# RF TEST REPORT

| | |
|---|---|
| **Report No.:** | 20240417G07158X-W1 |
| **Product Name:** | Universal Remote Key |
| **Model No.:** | XSGA |
| **FCC ID:** | 2AI4T-XSGA |
| **Applicant:** | Shenzhen Xhorse Electronics Co., Ltd. |
| **Address:** | Floor 28, Block A, Building NO.6, international innovation Valley, Nanshan District, Shenzhen |
| **Dates of Testing:** | 04/27/2024–05/27/2024 |
| **Issued by:** | CCIC Southern Testing Co., Ltd. |
| **Lab Location:** | Electronic Testing Building, No.43, Shahe Road, Xili Street, Nanshan District, Shenzhen, Guangdong, China. |
| | **Tel:** 86 755 26627338 **E-Mail:** manager@ccic-set.com |

# Test Report

| | |
|---|---|
| **Product.....:** | Universal Remote Key |
| **Brand Name..... :** | Xhorse |
| **Trade Name ..... :** | Xhorse |
| **Applicant.....:** | Shenzhen Xhorse Electronics Co., Ltd. |
| **Applicant Address.....:** | Floor 28, Block A, Building NO.6, international innovation Valley, Nanshan District, Shenzhen |
| **Manufacturer.....:** | Shenzhen Xhorse Electronics Co., Ltd. |
| **Manufacturer Address.....:** | Floor 28, Block A, Building NO.6, international innovation Valley, Nanshan District, Shenzhen |
| **Test Standards..... :** | 47 CFR Part 15 Subpart C 15.231<br>ANSI C63.10-2013 |
| **Test Result.....:** | Pass |

**Tested by .....:** Chuiwang Zhang 2024.05.27

Chuiwang Zhang, Test Engineer

**Reviewed by.....:** Sun Jiaohui 2024.05.27

Sun Jiaohui, Senior Engineer

**Approved by..... :** Chris You 2024.05.27

Chris You, Manager

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| Change History | | |
|---|---|---|
| Issue | Date | Reason for change |
| 1.0 | 2024.05.27 | First edition |
| | | |

# 1. General Information

## 1.1. EUT Description

| | |
|---|---|
| Product Name | Universal Remote Key |
| Model No. | XSGA |
| Operation Frequency | 315 MHz; 433.92 MHz |
| Modulation technology | ASK |
| Antenna Type | PCB Antenna |
| Antenna Gain | 2.0 dBi |
| Power supply | DC 3 V (CR2032 battery) |

Note 1: The information of antenna gain and cable loss is provided by the manufacturer and our lab is not responsible for the accuracy of the antenna gain and cable loss information.

## 1.2. Test Standards and Results

The purpose of the report is to conduct testing according to the following FCC certification standards:

| No. | Identity | Document Title |
|---|---|---|
| 1 | 47 CFR Part 15 Subpart C | Radio Frequency Devices |
| 2 | ANSI C63.10-2013 | American National Standard for Testing Unlicensed Wireless Devices |

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

| No. | Section in CFR 47 | Description | Result |
|---|---|---|---|
| 1 | § 15.203 | Antenna Requirement | PASS |
| 2 | § 15.231(c) | 20 dB Bandwidth | PASS |
| 3 | § 15.231(b) | Field Strength of Fundamental | PASS |
| 4 | § 15.231(b), § 15.209 | Field Strength of Spurious Emissions | PASS |
| 5 | §15.231(a)(1) | Duration Time | PASS |
| 6 | §15.207 | AC Power Line Conducted Emission | N/A[Note] |

Note: N/A means not applicable, EUT Power By 3 V DC Battery.

## 1.3. Table for Supporting Units

| No. | Equipment | Brand Name | Model Name | Manufacturer | Serial No. | FCC ID/DoC |
|---|---|---|---|---|---|---|
| 1 | N/A | | | | | |

## 1.4. EUT Operation Test Setup

For RF test items, an engineering test program was provided and enable to make EUT transmitting.

## 1.5. Test environment and mode

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

| **Operating Environment** | |
|---|---|
| Temperature | 15°C to 35°C |
| Humidity | 30% to 60% |
| Atmospheric Pressure | 86 kPa to 106 kPa |
| **Test Mode:** | |
| Transmitting mode | Keep the EUT in transmitting mode with modulation |

Note: The EUT was placed on three different polar directions tested: i.e. X axis, Y axis, Z axis, and found the test results are both the “worst case” and “worst setup”: Z axis, so the report only reflects the test data of worst mode.

## 1.6. Laboratory Facilities

**FCC-Registration No.: 406086**

CCIC Southern Testing Co., Ltd EMC Laboratory has been registered and fully described in a report filed with the FCC (Federal Communications Commission). The acceptance letter from the FCC is maintained in our files. Designation Number: CN1283, valid time is until Jun. 30th, 2025.

**ISED Registration: 11185A**

CCIC Southern Testing Co., Ltd. EMC Laboratory has been registered by Certification and Engineering Bureau of Industry Canada for the performance of radiated measurements with Registration No. 11185A on Aug. 04, 2016, valid time is until Jun. 30th, 2025.

**CAB number: CN0064**

**A2LA Code: 5721.01**

CCIC-SET is a third party testing organization accredited by A2LA according to ISO/IEC 17025. The accreditation certificate number is 5721.01.

# 2. Test 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. Antenna Information

**Antenna Category:** PCB Antenna

The antenna of EUT is an Spring Antenna. See product internal photos for details.

**Antenna General Information:**

| No. | EUT | Operating Frequency | Ant. Type | Ant. Gain |
|---|---|---|---|---|
| 1 | Universal Remote Key | 315 MHz; 433.92 MHz | PCB | 2.0 dBi |

### 2.1.3. Result: comply

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

## 2.2. 20 dB Bandwidth

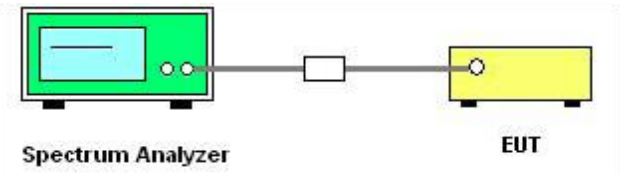
### 2.2.1. Limit of 20 dB Bandwidth

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.

### 2.2.2. Measuring Instruments

The measuring equipment is listed in the section 3 of this test report.

### 2.2.3. Test Setup




### 2.2.4. Test Procedures

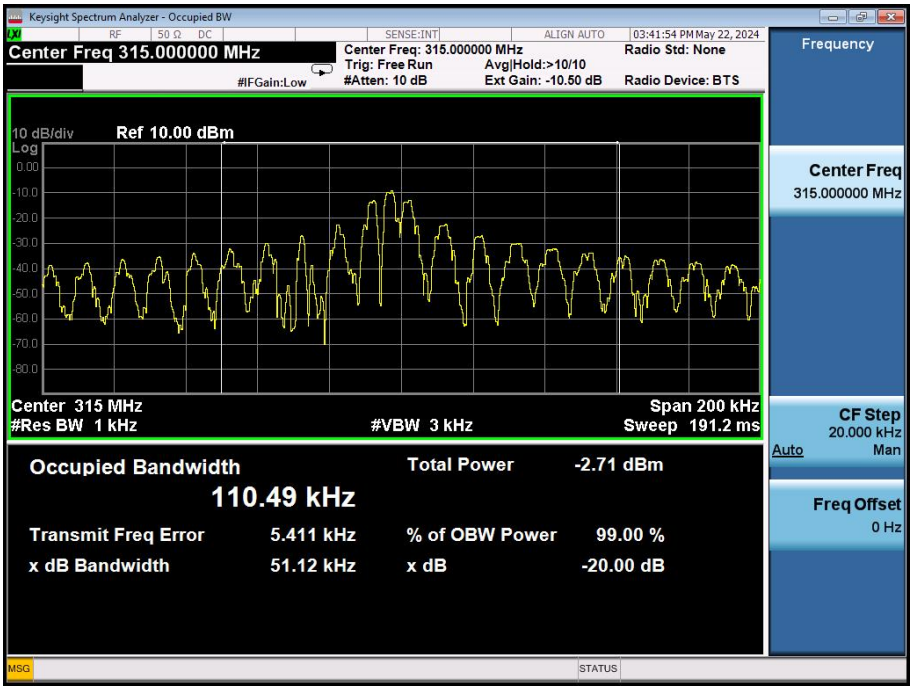
1. The testing follows the Measurement Procedure of ANSI C63.10-2013 Section 11.8.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Use the spectrum analyzer “Channel Bandwidth” function to easurement the 20 dB EBW.
5. For 20 dB EBW Use the following spectrum analyzer settings:

   Set instrument center frequency to operation frequency, Set the Span = 100 kHz, Set the RBW = 1 kHz, VBW = 3 kHz, Detector = Peak, Trace mode = Max hold, Sweep time = Auto couple, Allow trace to fully stabilize.
6. Record the measurement results in the test report.

