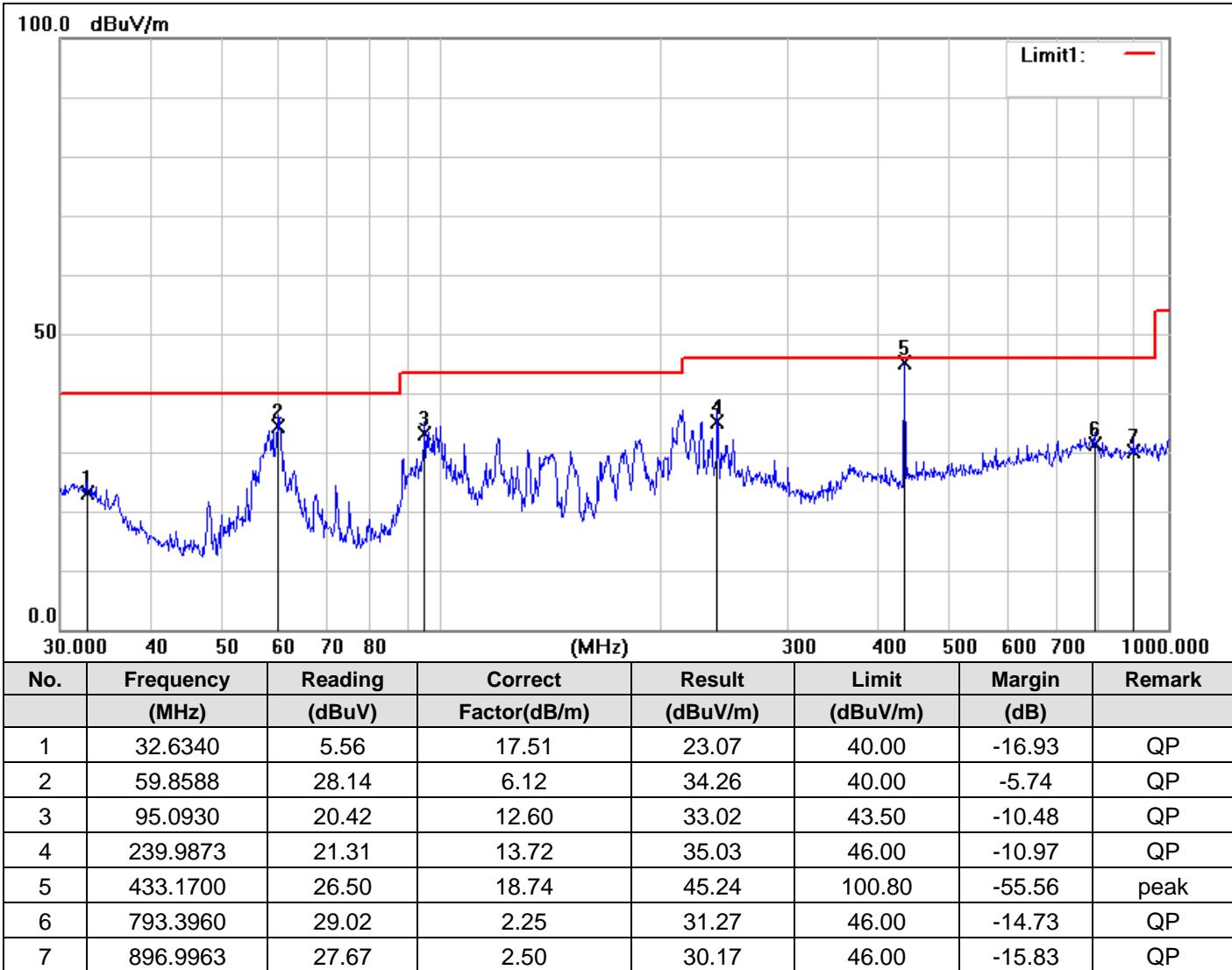
| Test channel | Freq.<br>(MHz) | Result Level<br>(dB $\mu$ V/m) | Limit Line<br>(dB $\mu$ V/m) | Over Limit<br>(dB) | Detector | Polarization |
|--------------|----------------|--------------------------------|------------------------------|--------------------|----------|--------------|
| Channel 1    | 433.17         | 45.24                          | 80.83                        | -35.59             | Peak     | Vertical     |
|              |                | 49.18                          | 80.83                        | -31.65             | Peak     | Horizontal   |

