# TEST REPORT

| | | |
|---|---|---|
| **APPLICANT** | : | Sound Extreme Inc. |
| **PRODUCT NAME** | : | SE Transom Remote Control |
| **MODEL NAME** | : | SEI-SERMTRNS |
| **BRAND NAME** | : | SOUNDEXTREME BY ECOXGEAR |
| **FCC ID** | : | 2BADE-SEISERMTRNS |
| **STANDARD(S)** | : | 47 CFR Part 15 Subpart C |
| **RECEIPT DATE** | : | 2024-01-02 |
| **TEST DATE** | : | 2024-01-09 to 2024-02-01 |
| **ISSUE DATE** | : | 2024-02-05 |

Edited by: Zeng Xiaoying (Rapporteur)

Approved by: Shen Junsheng (Supervisor)



MORLAB
Shenzhen Morlab Communications Technology Co., Ltd.
FL.1-3, Building A, FeiYang Science Park, No.8 LongChang Road,
Block67, BaoAn District, ShenZhen , GuangDong Province, P. R. China
Tel: 86-755-36698555 Fax: 86-755-36698525
Http://www.morlab.cn E-mail: service@morlab.cn

# DIRECTORY



| Change History | | |
|---|---|---|
| Version | Date | Reason for change |
| 1.0 | 2024-02-05 | First edition |
| | | |

# 1. Technical Information

**Note:** Provide by applicant.

## 1.1. Applicant and Manufacturer Information

| | |
|---|---|
| **Applicant:** | Sound Extreme Inc. |
| **Applicant Address:** | 9212 Fry Road, Suite 105-351, Cypress, TX 77433, United States of America |
| **Manufacturer:** | Xingtel Xiamen Group Co., Ltd. |
| **ManufacturerAddress:** | Xingtel Building,Chuangxin Road, Torch Hi-Tech Industrial District,Xiamen 361006, PR China |

## 1.2. Equipment Under Test (EUT) Description

| | | |
|---|---|---|
| **Product Name:** | SE Transom Remote Control | |
| **Sample No.:** | 1#, 2# | |
| **Hardware Version:** | V1.5 | |
| **Software Version:** | V1.0 | |
| **Operating Frequency:** | 433.92MHz | |
| **Channel Number:** | 1 | |
| **Antenna Type:** | Wire Antenna | |
| **Antenna Gain:** | 0dBi | |
| **Accessory Information:** | Battery | |
| | Brand Name: | Panasonic |
| | Model No.: | CR2032 |
| | Serial No.: | N/A |
| | Capacity: | 225mAh |
| | Rated Voltage: | 3.0V |
| | Charge Limit: | N/A |
| | Manufacturer: | Panasonic |

**Note 1:** For a more detailed description, please refer to Specification or User's Manual supplied by the applicant and/or manufacturer.

# 1.3. Test Standards and Results

The objective of the report is to perform testing according to 47 CFR Part 15 Subpart C for the EUT FCC ID Certification:

| No | Identity | Document Title |
|---|---|---|
| 1 | 47 CFR Part 15(10-1-15 Edition) | Radio Frequency Devices |

Test detailed items/section required by FCC rules and results are as below:

| No. | Section | Description | Test Date | Test Engineer | Result | Method Determination /Remark |
|---|---|---|---|---|---|---|
| 1 | 15.203 | Antenna Requirement | N/A | N/A | PASS | No deviation |
| 2 | 15.231(a)(1) | The Max Transmission Time | Jan. 15, 2024 | Su Xiaoxian | PASS | No deviation |
| 3 | 15.231(c) | 20dB Bandwidth | Jan. 10, 2024 | Su Xiaoxian | PASS | No deviation |
| 4 | 15.207 | Conducted Emission | N/A | N/A | $N/A_{Note1}$ | N/A |
| 5 | 15.231(b) 15.209(a) | Radiated Emission | Jan. 25, 2024 | Gao Jianrou | PASS | No deviation |
| 6 | 15.231(b) 15.205 | Restricted Frequency Bands | Feb. 01, 2024 | Gao Jianrou | PASS | No deviation |

**Note 1:** Measurements to demonstrate compliance with the conducted limits are not required for devices which only employ battery power for operation and which do not operate from the AC power lines or contain provisions for operation while connected to the AC power lines.

**Note 2:** The tests were performed according to the method of measurements prescribed in ANSI C63.10-2013.

**Note 3:** Additions to, deviation, or exclusions from the method shall be judged in the"method determination" column of add, deviate or exclude from the specific method shall be explained in the "Remark" of the above table.

**Note 4:** When the test result is a critical value, we will use the measurement uncertainty give the judgment result based on the 95% confidence intervals.

## 1.4. Environmental Conditions

During the measurement, the environmental conditions were within the listed ranges:

| | |
|---|---|
| Temperature (°C): | 15-35 |
| Relative Humidity (%): | 30-60 |
| Atmospheric Pressure (kPa): | 86-106 |

# 2. 47 CFR Part 15C Requirements

## 2.1. Antenna Requirement

### 2.1.1. Applicable Standard

According to FCC 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

### 2.1.2. Result: Compliant

The EUT has a permanently and irreplaceable attached antenna. Please refer to the EUT internal photos.

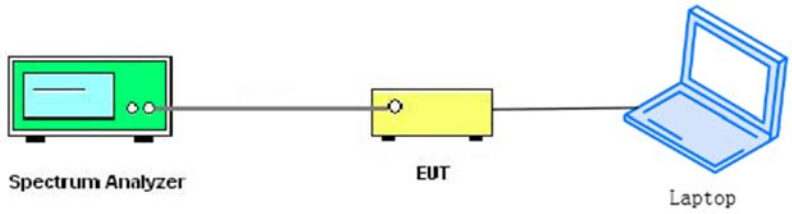
# 2.2. The Max Transmission Time

### 2.2.1. Requirement

A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.

### 2.2.2. Test Description

**Test Setup:**




### 2.2.3. Test Procedure

Set the SPA Center Frequency=Fundamental frequency,
Span=0Hz, change the weep time until get the burst in the screen.
Set EUT as normal operation and press Transmitter button.
Set the SPA View. Delta Mark time.