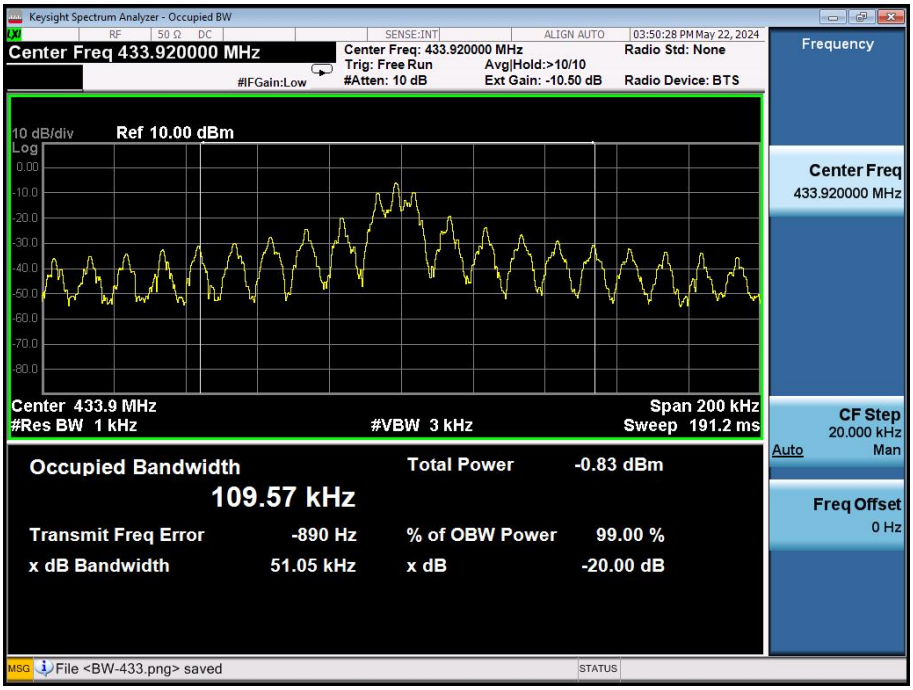
## 2.2.5. Test Results of 20 dB Bandwidth

| Frequency (MHz) | 20 dB Bandwidth (kHz) | Limit (kHz) | Result |
|---|---|---|---|
| 315 | 51.12 | 787.5 | PASS |
| 433.92 | 51.05 | 1084.8 | PASS |

315 MHz




433.92 MHz



## 2.3. Duty Cycle Factor

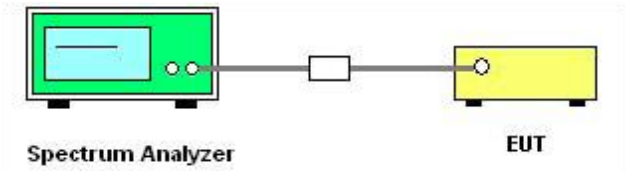
### 2.3.1. Limit of Duty Cycle Factor

For reporting purposes only.

### 2.3.2. Measuring Instruments

The measuring equipment is listed in the section 3 of this test report.

### 2.3.3. Test Setup




### 2.3.4. Test Procedures

1. The testing follows the Measurement Procedure of ANSI C63.10-2013 Section 7.4.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Use the following spectrum analyzer settings:

   Set instrument center frequency to operation frequency, Set the Span = 0 Hz, Set the RBW = 1 MHz, VBW = 3 MHz, Detector = Normal, Trace mode = Clear Write, Set sweep time greater than the specified time for periodic operation.
5. Calculation of duty cycle factor according to ANSI C63.10-2013 Section 7.6.3.
6. Record the measurement results in the test report.

### 2.3.5. Test Results of Duty cycle factor

| Frequency (MHz) | Total On Time (ms) | Period Time (ms) | Duty Cycle (%) | Duty Cycle Factor (dB) |
|---|---|---|---|---|
| 315 | 25.86 | 1069 | 2.42 | -32.33 |
| 433.92 | 25.86 | 1069 | 2.42 | -32.33 |

Note 1: According to ANSI C63.10-2013 section 7.6.3:

$T_{Total\ On\ Time} = T_{On\ 1} \times N_{Burst\ 1} + T_{On\ 2} \times N_{Burst\ 2} + \cdots T_{On\ n} \times N_{Burst\ n}$.

$N_{Burst\ n}$ is the number of Burst n in one period.

$T_{On\ n}$ is the pulse width of Burst n.

For fundamental frequency 315 MHz:

$T_{Total\ On\ Time} = 210\ \mu s \times 54 + 110\ \mu s \times 132 = 25.86$ ms.

Duty Cycle = (Total On Time / Period Time) * 100% = (25.86 / 1069) * 100% = 2.42%.

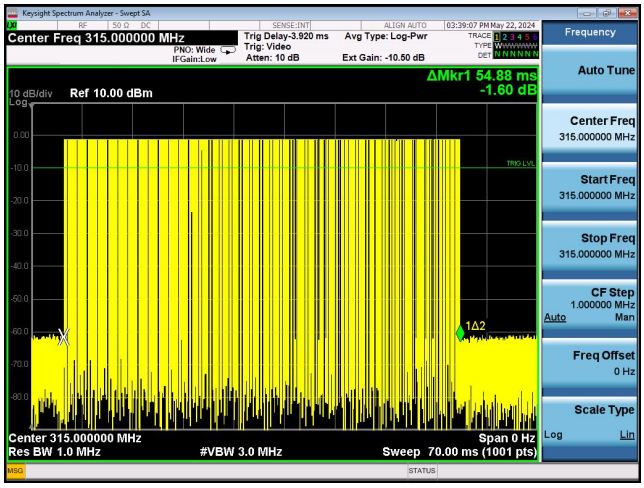
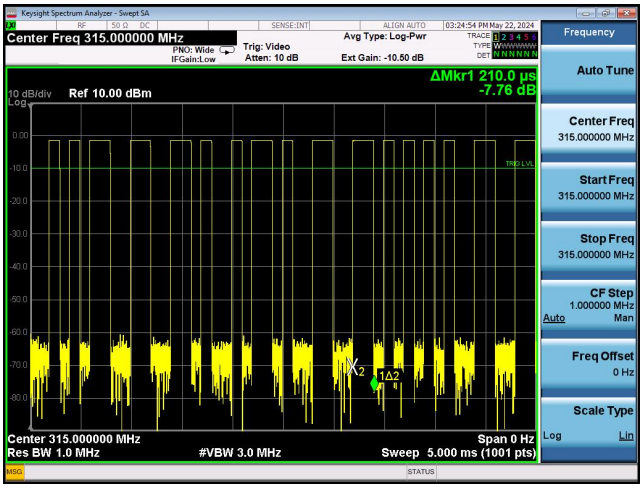
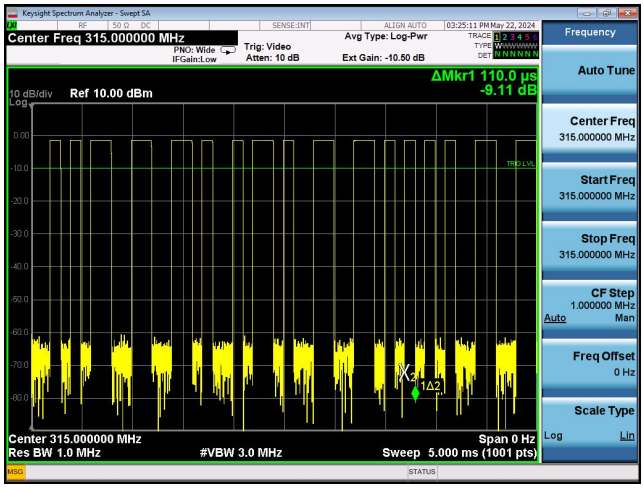
Duty Cycle Factor = 20 × log(Duty Cycle) = 20 × log(2.42%) = -32.33.

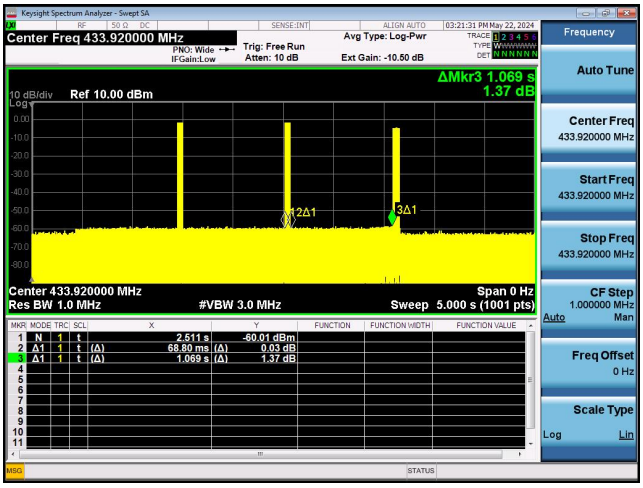
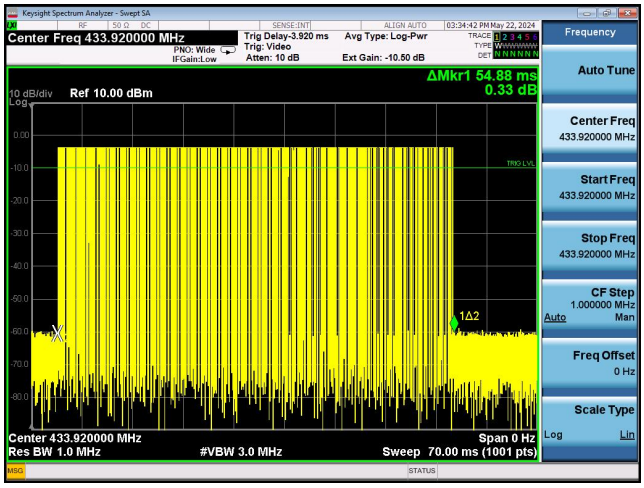
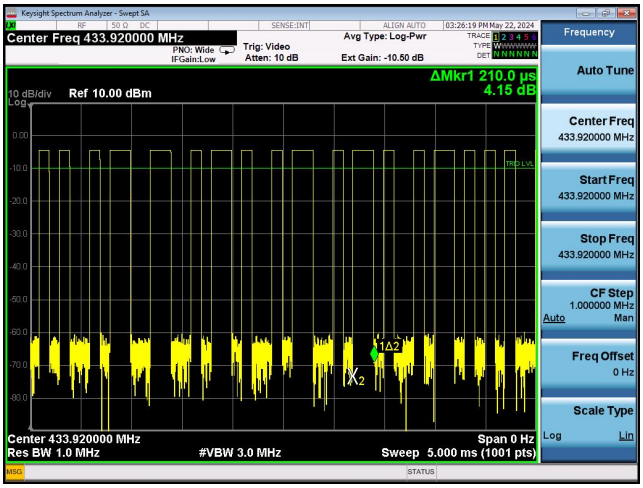
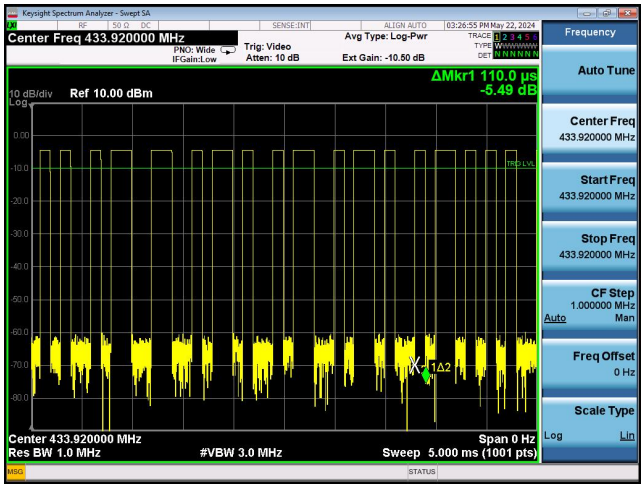
For fundamental frequency 433.92 MHz:

$T_{Total\ On\ Time} = 210\ \mu s \times 54 + 110\ \mu s \times 132 = 25.86$ ms.

Duty Cycle = (Total On Time / Period Time) * 100% = (25.86 / 1069) * 100% = 2.42%.

Duty Cycle Factor = 20 × log(Duty Cycle) = 20 × log(2.42%) = -32.33.

| 315 MHz: Period Time | 315 MHz: Total Burst |
|---|---|
|  |  |
| **315 MHz: Burst 1** | **315 MHz: Burst 2** |
|  |  |

| 433.92 MHz: Period Time | 433.92 MHz: Total Burst |
|---|---|
|  |  |
| **433.92 MHz: Burst 1** | **433.92 MHz: Burst 2** |
|  |  |

## 2.4. Field Strength of Fundamental and Spurious emissions

### 2.4.1. Limit of Field Strength of Fundamental and Spurious emissions

According to §15.231(b), In addition to the provisions of § 15.205, the field strength of emissions from intentional radiators operated under this section shall not exceed the following:

| 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 | [1]1250 to 3750 | [1]125 to 375 |
| 174–260 | 3750 | 375 |
| 260–470 | [1]3750 to 12500 | [1]375 to 1250 |
| Above 470 | 12500 | 1250 |
| Note: [1] Linear interpolations. | | |

(1) The above field strength limits are specified at a distance of 3 meters. The tighter limits apply at the band edges.

(2) Intentional radiators operating under the provisions of this section shall demonstrate compliance with the limits on the field strength of emissions, as shown in the above table, based on the average value of the measured emissions. As an alternative, compliance with the limits in the above table may be based on the use of measurement instrumentation with a CISPR quasi-peak detector. The specific method of measurement employed shall be specified in the application for equipment authorization. If average emission measurements are employed, the provisions in § 15.35 for averaging pulsed emissions and for limiting peak emissions apply. Further, compliance with the provisions of § 15.205 shall be demonstrated using the measurement instrumentation specified in that section.

(3) The limits on the field strength of the spurious emissions in the above table are based on the fundamental frequency of the intentional radiator. Spurious emissions shall be attenuated to the average (or, alternatively, CISPR quasi-peak) limits shown in this table or to the general limits shown in § 15.209, whichever limit permits a higher field strength.

According to § 15.209(a), 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) | Limit (dBμV/m)@3 m |
|---|---|---|---|
| 0.009–0.490 | 2400/F (kHz) | 300 | 128.52–104.84 |
| 0.490–1.705 | 24000/F (kHz) | 30 | 73.80–62.97 |
| 1.705–30.0 | 30 | 30 | 69.54 |
| 30–88 | 100 | 3 | 40.0 |
| 88–216 | 150 | 3 | 43.5 |
| 216–960 | 200 | 3 | 46.0 |
| Above 960 | 500 | 3 | 54.0 |

| Fundamental Frequency (MHz) | Field Strength of Fundamental | |
|---|---|---|
| | Peak Limit@3 m (dBμV/m) | Average Limit@3 m (dBμV/m) |
| 315 | 95.62 | 75.62 |
| 433.92 | 100.83 | 80.83 |
| Fundamental Frequency (MHz) | Field Strength of Spurious emissions | |
| | Peak Limit@3 m (dBμV/m) | Average Limit@3 m (dBμV/m) |
| 315 | 75.62 | 55.62 |
| 433.92 | 80.83 | 60.83 |

Note 1: According to ANSI C63.10:2013 section 7.6.2, the effective limit at the frequency of interest is found by linearly interpolating using the familiar slope-intercept formula, y = mx + b, rewritten as in Equation:

Limit[μV/m] = $Lim_{lower}$ + ΔF[($Lim_{upper}$ - $Lim_{lower}$) / ($f_{upper}$ - $f_{lower}$)]

For fundamental frequency 315 MHz:

Average Limit (μV/m) = 3750 + (315 - 260) * [(12500 - 3750) / (470 - 260)] = 6041.666667.

Average Limit (dBμV/m) = 20log[Average Limit (μV/m)] = 20log(6041.666667) = 75.62.

Note 2: According to § 15.35(b):

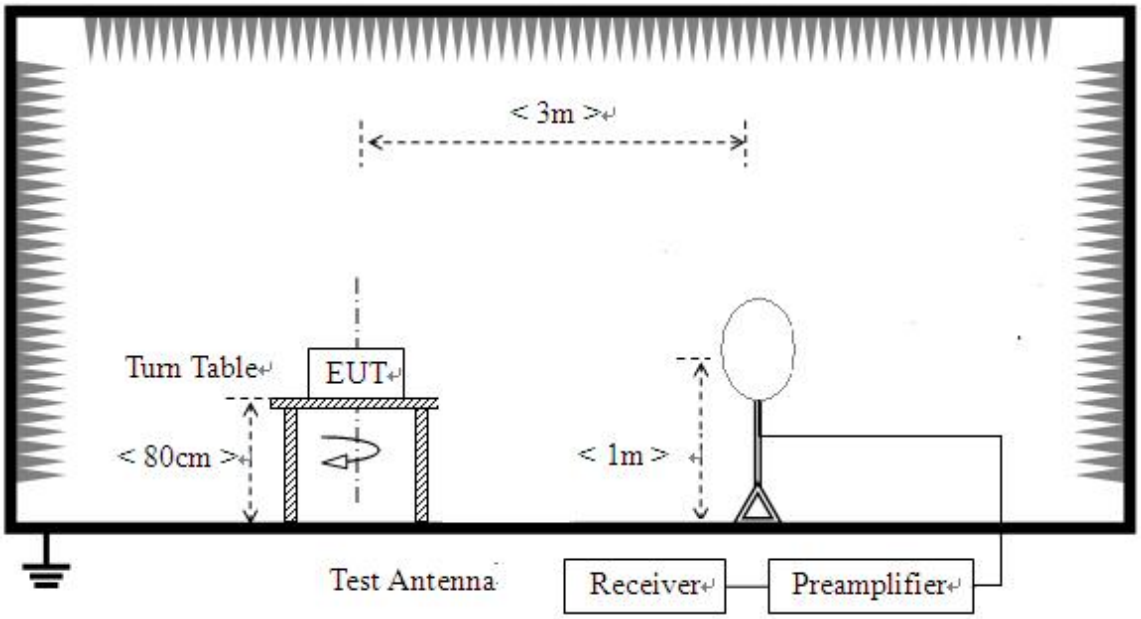
Peak Limit (dBμV/m) = Average Limit (dBμV/m) + 20 dB = 75.62 + 20 = 95.62.

### 2.4.2. Measuring Instruments

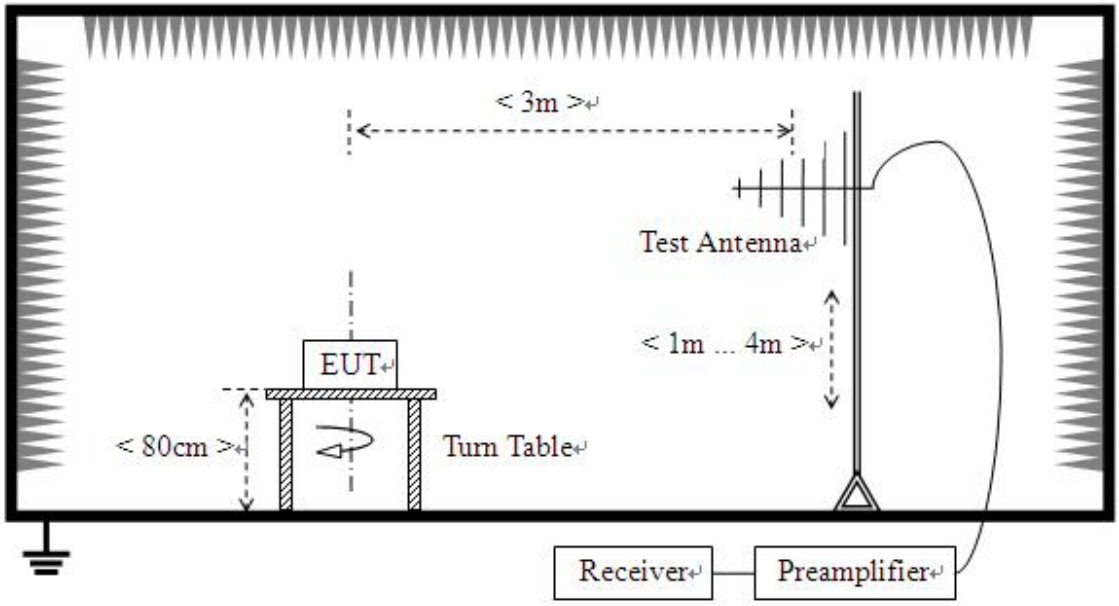
The measuring equipment is listed in the section 3 of this test report.