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

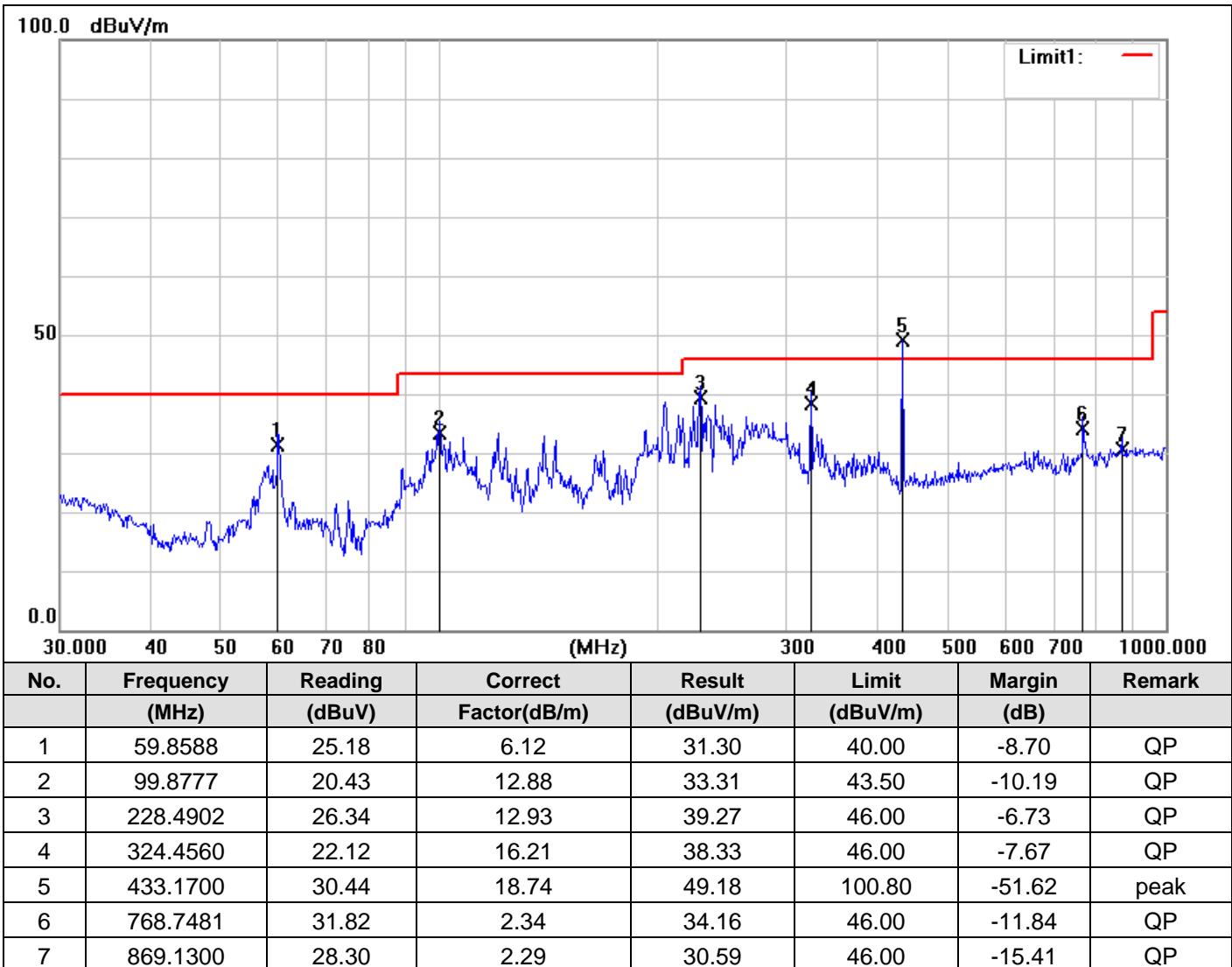
Below 1GHz:

433.17MHz:

Vertical:



Horizontal:



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Above 1GHz

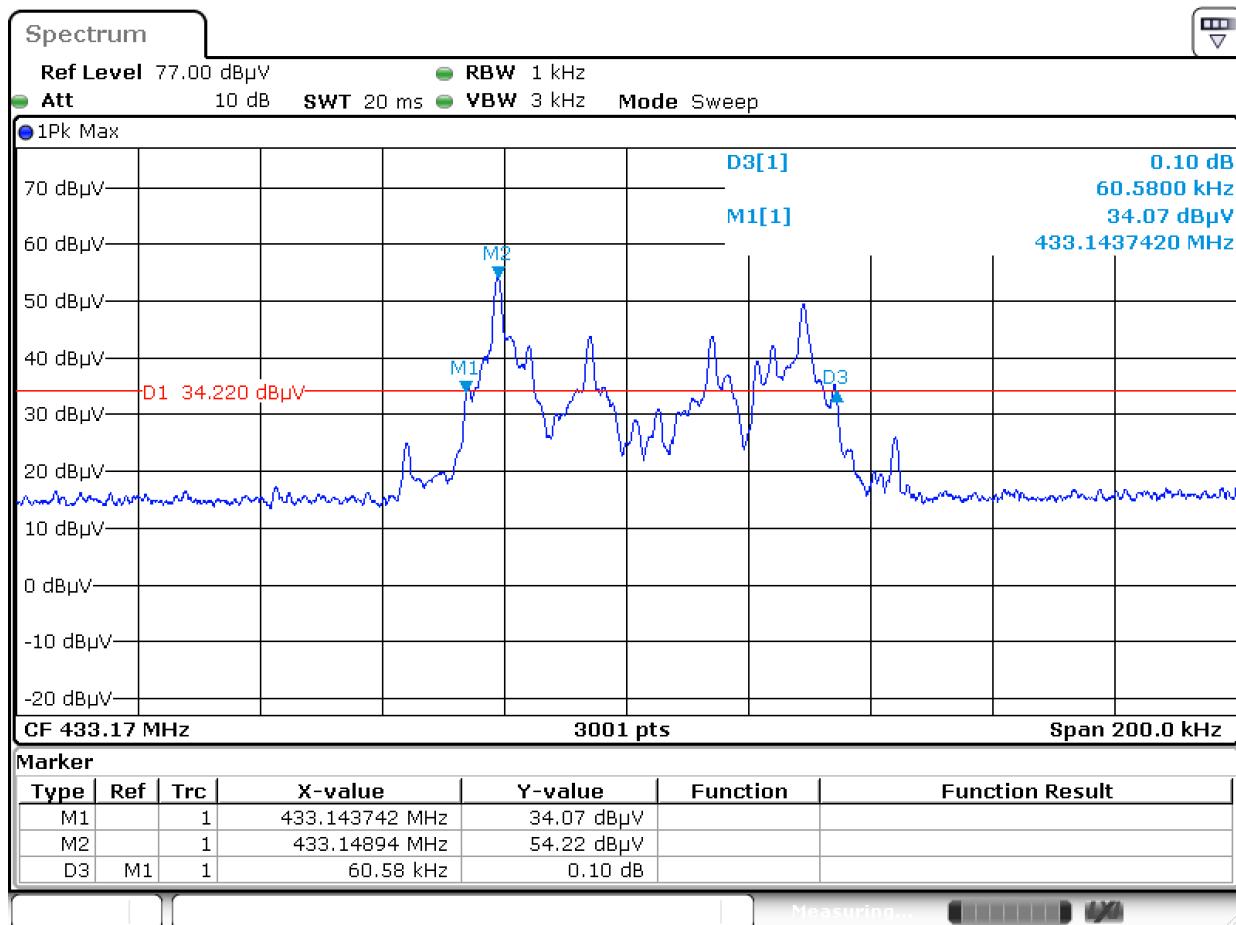
433.17MHz:

| Mark | Frequency (MHz) | Reading (dBuV) | Factor (dB) | Emission (dBuV/m) | Limit (dBuV/m) | Over Limit (dB) | Detector | polarization |
|------|-----------------|----------------|-------------|-------------------|----------------|-----------------|----------|--------------|
| 1    | 2400.000        | 59.96          | -24.66      | 35.30             | 54.00          | -18.70          | peak     | Vertical     |
| 2    | 3465.000        | 69.21          | -22.00      | 47.21             | 54.00          | -6.79           | peak     | Vertical     |
| 3    | 3925.000        | 59.00          | -20.42      | 38.58             | 54.00          | -15.42          | peak     | Vertical     |
| 4    | 3030.000        | 64.94          | -23.19      | 41.75             | 54.00          | -12.25          | peak     | Horizontal   |
| 5    | 3465.000        | 75.10          | -22.00      | 52.95             | 54.00          | -1.05           | peak     | Horizontal   |
| 6    | 4035.000        | 59.18          | -20.16      | 39.02             | 54.00          | -14.98          | peak     | Horizontal   |