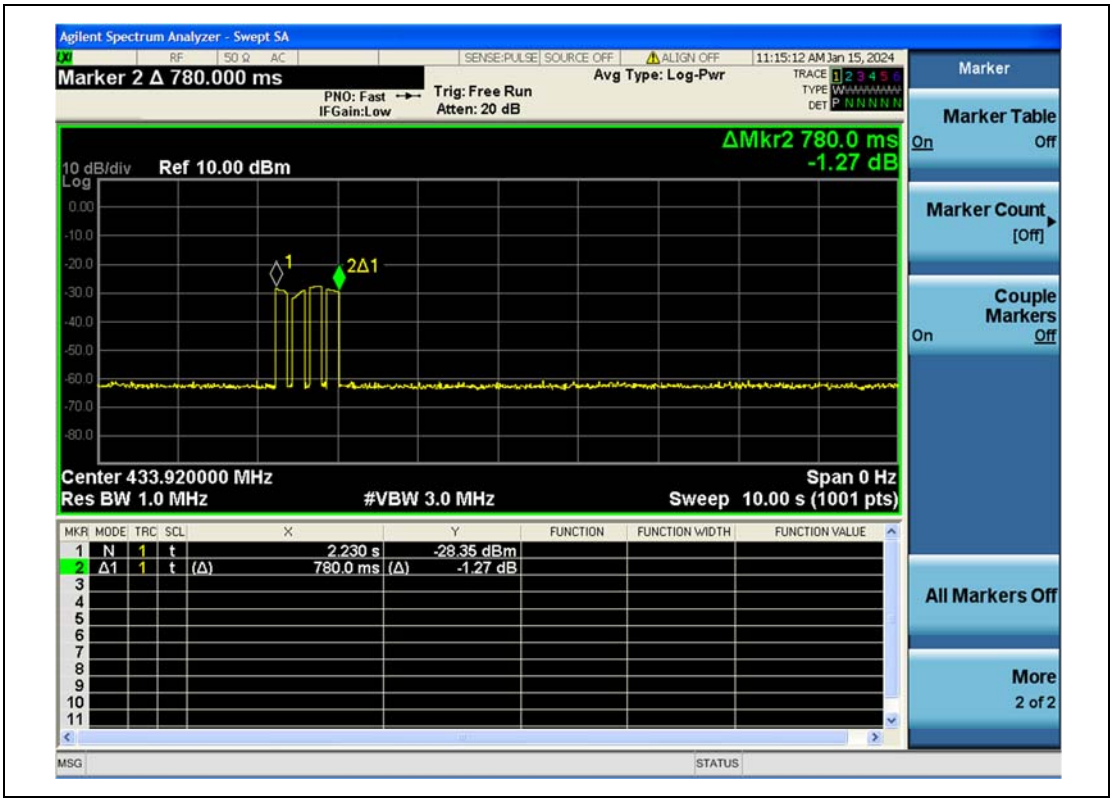
### 2.2.4. Test Result

The frequency(433.92MHz) is selected to perform testing to verify the max transmission time of the EUT.

**A. Test Verdict:**

| Frequency (MHz) | The max transmission time | Limit | Verdict |
|---|---|---|---|
| 433.92 | 0.78s | ≤5s | PASS |

**B. Test Plot:**




(The max transmission time _433.92MHz)

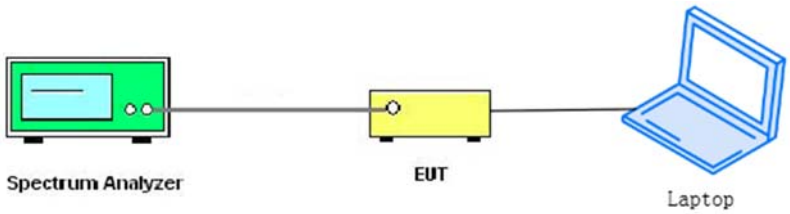
# 2.3. 20 dB Bandwidth

### 2.3.1. Requirement

The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier.
As the center frequency for the device operating is 433.92MHz, thus, the 20dB bandwidth limit is 1085 kHz.

### 2.3.2. Test Description

**Test Setup:**




### 2.3.3. Test Procedure

Set spectrum analyzer's Center Frequency =Fundamental frequency, RBW,VBW and span to applicable value with Peak in Max Hold, A PEAK output reading and 20db Bandwidth function in spectrum analyzer were taken.

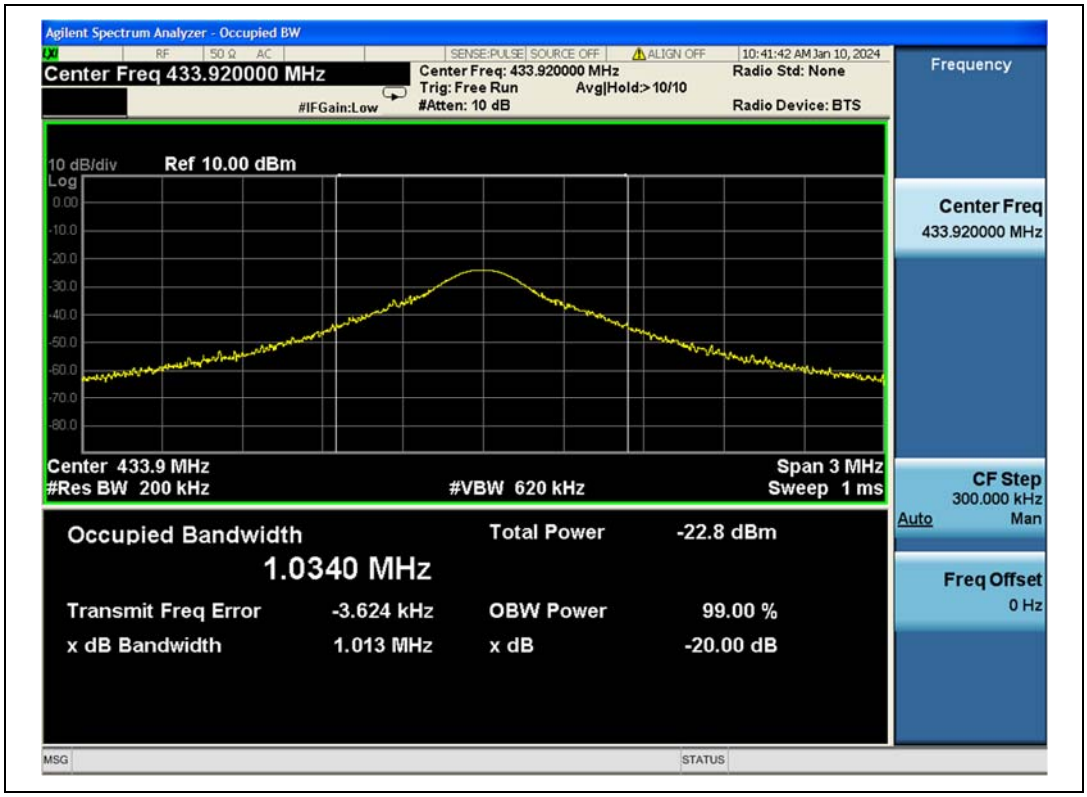
### 2.3.4. Test Result

The frequency (433.92MHz) is selected to perform testing to verify the 20dB bandwidth of the EUT.