### 2.4.3. Test Setup

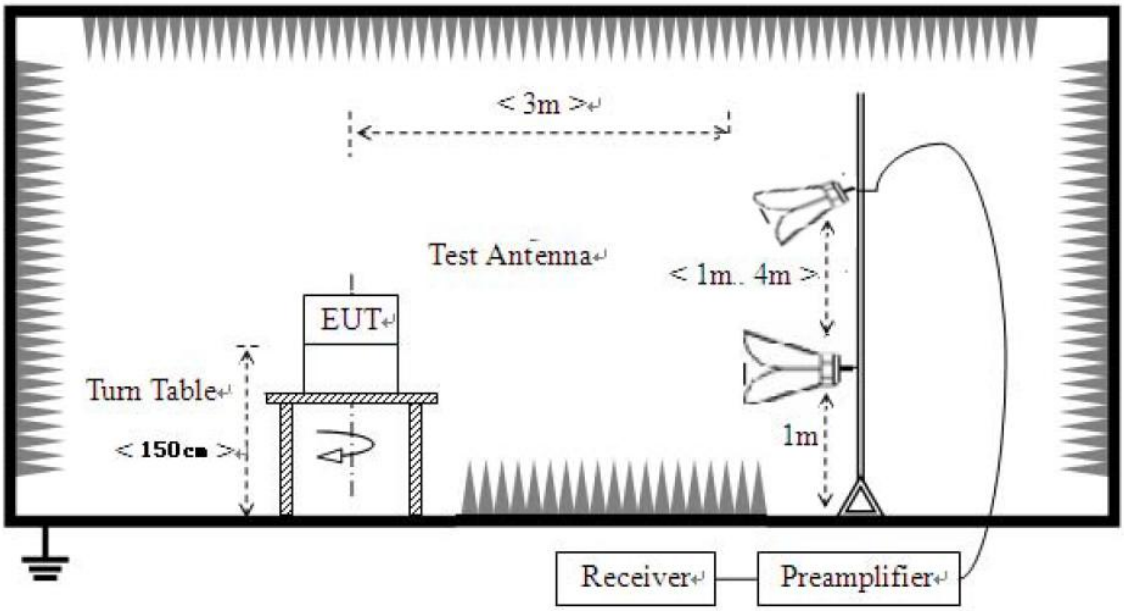
**For radiated emissions from 9 kHz to 30 MHz:**



**For radiated emissions from 30 MHz to 1 GHz:**




**For radiated emissions above 1 GHz:**




## 2.4.4. Test Procedures

1. The EUT was placed on the top of a rotating table 0.8 m (below 1 GHz)/1.5 m (above 1 GHz) above the ground at a 3 meter chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
2. The EUT was set 3 meters from the receiving antenna, which was mounted on thetop of a variable height antenna tower.

3. Height of receiving antenna 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.
4. 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.
5. The measurement receivers was set to peak detect Function and maximum hold trace mode.
6. For the radiated emission test above 1 GHz:

   Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.
7. Repeat above procedures until the measurements for all frequencies are complete, record the results in the test report.

Note 1: 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.

Note 2: For 9 kHz to 30 MHz, The amplitude of spurious emissions which are attenuated by more than 20 dB below the permissible value has no need to be reported.

**Spectrum Analyzer Setting:**

| SA Parameters | 9 kHz–150 kHz | 150 kHz–30 MHz | 30 MHz–1 GHz | 1 GHz–5 GMz |
|---|---|---|---|---|
| RBW | 200 Hz | 9 kHz | 120 kHz | 1 MHz |
| VBW | 620 Hz | 30 kHz | 300 kHz | 3 MHz |
| Sweep Time | Auto | Auto | Auto | Auto |
| Detector | Peak/QP | Peak/QP | Peak/QP | Peak |
| Trace Mode | Max Hold | Max Hold | Max Hold | Max Hold |

### 2.4.5. Test Results of Field Strength of Fundamental

| NO. | Freq. [MHz] | Level [dBμV/m] | Factor [dB] | Limit [dBμV/m] | Margin [dBμV/m] | Trace | Height [cm] | Angle [°] | Polarity |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 315.0 | 78.65 | 13.47 | 95.62 | 16.97 | PK | 100 | 248 | Horizontal |
| 2 | 315.0 | 55.71 | 13.47 | 95.62 | 39.91 | PK | 100 | 128 | Vertical |
| 3 | 433.92 | 71.05 | 17.64 | 100.83 | 29.78 | PK | 100 | 357 | Horizontal |
| 4 | 433.92 | 53.03 | 17.64 | 100.83 | 47.80 | PK | 100 | 33 | Vertical |
| NO. | Freq. [MHz] | Level [dBμV/m] | DC Factor [dB] | Limit [dBμV/m] | Margin [dBμV/m] | Trace | Height [cm] | Angle [°] | Polarity |
| 1 | 315.0 | 46.32 | -32.33 | 75.62 | 29.30 | AV | 100 | 248 | Horizontal |
| 2 | 315.0 | 23.38 | -32.33 | 75.62 | 52.24 | AV | 100 | 128 | Vertical |
| 3 | 433.92 | 38.72 | -32.33 | 80.83 | 42.11 | AV | 100 | 357 | Horizontal |
| 4 | 433.92 | 20.70 | -32.33 | 80.83 | 60.13 | AV | 100 | 33 | Vertical |

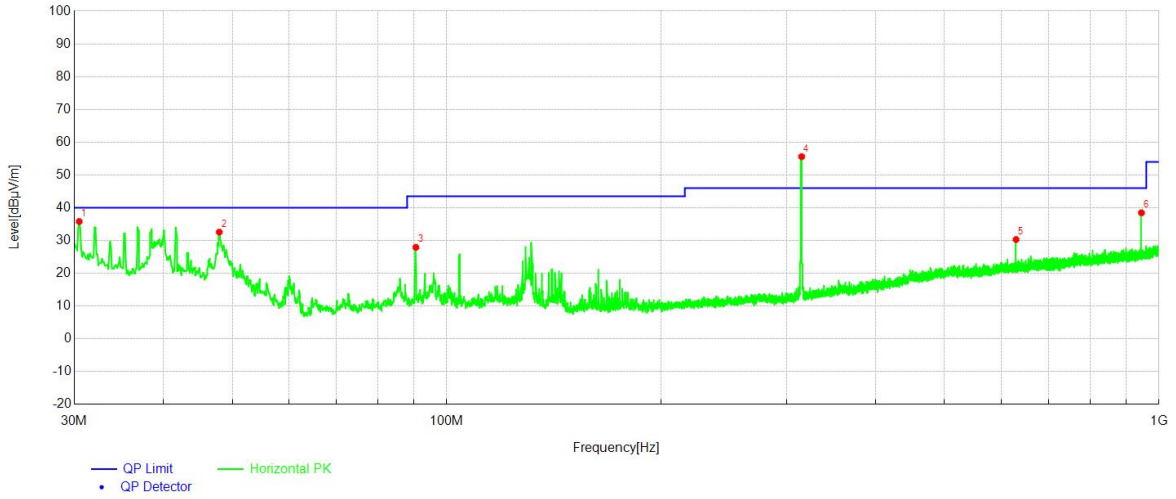
Remark:

1. Level = Raw Value + Factor (Antenna Factor + Cable Loss - Preamplifier Factor).
2. Margin = Limit - Level.
3. Average value = Peak value + Duty Cycle Factor (Please to clause 2.3).
4. Only the antenna height (from 1 m to 4 m) at maximum reading are recorded.

## 2.4.6. Test Results of Field Strength of Spurious emissions

**For 30 MHz to 1 GHz:**

| Test site: | 5 M anechoic chamber | Environment: | Temp: 23℃; Humi: 48%; 101 kPa |
|---|---|---|---|
| Operator: | Chuiwang Zhang | Test Date: | 2024.05.15 |
| Test Mode: | 315 MHz_TX | Test Result: | Pass |