## 10.2 20dB Bandwidth

**Measurement Data:**

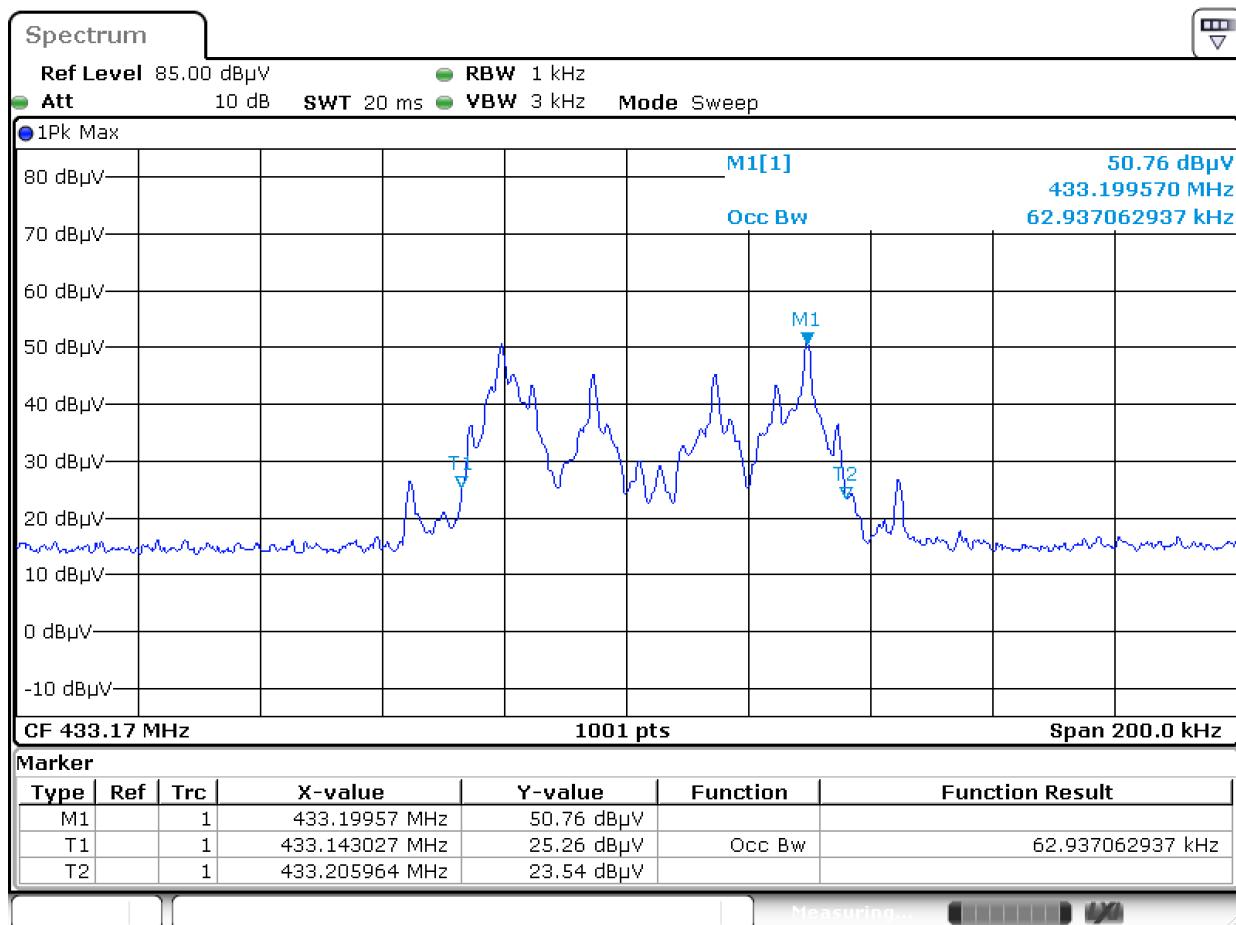
| Frequency (MHz) | 20dB bandwidth (kHz) | Limit (kHz) | Results |
|-----------------|----------------------|-------------|---------|
| 433.17          | 60.58                | 1082.9      | Pass    |