**A. Test Verdict:**

| Frequency (MHz) | 20 dB Bandwidth (MHz) | Limits(MHz) | Verdict |
|---|---|---|---|
| 433.92 | 1.013 | ≤1.085 | PASS |

**B. Test Plot:**




(Bandwidth_433.92MHz)

# 2.4. Conducted Emission

### 2.4.1. Requirement

According to FCC section 15.207, for an intentional radiator that 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 within the band 150kHz to 30MHz shall not exceed the limits in the following table, as measured using a 50μH/50Ω line impedance stabilization network (LISN).

| Frequency Range (MHz) | Conducted Limit (dBμV) | |
|---|---|---|
| | Quai-peak | Average |
| 0.15 - 0.50 | 66 to 56 | 56 to 46 |
| 0.50 - 5 | 56 | 46 |
| 5 - 30 | 60 | 50 |

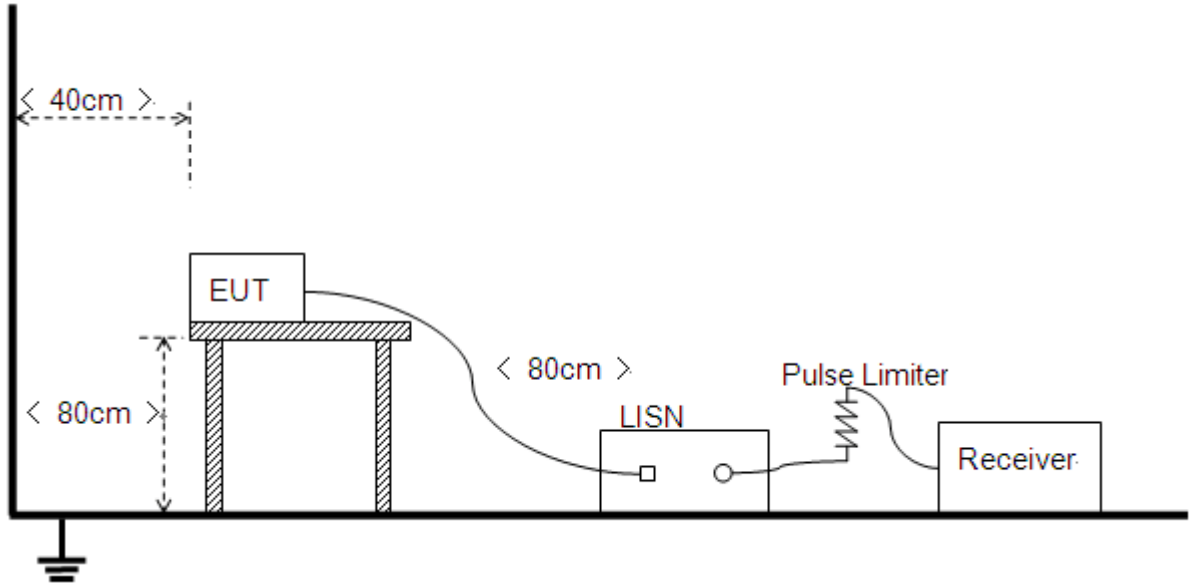
Note:

(a) The lower limit shall apply at the band edges.

(b) The limit decreases linearly with the logarithm of the frequency in the range 0.15 - 0.50MHz.

### 2.4.2. Test Description

**Test Setup:**




The Table-top EUT was placed upon a non-metallic table 0.8m above the horizontal metal reference ground plane. EUT was connected to LISN and LISN was connected to reference Ground Plane. EUT was 80cm from LISN. The set-up and test methods were according to ANSI C63.10: 2013.

### 2.4.3. Test Result

This test case does not apply this kind of EUT.

# 2.5. Radiated Emission

### 2.5.1. Requirement

According to FCC section 15.247(d), radiated emission outside the frequency band attenuation below the general limits specified in FCC section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in FCC section 15.205(a), must also comply with the radiated emission limits specified in FCC section 15.209(a).

According to FCC section 15.209 (a), except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

| Frequency (MHz) | Field Strength (μV/m) | Measurement Distance (m) |
|---|---|---|
| 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 |

FCC Part 15.231(b)

| Fundamental frequency(MHz) | Field strength of fundamental (microvolts/meter) | Field strength of spurious emission(microvolts/meter) |
|---|---|---|
| 40.66-40.70 | 2250 | 225 |
| 70-130 | 1250 | 125 |
| 130-174 | 1250 to 3750 | 125 to 375 |
| 174-260 | 3750 | 375 |
| 260-47 | 3750 to 12500 | 375 to 1250 |
| Above 470 | 12500 | 1250 |

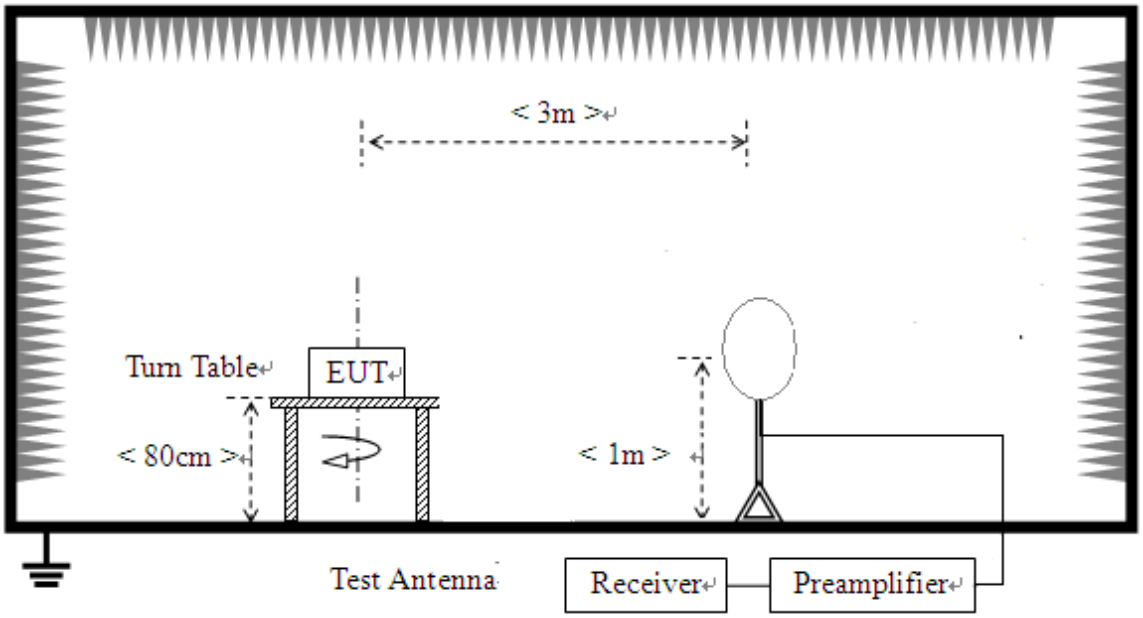
**Note 1:** For Above 1000MHz, the emission limit in this paragraph is based on measurement instrumentation employing an average detector, measurement using instrumentation with a peak detector function, corresponding to 20dB above the maximum permitted average limit.
**Note 2:** For above 1000MHz, limit field strength of harmonics: 54dBuV/m@3m (AV) and 74dBuV/m@3m (PK)

In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), also should comply with the radiated emission limits specified in Section 15.209(a)(above table).