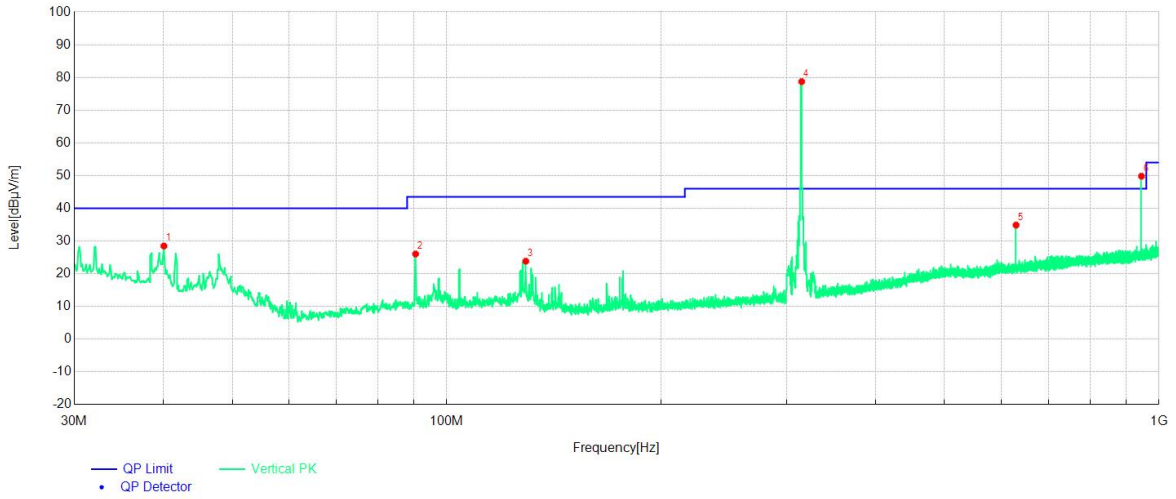



| NO. | Freq. [MHz] | Level [dBµV/m] | Factor [dB] | Limit [dBµV/m] | Margin [dBµV/m] | Trace | Height [cm] | Angle [°] | Polarity |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 30.49 | 35.80 | 19.04 | 40.00 | 4.20 | PK | 100 | 288 | Horizontal |
| 2 | 47.95 | 32.57 | 11.35 | 40.00 | 7.43 | PK | 100 | 360 | Horizontal |
| 3 | 90.53 | 27.94 | 10.64 | 43.50 | 15.56 | PK | 100 | 88 | Horizontal |
| 4 | 315.00 | 55.59 | 13.47 | 95.62 | 40.03 | PK | 100 | 136 | Horizontal |
| 5 | 630.00 | 30.31 | 21.21 | 75.62 | 45.31 | PK | 100 | 223 | Horizontal |
| 6 | 945.00 | 38.46 | 25.20 | 75.62 | 37.16 | PK | 100 | 217 | Horizontal |
| NO. | Freq. [MHz] | Level [dBµV/m] | DC Factor [dB] | Limit [dBµV/m] | Margin [dBµV/m] | Trace | Height [cm] | Angle [°] | Polarity |
| 1 | 315.00 | 23.26 | -32.33 | 75.62 | 52.36 | AV | 100 | 136 | Horizontal |
| 2 | 630.00 | -2.02 | -32.33 | 55.62 | 57.64 | AV | 100 | 223 | Horizontal |
| 3 | 945.00 | 6.13 | -32.33 | 55.62 | 49.49 | AV | 100 | 217 | Horizontal |

Remark:

1. Level = Raw Value + Factor (Antenna Factor + Cable Loss - Preamplifier Factor).
2. Margin = Limit - Level.
3. Average value = Peak value + Duty Cycle Factor (Please to clause 2.3).
4. Only the antenna height (from 1 m to 4 m) at maximum reading are recorded.

| Test site: | 5 M anechoic chamber | Environment: | Temp: 23℃; Humi: 48%; 101 kPa |
|---|---|---|---|
| Operator: | Chuiwang Zhang | Test Date: | 2024.05.15 |
| Test Mode: | 315 MHz_TX | Test Result: | Pass |



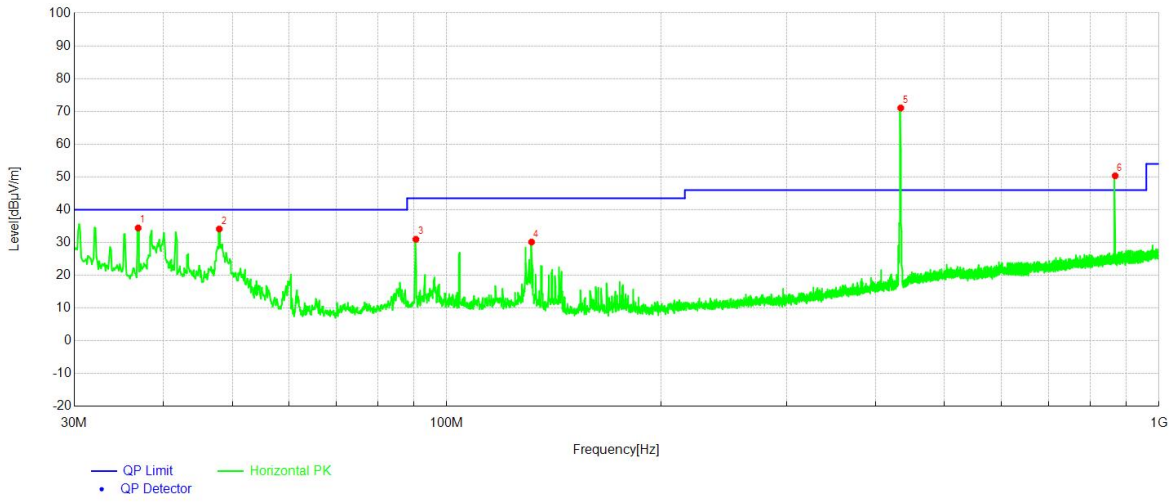

| NO. | Freq. [MHz] | Level [dBµV/m] | Factor [dB] | Limit [dBµV/m] | Margin [dBµV/m] | Trace | Height [cm] | Angle [°] | Polarity |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 40.09 | 28.48 | 14.91 | 40.00 | 11.52 | PK | 100 | 97 | Vertical |
| 2 | 90.44 | 26.05 | 10.63 | 43.50 | 17.45 | PK | 100 | 360 | Vertical |
| 3 | 129.14 | 23.85 | 10.85 | 43.50 | 19.65 | PK | 100 | 0 | Vertical |
| 4 | 315.00 | 78.72 | 13.47 | 95.62 | 16.90 | PK | 100 | 245 | Vertical |
| 5 | 630.00 | 34.88 | 21.21 | 75.62 | 40.74 | PK | 100 | 212 | Vertical |
| 6 | 945.00 | 49.82 | 25.20 | 75.62 | 25.80 | PK | 100 | 65 | Vertical |

| NO. | Freq. [MHz] | Level [dBµV/m] | DC Factor [dB] | Limit [dBµV/m] | Margin [dBµV/m] | Trace | Height [cm] | Angle [°] | Polarity |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 315.00 | 46.39 | -32.33 | 75.62 | 29.23 | AV | 100 | 245 | Vertical |
| 2 | 630.00 | 2.55 | -32.33 | 55.62 | 53.07 | AV | 100 | 212 | Vertical |
| 3 | 945.00 | 17.49 | -32.33 | 55.62 | 38.13 | AV | 100 | 65 | Vertical |

Remark:

1. Level = Raw Value + Factor (Antenna Factor + Cable Loss - Preamplifier Factor).
2. Margin = Limit - Level.
3. Average value = Peak value + Duty Cycle Factor (Please to clause 2.3).
4. Only the antenna height (from 1 m to 4 m) at maximum reading are recorded.

| Test site: | 5 M anechoic chamber | Environment: | Temp: 23℃; Humi: 48%; 101 kPa |
|---|---|---|---|
| Operator: | Chuiwang Zhang | Test Date: | 2024.05.15 |
| Test Mode: | 433.92 MHz_TX | Test Result: | Pass |

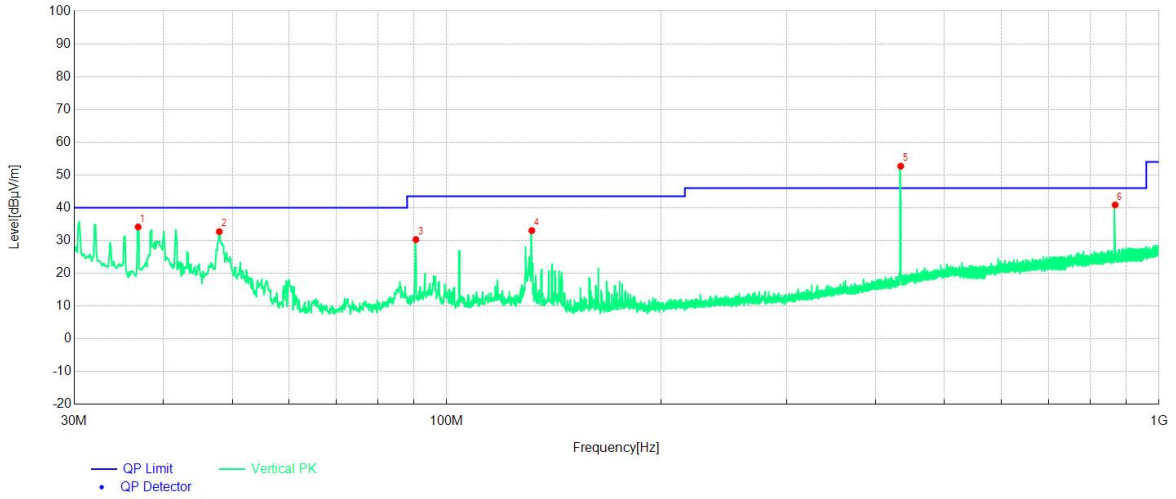



| NO. | Freq. [MHz] | Level [dBµV/m] | Factor [dB] | Limit [dBµV/m] | Margin [dBµV/m] | Trace | Height [cm] | Angle [°] | Polarity |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 36.89 | 34.44 | 16.29 | 40.00 | 5.56 | PK | 100 | 127 | Horizontal |
| 2 | 47.95 | 34.13 | 11.35 | 40.00 | 5.87 | PK | 100 | 180 | Horizontal |
| 3 | 90.53 | 30.99 | 10.64 | 43.50 | 12.51 | PK | 100 | 121 | Horizontal |
| 4 | 131.57 | 30.16 | 10.75 | 43.50 | 13.34 | PK | 100 | 303 | Horizontal |
| 5 | 433.92 | 71.05 | 17.64 | 100.83 | 29.78 | PK | 100 | 2 | Horizontal |
| 6 | 867.84 | 50.36 | 24.29 | 80.83 | 30.47 | PK | 100 | 10 | Horizontal |
| NO. | Freq. [MHz] | Level [dBµV/m] | DC Factor [dB] | Limit [dBµV/m] | Margin [dBµV/m] | Trace | Height [cm] | Angle [°] | Polarity |
| 1 | 433.92 | 38.72 | -32.33 | 80.83 | 42.11 | AV | 100 | 2 | Horizontal |
| 2 | 867.84 | 18.03 | -32.33 | 60.83 | 42.80 | AV | 100 | 10 | Horizontal |