**Test plot as follows:**

**10.3 99% Bandwidth**

Measurement Data:

| 99% bandwidth (kHz) | FL (MHz) | FH (MHz) | Limit(MHz) | Result |
|---------------------|----------|----------|------------|--------|
| 62.94               | 433.1430 | 433.2059 | 260-470    | Pass   |

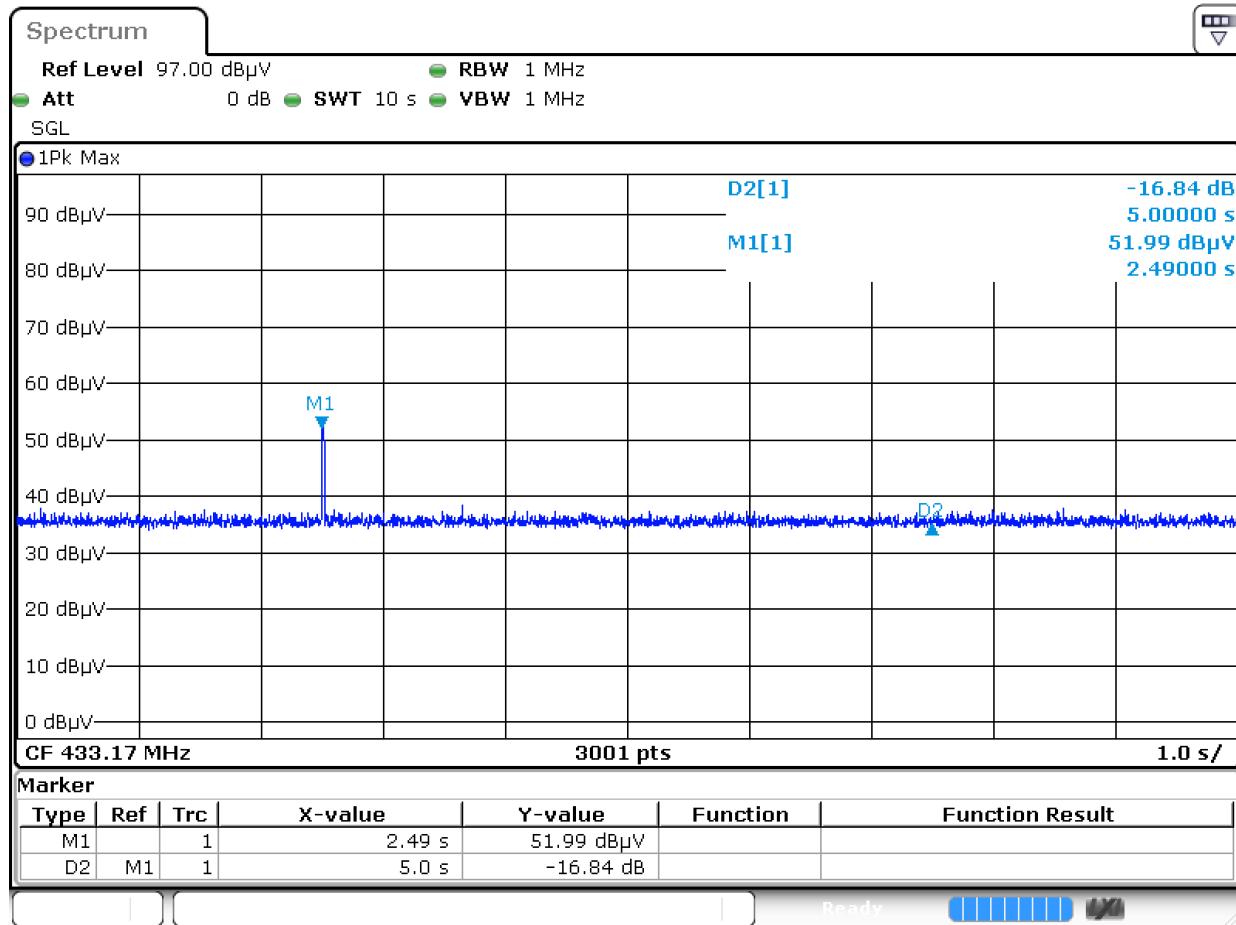
**Test plot as follows:**

## 10.4 Dwell Time

Measurement Data:

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

Test plot as follows:



- End of the Report -