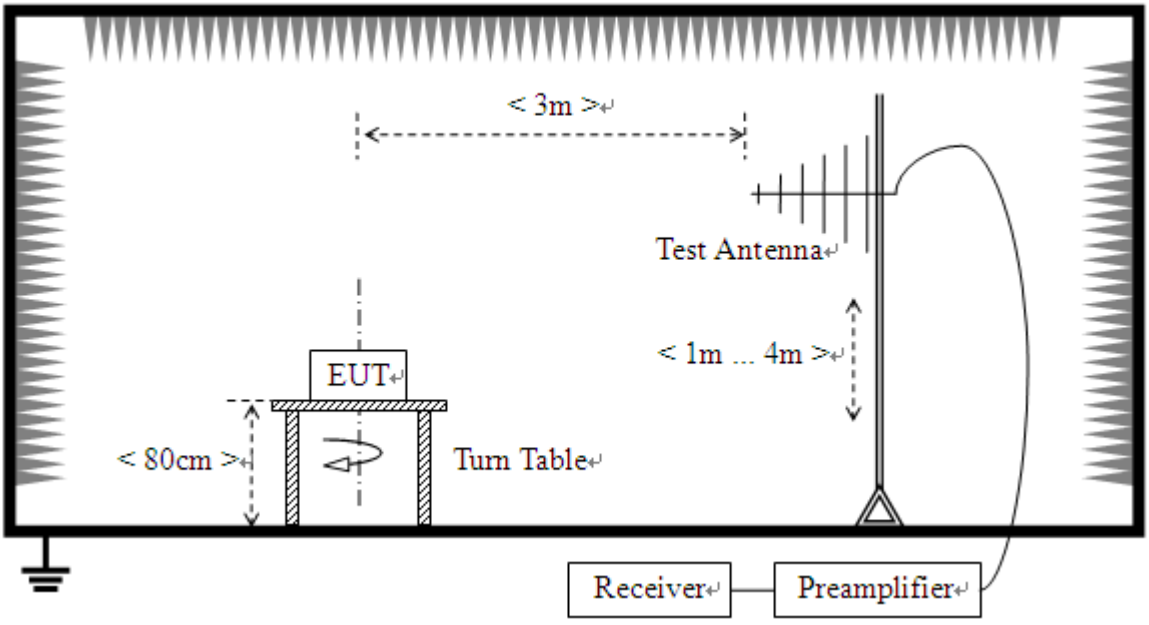
### 2.5.2. Test Description

**Test Setup:**

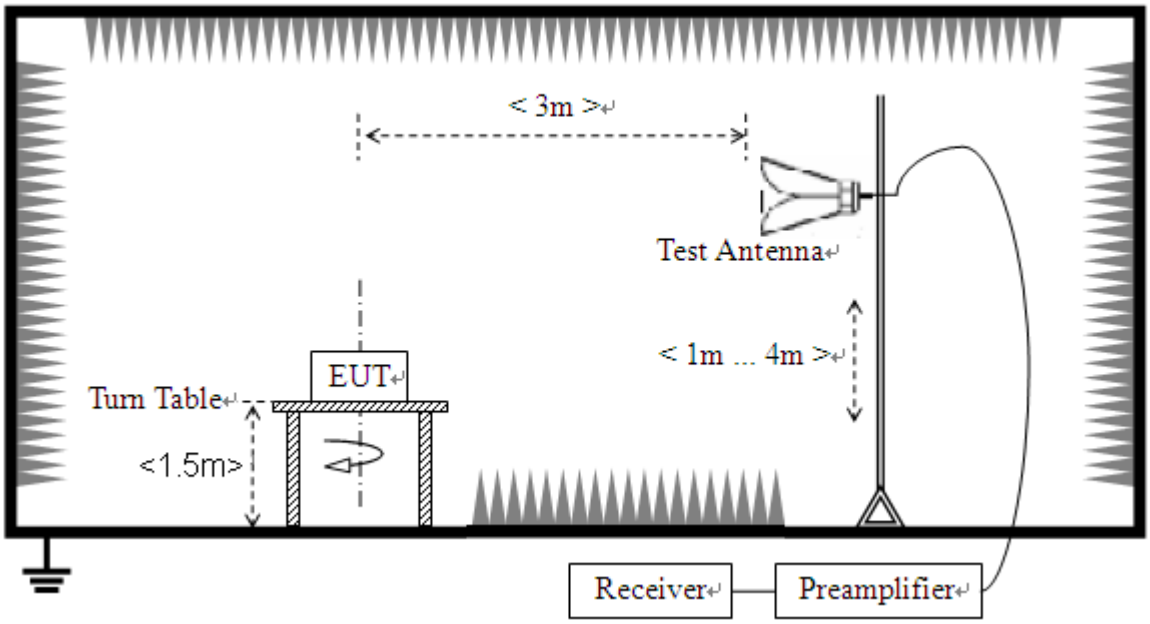
1) For radiated emissions from 9kHz to 30MHz




2) For radiated emissions from 30MHz to1GHz



3) For radiated emissions above 1GHz




The EUT is placed on a non-conducting table 80 cm above the ground plane for measurement below 1GHz; 1.5 m above the ground plane for measurement above 1GHz.The antenna to EUT distance is 3meters. The EUT is configured in accordance with ANSI C63.10. The EUT is set to transmit in a continuous mode.

For measurements below 30MHz, the emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9kHz-90 kHz, 110kHz-490 kHz. Radiated emission limits in these two bands are based on measurements employing an average detector.

For measurements below 1GHz the resolution bandwidth is set to 100kHz for peak detection measurements or 120kHz for quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

For measurements above 1GHz the resolution bandwidth is set to 1MHz, the video band width is set to 3MHz for peak measurements and as applicable for average measurements.

The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized in both the vertical and the horizontal positions.

### 2.5.3. Test Result

According to ANSI C63.10, because of peak detection will yield amplitudes equal to or greater than amplitudes measured with the quasi-peak (or average) detector, the measurement data from a spectrum analyzer peak detector will represent the worst-case results, if the peak measured value complies with the quasi-peak (or average) limit, it is unnecessary to perform an quasi-peak measurement (or average).

The measurement results are obtained as below:

$E\ [dB\mu V/m] = U_R + A_T + A_{Factor}\ [dB]$; $A_T = L_{Cable\ loss}\ [dB] - G_{preamp}\ [dB]$

E_AV[dBμV/m]=E_PK[dBμV/m]+AV factor[dB].

$A_T$: Total correction Factor except Antenna

$U_R$: Receiver Reading

$G_{preamp}$: Preamplifier Gain, if required

$A_{Factor}$: Antenna Factor at 3m

E_AV: Final Emission of Average

E_PK: Final Emission of Peak

During the spurious test, the total correction Factor $A_T$ and $A_{Factor}$ were built in test software.