Remark:

1. Level = Raw Value + Factor (Antenna Factor + Cable Loss - Preamplifier Factor).
2. Margin = Limit - Level.
3. Average value = Peak value + Duty Cycle Factor (Please to clause 2.3).
4. Only the antenna height (from 1 m to 4 m) at maximum reading are recorded.

| Test site: | 5 M anechoic chamber | Environment: | Temp: 23℃; Humi: 48%; 101 kPa |
|---|---|---|---|
| Operator: | Chuiwang Zhang | Test Date: | 2024.05.15 |
| Test Mode: | 433.92 MHz_TX | Test Result: | Pass |



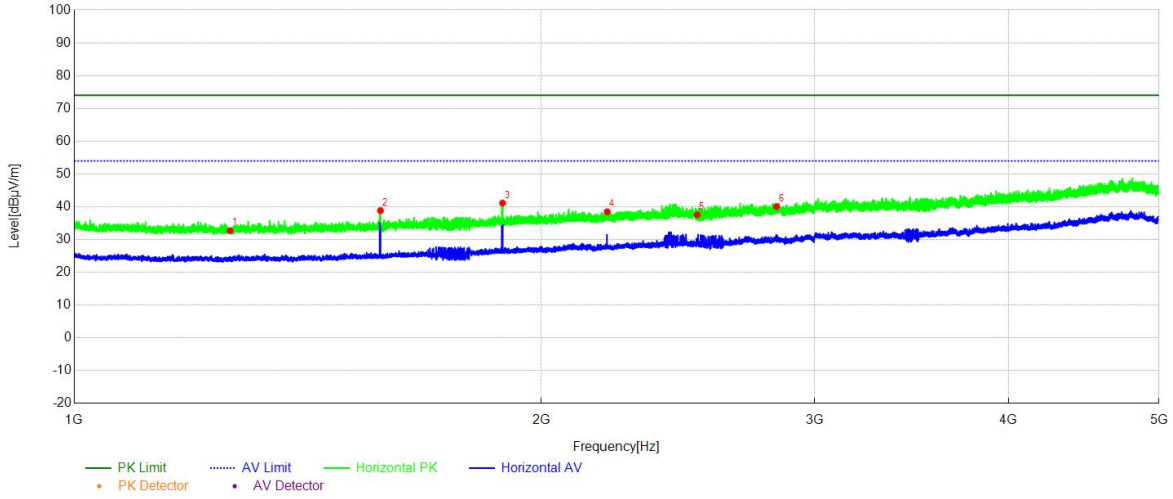

| NO. | Freq. [MHz] | Level [dBµV/m] | Factor [dB] | Limit [dBµV/m] | Margin [dBµV/m] | Trace | Height [cm] | Angle [°] | Polarity |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 36.89 | 34.14 | 16.29 | 40.00 | 5.86 | PK | 100 | 184 | Vertical |
| 2 | 47.95 | 32.73 | 11.35 | 40.00 | 7.27 | PK | 100 | 29 | Vertical |
| 3 | 90.53 | 30.31 | 10.64 | 43.50 | 13.19 | PK | 100 | 270 | Vertical |
| 4 | 131.67 | 33.02 | 10.75 | 43.50 | 10.48 | PK | 100 | 190 | Vertical |
| 5 | 433.92 | 52.70 | 17.64 | 100.83 | 48.13 | PK | 100 | 35 | Vertical |
| 6 | 867.84 | 40.87 | 24.29 | 80.83 | 39.96 | PK | 100 | 116 | Vertical |
| NO. | Freq. [MHz] | Level [dBµV/m] | DC Factor [dB] | Limit [dBµV/m] | Margin [dBµV/m] | Trace | Height [cm] | Angle [°] | Polarity |
| 1 | 433.92 | 20.37 | -32.33 | 80.83 | 60.46 | AV | 100 | 35 | Vertical |
| 2 | 867.84 | 8.54 | -32.33 | 60.83 | 52.29 | AV | 100 | 116 | Vertical |

Remark:

1. Level = Raw Value + Factor (Antenna Factor + Cable Loss - Preamplifier Factor).
2. Margin = Limit - Level.
3. Average value = Peak value + Duty Cycle Factor (Please to clause 2.3).
4. Only the antenna height (from 1 m to 4 m) at maximum reading are recorded.

**For 1 GHz to 5 GHz:**

| Test site: | 5 M anechoic chamber | Environment: | Temp: 23℃; Humi: 48%; 101 kPa |
|---|---|---|---|
| Operator: | Chuiwang Zhang | Test Date: | 2024.05.15 |
| Test Mode: | 315 MHz_TX | Test Result: | Pass |



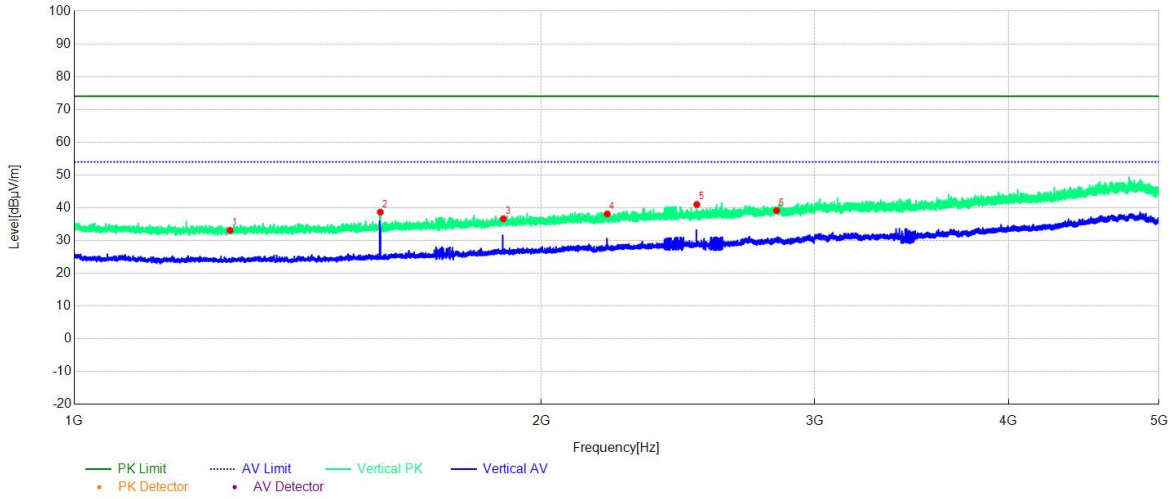

| NO. | Freq. [MHz] | Level [dBµV/m] | Factor [dB] | Limit [dBµV/m] | Margin [dBµV/m] | Trace | Height [cm] | Angle [°] | Polarity |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 1260.00 | 32.69 | -13.16 | 75.62 | 42.93 | PK | 150 | 230 | Horizontal |
| 2 | 1575.00 | 38.83 | -12.26 | 74.00 | 35.17 | PK | 150 | 90 | Horizontal |
| 3 | 1890.00 | 41.13 | -11.16 | 75.62 | 34.49 | PK | 150 | 10 | Horizontal |
| 4 | 2205.00 | 38.46 | -10.02 | 74.00 | 35.54 | PK | 150 | 120 | Horizontal |
| 5 | 2520.00 | 37.58 | -8.79 | 75.62 | 38.04 | PK | 150 | 350 | Horizontal |
| 6 | 2835.00 | 40.04 | -7.64 | 74.00 | 33.96 | PK | 150 | 330 | Horizontal |

| NO. | Freq. [MHz] | Level [dBµV/m] | DC Factor [dB] | Limit [dBµV/m] | Margin [dBµV/m] | Trace | Height [cm] | Angle [°] | Polarity |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 1260.00 | 0.36 | -32.33 | 55.62 | 55.26 | AV | 150 | 230 | Horizontal |
| 2 | 1575.00 | 6.50 | -32.33 | 54.00 | 47.50 | AV | 150 | 90 | Horizontal |
| 3 | 1890.00 | 8.80 | -32.33 | 55.62 | 46.82 | AV | 150 | 10 | Horizontal |
| 4 | 2205.00 | 6.13 | -32.33 | 54.00 | 47.87 | AV | 150 | 120 | Horizontal |
| 5 | 2520.00 | 5.25 | -32.33 | 55.62 | 50.37 | AV | 150 | 350 | Horizontal |
| 6 | 2835.00 | 7.71 | -32.33 | 54.00 | 46.29 | AV | 150 | 330 | Horizontal |

Remark:

1. Level = Raw Value + Factor (Antenna Factor + Cable Loss - Preamplifier Factor).
2. Margin = Limit - Level.
3. Average value = Peak value + Duty Cycle Factor (Please to clause 2.3).
4. Only the antenna height (from 1 m to 4 m) at maximum reading are recorded.

| Test site: | 5 M anechoic chamber | Environment: | Temp: 23℃; Humi: 48%; 101 kPa |
|---|---|---|---|
| Operator: | Chuiwang Zhang | Test Date: | 2024.05.15 |
| Test Mode: | 315 MHz_TX | Test Result: | Pass |