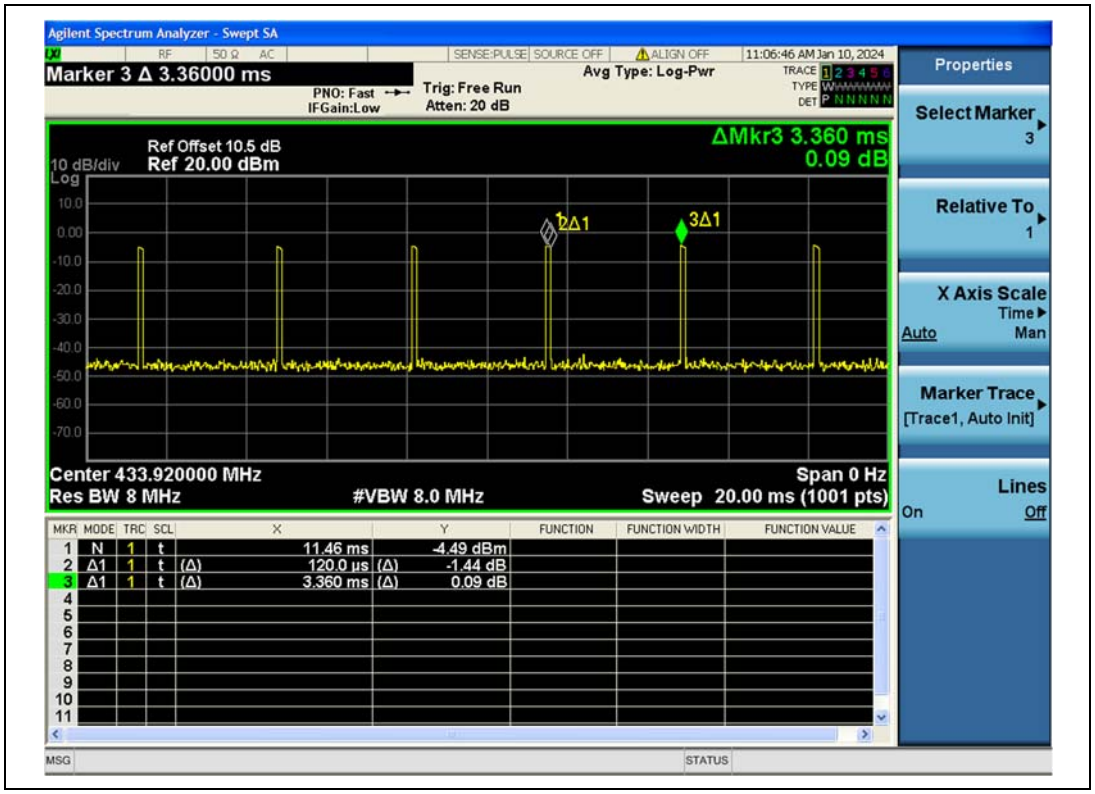
**Note1:** All radiated emission tests were performed in X, Y, Z axis direction. And only the worst axis test condition was recorded in this test report.

**Note2:**For the frequency, which started from 9kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit was not recorded.

The duty cycle is simply the on-time divided by the period:

| | |
|---|---|
| The duration of one cycle: | 0.12ms |
| Effective period of the cycle: | 3.36ms |
| Duty cycle (%): | 3.57 |

Therefore, the average factor is found by 20log(Duty cycle)=-28.94

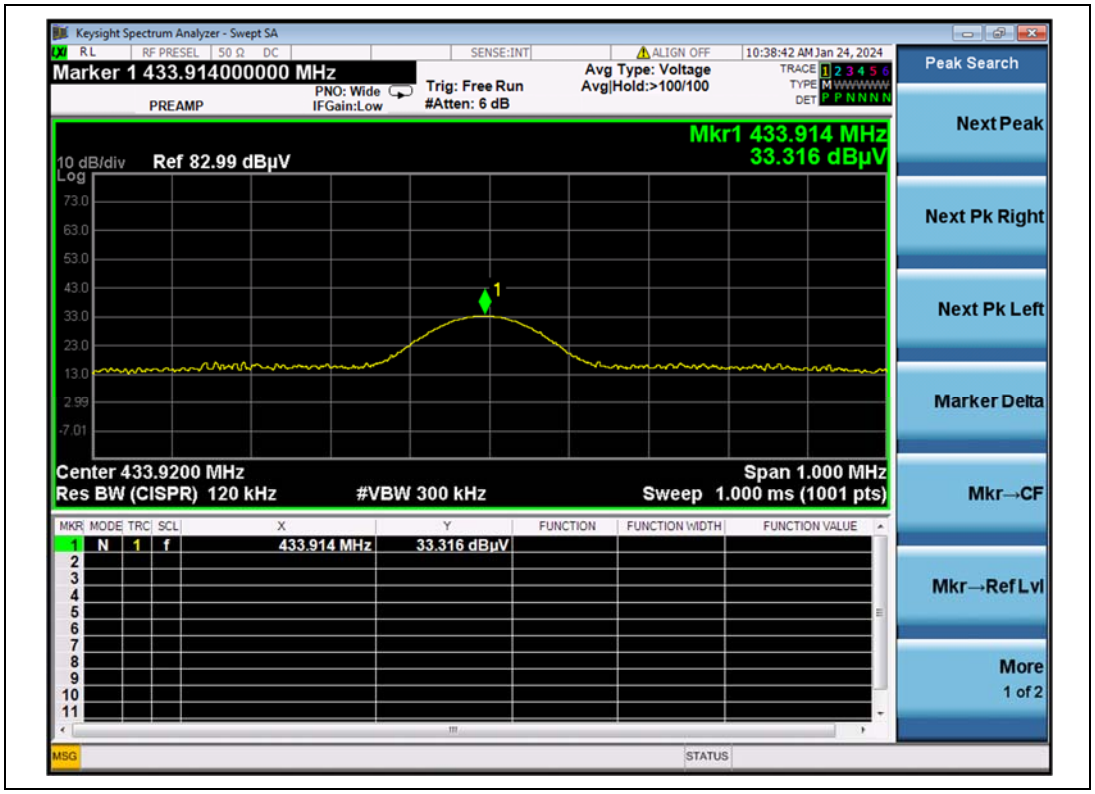



(Release Time)

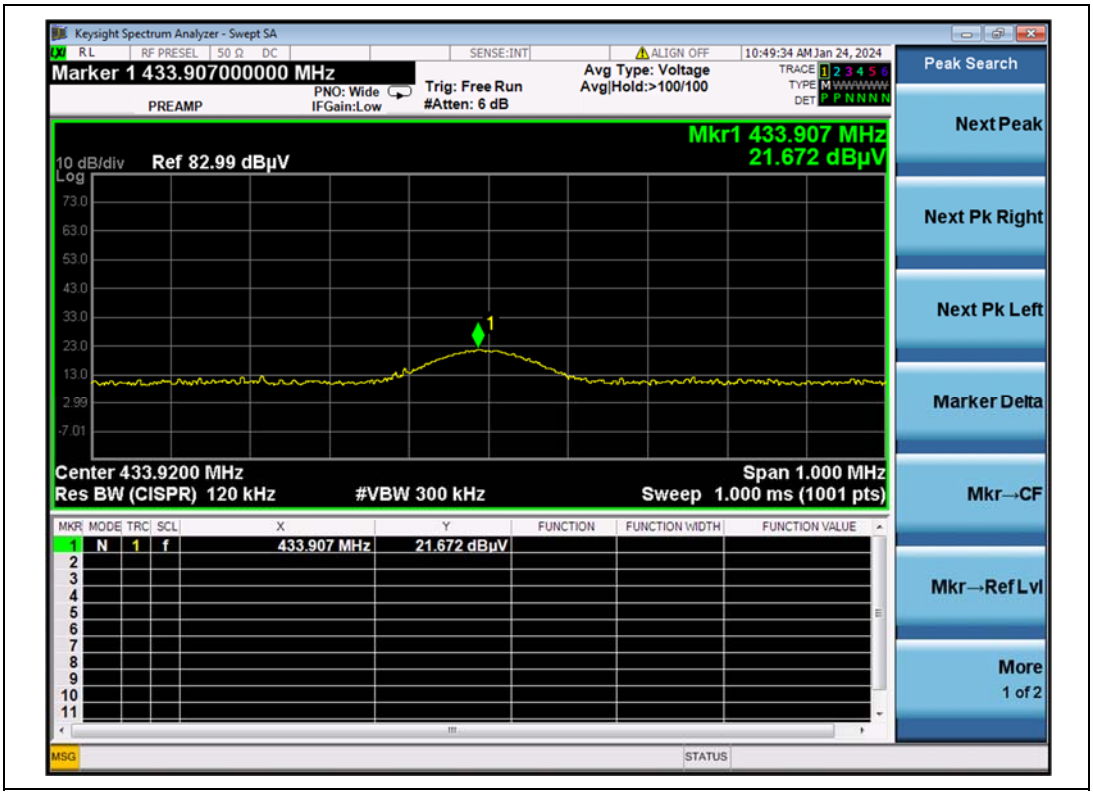
## A. Field strength of fundamental

| Fre. (MHz) | ANT | $U_R$(PK) (dBuV) | $A_T$ (dB) | $A_{Factor}$ (dB@ 3m) | E_PK (dBuV/m) | Limit_PK (dBμV/m) | AV factor (dB) | E_AV (dBuV/m) | Limit_AV (dBμV/m) | Verdict |
|---|---|---|---|---|---|---|---|---|---|---|
| 433.92 | H | 33.32 | 6.42 | 15.60 | 55.34 | 100.83 | -28.94 | 26.40 | 80.83 | PASS |
| 433.92 | V | 21.67 | 6.42 | 15.60 | 43.69 | 100.83 | -28.94 | 14.75 | 80.83 | PASS |

**Test Plot:**

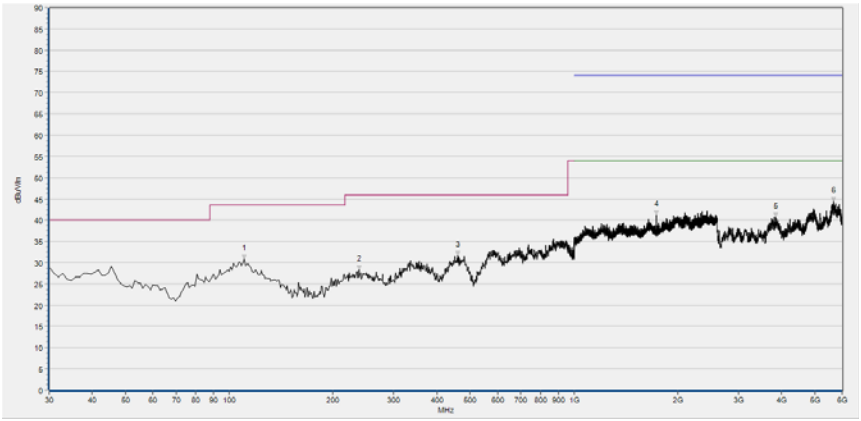



(433.92MHz, Antenna Horizontal)



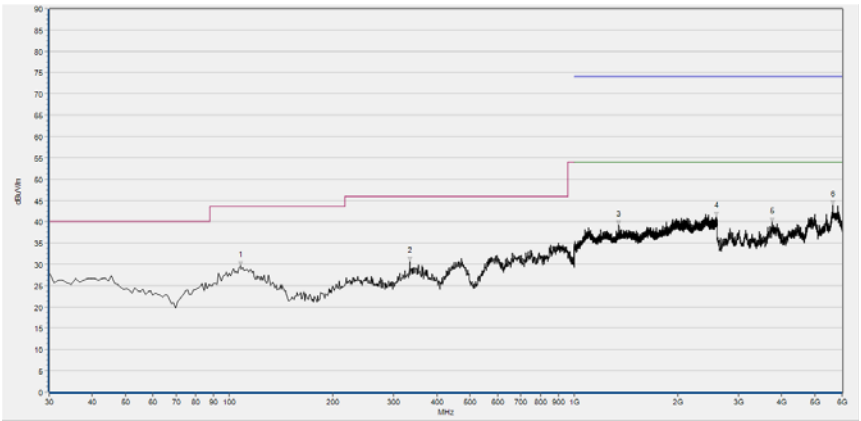

(433.92MHz, Antenna Vertical)

## B. Radiated emission



| Fre. (MHz) | Pk (dBμV/m) | QP (dBμV/m) | AV (dBμV/m) | Limit-PK (dBμV/m) | Limit-QP (dBμV/m) | Limit-AV (dBμV/m) | Antenna | Verdict |
|---|---|---|---|---|---|---|---|---|
| 110.510 | 30.85 | N/A | N/A | N/A | 43.50 | N/A | Horizontal | PASS |
| 237.580 | 28.32 | N/A | N/A | N/A | 46.00 | N/A | Horizontal | PASS |
| 460.680 | 31.75 | N/A | N/A | N/A | 46.00 | N/A | Horizontal | PASS |
| 1735.467 | 41.15 | N/A | N/A | N/A | N/A | 54.00 | Horizontal | PASS |
| 3847.400 | 40.68 | N/A | N/A | N/A | N/A | 54.00 | Horizontal | PASS |
| 5664.600 | 44.43 | N/A | N/A | N/A | N/A | 54.00 | Horizontal | PASS |

(433.92MHz, Antenna Horizontal, 30MHz to 5GHz)



| Fre. (MHz) | Pk (dBμV/m) | QP (dBμV/m) | AV (dBμV/m) | Limit-PK (dBμV/m) | Limit-QP (dBμV/m) | Limit-AV (dBμV/m) | Antenna | Verdict |
|---|---|---|---|---|---|---|---|---|
| 107.600 | 29.62 | N/A | N/A | N/A | 43.50 | N/A | Vertical | PASS |
| 333.610 | 30.60 | N/A | N/A | N/A | 46.00 | N/A | Vertical | PASS |
| 1349.867 | 39.23 | N/A | N/A | N/A | N/A | 54.00 | Vertical | PASS |
| 2592.533 | 41.30 | N/A | N/A | N/A | N/A | 54.00 | Vertical | PASS |
| 3755.000 | 39.93 | N/A | N/A | N/A | N/A | 54.00 | Vertical | PASS |
| 5646.120 | 43.91 | N/A | N/A | N/A | N/A | 54.00 | Vertical | PASS |