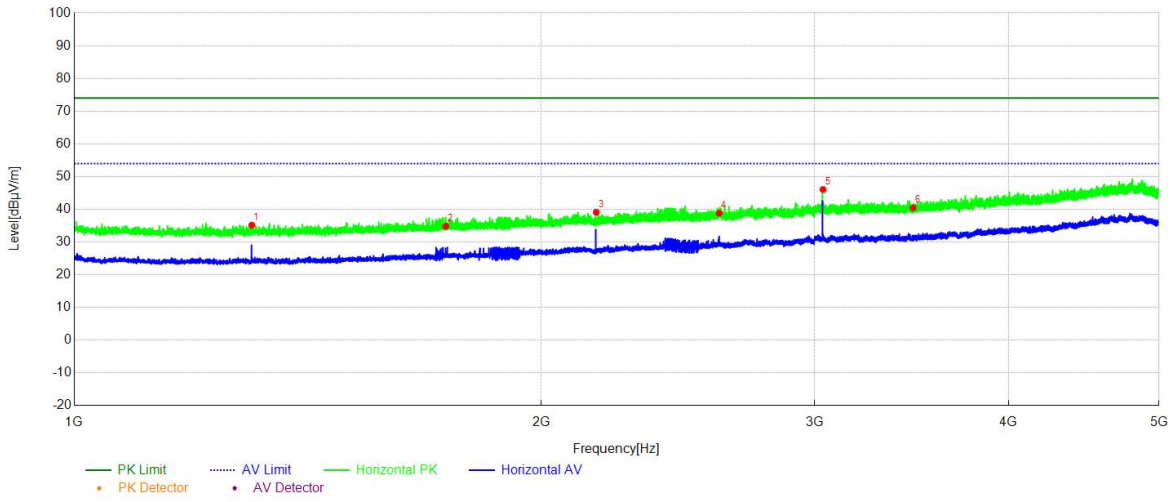



| NO. | Freq. [MHz] | Level [dBµV/m] | Factor [dB] | Limit [dBµV/m] | Margin [dBµV/m] | Trace | Height [cm] | Angle [°] | Polarity |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 1260.00 | 33.09 | -13.16 | 75.62 | 42.53 | PK | 150 | 290 | Vertical |
| 2 | 1575.00 | 38.66 | -12.26 | 74.00 | 35.34 | PK | 150 | 110 | Vertical |
| 3 | 1890.00 | 36.64 | -11.16 | 75.62 | 38.98 | PK | 150 | 200 | Vertical |
| 4 | 2205.00 | 38.11 | -10.02 | 74.00 | 35.89 | PK | 150 | 60 | Vertical |
| 5 | 2520.00 | 41.00 | -8.79 | 75.62 | 34.62 | PK | 150 | 230 | Vertical |
| 6 | 2835.00 | 39.14 | -7.64 | 74.00 | 34.86 | PK | 150 | 200 | Vertical |
| NO. | Freq. [MHz] | Level [dBµV/m] | DC Factor [dB] | Limit [dBµV/m] | Margin [dBµV/m] | Trace | Height [cm] | Angle [°] | Polarity |
| 1 | 1260.00 | 0.76 | -32.33 | 55.62 | 54.86 | AV | 150 | 290 | Vertical |
| 2 | 1575.00 | 6.33 | -32.33 | 54.00 | 47.67 | AV | 150 | 110 | Vertical |
| 3 | 1890.00 | 4.31 | -32.33 | 55.62 | 51.31 | AV | 150 | 200 | Vertical |
| 4 | 2205.00 | 5.78 | -32.33 | 54.00 | 48.22 | AV | 150 | 60 | Vertical |
| 5 | 2520.00 | 8.67 | -32.33 | 55.62 | 46.95 | AV | 150 | 230 | Vertical |
| 6 | 2835.00 | 6.81 | -32.33 | 54.00 | 47.19 | AV | 150 | 200 | Vertical |

Remark:

1. Level = Raw Value + Factor (Antenna Factor + Cable Loss - Preamplifier Factor).
2. Margin = Limit - Level.
3. Average value = Peak value + Duty Cycle Factor (Please to clause 2.3).
4. Only the antenna height (from 1 m to 4 m) at maximum reading are recorded.

| Test site: | 5 M anechoic chamber | Environment: | Temp: 23℃; Humi: 48%; 101 kPa |
|---|---|---|---|
| Operator: | Chuiwang Zhang | Test Date: | 2024.05.15 |
| Test Mode: | 433.92 MHz_TX | Test Result: | Pass |

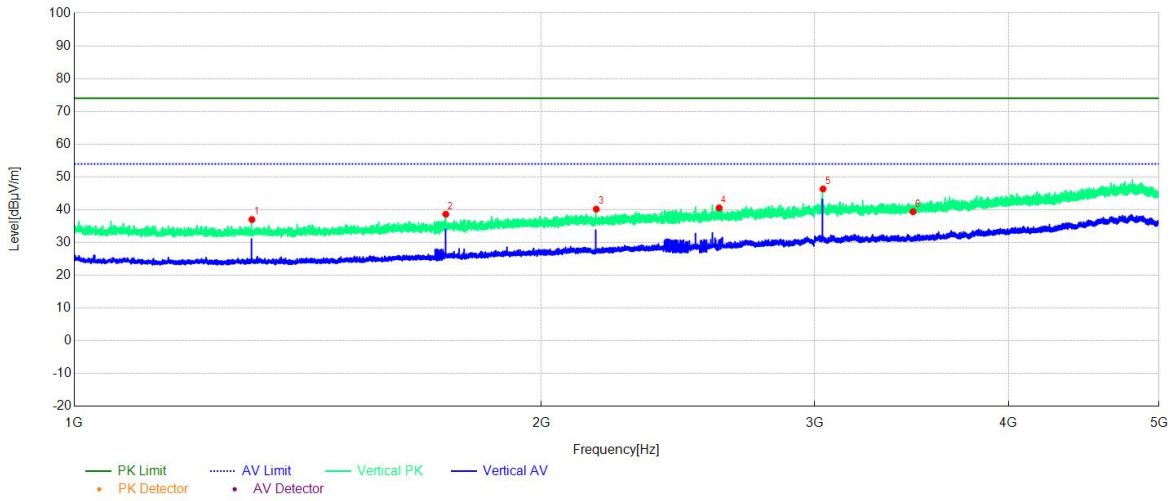



| NO. | Freq. [MHz] | Level [dBµV/m] | Factor [dB] | Limit [dBµV/m] | Margin [dBµV/m] | Trace | Height [cm] | Angle [°] | Polarity |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 1301.76 | 35.15 | -13.16 | 74.00 | 38.85 | PK | 150 | 190 | Horizontal |
| 2 | 1735.68 | 34.83 | -11.73 | 80.83 | 46.00 | PK | 150 | 330 | Horizontal |
| 3 | 2169.60 | 39.11 | -10.11 | 80.83 | 41.72 | PK | 150 | 230 | Horizontal |
| 4 | 2603.52 | 38.84 | -8.69 | 80.83 | 41.99 | PK | 150 | 240 | Horizontal |
| 5 | 3037.44 | 46.04 | -6.23 | 80.83 | 34.79 | PK | 150 | 180 | Horizontal |
| 6 | 3471.36 | 40.44 | -5.72 | 80.83 | 40.39 | PK | 150 | 220 | Horizontal |
| NO. | Freq. [MHz] | Level [dBµV/m] | DC Factor [dB] | Limit [dBµV/m] | Margin [dBµV/m] | Trace | Height [cm] | Angle [°] | Polarity |
| 1 | 1301.76 | 2.82 | -32.33 | 54.00 | 51.18 | AV | 150 | 190 | Horizontal |
| 2 | 1735.68 | 2.50 | -32.33 | 60.83 | 58.33 | AV | 150 | 330 | Horizontal |
| 3 | 2169.60 | 6.78 | -32.33 | 60.83 | 54.05 | AV | 150 | 230 | Horizontal |
| 4 | 2603.52 | 6.51 | -32.33 | 60.83 | 54.32 | AV | 150 | 240 | Horizontal |
| 5 | 3037.44 | 13.71 | -32.33 | 60.83 | 47.12 | AV | 150 | 180 | Horizontal |
| 6 | 3471.36 | 8.11 | -32.33 | 60.83 | 52.72 | AV | 150 | 220 | Horizontal |

Remark:

1. Level = Raw Value + Factor (Antenna Factor + Cable Loss - Preamplifier Factor).
2. Margin = Limit - Level.
3. Average value = Peak value + Duty Cycle Factor (Please to clause 2.3).
4. Only the antenna height (from 1 m to 4 m) at maximum reading are recorded.