(433.92MHz, Antenna Vertical, 30MHz to 5GHz)

# 2.6. Restricted Frequency Bands

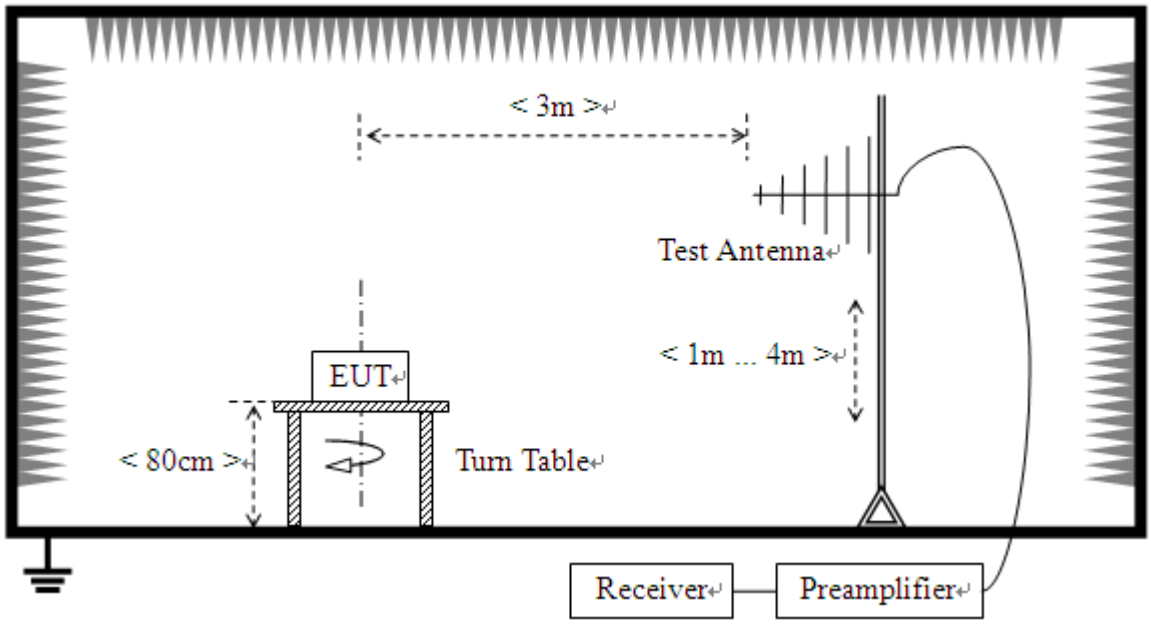
### 2.6.1. Requirement

Except as shown in paragraph (d) of section 15.205(d), only spurious emissions are permitted in any of the frequency bands listed below:

| MHz | MHz | MHz | GHz |
|---|---|---|---|
| 0.090–0.110 | 16.42–16.423 | 399.9–410 | 4.5–5.15 |
| 1 0.495–0.505 | 16.69475–16.69525 | 608–614 | 5.35–5.46 |
| 2.1735–2.1905 | 16.80425–16.80475 | 960–1240 | 7.25–7.75 |
| 4.125–4.128 | 25.5–25.67 | 1300–1427 | 8.025–8.5 |
| 4.17725–4.17775 | 37.5–38.25 | 1435–1626.5 | 9.0–9.2 |
| 4.20725–4.20775 | 73–74.6 | 1645.5–1646.5 | 9.3–9.5 |
| 6.215–6.218 | 74.8–75.2 | 1660–1710 | 10.6–12.7 |
| 6.26775–6.26825 | 108–121.94 | 1718.8–1722.2 | 13.25–13.4 |
| 6.31175–6.31225 | 123–138 | 2200–2300 | 14.47–14.5 |
| 8.291–8.294 | 149.9–150.05 | 2310–2390 | 15.35–16.2 |
| 8.362–8.366 | 156.52475–156.52525 | 2483.5–2500 | 17.7–21.4 |
| 8.37625–8.38675 | 156.7–156.9 | 2690–2900 | 22.01–23.12 |
| 8.41425–8.41475 | 162.0125–167.17 | 3260–3267 | 23.6–24.0 |
| 12.29–12.293 | 167.72–173.2 | 3332–3339 | 31.2–31.8 |
| 12.51975–12.52025 | 240–285 | 3345.8–3358 | 36.43–36.5 |
| 12.57675–12.57725 | 322–335.4 | 3600–4400 | (2) |
| 13.36–13.41 | | | |

### 2.6.2. Test Description

1) Test Setup




The EUT is located in a 3m Semi-Anechoic Chamber; the antenna factors, cable loss and so on of the site as factors are calculated to correct the reading.

For the Test Antenna:
Test Antenna is 3m away from the EUT. Test Antenna height is varied from 1m to 4m above the ground to determine the maximum value of the field strength.

### 2.6.3. Test Result

The lowest and highest channels are tested to verify the Restricted Frequency Bands.
The measurement results are obtained as below:
E [dBμV/m] =$U_R$ + $A_T$ + $A_{Factor}$ [dB]; $A_T$ =$L_{Cable\ loss}$ [dB]
$A_T$: Total correction Factor except Antenna
$U_R$: Receiver Reading
$A_{Factor}$: Antenna Factor at 3m

**Note1:** Restricted Frequency Bands were performed when antenna was at vertical and horizontal polarity, and only the worse test condition (Horizontal) was recorded in this test report.