| Test site: | 5 M anechoic chamber | Environment: | Temp: 23℃; Humi: 48%; 101 kPa |
|---|---|---|---|
| Operator: | Chuiwang Zhang | Test Date: | 2024.05.15 |
| Test Mode: | 433.92 MHz_TX | Test Result: | Pass |




| NO. | Freq. [MHz] | Level [dBµV/m] | Factor [dB] | Limit [dBµV/m] | Margin [dBµV/m] | Trace | Height [cm] | Angle [°] | Polarity |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 1301.76 | 37.01 | -13.16 | 74.00 | 36.99 | PK | 150 | 250 | Vertical |
| 2 | 1735.68 | 38.63 | -11.73 | 80.83 | 42.20 | PK | 150 | 240 | Vertical |
| 3 | 2169.60 | 40.20 | -10.11 | 80.83 | 40.63 | PK | 150 | 340 | Vertical |
| 4 | 2603.52 | 40.56 | -8.69 | 80.83 | 40.27 | PK | 150 | 70 | Vertical |
| 5 | 3037.44 | 46.34 | -6.23 | 80.83 | 34.49 | PK | 150 | 110 | Vertical |
| 6 | 3471.36 | 39.41 | -5.72 | 80.83 | 41.42 | PK | 150 | 30 | Vertical |
| NO. | Freq. [MHz] | Level [dBµV/m] | DC Factor [dB] | Limit [dBµV/m] | Margin [dBµV/m] | Trace | Height [cm] | Angle [°] | Polarity |
| 1 | 1301.76 | 4.68 | -32.33 | 54.00 | 49.32 | AV | 150 | 250 | Vertical |
| 2 | 1735.68 | 6.30 | -32.33 | 60.83 | 54.53 | AV | 150 | 240 | Vertical |
| 3 | 2169.60 | 7.87 | -32.33 | 60.83 | 52.96 | AV | 150 | 340 | Vertical |
| 4 | 2603.52 | 8.23 | -32.33 | 60.83 | 52.60 | AV | 150 | 70 | Vertical |
| 5 | 3037.44 | 14.01 | -32.33 | 60.83 | 46.82 | AV | 150 | 110 | Vertical |
| 6 | 3471.36 | 7.08 | -32.33 | 60.83 | 53.75 | AV | 150 | 30 | Vertical |

Remark:

1. Level = Raw Value + Factor (Antenna Factor + Cable Loss - Preamplifier Factor).
2. Margin = Limit - Level.
3. Average value = Peak value + Duty Cycle Factor (Please to clause 2.3).
4. Only the antenna height (from 1 m to 4 m) at maximum reading are recorded.

## 2.5. Duration Time

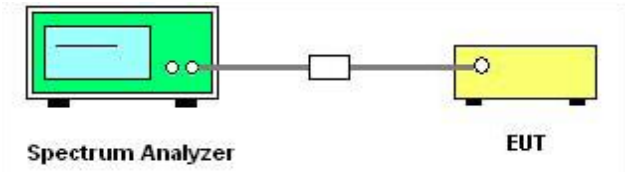
### 2.5.1. Limit of Duration Time

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

### 2.5.2. Measuring Instruments

The measuring equipment is listed in the section 3 of this test report.

### 2.5.3. Test Setup




### 2.5.4. Test Procedures

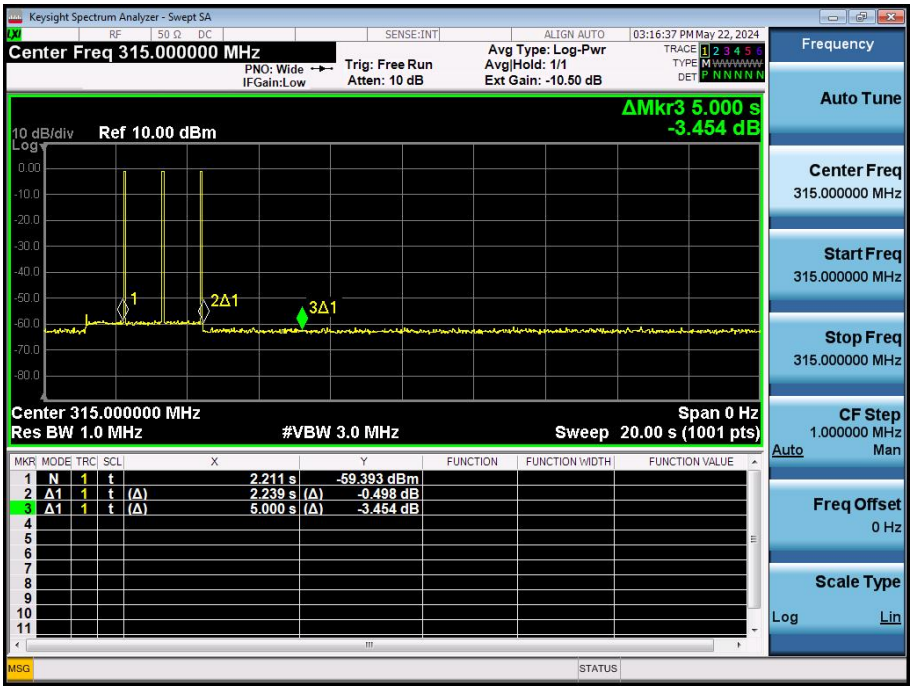
1. The testing follows the Measurement Procedure of ANSI C63.10-2013 Section 7.4.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Use the following spectrum analyzer settings:

   Set instrument center frequency to operation frequency, Set the Span = 0 Hz, Set the RBW = 1 MHz, VBW = 3 MHz, Detector = Peak, Trace mode = Max hold, Sweep time = 10 s.
5. Record the measurement results in the test report.

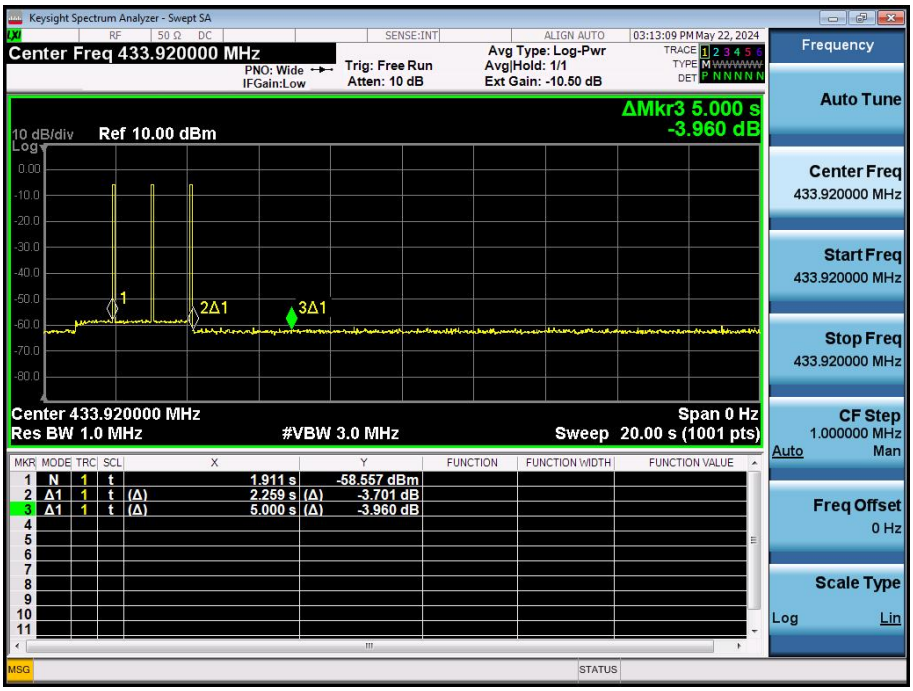
## 2.5.5. Test Results of Duration Time

| Frequency (MHz) | Pulse On Time (s) | Limit (s) | Result |
|---|---|---|---|
| 315 | 2.239 | 5 | PASS |
| 433.92 | 2.259 | 5 | PASS |

315 MHz




433.92 MHz



# 3. List of measuring equipment

| Item | Test Equipment | Manufacturer | Model No. | Serial No. | Cal Date | Due Date |
|---|---|---|---|---|---|---|
| 1 | 5 M Anechoic Chamber | Albatross | SAC-5MAC 12.8×6.8×6.4m | A0304210 | 2022.06.09 | 2026.06.08 |
| 2 | EMI Test Receiver | ROHDE&SCHWARZ | ESW26 | A180502935 | 2023.06.08 | 2024.06.07 |
| 3 | Loop Antenna | Schwarz beck | HFH2-Z2 | A0304220 | 2022.05.02 | 2025.05.01 |
| 4 | Broadband antenna (30 MHz–1 GHz) | R&S | HL562 | A0304224 | 2023.06.08 | 2024.06.07 |
| 5 | EMI Horn Ant. (1 GHz–18 GHz) | ETC | MCTD-1209 | A150402241 | 2023.05.16 | 2026.05.15 |
| 6 | Spectrum Analyzer | KEYSIGHT | N9030A | A160702554 | 2024.01.18 | 2025.01.17 |

# 4. Uncertainty of Evaluation

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI C63.10-2013. All the measurement uncertainty value were shown with a coverage K = 2 to indicate 95% level of confidence. The measurement data show herein meets or exceeds the CISPR measurement uncertainty values specified in CISPR 16-4-2 and can be compared directly to specified limit to determine compliance.

Uncertainty of AC Power Line Conducted Emission Measurement (150 kHz–30 MHz)

| | |
|---|---|
| Measuring Uncertainty for a level of confidence of 95% (U = 2Uc(y)) | 2.8 dB |

Uncertainty of Radiated Emission Measurement (9 kHz–30 MHz)

| | |
|---|---|
| Measuring Uncertainty for a level of confidence of 95% (U = 2Uc(y)) | 3.5 dB |

Uncertainty of Radiated Emission Measurement (30 MHz–1 GHz)

| | |
|---|---|
| Measuring Uncertainty for a level of confidence of 95% (U = 2Uc(y)) | 3.91 dB |

Uncertainty of Radiated Emission Measurement (1 GHz–18 GHz)

| | |
|---|---|
| Measuring Uncertainty for a level of confidence of 95% (U = 2Uc(y)) | 4.5 dB |

Uncertainty of Radiated Emission Measurement (18 GHz–40 GHz)

| | |
|---|---|
| Measuring Uncertainty for a level of confidence of 95% (U = 2Uc(y)) | 4.9 dB |

Uncertainty of RF Conducted Measurement (9 kHz–40 GHz)

| | |
|---|---|
| Measuring Uncertainty for a level of confidence of 95% (U = 2Uc(y)) | 1.3 dB |

**END OF REPORT**