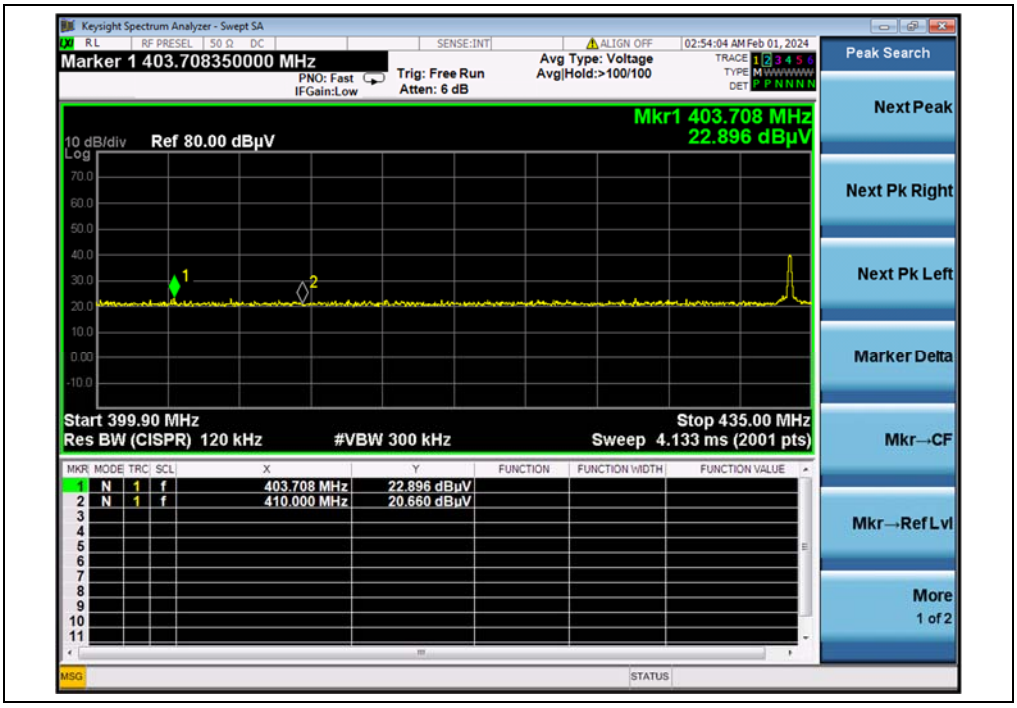
**Note2:** All emission tests were performed in X, Y, Z axis direction. And only the worst axis test condition(Z) was recorded in this test report.

**A.Test Verdict:**

| Frequency (MHz) | Detector | $U_R$ (dBμV) | $A_T$ (dB) | $A_{Factor}$ (dB@3m) | E (dBμV/m) | Limit-QP (dBμV/m) | Verdict |
|---|---|---|---|---|---|---|---|
| | Peak/ QP | | | | | | |
| 403.708 | PK | 22.896 | 4.56 | 16.11 | 43.566 | 46 | PASS |

**Note:** According to ANSI C63.4 selection 4.2.2, because of peak detection will yield amplitudes equal to or greater than amplitudes measured with the quasi-peak detector, the measurement data from a spectrum analyzer peak detector will represent the worst-case results, if the peak measured value complies with the quasi-peak limit, it is unnecessary to perform an quasi-peak(QP) measurement.

**B.Test Plot:**




(PEAK)

# Annex A Test Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for test performed on the EUT as specified in CISPR 16-1-2:

| Test Items | Uncertainty |
|---|---|
| 20 dB Bandwidth | ±5% |
| Transmission Time | ±5% |
| Radiated Emission | ±2.95dB |

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

# Annex B Testing Laboratory Information

## 1. Identification of the Responsible Testing Laboratory

| | |
|---|---|
| **Laboratory Name:** | Shenzhen Morlab Communications Technology Co., Ltd. |
| **Laboratory Address:** | FL.3, Building A, FeiYang Science Park, No.8 LongChang Road, Block 67, BaoAn District, ShenZhen, GuangDong Province, P. R. China |
| **Telephone:** | +86 755 36698555 |
| **Facsimile:** | +86 755 36698525 |

## 2. Identification of the Responsible Testing Location

| | |
|---|---|
| **Name:** | Shenzhen Morlab Communications Technology Co., Ltd. |
| **Address:** | FL.3, Building A, FeiYang Science Park, No.8 LongChang Road, Block 67, BaoAn District, ShenZhen, GuangDong Province, P. R. China |

## 3. Facilities and Accreditations

All measurement facilities used to collect the measurement data are located at FL.3, Building A, FeiYang Science Park, Block 67, BaoAn District, Shenzhen, 518101 P. R. China. The test site is constructed in conformance with the requirements of ANSI C63.10-2013and CISPR Publication 22; the FCC designation number is CN1192, the test firm registration number is 226174.

## 4. Test Equipments Utilized

### 4.1 Conducted Test Equipments

| Equipment Name | Serial No. | Type | Manufacturer | Cal. Date | Due Date |
|---|---|---|---|---|---|
| EXA Signal Analzyer | MY53470836 | N9010A | Agilent | 2023.02.27 | 2024.02.26 |
| RF Cable (30MHz-26GHz) | CB01 | RF01 | Morlab | N/A | N/A |
| Coaxial Cable | CB02 | RF02 | Morlab | N/A | N/A |
| SMA Connector | CN01 | RF03 | HUBER-SUHNER | N/A | N/A |
| Power Sensor | MY54180008 | U2021XA | Agilent | 2023.10.17 | 2024.10.16 |

### 4.2 List of Software Used

| Description | Manufacturer | Software Version |
|---|---|---|
| Test System | MaiWei | 2.0.0.0 |
| MORLAB EMCR | MORLAB | V1.2 |

**4.3Radiated Test Equipments**

| Equipment Name | Serial No. | Type | Manufacturer | Cal. Date | Due Date |
|---|---|---|---|---|---|
| Receiver | MY54130016 | N9038A | Agilent | 2023.06.21 | 2024.06.20 |
| Test Antenna - Bi-Log | 9163-519 | VULB 9163 | Schwarzbeck | 2023.07.01 | 2024.06.30 |
| Test Antenna - Loop | 1519-022 | FMZB1519 | Schwarzbeck | 2023.06.26 | 2024.06.25 |
| Test Antenna – Horn | 01774 | BBHA 9120D | Schwarzbeck | 2023.07.01 | 2024.06.30 |
| Test Antenna – Horn | BBHA9170 #773 | BBHA9170 | Schwarzbeck | 2023.07.01 | 2024.06.30 |
| Preamplifier (10MHz-6GHz) | 46732 | S10M100L3802 | LUCIX CORP. | 2023.06.27 | 2024.06.26 |
| Preamplifier (2GHz-18GHz) | 61171/61172 | S020180L3203 | LUCIX CORP. | 2023.06.27 | 2024.06.26 |
| Preamplifier (18GHz-40GHz) | DS77209 | DCLNA0118-40C-S | Decentest | 2023.07.04 | 2024.07.03 |
| RF Coaxial Cable (DC-18GHz) | MRE001 | PE330 | Pasternack | 2023.06.27 | 2024.06.26 |
| RF Coaxial Cable (DC-18GHz) | MRE002 | CLU18 | Pasternack | 2023.06.27 | 2024.06.26 |
| RF Coaxial Cable (DC-18GHz) | MRE003 | CLU18 | Pasternack | 2023.06.27 | 2024.06.26 |
| RF Coaxial Cable (DC-40GHz) | 22290045 | QA360-40-KK-0.5 | Qualwave | 2023.07.04 | 2024.07.03 |
| RF Coaxial Cable (DC-40GHz) | 22290046 | QA360-40-KKF-2 | Qualwave | 2023.07.04 | 2024.07.03 |
| RF Coaxial Cable (DC-18GHz) | 22120181 | QA500-18-NN-5 | Qualwave | 2023.07.04 | 2024.07.03 |
| Anechoic Chamber | N/A | 9m*6m*6m | CRT | 2022.05.10 | 2025.05.09 |

END OF REPORT